SPARCcluster™ System Hardware Site Preparation, Planning, and Installation Guide

THE NETWORK IS THE COMPUTER®

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Preface

This manual provides installation instructions for SPARCcluster™ systems, including factory-assembled and customer-assembled models.

These instructions are designed for a qualified trained service provider and/or system administrator with networking knowledge.

How This Book Is Organized

Part 1—Site preparation and Planning

Chapter 1, "Checklist," has checklists to verify that you have all the items that are necessary to complete the installation.

Chapter 2, "Product Description," defines what a SPARCcluster system is and presents details of several example configurations.

Chapter 3, "Specifications," provides system specifications.

Chapter 4, "Site Preparation and Planning," provides guidelines and information for preparing the site.

Chapter 5 and Chapter 6 provide configuration information for the SPARCcluster 1000 and SPARCcluster 2000 systems, respectively.

Chapter 7, "Powering Off and On," provides procedures for powering the system off and on.

Chapter 8, "Internal Access and Leveling," explains how to remove all relevant cover panels.

Chapter 9 and Chapter 10 provide procedures for installing the SPARCcluster 1000 and SPARCcluster 2000 systems respectively.

Chapter 11, "Configuring the Terminal Concentrator and Installing the Software," has instructions for installing and setting up the operating system and software specific to the SPARCcluster PDB or SPARCcluster HA system.

Appendix A, "Air Baffle, Rackmount Rail and Blower Assembly Installation," gives procedures for installing rails in the cabinets and installing SPARCstorage™ Array 100 Series and SPARCstorage Array 200 Series units in the rack.

Appendix B, "Configuring the SCI SBus Card," gives procedures needed to configure the SCI SBus card and driver for use in this system.

Appendix C, "Mixed Compute Platforms," provides rules governing which different platform types can be commbined to create a cluster.

For information on troubleshooting installation problems, refer to the *SPARCcluster Service Manual*.

UNIX Commands

This document may not include specific software commands or procedures. Instead, it may name software tasks and refer you to operating system documentation or the handbook that was shipped with your new hardware.

The type of information that you might need to use references for includes:

- Shutting down the system
- Booting the system
- Configuring devices
- Other basic software procedures

See one or more of the following:

- *Solaris 2.x Handbook for SMCC Peripherals* contains Solaris™ 2.x software commands.
- On-line AnswerBook™ for the complete set of documentation supporting the Solaris 2.x software environment.

- Other software documentation that you received with your system.

Typographic Conventions

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

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 the *User's Guide.* These are called *class* options. You *must* be root to do this.

Shell Prompts

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

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

Related Documentation

The following documents contain information that may be helpful to the system administrator and service provider.

Table P-1 Related Documents

Product Family	Title	Part Number
SPARCcenter 2000	***SPARCcenter 2000 Binder Set***	***825-1509***
	SPARCcenter 2000 Installation Manual	800-6975
	SPARCcenter 2000 Service Manual	801-2007
	SPARCcenter 2000 Storage Device User's Guide	800-7009
	SPARCcenter 2000 Regulatory Compliance Manual	801-3051
SPARCserver 1000	***SPARCserver 1000 Binder Set***	***825-1725***
	SPARCserver 1000 System Installation Manual	801-2893
	SPARCserver 1000 System Service Manual	801-2895
	SPARCserver 1000 Storage Device User's Guide	801-2198
	SPARCserver 1000 Regulatory Compliance Manual	801-2892
SPARCstorage Array 100	***SPARCstorage Array 100 Installation and Service Set***	***825-2513***
	SPARCstorage Array Model 100 Series Installation Manual	801-2205
	SPARCstorage Array Model 100 Series Service Manual	801-2206
	SPARCstorage Array Regulatory Compliance Manual	801-7103
	SPARCstorage Array User's Guide Doc Set	***825-2514***
	SPARCstorage Array Configuration Guide	802-2041
	SPARCstorage Array User's Guide	802-2042
	SPARCstorage Array Product Note	802-2043
	Disk Drive Installation Manual for the SPARCstorage Array Model 100 Series	801-2207

Table P-1 Related Documents *(Continued)*

Product Family	Title	Part Number
SPARCstorage Array 200	*SPARCstorage Array Model 200 Series Installation Manual*	802-2027
	SPARCstorage Array Model 200 Series Service Manual	802-2028
	SPARCstorage Array Battery and PROM Installation NoteManual	802-2029
	SPARCstorage Array Model 200 Series Regulatory Compliance Manual	802-2031
Terminal Concentrator	***Terminal Concentrator Binder Set***	***825-2227***
	Terminal Concentrator Installation Notes	801-6127
	Terminal Concentrator General Reference Guide	801-5972
Software	*SMCC SPARC Hardware Platform Guide Solaris 2.5.1*	802-6530
	Solstice System Manager Install Manual	802-6135
Diagnostics	*SunVTS Version 2.0 Users Guide*	802-5331
	Solstice SyMON User's Guide	802-5355
Options	*Expansion Cabinet Installation and Service Manual*	802-6084
	Sparcstorage RSM Installation, Operations and Service Manual	802-5062
	Differential SCSI Disk Tray Service Manual	802-7341
SPARCcluster PDB Clusters	***SPARCcluster PDB Preparation Binder Set***	***825-3527***
	Getting Started (roadmap)	802-6787
	SPARCcluster System Hardware Site Preparation, Planning and Installation Guide	802-6788
	SPARCcluster PDB System Binder Set	***825-3528***
	Getting Started (roadmap)	802-6787

Table P-1 Related Documents *(Continued)*

Product Family	Title	Part Number
	Ultra Enterprise Cluster PDB Software Site Preparation, Planning and Installation Guide	802-6790
	Ultra Enterprise Cluster PDB System Administration Guide	802-6784
	Ultra Enterprise Cluster PDB Cluster Volume Manager Administration Guide	802-6785
	SPARCcluster Service Manual	802-*6789*
	Ultra Enterprise PDB 1.2 Software (CD insert)	804-5449
	Ultra Enterprise PDB Server Release Notes	802-6793
	Ultra Enterprise Cluster PDB Error Messages	802-6792
SPARCcluster HA Clusters	***SPARCcluster High Availability Preparation Binder Set***	***825-3590***
	Getting Started (Roadmap)	802-7619
	SPARCcluster System Hardware Site Preparation, Planning and Installation Guide	802-6788
	SPARCcluster HA System Binder Set	***825-3591***
	Getting Started (roadmap)	802-7619
	Solstice HA 1.3 User's Guide	805-0317
	Solstice HA 1.3 Programmer's Guide	*805-0318*
	SPARCcluster Service Manual	802-*6789*
	Solstice HA 1.3 New Product Information	805-0629
	Solstice Disksuite 4.1 Binder Set	***851-2369***
	Solstice Disksuite 4.1 User's Guide	802-4215
	Solstice Disksuite 4.1 Reference Guide	802-6724
	SSolstice Disksuite 4.1 Installation/Product Notes	*802-7196*

Notes, Cautions, and Warnings

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

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

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

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

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

Ordering Sun Documents

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Checklist 1

This chapter gives specific information and checklists to use when inventorying each type of SPARCcluster system.

1

1.1 SPARCcluster 1000 System—Factory-Assembled

1.1.1 General Description

Table 1-1 Requirements for SPARCcluster 1000 Configuration

Device	Minimum	Maximum	Comment
SPARCserver 1000 systems (nodes)	2	2	
System boards	4 (2/chassis)	8 (4/chassis)	
Memory	256 Mbytess (128 Mbytess/chassis)	1.0 Gbyte (512 Mbytes /chassis)	Each node is equipped with an identical amount of memory.
SunSwift™ SBus cards	4 (2 per node)	4 (2 per node)	
SPARCstorage Array 112 units	PDB: 2 HA: 2	8	Each equipped with 2 FC/OM host adapters.
FC/S cards	4 (2 per node)	16 (8 per node)	
FC/OM optical modules	4 (2 per node)	16 (8 per node)	One additional for each SPARCstorage Array.
Terminal concentrator	1	1	
Cable set	1		
Expansion cabinet		1	To house 2 SPARCstorage Array 200 series and 4 RSMs each.

1.1.2 Checklist

Table 1-2 Checklist for SPARCcluster 1000 Model

Category	Item	Quantity Planned	Quantity On Hand
Systems	SPARCserver 1000 systems		
	System boards		
	Memory		
SBus cards	SunSwift		
	FC/S card		
Modules	FC/OM modules		

Table 1-2 Checklist for SPARCcluster 1000 Model *(Continued)*

Category	Item	Quantity Planned	Quantity On Hand
Chassis	Terminal concentrator		
Cables	RS-232 serial cable, PN 530-2152		
	Ethernet cable, standard		
	Sun private net cable, 1 meter, PN 530-2149		
	Sun private net cable, 5 meter, PN 530-2150		
	Optional fiber-optic cable, 2 meter, PN 537-1004		
	Optional fiber-optic cable, 15 meter, PN 537-1006		
Expansion cabinet			
	SPARCstorage Array 112 units		
	SPARCstorage Array 200 series units		
	SPARCstorage RSM units		

1.2 SPARCcluster 1000 System—Customer-Assembled

1.2.1 General Description

Table 1-3 Requirements for SPARCcluster 1000 Configuration

Device	Minimum	Maximum	Comment
SPARCserver 1000 systems (nodes)	2	2	
System boards	4 (2/chassis)	8 (4/chassis)	
Memory	256 Mbytes (128 Mbytes/chassis)	1.0 Gbyte (512 Mbytes /chassis)	Each node is equipped with an identical amount of memory.
SunSwift SBus cards	4 (2 per node)	4 (2 per node)	
SPARCstorage Array 112 units	2	8	Each equipped with 2 FC/OM optical modules.
FC/S cards	4 (2 per node)	16 (8 per node)	
FC/OM optical modules	3	8	One additional for each SPARCstorage Array.
Terminal concentrator	1	1	

Table 1-3 Requirements for SPARCcluster 1000 Configuration *(Continued)*

Device	Minimum	Maximum	Comment
Cable set	1		
Rail set, for mounting one SPARCstorage Array 100 Series chassis	PDB: 2 HA: 2	8	
Expansion cabinet		1	To house 2 SPARCstorage Array 200 series and 4 RSMs each.

1.2.2 Checklist

Table 1-4 Checklist for SPARCcluster 1000 Model

Category	Item	Quantity Planned	Quantity On Hand
Systems	SPARCserver 1000 systems		
	System boards		
	Memory		
SBus cards	FC/S card		
	SunSwift		
Modules	FC/OM modules		
Chassis	Terminal concentrator		
Cables	RS-232 serial cable		
	Ethernet cable, standard		
	Sun private net cable, 1 meter, PN 530-2149		
	Sun private net cable, 5 meter, PN 530-2150		
	Optional fiber-optic cable, 2 meter, PN 537-1004		
	Optional fiber-optic cable, 15 meter, PN 537-1006		
Rail kit	Rail set, for mounting one SPARCstorage Array 100 Series chassis		
Expansion cabinet			

Table 1-4 Checklist for SPARCcluster 1000 Model *(Continued)*

Category	Item	Quantity Planned	Quantity On Hand
	SPARCstorage Array 112 units		
	SPARCstorage Array 200 series units		
	SPARCstorage RSM units		

1.3 SPARCcluster 2000 System—Factory-Assembled

1.3.1 General Description

Table 1-5 Requirements for SPARCcenter 2000 Configuration

Device	Minimum	Maximum	Comment
System boards	6 (3/cabinet)	20 (10/cabinet)	
Memory	768 Mbytes (384 Mbytes/cabinet)	10.0 Gbyte (5.0 Gbyte /cabinet)	Each node is equipped with an identical amount of memory.
FSBE/S cards	4 (2/cabinet)	4 (2/cabinet)	In each node, one supports the boot disks and one supports the SCSI panel.
SunSwift SBus cards	4 (2/cabinet)	4 (2/cabinet)	
SPARCstorage Array 112 units	2	20	Each equipped with 2 FC/OM optical modules.
FC/S card	4 (2 per node)	40 (20 per node)	
FC/OM optical modules	2	40 (20 per node)	One additional for each SPARCstorage Array.
Terminal concentrator	1	1	
Cable set	1		
SCSI II cables	2		One connects to the boot disks, one connects to the SCSI tray.
SCSI II terminator	2		One each on the boot disk and SCSI tray SCSI OUT connector.
Expansion cabinet		4	To house 2 SPARCstorage Array 200 series and 4 RSMs each.

1.3.2 Checklist

Table 1-6 Checklist for SPARCcluster 2000 Model

Category	Item	Quantity Planned	Quantity On Hand
Systems	SPARCcenter™ 2000 systems		
	System boards		
	Memory		
SBus cards	FC/S card		
	SunSwift		
	FSBE/S card		
Modules	FC/OM modules		
Chassis	Terminal concentrator		
Cables	SCSI II cables		
	SCSI II terminator		
	RS-232 serial cable		
	Ethernet cable, standard		
	Sun private net cable, 1 meter, PN 530-2149		
	Sun private net cable, 5 meter, PN 530-2150		
	Optional fiber-optic cable, 2 meter, PN 537-1004		
	Optional fiber-optic cable, 15 meter, PN 537-1006		
Expansion cabinets			
	SPARCstorage Array 112 units		
	SPARCstorage Array 200 series units		
	SPARCstorage RSM units		

1.4 SPARCcluster 2000 System—Customer-Assembled

1.4.1 General Description

Table 1-7 Requirements for SPARCcluster 2000 Configuration

Device	Minimum	Maximum	Comment
System boards	6 (3/cabinet)	20 (10/cabinet)	
FSBE/S cards	4 (2/cabinet)	4 (2/cabinet)	In each node, one supports the the boot disks and one supports the SCSI panel.
SunSwift SBus cards	4 (2/cabinet)	4 (2/cabinet)	
SPARCstorage Array 112 units	2	20	Each equipped with 2 FC/OM optical modules.
FC/S card	6 (3 per node)	40 (20 per node)	
FC/OM optical modules	4 (2 per node)	40 (20 per node)	One additional for each SPARCstorage Array.
Terminal concentrator	1	1	
Cable set	—	—	Per customer order.
SCSI II cable	4 (2/node)	4 (2/node)	To connect boot disks and the SCSI panel.
SCSI II terminator	4 (2/node)	4 (2/node)	To terminate boot disks and the SCSI panel.
Rail set, for mounting one SPARCstorage Array 100 Series chassis	PDB: 2 HA: 2	20 sets (1/chassis)	
Expansion cabinet		4	To house 5th through 20th SPARCstorage Array as appropriate.

1.4.2 Checklist

Table 1-8 Checklist for SPARCcluster 2000 Model

Category	Item	Quantity Planned	Quantity On Hand
Systems	SPARCcenter 2000 systems		
	System boards		
	Memory		
SBus cards	FC/S card		
	SunSwift		
	FSBE/S card		
Modules	FC/OM modules		
Chassis	Terminal concentrator		
Cables	SCSI II cables		
	SCSI II terminator		
	RS-232 serial cable		
	Ethernet cable, standard		
	Sun private net cable, 1 meter, PN 530-2149		
	Sun private net cable, 5 meter, PN 530-2150		
	Optional fiber-optic cable, 2 meter, PN 537-1004		
	Optional fiber-optic cable, 15 meter, PN 537-1006		
Expansion cabinets			
	SPARCstorage Array 112 units		
	SPARCstorage Array 200 series units		
	SPARCstorage RSM units		

Product Description 2

2.1 Basic Features

Ultra Enterprise clustered systems operate on various hardware configurations, including the SPARCserver 1000E and SPARCcenter 2000E systems. These systems are targeted at enterprise-wide, mission-critical database applications.

SPARCcluster systems support several PDB (parallel data base) and HA (high availability) database products. For information on the database products supported, refer to the applicable document:

- PDB: *Ultra Enterprise Cluster Administration Guide*
- HA: *Solstice HA 1.2 Software Administration Guide*

Clustered systems improve the availability characteristics of databases. A cluster consists of two compute nodes (servers). Communication among nodes is accomplished using redundant private network links.

Coupling databases yields the benefits of increased performance and higher level of database availability.

The databases are implemented on clustered platforms using redundant SPARCstorage™ Array Model 100 series disk arrays.

SPARCcluster systems are designed for reliability and serviceability. They have no single point of failure, and can be repaired and maintained online. See Figure 2-1 through Figure 2-4 for functional block diagrams of clustered systems.

Each server has a disk partition to store its operating system, that is, the /. /usr, /ops, and /var file systems. The disk partition for the operating system can be mirrored to improve system availability (although these files are not viewed as a shared resource). Each server node boots from its own operating disk partition.

The database volumes are stored on two or more SPARCstorage disk arrays with each disk array cross-connected to both servers via a 25-Mbyte/second full duplex Fibre Channel optical link. Database volumes are mirrored across multiple disk arrays for high availability. The maximum number of storage arrays that can be installed is determined by the number of available optical connection slots on the servers.

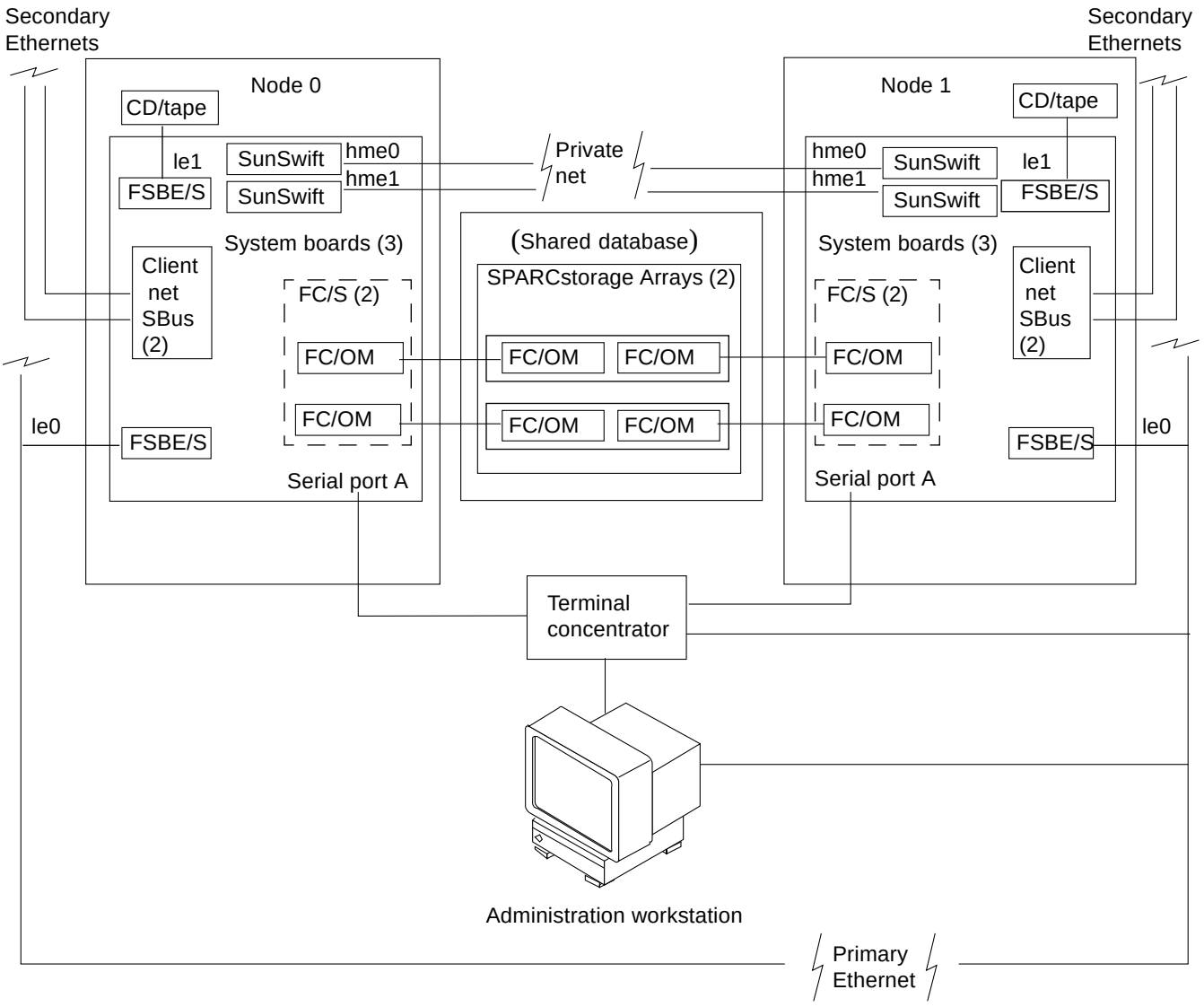


Figure 2-1 Clustered PDB System Based on the SPARCserver 1000E System

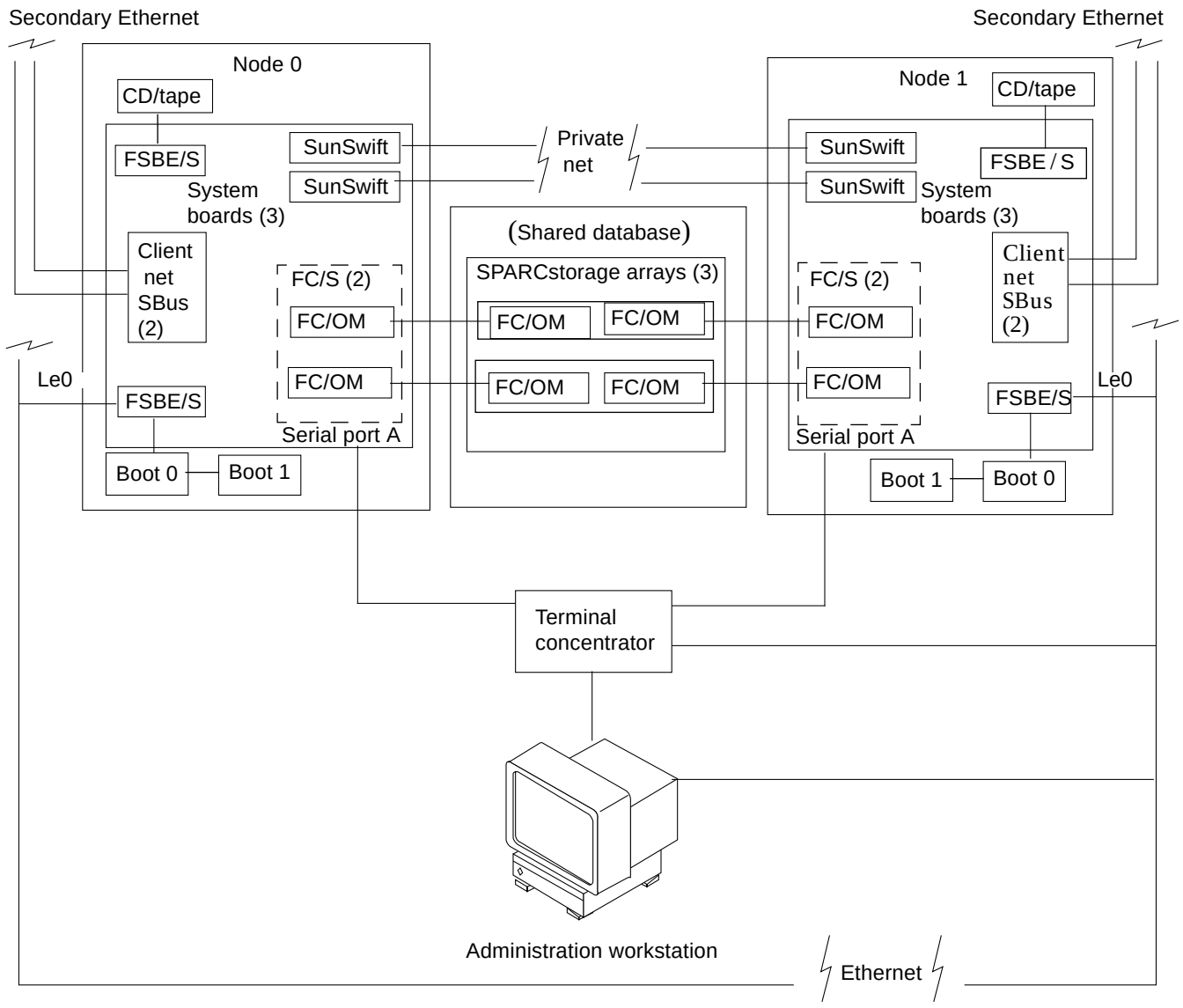


Figure 2-2 Clustered PDB System Based on SPARCcenter 2000E System

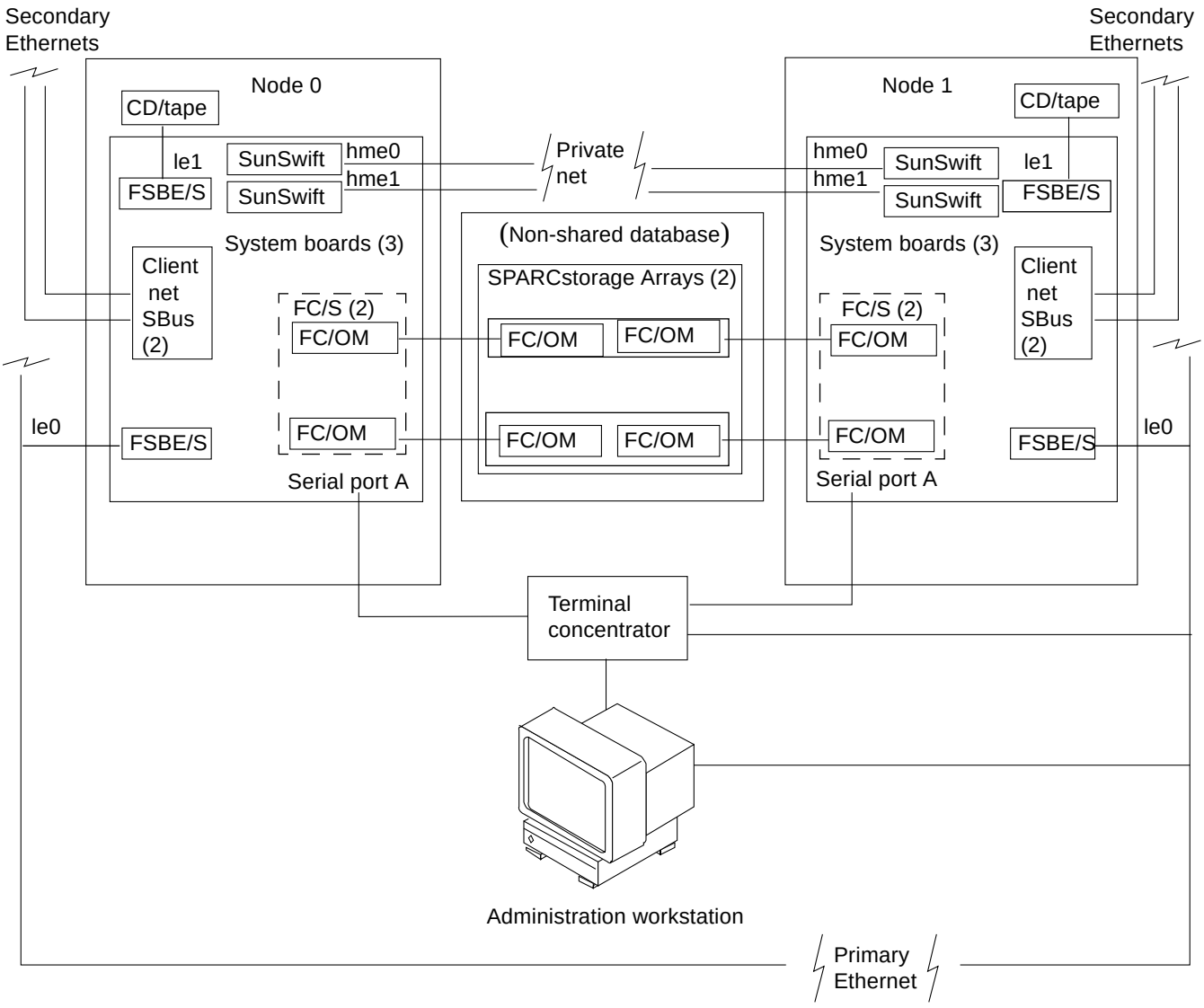


Figure 2-3 Clustered HA System Based on the SPARCserver 1000E System

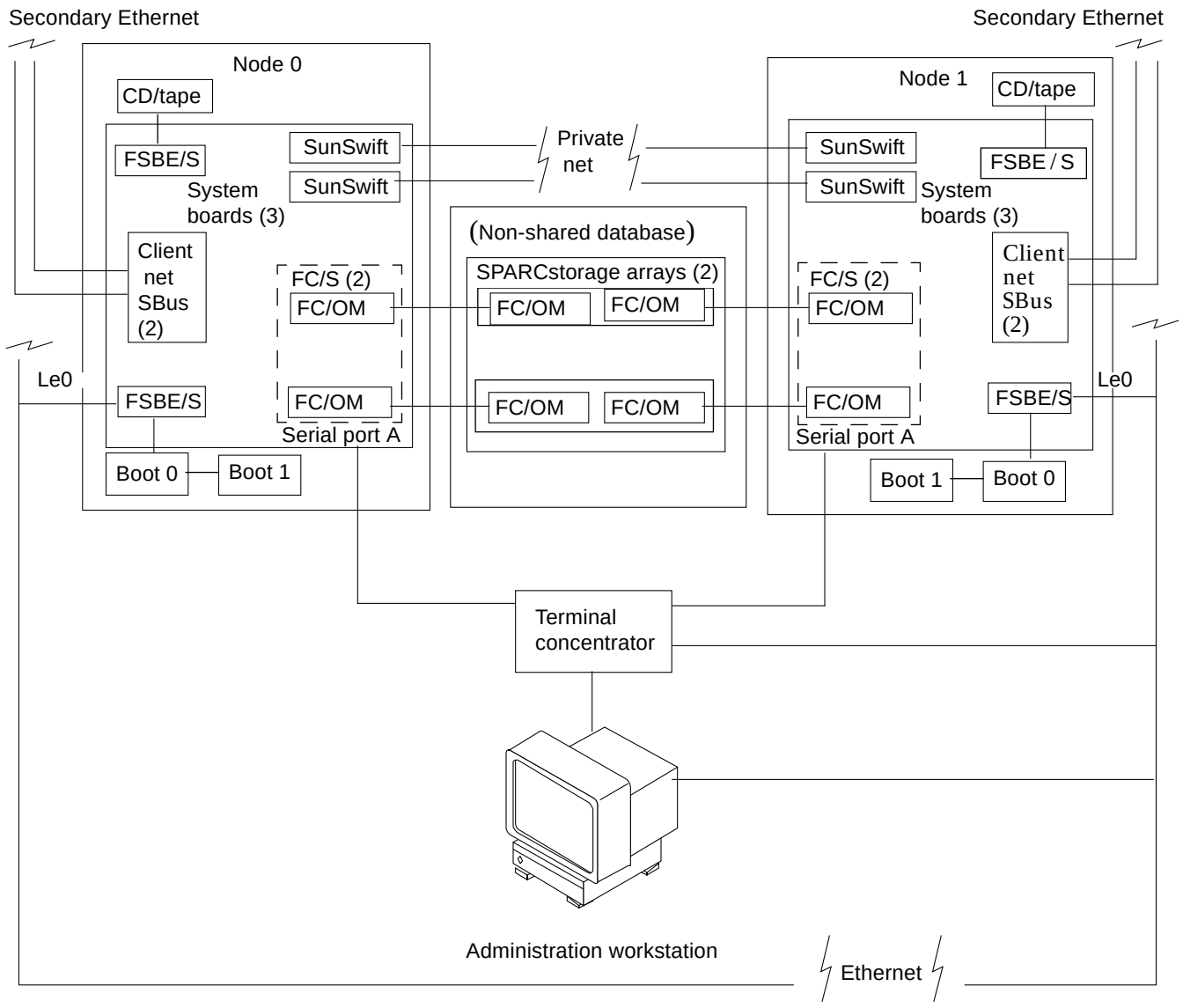


Figure 2-4 Clustered HA System Based on SPARCcenter 2000E System

2.2 SPARCcluster 1000 Configurations

There are several types of disk arrays used to store the highly-available database. The main system cabinets utilize SPARCstorage Array Model 112s. For expanded systems, the disk arrays are SPARCstorage Array Model 200 Series units hosting SPARCstorage RSM units (Removable Storage Media) or, SPARCstorage Array Model 210s hosting differential SCSI trays.

Figure 2-5 shows the SPARCcluster 1000 hardware required to support the Enterprise PDB and Solstice HA software. Note that these figures depict a system with more than the minimum configuration. The minimum configuration is listed in Table 2-1.

Table 2-1 SPARCcluster 1000 Minimum Configuration

Component	Per Cluster	Per Node	Comment
56-inch rack	1		Houses all components.
SPARCserver 1000 System: each equipped with • 2 system boards • 4 modules (2/system board) • 128 Mbytes RAM • 2 internal disk drives	2	1	
SPARCstorage Array 112 System with 1 extra FC/OM module	2	–	Each array is shared between both nodes.
FC/S SBus card: Installed in system boards	4	2	
FC/OM optical module • Installed in node FC/S SBus cards • Installed in SPARCstorage Array 112s	 4 2	 2	
fiber-optic cable	4		2 serve each array.
Terminal concentrator	1		Resides in primary node cabinet. Connects to each node (via private Ethernet), the administration workstation, and public Ethernet via serial cables.
SunSwift SBus card	4	2	

Table 2-1 SPARCcluster 1000 Minimum Configuration *(Continued)*

Component	Per Cluster	Per Node	Comment
Administration workstation with CD-ROM drive	1		Connects to the terminal concentrator via serial cable.
Cable set	1		
Expansion cabinet (Optional)		1	To house optional 4th through 8th SPARCstorage Array.

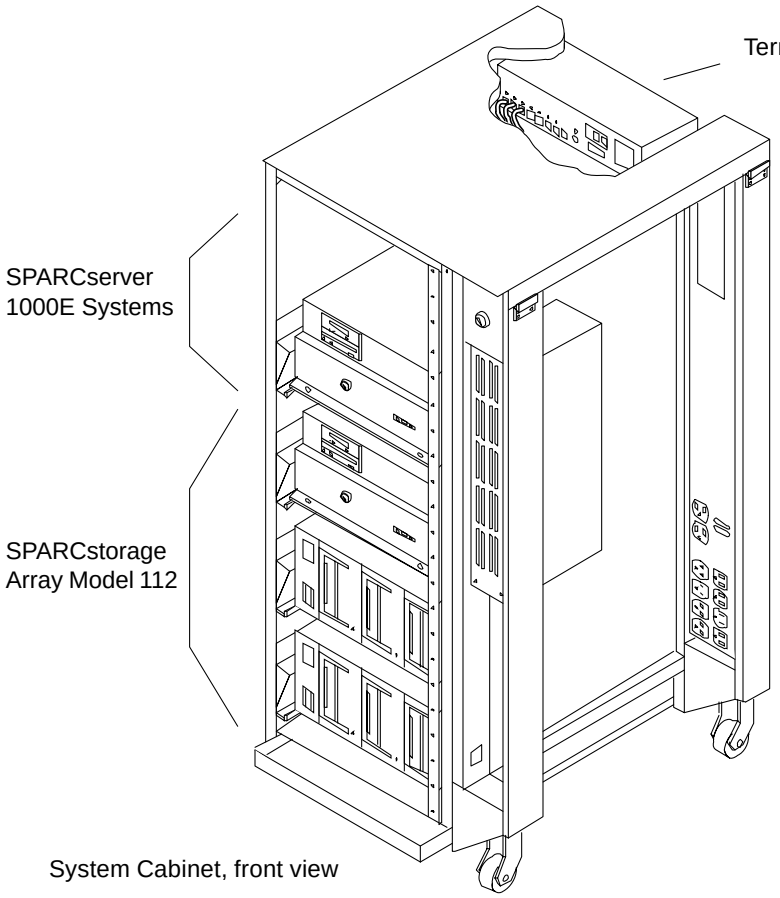


Figure 2-5 SPARCcluster 1000 System Cabinet with SPARCstorage Array Model 112 Units

2.3 SPARCcluster 2000 Configurations

There are two types of disk arrays used to store the highly-available database, SPARCstorage Array Model 112s within the system cabinets and, for expanded systems, SPARCstorage Array Model 200 Series units with SPARCstorage RSM units or differential SCSI trays in expansion cabinets.

Figure 2-6 depicts the SPARCcluster 2000 hardware required to support the SPARCcluster PDB and Solstice HA software. Figure 2-9 and Figure 2-10 illustrate expansion options beyond the basic system. The minimum configuration is listed in Table 2-2.

Table 2-2 SPARCcluster 2000 Minimum Configuration

Component	Per Cluster	Per Node	Comment
SPARCcenter 2000 System: each equipped with • 3 system boards • 6 modules (2/system board) • 384 Mbytes RAM	2	1	
SPARCstorage Array 112 System with 1 extra FC/OM module	2	–	Each array is shared between both nodes.
FC/S SBus card: Installed in node system boards	4	2	
FC/OM optical module • Installed in node FC/S SBus cards • Installed in SPARCstorage Array 112s	4 2	2	
fiber-optic cable	4		2 serve each array.
Terminal concentrator	1		Resides in primary node cabinet. Connects to each node (via private Ethernet), the administration workstation, and public Ethernet via serial cables.
FSBE/S card	4	2	In each node, one supports the boot disks and one supports the SCSI panel.
SunSwift SBus card	4	2	
Client net SBus cards (SQEC or similar)	2	1	
Administration workstation with CD-ROM drive	1		Connects to the terminal concentrator via serial cable.

Table 2-2 SPARCcluster 2000 Minimum Configuration *(Continued)*

Component	Per Cluster	Per Node	Comment
Cable set	1		
SCSI II cables	2		One connects to the boot disks, one connects to the SCSI tray.
SCSI II terminator	2		One each on the boot disk and SCSI tray SCSI OUT connector.
Expansion cabinet (optional)		4	To house optional 5th through 13th SPARCstorage Array.

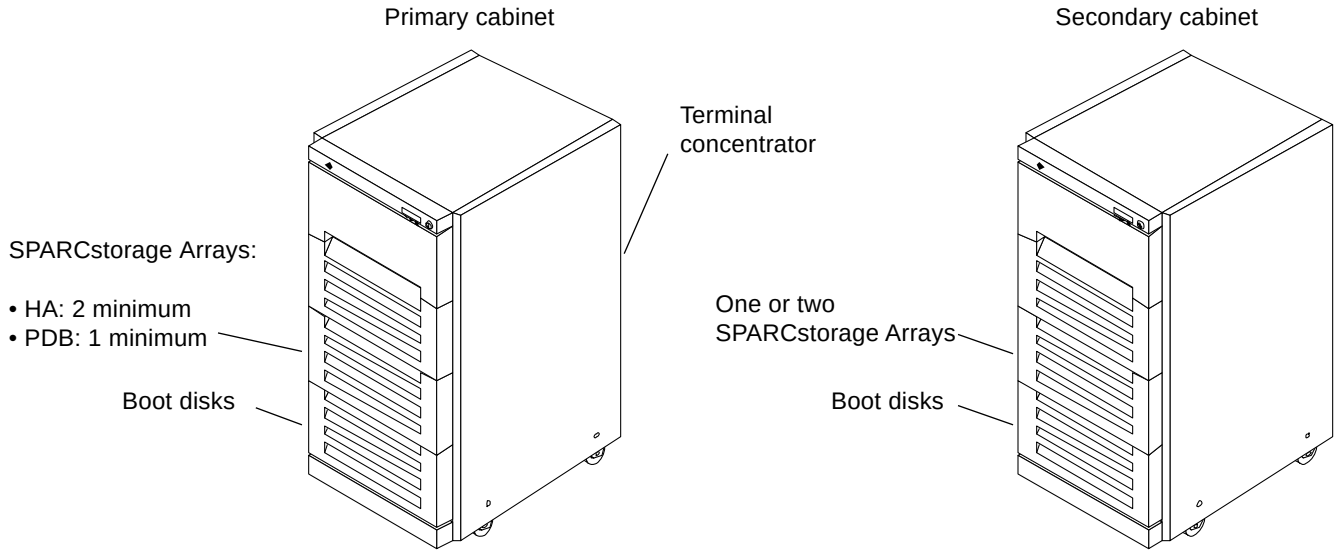


Figure 2-6 SPARCcluster 2000 System Cabinet

2.4 SPARCcluster 1000 Options

2.4.1 Internal Options

See Table 2-3

Table 2-3 Internal Options—SPARCcluster 1000 System

Option	Location	Quantity	Comments
System board	Chassis	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 Mbyte DRAM or 1 Mbyte 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 addit. 5 1/4-inch devices	Drives are numbered 0 to 3. One SunCD (standard equipment) per system. One tape drive optional.
Disk card	Chassis	0-3 per system	Each board contains 4 half-ht., 3 1/2-inch SCSI-2 disk drives.

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

2.4.2 External Options

2.4.2.1 Cluster Foundation Packages

Cluster Foundation Package, complete

- Ethernet and Fibre Channel cabling, SBus
- Ethernet and Fibre Channel adapter cards
- One SPARCstation™ 4 Cluster console, complete
- SPARCcluster™ support services package

Cluster Foundation Package Rack, Complete

- Ethernet and Fibre Channel cabling, SBus
- Ethernet and Fibre Channel adapter cards

- One SPARCstation 4 cluster console and one data center expansion cabinet

2.4.2.2 Mass Storage Options

- 20-Gbyte, 4-mm auto-loader with data center tray
- 14-Gbyte, 8-mm tape internal drive
- Multi-tape backup tray with one 14-Gbyte, 8-mm tape internal drive
- Front-load 1/2-inch tape for the expansion cabinet
- 20-Gbyte 4-mm auto-loader internal backup tape
- 56-inch data center expansion cabinet

2.4.2.3 Monitor and Graphics Accelerator Options

- 17-inch mid-range color monitor, TurboGX™ frame buffer and cable
- 17-inch color monitor, TurboGX frame buffer and cable
- 20-inch color monitor, TurboGX frame buffer and cable

2.4.2.4 Other Options

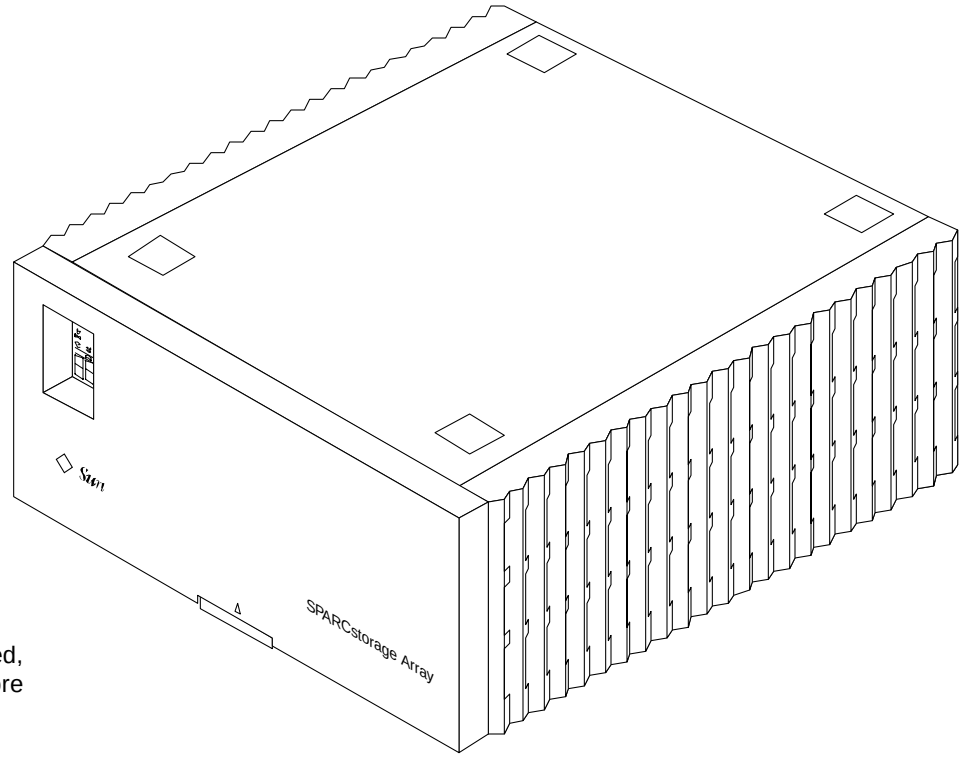
- Network terminal server

2.4.3 SPARCstorage Array Model 100 Series

2.4.3.1 Optional SPARCstorage Array Model 112 Accessories

- 6 x 2.1-Gbyte, FC/25
- 18 x 2.1-Gbyte, FC/25
- 30 x 2.1-Gbyte, FC/25
- 2-meter Fiber-Optic cable
- 15-meter Fiber-Optic cable

The array unit is shown in Figure 2-7.



Note: Shown with all panels affixed, although panels are removed before installation in a rack.

Figure 2-7 SPARCstorage Array 112

2.4.4 Optional SPARCstorage Array Model 200 Series Accessories

2.4.4.1 Controllers

- Model 200
- Model 210

2.4.4.2 Disks and Cables

- SPARCstorage RSM, 4 x 8-Gbyte hot-plug disks
- SPARCstorage RSM, 4 x 8-Gbyte hot-plug disks
- 2-meter fiber-optic cable
- 15-meter fiber-optic cable

The array unit is shown in Figure 2-8, and the expansion rack configurations are shown in Figure 2-9 and Figure 2-10.

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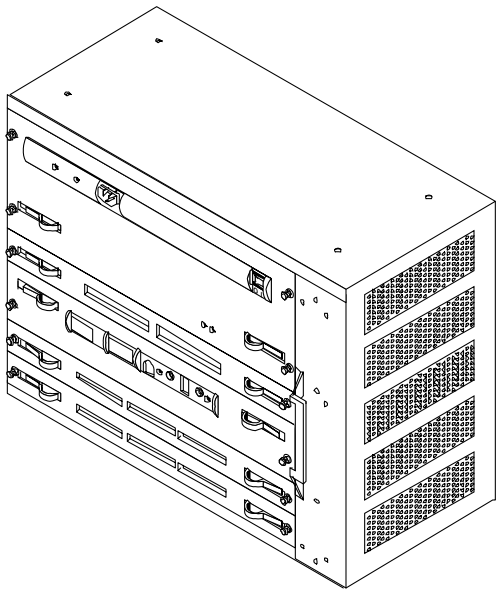


Figure 2-8 SPARCstorage Array Model 200 Series Unit

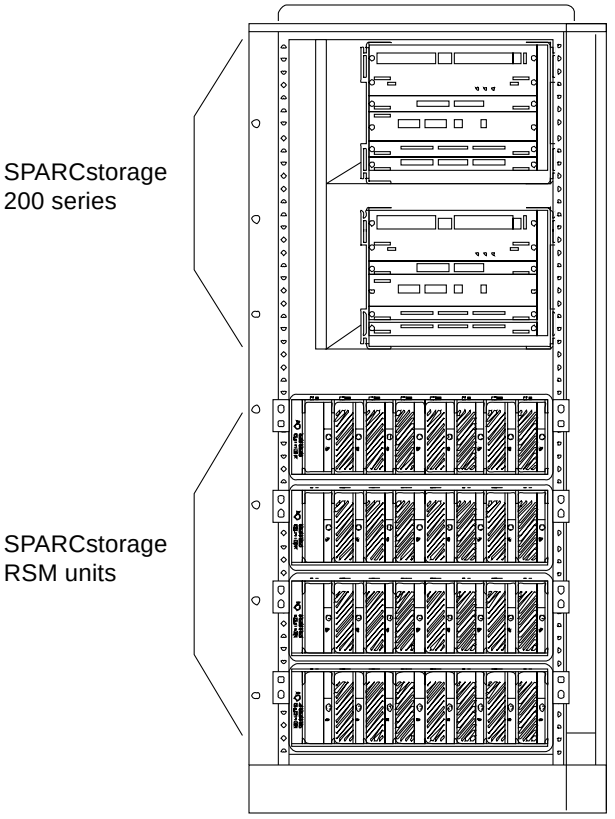


Figure 2-9 Expansion Cabinet with SPARCstorage Array 200 Series Hosting RSM Units

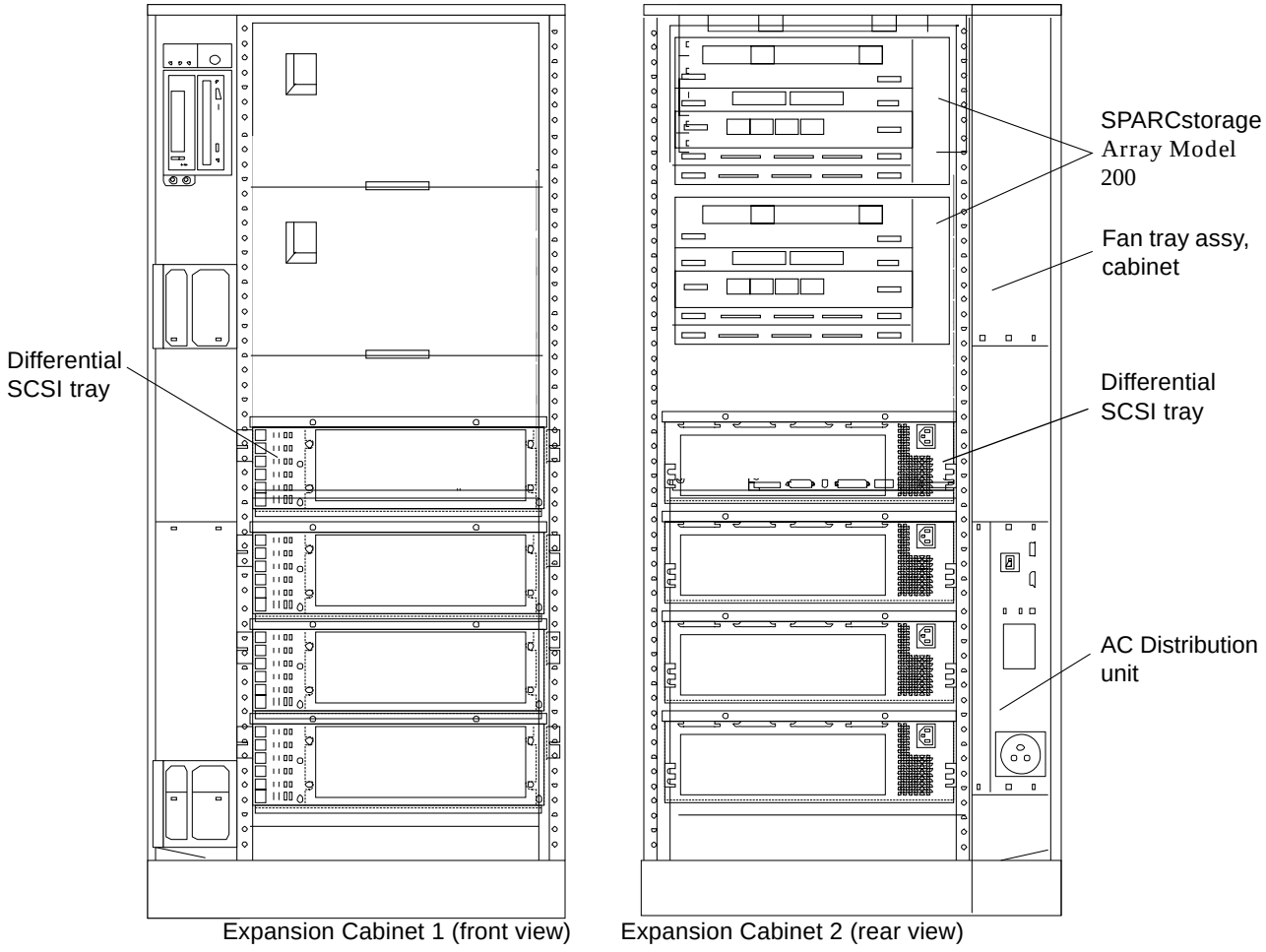


Figure 2-10 Expansion Cabinet with SPARCstorage Array 200 Series Hosting Differential SCSI Trays

2.5 SPARCcluster 2000 Options

2.5.1 Internal Options

See Table 2-4

Table 2-4 Internal Options—SPARCcluster 2000 System

Option	Quantity	Comments
System board	1-10 per system	One system board becomes the system master automatically. Jumper changes are not needed.
SuperSPARC module	1-20 per system	0-2 modules on each system board. (A moduleless board can provide additional memory and SBus slots for the system.)
SIMM, NVSIMM	0, 8, or 16 SIMMs per board	Add 8 SIMMs at a time, dividing the SIMMs (as groups of 4) between the two buses, but on the same group number (for example, group 0 on bus 0 and group 0 on bus 1); it is helpful (but not mandatory) to place the SIMMs on the same board. SIMM sizes are 8 or 32 Mbyte DRAM or 1 Mbyte NVSIMM. Do not mix sizes between groups. For optimum performance, add memory to multiples of 2 boards. This allows interleaving of memory between 2 or 4 boards. Interleaving does not occur for an unpaired, odd-numbered board.
SBus card	1-40 per system	0-4 cards per system board.
SCSI tray	Up to 4 full-height drives, or 4 half-height and 2 full-height drives	SCSI tray takes removable-media drives only. One SunCD 2Plus is standard equipment per system. Optional drives must be 1/4-inch or 8 mm tape drive or 4 mm tape auto-loader drive.
Disk drive tray	0-3 trays	Disk tray holds up to six 5 1/4-Inch form factor disk drives.

2.5.2 External Options

2.5.2.1 Cluster Foundation Packages

Cluster Foundation Package, complete

- Ethernet and Fibre Channel cabling, SBus
- Ethernet and Fibre Channel adapter cards
- One SPARCclassic cluster console, complete

- One 56-inch data center expansion cabinet

2.5.2.2 Mass Storage Options

- 14-Gbyte, 8-mm tape internal drive
- Multi-tape backup tray with one 14-Gbyte, 8-mm tape internal drive
- Front-load 1/2-inch tape for the expansion cabinet
- 20-Gbyte, 4-mm auto-loader with data center tray
- 20-Gbyte, 4-mm tape auto-loader internal drive
- 56-inch data center expansion cabinet
- Ballast kit

2.5.2.3 Monitor and Graphics Accelerator Options

- 17-inch color monitor, TurboGX frame buffer and cable
- 20-inch color monitor, TurboGX frame buffer and cable

2.5.2.4 Other Options

- Network terminal server

2.5.3 SPARCstorage Array Model 100 Series

2.5.3.1 Optional SPARCstorage Array Model 112 Accessories

- 6 x 2.1-Gbyte, FC/25
- 18 x 2.1-Gbyte, FC/25
- 30 x 2.1-Gbyte, FC/25
- 2-meter Fiber-Optic cable
- 15-meter Fiber-Optic cable

The array unit is shown in Figure 2-7.

2.5.4 Optional SPARCstorage Array Model 200 Series Accessories

2.5.4.1 Controllers

- Model 200

- Model 210

2.5.4.2 *Disks and Cables*

- SPARCstorage RSM, 4 x 8-Gbyte hot-plug disks
- SPARCstorage RSM, 4 x 8-Gbyte hot-plug disks
- 2-meter fiber-optic cable
- 15-meter fiber-optic cable

The array unit is shown in Figure 2-8.

2

Specifications 3

This section provides the environmental, physical, and electrical specifications for the SPARCcluster 1000 and SPARCcluster 2000 Systems.

Caution – Make no mechanical or electrical modifications to the cabinets. Sun is not responsible for the regulatory compliance if a cabinet is modified.

3.1 Physical Specifications

Physical specifications are presented in Table 3-1 through Table 3-10.

3.1.1 SPARCcluster 1000 System

Caution – Make no mechanical or electrical modifications to the cabinets. Sun is not responsible for the regulatory compliance if a cabinet is modified.

Table 3-1 SPARCcluster 1000 System Physical Specifications

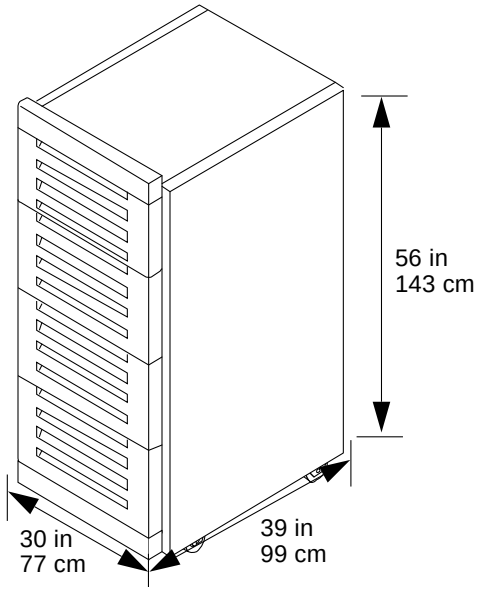
Specification Type	U.S.	Metric	Illustration and Comments
Height	56 in	143 cm	
Width	30 in	77 cm	
Depth	39 in	99 cm	
Weight	650 lb	300 kg	Approximate weight—depending upon configuration
Power cord	15 ft	4.6m	

Table 3-2 SPARCcluster 1000 System Clearance and Service Access

Direction	U.S.	Metric
Front	36 in	92 cm
Rear	36 in	92 cm
Left	36 in	92 cm
Right	36 in	92 cm

3.1.2 SPARCcluster 2000 System

Caution – Make no mechanical or electrical modifications to the cabinets. Sun is not responsible for the regulatory compliance if a cabinet is modified.

Table 3-3 SPARCcluster 2000 System Physical Specifications

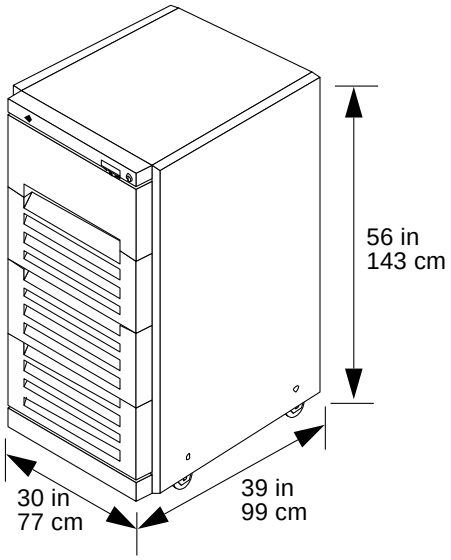
Specification Type	U.S.	Metric	Illustration and Comments
Height	56 in	143 cm	
Width	30 in	77 cm	
Depth	39 in	99 cm	
Weight	900 lb	360 kg	Approximate weight—depending upon configuration
Power cord	15 ft	4.6m	

Table 3-4 SPARCcluster 2000 System Clearance and Service Access

Direction	U.S.	Metric
Front	36 in	92 cm
Rear	36 in	92 cm
Left	36 in	92 cm
Right	36 in	92 cm

3.1.3 Expansion Cabinet

Caution – Make no mechanical or electrical modifications to the cabinets. Sun is not responsible for the regulatory compliance if a cabinet is modified.

Table 3-5 Expansion Cabinet Physical Specifications

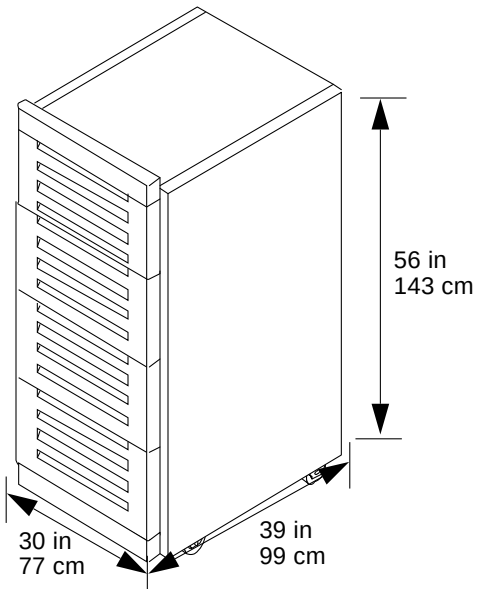
Specification Type	U.S.	Metric	Illustration and Comments
Height	56 in	143 cm	
Width	30 in	77 cm	
Depth	39 in	99 cm	
Weight	1000 lb	455 kg	Approximate weight—depending upon configuration
Power cord	15 ft	4.6m	

Table 3-6 Expansion Cabinet Clearance and Service Access

Direction	U.S.	Metric
Front	36 in	92 cm
Rear	36 in	92 cm
Left	36 in	92 cm
Right	36 in	92 cm

3.1.4 Cluster-Ready Node

The following data is for each of the principal components of a SPARCcluster 1000 customer-assembled system (SPARCserver 1000 and SPARCstorage Array chassis).

Table 3-7 SPARCserver 1000 Physical Specifications

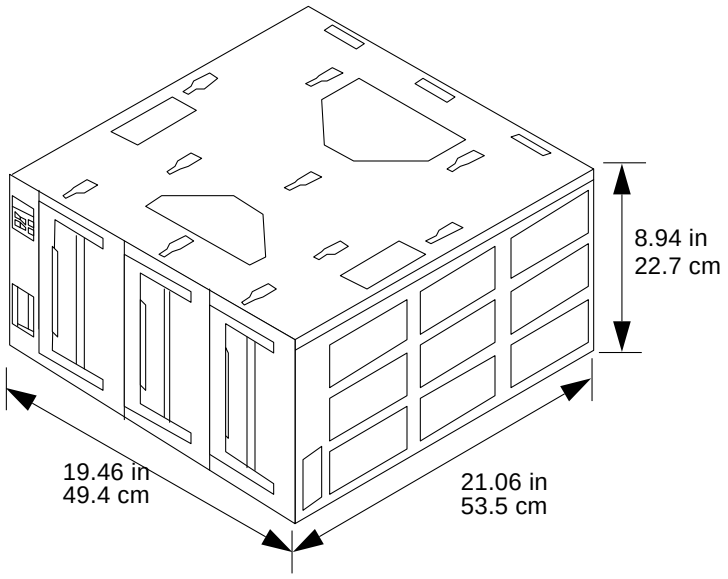
Specification Type	U.S.	Metric	Illustration and Comments
Height	8.90 in	22.6 cm	
Width	19.46 in	49.43 cm	
Depth	21.06 in	53.49 cm	
Weight	70 lb	32 kg	Actual weight depends on the installed options.
Power cord	6 ft	1.83 m	

Table 3-8 SPARCserver 1000 Clearance and Service Access

Direction	US	Metric	Comments
Front	12 in	30.48 cm	Access to storage media, key switch, and reset switch
Rear	16 in	40.64 cm	Access to system board, fan tray, and cables
Left	6 in	15.24 cm	To maintain airflow
Right	6 in	15.24 cm	To maintain airflow

Table 3-9 SPARCstorage Array Physical Specifications

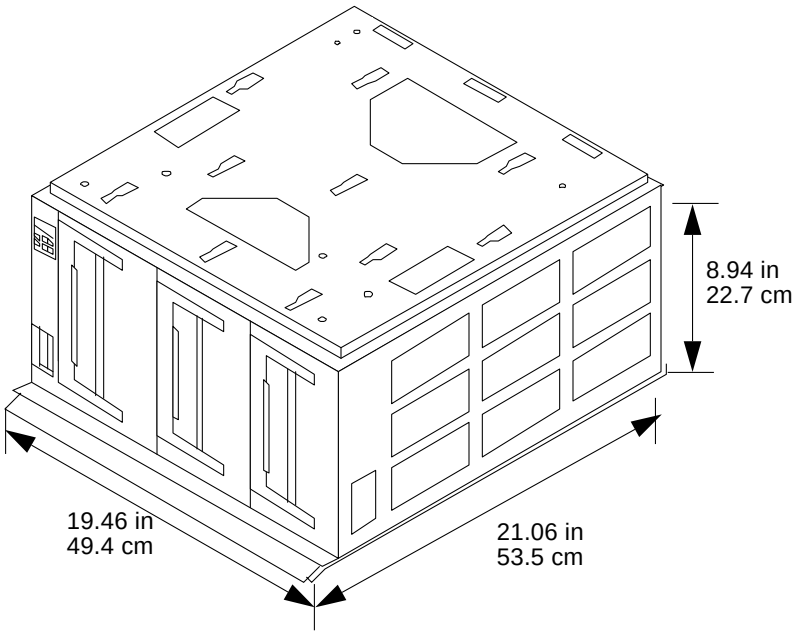
Specification Type	U.S.	Metric	Illustration and Comments
Height	8.90 in	22.6 cm	
Width	19.46 in	49.43 cm	
Depth	21.06 in	53.49 cm	
Weight	110 lb	50 kg	Approximate, for 30-drive option. Actual weight depends on installed options.
Power cord	6 ft	1.83 m	

Table 3-10 SPARCstorage Array Clearance and Service Access

Direction	US	Metric	Comments
Front	24 in	61 cm	Access to fan tray and drive trays (3)
Rear	18 in	46 cm	Access to power supply and array controller
Left	4 in	10 cm	To maintain airflow
Right	4 in	10 cm	To maintain airflow

3.2 Electrical Specifications

3.2.1 SPARCcluster 1000 System

Table 3-11 provides specifications for the system cabinet equipped with two SPARCserver 1000E systems and three SPARCstorage Arrays.

Table 3-11 SPARCcluster 1000 System Electrical Specifications

Parameter		Value
Input current	**Voltage range**	200–240 VAC
	Current, maximum	17A at 220 VAC input
	Current frequency range	47–63 Hz
Input power rating	Total continuous power	3480W
Volt-ampere rating		3740 VA
BTU rating		11,850 BTU
Power factor		0.91–0.96
Plug type	U.S.	NEMA L6-30P for 200–240 VAC
	International	32A, single phase IEC 309, connected for 220–240 VAC

3.2.2 SPARCcluster 2000 System

Table 3-12 provides specifications for one server cabinet equipped with two SPARCstorage Arrays.

Table 3-12 SPARCcluster 2000 System Electrical Specifications

Parameter		Value
Input current	**Voltage range**	200–240 VAC
	Current, maximum	24.7A at 220VAC input
	Current frequency range	47–66 Hz
Input power rating	Total continuous power	5100W
Volt-ampere rating		5430 VA
BTU rating		17,390 BTU

Table 3-12 SPARCcluster 2000 System Electrical Specifications *(Continued)*

Parameter		Value
Power factor		0.91–0.96
Plug type	U.S.	NEMA L6-30P for 200–240 VAC
	International	32A, single phase IEC 309, connected for 220–240 VAC

3.2.3 Expansion Cabinet

Table 3-13 provides specifications for the expansion cabinet housing two SPARCstorage Array 200 series and four RSMs.

Table 3-13 Electrical Specifications for the Expansion Cabinet Housing Two SPARCstorage Array 200 Series and Four RSM Units

Parameter		Value
Input current	**Voltage range**	200–240 VAC
	Current, maximum	24A at 220 VAC input
	Current frequency range	47–63 Hz
Input power rating	Total continuous power	5016W
Volt-ampere rating		5280 VA
BTU rating		17,104 BTU
Power factor		0.91–0.96
Plug type	U.S.	NEMA L6-30P for 200–240 VAC
	International	32A, single phase IEC 309, connected for 220–240 VAC

3.2.4 Customer-Assembled

Table 3-14 lists the electrical specifications for a single node of a customer-assembled SPARCcluster 1000 system (SPARCserver 1000 and SPARCstorage Array chassis as well as a terminal concentrator).

Table 3-14 Single Node Electrical Specifications

Parameter	Value
Nominal frequency range	47–66 Hz
Nominal voltage range	100–240 VAC
Maximum current	9.5 A at 100 VAC input
Maximum VA rating	950 VA
Maximum power consumption	1000 W
Maximum heat output	3410 BTUs / hour
Power factor	0.95–0.98

3.3 Environmental Specifications

The environmental specifications presented in Table 3-15 apply to the SPARCcluster 1000 and SPARCcluster 2000 systems. Avoid temperature extremes and keep the work area clean. Maintain the operating conditions shown in Table 3-15.

Table 3-15 Cabinet Server Temperature, Humidity, and Altitude Limits

Specification Type	Operating		Nonoperating	
Specification	**U.S.**	**Metric**	**U.S.**	**Metric**
Temperature	50° to 86°F	10° to 30°C	–4° to 140°F	–20° to 60°C
Altitude	10,000 ft	3,048m	40,000 ft	12,192m
Humidity	20% to 80% RH	5% to 95% RH	20% to 80% RH	5% to 95% RH

Install the SPARCcluster 2000 System in a computer room environment to ensure secure access to computers and stored information. In addition, a computer room can fulfill the requirements for a controlled environment,

especially with regard to temperature, humidity, and airborne dust. A computer room installation usually provides improved protection against damage by fire, flood, or other danger originating in the building.

Site Preparation and Planning 4

4.1 Hardware Planning

4.1.1 Planning Floor Space

Floor space and other requirements are:

- The cabinets require approximately three feet of space in the front and three feet of space at the back for access by service personnel.
- Power and interface cables should be kept out of the way of foot traffic. Cables can be routed inside walls, under the floor, through the ceiling, or in protective channels. Interface cables should be routed away from motors and other sources of magnetic or radio frequency interference.
- SPARCstorage Arrays can be located up to 2 kilometers (1.24 miles) from the system cabinets.
- System cabinets can be located up to 100 meters (330 feet) from each other.

4.1.1.1 SPARCcluster 1000 System

Figure 4-1 and Figure 4-2 are examples of floor plans for the minimum and maximum configurations, respectively.

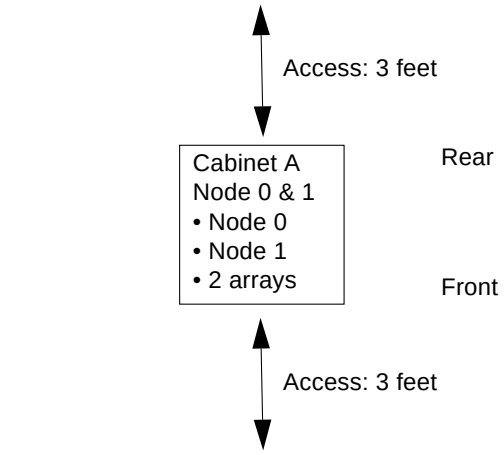


Figure 4-1 SPARCcluster 1000 System Floor Plan
Minimum Configuration Example (Top View)

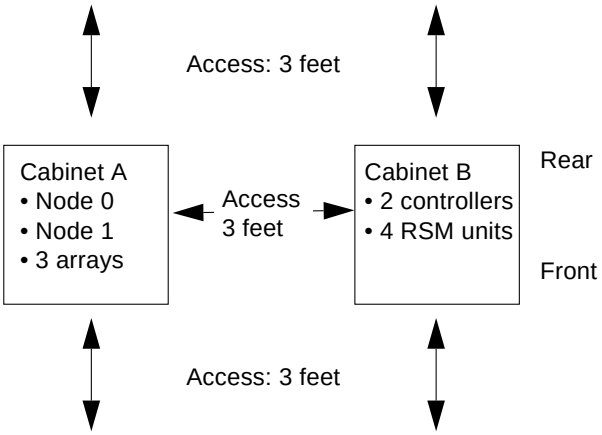


Figure 4-2 SPARCcluster 2000 System Floor Plan
Minimum Configuration Example (Top View)

4.1.1.2 SPARCcluster 2000 System

Determine the floor plan layout for your installation.

Figure 4-3 and Figure 4-4 are examples of floor plans for minimum and maximum configurations, respectively.

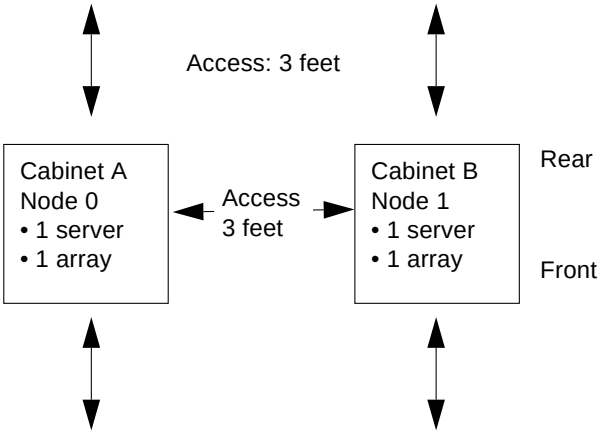


Figure 4-3 SPARCcluster 2000 System Floor Plan
Minimum Configuration Example (Top View)

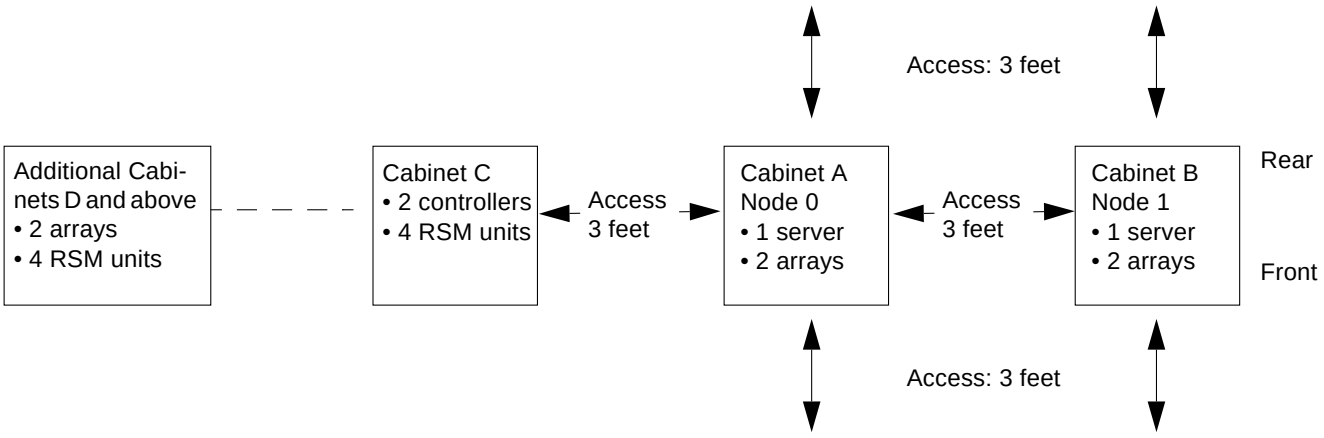


Figure 4-4 SPARCcluster 2000 System Floor Plan
Maximum Configuration Example (Top View)

4.2 Power Requirements and Options

Each cabinet should have a dedicated AC breaker panel. The cabinets should not share this breaker panel with unrelated equipment. Each cabinet has a single power cord that supplies AC power to the internal power distribution unit. Internal components (terminal concentrator, boot disks, server chassis, and SPARCstorage Arrays—as appropriate) are plugged into the power distribution unit in factory-configured systems.

All rack-mounted components in the cabinets can be connected to appropriate power outlets external to the cabinets to increase high availability.

4.2.1 Electrical Circuits Required

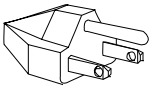
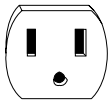
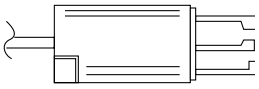
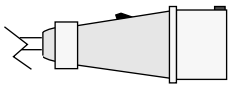
The following requirements apply to the:

- SPARCcluster 1000 server cabinet—housing two servers and three SPARCstorage Arrays
- SPARCcluster 2000 server cabinet (one of two)—each cabinet housing one server and one, or two, SPARCstorage Arrays
- Expansion cabinet—housing two SPARCstorage Array Model 200 Series and four SPARCstorage RSM units or differential SCSI disk tray units

Caution – Do not power other electrical equipment from the cabinet AC power distribution unit; system reliability may be adversely affected.

Each cabinet requires a 30A circuit. Two AC connector plug types are available. The NEMA L6-30P connector is used for 200-240V North American operation as shown in Table 4-1. The 32A, single-phase, IEC 309 connector is available for 220-240V international operation. See Table 4-1.

Table 4-1 Platform and Chassis Connector Requirements

Platform	Type: U.S.	Type: International	Comment
SPARCstorage Array 100 Series SPARCstorage Array 200 Series Multi-disk Pack	NEMA 5-15P Plug  Connector 	By country	One per storage array chassis. The appropriate international cables are included in the ship kit.
SPARCcluster 1000 SPARCcluster 2000 Expansion Cabinet	NEMA L6-30P Plug  Connector 	30A, single phase IEC 309 Plug  Connector 	One per node cabinet. One per expansion cabinet.

4.3 Ethernet Networks

4.3.1 Public and Client Networks

This network is per customer choice. The mode of network communication is Ethernet at time of publication.

4.3.2 Private Node-to-Node Network

SPARCcluster systems follow the IEEE standard for 100BASE-X Ethernet.

4.3.3 RS-232C/RS-423A

This section addresses asynchronous cables used to connect your Sun™ servers and Workstation™ to the terminal concentrator.

Most systems enable you to select between two EIA interface standards, RS-232C or RS-423A.

Differences between the two standards are noted in Table 4-2, but an overlap in values of certain parameters exists. When interconnecting RS-423A with RS-232C circuits, remember that performance is limited to that of RS-232C.

Table 4-2 Open-Circuit Voltages

	Open Circuit Voltages		
Recommended Standard	**Minimum**	**Maximum**	**Without Damage**
RS-232C	3.0V	25.0V	25.0V
RS-423A	4.0V	6.0V	12.0V

Table 4-2 shows a common operating area between ±4.0 and ±6.0 volts. However, there are differences between the two standards involving rise time, data rate, and cable length specifications.

- RS-232C specifies that the rise time through the ± 3 volt transition should not exceed 4% of the signal element duration.
- RS-423 generally requires much slower rise times which are specified from 10%–90% of the total signal amplitude to reduce cross talk for operation over longer distances.

4.3.3.1 Cable Requirements

Evaluate the routing of cables to all equipment. Keep cable runs short to increase interface reliability. Other considerations include:

- Make cable runs to equipment outside the computer room as direct as possible.
- Place equipment in the computer room in a way to minimize cable run length to units outside the room.
- Where necessary, allow extra cable length to:
  - Enable cables to be routed clear of strong radio frequency interference (RFI) fields.

- Permit system expansion or relocation.

4.3.3.2 *Cable Length*

Where possible, use short serial-interface cables for 9600 baud. You can use longer cables, provided the resulting load capacitance, measured at the interface point and including the signal terminator, does not exceed 2500 picofarads.

For further information see “EIA STANDARD RS-232C” and “EIA STANDARD RS-423-A.” EIA RS-232C cabling specification is available from:

Electronics Industries Association
2001 I Street N.W.
Washington, D.C. 20006 USA
Phone: (202) 457-4900

4.3.3.3 *Shield Ground (Drain)*

Some interface applications require use of shielded cable to minimize RFI or for other reasons. When used, connect the shield to frame ground at one or both ends depending on the specific application.

Note – On Sun Microsystems DB-25 connectors, the shield ground lead can be connected to pin 1 at the Sun system end (Protective Ground).

4.3.3.4 Generic Pinouts

Table 4-3 provides a cross reference of pinouts for Sun Workstations to standard EIA RS-232C and CCITT designations.

Table 4-3 Generic Pinouts for Sun System Boards and Communication Products

		Designation	
Pin No. (25 pin)	**Signal Description**	**EIA**	**CCITT**
1	Protective Ground	AA	101
2	Transmitted Data	BA	103
3	Received Data	BB	104
4	Request To Send	CA	105
5	Clear To Send	CB	106
6	Data Set Ready	CC	107
7	Signal Ground	AB	102
8	Data Carrier Detect	CF	109
15	Transmit Clock In (DCE Source)	DB	114
17	Receive Clock In (DCE Source)	DD	115
20	Data Terminal Ready	CD	108.2
24	Transmit Clock Out (DTE Source)	DA	113

Note – Sun Microsystems cannot guarantee proper system operation when maximum specified cable lengths are exceeded.

4.4 Coaxial Ethernet Cabling

For small Ethernet installations, you can purchase 15-meter lengths of Ethernet cable from Sun Microsystems. Use these 15-meter lengths only as single pieces, not as extensions with other cables. These branch cables come with two transceiver types:

- Vampire tap
- N-type in-line

Workstations can serve as gateways between physically separate Ethernet links. When a gateway is in place, users perceive a single logical network, and have transparent access to all the systems on both physical networks.

A gateway workstation simply has one Ethernet connection to each separate Ethernet cable. The software that performs the inter-network routing is included in the standard Solaris software release.

4.4.1 Ethernet Design Considerations

Refer to Table 4-4.

Table 4-4 Ethernet Design Considerations

Category	Specification	Description
Cable Type	Standard 802.3, 50-ohm Ethernet cable	Capable of a 10/100-megabit/second transmission rate
Network Design Details	Cable	Cable purchased in bulk should have marks on the casing every 2.5 meters. The maximum length of any standard Ethernet cable segment is 500 meters. This may consist of one continuous piece of cable or segments, but the segments must be in factors of 2.5 meters. (Spacing taps closer or farther apart disrupts cable impedance characteristics.) Cut the Ethernet cable only at 2.5-meter marks. The minimum length of any segment is approximately 24 meters. Connect the cable sheath conductor to earth ground.
	Transceivers	Attach transceivers, taps, and/or repeaters *only* at the 2.5 meter intervals on the cable. The distance between transceivers and/or taps must be in increments of 2.5 meters, and no closer than 2.5 meters from each other, and no farther apart than 500 meters. The path between two transceivers and/or taps cannot have more than one repeater. Install 50-ohm terminators on all ends of the Ethernet cable. Install them in a transceiver outlet or at the end of the cable, (for example, in the last transceiver at the end of the cable). The transceiver cable between the transceiver and workstation or terminal should be no longer than 50 meters.

If planning a large network (more than 40 workstations), you may improve local performance by grouping and connecting workstation-client clusters in small physical networks with gateway workstations to create your larger logical network.

Arranging workstation-client clusters according to work function, like engineering, accounting, and so on, is one possible scheme. Smaller networks (fewer than 40 workstations) may not benefit from this scheme. Figure 4-5 shows the elements used in the installation process.

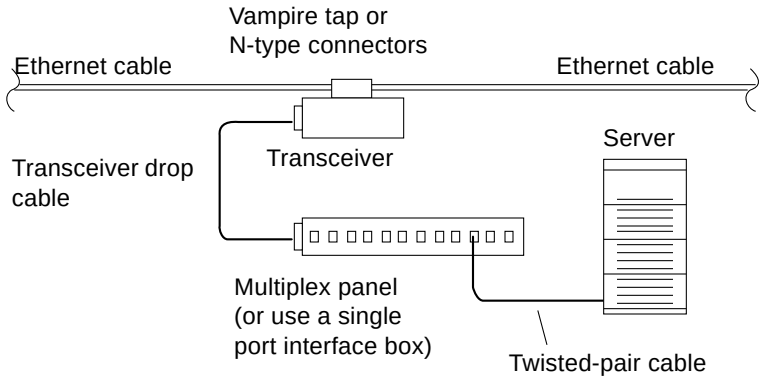


Figure 4-5 Connecting Twisted-Pair Ethernet to N-type Coaxial Cable

Determine whether to install a terminator. Refer to Table 4-5, which lists the cabling limitations for Ethernet.

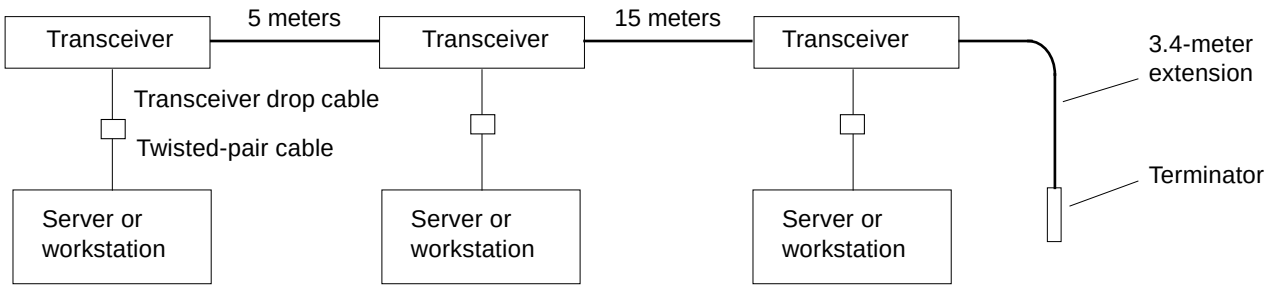
Table 4-5 Ethernet Cabling Limitations for N-type Coaxial Cable

Cable Segment	Length in Meters
Allowed contiguous length of cable segments	23.4, 70.2, 117.0, and 500.0[1]
Distance between transceivers (multiples-of)	2.5[2]
Minimum length of coaxial cable segments	23.4
Maximum length of transceiver “drop” cable	50.0

1. Finite lengths (as constrained by transmission line phenomena). Minimum length = 23.4M; maximum = 500M. If cable falls shorter than one of these values, add cable to achieve next-highest value.

2. Transceivers are placed at intervals of 2.5 meters, or multiples of 2.5 meters along the Ethernet cable.
Example: transceivers are connected 2.5 meters apart, not 2.0 meters.
Example: transceivers are connected 15 meters apart (6 multiples of 2.5 meters), not 14.0 meters.

Figure 4-6 shows an example of a typical network setup. The server system can be any one of the systems in this figure.



Note: 5 meters + 15 meters + 3.4 meter extension = 23.4 meters minimum length allowed.

Figure 4-6 Ethernet Cabling Length—Example Using N-type Cable

If a terminator is required, install a 50-ohm terminator on the unused transceiver N connector or the end of the coaxial cable. Use a female double N-type connector.

Note – Sun equipment conforms to the Ethernet 10BASE-T standard, which states that the link test function should always be enabled on both the node and the hub. If you have problems verifying the connection between your Sun equipment and your hub, you need to verify that your hub also has the link test function enabled. Refer to the Troubleshooting chapter in the applicable server system service manual and the manual provided with your hub for more information about the link test function.

4.4.2 Preparing the Ethernet Network

Sun Microsystems follows the IEEE standard for 10BASE-T Ethernet, also known as twisted-pair Ethernet.

For 10BASE-T, two pairs of unshielded wires connect to each workstation or a server. One pair transmits and the other receives. The 10BASE-T cable is made up of twisted pairs. These cables use RJ-45 connectors.

The cable connects the computer to a hardware interface called a hub. A coaxial or optical fiber cable connects the hub to the network. Single- and multiple-connection hubs are available commercially.

The maximum length of twisted-pair cables is 100 meters (330 feet). If cables connect through a wall socket, the combined length should not exceed 100 meters. Figure 4-7 summarizes implementation of twisted-pair Ethernet.

Note – Multiplexer boxes require a transceiver when used with the Ethernet applications described here. Although these transceivers are compatible with Sun equipment, Sun Microsystems does not guarantee the performance of any component not purchased from Sun.

Note – Many transceivers are compatible with both level-1 and level-2 Ethernet. To operate these transceivers with Sun equipment, set the device for level-2 operation using the manufacturer's instructions.

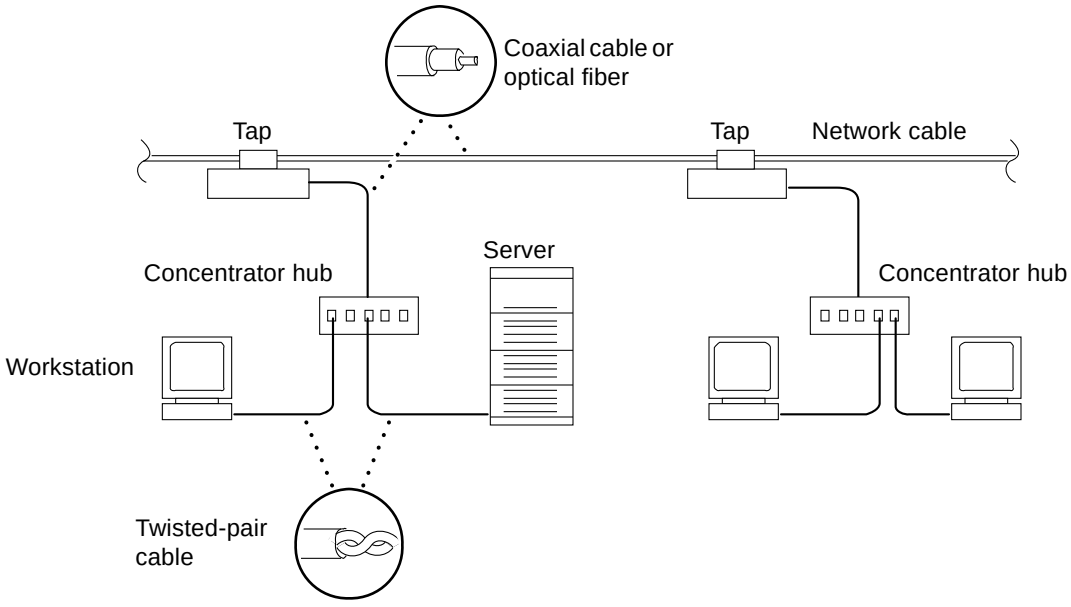


Figure 4-7 Example of 10BASE-T (Twisted-Pair) Ethernet

Set up Ethernet using Sun-supplied or third-party components. Read any applicable manufacturer instructions to obtain the best results.

SPARCcluster 1000 Configurations 5

This chapter covers configuration requirements and interface and cabling for possible configurations. Included here are configurations for minimum and maximum configuration systems. The basic system is shown in Figure 5-1.

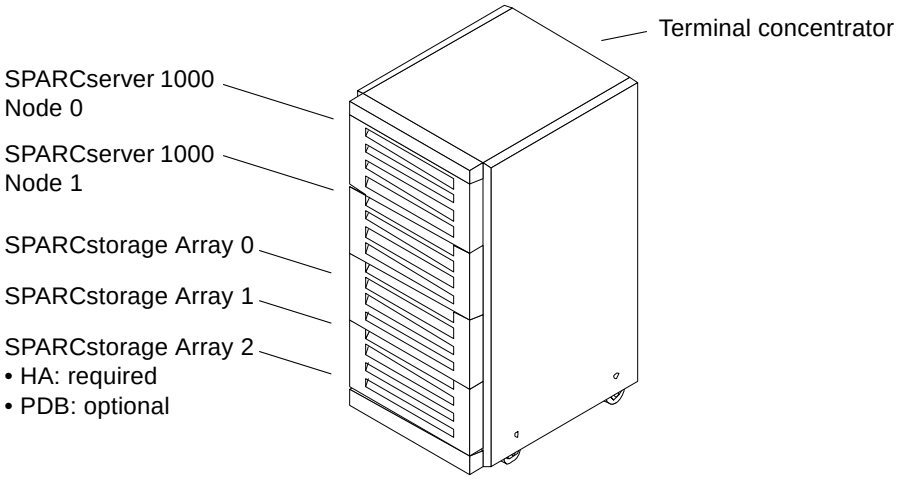


Figure 5-1 SPARCcluster 1000PDB Model

5

Use these configurations as a guide to assembling any size system. Omit those elements that will be absent from your particular site installation.

5.1 Minimum Configuration

5.1.1 SPARCcluster 1000PDB System Board Population

Minimum configuration is two nodes supporting two SPARCstorage Arrays.

Node 0 and node 1 card cages are configured identically. Figure 5-2 shows a minimally populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and SBus population by type

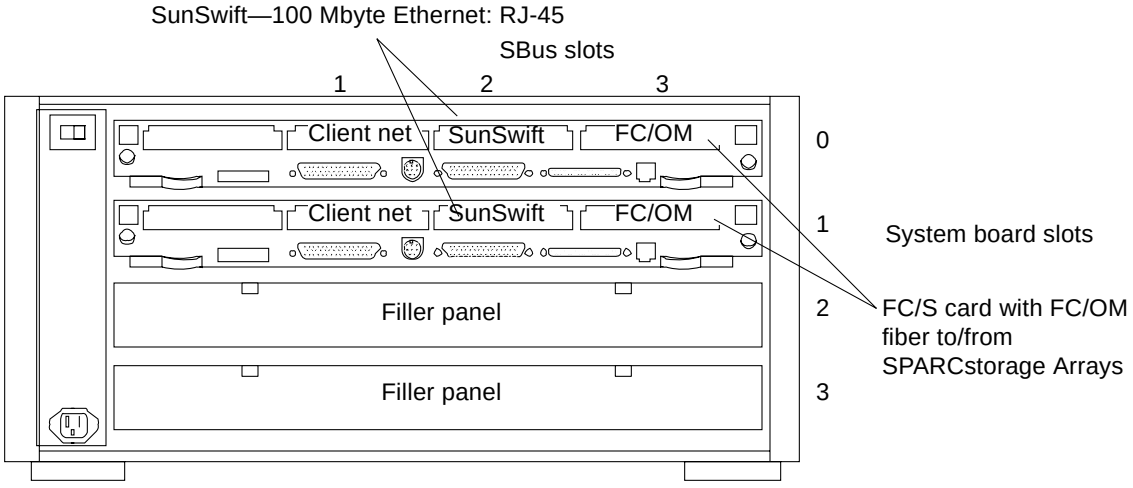


Figure 5-2 Minimum Population—SPARCcluster 1000PDB

5.1.2 SPARCcluster 1000HA System Board Population

Minimum configuration is two nodes supporting three SPARCstorage Arrays.

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-2 shows a minimally populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and SBus population by type

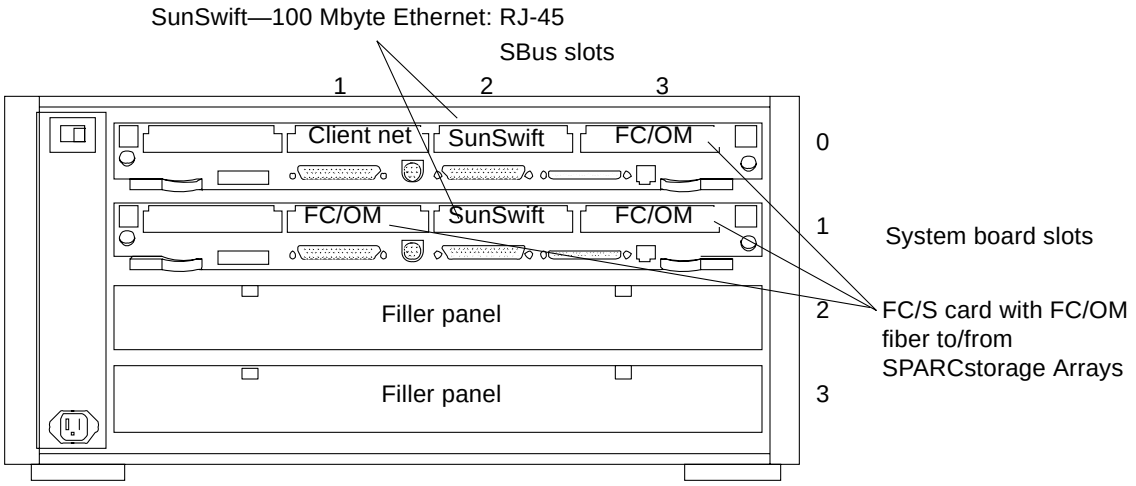


Figure 5-3 Minimum Population—SPARCcluster HA

5.2 Expansion

See the note below regarding adding SPARCstorage Arrays.

Note – Beyond minimum configuration, install FC/S cards in the first available empty SBus slot, following all other boards in the system. This ensures that the controller numbering is preserved if the Solaris operating environment is reinstalled.

5.3 Maximum Configuration

5.3.1 SPARCcluster 1000PDB System Board Population

The maximum configuration consists of three cabinets containing:

- Two nodes and three SPARCstorage Array Model 100 Series units (cabinet A)
- Four SPARCstorage Array Model 200 series controllers and eight SPARCstorage RSM units or eight Differential SCSI trays (cabinets B and C)

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-4 shows a fully populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and identifies SBus population by type

System boards 2 and 3 are configured alike.

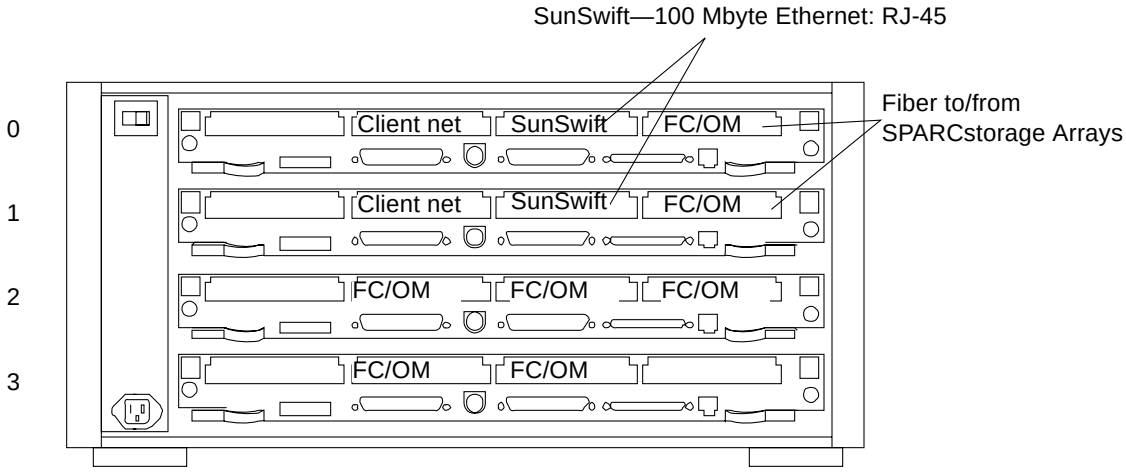


Figure 5-4 Maximum Population—SPARCcluster PDB

5.3.2 SPARCcluster 1000HA System Board Population

The maximum configuration consists of three cabinets containing:

- Two nodes and 3 SPARCstorage Arrays 100 Series (cabinet A)
- Four SPARCstorage Array Model 200 series controllers and 8 SPARCstorage RSM units or 8 Differential SCSI trays (cabinets B and C)

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-4 shows a fully populated card cage and identifies:

- System board slot numbers

- SBus card slot positions and identifies SBus population by type

System boards 2 and 3 are configured alike.

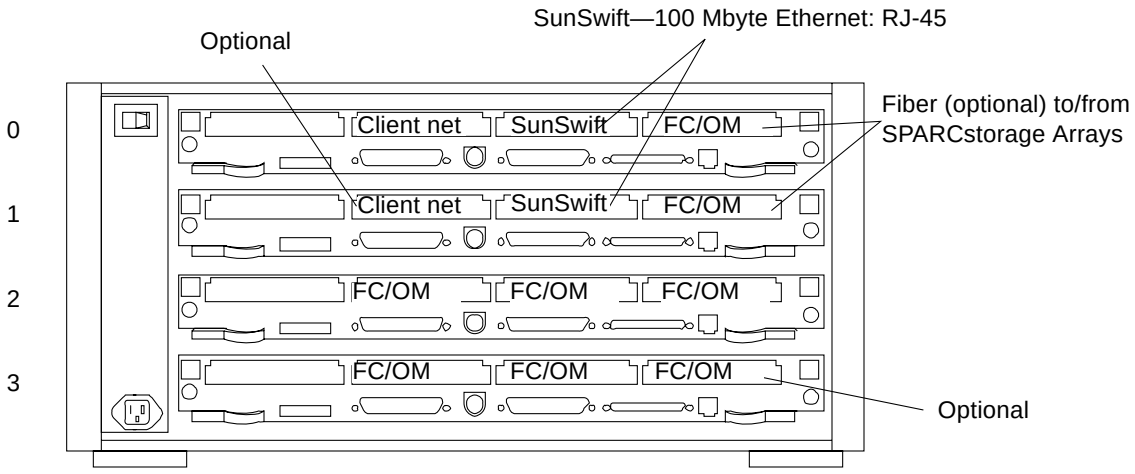


Figure 5-5 Maximum Population—SPARCcluster HA

5.4 System Component Cabling

Cabling is illustrated in Chapter 9, “SPARCcluster 1000 Hardware Installation.”

5.4.1 Administration Workstation

This unit connects to the:

- Terminal concentrator directly through a serial adapter cable
- Public Ethernet

5.4.2 Terminal Concentrator

This unit connects to:

- Node 0 and node 1 through a serial adapter cable connected to Serial A port on the system boards in slot 0 in both nodes
- Public Ethernet

5.4.3 Public Net Ethernet

Connection to the public or client network is through the terminal concentrator and administration workstation (see the bulleted items in Section 5.4.1 and Section 5.4.2).

5.4.4 Node 0 to Node 1

The two SPARCcluster nodes are connected over two 100 Mbit fast Ethernet (twisted pair) links. Two links are used to eliminate the possibility of a single point of failure. Sun private net cables (short or long) are used.

Note – Use short or long Sun private net cables of the appropriate length, part numbers: 530-2149 (short) or 530-2150 (long).

In each node, communication is hosted by a SunSwift 100 Mbit fast Ethernet card for each link. Thus, four such cards are required to support the two links for the High Availability system.

The two cables connect the two nodes directly—no hubs are used.

5.4.5 SPARCstorage Arrays

Note – Determine your fiber-optic cable requirements. Read the appropriate sections to determine the quantity, length, and type of cables you will require. Apply labels to both ends of all cables before you begin cabling. For cable labeling procedures, see Chapter 9, “Labeling Fiber-optic Cables” under Section 9.2.8.3.

Each SPARCstorage Array incorporates two FC/OM optical modules. One module connects to node 0 and one to node 1. These are identified by A and B on the SPARCstorage Array chassis back panel. See Figure 5-6. for an example of SPARCstorage Array-to-node communication fiber-optic cable.

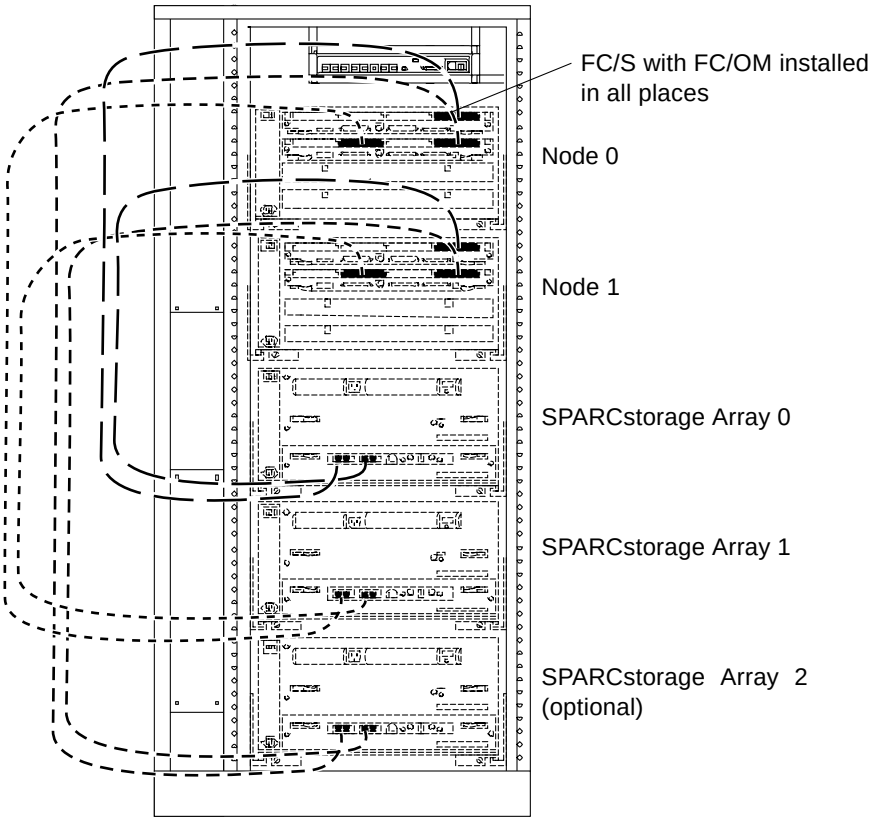


Figure 5-6 SPARCstorage Array Connection Detail

Cabinet A houses the nodes and two or three SPARCstorage Arrays. Cabinets B and above house two SPARCstorage Array Model 200 Series units and four RSM units or 9-Gbyte disk trays each. Figure 5-7 and Figure 5-8 show maximum configuration systems.

Note – Figure 5-7 and Figure 5-8 do not show cabling. For maximum configuration cabling detail, see Chapter 9.

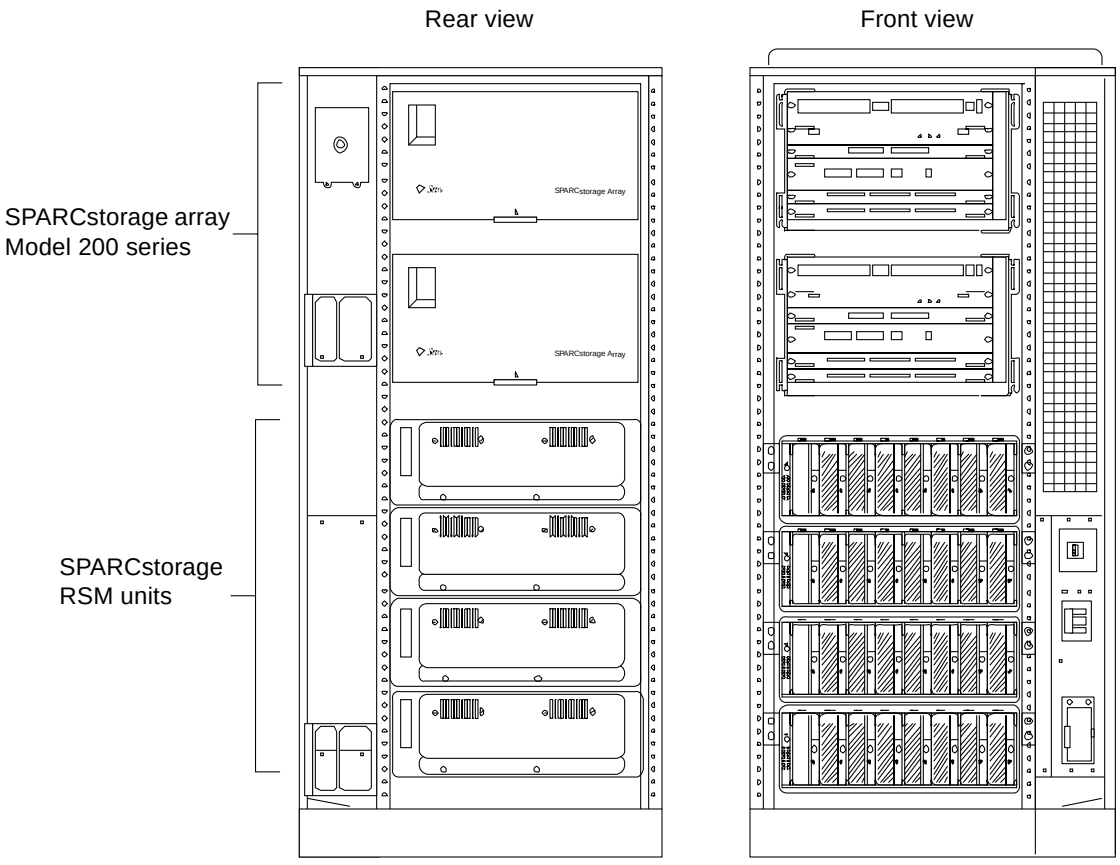


Figure 5-7 Expansion Cabinet with SSA Model 200 Series SPARCstorage RSM Units

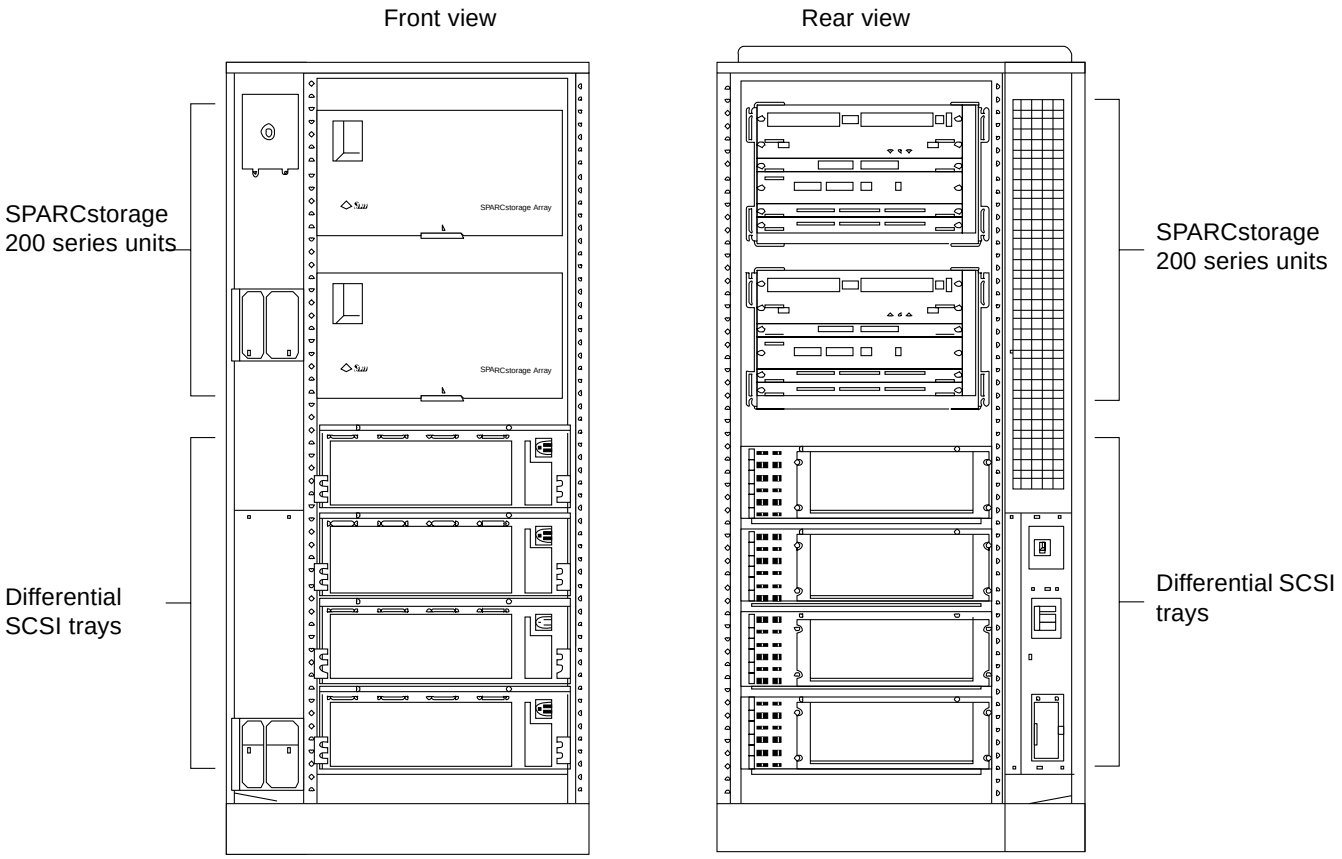


Figure 5-8 Expansion Cabinet with SPARCstorage Array Model 200 Series Hosting Differential SCSI Trays

5

SPARCcluster 2000 Configurations 6

This chapter covers configuration requirements and interface and cabling for possible configurations. Included here are configurations for minimum and maximum configuration systems. The basic system is shown in Figure 6-1.

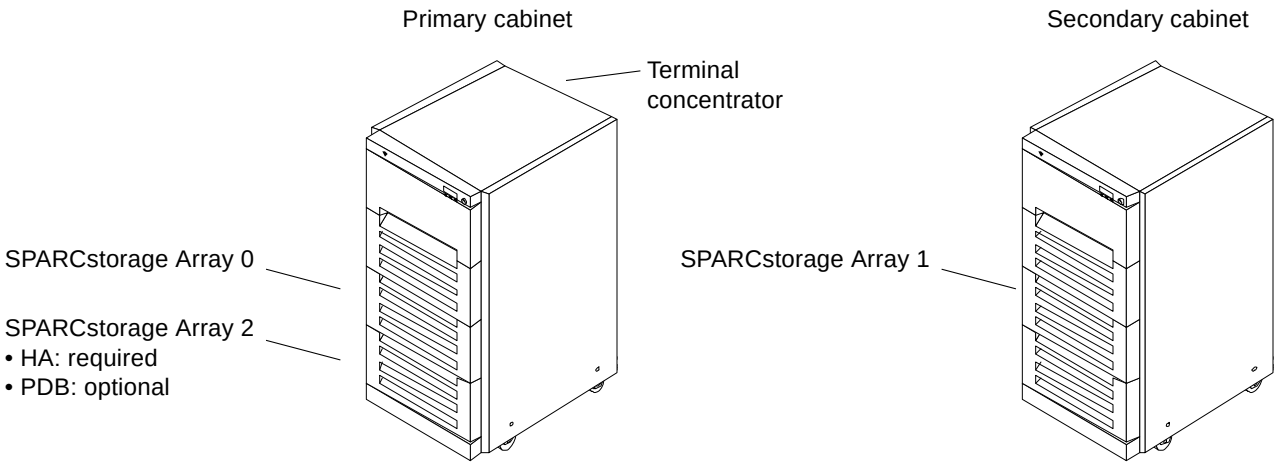


Figure 6-1 Basic SPARCcluster 2000PDB System

6

Use these configurations as a guide to assembling any size system. Omit those elements that will be absent from your particular site installation.

6.1 Minimum Configuration

6.1.1 SPARCcluster 2000PDB System Board Population

Minimum configuration is two nodes supporting two SPARCstorage Arrays.

Node 0 and node 1 card cages are configured identically. Figure 6-2 shows a minimally populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and SBus population by type

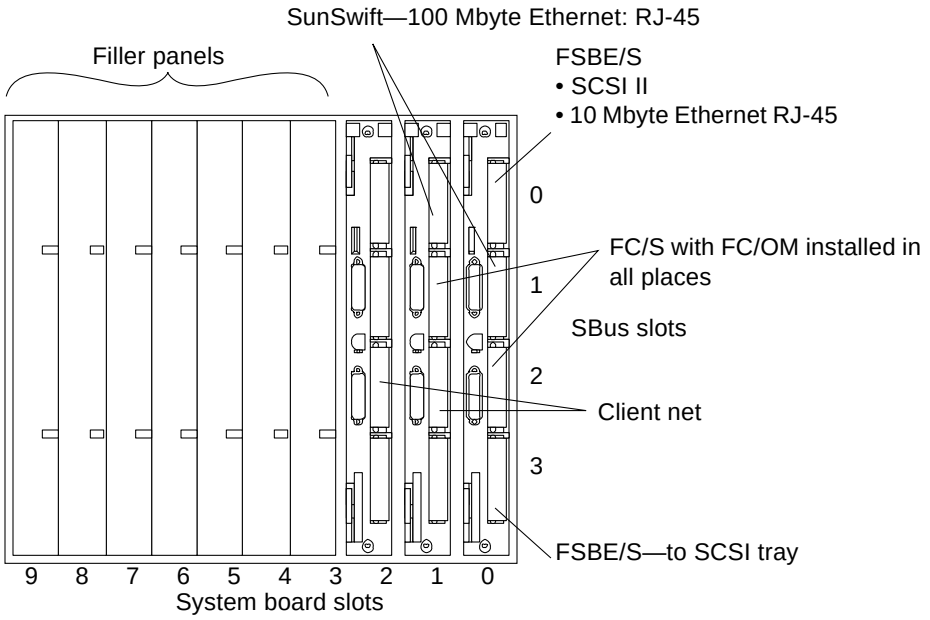


Figure 6-2 Minimum Populatioan—SPARCcluster 2000PDB

6.1.2 SPARCcluster 2000HA System Board Population

Minimum configuration is two nodes supporting three SPARCstorage Arrays.

Node 0 and node 1 card cages are configured identically. Figure 6-3 shows a minimally populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and SBus population by type

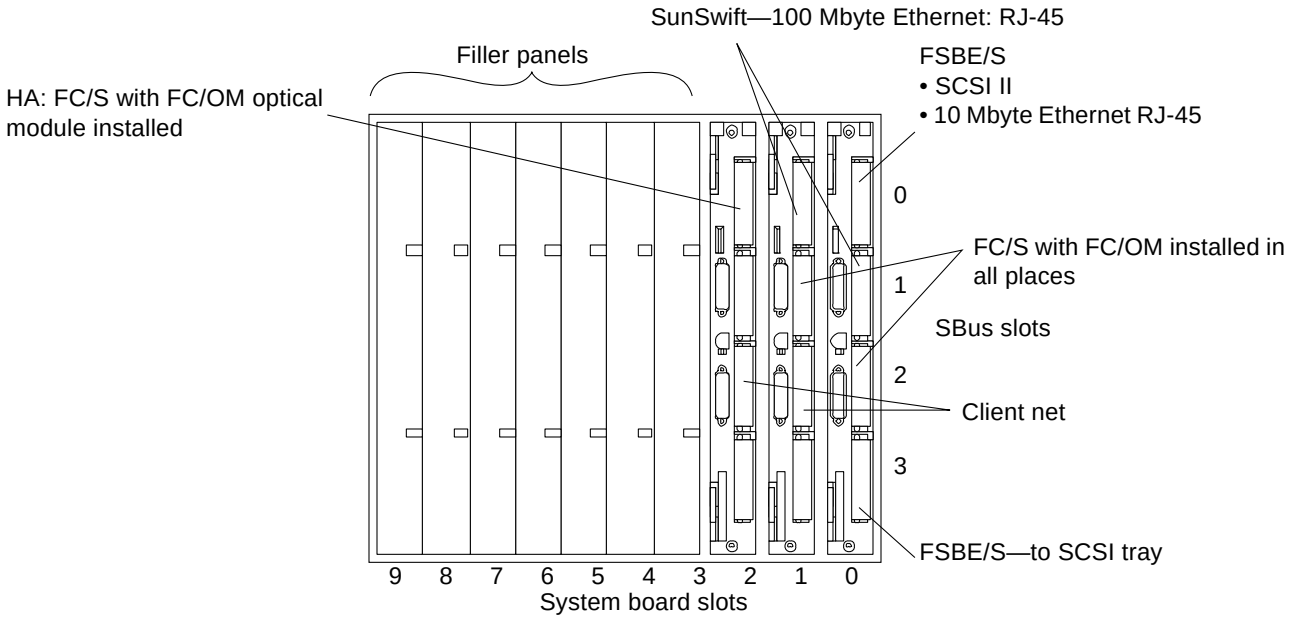


Figure 6-3 Minimum Population—SPARCcluster 2000HA

6.1.3 SBus Card Population

Install the quantity and types of SBus cards that are appropriate for your system. Figure 6-2 shows the SBus card configuration for a minimum-configuration system.

6.2 Expansion

See the note below regarding adding SPARCstorage Arrays.

Note – Beyond minimum configuration, install FC/S cards in the first available empty SBus slot, following all other boards in the system. This ensures that the controller numbering is preserved if the Solaris operating environment is reinstalled.

6.3 Maximum Configuration

6.3.1 SPARCcluster 2000PDB System Board Population

The maximum configuration consists of six cabinets containing:

- Two nodes—each housed in its own cabinet
- Four SPARCstorage Array Model 100 series units
- Four SPARCstorage Array Model 200 series controllers
- Eight SPARCstorage RSM units or 8 Differential SCSI trays

Node 0 and node 1 card cages are configured identically. Figure 6-4 shows a fully populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and identifies SBus population by type

System boards 2 through 9 are configured alike.

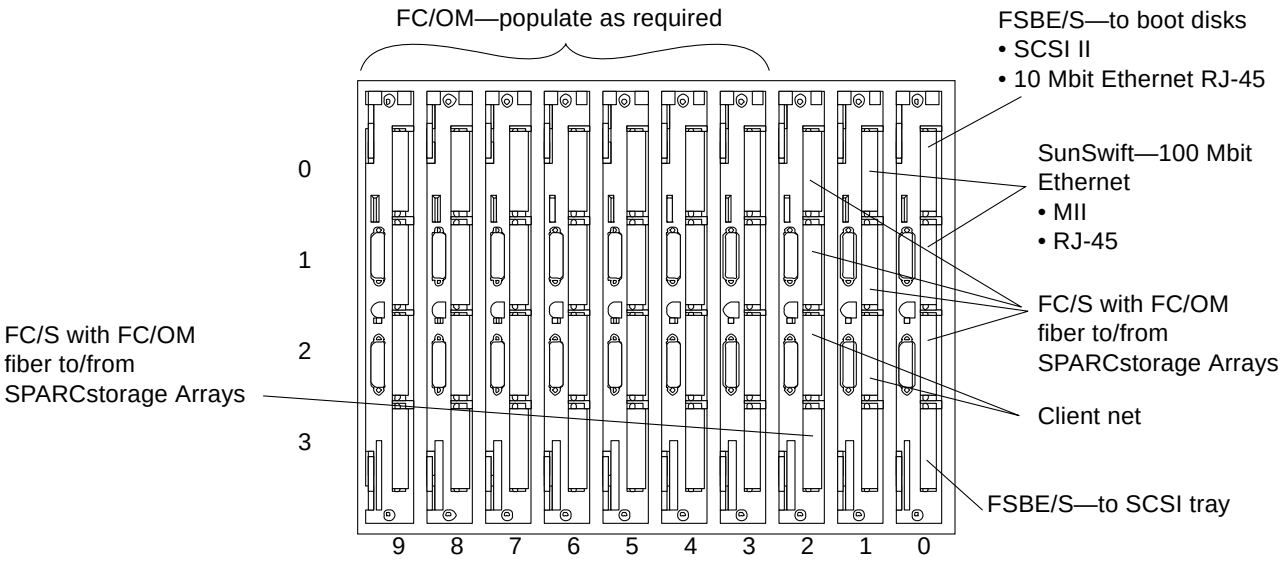


Figure 6-4 Maximum Population—SPARCcluster 2000PDB

6.3.2 SBus Card Population

Install the quantity and types of SBus cards that are appropriate for your system. Figure 6-4 shows the SBus card configuration for a fully populated, maximum-configuration system.

6.3.3 SPARCcluster 2000HA System Board Population

The maximum configuration consists of six cabinets containing:

- Two nodes—each housed in its own cabinet
- Four SPARCstorage Arrays 100 series units
- Four SPARCstorage Array Model 200 series controllers
- Eight SPARCstorage RSM units or 8 Differential SCSI trays

Node 0 and node 1 card cages are configured identically. Figure 6-4 shows a fully populated card cage and identifies:

- System board slot numbers
- SBus card slot positions and identifies SBus population by type

System boards 2 through 9 are configured alike.

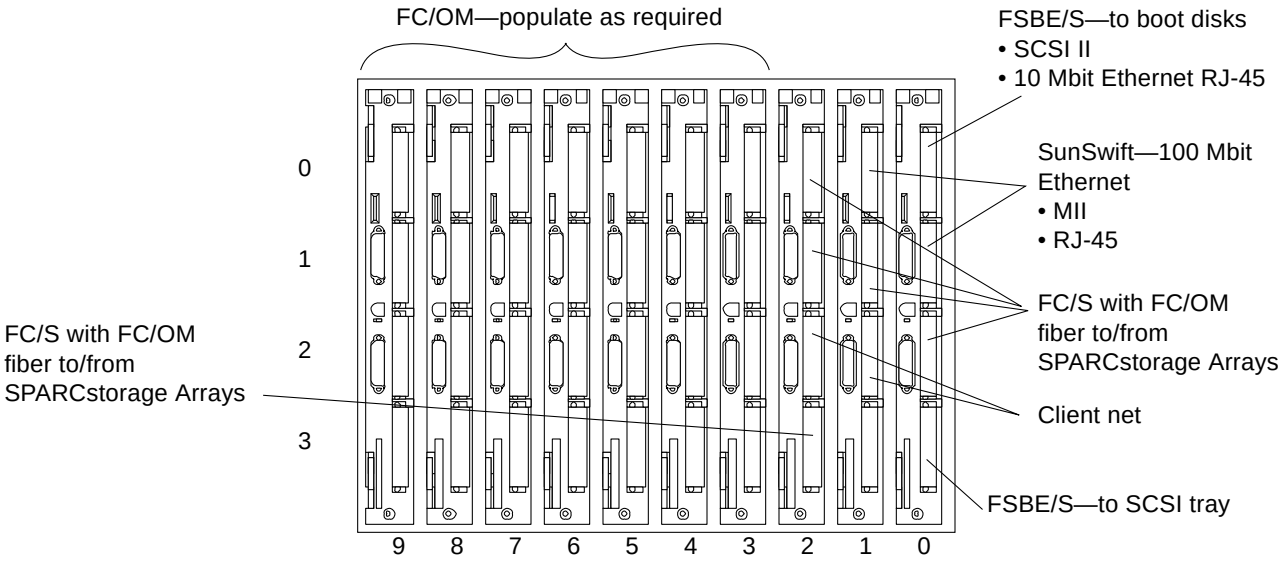


Figure 6-5 Maximum Population—SPARCcluster 2000PDB

6.3.4 SBus Card Population

Install the quantity and types of SBus cards that are appropriate for your system. Figure 6-4 shows the SBus card configuration for a fully populated, maximum-configuration system.

6.4 System Component Cabling

Interface cabling is illustrated in Chapter 10, “SPARCcluster 2000 Hardware Installation.”

6.4.1 Administration Workstation

This unit connects to the:

- Terminal concentrator directly through a serial adapter cable
- Public Ethernet

6.4.2 Terminal Concentrator

This unit connects to:

- Node 0 and node 1 through a serial adapter cable connected to Serial A port on the system boards in slot 0 in both nodes
- Public Ethernet

6.4.3 Public Net Ethernet

Connection to the public or client the network is through the terminal concentrator and administration workstation (see bulleted items in Section 6.4.1 and Section 6.4.2).

6.4.4 Node 0 to Node 1

The two SPARCcluster PDB nodes are connected over two 100 Mbit fast Ethernet (twisted pair) links. Two links are used to eliminate the possibility of a single point of failure. Sun private net cables (short or long) are used.

Note – Use short or long Sun private net cables of the appropriate length, part numbers: 530-2149 (short) or 530-2150 (long).

In each node, communication is hosted by a SunSwift 100 Mbit fast Ethernet card for each link. Thus, four such cards are required to support the two links for the High Availability system.

The two cables connect the two nodes directly—no hubs are used.

6.4.5 Boot Disks

Boot disks are hosted by a SCSI II host adapter installed in system board 0.

6.4.6 SPARCstorage Arrays

Note – Determine your fiber-optic cable requirements. Read the appropriate sections to determine the quantity, length, and type of cables you will require. Apply labels to both ends of all cables before you begin cabling. For cable labeling procedures, see Section , “Labeling Fiber-Optic Cables,” under Section 10.2.10.6.

Each SPARCstorage Array incorporates two FC/OM optical modules. One module connects to node 0 and one to node 1. These are identified by A and B on the SPARCstorage Array chassis back panel. See Figure 6-6. for an example of SPARCstorage Array-to-node communication fiber-optic cable.

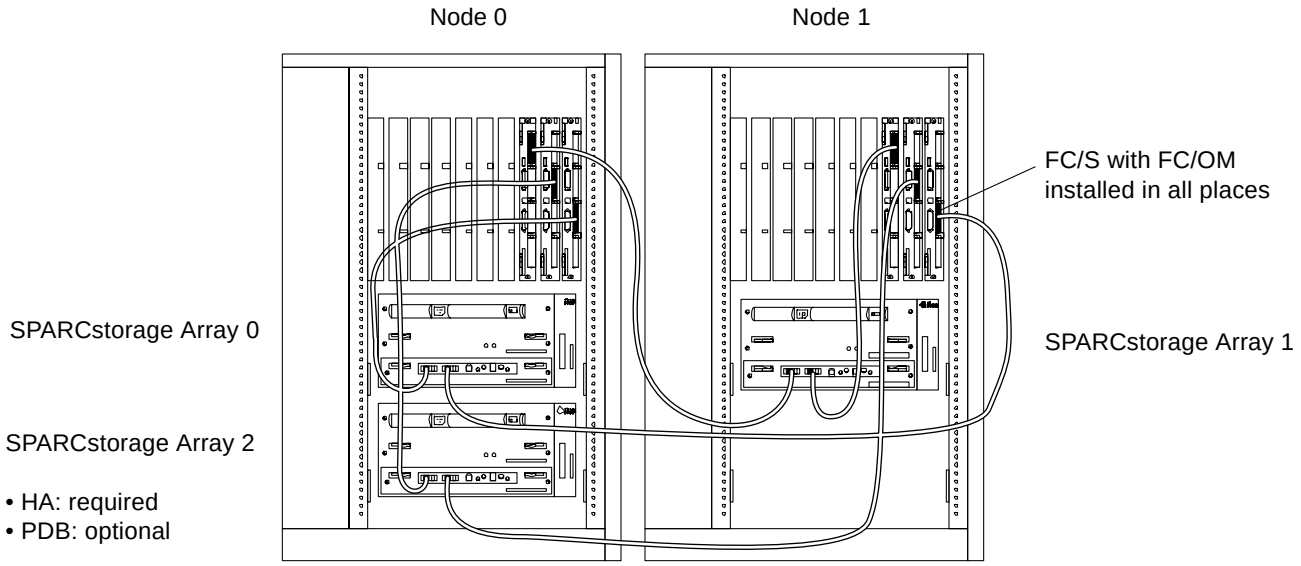


Figure 6-6 SPARCstorage Array Connection Detail

Cabinets A and B house the nodes and two to four SPARCstorage Arrays. Cabinets C and above house two SPARCstorage Array Model 200 series units and four RSM units or 9-Gbyte disk trays each. Figure 6-7 and Figure 6-8 show maximum configuration systems.

Note – Figure 6-7 and Figure 6-8 do not show cabling. For maximum configuration cabling detail, see Chapter 10.

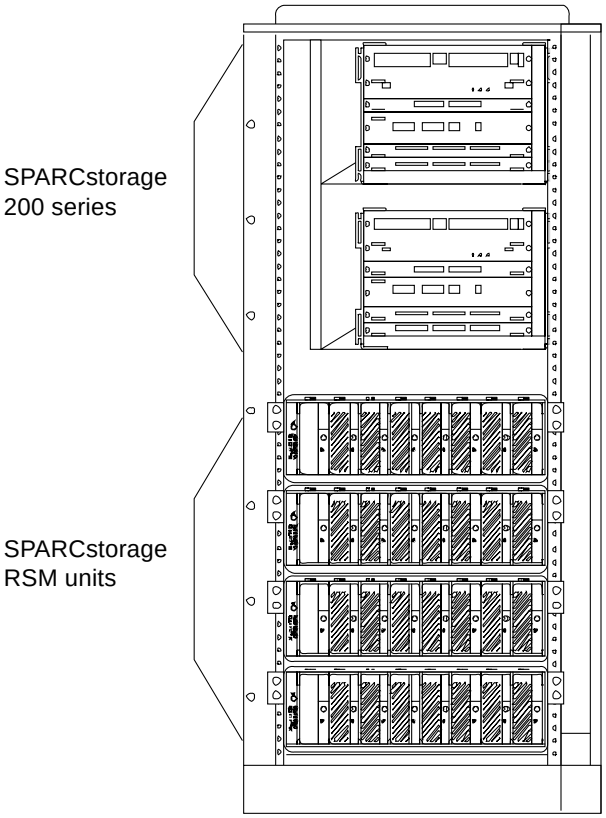


Figure 6-7 Expansion Cabinet with SPARCstorage Array Model 200 Units Hosting SPARCstorage RSM Units

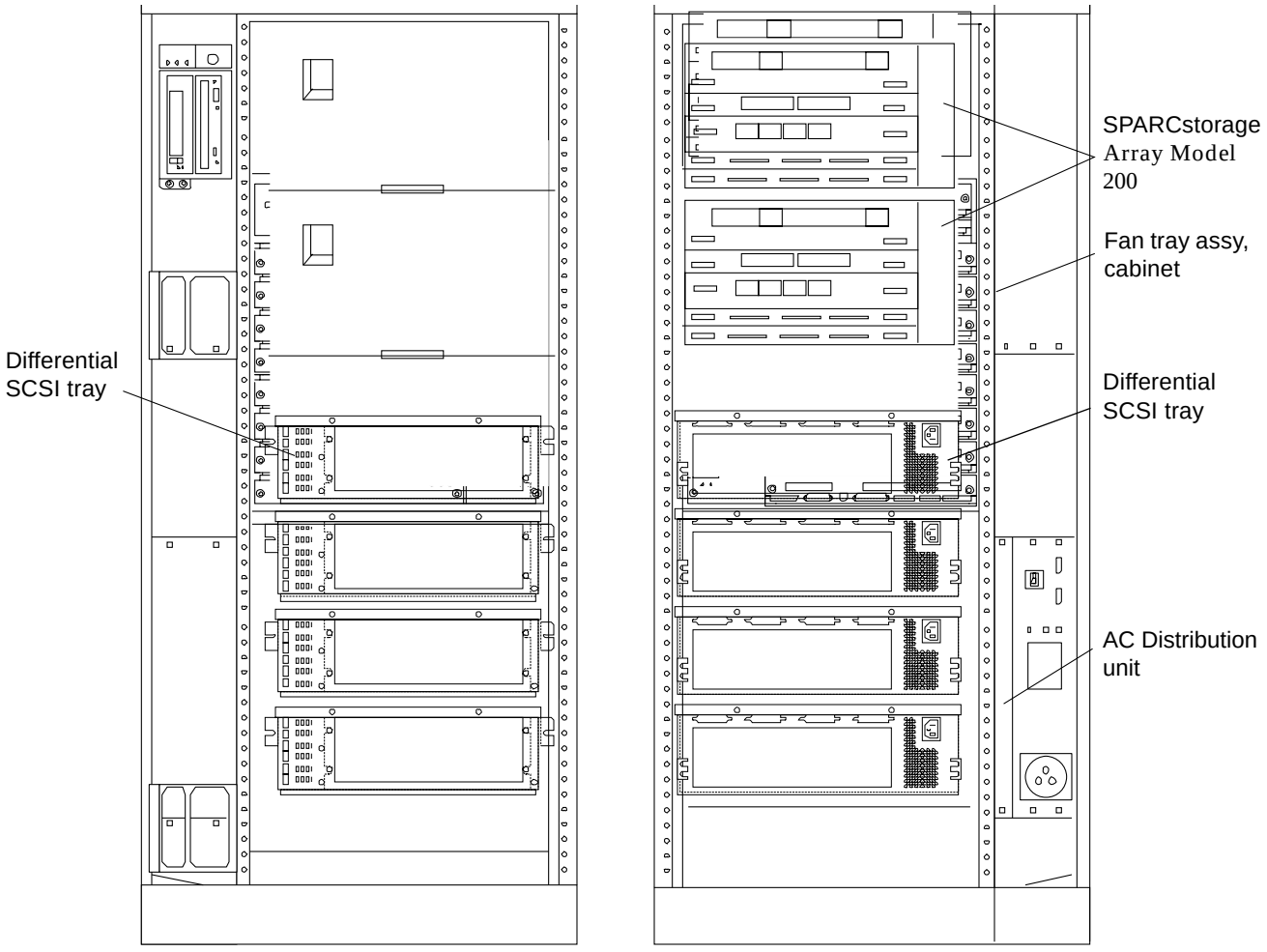


Figure 6-8 Expansion Cabinet with SPARCstorage Array Model 200 Units Hosting Differential SCSI Trays

Powering Off and On 7

Caution – Use these power off/on procedures **only** for systems that are:
Newly installed or in the process of being installed
NOT running real application database and processing live transactions

Performing these procedures on a system serving as a node in an "on-line" cluster poses great threat of irrecoverable data loss and a system crash.
For procedures on turning off or on a system which is operating as a node in a live cluster, refer to the *SPARCcluster System Service Manual*, Sun part number 802-6789.

Note – For panel removal procedures, see Chapter 8, "Internal Access and Leveling."

7.1 SPARCcluster 1000 System Cabinet

For these procedures, the administration workstation may need to be installed (see the caution above). See Chapter 9, the workstation connection step under Section 9.2.8.1, "Cabling the Terminal Concentrator," and Table 9-2 for this procedure.

7.1.1 Powering Off a Server (Node)

Note – It is understood that the server in question is in the process of hardware installation, and has no users nor data files to be concerned with. If this is not true, halt the system using the procedure found in the the *SPARCcluster System Service Manual*, Sun part number 802-6789.

1. **Turn the front panel key switch to ⏻ (the standby position).**
   This switch is behind the top vented panel.

2. **Turn the AC distribution unit power switch to Off.**
   The unit is at the rear of the cabinet (see Figure 7-1).

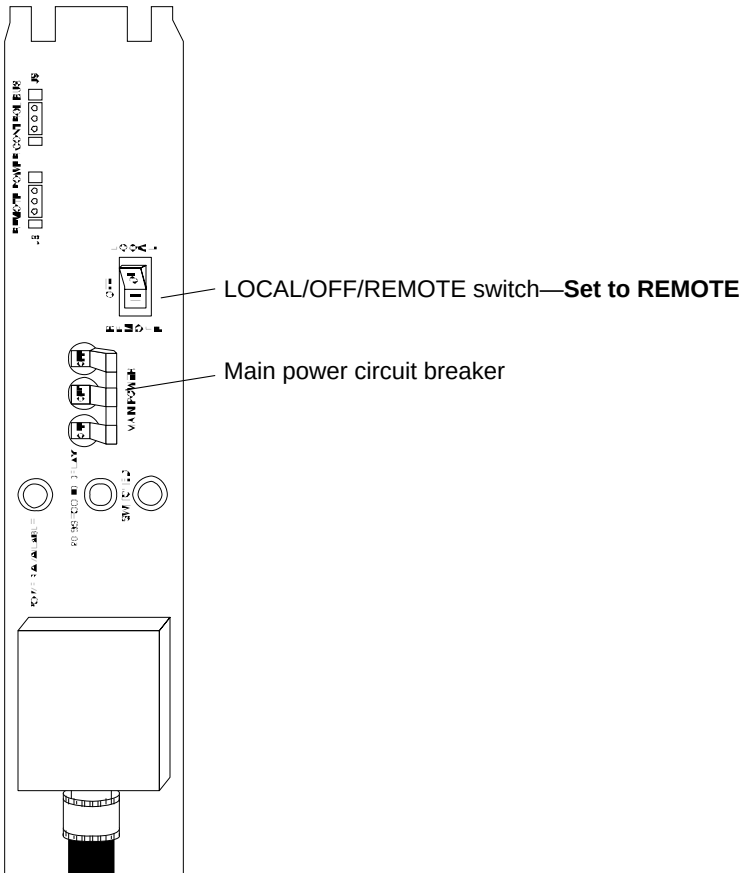


Figure 7-1 AC Distribution Unit Power Switch

Caution – Turn off the power at the AC distribution unit power switch on the rear of the system before attempting to access the system cabinet.

Warning – Some users may elect to power internal cabinet components, like SPARCstorage Arrays, the terminal concentrator, etc., from an external power source (a power circuit other than from the cabinet internal AC power distribution unit). These components, if plugged into an external power source will remain powered even after the cabinet AC distribution unit is turned OFF. Examine the system to verify that no component is externally powered before proceeding. If any component is externally powered, turn the component OFF using the ON / OFF switch at the rear of the component in question. Failure to turn off externally powered components poses a risk of equipment damage and / or personnel hazard from electrical shock.

7.1.2 Powering On a Server (Node)

1. **Begin with a safety inspection.**
   a. **Ensure the AC power switch on the cabinet rear is off.**
   b. **Verify the power cord is plugged into the correct facilities outlet.**
2. **Ensure the LOCAL/OFF/REMOTE switch is in the REMOTE position.** See Figure 7-1.
3. **Ensure the key switch is in the ⏻ (standby position).**
4. **Turn the AC power switch on the rear of the cabinet to ON.**
5. **Turn the key switch to | (the power-on position).** You will hear the fans spinning up.

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

7.2 SPARCcluster 2000 System Cabinet

For these procedures, the administration workstation may need to be installed (see the caution at the beginning of this chapter). See Chapter 10 Section 10.2.10.1, “Connecting the Administration Workstation” and Table 10-2 for this procedure.

7.2.1 Powering Off a Server (Node)

Note – It is understood that the server in question is in the process of hardware installation, and has no users nor data files to be concerned with. If this is not true, halt the system using the procedure found in the *SPARCcluster System Service Manual*, Sun part number 802-6789.

1. **Turn the front panel key switch to ⏻ (the standby position).**
   See Figure 7-2.
2. **Turn the AC distribution unit power switch to OFF.**
   The unit is at the rear of the cabinet. See Figure 7-3.

Caution – Turn off the power at the AC distribution unit power switch on the rear of the system before attempting to access the system cabinet.

Warning – Some users may elect to power internal cabinet components, like disk arrays, or the terminal concentrator, from an external power source (a power circuit other than from the cabinet internal AC power distribution unit). These components, if plugged into an external power source will remain powered even after the cabinet AC distribution unit is turned off. Examine the system to verify that no component is externally powered before proceeding. If any component is externally powered, turn the component OFF using the ON/OFF switch at the rear of the component in question. Failure to turn off externally powered components poses a risk of equipment damage and/or personnel hazard from electrical shock.

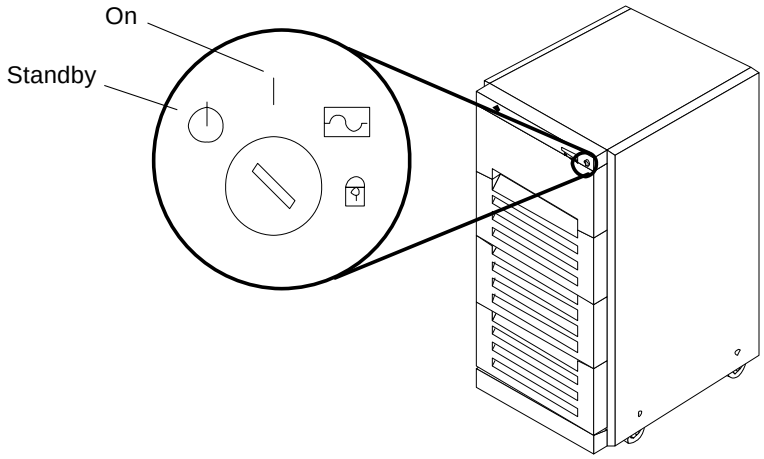


Figure 7-2 Key Switch Positions—System Cabinet Front Panel

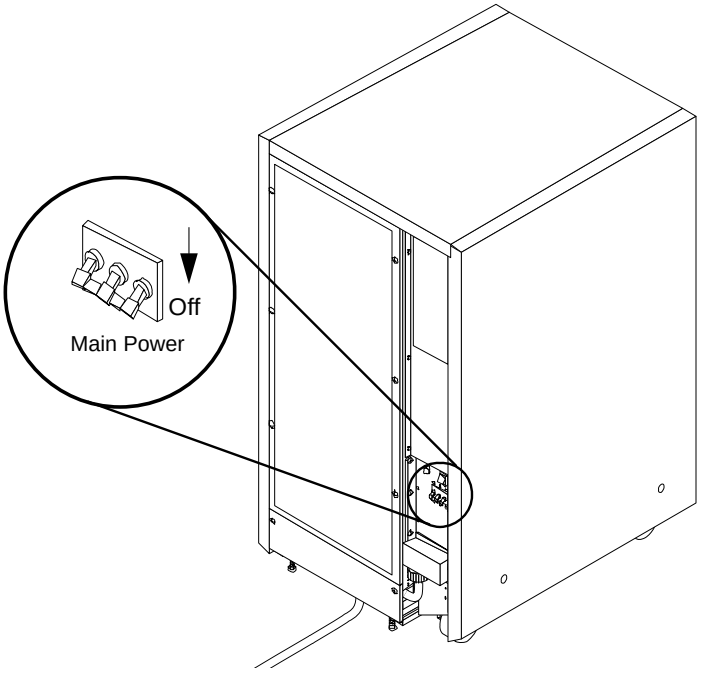


Figure 7-3 AC Distribution Unit Power Switch—Rear of System Cabinet

7.2.2 Powering On a Server (Node)

1. **Begin with a safety inspection.**
   a. **Ensure the AC power switch on the cabinet rear is OFF.**
   b. **Verify the power cord is plugged into the correct facilities outlet.**
2. **Ensure the Local/Remote switch is in the Remote position.**
   See Figure 7-4.
3. **Ensure the key switch is in the ⏻ (standby position).**
   See Figure 7-2.
4. **Turn the AC power switch on the rear of the cabinet to ON.**
   See Figure 7-3.

5. **Turn the key switch to | (the power-on position).**
   You will hear the fans begin turning.

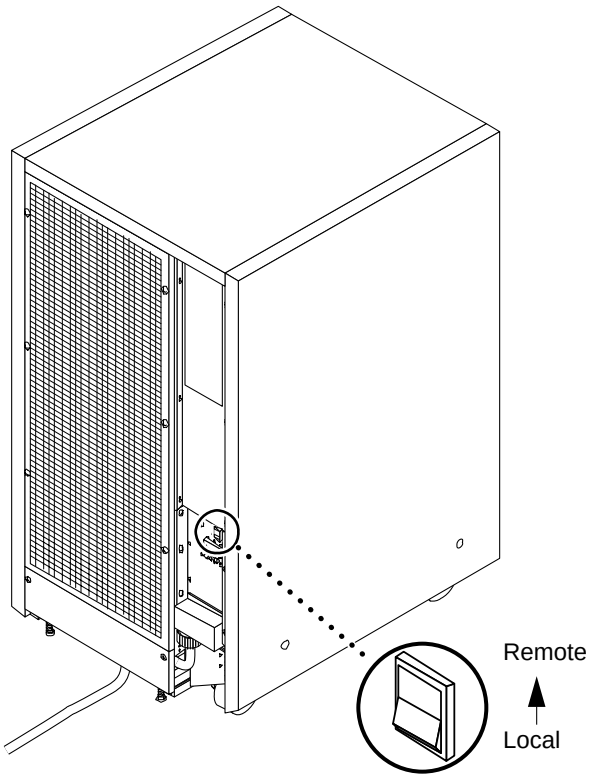


Figure 7-4 Local/Remote Switch Location

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

7.3 Powering On the Server/Storage Chassis

For proper power-on procedures for each chassis installed in the cabinet, refer to the appropriate installation and/or service manual for that chassis.

7.4 Reading POST Messages and Boot Messages

For each server system installed in the expansion cabinet, refer to the appropriate installation and/or service manual. Read the section covering Power-On Self-Test (POST) messages and boot messages to interpret messages for that server.

Likewise, for each storage chassis installed in the expansion cabinet, refer to the installation and/or service manual for the server acting as node to that storage chassis. Messages presented by this server will encompass power-on and boot behavior of the storage chassis in question. In addition, refer to the installation and/or service manual for the storage chassis itself for any additional clarification.

Internal Access and Leveling 8

This chapter provides procedures for

- Removing panels from the two cabinet types
- Leveling the cabinets

Note – Power must be turned off before removing panels. For powering off and on procedures, see Chapter 7, “Powering Off and On”.

Cabinet outer panels are shown in Figure 8-1 through Figure 8-4.

Note – The front panels on all cabinets remove in the same way with the following exception: the hinged front panel is absent on the expansion cabinet and SPARCcluster 1000 cabinet. Instead, there is a vented front panel.

8

8.1 Opening the Hinged Door (SPARCcluster 2000)

1. **Grasp the door at the upper-right corner and pull towards you firmly.**
   See Figure 8-1. The door is secured by clips and ball-studs at the side opposite the hinge. The door will release and swing open if pulled firmly.

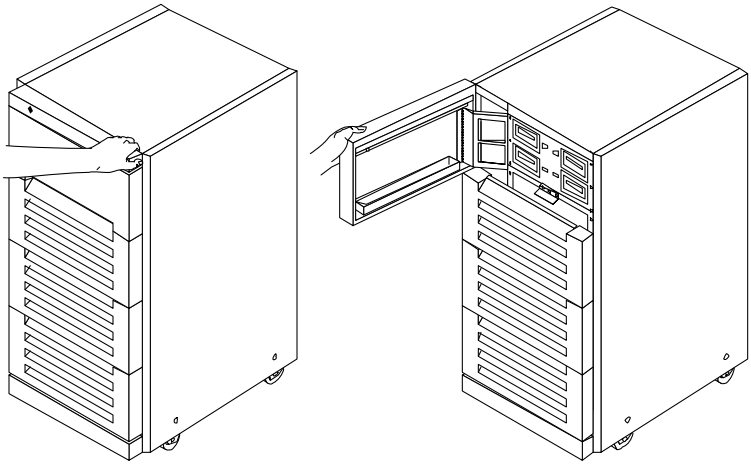


Figure 8-1 Opening the Hinged Door — System Cabinet

8.2 Vented Front Panels (SPARCcluster 2000 or SPARCcluster 1000)

The three vented front panels all remove in the same manner. They are retained by chassis-mounted ball studs that mate with catches on the back side of the panel.

Caution – Do not remove the vented front panels by twisting off. Such action may break the panel or fasteners. Always support the panels during removal and replacement.

To remove the panels:

1. **Grasp the panel under the vent on one side and pull out far enough to just disengage the ball studs.**
   See Figure 8-2.

2. **Repeat this procedure on the other side of the vent to disengage and remove the panel. Set the panel aside.**

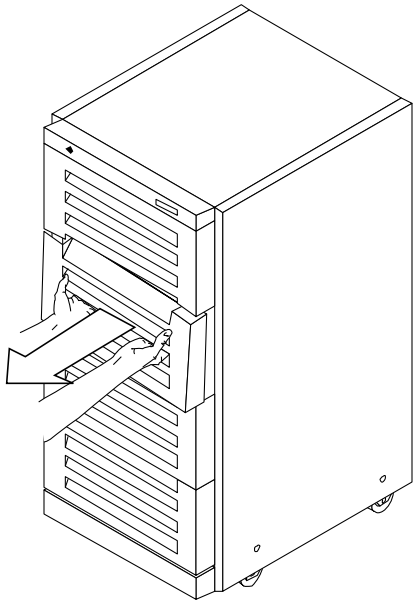


Figure 8-2 Removing the Vented Panels

To replace a panel:

1. **Place the panel against the chassis with ball studs aligned with the catches on the panel.**
2. **Tap or press both sides of the panel into place.**

8.3 Removing and Replacing the Rear Screen Panel

To remove the rear screen panel:

1. **Remove the two #10 Phillips screws securing the panel to the frame.** See Figure 8-3.

2. **Tilt the panel top out and lift it free of the chassis. Set the panel aside.**
   There is a flange on the bottom of the rear screen.

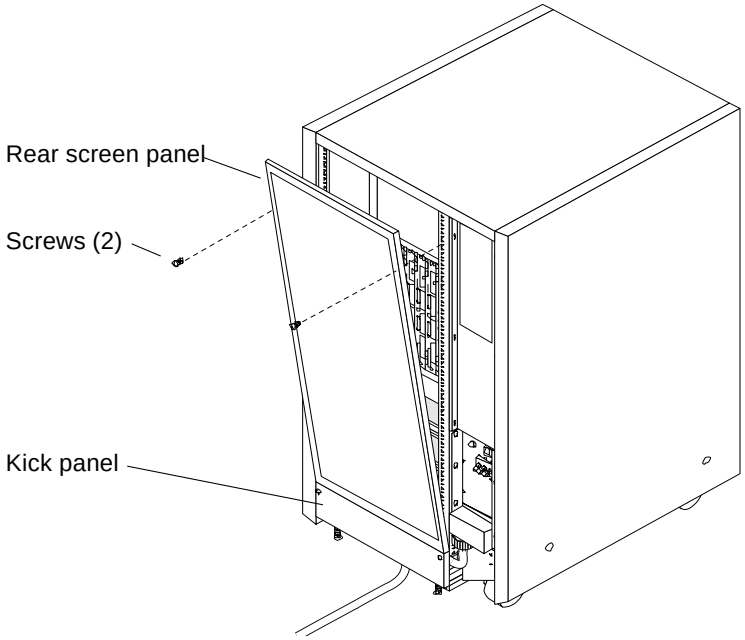


Figure 8-3 Rear Screen Panel Removal

To replace the rear screen panel:

1. **Insert the panel so the bottom flange engages behind the top of the kick panel.**
2. **Tilt the panel flush against the frame and secure it using Phillips screws.**

8.4 Removing and Replacing the Kick Panel

To remove the kick panel:

1. **Loosen the two captive screws.**
   See Figure 8-4.

To replace the kick panel:

♦ **Arrange cables (if applicable) neatly behind the kick panel, then fasten the two captive screws to secure the panel in place.**

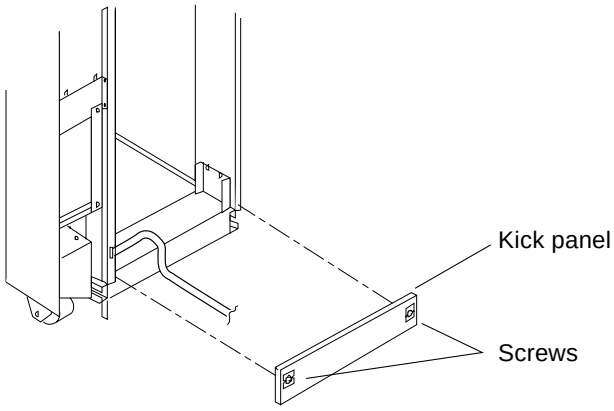


Figure 8-4 Removing the Kick Panel

8.5 *Adjusting the Stabilizer Bar and leveling Pads*

Warning – Always extend the stabilizer bar before pulling the disk drive trays out for servicing.

The cabinet has six pads.

- Four leveling pads on the cabinet frame support the cabinet and are adjusted to raise the cabinet off the wheels, level it and prevent rocking.
- Two pads incorporated into the front of the stabilizer bar are adjusted such that, should the cabinet tend to tip forward (as when extending internal trays), they contact the floor to prevent further tipping.

8.5.1 Stabilizer Bar

To extend the stabilizer bar:

1. **Grasp the stabilizer bar under the front edge and pull it out to its fully extended position.**
   See Figure 8-5.

2. **Screw the two stabilizer bar leveling pads down until they are 3 to 6 mm (1/8 to 1/4 inch) *above* the floor.**
   Ensure both pads are at equal heights. This clearance allows the stabilizer bar to slide in and out easily, yet catch the cabinet if it should begin to tilt.

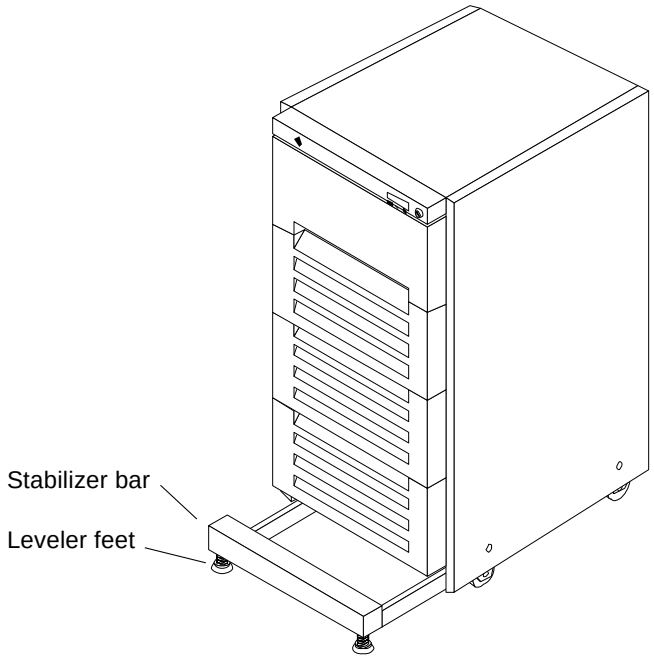


Figure 8-5 Stabilizer Bar

8.5.2 Leveling Pads

This procedure requires that the screen panel and kick panel be removed. See Section 8.3, “Removing and Replacing the Rear Screen Panel,” and Section 8.4, “Removing and Replacing the Kick Panel.”

1. **Remove the leveling wrench, located inside the cabinet:**
   Locate the leveling wrench in the upper part of the rack. Unlock the tie wrap and remove the wrench. Press the tie wrap tabs together to loosen the strap.

2. **Remove the kick panel.**
   The kick panel is held by two captive screws.

3. **Use the wrench to lower the four main leveling pads (not the pads on the stabilizer bar).**
   See Figure 8-6. The four main leveling pads are located near the corners of the cabinet. Lower the pads until all four wheels are off the floor.

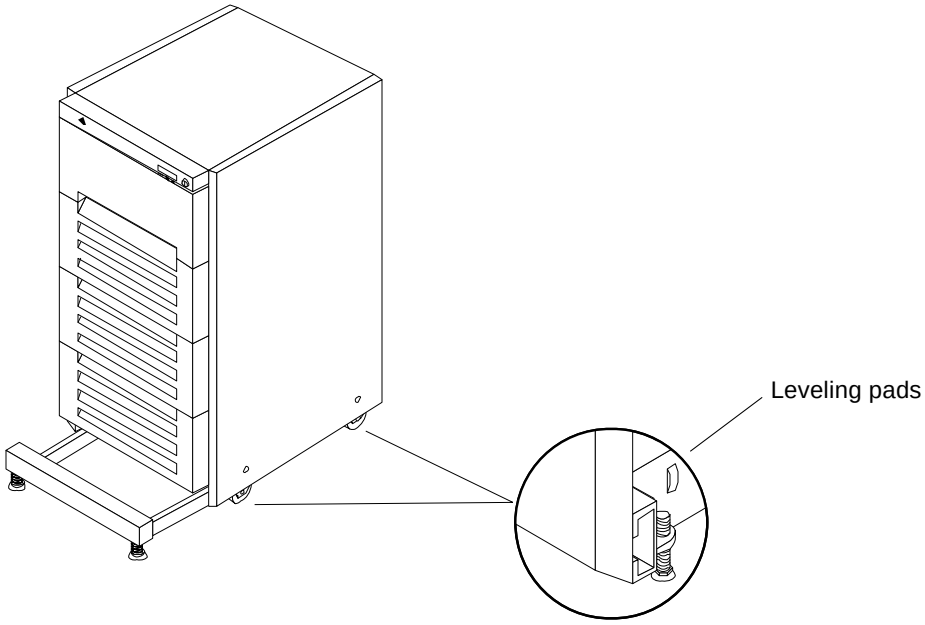


Figure 8-6 Leveling Pads

4. **Adjust the two leveling pads on the stabilizer bar:**

   a. **Fully extend the stabilizer bar.**
      See Figure 8-7.

b. Screw the pads down until they almost touch the floor.
Leave approximately 6 mm (1/4-inch) clearance between the pads and floor. This clearance will prevent tilting of the cabinet, and yet allow you to easily extend or retract the stabilizer bar.

c. Slide the stabilizer bar back into the cabinet.

5. Restore the wrench to its storage place in the rack.

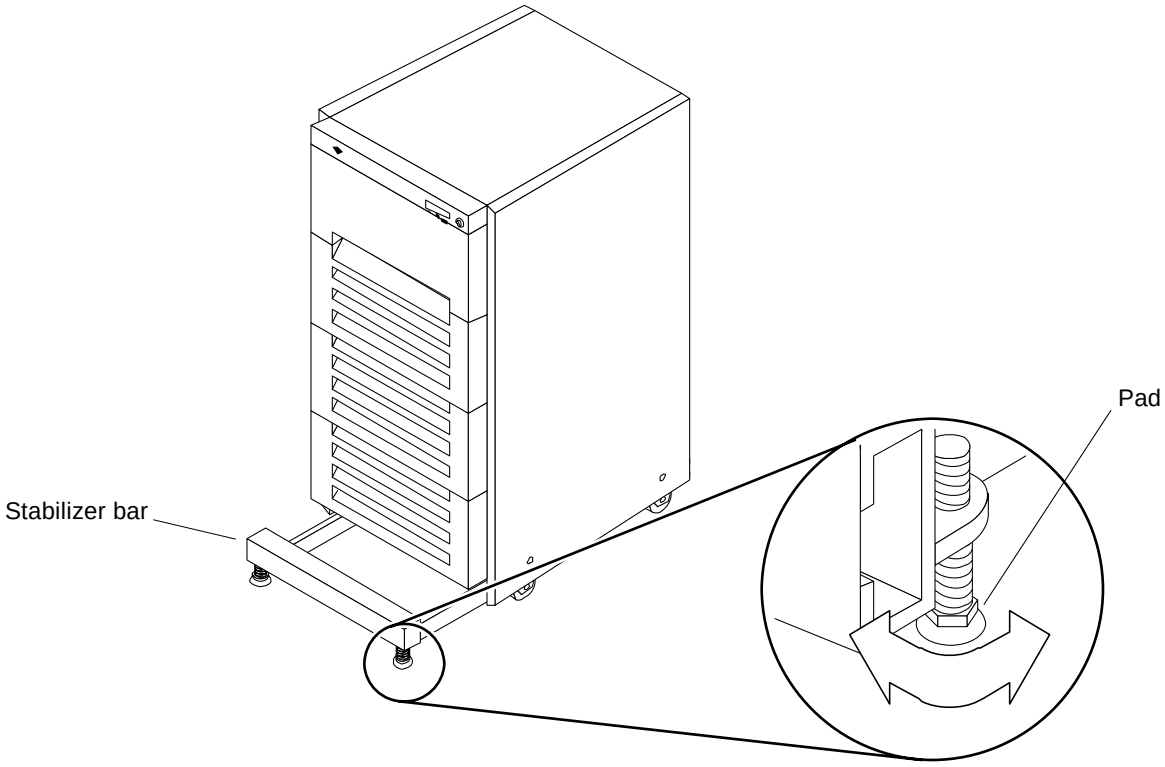


Figure 8-7 Stabilizer Bar Leveling Pads

8.6 Removing and Replacing the Side Panels

To remove the side panel:

1. Loosen two slot-head captive screws near the panel base.
See Figure 8-8.

2. **Tilt the panel bottom out.**
3. **Lift the panel up until free of the tabs at the top of the chassis.** Set the panel aside.

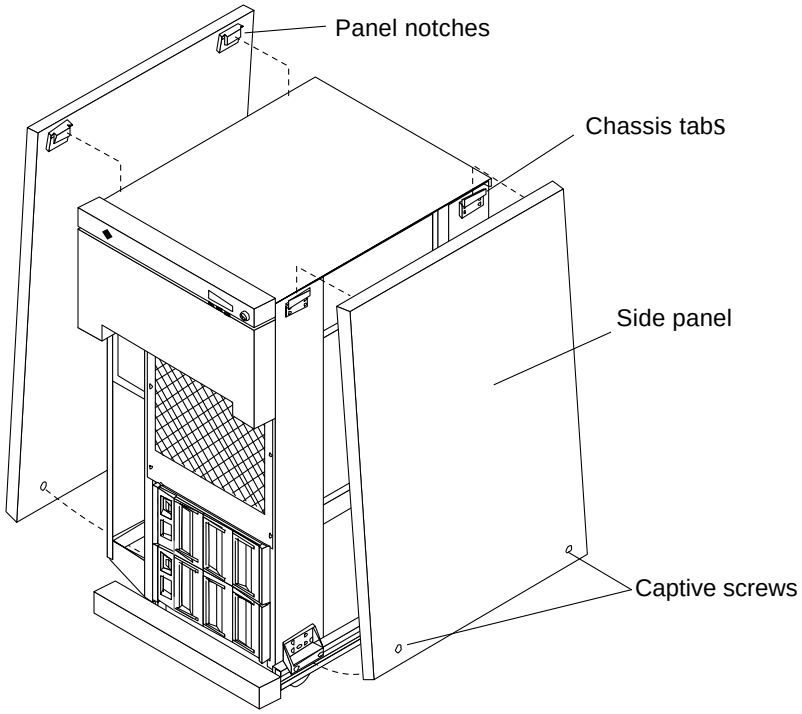


Figure 8-8 Removing the Side Panels

To replace a side panel:

1. **Place the panel against the cabinet so the notches on the panel inside align with tabs at the chassis top.**
2. **Lower the panel into place and allow it to hang flush against the chassis.**
3. **Tighten the two captive screws at the panel base.**

8

SPARCcluster 1000 Hardware Installation

9

9.1 Factory-Assembled SPARCcluster 1000 Hardware

Do these tasks in the order listed	See page
Preparing the Cabinets	*page 9-1*
Connecting the Power Cords	*page 9-2*
Configuring the Card Cages	*page 9-11*
Cabling System Components	*page 9-12*

The basic configuration is completely preassembled in a single cabinet.

Note – If you are installing a customer assembled system, see Section 9.2, “Customer-Assembled SPARCcluster 1000 Hardware.”

9.1.1 Preparing the Cabinets

1. **Unpack and inventory the equipment, if you have not already done so.**
   See Chapter 2 for a list of equipment.
2. **Move the cabinets to their designated installation locations.**
   For site planning guidelines, see Chapter 5, “SPARCcluster 1000 Configurations.”
3. **Ensure the front panel key switch is in the ⏻ (standby) position.**

9.1.2 Connecting the Power Cords

1. **Remove the cabinet panels to access the power switches and cables.**
   See Section 8.1, “Opening the Hinged Door (SPARCcluster 2000)”

2. **Level the cabinet.**
   See Section 8.5.2, “Leveling Pads”

3. **Turn the power sequencer power switch to Off.**
   The switch is at the rear of the cabinet. See Figure 9-1.

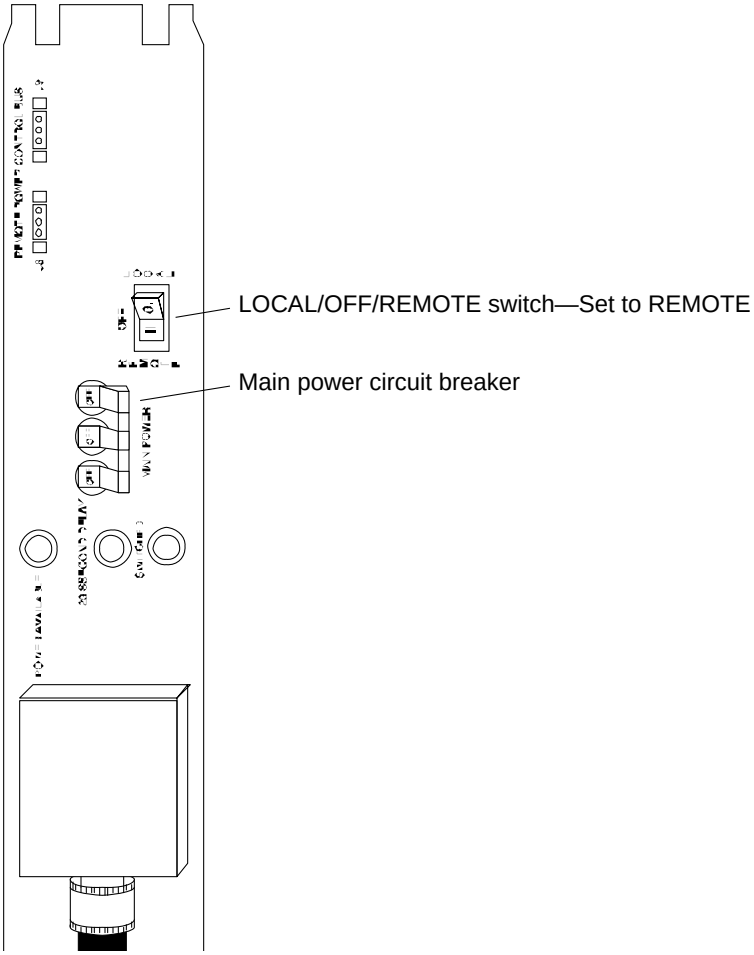


Figure 9-1 Power Sequencer Unit Power Switch

Warning – The power must be turned off at the power sequencer or risk of electrical shock to personnel exists.

4. **Uncoil the AC power cord and connect it to an AC outlet.**
   As noted in Chapter 1, the AC outlet should be part of a circuit dedicated to this system. Do not connect electrical motors or heaters to this circuit.

Caution – Do not disconnect the power cord when working on the system. This connection provides a ground path that prevents damage from electrostatic discharge.

5. **Plug in AC cords for any chassis within the cabinet to provide grounding for static electricity.**

9.2 *Customer-Assembled SPARCcluster 1000 Hardware*

Do these tasks in the order listed	See page
Preparing the Cabinet	*page 9-3*
Installing the Cabinet	*page 9-4*
Connecting the Main AC Cord	*page 9-4*
Installing the SPARCserver 1000 and the SPARCstorage Array Systems	*page 9-5*
Installing the Terminal Concentrator	*page 9-8*
Configuring the Card Cages	*page 9-11*
Cabling System Components	*page 9-12*

9.2.1 *Preparing the Cabinet*

9.2.1.1 *Powering Off the Cabinet*

Halt the operating system and power off the system and expansion cabinets. See Chapter 7, Section 7.1, “SPARCcluster 1000 System Cabinet.”

9.2.1.2 Accessing the Cabinet—Removing the Panels

Remove the cabinet panels to access the power switches and cables. See Chapter 8, "Internal Access and Leveling."

9.2.2 Installing the Cabinet

1. **Unplug AC cords and all cabling to allow repositioning of the cabinets (if required).**
2. **Move the cabinets to their designated installation locations. See Chapter 4 for site planning guidelines.**

Note – When moving the cabinets, replace all panels to protect inner components during transport.

---

3. **Level the cabinet(s). See Section 8.5.2, "Leveling Pads."**
4. **Plug in AC cords to provide grounding for static electricity.**
5. **If the panels are on, remove them. See Chapter 8, "Internal Access and Leveling."**

9.2.3 Connecting the Main AC Cord

1. **If necessary, plug in AC cords for all AC powered components in the cabinet to provide grounding for static electricity.**

Caution – Do not disconnect the power cord when working on the system. This connection provides a ground path that prevents damage from electrostatic discharge.

---

2. **Ensure the front panel key switch is in the ⏻ (standby) position.**
3. **Ensure the system power sequencer power switch is set to Off.**
   The switch is at the rear of the cabinet. See Figure 9-1.
4. **Uncoil the cabinet AC power cord and plug it into an AC outlet.**
   As noted in Chapter 1, the AC outlet should be part of a circuit dedicated to this system. Do not connect electrical motors or heaters to this circuit.

9.2.4 *Installing the SPARCserver 1000 and the SPARCstorage Array Systems*

Two or more SPARCstorage Arrays are installed in the cluster. These devices provide storage for the highly available data—NFS file systems and DBMS databases.

The cluster contains two identically configured SPARCserver 1000 systems.

9.2.4.1 *Mounting in the Cabinet*

- **Install the rails in the cabinets and install the SPARCstorage Arrays and the servers on the rails. In addition, install the air baffles and one or two blower assemblies in the cabinet.**
  For these procedures, See Appendix A, “Air Baffle, Rackmount Rail and Blower Assembly Installation.”

9.2.4.2 *Preparing the SPARCstorage Arrays*

1. **Locate the DIAG switch on the array rear panel.**
   See Figure 9-2.

2. **Ensure that the DIAG switch is set to DIAG and not to DIAG EXT.**
   Do not use the DIAG EXT position, as it will invoke extended diagnostics and prevent the SPARCstorage Array from booting. Use DIAG only for normal operation.

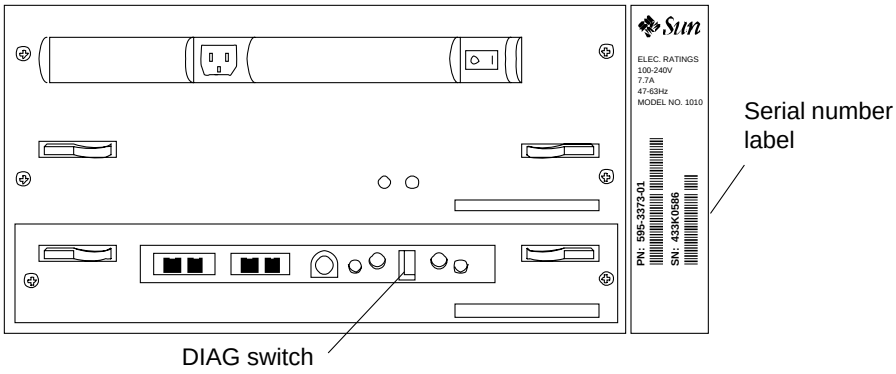


Figure 9-2 SPARCstorage Array Voltage Rating on the Serial Number Label

3. **Locate the serial number label on the rear panel of the chassis.**

4. **Check the electrical ratings label on the serial number label. Verify that the stated rating matches your AC input voltage.**

Table 9-1 provides maximum system operating voltage and frequency ranges.

Table 9-1 SPARCstorage Array 100 Series Nominal Power and Maximum Current Parameters

Configuration	Nominal AC Input Voltage Range - Single Phase	Operating Range	Operating Frequency Range	Maximum Current Requirement	Power Supply Output
North American	100–120 VAC	90-264 VAC	47–63 Hz	6.5A	460W
International	220–240 VAC	90-264 VAC	47–63 Hz	6.5A	460W

Connecting the Power

1. **Connect the server and SPARCstorage Array power cords.**

   a. **Connect a power cord at the rear of each chassis.**
   See Figure 9-3.

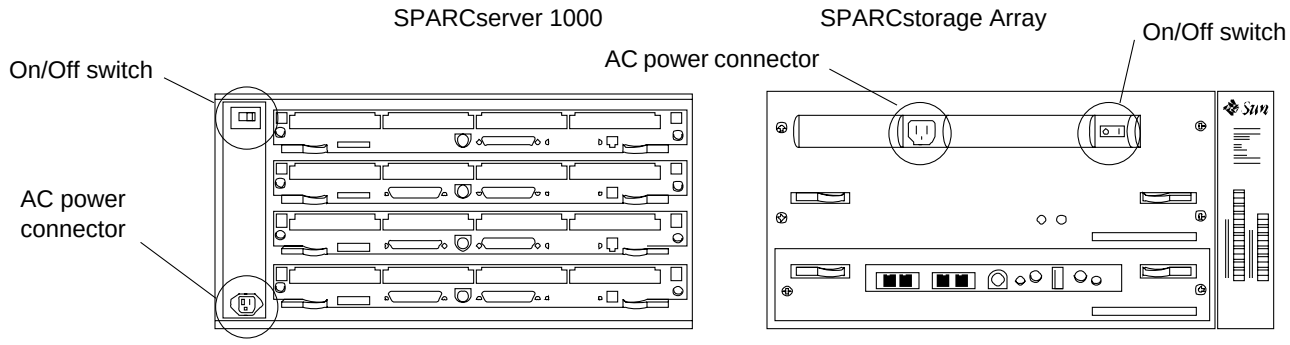


Figure 9-3 SPARCserver 1000 and SPARCstorage Array AC Power Connector and Power Switch

   b. **Route the power cords to the power sequencer.**
   Dress the power cords down the left side of the rack. Roll any excess cord and tuck it into the space under the power sequencer at the bottom of the cabinet. Secure it in place using tie-wraps.

2. **Connect the chassis to power.**
   Plug the power cords from the chassis into the power sequencer. Use the switched outlets identified in Figure 9-4 for the SPARCserver 1000 and SPARCstorage Arrays 0 through 2 as appropriate.

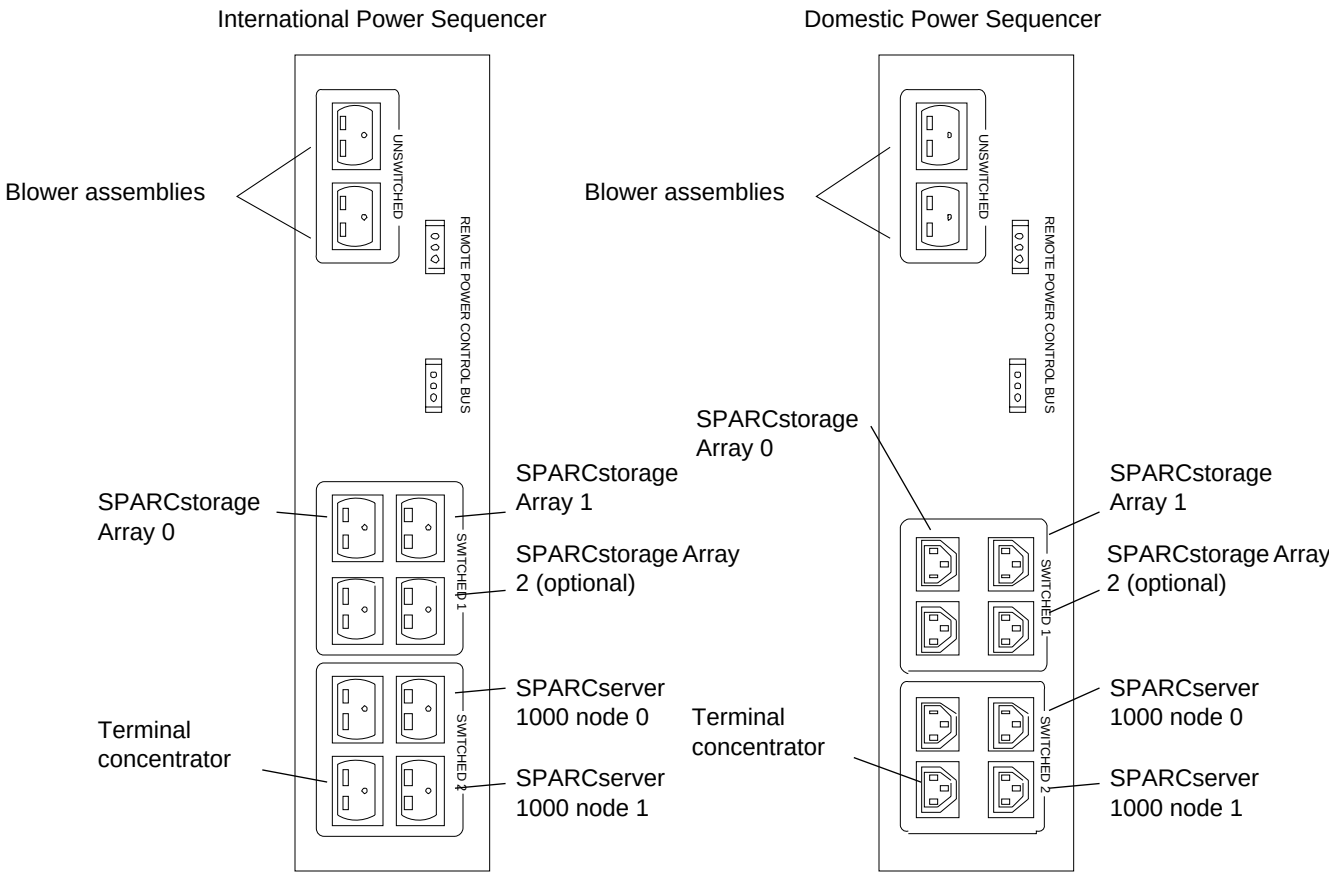


Figure 9-4 Plugging SPARCstorage Arrays/Terminal Concentrator into the Power Sequencer

3. **Turn the AC power switch on all SPARCstorage Arrays and servers.**
   See Figure 9-3.

9.2.5 Expansion Rack

Install SPARCstorage Array 200 Series and RSM unit in the expansion racks. For these procedures, refer to:

802-5062	SPARCstorage RSM Installation, Operations, and Service Manual
802-5063	SPARCstorage RSM Installation Supplement
802-7104	SPARCstorage RSM Product Note
802-7105	SPARCstorage RSM Read Me First

9.2.6 Installing the Terminal Concentrator

At the rear of the cabinet, install the bayonet hinge portion of the terminal concentrator bracket.

1. **Install the hinge in the rear of the primary cabinet. See Figure 9-5.**
   a. **Remove the screw in hole 79 on the inside securing the rear portion of the side air baffle.**
   b. **Orient the bayonet hinge as shown in Figure 9-5 and thread screws through the hinge into hole numbers 78 and 83 on the outside edge—do not tighten.**

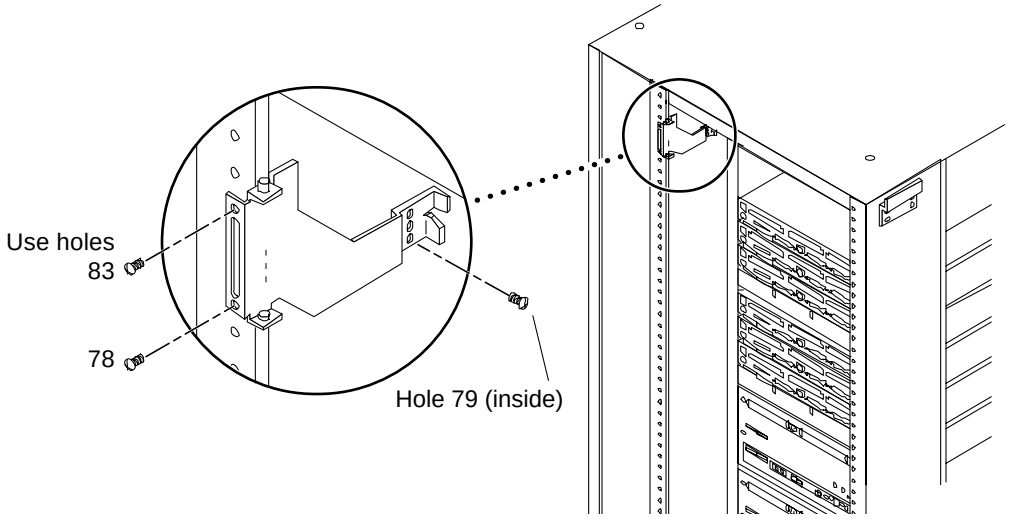


Figure 9-5 Installing the Terminal Concentrator Hinge

c. Replace the screw in hole 79 removed in step a above. Now, the tail of the bayonet hinge overlays the air baffle, so the screw must penetrate through the hinge and air baffle and thread into the rack.

d. Tighten all screws to secure the hinge and air baffle in place.

2. Assemble the terminal concentrator unit into the bracket.

a. Place the terminal concentrator on the bracket as shown in Figure 9-6.

b. Shove the terminal concentrator to the left—snug against the left side of the bracket.

c. Install the clamp piece to secure the unit to the bracket.
Place the clamp piece on the right side of the terminal concentrator. Align holes in the clamp piece with holes in the bracket.

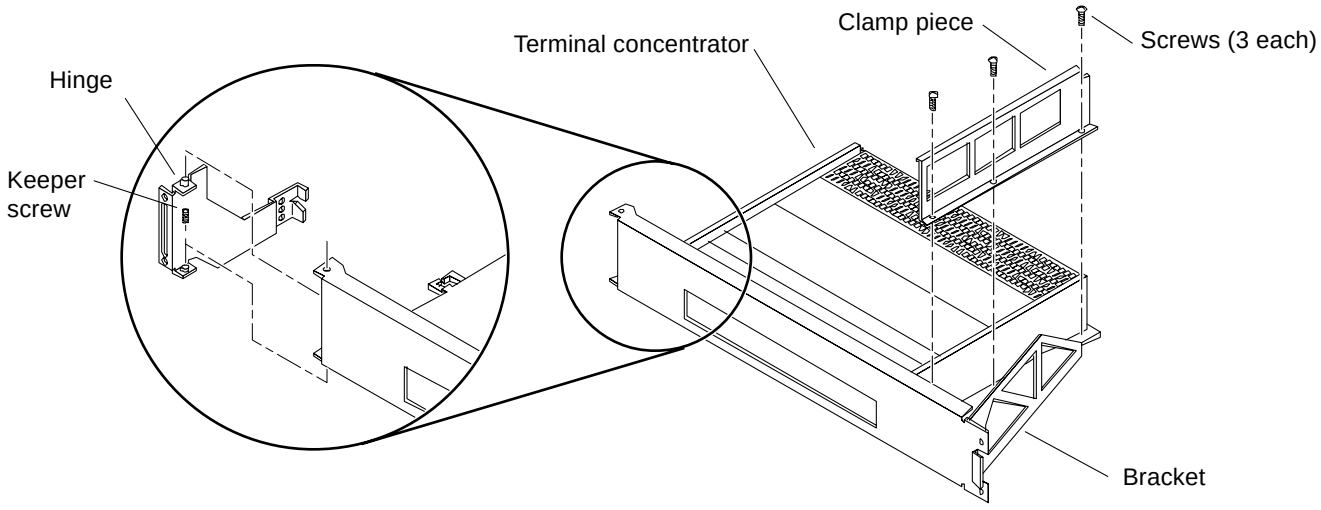


Figure 9-6 Assembling the Terminal Concentrator Bracket

d. Install three screws to secure the clamp piece (and terminal concentrator) to the bracket and tighten.
This completes assembly of the bracket assembly.

3. Install the terminal concentrator bracket onto the hinge in the chassis.

a. Tilt the bracket slightly and align the top hinge hole in the bracket with the mating stud on top of the hinge.
Raise the right side of the bracket about six inches above the left.

b. Drop the right side of the bracket (to level it) while aligning the screw hole in the bottom of the bracket with the threaded hole in the hinge.
See Figure 9-6.

c. Secure the bracket to the hinge.
Install a keeper screw (shown in Figure 9-6) through the bracket into the hinge and tighten. Figure 9-7 shows the bracket installed.

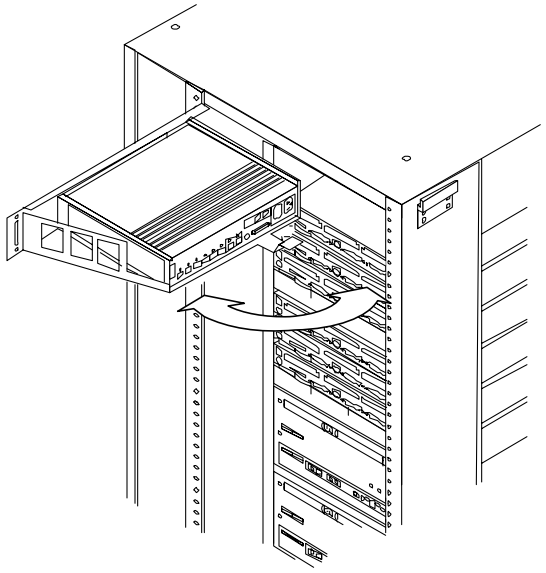


Figure 9-7 Terminal Concentrator Bracket Installed and Open

Note – Terminal concentrator data and power cabling will be performed at a later stage. Swing the terminal concentrator bracket closed so it does not protrude and present a hazard to personnel working around the cabinet.

9.2.7 Configuring the Card Cages

For instructions on removing system boards, refer to the documentation supplied with the system boards or the *SPARCserver 1000 System Service Manual*.

9.2.7.1 SBus Cards

If SBus cards or other devices are to be installed, do it now.

- **Load the system boards 0 through 3 as appropriate with the intended SBus card complement.**
  For SBus card installation procedures, refer to the documentation supplied with the card(s) in question or to the *SPARCserver 1000 System Service Manual*.

Note – Load the respective system boards for both servers identically.

Note – Beyond minimum configuration, install FC/S cards FC/S cards in the first available empty SBus slot, following all other boards in the system. This will ensure that the controller numbering is preserved if the Solaris Operating Environment is reinstalled.

9.2.7.2 System Boards

1. **Install the system boards loaded with SBus cards into the card cage.**
   For system board installation procedures, refer to the documentation supplied with the system boards or the *SPARCserver 1000 System Service Manual*.

2. Fill all unused slots with a filler panel. See Figure 9-8.

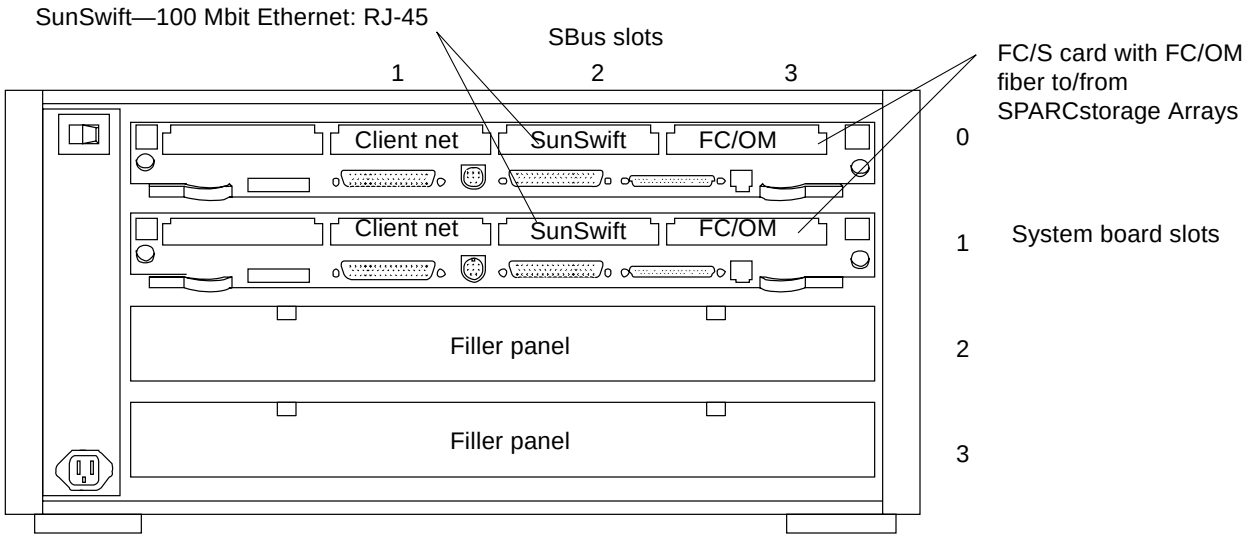


Figure 9-8 Minimum Configuration: System Boards Loaded with SBus Cards

9.2.8 Cabling System Components

Network cabling is presented in Table 9-2. Procedures for connecting each cable follow the table.

Note – For fiber-optic cable connections, see Table 9-3.

Table 9-2 Cable Connections (Except Fiber-optic)

	From Server (Cabinet A)		To		Interface/cable
System	**Node 0**	**Node 1**	**Cabinet A or ...**		**Type**
Board	**SBus Slot No. or ...**	**SBus Slot No. or ...**	**Board No./Slot No.**	**Other**	
0	1 Client net			Secondary Ethernet	AUI or RJ-45 [2]
		1 Client net		Secondary Ethernet	AUI or RJ-45 [2]
	le0 connector (onboard)			Primary Ethernet network	RJ-45 [2]
		le0 connector (onboard)		Primary Ethernet network	RJ-45[2]
	Serial A (onboard)			Terminal concentrator port 2	Serial
		Serial A (onboard)		Terminal concentrator port 3	Serial
	2 SunSwift	2 SunSwift	Connect node 0 to node 1		Private net [3]
	3[1]	3[1]			
1	1[2]	1[2]			
	2 SunSwift	2 SunSwift	Connect node 0 to node 1		Private net [3]
	3[1]	3[1]	1 slot A		
		3[1]	1 slot B		
2[1]					
3[1]					
Other	Administration workstation Serial A			Terminal concentrator port 1	Serial
	Administration workstation Ethernet port			Primary Ethernet network	AUI or RJ-45 [2]

1. See Table 9-3.

2. Category 5 twisted [pair.

3. Category 5 twisted pair, Sun Part Number 530-2149 (1 meter) or 530-2150 (5 meter).

9.2.8.1 *Cabling the Terminal Concentrator*

Warning – *Do not* plug a keyboard directly into a host system board. If a keyboard is plugged into a system board, it then becomes the default for console input, thus preventing input from the system administration workstation / terminal concentrator serial port. In addition, plugging a keyboard directly into a host system board while power is applied to the host sends a break signal to the Solaris operating system, just as if you had typed a Stop (L1-A) on the keyboard.

Terminal concentrator cabling must be routed in a special way. The terminal concentrator is located on a hinged bracket.

1. **Swing the terminal concentrator bracket open to expose connectors.** Remove two screws (Figure 9-14) and swing it out (Figure 9-9).

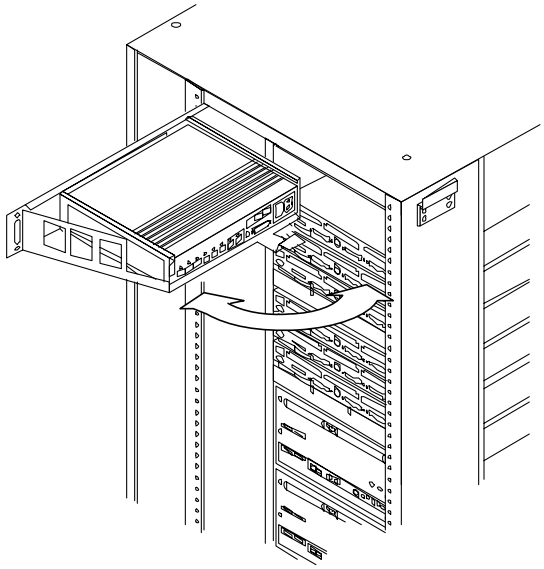


Figure 9-9 Swinging Terminal Concentrator Out of the Cabinet

2. **Connect the administration workstation:**
   a. **Plug one end of cable PN 530-2152 into the terminal concentrator, Port 1 (RJ-45). See Figure 9-10.**

b. Plug the other end into the administration workstation Serial A socket.

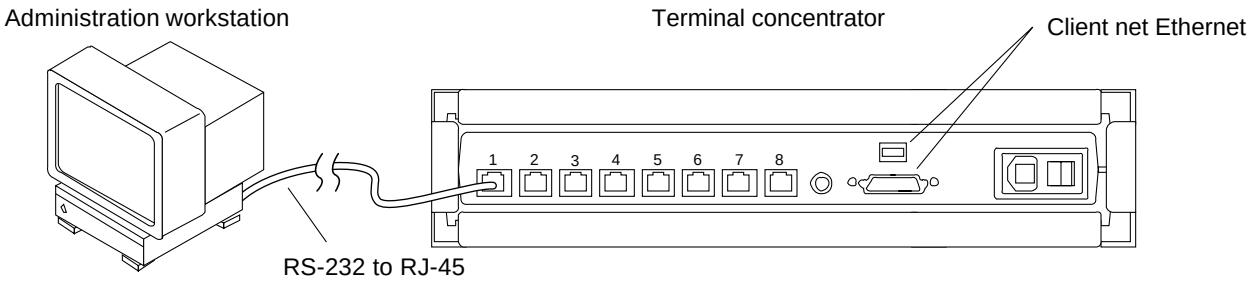


Figure 9-10 Connecting the Administration Workstation

3. **Connect the Public net Ethernet to the terminal concentrator:**
   Plug the public net Ethernet cable into the right side connector on the terminal concentrator. See Figure 9-10.

4. **Connect the terminal concentrator power cord.**
   Plug the female end into the connector on the rear of the unit. See Figure 9-11.

Note – For this procedure, use two serial cables, each with an RJ-45 connector on one end and a DB25 connector on the other.

---

5. **Connect the Public net Ethernet to the nodes:**

   a. **Node 0: Plug one end of the serial cable into port 2 on the terminal concentrator.**
      See Figure 9-11.

   b. **Node 1: Plug the other end of the serial cable into port 3 on the terminal concentrator.**

6. **With all cables (signal and power) plugged into the terminal concentrator, gather all cables together and route them over the unit and down the right side.**
   See Figure 9-11 for routing. Secure in place using a cable ties.

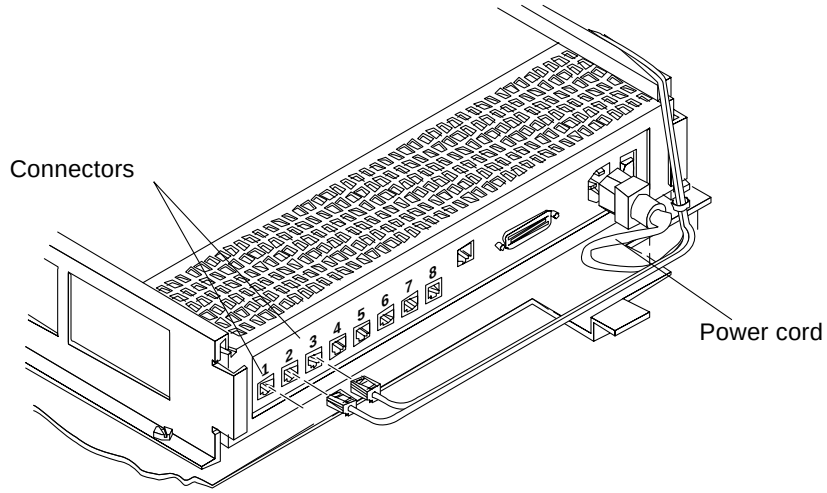


Figure 9-11 Terminal Concentrator Cabling Detail

7. **Find the cable tie under the terminal concentrator bracket.**
   This cable tie is attached to a bump under the bracket. Secure the cables to the underside of the bracket using this cable tie.

8. **Run all cables down the inside of the cabinet pillar.**
   Secure in place using cable ties. See Figure 9-12.

9. **Route the power cable through the hole near the base of the pillar.**
   If desired, run the Ethernet and administration workstation cable through this hole too. The hole is lined with a nylon protective stripping to prevent cable chafing.

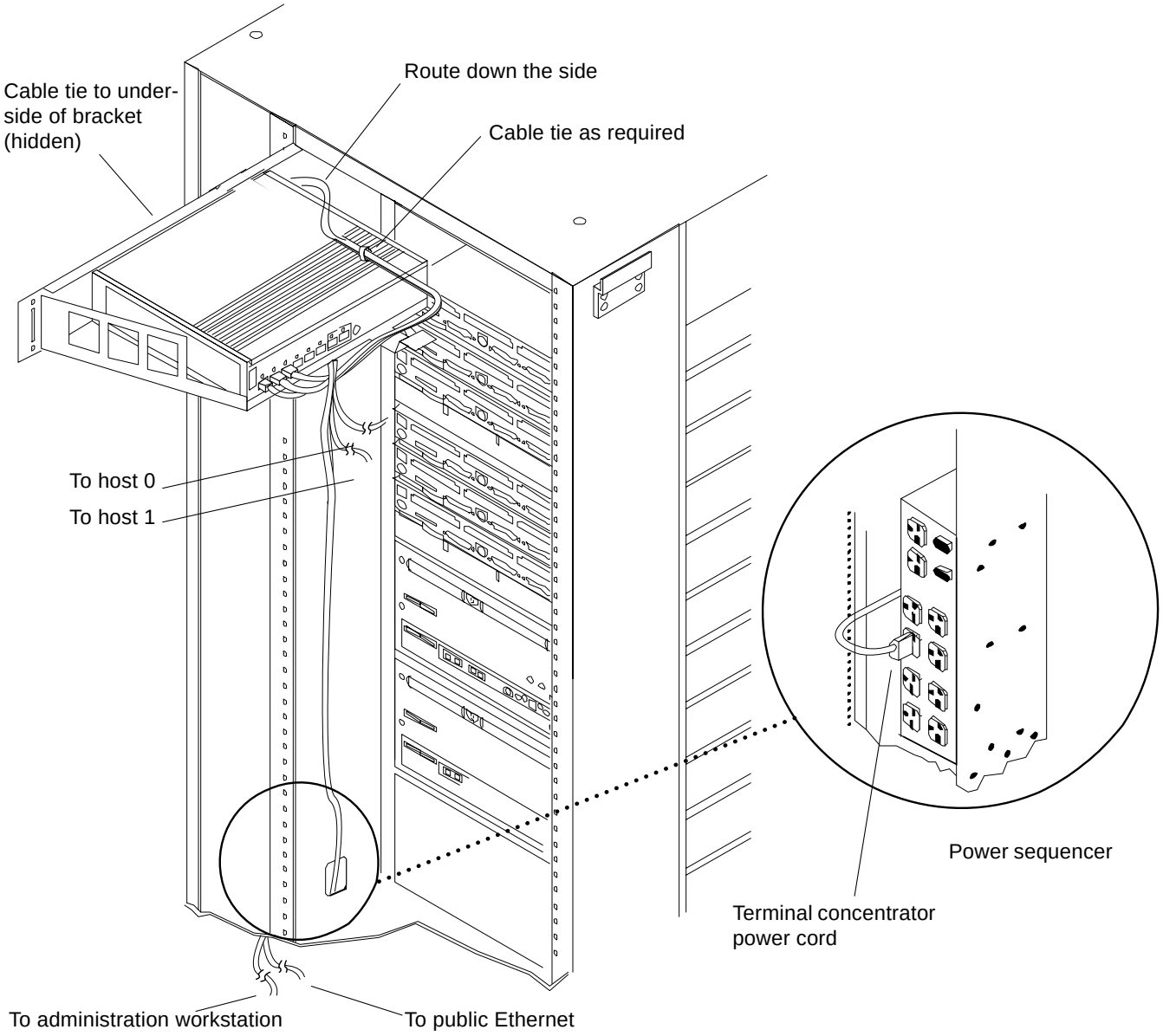


Figure 9-12 Cabling the Terminal Concentrator

10. **Route the Ethernet cable and administration workstation cable. Route these cables out the bottom of the cabinet and to their respective destinations. Make external connections as required.**

11. **Route the Public Ethernet cables from terminal concentrator port 2 to the Serial A port on node 0 server. Route the cable from terminal concentrator port 3 to the Serial A port on node 1 server.**
See Figure 9-13.

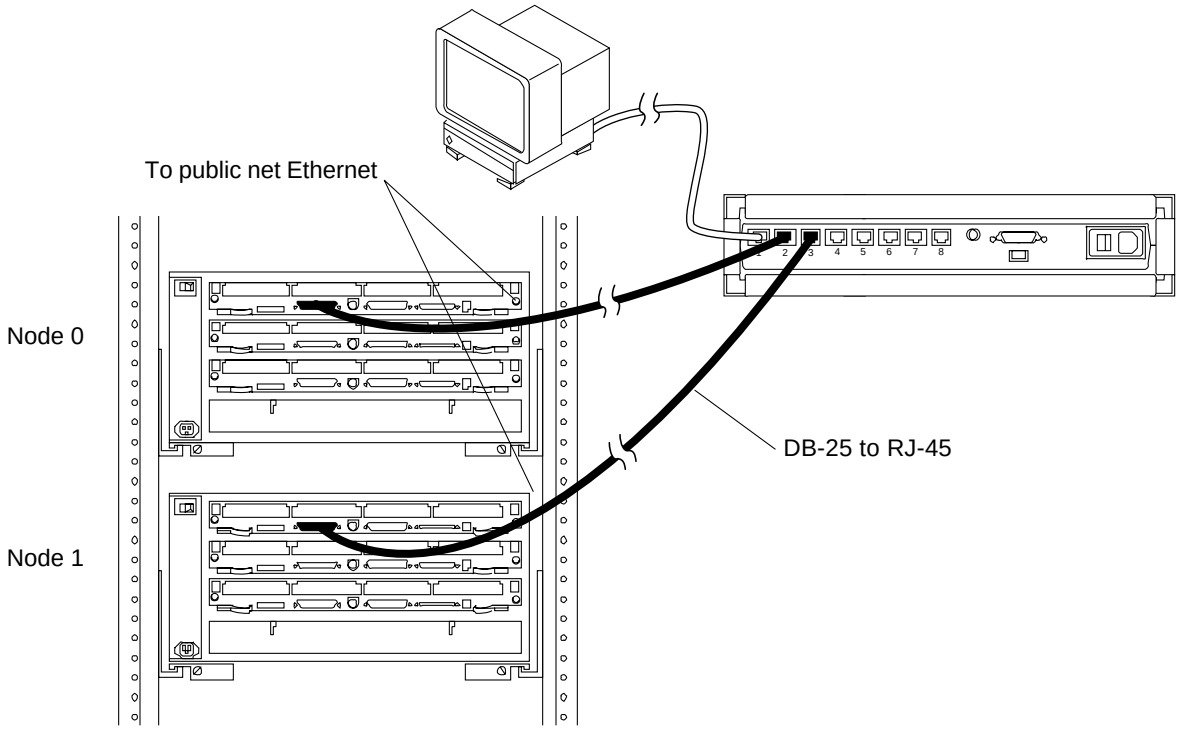


Figure 9-13 Connecting the Terminal Concentrator and Public Ethernet

12. **Connect the terminal concentrator power cord.**
Plug the power connector into the receptacle on the power sequencer identified in Figure 9-12.

13. **Close the terminal concentrator bracket and secure.**

    a. **Swing the bracket closed and flush against the cabinet.**

b. Install two screws to secure the bracket in place.
See Figure 9-14.

Note – You may need to lift up on the terminal concentrator mounting bracket to align the screws.

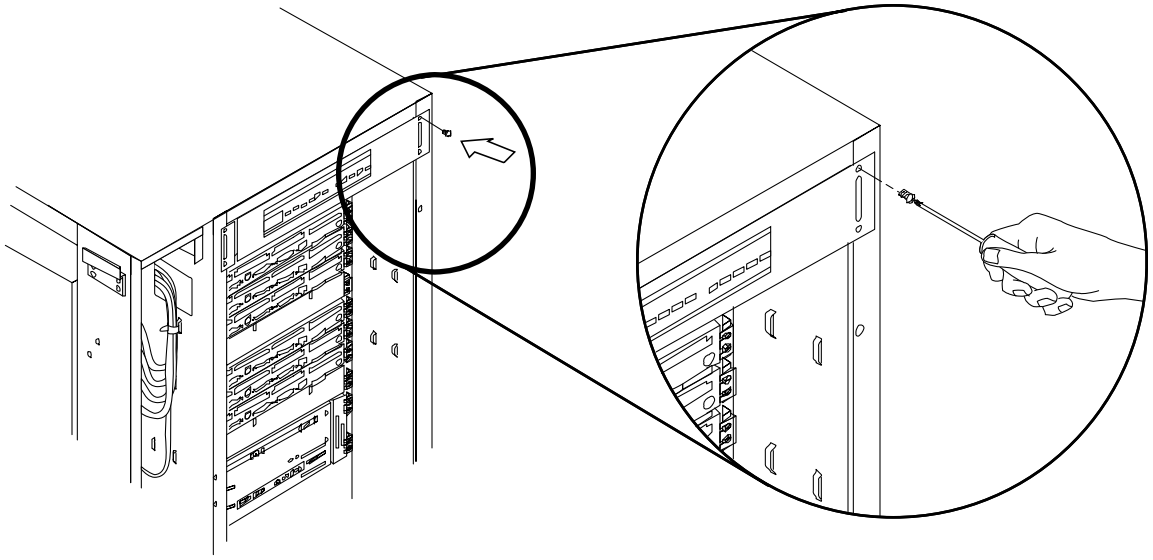


Figure 9-14 Installing the Terminal Concentrator Screws

9.2.8.2 Connecting Node 0 to Node 1

With two Sun private net cables (short or long), connect one node to the other.

Use short (Part No. 530-2149) or long (Part No. 530-2150) Sun private net cables as appropriate.

Note – These Sun private net cables are not interchangeable with standard Ethernet cables.

First Cable

1. **Connect one end of the Sun private net cable to the SunSwift 100 Mbit Ethernet card in system board slot 0, SBus position 1.**
   See Figure 9-15.

2. **Connect the other end to the identical system board and SBus card in the other node.**

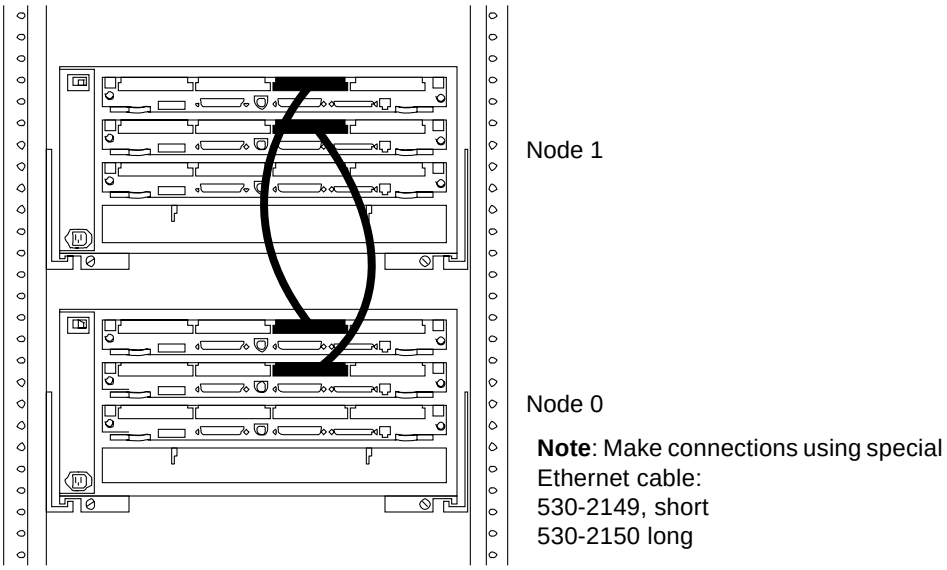


Figure 9-15 Node-to-Node Connection

Second Cable

1. **Connect one end of the Sun private net cable to the SunSwift 100 Mbit Ethernet card in system board slot 1, SBus position 2.**
   See Figure 9-15.

2. **Connect the other end to the identical system board and SBus card in the other node.**

Remaining Cables

- **Connect all remaining cables.**
  Table 9-2 summarizes cables that can be connected at this time. Your system may have more network cables than are listed in this table.

9.2.8.3 *Connecting the SPARCstorage Arrays*

Installing FC/OM Optical Modules in all SPARCstorage Array

♦ **Install the second module in the array using instructions provided with the module.**
The arrays are delivered with one FC/OM optical module installed.

Labeling Fiber-optic Cables

♦ **Label the fiber-optic cables prior to installation.**
Labeling ensures accurate installation and eases system reconfiguration and expansion later.

The suggested fiber-optic cable labeling scheme for any given cable is:

- One end connects to an FC/OM module in node 0 or 1 (cabinet A)
- The other end connects to an FC/OM module in the SPARCstorage Array of a given elevation in cabinet A or B. Elevations are denoted by color from top to bottom: blue, red, orange, yellow, and white.

Affix labels to both ends of each cable with the node, cabinet, and elevation information imprinted on it. Use Figure 9-16 through Figure 9-19 as a guide.

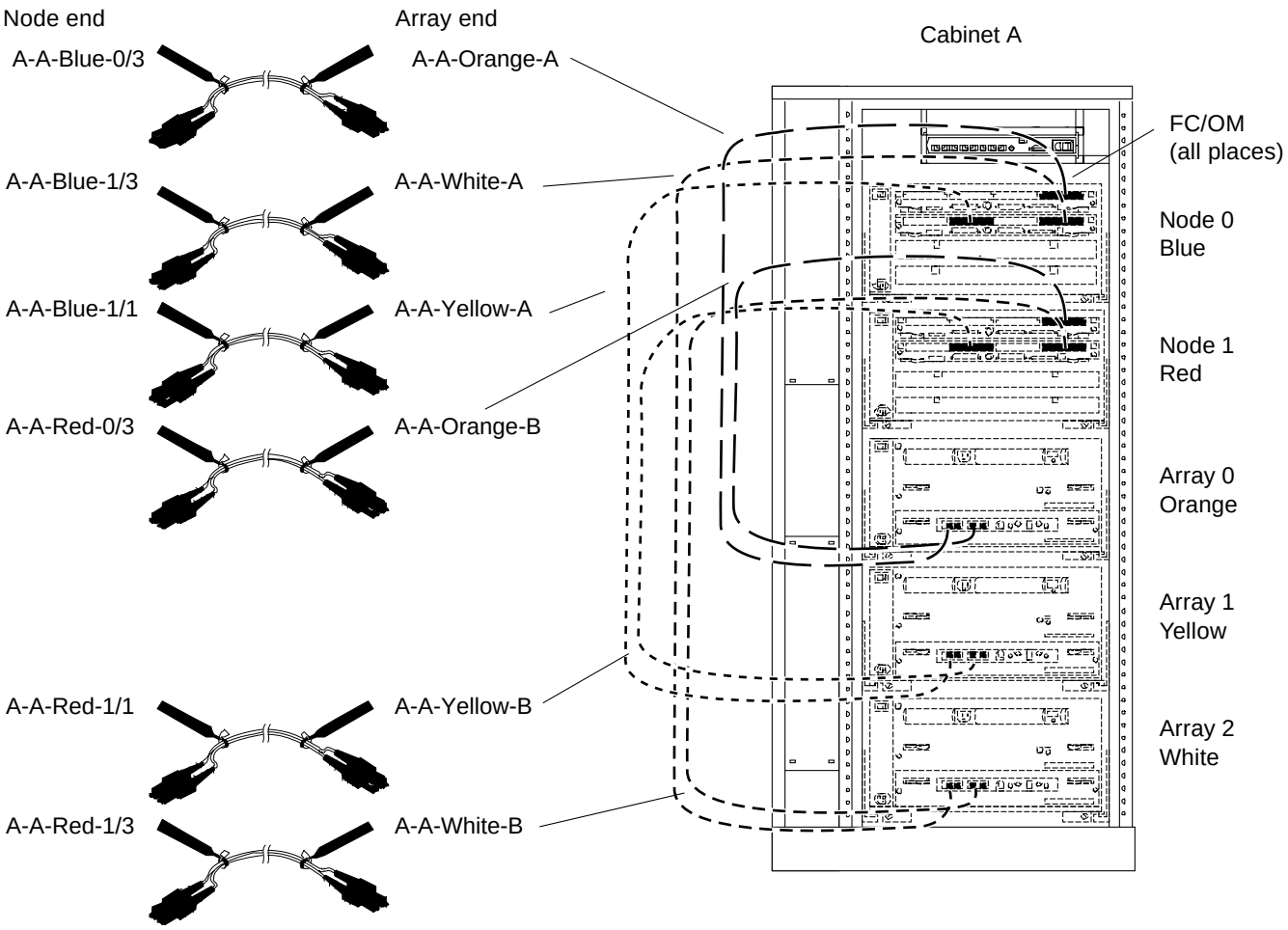
Installing the Cabling

1. **Plug one end of the fiber cable into the FC/OM on the SBus card.**
See Figure 9-20 for cable type and connection details.

2. **Plug the other end of the fiber cable into the FC/OM connector on the SPARCstorage Array rear panel.**
Plug node 0 into connector A and node 1 into connector B. Repeat to connect both nodes to both SPARCstorage Arrays. Refer to Table 9-3 for a listing of all cable connections.

3. **Repeat steps 1 and 2 for all FC/OM cables to be connected.**

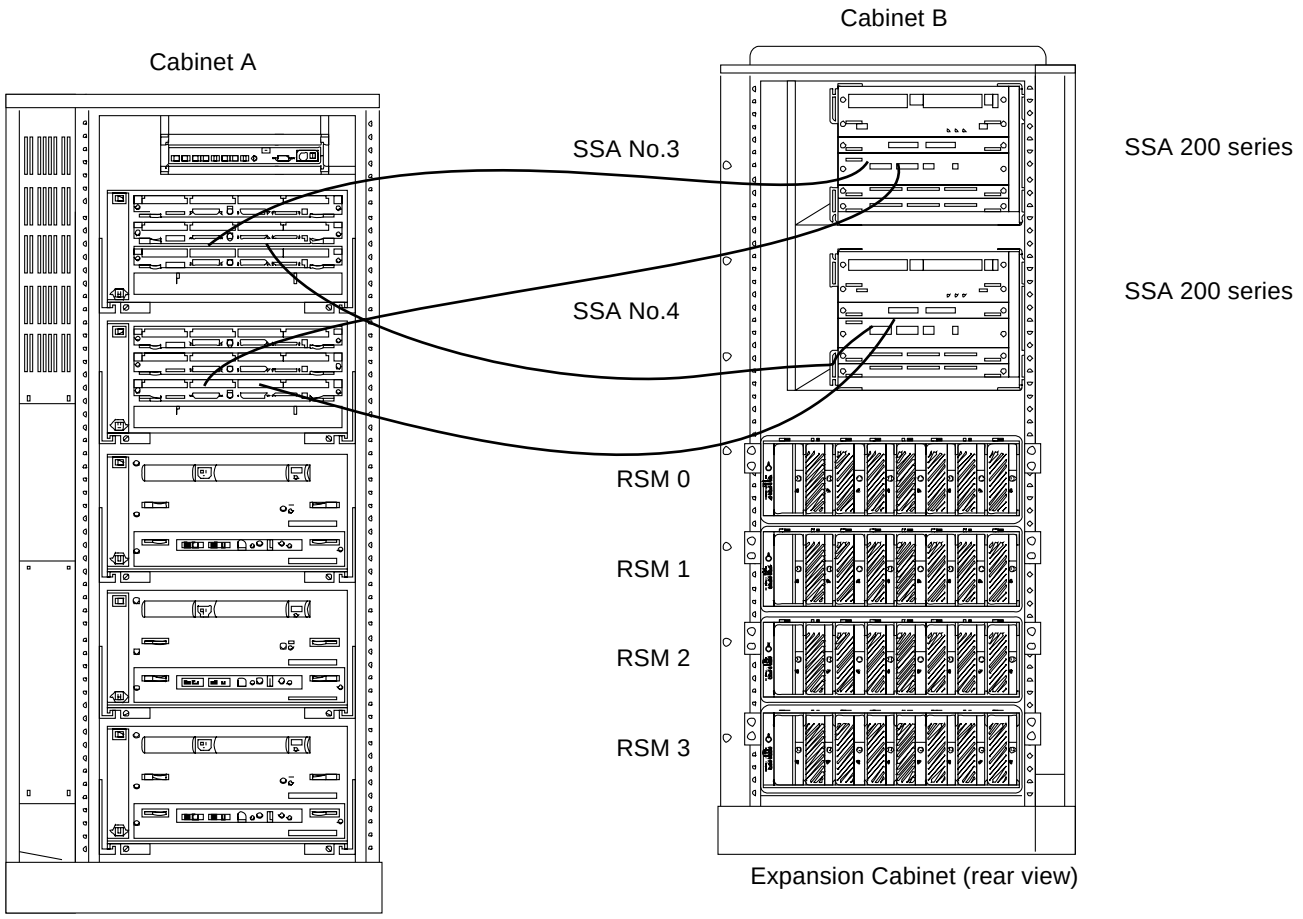
4. **Dress and secure all cables using cable ties as required.**



Note: For consistency, the labels are shown with the server end listed on the left, the SPARCstorage Array on the right. For your installation, place your server and array labels on the end of the cable to which they apply.

Note: Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

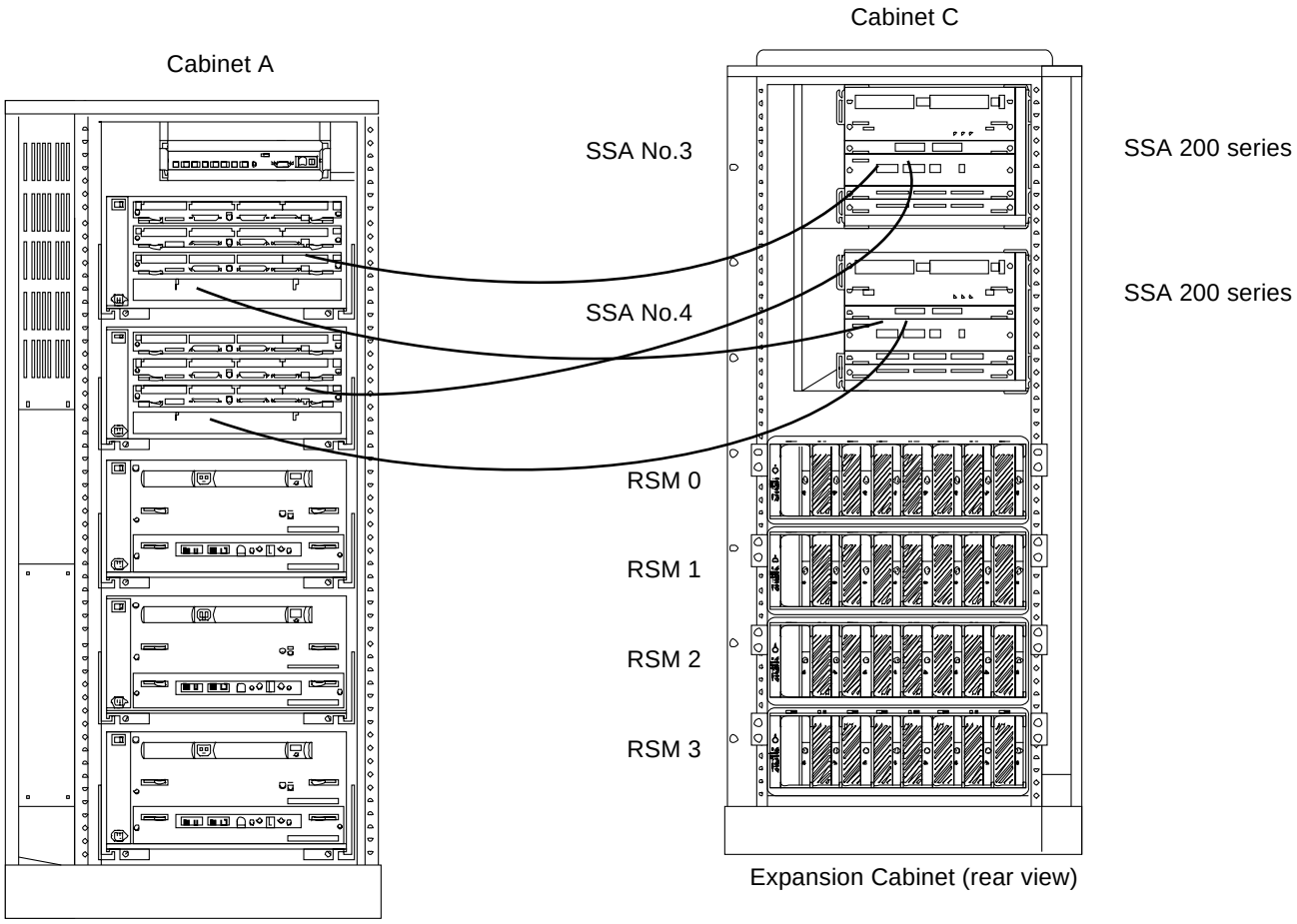
Figure 9-16 SPARCstorage Array 0, 1 and 2 Connection and Labeling Detail



Note: For consistency, the labels are shown with the server end listed on the left, the SPARCstorage Array on the right. For your installation, place your server and array labels on the end of the cable to which they apply.

Note: Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

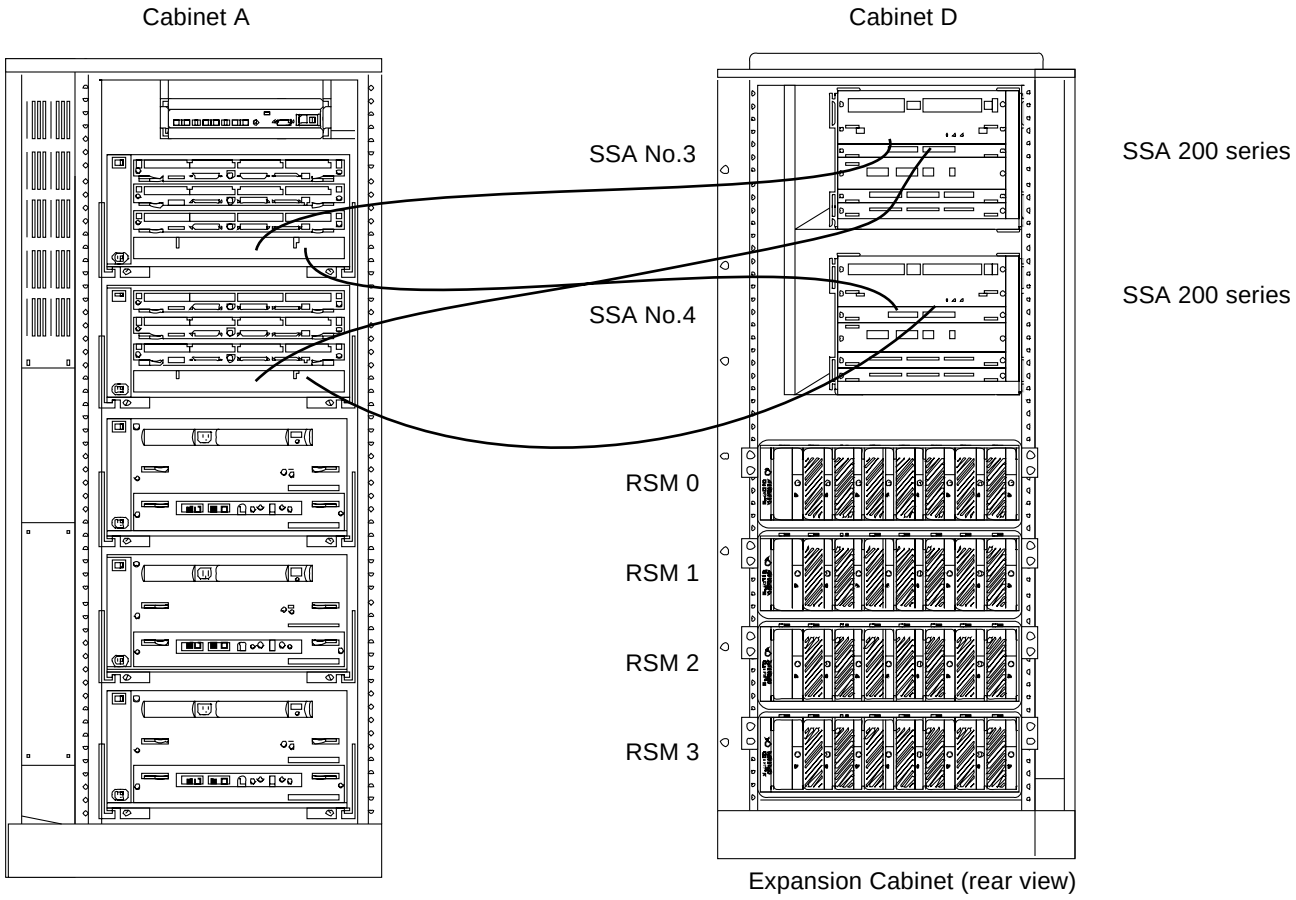
Figure 9-17 SPARCstorage Array 3 and 4 Connection Detail



Note: For consistency, the labels are shown with the server end listed on the left, the SPARCstorage Array on the right. For your installation, place your server and array labels on the end of the cable to which they apply.

Note: Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

Figure 9-18 SPARCstorage Array 5 and 6 Connection Detail



Note: For consistency, the labels are shown with the server end listed on the left, the SPARCstorage Array on the right. For your installation, place your server and array labels on the end of the cable to which they apply.

Note: Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

Figure 9-19 SPARCstorage Array 7 and 8 Connection Detail

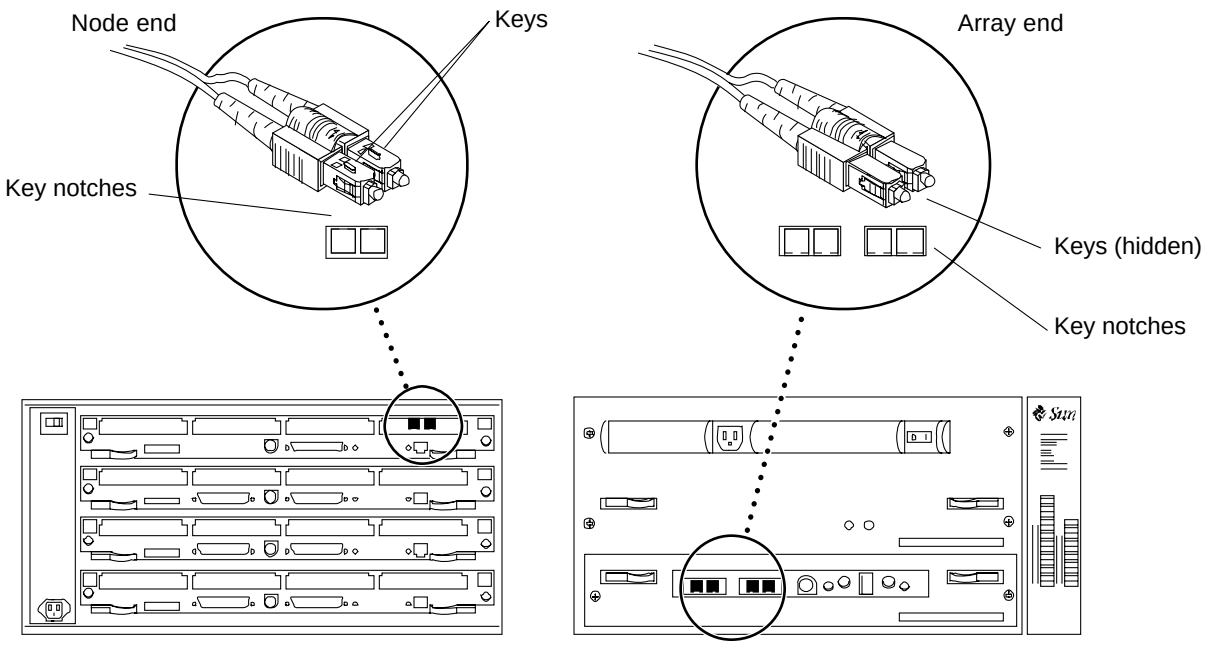


Figure 9-20 SPARCstorage Array Fiber Cable Connection

Table 9-3 Node to SPARCstorage Array Optical Fiber Cable Connections

	From Server[1] (Cabinet A)		To SSA[2]	To SSA[3]	To SSA[3]	To SSA[3]	
System	**Node 0**	**Node 1**	**Cabinet A**	**Cabinet B**	**Cabinets C**	**Cabinets D**	**Elevation**
Board	**SBus Slot**	**SBus Slot**	**Array No./Slot No.**	**Array No./Slot No.**	**Array No./Slot No.**	**Array No./Slot No.**	**(Color)**
0	1	1					
	2	2					
	3		0 slot A				Orange
		3	0 slot B				Orange
1	1		1 slot A				Yellow
		1	1 slot B				Yellow
	2	2					
	3		2 slot A				White
		3	2 slot B				White
2	1			3 slot A			Blue
		1		3 slot B			Blue
	2			4 slot A			Red
		2		4 slot B			Red
	3				5 slot A		Blue
		3			5 slot B		Blue
3	1				6 slot A		Red
		1			6 slot B		Red
	2					7 slot A	Blue
		2				7 slot B	Blue
	3					8 slot A	Red
		3				8 slot B	Red

1. All connections made using optical fiber cable Part No. 537-1004 (2 meter or Part No. 537-1006 (15 meter) as appropriate

2. SPARCstorage Array Model 100 Series units

3. SPARCstorage Array 200 Series units

9.3 Closing the Cabinet

- **Replace all panels on the cabinet.**
  See Chapter 8, “Internal Access and Leveling,” for procedures.

  Proceed to Chapter 11 for terminal concentrator configuration procedures.

SPARCcluster 2000 Hardware Installation

10

10.1 Factory-Assembled SPARCcluster 2000 Hardware

Do these tasks in the order listed	
Preparing the Cabinets	*page 10-1*
Connecting the Power Cords	*page 10-3*
Configuring the Card Cages	*page 10-18*
Cabling System Components	*page 10-23*

The basic configuration is completely pre-assembled in a single cabinet.

Note – If you are installing a customer-assembled system, see Section 10.2, “Customer-Assembled SPARCcluster 2000 Hardware.”

10.1.1 Preparing the Cabinets

1. **Unpack and inventory the equipment, if you have not already done so.**
   See Chapter 1, “Checklist” for a list of equipment.

2. **Move the cabinets to their designated installation locations.**
   For site planning guidelines, See Chapter 6, “SPARCcluster 2000 Configurations.”

3. Turn the front panel key switch to the Standby position. See Figure 10-1.

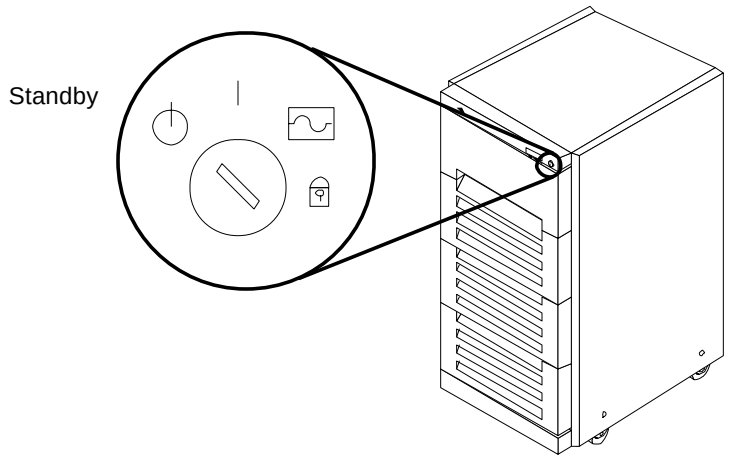


Figure 10-1 Key Switch in the Standby Position

4. **Set the LOCAL/REMOTE switch to REMOTE.**
   See Figure 10-2.

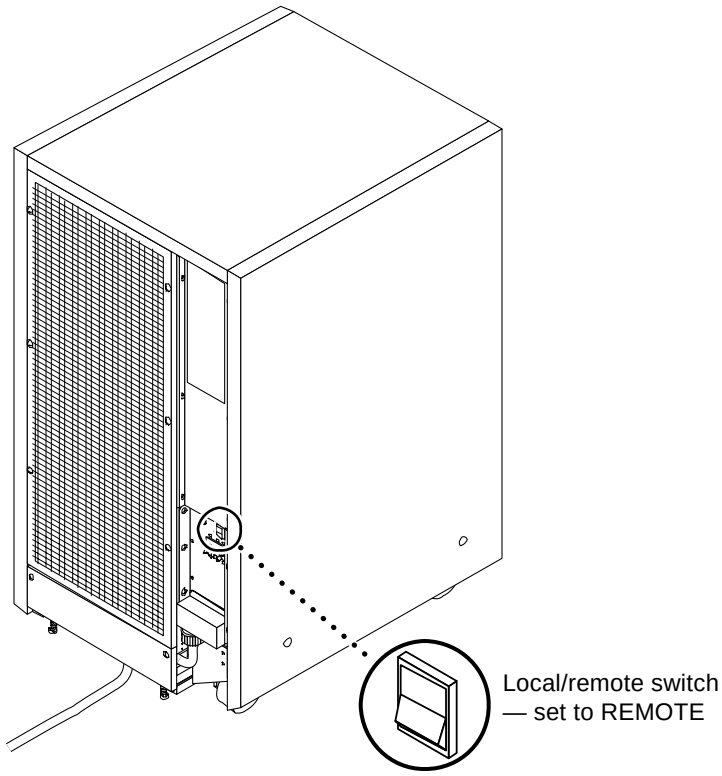


Figure 10-2 Local/Remote Switch

10.1.2 Connecting the Power Cords

1. **Remove the cabinet panels to access the power switches and cables.**
   See Section 8.1, “Opening the Hinged Door (SPARCcluster 2000).”

2. **Level the cabinet.**
   See Section 8.5.2, “Leveling Pads.”

3. **Turn the AC distribution unit power switch to Off.**
   The switch is at the rear of the cabinet. See Figure 10-3.

Warning – The power must be turned off at the AC distribution unit or risk of electrical shock to personnel exists.

Caution – Do not disconnect the power cord when working on the system. This connection provides a ground path that prevents damage from electrostatic discharge.

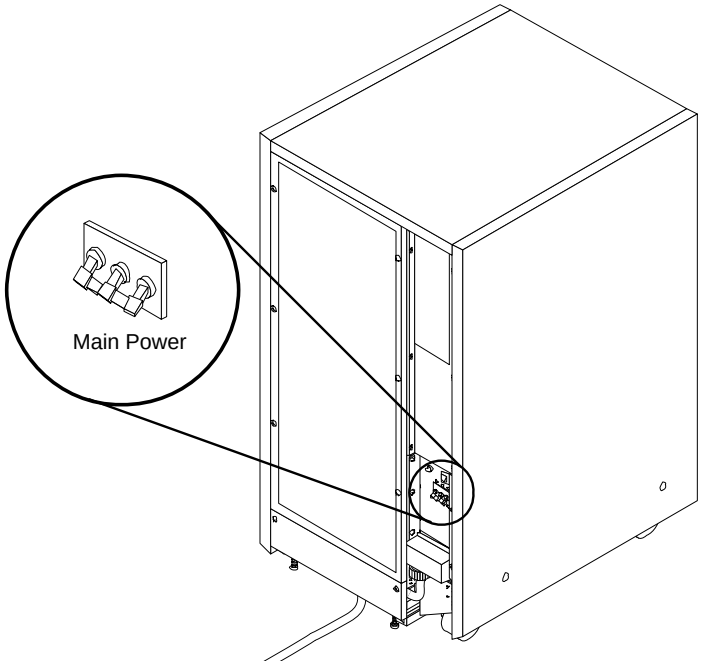


Figure 10-3 AC Distribution Unit Power Switch

4. **Uncoil the AC power cord and connect it to an AC outlet.**
   As noted in Chapter 4, “Site Preparation and Planning,” the AC outlet should be part of a circuit dedicated to this system. Do not connect electrical motors or heaters to this circuit.

5. **Plug in AC cords to provide grounding for static electricity.**

10.2 Customer-Assembled SPARCcluster 2000 Hardware

Do these tasks in the order listed	
Preparing the Cabinet	*page 10-5*
Removing the Cabinet Panels	*page 10-5*
Installing the Cabinets	*page 10-5*
Connecting the Main AC Cord	*page 10-6*
Installing SPARCstorage Arrays	*page 10-6*
Installing the Terminal Concentrator	*page 10-9*
Installing the Boot Disk Unit: the Multi-Disk Pack	*page 10-14*
Configuring the Card Cages	*page 10-18*
Cabling System Components	*page 10-23*
Programming the OBP Environment	*page 10-42*
Closing the Cabinet	*page 10-51*

10.2.1 Preparing the Cabinet

10.2.1.1 Powering Off the Cabinets

If the SPARCcenter 2000 cabinets are powered and operating, halt the operating systems and power off the system and expansion cabinets. See Section 7.2, “SPARCcluster 2000 System Cabinet.”

10.2.2 Removing the Cabinet Panels

Remove the cabinet panels to access the power switches and cables. See Chapter 8, “Internal Access and Leveling.”

10.2.3 Installing the Cabinets

1. **Unplug the AC cords and all cabling to allow repositioning of the cabinets.**
2. **Move the cabinets to their designated installation locations.**
   See Chapter 4 for site planning guidelines.

Note – When moving the cabinets, replace all panels to protect inner components during transport.

3. **Level the cabinet(s).**
   See Section 8.5.2, “Leveling Pads.”

10.2.4 Connecting the Main AC Cord

1. **For all AC-powered internal components, plug in AC cords to provide grounding for static electricity.**

Caution – Do not disconnect the power cord when working on the system. This connection provides a ground path that prevents damage from electrostatic discharge.

2. **Turn the front panel key switch to the Standby position.**
   See Figure 10-1.

3. **Turn the AC distribution unit power switch to Off.**
   The switch is at the rear of the cabinet (see Figure 10-3).

Warning – The switch must be turned off at the cabinet AC distribution unit or risk of electrical shock to personnel exists.

4. **Uncoil the AC power cord and connect it to an AC outlet.**
   The AC outlet should be part of a circuit dedicated to this system. Do not connect electrical motors or heaters to this circuit.

10.2.5 Installing SPARCstorage Arrays

Two or more SPARCstorage Arrays are installed in the cluster. These devices provide storage for the database.

The cluster contains two identically configured SPARCcenter 2000E systems.

10.2.5.1 *Mounting in the Cabinet*

♦ **Install the rails in the cabinets and install the SPARCstorage Arrays on the rails.**

For these procedures, See Appendix A, “Air Baffle, Rackmount Rail and Blower Assembly Installation.”

10.2.5.2 *Preparing the SPARCstorage Arrays*

1. **Locate the DIAG switch on the array rear panel.**
   See Figure 10-4.

2. **Ensure that the DIAG switch is set to DIAG and not to DIAG EXT.**
   Do not use the DIAG EXT position, as it will invoke extended diagnostics and prevent the SPARCstorage Array from booting. Use DIAG only for normal operation.

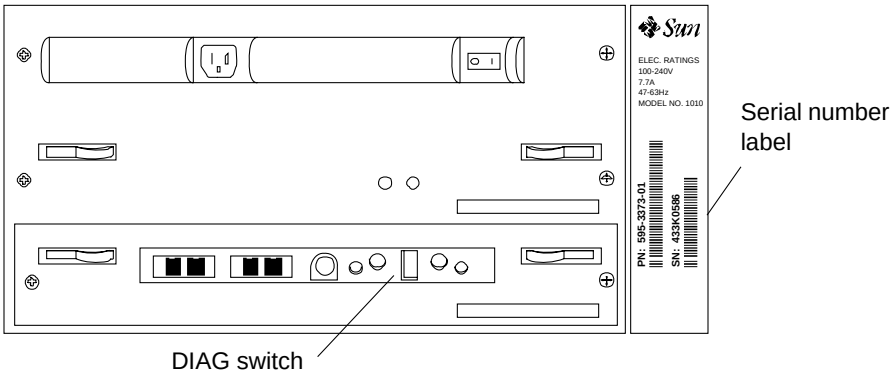


Figure 10-4 SPARCstorage Array Voltage Rating on the Serial Number Label

3. **Locate the serial number label on the rear panel of the chassis.**
   See Figure 10-4.

4. **Check the electrical ratings label on the serial number label. Verify that the stated rating matches your AC input voltage.**

Table 10-1 provides maximum system operating voltage and frequency ranges.

Table 10-1 SPARCstorage Array Model 100 Series Nominal Power and Maximum Current Parameters

Configuration	Nominal AC Input Voltage Range—Single Phase	Operating Range	Operating Frequency Range	Maximum Current Requirement	Power Supply Output
North American	100–120 VAC	90–264 VAC	47–63 Hz	6.5A	460W
International	220–240 VAC	90–264 VAC	47–63 Hz	6.5A	460W

5. Connect SPARCstorage Array power cords.

a. Plug a power cord into the connector at rear of each array.
See Figure 10-5.

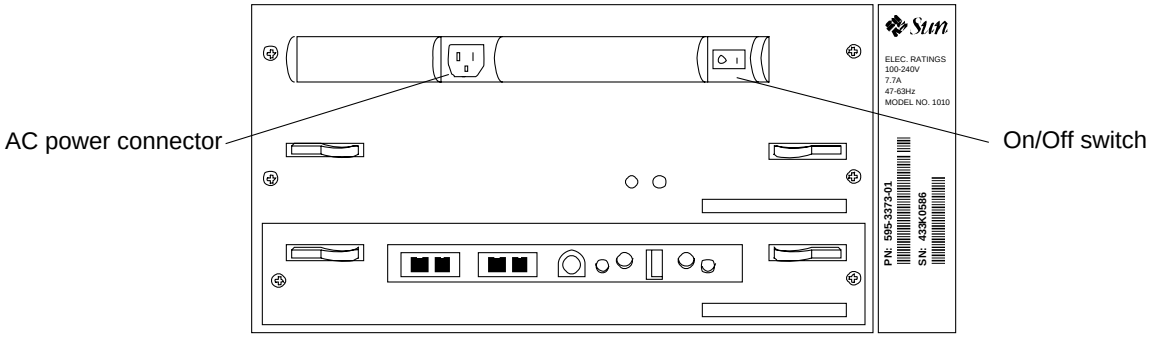


Figure 10-5 SPARCstorage Array AC Power Connector

b. Route the power cords to the power sequencer.
Dress the power cords down the left side of the rack. Roll any excess cord and tuck it into the space under the power distribution unit at the bottom of the cabinet. Secure in place using cable ties.

6. Plug in the SPARCstorage Arrays.
Plug the power cords from the chassis into the power distribution unit. Use the switched outlets identified in Figure 10-6 for SPARCstorage Array 0 and 1.

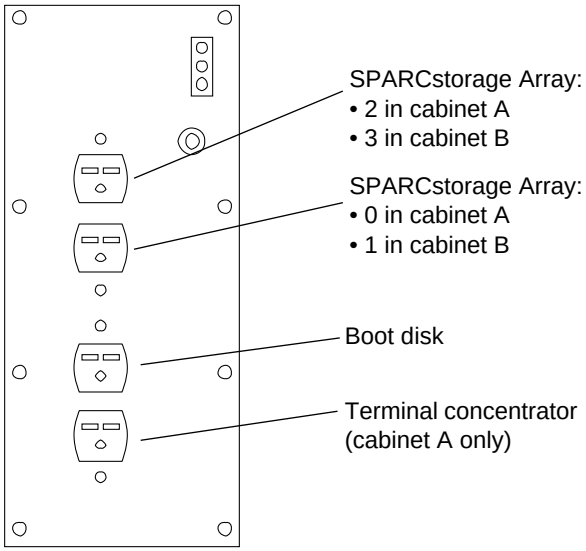


Figure 10-6 Plugging SPARCstorage Arrays into the Power Sequencer

7. **Turn the AC power switch to ON on all SPARCstorage Arrays and servers.** See Figure 10-5.

10.2.6 Expansion Rack

Install SPARCstorage Array Model 200 Series and RSM units in the expansion racks. For these procedures, refer to:

802-5062	SPARCstorage RSM Installation, Operations, and Service Manual
802-5063	SPARCstorage RSM Installation Supplement
802-7104	SPARCstorage RSM Product Note
802-7105	SPARCstorage RSM Read Me First

10.2.7 Installing the Terminal Concentrator

Install the terminal concentrator mounting bracket in the primary cabinet.

1. **Install the terminal concentrator bracket hinge.**

a. Locate the hinge portion of the terminal concentrator bracket assembly.

b. Install the locator screws.
Loosely install two locator screws in the right-hand rail in the rear of the cabinet. Thread them into holes 8 and 30 as shown in Figure 10-7.

Note – The locator screws will accept the slotted holes in the hinge piece.

---

c. Place the slotted holes of the hinge over the locator screws and allow the hinge to drop into place.

d. Install screws in holes 9 and 29.
Tighten these screws, as well as those in holes 8 and 30 (see Figure 10-7).

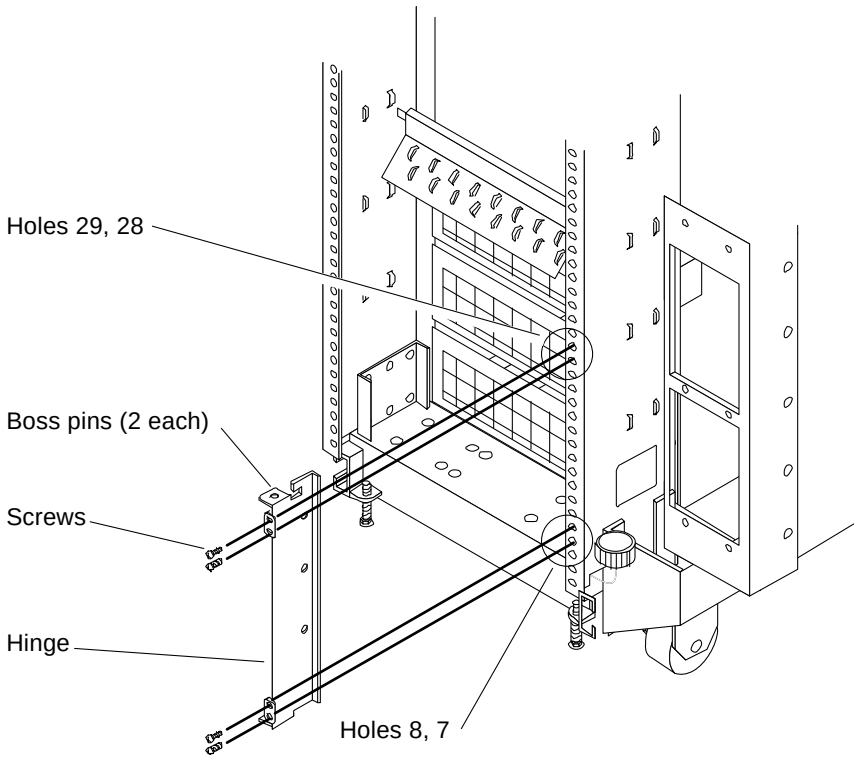


Figure 10-7 Installing the Terminal Concentrator Hinge

2. Install the terminal concentrator in the bracket and assemble the bracket.

a. Place the side pieces of the bracket against the terminal concentrator as shown in Figure 10-8.

b. Lower the terminal concentrator (with side pieces) onto the bottom plate. Align the holes in the side pieces with those in the bottom plate.

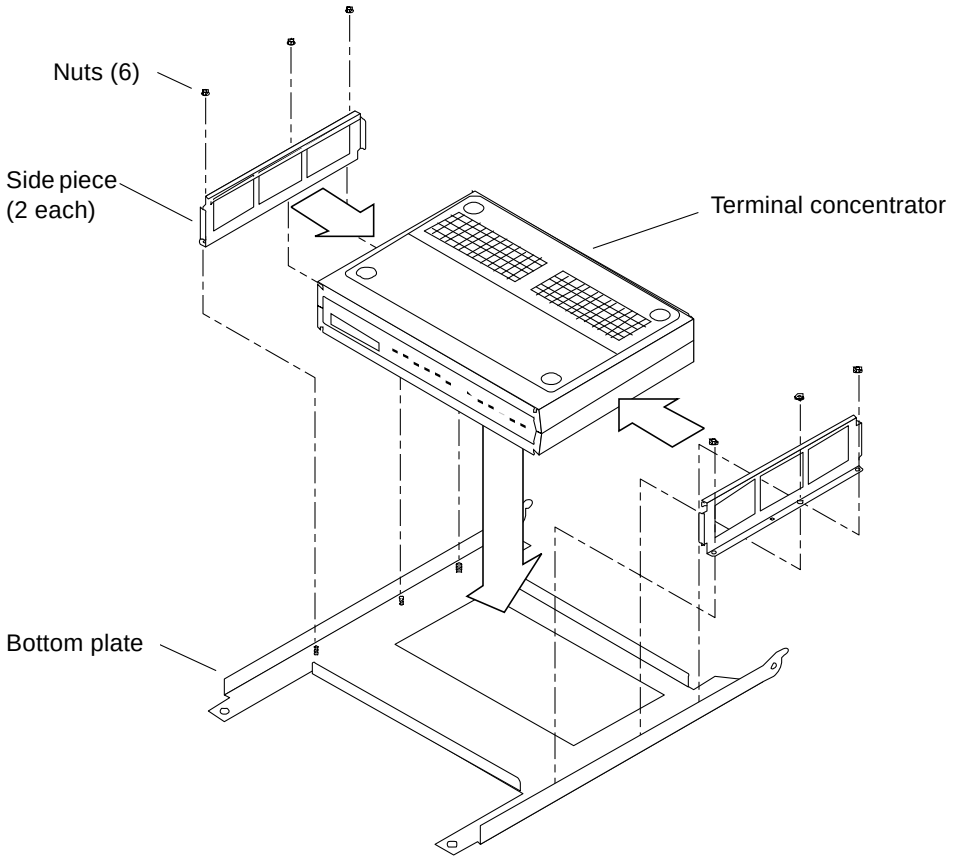


Figure 10-8 Assembling the Terminal Concentrator Bracket

c. Install three nuts on threaded studs penetrating through each side plate. Tighten the nuts.
This completes assembly of the bracket assembly.

3. **Install the terminal concentrator bracket onto the hinge in the chassis.**
   Turn the terminal concentrator bracket on its side so the hinge holes and cable connectors face right. Align the bracket holes with the boss pins in the hinge assembly and drop the bracket onto the hinge (see Figure 10-9).

4. **Install the keeper screw in the shorter boss pin.**
   This ensures the assembly will not be accidently knocked off the hinge.

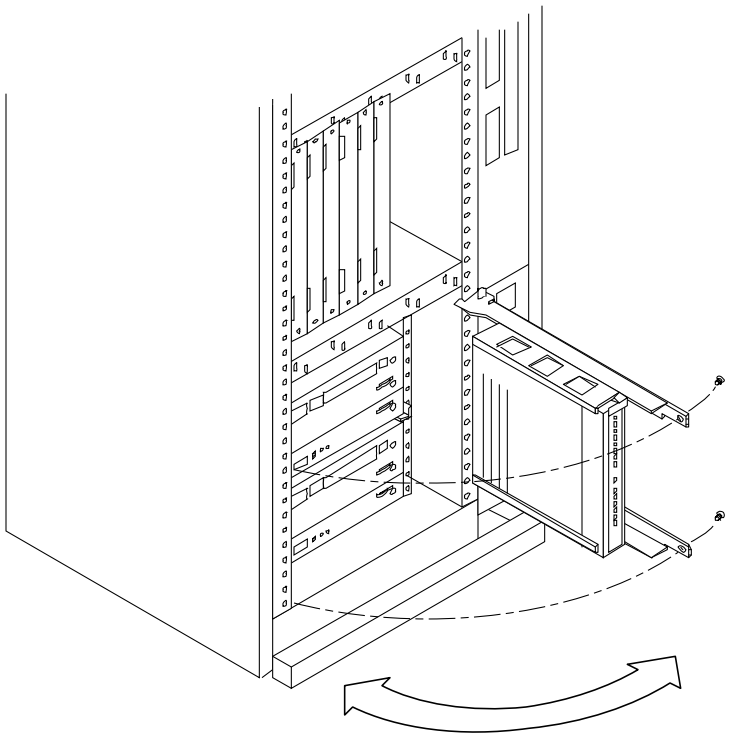


Figure 10-9 Terminal Concentrator Installed on the Hinge

5. **Connect the power cord.**

   a. **At the rear of the terminal concentrator, install the power cord.**
      See Figure 10-10.

   b. **Plug the other end into the AC power distribution unit.**
      See Figure 10-11.

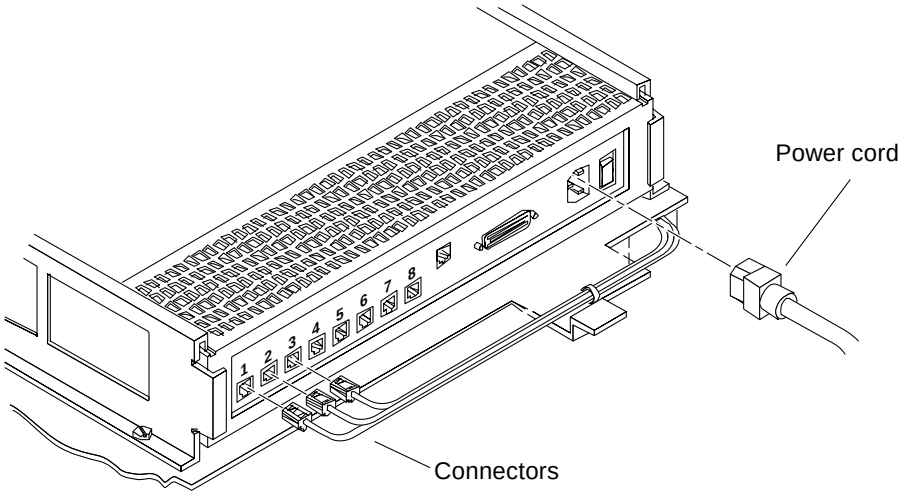


Figure 10-10 Terminal Concentrator Cable Locations

6. Close the terminal concentrator bracket.
Swing the bracket assembly closed and install screws in holes 8 and 30 on the left side rail.

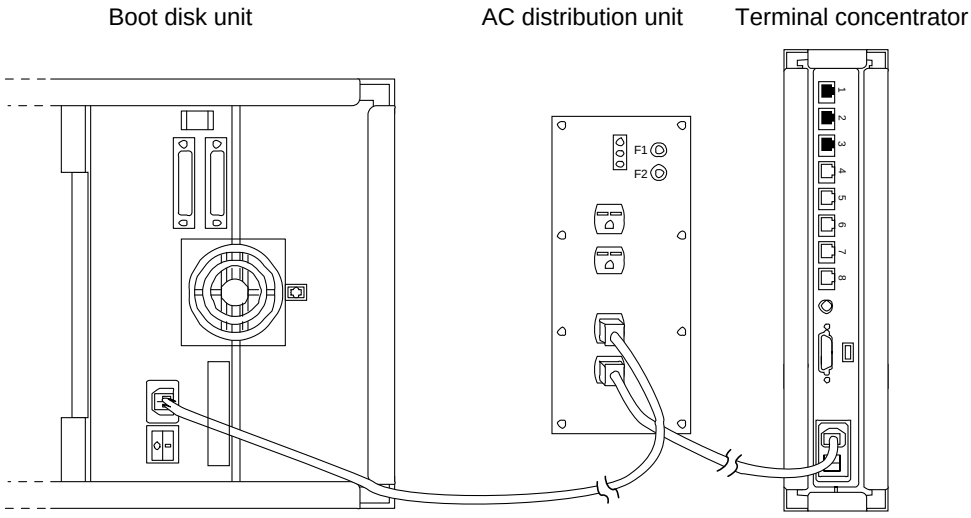


Figure 10-11 Plugging the Terminal Concentrator and Boot Disks into the Power Sequencer

10.2.8 Installing the Boot Disk Unit: the Multi-Disk Pack

10.2.8.1 Multi-Disk Pack

Determine if your Multi-Disk Pack contains two or four disk drives, and what their addresses are. Since the Multi-Disk Pack can be ordered in a four or two disk drive version, the default factory-set addressing for devices within the unit differs between the two versions. Determine which version you have:

1. **Find the part number on the Multi-Disk Pack:**
   - Part Number X738A denotes the 2 disk drive version. SCSI addressing is factory set to 1 and 3. This does not match the default OBP boot path setting. Go to step 2.
   - Part Number X739A denotes the 4 disk drive version. SCSI addressing is factory set to 0 through 3. This matches the default OBP boot path setting. No action may be required — go to step 3.

2. **Resolve the OBP path discrepancy.**
   Take one of the following two actions:

- Open the unit and reset the jumpers for the two drives to the correct addresses of 0 and 1.
  Refer to the *Multi-Disk-Pack Installation and Service Guide*, Part Number 801-6119 for SCSI jumper access and locations within the unit, and the address setting procedure. When done, go to Section 10.2.8.2, “Node 0 Cabinet.”

- Change the default OBP path to match the address jumper settings in the Multi-Disk Pack.
  For this procedure, go to Section 10.2.11.3, “Changing the Disk Addresses or Boot Path”. When done, go to Section 10.2.8.2, “Node 0 Cabinet.”

10.2.8.2 *Node 0 Cabinet*

Install the boot disk bracket in the front of the cabinets.

1. **Locate the hinge portion of the boot disk bracket assembly.**
2. **Thread screws in a few turns in holes 27 and 11 on the side of the rail on the left side.**
   These screws will be used to hang the hinge on. See Figure 10-12.
3. **Hang the hinge on the two screws installed in step 2.**
4. **Install the remaining four screws:**
   - Holes 24 and 12 on the side
   - Holes 26 and 10 from the front
5. **Tighten all screws. See Figure 10-12.**

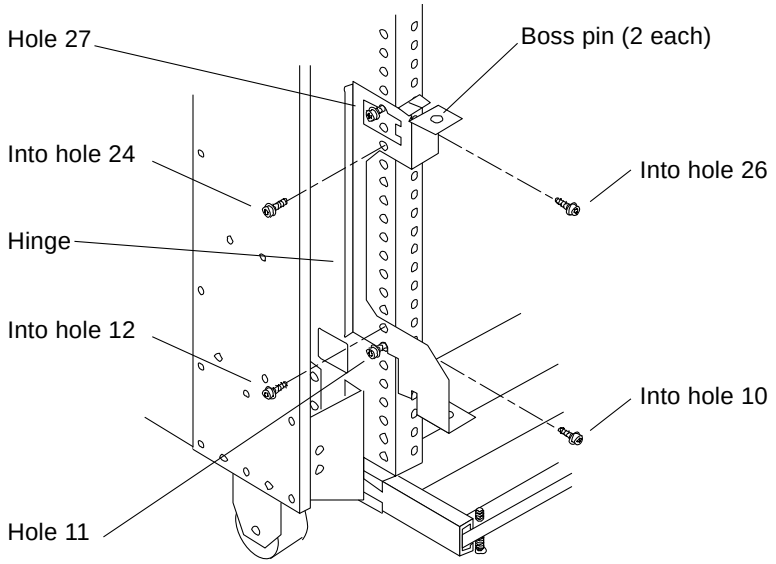


Figure 10-12 Installing the Boot Disk Hinge

6. **Install the boot disks in the bracket and assemble the bracket.**
   a. **Lay the bottom plate on a surface as shown in Figure 10-13.**

b. Place the boot disk on the bottom plate.
Orient the unit as shown in Figure 10-13.

c. Place the top plate over the boot disks and lower it so it contacts the bottom plate. Align holes with threaded studs in the bottom plate.

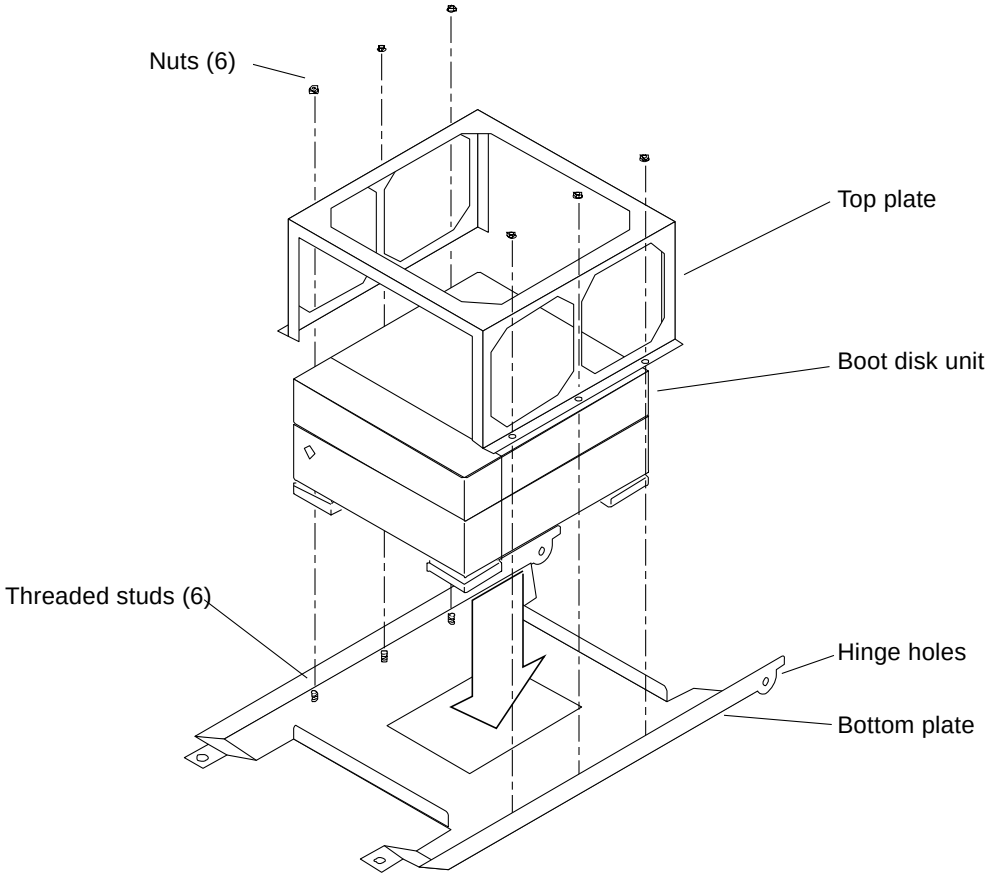


Figure 10-13 Assembling the Boot Disk Bracket

d. Assemble the top and bottom plates.
Install six nuts (three on each side) on threaded studs which penetrate through holes in the top plate. Tighten the nuts.

This completes assembly of the bracket assembly.

7. **Install the boot disk bracket onto the hinge in the chassis.**
   Turn the boot disk bracket on its side so the hinge holes and boot disk cable connectors face left. Align bracket holes with boss pins in the hinge assembly and drop the bracket onto the hinge. See Figure 10-14.

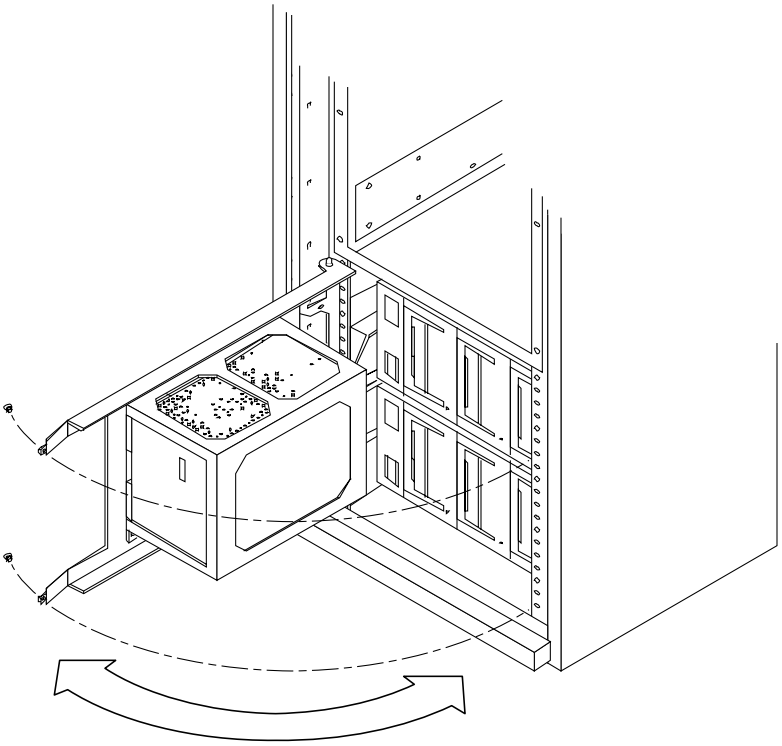


Figure 10-14 Boot Disk Bracket Installed on the Hinge

8. **Install the keeper screw in the shorter boss pin.**
   This ensures the assembly will not be accidently knocked off the hinge.

10.2.8.3 Node 1 Cabinet

Repeat Section 10.2.8.2, “Node 0 Cabinet,” for the node 1 cabinet.

10.2.9 Configuring the Card Cages

For instructions on removing the system board, refer to the documentation supplied with the system boards or the *SPARCcenter 2000 Service Manual.*

10.2.9.1 SBus Cards

If SBus cards or other devices are to be installed, do it now.

- **Load the system boards 0 through 9 as appropriate with the intended SBus card complement.**
  For SBus card installation procedures, refer to the documentation supplied with the card(s) in question or to the *SPARCcenter 2000 Service Manual.*

Note – Load the respective system boards for both servers identically.

Note – Beyond minimum configuration, install FC/S cards FC/S cards in the first available empty SBus slot, following all other boards in the system. This will ensure that the controller numbering is preserved if the Solaris Operating Environment is reinstalled.

10.2.9.2 System Boards

1. **Install the system boards loaded with SBus cards into the card cage.**
   For system board installation procedures, refer to the documentation supplied with the system boards or the *SPARCcenter 2000 Service Manual.*
2. **Fill all unused slots with a filler panel.**
   See Figure 10-15.

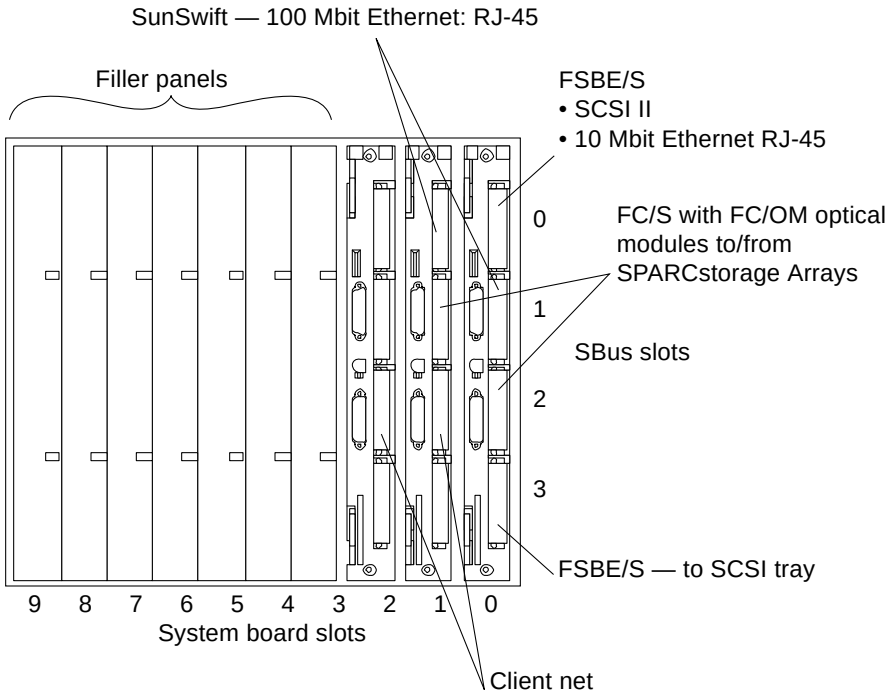


Figure 10-15 Minimum Configuration: System Boards Loaded with SBus Cards

10.2.9.3 Boot Disk Cabling

Cables for the boot disk unit must be routed and secured in a manner to permit servicing SPARCstorage Arrays while the node remains online in the cluster.

For the 2-meter SCSI cable to reach the FSBE/S controller on the system board, you may need to

- move the FSBE/S from the top slot (slot 0) down to the third slot (slot 2.
- edit the OBP boot parameter for the boot device and diag device to reflect the path change in controller location.

See Section 10.2.11, “Programming the OBP Environment.”

1. **Plug the cables into their source.**
   a. **Plug the power cord into the power distribution unit.**
   b. **Plug the SCSI cable into the FSBE/S card on system board 0, slot 0.**
2. **Route the power cord and SCSI cable to the boot disk.**
   Route them through the cutout in the hinge side of the boot disk bracket. Then run them along the inside edge of the side panel mounting bracket as shown in Figure 10-16.

Note – Route the cables through the cutout opening to ensure they can move freely when the bracket is swung open and will not pinch or bind when closed.

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3. **Loosely secure the cables using three or more cable ties.**
   See Figure 10-16. Do not tighten cable ties at this time.
4. **Connect the cables to the Multi-Disk Pack.**
   See Figure 10-17 for connection detail.
   a. **Plug the power cord into the power receptacle.**
   b. **Plug the SCSI cable into the SCSI IN connector.**
   c. **Install a terminator on the SCSI OUT connector.**
5. **Dress the cables as appropriate.**
   Arrange the cable run, but leave enough slack at both ends for ease of servicing. Cinch all cable ties. Loop excess cable and secure with cable ties.
6. **Test your work.**

a. Close the boot disk bracket. Verify that no cable binds or gets pinched.

b. Open the bracket fully and verify no cable pulls, gets crimped, abraded or pinched.

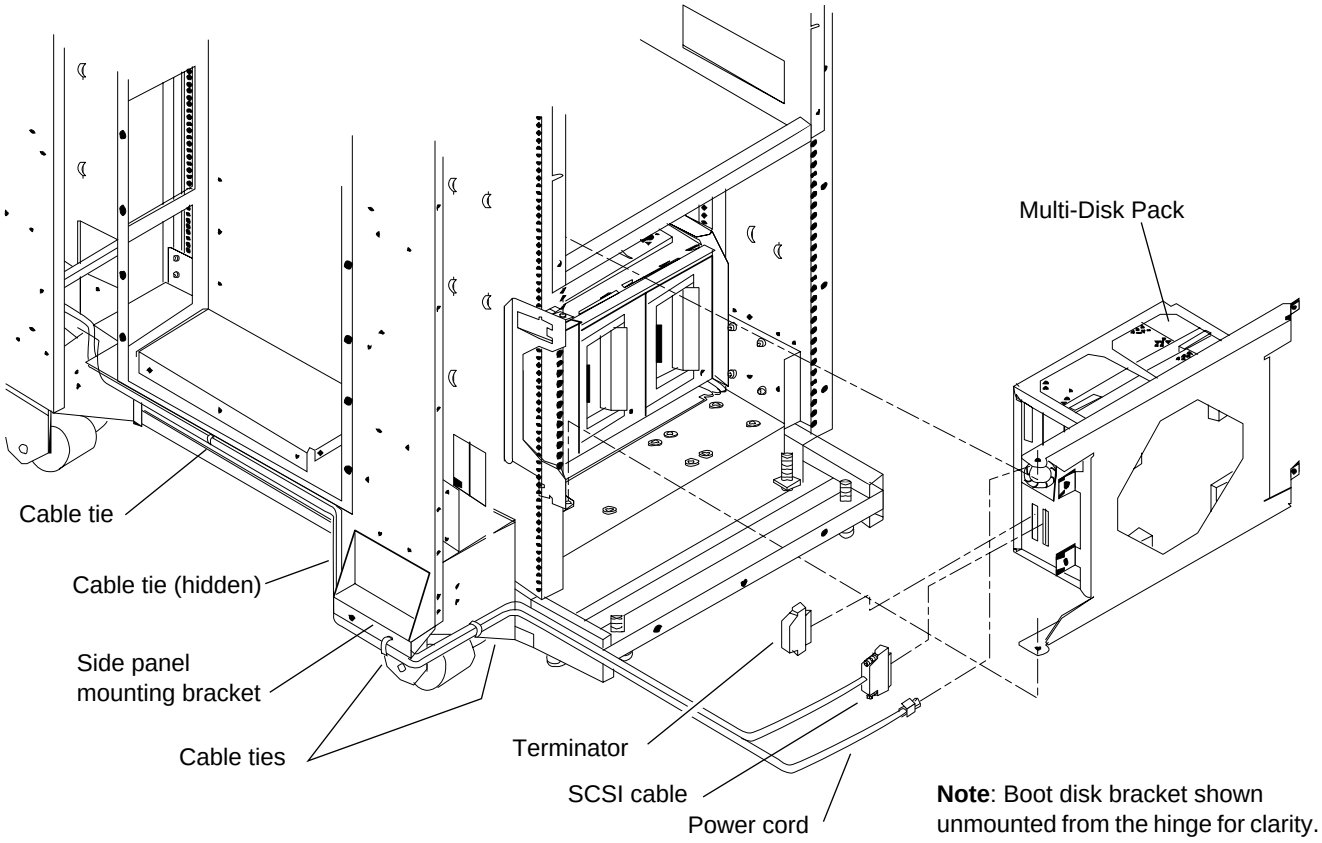


Figure 10-16 Boot Disk Cabling — Multi-Disk Pack

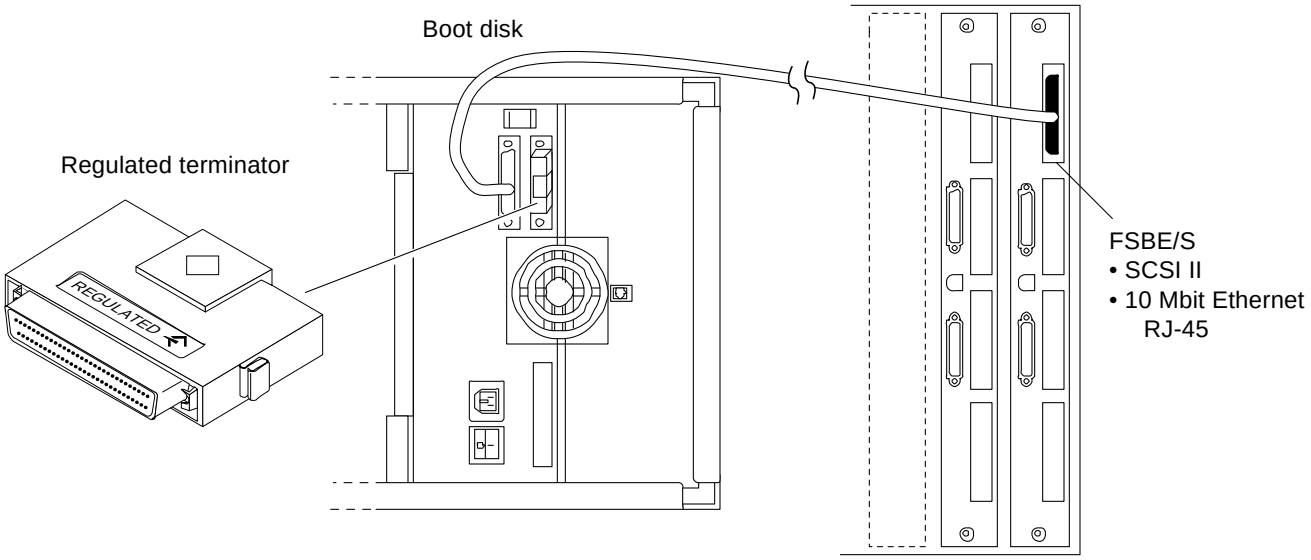


Figure 10-17 Boot Disk Cabling Detail

7. **Swing the boot disk bracket assembly closed and install screws in holes 26 and 10 on the right side rail.**

10.2.10 Cabling System Components

Ethernet and SCSI II cabling is presented in Table 10-2. Procedures for connecting each cable follow the table.

Note – For fiber-optic cable connections, see Table 10-3.

Table 10-2 Cable Connections (Except Fiber-Optic)

Category	Step	Interface type	Cable type	Part No.	From	Interface/Cable Type
Terminal Concentrator					Terminal concentrator	
	1.	Serial	RS-232 and serial		Port 1	Administration workstation Serial A
	2.	Serial	RS-232 and serial		Port 2	Node 0, board 0, Serial A
	3.	Serial	RS-232 and serial		Port 3	Node 1, board 0, Serial A
	4.	Ethernet	AUI or TPE		Ethernet	Client network
Admin. Workstation	5.	Ethernet	AUI or TPE		Admin. workstation	Client network
Node-to-node	6.	SunSwift	TPE	530-2149 (short) 530-2150 (long)	Node 0, board 0, slot 1	Node 1, board 0, slot 1
	7.	Same		Same	Node 0, board 1, slot 0	Node 1, board 1, slot 0
Node-to-main network	8.	Ethernet	AUI or TPE		Node 0, board 0, slot 0 FSBE/S card — le0	Main Ethernet network
	9.	Same	Same		Node 1, board 0, slot 0 FSBE/S card — le0	Main Ethernet network
Client Net	10.	Client net Ethernet	TPE		Node 0, board 1, slot 2	Client network
	11.				Node 0, board 2, slot 2	Client network
	12.				Node 1, board 1, slot 2	Client network
	13.				Node 1, board 2, slot 2	Client network

Table 10-2 Cable Connections (Except Fiber-Optic) *(Continued)*

Category	Step	Interface type	Cable type	Part No.	From	Interface/Cable Type
SCSI Tray	14.	FSBE/S	SCSI II		Node 0, board 0, slot 3	SCSI II IN connector on bulkhead below cardcage
	15.					Install terminator on SCSI II OUT connect. on multi disk pack
	16.	FSBE/S	SCSI II		Node 1, board 0, slot 3	SCSI II IN connector on bulkhead below cardcage
	17.					Install terminator on SCSI II OUT connect. on bulkhead below cardcage
Boot disks	18.	FSBE/S	SCSI II		Node 0, board 0, slot 0	SCSI II IN connector on multi disk pack
	19.					Install terminator on SCSI II OUT connect. on multi disk pack
	20.	FSBE/S	SCSI II		Node 1, board 0, slot 0	SCSI II IN connector on multi disk pack
	21.					Install terminator on SCSI II OUT connect. on multi disk pack

10.2.10.1 Connecting the Administration Workstation

Warning – *Do not* plug a keyboard directly into a host system board. If a keyboard is plugged into a system board, it then becomes the default for console input, thus preventing input from the system administration workstation/terminal concentrator serial port. In addition, plugging a keyboard directly into a host system board while power is applied to the host sends a break signal to the Solaris operating system, just as if you had typed a Stop (L1-A) on the keyboard.

1. **Plug one end of cable PN 530-2152 into the terminal concentrator, Port 1.**
   See Figure 10-18.

2. **Plug the other end into the administration workstation RS-232 connector.**

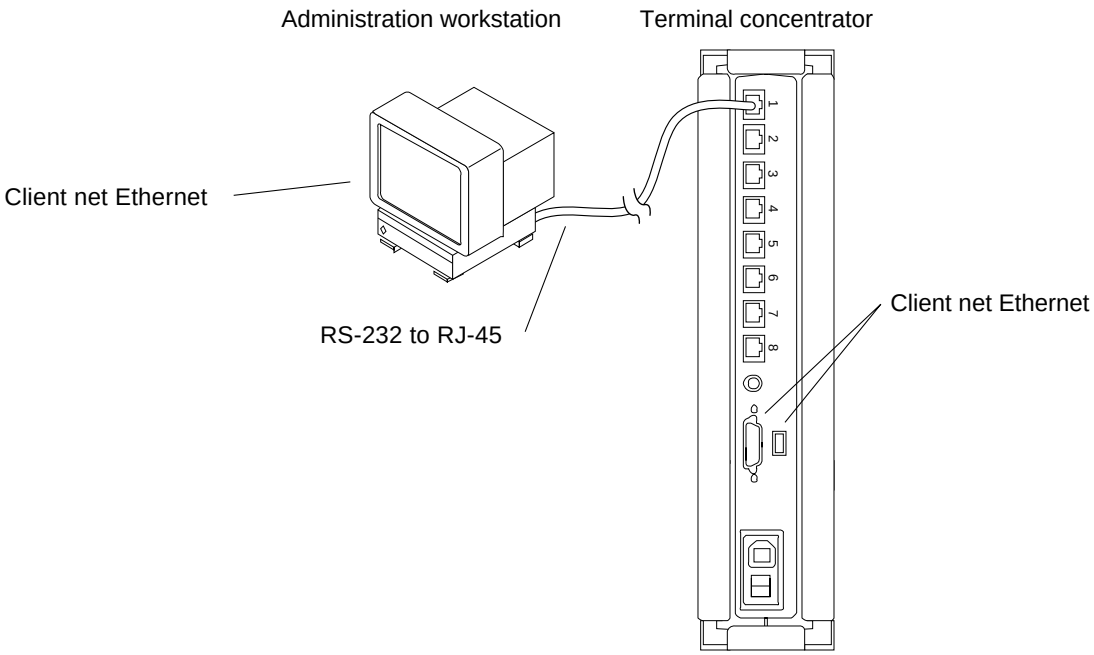


Figure 10-18 Connecting the Administration Workstation

3. **Plug the client network Ethernet cable into the administration workstation Ethernet socket.**

10.2.10.2 Cabling the Terminal Concentrator

1. **Connect Node 0**:

   a. **Plug one end of the RJ-45 cable into the Serial A port on the system board in slot 0 in node 0.**
   See Figure 10-18.

   b. **Plug the other end of this cable into the terminal concentrator, port 2.**

2. **Connect Node 1**:

a. Plug one end of the RJ-45 cable into the Serial A port on the system board in slot 0 in node 1.
See Figure 10-19.

b. Plug the other end of this cable into the terminal concentrator, port 3.

3. Public net Ethernet.
Plug the public net Ethernet cable into the "D" connector on the terminal concentrator.

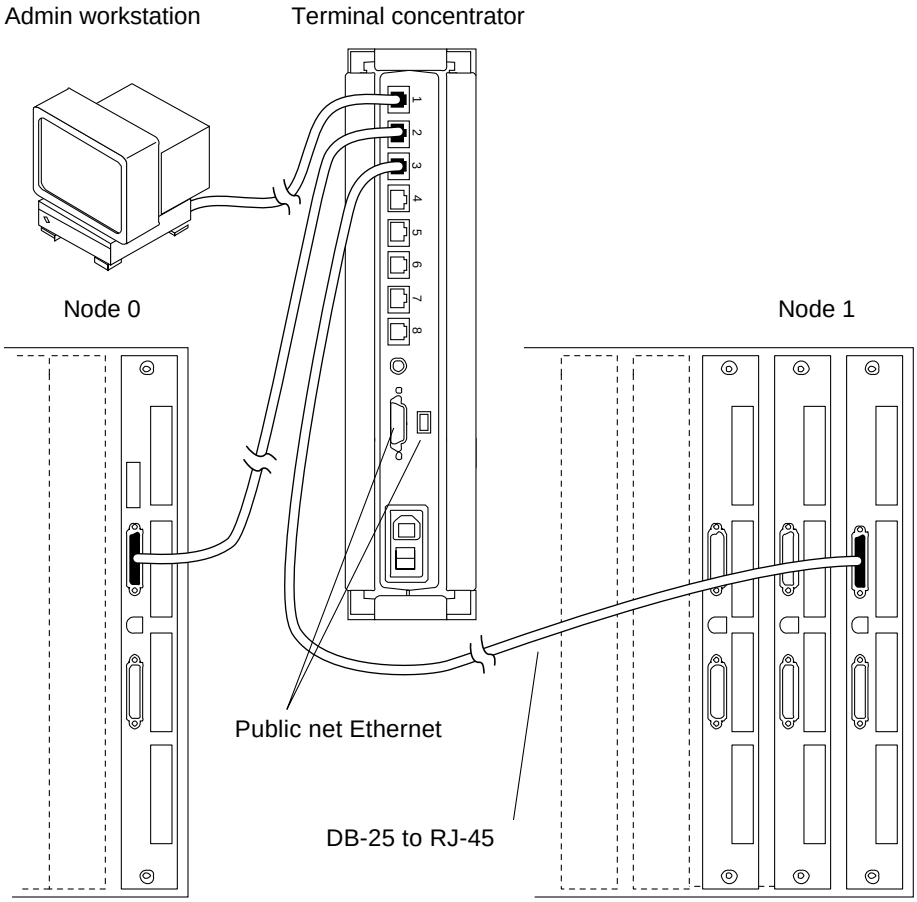


Figure 10-19 Node Interface to the Terminal Concentrator

10.2.10.3 *Connecting Node 0 to Node 1 — Private Net Ethernet*

With two Sun private net cables (short or long), connect one node to the other.

Note – Use short and long Sun private net cables as appropriate, part numbers 530-2149 (short) 530-2150 (long).

First Cable

1. **Connect one end of the Sun private net cable to the SunSwift 100 Mbit Ethernet card in system board slot 0, SBus position 1.**
   See Figure 10-20.

2. **Connect the other end to the identical system board and SBus card in the other node.**

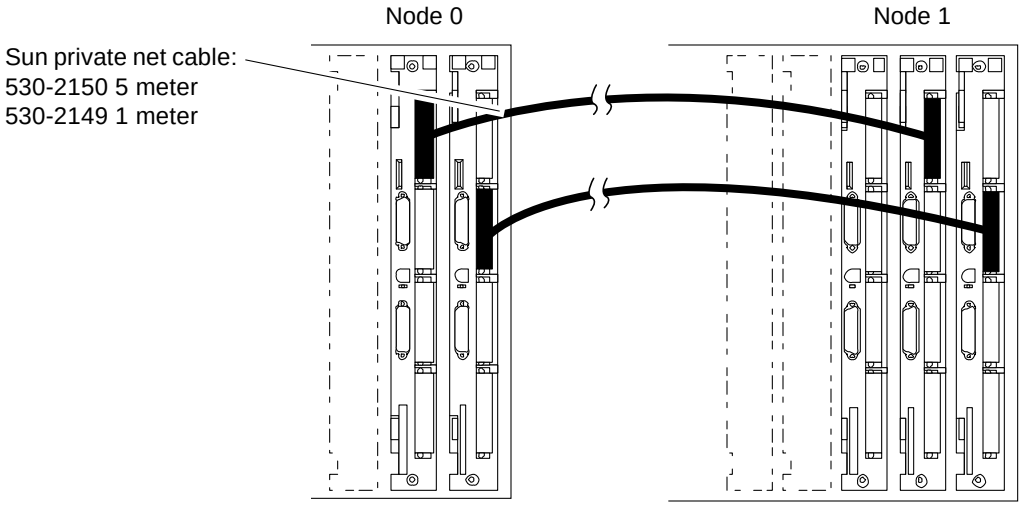


Figure 10-20 Node-to-Node Connections

Second Cable

1. **Connect one end of the Sun private net cable to the SunSwift 100 Mbit Ethernet card in system board slot 1, SBus position 0.**
   See Figure 10-20.

2. **Connect the other end to the identical system board and SBus card in the other node.**

Connect Any Remaining Cables.

Connect all remaining cables. Table 10-2 summarizes the cables that can be connected at this time. Your system may have more network cables than are listed in this table.

10.2.10.4 Connecting Node 0 to Node 1 — SCI Host and Cables

Using the SCI private net cables, connect one SPARCcluster 2000 node to the other.

Note – Node-to-node connection is made using the SCI host, cables and cable bracket.

Note – Use 2-, 5-, or 10-meter SCI cable as appropriate.

Installing the Bracket Supports

1. **At the rear of the cabinet, loosely install two screws holes 70 and two more in holes 38.**
   At each hole position, install screw one at the left and one at the right. These screws will accept the slotted holes in the bracket supports (see Figure 10-21).

2. **Install the top and bottom bracket support on the screws and tighten the screws.**

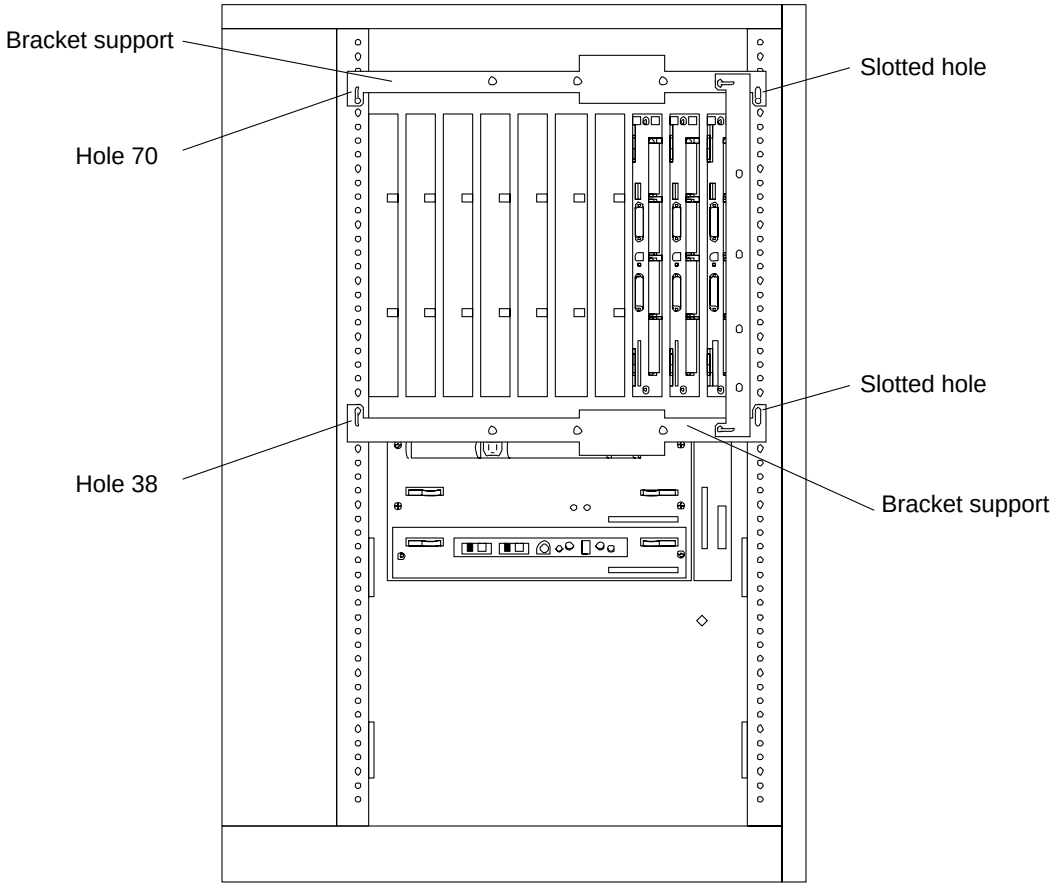


Figure 10-21 Installing the SCI Bracket Supports

Preparing the Cable and Bracket

Note – SCI cables are thick and stiff. The cable bracket incorporates a track on both sides to support both cables. These tracks mechanically form and support the SCI cables. This allows the bracket to hold the cable connector flush against the SCI host connector (SBus card), and isolate the connection from effects of cable inflexibility, twist or pull.

1. **At the rear of the cabinet, loosely install two screws in the top and bottom bracket supports.**
   Install screws in the hole closest to the right. These screws will accept the slotted holes in the cable bracket.

2. **Orient the bracket with the narrow portion of the slotted holes to the right and the cable track opening toward the top.**
   See Figure 10-22.

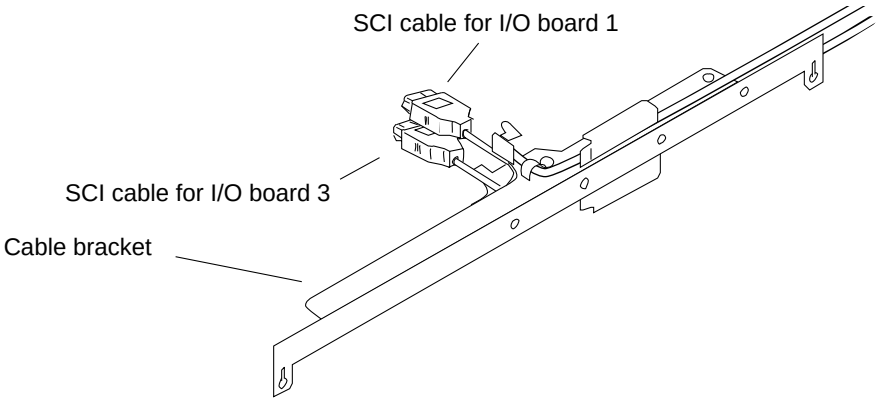


Figure 10-22 Installing the Two SCI Cables in the Cable Bracket

3. **Lay the cable for system board 1 into the right side of the bracket with the connector up and facing away from you.**
   Form the cable into the curved track built into the bracket.

4. **Install two cable clamps to secure the cable.**
   Use two plastic rivets to secure the clamps to the bracket.

5. **Repeat steps 2 and 3 for the left cable.**
   Install the cable in the track on the left side of the bracket and secure.

Cable and Bracket Installation

1. **Install the bracket with cables on the rack.**

   a. **Approach the rack. Align the cable connectors with the mating connectors on the system boards.**
      Do not force the connectors onto the host connectors at this time.

b. Adjust the cables in the tracks as required to allow the bracket surface to mate flush against the rack.
Adjust cables so the slotted holes in the bracket fit over the screws installed in step 1. Allow the bracket to rest on the screws but do not tighten.

c. Plug the cable connectors into the hosts.
Examine the cable connector to host spacing. Adjust the cables in the tracks as required to allow the top and bottom connectors to mate with the hosts.

d. Tighten the screws to secure the bracket to the rack.

Caution – Tighten the screws carefully or connector damage may occur. Readjust the cables in the tracks as required to prevent binding as the screws are tightened.

---

e. Check your work.
Ensure the connectors are secure and no excessive force bears on the cable, connector or system board. See Figure 10-23.

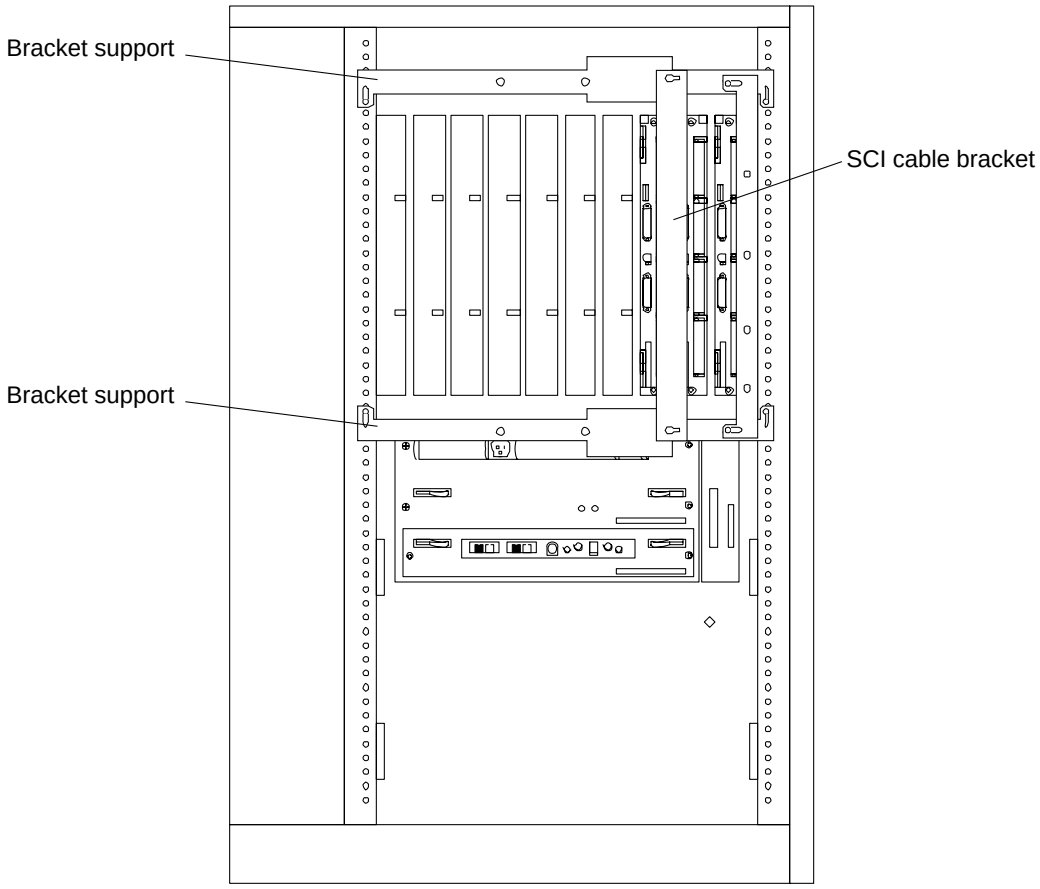


Figure 10-23 Installing the SCI Bracket to Connect the Nodes

2. Second node.
Repeat the Cable and Bracket Preparation and Cable and Bracket Installation procedures above for the remaining node.

10.2.10.5 Internal SCSI Tray

1. **Plug one end of a cable into the FSBE/S card in board 0, slot 4.**
   See Figure 10-24 and Table 10-2.
2. **Plug the other end into the IN connector of the bulkhead SCSI II panel.**
   This panel is located below the card cage and to the left.
3. **Install a terminator on the OUT connector of the bulkhead SCSI II panel.**

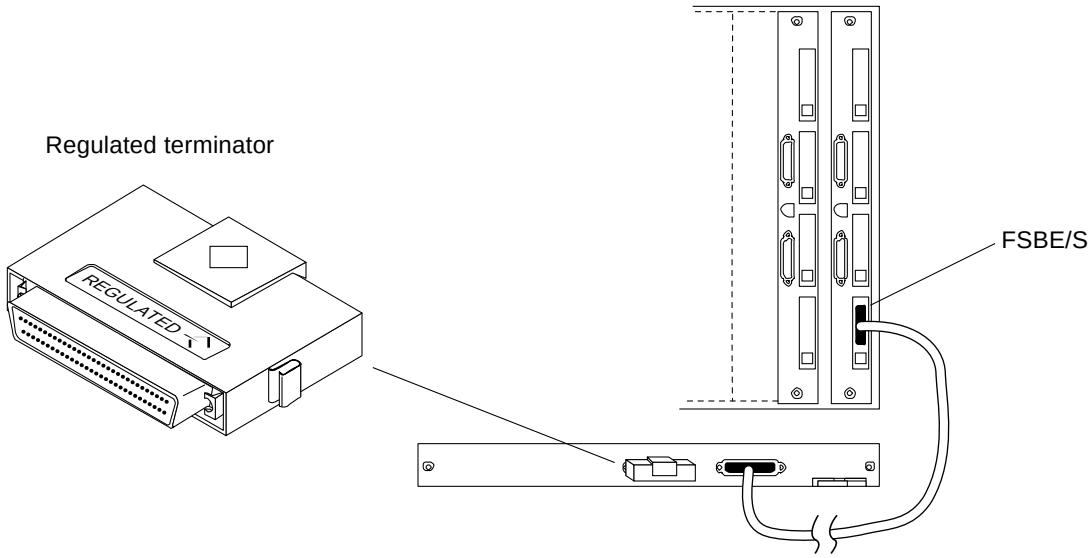


Figure 10-24 Connecting the Internal SCSI Tray

10.2.10.6 Connecting the SPARCstorage Arrays

Installing FC/OM Optical Module in all SPARCstorage Arrays

- **Install the second module in the array using the instructions provided with the module.**
  The arrays are delivered with one FC/OM optical module installed.

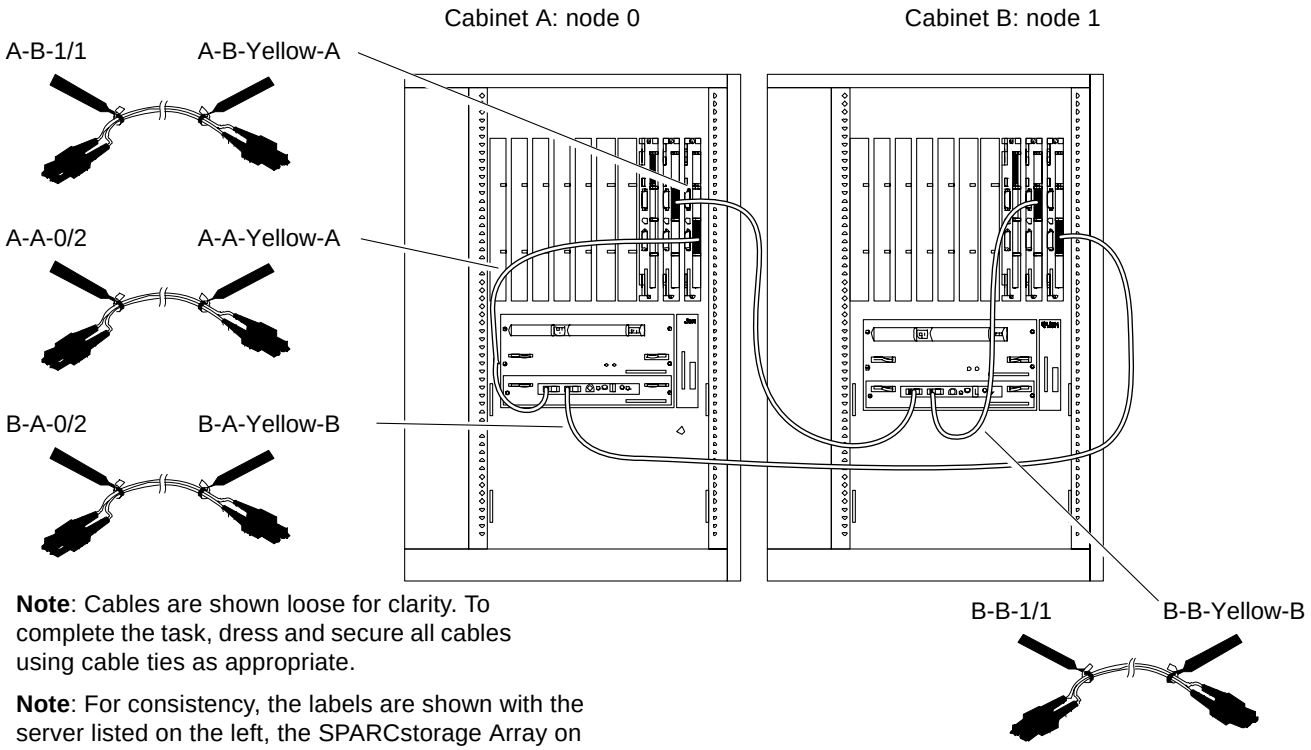
Labeling Fiber-Optic Cables

- **Label the fiber-optic cables prior to installation.**
  Labeling ensures accurate installation and eases system reconfiguration and expansion later.

The suggested fiber-optic cable labeling scheme for any given cable is:

- One end connects to an FC/OM module in node 0 or 1 (cabinet A)
- The other end connects to a FC/OM module in the SPARCstorage Array of a given elevation in cabinet A or B. Elevations are denoted by color from top to bottom, blue, red, orange, yellow, and white.

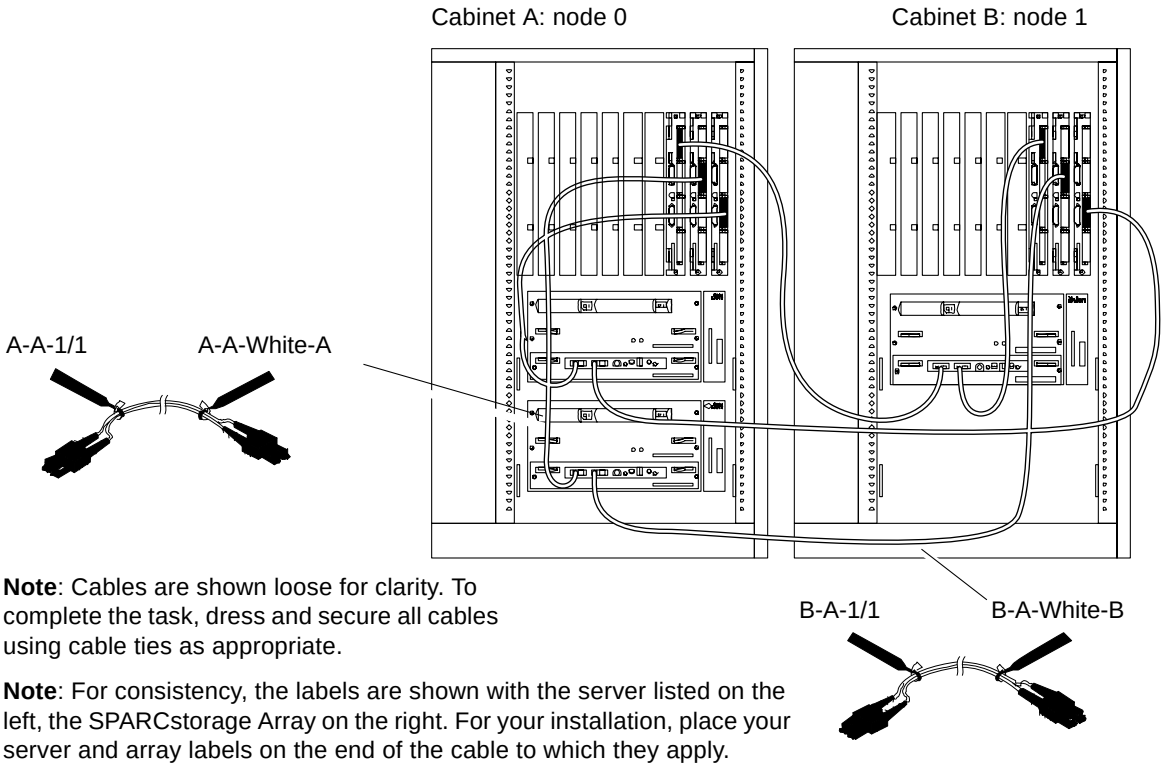
Affix labels to both ends of each cable with the node, cabinet, and elevation information imprinted on it. Use Figure 10-25 through Figure 10-31 as guides.



Note: Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

Note: For consistency, the labels are shown with the server listed on the left, the SPARCstorage Array on the right. For your installation, place your server and array labels on the end of the cable to which they apply.

Figure 10-25 SPARCstorage Array 0 and 1 Connection and Labeling Detail



Note: Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

Note: For consistency, the labels are shown with the server listed on the left, the SPARCstorage Array on the right. For your installation, place your server and array labels on the end of the cable to which they apply.

Figure 10-26 SPARCstorage Array 2 Connection Labeling Detail

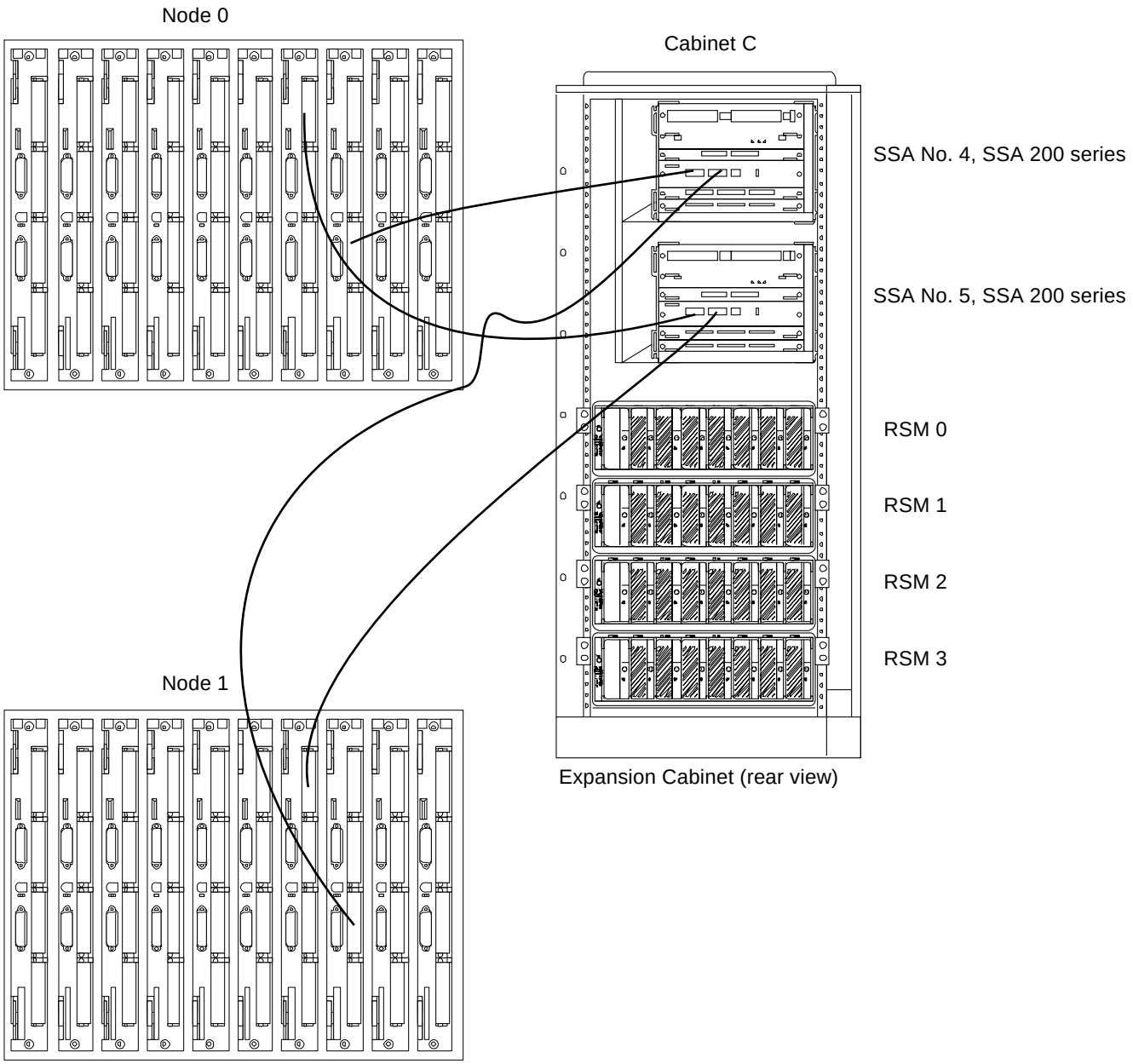


Figure 10-27 SPARCstorage Array 4 and 5 Connection Detail

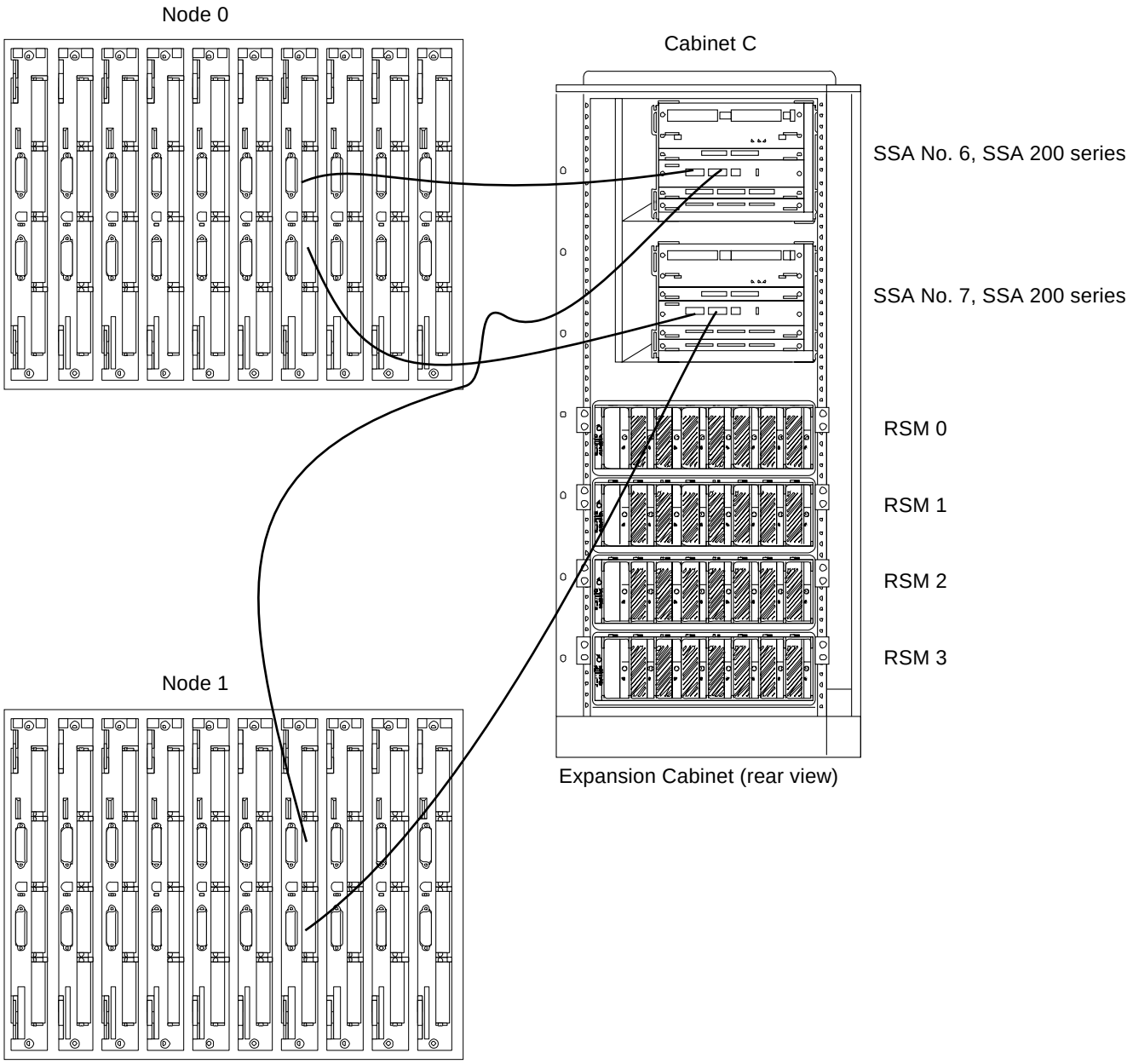


Figure 10-28 SPARCstorage Array 6 and 7 Connection Detail

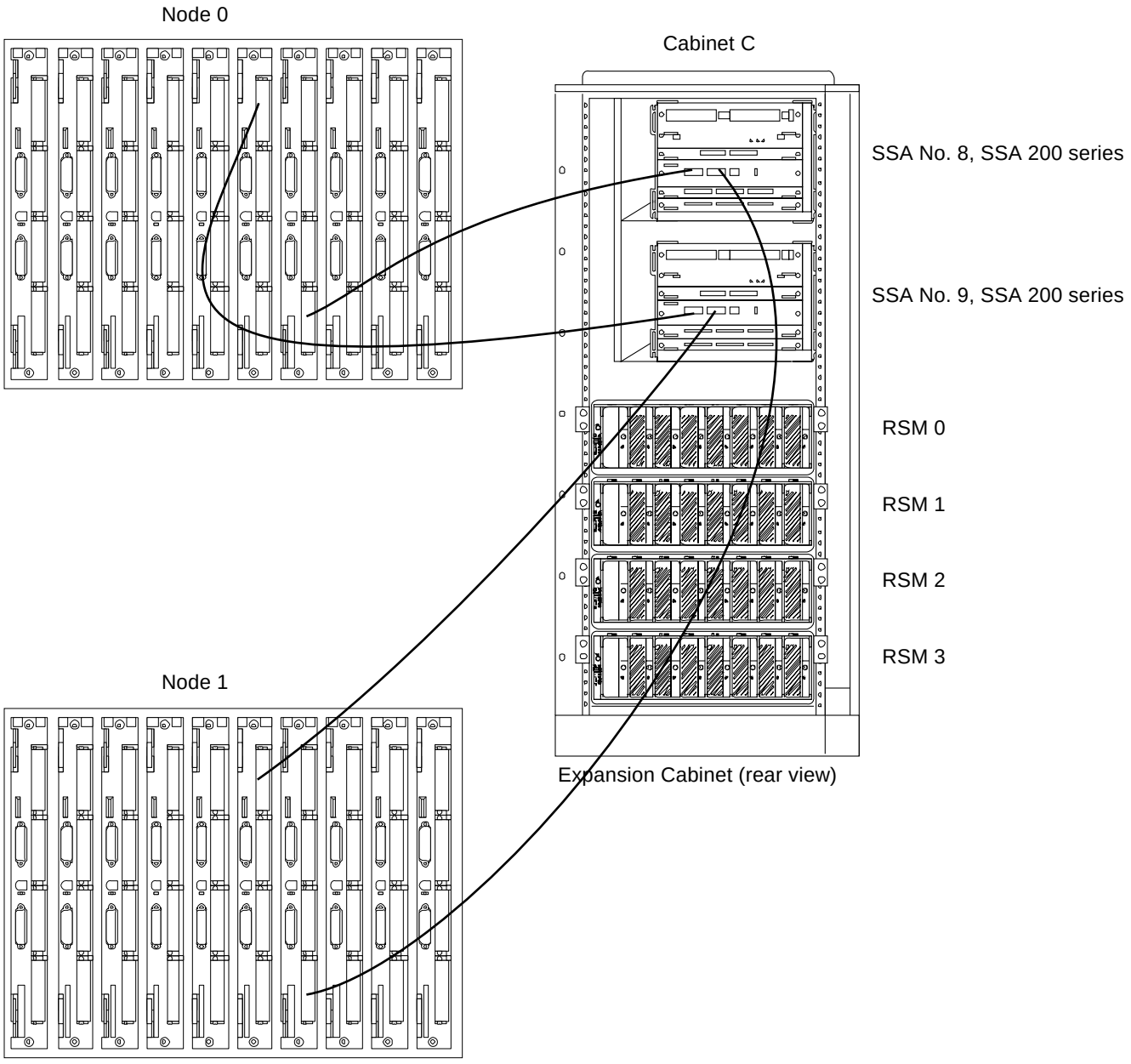


Figure 10-29 SPARCstorage Array 8 and 9 Connection Detail

Cabling

1. **Plug one end of the fiber cable into the FC/OM on the SBus card.**
   See Figure 10-30.

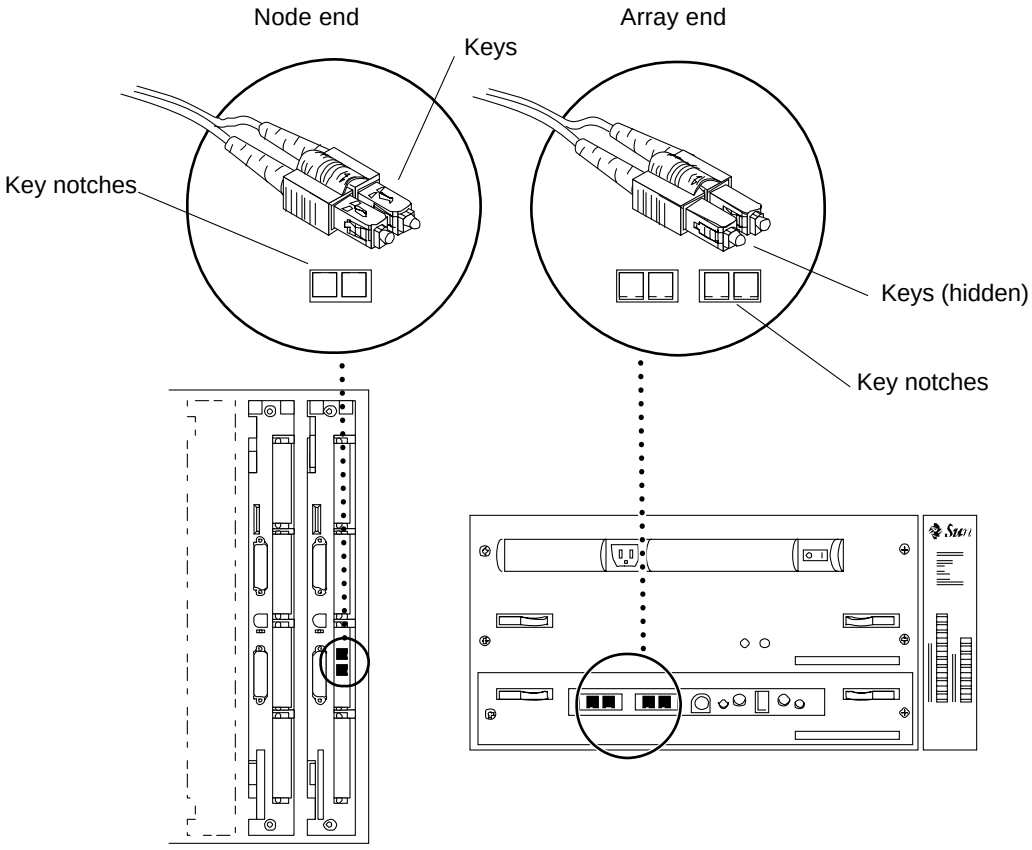
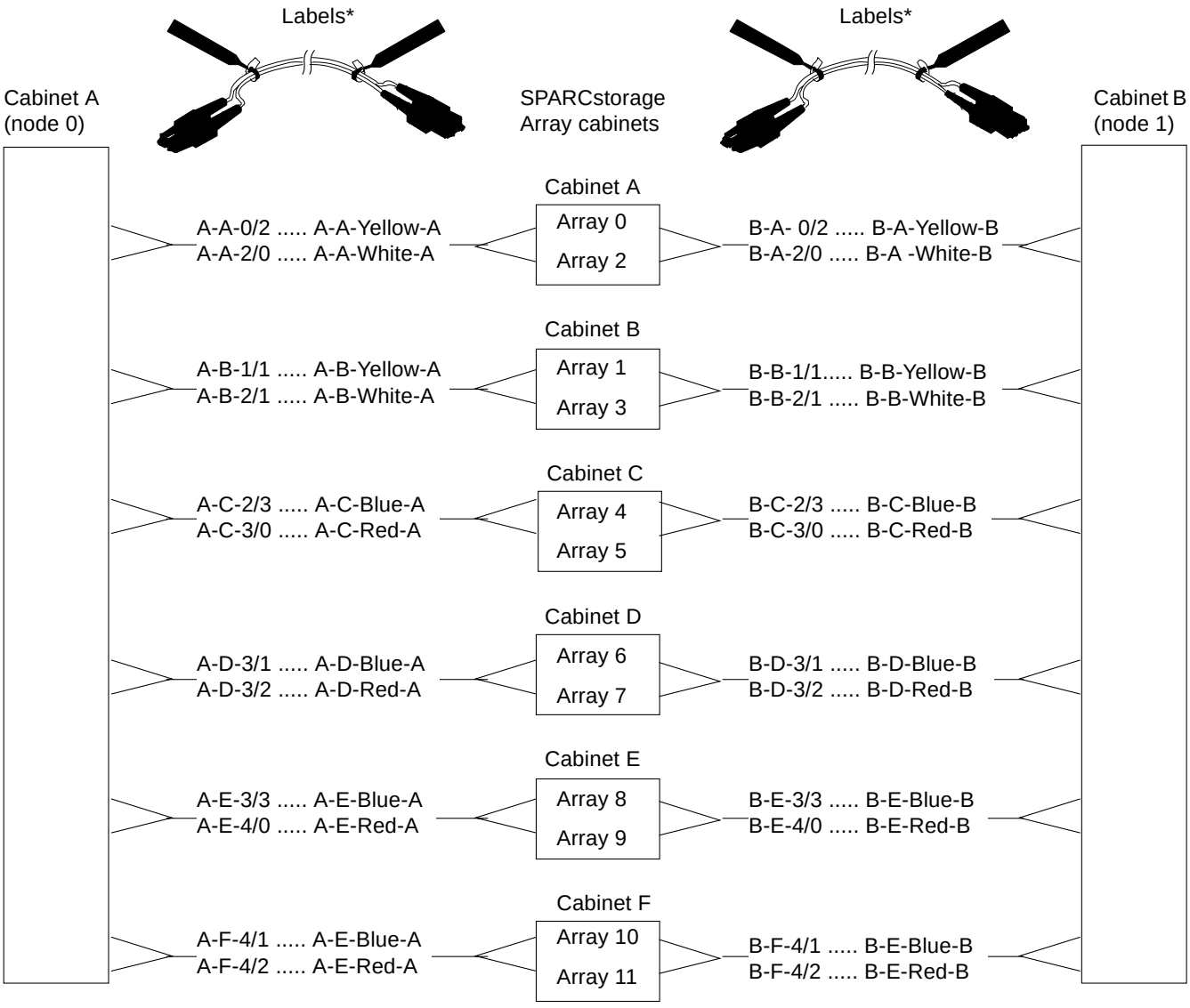


Figure 10-30 SPARCstorage Array Fiber Cable Connection

2. **Plug the other end of the fiber cable into the FC/OM connector or the SPARCstorage Array rear panel.**
   Plug node 0 into connector A and node 1 into connector B. Repeat to connect both nodes to all SPARCstorage Arrays. See Table 10-3 for a list of all fiber-optic cable connections. See Figure 10-31 for all point-to-point connections in a maximum configuration.

3. **Repeat steps 1 and 2 for all FC/OM cables to be connected.**

4. Dress and secure all cables using cable ties as required.



* **Note:** Place one label on each end of the cable.

Figure 10-31 Suggested Labeling Scheme for Fiber-Optic Cables

Table 10-3 Node to SPARCstorage Array Cable Connections

	From Server[1]		To SPARCstorage Array 100 Series						
	Node 0	Node 1	Cabinet A	Cab. B	Cab. C	Cab. D	Cab. E	Cab. F	Elevation
System Board	SBus Slot	SBus Slot	Array/ Slot	Array/ Slot	Array/ Slot	Array/ Slot	Array /Slot	Array /Slot	(Color)
0	0	0							
	1	1							
	2		0 slot A						Yellow
		2	0 slot B						Yellow
	3	3							
1	0	0							
	1			1 slot A					White
		1		1 slot B					White
	2	2							
	3	3							
2	0		2 slot A						Yellow
		0	2 slot B						Yellow
	1			3 slot A					White
		1		3 slot B					White
	2								
		2							
	3				4 slot A				Blue
		3			4 slot B				Blue
3	0				5 slot A				Red
		0			5 slot B				Red
	1					6 slot A			Blue
		1				6 slot B			Blue
	2					7 slot A			Red

Table 10-3 Node to SPARCstorage Array Cable Connections *(Continued)*

System Board	From Server[1] Node 0 SBus Slot	From Server[1] Node 1 SBus Slot	To SPARCstorage Array 100 Series Cabinet A Array/ Slot	Cab. B Array/ Slot	Cab. C Array/ Slot	Cab. D Array/ Slot	Cab. E Array /Slot	Cab. F Array /Slot	Elevation (Color)
		2				7 slot B			Red
3	3						8 slot A		Red
		3					8 slot B		Red
4	0						9 slot A		Blue
		0					9 slot B		Blue
	1							10 slot A	Red
		1						10 slot B	Red
	2							11 slot A	Red
		2						11 slot B	Red

1. All connections made using optical fiber cable Part No. 537-1004, 2 meter or Part No. 537-1006. 15 meter as appropriate

10.2.11 Programming the OBP Environment

Figure 10-32 illustrates the logical path that the OpenBoot PROM follows when performing boot.

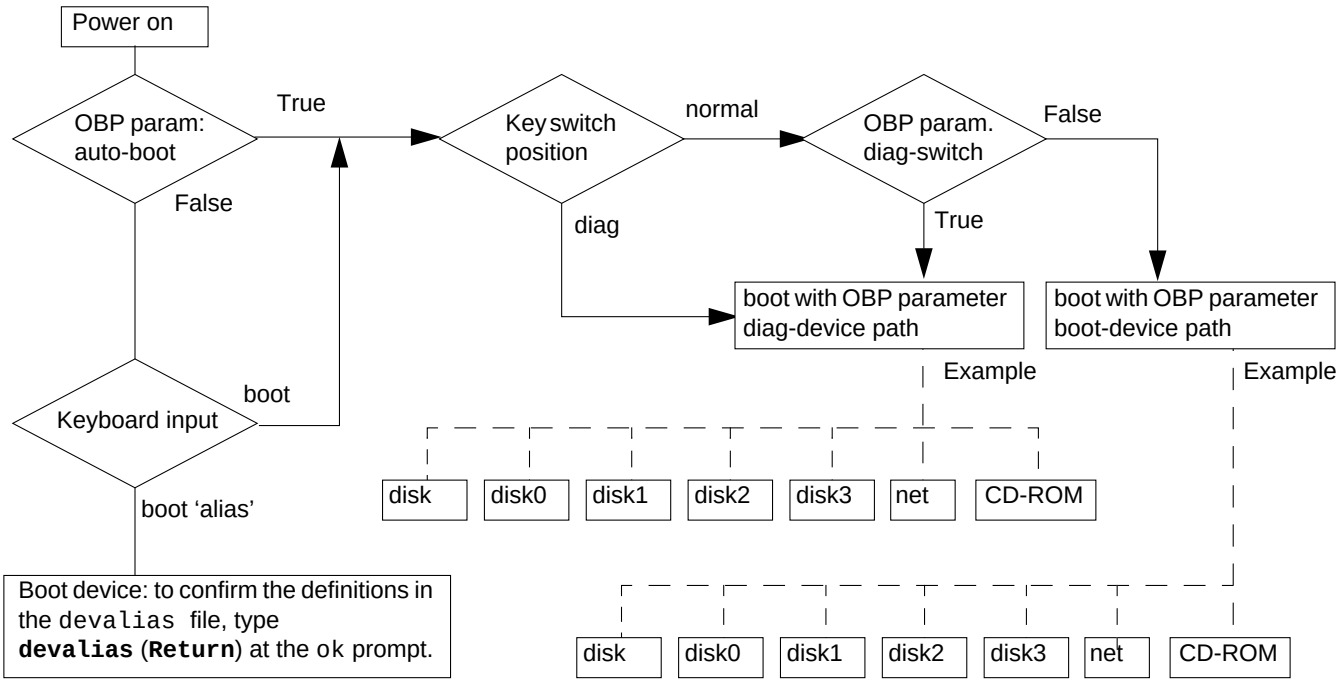


Figure 10-32 Open Boot Prom Variables

10.2.11.1 Command Line Verification

Determine how many SCSI disks are directly connected and which target addresses they use.

♦ **Enter `probe-scsi` at the ok PROM prompt. In the example below, disks with target addresses 0 and 1 are present.**

```
 <#0> ok probe-scsi
Target 0
  Unit 0   Disk     SEAGATE ST31200N SUN1.05872200541815Copyright
(c) 1994 Seagate All rights reserved 0000
Target 1
  Unit 0   Disk     SEAGATE ST31200N SUN1.05872200620219Copyright
(c) 1994 Seagate All rights reserved 0000
```

Since target address 0 is present, no action is required.

Note – Figure 10-33 shows the Multi-Disk Pack as it is assembled into its mounting bracket.

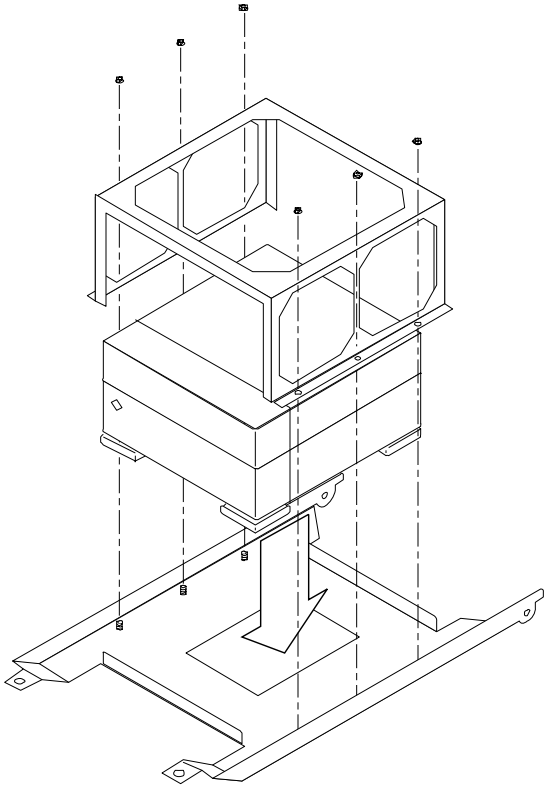


Figure 10-33 Multi-Disk Pack in its Mounting Bracket

10.2.11.2 Existing Default Boot Path

Determine if the existing boot path defaults to a disk you wish to use.

1. **Run** `devalias` **to see the default boot paths used.**
   In the example below, full path disk aliases are set for disks at target addresses 3. 2. 1 and 0. The aliases are disk 3, disk 2, disk 1 and disk 0 respectively.

```
 <#0> ok devalias
scsi          /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000
net           /io-unit@f,e0200000/sbi/lebuffer@3,40000/le@3,60000
disk3          /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@3,0
disk2          /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0
disk1          /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@1,0
disk0          /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@0,0
disk           /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@0,0
cdrom          /io-
unit@f,e0200000/sbi/dma@3,81000/esp@3,80000/sd@6,0:e
tape1          /io-
unit@f,e0200000/sbi/dma@3,81000/esp@3,80000/st@5,0
tape0          /io-
unit@f,e0200000/sbi/dma@3,81000/esp@3,80000/st@4,0
tape           /io-
unit@f,e0200000/sbi/dma@3,81000/esp@3,80000/st@4,0
keyboard1      /cpu-unit@f,e0000000/bootbus/zs@1,240000
keyboard!      /cpu-unit@f,e0000000/bootbus/zs@1,240000:forcemode
ttyb           /cpu-unit@f,e0000000/bootbus/zs@1,200000:b
ttya           /cpu-unit@f,e0000000/bootbus/zs@1,200000:a
keyboard       /cpu-unit@f,e0000000/bootbus/zs@1,240000
```

2. **Run** `set-defaults` **to invoke all default boot paths.**

```
 <#0> ok set-defaults
Setting NVRAM parameters to default values.
```

3. Enter the `printenv` command at the `ok` PROM prompt.

```
<#0> ok printenv
Parameter Name        Value                          Default Value

powerfail-time        0                               0
output-device         screen                          screen
input-device          keyboard                        keyboard
keyboard-click?       false                           false
keymap
ttyb-rts-dtr-off      false                           false
ttyb-ignore-cd        true                            true
ttya-rts-dtr-off      false                           false
ttya-ignore-cd        true                            true
ttyb-mode             9600,8,n,1,-                    9600,8,n,1,-
ttya-mode             9600,8,n,1,-                    9600,8,n,1,-
sbus-probe-list9      0123                            0123
sbus-probe-list8      0123                            0123
sbus-probe-list7      0123                            0123
sbus-probe-list6      0123                            0123
sbus-probe-list5      0123                            0123
sbus-probe-list4      0123                            0123
sbus-probe-list3      0123                            0123
sbus-probe-list2      0123                            0123
sbus-probe-list1      0123                            0123
sbus-probe-list0      0123                            0123
fcode-debug?          false                           false
auto-boot?            true                            true
watchdog-reboot?      false                           false
diag-file
diag-device           net                             net
boot-file
boot-device           disk net                        disk net
local-mac-address?    false                           false
screen-#columns       80                              80
screen-#rows          34                              34
selftest-#megs        768                             768
scsi-initiator-id     7                               7
use-nvramrc?          false                           false
nvramrc
sunmon-compat?        false                           false
security-mode         none                            none
security-password
```

```
security-#badlogins   1431655765                    <no default>
oem-logo                                            <no default>
oem-logo?             false                         false
oem-banner                                          <no default>
oem-banner?           false                         false
hardware-revision     UUUUUUUU ...                  <no default>
last-hardware-update  UUUUUUUU ...                  <no default>
testarea              0                             0
mfg-switch?           false                         false
diag-switch?          false                         false
```

You may use the shorter version by specifying the specific parameter you wish to display, as in the example below.

```
<#0> ok printenv boot-device
boot-device =         disk net
```

4. Reboot the system.

```
<#0> ok boot
Resetting...
screen not found.
Can't open input device.
Keyboard not present.  Using tty for input and output.

SPARCcenter 2000E, No Keyboard
ROM Rev. 2.21, 768 MB memory installed, Serial #7420298.
Ethernet address 8:0:20:71:39:8a, Host ID: 8071398a.



Rebooting with command:
Boot device: /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@0,0  File and
args:
SunOS Release 5.4 Version Generic_101945-33 [UNIX(R) System V
Release 4.0]
Copyright (c) 1983-1994, Sun Microsystems, Inc.
```

The boot disk points to the same alias as boot disk0:

```
<#0 ok boot disk
Resetting...
screen not found.
Can't open input device.
Keyboard not present.  Using tty for input and output.

SPARCcenter 2000E, No Keyboard
ROM Rev. 2.23, 128 MB memory installed, Serial #7420304.
Ethernet address 8:0:20:71:39:90, Host ID: 80713990.



Rebooting with command: disk
Boot device: /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@0,0  File and
args:
SunOS Release 5.4 Version Generic_101945-10 [UNIX(R) System V
Release 4.0]
Copyright (c) 1983-1994, Sun Microsystems, Inc.

.......more messages.......
```

The alternative is to boot from disk1 or disk3 in a Multi-Disk Pack with two disk drives.

```
<#0> ok boot disk1
  or

<#0> ok boot disk3
```

10.2.11.3 *Changing the Disk Addresses or Boot Path*

If you must change boot path addressing, do so by changing the OBP paths, or by changing the address jumpers on the internal disk drives:

Programming the OBP Environment

You must program the OpenBoot PROM (OBP) environment to use the right boot path to the Multi-Disk Pack. The default SCSI addressing for a multi-disk pack with 2 disk devices installed is 1 and 3. Set the OBP boot path using this procedure.

1. **Get to the** `ok` **prompt.**
   You may do this by power cycling the system or pressing the reset button.

2. **Enter the** `setenv` **command followed by** *parameter name* **and** *value* **to change the setting.**
   Use Figure 10-32 as a guide. Change the parameter value as required so that the system will boot from the disk you select for the boot image.
   See the printout below for an example of use of the `ok` prompt commands.

```
<#0> ok setenv boot-device disk1
boot-device =         disk1
```

3. **Enter** `printenv`**.**

```
<#0> ok printenv boot-device
boot-device =         disk1
```

4. **Boot the system.**

```
<#0> ok boot
Boot device: /io-
unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@1,0  File and
args:
.......more messages.......
```

10.2.11.4 Help Examples

See the example that follows for help menus.

```
<#0> ok help

Enter 'help command-name' or 'help category-name' for more help
(Use ONLY the first word of a category description)
Examples:  help select   -or-   help line
    Main categories are:
File download and boot
Resume execution
Diag (diagnostic routines)
Power on reset
>-prompt
Select I/O devices
Ethernet
System and boot configuration parameters
Line editor
Tools (memory,numbers,new commands,loops)
Assembly debugging (breakpoints,registers,disassembly,symbolic)
Sync (synchronize disk data)
Nvramrc (making new commands permanent)
```

```
<#0> ok help boot
    Category:  File download and boot
boot  <specifier>  ( -- )    boot kernel ( default ) or other file
   Examples:
        boot                    - boot kernel from default device.
                                    Factory default is to boot
                                  from disk if present, otherwise
from NET.
        boot net                 - boot kernel from network
        boot cdrom               - boot kernel from CD-ROM
        boot disk1:h             - boot from disk1 partition h
        boot tape                - boot default file from tape
       boot disk myunix -as    - boot myunix from disk with flags
"-as"
        boot /io-unit@f,e2200000/sbus/dma@3,81000/esp/st@4,0
oldunix
                                - boot oldunix from board#2 slot#3
                                  scsi device 'st' target 4 unit 0
<#0> ok help sys
    Category: System and boot configuration parameters
printenv         ( -- )   show all configuration parameters
        numbers are shown in decimal
setenv  name value  ( -- )  change a configuration parameter
        changes are permanent but only take effect after a reset
   Examples:
       setenv input-device ttya        - use ttya input next time
       setenv sbus-probe-list 0132     - set sequence of probing
sbus slots
        setenv screen-#rows 0x1e         - use 30 rows of display
( hex 1e )
       setenv boot-device net           - specify network as boot
device
        setenv auto-boot? false          - disable automatic boot
set-defaults     ( -- )  revert to factory configuration
<#0> ok
```

10.3 Closing the Cabinet

- **Replace all panels on the cabinet.**
  See Chapter 8, “Internal Access and Leveling” for procedures.

Proceed to Chapter 11 for terminal concentrator configuration procedures and software installation and setup procedures.

Configuring the Terminal Concentrator and Installing the Software

11

11.1 Configuring the Terminal Concentrator

1. **Edit the contents of the `/etc/remote` file on the administration workstation, and create the following line.**

```
a:dv=/dev/term/a:br#9600:
```

2. **From the administration workstation, type the following command to connect the workstation serial port, TTYA, to terminal concentrator port 1.**

```
# tip a
```

Note – Your administration workstation may have a combined serial port labeled SERIAL A/B. In this case, you cannot use the TTYB port without the appropriate splitter cable. See the documentation supplied with your workstation for more information.

3. **Verify that the server and the terminal concentrator are powered on and that the cabinet key switch (if applicable) is in the ON position.**

4. **Reset the terminal concentrator.**
   Press the Test button on the front panel for three or more seconds until the Power LED blinks rapidly. Release the button (see Figure 11-1).

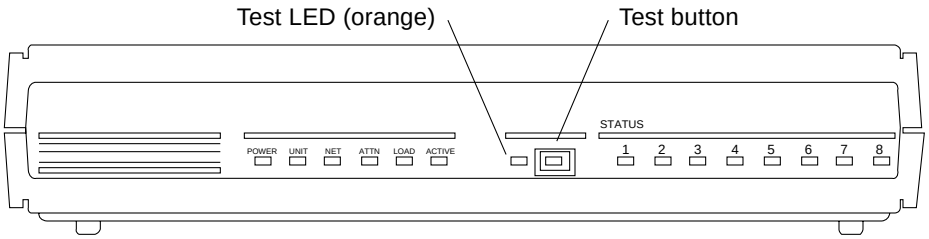


Figure 11-1 Terminal Concentrator Test Button

5. Within 30 seconds, press the Test button (again).

Note – Verify that the orange test LED lights to ensure the unit is in test mode.

The terminal concentrator performs a self-test, which lasts about 30 seconds. Messages display on the terminal screen. If the network connection is not found, press the q key to stop the message. When terminal concentrator boot completes successfully, the front panel LEDs light as shown:

Table 11-1 Front Panel LEDs Indicating a Successful Boot

Power (Green)	Unit (Green)	Net (Green)	Attn (Amber)	Load (Green)	Active (Green)
ON	ON	ON	OFF	OFF	Intermittent blinking

If boot fails, the LEDs on the front panel may light in one of these modes:

Table 11-2 Front Panel LEDs Indicating a Failed Boot

Mode	Power (Green)	Unit (Green)	Net (Green)	Attn (Amber)	Load (Green)	Active (Green)
Hardware failure	ON	Blinking	OFF	Blinking	OFF	OFF
Network test failure	ON	ON	Blinking	OFF	OFF	Intermittent blinking
Network test aborted, or net command failed	ON	ON	OFF	Blinking	OFF	Intermittent blinking
Booted wrong image	ON	ON	ON	Blinking	OFF	OFF
Other failure	One or more Status LEDs (1–8) are ON					

If the LEDs denote another mode of failure, refer to the *SPARCcluster PDB Service Manual*.

6. **Check the connector to the public net to verify that it is connected correctly.**

7. **Upon successful power-on, the** `monitor::` **prompt appears. Use the** `addr` **command to assign an IP address, subnet mask, and network address to the terminal concentrator.**
   In the example that follows, the broadcast address is the terminal concentrator address with the host portion set to 255 or all ones.

```
monitor:: addr

Enter Internet address [<uninitialized>]::terminal concentrator IP address
Enter Subnet mask [255.255.255.0]:: subnet mask
Enter preferred load host Internet address [<any host>]::<return>
Enter Broadcast address [0.0.0.0]::your network broadcast address
Enter preferred dump address 0.0.0.0]::<return>

Select type of IP packet encapsulation (ieee802/ethernet)
[<ethernet>]::<return>
    Type of IP packet encapsulation: <ethernet>
Load Broadcast Y/N [Y]::<return>

monitor::
```

8. **Verify that the terminal concentrator boots from itself instead of the network.**
   To do this, type the following commands at the `monitor::` prompt and press Return after verifying the correct settings shown in the second screen display:

```
monitor:: seq

Enter a list of 1 to 4 interfaces to attempt to use for downloading code or
upline dumping. Enter them in the order they should be tried, separated by
commas or spaces. Possible interfaces are:
    Ethernet: net
    SELF: self
Enter Interface sequence [net]:: self
Interface sequence: self

monitor:: image
    Enter Image name [(ip)“oper.52.enet”,(mop) ”OPER_52_ENET.SYS”]:: <return>
    Enter TFTP Load directory [“[“ “]”]:: <return>
    Enter TFTP Dump path/filename [“dump.0.0.0.0]::<return>

monitor::
```

9. **Quit the `tip` program by typing:**

```
monitor:: <return>
monitor:: ~. (tilde and period)
```

10. **Use the power switch on the back of the terminal concentrator to turn the terminal concentrator off momentarily, and then on again.**
    A power cycle will reboot the terminal concentrator. The terminal concentrator is ready when the Load light on the front panel goes off.

Note – For more information about commands available on the terminal concentrator, see the *Terminal Concentrator General Reference Guide.*

11. **Disconnect the serial cable from the administration workstation.**
    The cable is no longer needed.

11.2 Checkpoint to Verify Terminal Concentrator Setup

Verify your installation up to this point.

`telnet` to the terminal concentrator over the network by typing:

```
% telnet terminal concentrator name
```

The normal response is:

```
Trying ip_address ...
Connected to terminal concentrator
Escape character is '^]'.
```

- If you do not get the preceding message, `ping` the host system by typing:

```
# ping hostname
```

- If the system does not respond, reset the *ip_address* and *subnet mask* settings and verify your installation again.

```
# ping terminal concentrator name
```

11.3 Setting the Port Parameters

The type variable for each port must be set to `dial_in`. If it is set to `hardwired`, the cluster console may be unable to detect when a port is already in use. The next section explains how to determine if the port type variable must be set.

11.3.1 Determining if the Port Type Variable Must Be Set.

Perform this procedure to see if you must set the port variable.

1. **Find the Sun label on thr top panel of the terminal concentrator.**
   See Figure 11-2.

2. **Examine the serial number to see if it is in the lower serial number range.** The serial number consists of seven digits, followed by a dash and ten more digits.
   - If the numbers after the dash start with 9520 or higher, the port type variable is set correctly — no action required.
   - If the numbers after the dash start with 9519 or lower, the port type variable must be changed.
3. **If you must change the port type variable, use the procedure in Section 11.3.2, "Port Parameters Procedure."**

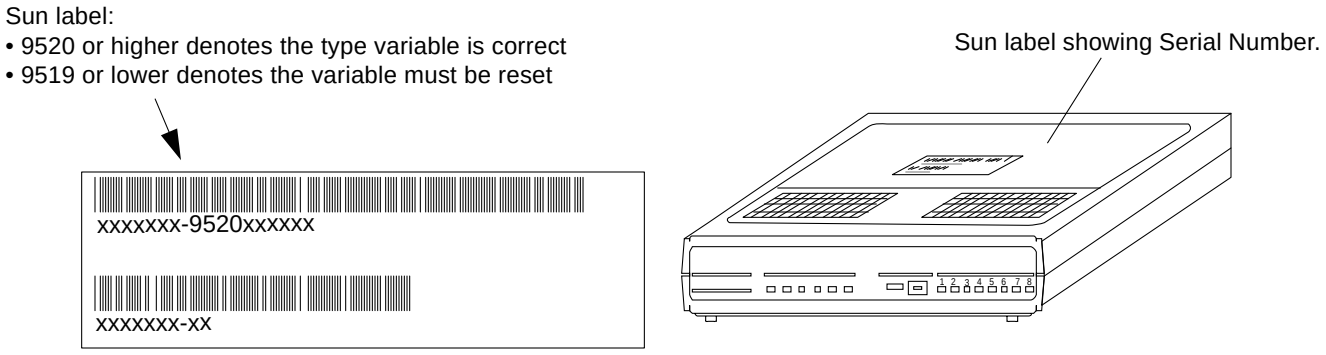


Figure 11-2 Determining the Terminal Concentrator Version

11.3.2 Port Parameters Procedure

Using an administration workstation, perform these steps to set the port parameters. Substitute your host name for `planets-tc`.

Note – Make sure that the terminal concentrator is powered on and has completed booting.

```
admin-ws# telnet terminal concentrator name
Trying terminal concentrator IP address
Connected to planets-tc.
Escape character is '^]'.


Rotaries Defined:
    cli                                 -

Enter Annex port name or number: cli


Annex Command Line Interpreter  *  Copyright 1991 Xylogics, Inc.

annex: su
Password: type the password (default password is the terminal concentrator
IP address)
annex# admin
Annex administration MICRO-XL-UX R7.0.1, 8 ports
admin : set port=1-8 type dial_in
  You may need to reset the appropriate port, Annex subsystem or
        reboot the Annex for changes to take effect.
admin : quit
annex# boot
bootfile:  <return>
warning:   <return>
```

Note – This will cause the terminal concentrator to reboot. Thus the terminal concentrator will be unavailable for about a minute.

11.4 Resetting the Terminal Concentrator Configuration Parameters

For this procedure, refer to the *SPARCcluster Service Manual*, Chapter 3.

11.5 Installing the Solaris 2.5.1 Operating System on the Nodes

For information on installing the Solaris 2.5.1 operating system on the nodes from the Solaris CD and the SMCC Updated CD, refer to the *SMCC SPARC Hardware Platform Guide Solaris 2.5.1*.

Note – The Solaris operating system installed on both PDB nodes must match the operating system version level (Sun Solaris 2.5.1) installed on the system administration workstation.

The operating system is installed during hardware installation to facilitate running the SunVTS™ diagnostic system. SunVTS is used to verify that the hardware is installed correctly.

11.6 Acceptance Test

At this point, establish an important installation milestone. Completion and sign-off of this acceptance test by both the installer and the site client is a mutual declaration that operational acceptance of all nodes of the cluster hardware with associated components, cabling, and installation has been completed, checked, and approved.

Note – This acceptance test is designed to prove that the physical installation was performed correctly and completely. It is *not* the intent of the acceptance test to prove system fault detection capabilities, nor to inject failures (for example) and then to monitor the results.

Perform the acceptance test after:

- All hardware is installed and cabling is complete
- The Solaris operating system is installed, including
  - Installation of the system administration workstation
  - Configuration of the terminal concentrator

Perform the test using the procedures presented in the following sections.

11.6.1 Using SunVTS

SunVTS is one of the on-line diagnostics tools for SPARCcluster PDB servers. See Section 11.6.1.2, “Running SunVTS.”

A utility within SunVTS, `vtsprobe`, is used to verify installation of system hardware, SPARCstorage Arrays, private net devices, and network interfaces. See Section 11.6.1.1, “Verifying Hardware Installation.”

Caution – Run SunVTS only while no database application software is running. Use SunVTS at this stage only to verify that the hardware configuration is correct. Do not attempt to use SunVTS to validate software configuration. If you run SunVTS while database application software is running, unpredictable results can occur.

Note – SunVTS must be run separately on each node. There is no provision for running SunVTS on both nodes at the same time. When you are done running SunVTS on one node, you must then repeat the process on the other node.

11.6.1.1 Verifying Hardware Installation

There are four prerequisites for the following procedure:

- Both nodes have Solaris 2.5.1 installed.
- Both nodes have SPARCstorage Array package installed.
- Both nodes have routing table established for the private interconnect.
- Both nodes have SUNWvts package installed.

Perform the following steps on each node:

1. **Become superuser and change directories:.**

```
# cd /opt/SUNWvts/bin
```

2. **Set the following environment variables**:

- For a Bourne shell:

```
# BYPASS_FS_PROBE=1;export BYPASS_FS_PROBE
```

- For a C shell:

```
% setenv BYPASS_FS_PROBE 1
```

3. Become superuser and type:

```
# ./vtsk
```

Executing the `./vtsk` command starts the SunVTS kernel. The SunVTS kernel probes system devices and awaits commands from an interface.

Note – The following error message may be displayed if you are executing the `./vtsk` command for the second time, such as when directed to in the final step of this procedure.

```
# vtsk: SunVTS kernel is already running
```

If this error message occurs, type:

```
# ps -ef|grep vtsk (find process id of vtsk)
# kill -INT <vtsk pid>
# ./vtsk
```

4. Wait a few minutes to enable `vtsk` to finish probing the system and then initiate a `probe_map` file using the `vtsprobe` command.
As shown in the following example, the output, which can be lengthy, is redirected to a file for later viewing. The `vtsprobe` command without modifiers will produce a console screen output.

```
# ./vtsprobe > /tmp/probe_map
```

5. **Verify that the response to the** `vtsprobe` **command is similar to the following for the private net devices:**

Note – The data listed in the following example is displayed before the private net is configured (in Sun4d systems, hme1 and hme2) are hme0 and hme1.

```
Network
      hme1(nettest)
      Port Address: Unknown
      Host ID: 80500419
      Domain Name : nn.nn.nn.com
      hme2(nettest)
      Port Address: Unknown
      Host ID: 80500419
      Domain Name : nn.nn.nn.com
```

If the data listed for the private net devices does not match the build configuration, check and correct any cabling errors and then repeat Steps 1 through 5.

6. **Verify that there is a response (under the Network heading) to the** `vtsprobe` **command for any network interface devices installed.**
For example, if you have installed an SBus Quad Ethernet Controller, there should be corresponding `hme` entries. Consult documentation supplied with your network interface card to determine the correct entry for your device.

7. **Verify that the response to the** `vtsprobe` **command is similar to the following for the SPARCstorage Arrays:**

```
pln0(plntest)
    Worldwide Name: 08002018375f
    Disks Attached: c1t0d0 c1t0d1 c1t1d0 c1t1d1 c1t2d0
    : c1t2d1 c1t3d0 c1t3d1 c1t4d0 c1t4d1
    : c1t5d0 c1t5d1

     pln1(plntest)
    Worldwide Name: 0800201cad8e
    Disks Attached: c2t0d0 c2t0d1 c2t1d0 c2t1d1 c2t2d0
    : c2t2d1 c2t3d0 c2t3d1 c2t4d0 c2t4d1
    : c2t5d0 c2t5d1
```

If the data listed for the SPARCstorage Arrays does not match the build configuration, check and correct any cabling errors, and then repeat Steps 1 through 7.

8. **Verify that the response to the `vtsprobe` command is similar to the following for each disk listed under a SPARCstorage Array:**

```
SparcStorageArray(pln0)
    c1t0d0(rawtest)<--- logical name(test name)
        Logical Name: c1t0d0
        Capacity: 1002.09MB
        Controller: pln0

    c1t0d1(rawtest)<--- logical name(test name)
        Logical Name: c1t0d1
        Capacity: 1002.09MB
        Controller: pln0

    c1t1d0(rawtest)<--- logical name(test name)
        Logical Name: c1t1d0
        Capacity: 1002.09MB
        Controller: pln0
```

If the data listed for the disks does not match that shown under the corresponding SPARCstorage Array, the disk may be bad. In this case, you may have to type `boot -r` to rebuild the device tree. Then, repeat steps 1 through 8.

9. **Compare the `probe_maps` generated by each node.**
10. **Check and verify WWN of each SPARCstorage Array.**
11. **Check and compare disk logical name and capacity for all disks under the corresponding SPARCstorage Array.**
    If there is not an identical match, replace the SPARCstorage Array controller and/or disks if necessary.

Note – Logical disk names may differ on the two nodes. This does not indicate a problem.

---

12. **To run a final system functional check, run SunVTS using the procedure in Section 11.6.1.2, "Running SunVTS."**

11.6.1.2 Running SunVTS

Run a final functional test of the system using SunVTS.

1. **Become superuser and change directories:**

```
# cd /opt/SUNWvts/bin
```

2. **Type:**

```
# ./sunvts
```

If the system does not have a frame buffer, a TTY base SunVTS control panel will be displayed. After the TTY interface is displayed, direct the cursor to the "start" button and use press Return to start SunVTS system testing. Allow for one system pass of the SunVTS run. For details of how to run SunVTS, refer to the *SunVTS User's Guide*, Part Number 801-7271.

11.6.2 Acceptance Test Criteria

This acceptance test has completed successfully if the data listed for all hardware components match the corresponding build configurations.

If this is not true, the system has failed acceptance test.

11.7 Software Installation

For these procedures, proceed to the the appropriate document listed below:

PDB	*Ultra Enterprise PDB 1.2 Software Planning and Installation Guide,* part number 802-6790
High Availability (HA)	*Solstice HA 1.2 Software Planning and Installation Guide part number 802-7211*

Air Baffle, Rackmount Rail and Blower Assembly Installation

A

This appendix provides procedures to install the following assemblies:

A.1 Installing the Air Baffles

To ensure proper cabinet air flow:

- Install the top air baffle assembly in all SPARCcluster 1000 system cabinets and all expansion cabinets
- Install the bottom air baffle assembly in all locations that do not have a SPARCstorage Array installed. Thus, all potential chassis cabinet locations will have a chassis installed or be configured with the multi-piece bottom air baffle assembly.

Note – The SPARCcluster 1000 cabinet may have a fifth chassis installed (two servers, three SPARCstorage Arrays). If five chassis are installed, the bottom air baffle assembly is not required to close open air gaps.

A.1.1 Installing the Top Air Baffle Assembly

A.1.1.1 Side Top Baffle

The top air baffle assembly consists of the side baffle and the front baffle.

1. **Loosely thread screws into hole 79 at the front and rear of the cabinet.** These will accept the slotted holes in the side top baffle. See Figure A-1.

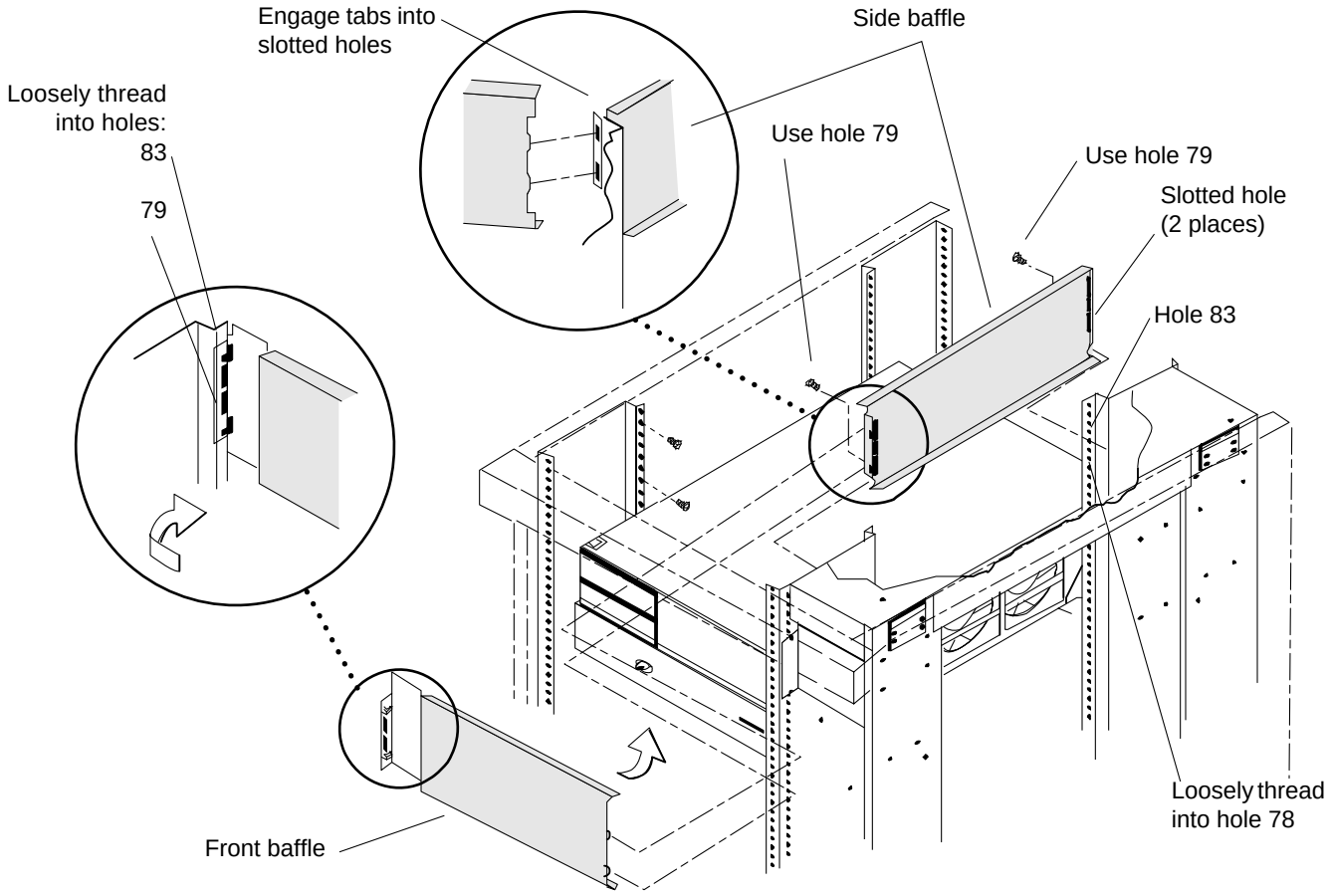


Figure A-1 Installing the Top Air Baffle Assembly

2. **Orient the side baffle as shown in Figure A-1 and slip the slotted holes over the screw heads installed in step 1, and under the loose bayonet hinge.**
3. **Tighten both screws to secure the side baffle in place.**
4. **Tighten all screws (loosened earlier) to secure the bayonet hinge in place.**

A.1.1.2 Front Top Baffle

1. **On the left-front side of the cabinet, loosely thread a screw into hole 78 and one into 83.**
   These screws accept the slotted holes in the front top baffle. See Figure A-1.
2. **Engage the front baffle to the side baffle.**
   Orient the side baffle as shown in Figure A-1 and slip the tabs into the slotted holes in the side baffle. Hold the front baffle on a slight angle to allow the tabs to slip in.
3. **Swing the front baffle flush against the cabinet and slip the slotted holes in the baffle over the screws installed in step 1.**
4. **Tighten both screws to secure the front baffle in place.**

A.1.2 Installing the Bottom Air Baffle Assembly

The bottom air baffle assembly consists of the side baffle, the bottom filler baffle, and the front baffle. See Figure A-2, Figure A-3 and Figure A-4.

Note – The bottom air baffle assembly is required only in node cabinets containing four chassis (configured with two SPARCstorage Arrays only).

A.1.2.1 Side Bottom Baffle

1. **Loosely thread screws into holes 4 and 13 at the front and rear of the cabinet on the inside rails.**
   These will accept the slotted cutouts in the side bottom baffle. See Figure A-2.
2. **Orient the side baffle as shown Figure A-2 and slip the slotted holes over the screw heads installed in step 1.**

3. **Lower the side baffle until it rests on the screws in holes 4 and 13.**
   Do not tighten screws at this time.

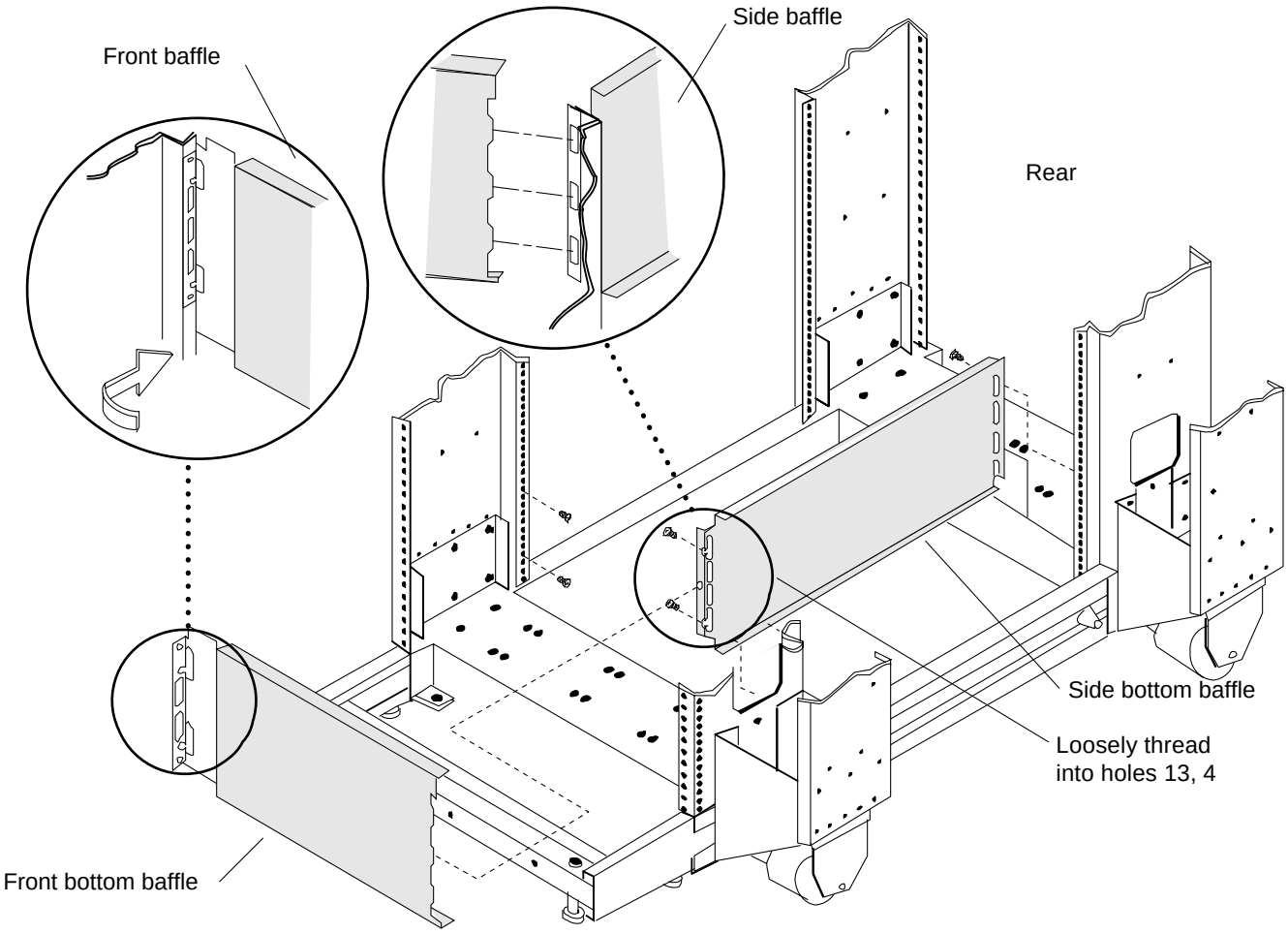


Figure A-2 Bottom Baffles

A.1.2.2 Bottom Filler Baffle

1. **Orient the bottom filler baffle as shown in Figure A-3.**

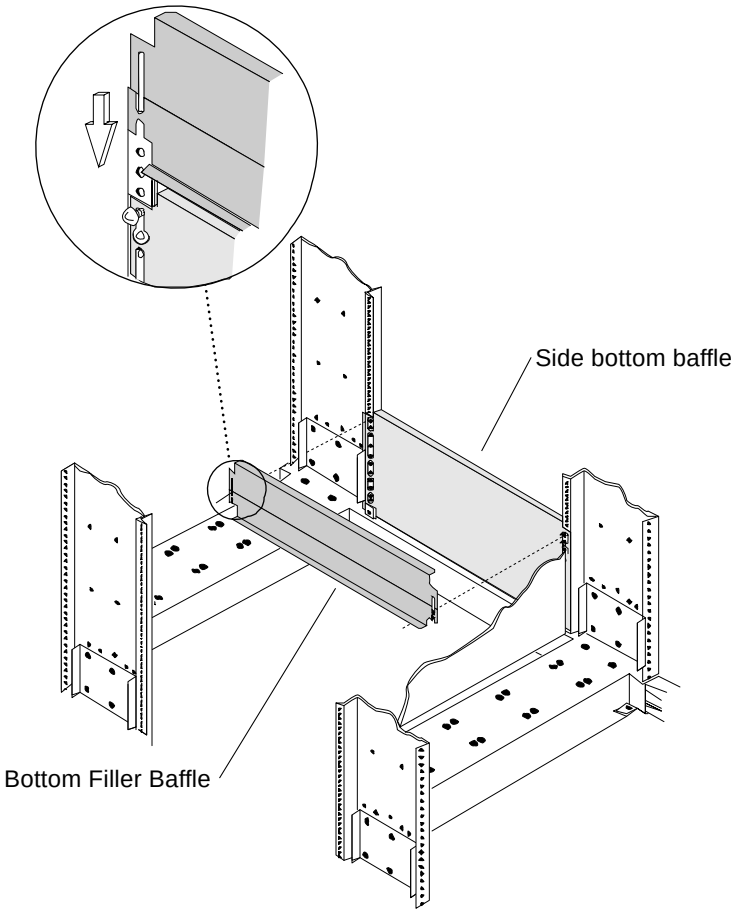


Figure A-3 Bottom Filler Baffle

2. **Insert the bottom filler baffle behind the chassis rail and lower it.**
   The slotted holes in the bottom filler baffle fit over the screw heads in hole 13 at the front and rear of the cabinet. See Figure A-4.

3. **Tighten screws in holes 4 and 13 at the front and rear of the cabinet.**
   This secures the bottom and bottom filler baffles in place.

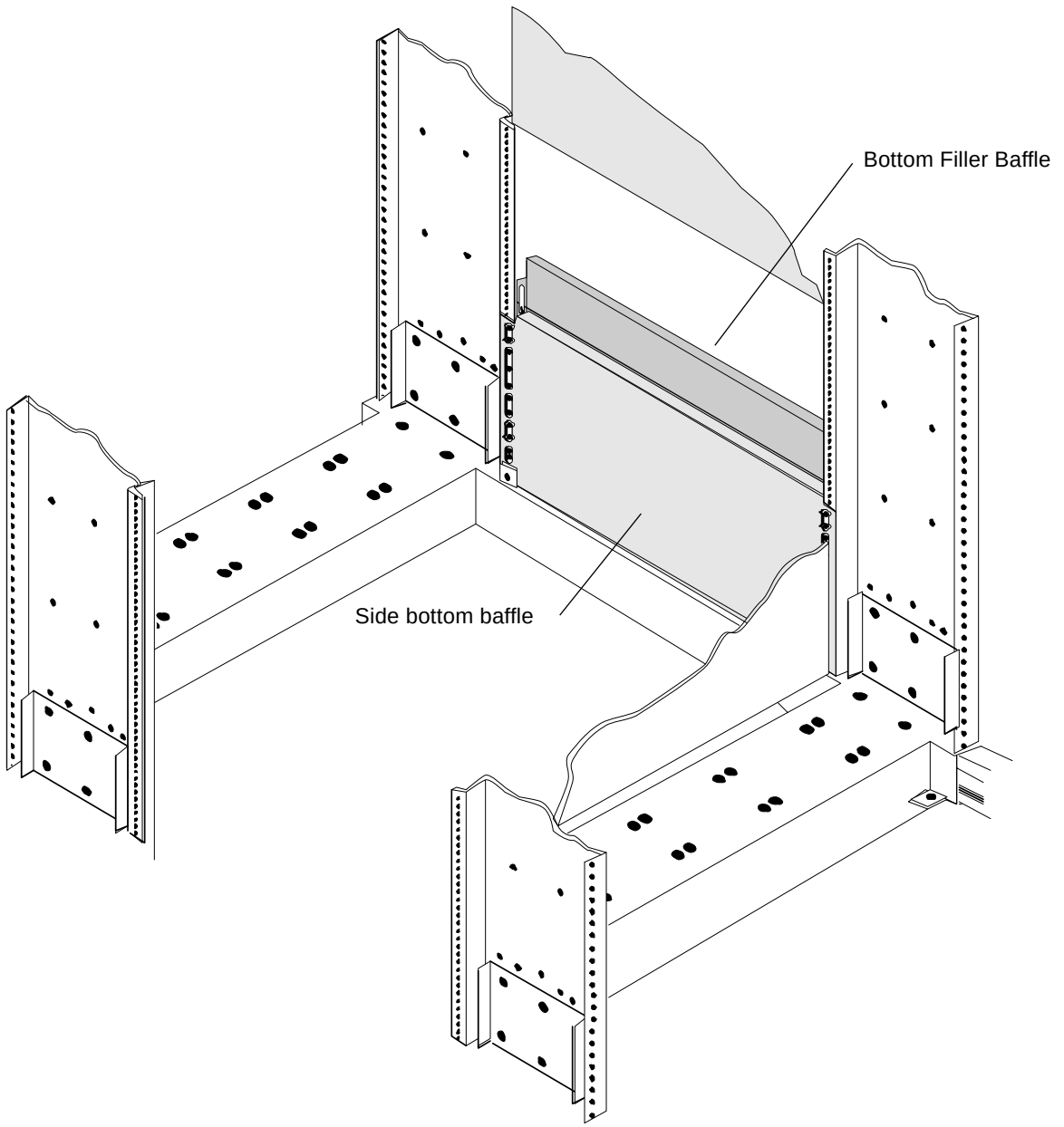


Figure A-4 Bottom Filler Baffle Installed

A.1.2.3 Front Bottom Baffle

1. **Loosely thread screws into holes 3 and 14 at the right-front inside rail of the cabinet.**
   These will accept the slotted cutouts in the front baffle. See Figure A-2.

2. **Engage the front bottom baffle to the side bottom baffle.**
   Orient the front bottom baffle as shown in Figure A-2 and slip the tabs into the slotted holes in the side bottom baffle.

Note – Hold the front bottom baffle at a slight angle away from the cabinet to slip into the tabs.

---

3. **Swing the front bottom baffle flush against the cabinet and slip the slotted holes in the baffle over the screws installed in step 1.**

4. **Tighten both screws to secure the front bottom baffle in place.**

A.2 Installing the Rackmount Rails

The rackmount rails are required when installing the SPARCstorage Array chassis into the SPARCcenter 2000E cabinet, or the SPARCstorage Array and SPARCserver 1000E chassis into the expansion cabinet.

The kit consists of the side rails and base plate (identified in Figure A-5) along with fasteners and certain other items. Rail installation consists of:

- Installing the side rails in the cabinet to accept the chassis
- Installing the base plate on the storage or server chassis
- Installing the chassis (with base plate attached) on side rails in the cabinet
- Reconfiguring the fan assemblies to provide correct cooling

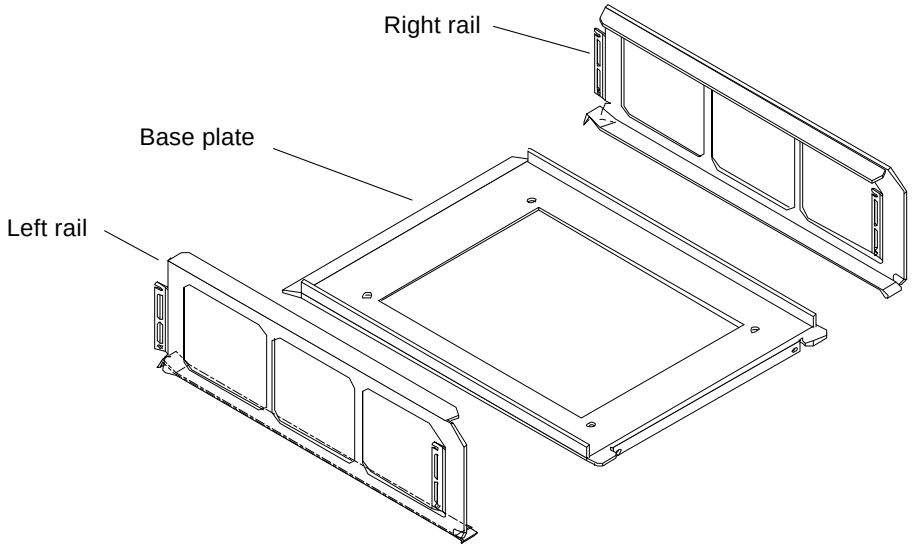


Figure A-5 Rackmount Kit Side Rails and Base Plate

A.2.1 Chassis Installation Positions

Note – Cabinet cooling is an important factor. Use only the hole numbers specified for installing side rails. These hole numbers determine chassis spacing for proper ventilation and cooling.

A.2.2 SPARCcluster 1000 Node Cabinets

SPARCstorage Array chassis are installed in the bottom three positions. The server chassis are installed above these in the top two positions. A typical installation is shown in Figure A-6. Side rails are installed using screw hole positions identified in this figure.

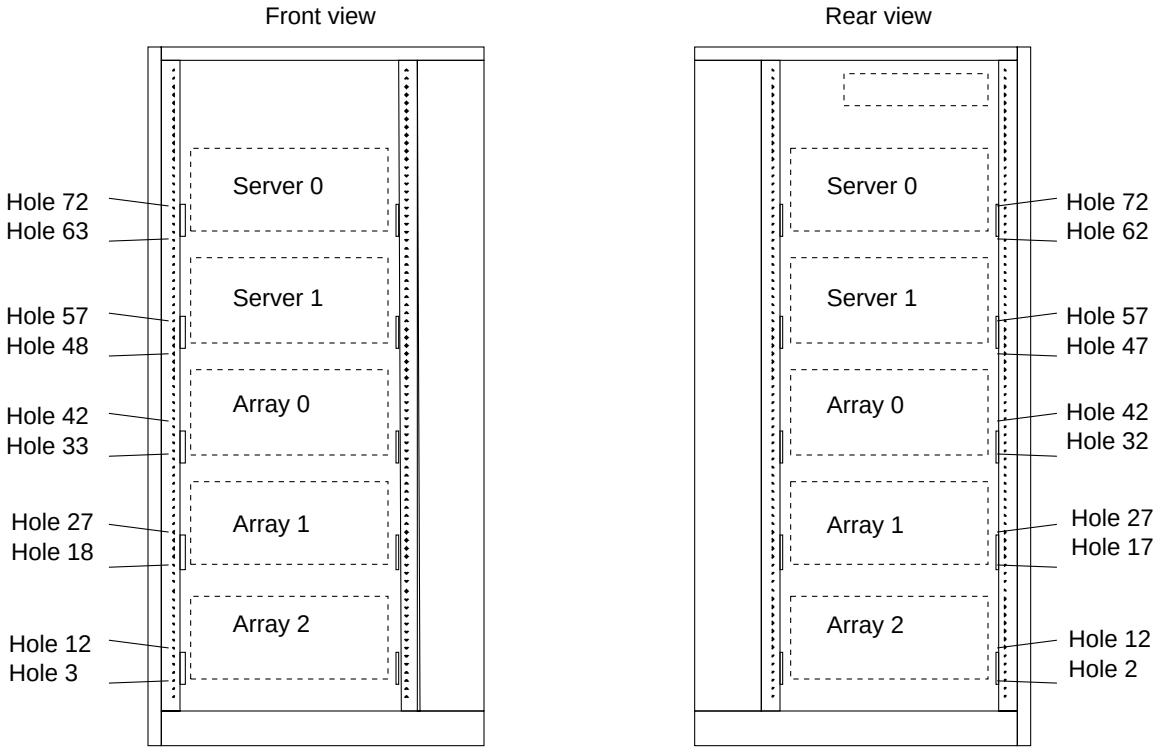


Figure A-6 Side Rail Installation Locations and Hole Numbers in the SPARCcluster 1000 Node Cabinet

Note – SPARCstorage Array positions in the expansion cabinet are shown in Figure A-9.

A.2.3 SPARCcluster 2000 Node Cabinets

SPARCstorage Arrays are installed in following positions:

- Primary cabinet: the top and (optionally) bottom chassis position, Figure A-7
- Secondary cabinet:
  - minimum-configuration: the top chassis position, Figure A-8
  - four or more SPARCstorage Arrays, both chassis positions, Figure A-7

Note – Any additional SPARCstorage Arrays are installed in one or more expansion cabinets.

A typical installation is shown in Figure A-7. Side rail hole numbers are identified here.

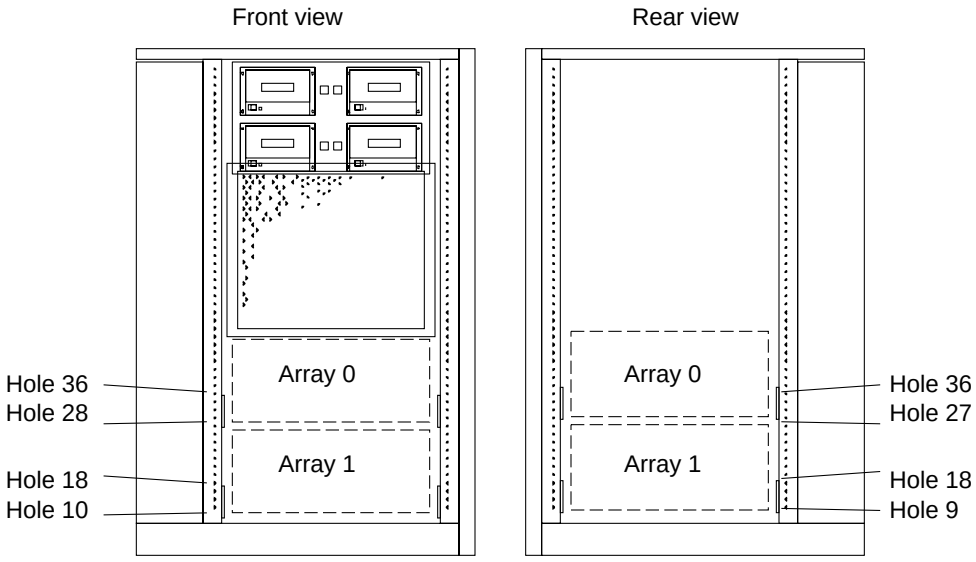


Figure A-7 Side Rail Installation Locations and Hole Numbers in the SPARCcluster 2000 Primary Cabinet

Note – The rails are asymmetrical front-to-rear with respect to the lower hole position used, so, the hole used in the rear is one lower than that in the front.

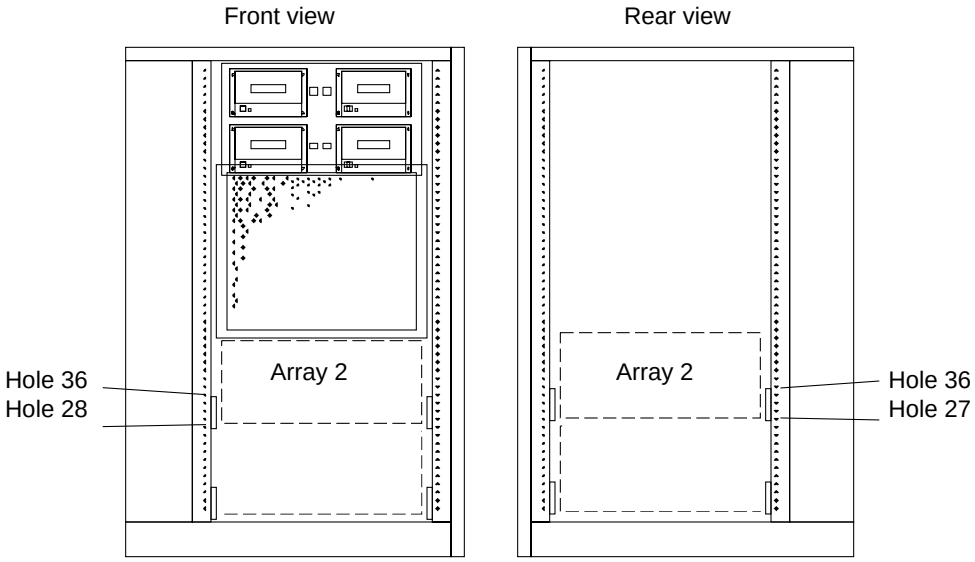


Figure A-8 Side Rail Installation Locations and Hole Numbers in the SPARCcluster 2000 Secondary Cabinet

Note – SPARCstorage Array positions in the expansion cabinet are shown in Figure A-9.

A.2.4 Expansion Cabinets

SPARCstorage Array chassis are installed in all five positions. A typical installation is shown in Figure A-9. Side rails are installed using screw hole positions identified in this figure.

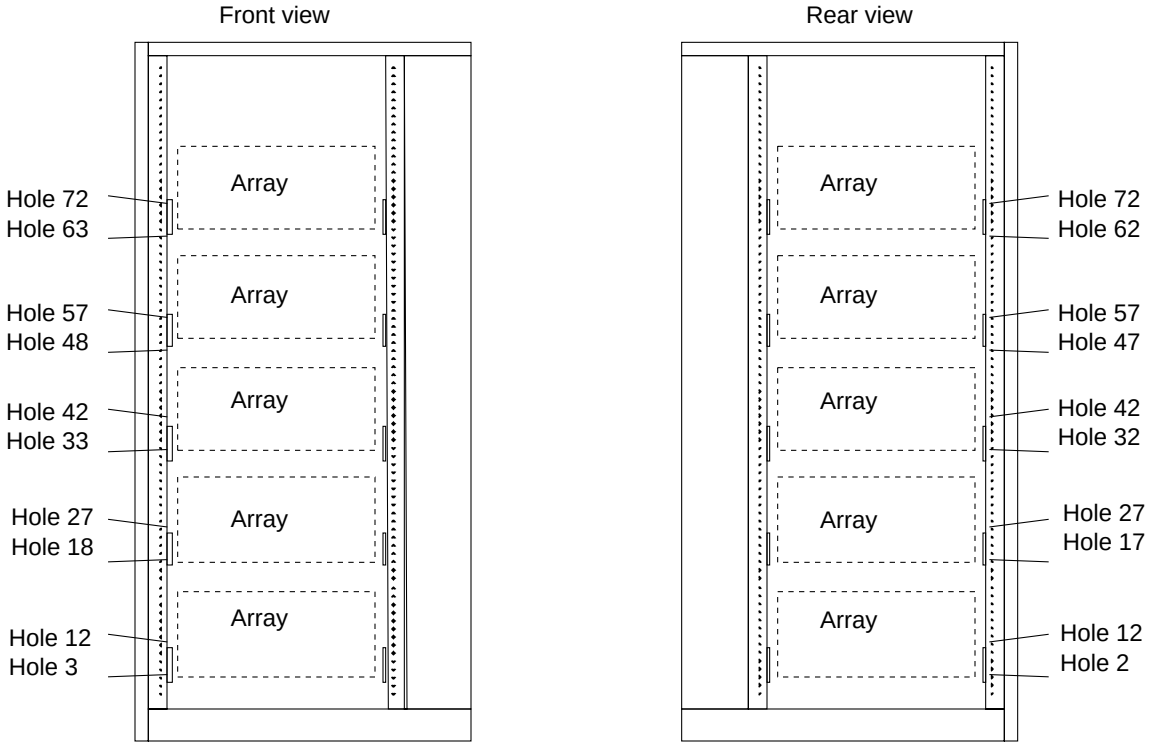


Figure A-9 Side Rail Installation Locations and Hole Numbers in the Expansion Cabinet

A.3 Installing the Side Rails

1. **Loosely thread in two screws on the right side of the rack.**
   a. **At the rear of the rack, thread a screw a few turns into hole 18.**
   b. **Thread a screw into hole 18 at the front of the rack.**
   Do not tighten. See Figure A-10.

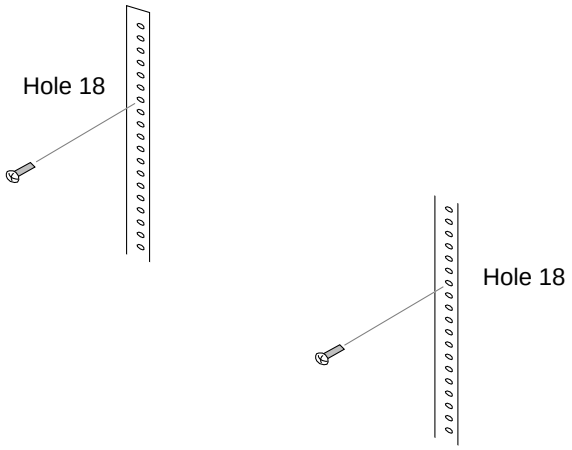


Figure A-10 Threading Screws into the Rack—Right Side Rail

2. **Place the right side rail in the rack. Align the open-slotted holes at the top of the rail with the screws installed in step 1.**
3. **Slide the rail to the rear so the holes seat on the shafts of the screws.**
4. **Install screws in the bottom rail holes front and rear.**
   In the rear, it is hole 9, in the front, it is hole 10.
   See Figure A-11.

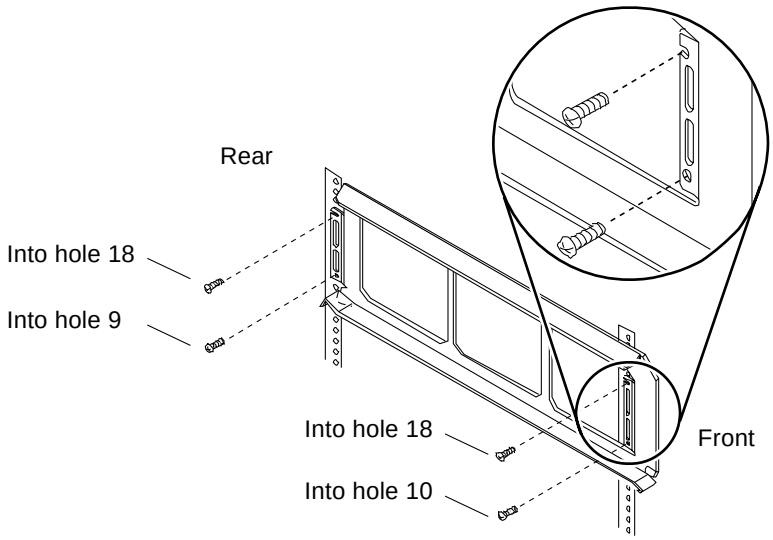


Figure A-11 Securing the Right Side Rail to the Rack

5. **Tighten all four screws, top and bottom.**

6. **Repeat steps 1 through 4 for the left side rail.**
   See Figure A-12.

7. **Install all remaining pairs of side rails at the hole numbers specified in Figure A-6 through Figure A-9.**

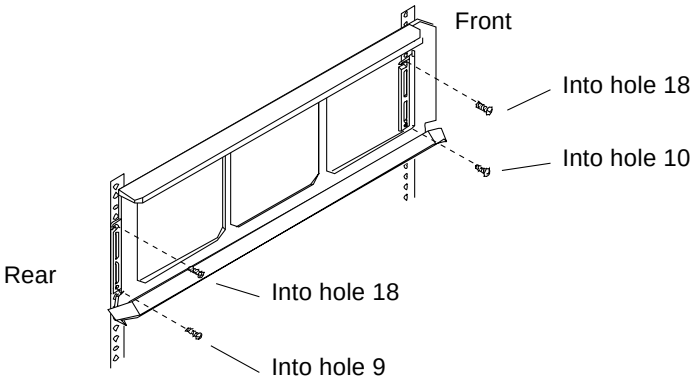


Figure A-12 Securing the Left Side Rail to the Rack

A.4 Preparing the SPARCstorage Array Chassis

Note – Illustrations in this section show a server chassis. A SPARCstorage Array chassis looks somewhat different, but the procedures apply to both chassis types.

Server and or storage chassis may have plastic panels installed. Part of chassis preparation involves removing these panels from each chassis to be installed.

Note – If plastic panels are not present, skip this procedure and go to Section A.5, “Installing the Base Plate on the SPARCstorage Array Chassis.”

A.4.1 Removing the Front Panel

The front panel rests in a groove along the top edge of the panel.

1. **If a key switch is present, remove the key from the key switch.**
2. **Place your fingers under the arrow embossed on the front panel and press up on the latch to release the panel.**
   See Figure A-13.

Note – If the panel resists becoming unlatched, press down on the top of the panel with one hand while pressing up on the latch with the other. This should release the latch.

3. **With the panel released, gently swing the panel bottom away from the chassis and lift it clear.**
   Set the panel aside.

Note: Server chassis shown, but applies to SPARCstorage Array chassis too.

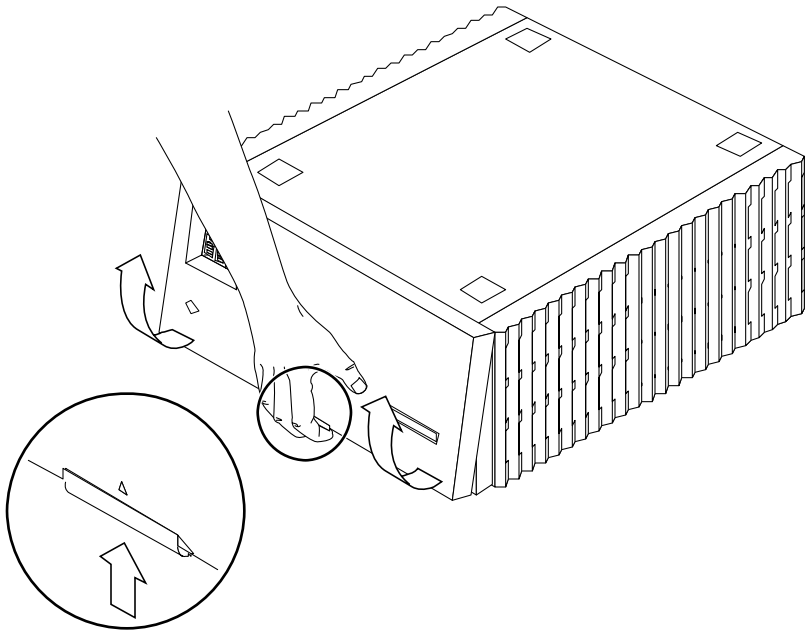


Figure A-13 Removing the Front Panel

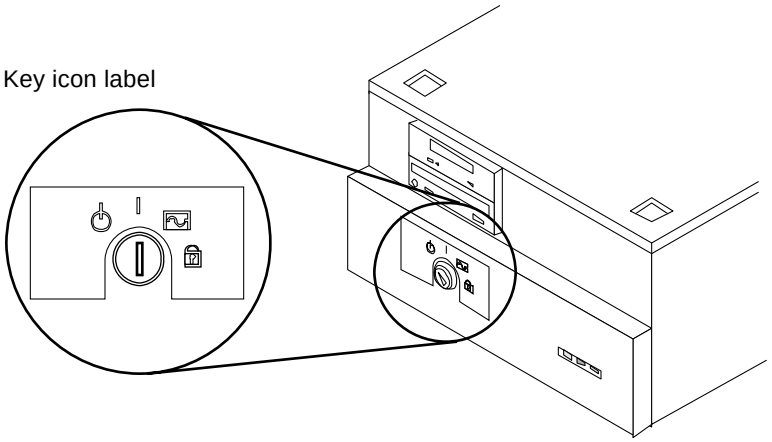
A.4.2 Installing the Key Switch Position Label

Note – This procedure applies only to server chassis. This switch is found on the EMI panel. For SPARCstorage Array chassis skip this procedure and proceed to Section A.4.3 (SPARCstorage Array chassis do not have key switches).

Key position icons embossed on the front panel are removed when the front panel is removed. To restore the key position information to the front of the chassis, install the icon label (supplied in the kit) to the EMI panel.

1. **Find the key icon label in the rack kit.**
2. **Remove the label backing.**
3. **Orient the label over the EMI panel so that the semicircular cutout straddles the key switch as shown in Figure A-14.**

4. **Apply the label to the EMI panel.**



Note: Server chassis shown. This illustration does not apply to SPARCstorage Array chassis.

Figure A-14 Installing the Key Icon Label on the Server Chassis EMI Panel

5. **Place the key(s) in a secure place so they can be found later.**

Note – Do **not** insert the key in the switch at this time because the necessary handling of the chassis may inadvertently break off the key.

A.4.3 Removing the Side Panels

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

1. **Remove the front panel as described in the previous section.**
2. **Remove the side panel**:
   a. **Grasp the panel with both hands, and slide it toward the rear of the chassis about 2 1/2 centimeters (about one inch).**
   Tap the front edge of the panel with the heel of your hand if necessary to slide the panel toward the rear of the chassis (see Figure A-15).
   b. **Pull the panel away, free of the chassis, and set it aside.**
3. **Repeat Step 2 to remove the remaining side panel.**

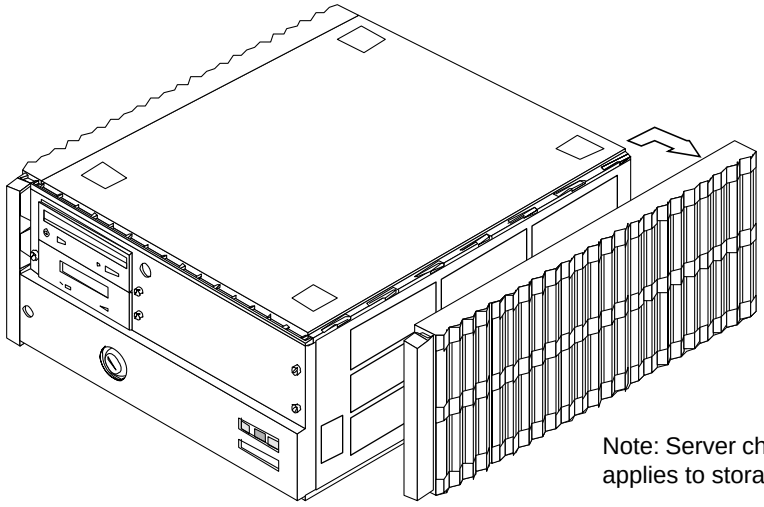


Figure A-15 Removing the Side Panels

A.4.4 Removing the Top Panel

The top panel slides to the rear to a release point after the popouts are removed, then lifts off.

A.4.4.1 Removing the Four Popouts

1. **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 A-16.**
2. **Press down on the popout at the small dot.**
3. **This action rocks the popout on a hinge-point, unlatching it.**
4. **Slide the popout back, away from the dots, and lift it free as shown in Figure A-16; set the popout aside.**
5. **Repeat step 1 through 3 to remove the remaining three popouts from the top panel.**

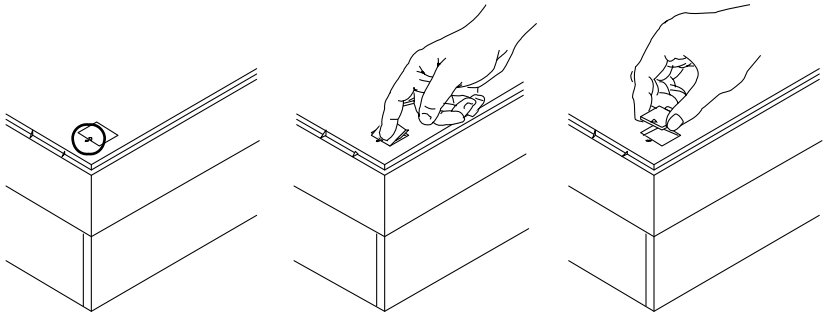


Figure A-16 Removing the Popouts from the Top Panel

A.4.4.2 Removing the Top Panel

1. **Place your fingers under the panel rear lip and lift.**
   See Figure A-17. 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.

2. **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.

3. **Lift the top panel straight up and clear of the chassis; set it aside.**

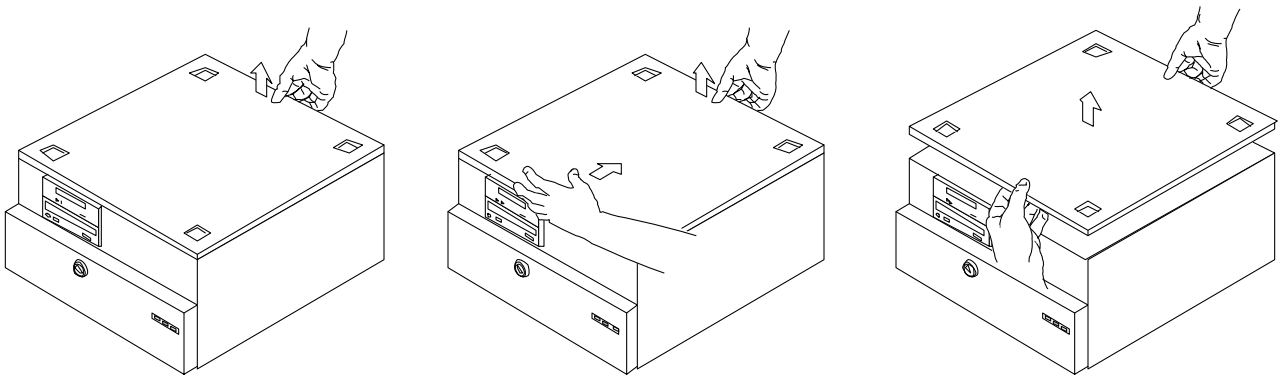


Figure A-17 Removing the Top Panel

A.4.4.3 Replacing the Four Popouts

To prevent losing the popouts:

1. **Orient the popout so the dots are nearest each other (Figure A-18).**
2. **Slide the popout in until it is centered in the hole.**
3. **Press down on the side opposite the dot to secure the popout in place.**
4. **Install the remaining three popouts in the same manner.**

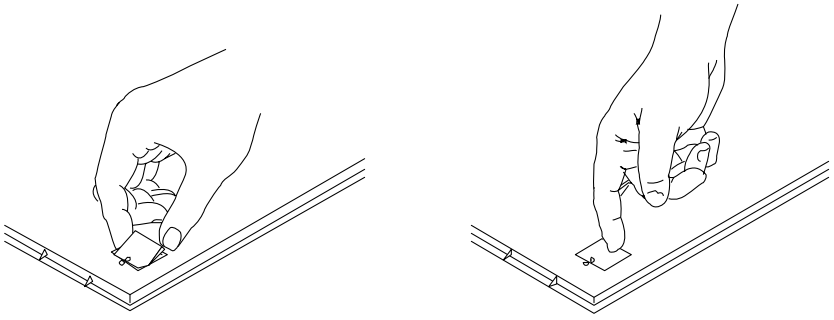
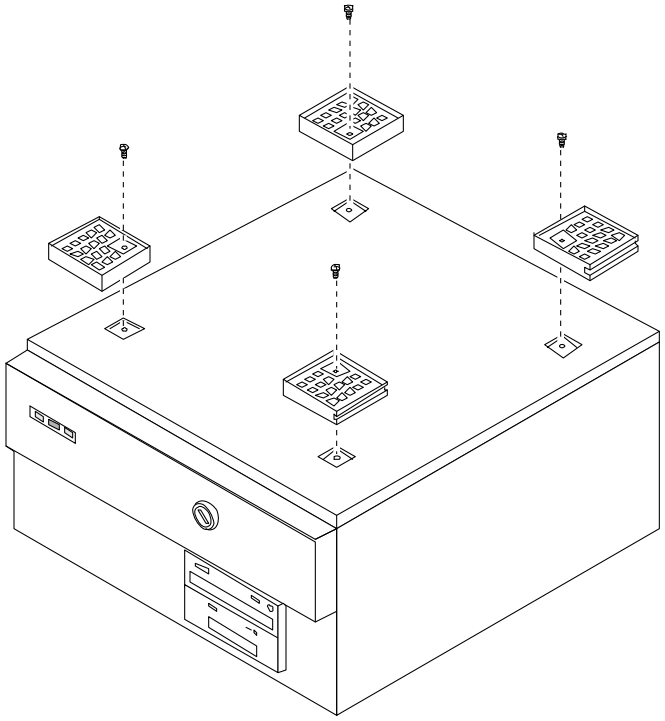


Figure A-18 Replacing the Popouts in the Top Panel

A.4.4.4 Removing the Feet

1. **Invert the chassis.**
   See Figure A-19.

2. **Unscrew all four feet.**
   The feet and screws are not used in this configuration.



Note: Server chassis shown, but applies to storage chassis too.

Figure A-19 Removing the Feet

A.4.4.5 Removing the Bottom Panel

The bottom panel is identical to the top panel and is removed in the same manner.

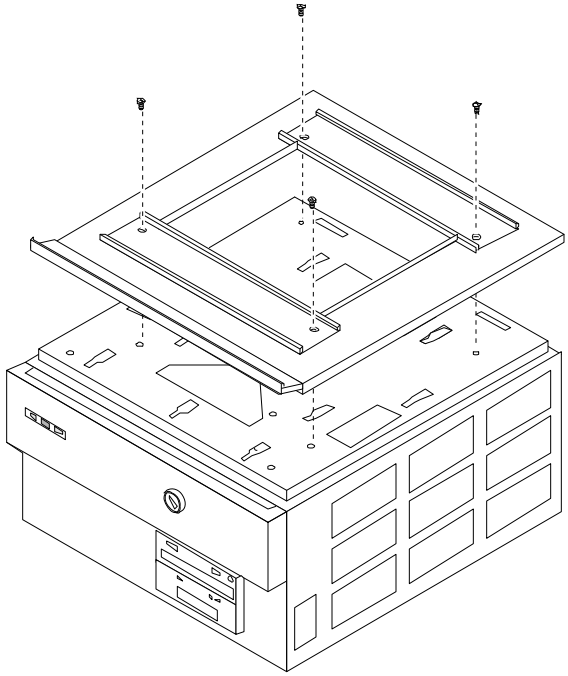
- **With the chassis inverted and the front facing you, repeat Section A.4.4.2, "Removing the Top Panel." See Figure A-17.**

A.5 *Installing the Base Plate on the SPARCstorage Array Chassis*

The base plate mounts to the chassis underside.

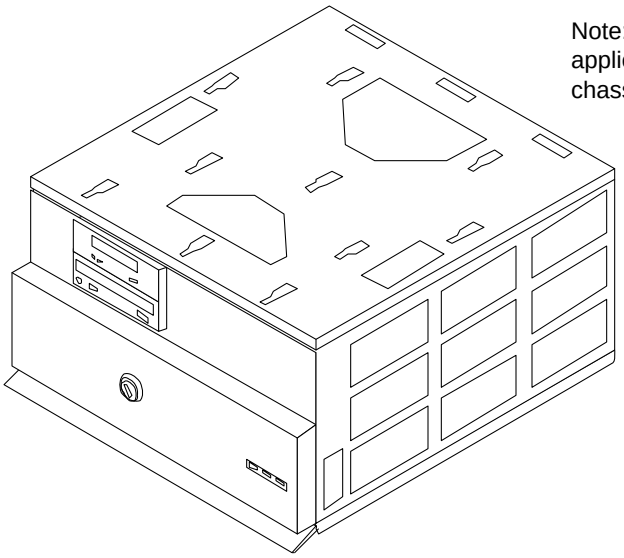
Caution – For this procedure, use only the four short screws provided in the kit for this purpose. The screws originally used for the feet are too long and will damage the chassis.

1. **Invert the chassis with the front facing you (Figure A-20).**
2. **Place the base plate on the chassis.**
3. **Loosely thread four short screws from the kit in all four holes.**
   When all screws are started, tighten them.
4. **Restore the chassis to the upright position with the front of chassis facing you (Figure A-21).**



Note: Server chassis shown, but applies to SPARCstorage Array chassis too.

Figure A-20 Installing the Base Plate on the Chassis



Note: Server chassis shown, but applies to SPARCstorage Array chassis too.

Figure A-21 Base Plate Installed

A.6 Installing the Chassis in the Cabinet

Install the chassis from the bottom-up in the order shown in Figure A-6.

Warning – The cabinet can become front-heavy while installing chassis. Ensure that the stabilizer bar is extended before proceeding. Failure to extend this bar can result in the cabinet tipping forward and injuring personnel.

Warning – Server and SPARCstorage Array chassis are heavy. Obtain the aid of an assistant to help lift the chassis. Attempting to lift the chassis alone can result in injury to personnel.

1. **With one person on each side, lift the chassis and approach the expansion cabinet with the chassis rear end first (Figure A-22).**

Note – If the cabinet tends to roll away, lower the main leveling pads as instructed in Section 8.5.2, “Leveling Pads.”

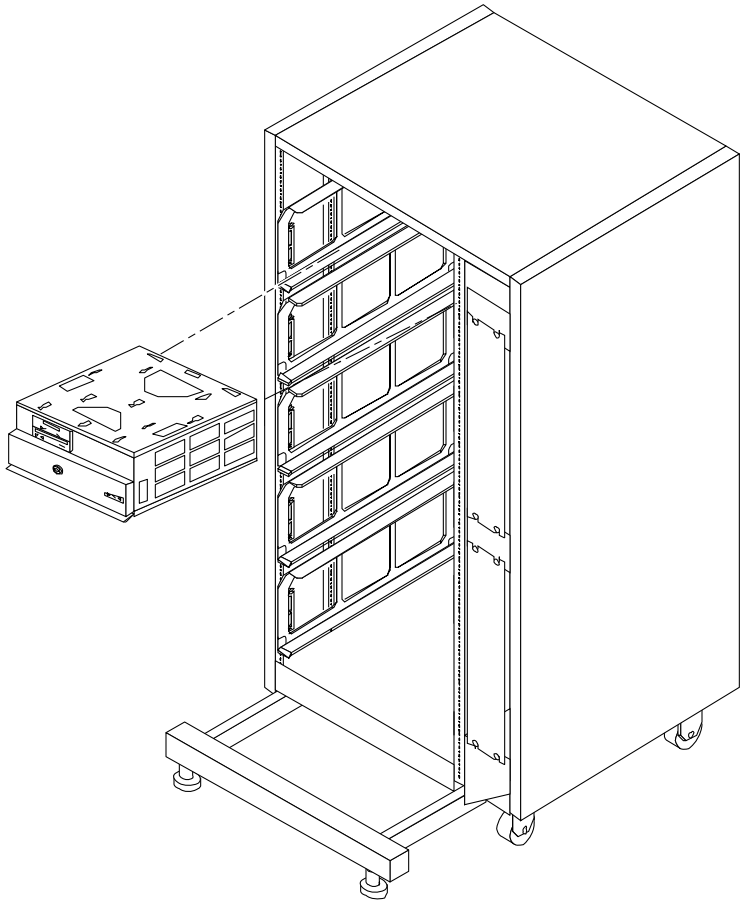


Figure A-22 Installing the Chassis in the Cabinet

2. **Line up the chassis base plate with mating side rails in the cabinet.**
   See Figure A-23.

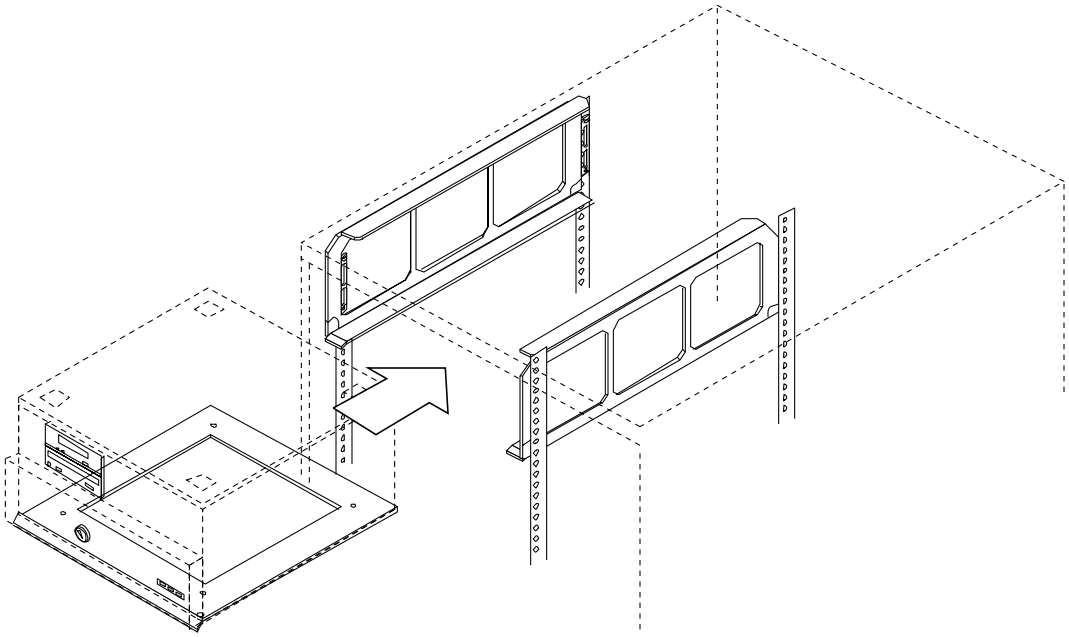


Figure A-23 Aligning the Chassis Base Plate with the Side Rails

3. **Rest the chassis on the side rails, then slide the chassis in.**

4. **Thread in a screw through the slotted hole in the front of the base plate, into the left and right side rail.**
   See Figure A-24.

5. **At the cabinet rear, insert screws through the holes in the rear of the side rails and screw them into threaded holes in the base plate.**

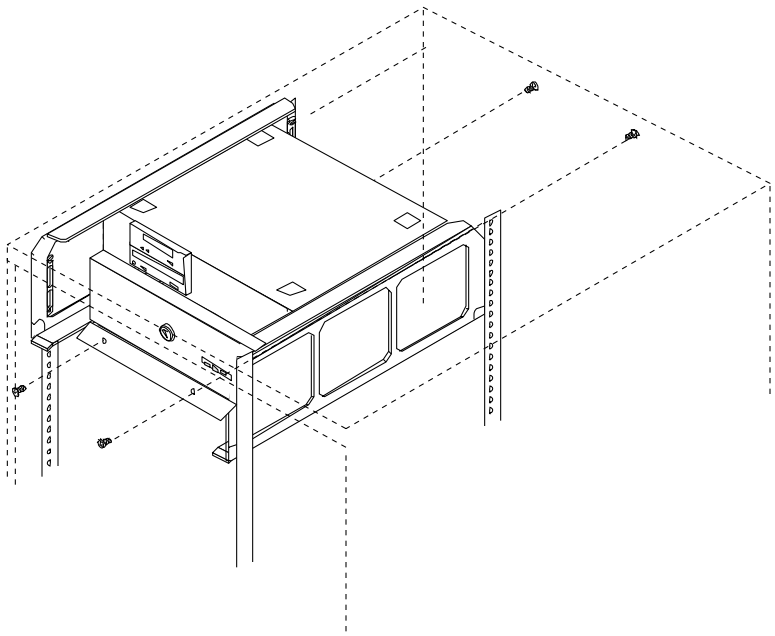


Figure A-24 Installing Screws to Secure the Base Plate to the Side Brackets

6. **Alternately tighten the screws at the front and rear of the base plate/side rails until the chassis/base plate is firmly clamped in the side rails. Do this on both sides of the cabinet.**

7. **Repeat steps 1 through 6 for all remaining chassis to be installed.**

Note – At this time, you may decide to
- Insert the keys in the server chassis key switches for ready use.
- Store the keys for use only when needed.

A.7 Installing the SPARCstorage Array 200 Series Chassis in the Expansion Cabinet

Install these controller units in the expansion rack using the hole numbers specified in Table A-1. See Figure A-25 for a graphic of this installation.

Note – Install the 200 series array into the rear of the expansion cabinet so the connector panel (on the rear of the unit) is accessible from the front.

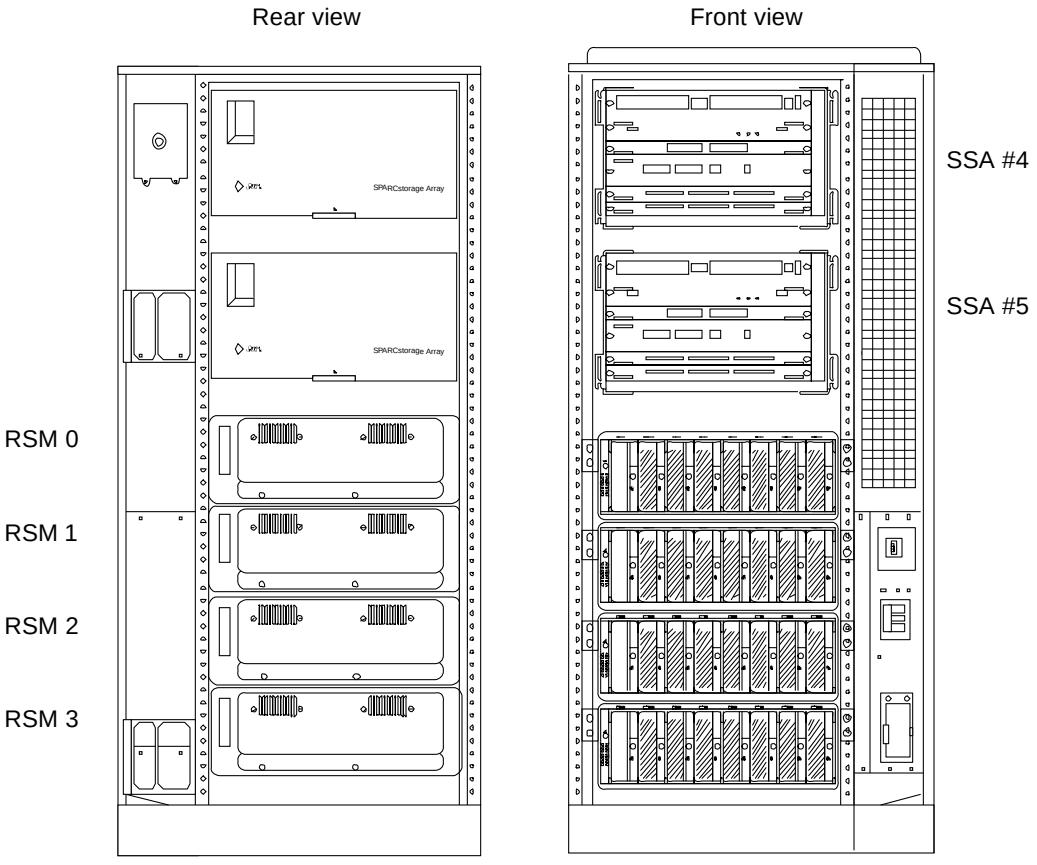


Figure A-25 SPARCstorage Array 200 Series and SPARCstorage RSM Installation

Table A-1 SPARCstorage Array 200 Series Chassis Hole Assignments in the Expansion Cabinet

	Tray Number	
System or Enclosure	**0 (Topmost)**	**1**
Ultra Enterprise Cluster Expansion Cabinet	64, 68, 79, 83	42, 46, 57, 61

A.8 Installing the SPARCstorage RSM Chassis

Install these removable storage module units in the expansion rack using the hole numbers specified in Table A-2. See Figure A-25 for a graphic of this installation.

Note – Install the 200 series chassis into the rear of the expansion cabinet so the connector panel (on the rear of the unit) is accessible from the front.

Table A-2 SPARCstorage RSM Chassis Hole Assignments In the Expansion Cabinet

	Tray number							
System or enclosure	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Ultra Enterprise Cluster Expansion Cabinet	N / A[1]	N / A	N / A	N / A	46,49	56,59[2]	66,69	79,82[3]
Locking brackets front (all trays)					42,43	52,53	62,63	75,76
Locking brackets rear (all trays)					43,44	53,54	63,64	76,77[4]

1. The top four positions are not used.
2. The side rear bottom hole is 57.
3. The right side rear bottom hole is 80.
4. Use only hole 76 on the left side rear.

A.9 *Installing the Differential SCSI Tray Chassis*

Install these disk trays in the expansion rack using the hole numbers specified in Table A-2. See FIGURE A-26 for a graphic of this installation.

Note – Install the 200 series chassis into the rear of the expansion cabinet so the connector panel (on the rear of the unit) is accessible from the front.

Table A-3 Differential SCSI Tray Hole Assignments In the Expansion Cabinet

	Tray number							
System or enclosure	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Ultra Enterprise Cluster Expansion Cabinet	4,5	14,15	25,26	35,36	46,47	56,57	67,68	77,78
Locking brackets rear (all trays)	8	18	29	39	50	60	71	81

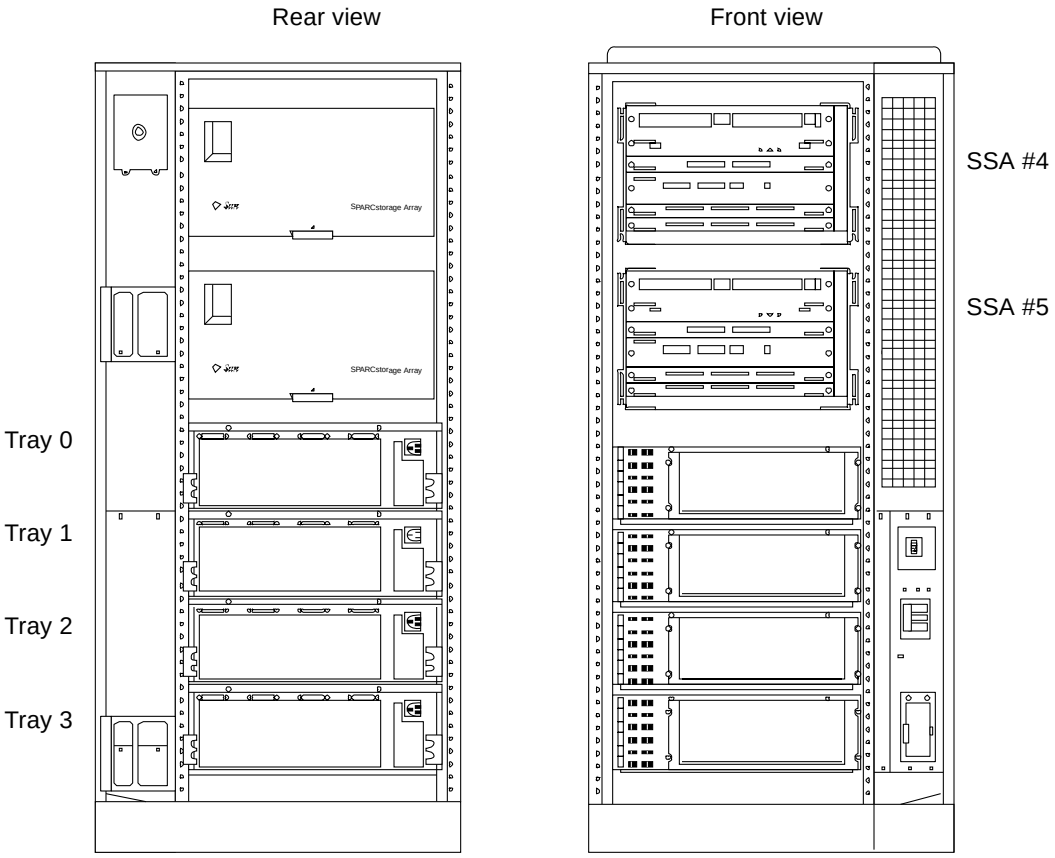


Figure A-26 SPARCstorage Array 200 Series and Differential SCSI Tray Installation

Configuring the SCI SBus Card B

This appendix provides procedures for configuring and installing the SCI SBus card into the appropriate I/O boards.

B.1 SCI Rings and Scrubber Settings

The SCI host device uses the concept of *rings* in which two or more *nodes* (SCI SBus cards) are mutually connected. In a given ring, one host device (SCI SBus card) is designated as *scrubber.* Assignment as scrubber is accomplished by setting the onboard *scrubber jumper.*
The scrubber performs certain ring maintenance functions. The scrubber host always resides in the primary cabinet, node 0.

1. **Assign two SCI cards as scrubbers.**
   These will be installed in node 0 I/O boards 1 and 3.

2. **In these two cards, install the jumper to dedicate these cards as "scrubbers."**
   Install the jumpers in the On position as shown in Figure B-1.

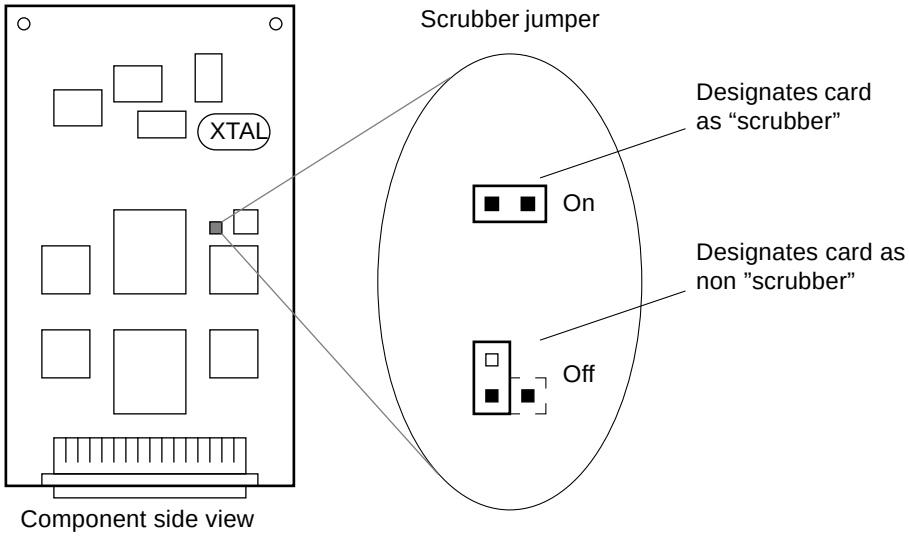


Figure B-1 Scrubber Jumper Positions

3. **Examine the two cards that are *not* assigned as scrubbers.**
   Ensure the numbers are in the Off position as shown in Figure B-1. These will be installed in node 1 I/O boards 1 and 3.

4. **Node 0: Install the SCI SBus cards in the system boards.**

   a. **Install one scrubber SCI card into the system board to be installed in slot 0.**
   Install it in SBus slot 0 (see Figure B-2).

   b. **Install the other scrubber SCI card into the I/O board to be installed in slot 1.**
   Install it in SBus slot 0.

Note – For SBus card installation procedures, refer to the documentation supplied with the I/O boards or to the *SPARCcenter 2000 Service Manual.*

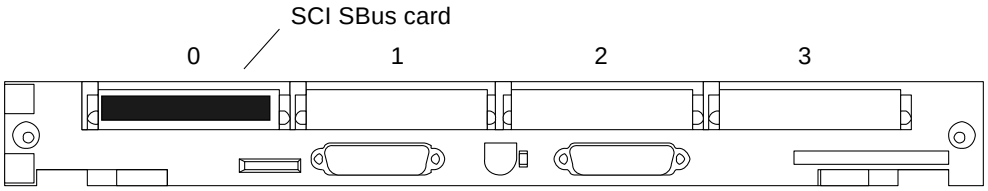


Figure B-2 SCI SBus Card Installed in the I/O Board

5. **Node 1: Install the SCI SBus cards in the system boards.**

   a. **Install one non-scrubber SCI card into the system board to be installed in slot 0.**
   Install it in SBus slot 0.

   b. **Install the other non-scrubber SCI card into the system board to be installed in slot 1.**
   Install it in SBus slot 0.

Note – For SBus card installation procedures, refer to the documentation supplied with the I/O boards or to the *SPARCcenter 2000 Service Manual.*

---

6. **Install the system boards in the card cages.**

   a. **Node 0:**
   Install the scrubber-equipped system boards into card cage slots 0 and 1.

   b. **Node 1:**
   Install the non-scrubber-equipped system boards into card cage slots 0 and 1.

Note – For I/O board installation procedures, refer to the documentation supplied with the I/O boards or to the *SPARCcenter 2000 Service Manual.*

The resulting installation is represented in Figure B-3.

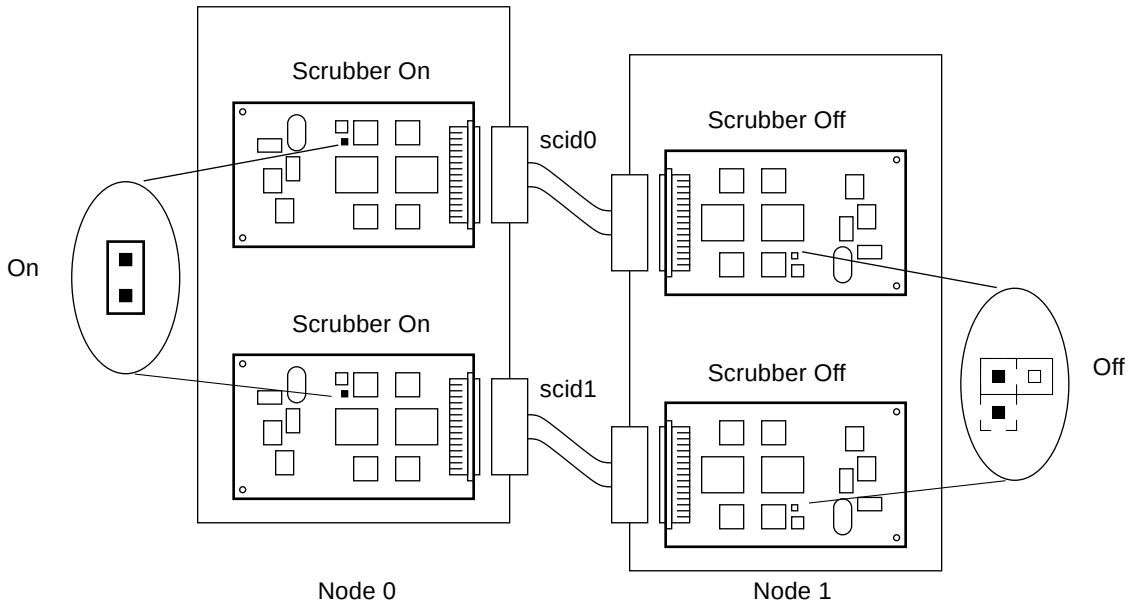


Figure B-3 SCI SBus Card Configuration in Node 0 and Node 1

Note – In rack-mounter servers, SCI cable strain relief brackets are used to support the cables. The bracket is designed to accommodate and support the cable in I/O board SBus slot 0 only.

Note – SCI cables are available in lengths of two, five, or ten meters.

B.2 SCI Nodeid Values

SCI cards use *nodeids* as hardware addresses. Unique *nodeid* values must be assigned to each card during software configuration. See Figure B-4.

Note – Nodeids are the equivalent of Ethernet addresses for SCI.

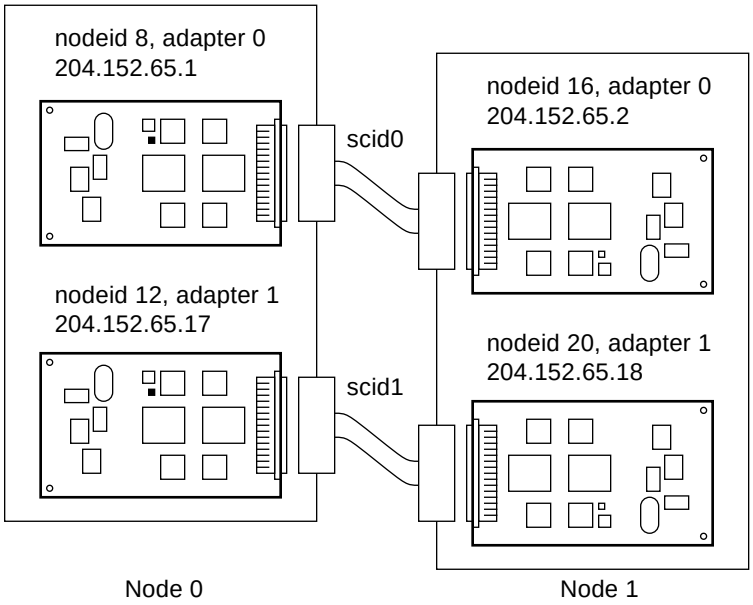


Figure B-4 `nodeid`, Adapter Number, and IP Assignment for Each SCI SBus Card

B.3 SCI Driver Installation and Configuration for SPARCcluster Systems

1. **Install the PDB software using `pdbinstall`. Specify SCI as the network interface.**

Note – `pdbinstall` is loaded from the PDB software CD.

2. **Configure the** `nodeid`**, adapter number and firmware for all SCI SBus cards.**
   Run the `sciconf` script in `/opt/SUNWsci/bin`.

```
sciconf
```

3. **Power-cycle both systems (nodes).**

```
sync; init 5
```

4. **Start PDB.**

```
pdbadmin startnode
```

   The `scid0` and `scid1` network interfaces are configured by the PDB script `/opt/SUNWcluster/bin/reconf_ener` during `pdbadmin startnode`.

Note – `pdbadmin stopnode` in PDB now takes down the private line network interfaces.

B.4 Configuring the SCI SBus cards Using the **`sciconf`** *Script*

The **`sciconf`** script is provided in the `SUNWsci` package to automatically configure the SCI SBus cards with the appropriate `nodeid`, adapter number, and firmware values. This script has no command line parameters. If the PDB software is not installed, the script will prompt for system node number (0 or 1) before proceeding with card configuration.

Note – Only two SCI SBus cards can be installed in each system node.

Adapter numbers are assigned according to ascending physical SBus slot order. The SCI card residing in the lower-numbered slot is assigned as adapter number 0; the card in the higher slot is assigned as adapter number 1.

Note – Adapter number 0 cards are connected together using one SCI cable, and adapter number 1 cards are connected using another.

Table B-1 specifies `nodeid` values that will be assigned and programmed into the card by the `sciconf` script.

Table B-1 `nodeid` Values Assigned to SCI SBus cards by the `sciconf` Script

Node	Adapter Number	nodeid	Interface (IP Address)
0	0 (in lower SBus slot number)	8	scid0 (204.152.65.1)
0	1 (in higher SBus slot number)	12	scid1 (204.152.65.17)
1	0 (in lower SBus slot number)	16	scid0 (204.152.65.2)
1	1 (in higher SBus slot number)	20	scid1 (204.152.65.18)

♦ **Run this command:**

```
/opt/SUNWsci/bin/sciconf
```

B.5 *SUNWsci SCI Driver Installation and Configuration Procedure for Non-PDB Systems*

1. **Install the SUNWsci package.**

```
pkgadd -d <package directory> SUNWsci
```

2. **Configure the `nodeid`, adapter number and firmware for all SCI SBus cards.**
   Run the `sciconf` script in `/opt/SUNWsci/bin`.

```
sciconf
```

3. **Edit the /etc/sci.iffconff file and uncomment the ifconfig commands for the appropriate system node.**

4. Power-cycle both systems (nodes).

```
sync; init 5
```

B.6 What's Next

Return to the SPARCcluster installation procedure for the server type in question:

SPARCcluster 1000: The appropriate procedure below:

- Section 9.2.7.1, "SBus Cards."

SPARCcluster 2000: The appropriate procedure below:

- Section 10.2.9.1, "SBus Cards."

Mixed Compute Platforms

C

Clusters may be comprised of two hosts which are different platform types and may have different type processors. Such platform combinations, however, are governed by constraints regarding compatibility and equivalency between the hosts. This appendix specifies which platforms and processors may be joined to create a cluster. Combinations not found here are not allowed.

C.1 Platform and Processor Equivalency

Table C-1 and Table C-2 list the compute platforms which can be combined to create a cluster for PDB and HA application respectively. In addition, they present module and memory equivalencies.

Note – The I/O connections must be identical for the two nodes, however the processor and memory configurations need not be identical. The larger the disparity, however, the greater the probability the two nodes will not boot-up at the same rate, which may affect HA start-up from a cold start. For example, after a total system power failure the larger node may take longer to boot. This can result in the smaller node starting HA without detecting the larger node and becoming the master of the logical hosts.

C.1.1 PDB

Table C-1 PDB Mixed Platform and Processor Equivalency

Platform[1]	SPARCserver 1000[2]	SPARCcenter 2000[2]	Ultra Enterprise 3000	Ultra Enterprise 5000/4000
Ultra Enterprise 3000	X[3]			
Ultra Enterprise 5000/4000	X[4]	X[4, 5]	X[4]	
Ultra Enterprise 6000		X[4, 5]	X[4]	X[4]

1. It is understood that identical platform types are allowed, and so are not documented here.
2. Three Sun4D 60 MHz processors are equivalent to one Sun4U 167 MHz processor.
3. Example: SPARCcluster 1000 has eight-to-twelve 60 MHz modules and 512 Mbytes memory; Ultra Enterprise 3000 has four 167 MHz modules and 512 Mbytes memory.
4. It is understood that the processor, memory and I / O capabilities are equivalent.
5. Example: SPARCcluster 2000 has twelve-to-twenty 60 MHz modules and 512 Mbytes memory; Ultra Enterprise 5000 / 4000 or 6000 has eight 167 MHz modules and 512 Mbytes memory.

C.1.2 HA

Table C-2 HA Mixed Platform and Processor Equivalency

Platform[1]	SPARCserver 1000	SPARCcenter 2000	Ultra Enterprise 3000	Ultra Enterprise 5000/4000
Ultra Enterprise 3000				
Ultra Enterprise 5000/4000			X[2]	
Ultra Enterprise 6000			X[2]	X[2]

1. It is understood that identical platform types are allowed, and so are not documented here.
2. t is understood that the processor, memory and I / O capabilities are equivalent.

C.2 Node-to-Node Cabling Instructions

Refer to Table C-3 for a guide to illustrations showing node-to-node cabling between mixed servers.

Table C-3 Ultra Enterprise and SPARCcenter/SPARCserver Platform Combinations

Host Platform	... to Host Platform	See Figure...
PDB Clusters		
SPARCserver 1000E	Ultra Enterprise 3000	Figure C-1
SPARCserver 1000E	Ultra Enterprise 5000/4000	Figure C-2
SPARCserver 2000E	Ultra Enterprise 5000/4000	Figure C-3
SPARCserver 2000E	Ultra Enterprise 6000	Figure C-4
Ultra Enterprise 3000	Ultra Enterprise 5000/4000	Figure C-5
Ultra Enterprise 3000	Ultra Enterprise 6000	Figure C-6
Ultra Enterprise 5000/4000	Ultra Enterprise 6000	Figure C-7
HA Clusters		
Ultra Enterprise 3000	Ultra Enterprise 5000/4000	Figure C-8
Ultra Enterprise 3000	Ultra Enterprise 6000	Figure C-9
Ultra Enterprise 5000/4000	Ultra Enterprise 6000	Figure C-10

C.3 PDB Clusters

The following server combinations are allowed for PDB clusters.

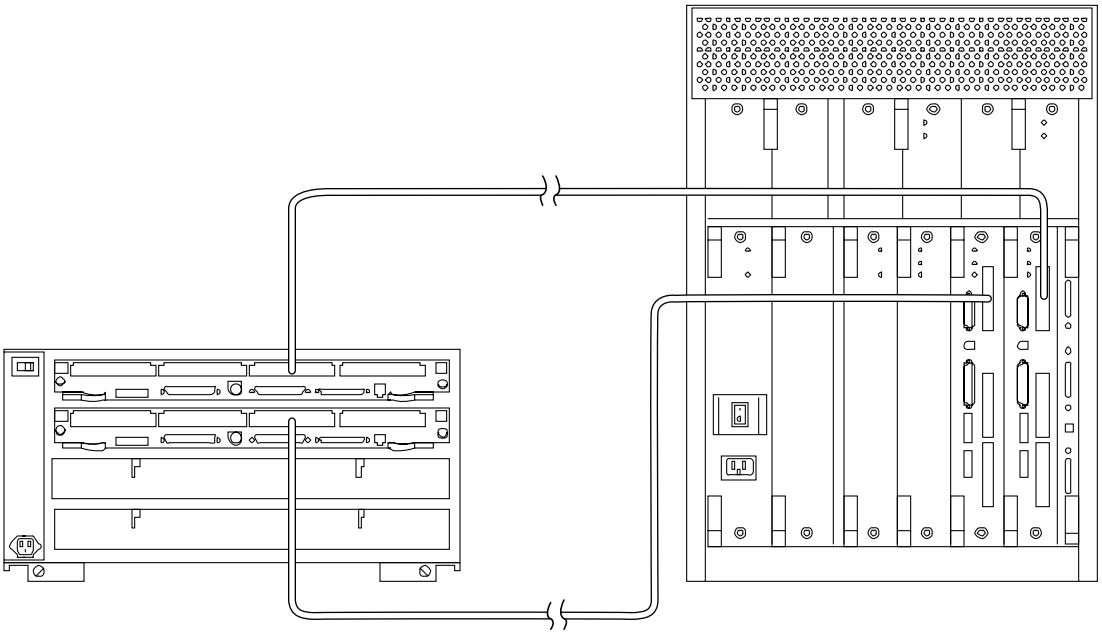


Figure C-1 SPARCserver 1000E to Ultra Enterprise 3000 Node-to-Node Connection

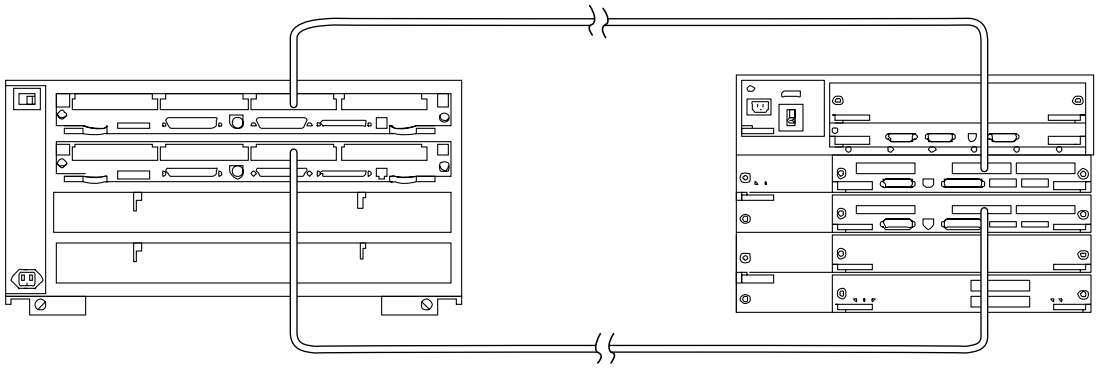


Figure C-2 SPARCserver 1000E to Ultra Enterprise 5000/4000 Node-to-Node Connection

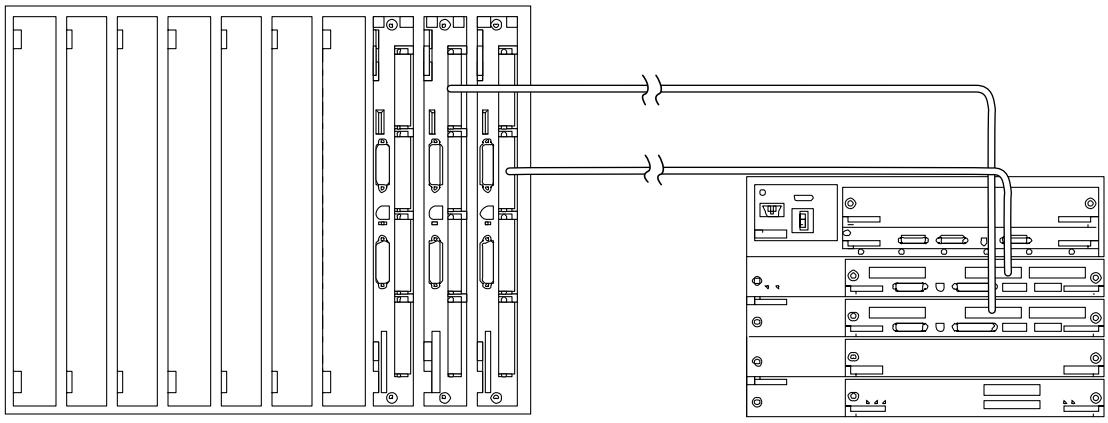


Figure C-3 SPARCcenter 2000E to Ultra Enterprise 5000/4000 Node-to-Node Connection

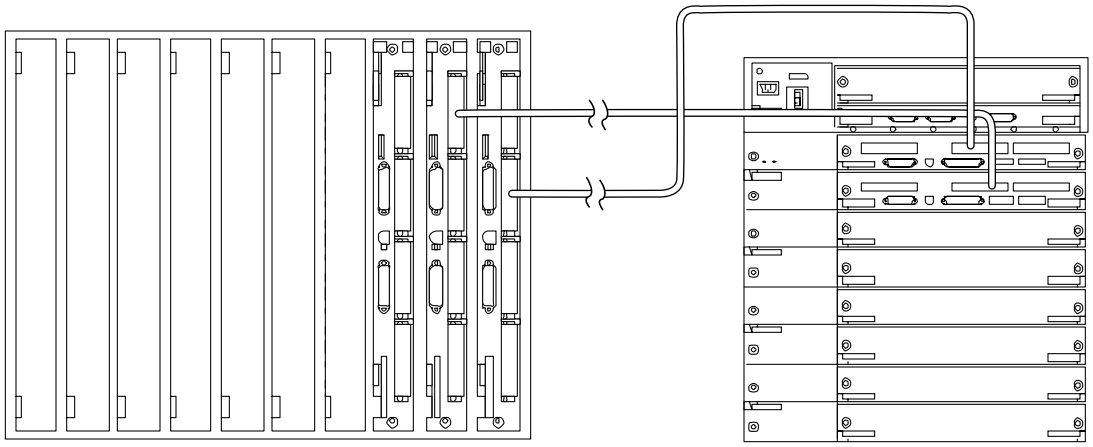


Figure C-4 SPARCcenter 2000E to Ultra Enterprise 6000 Node-to-Node Connection

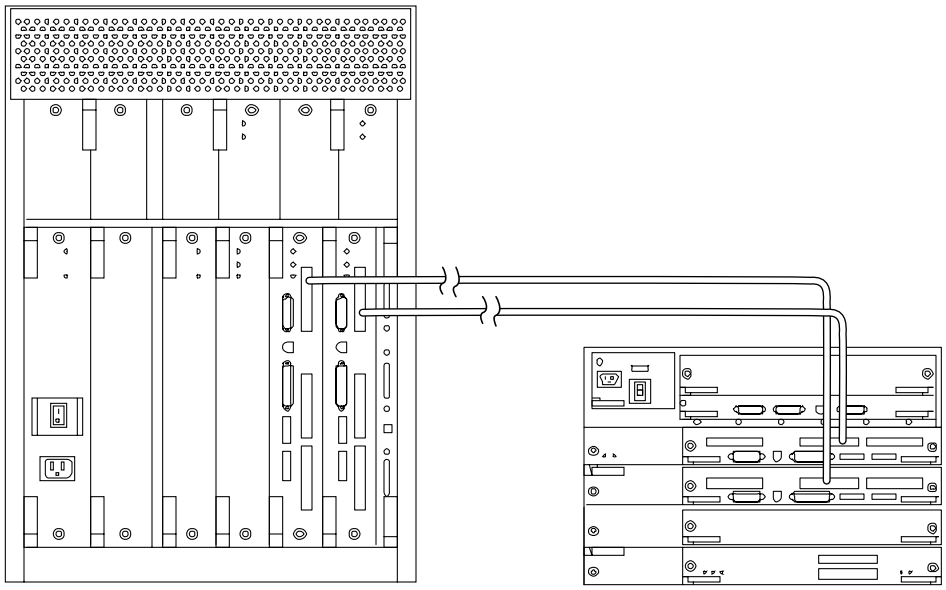


Figure C-5 Ultra Enterprise 3000 to Ultra Enterprise 5000/4000 Node-to-Node Connection

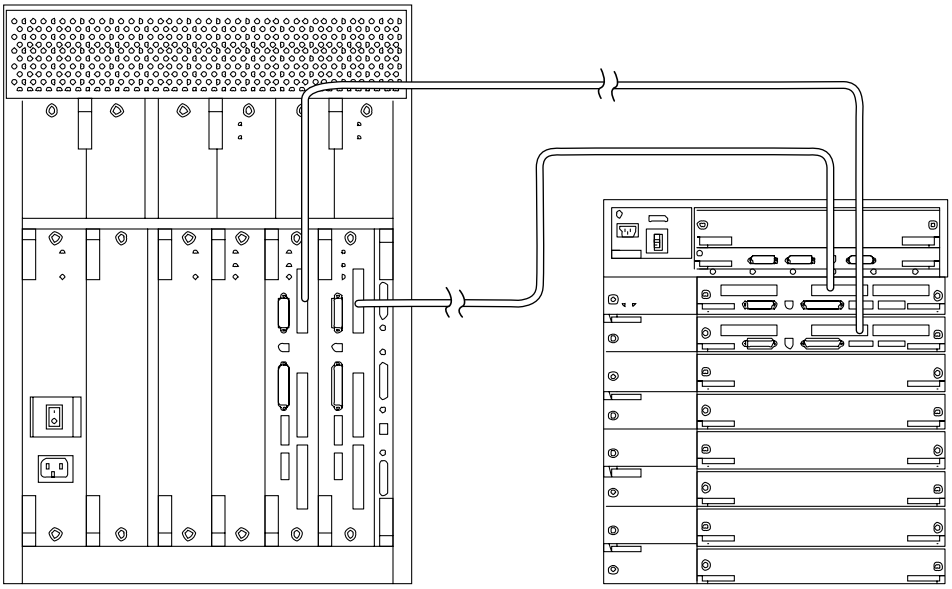


Figure C-6 Ultra Enterprise 3000 to Ultra Enterprise 6000 Node-to-Node Connection

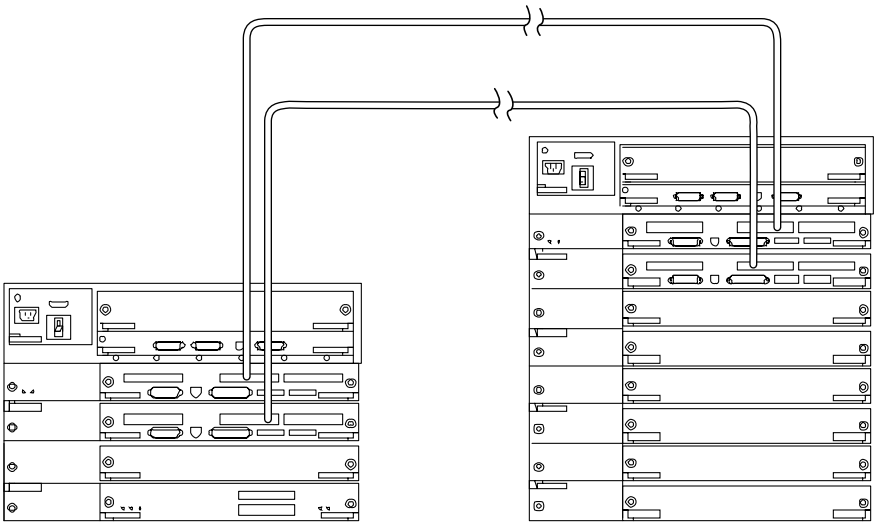


Figure C-7 Ultra Enterprise 5000/4000 to Ultra Enterprise 6000 Node-to-Node Connection

C.4 HA Clusters

The following server combinations are allowed for both HA clusters.

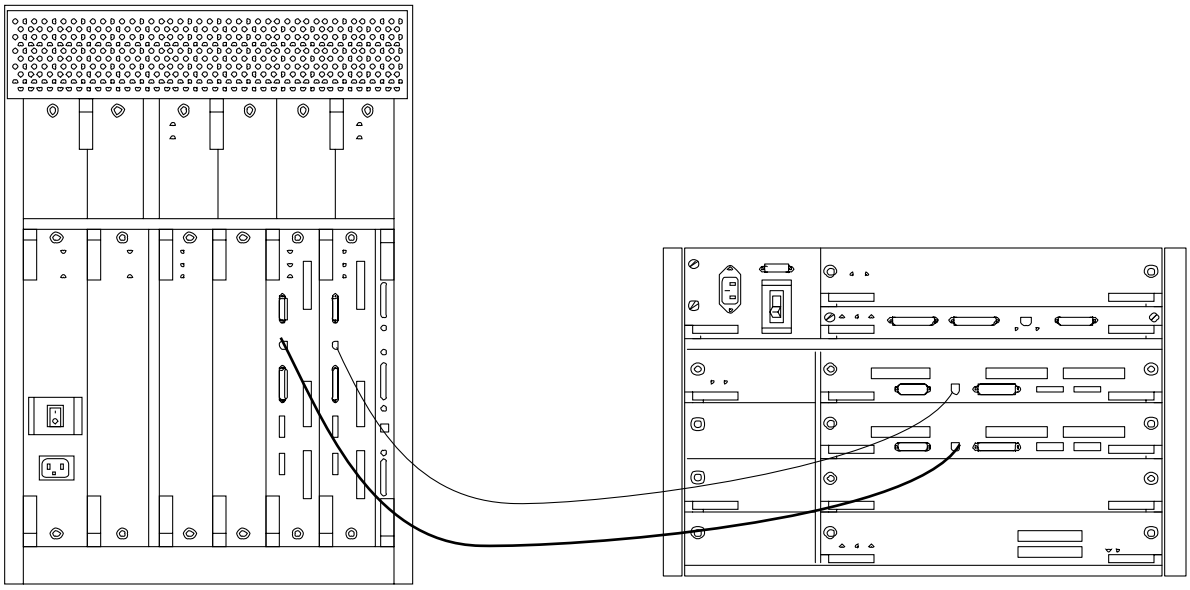


Figure C-8 Ultra Enterprise 3000 to Ultra Enterprise 5000/4000 Node-to-Node Connection for HA

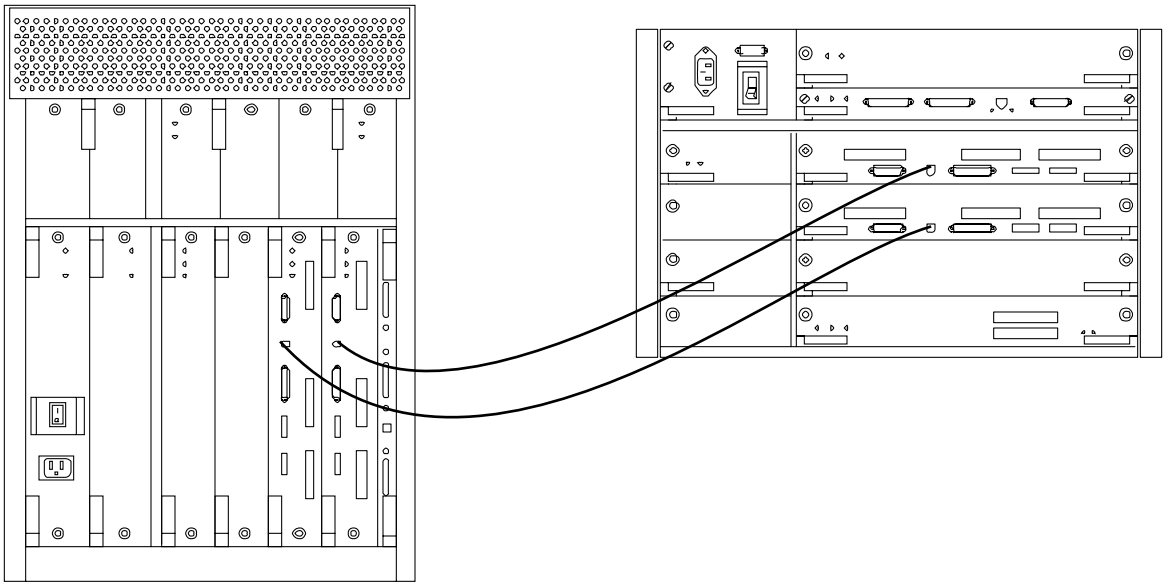


Figure C-9 Ultra Enterprise 3000 to Ultra Enterprise 6000 Node-to-Node Connection for HA

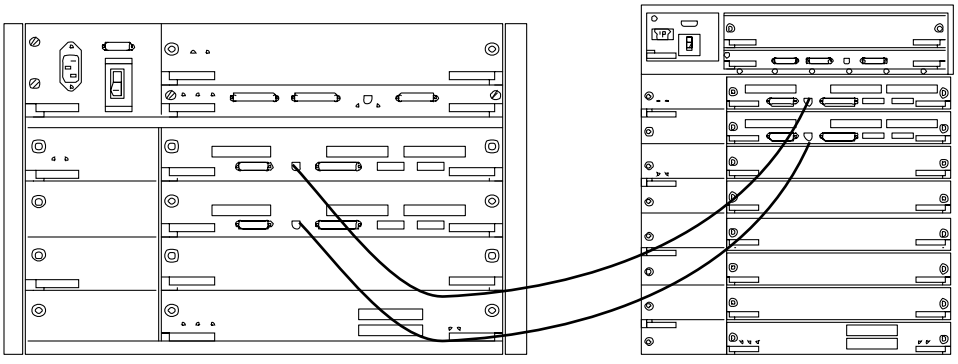


Figure C-10 Ultra Enterprise 5000/4000 to Ultra Enterprise 6000 Node-to-Node Connection for HA

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Revision History

Revision	Dash	Date	Comments
802-6788-11	11	April 1997	Beta Review, Version 1.2