

*Ultra™ Enterprise™ Cluster Hardware  
Site Preparation, Planning, and  
Installation Guide*



THE NETWORK IS THE COMPUTER™

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Part No.: 802-6783-11  
Revision A, April 1997

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## *Preface*

---

This manual provides installation instructions for Ultra™ Enterprise™ Cluster systems. These instructions are designed for a qualified trained service provider and/or system administrator with networking knowledge.

For information on troubleshooting problems, refer to the *Ultra Enterprise Cluster System Service Manual*, 802-6790.

### *How This Book Is Organized*

#### *Part 1—Site Planning and Preparation*

**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 an Ultra Enterprise Cluster server is and presents details of several example configurations.

**Chapter 3, “Specifications,”** provides system specifications.

**Chapter 4, “Planning for Hardware, Power, and Network Requirements,”** provides guidelines and information for preparing the site.

**Chapter 5, “Ultra Enterprise Cluster Configurations,”** provides configuration information for the Ultra Enterprise Cluster systems.

**Chapter 6, “Powering Off and On,”** provides procedures for powering the system off and on.

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**Chapter 7, “Internal Access and Leveling,”** explains how to remove all relevant cover panels.

**Chapter 8,** provides procedures for installing the Ultra Enterprise Cluster 3000 system.

**Chapter 9,** provides procedures for installing the Ultra Enterprise Cluster 4000 system.

**Chapter 10,** provides procedures for installing the Ultra Enterprise Cluster 5000 system.

**Chapter 11,** provides procedures for installing the Ultra Enterprise Cluster 6000 system.

**Chapter 12, “Configuring the Terminal Concentrator and Installing the Software”** explains how to configure the terminal concentrator.

**Appendix A, “Rackmount Rail Installation,”** gives procedures for installing rails in the cabinets and installing SPARCstorage™ Array 100 and 200 Series systems on the rails.

**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 guidelines on which platform types are allowed to be combined to make a cluster, and explains how to connect the different node types together.

## *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

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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 <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name%</code> You have mail.
<b>AaBbCc123</b>	What you type, contrasted with on-screen computer output	<code>machine_name%</code> <b>su</b> Password:
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rm filename</code> .
<b><i>AaBbCc123</i></b>	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be 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.

<b>Shell</b>	<b>Prompt</b>
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
<b>Ultra Enterprise Server</b>	<b>Ultra Enterprise Server 3000 Binder Set</b>	<b>825-3388</b>
Installation	<i>Ultra Enterprise 3000 Systems Installation Guide</i>	802-6050
Service	<i>Ultra Enterprise 3000 System Manual</i>	802-6051
Safety/EMI	<i>Ultra Enterprise System Cabinet Regulatory Compliance Guide</i>	801-3846
	<b>Ultra Enterprise Server 6000/5000/4000 Binder Set</b>	<b>825-3388</b>
Installation	<i>Ultra Enterprise 6000/5000/4000 Systems Installation Guide</i>	801-3844
Service	<i>Ultra Enterprise 6000/5000/4000 Systems Manual</i>	801-3845
Safety/EMI	<i>Ultra Enterprise System Cabinet Regulatory Compliance Guide</i>	801-3846
<b>SPARCstorage Array 100</b>	<b>SPARCstorage Array 100 Installation and Service Set</b>	<b>825-2513</b>
	<i>SPARCstorage Array Model 100 Series Installation Manual</i>	801-2205
	<i>SPARCstorage Array Model 100 Series Service Manual</i>	801-2206
	<i>SPARCstorage Array Regulatory Compliance Manual</i>	801-7103
	<b>SPARCstorage Array User's Guide Doc Set</b>	<b>825-2514</b>
	<i>SPARCstorage Array Configuration Guide</i>	802-2041
	<i>SPARCstorage Array User's Guide</i>	802-2042
	<i>SPARCstorage Array Product Note</i>	802-2043
	<i>Disk Drive Installation Manual for the SPARCstorage Array Model 100 Series</i>	801-2207
<b>SPARCstorage Array 200</b>	<i>SPARCstorage Array Model 200 Series Installation Manual</i>	802-2027
	<i>SPARCstorage Array Model 200 Series Service Manual</i>	802-2028
	<i>SPARCstorage Array Battery and PROM Installation Note Manual</i>	802-2029

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Table P-1 Related Documents (Continued)

<b>Product Family</b>	<b>Title</b>	<b>Part Number</b>
	<i>SPARCstorage Array Model 200 Series Regulatory Compliance Manual</i>	802-2031
<b>Terminal Concentrator</b>	<b>Terminal Concentrator Binder Set</b>	<b>825-2227</b>
	<i>Terminal Concentrator Installation Notes</i>	801-6127
	<i>Terminal Concentrator General Reference Guide</i>	801-5972
<b>Software</b>	<i>SMCC SPARC Hardware Platform Guide</i>	802-5341
	<i>Solstice System Manager Install Manual</i>	802-6135
<b>Diagnostics</b>	<i>SunVTS Version 2.0 User's Guide</i>	802-5331
	<i>Solstice SyMON User's Guide</i>	802-5355
<b>Options</b>	<i>Ultra Enterprise Expansion Cabinet Installation and Service Manual</i>	802-6084
	<i>Sparcstorage RSM Installation, Operations and Service Manual</i>	802-5062
	<i>Differential SCSI Disk Tray Service Manual</i>	802-7341
	<i>Ultra Enterprise X000 Systems Boards Installation Guide</i>	802-5030
	<i>Ultra Enterprise CPU Installation Guide</i>	802-5031
	<i>Ultra Enterprise SIMM Installation Guide</i>	802-5032
	<i>Ultra Enterprise Systems Peripheral Power Supply Installation Guide</i>	802-5033
	<i>Ultra Enterprise Systems PCM Installation Guide</i>	802-6244
<b>Ultra Enterprise PDB Clusters</b>	<b>Ultra Enterprise Cluster PDB Preparation Binder Set</b>	<b>825-3525</b>
	<i>Getting Started (roadmap)</i>	802-6782
	<i>Ultra Enterprise Cluster Hardware Site Preparation, Planning and Installation Guide (this document)</i>	802-6783

Table P-1 Related Documents (Continued)

<b>Product Family</b>	<b>Title</b>	<b>Part Number</b>
	<b>Ultra Enterprise Cluster PDB System Binder Set</b>	<b>825-3526</b>
	<i>Getting Started (roadmap)</i>	802-6782
	<i>Ultra Enterprise PDB 1.2 Software Site Preparation, Planning and Installation Guide</i>	802-6790
	<i>Ultra Enterprise Cluster PDB System Administration Guide</i>	802-6784
	<i>Ultra Enterprise Cluster PDB Volume Manager Administration Guide</i>	802-6785
	<i>Ultra Enterprise Cluster Service Manual</i>	802-6786
	<i>Ultra Enterprise PDB 1.2 Software (CD insert)</i>	804-5449
	<i>Ultra Enterprise PDB 1.2 Software Release Notes</i>	802-6793
	<i>Ultra Enterprise PDB Error Messages</i>	802-6792
<b>Ultra Enterprise HA Clusters</b>	<b>Ultra Enterprise Cluster High Availability Binder Set</b>	<b>825-3589</b>
	<i>Getting Started (Roadmap)</i>	802-7621
	<i>Solstice HA 1.3 User's Guide</i>	805-0317
	<i>Ultra Enterprise Cluster Hardware Site Preparation, Planning and Installation Manual</i>	802-6783
	<i>Solstice HA 1.3 Programmer's Guide</i>	805-0318
	<i>Ultra Enterprise Cluster Service Manual</i>	802-6786
	<i>Solstice HA 1.3 New Product Information (FCS only)</i>	805-0629
	<b>Solstice Disksuite 4.1 Binder Set</b>	<b>851-2369</b>
	<i>Solstice Disksuite 4.1 User's Guide</i>	802-4215
	<i>Solstice Disksuite 4.1 Reference Guide</i>	802-6724
	<i>SSolstice Disksuite 4.1 Installation/Product Notes</i>	802-7196

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## Notes, Cautions, and Warnings



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

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**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.

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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.

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**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.

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# Checklist



This chapter gives specific information and checklists to use when you inventory each type of Ultra Enterprise Cluster system.

<i>Ultra Enterprise Cluster 3000 — Customer-Assembled</i>	<i>page 1-2</i>
<i>Ultra Enterprise Cluster 4000 — Customer-Assembled</i>	<i>page 1-4</i>
<i>Ultra Enterprise Cluster 5000 System: Factory-Assembled</i>	<i>page 1-6</i>
<i>Ultra Enterprise Cluster 5000: Customer-Assembled</i>	<i>page 1-8</i>
<i>Ultra Enterprise Cluster 6000: Factory-Assembled</i>	<i>page 1-10</i>
<i>Ultra Enterprise Cluster 6000: Customer-Assembled</i>	<i>page 1-12</i>

## 1.1 Ultra Enterprise Cluster 3000 — Customer-Assembled

### 1.1.1 General Description

Table 1-1 Requirements for Ultra Enterprise Cluster 3000 System:  
Customer-Assembled

Device	Per Node		Per Cluster System		Comment
	Min	Max	Min	Max	
Terminal concentrator	–	–	1	1	Installed in customer-defined location
SPARCstorage Array	–	–	PDB: 2 HA: 2	PDB: 10 HA: 12	Each equipped with 2 FC/OM
Cable set Client net (HA) other	–	–	1	1	
Administration workstation	–	–	1	1	
Ultra Enterprise 3000 System	1	1	2	2	Chassis not mounted in a rack
CPU/Memory boards, each with 2 UltraSPARC™ modules 256 Mbytes RAM <sup>1</sup>	1	2	2	4	Installed in slot 0
I/O boards, each equipped with 1 fiber interface (FC/OM module) PDB: SCI cards	2	3	4	6	PDB: I/O boards in slots 1 and 2 are configured with SCI cards
Power/cooling modules (PCMs)	3	3	6	6	
FC/S SBus card	PDB: 0 HA: 0	PDB: 7 HA: 9	PDB: 0 HA: 0	PDB: 14 HA: 18	
FC/OM optical modules	2	3	4	6	

1. 128 Mbytes RAM is the minimum amount supported.

## 1.1.2 Checklist

Table 1-2 Checklist for Ultra Enterprise Cluster 3000 System  
Customer-Assembled

Category	Item	Per Node Quantity		Per Cluster Quantity	
		Planned	On Hand	Planned	On Hand
Systems	Ultra Enterprise 3000 System (nodes) CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM (128 Mbytes min.) I/O board Power/cooling module (PCMs) Administration workstation				
SBus cards	PDB: SCI SBus card FC/S SBus card				
Modules	FC/OM modules				
Chassis	Terminal concentrator				
Cables	RS-232 serial cable long, PN 530-2152 short PN 530-2151 HA: private net 1 meter, PN 530-2149 5 meter PN 530-2150  Differential SCSI 530-1884 PDB: SCI cable, 5 meter, PN 530-2310 Fiber-optic cable, 15 meter, PN 595-3379 Administration workstation with monitor				
Expansion cabinet	SPARCstorage Array 200 series units SPARCstorage RSM units Differential SCSI disk trays				

## 1.2 Ultra Enterprise Cluster 4000 — Customer-Assembled

### 1.2.1 General Description

Table 1-3 Requirements for Ultra Enterprise Cluster 4000 System:  
Customer-Assembled

Device	Per Node		Per Cluster System		Comment
	Min	Max	Min	Max	
Terminal concentrator	–	–	1	1	Installed in customer-defined location
SPARCstorage Array	–	–	PDB: 2 HA: 2	PDB: 24 HA: 26	Each equipped with 2 FC/OM host adapters
Cable set Client net (HA) other	–	–	1	1	
Administration workstation	–	–	1	1	
Ultra Enterprise 4000 System	1	1	2	2	Chassis not mounted in a rack
CPU/Memory boards, each with 2 UltraSPARC modules and 256 Mbytes RAM <sup>1</sup>	1	1	2	2	
I/O boards, each equipped with 1 fiber interface (FC/OM module), and:	2	PDB: 7 HA: 6	4	PDB: 14 HA: 12	PDB: I/O boards in slots 1 and 3 are configured with SCI cards
SCI cards (PDB only)	2	2	4	4	
FC/S SBus card	PDB: 0 HA: 0	PDB: 19 HA: 18	PDB: 0 HA: 0	PDB: 36 HA: 38	
Disk boards	PDB: 0 HA: 1	PDB: 0 HA: 4	PDB: 0 HA: 2	PDB: 0 HA: 8	
Power/cooling modules (PCMs)	3	4	6	8	
FC/OM optical modules	PDB: 2 HA: 2	PDB: 7 HA: 6	PDB: 4 HA: 4	PDB: 14 HA: 12	

1. 128 Mbytes RAM is the minimum amount supported.

## 1.2.2 Checklist

Table 1-4 Checklist for Ultra Enterprise Cluster 4000 System:  
Customer-Assembled

Category	Item	Per Node Quantity		Per Cluster Quantity	
		Planned	On Hand	Planned	On Hand
Systems	Ultra Enterprise 4000 System (nodes) CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM (128 Mbytes min.) I/O board Disk board Power/cooling module (PCMs) Administration workstation				
SBus cards	PDB: SCI SBus card FC/S SBus card				
Modules	FC/OM modules				
Chassis	Terminal concentrator				
Cables	RS-232 serial cable long, PN 530-2152 short PN 530-2151 HA: private net 1 meter, PN 530-2149 5 meter PN 530-2150  Differential SCSI 530-1884 PDB: SCI cable, 5 meter, PN 530-2310 Fiber-optic cable, 15 meter, PN 595-3379				
System cabinet	SPARCstorage Array units Administration workstation Monitor				
Expansion cabinet	SPARCstorage Array 200 series units SPARCstorage RSM units Differential SCSI disk trays				

## 1.3 Ultra Enterprise Cluster 5000 System: Factory-Assembled

### 1.3.1 General Description

Table 1-5 Requirements for Ultra Enterprise Cluster 5000 System: Factory-Assembled

Device	Per Node		Per Cluster System		Comment
	Min	Max	Min	Max	
Terminal concentrator	–	–	1	1	Installed in customer-defined location
SPARCstorage Array	–	–	PDB: 2 HA: 2	PDB: 24 HA: 26	Each equipped with 2 FC/OM host adapters
Cable set Client net (HA) other	–	–	1	1	
Administration workstation	–	–	1	1	
Ultra Enterprise 5000 System	1	1	2	2	
CPU/Memory boards, each with 2 UltraSPARC modules 256 Mbytes RAM <sup>1</sup>	1	1	2	2	
I/O boards, each equipped with one fiber interface (FC/OM module), and: SCI cards (PDB only) FC/S SBus card	2 2 PDB: 0 HA: 0	PDB: 7 HA: 6 2 PDB: 19 HA: 18	PDB: 4 HA: 4 4 PDB: 0 HA: 0	PDB: 14 HA: 12 4 PDB: 36 HA: 38	PDB: I/O boards in slots 1 and 3 are configured with SCI cards
Disk boards	PDB: 0 HA: 1	PDB: 0 HA: 4	PDB: 0 HA: 2	PDB: 0 HA: 8	
Power/cooling modules (PCMs)	3	4	6	8	
FC/OM optical modules	PDB: 2 HA: 2	PDB: 7 HA: 6	PDB: 4 HA: 4	PDB: 14 HA: 12	

1. 128 Mbytes RAM is the minimum amount supported.

### 1.3.2 Checklist

Table 1-6 Checklist for Ultra Enterprise Cluster 5000 System:  
Factory-Assembled

Category	Item	Per Node Quantity		Per Cluster Quantity	
		Planned	On Hand	Planned	On Hand
Systems	Ultra Enterprise 5000 System (nodes) CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM (128 Mbytes min.) I/O board Disk board Power/cooling module (PCMs) Administration workstation				
SBus cards	PDB: SCI SBus card FC/S SBus card				
Modules	FC/OM modules				
Chassis	Terminal concentrator Terminal concentrator bracket				
Cables	RS-232 serial cable long, PN 530-2152 short PN 530-2151 HA: private net 1 meter, PN 530-2149 5 meter PN 530-2150 Differential SCSI 530-1884  PDB: SCI cable, 5 meter, PN 530-2310 Fiber-optic cable, 15 meter, PN 595-3379				
System cabinet	SPARCstorage Array units Rackmount kit PDB: SCI bracket				
Expansion cabinet	SPARCstorage Array 200 series units SPARCstorage RSM units Differential SCSI disk trays				

## 1.4 Ultra Enterprise Cluster 5000: Customer-Assembled

### 1.4.1 General Description

Table 1-7 Requirements for Ultra Enterprise Cluster 5000 System: Customer-Assembled

Device	Per Node		Per Cluster System		Comment
	Min	Max	Min	Max	
Terminal concentrator	–	–	1	1	Installed in customer-defined location
SPARCstorage Array	–	–	PDB: 2 HA: 2	PDB: 24 HA: 26	Each equipped with 2 FC/OM host adapters
Rackmount kit	1	3	PDB: 2 HA: 2	PDB: 24 HA: 26	Mounts one SSA 100 Series chassis
Cable set Client net (HA) other	–	–	1	1	
Administration workstation	–	–	1	1	
Ultra Enterprise 5000 System	1	1	2	2	
CPU/Memory boards, each with 2 UltraSPARC modules 256 Mbytes RAM <sup>1</sup>	1	1	2	2	
I/O boards, each equipped with one fiber interface (FC/OM module), and: SCI cards (PDB only) FC/S SBus card	2  2 PDB: 0 HA: 0	PDB: 7 HA: 6  2 PDB: 19 HA: 18	PDB: 4 HA: 4  4 PDB: 0 HA: 0	PDB: 14 HA: 12  4 PDB: 36 HA: 38	PDB: I/O boards in slots 1 and 3 are configured with SCI cards
Disk boards	PDB: 0 HA: 1	PDB: 0 HA: 4	PDB: 0 HA: 2	PDB: 0 HA: 8	
Power/cooling modules (PCMs)	3	4	6	8	
FC/OM optical modules	PDB: 2 HA: 2	PDB: 7 HA: 6	PDB: 4 HA: 4	PDB: 14 HA: 12	

1. 128 Mbytes RAM is the minimum amount supported.

## 1.4.2 Checklist

Table 1-8 Checklist for Ultra Enterprise Cluster 5000 System  
Customer-Assembled

Category	Item	Per Node Quantity		Per Cluster Quantity	
		Planned	On Hand	Planned	On Hand
Systems	Ultra Enterprise 5000 System (nodes)				
	CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM (128 Mbytes min.)				
	I/O board				
	Disk board				
	Power/cooling module (PCMs)				
	Administration workstation				
SBus cards	PDB: SCI SBus card				
	FC/S SBus card				
Modules	FC/OM modules				
Chassis	Terminal concentrator				
	Terminal concentrator bracket				
Cables	RS-232 serial cable				
	long, PN 530-2152				
	short PN 530-2151				
	HA: private net				
	1 meter, PN 530-2149				
	5 meter PN 530-2150				
	Differential SCSI 530-1884				
System cabinet	PDB: SCI cable, 5 meter, PN 530-2310				
	Fiber-optic cable, 15 meter, PN 595-3379				
	SPARCstorage Array units				
Expansion cabinet	Rackmount kit				
	PDB: SCI bracket				
	SPARCstorage Array 200 series units				
	SPARCstorage RSM units				
	Differential SCSI disk trays				

## 1.5 Ultra Enterprise Cluster 6000: Factory-Assembled

### 1.5.1 General Description

Table 1-9 Requirements for Ultra Enterprise Cluster 6000 System: Factory-Assembled

Device	Per Node		Per Cluster System		Comment
	Min	Max	Min	Max	
Terminal concentrator	–	–	1	1	Installed in customer-defined location
SPARCstorage Array	–	–	PDB: 2 HA: 2	PDB: 58 HA: 56	Each equipped with 2 FC/OM host adapters
Rackmount kit	1	2	PDB: 2 HA: 2	PDB: 58 HA: 56	Mounts one SSA 100 Series chassis
Cable set Client net (HA) other	–	–	1	1	
Administration workstation	–	–	1	1	
Ultra Enterprise 6000 System	1	1	2	2	
CPU/Memory boards, each with 2 UltraSPARC modules 256 Mbytes RAM <sup>1</sup>	1	1	2	2	
I/O boards, each equipped with one fiber interface (FC/OM module), and:	2	PDB: 15 HA: 14	PDB: 4 HA: 4	PDB: 30 HA: 28	PDB: I/O boards in slots 1 and 3 are configured with SCI cards
SCI cards (PDB only)	2	2	4	4	
FC/S SBus card	PDB: 0 HA: 0	PDB: 19 HA: 18	PDB: 0 HA: 0	PDB: 36 HA: 38	
Disk boards	PDB: 0 HA: 1	PDB: 2 HA: 2	PDB: 0 HA: 2	PDB: 4 HA: 4	
Power/cooling modules (PCMs)	3	8	6	16	
FC/OM optical modules	PDB: 2 HA: 2	PDB: 15 HA: 14	PDB: 4 HA: 4	PDB: 30 HA: 28	

1. 128 Mbytes RAM is the minimum amount supported.

## 1.5.2 Checklist

Table 1-10 Checklist for Ultra Enterprise Cluster 6000 System:  
Factory-Assembled

Category	Item	Per Node Quantity		Per Cluster Quantity	
		Planned	On Hand	Planned	On Hand
Systems	Ultra Enterprise 6000 System (nodes)				
	CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM (128 Mbytes min.)				
	I/O board				
	Disk board				
	Power/cooling module (PCMs)				
	Administration workstation				
SBus cards	PDB: SCI SBus card				
	FC/S SBus card				
Modules	FC/OM modules				
Chassis	Terminal concentrator				
	Terminal concentrator bracket				
Cables	RS-232 serial cable				
	long, PN 530-2152				
	short PN 530-2151				
	HA: private net				
	1 meter, PN 530-2149				
	5 meter PN 530-2150				
	Differential SCSI 530-1884				
System cabinet	PDB: SCI cable, 5 meter, PN 530-2310				
	Fiber-optic cable, 15 meter, PN 595-3379				
	SPARCstorage Array units				
Expansion cabinet	Rackmount kit				
	PDB: SCI bracket				
	SPARCstorage Array 200 series units				
	SPARCstorage RSM units				
	Differential SCSI disk trays				

## 1.6 Ultra Enterprise Cluster 6000: Customer-Assembled

### 1.6.1 General Description

Table 1-11 Requirements for Ultra Enterprise Cluster 6000 System:  
Customer-Assembled

Device	Per Node		Per Cluster System		Comment
	Min	Max	Min	Max	
Terminal concentrator	–	–	1	1	Installed in customer-defined location
SPARCstorage Array	–	–	PDB: 2 HA: 2	PDB: 58 HA: 56	Each equipped with 2 FC/OM host adapters
Rackmount kit	1	2	PDB: 2 HA: 2	PDB: 58 HA: 56	Mounts one SSA 100 Series chassis
Cable set Client net (HA) other	–	–	1	1	
Administration workstation	–	–	1	1	
Ultra Enterprise 6000 System	1	1	2	2	
CPU/Memory boards, each with 2 UltraSPARC modules 256 Mbytes RAM <sup>1</sup>	1	1	2	2	
I/O boards, each equipped with one fiber interface (FC/OM module), and: SCI cards (PDB only) FC/S SBus card	2 PDB: 0 HA: 0	PDB: 15 HA: 14 2 PDB: 19 HA: 18	PDB: 4 HA: 4 4 PDB: 0 HA: 0	PDB: 30 HA: 28 4 PDB: 36 HA: 38	PDB: I/O boards in slots 1 and 3 are configured with SCI cards
Disk boards	PDB: 0 HA: 1	PDB: 2 HA: 2	PDB: 0 HA: 2	PDB: 4 HA: 4	
Power/cooling modules (PCMs)	3	8	6	16	
FC/OM optical modules	PDB: 2 HA: 2	PDB: 15 HA: 14	PDB: 4 HA: 4	PDB: 30 HA: 28	

1. 128 Mbytes RAM is the minimum amount supported.

## 1.6.2 Checklist

Table 1-12 Checklist for Ultra Enterprise Cluster 6000 System  
Customer-Assembled

Category	Item	Per Node Quantity		Per Cluster Quantity	
		Planned	On Hand	Planned	On Hand
Systems	Ultra Enterprise 6000 System (nodes) CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM (128 Mbytes min.) I/O board Disk board Power/cooling module (PCMs) Administration workstation				
SBus cards	PDB: SCI SBus card FC/S SBus card				
Modules	FC/OM modules				
Chassis	Terminal concentrator Terminal concentrator bracket				
Cables	RS-232 serial cable long, PN 530-2152 short PN 530-2151 HA: private net 1 meter, PN 530-2149 5 meter PN 530-2150 Differential SCSI 530-1884  PDB: SCI cable, 5 meter, PN 530-2310 Fiber-optic cable, 15 meter, PN 595-3379				
System cabinet	SPARCstorage Array units Rackmount kit PDB: SCI bracket				
Expansion cabinet	SPARCstorage Array 200 series units SPARCstorage RSM units Differential SCSI disk trays				



## *2.1 Standard Features*

Ultra Enterprise clustered systems operate on various hardware configurations, including the Ultra Enterprise 3000, 4000, 5000 and 6000 systems. These systems are targeted at enterprise-wide, mission-critical database applications.

Ultra Enterprise clustered 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). The two nodes communicate with each other using two private network links. The benefits of coupling database servers are increased performance and higher level of database availability.

The database(s) for these systems are implemented on clustered platforms using redundant SPARCstorage™ Array Model 100 series units. For expanded systems, the controllers can be either SPARCstorage Array Model 200s or 210s which are used with SPARCstorage RSM™s (removable storage media) unit or 9-Gbyte disk trays. Clustered software maintains a mirror-image database on the disk arrays.

The 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.

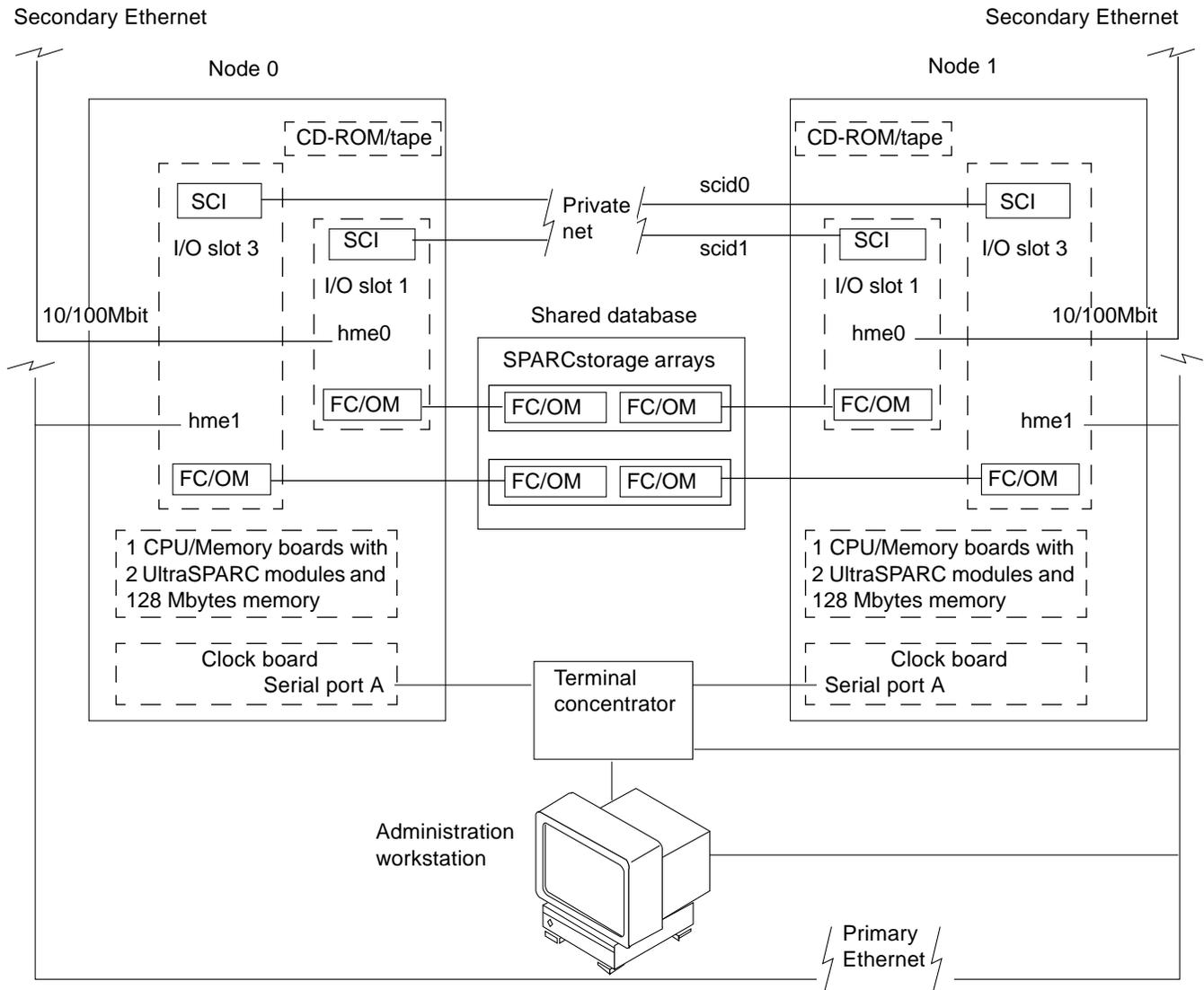


Figure 2-1 Clustered PDB System Based on the Ultra Enterprise 3000/4000/5000 System

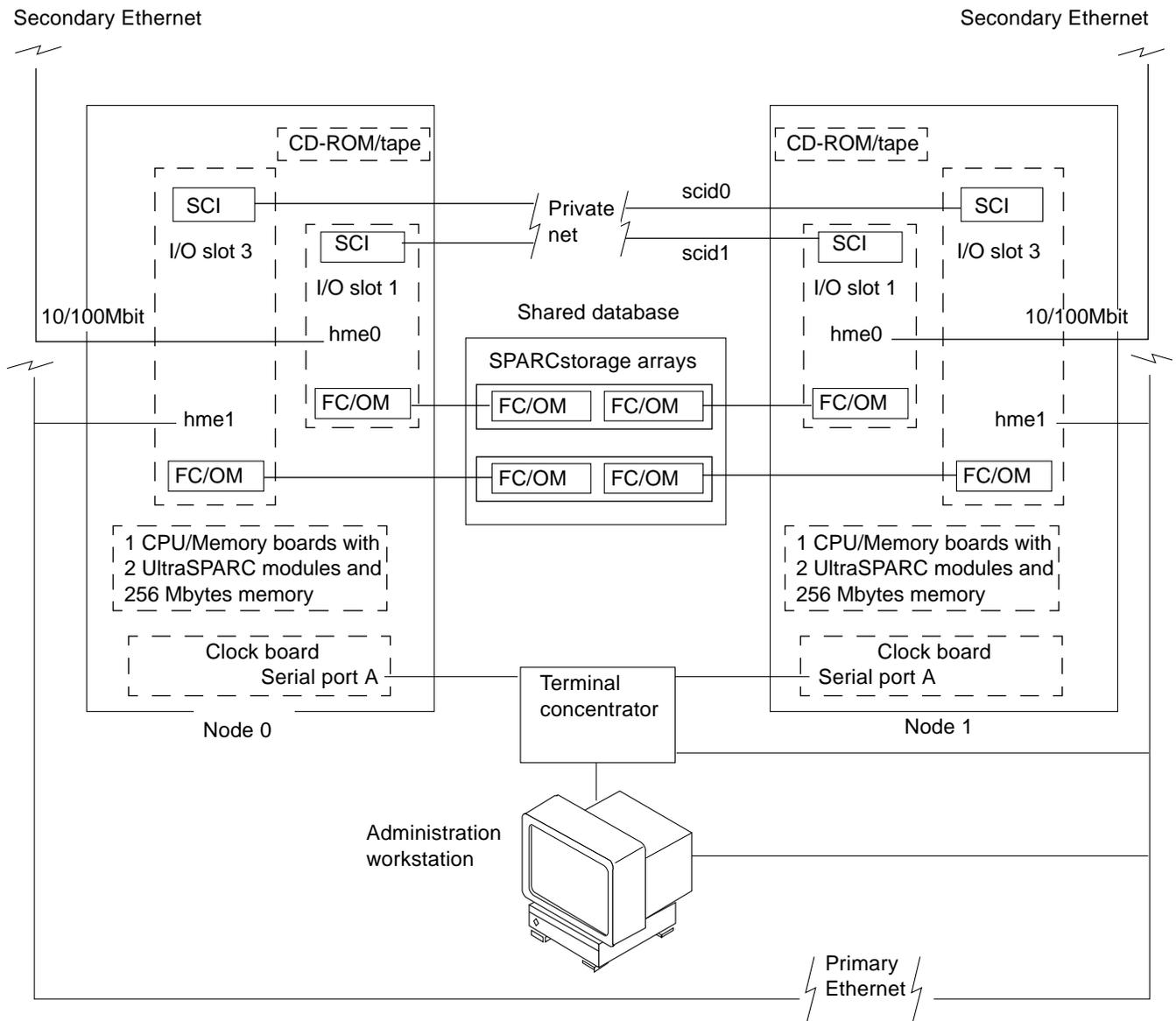


Figure 2-2 Clustered PDB System Based on the Ultra Enterprise 6000 System

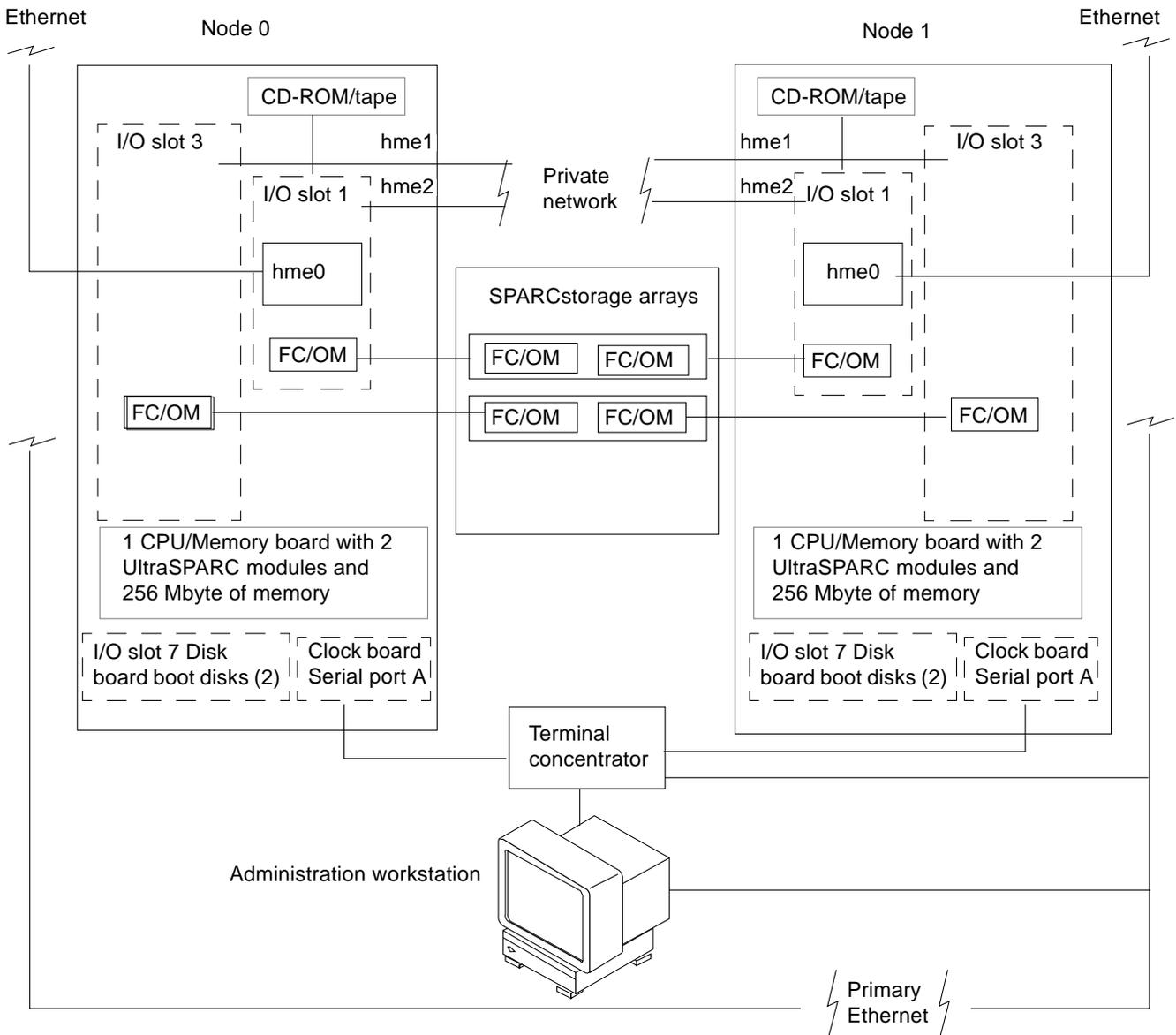


Figure 2-3 Clustered HA System Based on the Ultra Enterprise 4000/5000 System

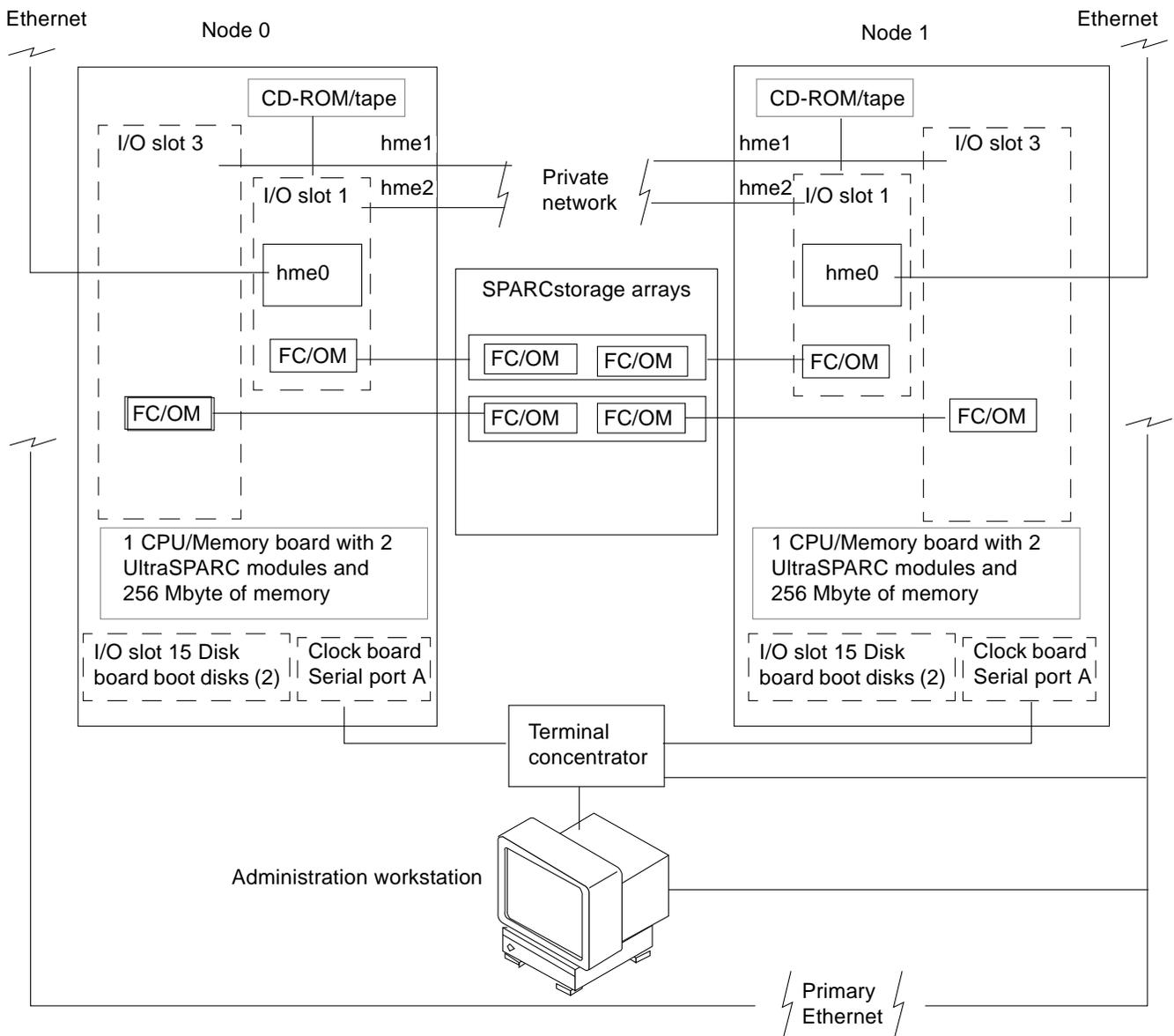


Figure 2-4 Clustered HA System Based on Ultra Enterprise 6000 System

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 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.

## ***2.2 Ultra Enterprise 3000 Configurations***

There are several types of disk arrays used by the shared database. This basic cluster is not installed in a rack. The system features SPARCstorage Array Model 100 series units. For expanded systems, the disk arrays may be

- SPARCstorage Array Model 100 series units, or
- SPARCstorage Array Model 200s hosting SPARCstorage RSM units (Removable Storage Media) or SPARCstorage Array Model 210s hosting differential SCSI trays.

Figure 2-5 shows Ultra Enterprise 3000 system hardware required to support the Ultra Enterprise software.

### ***2.2.1 PDB Configuration***

The minimum configuration is listed below.

- Two nodes (based on Ultra Enterprise 3000), each containing:
  - One CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM
  - Two I/O boards, each with one SCI card and one FC/OM
- Two SCI cables
- Two SPARCstorage Array Model 100 series units
- Four fiber optic cables
- Terminal concentrator with short and long serial cables

- CD-ROM and (optionally) 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

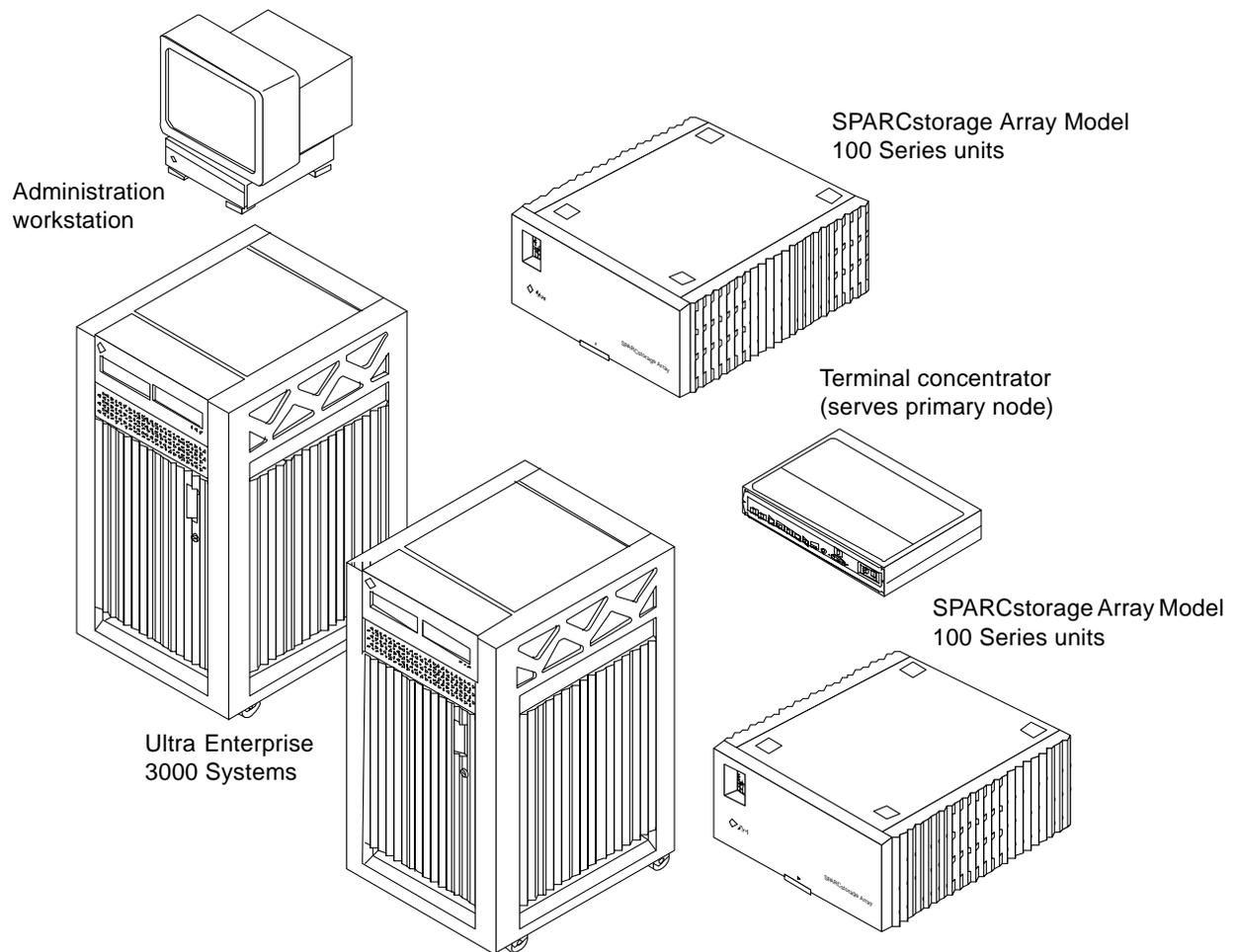


Figure 2-5 Ultra Enterprise Cluster 3000 System

### 2.2.2 HA Configuration

The minimum configuration is listed below.

- Two nodes (based on Ultra Enterprise 3000), each containing:

- One CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM
- Two I/O boards, each with one FC/OM
- Two SPARCstorage Array Model 100 series units
- Four fiber optic cables
- Terminal concentrator with short and long serial cables
- CD-ROM and (optionally) 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

### ***2.3 Ultra Enterprise 4000 Configurations***

There are several types of disk arrays used by the shared database. The main system uses SPARCstorage Array Model 100 series units. For expanded systems, the disk arrays are SPARCstorage Array Model 200s hosting SPARCstorage RSM units (Removable Storage Media) or, SPARCstorage Array Model 210s hosting differential SCSI trays.

Figure 2-6 shows the Ultra Enterprise Cluster system (node) cabinet.

Figure 2-7 shows the Ultra Enterprise Cluster 4000 hardware required to support the Ultra Enterprise software.

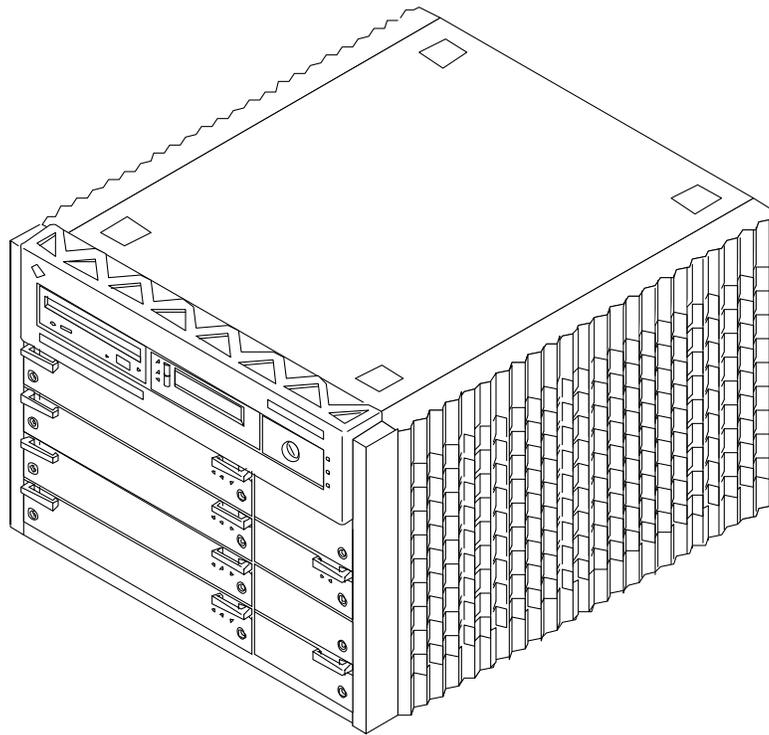


Figure 2-6 Ultra Enterprise Cluster 4000 System CABinet (Node Cabinet)

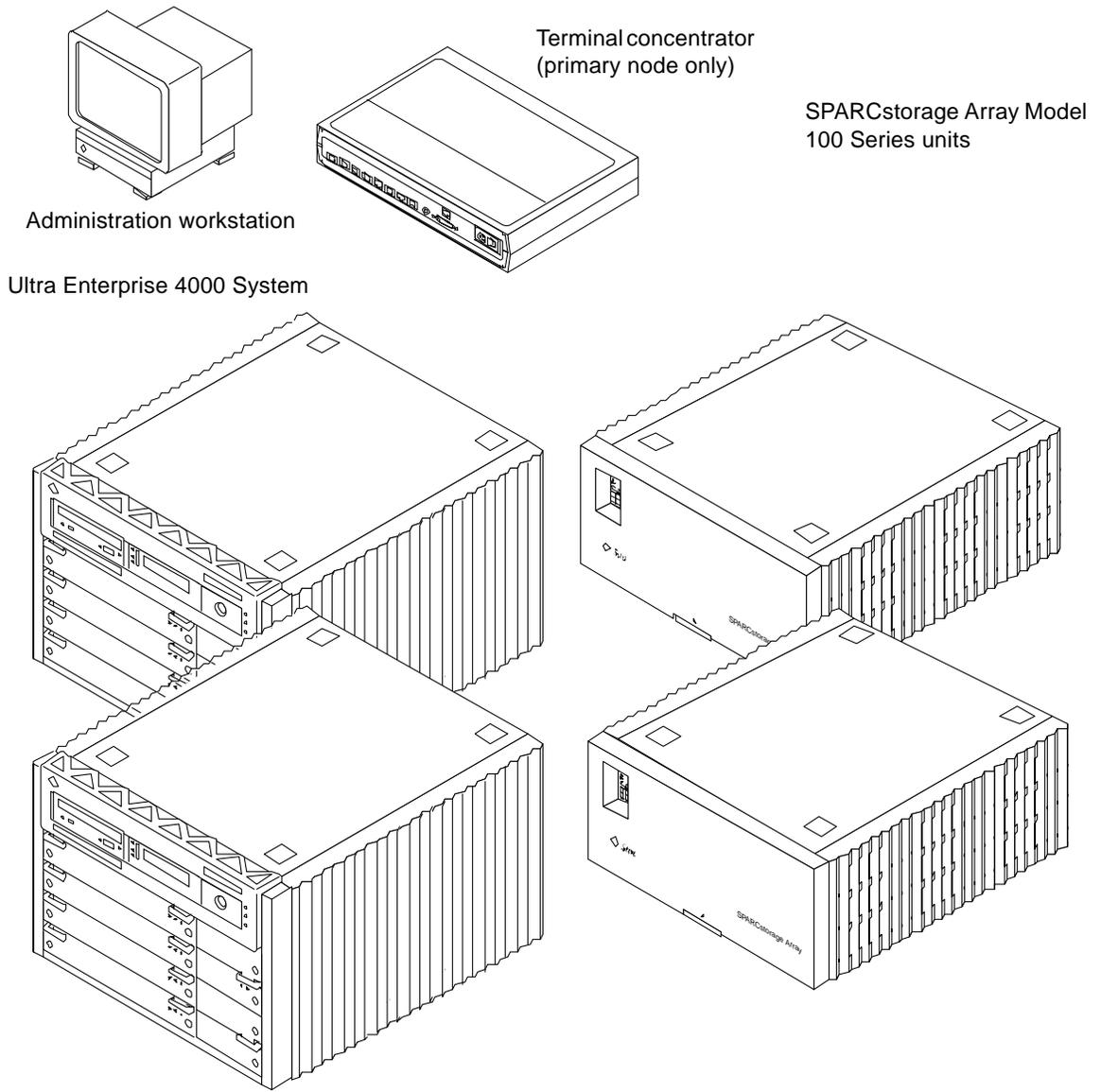


Figure 2-7 Basic Ultra Enterprise Cluster 4000 System

### *2.3.1 PDB Configuration*

The minimum configuration is listed below.

- Two nodes (based on the 4000), each containing:
  - One CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM
  - Two I/O boards, each with one SCI card and one FC/OM
- Two SCI cables
- Two SPARCstorage Array Model 100 series units
- Four fibre optic cables
- Terminal concentrator with short and long serial cables
- CD-ROM and (optionally) 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

### *2.3.2 HA Configuration*

The minimum configuration is listed below.

- Two nodes (based on the 4000), each containing:
  - One CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM
  - Two I/O boards, each with one FC/OM
- Two SPARCstorage Array Model 100 series units
- Four fibre optic cables
- Terminal concentrator with short and long serial cables
- CD-ROM and (optionally) 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

## 2.4 Ultra Enterprise 5000 Configurations

There are several types of disk arrays used by the shared database. The main system cabinets uses SPARCstorage Array Model 100 series units. For expanded systems, the disk arrays are SPARCstorage Array Model 200s hosting SPARCstorage RSM units (Removable Storage Media) or, SPARCstorage Array Model 210s hosting differential SCSI trays.

Figure 2-8 shows the Ultra Enterprise 5000 hardware required to support the Ultra Enterprise software. Note that these figures depict a system with more than the minimum configuration.

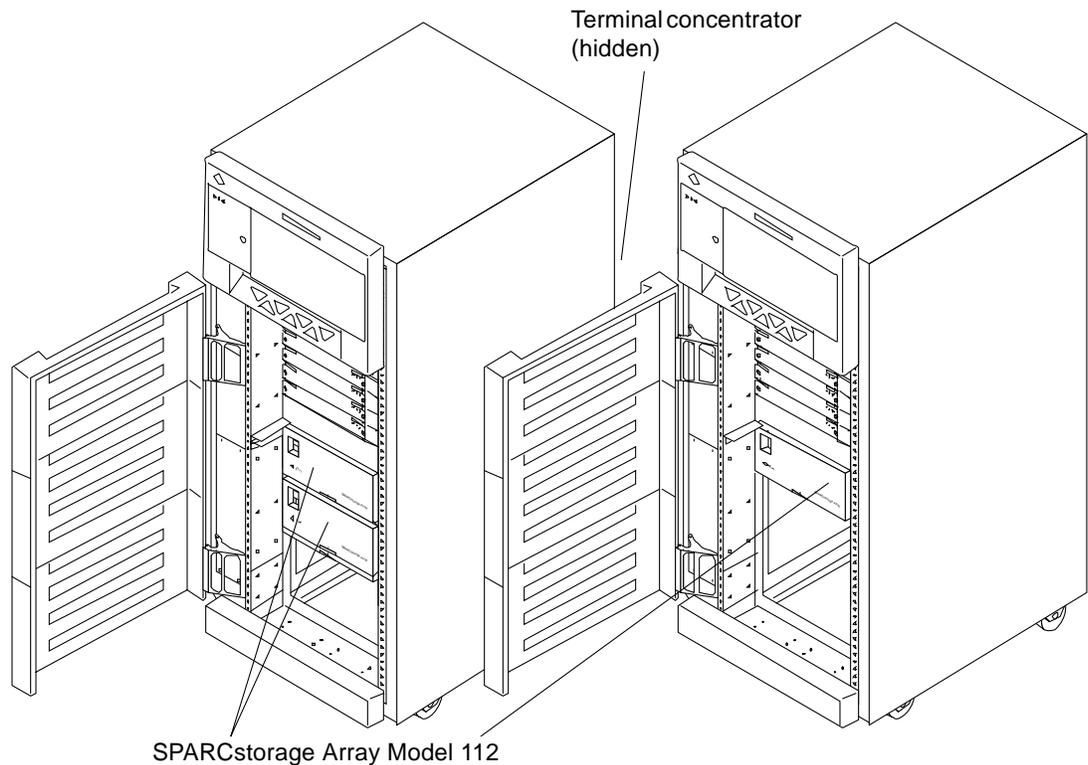


Figure 2-8 Basic Ultra Enterprise Cluster 5000 System

### 2.4.1 PDB Configuration

The minimum configuration is listed below.

- 
- Two nodes (based on the 5000), each containing:
    - One CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM
    - Two I/O boards, each with one SCI card and one FC/OM
  - Two SCI cables and brackets
  - Two SPARCstorage Array Model 100 series units
  - Four fibre optic cables
  - Terminal concentrator with short and long serial cables
  - CD-ROM and 8 mm tape drive
  - Administration workstation with CD-ROM drive (not shown)

### *2.4.2 HA Configuration*

The minimum configuration is listed below.

- Two nodes (based on the 5000), each containing:
  - One CPU/Memory board with 2 UltraSPARC modules and 256 Mbytes RAM
  - Two I/O boards, each with one FC/OM
- Two SPARCstorage Array Model 100 series units
- Four fibre optic cables
- Terminal concentrator with short and long serial cables
- CD-ROM and 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

## 2.5 Ultra Enterprise 6000 Configurations

Two types of disk arrays are used by the database, SPARCstorage Array Model 100 series units within the system cabinets, and for expanded systems, SPARCstorage Array Model 200s with SPARCstorage RSM units in expansion cabinets. Figure 2-9 shows the Ultra Enterprise 6000 hardware required to support the Ultra Enterprise software. Note that these figures depict a system with more than the minimum configuration.

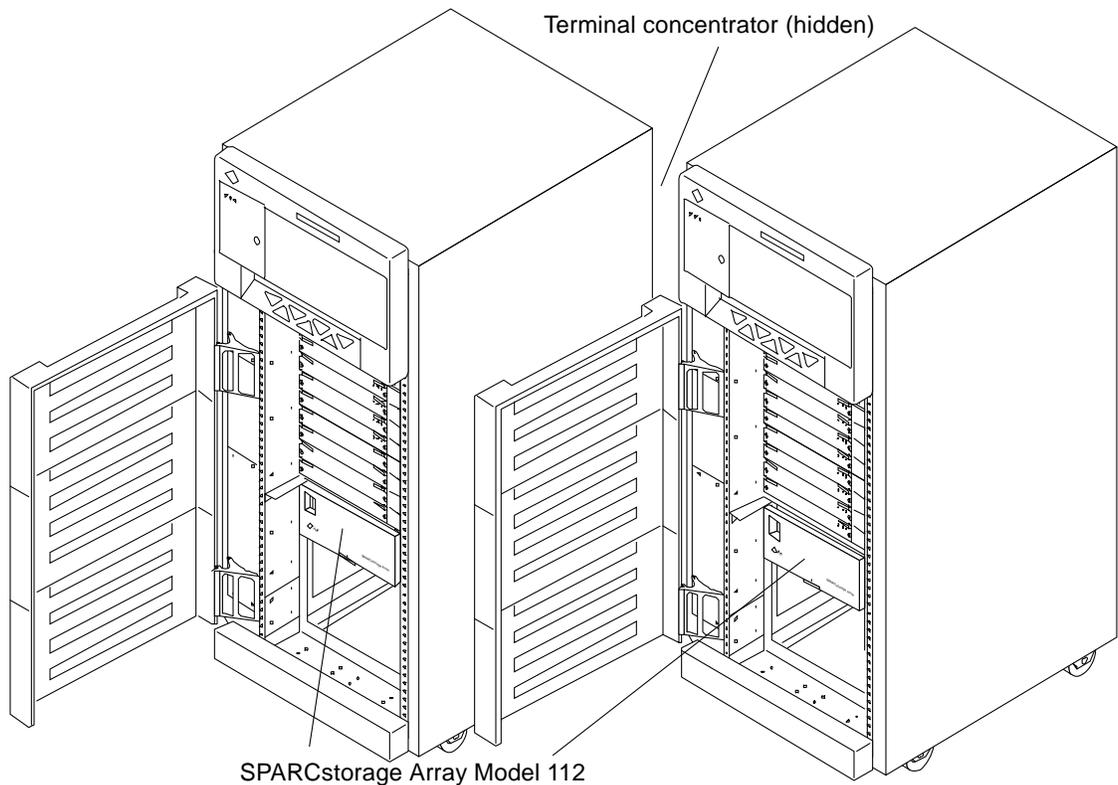


Figure 2-9 Basic Ultra Enterprise Cluster 6000 System

### *2.5.1 PDB Configuration*

The minimum configuration is listed below.

- Two Ultra Enterprise 6000 cabinets, each equipped with:
  - One CPU/Memory board with 256 Mbytes RAM and 2 UltraSPARC modules
  - Two I/O boards, each with one SCI card and one FC/OM
- Three Power/Cooling Modules
- Two SCI cables and brackets
- Two SPARCstorage Array Model 100 series units
- Terminal concentrator with short and long serial cables
- Four fibre optic cables
- CD-ROM and 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

### *2.5.2 HA Configuration*

The minimum configuration is listed below.

- Two Ultra Enterprise 6000 cabinets, each equipped with:
  - One CPU/Memory board with 256 Mbytes RAM and 2 UltraSPARC modules
  - Two I/O boards, each with one SCI card and one FC/OM
- Three Power/Cooling Modules
- Two SPARCstorage Array Model 100 series units
- Terminal concentrator with short and long serial cables
- Four fibre optic cables
- CD-ROM and 8 mm tape drive
- Administration workstation with CD-ROM drive (not shown)

## 2.6 Expansion

System expansion is accomplished by adding additional SPARCstorage Arrays. These are typically housed in expansion racks. Example expansion racks are shown in Figure 2-10 and Figure 2-11.

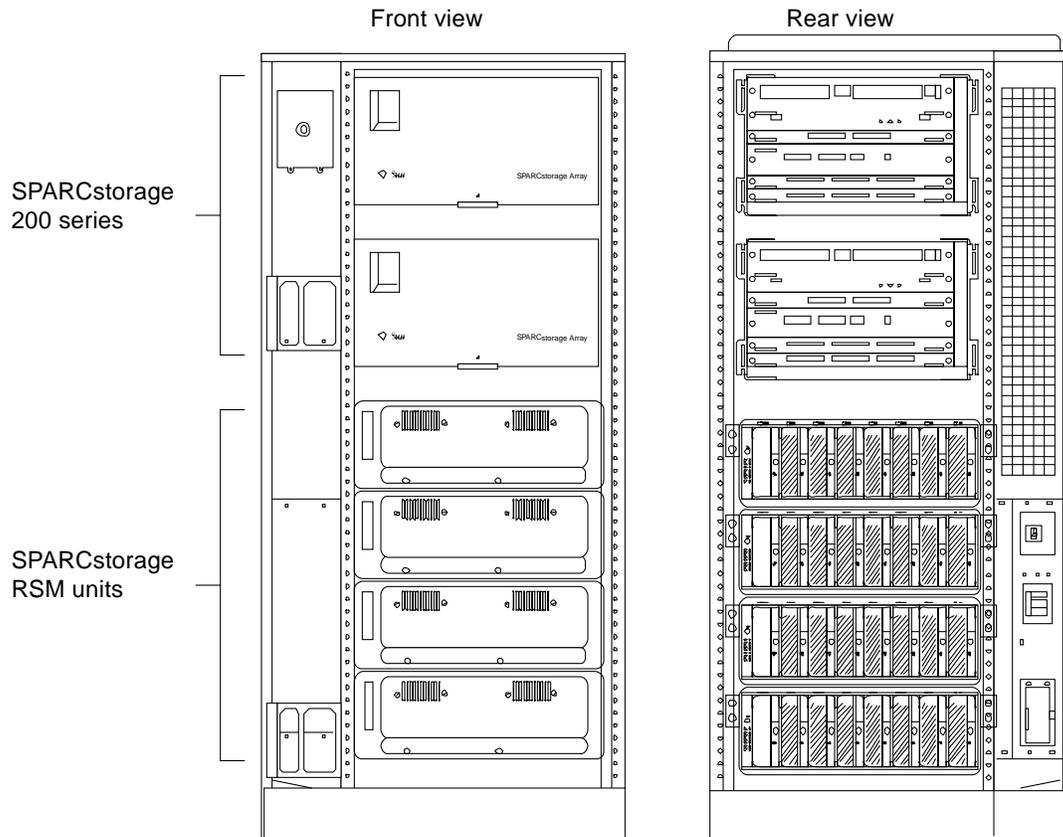


Figure 2-10 Expansion Cabinet with SPARCstorage Array 200 Series Units Hosting RSM Trays

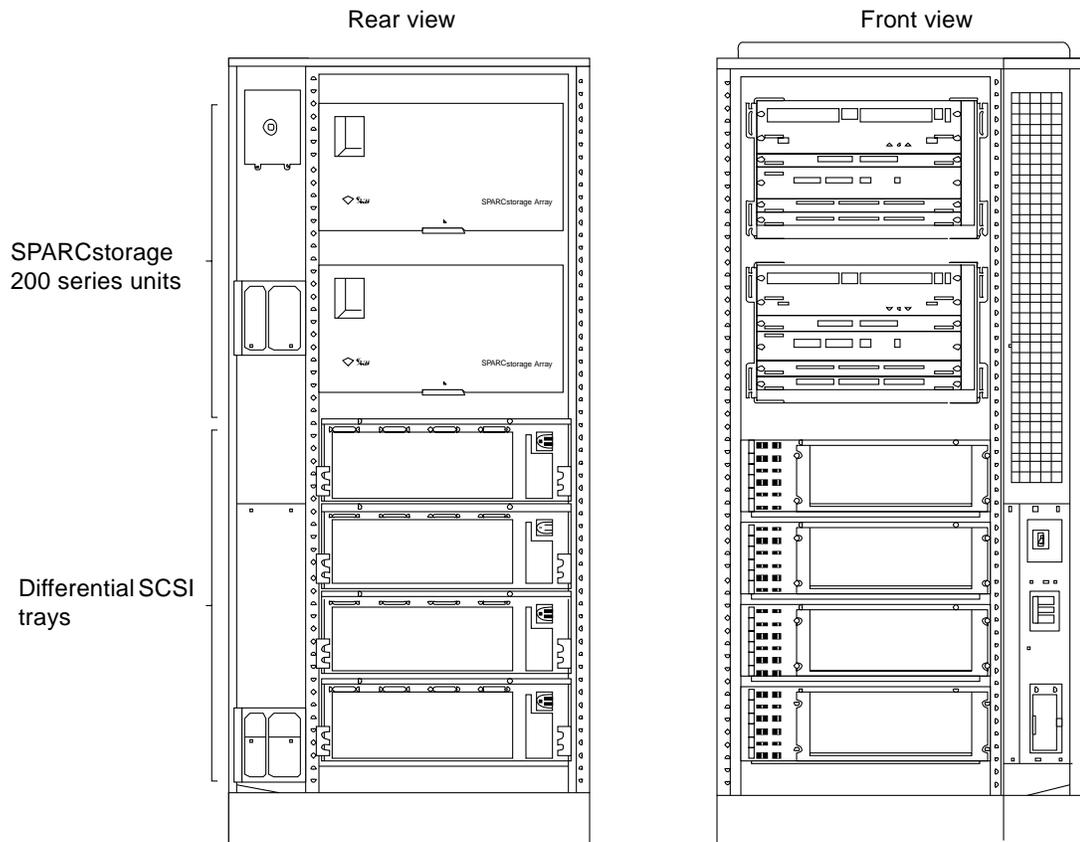


Figure 2-11 Expansion Cabinet with SPARCstorage Array 200 Series Units Hosting Differential SCSI Trays

## 2.7 Internal Options

The following internal options can be purchased for Ultra Enterprise systems.

### ***CPU/Memory Board Options (Expansion of Existing Nodes)***

UltraSPARC Server CPU board (no processor or memory)

### ***Memory Options***

- 64-Mbyte ECC memory expansion SIMMs (8x8-Mbyte SIMM)
- 256-Mbyte ECC memory expansion SIMMs (8x32-Mbyte SIMM)
- 1-Gbyte ECC memory expansion SIMMs (8x128-Mbyte SIMM)

### ***Processor Options***

UltraSPARC module with one 167MHz UltraSPARC processor and 2-Mbyte or 512-Mbyte Cache

### ***Disk Board Options***

Typically applies to Ultra Enterprise Cluster 6000/5000/4000 systems only.

- Internal plug-in hard disk board with two 2.1-Gbyte SCSI disks
- Internal plug-in hard disk board with two 4-Gbyte SCSI disks

### ***SBus Options***

- Fast SCSI-2/Buffered Ethernet card (FSBE/S)
- SBus Quad Ethernet Controller (SQEC)
- FDDI single- and/or dual-attach SBus interface
- Sun ATM/155M fiber adapter (not for HA)
- Sun ATM/155UTP adapter (not for HA)
- MII adapter-UTP
- MII adapter-fiber
- SunSwift™ Ethernet Adapter
- SunLink ISDN (not for HA)
- Token-ring interface/SBus (TRI/S) (not for HA)
- High-speed serial interface/SBus (HSI/S) (not for HA)
- Serial parallel controller (SPC/S) (not for HA)
- Fast Differential SCSI-2/Buffered Ethernet (DSBE/S)
- Differential/Fast/Wide Intelligent SCSI-2 Host Adapter (DWIS/S)
- Single-ended/Fast/Wide Intelligent SCSI-2 Host Adapter (SWIS/S)

- Fast/Wide SCSI-2 and 10/100-Mbit Buffered Ethernet
- Fibre Channel Card (SOCHA)
- 25 Mbit/second Fibre Channel Optical Module (FC25/OM)
- SunFastEthernet

#### ***Removable Media Options***

- Internal CD-ROM drive (4x speed)
- 8-Gbyte 4-mm tape drive (DDS2)
- 14-Gbyte 8-mm tape drive
- 2.54-Gbyte QIC tape drive
- 5-Gbyte 4-mm tape drive
- 14-Gbyte 8-mm tape drive

#### ***Graphics Options (Not for HA)***

- 17-inch premium color monitor, TurboGX4 frame buffer, and cable
- 20-inch premium color monitor, TurboGX4 frame buffer, and cable
- FFB
- FFB/DBZ
- ZX frame buffer
- ZX2 frame buffer

## ***2.8 SPARCstorage Array Model 100 Series Options***

### ***SPARCstorage Array Model 101***

- 6 x 1.05-Gbyte, FC/25
- 18 x 1.05-Gbyte, FC/25
- 30 x 1.05-Gbyte, FC/25

### ***SPARCstorage Array Model 102***

- 6 x 2.1-Gbyte, FC/25
- 18 x 2.1-Gbyte, FC/25
- 30 x 2.1-Gbyte, FC/25

### ***SPARCstorage Array Model 112***

- 6 x 2.1-Gbyte, FC/25
- 18 x 2.1-Gbyte, FC/25
- 30 x 2.1-Gbyte, FC/25

**Controllers**

- Model 200
- Model 210

**Disks**

- SPARCstorage RSM, 4.2-Gbyte hot-plug disks
- SPARCstorage RSM, 9-Gbyte hot-plug disks
- Differential SCSI tray, 2.0- or 2.9-Gbyte hot-plug disks

## 2.9 External Options

The following external options can be purchased for Ultra Enterprise systems.

### 2.9.1 Ultra Enterprise Cluster 5000/4000/3000

#### 2.9.1.1 Cluster Foundation Packages

Cluster Foundation Package Ultra Enterprise 5000, 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 Ultra Enterprise 5000 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

#### 2.9.1.2 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
- Enterprise expansion cabinet

### ***2.9.1.3 Monitor and Graphics Accelerator Options (Not for HA)***

- 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

### ***2.9.1.4 Other Options***

- Network terminal server

## ***2.9.2 Ultra Enterprise Cluster 6000PDB and HA***

### ***2.9.2.1 Cluster Foundation Packages***

#### **Cluster Foundation Package 6000**

- Ethernet and Fibre Channel cabling, SBus
- Ethernet and Fibre Channel adapter cards
- One SPARCstation 4 cluster console, complete

### ***2.9.2.2 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

### ***2.9.2.3 Monitor and Graphics Accelerator Options (Not for HA)***

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

### ***2.9.2.4 Other Options***

- Network terminal server

### ***2.9.3 SPARCstorage Array Model 100 Series***

#### ***2.9.3.1 Optional SPARCstorage Array Model 112***

- 12.6-Gbyte (6 x 2.1-Gbyte Fast/Wide SCSI-2 Disk) SPARCstorage Array, with 2-meter Fibre Channel cable
- 37.8-Gbyte (18 x 1.05-Gbyte Fast/Wide SCSI-2 Disk) SPARCstorage Array, with 2-meter Fibre Channel cable
- 63-Gbyte (30 x 1.05-Gbyte Fast/Wide SCSI-2 Disk) SPARCstorage Array, with 2-meter Fibre Channel cable

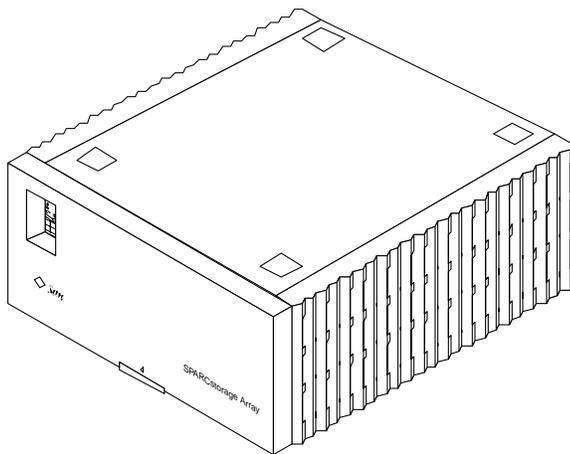
#### ***2.9.3.2 Optional SPARCstorage Array Model 110***

- 2.1-Gbyte SC Fast/Wide SCSI-2 Disk
- 12.6-Gbyte (6 x 1.05-Gbyte SC Fast/Wide SCSI-2 Disks)
- Fibre Channel/SBus Host Adapter, Single-Channel Host Connection for the SPARCstorage Array
- Fibre Channel Optical Module, Second Fibre channel port for use on either the SPARCstorage Array or the Fibre Channel/SBus Host Adapter

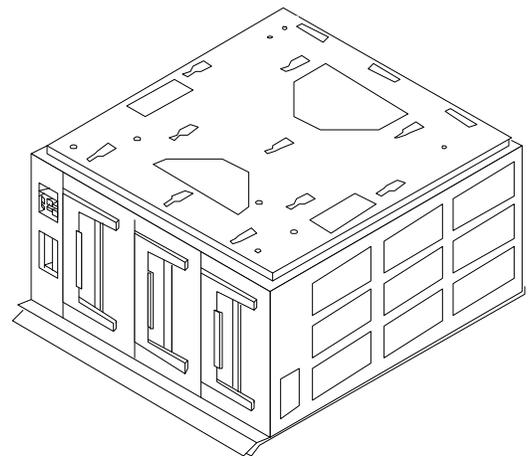
#### ***2.9.3.3 Optional SPARCstorage Array Model 112 Accessories***

- 2-meter Fiber-Optic cable
- 15-meter Fiber-Optic cable

The array unit is shown in Figure 2-12.



All panels attached for tabletop installation



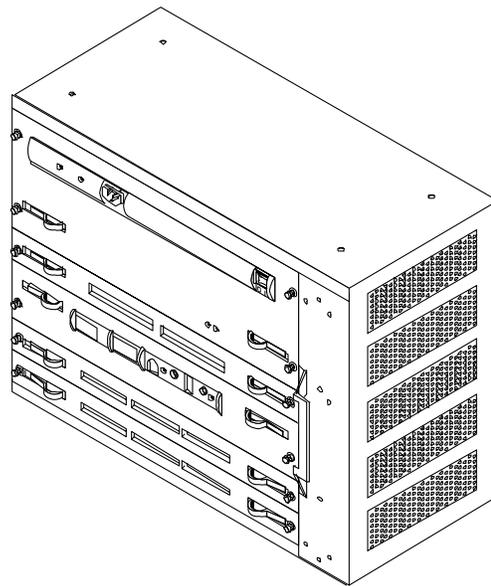
All \*panels removed for rack installation

Figure 2-12 SPARCstorage Array 112

### 2.9.3.4 *Optional SPARCstorage Array Model 200 Series Accessories*

- 2-meter fibre optic cable
- 15-meter fibre optic cable

The array unit is shown in Figure 2-13.



*Figure 2-13 SPARCstorage Array Model 200 Series Unit*

# *Specifications*

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This chapter provides the environmental, physical, and electrical specifications for all Ultra Enterprise Cluster systems.

## *3.1 Physical Specifications*

Physical specifications are presented in Table 3-1 through Table 3-16.

### 3.1.1 Ultra Enterprise Cluster 3000 System

*Table 3-1* System Physical Specifications

	<b>U.S.</b>	<b>Metric</b>
Height	25.5 in	64.5 cm
Width	17 in	43.2 cm
Depth	23.5 in	59.7 cm
Weight	160 lb, approx	72.7 kg, approx
Power cord	6 ft	1.8 m

*Table 3-2* Clearance and Service Access

	<b>U.S.</b>	<b>Metric</b>
Front	18 in	45.7 cm
Rear	18 in	45.7 cm
Left	6 in	15 cm
Right	6 in	15 cm

*Table 3-3* Shipping Specifications

	<b>U.S.</b>	<b>Metric</b>
Height	34 in	86 cm
Width	29 in	74 cm
Depth	22.5 in	57 cm
Weight	185 lb, approx	84 kg, approx

### 3.1.2 Ultra Enterprise Cluster 4000 System

*Table 3-4* Standalone Server Physical Specifications

	<b>U.S.</b>	<b>Metric</b>
Height	13.5 in	34 cm
Width	19.7 in	50 cm
Depth	22 in	56 cm
Weight	150 lb, approx	68 kg, approx
Power cord	6 ft	1.8 m

*Table 3-5* Standalone Server Clearance and Service Access

	<b>U.S.</b>	<b>Metric</b>
Front	18 in	47 cm
Rear	18 in	47 cm
Left	6 in	16 cm
Right	6 in	16 cm

*Table 3-6* Standalone Server Shipping Specifications

	<b>U.S.</b>	<b>Metric</b>
Height	19.0 in	48 cm
Width	23.8 in	60 cm
Depth	26.8 in	68 cm
Weight	160 lb, approx	72 kg, approx

### 3.1.3 Ultra Enterprise Cluster 5000 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 3-7 Ultra Enterprise Cluster 5000 Server Physical Specifications

Specification	U.S.	Metric	Diagram
Height	56 in	143 cm	
Width	30 in	77 cm	
Depth	39 in	99 cm	
Weight	800 lb	360 kg	
Power cord	15 ft	4.6m	

Table 3-8 Ultra Enterprise Cluster 5000 Server Clearance and Service Access

Access	U.S.	Metric
Front	48 in	122 cm
Rear	36 in	92 cm
Left	36 in	92 cm
Right	2 in	5 cm

### 3.1.4 Ultra Enterprise Cluster 6000 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 3-9 Ultra Enterprise Cluster 6000 Server Physical Specifications

Specification	U.S.	Metric	Diagram
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 3-10 Ultra Enterprise Cluster 6000 Server Clearance and Service Access

Access	U.S.	Metric
Front	48 in	122 cm
Rear	36 in	92 cm
Left	36 in	92 cm
Right	2 in	5 cm

### 3.1.5 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 3-11 Expansion Cabinet Physical Specifications

Specification	U.S.	Metric	Diagram
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 3-12 Expansion Cabinet Clearance and Service Access

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

### 3.1.6 Cluster-Ready Node

The following data is for each of the principal components of a Ultra Enterprise Cluster 5000 customer-assembled system (Ultra Enterprise 5000 Server and SPARCstorage Array 112 chassis).

Table 3-13 Ultra Enterprise 5000 Server Physical Specifications

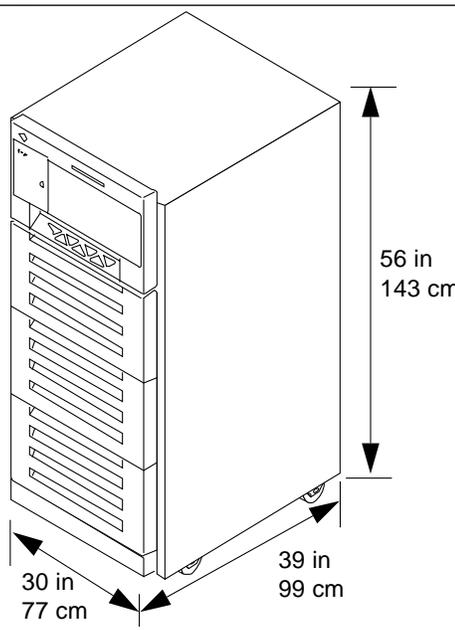
Specification	U.S.	Metric	Diagram
Height	56 in	143 cm	
Width	30 in	77 cm	
Depth	39 in	99 cm	
Weight	875 lb	400 kg	Approximate weight—depending upon configuration
Power cord	15 ft	4.6m	

Table 3-14 Ultra Enterprise 5000 Server Clearance and Service Access

Access	U.S.	Metric
Front	48 in	122 cm
Rear	36 in	92 cm
Left	36 in	92 cm
Right	2 in	5 cm

Table 3-15 SPARCstorage Array 112 Physical Specifications

Specification	U.S.	Metric	Diagram
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	

**Note:** All panels (visible here) are removed for rack installation

Table 3-16 SPARCstorage Array Clearance and Service Access

Access	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*

Electrical specifications are presented in Table 3-17 through Table 3-21.

### 3.2.1 *Ultra Enterprise Cluster 3000 System*

*Table 3-17* Server Electrical Specifications

<b>Parameter</b>		<b>Value</b>
Input current	Voltage range	100-120 Vac or 200-240 Vac
	Current, maximum	8.5A
	Current frequency range	47-63 Hz
Input power rating	Total continuous power	750W
Volt-Ampere rating		825 VA
BTU rating		2600 BTU
Power factor		0.92 - 0.96
Plug type	U.S.	NEMA 5-15P
	International	10A, single phase IEC 320, C14

### 3.2.2 *Ultra Enterprise Cluster 4000 System*

*Table 3-18* Standalone Server Electrical Specifications

<b>Parameter</b>		<b>Value</b>
Input current	Voltage range	100-120 Vac or 200-240 Vac
	Current, maximum	12A
	Current frequency range	47-63 Hz
Input power rating	Total continuous power	1370W
Volt-Ampere rating		1440 VA
BTU rating		4680 BTU

*Table 3-18 Standalone Server Electrical Specifications (Continued)*

<b>Parameter</b>	<b>Value</b>
Power factor	0.92 - 0.96
Plug type	U.S. NEMA 5-15P
	International 10A, single phase IEC 320, connected for 220-240 Vac

### 3.2.3 Ultra Enterprise Cluster 5000 System

Table 3-19 provides specifications for an Ultra Enterprise 5000 Cluster Systems cabinet equipped with three SPARCstorage Arrays.

*Table 3-19 Cabinet Server Electrical Specifications*

<b>Parameter</b>	<b>Specification</b>	<b>Value</b>
Input current	Voltage range	200–240 Vac
	Current, maximum	24A
	Current frequency range	47–63 Hz
Input power rating	Total continuous power	3500W (with 3 drive trays)
Volt-ampere rating		3700 VA
BTU rating		12,000 BTU
Power factor		0.92–0.96
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 Ultra Enterprise Cluster 6000 System

Table 3-20 provides specifications for one server cabinet equipped with two SPARCstorage Arrays.

*Table 3-20* Cabinet Server Electrical Specifications

Parameter	Specification	Value
Input current	Voltage range	200–240 Vac
	Current, maximum	24A
	Current frequency range	47–63 Hz
Input power rating	Total continuous power	3500W (with 3 drive trays)
Volt-ampere rating		3700 VA
BTU rating		12,000 BTU
Power factor		0.92–0.96
Plug type	U.S.	NEMA L6-30P for 200-240 Vac
	International	32A, single phase IEC 309, connected for 220–240 Vac

### 3.2.5 Expansion Cabinet

Table 3-21 provides specifications for the expansion cabinet housing two SPARCstorage Array 200 series and four RSM units.

*Table 3-21* Electrical Specifications for the Expansion Cabinet With Two SPARCstorage Array 200 Series Units and Four RSM Units

Parameter	Specification	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

*Table 3-21 Electrical Specifications for the Expansion Cabinet With Two SPARCstorage Array 200 Series Units and Four RSM Units (Continued)*

<b>Parameter</b>	<b>Specification</b>	<b>Value</b>
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

### 3.3 Environmental Specifications

Environmental specifications are presented in Table 3-22 through Table 3-24.

#### 3.3.1 Ultra Enterprise Cluster 3000

*Table 3-22 Temperature, Humidity, and Altitude Limits*

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

#### 3.3.2 Ultra Enterprise Cluster 4000

*Table 3-23 Standalone Server Temperature, Humidity, and Altitude Limits*

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

### 3.3.3 Ultra Enterprise Cluster 6000/5000

The environmental specifications presented in Table 3-24 apply to the Ultra Enterprise Cluster 5000 and Ultra Enterprise Cluster 6000 systems. Avoid temperature extremes and keep the work area clean. Maintain the operating conditions shown in Table 3-24.

*Table 3-24* Cabinet Server Temperature, Humidity, and Altitude Limits

<b>Specification</b>	<b>Operating</b>	<b>Nonoperating</b>
Temperature	41F to 95F (5C to 40C)	-4F to 140F (-20C to 60C)
Humidity	20% to 80% RH noncondensing, 27C max wb	93% RH
Altitude	9,843 ft (3 km)	39,370 ft (12 km)

Install the Ultra Enterprise Cluster 6000 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.



# *Planning for Hardware, Power, and Network Requirements*

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## *4.1 Hardware Planning*

Floor space and other requirements for the Ultra Enterprise Cluster systems 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 10 meters (33 feet) from each other.

### *4.1.1 Ultra Enterprise Cluster 3000 Server*

Use the following guidelines to prepare a location for your server.

- The server unit requires approximately 1.5 feet (47 cm) of space in the front and back for access by service personnel. See Figure 4-1.
- A minimum space of 6 inches (16 cm) is required on both sides of the server to afford adequate air flow.



**Warning** – To avoid exhaust air recirculation, do not put systems or peripherals next to each other, side by side.

- Keep power and interface cables clear of foot traffic. Route cables inside walls, under the floor, through the ceiling, or in protective channels. Route interface cables away from motors and other sources of magnetic or radio frequency interference.

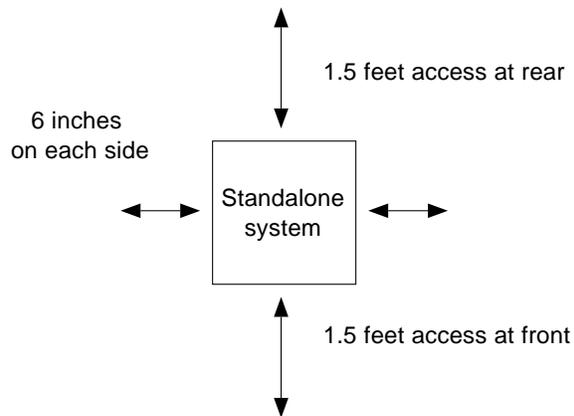


Figure 4-1 Standalone Server Access Areas — Top View

### 4.1.2 Ultra Enterprise Cluster 4000 Server

The Ultra Enterprise 4000 system is designed to sit on the floor, on a caster base, or on a desk or table.

**Note** – Do not stack multiple Ultra Enterprise 4000 systems so that they sit directly on top of each other, resting on the top cover of the system below.

Use the following guidelines to prepare a location for your server.

- The server unit requires approximately 1.5 feet (47 cm) of space in the front and back for access by service personnel. See Figure 4-1.
- A minimum space of 6 inches (16 cm) is required on both sides of the server to afford adequate air flow.



**Warning** – To avoid exhaust air recirculation, do not put systems or peripherals next to each other, side by side.

- Keep power and interface cables clear of foot traffic. Route cables inside walls, under the floor, through the ceiling, or in protective channels. Route interface cables away from motors and other sources of magnetic or radio frequency interference.

### 4.1.3 Ultra Enterprise Cluster 5000 Server

Determine the floor plan layout for your installation.

Figure 4-2 and Figure 4-3 are examples of floor plans for the minimum and maximum configurations, respectively.

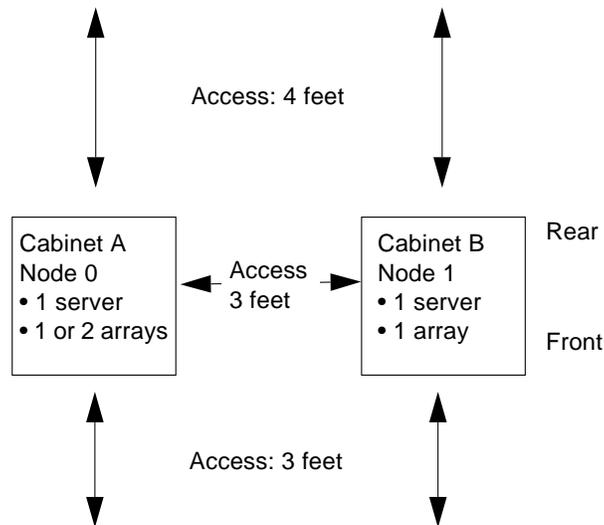


Figure 4-2 Enterprise Cluster 5000 Server Floor Plan Example Minimum Configuration (Top View)

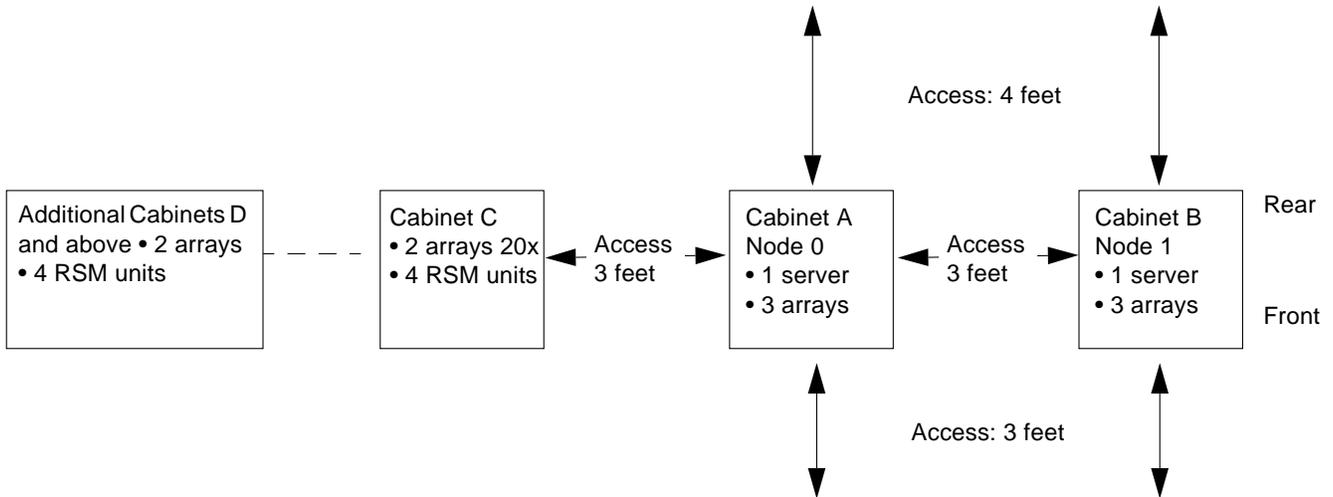


Figure 4-3 Enterprise Cluster 5000 Server Floor Plan Example Maximum Configuration (Top View)

#### 4.1.4 Enterprise Cluster 6000 Server

Determine the floor plan layout for your installation.

Figure 4-4 and Figure 4-5 are examples of floor plans for minimum and maximum configurations, respectively.

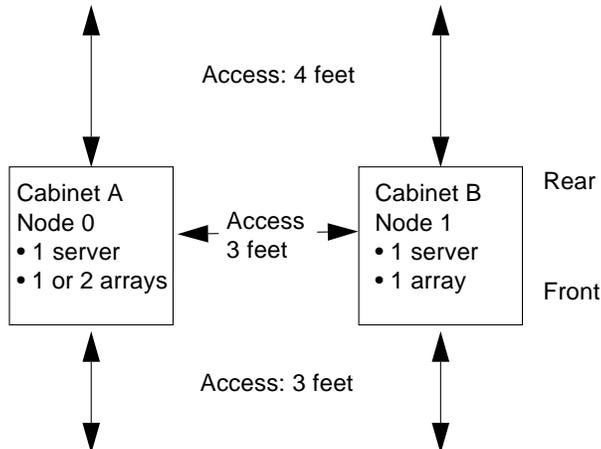


Figure 4-4 Enterprise Cluster 6000 Server Floor Plan Example Minimum Configuration (Top View)

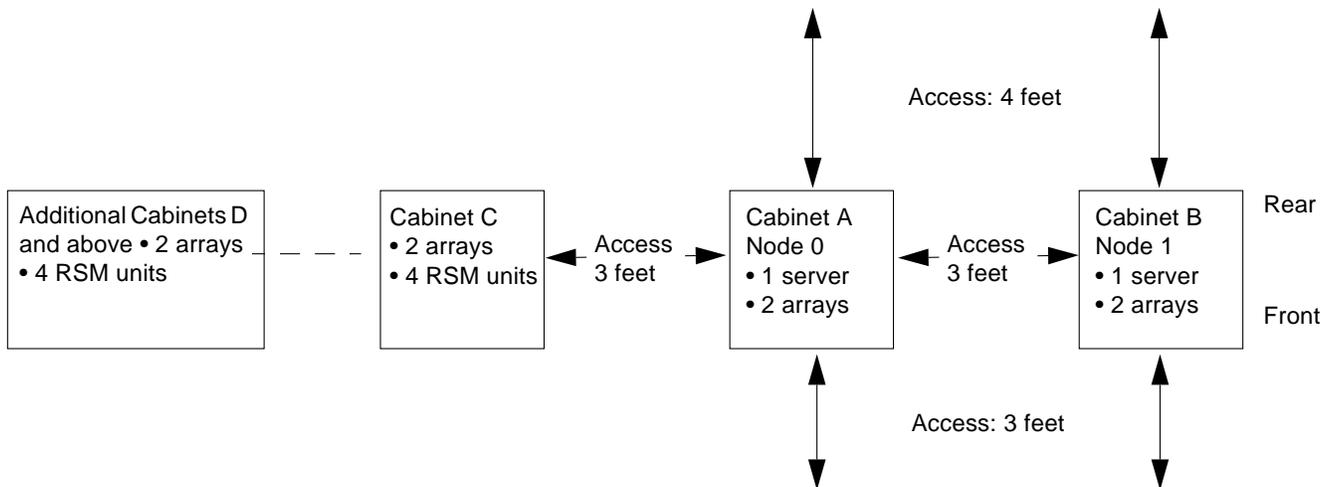


Figure 4-5 Enterprise Cluster 6000 Server Floor Plan  
Example—Maximum Configuration (Top View)

## 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 rackmounted 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:

- Ultra Enterprise Cluster 5000 server cabinet (one of two)—each cabinet housing one server and one, two, or three SPARCstorage Arrays
- Ultra Enterprise Cluster 6000 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 RSM devices



**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. The cabinet is powered by the power cable, as shown in Figure 4-6.

For connector requirements, see Table 4-1.

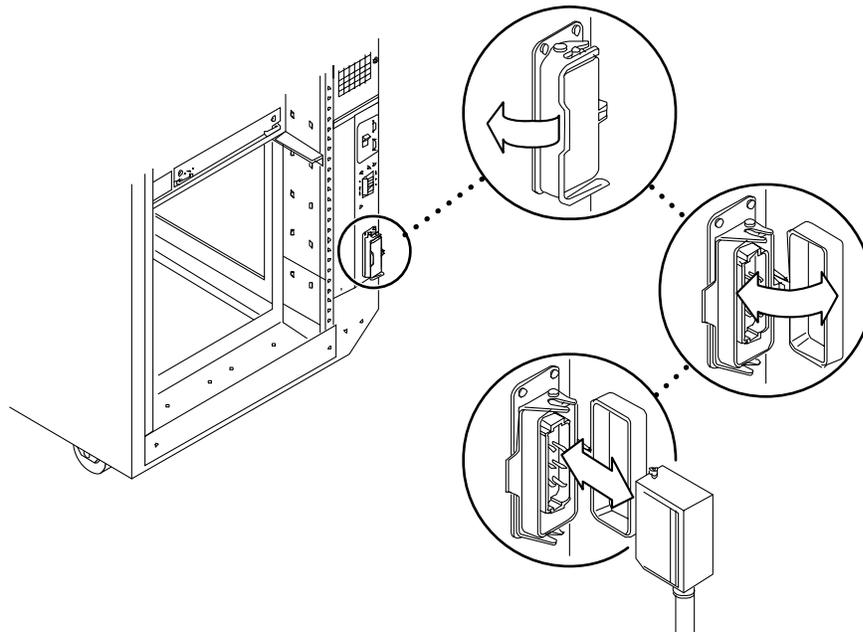
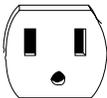


Figure 4-6 Power Connector and Detachable Cable

Table 4-1 Platform and Chassis Connector Requirements

Platform	Type: U.S.	Type: International	Comment
Ultra Enterprise Cluster 3000 Ultra Enterprise Cluster 4000 SPARCstorage Array 100 Series SPARCstorage Array 200 Series Multi-disk Pack	NEMA 5-15P  Plug  Connector	By country    	One per node chassis. One per storage array chassis. Country kits provided with international shipments include the proper cables for the country of destination.
Ultra Enterprise Cluster 5000 Ultra Enterprise Cluster 6000 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

Ultra Enterprise Cluster systems follow the IEEE standard for SCI and Ethernet.

### 4.3.3 RS-232C and 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

Recommended Standard	Open Circuit Voltages		
	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 shielded cable to minimize RFI. 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 cable end connecting to Sun equipment (this serves as 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

Pin No. (25 pin)	Signal Description	Designation	
		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 internetwork 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	<p>Cable purchased in bulk should have marks on the casing every 2.5 meters.</p> <p>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.</p> <p>The minimum length of any segment is approximately 24 meters.</p> <p>Connect the cable sheath conductor to earth ground.</p>
	Transceivers	<p>Attach transceivers, taps, and/or repeaters <i>only</i> at the 2.5 meter intervals on the cable.</p> <p>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.</p> <p>The path between two transceivers and/or taps cannot have more than one repeater.</p> <p>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).</p> <p>The transceiver cable between the transceiver and workstation or terminal should be no longer than 50 meters.</p>

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 4-7 shows the elements used in the installation process.

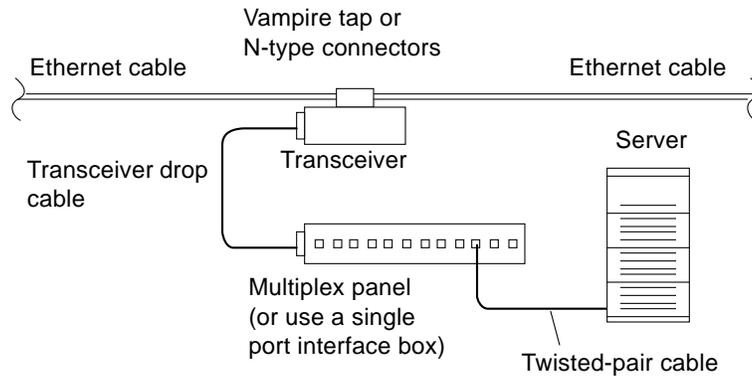


Figure 4-7 Connecting Twisted-Pair Ethernet to N-type Coaxial Cable

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

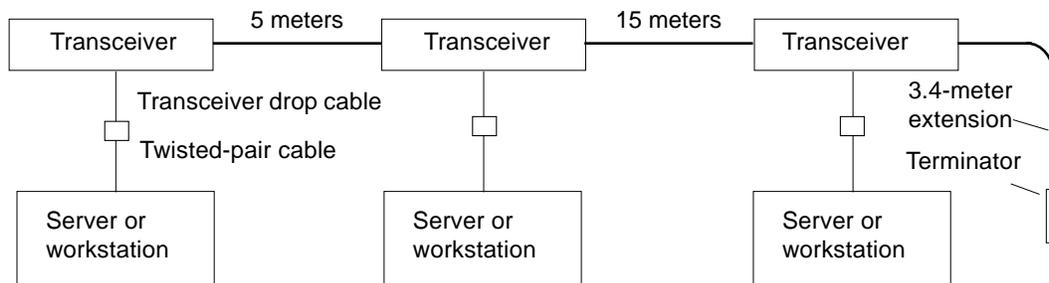
Table 4-5 Ethernet Cabling Limitations for N-type Coaxial Cable

Cable Segment	Length in Meters
Allowed contiguous length of cable segments	23.4, 70.2, 117.0, and 500.0 <sup>1</sup>
Distance between transceivers (multiples-of)	2.5 <sup>2</sup>
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 4-8 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 4-8 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 and 100BASE-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 and 100BASE-T Ethernet, also known as twisted-pair Ethernet.

For 10BASE-T and 100BASE-T two pairs of unshielded wires connect to each workstation or a server. One pair transmits and the other receives. The 10BASE-T and 100BASE-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 4-9 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.

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**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.

---

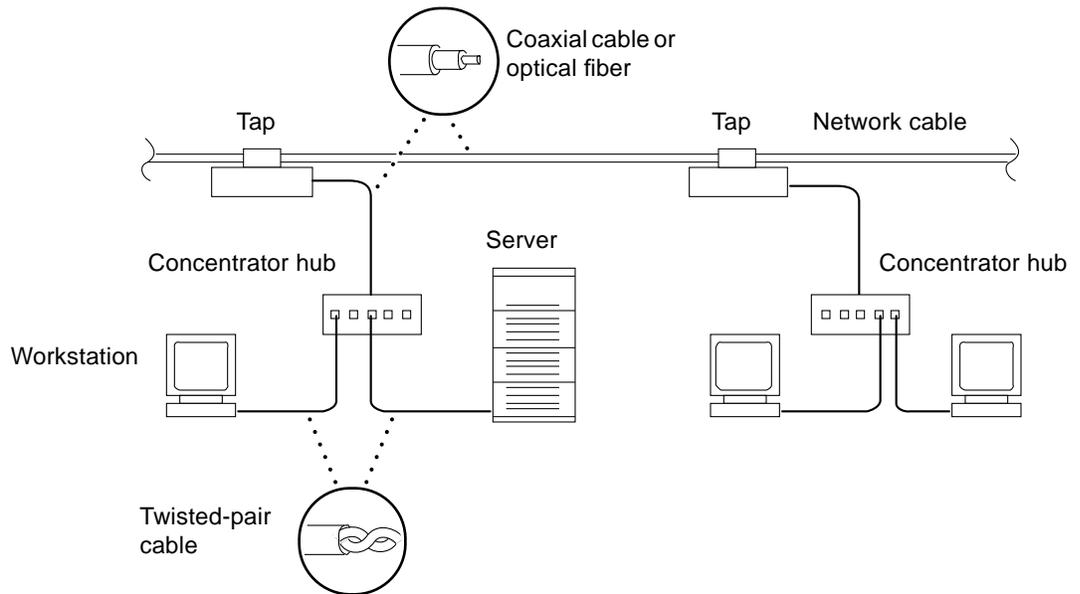


Figure 4-9 Example of 10/100BASE-T (Twisted-Pair) Ethernet

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

# *Ultra Enterprise Cluster Configurations*

---

This chapter details configuration requirements and presents interface and cabling information for possible Enterprise Cluster system configurations. Minimum and example expansion configurations are shown, and expansion is addressed.

<i>Ultra Enterprise Cluster 3000</i>	<i>page 5-1</i>
<i>Ultra Enterprise Cluster 4000 and 5000</i>	<i>page 5-8</i>
<i>Ultra Enterprise Cluster 6000</i>	<i>page 5-15</i>
<i>System Component Cabling</i>	<i>page 5-20</i>

## *5.1 Ultra Enterprise Cluster 3000*

The basic Enterprise Cluster 3000 systems is shown in Figure 5-1.

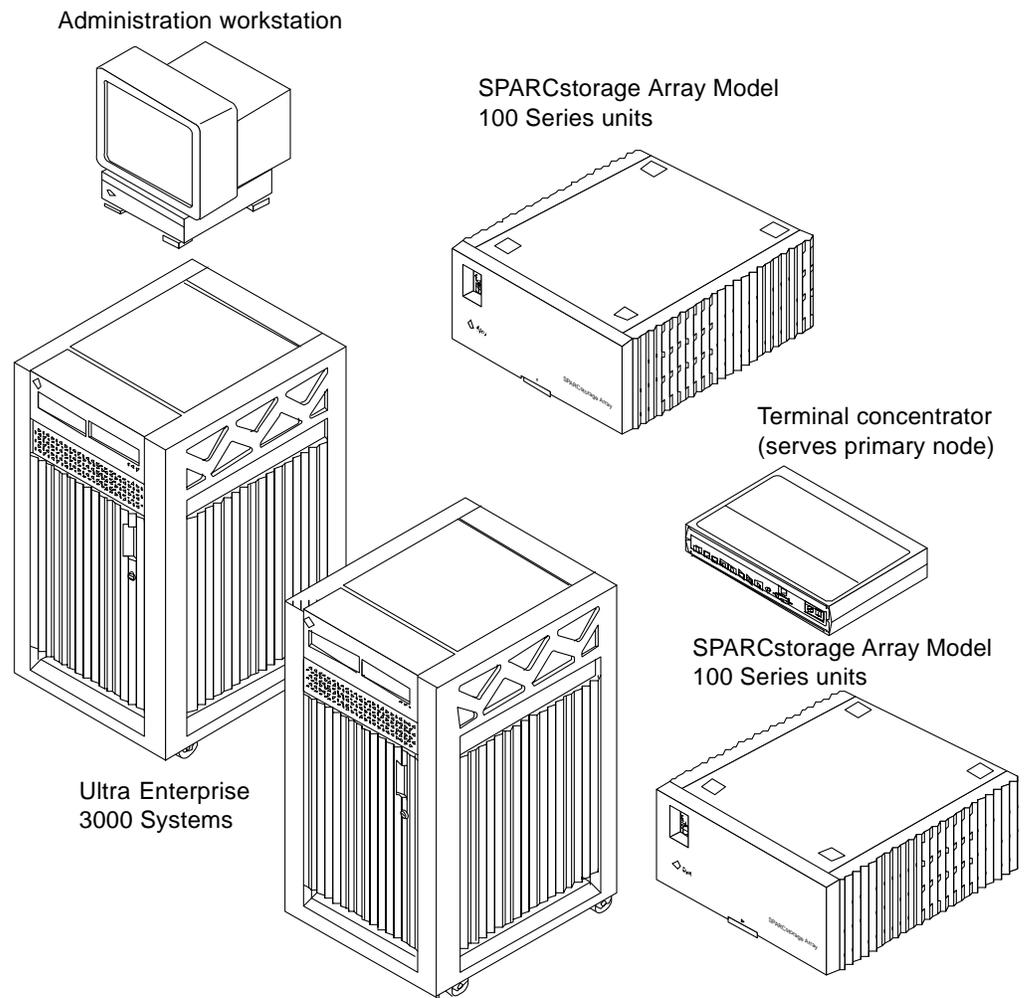


Figure 5-1 Ultra Enterprise Cluster 3000 System

### 5.1.1 Minimum Configuration

The minimum configuration is two nodes supporting two or three SPARCstorage Arrays for PDB and HA respectively.

---

### ***5.1.1.1 Power Cooling Modules (PCMs)***

Three PCMs must be installed in each node.

### ***5.1.1.2 Board Population***

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-2 and Figure 5-3 show minimally populated card cages for both nodes.

#### ***CPU/Memory Boards***

Slot 7 is configured with a CPU/Memory board.

#### ***I/O Boards***

Slots 1, 3, and (optionally) 5 are configured with I/O boards. SBus cards are installed in the appropriate slots.

#### ***Clock Board***

One clock board is required in each node.

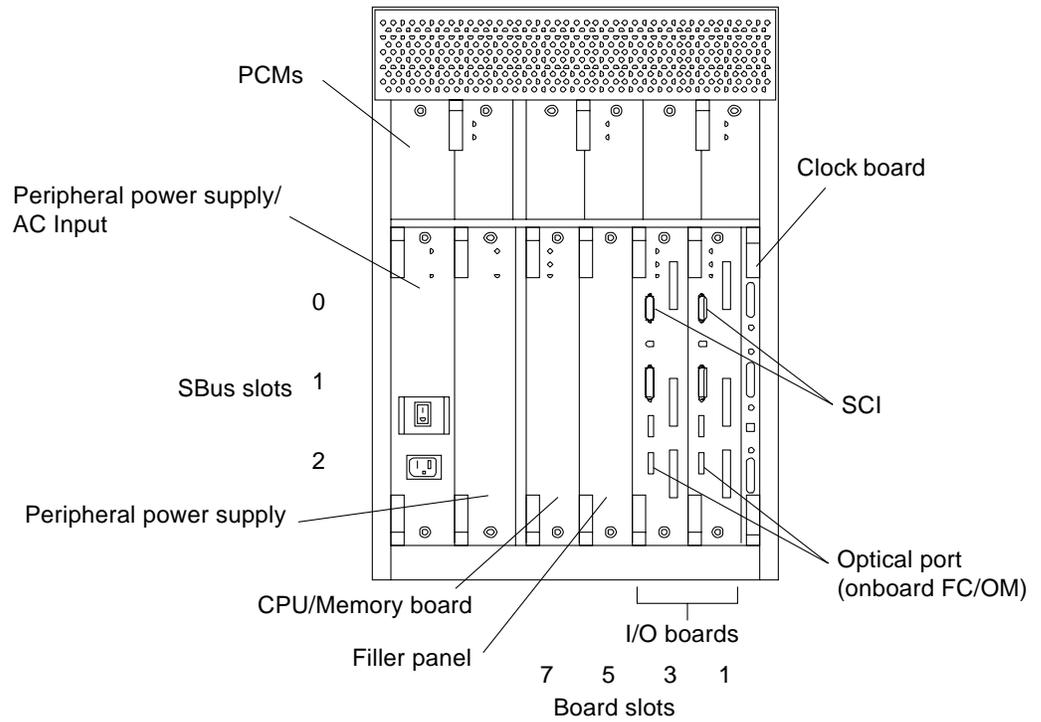


Figure 5-2 Ultra Enterprise Cluster 3000PDB Card Cage Minimum Population; Typical of Node 0 and Node 1

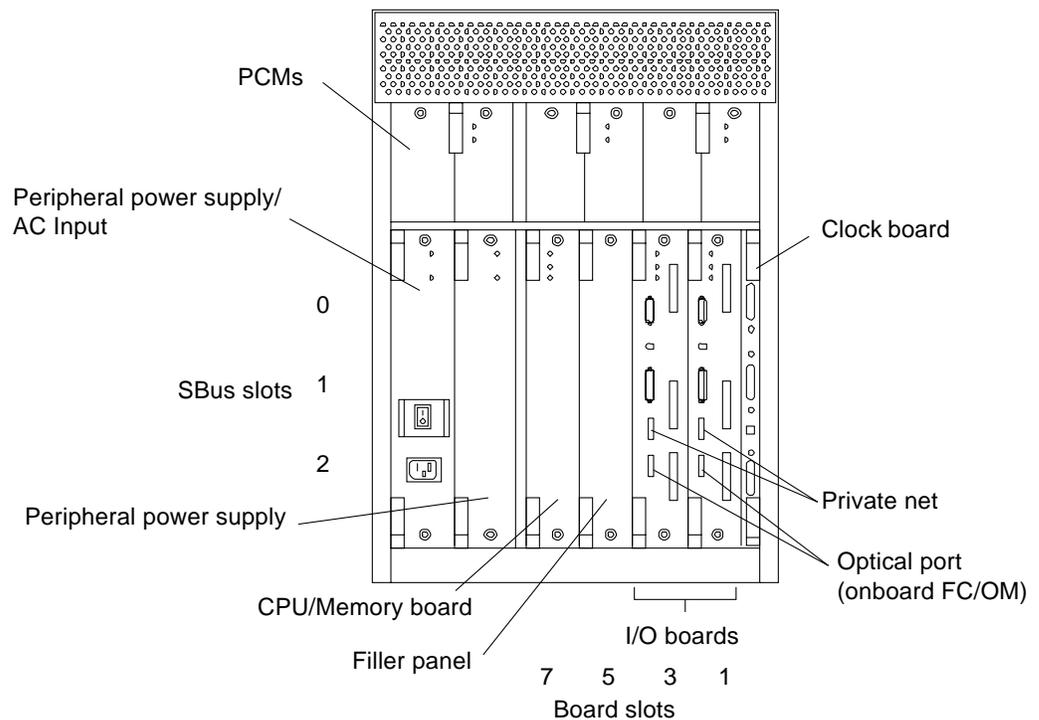


Figure 5-3 Ultra Enterprise Cluster 3000HA Card Cage Minimum Population; Typical of Node 0 and Node 1

### 5.1.1.3 SBus Card Population

Install the quantity and types of cards that are appropriate for your system.

## 5.1.2 Expansion

See the following notes regarding adding SPARCstorage Arrays.

**Note** – Do not occupy (or connect cables to) both optical ports on any given I/O board.

---

**Note** – Beyond minimum configuration use the first available optical module port following all other boards in the system. This will ensure that the controller numbering is preserved if the Solaris operating environment is reinstalled.

---

An expansion configuration consists of:

- Two nodes
- Ten (PDB) or twelve (HA) SPARCstorage Array systems

These components can be installed in cabinets.

#### ***5.1.2.1 Power Cooling Modules (PCMs)***

Three PCMs must be installed in each node.

#### ***5.1.2.2 Board Population***

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-4 and Figure 5-5 show the expanded board population installed in the card cages of both nodes.

##### ***CPU/Memory Boards***

Slot 7 is configured with a CPU/Memory board.

##### ***I/O Boards***

Slots 1, 3, and 5, are configured with I/O boards. SBus cards are installed in the appropriate slots.

##### ***Clock Board***

One clock board is required in each node.

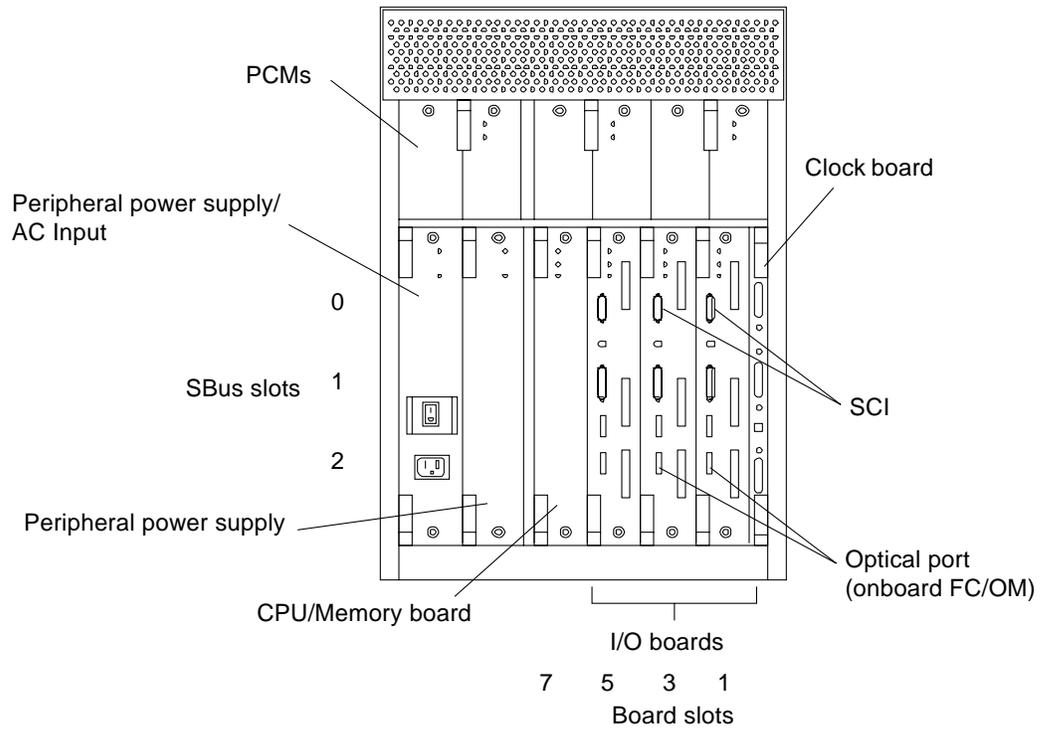


Figure 5-4 Ultra Enterprise Cluster 3000PDB Card Cage Expansion Example; Typical of Node 0 and Node 1

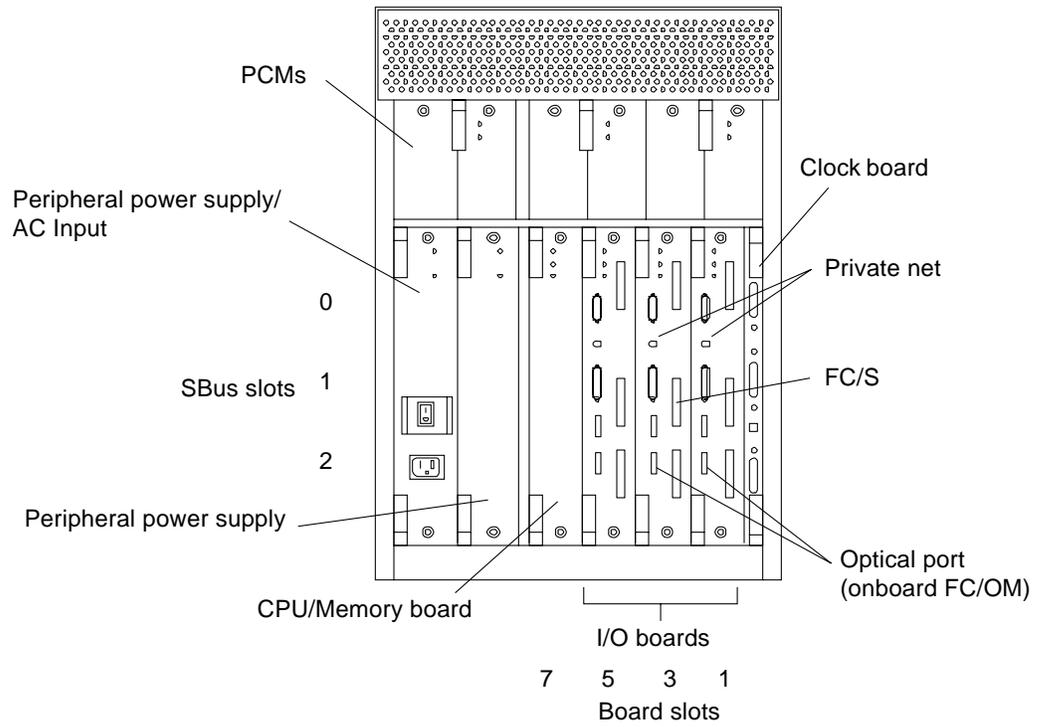


Figure 5-5 Ultra Enterprise Cluster 3000HA Card Cage Expansion Example; Typical of Node 0 and Node 1

## 5.2 Ultra Enterprise Cluster 4000 and 5000

The basic Enterprise Cluster 4000 and 5000 systems are shown in Figure 5-6 and Figure 5-7, respectively.

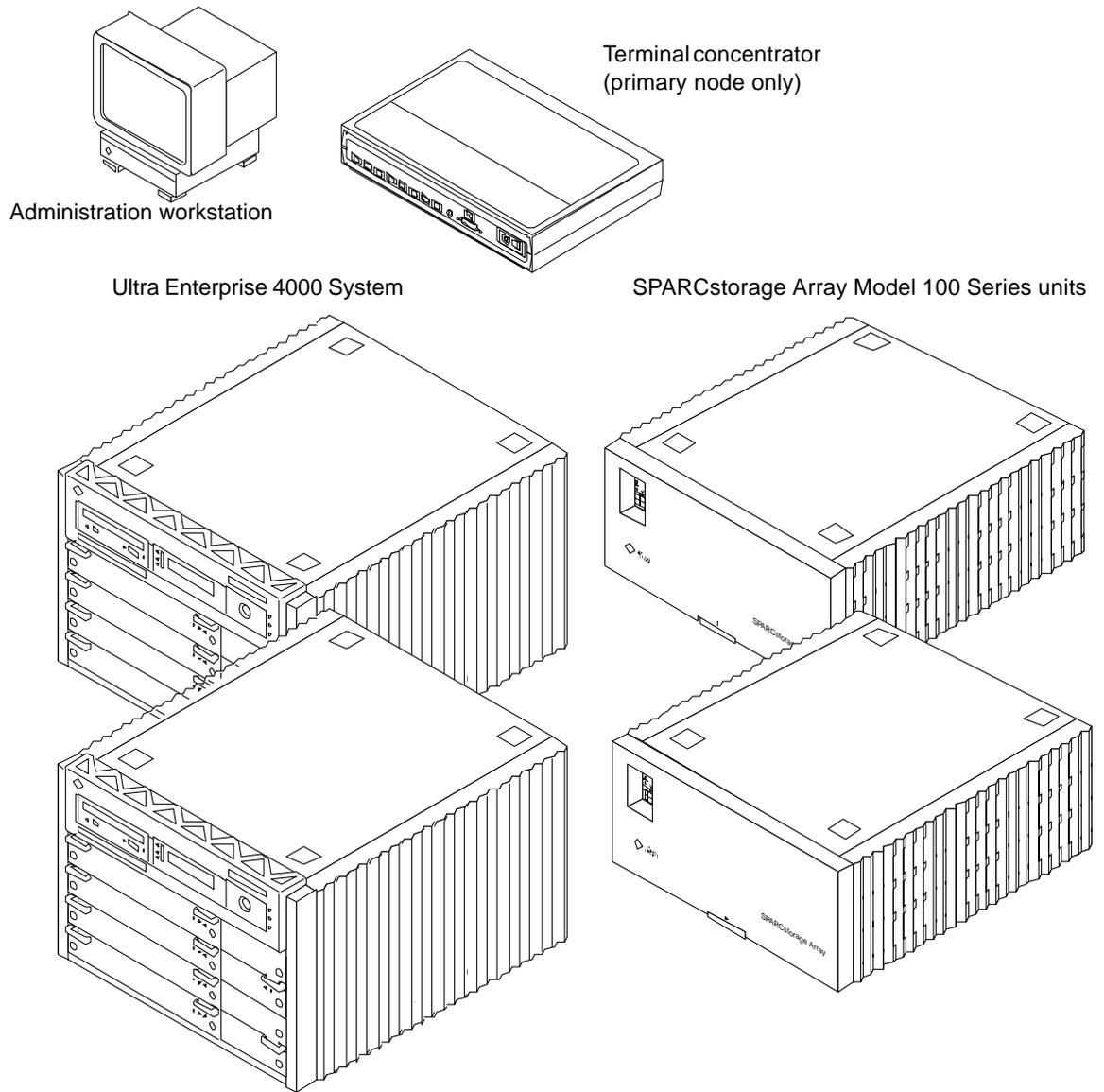


Figure 5-6 Ultra Enterprise Cluster 4000 Server

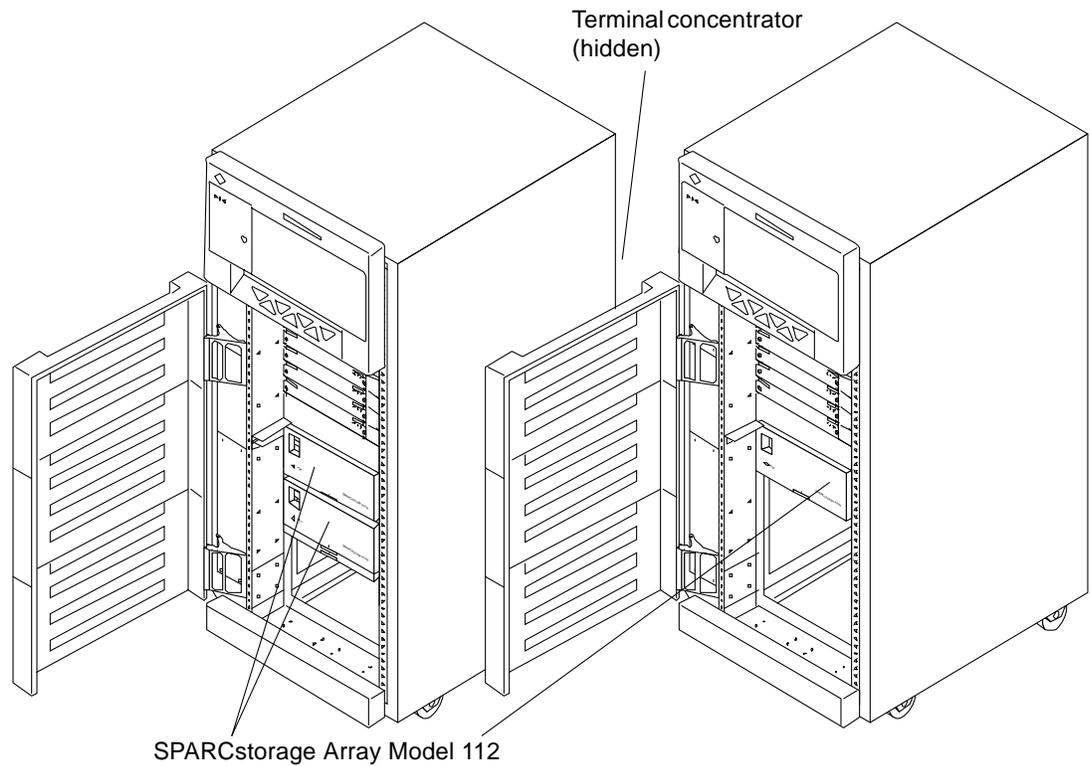


Figure 5-7 Ultra Enterprise Cluster 5000 Server

Use these configurations as a guide to assembling any size system. Omit those elements that will be absent from your particular site installation. To install a system, use the appropriate sections listed below.

### 5.2.1 Minimum Configuration

The minimum configuration is two nodes supporting two (PDB) or three (HA) SPARCstorage Arrays.

#### 5.2.1.1 Power Cooling Modules (PCMs)

Three PCMs minimum must be installed in each node.

### 5.2.1.2 Board Population

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-8 and Figure 5-9 show minimally populated card cages for both nodes.

#### **CPU/Memory Boards**

Even numbered slot 0 is configured with a CPU/Memory board.

#### **I/O Boards**

Odd numbered slots 1 and 3 are configured with I/O boards. SBus cards are installed in the appropriate slots.

#### **Clock Board**

One clock board is required in each node.

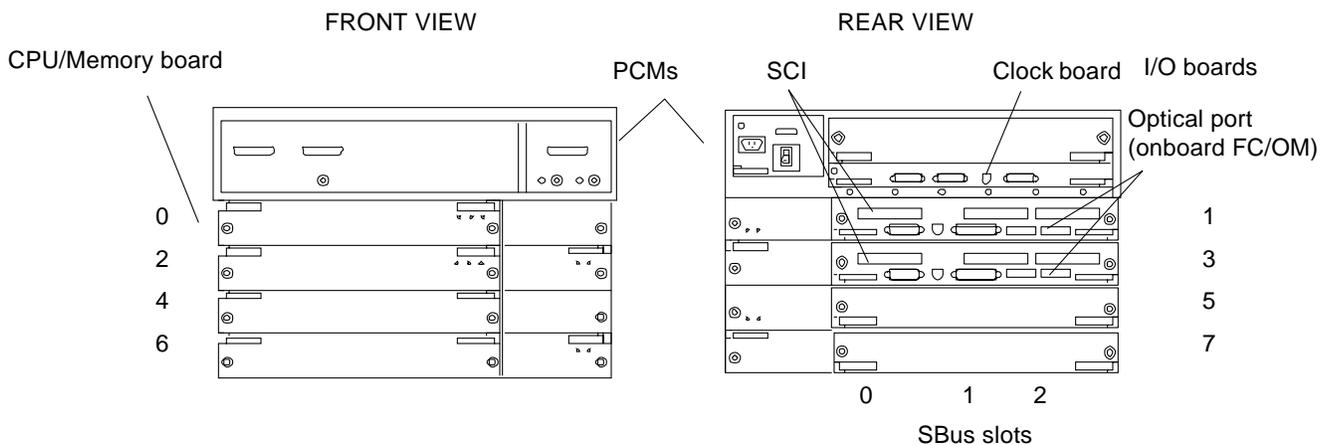


Figure 5-8 Ultra Enterprise Cluster 5000/4000PDB Card Cage Minimum Population (Typical of Node 0 and 1)

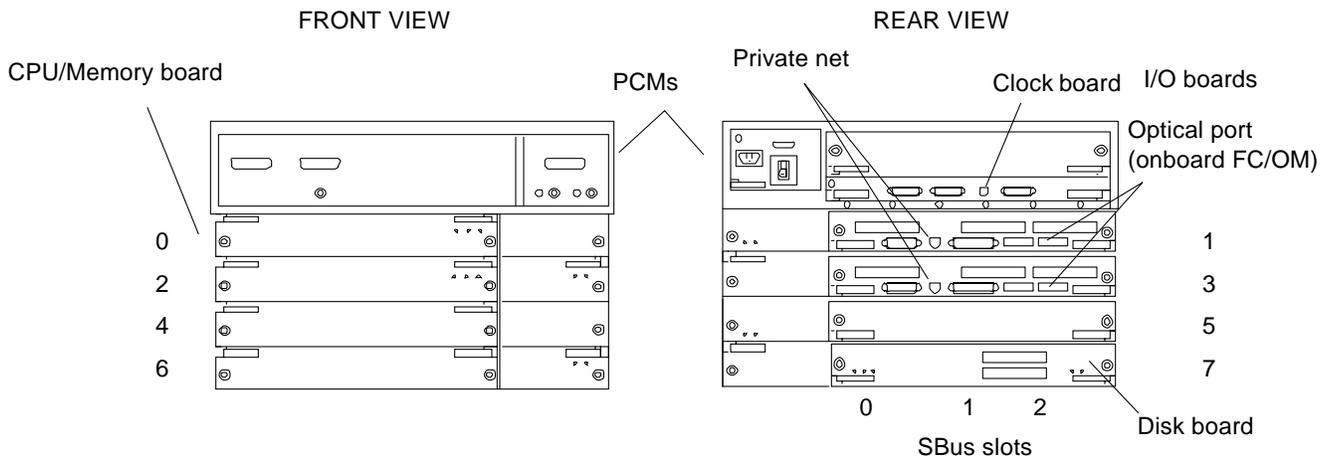


Figure 5-9 Ultra Enterprise Cluster 5000/4000HA Card Cage Minimum Population (Typical of Node 0 and 1)

## 5.2.2 Expansion

**Note** – Do not occupy (or connect cables to) both optical ports on any given I/O board.

Beyond minimum configuration use the first available optical module port following all such ports in the system. This will ensure that the controller numbering is preserved if the Solaris operating environment is reinstalled.

An expanded configuration consists of:

- Two nodes:
  - Three or more SPARCstorage Array 100 series units
- Expansion cabinets containing:
  - Two SPARCstorage Array 200 series units—hosting the devices below
  - Four SPARCstorage RSM or differential SCSI tray systems

### 5.2.2.1 Power Cooling Modules (PCMs)

Four PCMs must be installed in each node.

### 5.2.2.2 Board Population

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-10 and Figure 5-11 show example expansion board populations installed in the card cages of both nodes.

#### **CPU/Memory Boards**

Even numbered slots 0, 2, 4, and 6 are configured with CPU/Memory boards.

#### **I/O Boards**

Odd numbered slots 1, 3, 5 and 7 are configured with I/O boards. SBus cards are installed in the appropriate SBus slots.

#### **Clock Board**

One clock board is required in each node.

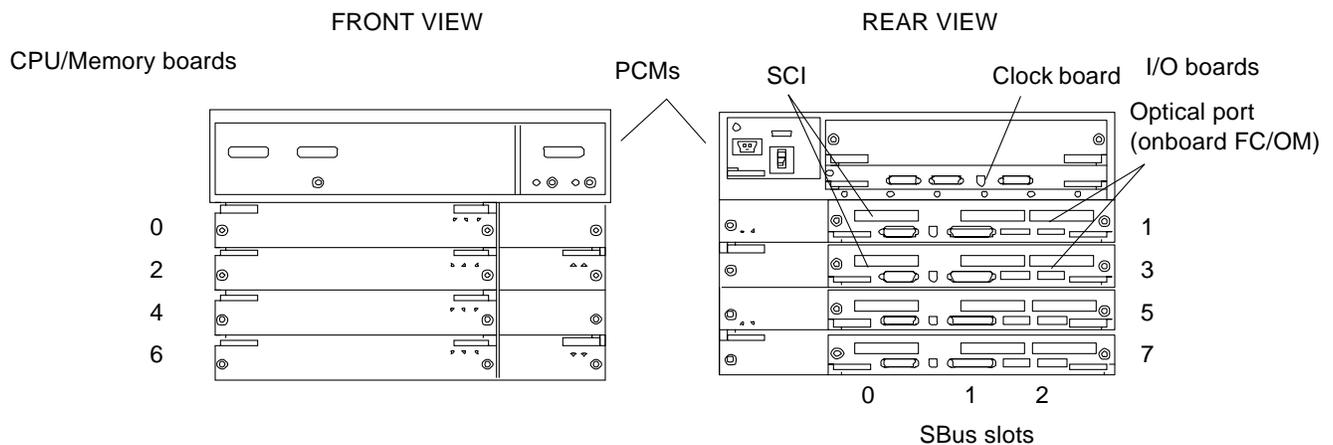


Figure 5-10 Ultra Enterprise Cluster 5000/4000PDB Card Cage Expansion Example (Typical of Node 0 and 1)

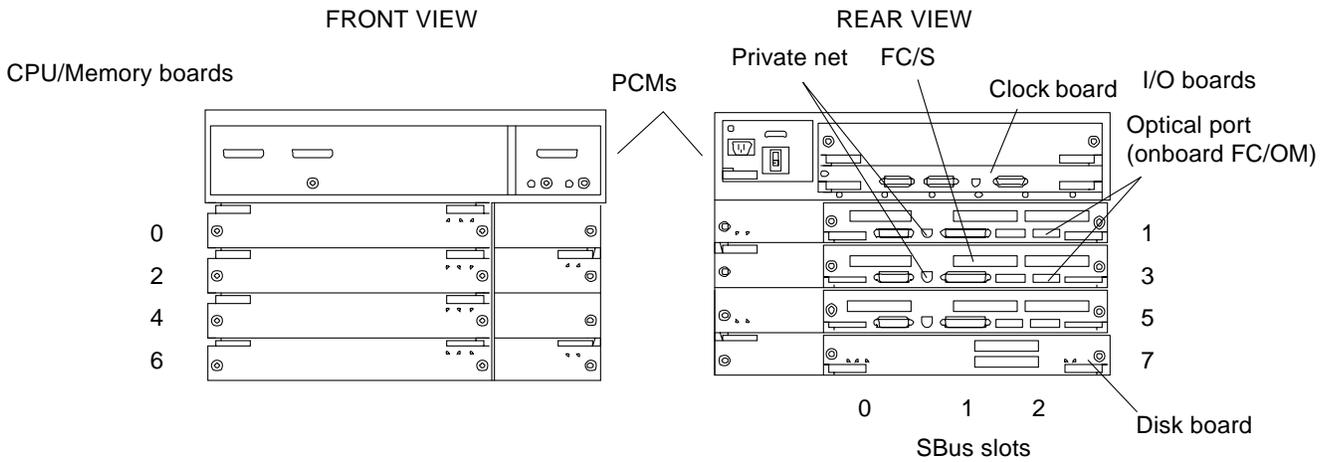


Figure 5-11 Ultra Enterprise Cluster 5000/4000HA Card Cage Expansion Example (Typical of Node 0 and 1)

### 5.3 Ultra Enterprise Cluster 6000

This section covers configuration requirements and interface and cabling for possible Enterprise Cluster 6000 systems. Included here is information covering minimum and expansion configuration systems. The basic system is shown in Figure 5-12.

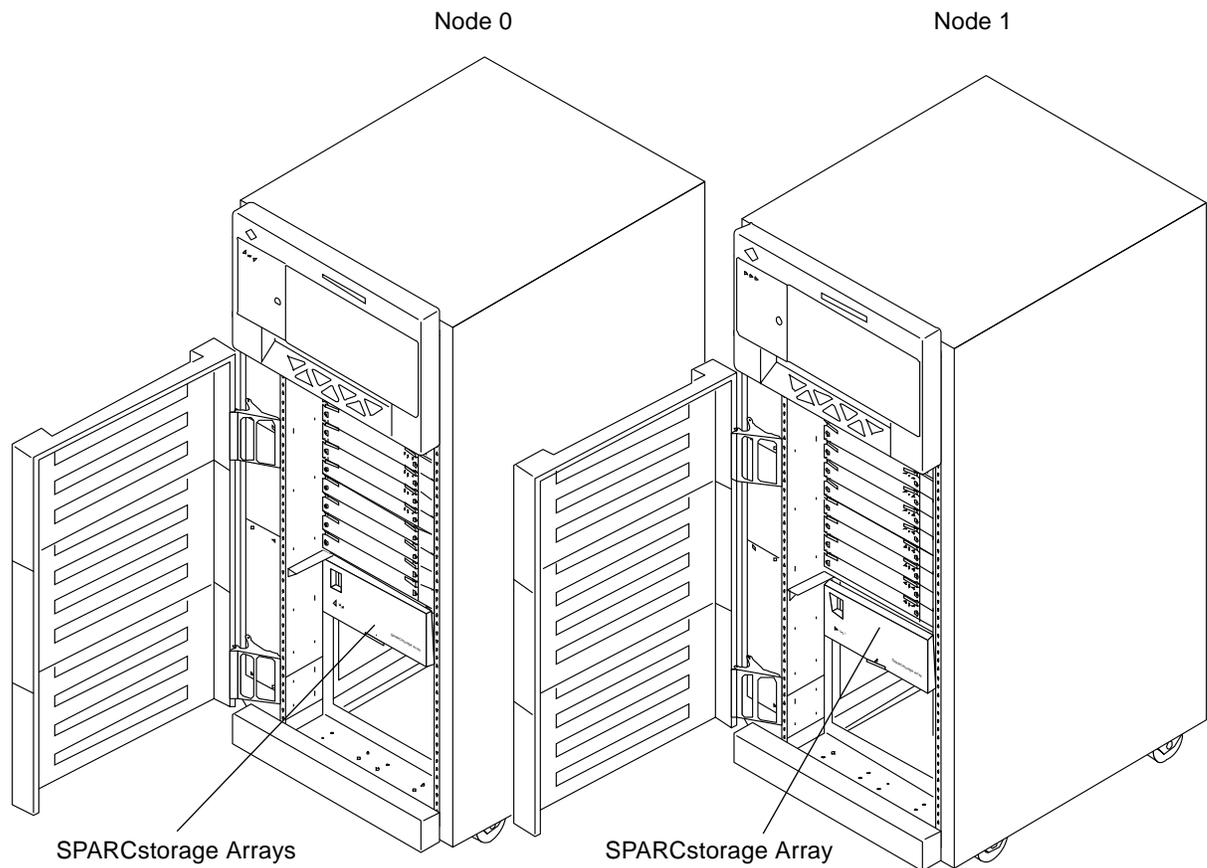


Figure 5-12 Ultra Enterprise Cluster 6000 System

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

### ***5.3.1 Minimum Configuration***

Minimum configuration is two nodes supporting two (PDB) or three (HA) SPARCstorage Arrays.

#### ***5.3.1.1 Power Cooling Modules (PCMs)***

Three PCMs minimum must be installed in each node.

#### ***5.3.1.2 Board Population***

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-13 and Figure 5-14 show minimally populated card cages for both nodes.

##### ***CPU/Memory Boards***

Even numbered slot 0 is configured with a CPU/Memory board.

##### ***I/O Boards***

Odd numbered slots 1 and 3 are configured with I/O boards. SBus cards are installed in the appropriate SBus slots (see Figure 5-13 and Figure 5-14).

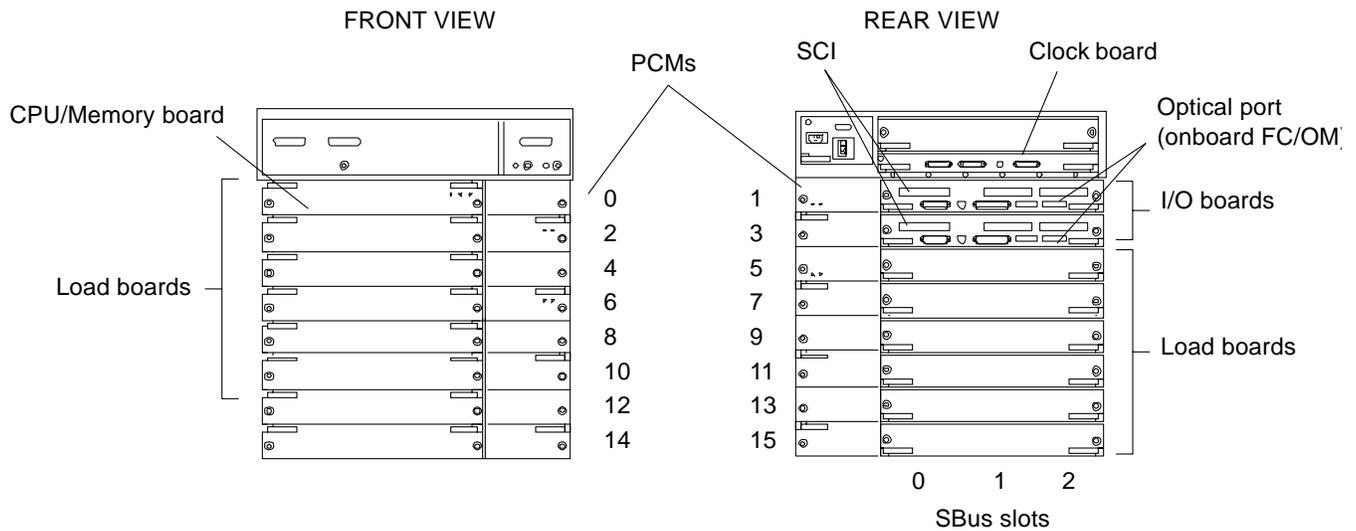


Figure 5-13 Ultra Enterprise Cluster 6000PDB Card Cage Minimum Population (Typical of Node 0 and 1)

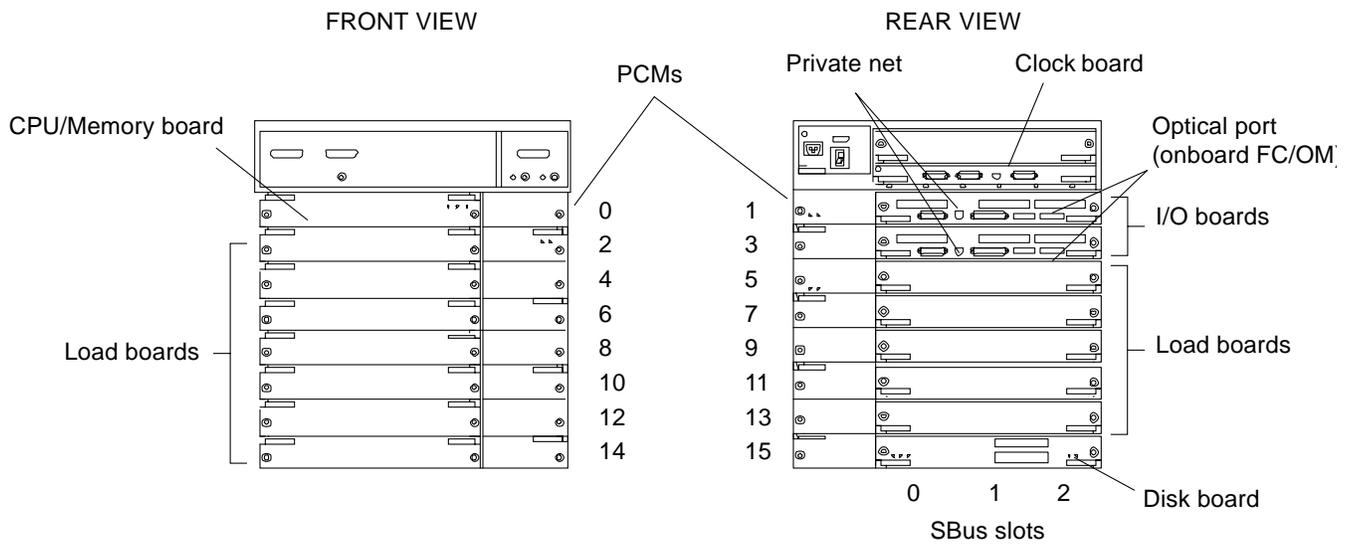


Figure 5-14 Ultra Enterprise Cluster 6000HA Card Cage Minimum Population (Typical of Node 0 and 1)

## 5.3.2 Expansion

---

**Note** – Do not occupy (or connect cables to) both optical ports on any given I/O board.

---

Beyond minimum configuration use the first available optical module port following all such ports in the system. This will ensure that the controller numbering is preserved if the Solaris operating environment is reinstalled.

An example of an expansion configuration consists of six cabinets equipped as follows:

- First and second cabinets, each containing:
  - One node
  - Two SPARCstorage Array 100 series units
- Expansion cabinets, each containing:
  - Two SPARCstorage Array 200 series units—hosting the devices below
  - Four SPARCstorage RSM or differential SCSI tray systems

### 5.3.2.1 Power Cooling Modules (PCMs)

Besides providing power, each PCM provides required cooling to the one or two boards installed adjacent to it. For this reason, every board or board-pair must be supported by an adjacent PCM. In this system, a full complement of PCMs is eight per node (sixteen per cluster).

### 5.3.2.2 Board Population

The card cages in the node 0 and node 1 servers are configured identically. Figure 5-15 and Figure 5-16 show the example expansion board population installed in the card cages of both nodes.

#### **CPU/Memory Boards**

Even numbered slots 0, 2, 4, 6, 8, 10, 12, and 14 are configured with CPU/Memory boards.

### I/O Boards

Odd numbered slots 1, 3, 5, 7, 9, 11, 13, and 15 are configured with I/O boards. SBus cards are installed in the appropriate SBus slots.

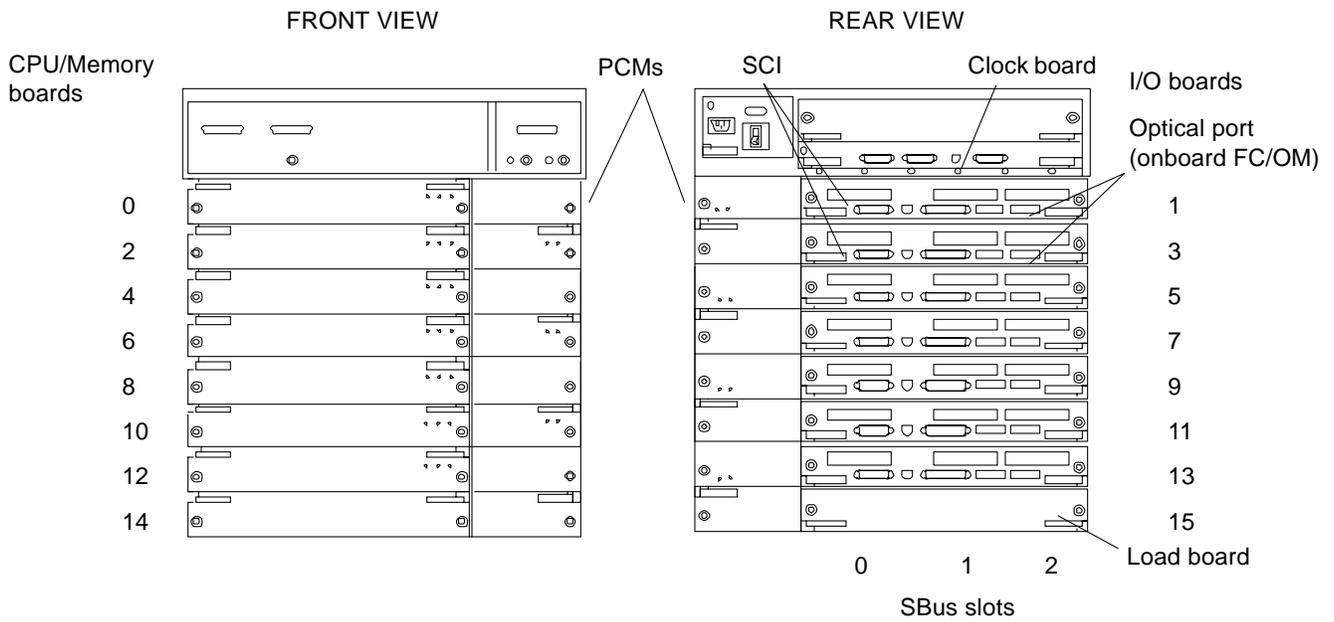


Figure 5-15 Ultra Enterprise Cluster 6000PDB Card Cage Expansion Example (Typical of Node 0 and 1)

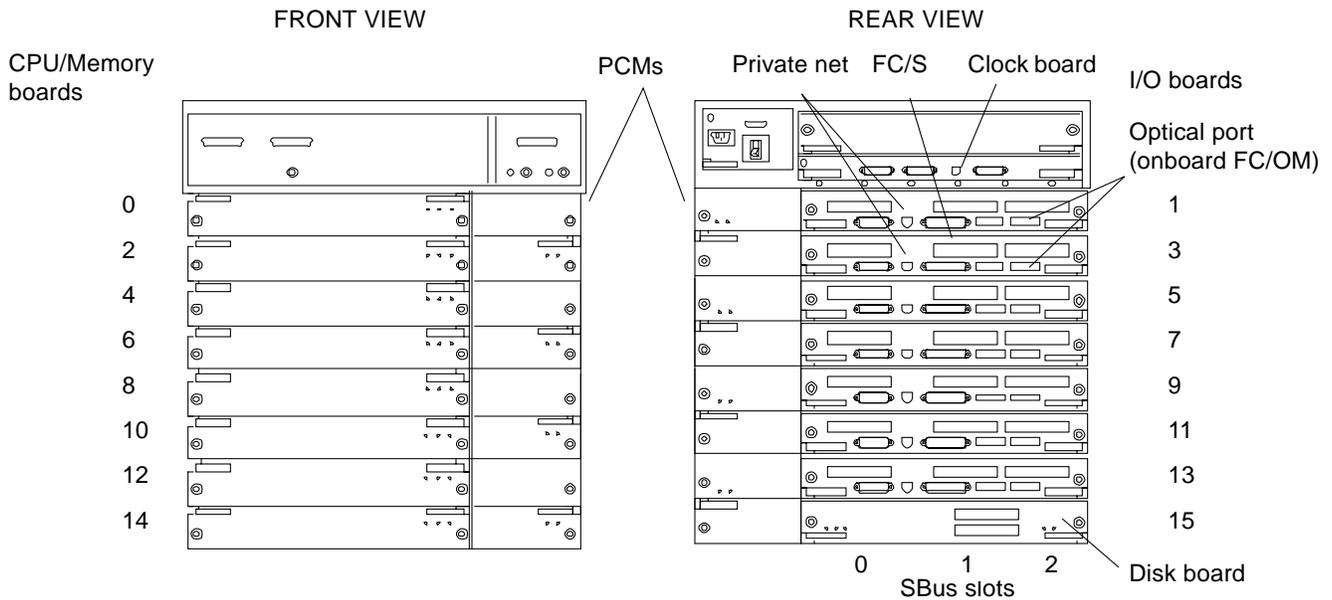


Figure 5-16 Ultra Enterprise Cluster 6000HA Card Cage Expansion Example (Typical of Node 0 and 1)

## 5.4 System Component Cabling

Interface cabling is illustrated in Chapter 11, “Ultra Enterprise Cluster 6000 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:

- The Serial A port on the clock boards in node 0 and node 1; connection is via serial adapter cables
- Public Ethernet

### 5.4.3 *Public Net Ethernet*

Connection to the public or client network is via 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 Enterprise PDB nodes are connected over two SCI links. Two links are used to eliminate the possibility of a single point of failure. Sun cables (three lengths) are used.

---

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

---

In each node, communication is hosted by a SCI adapter for each link. The first two I/O boards must have SCI SBus cards installed.

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. Each cable is labeled before or during installation as instructed in Chapter 11, in the section titled “Labeling Fiber-Optic Cables” under Section 11.3.4.1.

---

Each SPARCstorage Array 100 series and 200 series unit incorporates two FC/OM optical modules (the second one being optional). One module connects to node 0 and the other to node 1. These are identified as A and B on the SPARCstorage Array chassis back panel. See Figure 5-17 and Figure 5-18 for an example of SPARCstorage Array-to-node communication fiber-optic cable connection.

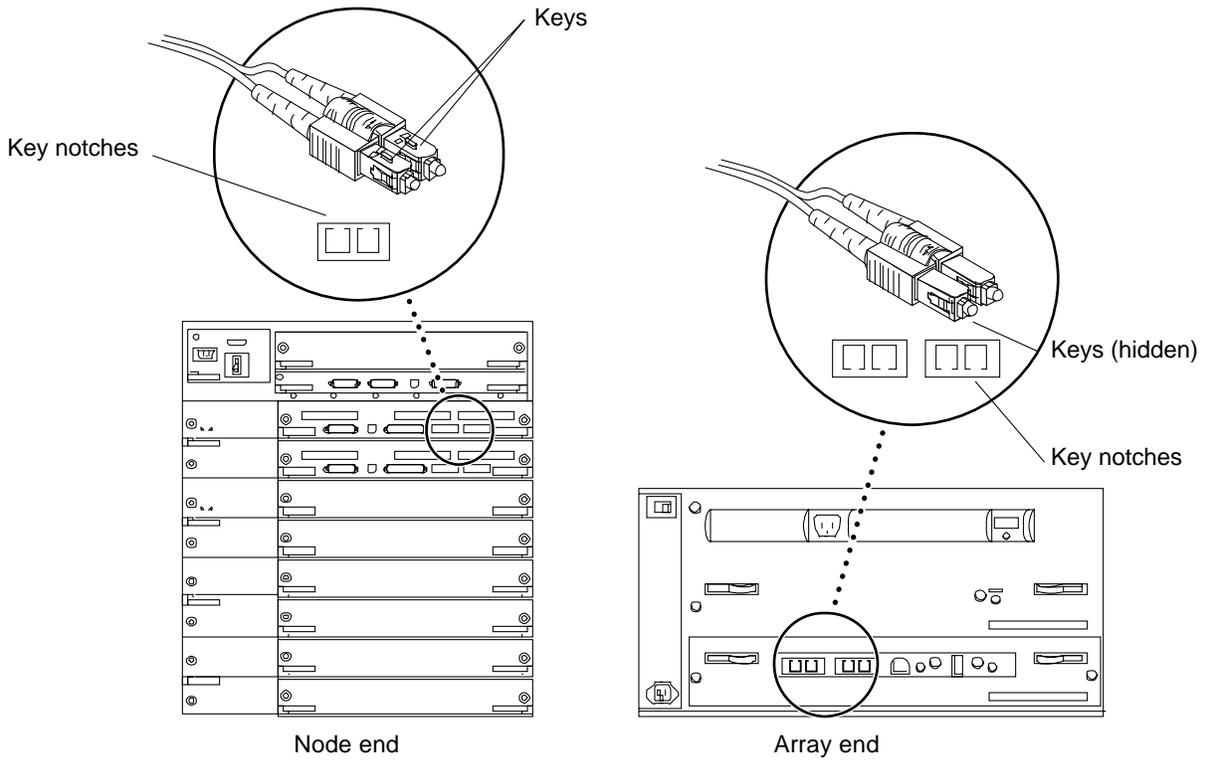


Figure 5-17 SPARCstorage Array Fiber Cable Connection

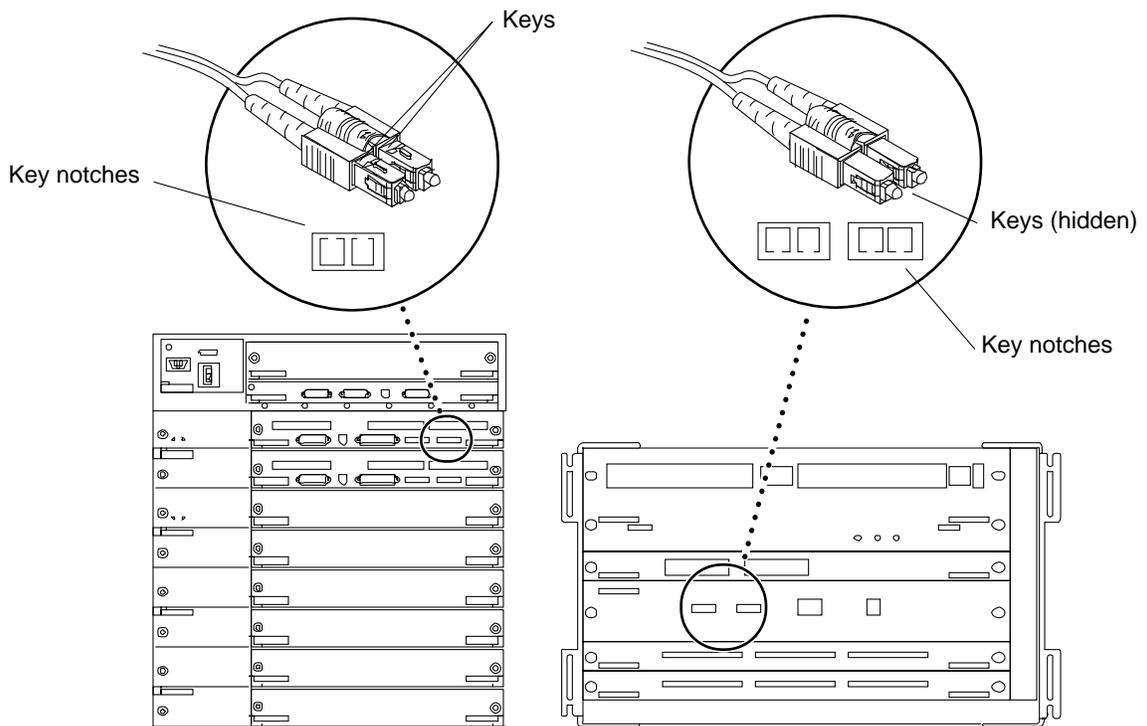


Figure 5-18 SPARCstorage Array 200 Series Connection



## Powering Off and On

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**Caution** – Use these power off/on procedures *only* for systems that are newly installed or in the process of being installed.

Do *not* use these procedures on a system 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 *Ultra Enterprise Cluster System Service Manual*, part number 802-6786.

---

**Note** – For panel removal procedures, see Chapter 7, “Internal Access and Leveling.”

---

For these procedures, the administration workstation may need to be installed (see the caution above). See the following for the workstation connection procedures:

- Enterprise Cluster 3000: Section 8.7.2, “Connecting the Terminal Concentrator,” and Table 8-2 for this procedure.
- Enterprise Cluster 4000: Section 9.7.2, “Connecting the Terminal Concentrator,” and Table 9-2 for this procedure.
- Enterprise Cluster 5000: Section 10.3.2.2, “Connecting the Terminal Concentrator,” and Table 10-2 for this procedure.

- Enterprise Cluster 6000: Section 11.3.2.2, “Connecting the Terminal Concentrator,” and Table 10-2 for this procedure.

## 6.1 Powering Off an Ultra Enterprise Cluster 6000 or 5000 Cabinet

---

**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 *Enterprise Cluster System Service Manual*, part number 802-6786.

---

**1. Turn the front panel key switch to  $\phi$  (the standby position).**

The key switch is behind the front door (See Figure 6-1).

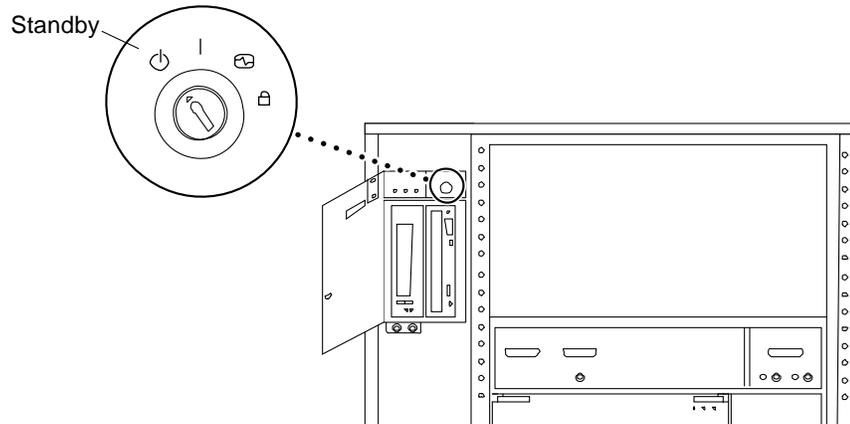


Figure 6-1 Key Switch in the Standby Position

---

**Note** – The front panel keys for this switch are packed in the accessory box.

---

---

**Note** – The standby position ( $\phi$ ) does not turn off any AC-powered drive trays in the lower part of the system cabinet. The key switch controls only the DC power supply and DC-powered devices in the cabinet.

---

**2. Turn off the system power in this order:**

- a. External drives and expansion cabinets (if any).

- b. System cabinet AC distribution unit power switch  
The unit is at the rear of the cabinet (see Figure 6-2).
- c. Terminal.

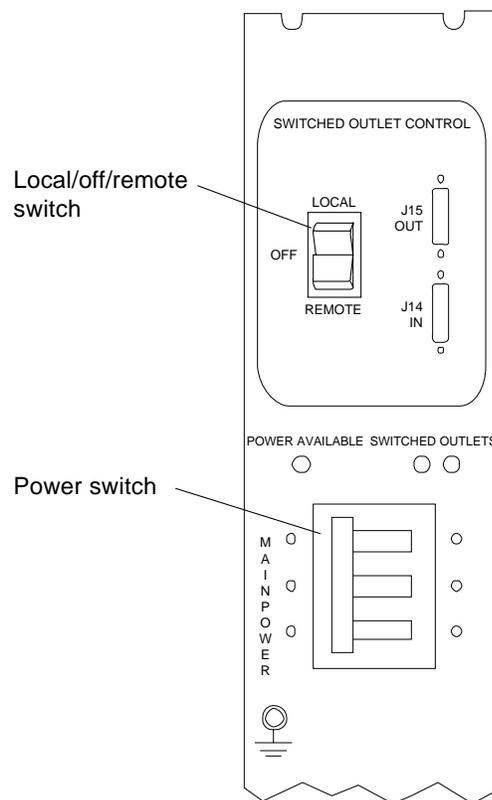


Figure 6-2 AC Distribution Unit Power Switch



**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.

---

## 6.2 Powering On an Ultra Enterprise Cluster 6000 or 5000 Cabinet

### 1. Begin with a safety inspection.

- a. Turn the system key switch to  $\ominus$  (the Standby position).  
See Figure 6-1.

---

**Note** – The front panel keys for this switch are packed in the accessory box.

---

---

**Note** – The standby position ( $\ominus$ ) does not turn off any AC-powered drive trays in the lower part of the system cabinet. The key switch controls only the DC power supply and DC-powered devices in the main cabinet.

---

- a. **Ensure the AC power switch on the cabinet rear is off.**  
The AC distribution unit is at the rear of the cabinet. See Figure 6-2.
  - b. **Verify the power cord is plugged into the correct facilities outlet.**
2. **Turn on power to any expansion cabinets.**  
Read the documentation supplied with the expansion cabinet for specific instructions.
  3. **Turn on power to the terminal (if applicable).**
  4. **Ensure the LOCAL/OFF/REMOTE switch is in the REMOTE position (Figure 6-2).**

**5. Turn the AC distribution unit power switch to ON.**

Listen for the sound of AC-powered devices such as SPARCstorage Arrays and fans to start up.

**6. Turn the key switch to  (the power-on position).**

The system will run firmware diagnostics for about one minute and then boot (Figure 6-3).

You should see and hear several things happen:

- The fans in the power supplies begin turning.
- The left LED (green) on the front of the cabinet turns on immediately to indicate the DC power supply is functioning.
- The middle LED (yellow) begins flashing.
- The right LED (green) flashes after firmware completes Power-On Self-Test to denote that the operating system is running.

---

**Note** - These events may take several minutes to occur.

---



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**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.

---

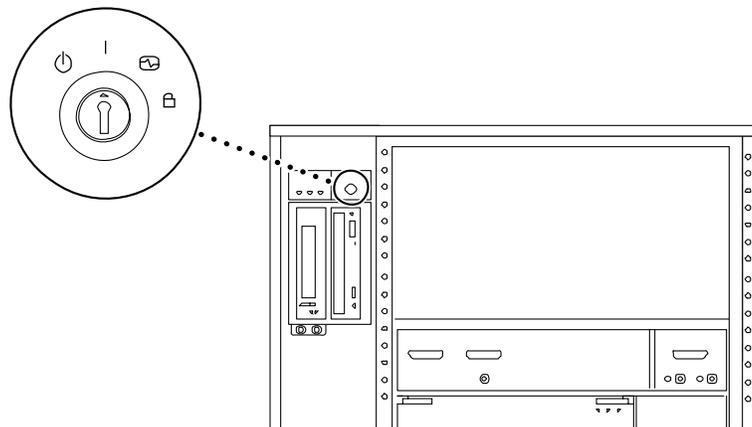


Figure 6-3 Key Switch in the On Position

### 6.3 Powering Off an Ultra Enterprise Cluster 4000 Cabinet

**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 *Enterprise Cluster System Service Manual*, Sun part number 802-6786.

1. Turn the front panel key switch to  (the standby position, fully counterclockwise).

The key switch is behind the front door (see Figure 6-4).

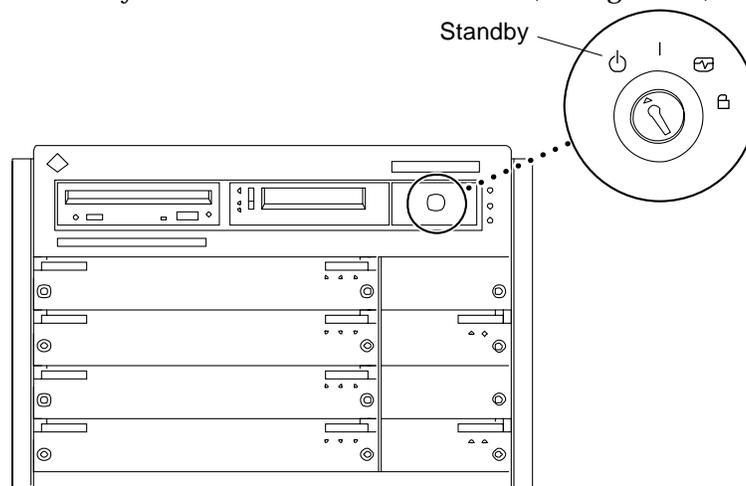


Figure 6-4 Key Switch in the Standby Position

**Note** – The front panel keys for this switch are packed in the accessory box.

2. Turn off the system power in this order:
  - a. External drives and expansion cabinets (if any)
  - b. System cabinet AC power switch  
The unit is at the rear of the cabinet (see Figure 6-5)
  - c. Terminal

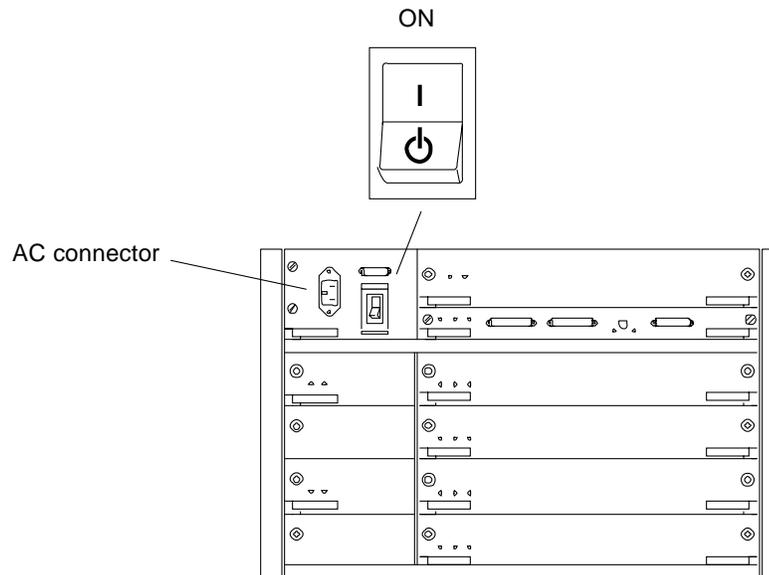


Figure 6-5 AC Power Switch



**Caution** – Turn off the AC power switch on the rear of the cabinet before accessing the system.



**Warning** – External components like the SPARCstorage Arrays and terminal concentrator are powered by an external power source (a power circuit other than from the cabinet internal AC power circuit). These externally powered components will remain powered even after the cabinet AC switch is turned off. Turn off externally powered components using the ON/OFF switch at the rear of the components in question. Failure to turn off externally powered components poses a risk of equipment damage and/or personnel hazard from electrical shock.

## 6.4 Powering On an Ultra Enterprise Cluster 4000 Cabinet

### 1. Begin with a safety inspection.

- a. **Turn the system key switch to  $\phi$  (the Standby position).**  
See Figure 6-4.

---

**Note** – The front panel keys for this switch are packed in the accessory box.

---

- a. **Ensure the AC power switch is off.**

The AC power switch is at the rear of the cabinet. See Figure 6-5.

- b. **Verify the power cord is plugged into the correct facilities outlet.**

### 2. Turn on power to any expansion cabinets.

Read the documentation supplied with each type of expansion cabinet for specific instructions.

### 3. Turn on the terminal (if applicable).

### 4. Turn the AC power switch to On.

See Figure 6-5.

### 5. Turn the key switch on the front panel to the On position.

See Figure 6-4. You should see and hear several things happen:

- The fans in the power supplies begin turning.
- The top front panel LED (green) turns on immediately denoting the power supply is delivering DC power.
- The middle front panel LED (yellow) flashes while POST runs for approximately 60 seconds. After 60 seconds, this LED turns off if the tests pass. If the LED remains lighted after 60 seconds, a test has failed.
- The bottom front panel LED (green) flashes to show that booting is successful and the operating system is running. If this LED fails to turn on and the middle LED is on, a severe hardware fault exists.



---

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

---

---

## 6.5 Powering Off an Ultra Enterprise Cluster 3000 Cabinet

---

**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 *Enterprise Cluster System Service Manual*, Sun part number 802-6786.

---



---

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

---

1. **Pull on the handle to open the system front door.**
2. **Locate the system keyswitch in the upper right corner, and turn the key switch to the Standby position (fully counterclockwise).**  
See Figure 6-6.
3. **Turn off the system power in this order:**
  - a. External drives and expansion cabinets (if any)
  - b. System AC power switch (see Figure 6-7)
  - c. Terminal

Legend:

- Locked = Normal power ON in secure mode
- Diagnostics = Normal power ON with full diagnostics
- On = Normal power ON
- Standby = OFF; no DC power

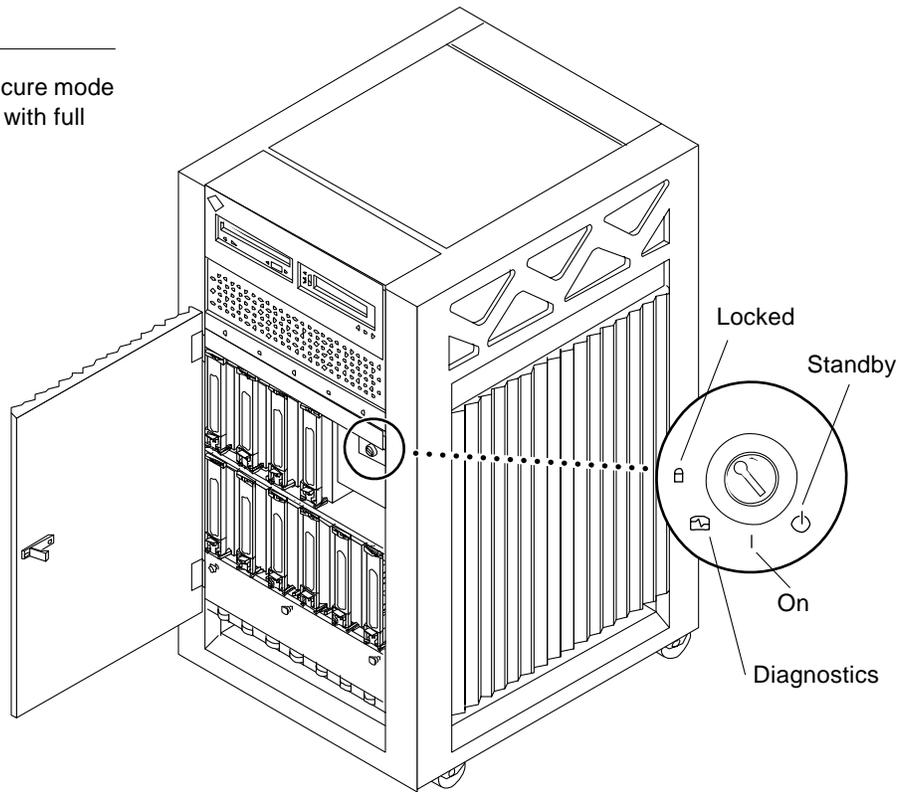


Figure 6-6 Key Switch in the STANDBY Position

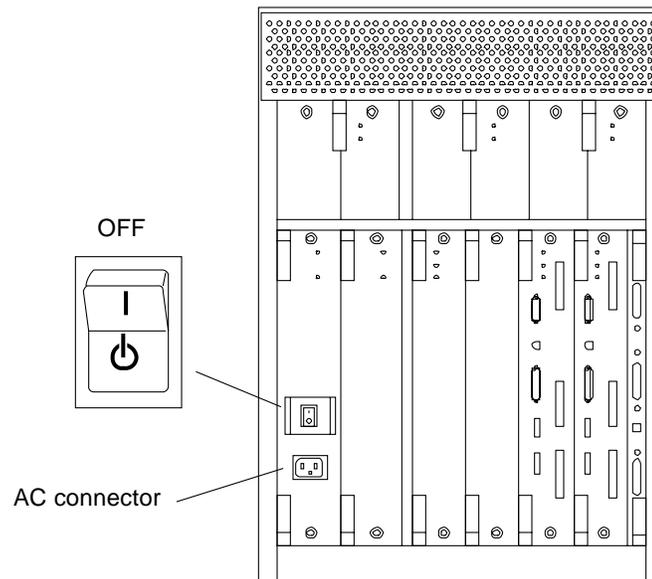


Figure 6-7 Turning the AC Power Switch to OFF

## 6.6 Powering On an Ultra Enterprise Cluster 3000 Cabinet

### 1. Begin with a safety inspection.

- a. Use the handle on the front of the system to open the front door.
- b. Turn the system key switch to  (the Standby position).  
See Figure 6-6.
- c. Turn the AC power switch to ON.  
The AC power switch is at the rear of the enclosure. See Figure 6-8.
- d. Verify that the AC power cord is plugged into a wall socket.

---

**Note** – The front panel keys for this switch are packed in the accessory box.

---

### 2. Turn on power to any expansion cabinets.

Read the documentation supplied with the expansion cabinet for specific instructions.

**3. Turn on power to the terminal (if applicable).**



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

**4. Turn the key switch to the On position.**

See Figure 6-9. Several things should occur:

- The fans in the power supplies begin turning.
- The top front panel LED (green) turns on immediately denoting the power supply is delivering DC power.
- The middle front panel LED (yellow) flashes while POST runs for approximately 60 seconds. After 60 seconds, this LED turns off if the tests pass. If the LED remains lit after 60 seconds, a test has failed.
- The bottom front panel LED (green) flashes to show that boot is successful and the operating system is running. If this LED fails to turn on and the middle LED is on, a severe hardware fault exists.

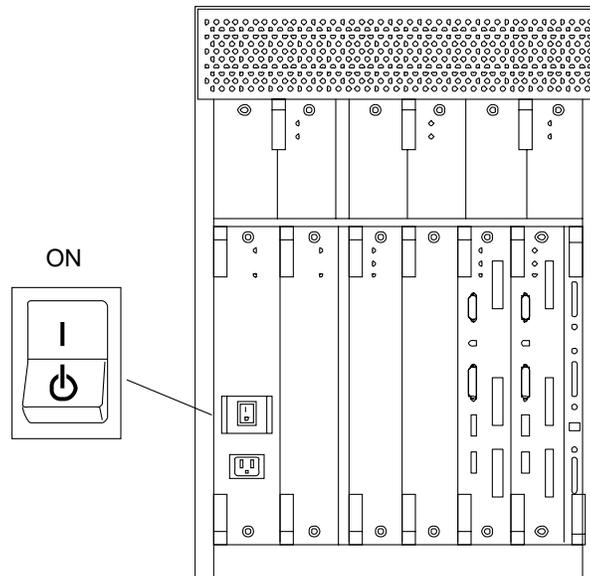


Figure 6-8 Turning the AC Power Switch to ON

Legend:

Locked = Normal power ON in secure mode

Diagnostics = Normal power ON with full diagnostics

On = Normal power ON

Standby = OFF; no DC power

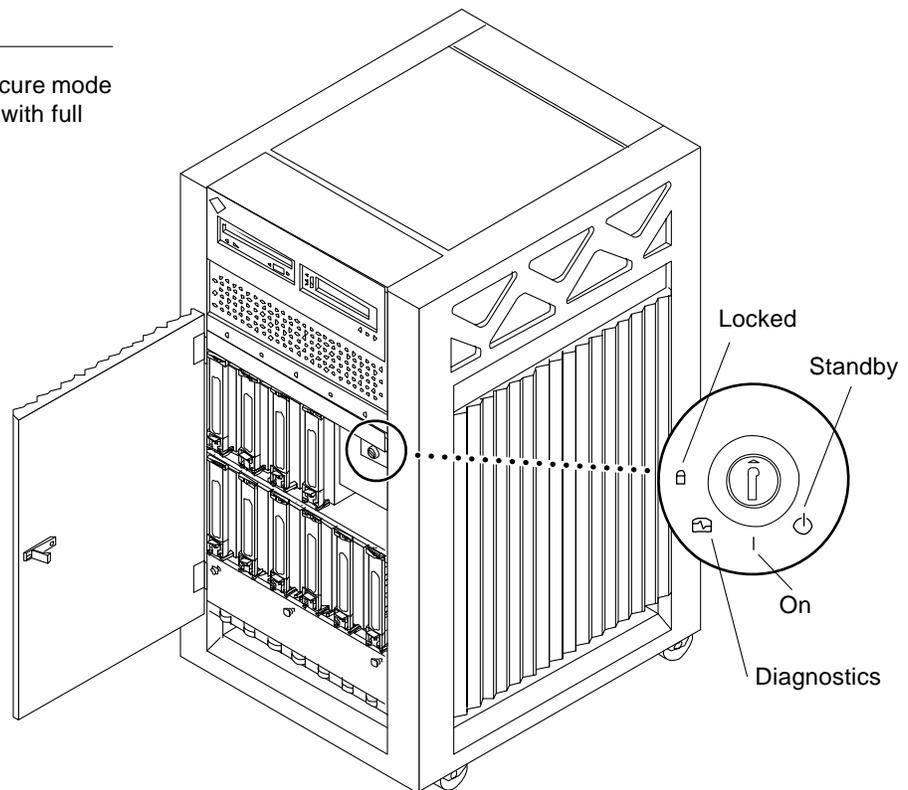


Figure 6-9 Key Switch in the ON Position



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

## 6.7 *Powering On the SPARCstorage Array Chassis*

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

## 6.8 *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



This chapter provides procedures for

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

<i>Ultra Enterprise Cluster 5000/6000</i>	<i>page 7-1</i>
<i>Ultra Enterprise Cluster 4000</i>	<i>page 7-9</i>
<i>Ultra Enterprise Cluster 3000</i>	<i>page 7-10</i>

## 7.1 Ultra Enterprise Cluster 5000/6000

---

**Note** – Power must be turned off before removing panels. For powering off and on procedures, see Chapter 6, “Powering Off and On.”

---

Cabinet outer panels are shown in Figure 7-1 through Figure 7-3.

### 7.1.1 CD-ROM/Tape Device Door

The small door to the left of the top panel can contain a CD-ROM drive and/or a tape drive. To open the door:

- ♦ **Push on the top right corner of the door. The clasp will release and the door will spring open.**

To close the door:

◆ Press gently to engage the clasp.

### 7.1.1.1 *Opening the Hinged Door*

1. Grasp the door at the upper-right corner and pull towards you firmly. See Figure 7-1. The door is secured by a catch mechanism at the side opposite the hinge. The door will release and swing open.

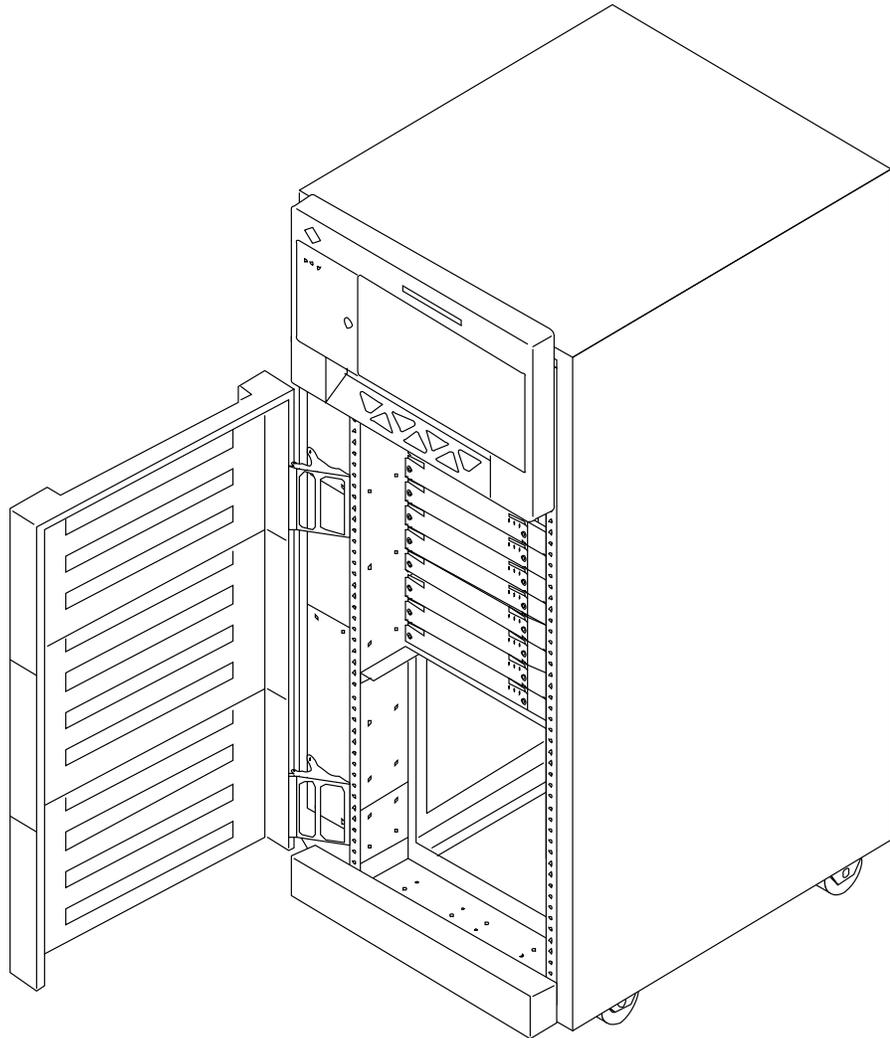


Figure 7-1 Opening the Hinged Door

### 7.1.1.2 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 7-2.
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.

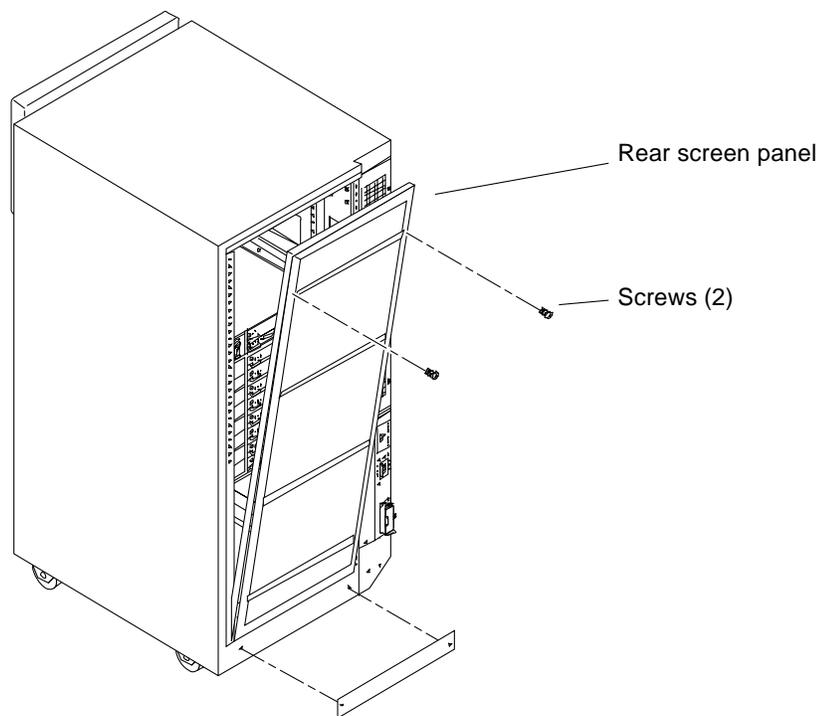


Figure 7-2 Removing the Rear Screen Panel

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 the Phillips screws removed above.**

### 7.1.1.3 Removing and Replacing the Kick Panel

To remove the kick panel:

1. **Loosen the two captive screws.**

See Figure 7-3.

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.**

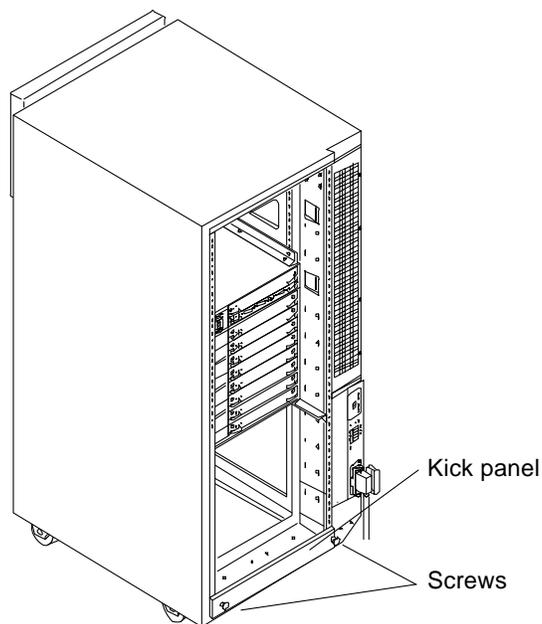


Figure 7-3 Removing the Kick Panel

### 7.1.1.4 *Adjusting the Stabilizer Bar and Leveling Pads*



**Warning** – Always extend the stabilizer bar before pulling the disk drive trays out for servicing. The trays extend on slide rails and the weight shift forward could tend to topple the cabinet if the stabilizer bar is not fully extended.

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 to prevent the cabinet from tipping forward when internal trays are extended. These pads contact the floor to prevent tipping.

#### ***Extending the Stabilizer Bar***

- ♦ **Grasp the stabilizer bar under the front edge and pull it out to its fully extended position.**

#### ***Adjusting the Leveling Pads***

This procedure requires that the screen panel and kick panel be removed. See Section 7.1.1.2, “Removing and Replacing the Rear Screen Panel,” and Section 7.1.1.3, “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. Press the cable tie tab to free the wrench.
- 2. Remove the kick panel.**  
The kick panel is secured by two captive screws.
- 3. Use the wrench to lower the four main leveling pads (not the pads on the stabilizer bar).**  
See Figure 7-4. The four main leveling pads are located near the corners of the cabinet.
  - a. Lower the pads to raise all four wheels off the floor.**
  - b. Using a level, adjust the pads to level the cabinet.**

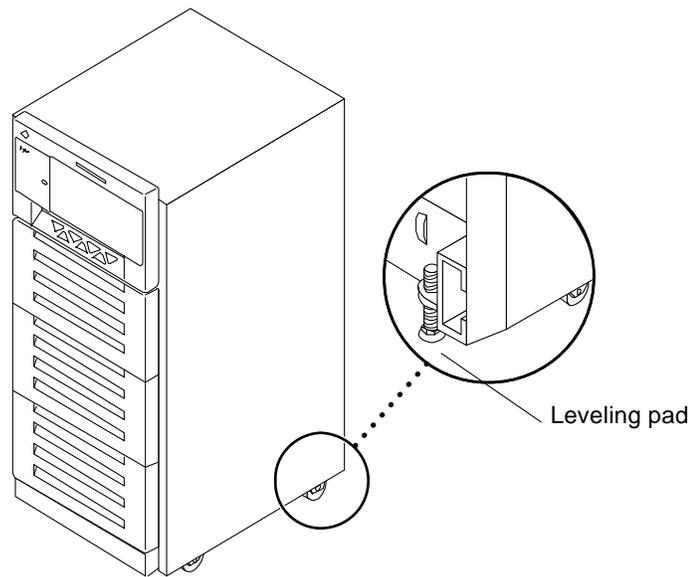


Figure 7-4 Leveling Pads

### ***Adjusting the Stabilizer Bar***

Adjust the two leveling pads on the stabilizer bar:

- 1. With the stabilizer bar fully extended, 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 the cabinet from tilting, yet allow you to easily extend and retract the stabilizer bar. See Figure 7-5.
- 2. Slide the stabilizer bar back into the cabinet.**
- 3. Restore the wrench to its storage place in the rack.**

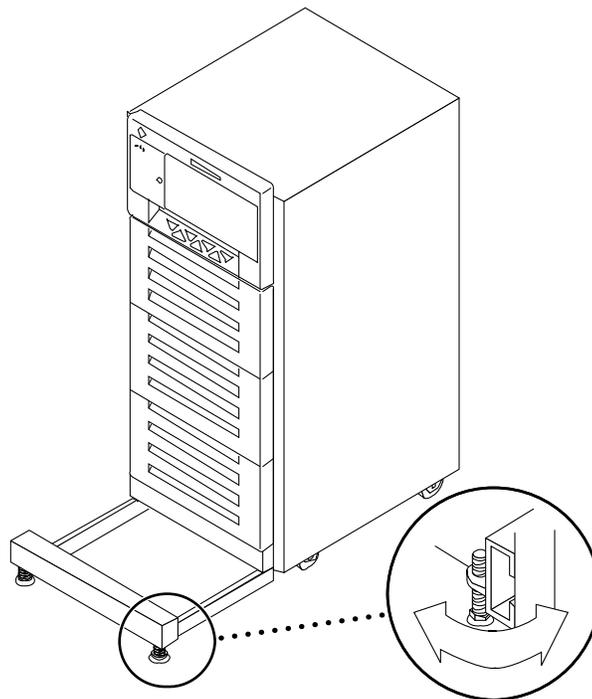


Figure 7-5 Stabilizer Bar

### 7.1.1.5 Removing and Replacing the Side Panels

To remove the side panel:

1. **Loosen two slot-head captive screws near the panel base.**  
See Figure 7-6.
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.

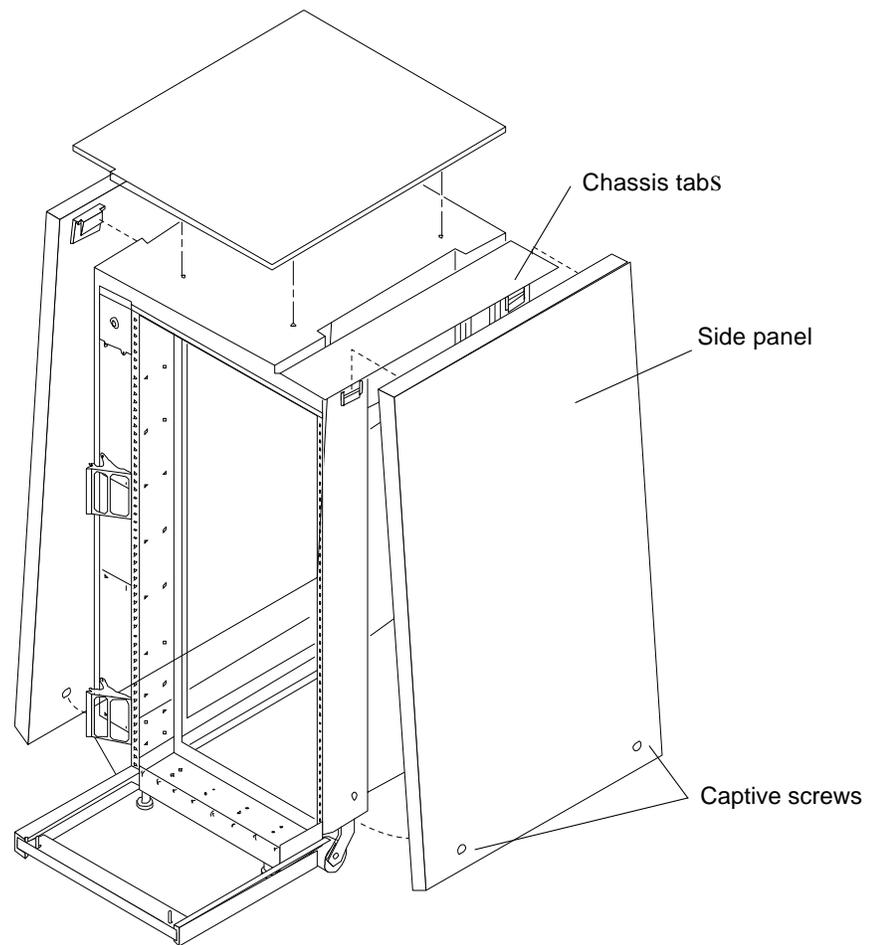


Figure 7-6 Removing the Side Panels

To replace a side panel:

1. Place the panel against the cabinet so the notches on the panel inside align with the 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.

## 7.2 Ultra Enterprise Cluster 4000

The Enterprise 4000 system has a top bezel that must be removed to access the SCSI tray and the keyswitch tray.

### 7.2.1 Top Bezel

To remove the top bezel:

- 1. Grasp the bottom corners of both sides of the top bezel and pull it toward you.**  
Apply inward pressure to release the snap locks on each side.
- 2. Tilt the top bezel upward to a 45° angle and remove the bezel.**  
Set the bezel aside. See Figure 7-7.

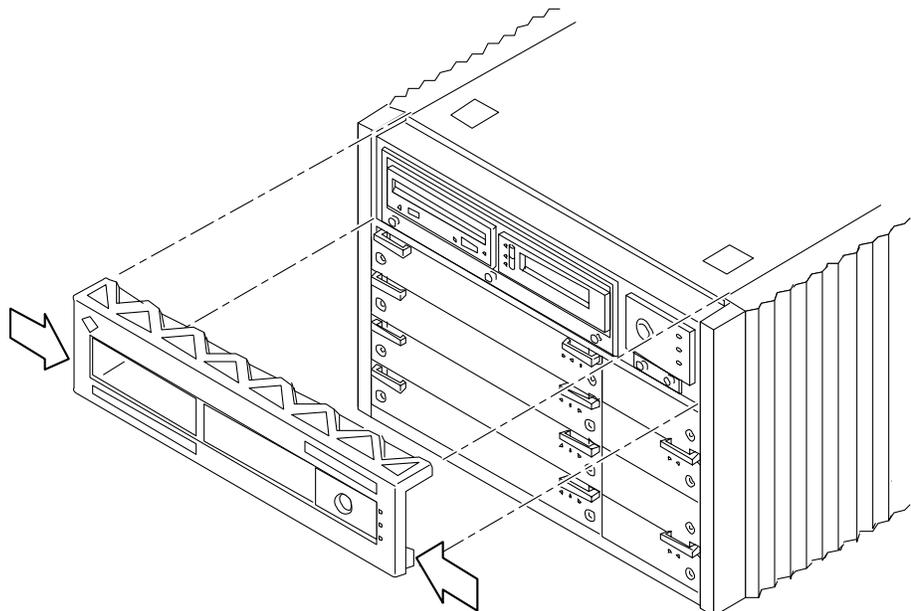


Figure 7-7 Removing the Top Bezel/Panel

To replace the top bezel, reverse these instructions.

## 7.3 *Ultra Enterprise Cluster 3000*

### 7.3.1 *Front Door*

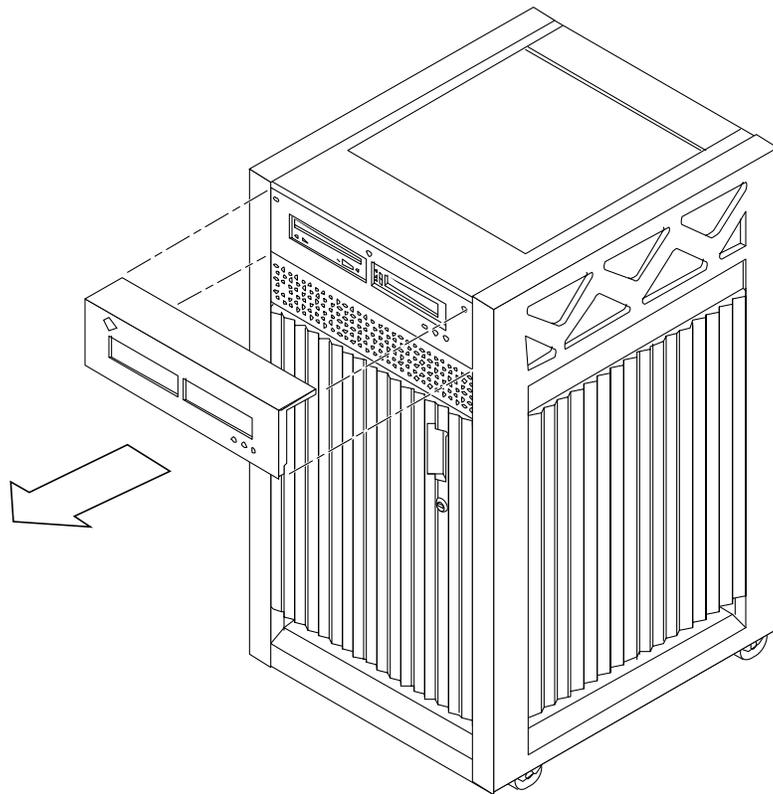
To open the door:

- ◆ **Use the handle on the front of the Enterprise 3000 system and pull the front door open.**

### 7.3.2 *Front Bezel*

To remove the front bezel:

- 1. Grasp the front bezel on both sides near the center.**  
Place your thumbs on top of the front bezel and place your other fingers at the slight indentations under the front bezel for leverage.
- 2. Pull the front bezel straight out toward you and set it aside.**  
See Figure 7-8.



*Figure 7-8* Removing the Front Bezel

To replace the front bezel, reverse these instructions.



# Ultra Enterprise Cluster 3000 Hardware Installation



## Do these tasks in the order listed

<i>Preparing the Server</i>	<i>page 8-1</i>
<i>Connecting the Power Cords</i>	<i>page 8-1</i>
<i>Installing the SPARCstorage Arrays</i>	<i>page 8-4</i>
<i>Installing the Terminal Concentrator</i>	<i>page 8-6</i>
<i>Configuring the Card Cages</i>	<i>page 8-6</i>
<i>Cabling System Components</i>	<i>page 8-13</i>
<i>Closing the Cabinet</i>	<i>page 8-26</i>

## 8.1 Preparing the Server

- 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 5, “Ultra Enterprise Cluster Configurations.”

## 8.2 Connecting the Power Cords

On each server node chassis, perform the procedure which follows.

1. Use the handle on the front of the Enterprise 3000 system to pull the front door open.
2. Locate the system key switch in the upper right corner, insert the key provided with your system, and turn the key switch to  (the Standby position).  
See Figure 8-1.

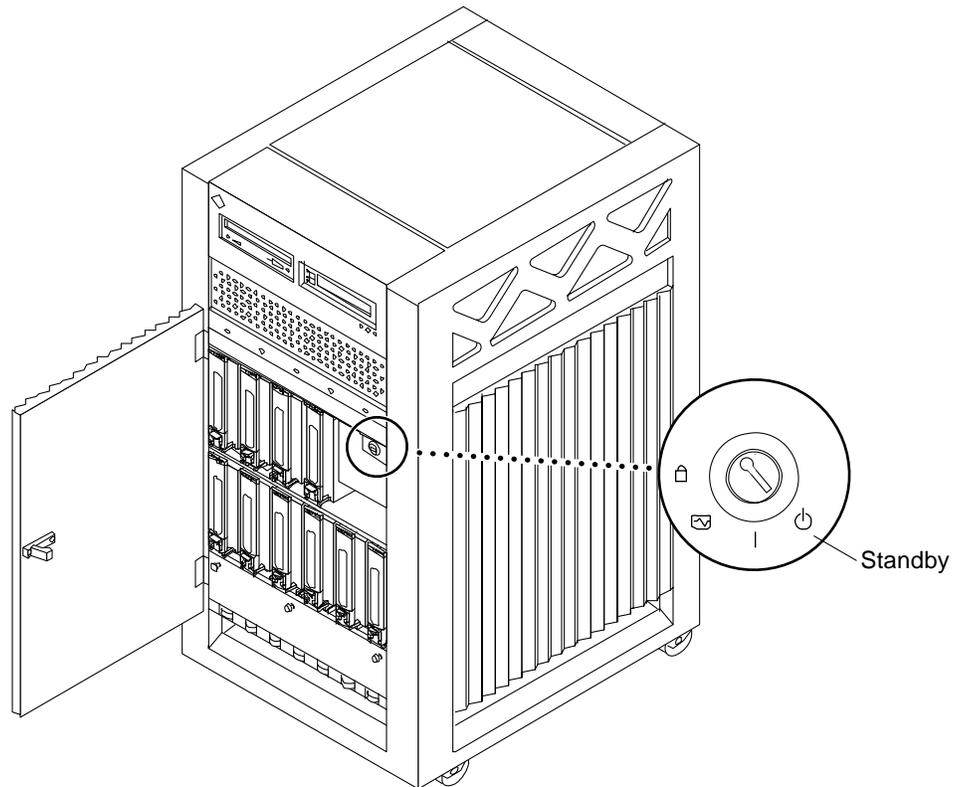


Figure 8-1 Key Switch in the Standby Position

3. Turn the AC power switch to Off.  
This switch is at the rear of the system, on the peripheral power supply/AC (PPS/AC) that is installed in the far left corner. See Figure 8-2.
4. Connect the female end of the power cord into the AC connector.  
This connector is at the rear of the system, on the PPS/AC, just below the AC power switch. See Figure 8-2.

5. **Route the power cord through the power cord retainer clip.**  
A plastic clip is attached to the back support bracket.
  - a. **Use a Phillips screwdriver to open the plastic retainer clip.**  
Remove the screw.
  - b. **Place the power cord inside the open clip.**
  - c. **Replace the screw to reattach the retainer clip to the support bracket.**
6. **Connect the male end of the power cord into a grounded outlet.**  
The outlet must be a 100-120 or 220-240 VAC 15A circuit.

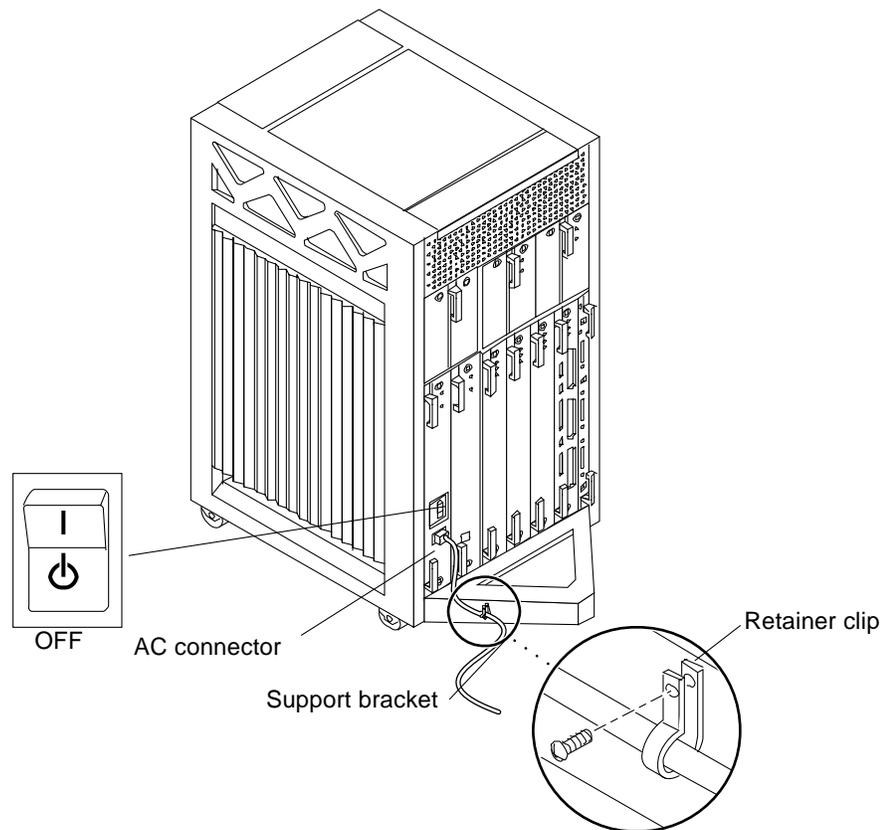


Figure 8-2 AC Power Switch, Power Receptacle, and Retainer Clip



**Caution** – Do *not* turn on power to the unit yet. Doing so can cause system damage to occur.

### 8.3 Installing the SPARCstorage Arrays

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.

#### 8.3.1 Preparing the SPARCstorage Arrays

1. **Locate the DIAG switch on the array rear panel.**  
See Figure 8-3.
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.

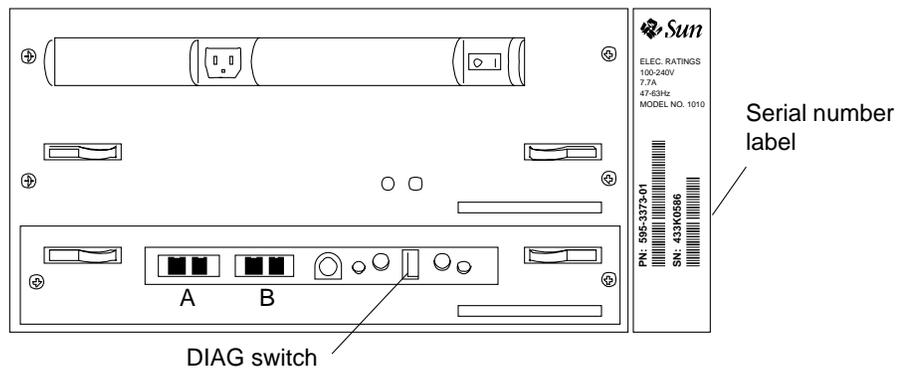


Figure 8-3 SPARCstorage Array Voltage Rating on the Serial Number Label

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 8-1 provides maximum system operating voltage and frequency ranges, and lists current requirements at nominal line voltage for a cabinet in maximum configuration.

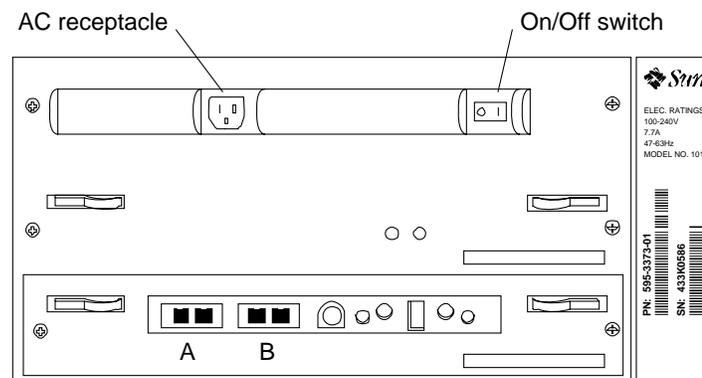
*Table 8-1* SPARCstorage Array 100 Series Nominal Power and Maximum Current Parameters

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

### 8.3.1.1 Connecting the Power

#### 1. Connect the SPARCstorage Array power cords.

Connect a power cord at the rear of each chassis (see Figure 8-4).



*Figure 8-4* SPARCstorage Array AC Power Connector and Power Switch

#### 2. Plug the power cords into the power source.

Route the power cords to the designated power source. Dress the power cords as required. Roll any excess cord and secure it using cable ties.

#### 3. Turn on the AC power switch on all SPARCstorage Arrays.

See Figure 8-4.

## 8.4 *Installing the Terminal Concentrator*

Install the terminal concentrator in its designated installation place.

## 8.5 *Power Cooling Modules (PCMs)*

Each PCM provides power and cooling to the one or two boards installed adjacent to it. For this reason, every board or board-pair must be supported by an adjacent PCM.

- ◆ **Ensure that a PCM is installed for each board or board-pair to be installed in the card cage. Install additional PCMs as required to meet this requirement. In addition, ensure a PCM is installed to support the peripheral power supply and peripheral power supply/AC input unit.**

---

**Note** – In the Ultra Enterprise Cluster 3000 System, the required complement of PCMs is three in each node. Two provide power and cooling to the four board slots, and one must be present to cool the peripheral power supply and peripheral power supply/AC input unit, and to provide redundant power.

---

## 8.6 *Configuring the Card Cages*

For instructions on removing I/O boards, refer to the documentation supplied with the I/O boards or the *Enterprise 3000 System Manual*.

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

---

**Note** – Board slot numbers are marked on the chassis.

---

- ◆ **Install a filler panel in all empty slots to ensure proper cooling and to provide proper bus termination.**

## 8.6.1 CPU/Memory Board

### 1. Install the CPU/Memory board into slot 7.

For CPU/Memory board installation procedures, refer to the documentation supplied with the CPU/Memory boards or the *Enterprise 3000 System Manual*. See Figure 8-5 and Figure 8-6 or Figure 8-7 and Figure 8-8 for PDB and HA respectively.

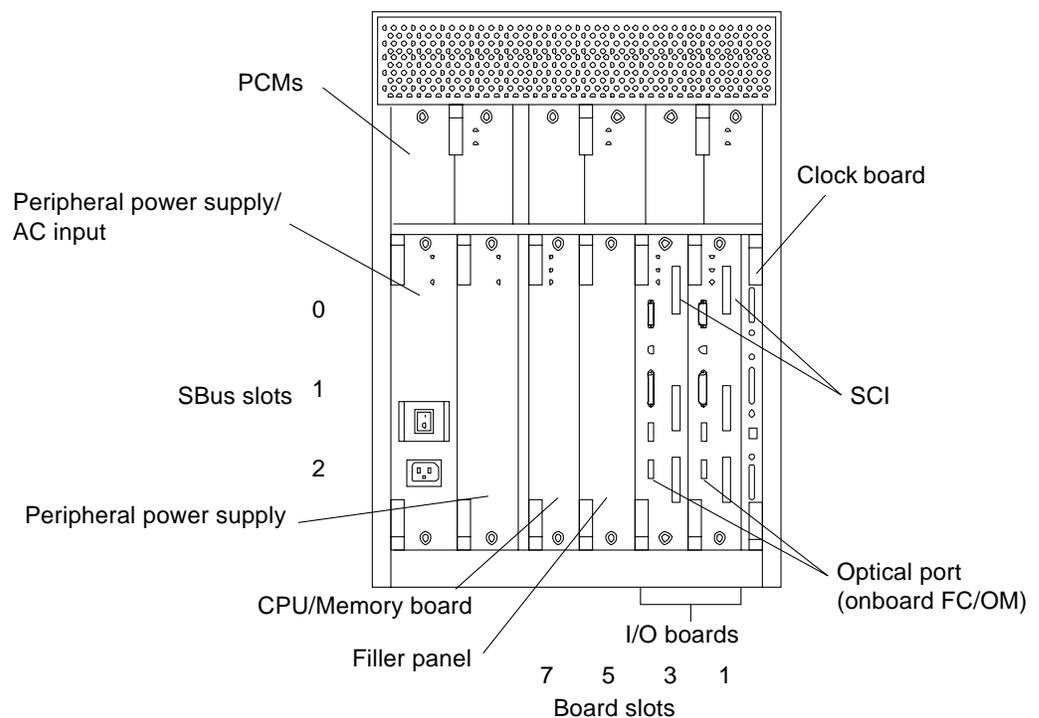


Figure 8-5 Enterprise Cluster 3000PDB Card Cage Minimum Population; Typical of Node 0 and Node 1

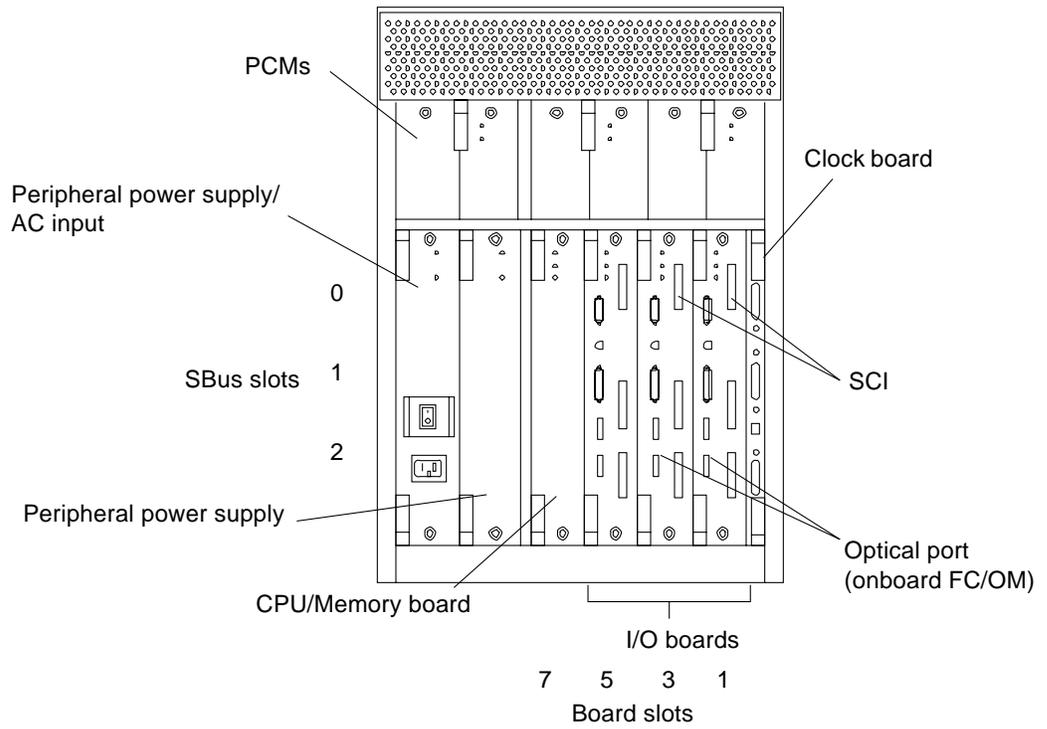


Figure 8-6 Enterprise Cluster 3000PDB Card Cage Expansion Example; Typical of Node 0 and Node 1

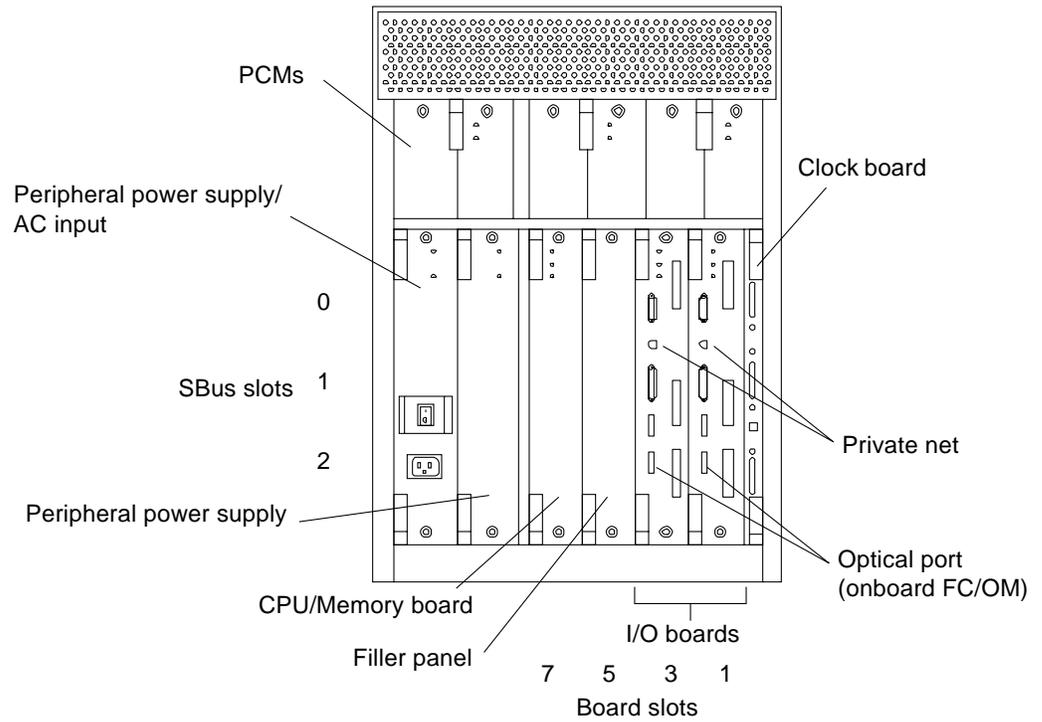


Figure 8-7 Enterprise Cluster 3000HA Card Cage Minimum Population; Typical of Node 0 and Node 1

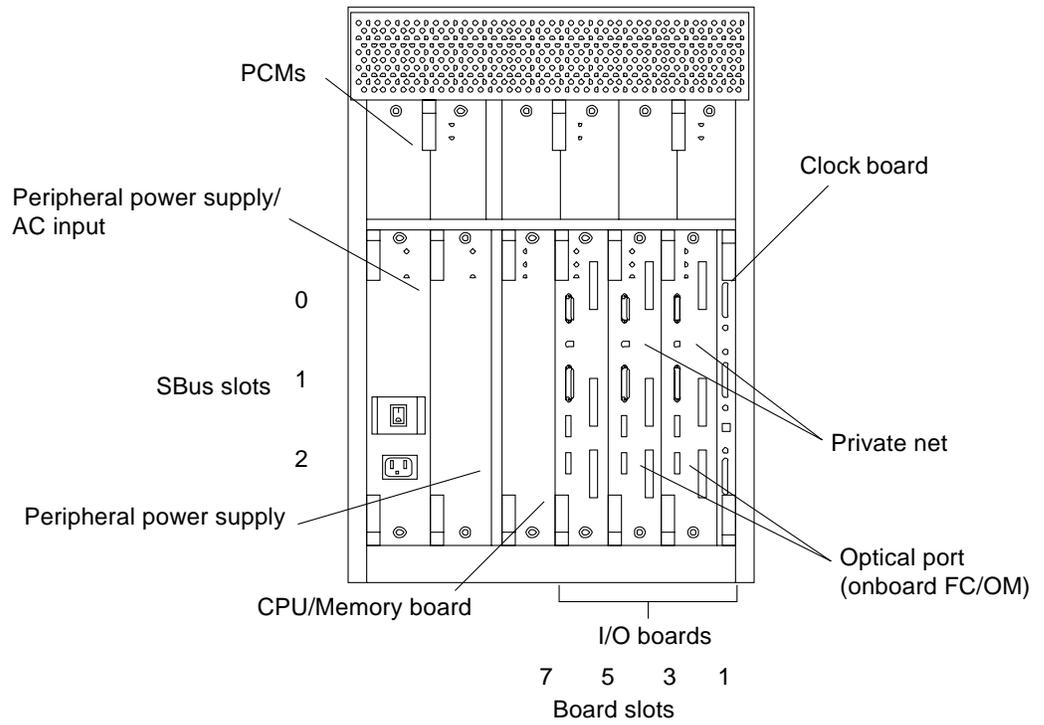


Figure 8-8 Enterprise Cluster 3000HA Card Cage Expansion Example; Typical of Node 0 and Node 1

### 8.6.2 I/O Boards

Use the appropriate section below for PDB or HA installation.

### 8.6.2.1 PDB Installation Only

#### ***I/O Boards Intended for Slots 1 and 3 (Equipped with SCI SBus Cards)***

♦ **Configure and install the SCI SBus cards.**

These will be installed into the two I/O boards each which will be installed in card cage slots 1 and 3 of node 0 and 1.

For this procedure, proceed to Appendix B, “Configuring the SCI SBus Card.” This procedure takes the installer through installation of I/O boards in card cage slots 1 and 3 of both nodes.

### 8.6.2.2 PDB and HA Installation

**1. Configure and install any other SBus cards as appropriate.**

**2. Load the I/O boards with the appropriate FC/OM modules.**

For module card installation procedures, refer to the documentation supplied with the card(s) in question or the *Enterprise 3000 System Manual*.

---

**Caution** – Install FC/OM modules in the A locations only. Do **not** install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage arrays or other storage device.

---

**3. Install the I/O boards in the card cage.**

See Figure 8-5 through Figure 8-8.

#### ***I/O Boards Intended for Slot 5 (Optional)***

♦ **Configure and install any SBus cards as appropriate and install the I/O board in the card cage.**

### 8.6.3 I/O Boards Intended for Slot 1 and (Optionally) 5

**1. Load the I/O board with the appropriate SBus cards.**

For SBus card installation procedures, refer to documentation supplied with the card(s) in question or the *Enterprise 3000 System Manual*.

**2. Load the I/O board with the appropriate FC/OM modules.**

For module card installation procedures, refer to documentation supplied with the card(s) in question or the *Enterprise 3000 System Manual*.

---

**Caution** – Install FC/OM modules in the A locations only. Do *not* install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage Arrays or other storage devices.

---

**3. Install the I/O board into the card cage slots 1 and 5.**

For I/O board installation procedures, refer to the documentation supplied with the CPU/Memory boards or the *Enterprise 3000 System Manual*.

**4. If the third I/O board is not installed, fill the empty slot with a filler panel.**

See Figure 8-9.

**5. Install the I/O board in the card cage.**

See Figure 8-5 through Figure 8-8.

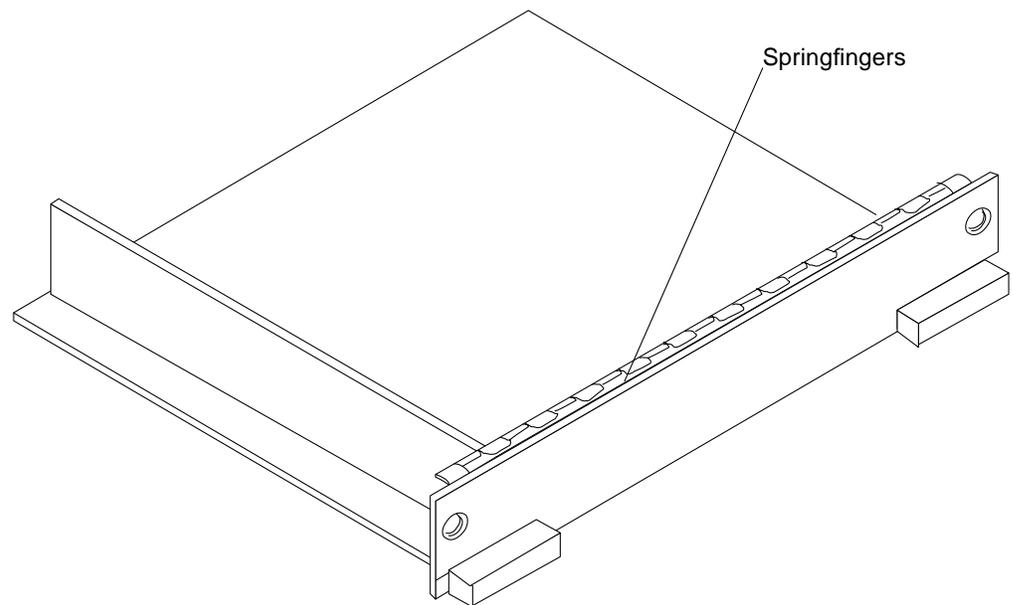


Figure 8-9 Filler Panel

### 8.6.4 Clock Board

1. **The clock board must be installed in the clock board slot to the right of the I/O boards.**

For clock board installation procedures, refer to documentation supplied with the card(s) in question or the *Enterprise 3000 System Manual*.

### 8.6.5 Node 1 Card Cage

1. **Repeat the instructions in Section 8.6 for node 1.**

## 8.7 Cabling System Components

Network cabling is presented in Table 8-2. Procedures for connecting each cable follow the table.

**Note** – Table 8-2 does not cover fiber-optic cabling. For fiber-optic cable connections, see Table 8-3.

*Table 8-2 Cable Connections (Except Fiber-Optic)*

System	Board	From Node 0	From Node 1	To	Interface Type
HA	I/O slot 1	Onboard hme		Node 1 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
		Onboard SCSI		Wide SCSI terminator	Wide SCSI
			Onboard SCSI	Wide SCSI terminator	Wide SCSI
		Public net SBus card in slot 1		Public net	Ethernet or FDDI
			Public net SBus card in slot 1	Public net	Ethernet or FDDI
		Install terminator on SCSI port	Install terminator on SCSI port		Wide SCSI
Public net SBus card in slot 1		Public net	Ethernet or FDDI		
I/O slot 3	Onboard hme		Node 1 onboard hme on I/O board 2	RJ-45/TPE private net <sup>1</sup>	
		Onboard hme	Node 0 onboard hme on I/O board	RJ-45/TPE private net <sup>1</sup>	
PDB		SCI SBus port		Node 1 SCI SBus port	SCI cable
			SCI SBus card	Node 0 SCI SBus port	SCI cable
All	Clock Board	Serial A		Terminal concentrator port 2	Serial
			Serial A	Terminal concentrator port 3	Serial
	Other	Administration workstation Serial A		Terminal concentrator port 1	Serial
Administration workstation Ethernet port			Primary Ethernet network	AUI or RJ-45	

1. Category 5 twisted-pair private net cable, part number 530-2149 (1-meter) or 530-2150 (5-meter).

## 8.7.1 Cabling the Administration Workstation



**Warning** – Do not plug a keyboard directly into a host I/O board. If a keyboard is plugged into a I/O 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 I/O 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 8-10.
2. **Plug the other end into the administration workstation RS-232 connector.**

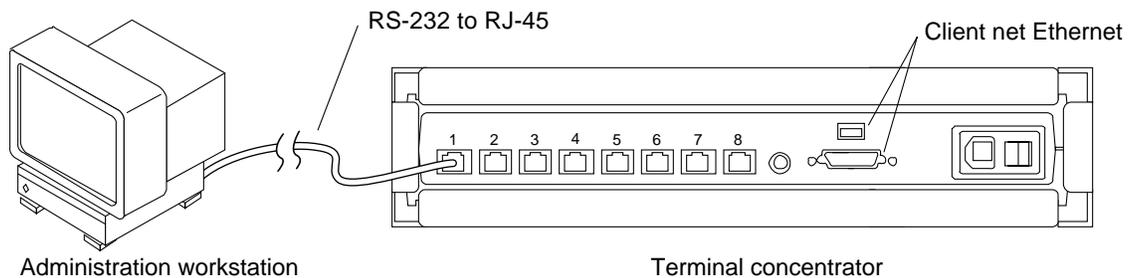


Figure 8-10 Connecting the Administration Workstation

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

## 8.7.2 Connecting the Terminal Concentrator

Using the 530-2152 (5-Meter) or 530-2151 (1-Meter) cable, proceed as follows:

1. **Connect Node 0.**
  - a. **Plug the DB25 end of the cable into the Serial A port on the clock board in node 0.**  
See Figure 8-11.

- b. **Plug the RJ-45 end of this cable into the terminal concentrator, port 2.**  
See Figure 8-12.

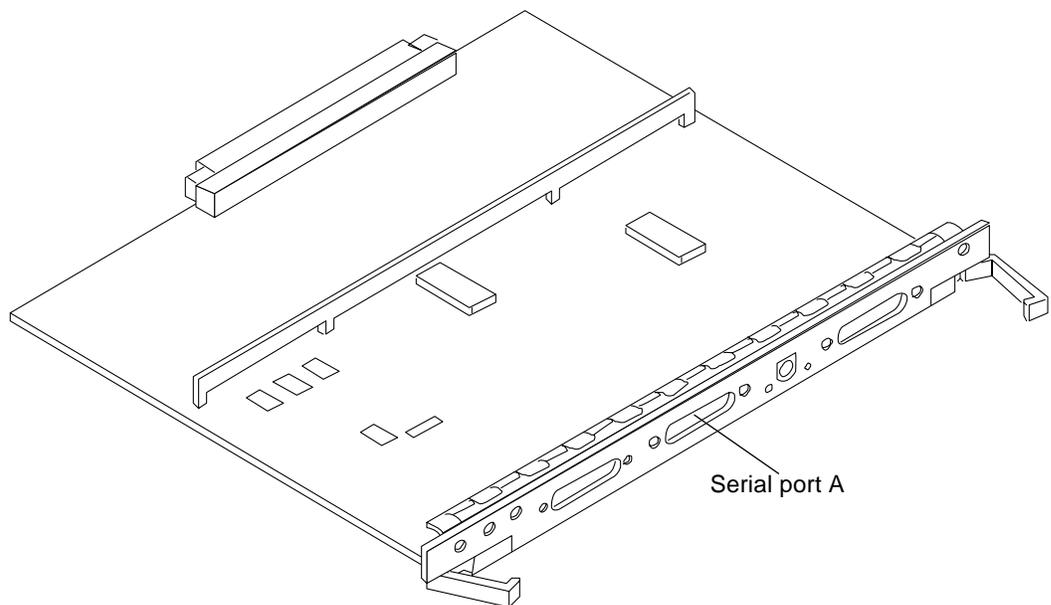


Figure 8-11 Serial Port A on the Clock Board

- 2. **Connect Node 1.**
  - a. **Plug the DB25 end of the cable into the Serial A port on the clock board in node 1.**
  - b. **Plug the RJ-45 end of this cable into the terminal concentrator, port 3.**  
See Figure 8-12.
- 3. **Connect the public net Ethernet.**  
Plug the public net Ethernet cable into the RJ-45 or DB25 connector as appropriate on the terminal concentrator.

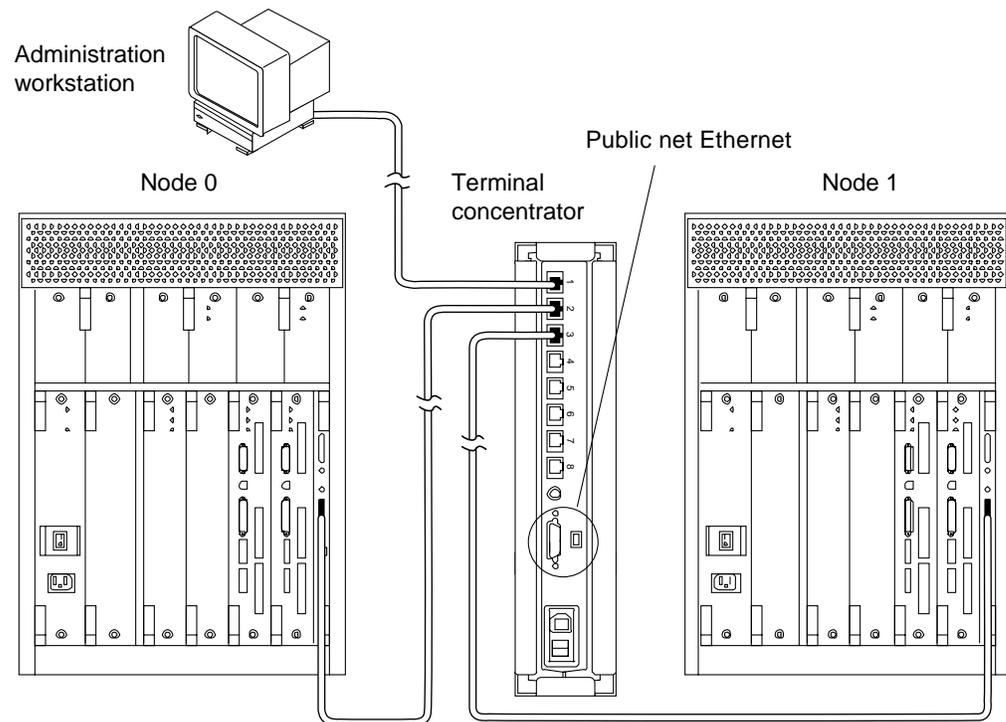


Figure 8-12 Node Interface to the Terminal Concentrator

### 8.7.3 Connecting Node 0 to Node 1—Ethernet

Using the Ethernet cables, connect one node to the other.

#### 8.7.3.1 First Cable

1. Connect one end of the Ethernet cable to the onboard Ethernet port on I/O board slot 1. See Figure 8-13.
2. Connect the other end to the Ethernet port on board 1 in the other node.

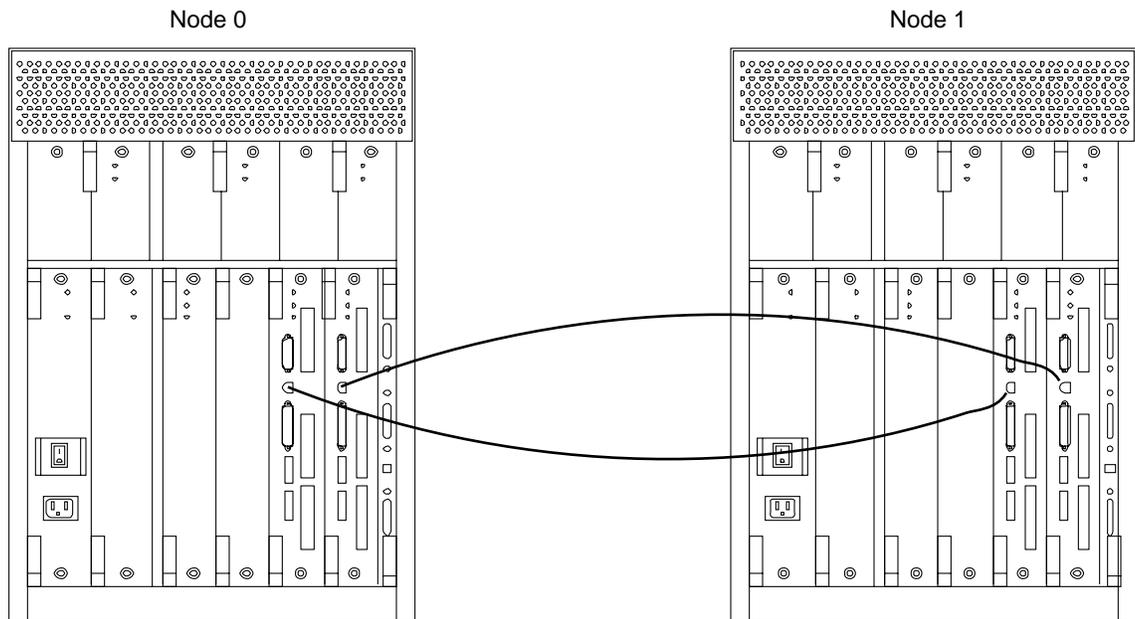


Figure 8-13 Node-to-Node Ethernet Connection

### 8.7.3.2 Second Cable

1. Connect one end of the Ethernet cable to the Ethernet port on I/O board slot 3.
2. Connect the other end to the Ethernet port on I/O board slot 3.

### 8.7.4 Connecting Node 0 to Node 1—SCI Host and Cables

Connect one Enterprise Cluster 3000 node to the other.

---

**Note** – Node-to-node connection is made using the appropriate SCI cables:  
 530-2360, 2 meter  
 530-2361, 5 meter  
 530-2362, 10 meter.

---

### 8.7.4.1 First Cable

1. Connect one end of the SCI cable to the SCI SBus card in I/O board slot 1, SBus position 0. See Figure 8-14.
2. Connect the other end to the I/O board slot 1, SBus position 0 in the other node.

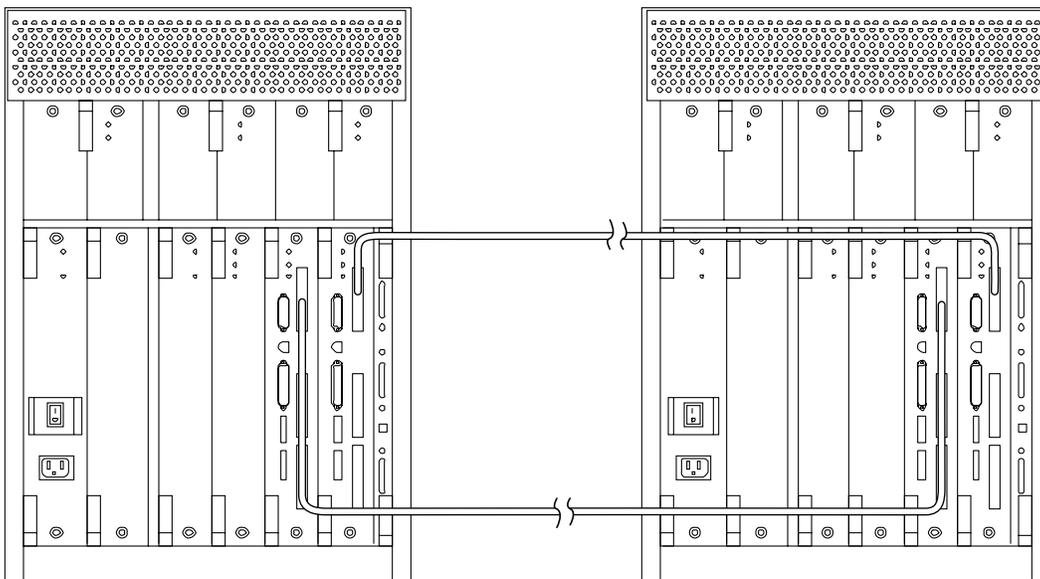


Figure 8-14 Node-to-Node SCI Connection

### 8.7.4.2 Second Cable

1. Connect one end of the SCI cable to the SCI SBus card in I/O board slot 3, SBus position 0. See Figure 8-14.
2. Connect the other end to the identical SCI SBus card in I/O board slot 3, SBus position 0 in the other node.

### 8.7.5 Remaining Cables

- ◆ Connect all remaining cables. Table 8-2 on page 8-14 summarizes cables that can be connected at this time. Your system may have more network cables than are listed in this table.

### 8.7.6 Internal SCSI Devices

1. I/O board in slot 1: install a terminator on the SCSI connector of the I/O board panel.  
See Figure 8-15 for connector location.

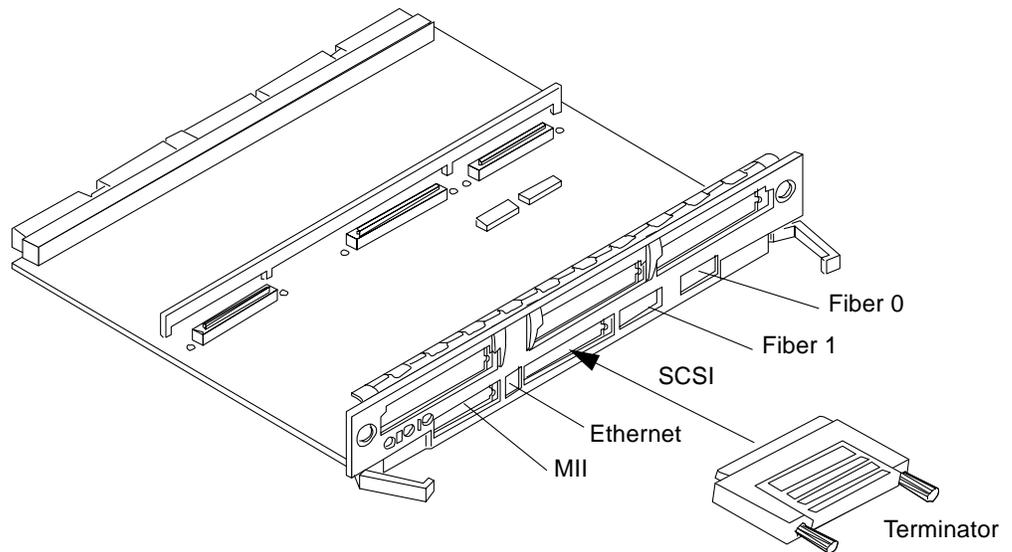


Figure 8-15 SCSI Terminator Installation on the I/O Board

---

## 8.7.7 Connecting the SPARCstorage Arrays

### 8.7.7.1 Installing the Second FC/OM Optical Module in all SPARCstorage Arrays

- ◆ **Install the second module in the array using instructions provided with the module.**

The arrays are delivered with one FC/OM optical module installed.

### 8.7.7.2 Labeling Fiber-Optic Cables

- ◆ **Label the fiber-optic cables prior to installation.**

Labeling ensures accurate installation and eases system reconfiguration and expansion later.

Put labels on both ends of each cable, with the node and SPARCstorage Array information imprinted on it. Use Figure 8-16 through Figure 8-18 as guides.

### 8.7.7.3 Installing the Fiber-Optic Cables

- 1. Plug one end of the fiber cable into the FC/OM in the I/O board.**  
See Figure 8-19 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 8-3 on page 8-26 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** – Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

---

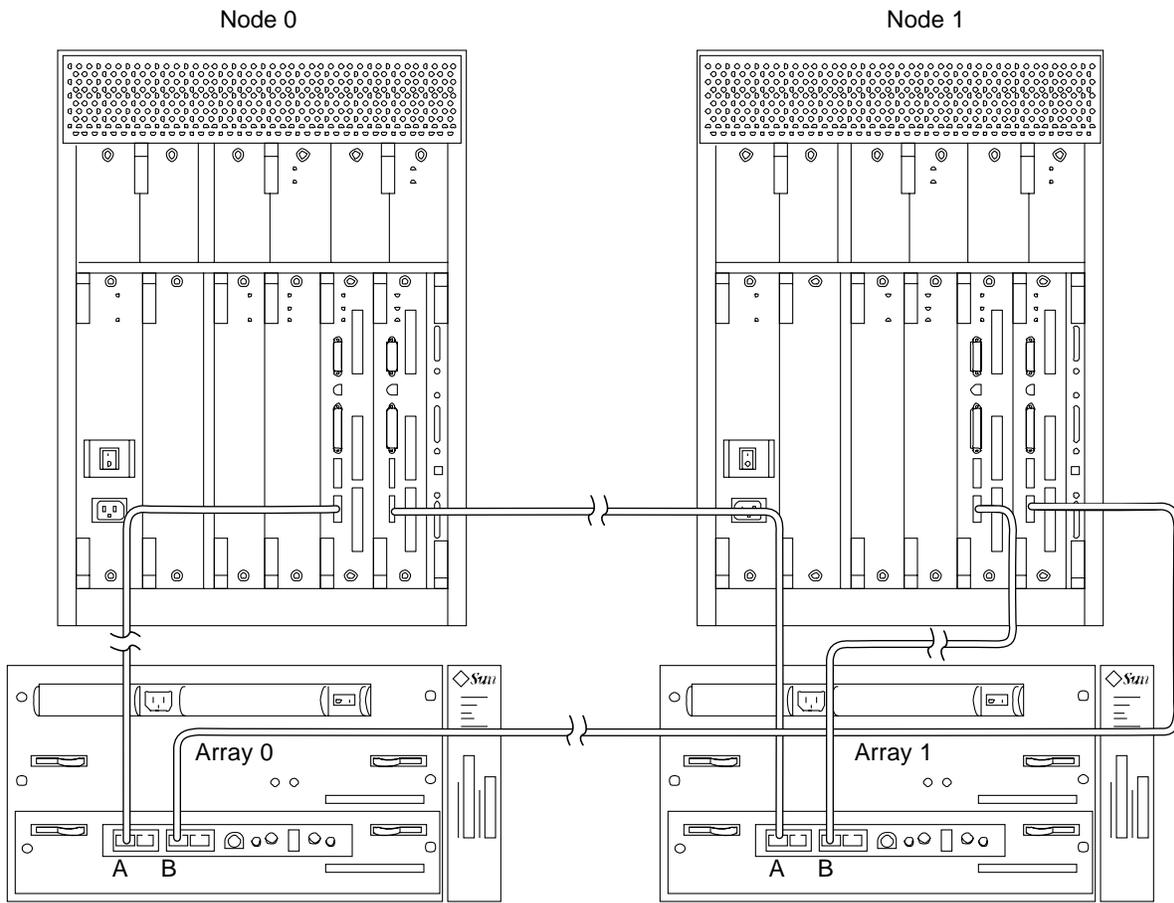


Figure 8-16 SPARCstorage Array 0 and 1 Connection Example

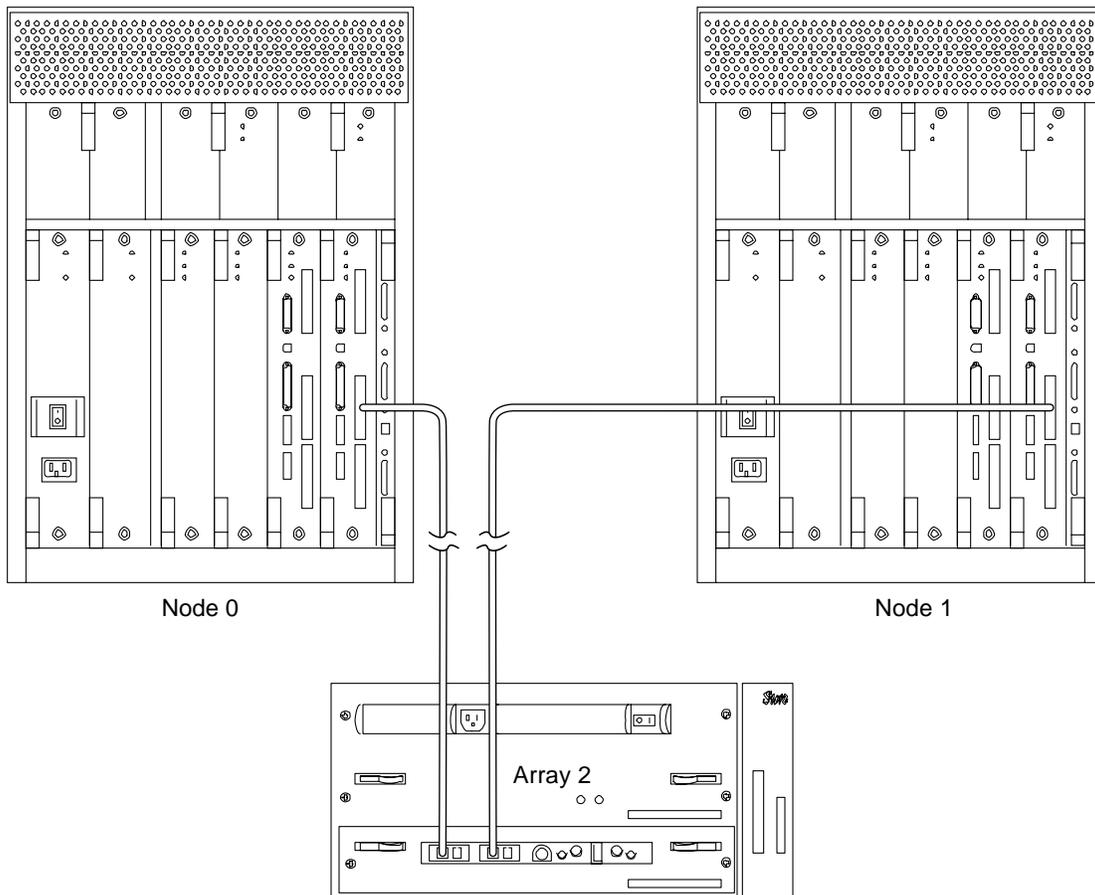


Figure 8-17 SPARCstorage Array 2 Connection Example

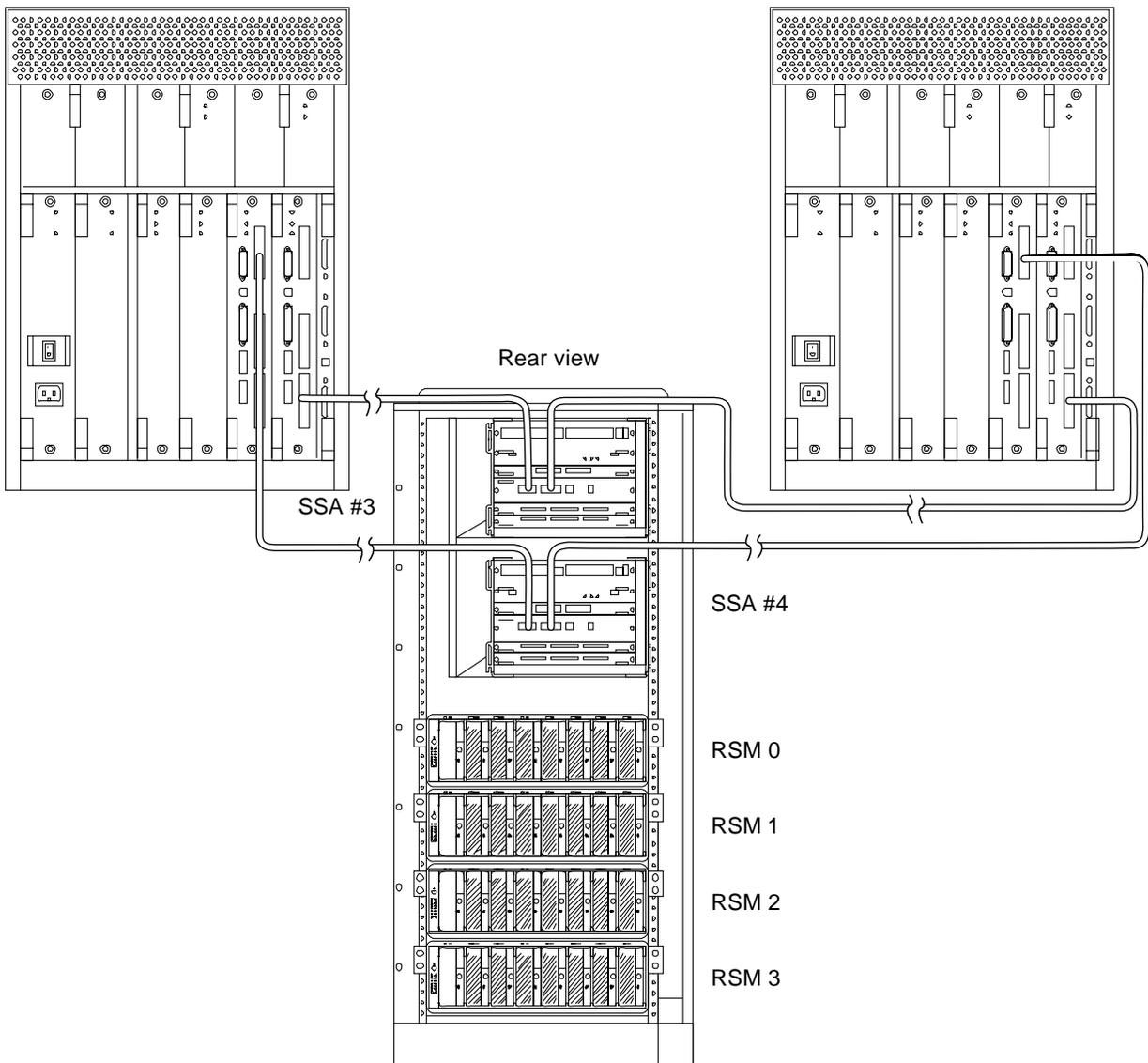


Figure 8-18 SPARCstorage Array 3 and 4 (SPARCstorage Array 200 Series) Connection Example

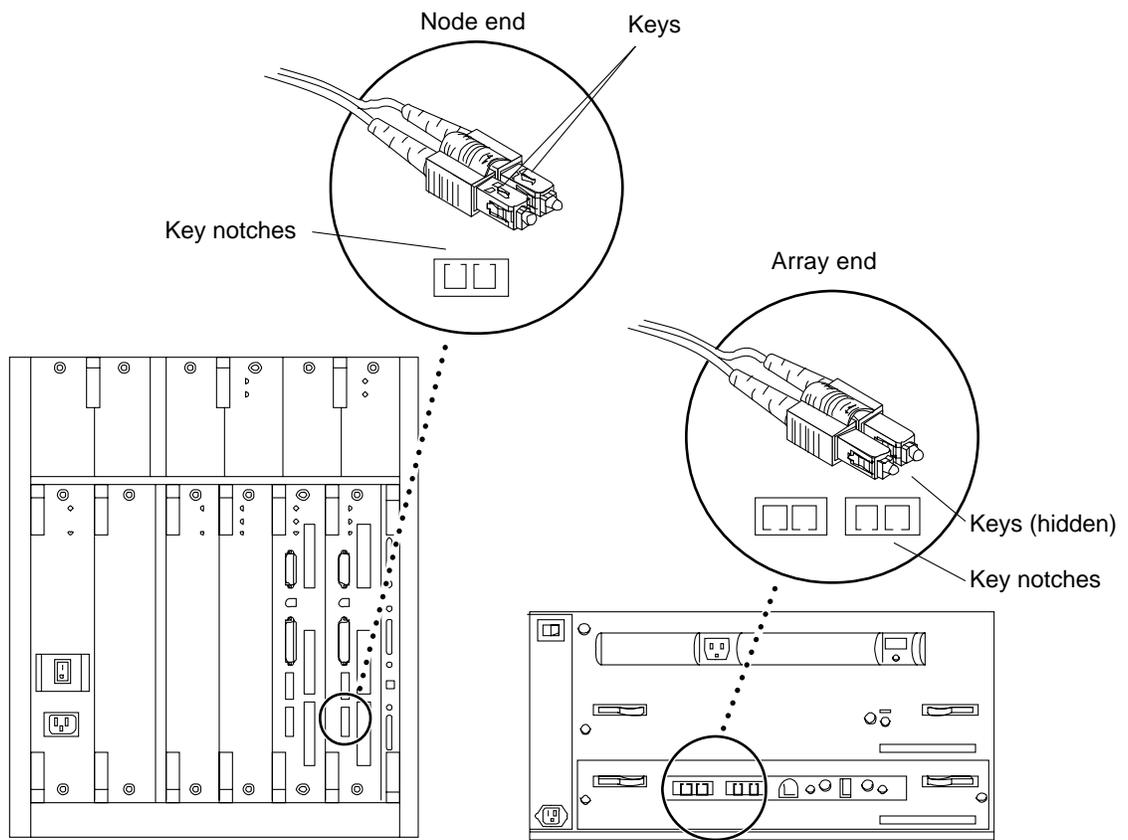


Figure 8-19 SPARCstorage Array Fiber Cable Connection

Table 8-3 Node to SPARCstorage Array Cable Connection Example

I/O Board	From Node 0 FC/OM	From Node 1 FC/OM	To SPARCstorage Array
1	Onboard		0 port A
		Onboard	0 port B
3	Onboard		1 port A
		Onboard	1 port B
1	SBus slot 1		2 port A
		SBus slot 1	2 port B
3	SBus slot 1		3 port A
		SBus slot 1	3 port B
1	SBus slot 2		4 port A
		SBus slot 2	4 port B

## 8.8 Closing the Cabinet

♦ **Replace all panels on the cabinet.**

See Chapter 7, “Internal Access and Leveling,” for procedures.

Proceed to Chapter 11 for terminal concentrator configuration procedures.

# Ultra Enterprise Cluster 4000 Hardware Installation



<b>Do these tasks in the order listed</b>	
<i>Preparing the System</i>	<i>page 9-1</i>
<i>Installing the SPARCstorage Array Systems</i>	<i>page 9-3</i>
<i>Installing the Terminal Concentrator</i>	<i>page 9-5</i>
<i>Configuring the Card Cages</i>	<i>page 9-5</i>
<i>Cabling System Components</i>	<i>page 9-12</i>
<i>Closing the Cabinet</i>	<i>page 9-26</i>

## 9.1 Preparing the System

- 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 system chassis to their designated installation locations.**  
For site planning guidelines, See Chapter 5, “Ultra Enterprise Cluster Configurations.”
- 1. Insert the key provided with your system into the front panel key switch. Turn it to the Standby position (fully counterclockwise).**  
See Figure 9-1.

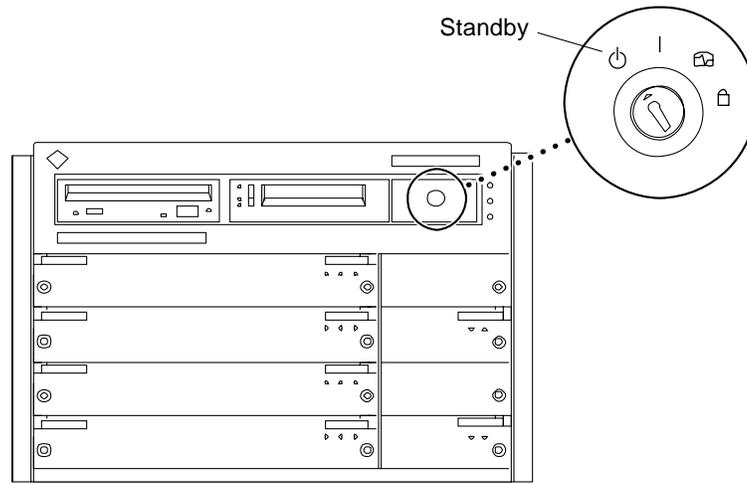


Figure 9-1 Key Switch in the Standby Position

2. **Set the AC power switch to the OFF position.**  
See Figure 9-2.
3. **Connect the female end of the power cord into the AC connector.**  
This connector is to the left of the AC power switch on the system rear.

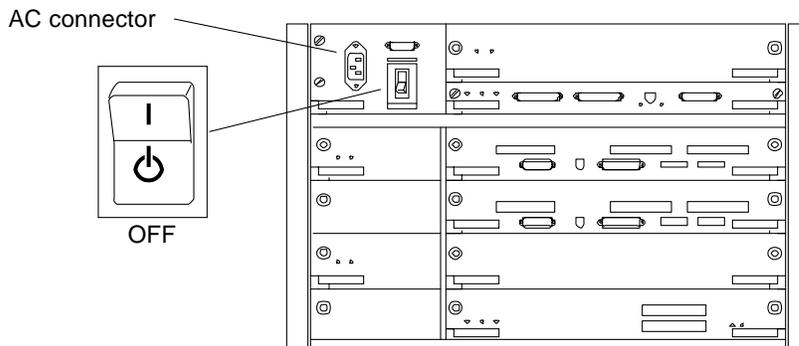


Figure 9-2 AC Power Switch and AC Connector

4. **Connect the male end of the power cord into a grounded wall outlet.**  
The outlet must be a 100-240 VAC 15A 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.

## 9.2 Installing the SPARCstorage Array Systems

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

### 9.2.1 Preparing the SPARCstorage Arrays

1. **Locate the DIAG switch on the array rear panel.**  
See Figure 9-3.
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.

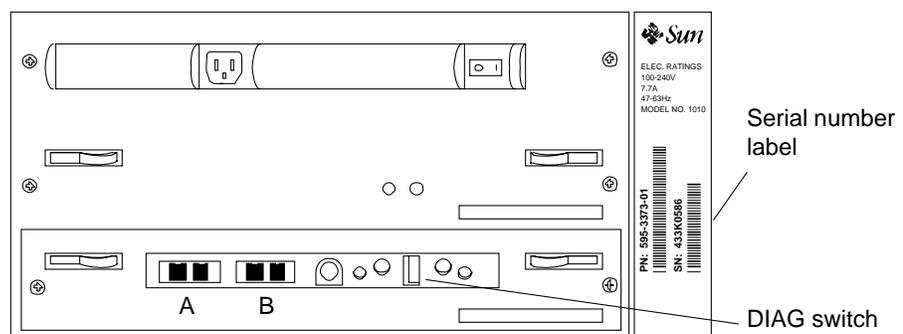


Figure 9-3 SPARCstorage Array Voltage Rating on the Serial Number Label

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, and lists current requirements at nominal line voltage for a cabinet in maximum configuration.

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

### 9.2.2 Connecting the Power

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

Connect a power cord at the rear of each chassis (see Figure 9-4).

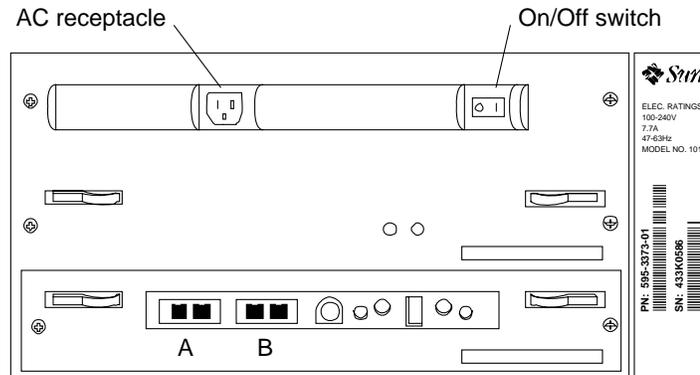


Figure 9-4 SPARCstorage Array AC Power Connector and Power Switch

**2. Plug the power cords into the power source.**

Route the power cords to the designated power source. Dress the power cords as required. Roll any excess cord and secure it using cable ties.

**3. Turn on the AC power switch on all SPARCstorage Arrays.**

See Figure 9-4.

---

### 9.3 *Installing the Terminal Concentrator*

Install the terminal concentrator in its designated installation place.

### 9.4 *Power Cooling Modules (PCMs)*

Each PCM provides power and cooling to the one or two boards installed adjacent to it. For this reason, every board or board-pair must be supported by an adjacent PCM.

- ◆ **Ensure that a PCM is installed for each board or board-pair to be installed in the card cage. Install additional PCMs as required to meet this requirement.**

---

**Note** – To adhere to cooling and power requirements, one power/cooling module (PCM) must be installed for every two boards, plus an additional one for redundancy. Install the PCMs adjacent to populated board slots to ensure the fan in the PCM cools the associated boards.

---

### 9.5 *Configuring the Card Cages*

For instructions on removing I/O boards, refer to the documentation supplied with the I/O boards or the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Note** – Logically there is no difference between the board slots in the front or rear of the card cage, and each slot can accept any board type. For this PDB system, however, install CPU/Memory boards in the front slots, and I/O and disk boards in the rear slots to facilitate proper cabling. Install the first I/O board in slot 1. This is the only slot connected to the onboard SCSI devices.

---

---

**Note** – Install a filler panel in all empty slots to ensure proper cooling and to provide proper bus termination.

---

### 9.5.1 CPU/Memory Boards

1. Install the CPU/Memory boards into the card cage as viewed from the front. Install them from lowest (0) through the highest (14) as appropriate. For CPU/Memory board installation procedures, refer to the documentation supplied with the CPU/Memory boards or the *Ultra Enterprise 6000/5000/4000 System Manual*. See Figure 9-5 and Figure 9-6 or Figure 9-7 and Figure 9-8 for PDB and HA respectively.
2. Fill all unused, even-numbered slots with a filler panel.

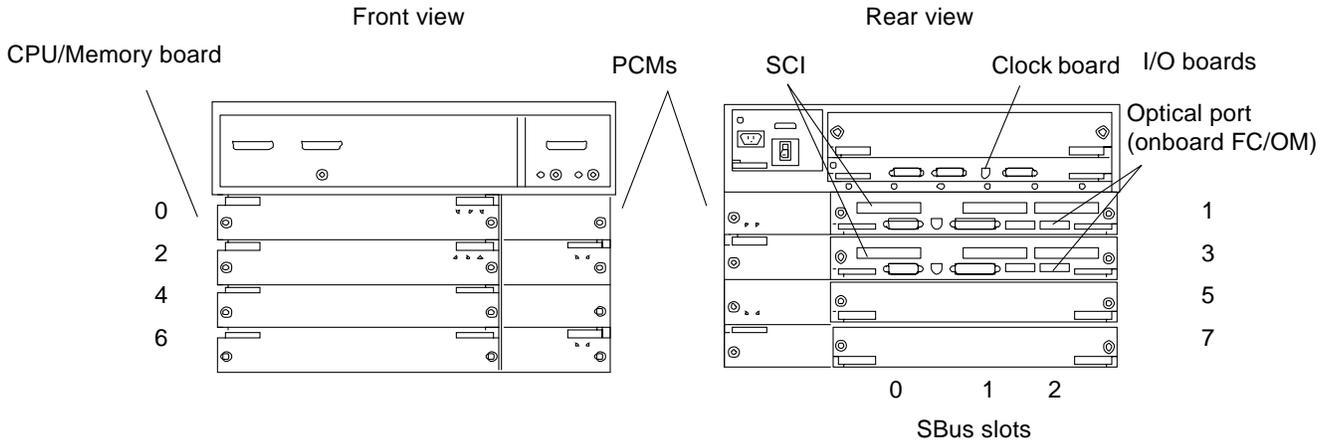


Figure 9-5 Ultra Enterprise Cluster 4000PDB Card Cage Minimum Population (Typical of Node 0 and 1)

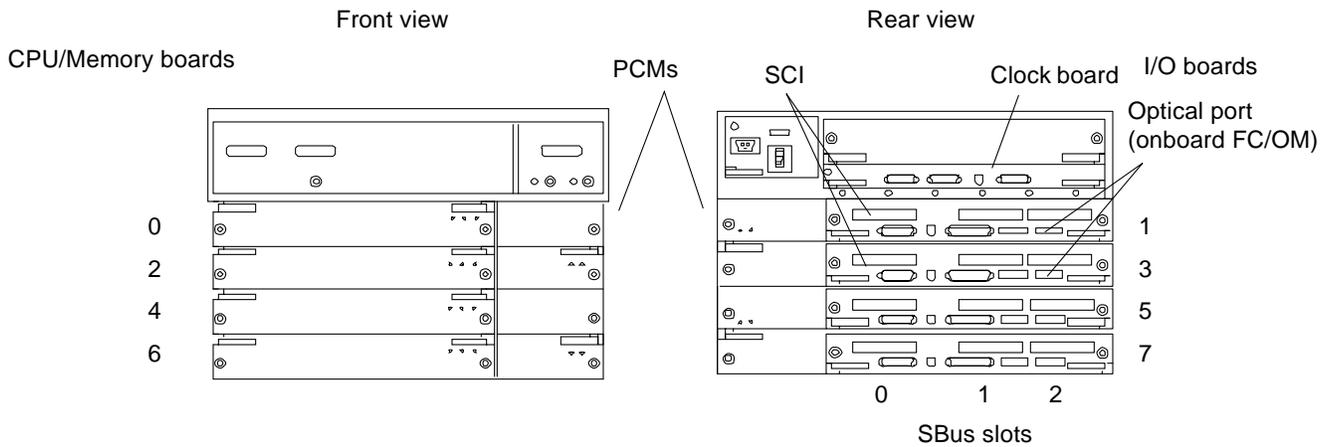


Figure 9-6 Ultra Enterprise Cluster 4000PDB Card Cage Expansion Example (Typical of Node 0 and 1)

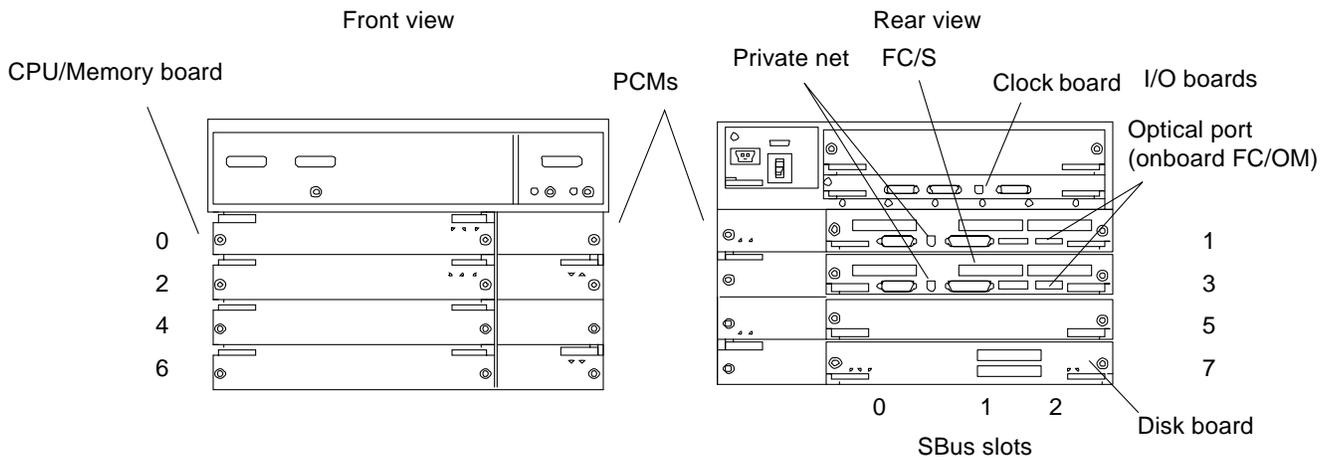


Figure 9-7 Ultra Enterprise Cluster 4000HA Card Cage Minimum Population (Typical of Node 0 and 1)

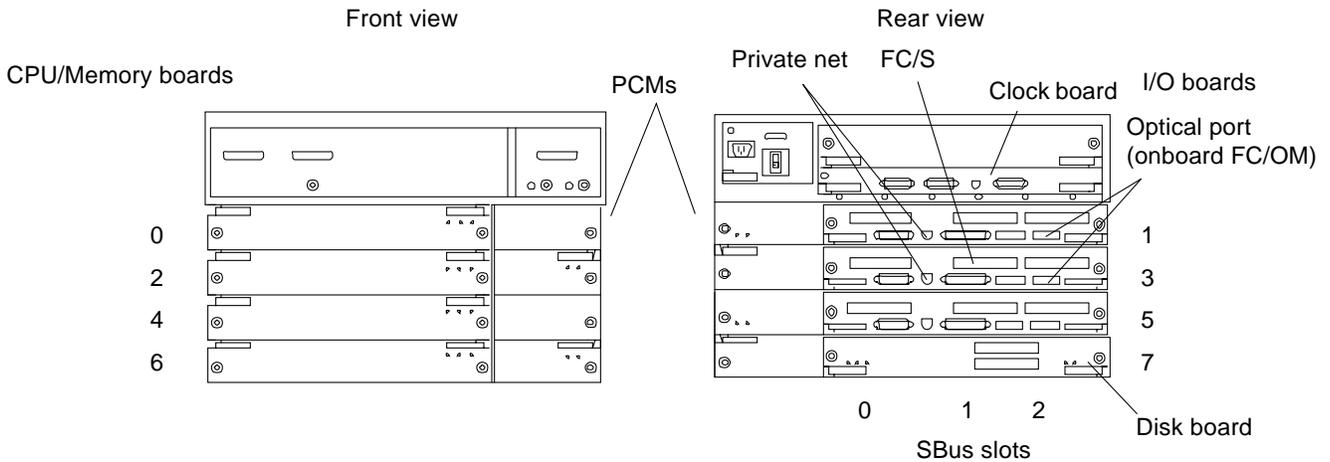


Figure 9-8 Ultra Enterprise Cluster 4000HA Card Cage Expansion Example (Typical of Node 0 and 1)

## 9.5.2 I/O Boards

Use the appropriate section below for PDB or HA installation.

**Caution** – Install FC/OM modules in the A locations only. Do **not** install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage arrays or other storage device.

### 9.5.2.1 PDB Installation Only

#### **I/O Boards Intended for Slots 1 and 3 (Equipped with SCI SBus Cards)**

##### ◆ **Configure and install the SCI SBus cards.**

These will be installed into the two I/O boards each which will be installed in card cage slots 1 and 3 of node 0 and 1.

For this procedure, proceed to Appendix B, “Configuring the SCI SBus Card.” This procedure takes the installer through installation of I/O boards in card cage slots 1 and 3 of both nodes.

---

### 9.5.2.2 PDB and HA Installation

1. **Configure and install any other SBus cards as appropriate.**
2. **Load the I/O boards with the appropriate OLC modules.**  
For module card installation procedures, refer to the documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Caution** – Install FC/OM modules in the A locations only. Do **not** install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage arrays or other storage device.

---

3. **Install the I/O boards in the card cage.**  
See Figure 9-5 through Figure 9-8.

#### ***I/O Boards Intended for Slot 5 and 7 (Optional)***

- ◆ **Configure and install any SBus cards as appropriate and install the I/O board in the card cage.**

### 9.5.3 I/O Boards Intended for Slot 1 and (Optionally) 5 and 7

1. **Load the I/O board with the appropriate SBus cards.**  
For SBus card installation procedures, refer to documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.
2. **Load the I/O board with the appropriate OLC modules.**  
For module card installation procedures, refer to documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Caution** – Install FC/OM modules in the A locations only. Do *not* install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage Arrays or other storage devices.

---

**3. Install the I/O board into the card cage slots 1 and 5.**

For I/O board installation procedures, refer to the documentation supplied with the CPU/Memory boards or the *Ultra Enterprise 6000/5000/4000 System Manual*.

### 9.5.4 Filler Panels

**4. Fill all unused slots with a filler panel.**

See Figure 9-9.

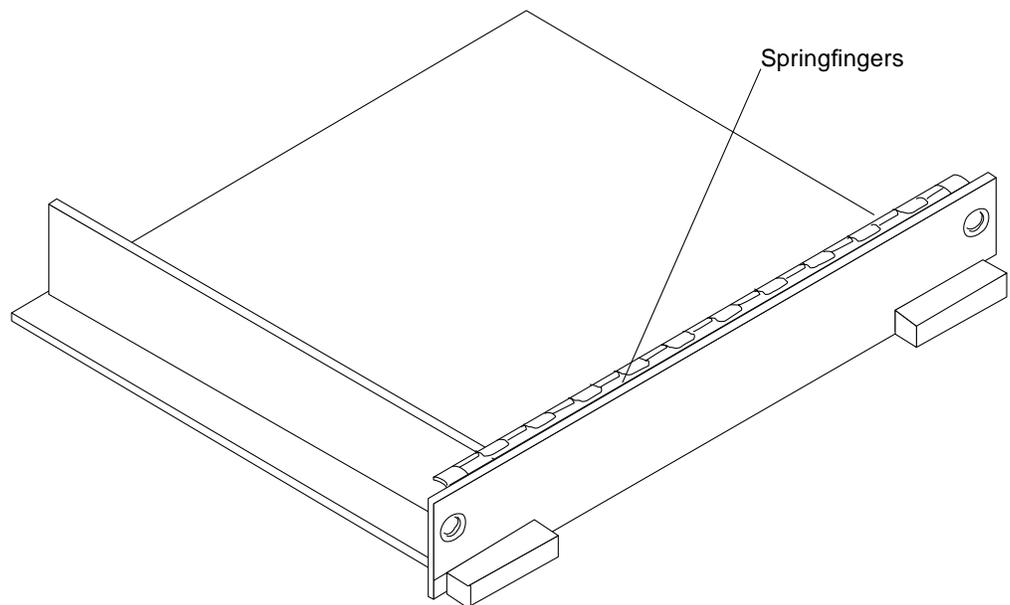


Figure 9-9 Filler Panel

### 9.5.5 Disk Board: HA System Only

**1. If your system is intended to boot from a disk board, install it in slot 7.**

For disk board installation procedures, refer to the documentation supplied with the board or in the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Note** – PDB systems boot from bootable SPARCstorage arrays.

---

- 2. Install the terminator on the bottom (OUT) SCSI II port of the disk board in slot 7.**  
See Figure 9-10.

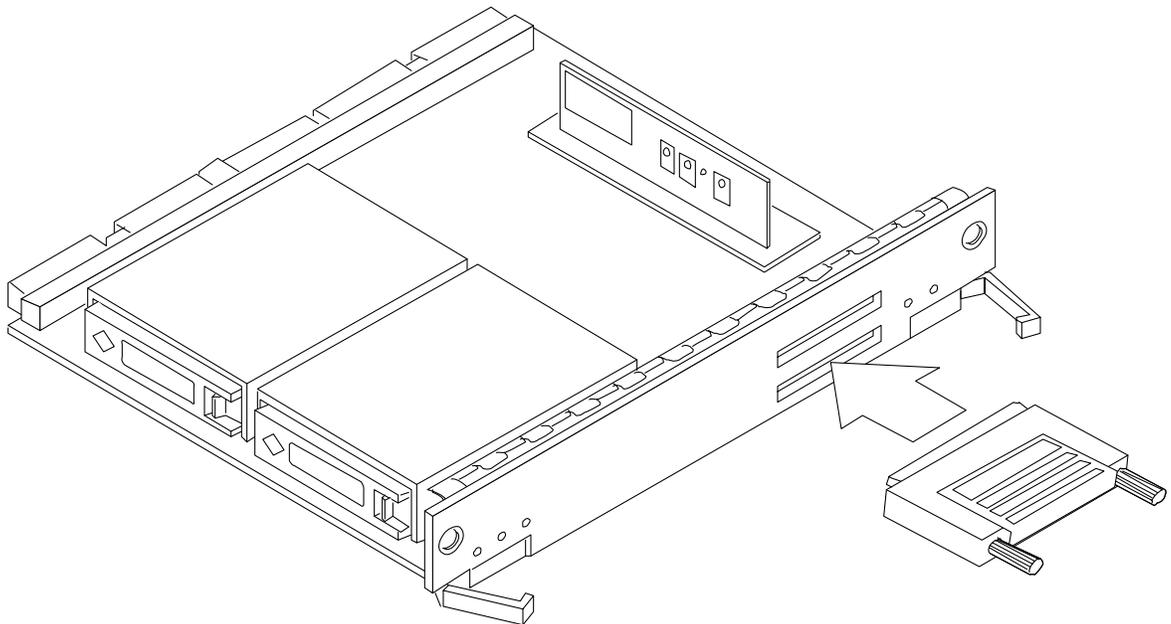


Figure 9-10 Installing the Terminator on the Disk Board

### 9.5.6 Clock Board

- 1. The clock board is installed in the clock board slot above the I/O boards.**  
For clock board installation procedures, refer to documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

## 9.6 Node 1 Card Cage

- 1. Repeat the instructions in Section 9.5 above for node 1.**

## 9.7 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)

System	Board	From Node 0	From Node 1	To	Interface Type
HA	I/O slot 1	Onboard hme		Node 1 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
		Onboard SCSI		Wide SCSI terminator	Wide SCSI
			Onboard SCSI	Wide SCSI terminator	Wide SCSI
		Public net SBus card in slot 1		Public net	Ethernet or FDDI
			Public net SBus card in slot 1	Public net	Ethernet or FDDI
	Install terminator on SCSI port	Install terminator on SCSI port		Wide SCSI	
	Public net SBus card in slot 1		Public net	Ethernet or FDDI	
I/O slot 3	Onboard hme			Node 1 onboard hme on I/O board 2	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board	RJ-45/TPE private net <sup>1</sup>
PDB		SCI SBus port		Node 1 SCI SBus port	SCI cable
			SCI SBus card	Node 0 SCI SBus port	SCI cable
All	Clock Board	Serial A		Terminal concentrator port 2	Serial
			Serial A	Terminal concentrator port 3	Serial

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

System	Board	From Node 0	From Node 1	To	Interface Type
	Other	Administration workstation Serial A		Terminal concentrator port 1	Serial
		Administration workstation Ethernet port		Primary Ethernet network	AUI or RJ-45

1. Category 5 twisted-pair private net cable, part number 530-2149 (1-meter) or 530-2150 (5-meter).

### 9.7.1 Cabling the Administration Workstation



**Warning** – Do not plug a keyboard directly into a host I/O board. If a keyboard is plugged into a I/O 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 I/O 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 9-11.
2. Plug the other end into the administration workstation RS-232 connector.

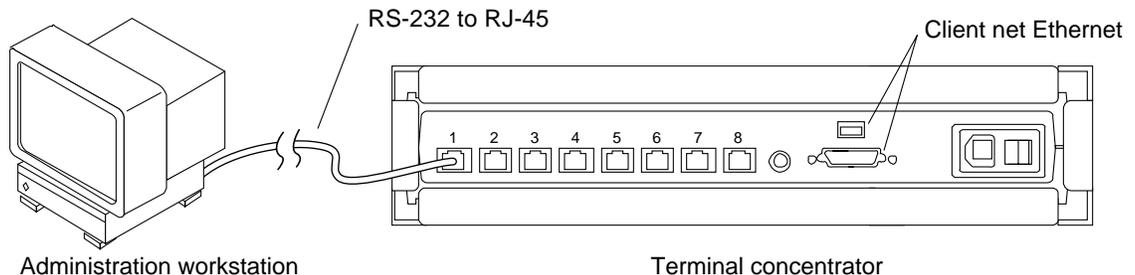


Figure 9-11 Connecting the Administration Workstation

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

### ***9.7.2 Connecting the Terminal Concentrator***

Using the 530-2152 (5-Meter) or 530-2151 (1-Meter) cable, proceed as follows:

**1. Connect Node 0.**

**a. Plug the DB25 end of the cable into the Serial A port on the clock board in node 0.**

See Figure 9-12.

**b. Plug the RJ-45 end of this cable into the terminal concentrator, port 2.**

**2. Connect Node 1.**

**a. Plug the DB25 end of the cable into the Serial A port on the clock board in node 1.**

**b. Plug the RJ-45 end of this cable into the terminal concentrator, port 3.**

**3. Connect the public net Ethernet.**

Plug the public net Ethernet cable into the RJ-45 or DB25 connector as appropriate on the terminal concentrator.

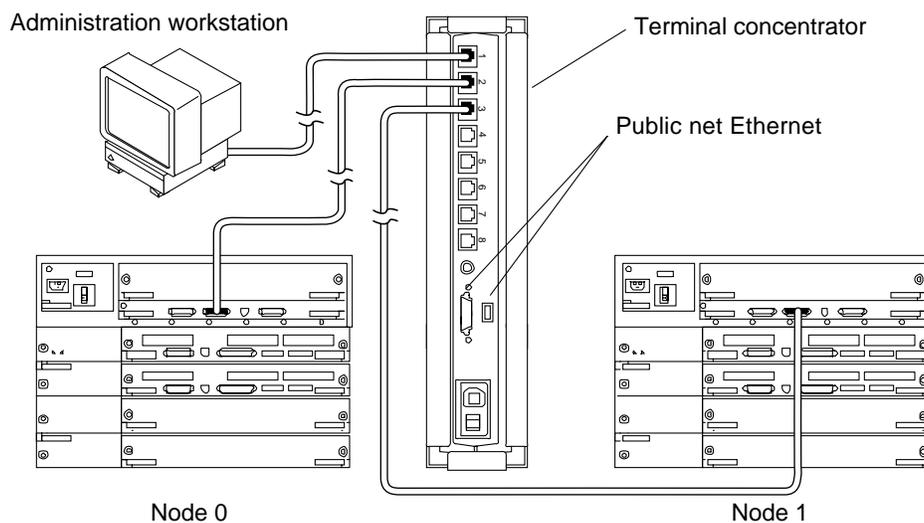


Figure 9-12 Node Interface to the Terminal Concentrator

### 9.7.3 Connecting Node 0 to Node 1—Ethernet

Using the Ethernet cables, connect one node to the other.

#### 9.7.3.1 First Cable

1. **Connect one end of the Ethernet cable to the onboard Ethernet port on I/O board slot 1.**  
See Figure 9-13.
2. **Connect the other end to the Ethernet port on board 1 in the other node.**

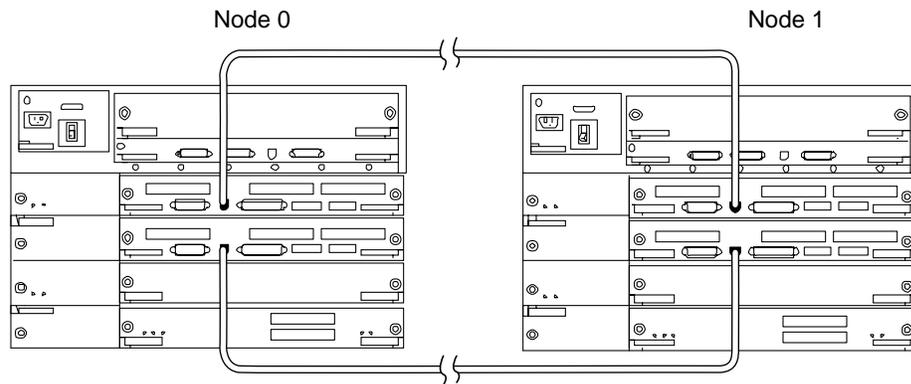


Figure 9-13 Node-to-Node Ethernet Connection

### 9.7.3.2 Second Cable

1. Connect one end of the Ethernet cable to the Ethernet port on I/O board slot 3.  
See Figure 9-13.
2. Connect the other end to the Ethernet port on I/O board slot 3.

## 9.7.4 Connecting Node 0 to Node 1—SCI Host and Cables

Connect one Ultra Enterprise Cluster 4000 node to the other.

---

**Note** – Node-to-node connection is made using the appropriate SCI cables:  
 530-2360, 2 meter  
 530-2361, 5 meter  
 530-2362, 10 meter.

---

### 9.7.4.1 First Cable

1. Connect one end of the SCI cable to the SCI SBus card in I/O board slot 1, SBus position 0.  
See Figure 9-14.

2. Connect the other end to the I/O board slot 1, SBus position 0 in the other node.

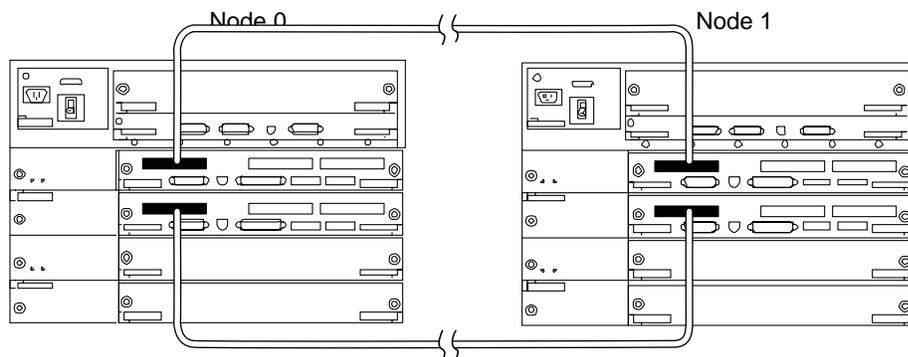


Figure 9-14 Node-to-Node SCI Connection

#### 9.7.4.2 Second Cable

1. Connect one end of the SCI cable to the SCI SBus card in I/O board slot 3, SBus position 0. See Figure 9-14.
2. Connect the other end to the identical SCI SBus card in I/O board slot 3, SBus position 0 in the other node.

#### 9.7.5 Remaining Cables

- ◆ Connect all remaining cables. Table 9-2 on page 9-12 summarizes cables that can be connected at this time. Your system may have more network cables than are listed in this table.

#### 9.7.6 Internal SCSI Tray

If a disk board is installed, skip this procedure and proceed to Section 9.7.7.

1. **I/O board in slot 1: install a terminator on the SCSI connector of the I/O board panel.**  
See Figure 9-15 for connector location.

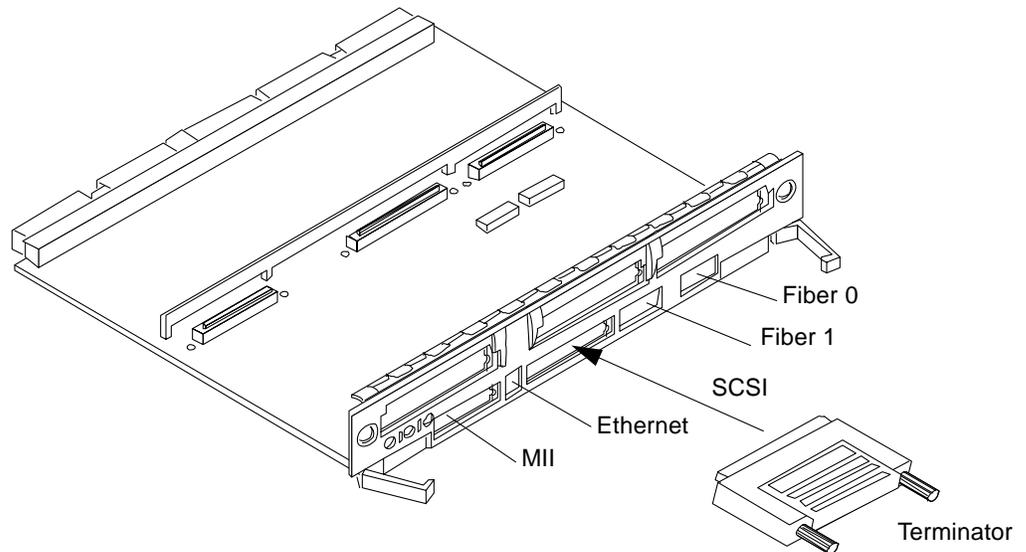


Figure 9-15 SCSI Terminator Installation on the I/O Board

### 9.7.7 Disk Board (HA Only)

1. **I/O board in slot 1: connect one end of the SCSI cable to the onboard SCSI port.**  
See Figure 9-16 for connector locations.
2. **Connect the other end to the SCSI IN port on the disk board.**
3. **Install a terminator on the SCSI OUT port on the disk board.**

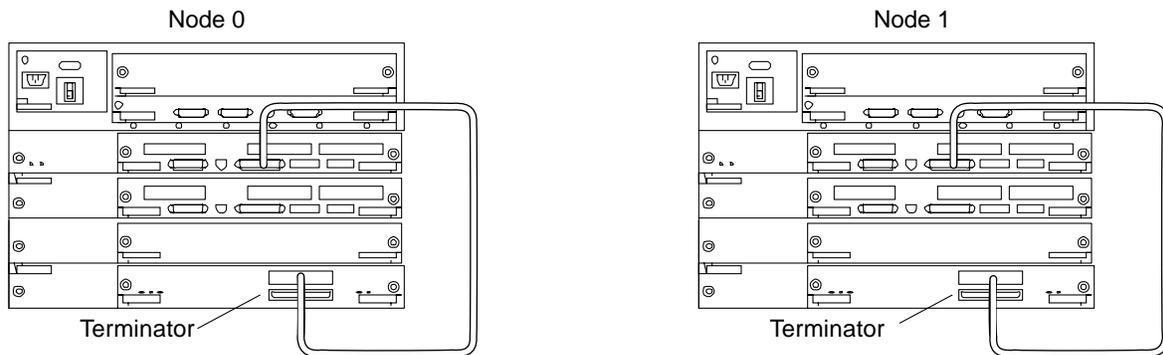


Figure 9-16 Disk Board Connection

## 9.7.8 Connecting the SPARCstorage Arrays

### 9.7.8.1 Installing the Second FC/OM Optical Module in all SPARCstorage Arrays

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

### 9.7.8.2 Labeling Fiber-Optic Cables

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

Put labels on both ends of each cable, with the node, cabinet, and elevation information imprinted on it. Use Figure 9-17 through Figure 9-20 as guides.

### 9.7.8.3 Installing the Fiber-Optic Cables

1. **Plug one end of the fiber cable into the FC/OM in the I/O board.**  
See Figure 9-21 and Figure 9-22 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 on page 9-26 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** – Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

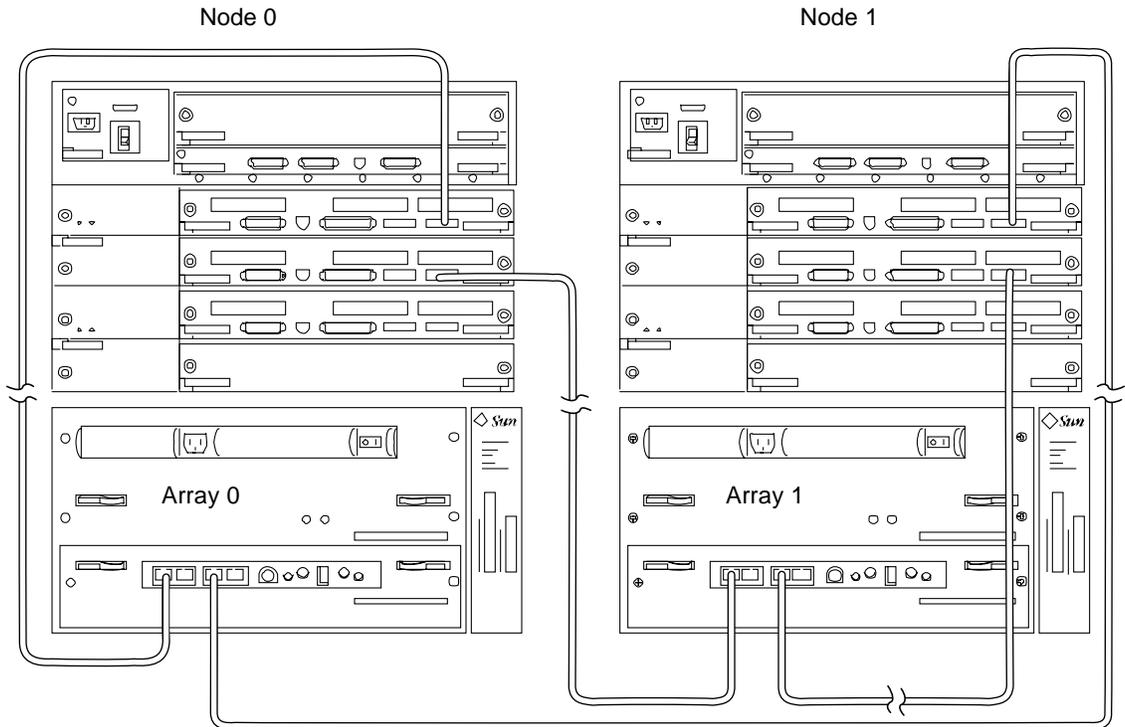


Figure 9-17 SPARCstorage Array 0 and 1 Connection Example

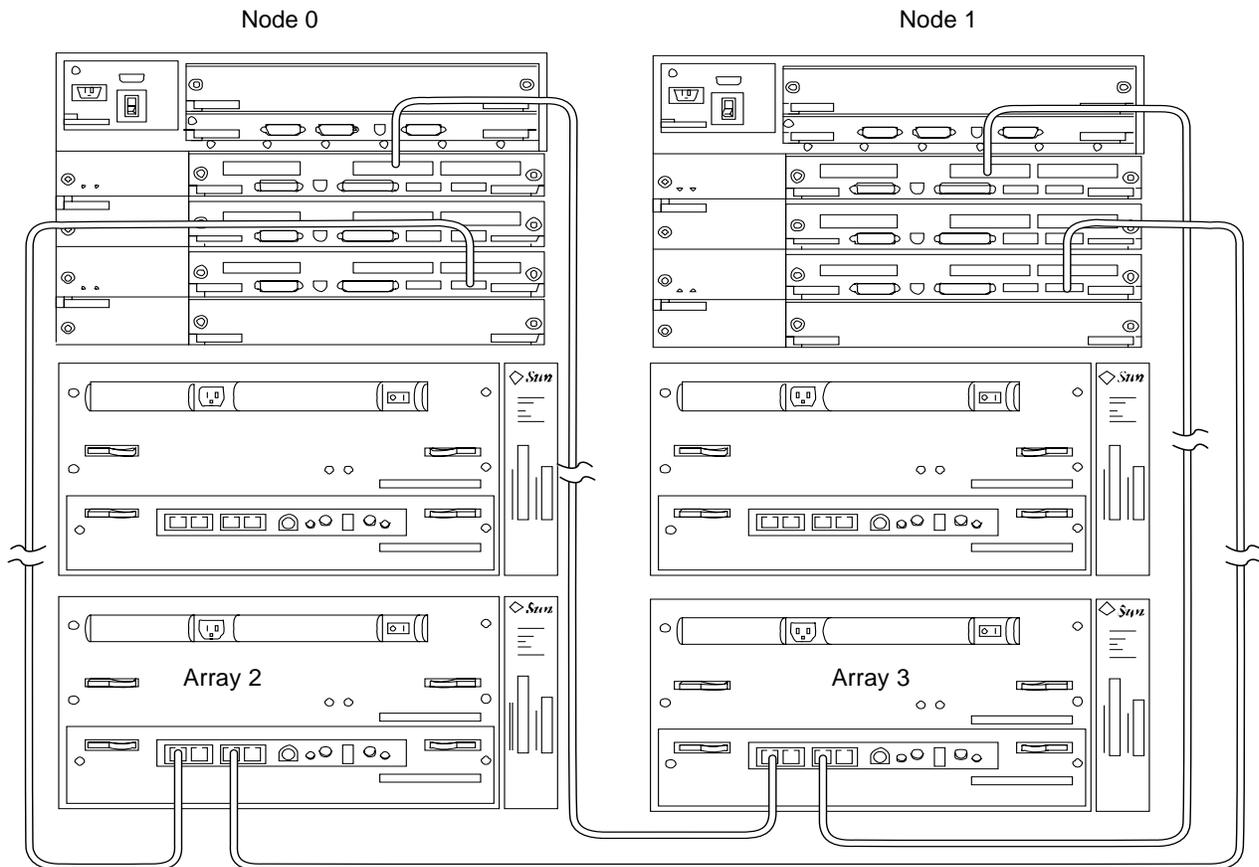


Figure 9-18 SPARCstorage Array 2 and 3 Connection Example

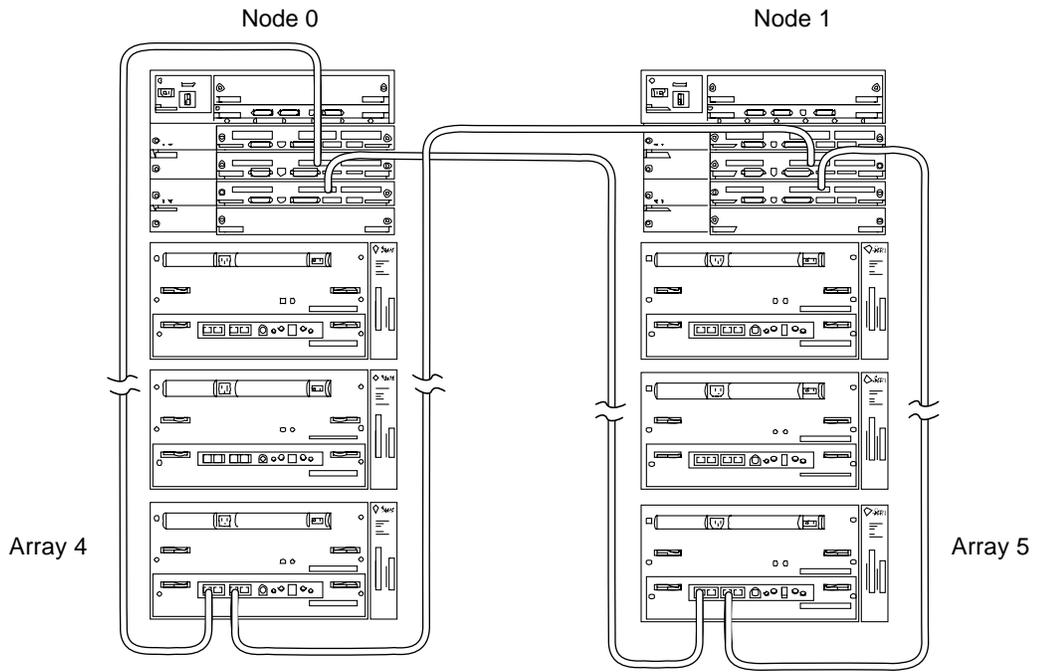


Figure 9-19 SPARCstorage Array 4 and 5 Connection Example

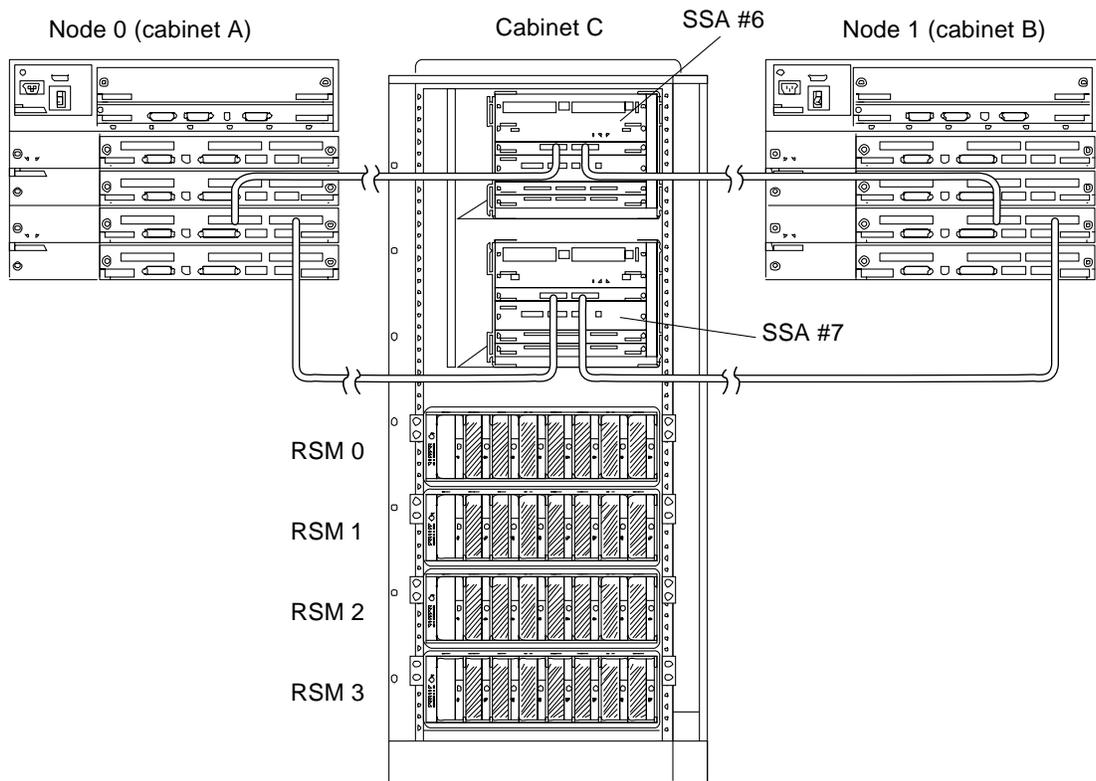


Figure 9-20 SPARCstorage Array 6 and 7 (SPARCstorage Array 200 Series) Connection Example

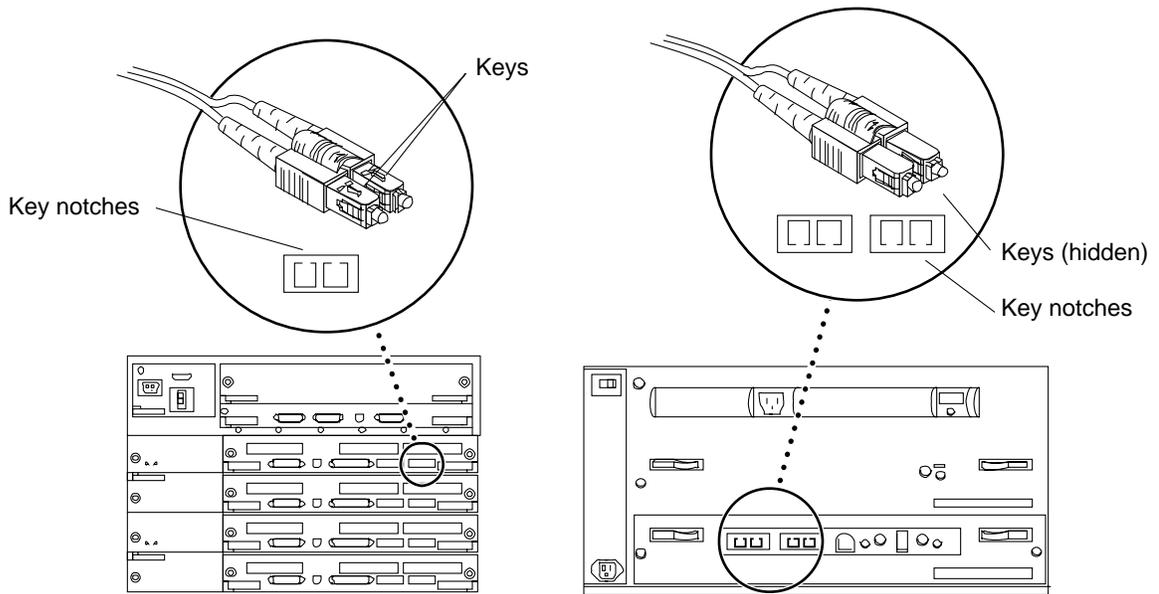


Figure 9-21 SPARCstorage Array Fiber Cable Connection to SPARCstorage Array Model 100 Series Unit

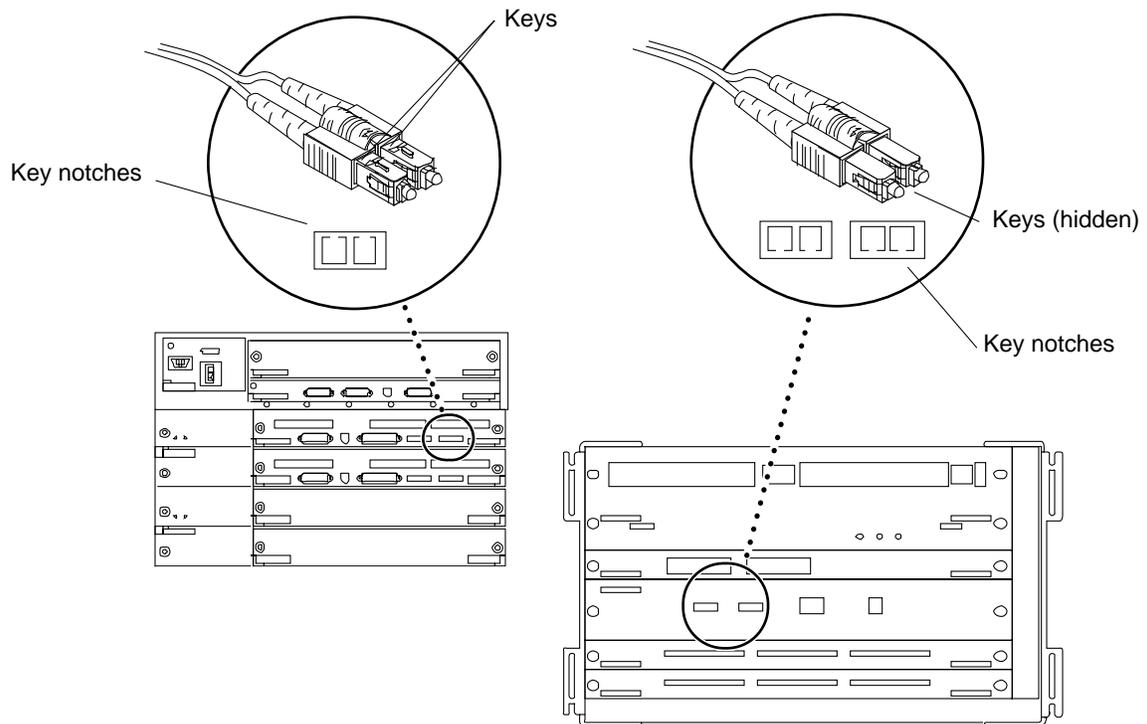


Figure 9-22 SPARCstorage Array Fiber Cable Connection to SPARCstorage Array Model 200 Series Unit

Table 9-3 Node to SPARCstorage Array Cable Connection Example

I/O Board	From Node 0 FC/OM	From Node 1 FC/OM	To SPARCstorage Array
1	Onboard		0 port A
		Onboard	0 port B
3	Onboard		1 port A
		Onboard	1 port B
5	Onboard		2 port A
		Onboard	2 port B
1	SBus slot 1		3 port A
		SBus slot 1	3 port B
3	SBus slot 1		4 port A
		SBus slot 1	4 port B
5	SBus slot 1		5 port A
		SBus slot 1	5 port B
1	SBus slot 2		6 port A
		SBus slot 2	6 port B
3	SBus slot 2		7 port A
		SBus slot 2	7 port B

## 9.8 Closing the Cabinet

♦ **Replace all panels on the cabinet.**

See Chapter 7, “Internal Access and Leveling,” for procedures.

Proceed to Chapter 11 for terminal concentrator configuration procedures.

# *Ultra Enterprise Cluster 5000 Hardware Installation*

## *10.1 Factory-Assembled Ultra Enterprise Cluster 5000 Hardware*

<b>Do these tasks in the order listed</b>	
<i>Preparing the Cabinet</i>	<i>page 10-2</i>
<i>Connecting the Power Cords</i>	<i>page 10-3</i>
<i>Configuring the Card Cages</i>	<i>page 10-16</i>
<i>Cabling System Components</i>	<i>page 10-21</i>

The basic Ultra Enterprise Cluster 5000 configuration is completely pre-assembled in a single cabinet.

---

**Note** – If you are installing a customer-assembled system, see Section 10.2, “Customer-Assembled Ultra Enterprise Cluster 5000 Hardware Installation.”

---

### 10.1.1 Preparing the Cabinet

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 5, “Ultra Enterprise Cluster Configurations.”
3. **Turn the front panel key switch to the Standby position (see Figure 10-1).**

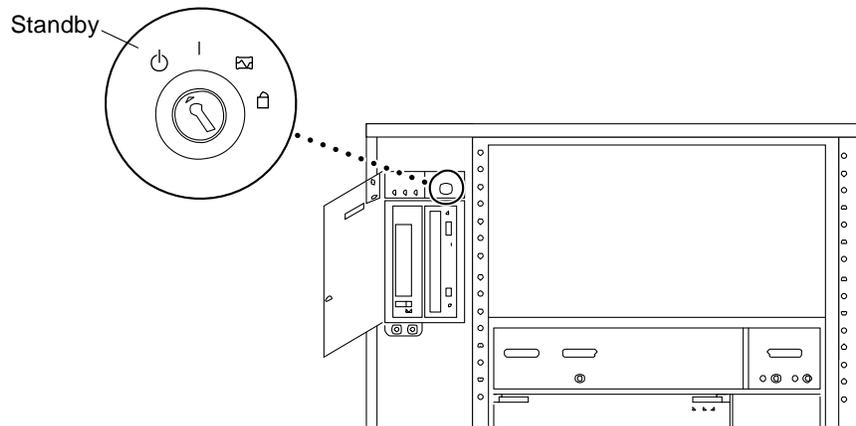


Figure 10-1 Key Switch in the Standby Position

**4. Set the LOCAL/OFF/REMOTE switch to REMOTE. (see Figure 10-2).**

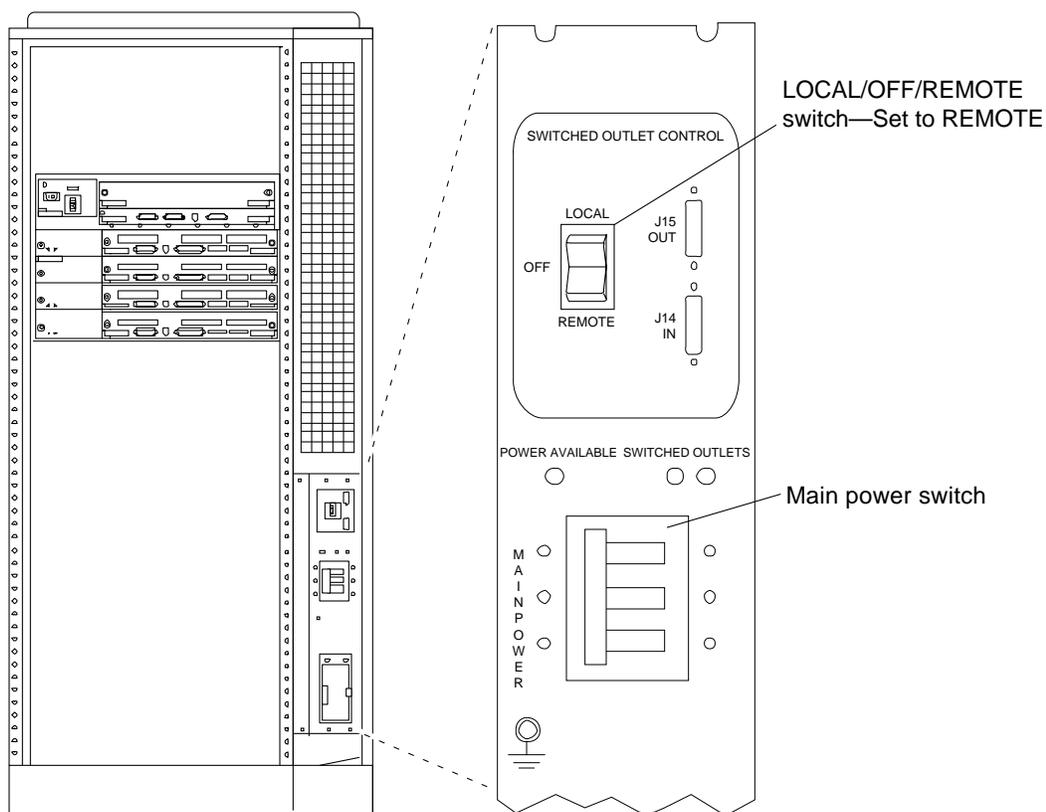


Figure 10-2 Local/Off/Remote Switch and Main Power Switch

### 10.1.2 Connecting the Power Cords

Perform this procedure in the sequence given.

- 1. Remove the cabinet panels to access the power switches and cables.**  
See Chapter 8 for panel removal procedures.
- 2. Level the cabinet.**  
See Section 7.1.1.4, “Adjusting the Stabilizer Bar and Leveling Pads.”

3. **Turn the AC distribution unit power switch to Off.**  
The switch is at the rear of the cabinet. See Figure 10-2.



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

4. **Locate the AC power cord and uncoil it.**
5. **Open the spring loaded cover and plug the female end of the power cord into the cabinet AC connector.**  
This connector is at the rear of the cabinet at the bottom-right corner.
  - a. **Open the spring-loaded cover on the AC connector housing.**
  - b. **Plug in the power cord female end.**  
See Figure 10-3.
  - c. **Release the cover.**

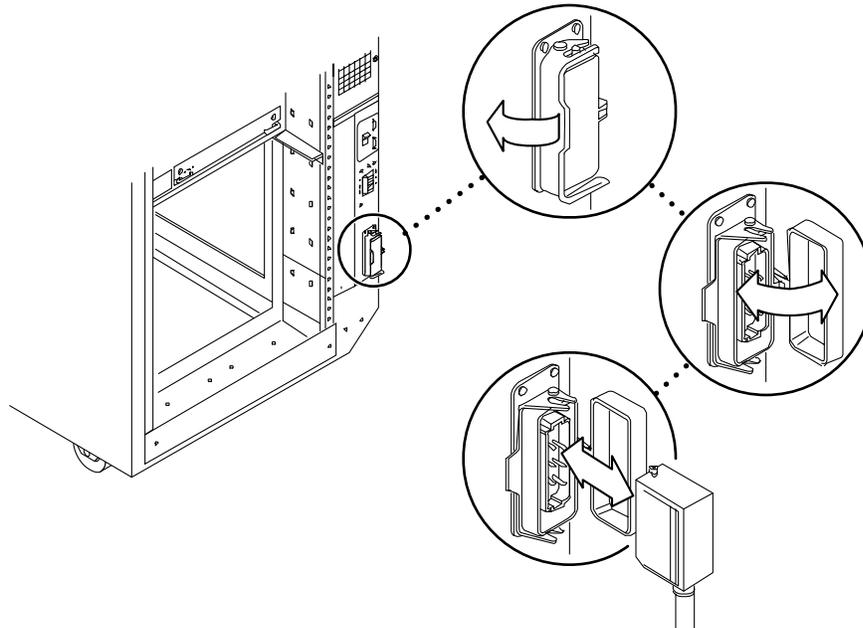


Figure 10-3 Power Connector and Detachable Cable

**6. Plug the power cord male end into the facilities power connector.**

As noted in Chapter 4, “Planning for Hardware, Power, and Network Requirements” the AC outlet must 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.

## 10.2 *Customer-Assembled Ultra Enterprise Cluster 5000 Hardware Installation*

<b>Do these tasks in the order listed</b>	
<i>Preparing the Cabinet</i>	<i>page 10-5</i>
<i>Removing the Cabinet Panels</i>	<i>page 10-6</i>
<i>Installing the Cabinets</i>	<i>page 10-6</i>
<i>Connecting the Main AC Cord</i>	<i>page 10-6</i>
<i>Installing the SPARCstorage Array Systems in the System Cabinets</i>	<i>page 10-7</i>
<i>Installing the Terminal Concentrator</i>	<i>page 10-10</i>
<i>Configuring the Card Cages</i>	<i>page 10-16</i>
<i>Cabling System Components</i>	<i>page 10-21</i>

### 10.2.1 *Preparing the Cabinet*

Prepare the cabinet using the procedures which follow.

#### 10.2.1.1 *Powering Off the Cabinets*

If the system cabinets are powered and operating, halt the operating systems and power off the system and expansion cabinets. See Section 6.1, “Powering Off an Ultra Enterprise Cluster 6000 or 5000 Cabinet.”

### 10.2.2 Removing the Cabinet Panels

Remove the cabinet panels to access the power switches and cables. See Chapter 7, “Internal Access and Leveling.”

### 10.2.3 Installing the Cabinets

1. **Unplug 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 7.1.1.4, “Adjusting the Stabilizer Bar and 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 10-2.



---

**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 the SPARCstorage Array Systems in the System Cabinets

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.

### 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, “Rackmount Rail 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.

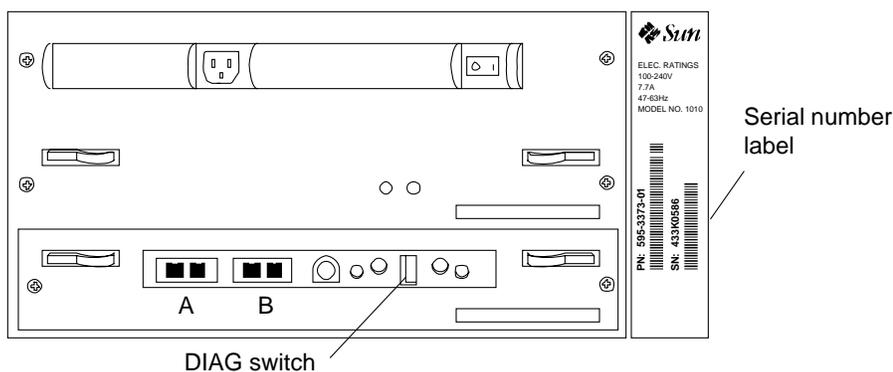


Figure 10-4 SPARCstorage Array Voltage Rating on the Serial Number Label

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

**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, and lists current requirements at nominal line voltage for a cabinet in maximum configuration.

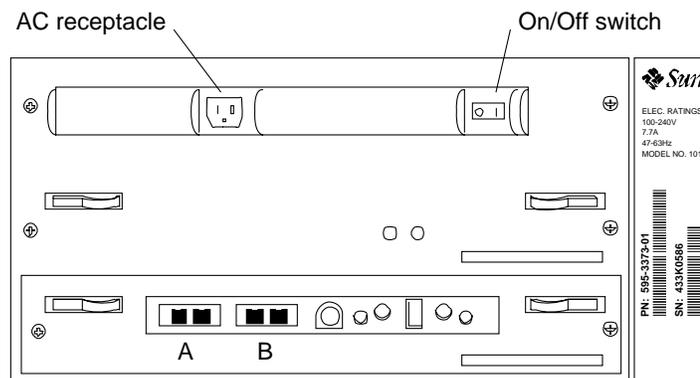
*Table 10-1* SPARCstorage Array 100 Series Nominal Power and Maximum Current Parameters

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 SPARCstorage Array power cords.**

- a. Connect a power cord at the rear of each chassis.**  
See Figure 10-5.



*Figure 10-5* SPARCstorage Array AC Power Connector and Power Switch

- b. Route the power cords to the power sequencer.**  
Dress the power cords down the right 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 cable ties.

**2. Connect the chassis to power.**

Plug the power cords from the chassis into the power sequencer. Use the switched outlets identified in Figure 10-6 for the SPARCstorage Arrays 0-5 as appropriate.

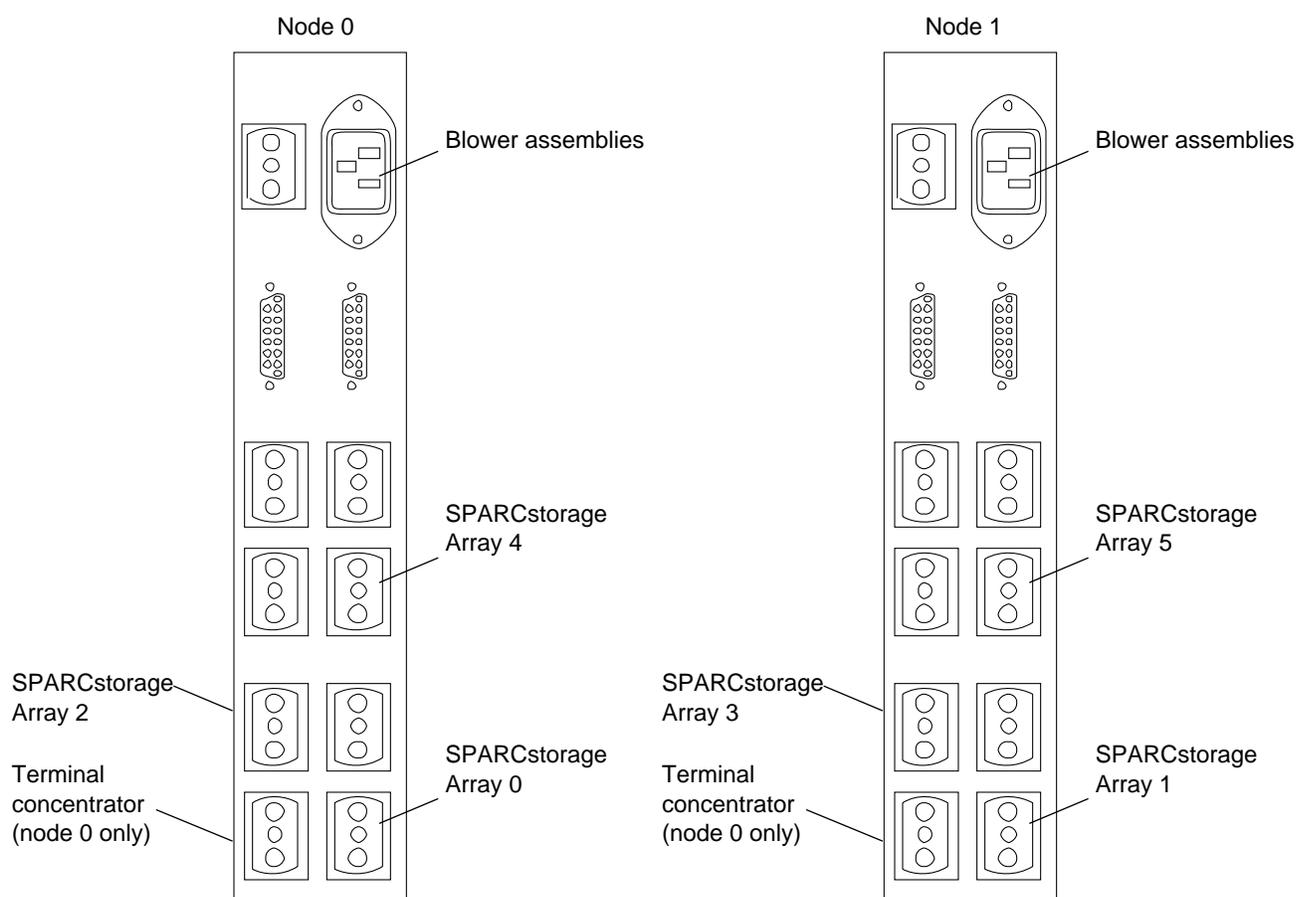


Figure 10-6 Plugging SPARCstorage Arrays/Terminal Concentrator into the Power Sequencer

**3. Turn on the AC power switch on all SPARCstorage Arrays.**

See Figure 10-5.

### 10.2.6 *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 slotted holes of the hinge over the locator screws and allow the hinge to drop into place.**

**d. Install an additional pair of screws into holes 9 and 29.**

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

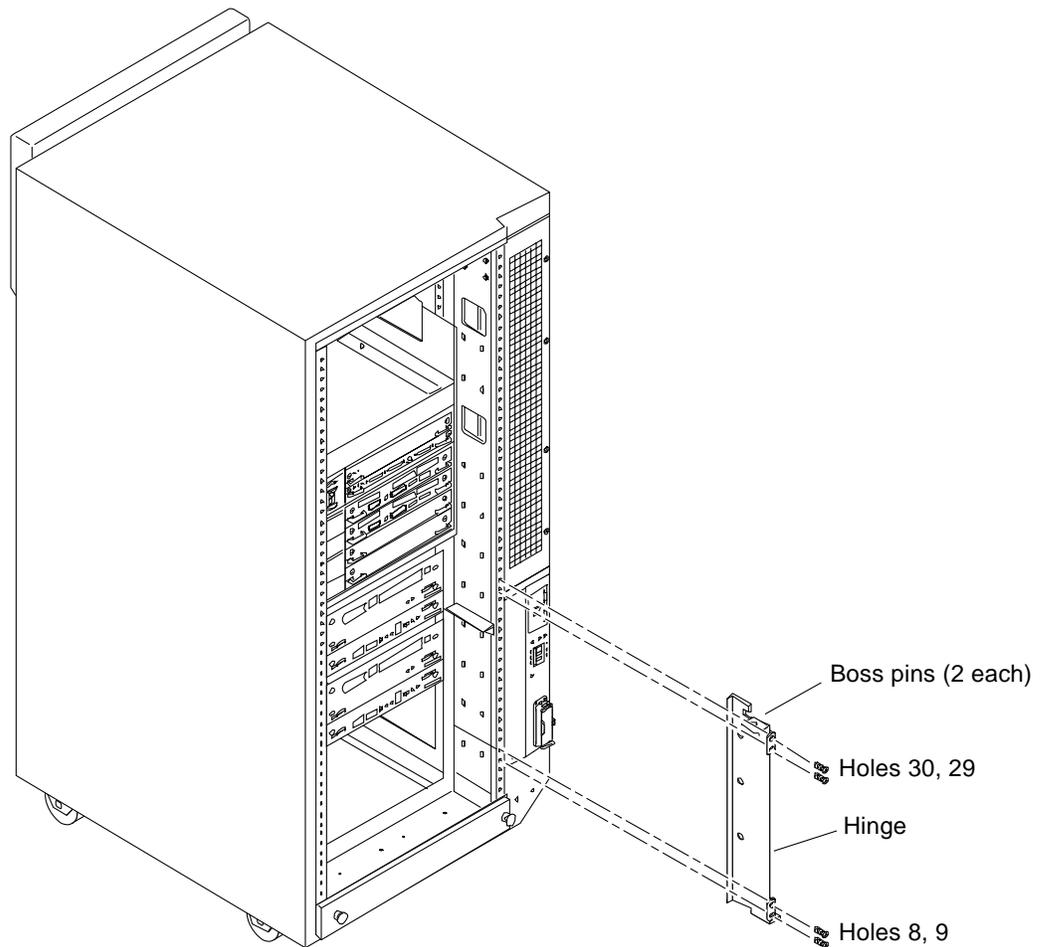
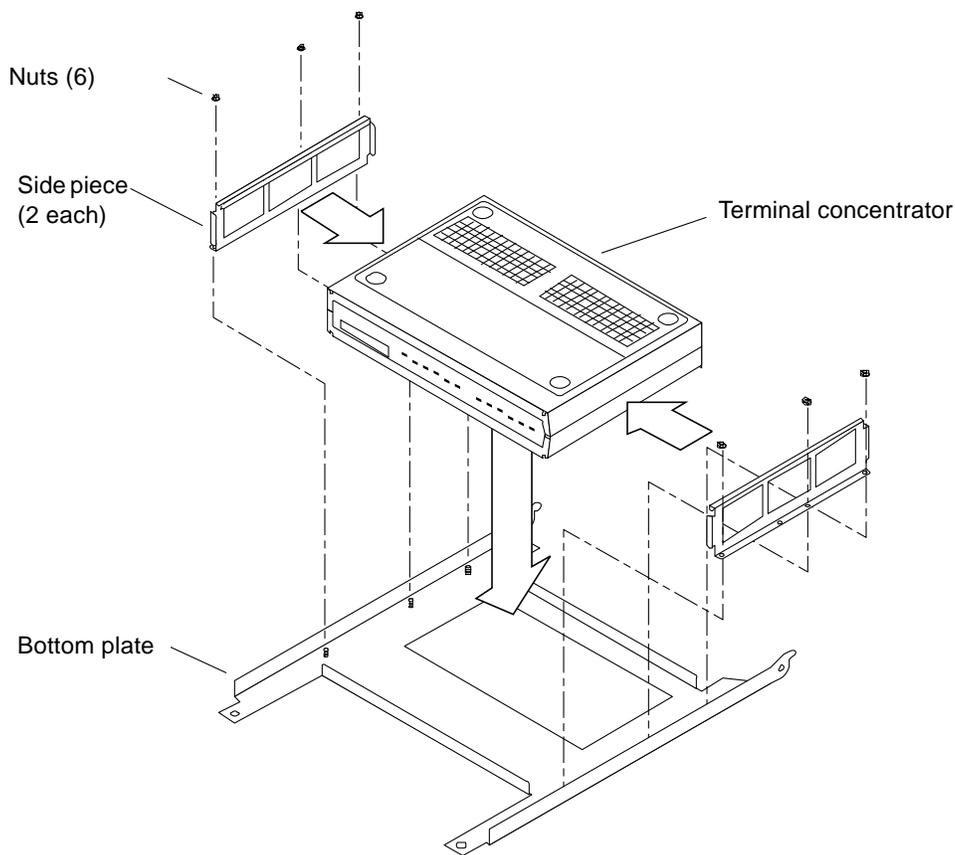


Figure 10-7 Installing the Terminal Concentrator Hinge

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

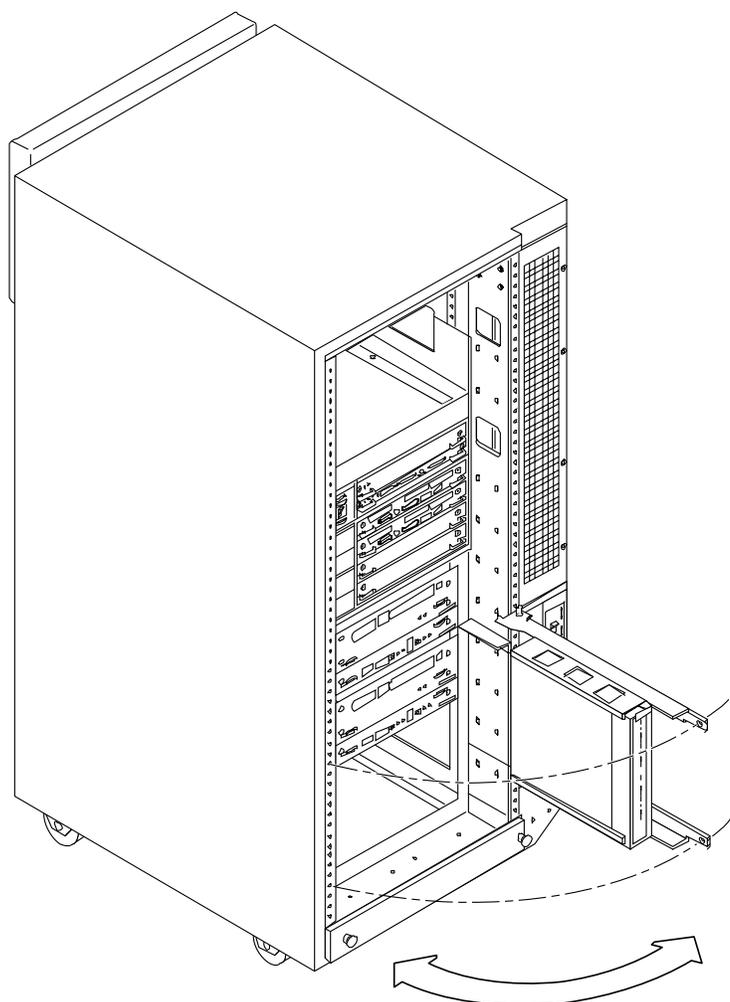
**c. Install three nuts on threaded studs penetrating through each side plate. Tighten the nuts.**

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 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 accidentally 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.

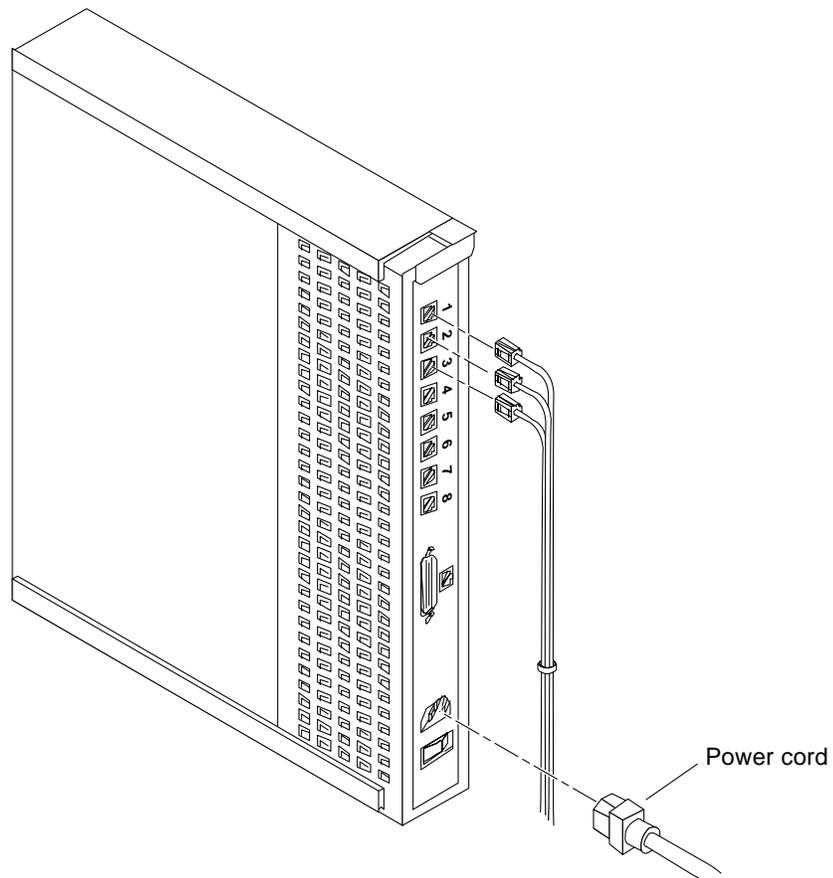


Figure 10-10 Terminal Concentrator Cable Locations

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

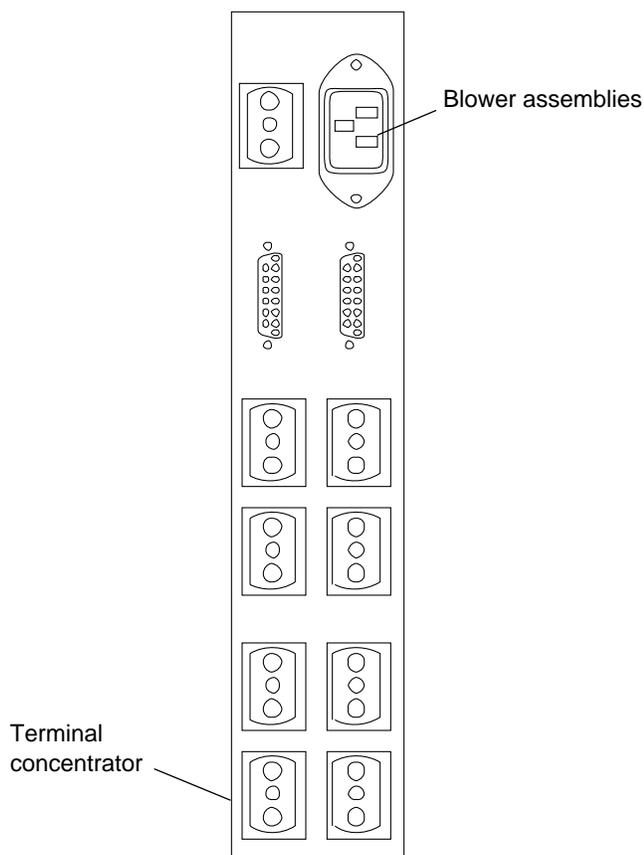


Figure 10-11 Plugging the Terminal Concentrator into the Power Sequencer (Node 0)

### 10.3 Power Cooling Modules (PCMs)

Each PCM provides power and cooling to the one or two boards installed adjacent to it. For this reason, every board or board-pair must be supported by an adjacent PCM.

- ◆ **Ensure that a PCM is installed for each board or board-pair to be installed in the card cage. Install additional PCMs as required to meet this requirement.**

---

**Note** – To adhere to cooling and power requirements, one power/cooling module (PCM) must be installed for every two boards, plus an additional one for redundancy. Install the PCMs adjacent to populated board slots to ensure the fan in the PCM cools the associated boards.

---

### 10.3.1 Configuring the Card Cages

For instructions on removing I/O boards, refer to the documentation supplied with the I/O boards or the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Note** – Logically there is no difference between the board slots in the front or rear of the card cage, and each slot can accept any board type. For this system, however, install CPU/Memory boards in the front slots, and I/O and disk boards in the rear slots to facilitate proper cabling. Install the first I/O board in slot 1. This is the only slot connected to the onboard SCSI devices.

---

---

**Note** – To adhere to cooling and power requirements, one power/cooling module (PCM) must be installed for every two boards, plus an additional one for redundancy. Install the PCMs adjacent to populated board slots to ensure the fan in the PCM cools the associated boards.

---

---

**Note** – Install a filler panel in all empty slots to ensure proper cooling and to provide proper bus termination.

---

#### 10.3.1.1 CPU/Memory Boards

- 1. Install the CPU/Memory boards into the card cage as viewed from the front. Install them from lowest (0) through the highest (6) as appropriate.** For CPU/Memory board installation procedures, refer to the documentation supplied with the CPU/Memory boards or the *Ultra Enterprise 6000/5000/4000 System Manual*. See Figure 10-7 and Figure 10-8 or Figure 10-9 and Figure 10-10 for PDB and HA respectively.
- 2. Fill all unused slots in the front of the system with a filler panel.**

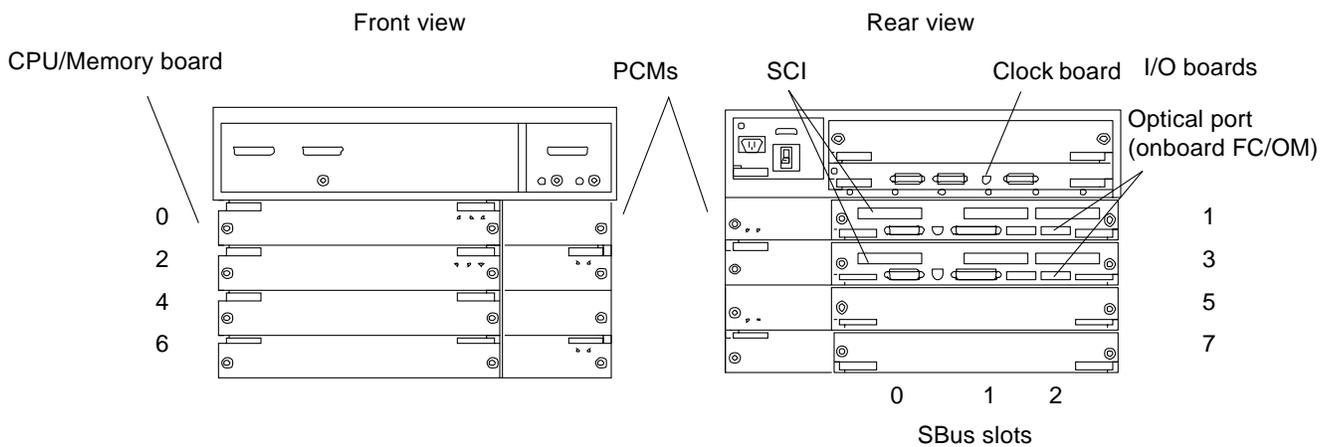


Figure 10-12 Ultra Enterprise Cluster 5000PDB Card Cage Minimum Population (Typical of Node 0 and 1)

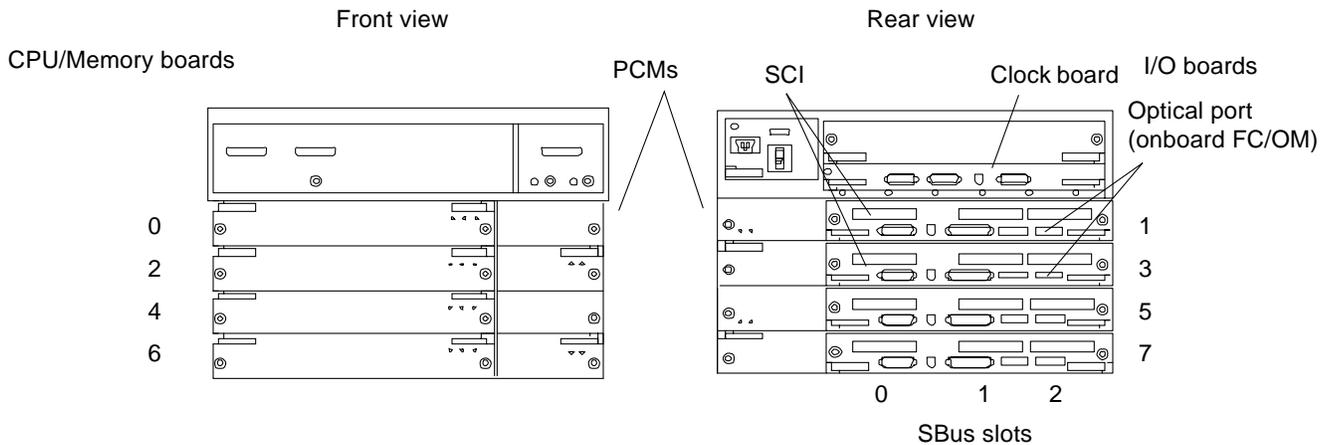


Figure 10-13 Ultra Enterprise Cluster 5000PDB Card Cage Expansion Example (Typical of Node 0 and 1)

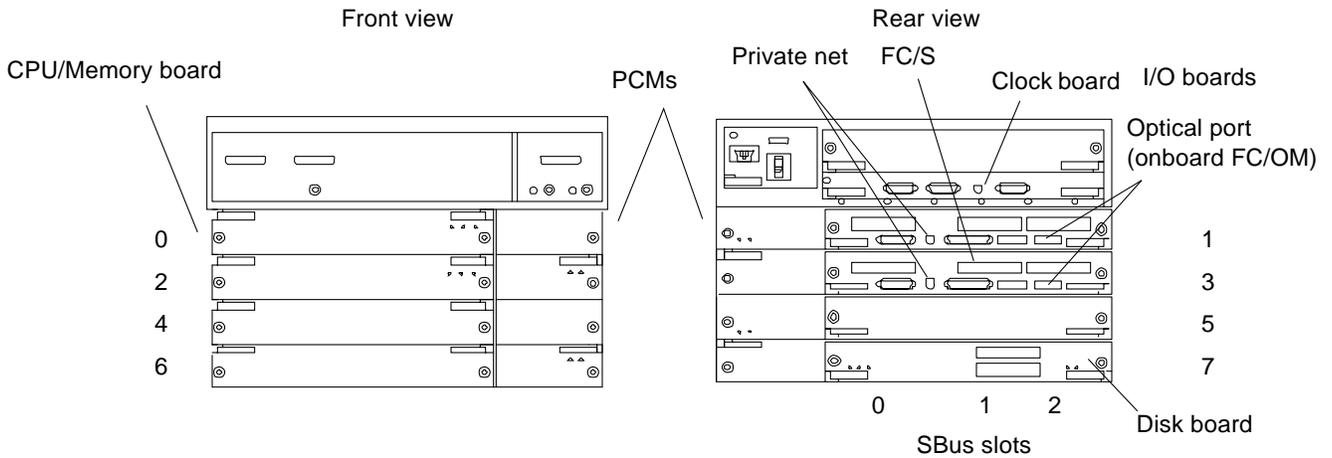


Figure 10-14 Ultra Enterprise Cluster 5000HA Card Cage  
Minimum Population (Typical of Node 0 and 1)

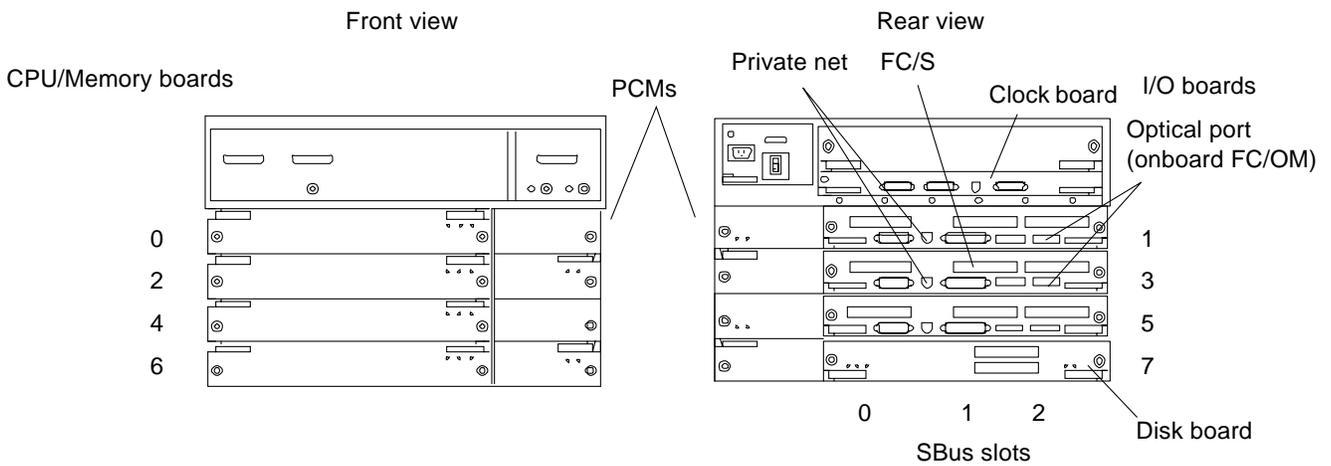


Figure 10-15 Ultra Enterprise Cluster 5000HA Card Cage  
Expansion Example (Typical of Node 0 and 1)

### 10.3.1.2 Installing I/O Boards for PDB

#### ***I/O Boards Intended for Slots 1 and 3 (Equipped with SCI SBus Cards)***

♦ **Configure and install the SCI SBus cards.**

These will be installed into the two I/O boards each which will be installed in card cage slots 1 and 3 of node 0 and 1.

For this procedure, proceed to Appendix B, “Configuring the SCI SBus Card.” This procedure takes the installer through installation of I/O boards in card cage slots 1 and 3 of both nodes.

### 10.3.1.3 PDB and HA Installation

**1. Configure and install any other SBus cards as appropriate.**

**2. Load the I/O boards with the appropriate FC/OM modules.**

For module card installation procedures, refer to the documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Caution** – Install FC/OM modules in the A locations only. Do not install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage arrays or other storage device.

---

**3. Install the I/O boards in the card cage.**

See Figure 10-7 through Figure 10-10.

#### ***I/O Boards Intended for Slot 5 and 7 (Optional)***

♦ **Configure and install any SBus cards as appropriate and install the I/O board in the card cage.**

### 10.3.1.4 Filler Panels

♦ **Fill all unused slots with a filler panel.**

See Figure 10-16.

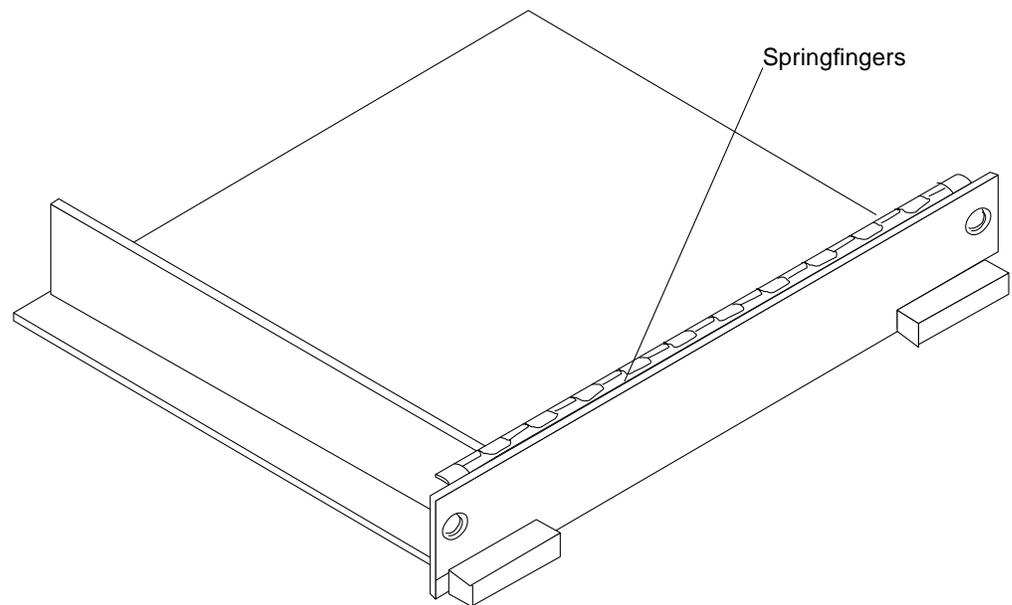


Figure 10-16 Filler Panel

### 10.3.1.5 Disk Board: HA System Only

1. **If your system is intended to boot from a disk board, install it in slot 7.**  
For disk board installation procedures, refer to the documentation supplied with the board or in the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Note** – PDB systems boot from bootable SPARCstorage arrays.

---

2. **Install the terminator on the SCSI II OUT port of the disk board in slot 7.**  
See Figure 10-17.

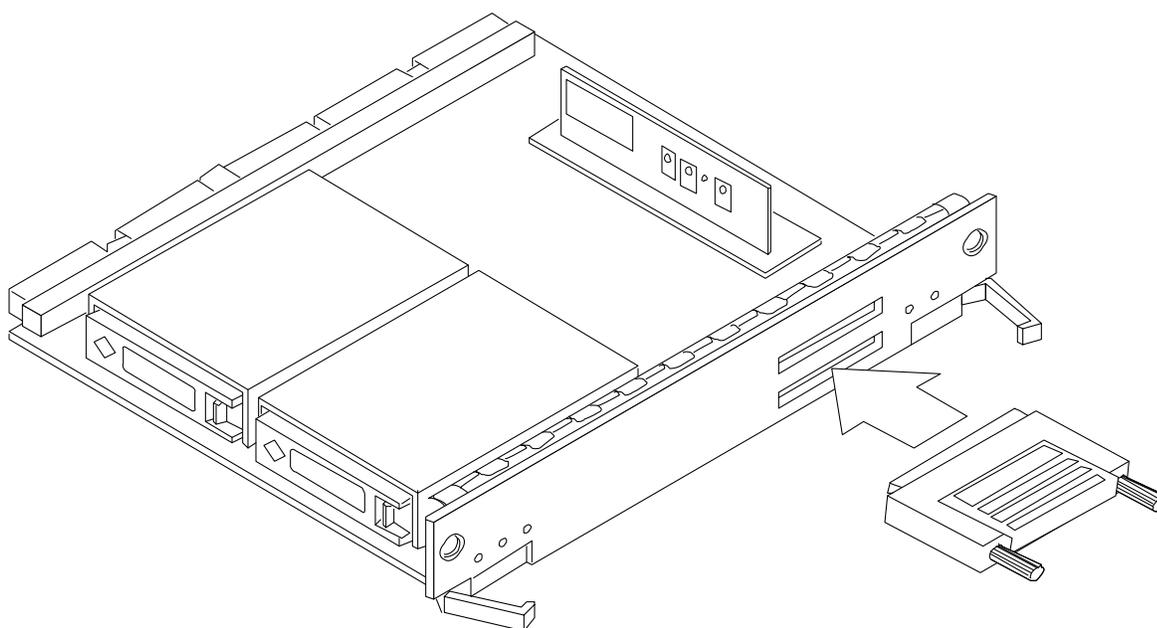


Figure 10-17 Installing the Terminator in the Disk Board SCSI OUT Connector

### 10.3.1.6 Clock Board

1. **The clock board is installed in the clock board slot above the I/O boards.** For clock board installation procedures, refer to documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

### 10.3.1.7 Node 1 Card Cage

1. Repeat Section 10.3.1 above for node 1.

## 10.3.2 Cabling System Components

Network 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)*

System	Board	From Node 0	From Node 1	To	Interface Type
HA	I/O slot 1	Onboard hme		Node 1 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
		Onboard SCSI		Wide SCSI terminator	Wide SCSI
			Onboard SCSI	Wide SCSI terminator	Wide SCSI
		Public net SBus card in slot 1		Public net	Ethernet or FDDI
			Public net SBus card in slot 1	Public net	Ethernet or FDDI
	Install terminator on SCSI port	Install terminator on SCSI port		Wide SCSI	
	Public net SBus card in slot 1		Public net	Ethernet or FDDI	
I/O slot 3	Onboard hme			Node 1 onboard hme on I/O board 2	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board	RJ-45/TPE private net <sup>1</sup>
PDB		SCI SBus port		Node 1 SCI SBus port	SCI cable
			SCI SBus card	Node 0 SCI SBus port	SCI cable
All	Clock Board	Serial A		Terminal concentrator port 2	Serial
			Serial A	Terminal concentrator port 3	Serial
	Other	Administration workstation Serial A		Terminal concentrator port 1	Serial
		Administration workstation Ethernet port		Primary Ethernet network	AUI or RJ-45

1. Category 5 twisted-pair private net cable, part number 530-2149 (1-meter) or 530-2150 (5-meter).

### 10.3.2.1 Cabling the Terminal Concentrator



**Warning** – Do not plug a keyboard directly into a host I/O board. If a keyboard is plugged into a I/O 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 I/O board while power is applied to the host sends a break signal to the Solaris operating system, as if you typed Stop (L1)-A on the keyboard.

1. Plug one end of cable PN 530-2152 into the terminal concentrator, Port 1.  
Port 1.  
See Figure 10-18.
2. Plug the other end into the administration workstation RS-232 connector.

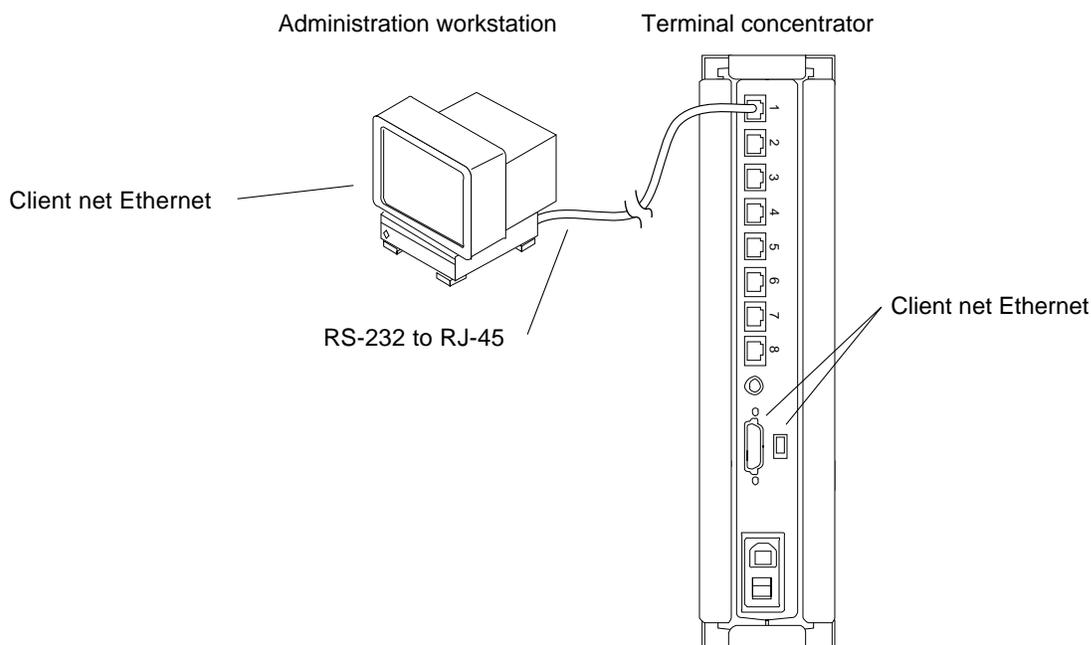


Figure 10-18 Connecting the Administration Workstation

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

### *10.3.2.2 Connecting the Terminal Concentrator*

Using the 530-2152 (5-Meter) or 530-2151 (1-Meter) cable, proceed as follows:

**1. Connect Node 0.**

**a. Plug the DB25 end of the cable into the Serial A port on the clock board in node 0.**

See Figure 10-19.

**b. Plug the RJ-45 end of this cable into the terminal concentrator, port 2.**

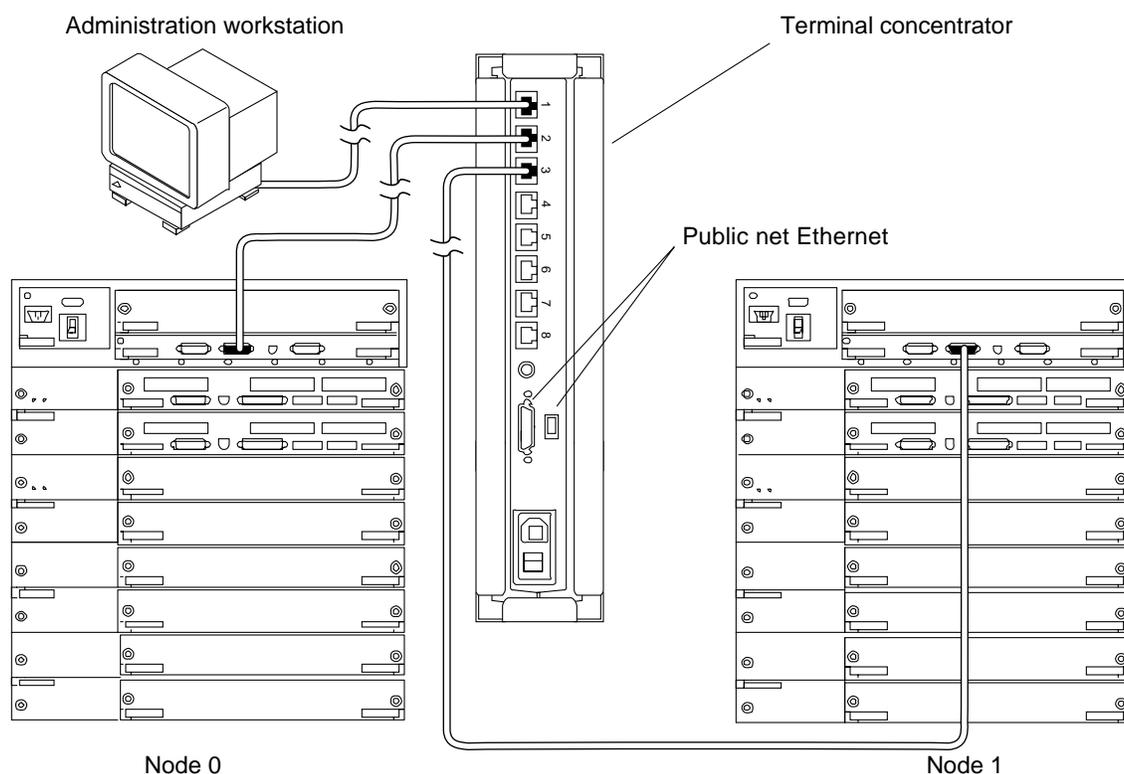
**2. Connect Node 1.**

**a. Plug the DB25 end of the cable into the Serial A port on the clock board in node 1.**

**b. Plug the RJ-45 end of this cable into the terminal concentrator, port 3.**

**3. Connect the public net Ethernet.**

Plug the public net Ethernet cable into the RJ-45 or DB25 connector as appropriate on the terminal concentrator.



Note: Ultra Enterprise Cluster 6000 shown, but applies to Ultra Enterprise Cluster 5000 too.

Figure 10-19 Node Interface to the Terminal Concentrator

### 10.3.3 Connecting Node 0 to Node 1—Ethernet

Using the Ethernet cables, connect one node to the other.

#### 10.3.3.1 First Cable

1. **Connect one end of the Ethernet cable to the onboard Ethernet port on I/O board slot 1.**  
See Figure 10-20.
2. **Connect the other end to the Ethernet port on board 1 in the other node.**

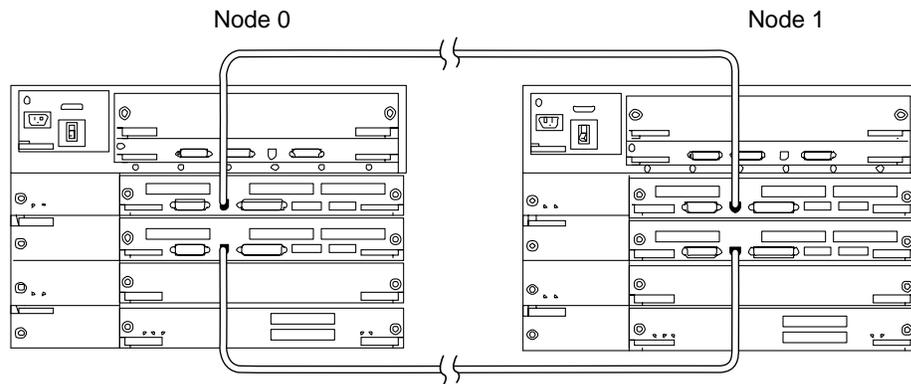


Figure 10-20 Node-to-Node Ethernet Connection

### 10.3.3.2 Second Cable

1. Connect one end of the Ethernet cable to the Ethernet port on I/O board slot 3.  
See Figure 10-20.
2. Connect the other end to the Ethernet port on I/O board slot 3.

### 10.3.3.3 Connecting Node 0 to Node 1—SCI Host and Cables

Using the SCI private net cables, connect one Ultra Enterprise Cluster 5000 node to the other.

---

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

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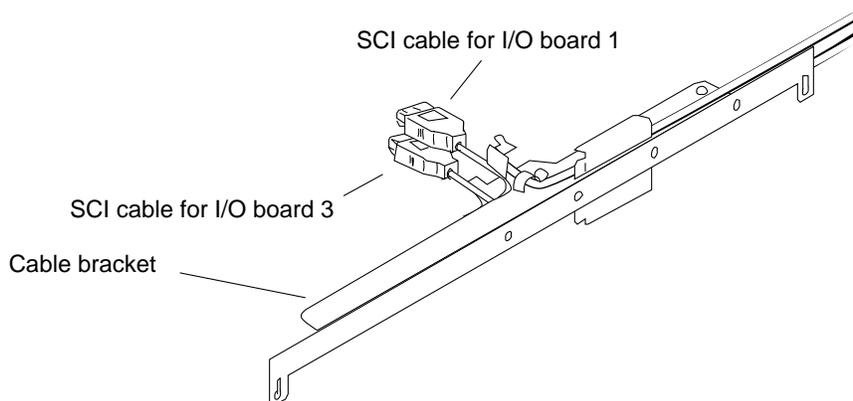
**Note** – Use 2, 5, or 10 meter SCI cable as appropriate.

---

### ***Cable and Bracket Preparation***

**Note** – SCI cables are thick and stiff. The cable bracket incorporates a track on the top and the bottom (one for each cable) to support the 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, and isolate the connection from cable inflexibility, twist or pull.

- 1. At the rear of the cabinet, loosely install two screws in the rack in holes 58.**  
Install one at the left and one at 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 up and the cable track opening to the left.**  
See Figure 10-21.



*Figure 10-21* Installing the Two SCI Cables in the Cable Bracket

- 3. Lay the cable for I/O board 1 into the top of the bracket with the connector toward the left and facing away from you.**  
Form the cable into the curved track built into the top of 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 bottom cable.**  
Install the cable in the track on the underside 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 I/O 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.**

---

**Note** – The SCI bracket automatically aligns the cable connectors to the SCI SBus cards in I/O board slots 1 and 3, SBus position 0.

---

---

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

---

- e. Check your work.**

Ensure that the connectors are secure and that no excessive force is placed on the cable, connector, or I/O board. See Figure 10-22.

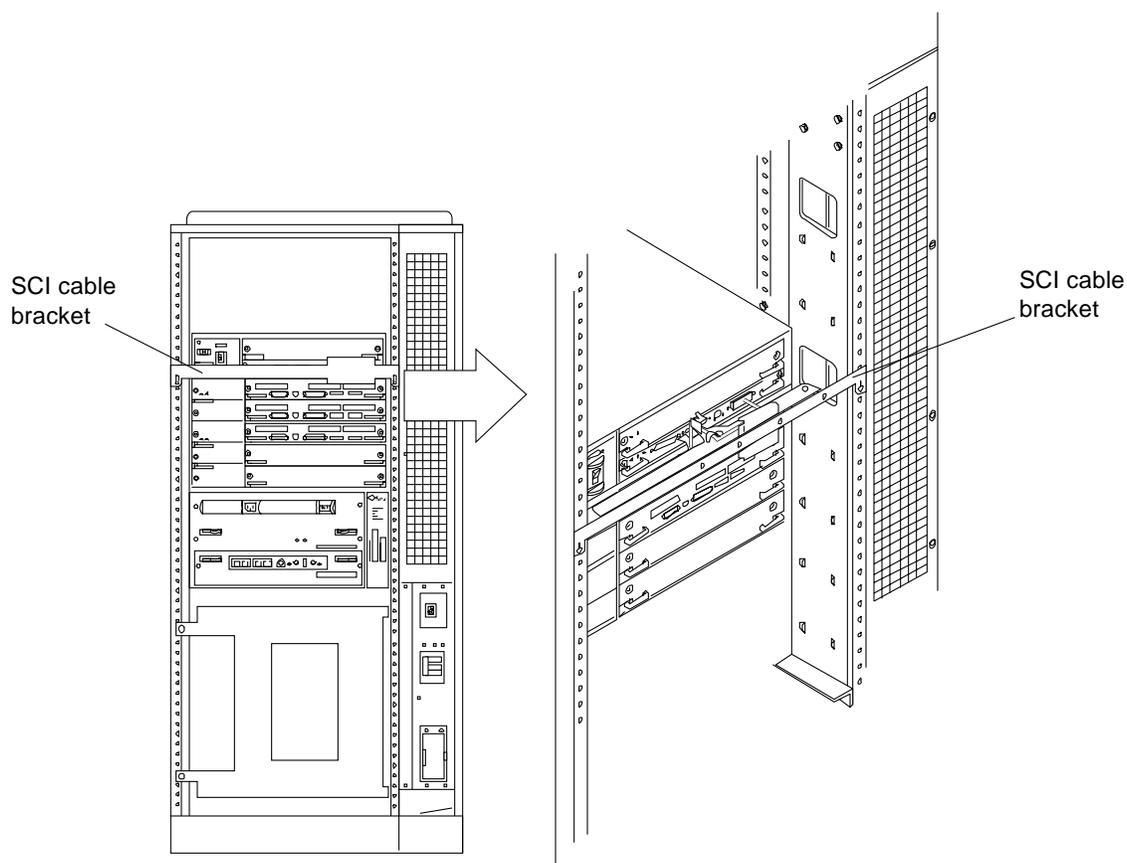


Figure 10-22 Installing the SCI Cable Bracket

## 2. Install the second node.

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

### ***Remaining Cables***

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

### 10.3.3.4 Internal SCSI Tray

If a disk board is installed, skip this procedure and proceed to Section 10.3.4.

1. **I/O board in slot 1: install a terminator on the SCSI connector of the I/O board to be installed in slot 1.**

See Figure 10-23 for connector location.

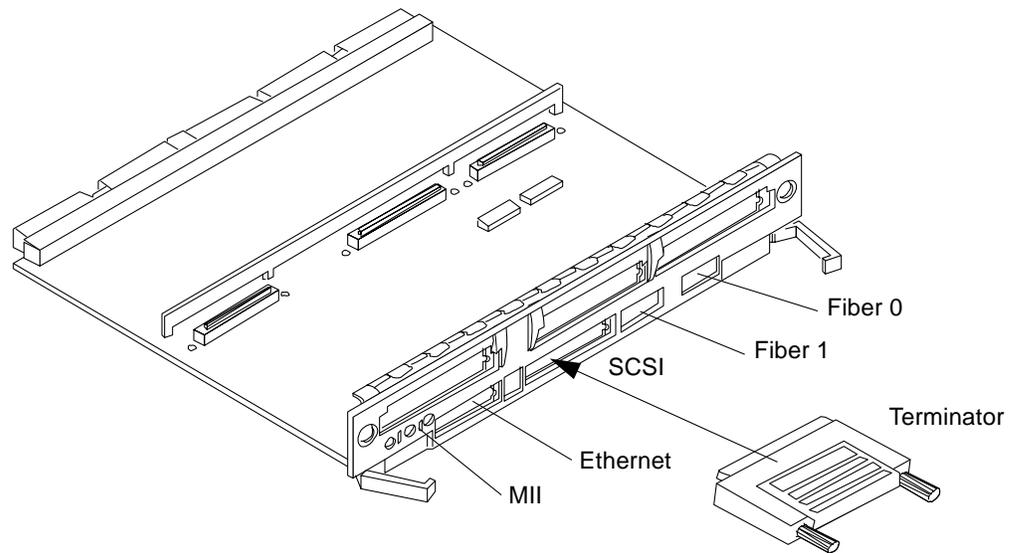


Figure 10-23 SCSI Terminator Installation on the I/O Board

### 10.3.4 Disk Board (HA Only)

1. **I/O board in slot 1: connect one end of the SCSI cable to the onboard SCSI port.**  
See Figure 10-24 for connector locations.
2. **Connect the other end to the SCSI IN port on the disk board.**
3. **Install a terminator on the SCSI OUT port on the disk board.**

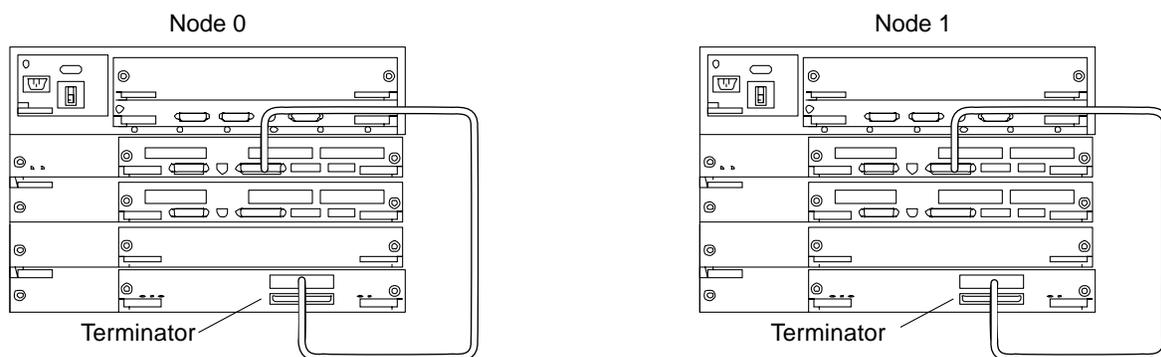


Figure 10-24 Disk Board Connection

### 10.3.4.1 Connecting the SPARCstorage Arrays

#### ***Installing the Second FC/OM Optical Module in all SPARCstorage Arrays***

- ◆ **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.

- One end connects to an FC/OM module in node 0 or 1 (cabinet A or B)
- The other end connects to an FC/OM module in the SPARCstorage Array in the target cabinet.

Put labels on both ends of each cable. Use Figure 10-25 through Figure 10-28 as guides.

#### ***Installing the Fiber-Optic Cables***

1. **Plug one end of the fiber cable into the FC/OM in the I/O board.**

See Figure 10-29 and Figure 10-30 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 10-3 on page 10-38 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** – Cables are shown loose for clarity. To complete the task, dress and secure all cables using cable ties as appropriate.

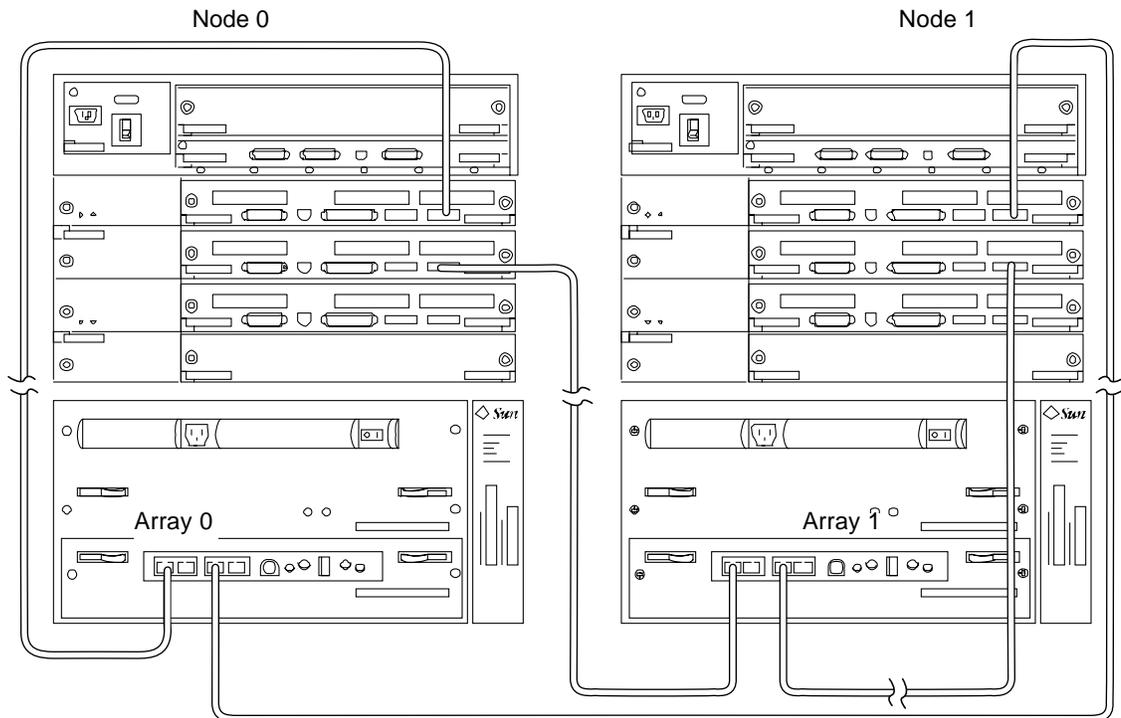


Figure 10-25 SPARCstorage Array 0 and 1 Connection Example

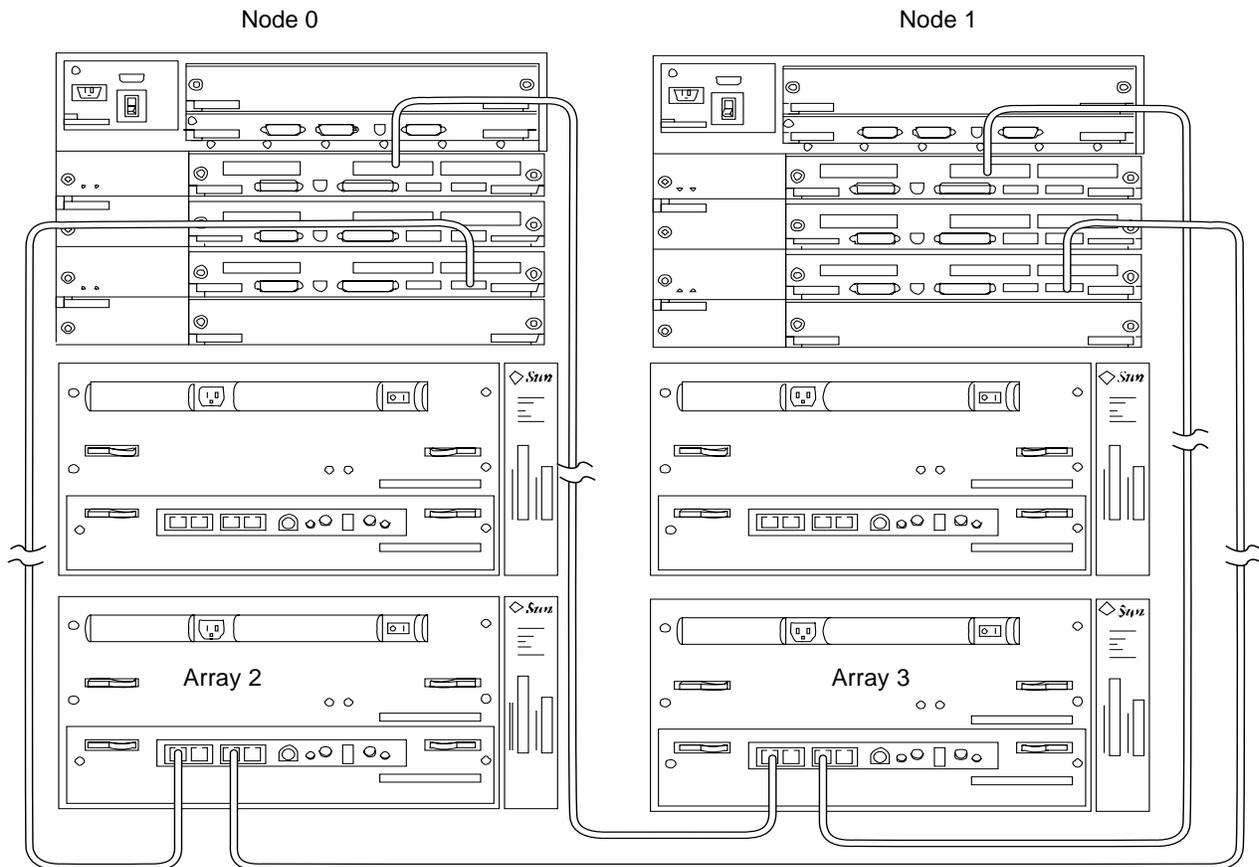


Figure 10-26 SPARCstorage Array 2 and 3 Connection Example

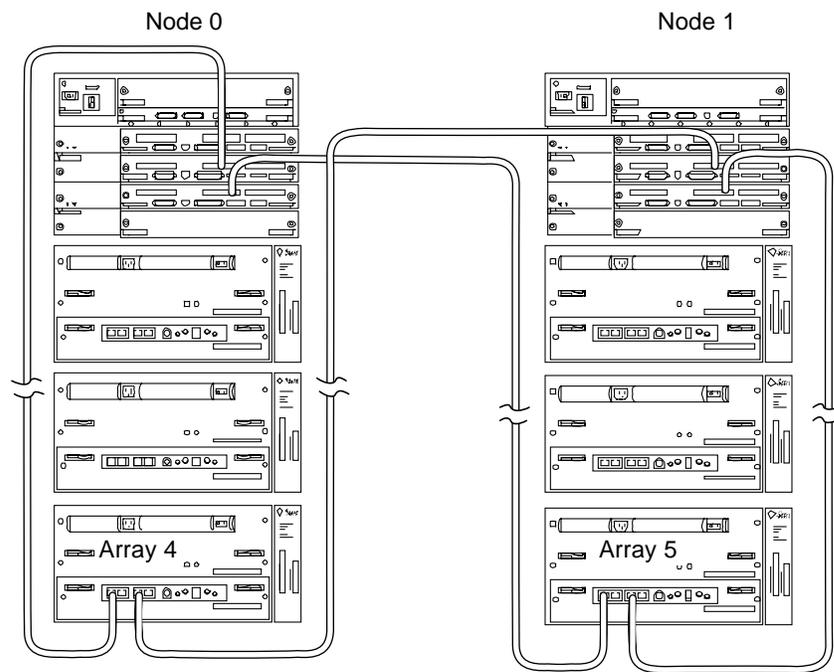


Figure 10-27 SPARCstorage Array 4 and 5 Connection Example

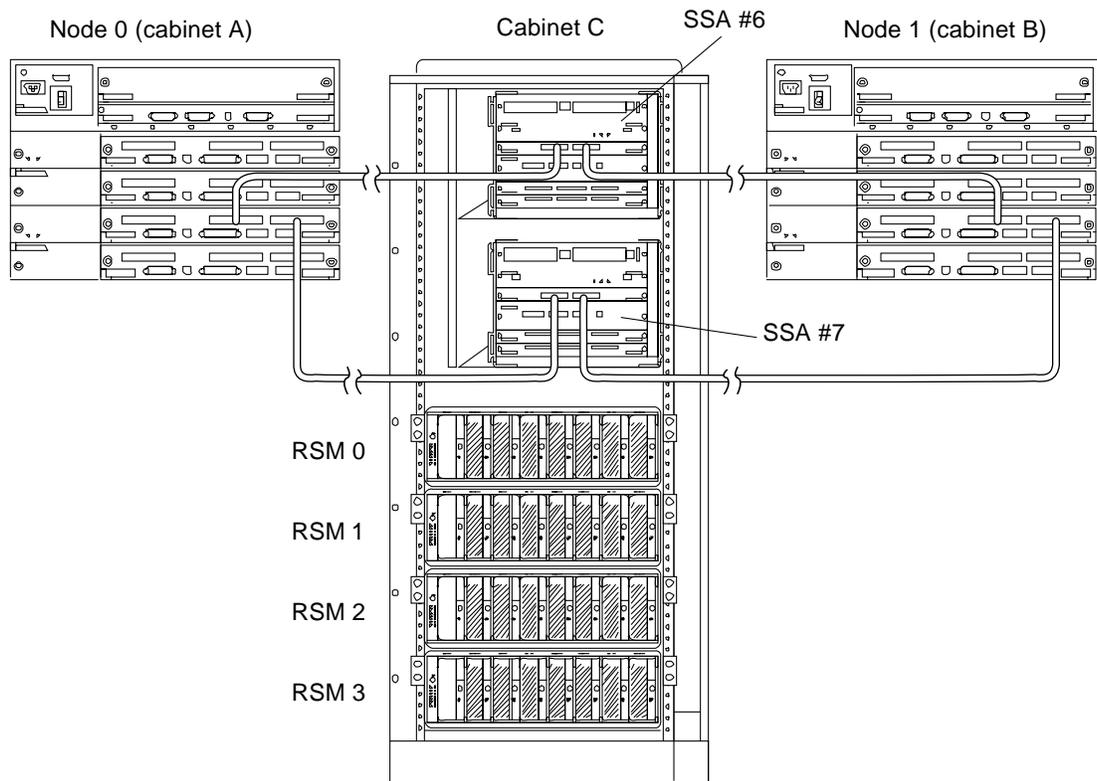


Figure 10-28 SPARCstorage Array 6 and 7 (SPARCstorage Array 200 Series) Connection Example

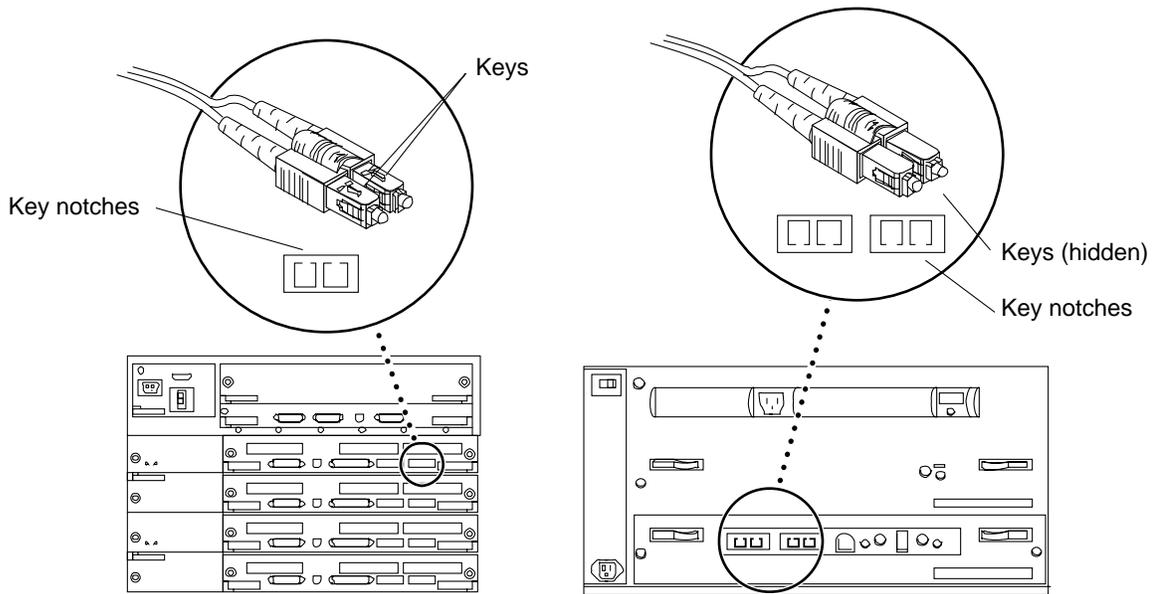


Figure 10-29 SPARCstorage Array Fiber Cable Connection to SPARCstorage Array Model 100 Series Unit

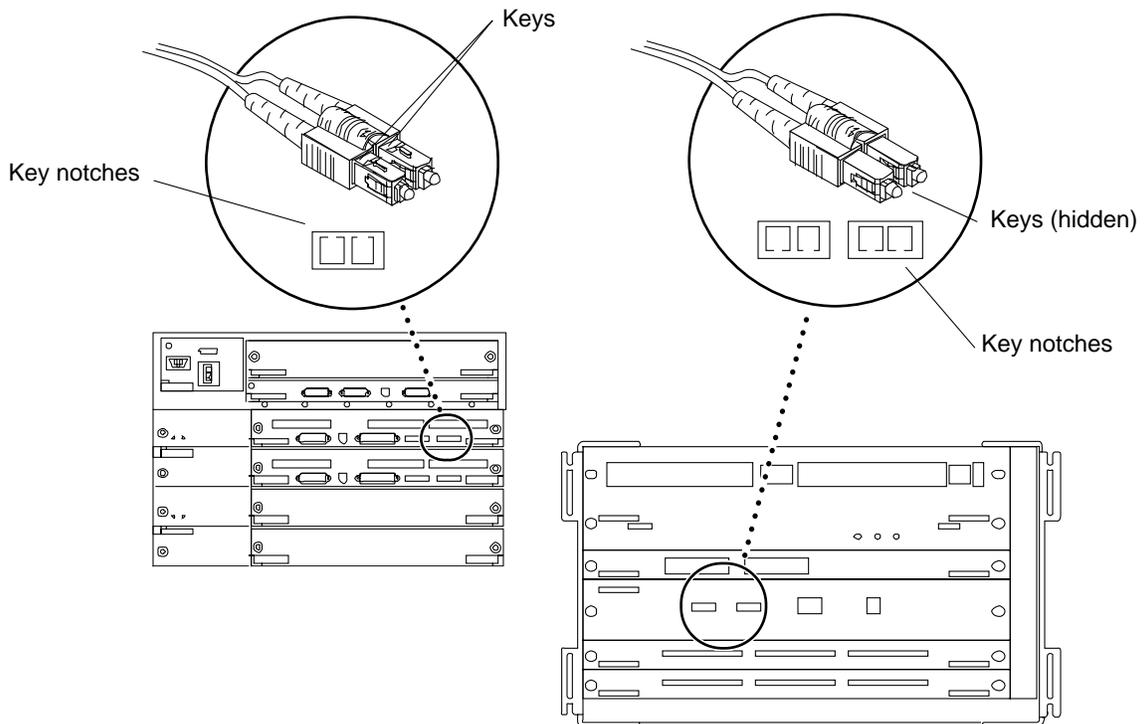


Figure 10-30 SPARCstorage Array Fiber Cable Connection to SPARCstorage Array Model 200 Series Unit

Table 10-3 Node to SPARCstorage Array Cable Connection Example

I/O Board	From Node 0 FC/OM	From Node 1 FC/OM	To SPARCstorage Array
1	Onboard		0 port A
		Onboard	0 port B
3	Onboard		1 port A
		Onboard	1 port B
5	Onboard		2 port A
		Onboard	2 port B
1	SBus slot 1		3 port A
		SBus slot 1	3 port B
3	SBus slot 1		4 port A
		SBus slot 1	4 port B
5	SBus slot 1		5 port A
		SBus slot 1	5 port B
1	SBus slot 2		6 port A
		SBus slot 2	6 port B
3	SBus slot 2		7 port A
		SBus slot 2	7 port B

## 10.4 Closing the Cabinet

♦ **Replace all panels on the cabinet.**

See Chapter 7, “Internal Access and Leveling,” for procedures.

Proceed to Chapter 11 for terminal concentrator configuration procedures.

# Ultra Enterprise Cluster 6000 Hardware Installation

<b>Do tasks in the order listed</b>	
<i>Preparing the Cabinet</i>	<i>page 11-2</i>
<i>Removing the Cabinet Panels</i>	<i>page 11-5</i>
<i>Installing the Cabinets</i>	<i>page 11-6</i>
<i>Connecting the Main AC Cord</i>	<i>page 11-6</i>
<i>Installing SPARCstorage Arrays in the System Cabinets</i>	<i>page 11-7</i>
<i>Installing the Terminal Concentrator</i>	<i>page 11-10</i>
<i>Configuring the Card Cages</i>	<i>page 11-16</i>
<i>Cabling System Components</i>	<i>page 11-24</i>

## 11.1 Factory-Assembled Ultra Enterprise Cluster 6000 Hardware

The basic Ultra Enterprise Cluster 6000 configuration is completely pre-assembled in a single cabinet.

---

**Note** – If you are installing a customer-assembled system, see Section 11.2, “Customer-Assembled Ultra Enterprise Cluster 6000 Hardware Installation.”

---

### 11.1.1 Preparing the Cabinet

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 4, “Enterprise Cluster 6000 Server.”
3. **Turn the front panel key switch to the Standby position.**  
See Figure 11-1.

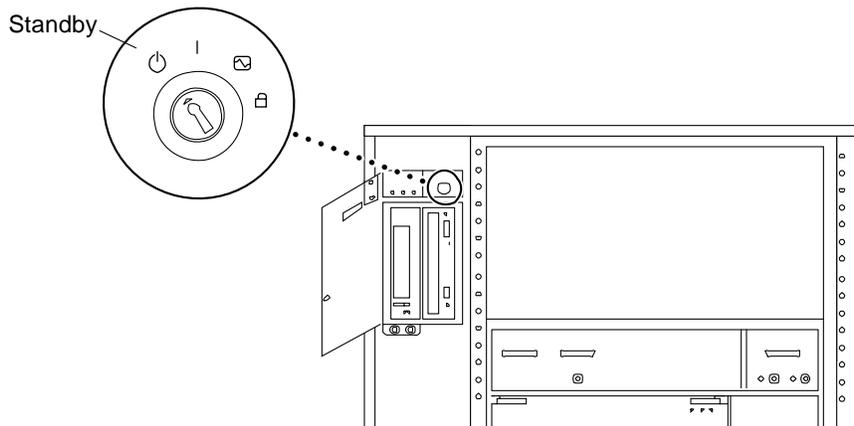


Figure 11-1 Key Switch in the Standby Position

4. **Set the LOCAL/OFF/REMOTE switch to REMOTE.**  
See Figure 11-2.

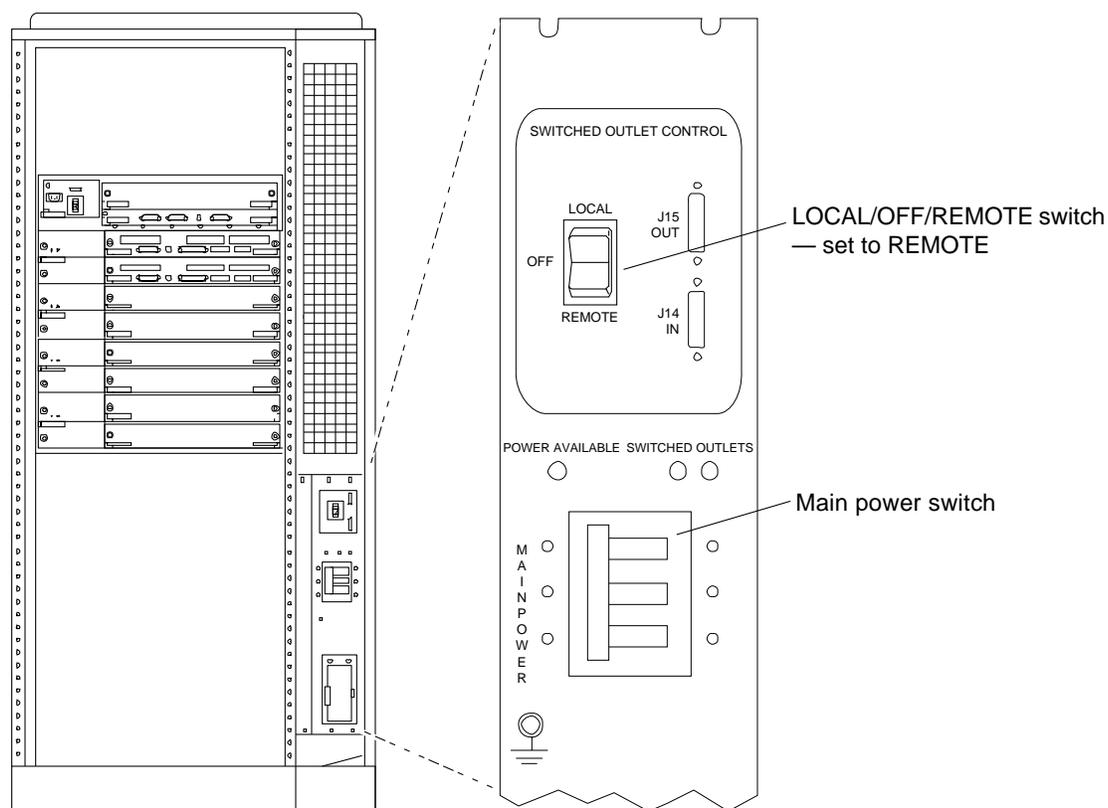


Figure 11-2 Local/Off/Remote Switch and Main Power Switch

## 11.1.2 Connecting the Power Cords

Perform this procedure in the sequence given.

- 1. Remove the cabinet panels to access the power switches and cables.**  
See Chapter 8 for panel removal procedures.
- 2. Level the cabinet.**  
See Section 7.1.1.4, “Adjusting the Stabilizer Bar and Leveling Pads.”
- 3. Turn the AC distribution unit power switch to Off.**  
The switch is at the rear of the cabinet. See Figure 11-2.



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

**4. Locate the AC power cord and uncoil it.**

**5. Plug in the AC power cord.**

**a. Open the lock on the cover of the AC connector housing.**

This connector housing is at the rear of the cabinet at the bottom-right corner. See Figure 11-3.

**b. Open the spring-loaded cover.**

The cover has detents to secure it in the open position.

**c. Plug the power cord female end into the connector.**

**d. Close the lock to secure the plug in place.**

The lock engages features on the plug housing to hold it fast.

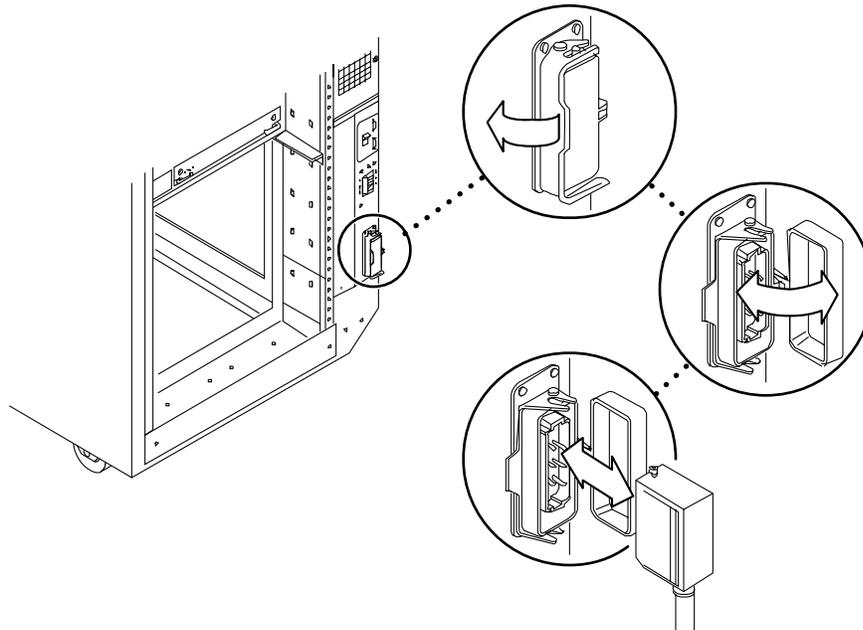


Figure 11-3 Power Connector and Detachable Cable

**6. Plug the power cord male end into the facilities power connector.**

As noted in Chapter 4, “Planning for Hardware, Power, and Network Requirements” the AC outlet must 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.

---

## ***11.2 Customer-Assembled Ultra Enterprise Cluster 6000 Hardware Installation***

If the system is to be assembled at the site, follow these procedures.

### ***11.2.1 Preparing the Cabinet***

#### ***11.2.1.1 Powering Off the Cabinets***

If the system cabinets are powered and operating, halt the operating systems and power off the system and expansion cabinets. See Section 6.1, “Powering Off an Ultra Enterprise Cluster 6000 or 5000 Cabinet.”

### ***11.2.2 Removing the Cabinet Panels***

Remove the cabinet panels to access the power switches and cables. See Chapter 7.1.1.4, “Internal Access and Leveling.”

### 11.2.3 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, it is advisable to replace all panels to protect inner components during transport.

---

3. **Level the cabinet(s).**  
See Section 7.1.1.4, “Adjusting the Stabilizer Bar and Leveling Pads.”

### 11.2.4 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 11-4.
3. **Turn the AC distribution unit power switch to Off.**  
The switch is at the rear of the cabinet.



---

**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.

## 11.2.5 Installing SPARCstorage Arrays in the System Cabinets

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

The cluster contains two identically configured Ultra Enterprise 6000 systems.

### 11.2.5.1 Mounting in the Cabinet

- ◆ Install the rails in the cabinets and install the SPARCstorage Arrays on the rails.

For these procedures, See Appendix A, “Rackmount Rail Installation.”

### 11.2.5.2 Preparing the SPARCstorage Arrays

1. Locate the DIAG switch on the array rear panel.

See Figure 11-4.

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 the DIAG position *only* for normal operation.

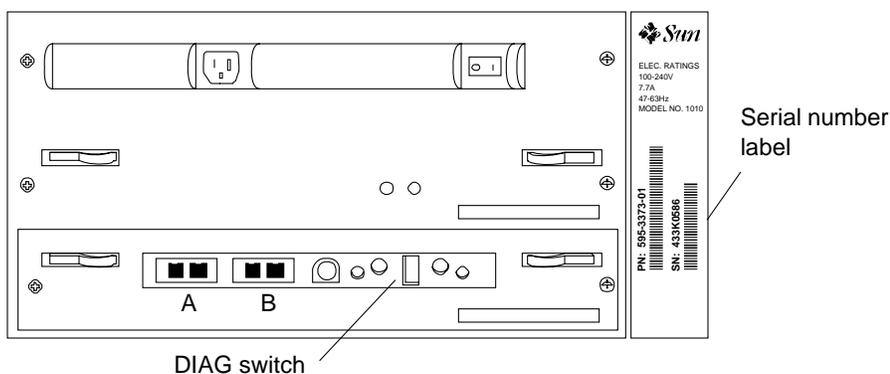


Figure 11-4 SPARCstorage Array Voltage Rating on the Serial Number Label

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

See Figure 11-4.

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

Table 11-1 provides maximum system operating voltage and frequency ranges, and lists current requirements at nominal line voltage for a cabinet in maximum configuration.

*Table 11-1* SPARCstorage Array 100 Series Nominal Power and Maximum Current Parameters

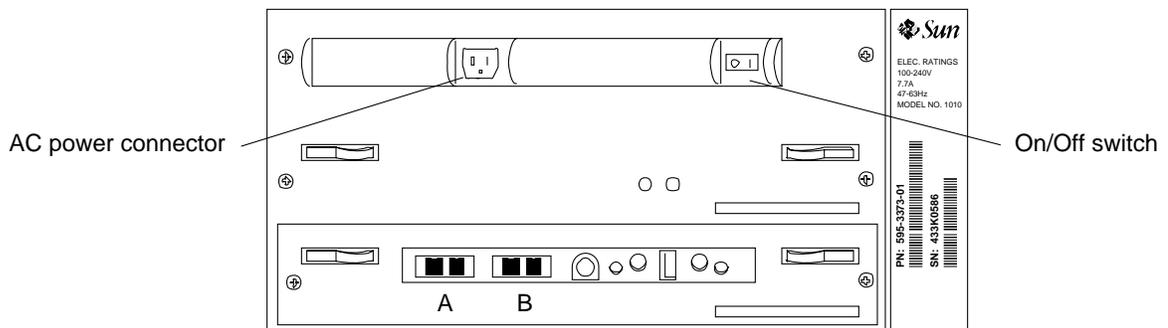
Configuration	Nominal AC Input Voltage Range - Single Phase	Operating Range	Operating Frequency Range	Maximum Current Requirement	Power Supply Output
North American	100–120 VAC	90–264 VAC	47–63 Hz	6.5A	460W
International	220–240 VAC	90–264 VAC	47–63 Hz	6.5A	460W

**Connecting the Power**

**1. Connect SPARCstorage Array power cords.**

**a. Plug a power cord into the connector at the rear of each array.**

See Figure 11-5.



*Figure 11-5* 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.

**2. Plug in the SPARCstorage Arrays.**

Plug the power cords from the chassis into the power distribution unit. Use the switched outlets identified in Figure 11-6 for SPARCstorage Arrays 0-3 as appropriate.

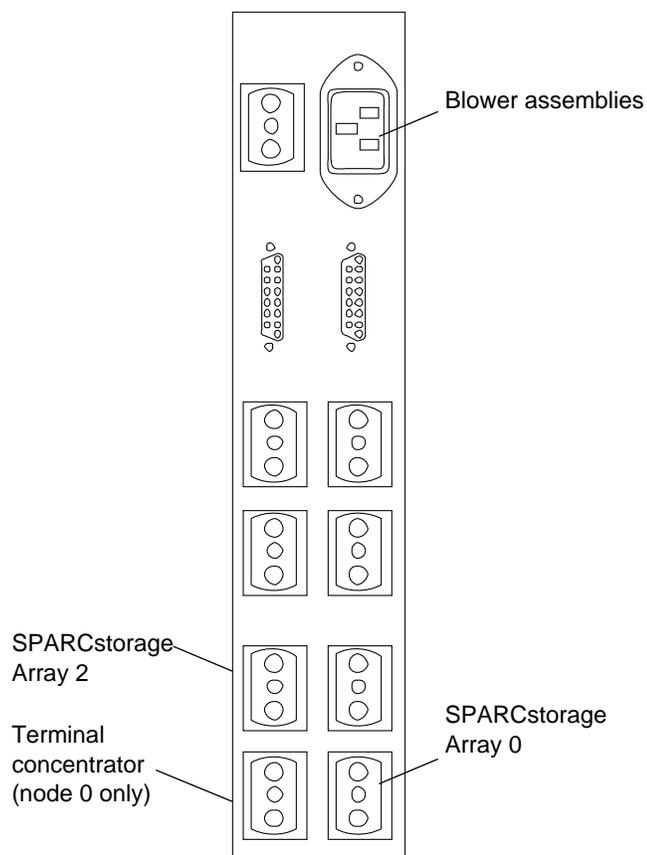


Figure 11-6 Plugging SPARCstorage Arrays into the Power Sequencer

3. **Turn the AC power switch to ON on all SPARCstorage Arrays and servers.**  
See Figure 11-5.

### *11.2.6 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 11-7.

---

**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 an additional pair of screws into holes 9 and 29.**  
Tighten these screws, as well as those in holes 8 and 30.

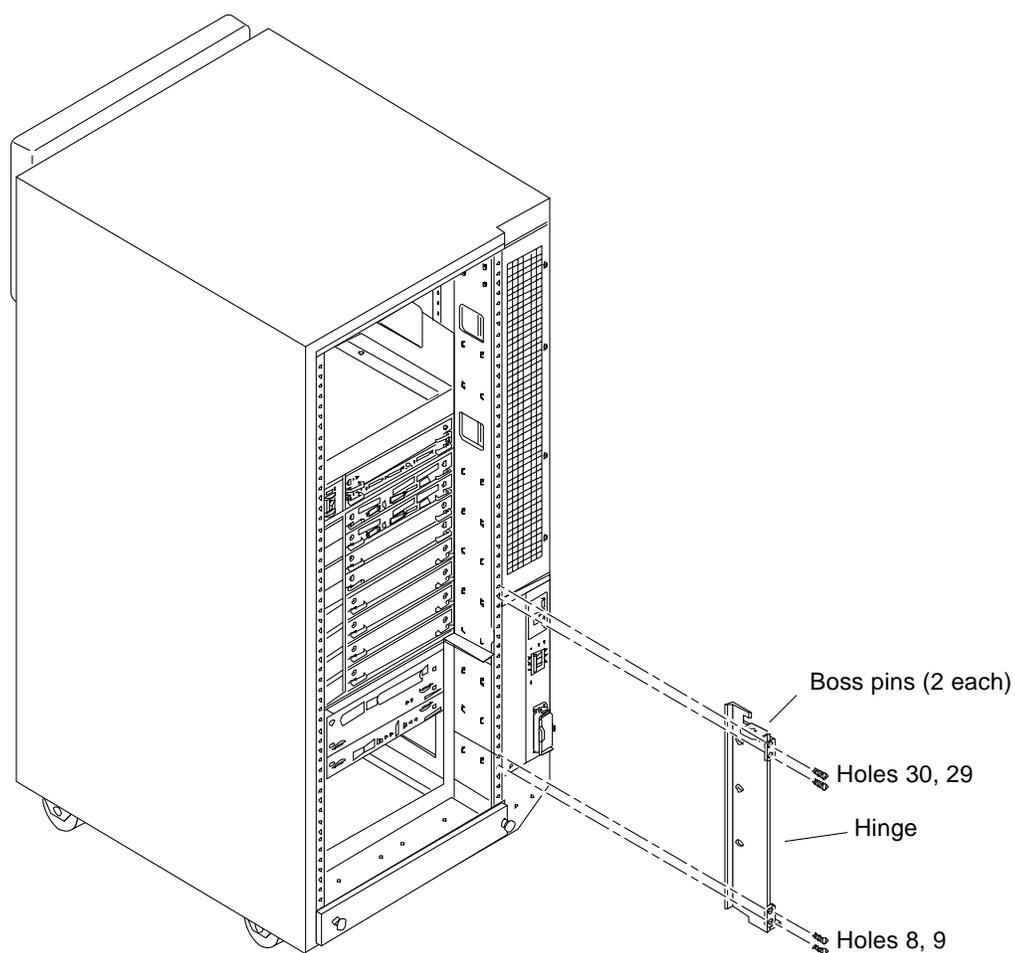
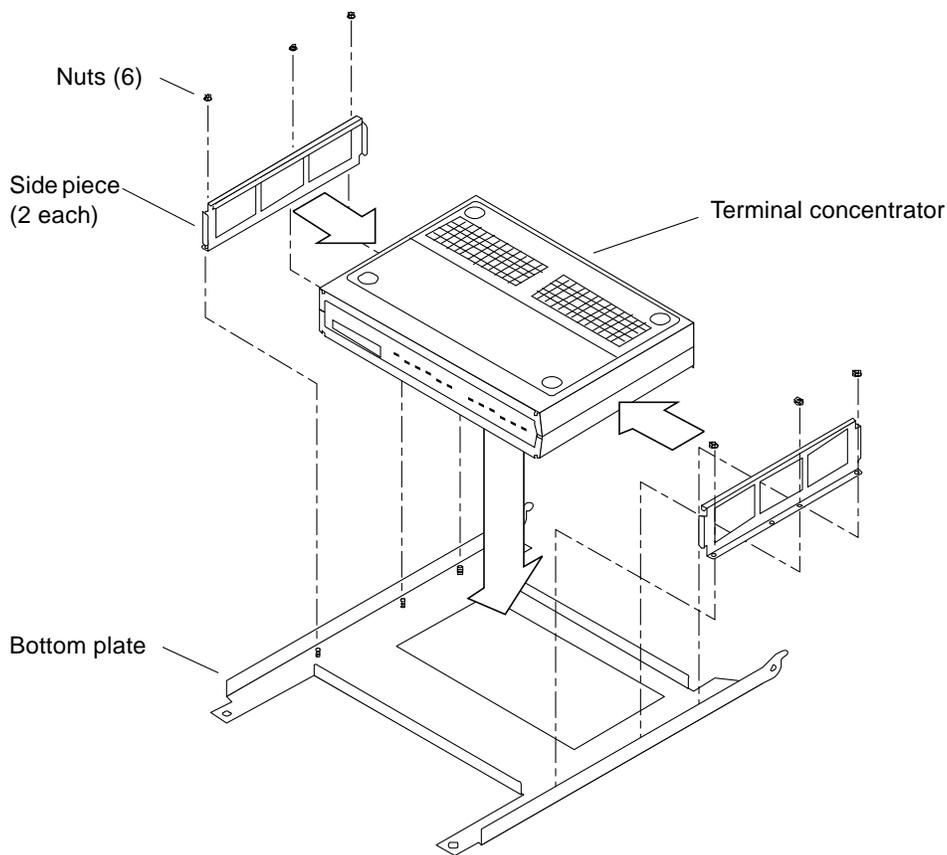


Figure 11-7 Installing the Terminal Concentrator Hinge

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 11-8.

**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 11-8* Assembling the Terminal Concentrator Bracket

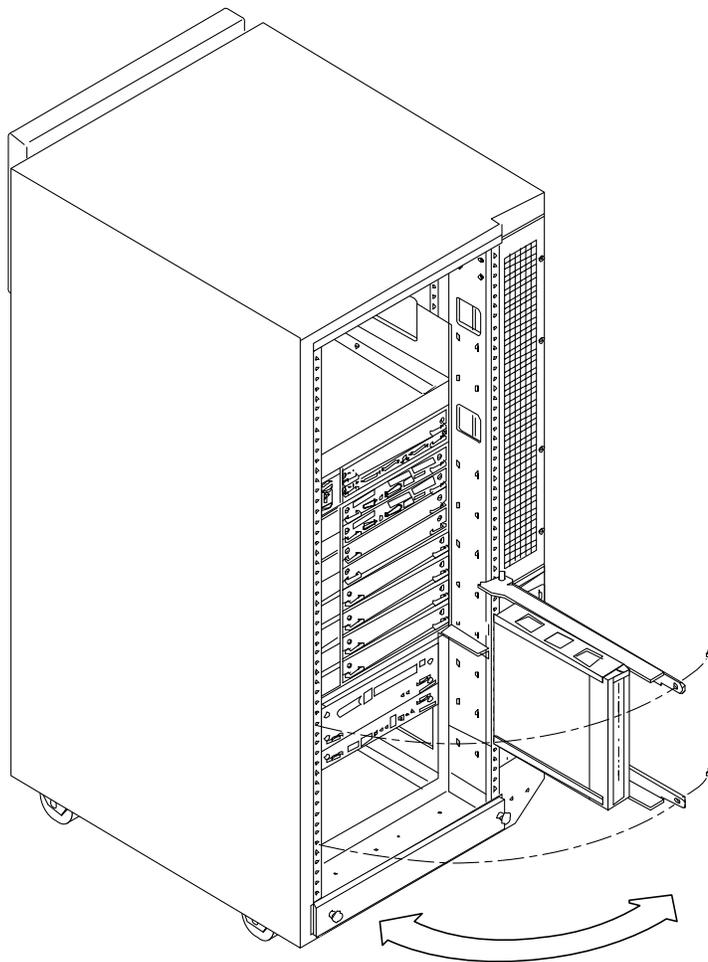
**c. Install three nuts on threaded studs penetrating through each side plate. Tighten the nuts.**

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 11-9).

**4. Install the keeper screw in the shorter boss pin.**

This ensures the assembly will not be accidentally knocked off the hinge.



*Figure 11-9* 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 11-10.

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

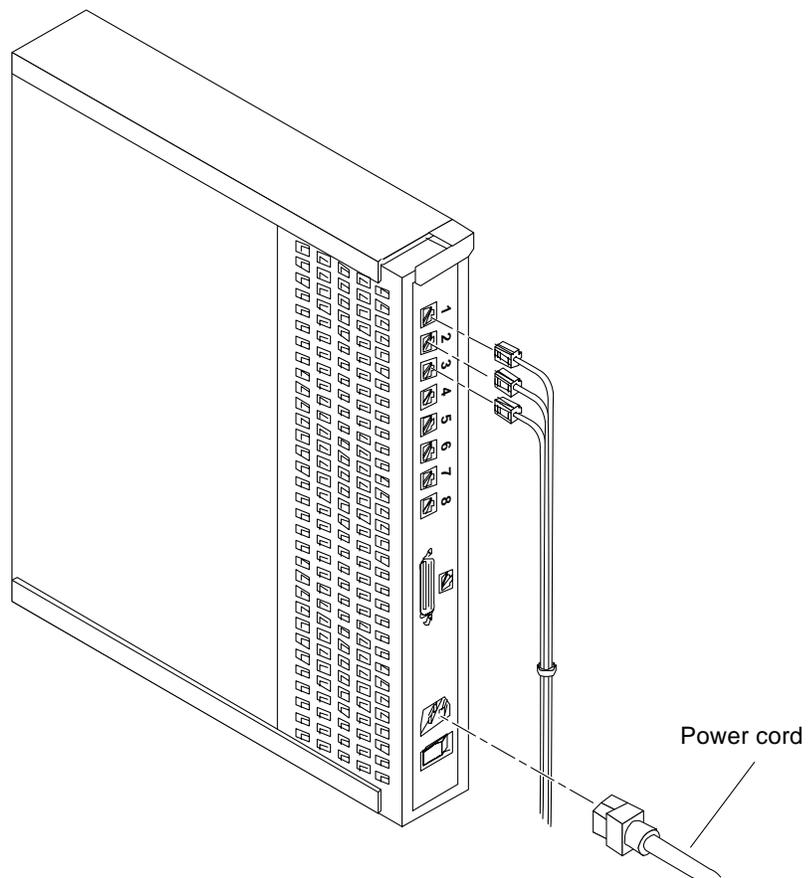


Figure 11-10 Terminal Concentrator Cable Locations

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

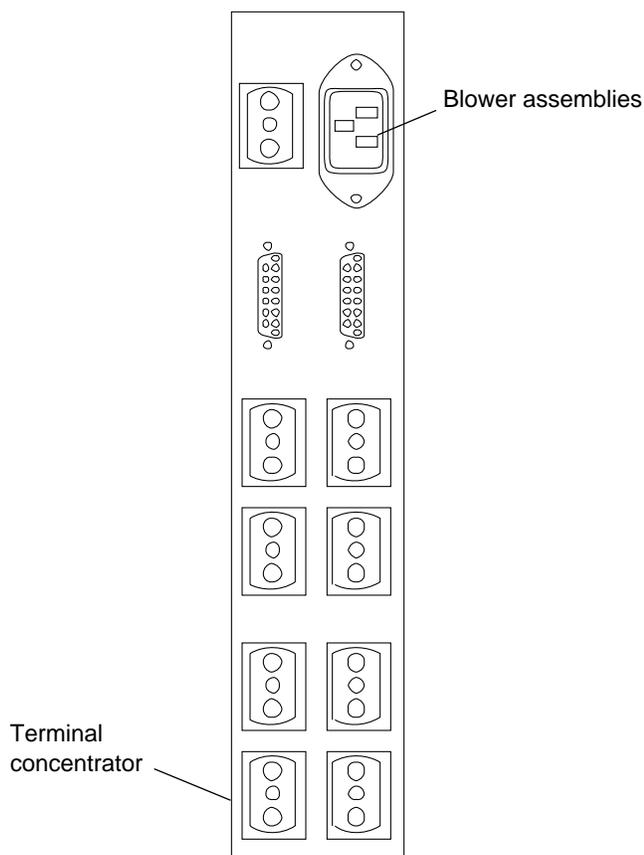


Figure 11-11 Plugging the Terminal Concentrator into the Power Sequencer (Node 0)

### 11.3 Power Cooling Modules (PCMs)

Each PCM provides power and cooling to the one or two boards installed adjacent to it. For this reason, every board or board-pair must be supported by an adjacent PCM.

- ◆ **Ensure that a PCM is installed for each board or board-pair to be installed in the card cage. Install additional PCMs as required to meet this requirement.**

---

**Note** – To adhere to cooling and power requirements, one power/cooling module (PCM) must be installed for every two boards, plus an additional one for redundancy. Install the PCMs adjacent to populated board slots to ensure the fan in the PCM cools the associated boards.

---

### 11.3.1 Configuring the Card Cages

For instructions on removing the CPU/Memory board and I/O board, refer to the documentation supplied with the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Note** – Logically there is no difference between the board slots in the front or rear of the card cage, and each slot can accept any board type. For this system, however, install CPU/Memory boards in the front slots, and I/O and disk boards in the rear slots to facilitate proper cabling. Install the first I/O board in slot 1. This is the only slot connected to the onboard SCSI devices.

---

---

**Note** – To adhere to cooling and power requirements, one power/cooling module (PCM) must be installed for every two boards, plus an additional one for redundancy. Install the PCMs adjacent to populated board slots to ensure the fan in the PCM cools the associated boards.

---

---

**Note** – Install a load board in all empty slots to ensure proper cooling and to provide proper bus termination.

---

#### 11.3.1.1 CPU/Memory Boards

- 1. Install the CPU/Memory boards into the card cage as viewed from the front. Install them from lowest (0) through the highest (14) as appropriate.** For CPU/Memory board installation procedures, refer to the documentation supplied with the CPU/Memory boards or the *Ultra Enterprise 6000/5000/4000 System Manual*. See Figure 11-12 and Figure 11-13 or Figure 11-14 and Figure 11-15 for PDB and HA respectively.
- 2. Fill all unused slots in the front of the system with a load board.**

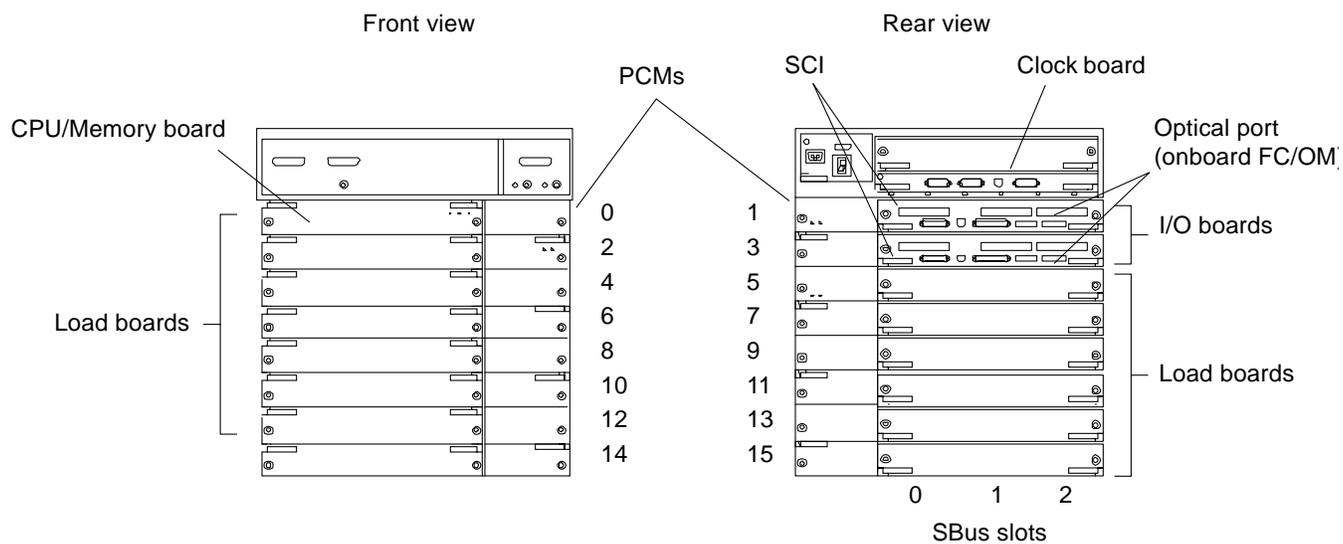


Figure 11-12 Ultra Enterprise Cluster 6000PDB Card Cage  
Minimum Population (Typical of Node 0 and 1)

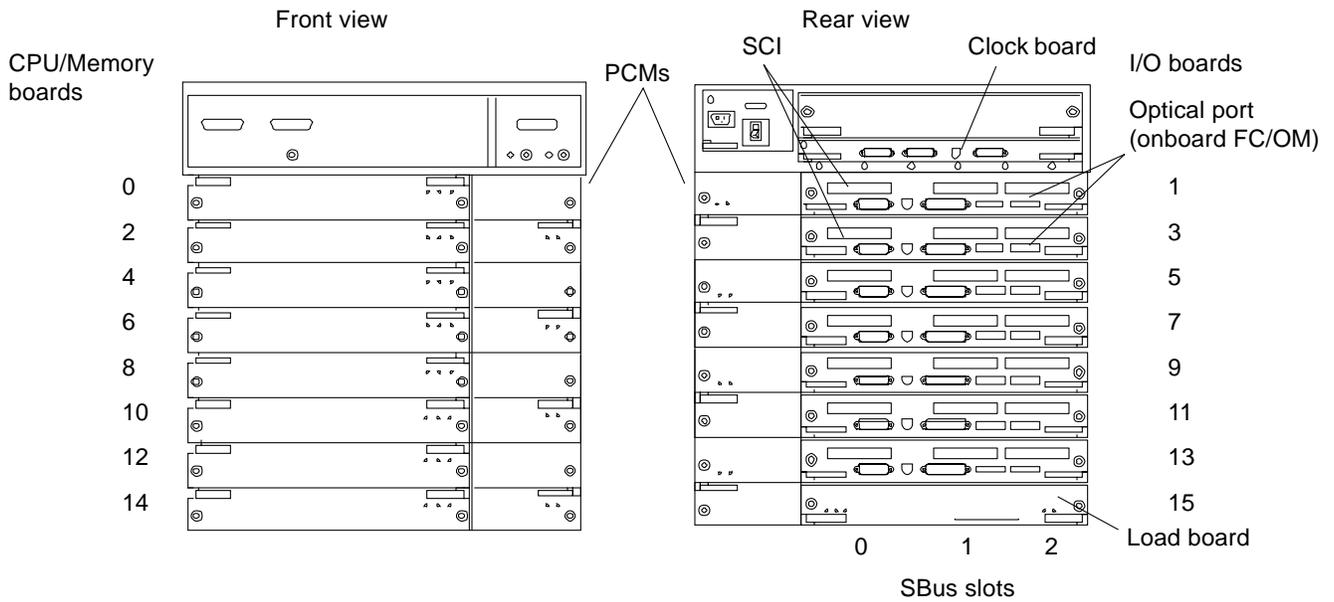


Figure 11-13 Ultra Enterprise Cluster 6000PDB Card Cage Expansion Example (Typical of Node 0 and 1)

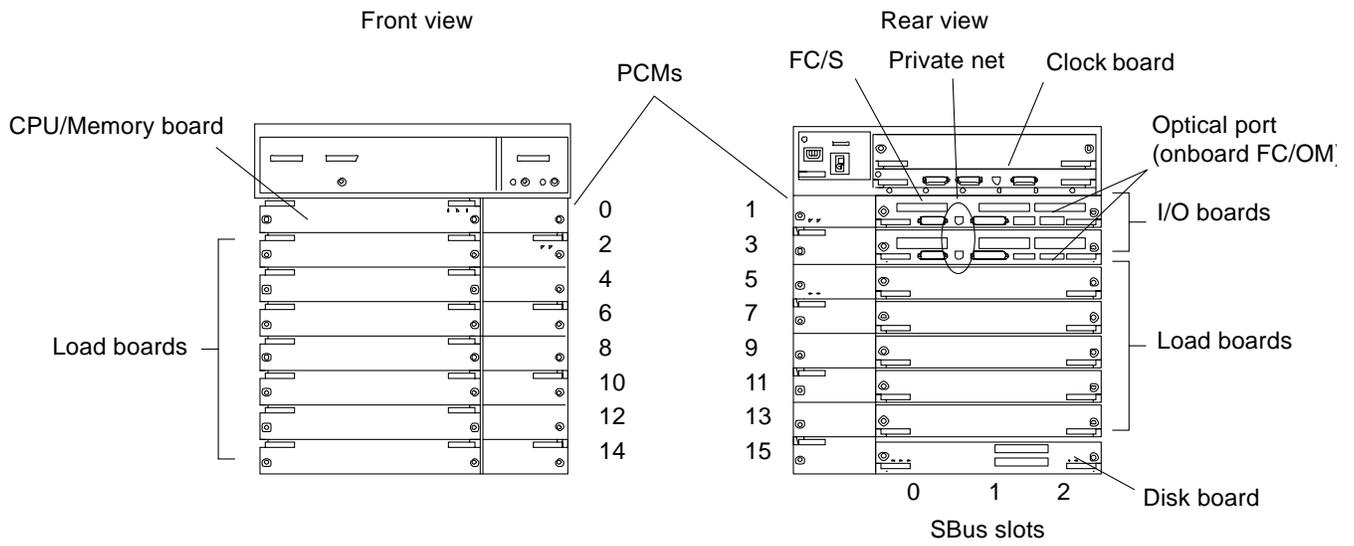


Figure 11-14 Ultra Enterprise Cluster 6000HA Card Cage  
Minimum Population (Typical of Node 0 and 1)

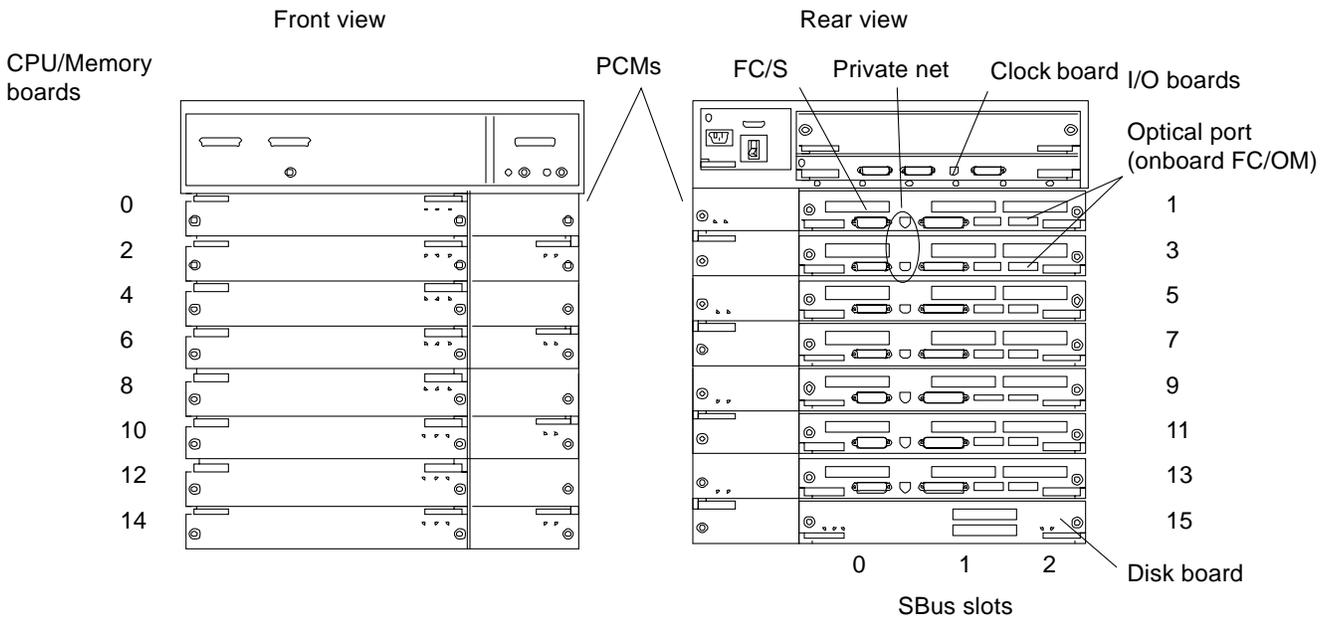


Figure 11-15 Ultra Enterprise Cluster 6000HA Card Cage Expansion Example (Typical of Node 0 and 1)

### 11.3.1.2 Installing I/O Boards for PDB

Use the appropriate section below for PDB or HA installation.

#### ***I/O Boards Intended for Slots 1 and 3 (Equipped with SCI SBus Cards)***

◆ **Configure and install the SCI SBus cards.**

These will be installed into the two I/O boards each which will be installed in card cage slots 1 and 3 of node 0 and 1.

For this procedure, proceed to Appendix B, “Configuring the SCI SBus Card.” This procedure takes the installer through installation of I/O boards in card cage slots 1 and 3 of both nodes.

### 11.3.1.3 PDB and HA Installation

1. **Configure and install any other SBus cards as appropriate.**

---

**2. Load the I/O boards with the appropriate FC/OM modules.**

For module card installation procedures, refer to the documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Caution** – Install FC/OM modules in the A locations only. Do **not** install FC/OM modules in the B location. If FC/OM modules are installed in both locations, then a failure of either module can result in loss of communication with both supported SPARCstorage arrays or other storage device.

---

**3. Install the I/O boards in the card cage.**

See Figure 11-12 through Figure 11-15.

***I/O Boards Intended for Slots 5 Through 15 (Optional)***

- ◆ **Configure and install any SBus cards as appropriate and install the I/O board in the card cage.**

***11.3.1.4 Filler Panels***

- ◆ **Fill all unused slots with a filler panel.**  
See Figure 11-16.

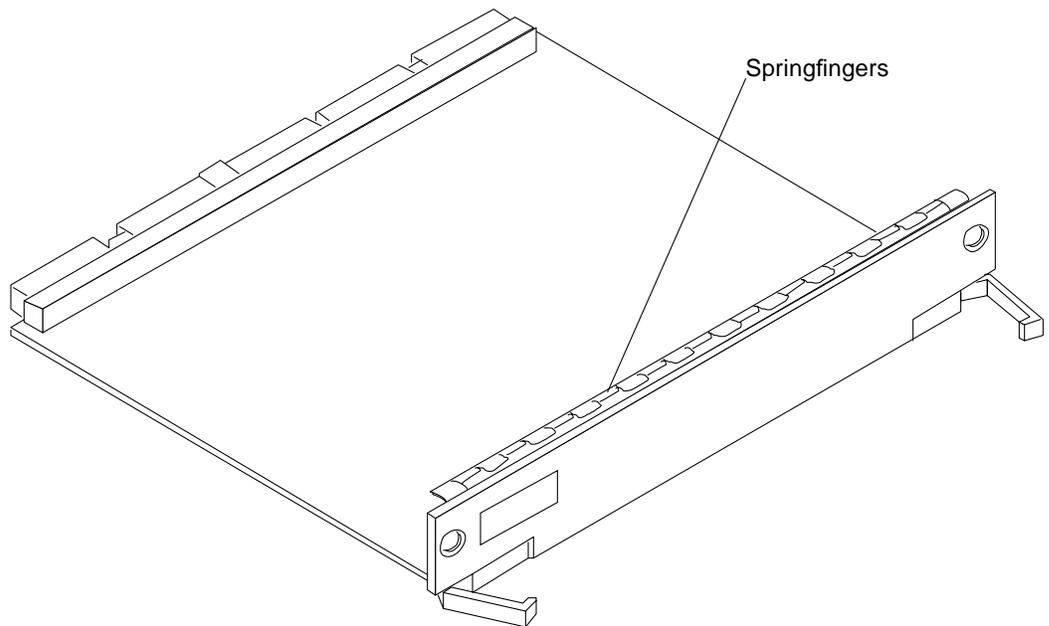


Figure 11-16 Load Board

### 11.3.1.5 Disk Board: HA System Only

1. If your system is intended to boot from a disk board, install it in slot 15. For disk board installation procedures, refer to documentation supplied with the board or in the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**Note** – PDB systems boot from bootable SPARCstorage arrays.

---

### 11.3.1.6 SCSI Termination

#### **PDB system**

Install the terminator on the SCSI II port of the I/O board in slot 1.

### **HA system**

Install the terminator on the top (OUT) SCSI II port of the disk board in slot 7.  
See Figure 11-17.

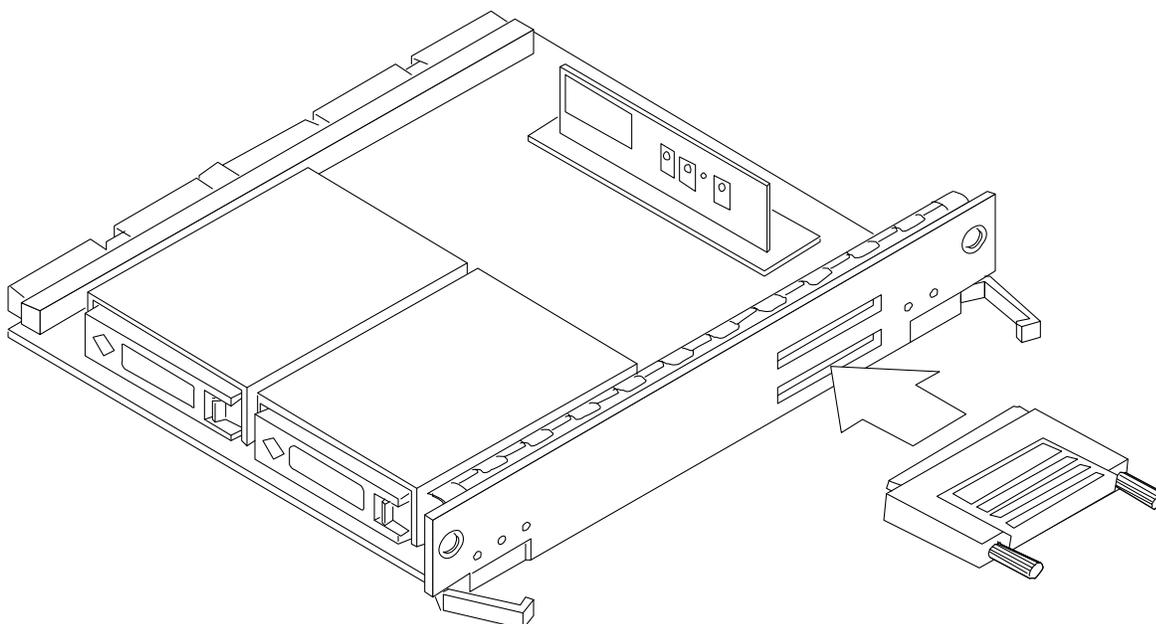


Figure 11-17 Installing the Terminator on the Disk Board

#### **11.3.1.7 Clock Board**

- 1. The clock board must be installed in the clock board slot above the I/O boards.**

For clock board installation procedures, refer to documentation supplied with the card(s) in question or the *Ultra Enterprise 6000/5000/4000 System Manual*.

#### **11.3.1.8 Node 1 Card Cage**

- 1. Repeat Section 11.3.1 above, but for node 1.**

### 11.3.2 Cabling System Components

Ethernet and SCSI II cabling is presented in Table 11-2. Procedures for connecting each cable follow the table.

Table 11-2 Cable Connections (Except Fiber-Optic)

System	Board	From Node 0	From Node 1	To	Interface Type
HA	I/O slot 1	Onboard hme		Node 1 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board 1	RJ-45/TPE private net <sup>1</sup>
		Onboard SCSI		Wide SCSI terminator	Wide SCSI
			Onboard SCSI	Wide SCSI terminator	Wide SCSI
		Public net SBus card in slot 1		Public net	Ethernet or FDDI
			Public net SBus card in slot 1	Public net	Ethernet or FDDI
	Install terminator on SCSI port	Install terminator on SCSI port		Wide SCSI	
	Public net SBus card in slot 1		Public net	Ethernet or FDDI	
	I/O slot 3	Onboard hme		Node 1 onboard hme on I/O board 2	RJ-45/TPE private net <sup>1</sup>
			Onboard hme	Node 0 onboard hme on I/O board	RJ-45/TPE private net <sup>1</sup>
PDB		SCI SBus port		Node 1 SCI SBus port	SCI cable
			SCI SBus card	Node 0 SCI SBus port	SCI cable
All	Clock Board	Serial A		Terminal concentrator port 2	Serial
			Serial A	Terminal concentrator port 3	Serial
	Other	Administration workstation Serial A		Terminal concentrator port 1	Serial
		Administration workstation Ethernet port		Primary Ethernet network	AUI or RJ-45

1. Category 5 twisted-pair private net cable, part number 530-2149 (1-meter) or 530-2150 (5-meter).

### 11.3.2.1 Connecting the Administration Workstation

**Warning** – Do *not* plug a keyboard directly into a host I/O board. If a keyboard is plugged into an I/O 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 I/O 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 11-18.
2. Plug the other end into the administration workstation RS-232 connector.

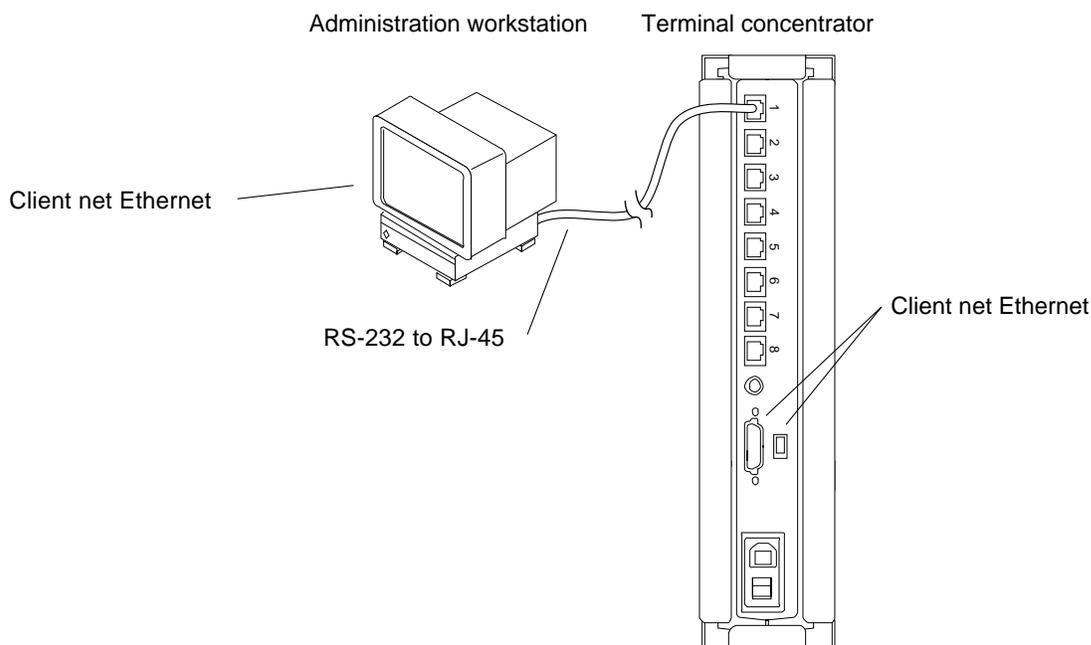


Figure 11-18 Connecting the Administration Workstation

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

### ***11.3.2.2 Connecting the Terminal Concentrator***

Using the 530-2152 (5-Meter) or 530-2151 (1-Meter) cable, proceed as follows:

**1. Connect Node 0.**

**a. Plug the DB25 end of the cable into the Serial A port on the clock board in node 0.**

See Figure 11-18.

**b. Plug the RJ-45 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 clock board in node 1.**

See Figure 11-19.

**b. Plug the RJ-45 end of this cable into the terminal concentrator, port 3.**

**3. Connect the public net Ethernet.**

Plug the public net Ethernet cable into the RJ-45 or DB25 connector as appropriate on the terminal concentrator.

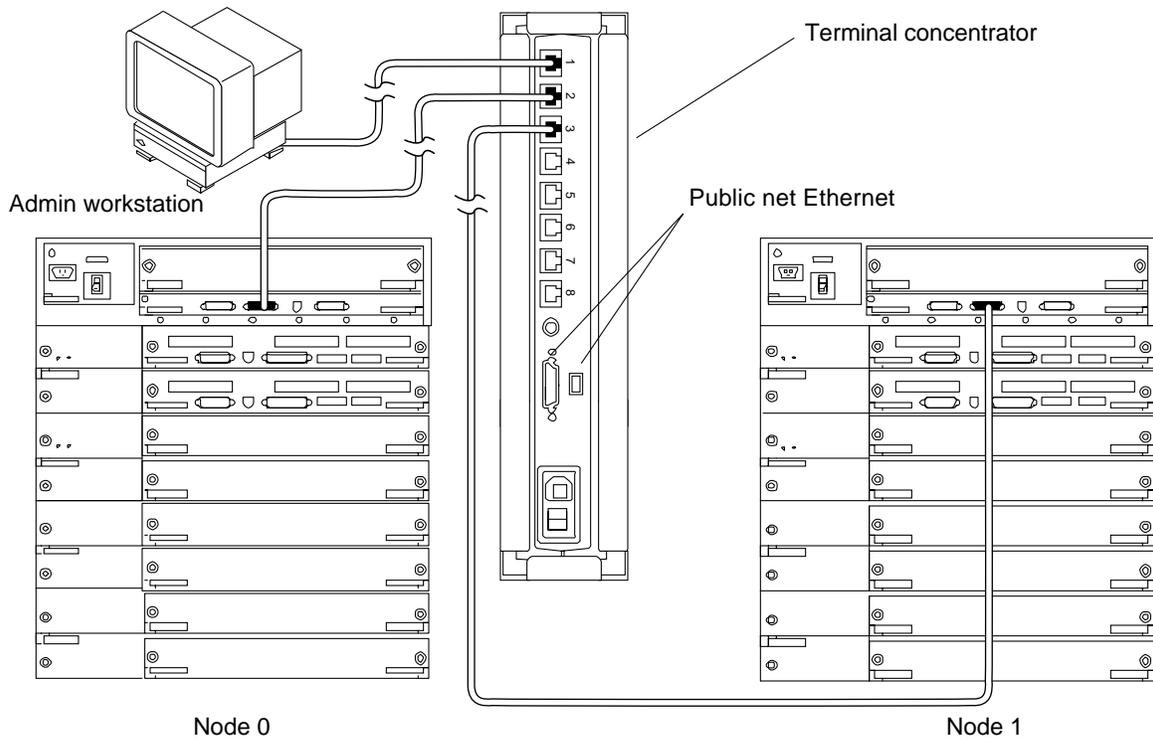


Figure 11-19 Node Interface to the Terminal Concentrator

### 11.3.3 Connecting Node 0 to Node 1—Ethernet

Using the Ethernet cables, connect one node to the other.

#### 11.3.3.1 First Cable

1. Connect one end of the Ethernet cable to the onboard Ethernet port on I/O board slot 1. See Figure 11-20.
2. Connect the other end to the Ethernet port on board 1 in the other node.

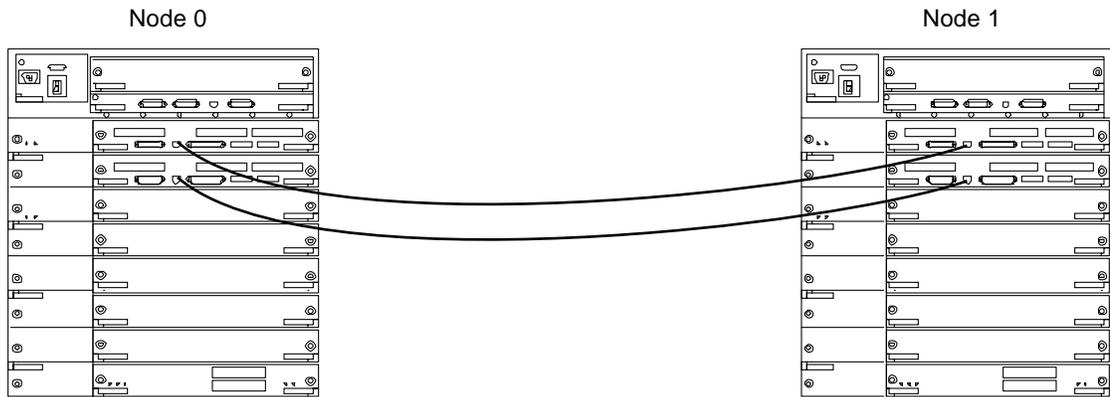


Figure 11-20 Node-to-Node Ethernet Connection

### 11.3.3.2 Second Cable

1. Connect one end of the Ethernet cable to the Ethernet port on I/O board slot 3.
2. Connect the other end to the Ethernet port on I/O board slot 3.

### 11.3.3.3 Connecting Node 0 to Node 1 — SCI Host and Cables

Using the SCI private net cables, connect one Ultra Enterprise Cluster 6000 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.

---

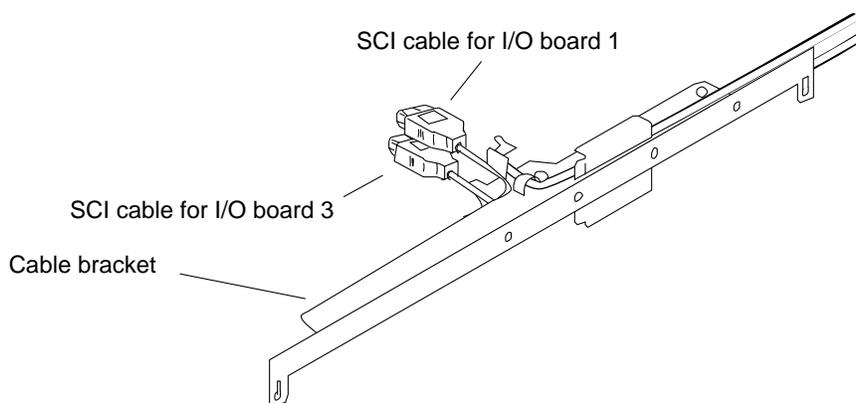
#### **Preparing the Cable and Bracket**

---

**Note** – SCI cables are thick and stiff. The cable bracket incorporates a track on the top and the bottom to support the top and bottom cables respectively. 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 the effects of cable inflexibility, twist or pull.

- 1. At the rear of the cabinet, loosely install two screws in the rack in holes 58.**  
Install one at the left and one at 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 up and the cable track opening to the left.**  
See Figure 11-21.



*Figure 11-21* Installing the Two SCI Cables in the Cable Bracket

- 3. Lay the cable for I/O board 1 into the top of the bracket with the connector toward the left and facing away from you.**  
Form the cable into the curved track built into the top of 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 bottom cable.**  
Install the cable in the track on the underside of the bracket and secure.

### ***Installing the Cable and Bracket***

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

- a. **Approach the rack. Align the cable connectors with the mating connectors on the I/O 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. Rest the bracket 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 cable binding as the screws are tightened.

---

- e. **Check your work.**  
Ensure that the connectors are secure and that no excessive force is placed on the cable, connector, or I/O board. See Figure 11-22.

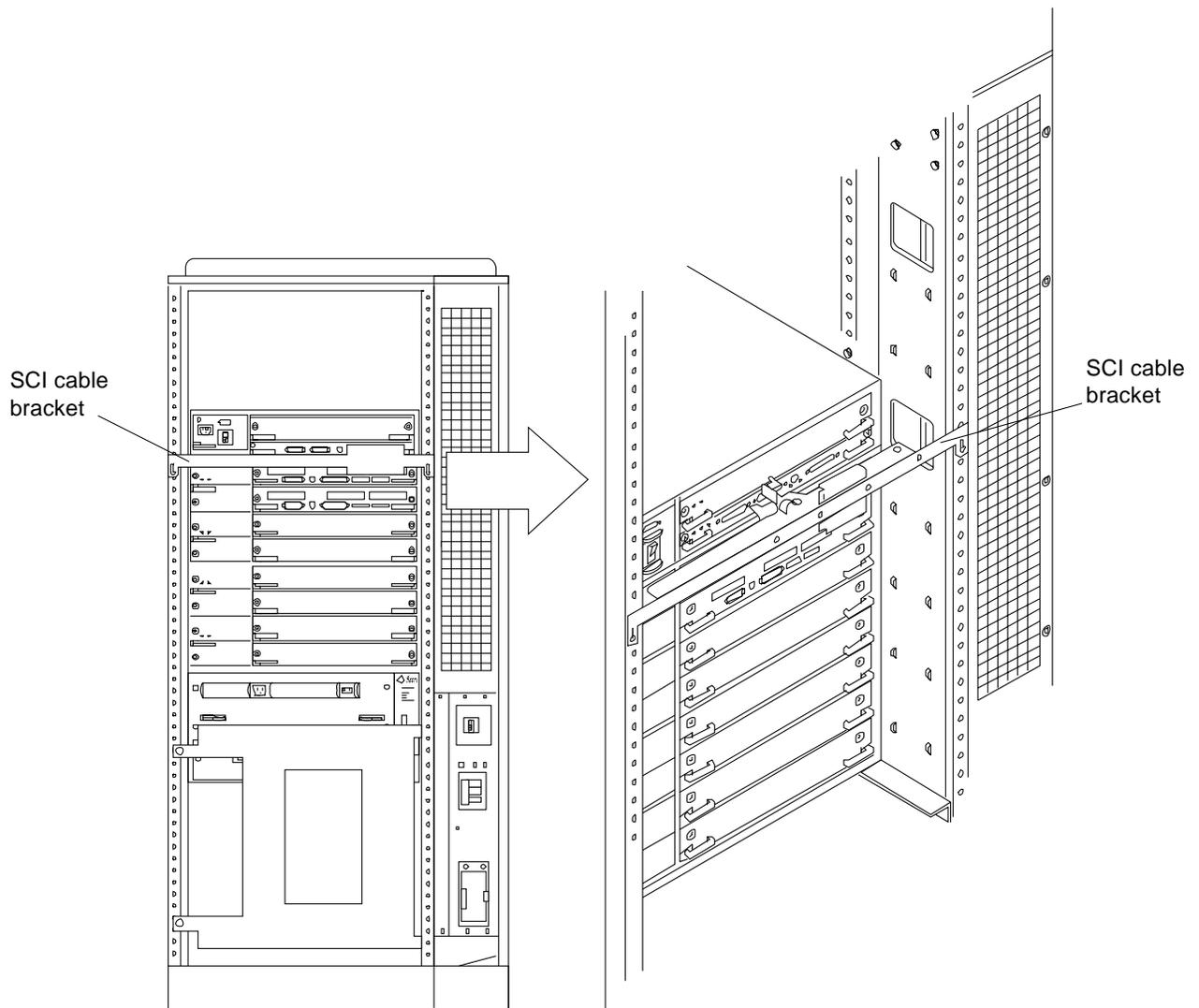


Figure 11-22 Installing the SCI Bracket to Connect the Nodes

**2. Second node.**

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

**Remaining Cables.**

- ◆ **Table 11-2 summarizes the cables that can be connected at this time.**  
Your system may have more network cables than are listed in this table.  
Connect all remaining cable.

**11.3.3.4 Internal SCSI Tray**

If a disk board is installed, skip this procedure and proceed to Section 11.3.4.

- 1. I/O board in slot 1: install a terminator on the SCSI connector of the I/O board panel.**

See Figure 11-23 for connector location.

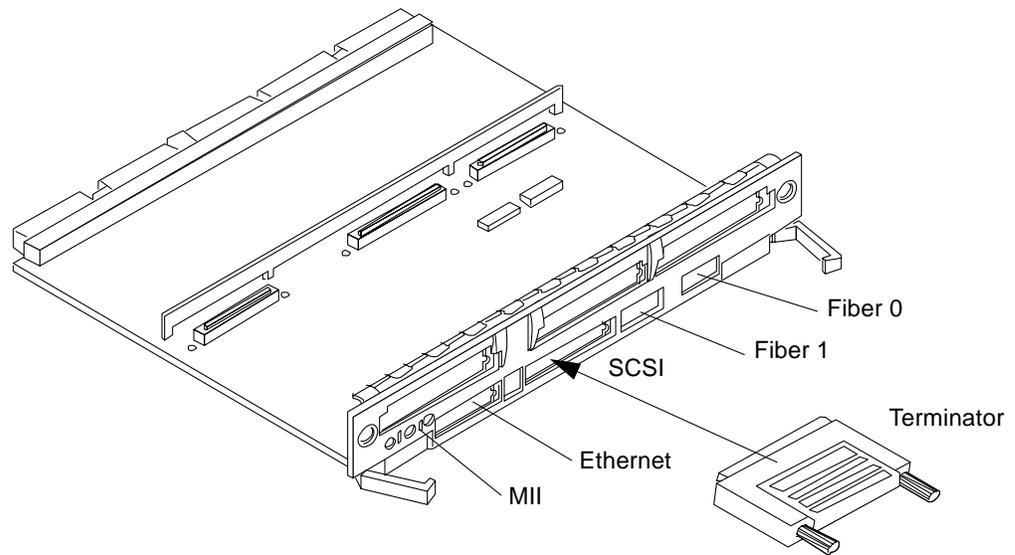


Figure 11-23 Connecting the Internal SCSI Tray

**11.3.4 Disk Board (HA Only)**

- 1. I/O board in slot 1: connect one end of the SCSI cable to the onboard SCSI port.**  
See Figure 11-24 for connector locations.
- 2. Connect the other end to the SCSI IN port on the disk board.**

### 3. Install a terminator on the SCSI OUT port on the disk board.

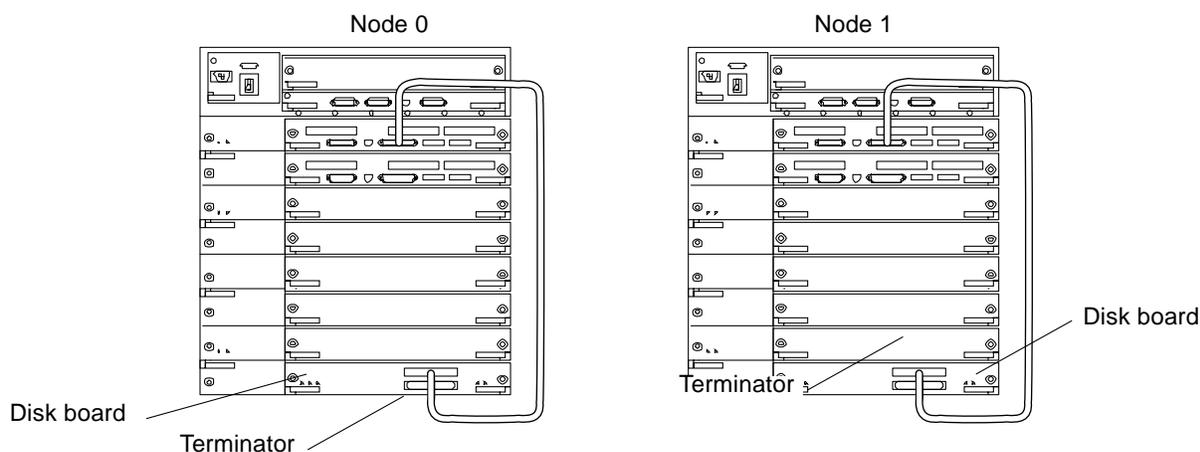


Figure 11-24 Disk Board Connection

#### 11.3.4.1 Connecting the SPARCstorage Arrays

##### **Installing the 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.

- One end connects to an FC/OM module in node 0 or 1 (cabinet A or B)
- The other end connects to an FC/OM module in the SPARCstorage Array in the target cabinet.

Put labels on both ends of each cable. Use Figure 11-25 through Figure 11-27 as guides.

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

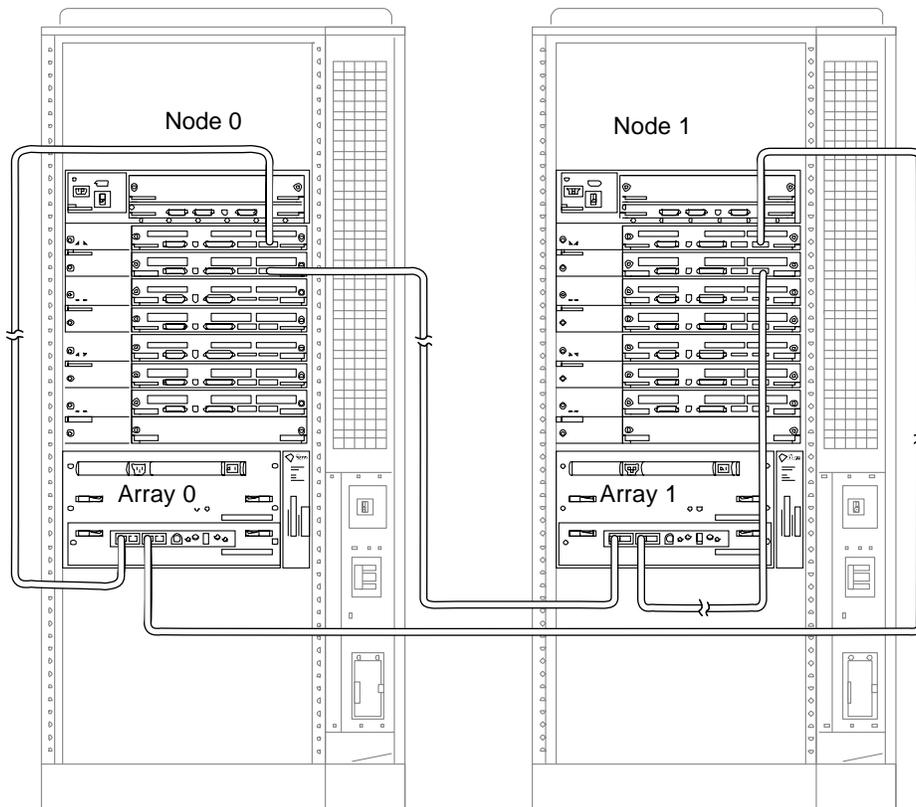


Figure 11-25 SPARCstorage Array 0 and 1 Connection Example

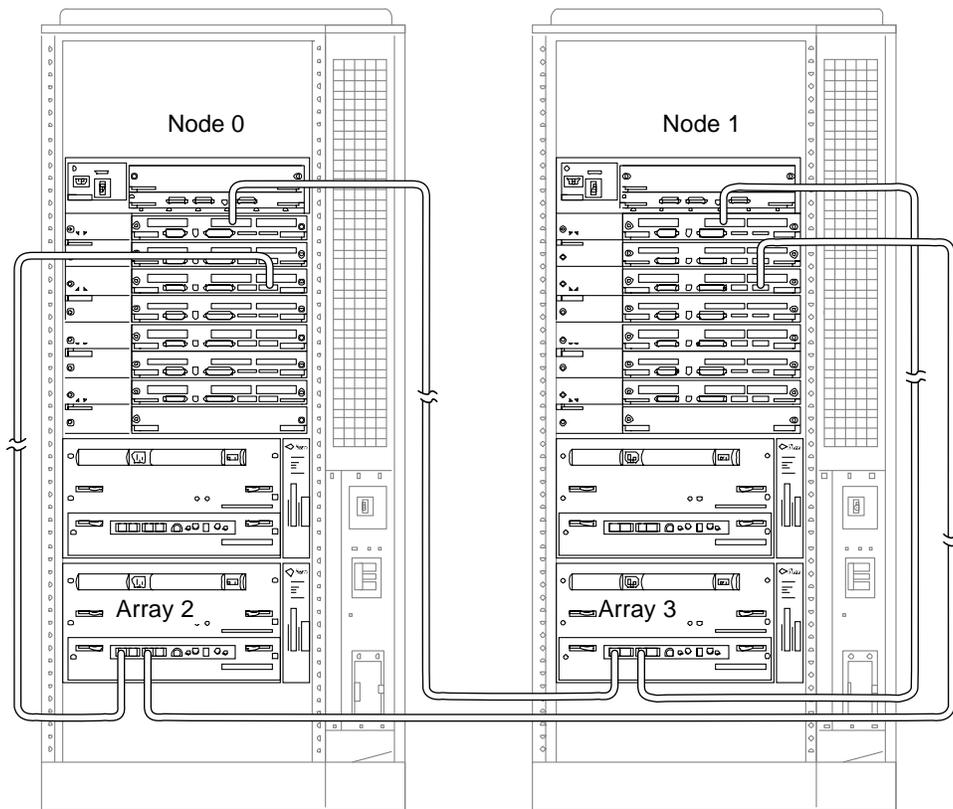
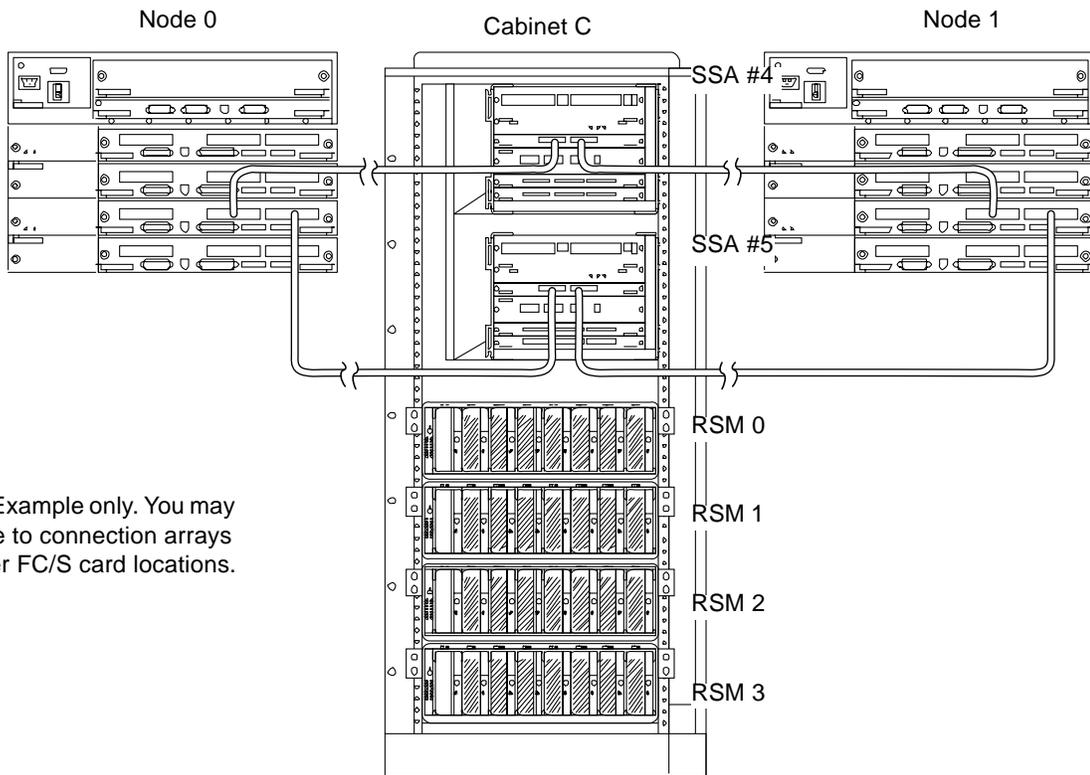


Figure 11-26 SPARCstorage Array 2 and 3 Connection Example

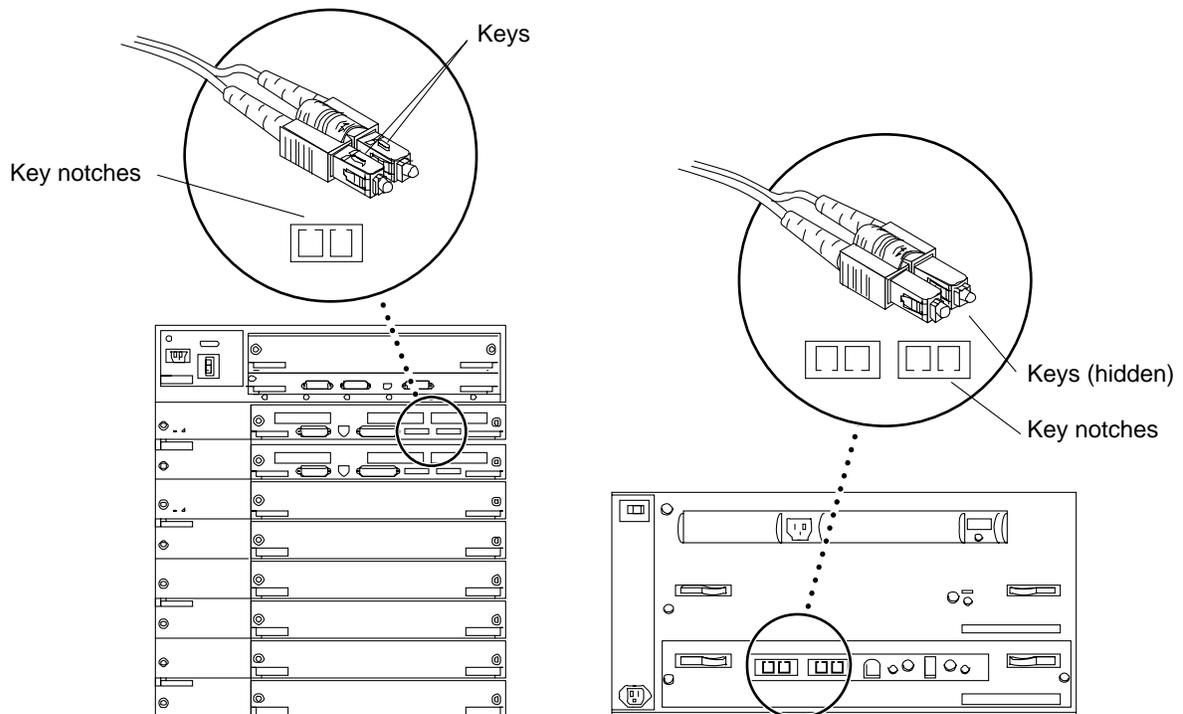


Note: Example only. You may choose to connection arrays to other FC/S card locations.

Figure 11-27 SPARCstorage Array 4 and 5 (SPARCstorage Array 200 Series) Connection Example

### **Cabling**

- 1. Plug one end of the fiber cable into the FC/OM in the I/O board.**  
See Figure 11-28 or Figure 11-29 as appropriate.



**Figure 11-28** SPARCstorage Array Fiber Cable Connection to SPARCstorage Array Model 100 Series Unit

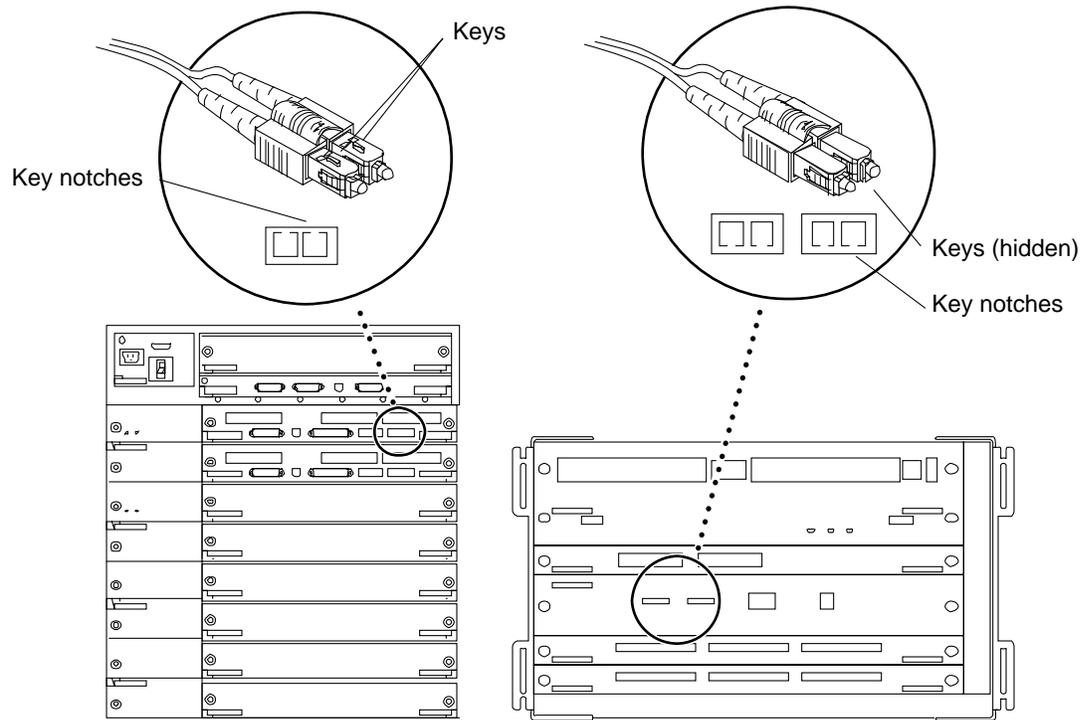


Figure 11-29 SPARCstorage Array Fiber Cable Connection to SPARCstorage Array Model 200 Series Unit

**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 Step 2 to connect both nodes to all SPARCstorage Arrays. See Table 11-3 for a list of all fiber-optic cable connections. See Figure 11-29 for all point-to-point connections in an example expansion 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.**

Table 11-3 Node to SPARCstorage Array Cable Connection Example

I/O Board	From Node 0 FC/OM	From Node 1 FC/OM	To SPARCstorage Array
1	Onboard		0 port A
		Onboard	0 port B
3	Onboard		1 port A
		Onboard	1 port B
5	Onboard		2 port A
		Onboard	2 port B
1	SBus slot 1		3 port A
		SBus slot 1	3 port B
3	SBus slot 1		4 port A
		SBus slot 1	4 port B
5	SBus slot 1		5 port A
		SBus slot 1	5 port B
1	SBus slot 2		6 port A
		SBus slot 2	6 port B
3	SBus slot 2		7 port A
		SBus slot 2	7 port B

## 11.4 Closing the Cabinet

♦ **Replace all panels on the cabinet.**

See Chapter 7, “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

## 12.1 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 12-1).

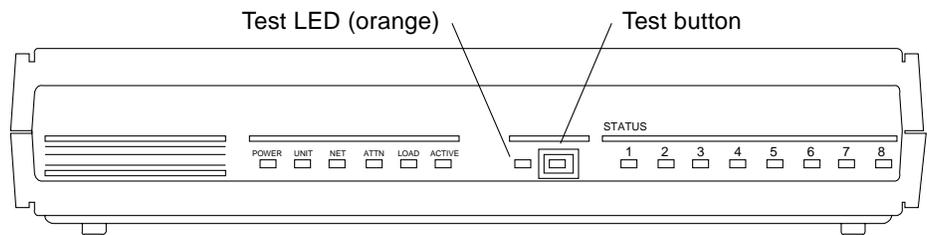


Figure 12-1 Terminal Concentrator Test Button

**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 12-1 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 12-2 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 *Ultra Enterprise Cluster System 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.

## 12.2 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 '^]'.  
^Z  
^C
```

- 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
```

## 12.3 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.

### 12.3.1 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 the top panel of the terminal concentrator.**  
See Figure 12-2.

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 is 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 12.3.2, “Port Parameters Procedure.”**

Sun label:

- 9520 or higher denotes the type variable is correct
- 9519 or lower denotes the variable must be reset

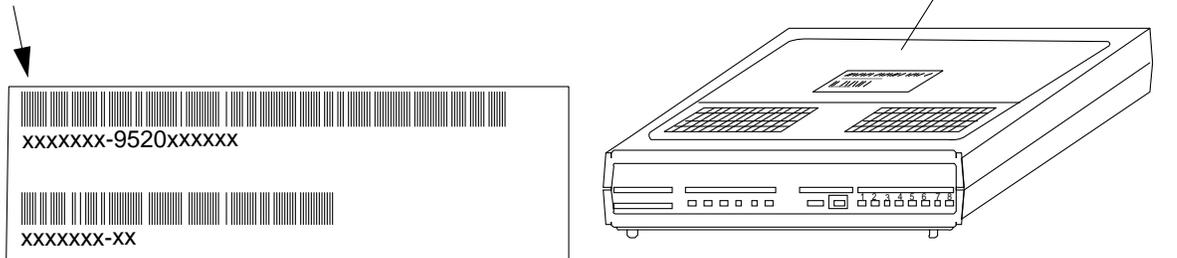


Figure 12-2 Determining the Terminal Concentrator Version

### 12.3.2 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.

---

### 12.4 *Resetting the Terminal Concentrator Configuration Parameters*

For this procedure, refer to the *Ultra Enterprise Cluster Service Manual*, Chapter 3.

### 12.5 *Installing the Solaris 2.5.1 Operating System on the Nodes*

#### 12.5.1 *Ultra Enterprise Cluster HA*

Proceed to the *Solstice HA 1.2 Software Planning and Installation Guide*, part number 802-7211.

#### 12.5.2 *Ultra Enterprise Cluster PDB*

Perform the procedures which follow.

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 *SMCCSPARC 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.

---

### 12.6 *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 acceptance test using the procedures presented in the following sections.

### 12.6.1 Using SunVTS

SunVTS is one of the on-line diagnostics tools for Ultra Enterprise servers. See Section 12.6.1.2, “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 12.6.1.1, “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.

---

#### 12.6.1.1 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.

### 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 the following:

```
# 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 vtspoke command.**

As shown in the following example, the output, which can be lengthy, is redirected to a file for later viewing. The vtspoke command without modifiers will produce a console screen output.

```
# ./vtspoke > /tmp/probe_map
```

**5. Verify that the response to the vtspoke 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.

```
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 vtspoke command for any network interface devices installed.** Consult documentation supplied with your network interface card to determine the correct entry for your device.

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

```
ssa4(plntest)
  Vendor Id : SUN
  Product Id : SSA210
  Product Rev : 1.0
  Firmware Rev : 3.6
  Serial Number : 00000078BB2B
  Disks Attached : c3t2d6 c3t2d5 c3t2d4 c3t2d3 c3t2d2
                  c3t2d1 c3t2d0 c3t1d0
```

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 `vtsp` command is similar to the following for each disk listed under a SPARCstorage Array:**

```
SparcStorageArray(pln0)
  clt0d0(rawtest)<--- logical name(test name)
    Logical Name: clt0d0
    Capacity: 1002.09MB
    Controller: pln0

  clt0d1(rawtest)<--- logical name(test name)
    Logical Name: clt0d1
    Capacity: 1002.09MB
    Controller: pln0

  clt1d0(rawtest)<--- logical name(test name)
    Logical Name: clt1d0
    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. For PDB This does not indicate a problem; for HA, it does.

---

12. To run a final system functional check, run SunVTS using the procedure in Section 12.6.1.2, “Running SunVTS.”

### 12.6.1.2 *Running SunVTS*

Run a final functional test of the system using SunVTS.

1. Become superuser and change directories:

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

2. Invoke the SunVTS using in one of the following ways:

- a. If you logged-in on the HA server console port (the serial console port connected through the terminal concentrator) type:

```
# ./sunvts
```

- b. To use a window-based interface to remotely execute SunVTS (SunVTS 2.0 supports the OPEN LOOK and Common Desktop Environment [CDE] windowing environments) do this. From the administration workstation's windowing system, type:

```
# ./sunvts -h ha_host_name
```

---

**Note** – This allows you to monitor the HA server *ha\_host\_name* (italics) in the CDE environment.

---

c. In the OpenWindows environment, type:

```
# ./sunvts -l -h ha_host_name
```

d. To run in the TTY interface mode, type:

```
# ./sunvts -t -h ha_host_name
```

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 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 2.0 User’s Guide*, Part Number 802-5331.

### 12.6.2 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.

## 12.7 Software Installation

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

---

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

---

# Rackmount Rail Installation



This appendix provides procedures to install the following assemblies:

<i>Installing the Rackmount Rails for SPARCstorage Array 100 Series Chassis</i>	<i>page A-1</i>
<i>Installing the Side Rails</i>	<i>page A-6</i>
<i>Preparing the SPARCstorage Array 100 Series Chassis</i>	<i>page A-8</i>
<i>Installing the Base Plate on the Chassis</i>	<i>page A-14</i>
<i>Installing the Array in the Cabinet</i>	<i>page A-15</i>
<i>Installing the SPARCstorage Array 200 Series Chassis in the Expansion Cabinet</i>	<i>page A-18</i>
<i>Installing the SPARCstorage RSM Chassis</i>	<i>page A-20</i>

## A.1 *Installing the Rackmount Rails for SPARCstorage Array 100 Series Chassis*

The rackmount rails are required when installing the SPARCstorage Array 100 series chassis into the Ultra Enterprise 5000 and Ultra Enterprise 6000 node cabinets:

The kit consists of the side rails and base plate (identified in Figure A-1) along with fasteners and certain other items. Rail installation consists of

- Installing the side rails in the cabinet to accept the array
- Installing the base plate on the SPARCstorage Array

- Installing the array (with base plate attached) on side rails in the cabinet
- Reconfiguring the fan assemblies to provide correct cooling

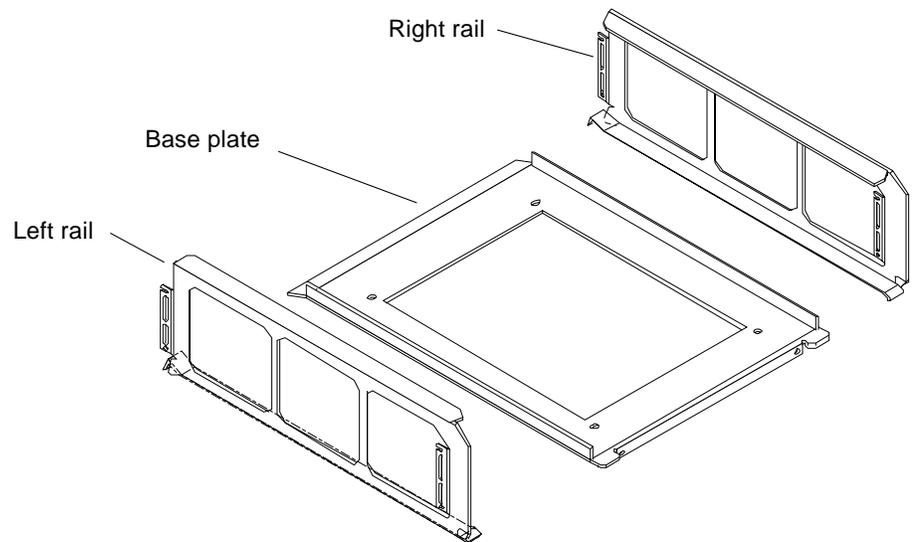


Figure A-1 Rackmount Kit Side Rails and Base Plate

## A.1.1 Array Installation Positions

**Note** – Cabinet cooling is an important factor. Install only SPARCstorage Array 100 series chassis in the Ultra Enterprise Cluster system cabinets. Use only the hole numbers specified for installing side rails. These hole numbers determine array spacing for proper ventilation.

## A.1.2 Ultra Enterprise Cluster 5000 Node Cabinets

SPARCstorage Array chassis are installed in the lower three positions. A typical installation is shown in Figure A-2. Side rails are installed using screw hole positions identified in Figure A-2.

SPARCstorage Arrays are installed in the top position and (optionally) the two array positions below this (Figure A-3).

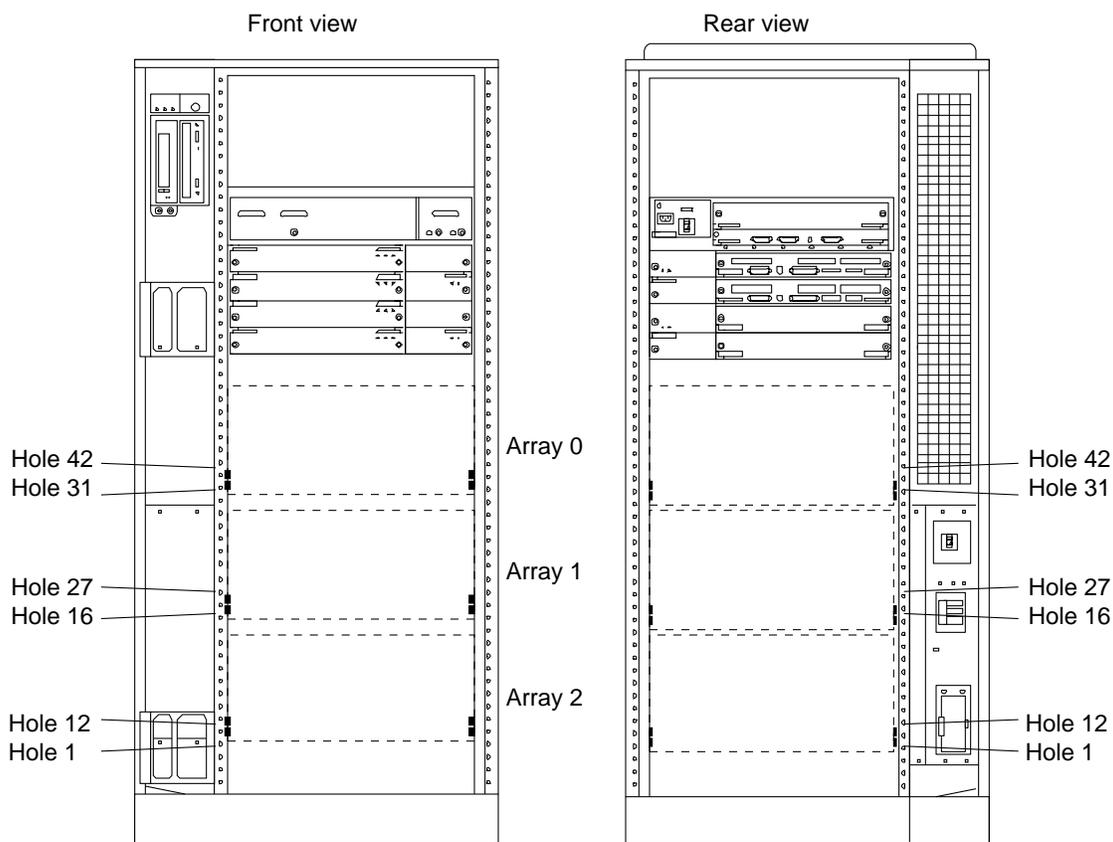


Figure A-2 Side Rail Installation Locations and Hole Numbers in the Ultra Enterprise Cluster 5000 Node Cabinet

### A.1.3 Ultra Enterprise Cluster 6000 Node Cabinets

SPARCstorage Arrays are installed in the top and (optionally) bottom chassis position (Figure A-3).

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

A typical installation is shown in Figure A-3. Side rail hole numbers are identified here.

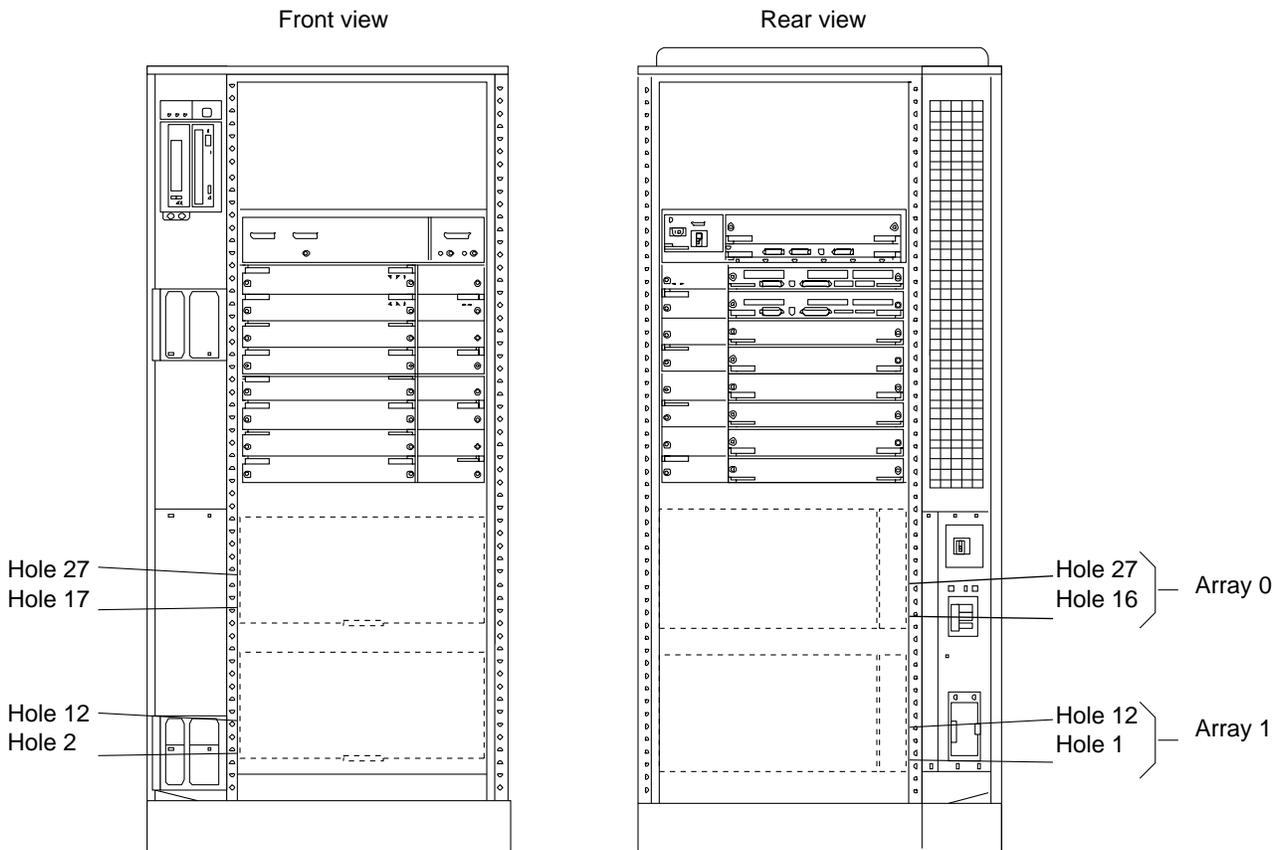


Figure A-3 Side Rail Installation Locations and Hole Numbers in the Ultra Enterprise Cluster 6000 Node Cabinet

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

### A.1.4 Expansion Cabinets

SPARCstorage Array chassis are installed in all five positions. A typical installation is shown in Figure A-4. Side rails are installed using screw hole positions identified in Figure A-4.

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

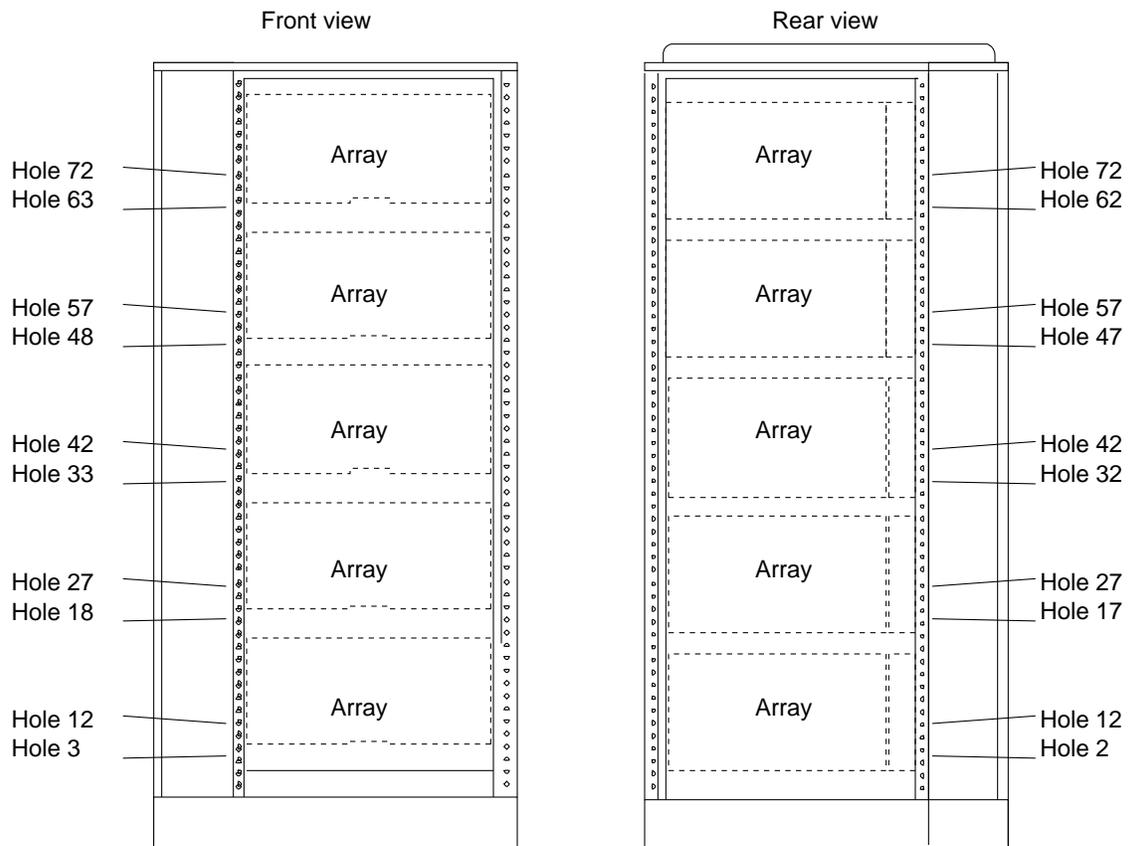


Figure A-4 Side Rail Installation Locations and Hole Numbers in the Expansion Cabinet

## A.2 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-5.

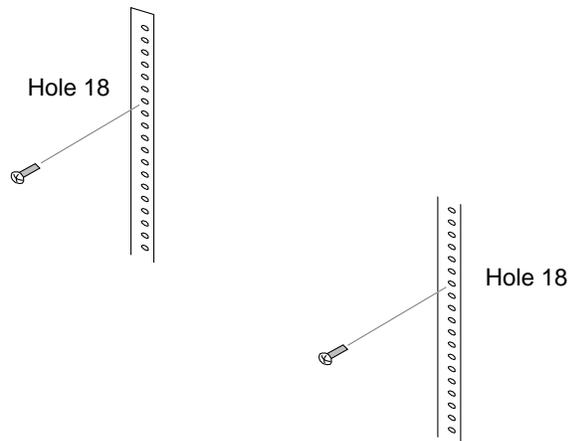


Figure A-5 Threading Screws into the Rack—Right Side Rail

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-6.

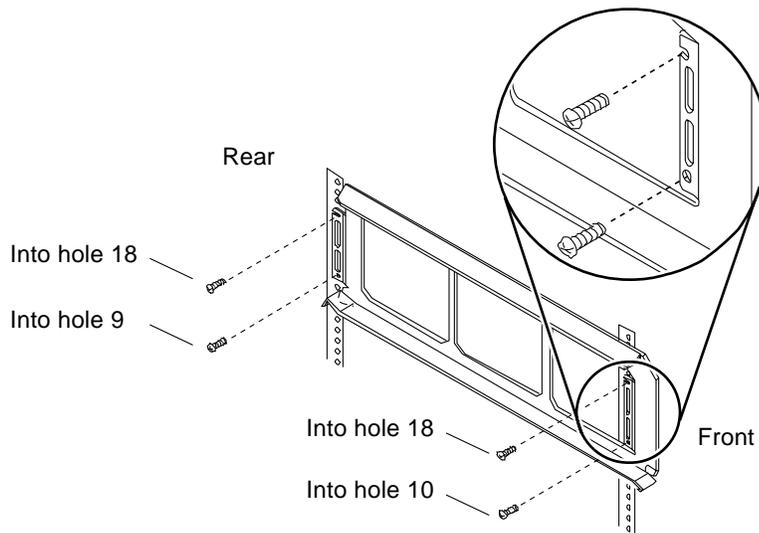


Figure A-6 Securing the Right Side Rail to the Rack

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

**6. Repeat steps 1 through 4 for the left side rail.**  
See Figure A-7.

**7. Install all remaining pairs of side rails at the hole numbers specified in Figure A-2 through Figure A-4.**

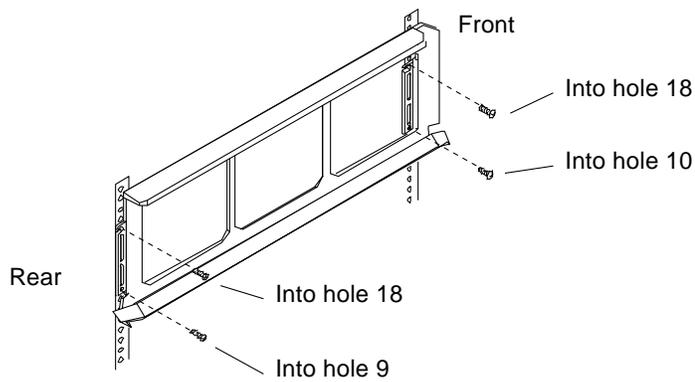


Figure A-7 Securing the Left Side Rail to the Rack

## A.3 *Preparing the SPARCstorage Array 100 Series Chassis*

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.4, “Installing the Base Plate on the Chassis” on *page A-14*

---

### A.3.1 *Removing the Front Panel*

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

- 1. Place your fingers under the arrow embossed on the front panel and press up on the latch to release the panel.**

See Figure A-8.

---

**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.

---

- 2. With the panel released, gently swing the panel bottom away from the array and lift it clear.**

Set the panel aside.

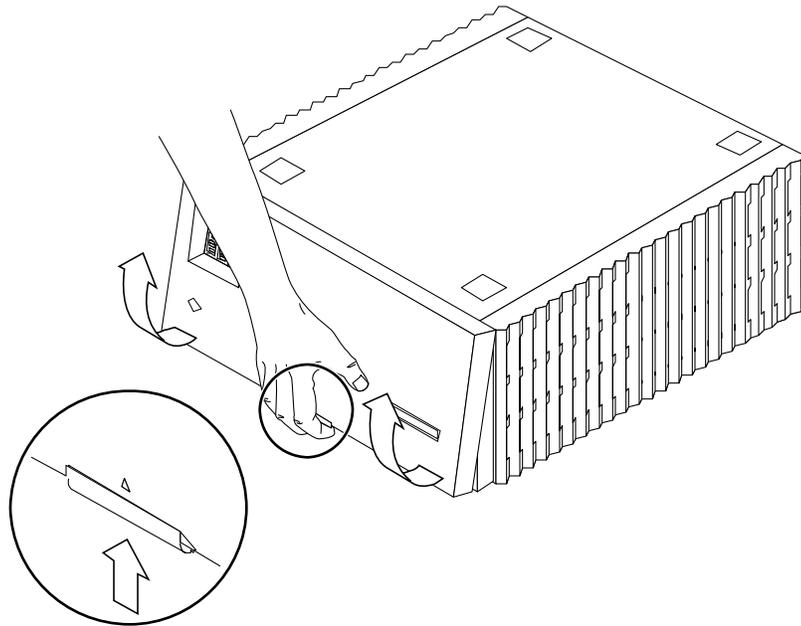


Figure A-8 Removing the Front Panel

### A.3.2 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 array 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-9).
  - b. Pull the panel away, free of the array, and set it aside.
3. Repeat Step 2 to remove the remaining side panel.

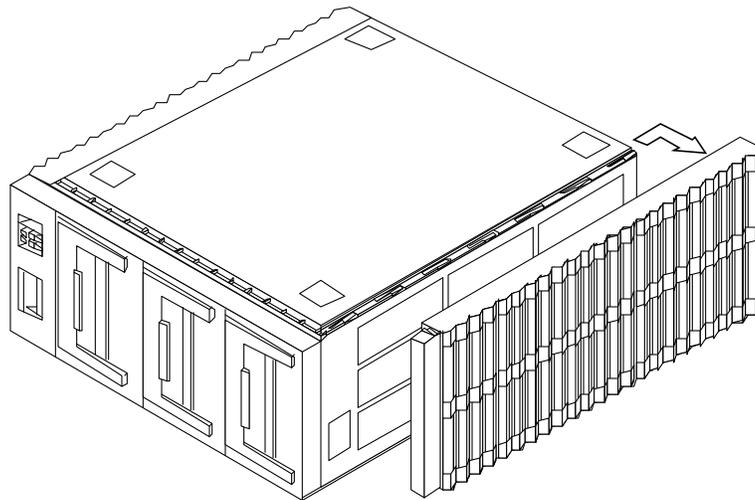


Figure A-9 Removing the Side Panels

### *A.3.3 Removing the Top Panel*

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

#### *A.3.3.1 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-10.**
- 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-10; set the popout aside.**
- 5. Repeat step 1 through 3 to remove the remaining three popouts from the top panel.**

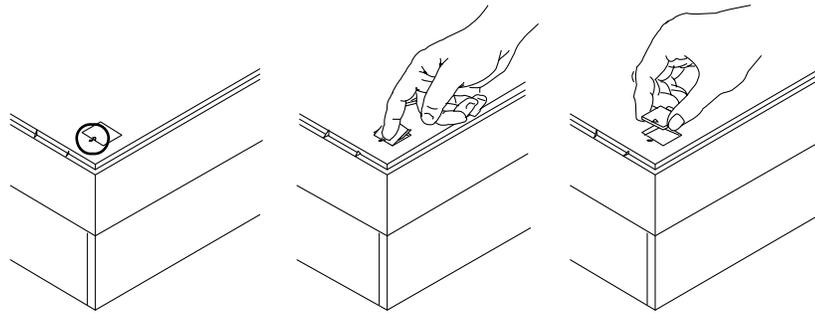


Figure A-10 Removing the Popouts from the Top Panel

### A.3.3.2 Removing the Top Panel

**1. Place your fingers under the panel rear lip and lift.**

See Figure A-11.

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.**

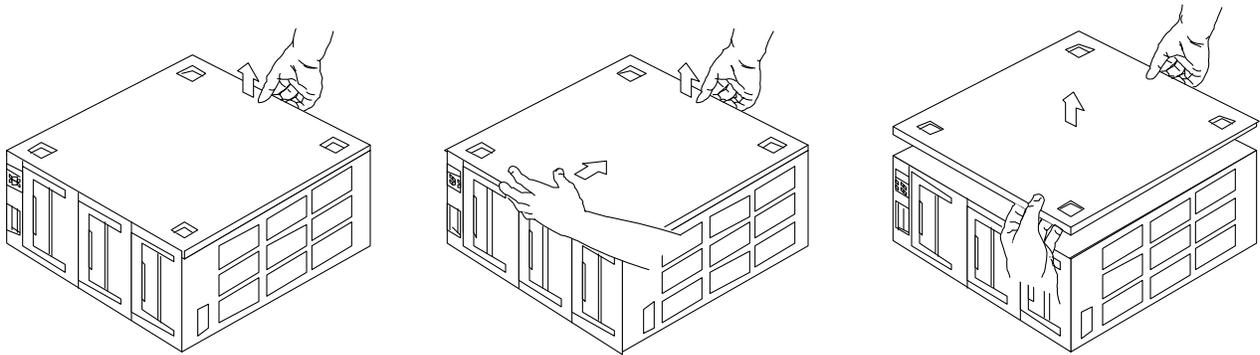


Figure A-11 Removing the Top Panel

### A.3.3.3 Replacing the Four Popouts

To prevent losing the popouts:

1. Orient the popout so the dots are nearest each other (Figure A-12).
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.

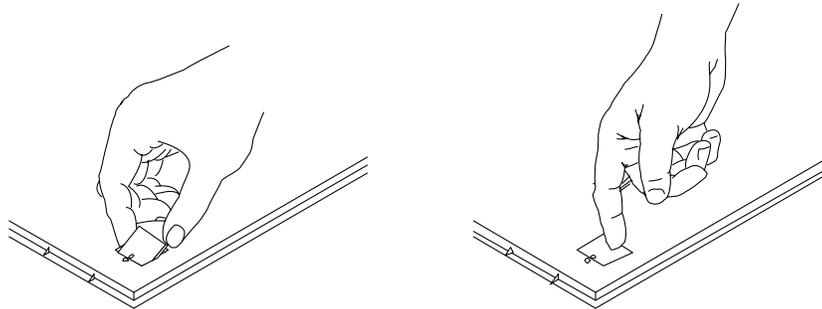


Figure A-12 Replacing the Popouts in the Top Panel

### A.3.3.4 *Removing the Feet*

- 1. Invert the array.**  
See Figure A-13.
- 2. Unscrew all four feet.**  
The feet and screws are not used in this configuration.

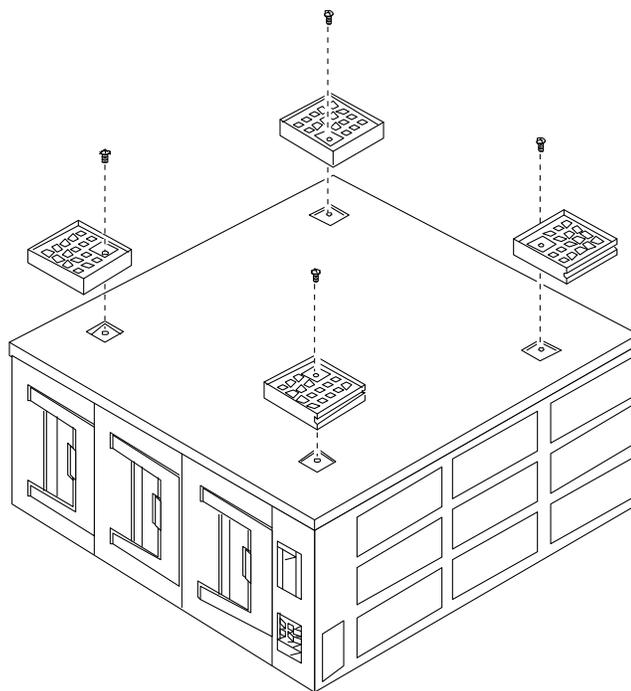


Figure A-13 Removing the Feet

### A.3.3.5 *Removing the Bottom Panel*

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

- ◆ **With the array inverted and the front facing you, repeat Section A.3.3.2, “Removing the Top Panel.”**  
See Figure A-11.

## A.4 Installing the Base Plate on the 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 array with the front facing you (Figure A-14).
2. Place the base plate on the array (Figure A-14).
3. Loosely thread four short screws from the kit in all four holes. When all screws are started, tighten them.
4. Restore the array to the upright position with the front facing you. See Figure A-15.

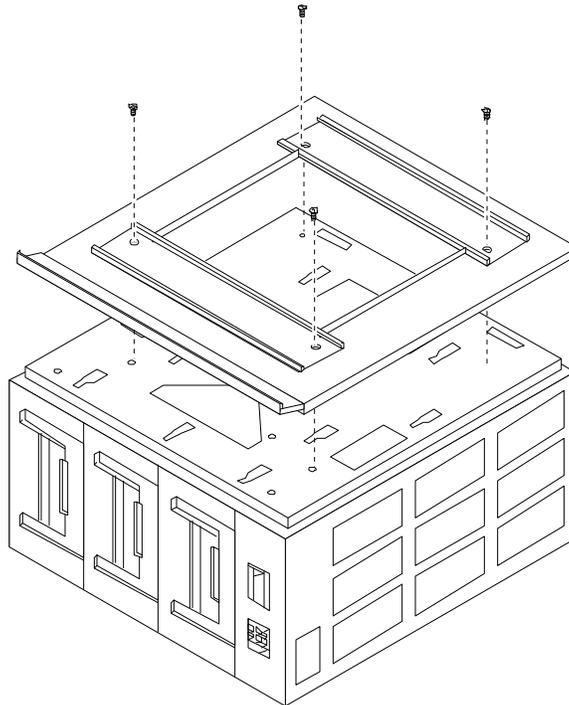


Figure A-14 Installing the Base Plate on the Array

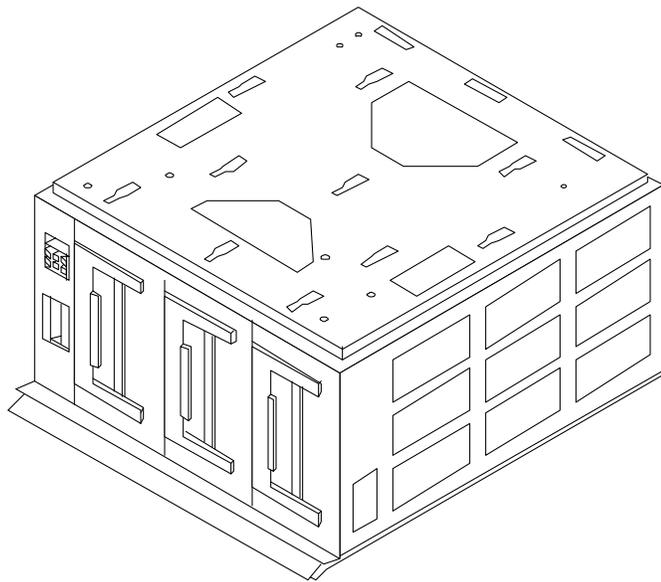


Figure A-15 Base Plate Installed

## A.5 Installing the Array in the Cabinet

Install the array from the bottom-up in the order shown in Figure A-2.



---

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

---

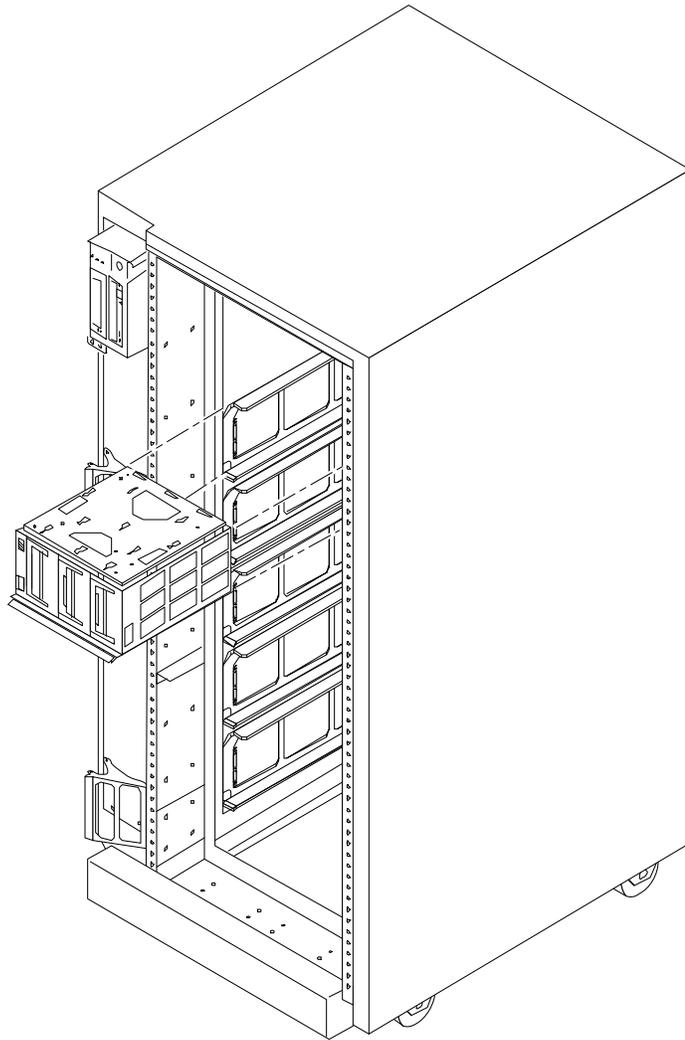


---

**Warning** – The SPARCstorage Array chassis is heavy. Obtain the aid of an assistant to help lift the array. Attempting to lift the array alone can result in injury to personnel.

---

1. With one person on each side, lift the array and approach the expansion cabinet with the back of the array facing the front of the cabinet (Figure A-16).



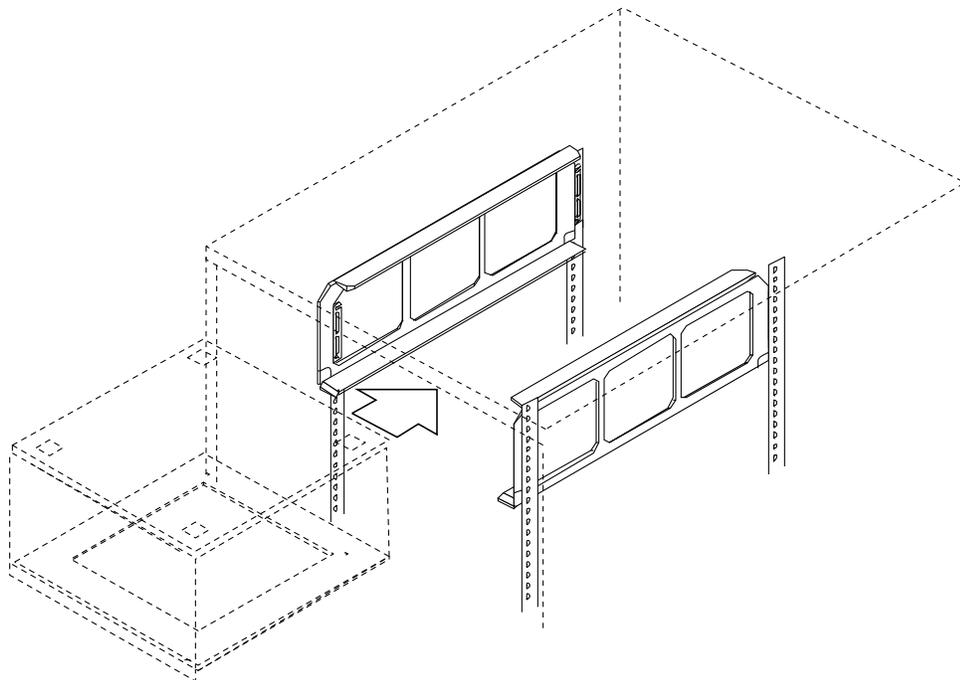
*Figure A-16* Installing the Array in the Cabinet

---

**Note** – If the cabinet tends to roll away, lower the main leveling pads as instructed in Chapter 7, Section 7.1.1.4, “Adjusting the Stabilizer Bar and Leveling Pads.”

---

- 2. Line up the array base plate with mating side rails in the cabinet.**  
See Figure A-17.



*Figure A-17* Aligning the Array Base Plate with the Side Rails

- 3. Rest the array on the side rails, then slide the array 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-18.
- 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.**  
See Figure A-18.

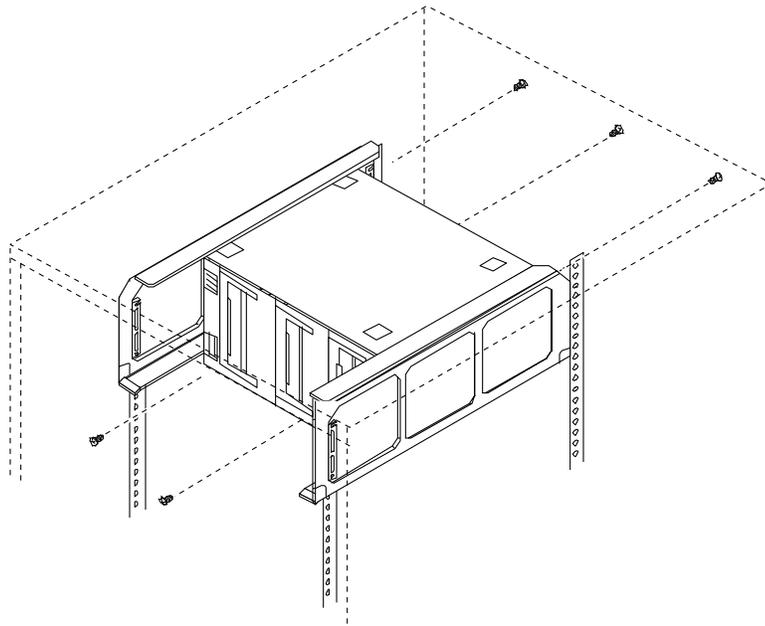


Figure A-18 Installing Screws to Secure the Base Plate to the Side Brackets

6. Alternately tighten the screws at the front and rear of the base plate/side rails until the array/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 arrays to be installed.

## A.6 *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-19 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.

---

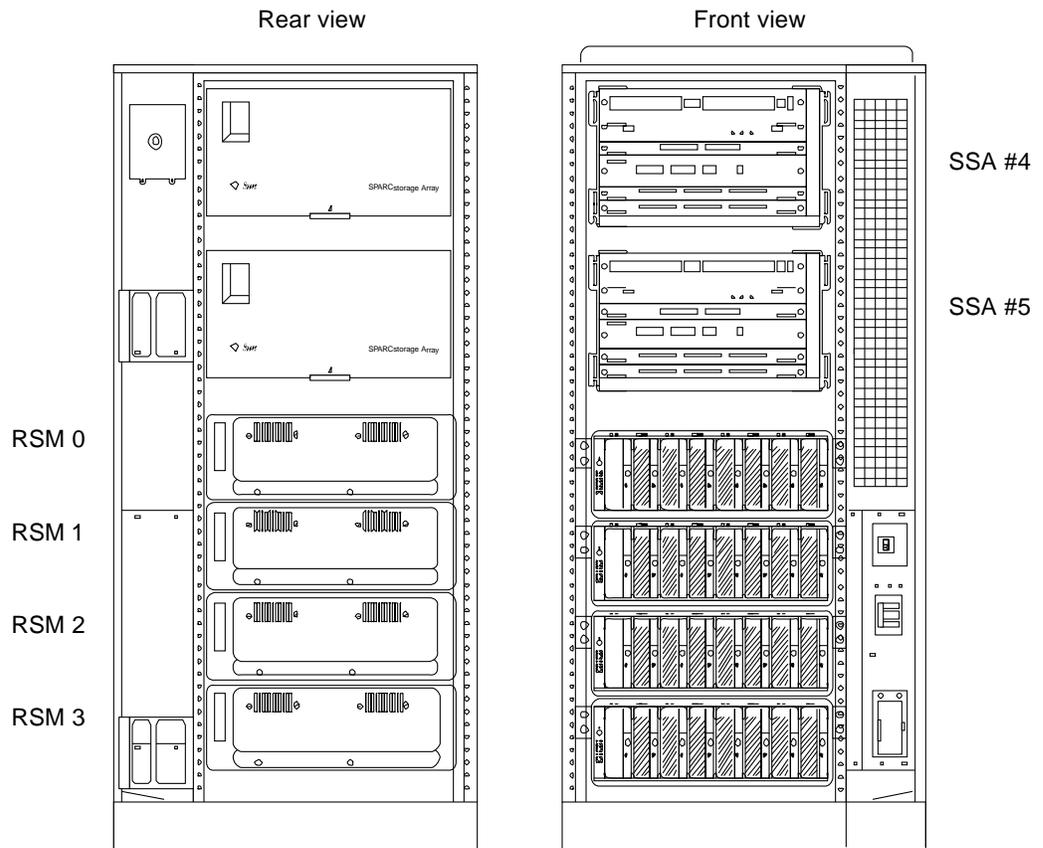


Figure A-19 SPARCstorage Array 200 Series and SPARCstorage RSM Installation

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

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

## A.7 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-19 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

System or enclosure	Tray number							
	0	1	2	3	4	5	6	7
Ultra Enterprise Cluster Expansion Cabinet	N/A <sup>1</sup>	N/A	N/A	N/A	46,49	56,59 <sup>2</sup>	66,69	79,82 <sup>3</sup>
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 <sup>4</sup>

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.8 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-20 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

System or enclosure	Tray number							
	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

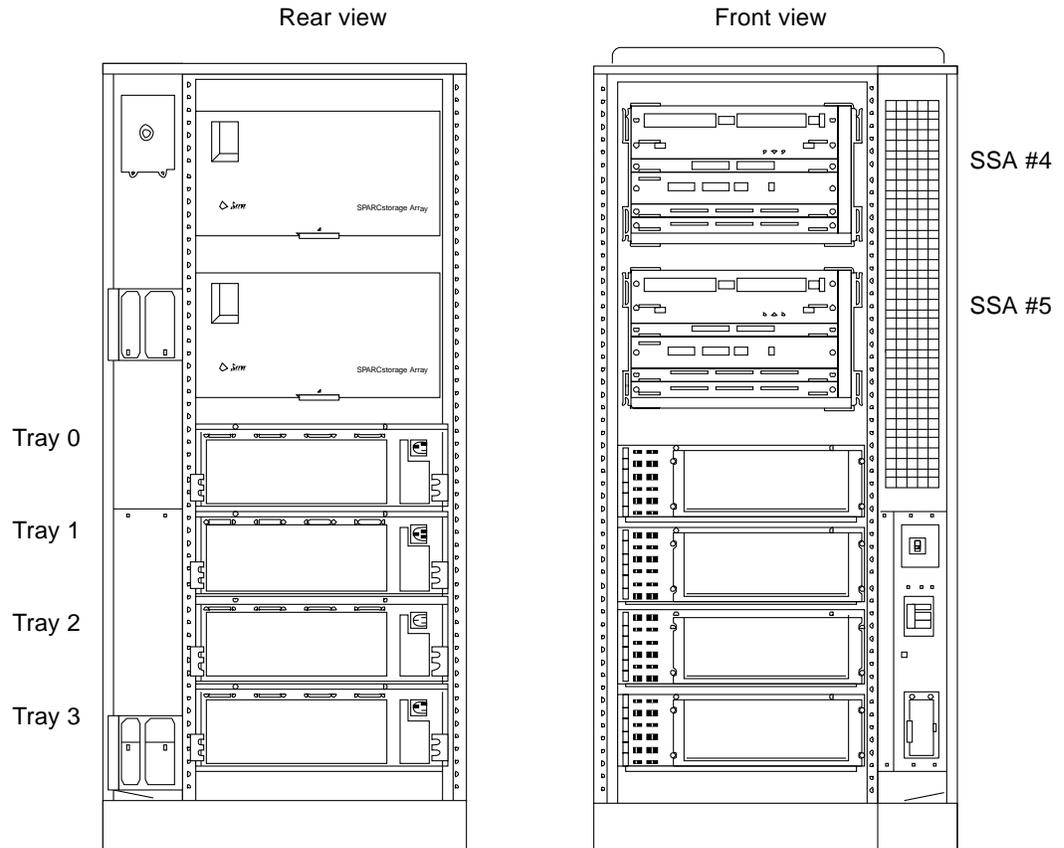


FIGURE A-20 SPARCstorage Array 200 Series and Differential SCSI Tray Installation



## Configuring the SCISBus Card

---



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.

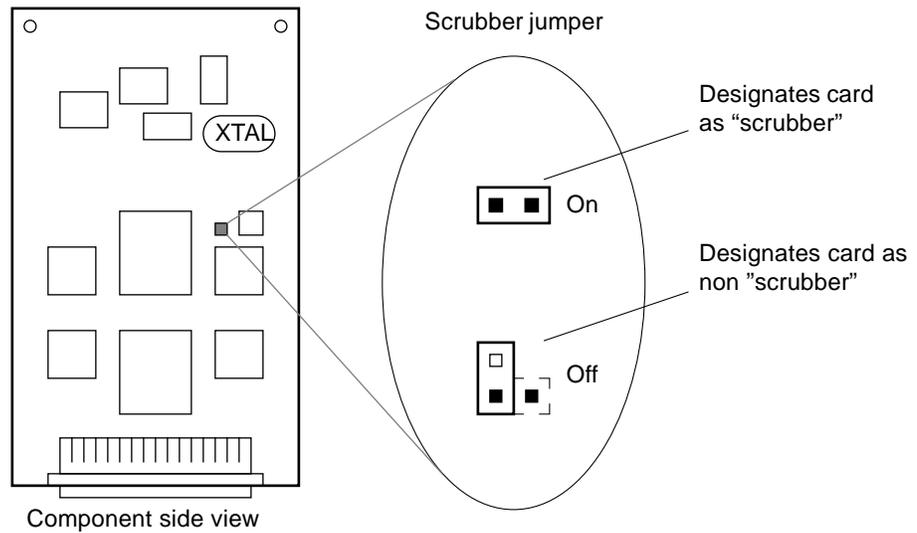


Figure B-1 Scrubber Jumper Positions

**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 I/O boards.**

**a. Install one scrubber SCI card into the I/O board to be installed in slot 1.**

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 3.**

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 *Ultra Enterprise 6000/5000/4000 System Manual*.

---

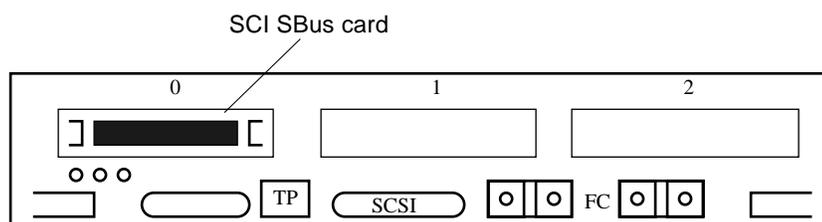


Figure B-2 SCI SBus Card Installed in the I/O Board

**5. Node 1: Install the SCI SBus cards in the I/O boards.**

- a. **Install one non-scrubber SCI card into the I/O board to be installed in slot 1.**  
Install it in SBus slot 0.
- b. **Install the other non-scrubber SCI card into the I/O board to be installed in slot 3.**  
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 *Ultra Enterprise 6000/5000/4000 System Manual*.

---

**6. Install the I/O boards in the card cages.**

- a. **Node 0:**  
Install the scrubber-equipped I/O boards into card cage slots 1 and 3.
- b. **Node 1:**  
Install the non-scrubber-equipped I/O boards into card cage slots 1 and 3.

---

**Note** – For I/O board installation procedures, refer to the documentation supplied with the I/O boards or to the *Ultra Enterprise 6000/5000/4000 System Manual*.

---

The resulting installation is represented in Figure B-3.

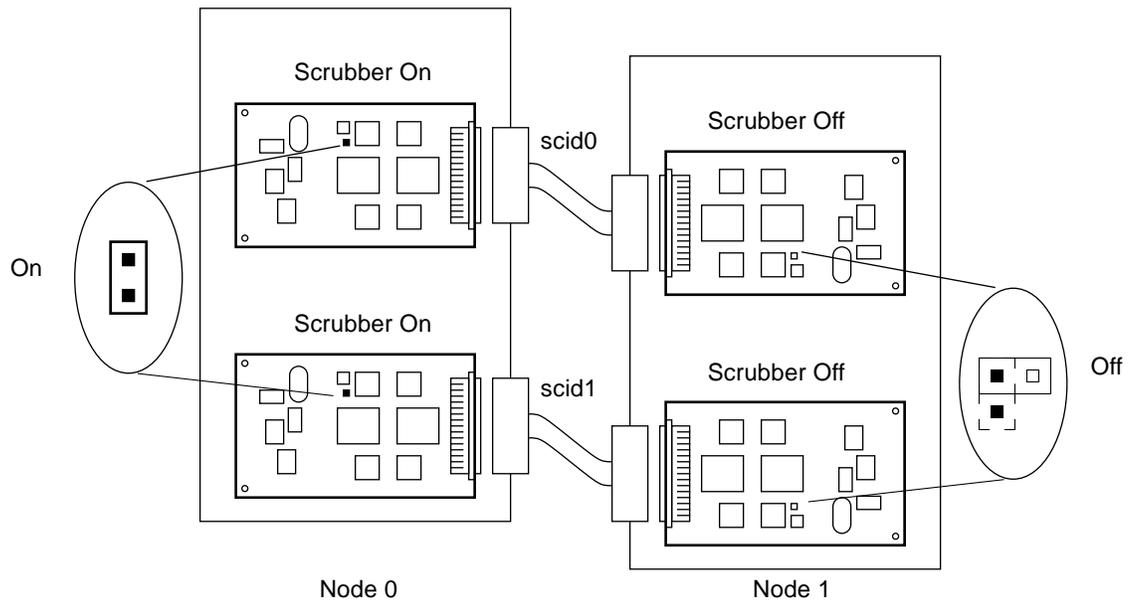


Figure B-3 SCI SBus Card Configuration in Node 0 and Node 1

**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.

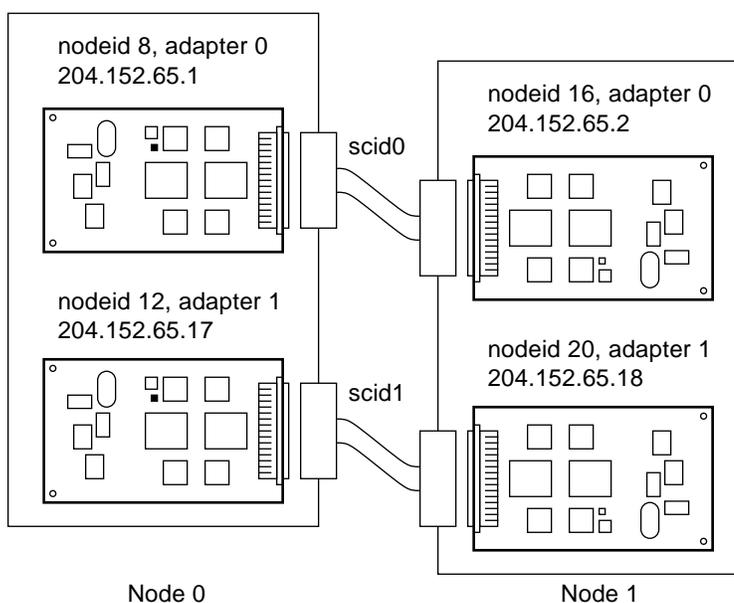


Figure B-4 nodeid, Adapter Number, and IP Assignment for Each SCI SBus Card

## B.3 SCI Driver Installation and Configuration for Ultra Enterprise Cluster Systems

1. Install the PDB software using `pdbinstall`. Specify SCI as the network interface.  
`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.

```
pdadmin startnode
```

The `scid0` and `scid1` network interfaces are configured by the PDB script `/opt/SUNWcluster/bin/reconf_ener` during `pdadmin startnode`.

---

**Note** – `pdadmin 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.ifconfig` file and uncomment the `ifconfig` commands for the appropriate system node.  
Power-cycle both systems (nodes).**

```
sync; init 5
```

## *B.6 What's Next*

Return to the Ultra Enterprise installation procedure for the server type in question:

Ultra Enterprise 3000: The appropriate procedure below:

- Section 8.6.2, "I/O Boards."

Ultra Enterprise 4000: The appropriate procedure below:

- Section 9.5.2, "I/O Boards."

Ultra Enterprise 5000: The appropriate procedure below:

- Section 10.3.1.2, "Installing I/O Boards for PDB."
- Section 10.3.1.3, "PDB and HA Installation"

Ultra Enterprise 6000: The appropriate procedure below:

- Section 11.3.1.2, "Installing I/O Boards for PDB."
- Section 11.3.1.5, "Disk Board: HA System Only"

## *Mixed Compute Platforms*

---



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 <sup>1</sup>	SPARCserver 1000 <sup>2</sup>	SPARCcenter 2000 <sup>2</sup>	Ultra Enterprise 3000	Ultra Enterprise 5000/4000
Ultra Enterprise 3000	X <sup>3</sup>			
Ultra Enterprise 5000/4000	X <sup>4</sup>	X <sup>4</sup> , 5	X <sup>4</sup>	
Ultra Enterprise 6000		X <sup>4</sup> , 5	X <sup>4</sup>	X <sup>4</sup>

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 <sup>1</sup>	SPARCserver 1000	SPARCcenter 2000	Ultra Enterprise 3000	Ultra Enterprise 5000/4000
Ultra Enterprise 3000				
Ultra Enterprise 5000/4000			X <sup>2</sup>	
Ultra Enterprise 6000			X <sup>2</sup>	X <sup>2</sup>

1. It is understood that identical platform types are allowed, and so are not documented here.
2. It 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

<b>Host Platform</b>	<b>... to Host Platform</b>	<b>See Figure...</b>
<i>PDB Clusters</i>		
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
<i>HA Clusters</i>		
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.

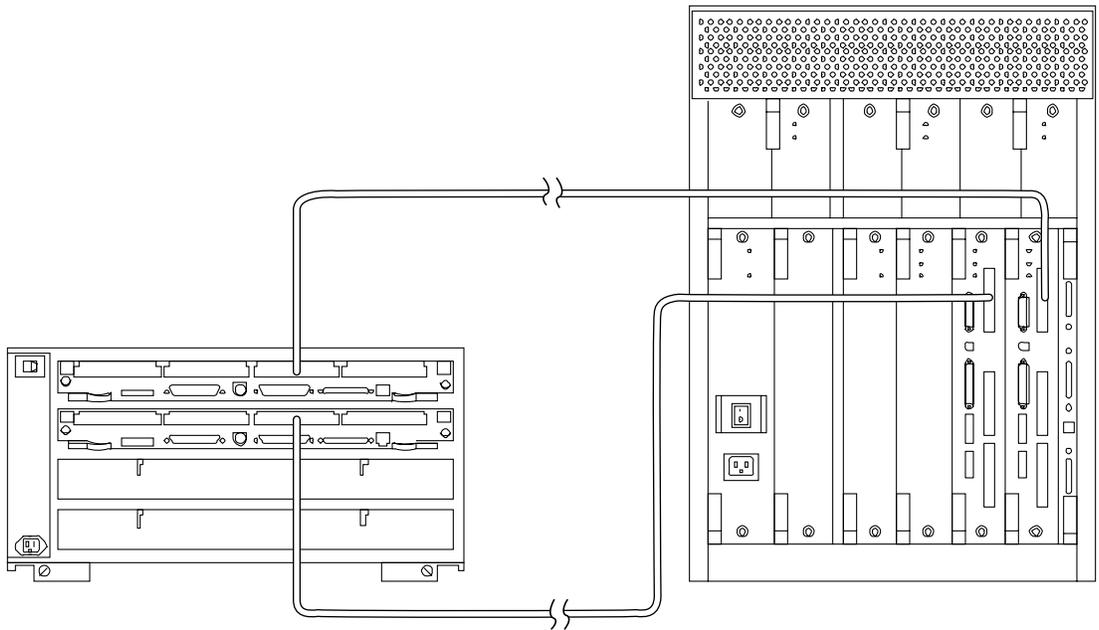


Figure C-1 SPARCserver 1000E to Ultra Enterprise 3000 Node-to-Node Connection

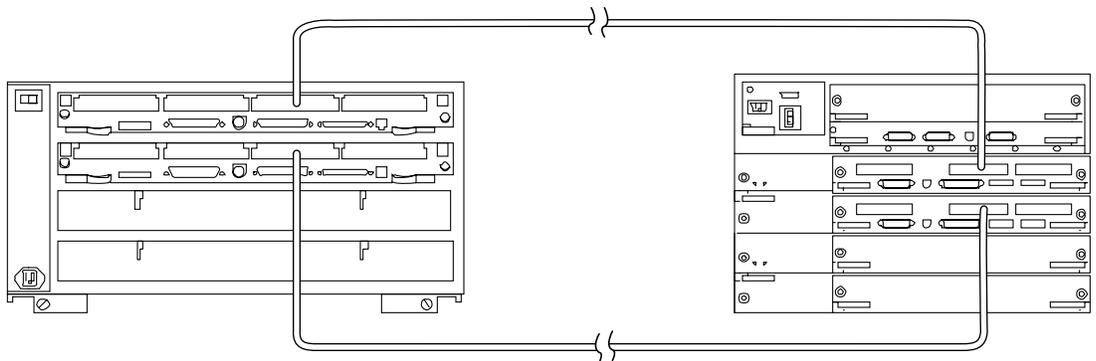
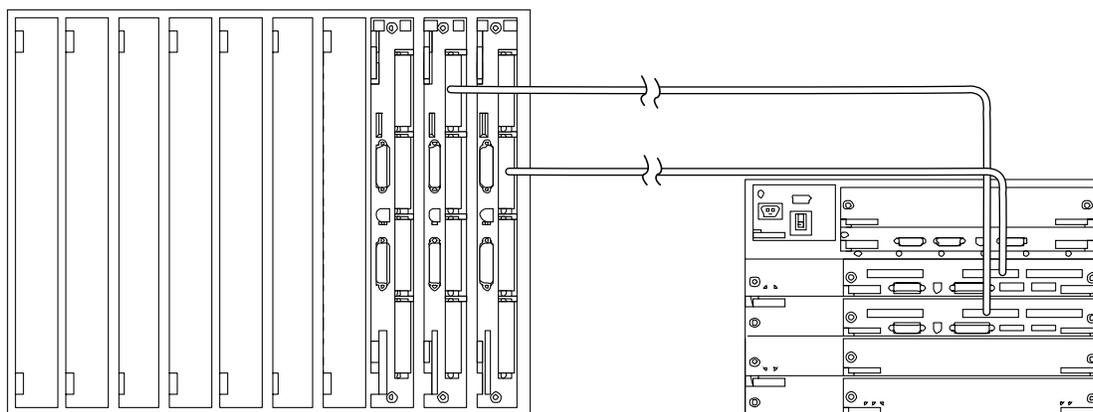
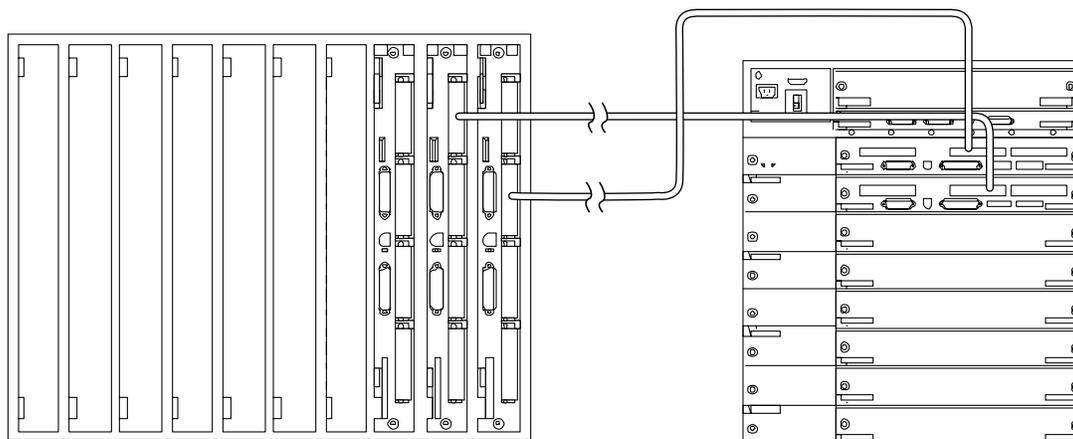


Figure C-2 SPARCserver 1000E to Ultra Enterprise 5000/4000 Node-to-Node Connection



*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

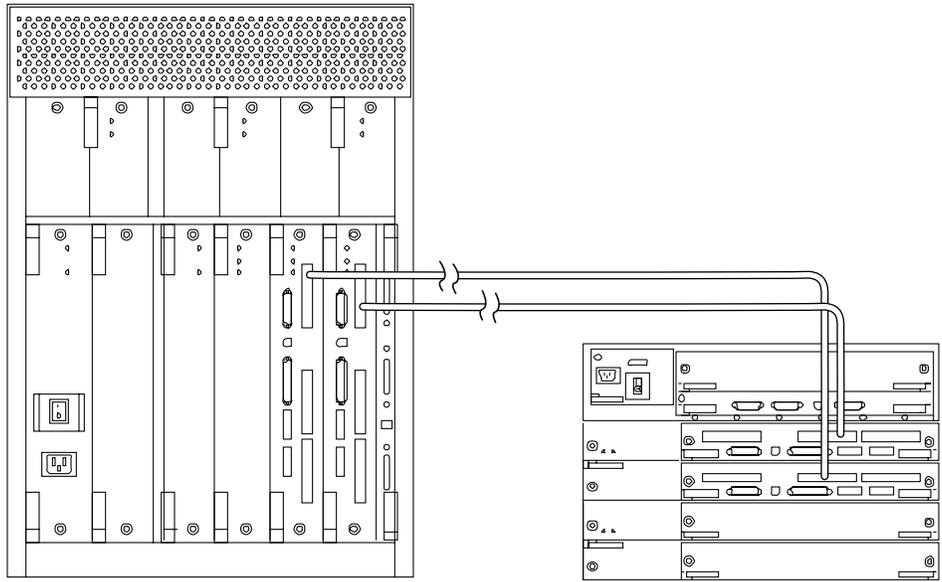
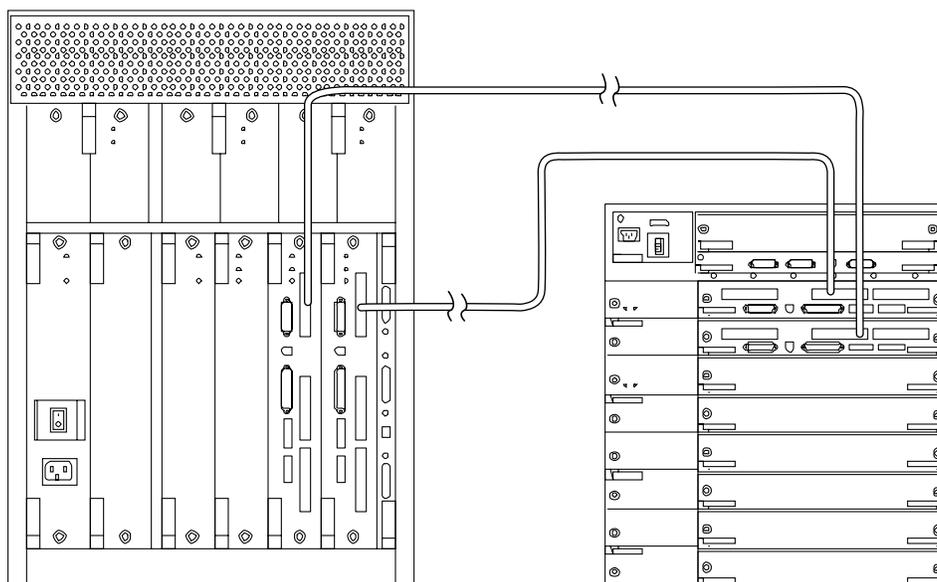
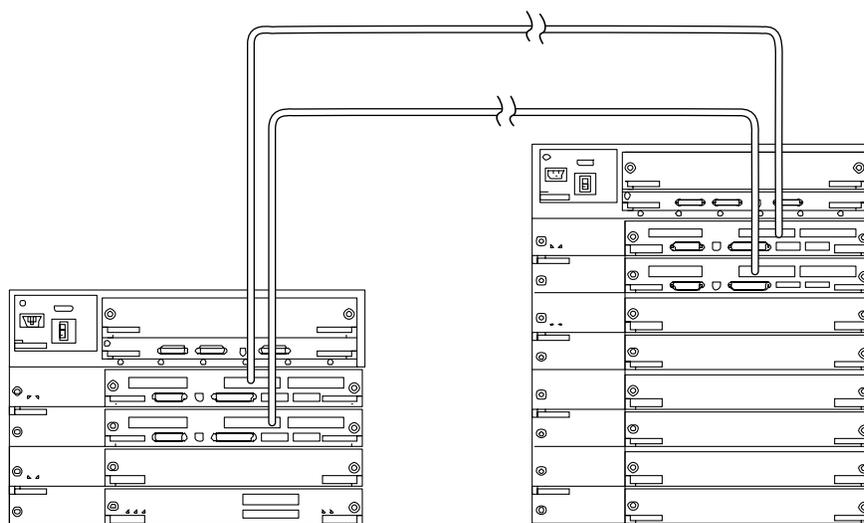


Figure C-5 Ultra Enterprise 3000 to Ultra Enterprise 5000/4000 Node-to-Node Connection



**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.

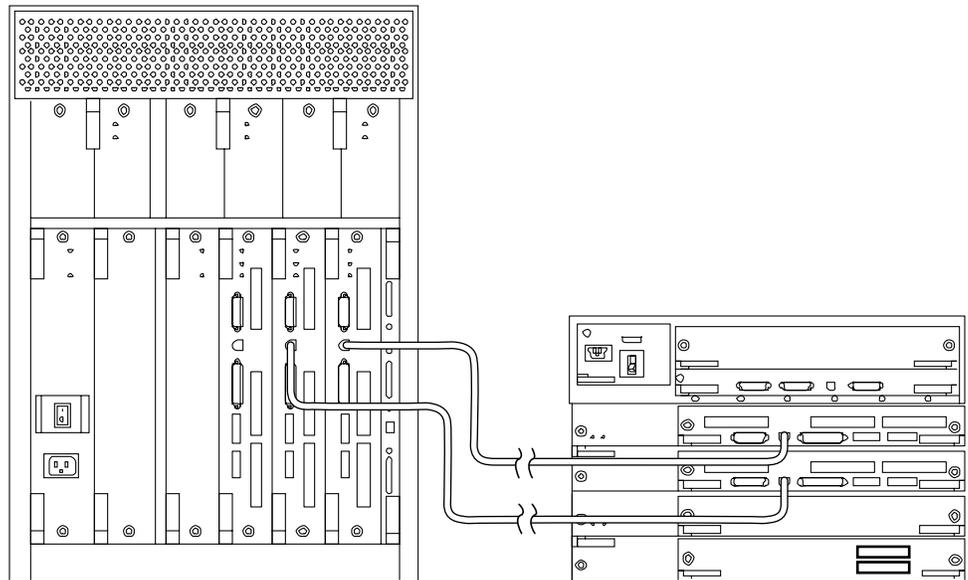
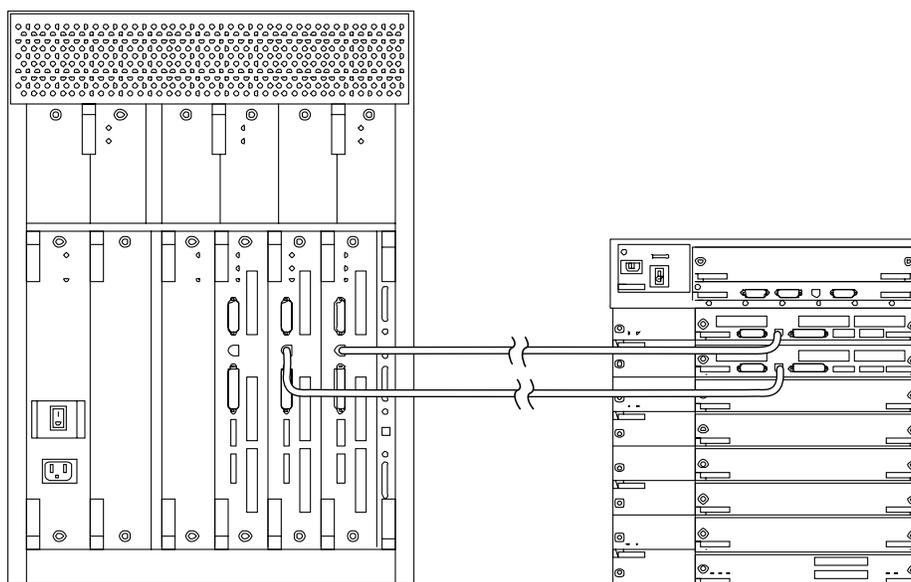
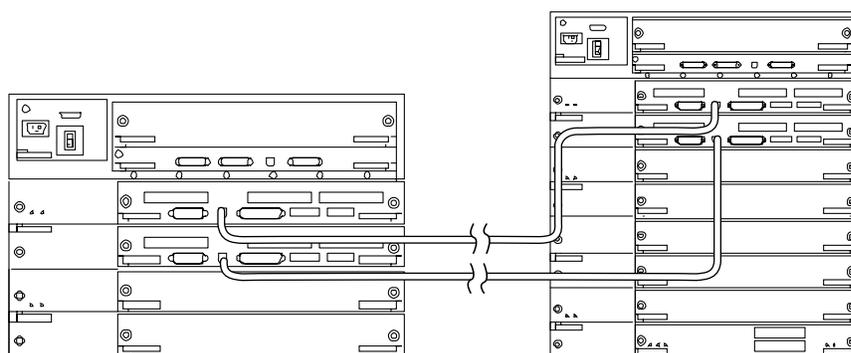


Figure C-8 Ultra Enterprise 3000 to Ultra Enterprise 5000/4000 Node-to-Node Connection for HA



**Figure C-9** Ultra Enterprise 3000 to Ultra Enterprise 6000 Node-to-Node Connection



**Figure C-10** Ultra Enterprise 5000/4000 to Ultra Enterprise 6000 Node-to-Node Connection for HA



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## *Revision History*

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<b>Revision</b>	<b>Dash</b>	<b>Date</b>	<b>Comments</b>
802-6783-11	11	April 1997	Beta Review, Version 1.2

