Overview of the Netra E1 PCI System Expander

The Netra E1 PCI system expander expands the I/O capacity of your PCI server by providing four additional PCI slots. It can be used with any host system that contains at least one PCI slot. One host system PCI slot is occupied by the host interface card.

This chapter provides an overview of the basic features of the Netra E1 PCI system expander and is organized as follows:

Product Description

The Netra E1 PCI system expander expands the capabilities of your Netra server by providing four additional PCI expansion cards. One host system PCI slot is occupied by the system expander's host interface card.

The Sun systems that you may want to use as a host for the system expander include:

- Netra t1 100/105 server
- Netra T1 AC200/DC200 server
- Netra t 1120/1125 server
- Netra t 1400/1405 server

However, the Netra E1 PCI system expander can be used with any host system that contains at least one PCI-compliant slot.

If you use the maximum of two system expanders with a multiple-slot server, the system expanders can power up to eight 32-bit, 33-MHz PCI cards. If you use two system expanders, each must connect to the server with its own host interface card.

The system expander uses only one rackmount unit of space (1U) and can be installed into standard telecom racks. Cables connect to the back of the chassis. It is available as either an AC- or DC-powered version.
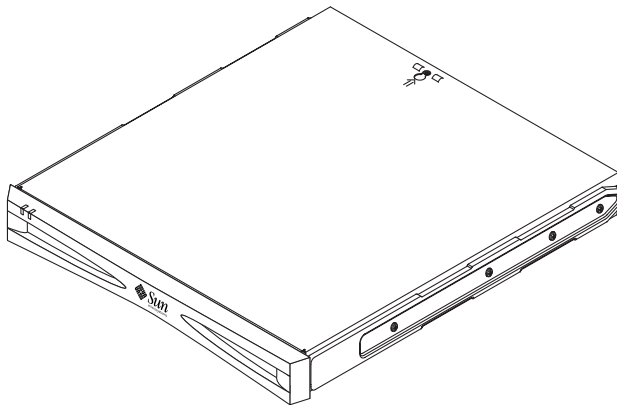

FIGURE 1-1   Netra E1 PCI System Expander

The Netra E1 PCI system expander carries the following certifications:

- NEBS Level 3
- FCC Class A
- EN60950
- CE Mark

Ordering Information

TABLE 1-1 lists order numbers for the Netra E1 PCI system expander.

TABLE 1-1 Netra E1 PCI System Expander Order Numbers

Part Number	Version
X1184A	AC-powered Netra E1 PCI system expander
X1186A	DC-powered Netra E1 PCI system expander

TABLE 1-2 lists major components of the AC system expander.

TABLE 1-2 AC-Powered Netra E1 PCI System Expander Components (X1184A)

Description	Quantity	Part No.
AC-powered Netra E1 PCI system expander		540-4640
Host interface card	1	375-0129
Connector cable	1	530-2977
AC power supply		300-1488
AC power cord	1	
Netra E1 PCI System Expander Installation and Maintenance *Manual* (this manual) and	1	806-6325-11
Netra E1 PCI System Expander Product Notes	1	806-6326-10
Netra E1 PCI System Expander Installation Overview	1	806-7645-10

TABLE 1-3 lists major components of the DC system expander.

TABLE 1-3   DC-Powered Netra E1 PCI System Expander Parts List (X1186A)

Description	Quantity	Part No.
DC-powered Netra E1 PCI system expander	1	540-4641
Host interface card	1	375-0129
Connector cable	1	530-2977
DC power supply		300-1489
DC power input connector cables and assembly materials	2	
Netra E1 PCI System Expander Installation and Maintenance *Manual* (this manual) and	1	806-6325-11
Netra E1 PCI System Expander Product Notes	1	806-6326-10
Netra E1 PCI System Expander Installation Overview	1	806-7645-10

Both AC and DC system expanders include rackmounting parts for installation into 19-inch four-post, Sun StorEdge four-post, and two-post racks, as shown in TABLE 1-4.

TABLE 1-4   Rackmounting Included with System Expander

Description	Quantity	Part No.
19-inch and Sun StorEdge slide assembly	2	540-4785
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645
Fixed mount brackets for two-post racks	4	340-5819

If you are planning to install the system expander into a different sized rack, you should also have a separate box containing the appropriate rackmounting hardware. The parts you require are listed in TABLE 1-5 through TABLE 1-8 below. Refer to "Rackmounting the System Expander" on page 29 for rackmounting instructions.

TABLE 1-5 23-inch Rackmounting Kit (X6966A)

Description	Quantity	Part No.
Slide assembly	2	540-4359
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8-mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

TABLE 1-6 24-inch Rackmounting Kit (X6967A)

Description	Quantity	Part No.
Slide assembly	2	540-4360
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8-mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

TABLE 1-7 600mm Rackmounting Kit (X6968A)

Description	Quantity	Part No.
Slide assembly	2	540-4361
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8-mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

TABLE 1-8   72-inch Expansion Rack Mounting Kit (X6919A)

Description	Quantity	Part No.
Slide assembly	2	540-4785
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

External Components

This section describes the following external components:

- "Host Interface Card" on page 7
- "Power and Fault LEDs" on page 8
- "Power Switch" on page 9
- "AC or DC Power Connectors" on page 10
- "Grounding Posts" on page 10

Host Interface Card

The host interface card that is shipped with the system expander is installed into the host system, and cabled to the system expander's rear PCI connector. The host interface card is a bridge that enables PCI cards installed in the system expander to operate as if they were installed in the host system. The host interface card requires no additional driver software.
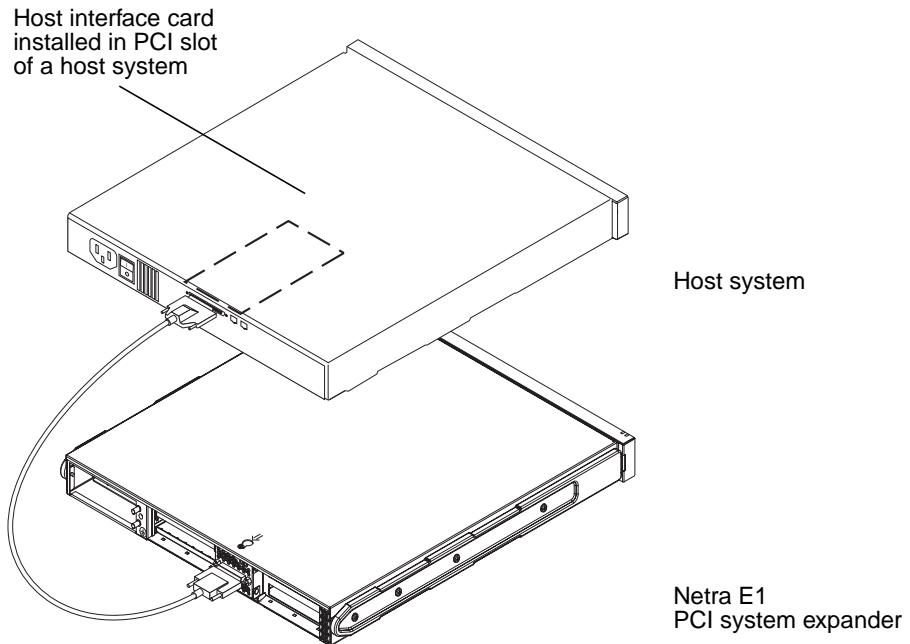
Host interface card
installed in PCI slot
of a host system

Host system

Netra E1
PCI system expander

FIGURE 1-2   Netra E1 PCI System Expander Cabled to the Host Interface Card

Power and Fault LEDs

The system power and fault LEDs shown in FIGURE 1-3 are on both the front and back panels of the system expander enclosure. TABLE 1-9 describes the LED system states.
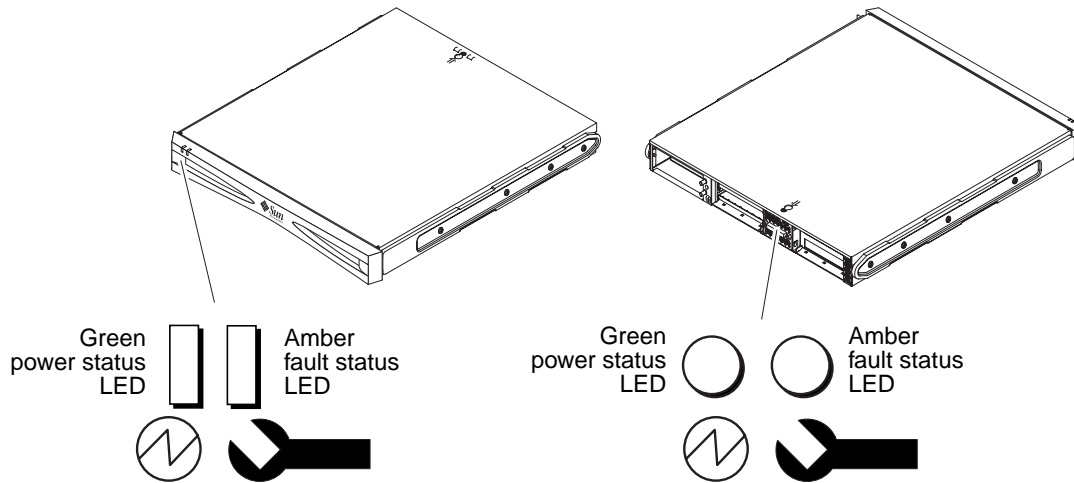

FIGURE 1-3   System Icons, Power and Fault LEDs

TABLE 1-9   LED Status Description

LED	Off	On	Flashing
Green power status LED	Output power is off	Output power is on	Input power is connected, but output power is in a standby state[1], or, the PSU is nonoperational.
Amber fault status LED	OK, no system faults	One of four fans has failed, or power supply fan has failed, or one of two DC inputs is not connected or has failed	Two or more failures have occurred, and/or output power is out of specification. If power is at fault, the system expander will electrically isolate itself from the host, and the amber LED will continue to flash.

1. Standby state means the PSU input power feeds are connected, but only 5V standby output power is on. All other outputs, those which power the electronic components, are off.

There are no customer-replaceable components in the Netra E1 PCI system expander. If the LEDs indicate a problem with your system expander, refer to "Troubleshooting" on page 46. If you continue to experience problems with the system expander after troubleshooting, contact your service representative for a replacement unit.

Power Switch

The system expander has one rocker switch to control the power supply. It is located on the back of the system expander, as shown in FIGURE 1-4.

Caution – The system expander will power up automatically as the cable is connected to the host system, or as the host system is switched on. Do *not* switch off the system expander or disconnect the connector cable while the host system is running. This will result in the loss of data transmission.

If the host system-to-system expander connection has been interrupted, you must reboot the host system. The start up sequence enables the host system to establish connection with the PCI cards installed in the system expander.
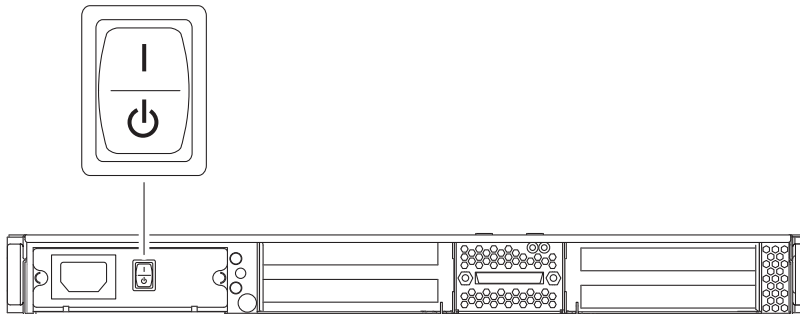

FIGURE 1-4   Power Switch on AC System Expander

- On – The power supply provides power to the system expander.
- Neutral – When the switch is released from the On position, it settles into the Neutral position, and the power supply remains on.
- Standby – The power supply does not provide full power to the system expander.

Caution – Placing the power switch in the Standby position does not completely remove power to the system. AC or DC input will continue to flow to the power supply until you disconnect the power cable from the electrical outlet.

AC or DC Power Connectors

The system expander is connected to AC or DC power from the back of the chassis, depending upon the version you have ordered.
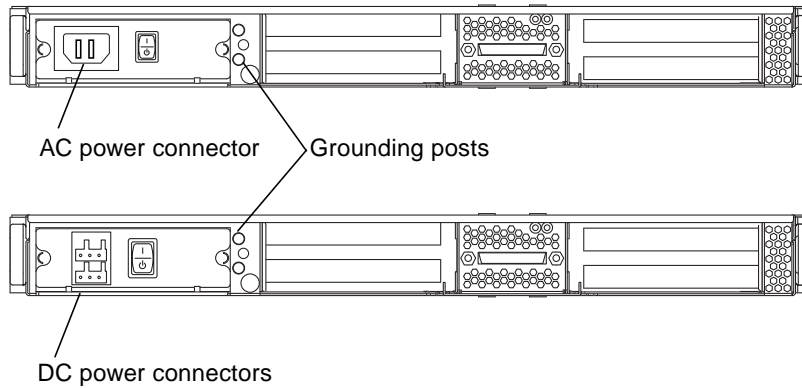

FIGURE 1-5　Power Connectors and Grounding Posts on Netra E1 PCI System Expander

Grounding Posts

Two threaded grounding posts are provided to ground the system expander. They are located on the back of the system expander chassis, as shown in FIGURE 1-5.

Internal Components

The internal components of the Netra E1 PCI system expander include the following:

- PCI card cage (includes the PCI card slots and connectors, baseboard, riser cards, and fans)
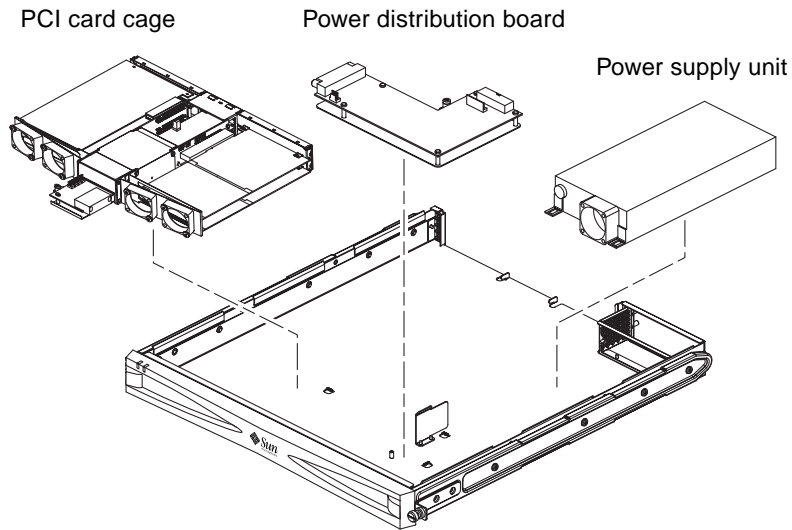- AC or DC power supply unit
- Power distribution board

PCI card cage   Power distribution board

Power supply unit

FIGURE 1-6   Netra E1 PCI System Expander Internal Components

PCI Card Cage

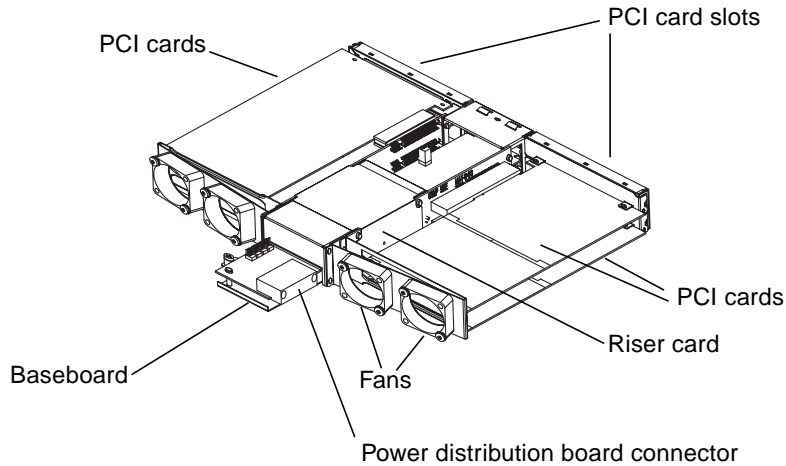FIGURE 1-7 illustrates the PCI card cage after PCI cards have been installed.

PCI cards

PCI card slots

PCI cards

Riser card

Baseboard

Fans

Power distribution board connector

FIGURE 1-7   Netra E1 PCI System Expander PCI Card Cage

Riser Cards

The riser cards are perpendicular to the system expander's baseboard, which is located at the bottom of the PCI card cage assembly. The PCI cards attach to the riser card connectors, as shown in FIGURE 1-7.

Fans

The system expander is cooled by four fans mounted on the PCI card cage, as shown in FIGURE 1-7. The fans provide airflow over the printed circuit boards within the chassis. Baffling is provided to maximize airflow over the boards.

The power supply has a built-in fan, so no separate fans are required to cool it.

Power Distribution Board

The power distribution board distributes power from the AC or DC power supply to all electrical components within the system expander. It is connected to the PCI card cage assembly by a single connector, as shown within the circle in FIGURE 1-8.

> **Note –** You must remove the PCI card cage from the chassis to install PCI cards. This can be done without disconnecting any internal power connections, all of which attach to the power distribution board.
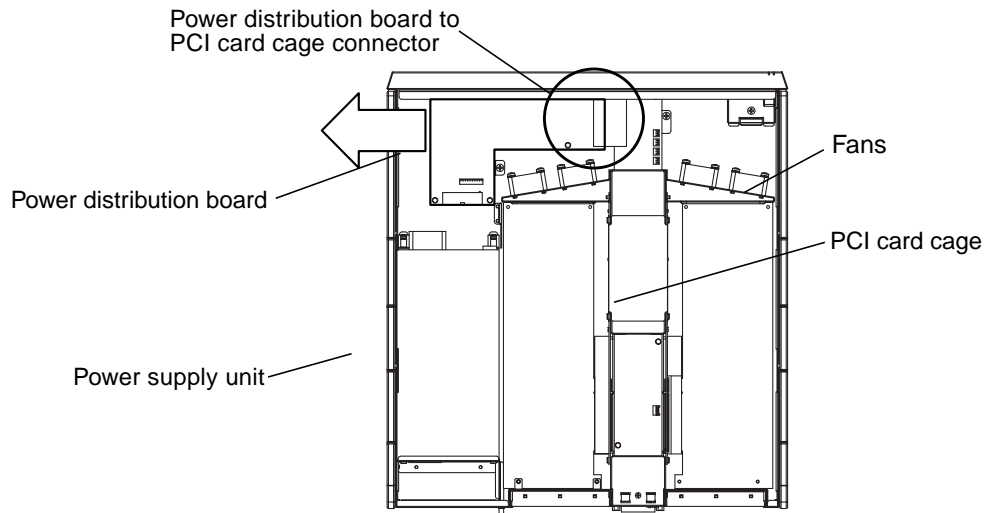

FIGURE 1-8   Power Distribution Board Connection to the PCI Card Cage

Power Supply Unit

The Netra E1 PCI system expander is powered by either an AC or DC power supply unit, depending upon the model you have purchased.

Site Power Source Requirements

AC Site Power Source Requirements

TABLE 1-10   AC Power Requirements

Electrical Element	Requirement
Voltage (nominal)	100 VAC to 240 VAC
Frequency	47 to 63 Hz
AC power supply range	90 VAC to 264 VAC
Circuit breaker rating	5 amps
Maximum operating current for whole system	2.5 amps
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms); 100 amps peak for warm start (power dropouts < 200 ms)

DC Site Power Source Requirements

TABLE 1-11   DC Power Requirements

Electrical Element	Requirement
Voltage (nominal)	-48 VDC to -60 VDC
DC power supply range	-40 VDC to -75 VDC
Circuit breaker rating	10 amps
Maximum operating current for whole system	5.5 amps
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms);. 100 amps peak for warm start (power dropouts < 200 ms)

Overcurrent Protection Requirements

The overcurrent protection requirements are as follows:

- Overcurrent protection devices must be provided as part of each equipment rack.
- Circuit breakers must be located between the power source and the Netra E1 PCI system expander.
- Overcurrent protection devices must meet applicable national and local electrical safety codes and must be approved for the intended application.

DC Supply and Ground Conductor Requirements

The DC supply and ground conductor requirements are as follows:

- Suitable conductor material: copper only
- Power supply connections through the input connector: 14 AWG (between the Netra E1 PCI system expander and the circuit breaker). There are three conductors:
  - -48V
  - Ground connection to the power supply
  - -48V return
- System ground conductor: 8 AWG (to be connected to the system chassis)
- Cable insulation rating: minimum of 75 C,low smoke fume (LSF), flame retardant
- Cable type one of the following:
  - UL style 1028 or other UL 1581(VW-1) - compliant equivalent
  - IEEE 383 and IEEE 1202-1991 compliant
- Branch circuit cable insulation color: per applicable national electrical codes
- Grounding cable insulation color: green/yellow
- Electrically isolated from any AC source
- Reliably connected to ground (that is, the battery room positive bus is connected to the grounding electrode)
- Capable of providing up to 220 watts of continuous power per feed pair

---

Note – The DC version of the Netra E1 PCI system expander must be installed in a *restricted access location.* According to the intent of the National Electrical Code, a restricted access location is an area intended for qualified or trained personnel only and has access controlled by a locking mechanism, such as a key lock or access-card system.

System Specifications

This section contains the following system specifications for the Netra E1 PCI system expander:

- "Environmental Specifications" on page 16
- "Physical Specifications" on page 17
- "Electrical Specifications" on page 17

Environmental Specifications

The Netra E1 PCI system expander carries the following certification: Telcordia NEBS GR-63-CORE Level 3 (Earthquake Risk Zone 4).

TABLE 1-12 Temperature and Humidity Specifications

Type		Minimum to Maximum Range
Temperature	Operating	41˚F to 104˚F, (5˚C to 40˚C)
	Nonoperating	-40˚F to 158˚F, (-40˚C to 70˚C)
Relative humidity (noncondensing)	Operating	5% to 85% 79˚F (26˚C) maximum, wet bulb
	Nonoperating	90% 100˚F (38˚C) maximum, wet bulb

TABLE 1-13 Declared Acoustic Emissions

Declared acoustic emissions in accordance with ISO 9296	Operating and Idling
L_{WA}d (1B = 10dB)	6.4 B
L_{pA}m (bystander position)	51 dB

Physical Specifications

TABLE 1-14 Physical Specifications

Measure	English	Metric
Width	17.2 in.	436.7 mm
Depth	19.5 in.	495 mm
Height	1.728 in., to fit into 1 rack unit (1U)	43.9 mm
Weight without PCI cards	15.04 lbs	6.83 kg
Weight with maximum load, four long PCI cards	17.44 lbs	7.91 kg

Electrical Specifications

TABLE 1-15 AC Input and DC Output Power Requirements

Electrical Element	Requirement
Voltage (nominal)	100 VAC to 240 VAC
Frequency	47 to 63 Hz
Local power	+5V +/- 5% +3.3V +/- 5% +12V +/- 5% +5V standby +/- 5%
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms); 100 amps peak for warm start (power dropouts < 200 ms)

TABLE 1-16 DC Input and AC Output Power Requirements

Electrical Element	Requirement
Voltage (nominal)	-48 VDC to -60 VDC
Local power	+5V +/- 5% +3.3V +/- 5% +12V +/- 5% +5V standby +/- 5%
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms); 100 amps peak for warm start (power dropouts < 200 ms)

Installing the Netra E1 PCI System Expander

This chapter provides instructions for installing PCI cards, installing the system expander into a rack, and configuring the system expander to a host system. It also provides information on troubleshooting the system expander.

You can install up to two Netra E1 PCI system expanders to any host system that contains at least two PCI-compliant slots. If you are installing two system expanders, each one is connected to the host system through its own host interface card. Daisy-chaining two system expanders together is not supported.

This chapter contains the following sections:

- "Preparing for Installation" on page 19
- "Installing PCI Cards" on page 21
- "Rackmounting the System Expander" on page 29
- "Cabling the System Expander to the Host System" on page 40
- "Connecting the Power Cables" on page 42
- "Powering On and Off" on page 44
- "Troubleshooting" on page 46

Preparing for Installation

Refer to the system and rackmounting parts tables in Chapter 1 to familiarize yourself with the parts included in your system expander shipping carton.

Installation Precautions

Follow the precautions described in this section to help avoid injury to yourself and damage to your equipment.

- Read any Product Notes for the latest product information.
- Prepare the site for the installation, including determining site power and sizing requirements. Refer to "Site Power Source Requirements" on page 14.
- Have any relevant PCI card and host system documentation available during the installation.
- Refer to your host system documentation for instructions on shutting down and powering off your host system.

Caution – Ensure that the system expander is *not* connected to the host system, and the system expander power is off, before installing the PCI cards. Since 5 volt standby power, and potentially dangerous power supply voltages are present whenever the system expander is plugged in, ensure that the AC or DC power cables are unplugged.

Caution – Electrostatic discharge can damage integrated circuits on circuit boards and cards. Use an antistatic wrist strap when installing the PCI cards. If you must put a board or card down, place it on antistatic packaging or on an antistatic mat.

To prevent electrostatic damage, observe the following precautions while unpacking and installing PCI cards.

- Wear a grounding strap to ensure that any accumulated electrostatic charge is discharged from your body to the ground.
- If possible, stand on an antistatic mat.
- Handle PCI cards only by their nonconducting edges once you have removed them from their protective antistatic bags.
- Install PCI cards as soon as you remove them from their protective antistatic packaging.

Tools Needed

The following tools are needed to connect the system expander to your host system:

- No. 1 and No. 2 Phillips screwdrivers
- Antistatic wrist strap and antistatic mat for use when installing the PCI cards
- If installing a DC system, a small slotted screwdriver to assemble DC input cables

Installing PCI Cards

> **Note –** Before installing PCI cards into the system expander, it is important to refer to your PCI card documentation for additional procedures. Software, additional cabling, and/or system configuration are required for many PCI cards.

While any cards meeting the PCI specification may reasonably be expected to function in the Netra E1 PCI system expander, the following Sun-manufactured cards have undergone verification testing to date.

- SunSAI/P Adapter, X2156A
- Sun Quad FastEthernet™ PCI Adapter, X1034A
- SunATM™/P 155 MMF Adapter, X1157A & SunATM/P 155 UTP Adapter, X1158A
- SunHSI/P™ Adapter, X1155A

Check with your sales or service representative for a current list of PCI cards which Sun has verified for use with the Netra E1 PCI system expander.

PCI Card Power Ratings

It is important to consider the total power ratings of combined PCI cards installed in the Netra E1 PCI system expander, to avoid exceeding power supply restrictions.

The total PCI card power ratings for cards installed in the system expander should not exceed 100 watts. Sun-manufactured PCI cards all have 5-volt power ratings of less than 15 watts, so any four Sun-manufactured cards will function in the Netra E1 PCI system expander without exceeding the power supply restrictions.

▼ To Calculate PCI Card Power Ratings

1. **Refer to your third-party PCI card documentation to determine the power rating for PCI cards sold by other vendors.**

   Third-party cards of same voltages should not exceed a total of 100 watts. If the PCI cards are of differing voltages, the power restrictions differ.

2. **Consult** TABLE 2-1 **and** TABLE 2-2**, which give examples of power rating computations for third-party PCI cards, to be certain you do not exceed the system expander's power supply restrictions.**

TABLE 2-1 Power Computation Example for Four PCI Cards, Stated in Watts

Row #	PCI Card Voltage	Power (Watts)			
		5v	3.3v	12v	-12v
1	PCI card installed in slot 1	10w	1.5w	0.1w	
2	PCI card installed in slot 2	20w			
3	PCI card installed in slot 3	8w	3.5w	0.2w	0.1w
4	PCI card installed in slot 4	13w		0.1w	
5	Total PCI card power (Add rows 1-4)	51w	5w	0.4w	0.1w
6	Maximum power allowed for different-voltage PCI cards	85w	48w	24w	4.8w
7	Add totals for power for 5v and 3.3v cards from row 5	56w			
8	Maximum power allowed for cards which use 5v and 3.3v	85w			
9	Total system power (Add totals for 5v/3.3v/12v/-12v from row 5)	56.5w			
10	Maximum total system power allowed	100w			

The example in TABLE 2-1 shows that the total power for each column is within the maximum voltage allowed in row 6.

Row 7 shows the total power of the 5v and 3.3v PCI cards is 56w, which is less than the maximum allowed for this combination of voltages, or 85 watts.

The total system power shown in row 9 is 56.5w, which is well within the maximum total system power allowed, or 100 watts.

3. **When PCI cards are stated in amperes, a conversion to watts is necessary. See row 6 in** TABLE 2-2 **for instructions.**

TABLE 2-2   Total Power Computation Example of Four PCI Cards, Stated in Amps

Row #	Voltage	Current (Amperes)			
		5v	3.3v	12v	-12v
1	PCI card installed in slot 1	2A		1A	0.1A
2	PCI card installed in slot 2		5A		
3	PCI card installed in slot 3	3A	1.5A	0.2A	0.2A
4	PCI card installed in slot 4	3A	2A	0.1A	
5	Total current	8A	8.5A	1.3A	0.3
6	Convert current to power (Multiply total current by its voltage)	40w	28.05w	15.6w	3.6w
7	Maximum Watts allowed	85w	48w	24w	4.8w
8	Add totals for power for 5v and 3.3v from row 6	68.05w			
9	Maximum allowed in watts	85w			
10	Total system power in watts (Add totals for 5v/3.3v/12v/-12v from row 6	87.25w			
11	Maximum power allowed in watts	100w			

The example in TABLE 2-2 shows that the total power for each column from row 6 is within the maximum allowed, shown in row 7.

Row 8 shows that the total power of the 5v and 3.3v PCI cards is 68.05 watts, which is within the maximum allowed of 85 watts, shown in row 9.

The total system power of 87.25 watts is within the maximum allowed limit of 100 watts shown in row 11.

Caution – Your system expander can be damaged if you install same-voltage PCI cards that exceed the 100 watt total power rating, or if you install PCI cards which exceed the allowable power ratings listed in TABLE 2-1 and TABLE 2-2.

4. **Fill one of the worksheets below to compute power requirements for third-party PCI cards you plan to install in the system expander.**

TABLE 2-3   Total Power Computation Worksheet for PCI Cards, Stated in Watts

Row #	PCI Card Voltage	Power (Watts)			
		5v	3.3v	12v	-12v
1	PCI card installed in slot 1				
2	PCI card installed in slot 2				
3	PCI card installed in slot 3				
4	PCI card installed in slot 4				
5	Total PCI card power (Add rows 1-4)				
6	Maximum power allowed for different-voltage PCI cards	85w	48w	24w	4.8w
7	Add totals for power for 5v and 3.3v cards from row 5				
8	Maximum power allowed for cards which use 5v and 3.3v	85w			
9	Total system power (Totals for all cards from row 5)				
10	Maximum total system power allowed	100w			

TABLE 2-4   Total Power Computation Worksheet for PCI Cards, Stated in Amperes

Row #	Voltage	Current (Amperes)			
		5v	3.3v	12v	-12v
1	PCI card installed in slot 1				
2	PCI card installed in slot 2				
3	PCI card installed in slot 3				
4	PCI card installed in slot 4				
5	Total current				
6	Convert current to power (Multiply total current by its voltage)				
7	Maximum Watts allowed	85w	48w	24w	4.8w
8	Add totals for power for 5v and 3.3v from row 6				
9	Maximum allowed in watts	85w			
10	Total system power in watts (Totals for all cards from row 6)				
11	Maximum power allowed in watts	100w			

▼ To Remove the PCI Card Cage

These instructions assume you are installing the PCI cards for the first time, *before* the system expander is mounted in a rack and attached to a host system.

Note – You must remove the PCI card cage from the system expander chassis to install the PCI cards.

Refer to "Removing or Replacing Cards in the Netra E1 PCI System Expander" on page 53 for instructions on removing and replacing cards in an system expander which has already been installed in a rack.

Note – The host interface card included with your system expander must be installed in the host system, not in the system expander.

---

1. **Attach an antistatic wrist strap to your wrist and to the exposed metal back panel of the system expander.**

2. **Make sure that input power is off to the Netra E1 PCI system expander.**

3. **Using a #1 Phillips screwdriver, loosen the screw that holds the top access cover, indicated by an arrow.**
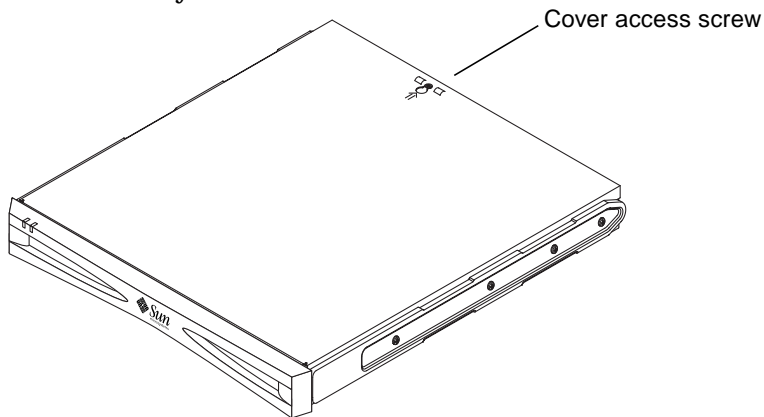
FIGURE 2-1   Netra E1 PCI System Expander Top Cover

4. **Slide the top cover slightly toward the back of the system expander to allow the screw to fall through the keyhole slot.**

   You do not have to remove the screw from the chassis.

5. **Lift the cover off the system expander and set it aside.**

6. **Using a #1 Phillips screwdriver, loosen the one captive screw shown in** FIGURE 2-2 **that holds the power distribution board in position.**

   You do not have to disconnect any of the power cables.

7. **Slide the power distribution board toward the side wall of the system expander, disconnecting the PCI card cage connector.**
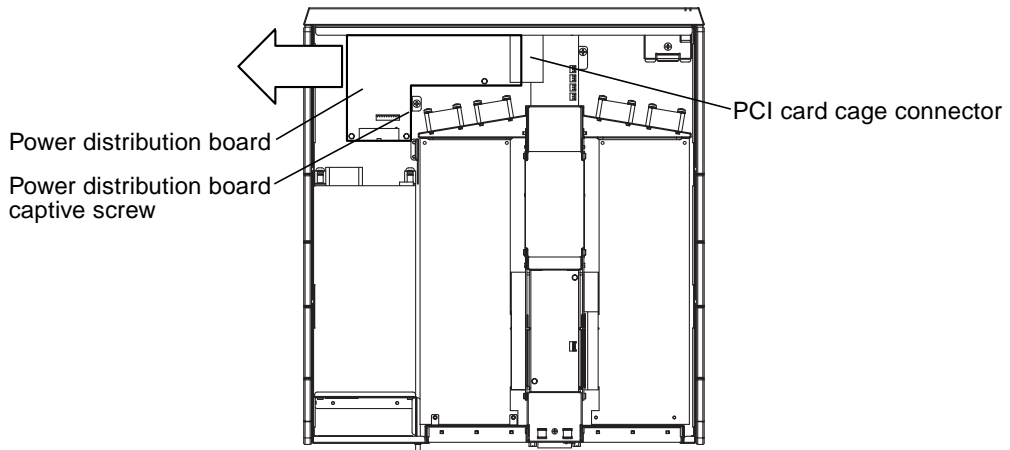

Power distribution board

Power distribution board
captive screw

PCI card cage connector

FIGURE 2-2   Disconnecting the Power Distribution Board From the PCI Card Cage

8. **Loosen the one PCI card cage captive screw shown in** FIGURE 2-3.

9. **Use the gripping area on the service label to push the PCI card cage toward the front of the chassis, and then lift the card cage out the back of the chassis.**

PCI card cage stabilizer

PCI card cage captive screw

Service label

PCI card cage

Back of the system expander
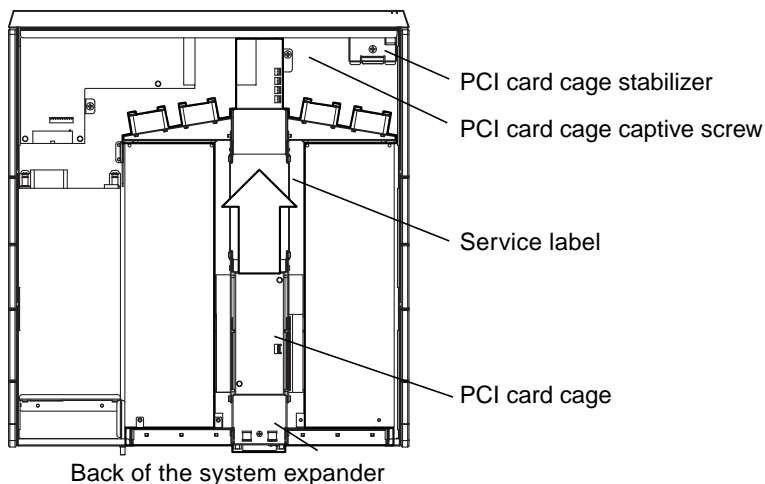
FIGURE 2-3   Removing the PCI Card Cage

▼ To Install PCI Cards

1. **Rotate the PCI card cage assembly so that a PCI card slot can slide under the lip of the PCI card cage stabilizer, as shown in** FIGURE 2-4**.**

   This will help to stabilize the assembly while installing the PCI cards.
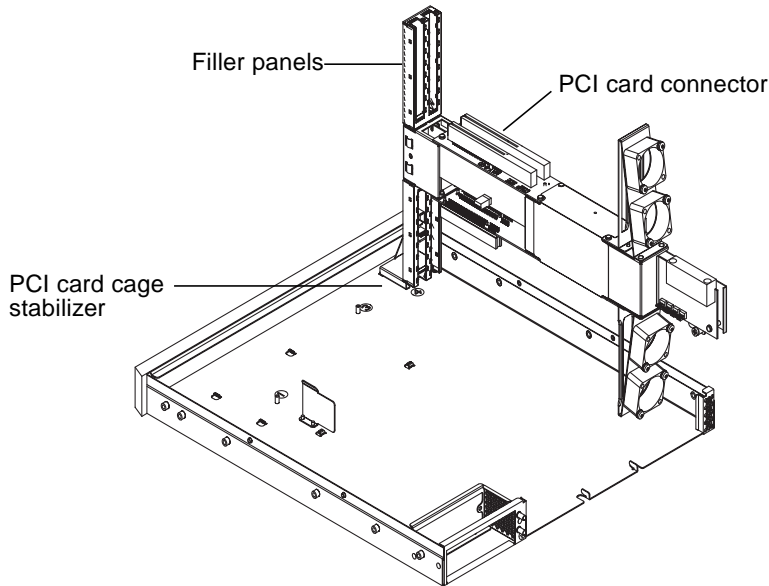
FIGURE 2-4   PCI Card Cage on the PCI Card Cage Stabilizer

2. **Using a #1 Phillips screwdriver, remove as many metal filler panels from the PCI card slots as necessary.**

3. **Seat each PCI card firmly into any open PCI card connector.**

   Most PCI cards can be placed in any of the four PCI slots. However, some cards may require placement in a specific slot because they need to be cabled to another PCI card, so refer to your PCI card documentation.

Note – A maximum of two Sun Quad Fast Ethernet PCI cards are supported for installation in the system expander. Supported PCI slot assignments for two Sun Quad Fast Ethernet cards are the slots marked 1 and 2, or slots 3 and 4. To avoid EMI concerns, do not install two Sun Quad Fast Ethernet cards on top of one another, as in slots 1 and 3, or slots 2 and 4.

> **Note –** If you are installing long PCI cards, insert the left edge into the metal card guide located near the fans first. Align the connectors, and then push down firmly to seat the card.

4. Fasten each card into a PCI slot with the screw you removed from the metal filler panel.

Refer to your PCI card documentation for any additional installation or cabling steps required for specific PCI cards.
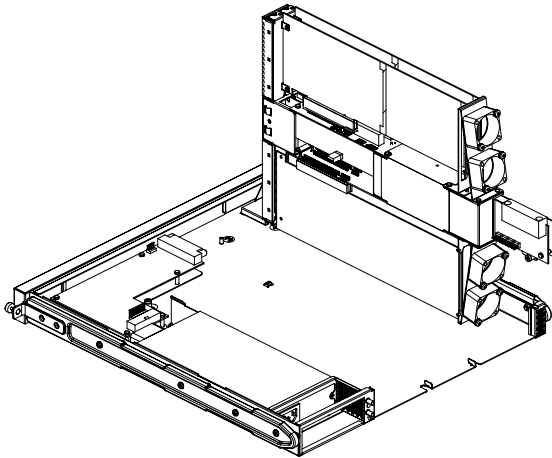

FIGURE 2-5 PCI Cards Installed in the PCI Card Cage Slots

▼ To Reassemble the System Expander

1. Using the gripping area indicated on the service label, lift the PCI card cage from the PCI card cage stabilizer and slide it into its original position in the system expander chassis.

2. Align the PCI card cage captive screw with the screw hole in the bottom of the chassis.

3. Using a #1 Phillips screwdriver, tighten the captive screw to hold the PCI card cage in place.

4. Slide the power distribution board toward the PCI card cage connector until they connect.

5. Align and tighten the captive screw to hold the power distribution board in place.

6. Slide the top cover onto the chassis and tighten the top cover screw.

Rackmounting the System Expander

After you have installed the PCI cards into your Netra E1 PCI system expander, replaced the top cover, and determined the location of your host system, you can mount the system expander into your rack.

Install each system expander in close proximity to your host system, to allow connection using the supplied cable.

This section explains how to install a Netra E1 PCI system expander into several types of racks.

The section describes the following topics:

- "Rack Installation Precautions" on page 29
- "To Install the System Into Four-Post Racks" on page 31
- "To Install the System Into a Two-Post Relay Rack" on page 38

Rack Installation Precautions

Follow these precautions to avoid injury to yourself and damage to your equipment.

- Install heavier systems toward the bottom of the rack to improve stability.
- Position your racks so that warm air exhaust from the back of one rack does not flow directly into the cool air intake area for another.
- Make sure racks are securely fastened to the floor.
- Make sure that each system is grounded to the rack, and that each rack is connected to ground in the building.
- If you have many system expanders installed in your facility and need to calculate thermal dissipation in order to ensure proper site cooling, refer to the following procedure.

▼ To Calculate Thermal Dissipation

If you intend to install many system expanders in one location, you may need to calculate the heat your cooling system must dissipate. To do this, you must convert the system expander's power ratings to BTU/hr. Refer to steps 1 through 4.

1. **Add power ratings for your system expander components, as shown in** TABLE 2-5.

TABLE 2-5 Power Ratings for System Expander Components

Components	Power Ratings
Baseboard	8.25w
Power distribution board	4w
Cooling fans	10.75w
Maximum for PCI slots (25w x 4)	100w
Total power rating	123w

2. **Divide total power ratings by the power supply efficiency rating.**

   123w /.65% = 189.23w

3. **Multiply total watts by 3.413 to convert to BTU/hr.**

   189.23w x 3.413 = 645.84 BTU/hr.

4. **Multiply by the number of system expanders installed in your facility.**

▼ To Install the System Into Four-Post Racks

The following instructions can be used to install the Netra E1 system expander into both the Sun StorEdge 72-inch tall (19-inch wide) rack and standard four-post telecom racks.

Rackmounting parts required are listed in "Ordering Information" on page 3.

1. **Attach the thumbscrew rack mounting brackets on either side of the system (see** FIGURE 2-6**).**
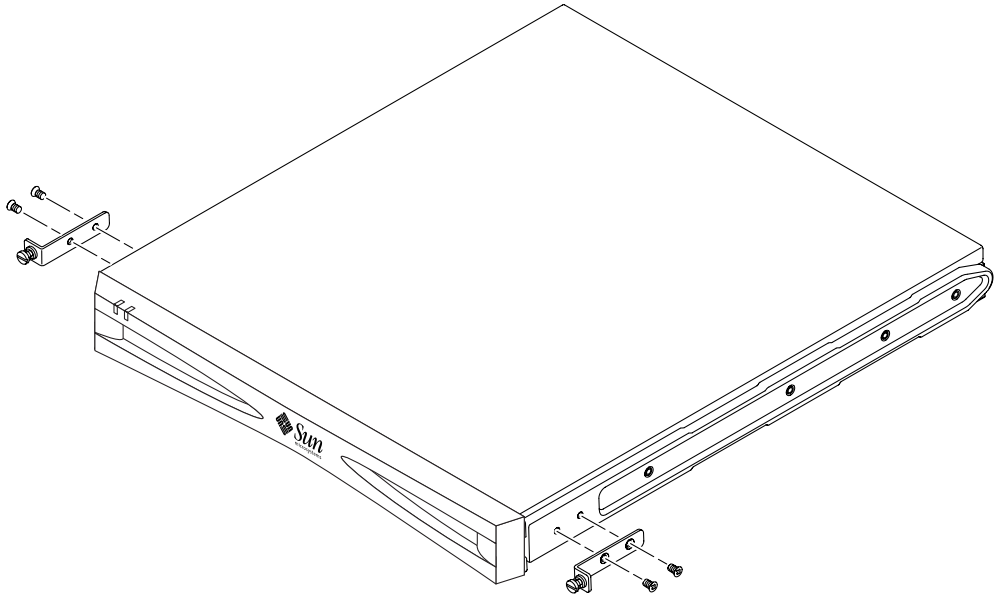
FIGURE 2-6   Attaching the Thumbscrew Brackets

2. **Position the two parts of the slide so that the double-angled end (A) is in the correct position for the rack you are installing into.**

For the Sun StorEdge™ 72-inch tall (19-inch wide) rack, the double-angled end (A) must be at the back (see FIGURE 2-7).
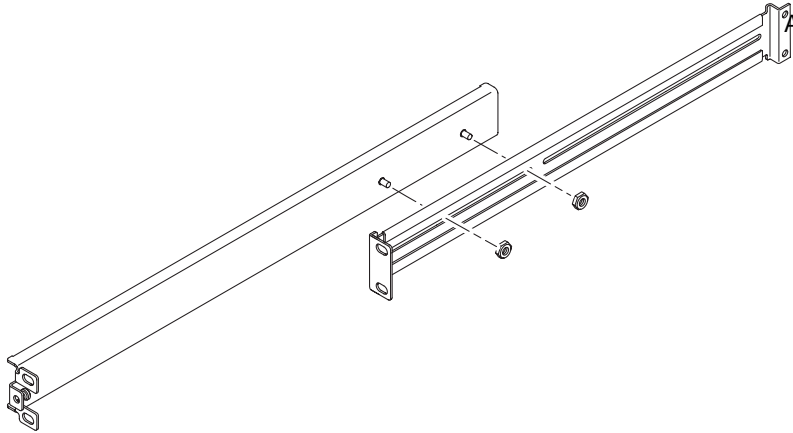
FIGURE 2-7 Positioning the Slide Mounts for a Sun StorEdge 72-inch Tall Rack

For a standard 19-inch wide rack, the double-angled end (A) must be at the front (see FIGURE 2-8).
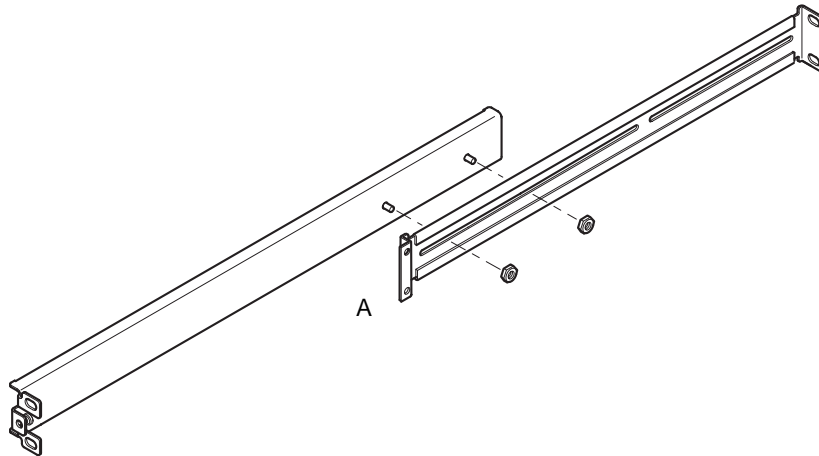
FIGURE 2-8 Positioning the Slide Mounts for a Standard 19-inch Wide Rack

3. **Loosely secure the two parts of the slide mounts, using the supplied M4 nuts.**

4. **Measure the distance between the front and rear posts of your rack.**

5. **Adjust the slide mounts so that the distance between the front and rear mounting brackets is approximately the same as the distance between the front and rear posts of the rack.**

6. **Move the brackets so that the studs are in suitable slots, and tighten the nuts.**

7. **Fasten the slide mounts to the rack, using the screws supplied.**

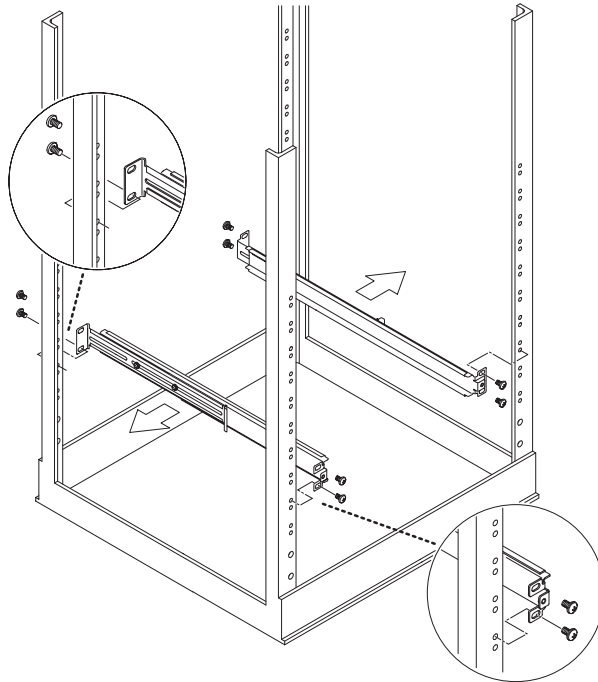8. **For a standard 19-inch rack, see** FIGURE 2-9. **Leave the screws slightly loose to allow adjustment as you slide the system into the rack.**

FIGURE 2-9   Fastening the Slide Mounts to a Standard 19-inch Rack (Rear View)

For the Sun StorEdge 72-inch rack, see FIGURE 2-10.

.
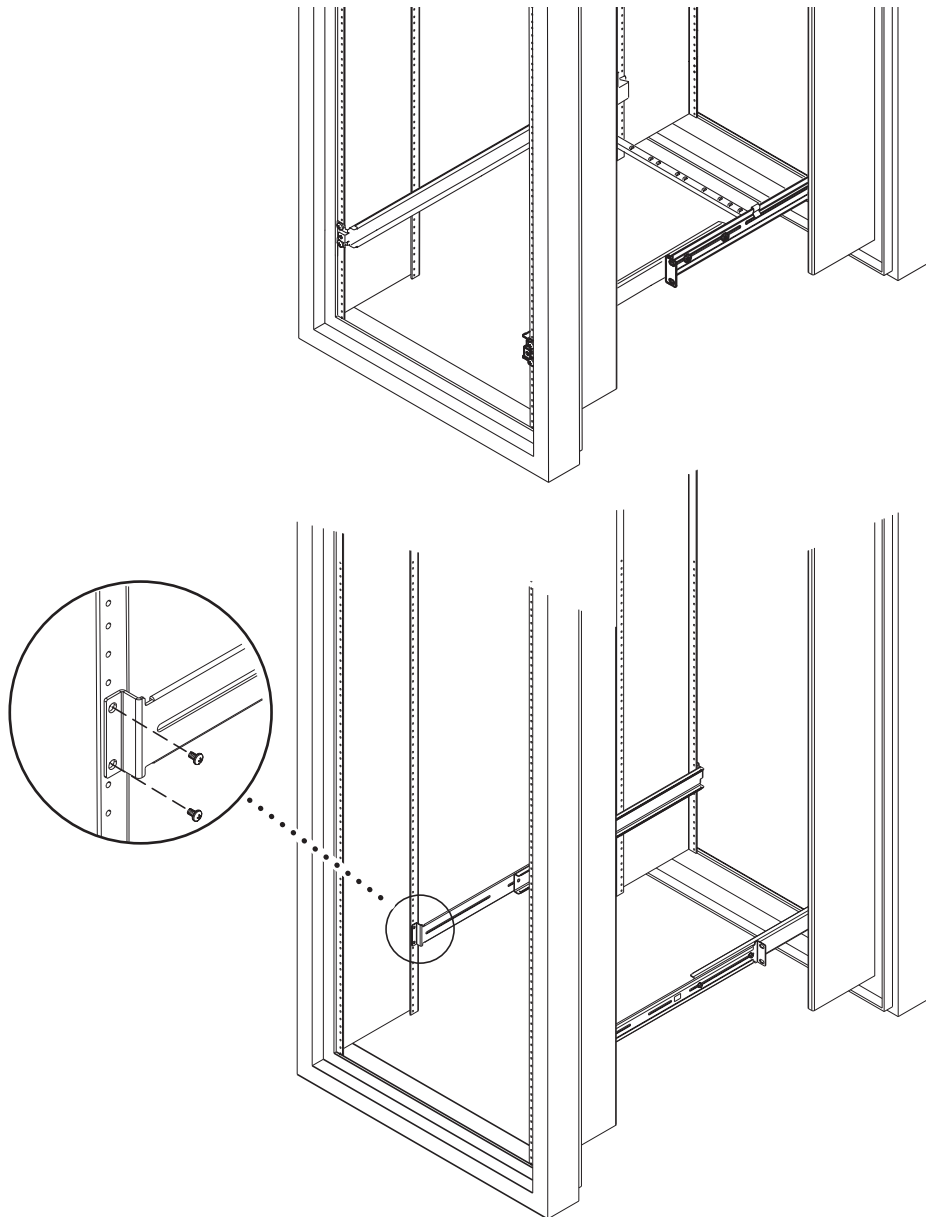
FIGURE 2-10 Fastening the Slide Mounts to a Sun StorEdge 72-inch Tall Rack –
Front and Rear View (side panels removed for clarity)

9. Slide the Netra E1 PCI system expander into the rack (FIGURE 2-11**).**
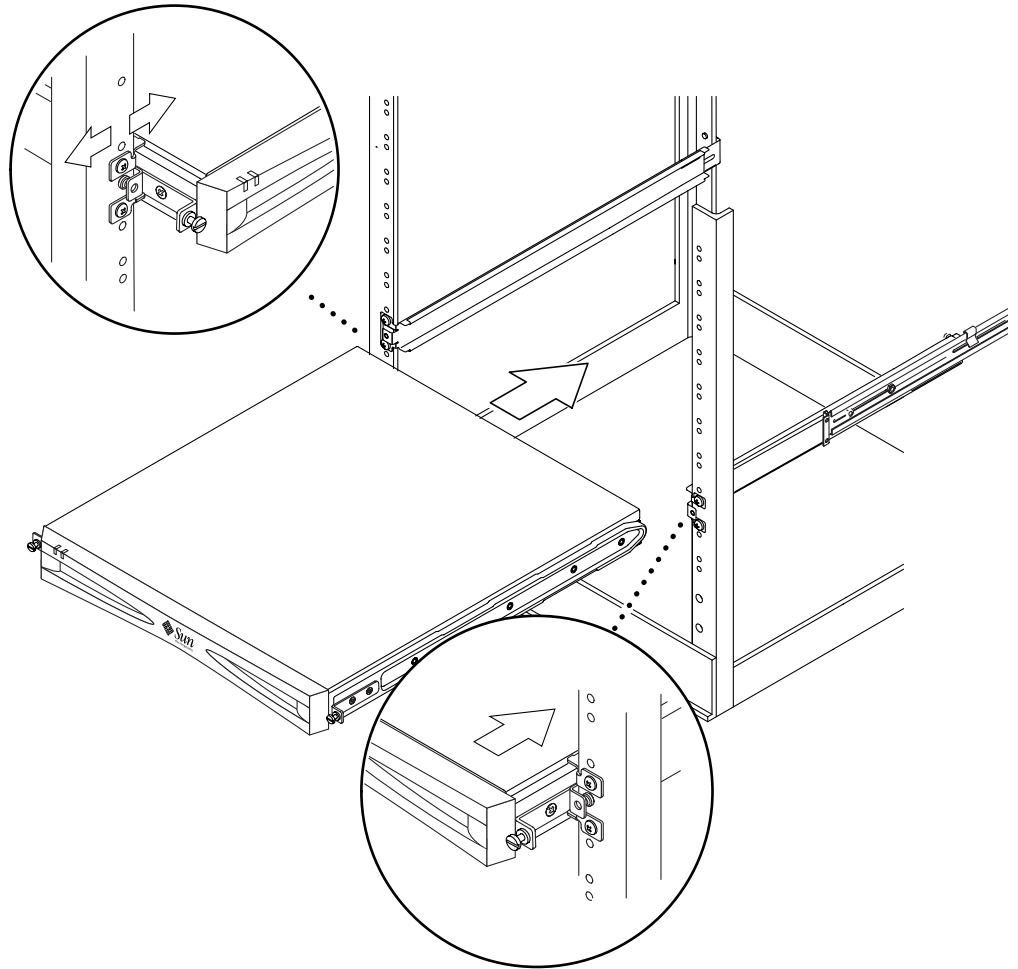

FIGURE 2-11 Sliding the Netra E1 PCI System Expander Into a Standard 19-inch Rack

10. **Align the screws on the sides of the system with the slide mounts in the rack (**FIGURE 2-12**).**

   If necessary, readjust the slide mount rails to align the system properly. The thumbscrews need to be finger-tight.
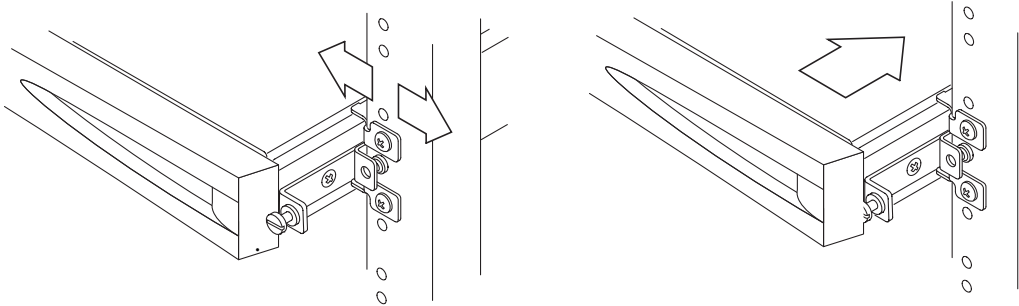

FIGURE 2-12   Adjusting the Slide Mount Rails

11. **Tighten the slide mount rails in the rack if you have not fully secured them yet.**

12. **When the slide mount rails are secure, use a screwdriver to tighten the thumbscrews in the fixed mounting brackets at the front of the system.**

   The system is now securely installed in the rack.

13. Hook the cable management bracket over the slide mounts at the rear of the system, as shown in FIGURE 2-13**.**
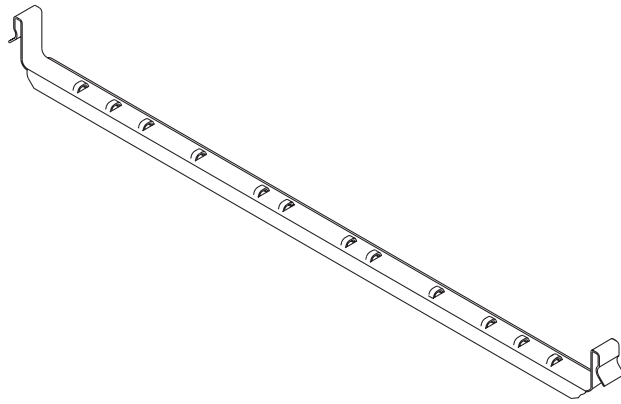

FIGURE 2-13 Cable Management Bracket

.

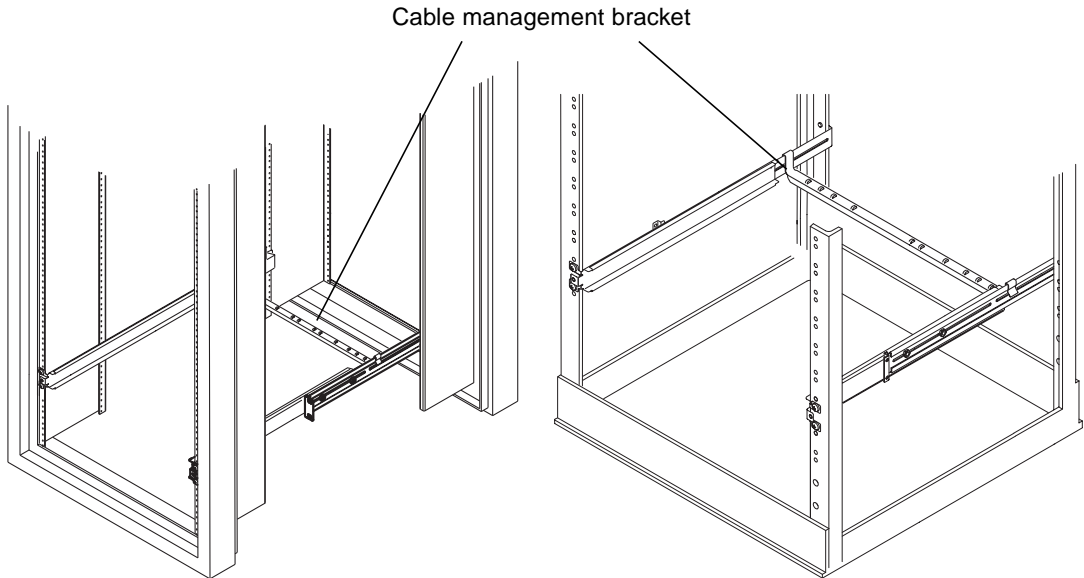
Cable management bracket

FIGURE 2-14 Cable Management Bracket on a Sun StorEdge or Standard 19-inch Rack

14. Secure cables by bundling together using cable ties attached to the bracket holes.

▼ To Install the System Into a Two-Post Relay Rack

1. **Remove three of the screws from the plastic slide-mount fixings on the right and left panels of the unit (see** FIGURE 2-15**).**

Note – Do not attach the rear brackets until you have completed Steps 1 through 4.

---

2. **Attach the two front fixed brackets to the second and third tapped holes toward the front of the system.**

   Use the Phillips-head countersunk screws provided. See FIGURE 2-15, but do *not* install the rear brackets yet.
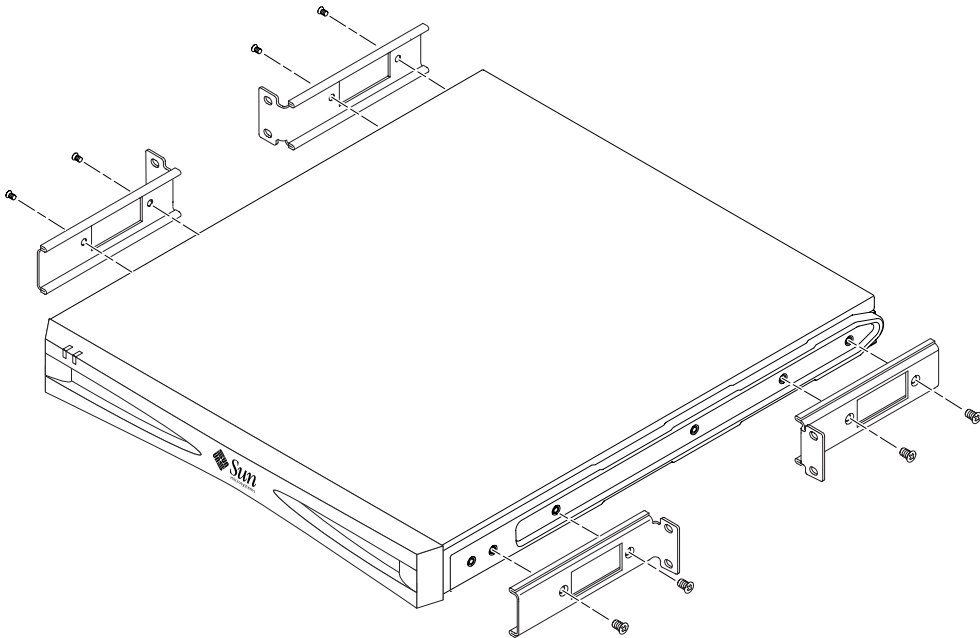

FIGURE 2-15 Installing the Fixed Mounting Brackets

3. **Secure the system to the rack, using just the front brackets, but do not fully tighten the screws yet.**

4. **Fit the two rear fixed brackets to the two tapped holes at the rear of the system on each side, using the Phillips-head countersunk screws provided.**

5. Secure the rear brackets to the rack in the appropriate place, as shown in
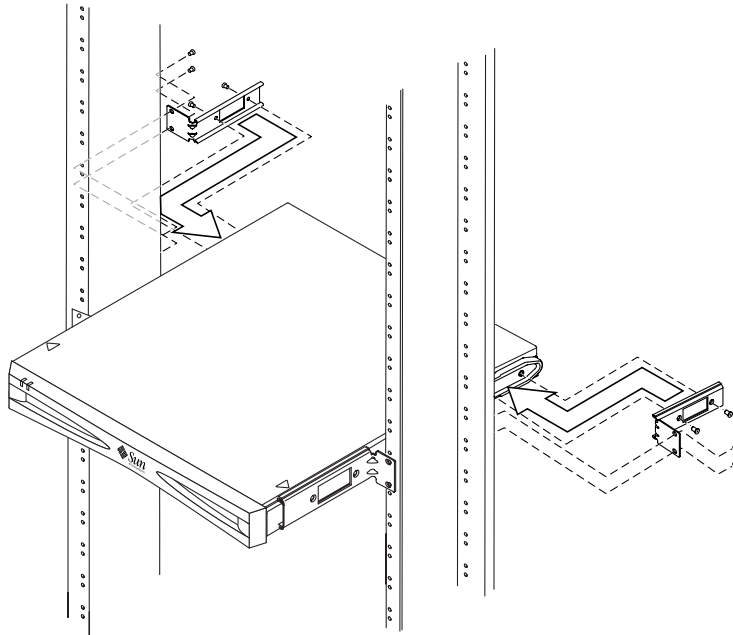   FIGURE 2-16**.**

FIGURE 2-16 The PCI System Expander Installed in a Two-Post Relay Rack

6. Once you are certain that all the rack fixing screws are correctly aligned, you can fully tighten the screws.

Cabling the System Expander to the Host System

After you have installed the PCI cards into the system expander, and mounted the system expander into the rack, use the supplied cable to connect the system expander to the host system.

▼ To Install the Host Interface Card

● **Attach the host interface card to a PCI slot in your host system.**

See your host system documentation for specific instructions, required slot placement, or for any other requirements that are specific to your host system.
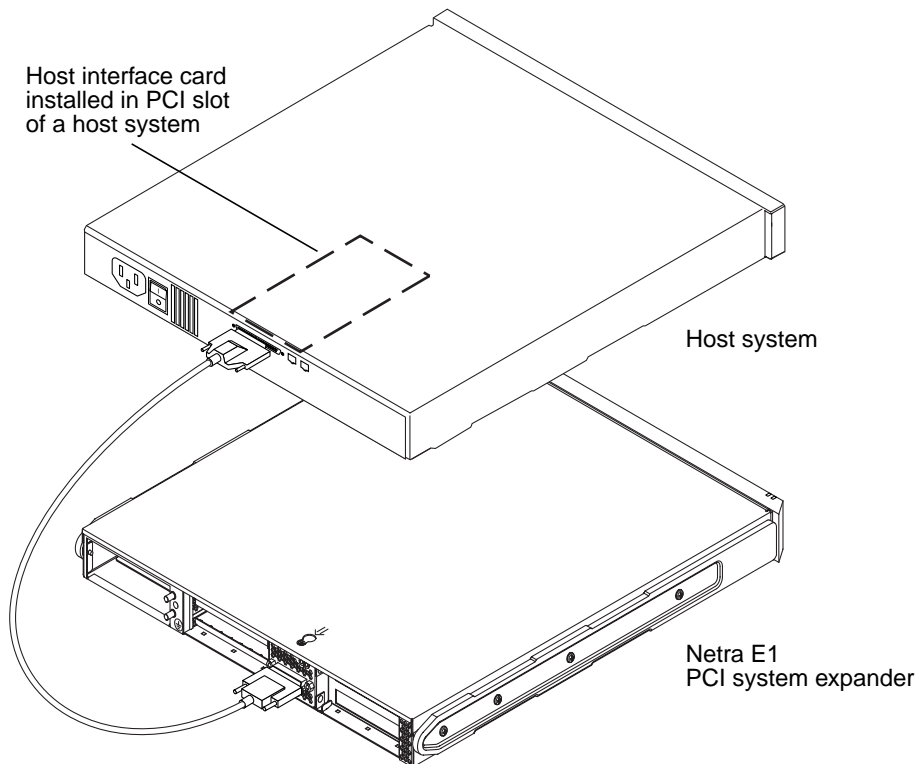

Host interface card
installed in PCI slot
of a host system

Host system

Netra E1
PCI system expander

FIGURE 2-17 Host Interface Card Installed in the Host System

▼ To Attach the Host Connector Cable

1. **Attach one end of the connector cable to the host interface card installed in the host system as shown in** FIGURE 2-17**.**

2. **Attach the other end of the cable to the PCI connector in the system expander** (FIGURE 2-17)**.**

   The connector cable ends can be attached only in one direction. If the host system is off, continue with Step 3.

   Caution – If the host system is powered on, the system expander will power on automatically as the cable is connected to the host system.

   ---

3. **Tighten all four captive cable screws securely.**

   Make sure that the cable is supported so that there is no unnecessary stress on the host interface card.

   Caution – Lack of physical support for the connector cable can cause intermittent connections and damage to the host or connector card. Always provide stress relief for the cabling.

   ---

4. **Reboot the host system.**

   The startup sequence enables the host system to establish a connection with the PCI cards installed in the system expander.

Connecting the Power Cables

You must have the following hardware at your site to successfully connect your PCI system expander to power:

- A host interface card installed in the host system
- A circuit breaker (refer to "Site Power Source Requirements" on page 14)
- The power cables included with your Netra E1 PCI system expander

The procedures for connecting the power cables differ depending on whether you have an AC- or DC-powered system expander.

▼ To Connect to AC Power

1. **Connect a grounding lug to the two vertically-oriented grounding posts located at the back of the system expander chassis.**

2. **Secure the other end of the grounding cable to the earth ground in the building.**

   If you are installing the PCI system expander into a rack, you can secure the grounding cable to a grounding point on the rack, as long as the rack is properly grounded to the earth ground in the building.

3. **Connect the AC power cord included with your AC-powered system expander to an AC power source.**

   Refer to "Site Power Source Requirements" on page 14 for the required circuit breaker rating.

▼ To Connect to DC Power

There are four parts to the process of connecting to DC power:

- Grounding the Netra E1 PCI system expander chassis
- Assembling the DC input cables
- Attaching the input cables to the system expander
- Attaching the two DC input cables to two DC power sources

1. **Connect a grounding lug to the two vertically-oriented grounding posts located at the back of the system expander chassis.**

2. **Secure the other end of the grounding cable to the earth ground in the building.**

   If you are installing the PCI system expander into a rack, you can secure the grounding cable to a grounding point on the rack, as long as the rack is properly grounded to the earth ground in the building.

3. **Verify that the DC power sources are off through the circuit breakers.**

   Caution – To avoid personal injury, *do not* proceed with these instructions until you have verified that the power is off to the DC power sources through the circuit breakers.

4. **Verify that the DC input power cables are connected to the DC power sources through the circuit breakers.**

   Connect the first DC input power cable to DC power source A, and the second DC input power cable to DC power source B. Connect one DC input power cable to a DC connector at the back of the system expander.
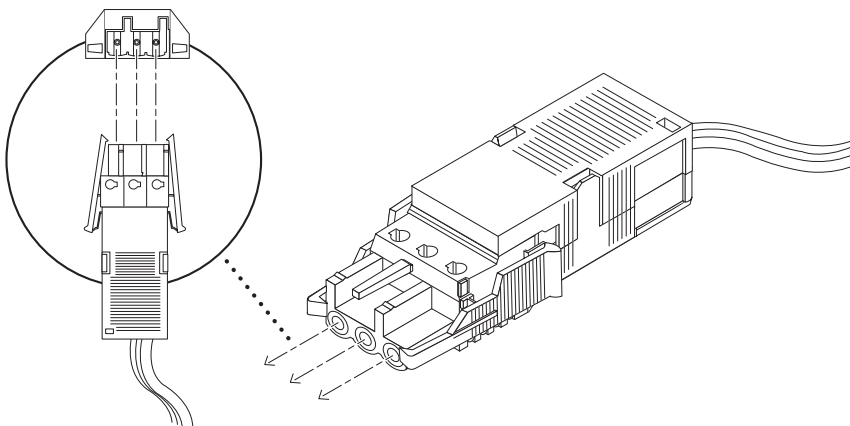

FIGURE 2-18 Connecting the DC Input Power Cable to the DC Connector

5. **Repeat Step 4, connecting the second DC input power cable to the other DC connector at the rear of the system expander.**

6. **Turn on the circuit breakers to provide power to the system.**

7. **Connect the DC cables to two external DC power sources.**

8. **Connect the DC input cables to the DC connectors on the back of the Netra E1 PCI system expander chassis.**

Powering On and Off

▼ To Power On the System Expander

1. Confirm that the system expander cover is fastened in place, and that the power cables are connected correctly.

Note – The system expander will power on automatically as the cable is connected to the host system, or as the host system is powered on.

2. Press the momentary power switch to the On position (|).

The switch will settle into the Standby position. The power switch is located on the back of the Netra E1 PCI system expander chassis, as shown in FIGURE 2-19. Verify by checking the power and fault LED, located on both the front and back of the system expander. Refer to "Power and Fault LEDs" on page 8 for LED descriptions.
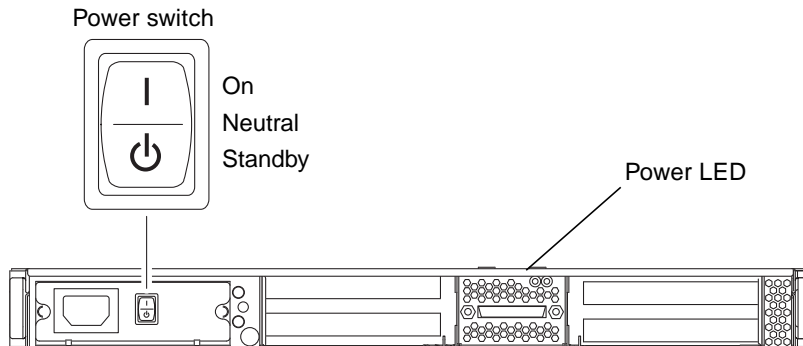

FIGURE 2-19 Location of the Power Switch and the Rear Power LED

3. Power on and boot the host system.

The startup sequence enables the host system to establish connection with the PCI cards installed in the system expander.

Refer to your host system documentation for instructions.

4. Install and configure any software required to operate the PCI cards, using the host system.

Refer to the PCI card documentation for instructions.

See "To Locate PCI Cards Installed in the System Expander" on page 49 for instructions about how to list the logical device names of the PCI cards installed in the system expander.

▼ To Power Off the System Expander

1. Power off the host system.

Caution – Do *not* switch off the system expander or disconnect the connector cable while the host system is running, or data transmission will be disrupted. If the connection has been interrupted, reboot your host system. The power-on sequence will reestablish connection between the host system and installed PCI cards.

---

2. Press the power switch on the system expander to the Standby position.

Both the power switch and power LED are located on the back of the system expander (see FIGURE 2-19).

3. Verify that the power LED indicates standby or off.

4. Disconnect the AC or DC input power cables from the system expander back.

To disconnect a DC input power cable from the DC power connector, squeeze the two tabs on the sides of the DC input power cable and disconnect the DC input power cable from the DC power supply (FIGURE 2-20).
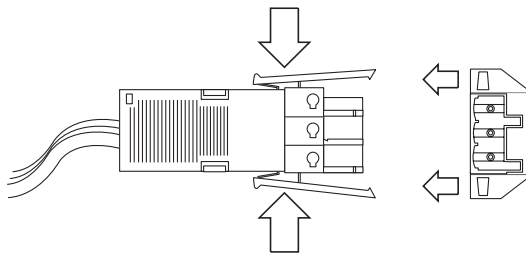
FIGURE 2-20 Disconnecting the DC Input Power Cable from the DC Power Connector

Troubleshooting

Perform the following procedure to isolate any problems that occur after installation of the Netra E1 PCI system expander.

▼ To Isolate Problems With the System Expander

1. **Verify the following to ensure that the Netra E1 PCI system expander and PCI cards are properly installed.**

   - Is the host system powered on?

   - Is the system expander powered on?

   - Has the host system been rebooted after initial installation, or any lapse of power? The startup sequence enables the host system to establish connection with the PCI cards installed in the system expander.

   - Is the power cord loose at the source or at the connection to the system expander?

   - Is the PCI host interface card properly installed in the host system?

   - Is the connector cable firmly connected to both the host interface card and the Netra E1 PCI system expander? The thumbscrews should be finger-tight.

   - Are the PCI cards properly seated in the system expander's PCI card cage?

   - Is there any physical damage to the following components:
     - Host interface card (installed in host system)
     - Host interface card connector cable
     - DC input connector cables (DC unit only)
     - PCI cards (installed in system expander) and/or cables
     - PCI card cage connectors

   If there is noticeable physical damage to the host interface card or the host interface card connection cable, contact your service representative for replacement. If there is noticeable physical damage to PCI cards, contact their manufacturer. If PCI card cage connectors are damaged, contact your service representative for a replacement unit.

2. **Verify that the OpenBoot™ PROM of your host system is Version 3.11 or higher. Version 3.11 and more current OpenBoot versions are fully compliant with Revision 2.1 of the** *PCI Local Bus Specification.*

   The OpenBoot PROM of the compatible Sun systems are flash devices, so they can be upgraded by a patch, if needed. The SunSolve Online web site `http://sunsolve.sun.com/` has the latest OpenBoot PROM patch revisions.

3. **Verify that your host system can access the host interface card and all the cards installed in the system expander.**

   See "To Locate PCI Cards Installed in the System Expander" on page 49 for more information.

   If none of the cards installed in the system expander registers by means of the show-devs command, reboot your host system. If this does not solve the problem, contact your local Enterprise Services representative for support.

   If one card installed in the system expander is not printed in the output of the show-devs command, while the others are, install that card in the host system. If it operates properly in the host system, the card's driver may not support bridging. Contact the PCI card manufacturer for information.

   If the card does not operate correctly in the host system, the card might be damaged. Contact the manufacturer or dealer for service or a replacement.

4. **If your system is displaying a flashing green LED, and pressing the On (|) symbol on the momentary power switch does not change the LED to a solid on green, either your power supply is malfunctioning, or your voltage input is below the required specification.**

   Contact your service representative for help.

5. **If your system expander is displaying a solid on green LED and a flashing amber LED, and the system expander is not responding to the host system, it has electrically isolated itself to protect the host system.**

   Contact your service representative for help. Refer to TABLE 1-9 for information on other LED states.

6. **Refer to "PCI Card Power Ratings" on page 21 to verify that the PCI cards you have installed in the system expander do not exceed the power supply restrictions.**

   Contact your service representative for replacement of the Netra E1 PCI system expander if these suggestions do not solve the problem.