



Sun Enterprise™ 450 Server Internal RAID Storage Option Installation Guide

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Manufacturer's Address: 140 Candace Drive
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407-830-5522

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Type of Equipment: SCSI Cards and Peripheral equipment

Model Number: PM2044U, PM2044UW, PM2144UW, PM3332UW, PM3334UW, PM3334UDW, PM2554UW, PM1554U2, PM1654U2, PM2554U2, PM2654U2, PM3754U2, PM3755U2B, SX4054U2, SX4055U2, SX4055F (class A), BB4050, RA4050, SM4050-4, SM4050-16, SM4050-64, DM4050-4, DM4050-16, DM4050-64 and RAIDStation (DPT-RS3 & DPT-RS3W)

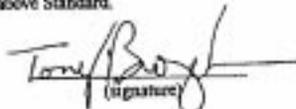
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Place: Maitland, FL, USA



(signature)

Date: 10 Nov 98

Tony Brogren
(Full Name)

V. P. Program Management
(Position)

DO-0957-004



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Application of Council Directive :
89/336/EEC - EMC Directive
73/23/EEC - Low Voltage Directive

Standard to which Conformity is Declared :
EN55022 Class B, EN50082-1
EN60950, AS/NZS 3548

Manufacturer's Name: Distributed Processing Technology Corporation

Manufacturer's Address: 140 Candace Drive
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407-830-5522

European Contact: Weltenburgerstr 70 Premier Suites
D-81677 Munich 494 Midsummer Blvd
Germany 49-8992-40416-0 Central Milton Keynes
MK9 2EA 44-1-908-233-951

Australian Contact: 117 Phillip Avenue Australian Supplier Code N740
Watson ACT 2602
Australia 61-412-004-830

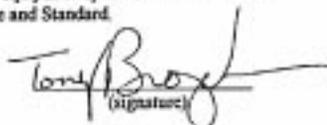
Type of Equipment: SCSI Boards and RAID Subsystems

Model Number: PM2021, PM2022, PM2024, PM2122, PM2124, PM3222, PM3224, PM2124W, PM3224W,
PM2041W, PM2042W, PM2142W, PM2044W, PM2044U, PM2044UW, PM2144W, PM2144UW, PM3332W,
PM3332UW, PM3334W, PM3334UW, PM3334UW, SM4000, CM4000, DM4000, SX4000, SX4000W,
SX4030W, SX4030UW, SX4030UW, RC4040, RC4041, 3 Bay RAIDStation, PM1554U2, PM1654U2,
PM2554UW, PM2554U2, PM2654U2, PM3754U2, PM3755U2B, SX4054U2, SX4055U2, SX4055F (class A),
BB4050, RA4050, SM4050-4, SM4050-16, SM4050-64, DM4050-4, DM4050-16, DM4050-64

I, the undersigned, hereby declare that the equipment specified above conforms
to the above Directive and Standard.

Place: Maitland, FL, USA

Date: 10 Nov 98



(signature)

Tony Broden
(Full Name)

DO-0923-010

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Preface

This guide describes how to install a Sun Enterprise™ 450 internal RAID storage option into a Sun Enterprise 450 server. It includes instructions for installing a Sun StorEdge SRC/P Intelligent SCSI RAID Controller™ card into a Sun Enterprise 450 server and connecting internal and external devices to the card.

These instructions are designed for an experienced workgroup server administrator

Using UNIX Commands

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

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

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

Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

The following documents contain topics that relate to information in this guide.

TABLE P-1 Related Documentation

Title	Part Number
<i>Ultra Enterprise 450 Server Owner's Guide</i>	805-0429
<i>Sun StorEdge SRC/P Intelligent SCSI RAID Controller User's Guide</i>	806-4148
<i>Sun StorEdge MultiPack Installation</i>	805-3953
<i>Sun StorEdge MultiPack Storage Guide</i>	805-3955
<i>Sun StorEdge MultiPack User's Guide</i>	805-3954

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Sun Enterprise 450 Server Internal RAID Storage Option Installation

The Sun Enterprise 450 internal RAID storage option consists of a Sun StorEdge SRC/P Intelligent SCSI RAID Controller, an 8-disk backplane, and the internal cables necessary to connect the SRC/P Controller to the 8-disk backplane.

This guide describes how to:

- Install the internal RAID storage option into a Sun Enterprise 450 server
- Upgrade an 8-bay storage expansion option to an internal RAID storage option

After you have completed the procedures in this guide, see the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User's Guide* for information about software installation and array configuration.

See “First-Time Installation Information” on page 10 for a list of the tasks required to completely install the SRC/P Controller.

About the SRC/P Controller

The SRC/P Controller is a host-based, three-channel UltraSCSI RAID controller card with a 64-bit PCI system interface and a dedicated processor.

The idea of RAID (redundant array of independent disks) is to combine multiple disk drives into an array of drives that provides better performance and more data protection than a single large drive. The server sees the array as a single logical storage unit.

The SRC/P Controller improves performance over software-based RAID because it off-loads RAID processing from the server CPU to the processor on the SRC/P Controller card.

Fault tolerance for data protection is provided by different types of RAID architecture. RAID levels 1, 5, 1+0, and 5+0 provide disk fault tolerance methods to protect data from being lost in the event of a hardware failure. Each RAID level offers different trade-offs in fault tolerance features and performance. In addition, RAID 0 offers no fault tolerance, but it does provide high I/O performance.

For additional data protection, hot spare drives are supported. Should an active drive fail, the hot spare drive assigned to the array replaces it and the data is automatically redirected to the hot spare drive.

The SRC/P Storage Manager, which is a graphical user interface (GUI), and a command-line management interface are included for RAID configuration, diagnostics, and event reporting. The SRC/P Controller automatically determines a RAID level and stripe size for your array based on your requirements for capacity, security, and performance. You can also manually select a specific RAID level through the GUI.

The SRC/P Controller uses read-ahead caching to reduce disk access time and improve performance. The controller automatically tallies I/O operations in cache RAM for analysis of storage subsystem I/O loading. You can view these numbers through the SRC/P Storage Manager. The controller analyzes these statistics to optimize the array architecture, cache, and stripe size for your system. You can tune and set cache parameters through the SRC/P Storage Manager.

The SRC/P Controller provides three independent single-ended channels with three high-density 68-pin external SCSI connectors that are Fast/Wide and Ultra/Wide capable and three 68-pin internal SCSI connectors that are Ultra/Wide capable. Each channel supports either internal disk drives (where applicable) or external storage devices, but not both.

Each SRC/P Controller supports 36 disk drives per card. The SRC/P Controller supports disk hot plugging so that you can replace drives while the system is operational. For information about hot plug disk replacement, see the *Sun StorEdge Multipack Storage Guide* for external devices; for internal disk drives see the product notes or owner's guide for your server.

ECC (error checking and correcting) memory detects and corrects data errors in the entire data path through the controller cache and other controller hardware. With ECC you generate redundant information that you can use to detect and correct errors in stored or transmitted data.

If you are using a software RAID package such as Veritas or Solstice DiskSuite™, along with the SRC/P Controller, the software RAID package will recognize the logical devices created using the SRC/P Controller.

Onboard temperature and voltage sensors pass critical hardware management data to the SRC/P Storage Manager information windows for logging and for notifying you. GUI windows also display status conditions with status flags on the drive or array icons.

The onboard battery backup module supports the cache. It protects data not yet written to the drives from being lost when the power is lost. Using the SRC/P Storage Manager, you can view the battery charge status, the date of initial calibration, and the date of the last maintenance calibration.

Features

All SRC/P Controllers include the following features:

- PCI Local Bus Rev. 2.1 compliant; 12.28-inch (31.19 cm) long card; 64-bit PCI bus; 33-MHz clock speed
- High-performance RISC processor
- Universal dual voltage signaling (3.3V and 5V)
- Three external and three internal 68-pin SCSI connectors that are Fast/Wide and Ultra/Wide capable and that can support external, single-ended UltraSCSI disks
- SCSI data transfer rates of up to 40-Mbytes/sec peak throughput per channel at a 20-MHz bus clock rate
- One 64-Mbyte onboard ECC write-cache memory module
- Replaceable battery module that provides a backup time of 48 hours for 64-Mbyte cache
- Support for RAID levels 0, 1, 5, 1+0, and 5+0
- Support for hot spares, hot-plug disks, and transparent drive rebuild
- Tunable cache parameters
- Self-test capability
- Controller firmware that resides onboard in flash PROM and that can be upgraded without replacing any hardware chips
- Graphical and command-line management interface

Kit Contents

Your system may be configured-to-order with a RAID storage option already installed at the factory, or you may order one of the option kits listed below. Check that you've received all of the parts you ordered. Contact Sun Microsystems or your distributor/reseller if you are missing anything.

TABLE 1-1 Option Kit Contents

Option Kit and Related Options	Description
Sun Enterprise 450 Server Internal RAID Storage Option Kit	The option kit includes the following parts: <ul style="list-style-type: none">• SRC/P Controller• 8-disk backplane• 8-slot SCSI data cable• 8-slot SCSI power cable• I²C cable• Electrostatic discharge strap• SRC/P Controller CD
External SCSI data cable option	2m cable for use with external storage devices

Internal RAID Option Components

The following figures show the SRC/P Controller and internal cables.

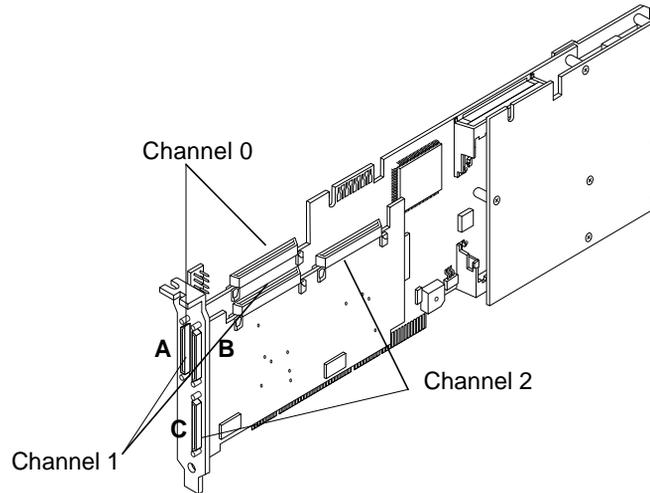


FIGURE 1-1 Sun StorEdge SRC/P Intelligent SCSI RAID Controller Card

Note – The internal connectors for Channel 0, Channel 1, and Channel 2 correspond to the external connectors A,B, and C on the SRC/P Controller. Each channel supports either internal or external devices (but not both).

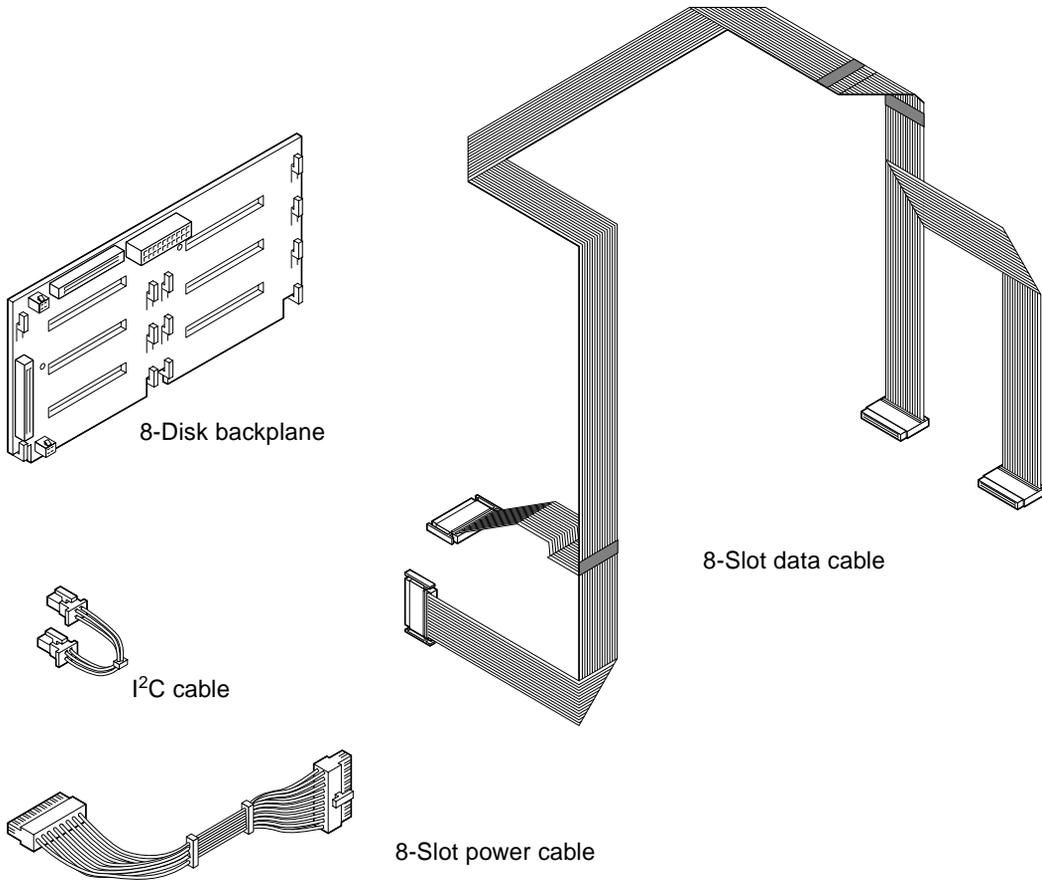


FIGURE 1-2 Internal Cables and 8-Disk Backplane

Host System Requirements

Before installing the SRC/P Controller, make sure that the Sun Enterprise 450 host server meets the following hardware and software requirements.

TABLE 1-2 System Requirements

Component	Description
Software	The operating environments supported are Solaris 2.6, Solaris 7 and later compatible operating environments.
Host system	Sun Enterprise 450 server.
Maximum SRC/P Controller cards	Six cards.
PCI slot selection	The SRC/P Controller requires a 64-bit PCI slot. On a Sun Enterprise 450 server use PCI slots 1 through 7 only.
Power requirements	Two power supply units must be installed in the server.

General Information

The next table provides hardware configuration information. See Appendix A for specification information.

TABLE 1-3 General Information

Component	Description
Target devices	<p>Internal Disk Drives</p> <p>Each internal channel supports four internal disk drives. One SRC/P Controller card can support 12 internal disk drives. Two 8-disk storage options are required to support the maximum internal disk drives.</p> <p>External Devices</p> <p>Each card has three external connectors that can be used to support up to 36 external devices. For each external storage device you need a 2m cable (ordered separately).</p> <p>The controller can support the following external drives if internal disks are not connected to that internal channel:</p> <ul style="list-style-type: none">• Sun StorEdge MultiPack-6• Sun StorEdge MultiPack-12
SCSI IDs and termination	<p>Internal Disk Devices</p> <p>The SCSI target address (SCSI ID) of each disk drive is determined by the slot location where the drive is connected to the 8-disk backplane. The backplane also provides the SCSI termination for each drive. Do not use jumpers on the drive to select a specific SCSI ID.</p> <p>Target address (SCSI ID) 7 is reserved for the SRC/P Controller.</p> <p>External Devices</p> <p>Your hardware configuration determines the number and distribution of SCSI addresses available. For the Sun StorEdge MultiPack devices, SCSI IDs are hardcoded. You do not need to set jumpers. You can view SCSI IDs through the GUI for the SRC/P Controller.</p>
PCI slot selection	<p>The SRC/P Controller requires a 64-bit PCI slot. You may install the SRC/P Controller in slots 1 through 7 only. For maximum performance, configure the system, if possible, with no more than one card on each PCI bus.</p> <p>If you are installing two 8-disk storage options, install the SRC/P Controller for the upper 8-disk backplane into a PCI slot located above the card used for the lower 8-disk backplane.</p>
DC power	<p>The DC power requirement is 5V +5% at 3.5 amps.</p>

External Cabling Guidelines

Use the following cabling guidelines to ensure proper device termination:

- A 2m cable is required for each external device (Sun part number 3832A).
- A maximum of 12 disks (one 6-drive or one 12-drive MultiPack) is supported per external port for up to 36 disk drives per SRC/P Controller.
- The SCSI bus must be correctly terminated. Most Sun devices use autotermination. See the documentation supplied with the device.
- Non-Sun devices are not supported.

Installation Scenarios

The Sun Enterprise 450 server internal RAID storage option can support up to 16 internal disk drives (two option kits) and 36 external disk drives (additional cables required).

TABLE 1-4 below lists installation scenarios for a new Sun Enterprise 450 server.

If you are upgrading an 8-bay storage expansion option to an internal RAID storage option, see “Upgrading an 8-Bay Storage Expansion Option” on page 27.

TABLE 1-4 Disk Drive Installation Scenarios for a Sun Enterprise 450 Server

Number of Disk Drives	Internal RAID Option Required
First eight internal disk drives	One Sun Enterprise 450 Server Internal RAID Storage Option Kit
Last eight internal disk drives	One additional Sun Enterprise 450 Server Internal RAID Storage Option Kit
Eight internal disk drives and external storage	One Sun Enterprise 450 Server Internal RAID Storage Option Kit Two 2m cables (ordered separately)
Two external storage devices	Sun StorEdge SRC/P Intelligent SCSI RAID Controller Kit Two 2m cables (ordered separately)
Three external storage devices	Sun StorEdge SRC/P Intelligent SCSI RAID Controller Kit One additional 2m cable

First-Time Installation Information

Installing the Sun Enterprise 450 Server Internal RAID Storage option is one step in the SRC/P Controller installation process. You need to complete all of the steps in TABLE 1-5 to fully install your storage option.

TABLE 1-5 First-Time Installation Steps

Task	For Information, See...
1 Review the features of the SRC/P Controller and read the general information.	This chapter.
2 Verify that you have received all of the parts you have ordered.	“Kit Contents” on page 4 of this guide.
3 Back up the data on the disks, if necessary.	AnswerBook2 online documentation for the Solaris software environment.
4 Install the SRC/P Controller card into the server.	<ul style="list-style-type: none">• “Installing the SRC/P Controller Card” on page 12 of this guide; or• “Upgrading an 8-Bay Storage Expansion Option” on page 27 if you are upgrading from an 8-bay storage option.
5 Install the software and configure RAID arrays.	The installation document included with the SRC/P Controller software and the <i>Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide</i> .
6 Restore data to disks, if necessary.	AnswerBook2 online documentation for the Solaris software environment.

Installing the Internal RAID Storage Option

This chapter describes how to install the internal RAID storage option into a new Sun Enterprise 450 server. To upgrade a Sun Enterprise 450 server that has a SRC/P Controller already installed, see Chapter 3.

To install the internal RAID storage option, you will need to complete the following tasks:

- Prepare the Sun Enterprise 450 server
- Install the SRC/P Controller card
- Install the 8-disk backplane
- Install the internal SCSI cables
- Connect any external devices
- Reassemble the system
- Reconfigure and reboot the system
- Verify the installation

Before You Begin



Caution – Persons who access this equipment must observe all safety precautions described in Appendix C of the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User's Guide*.

- Verify that you have received all of the parts you ordered; see “Kit Contents” on page 4.
- Locate the following tools:
 - Screwdriver, Phillips #1
 - Screwdriver, Phillips #2
 - Electrostatic discharge (ESD) mat, Sun part number 250-1088, or equivalent
 - Grounding wrist or foot strap
- Locate the following manuals:
 - *Ultra Enterprise 450 Server Owner’s Guide*
 - *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide*
 - *Sun StorEdge MultiPack Installation Manual*

Installing the SRC/P Controller Card



Caution – You need two power supplies in the Sun Enterprise 450 server to support the internal RAID storage option.

1. Back up any data on the disks, if necessary.

See the AnswerBook online documentation for the Solaris software environment.

Note – You will need to refer to the *Ultra Enterprise 450 Server Owner’s Guide* to complete the following tasks.

2. Power off the system.

See “How to Power Off the System.”

3. Turn off any peripheral devices attached to the server.

4. Remove the right side panel.

See “How to Remove the Right Side Panel.”

5. Remove the left side panel.

See “How to Remove the Left Side Panel.”

6. Attach the antistatic wrist strap to your wrist and to a metal component on the server chassis.

7. Remove the disk fan tray assembly.

See “How to Remove the Disk Fan Tray Assembly.”

8. Unpack the SRC/P Controller and place it on an antistatic surface.

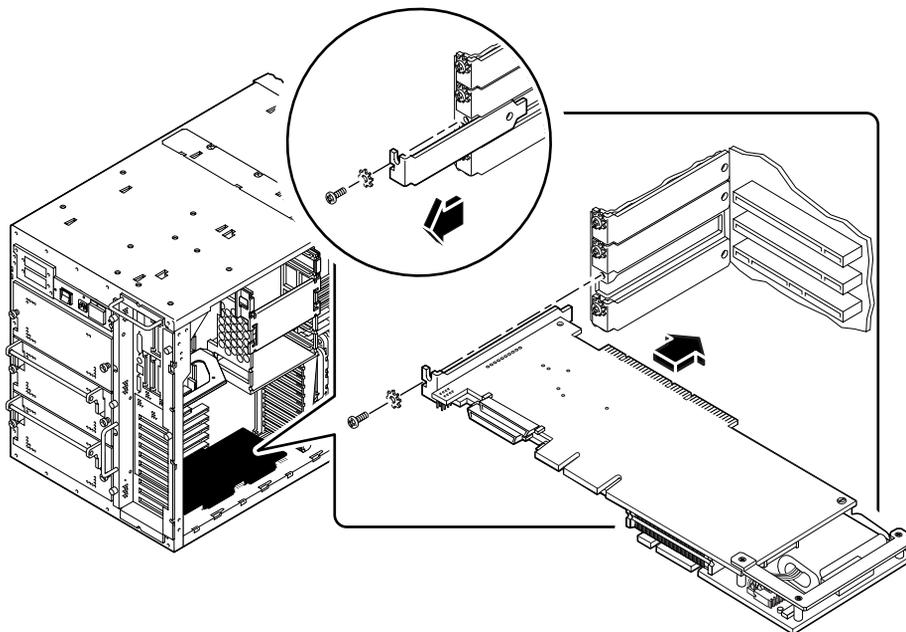
9. Insert the SRC/P Controller into the appropriate slot on the main logic board.

You can install the SRC/P Controller in PCI slots 1 through 7 only. The SRC/P Controller requires a 64-bit PCI slot.

a. Remove the filler panel for the PCI slot you intend to use.

Remove the Phillips screw that secures the PCI filler panel to the rear panel.

b. Align the left side of the card with the appropriate opening on the back panel. At the same time, insert the bracket on the right side of the card into the corresponding groove on the CPU cage.



c. Push the card securely into the slot.

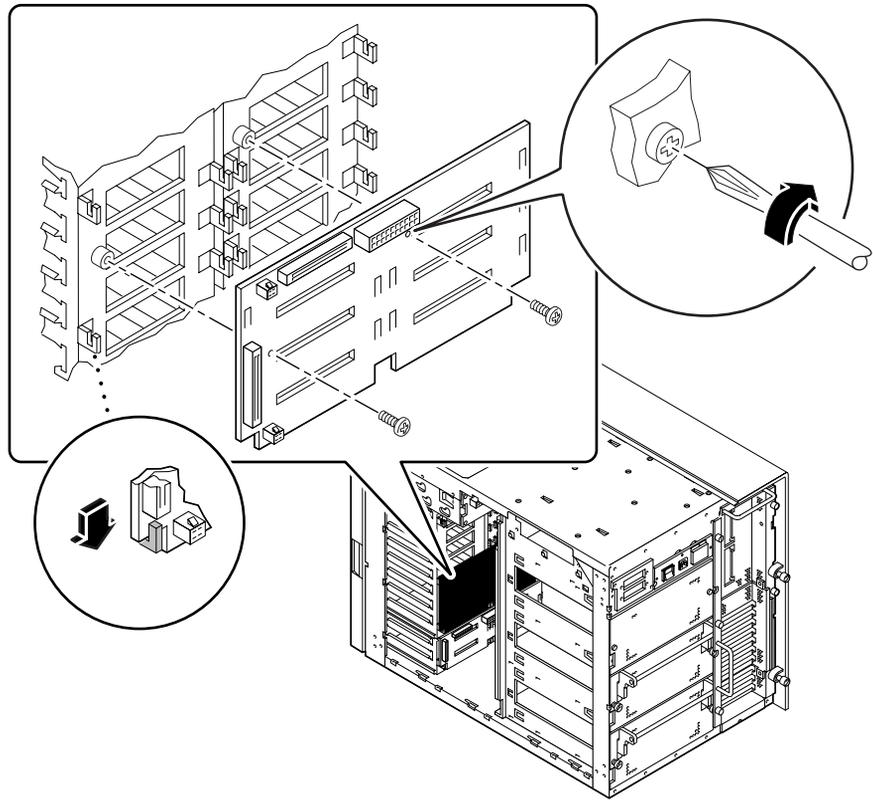
d. Secure the SRC/P Controller faceplate to the back panel with the Phillips screw.

10. If you are installing an external device only, go to “Installing External Devices” on page 22. Otherwise, go to “Installing the 8-Disk Backplane” on page 14.

Installing the 8-Disk Backplane

Note – If you are installing two Sun Enterprise 450 Server Internal RAID Storage Option Kits, install the SRC/P Controller for the upper 8-disk backplane in a PCI slot located above the SRC/P Controller used for the lower 8-disk backplane.

- 1. Remove the disk fan tray assembly, if you have not already done so.**
See “How to Remove a Disk Fan Tray Assembly” in your server owner’s guide.
- 2. On the right side of the enclosure, remove the two screws that secure the 8-disk backplane filler panel to the disk cage, and remove the filler panel. Remove both backplane filler panels if you are installing the lower 8-disk backplane.**
- 3. Insert the 8-disk backplane down into the 12 mounting hooks at the rear of the disk cage.**
Use the lowest available set of hooks; do not mount a backplane at the top of the disk cage if the center portion of the cage has no backplane.



4. Secure the backplane to the disk cage using the two Phillips screws provided in the option kit.

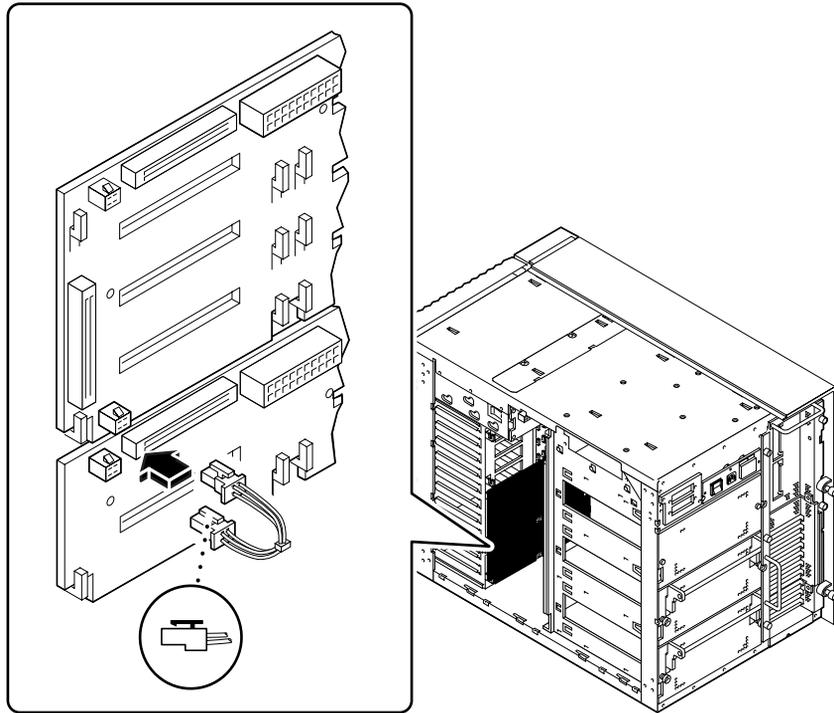
Installing the Internal Cables



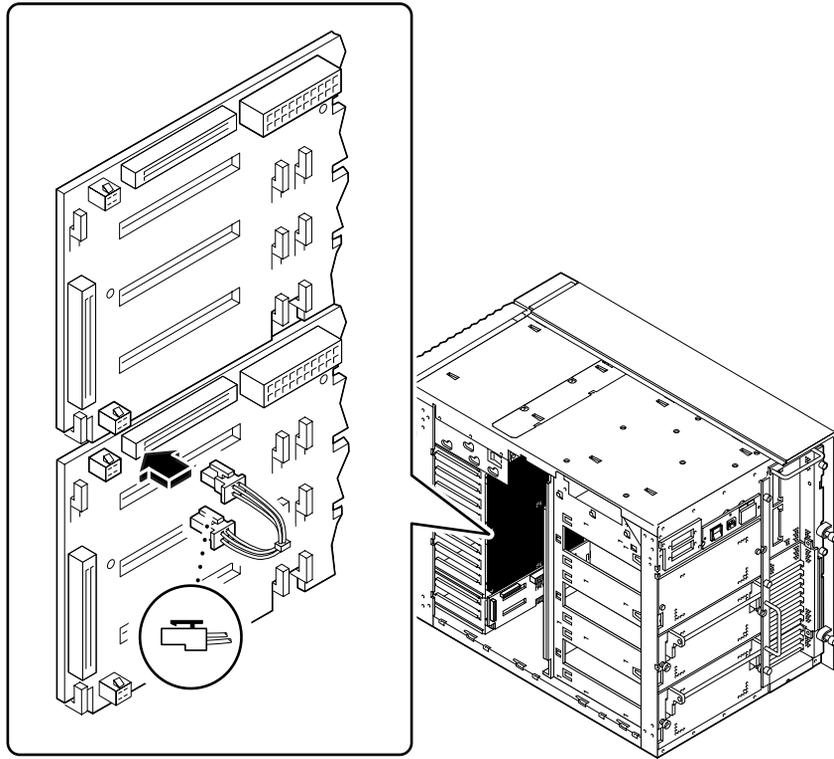
Caution – UltraSCSI data cables are fragile and should be handled with care.

1. Connect the I²C cable.

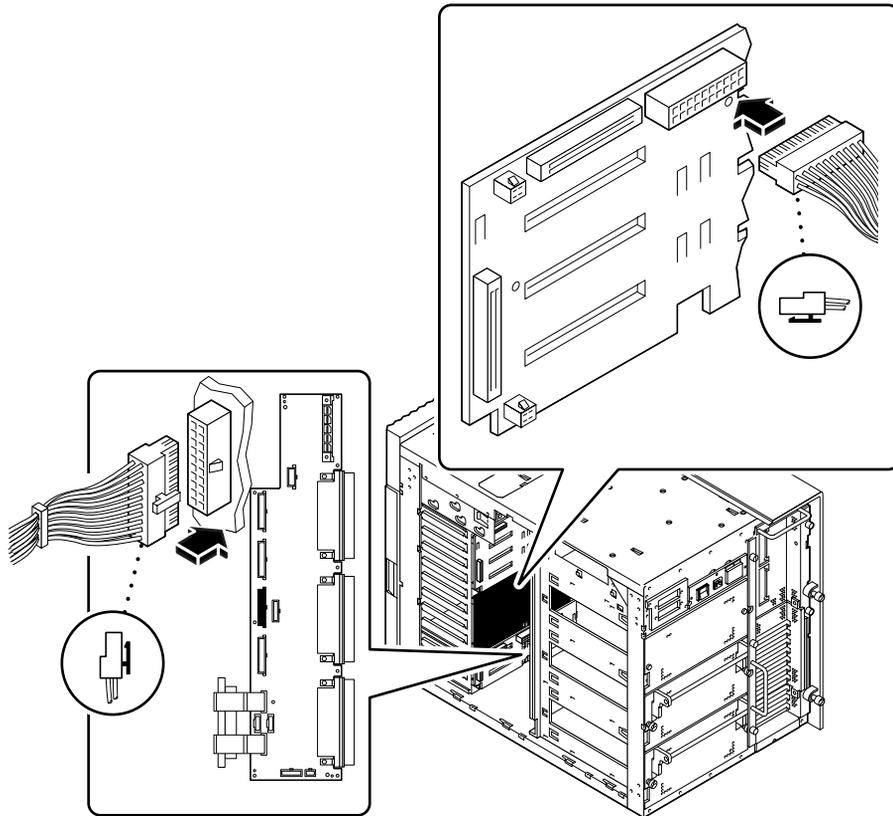
- *If you are installing the lower 8-disk backplane, connect the I²C cable to connector P0500 on the 4-slot backplane and to connector P0600 on the 8-disk backplane.*



- *If you are installing the upper 8-disk backplane, connect the I²C cable to connector P0601 on the lower 8-disk backplane and to connector P0600 on the upper 8-disk backplane.*

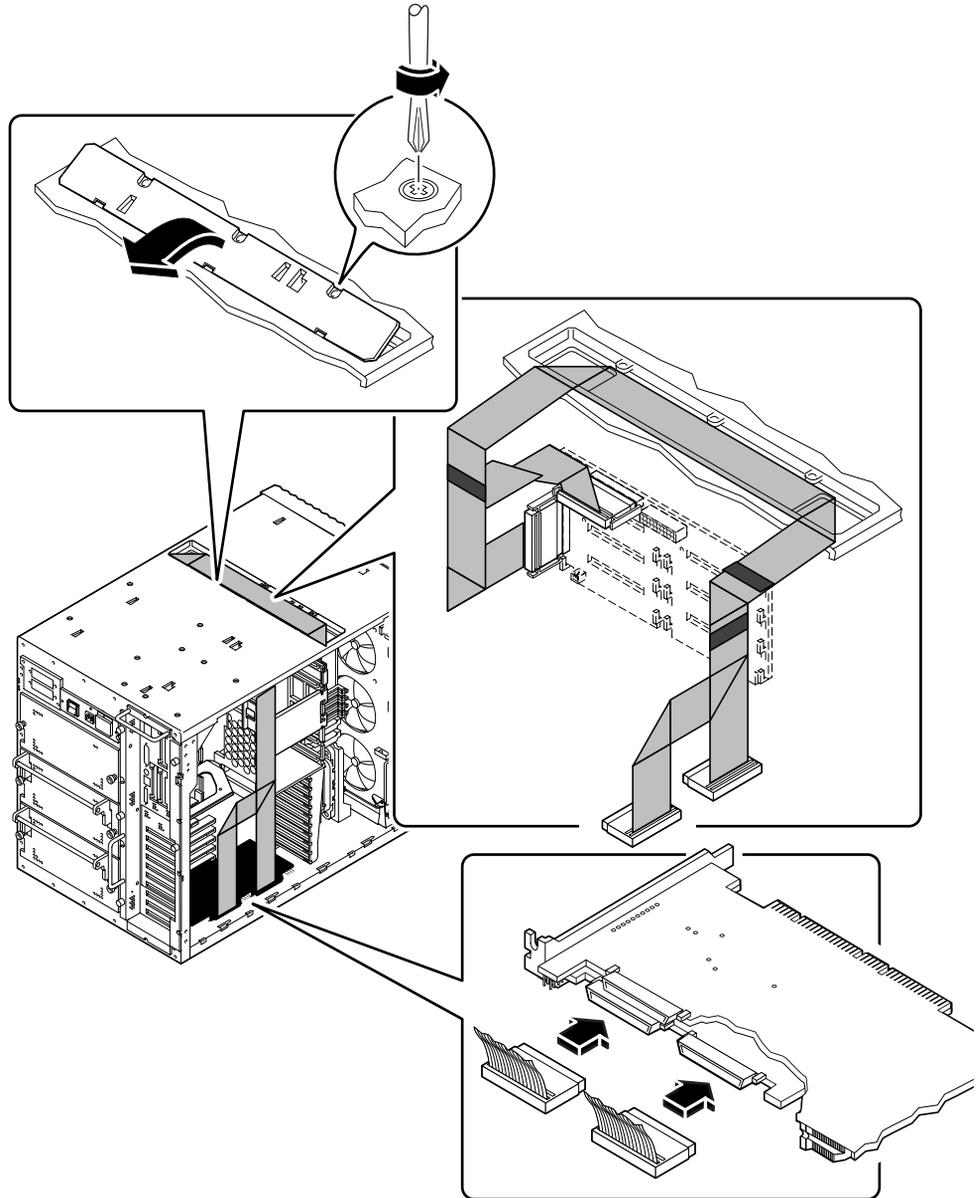


- 2. Connect the 8-slot UltraSCSI power cable to the backplane at connector J0101.**
Make sure that the tab on the bottom of the connector snaps into place.



- 3. Connect the other end of the 8-disk UltraSCSI power cable to the power distribution board.**
- *If you are installing the lower 8-disk backplane, use connector J0304 on the power distribution board.*
 - *If you are installing the upper 8-disk backplane, use connector J0303 on the power distribution board.*
- Be sure that the tab on the right side of the connector snaps into place.

4. Remove the three small Phillips screws that secure the cable access panel to the top of the system chassis.



5. Tilt the front edge of the access panel upward and lift it free from the chassis.

- 6. Insert the 8-disk UltraSCSI data cable into the cable access port on the top of the system chassis.**

Position the cable in the access port with connectors P1-A and P1-B toward the left side of the enclosure (where the main logic board is located). If you are installing the upper 8-disk backplane, you must position the cable between the two existing data cables in the access port.

- 7. On the left side of the enclosure, carefully route the cable so that it rests on top of the shelf located directly above the top CPU module.**

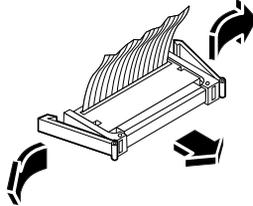
Take care to avoid damaging the cable on any sharp sheet metal edges.

- 8. On the left side of the enclosure, connect the two cable connectors to the SRC/P Controller.**

Note – Channel 0 is for the 4-slot data cable. Use channels 1 and 2.

See “Internal RAID Option Components” on page 5 to view the location of the channels.

If necessary, remove the brackets from the ends of each connector.



Note – If you are installing two storage option kits, the 8-slot UltraSCSI data cable on the outside (on top in the access port) must connect to the SRC/P Controller in the lower slot.

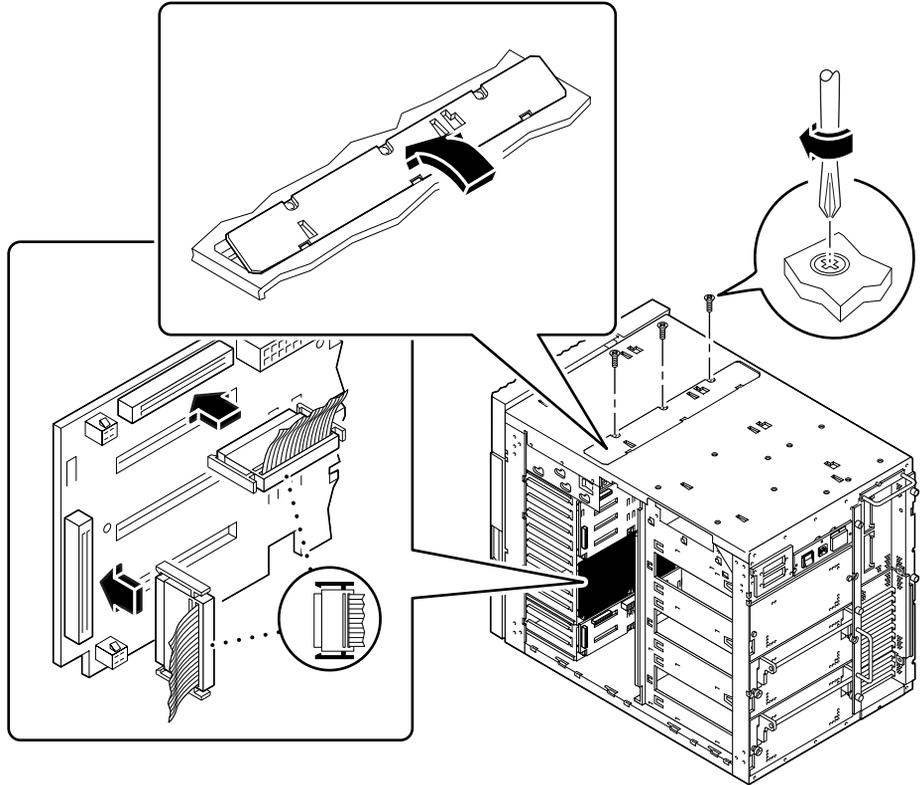
- 9. If the 8-slot UltraSCSI data cable has excess slack, carefully fold the cable and secure the fold using the cable clip attached to the CPU card cage.**

Do not crease the cable when you fold it.

10. Connect the other end of the cable to the 8-disk backplane.

Connect P2-B to the upper connector, J0402, and connect P2-A to the lower connector, J0102.

Note – If you are installing two expansion option kits, the UltraSCSI data cable on the outside (on top in the access port) must connect to the lower 8-disk backplane.



11. If the 8-disk UltraSCSI data cable has excess slack, carefully fold the cable and secure the fold using the cable clip attached to the disk fan tray assembly.

Do not crease the cable when you fold it.

12. Replace the cable access panel on top of the system chassis.

Align the three tabs on the edge of the panel with the corresponding slots in the system chassis.

13. Secure the access panel with the three Phillips screws.

14. Fill in information on the four labels at the ends of the 8-disk UltraSCSI data cable.

This identification is important when replacing a cable, backplane, or PCI card, particularly when two Sun Enterprise 450 server internal RAID options are installed.

a. On the left side of the system, fill in the two labels on the 8-disk UltraSCSI data cable for the appropriate connectors.

Fill in the number of the PCI slot used and check the box to indicate either the upper backplane or lower backplane.

b. On the right side of the system, fill in the two labels on the 8-disk UltraSCSI data cable for the appropriate connectors.

Check the box to indicate either the upper backplane or lower backplane.

Installing External Devices

You need an UltraSCSI 2m cable for each external storage device that you connect to the SRC/P Controller.

1. If necessary, power off the server.

See “How to Power Off the System” in your server owner’s guide for instructions.

2. Turn off any peripheral devices attached to the server.

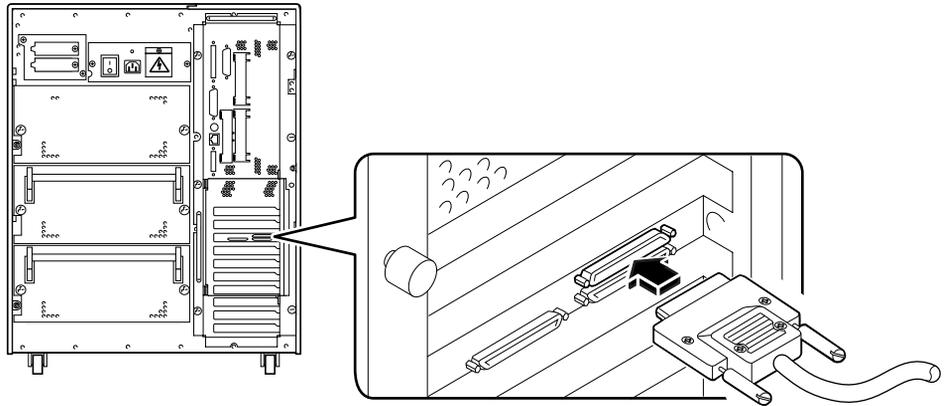
3. Connect any external storage devices to the SRC/P Controller.

Use the external 2m cables supplied with the SRC/P Controller. The cable connectors are keyed so that they can only connect one way. See “Internal RAID Option Components” on page 5 to view the location of the channels.

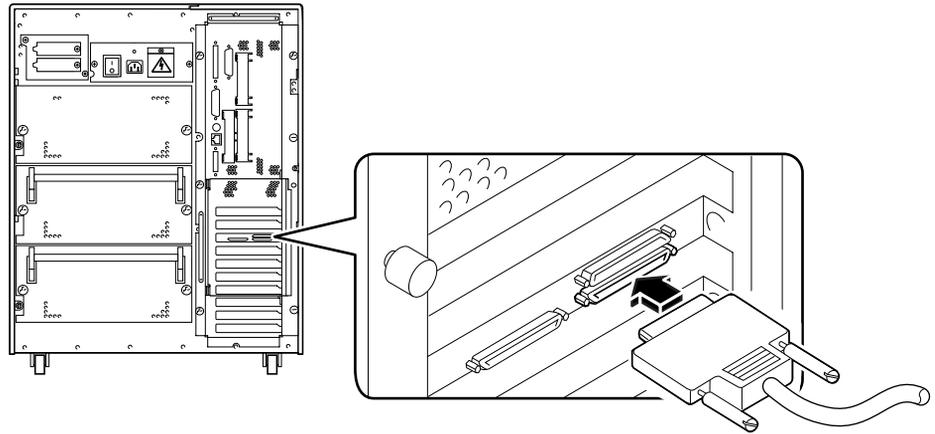
Note – Do not connect external SCSI devices to a SCSI channel that is used to support internal disk drives.

Note – External ports A and B are close together and will not accommodate non-Sun external 2m cables.

- *If you are connecting an external storage device to the upper port A on the SRC/P Controller, insert the connector with the flat side facing down.*



- *If you are connecting an external storage device to either port B or port C on the SRC/P Controller, insert the connector with the flat side facing up.*



Reassembling the System

Note – After reassembling the system, be sure to perform the steps in the next section, “Reconfiguring and Rebooting the System” on page 24 to reconfigure and reboot your system so that it can use the SRC/P Controller.

Complete these tasks to reassemble the system. Refer to the *Ultra Enterprise 450 Server Owner's Guide* for the information to complete each task.

- “How to Install the Disk Fan Tray Assembly”
- “How to Install the Left Side Panel”
- “How to Install the Right Side Panel”

To install disk drives for the new backplane(s), complete this task:

- “How to Install a Disk Drive” in the *Ultra Enterprise 450 Server Owner's Guide*

Reconfiguring and Rebooting the System

Before the system can properly recognize the new SRC/P Controller, you must verify that the card is installed correctly, reconfigure the system, and reboot the system.

1. Power on the system.

See “How to Power On the System” in the *Ultra Enterprise 450 Server Owner's Guide*.

2. When the system banner is displayed on the monitor, immediately enter the Stop-a sequence on the Sun keyboard.

If you are using an alphanumeric terminal instead of a monitor, press the Break key on the terminal's keyboard.

3. Use the `show-devs` command to verify that the SRC/P Controller is included in the list of system devices. When the `ok` prompt is displayed, enter the following command:

```
ok show-devs
```

`scsis` identifies the SRC/P Controller. The listing should include a line similar to the following:

```
/pci@4,4000/pci@4/scsis@4/scsi@0
```

If the SRC/P Controller is not listed, check that the card is properly seated. Reinstall the card if necessary.

4. Enter the following command to perform a reconfiguration boot:

```
ok boot -r
```

This command rebuilds the device trees for the system, incorporating any newly installed options so that they can be recognized by the system. After the reconfiguration boot has successfully completed, the system prompt should be displayed.

What Next

- *If this is the first SRC/P Controller that you installed in your server, the next step is to install the software necessary to run the SRC/P Controller. See the installation document supplied with the controller software.*
- *If you have already installed the software for a different SRC/P Controller, you are ready to configure drive arrays. See “How to Create an Array” in the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide*.*

Note – When you install a new SRC/P Controller, the controller will automatically initiate the initial calibration cycle for the battery. The calibration cycle requires approximately 24 hours to complete. During the calibration cycle, the SRC/P Controller cache is operating in Write-through mode and should not be used for performance testing. When the process is completed, the battery module will be ready to provide backup protection and the controller will automatically switch to Write-back mode. See the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide* for more information.

Upgrading an Internal 8-Bay Storage Expansion Option to an Internal RAID Storage Option

This chapter describes how to upgrade an installed 8-bay storage expansion option to an internal RAID storage option.

Upgrading an 8-Bay Storage Expansion Option

Perform the following steps to upgrade an 8-bay storage expansion option to an internal RAID storage option.

- 1. If there are two UltraSCSI controller cards installed in the system, and you are using the SRC/P Controller to support an 8-disk storage option, you need to remove one of the UltraSCSI controller cards.**
 - a. Disconnect the two 8-disk UltraSCSI data cable connectors from the front of the UltraSCSI controller PCI card you are removing.**

The cables are labeled P1-A and P1-B. Take note of where each connector attaches to the PCI card.
 - b. Disconnect all external cables from the faceplate of the PCI card.**
 - c. Remove the Phillips screw that secures the faceplate of the PCI card to the back panel of the system.**
 - d. Pull the UltraSCSI PCI card all the way out of the slot.**

Hold the PCI card by the edges.

2. Install the SRC/P Controller.

See “Installing the SRC/P Controller Card” on page 12.

3. If necessary remove the existing 8-slot UltraSCSI backplane and install the new 8-disk backplane.

To remove the 8-slot UltraSCSI backplane, see “How to Remove an 8-slot UltraSCSI Backplane” in the *Ultra Enterprise 450 Server Owner’s Guide*.

To install the 8-disk backplane, see “Installing the 8-Disk Backplane” on page 14.

4. If necessary, install the internal SCSI data cables.

See “Installing the Internal Cables” on page 15.

5. Connect any external devices.

See “Installing External Devices” on page 22.

6. Reassemble the system.

See “Reassembling the System” on page 23.

7. Reconfigure and reboot the system.

See “Reconfiguring and Rebooting the System” on page 24.

What Next

- *If this is the first SRC/P Controller that you installed in your server, the next step is to install the software necessary to run the SRC/P Controller. See the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide* and the documentation supplied with your controller software.*
- *If you have already installed the software for a different SRC/P Controller, you are ready to configure drive arrays. See “How to Create an Array” in the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide*.*

Note – When you install a new SRC/P Controller, the controller will automatically initiate the initial calibration cycle for the battery. The calibration cycle requires approximately 24 hours to complete. During the calibration cycle, the SRC/P Controller cache is operating in Write-through mode and should not be used for performance testing. When the process is completed, the battery module will be ready to provide backup protection and the controller will automatically switch to Write-back mode. See the *Sun StorEdge SRC/P Intelligent SCSI RAID Controller User’s Guide* for more information.

Specifications

This appendix provides a functional description and a reference for physical, performance, electrical, and environmental specifications.

Functional Description

TABLE A-1 Functional Description

Component	Description
Processor	High-performance RISC processor
Firmware	Operational firmware is stored in flash memory and can be updated using host utilities without requiring component replacements
PCI	PCI Version 2.1 compliant, 64-bit, 33-MHz PCI bus; up to 264-Mbytes/sec transfer rate; Universal PCI compliant
SCSI	Clock Rate: 20 MHz Three internal 68-pin connectors Three external 68-pin VHDCI connectors Support of ANSI X3.131:1994, SCSI-2 specification Support of ANSI X3.277:1996, FAST-20 specification UltraSCSI synchronous wide (16-bit) data transfers up to 40 Mbytes/sec UltraSCSI synchronous narrow (8-bit) data transfers up to 20 Mbytes/sec UltraSCSI low-voltage differential or single-ended bus operation

TABLE A-1 Functional Description (*Continued*)

Component	Description
Memory	64-Mbyte DIMM DIMMs to be installed in the controller must conform to the following specifications: Speed: 60-ns EDO Size: 64 Mbytes Width: 32 bit Configuration: 72 pin, small-outline Voltage 3.3V
Battery	Type: Nickel Metal Hydride Capacity: 3800 mAH Backup time: 48 hours (with 64-Mbyte cache installed); 65 hours (with 16-Mbyte cache installed) Charge time: 3 hours Operating Temp: 10 °C to 40 °C
DC power requirements	Measurement: 5V +/-5%; 3.3V +/-0.3V Voltage: 5V + 5% Ripple and noise: 50-mv peak-to-peak max Current: 3.27A typical (3 channel configuration) Voltage: 3.3V + 5% Ripple and noise: 50-mv peak-to-peak max

Physical Dimensions

TABLE A-2 Physical Dimensions

Dimension	Measurement
Length of SRC/P Controller with expansion card and battery backup unit	12.28 in (31.19 cm)
Width of SRC/P Controller card	4.2 in (10.67 cm)
Length of basic SRC/P Controller card (measurement does not include length of expansion card and battery backup unit)	10.25 in (26.03 cm)
Component height (not including PCB):	
Primary component side	0.570 in (14.48 mm)
Back side	0.105 in (2.67 mm)

TABLE A-2 Physical Dimensions (Continued)

Dimension	Measurement
Length of expansion card (daughter card)	5.575 in (141.6 mm)
Width of expansion card	3.46 in (81.3 mm)
Length of battery module	4.475 in (113.7 mm)
Width of battery module	3.875 in (98.4 mm)

Performance Specifications

TABLE A-3 Performance Specifications

Feature	Specification
PCI clock	16–33 MHz
PCI data burst transfer rate	132 Mbytes/sec (32-bit PCI) 264 Mbytes/sec (64-bit PCI)
SCSI synchronous transfer rate	40 Mbytes/sec (Ultra)
SCSI asynchronous transfer rate	Device dependent
SCSI transfer size	64K blocks
PCI data address lines	64-bit PCI (63-0)
PCI modes	32-bit/64-bit PCI
Capacitance per PCI signal line	10 pf (maximum)
SCSI interface	16-bit single-ended SCSI
SCSI bus parity	Yes
SCSI 8-bit devices	No
SCSI 16-bit devices	Yes

Environmental Specifications

TABLE A-4 Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	10 °C to 40 °C	0 °C to 40 °C
Relative humidity	10%–90% (non-condensing)	10%–90% (non-condensing)
Altitude	3000 meters (10,000 feet)	