

# StorageWorks™ Solutions

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## StorageWorks FDDI Server HS110 Upgrade Installation Guide

Order Number: EK-HS110-IG. B01

This guide describes how to install the HS110 single processor upgrade kit into:

- An SW800-series cabinet, creating an HS111 model StorageWorks™ FDDI Server, or
- An HS111 model StorageWorks FDDI Server, creating an HS121 model StorageWorks FDDI Server.

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**June 1995**

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Any changes or modifications made to this equipment may void the user's authority to operate the equipment.

Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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# Preface

## Intended Audience

This guide is intended for use by Digital™ Multivendor Customer Services personnel or other qualified technicians who install and configure OpenVMS Alpha™ processors and related storage hardware.

This audience must know how to install and configure StorageWorks™ shelves, devices, and related components.

## Structure

This guide is organized as follows:

- |           |  |
|-----------|--|
| Chapter 1 | Provides an overview of the HS110 single processor upgrade kit.  |
| Chapter 2 | Describes preinstallation considerations and tasks.  |
| Chapter 3 | Describes installing the kit into an unconfigured SW800-series cabinet to create an HS111 model StorageWorks FDDI Server.    |
| Chapter 4 | Describes installing the kit into an HS111 model StorageWorks FDDI Server to create an HS121 model StorageWorks FDDI Server. |

## Related Documents

Table 1 lists the StorageWorks-related user documents organized by use, system, or product.

**Table 1 StorageWorks Related Documentation**

Document Title	Order Number
<b>StorageWorks Primary Publications</b>	
<i>StorageWorks™ Solutions Configuration Guide</i>	EK-BA350-CG
<i>StorageWorks™ Solutions Shelf and SBB User's Guide</i>	EK-BA350-UG
<i>StorageWorks™ Solutions Array Controllers HS Family of Array Controllers User's Guide</i>	EK-HSFAM-UG

(continued on next page)

**Table 1 (Cont.) StorageWorks Related Documentation**

<b>Document Title</b>	<b>Order Number</b>
<b>StorageWorks FDDI Server Publications</b>	
<i>StorageWorks™ Solutions StorageWorks FDDI Server Installation Guide</i>	EK-HS1xx-IG
<i>StorageWorks™ Solutions StorageWorks FDDI Server HS110 Upgrade Installation Guide</i>	EK-HS110-IG
<i>StorageWorks™ Solutions StorageWorks FDDI Server HS1AD Device Bus Adapter Installation Guide</i>	EK-HS1AD-IG
<i>StorageWorks™ Solutions StorageWorks FDDI Server HS1MM/HS2MM Server Processor Memory Installation Guide</i>	EK-HS1MM-IG
<i>StorageWorks™ Solutions StorageWorks FDDI Server HS1CP™ Device Channel Processor Installation Guide</i>	EK-HS1CP-IG
<i>StorageWorks™ Solutions StorageWorks FDDI Server HS1PW Server Processor Power Supply Installation Guide</i>	EK-HS1PW-IG
<i>StorageWorks™ Solutions StorageWorks FDDI Server, Server Processor Component Manual</i>	EK-HS1CM-IG
<b>StorageWorks Enclosures</b>	
<i>StorageWorks™ Solutions SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide</i>	EK-35XRD-IG
<i>StorageWorks™ Solutions RETMA Shelf Rail Kit Installation Guide</i>	EK-35XRB-IG
<i>StorageWorks™ Solutions SW800-Series Data CDU Installation Guide</i>	EK-SW8XP-BA
<i>StorageWorks™ Solutions SW800-Series Data Center Cabinet Installation and User's Guide</i>	EK-SW800-IG
<b>Storage Devices</b>	
<i>StorageWorks™ Solutions Building Blocks User's Guide</i>	EK-SBB35-UG
<i>StorageWorks™ Solutions 3½-Inch Storage Device Installation Guide</i>	EK-MC350-IG
<i>StorageWorks™ Solutions 5¼-Inch Storage Device Installation Guide</i>	EK-MC525-IG
<b>General Reference Publications</b>	
<i>Digital Systems and Options Catalog</i>	†
<i>Small Computer System Interface, An Overview</i>	EK-SCSIS-OV
<i>OpenVMS Alpha Version 6.1 Upgrade and Installation Manual</i>	AA-PV6XB-TE

† Available from your Digital account representative.

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## Manufacturer's Declarations

Following are manufacturer's declarations applicable to the StorageWorks FDDI Server:

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**CAUTION**

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This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective measures.

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---

**ACHTUNG !**

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Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen die Benutzer für entsprechende Gegenmaßnahmen verantwortlich sind.

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**ATTENTION !**

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Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radiélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

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**Note**

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The equipment described in this guide is listed by the Underwriters Laboratories Incorporated and bears the UL Listing mark. The StorageWorks FDDI Server cabinets also are certified by the Canadian Standards Association and TUV Product Service GmbH and bear both the CSA certification and TUV GS marks.

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**Table 2 Acoustics—Preliminary Declared Values per ISO 9296 and ISO 7779**

Product†	Sound Power Level $L_{WAd}$ , B‡		Sound Pressure Level $L_{pAm}$ , dBA (Bystander Positions)	
	Idle	Operate	Idle	Operate
HS121 with only cabinet fans operating	7.6	7.6	59	59
HS121 with 2 BA350–M shelves and 12 BA350–SA shelves, each containing 6 RZ26–VA disk drives	7.6	7.6	59	59
<b>Per device when installed in an HS121</b>				
BA350–SA shelf containing 6 RZ26–VA disk drives	5.7	5.7	39	39
BA350–M shelf	5.6	5.6	39	39

† Current values for specific configurations are available from Digital representatives.  
‡ 1 B = 10 dBA.

**Note**

Table 3 contains the specifications in Table 2 translated into the German language.

**Table 3 Schallemissionswerte—Vorläufige Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779**

Gerät†	Schalleistungspegel $L_{WAd}$ , B‡		Schalldruckpegel $L_{pAm}$ , dBA (Beistehende Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
HS121 nur mit kabinett Lüftern in Betrieb	7,6	7,6	59	59
HS121 mit 2 BA350–M shelves und 12 BA350–SA shelves, jedes bestückt mit 6 RZ26–VA disk drives	7,6	7,6	59	59
<b>Pro Gerät installiert im HS121</b>				
BA350–SA shelf mit 6 RZ26–VA disk drives	5,7	5,7	39	39
BA350–M shelf	5,6	5,6	39	39

† Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich.  
‡ 1 B = 10 dBA.

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# Introduction

The HS110 upgrade kit contains subsystems, components, and parts necessary to create a StorageWorks FDDI Server. The SW800-series cabinet is not included. The following two conversions are available:

- Upgrading an existing SW800-series cabinet to a model HS111 StorageWorks FDDI Server
- Upgrading a model HS111 StorageWorks FDDI Server to a model HS121 StorageWorks FDDI Server

If you are installing this kit into an unconfigured SW800-series cabinet, review information in *StorageWorks™ Solutions SW800-Series Data Center Cabinet Installation and User's Guide* before performing the installation tasks described in this document.

If you are installing this kit into an HS111 model StorageWorks FDDI Server, also review the SW800-to-HS111 installation tasks described in Chapter 3 before performing the HS111-to-HS121 installation.

## 1.1 HS110 Upgrade Kit Description

The HS110 upgrade kit provides components necessary for converting an existing SW800-series cabinet to a model HS111 StorageWorks FDDI Server.

The HS110 upgrade kit provides the following major components of the StorageWorks FDDI Server:

- Server processor
- BA350–M shelf assembly (includes power supply)
- HS1CP device channel processor
- Horizontal and vertical air baffles

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**Note**

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The HS110 upgrade kit does not include storage shelves, storage devices, a cable distribution unit (CDU), or cabling for these components.

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Chapter 2 contains the complete parts list for this upgrade kit.

Refer to the *StorageWorks FDDI Server Installation Guide* for a description of the StorageWorks FDDI Server subcomponents.

## 1.2 HS111 Description

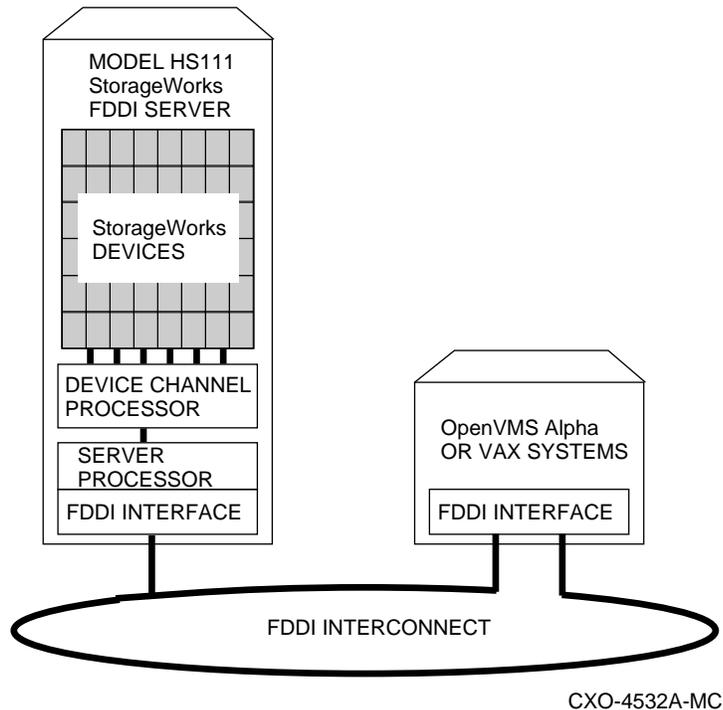
Figure 1-1 shows a conceptual model of the HS111 StorageWorks FDDI Server. The model HS111 provides managed storage services to as many as 95 host computers or workstations in a VMCluster™ system.

It contains a single server processor with an FDDI interface and a device channel processor capable of connecting the server processor to as many as 36 StorageWorks devices (42 nonredundant devices) using your choice of supported StorageWorks devices and packaging options.

Using the currently available 2.1 gigabytes (GB) StorageWorks disk drives provides 75 GB of redundant online storage per server. The model HS111 StorageWorks FDDI Server and its attached storage devices are housed in a single StorageWorks SW800-series cabinet.

The HS111's server processor runs the OpenVMS Alpha operating system. This means that, in addition to serving online storage to hosts, the HS111 StorageWorks FDDI Server can use the full range of OpenVMS storage management software to provide an optimally managed storage environment. For enhanced data protection, user-configurable RAID capability is available for the HS111's device channel processor.

Figure 1-1 HS111 Diagram



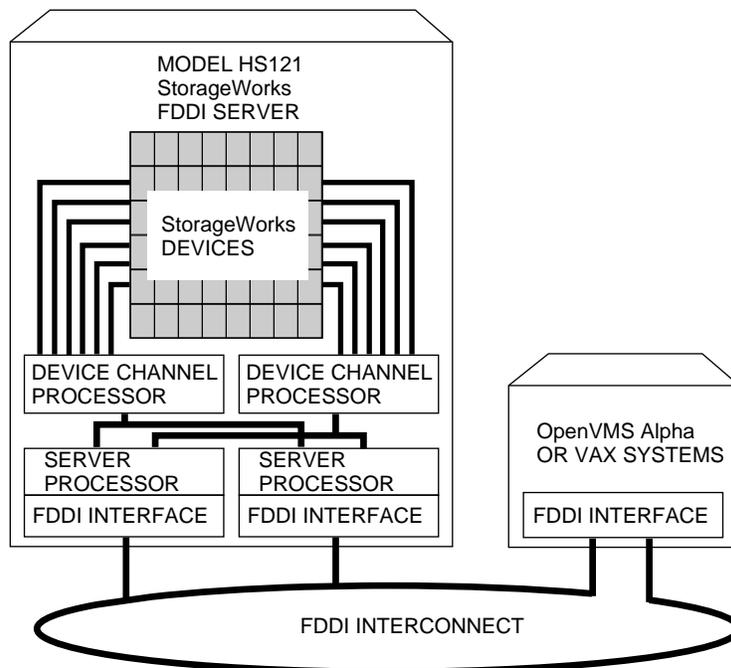
### 1.3 HS121 Description

Figure 1-2 shows a conceptual model of the HS121 StorageWorks FDDI Server. The HS121 server is an FDDI storage solution that offers full protection against any single component failure. The HS121 StorageWorks FDDI Server includes redundant server processors, two paths to the FDDI bus, two paths to every storage device, and redundant power and cooling. Space is provided for adding dual redundant device channel processors on each path. Redundant power controllers are also a standard feature. The full range of StorageWorks redundant power and cooling features for devices is also available.

The basic HS121 StorageWorks FDDI Server provides fully redundant access to up to 36 StorageWorks devices. Space is available for adding a second pair of device channel processors to increase the capacity to 72 device connections. Using the currently available 2.1 GB StorageWorks disk drives provides up to 151 GB of online storage per server with fully redundant FDDI access. All data protection and storage management options are available for the HS121 StorageWorks FDDI Server. The model HS121 StorageWorks FDDI Server and its attached storage devices are housed in a single StorageWorks SW800-series cabinet.

During normal operation, I/O performance is enhanced by balancing the I/O load across the redundant system components as specified by the customer. If a component fails, its redundant partner provides continued service until the failed component is repaired or replaced. All HS121 StorageWorks FDDI Server components can be removed or replaced without interrupting I/O service.

Figure 1-2 HS121 Diagram



CXO-4533A-MC



## Before You Begin Installation

This chapter describes necessary considerations and some preliminary tasks that must be performed before you begin the installation procedure.

### 2.1 Environmental Specifications

The location of the cabinet into which this kit is being installed must meet the specifications listed in Table 2–1 for proper operation.

**Table 2–1 StorageWorks Environmental Specifications**

Condition	Specification
<b>Optimum Operating Environment</b>	
Temperature	+18°C to +24°C (+64.4°F to +75.2°F)
Rate of change	3°C (5.4°F) per hour maximum
Step change	3°C (5.4°F) maximum
Relative humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	From sea level to 2400 m (8000 ft)
Air quality	Maximum particle count 0.5 micron or larger, not to exceed 500,000 particles per cubic ft of air
Inlet air volume	.047 to .236 cubic m per second (100 to 500 cubic ft per minute) for minimum to maximum configurations.
<b>Maximum Operating Environment (Range)</b>	
Temperature	+10°C to +35°C (+50°F to +95°F) Derate 1.8°C for each 1000 m (1.0°F for each 1000 ft) of altitude Maximum temperature gradient 11°C/hr (20°F/hr) ±2°C/hr (4°F/hr)
Relative humidity	10% to 90% (noncondensing) Maximum wet bulb temperature: 28°C (82°F) Minimum dew point: 2°C (36°F)
<b>Maximum Nonoperating Environment (Range)</b>	
Temperature	– 40°C to +66°C (– 40°F to +151°F) (During transportation and associated short-term storage)
Relative humidity Nonoperating	8% to 95% in original shipping container (noncondensing); otherwise, 50% (noncondensing)
Altitude	From sea level to +3600 m (+12,000 ft) MSL (mean sea level) pressure equivalent

## 2.2 Electrostatic Discharge Protection

Electrostatic discharge (ESD) can damage subsystem components. This section describes the necessary procedures for protecting the subsystem components against ESD.

Use the following strategies to minimize ESD problems:

- Maintain more than 40 percent humidity in the room where your subsystem resides.
- Place the subsystem cabinet away from heavy traffic paths.
- Do not use carpet, if possible. If carpet is necessary, choose an antistatic carpet. If a carpet is installed, place antistatic mats around the subsystem to decrease ESD.

### ESD Grounding Procedure

Prior to removing or replacing any module:

1. Obtain and attach an ESD wrist strap to your wrist. Ensure that the strap fits snugly around your wrist.
2. Plug or clip the other end of the ESD wrist strap to a ESD bolt or ground stud usually located on the cabinet's vertical rail that is common for both the device channel processor shelves and the storage shelves.
3. Obtain and use an approved antistatic bag and/or a grounded antistatic mat.

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#### Note

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The part number for the Portable Anti-Static Kit is 29-26246-00.

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## 2.3 Personnel Needed for Installation

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### WARNING

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Failure to use sufficient personnel can result in personnel injury or equipment damage.

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A fully-loaded SW800-series cabinet is heavy. The server processor's weight and size require two people to remove it from the shipping container and install it into the SW800-series cabinet.

Most other options involved in the upgrade require only one person.

## 2.4 Tools Needed for Installation

The following tools may be needed during the installation of your subsystem. Not all of the tools listed are required for every cabinet type.

- Hex wrench (3/8-inch)
- Allen wrench (5/32-inch)

- Small Phillips screwdriver
- Small flat blade screwdriver
- ESD wrist strap and antistatic mat

## 2.5 Unpacking and Inventory

Upon receipt of your subsystem upgrade kit, check the carton for obvious signs of shipping damage. Report any damage to Digital Multivendor Customer Services or the Digital sales office in your area, and to the local carrier who delivered your equipment.

Keep all packing materials and shipping labels for later use and reference.

Before starting the installation, check the kit contents against the list of parts in Table 2–2.

**Table 2–2 HS110–AA Parts List**

Description	Quantity
Shelf, controller (BA350–MB)	1
Cable, internal bus, 9 foot	1
HS1CP device channel processor with 32 MB Cache Module	1
Adapter, 9-pin, MMJ (H8571–J)	1
Terminator, internal bus	1
Slide, chassis, solid bearing, 2-way	2
Harness wiring, 10A, (Gray), 7 foot	1
Harness wiring, 10A, (Black), 7 foot	1
Label, booklet, SF family	1
Adapter, EISA to internal bus	1
Enclosure assembly electrical (Server Processor)	1
Plate, RETMA-to-metric slide adapter	3
Bracket, slide mounting	2
Baffle, horizontal air	1
Baffle, vertical air	1
Bracket, shipping, right hand	1
Bracket, shipping, left hand	1
Screw, SEMS, 10–32x.343 inch†	4
Screw, SEMS, 10–32x.625 inch†	10
Screw, machine (flat head), 10–32x.500 inch†	14
Nut, KEP, 10–32x3/8 inch†	16
Tie, cable	10
U-nut, 10–32	11
Clamp, cable, screw-mounted, 1-1/2 inch	1
Clamp, cable, screw adhesive-backed, 3/8 inch	4

†These parts are shown in detail in Figure 2–1.

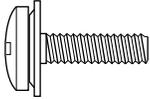
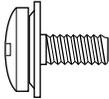
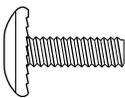
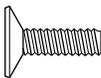
(continued on next page)

**Table 2-2 (Cont.) HS110-AA Parts List**

<b>Description</b>	<b>Quantity</b>
Clip, flat cable, clip-on type	3
StorageWorks FDDI Server Vx.x CD-ROM (AG-QGPMx-BE)	1
EISA Configuration Utility (ECU) Vx.x Diskette, 3.5-inch (AK-Q2CRG-CA)	1
VMScluster V/A License (QL-MUZA <sub>x</sub> -AA)	1
VMScluster V/A LPS (QT-MUZA <sub>x</sub> -L9)	1
Volume Shadowing V/A License (QL-2A1A <sub>x</sub> -AA)	1
OpenVMS Volume Shadowing LPS (QT-2A1A <sub>x</sub> -L9)	1
Cache FW HSD30 License (QL-3HVA <sub>x</sub> -AA)	1
Open VMS Alpha Operating System License (QL-MT1A <sub>x</sub> -6R)	1
Open VMS Alpha BAS XNS (QT-MT1A <sub>x</sub> -NR)	1
PAK Certificate (AV-LU83D-TE)	1
HS110,111,121 Warranty Card (AV-QKDGA-TE)	1
HS1XX FDDI Server SPD (AE-QKCXA-TE)	1
HS1XX Hardware License Letter (AV-QKDFA-TE)	1
StorageWorks FDDI Server Installation Guide (EK-HS1XX-IG)	1
HS1XX Installation Guide Addendum (EK-OCPAD-IG)	1

Figure 2-1 is a diagram of the screws and nuts used in this installation. Use this diagram to determine the proper screw to install.

**Figure 2-1 HS110 Screw Diagrams**

	10-32 SEMS .625 in
	10-32 SEMS, .343 in
	10-32, .500 in
	10-32 MACHINE FLAT HEAD, .500 in
	10-32 KEP NUT

CXO-4701A-MC

## 2.6 Access to the Cabinet

Refer to the *StorageWorks FDDI Server Installation Guide* to verify cabinet access and space requirements.



---

## SW800-Series Cabinet to HS111 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS110 upgrade kit in an SW800-series StorageWorks cabinet.

### 3.1 Prepare the Cabinet for Upgrade

Use the following procedure to remove power, gain access to the cabinet interior, and install the upgrade kit:

Digital recommends full and unrestricted access to the cabinet interior, because you will be routing cables while installing the HS110 upgrade kit.

1. Remove power from the cabinet by shutting down all devices, cutting power at the Cable Distribution Units (CDUs), and removing the CDU power cords from their wall receptacles.

---

#### WARNING

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While working in the cabinet interior, ac power must be removed from cabinet components. Failure to do so may result in personal injury as a result of electric shock.

Prior to performing any of the procedures in this chapter, remove ac power from cabinet components. If the cabinet is installed and operating, spin down all disk drives and halt all tape drives in the cabinet. Switch the circuit breaker on the front panels of any CDUs to the OFF (○) position.

---

2. Move the cabinet away from any adjacent cabinets to allow 360 degree access.
3. Using Figure 3–1 for reference, remove the side panels as follows:

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#### Note

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There are three side panel hanger clips on each side of the cabinet. A matching set of hanger clips are attached to each side panel.

---

4. Loosen the top cover by pushing up on its front and rear edges until it snaps free of its fasteners.

---

**WARNING**

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The top cover is heavy and awkward to lift. Removing it requires two people. Failure to use sufficient personnel can result in personnel injury or equipment damage.

---

5. Using two people, lift the top cover from the cabinet and set it aside.
6. Remove the bolts attaching the side panels to the top side rails of the cabinet.
7. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.
8. Repeat the previous step to remove the other panel.
9. Release the door locks mounted on the smooth vertical panel of each door by turning the locks counterclockwise with a 5/32-inch hex wrench.
10. Open the cabinet doors.
11. Relocate the ESD bolt to hole position 19 (Figure 3-2).

---

**Note**

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- The bottom hole of the vertical rail is hole location 60.
  - The top hole of the vertical rail is hole location 1.
- 

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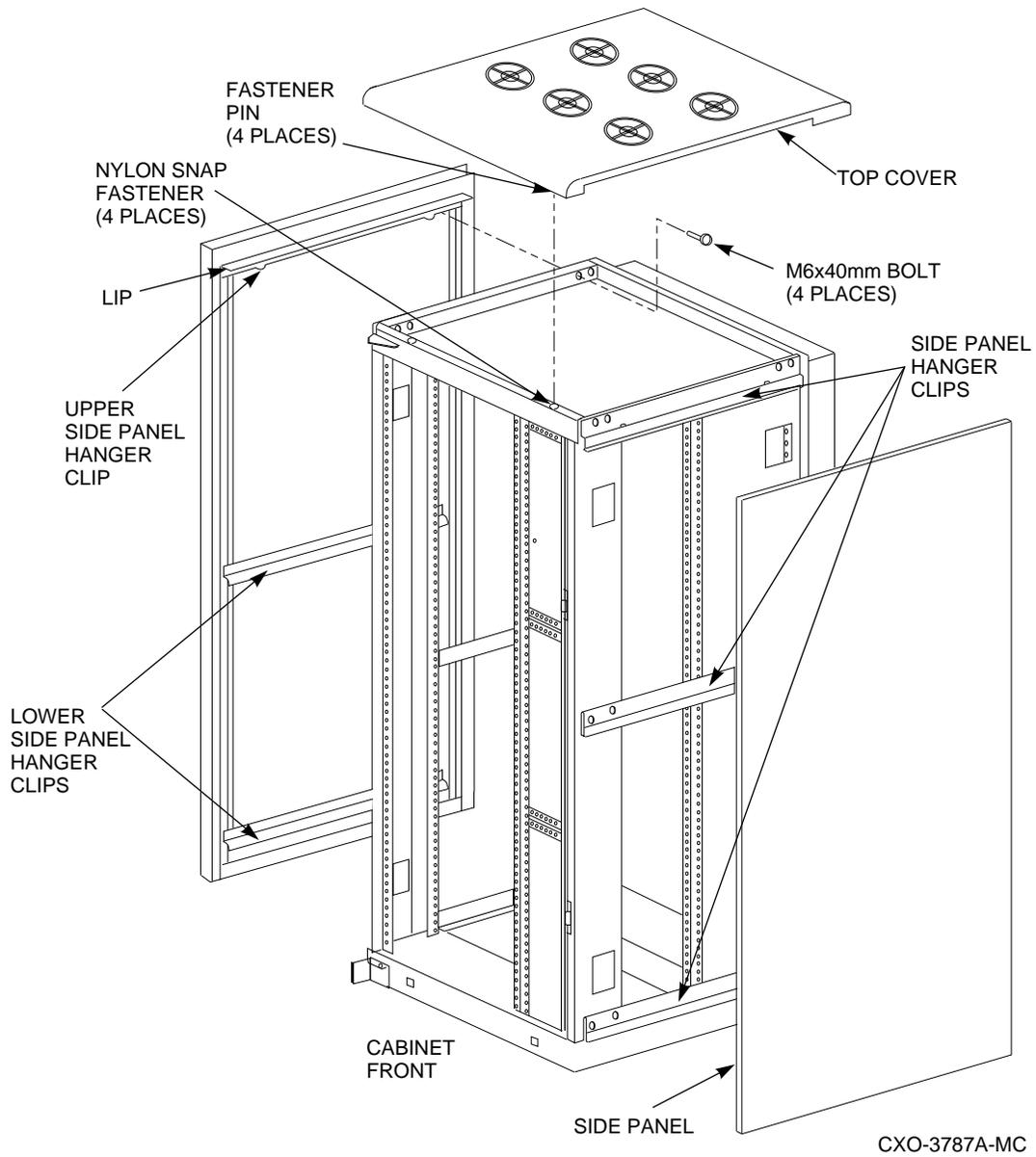
**Note**

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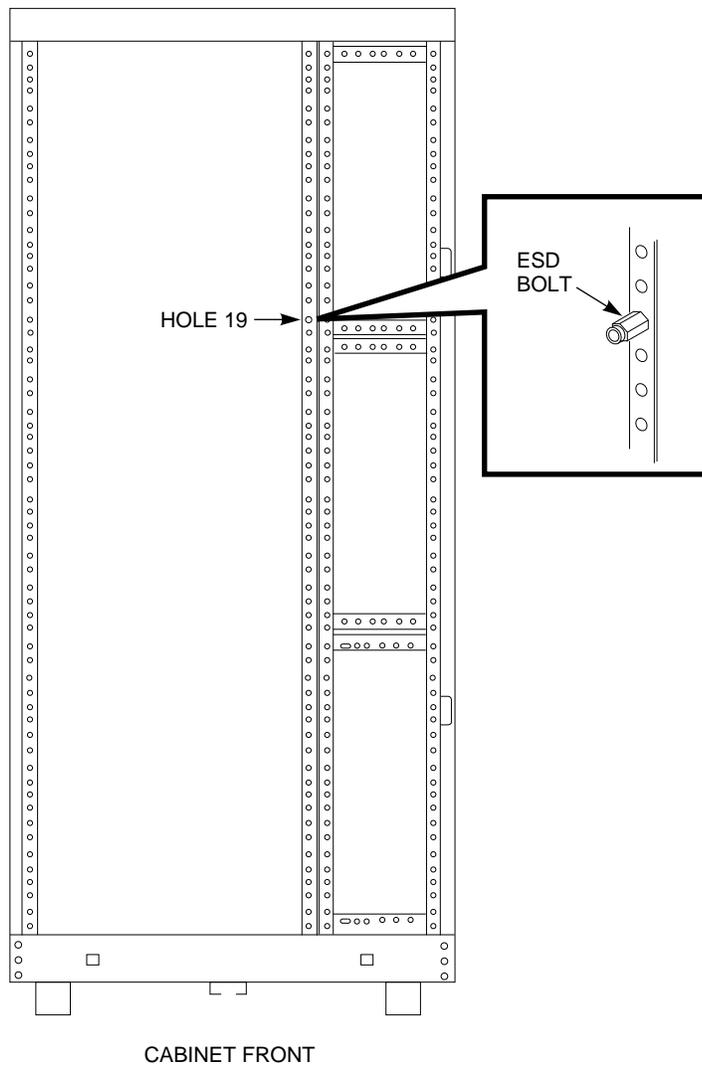
If necessary:

- Remove any screws and cable clamps already installed on the vertical rails below hole 38.
  - Remove and relocate any previous installed U-nuts on the vertical rails below hole 38.
  - Move any cable harnesses or tie wraps on the vertical rails below hole 38.
-

**Figure 3-1 Exterior Cabinet Panel Removal (and Installation)**



**Figure 3–2 Relocate ESD Bolt to Hole 19**



CXO-4805A-MC

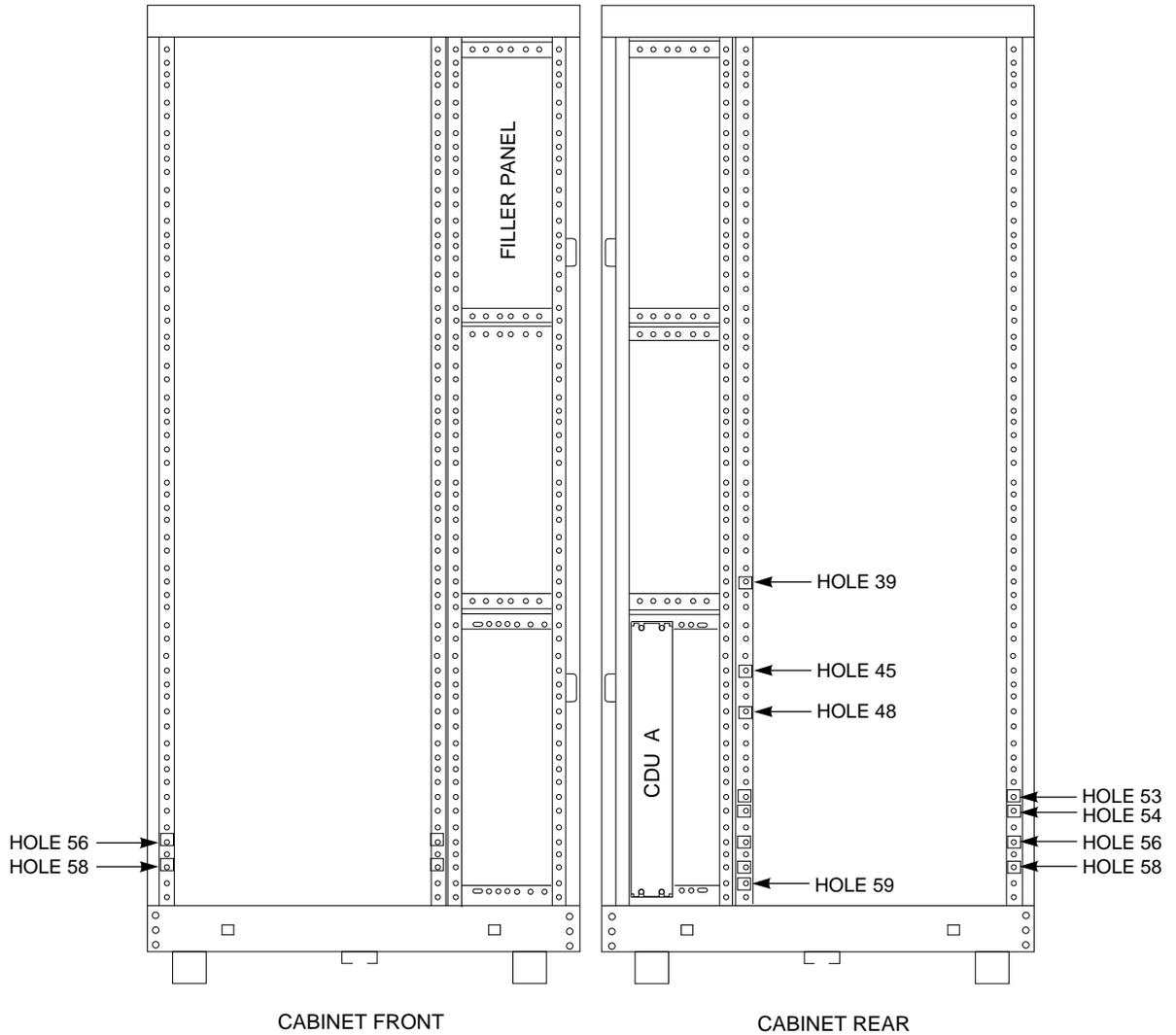
12. Remove all devices and shelves below mounting hole 36.

For the HS111 upgrade, the cabinet must not contain any shelves below mounting hole 36. This space is needed to accommodate the air baffles.

One or two CDUs, if already mounted in the cabinet, may remain mounted.

13. If a BA350–M shelf is not already installed in the cabinet, remove the filler panel (if any) from the center slot on *front right* of the cabinet (Figure 3–3). This slot is used for the BA350–M shelf.

**Figure 3-3 Install U-Nuts on Cabinet Vertical Rails**



CXO-4740A-MC

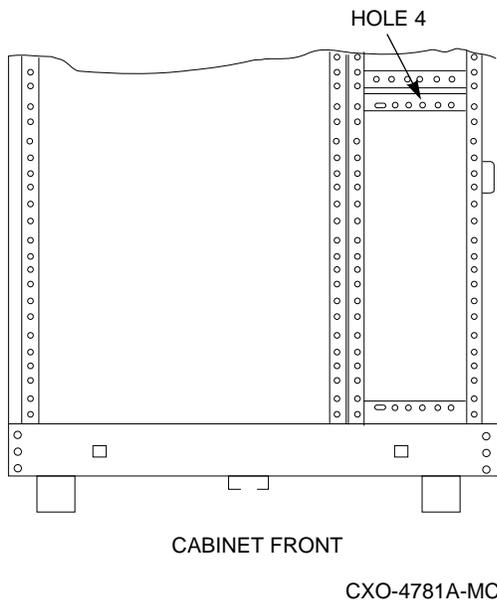
14. Also remove the lower front filler panel.
15. Install 10-32 U-nuts in the vertical rails of the cabinet as designated in Table 3-1 and Figure 3-3.

**Table 3–1 U-Nut Vertical Rail Hole Locations for HS111 Upgrade**

Left Front	Right Front	Left Rear	Right Rear	
		39		For air baffle.
		45		For air baffle.
		48		For air baffle.
		53	53	For shipping bracket.
		54	54	For shipping bracket.
56	56	56	56	For air baffle and slide chassis assembly
58	58		58	For slide chassis assembly.
		59		For air baffle.

16. Install one 10–32 U-nut in the fourth hole from the right on the front lower right horizontal rail as shown in Figure 3–4.

**Figure 3–4 Install U-Nut on Lower Horizontal Rail**



The cabinet is ready for installing the HS110 upgrade kit.

### 3.2 Locate Power Cord for Server Processor Installation

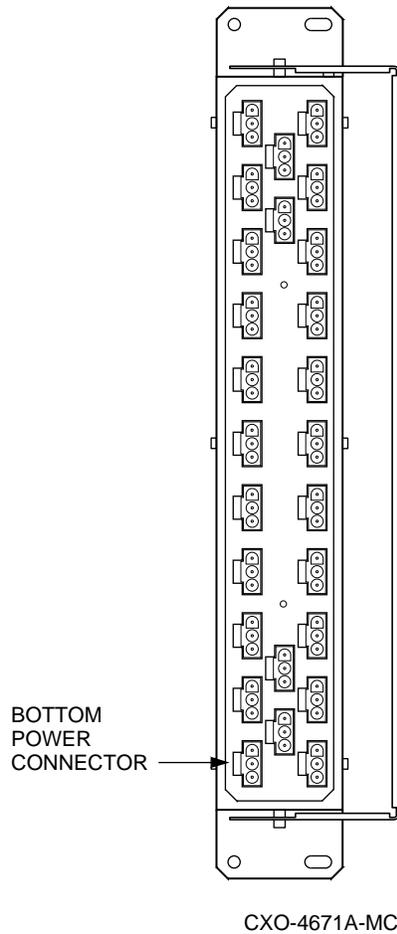
The server processor uses the lowest power connector in the CDU. Use the following procedure to locate this connector:

1. Connect the CDU power cords to a wall receptacle.
2. Switch the circuit breaker on the front panel of the CDUs to the ON (I) position.

3. From the front of the cabinet, locate the lowest power cord on the vertical rail. This cord will be secured to the vertical rail with cable clamps and tie wraps.
4. Use the BA350-M shelf *power supply* to determine which of the CDU connectors the lowest power cord is attached:
  - a. Plug the lowest power cord into the power supply.  
The LED on front panel of power supply will light if the cord is connected to the CDU.
  - b. To determine which connector the cord is attached, pull one connector at a time from CDU until power supply LED light goes out.
5. If the power cord is connected to the lowest connector on the CDU, remove the connector.

If the power cord is *not* connected to the lowest connector on the CDU, move all other connectors up one on the CDU to free the bottom connector for the server processor power cord. The arrow in figure Figure 3-5 identifies the bottom connector on the CDU. This bottom connector is used for the server processor.

**Figure 3–5 CDU Power Cord Connectors**



6. Install a new power cord to the bottom connector on the CDU. Route this new cord to the bottom front of the cabinet.
7. Switch the circuit breaker on the front panel of the CDUs to the OFF (○) position.
8. Remove the CDU power cords from the wall receptacle.

---

**Note**

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This new power cord will be used later to connect power to the server processor.

---

### 3.3 Install Horizontal and Vertical Air Baffles

Use the following procedure to install the horizontal and vertical air baffles:

1. The vertical rail on the *left rear* of the cabinet must be open and unobstructed. Remove any cable clamps or screws that may be in this area. This rail is used for mounting the vertical air baffle.
2. Install the vertical air baffle along the vertical rails on the *left rear* of the cabinet. Secure to the installed U-nuts with 10-32 SEMS screws.

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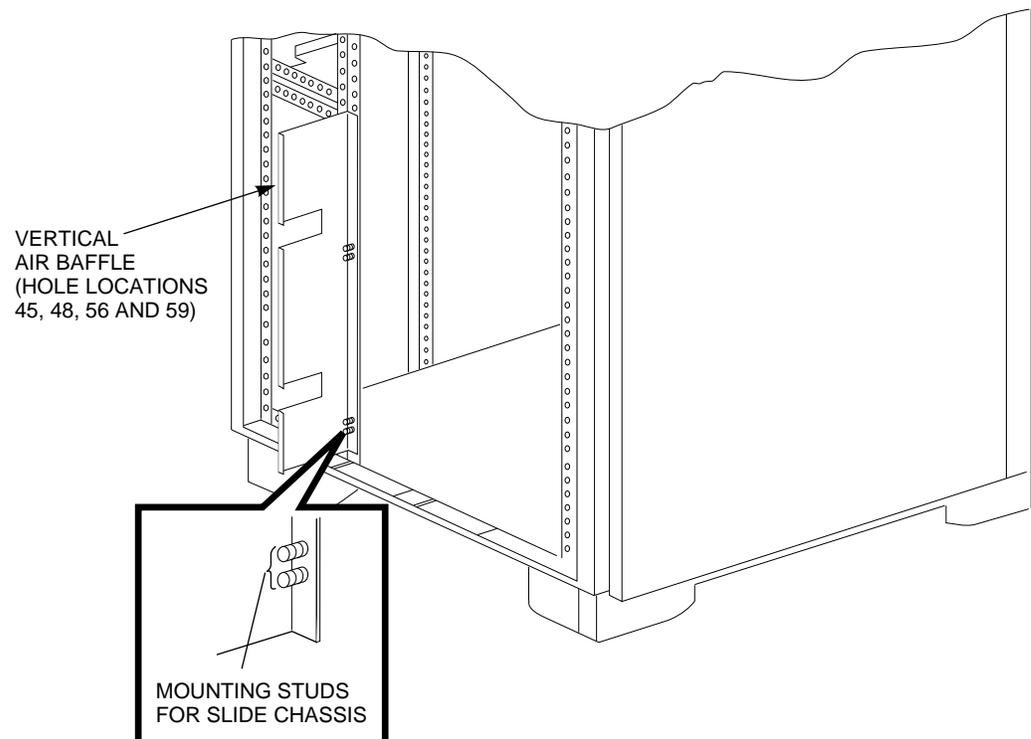
#### IMPORTANT

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The bottom hole in the vertical air baffle is aligned and secured to hole 59 (one from the bottom of cabinet) of the *left rear* rail (see Figure 3-6).

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Figure 3-6 Vertical Air Baffle Installation



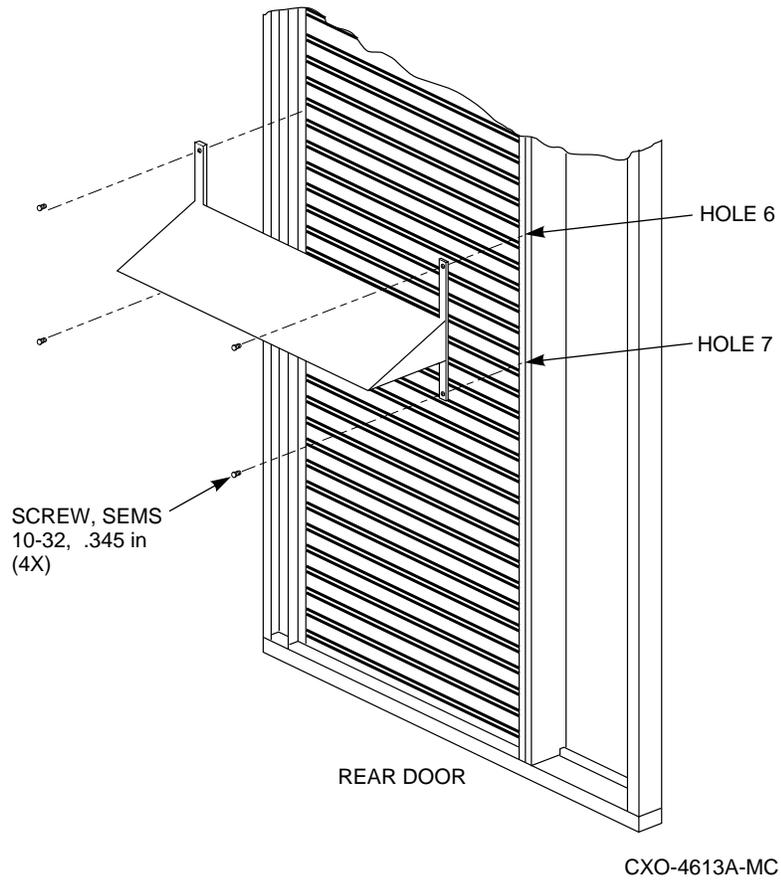
CXO-4625A-MC

3. Install the horizontal air baffle to the rear door at hole positions 6 and 7 (from the top of the door) on both sides. Secure the baffle with 10-32 x .343 inch SEMS screws. When the rear door is closed, the horizontal baffle slides over the vertical air baffle (see Figure 3-7).

**CAUTION**

Make sure you use the short (10-32 x .343 inch) SEMS screws to install the horizontal air baffle. Longer screws cannot be used because they bend the panels on the rear door. Refer to Figure 2-1 for a diagram of these screws.

**Figure 3-7 Horizontal Air Baffle Installation**



### 3.4 Install BA350–S Storage Shelves

The SCSI–2 storage devices supported by the device channel processor mount on BA350–S shelves. At the lowest level, a SCSI–2 storage device fits into a plastic carrier. The combination of the plastic carrier and the storage device is called a *StorageWorks Building Block* (SBB). SBBs slide into slots in the storage shelves. This section discusses the configuration of storage shelves in an SW800-series cabinet.

Figure 3–8 shows the location of storage shelves when disks but no TZ8xx-series tape drives are installed in the HS111 upgrade.

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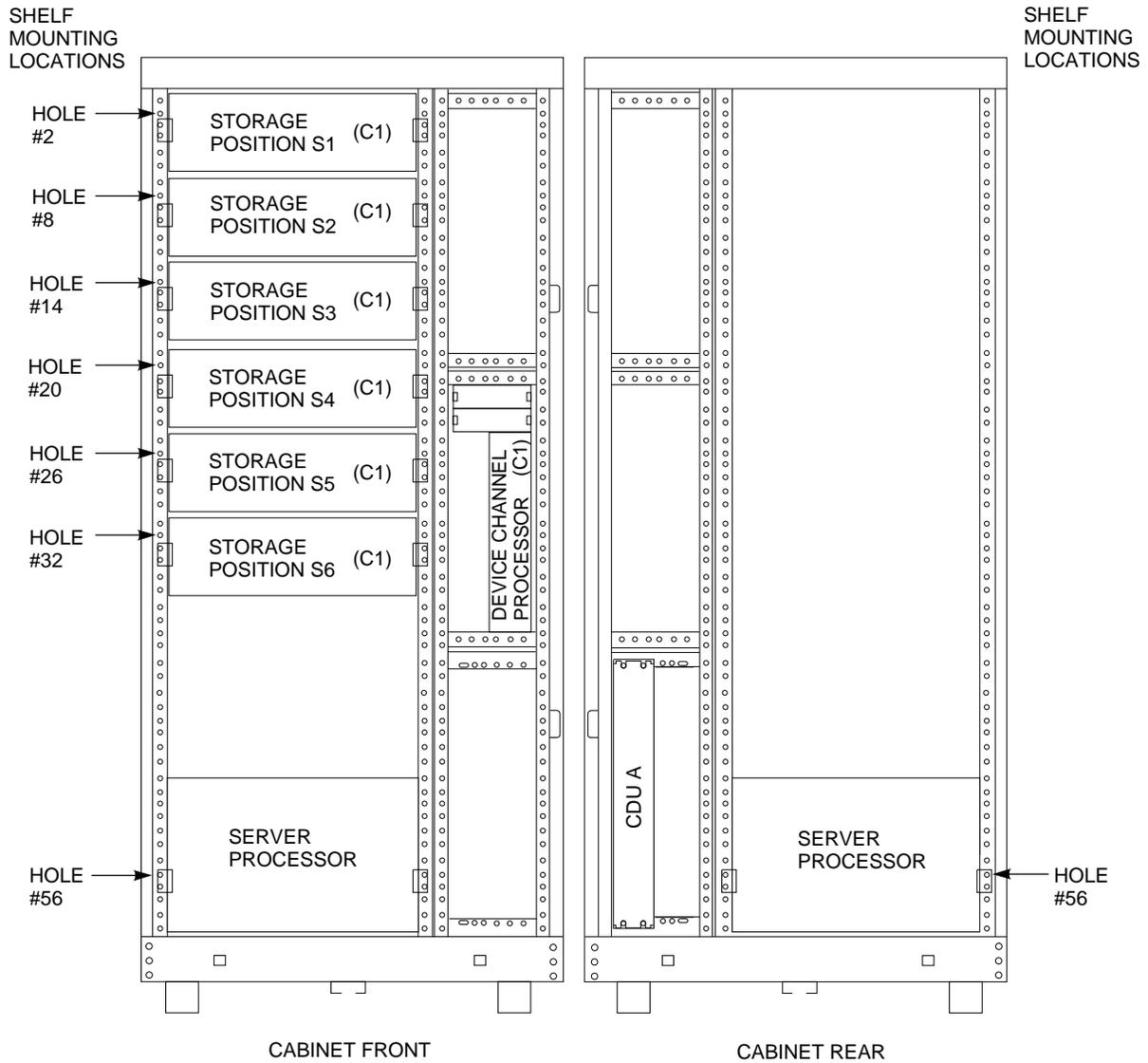
**Note**

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A maximum of six shelves of storage devices may be installed on a standard HS111 StorageWorks FDDI Server. Optional enhancements may add additional shelves in the back of the cabinet.

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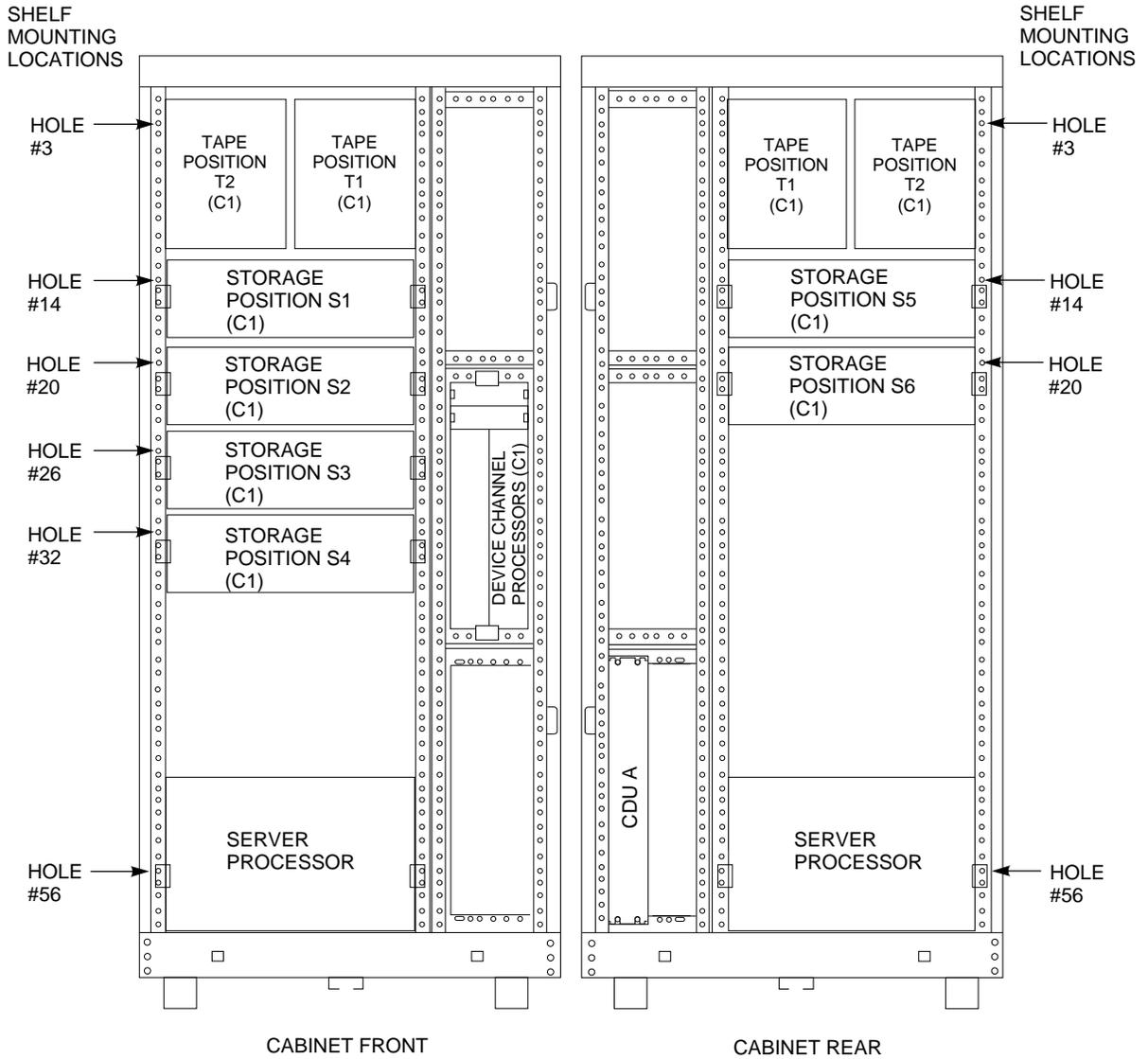
**Figure 3–8 HS111 Configuration With Optimal Disk Storage and No TZ8xx-Series Tape Drives Installed**



CXO-4624A-MC

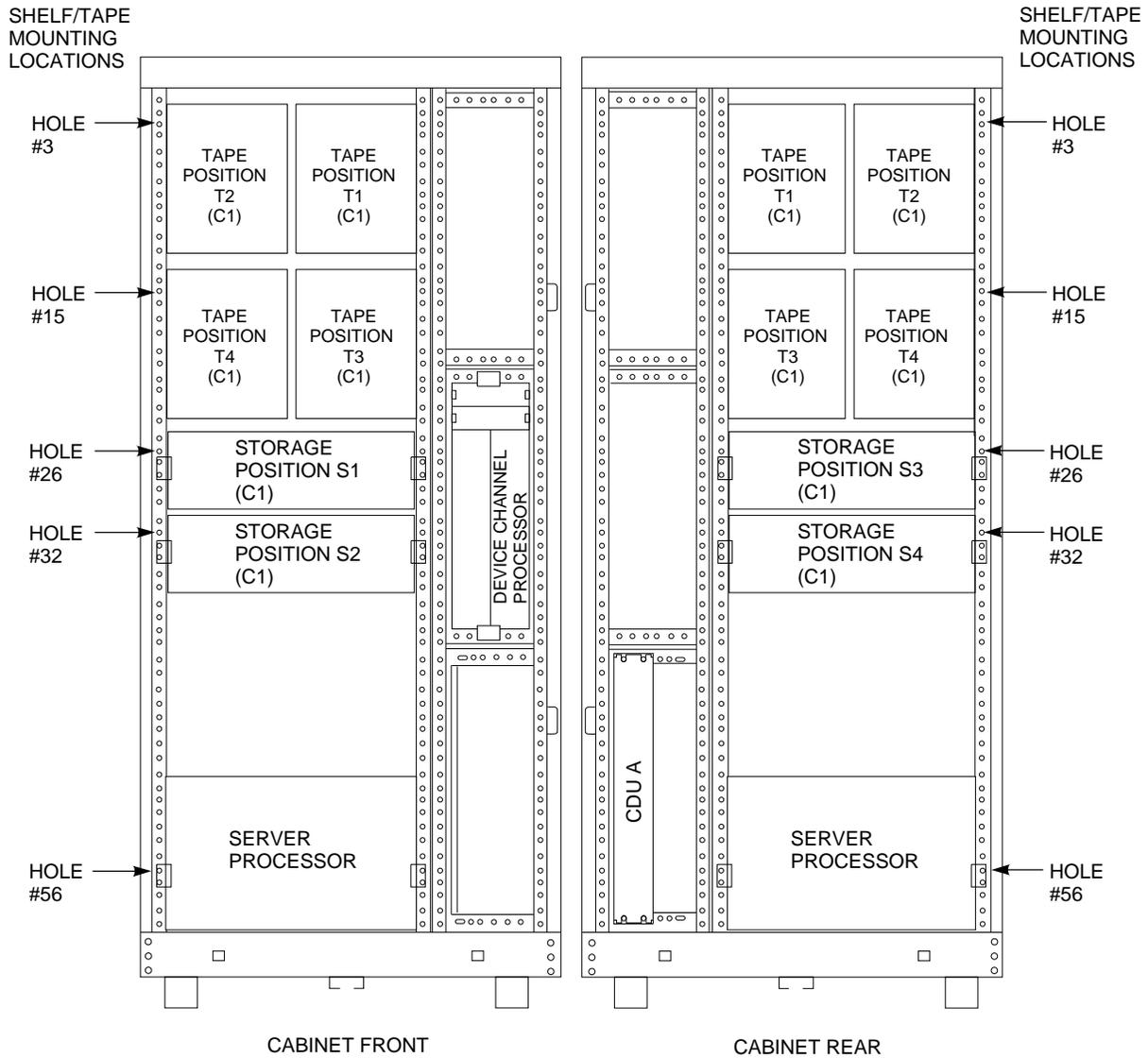
Figures 3–9 and 3–10 show the location of storage shelves when two or four TZ8xx-series tape drives are installed in the HS111 upgrade.

**Figure 3–9 HS111 Storage Configuration with Two TZ8xx-Series Tape Drives Installed**



CXO-4794A-MC

**Figure 3–10 HS111 Storage Configuration with Four TZ8xx-Series Tape Drives Installed**



CXO-4829A-MC

Refer to Appendix A for shelf configuration rules and restrictions.

Refer to the *StorageWorks Solutions Shelf and SBB User's Guide* for instructions on installing and replacing storage shelves and StorageWorks Building Blocks (SBBs). These documents are included in the BA350–MB kit that is part of this HS110 upgrade.

### 3.5 Install the BA350–M Shelf

If a BA350–M shelf is already installed, go to Section 3.6. If a BA350–M shelf is not installed, use the following guidelines to install a BA350–M shelf:

- The BA350–M shelf is used to install and support up to two device channel processors and their associated write-back cache modules (one for each device channel processor).
- The HS111 upgrade uses only one device channel processor in slot 7 (*right* slot). This slot is assigned SCSI ID 7.
- The primary shelf power supply is mounted in the top slot of the shelf.
- The BA350–M shelf has two replaceable blowers mounted on the rear.

Installation of the BA350–M shelf requires the contents of the BA350–MB kit: This kit contains the following parts:

Description	Qty	Comments
BA350–M shelf assembly	1	This molded shell is installed between the upper and lower shelf mounting brackets.
Bracket, shelf mounting	2	One bracket mounted in the upper position and one mounted in the lower position to support the shelf assembly.
Bracket, locking rear	2	One holding bracket for rear of each shelf.
Bracket, locking front	2	One holding bracket for the front of each shelf. This bracket is installed after the BA350–M shelf is inserted between the upper and lower shelf mounting brackets.
Bracket, stop	2	One bracket for the rear of each shelf mounting bracket.
U-nut, 10–32	4	
Screw, SEMS 10–32 pan .500 inch	14	For shelf bracket, shelf stop bracket, and locking front bracket. Refer to Figure 2–1 for a diagram of these screws.
350 SBB PS (A/C)	1	This is the power supply.
Cover, SBB, blank	1	This blank is used to cover the unused power supply position.
Cover, blank metal	1	This is for an empty BA350–M shelf slot.

---

#### WARNING

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Cabinet rail edges are sharp and can cut or abrade skin or cable insulation.

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#### Note

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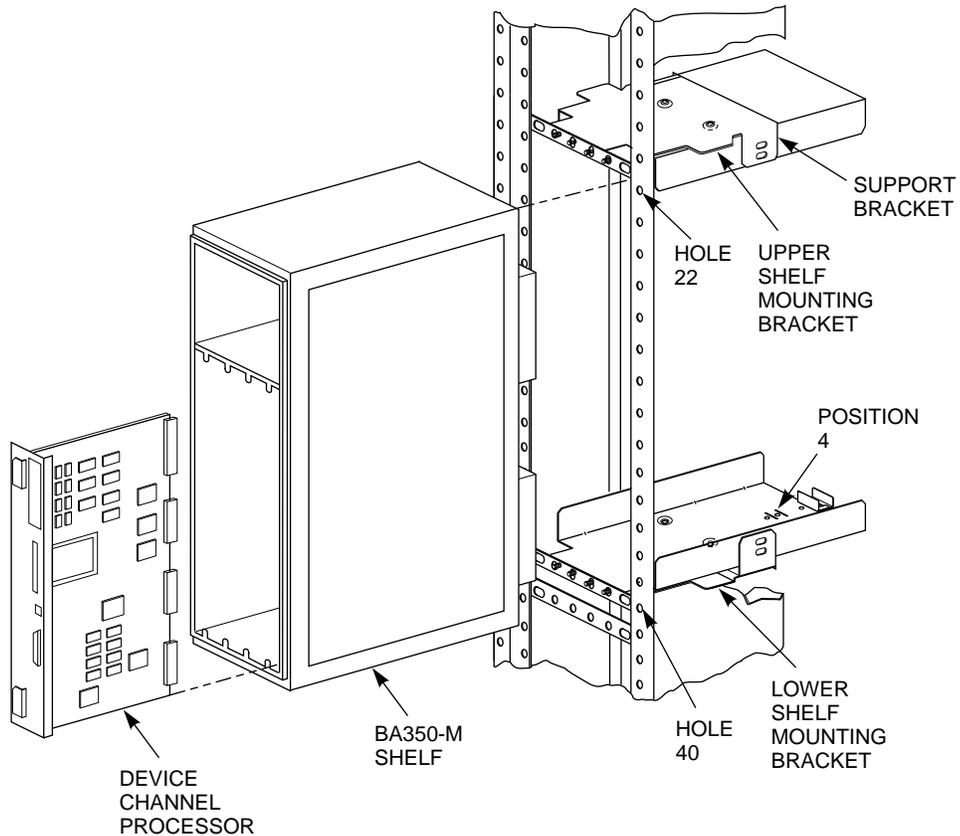
The BA350–MB kit is a multipurpose kit. Some of the parts in this kit cannot be used for this installation.

---

Figure 3–11 shows an exploded view of the components of the BA350–M shelf assembly:

- Upper and lower shelf mounting brackets  
These shelves hold the BA350–M shelf in place.
- BA350–M shelf  
The backplane of this plastic shell contains the connectors for the modules to be installed.
- HS1CP device channel processor (and write-back cache module)  
There are two sets of connectors on the backplane for each write-back cache module and device channel processor.

**Figure 3–11 BA350–M Shelf Assembly Components (Exploded View)**



CXO-4636A-MC

Use the following procedure to install the BA350-M shelf mounting brackets:

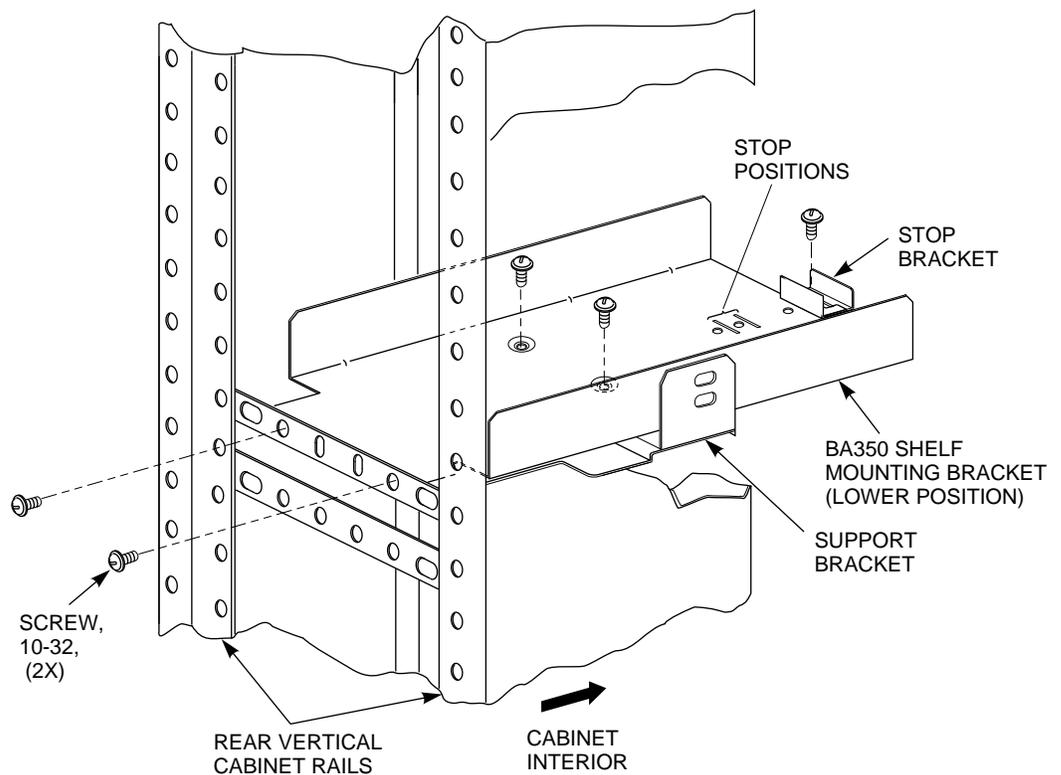
1. Determine the correct lower and upper locations for the BA350-M shelf mounting brackets.

Counting from the top of each *front* VERTICAL rail:

- The *lower* shelf mounting bracket is installed on the horizontal cabinet bracket at hole 40.
- The *upper* shelf mounting bracket is installed on the horizontal cabinet bracket at hole 22.

Figure 3-12 shows the proper horizontal cabinet bracket configuration for the *lower* BA350-M shelf mounting bracket.

**Figure 3-12 BA350-M Shelf Mounting Bracket Installation (Lower)**



CXO-4743A-MC

2. Insert the tab on the stop bracket into the slot at the fourth stop bracket position (rear-most position) (see Figure 3-12). Fasten the stop bracket to the shelf mounting bracket with a 10-32 SEMS screw.
3. Position the two indented holes at the bottom of the shelf mounting bracket over the holes in the bracket support.
4. Fasten the shelf mounting bracket to the bracket support with two 10-32 SEMS screws and two 10-32 KEP nuts.
5. Align the four mounting holes on the front of the shelf mounting bracket with the four holes of the horizontal cabinet rail (see Figure 3-12).

6. Fasten the shelf bracket to the horizontal rail with two 10–32 SEMS screws.

---

**Note**

---

Install only to the two outside SEMS screws of the shelf bracket as shown in Figure 3–12. The two inner screws will be installed later to attach the locking front bracket when the shelf is in place.

---

The shelf mounting bracket is now supported by the support bracket and horizontal cabinet rail.

7. Repeat steps 1 through 5 to mount the companion BA350–M shelf mounting bracket on the *upper* shelf position.  
Refer to Figure 3–11 for a diagram of the bracket locations.
8. With the power supply end of the shelf at the top and the blowers facing the cabinet, slide the BA350–M shelf between the upper and lower shelf mounting brackets until it contacts the stop brackets.

---

**Note**

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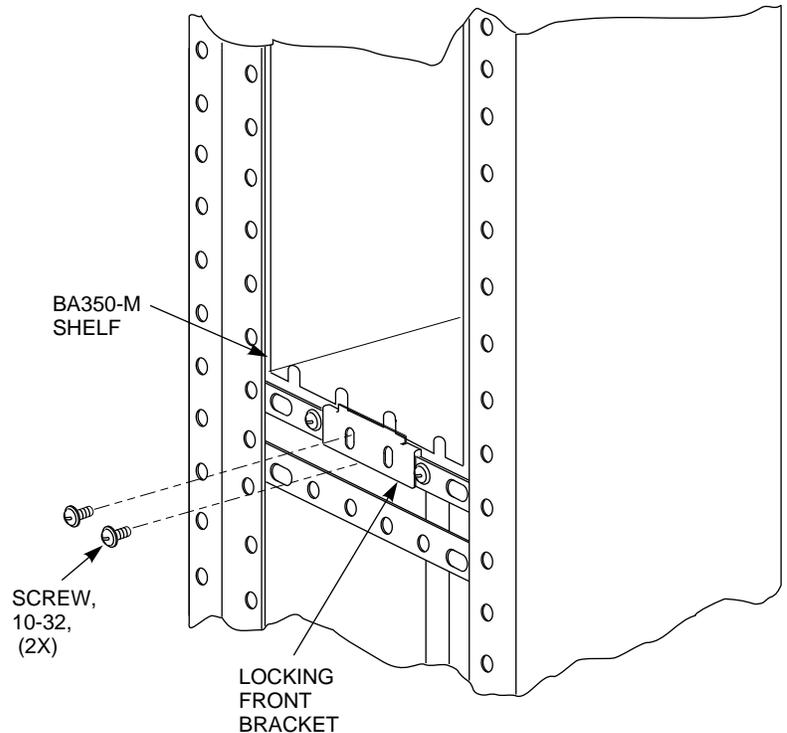
Route the power cords in the slot around the shelf so they extend outside and can reach the power outlet on the front top of the shelf.

---

The BA350–M shelf should slide into the upper and lower shelf mounting brackets. If it binds, remove it and check the alignment of the shelf mounting brackets. The bracket mounting screws might need to be loosened slightly or adjusted to allow the brackets to align properly with the shelf. Tighten the screws when the brackets are properly aligned.

9. Once the shelf is positioned within the shelf mounting brackets, install the *locking front bracket* with 10–32 SEMS screws in the two middle holes as shown in Figure 3–13.

**Figure 3–13 Locking Front Bracket Installation**



CXO-4741A-MC

### **3.6 Install BA350–M Shelf SCSI Cables (If Required)**

Use the following procedure to install the SCSI cabling in the BA350–M shelf:

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**CAUTION**

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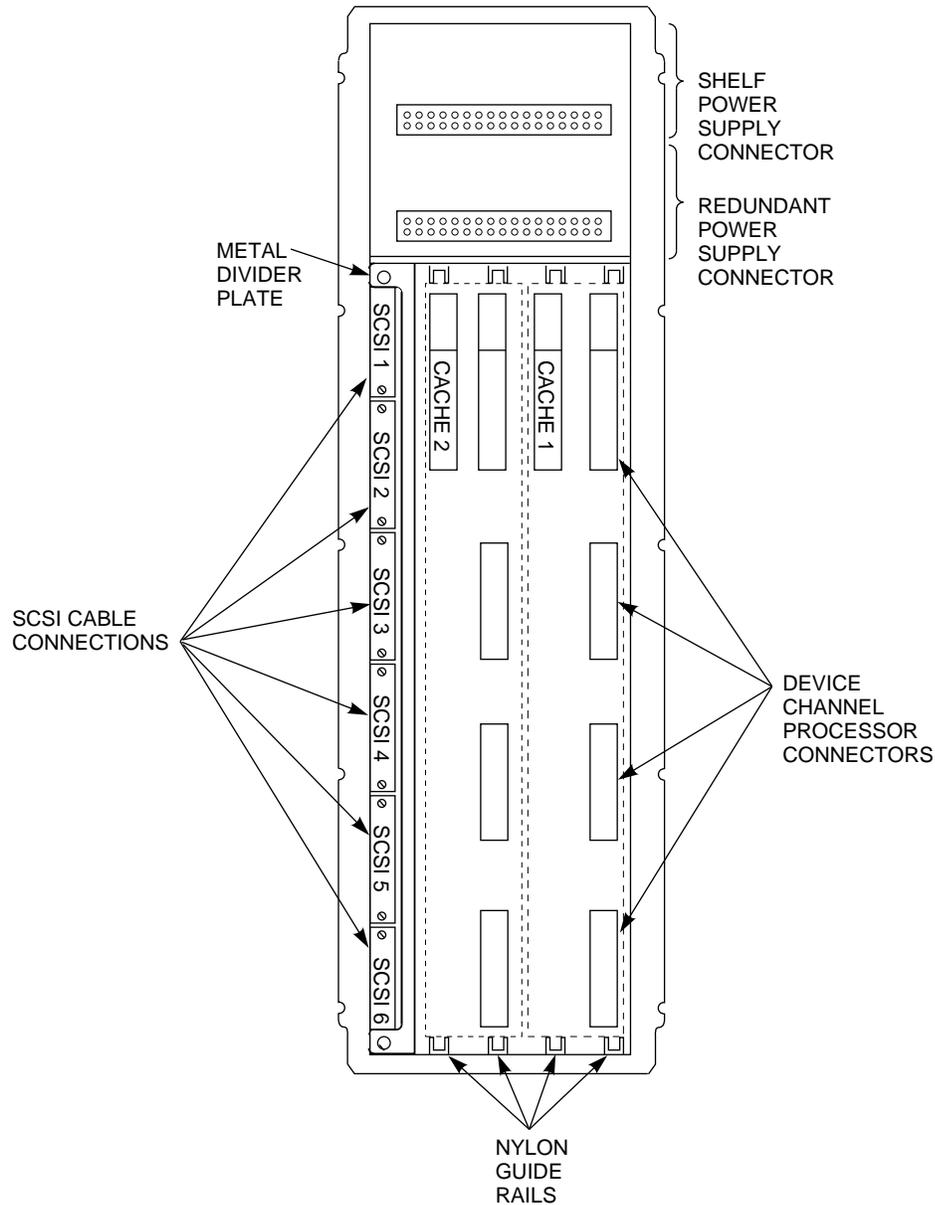
SCSI pins are easily bent. Make sure the SCSI connector pins are not bent or damaged when connecting SCSI cables.

---

1. Remove the metal divider plate inside the BA350–M shelf that separates the module area from the SCSI–2 port cable area in the shelf. Figure 3–14 shows the location of the metal divider plate.

This gives you the necessary space to plug in the SCSI–2 cable connectors.

**Figure 3-14 BA350-M Shelf Layout (Front View)**



CXO-4806A-MC

Connect the SCSI-2 device cables to the BA350-M shelf backplane and route them out the front of the shelf and into the front of the storage shelves (such as the BA350-S shelf) that hold the SCSI-2 storage devices. Figure 3-14 shows the location of the SCSI connectors on the BA350-M backplane.

2. Plug the SCSI-2 port cables into your choice of storage shelves.
3. Replace the metal divider plate that separates the SCSI-2 port cable area from the module area in the BA350-M shelf, then tighten the two screws to hold it in place.

### 3.7 Install the Write-Back Cache Module and HS1CP Device Channel Processor

A write-back cache module and HS1CP device channel processor are installed into the BA350-M shelf. For an HS111 configuration, the HS1CP device channel processor will occupy slot 7 (*right* slot). This slot is assigned SCSI ID 7.

Figure 3-14 shows the layout of the BA350-M shelf connectors. Note the following:

- There are two sets of connectors (one connector for each write-back cache module and four connectors for each device channel processor).  
The *right* set of connectors are used to install the first write-back cache module and device channel processor.
- The shelf has a nylon guide rail along the top and bottom to guide the write-back cache module into its single connector.
- The shelf has a nylon guide rail along the top and bottom to guide the device channel processor module into its four connectors.

---

#### CAUTION

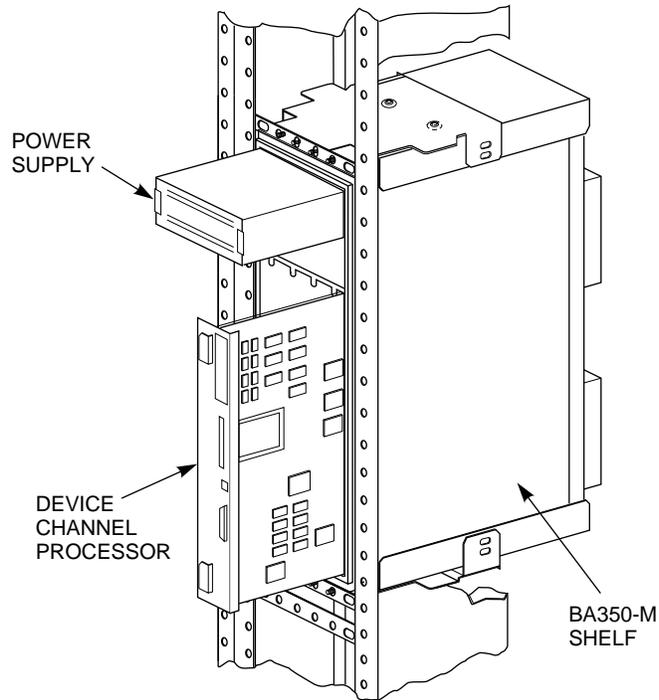
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Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.2 for proper grounding procedures.

---

Figure 3-15 shows the installation positions of the power supply and device channel processor into the BA350-M shelf. The write-back cache module is installed under the device channel processor.

**Figure 3–15 BA350–M Shelf Component Positions**

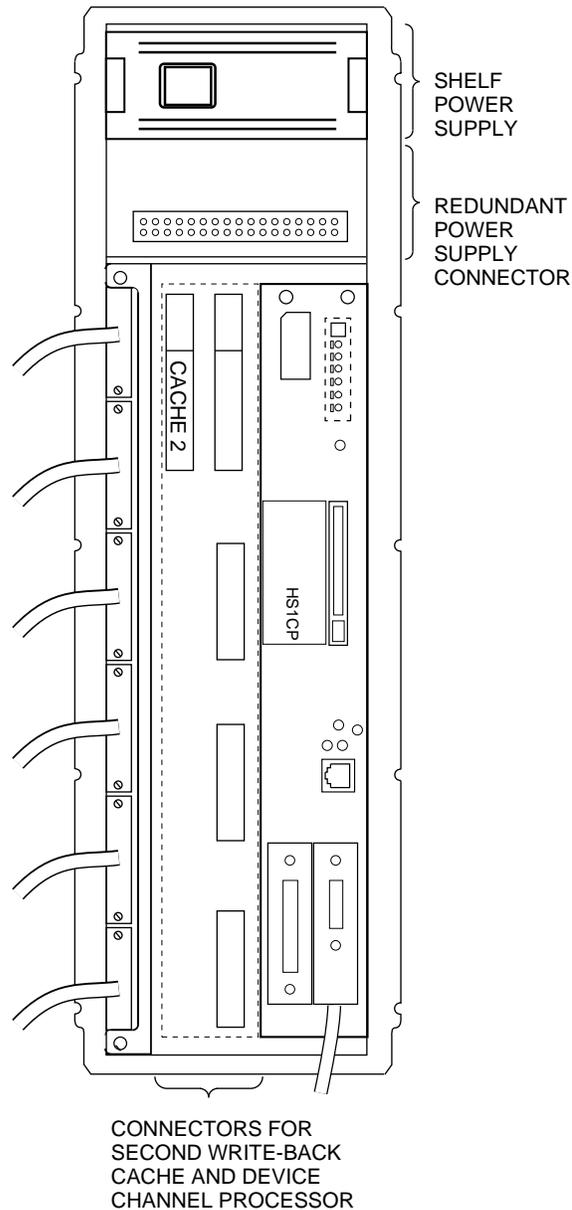


CXO-4809A-MC

Use the following procedure to install the write-back cache module and device channel processor:

1. Install the write-back cache module into the *right* side of the BA350–M shelf.  
Align the module in the top and bottom nylon guide rails and slide the module into the single white connector in the top back side of the shelf (see Figure 3–14).
2. Install the device channel processor into the *right* side of the BA350–M shelf over the write-back cache module (see Figure 3–15).  
Align the module in the top and bottom nylon guide rails and slide the module into the four white SCSI connectors at the back of the shelf (see Figure 3–16).

**Figure 3–16 Slot 7 Device Channel Processor Installed**



CXO-4807A-MC

3. With a flat blade screwdriver, tighten the four screws on the front corners of the device channel processor.

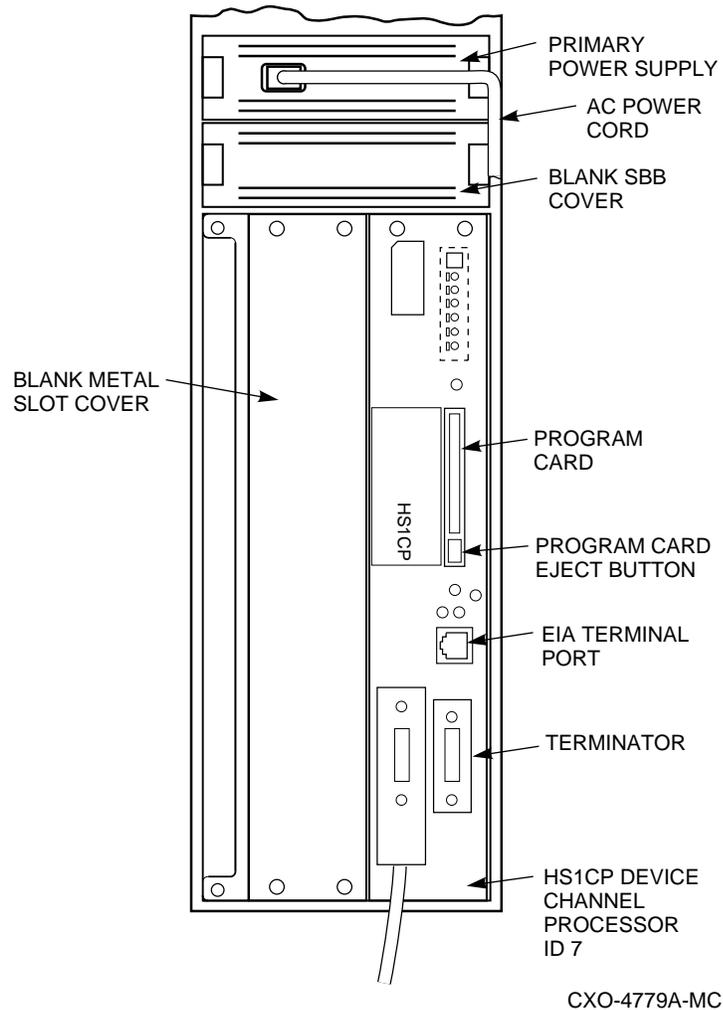
**CAUTION**

Do not overtighten these screws. Using excessive force could break the screws or damage the module.

4. Install power supply into the top slot of the BA350–M shelf (see Figure 3–15). Insert the power supply into the guide slots on both sides and push it in until it is fully seated and the mounting tabs engage the shelf.

5. Plug the shelf power cord into the front of shelf power supply.
6. Install the blank SBB cover over the open lower power supply slot (see Figure 3-17).

**Figure 3-17 Blank SBB and Metal Slot Covers Installed**



Insert the cover into the open slot and push it in until the mounting tabs engage the cover.

7. Install a blank metal slot cover over the open BA350-M shelf slot (Figure 3-17).

Secure the blank metal slot cover with its four corner mounting screws.

---

**CAUTION**

---

Do not overtighten these screws. Using excessive force could break the screws or damage the shelf.

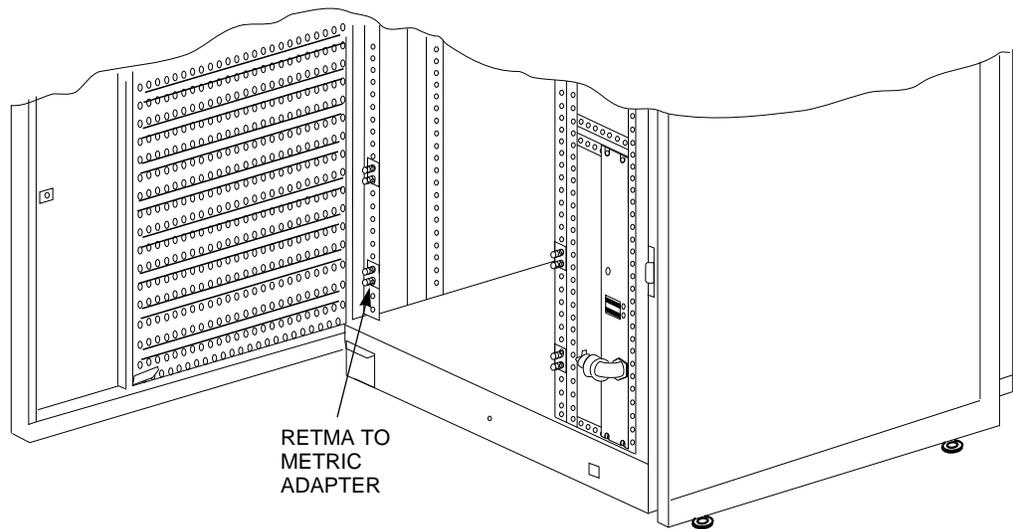
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### 3.8 Install the Chassis Slide Assembly

Use the following procedure to install the chassis slide assembly:

1. Install a RETMA-to-metric slide adapter to the cabinet at hole position 56 and 58 on the *left front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 3–18).
2. Install a RETMA-to-metric slide adapter to the cabinet at hole position 56 and 58 on the *right front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 3–18).

**Figure 3–18 RETMA-to-Metric Slide Adapter Location**



CXO-4815A-MC

These adapters are used to hold the chassis slides.

3. Install one more RETMA-to-metric slide adapter at hole positions 56 and 58 on the *right rear* vertical rail.

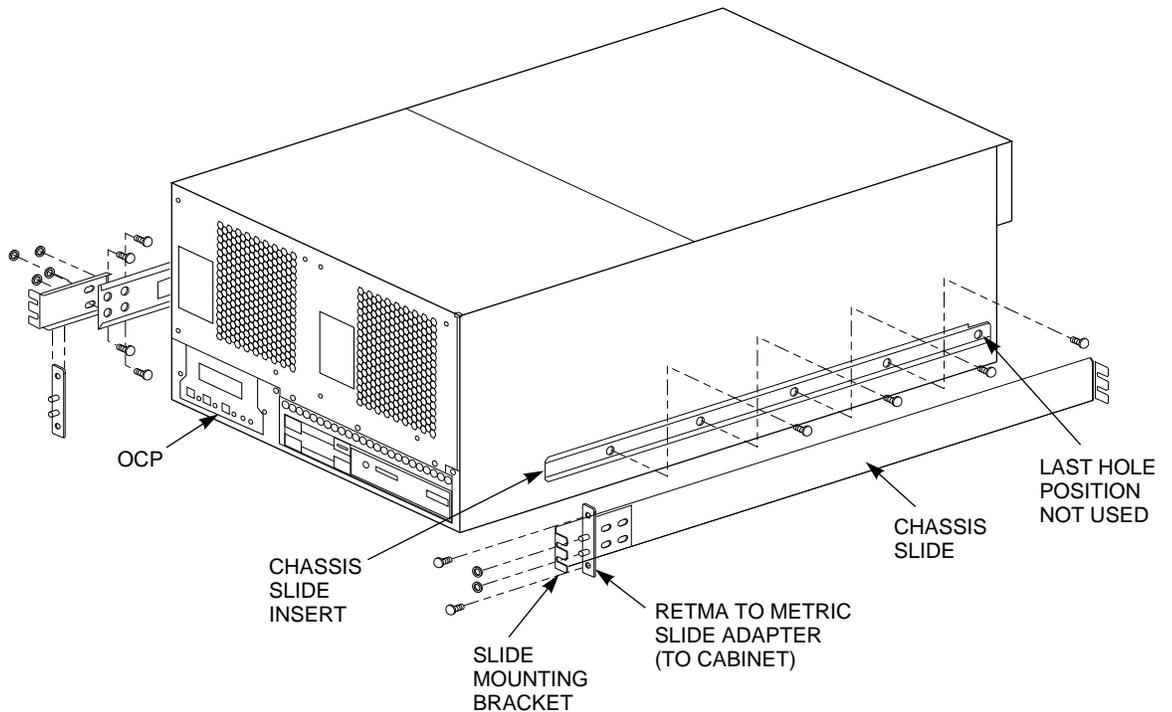
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**Note**

No adapter is needed on the *left rear* vertical rail of the cabinet because the vertical air baffle has permanent mounting studs for the chassis slides (Figure 3–6).

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**Figure 3–19 Slide Insert Installation**



CXO-4618A-MC

4. Attach a slide mounting bracket to the outside end of each chassis slide as shown in Figure 3–19.  
Secure each slide mounting bracket to the four holes on the chassis slide with four 10–32 flat head screws and four 10–32 KEP nuts. The four screw heads must sit flush so the insert can move smoothly through the chassis slide.
5. Install the two chassis slides (with slide mounting brackets attached) to the RETMA-to-metric slide adapters on the front cabinet and secure with 10–32 KEP nuts (see Figure 3–19).

**Note**

Do not tighten the screws on the chassis slides. Leave the screws slightly loose so they allow the chassis slide to align properly when the slide inserts on the server processor are installed. Tighten these screws after the server processor has been successfully installed into the chassis slides.

6. Remove the slide inserts from the chassis slide.

**Note**

Each slide insert has a metal locking tab that locks when the insert and chassis slide are partly engaged. Depress the metal locking tab to release the slide and to allow removal of the insert.

7. Install one slide insert on each side of the server processor as shown in Figure 3–19.

Position the slide insert so that the metal lock tab is outside and the *notch* on each slide insert is toward the rear of the server processor (see Figure 3–19). Align the screw holes on the server processor with the holes to the slide insert.

---

**Note**

---

The last hole in the slide insert is not used.

---

8. Secure the slide insert to the server processor using 10–32 screws. Do not tighten these screws completely until after the server processor has been installed.

### 3.9 Install the Server Processor

Use the following procedure to install the server processor:

1. With the help of a second person or a lifting device, install the server processor into the chassis slide from the *rear* of the cabinet. Align the slide insert on the server processor to the chassis slides in the cabinet and slide the server processor into the cabinet until the slide insert locks on to the chassis slides (see Figure 3–20).

---

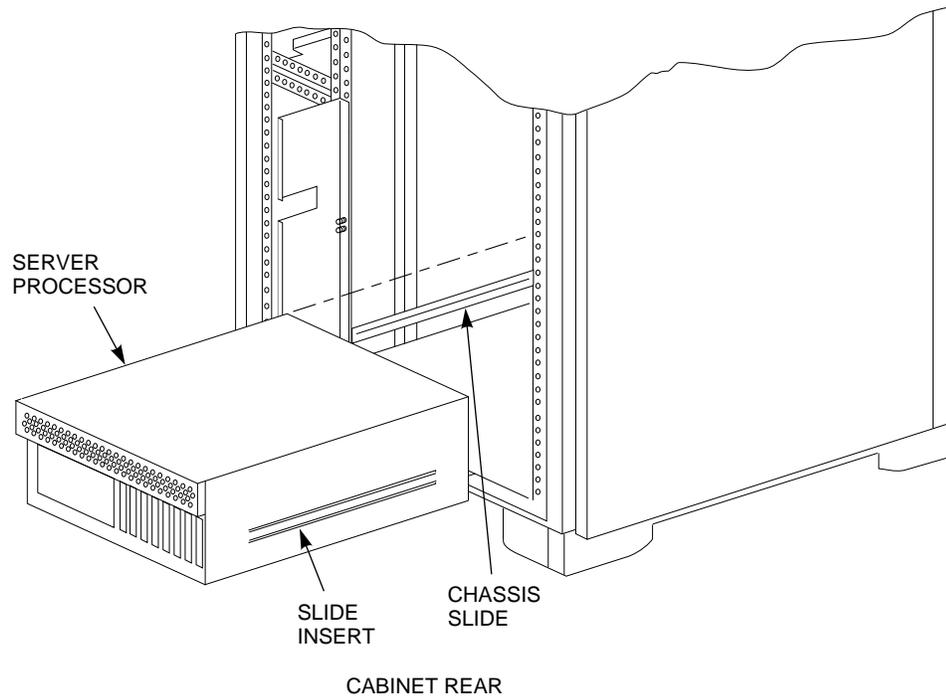
**Note**

---

The metal locking tab on the chassis slide insert locks when the server processor is part way into the cabinet. To push the server processor completely into the cabinet, depress the metal locking tab to release the slide and to allow full movement of the server processor.

---

**Figure 3–20 Server Processor Installation**

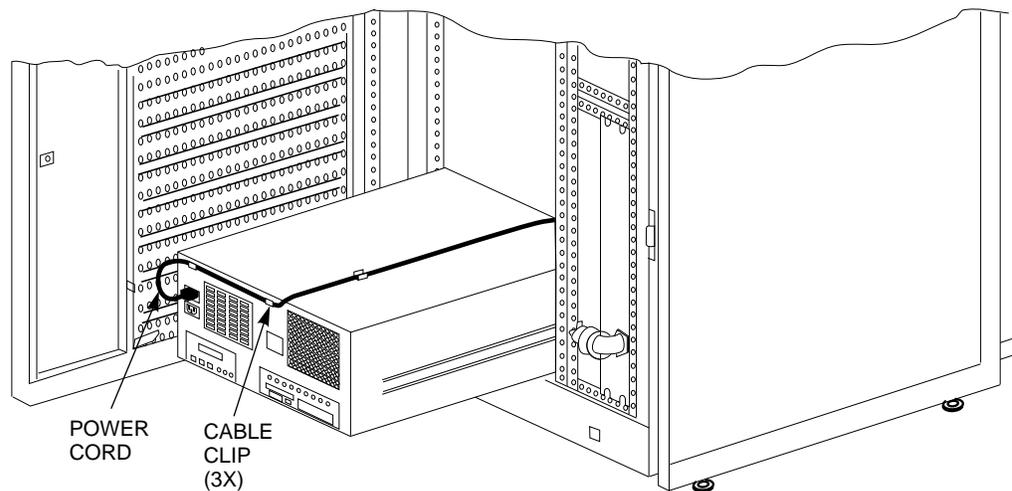


CXO-4696A-MC

When installed, the server processor should be able to move in both directions.

2. Attach three adhesive-backed cable clips to the new server processor. Two clips are attached to the front of the server processor; the third clip is attached to the top as shown in Figure 3–21.

**Figure 3–21 Server Processor Cable Clip Installation**



CXO-4817A-MC

3. Connect the power cord to the server processor power supply (front of server processor) and route it neatly back to the CDU. Use the three cable clips to route the power cord over the server processor and hold the cord in place. Make a service loop to ensure the power cords do not rub against the rails when you slide the server processor in and out of the cabinet. Secure the power cords to the vertical rail near the CDU with tie wraps.
4. Slide server processor into the cabinet.
5. Install left and right shipping brackets at hole positions 53 and 54 on both rear vertical rails.

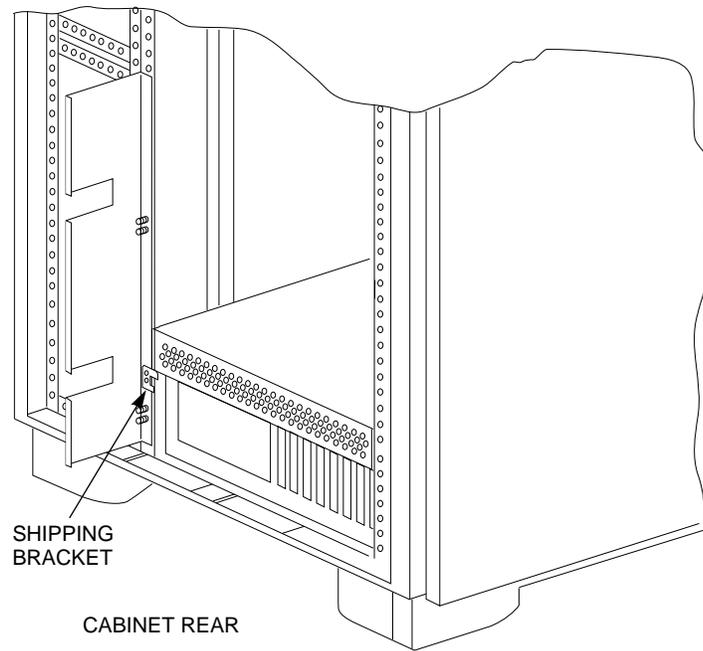
---

**Note**

The flat side of each shipping bracket must face out when installed. These shipping brackets are used to keep the server processor from sliding during shipping or when the cabinet is moved.

---

**Figure 3–22 Shipping Brackets**



CXO-4706A-MC

6. Tighten all screws.
7. Connect power cords to devices.
8. Replace the side panels and top cover by reversing the procedures described in Section 3.1.

This completes the server processor installation.

### 3.10 Install Internal Bus Cables for the HS1CP Device Channel Processor

Use the following procedure to connect internal bus cables and terminators for the HS1CP device channel processor:

1. Connect one end of the internal bus cable to the trilink connector and connect the other end into the HS1AD device bus adapter connector on the rear of the server processor.
2. Plug a bus terminator into the other trilink connector (see Figures 3-23 and 3-24).

---

#### CAUTION

---

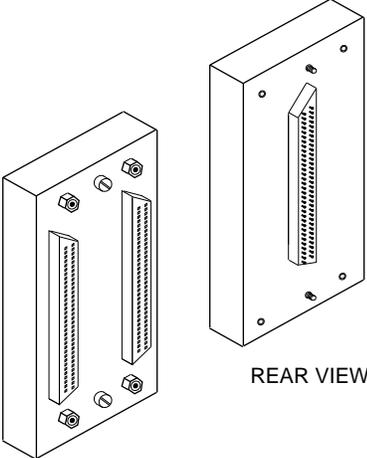
Currently, component damage can result if internal bus cables are connected or disconnected with power applied, *unless* the mating guide (Digital part number 74-49066-01) is installed around the outside edge of your HS1CP port connector. HS1CP modules are shipped from the factory with the mating guide and the trilink connector block premounted on the HS1CP port connector.

Be aware that the trilink connector block is the interface between the HS1CP device channel processor and other internal bus cable connections. It is the *trilink* that you can disconnect and connect safely when you have a mating guide installed. In a power-on situation, you must work around any internal bus cable or terminator connections to the trilink *without* disconnecting them.

Some internal bus cable and terminator connectors do not provide enough access to the trilink screws for you to disconnect the trilink (without first disconnecting the cable and/or terminator). In these cases, you must disconnect power from all bus members and disconnect cables and terminators before disconnecting the trilink connector block.

---

**Figure 3–23 Trilink Connector**

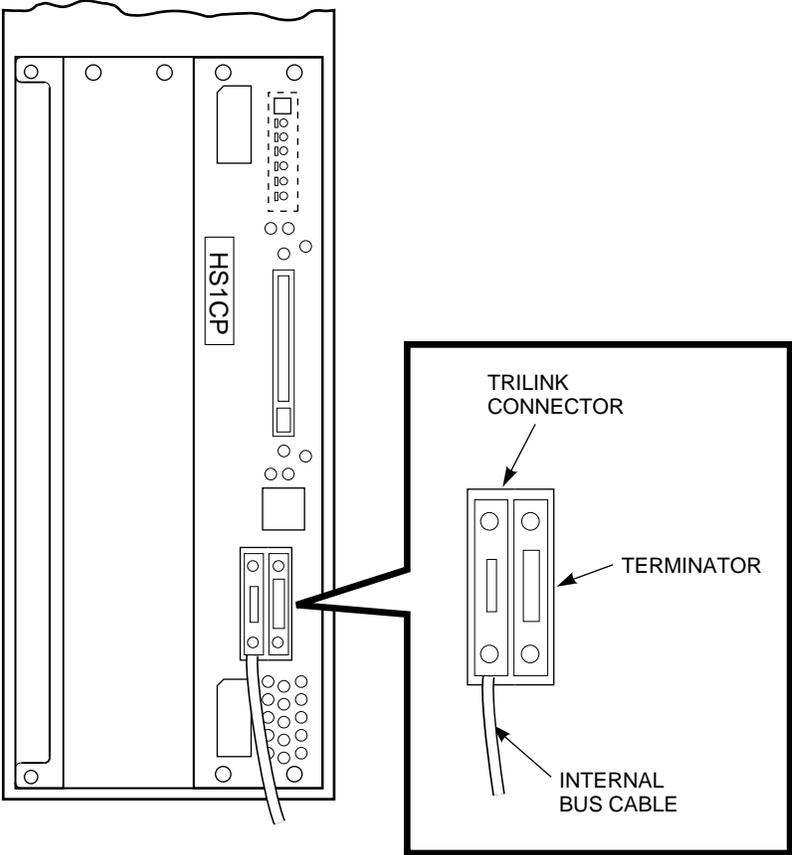


FRONT VIEW

REAR VIEW

CXO-3851A-MC

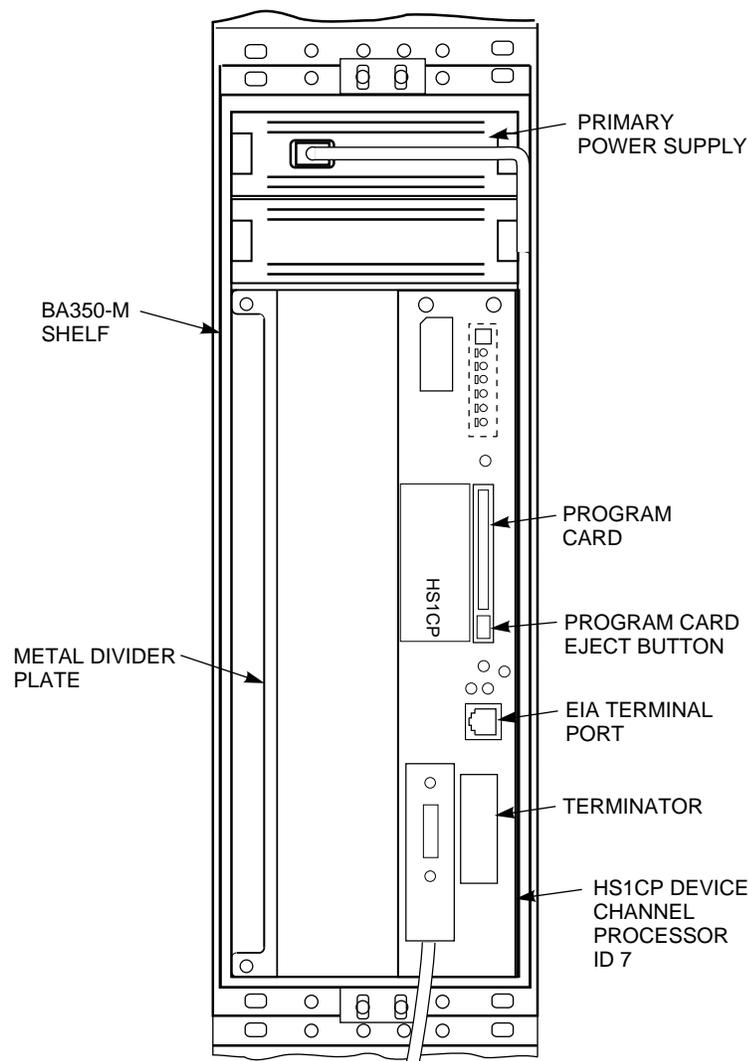
**Figure 3–24 Trilink Connector with Cable and Terminator**



CXO-4621A-MC

- 3. The program card should already be installed in the device channel processor (see Figure 3–25).

**Figure 3–25 Device Channel Processor**



CXO-4623A-MC

4. Attach ESD cover over program card.
5. Switch the circuit breaker on the front panel of the CDUs to the ON (I) position.
6. Depress power button on front of server processor.

### **3.11 Connect the Terminal to the Device Channel Processor**

Use the following procedure to connect a terminal to the EIA terminal port of the HS1CP device channel processor for initial parameter configuration:

1. Make sure the power switch on the back of the terminal is OFF (O).
2. Connect one end of the terminal cable to the back of the terminal.
3. Connect the other end of the terminal cable to the EIA terminal port on the front of the device channel processor (see Figure 3–25).

4. Turn the terminal power switch to the ON (I) position.
5. Set the terminal at 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.
6. Press the Return key if no prompt is visible on the screen. This brings you to the device channel processor's command line interpreter (CLI) prompt.

### 3.12 Set Initial Parameters of the Device Channel Processor

Use the following procedure to set the initial parameters of the device channel processor:

1. Set the HS1CP device channel processor node name:

```
CLI> SET THIS_CONTROLLER SCS_NODENAME="HS1CP1"
```

2. Enable the path from the HS1CP device channel processor to the server processor with the following command:

```
CLI> SET THIS_CONTROLLER PATH
```

3. Set the device channel processor identification:

```
CLI> SET THIS_CONTROLLER ID=1
```

4. Set the prompt:

```
CLI> SET THIS_CONTROLLER PROMPT="HS1CP1"
```

This completes the setting of initial parameters. Although the "Restart this controller" message has been displayed, do not restart the module now. The restart will be performed in a later step.

### 3.13 Install the Write-Back Cache License Key

When you add a device channel processor, you must install a new *license key* for the write-back cache feature. The next section describes the utility used to install the license key.

#### Firmware Licensing System (FLS)

The firmware licensing system (FLS) enables or disables the licensed software features of the HS1CP.

You start FLS from the HS1CP prompt. The following example demonstrates the FLS program and describes the FLS main menu items. The numbers in this example correspond to the list of explanations that follows.

```
HS1CP1> RUN FLS
```

```
-----
                Firmware Licensing System (FLS) on node HS1CP1
Option1  State2      License3      Key4
-----
RAID      ENABLED      INVALID      *none*
WBCA      ENABLED      VALID        ACME_WIDGET_CORP.....
MIRR      DISABLED      INVALID      *none*
```

```

RAID = Raid5 + Writeback Cache ⑤
WBCA = Writeback Cache ONLY
MIRR = Disk Mirroring Option

```

---

```

1. Enable a firmware option
2. Disable a firmware option
3. Enter a license key for a firmware option
4. Clear a license key for a firmware option
0. Exit FLS
Enter selection (0:4) [0] ?

```

- ① **Option**—In this example, the options that are available—RAID, write-back cache (WBCA), and mirroring—are shown.
- ② **State**—In this example, both the RAID and WBCA options are enabled, and the mirroring option is disabled. You can use any option that is enabled. Enabled options without a valid license key can produce frequent error messages. Valid licenses must be purchased for these options if you desire to use the functionality.
- ③ **License**—WBCA is running with a valid license. RAID is running without a valid license. This status shows when you run an option on a trial basis. The license becomes valid when you enter a license key that FLS verifies as valid. You receive this key when you purchase a software option.
- ④ **Key**—The license key is ACME\_WIDGET\_CORP; the 8-character CRC portion of the key is shown as hidden text (.....).
- ⑤ **Description of Option**—Each option is described briefly.

After starting FLS, the display shows the current status of the value-added options for your HS1CP and contains menu choices for each utility.

### 3.13.1 Using the FLS Main Menu

The FLS main menu offers the following options:

Select	Action	Submenu Choices	Result
1	Enable an option	List each option and its status	Selection enabled
2	Disable an option	List each option and its status	Selection disabled
3	Enter a license key	Prompt for new license key	Entered key checked for validity
4	Clear a license key	Prompt for license key	Entered key becomes invalid to clear

### 3.13.2 Enabling Options

You can turn on any option at any time with FLS, but if you enable an option for which you are not licensed, an error message appears on your CLI console and an error is recorded in the host error log. These error messages are repeated at least once each hour while the unlicensed option remains enabled.

### 3.13.3 Disabling Options

You cannot disable an option if that option is currently in use. To disable the WBCA option, the write-back caching feature must not be in use.

### 3.13.4 License Key

When you purchase a license for a firmware option, you receive a customer license key. This license key contains two parts:

- A *customer identification string* of 6 to 32 characters.
- An 8-character *cyclic redundancy check (CRC)* string.

You must enter the customer identification string with the CRC string appended to it when you use selection 3 in the FLS menu.

#### Example Operations

The following example demonstrates how to enter a license key and enable the write-back caching option.

```
HS1CP1> RUN FLS
```

```
-----  
Firmware Licensing System (FLS) on node HS1CP1  
Option      State      License      Key
```

```
-----  
RAID        DISABLED   INVALID      *none*  
WBCA        DISABLED   INVALID      *none*  
MIRR        DISABLED   INVALID      *none*
```

```
RAID = Raid5 + Writeback Cache  
WBCA = Writeback Cache ONLY  
MIRR = Disk Mirroring Option
```

```
-----  
1. Enable a firmware option  
2. Disable a firmware option  
3. Enter a license key for a firmware option  
4. Clear a license key for a firmware option  
0. Exit FLS
```

```
Enter selection (0:4) [0] ? 3
```

```
1. Enter new license key+CRC for RAID (current key is invalid)  
2. Enter new license key+CRC for WBCA (current key is invalid)  
0. Return to main menu
```

```
Enter selection (0:2) [0] ? 2
```

```
Enter new WBCA key, including 8-character CRC, or enter 0  
to return to main menu: ACME_WIDGET_CORPVB8UWQ9C
```

```
*** License key verified ***
```

```
-----  
Firmware Licensing System (FLS) on node HS1CP1  
Option      State      License      Key
```

```
-----  
RAID        DISABLED   INVALID      *none*  
WBCA        DISABLED   VALID        ACME_WIDGET_CORP.....  
MIRR        DISABLED   INVALID      *none*
```

```

                RAID = Raid5 + Writeback Cache
                WBCA = Writeback Cache ONLY
                MIRR = Disk Mirroring Option
-----
    1. Enable a firmware option
    2. Disable a firmware option
    3. Enter a license key for a firmware option
    4. Clear a license key for a firmware option
    0. Exit FLS
Enter selection (0:4) [0] ? 1

    1. Enable RAID
    2. Enable WBCA
    0. Return to main menu
Enter selection (0:2) [0] ? 2
*** WBCA enabled ***
-----
                Firmware Licensing System (FLS) on node HS1CP1
Option          State          License          Key
-----
RAID            DISABLED          INVALID          *none*
WBCA            ENABLED           VALID4           ACME_WIDGET_CORP.....
MIRR            DISABLED          INVALID          *none*

                RAID = Raid5 + Writeback Cache
                WBCA = Writeback Cache ONLY
                MIRR = Disk Mirroring Option
-----
    1. Enable a firmware option
    2. Disable a firmware option
    3. Enter a license key for a firmware option
    4. Clear a license key for a firmware option
    0. Exit FLS
Enter selection (0:4) [0] ? Return5
FLS - Normal Termination
HS1CP1>

```

- ❶ The user chooses to enter a new license key for WBCA.
- ❷ The user enters the license key, which is displayed as it is entered.  
This license key consists of the *customer identification string* (6 to 32 characters long) with the 8-character CRC string appended to it.
- ❸ The user enables write-back cache.
- ❹ This entry in the FLS display shows that write-back cache is enabled under a valid license.
- ❺ Exit the program:

```
HS1CP1> EXIT
```

### 3.14 Where to Go Next

You have completed the installation of the HS110 upgrade kit to upgrade an SW800-series cabinet to a model HS111 StorageWorks FDDI Server. You must now perform the tasks described in Chapters 3 through 8 of the *StorageWorks FDDI Server Installation Guide*. Procedures described in these chapters are used to connect a terminal to the server processor, customize server operating system parameters, configure devices that have been installed, and bring the HS111 to an operational state.

---

## HS111 to HS121 Upgrade Procedure

This chapter provides step-by-step procedures for installing an HS110 upgrade kit in a model HS111 StorageWorks FDDI Server.

Upgrading a model HS111 requires the installation of a HS110 Upgrade Kit (Table 2-2) and the following additional parts.

**Table 4-1 HS121 Additional Parts List**

Description	Qty
Device Bus Adapter (HS1AD-AA)	2
Internal Bus Cable (BC29S-09)	2
Cable Distribution Unit (CDU)—SW8XP	1

## 4.1 Prepare the Cabinet for Upgrade

Use the following procedure to remove power, gain access to the cabinet interior, and install the upgrade.

Digital recommends full and unrestricted access to the cabinet interior because you will be routing cables while installing the HS110 upgrade kit.

1. Remove power from the cabinet by shutting down all devices, cutting power at the CDUs, and removing the CDU power cords from their wall receptacles.

---

### WARNING

---

While working in the cabinet interior, ac power must be removed from cabinet components. Failure to do so may result in personal injury as a result of electric shock.

Prior to performing any of the procedures in this chapter, remove ac power from cabinet components. If the cabinet is installed and operating, spin down all disk drives and halt all tape drives in the cabinet. Switch the circuit breaker on the front panels of any CDUs to the OFF (○) position.

---

2. Move the cabinet away from any adjacent cabinets to allow 360 degree access.
3. Using Figure 4–1 for reference, remove the side panels as follows:

---

### Note

---

There are three side panel hanger clips on each side of the cabinet. A matching set of hanger clips are attached to each side panel.

---

4. Loosen the top cover by pushing up on its front and rear edges until it snaps free of its fasteners.

---

### WARNING

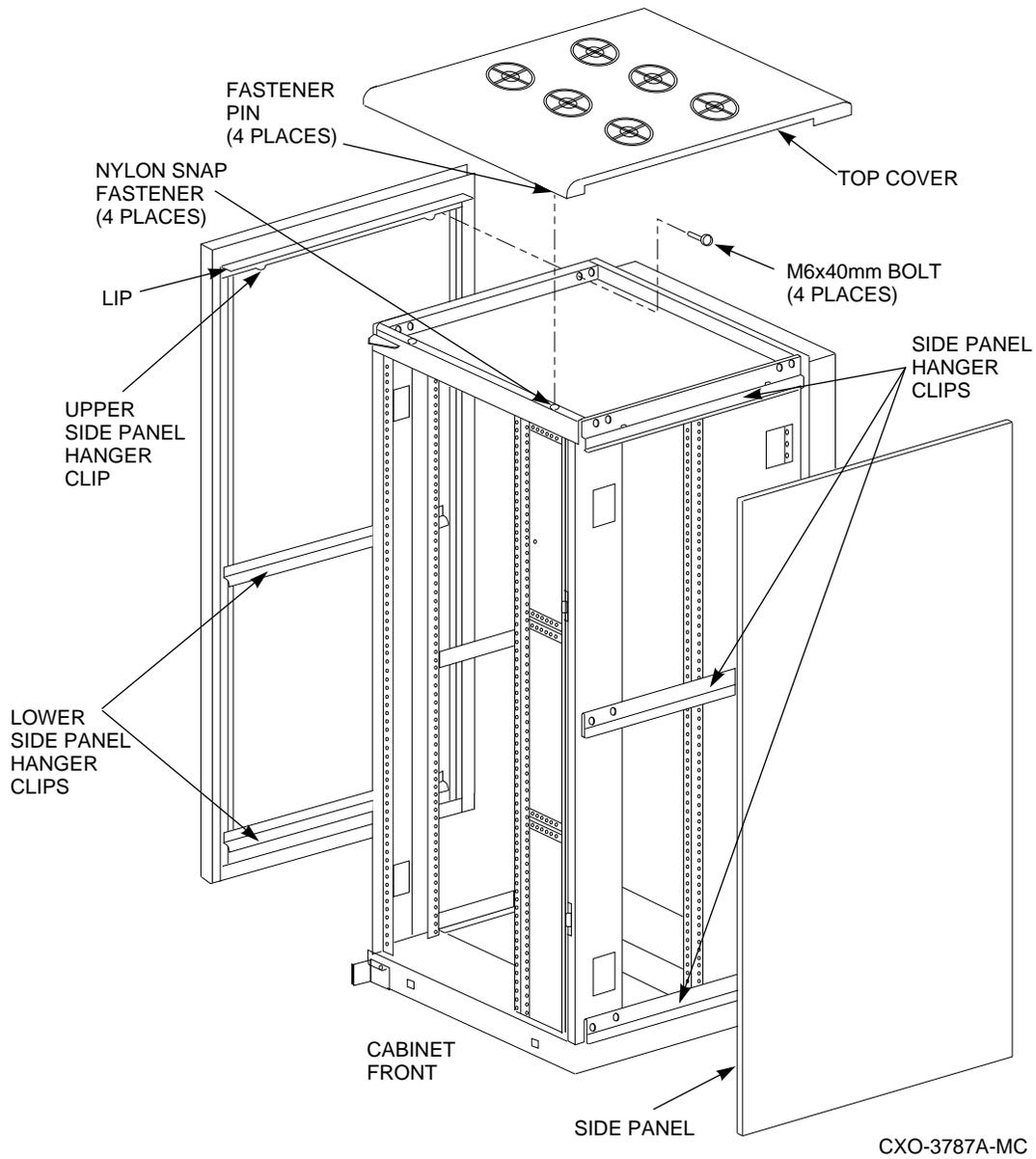
---

The top cover is heavy and awkward to lift. Removing it requires two people. Failure to use sufficient personnel can result in personnel injury or equipment damage.

---

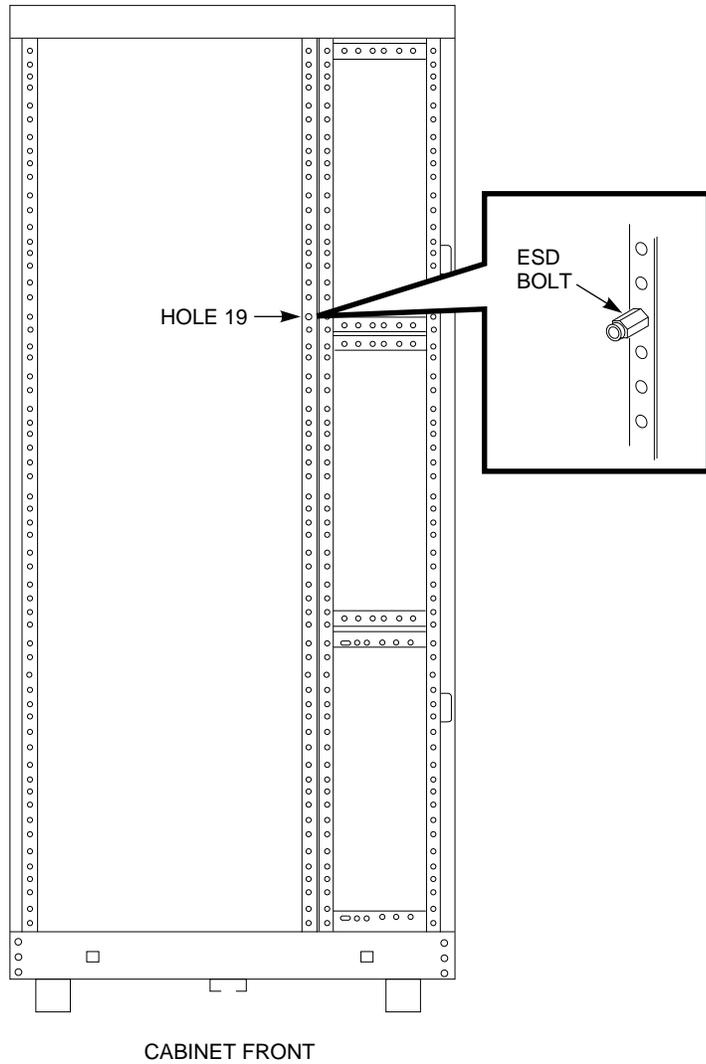
5. Using two people, lift the top cover from the cabinet and set it aside.
6. Remove the bolts attaching the side panels to the top side rails of the cabinet.
7. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.
8. Repeat the previous step to remove the other panel.

**Figure 4-1 Exterior Cabinet Panel Removal (and Installation)**



9. Release the door locks mounted on the smooth vertical panel of each door by turning the locks counterclockwise with a 5/32-inch hex wrench.
10. Open the cabinet doors.
11. Relocate the ESD bolt to hole position 19 (see Figure 4-2).

**Figure 4-2 Relocate ESD Bolt to Hole 19**



CXO-4805A-MC

12. Install 10-32 U-nuts in the following holes on the designated vertical rails of the cabinet. Refer to Table 4-2 and Figure 4-3 during this procedure.

---

**Note**

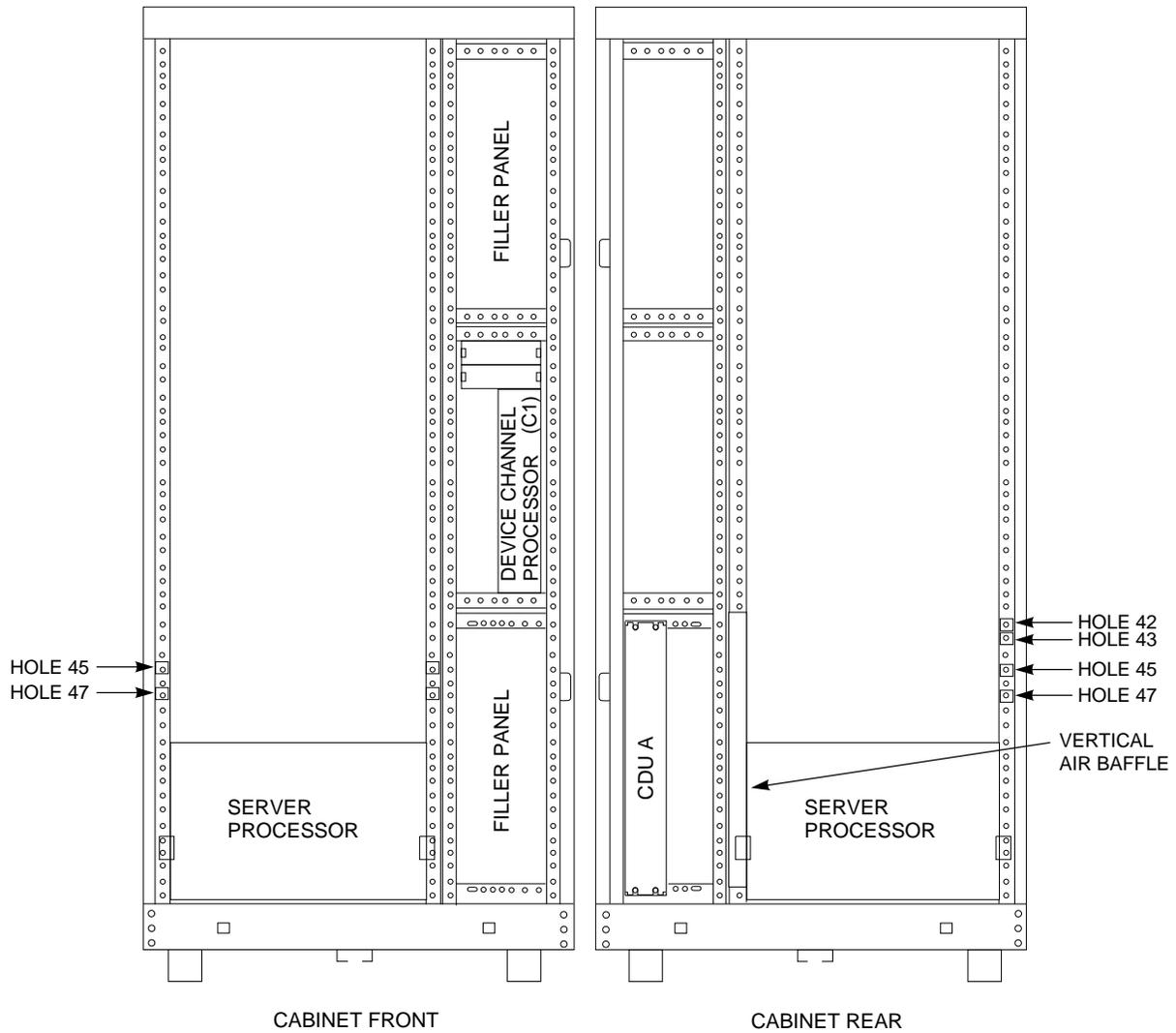
---

- The bottom hole of the vertical rail is hole location 60.
  - The top hole of the vertical rail is hole location 1.
- 

**Table 4–2 U-Nut Vertical Rail Hole Locations for HS121 Upgrade**

<b>Left Front</b>	<b>Right Front</b>	<b>Left Rear</b>	<b>Right Rear</b>
			42 For shipping bracket.
			43 For shipping bracket.
45	45		45 For slide adapters.
47	47		47 For slide adapters.

**Figure 4-3 Install U-Nuts on Cabinet Vertical Rails**



CXO-4739A-MC

**Note**

The horizontal air baffle on the rear door may be removed to make it easier to access the cabinet and install the server processor.

If this baffle is removed, do not forget to reinstall it in the rear door after all other installation has been completed.

Refer to Section 3.3 for additional information on the air baffle.

## 4.2 Install the Second Cable Distribution Unit

Use the following procedure to install the dual power option kit:

1. Verify that the contents of the dual power option kit match the parts listed in Table 4-3. Check your CDU for proper voltage.

**Table 4-3 CDU Parts List**

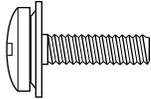
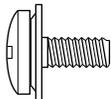
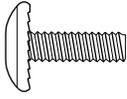
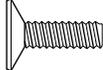
Description	Qty
Distribution unit, cable, 120/208V, 60 Hz (SW8XP-AA)	1
Screw, SEMS 10-32 Pan, .625 inch†	4
U-Nut, 10-32	4
Tie, cable	40
Cord, ac power, gray, 5 feet	6
Cord, ac power, gray, 7 feet	10
Cord, ac power, gray, 9 feet	8
Tie, cable, adhesive-backed	13
Label, CDU ID/Caution, power cords	2

†These parts are shown in detail in Figure 4-4.

### Note

The gray power cords are for the new CDU (CDU B). The existing CDU (CDU A) uses the black power cords that were previously installed.

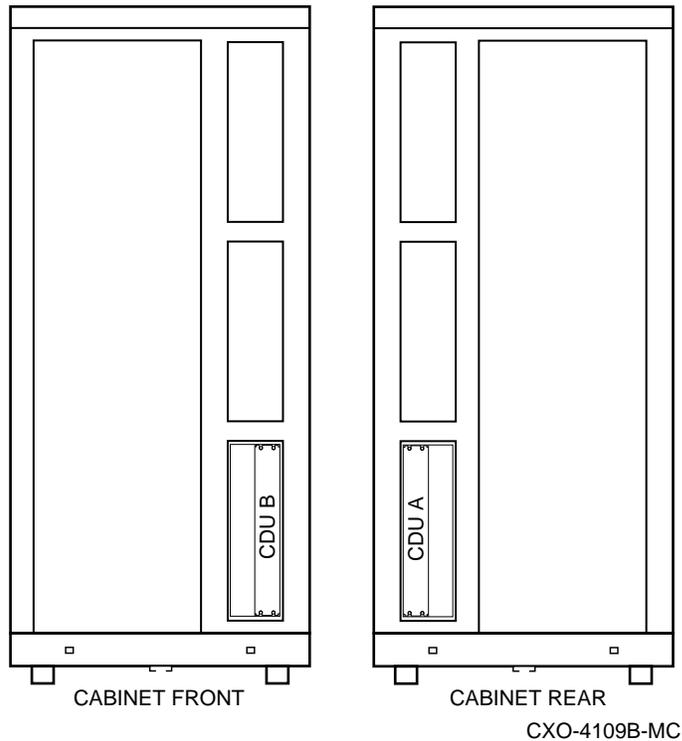
**Figure 4-4 HS110 Screw Diagrams**

	<p>10-32 SEMS .625 in</p>
	<p>10-32 SEMS, .343 in</p>
	<p>10-32, .500 in</p>
	<p>10-32 MACHINE FLAT HEAD, .500 in</p>
	<p>10-32 KEP NUT</p>

CXO-4701A-MC

2. See Figure 4-5 to identify and locate CDU A. Identify the location for the installation of CDU B.

**Figure 4-5 CDU Locations**



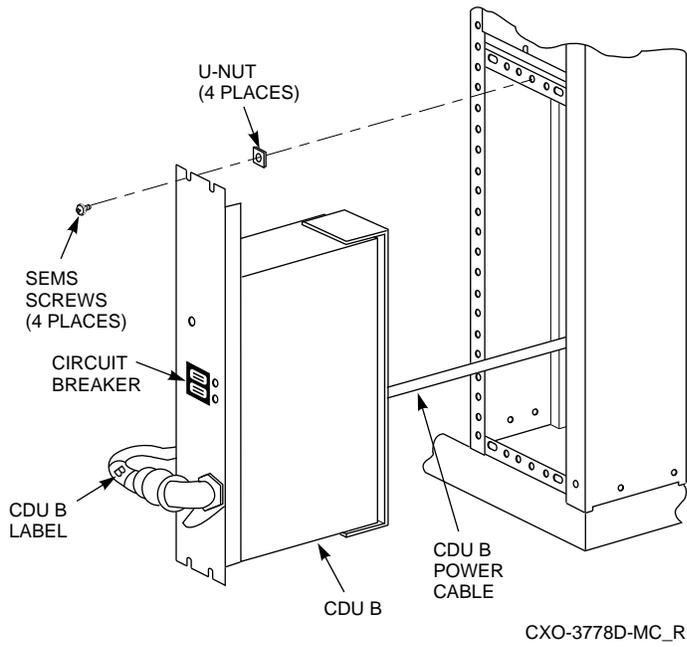
3. Open the rear cabinet door to access CDU A.
4. Switch the CDU A front panel circuit breaker to OFF (○).
5. Disconnect the CDU A power cord from the power source.
6. Move the cabinet if necessary to allow free access to the front and rear CDU mounting slots.

**WARNING**

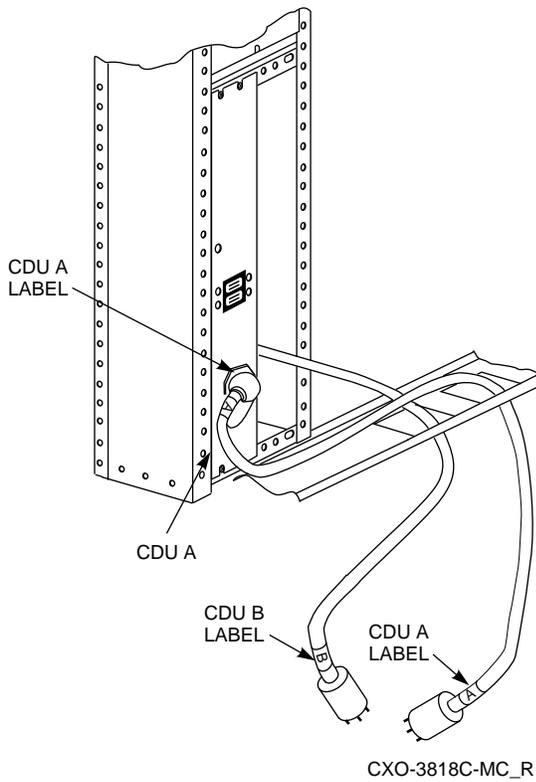
Cabinet rail edges are sharp and can cut or abrade skin and cable or cord insulation.

7. Remove the new CDU (to be installed as CDU B) from the packing material. Thread the gray power cord through the cabinet as shown in Figures 4-6 and 4-7.
8. Use the hardware provided in the kit to mount CDU B to the cabinet chassis rails (see Figure 4-6).

**Figure 4-6 CDU B Installation**



**Figure 4-7 Rear Power Cord Installation**

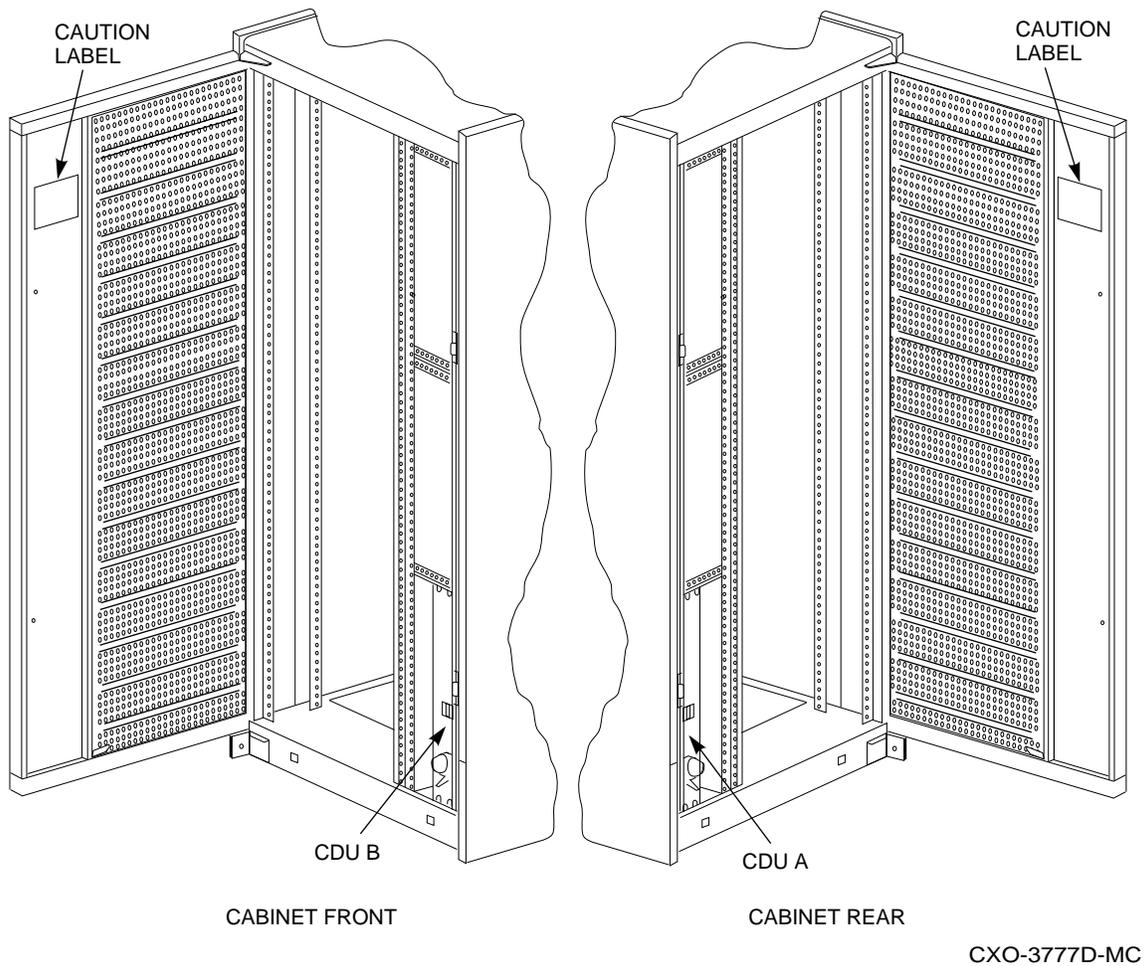


9. To prevent confusion, apply safety labels to CDU A and CDU B power cords. Install the safety labels as described in the following steps:
  - a. Remove backing paper from two of the yellow A labels in the kit and wrap

one around each end of the black power cord of CDU A (see Figures 4-6 and 4-7).

- b. Remove backing paper from two of the yellow B labels in the kit and wrap one around each end of the gray power cord of CDU B (see Figures 4-6 and 4-7).
- c. Remove backing paper from the two yellow CAUTION labels and place them at eye level on the inside of each door, as shown in Figure 4-8.

**Figure 4-8 Safety Label Locations**

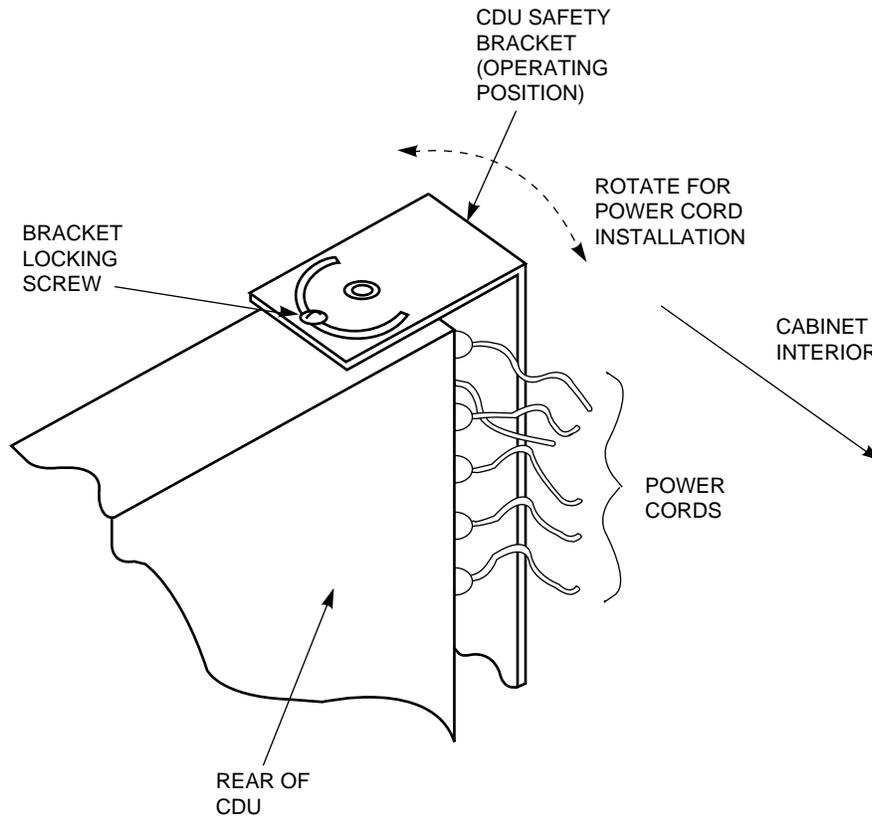


10. Make sure that the second ac power supply required for the dual power option is installed in each shelf.

11. The set of gray ac power cords in the kit are for the new CDU. The length of each power cord varies for each shelf. Refer to the chapter pertaining to your particular cabinet configuration in the *StorageWorks SW800-Series Data Center Cabinet Installation and User's Guide* to determine the correct cable length for each shelf.

12. Loosen the CDU B safety bracket locking screw and rotate the safety bracket to one side (Figure 4-9).

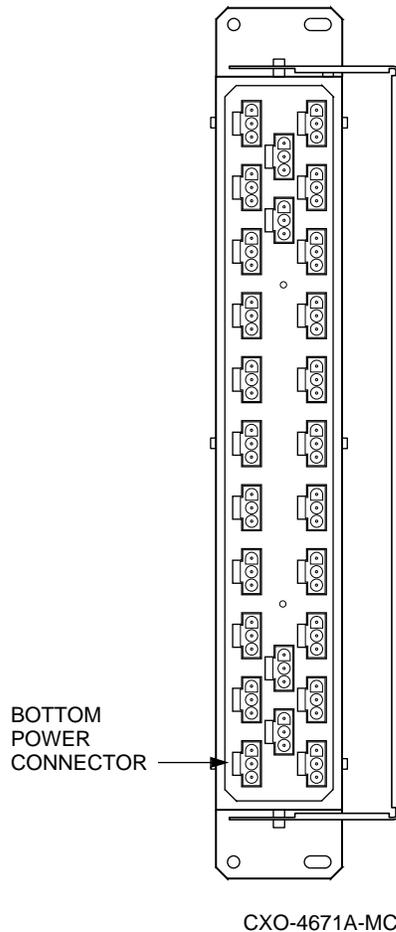
**Figure 4-9 CDU Safety Bracket**



CXO-4108A-MC

13. Plug the gray ac power cord of the appropriate length into the second ac power supply in each shelf and route the cord to CDU B.
14. Route each added power cord to CDU B along the same path as the corresponding black ac power cord. Attach the new gray power cord to the cabinet rails using the existing cable clamps where possible. Use the additional cable ties, cable clamps, and mounting hardware provided in the kit as required.
15. Connect the gray ac power cords to the connectors on the rear panel of CDU B. Start at the top, then move to the bottom and back to the top, if required (see Figure 4-10).

**Figure 4–10 CDU B Power Cord Connectors**



16. Locate the cabinet fan power cords on CDU A. They are labeled A and B with large, yellow labels.
17. Loosen the bracket locking screw on the CDU A safety bracket and rotate the safety bracket to one side.
18. Unplug the fan cord labeled B from CDU A, and plug it into a free outlet on the rear panel of CDU B.
19. Rotate the safety bracket back over the rear panel of CDU A and CDU B. Tighten the bracket locking screws.
20. If the host computer interface cables were disconnected in a previous step, reconnect the cables.
21. Replace the cabinet side panels and reposition the cabinet next to the adjacent ones as appropriate.
22. Connect the black power cord from CDU A to the primary power source.

23. Connect the gray power cord from CDU B to the auxiliary power source.

**Note**

If you removed the horizontal air baffle to make it easier to access the cabinet, reinstall it at this time. Refer to Section 3.3 for additional information on the air baffle.

### 4.3 Install the Second Device Bus Adapter Module in the Original Server Processor

For the HS121 upgrade, the original server processor must have a second device bus adapter module installed.

**CAUTION**

Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.2 for proper grounding procedures.

Check to make sure each HS1AD upgrade kit contains the following items listed in Table 4-4:

**Table 4-4 HS1AD Upgrade Kit Contents**

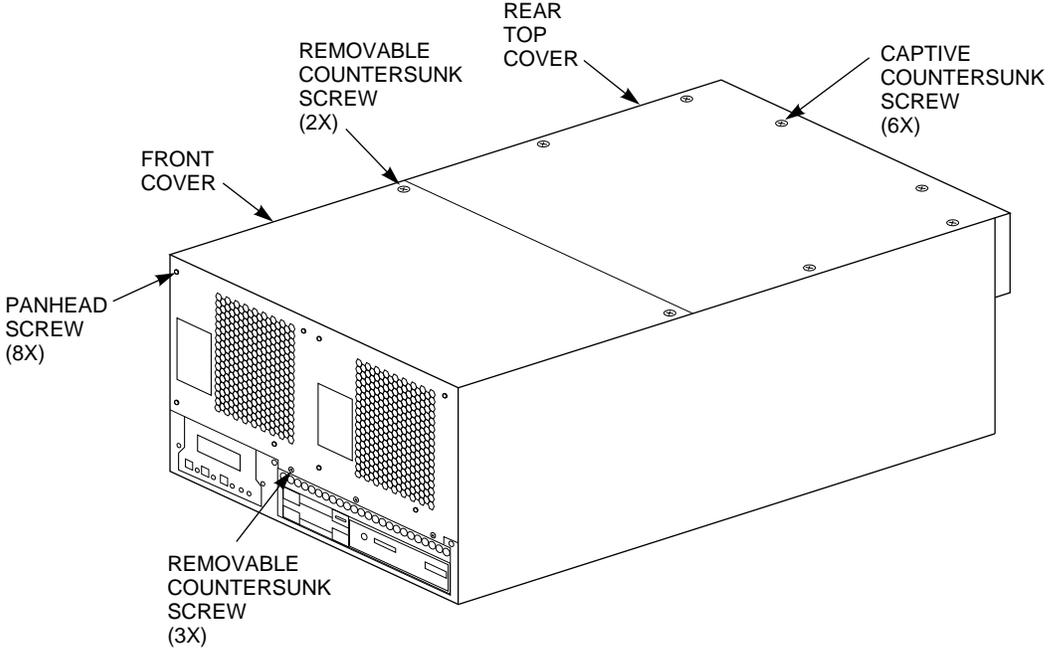
Description	Qty
Device Bus Adapter Module	1
Internal Bus Cable (BC29S-09)	1
<i>StorageWorks FDDI Server HS1AD Device Bus Adapter Installation Guide</i>	1

#### 4.3.1 Slide the Original Server Processor Out of FDDI Server Cabinet

Use the following procedure to slide the original server processor out of the FDDI Server cabinet:

1. If necessary, remove the red shipping brackets from the *rear* of the original server processor (hole locations 53 and 54).
2. Slide the original server processor out of the back of the cabinet on its slides to easily access the rear top cover panel.
3. Attach an ESD ground strap to the server processor's chassis and to the other end of the strap to your wrist.
4. Loosen all the quarter-turn fasteners on the rear top cover using a Phillips screwdriver (Figure 4-11).
5. Lift off the rear top cover.

**Figure 4-11 Removing the Rear Top Cover Panel**

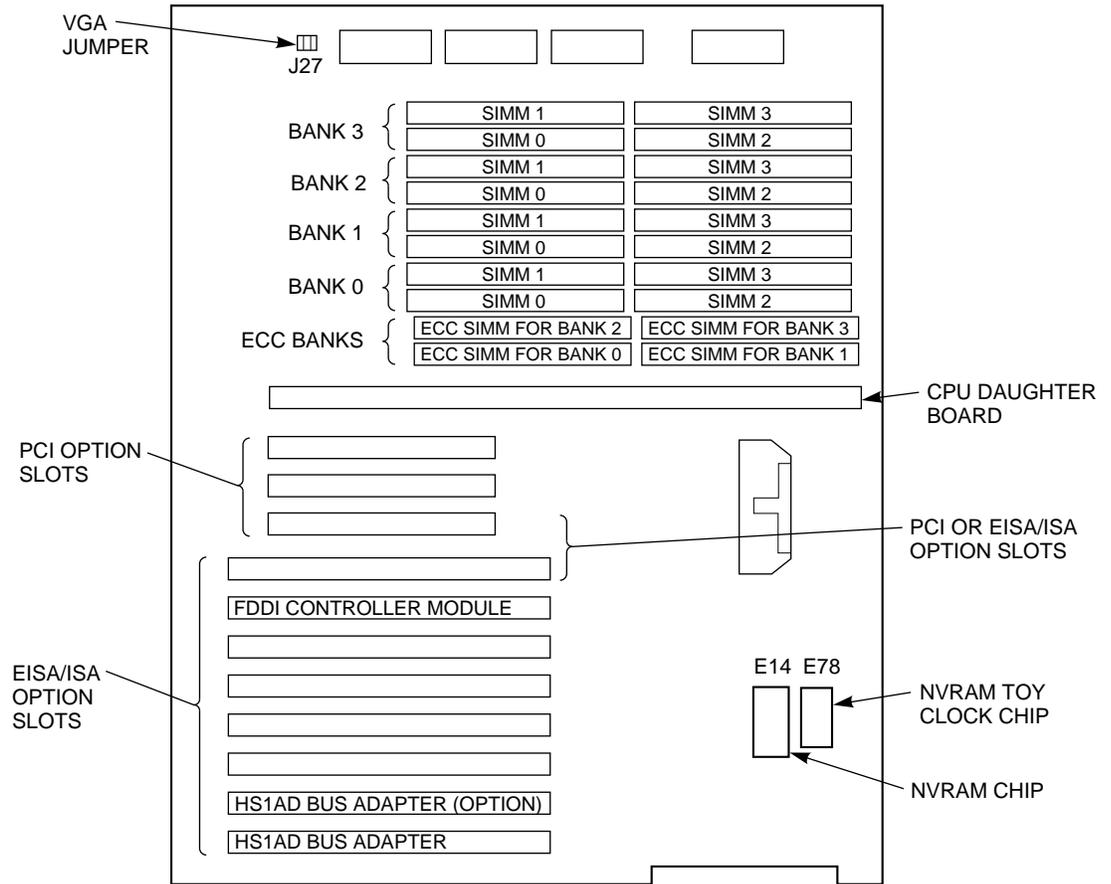


CXO-4725A-MC

### 4.3.2 Install the Device Bus Adapter

Use the following procedure to install the device bus adapter. Figure 4–12 shows the slot position for the second device bus adapter.

**Figure 4–12 Slot Position for Device Bus Adapter**



CXO-4626A-MC

**Note**

Though it is possible to use any EISA slot from 2 through 4 when you add a second device bus adapter, Digital recommends that you install the second one in slot 2 next to the first device bus adapter. In Figure 4–12, the slot position of the second device bus adapter is named “HS1AD Bus Adapter (option).”

1. With a Phillips screwdriver, remove the screw that holds the metal slot cover on EISA slot 2. Retain the screws to secure the second device bus adapter in place later.
2. Pull off the metal slot cover.
3. Install the device bus adapter card into EISA slot 2.

4. Secure the device bus adapter by inserting and tightening the screw you retained from the first step in this portion of this procedure.
5. Reinstall top rear cover panel on server processor.  
Tighten all the quarter-turn fasteners on the rear top cover panel.
6. Slide the server processor back into the cabinet.

---

**Note**

---

The metal locking tab on the chassis slide insert locks when the server processor is part way into the cabinet. To push the server processor completely into the cabinet, depress the metal locking tab to release the slide and allow full movement of the server processor.

---

## 4.4 Install Storage Shelves (Optional)

The SCSI-2 storage devices supported by the device channel processor mount in *BA350-S* shelves. At the lowest level, a SCSI-2 storage device fits into a plastic carrier. The combination of the plastic carrier and the storage device is called a StorageWorks Building Block (SBB). SBBs slide into slots in the storage shelves. This section discusses the configuration of storage shelves in an HS121 upgrade.

---

**Note**

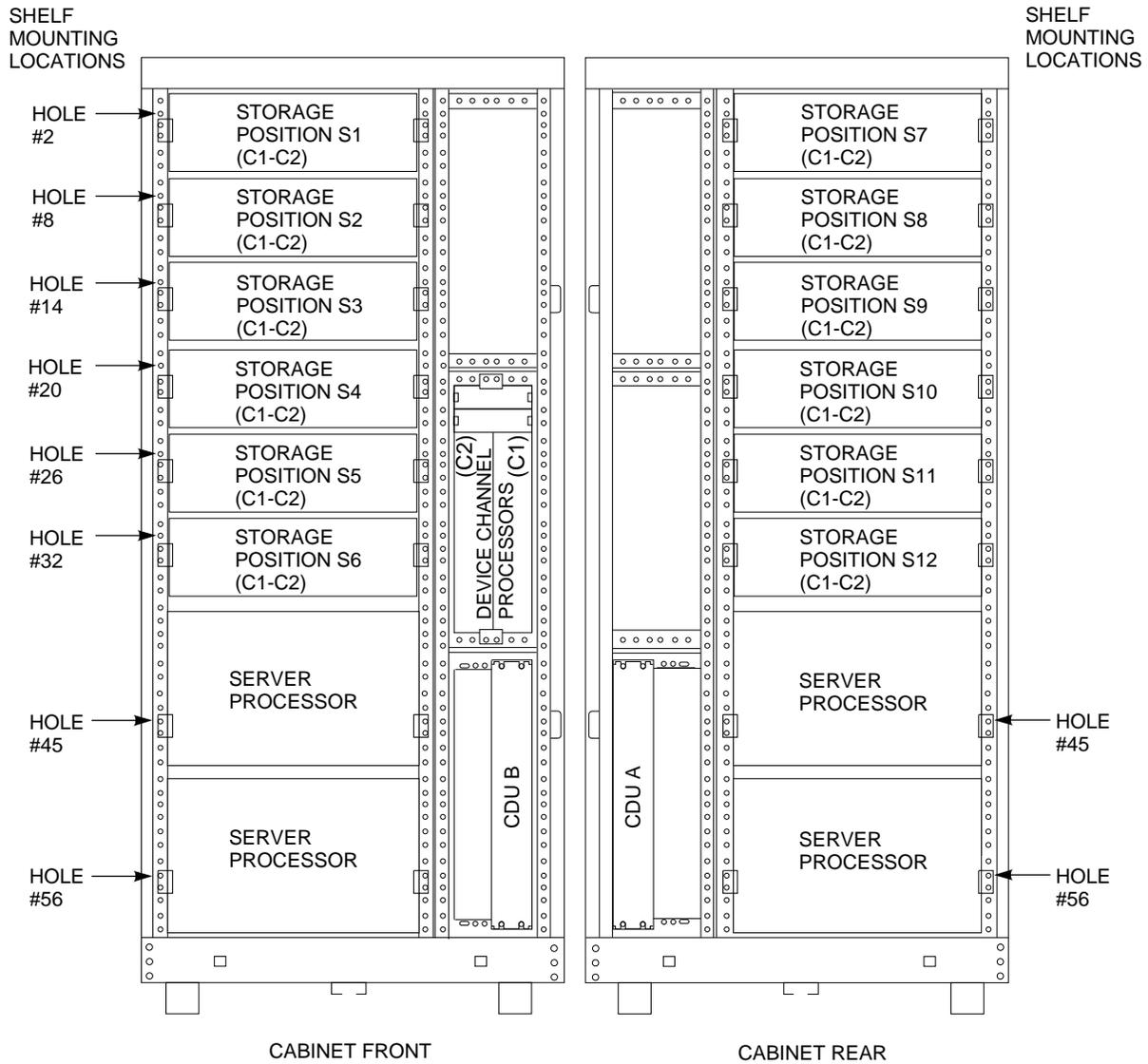
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A maximum of 12 shelves of storage devices may be installed in an HS121 StorageWorks FDDI Server. If storage in excess of 36 devices is desired, refer to the *HS1CP Device Channel Processor Upgrade Installation Guide* for instructions.

---

Figure 4-13 shows the location of storage shelves when disks but no TZ8xx-series tape drives are installed in the HS121 upgrade.

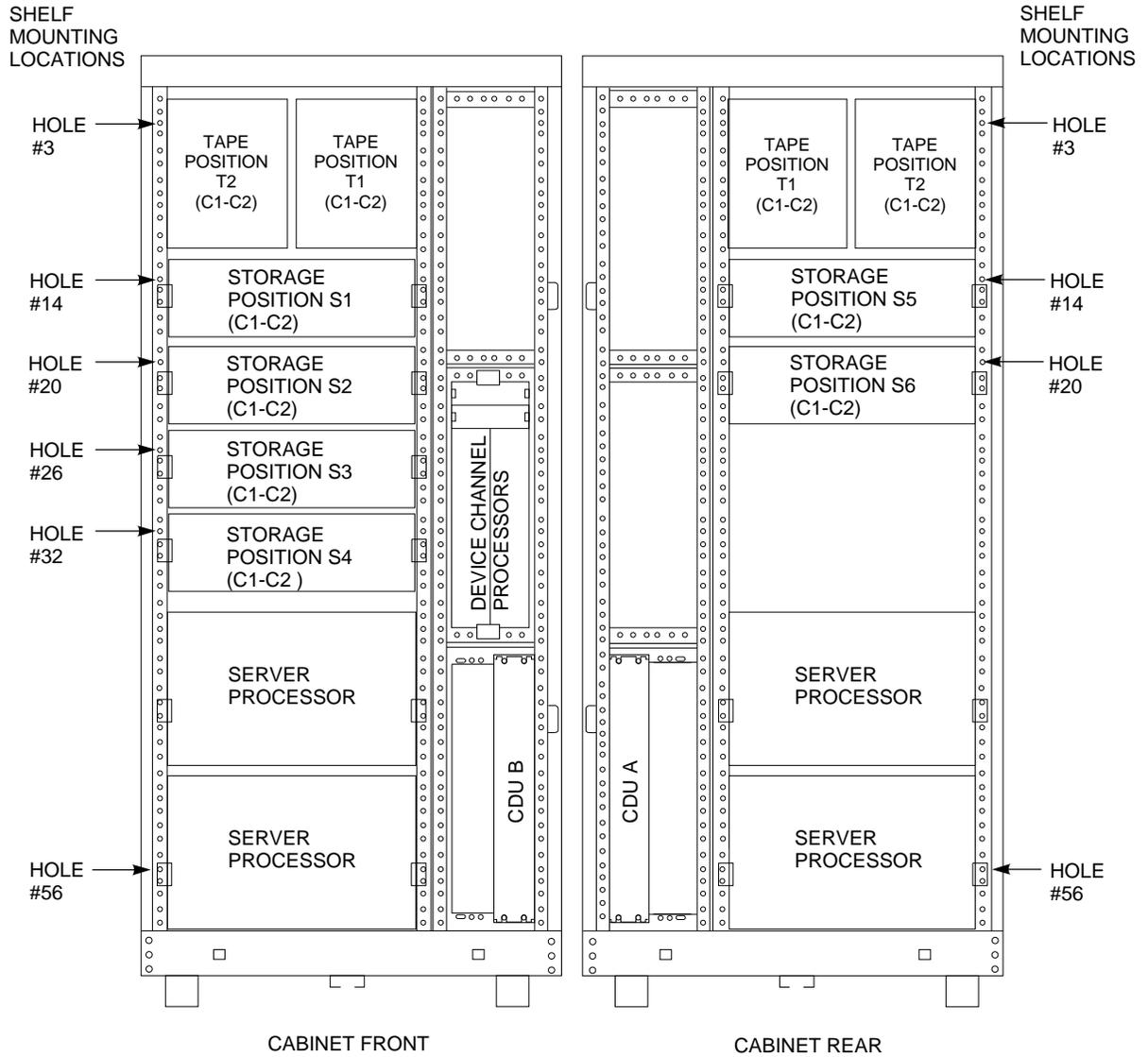
**Figure 4–13 HS121 Storage Configuration with Optimal Disk Storage and No TZ8xx-Series Tape Drives Installed**



CXO-4830A-MC

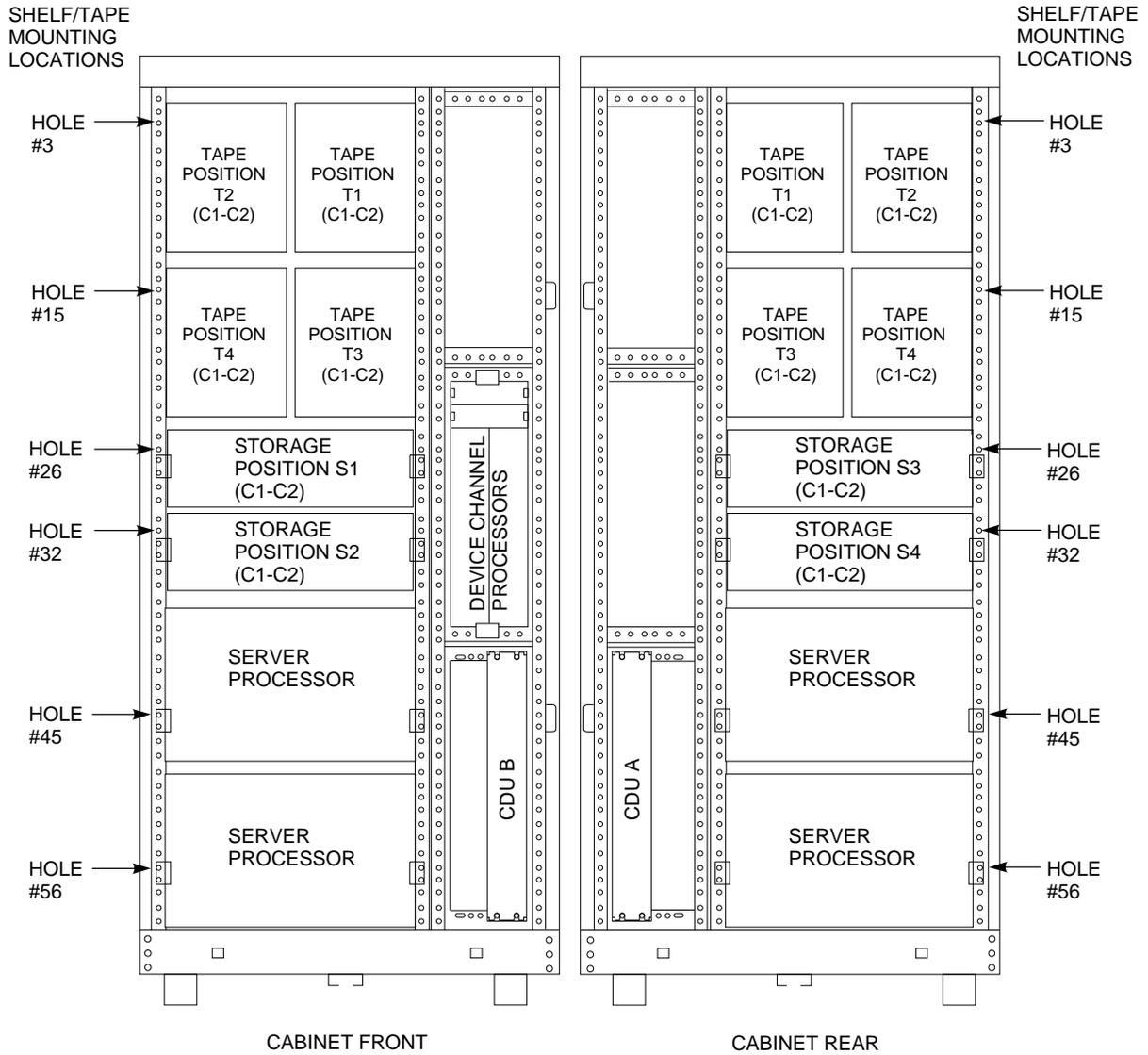
Figures 4-14 and 4-15 show the location of storage shelves when two or four TZ8xx-series tape drives are installed in the HS121 upgrade.

**Figure 4-14 HS121 Storage Configuration with Two TZ8xx-Series Tape Drives Installed**



CXO-4826A-MC

**Figure 4–15 HS121 Storage Configuration with Four TZ8xx-Series Tape Drives Installed**



CXO-4795A-MC

Refer to Appendix A for shelf configuration rules and restrictions.

Refer to the *StorageWorks Solutions Shelf and SBB User's Guide* for instructions on installing and replacing storage shelves and SBBs. These documents are included in the BA350–MB kit that is part of this HS110 upgrade.

## 4.5 Install BA350–M Shelf SCSI Cables (If Required)

Use the following procedure to install the SCSI cabling in the BA350–M shelf:

---

**CAUTION**

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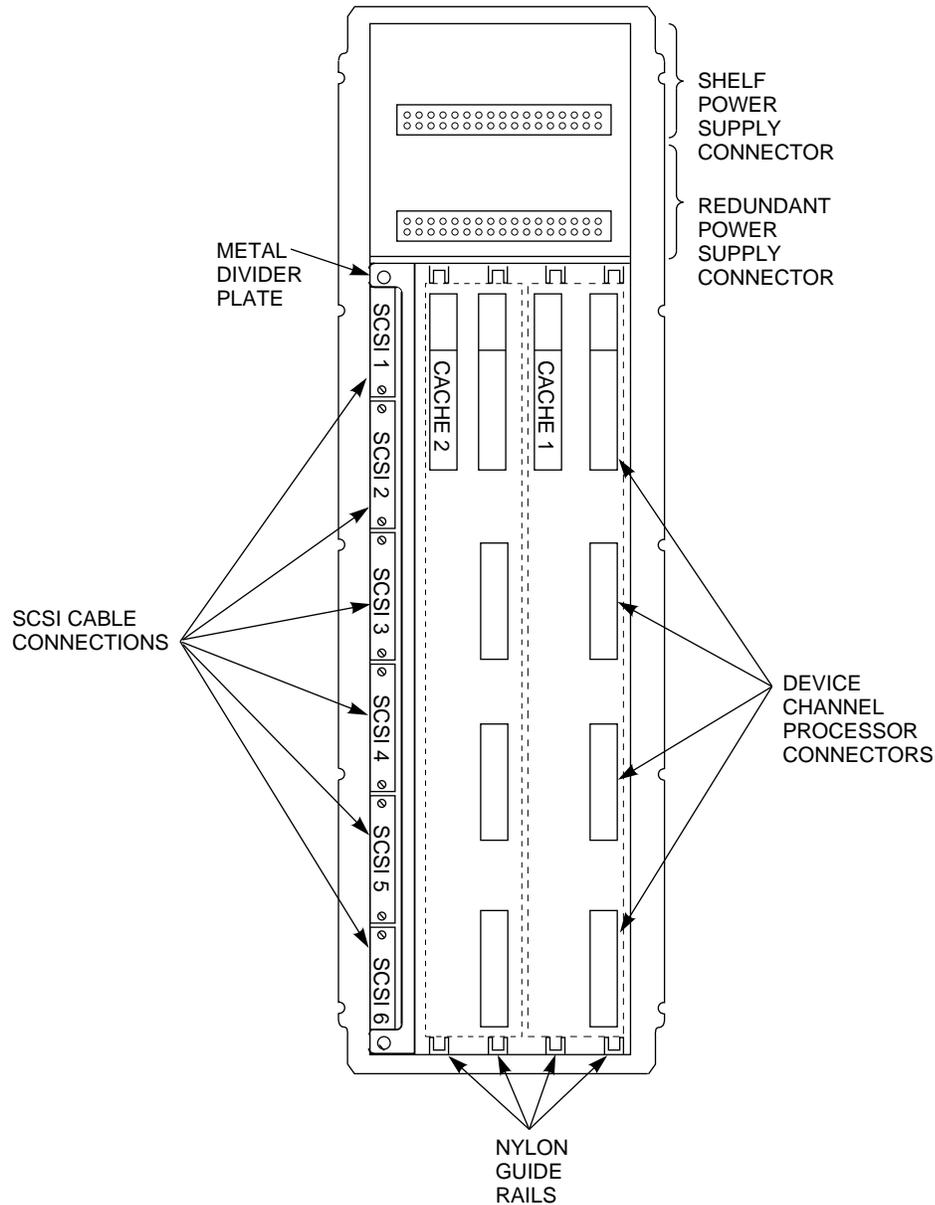
SCSI pins are easily bent. Make sure the SCSI connector pins are not bent or damaged when connecting SCSI cables.

---

1. Remove the metal divider plate inside the BA350–M shelf that separates the module area from the SCSI–2 port cable area.

Loosen the screws at the top and bottom of the shield. This gives you the necessary space to room to plug in the SCSI–2 cable connectors. Figure 4–16 shows the location of the metal divider plate.

**Figure 4-16 BA350-M Shelf Layout (Front View)**



CXO-4806A-MC

2. Connect the SCSI-2 device cables to the BA350-M shelf backplane and route them out the front of the shelf and into the front of the storage shelves (such as the BA350-S shelf) that hold the SCSI-2 storage devices. Figure 4-16 shows the location of the SCSI connectors on the BA350-M backplane.
3. Plug the SCSI-2 port cables into your choice of storage shelves as required.
4. Replace the metal divider plate that separates the SCSI-2 port cable area from the module area in the BA350-M shelf, then tighten the two screws to hold it in place.

## 4.6 Install Second Write-Back Cache Module and HS1CP Device Channel Processor

Use this section to install a second write-back cache module and HS1CP device channel processor into a *preexisting* nonredundant configuration to form a dual-redundant configuration.

Figure 4–16 shows the layout of the connectors on the back of the BA350–M shelf. Note the following:

- There are two sets of connectors (one connector for each write-back cache module and four connectors for each device channel processor).  
The *left* set of connectors will be used to install the second write-back cache module and device channel processor.
- The shelf has nylon guide rails along the top and bottom to guide the write-back cache module into its connector.
- The shelf has nylon guide rails along the top and bottom to guide the device channel processor module into its four connectors.

---

### CAUTION

---

Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.2 for proper grounding procedures.

---

---

### Note

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In a dual-redundant configuration, both cache modules must be the same cache size. The firmware version must be the same for both device channel processors for proper operation of the subsystem. When the firmware versions are mismatched, the device channel processors do not allow access to any devices.

---

For an HS121 configuration, the second HS1CP device channel processor occupies slot 6 (*left* slot). This slot is assigned SCSI ID 6.

Refer to Appendix A of this guide for device channel processor configuration rules and restrictions.

---

### WARNING

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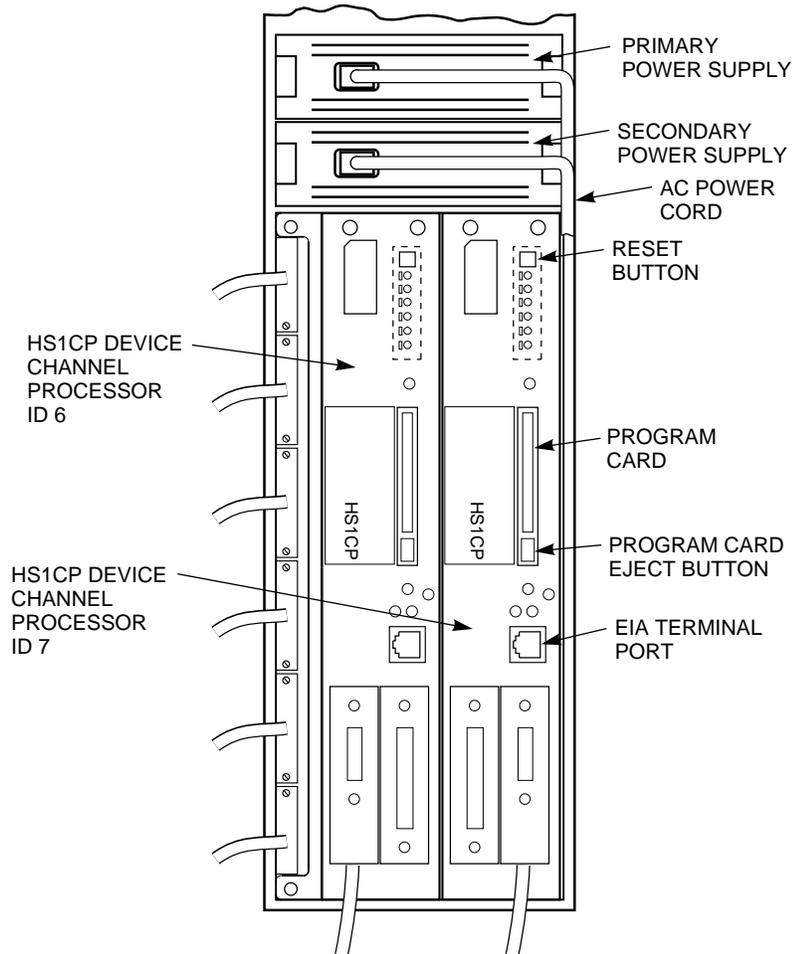
Switch the circuit breaker on both CDUs to OFF (○) before performing the following steps.

---

1. Install the write-back cache module into the *left* side of the BA350–M shelf.  
Align the module in the top and bottom nylon guide rails and slide the module into the white connector in the top back side of the shelf (see Figure 4–16).
2. Install the second HS1CP device channel processor into the *left* side of the BA350–M shelf.

Align the module in the top and bottom nylon guide rails and slide the module into the four white SCSI connectors at the back of the shelf (see Figures 4-16 and 4-17).

**Figure 4-17 Device Channel Processor Installation**



CXO-4614A-MC

3. With a flat blade screwdriver, tighten the four screws on the front corners of the HS1CP device channel processor.

**CAUTION**

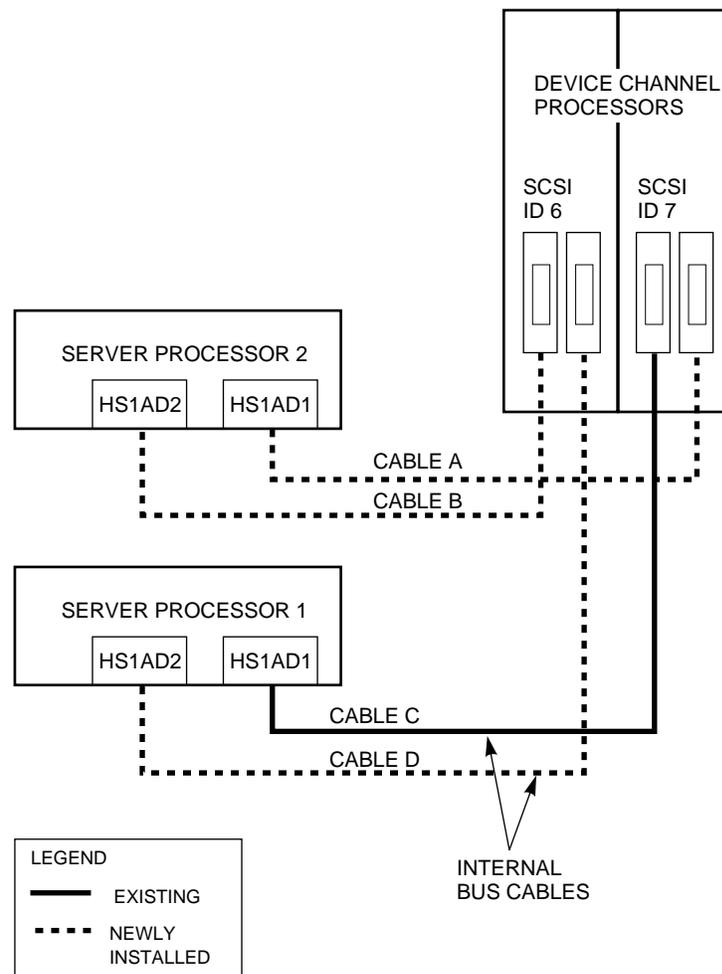
Do not overtighten these screws. Using excessive force could break the screws or damage the module.

4. Install the additional power supply into the second top slot of the BA350-M shelf (see Figure 4-17).  
Insert the power supply into the guide slots on both sides and push it in until it is fully seated and the mounting tabs engage the shelf.
5. Plug shelf power cords into the front of both shelf power supplies.

## 4.7 Install Internal Bus Cables for the Original Server Processor

Use the following procedure to connect internal bus cables and terminators to the original server processor. Refer to Figures 4–17 and 4–18 during the following procedure.

Figure 4–18 Cabling Diagram for HS121



1. Carefully attach an internal bus cable from the open tralink connector in slot 6 to the newly installed device bus adapter (HS1AD2) in the original server processor (Server Processor 1). Make sure the tralink connector pins are not bent or damaged.

This is identified as Cable D in Figure 4–18.

### CAUTION

Currently, component damage can result if internal bus cables are connected or disconnected with power applied, *unless* the mating guide (Digital part number 74–49066–01) is installed around the outside edge of your HS1CP port connector. HS1CP modules are shipped from the factory

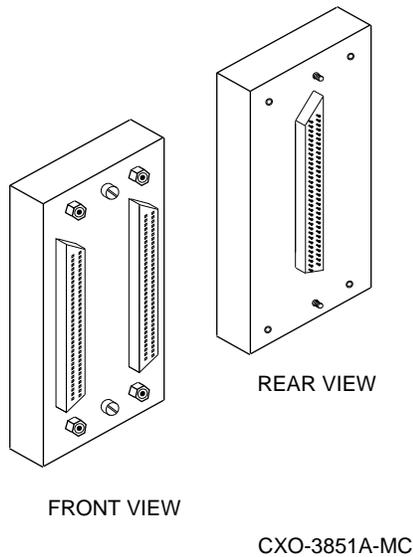
with the mating guide and the trilink connector block premounted on the HS1CP port connector.

Be aware that the trilink connector block (Figure 4–19) is the interface between the HS1CP device channel processor and other internal bus cable connections. It is the *trilink* that you can disconnect and connect safely when you have a mating guide installed. In a power-on situation, you must work around any internal bus cable or terminator connections to the trilink *without* disconnecting them.

Some internal bus cable and terminator connectors do not provide enough access to the trilink screws for you to disconnect the trilink (without first disconnecting the cable and/or terminator). In these cases, you must disconnect power from all bus members and disconnect cables and terminators before disconnecting the trilink connector block.

---

**Figure 4–19 Trilink Connector**



2. Make sure a cable is attached from a trilink connector in slot 7 to the first device bus adapter (HS1AD1) in the original server processor (Server Processor 1). This cable should already be attached from the HS111 configuration.

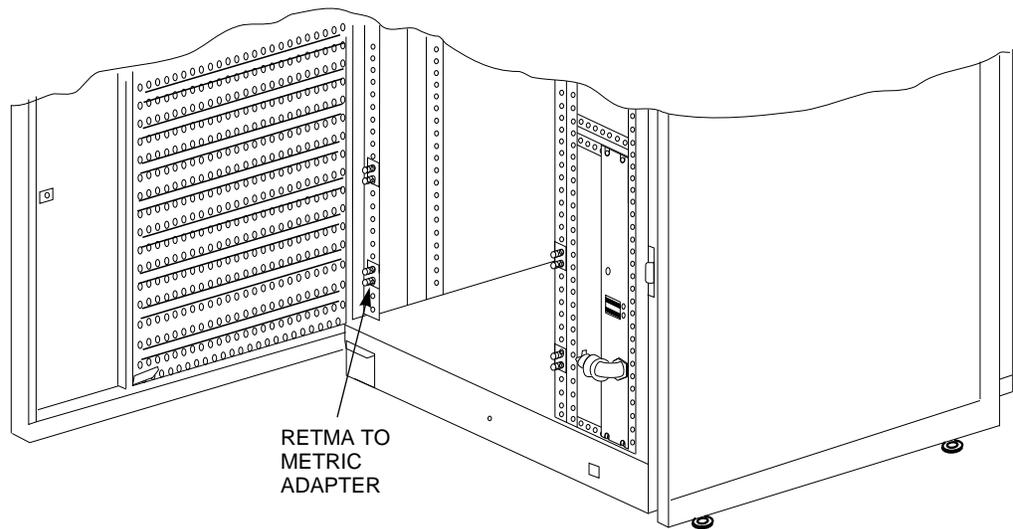
This is identified as Cable C in Figure 4–18.

## 4.8 Install the Chassis Slide Assembly

Use the following procedure to install the chassis slide assembly:

1. Install a RETMA-to-metric slide adapter to the cabinet at hole positions 45 and 47 on the *left front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 4–20).
2. Install a RETMA-to-metric slide adapter to the cabinet at hole positions 45 and 47 on the *right front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 4–20).

**Figure 4–20 RETMA-to-Metric Slide Adapter Installation**



CXO-4815A-MC

These adapters are used to hold the chassis slides.

3. Install one more RETMA-to-metric slide adapter at hole positions 45 and 47 on the *right rear* vertical rail.

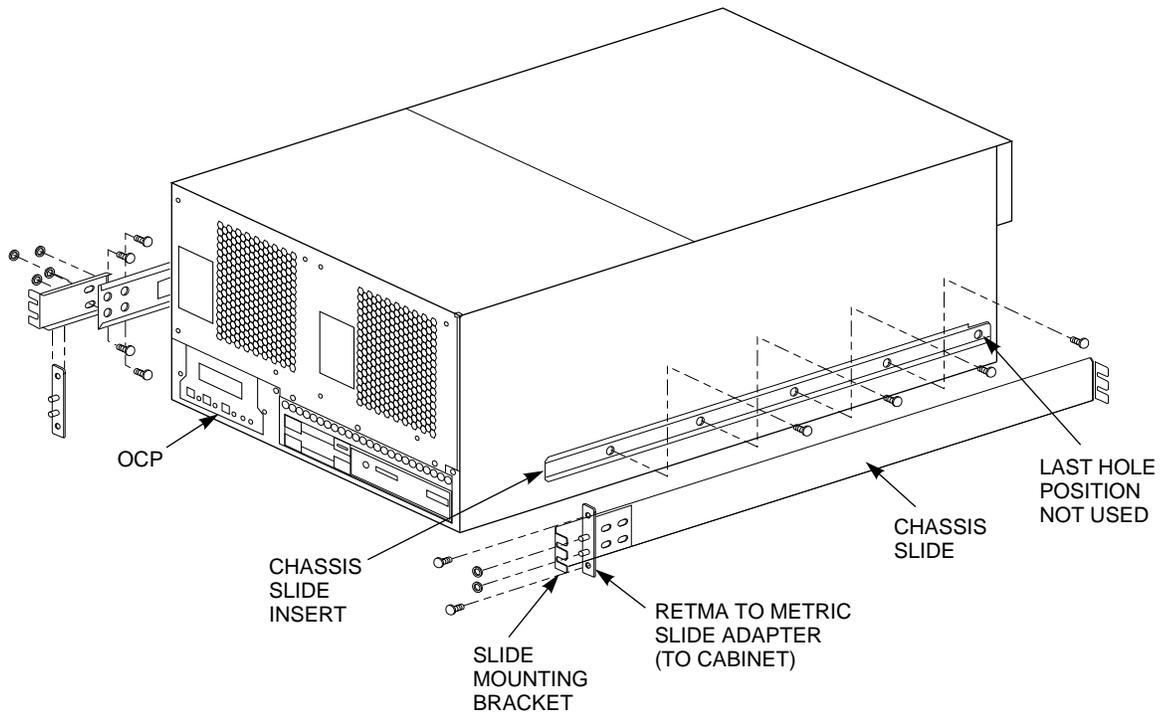
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### Note

No adapter is needed on the *left rear* vertical rail of the cabinet because the vertical air baffle has permanent mounting studs for the chassis slides.

---

**Figure 4-21 Slide Insert Installation**



CXO-4618A-MC

4. Attach a slide mounting bracket to the outside end of each chassis slide.  
Secure each slide mounting bracket to the four holes on the chassis slide with four 10-32 flat head screws and four 10-32 KEP nuts (see Figure 4-21). The four screw heads must sit flush so the insert can move smoothly through the chassis slide.
5. Install the two chassis slides with slide mounting brackets attached (bracket towards the front of the cab) to the RETMA-to-metric slide adapters and secure with 10-32 KEP nuts (see Figure 4-21).
6. Remove the slide inserts from the chassis slide.

**Note**

Each slide insert has a metal locking tab that locks when the insert and chassis slide are partly engaged. Depress the metal locking tab to release the slide and allow removal of the insert.

7. Install one slide insert on each side of the server processor as shown in Figure 4-21.  
Position the slide insert so that the metal locking tab is outside and the notch on each slide insert is toward the rear of the server processor (see Figure 4-21). Align the screw holes on the server processor with the holes to the slide insert.

---

**Note**

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The last hole in the slide insert is not used.

---

8. Secure the slide insert to the server processor using 10–32 screws. Do not tighten these screws completely until after the server processor has been installed.

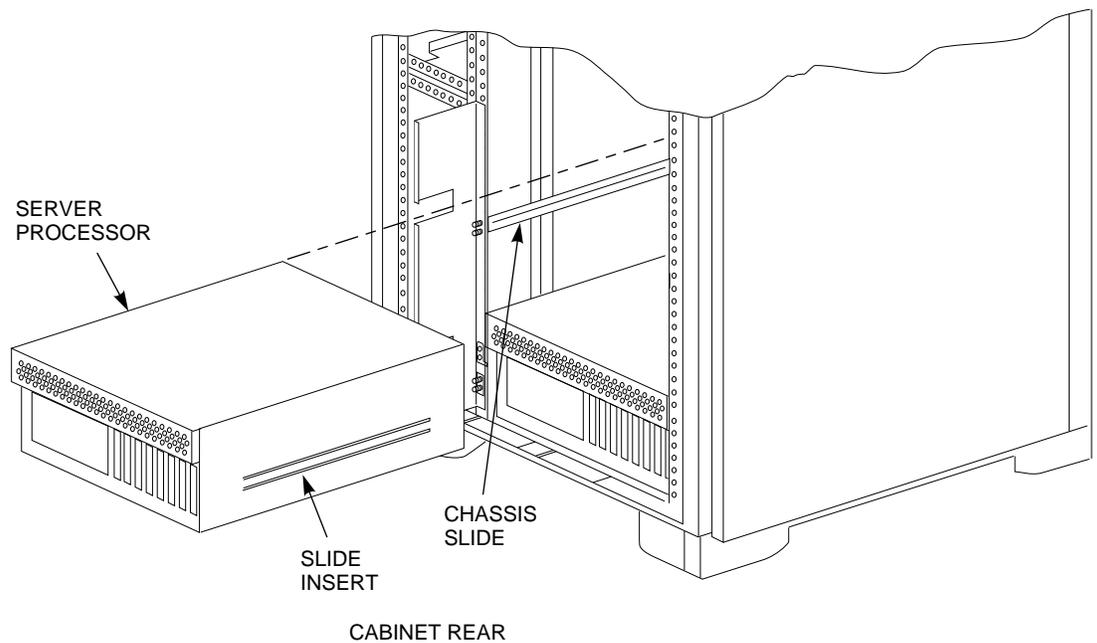
This completes installation of the slide inserts and chassis slides.

## 4.9 Install the New Server Processor on Chassis Slides

Use the following procedure to install the server processor:

1. With the help of a second person, or a lifting device, install the new server processor into the chassis slide from the *rear* end of the cabinet. Align the slide insert on the server processor to the chassis slides in the cabinet and slide the server processor into the cabinet until the insert locks on to the chassis slides (see Figure 4–22).
2. Slide the new server processor out of the front of the cabinet on its slides to easily access the rear top cover panel.

**Figure 4–22 Server Processor Installation**



CXO-4697A-MC

When installed, the server processor should be able to move in both directions.

## 4.10 Install the Second Device Bus Adapter Module in the New Server Processor

For the HS121 upgrade, the new server processor also must have a second device bus adapter module installed.

### CAUTION

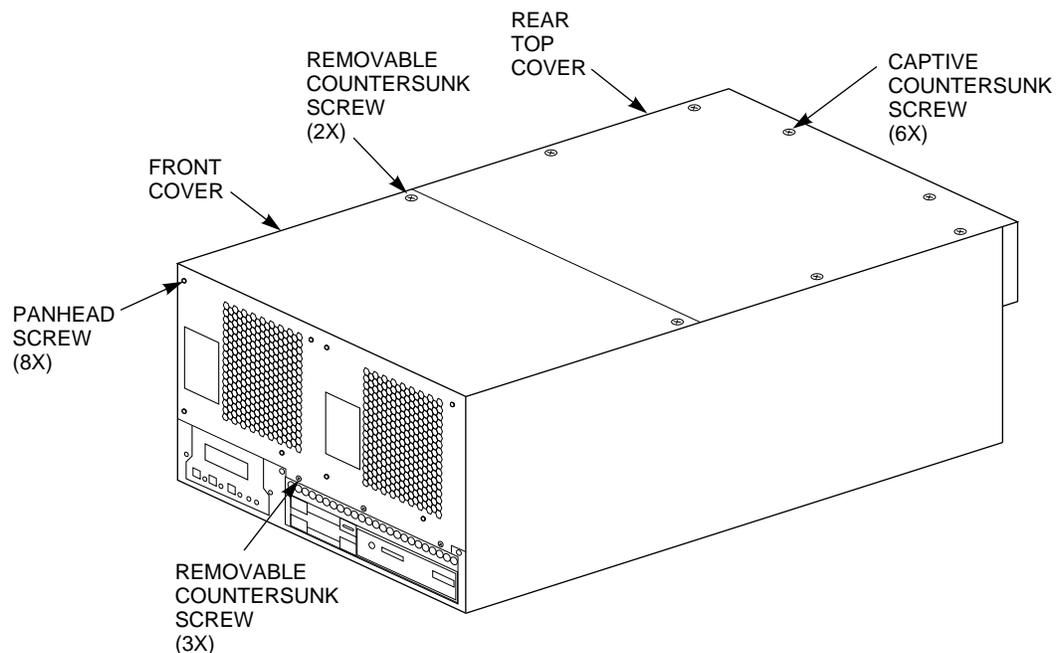
Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.2 for proper grounding procedures.

### 4.10.1 Slide the New Server Processor Out of the FDDI Server Cabinet

Use the following procedure to slide the server processor out of the FDDI Server cabinet:

1. Slide the new server processor out of the front of the cabinet on its slides to easily access the rear top cover panel.
2. Attach an ESD ground strap to the server processor's chassis and the other end of the strap to your wrist.
3. Loosen all the quarter-turn fasteners on the rear top cover using a Phillips screwdriver (see Figure 4-23).
4. Lift off the rear top cover.

Figure 4-23 Removing the Rear Top Cover Panel

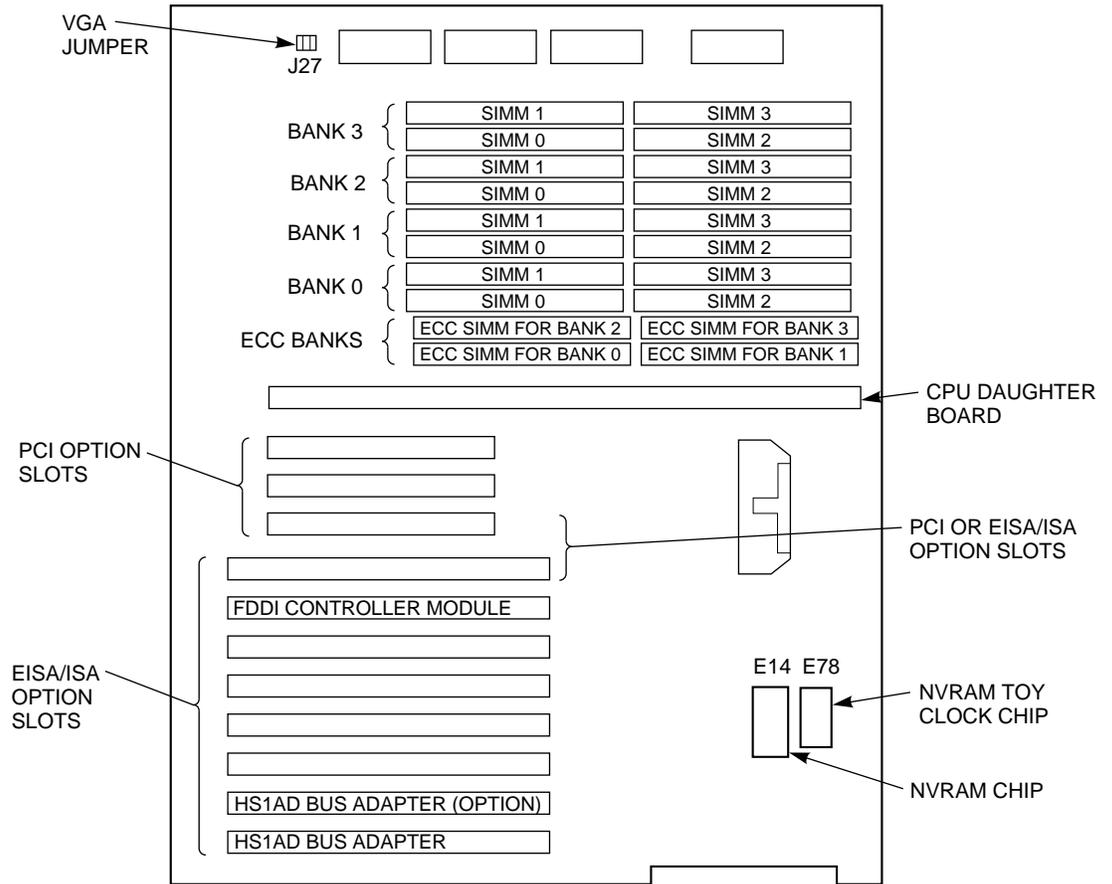


CXO-4725A-MC

## 4.10.2 Install the Device Bus Adapter

Use the following procedure to install the device bus adapter. Figure 4–24 shows the slot position for the second device bus adapter.

**Figure 4–24 Slot Position for Device Bus Adapter**



CXO-4626A-MC

### Note

Though it is possible to use any EISA slot from 2 through 4 when you add a second device bus adapter, Digital recommends that you install the second one in slot 2 next to the first device bus adapter. In Figure 4–24, the slot position of the second device bus adapter is named “HS1AD Bus Adapter (option).”

1. With a Phillips screwdriver, remove the screw that holds the metal slot cover on EISA slot 2. Retain the screws to secure the second device bus adapter in place later.
2. Pull off the metal slot cover.
3. Install the device bus adapter card into EISA slot 2.

4. Secure the device bus adapter by inserting and tightening the screw you retained from the first step in this portion of this procedure.
5. Leave the new server processor pulled out the front of the cabinet.  
The server processor is pulled out for installation of modules later in this chapter.

## 4.11 Change the SCSI Identifier on the New Server Processor's System Disk

You must assign a unique address to each device on a SCSI bus. Typically, the first device on the bus is assigned address 0, the second device is assigned address 1, and so on through address 7.

Every server processor is shipped from the factory with the RZxx system disk SCSI ID (identifier) set to ID 1. Because the original server processor's system disk is already using SCSI ID 1, *the new server processor's system disk ID must be set to a different address*. Use the following procedure to change the ID on the new server processor's system disk from SCSI ID 1 to SCSI ID 0:

---

### CAUTION

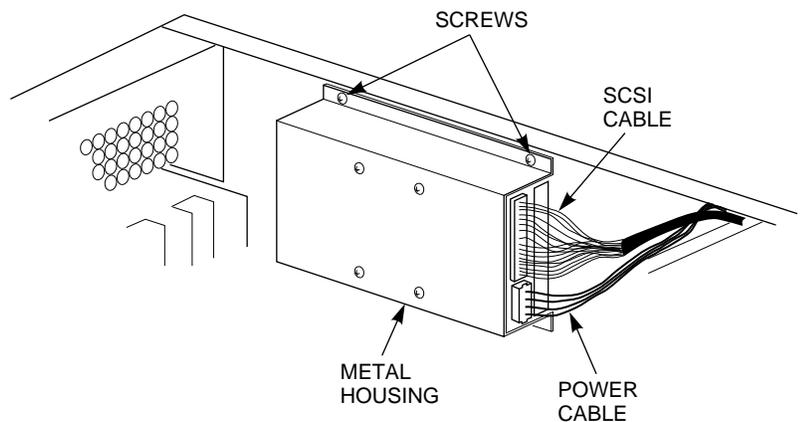
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Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.2 for proper grounding procedures.

---

1. Disconnect the SCSI cable and the power cable that are plugged into the back of the system disk (see Figure 4–25).

**Figure 4–25 System Disk Cabling**



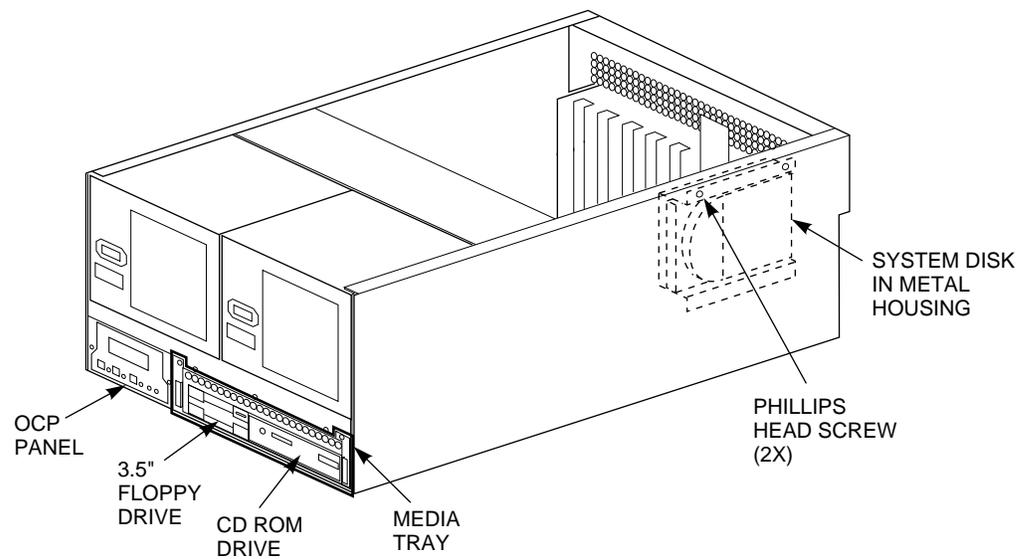
CXO-4702A-MC

- Using a Phillips screwdriver, remove the two screws on the left side panel of the server processor (see Figure 4–26).

**CAUTION**

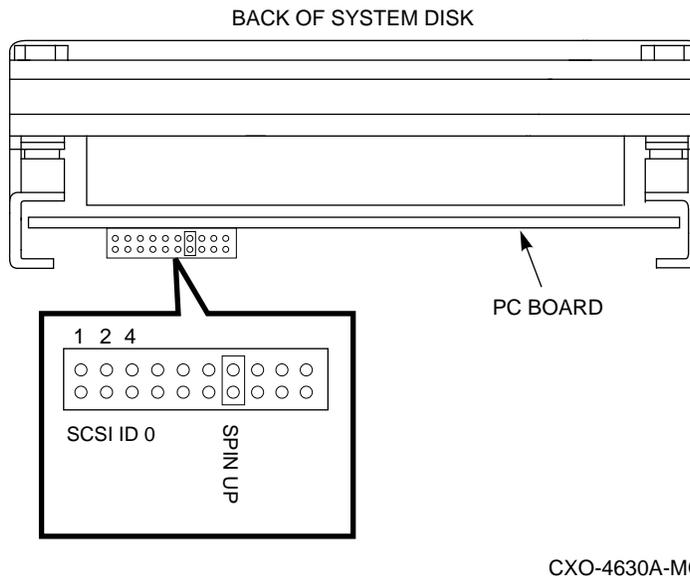
The system disk drive is heavy. Securely hold and support metal housing and system disk drive with one hand when removing the screws so the drive does not drop on the motherboard when the second screw is removed.

**Figure 4–26 System Disk Location**



- Carefully remove the system disk and its metal housing from the inside of the server processor.  
This metal housing is the *disk bracket* that holds the system disk.
- Locate the option connector on the system disk (Figure 4–27). This option connector is a small black 20-pin connector with two white jumpers installed.

**Figure 4-27 System Disk Option Connector and SCSI ID 0**



**CAUTION**

The first three pairs of pins on the option connector are used to set the drive SCSI ID. Do not change any other jumpers on the option connector.

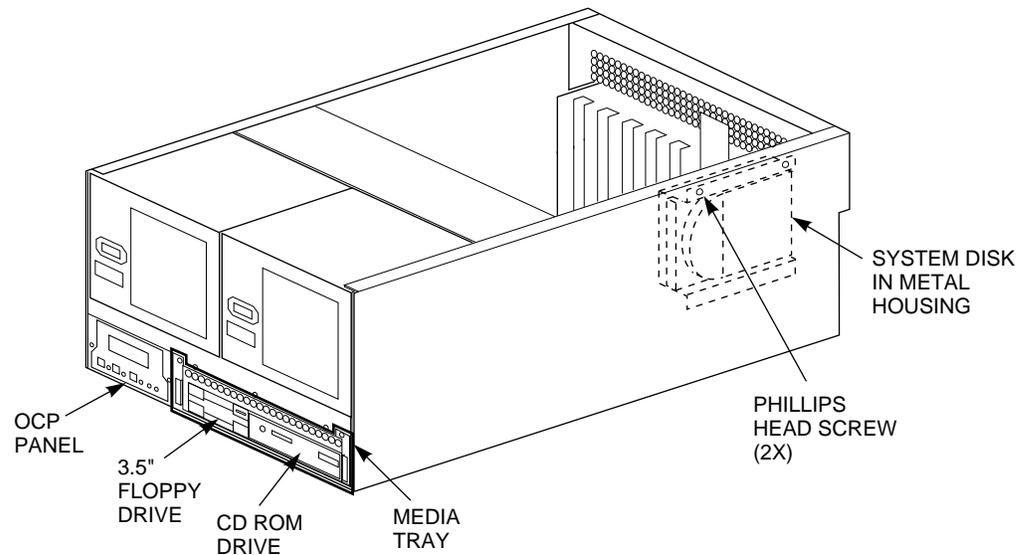
5. Remove the jumper from the first three pairs of SCSI ID pins. Removing this jumper sets the drive to SCSI ID 0 (see Figure 4-27).  
With all SCSI ID jumpers removed, the system disk in this server processor will now show device DKA0 when the SHOW DEVICE command is issued from the DCL prompt.
6. Reinstall the system disk and metal housing into the server processor by mounting it onto the left side panel with the two Phillips screws that were previously removed.
7. Reattach both the SCSI cable and power cables to the system disk (Figure 4-25).

## 4.12 Change the SCSI Identifier on New CD-ROM Drive

Every server processor is shipped from the factory with its RRD43 CD-ROM drive ID set to SCSI ID 5. Since the original server processor's CD-ROM drive is already using SCSI ID 5, *the new CD-ROM drive ID must be set to a different address*. Use the following procedure to change the ID on the new CD-ROM drive to SCSI ID 4:

1. Locate the media tray in the front of the new server processor.
2. Remove the two hex screws that hold the media tray in the new server processor (see Figure 4-28).

**Figure 4–28 Media Tray Location**



CXO-4698A-MC

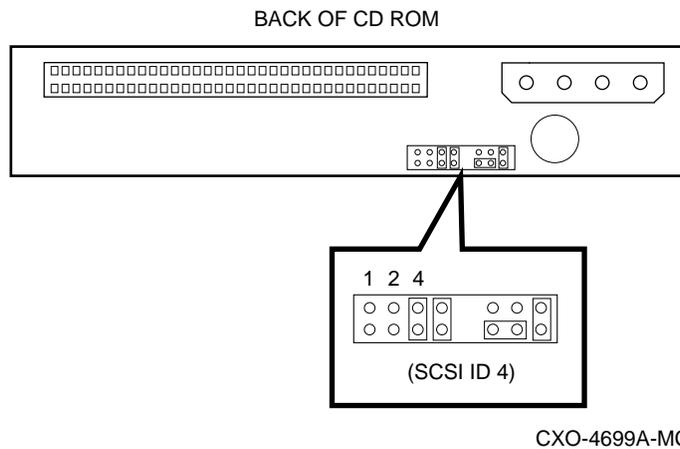
3. Grasp the two metal pull handles on the media tray and pull the tray out of the server processor.
4. Disconnect the SCSI cable and power cable from the back of the CD-ROM drive.
5. Remove the CD-ROM drive from media tray.
6. Locate the option connector on the rear of the CD-ROM drive (see Figure 4–29).

**CAUTION**

The first three pairs of pins on this option connector are used to set the drive SCSI ID. Do not change any other jumpers on the option connector.

7. Remove the black jumper from the pair of pins labeled SCSI ID 1 in Figure 4–29. The CD-ROM drive SCSI ID is now set to SCSI ID 4.

**Figure 4–29 CD–ROM Drive Option Connector and SCSI ID 4**



Slide the unused jumper over the bottom two pins of ID 1 and ID 2 in case you might want to set the CD–ROM drive to another ID at some later time. The RRD43 CD–ROM drive will now appear as DKA400 when the SHOW DEVICE command is issued from the DCL prompt.

8. Reinstall the CD–ROM drive into the media tray, reattach the SCSI and power cables, and slide the media tray back into the server processor.
9. Secure the media tray back onto the server processor by reinserting the two screws you previously removed (see Figure 4–28).

### 4.13 Complete Installation of Both Server Processors

Use the following procedure to complete the installation of the server processors:

1. Reinstall top rear cover panel on new server processor. Tighten all the quarter-turn fasteners on the rear top cover panel.
2. Slide the new server processor back into the cabinet.

---

**Note**

The metal locking tab on the chassis slide insert locks when the server processor is part way into the cabinet. To push the server processor completely into the cabinet, depress the metal locking tab to release the slide and allow full movement of the server processor.

---

3. If they are not already installed, install left and right shipping brackets for the original server processor at hole positions 53 and 54 on both *rear* vertical rails (see Figure 4–30).

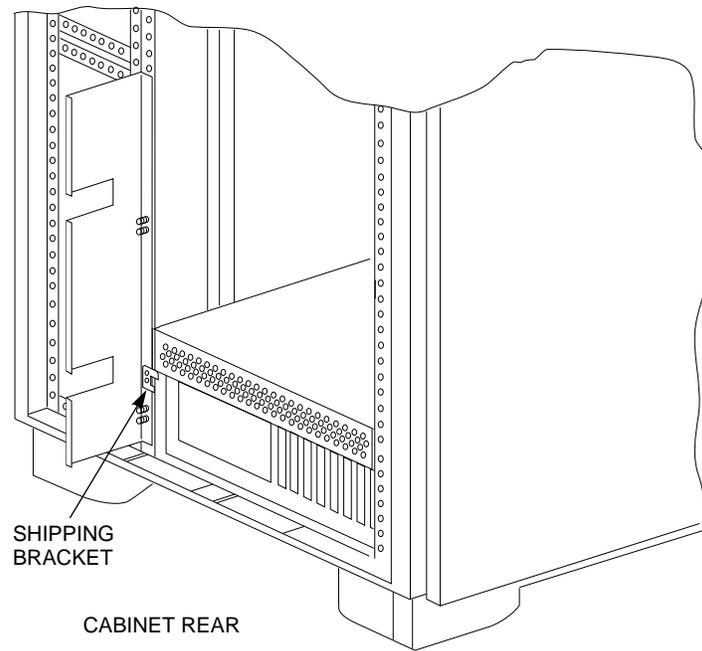
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**Note**

The flat side of each shipping bracket must face out out when installed. These shipping brackets are used to keep the server processor from sliding during shipping or when the cabinet is moved.

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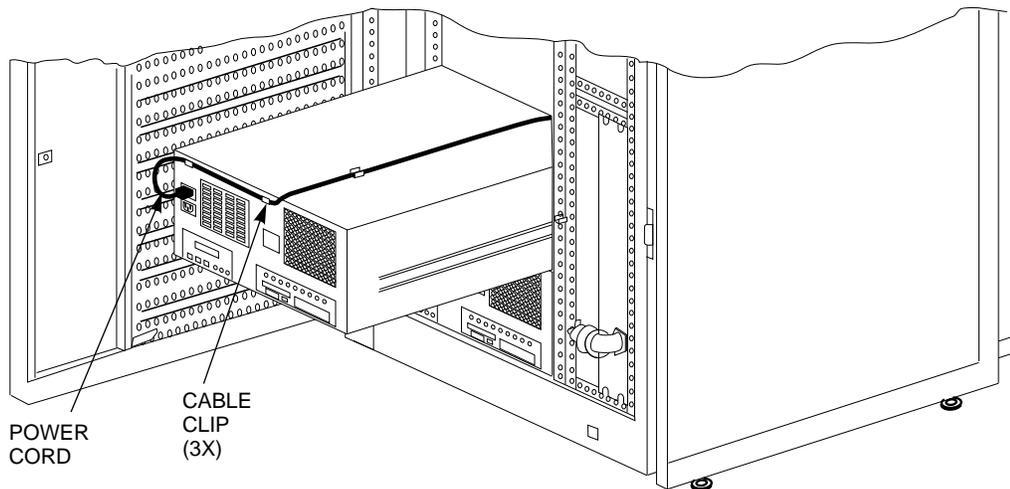
**Figure 4-30 Shipping Brackets**



CXO-4706A-MC

4. Tighten all screws.
5. Slide the new server processor back into the cabinet.
6. Attach three adhesive-backed cable clips (as shown in Figure 4-31) to the new server processor.  
Two clips are attached to the front of the server processor; the third clip is attached to the top as shown in Figure 4-31.

**Figure 4–31 Server Processor Cable Clip Installation**



CXO-4818A-MC

7. Connect the power cord to the front of the new server processor and route it neatly back to the CDU.

Use the three cable clips to route the power cord over the server processor and hold the cord as shown in Figure 4–31. Make a service loop to ensure the power cords do not rub against the rails when you slide the server processor in and out of the cabinet. Secure the power cords to the vertical rail near the CDU with tie wraps.

8. Install left and right shipping brackets for the new server processor at hole positions 42 and 43 on both *rear* vertical rails.

---

**Note**

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The flat side of each shipping bracket must face out when installed. These shipping brackets are used to keep the server processor from sliding during shipping or when the cabinet is moved.

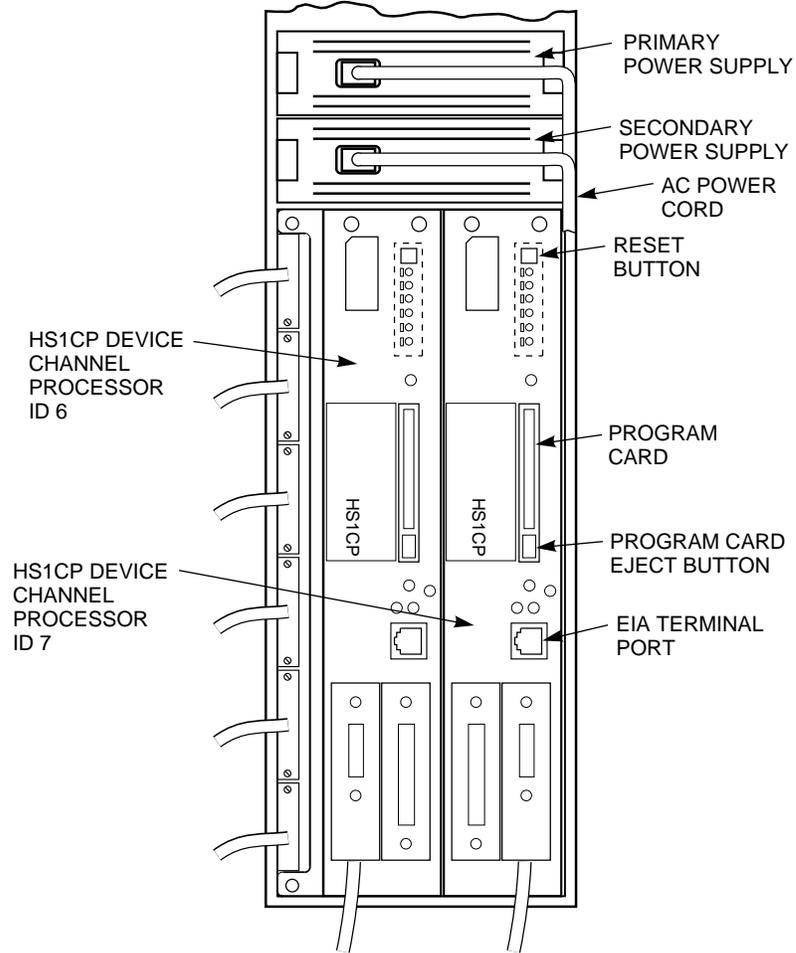
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9. Tighten all screws.
10. Replace the cabinet side panels and top cover by reversing the procedures described in Section 4.1.

#### **4.14 Install Internal Bus Cables for the New Server Processor**

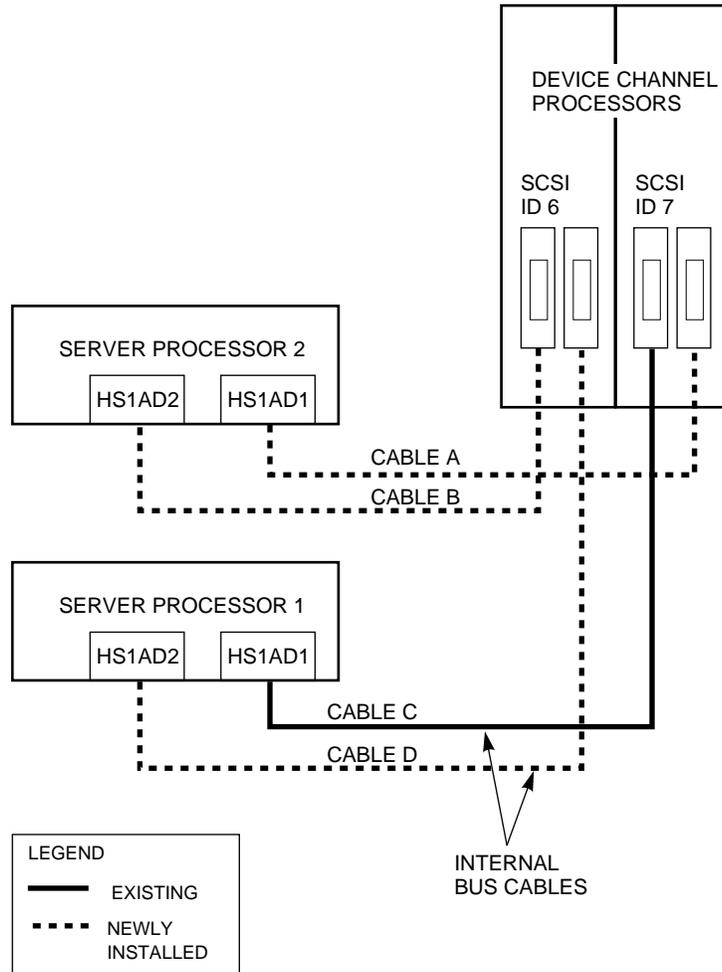
Use the following procedure to connect internal bus cables and terminators to the new server processor. Refer to Figures 4–32 and 4–33 during the following procedure.

Figure 4-32 Device Channel Processor



CXO-4614A-MC

Figure 4–33 Cabling Diagram for HS121



CXO-4703A-MC

1. Carefully attach an internal bus cable from the open tralink connector in slot 7 to the first device bus adapter (HS1AD1) in the new server processor (Server Processor 2). Make sure the tralink connector pins are not bent or damaged.

This is identified as Cable A in Figure 4–33.

#### CAUTION

Currently, component damage can result if internal bus cables are connected or disconnected with power applied, *unless* the mating guide (Digital part number 74–49066–01) is installed around the outside edge of your HS1CP port connector. HS1CP modules are shipped from the factory with the mating guide and the tralink connector block premounted on the HS1CP port connector.

Be aware that the tralink connector block (Figure 4–19) is the interface between the HS1CP device channel processor and other internal bus cable connections. It is the *trilink* that you can disconnect and connect safely when you have a mating guide installed. In a power-on situation, you

must work around any internal bus cable or terminator connections to the trilink *without* disconnecting them.

Some internal bus cable and terminator connectors do not provide enough access to the trilink screws for you to disconnect the trilink (without first disconnecting the cable and/or terminator). In these cases, you must disconnect power from all bus members and disconnect cables and terminators before disconnecting the trilink connector block.

---

2. Carefully attach an internal bus cable from the open trilink connector in slot 6 to the second device bus adapter (HS1AD2) in the new server processor (Server Processor 2). Make sure the trilink connector pins are not bent or damaged.

This is identified as Cable B in Figure 4–33.

3. Switch the circuit breakers on both CDUs to ON (I).
4. Depress power buttons on front of both server processors.

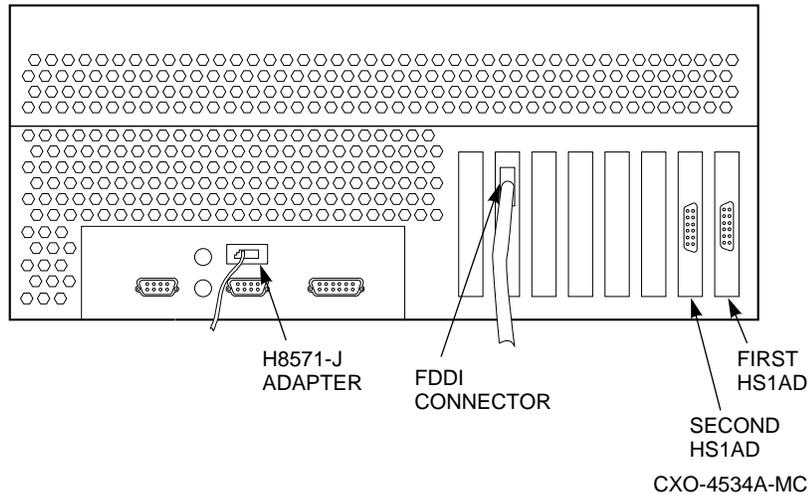
## 4.15 Connect the Terminal to the Original Server Processor

Communicating with the server processor requires that you connect a terminal to it. Any terminal that supports ANSI control sequences can be used, including graphics displays that provide emulation of an ANSI compatible video terminal.

Use the following procedure to connect a terminal to the original server processor:

1. Plug the terminal's power cord into a proper wall socket.
2. Make sure the power switch on the back of the terminal is OFF (O).
3. Connect one end of the terminal cable to the back of the terminal.
4. Connect the other end of the terminal cable to the EIA terminal port on the rear of the original server processor using the female MMJ adapter (part number H8571–J) as shown in Figure 4–34.

**Figure 4–34 Connecting Terminal to the H8571–J Adapter on the Server Processor**



5. Turn the terminal power switch to ON (I).
6. Set the terminal's communication setup to 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.
7. Your terminal screen displays the DCL prompt (\$) when your server is up and running.

## 4.16 Run the EISA Configuration Utility (ECU) for the Original Server Processor

Whenever you add, remove, or move an EISA option, you need to run a utility called the EISA Configuration Utility (ECU). The ECU and a configuration file (CFG) for the device bus adapter are located on the diskette included with the FDDI Server's software kit. The ECU uses the CFG file to allocate system resources and create a conflict-free configuration. This configuration information is saved to your server's nonvolatile memory.

---

### Note

---

As previously indicated, in most cases, the CFG file for the device bus adapter is located on the ECU diskette that is shipped with your server. If the file is not found, the ECU program prompts you to insert the CFG diskette (AK-Q767A-CA) shipped with the device bus adapter option.

---

The ECU allows you to set device bus adapter parameters, as described in Section 4.16.1.

## 4.16.1 How to Run the ECU

Use the following procedure to run the ECU:

---

### Note

---

If you do not set your terminal as described in the following procedure, the keyboard does not function correctly with the ECU. Your terminal mode setup must be set to 7-bit mode.

Check the communication setup and make sure it is set to 9600 baud, 8 bit, one stop bit, and no parity.

---

1. If the terminal is not already displaying the >>> prompt, power cycle the server processor OCP. When the >>> prompt appears on the terminal screen, the self test is complete.
2. Insert the ECU diskette into the floppy diskette drive.
3. Type ECU and press the Return key at the >>> prompt. The system loads the ECU software.
4. During loading, press Return to respond to system questions until the software displays the menu shown in the following example:

```
EISA Configuration Utility
Steps in configuring your computer

STEP 1: Important EISA configuration Information
STEP 2: Add or remove boards
STEP 3: View or edit details
STEP 4: Examine required details
STEP 5: Save and exit

>Select=ENTER< <Cancel=ESC>
```

5. Use the down arrow key to select the "STEP 3: View or edit details" option (shown in the previous example) and press the Enter key.
6. Use the down arrow key to scroll through the file until you find the device bus adapter option and its slot number. The display lists the current settings, as shown in the following example:

```
Step 3: View or edit details

Slot 7 -- Digital device bus adapter internal bus EISA Host Adapter   Added
Host Adapter Interface.....Trigger EDGE
Host Adapter IRQ.....IRQ 15
Host Adapter internal bus ID.....Device ID 7

Slot 8 -- Digital device bus adapter internal bus EISA Host Adapter   Added
Host Adapter Interface.....Trigger EDGE
Host Adapter IRQ.....IRQ 14
Host Adapter internal bus ID.....Device ID 7
```

---

### Note

---

The IRQ and device ID of the device bus adapter are automatically set to the default values by the ECU. The previous display shows that the

server processor contains one device bus adapter with a device ID of 7 and an IRQ of 15, and another device bus adapter with a device ID of 7 and an IRQ of 14.

---

7. To change the settings (Step 3, “edit details”), use the down arrow key to select the options you want to change and press the Return key.
8. **Set both device bus adapters to SCSI ID 7.**
9. When you have finished with the option settings, enter Ctrl/[ (control left bracket). A main menu similar to the following displays:

```
EISA Configuration Utility
Steps in configuring your computer

STEP 1: Important EISA configuration Information
STEP 2: Add or remove boards
STEP 3: View or edit details
STEP 4: Examine required details
STEP 5: Save and exit

>Select=ENTER< <Cancel=ESC>
```

10. Use the arrow key to select “Step 5: Save and exit” (see the example above) and press the Enter key. The display shows that your configuration is saved.
11. Press Enter again, and the >>> prompt displays.
12. Remove the ECU diskette from the floppy diskette drive.
13. Power cycle the server processor (depress power button on the server processor twice: once to turn it off and again to restart the system). After the system performs the self test, the >>> prompt displays.

#### 4.16.2 Verifying Your Installation

Use the following procedure to verify your installation of the HS1AD device bus adapter:

1. At the >>> prompt, enter SHOW CONFIG, and press Return. A screen display similar to the following appears:

```
Firmware
SRM Console:  V3.0-1
ARC Console:  4.6
PALcode:     VMS PALcode X5.48-49, OSF PALcode X1.35-59
Serial Rom:   V1.1

Processor
DECchip (tm) 21064-2

MEMORY
  64 Meg of System Memory
  Bank 0 = 32 Mbytes (8 MB Per Simm) Starting at 0x00000000
  Bank 1 = 32 Mbytes (8 MB Per Simm) Starting at 0x02000000
  Bank 2 = No Memory Detected
  Bank 3 = No Memory Detected

PCI Bus
  Bus 00 Slot 06: NCR      810 Scsi Controller
                        pka0.7.6.0          SCSI Bus ID 7
                        dka100.1.0.6.0      RZ28B
                        dka400.4.0.6.0      RRD43
```

Bus 00 Slot 07: Intel 8275EB PCI to Eisa Bridge

**EISA Bus Modules (installed)**

Slot 3	DEC3002	fra0.0.0.3.1	08-00-2B-A5-CC-93
Slot 7	DEC2E00		
Slot 8	DEC2E00		

2. If your newly installed HS1AD appears in slot 07, your installation is successful.

If slot 07 does not display on your terminal screen, the second HS1AD device bus adapter is not being recognized by the server processor. Consult the *StorageWorks Solutions FDDI Server HS1xx Service Manual*.

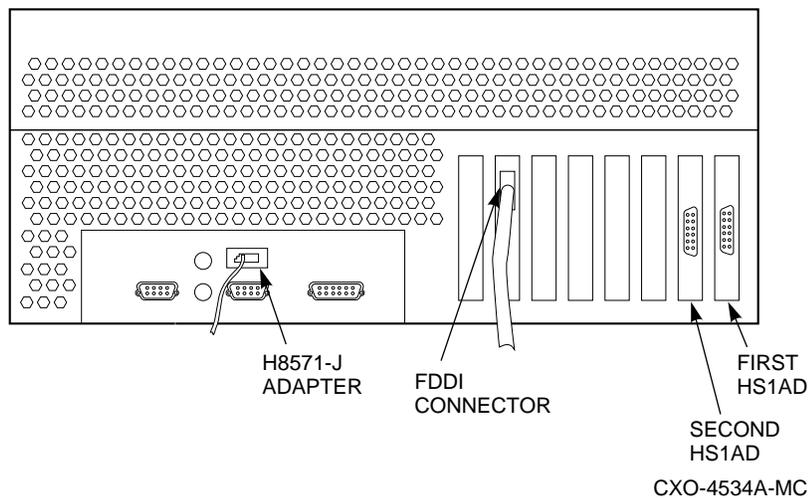
3. Leave the server processor at the >>> prompt.

## 4.17 Connect the Terminal to the New Server Processor

Use the following procedure to connect a terminal to the new server processor:

1. Plug the terminal's power cord into a proper wall socket.
2. Make sure the power switch on the back of the terminal is OFF (○).
3. Connect one end of the terminal cable to the back of the terminal.
4. Connect the other end of the terminal cable to the EIA terminal port on the rear of the new server processor using the female MMJ adapter (part number H8571-J) as shown in Figure 4-35.

**Figure 4-35 Connecting Terminal to the H8571-J Adapter on the Server Processor**



5. Turn the terminal power switch to ON (●).
6. Set the terminal's communication setup to 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.
7. Your terminal screen displays the DCL prompt (\$) when your server is up and running.

## 4.18 Run EISA Configuration Utility (ECU) for New Server Processor

Run the EISA Configuration Utility and verify your HS1AD installation as described in Section 4.16.

---

**Note**

Set both device bus adapters to SCSI ID 6.

---

## 4.19 Connect the Terminal to the New Device Channel Processor

The following sections describe how to connect a terminal to the EIA terminal port of the HS1CP device channel processor in slot 6 and to set device configurations.

1. Make sure the power switch on the back of the terminal is OFF (○).
2. Connect one end of the terminal cable to the back of the terminal.
3. Connect the other end of the terminal cable to the EIA terminal port on the front of the device channel processor (see Figure 3–25).
4. Turn the terminal power switch to the ON (⌘) position.
5. Set the terminal at 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.
6. Press the Return key if no prompt is visible on the screen. This brings you to the device channel processor's command line interpreter (CLI) prompt.

## 4.20 Set Initial Parameters of the Device Channel Processor

Use the following procedure to set the initial parameters of the device channel processor:

1. Set the HS1CP device channel processor node name:

```
CLI> SET THIS_CONTROLLER SCS_NODENAME="HS1CP2"
```

2. Enable the path from the HS1CP device channel processor to the server processor with the following command:

```
CLI> SET THIS_CONTROLLER PATH
```

3. Set the device channel processor identification:

```
CLI> SET THIS_CONTROLLER ID=2
```

4. Set the prompt:

```
CLI> SET THIS_CONTROLLER PROMPT="HS1CP2"
```

This completes the setting of initial parameters. Although the “Restart this controller” message has been displayed, do not restart the module now. The restart will be performed in a later step.

## 4.21 Install the Write-Back Cache License Key

Complete the procedure described in Section 3.13 to install a new *license key* for the write-back cache feature.

---

### Note

---

The prompt and screen identifier for the new device channel processor will be HS1CP2.

---

## 4.22 Configure Storage for the Second Device Channel Processor

For a model HS121 or a model HS111 FDDI Server with dual-redundant device channel processors and no additional storage, use the following procedure to copy the storage configuration from one device channel processor to another:

1. Make sure the terminal is displaying the HS1CP2> prompt.
2. Copy the configuration from HSCP1 to the newly installed HSCP2 with the following command:

```
HS1CP2> SET FAILOVER COPY = OTHER
```

The following messages appear:

```
Restart of this controller required.  
Restart of the other controller required.
```

3. Restart the other HS1CP device channel processor with this command:

```
HS1CP2> RESTART OTHER
```

The following messages appear:

```
Received LAST GASP message from other controller, Fail Code: 08080000  
HS1CP2>  
%PAx0, Software is Closing Virtual Circuit -- REMOTE NODE HS1CPx
```

4. Restart the HS1CP device channel processor to which you are currently connected with this command:

```
HS1CP2> RESTART THIS
```

The following messages appear:

```
%PAx0, Software is Closing Virtual Circuit -- REMOTE NODE HS1CPx  
%HSCPAD-F-NOLOCXE, Local program not executing  
-SYSTEM-F-VCBROKEN, virtual circuit broken  
%HSCPAD-S-END, Control returned to node XXXXXX
```

At this time, your connection to HS1CP2 is broken and you cannot communicate with the device channel processor until it completes its restart.

---

### Note

---

Restart is complete when you can press the Return key and the HS1CP> prompt appears on the terminal screen.

---

5. When restart is complete and the HS1CP2> prompt appears, enter the following command:

```
HS1CP2> SHOW THIS
```

This command displays information about the current device channel processor (HS1CP2). From the display, note parameter settings (for example, MSCP\_ALLO).

6. Enter the following command:

```
HS1CP2> SHOW OTHER
```

This command displays information about the other device channel processor. From the display, note parameter settings (for example, `MSCP_ALLO`).

Also note the disk and tape allocation class values. These values will be used in the next section to customize the operating system on the new server processor.

7. Verify that the information displayed for both device channel processors matches.
8. To show information about the storage media, enter the following command:

```
HS1CP2> SHOW DEVICE
```

A device list similar to the following displays:

dka100.1.0.6.0	DKA100	RZ28 D41C
dka500.4.0.6.0	DKA400	RRD43 1084
dva0.0.0.0.1	DVA0	
fra0.0.0.2.1	FRA0	08-00-2B-B0-4B-F0
pka0.7.0.6.0	PKA0	SCSI Bus ID 7

The devices on the system are identified by the “dka” prefix. In this example, the SCSI ID for the CD-ROM drive (RRD43) is DKA400 and the SCSI ID for the RZ28 system disk is DKA100.

## 4.23 Customize the Operating System on the New Server Processor

The OpenVMS Alpha operating system in the new server processor must be customized with your site-specific parameters. Use the following procedure to accomplish this task:

1. Connect the terminal to the new server processor as described in Section 4.17.

2. Type BOOT at the >>> prompt.  
This action will cause the server processor to boot from the system disk and enter the Software Customization Procedure.
3. Perform the Software Customization Procedure as described in the *StorageWorks Solutions StorageWorks FDDI Server Installation Guide*.  
Be sure to enter the same parameters for cluster group number, cluster password, and so forth for the new server processor as you used on the original server processor. Be sure to enter the same disk and/or tape allocation class that has been assigned to the HS1CP device channel processors; see the printout you created in Section 4.22 for the correct value.
4. When the Software Customization Procedure completes, the server processor will automatically reboot and prompt you to log in to the system manager's account.

## 4.24 Integrate the New Server Processor Node into the VMScLuster System

After you have customized the OpenVMS Alpha operating system parameters and configured the storage system, you can complete the installation by connecting the server to the FDDI interconnect and by completing a few additional tasks. In addition, there are other optional postinstallation tasks that you may want to complete.

### 4.24.1 Connecting to the FDDI Interconnect

After the software customization and storage configuration have been completed, you can connect the StorageWorks FDDI Server to the FDDI interconnect and boot the server so that it becomes a member of the cluster containing the client nodes. Perform the following steps to accomplish the task:

1. Shutdown the StorageWorks FDDI Server OpenVMS Alpha operating system as follows:
  - a. Log in to a privileged account such as the system manager account established earlier.
  - b. Execute the system shutdown command file. For example, entering the following command invokes a system shutdown:  

```
$ @SYS$SYSTEM:SHUTDOWN
```
  - c. Answer the questions asked during the server's execution of the shutdown command file and wait until the system has completed a logical shutdown.
2. Connect the StorageWorks FDDI Server to the FDDI interconnect as follows:
  - a. Remove the dust covers attached to the FDDI connections of the StorageWorks FDDI Server.
  - b. Place the dust covers in a protective container such as a resealable plastic bag. Place the container in a safe place for later use if you disconnect the StorageWorks FDDI Server from the FDDI interconnect.
  - c. Connect the StorageWorks FDDI Server to the FDDI interconnect.

3. Cycle power for the server processor by pressing its power switch off and then on again. After the power-on self-tests complete and the system prompt >>> appears, type B to reboot the system.

As the StorageWorks FDDI Server boots, it will automatically request membership in the cluster containing the client nodes. On completion of the boot process, the StorageWorks FDDI Server will be able to serve its storage devices to the client nodes.

#### 4.24.2 Preparing for Operations

At this point, you have set the StorageWorks FDDI Server operating system parameters, configured your StorageWorks storage devices, and connected the StorageWorks FDDI Server to your VMScluster FDDI interconnect.

#### 4.24.3 Accessing Necessary Documentation

Before completing the StorageWorks FDDI Server installation procedure, you may want to access and print some documentation provided on the server system disk. For example, if this is the first Alpha-based node joining your cluster, you should print the *OpenVMS Alpha Version 6.1 Upgrade and Installation Manual*, located on the StorageWorks FDDI Server's system disk. This manual provides detailed information on system halt, shutdown, and boot procedures.

When needed, take these steps to print the documentation:

1. Copy the appropriate document from SYSSYSDEVICE (the server's system disk) to one of the devices on the server that can be accessed by another VMScluster node.
2. From another VMScluster node, print the file on an available printer.

#### 4.24.4 Ensuring VMScluster System Compatibility

After installing the StorageWorks FDDI Server software, there remain some tasks that will ensure the system operates correctly in the cluster. The required tasks are as follows:

- Install the Volume Shadowing Interoperability Kit (I14Y) on VAX and/or Alpha nodes in your cluster as appropriate. See the release notes (*AXPSHADnn-061.RELEASE\_NOTES* and *VAXSHADnn-061.RELEASE\_NOTES* where *nn* refers to the version) found on the server's system disk for reference information.
- Update other nodes in the cluster as required by any changes to the quorum scheme caused by installation of the StorageWorks FDDI Server. You must update the EXPECTED\_VOTES value in each cluster member's MODPARAMS.DAT file, then run AUTOGEN on each node followed by shutting down and rebooting the cluster. For example, if you add an HS121 and a quorum disk, then each cluster member will need to have its EXPECTED\_VOTES parameter increased by 3. See *VMScluster Systems for OpenVMS* for additional information on quorum issues.
- Run AUTOGEN on the server to update cluster parameters.

#### 4.24.5 Ensuring Viability of the Write-Back Cache

The write-back cache module installed in your StorageWorks FDDI Server contains batteries that were completely charged at the factory. It is normal for these batteries to discharge slightly in shipment.

The server's write-back cache and RAID features require fully-charged batteries to maintain absolute data integrity. After installation, these advanced features may not be available until the batteries have had an opportunity to completely recharge. The charging process may take up to 4 hours to complete.

#### 4.25 Boot the Original Server Processor

Use the following procedure to boot the original server processor:

1. Connect the terminal to the original server processor as described in Section 4.17.
2. Type BOOT at the >>> prompt.  
This action causes the original server processor to boot from the system disk and join the VMSccluster, completing the installation of the HS121 FDDI Server.
3. If the addition of the second server processor node has resulted in changes to the cluster quorum scheme, be sure to update the other nodes in the cluster, including the original server processor.

#### 4.26 Verify the VMSccluster Membership

Connect the terminal to the new server processor and enter the SHOW CLUSTER command. Use the resulting display to verify that both nodes of the HS121 FDDI Server have joined the VMSccluster. You may also want to enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see both nodes of the HS121 FDDI Server.

#### 4.27 Supporting and Operating the StorageWorks FDDI Server

Once the model HS121 StorageWorks FDDI Server has been installed, you may want to perform various system management tasks to customize the system and to conform the new server processor to the setup previously created on the original server processor. See the *StorageWorks Solutions StorageWorks FDDI Server Installation Guide* for details on supporting and operating the StorageWorks FDDI Server.

---

## Configuration Rules and Restrictions

### A.1 BA350-Series Shelf Configuration Rules

The following configuration rules apply to the arrangement of BA350-series controller and storage shelves.

BA350-series shelves can be arranged in any SCSI-2 legal configuration, subject to the following rules:

- No more than a single extension from one BA350-S shelf is permitted.
- The two BA350-series storage shelves must be physically adjacent to each other.
- Mixing 5¼-inch SBBs and 3½-inch SBB is permitted per StorageWorks configuration rules.
- Half-rack/full-depth devices, for example all TZ867 tapes, must be on their own port and cannot be connected as an extension from a BA350-S shelf. Only two such devices (maximum) can be configured per controller port, and those devices must be physically adjacent to each other at the top of the cabinet.
- When using a 1.0 meter cable with a device channel processor in the lower controller shelf position (C1) in the front of the cabinet, all front-mounted shelves can be reached. The 2.0 meter cable reaches all shelves, but does not permit shelf jumpering.

Figure A-1 shows an example of storage shelves in a single extension configuration.

**Figure A-1 Single Extension from Storage Shelf to Storage Shelf**

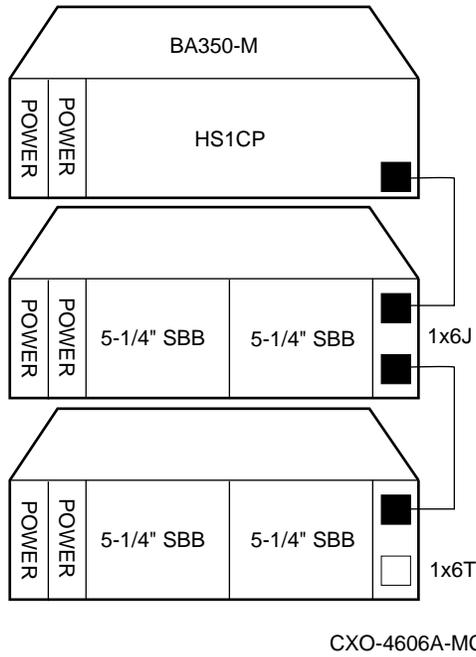
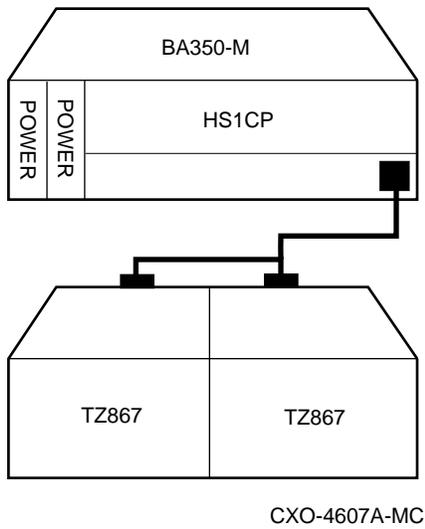


Figure A-2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

**Figure A-2 Adjacent Devices on a Single Port**



## A.1.1 Typical and Recommended 3½-Inch and 5¼-Inch SBB Configurations

The following sections describe recommended device configurations for 3½-inch and 5¼-inch SBBs.

---

### Note

---

Mixing disk SBBs and tape SBBs on the same controller port is permitted, provided all other configuration rules are also obeyed.

---

### Conventions

The following describes the conventions used in the following sections. These are to help you determine the possible devices in each shelf and the number of possible devices in similarly configured shelves:

$(n)m*oT$

or

$(n)m*oJ$

### Where:

$n$  is the number (in parentheses) of storage shelves of this type

$m$  is the number of SCSI-2 connections to a storage shelf

$*$  is the symbol used for multiply

$o$  is the number of devices on each SCSI-2 connection

$T$  indicates the storage shelf is terminated

$J$  indicates the storage shelf is jumpered

According to the formula:

$m * o$  is the possible number of devices in each shelf

$n * m * o$  is the possible number of devices in similarly configured shelves

### A.1.1.1 3½-Inch SBB Restrictions

There are no restrictions for adding 3½-inch SBBs to a configuration. Refer to your product-specific SPD and release notes for a list of supported device types.

### A.1.1.2 3½-Inch SBB Recommended Configurations

Table A–1 lists some recommended configurations for 3½-inch SBBs.

**Table A–1 3½-Inch SBB Configurations, HS1CP Device Channel Processor**

Number of Devices	Number of BA350–S Shelves*	Configure as**	Available as 3½-Inch SBBs***	Ports Used
1-2	1	(1)2x3T	5-4	1-2
3-4	2	(2)2x3T	9-8	3-4
5-18	3	(3)2x3T	13-0	5-6
19-24	4	(2)2x3T	5-0	6
		(2)1x6T		
25-30	5	(1)2x3T	5-0	6
		(4)1x6T		
31-36	6	(6)1x6T	5-0	6
37-42****	6	(6)1x7T	5-0	6

#### Key for Table Conventions

2x3T refers to two (split) SCSI–2 connections, separately terminated in the shelf. The devices appear as IDs 0, 2, 4, and 1, 3, 5.

1x6T refers to a single path SCSI–2 connection terminated in the shelf. The devices appear as IDs 0 through 5.

1x7T refers to a single path SCSI–2 connection terminated in the shelf. The devices appear as IDs 0 through 6.

Parentheses () around a number indicates the number of storage shelves.

T indicates that the shelf is terminated.

\* Consult *StorageWorks Solutions Shelf and SBB User's Guide* for BA350-series storage shelf information.

\*\* Each BA350–S shelf's upper SCSI–2 port connector is cabled to a controller port. The lower SCSI–2 port connector is attached to a controller port for 2x3T configurations and is unused for a 1x6T or 1x7T.

\*\*\* Available for future expansion.

\*\*\*\* Nonredundant device channel processor and power only (not recommended).

### A.1.1.3 5¼-Inch SBB Restrictions

The following restrictions apply when using 5¼-inch SBBs in your configuration. Refer to your model-specific SPD and release notes for a list of supported device types:

- A maximum of two 5¼-inch SBBs are allowed per port (in a single shelf), or four 5¼-inch SBBs per port (in adjacent jumpered shelves).

No more than four 5¼-inch SBBs are allowed on a single port. That would take three shelves, which cannot be configured within SCSI-2 cable limits.

- Mixing 5¼-inch and 3½-inch SBBs is permitted using up to six devices per port (maximum of two shelves), with no more than three 5¼-inch SBBs.

You can use two 5¼-inch SBBs and four 3½-inch SBBs in two BA350-S shelves, or one 5¼-inch SBB and four 3½-inch SBBs in one BA350-S shelf.

- When using jumpered shelves, only five jumpered-pair shelves (for a total of 10 shelves) can be used within each SW800-series cabinet. The sixth port is left unused. Alternately, four jumpered ports permit two single-shelf connections on the remaining two controller ports, which is preferable.

This is permitted only in the lower front of the cabinet from the C1 device channel processor position. Five such ports can take up to a maximum of 10 front shelf locations, with no allowance for cable access to shelves or devices in the rear of the SW800-series cabinet.

A more balanced configuration consists of four 5¼-inch SBBs on each of four ports and two ports each with two 5¼-inch SBBs.

- When five ports have doubled shelves for 5¼-inch SBBs (4+2), TZ8x7 tapes cannot be connected or even mounted in the cabinet because all or most (front) shelf locations are needed for the 5¼-inch SBBs.

#### A.1.1.4 5¼-Inch SBB Recommended Configurations

Table A–2 lists some recommended configurations for 5¼-inch SBBs exclusively.

**Table A–2 5¼-Inch SBB Configurations, HS1CP Device Channel Processor**

Number of Devices	Number of BA350–S Shelves*	Configure as	Available for 5¼-Inch SBBs**	Ports Used
1-2	1	(1)2x3T	1-0	1-2
3-4	2	(2)2x3T	1-0	3-4
5-6	3	(3)2x3T	1-0	5-6
7-8	4	(2)1x6T (2)2x3T	1-0	6
9-10	5	(4)1x6T (1)2x3T	1-0	6
11-12	6	(6)1x6T	1-0	6
13-14***	7	(6)1x6T (1)1x6J	1-0	6
15-16***	8	(6)1x6T (2)1x6J	1-0	6
17-18***	9	(6)1x6T (3)1x6J	1-0	6
19-20***	10	(6)1x6T (4)1x6J	1-0	6

#### Key for Table Conventions

Each BA350–S shelf has its upper connector cable attached to either the adjacent BA350–S shelf's lower connector (1x6J), or a controller port connector (2x3T or 1x6T).

The lower connector cable is attached to either an adjacent BA350–S shelf's upper connector (1x6J, as in the first list item), controller port connector (2x3T), or is unused (1x6T).

Parentheses () around a number indicate the number of storage shelves.

T indicates the shelf is terminated.

J indicates the shelf is not terminated and jumpered to the next shelf.

\* Consult the *StorageWorks Solutions Shelf and SBB User's Guide* to configure BA350-series storage shelves.

\*\* Available for additional 5¼-inch device.

\*\*\* When used with the device channel processor in the C1 position in an SW800-series cabinet.

### A.1.1.5 Mixing 5¼-Inch and 3½-Inch SBBs

Use these guidelines for mixing 5¼-inch and 3½-inch SBBs:

- Treat each 5¼-inch SBB as three 3½-inch SBBs.
- Each 5¼-inch SBB must have its SCSI-2 ID set manually using the address switch on the rear of the SBB or by setting the switch to automatic and letting the slot connector dictate the device address. (Refer to the *StorageWorks Solutions Shelf and SBB User's Guide*.)
- A 5¼-inch SBB can be located in the same shelf with three or four 3½-inch SBBs.

### A.1.1.6 Atypical Configurations

By unbalancing the number of devices per controller port, configurations can be devised with a smaller shelf count. This results in lower performance and/or availability. Table A-3 lists the minimum shelf count for various numbers of 3½-inch SBBs in an SW800 cabinet for device channel processor configurations.

**Table A-3 Small Shelf Count Configurations, HS1CP Device Channel Processor**

Number of Devices	Number of BA350-S Shelves*	Configure as	Ports Used
1-6	1	1x6T**	1
7-12	2	1x6T	2
13-18	3	1x6T	3
19-24	4	1x6T	4
25-30	5	1x6T	5
31-36	6	1x6T	6
37-42***	6	1x7T	6

#### Key for Table Conventions

\* Consult the *StorageWorks Solutions Shelf and SBB User's Guide* for BA350-series storage shelf information.

\*\* T indicates that the shelf is terminated.

\*\*\* Nonredundant device channel processor and power configurations (not recommended).

## A.2 HS1CP Device Channel Processor Configuration Rules

The following sections describe specifics for configuring the HS1CP device channel processor.

### A.2.1 Nonredundant HS1CP Device Channel Processor Configurations

The following considerations apply to nonredundant configurations:

- A nonredundant HS1CP must be installed in the slot furthest from the BA350–M shelf's SCSI connectors. This slot is SCSI ID 7. By using SCSI ID 7, SCSI ID 6 (the other slot) is available as an additional ID on the storage shelf.
- Beginning with HS1CP operating firmware version 2.5, a maximum of four HS1CPs per internal bus is allowed.
- The maximum recommended HS1CP subsystem configuration using the BA350-series storage shelves is six devices per HS1CP port (36 devices). This recommendation is to allow the addition of another HS1CP and additional power supplies in the storage shelves without relocating a storage device.

### A.2.2 Dual-Redundant HS1CP Device Channel Processor Configurations

The following considerations apply to dual-redundant HS1CP configurations :

- Dual-redundant HS1CPs are located in the same shelf, and are connected to each other through the shelf backplane. Both HS1CPs have access to all the devices on each other's ports. This setup increases availability and provides for failover if one HS1CP in the pair fails. (The surviving HS1CP takes over service of all devices.)
- Dual-redundant configurations follow the same guidelines as nonredundant configurations.
- Firmware versions of both HS1CPs must be identical. If there is a mismatch, neither HS1CP accesses any devices.
- Dual-redundant HS1CPs must be on the same internal bus.

### A.2.3 Optimal Performance Configurations

For optimal performance, configure to the following guidelines:

- Balance the number of devices on each port of the device channel processor. This permits parallel activity on the device channel processor's available ports to the attached devices.
- Mixing higher and lower performance devices on each port is beneficial. Therefore, put each high performer on a separate port. For example, put multiple solid state disks on separate ports.  
Use the guidelines given in Table A-4.
- Limit the number of devices per controller port to two in nonredundant configurations and four in dual-redundant configurations.

**Table A–4 High-Performance Devices per Port**

<b>Number of Relatively Higher Performance Devices</b>	<b>Maximum Number of Devices Configured per Port</b>
1 - 3	1
4 - 6	1
7 - 9	2
10 - 12	2
13 - 15	3
16 - 18	3

#### **A.2.4 Highest Performance**

Use a dual-redundant configuration and balance the number of devices across the two device channel processors. Do this through your operating system by ordering how the devices are mounted or sequenced, and by setting preferred path definitions.

This results in approximately half of the devices normally accessed through each device channel processor. Should one device channel processor fail, its devices fail over to the other device channel processor automatically.

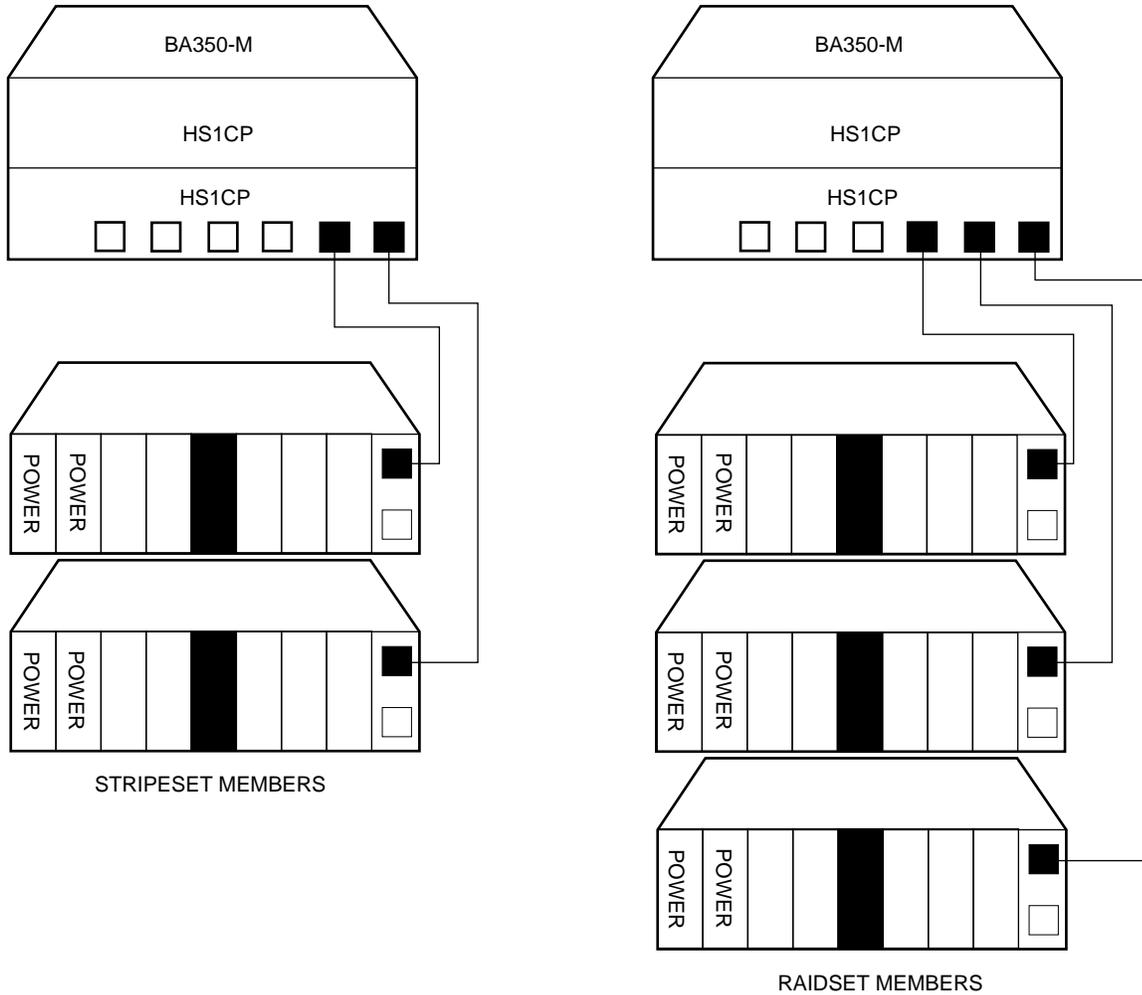
#### **A.2.5 Optimal Availability Configurations**

For optimal availability, configure to the following guidelines:

- Place storageset members on different controller ports and different storage shelves.
- Use predesignated spares on separate controller ports and storage shelves.
- Place storageset members on separate device channel processors when using host-based RAID implementations (for example, shadowing).

Figure A–3 shows examples of optimal configurations for RAIDset members and designated spares on separate controller ports.

**Figure A-3 Optimal Availability Configuration Example**



CXO-4608A-MC

### **A.2.6 Highest Availability**

For highest availability, especially with RAID implementations, follow these guidelines:

- For host-based RAID implementations, split the normal access path between device channel processors.
- Use redundant power supplies in all shelves.

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