StorageWorks™ Solutions

StorageWorks FDDI Server Upgrade Manual

Order Number: EK–FSUPG–IG. A01

This guide describes how to upgrade the HS1*xx* and HS2*xx* FDDI Servers to HS2*xx* FDDI Servers.

Digital Equipment Corporation
Maynard, Massachusetts

October 1995

NOTE: This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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

This manual describes the procedures necessary to install and configure HS2*xx* upgrade kits for StorageWorks™ Fiber Distributed Data Interface (FDDI) Servers. The *StorageWorks Solutions StorageWorks FDDI Server Installation Guide* (EK–FSERV–IG) is referred to extensively.

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 and description of the HS211/111, HS221/121, and HS241 StorageWorks FDDI Servers and HS280 and HS210/110 expansion options.
Chapter 2	Describes preinstallation considerations and tasks.
Chapter 3	Describes installing the HS210–AA upgrade kit into the SW800-series cabinet to create an HS211 model StorageWorks FDDI Server.
Chapter 4	Describes installing the HS211–AX upgrade kit into an HS111 model to create an HS211 model StorageWorks FDDI Server.
Chapter 5	Describes installing the HS221–AX upgrade kit into an HS121 model to create an HS221 model StorageWorks FDDI Server.
Chapter 6	Describes installing the HS221–BX upgrade kit into an HS211 model to create an HS221 model StorageWorks FDDI Server.
Chapter 7	Describes installing the HS241–AX upgrade kit into an HS121 model to create an HS241 model StorageWorks FDDI Server.
Chapter 8	Describes installing the HS241–BX upgrade kit into an HS221 model to create an HS241 model StorageWorks FDDI Server.
Chapter 9	Describes attaching the HS280–AA expansion kit to an HS241 model StorageWorks FDDI Server.
Chapter 10	Describes supporting and operating the StorageWorks FDDI Server in a VMScluster™ system.
Chapter 11	Describes system software maintenance tasks.

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
StorageWorks FDDI Server Publications	
StorageWorks™ Solutions StorageWorks FDDI Server Installation Guide	EK–FSERV–IG
StorageWorks™ Solutions StorageWorks FDDI Server HS110 Upgrade Installation Guide	EK–HS110–IG
StorageWorks™ Solutions StorageWorks FDDI Server HS1MM/HS2MM Server Processor Memory Installation Guide	EK–HS1MM–IG
StorageWorks™ Solutions StorageWorks FDDI Server HS1PW Server Processor Power Supply Installation Guide	EK–HS1PW–IG
StorageWorks™ Solutions StorageWorks FDDI Server, Server Processor Component Manual	EK–HSASP–CM
StorageWorks™ Solutions StorageWorks FDDI Server Service Manual	EK–FSERV–SM
StorageWorks Enclosures	
StorageWorks™ Solutions SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG
StorageWorks™ Solutions RETMA Shelf Rail Kit Installation Guide	EK–35XRB–IG
StorageWorks™ Solutions SW800-Series Data CDU Installation Guide	EK–SW8XP–BA
StorageWorks™ Solutions SW800-Series Data Center Cabinet Installation and User's Guide	EK–SW800–IG
StorageWorks™ Solutions Shelf and SBB User's Guide	EK–BA350–UG
Storage Devices	
StorageWorks™ Solutions Configuration Planning Guide	ED–BA350–PG
StorageWorks™ Solutions Building Blocks User's Guide	EK–SBB35–UG
StorageWorks™ Solutions 3½-Inch Storage Device Installation Guide	EK–MC350–IG
StorageWorks™ Solutions 5¼-Inch Storage Device Installation Guide	EK–MC525–IG
StorageWorks Array Controller Publications	
StorageWorks™ Solutions Array Controllers HS Family of Array Controllers User's Guide	EK–HSFAM–UG

(continued on next page)

Table 1 (Cont.) StorageWorks Related Documentation

Document Title	Order Number
General Reference Publications	
Digital Systems and Options Catalog	†
OpenVMS Alpha Version 6.2 Upgrade and Installation Manual	AA–PV6XC–TE

† Available from your Digital account representative.

Manufacturer's Declarations

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

CAUTION

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.

ACHTUNG !

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.

ATTENTION !

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

Note

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.

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

	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Bystander Positions)	
Product†	**Idle**	**Operate**	**Idle**	**Operate**
HS2xx with only cabinet fans operating	7.6	7.6	59	59
HS2xx with 2 BA350–M shelves and 12 BA350–S shelves, each containing 6 RZ26–VA disk drives	7.6	7.6	59	59
Per device when installed in an HS121				
BA350–S 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

	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Beistehende Position)	
Gerät†	**Leerlauf**	**Betrieb**	**Leerlauf**	**Betrieb**
HS2xx nur mit kabinett Lüftern in Betrieb	7,6	7,6	59	59
HS2xx mit 2 BA350–M shelves und 12 BA350–S shelves, jedes bestückt mit 6 RZ26–VA disk drives	7,6	7,6	59	59
Pro Gerät installiert im HS121				
BA350–S 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.

1
Introduction

This chapter presents a system overview of the StorageWorks FDDI Server, describes each of its major components, and lists the upgrade options. The final section of this chapter provides information on how to use the remainder of the guide.

1.1 System Overview

The StorageWorks FDDI Servers integrate Digital's Alpha technology with StorageWorks modular design to meet the storage requirements of large FDDI-based VMScluster systems. The StorageWorks FDDI Servers support a wide range of StorageWorks solid state disk, magnetic disk, tape, optical, and loader devices for configuring the exact FDDI storage solution to meet your application's needs. The StorageWorks FDDI Server family extends the StorageWorks line with both standard and highly available servers to meet the I/O needs of even the largest FDDI-based VMScluster systems. Each StorageWorks FDDI Server comprises part of an FDDI-based VMScluster environment.

The following StorageWorks FDDI Servers currently are available:

- HS111
- HS121
- HS211
- HS221
- HS241

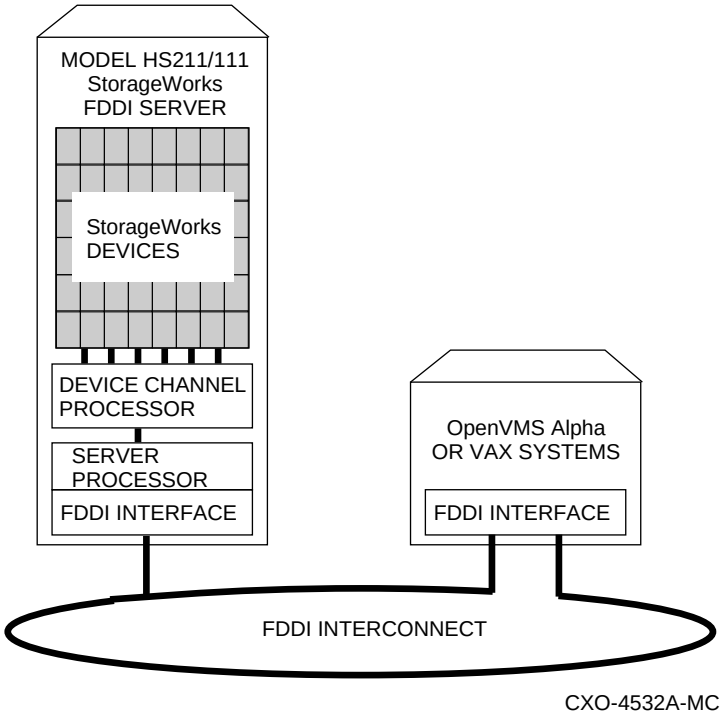
Each of these servers is available in 60 Hz (–AA) and 50 Hz (–AB) versions.

The following expansion options are also available:

- HS110–AA (expands a StorageWorks SW800 cabinet to an HS111 or, with additional parts, an HS111 to an HS121)
- HS210–AA (expands a StorageWorks SW800 cabinet to an HS211)
- HS280–AA, AB (for use with HS241 servers only)

In addition, many kits to upgrade these FDDI Servers are available. See Tables 1–1 and 1–2 for a list of upgrade kits and recommended migration path from one FDDI Server to another FDDI Server. These upgrade kits are available in the *Digital Systems and Options Catalog.*

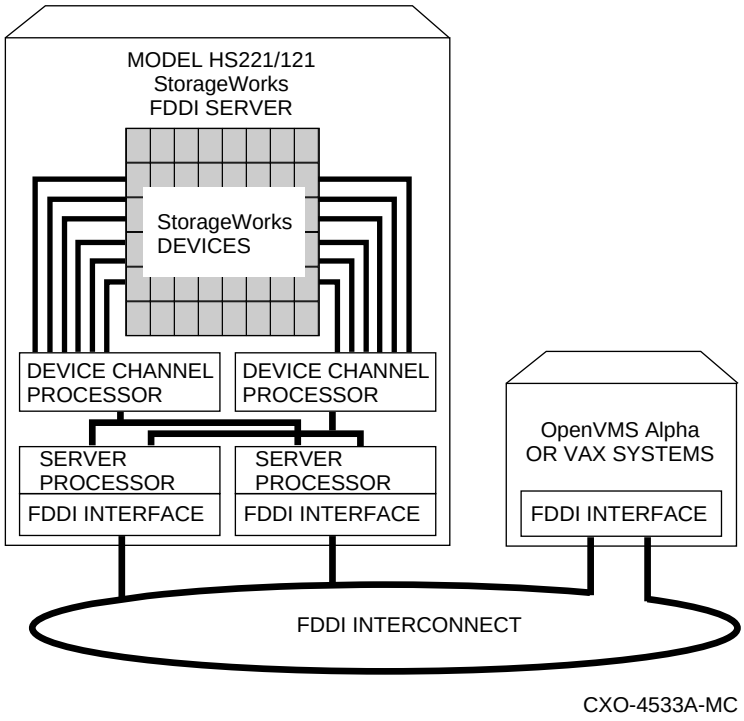
Figure 1–1 HS211/111 Diagram



1.1.1 HS211/111 Description

Figure 1–1 shows a conceptual model of the HS211/111 StorageWorks FDDI Server. Suited to medium-sized operations where you need distributed access and storage management benefits, these servers consist of a single Alpha-based server processor with a FDDI DAS (HS211) or SAS (HS111) network interface and a device channel processor (HS1CP) capable of connecting the server processor to as many as 42 StorageWorks devices. Consult the Software Product Description (SPD) for the HS1CP device channel processor operating firmware (SPD 64.19.*xx*) for a complete list of supported StorageWorks devices. Using the RZ29 disk drive, up to 180 GB of nonredundant online storage per server are available. The model HS211/111 StorageWorks FDDI Server and its attached storage devices are housed in a single StorageWorks SW800 cabinet.

Figure 1–2 HS221/121 Diagram



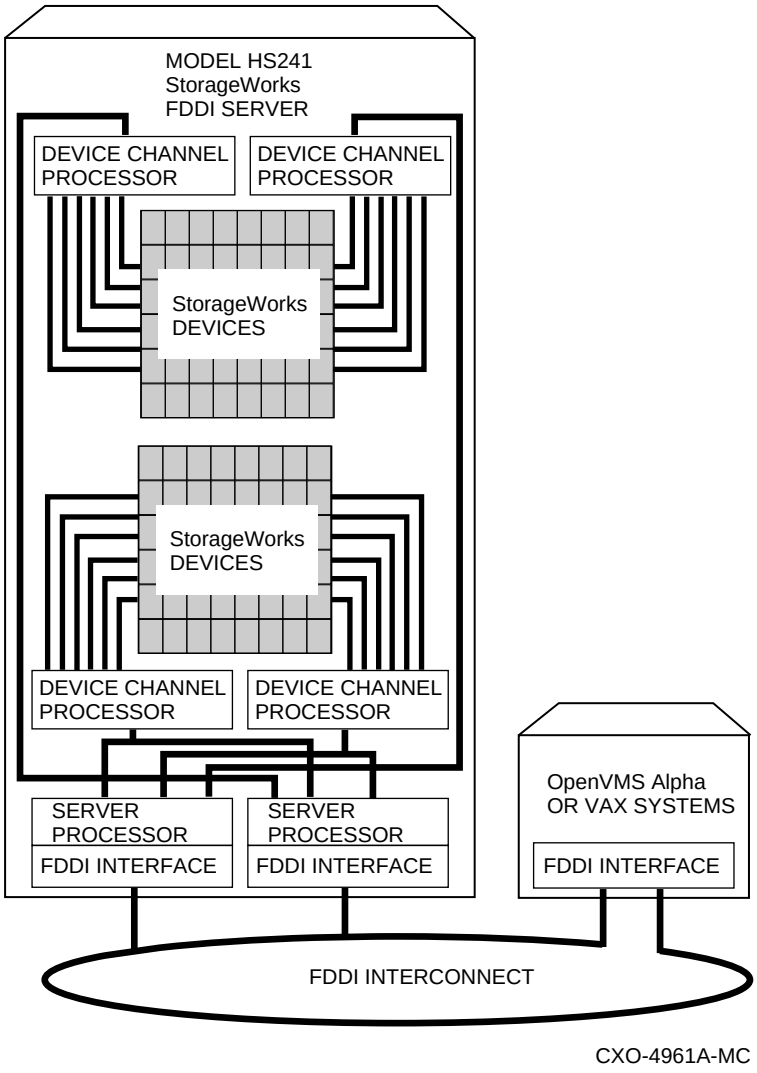
1.1.2 HS221/121 Description

Figure 1–2 shows a conceptual model of the HS221/121 StorageWorks FDDI Server. It is a fully redundant, high-availability FDDI storage solution offering full protection against any single component failure. These servers are suited to medium-sized operations running "mission-critical" applications. High server availability is assured with fully redundant server processors, two paths to the FDDI interface, two paths to every storage device, standard redundant power, and cooling. The full range of StorageWorks redundant power and cooling features for devices are also available.

The basic HS221/121 StorageWorks FDDI Server provides fully redundant access to up to 36 redundant StorageWorks device connections. Consult the Software Product Description (SPD) HS1CP device channel processor operating firmware (SPD 64.19.*xx*) for a complete list of supported StorageWorks devices. Using the RZ29 disk drive, 154 GB of online, redundant storage per server are available. The model HS221/121 StorageWorks FDDI Server and its attached storage devices are housed in a single StorageWorks SW800 cabinet.

During normal operation, I/O performance is enhanced by balancing the I/O load across the redundant system components in a customer-definable manner. If a component failure occurs, the redundant partner takes over, providing continued service until the failed component can be repaired or replaced. All HS2*xx* redundant StorageWorks FDDI Server components can be hot swapped (replaced without interrupting I/O service).

Figure 1–3 HS241 Diagram

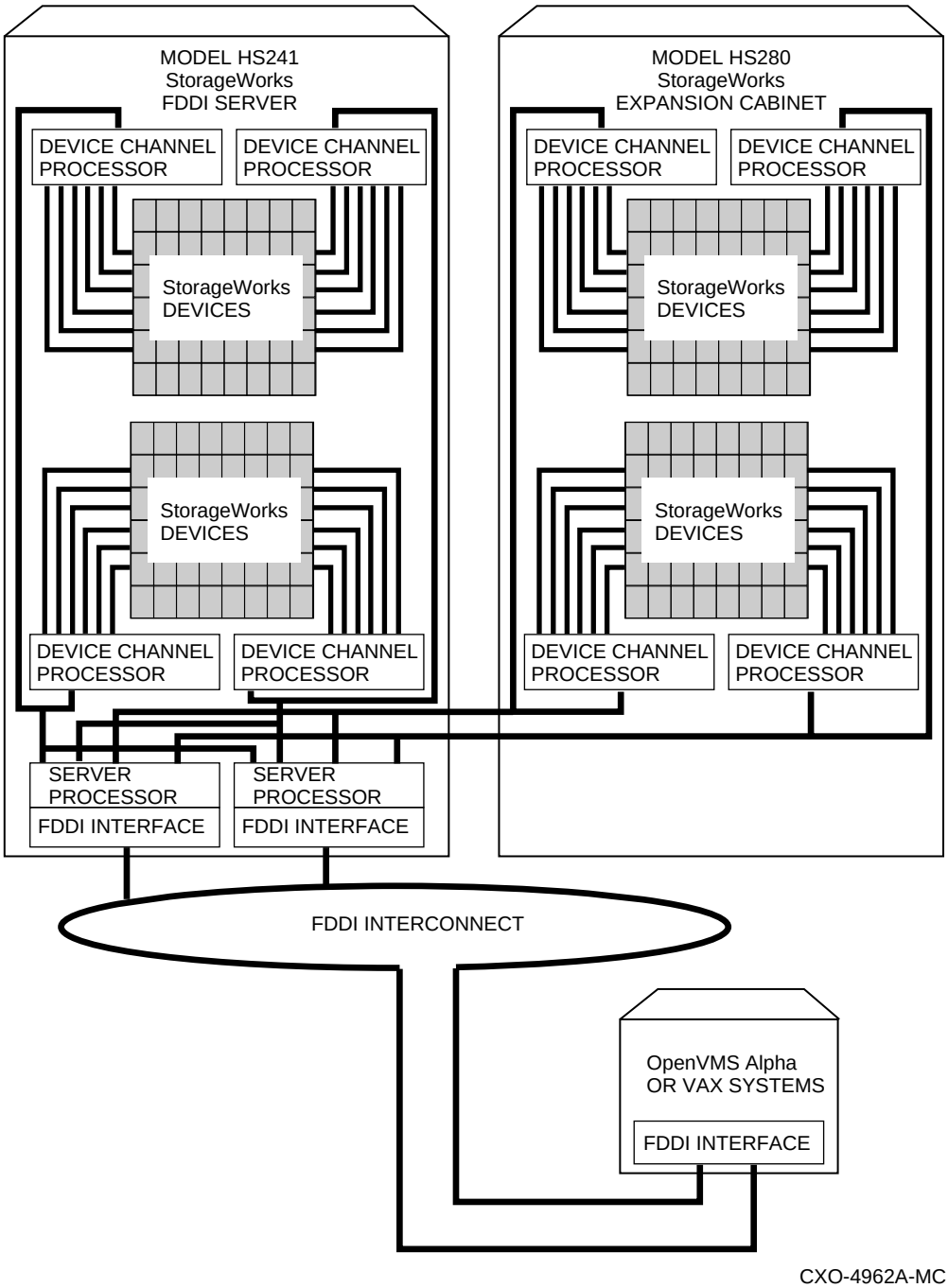


1.1.3 HS241 Description

Figure 1–3 shows a conceptual model of the HS241 StorageWorks FDDI Server. Ideal for large networks running "bet-your-business" applications, the HS241 server runs at 4300 I/Os per second and provides high server availability via dual-redundant server processors and four dual-redundant device channel processors. Housed in a single StorageWorks SW800 cabinet, this server can connect up to 72 redundant devices. Maximum HS241 online disk capacity is 309 GB using RZ29 disk drives. Consult the SPD for the HS1CP device channel processor operating firmware (SPD 64.19.*xx*) for a complete list of supported StorageWorks devices. Nearline storage of 10-plus terabytes is possible by adding up to two StorageWorks tape libraries for backups and archiving.

During normal operation, I/O performance is enhanced by balancing the I/O load across the redundant system components in a customer-definable manner. If a component failure occurs, the redundant partner takes over, providing continued service until the failed component can be repaired or replaced. All HS2*xx* redundant StorageWorks FDDI Server components can be hot swapped.

Figure 1–4 HS241 with HS280 Diagram



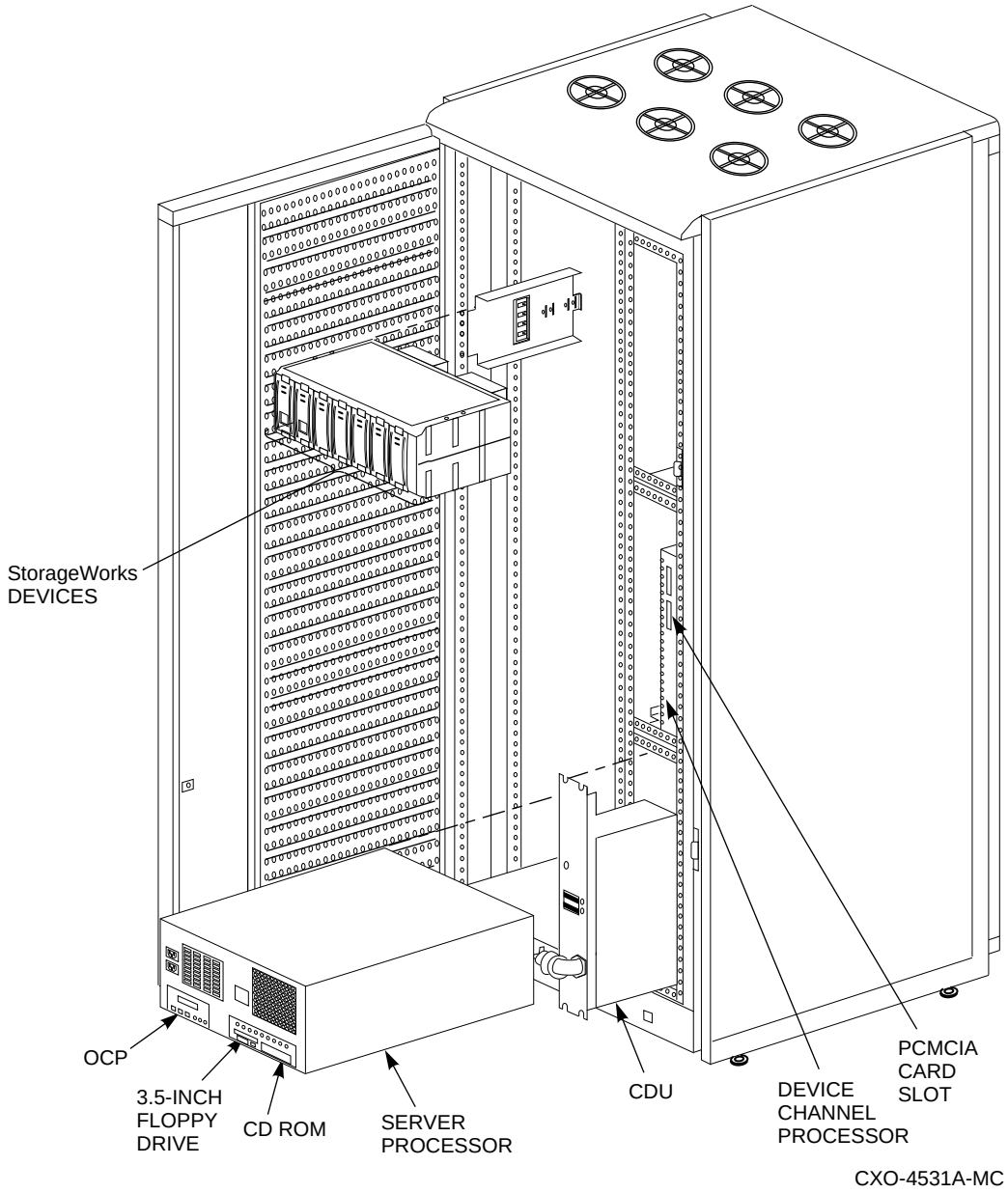
1.1.4 HS280 Description

Double the device support (to 144 devices) and online disk capacity to 619 GB by connecting the HS241 to an optional HS280 expansion cabinet. The HS280 includes a second StorageWorks SW800 cabinet and four additional redundant device channel processors. Redundant power and cooling are also standard at the SW800 cabinet level. Figure 1–4 shows a conceptual model of the HS241 StorageWorks FDDI Server with the HS280 expansion option installed.

1.1.5 HS210/110 Description

The HS210/110 contains all the major components of an HS211/111 except for the StorageWorks SW800 cabinet. These options provide for the conversion of an existing SW800 cabinet to a StorageWorks HS211/111 FDDI Server. This manual describes the HS210 installation while the *StorageWorks Solutions StorageWorks FDDI Server HS110 Upgrade Installation Guide* describes the HS110 installation.

Figure 1–5 StorageWorks FDDI Server Major Components



1.2 Major Components

Figure 1–5 shows a StorageWorks FDDI Server calling out each of the major components and subcomponents. The major components are as follows:

- Server processor
- Device channel processor (HS1CP)
- StorageWorks storage devices

The subcomponents are explained in Section 1.2.1 through Section 1.2.3.

1.2.1 Server Processor

The StorageWorks FDDI Server's server processor combines Digital's advanced Alpha technology with 64 MB RAM to provide the internal performance required to handle the I/O load of FDDI-based VMScluster systems.

In the model HS241/221/121 StorageWorks FDDI Server, two server processors share the I/O load under normal circumstances. When a failure occurs, the operational server processor takes over the load of its failed partner and continues to deliver data from all devices until repair is effected. Because server processors are separately powered and cooled, a power supply or cooling failure does not interrupt data access.

1.2.1.1 System Disk

The system disk contains the OpenVMS Alpha operating system, the Software Customization Procedure (SCP), various relevant documents, and required layered software components. It consists of an RZ28 disk drive located inside the server processor.

1.2.1.2 CD–ROM Drive

The CD–ROM drive is used to mount the two CD–ROMs and to access files for various purposes. The FDDI Server includes two CD–ROMs, an operating system CD–ROM and a documentation CD–ROM.

The operating system CD–ROM is used for system rebuild operations if there is no system disk backup, for updating the server operating system to a new version of the OpenVMS Alpha operating system, or for operations performed directly from the CD–ROM such as backup. The documentation CD–ROM is used to access documentation related to the OpenVMS Alpha operating system.

1.2.1.3 3.5-Inch Floppy Drive

The 3.5-inch floppy drive is used to run the EISA Configuration Utility (ECU) whenever configuration changes are made to the server processor's internal bus, such as during a hardware upgrade.

1.2.1.4 Operator Control Panel

The operator control panel (OCP) gives you another interface to the StorageWorks FDDI Server. It provides information about and allows you to control the operation of the server processor.

Cycling Power with the OCP

During the installation procedure, you are directed to cycle (remove, then restore) power to the server processor. Use the Power On switch on the OCP to perform this step when directed to cycle the server processor.

1.2.2 Device Channel Processor

The device channel processor can provide nonredundant connections between a server processor and up to 42 industry-standard SCSI–2 devices on six independent fast (10 MB/second) SCSI–2 buses. The device channel processor supports a wide range of StorageWorks magnetic, solid state, and optical disks, tapes, and media loader devices.

To support storage I/O requirements, each device channel processor is capable of processing up to 1000 I/O requests per second. The device channel processor firmware automatically balances stripeset I/O across member disks as well as enabling the following features:

- Redundant access
- Read/Write caching
- RAIDset configuration support (optional feature)

The device channel processor firmware resides on a PCMCIA card that ships with the StorageWorks FDDI Server. The PCMCIA card is located in the slot located on the front of the device channel processor.

1.2.2.1 Redundant Access

In model HS121/221/241 StorageWorks FDDI Servers, two device channel processors are configured as a dual-redundant pair connected to the same storage devices. In this configuration, each device channel processor can assume control of all storage devices in the event of its partner's failure, including flushing any unsaved data from the partner's write cache to storage media.

1.2.2.2 Read/Write Cache

Each device channel processor includes a 32 MB nonvolatile read/write cache that reduces I/O request execution times. Firmware allocates the cache dynamically based on actual I/O activity. For optimal resource utilization, management facilities allow you to enable or disable both read and write caching for each storage unit attached to a device channel processor. In the event of a power failure, on-board batteries keep write cache contents intact for up to 100 hours, so no data is lost.

Note

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.

1.2.3 StorageWorks Storage Devices

Because StorageWorks FDDI Servers support a wide selection of Digital's StorageWorks components, storage subsystems can be custom configured to meet virtually any application need. For increased reliability, the SW800 cabinet that houses StorageWorks FDDI Server models supports the full suite of StorageWorks redundant power and cooling features.

StorageWorks enclosure components and supported storage devices are all available on a configure-to-order basis. Consult the SPD for the HS1CP device channel processor operating firmware (SPD 64.19.*xx*) for an up-to-date list of supported StorageWorks devices.

1.3 Available Upgrades

The StorageWorks FDDI Servers have a number of applicable upgrades: some are StorageWorks FDDI Server specific, others are applicable to the SW800 cabinet.

Table 1–1 shows the recommended migration paths among the various StorageWorks FDDI Servers.

Each upgrade kit is briefly described in Table 1–2. A complete description of each of the HS2*xx* upgrade kits, along with installation procedures, is outlined in chapters 3-9 of this manual. HS1*xx* upgrades are delineated in the manual entitled *StorageWorks Solutions StorageWorks FDDI Server HS110 Upgrade Installation Guide*.

Appendix A provides specifications for all StorageWorks FDDI Servers.

Table 1–1 StorageWorks FDDI Server Migration Path Upgrade Matrix

From↓ To→	HS111	HS121	HS211	HS221	HS241	HS280‡
SW800	HS110–AA	SW800→HS111 (HS110–AA), then HS111→HS121 (HS110–AA)†	HS210–AA	SW800→HS111 (HS110–AA), then HS211→HS221 (HS221–BX)	SW800→HS111 (HS110–AA), then HS211→HS221 (HS221–BX), then HS221→HS241 (HS241–BX)	NA
HS111	NA	HS110–AA†	HS211–AX	HS111→HS211 (HS211–AX), then HS211→HS221 (HS221–BX)	HS111→HS211 (HS211–AX), then HS211→HS221 (HS221–BX), then HS221→HS241 (HS241–BX)	NA
HS121	NA	NA	NA	HS221–AX	HS241–AX	NA
HS211	NA	NA	NA	HS221–BX	HS211→HS221 (HS221–BX), then HS221→HS241 (HS241–BX)	NA
HS221	NA	NA	NA	NA	HS241–BX	NA

†The HS111-to-HS121 upgrade requires purchase of additional parts not included in the HS110–AA kit. These parts are identified in the *StorageWorks Solutions StorageWorks FDDI Server HS110 Upgrade Installation Guide*.

‡StorageWorks FDDI Server expansion cabinet (HS280–AA) for expansion of model HS241 StorageWorks FDDI Server capacity.

Table 1–2 HS2*xx* StorageWorks FDDI Server Upgrades

Upgrade Order Number	Description
HS110–AA	Expands an existing SW800 cabinet to an HS111 or upgrades an HS111–AA, AB to an HS121–AA, AB. The HS111-to-HS121 upgrade requires purchase of additional parts not included in the HS110 kit. See *StorageWorks Solutions StorageWorks FDDI Server HS110 Upgrade Installation Guide*.
HS210–AA	Expands an existing SW800 cabinet to an HS211, providing nonredundant access to the installed StorageWorks devices. See Chapter 3.
HS211–AX	Upgrades an HS111 to an HS211. See Chapter 4.
HS221–AX	Upgrades an HS121 to an HS221. See Chapter 5.
HS221–BX/BY	Upgrades an HS211 to an HS221. Available in 50 Hz and 60 Hz options. See Chapter 6.
HS241–AX	Upgrades an HS121 to an HS241. See Chapter 7.
HS241–BX	Upgrades an HS221 to an HS241. See Chapter 8.
HS280–AA, AB	StorageWorks FDDI Server expansion cabinet for attachment to an HS241 Server. Expands the number of device buses to 8 and available device ports to 144. Available in 50 Hz and 60 Hz options. See Chapter 9.

2
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 an upgrade kit is being installed must meet the specifications listed in Table 2–1 for proper operation.

Table 2–1 StorageWorks Environmental Specifications

Condition	Specification
	Optimum Operating Environment
Temperature Rate of change Step change	+18°C to +24°C (+64.4°F to +75.2°F) 3°C (5.4°F) per hour maximum 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
	Maximum Operating Environment (Range)
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)
	Maximum Nonoperating Environment (Range)
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 SW800 Cabinet

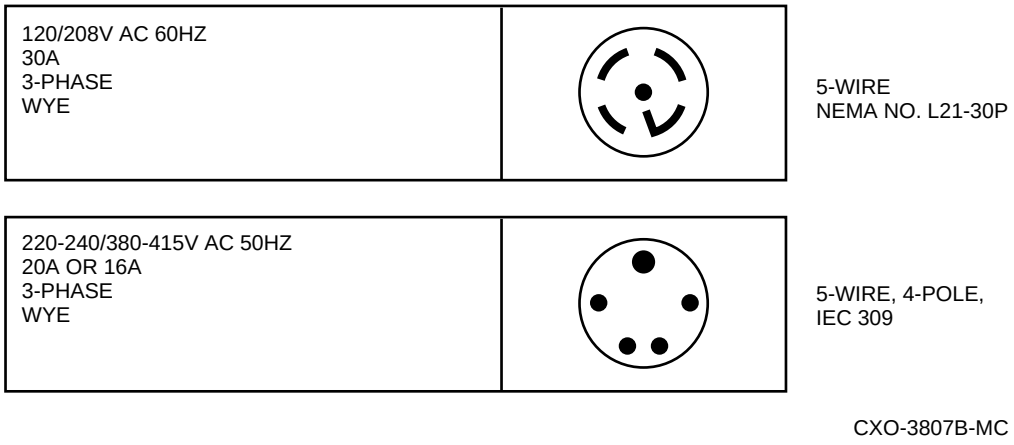
You must ensure that the site selected for installing a StorageWorks FDDI Server satisfies requirements for power, grounding, safety, and service. This section discusses preparing your site to meet those requirements.

2.2.1 Power Requirements

The SW800 cabinet is intended for installation in Class A computer room environments. Before installing the cabinet, make sure that the following conditions have been met:

- The primary power source can supply the required amount of ac power, as specified in the specifications tables (see Appendix A).
- The site's primary power receptacles are the correct versions for the power plugs provided with the cabinet. Figure 2–1 specifies the cabinet primary power plugs supplied for both 60 Hz and 50 Hz power.

Figure 2–1 StorageWorks FDDI Server Primary Power Plugs



2.2.2 Equipment Grounding

The StorageWorks FDDI Server usually is connected to other equipment by one or more FDDI interconnect cables. For both safety and reliable operation, proper grounding is required between the cabinet and other equipment.

WARNING

If enclosures are not connected to a common ground, there is a potential for personal injury as a result of electric shock.

Make sure that site power distribution systems meet local electrical codes prior to the installation of the StorageWorks FDDI Server.

To make sure that the power distribution system will perform satisfactorily, a power system survey should be done before installation. The following areas should be investigated:

- Do all outlets have power ground connections?

- Do the power cords on all equipment at the site have grounding prongs?
- Are all power outlet neutral connections isolated from ground?
- Are the grounds for all outlets connected to the same power distribution panel?
- Are all devices that are connected to the same breaker as the StorageWorks FDDI Server UL or IEC approved?

WARNING

If there is a deficiency found in any area during the power survey, a qualified electrician must correct it before installation may begin. Failure to resolve power survey deficiencies before installing the equipment may result in personal injury as a result of electric shock.

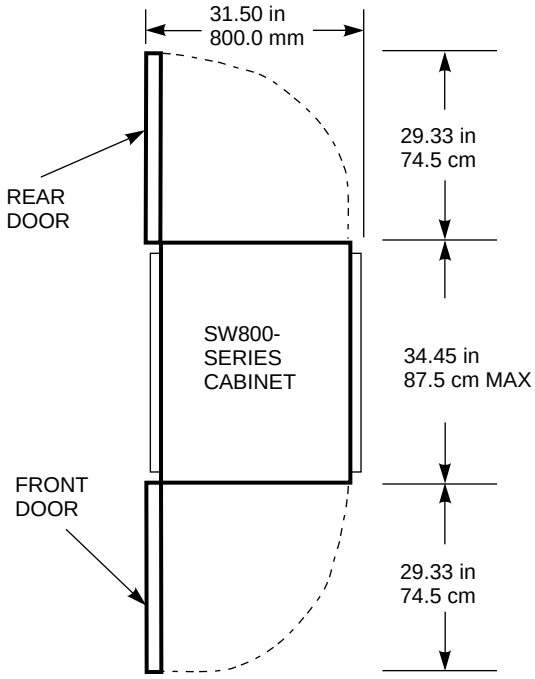
If no problems are found during the survey, the site grounding system may be considered to be adequate for safety and reliable StorageWorks FDDI Server operation.

2.2.3 Safety and Service Requirements

The following general safety and service requirements refer to the floor location chosen for placing the StorageWorks FDDI Server:

- The site floor can safely bear the weight of the cabinet, as specified in Appendix A. Keep in mind that the entire weight of the cabinet is borne by the small surface area of the four leveler feet when the cabinet is installed in its final position.
- The space around the cabinet must allow for opening the front and rear doors, for accessing cables, and for adequate airflow. See Figure 2–2 for specific space requirements.

Figure 2–2 Minimum Installation Clearances



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- If the cabinet is to be positioned next to other enclosures, there is sufficient service loop in any connecting cables to allow the cabinet to be moved out for access.

Note

The StorageWorks FDDI Server is not designed to be fastened to adjacent cabinets.

2.3 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.

Note

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

2.4 Personnel Needed for Installation

WARNING

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

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. The HS210–AA and HS221–BX upgrade kits require installing a second server processor. The HS280–AA expansion kit requires unpacking and moving a loaded SW800 cabinet.

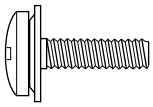
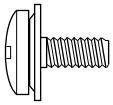
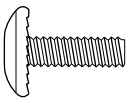
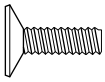
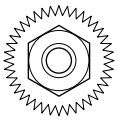
2.5 Tools Needed for Installation

The following tools may be needed to install 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

Figure 2–3 is a diagram of the screws and nuts used in installing and upgrading FDDI Servers. Use this diagram to determine the proper screw.

Figure 2–3 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

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3

SW800-Series Cabinet to HS211 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS210–AA upgrade kit in an SW800-series StorageWorks cabinet to create a model HS211 StorageWorks FDDI Server.

3.1 Purpose of This Upgrade

A customer with an existing SW800-series cabinet that contains CI-based StorageWorks hardware may want to switch the cluster over from a CI-based to a FDDI-based interconnect system. For little additional expense, the customer can utilize his existing cabinet, purchase the hardware, software, and cables contained in the HS210–AA kit, and apply this upgrade procedure to create a model HS211 FDDI Server.

The HS210–AA upgrade kit provides all the components for converting an existing SW800 cabinet to a StorageWorks HS211 FDDI Server. The following sections provide information about the upgrade kit and how to perform the upgrade.

3.2 HS210–AA Upgrade Kit Description

The main components of the HS210–AA upgrade kit are as follows:

- One server processor with new FDDI and HS1AD bus adapters already installed
- One HS1CP device channel processor with a 32 MB write-back cache module
- One BA350–M shelf
- OpenVMS Alpha operating system software Version 6.2 (or later) CD–ROM

When you receive your HS210–AA 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.

3.3 Preparing the Cabinet for Upgrade

Digital recommends full and unrestricted access to the cabinet interior because you will be routing cables while installing the HS210–AA upgrade kit.

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

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:

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.

   a. 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.

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

4. 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.
5. Open the cabinet doors.

Figure 3–1 Exterior Cabinet Panel Removal (and Installation)

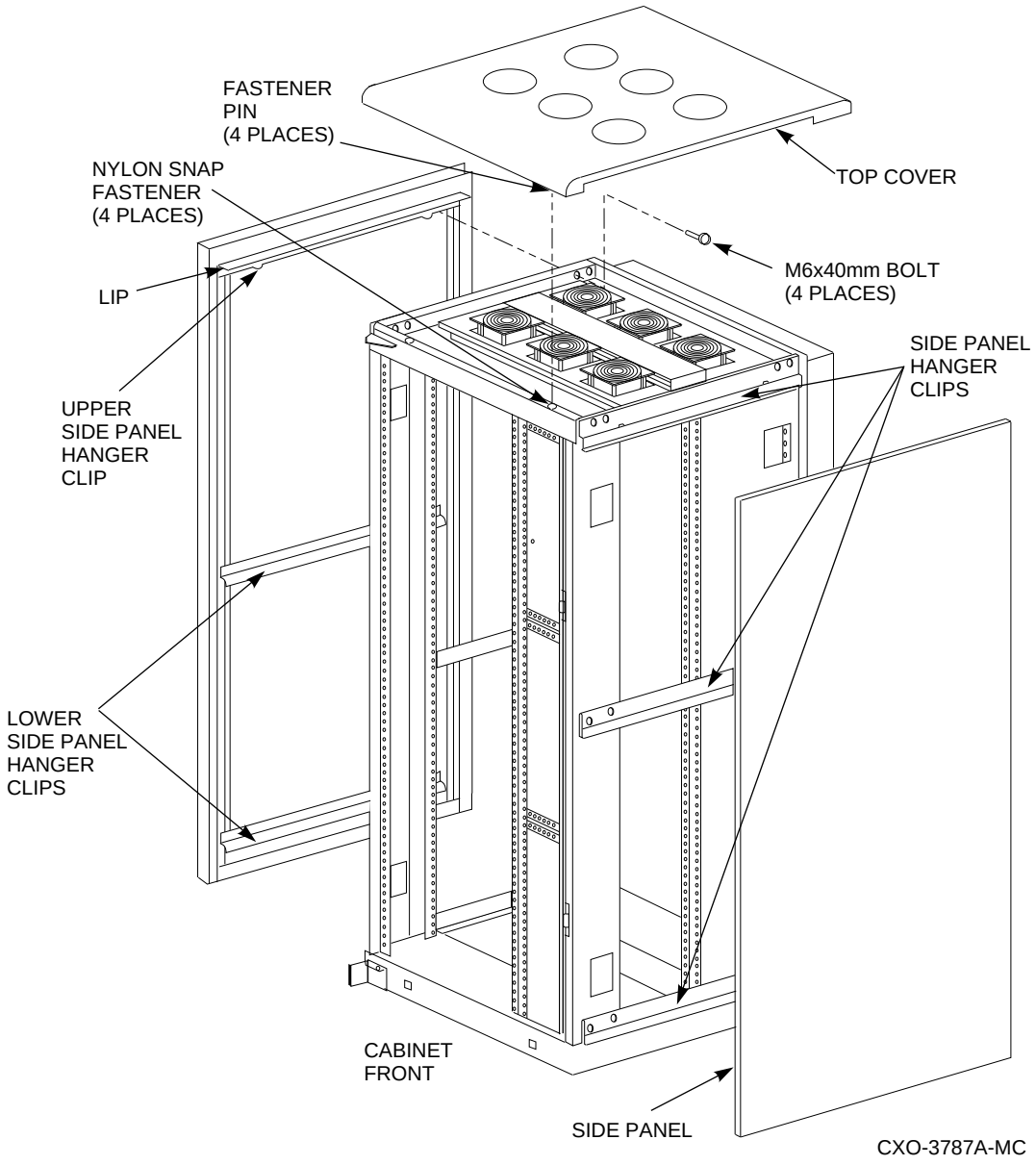
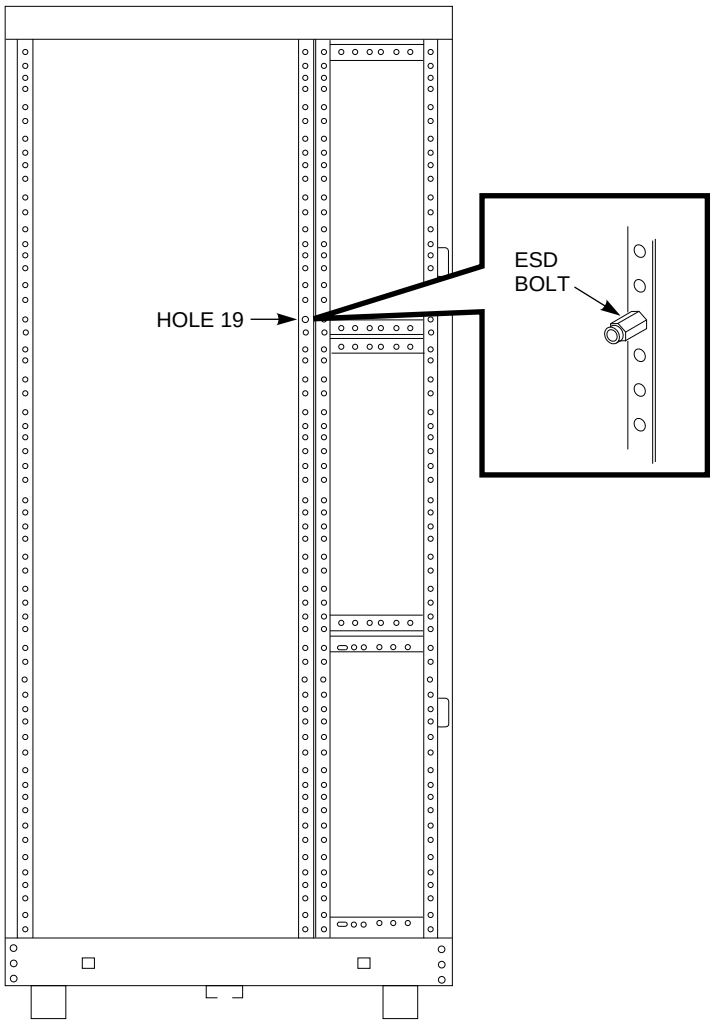


Figure 3–2 Relocate ESD Bolt to Hole 19



6. Relocate the ESD bolt to hole position 19 (Figure 3–2).

Note

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

Note

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.

---

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

   For the HS210–AA 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.

8. 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.
9. Also remove the lower front filler panel.
10. Install 10–32 U-nuts in the vertical rails of the cabinet as designated in Table 3–1 and Figure 3–3.
11. 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 3–3 Install U-Nuts on Cabinet Vertical Rails

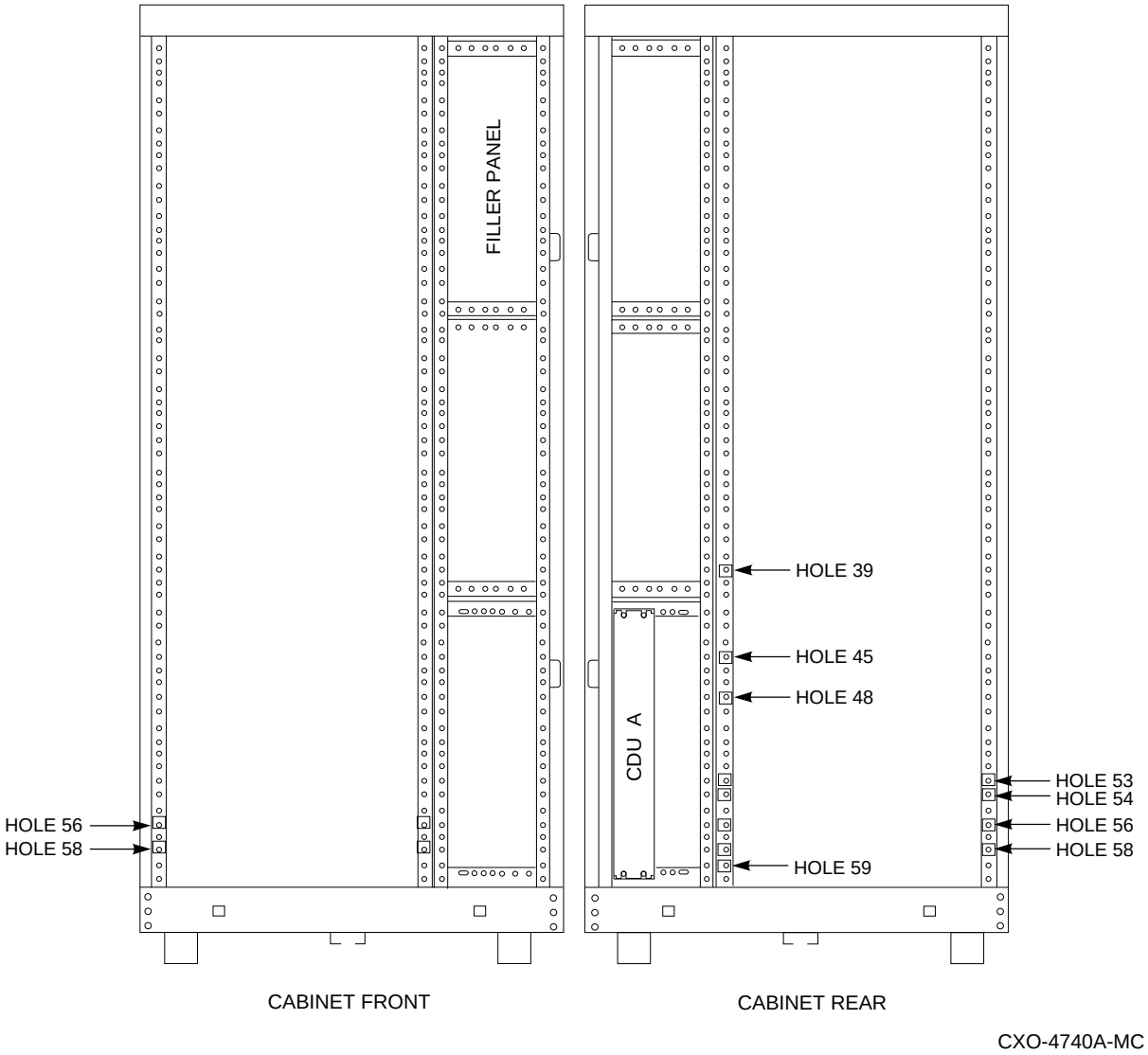
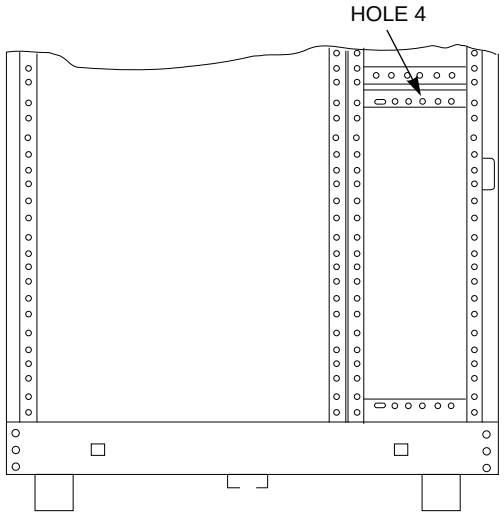


Table 3–1 U-Nut Vertical Rail Hole Locations for the HS210–AA Upgrade

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.

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



The cabinet is ready for installing the HS210–AA upgrade kit.

3.4 Locating the 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:

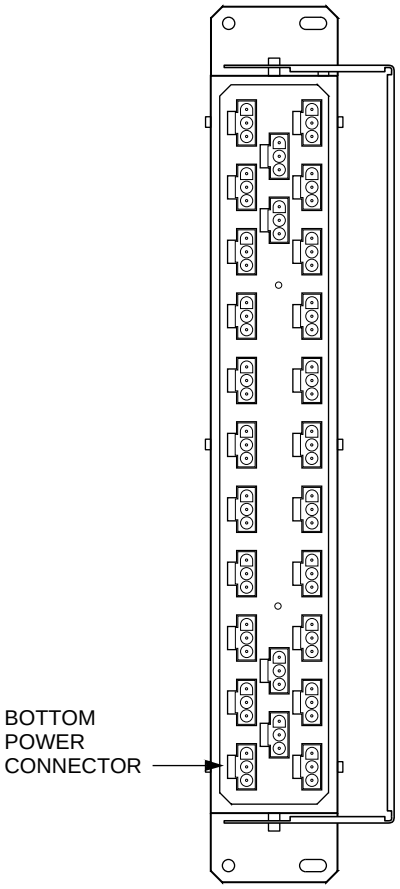
1. Connect the CDU power cords to a wall receptacle.
2. Switch the circuit breaker on the front panel of the CDUs to the ON (|) position.
3. From the front of the cabinet, locate the lowest power cord on the vertical rail. This cord will be secured to the vertical rail with cable clamps and tie wraps.
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 the front panel of the power supply lights if the cord is connected to the CDU.

   b. To determine the connector to which the cord is attached, pull one connector at a time from the CDU until the 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 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



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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

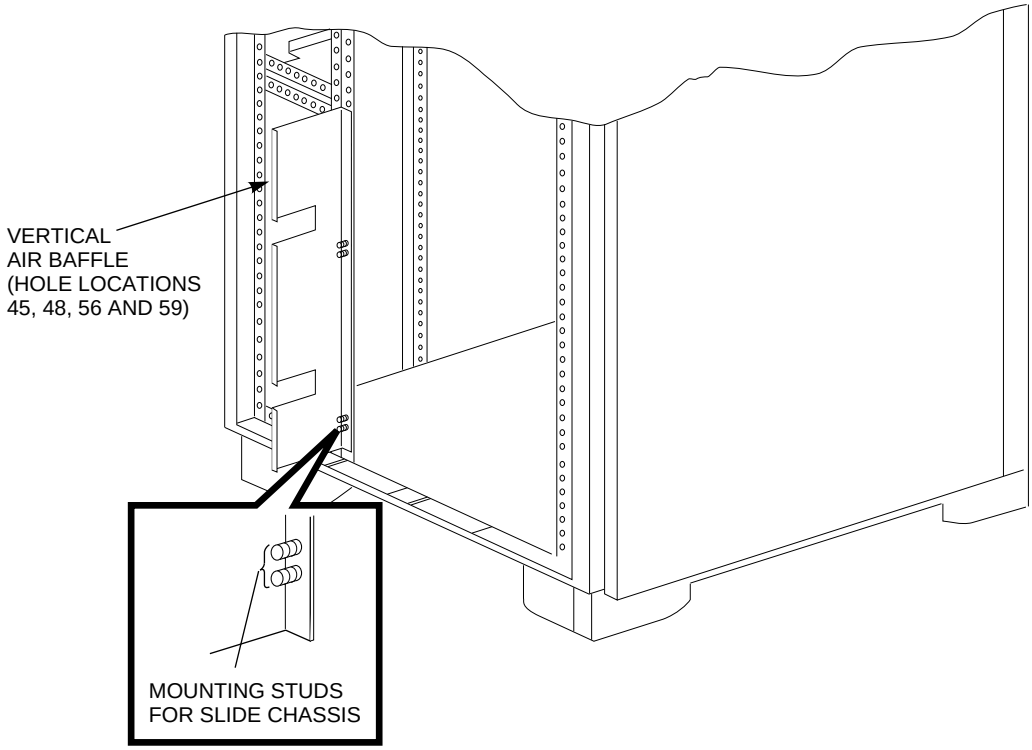
This new power cord is used later to connect power to the server processor.

3.5 Installing 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.

Figure 3–6 Vertical Air Baffle Installation



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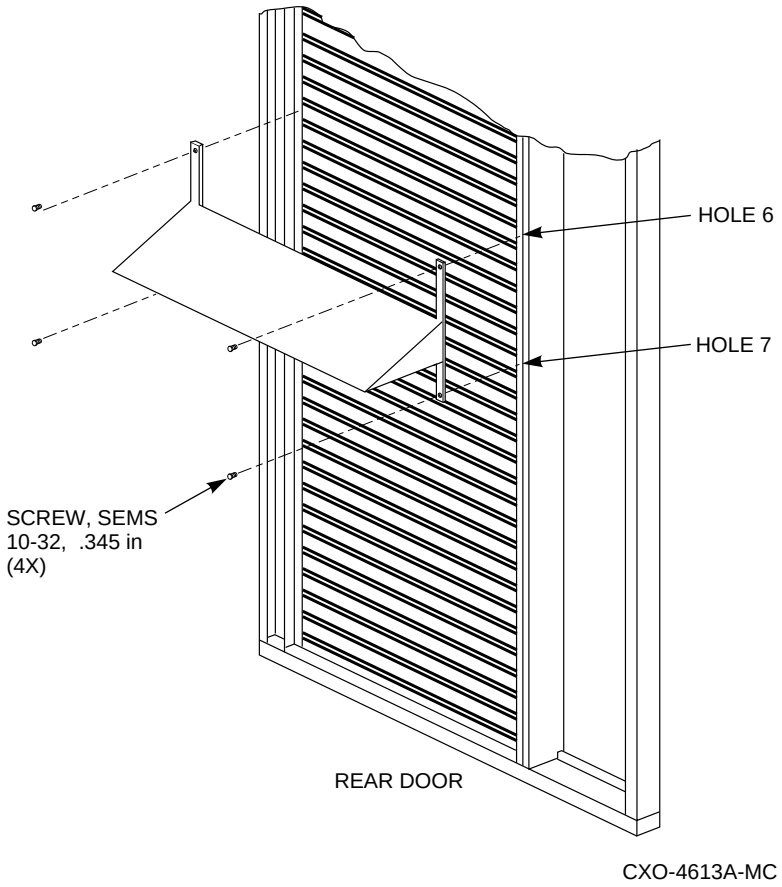
Note

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).

Figure 3–7 Horizontal Air Baffle Installation



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 2–3 for a diagram of these screws.

3.6 Installing BA35*x*–S Storage Shelves

The SCSI–2 storage devices supported by the device channel processor mount on *BA35x–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 a generalized FDDI Server.

Note

A maximum of 6 shelves of storage devices may be installed in an HS211 StorageWorks FDDI Server.

Figure 3–8 Generalized FDDI Server Storage Configuration with Optimal Disk Storage and No TZ8*xx*–Series Tape Drives Installed

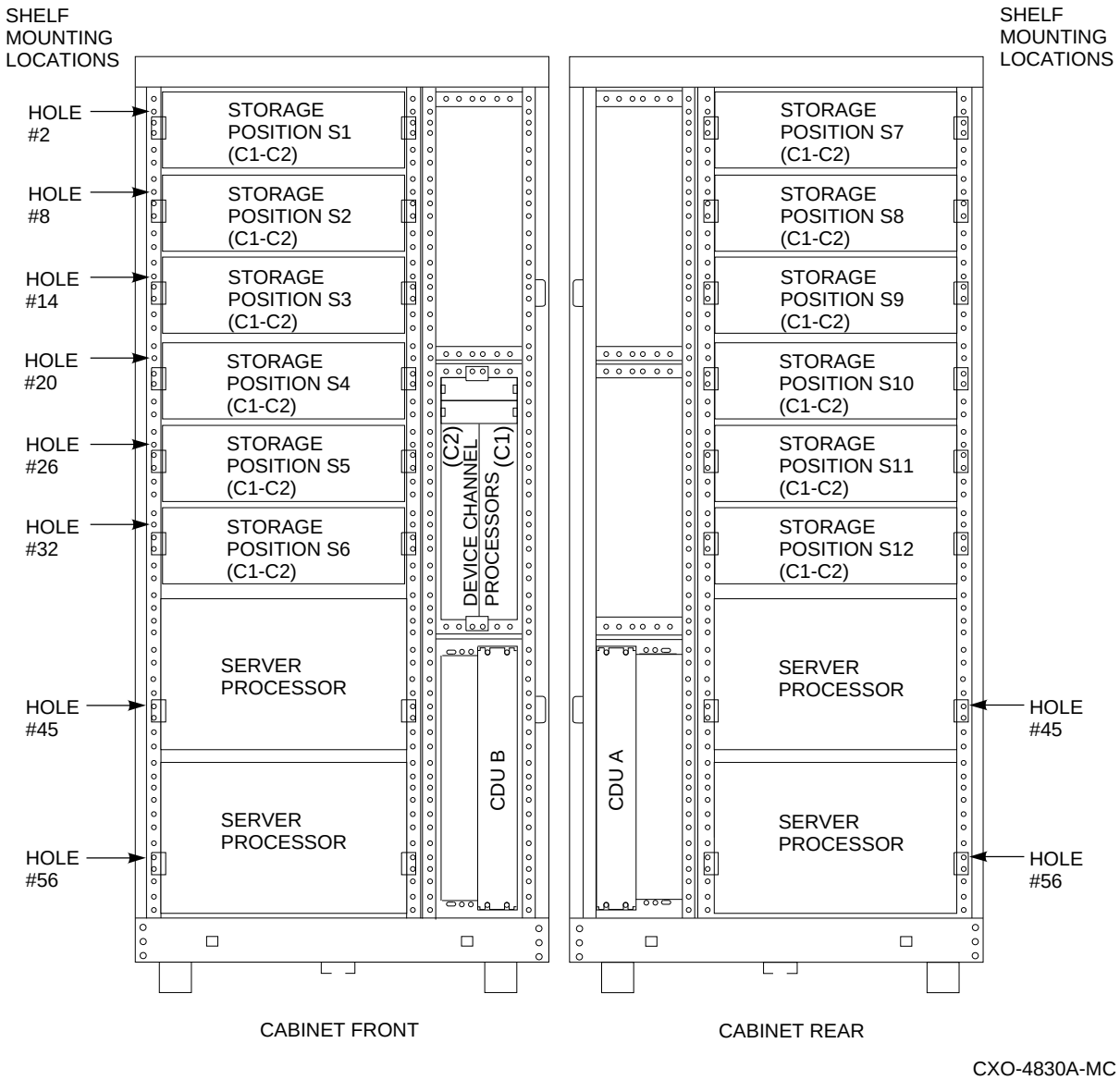
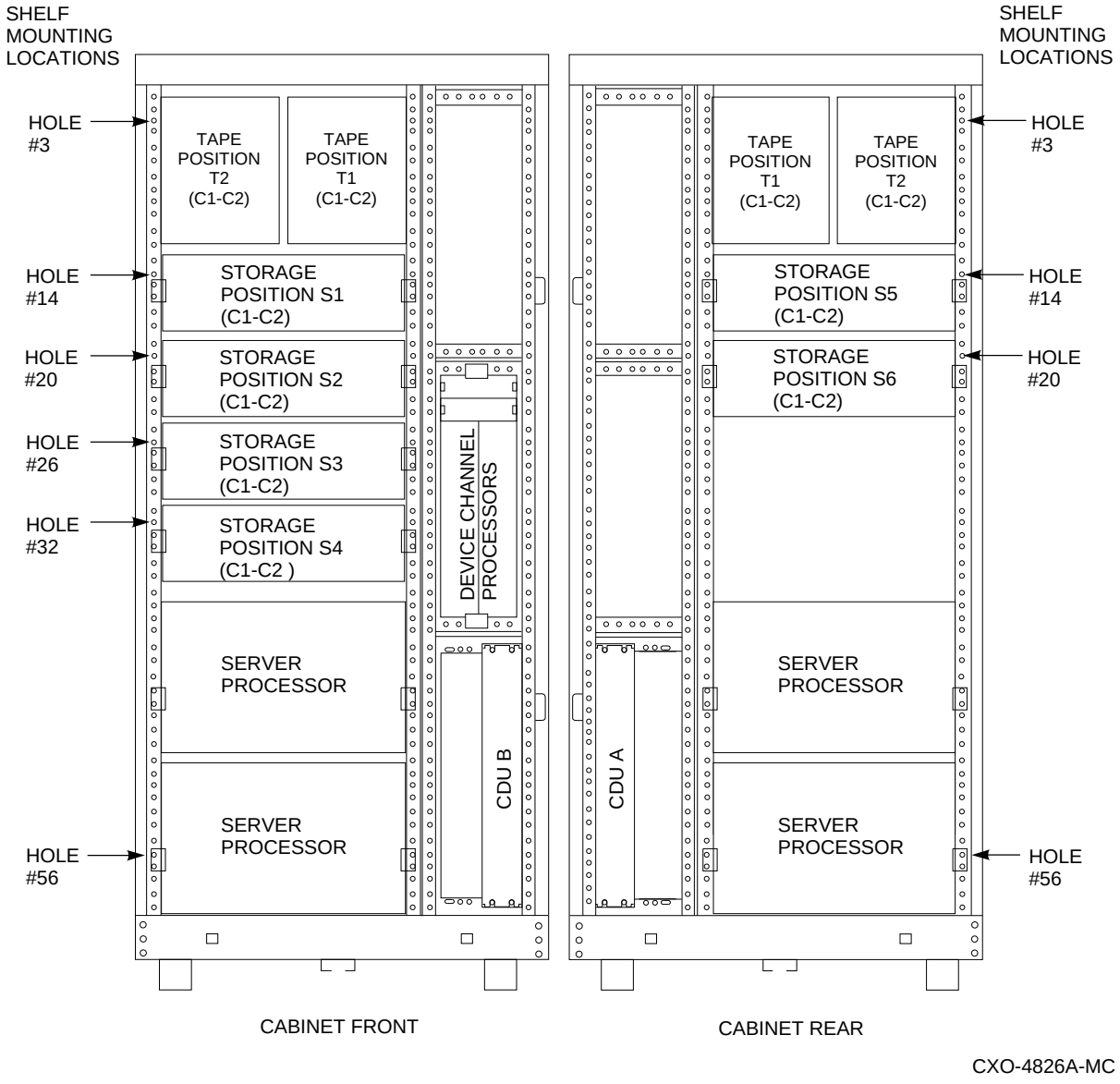


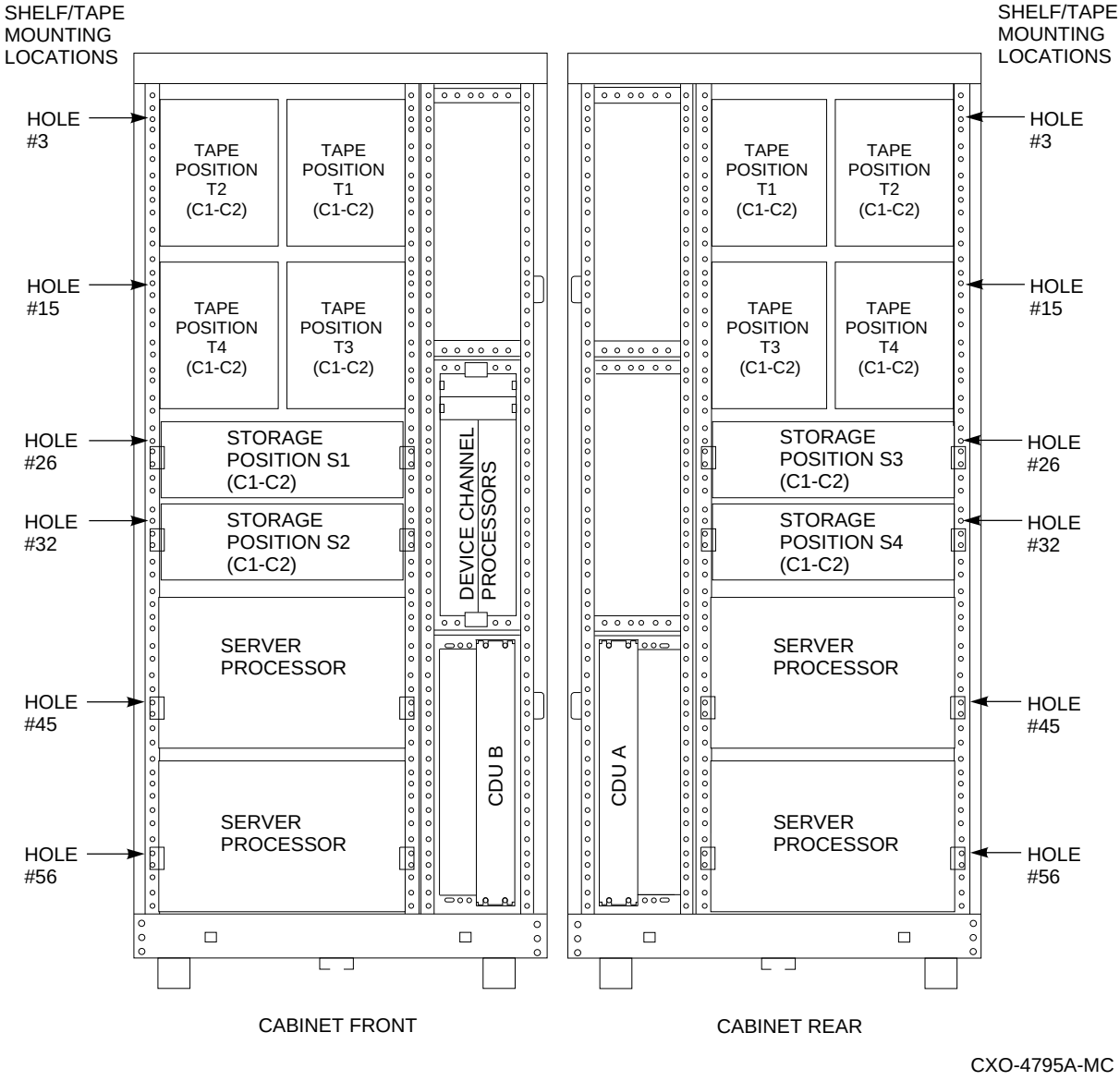
Figure 3–8 shows the location of storage shelves when disks but no TZ8*xx*–series tape drives are installed in a generalized FDDI Server.

Figure 3–9 Generalized FDDI Server Storage Configuration with Two TZ8*xx*–Series Tape Drives Installed



Figures 3–9 and 3–10 show the location of storage shelves when two or four TZ8*xx*–series tape drives are installed in a generalized FDDI Server.

Figure 3–10 Generalized FDDI Server Storage Configuration with Four TZ8*xx*–Series Tape Drives Installed



Refer to Appendix B for shelf configuration rules and restrictions.

Refer either to the *StorageWorks Solutions SW800-Series Data Center Cabinet Installation and User's Guide* or the *StorageWorks Solutions SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide* for instructions on installing and replacing storage shelves and SBBs.

3.7 Installing the BA350–M Shelf (If Required)

If a BA350–M shelf is already installed, go to Section 3.8. 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 HS210–AA 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 2–3 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

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

Note

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

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

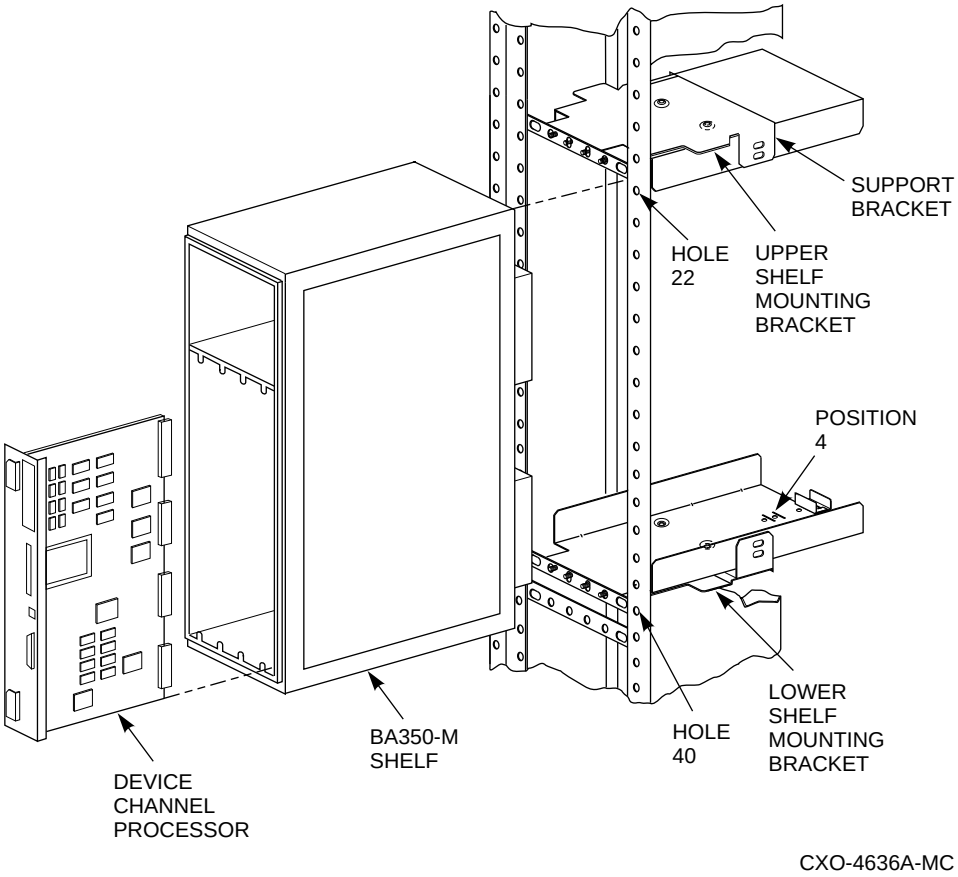


Figure 3–11 shows an exploded view of the components of the BA350–M shelf assembly:

- 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.

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 BA350–M Shelf Mounting Bracket Installation (Lower)

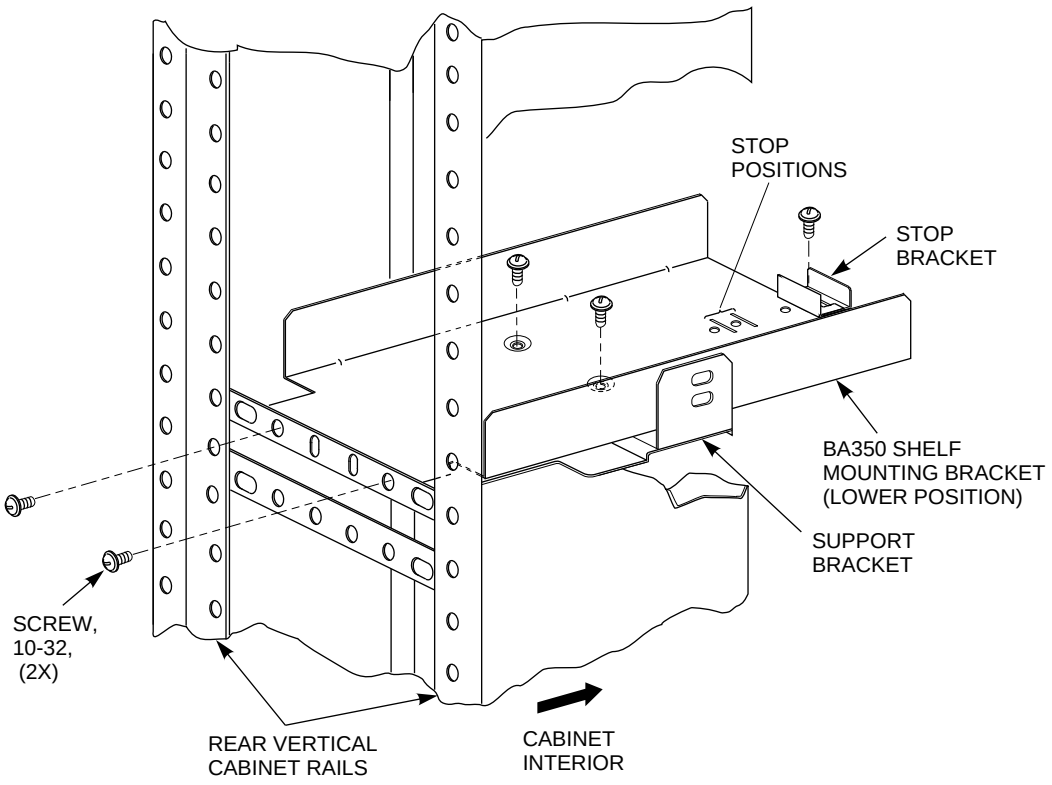


Figure 3–12 shows the proper horizontal cabinet bracket configuration for the *lower* BA350–M shelf mounting bracket.

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 the two outside SEMS screws of the shelf bracket as shown in Figure 3–12. The two inner screws are 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.

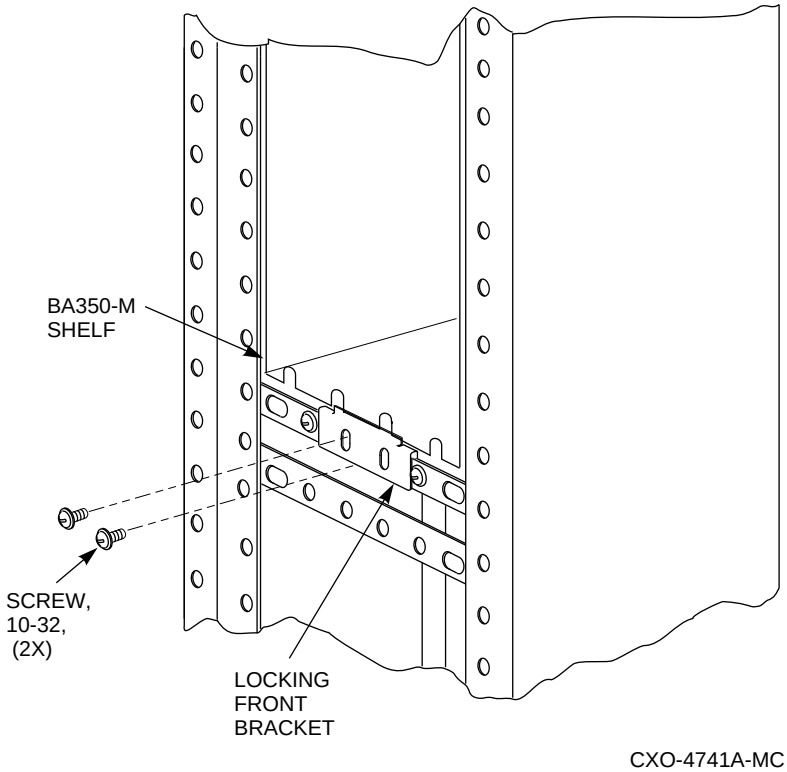
8. With the power supply end of the shelf at the top and the blowers facing the cabinet, slide the BA350–M shelf between the upper and lower shelf mounting brackets until it contacts the stop brackets.

Note

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.

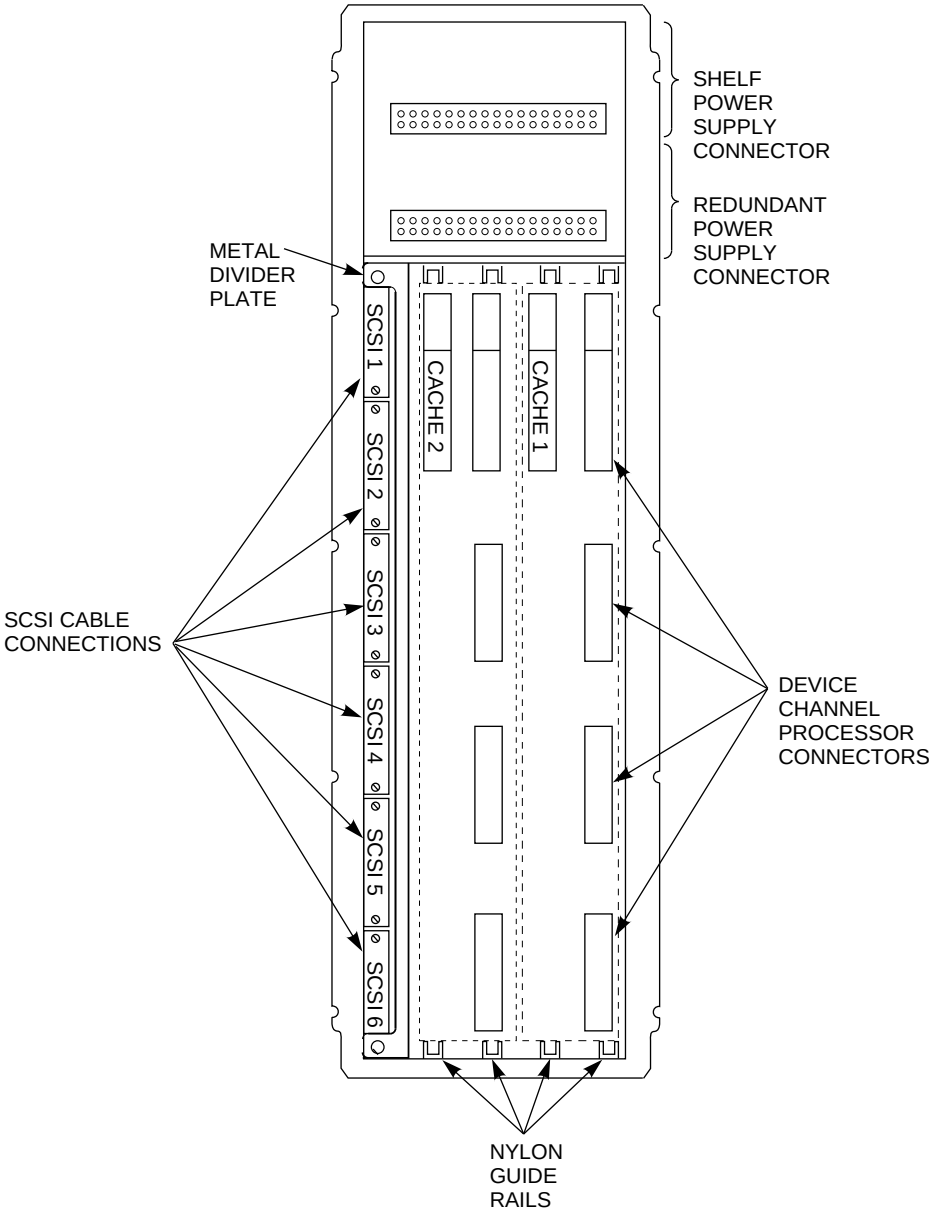
The BA350–M shelf should slide into the upper and lower shelf mounting brackets. If it binds, remove it and check the alignment of the shelf mounting brackets. The bracket mounting screws might need to be loosened slightly or adjusted to allow the brackets to align properly with the shelf. Tighten the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

Figure 3–13 Locking Front Bracket Installation



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 3–14 BA350–M Shelf Layout (Front View)



3.8 Installing BA350–M Shelf SCSI Cables (If Required)

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

CAUTION

SCSI pins are bent easily. 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.

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 BA35*x*–S shelf) that hold the SCSI–2 storage devices. Figure 3–14 shows the location of the SCSI connectors on the BA350–M backplane.

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.

3.9 Installing 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 HS211 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 write-back cache module must be installed prior to installation of the 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

Electrostatic discharge damages modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.3 for proper grounding procedures.

Figure 3–15 BA350–M Shelf Component Positions

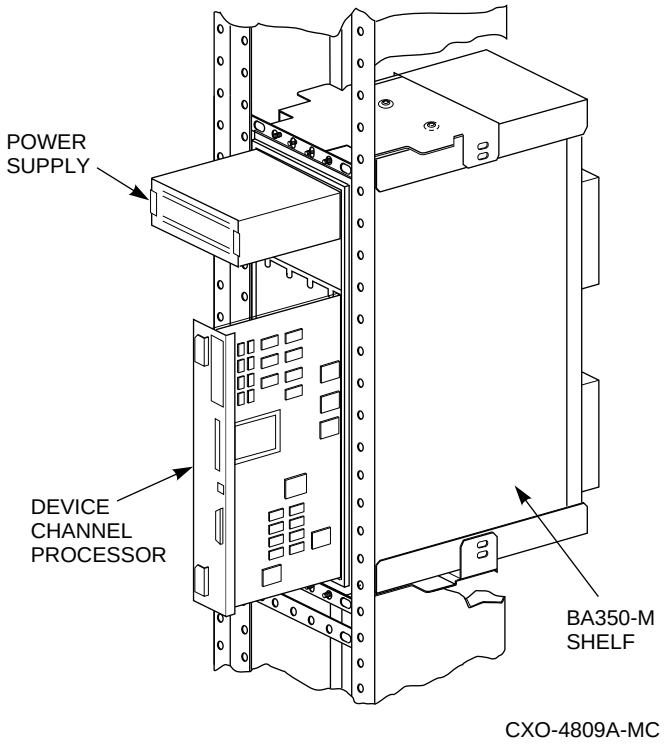


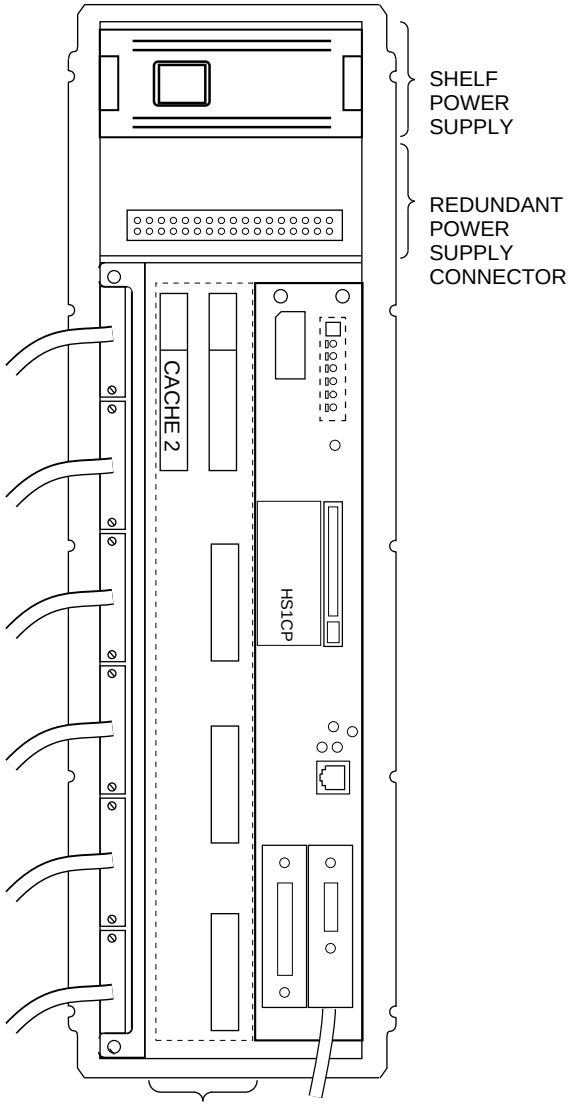
Figure 3–15 shows the installation positions of the power supply and device channel processor into the BA350–M shelf.

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

1. Install the 32 MB write-back cache module into the *right* side (slot 7) of the BA350–M shelf by sliding the module into the single white connector located in the back of the shelf.

   The single white connector is shown as "CACHE 1" in Figure 3–14.

Figure 3–16 Slot 7 Device Channel Processor Installed



2. Install the HS1CP into the BA350–M shelf by sliding the module into the four white connectors located at the back of the shelf (refer to Figure 3–14).

   Figure 3–16 shows the BA350–M shelf with one HS1CP device channel processor installed.

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

CAUTION

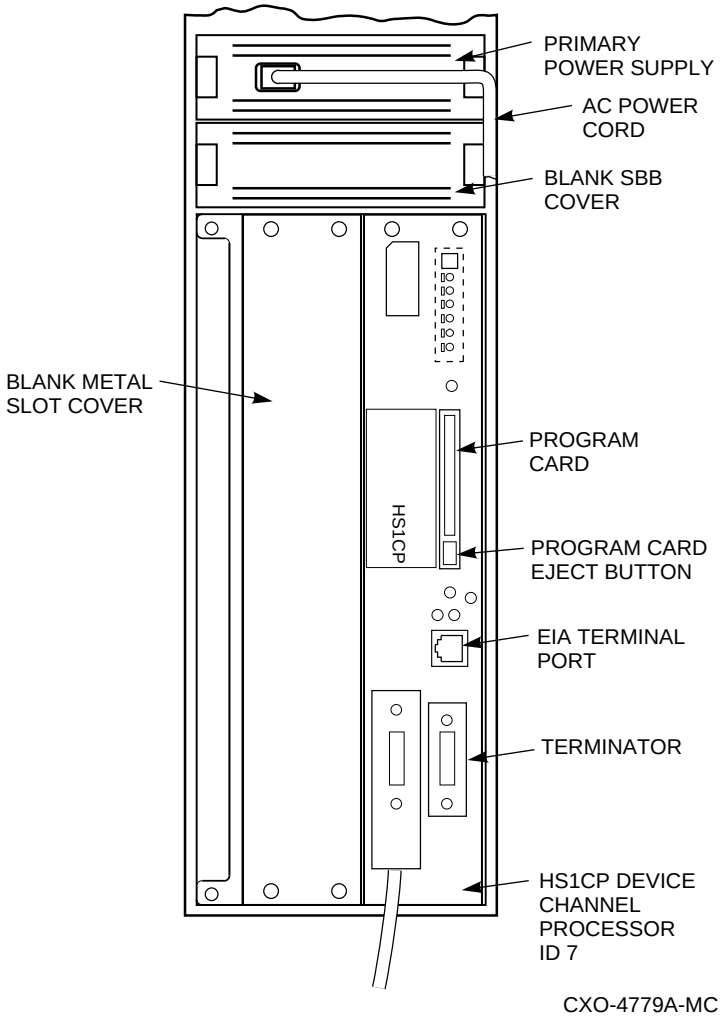
Do not overtighten these screws. Using excessive force could break the screws or damage the module.

4. Install the power supply into the top slot of the BA350–M shelf (see Figures 3–14 and 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 ac power cord into the front of shelf power supply.

Figure 3–17 Blank SBB and Metal Slot Covers Installed



6. Install the blank SBB cover over the open lower power supply slot (see Figure 3–17).

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

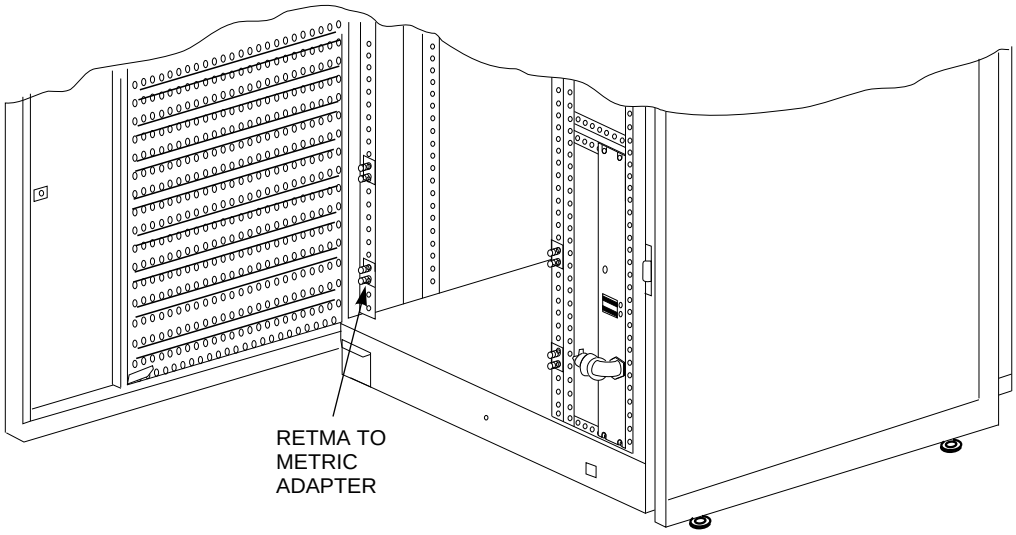
7. Install a blank metal slot cover over the open BA350–M shelf slot (see Figure 3–17).

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.

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



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3.10 Installing the Chassis Slide Assembly

Use the following procedure to install the chassis slide assembly:

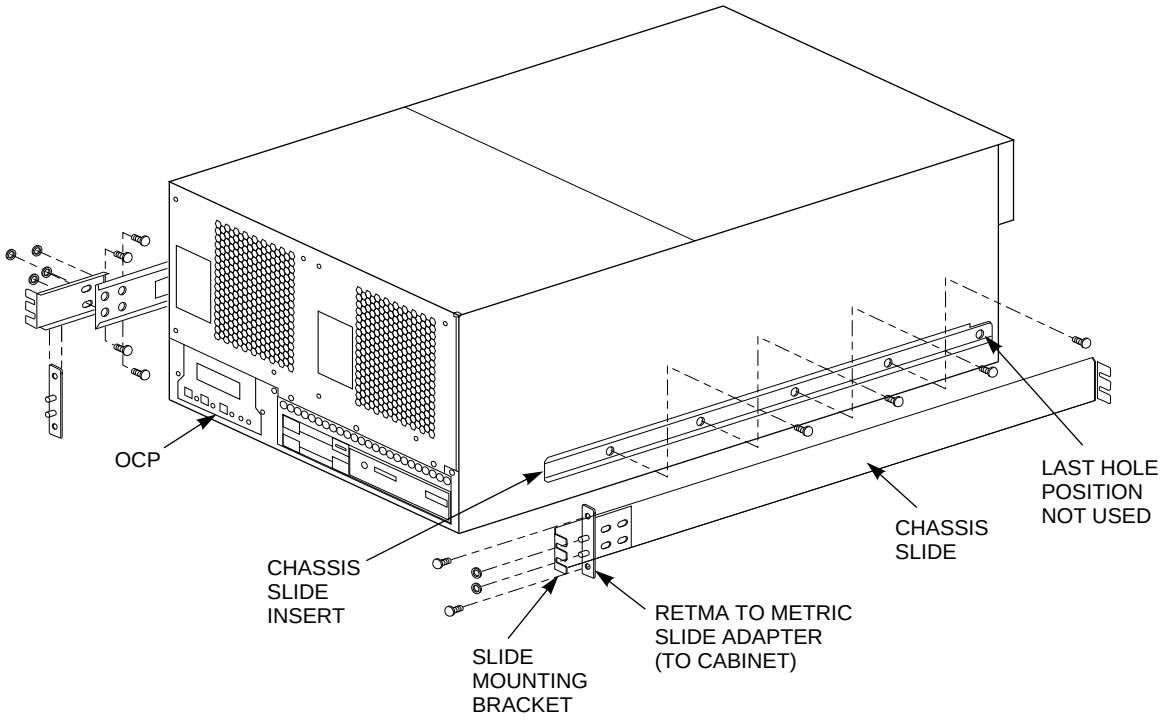
1. Install a RETMA-to-metric slide adapter to the cabinet at hole position 56 and 58 on the *left front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 3–18).
2. Install a RETMA-to-metric slide adapter to the cabinet at hole position 56 and 58 on the *right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

   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.

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 (see Figure 3–6).

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.

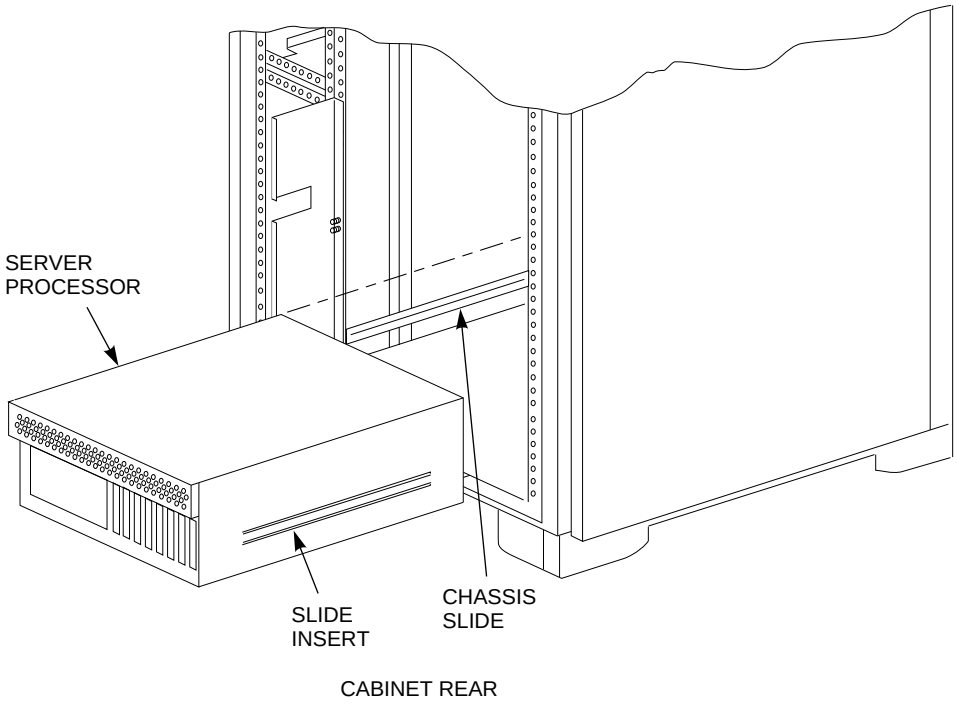
   Position the slide insert so that the metal lock tab is outside and the *notch* on each slide insert is toward the rear of the server processor (see Figure 3–19). Align the screw holes on the server processor with the holes to the slide insert.

   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.

Figure 3–20 Server Processor Installation



3.11 Installing the Server Processor

Use the following procedure to install the server processor:

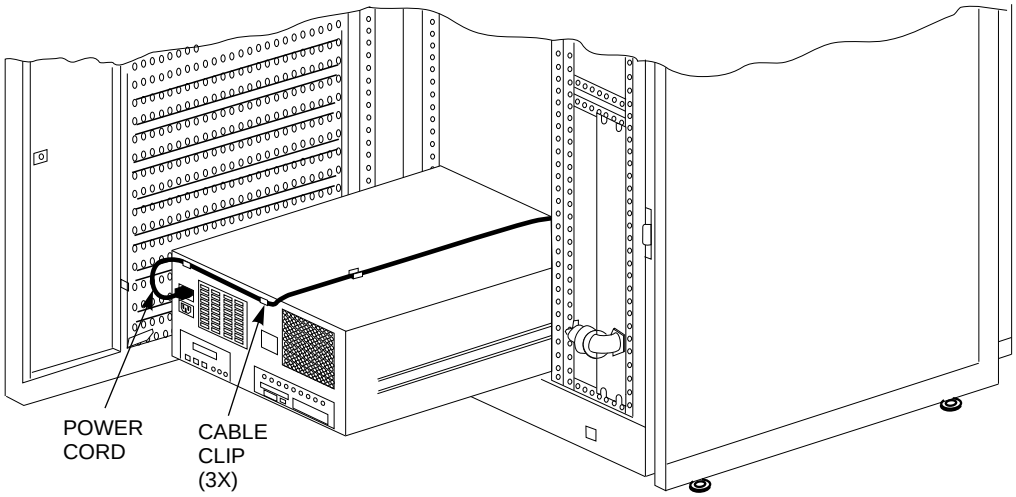
1. With the help of a second person or a lifting device, install the server processor into the chassis slide from the *rear* of the cabinet. Align the slide insert on the server processor to the chassis slides in the cabinet and slide the server processor into the cabinet until the slide insert locks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

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

Figure 3–21 Server Processor Cable Clip Installation



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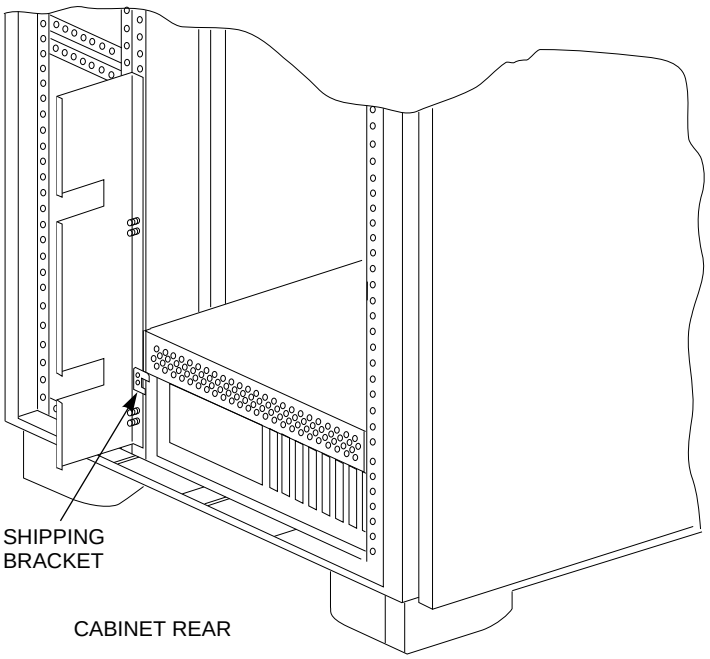
2. Attach three adhesive-backed cable clips to the new server processor.

   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.

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.

Figure 3–22 Shipping Brackets



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.

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 3.3.

This completes the server processor installation.

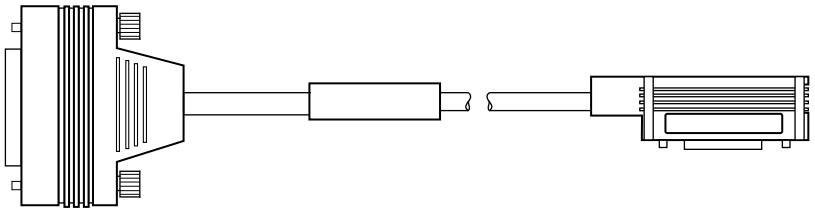
3.12 Installing Internal Bus Cables for the HS1CP Device Channel Processor

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

1. Connect the right-angle end of the internal bus cable to the HS1CP device channel processor trilink connector (refer to the connector on the *right* in Figure 3–23).

2. Connect the straight end of the internal bus cable to the HS1AD device bus adapter (refer to the connector on the *left* in Figure 3–23).

Figure 3–23 Internal Bus Cable Connectors



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See Figure 3–24 for where to attach the straight end of the internal bus cable into the HS1AD device bus adapter port on the rear of the server processor. This server processor will only have the port labeled "FIRST HS1AD."

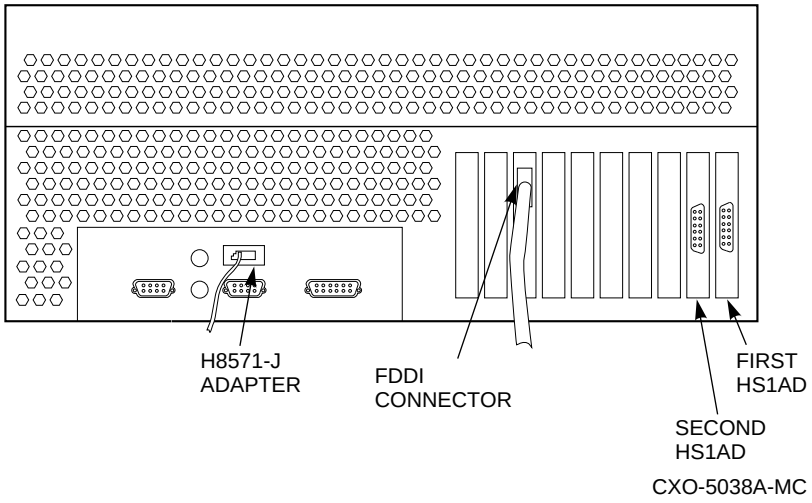
CAUTION

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 the 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.

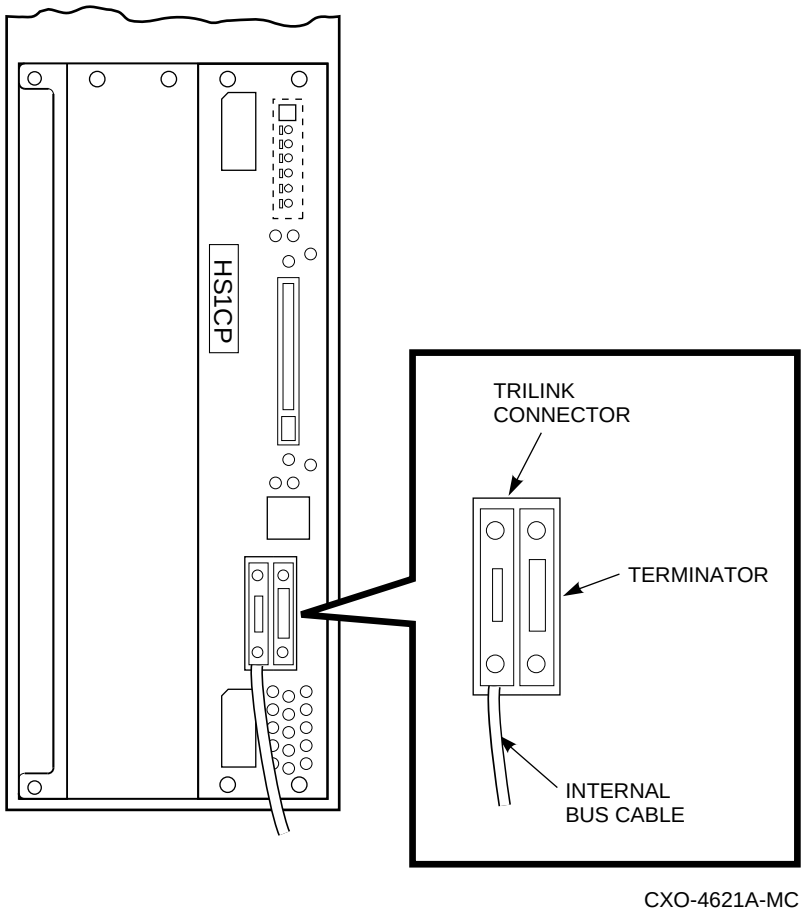
Some internal bus cable and terminator connectors do not provide enough access to the trilink screws for you to disconnect the trilink (without first disconnecting the cable and/or terminator). In these cases, you must disconnect power from all bus members and disconnect cables and terminators before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

Figure 3–24 Connecting to the Bus Adapter Port of the StorageWorks FDDI Server



See Figure 3–25 for where to attach the internal bus cable to the trilink connector on the HS1CP.

Figure 3–25 Trilink Connector with Cable and Terminator



3. Plug a bus terminator into the other trilink connector (see Figures 3–27 and 3–26). The HS1CP should now look like 3–25.

Figure 3–26 Trilink Connector

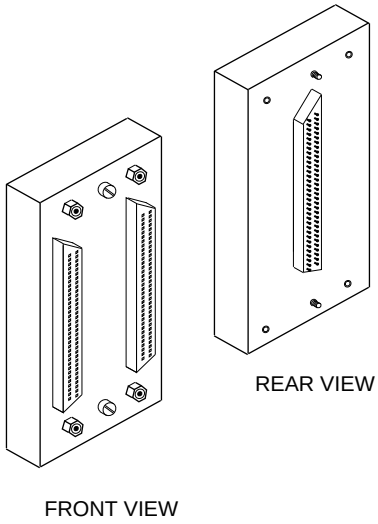
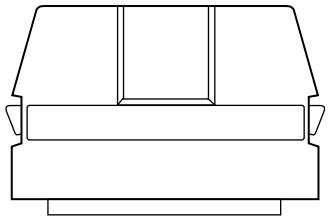
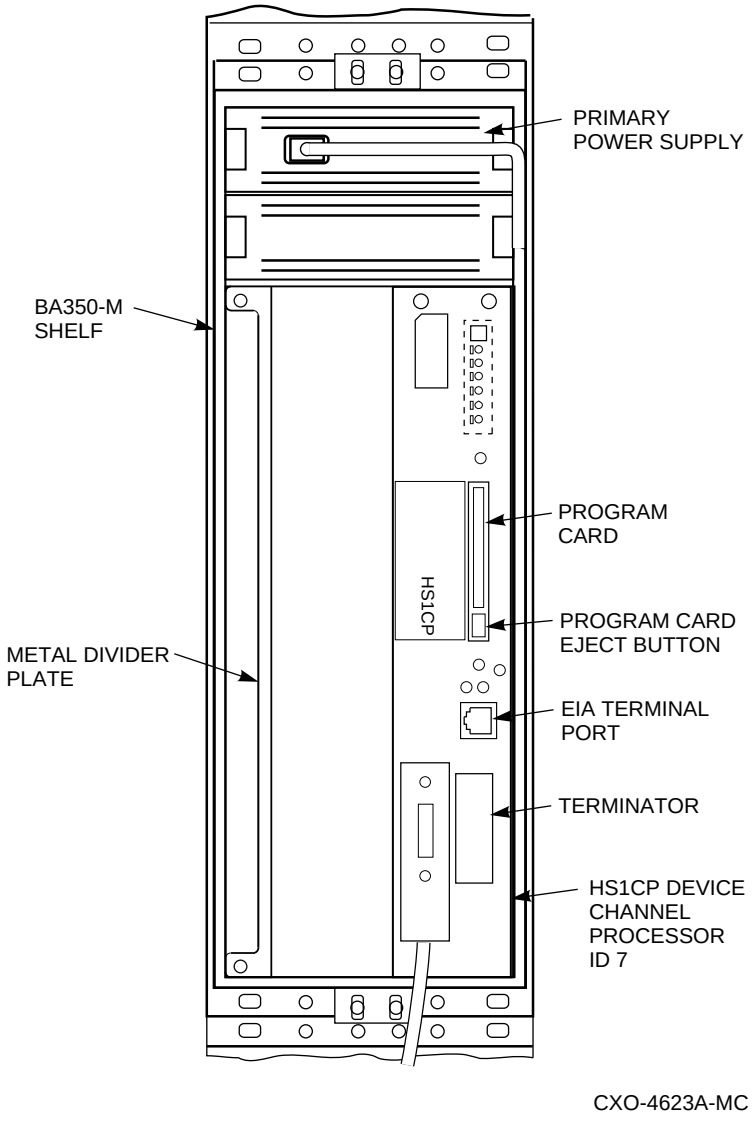


Figure 3–27 Terminator



4. The PCMCIA program card should already be installed in the device channel processor (see Figure 3–28).

Figure 3–28 HS1CP Device Channel Processor



5. Attach the ESD cover over the program card, if it is not already in place.
6. Switch the circuit breaker on the front panel of the CDUs to the ON (|) position.
7. Depress the power button on the front of the server processor.

3.13 Connecting the Terminal to the HS1CP 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 (◯).
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 3–28).
4. Turn the terminal power switch to the ON (|) position.
5. 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.
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.

3.14 Setting 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 operation will be performed in a later step.

3.15 Installing 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. This 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 callout numbers in this example correspond to the list of explanations that follows.

```
HS1CP1> RUN FLS

------------------------------------------------------------------------------
      Firmware Licensing System (FLS) on node HS1CP1
Option❶   State❷       License❸       Key❹
------------------------------------------------------------------------------
 RAID      ENABLED       INVALID        *none*
 WBCA      ENABLED        VALID         ACME_WIDGET_CORP........
 MIRR      DISABLED      INVALID        *none*
```

```
                RAID = Raid5 + Writeback Cache ❺
                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] ?
```

❶ **Option**—In this example, the options that are available—RAID, write-back cache (WBCA), and mirroring—are shown.

❷ **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.

❸ **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.

❹ **Key**—The license key is ACME_WIDGET_CORP; the 8-character CRC portion of the key is shown as hidden text (.....).

❺ **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.

3.15.1 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 to clear	Entered key becomes invalid

3.15.2 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.

3.15.3 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.

3.15.4 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. The callout numbers in this example correspond to the list of explanations that follows.

Note

All firmware functionality options, e.g., RAID, write-back cache, and disk mirroring, may be installed and enabled at this time. Consult the Software Product Description (SPD) for the HS1CP firmware functionality options (SPD 64.20.*xx*.

```
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] ? 2❶

Enter new WBCA key, including 8-character CRC, or enter 0
        to return to main menu: ACME_WIDGET_CORPVB8UWQ9C❷

*** 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] ? 2❸
*** WBCA enabled ***

--------------------------------------------------------------------------------
      Firmware Licensing System (FLS) on node HS1CP1
Option      State        License        Key
--------------------------------------------------------------------------------
 RAID      DISABLED      INVALID        *none*
 WBCA      ENABLED        VALID❹        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] ? Return❺
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
```

You have completed the installation of the HS210–AA upgrade kit to upgrade an SW800-series cabinet to a model HS211 StorageWorks FDDI Server. Now you must configure storage for the HS1CP device channel processor after connecting a terminal to the server processor.

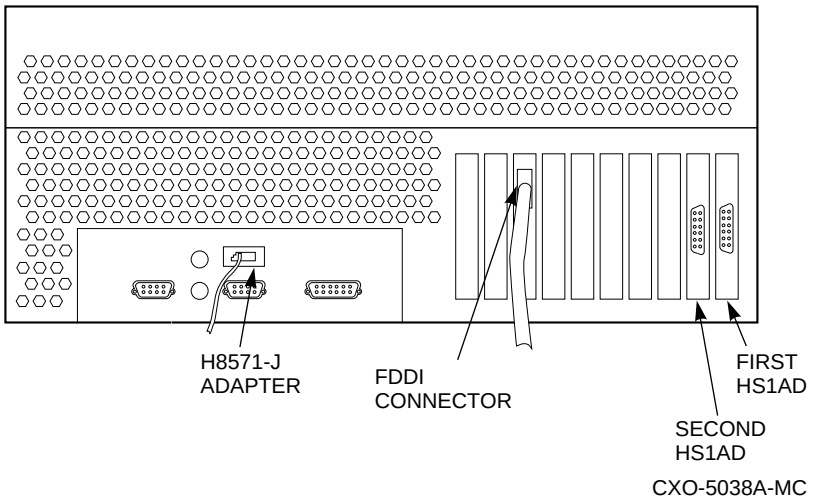
3.16 Connecting a Terminal to the StorageWorks FDDI Server

Communicating with the StorageWorks FDDI Server 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 most EIA compatible terminals:

1. Make sure the power switch on the back of the terminal is OFF (0).
2. Connect one end of the terminal cable to the back of the terminal.

Figure 3–29 Connecting to the Terminal Port of the StorageWorks FDDI Server



3. Connect the other end of the terminal cable to the EIA terminal port on the rear of the StorageWorks FDDI Server cabinet using an H8571–J adapter as shown in Figure 3–29.
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. The terminal screen displays a >>> prompt after power is applied to the server processor.

3.17 Customizing Server Operating System Parameters

Sections 3.17.1 through 3.17.3 describe how to customize operating system parameters in the StorageWorks FDDI Server.

3.17.1 Software Configuration Overview

Each StorageWorks FDDI Server ships from the factory with the OpenVMS Alpha operating system preloaded on the system disks. You set StorageWorks FDDI Server processor operating system parameters the **first time** you boot the servers.

Because each StorageWorks FDDI Server processor is a VMScluster node, it is important that you perform the software configuration in the recommended sequence. Table 3–2 describes the configuration tasks in the remainder of this chapter.

Table 3–2 Software Configuration Tasks

Step	Action	Refer to
1	Customize the parameters on the first server processor by running the Software Customization Procedure. Reboot the server processor upon completion.	Section 3.17.3, Executing the Software Customization Procedure.
2	If your StorageWorks FDDI Server has two server processors, move the terminal to the second server processor and customize the parameters on the second server processor by running the Software Customization Procedure (see Connecting a Terminal to the StorageWorks FDDI Server). Reboot the server processor upon completion.	Section 3.17.3, Executing the Software Customization Procedure.
3	Configure the StorageWorks storage devices according to your needs.	Section 3.18, Configuring the StorageWorks FDDI Server Storage Devices.
4	Connect the server to the FDDI interconnect. For each server processor: 1. Shut down the server processor. 2. Reboot into the VMScluster system.	Section 3.20.1, Connecting to the FDDI Interconnect.
5	Ensure VMScluster system compatibility and server readiness.	Section 3.20.3, Ensuring VMScluster System Compatibility.

3.17.2 VMScluster System Considerations

Introducing the StorageWorks FDDI Server to a VMScluster system requires you to consider some broad, clusterwide issues. Among them are the VMScluster quorum scheme, enabling you to maintain an available VMScluster system, and Volume Shadowing interoperability. This section addresses each of these topics with some guidelines for you to consider.

3.17.2.1 Considering the VMScluster Quorum Scheme

The addition of a StorageWorks FDDI Server to an existing VMScluster may impact existing VMScluster voting and quorum schemes. The following two sample configurations may provide insight into possible VMScluster voting and quorum schemes:

Example 1:

The FDDI Server is being added to an existing cluster (perhaps on a new FDDI ring) with an existing and working quorum scheme. In this case, the FDDI Server is providing device serving only and does not contain a VMScluster system disk for other cluster nodes. In this case, the FDDI Server should have ZERO votes and should contain no quorum disk (which may already exist in another part of the cluster). The expected votes on the FDDI Server should be set to the current value in the cluster.

Example 2:

The FDDI Server provides the VMScluster system disk for other VMScluster satellites (nodes without votes). There are no other voting nodes in the cluster. This case would occur in a new cluster being formed with an FDDI Server as the core. In this case, the nodes in the FDDI Server must provide all the votes for the cluster. For the two-node servers, a quorum disk on the server is recommended so that the cluster can continue with only one server node operational. In the voting scheme, each of the two server nodes would have one vote; the quorum disk would have a single vote; and the expected votes for the cluster would be THREE. For the HS*x*11 (single-node servers), there is no need for a quorum disk, because only the single node in the HS211/111 will be contributing to quorum. In this case, the HS*x*11 node would have one vote and the expected votes for the cluster would be ONE. Note that the cluster will hang if the HS211/111 is unavailable.

Many other cluster configurations are possible, and appropriate quorum and voting schemes should be designed by knowledgeable system and network managers, perhaps with assistance from consulting services. Extensive information regarding quorum and voting issues may be found in the *VMScluster Systems for OpenVMS* and the *Guidelines for VMScluster Configurations* manuals.

3.17.2.2 Volume Shadowing Interoperability

Each server processor in your FDDI Server is a node in your VMScluster running the OpenVMS Alpha operating system software Version 6.2 (or later). Introduction of this operating system version into your cluster has clusterwide implications that should be considered by knowledgeable system managers. OpenVMS Alpha operating system software Version 6.2 includes Phase II Volume Shadowing™ interoperability changes from previous ECO kits. If you are using Phase II Volume Shadowing, then you must install the Volume Shadowing interoperability patches on any cluster member running an operating system version earlier than OpenVMS Version 6.2 to ensure correct shadowing operation throughout your cluster.

More information regarding these patches is available in the Problem Description section of the release notes supplied with the patch kits. Please read these notes regarding the cluster impact of patch installation. For your convenience, the FDDI Server Version 1.1 CD–ROM contains the release notes and shadowing remedial kits current at the time the CD–ROM was built. The release notes and kits are located in the [SHADOW_KITS] directory.

Digital recommends that you contact the Digital Customer Support Center to obtain the latest Volume Shadowing ECOs for all operating system versions in your cluster. TIMA remedial kits containing these changes are available through Digital Customer Services worldwide.

3.17.3 Executing the Software Customization Procedure

Note

The Software Customization Procedure should be performed by an experienced cluster manager who is knowledgeable about the clusters at the installation site. Network knowledge also is required to complete the procedure.

Note

You must perform the Software Customization Procedure on each StorageWorks FDDI Server Server Processor.

The Software Customization Procedure is self-explanatory and provides immediate help for determining responses to questions asked during the procedure. To get help, type a question mark (?) as your response to a procedure question and press the Return key.

The Software Customization Procedure requires specific information in order to complete successfully. Before starting, make sure that you have the information described in Table 3–3. (Table 3–3 can be used as a worksheet. Use the underlined space in column 1 to record your response to each of the questions in advance.)

Once completed, the Software Customization Procedure will not run again. However, if you abort the procedure before it completes, it will appear the next time you boot the system.

After completing the Software Customization Procedure, manage the StorageWorks FDDI Server using normal OpenVMS Alpha system management procedures. For information on managing the server, consult appropriate documentation on the OpenVMS Alpha operating system.

To begin the Software Customization Procedure, type B at the >>> system prompt on the terminal attached to the server processor. Examples 3–1 and 3–2 show sample Software Customization Procedure log files and provide sample answers to the questions in the Software Customization Procedure. All user input is shown in bold text except for passwords, which are not echoed, and carriage returns.

Table 3–3 Required Information for Customizing the OpenVMS Alpha Operating System

Use the information for the . . .	To respond to the prompts . . .
Current date and time _____	The current system date is dd-mmm-yyyy Is this date correct? [YES]: no Type the current date [ ]: and The current system time is hh:mm:ss Is this time correct? [YES]: no Type the current time [ ]:
System password _____	Type the password for the system account: and To verify the password is correct, type it again now. Password verification:
DECnet™ node name of the StorageWorks FDDI Server _____	What is the server's DECnet node name?
DECnet address of the StorageWorks FDDI Server _____	What is the server's DECnet node address?
Cluster group number _____	Enter this cluster's group number:
Cluster password _____	Enter this cluster's password: and Reenter this cluster's password for verification:
Value of the disk ALLOCLASS parameter _____	Enter a value for *xxxxxx*'s † ALLOCLASS parameter?
Value of the tape ALLOCLASS parameter _____	Enter a value for *xxxxxx*'s † TAPE_ALLOCLASS parameter?
Name of the quorum disk ‡ _____	What is the device name of the quorum disk?
The number of votes the server will contribute toward quorum _____	Enter a value for the number of votes:
The expected number of votes in the cluster	Enter a value for the number of expected votes:

†Where *xxxxxx* is the server's name.

‡The quorum disk, if specified, must be attached to the server's device channel processor; that is, it must be a DUA disk and not the server's local system disk.

Example 3–1 Software Customization Procedure Log File—Part 1

```
>>> BOOT
(boot dka0.0.0.6.0 -flags 0)
block 0 of dka0.0.0.6.0 is a valid boot block
reading 1035 blocks from dka0.0.0.6.0
bootstrap code read in
base = 14e000, image_start = 0, image_bytes = 81600
initializing HWRPB at 2000
initializing page table at 140000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

  +---------------------------------------------------------------------+
  |                           Welcome to the                            |
  |                                                                     |
  |                      StorageWorks FDDI Server                       |
  |                                                                     |
  |                  Software Customization Procedure                   |
  +---------------------------------------------------------------------+

   Please wait while the Software Customization procedure initializes the
   system.  This will take less than one minute.

  +---------------------------------------------------------------------+
  |                   Software Customization Procedure                  |
  |                                                                     |
  |                            Introduction                             |
  +---------------------------------------------------------------------+

   The Software Customization procedure will ask you to enter the
   information required for the factory installed software to be
   custom configured for your site.

   To answer a question, type the requested information and press Return.
   To get help at any time, type a question mark (?) and press Return.

   Press Return to continue:

   No licenses have been registered on this system.

   To register your license PAKs, type the following command after
   the system restarts and you have logged in to the system manager's
   account:

   $ @SYS$UPDATE:VMSLICENSE

   Press Return to continue:
   The following information is essential to ensure that the server
   can be customized correctly:
```

(continued on next page)

Example 3–1 (Cont.) Software Customization Procedure Log File—Part 1

```
   o  The current date and time
   o  The password for the system manager's account on the server
   o  Cluster Information
      -   The DECnet node name of the server
      -   The DECnet address of the server
      -   The cluster group number and password
      -   The value of the ALLOCLASS parameter for disk and tape
      -   Whether this server will serve tapes
      -   The name of a quorum disk if a quorum disk will be installed
          on the server.  (This disk must be attached to the server's
          Device Channel Processor; that is, it must be a DUA disk and
          not the server's local system disk.)
      -   The number of Votes the server will contribute toward quorum
      -   The expected number of Votes in the cluster

   You cannot complete the Software Customization procedure if you do not
   have all the essential information.  If you do not have this
information,
   you can obtain it from your system manager or network administrator.

   Are you ready to proceed with the Software Customization? [YES]:

   At the end of the Software Customization procedure, the server will
   restart itself.  Then it will be ready for use.


  +-----------------------------------------------------------------------+
  |                       Set the system date and time                    |
  +-----------------------------------------------------------------------+

   To set the server up correctly, you must set the system date and
   time.

   To get help, type a question mark (?) and press Return.

   The current system date is 21-AUG-1995.

   Is this date correct? [YES]:

   The current system time is 22:58:12

   Is this time correct? [YES]:

   The current system date and time is 21-AUG-1995 22:58:13.60

   Are the date and time correct? [YES]:

  +-----------------------------------------------------------------------+
  |                         Set the system password                       |
  +-----------------------------------------------------------------------+

   The system password gives you access to the system manager's account on
   the server.  When the Software Customization procedure completes, you will
   be able to log in to the system manager's account on the server by typing
   the user name SYSTEM, followed by the system password.

   The system password that you specify must contain at least 8 characters.
   For security reasons, the characters you type are not displayed on the
   screen.

   IMPORTANT:  Do not forget the system password, otherwise you will be
               unable to log in to the system manager's account.

   Type the password for the SYSTEM account:
```

(continued on next page)

Example 3–1 (Cont.) Software Customization Procedure Log File—Part 1

```
   To verify that the password is correct, type it again now.

   Password verification:

   The password for the SYSTEM account has been verified.

  +-------------------------------------------------------------------+
  |                         Configure Cluster                         |
  +-------------------------------------------------------------------+

What is the server's DECnet node name? FSERV1
What is the server's DECnet node address? 63.849
Enter this cluster's group number: 3396
Enter this cluster's password:
Re-enter this cluster's password for verification:

Do you wish FSERV1 to automatically serve disks? (Y/N) Y
Enter a value for FSERV1's ALLOCLASS parameter: 27
Do you wish FSERV1 to automatically serve tapes? (Y/N) Y
Enter a value for FSERV1's TAPE_ALLOCLASS parameter: 27
Will a quorum disk be installed on the server? (Y/N) N
Enter the number of votes that the server will contribute toward quorum: [1] 0
Enter a value for the number of expected votes in the cluster: [1] 3

      You have chosen the following cluster parameters:

Server name (SCSNODE)                   FSERV1
System id (SCSSYSTEMID)                 65361 (63.849)
Cluster group number                    3396
Automatically serve disks               YES
Disk allocation class (ALLOCLASS)       27
No quorum disk selected
Tape server (TMSCP_LOAD)                YES
Tape allocation class (TAPE_ALLOCLASS)  27
Number of Votes for this server         0
Number of Expected Votes in the cluster 3


Would you like to change any of these parameters? (Y/N):  N
```

If you respond with an N to the last question shown in the previous example, the Software Customization Procedure continues as shown in Example 3–2. If you respond with a Y, then the previous script repeats.

Example 3–2 Software Customization Procedure Log File—Part 2

```
  ****************************************************************
  *                                                              *
  *    The following parameters have been set for FSERV1:        *
  *                  VOTES = 1                                   *
  *                  QDSKVOTES = 1                               *
  *                                                              *
  *    After FSERV1 has booted into the cluster, you must        *
  *    adjust the value for EXPECTED_VOTES in every cluster      *
  *    member's  MODPARAMS.DAT.  You must then run AUTOGEN on    *
  *    each node and shutdown and reboot the cluster.  This      *
  *    will cause EXPECTED_VOTES to be correct on each           *
  *    node.                                                     *
  *                                                              *
  *    For example, if the server includes two Alpha VMS         *
  *    systems and a quorum disk, then EXPECTED_VOTES for        *
  *    each cluster member will have to be increased by          *
  *    a total of 3.                                             *
  *                                                              *
  ****************************************************************

 Cluster set-up complete.  Continuing...

+----------------------------------------------------------------------+
|           Volume Shadowing for OpenVMS Alpha ECO kits                |
+----------------------------------------------------------------------+

   Note that the OpenVMS Alpha V6.2 operating system contains Volume
   Shadowing interoperability changes from previous ECO kits.  If you
   are using Volume Shadowing, you must install the Volume Shadowing
   interoperability patches on any cluster member running an operating
   system version earlier than OpenVMS V6.2 to ensure correct shadowing
   operation throughout your cluster.

   More information regarding these patches is available in the
   Problem Description section of the release notes supplied with the
   patch kits.  Please read these notes regarding the cluster impact
   of patch installation.  The release notes are located in the SYS$HELP
   directory of the server's system disk in the following files:

       ALPSHAD01_062.RELEASE_NOTES     ALPSHAD07_061.RELEASE_NOTES
       VAXSHAD01_062.RELEASE_NOTES     VAXSHAD03_060.RELEASE_NOTES
       VAXSHAD07_061.RELEASE_NOTES

 Press Return to continue:

   For your convenience, the shadowing remedial kits current at the
   time this server was built have been provided in the following
   directory of the server's system disk and in the equivalent directory
   of the FDDI Server's distribution CD--ROM.

   sys$sysdevice:[shadow_kits]ALPSHAD01_062.*
   sys$sysdevice:[shadow_kits]ALPSHAD07_061.*
   sys$sysdevice:[shadow_kits]VAXSHAD01_062.*
   sys$sysdevice:[shadow_kits]VAXSHAD03_060.*
   sys$sysdevice:[shadow_kits]VAXSHAD07_061.*

   TIMA remedial kits containing these changes are available through
   Digital Customer Services worldwide.  Digital recommends that you
   contact your Customer Support Center to obtain the latest Volume
   Shadowing ECOs for all operating system versions in your cluster.

 Press Return to continue:
```

(continued on next page)

Example 3–2 (Cont.) Software Customization Procedure Log File—Part 2

```
   +---------------------------------------------------------------------+
   |                          End of Data Entry                          |
   +---------------------------------------------------------------------+

   This is the end of the data entry part of the Software Customization
   procedure -- you do not need to provide any more information.

   The server will now shut down and restart automatically as a
   standalone node; it will not join or create a cluster.  After this
   reboot, you can log in to the system manager's account using the user
   name SYSTEM and the password that you specified earlier.  You may
   then install any license PAK's, configure the storage attached to the
   server, add a command to the startup procedure to mount the quorum
   disk (if any), perform additional system customization, etc.

   The third time the server is started, it will attempt to join
   the cluster using the parameters you have entered above.  If it has
   been attached to the FDDI interconnect, the server will join the FDDI
   cluster.  Dual-processor servers will form a cluster with each other
   if they do not find a cluster to join.


   Press Return to complete the Customization procedure:

   The server is now being configured. This will take less than one
   minute.

   Please wait...

   Server is being configured...     22:59:19

   The server SYSGEN parameters have been set.  The server will now
   restart automatically. Please wait...

halted CPU 0

halt code = 5
HALT instruction executed
PC = ffffffff8004df84

CPU 0 booting

(boot dka0.0.0.6.0 -flags 0)
block 0 of dka0.0.0.6.0 is a valid boot block
reading 1035 blocks from dka0.0.0.6.0
bootstrap code read in
base = 14e000, image_start = 0, image_bytes = 81600
initializing HWRPB at 2000
initializing page table at 140000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

    OpenVMS (TM) Alpha Operating System, Version V6.2
```

After the server has shut down, it may be necessary to cycle power for the server processor. If the reboot does not proceed beyond the banner shown above, power cycle 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.

Pressing the Return key at this point results in the system prompting you for a user name and password.

Note

If you specified a quorum disk as part of the StorageWorks FDDI Server software installation, the quorum disk must be mounted after the OpenVMS Alpha operating system is running. As soon as possible, add a command to mount the quorum disk on the server to the startup procedure for the server's processor. This allows you to maintain quorum in the event one of the server processors fail (see Section 10.1.1).

3.18 Configuring the StorageWorks FDDI Server Storage Devices

The StorageWorks FDDI Server requires you to configure the StorageWorks storage system to meet your particular storage needs. The *StorageWorks Array Controllers HS Family of Array Controllers User's Guide* provides a detailed description of stripesets and RAIDsets that you can configure for the StorageWorks FDDI Server.

This section begins by providing a few general guidelines to help you decide how you may want to configure the StorageWorks storage system, continues with the steps required to use the CFMENU utility from a terminal connected to the server processor, and concludes by providing a sample configuration.

3.18.1 General Considerations for Configuring a StorageWorks Storage System

Configuring the storage system is the process of defining, through parameters, the logical organization of the storage devices. The storage devices may be configured as one or more of the following:

- Stripeset—A virtual disk drive with its physical data spread across multiple physical disks.
- RAIDset—Three or more physical disks that are connected to present an array of disks as a single virtual unit to the host.
- Spareset—A pool of disk drives used by the device channel processor to replace failing members of a RAIDset.
- Failedset—A group of disk drives that have been removed from RAIDsets due to a failure or a manual removal.
- Container—An entity that is capable of storing data, whether it is one physical device or a group of physical devices. A disk, a stripeset, and a RAIDset are examples of a container.
- Passthrough Container—A virtual device used to pass SCSI commands that perform operations other than simple device read or write operations. A passthrough container typically is used with tape libraries that contain standard tape devices plus a robotic mechanism for selecting and loading cartridges from a pool of tapes. A passthrough container must exist to pass SCSI commands to the robotic mechanism.

- Unit—A logical entity composed of one or more devices and treated as a single addressable storage structure by the cluster members. Units can be single devices, stripesets, or RAIDsets.

3.18.2 Running CFMENU from the StorageWorks FDDI Server Terminal

Before CFMENU can be invoked from a terminal connected to the StorageWorks FDDI Server, you must establish a logical connection to the device channel processor. To create a logical connection to the device channel processor, perform the following steps:

1. Log into the system manager's or other appropriate account on the StorageWorks FDDI Server (the account must have DIAGNOSE privilege).
2. At the DCL prompt, enter the SHOW CLUSTER command. The system will respond with default cluster information similar to that shown in Figure 3–30 and return control to the DCL command level.

Figure 3–30 Example Cluster Information

View of Cluster from Node: FSERV1 9−OCT−1995 15:51:01

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
NODE03	VMS V6.2	MEMBER
HS1CP1	HSD V25F	

3. Identify the names of the device channel processors (note, there may be more than one). The device channel processor can be identified by searching for the nodes that are named HS1CP1, HS1CP2, and so on.
4. Change the terminal format to accommodate 132 characters with this command:

   ```
   $ SET TERMINAL/WIDTH=132
   ```

5. Logically connect the StorageWorks FDDI Server terminal to the device channel processor by entering the following command at the DCL prompt:

   ```
   $ SET HOST/DUP/SERVER=mscp$dup/TASK=CLI node-name
   ```

   Where:

   node-name is the name assigned to the device channel processor (for example, HS1CP1).

   The device channel processor responds with its prompt (for example, HS1CP1>).

6. Enter the following command to start the CFMENU utility:

   ```
   HS1CP1> RUN CFMENU
   ```

The CFMENU utility begins executing. After CFMENU's initial message, press the Return key to get to CFMENU's main menu as shown in Figure 3–31. Any recognized devices that have not been added to your configuration will appear, with their Port Target LUN (PTL), in the column to the right of the menu options. All the devices shown in Figure 3–31 are attached but not yet configured.

Figure 3–31 CFMENU Main Menu

```
MAIN MENU:                    |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In- Re-       W W
1. Add/delete devices         | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp. it'd duc  Unit P B
2. Add/delete stripesets      |----------|      ------ --------- ----------------  --------- ------ ------- --- ---- --- ----- - -
3. Add/delete raidsets/       | 100 (dsk)|
   sparesets/failedsets       | 110 (dsk)|
4. Add/delete passthrough     | 120 (dsk)|
5. Initialize devices         | 130 (dsk)|
   and/or storagesets         | 140 (dsk)|
6. Add/delete units           | 150 (dsk)|
7. Setup terminal             | 200 (dsk)|
8. Exit CFMENU                | 210 (dsk)|
                              | 220 (dsk)|
                              | 230 (dsk)|
                              | 240 (dsk)|
                              | 250 (dsk)|
  D=Scroll down  U=Scroll up  | 300 (dsk)|
Enter menu choice (1,5) [5] ?5
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
```

Note

If your terminal is capable of displaying more than 24 rows, you may want to enter option 7 from the main menu to set the number of rows CFMENU will display.

Table 3–4 describes the information headings of the main menu. To avoid confusion, the information headings are presented exactly as they appear on the main menu.

Table 3–4 CFMENU Information Headings

Information Heading	Description
Main Menu	Lists the major operations that are available
Unconfig'd Dev.PTLs	Unconfigured PTLS—The device PTLs that are recognized by the HS1CP device channel processor but that have not yet been added to the configuration.
Config'd PTLs	Configured PTLS—The device PTLs that have been configured by the HS1CP device channel processor.
Device Name	Device name—The name automatically assigned to the device when it is configured by the HS1CP device channel processor. The name can be changed through use of the CLI commands.
Product ID	Product ID—Information that identifies the device.
Stor.set Name	Storageset name—The name assigned by CFMENU to the storageset. The name is assigned using one of the following conventions: • S*x* for stripesets • R*x* for RAIDsets • P*x* for passthrough containers The number denoted by *x* is assigned sequentially beginning with 1 for each type of storageset. The name can be changed by using the CLI commands. (See the *StorageWorks Array Controllers HS Family of Array Controllers User's Guide* for complete descriptions of the CLI commands.)
Stor.set Type	Storageset—The type of storageset: STRP for stripesets, RAID for RAIDsets, PASS for passthrough containers.
Chnk Size	Chunksize—The size, in blocks, of data transfers with the device.
Trn sp.	Transportable—The letter, Y or N, to indicate if the device is transportable or not. A transportable device is one that does not have metadata written on it. A nontransportable device has a small amount of metadata written on it.
In- it'd	Initialized—The letter, Y or N, to indicate if the device has been initialized.
Re- duc	Reduced—Valid for RAIDsets only, indicates the RAIDset is missing one member.
Unit	Unit—The logical number of the unit as assigned by you and preceded by the letter D for disk or T for tape.
W P	Write Protected—The letter, Y or N, to indicate whether the device is write protected.
W B	Write-back—The letter, Y or N, to indicate if the device has write-back caching enabled.

3.18.3 Configuring Storage Devices Using CFMENU

CFMENU allows you to quickly configure storage devices attached to the HS1CP device channel processor. CFMENU presents, in a menu format, configuration commands normally entered at the Command Line Interpreter (CLI). Because CFMENU prompts you to choose options for devices, storagesets, and units based on the command qualifiers of the CLI, you should have a good understanding of

the various CLI commands. A complete discussion of CLI commands can be found in *StorageWorks Array Controllers HS Family of Array Controllers User's Guide*.

Note

The following configuration is a sample only. It does not configure all of the devices.

The following sample configuration assumes an HS121 model StorageWorks FDDI Server with a complement of 36 storage devices. It is further assumed that you have decided to configure the following:

- Two stripesets, one consisting of six drives, the other consisting of five drives
- One RAIDset consisting of five drives
- One spareset with two drives

In order to create the configuration you will perform the following tasks:

- Add the attached storage devices to the configuration
- Add the two stripesets
- Add the RAIDset
- Add devices to the spareset
- Initialize the containers
- Add the units

Note

Each HS1CP device channel processor must be configured identically. You may copy this configuration to other HS1CPs, as required.

3.18.3.1 Adding Storage Devices

From the main menu, enter option 1, then press the Return key. The device menu appears as shown in Figure 3–32. The list of unconfigured devices appears to the right of the options. If the list is too long to be shown on one screen, press D or U to scroll the information down or up.

Figure 3–32 CFMENU Device Menu (Before Adding Devices)

```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
DEVICE MENU:                  |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Add a device from list     | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp.  it'd duc  Unit P B
   of PTLs not configured     |----------|      ------ --------- ----------------  --------- ------ ------- ---  ---- ---  ----- - -
   (marked with ^)            |^100 (dsk)|
2. Delete an unbounded device |^110 (dsk)|
   (marked with *)            |^120 (dsk)|
3. Add all devices from list  |^130 (dsk)|
   of PTLs not configured     |^140 (dsk)|
   (marked with ^)            |^150 (dsk)|
4. Delete all unbounded       |^200 (dsk)|
   devices (marked with *)    |^210 (dsk)|
5. Return to main menu        |^220 (dsk)|
                              |^230 (dsk)|
                              |^240 (dsk)|
                              |^250 (dsk)|
  D=Scroll down  U=Scroll up  |^300 (dsk)|
```

In Figure 3–32, none of the devices have been added to the configuration yet. If you enter option 1, CFMENU prompts you as to whether or not (y/n/q) to add each device on the list. If you enter option 3, CFMENU will add *all* the unknown devices. The y/n/q prompt asks whether you want the option (yes), do not want the option (no), or want to stop what you are doing (quit).

After entering either option 1 or option 3 and adding all of the devices, the screen resembles Figure 3–33.

Figure 3–33 CFMENU Device Menu (After Adding Devices)

```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
DEVICE MENU:                  |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Add a device from list     | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp.  it'd duc  Unit P B
   of PTLs not configured     |----------|      ------ --------- ----------------  --------- ------ ------- ---  ---- ---  ----- - -
   (marked with ^)            |          |disks:  100 *  DISK100 RZ28     (C) DEC                          N    Y
2. Delete an unbounded device |          |        110 *  DISK110 RZ28     (C) DEC                          N    Y
   (marked with *)            |          |        120 *  DISK120 RZ28     (C) DEC                          N    Y
3. Add all devices from list  |          |        130 *  DISK130 RZ28     (C) DEC                          N    Y
   of PTLs not configured     |          |        140 *  DISK140 RZ28     (C) DEC                          N    Y
   (marked with ^)            |          |        150 *  DISK150 RZ28     (C) DEC                          N    Y
4. Delete all unbounded       |          |        200 *  DISK200 RZ28     (C) DEC                          N    Y
   devices (marked with *)    |          |        210 *  DISK210 RZ28     (C) DEC                          N    Y
5. Return to main menu        |          |        220 *  DISK220 RZ28     (C) DEC                          N    Y
                              |          |        230 *  DISK230 RZ28     (C) DEC                          N    Y
                              |          |        240 *  DISK240 RZ28     (C) DEC                          N    Y
                              |          |        250 *  DISK250 RZ28     (C) DEC                          N    Y
  D=Scroll down  U=Scroll up  |          |        300 *  DISK300 RZ28     (C) DEC                          N    Y
```

After adding devices, return to the main menu.

3.18.3.2 Adding Stripesets

Enter option 2 from the main menu to configure stripesets. From the stripeset menu (see Figure 3–34), enter option 1 to create a stripeset. CFMENU prompts you for how many and which devices from the configured PTLs list you wish to include in the stripeset (2 to 14 devices allowed). Figure 3–35 shows the result of creating two stripesets from the disks at the PTLs shown.

Figure 3–34 CFMENU Stripeset Menu

```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
STRIPESET MENU:                |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a stripeset          | Dev.PTLs |       PTLs     Name          ID            Name     Type     Size  sp.  it'd duc  Unit P B
   (eligible devices marked    |----------|      ------ --------- ----------------  --------- ------ ------- ---  ---- --- ----- - -
   by ^)                       |          |disks:  100 ^  DISK100 RZ28     (C) DEC                          N    Y
2. Delete an unbounded         |          |        110 ^  DISK110 RZ28     (C) DEC                          N    Y
   stripeset (marked by *)     |          |        120 ^  DISK120 RZ28     (C) DEC                          N    Y
3. Delete all unbounded        |          |        130 ^  DISK130 RZ28     (C) DEC                          N    Y
   stripesets (marked by *)    |          |        140 ^  DISK140 RZ28     (C) DEC                          N    Y
4. Return to main menu         |          |        150 ^  DISK150 RZ28     (C) DEC                          N    Y
                               |          |        200 ^  DISK200 RZ28     (C) DEC                          N    Y
                               |          |        210 ^  DISK210 RZ28     (C) DEC                          N    Y
                               |          |        220 ^  DISK220 RZ28     (C) DEC                          N    Y
                               |          |        230 ^  DISK230 RZ28     (C) DEC                          N    Y
                               |          |        240 ^  DISK240 RZ28     (C) DEC                          N    Y
                               |          |        250 ^  DISK250 RZ28     (C) DEC                          N    Y
  D=Scroll down  U=Scroll up   |          |        300 ^  DISK300 RZ28     (C) DEC                          N    Y

Enter menu choice (1,4) [4] ?1
```

Figure 3–35 CFMENU Showing Created Stripesets

```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
STRIPESET MENU:                |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a stripeset          | Dev.PTLs |       PTLs     Name          ID            Name     Type     Size  sp.  it'd duc  Unit P B
   (eligible devices marked    |----------|      ------ --------- ----------------  --------- ------ ------- ---  ---- --- ----- - -
   by ^)                       |          |        640 ^  DISK640 RZ28     (C) DEC                          N    Y
2. Delete an unbounded         |          |        650 ^  DISK650 RZ28     (C) DEC                          N    Y
   stripeset (marked by *)     |          |strps:  100    DISK100 RZ28     (C) DEC *    S1     STRP    unk        N
3. Delete all unbounded        |          |        110    DISK110 RZ28     (C) DEC      "       "       "          "
   stripesets (marked by *)    |          |        120    DISK120 RZ28     (C) DEC      "       "       "          "
4. Return to main menu         |          |        130    DISK130 RZ28     (C) DEC      "       "       "          "
                               |          |        140    DISK140 RZ28     (C) DEC      "       "       "          "
                               |          |        150    DISK150 RZ28     (C) DEC      "       "       "          "
                               |          |        200    DISK200 RZ28     (C) DEC *    S2     STRP    unk        N
                               |          |        300    DISK300 RZ28     (C) DEC      "       "       "          "
                               |          |        400    DISK400 RZ28     (C) DEC      "       "       "          "
                               |          |        500    DISK500 RZ28     (C) DEC      "       "       "          "
  D=Scroll down  U=Scroll up   |          |        600    DISK600 RZ28     (C) DEC      "       "       "          "
Enter menu choice (1,4) [4] ?
```

After adding stripesets, return to the main menu.

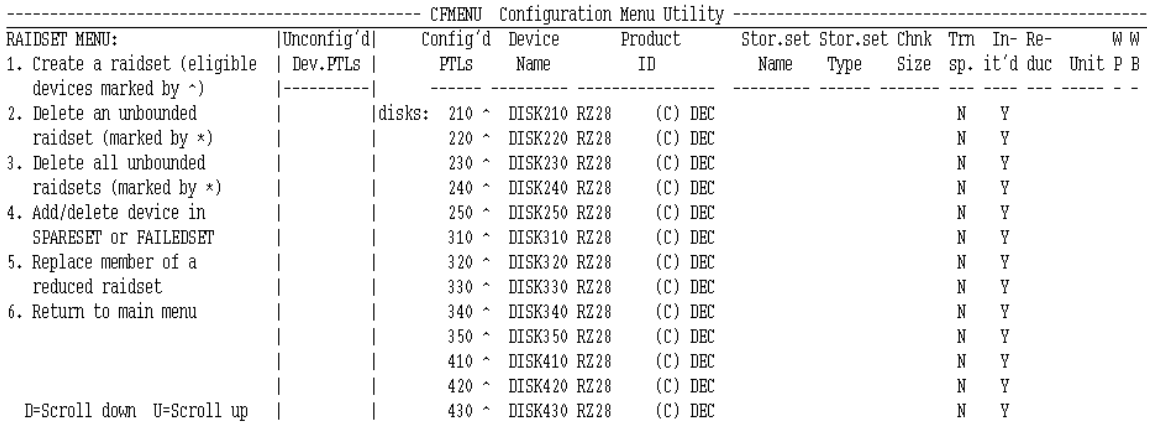
3.18.3.3 Adding RAIDsets

Enter option 3 from the main menu to configure RAIDsets. From the RAIDset menu (see Figure 3–36), enter option 1 to add a RAIDset. CFMENU prompts you for how many and which devices from the configured PTLs list you wish to include in the RAIDset (3–14 devices allowable). Figure 3–37 shows the result of creating a RAIDset from disks at the PTLs shown.

Note

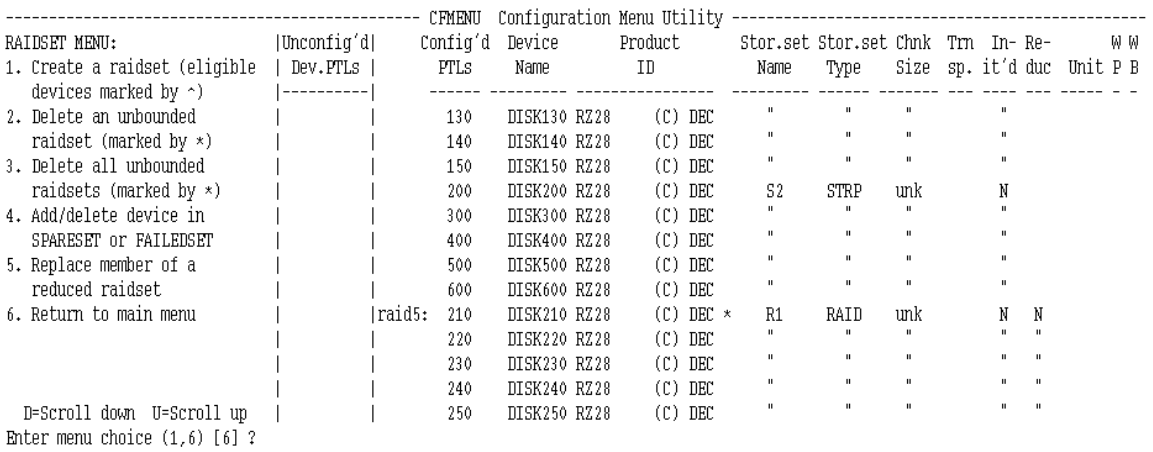
RAIDsets require that write-back cache be licensed and enabled.

Figure 3–36 CFMENU RAIDset Menu



```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
RAIDSET MENU:                |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a raidset (eligible | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp. it'd duc  Unit P B
   devices marked by ^)       |----------|     ------ --------- ----------------  --------- ------ ------- --- ---- --- ----- - -
2. Delete an unbounded        |          |disks:  210 ^  DISK210 RZ28     (C) DEC                          N    Y
   raidset (marked by *)      |          |        220 ^  DISK220 RZ28     (C) DEC                          N    Y
3. Delete all unbounded       |          |        230 ^  DISK230 RZ28     (C) DEC                          N    Y
   raidsets (marked by *)     |          |        240 ^  DISK240 RZ28     (C) DEC                          N    Y
4. Add/delete device in       |          |        250 ^  DISK250 RZ28     (C) DEC                          N    Y
   SPARESET or FAILEDSET      |          |        310 ^  DISK310 RZ28     (C) DEC                          N    Y
5. Replace member of a        |          |        320 ^  DISK320 RZ28     (C) DEC                          N    Y
   reduced raidset            |          |        330 ^  DISK330 RZ28     (C) DEC                          N    Y
6. Return to main menu        |          |        340 ^  DISK340 RZ28     (C) DEC                          N    Y
                              |          |        350 ^  DISK350 RZ28     (C) DEC                          N    Y
                              |          |        410 ^  DISK410 RZ28     (C) DEC                          N    Y
                              |          |        420 ^  DISK420 RZ28     (C) DEC                          N    Y
  D=Scroll down  U=Scroll up  |          |        430 ^  DISK430 RZ28     (C) DEC                          N    Y
```

Figure 3–37 CFMENU Showing Created RAIDsets



```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
RAIDSET MENU:                |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a raidset (eligible | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp. it'd duc  Unit P B
   devices marked by ^)       |----------|     ------ --------- ----------------  --------- ------ ------- --- ---- --- ----- - -
2. Delete an unbounded        |          |        130    DISK130 RZ28     (C) DEC      "       "      "          "
   raidset (marked by *)      |          |        140    DISK140 RZ28     (C) DEC      "       "      "          "
3. Delete all unbounded       |          |        150    DISK150 RZ28     (C) DEC      "       "      "          "
   raidsets (marked by *)     |          |        200    DISK200 RZ28     (C) DEC      S2      STRP   unk        N
4. Add/delete device in       |          |        300    DISK300 RZ28     (C) DEC      "       "      "          "
   SPARESET or FAILEDSET      |          |        400    DISK400 RZ28     (C) DEC      "       "      "          "
5. Replace member of a        |          |        500    DISK500 RZ28     (C) DEC      "       "      "          "
   reduced raidset            |          |        600    DISK600 RZ28     (C) DEC      "       "      "          "
6. Return to main menu        |          |raid5:  210    DISK210 RZ28     (C) DEC *    R1      RAID   unk        N   N
                              |          |        220    DISK220 RZ28     (C) DEC      "       "      "          "   "
                              |          |        230    DISK230 RZ28     (C) DEC      "       "      "          "   "
                              |          |        240    DISK240 RZ28     (C) DEC      "       "      "          "   "
  D=Scroll down  U=Scroll up  |          |        250    DISK250 RZ28     (C) DEC      "       "      "          "   "
Enter menu choice (1,6) [6] ?
```

3.18.3.4 Adding to Sparesets

Enter option 4 from the RAIDset menu to configure sparesets and failedsets associated with RAIDsets. From the spareset/failedset menu shown in Figure 3–38, enter option 1 to add a device to the spareset. CFMENU prompts you for which devices from the configured PTLs list that you wish to include in the spareset. As shown in Figure 3–39, two devices, PTL 310 and PTL 320, were added to the spareset.

Figure 3–38 CFMENU Spareset/Failedset Menu

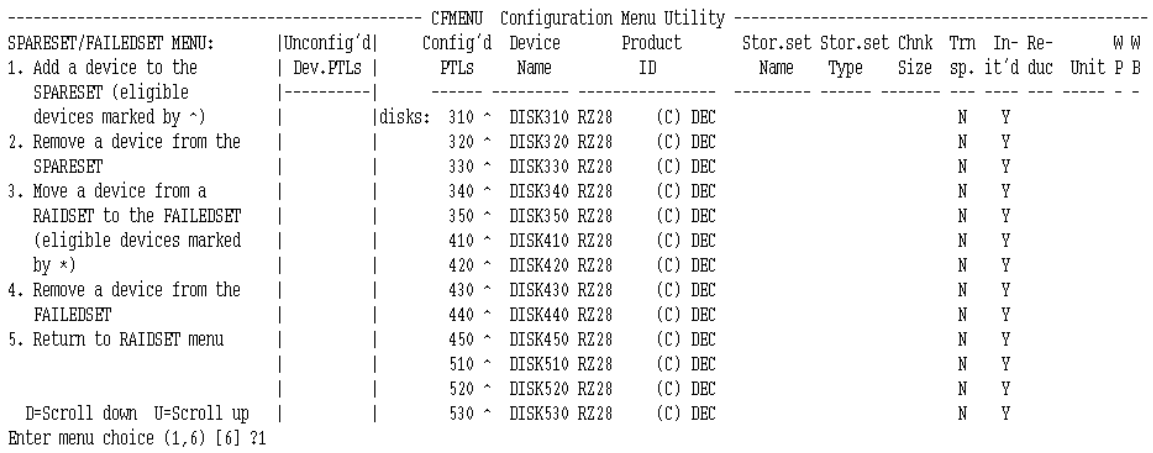
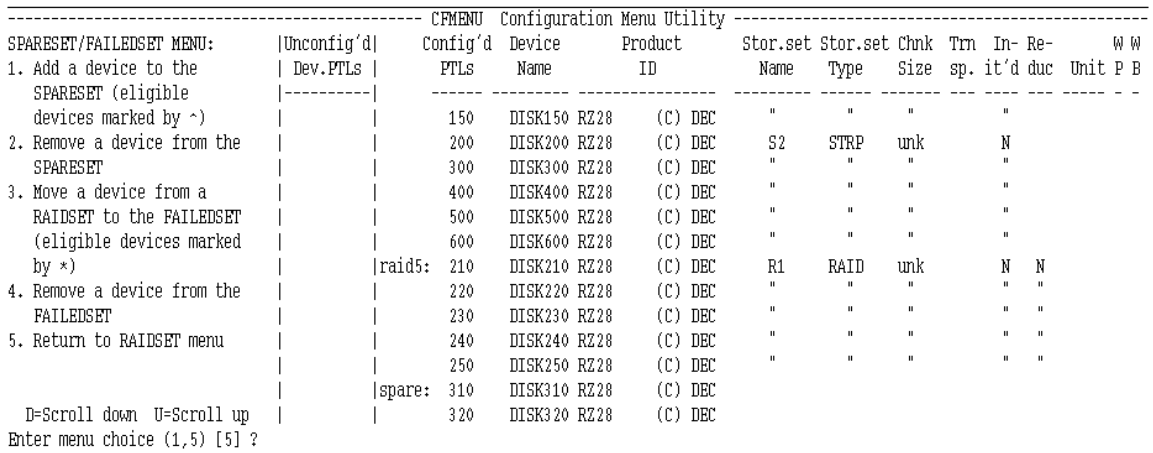


Figure 3–39 CFMENU Showing Created Spareset

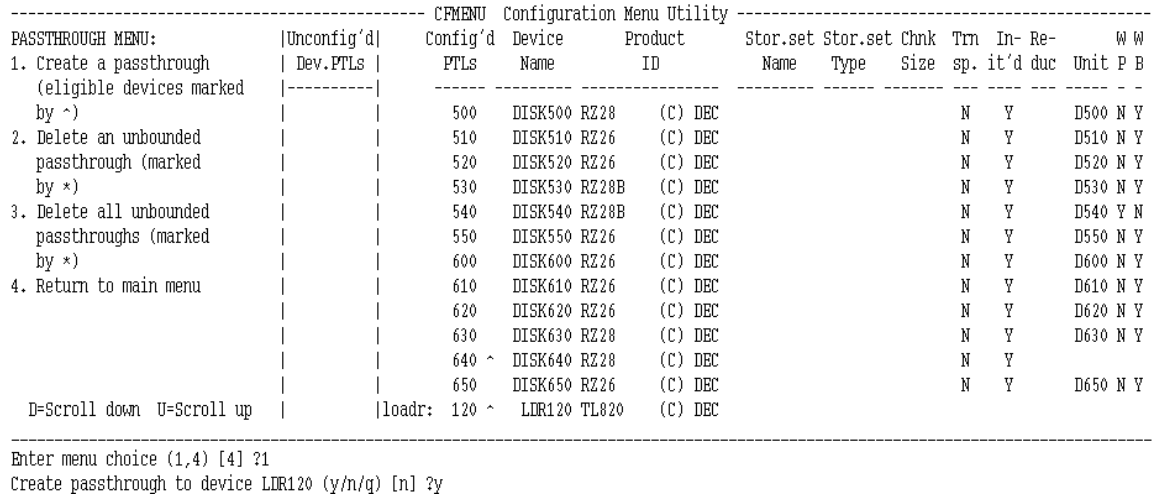


After adding sparesets, return to the main menu via the RAIDset menu.

3.18.3.5 Adding Passthrough Containers

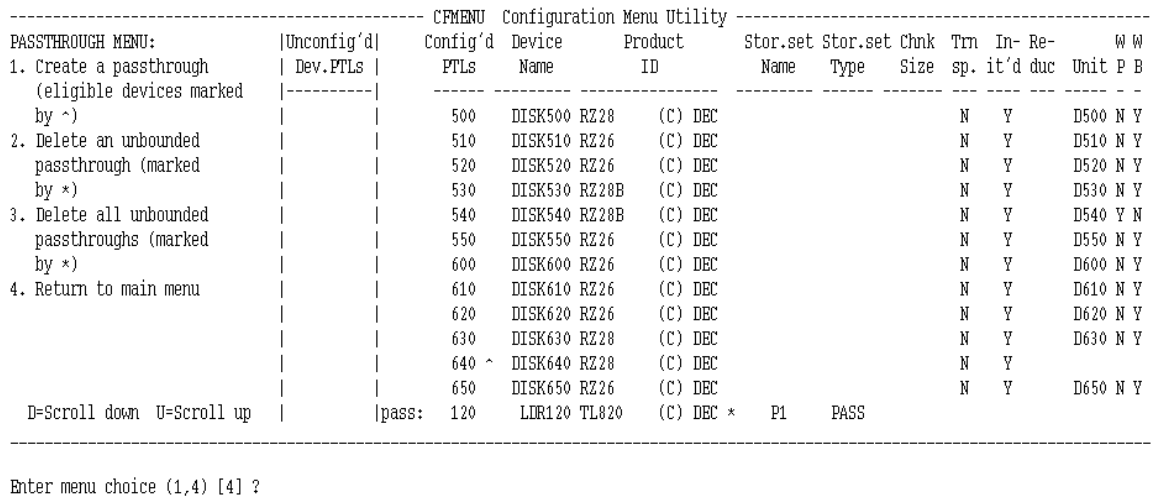
Enter option 4 from the main menu to add passthrough containers. From the passthrough menu (see Figure 3–40), enter option 1. CFMENU prompts you (y/n) as to whether you want to create a passthrough container from the eligible devices. Figure 3–41 shows the device LDR120 has been created as a passthrough container.

Figure 3–40 CFMENU Passthrough Menu



```
------------------------------------------------ CFMENU  Configuration Menu Utility -------------------------------------------------
PASSTHROUGH MENU:            |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a passthrough      | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp. it'd duc  Unit P B
   (eligible devices marked  |----------|      ------ --------- ----------------  --------- ------ ------- --- ---- --- ----- - -
   by ^)                     |          |        500    DISK500 RZ28     (C) DEC                          N    Y       D500 N Y
2. Delete an unbounded       |          |        510    DISK510 RZ26     (C) DEC                          N    Y       D510 N Y
   passthrough (marked       |          |        520    DISK520 RZ26     (C) DEC                          N    Y       D520 N Y
   by *)                     |          |        530    DISK530 RZ28B    (C) DEC                          N    Y       D530 N Y
3. Delete all unbounded      |          |        540    DISK540 RZ28B    (C) DEC                          N    Y       D540 Y N
   passthroughs (marked      |          |        550    DISK550 RZ26     (C) DEC                          N    Y       D550 N Y
   by *)                     |          |        600    DISK600 RZ26     (C) DEC                          N    Y       D600 N Y
4. Return to main menu       |          |        610    DISK610 RZ26     (C) DEC                          N    Y       D610 N Y
                             |          |        620    DISK620 RZ26     (C) DEC                          N    Y       D620 N Y
                             |          |        630    DISK630 RZ28     (C) DEC                          N    Y       D630 N Y
                             |          |        640 ^  DISK640 RZ28     (C) DEC                          N    Y
                             |          |        650    DISK650 RZ26     (C) DEC                          N    Y       D650 N Y
  D=Scroll down  U=Scroll up |          |loadr:  120 ^   LDR120 TL820    (C) DEC
-------------------------------------------------------------------------------------------------------------------------------------
Enter menu choice (1,4) [4] ?1
Create passthrough to device LDR120 (y/n/q) [n] ?y
```

Figure 3–41 CFMENU Passthrough Menu Showing a Passthrough Container



```
------------------------------------------------ CFMENU  Configuration Menu Utility -------------------------------------------------
PASSTHROUGH MENU:            |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a passthrough      | Dev.PTLs |       PTLs     Name          ID            Name    Type    Size  sp. it'd duc  Unit P B
   (eligible devices marked  |----------|      ------ --------- ----------------  --------- ------ ------- --- ---- --- ----- - -
   by ^)                     |          |        500    DISK500 RZ28     (C) DEC                          N    Y       D500 N Y
2. Delete an unbounded       |          |        510    DISK510 RZ26     (C) DEC                          N    Y       D510 N Y
   passthrough (marked       |          |        520    DISK520 RZ26     (C) DEC                          N    Y       D520 N Y
   by *)                     |          |        530    DISK530 RZ28B    (C) DEC                          N    Y       D530 N Y
3. Delete all unbounded      |          |        540    DISK540 RZ28B    (C) DEC                          N    Y       D540 Y N
   passthroughs (marked      |          |        550    DISK550 RZ26     (C) DEC                          N    Y       D550 N Y
   by *)                     |          |        600    DISK600 RZ26     (C) DEC                          N    Y       D600 N Y
4. Return to main menu       |          |        610    DISK610 RZ26     (C) DEC                          N    Y       D610 N Y
                             |          |        620    DISK620 RZ26     (C) DEC                          N    Y       D620 N Y
                             |          |        630    DISK630 RZ28     (C) DEC                          N    Y       D630 N Y
                             |          |        640 ^  DISK640 RZ28     (C) DEC                          N    Y
                             |          |        650    DISK650 RZ26     (C) DEC                          N    Y       D650 N Y
  D=Scroll down  U=Scroll up |          |pass:   120     LDR120 TL820    (C) DEC *    P1     PASS
-------------------------------------------------------------------------------------------------------------------------------------

Enter menu choice (1,4) [4] ?
```

3.18.3.6 Initializing Containers

Enter option 5 from the main menu to initialize containers (devices or storagesets). From the initialization menu (see Figure 3–42), enter option 1. CFMENU prompts (y/n) whether you want to initialize each eligible container.

In addition, CFMENU prompts you to decide on other operating qualifiers, depending on whether the container is a device, stripeset, or RAIDset.

In Figure 3–43, the stripesets S1 and S2 are initialized. Notice that each now has a chunksize specified.

Figure 3–42 CFMENU Initialization Menu

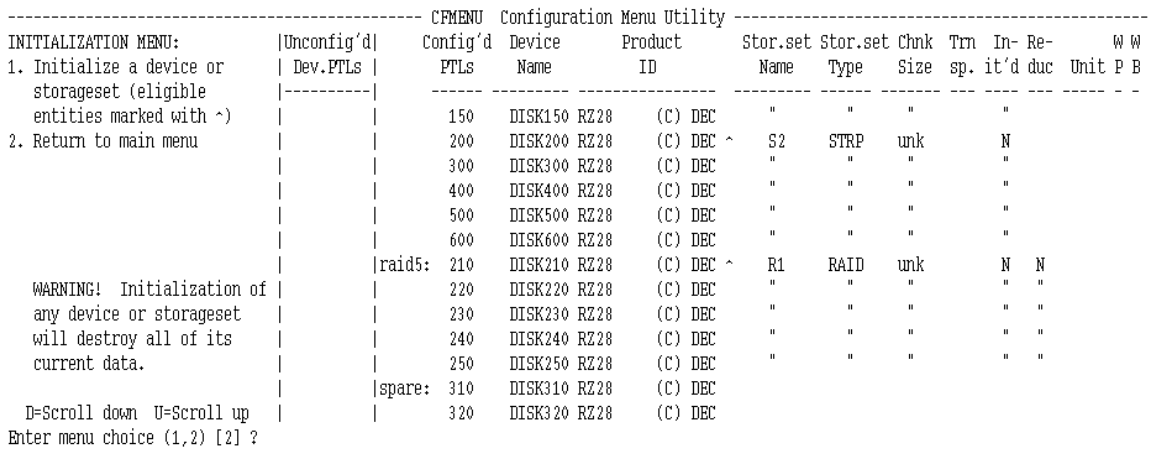
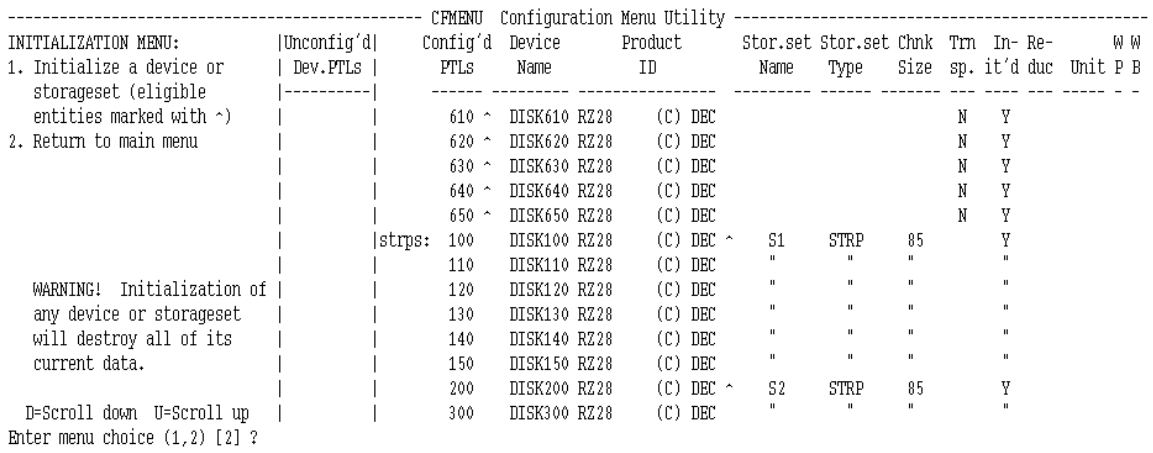


Figure 3–43 CFMENU Showing Initialization Results



After initializing containers, return to the main menu.

3.18.3.7 Adding Units

Enter option 6 from the main menu to configure units. From the unit menu, shown in Figure 3–44, enter option 1 to add a unit. CFMENU prompts you for which initialized containers you want to create units from.

CFMENU also will prompt you to assign a unit number. (The program automatically assigns a "D" or "T" to the unit number when listing the unit, as shown in Figure 3–45.) In addition, CFMENU prompts you to decide on other unit qualifiers.

In Figure 3–45, three units were created from disks at PTLs 330, 340, and 350.

Figure 3–44 CFMENU Unit Menu

```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
UNIT MENU:                    |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a unit (eligible    | Dev.PTLs |       PTLs     Name          ID            Name     Type     Size  sp.  it'd duc  Unit P B
   entities marked by ^)      |----------|     ------ --------- ----------------  --------- ------ ------- ---  ---- --- ----- - -
2. Delete a unit (eligible    |          |disks:  330 ^  DISK330 RZ28     (C) DEC                          N    Y
   units marked by *)         |          |        340 ^  DISK340 RZ28     (C) DEC                          N    Y
3. Return to main menu        |          |        350 ^  DISK350 RZ28     (C) DEC                          N    Y
                              |          |        410 ^  DISK410 RZ28     (C) DEC                          N    Y
                              |          |        420 ^  DISK420 RZ28     (C) DEC                          N    Y
                              |          |        430 ^  DISK430 RZ28     (C) DEC                          N    Y
                              |          |        440 ^  DISK440 RZ28     (C) DEC                          N    Y
                              |          |        450 ^  DISK450 RZ28     (C) DEC                          N    Y
                              |          |        510 ^  DISK510 RZ28     (C) DEC                          N    Y
                              |          |        520 ^  DISK520 RZ28     (C) DEC                          N    Y
                              |          |        530 ^  DISK530 RZ28     (C) DEC                          N    Y
                              |          |        540 ^  DISK540 RZ28     (C) DEC                          N    Y
  D=Scroll down  U=Scroll up  |          |        550 ^  DISK550 RZ28     (C) DEC                          N    Y
Enter menu choice (1,3) [3] ?1
```

Figure 3–45 CFMENU Showing Created Units

```
------------------------------------------------ CFMENU  Configuration Menu Utility ------------------------------------------------
UNIT MENU:                    |Unconfig'd|     Config'd  Device       Product       Stor.set Stor.set Chnk  Trn  In-  Re-       W W
1. Create a unit (eligible    | Dev.PTLs |       PTLs     Name          ID            Name     Type     Size  sp.  it'd duc  Unit P B
   entities marked by ^)      |----------|     ------ --------- ----------------  --------- ------ ------- ---  ---- --- ----- - -
2. Delete a unit (eligible    |          |disks:  330    DISK330 RZ28     (C) DEC                          N    Y     * D330 N Y
   units marked by *)         |          |        340    DISK340 RZ28     (C) DEC                          N    Y     * D340 N N
3. Return to main menu        |          |        350    DISK350 RZ28     (C) DEC                          N    Y     * D350 N N
                              |          |        410 ^  DISK410 RZ28     (C) DEC                          N    Y
                              |          |        420 ^  DISK420 RZ28     (C) DEC                          N    Y
                              |          |        430 ^  DISK430 RZ28     (C) DEC                          N    Y
                              |          |        440 ^  DISK440 RZ28     (C) DEC                          N    Y
                              |          |        450 ^  DISK450 RZ28     (C) DEC                          N    Y
                              |          |        510 ^  DISK510 RZ28     (C) DEC                          N    Y
                              |          |        520 ^  DISK520 RZ28     (C) DEC                          N    Y
                              |          |        530 ^  DISK530 RZ28     (C) DEC                          N    Y
                              |          |        540 ^  DISK540 RZ28     (C) DEC                          N    Y
  D=Scroll down  U=Scroll up  |          |        550 ^  DISK550 RZ28     (C) DEC                          N    Y
```

3.18.4 Completing the Device Channel Processor Configuration

After the storage devices have been defined as described in Section 3.18.3, the configuration of the device channel processor must be completed as described in this section.

During the Software Customization Procedure, you were prompted to type in the MSCP and TMSCP allocation classes of the FDDI Server. The HS1CP device channel processors must have the same MSCP and TMSCP allocation class as the server processors.

Set the allocation classes with this procedure:

1. From the currently active menu, type in the number to select the option:

   ```
   Return to main menu
   ```

2. Exit from the CFMENU utility to return to the HS1CP1> prompt. From the Main Menu type in 8 at the Enter Menu choice:

   ```
   (1,8) [8]?
   ```

3. Enter the following command to determine the MSCP allocation class and the TMSCP allocation class:

   ```
   HS1CP1> SHOW THIS
   ```

4. If the display shows the correct allocation class information, then proceed to Step 9 for upgrades to a model HS211 FDDI Server and to step 7 for all others. If the display shows the incorrect or incomplete allocation class information, then continue.

5. Set the MSCP allocation class by entering this command:

   ```
   HS1CP1> SET THIS MSCP_ALLOCATION_CLASS = n
   ```

   Where:

   n is the number you entered for the server.

   The following will be displayed on the terminal screen:

   ```
   Warning 4020: A restart of both this and the other controller is
                 required before all the parameters modified will
                 take effect.
   Restart of this controller required
   Restart of the other controller required
   ```

6. Set the TMSCP allocation class by entering this command:

   ```
   HS1CP1> SET THIS TMSCP_ALLOCATION_CLASS = n
   ```

   Where:

   n is the number you entered for the server.

   The following will be displayed on the terminal screen:

   ```
   Warning 4020: A restart of both this and the other controller is
                 required before all the parameters modified will
                 take effect.
   Restart of this controller required
   Restart of the other controller required
   ```

7. In FDDI Server models with dual-redundant pairs of HS1CPs (HS121/221/241), both device channel processors in each pair must have the same configuration.

   Note

   When you add a new (REV C01) HS1CP device channel processor to an existing HS110/111/121 FDDI Server which has an older model (REV A01) HS1CP installed, the "SET FAILOVER COPY" command used in the following procedure will fail because of a difference in Product IDs between the two HS1CP models. The HS1CPs function without problem individually but will not work together as a dual-redundant pair.

   Refer to the *StorageWorks™ Solutions StorageWorks FDDI Server Service Manual* for the procedures to update the REV A01 HS1CPs firmware with Version 2.5 code and new Product Id.

8. Copy the configuration and allocation classes from this HS1CP to the other HS1CP with the following command:

   ```
   HS1CP1> SET FAILOVER COPY = THIS
   ```

These messages will appear on the screen:

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

9. Restart the HS1CP device channel processor to which you copied the configuration with this command:

   ```
   HS1CP1> RESTART OTHER
   ```

   These messages will appear on the screen:

   ```
   Received LAST GASP message from other controller, Fail Code: 08080000
   HS1CP1>
   %PAx0, Software is Closing Virtual Circuit -- REMOTE NODE HS1CPx
   ```

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

    ```
    HS1CP1> RESTART THIS
    ```

    These messages will appear on the screen:

    ```
    %PAx0, Software is Closing Virtual Circuit -- REMOTE NODE HS1CPx

    %HSCPAD-F-NOLOCEXE, Local program not executing
    -SYSTEM-F-VCBROKEN, virtual circuit broken
    %HSCPAD-S-END, Control returned to node XXXXXX
    ```

3.18.5 Saving the Configuration Setup

After defining each device channel processor or dual-redundant pair configuration setup, make sure it is printed and kept available to assist in servicing the subsystem in the future. Make a new printout each time you change your configuration.

To capture your device setup, you should perform the following steps:

1. Enter the following command at the DCL prompt to logically connect the StorageWorks FDDI Server terminal to the device channel processor and record the results of the session in the CONFIG.LOG file in the SYS$MANAGER directory on the server's system disk.

   ```
   $ SET HOST/DUP/SERVER=mscp$dup/TASK=CLI/LOG=SYS$MANAGER:CONFIG.LOG
   node-name
   ```

   Where:

   node-name is the name assigned to the device channel processor (for example, HS1CP1).

   The device channel processor responds with a brief display and its prompt.

   ```
   Copyright (C) Digital Equipment Corporation 1994
   HS1CP Firmware version E35D-0, Hardware version AX01

   Last fail code: 018000A0

   Press " ?" at any time for help.

   HS1CP1>
   ```

2. At the HS1CP1> prompt enter the following command:

   ```
   HS1CP1> SHO DEVICE FULL
   ```

The following information will be captured in the CONFIG.LOG file in the SYS$MANAGER directory on the server's system disk as it appears on the screen:

```
Name          Type          Port Targ  Lun                    Used by
-------------------------------------------------------------------------------

DISK100       disk             1    0    0                    D1100

          DEC      RZ28     (C) DEC D41C

        Switches:
          NOTRANSPORTABLE

DISK110       disk             1    1    0                    D1110

          DEC      RZ28B    (C) DEC 0003

        Switches:
          NOTRANSPORTABLE

DISK120       disk             1    2    0                    D1120

          DEC      RZ28     (C) DEC D41C

        Switches:
          NOTRANSPORTABLE

DISK130       disk             1    3    0                    D1130

          DEC      RZ28     (C) DEC D41C

        Switches:
          NOTRANSPORTABLE
```

3. Exit the display by entering this command at the prompt:

```
HS1CP1> EXIT
```

At this point, the HS1CP device channel processors and their storage devices have been configured. You should leave the terminal attached to the server processor while you perform other tasks in the installation procedure.

3.19 Verify Installation Procedures

You must verify all the previous installation procedures, including:

- HS1CP device channel processor installation
- Internal bus cable installation

Use the following procedure to verify your installation:

Step1: Check for server processors and HS1CP device channel processors

- With the terminal connected to the server processor, enter the following command at the DCL prompt:

```
$ SHOW CLUSTER
```

- The names of the server processor and HS1CP installed in your FDDI Server are displayed on your terminal screen in a table similar to the following example:

```
---------------------------------
|          SYSTEMS     | MEMBERS |
---------------------------------
|    NODE  | SOFTWARE  | STATUS  |
|-------------------------------
| FSERV1   | VMS 6.2   | MEMBER  |
| HS1CP1   | HSD V25F  |         |
---------------------------------
```

Note

This table is representative of an HS211 FDDI Server with its server processor named FSERV1 and a single HS1CP at operating firmware revision V25F. For each server processor and HS1CP in the FDDI Server, your system displays the actual server processor name you selected during the Software Customization Procedure and the HS1CP number with operating firmware revision level.

- If you do not see the HS1CP that is installed in your system displayed on the terminal screen, there is a problem with the equipment or configuration. Refer to the *StorageWorks™ Solutions StorageWorks FDDI Server Service Manual* for the procedures to correct the problem that is identified.

Step 2: Check for attached storage devices

- Enter the following command at the DCL prompt:

```
$ SHOW DEVICE
```

- All attached storage devices, the HS1CP to which the storage devices have been assigned and the allocation class you chose during the Software Customization Procedure display at this time. The following is an example of this display:

```
$ SHOW DEVICE

Device                 Device      Error    Volume      Free    Trans    Mnt
 Name                  Status      Count     Label      Blocks  Count    Cnt

$13$DKA0:    (FSERV1)  Mounted         0   FSRVER1$SYS
$13$DKA100:  (FSERV1)  Mounted         0   FSRVER1$SYS 3196736   191      1
$13$DKA400:  (FSERV1)  Online wrtlck   0   FSRVER1$SYS
$13$DKA500:  (FSERV1)  Online
$13$DUA100:  (HS1CP1)  Mounted         0   13$200      4109068     1      5
$13$DUA110:  (HS1CP1)  Mounted         0   13$110      4109068     1      5
$13$DUA120:  (HS1CP1)  Mounted         0   13$120      4109068     1      5
$13$DUA130:  (HS1CP1)  Mounted         0   13$130      4109068     1      5
.
.
Device                 Device      Error
 Name                  Status      Count

FRA0:                  Online          0
FRA1:                  Online          0
FRYA0:                 Offline         0
PAA0:                  Online          0
PAB0:                  Online          0
PKA0:                  Online          0
RMA0:                  Online          0
SWA0:                  Online          0
$lo
```

- If all the storage devices in the FDDI Server do not appear in your display, there is a problem. Refer to the *StorageWorks™ Solutions StorageWorks FDDI Server Service Manual* to correct the problem that is identified.

3.20 Booting the Server Processor and Integrating the Server into the VMScluster

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 performing a few additional tasks. In addition, there are other optional postinstallation tasks that you may want to complete. This section discusses each task, required and optional, to complete the installation.

3.20.1 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. Shut down 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.

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.

3.20.2 Accessing Important 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 6.2 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.

Some frequently used documentation for OpenVMS Alpha software is located on the FDDI Server's system disk in the [DOCUMENTATION.V0*xx*] directory where *xx* represents the OpenVMS operating system software version number. For example, for Version 6.2, the directory is [DOCUMENTATION.V062]. Documentation on the operating system CD–ROM is in directory [ALPHA062.DOCUMENTATION].

When needed, take these steps to print the documentation:

1. Copy the appropriate document from SYS$SYSDEVICE (the server's system disk) or from the documentation CD–ROM 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.

3.20.3 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 (I14Y) Kit on VAX and/or Alpha nodes in your cluster as appropriate. See the release notes (*ALPSHADnn-062.RELEASE_NOTES* and *VAXSHADnn-062.RELEASE_NOTES* where *nn* refers to the kit version) found on the server's system disk for reference information. Refer to Section 3.17.2.2 for additional information on volume shadowing interoperability.
- 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. Refer to Section 10.5 for details on running AUTOGEN.

3.20.4 Activating Shadowing Functionality on the FDDI Server

By default, shadowing functionality is enabled on the server. For additional information about shadowing system parameters and managing shadowing in a VMScluster environment, refer to the *Volume Shadowing for OpenVMS* manual.

3.20.5 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.

3.21 Installing and Registering Licenses

The FDDI Server ships with licenses included as paper Product Authorization Keys (PAK) for the OpenVMS Alpha operating system (OPENVMS-ALPHA), volume shadowing (VOLSHAD), and OpenVMS Clustering (VMSCLUSTER).

You must perform the following tasks to use the software products included with the FDDI Server (including the OpenVMS operating system):

1. Set up the license database for each server node.
2. Register each of the software product licenses provided with the FDDI Server in the cluster license database.

Note

It is important to note that in a VMScluster, one of the following conditions MUST be maintained:

- There is a single, common license database.
- If there are multiple databases, then all must be identical.

3.21.1 Setting Up the License Database on a Cluster

The default license database for an unmodified OpenVMS operating system is on the system disk in SYS$COMMON:[SYSEXE]LMF$LICENSE.LDB. If you move the database, you must define the logical name LMF$LICENSE at the system level to point to the new database. Place permanent systemwide logical name definitions in the SYS$COMMON:[SYSMGR]SYLOGICALS.COM file (see Section 3.21.1.1).

In a VMScluster environment, each node in the cluster must access either the same license database or an identical copy of the database seen by the other nodes.

If there is a disk in the cluster that will always be available to the cluster nodes, then it is normally convenient to put your common license database on that disk (which may be the system disk for some of the cluster nodes). For any systems that boot from a separate system disk, you must redirect LMF to the license database. This is done by defining the logical name LMF$LICENSE to point to the common license database.

If it is not possible to provide a common disk for all cluster nodes, then you must keep separate identical license databases. Whenever one database is modified, you must copy it to the other locations in order to update the other databases.

Further information about managing software licenses on OpenVMS VAX and OpenVMS Alpha systems can be found in the system management manual *OpenVMS License Management Utility Manual*.

3.21.1.1 Common License Database

After the first reboot of the FDDI Server server processor during the Software Customization Procedure (while the server is not yet part of the cluster), modify SYS$MANAGER:SYLOGICALS.COM to do the following:

1. Mount the disk where the license database is located.
2. Define the logical LMF$LICENSE to point to the database.

Example:

In SYS$COMMON:[SYSMGR]SYLOGICALS.COM, add the following lines:

```
$ MOUNT/SYSTEM/NOASSIST $17$DKA23: FSERV 1$SYSTEM
$ DEFINE/SYSTEM/EXEC LMF$LICENSE-
    $17$DKA23:[VMS$COMMON.SYSEXE]LMF$LICENSE.LDB
```

3.21.1.2 Separate License Databases

Obtain a copy of one of the cluster license databases. This step should be done after the second reboot of each FDDI Server server processor during the Software Customization Procedure so that the server will be part of the existing cluster and will be able to mount disks where a copy of the database is located.

Example:

After rebooting the server processor to bring the FDDI Server into the cluster, log into the server's operating system through the console port and enter the following commands:

```
$ MOUNT/NOASSIST $17$DKA23:FSERV1$SYSTEM
$ COPY $17$DKA23:[VMS$COMMON.SYSEXE]LMF$LICENSE.LDB-
   SYS$COMMON:[SYSEXE]LMF$LICENSE.LDB
```

3.21.2 Registering the Licenses

After the second server processor reboot (the server now being part of cluster, but having no licenses loaded):

1. Log into the system account on a console attached to the FDDI Server's server processor.
2. Register each license (three for each server node in a dual processor server) using the licensing procedure SYS$UPDATE:VMSLICENSE.COM.

   Example:

   Assume in a dual-processor system that the two server nodes have SCS node names of FSERV1 and FSERV2 (selected during the Software Customization Procedure and written to the SYSGEN parameter SCSNODE on each node). In addition, assume the following authorization numbers for the two OPENVMS-ALPHA PAKs:

   ALS-WM-95099-5555
   ALS-WM-95099-7777

   Enter the following command:

   ```
   $ @SYS$UPDATE:VMSLICENSE
   ```

   A menu of options will be displayed. Select option 1, "REGISTER a Product Authorization Key," and follow the instructions to register each license.

3. Modify each OPENVMS-ALPHA license to include the name of the specific server node on which this license is being installed.

   Because licenses for the OpenVMS operating system software specify the NO_SHARE option on their PAKs, in a VMScluster environment, you must restrict each OpenVMS license to a single node. Use the license command LICENSE MODIFY/INCLUDE=node_name, specifying only one SCS node name for each OpenVMS license.

   Example:

```
$ LICENSE MODIFY OPENVMS-ALPHA-
    /INCLUDE=FSERV1/AUTHORIZATION=ALS-WM-95099-5555
$ LICENSE MODIFY OPENVMS-ALPHA-
    /INCLUDE=FSERV2/AUTHORIZATION=ALS-WM-95099-7777
```

4. Load the licenses by either rebooting the server processor at this point or by using the following command to load the OPENVMS-ALPHA license:

```
$ LICENSE LOAD OPENVMS-ALPHA
```

   If the site uses separate license databases, then the updated license database on each node in the FDDI Server must be copied to each place where a separate license database exists.

   If the FDDI Server is being added to an existing cluster, then the licenses may be registered all at one time in the existing cluster license database (or databases) before the FDDI Server is installed. The remaining task after the servers are installed is to ensure that each server node has access to the common database. This can be accomplished either by defining LMF$LICENSE in SYLOGICAL.COM (as described above) or by copying the updated LMF$LICENSE.LDB to SYS$COMMON:[SYSEXE]LMF$LICENSE.LDB on each server node.

5. During subsequent reboots, the licenses will be loaded automatically on each server.

3.22 Verifying the VMScluster Membership

Since the terminal is still connected to the server processor, enter the SHOW CLUSTER command. Use the resulting display to verify that the single node of the HS211 FDDI Server has joined the VMScluster. You may also want to enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see the HS211 FDDI Server.

3.23 Supporting and Operating the StorageWorks FDDI Server

You have completed the installation of the HS210–AA upgrade kit to upgrade an SW800-series cabinet to a model HS211 StorageWorks FDDI Server. You may want to perform various system management tasks to customize the system. See Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

4

HS111 to HS211 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS211–AX upgrade kit.

4.1 Purpose of this Upgrade

A customer who originally purchased a model HS111 FDDI Server may want the performance improvements and additional features offered in the HS211 system. Rather than purchasing a new HS211 system, the HS211–AX kit provides a migration path to an HS211 for a reasonable incremental cost.

The HS211–AX upgrade kit provides all the components for upgrading a model HS111 StorageWorks FDDI Server to a model HS211 StorageWorks FDDI Server. The following sections provide information about the upgrade kit and how to perform the upgrade.

4.2 HS211–AX Upgrade Kit Description

The main components of the HS211–AX upgrade kit are as follows:

- One FDDI adapter
- One HS1AD bus adapter
- OpenVMS Alpha operating system software Version 6.2 (or later) CD–ROM

When you receive your HS211–AX 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.

4.3 Preparing the Operating System for Upgrade

Changes in the FDDI Server internal bus adapter require that the console code and the operating system be upgraded to Console Code Version 5.0 (or later) and OpenVMS Alpha operating system software Version 6.2 (or later) **prior** to operation of this module. A CD–ROM containing the upgrade software is included in this kit. Follow the instructions in Sections 4.3.1 and 4.3.2 to perform this upgrade.

Note

Digital recommends that you perform a backup of your system disk prior to any upgrades to provide a means of recovery if anything should go wrong during the upgrade.

See Section 10.3 for backup procedures.

4.3.1 Upgrading the Console Code to Version 5.0 (or Later)

Perform the following steps to upgrade the console code to Version 5.0 (or later):

1. Follow the instructions in Section 3.16 to connect a terminal to the server processor.

   Note

   Because your system is running, the DCL **$** prompt will be displayed.

2. Stop all work on the server processor.
3. Stop all work on nodes that are booted through a served system disk on your FDDI Server.
4. If there are no nodes in the cluster that are booted through a served system disk on your FDDI Server, then shut down the StorageWorks FDDI Server as described in this step. Otherwise shut down these boot served nodes first and then shut down your FDDI Server as follows:

   a. Log in to a privileged account such as the system manager account. For example:

   ```
   Username: SYSTEM
   Password:
      Welcome to OpenVMS AXP (TM) Operating System, Version V6.2
       Last interactive login on Thursday, 28-SEP-1995 21:35:03.64
       Last non-interactive login on Thursday, 28-SEP-1995 21:35:20.48
   ```

   b. Execute the system shutdown command file by entering the following command:

   ```
   $ @SYS$SYSTEM:SHUTDOWN
   ```

   c. Answer the questions asked during the execution of the shutdown command file and wait until the system has completed a logical shutdown.

   Take the default values for all the questions by pressing the Return key. Select the "REMOVE_NODE" shutdown option **ONLY**, otherwise, the VMScluster could hang.

   ```
           SHUTDOWN -- Perform an Orderly System Shutdown
                       on node NODE1

   How many minutes until final shutdown [0]:
   Reason for shutdown [Standalone]:
   Do you want to spin down the disk volumes [NO]?
   Do you want to invoke the site-specific shutdown procedure [YES]?
   Should an automatic system reboot be performed [NO]? NO
   When will the system be rebooted [later]:
   Shutdown options (enter as a comma-separated list):
    REMOVE_NODE         Remaining nodes in the cluster should adjust quorum
    CLUSTER_SHUTDOWN    Entire cluster is shutting down
    REBOOT_CHECK        Check existence of basic system files
    SAVE_FEEDBACK       Save AUTOGEN feedback information from this boot
    DISABLE_AUTOSTART   Disable autostart queues

   Shutdown options [NONE]: REMOVE_NODE
   ```

d. Messages similar to the following will appear on the terminal screen as the system shuts down:

```
%SHUTDOWN-I-OPERATOR, this terminal is now an operator's console
%%%%%%%%%%  OPCOM  29-SEP-1995 16:17:51.71  %%%%%%%%%%
Operator status for operator _NODE1$OPA0:
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
LICENSE, OPER1, OPER2, OPER3, OPER4, OPER5, OPER6, OPER7, OPER8, OPER9,
OPER10,OPER11, OPER12

%SHUTDOWN-I-DISLOGINS, interactive logins will now be disabled
%SET-I-INTSET, login interactive limit = 0, current interactive value = 1


SHUTDOWN message on NODE2 from user USER1 at _NODE1$OPA0:   16:18:12
NODE1 will shut down in 0 minutes; back up later.  Please log off node
NODE1.
Standalone
%SHUTDOWN-I-STOPQUEUES, the queues on this node will now be stopped

SHUTDOWN message on NODE1 from user USER1 at _NODE1$OPA0:   16:17:52
NODE1 will shut down in 0 minutes; back up later.  Please log off node
NODE1.
Standalone

1 terminal has been notified on NODE3.

14 terminals have been notified on NODE2.
%SHUTDOWN-I-SITESHUT, the site-specific shutdown procedure will now be
invoked
2 terminals have been notified on NODE4.
1 terminal has been notified on NODE5.
%SHUTDOWN-I-STOPUSER, all user processes will now be stopped
1 terminal has been notified on NODE6.
1 terminal has been notified on NODE7.
2 terminals have been notified on NODE1.
%SHUTDOWN-I-STOPAUDIT, the security auditing subsystem will now be shut
down
%%%%%%%%%%  OPCOM  29-SEP-1995 16:17:53.99  %%%%%%%%%%
Message from user AUDIT$SERVER on NODE1
Security alarm (SECURITY) and security audit (SECURITY) on NODE1, system
id:
65XXX
Auditable event:          Audit server shutting down
Event time:               29-SEP-1995 16:17:53.98
PID:                      34600092
Username:                 USER1

%SHUTDOWN-I-REMOVE, all installed images will now be removed
%SHUTDOWN-I-DISMOUNT, all volumes will now be dismounted
%%%%%%%%%%  OPCOM  29-SEP-1995 16:17:56.83  %%%%%%%%%%
Message from user USER1 on NODE1
_NODE1$OPA0:, NODE1 shutdown was requested by the operator.

%%%%%%%%%%  OPCOM  29-SEP-1995 16:17:56.88  %%%%%%%%%%
Logfile was closed by operator _NODE1$OPA0:
Logfile was NODE1::SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1

%%%%%%%%%%  OPCOM  29-SEP-1995 16:17:56.93  %%%%%%%%%%
Operator _NODE1$OPA0: has been disabled, username SYSTEM

%CNXMAN,  Proposing modification of quorum or quorum disk membership
%CNXMAN,  Completing VMScluster state transition

        SYSTEM SHUTDOWN COMPLETE


halted CPU 0
```

```
halt code = 5
HALT instruction executed
PC = ffffffff8004df84
waiting for fw to start...
```

5. Locate the CD–ROM labeled "Software Customization Procedure V1.1 and OpenVMS Alpha Operating System V6.2," AG–QGPMB–BE, and slide it into the CD drive of the server processor.
6. On the FDDI Server console terminal, press the Return key to get the >>> prompt.
7. Determine which "dk" number is assigned to the CD–ROM by entering the "SHO DEVICE DK" command. In the following display, RRD43 is the CD–ROM and it is assigned the device label DKA500.

```
>>>SHO DEVICE DK
dka0.0.0.6.0              DKA0                            RZ28  D41C
dka500.5.0.6.0            DKA500                         RRD43  0064
```

8. Boot from the CD–ROM (device DKA500) using the "BOOT -FLAGS 0,A0 DKA500" command. This command starts the console code update:

```
>>>BOOT -FLAGS 0,A0 DKA500
(boot dka500.5.0.6.0 -flags 0,A0)
block 0 of dka500.5.0.6.0 is a valid boot block
reading 1035 blocks from dka500.5.0.6.0
bootstrap code read in
base = 14c000, image_start = 0, image_bytes = 81600
initializing HWRPB at 2000
initializing page table at 13e000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

9. At this point, the system will prompt you for the bootfile. Enter "[VMS$COMMON.SYSMAINT]V5_0_UPD.SYS," which tells the system where to find the Console Code Version 5.0 upgrade file:

```
Bootfile: [VMS$COMMON.SYSMAINT]V5_0_UPD.SYS
```

The update software displays the following command stream:

```
*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.0-15, built on May 5 1995 at 15:47:21
>>>Execute Update Sequence
Update Script Complete
(boot pmem:180000 -flags 0)
bootstrap code read in
base = 180000, image_start = 0, image_bytes = 800000
initializing HWRPB at 2000
initializing page table at 740000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

```
*** Firmware Update V5.0 ***
*** System SMM: 1090 ***
*** System Platform Name: AlphaServer 1000 4/200 ***
Update
Verify
List
Show
Dump
Verbose
NVerbose
Debug
NDebug
?
```

10. The system then prompts you for the Aup. Enter "UPDATE":

```
Apu-> UPDATE
APU-I *** ROMS 0,1 CONTENTS WILL BE DESTROYED ***
```

11. Enter "Y" (yes) at the next prompt in order to proceed with the console code update:

```
APU-I ARE YOU READY TO PROGRAM DEVICE ? (Y/N ) Y
APU-I ERASING ROM DEVICE
APU-I PROGRAMMING DEVICE
APU-I PROGRAMMING COMPLETED
APU-I ERASING ROM DEVICE
APU-I PROGRAMMING DEVICE
APU-I PROGRAMMING COMPLETED
Apu->
```

12. The system will now hang at the Apu-> prompt. Power cycle the server processor NOW in order for the update to complete. The following information will be displayed:

```
Apu-> *** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.0-15, built on May 5 1995 at 15:47:21
```

13. Press the Return key to get the >>> prompt and enter the SHO CONFIG command to verify that the console upgrade was successful. The highlighted lines indicate the console code Version 5.0 has been installed successfully:

Note

A "PALcode" greater than "VMS PALcode X5.48-101" indicates a later version of the console code.

```
>>>SHO CONFIG

Firmware
SRM Console:    V3.0-12
ARC Console:    4.26
PALcode:        VMS PALcode X5.48-101, OSF PALcode X1.35-66
Serial Rom:     V1.1

Processor
DECchip (tm) 21064-2
```

```
MEMORY
     96 Meg of System Memory
     Bank 0 = 32 Mbytes(8 MB Per Simm) Starting at 0x04000000
     Bank 1 = 64 Mbytes(16 MB Per Simm) Starting at 0x00000000
     Bank 2 = No Memory Detected
     Bank 3 = No Memory Detected

PCI Bus
     Bus 00  Slot 06: NCR     810 Scsi Controller
                                   pka0.7.0.6.0          SCSI Bus ID 7
                                   dka0.0.0.6.0           RZ28
                                   dka500.5.0.6.0         RRD43

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


EISA Bus Modules (installed)
     Slot 2  DEC3002               fra0.0.0.1002.0        08-00-2B-A6-0D-73
     Slot 7  DEC2E00
     Slot 8  DEC2E00
```

This completes the console code upgrade. Now proceed with the OpenVMS Alpha 6.2 (or later) upgrade.

4.3.2 Upgrading the Server Processor with OpenVMS Alpha Version 6.2 (or Later)

After completing the console code upgrade to Version 5.0 (or later), perform the following steps to upgrade the OpenVMS Alpha operating system to Version 6.2 (or later).

1. Determine which "dk" number is assigned to the CD–ROM by entering the SHO DEVICE DK command. In the following display, RRD43 is the CD–ROM and it is assigned the device label DKA500:

   ```
   >>>SHO DEV DK
   dka0.0.0.6.0              DKA0                           RZ28  D41C
   dka500.5.0.6.0            DKA500                        RRD43  0064
   ```

2. Perform an OpenVMS upgrade by booting off the CD–ROM. Enter "B DKA500" as follows:

   ```
   >>>b dka500
   ```

   The following sequence will appear on the terminal screen:

   ```
   (boot dka500.5.0.6.0 -flags 0)
   block 0 of dka500.5.0.6.0 is a valid boot block
   reading 1035 blocks from dka500.5.0.6.0
   bootstrap code read in
   base = 14e000, image_start = 0, image_bytes = 81600
   initializing HWRPB at 2000
   initializing page table at 140000
   initializing machine state
   setting affinity to the primary CPU
   jumping to bootstrap code

       OpenVMS (TM) Alpha Operating System, Version V6.2

       Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.


       Installing required known files...

       Configuring devices...
   ```

```
    ************************************************************

    You can install or upgrade the OpenVMS Alpha operating system
    or you can install or upgrade layered products that are included
    on the OpenVMS Alpha operating system CD-ROM.

    You can also execute DCL commands and procedures to perform
    "standalone" tasks, such as backing up the system disk.

    Please choose one of the following:

        1)  Install or upgrade OpenVMS Alpha Version V6.2
        2)  List layered product kits that this procedure can install
        3)  Install or upgrade layered product(s)
        4)  Execute DCL commands and procedures
        5)  Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?)
```

Note

Booting from a CD–ROM is slower than from a disk. It will take some time before this choice menu is displayed.

3. Enter "1" after the prompt, as follows:

```
Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 1
```

The following sequence will appear on the terminal screen:

```
    The OpenVMS Alpha V6.2 operating system includes Volume Shadowing
    interoperability changes from previous ECO kits.  If you are using
    Volume Shadowing and you upgrade this node to V6.2, then you must
    install the Volume Shadowing interoperability patches on any cluster
    member running an operating system version earlier than OpenVMS V6.2
    to ensure correct shadowing operation throughout your cluster.

    More information regarding these patches is available in the Problem
    Description section of the release notes supplied with the patch
    kits.  Please read these notes regarding the cluster impact of
    patch installation.  The release notes are located in the directory
    [SHADOW_KITS] on this CD-ROM in the following files:

         ALPSHAD01_062.RELEASE_NOTES     ALPSHAD07_061.RELEASE_NOTES
         VAXSHAD01_062.RELEASE_NOTES     VAXSHAD03_060.RELEASE_NOTES
         VAXSHAD07_061.RELEASE_NOTES

Press Return to continue...

     For your convenience, the shadowing remedial kits current at the
     time this CD was built have been provided in the following
     directory of the FDDI Server distribution CD-ROM.

     sys$sysdevice:[shadow_kits]ALPSHAD01_062.*
     sys$sysdevice:[shadow_kits]ALPSHAD07_061.*
     sys$sysdevice:[shadow_kits]VAXSHAD01_062.*
     sys$sysdevice:[shadow_kits]VAXSHAD03_060.*
     sys$sysdevice:[shadow_kits]VAXSHAD07_061.*

     TIMA remedial kits containing these changes are available through
     Digital Customer Services worldwide.  Digital recommends that you
     contact your Customer Support Center to obtain the latest Volume
     Shadowing ECOs for all operating system versions in your cluster.

Do you want to continue the upgrade or installation? (Yes/No) [YES]
```

4. Enter the default (Yes) by pressing the Return key.

The following sequence will appear on the terminal screen:

```
    ************************************************************

    The installation procedure will ask a series of questions.

          () - encloses acceptable answers
          [] - encloses default answers

    Type your response and press the <Return> key.  Type:

          ? - to repeat an explanation
          ^ - to change prior input (not always possible)
          Ctrl-Y - to exit the installation procedure

    The system disk on this StorageWorks FDDI Server has been identified
    as the following:

    Target disk   DKA0:
    Current label NODE1$SYS.

    By default this disk will be upgraded to OpenVMS Alpha Version
    V6.2.  All data on the target system disk will be preserved.


Is this OK? (Yes/No)
```

5. Enter "Yes" at the prompt, as follows:

```
Is this OK? (Yes/No) YES
```

The following sequence will appear on the terminal screen:

```
    DKA0: is now labeled NODE1$SYS.

Do you want to keep this label? (Yes/No) [Yes]
```

6. Accept the default (Yes) by pressing the Return key. The following sequence will appear on the terminal screen:

```
    OpenVMS Alpha will be upgraded on DKA0:.


    The installation can provide brief or detailed descriptions.
    In either case, you can request the detailed descriptions by typing "?".

Do you always want detailed descriptions? (Yes/No) [No]
```

7. Accept the default (No) by pressing the Return key. The following sequence will appear on the terminal screen:

```
The following product has been selected:
DEC AXPVMS VMS V6.2     [Available]


*** DEC AXPVMS VMS V6.2: OpenVMS Operating System, Version V6.2

    COPYRIGHT (c) 24-MAY-1995 -- All rights reserved

    Digital Equipment Corporation
```

8. Accept the defaults for the following two questions by pressing the Return key in each case. The following sequence will appear on the terminal screen:

```
    Do you want all the default values for this product? [YES]

    Do you want to view the values? [NO]

%PCSIUI-I-DONEASK, execution phase starting
The following product will be installed:
DEC AXPVMS VMS V6.2
%PCSI-I-VOLINFO, estimated space information for volume DISK$NODE1$SYS
-PCSI-I-VOLSPC, 25 required; 3082432 available; 3082407 net
```

9. The upgrade process starts and will take a long time, depending on actual system configuration. At first, the cursor will blink in the left-most position on the terminal screen; then "Portion Done:" will appear. Next, a percentage completed number will be shown, starting with **zero** percent and incrementing to 100 percent. Final completion will be shown as follows:

```
Portion Done:0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
The following product has been installed:
DEC AXPVMS VMS V6.2
Copying V6.2 release documentation to directory [documentation.v062]

    The upgrade is now complete.

    When the newly upgraded system is first booted, a special
    startup procedure will be run.  This procedure will:

        o  Run AUTOGEN to set system parameters.
        o  Reboot the system with the newly set parameters.

    When the special startup procedure has completed, you may resume
    normal operations on your FDDI Server.

    You may shut down now or continue with other operations.


  Process AXPVMS_INSTALL logged out at 29-SEP-1995 16:58:30.06
    ************************************************************

    You can install or upgrade the OpenVMS Alpha operating system
    or you can install or upgrade layered products that are included
    on the OpenVMS Alpha operating system CD-ROM.

    You can also execute DCL commands and procedures to perform
    "standalone" tasks, such as backing up the system disk.

    Please choose one of the following:

        1)  Install or upgrade OpenVMS Alpha Version V6.2
        2)  List layered product kits that this procedure can install
        3)  Install or upgrade layered product(s)
        4)  Execute DCL commands and procedures
        5)  Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?)
```

10. Enter "5" at the prompt to shut down the system. The following sequence will appear on the terminal screen:

```
Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 5

    Shutting down the system

        SYSTEM SHUTDOWN COMPLETE

halted CPU 0

halt code = 5
HALT instruction executed
PC = ffffffff80057f84
>>>*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.0-15, built on May 5 1995 at 15:47:21
```

Note

If we were only performing an OpenVMS Alpha operating system software code upgrade, we would continue executing the rest of the steps of this

procedure.

However, because of hardware installation requiring the removal of all ac power, we will leave the server processor in a shutdown state. Go to Section 4.4 to continue with this FDDI Server upgrade.

If upgrades are performed on other nodes of the cluster, then continue this process for completion.

---

11. Reboot the system, as follows:

```
>>>b
(boot dka0.0.0.6.0 -flags 0)
block 0 of dka0.0.0.6.0 is a valid boot block
reading 1035 blocks from dka0.0.0.6.0
bootstrap code read in
base = 14e000, image_start = 0, image_bytes = 81600
initializing HWRPB at 2000
initializing page table at 140000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

    OpenVMS (TM) Alpha Operating System, Version V6.2
```

During the boot process, messages similar to this example will appear on your server processor console terminal.

```
waiting to form or join a VMScluster system
%VMScluster-I-LOADSECDB, loading the cluster security database
%MSCPLOAD-I-CONFIGSCAN, enabled automatic disk serving
%CNXMAN,  Using remote access method for quorum disk
%CNXMAN,  Sending VMScluster membership request to system NODE6
%CNXMAN,  Sending VMScluster membership request to system NODE6
%CNXMAN,  Now a VMScluster member -- system NODE1
$!  Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.

    Installing required known files...

    Configuring devices...
%CNXMAN,  Established "connection" to quorum disk
%RUN-S-PROC_ID, identification of created process is 34800085
%SYSTEM-I-BOOTUPGRADE, security auditing disabled
%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.33  %%%%%%%%%%
Operator _NODE1$OPA0: has been enabled, username SYSTEM

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.34  %%%%%%%%%%
Operator status for operator _NODE1$OPA0:
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
LICENSE, OPER1, OPER2, OPER3, OPER4, OPER5, OPER6, OPER7, OPER8, OPER9,
OPER10,OPER11, OPER12

%SYSTEM-I-BOOTUPGRADE, security server not started
%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.49  %%%%%%%%%%
Logfile has been initialized by operator _NODE1$OPA0:
Logfile is NODE1::SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;2

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.49  %%%%%%%%%%
Operator status for operator NODE1::SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;2
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
LICENSE, OPER1, OPER2, OPER3, OPER4, OPER5, OPER6, OPER7, OPER8, OPER9,
OPER10,OPER11, OPER12

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.50  %%%%%%%%%%
17:02:55.81 Node NODE1 (csid 00000000) is using remote access method for
quorum disk
```

```
%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.51  %%%%%%%%%%
17:08:29.68 Node NODE1 (csid 000100A4) is now a VMScluster member

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.51  %%%%%%%%%%
17:08:35.91 Node NODE1 (csid 000100A4) re-established "connection" to
quorum disk

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.51  %%%%%%%%%%
Operator _NODE4$OPA0: has been enabled, username SYSTEM

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:42.51  %%%%%%%%%%
Operator _NODE5$OPA0: has been enabled, username SYSTEM

    AUTOGEN will now be run to compute the new System Parameters.  The
    system will then shut down and reboot, and the installation or upgrade
    will be complete.

%%%%%%%%%%  OPCOM  29-SEP-1995 17:08:51.29  %%%%%%%%%%
Message from user SYSTEM on NODE1
%CSP-I-DIFSWVER, different versions of VMS exist in cluster

    After rebooting you can continue with such system management tasks as:

            Decompressing the System Libraries
            Configuring DECnet
            Using SYS$MANAGER:CLUSTER_CONFIG.COME to create a VMScluster
            Creating FIELD, SYSTEST and SYSTEST_CLIG accounts if needed

%AUTOGEN-I-BEGIN, GETDATA phase is beginning.
%AUTOGEN-I-NEWFILE, A new version of SYS$SYSTEM:PYROMANIAS.DAT has been created.
      You may wish to purge this file.
%AUTOGEN-I-END, GETDATA phase has successfully completed.
%AUTOGEN-I-BEGIN, GENPARAMS phase is beginning.
%AUTOGEN-I-NEWFILE, A new version of SYS$MANAGER:VMSIMAGES.DAT has been
created.
      You may wish to purge this file.
%AUTOGEN-I-NEWFILE, A new version of SYS$SYSTEM:SETPARAMS.DAT has been
created.
      You may wish to purge this file.
%AUTOGEN-I-END, GENPARAMS phase has successfully completed.
%AUTOGEN-I-BEGIN, GENFILES phase is beginning.

******************
%AUTOGEN-W-REPORT, Warnings were detected by AUTOGEN.  Please review the
        information given in the file SYS$SYSTEM:AGEN$PARAMS.REPORT
******************

%AUTOGEN-W-REPORT, AUTOGEN has produced some informational messages which
        have been stored in the file SYS$SYSTEM:AGEN$PARAMS.REPORT.  You
        may wish to review the information in that file.

%AUTOGEN-I-END, GENFILES phase has successfully completed.
%AUTOGEN-I-BEGIN, SETPARAMS phase is beginning.
%%%%%%%%%%  OPCOM  29-SEP-1995 17:10:09.64  %%%%%%%%%%
Message from user SYSTEM on NODE1
%SYSGEN-I-WRITECUR, CURRENT system parameters modified by process ID
34800084n to file SYS$SYSROOT:[SYSEXE]ALPHAVMSSYS.PAR;8

%AUTOGEN-I-SYSGEN, parameters modified
%AUTOGEN-I-END, SETPARAMS phase has successfully completed.
%AUTOGEN-I-BEGIN, REBOOT phase is beginning.

The system is shutting down to allow the system to boot with the
generated site-specific parameters and installed images.

The system will automatically reboot after the shutdown and the
upgrade will be complete.
```

```
        SHUTDOWN -- Perform an Orderly System Shutdown
                    on node NODE1

%SHUTDOWN-I-BOOTCHECK, performing reboot consistency check...
%SHUTDOWN-I-CHECKOK, basic reboot consistency check completed

%SHUTDOWN-I-OPERATOR, this terminal is now an operator's console
%SHUTDOWN-I-DISLOGINS, interactive logins will now be disabled
%SET-I-INTSET, login interactive limit = 0, current interactive value = 0


SHUTDOWN message on NODE2 from user SYSTEM at NODE1 Batch   17:10:34
NODE1 will shut down in 0 minutes; back up soon.  Please log off node NODE1.
Reboot system with AUTOGENerated parameters
%SHUTDOWN-I-STOPQUEUES, the queues on this node will now be stopped

SHUTDOWN message on NODE1 from user SYSTEM at NODE1 Batch   17:10:13
NODE1 will shut down in 0 minutes; back up soon.  Please log off node NODE1.
Reboot system with AUTOGENerated parameters


%SHUTDOWN-I-SITESHUT, the site-specific shutdown procedure will now be
invoked
%SHUTDOWN-I-STOPUSER, all user processes will now be stopped
%SHUTDOWN-I-REMOVE, all installed images will now be removed
%SHUTDOWN-I-DISMOUNT, all volumes will now be dismounted
%%%%%%%%%%  OPCOM  29-SEP-1995 17:10:16.37  %%%%%%%%%%
Message from user SYSTEM on NODE1
STARTUP, NODE1 shutdown was requested by the operator.


halted CPU 0

halt code = 5
HALT instruction executed
PC = ffffffff8004df84

CPU 0 booting

(boot dka0.0.0.6.0 -flags 0)
block 0 of dka0.0.0.6.0 is a valid boot block
reading 1035 blocks from dka0.0.0.6.0
bootstrap code read in
base = 14e000, image_start = 0, image_bytes = 81600
initializing HWRPB at 2000
initializing page table at 140000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code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waiting to form or join a VMScluster system
%VMScluster-I-LOADSECDB, loading the cluster security database
%MSCPLOAD-I-CONFIGSCAN, enabled automatic disk serving
%CNXMAN,  Using remote access method for quorum disk
%CNXMAN,  Re-established connection to system NODE6
%CNXMAN,  Sending VMScluster membership request to system NODE1

%CNXMAN,  Now a VMScluster member -- system NODE1
%CNXMAN,  Removed from VMScluster system NODE6
$!  Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.
%STDRV-I-STARTUP, OpenVMS startup begun at 29-SEP-1995 17:16:26.24
%CNXMAN,  Established "connection" to quorum disk
%MSCPLOAD-I-CONFIGSCAN, enabled automatic disk serving
%RUN-S-PROC_ID, identification of created process is 34C00086
%SET-I-NEWAUDSRV, identification of new audit server process is 34C0008C
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:39.88  %%%%%%%%%%
Operator _NODE1$OPA0: has been enabled, username SYSTEM
```

```
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:39.89  %%%%%%%%%%
Operator status for operator _NODE1$OPA0:
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
LICENSE, OPER1, OPER2, OPER3, OPER4, OPER5, OPER6, OPER7, OPER8, OPER9,
OPER10,OPER11, OPER12

%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.43  %%%%%%%%%%
Logfile has been initialized by operator _NODE1$OPA0:
Logfile is NODE1::SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;20


%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.43  %%%%%%%%%%
Operator status for operator NODE1::SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;20
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
LICENSE, OPER1, OPER2, OPER3, OPER4, OPER5, OPER6, OPER7, OPER8, OPER9,
OPER10,OPER11, OPER12

The OpenVMS system is now executing the site-specific startup commands.
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.44  %%%%%%%%%%
17:12:35.77 Node NODE1 (csid 00000000) is using remote access method for
quorum disk

%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.44  %%%%%%%%%%
17:16:22.13 Node NODE1 (csid 000100A6) is now a VMScluster member

%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.44  %%%%%%%%%%
17:16:24.25 Node NODE6 (csid 000100A5) has been removed from the VMScluster

%MOUNT-I-MOUNTED, NODE7$NODE3$QRM mounted on _$9$DUA100: (NODE7)
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.44  %%%%%%%%%%
17:16:26.98 Node NODE1 (csid 000100A6) re-established "connection" to
quorum disk

%MOUNT-I-MOUNTED, LCLUSER mounted on _$9$DUA110: (NODE3)
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.45  %%%%%%%%%%
Operator _NODE4$OPA0: has been enabled, username SYSTEM

%MOUNT-I-REBLDREQD, rebuild not performed; some free space unavailable;
disk quota usage stale
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.45  %%%%%%%%%%
Operator _NODE5$OPA0: has been enabled, username SYSTEM

%MOUNT-I-MOUNTED, RESULTS mounted on _$9$DUA300: (NODE7)
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:40.67  %%%%%%%%%%

%MOUNT-I-MOUNTED, DEVELOP mounted on _$7$DKC200: (NODE2)
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:44.20  %%%%%%%%%%

%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:44.20  %%%%%%%%%%
Message from user SYSTEM on NODE1
%SECSRV-I-SERVERSTARTINGU, security server starting up

%MOUNT-I-MOUNTED, DUMPS mounted on _$7$DKC100: (NODE2)
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:44.31  %%%%%%%%%%
Message from user SYSTEM on NODE1
%SECSRV-I-CIASTARTINGUP, bracken detection and evasion processing now
starting up

%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:44.76  %%%%%%%%%%
Message from user AUDIT$SERVER on NODE1
Security alarm (SECURITY) and security audit (SECURITY) on NODE1, system
id:5
361
Auditable event:          Audit server starting up
Event time:               29-SEP-1995 17:16:44.56
PID:                      34C00084
Username:                 SYSTEM
```

```
%MOUNT-I-MOUNTED, NODE2VMSSYS mounted on _$7$DKD300: (NODE2)
%%%%%%%%%%  OPCOM  29-SEP-1995 17:16:49.37  %%%%%%%%%%
Message from user SYSTEM on NODE1
%CSP-I-DIFSWVER, different versions of VMS exist in cluster

%MOUNT-I-MOUNTED, PSDC mounted on _$9$DUA420: (NODE7)

%RUN-S-PROC_ID, identification of created process is 34C00091
%%%%%%%%%%  OPCOM  29-SEP-1995 17:17:33.94  %%%%%%%%%%
Message from user LATACP on NODE1
LATACP initialized


%SET-I-INTSET, login interactive limit = 64, current interactive value = 0
  SYSTEM       job terminated at 29-SEP-1995 17:17:36.40

  Accounting information:
  Buffered I/O count:           2145         Peak working set size:   3616
  Direct I/O count:              985         Peak page file size:    20400
  Page faults:                  2290         Mounted volumes:            7
```

12. At this point, the console code and OpenVMS Alpha operating system software updates are complete. If you press the Return key, VMS will prompt with "Username:" and "Password". After entering in the user name and password, the user is logged in and can begin doing work once again on the FDDI Server.

    A successful login will result with the following text being displayed:

    ```
    Welcome to OpenVMS AXP (TM) Operating System, Version V6.2
    Last interactive login on Thursday, 28-SEP-1995 21:35:03.64
    Last non-interactive login on Thursday, 28-SEP-1995 21:35:20.48
    ```

4.4 Preparing the Cabinet for Upgrade

The following sections describe how to prepare the cabinet for the upgrade.

4.4.1 Powering Off the Server Processor

Use the following procedure to power off the server processor:

1. Open the front door of the FDDI Server cabinet with a 5/32-inch hex wrench.
2. Depress the power button on the server OCP to turn off power.
3. Set the On/Off switches on any external options connected to the system to the Off position.

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.

4.4.2 Cabinet Panel Removal (If Required)

If additional storage devices are being added, then Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables. See Section 3.3, steps 2 through 4 for removing the cabinet panels.

If no additional storage devices are being added, then ensure that there is sufficient space in front and behind the cabinet to slide the server processor all the way forward and to the rear. See Figure 2–2 for specific space requirements.

4.5 Replacing the FDDI and Bus Adapters

Replacing the FDDI and bus adapters on the FDDI Server server processor motherboard involves the following tasks:

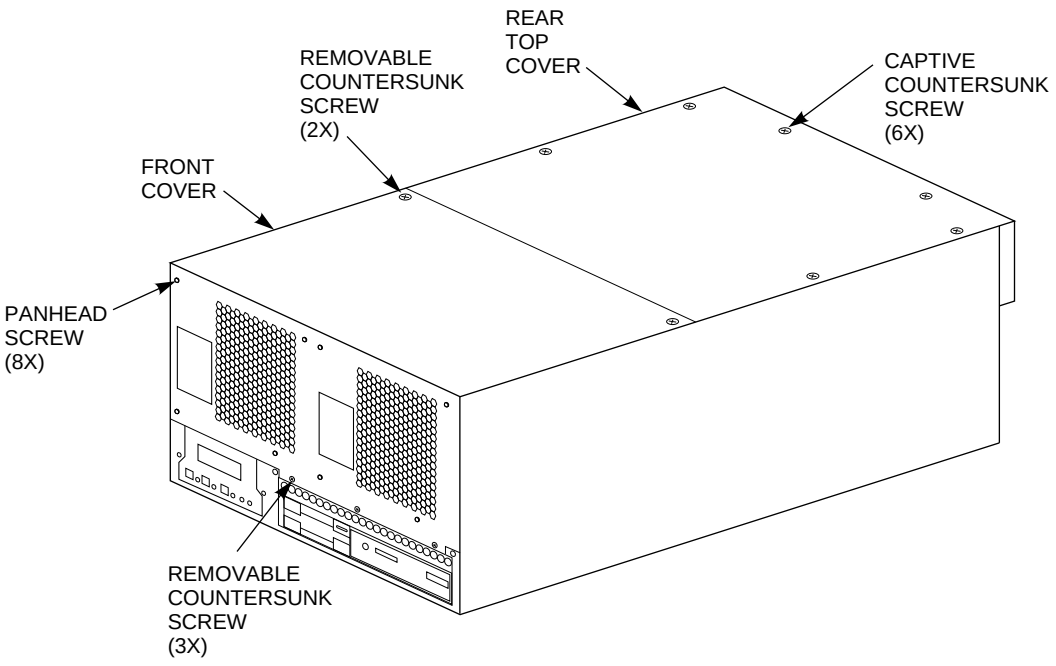
- Sliding the server processor out of the FDDI Server cabinet
- Removing the old adapter cards
- Installing the new adapter cards
- Sliding the server processor into the FDDI Server cabinet
- Restarting the system

4.5.1 Sliding the Server Processor Out of the FDDI Server Cabinet

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

1. If necessary, remove the shipping brackets from the *rear* of the original server processor (hole locations 53 and 54).
2. Slide the server processor out of the back of the cabinet on its slides to access the rear top cover panel.
3. Attach an ESD ground strap to the server processor's chassis. Attach the other end of the strap to your wrist.

Figure 4–1 Removing the Rear Top Cover Panel



4. Loosen all the quarter-turn fasteners on the rear top cover using a Phillips screwdriver (Figure 4–1).
5. Lift off the rear top cover.

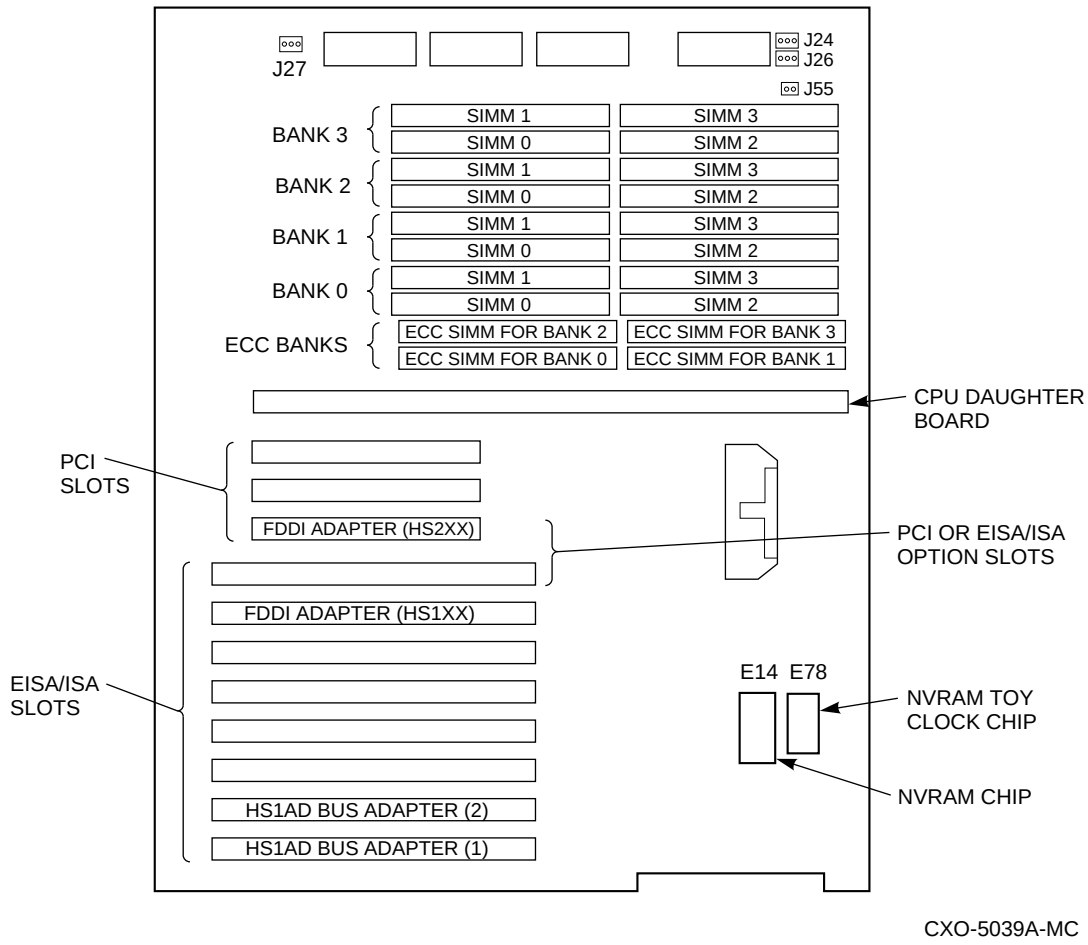
4.5.2 Removing FDDI and Bus Adapter Cards

Note

The HS211–AX upgrade involves removing an FDDI adapter card and a bus adapter card. These cards should be located in EISA slots 2 and 8 (marked as "FDDI ADAPTER (HS1XX)" and "HS1AD BUS ADAPTER (1)", respectively, in Figure 4–2).

See Section 4.5.3 for replacing these cards.

Figure 4–2 Server Processor Motherboard Configuration



To remove an EISA or PCI adapter card from the server processor, perform the following steps:

CAUTION

Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components (see Section 2.3).

1. Disconnect any cables connected to the external or internal ports on the adapter card you want to remove.
2. Remove the slot cover screws securing the adapter card to the chassis.
3. Carefully disconnect the adapter card from the slot connectors on the motherboard and remove it from the system.
4. If you intend leaving the adapter slot vacant, install a slot cover and secure it to the chassis using the screw that you removed.

4.5.3 Installing an Option Card

Note

The HS211–AX upgrade involves replacing the FDDI adapter card and the bus adapter card. These cards should be located in PCI slot 3 and EISA slot 8 (marked as FDDI ADAPTER (HS2XX) and HS1AD BUS ADAPTER (1), respectively, in Figure 4–2).

See Section 4.5.2 for removing the original cards.

To install an EISA or PCI adapter card, perform the following steps:

CAUTION

Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components (see Section 2.3).

1. Select a vacant adapter card slot on the motherboard. The first three slots are reserved for PCI options; the last eight are for EISA or ISA options. Figure 4–2 shows the slot locations on the motherboard.
2. Remove the screw securing the slot cover to the chassis.
3. Remove the slot cover from the server and store it for future use.
4. Carefully install the adapter card into the appropriate connectors on the motherboard and press it firmly into place.

Note

If the top EISA adapter slot is used, the bottom PCI slot cannot be used. If the bottom PCI slot is used, the top EISA slot cannot be used.

5. Secure the adapter card to the chassis using the screw you removed.
6. Reattach the FDDI interconnect cable to the new FDDI adapter card.

   Reattach the internal bus cable to the new bus adapter card.

4.5.4 Sliding the Server Processor Back Into the FDDI Server Cabinet

When you have finished removing or installing internal options, reassemble the server processor by performing the following steps:

1. Reinstall the rear top cover on the server processor.
2. Slide the server processor back into the FDDI Server 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. Reinstall the shipping brackets.
4. Close the rear door and secure it shut with a hex wrench.

Caution

See Section 4.10 for restoring power to the FDDI Server. Power should be restored only after all new hardware has been added to the system.

4.6 Installing Additional Storage Devices (Optional)

Sections 4.7 through 4.8 describe the procedures to follow if additional storage is to be added to this FDDI Server.

4.7 Installing BA35*x*–S Storage Shelves (Optional)

Follow the instructions in Section 3.6 to install additional BA35*x*–S storage shelves.

4.8 Installing BA350–M Shelf SCSI Cables (If Required)

Follow the procedures in Section 3.8 to install SCSI cabling in the BA350–M shelf.

4.9 Replacing Cabinet Panels (If Required)

After all hardware has been installed, replace the cabinet side panels (if removed) **before** reapplying power to the FDDI Server. To replace the cabinet panels, reverse the steps in Section 3.3.

4.10 Restarting the System

Once the cabinet has been inspected for tools and installation debris, apply power as follows:

1. Plug the primary power cable from the CDU into the appropriate site power receptacle.
2. Switch the circuit breaker on the CDU to the | (ON) position.
3. Verify that all cabinet fans and shelf blowers are operating and that both status indicators on each shelf power supply SBB are illuminated. Refer to the *StorageWorks Solutions Shelf and SBB User's Guide* for more information about shelf status indicators.
4. Apply DC power to the server processor. The DC power switch is located on the OCP of the server processor. Figure 1–5 shows the location of the OCP.

4.11 Connecting the Terminal to the HS1CP Device Channel Processor (If Required)

If storage devices have been added to the FDDI Server, then the HS1CP device channel processor must be reconfigured. First, the terminal must be connected to the HS1CP by following the steps in Section 3.13.

4.12 Configuring Storage for the HS1CP Device Channel Processor (If Required)

If storage devices have been added to the FDDI Server, then the device channel processor must be reconfigured. To reconfigure the HS1CP, follow the steps in Section 3.18.

Note

Since you are directly connected to the HS1CP, perform only Step 6 in Section 3.18.2.

Do not execute Section 3.18.5 at this time.

4.13 Running the EISA Configuration Utility for the Server Processor

Whenever you add, remove, or move an EISA adapter card, 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–Q2CR*x*–CA) shipped with the device bus adapter card.

Note

PCI cards require no additional configuration procedures; the system automatically recognizes the cards and assigns the appropriate system resources.

Use the following procedure to run the ECU and set device bus adapter parameters:

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. Connect a terminal to the server processor as described in Section 3.16.

2. Press the Return key to obtain the >>> prompt if one is not displayed on the terminal screen.
3. Insert the ECU diskette into the floppy diskette drive.
4. Enter ECU and press the Return key at the >>> prompt. The system loads the ECU software.
5. 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>
```

6. 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.
7. 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 8 -- 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
```

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.

8. 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.
9. **Set the device bus adapter to SCSI ID 7**, if it is not already at this setting.
10. 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>
```

11. Use the arrow key to select "Step 5: Save and exit" (see the previous example) and press the Enter key. The display shows that your configuration is saved.
12. Press Enter again, and the >>> prompt displays.
13. Remove the ECU diskette from the floppy diskette drive.
14. 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.

4.14 Verifying the Installation

Sections 4.14.1 and 4.14.2 describe the procedures for verifying the hardware installation.

4.14.1 Verifying Your Bus Adapter Installation

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

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

```
 Firmware
 SRM Console:   V3.0-12
 ARC Console:   4.26
 PALcode:       VMS PALcode X5.48-101, OSF PALcode X1.35-66
 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       RZ28
                                dka400.4.0.6.0       RRD43

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

 EISA Bus Modules (installed)
      Slot 8   DEC2E00
```

2. If your newly installed HS1AD appears in slot 8, your installation is successful.

   If slot 8 does not display on your terminal screen, the missing HS1AD device bus adapter is not being recognized by the server processor. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual.*

4.14.2 Verifying Server Processor and HS1CP Installation

To ensure the server processor and HS1CP recognize the new hardware correctly, enter the SHOW DEVICE command at the >>> prompt. Information similar to the following will be displayed on the terminal screen:

```
>>>SHO DEV
dka0.0.0.6.0              DKA0                            RZ28  D41C
dka500.5.0.6.0            DKA500                         RRD43  0064
dua1100.1.0.6.1           $13$DUA1100 (HS1CP1)              HSX0
dua1110.1.0.6.1           $13$DUA1110 (HS1CP1)              HSX0
   .
   .
   .
dua1600.1.0.6.1           $13$DUA1600 (HS1CP1)              HSX0
dva0.0.0.0.1              DVA0
erb0.0.0.3.1              ERB0              08-00-2B-BD-86-35
fwa0.0.0.11.0             FWA0              08-00-2B-B2-9C-49
pka0.7.0.6.0              PKA0                  SCSI Bus ID 7
pua0.7.0.5.1              PAE0                  DSSI Bus ID 7
```

Verify that all HS211 FDDI Server storage units, stripesets, and RAIDsets appear in the resultant display. If any storage devices are missing, return to CFMENU per Section 3.18.2 and confirm the configuration. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual* if you still have configuration problems.

This completes the verification of the hardware installation.

4.15 Booting the Server Processor

To boot the server processor, enter BOOT at the >>> prompt.

This action causes the server processor to boot from the system disk and join the VMScluster, completing the installation of the HS211 FDDI Server.

Note

Because of the OpenVMS Alpha operating system software Version 6.2 (or later) upgrade, this boot procedure will be similar to that in Steps 11 and 12 in Section 4.3.2.

Now perform the procedure in Section 3.18.5 to save your storage configuration setup.

4.16 Verifying VMScluster Environment

Use the following procedure to verify that the HS211 FDDI Server is correctly integrated into the VMScluster environment:

1. Enter the SHOW CLUSTER command. A display similar to the example below (see Figure 4–3) can be used to verify that the single node of the HS211 FDDI Server has joined the VMScluster.

Figure 4–3 Example Cluster Information

View of Cluster from Node: FSERV1 **9−OCT−1995 15:51:01**

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
NODE03	VMS V6.2	MEMBER
HS1CP1	HSD V25F	

2. Enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see the HS211 FDDI Server.
3. Enter the SHOW DEVICE command to ensure the HS211 is serving storage to the clients. All storage units, stripesets, and RAIDsets should appear in the resultant display.
4. If any nodes in the VMScluster were shut down during the console code upgrade because they were booted through a served system disk on the original HS111 FDDI Server, now is the time to bring them back online, as follows:
   a. At each of the served nodes, enter the boot command at the >>> prompt:

      ```
      >>>boot
      ```

   b. At the DCL $ prompt on any of the served nodes, enter the SHOW DEVICE and SHOW CLUSTER commands to verify that the served nodes have reentered the VMScluster and can see the server.

4.17 Supporting and Operating the StorageWorks FDDI Server

Once the model HS211 StorageWorks FDDI Server has been installed, you may want to perform various system management tasks to customize the system. See Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

5

HS121 to HS221 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS221–AX upgrade kit.

5.1 Purpose of This Upgrade

A customer who is satisfied with the redundancy and failover capabilities of a model HS121 FDDI Server, but who wants the performance improvements and additional features of an HS221 FDDI Server, can, for the incremental cost of the HS221–AX upgrade kit, convert the HS121 FDDI Server to an HS221 FDDI Server.

The HS221–AX upgrade kit provides all the components for upgrading a model HS121 StorageWorks FDDI Server to a model HS221 StorageWorks FDDI Server. The following sections provide information about the upgrade kit and how to perform the upgrade.

5.2 HS221–AX Upgrade Kit Description

The main components of the HS221–AX upgrade kit are as follows:

- Two FDDI adapters
- Four HS1AD bus adapters
- OpenVMS Alpha operating system software Version 6.2 (or later) CD–ROM

When you receive your HS221–AX 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.

5.3 Preparing the HS121 FDDI Server for Upgrade

Changes in the FDDI Server internal bus adapter require that the console code and the operating system be upgraded to Console Code Version 5.0 (or later) and OpenVMS Alpha operating system software Version 6.2 (or later) **prior** to operation of this module. A CD–ROM containing the upgrade software is included in this kit. Follow the instructions in Sections 5.3.1 and 5.3.2 to perform this upgrade for **EACH SERVER PROCESSOR IN TURN**.

Note

Digital recommends that you perform a backup of your system disk prior to any upgrades to provide a means of recovery if anything should go wrong during the upgrade.

See Section 10.3 for backup procedures.

5.3.1 Upgrading the Console Code

Follow the instructions in Section 4.3.1 to upgrade the console code to Version 5.0 (or later).

Note

Any node in the VMScluster system whose system disk is served through either node of this FDDI Server also should be shut down, because this upgrade procedure requires shutting down both server processors at the same time. Shut down any served nodes before shutting down the server processors in this FDDI Server.

5.3.2 Upgrading the Server Processor with OpenVMS Alpha Version 6.2 (or Later)

Before the FDDI and bus adapters can be replaced, the OpenVMS Alpha operating system software version must be upgraded to Version 6.2 (or later). If the OpenVMS Alpha operating system software has not already been upgraded to Version 6.2 (or later), do so now by following steps 1 through 10 in Section 4.3.2 to upgrade the operating system.

5.4 Preparing the Cabinet for Upgrade

Use the following procedure to power off the server processors:

1. Open the front door of the FDDI Server cabinet with a 5/32-inch hex wrench.
2. Depress the power button on the server OCP to turn off power to each server processor.
3. Set the On/Off switches on any external options connected to the system to the Off position.

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.

5.5 Replacing the FDDI and Bus Adapters

Note

The HS221–AX upgrade involves removing one FDDI adapter card from EISA slot 2 (marked as FDDI ADAPTER (HS1XX) in Figure 4–2) and replacing it with a new FDDI adapter card in PCI slot 3 (marked as FDDI ADAPTER (HS2XX)).

This upgrade also involves removing two bus adapter cards from EISA slots 7 and 8 (marked as HS1AD BUS ADAPTER (2) and HS1AD BUS ADAPTER (1), respectively, in Figure 4–2) and replacing them with two new bus adapter cards in the same EISA slots.

Follow the steps in Section 4.5 to replace the FDDI and bus adapter cards in each server processor.

5.6 Installing Additional Storage Devices (Optional)

Sections through describe the procedures to follow if additional storage is to be added to this FDDI Server.

Removing Cabinet Panels (If Required)

If additional storage devices are being added, then Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables. See Section 3.3, steps 2 through 4 for removing the cabinet panels.

If no additional storage devices are being added, then ensure that there is sufficient space in front and behind the cabinet to slide the server processors all the way forward and to the rear. See Figure 2–2 for specific space requirements.

5.7 Installing BA35*x*–S Storage Shelves (Optional)

If additional BA35*x*–S storage shelves are needed, go to Section 4.7.

5.8 Installing BA350–M Shelf SCSI Cables (If Required)

If additional SCSI cabling is required, go to Section 4.8.

Replacing Cabinet Panels (If Required)

After all hardware has been installed, replace the cabinet side panels (if removed) **before** reapplying power to the FDDI Server. To replace the cabinet panels, reverse the steps in Section 3.3.

5.9 Restarting the System

Once the cabinet has been inspected for tools and installation debris, apply power as follows:

1. Plug the primary power cable from the CDU into the appropriate site power receptacle.
2. Switch the circuit breaker on the CDU to the | (ON) position.
3. Verify that all cabinet fans and shelf blowers are operating and that both status indicators on each shelf power supply SBB are illuminated. Refer to the *StorageWorks Solutions Shelf and SBB User's Guide* for further information on shelf status indicators.
4. Apply DC power to each server processor. The DC power switch is located on the OCP of the server processor. Figure 1–5 shows the location of the OCP.

5.10 Connecting the Terminal to the HS1CP Device Channel Processor (If Required)

If storage devices have been added to the FDDI Server, then the HS1CP device channel processor must be reconfigured. First, the terminal must be connected to the HS1CP by following the steps in Section 3.13.

5.11 Configuring Storage for the HS1CP Device Channel Processor (If Required)

If storage devices have been added to the FDDI Server, then the device channel processors must be reconfigured. To reconfigure the HS1CP, follow the steps in Section 3.18.

Note

Since you are directly connected to the HS1CP, perform only step 6 in Section 3.18.2.

Do not execute Section 3.18.5 at this time.

5.12 Running the EISA Configuration Utility for Each Server Processor

Do the following for each server processor:

1. Follow the instructions in Section 3.16 to connect a terminal to the server processor before starting the next step.
2. Run the EISA Configuration Utility and verify your FDDI adapter option installation in the server processor as described in Section 4.13.

Note

Set both device bus adapters in the first server processor to SCSI ID 7 and in the second server processor to SCSI ID 6.

Replace the example in Step 7 in Section 4.13 with 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.

5.13 Verifying the Installation

Sections 5.13.1 and 5.13.2 describe the procedures for verifying the hardware installation.

5.13.1 Verifying Your Bus Adapter Installation

Use the following procedure to verify your installation of the HS1AD device bus adapters for each server processor:

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

```
Firmware
SRM Console:   V3.0-12
ARC Console:   4.26
PALcode:       VMS PALcode X5.48-101, OSF PALcode X1.35-66
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 device bus adapters appear in slots 7 and 8, your installation is successful.

   If slot 7 or 8 do not display on your terminal screen, the missing HS1AD device bus adapter is not being recognized by the server processor. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual.*

5.13.2 Verifying Server Processor and HS1CP Installation

Use the procedures below to ensure the server processor and HS1CP recognize the new hardware correctly:

Note

Ensure you do the following for *each* server processor.

1. Storage configuration information similar to the following will be displayed after typing SHOW DEVICE at the >>> prompt, if you have not set your storage devices to preferred and if you have not set "BUS_PROBE_ALGORITHM" to "NEW".

```
>>>SHO DEV
dka0.0.0.6.0              DKA0                          RZ28  D41C
dka500.5.0.6.0            DKA500                       RRD43  0064
due1100.2.0.5.1           $13$DUA1100 (HS1CP2)            HSX0
due1110.2.0.5.1           $13$DUA1110 (HS1CP2)            HSX0
   .
   .
   .
due1600.2.0.5.1           $13$DUA1600 (HS1CP2)            HSX0
duf1100.1.0.6.1           $13$DUA1100 (HS1CP1)            HSX0
duf1110.1.0.6.1           $13$DUA1110 (HS1CP1)            HSX0
   .
   .
   .
duf1600.1.0.6.1           $13$DUA1600 (HS1CP1)            HSX0
dva0.0.0.0.1              DVA0
erb0.0.0.3.1              ERB0              08-00-2B-BD-86-35
fwa0.0.0.11.0             FWA0              08-00-2B-B2-9C-49
pka0.7.0.6.0              PKA0                  SCSI Bus ID 7
pue0.7.0.5.1              PAE0                  DSSI Bus ID 7
puf0.7.0.6.1              PAF0                  DSSI Bus ID 7
```

   By not setting a preferred path, the same device will appear in the display for each HS1CP Device Channel Processor which can see it. For example, DUE1100 and DUF1100 are the same device but DUE1100 is seen through HS1CP2 and DUF1100 is seen through HS1CP1.

   By not executing the SET BUS_PROBE_ALGORITHM NEW command, your SCSI storage devices will appear with labels DUE and DUF in the first display column rather than the more common DUA and DUB.

2. If BUS_PROBE_ALGORITHM is set to "NEW", then device names in the first display column will be DUA and DUB rather than the unusual DUE and DUF.

   To invoke the BUS_PROBE_ALGORITHM command, simply perform the two following steps:

```
>>>set bus_probe_algorithm new
>>>init
*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.0-15, built on Jul 27 1995 at 15:45:08
>>>
```

3. The setting of preferred path ensures that a device will only appear once in the display; the device will be associated with the HS1CP device channel processor to which it has been preferred. See Section 10.6 for setting the preferred path and balancing the I/O load.

   Storage configuration information similar to the following will be displayed after setting the storage devices to a preferred path and having executed the "SET BUS_PROBE_ALGORITHM NEW" command.

```
>>>sho device
dka0.0.0.6.0             DKA0                              RZ28  D41C
dka500.5.0.6.0           DKA500                           RRD43  0064
dua1100.2.0.1005.0       $13$DUA1100 (HS1CP2)                HSX0
dua1200.2.0.1005.0       $13$DUA1200 (HS1CP2)                HSX0
   .
   .
   .
dua1610.2.0.1005.0       $13$DUA1610 (HS1CP2)                HSX0
dub1110.1.0.1006.0       $13$DUA1110 (HS1CP1)                HSX0
dub1120.1.0.1006.0       $13$DUA1120 (HS1CP1)                HSX0
   .
   .
   .
dub1640.1.0.1006.0       $13$DUA1640 (HS1CP1)                HSX0
dva0.0.0.0.1             DVA0
era0.0.0.1003.0          ERA0              08-00-2B-BD-86-35
fwa0.0.0.11.0            FWA0              08-00-2B-B2-9C-49
pka0.7.0.6.0             PKA0                  SCSI Bus ID 7
pua0.7.0.1005.0          PAA0                  DSSI Bus ID 7
pub0.7.0.1006.0          PAB0                  DSSI Bus ID 7
```

Verify that all HS221 FDDI Server storage units, stripesets, and RAIDsets appear in the resultant display. If any storage devices are missing, return to CFMENU per Section 3.18.2 and confirm the configuration. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual* if you still have configuration problems.

This completes the verification of the hardware installation.

5.14 Booting the Server Processors

For each server processor in turn, enter BOOT at the >>> prompt.

This action causes each server processor to boot from the system disk and join the VMScluster.

Note

Because of the OpenVMS Alpha operating system software Version 6.2 (or later) upgrade, this boot procedure will be similar to that in Steps 11 and 12 in Section 4.3.2.

The booting of the second server processor completes the installation of the HS221 FDDI Server.

Now perform the procedure in Section 3.18.5 to save your storage configuration setup.

5.15 Verifying VMScluster Membership

Use the following procedure to verify that the HS221 FDDI Server is correctly integrated into the VMScluster environment:

1. Enter the SHOW CLUSTER command on the terminal that is connected to one of the server processors. A display similar to the one in the following example (see Figure 5–1) can be used to verify that the both nodes of the HS221 FDDI Server have joined the VMScluster.

Figure 5–1 Example Cluster Information

View of Cluster from Node: FSERV1 9−OCT−1995 16:50:02

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
FSERV2	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
HS1CP1	HSD V25F	
HS1CP2	HSD V25F	

2. Enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see both nodes of the HS221 FDDI Server.
3. Enter the SHOW DEVICE command to ensure the HS221 is serving storage to the clients. All storage units, stripesets, and RAIDsets should appear in the resultant display.
4. If any nodes in the VMScluster were shut down during the console code upgrade because they were booted through a served system disk on the original HS121 FDDI Server, now is the time to bring them back online, as follows:
   a. At each of the served nodes, enter the boot command at the >>> prompt:

      ```
      >>>BOOT
      ```

   b. At the DCL $ prompt on any of the served nodes, enter the SHOW DEVICE and SHOW CLUSTER commands to verify that the served nodes have reentered the VMScluster and can see the server.

5.16 Supporting and Operating the StorageWorks FDDI Server

Once the model HS221 StorageWorks FDDI Server has been installed, you may want to perform various system management tasks to customize the system. See Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

6

HS211 to HS221 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS221–BX upgrade kit.

6.1 Purpose of This Upgrade

To achieve improved performance and more storage connectivity and failover redundancy, a model HS211 FDDI Server can be upgraded with an HS221–BX kit to an HS221 FDDI Server for less expense than the purchase of a new HS221 Server.

The HS221–BX upgrade kit provides all the components for upgrading a model HS211 StorageWorks FDDI Server to a model HS221 StorageWorks FDDI Server. The following sections provide information about the upgrade kit and how to perform the upgrade.

6.2 HS221–BX Upgrade Kit Description

The main components of the HS221–BX upgrade kit are as follows:

- One HS1AD bus adapter to be installed in original server processor
- One server processor with new FDDI and bus adapters already installed
- One HS1CP device channel processor with 32 MB write-back cache module
- One cable distribution unit (CDU)
- OpenVMS Alpha operating system software Version 6.2 (or later) CD–ROM

When you receive your HS221–BX 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.

6.3 Preparing the Cabinet for Upgrade

Prior to installing the hardware in this upgrade kit, you must perform an orderly shutdown of the system, as described in Section 6.3.1, and remove cabinet panel for ease of cable installation, as described in Section 6.3.2.

6.3.1 Shutting Down the System

Perform the following steps to shut down the FDDI Server:

1. Follow the instructions in Section 3.16 to connect a terminal to the server processor.
2. Stop all work on the server processor.

3. Stop all work on nodes that are booted through a served system disk on your FDDI Server.

4. If there are no nodes in the cluster that are booted through a served system disk on your FDDI Server, then shut down the StorageWorks FDDI Server as described in this step. Otherwise, shut down these boot served nodes first and then shut down your FDDI Server as follows:

   a. Log in to a privileged account such as the system manager account. For example:

```
Username: SYSTEM
Password:
   Welcome to OpenVMS AXP (TM) Operating System, Version V6.2
    Last interactive login on Thursday, 28-SEP-1995 21:35:03.64
    Last non-interactive login on Thursday, 28-SEP-1995 21:35:20.48
```

   b. Execute the system shutdown command file by entering the following command:

```
$ @SYS$SYSTEM:SHUTDOWN
```

   c. Answer the questions asked during the execution of the shutdown command file and wait until the system has completed a logical shutdown.

      Take the default values for all the questions by pressing the Return key. Select the "REMOVE_NODE" shutdown option **ONLY**, otherwise, the VMScluster could hang.

```
        SHUTDOWN -- Perform an Orderly System Shutdown
                    on node NODE1

How many minutes until final shutdown [0]:
Reason for shutdown [Standalone]:
Do you want to spin down the disk volumes [NO]?
Do you want to invoke the site-specific shutdown procedure [YES]?
Should an automatic system reboot be performed [NO]? NO
When will the system be rebooted [later]:
Shutdown options (enter as a comma-separated list):
 REMOVE_NODE         Remaining nodes in the cluster should adjust quorum
 CLUSTER_SHUTDOWN    Entire cluster is shutting down
 REBOOT_CHECK        Check existence of basic system files
 SAVE_FEEDBACK       Save AUTOGEN feedback information from this boot
 DISABLE_AUTOSTART   Disable autostart queues

Shutdown options [NONE]: REMOVE_NODE
```

   d. At the completion of shutdown, the following command stream will appear:

```
        SYSTEM SHUTDOWN COMPLETE

halted CPU 0

halt code = 5
HALT instruction executed
PC = ffffffff8004df84
>>>
```

5. Power off the server processor by:

   a. Opening the front door of the FDDI Server cabinet with a 5/32-inch hex wrench.

   b. Depressing the power button on the server OCP to turn off power.

c. Setting the On/Off switches on any external options connected to the system to the Off position.

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.

6.3.2 Cabinet Panel Removal

As part of the HS221–BX upgrade, cabinet panel removal is required prior to installing the second cable distribution unit. Also, if additional storage devices are being added, then Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables. See Section 3.3, steps 2 through 4 for removing the cabinet panels.

Ensure that there is sufficient space in front and behind the cabinet to slide the server processors all the way forward and to the rear. See Figure 2–2 for specific space requirements.

6.4 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 6–1. Check your CDU for proper voltage.

Table 6–1 CDU Parts List

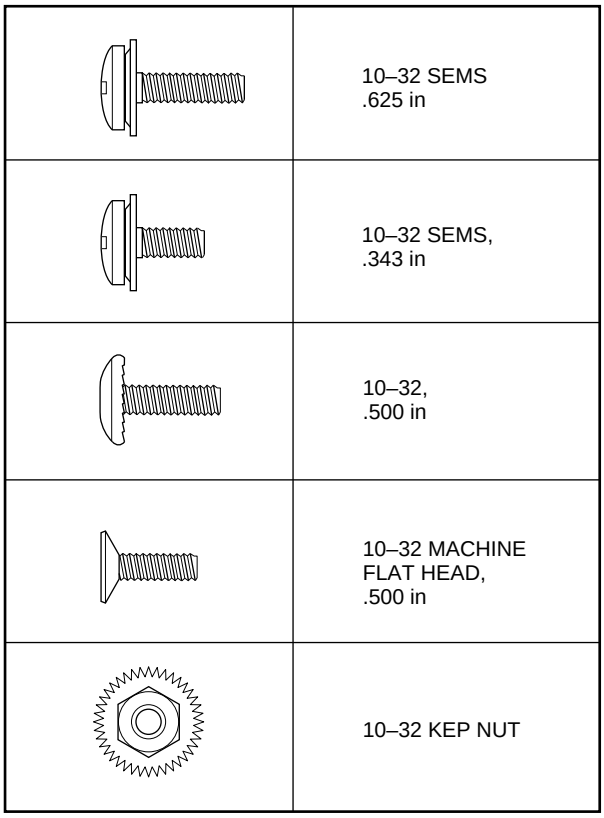
Description	Qty
Distribution unit, cable, 120/208V, 60 Hz (SW8XP–AA)	1
Screw, SEMS 10–32 Pan, .625 inch†	4
U-Nut, 10–32	4
Tie, cable	40
Cord, ac power, gray, 5 feet	6
Cord, ac power, gray, 7 feet	10
Cord, ac power, gray, 9 feet	8
Tie, cable, adhesive-backed	13
Label, CDU ID/Caution, power cords	2

†These parts are shown in detail in Figure 6–1.

Note

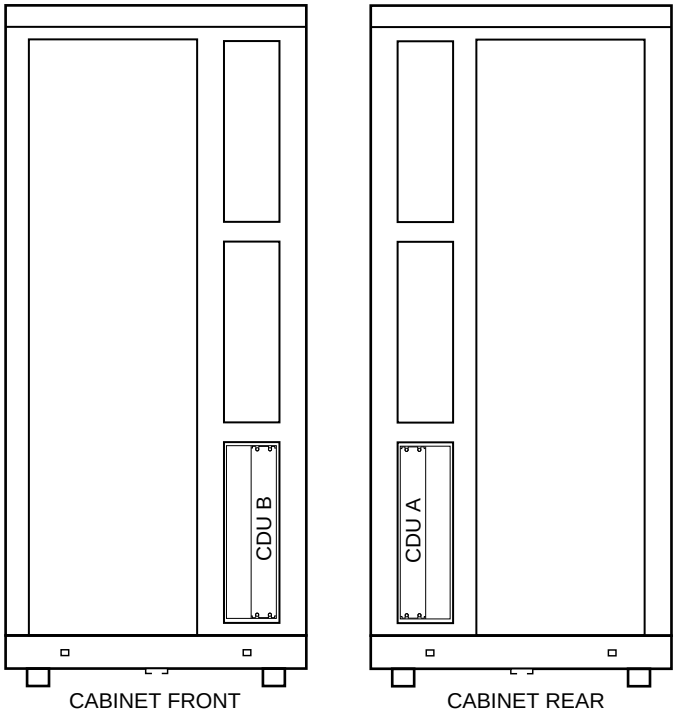
The gray power cords are for the new CDU (CDU B). The existing CDU (CDU A) uses the black power cords that were previously installed.

Figure 6–1 HS221 Screw Diagrams



CXO-4701A-MC

Figure 6–2 CDU Locations



2. See Figure 6–2 to identify and locate CDU A. Identify the location for the installation of CDU B.
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 6–3 and 6–4.

Figure 6–3 CDU B Installation

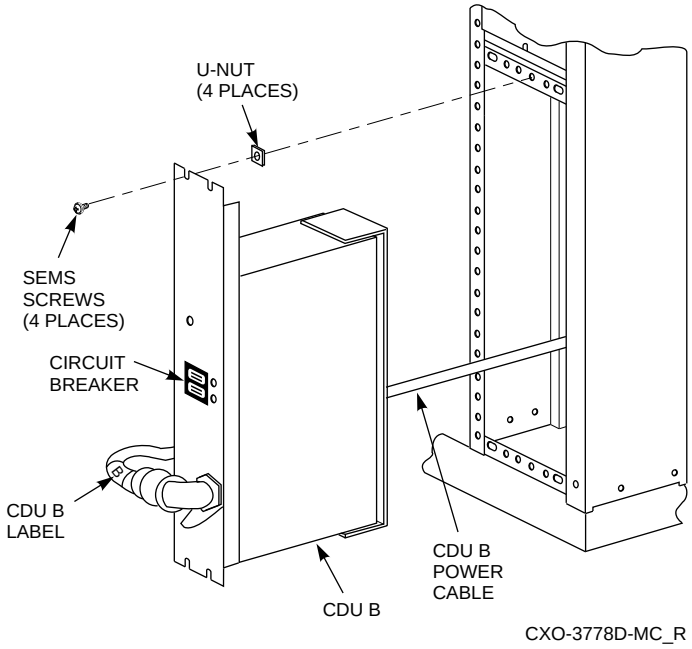
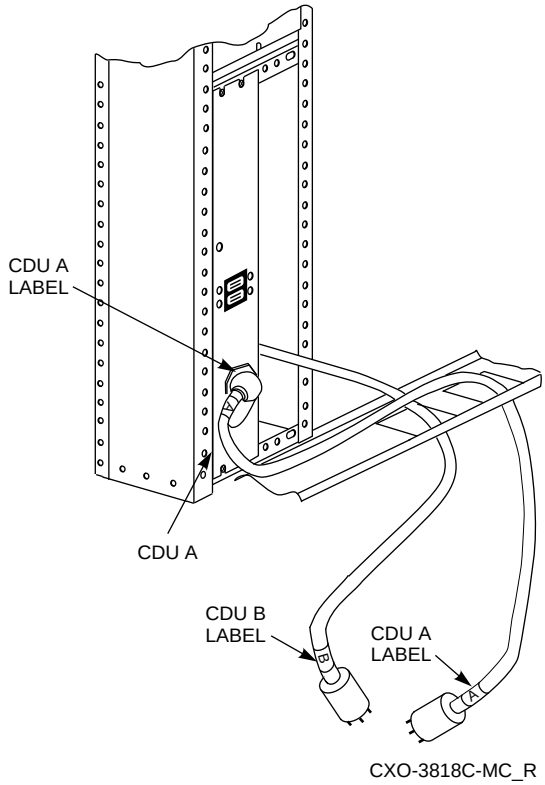


Figure 6–4 Rear Power Cord Installation



8. Use the hardware provided in the kit to mount CDU B to the cabinet chassis rails (see Figure 6–3).

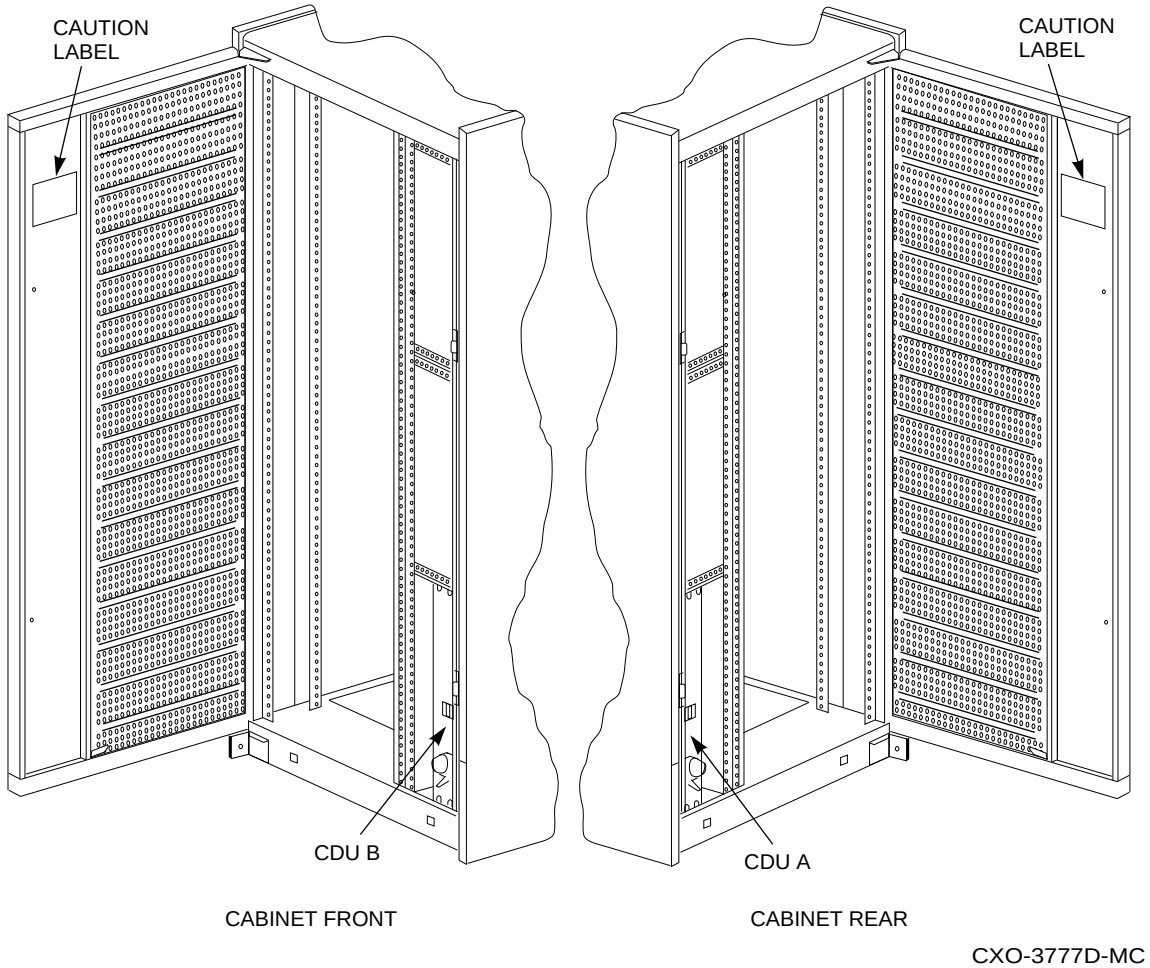
9. To prevent confusion, apply safety labels to CDU A and CDU B power cords. Install the safety labels as described in the following steps:

   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 6–3 and 6–4).

   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 6–3 and 6–4).

   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 6–5.

Figure 6–5 Safety Label Locations

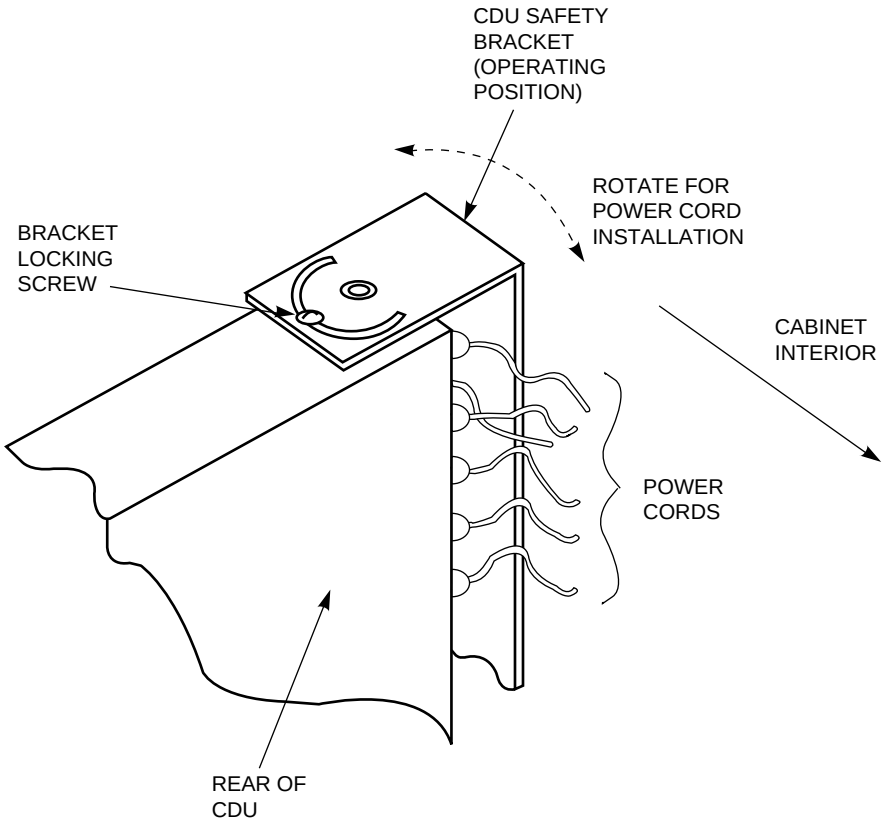


10. Make sure that the second ac power supply required for the dual power option is installed in each shelf.

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.

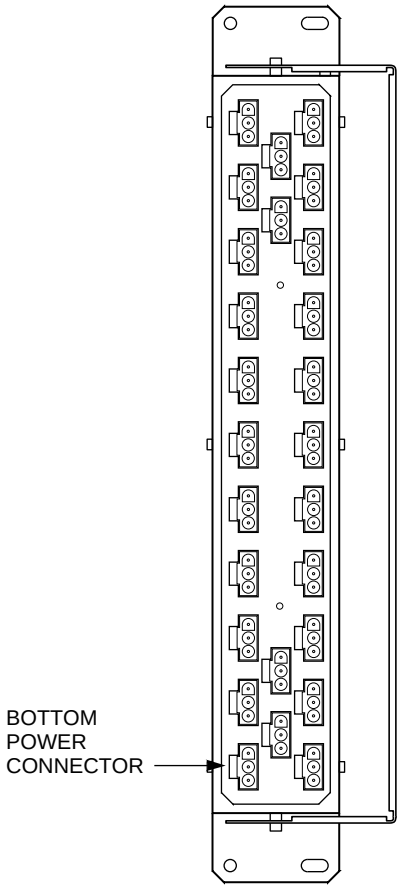
12. Loosen the CDU B safety bracket locking screw and rotate the safety bracket to one side (Figure 6–6).

Figure 6–6 CDU Safety Bracket



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 6–7).

Figure 6–7 CDU B Power Cord Connectors



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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 3.5 for additional information on the air baffle.

6.5 Replacing the FDDI Adapter

For the HS221–BX upgrade, the FDDI adapter in the original server processor must be replaced with a later version card.

CAUTION

Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.3 for proper grounding procedures.

Follow the steps in Section 4.5 to replace the FDDI adapter card in this server processor.

Note

Do not close the server processor at this time, because the next step (see Section 6.6) requires access to the server processor.

6.6 Installing the Second Bus Adapter into the Original Server Processor

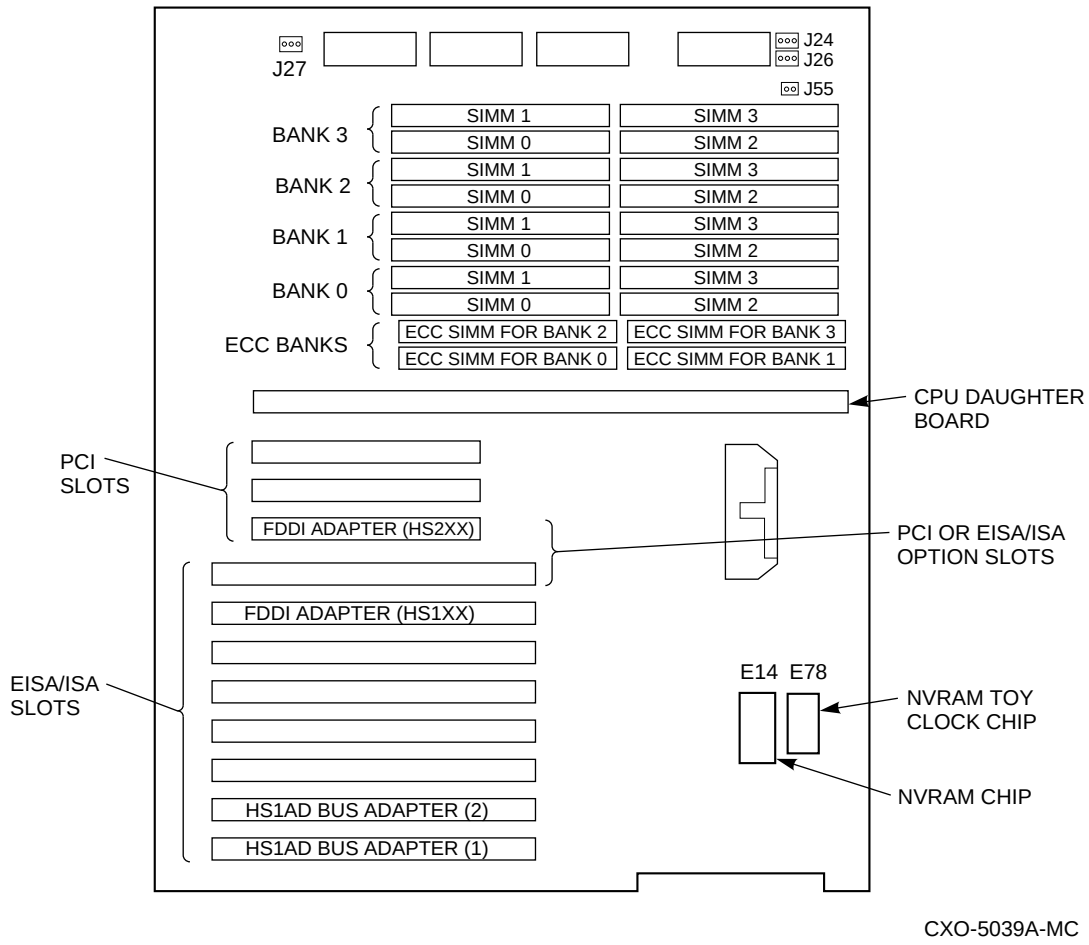
For the HS221–BX upgrade, the original server processor must have a second device bus adapter module installed.

CAUTION

Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.3 for proper grounding procedures.

Follow the appropriate steps in Section 4.5 to install a second bus adapter into the original server processor.

Figure 6–8 Slot Position for Device Bus Adapter



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 6–8, the slot position of the second device bus adapter is named "HS1AD Bus Adapter (2)."

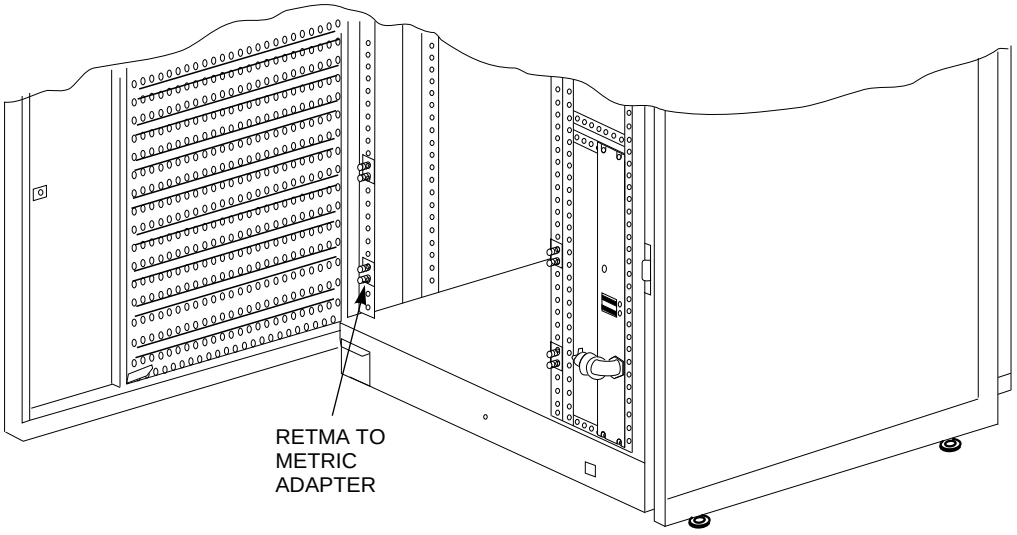
6.7 Installing the Chassis Slide Assembly for the New Server Processor

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 6–9).

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 6–9).

Figure 6–9 RETMA-to-Metric Slide Adapter Installation



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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.

Note

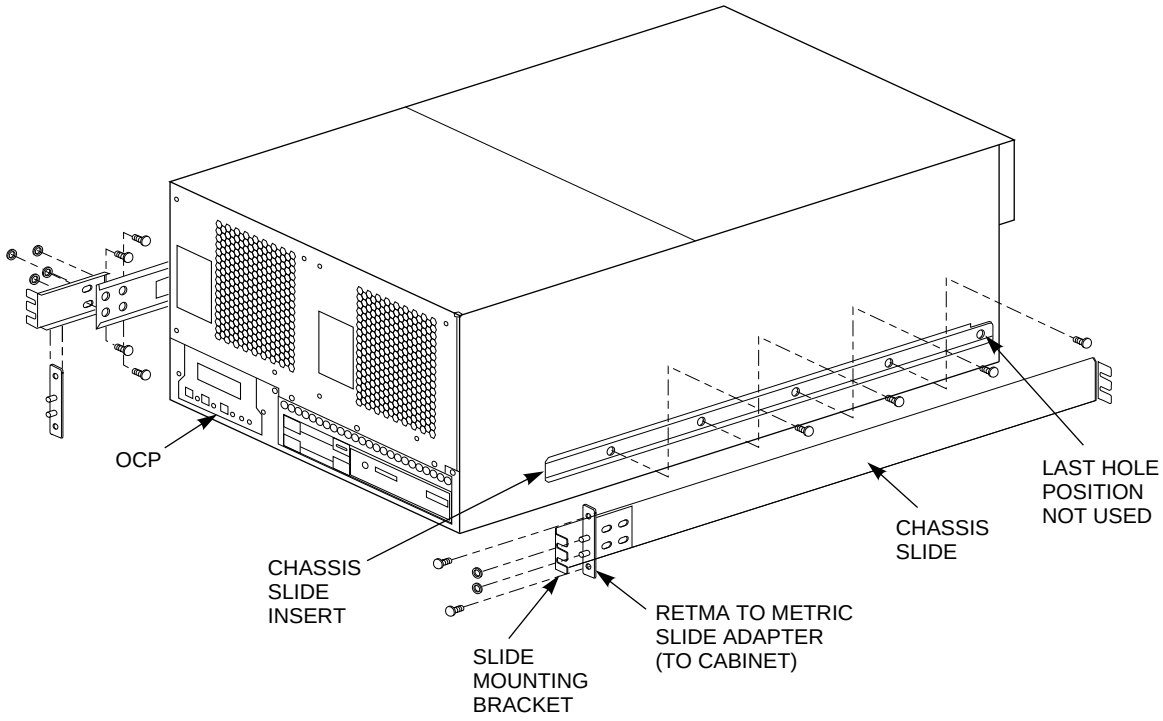
No adapter is needed on the *left rear* vertical rail of the cabinet, because the vertical air baffle has permanent mounting studs for the chassis slides.

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 6–10). 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 6–10).

Figure 6–10 Slide Insert Installation



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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 6–10.

   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 6–10). 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.

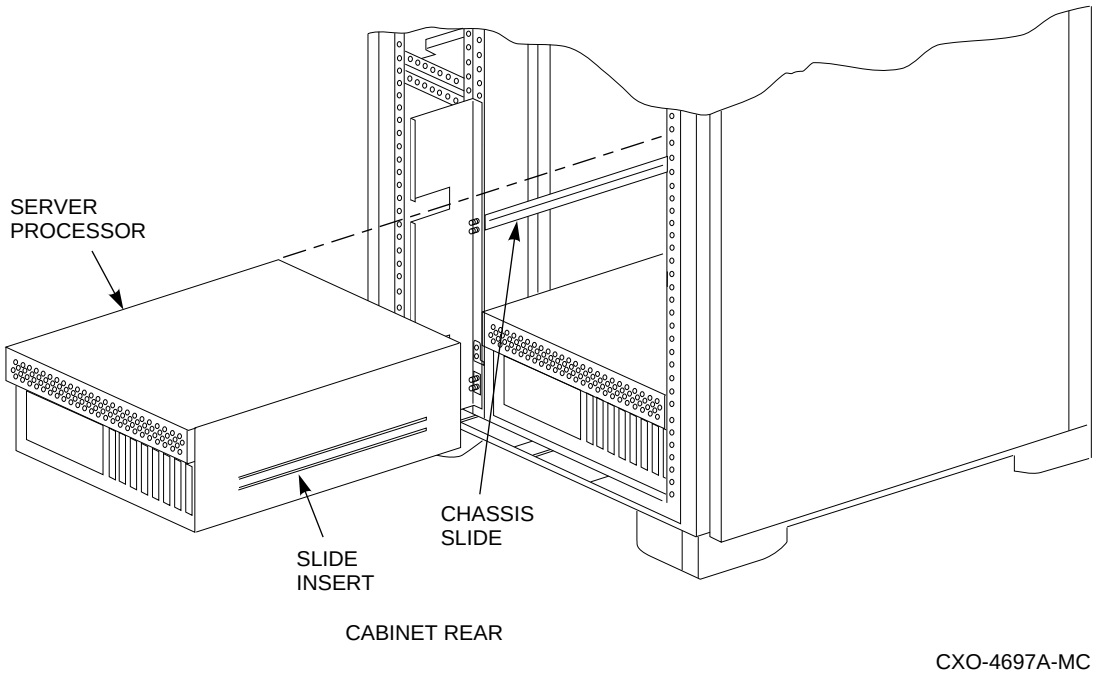
This completes installation of the slide inserts and chassis slides.

6.8 Installing the Second Server Processor into the Cabinet

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 6–11).
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 6–11 Server Processor Installation



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

Note

This server processor is shipped completely configured for installation into the HS211 FDDI Server, as follows:

- Two new bus adapters have been installed on the server processor motherboard in EISA slots 7 and 8, labeled "HS1AD Bus Adapter (2)" and "HS1AD Bus Adapter (1)" in Figure 6–8.
- The RZ*xx* system disk SCSI ID (identifier) has been set to SCSI ID 0.
- The RRD43 CD–ROM drive ID has been set to SCSI ID 4.

6.9 Installing Additional Storage Devices (Optional)

Section 6.10 and Section 6.11 describe the procedures to follow if additional storage is to be added to this FDDI Server.

6.10 Installing BA35*x*–S Storage Shelves (Optional)

If additional BA35*x*–S storage shelves are needed, go to Section 4.7.

6.11 Installing BA350–M Shelf SCSI Cables (If Required)

If additional SCSI cabling is required, go to Section 4.8.

6.12 Installing Second HS1CP Device Channel Processor and 32 MB Write-Back Cache Module into Existing BA350-M Shelf

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.

6.12.1 Identify the Slot Position of the Second HS1CP Device Channel Processor

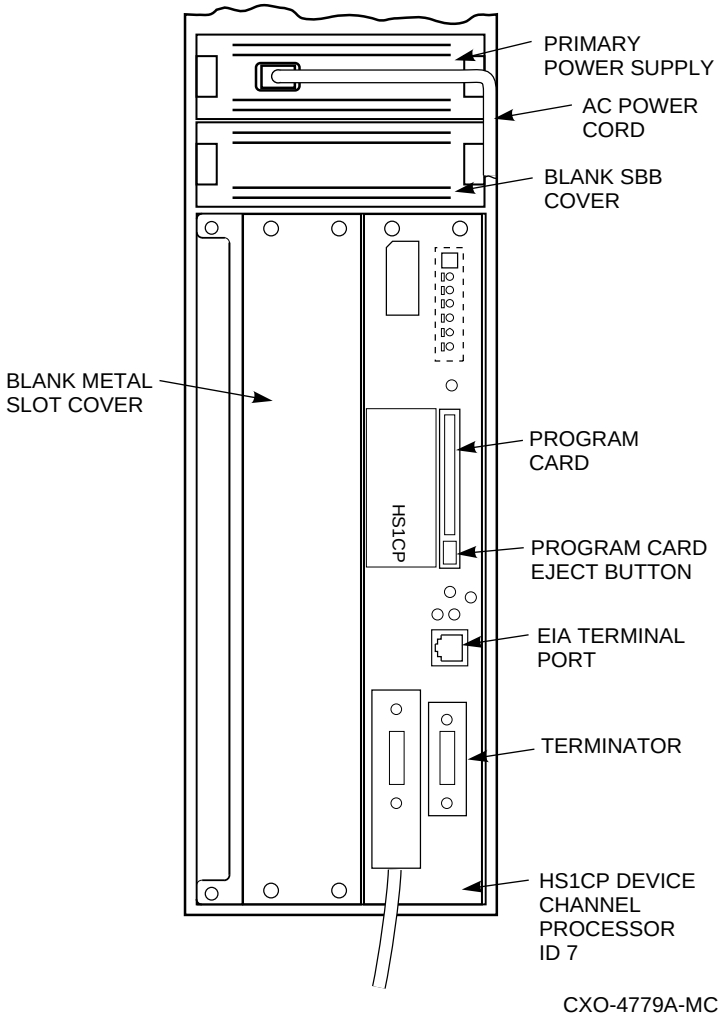
For an HS211 FDDI Server configuration, the existing HS1CP occupies the SCSI ID slot 7 of the BA350–M shelf.

Refer to Appendix B of this guide for HS1CP configuration rules and restrictions.

The second HS1CP must occupy SCSI ID slot 6. The second HS1CP does not function correctly if there are attached devices in slot 6 of any storage shelf. Check that each port has no more than six SCSI–2 devices at SCSI ID numbers 0 through 5.

Figure 6–12 shows what the BA350–M shelf should look like prior to installation.

Figure 6–12 HS211 BA350–M Shelf Configuration



6.12.2 Installing the HS1CP Device Channel Processor and the Write-Back Cache Module

Use the following procedure to install the HS1CP and the write-back cache module:

1. Disconnect the power cord from the BA350–M shelf power supply.

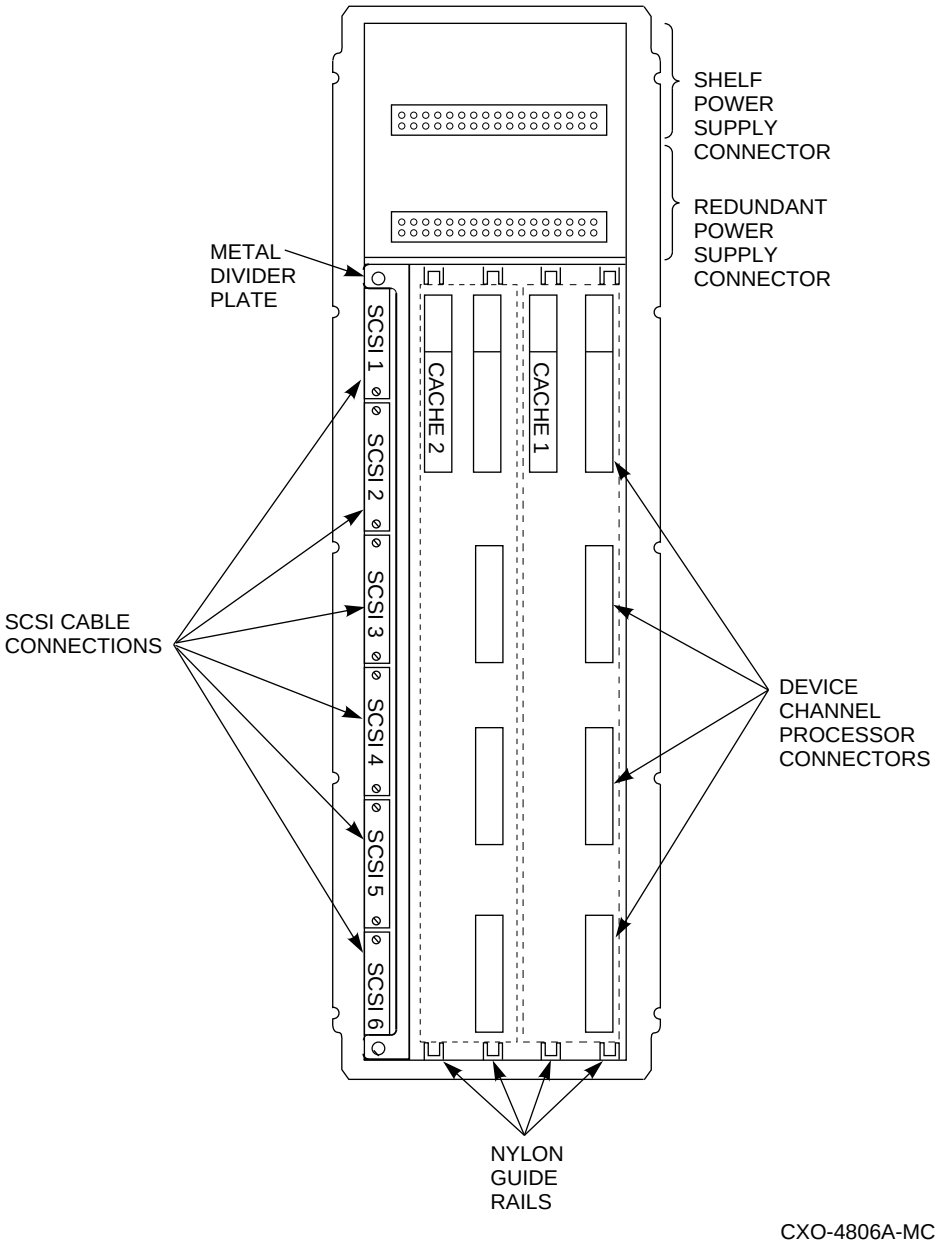
   Refer to Figure 6–12 for the location of the ac power cord and power supply in the BA350–M shelf.

2. With a flathead screwdriver loosen the four fastening screws on the front corners of the metal filler panel over SCSI ID slot 6 in the BA350–M shelf and remove the filler panel (refer to Figure 6–12).

CAUTION

Electrostatic discharge will damage modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 2.3 for proper grounding procedures.

Figure 6–13 BA350–M Shelf Layout (Front View)



Note

Figure 6–13 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.

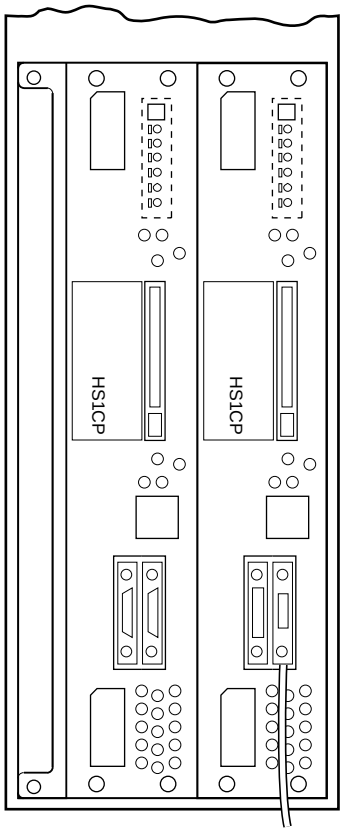
- The shelf has nylon guide rails along the top and bottom to guide the modules into their connectors.

3. Install the 32 MB write-back cache module into the BA350–M shelf by sliding the module through the nylon guide rails into the single white connector located in the back of the shelf (refer to Figure 6–13).
4. Install the HS1CP into the BA350–M shelf by sliding the module through the nylon guide rails into the four white connectors located in the back of the shelf (refer to Figure 6–13).
5. With a flathead screwdriver, tighten the four fastening screws on the front corners of the HS1CP.

CAUTION

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

Figure 6–14 Device Channel Processor Installation



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6. Install the additional power supply into the second top slot of the BA350–M shelf (see Figure 6–14).

   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.

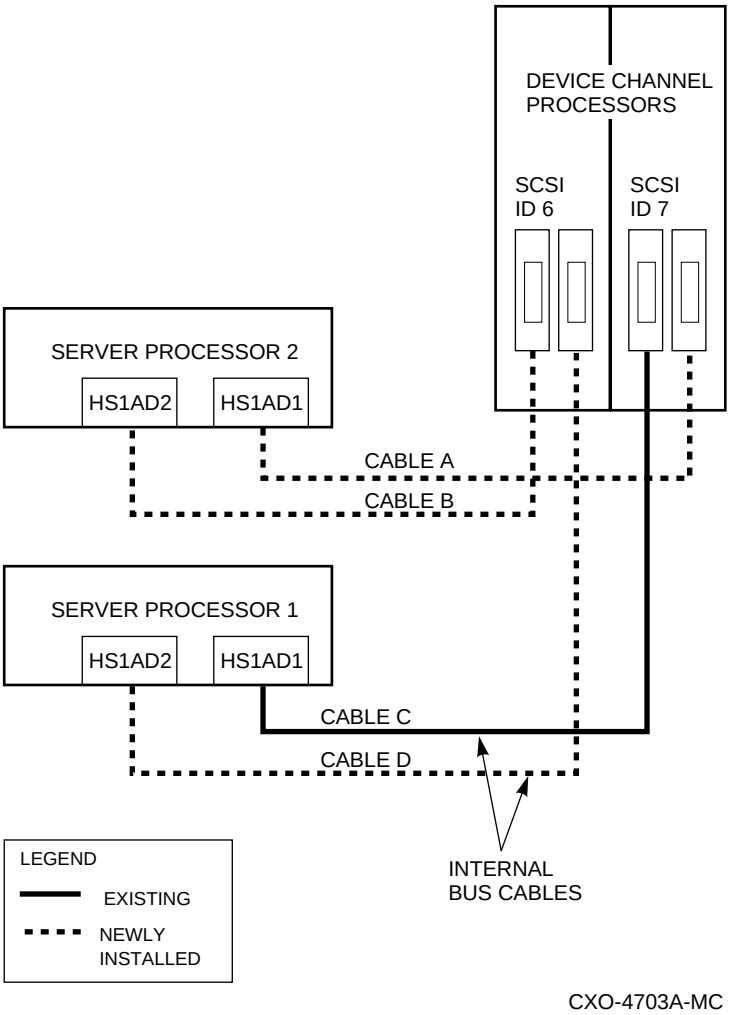
7. Plug shelf power cords into the front of both shelf power supplies.

You have completed write-back cache module and HS1CP device channel processor installation and your shelf should look like Figure 6–14.

6.13 Installing Internal Bus Cables

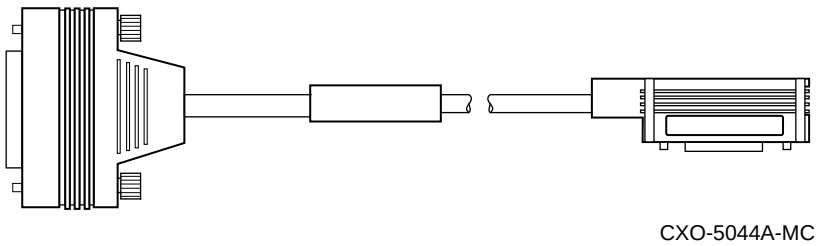
Use the following procedure to connect internal bus cables between the two HS1CP device channel processors and the two server processors. Refer to Figures 6–15 and 6–16 during the following procedure.

Figure 6–15 Cabling Diagram for HS221



Note

Figure 6–16 Internal Bus Cable Connectors



Use the right-angle end of the internal bus cable to attach to the HS1CP device channel processor trilink connector (refer to the connector on the *right* in Figure 6–16).

Use the straight end of the internal bus cable to attach to the HS1AD device bus adapter (refer to the connector on the *left* in Figure 6–16).

1. Carefully attach an internal bus cable from the open trilink connector of the HS1CP in slot 6 to the newly installed device bus adapter (HS1AD2) in the original server processor (Server Processor 1). Make sure the trilink connector pins are not bent or damaged.

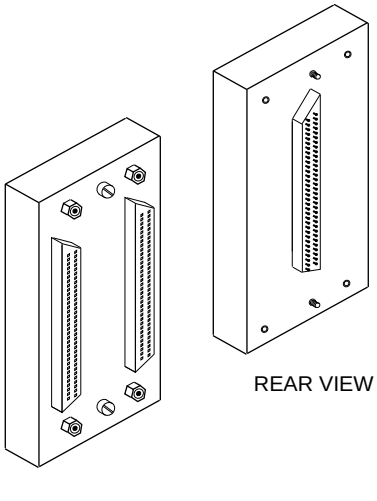
   This is identified as Cable D in Figure 6–15.

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.

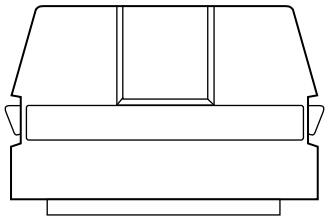
Be aware that the trilink connector block (Figure 6–17) is the interface between the HS1CP device channel processor and other internal bus cable connections. It is the *trilink* that you can disconnect and connect safely when you have a mating guide installed. In a power-on situation, you must work around any internal bus cable or terminator connections to the trilink *without* disconnecting them.

Figure 6–17 Trilink Connector



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 6–18 Terminator



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2. Remove the terminator (see Figure 6–18) from the trilink connector of the HS1CP in slot 7.

   The other side of this trilink should have an already attached internal bus cable, identified as Cable C in Figure 6–15.

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

   This is identified as Cable A in Figure 6–15.

4. 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 6–15.

6.14 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 the 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

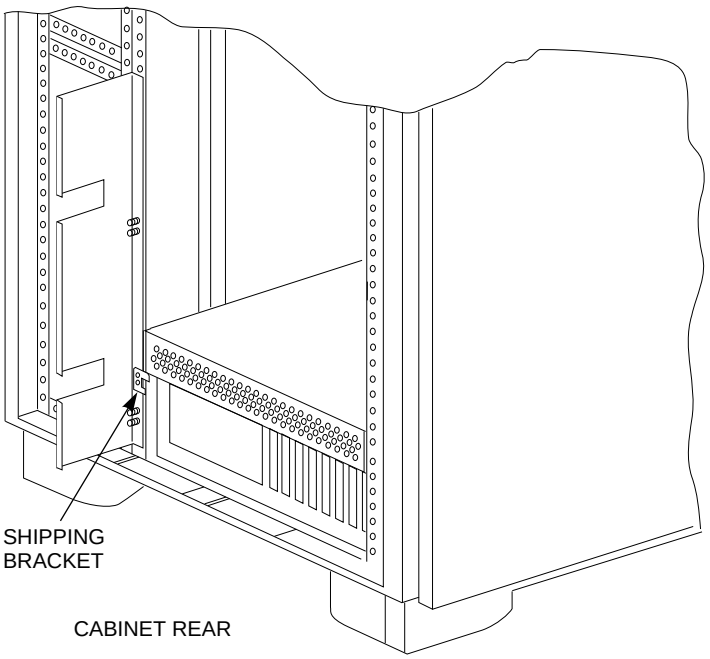
The metal locking tab on the chassis slide insert locks when the server processor is part way into the cabinet. To push the server processor completely into the cabinet, depress the metal locking tab to release the slide and allow full movement of the server processor.

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 6–19).

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.

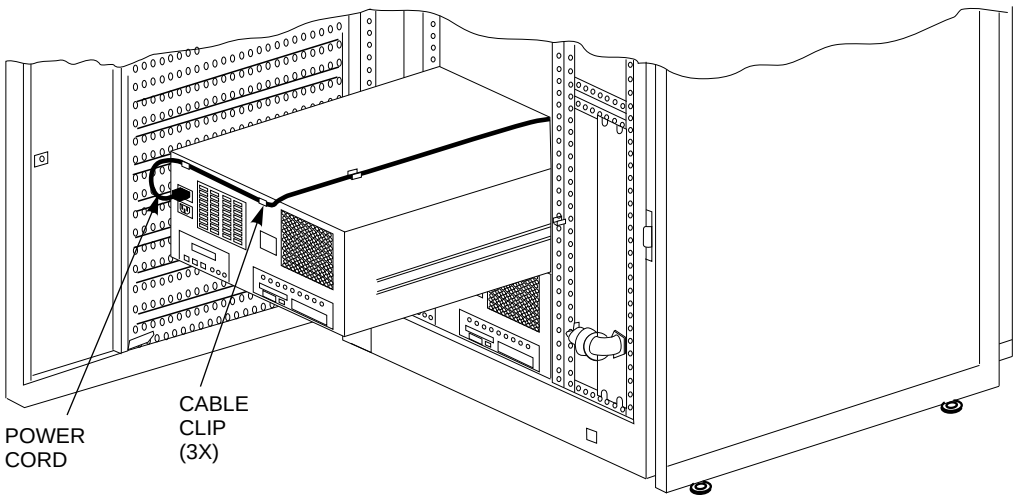
Figure 6–19 Shipping Brackets



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 6–20) 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 6–20.

Figure 6–20 Server Processor Cable Clip Installation



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 6–20. 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, if you so desire.

   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.

9. Tighten all screws.
10. Replace the cabinet side panels and top cover by reversing the procedures described in Section 6.3.
11. Switch the circuit breakers on both CDUs to ON (|).
12. Depress power buttons on front of both server processors.

6.15 Connecting a Terminal to the New HS1CP Device Channel Processor

The following sections describe how to connect a terminal to the EIA terminal port of the new 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 6–14).
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.

6.16 Setting the Initial Parameters of the New HS1CP 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.

6.17 Verifying the Firmware Versions and Write-Back Cache Size

CAUTION

In a redundant configuration, the following must apply:

- The firmware version and patch level must be the same for both HS1CPs in a dual-redundant pair for proper operation of the server.
- Both write-back cache modules must be the same cache size.

When the firmware versions are mismatched, the HS1CPs detect the mismatch and do not allow access to any devices.

1. Enter the following command at the HS1CP2> prompt:

```
HS1CP2> SHOW THIS
```

A display similar to the example below displays on your screen:

```
HS1CP2> SHOW THIS

Controller:
        HS1CP   (C) DEC ZG43100021 Firmware V25F-0, Hardware AX01
        Configured for dual-redundancy with ZG43100011
            In dual-redundant configuration
        SCSI address 7
        Time: 24-APR-1995 09:56:50

Host port:
        Node name: HS1CP2, valid DSSI node 2
        Host path is ON
        MSCP allocation class   13
        TMSCP allocation class  13

Cache:
        32 megabyte write cache, version 2
        Cache is GOOD
        Battery is GOOD
        No unflushed data in cache
        CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
```

2. The firmware version and patch level of the HS1CP displays on the first line of the text of the "Controller:" field, "V25F" in this case.

   The cache information displays in the "Cache:" field.

Note

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.

3. Record the firmware version and cache information for later use.
4. Enter the following command at the HS1CP2> prompt:

   ```
   HS1CP2> SHOW OTHER
   ```

   A display similar to the following example displays on your terminal screen:

```
HS1CP2> SHOW OTHER

Controller:
        HS1CP   (C) DEC ZG43100021 Firmware V25F-0, Hardware AX01
        Configured for dual-redundancy with ZG43100011
            In dual-redundant configuration
        SCSI address 6
        Time: 24-APR-1995 09:56:50

Host port:
        Node name: HS1CP1, valid DSSI node 1
        Host path is ON
        MSCP allocation class   13
        TMSCP allocation class  13
```

```
Cache:
        32 megabyte write cache, version 2
        Cache is GOOD
        Battery is GOOD
        No unflushed data in cache
        CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
```

5. Compare the displayed values of the two HS1CPs and follow these instructions:
   - If the firmware version, patch level, and cache sizes match, proceed to Section 6.18 and install the license key for the newly installed write-back cache module.
   - If the firmware versions are different, you must disable the HS1CP that has the lower version of code by removing its PCMCIA card.
   - As soon as possible, obtain and install a PCMCIA card with the correct firmware version.
6. Compare the cache size on the two write-back cache modules and follow these instructions:
   - If the cache size of the two write-back cache modules matches, then proceed to Section 6.18 to install the license key for the module.
   - If the cache size of the two write-back cache modules does not match, obtain and install the correct cache module as soon as possible. Meanwhile, do not enable the write-back cache function on the module with the wrong memory size with the Firmware Licensing System utility (see Firmware Licensing System (FLS)).
7. When you have the correct firmware version and write-back cache modules installed, repeat this verification procedure.

When the verification procedure is completed successfully, proceed to Section 6.18 to install the license key for the write-back cache module.

6.18 Installing the Write-Back Cache License Key

Complete the procedure described in Section 3.15 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.

6.19 Copying the Storage Configuration from One HS1CP Device Channel Processor to Its Dual-Redundant Partner

When you are configuring the storage devices connected to a second HS1CP device channel processor for redundancy, both HS1CPs must have the same storage configuration. For an FDDI Server with dual-redundant device channel processors, use the following procedure to copy the storage configuration from one device channel processor to the other:

1. Make sure the terminal is displaying the HS1CP2> prompt.

2. Copy the configuration from HS1CP1 to the newly installed HS1CP2 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 HS1CP 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-NOLOCEXE, 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 HS1CP2> prompt appears on the terminal screen.

4. 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).

5. Enter the following command:

```
HS1CP2> SHOW OTHER
```

This command displays information about the other device channel processor (HS1CP1). 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.

6. Verify that the information displayed for both device channel processors matches.

7. 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.

6.20 Configuring Storage for the HS1CP Device Channel Processors (If Required)

If storage devices have been added to the FDDI Server, then both device channel processor must be reconfigured. To reconfigure the HS1CP, follow the steps in Section 3.18, but do not execute Section 3.18.5 at this time.

Note

Since you are directly connected to the HS1CP, only perform Step 6 in Section 3.18.2.

Do the appropriate steps in Section 3.18.3.

Perform Steps 7, 8, and 9 in Section 3.18.4.

6.21 Customizing 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, as follows:

1. Follow the instructions in Section 3.16 to connect a terminal to the new server processor.
2. Follow the procedure in Section 3.17 to customize this server processor.
3. In order to run the ECU for the new server processor, shut down the server processor by entering @SYS$SYSTEM:SHUTDOWN at the DCL $ prompt.

6.22 Running the EISA Configuration Utility for Each Server Processor

Configure the device bus adapters as follows:

1. Run the EISA Configuration Utility and verify your FDDI adapter option installation in the new server processor as described in Section 4.13.

Note

Set both device bus adapters in the original server processor to SCSI ID 7 and in the new server processor to SCSI ID 6.

Replace the example in Step 7 in Section 4.13 with 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.

2. Follow the instructions in Section 3.16 to connect a terminal to the other server processor and repeat the above operation.

6.23 Verifying the Installation

Follow the instructions in Section 5.13 to verify hardware installation for each server processor.

6.24 Booting Both Server Processors

Use the following procedure to boot the server processors:

1. Enter BOOT at the >>> prompt on the original server processor.

   This action causes the original server processor to boot from the system disk and join the VMScluster, completing the installation of the HS221 FDDI Server.

2. Connect the terminal to the new server processor and integrate the new server processor into the existing VMScluster by following the procedures in Sections 3.20 and 3.21.

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.

The booting of the second server processor completes the installation of the HS221 FDDI Server.

Now perform the procedure in Section 3.18.5 to save your storage configuration setup.

6.25 Verifying VMScluster Membership

Use the following procedure to verify that the HS221 FDDI Server is correctly integrated into the VMScluster environment:

1. Enter the SHOW CLUSTER command on the terminal that is connected to one of the server processors. A display similar to the example below (see Figure 6–21) can be used to verify that the both nodes of the HS221 FDDI Server have joined the VMScluster.

Figure 6–21 Example Cluster Information

View of Cluster from Node: FSERV1 **9−OCT−1995 16:50:02**

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
FSERV2	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
HS1CP1	HSD V25F	
HS1CP2	HSD V25F	

2. Enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see both nodes of the HS221 FDDI Server.
3. Enter the SHOW DEVICE command to ensure the HS221 is serving storage to the clients. All storage units, stripesets, and RAIDsets should appear in the resultant display.
4. If any nodes in the VMScluster were shut down during the console code upgrade because they were booted through a served system disk on the original HS211 FDDI Server, now is the time to bring them back online, as follows:
   a. At each of the served nodes, enter the boot command at the >>> prompt:

      ```
      >>>boot
      ```

   b. At the DCL $ prompt on any of the served nodes, enter the SHOW DEVICE and SHOW CLUSTER commands to verify that the served nodes have reentered the VMScluster and can see the server.

6.26 Supporting and Operating the StorageWorks FDDI Server

Once the model HS221 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 Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

7

HS121 to HS241 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS241–AX upgrade kit.

7.1 Purpose of This Upgrade

The four internal bus structure within a model HS241 FDDI Server dramatically improves performance and offers more storage connectivity than provided in an HS121 FDDI Server. The HS241–AX upgrade kit provides a relatively inexpensive migration path from an HS121 FDDI Server to an HS241 FDDI Server.

The HS241–AX upgrade kit provides all the components for upgrading a model HS121 StorageWorks FDDI Server to a model HS241 StorageWorks FDDI Server. The following sections provide information about the upgrade kit and how to perform the upgrade.

7.2 HS241–AX Upgrade Kit Description

The main components of the HS241–AX upgrade kit are as follows:

- Two FDDI adapters
- Eight HS1AD bus adapters
- Two HS1CP device channel processors, each with a 32 MB write-back cache module
- OpenVMS Alpha operating system software Version 6.2 (or later) CD–ROM

When you receive your HS241–AX 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.

7.3 Preparing the HS221 FDDI Server for Upgrade

Changes in the FDDI Server internal bus adapter require that the console code and the operating system be upgraded to Console Code Version 5.0 (or later) and OpenVMS Alpha operating system software Version 6.2 (or later) **prior** to operation of this module. A CD–ROM containing the upgrade software is included in this kit. Follow the instructions in Sections 7.3.1 and 7.3.2 to perform this upgrade for **EACH SERVER PROCESSOR IN TURN**.

Note

Digital recommends that you perform a backup of your system disk prior to any upgrades to provide a means of recovery if anything should go wrong during the upgrade.

See Section 10.3 for backup procedures.

7.3.1 Upgrading the Console Code

Follow the instructions in Section 4.3.1 to upgrade the console code to Version 5.0 (or later).

Note

Any node in the VMScluster system whose system disk is served through either node of this FDDI Server also should be shut down since this upgrade procedure requires shutting down both server processors at the same time. Shut down any served nodes before shutting down the server processors in this FDDI Server.

7.3.2 Upgrading the Server Processor with OpenVMS Alpha Version 6.2 (or Later)

Before the FDDI and bus adapters can be replaced, the OpenVMS Alpha operating system software version must be upgraded to Version 6.2 (or later). If the OpenVMS Alpha operating system software has not already been upgraded to Version 6.2 (or later), follow the appropriate steps in Section 4.3.2 to upgrade the operating system.

7.4 Preparing the Cabinet for Upgrade

Follow the procedure in Section 4.4.1 to shut down each server processor.

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.

7.4.1 Cabinet Panel Removal

When additional storage devices are being added, Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables. See Section 3.3, steps 2 through 4 for removing the cabinet panels.

Ensure that there is sufficient space in front and behind the cabinet to slide the server processors all the way forward and to the rear. See Figure 2–2 for specific space requirements.

7.5 Installing BA35*x*–S Storage Shelves in the Rear of the Cabinet

Section 3.6 describes how to install BA35*x*–S storage shelves in the rear of the SW800-series cabinet.

7.6 Installing BA350–M Shelf in the Rear of the Cabinet

The HS1CP and associated write-back cache module mount in a BA350–M shelf. Each shelf supports up to two HS1CP modules, two write-back cache modules, and one or two shelf power supplies.

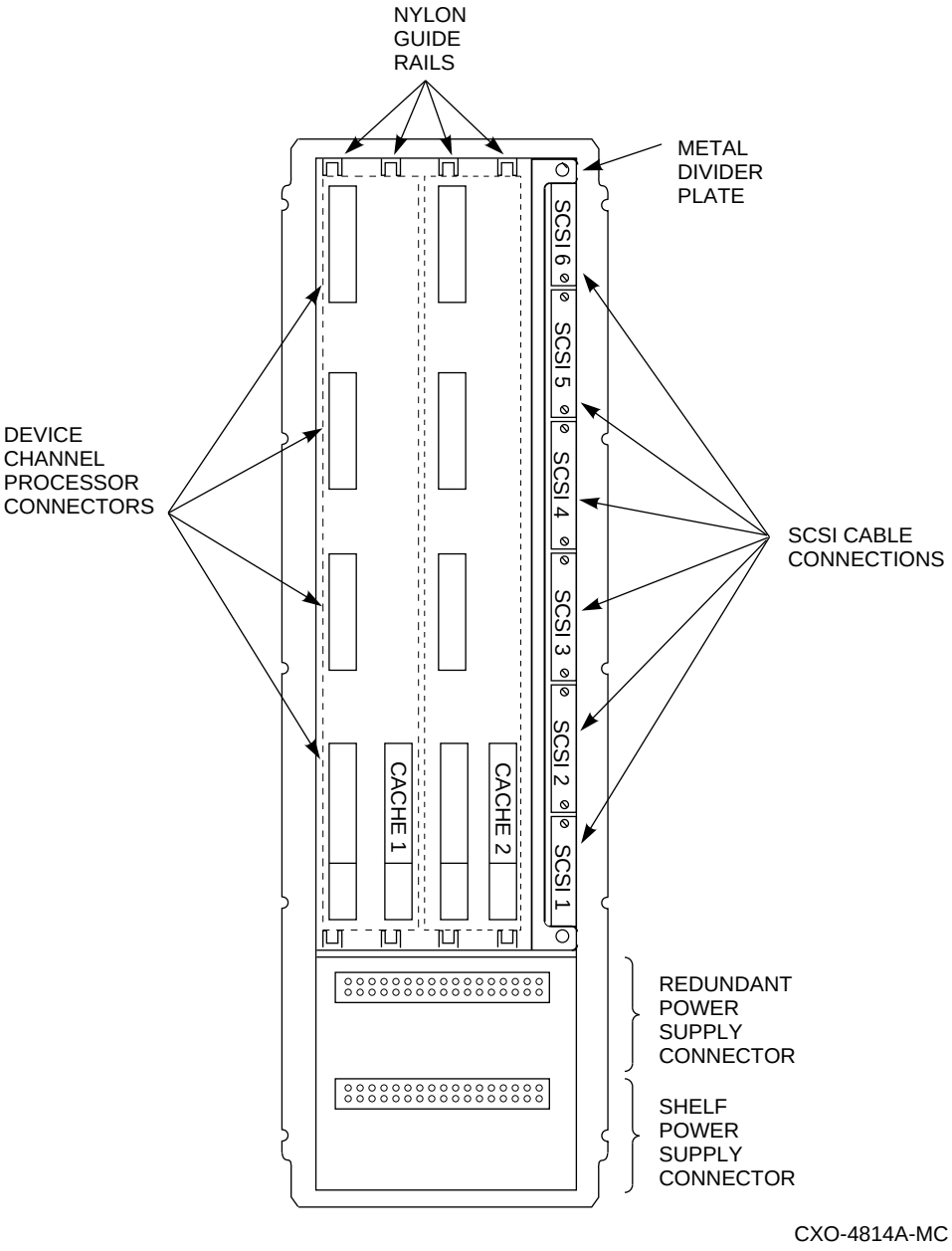
Section 3.7 describes how to install a BA350–M shelf in the rear of the SW800-Series cabinet.

Note

The second BA350–M shelf must be installed upside-down in the back of the SW800 cabinet (refer to Figure 7–1).

The shelf is installed upside-down so the SCSI–2 cable connectors are next to the BA35*x*–S storage shelves. This simplifies cabling routing; the routing will mirror that from the front BA350–M shelf.

Figure 7–1 Rear BA350–M Shelf Layout (Upside-down)



7.7 Installing BA350–M Shelf SCSI Cables

Section 3.8 describes how to install the SCSI cabling in the BA350–M shelf.

7.8 Installing Two HS1CP Device Channel Processors and 32 MB Write-Back Cache Modules into Second BA350–M Shelf

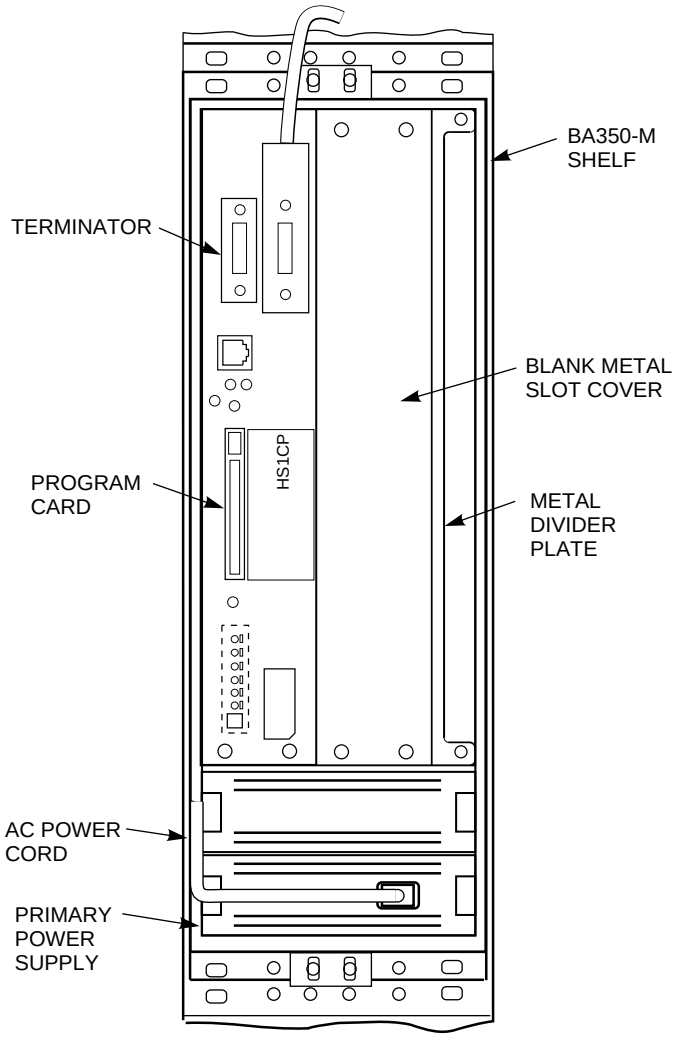
Follow the procedures in Section 3.9 through Step 5 only to install the *first* HS1CP device channel processor and 32 MB write-back cache module into the second (rear) BA350–M shelf.

Follow the procedures in Section 6.12 to install the *second* HS1CP device channel processor and 32 MB write-back cache module into the second (rear) BA350–M shelf.

Note

The rear BA350–M shelf has been installed upside-down so now slot 7 is on the *left* side and slot 6 is on the *right* side. Figure 7–2 shows the first HS1CP device channel processor installed in the rear BA350–M shelf. Notice that the internal bus cable runs *over the top* of the shelf housing.

Figure 7–2 Single HS1CP Device Channel Processor in the Rear BA350–M Shelf



7.9 Replacing Original FDDI Adapter in Each Server Processor with New FDDI Adapter

Note

The HS241–AX upgrade involves removing the FDDI adapter card in EISA slot 2 (marked as FDDI ADAPTER (HS1XX) in Figure 4–2) and replacing it with a new card in PCI slot 3 (marked as FDDI ADAPTER (HS2XX)).

Follow the steps in Section 4.5 to replace the FDDI adapter card in each server processor.

7.10 Removing the Two Original Bus Adapters and Installing Four New Bus Adapters into Each Server Processor

Note

The HS241–AX upgrade involves removing the two bus adapter cards in EISA slots 7 and 8 (marked as HS1AD BUS ADAPTER (2) and HS1AD BUS ADAPTER (1), respectively, in Figure 4–2) and replacing them with four new cards in EISA slots 5, 6, 7, and 8 (marked as HS1AD BUS ADAPTER (4), HS1AD BUS ADAPTER (3), HS1AD BUS ADAPTER (2), and HS1AD BUS ADAPTER (1), respectively, in Figure 4–2).

Follow the steps in Section 4.5 to replace the *two* original bus adapter cards in each server processor with *four* new bus adapter cards in each server processor.

7.11 Installing Internal Bus Cables

Use the following procedure to connect internal bus cables from the four new bus adapters in each server processor to the four HS1CP device channel processors.

Figure 7–3 shows the logical "before" cabling diagram.

Figure 7–4 shows the front dual-redundant pair of HS1CP device channel processors with their four attached internal bus cables.

Figure 7–5 shows the logical "after" cabling diagram.

Figure 7–3 Cabling Diagram for HS221/121

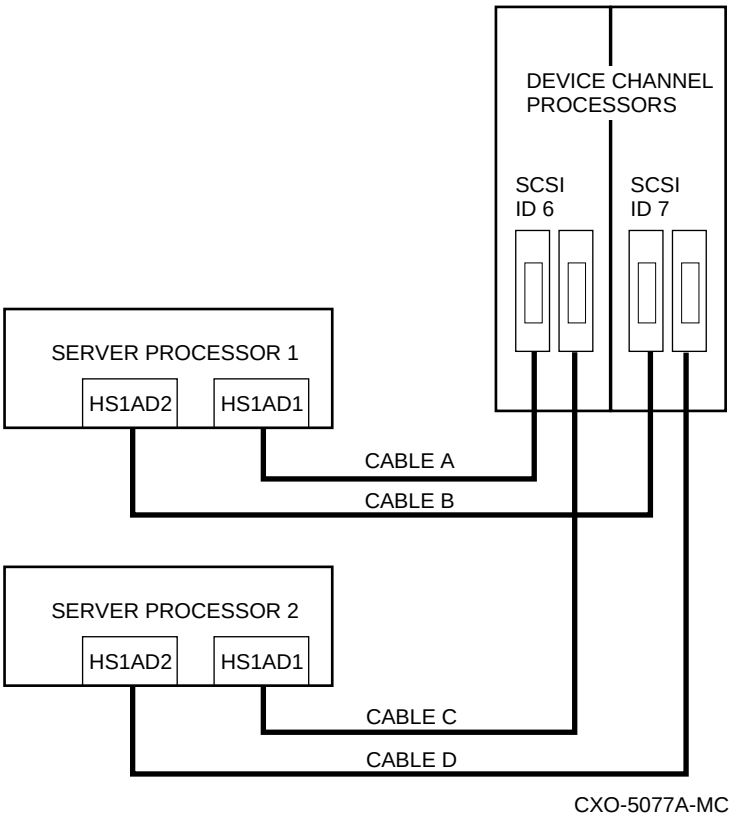


Figure 7–4 Device Channel Processor Installation

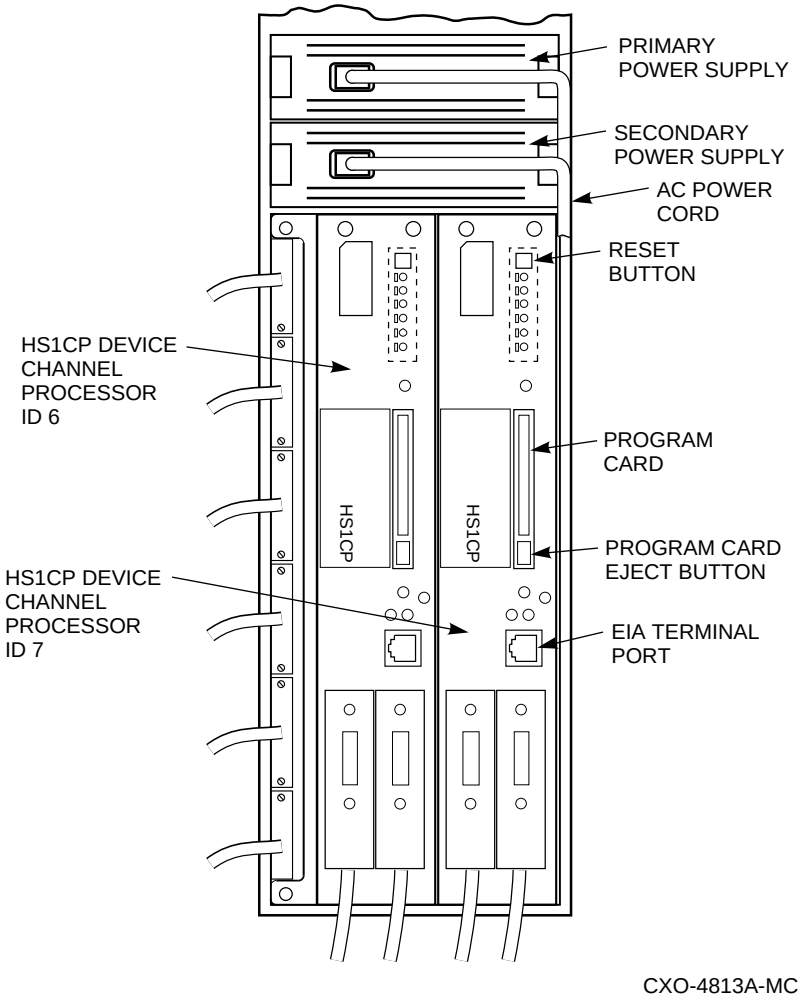
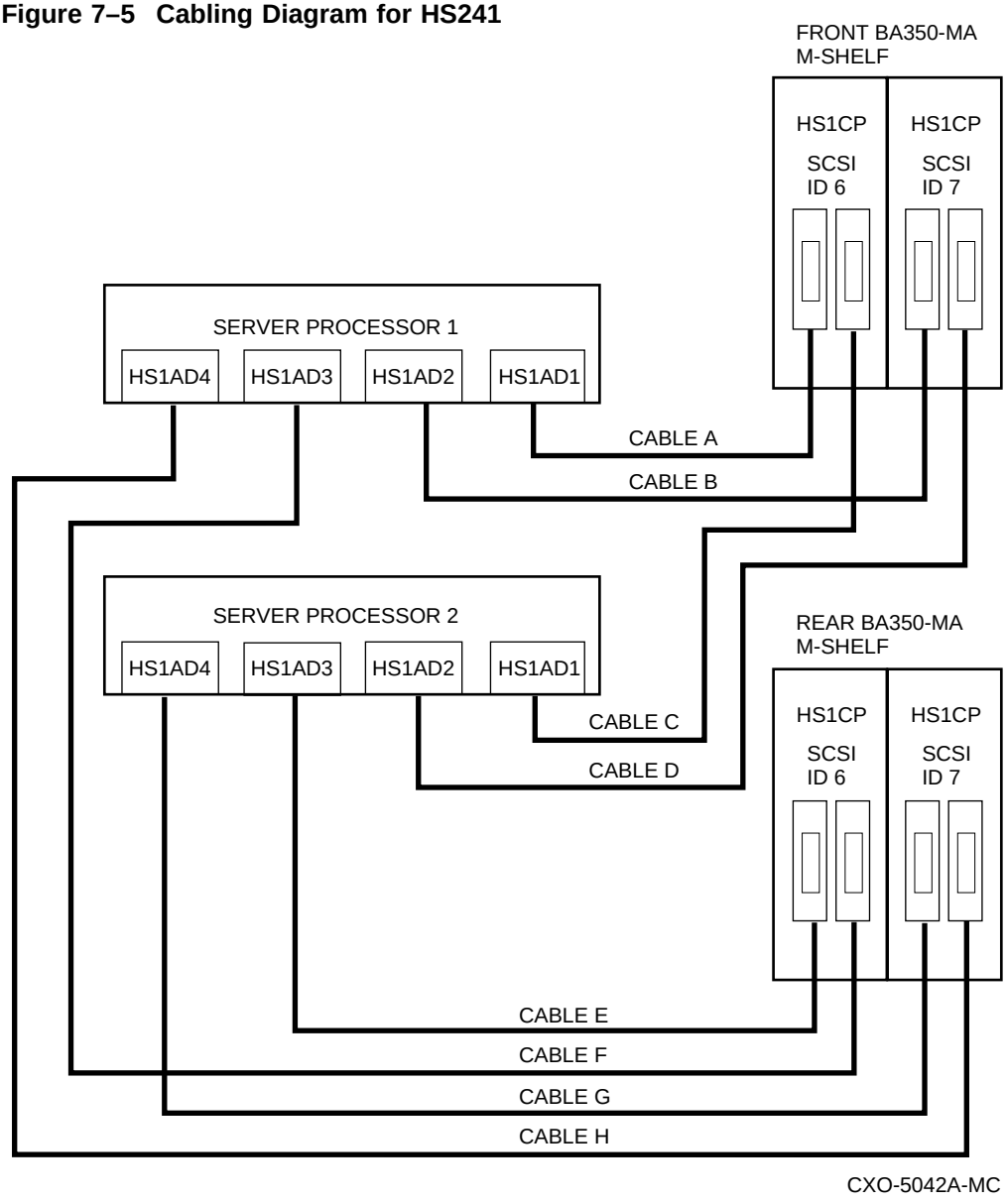
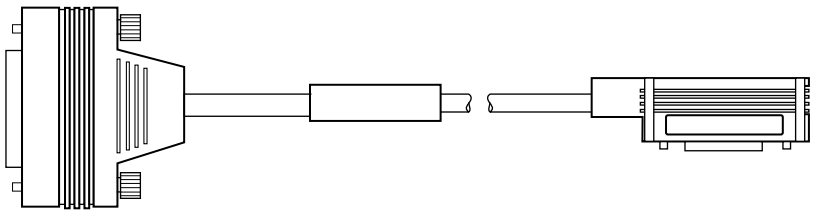


Figure 7–5 Cabling Diagram for HS241



Note

Figure 7–6 Internal Bus Cable Connectors



CXO-5044A-MC

Use the right-angle end of the internal bus cable to attach to the HS1CP device channel processor trilink connector (refer to the connector on the *right* in Figure 7–6).

Use the straight end of the internal bus cable to attach to the HS1AD device bus adapter (refer to the connector on the *left* in Figure 7–6).

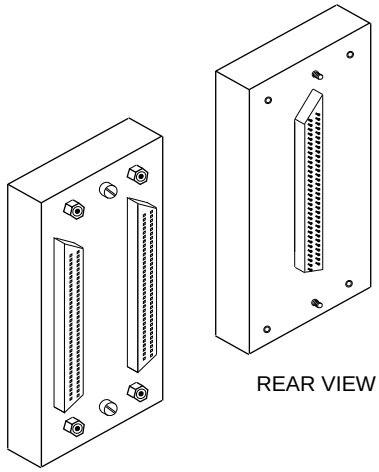
CAUTION

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 7–7) 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 7–7 Trilink Connector



Note

Exercise care that trilink connector pins are not bent or damaged when connecting an internal bus cable into a trilink connector.

1. Reattach the internal bus cable identified as Cable A in Figures 7–3 and 7–5 to the device bus adapter (labeled HS1AD1) in slot 8 of Server Processor 1.
2. Reattach the internal bus cable identified as Cable B in Figures 7–3 and 7–5 to the device bus adapter (labeled HS1AD2) in slot 7 of Server Processor 1.
3. Reattach the internal bus cable identified as Cable C in Figures 7–3 and 7–5 to the device bus adapter (labeled HS1AD1) in slot 8 of Server Processor 2.
4. Reattach the internal bus cable identified as Cable D in Figures 7–3 and 7–5 to the device bus adapter (labeled HS1AD2) in slot 7 of Server Processor 2.
5. Attach the internal bus cable identified as Cable E in Figure 7–5 from the *left* trilink connector in slot 6 of the rear HS1CP pair to the device bus adapter (labeled HS1AD3) in slot 6 of Server Processor 2.
6. Attach the internal bus cable identified as Cable F in Figure 7–5 from the *right* trilink connector in slot 6 of the rear HS1CP pair to the device bus adapter (labeled HS1AD3) in slot 6 of Server Processor 1.
7. Attach the internal bus cable identified as Cable G in Figure 7–5 from the *left* trilink connector in slot 7 of the rear HS1CP pair to the device bus adapter (labeled HS1AD4) in slot 5 of Server Processor 2.
8. Attach the internal bus cable identified as Cable H in Figure 7–5 from the *right* trilink connector in slot 7 of the rear HS1CP pair to the device bus adapter (labeled HS1AD4) in slot 5 of Server Processor 1.
9. Switch the circuit breakers on both CDUs to ON (|).
10. Depress power buttons on front of both server processors.

7.12 Setting the Initial Parameters for the First New HS1CP Device Channel Processor

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

1. Connect a terminal to the EIA terminal port of the new HS1CP device channel processor in slot 7 (rear BA350–M shelf) (see Section 6.15).
2. Set the HS1CP device channel processor node name:

```
CLI> SET THIS_CONTROLLER SCS_NODENAME="HS1CP3"
```

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

```
CLI> SET THIS_CONTROLLER PATH
```

4. Set the device channel processor identification:

```
CLI> SET THIS_CONTROLLER ID=3
```

5. Set the prompt:

```
CLI> SET THIS_CONTROLLER PROMPT="HS1CP3"
```

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.

7.13 Installing the Write-Back Cache License for the First New HS1CP Device Channel Processor

Section 3.15 describes how to install a new *license key* for the write-back cache feature for the first new HS1CP device channel processor.

Note

The prompt and screen identifier for the new device channel processor will be HS1CP3>.

7.14 Setting the Initial Parameters for the Second New HS1CP Device Channel Processor

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

1. Connect a terminal to the EIA terminal port of the new HS1CP device channel processor in slot 6 (rear BA350–M shelf) (see Section 6.15).
2. Set the HS1CP device channel processor node name:

```
CLI> SET THIS_CONTROLLER SCS_NODENAME="HS1CP4"
```

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

```
CLI> SET THIS_CONTROLLER PATH
```

4. Set the device channel processor identification:

```
CLI> SET THIS_CONTROLLER ID=4
```

5. Set the prompt:

```
CLI> SET THIS_CONTROLLER PROMPT="HS1CP4"
```

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.

7.15 Installing the Write-Back Cache License for the Second New HS1CP Device Channel Processor

Section 3.15 describes how to install a new *license key* for the write-back cache feature for the second new HS1CP device channel processor.

Note

The prompt and screen identifier for the new device channel processor will be HS1CP4>.

7.16 Configuring Storage for the New HS1CP Device Channel Processors

To configure storage for a new dual-redundant pair of HS1CP device channel processors, follow all the steps in Section 3.18 except the following:

- Since you are directly connected to the HS1CP, only perform Step 6 in Section 3.18.2.
- Do not execute Section 3.18.5 at this time.

7.17 Replacing Cabinet Panels

After all hardware has been installed, replace the cabinet side panels (if removed) **before** reapplying power to the FDDI Server. To replace the cabinet panels, reverse the steps in Section 3.3.

7.18 Running the EISA Configuration Utility for Each Server Processor

Do the following for each server processor:

1. Follow the instructions in Section 3.16 to connect a terminal to the server processor before starting the next step.
2. Follow the instructions in Section 4.10 to restart the server processor.

3. Run the EISA Configuration Utility and verify the FDDI adapter option installation in the server processor as described in Section 4.13.

Note

Set all four device bus adapters in one server processor to SCSI ID 7 and in the second server processor to SCSI ID 6.

Replace the example in Step 7 in Section 4.13 with the following example:

```
        Step 3: View or edit details

Slot 5 -- 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 6 -- 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

Slot 7 -- Digital device bus adapter internal bus EISA Host Adapter   Added

Host Adapter Interface..................Trigger EDGE
Host Adapter IRQ........................IRQ 13
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 12
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 one server processor contains one device bus adapter with a device ID of 7 and an IRQ of 15, a second device bus adapter with a device ID of 7 and an IRQ of 14, a third device bus adapter with a device ID of 7 and an IRQ of 13, and a fourth device bus adapter with a device ID of 7 and an IRQ of 12. The second server processor will have the same range of IRQs for the device bus adapters but the device IDs will all be 6.

7.19 Verifying the Installation

Sections 7.19.1 and 7.19.2 describe the procedures for verifying the hardware installation.

7.19.1 Verifying Your Bus Adapter Installation

Use the following procedure to verify your installation of the HS1AD device bus adapters for each server processor:

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

```
Firmware
SRM Console:    V3.0-12
ARC Console:    4.26
PALcode:        VMS PALcode X5.48-101, OSF PALcode X1.35-66
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 5   DEC2E00
     Slot 6   DEC2E00
     Slot 7   DEC2E00
     Slot 8   DEC2E00
```

2. If your newly installed HS1AD device bus adapters appear in slots 5 through 8, your installation is successful.

   If slots 5-8 do not display on your terminal screen, the missing HS1AD device bus adapter is not being recognized by the server processor. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual*.

7.19.2 Verifying Server Processor and HS1CP Installation

Use the procedures below to ensure the server processor and HS1CP recognize the new hardware correctly:

Note

Do the following for *each* server processor.

1. The following display is an example of what you should see after typing SHOW DEVICE at the >>> prompt, if you have not set your storage devices to preferred and if you have not set BUS_PROBE_ALGORITHM to NEW.

```
>>>SHO DEV
dka0.0.0.6.0             DKA0                              RZ28  D41C
dka500.5.0.6.0           DKA500                           RRD43  0064
due1100.2.0.5.1          $13$DUA1100 (HS1CP2)               HSX0
due1110.2.0.5.1          $13$DUA1110 (HS1CP2)               HSX0
   .
   .
   .
due1600.2.0.5.1          $13$DUA1600 (HS1CP2)               HSX0
duf1100.1.0.6.1          $13$DUA1100 (HS1CP1)               HSX0
duf1110.1.0.6.1          $13$DUA1110 (HS1CP1)               HSX0
   .
   .
   .
duf1600.1.0.6.1          $13$DUA1600 (HS1CP1)               HSX0
dug110.4.0.7.1           $13$DUA110 (HS1CP4)                HSX0
dug150.4.0.7.1           $13$DUA150 (HS1CP4)                HSX0
   .
   .
   .
dug620.4.0.7.1           $13$DUA620 (HS1CP4)                HSX0
duh110.3.0.8.1           $13$DUA110 (HS1CP3)                HSX0
duh150.3.0.8.1           $13$DUA150 (HS1CP3)                HSX0
   .
   .
   .
duh620.3.0.8.1           $13$DUA620 (HS1CP3)                HSX0
dva0.0.0.0.1             DVA0
erb0.0.0.3.1             ERB0              08-00-2B-BD-86-35
fwa0.0.0.11.0            FWA0              08-00-2B-B2-9C-49
pka0.7.0.6.0             PKA0                  SCSI Bus ID 7
pue0.7.0.5.1             PAE0                  DSSI Bus ID 7
puf0.7.0.6.1             PAF0                  DSSI Bus ID 7
pug0.7.0.7.1             PAG0                  DSSI Bus ID 7
puh0.7.0.8.1             PAH0                  DSSI Bus ID 7
```

By not setting a preferred path, the same device will appear in the display for each HS1CP Device Channel Processor which can see it. For example, DUE1100 and DUF1100 are the same device but DUE1100 is seen through HS1CP2 and DUF1100 is seen through HS1CP1.

By not executing the SET BUS_PROBE_ALGORITHM NEW command, your SCSI storage devices will appear with labels DUE, DUF, DUG, and DUH in the first display column rather than the more common DUA, DUB, DUC, and DUD.

2. If BUS_PROBE_ALGORITHM is set to NEW, then device names in the first display column will be DUA, DUB, and so forth, rather than the unusual DUE, DUF, and so forth.

   To invoke the BUS_PROBE command simply perform the two following steps:

```
>>>SET BUS_PROBE_ALGORITHM NEW
>>>INIT
*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.0-15, built on Jul 27 1995 at 15:45:08
>>>
```

3. The setting of preferred path ensures that a device will only appear once in the display; the device will be associated with the HS1CP device channel processor to which it has been preferred.

Storage configuration information similar to the following will be displayed after setting the storage devices to a preferred path and having executed the SET BUS_PROBE_ALGORITHM NEW command. See Section 10.6 for setting the preferred path and balancing the I/O load.

```
>>>SHO DEVICE
dka0.0.0.6.0              DKA0                            RZ28  D41C
dka500.5.0.6.0            DKA500                         RRD43  0064
dua1100.2.0.1005.0        $13$DUA1100 (HS1CP2)              HSX0
dua1200.2.0.1005.0        $13$DUA1200 (HS1CP2)              HSX0
   .
   .
   .
dua1610.2.0.1005.0        $13$DUA1610 (HS1CP2)              HSX0
dub1110.1.0.1006.0        $13$DUA1110 (HS1CP1)              HSX0
dub1120.1.0.1006.0        $13$DUA1120 (HS1CP1)              HSX0
   .
   .
   .
dub1640.1.0.1006.0        $13$DUA1640 (HS1CP1)              HSX0
duc110.4.0.1007.0         $13$DUA110 (HS1CP4)               HSX0
duc130.4.0.1007.0         $13$DUA130 (HS1CP4)               HSX0
   .
   .
   .
duc620.4.0.1007.0         $13$DUA620 (HS1CP4)               HSX0
dud100.3.0.1008.0         $13$DUA100 (HS1CP3)               HSX0
dud120.3.0.1008.0         $13$DUA120 (HS1CP3)               HSX0
   .
   .
   .
dud630.3.0.1008.0         $13$DUA630 (HS1CP3)               HSX0
dva0.0.0.0.1              DVA0
era0.0.0.1003.0           ERA0              08-00-2B-BD-86-35
fwa0.0.0.11.0             FWA0              08-00-2B-B2-9C-49
pka0.7.0.6.0              PKA0                  SCSI Bus ID 7
pua0.7.0.1005.0           PAA0                  DSSI Bus ID 7
pub0.7.0.1006.0           PAB0                  DSSI Bus ID 7
puc0.7.0.1007.0           PAC0                  DSSI Bus ID 7
pud0.7.0.1008.0           PAD0                  DSSI Bus ID 7
```

Verify that all HS241 FDDI Server storage units, stripesets, and RAIDsets appear in the resultant display. If any storage devices are missing, return to CFMENU per Section 3.18.2 and confirm the configuration. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual* if you still have configuration problems.

This completes the verification of the hardware installation.

7.20 Booting Both Server Processors

For each server processor in turn, type BOOT at the >>> prompt.

This action causes each server processor to boot from the system disk and join the VMScluster.

The booting of the second server processor completes the installation of the HS241 FDDI Server.

Now perform the procedure in Section 3.18.5 to save your storage configuration setup.

7.21 Verifying VMScluster Membership

Use the following procedure to verify that the HS241 FDDI Server is correctly integrated into the VMScluster environment:

1. Enter the SHOW CLUSTER command on the terminal that is connected to one of the server processors. A display similar to the example below (see Figure 7–8) can be used to verify that both nodes of the HS241 FDDI Server have joined the VMScluster.

Figure 7–8 Example Cluster Information

```
View of Cluster from Node: FSERV1                    20-OCT-1995  10:51:09
```

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
FSERV2	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
NODE03	VMS V6.2	MEMBER
NODE04	VMS V6.2	MEMBER
HS1CP1	HSD V25F	
HS1CP2	HSD V25F	
HS1CP3	HSD V25F	
HS1CP4	HSD V25F	

2. Enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see both nodes of the HS241 FDDI Server.
3. Enter the SHOW DEVICE command to ensure the HS241 is serving storage to the clients. All storage units, stripesets, and RAIDsets should appear in the resultant display.
4. If any nodes in the VMScluster were shut down during the console code upgrade because they were booted through a served system disk on the original HS121 FDDI Server, now is the time to bring them back online, as follows:
   a. At each of the served nodes, enter the boot command at the >>> prompt:

      ```
      >>>BOOT
      ```

   b. At the DCL $ prompt on any of the served nodes, enter the SHOW DEVICE and SHOW CLUSTER commands to verify that the served nodes have rejoined the VMScluster and can see the server.

7.22 Supporting and Operating the StorageWorks FDDI Server

Once the model HS241 StorageWorks FDDI Server has been installed, you may want to perform various system management tasks to customize the system. See Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

8

HS221 to HS241 Upgrade Procedure

This chapter provides step-by-step procedures for installing the HS241–BX upgrade kit.

8.1 Purpose of This Upgrade

A customer who desires more performance and would like the increased storage capacity provided by the model HS241 FDDI Server could purchase an HS241–BX kit and upgrade an existing model HS221 FDDI Server for less cost than purchasing a new HS241 FDDI Server.

The HS241–BX upgrade kit provides all the components for upgrading a model HS221 StorageWorks FDDI Server to a model HS241 StorageWorks FDDI Server. The following sections provide information about the upgrade kit and how to perform the upgrade.

8.2 HS241–BX Upgrade Kit Description

The main components of the HS241–BX upgrade kit are as follows:

- Four HS1AD bus adapters
- Two HS1CP device channel processors, each with a 32 MB write-back cache module
- OpenVMS Alpha operating system software Version 6.2 (or later) CD–ROM

When you receive your HS241–BX 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.

8.3 Preparing the HS221 FDDI Server for Upgrade

Note

Any node in the VMScluster system whose system disk is served through either node of this FDDI Server also should be shut down since this upgrade procedure requires shutting down both server processors at the same time. Shut down any served nodes before shutting down the server processors in this FDDI Server.

Do the following for each server processor in turn:

- Follow the instructions in Section 6.3.1 to shut down the system and power off the server processor.

8.4 Preparing the Cabinet for Upgrade

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.

When additional storage devices are being added, Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables. See Section 3.3, steps 2 through 10 for removing the cabinet panels.

Ensure that there is sufficient space in front and behind the cabinet to slide the server processors all the way forward and to the rear. See Figure 2–2 for specific space requirements.

8.5 Installing BA35*x*–S Storage Shelves in the Rear of the Cabinet

Use the procedure in Section 3.6 to install BA35*x*–S storage shelves in the rear of the SW800-series cabinet.

8.6 Installing BA350-M Shelf in the Rear of the Cabinet

The HS1CP and associated write-back cache module mount in a BA350–M shelf. Each shelf supports up to two HS1CP modules, two write-back cache modules, and one or two shelf power supplies.

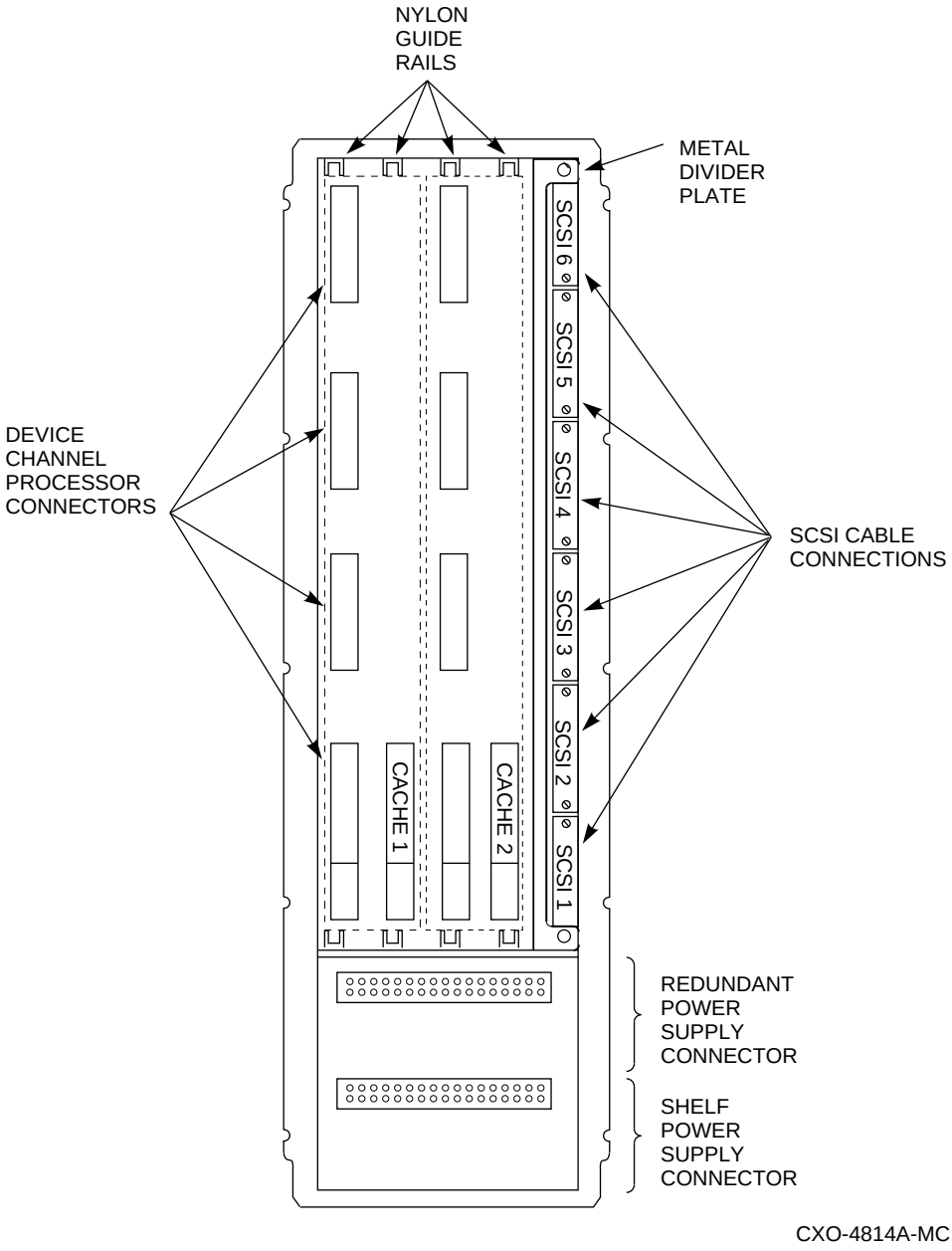
Use the procedure in Section 3.7 to install a BA350–M shelf in the rear of the SW800-series cabinet.

Note

The second BA350–M shelf must be installed upside-down in the back of the SW800 cabinet (refer to Figure 8–1).

The shelf is installed upside-down so the SCSI–2 cable connectors are next to the BA35*x*–S storage shelves. This simplifies cabling routing; the routing will mirror that from the front BA350–M shelf.

Figure 8–1 Rear BA350–M Shelf Layout (Upside-down)



8.7 Installing BA350-M Shelf SCSI Cables

Section 3.8 describes how to install the SCSI cabling in the BA350–M shelf.

8.8 Installing Two HS1CP Device Channel Processors and 32 MB Write-Back Cache Modules into Newly Installed BA350-M Shelf

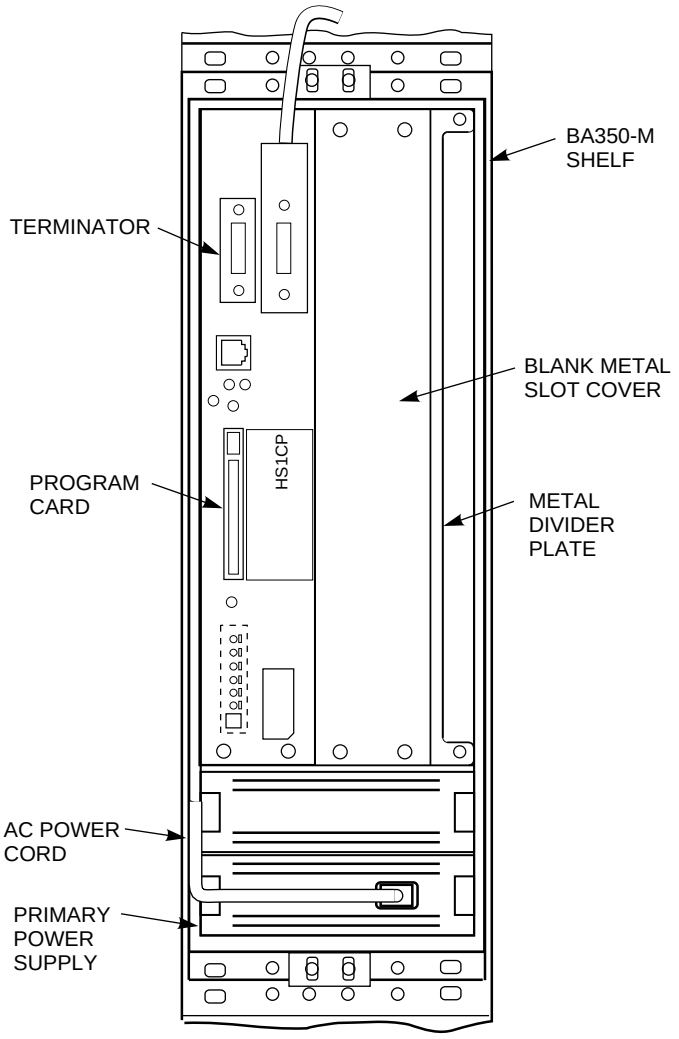
Follow the procedures in Section 3.9 through Step 5 only to install the *first* HS1CP device channel processor and 32 MB write-back cache into the second (rear) BA350–M shelf.

Follow the procedures in Section 6.12 to install the *second* HS1CP device channel processor and 32 MB write-back cache into the second (rear) BA350–M shelf.

Note

The rear BA350–M shelf has been installed upside-down so now slot 7 is on the *left* side and slot six is on the *right* side. Figure 8–2 shows the first HS1CP device channel processor installed in the rear BA350–M shelf. Notice that the internal bus cable runs *over the top* of the shelf housing.

Figure 8–2 Single HS1CP Device Channel Processor in the Rear BA350–M Shelf



8.9 Installing Two New Bus Adapters into Each Server Processor

Note

The HS241–BX upgrade involves installing two new bus adapter cards in each server processor. These cards should be located in EISA slots 5 and 6 (marked as "HS1AD BUS ADAPTER (4)" and "HS1AD BUS ADAPTER (3)", respectively, in Figure 4–2).

Follow the steps in Section 4.5 to install two new bus adapters into each server processor.

8.10 Installing Internal Bus Cables from the Newly Installed Bus Adapters in Each Server Processor to the Newly Installed HS1CP Device Channel Processors

Follow the steps in Section 7.11 to connect internal bus cables from the four bus adapters in each server processor to the four HS1CP device channel processors.

8.11 Initializing the New HS1CP Device Channel Processors

Perform the following steps to set the initial parameters and install the write-back cache license key for *each* of the new HS1CP device channel processors in the rear BA350–M shelf.

1. Set the initial parameters of HS1CP device channel processor in slot 7 (see Section 7.12).
2. Install a new *license key* for the write-back cache feature (see Section 3.15).
3. Set the initial parameters of HS1CP device channel processor in slot 6 (see Section 7.14).
4. Install a new *license key* for the write-back cache feature (see Section 3.15).

Note

The prompt and screen identifiers for the new device channel processors will be HS1CP3> and HS1CP4> instead of HS1CP1> and HS1CP2>.

8.12 Configuring Storage for the New HS1CP Device Channel Processors

To configure storage for a new dual-redundant pair of HS1CP device channel processors, follow all the steps in Section 3.18 except the following:

- Since you are directly connected to the HS1CP, only perform Step 6 in Section 3.18.2.
- Do not execute Section 3.18.5 at this time.

8.13 Replacing Cabinet Panels

After all hardware has been installed, replace the cabinet side panels (if removed) **before** reapplying power to the FDDI Server. To replace the cabinet panels, reverse the steps in Section 3.3.

8.14 Running the EISA Configuration Utility for Each Server Processor

Do the following for each server processor:

1. Connect a terminal to the server processor before starting the next step (see Section 3.16).
2. Follow the instructions in Section 4.10 to restart the server processor.

3. Run the EISA Configuration Utility and verify the FDDI adapter option installation in the server processor as described in Section 4.13.

Note

Set all four device bus adapters in one server processor to SCSI ID 7 and in the second server processor to SCSI ID 6.

Replace the example in Step 7 in Section 4.13 with the following example:

```
        Step 3: View or edit details

Slot 5 -- 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 6 -- 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

Slot 7 -- Digital device bus adapter internal bus EISA Host Adapter   Added

Host Adapter Interface..................Trigger EDGE
Host Adapter IRQ........................IRQ 13
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 12
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 one server processor contains one device bus adapter with a device ID of 7 and an IRQ of 15, a second device bus adapter with a device ID of 7 and an IRQ of 14, a third device bus adapter with a device ID of 7 and an IRQ of 13, and a fourth device bus adapter with a device ID of 7 and an IRQ of 12. The second server processor will have the same range of IRQs for the device bus adapters but the device IDs will all be 6.

8.15 Verifying the Installation

Sections 8.15.1 and 8.15.2 describe the procedures for verifying the hardware installation.

8.15.1 Verifying Your Bus Adapter Installation

Follow the instructions in Section 7.19.1 to verify hardware installation.

Note

Since this installation procedure does not replace the HS1AD device bus adapters in slots 7 and 8 in each server processor, the only addition to the HS221 SHOW CONFIG display will be the addition of slots 5 and 6 to the HS241 SHOW CONFIG display. If these newly installed device bus adapters appear in slots 5 and 6, your installation is successful.

If slots 5 through 8 do not display on your terminal screen, the missing HS1AD device bus adapter is not being recognized by the server processor. Consult the *StorageWorks Solutions StorageWorks FDDI Server Service Manual*.

8.15.2 Verifying Server Processor and HS1CP Installation

Follow the instructions in Section 7.19.2 for each server processor to ensure the server processor and HS1CP recognize the new hardware correctly.

8.16 Booting Both Server Processors

For each server processor in turn, enter BOOT at the >>> prompt.

This action causes the server processor to boot from the system disk and join the VMScluster.

The booting of the second server processor completes the installation of the HS241 FDDI Server.

Now perform the procedure Section 3.18.5 to save your storage configuration setup.

8.17 Verifying VMScluster Membership

Use the following procedure to verify that the HS241 FDDI Server is correctly integrated into the VMScluster environment:

1. Enter the SHOW CLUSTER command on the terminal that is connected to one of the server processors. A display similar to the example below (see Figure 8–3) can be used to verify that the both nodes of the HS241 FDDI Server have joined the VMScluster.

Figure 8–3 Example Cluster Information

View of Cluster from Node: FSERV1 20-OCT-1995 10:51:09

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
FSERV2	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
NODE03	VMS V6.2	MEMBER
NODE04	VMS V6.2	MEMBER
HS1CP1	HSD V25F	
HS1CP2	HSD V25F	
HS1CP3	HSD V25F	
HS1CP4	HSD V25F	

2. Enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see both nodes of the HS241 FDDI Server.
3. Enter the SHOW DEVICE command to ensure the HS241 is serving storage to the clients. All storage units, stripesets, and RAIDsets should appear in the resultant display.
4. If any nodes in the VMScluster were shut down during the console code upgrade because they were booted through a served system disk on the original HS221 FDDI Server, now is the time to bring them back online, as follows:
   a. At each of the served nodes, enter the boot command at the >>> prompt:

      ```
      >>>BOOT
      ```

   b. At the DCL $ prompt on any of the served nodes, enter the SHOW DEVICE and SHOW CLUSTER commands to verify that the served nodes have reentered the VMScluster and can see the server.

8.18 Supporting and Operating the StorageWorks FDDI Server

Once the model HS241 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 Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

9

HS280 Expansion Cabinet Installation Procedure

This chapter provides step-by-step procedures for attaching the HS280 expansion cabinet to an existing model HS241 StorageWorks FDDI Server.

9.1 Purpose of This Option

To double storage capacity, a customer with a model HS241 FDDI Server could purchase and install an HS280–AA expansion kit.

The HS280–AA expansion kit provides all the components for attaching a StorageWorks expansion cabinet to a model HS241 StorageWorks FDDI Server. The following sections provide information about the expansion kit and how to perform the installation.

9.2 HS280–AA Expansion Cabinet Kit Description

The main components of the HS280–AA expansion kit are as follows:

- SW800 cabinet with four HS1CP device channel processors, each with a 32 MB write-back cache module
- Four extra long internal bus cables

When you receive your HS280–AA 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.

9.3 HS280 Cabinet Thermal Stabilization

The HS280 expansion cabinet arrives packed in a corrugated carton attached to a wooden shipping pallet. Some cabinets are packaged in a plastic or barrier bag. If the cabinet arrives in a plastic bag, leave the bag in place until the cabinet has adjusted to the local temperature and humidity, as follows:

CAUTION

Failure to thermally stabilize storage subsystems may damage drive media or associated electronics when the unit is turned on. Environmental stabilization begins when the equipment is placed in the room in which it is to be installed.

- To ensure proper operation of Digital storage devices, the StorageWorks building block (SBB) temperature must be within 18°C to 29°C (65°F to 85°F).

Table 9–1 specifies the time required to thermally stabilize SBBs based on the ambient shipping temperature.

Table 9–1 Thermal Stabilization Specifications

Ambient Temperature Range °C	Ambient Temperature Range °F	Minimum Stabilization Time
60 to 66	140 to 151	3 hours
50 to 59	122 to 139	2 hours
40 to 49	104 to 121	1 hour
30 to 39	86 to 103	30 minutes
18 to 29	65 to 85	None
10 to 17	50 to 64	30 minutes
0 to 9	32 to 49	1 hour
–10 to –1	14 to 31	2 hours
–20 to –11	–4 to 13	3 hours
–30 to –21	–22 to –5	4 hours
–40 to –31	–40 to –21	5 hours

- If condensation *is visible* on the outside of the storage device, stabilize the device and the SBB in the operating environment for 6 hours or until the condensation is no longer visible, whichever is longer.
- If condensation *is not visible* on the outside of the storage device, thermally stabilize the device for the amount of time specified in Table 9–1.

9.4 Removing the Cabinet from the Pallet

WARNING

Three people are required to remove the cabinet from the shipping pallet. Failure to use sufficient personnel and correct safety precautions can result in injury and equipment damage. All personnel should wear safety glasses.

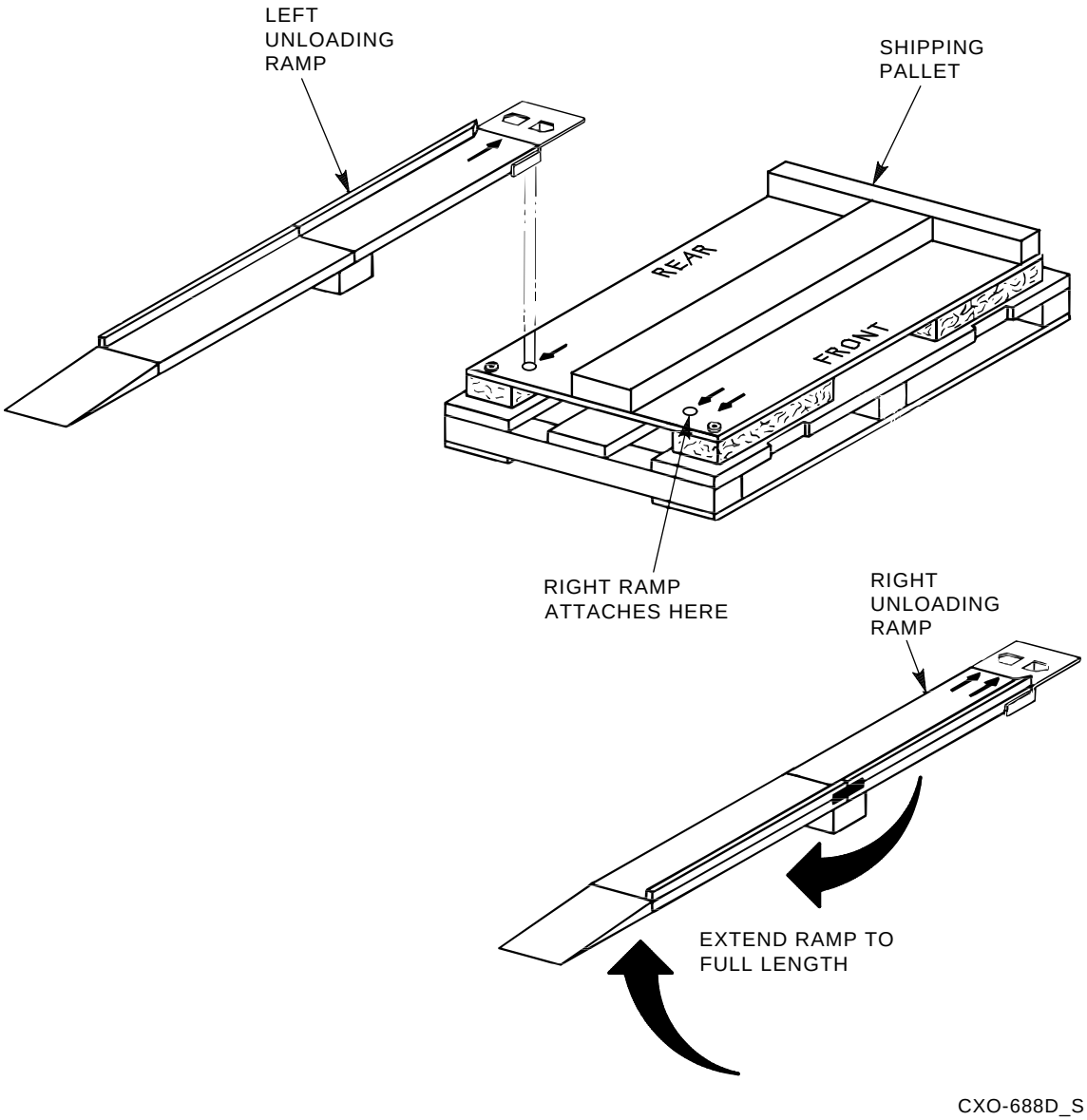
Use the following procedure to remove the cabinet from the shipping pallet:

1. Remove any packing material remaining on the pallet.
2. Remove and inspect the two unloading ramps. The ramps, ramp side rails, and metal hardware should be inspected for the following defects:
   - Cracks more than 25 percent of the ramp depth, either across or lengthwise on the ramp
   - Knots or knotholes going through the thickness of the ramp and greater than 50 percent of the ramp width
   - Loose, missing, or broken ramp side rails
   - Loose, missing, or bent metal hardware

   If any of these defects exist, do not use the ramp. Investigate alternate means of removing the cabinet or order a new ramp. (The part number for the ramp set is 99–08897–05.)

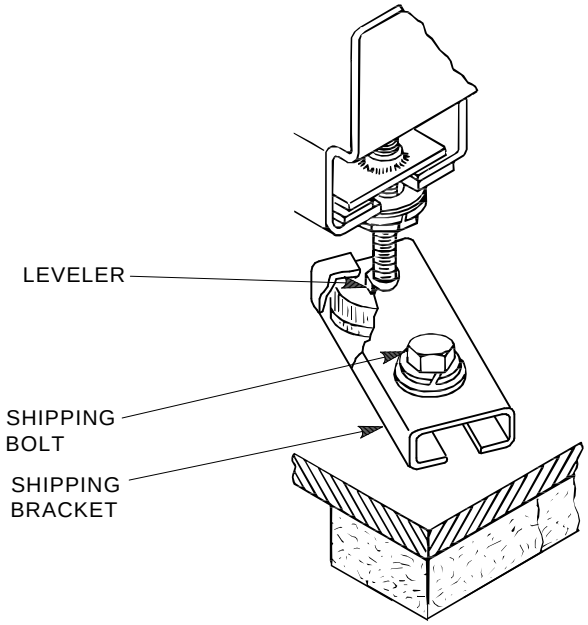
3. Attach the ramps by fitting the metal prongs into the holes on the pallet, as shown in Figure 9–1. Make sure that the arrows on the ramps match up with the arrows on the pallet.

Figure 9–1 Shipping Pallet Ramp Installation



4. Extend the ramps to their full length.
5. See Figure 9–2 for the location of the shipping bolts. Remove the bolts.

Figure 9–2 Shipping Bolts and Brackets

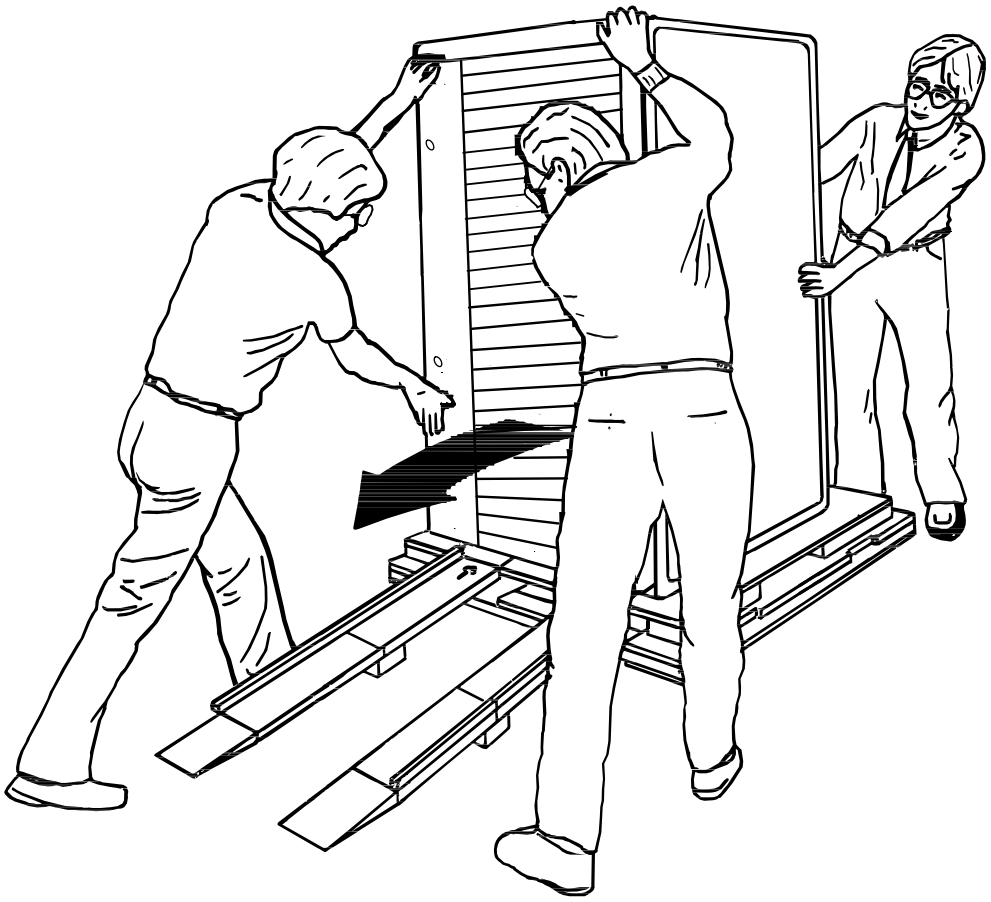


6. Remove the shipping brackets, shown in Figure 9–2, from the cabinet leveler feet and set aside.
7. Loosen the leveler locking nuts and screw the four cabinet leveler feet all the way up into the cabinet.

WARNING

The leveler feet must be raised fully for the cabinet to roll easily down the unloading ramps. Failure to do so can result in the cabinet tipping off the pallet or ramp.

Figure 9–3 Removing the Cabinet from the Pallet



CXO-3808A

8. Carefully roll the cabinet off the pallet and down the ramps to the floor as shown in Figure 9–3.

9.5 Placing the Cabinet

WARNING

Use extreme caution when rolling the cabinet across the floor. Failure to raise all leveler feet and to provide a clear path for the cabinet's casters can result in the cabinet tipping over and injury to personnel.

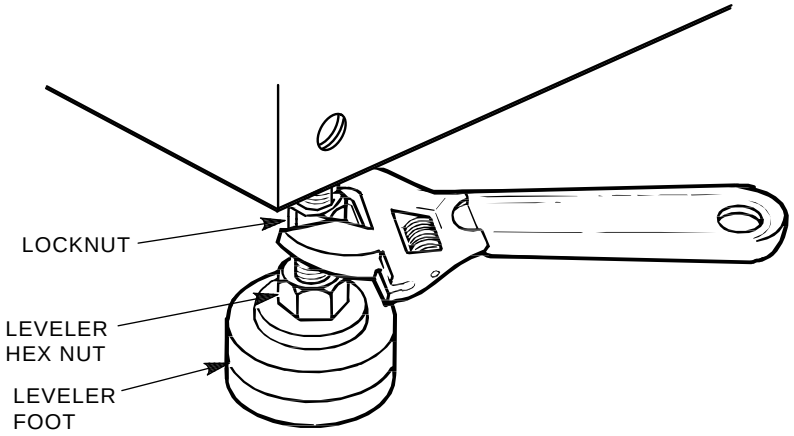
Once the cabinet has been removed from the pallet, the cabinet can be rolled to its final installation position. Secure loose cabinet cables up and out of the way when rolling the cabinet.

9.6 Leveling the Cabinet

Level the cabinet in its final position as follows:

1. Loosen the locknuts on all four leveler feet as shown in Figure 9–4.
2. Turn each leveler hex nut clockwise until the leveler foot contacts the floor.
3. Adjust all four leveler feet until the cabinet is level and the load is removed from all casters. Verify that the casters spin freely.
4. Tighten the locknuts on all four leveler feet.

Figure 9–4 Leveler Foot Adjustment



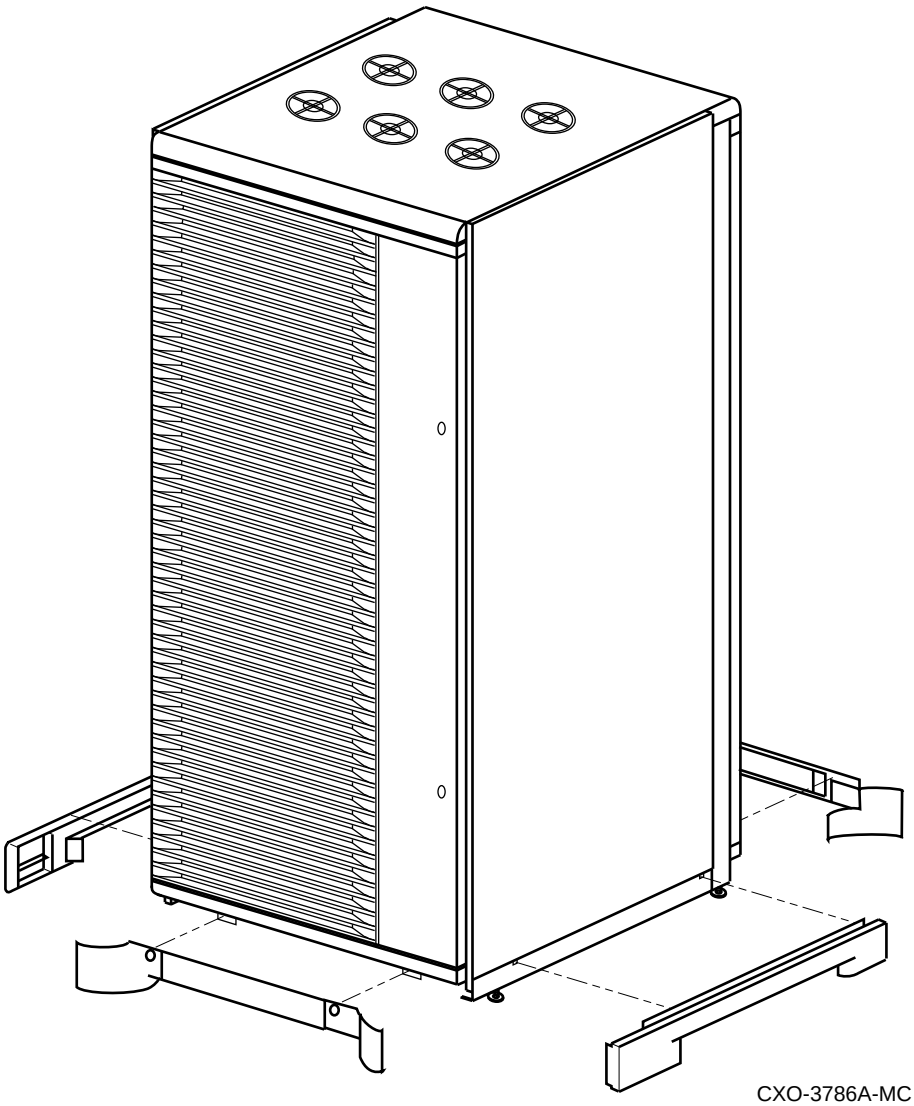
9.7 Installing the Skirt Kit

The skirt kit is packaged separately inside the corrugated carton with the cabinet. Installation of the skirt kit is optional. If you are installing the skirt kit, proceed as follows:

1. Unpack the skirt kit carton, using Figure 9–5 for reference, identify the right, left, front, and rear skirts.
2. Using Figure 9–5 for reference, position the skirts next to the cabinet.
3. The skirt fasteners are quarter-turn fasteners. Position each skirt against the cabinet such that the fasteners mate with the receptacles on the cabinet's base.
4. Using a screwdriver, push each fastener into its mating receptacle on the cabinet base, and turn it one quarter-turn clockwise.

   (Once the skirts are installed, there is a small amount of play that allows them to be adjusted slightly up or down for proper alignment.)

Figure 9–5 Cabinet Skirt Installation



9.8 Inspecting the Cabinet

Inspect the cabinet installation as follows:

1. Make sure that all four leveler feet are lowered to support the full weight of the cabinet and that the cabinet is level.
2. The remaining steps require access to the cabinet interior. To access the cabinet interior perform the following:
   a. 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.

b. Swing the doors open.

note

The following steps assume the side panels must be removed.

c. Move the cabinet away from adjacent cabinets.

d. Remove the side panels.

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.

e. 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.

f. Using two people, lift the top cover from the cabinet and set it aside.

g. Remove the bolts attaching the side panels to the top side rails of the cabinet.

h. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.

i. Repeat the previous step to remove the other panel.

3. Make sure that the circuit breaker on the CDUs is in the ◯ (OFF) position.
4. Make sure that all hardware within the cabinet is fastened securely, and that there are no loose pieces present in the cabinet interior.
5. Check each of the cabinet fans to make sure that the blades turn freely and are not obstructed.
6. Make sure that there are no obstructions to the airflow from the shelf blowers.
7. Check the identification label on the rear of the cabinet to verify that the cabinet is configured to accept the power available at the site.
8. Make sure that all ac power cords connected from the shelves and cabinet fans to the CDUs are firmly seated in their connectors at both ends.
9. Make sure that all SBBs are seated firmly in their shelves.
10. Make sure that any necessary external interface cables are installed and firmly seated in their connectors.
11. Replace the side panels and top cover by reversing the procedures described in step 2.

9.9 Preparing the HS241 Server for Upgrade

The following sections provide information for preparing the HS241 Server for the upgrade.

9.9.1 Shutting Down the System

Note

Any node in the VMScluster system whose system disk is served through either node of this FDDI Server also should be shut down, because this upgrade procedure requires shutting down both server processors at the same time. Shut down any served nodes before shutting down the server processors in this FDDI Server.

For each server processor in turn, follow the instructions in Section 6.3.1 to shut down the system and power off the server processor.

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.

9.9.2 Accessing Cabinet Interior

Open the front and rear cabinet doors. See Figure 2–2 for specific space requirements.

This installation procedure requires access to the front and rear HS1CP device channel processors and to the rear of the server processors.

9.10 Attaching the HS280 Expansion Cabinet to the HS241 FDDI Server

This section describes how to:

- Recable the connections between the HS1CPs and server processors in the HS241 (see Section 9.10.1
- Connect the HS1CPs in the HS280 cabinet to the server processors in the HS241 (see Section 9.10.2

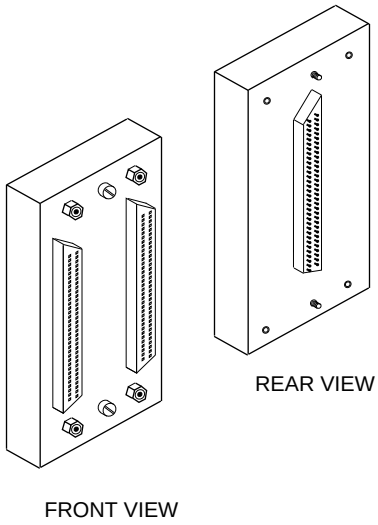
9.10.1 Recabling the Internal Bus Cables in the HS241

Use the following procedure to recable the connections between the HS1CPs and server processors in the HS241:

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.

Figure 9–6 Trilink Connector



Be aware that the trilink connector block (Figure 9–6) 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 9–7 shows the logical “before” cabling diagram.

Figure 9–8 shows the logical “after” cabling diagram.

1. Carefully detach all internal bus cables in the HS241 from the four bus adapters in each of the two server processors, except for the two cables labeled “Cable A” and “Cable B” in Figure 9–7.
2. Carefully detach four of the internal bus cables (C, D, E, and H) from the HS1CP device channel processors, leaving cables A, B, F, and G attached to the HS1CPs. See Figure 9–7.

Figure 9–7 Cabling Diagram for HS241

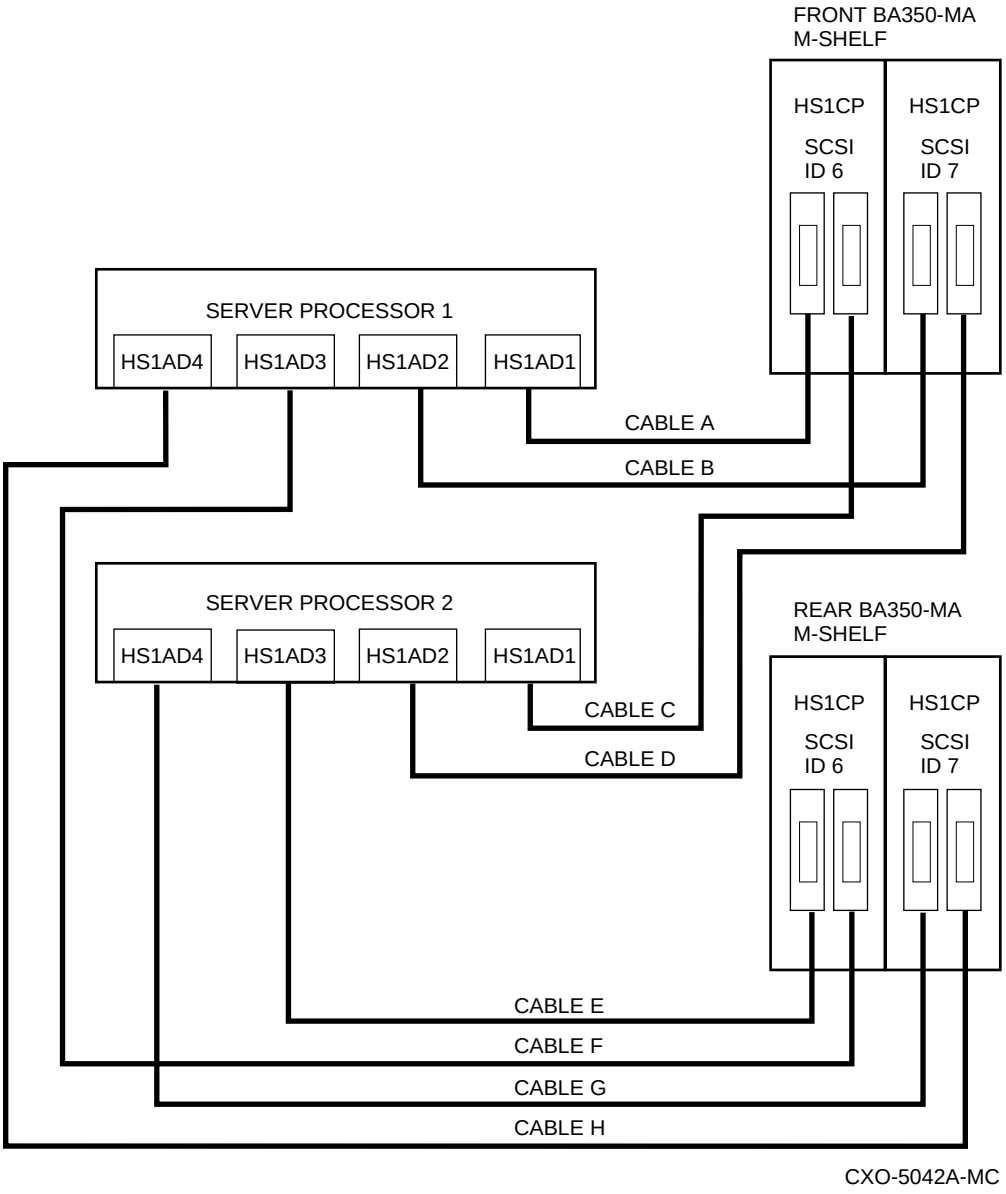
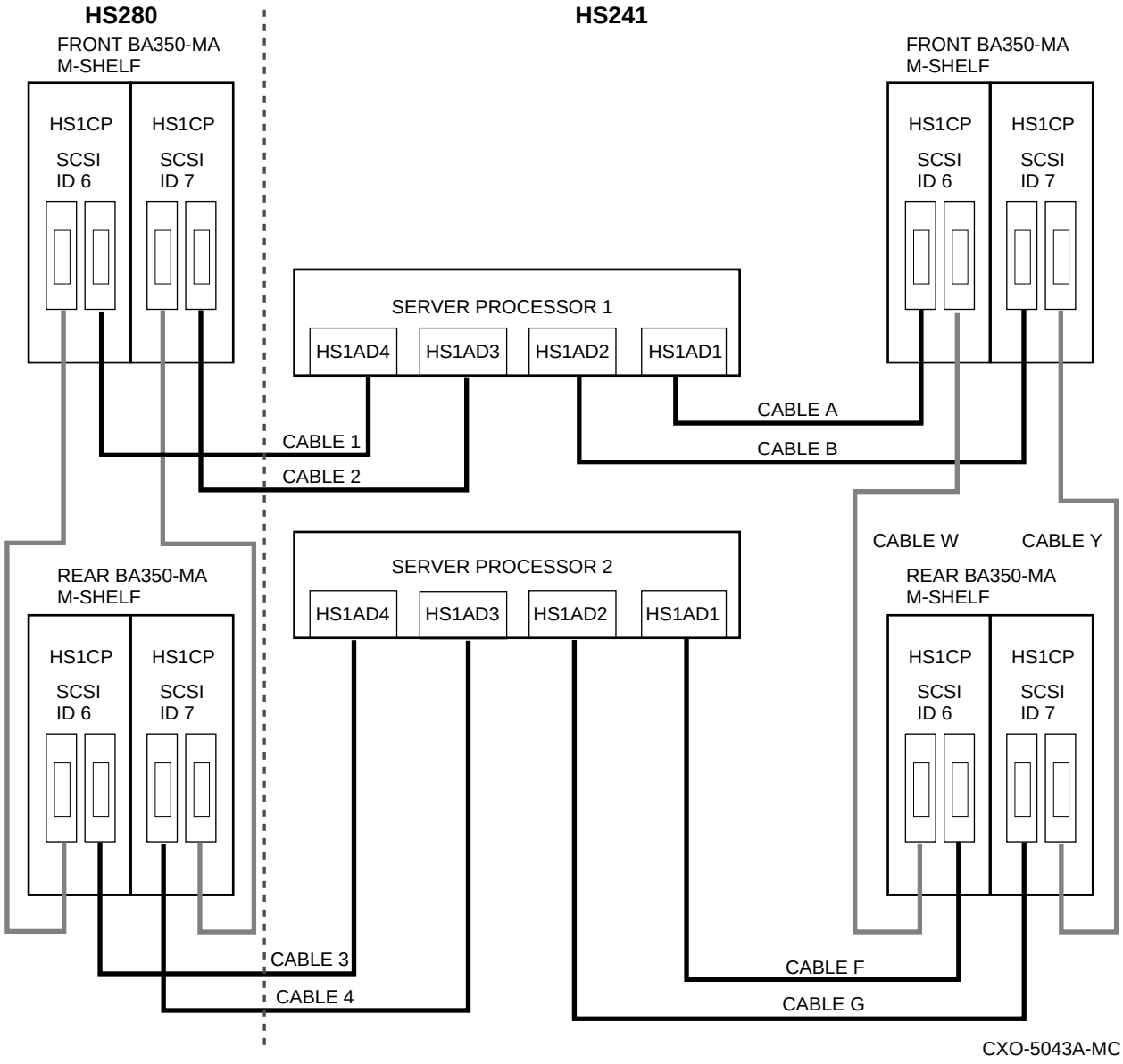
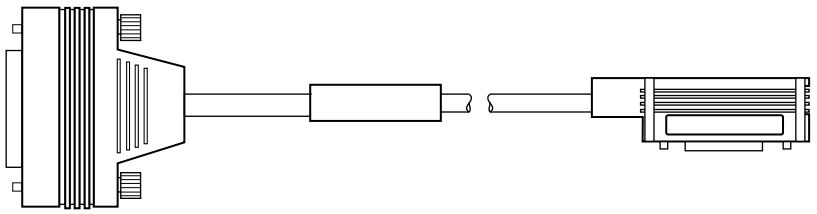


Figure 9–8 Cabling Diagram for HS241/HS280



Note

Figure 9–9 Internal Bus Cable Connectors



CXO-5044A-MC

Use the right-angle end of the internal bus cable to attach to the HS1CP device channel processor trilink connector (refer to the connector on the *right* in Figure 9–9).

Use the straight end of the internal bus cable to attach to the HS1AD device bus adapter (refer to the connector on the *left* in Figure 9–9).

Note

Exercise care that trilink connector pins are not bent or damaged when connecting an internal bus cable into a trilink connector.

3. Carefully reattach the internal bus cable identified as Cable F in Figure 9–8 from the *right* trilink connector in slot 6 of the rear HS1CP pair to the device bus adapter (labeled HS1AD1) in slot 8 of Server Processor 2.
4. Carefully reattach the internal bus cable identified as Cable G in Figure 9–8 from the *left* trilink connector in slot 7 of the rear HS1CP pair to the device bus adapter (labeled HS1AD2) in slot 7 of Server Processor 2.
5. Interconnect the HS1CP in slot 7 of the front BA350–M shelf to the HS1CP in slot 7 of the rear BA350–M shelf by attaching the right-angle cable connectors of the internal bus cable identified as Cable Y in Figure 9–8 into the open trilink connector of the HS1CPs.
6. Interconnect the HS1CP in slot 6 of the front BA350–M shelf to the HS1CP in slot 6 of the rear BA350–M shelf by attaching the right-angle cable connectors of the internal bus cable identified as Cable W in Figure 9–8 into the open trilink connector of the HS1CPs.

Note

These special cables, with right-angle connectors at each end of the cable, are shipped inside the HS280 cabinet and are found in a package on the floor of that cabinet.

9.10.2 Interconnecting the HS241 and the HS280

Use the following procedure to connect the HS1CPs in the HS280 cabinet to the server processors in the HS241.

Using the special, extra-long internal bus cables, carefully attach each HS1CP device channel processor in the HS280 cabinet to one bus adapter in the HS241 server processors, as follows:

1. Carefully attach the internal bus cable identified as Cable 1 in Figure 9–8 from the *right* trilink connector in slot 6 of the front HS1CP pair in the HS280 to the device bus adapter (labeled HS1AD4) in slot 5 of Server Processor 1 in the HS241.
2. Carefully attach the internal bus cable identified as Cable 2 in Figure 9–8 from the *right* trilink connector in slot 7 of the front HS1CP pair in the HS280 to the device bus adapter (labeled HS1AD3) in slot 6 of Server Processor 1 in the HS241.
3. Carefully attach the internal bus cable identified as Cable 3 in Figure 9–8 from the *right* trilink connector in slot 6 of the rear HS1CP pair in the HS280 to the device bus adapter (labeled HS1AD4) in slot 5 of Server Processor 2 in the HS241.
4. Carefully attach the internal bus cable identified as Cable 4 in Figure 9–8 from the *left* trilink connector in slot 7 of the rear HS1CP pair in the HS280 to the device bus adapter (labeled HS1AD3) in slot 6 of Server Processor 2 in the HS241.

   The cables interconnecting the front and rear BA350–M shelf HS1CP device channel processors in the HS280 were shipped correctly attached, as shown in Figure 9–8.
5. Switch the circuit breakers on both CDUs in the HS280 cabinet to ON (|).
6. Switch the circuit breakers on both CDUs in the HS241 cabinet to ON (|).

9.11 Configuring Storage for All Four HS1CP Device Channel Processor Dual-Redundant Pairs

Sections 9.11.1 and 9.11.2 describe the procedure for configuring the storage for the HS241/HS280.

9.11.1 Configuring Storage for the HS1CP Device Channel Processor Dual-Redundant Pairs in the HS241

Since the addition of the HS280 expansion cabinet has changed the storage configuration of the HS241 FDDI Server, both pairs of device channel processors in the HS241 must be reconfigured.

Perform the following procedure on the dual-redundant pairs of HS1CPs in the front BA350–M shelf and then repeat the procedure for the HS1CPs in the rear BA350–M shelf.

Note

Use the following table to identify the appropriate HS1CP device channel processor with the appropriate prompt in the reconfiguration process:

Table 9–2 Standard HS241/HS280 HS1CP Device Channel Processor Identification

BA350–M Shelf	Slot 7	Slot 6
HS241 Front	HS1CP1	HS1CP2
HS241 Rear	HS1CP3	HS1CP4
HS280 Front	HS1CP5	HS1CP6
HS280 Rear	HS1CP7	HS1CP8

1. Follow the instructions in Section 6.15 to connect a terminal to one of the HS1CP device channel processors in the dual-redundant pair.
2. Reconfigure the storage parameters of this HS1CP by following the steps in Section 3.18.

Note

Since you are directly connected to the HS1CP, only perform Step 6 in Section 3.18.2.

Do not execute Section 3.18.5 at this time.

3. Reconfigure the second device channel processor in the dual-redundant pair by following the steps in Section 6.19 to copy the storage configuration from the first HS1CP to the second HS1CP device channel processor in the same BA350–M shelf.

9.11.2 Configuring Storage for the HS1CP Device Channel Processor Dual-Redundant Pairs in the HS280

Repeat the procedure in Section 9.11.1 for each of the HS1CP device channel processor dual-redundant pairs in the HS280 expansion cabinet.

9.12 Rebooting Both Server Processors in the HS241

For each server processor in turn, type BOOT at the >>> prompt.

This action causes the server processor to boot from the system disk and join the VMScluster.

The booting of the second server processor completes the installation of the HS241 FDDI Server with HS280 expansion cabinet.

Now perform the procedure in Section 3.18.5 to save your storage configuration setup for each cabinet.

9.13 Verifying VMScluster Membership

Use the following procedure to verify that the HS241 FDDI Server with HS280 expansion cabinet is correctly integrated into the VMScluster environment:

1. Enter the SHOW CLUSTER command on the terminal that is connected to one of the server processors. A display similar to the example below (see Figure 8–3) can be used to verify that the both nodes of the HS241 FDDI Server have joined the VMScluster.

Note

For an HS241 FDDI Server with HS280 expansion cabinet, Figure 9–10 would list eight HS1CPs.

Figure 9–10 Example Cluster Information

```
View of Cluster from Node: FSERV1                    20-OCT-1995  10:51:09
```

SYSTEMS		MEMBERS
NODE	SOFTWARE	STATUS
FSERV1	VMS V6.2	MEMBER
FSERV2	VMS V6.2	MEMBER
NODE01	VMS V6.2	MEMBER
NODE02	VMS V6.2	MEMBER
NODE03	VMS V6.2	MEMBER
NODE04	VMS V6.2	MEMBER
HS1CP1	HSD V25F	
HS1CP2	HSD V25F	
HS1CP3	HSD V25F	
HS1CP4	HSD V25F	
HS1CP5	HSD V25F	
HS1CP6	HSD V25F	
HS1CP7	HSD V25F	
HS1CP8	HSD V25F	

2. Enter the SHOW CLUSTER command from one or more client nodes to ensure that the client nodes can see both nodes of the HS241 FDDI Server.
3. Enter the SHOW DEVICE command to ensure the HS241 is serving storage to the clients. All storage units, stripesets, and RAIDsets should appear in the resultant display.
4. If any nodes in the VMScluster were shut down during the console code upgrade because they were booted through a served system disk on the HS241 FDDI Server, now is the time to bring them back online, as follows:
   a. At each of the served nodes, enter the boot command at the >>> prompt:

      ```
      >>>BOOT
      ```

   b. At the DCL $ prompt on any of the served nodes, enter the SHOW DEVICE and SHOW CLUSTER commands to verify that the served nodes have reentered the VMScluster and can see the server.

9.14 Supporting and Operating the StorageWorks FDDI Server

Once the HS280 expansion cabinet has been connected to the model HS241 StorageWorks FDDI Server, you may want to perform various system management tasks to customize the system. See Chapters 10 and 11 for details on supporting and operating the StorageWorks FDDI Server.

10

Supporting and Operating the StorageWorks FDDI Server

This chapter discusses system management issues for the StorageWorks FDDI Server such as preparing for and installing system management software, setting certain operational parameters, and backing up the server's system disk.

Note

For optimal performance of StorageWorks FDDI Servers, you should limit the applications you install on the server processors to storage management and system management applications. By installing and executing production software on the processors, you could degrade the performance of the StorageWorks FDDI Server.

You also should consider the kinds of operations you plan to perform with the servers. For example, to realize optimal performance of your StorageWorks FDDI Server, you should perform backup operations of online storage to devices controlled by the same server.

10.1 Customizing the System

Manage the StorageWorks FDDI Server processors as you would other VMScluster nodes with respect to maintaining a functional, highly reliable computing environment. You can customize system files and install DECnet software and layered products as needed.

Before you make changes to the files on the server system disk, you should make a backup copy (see Section 10.3). If the changes you make cause configuration problems, you can restore your configuration to a known state.

10.1.1 Customizing System Files

You can edit system files that allow you to tailor your system management environment. If you created a quorum disk on the server, you need to add a MOUNT command in the system startup file to mount the quorum disk during server startup.

When customizing your environment, you may decide to set system parameters in the following command files:

- SYCONFIG.COM
- SYLOGICALS.COM
- SYLOGIN.COM
- SYSTARTUP_VMS.COM

The release notes, release notes addendum, and *A Comparison of System Management on OpenVMS Alpha and OpenVMS VAX* contain detailed information for notes and restrictions that might be relevant to your customization plans. Additional information about maintaining the server's performance can be found in the *Guide to OpenVMS Performance Management*.

Note

Immediately after changing your server processor system parameters, you should make a backup copy to protect your modifications.

10.1.2 Configuring and Starting DECnet for OpenVMS Alpha Software

If you plan to run DECnet for OpenVMS Alpha software, you must do the following:

1. After you have registered the license for the DECnet for OpenVMS Alpha software, execute the interactive command procedure SYS$MANAGER:NETCONFIG.COM to automatically configure your system for networking. See the *DECnet for OpenVMS Guide to Networking* for instructions on using NETCONFIG.COM.
2. After you start the queue manager (see the *OpenVMS System Manager's Manual*), edit the commands in SYS$COMMON:[SYSMGR]SYSTARTUP_VMS.COM that pertain to networking so that the DECnet for OpenVMS software starts automatically when your system is booted. Choose one of the following commands to start the network and remove the comment delimiter (!) from that command:

```
$! IF F$SEARCH("SYS$SYSTEM:NETACP.EXE") .NES. "" THEN @SYS$MANAGER:STARTNET
$! IF F$SEARCH("SYS$SYSTEM:NETACP.EXE") .NES. "" THEN SUBMIT SYS$MANAGER:STARTNET.COM
```

Both of the previous commands perform the same task. However, the first command executes STARTNET.COM and delays further processing until the procedure is completed; the second submits STARTNET.COM to a batch queue and continues executing SYSTARTUP_VMS.COM.

Note

Immediately after changing your server processor system parameters, you should make a backup copy to protect your modifications.

10.1.3 Installing Layered Products

The StorageWorks FDDI Server ships from the factory with all the layered products required for its operation. If you decide to install additional layered products such as Storage Library System for OpenVMS or Host Based RAID, note the following:

- You must register the licenses for OpenVMS Alpha layered products such as Host Based RAID for OpenVMS Alpha software.

  You can invoke the OpenVMS License utility by entering the following command:

  ```
  $ @SYS$UPDATE:VMSLICENSE
  ```

  (You also can use the LICENSE REGISTER command.)

For additional information about registering licenses, see the *OpenVMS License Management Utility Manual*.

- For general information about installing layered products, see the *OpenVMS System Manager's Manual*. For more specific information, see the documentation you received with each layered product.

The DECwindows components provided with the OpenVMS Alpha Version 6.2 operating system supply only DECwindows base support and workstation support files. To get full DECwindows support, you also must install the separate DECwindows™ Motif® for OpenVMS Alpha layered product, which supports both the Motif and XUI environments.

See the most recent version of the *DECwindows Motif for OpenVMS Installation Guide* for information about installing the separate DECwindows Motif for OpenVMS Alpha layered product. After the installation, follow the directions in that manual and in *Managing DECwindows Motif for OpenVMS Systems* to customize your DECwindows environment.

Note

Immediately after changing your server processor system parameters, you should make a backup copy to protect your modifications.

10.2 Booting a Server Processor

At various times, you may have to boot the server processor. You can boot a server processor from either the server's system disk or the CD–ROM device.

After the processor has been halted or after it has been powered up, the terminal connected to the processor displays the >>> prompt. To determine the name of the device from which you want to boot the server processor, then boot the device, follow this procedure:

1. Determine the names of the devices available to the server processor. Enter the following command at the >>> prompt:

```
>>>SHOW DEVICE
```

A display similar to the following appears:

```
dka0.0.0.6.0     DKA0  ❶ RZ28      D41C
dka500.5.0.6.0   DKA500  ❷ RRD43     0064

dva0.0.0.1       DVA0
era0.0.0.3.1     ERA0      08-00-2B-BC-06-99
fra0.0.0.3.1     FRA0      08-00-2B-A6-0B-D4
pka0.7.0.6.0     PKA0      SCSI BUS ID 7
```

Where:

❶ DKA0 is the name of the server processor system disk, an RZ28 drive.

❷ DKA500 is the name of the server processor CD–ROM drive, an RRD43 drive.

2. To boot the server processor, specify the device by name in the boot command. For example, the following command shows how to boot from the CD–ROM shown in the previous example:

   >>>BOOT DKA500

10.3 Backing Up the Server System Disk

After you create a backup copy of the files on the system disk, you should keep the copy in a safe location. For complete information about backup operations, see the *OpenVMS Alpha Upgrade and Installation Manual*.

Perform the following steps to back up the StorageWorks FDDI Server OpenVMS Alpha operating system:

- Shut down the server.

  Note

  Any node in the VMScluster system whose system disk is served through a single server node (HS111 or HS211) also should be shut down. Shut down that system before shutting down the HS111/211 server.

- Boot the server from the CD–ROM (see Section 10.2). This starts the menu-driven command procedure shown in the following example:

```
OpenVMS Alpha (TM) Operating System, Version 6.2
Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.
Installing required known files...
Configuring devices...
************************************************************

You can install or upgrade the OpenVMS Alpha operating system
or you can install or upgrade layered products that are included
on the OpenVMS Alpha operating system CD-ROM.

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

1)  Install or upgrade OpenVMS Alpha Version V6.2
2)  List layered product kits that this procedure can install
3)  Install or upgrade layered product(s)
4)  Execute DCL commands and procedures
5)  Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 1
```

- Enter 2, then press the Return key.
- At the triple dollar sign prompt ($$$), enter the SHOW DEVICES command.
- Examine the list of devices so you can determine which device is the source drive (the system disk you want to back up) and which device is your target drive (the supported disk or tape device that will hold the backed up files).

- When you have determined which devices will be the source drive and target drive, mount those devices (and any other output devices you plan to use) before you perform any backup operations. Enter the MOUNT commands in the following format:

  ```
  $$$ MOUNT/OVERRIDE=IDENTIFICATION source-drive
  $$$ MOUNT/FOREIGN target-drive
  ```

  Where:

  source-drive is the name of the drive holding the system disk.
  target-drive is the name of the drive that will hold the backup files.

- When the system disk and output devices are mounted, back up the system disk by entering the BACKUP command in the following format:

  ```
  $$$ BACKUP/IMAGE/VERIFY source-drive: target-drive:
  ```

  You also must include the save set name and the /SAVE_SET qualifier if the target drive is a tape device.

In this example, the system disk and a target disk are mounted so the BACKUP command can create a backup disk. (You can use a backup disk as a system disk.)

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION DKA200
$$$ MOUNT/FOREIGN DKA300
$$$ BACKUP/IMAGE/VERIFY DKA200: DKA300:
```

In this example the system disk and a target tape device are mounted so the BACKUP command can create a backup tape.

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION DKA200
$$$ MOUNT/FOREIGN MKA300
$$$ BACKUP/IMAGE/VERIFY DKA200: MKA300:APR_06_BACKUP.BCK/SAVE_SET
```

The BACKUP command creates a system disk that includes a set of volume parameters provided by Digital, including a CLUSTER_SIZE (disk access scheme) that is appropriate for your system. (The CLUSTER_SIZE refers to the way files are stored on the disk, not to VMScluster environments.) You can change most volume parameters later with the SET VOLUME command.

However, to change the CLUSTER_SIZE, you must back up the system disk to a disk that has been previously initialized with the CLUSTER_SIZE that you want. For more information about initializing a disk and using the BACKUP command, see the *OpenVMS System Manager's Manual* and the *OpenVMS System Management Utilities Reference Manual*, and see the description of the INITIALIZE and BACKUP commands in the OpenVMS DCL Dictionary.

After you complete the backup operation, do the following:

- Enter the LOGOUT command to exit from the DCL environment and return to the menu.
- Choose the shutdown option (3).
- After the shutdown completes, boot from the system disk.

10.4 Defining Packet Sizes

The StorageWorks FDDI Server operating system is OpenVMS Alpha operating system Version 6.2. The SYSGEN parameter governing packet size has been preset to 4468. All other nodes in the same cluster and on the FDDI interconnect should be set to the same packet size according to the following rules:

If the Operating System of the Node Is . . .	Then Set the SYSGEN Parameter . . .
OpenVMS VAX Version 6.2	NISCS_MAX_PKTSZ to 4468
OpenVMS Alpha Version 6.2	NISCS_MAX_PKTSZ to 4468
OpenVMS Version 5.5–2	LRPSIZE to 4474

More information on packet sizes and related configuration considerations can be found in the manual titled *VMScluster Systems for OpenVMS*.

10.5 Running AUTOGEN

When you installed the operating system, the system executed the AUTOGEN.COM procedure to set the values of system parameters and the sizes of the page, swap, and dump files according to the system configuration. As a postinstallation procedure, you need to run the AUTOGEN.COM procedure again to properly tune the system.

Run AUTOGEN as follows:

1. After 24 hours of operation, run AUTOGEN in feedback mode and reboot the system.
2. Run AUTOGEN again in feedback mode two workdays later, and then reboot the system.
3. Digital recommends that you run AUTOGEN from SAVPARAMS through TESTFILES on a weekly basis thereafter, and examine AGEN$PARAMS.REPORT to determine the need for additional changes.

Based on your examination of AGEN$PARAMS.REPORT, you might need to modify parameter values in MODPARAMS.DAT. If so, note the following:

- Hardcoded values in MODPARAMS.DAT should not hinder AUTOGEN's ability to calculate feedback parameters. AUTOGEN generally does not reduce the value of parameters that allocate resources; it considers current parameter values to be minimum values, which means that you do not have to add MIN_* symbols to MODPARAMS.DAT.
- AUTOGEN does increase parameter values according to its calculations unless you have specified explicit or maximum values (by adding MAX_* symbols) in MODPARAMS.DAT.

For more information about the MODPARAMS.DAT file and about using AUTOGEN in general, see the *OpenVMS System Manager's Manual*. Also, see the *OpenVMS System Manager's Manual: Tuning, Monitoring and Complex Systems* for information on running AUTOGEN and for additional information on system tuning.

10.6 Balancing I/O Load on the Dual-Processor Servers

When a device is accessed on a server from multiple client nodes, performance can be enhanced if the access pathways used in device mounting are different. In the dual-processor server models (HS121/221/241), the two processors and two or more HS1CP controllers typically offer four or more possible paths to a given disk device. By distributing mount connections to a device, bandwidth contention along a given path is minimized. When the load is balanced across the two server processors, the server provides better performance than if one server processor was heavily loaded while the other was mostly idle.

Load balancing can be implemented in one or both of two domains: at the device bus level, and at the server/network (mount path) level.

10.6.1 Device-Level Balancing

To ensure that all resources connected to the device bus are utilized fairly equally in server's with dual-redundant device channel processors, the HS1CP provides a means of tuning their usage via the PREFER qualifier. This can be done on one of the HS1CP device channel processors:

```
HS1CP> SET unit PREFERRED_PATH=HS1CP_NAME
```

where *unit* specifies a device and *HS1CP_NAME* is THIS (for the HS1CP currently used) or OTHER (for the alternate HS1CP).

10.6.2 Mount Path-Level Balancing via the DCL PREFER Command

A DCL-level command, PREFER, can be incorporated into the DCL command table to provide a means of explicitly specifying a preferred disk path at mount time, or to change an existing mount path. You can use the PREFER command to set up device paths for each VMScluster node to take maximum advantage of the pathways available.

The PREFER command files should be available in the SYS$EXAMPLES directory of your system disk (as PREFER.*). To set up the PREFER command:

1. Place PREFER.EXE in the SYS$SYSTEM directory. (Another directory may be used; edit the 'image' line in file PREFER.CLD to specify the directory.)
2. To define PREFER in the local process DCL command table, issue the command:

   ```
   $ SET COMMAND PREFER
   ```

   To define PREFER in the systemwide DCL command table, issue the following command from an account with CMKRNL privilege:

   ```
   $ SET COMMAND /TABLE=SYS$LIBRARY:DCLTABLES -
   _$ /OUTPUT=SYS$COMMON:[SYSLIB]DCLTABLES PREFER
   ```

   VMS Install is needed to make PREFER available to other users, again requiring CMKRNL privilege:

   ```
   $ INSTALL
   INSTALL> REPLACE SYS$LIBRARY:DCLTABLES
   INSTALL> EXIT
   ```

Note

The VMS Install utility commands must be executed from all nodes in a VMScluster system. If your system configuration deviates from the standard usage of DCLTABLES, modify the above commands to suit your site. For further information on defining command verbs or using the Install utility, consult the VMS documentation set.

To use the preferred path functionality, enter the command:

```
$ PREFER unit/HOST=host[/FORCE]
```

where *unit* specifies a device and *host* is the name of the server node that constitutes the preferred path. /FORCE is an optional qualifier described in following paragraphs.

In the following example, device 10DUA10: has a primary path through node FSERV1 and a secondary path through node FSERV2. To select FSERV1 as the primary path, enter the following command:

```
$ PREFER $10$DUA10:/HOST=FSERV1
```

This command sets the preferred path on the local node so that the next mount will use the selected path. If the /CLUSTER qualifier is used on the MOUNT command, all nodes in the cluster will use the selected path. Note that no change is made to the SHOW DEVICE output.

The /FORCE qualifier is used to select a preferred path for mounted disks. If the disk is mounted (not /FOREIGN), then the /FORCE qualifier will force the drive into mount verification and move it to the new controller. For example:

```
$ PREFER $10$DUA10:/HOST=FSERV1/FORCE
```

The path used to remount the disk will be the preferred path of the node that performs the mount verification. No other nodes in the VMScluster system will alter their paths to the device. For proper operation, the /FORCE qualifier should be issued only from a host on which the device is mounted.

To select a preferred path for all nodes in a VMScluster system, use the VMS SYSMAN Utility to set the preferred path on all nodes in the cluster before executing the PREFER command with the /FORCE qualifier.

Note

The PREFER command must be defined as a DCL command verb on all nodes in the VMScluster system before using it within SYSMAN.

In the following example, the SYSMAN PREFER command sets the preferred path on all nodes so that the next mount command from any node will use the selected path. The DCL PREFER command using the /FORCE qualifier causes the device to enter mount verification. After mount verification completes, the device will be remounted by all nodes through the preferred path, FSERV1.

```
SYSMAN> SET ENVIRONMENT/CLUSTER
SYSMAN> DO PREFER $10$DUA10:/HOST=FSERV1
SYSMAN> EXIT
$ PREFER $10$DUA10:/HOST=FSERV1/FORCE
```

11

System Software Maintenance

Much of the information contained in this chapter is found in the current *OpenVMS Alpha Upgrade and Installation Manual*, available in hardcopy as well as documentation files on the server system disk and documentation CD–ROM. These documents also include other information that can be used in maintaining server and client nodes in a VMScluster environment.

11.1 Upgrading the OpenVMS Alpha Software Version

Note

Digital recommends that you first make a backup copy of your system disk prior to upgrading it. If there is any problem during the upgrade that might affect the integrity of the disk, you will have the backup copy as a safeguard.

Perform the following steps to upgrade the StorageWorks FDDI Server OpenVMS Alpha operating system:

1. Shut down the server.

Note

Any node in the VMScluster whose system disk is served through a single server node (HS111 or HS211) also should be shut down. Shut down that system before shutting down the server.

2. Boot the server from the CD–ROM (see Section 10.2). This starts the menu-driven command procedure shown in the following example:

```
        OpenVMS Alpha (TM) Operating System, Version 6.2
        Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.
        Installing required known files...
        Configuring devices...
        ************************************************************

    You can install or upgrade the OpenVMS Alpha operating system
    or you can install or upgrade layered products that are included
    on the OpenVMS Alpha operating system CD-ROM.

    You can also execute DCL commands and procedures to perform
    "standalone" tasks, such as backing up the system disk.

    Please choose one of the following:
```

```
        1)  Install or upgrade OpenVMS Alpha Version V6.2
        2)  List layered product kits that this procedure can install
        3)  Install or upgrade layered product(s)
        4)  Execute DCL commands and procedures
        5)  Shut down this system

    Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 1

        The OpenVMS Alpha V6.2 operating system includes Volume Shadowing
        interoperability changes from previous ECO kits.  If you are using
        Volume Shadowing and you upgrade this node to V6.2, then you must
        install the Volume Shadowing interoperability patches on any cluster
        member running an operating system version earlier than OpenVMS V6.2
        to ensure correct shadowing operation throughout your cluster.

        More information regarding these patches is available in the Problem
        Description section of the release notes supplied with the patch
        kits.  Please read these notes regarding the cluster impact of
        patch installation.  The release notes are located in the directory
        [SHADOW_KITS] on this CD-ROM in the following files:

             ALPSHAD01_062.RELEASE_NOTES     ALPSHAD07_061.RELEASE_NOTES
             VAXSHAD01_062.RELEASE_NOTES     VAXSHAD03_060.RELEASE_NOTES
             VAXSHAD07_061.RELEASE_NOTES

    Press Return to continue...

         For your convenience, the shadowing remedial kits current at the
         time this CD was built have been provided in the following
         directory of the FDDI Server distribution CD-ROM.

         sys$sysdevice:[shadow_kits]ALPSHAD01_062.*
         sys$sysdevice:[shadow_kits]ALPSHAD07_061.*
         sys$sysdevice:[shadow_kits]VAXSHAD01_062.*
         sys$sysdevice:[shadow_kits]VAXSHAD03_060.*
         sys$sysdevice:[shadow_kits]VAXSHAD07_061.*

         TIMA remedial kits containing these changes are available through
         Digital Customer Services worldwide.  Digital recommends that you
         contact your Customer Support Center to obtain the latest Volume
         Shadowing ECOs for all operating system versions in your cluster.

    Do you want to continue the upgrade or installation? (Yes/No) [YES]
```

3. The above question gives you the opportunity to safely abort the upgrade if you decide you are not ready to proceed due to Volume Shadowing interoperability issues. If you answer this question NO, the upgrade procedure returns to the selection menu without making any changes to your system disk. If you answer YES, the procedure continues with the upgrade as shown in the remainder of this example.

```
            ******************************************************

        The installation procedure will ask a series of questions.

             () - encloses acceptable answers
             [] - encloses default answers

        Type your response and press the RETURN key.  Type:

             ? - to repeat an explanation
             ^ - to change prior input (not always possible)
             Ctrl-Y - to exit the installation procedure

        The system disk on this StorageWorks FDDI Server has been identified
        as the following:
```

```
    Target disk   DKA0:
    Current label FSERV1$SYS.

    By default this disk will be upgraded to OpenVMS Alpha Version
    V6.2.  All data on the target system disk will be preserved.

Is this OK? (Yes/No) yes

    DKA0: is now labeled FSERV1$SYS.

Do you want to keep this label? (Yes/No) [Yes]

    OpenVMS Alpha will be upgraded on DKA0:.


    The installation can provide brief or detailed descriptions.
    In either case, you can request the detailed descriptions by typing "?".

Do you always want detailed descriptions? (Yes/No) [No]

The following product has been selected:
DEC AXPVMS VMS V6.2     [Available]

*** DEC AXPVMS VMS V6.2: OpenVMS Operating System, Version V6.2

    COPYRIGHT (c) 24-MAY-1995 -- All rights reserved

    Digital Equipment Corporation

    Do you want all the default values for this product? [YES]

    Do you want to view the values? [NO]

%PCSIUI-I-DONEASK, execution phase starting
The following product will be installed:
DEC AXPVMS VMS V6.2
%PCSI-I-VOLINFO, estimated space information for volume DISK$FSERV1$SYS
-PCSI-I-VOLSPC, -14 required; 3298176 available; 3298190 net
Portion Done: 0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
The following product has been installed:
DEC AXPVMS VMS V6.2


    The upgrade is now complete.

    When the newly upgraded system is first booted, a special
    startup procedure will be run.  This procedure will:

        o  Run AUTOGEN to set system parameters.
        o  Reboot the system with the newly set parameters.

    When the special startup procedure has completed, you may resume
    normal operations on your FDDI Server.

    You may shut down now or continue with other operations.

  Process AXPVMS_INSTALL logged out at 21-AUG-1995 22:45:24.45
```

4. The upgrade procedure returns to the selection menu. You may continue with other operations or shut down the server. The upgraded operating system becomes active when the server is rebooted.

Refer to the *OpenVMS Alpha Upgrade and Installation Manual* for detailed information on upgrading the OpenVMS Alpha operating system.

11.2 Restoring the System Disk from a Backup

Perform the following steps to restore the StorageWorks FDDI Server OpenVMS Alpha operating system:

1. Shut down the server.

Note

Any node in the VMScluster system whose system disk is served through a single server node (HS111 or HS211) also should be shut down. Shut down that system before shutting down the HS111/211 server.

2. Boot the server from the CD–ROM (see Section 10.2). This starts the menu-driven command procedure shown in the following example.

```
        OpenVMS Alpha (TM) Operating System, Version 6.2
        Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.
        Installing required known files...
        Configuring devices...
        ************************************************************

    You can install or upgrade the OpenVMS Alpha operating system
    or you can install or upgrade layered products that are included
    on the OpenVMS Alpha operating system CD-ROM.

    You can also execute DCL commands and procedures to perform
    "standalone" tasks, such as backing up the system disk.

    Please choose one of the following:

        1)  Install or upgrade OpenVMS Alpha Version V6.2
        2)  List layered product kits that this procedure can install
        3)  Install or upgrade layered product(s)
        4)  Execute DCL commands and procedures
        5)  Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 4
```

3. Enter 4, then press the Return key to begin a limited DCL environment that is identified by a triple dollar sign prompt ($$$).
4. At the triple dollar sign prompt ($$$), enter the SHOW DEVICES command.
5. Examine the list of devices so you can determine which device is the source drive (the drive holding the backed up files you want to restore) and which device is your target drive (the disk on which you want the files restored).
6. When you have determined which devices will be the source drive and target drive, mount those devices (and any other output devices you plan to use) before you perform any restore operations. Enter the MOUNT commands in the following format:

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION source-drive
$$$ MOUNT/FOREIGN target-drive
```

where:

source-drive is the device holding the files you want to restore.
target-drive is the destination.

(Note, however, that you must use the MOUNT/FOREIGN command if the source drive is a tape device.)

7. Enter the BACKUP command in the following format:

   $$$ **BACKUP/IMAGE/VERIFY** *source-drive*: *target-drive*:

   (You also must include the save set name and the /SAVE_SET qualifier if the source drive is a tape device.)

In this example, a backup disk and a target disk are mounted so the BACKUP command can restore the system disk from the backup disk:

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION DKA300
$$$ MOUNT/FOREIGN DKA200
$$$ BACKUP/IMAGE/VERIFY DKA300: DKA200:
```

In this example, a backup tape and a target disk are mounted so the BACKUP command can restore the system disk from the backup tape:

```
$$$ MOUNT/FOREIGN MKA300
$$$ MOUNT/FOREIGN DKA200
$$$ BACKUP/IMAGE/VERIFY MKA300:APR_06_BACKUP.BCK/SAVE_SET DKA200:
```

After you complete the restore operation, do the following:

- Enter the LOGOUT command to exit from the DCL environment and return to the menu.
- Choose the shutdown option (5).
- After the shutdown completes, boot from the server's system disk.

11.3 Rebuilding the System Disk from the Server CD–ROM

Perform the following steps to rebuild the StorageWorks FDDI Server OpenVMS Alpha operating system:

1. Shut down the server.

   Note

   Any node in the VMScluster system whose system disk is served through a single server node (HS111 or HS211) also should be shut down. Shut down that system before shutting down the HS111/211 server.

2. Boot the server from the CD–ROM (see Section 10.2). This starts the menu-driven command procedure shown in the following example:

```
        OpenVMS Alpha (TM) Operating System, Version 6.2
        Copyright (c) 1995 Digital Equipment Corporation.  All rights reserved.
        Installing required known files...
        Configuring devices...
        ************************************************************

    You can install or upgrade the OpenVMS Alpha operating system
    or you can install or upgrade layered products that are included
    on the OpenVMS Alpha operating system CD-ROM.

    You can also execute DCL commands and procedures to perform
    "standalone" tasks, such as backing up the system disk.
```

```
    Please choose one of the following:

        1)  Install or upgrade OpenVMS Alpha Version V6.2
        2)  List layered product kits that this procedure can install
        3)  Install or upgrade layered product(s)
        4)  Execute DCL commands and procedures
        5)  Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 1

    The OpenVMS Alpha V6.2 operating system includes Volume Shadowing
    interoperability changes from previous ECO kits.  If you are using
    Volume Shadowing and you upgrade this node to V6.2, then you must
    install the Volume Shadowing interoperability patches on any cluster
    member running an operating system version earlier than OpenVMS V6.2
    to ensure correct shadowing operation throughout your cluster.

    More information regarding these patches is available in the Problem
    Description section of the release notes supplied with the patch
    kits.  Please read these notes regarding the cluster impact of
    patch installation.  The release notes are located in the directory
    [SHADOW_KITS] on this CD-ROM in the following files:

         ALPSHAD01_062.RELEASE_NOTES     ALPSHAD07_061.RELEASE_NOTES
         VAXSHAD01_062.RELEASE_NOTES     VAXSHAD03_060.RELEASE_NOTES
         VAXSHAD07_061.RELEASE_NOTES

Press Return to continue...

     For your convenience, the shadowing remedial kits current at the
     time this CD was built have been provided in the following
     directory of the FDDI Server distribution CD-ROM.

     sys$sysdevice:[shadow_kits]ALPSHAD01_062.*
     sys$sysdevice:[shadow_kits]ALPSHAD07_061.*
     sys$sysdevice:[shadow_kits]VAXSHAD01_062.*
     sys$sysdevice:[shadow_kits]VAXSHAD03_060.*
     sys$sysdevice:[shadow_kits]VAXSHAD07_061.*

     TIMA remedial kits containing these changes are available through
     Digital Customer Services worldwide.  Digital recommends that you
     contact your Customer Support Center to obtain the latest Volume
     Shadowing ECOs for all operating system versions in your cluster.

Do you want to continue the upgrade or installation? (Yes/No) [YES]
```

3. The above question gives you the opportunity to safely abort the installation if you decide you are not ready to proceed due to Volume Shadowing interoperability issues. If you answer this question NO, the installation procedure returns to the selection menu without making any changes to your system disk. If you answer YES, the procedure continues with the installation as shown in the remainder of this example.

```
    ************************************************************

    The installation procedure will ask a series of questions.

          () - encloses acceptable answers
          [] - encloses default answers

    Type your response and press the RETURN key.  Type:

          ? - to repeat an explanation
          ^ - to change prior input (not always possible)
          Ctrl-Y - to exit the installation procedure
```

```
    The system disk on this StorageWorks FDDI Server has been identified
    as the following:

    Target disk   DKA0:
    Current label FSERV1$SYS.

    By default this disk will be upgraded to OpenVMS Alpha Version
    V6.2.  All data on the target system disk will be preserved.


Is this OK? (Yes/No) no

    There are two choices for Installation/Upgrade:

    INITIALIZE - removes all software and data files that were
        previously on the target disk and installs OpenVMS Alpha.

    PRESERVE -- installs or upgrades OpenVMS Alpha on the target disk
        and retains all other contents of the target disk.

   * NOTE: You cannot use PRESERVE to install OpenVMS Alpha on a disk on
        which OpenVMS VAX or any other operating system is installed.

Do you want to INITIALIZE or to PRESERVE? [PRESERVE] initialize


    You must enter the device name for the target disk on which
    OpenVMS Alpha will be installed.

Enter device name for target disk: (? for choices) dka0:

    DKA0: is now labeled FSERV1$SYS.

Do you want to keep this label? (Yes/No) [Yes]


    You have chosen to install OpenVMS Alpha on a new disk.

    The target system disk, DKA0:, will be initialized.
    It will be labeled FSERV1$SYS.
    Any data currently on the target system disk will be lost.

Is this OK? (Yes/No) yes

    Initializing and mounting target....


    The installation can provide brief or detailed descriptions.
    In either case, you can request the detailed descriptions by typing "?".

Do you always want detailed descriptions? (Yes/No) [No]

The following product has been selected:
DEC AXPVMS VMS V6.2


*** DEC AXPVMS VMS V6.2: OpenVMS Operating System, Version V6.2

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    Digital Equipment Corporation

    Do you want all the default values for this product? [YES]

    Do you want to view the values? [NO]

%PCSIUI-I-DONEASK, execution phase starting
The following product will be installed:
DEC AXPVMS VMS V6.2
%PCSI-I-VOLINFO, estimated space information for volume DISK$FSERV1$SYS
-PCSI-I-VOLSPC, 337699 required; 4104424 available; 3766725 net
Portion Done: 0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
The following product has been installed:
DEC AXPVMS VMS V6.2
```

```
Copying FDDI Server Software Customization Procedures to disk
Copying documentation directory to new system disk


    The installation is now complete.

    When the newly installed system is first booted, the
    StorageWorks FDDI Server Software Customization Procedure
    will run.  This procedure will ask you to enter information
    required to custom configure the server for your site.

    You may shut down now or continue with other operations.

  Process AXPVMS_INSTALL logged out at 21-AUG-1995 22:45:24.45
```

4. The installation procedure returns to the selection menu. You may continue with other operations or shut down the server. The FDDI Server Software Customization Procedure will run when the server is rebooted.

For further information on the operating system installation, refer to the *OpenVMS Alpha Upgrade and Installation Manual*.

A

StorageWorks FDDI Server Specifications

A.1 StorageWorks FDDI Server HS2*xx*/1*xx* Specifications

Table A–1 provides the specifications for HS2*xx*/1*xx* FDDI Servers.

Table A–1 StorageWorks FDDI Server HS2*xx*/1*xx* Specifications

	Models HS211/111	Model HS221/121
Storage Capacity		
Maximum number of disks	42 nonredundant connections	36 redundant connections
Maximum disk capacity using RZ29 disks	180 GB	154 GB
Maximum number of tape drives	See the *StorageWorks Solutions Configuration Planning Guide* for configuration guidelines.	
Maximum number of Solid State disk drives	See the *StorageWorks Solutions Configuration Planning Guide* for configuration guidelines.	
I/O Performance		
Saturation performance: single-block disk I/O request rate	800	2,100
Saturation performance: Maximum data transfer rate (to/from FDDI interconnect)	2.5 MB/second	5.5 MB/second
I/O response time for typical OpenVMS load	12 ms (cache disabled) 7 ms (read and write cache enabled)	12 ms (cache disabled) 7 ms (read and write cache enabled)
Power Requirements		
Voltage	100 to 240 V ac	100 to 240 V ac
Frequency	50/60 Hz	50/60 Hz
Device channel processor battery backup	Standard	Standard
Redundant Power	Optional	Standard

(continued on next page)

Table A–1 (Cont.) StorageWorks FDDI Server HS2*xx*/1*xx* Specifications

	Models HS211/111	Model HS221/121
Environmental		
Operating temperature	10 C to 40 C	10 C to 40 C
Nonoperating temperature	-40 C to 66 C	-40 C to 66 C
Relative humidity	10% to 80%	10% to 80%
Altitude	Sea level to 2400 m (8000 ft)	Sea level to 2400 m (8000 ft)
Physical Dimensions		
Height	1700 mm (67 in)	1700 mm (67 in)
Width	800 mm (31 in)	800 mm (31 in)
Depth	875 mm (34.5 in)	875 mm (34.5 in)
Weight (without devices)	310 kg (685 lbs)	355 kg (780 lbs)

A.2 StorageWorks FDDI Server HS241/280 Specifications

Table A–2 provides the specifications for HS241/280 FDDI Servers.

Table A–2 StorageWorks FDDI Server HS241/280 Specifications

	Model HS241	Model HS241 with HS280 Installed
Storage Capacity		
Maximum number of disks	72 redundant connections	144 redundant connections
Maximum disk capacity using RZ29 disks	309 GB	619 GB
Maximum number of tape drives	See the *StorageWorks Solutions Configuration Planning Guide* for configuration guidelines.	
Maximum number of Solid State disk drives	See the *StorageWorks Solutions Configuration Planning Guide* for configuration guidelines.	
I/O Performance		
Saturation performance: single-block disk I/O request rate	4,300	4,300
Saturation performance: Maximum data transfer rate (to/from FDDI interconnect)	11 MB/second	11 MB/second
I/O response time for typical OpenVMS load	12 ms (cache disabled) 7 ms (read and write cache enabled)	12 ms (cache disabled) 7 ms (read and write cache enabled)

(continued on next page)

Table A–2 (Cont.) StorageWorks FDDI Server HS241/280 Specifications

	Model HS241	Model HS241 with HS280 Installed
Power Requirements		
Voltage	100 to 240 V ac	100 to 240 V ac
Frequency	50/60 Hz	50/60 Hz
Device channel processor battery backup	Standard	Standard
Redundant Power	Optional	Standard
Environmental		
Operating temperature	10 C to 40 C	10 C to 40 C
Nonoperating temperature	-40 C to 66 C	-40 C to 66 C
Relative humidity	10% to 80%	10% to 80%
Altitude	Sea level to 2400 m (8000 ft)	Sea level to 2400 m (8000 ft)
Physical Dimensions		
Height	1700 mm (67 in)	1700 mm (67 in)
Width	800 mm (31 in)	800 mm (31 in)
Depth	875 mm (34.5 in)	875 mm (34.5 in)
Weight (without devices)	310 kg (685 lbs)	355 kg (780 lbs)

B

Configuration Rules and Restrictions

B.1 BA350-Series Shelf Configuration Rules

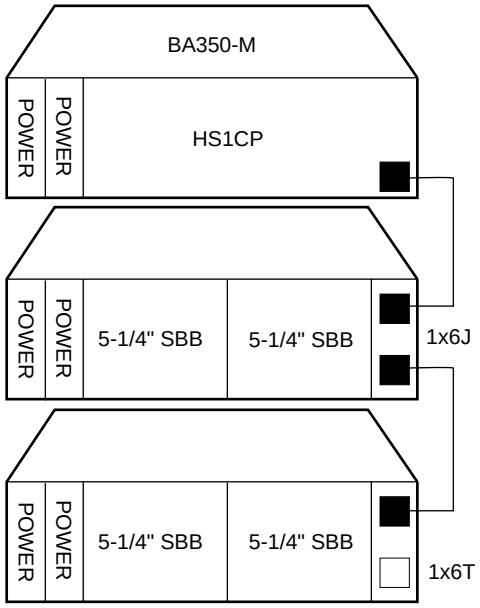
The following configuration rules apply to the arrangement of BA350-series controller and storage shelves.

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 BA35*x*–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 BA35*x*–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 B–1 shows an example of storage shelves in a single extension configuration.

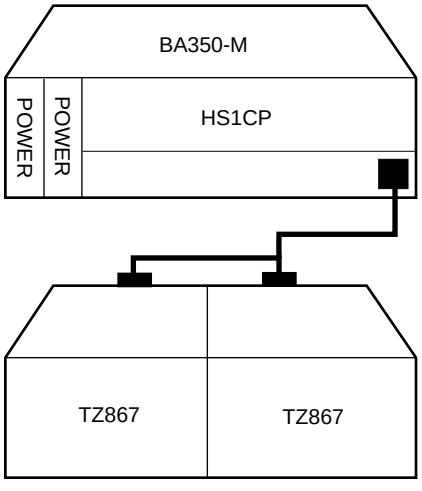
Figure B–1 Single Extension from Storage Shelf to Storage Shelf



CXO-4606A-MC

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

Figure B–2 Adjacent Devices on a Single Port



CXO-4607A-MC

B.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

B.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.

B.1.1.2 3½-Inch SBB Recommended Configurations

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

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

Number of Devices	Number of BA35*x*–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 BA35*x*–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).

B.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 BA35*x*–S shelves, or one 5¼-inch SBB and four 3½-inch SBBs in one BA35*x*–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), TZ8*x*7 tapes cannot be connected or even mounted in the cabinet because all or most (front) shelf locations are needed for the 5¼-inch SBBs.

B.1.1.4 5¼-Inch SBB Recommended Configurations

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

Table B–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	1-0	6
		(2)2x3T		
9-10	5	(4)1x6T	1-0	6
		(1)2x3T		
11-12	6	(6)1x6T	1-0	6
13-14***	7	(6)1x6T	1-0	6
		(1)1x6J		
15-16***	8	(6)1x6T	1-0	6
		(2)1x6J		
17-18***	9	(6)1x6T	1-0	6
		(3)1x6J		
19-20***	10	(6)1x6T	1-0	6
		(4)1x6J		

Key for Table Conventions

Each BA35*x*–S shelf has its upper connector cable attached to either the adjacent BA35*x*–S shelf's lower connector (1x6J), or a controller port connector (2x3T or 1x6T).

The lower connector cable is attached to either an adjacent BA35*x*–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.

B.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.

B.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 B–3 lists the minimum shelf count for various numbers of 3½-inch SBBs in an SW800 cabinet for device channel processor configurations.

Table B–3 Small Shelf Count Configurations, HS1CP Device Channel Processor

Number of Devices	Number of BA35*x*–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).

B.2 HS1CP Device Channel Processor Configuration Rules

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

B.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.

B.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.

B.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 B–4.
- Limit the number of devices per controller port to two in Nonredundant configurations and four in dual-redundant configurations.

Table B–4 high-performance Devices per Port

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

B.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 failover to the other device channel processor automatically.

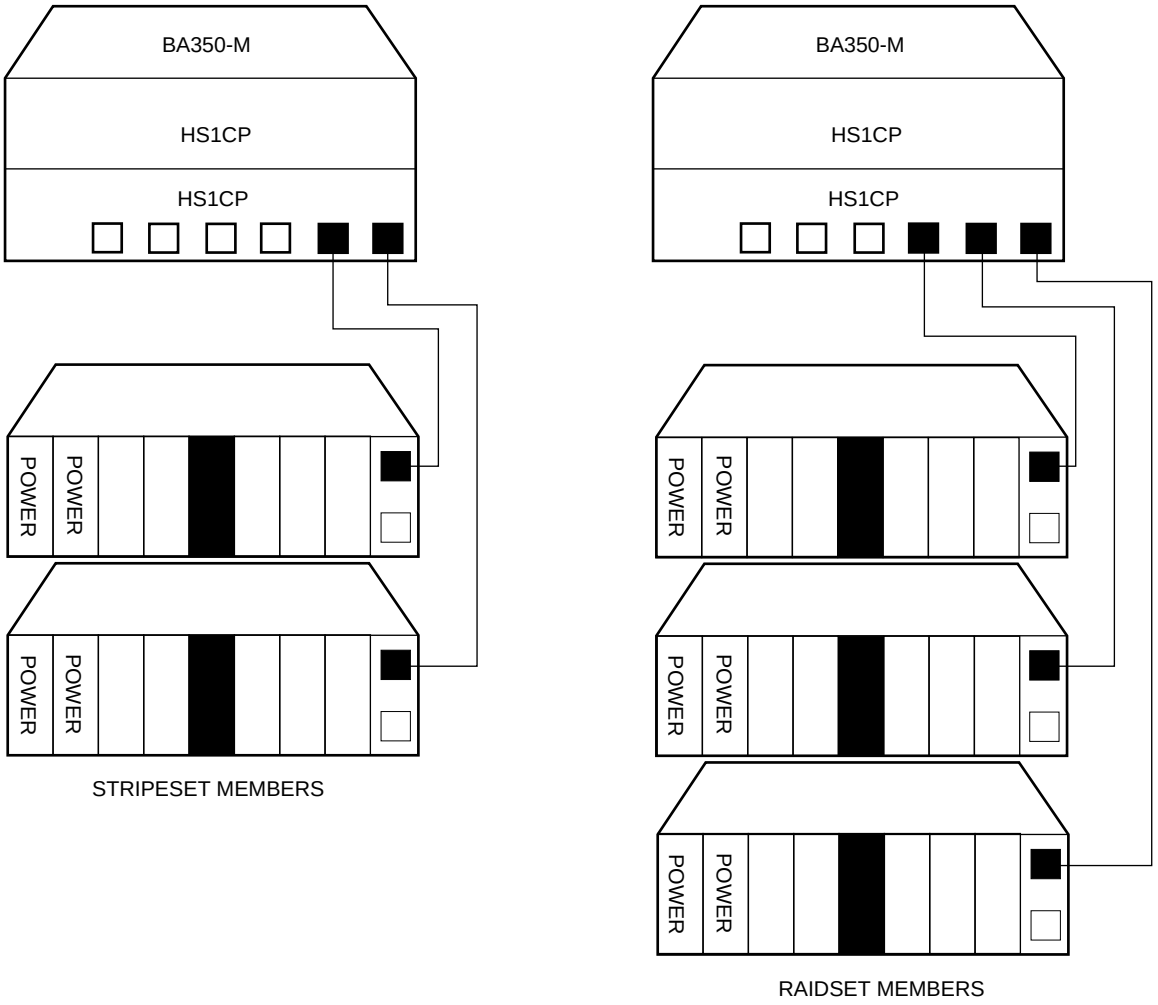
B.2.5 Optimal Availability Configurations

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

Figure B–3 Optimal Availability Configuration Example



B.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.

C

FDDI Server Interconnect Cables

Table C–1 provides a listing of cables that can used to interconnect the FDDI system with StorageWorks FDDI Servers.

Table C–1 StorageWorks FDDI Server FDDI Interconnect Cables

	SAS Interconnect		DAS Interconnect	
FDDI Adapter	**Digital Part#**	**Connector Type**	**Digital Part#**	**Connector Type**
HS1xx	BN24B–1	MIC–MIC		
	BN24B–3	MIC–MIC		
	BN24B–10	MIC–MIC		
	BN24B-20	MIC–MIC		
	BN24B–30	MIC–MIC		
HS2xx	BN34D–1	SC–MIC	BN34D–1	SC–MIC
	BN34D–3	SC–MIC	BN34D–1	SC–MIC
	BN34D–10†	SC–MIC	BN34D–10†	SC–MIC
			BN34B–1	SC–SC
			BN34B–3	SC–SC
			BN34B–10	SC–SC
			BN34B–20	SC–SC
			BN34B–30	SC–SC
			BN34A–1	SC–ST

†For connections greater than 10 meters, use Computer Crafts, Inc. cables:
F1511110-20 SC-MC
F1511110-30 SC-MC

Key for Connector Type

The HS1xx FDDI adapter uses a MIC-type connector, while the HS2xx FDDI adapter uses an SC-type connector.

Bridges and concentrators use MIC-type connectors.

The HS1xx FDDI adapter connects to an FDDI ring through bridges and concentrators using a MIC–MIC connection. A SAS adapter cannot be functionally attached to an FDDI ring.

The HS2xx FDDI adapter connects to an FDDI ring through bridges and concentrators using an SC–MIC connection. This adapter can also attach directly to an FDDI ring using SC-or ST-type connectors.

Two HS2xx FDDI adapter cables are needed to connect the HS2xx FDDI adapter to an FDDI ring in a DAS-mode. Use only one cable for a SAS-mode connection.

(continued on next page)

Table C–1 (Cont.) StorageWorks FDDI Server FDDI Interconnect Cables

	SAS Interconnect		DAS Interconnect	
FDDI Adapter	**Digital Part#**	**Connector Type**	**Digital Part#**	**Connector Type**
			BN34A–3	SC–ST
			BN34A–10	SC–ST
			BN34A–20	SC–ST
			BN34A–30	SC–ST

Key for Connector Type

The HS1xx FDDI adapter uses a MIC-type connector, while the HS2xx FDDI adapter uses an SC-type connector.

Bridges and concentrators use MIC-type connectors.

The HS1xx FDDI adapter connects to an FDDI ring through bridges and concentrators using a MIC–MIC connection. A SAS adapter cannot be functionally attached to an FDDI ring.

The HS2xx FDDI adapter connects to an FDDI ring through bridges and concentrators using an SC–MIC connection. This adapter can also attach directly to an FDDI ring using SC-or ST-type connectors.

Two HS2xx FDDI adapter cables are needed to connect the HS2xx FDDI adapter to an FDDI ring in a DAS-mode. Use only one cable for a SAS-mode connection.

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