StorageWorks™ Solutions

StorageWorks Network Storage Array SWXNA-DA/HA Installation Guide

Order Number: EK–NSA08–IG. A01

This guide describes how to install the SWXNA-DA/HA option into an SW800 cabinet to create a StorageWorks SWXNA-Ex (FDDI Interconnect) or SWXNA-Jx (CDDI Interconnect) Network Storage Array.

Digital Equipment Corporation
Maynard, Massachusetts

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

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

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Preface

This manual describes the procedures necessary to install and configure the SWXNA-DA/HA option kit into a SW800 cabinet to create an SWXNA-Ex/Jx.

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 necessary considerations and some preliminary tasks that must be performed before you begin the installation procedure.
Chapter 1	Describes preinstallation considerations and tasks.
Chapter 2	Describes installing the SWXNA-DA/HA option kit into the SW800-series cabinet to create an SWXNA-Ex/Jx model StorageWorks Network Storage Array.
Appendix A	Lists the Network Storage Array specifications.
Appendix B	Describes the HS1CP and StorageWorks shelf configuration rules.
Appendix C	Lists the appropriate SWXNA-xx interface cables.

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 Network Storage Array Publications	
StorageWorks™ Solutions Getting Started with the StorageWorks Network Storage Array Guide	EK–SWXNA–IG
StorageWorks™ Solutions StorageWorks Network Storage Array, Server Processor Component Manual	EK–SWXNA–CM
StorageWorks™ Solutions StorageWorks Network Storage Array Service Manual	EK–SWXNA–SM
StorageWorks Enclosures	
StorageWorks™ Solutions SW800-Series Data Center Cabinet Installation and User's Guide	EK–SW800–IG
StorageWorks™ SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG

Manufacturer's Declarations

Following are manufacturer's declarations applicable to the StorageWorks Network Storage Array:

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 Network Storage Array 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**
SWXNA-xx with only cabinet fans operating	7.6	7.6	56	56
SWXNA-xx with 2 BA350–M shelves and 12 BA350–S shelves, each containing 6 RZ29–VA disk drives	7.7	7.7	58	58
Per device when installed in an SWXNA-Ex/Jx				
BA350–S shelf containing 6 RZ29–VA disk drives	5.4	5.4	40	41
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**
SWXNA-xx nur mit kabinett Lüftern in Betrieb	7,6	7,6	56	56
SWXNA-xx mit 2 BA350–M shelves und 12 BA350–S shelves, jedes bestückt mit 6 RZ29–VA disk drives	7,7	7,7	58	58
Pro Gerät installiert im SWXNA-Ex/Jx				
BA350–S shelf mit 6 RZ29–VA disk drives	5,4	5,4	40	41
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
Before You Begin Installation

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

1.1 Environmental Specifications

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

Table 1–1 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)

(continued on next page)

Table 1–1 (Cont.) StorageWorks Environmental Specifications

Condition	Specification
	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

1.2 SW800 Cabinet

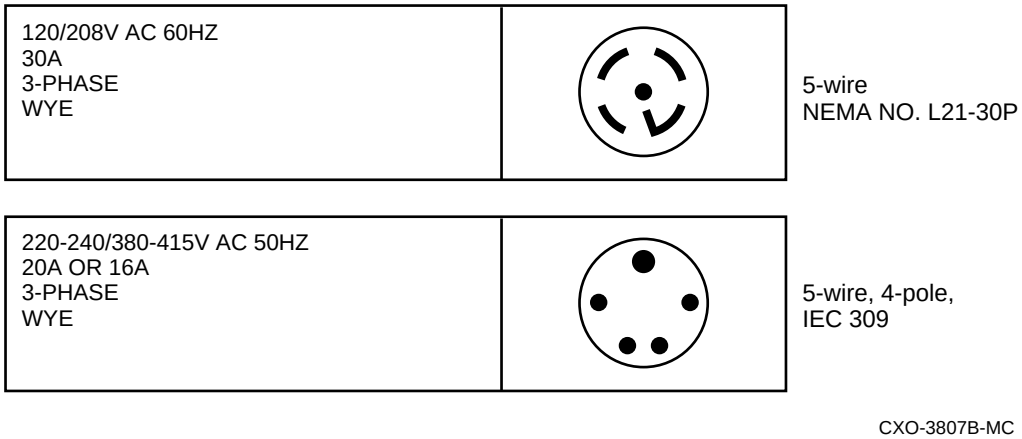
You must ensure that the site selected for installing a StorageWorks Network Storage Array satisfies requirements for power, grounding, safety, and service. This section discusses preparing your site to meet those requirements.

1.2.1 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 1–1 specifies the cabinet primary power plugs supplied for both 60 Hz and 50 Hz power.

Figure 1–1 StorageWorks Network Storage Array Primary Power Plugs



1.2.2 Equipment Grounding

The StorageWorks Network Storage Array usually is connected to other equipment by one or more network 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 Network Storage Array.

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 Network Storage Array 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.

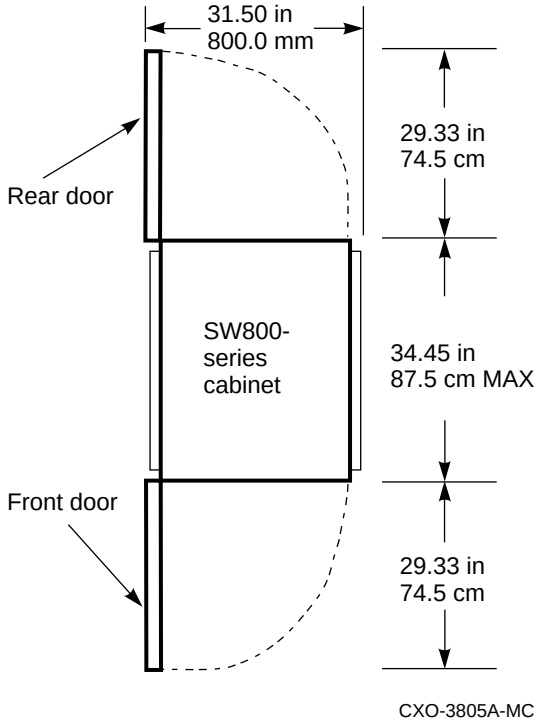
If no problems are found during the survey, the site grounding system may be considered to be adequate for safety and reliable StorageWorks Network Storage Array operation.

1.2.3 Safety and Service Requirements

The following general safety and service requirements refer to the floor location chosen for placing the StorageWorks Network Storage Array:

- 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 1–2 for specific space requirements.

Figure 1–2 Minimum Installation Clearances



- 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 Network Storage Array is not designed to be fastened to adjacent cabinets.

1.3 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.

1.4 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.

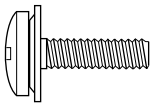
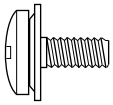
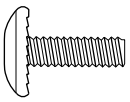
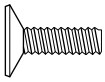
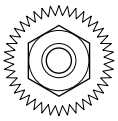
1.5 Tools Needed for Installation

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 1–3 is a diagram of the screws and nuts used in installing and upgrading network arrays. Use this diagram to determine the proper screw.

Figure 1–3 Screw Diagrams

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

CXO-4701A-MC

2

SW800-Series Cabinet to SWXNA-Ex/Jx Upgrade Procedure

This chapter provides step-by-step procedures for installing the SWXNA-DA/HA option kit into an SW800-series StorageWorks cabinet to create a model SWXNA-Ex (FDDI Interconnect) or SWXNA-Jx (CDDI Interconnect) StorageWorks Network Storage Array.

2.1 Purpose of This Upgrade

A customer with an existing SW800-series cabinet may want to switch to a StorageWorks Network Storage Array system. For little additional expense, the customer can utilize his existing cabinet, purchase the hardware, software, and cables contained in the SWXNA-DA/HA option kit, and apply this procedure to create a model SWXNA-Ex/Jx Network Storage Array.

The SWXNA-DA/HA option kit provides all the components for converting an existing SW800 cabinet to a StorageWorks SWXNA Network Storage Array. The following sections provide information about the upgrade kit and how to perform the upgrade.

2.2 SWXNA-DA/HA Option Kit Description

The main components of the SWXNA-DA/HA upgrade kit are as follows:

- One server processor with network, bus, and PCI-to-SCSI adapters already installed. The SWXNA-DA contains the FDDI network adapter, the SWXNA-HA contains the CDDI network adapter.
- Two HS1CP device channel processors with write-back cache modules
- One BA350–M shelf
- Shadowed system disk assembly with:

  One RZ29-VA disk for the Shadowed System Disk
  BA356-S shelf and cables
- OpenVMS Alpha operating system software Version 6.2-1H3 (or later) CD–ROM

When you receive your SWXNA-DA/HA 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.

2.3 Preparing the Cabinet for Upgrade

Digital recommends full and unrestricted access to the cabinet interior because you will be routing cables while installing 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 2–1 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.

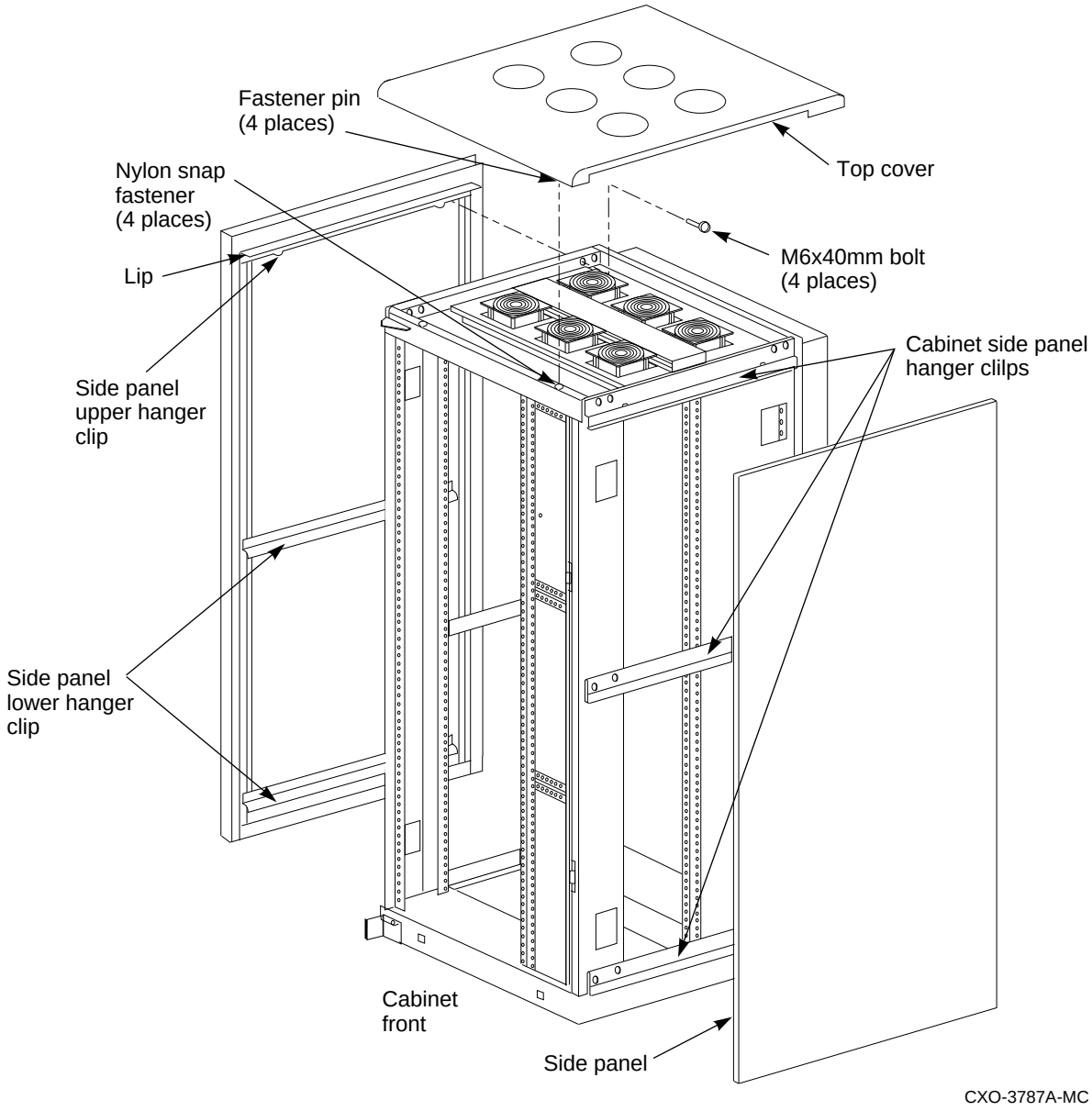
   b. Using two people, lift the top cover from the cabinet and set it aside.

   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.

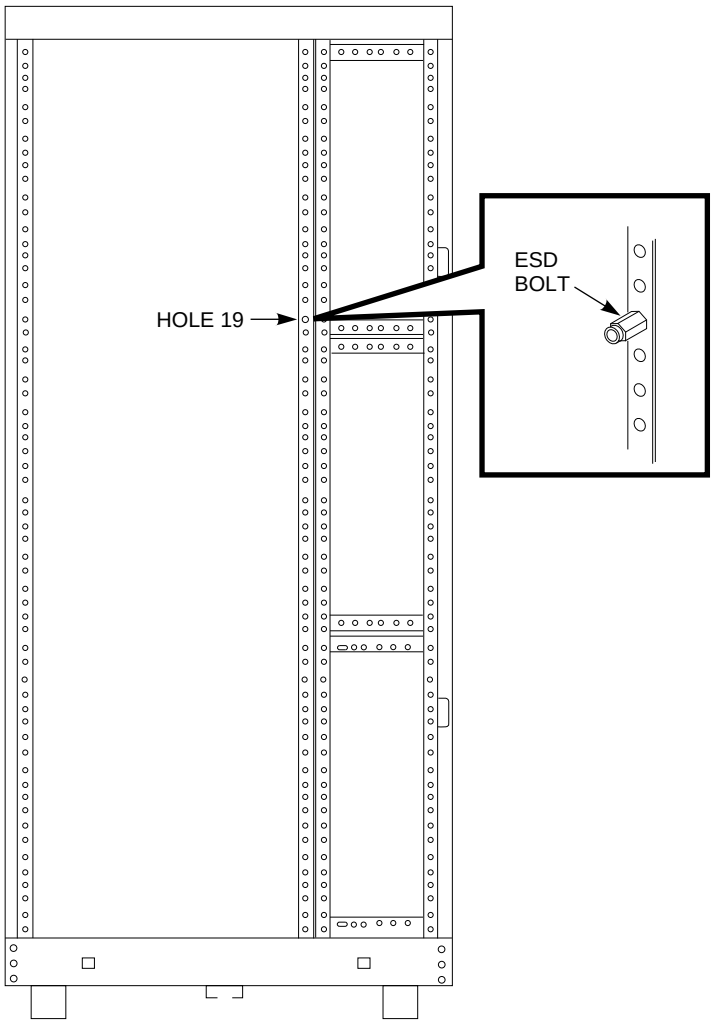
   e. Repeat the previous step to remove the other panel.

Figure 2–1 Exterior Cabinet Panel Removal (and Installation)



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 2–2 Relocate ESD Bolt to Hole 19



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

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 SWXNA-DA/HA 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 2–3). 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 2–1 and Figure 2–3.
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 2–4.

Figure 2–3 Install U-Nuts on Cabinet Vertical Rails

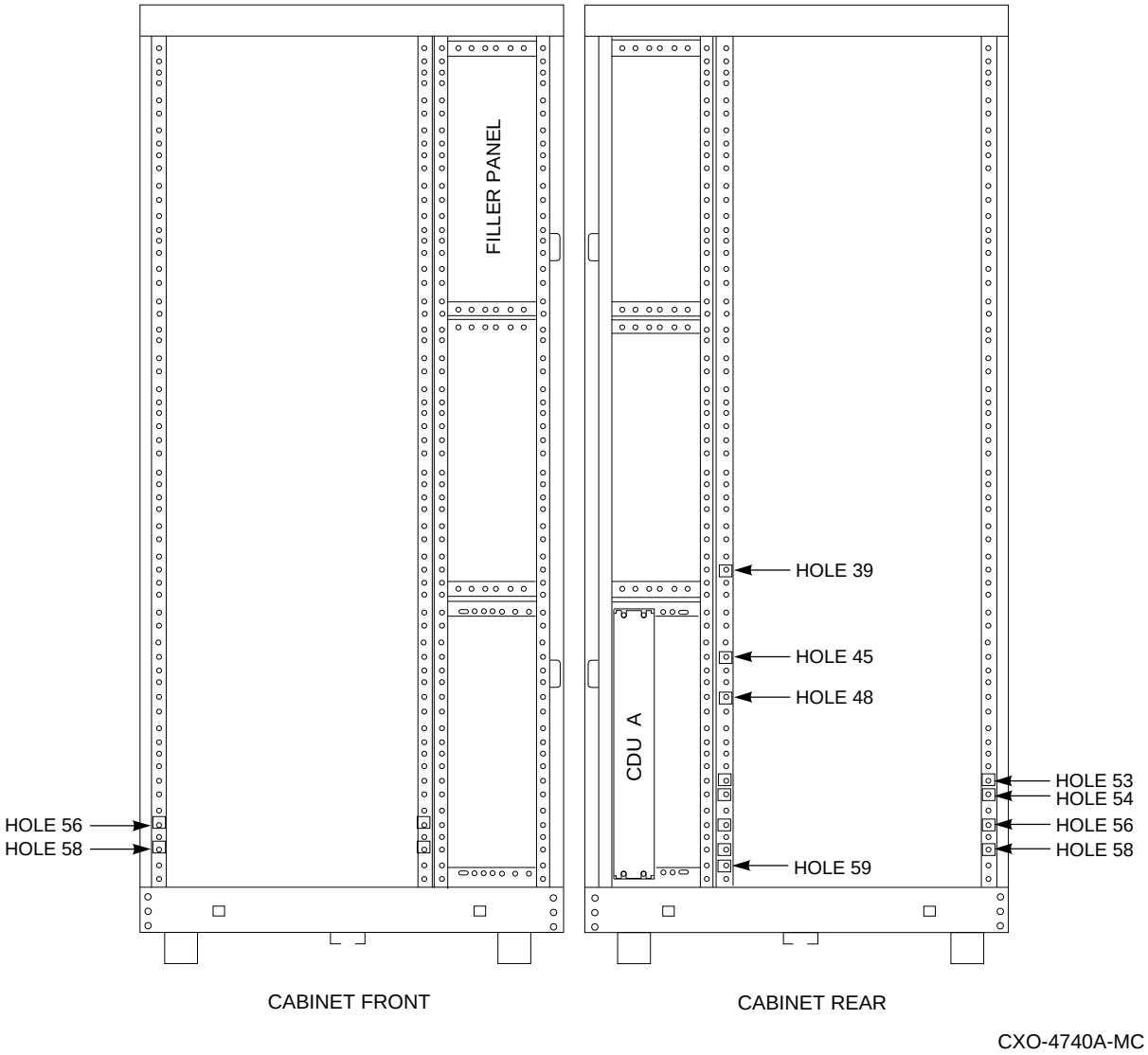
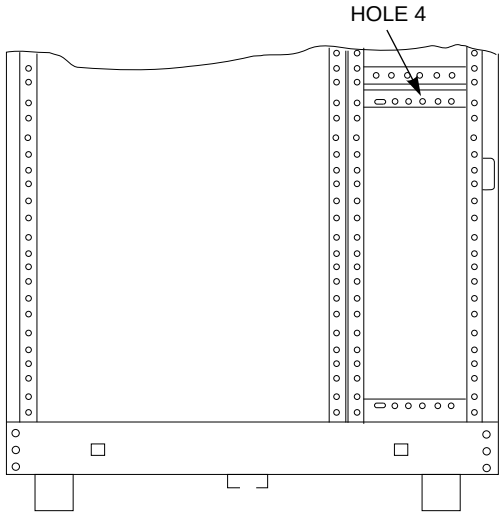


Table 2–1 U-Nut Vertical Rail Hole Locations for the SWXNA-DA/HA Upgrade

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 2–4 Install U-Nut on Lower Horizontal Rail



The cabinet is ready for installing the SWXNA-DA/HA upgrade kit.

2.4 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:

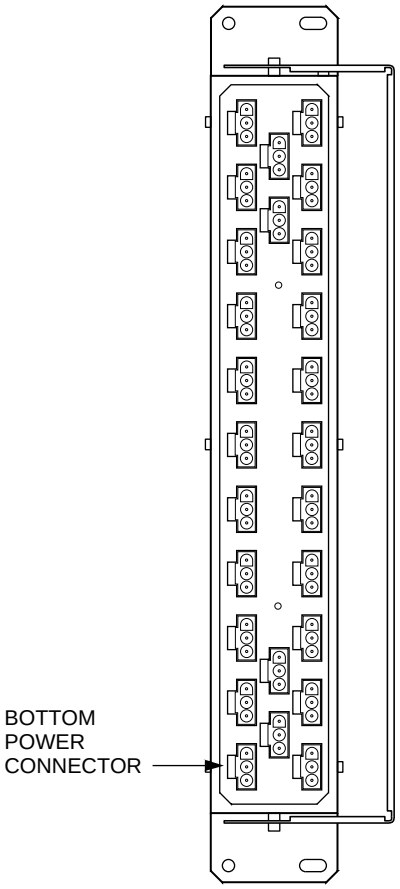
1. Connect the CDU power cords to a wall receptacle.
2. Switch the circuit breaker on the front panel of the CDUs to the ON (|) position.
3. From the front of the cabinet, locate the lowest power cord on the vertical rail. This cord will be secured to the vertical rail with cable clamps and tie wraps.
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 2–5 identifies the bottom connector on the CDU. This bottom connector is used for the server processor.

Figure 2–5 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

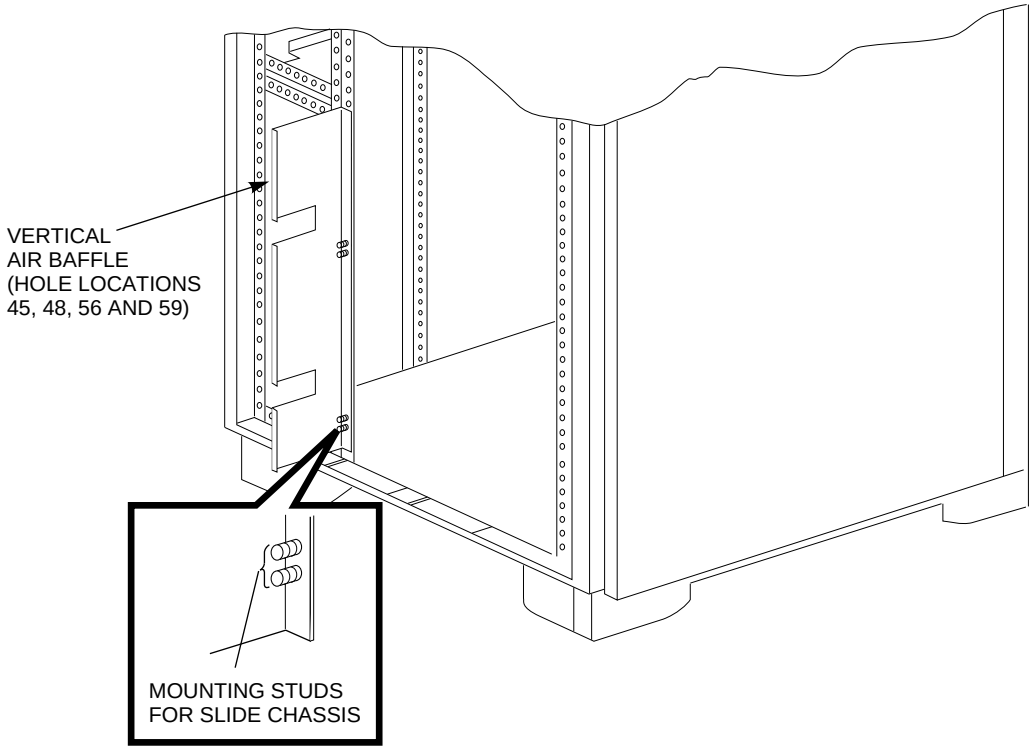
This new power cord is used later to connect power to the server processor.

2.5 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 2–6 Vertical Air Baffle Installation



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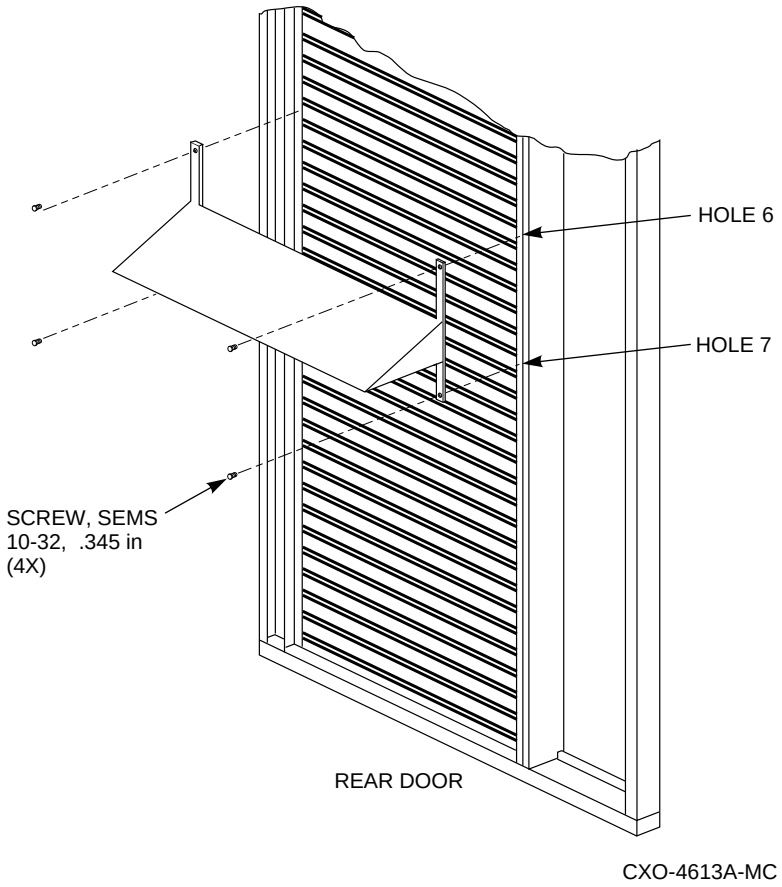
Note

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 2–6).

Figure 2–7 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 2–7).

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 1–3 for a diagram of these screws.

2.6 Installing BA35*x*–S Storage Shelves

The SCSI–2 storage devices supported by the device channel processor mount in *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 network array.

Note

A maximum of 6 shelves of storage devices may be installed in an SWXNA-Ex/Jx StorageWorks Network Storage Array.

Figure 2–8 Generalized Network Storage Array Storage Configuration with Optimal Disk Storage and No TZ8*xx*–Series Tape Drives Installed

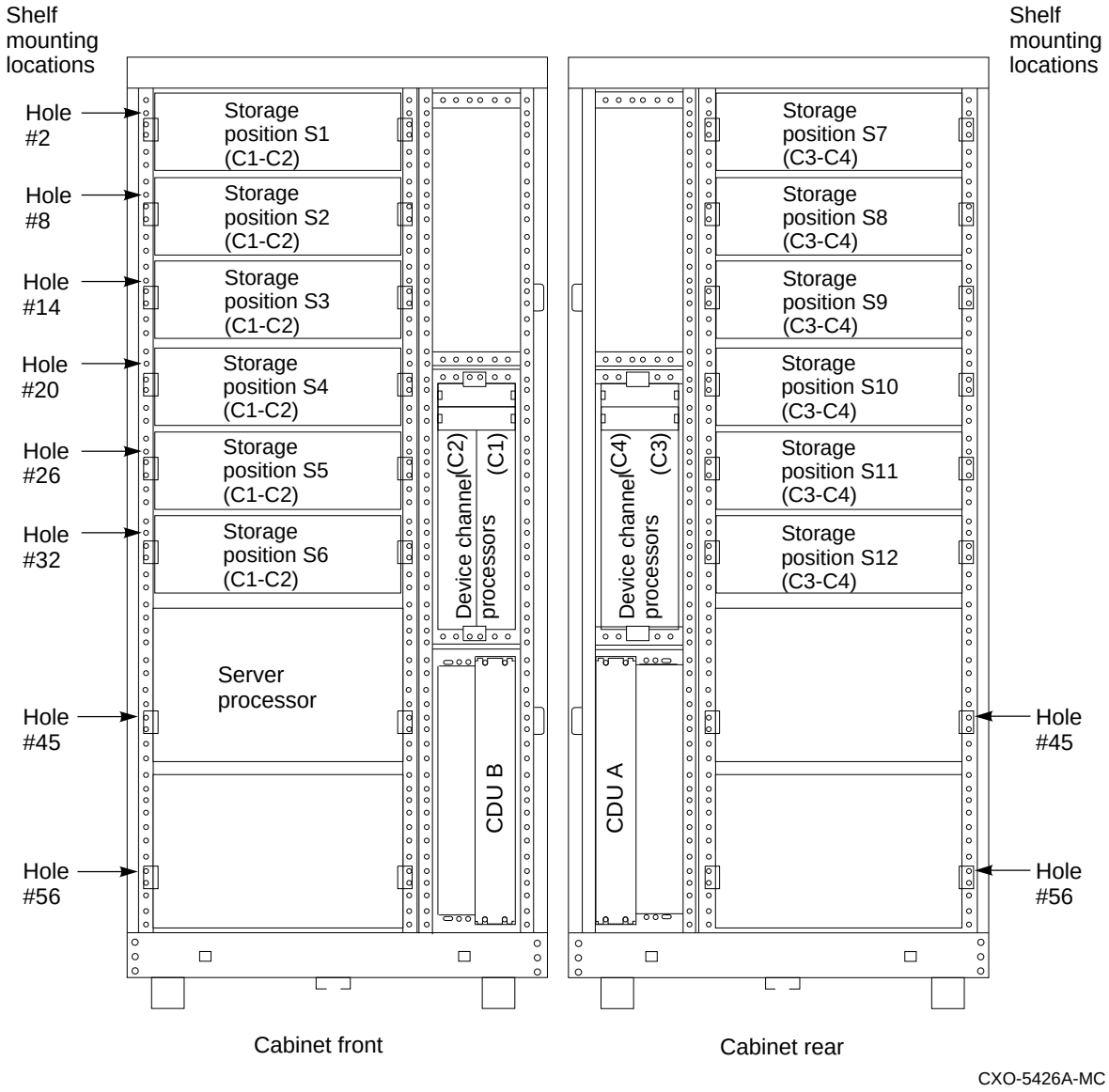
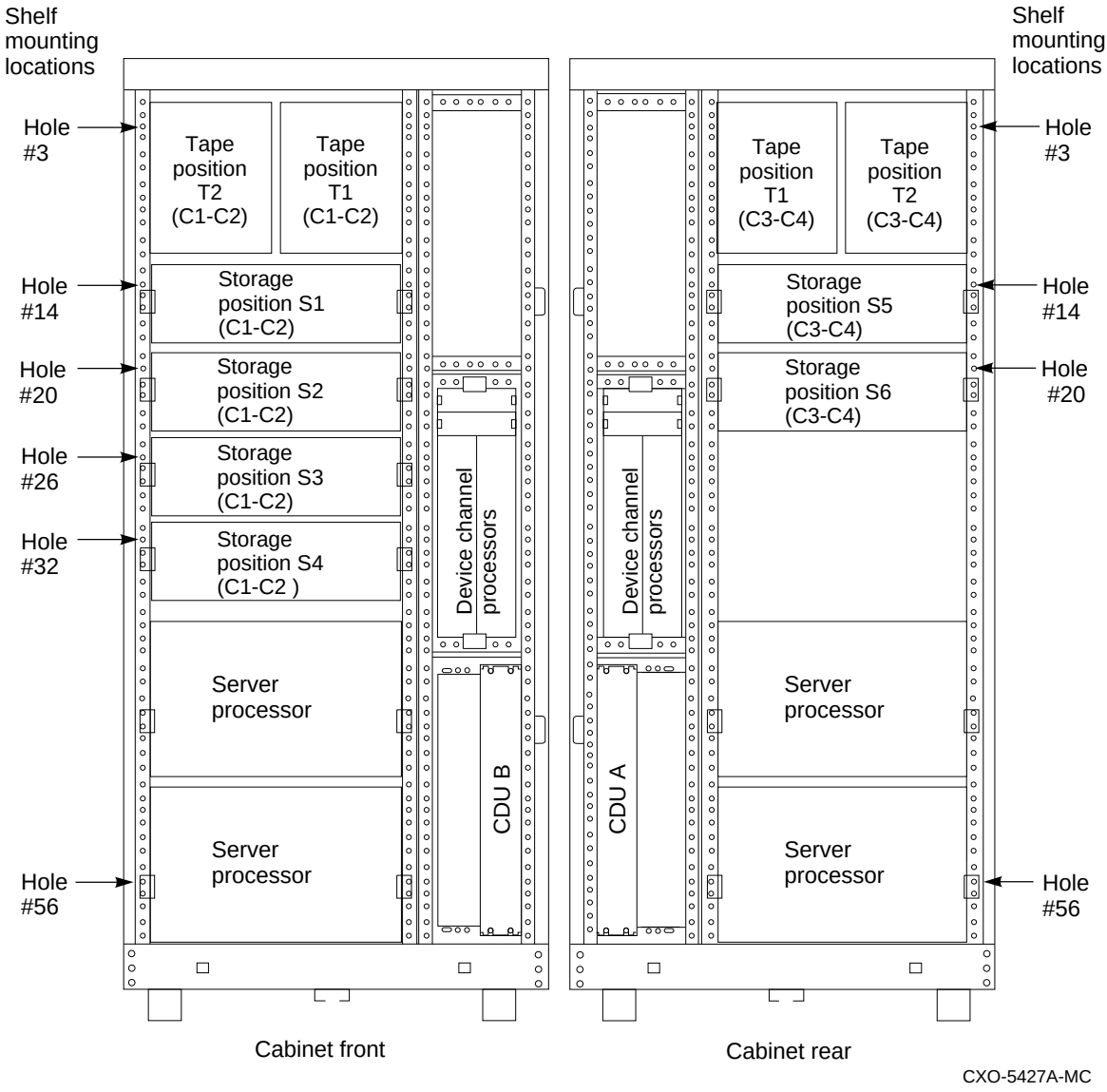


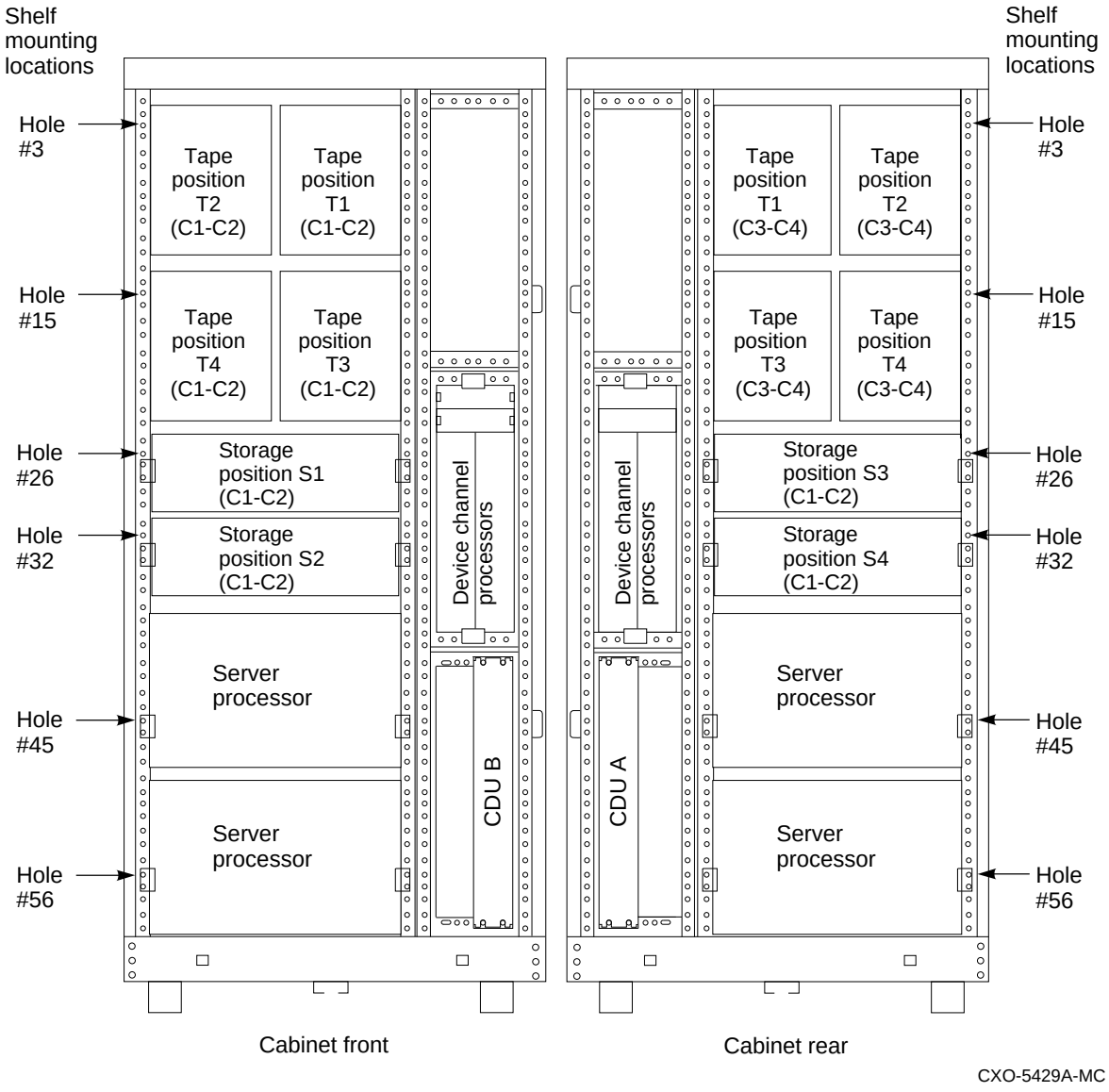
Figure 2–8 shows the location of storage shelves when disks but no TZ8*xx*–series tape drives are installed in a generalized Network Storage Array.

Figure 2–9 Generalized Network Storage Array Storage Configuration with Two TZ8*xx*–Series Tape Drives Installed



Figures 2–9 and 2–10 show the location of storage shelves when two or four TZ8*xx*–series tape drives are installed in a generalized Network Storage Array.

Figure 2–10 Generalized Network Storage Array 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.

2.7 Installing the BA350–M Shelf

If a BA350–M shelf is already installed in the front of the SW800 cabinet, go to Section 2.8. If a BA350–M shelf is not installed in the front of the SW800 cabinet, use the following guidelines to install a BA350–M shelf:

- The BA350–M shelf is used to install and support two device channel processors and their associated write-back cache modules (one for each device channel processor). The SWXNA-DA/HA upgrade uses two device channel processors. The device channel processor in slot 7 (*right* slot) is assigned SCSI ID 7. The device channel processor in slot 6 (*left* slot) is assigned SCSI ID 6.
- 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 1–3 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 2–11 BA350–M Shelf Assembly Components (Exploded View)

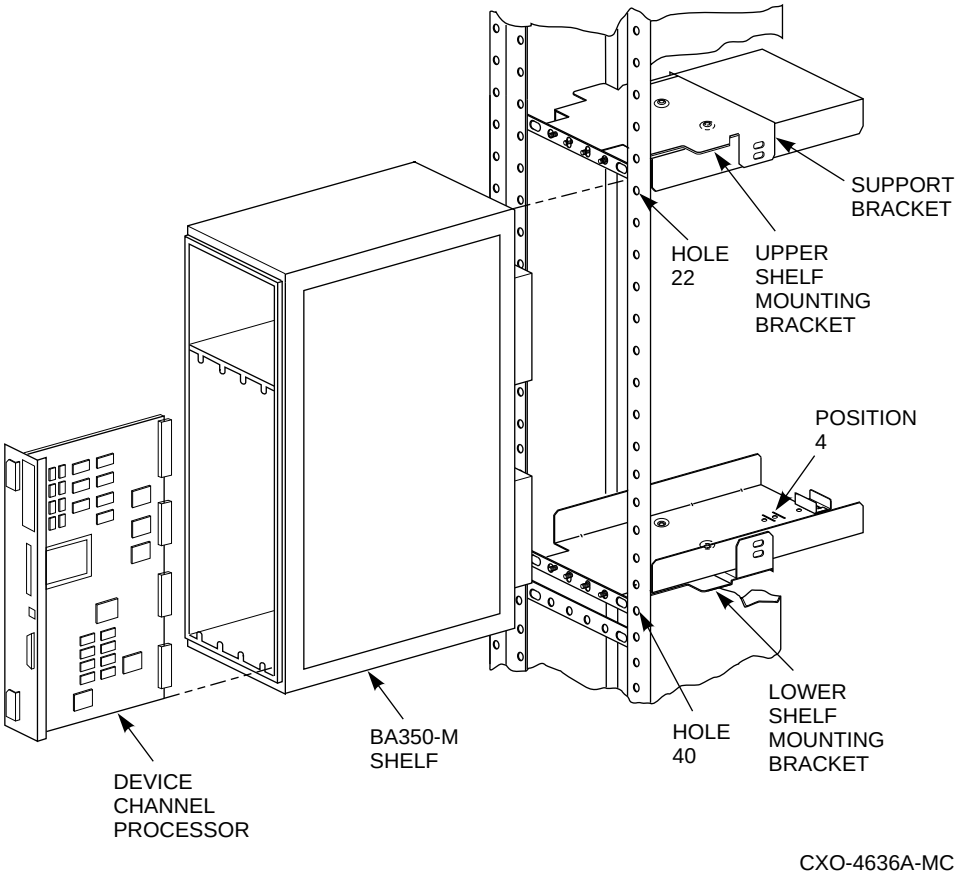


Figure 2–11 shows an exploded view of the components of the BA350–M shelf assembly:

- 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 2–12 BA350–M Shelf Mounting Bracket Installation (Lower)

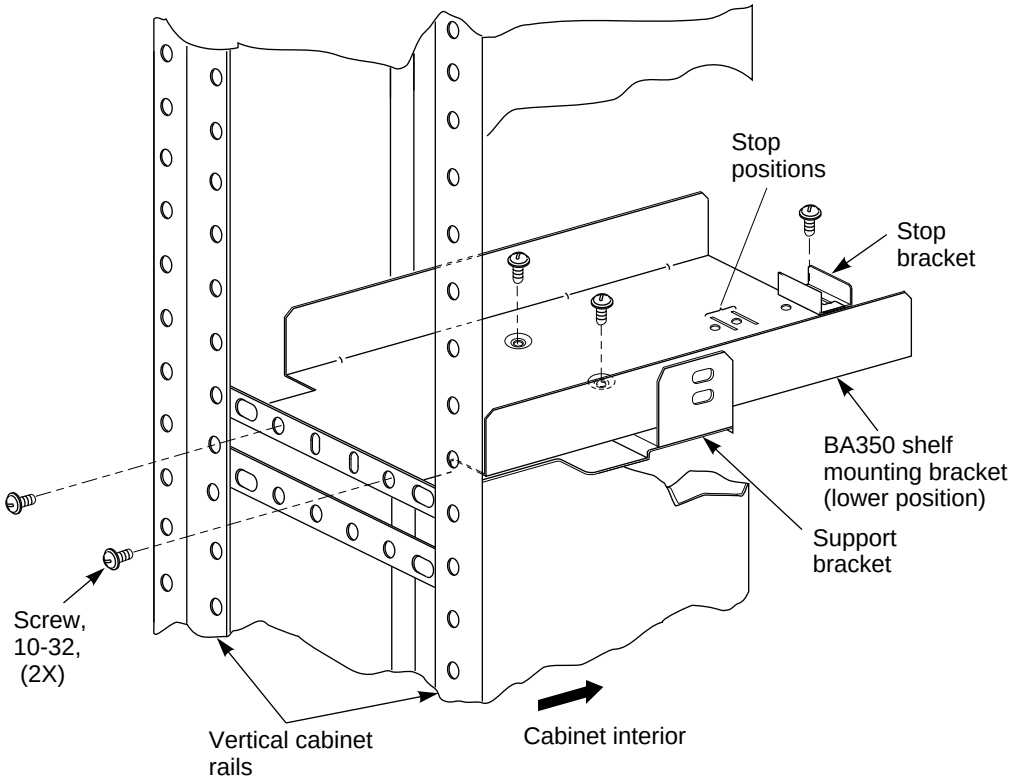


Figure 2–12 shows the proper horizontal cabinet bracket configuration for the *lower* BA350–M shelf mounting bracket.

2. Insert the tab on the stop bracket into the slot at the fourth stop bracket position (rear-most position) (see Figure 2–12). 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 2–12).
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 2–12. 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 2–11 for a diagram of the bracket locations.

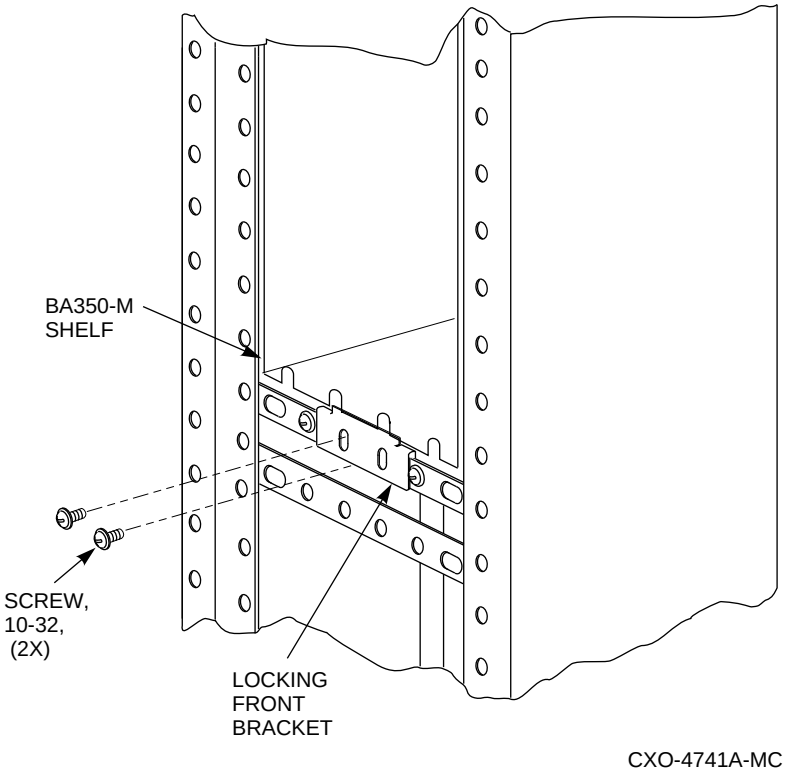
8. With the power supply end of the shelf at the top and the blowers facing the cabinet, slide the BA350–M shelf between the upper and lower shelf mounting brackets until it contacts the stop brackets.

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.

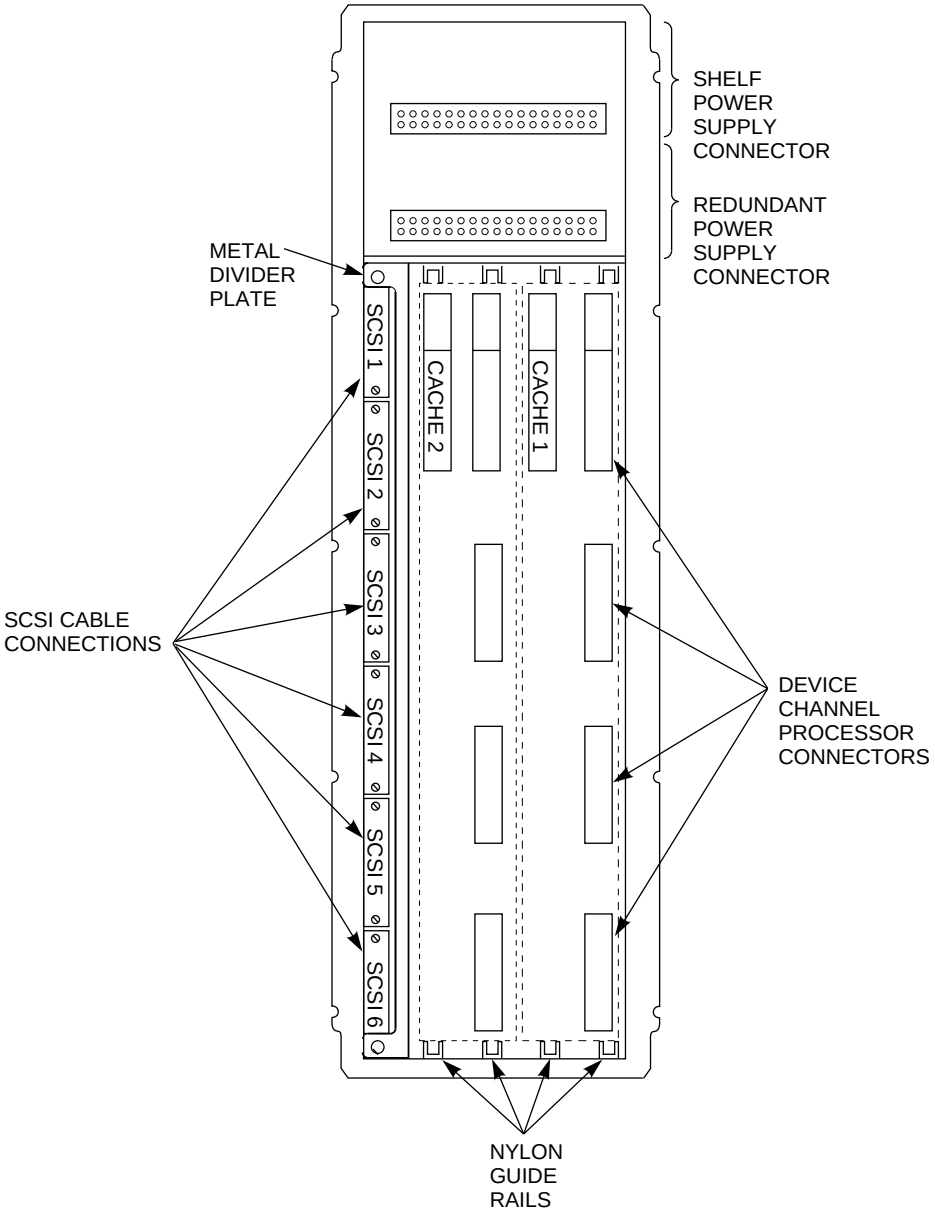
The BA350–M shelf should slide into the upper and lower shelf mounting brackets. If it binds, remove it and check the alignment of the shelf mounting brackets. The bracket mounting screws might need to be loosened slightly or adjusted to allow the brackets to align properly with the shelf. Tighten the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

Figure 2–13 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 2–13.

Figure 2–14 BA350–M Shelf Layout (Front View)



2.8 Installing BA350–M Shelf SCSI Cables

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 2–14 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 2–14 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.

2.9 Installing the Write-Back Cache Modules and HS1CP Device Channel Processors

Two write-back cache modules and two HS1CP device channel processors are installed into the BA350–M shelf for an SWXNA-Ex/Jx configuration.

Figure 2–14 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 1.3 for proper grounding procedures.

Figure 2–15 BA350–M Shelf Component Positions

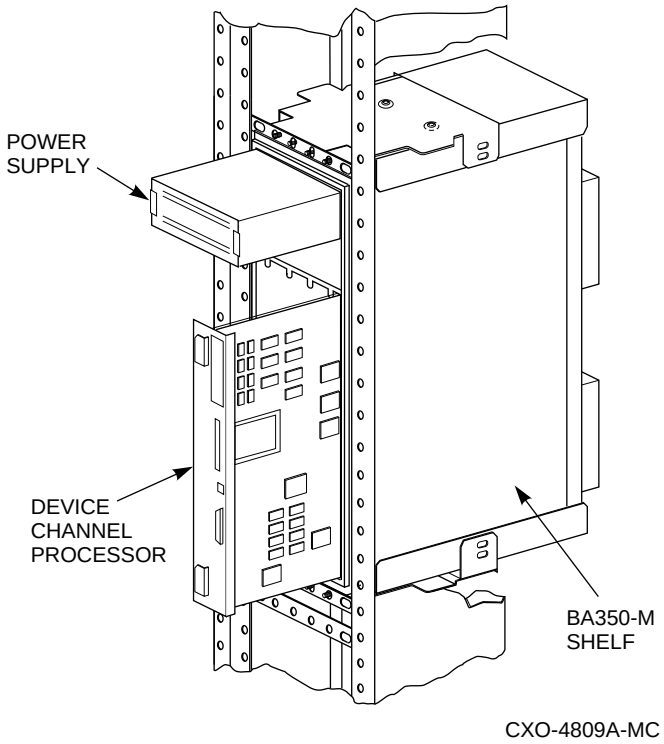


Figure 2–15 shows the installation positions of the power supply and device channel processor into the BA350–M shelf.

Installing the first write-back cache and HS1CP

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

1. Install the 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 2–14.

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 2–14).

   Figure 2–16 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.

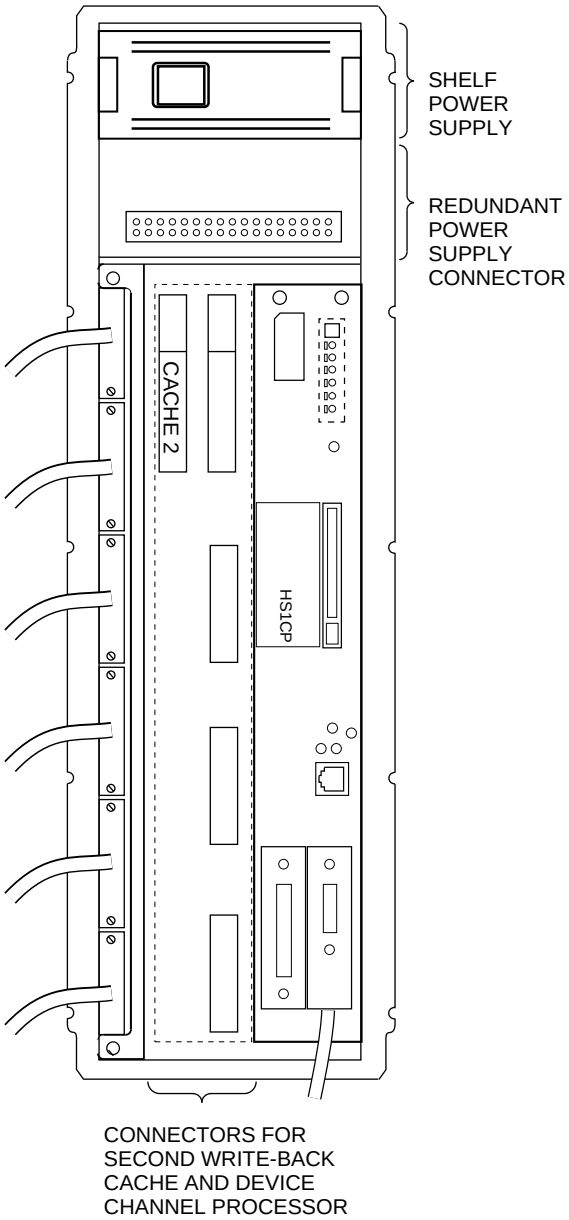
Installing the second write-back cache and HS1CP

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

1. Install the write-back cache module into the *left* side (slot 6) 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 2" in Figure 2–16.

Figure 2–16 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 2–16).

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.

Installing the Power Supply

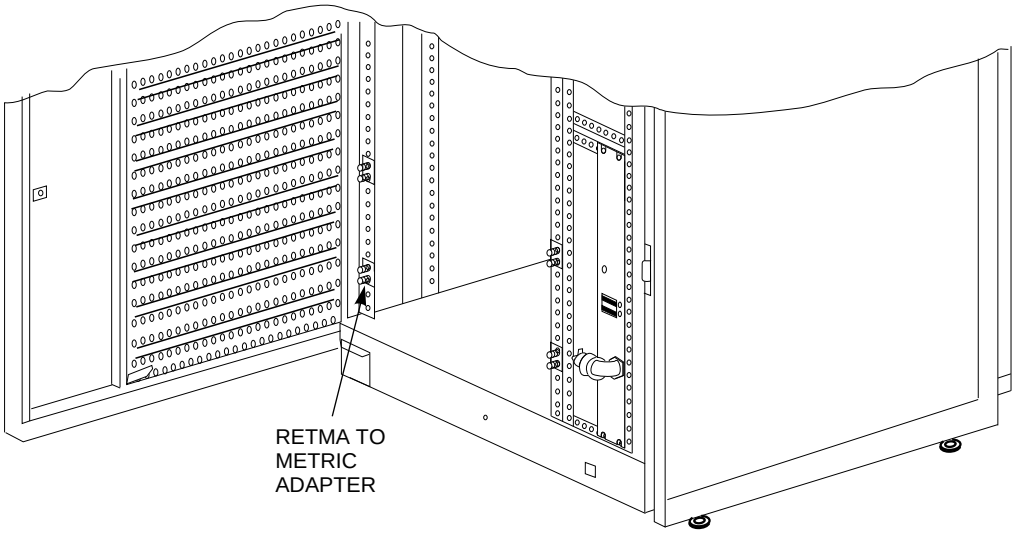
Complete the following procedure to install the power supply.

1. Remove the slot cover, if one is installed, and install the power supply into the top slot of the BA350–M shelf (see Figures 2–14 and 2–15).

   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.

2. Plug the shelf ac power cord into the front of shelf power supply.

Figure 2–17 RETMA-to-Metric Slide Adapter Location



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2.10 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 2–17).

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 2–17).

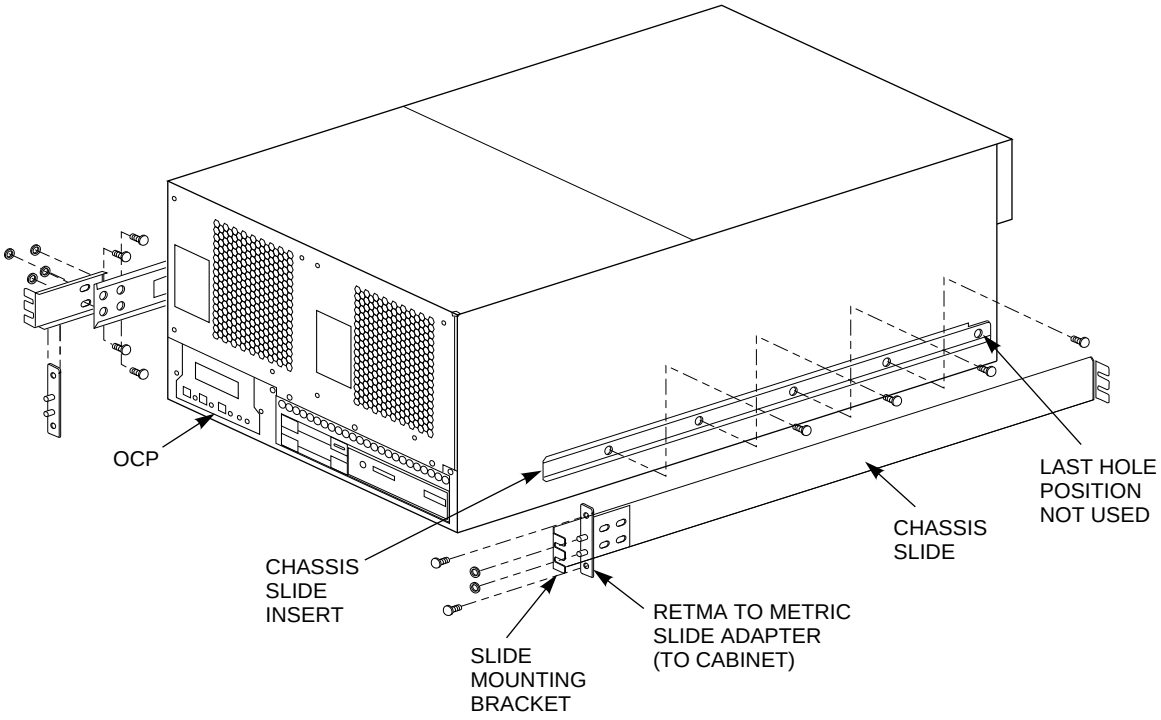
   These adapters are used to hold the chassis slides.

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 2–6).

Figure 2–18 Slide Insert Installation



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4. Attach a slide mounting bracket to the outside end of each chassis slide as shown in Figure 2–18.

   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 2–18).

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 2–18.

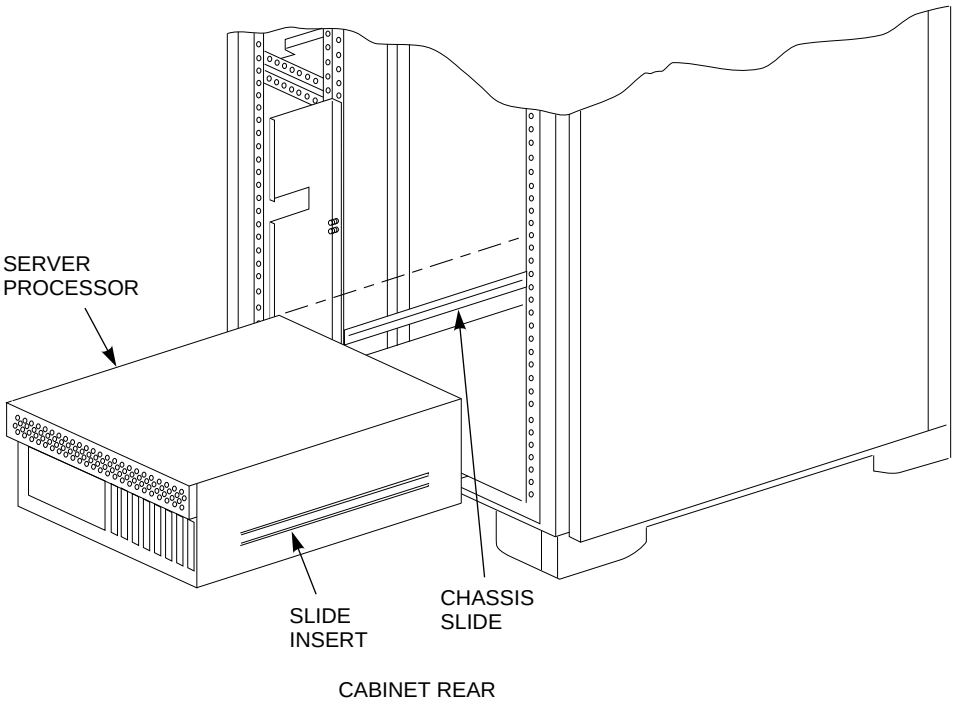
   Position the slide insert so that the metal lock tab is outside and the *notch* on each slide insert is toward the rear of the server processor (see Figure 2–18). Align the screw holes on the server processor with the holes to the slide insert.

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 2–19 Server Processor Installation



2.11 Installing the Server Processor

Use the following procedure to install the server processor:

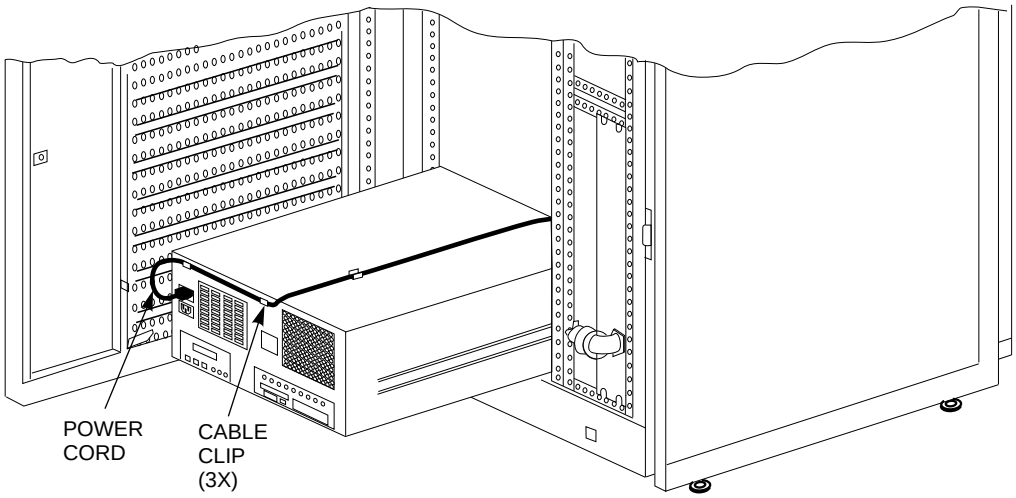
1. With the help of a second person or a lifting device, install the server processor into the chassis slide from the *rear* of the cabinet. Align the slide insert on the server processor to the chassis slides in the cabinet and slide the server processor into the cabinet until the slide insert locks on to the chassis slides (see Figure 2–19).

   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 2–20 Server Processor Cable Clip Installation



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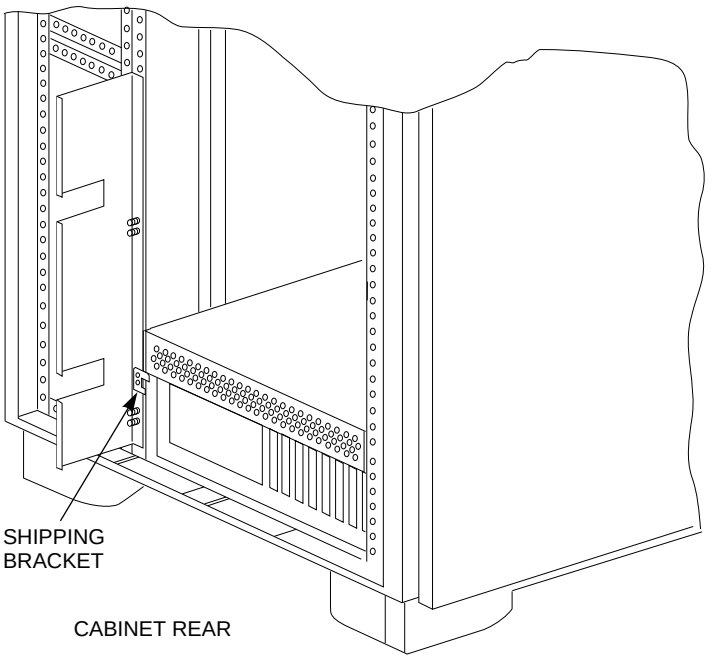
2. Attach three adhesive-backed cable clips to the new server processor.

   Two clips are attached to the front of the server processor; the third clip is attached to the top as shown in Figure 2–20.

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 2–21 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.

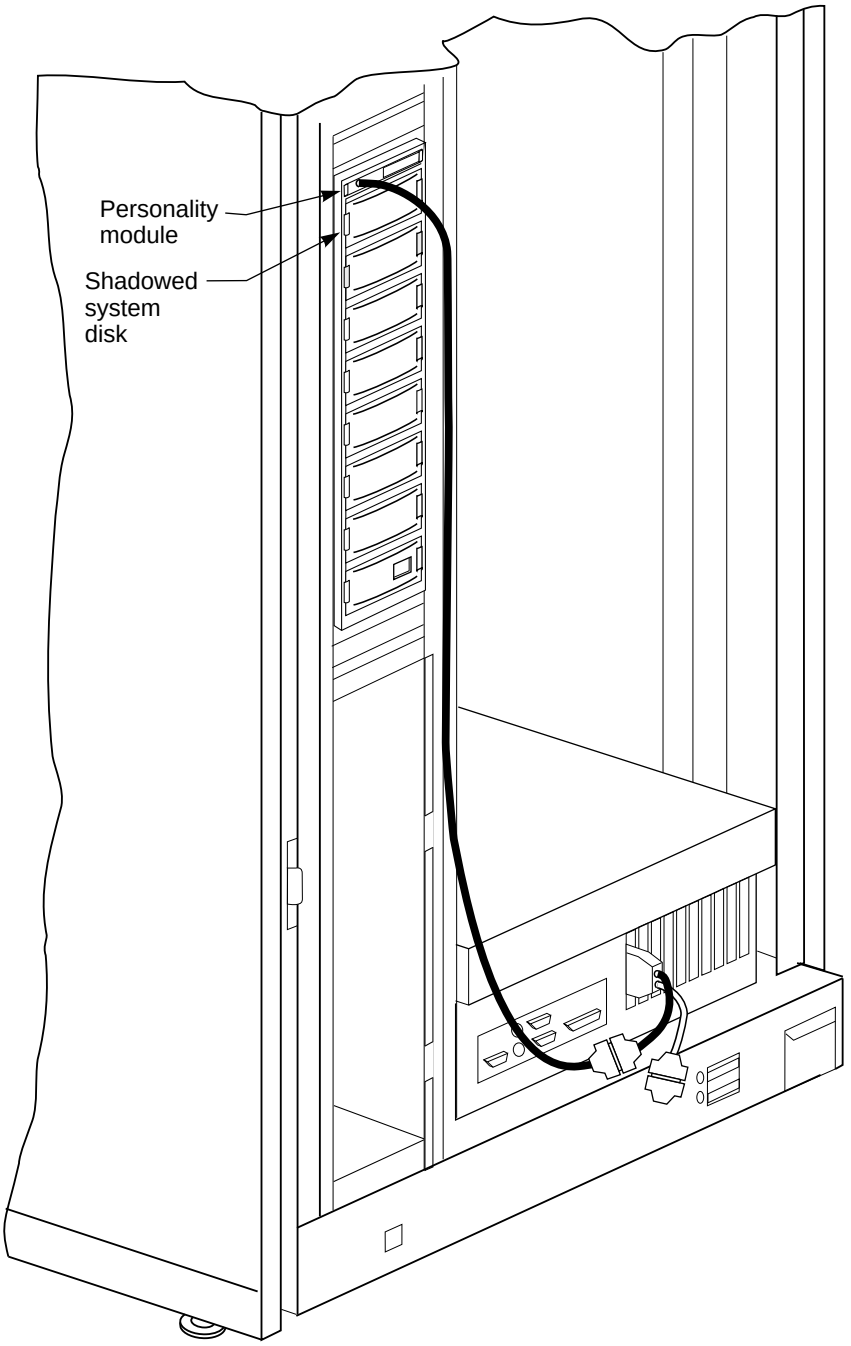
6. Tighten all screws.
7. Connect power cords to devices.
8. Replace the side panels and top cover by reversing the procedures described in Section 2.3.

This completes the server processor installation.

2.12 Installing the Shadowed System Disk

The following procedure explains how to install the shadowed system disk into the StorageWorks Network Storage Array.

Figure 2–22 Shadowed System Disk



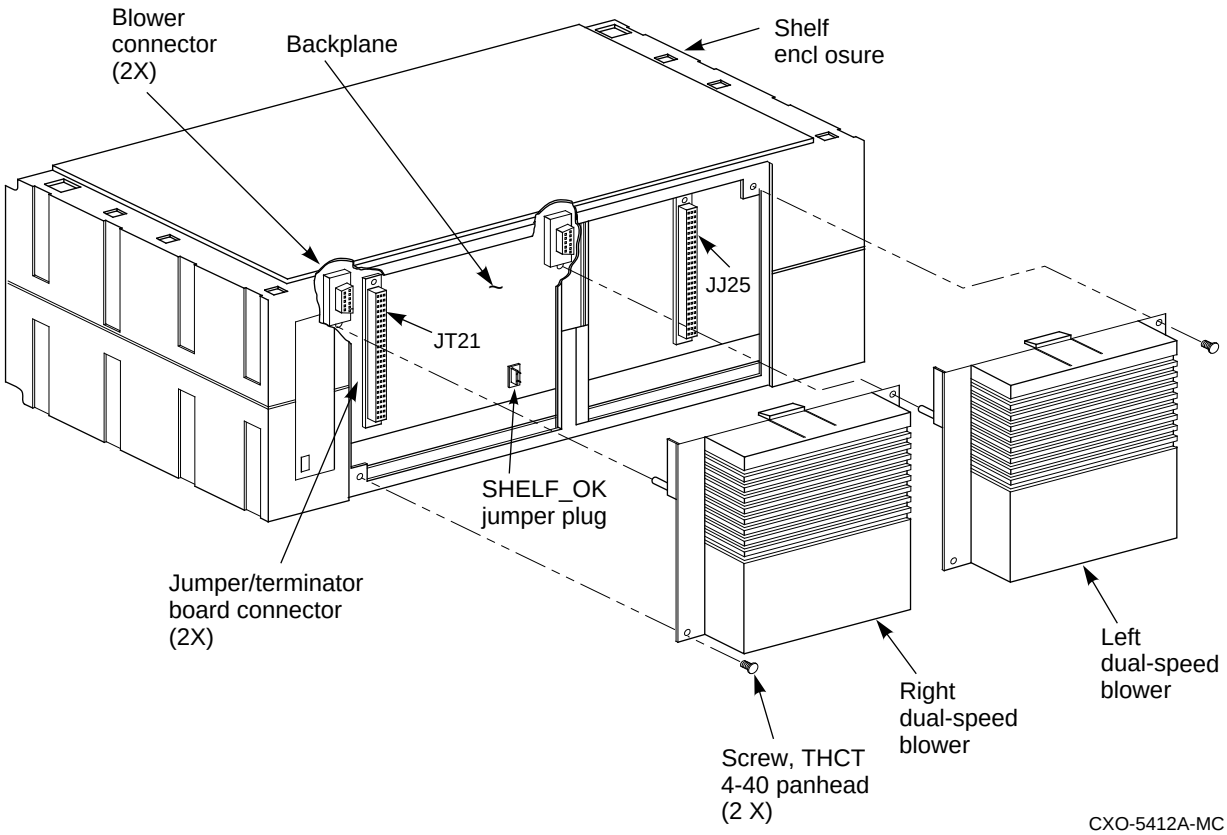
2.12.1 Installing the BA356-S Shelf

Complete the following steps to install the BA356-S shelf.

1. Remove the blank cover in the rear middle section of the left vertical cabinet channel where the shelf is to be mounted. See Figure 2–22.

2. Remove the fan assemblies from the rear of the BA356–S shelf and ensure the jumper board is installed on connector JT21 and the terminator board is installed on connector JJ25 as shown in Figure 2–23. Also verify that the SHELF_OK jumper is installed in position 1. If not, install the jumpers and terminator in the correct location and reattach the fan assemblies.

Figure 2–23 BA356-S Jumper and Terminator Locations



3. Install the mounting brackets for the BA356-S shelf.
4. Slide the BA356-S shelf into the cabinet and secure in place.

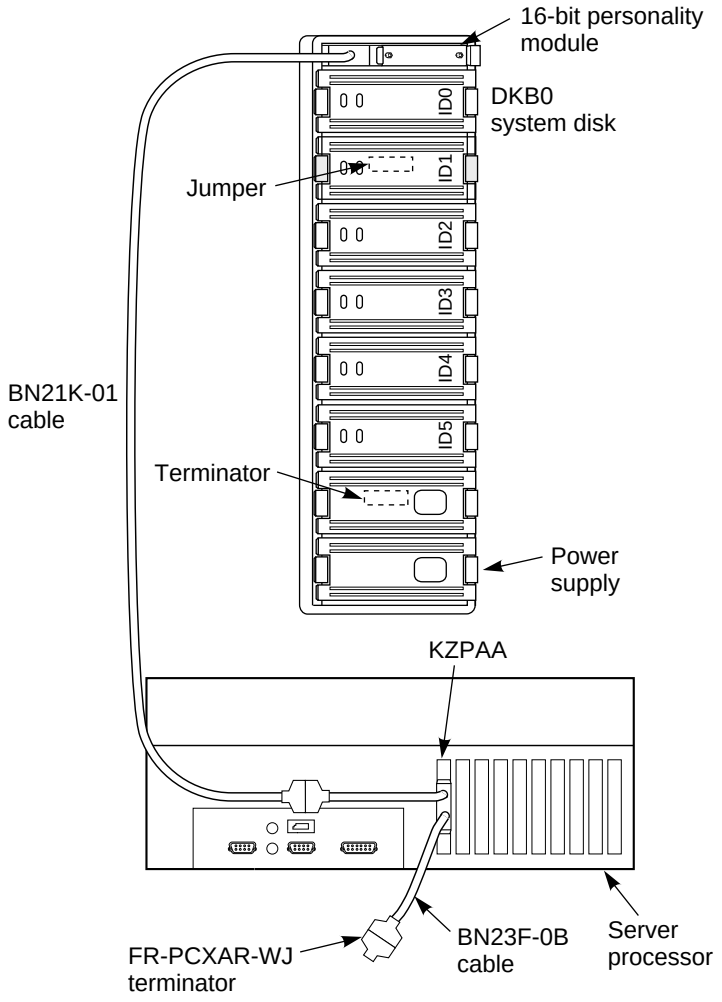
Note

The shelf must be mounted so the power supply can be installed in the bottom of the shelf.

2.12.2 Installing SCSI Cables

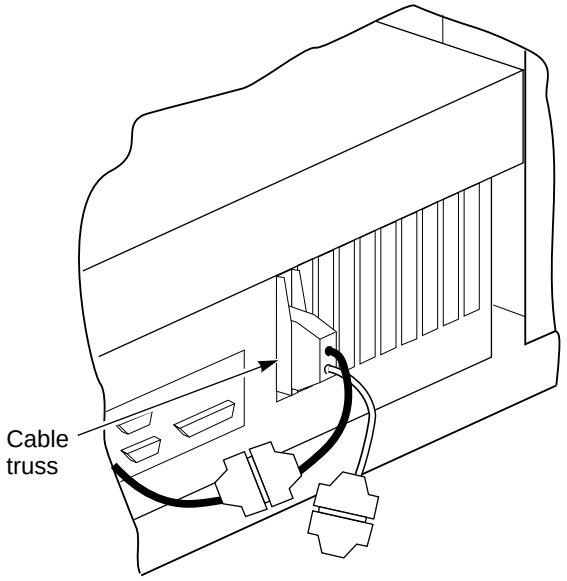
Complete the following steps to connect the SCSI cables to the system disk BA356-S shelf. Figure 2–24 shows the correct cabling.

Figure 2–24 Shadowed System Disk Interconnection



1. Attach the cable truss to the KZPAA connector as shown in Figure 2–25.
2. Attach Y-cable BN23F-0B to the KZPAA connector.

Figure 2–25 KZPAA Cable Truss



3. Attach the terminator to bottom cable of the Y-cable.
4. Attach the BN21K-01 SCSI cable to the top cable of the Y-cable.
5. Attach right angle connector of BN21K-01 cable into personality module.

2.12.3 Installing Components into the BA356 Shelf

Install the components into the BA356-S shelf by completing the following steps as shown in Figure 2–22.

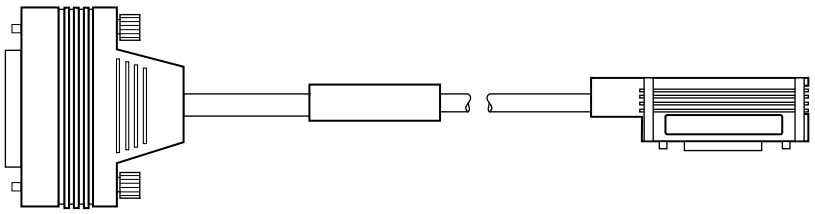
1. Install the Personality Module into the SCSI connector at the top of the BA356-S shelf.
2. Install the system disk into slot 0 of the BA356-S shelf.
3. Install the power supply into the bottom of the BA356-S shelf.

2.13 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 processors:

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 2–26).
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 2–26).

Figure 2–26 Internal Bus Cable Connectors



CXO-5044A-MC

CAUTION

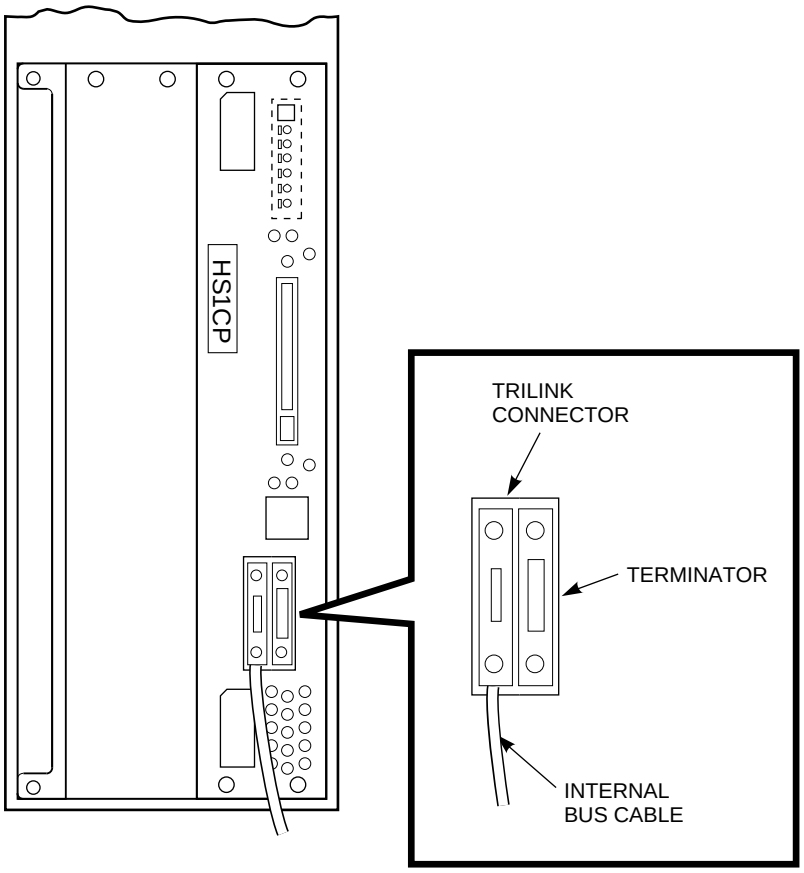
Currently, component damage can result if internal bus cables are connected or disconnected with power applied, *unless* the mating guide (Digital part number 74–49066–01) is installed around the outside edge of the HS1CP port connector. HS1CP modules are shipped from the factory with the mating guide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

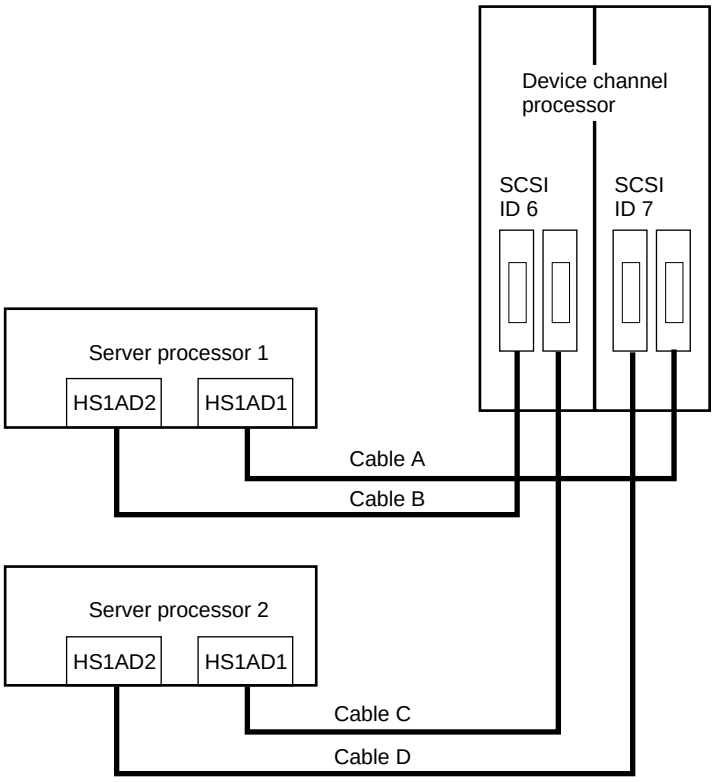
See Figure 2–27 for where to attach the internal bus cable to the trilink connector on each HS1CP. Attach the internal bus cable from the (*right*) HS1AD in EISA slot 8 to the right HS1CP. Attach the internal bus cable from the (*left*) HS1AD in EISA slot 7 to the left HS1CP. Figure 2–28 shows the cabling scheme for your network array.

Figure 2–27 Trilink Connector with Cable and Terminator



CXO-4621A-MC

Figure 2–28 Internal Bus Cables



CXO-4703C-MC

3. Plug a bus terminator into the other trilink connector on each HS1CP (see Figures 2–29 and 2–30).

Figure 2–29 Trilink Connector

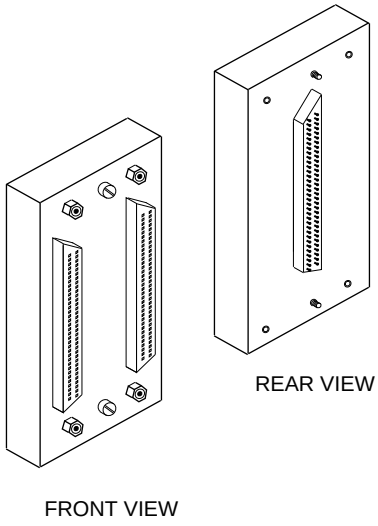
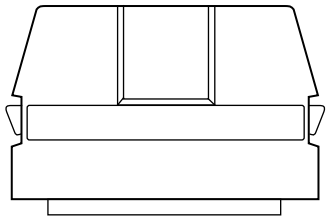


Figure 2–30 Terminator



4. A PCMCIA program card should be installed in each HS1CP. If not, locate the PCMCIA program cards in the HS1CP Operating System Version 2.7 kits and install a card into each HS1CP program card slot (see <REFERENCE>(both)).
5. Attach the ESD cover over the program card for each HS1CP.

2.14 Setting HS1CP Parameters

Complete the following sections to setup the *right* HS1CP as HS1CP1.

2.14.1 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. Switch the circuit breaker on the front panel of the CDUs to the ON (|) position.
2. Depress the power button on the front of the server processor.
3. Make sure the power switch on the back of the terminal is OFF (◯).
4. Connect one end of the terminal cable to the back of the terminal.

5. Connect the other end of the terminal cable to the EIA terminal port on the front of the device channel processor (see <REFERENCE>(both)).
6. Turn the terminal power switch to the ON (|) position.
7. 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.
8. 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.

2.14.2 Setting the Initial Parameters for the HS1CP

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.

2.14.3 Installing the Write-Back Cache, RAID, and Disk Mirroring License Keys

When you add a device channel processor, you must install new *license keys* for the write-back cache, RAID, and disk mirroring features. This section describes the utility used to install the license keys.

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.

2.14.3.1 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

2.14.3.2 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.

2.14.3.3 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.

2.14.3.4 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. Enter the license key for write-back caching, RAID, and MIRR at this time. 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 64.19.*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)
    3. Enter new license key+CRC for MIRR   (current key is invalid)
    0. Return to main menu
Enter selection (0:3) [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
    3. Enable MIRR
    0. Return to main menu
Enter selection (0:3) [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] ? Return ❺
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
```

2.15 Setting Parameters for the Second HS1CP

Complete the procedures starting in Section 2.14.1 for the second (*left*) HS1CP, substituting HS1CP2 and ID 2 for the initial parameter setup.

2.16 Creating a Device Channel Processor Dual-redundant Pair

Both HS1CPs must have the same storage configuration in dual-redundant configurations. Once configured, any storage configuration is automatically transferred between the HS1CPs. Use the following procedure to set up the HS1CPs:

1. From either HS1CP prompt, issue the following command:

   ```
   HS1CP2> SET FAILOVER COPY = OTHER_CONTROLLER
   ```

   A message similar to the following appears:

   ```
   Copyright Digital Equipment Corporation 1993, 1996. All rights reserved.
   HSD40 Firmware version V27D-0, Hardware version AX01
   Last fail code: 20150100
   Press " ?" at any time for help.
   ```

   Note

   During this time, your connection to the HS1CP is broken and you cannot communicate with the device channel processor until it completes its automatic restart. Restart is complete when you can press the RETURN key and the HS1CP prompt appears on the terminal screen. This may take as long as a minute.

2. When restart is complete and the HS1CP 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).

3. 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).

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

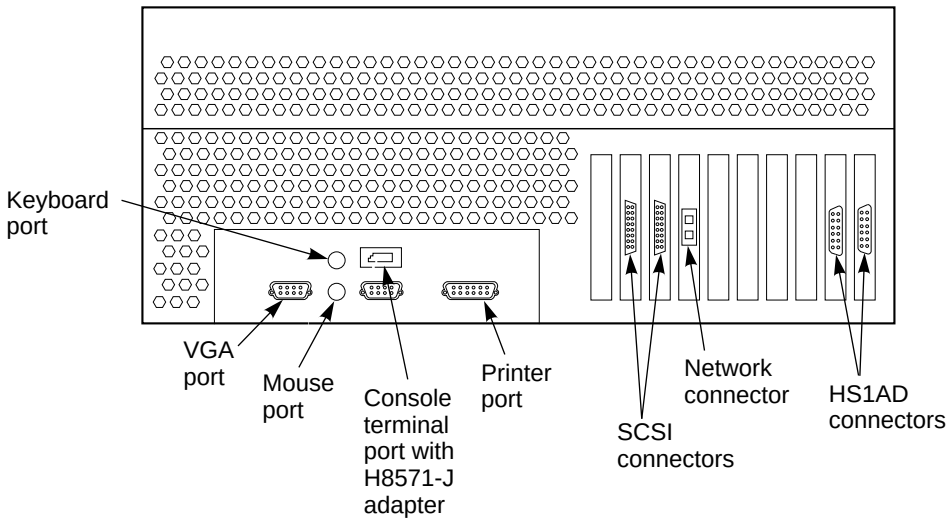
2.17 Connecting a Terminal to the Network Array

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

Use the following procedure to connect 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 2–31 Connecting to the Terminal Port of the Network Array



3. Connect the other end of the terminal cable to the EIA terminal port on the rear of the server processor using an H8571–J adapter as shown in Figure 2–31.
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 power switch on the server processor OCP. The terminal screen displays a >>> prompt after power is applied to the server processor.

2.18 Setting up the Server Processor

You have now completed the hardware installation of the SWXNA-DA/HA option kit. Before you can put your network array on line you must perform various system management tasks to customize the system for your use. The shadowed system disk you installed in this procedure is blank.

2.18.1 Setting up the Server Processor Console Parameters

Table 2–2 shows the correct parameter set up for the server processor.

Table 2–2 Server Processor Console Parameters

Parameter	Setting
boot_osflags	0,0
boot_reset	on
bootdef_dev	DKB0
pka0_disconnect	1
pka0_fast	1
pka0_host_id	7
pkb0_disconnect	1
pkb0_fast	1
pkb0_host_id	7
scsi_poll	on
console	serial
os_type	OpenVMS

Complete the following procedure for your server processor to verify that the settings are correct.

1. Connect a terminal to the server processor if you have not already done so.
2. For each parameter listed in Table 2–2 type SHOW <PARAMETER> to view the current setting. For example:

```
>>> SHOW boot_osflags
boots_osflags  0,0
```

3. For any parameter which is different than the value listed in Table 2–2, type SET <PARAMETER> <PARAMETER VALUE> to set the proper value. For example:

```
>>> SET boot_osflags 0,0
```

2.18.2 Loading the Operating System

Now you must boot your new array and load the OpenVMS Alpha operating system onto the system disk. Complete the following steps to load the operating system.

1. At the boot prompt, use the SHOW DEVICE command to identify the CD ROM.

```
>>> SHOW DEVICE DK

dka500.5.0.6.0             DKA500                        RRD45  1645
dkb0.0.0.11.0              DKB0                           RZ28  442D
```

2. Insert the V2.1 CD ROM into the CD ROM drive and boot.

```
>>> BOOT DKA500

(boot dka500.5.0.6.0 -flags 0,0)
block 0 of dka500.5.0.6.0 is a valid boot block
reading 1004 blocks from dka500.5.0.6.0
bootstrap code read in
base = 154000, image_start = 0, image_bytes = 7d800
initializing HWRPB at 2000
initializing page table at 146000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

    OpenVMS (TM) Alpha Operating System, Version V6.2-1H3

    Copyright (c) 1996 Digital Equipment Corporation.  All rights reserved.

    +------------------------------------------------------------------+
    |                          Welcome to the                          |
    |               StorageWorks (TM) Network Storage Array            |
    |                        Standalone Environment                    |
    +------------------------------------------------------------------+

    System initialization will take about one minute.  Please wait...

    This Network Storage Array has one server processor.

    +------------------------------------------------------------------+
    |             StorageWorks Network Storage Array CD Menu           |
    +------------------------------------------------------------------+

    You can install the OpenVMS Alpha Operating System, migrate to a
    shadowed system disk, or execute DCL commands and procedures to
    perform "standalone" tasks, such as backing up the system disk.

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

    Please choose one of the following:

        (1) Install the OpenVMS Alpha Operating System, Version V6.2-1H3
        (2) Migrate to shadowed system disk
        (3) Execute DCL commands and procedures
        (4) Shut down this system

Enter your choice: (1/2/3/4) 1
```

3. Select option 1 to install the OpenVMS Alpha Operating System. The following printout shows a typical installation.

```
    +------------------------------------------------------------------+
    |     Install the OpenVMS Alpha Operating System, Version V6.2-1H3 |
    +------------------------------------------------------------------+

    The installation procedure will ask a series of questions.

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

    The following disk will compose the StorageWorks Network Storage Array
    shadowed system disk, which will be called DSA100: by default:

      $13$DKB0:     RZ28      Label = SOME_LABEL    Total blocks = 4110480

    WARNING: The above disk will be initialized.
             All system and user data will be lost.

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

    Initializing and mounting target shadow set (DSA100:)...
```

```
*** DEC AXPVMS VMS V6.2-1H3: OpenVMS Operating System, Version V6.2-1H3

    COPYRIGHT (c) 14-MAY-1996 -- All rights reserved

    Digital Equipment Corporation

    DECnet Phase IV / DECnet/OSI Support: YES

    Programming Support: YES

    System Programming Support: YES

    Utilities: YES

    Documentation Manuals: YES

    Support for DECwindows: YES

        video fonts: YES

%PCSIUI-I-DONEASK, execution phase starting
The following product will be installed:
DEC AXPVMS VMS V6.2-1H3
%PCSI-I-VOLINFO, estimated space information for volume DISK$ALPHASYS
-PCSI-I-VOLSPC, 353584 required; 4110080 available; 3756496 net
Portion Done: 0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
The following product has been installed:
DEC AXPVMS VMS V6.2-1H3

    Please wait while additional installation tasks complete...

        Portion Done: 100%

    Installation of the OpenVMS Alpha Operating System is complete.

    When the newly installed system is first booted, the StorageWorks
    Network Storage Array Software Customization Procedure will ask you
    to enter information required to custom configure the network array
    for your site.

    +---------------------------------------------------------------------+
    |             StorageWorks Network Storage Array CD Menu              |
    +---------------------------------------------------------------------+

    You can install the OpenVMS Alpha Operating System, migrate to a
    shadowed system disk, or execute DCL commands and procedures to
    perform "standalone" tasks, such as backing up the system disk.

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

    Please choose one of the following:

        (1) Install the OpenVMS Alpha Operating System, Version V6.2-1H3
        (2) Migrate to shadowed system disk
        (3) Execute DCL commands and procedures
        (4) Shut down this system

Enter your choice: (1/2/3/4) 4
```

4. Select option 4 to shut down the system.

```
    Shutting down the system.  Please wait...

        SYSTEM SHUTDOWN COMPLETE

halted CPU 0

halt code = 5
HALT instruction executed
PC = ffffffff8005a1dc
waiting for pdq to start...
>>>
```

2.19 Customizing Network Array Parameters

Now you are ready to set up the network array to go on-line. Complete the following steps to complete the installation.

1. Boot your system disk to start the Software Customization Procedure (SCP). The SCP is used to set up the initial system parameters.
2. Configure your storage devices using CFMENU.
3. Customize the read cache for your system.
4. Run the Network File System (NFS™) setup if your network array is to serve UNIX or PC systems.
5. Integrate your network array into the network.

The procedures to complete these steps are in the *Getting Started with the StorageWorks Network Storage Array*. Run the procedures in the following chapters to complete the SWXNA-DA/HA installation.

- Customizing Network Array Operating Parameters
- Configuring the StorageWorks Network Storage Array Storage Devices
- Managing the Network Storage Array's Read Cache
- Network File System
- Integrating the Network Array into the Network System

A

StorageWorks Network Storage Array Specifications

A.1 StorageWorks Network Storage Array Specifications

Table A–1 provides the specifications for the various StorageWorks Network Storage Array configurations.

Table A–1 StorageWorks Network Storage Array Specifications

	Models SWXNA-Ex/Jx	Model SWXNA-Ax/Fx
Storage Capacity		
Maximum number of disks	36 redundant connections	36 redundant connections
Maximum disk capacity using RZ29 disks	154 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.	
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)

(continued on next page)

Table A–1 (Cont.) StorageWorks Network Storage Array Specifications

	Models SWXNA-Ex/Jx	Model SWXNA-Ax/Fx
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 Network Storage Array SWXNA–Bx/Gx/SWXNA–Cx Specifications

Table A–2 StorageWorks Network Storage Array SWXNA–Bx/GX/SWXNA–Cx Specifications

	Model SWXNA–Bx/Gx	Model SWXNA–Bx /Gx with SWXNA–Cx 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.	
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)

(continued on next page)

Table A–2 (Cont.) StorageWorks Network Storage Array SWXNA–Bx/GX /SWXNA–Cx Specifications

	Model SWXNA–Bx/Gx	Model SWXNA–Bx /Gx with SWXNA–Cx Installed
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)

HIG

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

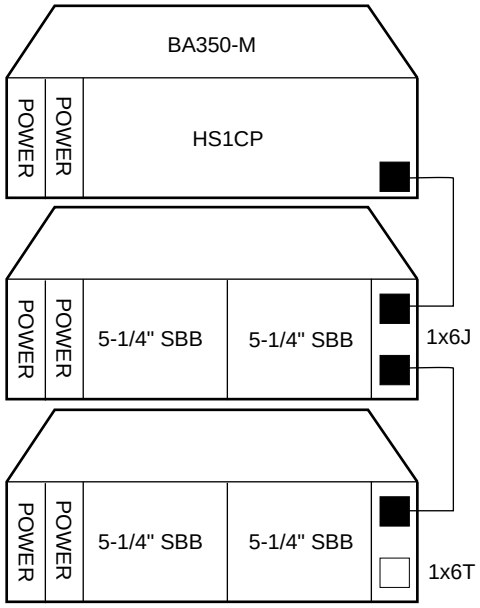


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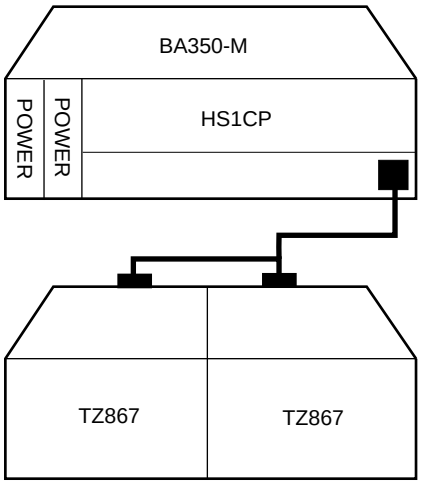
Figure B–2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

Figure B–2 Adjacent Devices on a Single Port



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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.

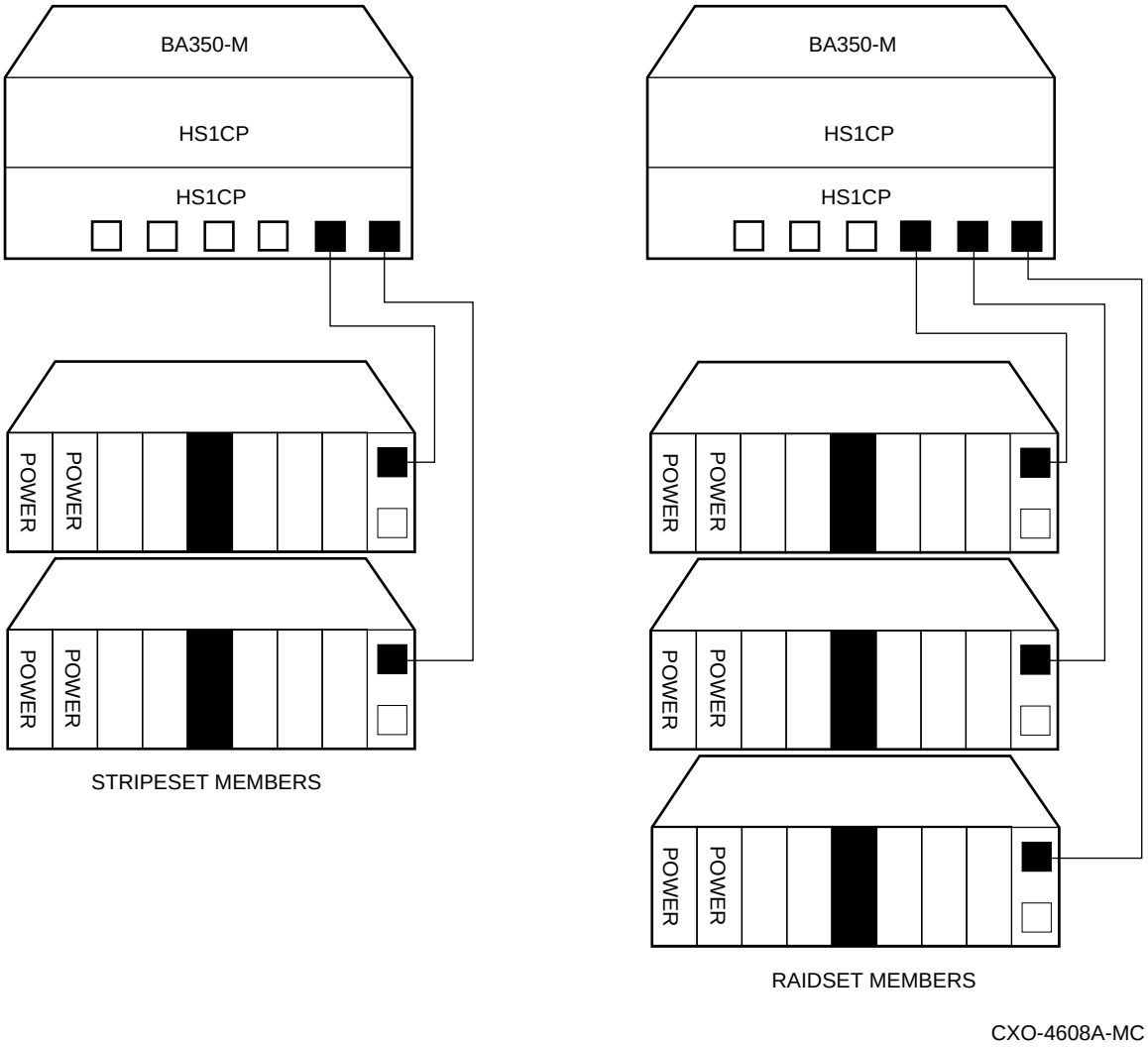
B.2.5 Optimal Availability Configurations

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

Network Storage Array Interconnect Cables

Table C–1 provides a list of cables to connect the SWXNA-*xx* Network Storage Array to the network.

Table C–1 StorageWorks Network Storage Array Interconnect Cables

	SAS Interconnect		DAS Interconnect	
Adapter	**Digital Part#**	**Connector Type**	**Digital Part#**	**Connector Type**
DEFPA–DA FDDI (DAS)	BN34D–1	SC–MIC	BN34D–1	SC–MIC
	BN34D–3	SC–MIC	BN34D–3	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
			BN34A–3	SC–ST
			BN34A–10	SC–ST
			BN34A–20	SC–ST
			BN34A–30	SC–ST
DEFPA–MA CDDI (DAS)			BN25H–03	UTP/RJ45

†For connections greater than 10 meters, use Computer Crafts, Inc. cables:
F1511110–20 SC–MC
F1511110–30 SC–MC

Key for Connector Type

- The SWXNA–*xx* FDDI adapter uses an SC-type connector.
- Bridges and concentrators use MIC-type connectors.
- A SAS adapter cannot be functionally attached directly to an FDDI ring.
- The SWXNA–*xx* FDDI adapter connects to an FDDI ring through bridges and concentrators using an SC–MIC connection. This adapter also can attach directly to an FDDI ring using SC- or ST-type connectors.
- Two SWXNA–*xx* FDDI adapter cables are needed to connect the SWXNA–*xx* FDDI adapter to an FDDI ring in a DAS-mode. Use only one cable for a SAS-mode connection.

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