StorageWorks™ Solutions StorageWorks Network Storage Array

SWXUA–BA Upgrade Manual

Order Number: EK–NSA01–UM. A01

This guide describes how to upgrade an SWXNA–Ax/Fx to an SWXNA–Bx/Gx StorageWorks Network Storage Array.

This document was prepared using VAX DOCUMENT Version 2.1.

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A StorageWorks Network Storage Array Specifications

B Configuration Rules and Restrictions

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Preface

This manual describes the procedures necessary to install and configure the
SWXUA–BA upgrade kit into a SWXNA–Ax (FDDI) /Fx (CDDI) Network Storage
Array, to create a SWXNA–Bx (FDDI) /Gx (CDDI) Network Storage Array.

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	Describes preinstallation considerations and tasks.
Chapter 2	Describes the procedures to install the SWXUA–BA option.
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.

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 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.

_____

1.2 Connecting a Terminal to the Network Array

Communicating with the StorageWorks Network Storage Array 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 1–1 Connecting to the Terminal Port of the Network Array
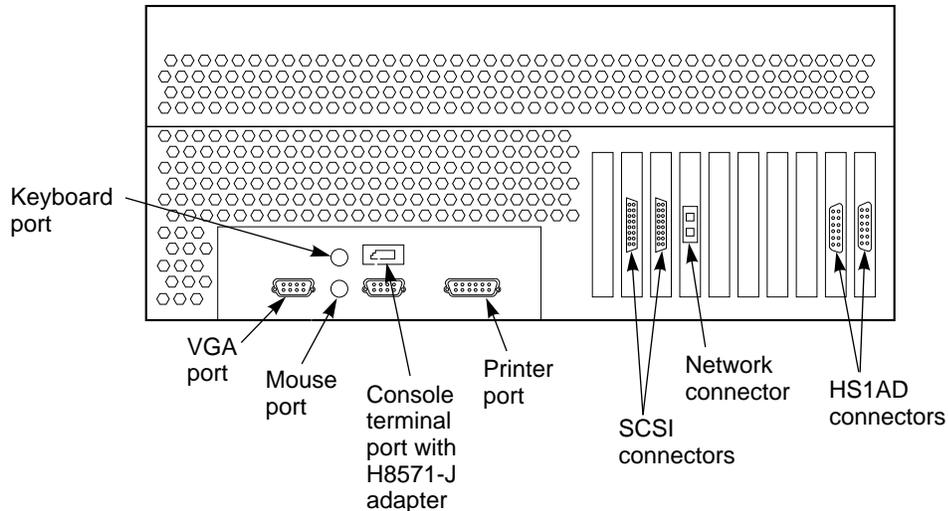
CXO-4774B-MC

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 1–1.

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, or if the system was running, displays the USERNAME PROMPT.

7. Log into a system account.

1.3 Upgrading the OpenVMS Alpha Operating System

Changes in the Network Storage Array hardware components require that the operating system be upgraded to OpenVMS Alpha operating system software Version 6.2-1H3 (or later) **prior** to installing this upgrade. A CD–ROM containing the upgrade software is included in this kit. Follow the instructions in Section 1.3.2 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.

The backup procedures are in the *Getting Started with the StorageWorks Network Storage Array* manual.

_____

1.3.1 Taking the Array Off-line

<hr>

Note

<hr>

Any node in the VMScluster system whose system disk is served through either node of this Network Storage Array 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 array.

<hr>

1.3.2 Upgrading to OpenVMS Alpha Version 6.2-1H3

Complete the following procedure to upgrade to version 6.2-1H3.

1. Follow the procedures in Section 1.2 to connect the terminal to the server processor selected in step 1.

2. Boot from your V6.2 system disk if the array is not already running.

3. Insert the StorageWorks Network Storage Array Software Customization Procedure V2.1 CD in the CD player.

4. Use the "SHOW DEVICE" command to determine the device name of the CD player:

```
$ SHOW DEVICE DKA

    Device            Device        Error    Volume      Free  Trans Mnt
     Name             Status        Count     Label     Blocks Count Cnt
    $27$DKA0:   (NSA) Mounted           0  NSA$SYS     3057748   184 1
    $27$DKA400: (NSA) Online wrtlck     0
```

In this case, the CD player is 27DKA400:.

5. Enter the following command to start the upgrade. The following display shows a default upgrade:

```
$ @SYS$UPDATE:VMSINSTAL AXPVMSU1H3062 $27$DKA400:

        OpenVMS AXP Software Product Installation Procedure V6.2

It is 29-JUL-1996 at 13:00.

Enter a question mark (?) at any time for help.

* Are you satisfied with the backup of your system disk [YES]?

Please mount the first volume of the set on  $27$DKA400:.
* Are you ready? yes
%MOUNT-I-MOUNTED, ALPHA0621H3 mounted on _$27$DKA400: (NSA)

The following products will be processed:

  AXPVMSU1H3 V6.2


        Beginning installation of AXPVMSU1H3 V6.2 at 13:00

%VMSINSTAL-I-RESTORE, Restoring product save set A ...
%VMSINSTAL-I-RELMOVED, Product's release notes have been moved to SYS$HELP.
```

```
          To complete the installation of this product, you must reboot
          the system.  If it is not convenient to reboot at this time, then
          enter NO to the following question. The installation of this kit
          will continue and the files moved to their appropriate locations
          without forcing the system to reboot upon completion of the
          installation. The system can than be rebooted at some more
          convenient time to actually have this update take effect.

          Entering YES will cause the system to automatically reboot
          upon the installation of this kit.
```

```
* Will you allow a system shutdown after this product is installed? [YES]:
* How many minutes for system shutdown [7]:
```

```
    No more questions will be asked ...

    Now applying AXPVMSU1H3062 ...
```

```
 1) APB (new image)

 2) AUTOGEN (new file)

...

%VMSINSTAL-I-MOVEFILES, Files will now be moved to their target directories...

        Installation of AXPVMSU1H3 V6.2 completed at 13:03

    Adding history entry in VMI$ROOT:[SYSUPD]VMSINSTAL.HISTORY

    Creating installation data file: VMI$ROOT:[SYSUPD]AXPVMSU1H3062.VMI_DATA

%VMSINSTAL-I-SHUTDOWN, This product requires that the system be rebooted.

    **********************************************************************

        This system will shutdown in 7 minutes WITHOUT an
        automatic reboot.

        If you wish to do an immediate shutdown and reboot, type
        CTRL/Y and initiate the shutdown manually.

        The installation will not be complete until a system reboot.

    **********************************************************************

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

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
>>>
```

6. **Power off the server processor by:**

    a. **Opening the front door of the network array 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.**

1.4 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 1–2 is a diagram of the screws and nuts used in installing and upgrading network arrays. Use this diagram to determine the proper screw.

Figure 1–2 Screw Diagrams
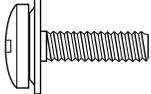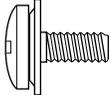
	10–32 SEMS .625 in
	10–32 SEMS, .343 in
	10–32, .500 in
	10–32 MACHINE FLAT HEAD, .500 in
	10–32 KEP NUT
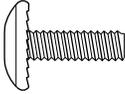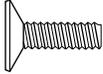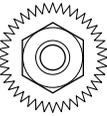
CXO-4701A-MC

2

SWXNA–Ax/Fx to SWXNA–Bx/Gx Upgrade Procedure

This chapter provides step-by-step procedures for installing the SWXUA–BA upgrade kit.

2.1 Purpose of This Upgrade

A customer who desires more performance and would like the increased storage capacity provided by the model SWXNA–Bx/Gx StorageWorks Network Storage Array could purchase an SWXUA–BA kit and upgrade an existing model SWXNA–Ax/Fx network array for less cost than purchasing a new SWXNA–Bx /Gx network array.

The SWXUA–BA upgrade kit provides all the components for upgrading a model SWXNA–Ax/Fx StorageWorks Network Storage Array to a model SWXNA–Bx/Gx network array. The following sections provide information about the upgrade kit and how to perform the upgrade.

2.2 SWXUA–BA Upgrade Kit Description

The main components of the SWXUA–BA upgrade kit are as follows:

- Four HS1AD bus adapters

- Two HS1CP device channel processors, each with a write-back cache module

- OpenVMS Alpha operating system software Version 6.2-1H3 (or later) CD–ROM

When you receive your SWXUA–BA 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

When additional storage devices are being added, Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables.

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.

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

Fastener pin (4 places)

Nylon snap fastener (4 places)

Lip

Side panel upper hanger clip

Side panel lower hanger clip

Cabinet front

Side panel

Top cover

M6x40mm bolt (4 places)

Cabinet side panel hanger clilps
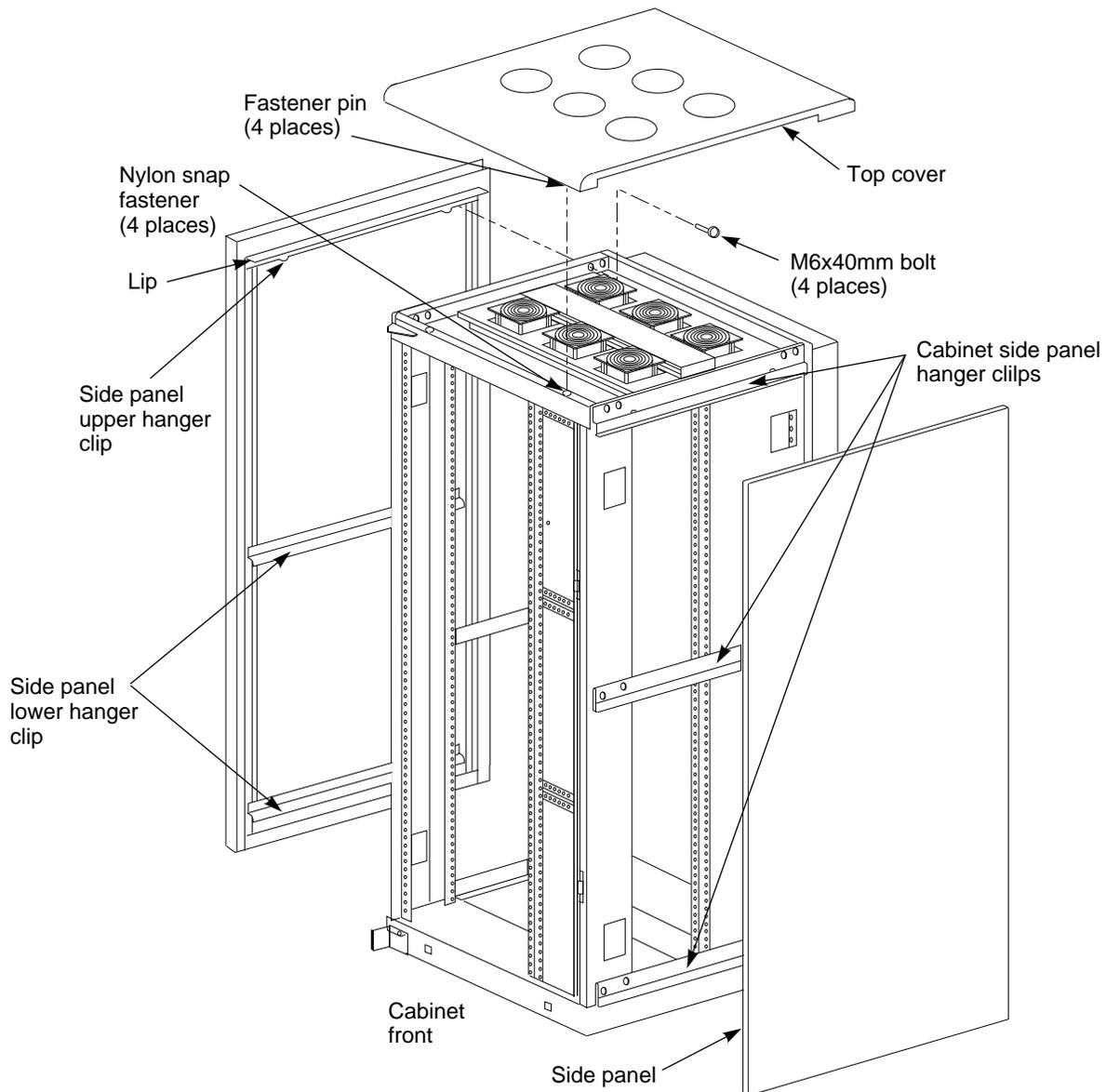
CXO-3787A-MC

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.

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.

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.

Figure 2–2 Minimum Installation Clearances

CXO-3805A-MC
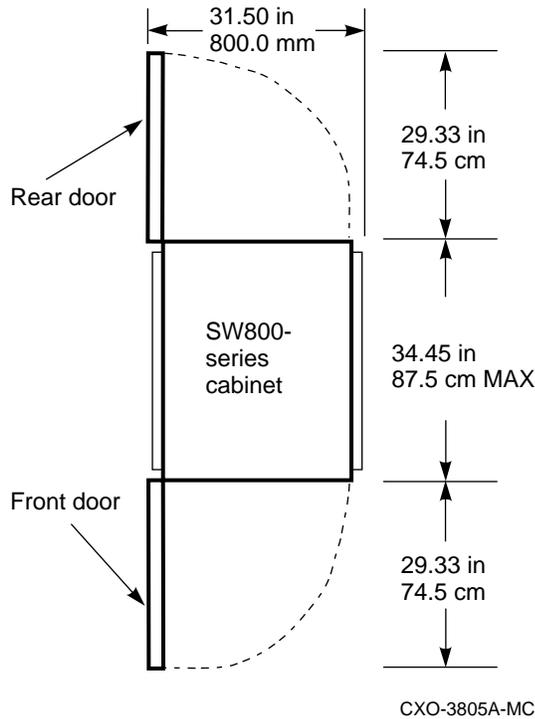
2.4 Installing BA35x–S Storage Shelves in the Rear of the Cabinet

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 network array.

Figure 2–3 Generalized Network Storage Array Storage Configuration with Optimal Disk Storage and No TZ8*xx*–Series Tape Drives Installed
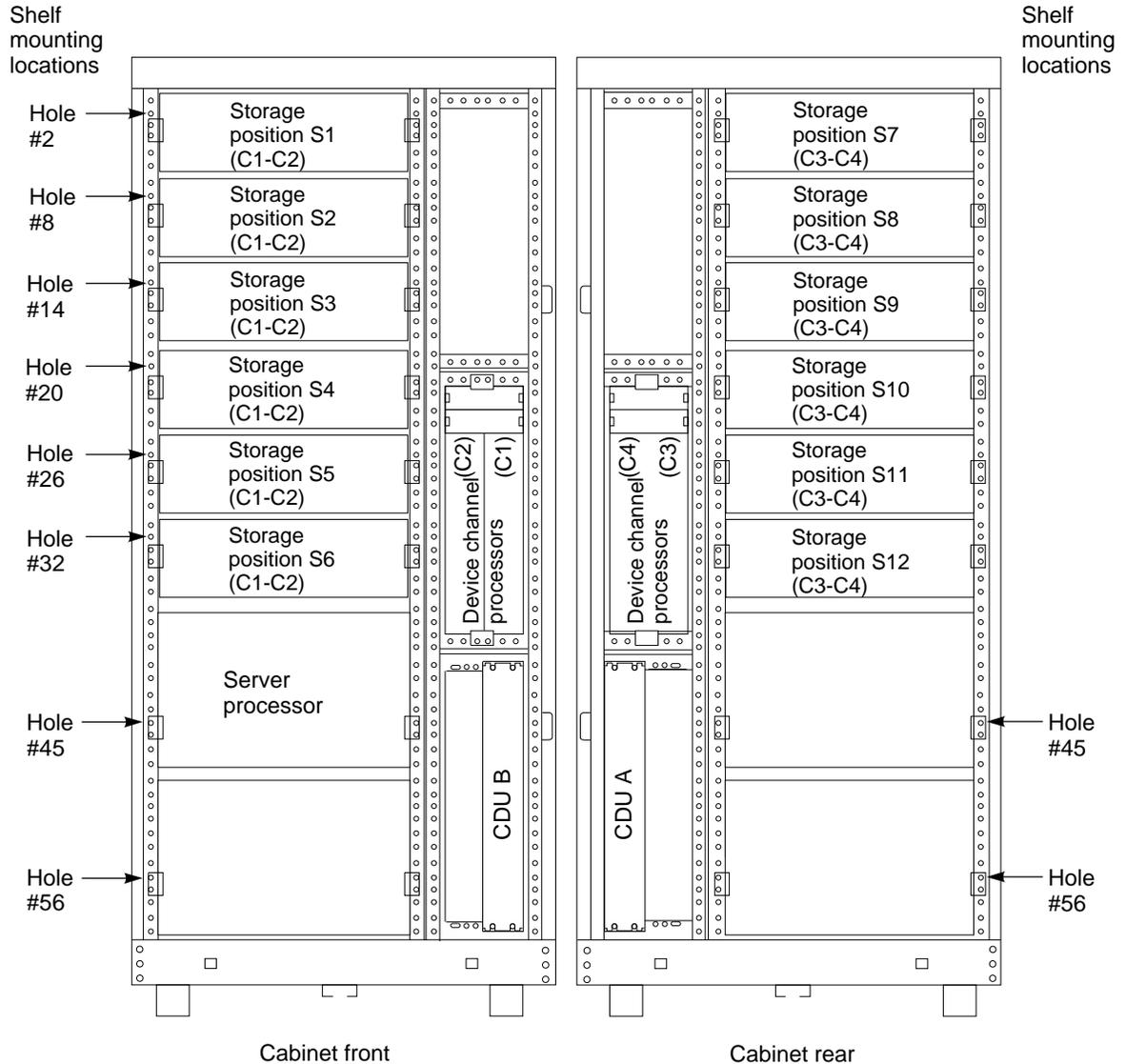
Figure 2–3 shows the location of storage shelves when disks but no TZ8*xx*–series tape drives are installed in a generalized Network Storage Array.

Figure 2–4 Generalized Network Storage Array Storage Configuration with Two TZ8xx–Series Tape Drives Installed

CXO-5427A-MC
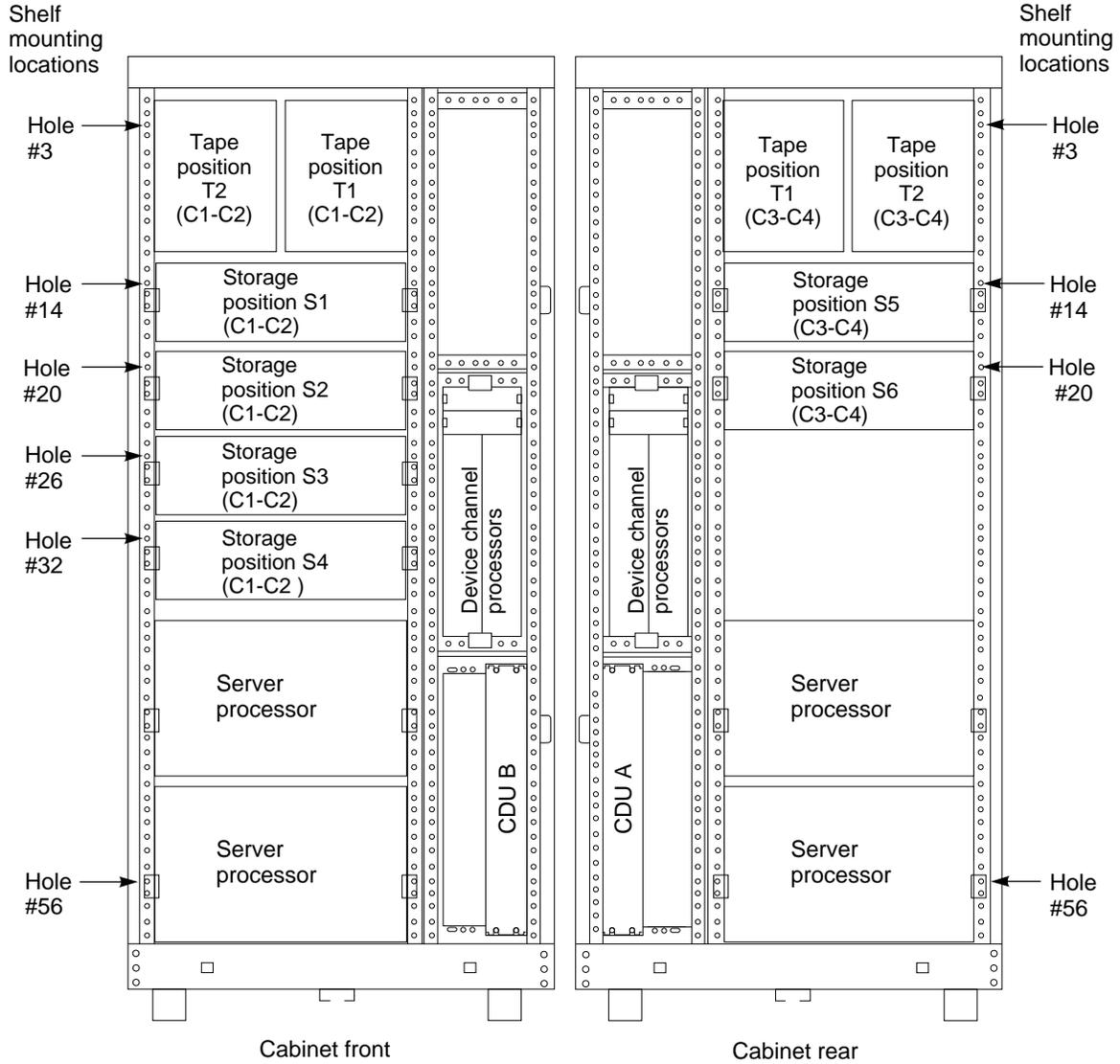
Figures 2–4 and 2–5 show the location of storage shelves when two or four TZ8xx–series tape drives are installed in a generalized Network Storage Array.

Figure 2–5 Generalized Network Storage Array Storage Configuration with Four TZ8xx–Series Tape Drives Installed
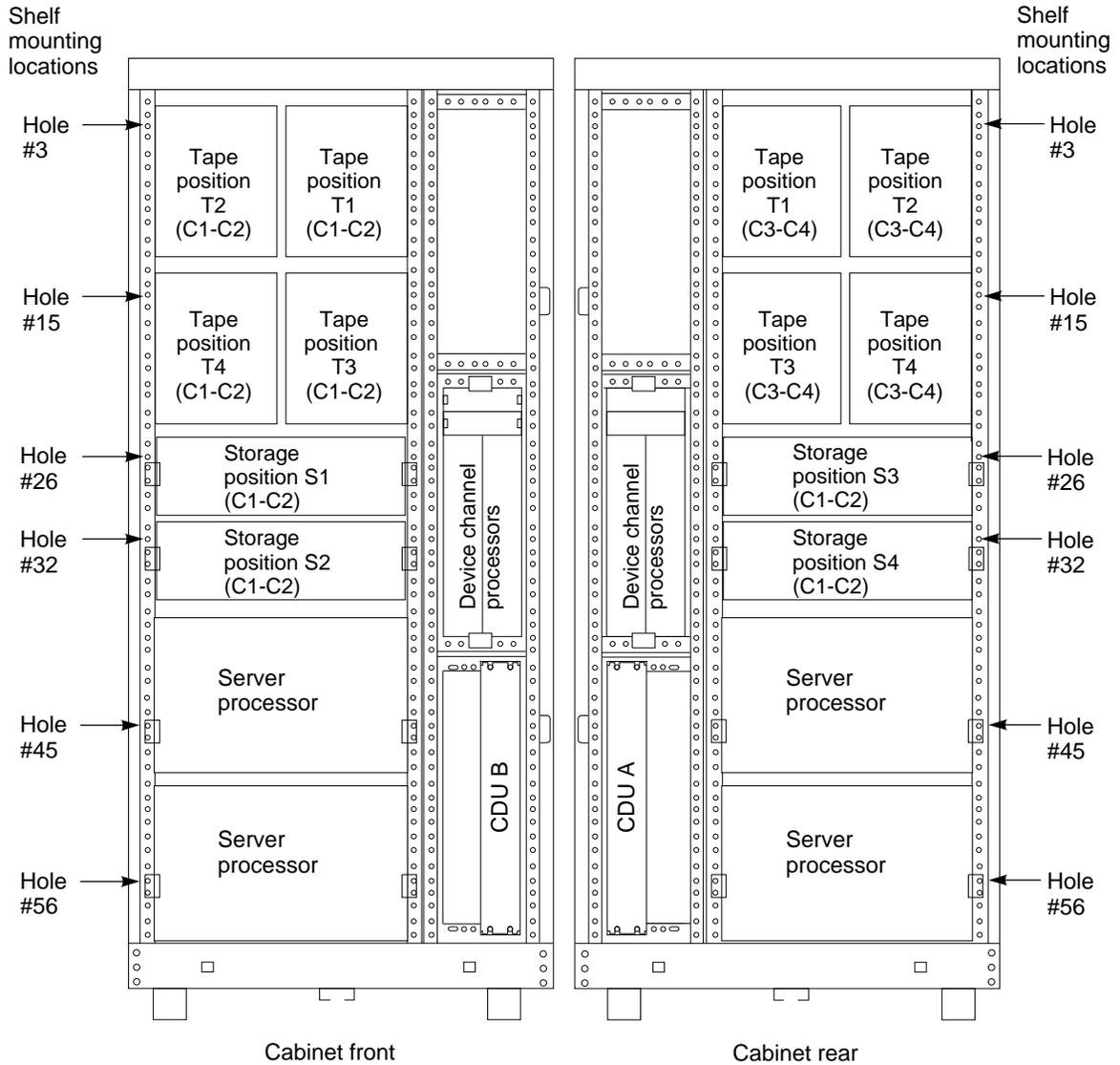
CXO-5429A-MC

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.

2.5 Installing the New HS1CP Assembly in the Rear of the Cabinet

Two HS1CPs and associated write-back cache modules along with two power supplies mount in a BA350–M shelf.

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 1–2 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.

_____ **Note** _____

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

_____

_____ **WARNING** _____

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

_____

Figure 2–6 BA350–M Shelf Assembly Components (Exploded View)

SUPPORT
BRACKET

HOLE
22

UPPER
SHELF
MOUNTING
BRACKET

POSITION
4

LOWER
SHELF
MOUNTING
BRACKET

BA350-M
SHELF

HOLE
40

DEVICE
CHANNEL
PROCESSOR
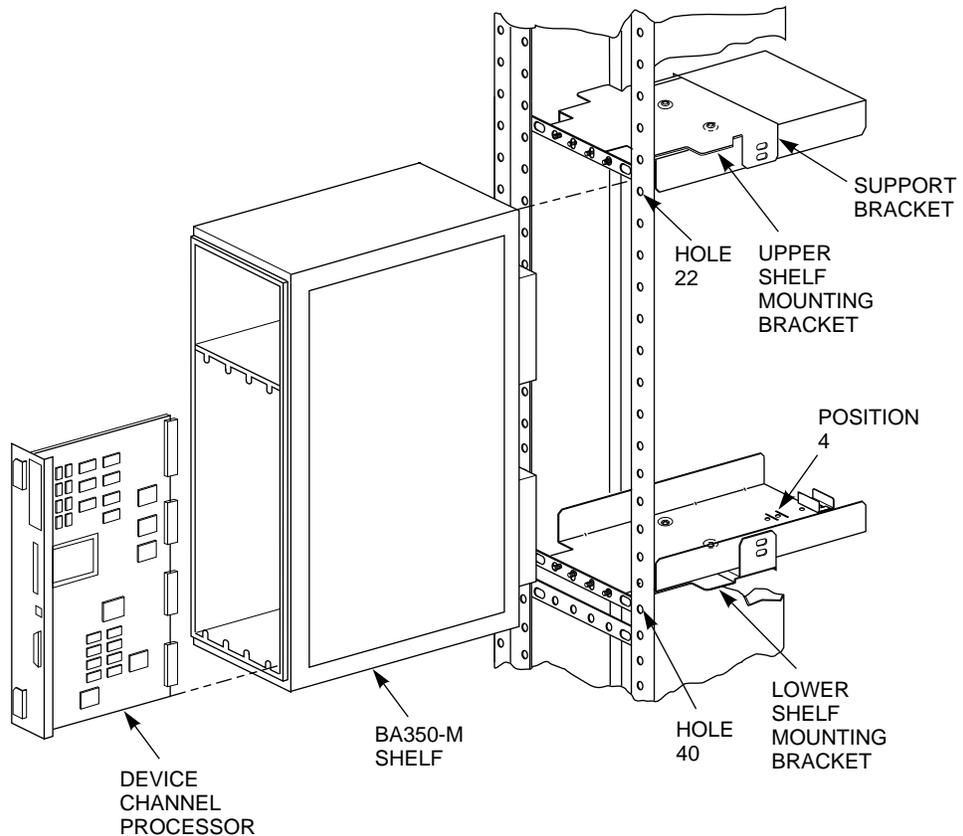
CXO-4636A-MC

Figure 2–6 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.

2.5.1 Installing the BA350–M Shelf in the Rear of the Cabinet

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 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 2–7 BA350–M Shelf Mounting Bracket Installation (Lower)
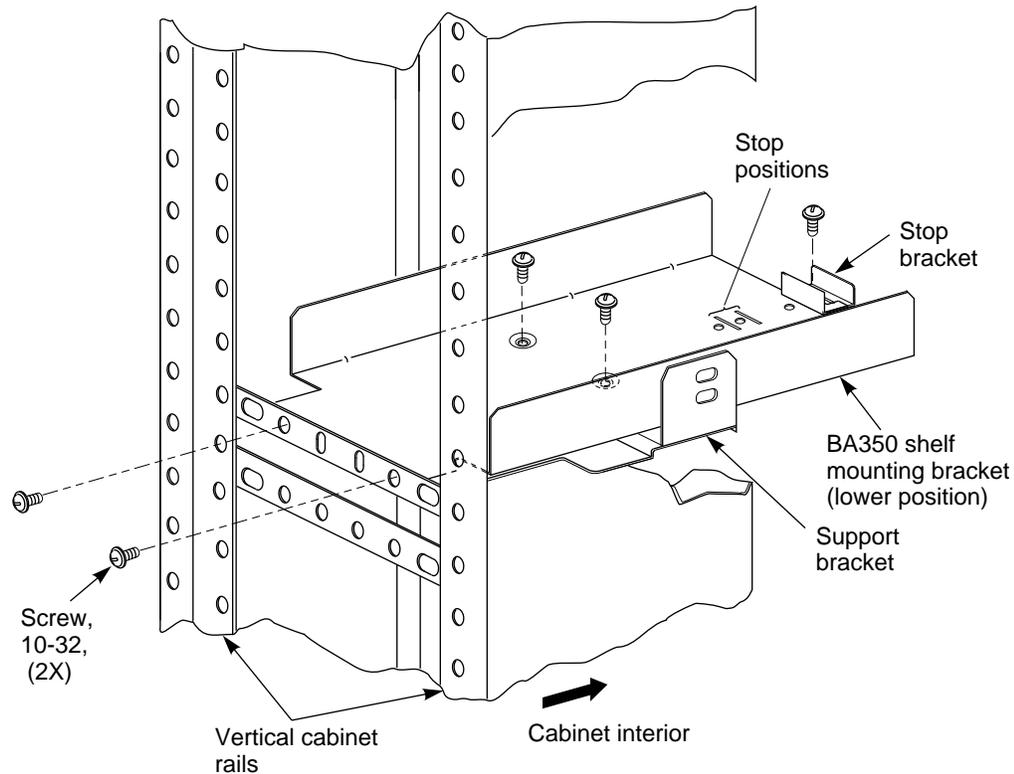
CXO-4743B-MC

Figure 2–7 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 2–7). 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 2–7).

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 2–7. 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 2–6 for a diagram of the bracket locations.

8. With the power supply end of the shelf at the bottom 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** _____

   The second BA350–M shelf must be installed upside-down (with the power supply connectors on the bottom) in the back of the SW800 cabinet.

   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.

   _____

   _____ **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 2–8 Locking Front Bracket Installation

BA350-M
SHELF

SCREW,
10-32,
(2X)

LOCKING
FRONT
BRACKET
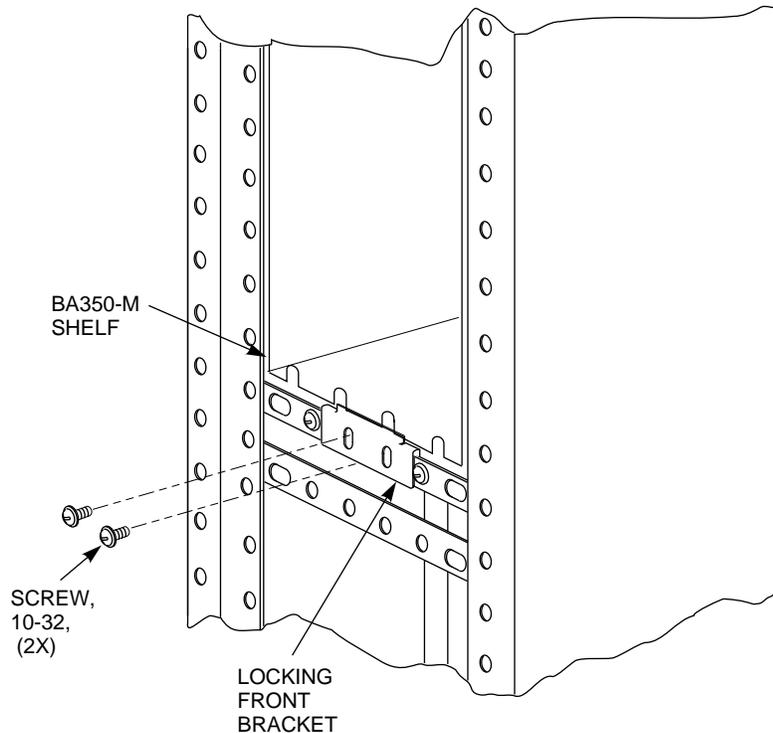
CXO-4741A-MC

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 2–8.

2.5.2 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 2–9 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 BA35x–S shelf) that hold the SCSI–2 storage devices. Figure 2–9
    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.

Figure 2–9 Rear BA350–M Shelf Layout (Upside-down)
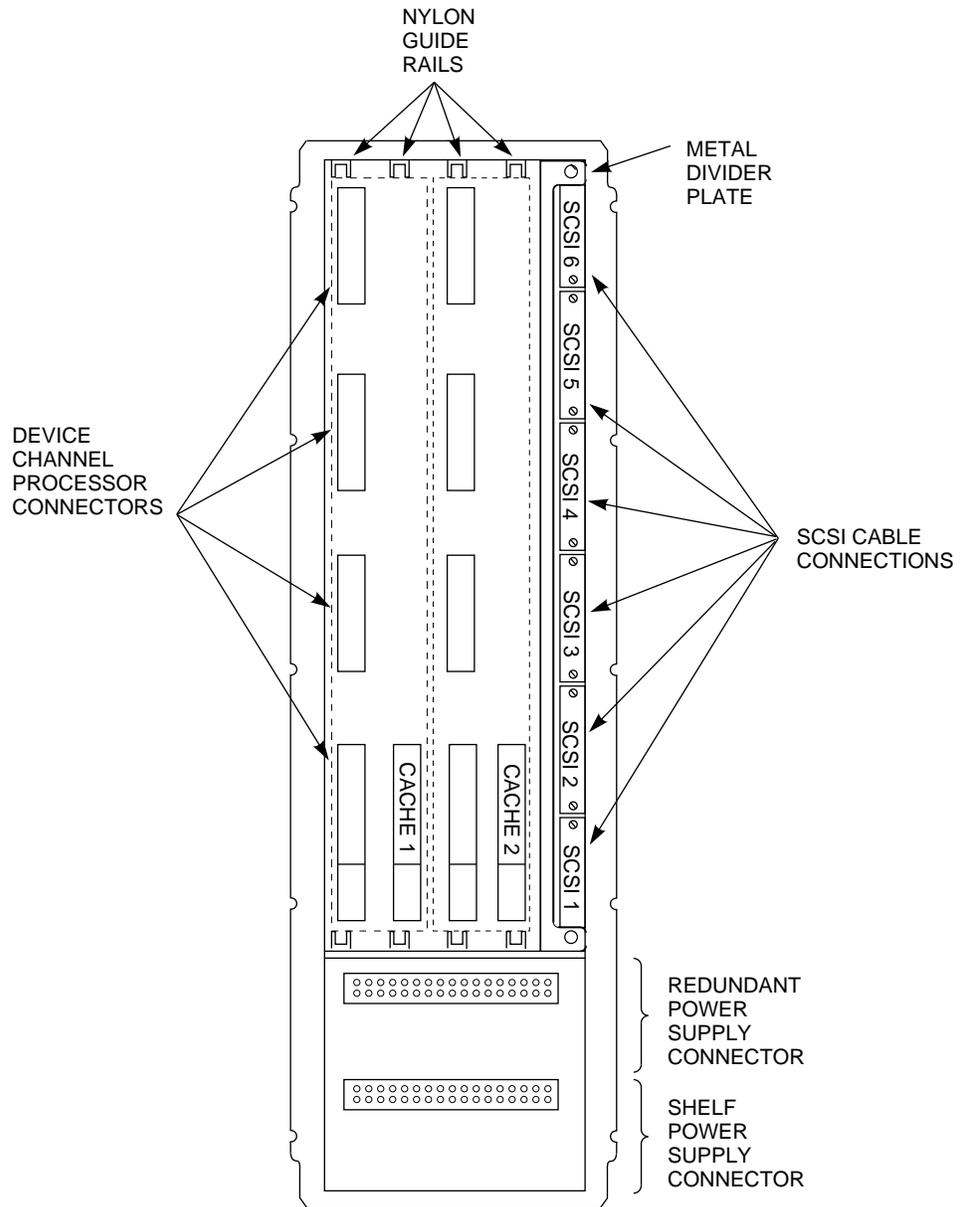
CXO-4814A-MC

2.5.3 Installing Two HS1CP Device Channel Processors and Write-Back Cache Modules into Newly Installed BA350–M Shelf

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

Figure 2–9 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 1.1 for proper grounding procedures.

Installing the First HS1CP and Write-Back Cache Module

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

1. Install the write-back cache module into the *left* 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 2–9.

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 2–10 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.

---

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 2–9).

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.

Figure 2–10 Single HS1CP Device Channel Processor in the Rear BA350–M Shelf

TERMINATOR

BA350-M SHELF

BLANK METAL SLOT COVER

PROGRAM CARD

HS1CP

METAL DIVIDER PLATE

AC POWER CORD

PRIMARY POWER SUPPLY
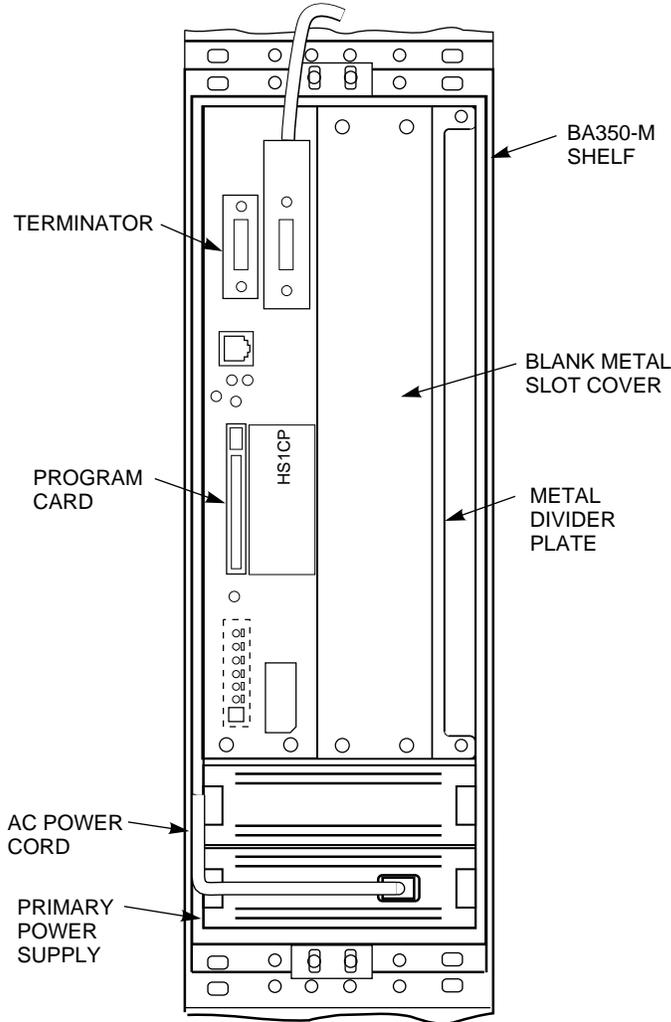
CXO-4777A-MC

Installing the Second HS1CP and Write-Back Cache Module

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 2–10 shows what the BA350–M shelf should look like prior to installation.

1. 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 2–10).

2. Install the 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 2–9).

3. 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 2–9).

4. 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.

Installing the Power Supplies

1. Install the power supplies into the slots on the BA350–M shelf (see Figure 2–10).

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

You have completed write-back cache module and HS1CP device channel processor installation.

2.6 Installing the New Bus Adapters

Installing the new bus adapters on the array server processor motherboard involves the following tasks:

- Sliding the server processor out of the array cabinet
- Installing the new adapter cards
- Sliding the server processor into the cabinet

2.6.1 Sliding the Server Processor Out of the Cabinet

Use the following procedure to slide the server processor out of the 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.

4. Loosen all the quarter-turn fasteners on the rear top cover using a Phillips screwdriver (Figure 2–11).

5. Lift off the rear top cover.

Figure 2–11   Removing the Rear Top Cover Panel

REAR
TOP
COVER

REMOVABLE
COUNTERSUNK
SCREW
(2X)

CAPTIVE
COUNTERSUNK
SCREW
(6X)

FRONT
COVER

PANHEAD
SCREW
(8X)

REMOVABLE
COUNTERSUNK
SCREW
(3X)
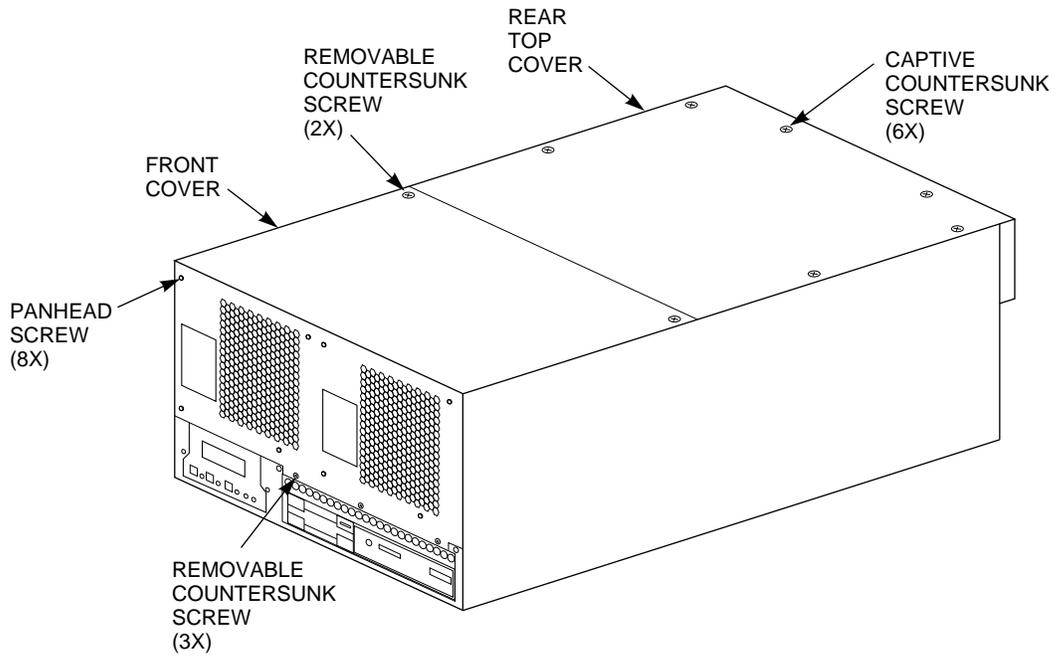
CXO-4725A-MC

Figure 2–12 Server Processor Motherboard Configuration
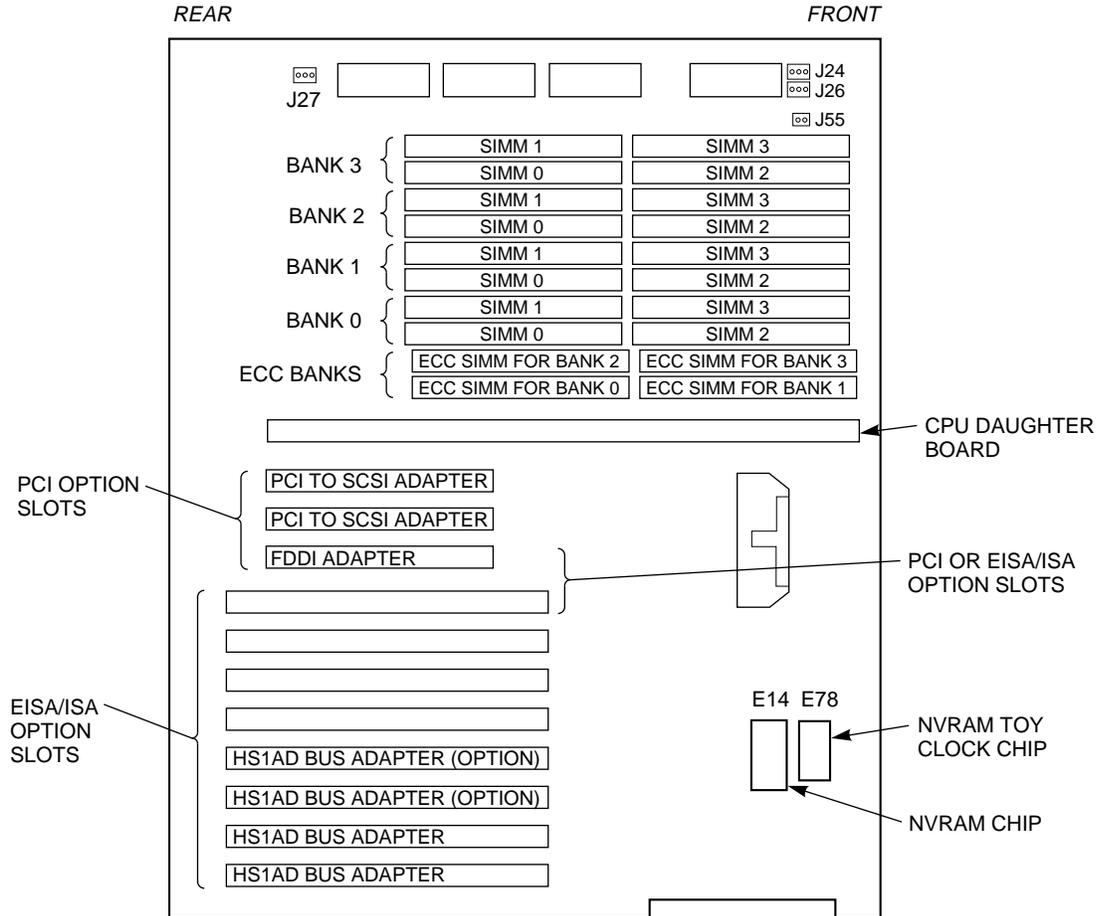
CXO-4626B-MC

2.6.2 Installing an Option Card

_____ **Note** _____

The SWXUA–BA upgrade involves installing two new HS1AD bus adapter cards into each server processor. These cards should be located in EISA slots 5 and 6, show as HS1AD Bus Adapter (option) in Figure 2–12.

_____

To install the bus adapter cards, perform the following steps:

_____ **CAUTION** _____

Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components (see Section 1.1).

_____

1. Locate the position of the optional bus adapter cards on Figure 2–12.

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.

5. Secure the adapter card to the chassis using the slot cover screw you removed.

2.6.3 Sliding the Server Processor Back into the 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 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. Repeat the procedure starting with Section 2.6 for the bottom server processor.

5. Close the rear door and secure it shut with a hex wrench.

2.7 Installing Internal Bus Cables from the Newly Installed Bus Adapters in Each Server Processor to the Newly Installed HS1CP Device Channel Processors

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 2–13 shows the logical "before" cabling diagram.

Figure 2–14 shows the logical "after" cabling diagram.

Figure 2–15 shows the front dual-redundant pair of HS1CP device channel processors with their four attached internal bus cables.

Figure 2–13 Cabling Diagram for SWXNA–Ax/Fx

CXO-5077A-MC
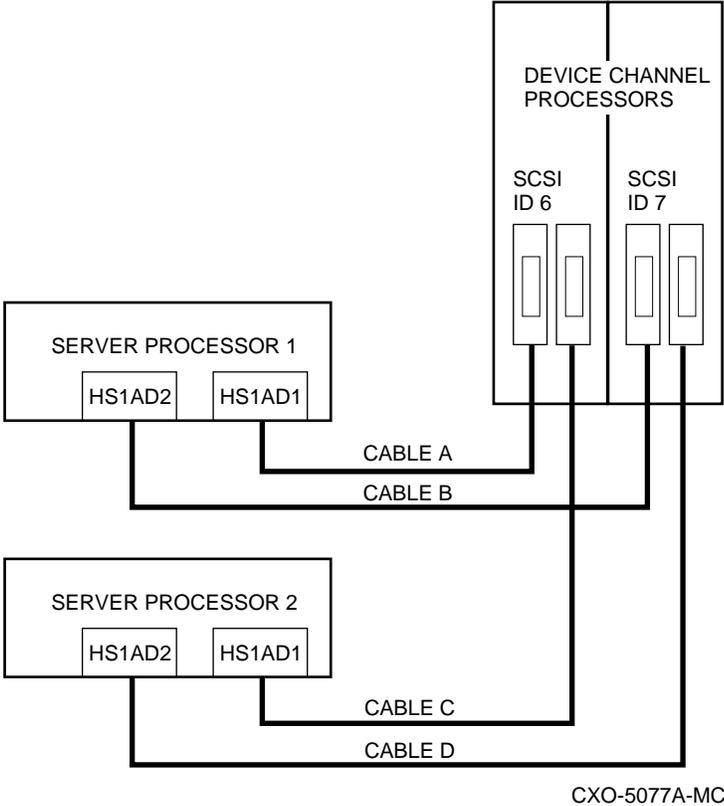
Figure 2–14 Cabling Diagram for SWXNA–Bx/Gx

FRONT BA350-MA
M-SHELF

HS1CP	HS1CP
SCSI ID 6	SCSI ID 7

SERVER PROCESSOR 1

HS1AD4	HS1AD3	HS1AD2	HS1AD1

CABLE A

CABLE B

SERVER PROCESSOR 2

HS1AD4	HS1AD3	HS1AD2	HS1AD1

REAR BA350-MA
M-SHELF

HS1CP	HS1CP
SCSI ID 6	SCSI ID 7

CABLE C

CABLE D

CABLE E

CABLE F

CABLE G

CABLE H

CXO-5042A-MC
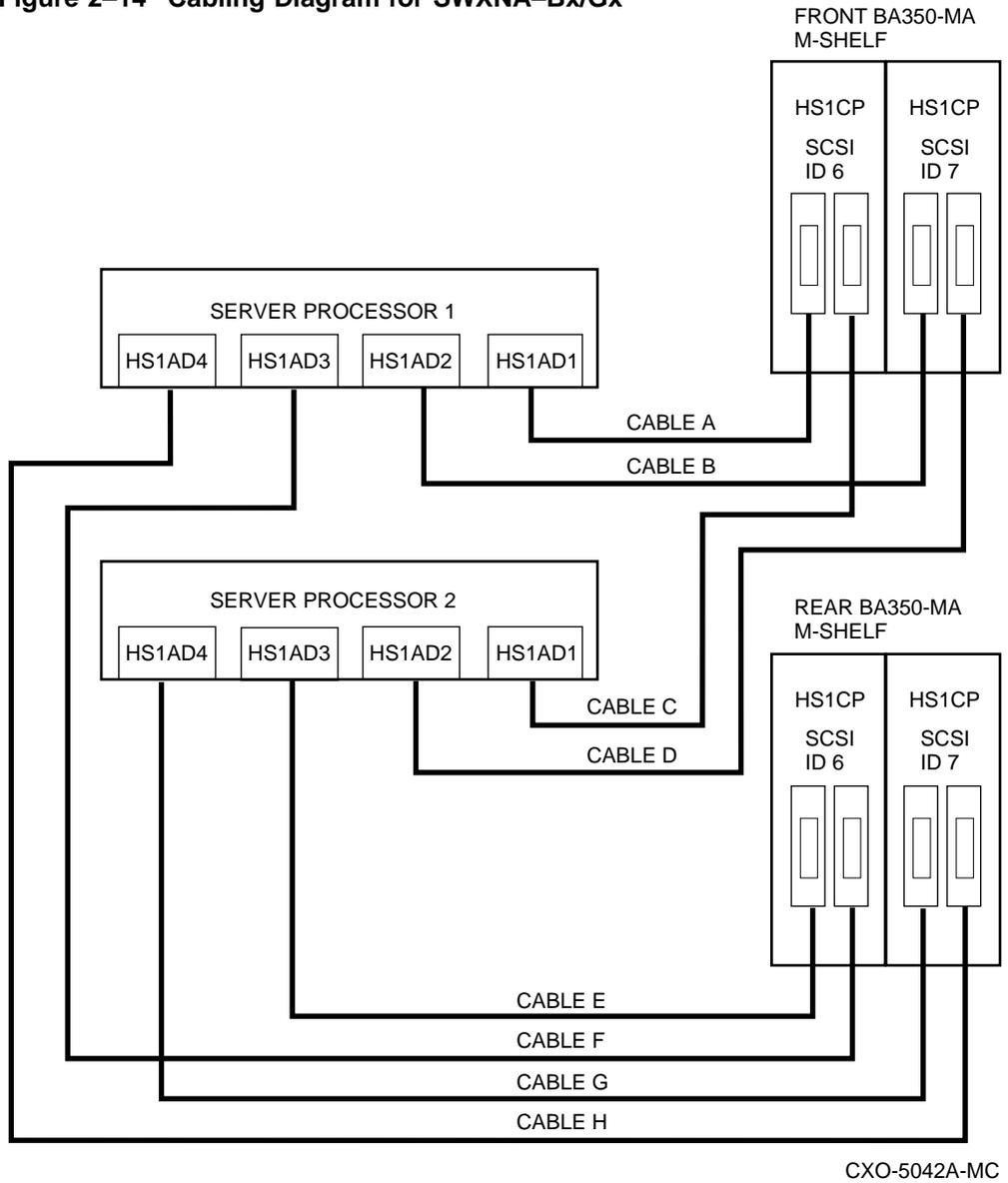
Figure 2–15 Device Channel Processor Installation

PRIMARY
POWER SUPPLY

SECONDARY
POWER SUPPLY

AC POWER
CORD

RESET
BUTTON

HS1CP DEVICE
CHANNEL
PROCESSOR
ID 6

PROGRAM
CARD

PROGRAM CARD
EJECT BUTTON

HS1CP DEVICE
CHANNEL
PROCESSOR
ID 7

EIA TERMINAL
PORT
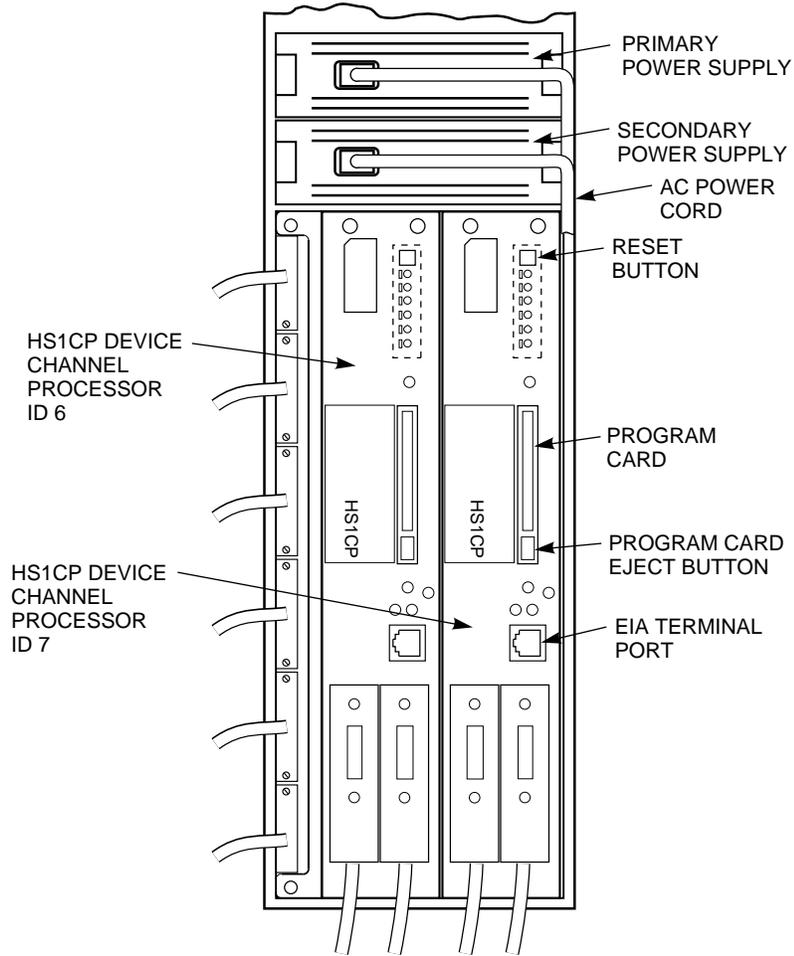
HS1CP

HS1CP

CXO-4813A-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 2–16).

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 2–16).

Figure 2–16 Internal Bus Cable Connectors

CXO-5044A-MC
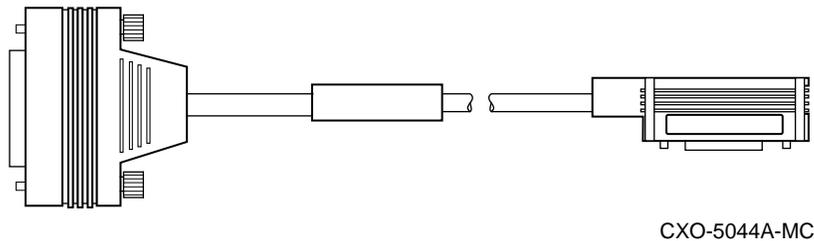
_____ CAUTION _____

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
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 2–17) 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.

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 2–17 Trilink Connector

REAR VIEW

FRONT VIEW

CXO-3851A-MC
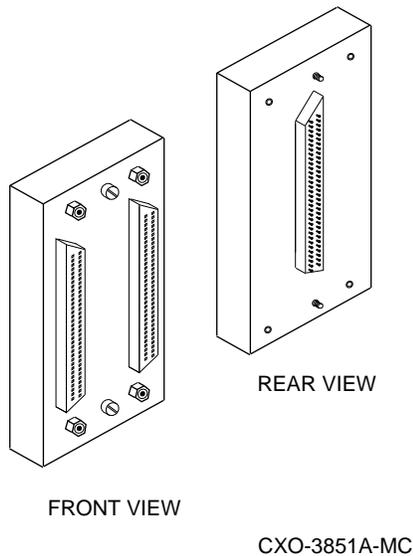
_____ **Note** _____

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 2–13 and
   2–14 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 2–13 and
   2–14 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 2–13 and
   2–14 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 2–13 and
   2–14 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 2–14 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 2–14 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 2–14 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 2–14 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.

2.8 Replacing Cabinet Panels

After all hardware has been installed, replace the cabinet side panels (if removed) **before** reapplying power to the network array. To replace the cabinet panels, reverse the steps in Section 2.3.

2.9 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. Switch the circuit breakers on both CDUs to ON (|).

2. Depress power buttons on front of both server processors.

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 first HS1CP device channel processor in slot 7 (rear BA350–M shelf). See Figure 2–15.

---------------------- **Note** ----------------------

Remember the *rear* BA350–M shelf is mounted upside down.

----

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.

9. Set the HS1CP device channel processor node name:

   CLI> **SET THIS_CONTROLLER SCS_NODENAME="HS1CP3"**

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

   CLI> **SET THIS_CONTROLLER PATH**

11. Set the device channel processor identification:

   CLI> **SET THIS_CONTROLLER ID=3**

12. Set the prompt:

   CLI> **SET THIS_CONTROLLER PROMPT="HS1CP3"**

This completes the setting of initial parameters for the first new HS1CP. Although the "Restart this controller" message has been displayed, do not restart the module now. The restart will be performed in a later step.

2.10 Installing the Write-Back Cache License for the First New HS1CP Device Channel Processor

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.

```
HS1CP3> 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.

2.10.1 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

2.10.2 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.

2.10.3 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.

2.10.4 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, for example, 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*).

_____

```
HS1CP3> 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] ? Return ❺
FLS - Normal Termination

HS1CP3>
```

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:

```
    HS1CP3> EXIT
```

2.11 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 second HS1CP device channel processor in slot 6 (rear BA350–M shelf) (see Figure 2–15).

   _____ **Note** _____

   Remember the *rear* BA350–M shelf is mounted upside down.

   _____

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 for the second new HS1CP. Although the "Restart this controller" message has been displayed, do not restart the module now. The restart will be performed in a later step.

2.12 Installing the Write-Back Cache License for the Second New HS1CP Device Channel Processor

Section 2.10 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>.

_____

2.13 Running the EISA Configuration Utility for Each 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 network array'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** _____

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.

_____

Do the following for each server processor:

1. Connect a terminal to the server processor before starting the next step (see Section 1.2).

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.

_____ **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.

_____

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 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. 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>
```

9. 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.

10. Press Enter again, and the >>> prompt displays.

11. Remove the ECU diskette from the floppy diskette drive.

12. 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.

13. Repeat this process for the second server processor.

2.14 Supporting and Operating the StorageWorks Network Storage Array

You have now completed the hardware installation of the SWXUA–BA upgrade. The final steps you must complete to finish the upgrade are to:

1. Boot your system disk.

2. Configure your new storage devices using CFMENU.

3. 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 SWXUA–BA upgrade.

• Configuring the StorageWorks Network Storage Array Storage Devices

• 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)

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)

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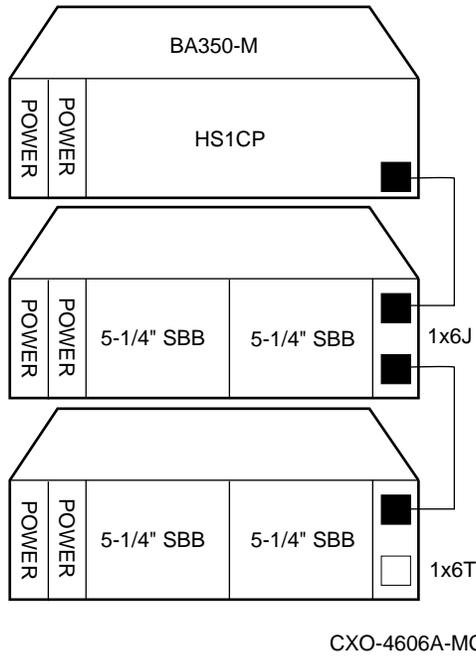
Figure B–2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

Figure B–2 Adjacent Devices on a Single Port

CXO-4607A-MC
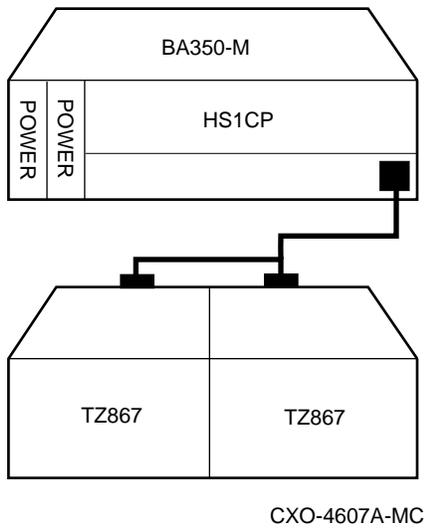
B.1.1 Typical and Recommended 3½-Inch and 5¼-Inch SBB Configurations

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 BA35x–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 BA35x–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 BA35x–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

STRIPESET MEMBERS

RAIDSET MEMBERS
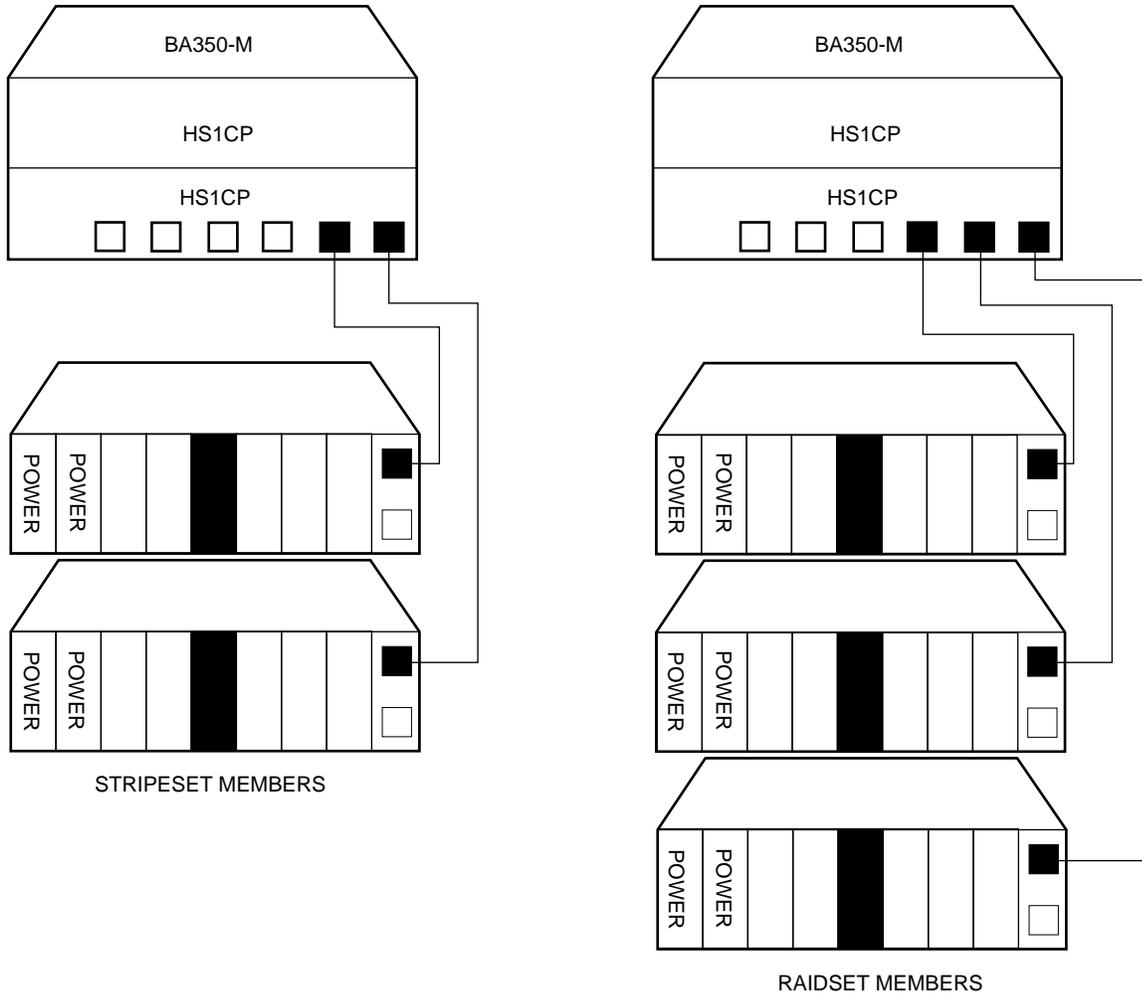
CXO-4608A-MC

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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