StorageWorks™ Solutions

StorageWorks Network Storage Array SWXUA–AA/AB/FA/FB Upgrade Manual

This guide describes how to install the SWXUA–AA/AB/FA/FB upgrades into an SWXNA–Ex/Jx Network Storage Array to create an SWXNA–Ax (FDDI Interconnect) or SWXNA–Fx (CDDI Interconnect) Network Storage Array.

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Maynard, Massachusetts

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Contents

B Configuration Rules and Restrictions

C Network Storage Array Interconnect Cables

Index

Figures

Tables

Preface

This manual describes the procedures necessary to install and configure the SWXNA–AA/AB/FA/FB upgrade kits into a SWXNA–Ex/Jx 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	Provides necessary considerations and some preliminary tasks that must be performed befofe you begin the installation procedure.
Chapter 2	Describes installing the SWXUA–AA/AB/FA/FB upgrade kits into the SWXNA–Ex/Jx (single server processor) network storage array to create an SWXNA–Ax/Fx (dual server processor) 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 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

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

Product†	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Bystander Positions)	
	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

Gerät†	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Beistehende Position)	
	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 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
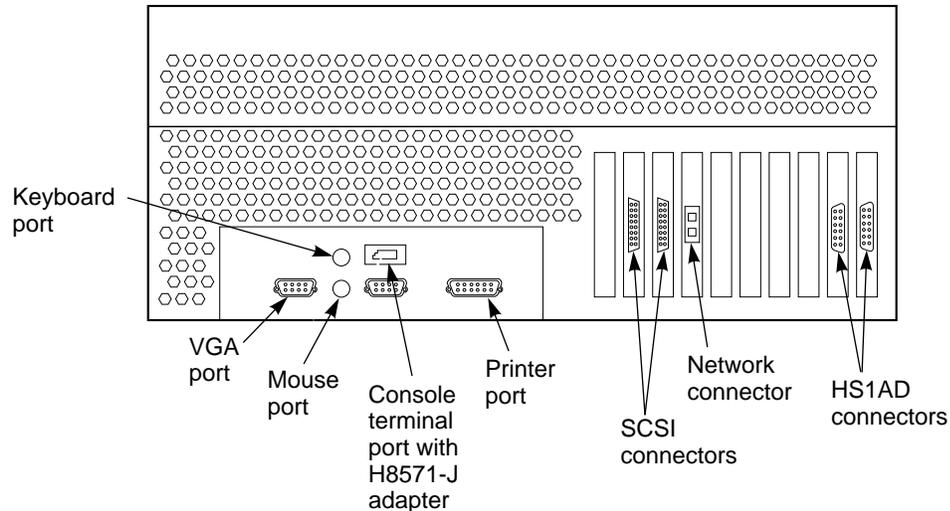
CXO-4774B-MC

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 Shutting Down the Array

_____ **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.

_____

_____ **Note** _____

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.

Perform the following steps to shut down the storage array:

1. Stop all work on the server processor.

2. Stop all work on nodes that are booted through a served system disk on your
   network array.

3. If there are no nodes in the cluster that are booted through a served system
   disk on your network array, then shut down the StorageWorks Network
   Storage Array as described in this step. Otherwise shut down these boot
   served nodes first and then shut down your network array as follows:

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

      ```
      Username: SYSTEM
      Password:
         Welcome to OpenVMS AXP (TM) Operating System, Version V6.1
           Last interactive login on Thursday, 28-SEP-1995 21:35:03.64
           Last non-interactive login on Thursday, 28-SEP-1995 21:35:20.48
      ```

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

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

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

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

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

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

      Shutdown options [NONE]: REMOVE_NODE
      ```

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

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

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

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

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

1 terminal has been notified on NODE3.

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

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

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

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

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

        SYSTEM SHUTDOWN COMPLETE

halted CPU 0

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

4. 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.

_____ **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.

_____

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
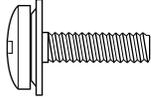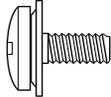
	10–32 SEMS .625 in
	10–32 SEMS, .343 in
	10–32, .500 in
	10–32 MACHINE FLAT HEAD, .500 in
	10–32 KEP NUT
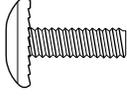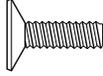
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2

SWXNA–Ex/Jx to SWXNA–Ax/Fx Upgrade Procedure

This manual describes the procedures necessary to install and configure the SWXNA–AA/AB/FA/FB upgrade kits into a SWXNA–Ex/Jx Network Storage Array. Table 2–1 shows the migration path for each of the upgrade kits.

Table 2–1   SWXUA–AA/AB/FA/FB

Upgrade Kit	From	To
SWXUA–AA	SWXNA–EA single server processor FDDI 60 Hz	SWXNA–AA dual server processor FDDI 60 Hz
SWXUA–AB	SWXNA–EB single server processor FDDI 50 Hz	SWXNA–AB dual server processor FDDI 50 Hz
SWXUA–FA	SWXNA–JA single server processor CDDI 60 Hz	SWXNA–FA dual server processor CDDI 60 Hz
SWXUA–FB	SWXNA–JB single server processor CDDI 50 Hz	SWXNA–FB dual server processor FDDI 50 Hz

2.1 Purpose of This Upgrade

To achieve improved performance and more storage connectivity and failover redundancy, a model SWXNA–Ex/Jx Network Storage Array can be upgraded to an SWXNA–Ax/Fx array for less expense than the purchase of a new Network Storage Array.

The SWXUA–AA/AB/FA/FB upgrade kits provide all the components for upgrading a model SWXNA–Ex/Jx StorageWorks Network Storage Array to a model SWXNA–Ax/Fx StorageWorks Network Storage Array. The following sections provide information about the upgrade kit and how to perform the upgrade.

2.2 Upgrade Kit Description

The main components of the upgrade kit are as follows:

- One KZPAA PCI-to-SCSI adapter to be installed in the original server processor

- One server processor with the new network and bus adapters already installed

- One cable distribution unit (CDU)

- Shadowed system disk and quorum disk

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

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

2.3 Preparing the Cabinet for Upgrade

_____ **WARNING** _____

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

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

_____

As part of this upgrade, cabinet panel removal is required prior to installing the second cable distribution unit. Complete the following steps to remove the cabinet panels:

1. Move the cabinet away from any adjacent cabinets to allow 360 degree access.

2. 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)

Fastener pin
(4 places)

Nylon snap
fastener
(4 places)

Lip

Side panel
upper hanger
clip

Side panel
lower hanger
clip

Top cover

M6x40mm bolt
(4 places)

Cabinet side panel
hanger clilps

Cabinet side panel
hanger clilps

Cabinet
front

Side panel
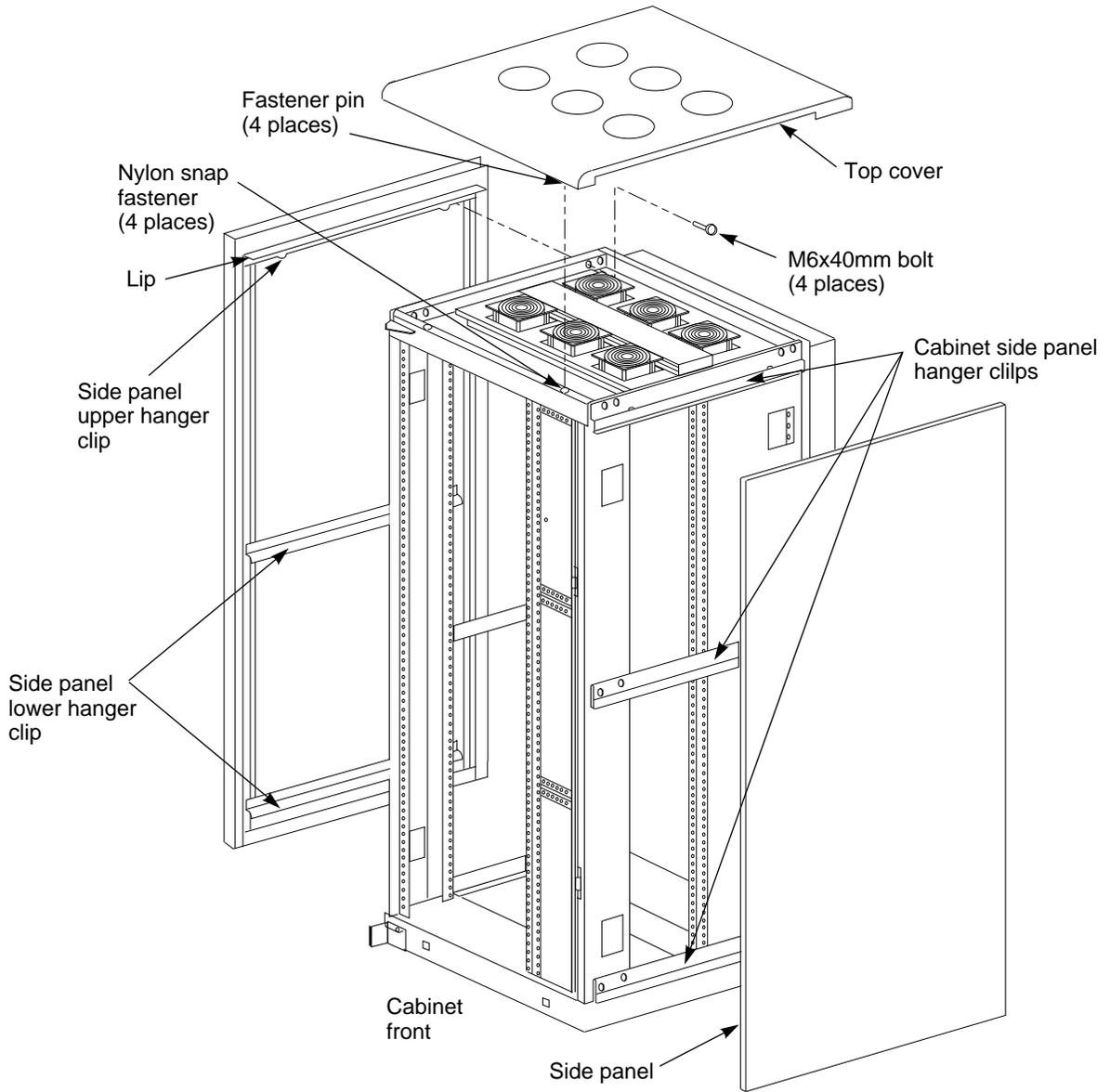
CXO-3787A-MC

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


```
        |←  31.50 in  →|
           800.0 mm
     _____
    |   _____     |                ↑
    |  |           |     \               |
    |  |            \     \           29.33 in
    ← Rear door      \     \          74.5 cm
    |  |              |     |             |
    |  |_____|     |             ↓
     _____
    |                  |                  ↑
    |                  |
    |   SW800-         |              34.45 in
    |   series         |              87.5 cm MAX
    |   cabinet        |
    |                  |
    |_____|                  ↓
     _____
    |   _____     |                ↑
    ← Front door    /    /                |
    |  |           /    /             29.33 in
    |  |          /    /              74.5 cm
    |  |_____/____/                    |
    |_____/                   ↓
```

CXO-3805A-MC
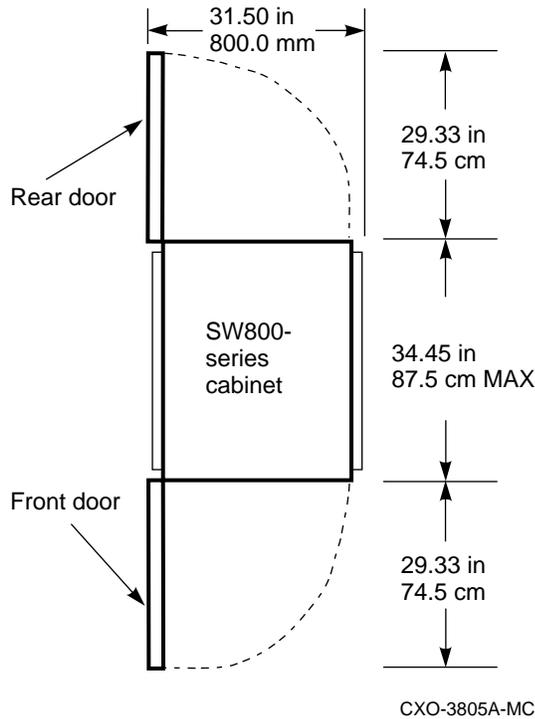
2.4 Installing the Second Cable Distribution Unit

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

1. Verify that the contents of the dual power option kit match the parts listed in Table 2–2. Check your CDU for proper voltage.

Table 2–2 CDU Parts List

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

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

Figure 2–3   CDU Locations

CABINET FRONT   CABINET REAR

CXO-4109B-MC
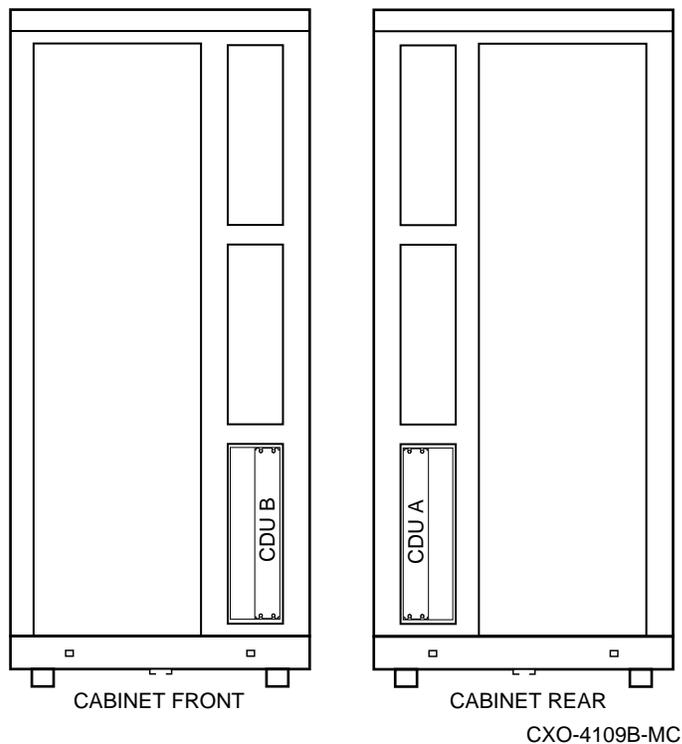
2. See Figure 2–3 to identify and locate CDU A. Identify the location for the installation of CDU B.

3. Open the rear cabinet door to access CDU A.

4. Switch the CDU A front panel circuit breaker to OFF ($\bigcirc$).

5. Disconnect the CDU A power cord from the power source.

6. Move the cabinet if necessary to allow free access to the front and rear CDU mounting slots.

7. Remove the new CDU (to be installed as CDU B) from the packing material. Thread the gray power cord through the cabinet as shown in Figures 2–4 and 2–5.

Figure 2–4 CDU B Installation

U-NUT
(4 PLACES)

SEMS
SCREWS
(4 PLACES)

CIRCUIT
BREAKER

CDU B
LABEL

CDU B
POWER
CABLE

CDU B

CXO-3778D-MC_R
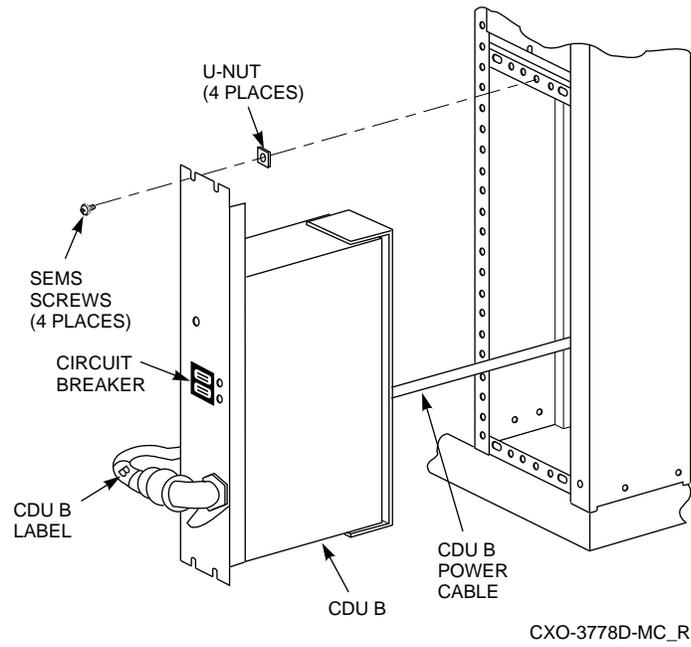
Figure 2–5 Rear Power Cord Installation

CDU A
LABEL

CDU A

CDU B
LABEL

CDU A
LABEL

CXO-3818C-MC_R
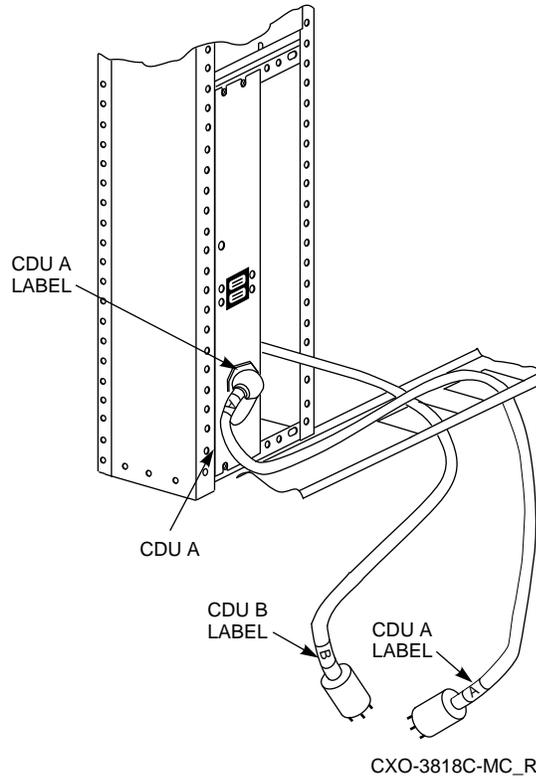
8. Use the hardware provided in the kit to mount CDU B to the cabinet chassis
    rails (see Figure 2–4).

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

   a. Remove backing paper from two of the yellow A labels in the kit and wrap one around each end of the black power cord of CDU A (see Figures 2–4 and 2–5).

   b. Remove backing paper from two of the yellow B labels in the kit and wrap one around each end of the gray power cord of CDU B (see Figures 2–4 and 2–5).

   c. Remove backing paper from the two yellow CAUTION labels and place them at eye level on the inside of each door, as shown in Figure 2–6.

Figure 2–6 Safety Label Locations

CAUTION LABEL

CAUTION LABEL

CDU B

CDU A

CABINET FRONT

CABINET REAR

CXO-3777D-MC
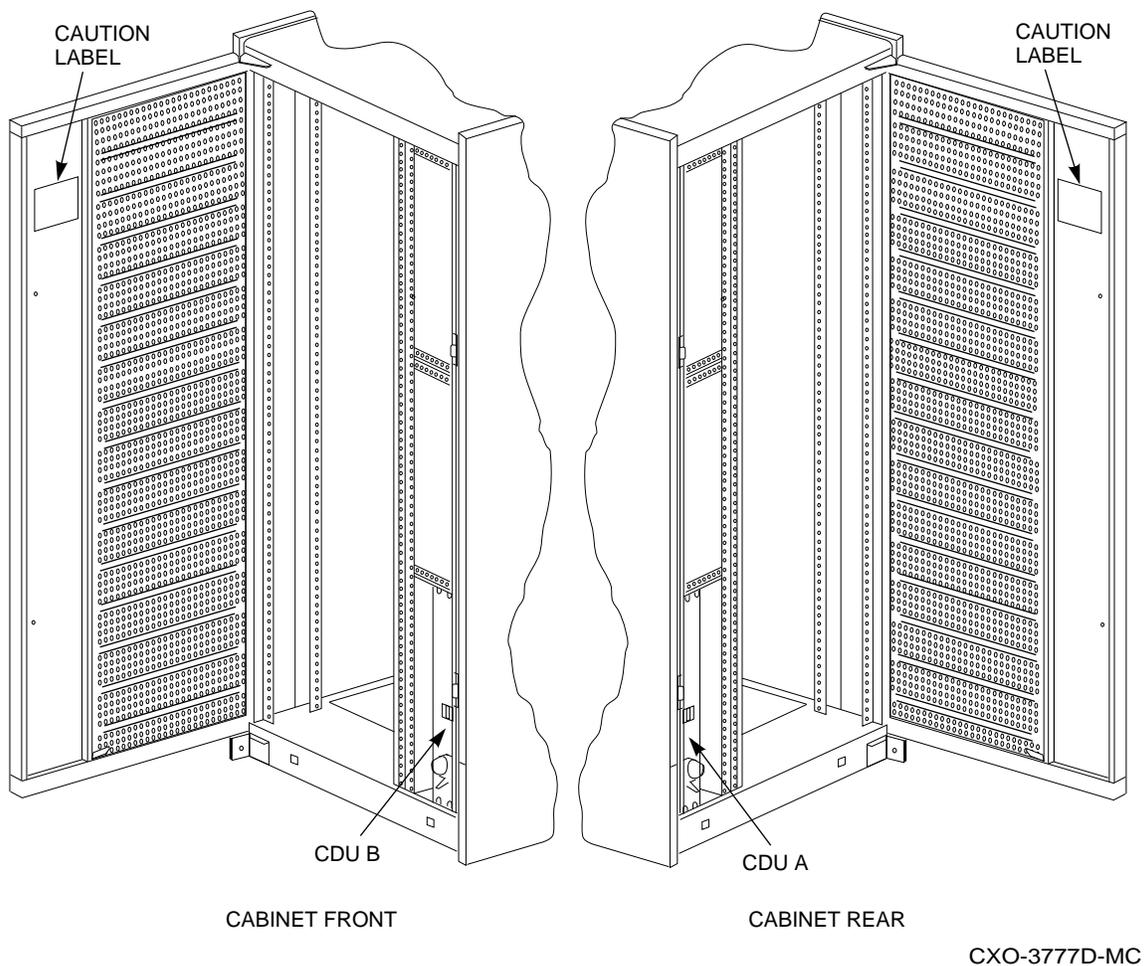
10. Make sure that the second ac power supply required for the dual power option is installed in each shelf.

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

12. Loosen the CDU B safety bracket locking screw and rotate the safety bracket to one side (Figure 2–7).

Figure 2–7 CDU Safety Bracket

CDU SAFETY
BRACKET
(OPERATING
POSITION)

ROTATE FOR
POWER CORD
INSTALLATION

BRACKET
LOCKING
SCREW

CABINET
INTERIOR

POWER
CORDS

REAR OF
CDU
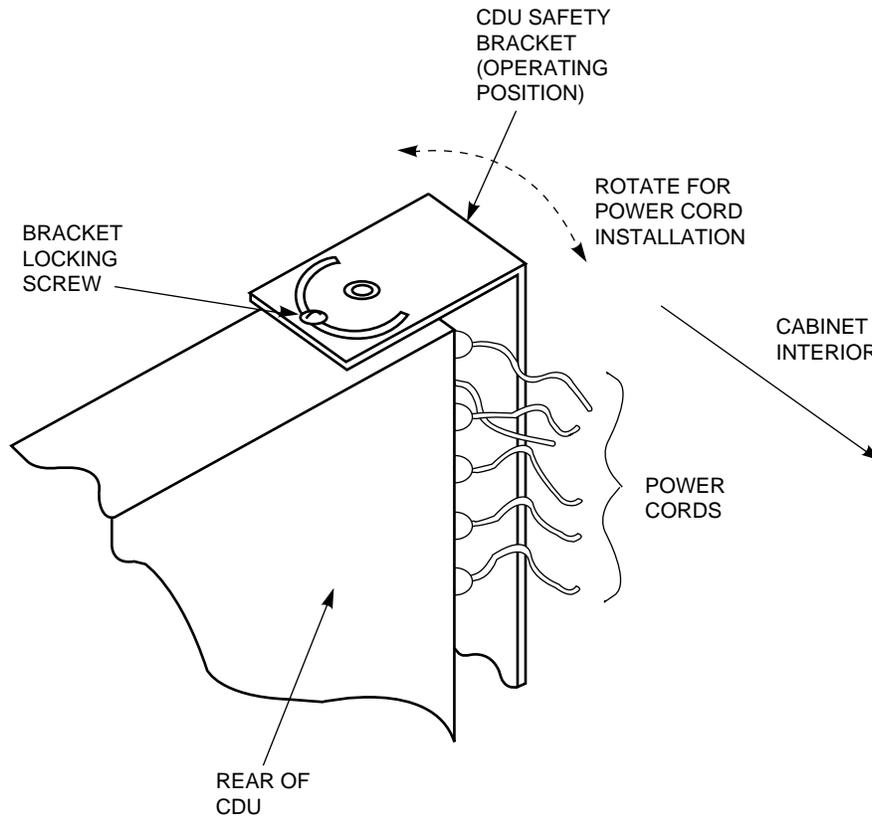
CXO-4108A-MC

13. Plug the gray ac power cord of the appropriate length into the second ac power supply in each shelf and route the cord to CDU B.

14. Route each added power cord to CDU B along the same path as the corresponding black ac power cord. Attach the new gray power cord to the cabinet rails using the existing cable clamps where possible. Use the additional cable ties, cable clamps, and mounting hardware provided in the kit as required.

15. Connect the gray ac power cords to the connectors on the rear panel of CDU B. Start at the top, then move to the bottom and back to the top, if required (see Figure 2–8).

Figure 2–8 CDU B Power Cord Connectors

BOTTOM
POWER
CONNECTOR

CXO-4671A-MC
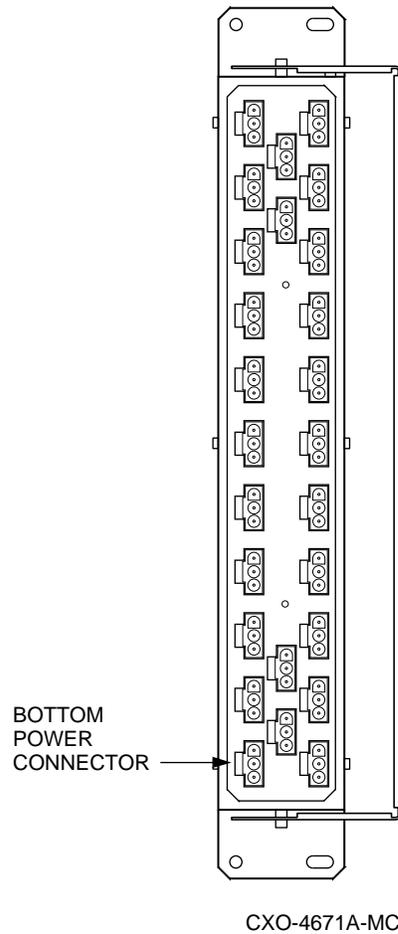
16. Locate the cabinet fan power cords on CDU A. They are labeled A and B with large, yellow labels.

17. Loosen the bracket locking screw on the CDU A safety bracket and rotate the safety bracket to one side.

18. Unplug the fan cord labeled B from CDU A, and plug it into a free outlet on the rear panel of CDU B.

19. Rotate the safety bracket back over the rear panel of CDU A and CDU B. Tighten the bracket locking screws.

20. If the host computer interface cables were disconnected in a previous step, reconnect the cables.

21. Replace the cabinet side panels and reposition the cabinet next to the adjacent ones as appropriate.

22. Connect the black power cord from CDU A to the primary power source.

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

_____ **Note** _____

If you removed the horizontal air baffle to make it easier to access the
cabinet, reinstall it at this time.

_____

2.5 Installing the KZPAA PCI-to-SCSI Adapter into the Existing Server Processor

Installing the PCI-to-SCSI adapter on the existing server processor motherboard
involves the following tasks:

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

2.5.1 Sliding the Server Processor Out of the Cabinet

Figure 2–9 Removing the Rear Top Cover Panel
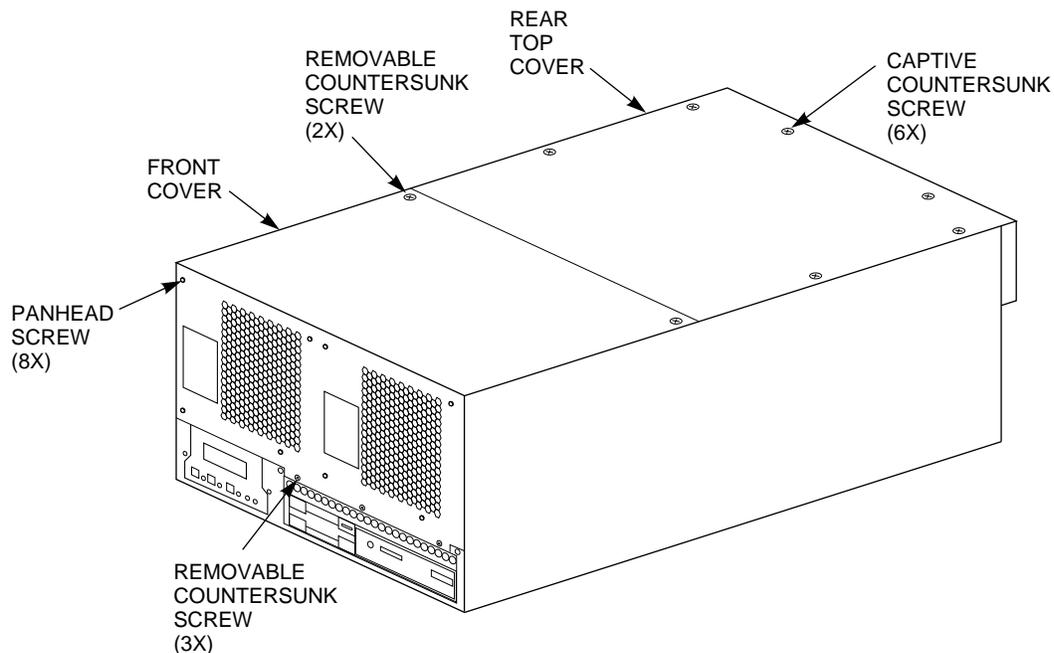
CXO-4725A-MC

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 2–9).

5. Lift off the rear top cover.

2.5.2 Installing the Option Card

This upgrade involves installing a new KZPAA PCI-to-SCSI adapter card into PCI slot 2 in Figure 2–10.

Figure 2–10 SWXNA Server Processor Motherboard Configuration
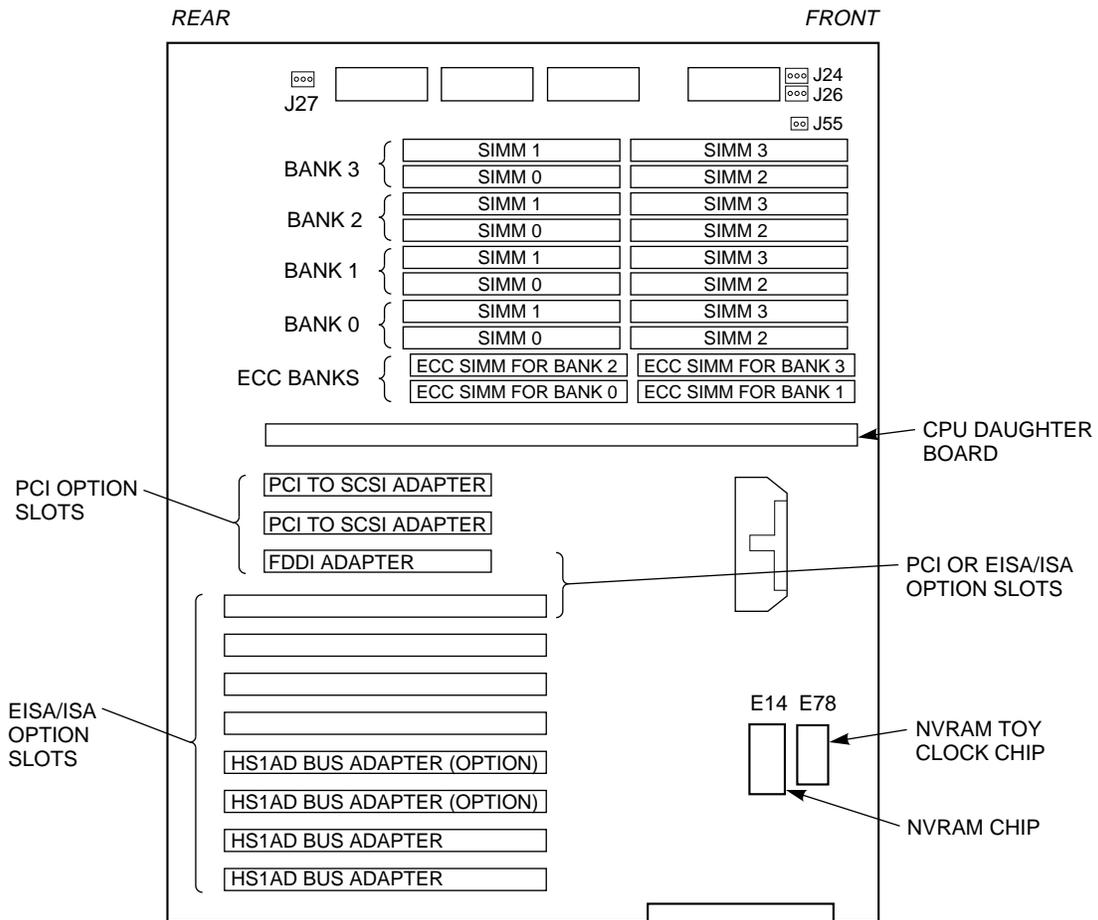
CXO-4626B-MC

1. In Figure 2–10, the first three slots are reserved for PCI options; the last eight are for EISA or ISA options.

2. Remove the termination jumper (E1) on the KZPAA PCI-to-SCSI adapter, as shown in Figure 2–11.

3. Remove the metal cover from PCI slot 2 (see Figure 2–10).

4. Install the KZPAA into the server processor using the slot cover screw to hold it in place.

Figure 2–11 KZPAA SCSI Termination Jumper Location

CXO-5402A-MC
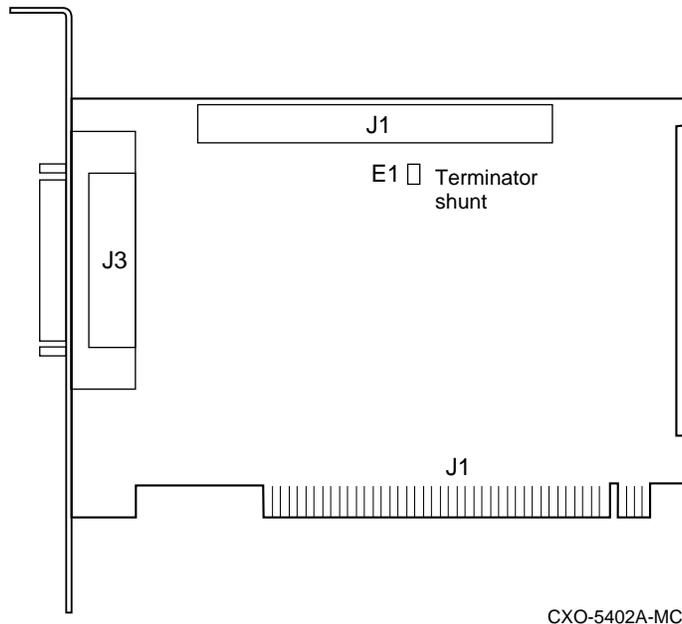
5. Replace the server processor top cover.

6. Slide the server processor back into the cabinet.

7. Replace the shipping brackets at the *rear* of the original server processor (hole locations 53 and 54).

2.6 Installing the Chassis Slide Assembly for the New Server Processor

Use the following procedure to install the chassis slide assembly:

1. Install a RETMA-to-metric slide adapter to the cabinet at hole positions 45 and 47 on the *left front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 2–12).

2. Install a RETMA-to-metric slide adapter to the cabinet at hole positions 45 and 47 on the *right front* vertical rail. Secure the adapters to the cabinet using 10–32 flat head screws (see Figure 2–12).

   These adapters are used to hold the chassis slides.

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

Figure 2–12 RETMA-to-Metric Slide Adapter Installation

RETMA TO
METRIC
ADAPTER

CXO-4815A-MC
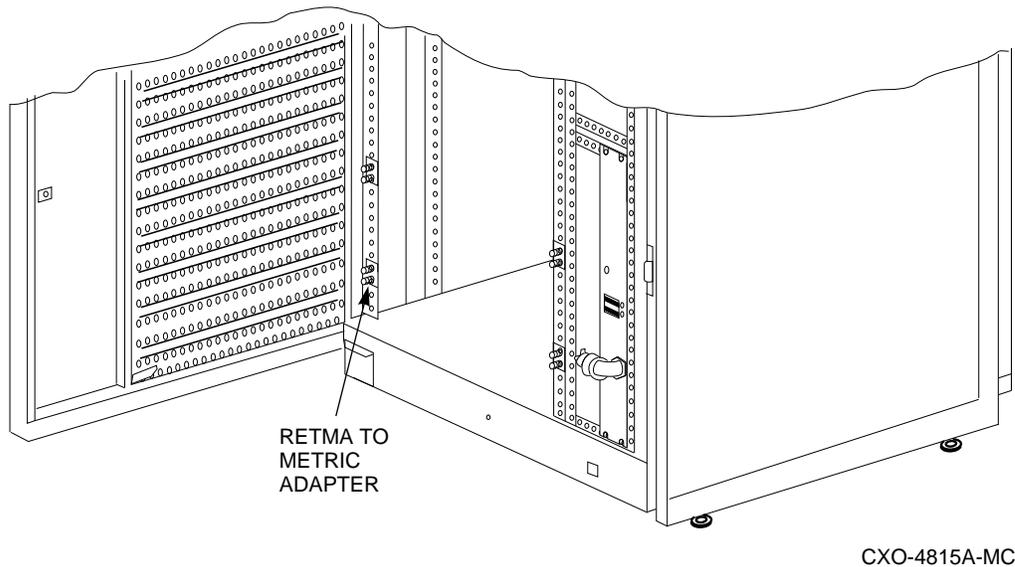
_____ **Note** _____

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

_____

4. Attach a slide mounting bracket to the outside end of each chassis slide.

   Secure each slide mounting bracket to the four holes on the chassis slide with
   four 10–32 flat head screws and four 10–32 KEP nuts (see Figure 2–13). The
   four screw heads must sit flush so the insert can move smoothly through the
   chassis slide.

5. Install the two chassis slides with slide mounting brackets attached (bracket
   towards the front of the cab) to the RETMA-to-metric slide adapters and
   secure with 10–32 KEP nuts (see Figure 2–13).

6. Remove the slide inserts from the chassis slide.

_____ **Note** _____

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

_____

7. Install one slide insert on each side of the server processor as shown in
   Figure 2–13.

Figure 2–13 Slide Insert Installation
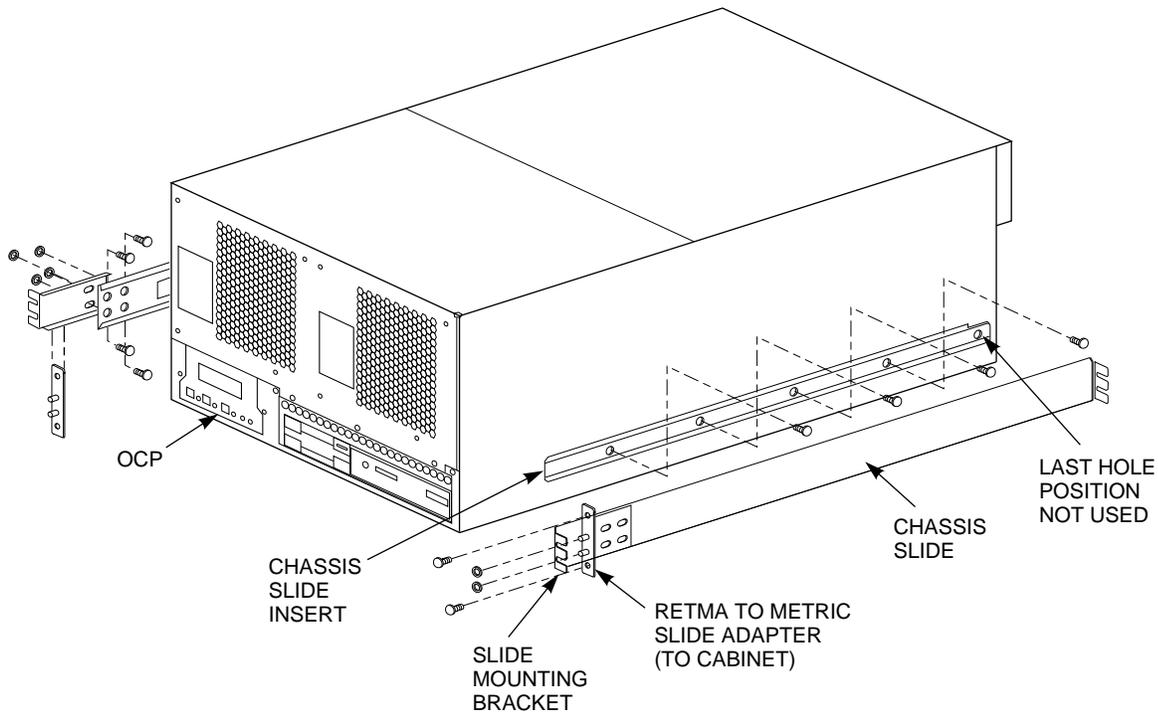
CXO-4618A-MC

Position the slide insert so that the metal locking tab is outside and the notch on each slide insert is toward the rear of the server processor (see Figure 2–13). Align the screw holes on the server processor with the holes to the slide insert.

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

The last hole in the slide insert is not used.

---

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

This completes installation of the slide inserts and chassis slides.

2.7 Installing the Second Server Processor into the Cabinet

Use the following procedure to install the server processor:

1. With the help of a second person, or a lifting device, install the new server processor into the chassis slide from the *rear* end of the cabinet. Align the slide insert on the server processor to the chassis slides in the cabinet and slide the server processor into the cabinet until the insert locks on to the chassis slides (see Figure 2–14).

Figure 2–14 Server Processor Installation

SERVER
PROCESSOR

CHASSIS
SLIDE

SLIDE
INSERT

CABINET REAR

CXO-4697A-MC
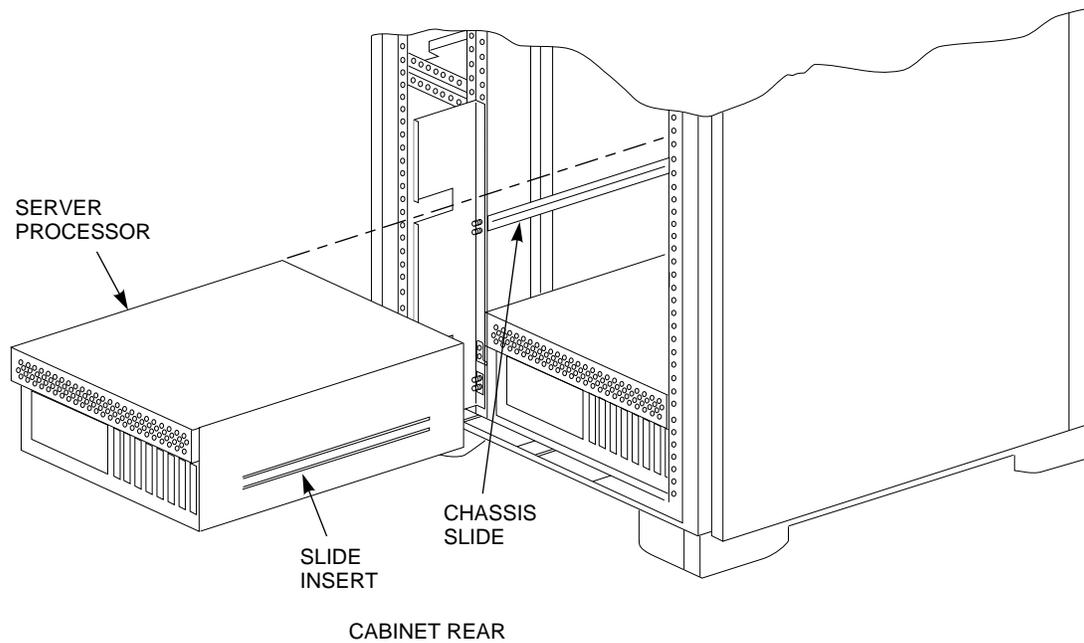
2. Slide the new server processor out of the front of the cabinet on its slides to easily access the rear top cover panel.

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

_____ **Note** _____

This server processor is shipped completely configured for installation into the network array, as follows:

- Two new bus adapters have been installed on the server processor motherboard in EISA slots 7 and 8, labeled "HS1AD Bus Adapter" in Figure 2–10.

- Two KZPAA PCI-to-SCSI adapters have been installed in PCI slots 1 and 2 as shown in Figure 2–10.

- One network interconnect card has been installed in PCI slot 3 as shown in Figure 2–10.

- The RRD43 CD–ROM drive ID has been set to SCSI ID 4.

_____

2.8 Installing Internal Bus Cables

Use the following procedure to connect internal bus cables between the two HS1CP device channel processors and the two server processors.

Figure 2–15 Internal Bus Cable Connectors

CXO-5044A-MC
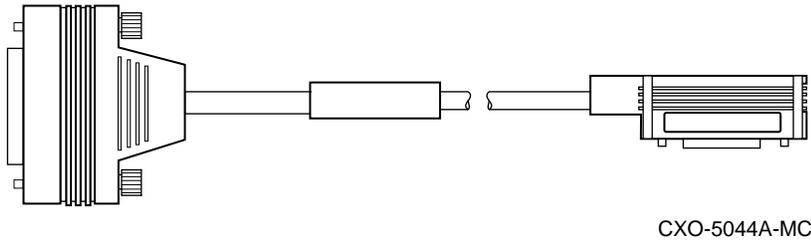
Use the right-angle end of the internal bus cable to attach to the HS1CP device channel processor trilink connector (refer to the connector on the *right* in Figure 2–15).

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 2–15).

1. Remove the terminators (see Figure 2–18) from the trilink connector of both HS1CPs.

2. Carefully attach an internal bus cable from the open trilink connector in slot 7 to the *right* device bus adapater in the new server processor. Make sure the trilink connector pins are not bent or damaged. This cable is labeled "Cable A" in Figure 2–16.

3. Carefully attach an internal bus cable from the open trilink connector of the HS1CP in slot 6 to the *left* device bus adapter in the new server processor (top server processor). Make sure the trilink connector pins are not bent or damaged. This cable is labeled "Cable B" in Figure 2–16.

Figure 2–16 Internal Bus Cabling Diagram
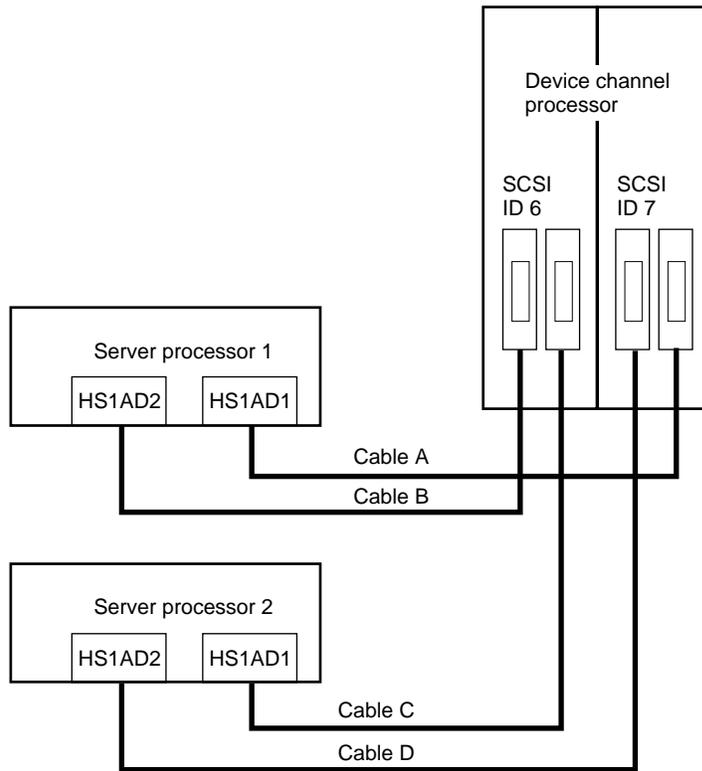
CXO-4703C-MC

_____ **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.

Figure 2–17   Trilink Connector

REAR VIEW

FRONT VIEW
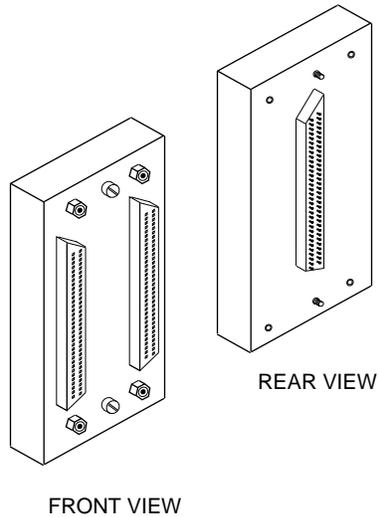
CXO-3851A-MC

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 2–18   Terminator
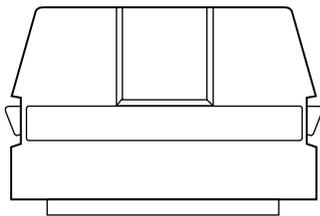
CXO-4957A-MC

2.9 Installing the New System and Quorum Disk

The SWXNA–Ax/Fx Network Storage Array contains a second system disk and a quorum disk in the system disk BA356–S shelf as shown in Figure 2–19. Complete the following steps to install the second system disk.

Figure 2–19 Shadowed System Disk Interconnection

DSA100 shadowset
BN21K-01 cable
Jumper
Terminator
16-bit personality module
DKB0 system disk
DKC100 system disk
DKB200 Quorum disk
BN31G-01 cable
Power supplies
KZPAA
KZPAA
BN23F-UB
BN31G-UE
FR-PCXAR-WJ terminator
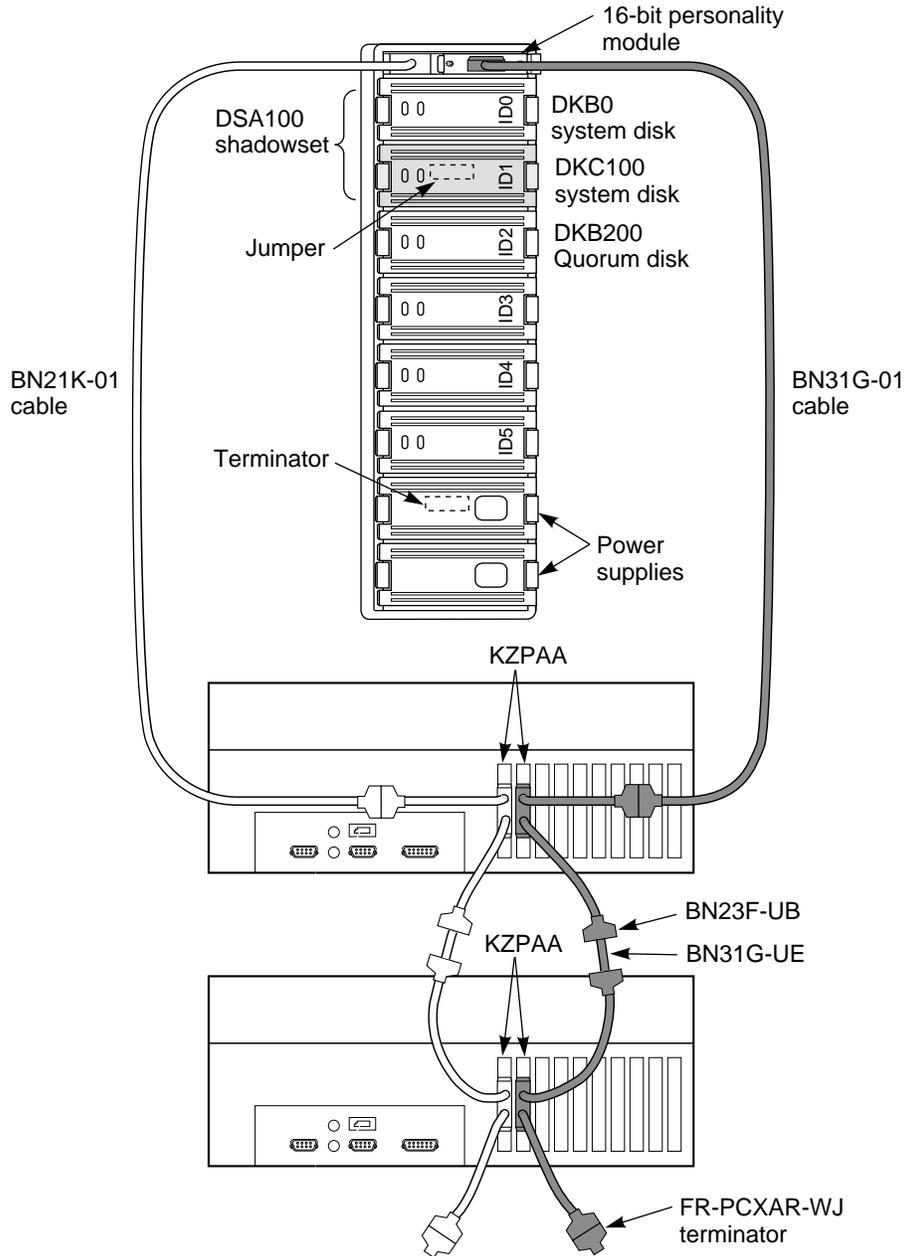
CXO-5403A-MC

2.9.1 Installing SCSI Cables

Use the following procedure to install SCSI cables:

1. Ensure cable trusses are attached to each KZPAA connector in both server processors as shown in Figure 2–20.

Figure 2–20 KZPAA Cable Truss
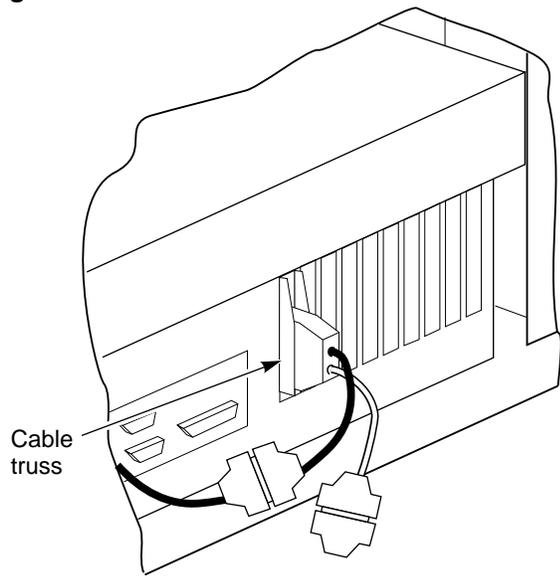
Cable
truss

CXO-5438A-MC

2. Attach a Y-cable (BN23F–0B) to each of the three new KZPAA connectors.

3. Attach a terminator (FR–PCXAR–WJ) to the bottom cable of each Y-cable on the bottom server processor.

4. Verify the BN21K–01 SCSI cable is attached to the top cable of the left Y-cable on the top server processor.

5. Attach the right angle connector of the BN21K–01 cable into the personality module.

6. Attach the BN31G–01 cable to the top cable of the right Y-cable on the top server processor.

7. Attach the straight end of the BN31G–01 cable to the personality module.

8. Connect a BN31G–UE cable between the bottom cable of the left Y-cable on the top server processor and the top cable of the left Y-cable on the bottom server processor.

9. Repeat step 8 for the right Y-cables.

2.9.2 Installing Components into the BA356 Shelf

Install the components into the BA356–S shelf by completing the following steps as shown in Figure 2–19:

1. Install the shadow system disk into slot 1 of the BA356–S shelf. This is the disk labeled DKC100 in Figure 2–19.

2. Install the quorum disk into slot 2 of the BA356–S shelf. This is the disk labeled DKB200 in Figure 2–19.

3. Install the second power supply into the bottom of the BA356–S shelf.

2.10 Complete the Installation of the Server Processor

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

1. Reinstall top rear cover panel on the new server processor. Tighten all the quarter-turn fasteners on the rear top cover panel.

2. Slide the new server processor back into the cabinet.

   _____ **Note** _____

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

   _____

3. Connect the network interconnect cable to the network connector on the new server processor. See Figure 1–1.

4. If they are not already installed, install left and right shipping brackets for the original server processor at hole positions 53 and 54 on both *rear* vertical rails (see Figure 2–21).

   _____ **Note** _____

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

   _____

Figure 2–21 Shipping Brackets

SHIPPING
BRACKET

CABINET REAR
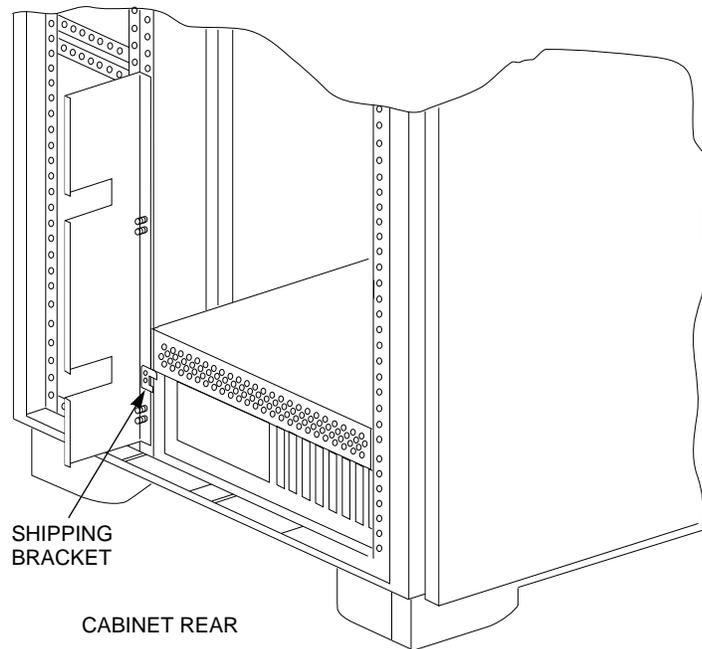
CXO-4706A-MC

5. Tighten all screws.

6. Attach three adhesive-backed cable clips (as shown in Figure 2–22) 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 2–22.

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

    Use the three cable clips to route the power cord over the server processor
    and hold the cord as shown in Figure 2–22. Make a service loop to ensure the
    power cords do not rub against the rails when you slide the server processor
    in and out of the cabinet. Secure the power cords to the vertical rail near the
    CDU with tie wraps.

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

    _____ **Note** _____

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

    _____

9. Tighten all screws.

Figure 2–22   Server Processor Cable Clip Installation

POWER
CORD

CABLE
CLIP
(3X)

CXO-4818A-MC
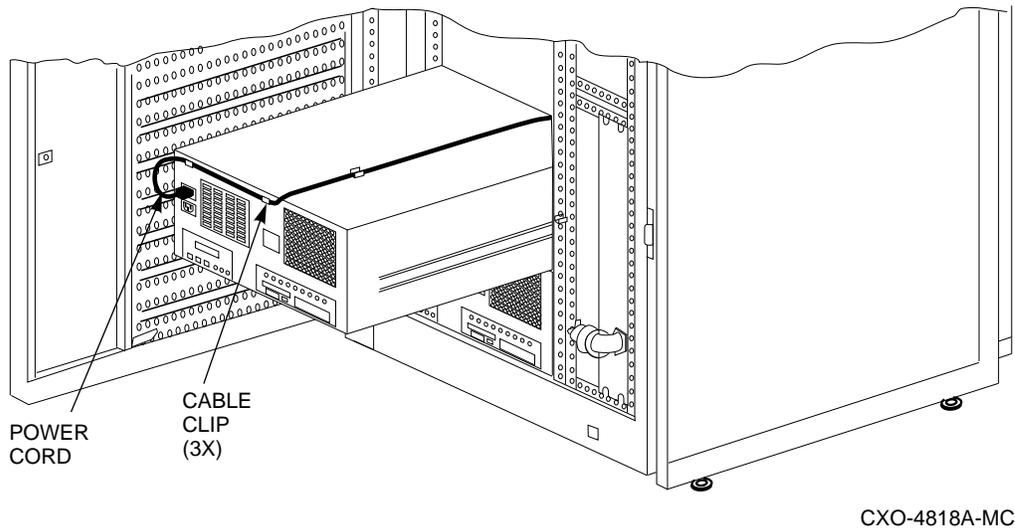
10. Replace the cabinet side panels and top cover by reversing the procedures described in Section 2.3.

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

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

2.11 Customizing Network Array Operating System Parameters

You have now completed the hardware installation of this upgrade kit to upgrade an SWXNA-Ex/Jx to an SWXNA-Ax/Fx Network Storage Array. The additional disk you installed in this procedure for the shadowed system disk is blank. You have also added a new SCSI bus to support the shadowed system disk. At this time, you must:

• Set up the console parameters for each server processor

• Initialize and mount the new shadow set member for the system disk

2.11.1 Setting Up the Server Processor Console Parameters

Table 2–3 shows the correct parameter set up for each server processor.

Table 2–3   Server Processor Console Parameters

Parameter	Top Server Processor	Bottom Server Processor
boot_osflags	1,0	0,0
boot_reset	on	on
bootdef_dev	DKB0, DKC100	DKB0, DKC100
pka0_disconnect	1	1
pka0_fast	1	1
pka0_host_id	6	7
pkb0_disconnect	1	1
pkb0_fast	1	1
pkb0_host_id	6	7
pkc0_disconnect	1	1
pkc0_fast	1	1
pkc0_host_id	6	7
scsi_poll	on	on
console	serial	serial
os_type	OpenVMS	OpenVMS

Complete the following procedure for *both* server processors to verify that the settings are correct:

1. Connect a terminal to the server processor.

2. For each parameter listed in Table 2–3 type SHOW <PARAMETER> to view the current setting. For example:

    ```
    >>> SHOW boot_osflags
    boots_osflags  1,0
    ```

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

    ```
    >>> SET boot_osflags 1,0
    ```

2.11.2 Initialize and Mount the New Shadowed System Disk Member

Now you must initialize and mount the new shadowed system disk member that you installed. Complete the following steps:

1. Connect a terminal to the *bottom* (original) server processor.

2. At the prompt, use the SHOW DEVICE command to show the current system disk.

```
$ SHOW DEVICE SYS$SYSDEVICE

Device                 Device           Error    Volume        Free  Trans Mnt
 Name                  Status           Count    Label       Blocks Count Cnt
DSA100:                Mounted              0    SYS$NSTAR1  3018240   190   1
$13$DKB0:    (NSTAR1)  ShadowSetMember      0    (member of DSA100:)
```

The current SYS$SYSDEVICE in our example is DSA100 consisting of a single ShadowSetMember, 13DKB0.

3. Use the SHOW DEVICE command to locate the new system disk.

```
$ SHOW DEVICE DK

Device                 Device           Error    Volume        Free  Trans Mnt
 Name                  Status           Count    Label       Blocks Count Cnt
$13$DKA500:  (NSTAR1)  Online wrtlck        0
$13$DKB0:    (NSTAR1)  ShadowSetMember      0    (member of DSA100:)
$13$DKB200:  (NSTAR1)  Online               0
$13$DKC100:  (NSTAR1)  Online               0
```

In our example using the defaults,

> 13DKA500: (NSTAR1) Online wrtlck is the CD ROM reader
> 13DKB0: (NSTAR1) ShadowSetMember is the original system disk
> 13DKB200: (NSTAR1) Online is the new quorum disk
> 13DKC100: (NSTAR1) Online is the new system disk

4. Enter the following commands to initialize and mount the new system disk using the same Volume Label as the original system disk, SYS$NSTAR1 in our example.

```
$ INITIALIZE $13$DKC100: SYS$NSTAR1
$ MOUNT /SYSTEM DSA100: /SHADOW=$13$DKC100: SYS$NSTAR1

$ SHOW DEVICE SYS$SYSDEVICE

Device                 Device           Error    Volume        Free  Trans Mnt
 Name                  Status           Count    Label       Blocks Count Cnt
DSA100:                Mounted              0    SYS$NSTAR1  3018240   190   1
$13$DKB0:    (NSTAR1)  ShadowSetMember      0    (member of DSA100:)
$13$DKC100:  (NSTAR1)  ShadowCopying        0    (copy trgt DSA100:  1% copied)
```

The SHOW DEVICE command now shows the SYS$SYSDEVICE consists of two ShadowSetMembers, 13DKB0 and 13DKC100. As soon as the new system disk is mounted, the operating system is automatically copied from the original system disk.

5. Connect a terminal to the *top* (new) server processor and initiate a conversational boot. The following example shows the default boot session. Your parameters may be different if you did not use the default values when you installed the orginal server processor in the SWXNA–Ex/Jx network storage array.

```
>>>BOOT -FLAGS 1,1

SYSBOOT> SET /STARTUP SYS$SYSTEM:STARTUP.COM

SYSBOOT> SET SCSNODE "NSTAR2"
SYSBOOT> SET SCSSYSTEMID 1026
SYSBOOT> SET VOTES 1
SYSBOOT> SET EXPECTED_VOTES 2
SYSBOOT> SET NISCS_LOAD_PEA0 1
SYSBOOT> SET VAXCLUSTER 2
SYSBOOT> CONTINUE
```

6. Login to the system account and at the $ prompt, issue the following
    commands to start the read cache on the new server processor. The NODE
    NAME must be the same node you set up in the boot session, in our example
    NSTAR2.

    ```
    $ MCR SYSMAN STARTUP ENABLE FILE /NODE=NSTAR2 NSA$PCS_STARTUP.COM

    $ MCR SYSMAN STARTUP SHOW FILE NSA$PCS_STARTUP.COM /FULL
    %SYSMAN-I-COMFIL, contents of component database on node NSTAR2
    Phase        Mode    File
    ------------ ------  ----------------------------------
    LPMAIN       DIRECT  NSA$PCS_STARTUP.COM
          Enabled on NSTAR1,NSTAR2
          P1:<def> P2:<def> P3:<def> P4:<def> P5:<def> P6:<def> P7:<def> P8:<def>
    ```

    The next server processor boot will start the read cache on all available disk
    drives. Consult the Managing the Network Storage Array's Read Cache in
    the *Getting Started with the StorageWorks Network Storage Array* manual for
    information on customizing the read cache.

7. If your network array will serve UNIX or PC clients, enter the following
    command to start the Network File System Configuration Procedure. All
    NFS parameters must be re-entered, even if they were set up before on the
    SWXNA-Ex/Jx, to enable the new server processor.

    ```
    $ @SYS$MANAGER:NSA$NFS_CONFIG_MAIN.COM
    ```

    An NFS configuration session will start. Consult the Network File System
    section of your *Getting Started with the StorageWorks Network Storage Array*
    manual for instructions on setting up NFS.

8. Reboot the server processor to start the read cache and NFS.

After the last reboot, your network storage array is on line and running. Consult
the *Getting Started with the StorageWorks Network Storage Array* for any
questions you may have.

A

StorageWorks Network Storage Array Specifications

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)

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)

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)

HIG

B

Configuration Rules and Restrictions

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 BA35x–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 BA35x–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
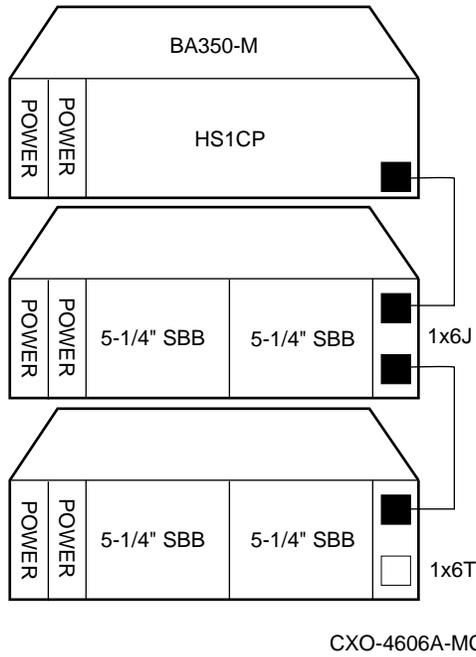
Figure B–2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

Figure B–2 Adjacent Devices on a Single Port

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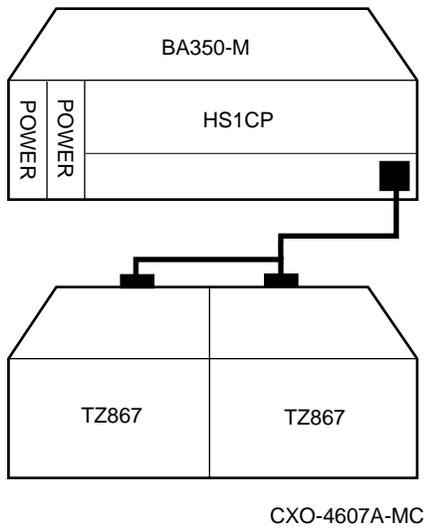
Typical and Recommended 3½-Inch and 5¼-Inch SBB Configurations

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

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.

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).

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.

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 BA35x–S shelf has its upper connector cable attached to either the adjacent BA35x–S shelf's lower connector (1x6J), or a controller port connector (2x3T or 1x6T).

The lower connector cable is attached to either an adjacent BA35x–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.

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.

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).

HS1CP Device Channel Processor Configuration Rules

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

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.

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.

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

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.

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
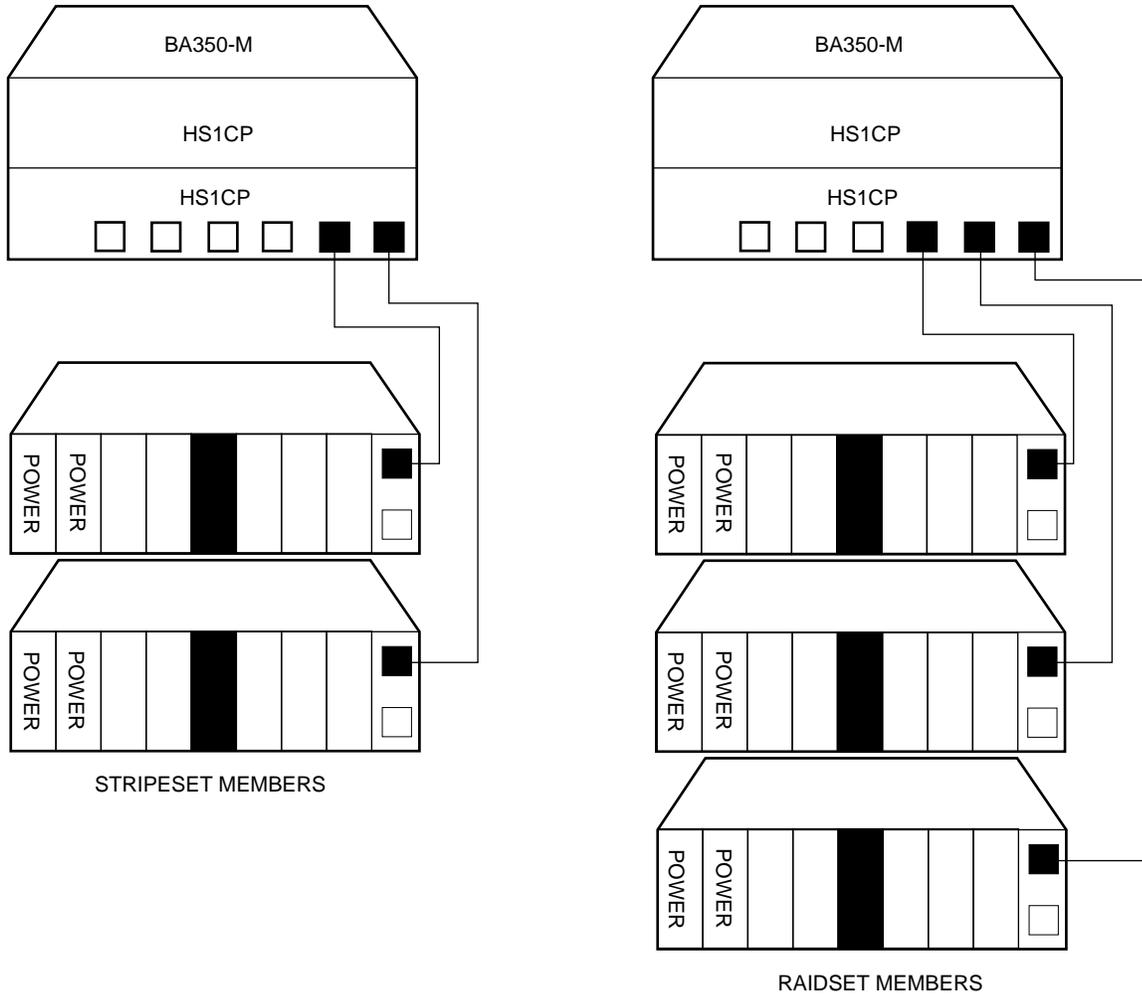
CXO-4608A-MC

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.

Index