StorageWorks™ Solutions StorageWorks Network Storage Array

SWXNA–Cx Installation Guide

Order Number: EK–NSACX–IG. A01

This guide describes how to install the SWXNA–Cx expansion cabinet.

Digital Equipment Corporation
Maynard, Massachusetts

Contents

C   Network Storage Array Interconnect Cables

Index

Figures

Tables

Preface

This manual describes the procedures necessary to install and configure the SWXNA–Cx expansion cabinet.

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 the steps for connecting the SWXNA–Cx to an SWXNA–Bx /Gx.
Appendix A	Describes the SWXNA specifications.
Appendix B	Describes the shelf and HS1CP configuration rules.
Appendix C	Provides a list of network interconnect 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

SWXNA–Cx Expansion Cabinet Installation Procedure

This chapter provides step-by-step procedures for attaching the SWXNA–Cx expansion cabinet to an existing model SWXNA–Bx/Gx StorageWorks Network Storage Array.

1.1 Purpose of This Option

To double storage capacity, a customer with a model SWXNA–Bx/Gx could purchase and install an SWXNA–Cx expansion kit.

The SWXNA–Cx expansion kit provides all the components for attaching a StorageWorks expansion cabinet to a model SWXNA–Bx/Gx Network Storage Array. The following sections provide information about the expansion kit and how to perform the installation.

1.2 SWXNA–Cx Expansion Cabinet Kit Description

The main components of the SWXNA–Cx expansion kit are as follows:

- SW800 cabinet with four HS1CP device channel processors, each with a write-back cache module

- Four extra long internal bus cables

When you receive your SWXNA–Cx 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.

1.3 SWXNA–Cx Cabinet Thermal Stabilization

The SWXNA–Cx expansion cabinet arrives packed in a corrugated carton attached to a wooden shipping pallet. Some cabinets are packaged in a plastic or barrier bag. If the cabinet arrives in a plastic bag, leave the bag in place until the cabinet has adjusted to the local temperature and humidity, as follows:

CAUTION

Failure to thermally stabilize storage subsystems may damage drive media or associated electronics when the unit is turned on. Environmental stabilization begins when the equipment is placed in the room in which it is to be installed.

- To ensure proper operation of Digital storage devices, the StorageWorks building block (SBB) temperature must be within 18°C to 29°C (65°F to 85°F).

Table 1–1 specifies the time required to thermally stabilize SBBs based on the ambient shipping temperature.

Table 1–1 Thermal Stabilization Specifications

Ambient Temperature Range °C	Ambient Temperature Range °F	Minimum Stabilization Time
60 to 66	140 to 151	3 hours
50 to 59	122 to 139	2 hours
40 to 49	104 to 121	1 hour
30 to 39	86 to 103	30 minutes
18 to 29	65 to 85	None
10 to 17	50 to 64	30 minutes
0 to 9	32 to 49	1 hour
−10 to −1	14 to 31	2 hours
−20 to −11	−4 to 13	3 hours
−30 to −21	−22 to −5	4 hours
−40 to −31	−40 to −21	5 hours

- If condensation *is visible* on the outside of the storage device, stabilize the device and the SBB in the operating environment for 6 hours or until the condensation is no longer visible, whichever is longer.

- If condensation *is not visible* on the outside of the storage device, thermally stabilize the device for the amount of time specified in Table 1–1.

1.4 Removing the Cabinet from the Pallet

—————————————— WARNING ——————————————

Three people are required to remove the cabinet from the shipping pallet. Failure to use sufficient personnel and correct safety precautions can result in injury and equipment damage. All personnel should wear safety glasses.

———————————————————————————————————————

Use the following procedure to remove the cabinet from the shipping pallet:

1. Remove any packing material remaining on the pallet.

2. Remove and inspect the two unloading ramps. The ramps, ramp side rails, and metal hardware should be inspected for the following defects:

   - Cracks more than 25 percent of the ramp depth, either across or lengthwise on the ramp

   - Knots or knotholes going through the thickness of the ramp and greater than 50 percent of the ramp width

   - Loose, missing, or broken ramp side rails

   - Loose, missing, or bent metal hardware

   If any of these defects exist, do not use the ramp. Investigate alternate means of removing the cabinet or order a new ramp (Digital part number 99–08897–05).

3. Attach the ramps by fitting the metal prongs into the holes on the pallet, as shown in Figure 1–1. Make sure that the arrows on the ramps match up with the arrows on the pallet.

Figure 1–1 Shipping Pallet Ramp Installation

LEFT
UNLOADING
RAMP

SHIPPING
PALLET

REAR

FRONT

RIGHT RAMP
ATTACHES HERE

RIGHT
UNLOADING
RAMP

EXTEND RAMP TO
FULL LENGTH
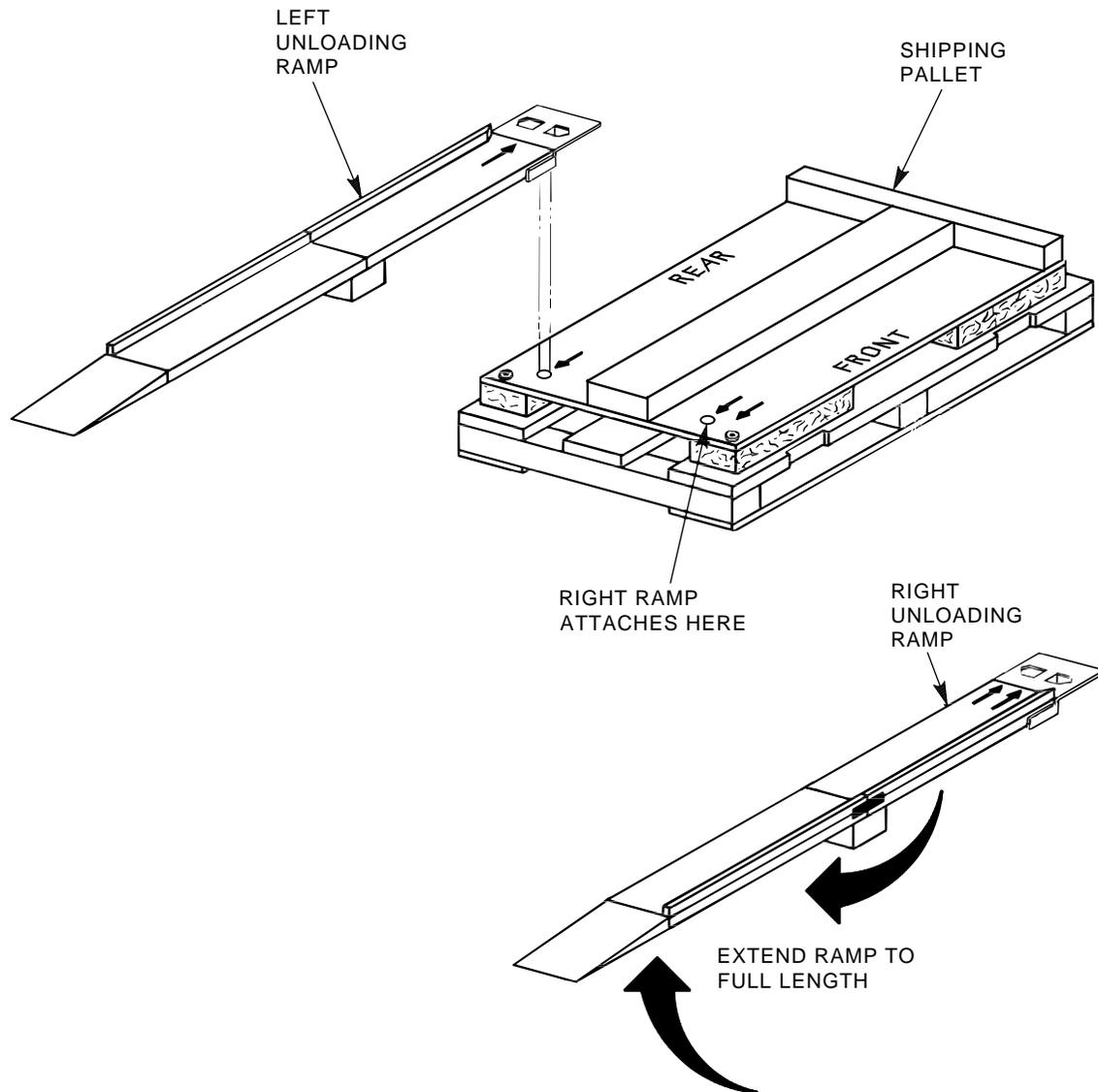
CXO-688D_S

4. Extend the ramps to their full length.

5. See Figure 1–2 for the location of the shipping bolts. Remove the bolts.

Figure 1–2 Shipping Bolts and Brackets

LEVELER

SHIPPING
BOLT
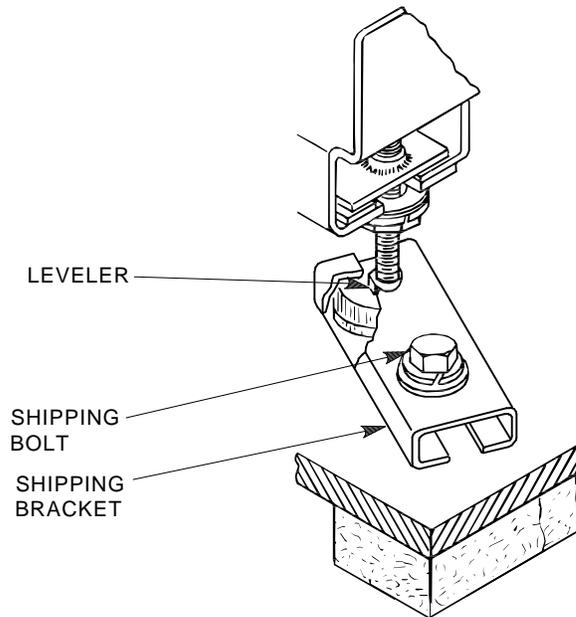
SHIPPING
BRACKET

SHR_X1102A_89_SCN

6. Remove the shipping brackets, shown in Figure 1–2, from the cabinet leveler feet and set aside.

7. Loosen the leveler locking nuts and screw the four cabinet leveler feet all the way up into the cabinet.

_____ **WARNING** _____

The leveler feet must be raised fully for the cabinet to roll easily down the unloading ramps. Failure to do so can result in the cabinet tipping off the pallet or ramp.

_____

8. Carefully roll the cabinet off the pallet and down the ramps to the floor as shown in Figure 1–3.

Figure 1–3 Removing the Cabinet from the Pallet
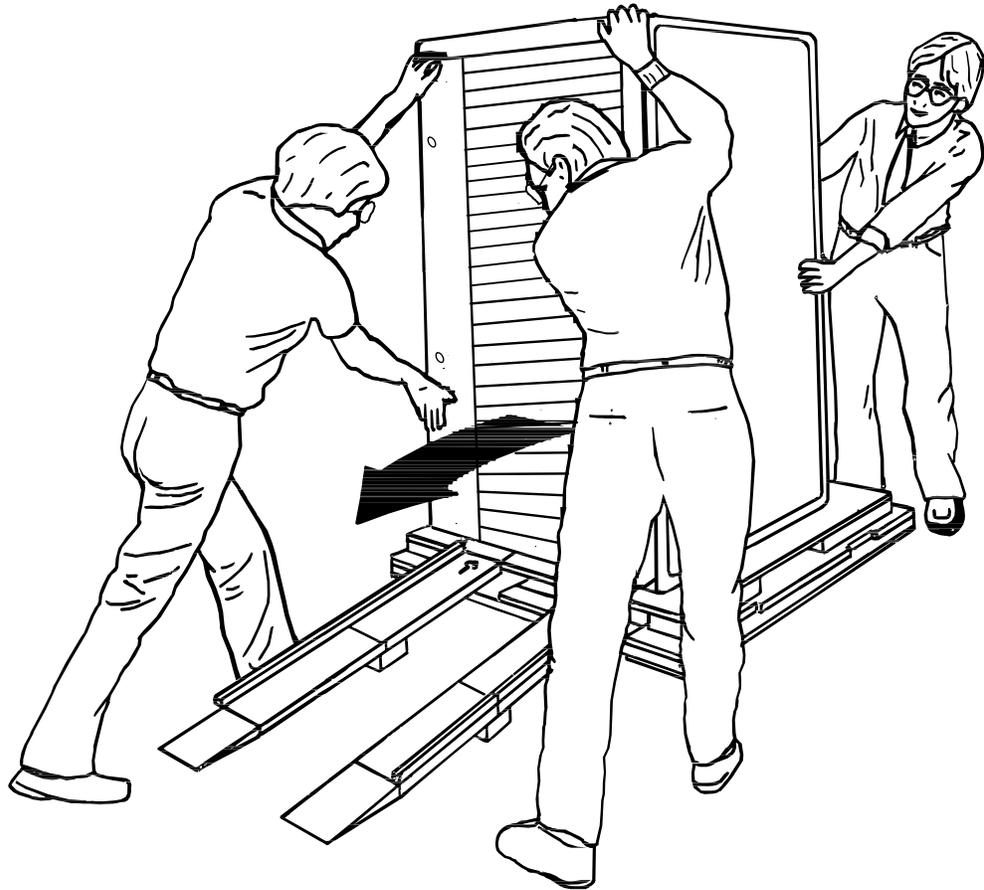
CXO-3808A

1.5 Placing the Cabinet

_____ **WARNING** _____

Use extreme caution when rolling the cabinet across the floor. Failure to raise all leveler feet and to provide a clear path for the cabinet's casters can result in the cabinet tipping over and injury to personnel.

_____

Once the cabinet has been removed from the pallet, the cabinet can be rolled to its final installation position. Secure loose cabinet cables up and out of the way when rolling the cabinet.

1.6 Leveling the Cabinet

Level the cabinet in its final position as follows:

1. Loosen the locknuts on all four leveler feet as shown in Figure 1–4.

2. Turn each leveler hex nut clockwise until the leveler foot contacts the floor.

3. Adjust all four leveler feet until the cabinet is level and the load is removed from all casters. Verify that the casters spin freely.

4. Tighten the locknuts on all four leveler feet.

Figure 1–4   Leveler Foot Adjustment

LOCKNUT

LEVELER
HEX NUT

LEVELER
FOOT
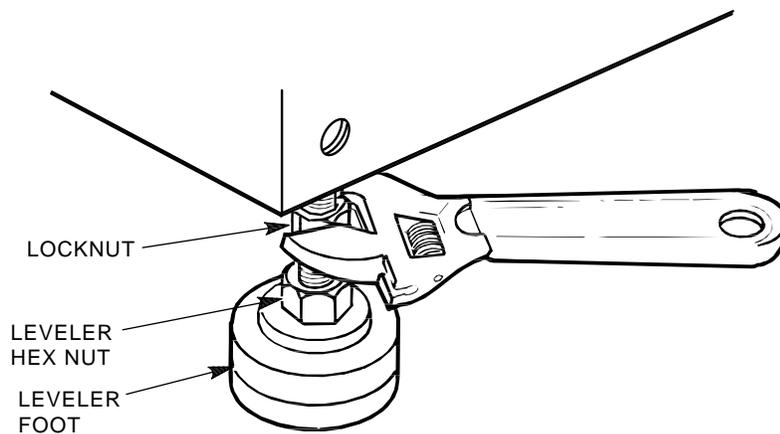
CXO-3829A

1.7 Installing the Skirt Kit

The skirt kit is packaged separately inside the corrugated carton with the cabinet. Installation of the skirt kit is optional. If you are installing the skirt kit, proceed as follows:

1. Unpack the skirt kit carton, using Figure 1–5 for reference, identify the right, left, front, and rear skirts.

2. Using Figure 1–5 for reference, position the skirts next to the cabinet.

3. The skirt fasteners are quarter-turn fasteners. Position each skirt against the cabinet such that the fasteners mate with the receptacles on the cabinet's base.

4. Using a screwdriver, push each fastener into its mating receptacle on the cabinet base, and turn it one quarter-turn clockwise.

   (Once the skirts are installed, there is a small amount of play that allows them to be adjusted slightly up or down for proper alignment.)

Figure 1–5 Cabinet Skirt Installation
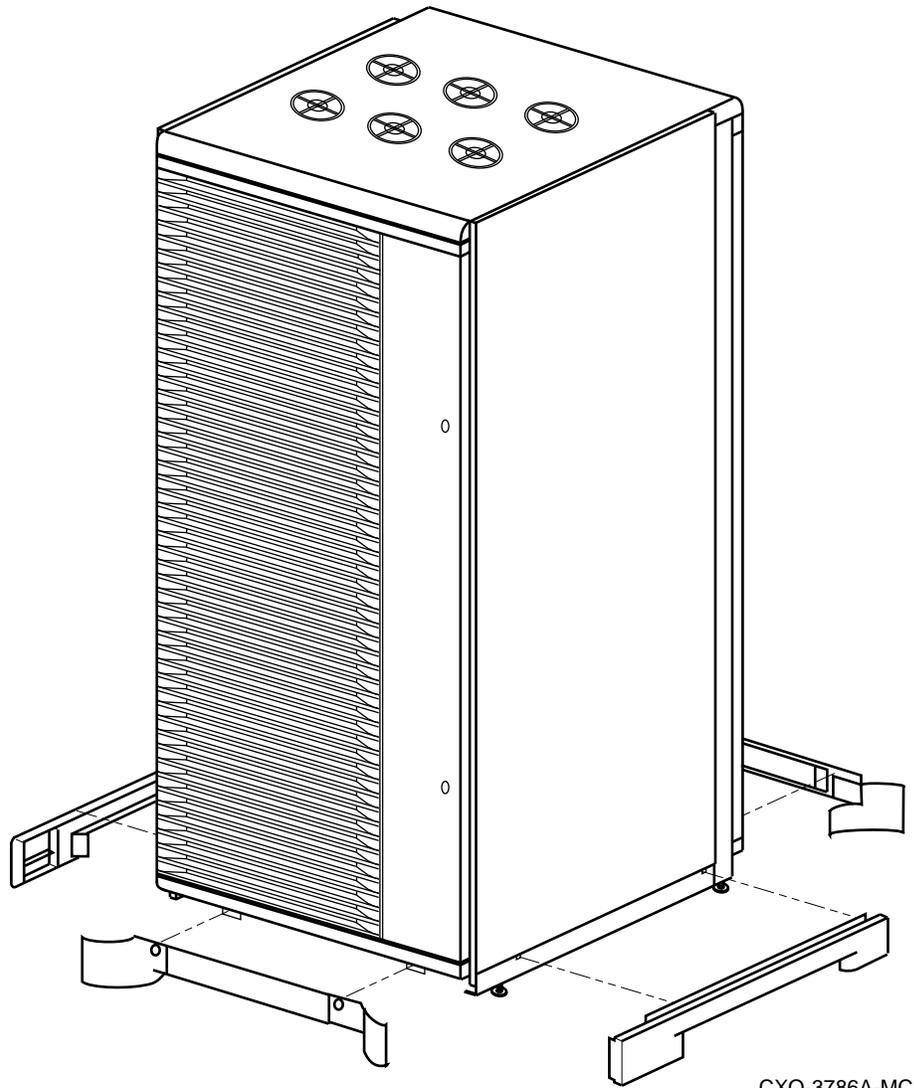
CXO-3786A-MC

1.8 Inspecting the Cabinet

Inspect the cabinet installation as follows:

1. Make sure that all four leveler feet are lowered to support the full weight of the cabinet and that the cabinet is level.

2. The remaining steps require access to the cabinet interior. To access the cabinet interior perform the following:

   a. Release the door locks mounted on the smooth vertical panel of each door by turning the locks counterclockwise with a 5/32-inch hex wrench.

b. Swing the doors open.

_____ **note** _____

The following steps assume the side panels must be removed.

_____

c. Move the cabinet away from adjacent cabinets.

d. Remove the side panels.

_____ **Note** _____

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

_____

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

_____ **WARNING** _____

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

_____

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

g. Remove the bolts attaching the side panels to the top side rails of the cabinet.

h. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.

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

3. Make sure that the circuit breaker on the CDUs is in the ○ (OFF) position.

4. Make sure that all hardware within the cabinet is fastened securely, and that there are no loose pieces present in the cabinet interior.

5. Check each of the cabinet fans to make sure that the blades turn freely and are not obstructed.

6. Make sure that there are no obstructions to the airflow from the shelf blowers.

7. Check the identification label on the rear of the cabinet to verify that the cabinet is configured to accept the power available at the site.

8. Make sure that all ac power cords connected from the shelves and cabinet fans to the CDUs are firmly seated in their connectors at both ends.

9. Make sure that all SBBs are seated firmly in their shelves.

10. Make sure that any necessary external interface cables are installed and firmly seated in their connectors.

11. Replace the side panels and top cover by reversing the procedures described in step 2.

1.9 Preparing the SWXNA–Bx/Gx Array for Upgrade

The following sections provide information for preparing the SWXNA–Bx/Gx Network Storage Array for the upgrade.

1.9.1 Shutting Down the System

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.

1.9.1.1 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 1–6 Connecting to the Terminal Port of the Network Array
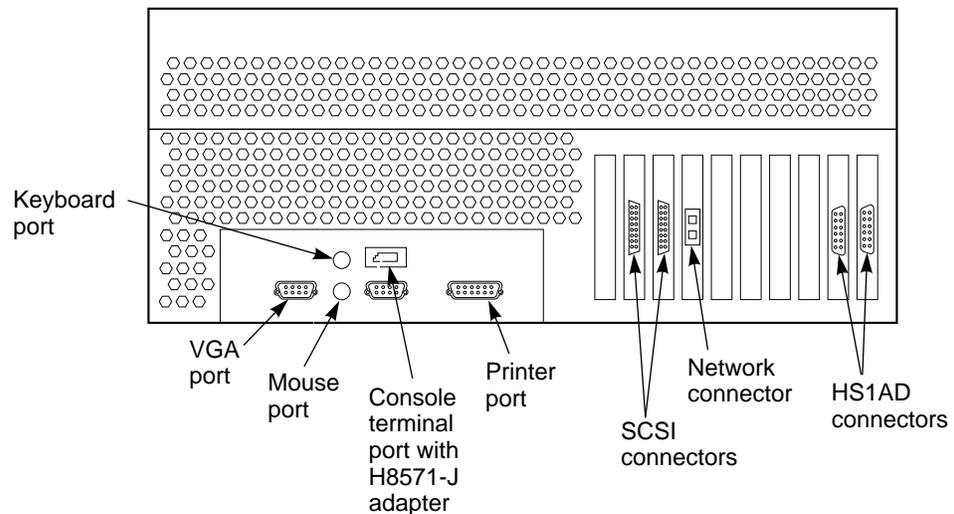
CXO-4774B-MC

3. Connect the other end of the terminal cable to the EIA terminal port on the rear of the StorageWorks Network Storage Array cabinet using an H8571–J adapter as shown in Figure 1–6.

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.

1.9.1.2 Shutting Down the System

Perform the following steps to shut down the storage array:

1. Follow the instructions in Section 1.9.1.1 to connect a terminal to the server processor.

2. Stop all work on the server processor.

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

4. If there are no nodes in the cluster that are booted through a served system disk on your storage 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 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 V6.2
          Last interactive login on Thursday, 28-SEP-1995 21:35:03.64
          Last non-interactive login on Thursday, 28-SEP-1995 21:35:20.48
      ```

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

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

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

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

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

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

      Shutdown options [NONE]: REMOVE_NODE
      ```

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

```
          SYSTEM SHUTDOWN COMPLETE

     halted CPU 0

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

5. Power off the server processor by:

    a. Opening the front door of the 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.

1.9.2 Accessing the Cabinet Interior

Open the front and rear cabinet doors. See Figure 1–7 for specific space
requirements.

Figure 1–7 Minimum Installation Clearances

CXO-3805A-MC
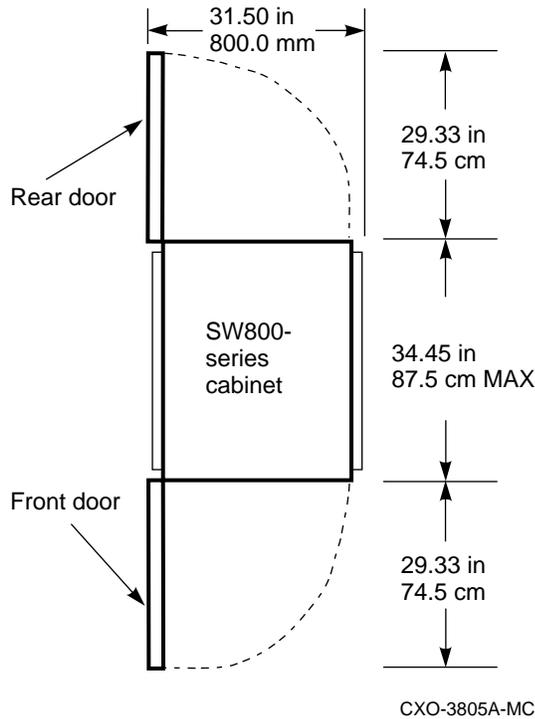
This installation procedure requires access to the front and rear HS1CP device channel processors and to the rear of the server processors.

1.10 Attaching the SWXNA–Cx Expansion Cabinet to the SWXNA–Bx/Gx Network Storage Array

This section describes how to:

- Recable the connections between the HS1CPs and server processors in the SWXNA–Bx/Gx (see Section 1.10.1).

- Connect the HS1CPs in the SWXNA–Cx cabinet to the server processors in the SWXNA–Bx/Gx (see Section 1.10.2).

1.10.1 Recabling the Internal Bus Cables in the SWXNA–Bx/Gx

Use the following procedure to recable the connections between the HS1CPs and server processors in the SWXNA–Bx/Gx:

_____ **CAUTION** _____

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

Figure 1–8 Trilink Connector

REAR VIEW

FRONT VIEW

CXO-3851A-MC
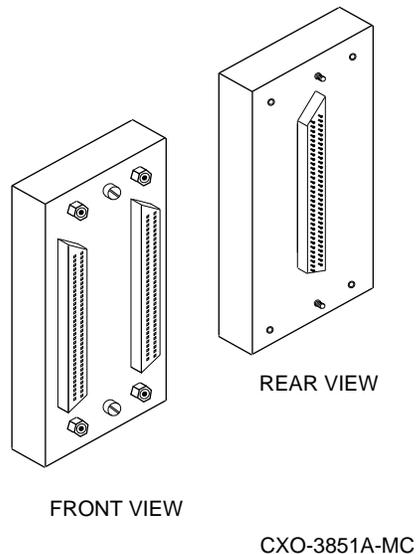
Be aware that the trilink connector block (Figure 1–8) is the interface between the HS1CP device channel processor and other internal bus cable connections. It is the *trilink* that you can disconnect and connect safely when you have a mating guide installed. In a power-on situation, you must work around 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 1–9 shows the logical "before" cabling diagram.

Figure 1–9 Cabling Diagram for SWXNA–Bx/Gx

CXO-5042A-MC
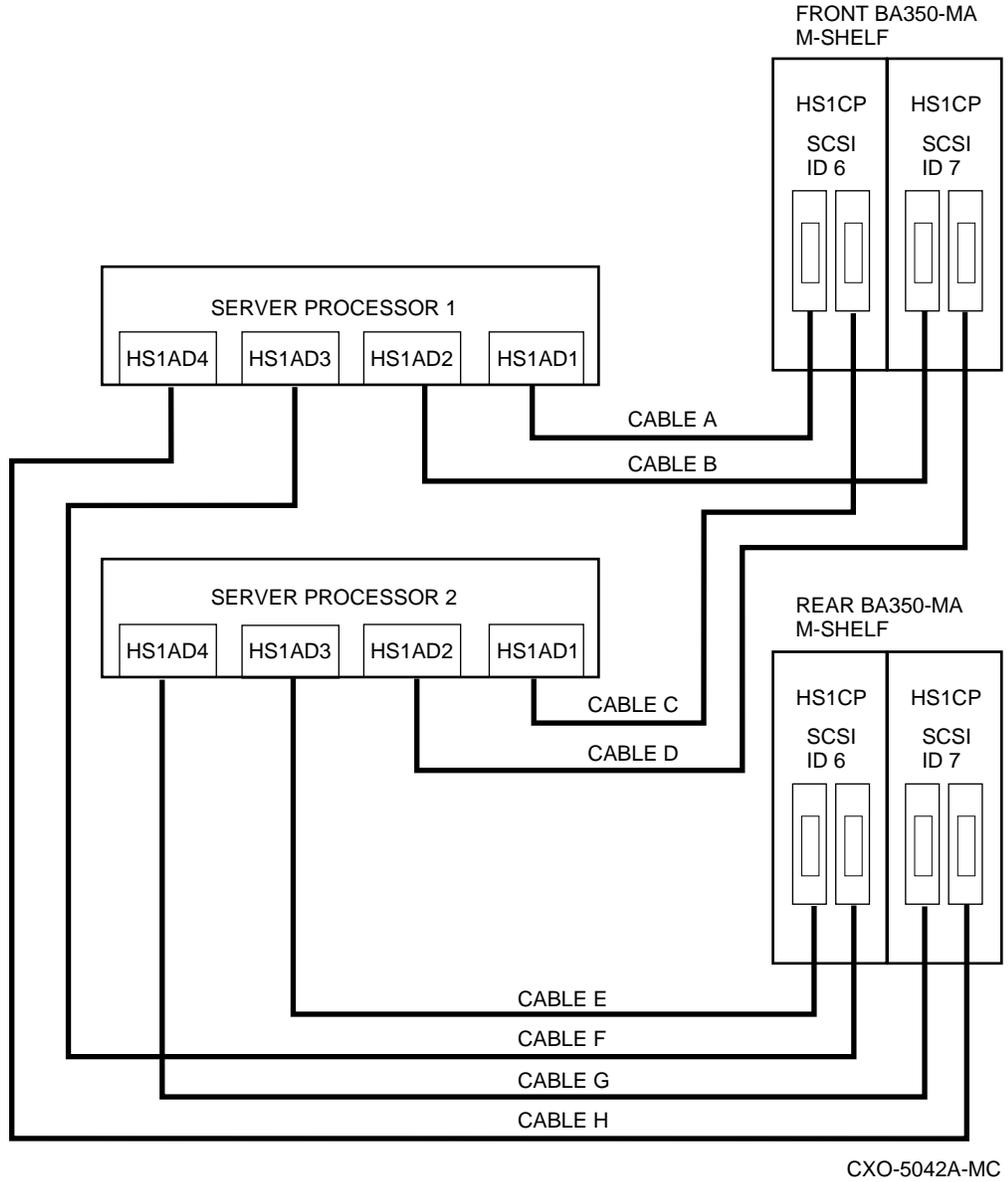
Figure 1−10 shows the logical "after" cabling diagram.

Figure 1–10 Cabling Diagram for SWXNA–Bx/Gx/SWXNA–Cx

CXO-5043A-MC
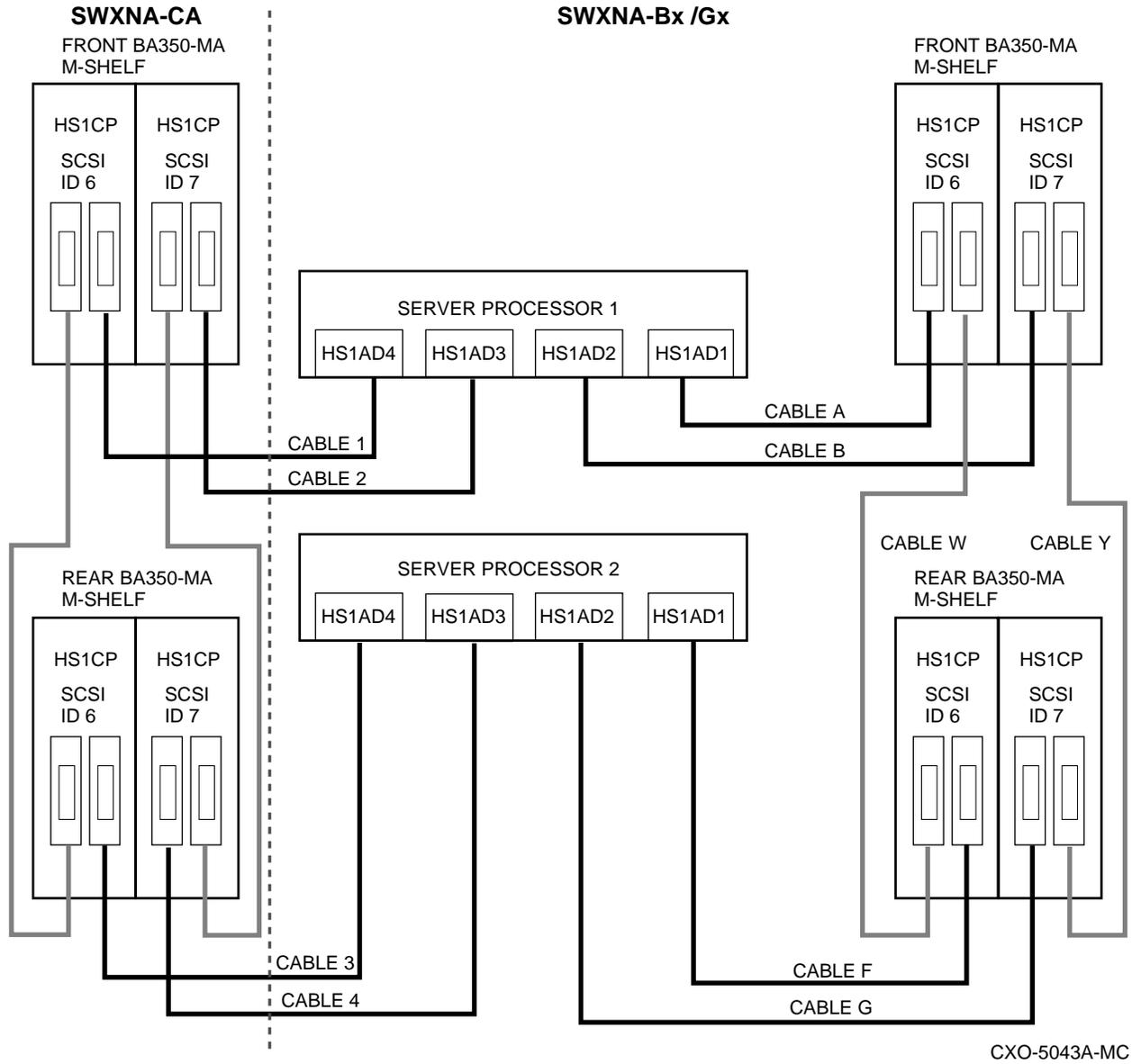
1. Carefully detach all internal bus cables in the SWXNA–Bx/Gx from the four bus adapters in each of the two server processors, except for the two cables labeled "Cable A" and "Cable B" in Figure 1–9.

2. Carefully detach four of the internal bus cables (C, D, E, and H) from the HS1CP device channel processors, leaving cables A, B, F, and G attached to the HS1CPs. (See Figure 1–9.)

_____ **Note** _____

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 1–11).

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 1–11).

Figure 1–11   Internal Bus Cable Connectors

CXO-5044A-MC
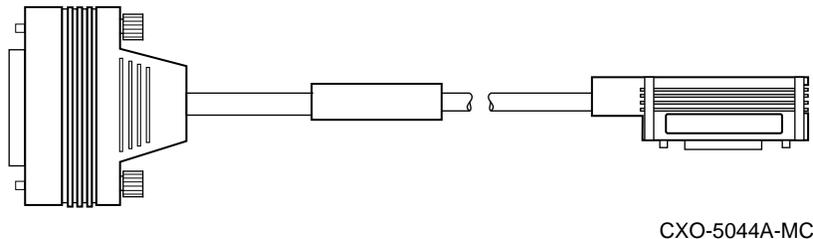
_____ **Note** _____

Exercise care that trilink connector pins are not bent or damaged when connecting an internal bus cable into a trilink connector.

3. Carefully reattach the internal bus cable identified as Cable F in Figure 1–10 from the *right* trilink connector in slot 6 of the rear HS1CP pair to the device bus adapter (labeled HS1AD1) in slot 8 of Server Processor 2.

4. Carefully reattach the internal bus cable identified as Cable G in Figure 1–10 from the *left* trilink connector in slot 7 of the rear HS1CP pair to the device bus adapter (labeled HS1AD2) in slot 7 of Server Processor 2.

5. Interconnect the HS1CP in slot 7 of the front BA350–M shelf to the HS1CP in slot 7 of the rear BA350–M shelf by attaching the right-angle cable connectors of the internal bus cable identified as Cable Y in Figure 1–10 into the open trilink connector of the HS1CPs.

6. Interconnect the HS1CP in slot 6 of the front BA350–M shelf to the HS1CP in slot 6 of the rear BA350–M shelf by attaching the right-angle cable connectors of the internal bus cable identified as Cable W in Figure 1–10 into the open trilink connector of the HS1CPs.

_____ **Note** _____

These special cables, with right-angle connectors at each end of the cable,
are shipped inside the SWXNA–Cx cabinet and are found in a package on
the floor of that cabinet.

_____

1.10.2 Interconnecting the SWXNA–Bx/Gx and the SWXNA–Cx

Use the following procedure to connect the HS1CPs in the SWXNA–Cx cabinet to
the server processors in the SWXNA–Bx/Cx cabinet.

Using the special, extra-long internal bus cables, carefully attach each HS1CP
device channel processor in the SWXNA–Cx cabinet to one bus adapter in the
SWXNA–Bx/Gx server processors, as follows:

1. Carefully attach the internal bus cable identified as Cable 1 in Figure 1–10
   from the *right* trilink connector in slot 6 of the front HS1CP pair in the
   SWXNA–Cx to the device bus adapter (labeled HS1AD4) in slot 5 of Server
   Processor 1 in the SWXNA–Bx/Gx.

2. Carefully attach the internal bus cable identified as Cable 2 in Figure 1–10
   from the *right* trilink connector in slot 7 of the front HS1CP pair in the
   SWXNA–Cx to the device bus adapter (labeled HS1AD3) in slot 6 of Server
   Processor 1 in the SWXNA–Bx/Gx.

3. Carefully attach the internal bus cable identified as Cable 3 in Figure 1–10
   from the *right* trilink connector in slot 6 of the rear HS1CP pair in the
   SWXNA–Cx to the device bus adapter (labeled HS1AD4) in slot 5 of Server
   Processor 2 in the SWXNA–Bx/Gx.

4. Carefully attach the internal bus cable identified as Cable 4 in Figure 1–10
   from the *left* trilink connector in slot 7 of the rear HS1CP pair in the
   SWXNA–Cx to the device bus adapter (labeled HS1AD3) in slot 6 of Server
   Processor 2 in the SWXNA–Bx/Gx.

   The cables interconnecting the front and rear BA350–M shelf HS1CP device
   channel processors in the SWXNA–Cx were shipped correctly attached, as
   shown in Figure 1–10.

5. Switch the circuit breakers on both CDUs in the SWXNA–Cx cabinet to ON
   (|).

6. Switch the circuit breakers on both CDUs in the SWXNA–Bx/Gx cabinet to
   ON (|).

1.11 Rebooting Both Server Processors in the SWXNA–Bx/Gx

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

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

The booting of the second server processor completes the hardware installation of the SWXNA–Cx expansion cabinet.

The final action you must complete is to configure your storage devices for each dual-redundant pair of HS1CP device channel processors in the new SWXNA–Cx cabinet. The configuration has not changed for the SWXNA–Bx/Gx cabinet.

You need to configure only one device channel processor in each dual-redundant pair, as the configuration data is automatically transferred to the partner. The procedure for configuring your storage devices can be found in the *Getting Started with the StorageWorks Network Storage Array Manual* in the chapter entitled "Configuring the StorageWorks Network Storage Array Storage Device." Use the following table to identify the appropriate HS1CP device channel processor with the appropriate prompt in the reconfiguration process:

Table 1–2 Standard SWXNA–Bx/Gx/SWXNA–Cx HS1CP Device Channel Processor Identification

BA350–M Shelf	Slot 7	Slot 6
SWXNA–Bx/Gx Front	HS1CP1	HS1CP2
SWXNA–Bx/Gx Rear	HS1CP3	HS1CP4
SWXNA–Cx Front	HS1CP5	HS1CP6
SWXNA–Cx Rear	HS1CP7	HS1CP8

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)

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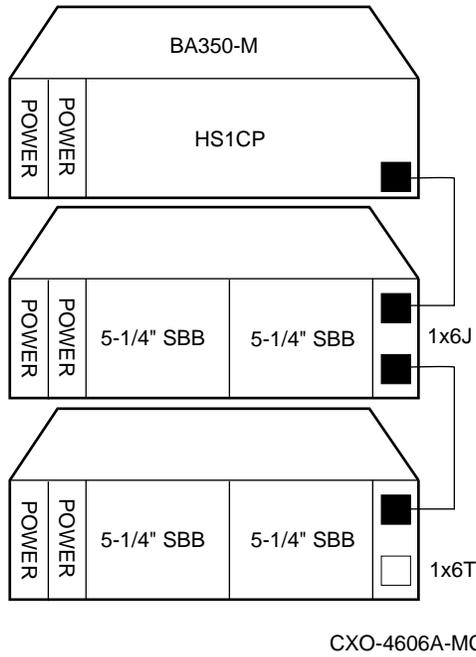
Figure B–2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

Figure B–2 Adjacent Devices on a Single Port

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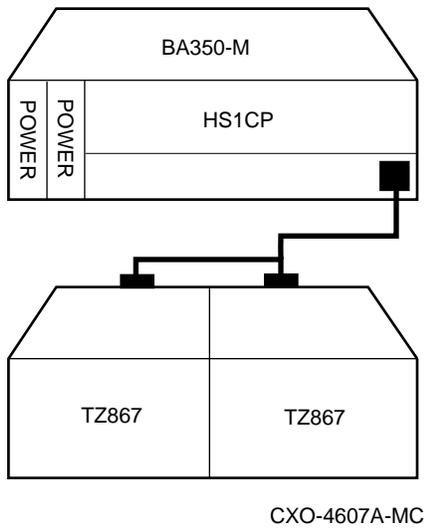
B.1.1 Typical and Recommended 3½-Inch and 5¼-Inch SBB Configurations

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 BA35x–S shelves, or one 5¼-inch SBB and four 3½-inch SBBs in one BA35x–S shelf.

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

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

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

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

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 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.

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
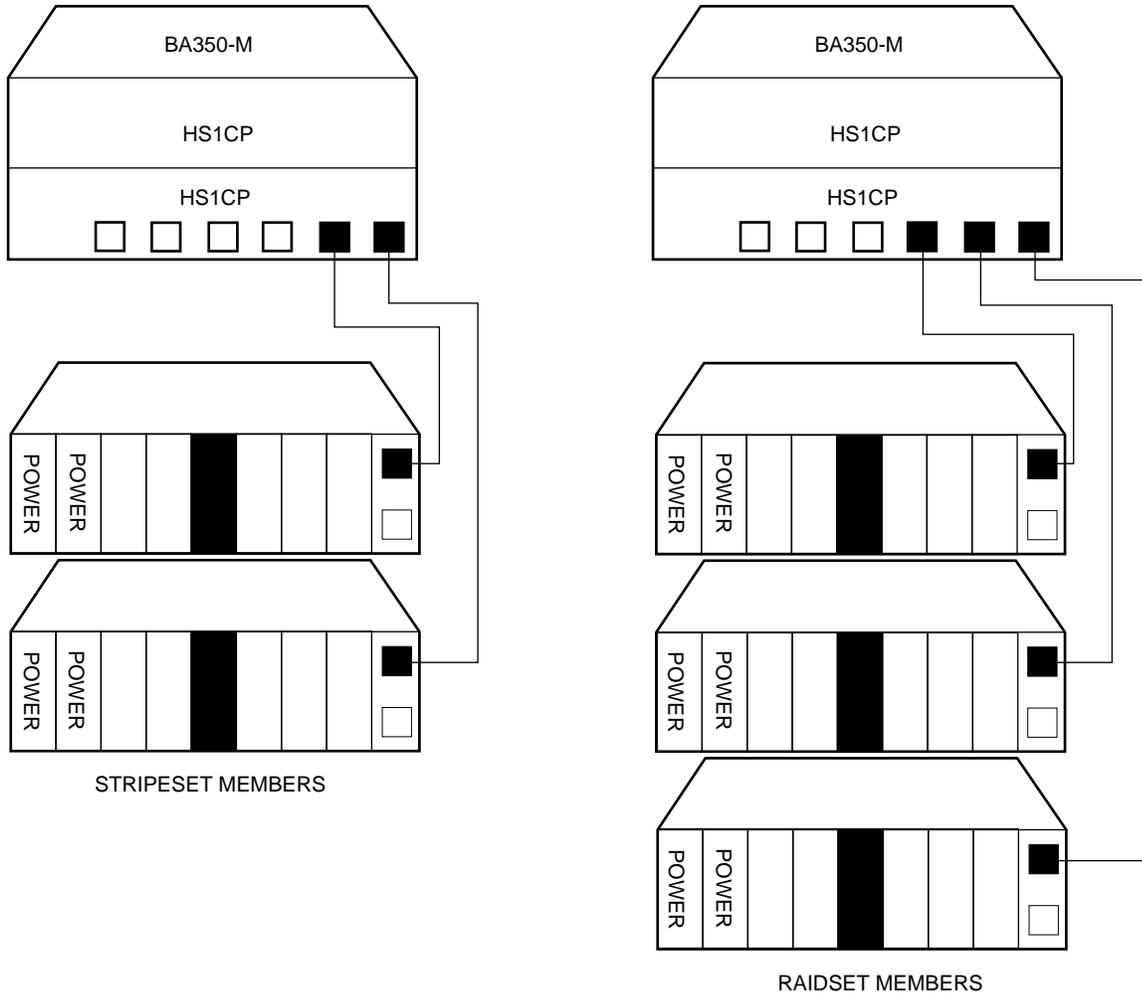
CXO-4608A-MC

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

| Adapter | SAS Interconnect | | DAS Interconnect | |
	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