

# StorageWorks™ Solutions StorageWorks Network Storage Array

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## SWXUA–A2/B2 Upgrade Manual

Order Number: EK–NSA02–UM. A01

This guide describes how to upgrade either a StorageWorks HS221 FDDI Server to a StorageWorks SWXNA–Ax Network Storage Array or a StorageWorks HS241 FDDI Server to a StorageWorks SWXNA–Bx Network Storage Array.

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**September 1996**

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# Preface

This manual describes the procedures necessary to install and configure the SWXUA–A2 upgrade kit into a StorageWorks HS221 FDDI Server to create an SWXNA–Ax Network Storage Array, or the SWXUA–B2 upgrade kit into a HS241 FDDI Server to create an SWXNA–Bx 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:

Section 1.3	Describes the procedures for updating the OpenVMS Alpha operating system and lists some preinstallation considerations.
Section 2.3	Gives the procedures for installing either the SWXNA–A2 or SWXUA–B2 upgrade kit.
Appendix A	Describes the SWXNA specifications.
Appendix B	Describes the shelf and HS1CP configuration rules.
Appendix C	Provides a list of network interconnect cables.



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## Related Documents

Table 1 lists the StorageWorks-related user documents organized by use, system, or product.

**Table 1 StorageWorks Related Documentation**

<b>Document Title</b>	<b>Order Number</b>
<b>StorageWorks Network Storage Array Publications</b>	
<i>StorageWorks™ Solutions Getting Started with the StorageWorks Network Storage Array Guide</i>	EK-SWXNA-IG
<i>StorageWorks™ Solutions StorageWorks Network Storage Array, Server Processor Component Manual</i>	EK-SWXNA-CM
<i>StorageWorks™ Solutions StorageWorks Network Storage Array Service Manual</i>	EK-SWXNA-SM



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# Manufacturer's Declarations

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

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**CAUTION**

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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.

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**ACHTUNG !**

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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.

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**ATTENTION !**

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

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**Note**

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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.

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## 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.

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#### Note

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

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### 1.2 Connecting a Terminal to the Network Array

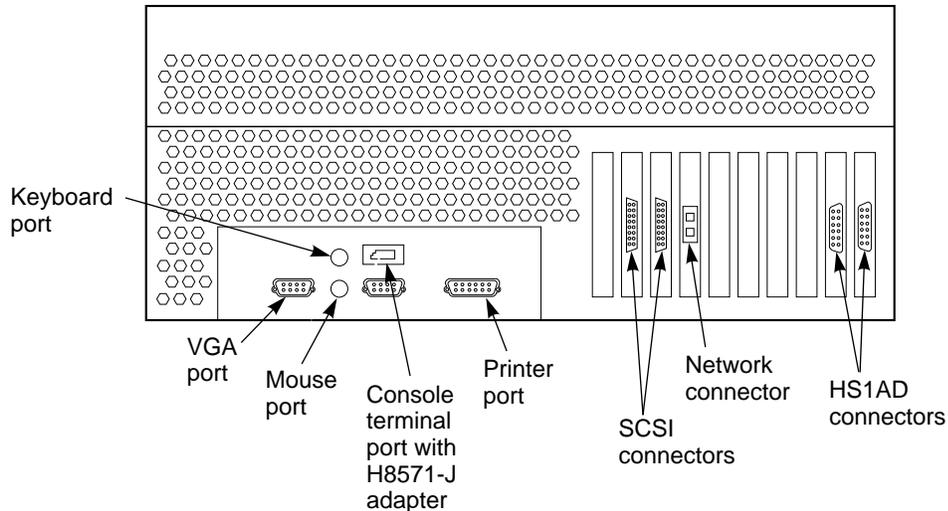
Communicating with the StorageWorks Network Storage Array requires that you connect a terminal to it. Any terminal that supports ANSI control sequences can be used, including graphics displays that provide emulation of an ANSI compatible video terminal.

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**



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3. Connect the other end of the terminal cable to the EIA terminal port on the rear of the server processor using an H8571–J adapter as shown in Figure 1–1.
4. Turn the terminal power switch to the ON position.
5. Set the terminal at 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.
6. The terminal screen displays a >>> prompt after power is applied to the server processor, or if the system was running, displays the USERNAME PROMPT.
7. Log into a system account.

### 1.3 Upgrading the OpenVMS Alpha Operating System

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

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**Note**

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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.

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### 1.3.1 Taking the Array Off-line

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**Note**

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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.

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### 1.3.2 Upgrading to OpenVMS Alpha Version 6.2-1H3

Before installing the upgrade, you must upgrade the OpenVMS Alpha Operating System to Version 6.2-1H3. This upgrade only needs to be done on one of the existing system disks. The contents of the system disk you select will be migrated to the new shadowed system disk after the new hardware has been installed. Complete the following procedure to upgrade to version 6.2-1H3.

1. Select which existing internal system disk will be the master for migration to the new shadowed system disk.
2. Follow the procedures in Section 1.2 to connect the terminal to the server processor which contains the system disk selected in step 1.
3. Boot from your V6.2 system disk if the array is not already running.
4. Insert the StorageWorks Network Storage Array Software Customization Procedure V2.1 CD in the CD player.
5. Use the "SHOW DEVICE" command to determine the device name of the CD player:

```
$ SHOW DEVICE DKA
```

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

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

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

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

```
OpenVMS AXP Software Product Installation Procedure V6.2
```

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

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

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

```
Please mount the first volume of the set on $27$DKA400:.
```

```
* Are you ready? yes
```

```
%MOUNT-I-MOUNTED, ALPHA0621H3 mounted on _$27$DKA400: (NSA)
```

```
The following products will be processed:
```

```
AXPVMSU1H3 V6.2
```

```

Beginning installation of AXPVMSU1H3 V6.2 at 13:00
%VMSINSTAL-I-RESTORE, Restoring product save set A ...
%VMSINSTAL-I-RELMOVED, Product's release notes have been moved to SYS$HELP.

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

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

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

No more questions will be asked ...

Now applying AXPVMSU1H3062 ...

1) APB (new image)
2) AUTOGEN (new file)
...
%VMSINSTAL-I-MOVEFILES, Files will now be moved to their target directories...
Installation of AXPVMSU1H3 V6.2 completed at 13:03
Adding history entry in VMI$ROOT:[SYSUPD]VMSINSTAL.HISTORY
Creating installation data file: VMI$ROOT:[SYSUPD]AXPVMSU1H3062.VMI_DATA
%VMSINSTAL-I-SHUTDOWN, This product requires that the system be rebooted.
*****
This system will shutdown in 7 minutes WITHOUT an
automatic reboot.

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

The installation will not be complete until a system reboot.
*****

SHUTDOWN -- Perform an Orderly System Shutdown
on node NSA

```

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

```

SYSTEM SHUTDOWN COMPLETE

halted CPU 0
halt code = 5
HALT instruction executed
PC = ffffffff8004df84
>>>

```

7. 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.

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**WARNING**

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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.

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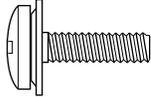
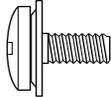
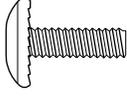
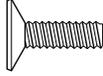
## 1.4 Tools Needed for Installation

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**

	<p>10-32 SEMS .625 in</p>
	<p>10-32 SEMS, .343 in</p>
	<p>10-32, .500 in</p>
	<p>10-32 MACHINE FLAT HEAD, .500 in</p>
	<p>10-32 KEP NUT</p>

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## SWXUA–A2/B2 Upgrade Procedure

This chapter provides step-by-step procedures for installing the SWXUA–A2 or B2 upgrade kit.

### 2.1 Purpose of This Upgrade

A customer who is satisfied with the redundancy and failover capabilities of a the FDDI Server, but who wants the performance improvements and additional features of an SWXNA Network Storage Array, can, for the incremental cost of the SWXUA–A or B2 upgrade kit, convert the FDDI Server to an SWXNA array.

The SWXNA–A2/B2 upgrade kit provides all the components for upgrading a model FDDI Server to a model SWXNA Network Storage Array. The following sections provide information about the upgrade kit and how to perform the upgrade.

### 2.2 SWXUA–A2/B2 Upgrade Kit Description

The main components of the SWXNA–A2/B2 upgrade kit are as follows:

- Four KZPAA PCI-to-SCSI adapters
- Shadowed system disk
- OpenVMS Alpha operating system software Version 6.2-1H3 (or later) CD-ROM

When you receive your SWXUA–A2/B2 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 SWXUA–A2/B2 Upgrade Procedure

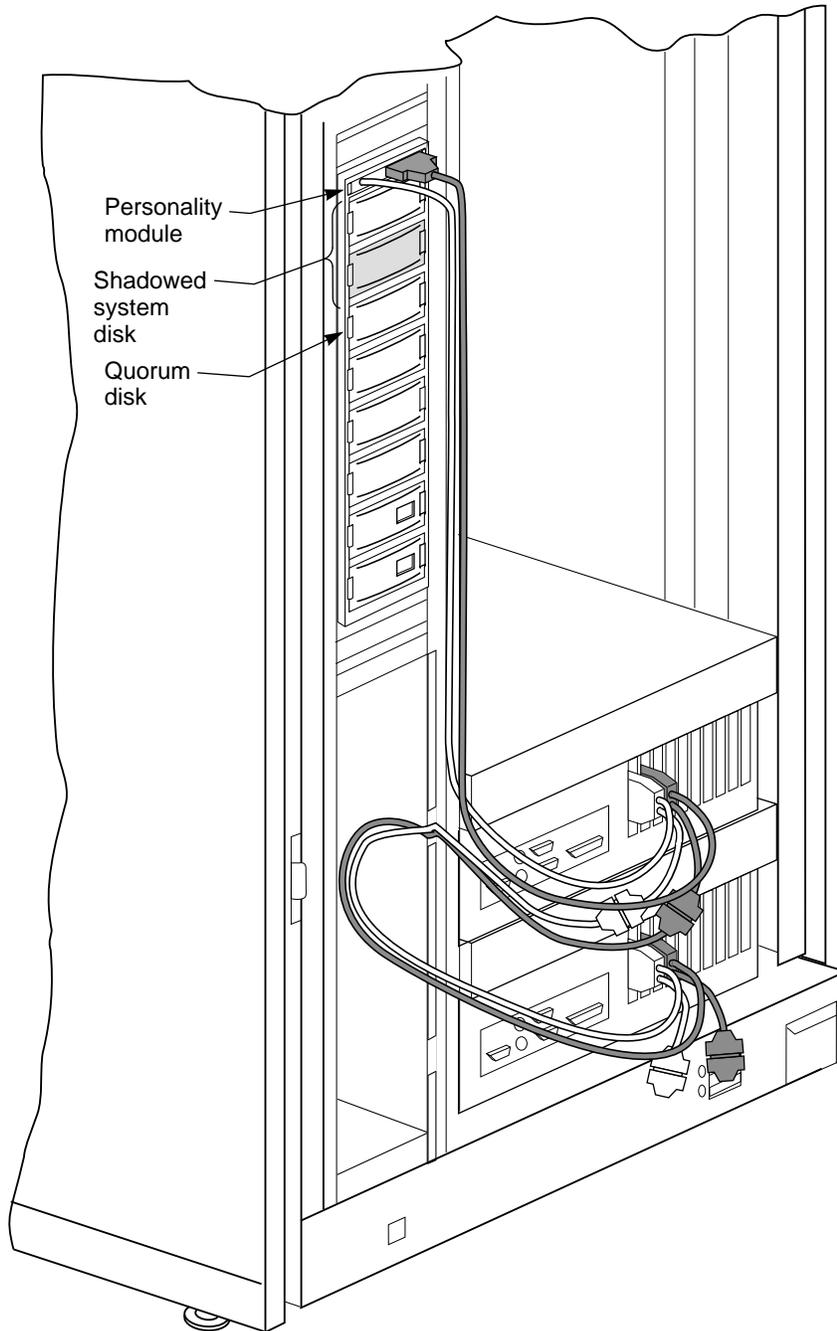
The following procedure explains how to install the shadowed system disk into the StorageWorks Network Storage Array.

#### 2.3.1 Installing the BA356–S Shelf

Complete the following steps to install the BA356–S shelf:

1. Open the back door on the network array.
2. Remove the blank cover in the middle section of the left vertical cabinet channel where the shelf is to be mounted. See Figure 2–1 for the location to mount the shelf.

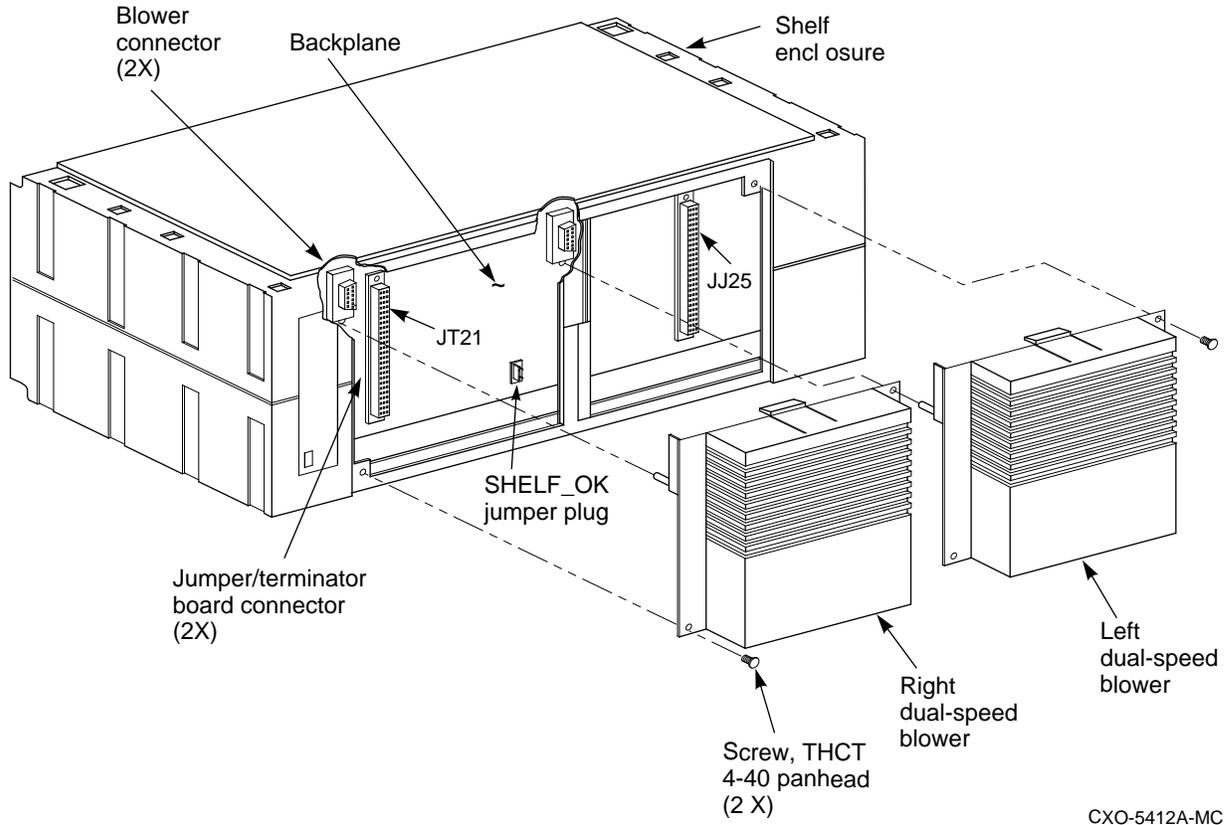
**Figure 2–1 Shadowed System Disk**



CXO-5285A-MC

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

**Figure 2–2 BA356–S Jumper and Terminator Locations**



4. Install the mounting brackets for the BA356–S shelf.

**Note**

The BA356–S shelf should be mounted so the power supplies will be installed in the bottom of the shelf.

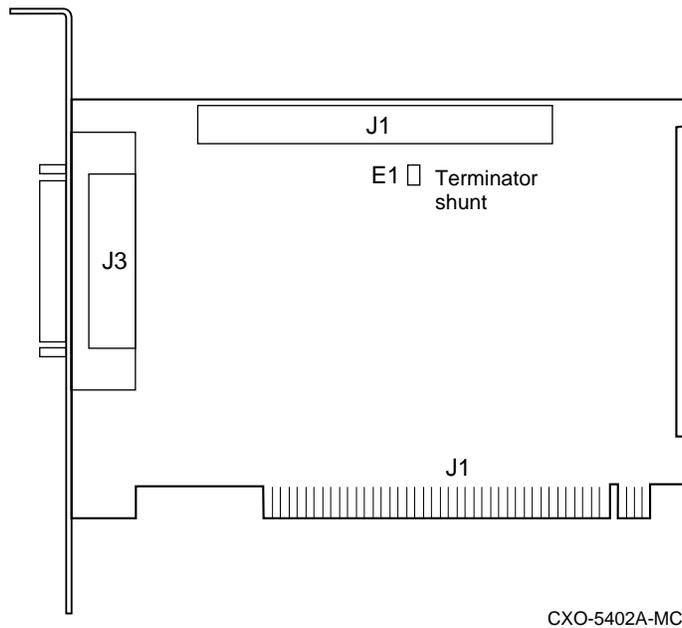
5. Slide the BA356–S shelf into the cabinet and secure in place.

### 2.3.2 Installing the KZPAA PCI-to-SCSI Adapters

Complete the following steps to install the KZPAA PCI-to-SCSI adapters into the server processors:

1. Slide the top server processor out of the cabinet and remove the top cover.
2. Remove the termination jumper (E1) on each KZPAA PCI-to-SCSI adapter, as shown in Figure 2–3.

**Figure 2–3 KZPAA SCSI Termination Jumper Location**



3. Using a Phillips head screwdriver, remove the metal cover from two empty PCI I/O slots.

**Note**

Do not discard the cover screws. They are needed to mount the KZPAAs into the server processor.

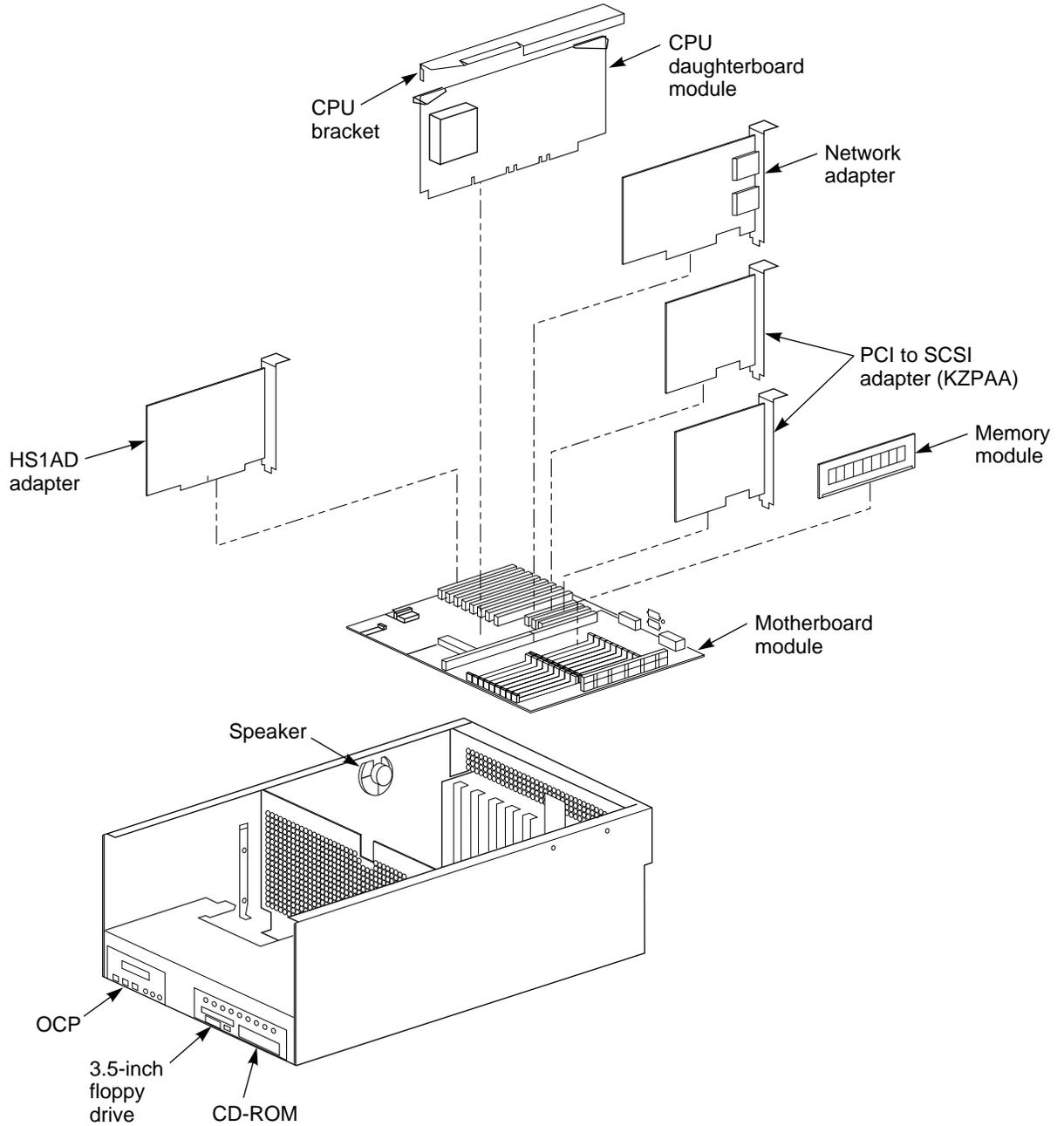
4. Install two KZPAA adapters into the top server processor using the cover hex screw as shown in Figure 2–4.
5. Replace the server processor top cover.
6. Slide the server processor back into the cabinet.
7. Repeat the procedure for the bottom server processor.

### 2.3.3 Installing SCSI Cables

Refer to Figure 2–5 as you complete the following steps:

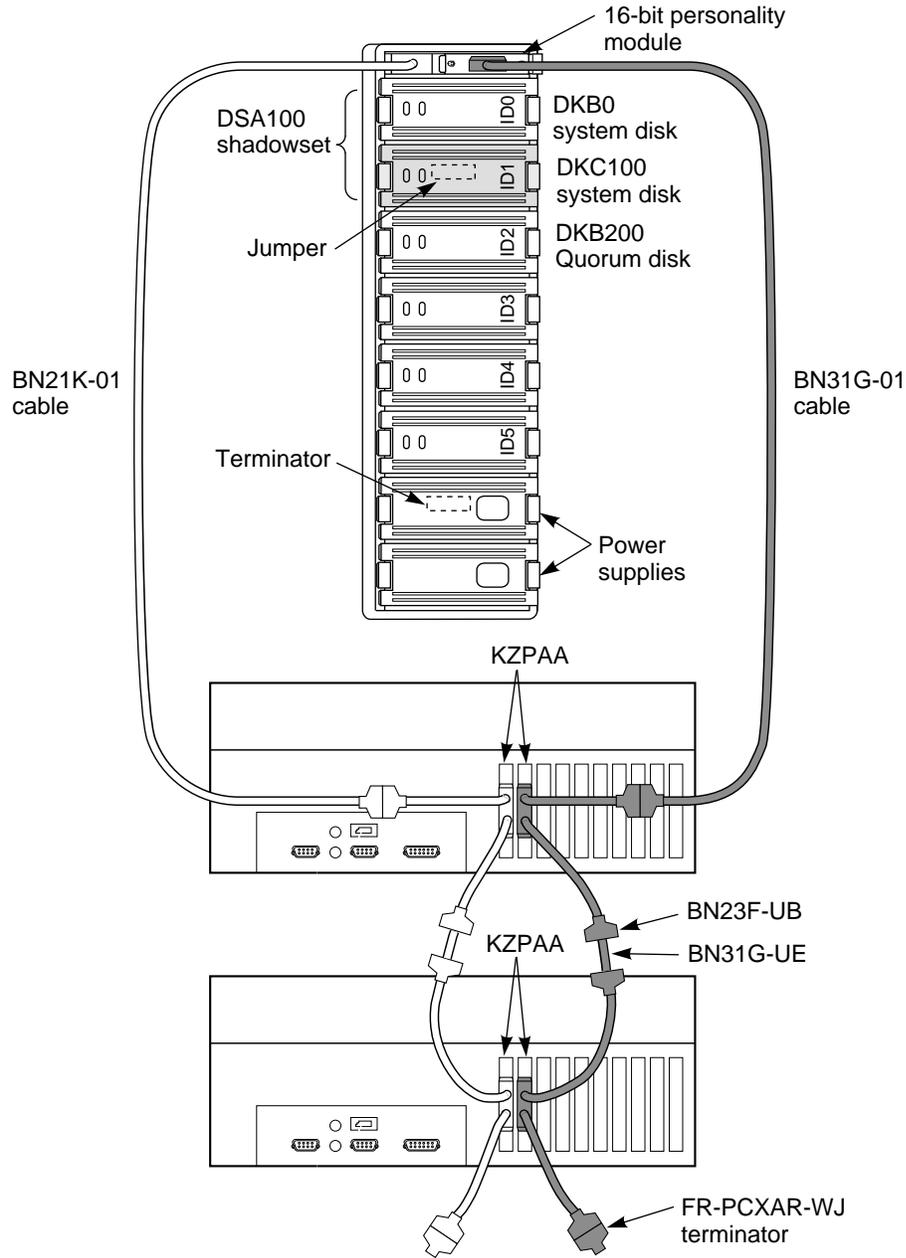
1. Attach the cable trusses to each KZPAA connector in both server processors as shown in Figure 2–6.

Figure 2-4 Server Processor Internal Components



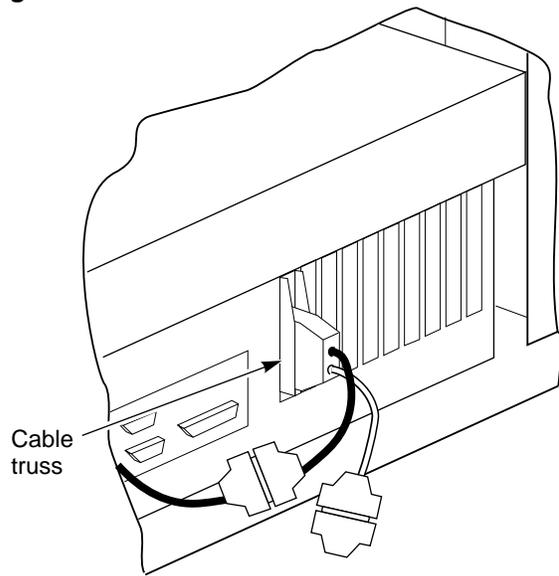
CXO-5346A-MC

**Figure 2-5 Shadowed System Disk Interconnection**



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**Figure 2-6 KZPAA Cable Truss**



CXO-5438A-MC

2. Attach a Y-cable (BN23F-0B) to each KZPAA connector.
3. Attach a terminator (FR-PCXAR-WJ) to the bottom cable of each Y-cable on the bottom server processor.
4. Attach the BN21K-01 SCSI cable 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.

### **2.3.4 Installing Components into the BA356 Shelf**

Install the components into the BA356-S shelf by completing the following steps as shown in Figure 2-5:

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

## 2.4 Applying Power to the Network Storage Array

Use the following procedure to apply power to the Network Storage Array:

1. Switch the circuit breaker on the front panel of the CDUs to the ON position.
2. Press the power button on the front panel of the server processor.

## 2.5 Customizing Network Array Operating System Parameters

You have now completed the hardware installation of the SWXUA–A2/B2 upgrade kit to upgrade an FDDI Server to an SWXNA Network Storage Array. The shadowed system disk you installed in this procedure is blank and you have added two new SCSI buses to support the shadowed system disk. At this time, you must:

- Set up the console parameters for each server processor,
- Migrate the operating system from the previous system disk to the new shadowed system disk,
- Customize the software parameters for your Network Storage Array.

### 2.5.1 Setting Up the Server Processor Console Parameters

Table 2–1 shows the correct parameter set up for each server processor.

**Table 2–1 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:



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

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

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

Please choose one of the following:

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

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

#### 4. Enter **2** to migrate the OpenVMS Alpha Operating System.

```
+-----+
|           Migrate to new shadowed system disk           |
+-----+
```

The migration procedure will ask a series of questions.

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

Enter the name of your current system disk: [\$13\$DKA100:]

\$13\$DKA100: RZ28 Label = SOME\_LABEL\_1 Free blocks = 3018276

Is this correct? (Yes/No/Exit)

#### 5. Type **Yes** if the correct system disk is displayed.

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

\$13\$DKB0: RZ28 Label = SOME\_LABEL\_2 Total blocks = 4110480  
\$13\$DKC100: RZ28 Label = SOME\_LABEL\_3 Total blocks = 4110480

The following disk will compose the Network Storage Array quorum disk:

\$13\$DKB200: RZ26L Label = SOME\_LABEL\_4 Total blocks = 2050860

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

Is this OK? (Yes/No/Exit)

#### 6. Enter **Yes** to proceed with creating the new shadowed system disk and quorum disk. The migration process will start.

```
Mounting source disk ($13$DKA100:)...
Initializing and mounting target disk ($13$DKB0:)...
Doing an image backup from $13$DKA100: to $13$DKB0:, please wait...
Initializing and mounting target shadow set (DSA100:)...
Initializing the quorum disk ($13$DKB200:) with label SYSS$QUORUM...
Please wait while additional migration tasks complete...
```

Portion Done: 100%

Migration to the shadowed system disk is complete.

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

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

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

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

Please choose one of the following:

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

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

#### 7. Enter **4** to shut down the system.

Shutting down the system. Please wait...

SYSTEM SHUTDOWN COMPLETE

```
halted CPU 0
halt code = 5
HALT instruction executed
PC = ffffffff8005aldc
>>>
```

After performing the migration procedure, you have transferred your operating system from the internal server processor system disk to the new shadowed system disk. The old system disk is still intact, but will not be used further. The server processor parameters you set up in Section 2.5.1 will cause the network array to boot from the new shadowed system disk and run the Software Customization Procedure (SCP) to set up the initial parameters for the network array.

Before you can put your network array on line you must perform various system management tasks to customize the system for your use:

1. Reboot your system from the new shadowed system disk. The SCP automatically starts.
2. Answer the questions in the SCP to set up the initial system parameters.
3. Customize the read cache for your system.
4. Run the Network File System (NFS™) setup if your network array is to serve UNIX or PC systems.
5. Integrate your network array into the network.

The procedures to complete these steps are in the *Getting Started with the StorageWorks Network Storage Array*. Run the procedures in the following chapters to complete the SWXUA–A2/B2 upgrade:

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



# 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
<b>Storage Capacity</b>		
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 <i>StorageWorks Solutions Configuration Planning Guide</i> for configuration guidelines.	
Maximum number of Solid State disk drives	See the <i>StorageWorks Solutions Configuration Planning Guide</i> for configuration guidelines.	
<b>Power Requirements</b>		
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
<b>Environmental</b>		
Operating temperature	10 C to 40 C	10 C to 40 C
Nonoperating temperature	-40 C to 66 C	-40 C to 66 C
Relative humidity	10% to 80%	10% to 80%
Altitude	Sea level to 2400 m (8000 ft)	Sea level to 2400 m (8000 ft)

(continued on next page)

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

	Models SWXNA-Ex/Jx	Model SWXNA-Ax/Fx
<b>Physical Dimensions</b>		
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
<b>Storage Capacity</b>		
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 <i>StorageWorks Solutions Configuration Planning Guide</i> for configuration guidelines.	
Maximum number of Solid State disk drives	See the <i>StorageWorks Solutions Configuration Planning Guide</i> for configuration guidelines.	
<b>Power Requirements</b>		
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
<b>Environmental</b>		
Operating temperature	10 C to 40 C	10 C to 40 C
Nonoperating temperature	-40 C to 66 C	-40 C to 66 C
Relative humidity	10% to 80%	10% to 80%
Altitude	Sea level to 2400 m (8000 ft)	Sea level to 2400 m (8000 ft)

(continued on next page)

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

	<b>Model SWXNA-Bx/Gx</b>	<b>Model SWXNA-Bx/Gx with SWXNA-Cx Installed</b>
<b>Physical Dimensions</b>		
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)



---

## 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**

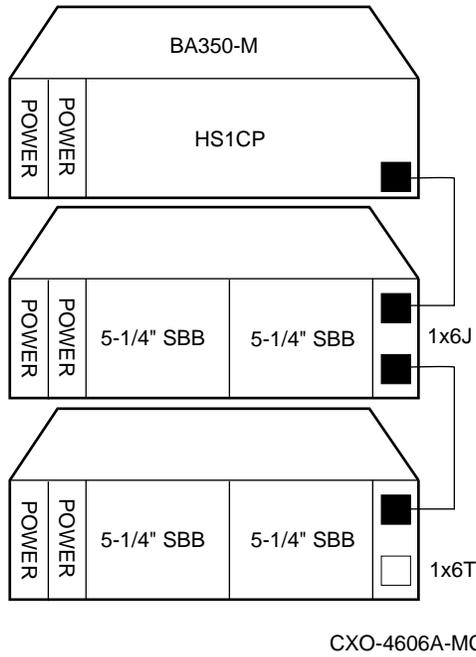
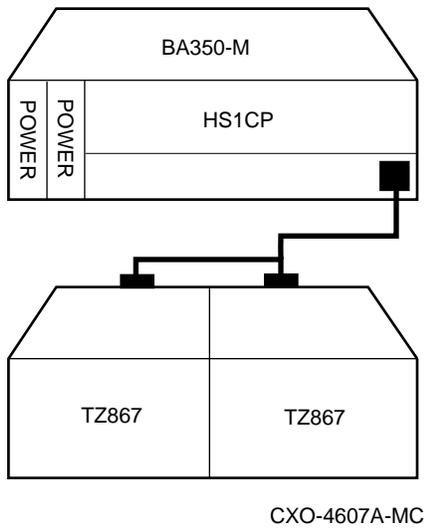


Figure B-2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

**Figure B-2 Adjacent Devices on a Single Port**



## 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 (2)2x3T	1-0	6
9-10	5	(4)1x6T (1)2x3T	1-0	6
11-12	6	(6)1x6T	1-0	6
13-14***	7	(6)1x6T (1)1x6J	1-0	6
15-16***	8	(6)1x6T (2)1x6J	1-0	6
17-18***	9	(6)1x6T (3)1x6J	1-0	6
19-20***	10	(6)1x6T (4)1x6J	1-0	6

#### 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**

<b>Number of Relatively Higher Performance Devices</b>	<b>Maximum Number of Devices Configured per Port</b>
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.

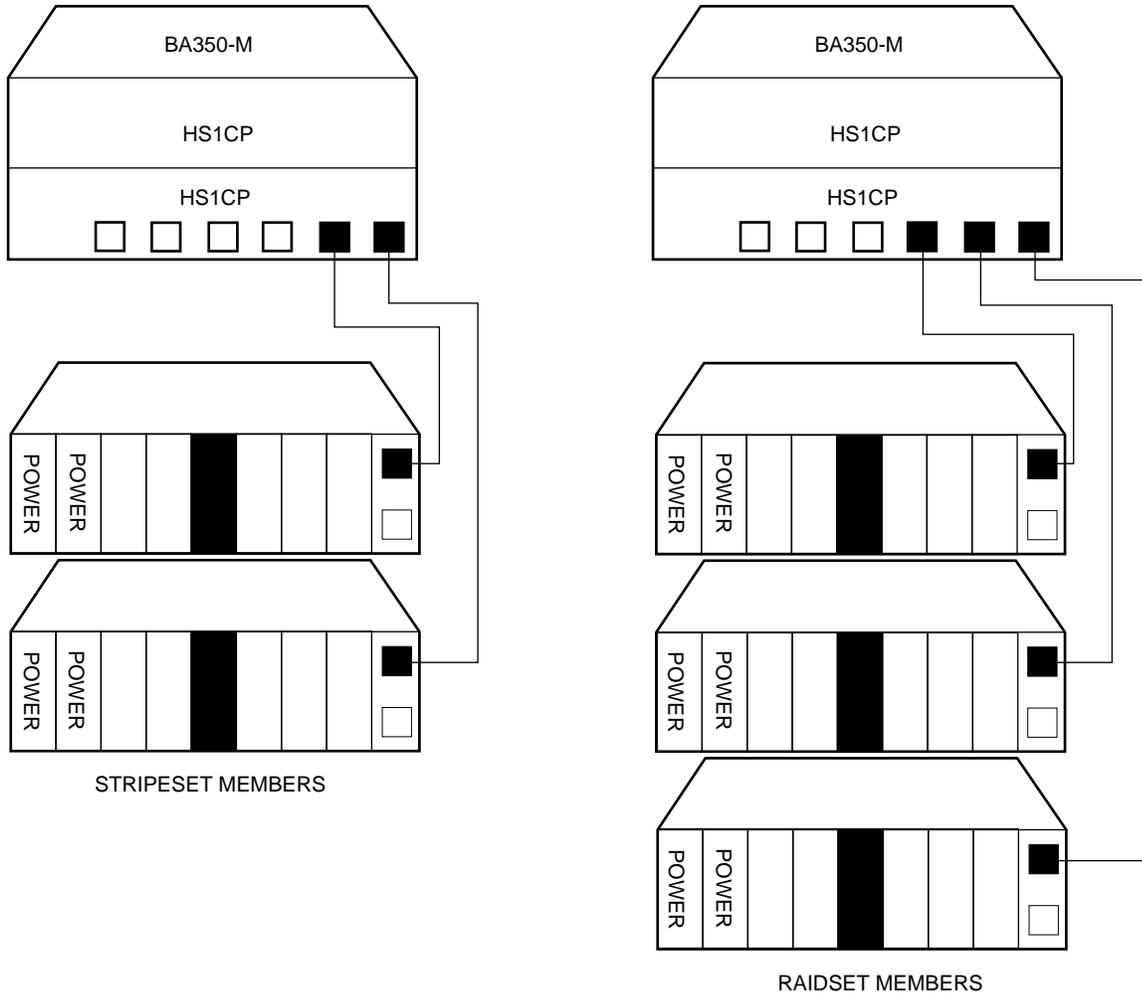
### **B.2.5 Optimal Availability Configurations**

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**



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.

## 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.



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