

StorageWorks™ Solutions

StorageWorks Network Storage
Array
SWXUA-E4 Upgrade Manual

Order Number: EK-NSA10-UM. A01

This guide describes how to upgrade an HS211 FDDI Server to an
SWXNA-Ex StorageWorks Network Storage Array.

September 1997

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Preface

This manual describes the procedures necessary to install and configure the SWXUA-E4 upgrade kit into an HS211 FDDI Server to create a SWXNA-Ex Network Storage Array.

Intended Audience

This guide is intended for use by Digital™ Multivendor Customer Services personnel or other qualified technicians who install and configure OpenVMS Alpha™ processors and related storage hardware.

This audience must know how to install and configure StorageWorks shelves, devices, and related components.

Structure

This guide is organized as follows:

Chapter 1	Describes the procedures for updating the OpenVMS Alpha operating system and some preinstallation considerations and tasks.
Chapter 2	Lists the procedures for installing the SWXUA-E2 upgrade.
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	
<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

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 environnement 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.

Before You Begin Installation

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

1.1 Electrostatic Discharge Protection

Electrostatic discharge (ESD) can damage subsystem components. This section describes the necessary procedures for protecting the subsystem components against ESD.

Use the following strategies to minimize ESD problems:

- Maintain more than 40 percent humidity in the room where your subsystem resides.
- Place the subsystem cabinet away from heavy traffic paths.
- Do not use carpet, if possible. If carpet is necessary, choose an antistatic carpet. If a carpet is installed, place antistatic mats around the subsystem to decrease ESD.

ESD Grounding Procedure

Prior to removing or replacing any module:

1. Obtain and attach an ESD wrist strap to your wrist. Ensure that the strap fits snugly around your wrist.
2. Plug or clip the other end of the ESD wrist strap to a ESD bolt or ground stud usually located on the cabinet's vertical rail that is common for both the device channel processor shelves and the storage shelves.
3. Obtain and use an approved antistatic bag and/or a grounded antistatic mat.

Note

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

1.2 Connecting a Terminal to the Network Array

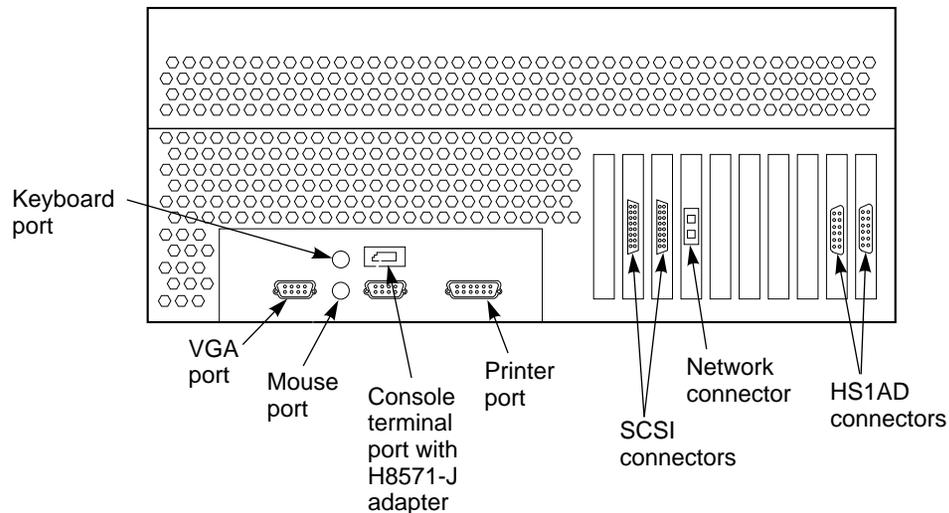
Communicating with the StorageWorks Network Storage Array requires that you connect a terminal to it. Any terminal that supports ANSI control sequences can be used, including graphics displays that provide emulation of an ANSI compatible video terminal.

Use the following procedure to connect most EIA compatible terminals:

1. Make sure the power switch on the back of the terminal is OFF (0).

2. Connect one end of the terminal cable to the back of the terminal.

Figure 1-1 Connecting to the Terminal Port of the Network Array



CXO-4774B-MC

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

1.3 Upgrading the Console Code and Operating System

Changes in the Network Storage Array internal hardware components require that the console code and the operating system be upgraded to Console Code Version 5.5 (or later) and OpenVMS Alpha operating system software Version 6.2-1H3 (or later) **prior** to the installation of this upgrade kit. A CD-ROM containing the upgrade software is included in this kit. Follow the instructions in Sections 1.3.3 and 1.4 to perform this upgrade.

Note

Digital recommends that you perform a backup of your system disk prior to any upgrades to provide a means of recovery if anything should go wrong during the upgrade.

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

1.3.1 Taking the Array Off-line

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.

1.3.2 Shutting Down the System

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 FDDI Server.
3. If there are no nodes in the cluster that are booted through a served system disk on your FDDI Server, then shut down the StorageWorks FDDI Server as described in this step. Otherwise shut down these boot served nodes first and then shut down your FDDI Server 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...
```

1.3.3 Upgrading the Console Code to Version 5.5 (or Later)

The console code needs to be at Version 5.5 before you begin installing the upgrade. Perform the following steps to upgrade the server processor console code to Version 5.5 (or later):

1. Enter the following command:

```
>>> SHO CONFIG

Firmware
SRM Console:   V3.1-2
ARC Console:   4.44
PALcode:      VMS PALcode V5.53-5, OSF PALcode V1.46-1
Serial Rom:    0.8

Processor
DECchip (tm) 21064-2    200Mhz
```

2. If the SRM code is V3.1-2, you are already running Console Code Version 5.5 on this server processor and can skip to Section 1.4. Otherwise, continue with this procedure.
3. Open the front door of the network array cabinet with a 5/32-inch hex wrench.
4. Locate the CD-ROM labeled "Software Customization Procedure V2.0 and OpenVMS Alpha Operating System V6.2," and slide it into the CD drive of the server processor.
5. On the FDDI Server console terminal, press the Return key to get the >>> prompt.
6. Determine which "dk" number is assigned to the CD-ROM by entering the "SHO DEVICE DK" command. In the following display, RRD43 is the CD-ROM and it is assigned the device label DKA500.

```
>>> SHO DEVICE DK
dka0.0.0.6.0           DKA0           RZ28  D41C
dka500.5.0.6.0         DKA500        RRD43 0064
```

7. Boot from the CD-ROM (device DKA500) using the "BOOT -FLAGS 0,A0 DKA500" command. This command starts the console code update:

```
>>> BOOT -FLAGS 0,A0 DKA500
(boot dka500.5.0.6.0 -flags 0,a0)
block 0 of dka500.5.0.6.0 is a valid boot block
reading 1004 blocks from dka500.5.0.6.0
bootstrap code read in
base = 156000, image_start = 0, image_bytes = 7d800
initializing HWRPB at 2000
initializing page table at 148000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

8. At this point, the system will prompt you for the bootfile. Enter "[VMS\$COMMON.SYSMAINT]V5_5_UPD.SYS," which tells the system where to find the Console Code Version 5.5 upgrade file:

```
Bootfile: [VMS$COMMON.SYSMAINT]V5_5_UPD.SYS
```

The update software displays the following command stream:

```
*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.1-2, built on Jan 22 1996 at 10:58:01
>>>Execute Update Sequence
Update Script Complete
/boot pmem:180000 -flags 0,0)
bootstrap code read in
base = 180000, image_start = 0, image_bytes = 800000
initializing HWRPB at 2000
initializing page table at 746000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

*** AlphaServer 1000 4/200 -- Firmware Update V5.5 ***

For more information, type: HELP <Topic> or ? <Topic>

Topic      Description
-----
Update     Update the ROM(s)
DUMP       Display ROM(s) header
List       List ROM device type
Show       Show ROM(s) checksum
VERBOSE    Enable verbose messages
NVERBOSE   Disable verbose messages
VERIFY     Verify ROM(s) image
Quit       Quit update utility
```

9. The system then prompts you for the Apu. Enter “UPDATE”:

```
Apu-> UPDATE
APU-P *** ALL ROMS CONTENTS WILL BE DESTROYED ***
APU-P *** READY TO PROGRAM DEVICE (Y/N) ? Y

*** Programming SRM ROM
APU-I ERASING ROM DEVICE
APU-I PRECHARGING ROM DEVICE
APU-I PROGRAMMING ROM DEVICE
APU-I VERIFYING LOADED ROM IMAGE
APU-I VERIFYING SUCCESSFULL
APU-I PROGRAMMING COMPLETED
*** Programming ARC ROM
APU-I ERASING ROM DEVICE
APU-I PRECHARGING ROM DEVICE
APU-I PROGRAMMING ROM DEVICE
APU-I VERIFYING LOADED ROM IMAGE
APU-I VERIFYING SUCCESSFULL
APU-I PROGRAMMING COMPLETED
```

10. Verify the update is complete by entering “VERIFY”:

```
Apu-> VERIFY
*** ROM: SRM
APU-I VERIFYING LOADED ROM IMAGE
APU-I VERIFYING SUCCESSFULL
*** ROM: ARC
APU-I VERIFYING LOADED ROM IMAGE
APU-I VERIFYING SUCCESSFULL
```

11. Then enter "QUIT":

```
Apu-> QUIT
QHard Reset or ...Cycle Power ...
```

12. Set the On/Off switches on any external options connected to the system to the Off position.
13. Depress the power button on the server OCP to turn off power, wait a couple of seconds, and turn the power back on.

```
*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
V3.1-2, built on Jan 22 1996 at 10:58:01
```

14. Press the Return key to get the >>> prompt and enter the SHO CONFIG command to verify that the console upgrade was successful. The PALcode line indicates the console code Version 5.5 has been installed successfully:

```
>>> SHO CONFIG

Firmware
SRM Console:   V3.1-2
ARC Console:   4.44
PALcode:       VMS PALcode V5.53-5, OSF PALcode V1.46-1
Serial Rom:    0.8

Processor
DECchip (tm) 21064-2    200Mhz
```

Note

A "PALcode" greater than "VMS PALcode X5.53-5" indicates a later version of the console code.

This completes the console code upgrade for this server processor. Proceed with the OpenVMS Alpha Operating System Version 6.2-1H3 (or later) upgrade.

1.4 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 1.4.1 to perform this upgrade.

Note

Digital recommends that you perform a backup of your system disk prior to any upgrades to provide a means of recovery if anything should go wrong during the upgrade.

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

1.4.1 Upgrading to OpenVMS Alpha Version 6.2-1H3

Before installing the upgrade kit, you must upgrade the OpenVMS Alpha Operating System to Version 6.2-1H3. The contents of the system disk 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. Follow the procedures in Section 1.2 to connect the terminal to the server processor.
2. Boot from your V6.2 system disk if the array is not already running.
3. Insert the StorageWorks Network Storage Array Software Customization Procedure V2.1 CD, included in your upgrade kit, into the CD ROM reader.
4. 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:.

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

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

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

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

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

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

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

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

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

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

```
AXPVMSU1H3 V6.2
```

```
Beginning installation of AXPVMSU1H3 V6.2 at 13:00
```

```
%VMSINSTAL-I-RESTORE, Restoring product save set A ...
```

```
%VMSINSTAL-I-RELMOVED, Product's release notes have been moved to SYS$HELP.
```

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

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

```
* Will you allow a system shutdown after this product is installed? [YES]:
```

```
* How many minutes for system shutdown [7]:
```

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

Now applying AXPVMSU1H3062 ...

- 1) APB (new image)
- 2) AUTOGEN (new file)

...

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

Installation of AXPVMSU1H3 V6.2 completed at 13:03

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

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

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

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

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

The installation will not be complete until a system reboot.

SHUTDOWN -- Perform an Orderly System Shutdown
on node NSA

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

SYSTEM SHUTDOWN COMPLETE

halted CPU 0

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

6. Power off the server processor by:
 - a. Opening the front door of the network array cabinet with a 5/32-inch hex wrench.
 - b. Depressing the power button on the server OCP to turn off power.
 - c. Setting the On/Off switches on any external options connected to the system to the Off position.

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.

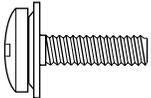
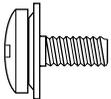
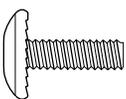
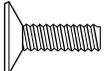
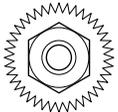
1.5 Tools Needed for Installation

The following tools may be needed to install your subsystem. Not all of the tools listed are required for every cabinet type:

- Hex wrench (3/8-inch)
- Allen wrench (5/32-inch)
- Small Phillips screwdriver
- Small flat blade screwdriver
- ESD wrist strap and antistatic mat

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

Figure 1-2 Screw Diagrams

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

CXO-4701A-MC

HS211 to SWXNA-Ex Upgrade Procedure

This chapter provides step-by-step procedures for installing the SWXUA-E4 upgrade kit.

2.1 Purpose of this Upgrade

A customer who originally purchased a model HS211 FDDI Server may want the performance improvements and additional features offered in the SWXNA-Ex Network Storage Array. Rather than purchasing a new array, the SWXUA-E4 kit provides a migration path to an SWXNA-Ex Network Storage Array for a reasonable incremental cost.

The SWXUA-E4 upgrade kit provides all the components for upgrading a model HS111 StorageWorks FDDI Server to a model SWXNA-Ex Network Storage Array. The following sections provide information about the upgrade kit and how to perform the upgrade.

2.2 SWXUA-E4 Upgrade Kit Description

The main components of the SWXUA-E4 upgrade kit are as follows:

- One HS1AD bus adapters
- One 64MB memory option
- Two HSD50 Array Controllers with write-back cache modules, external cache batteries, and power supply
- One KZPAA PCI-to-SCSI adapter
- Shadowed system disk assembly with:
 - One RZ29-VA disk for the Shadowed System Disk
 - BA356-S shelf and cables
- OpenVMS Alpha operating system software Version 6.2-1H3 (or later) CD-ROM

When you receive your SWXUA-E4 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 Powering Off the Server Processor

Use the following procedure to power off the server processor:

1. Depress the power button on the server OCP to turn off power.
2. Set 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.

2.4 Installing Adapters and Adding Memory in the Server Processor

Installing the adapters and adding memory on the server processor motherboard involves the following tasks:

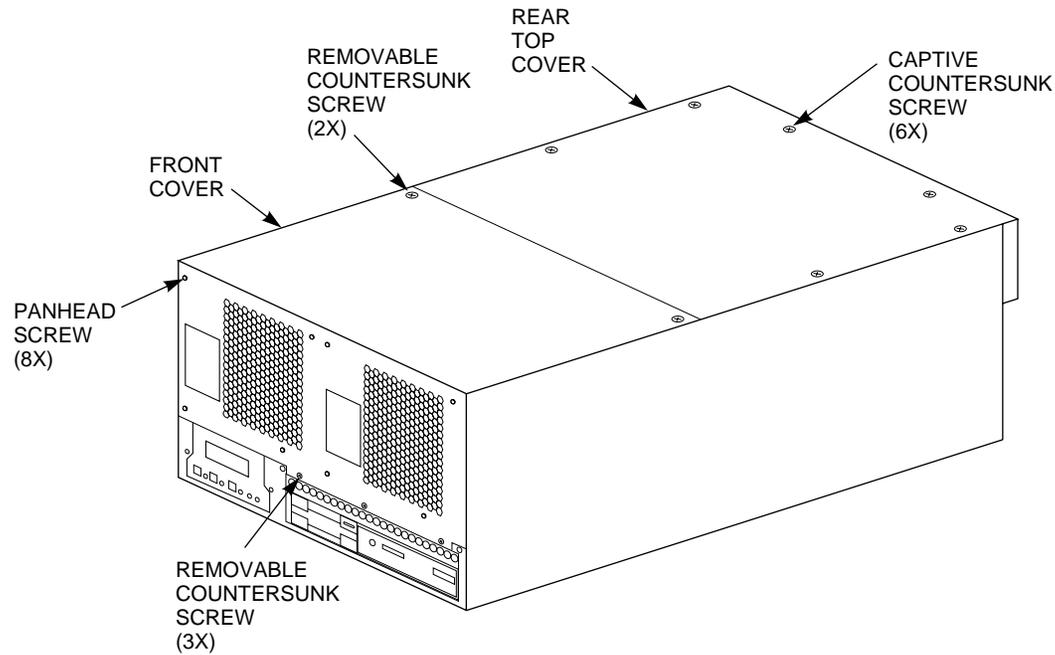
- Sliding the server processor out of the cabinet
- Installing the new adapter cards
- Adding memory
- Sliding the server processor back into the cabinet

2.4.1 Sliding the Server Processor Out of the Cabinet

Use the following procedure to slide the server processor out of the cabinet:

1. If necessary, remove the shipping brackets from the *rear* of the server processor (hole locations 53 and 54).
2. Slide the top 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 2-1).
5. Lift off the rear top cover.

Figure 2-1 Removing the Rear Top Cover Panel



CXO-4725A-MC

2.4.2 Installing the Option Cards

The SWXUA-E4 upgrade involves installing a bus adapter card into EISA slot 7 and a KZPAA PCI-to-SCSI adapter card into PCI slot 1 as shown in Figure 2-2.

2.4.2.1 Installing the New Option Cards

1. In Figure 2-2, the first three slots are reserved for PCI options; the last eight are for EISA or ISA options.
2. Complete the following steps for the bus adapter and KZPAA cards to install them into the correct slots as shown in Figure 2-2.
3. Remove the screw securing the slot cover for EISA slot 7 to the chassis.
4. Remove the slot cover from the server processor and store it for future use.
5. Carefully install the HS1AD bus adapter card into EISA slot 7.
6. Secure the HS1AD adapter card to the chassis using the slot cover screw.
7. Remove the termination jumper (E1) on the KZPAA PCI-to-SCSI adapter, as shown in Figure 2-3.
8. Remove the metal cover from PCI slot 1. See Figure 2-2
9. Install the KZPAA into the server processor using the slot cover screw in PCI slot 1.

Figure 2-2 SWXNA Server Processor Motherboard Configuration

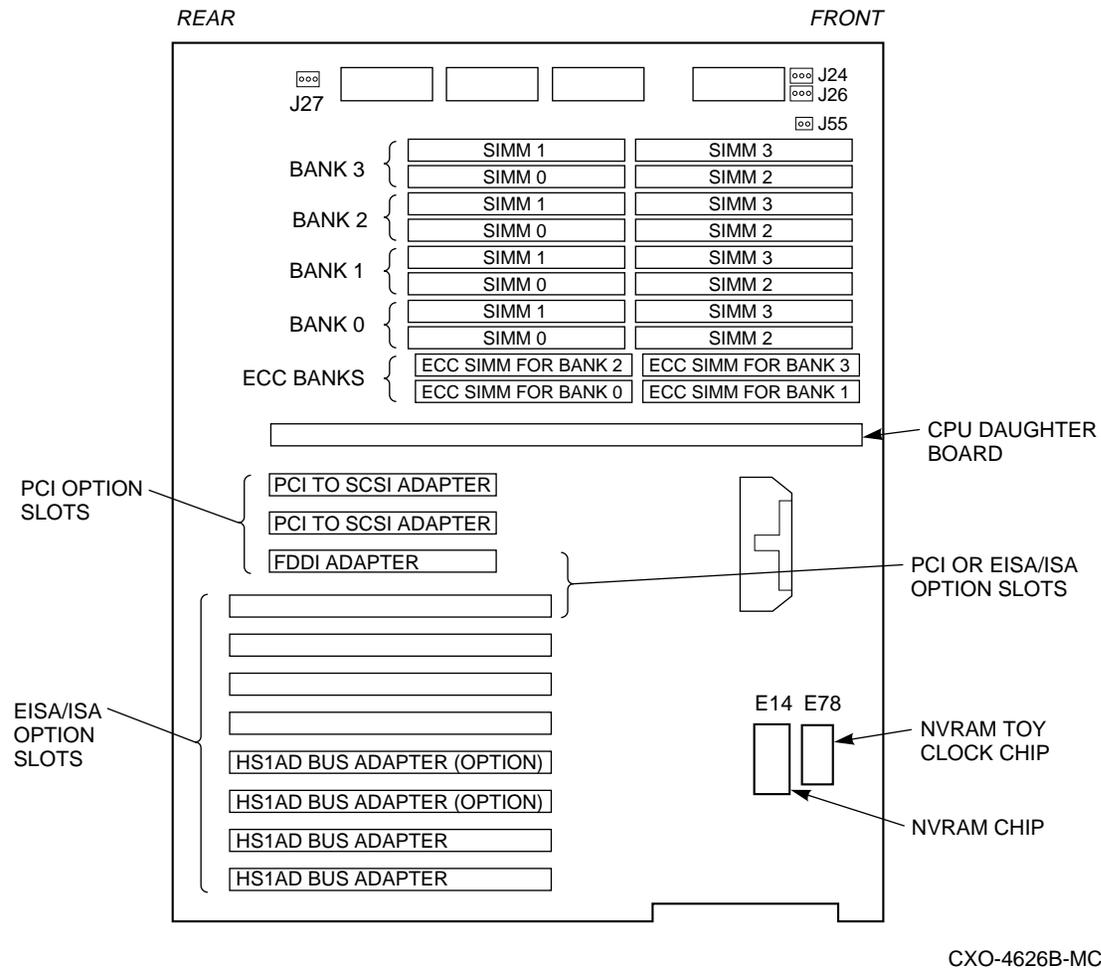
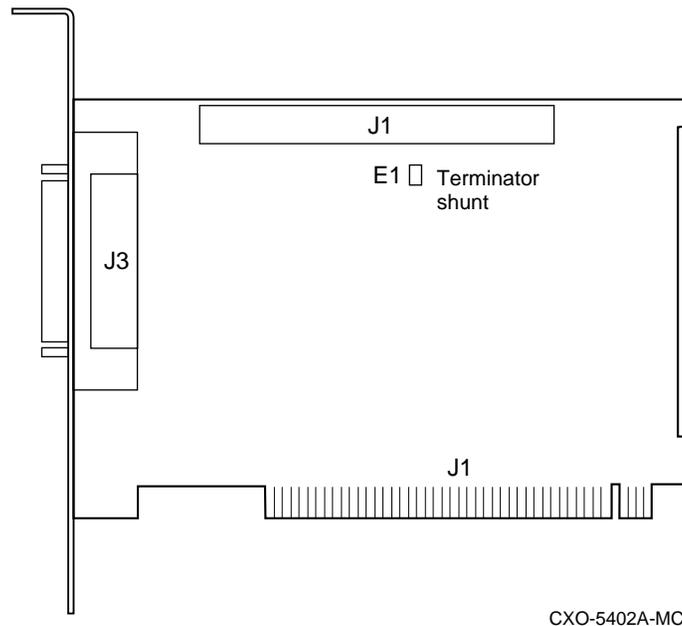


Figure 2-3 KZPAA SCSI Termination Jumper Location



2.4.3 Adding Additional Server Processor Memory

A 64MB memory upgrade for the server processor memory has been included in your upgrade kit to bring your total server processor memory to 128MB. At this time, complete the steps in the *StorageWorks Network Storage Array Server Processor Memory Installation Guide*, EK-NSAMM-IG.

2.4.4 Sliding the Server Processor Back into the Cabinet

After replacing the adapter cards and installing additional memory, complete the following steps to slide the server processor back into the cabinet.

1. Replace the server processor top cover.
2. Slide the server processor back into the cabinet.
3. Replace the shipping bracket in hole locations 53 and 54.

2.5 Installing the Write-Back Cache Modules and HSD50 Array Controllers

The original HS1CP device channel processor and write-back cache module must be removed and replaced with two HSD50 Array Controllers. The HSD50s will be installed into the existing BA350-M shelf located in the front of the network array.

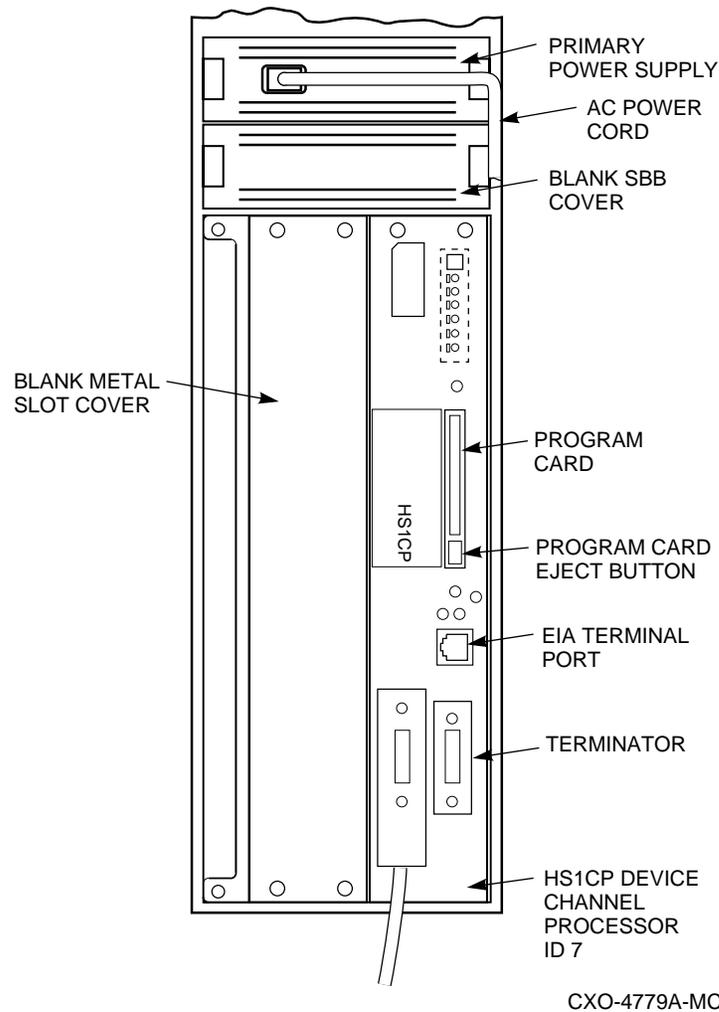
The second HSD50 occupies SCSI ID slot 6. The second HSD50 does not function correctly if there are attached devices in slot 6 of *any* storage shelf. Check that each port has no more than six SCSI-2 devices at SCSI ID numbers 0 through 5.

Complete the following steps to install the HSD50s:

1. Remove the blank metal cover from the BA350-M shelf. See Figure 2-4.

- Remove the existing HS1CP and write-back cache module.

Figure 2-4 Blank SBB and Metal Slot Covers Installed



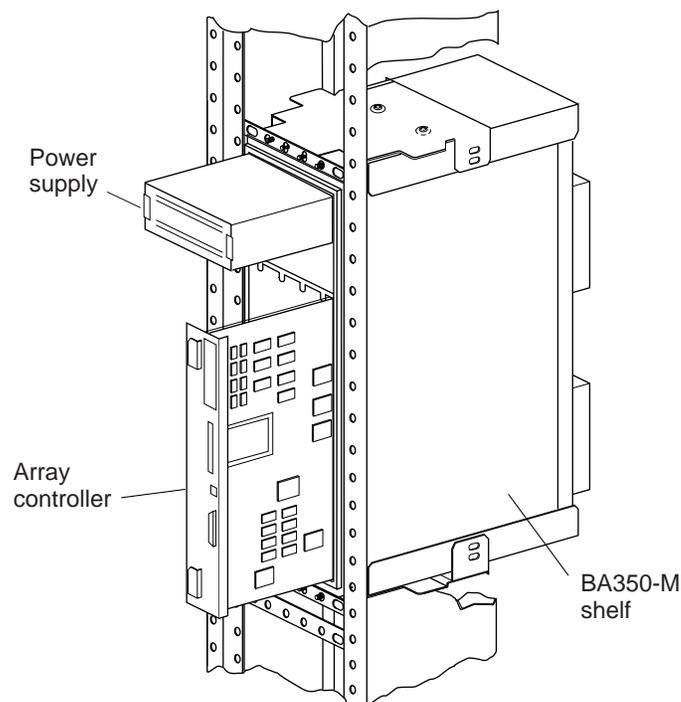
<REFERENCE>(210aama_lay) shows the layout of the BA350-M shelf connectors. Note the following:

- There are two sets of connectors (one connector for each write-back cache module and four connectors for each array controller).
The write-back cache module must be installed prior to installation of the array controller.
- The shelf has a nylon guide rail along the top and bottom to guide the write-back cache module into its single connector.
- The shelf has a nylon guide rail along the top and bottom to guide the array controller module into its four connectors.

CAUTION

Electrostatic discharge damages modules. Always use proper ESD grounding procedures when handling modules. Refer to Section 1.1 for proper grounding procedures.

Figure 2-5 BA350-M Shelf Component Positions



CXO6047A

Figure 2-5 shows the installation positions of the power supply and array controller into the BA350-M shelf.

Installing the first write-back cache and HSD50

Use the following procedure to install the first write-back cache module and array controller:

1. Install the write-back cache module into the *right* side (slot 7) of the BA350-M shelf by sliding the module into the single white connector located in the back of the shelf.

The single white connector is shown as “CACHE 1” in <REFERENCE>(210aama_lay).

2. Install the HSD50 into the BA350-M shelf by sliding the module into the four white connectors located at the back of the shelf (refer to <REFERENCE>(210aama_lay)).

Figure 2-6 shows the BA350-M shelf with one HSD50 Array Controller installed.

3. With a flat blade screwdriver, tighten the four screws on the front corners of the array controller.

CAUTION

Do not overtighten these screws. Using excessive force could break the screws or damage the module.

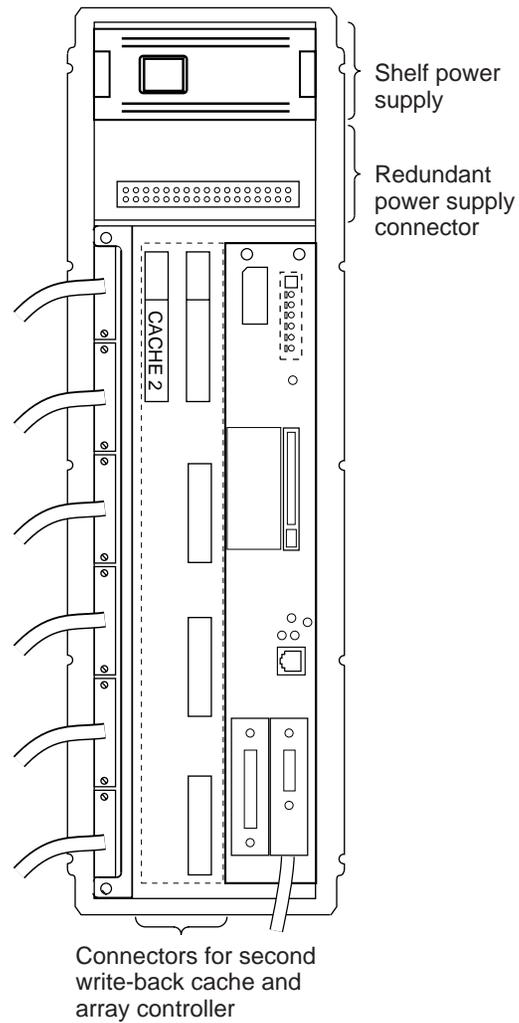
Installing the second write-back cache and HSD50

Use the following procedure to install the second write-back cache module and array controller:

1. Install the write-back cache module into the *left* side (slot 6) of the BA350-M shelf by sliding the module into the single white connector located in the back of the shelf.

The single white connector is shown as “CACHE 2” in Figure 2-6.

Figure 2-6 Slot 7 Array Controller Installed



CXO6046A

2. Install the HSD50 into the BA350-M shelf by sliding the module into the four white connectors located at the back of the shelf (refer to Figure 2-6).
3. With a flat blade screwdriver, tighten the four screws on the front corners of the array controller.

CAUTION

Do not overtighten these screws. Using excessive force could break the screws or damage the module.

Installing the Power Supply

Complete the following procedure to install the power supply.

1. Remove the slot cover, if one is installed, and install the power supply into the top slot of the BA350-M shelf (see Figures <REFERENCE>(210aama_lay\value) and 2-5).

Insert the power supply into the guide slots on both sides and push it in until it is fully seated and the mounting tabs engage the shelf.

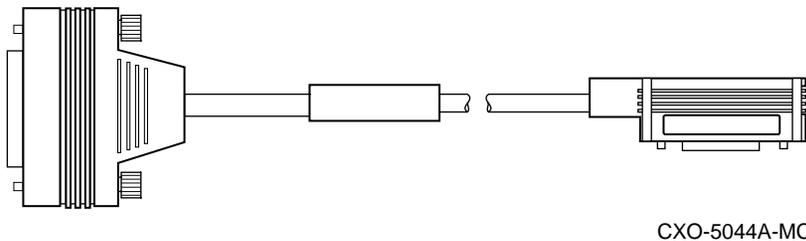
2. Plug the shelf ac power cord into the front of shelf power supply.

2.6 Installing Internal Bus Cables for the HSD50 Array Controller

Connect the right-angle end of the internal bus cable to the HSD50 Array Controller trilink connector (refer to the connector on the *right* in Figure 2-7).

Connect the straight end of the internal bus cable to the HS1AD device bus adapter (refer to the connector on the *left* in Figure 2-7).

Figure 2-7 Internal Bus Cable Connectors



CAUTION

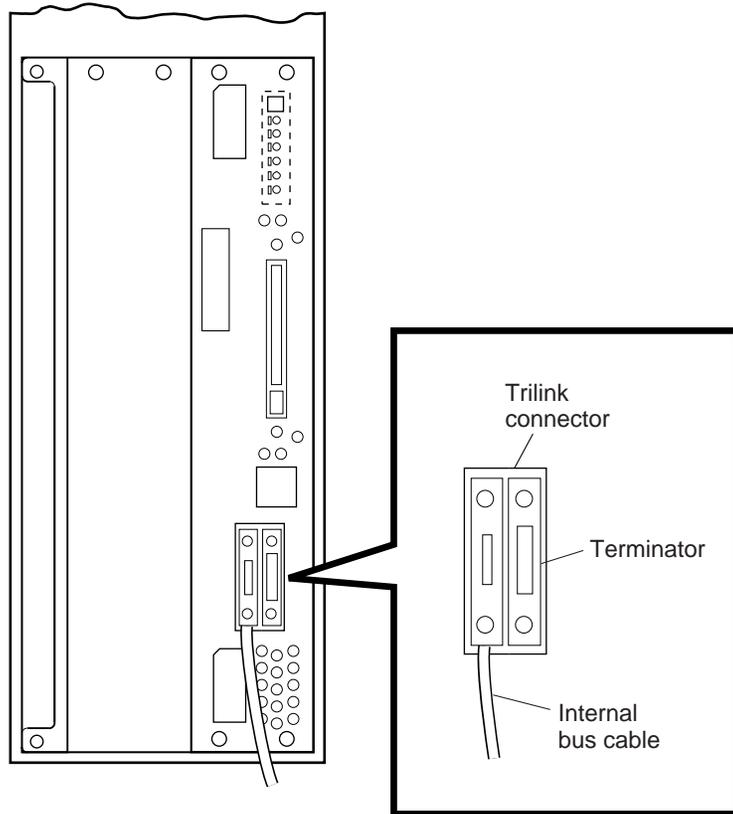
Currently, component damage can result if internal bus cables are connected or disconnected with power applied, *unless* the mating guide (Digital part number 74-49066-01) is installed around the outside edge of the HSD50 port connector. HSD50 modules are shipped from the factory with the mating guide and the trilink connector block premounted on the HSD50 port connector.

Be aware that the trilink connector block is the interface between the HSD50 Array Controller 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.

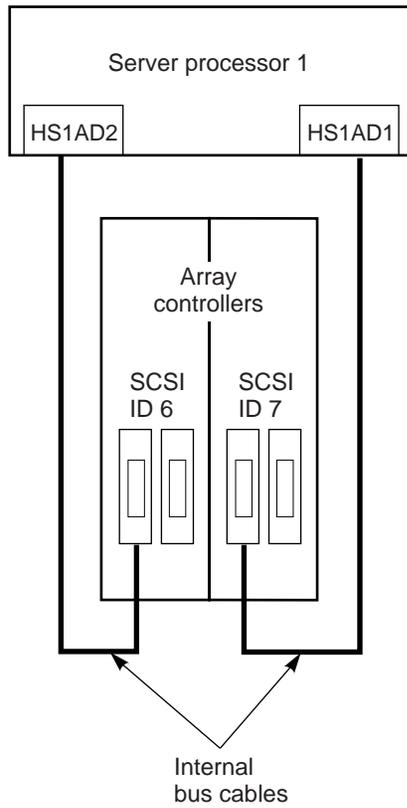
1. See Figure 2-8 for where to attach the internal bus cable to the trilink connector on each HSD50. Attach the internal bus cable from the (*left*) HS1AD in EISA slot 7 to the (*left*) HSD50. Attach the internal bus cable from the (*right*) HS1AD in EISA slot 7 to the (*right*) HSD50. Figure 2-9 shows how the internal bus cables should be connected for your new configuration.

Figure 2-8 Trilink Connector with Cable and Terminator



CXO6045A

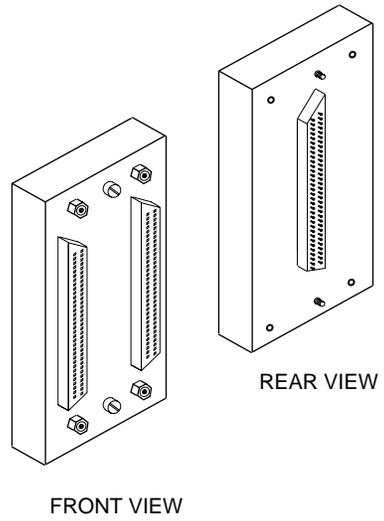
Figure 2–9 Logical Diagram - HSD50s in SWXNA-Ex



CXO6044A

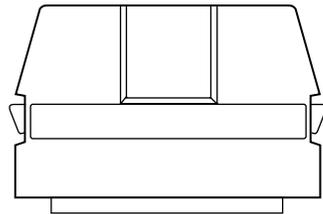
2. Plug a bus terminator into the other tralink connector on each HSD50 (see Figures 2–10 and 2–11). Figure 2–12 shows the BA350–M shelf with both HSD50 Array Controllers installed and cabled.

Figure 2-10 Trilink Connector



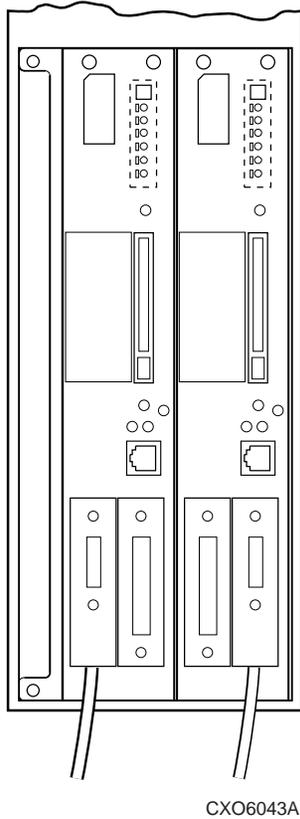
CXO-3851A-MC

Figure 2-11 Terminator



CXO-4957A-MC

Figure 2–12 Array Controller Installation



2.7 Installing the Shadowed System Disk

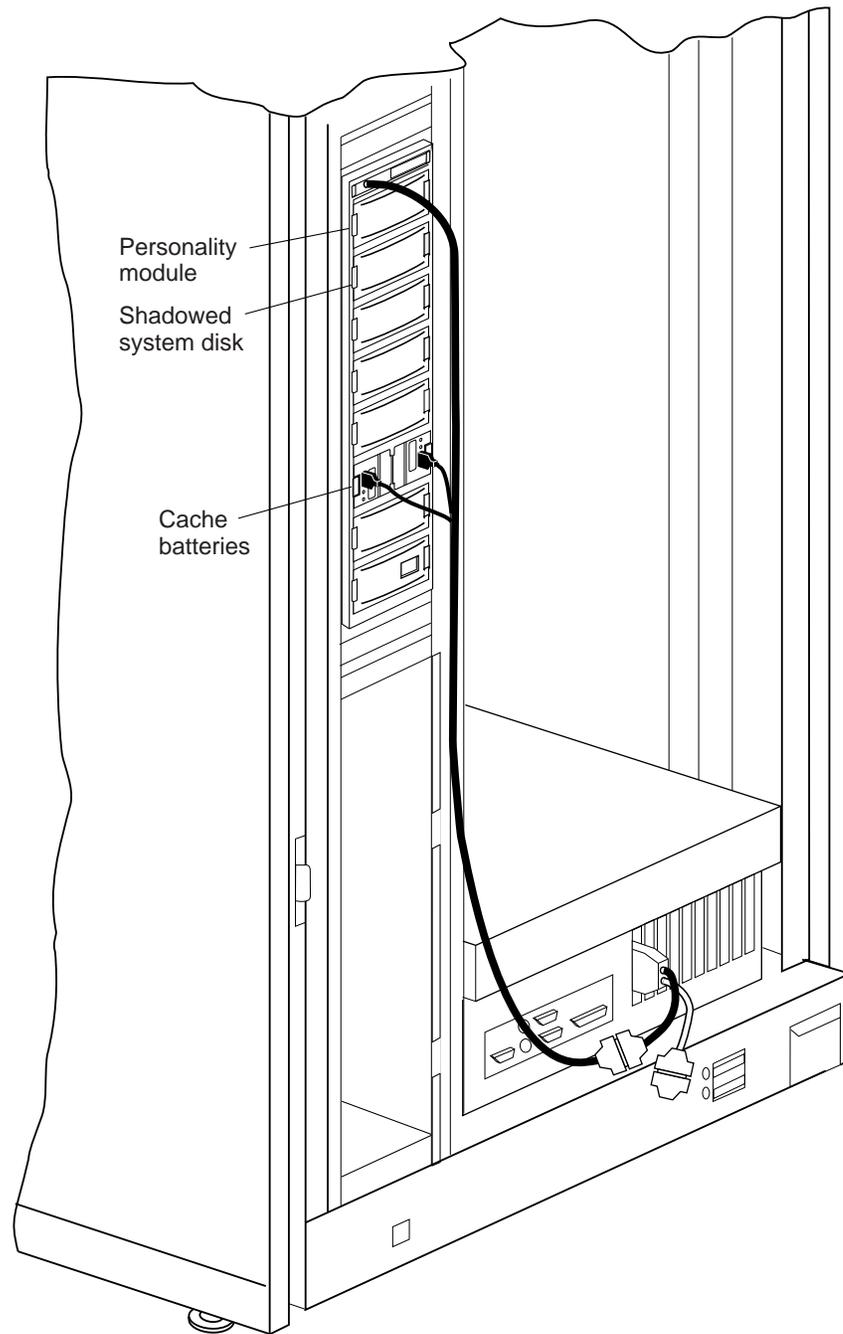
The following procedure explains how to install the shadowed system disk into the StorageWorks Network Storage Array.

2.7.1 Installing the BA356-S Shelf

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

1. Remove the blank cover in the rear middle section of the left vertical cabinet channel where the shelf is to be mounted. See Figure 2–13.
2. Remove the fan assemblies from the rear of the BA356-S shelf and ensure the jumper board is installed on connector JT21 and the terminator board is installed on connector JT25 as shown in Figure 2–14. 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.

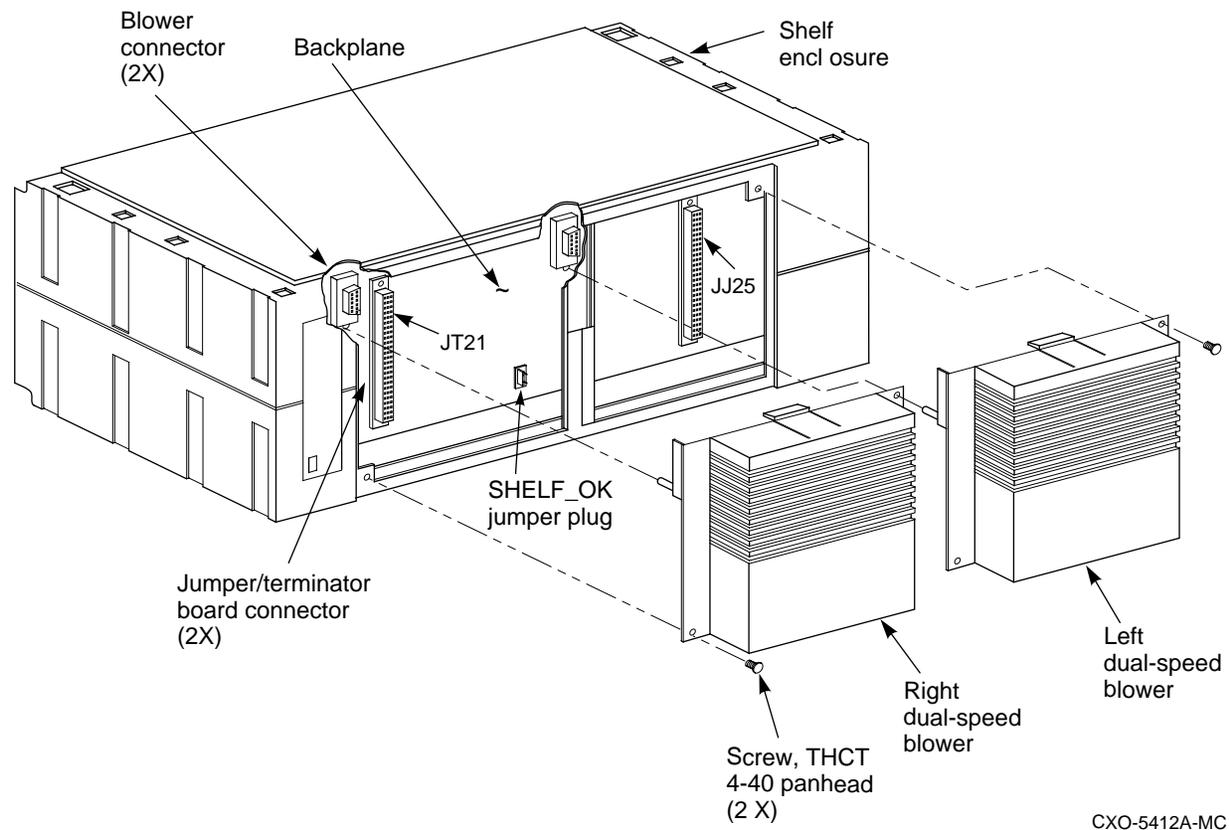
Figure 2-13 Shadowed System Disk



CXO6042A

3. Install the mounting brackets for the BA356-S shelf.

Figure 2-14 BA356-S Jumper and Terminator Locations



Note

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

4. Slide the BA356-S shelf into the cabinet and secure in place.

2.7.2 Installing SCSI cables

Complete the following steps to connect the SCSI cables to the system disk BA356-S shelf. Figure 2-15 shows the correct cabling.

1. Attach the cable truss to the KZPAA connector as shown in Figure 2-16.
2. Attach Y-cable BN23F-0B to the KZPAA connector.

Figure 2-15 Shadowed System Disk Interconnection

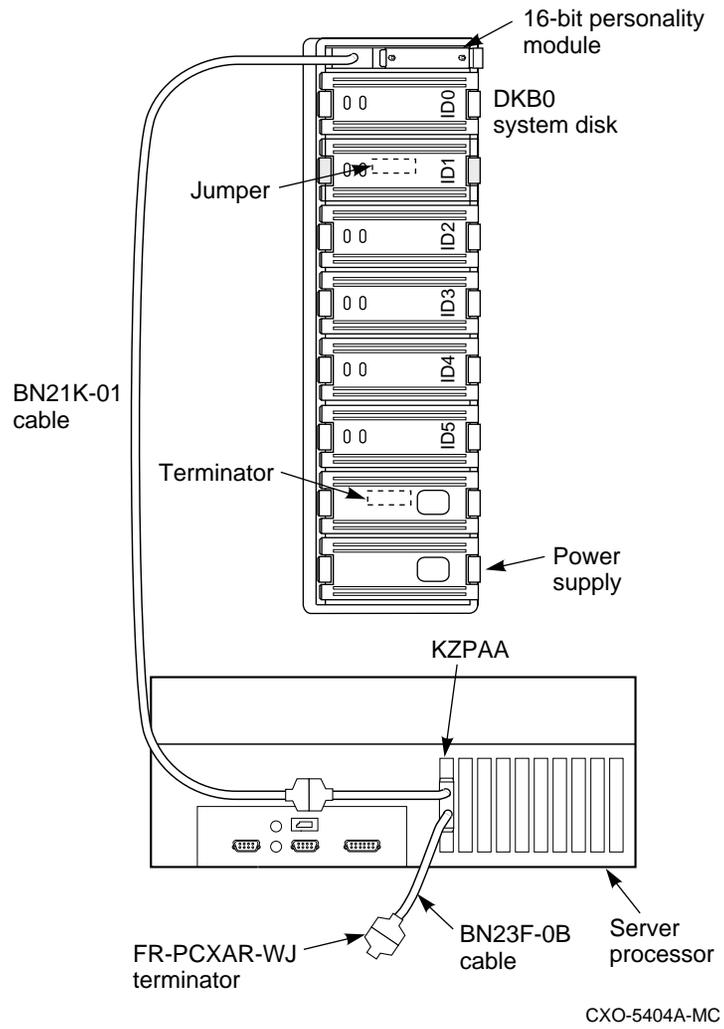
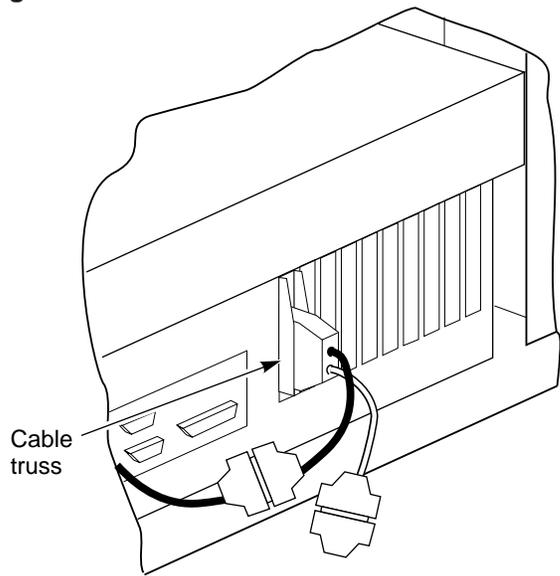


Figure 2–16 KZPAA Cable Truss



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

2.7.3 Installing Components into the BA356 Shelf

Install the components into the BA356-S shelf by completing the following steps as shown in Figure 2–13.

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

2.8 Restarting the System

Once the cabinet has been inspected for tools and installation debris, apply power as follows:

1. Plug the primary power cable from the CDU into the appropriate site power receptacle.
2. Switch the circuit breaker on the CDU to the ON position.
3. Verify that all cabinet fans and shelf blowers are operating and that both status indicators on each shelf power supply SBB are illuminated. Refer to the *StorageWorks Solutions Shelf and SBB User's Guide* for more information about shelf status indicators.
4. Apply DC power to the server processor. The DC power switch is located on the OCP of the server processor.

2.9 Running the EISA Configuration Utility

Whenever you add, remove, or move an EISA adapter card, you need to run a utility called the EISA Configuration Utility (ECU). The ECU and a configuration file (CFG) for the device bus adapter are located on the diskette included with the network array's hardware kit. The ECU uses the CFG file to allocate system resources and create a conflict-free configuration. This configuration information is saved to your server's nonvolatile memory.

Note

The CFG file for the device bus adapter is located on the ECU diskette that is shipped with your array. If the file is not found, the ECU program prompts you to insert the CFG diskette (AK-Q2CRx-CA) shipped with the device bus adapter card.

Complete the following steps:

1. Connect a terminal to the server processor before starting the next step (see Section 1.2).
2. Press the RETURN key to obtain the >>> prompt if one is not displayed on the terminal screen.
3. Insert the ECU diskette into the floppy diskette drive.
4. Enter ECU and press the Return key at the >>> prompt. The system loads the ECU software.

Note

Set both device bus adapters to SCSI ID 7.

5. During loading, press Return to respond to system questions until the software displays the menu shown in the following example:

```
EISA Configuration Utility
Steps in configuring your computer

STEP 1: Important EISA configuration Information
STEP 2: Add or remove boards
STEP 3: View or edit details
STEP 4: Examine required details
STEP 5: Save and exit

>Select=ENTER< <Cancel=ESC>
```

6. Use the down arrow key to select the "STEP 3: View or edit details" option (shown in the previous example) and press the Enter key.
7. Use the down arrow key to scroll through the file until you find the device bus adapter option and its slot number. The display lists the current settings, as shown in the following example:

```

Step 3: View or edit details
Slot 7 -- Digital device bus adapter internal bus EISA Host Adapter  Added
Host Adapter Interface.....Trigger EDGE
Host Adapter IRQ.....IRQ 15
Host Adapter internal bus ID.....Device ID 7

Slot 8 -- Digital device bus adapter internal bus EISA Host Adapter  Added
Host Adapter Interface.....Trigger EDGE
Host Adapter IRQ.....IRQ 14
Host Adapter internal bus ID.....Device ID 7

```

Note

The IRQ and device ID of the device bus adapter are automatically set to the default values by the ECU. The previous display shows that the server processor contains one device bus adapter with a device ID of 7 and an IRQ of 15, and another device bus adapter with a device ID of 7 and an IRQ of 14.

8. When you have finished with the option settings, enter Ctrl/[(control left bracket). A main menu similar to the following displays:

```

EISA Configuration Utility
Steps in configuring your computer

STEP 1: Important EISA configuration Information
STEP 2: Add or remove boards
STEP 3: View or edit details
STEP 4: Examine required details
STEP 5: Save and exit

>Select=ENTER< <Cancel=ESC>

```

9. Use the arrow key to select “Step 5: Save and exit” (see the previous example) and press the Enter key. The display shows that your configuration is saved.
10. Press Enter again, and the >>> prompt displays.
11. Remove the ECU diskette from the floppy diskette drive.
12. Power cycle the server processor (depress power button on the server processor twice: once to turn it off and again to restart the system). After the system performs the self test, the >>> prompt displays.

The next step is to configure your new HS1CP device channel processor.

2.10 Setting HSD50 Parameters

Complete the following sections to setup the *right* HSD50 as HSD501.

2.10.1 Connecting the Terminal to the HSD50 Array Controller

Use the following procedure to connect a terminal to the EIA terminal port of the HSD50 Array Controller for initial parameter configuration:

1. Switch the circuit breaker on the front panel of the CDUs to the ON (I) position.
2. Depress the power button on the front of the server processor.

3. Make sure the power switch on the back of the terminal is OFF (○).
4. Connect one end of the terminal cable to the back of the terminal.
5. Connect the other end of the terminal cable to the EIA terminal port on the front of the array controller (see Figure 2-12).
6. Turn the terminal power switch to the ON (Ⓛ) position.
7. Set the terminal's communication setup to 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.
8. Press the Return key if no prompt is visible on the screen. This brings you to the array controller's command line interpreter (CLI) prompt.

2.10.2 Setting the Initial Parameters for the HSD50

Use the following procedure to set the initial parameters of the Array Controller:

1. Set the HSD50 Array Controller node name:

```
CLI> SET THIS_CONTROLLER SCS_NODENAME="HSD501"
```

2. Enable the path from the HSD50 Array Controller to the server processor with the following command:

```
CLI> SET THIS_CONTROLLER PATH
```

3. Set the array controller identification:

```
CLI> SET THIS_CONTROLLER ID=1
```

4. Set the prompt:

```
CLI> SET THIS_CONTROLLER PROMPT="HSD501"
```

This completes the setting of initial parameters.

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

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

Firmware Licensing System (FLS)

The firmware licensing system (FLS) enables or disables the licensed software features of the HSD50.

You start FLS from the HSD50 prompt. The following example demonstrates the FLS program and describes the FLS main menu items. The callout numbers in this example correspond to the list of explanations that follows.

```
HSD501> RUN FLS
```

```
-----
          Firmware Licensing System (FLS) on node HSD501
Option1   State2   License3   Key4
-----
RAID      ENABLED      INVALID    *none*
WBCA      ENABLED      VALID      ACME_WIDGET_CORP.....
MIRR      DISABLED     INVALID    *none*
```

```

RAID = Raid5 + Writeback Cache 5
WBCA = Writeback Cache ONLY
MIRR = Disk Mirroring Option
-----

```

```

1. Enable a firmware option
2. Disable a firmware option
3. Enter a license key for a firmware option
4. Clear a license key for a firmware option
0. Exit FLS
Enter selection (0:4) [0] ?

```

- 1 **Option**—In this example, the options that are available—RAID, write-back cache (WBCA), and mirroring—are shown.
- 2 **State**—In this example, both the RAID and WBCA options are enabled, and the mirroring option is disabled. You can use any option that is enabled.
Enabled options without a valid license key can produce frequent error messages. Valid licenses must be purchased for these options if you desire to use the functionality.
- 3 **License**—WBCA is running with a valid license. RAID is running without a valid license. This status shows when you run an option on a trial basis. The license becomes valid when you enter a license key that FLS verifies as valid. You receive this key when you purchase a software option.
- 4 **Key**—The license key is ACME_WIDGET_CORP; the 8-character CRC portion of the key is shown as hidden text (.....).
- 5 **Description of Option**—Each option is described briefly.

After starting FLS, the display shows the current status of the value-added options for your HSD50 and contains menu choices for each utility.

2.10.3.1 Using the FLS Main Menu

The FLS main menu offers the following options:

Select	Action	Submenu Choices	Result
1	Enable an option	List each option and its status	Selection enabled
2	Disable an option	List each option and its status	Selection disabled
3	Enter a license key	Prompt for new license key	Entered key checked for validity
4	Clear a license key	Prompt for license key to clear	Entered key becomes invalid to clear

2.10.3.2 Enabling Options

You can turn on any option at any time with FLS, but if you enable an option for which you are not licensed, an error message appears on your CLI console and an error is recorded in the host error log. These error messages are repeated at least once each hour while the unlicensed option remains enabled.

2.10.3.3 Disabling Options

You cannot disable an option if that option is currently in use. To disable the WBCA option, the write-back caching feature must not be in use.

2.10.3.4 License Key

When you purchase a license for a firmware option, you receive a customer license key. This license key contains two parts:

- A *customer identification string* of 6 to 32 characters.
- An 8-character *cyclic redundancy check (CRC)* string.

You must enter the customer identification string with the CRC string appended to it when you use selection 3 in the FLS menu.

Example Operations

The following example demonstrates how to enter a license key and enable the write-back caching option. Enter the license key for write-back caching, RAID, and MIRR at this time. The callout numbers in this example correspond to the list of explanations that follows.

Note

All firmware functionality options, e.g., RAID, write-back cache, and disk mirroring, may be installed and enabled at this time. Consult the Software Product Description (SPD) for the HSD50 firmware functionality options (SPD 64.19.xx).

```
HSD501> RUN FLS
```

```
-----
      Firmware Licensing System (FLS) on node HSD501
Option   State   License   Key
-----
RAID     DISABLED  INVALID   *none*
WBCA     DISABLED  INVALID   *none*
MIRR     DISABLED  INVALID   *none*

      RAID = Raid5 + Writeback Cache
      WBCA = Writeback Cache ONLY
      MIRR = Disk Mirroring Option
-----

1. Enable a firmware option
2. Disable a firmware option
3. Enter a license key for a firmware option
4. Clear a license key for a firmware option
0. Exit FLS
Enter selection (0:4) [0] ? 3

      1. Enter new license key+CRC for RAID   (current key is invalid)
      2. Enter new license key+CRC for WBCA   (current key is invalid)
      3. Enter new license key+CRC for MIRR   (current key is invalid)
      0. Return to main menu
Enter selection (0:3) [0] ? 21

Enter new WBCA key, including 8-character CRC, or enter 0
to return to main menu: ACME_WIDGET_CORPVB8UWQ9C2

*** License key verified ***
```

```

-----
          Firmware Licensing System (FLS) on node HSD501
Option      State      License      Key
-----
RAID        DISABLED    INVALID     *none*
WBCA        DISABLED    VALID       ACME_WIDGET_CORP.....
MIRR        DISABLED    INVALID     *none*

          RAID = Raid5 + Writeback Cache
          WBCA = Writeback Cache ONLY
          MIRR = Disk Mirroring Option
-----

```

```

1. Enable a firmware option
2. Disable a firmware option
3. Enter a license key for a firmware option
4. Clear a license key for a firmware option
0. Exit FLS

```

Enter selection (0:4) [0] ? **1**

```

1. Enable RAID
2. Enable WBCA
3. Enable MIRR
0. Return to main menu

```

Enter selection (0:3) [0] ? **23**

*** WBCA enabled ***

```

-----
          Firmware Licensing System (FLS) on node HSD501
Option      State      License      Key
-----
RAID        DISABLED    INVALID     *none*
WBCA        ENABLED     VALID4      ACME_WIDGET_CORP.....
MIRR        DISABLED    INVALID     *none*

          RAID = Raid5 + Writeback Cache
          WBCA = Writeback Cache ONLY
          MIRR = Disk Mirroring Option
-----

```

```

1. Enable a firmware option
2. Disable a firmware option
3. Enter a license key for a firmware option
4. Clear a license key for a firmware option
0. Exit FLS

```

Enter selection (0:4) [0] ? **[Return]5**

FLS - Normal Termination

HSD501>

- 1** The user chooses to enter a new license key for WBCA.
- 2** The user enters the license key, which is displayed as it is entered.
This license key consists of the *customer identification string* (6 to 32 characters long) with the 8-character CRC string appended to it.
- 3** The user enables write-back cache.
- 4** This entry in the FLS display shows that write-back cache is enabled under a valid license.
- 5** Exit the program:

HSD501> **EXIT**

2.11 Setting Parameters for the Second HSD50

Complete the procedures starting in Section 2.10.1 for the second (*left*) HSD50, substituting HSD502 and ID 2 for the initial parameter setup.

2.12 Creating an Array Controller Dual-redundant Pair

Both HSD50s must have the same storage configuration in dual-redundant configurations. Once configured, any storage configuration is automatically transferred between the HSD50s. Use the following procedure to set up the HSD50s:

1. From either HSD50 prompt, issue the following command:

```
HSD502> SET FAILOVER COPY = OTHER_CONTROLLER
```

A message similar to the following appears:

```
Copyright Digital Equipment Corporation 1993, 1996. All rights reserved.  
HSD40 Firmware version V27D-0, Hardware version AX01
```

```
Last fail code: 20150100
```

```
Press " ?" at any time for help.
```

Note

During this time, your connection to the HSD50 is broken and you cannot communicate with the array controller until it completes its automatic restart. Restart is complete when you can press the RETURN key and the HSD50 prompt appears on the terminal screen. This may take as long as a minute.

2. When restart is complete and the HSD50 prompt appears, enter the following command:

```
HSD502> SHOW THIS
```

This command displays information about the current array controller (HSD502). From the display, note parameter settings (for example, MSCP_ALLO).

3. Enter the following command:

```
HSD502> SHOW OTHER
```

This command displays information about the other array controller (HSD501). From the display, note parameter settings (for example, MSCP_ALLO).

4. Verify that the information displayed for both array controllers matches.

2.13 Setting up the Server Processor and Shadowed System Disk

The shadowed system disk you installed in this upgrade procedure is blank and you have added a new SCSI bus to support the shadowed system disk. At this time, you must:

- Set up the server processor console parameters
- Migrate the operating system from the previous system disk to the new shadowed system disk

2.13.1 Setting up the Server Processor Console Parameters

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

Table 2-1 Server Processor Console Parameters

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

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

1. Connect a terminal to the server processor.
2. For each parameter listed in Table 2-1 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 2-1, type `SET <PARAMETER> <PARAMETER VALUE>` to set the proper value. For example:

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

2.13.2 Migrating the Operating System

Now you must move the operating system from the old system disk you upgraded in Section 1.4 to OpenVMS Alpha Operating System Version 6.2-1H3 to your new shadowed system disk. Complete the following procedure to move your operating system.

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

```
>>> SHOW DEVICE DK
dka100.1.0.6.0          DKA100          RZ28  D41C
dka500.5.0.6.0          DKA500          RRD45 1645
dkb0.0.0.11.0          DKB0            RZ28  442D
```

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

```
>>> BOOT DKA500
(boot dka500.5.0.6.0 -flags 0,0)
block 0 of dka500.5.0.6.0 is a valid boot block
reading 1004 blocks from dka500.5.0.6.0
bootstrap code read in
base = 154000, image_start = 0, image_bytes = 7d800
initializing HWRPB at 2000
initializing page table at 146000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

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

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

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

System initialization will take about one minute. Please wait...
This Network Storage Array has one server processor.

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

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

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

Please choose one of the following:

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

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

3. Select option 2 to migrate the OpenVMS Alpha Operating System. The following printout shows a typical migration.

```
+-----+
|                               |
|                               |
|                               |
+-----+
```

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) YES

4. Type **YES** if the system disk is correct.

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

\$13\$DKB0: RZ28 Label = SOME_LABEL_2 Total blocks = 4110480

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

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

5. Type **YES** to begin migrating the operating system.

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:)...

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.

```
+-----+
|                               |
|                               |
|                               |
+-----+
```

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

6. Select option 4 to shut down the system.

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

SYSTEM SHUTDOWN COMPLETE

halted CPU 0
halt code = 5
HALT instruction executed
PC = 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.

2.14 Starting the Network Array

The server processor parameters you set up in Section 2.13.1 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 new SWXNA read cache and Network File Serving features.

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

1. Reboot your system from the new shadowed system disk.
2. Run the Software Customization Procedure (SCP) to confirm 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-E1 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

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 <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.	
Power Requirements		
Voltage	100 to 240 V ac	100 to 240 V ac
Frequency	50/60 Hz	50/60 Hz
Device channel processor battery backup	Standard	Standard
Redundant Power	Optional	Standard
Environmental		
Operating temperature	10 C to 40 C	10 C to 40 C
Nonoperating temperature	-40 C to 66 C	-40 C to 66 C
Relative humidity	10% to 80%	10% to 80%
Altitude	Sea level to 2400 m (8000 ft)	Sea level to 2400 m (8000 ft)

(continued on next page)

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

	Models SWXNA-Ex/Jx	Model SWXNA-Ax/Fx
Physical Dimensions		
Height	1700 mm (67 in)	1700 mm (67 in)
Width	800 mm (31 in)	800 mm (31 in)
Depth	875 mm (34.5 in)	875 mm (34.5 in)
Weight (without devices)	310 kg (685 lbs)	355 kg (780 lbs)

A.2 StorageWorks Network Storage Array SWXNA-Bx/Gx/SWXNA-Cx Specifications

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

	Model SWXNA-Bx/Gx	Model SWXNA-Bx/Gx with SWXNA-Cx Installed
Storage Capacity		
Maximum number of disks	72 redundant connections	144 redundant connections
Maximum disk capacity using RZ29 disks	309 GB	619 GB
Maximum number of tape drives	See the <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.	
Power Requirements		
Voltage	100 to 240 V ac	100 to 240 V ac
Frequency	50/60 Hz	50/60 Hz
Device channel processor battery backup	Standard	Standard
Redundant Power	Optional	Standard
Environmental		
Operating temperature	10 C to 40 C	10 C to 40 C
Nonoperating temperature	-40 C to 66 C	-40 C to 66 C
Relative humidity	10% to 80%	10% to 80%
Altitude	Sea level to 2400 m (8000 ft)	Sea level to 2400 m (8000 ft)

(continued on next page)

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

	Model SWXNA-Bx/Gx	Model SWXNA-Bx/Gx with SWXNA-Cx Installed
Physical Dimensions		
Height	1700 mm (67 in)	1700 mm (67 in)
Width	800 mm (31 in)	800 mm (31 in)
Depth	875 mm (34.5 in)	875 mm (34.5 in)
Weight (without devices)	310 kg (685 lbs)	355 kg (780 lbs)

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

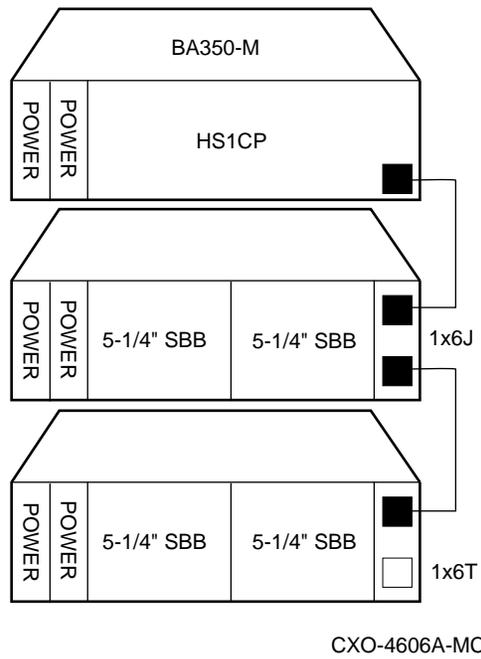
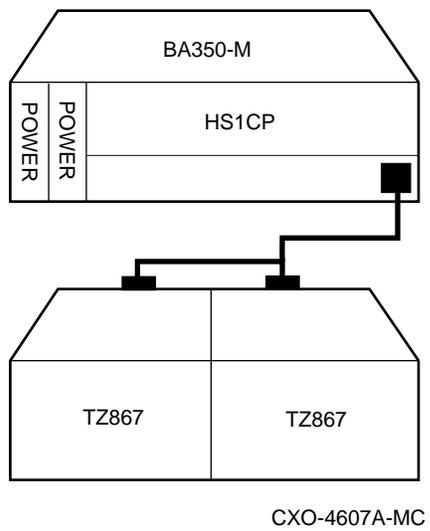


Figure B-2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

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

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.

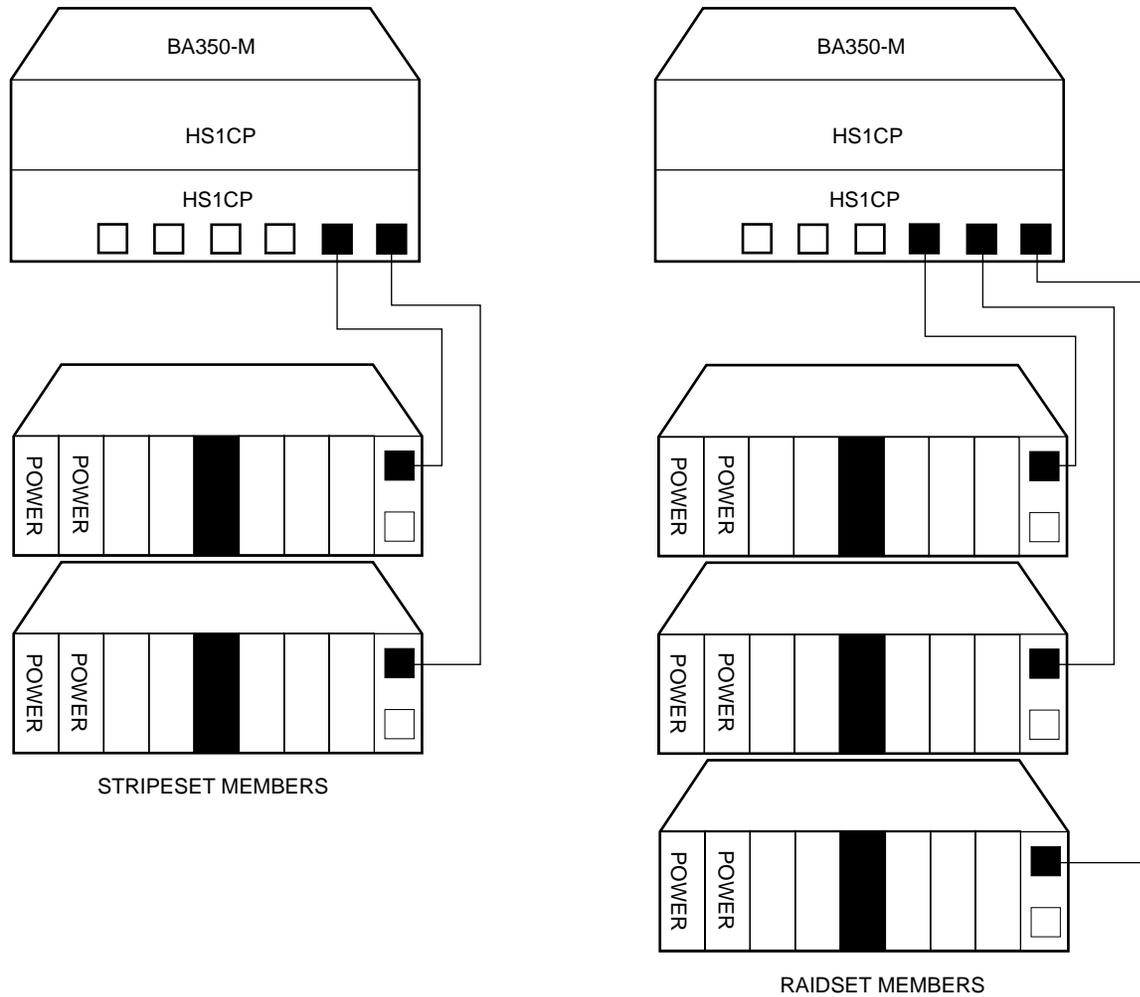
B.2.5 Optimal Availability Configurations

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



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.

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