

StorageWorks™ Solutions StorageWorks Network Storage Array

SWXUA–A1 Upgrade Manual

Order Number: EK–NSA06–UM. A01

This guide describes how to upgrade an HS121 to an SWXNA–Ax StorageWorks Network Storage Array.

September 1996

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Preface

This manual describes the procedures necessary to install and configure the SWXUA–A1 upgrade kit into an HS121 FDDI Server to create an SWXNA–Ax 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	Describes the procedure for installing the SWXUA–A1 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
StorageWorks Enclosures	
<i>StorageWorks™ Solutions SW800-Series Data Center Cabinet Installation and User's Guide</i>	EK-SW800-IG
<i>StorageWorks™ SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide</i>	EK-35XRD-IG

Manufacturer's Declarations

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

CAUTION

This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective measures.

ACHTUNG !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen die Benutzer für entsprechende Gegenmaßnahmen verantwortlich sind.

ATTENTION !

Ceci est un produit de Classe A. Dans un 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.

Preparing the Server for Upgrade

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.

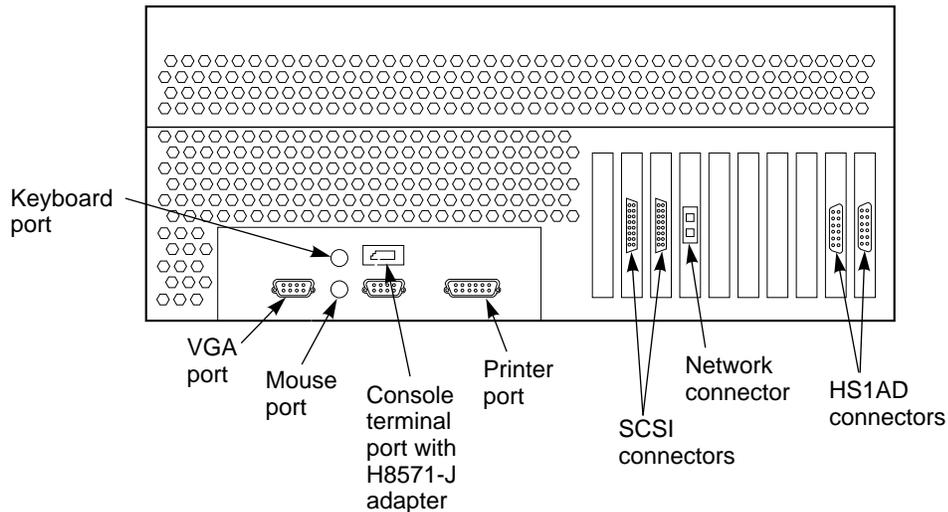
Note

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

1.2 Connecting a Terminal to the Server Processor

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 either a >>> prompt after power is applied to the server processor or the USERNAME prompt if the system was previously running.

1.3 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...

```

1.4 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 1.4.1 and 1.4.2 to perform this upgrade.

Note

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

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

1.4.1 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.

Note

If you have a system with two server processors, complete Section 1.4.1 for *both* server processors before continuing on to Section 1.4.2.

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 1.4.2. 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. If you have a two server processor system, upgrade the other server processor by connecting a terminal to the other server processor and following the instructions in Section 1.4.1. Then proceed with the OpenVMS Alpha Operating System Version 6.2-1H3 (or later) upgrade.

1.4.2 Upgrading the Server Processor with OpenVMS Alpha Version 6.2-1H3 (or Later)

After completing the console code upgrade, perform the following two steps to upgrade the OpenVMS Alpha operating system. The first procedure will update the OpenVMS Alpha operating system to Version 6.2. The second procedure will update OpenVMS Alpha operating system Version 6.2 to Version 6.2-1H3. This two-step upgrade is necessary because there is no direct upgrade path from Version 6.1 to Version 6.2-1H3.

The operating system upgrade only needs to be completed on one server processor system disk. The contents of the disk you select to upgrade will be migrated to the new shadowed system disk after you install the upgrade kit.

1.4.2.1 Upgrading to OpenVMS Alpha Version 6.2

Complete the following procedure to upgrade from OpenVMS Alpha Version 6.1-1H2 to Version 6.2:

1. Boot the server processor which contains the system disk you selected to upgrade.
2. At the VMS prompt, type the following command:

```
$ WRITE SYS$OUTPUT F$GETSYI("VERSION")  
V6.2
```

3. If your system responded by displaying V6.2, you can skip this section and go to Section 1.4.2.2. Otherwise, continue with this procedure.

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

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

5. Insert the StorageWorks Network Storage Array Software Customization Procedure V2.0 CD in the CD player.

6. Determine the device name of the CD player using the "SHOW DEVICE" command:

```
>>> SHOW DEVICE DKA  
  
dka0.0.0.6.0          DKA0          RZ28  D41C  
dka400.4.0.6.0       DKA400       RRD45 1645
```

In this case, the CD player is the RRD45, DKA400.

7. Boot from the CD:

```
>>> BOOT DKA400 -FLAGS 0,1  
  
(boot dka400.4.0.6.0 -flags 0,1)  
block 0 of dka400.4.0.6.0 is a valid boot block  
reading 1035 blocks from dka400.4.0.6.0  
bootstrap code read in  
base = 156000, image_start = 0, image_bytes = 81600  
initializing HWRPB at 2000  
initializing page table at 148000  
initializing machine state  
setting affinity to the primary CPU  
jumping to bootstrap code  
  
SYSBOOT>
```

8. At the SYSBOOT prompt, enter the following:

```
SYSBOOT> SET /STARTUP SYS$SYSTEM:SA_STARTUP.COM  
SYSBOOT> CONTINUE
```

9. The following menu is displayed:

```
OpenVMS (TM) Alpha Operating System, Version V6.2

$! Copyright (c) 1995 Digital Equipment Corporation. All rights reserved.

Installing required known files...
Configuring devices...

*****

You can install or upgrade the OpenVMS Alpha operating system
or you can install or upgrade layered products that are included
on the OpenVMS Alpha operating system CD-ROM.

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

    1) Install or upgrade OpenVMS Alpha Version V6.2
    2) List layered product kits that this procedure can install
    3) Install or upgrade layered product(s)
    4) Execute DCL commands and procedures
    5) Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?) 1
*****
```

10. Choose option 1.

```
The installation procedure will ask a series of questions.

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

Enter your response and press the <Return> key. Enter:

    ? - to repeat an explanation
    ^ - to change prior input (not always possible)
    Ctrl-Y - to exit the installation procedure

There are two choices for Installation/Upgrade:

INITIALIZE - removes all software and data files that were
            previously on the target disk and installs OpenVMS Alpha.

PRESERVE -- installs or upgrades OpenVMS Alpha on the target disk
            and retains all other contents of the target disk.

* NOTE: You cannot use PRESERVE to install OpenVMS Alpha on a disk on
        which OpenVMS VAX or any other operating system is installed.

Do you want to INITIALIZE or to PRESERVE? [PRESERVE]
```

11. Choose PRESERVE to retain the contents of the target disk.

```
You must enter the device name for the target disk on which
OpenVMS Alpha will be installed.

Enter device name for target disk: (? for choices)
```

12. Enter the name of your system disk. In this example, we use DKA0:. The following display shows the default upgrade:

```
DKA0: is now labeled NSA$SYS.
Do you want to keep this label? (Yes/No) [Yes]
OpenVMS Alpha will be upgraded on DKA0:.

The installation can provide brief or detailed descriptions.
In either case, you can request the detailed descriptions by typing "?".
Do you always want detailed descriptions? (Yes/No) [No]
The following product has been selected:
DEC AXPVMS VMS V6.2

*** DEC AXPVMS VMS V6.2: OpenVMS Operating System, Version V6.2
COPYRIGHT (c) 24-MAY-1995 -- All rights reserved
Digital Equipment Corporation
Do you want all the default values for this product? [YES]
Do you want to view the values? [NO]
%PCSIUI-I-DONEASK, execution phase starting
The following product will be installed:
DEC AXPVMS VMS V6.2
The following product will be removed:
DEC AXPVMS VMS V6.1-1H2
%PCSI-I-VOLINFO, estimated space information for volume DISK$NSA$SYS
-PCSI-I-VOLSPC, 21353 required; 3079284 available; 3057931 net
Portion Done: 0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
The following product has been installed:
DEC AXPVMS VMS V6.2
The following product has been removed:
DEC AXPVMS VMS V6.1-1H2

The upgrade is now complete.

When the newly upgraded system is first booted, a special
startup procedure will be run. This procedure will:
    o Run AUTOGEN to set system parameters.
    o Reboot the system with the newly set parameters.

You may shut down now or continue with other operations.

Process AXPVMS_INSTALL logged out at 29-JUL-1996 11:12:14.60
*****
You can install or upgrade the OpenVMS Alpha operating system
or you can install or upgrade layered products that are included
on the OpenVMS Alpha operating system CD-ROM.

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:
    1) Install or upgrade OpenVMS Alpha Version V6.2
    2) List layered product kits that this procedure can install
    3) Install or upgrade layered product(s)
    4) Execute DCL commands and procedures
    5) Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?)
```

13. Enter "5" to complete the upgrade.

```
Shutting down the system

SYSTEM SHUTDOWN COMPLETE

halted CPU 0
halt code = 5
HALT instruction executed
PC = ffffffff80057f84
>>>
```

1.4.2.2 Upgrading to OpenVMS Alpha Version 6.2-1H3

OpenVMS Alpha Operating System has now been upgraded to Version 6.2. Complete the following procedure to upgrade to Version 6.2-1H3.

1. Boot from your Version 6.2 server processor system disk.
2. Insert the StorageWorks Network Storage Array Software Customization Procedure Version 2.1 CD in the CD player.
3. 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:.

4. 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-REMOVED, 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

>>>

5. **Power off the server processor by depressing the power button on the server OCP to turn off power.**

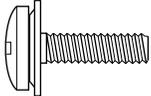
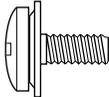
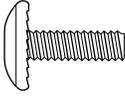
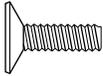
1.5 Tools Needed for Installation

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

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HS121 to SWXNA–Ax Upgrade Procedure

This chapter provides step-by-step procedures for installing the SWXUA–A1 upgrade kit.

2.1 Purpose of This Upgrade

A customer who is satisfied with the redundancy and failover capabilities of a model HS121 FDDI Server, but who wants the performance improvements and additional features of an SWXNA–Ax Network Storage Array, can, for the incremental cost of the SWXUA–A1 upgrade kit, convert the HS121 FDDI Server to an SWXNA–Ax array.

The SWXNA–A1 upgrade kit provides all the components for upgrading a model HS121 StorageWorks FDDI Server to a model SWXNA–Ax Network Storage Array. The following sections provide information about the upgrade kit and how to perform the upgrade.

2.2 SWXUA–A1 Upgrade Kit Description

The main components of the SWXUA–A1 upgrade kit are as follows:

- Two FDDI adapters
- Four HS1AD bus adapters
- Four KZPAA PCI-to-SCSI adapters
- Shadowed system disk assembly with:
 - Two RZ29–VA disks for Shadowed System Disk
 - One RZ29–VA disks for Quorum Disk
 - BA356–S shelf and cables
- OpenVMS Alpha operating system software Version 6.2-1H3 (or later) CD-ROM

When you receive your SWXUA–A1 kit, check the carton for obvious signs of shipping damage. Report any damage to Digital Multivendor Customer Services or the Digital sales office in your area, and to the local carrier who delivered your equipment.

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

2.3 Preparing the Cabinet for Upgrade

The following sections describe how to prepare the cabinet for the upgrade.

2.3.1 Cabinet Panel Removal (If Required)

If additional storage devices are being added, then Digital recommends full and unrestricted access to the cabinet interior for easier installation of cables. Complete the following steps if you must remove the cabinet panels.

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. Move the cabinet away from any adjacent cabinets to allow 360 degree access.
2. Using Figure 2-1 for reference, remove the side panels as follows:

Note

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

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

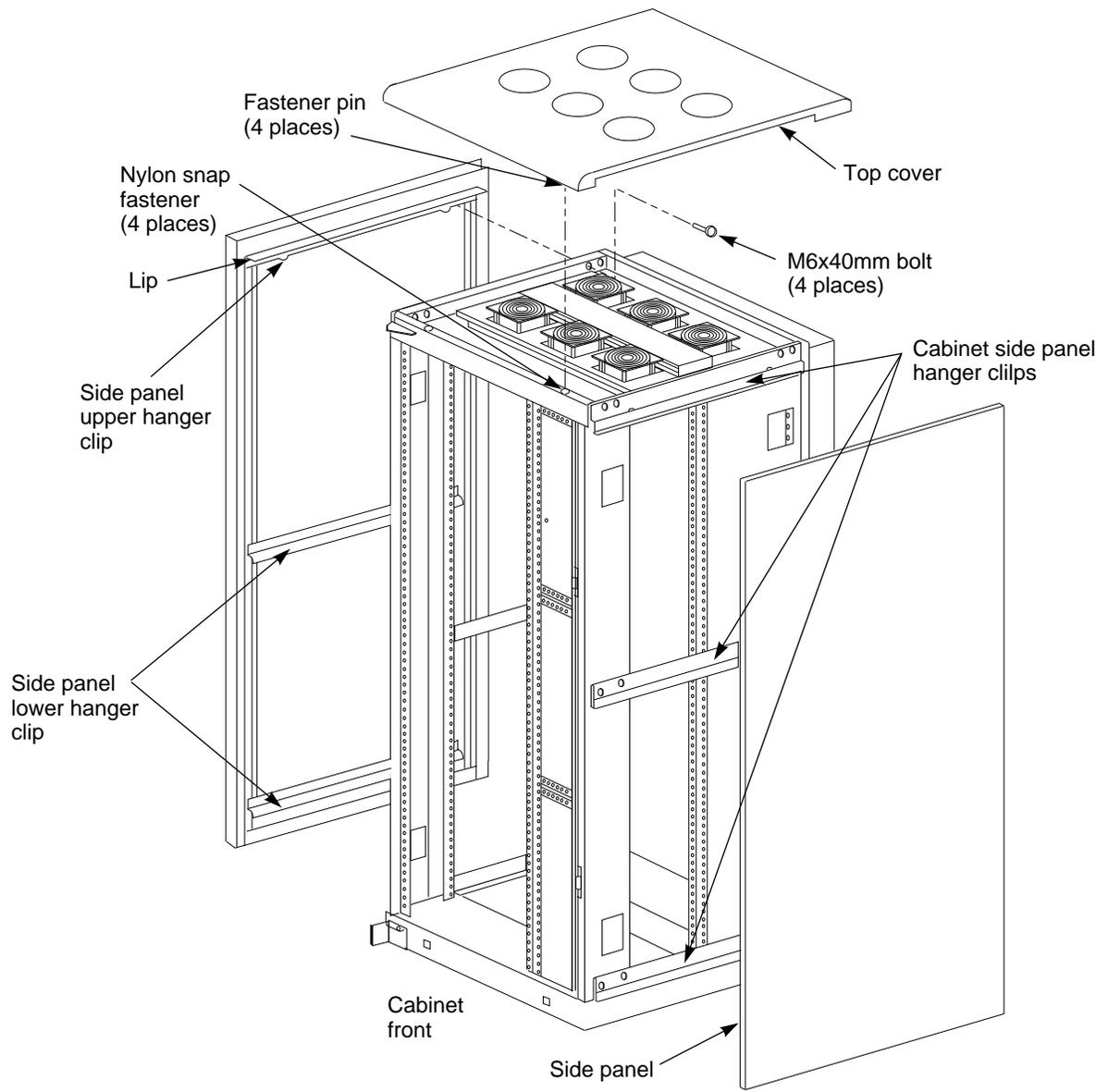
WARNING

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

- b. Using two people, lift the top cover from the cabinet and set it aside.
- c. Remove the bolts attaching the side panels to the top side rails of the cabinet.
- d. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.
- e. Repeat the previous step to remove the other panel.

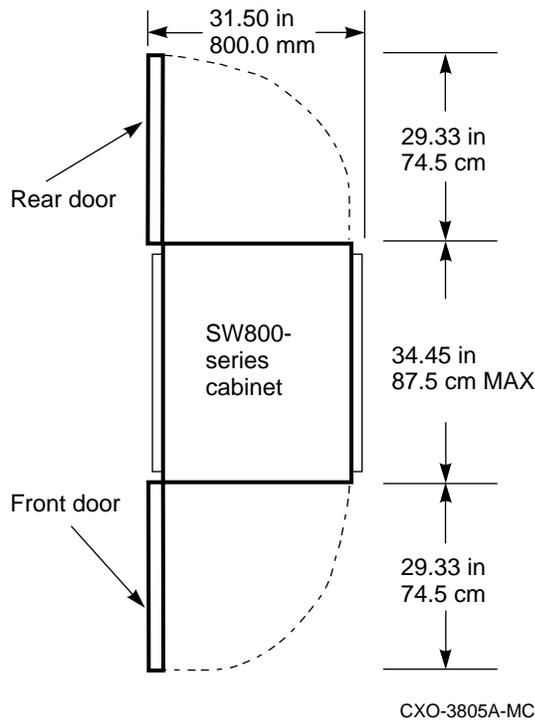
Ensure that there is sufficient space in front and behind the cabinet to slide the server processor all the way forward and to the rear. See Figure 2-2 for specific space requirements.

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



CXO-3787A-MC

Figure 2–2 Minimum Installation Clearances



2.4 Replacing the FDDI and Bus Adapters in the Top Server Processor

Replacing the FDDI and bus adapters on the server processor motherboard involves the following tasks:

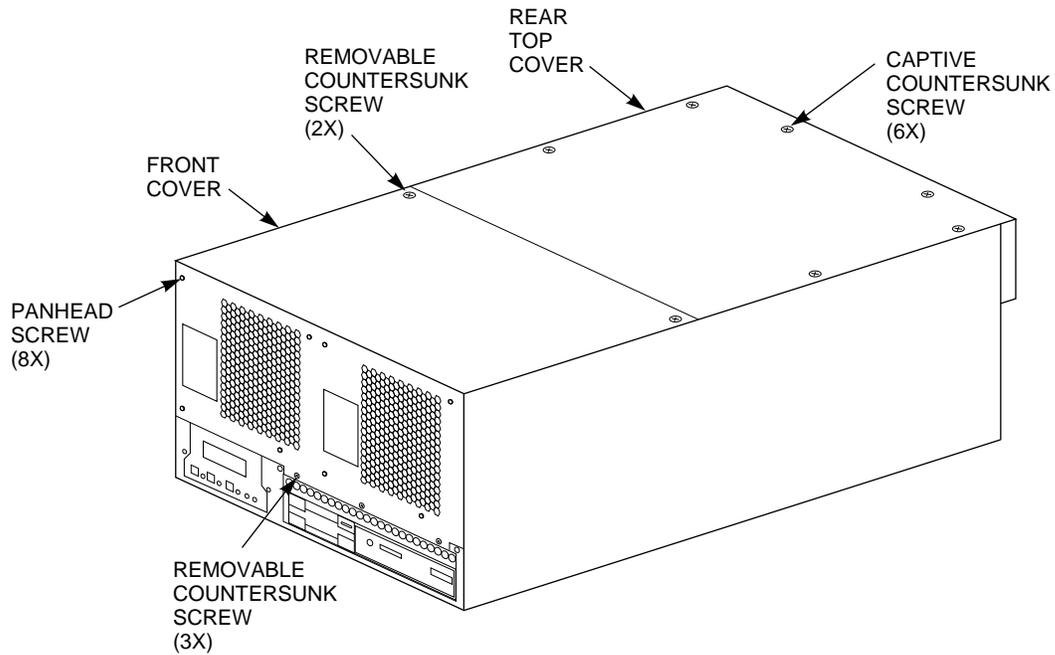
- Sliding the server processor out of the cabinet
- Removing the old adapter cards
- Installing the new adapter cards

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 original 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 2–3).
5. Lift off the rear top cover.

Figure 2-3 Removing the Rear Top Cover Panel



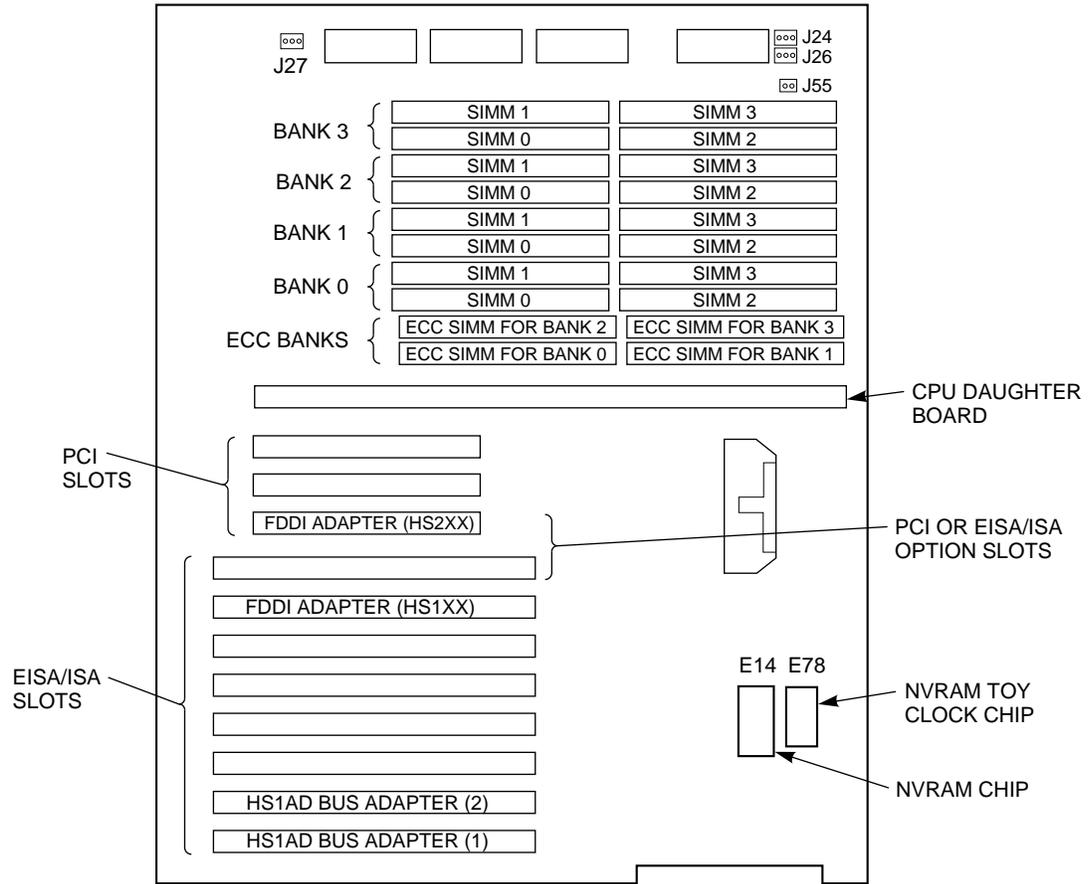
CXO-4725A-MC

2.4.2 Removing FDDI and Bus Adapter Cards

The SWXUA-A1 upgrade involves removing an FDDI adapter card and two bus adapter cards. These cards should be located in EISA slots 2, 7 and 8 (marked as FDDI ADAPTER (HS1xx) and HS1AD BUS ADAPTER (1) and (2), respectively, in Figure 2-4).

See Section 2.4.3 for replacing these cards.

Figure 2-4 HS1XX Server Processor Motherboard Configuration



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To remove an EISA or PCI adapter card from the server processor, perform the following steps:

CAUTION

Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components.

1. Disconnect any cables connected to the external or internal ports on the adapter card you want to remove.
2. Using a Phillips head screwdriver, remove the slot cover screws securing the adapter card to the chassis.
3. Carefully disconnect the adapter card from the slot connectors on the motherboard and remove it from the system.
4. If you intend leaving the adapter slot vacant, install a slot cover and secure it to the chassis using the screw that you removed.

2.4.3 Installing the Option Cards

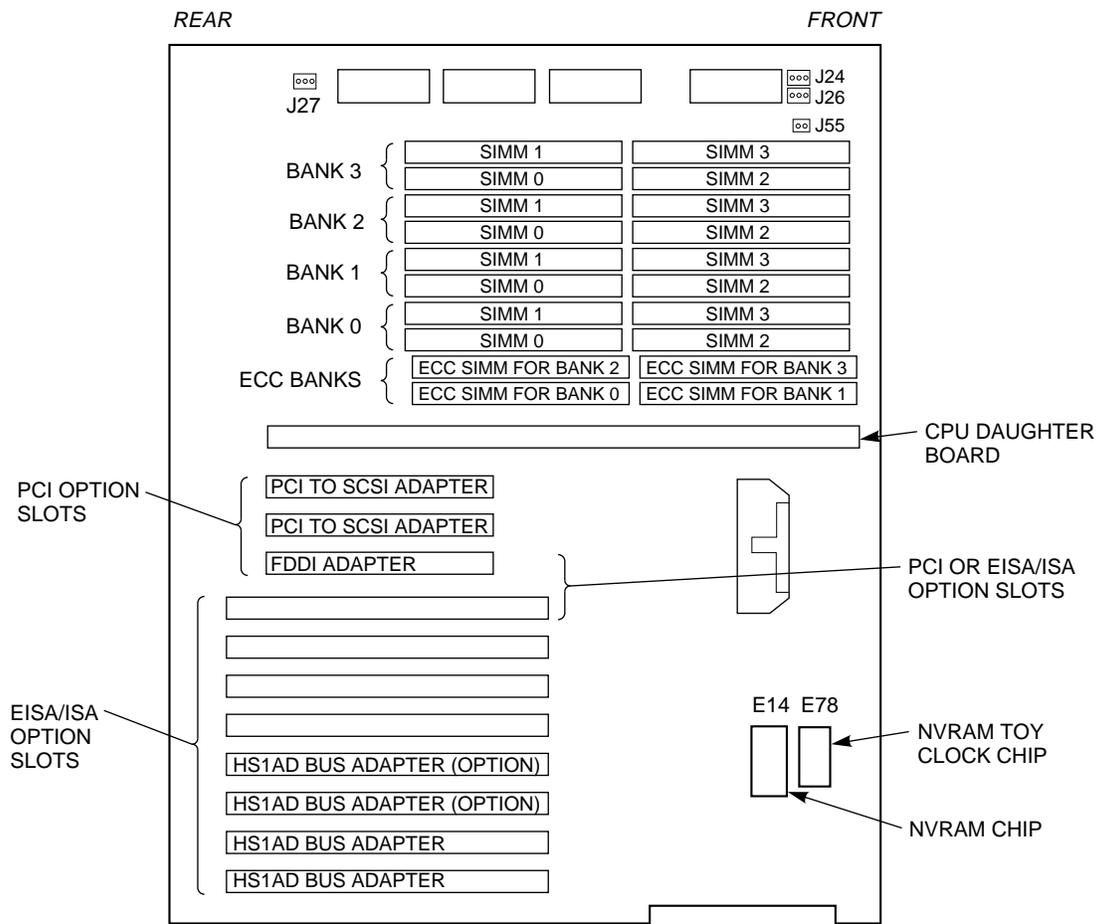
The SWXUA-A1 upgrade involves replacing the FDDI adapter card with a new FDDI adapter in PCI slot 3, and replacing the bus adapter cards in EISA slot 7 and 8. Two KZPAA PCI-to-SCSI adapter cards also need to be installed into PCI slots 1 and 2 in Figure 2-5.

See Section 2.4.2 for removing the original cards.

2.4.3.1 Installing the New FDDI Adapter and HS1ADs

1. In Figure 2-5, the first three slots are reserved for PCI options; the last eight are for EISA or ISA options.

Figure 2-5 SWXNA Server Processor Motherboard Configuration



2. Complete the following steps for the FDDI adapter and the two HS1AD bus adapter cards to install them into the correct slots as shown in Figure 2-5.
3. Remove the screw securing the slot cover for PCI slot 3 to the chassis.
4. Remove the slot cover from the server processor and store it for future use.

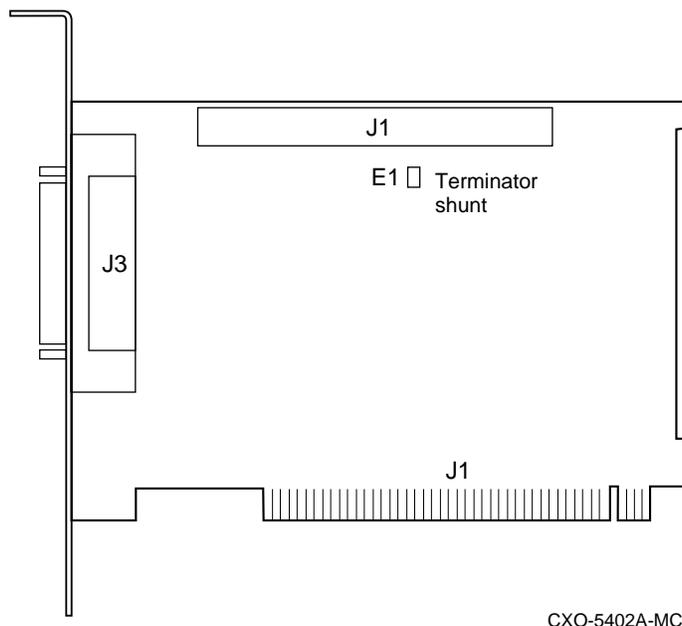
5. Carefully install the FDDI adapter card into PCI slot 3 and press it firmly into place.
6. Secure the FDDI adapter card to the chassis using the screw you removed.
7. Carefully install the HS1AD bus adapter cards into EISA slots 7 and 8.
8. Secure the HS1AD adapter cards to the chassis using the screws you removed when you removed the original HS1ADs.
9. Reattach the FDDI interconnect cable to the new FDDI adapter card.
10. Reattach the internal bus cables to the new bus adapter cards.

2.4.3.2 Installing the KZPAA PCI-to-SCSI Adapters

Complete the following steps to install two KZPAA PCI-to-SCSI adapters into the server processor.

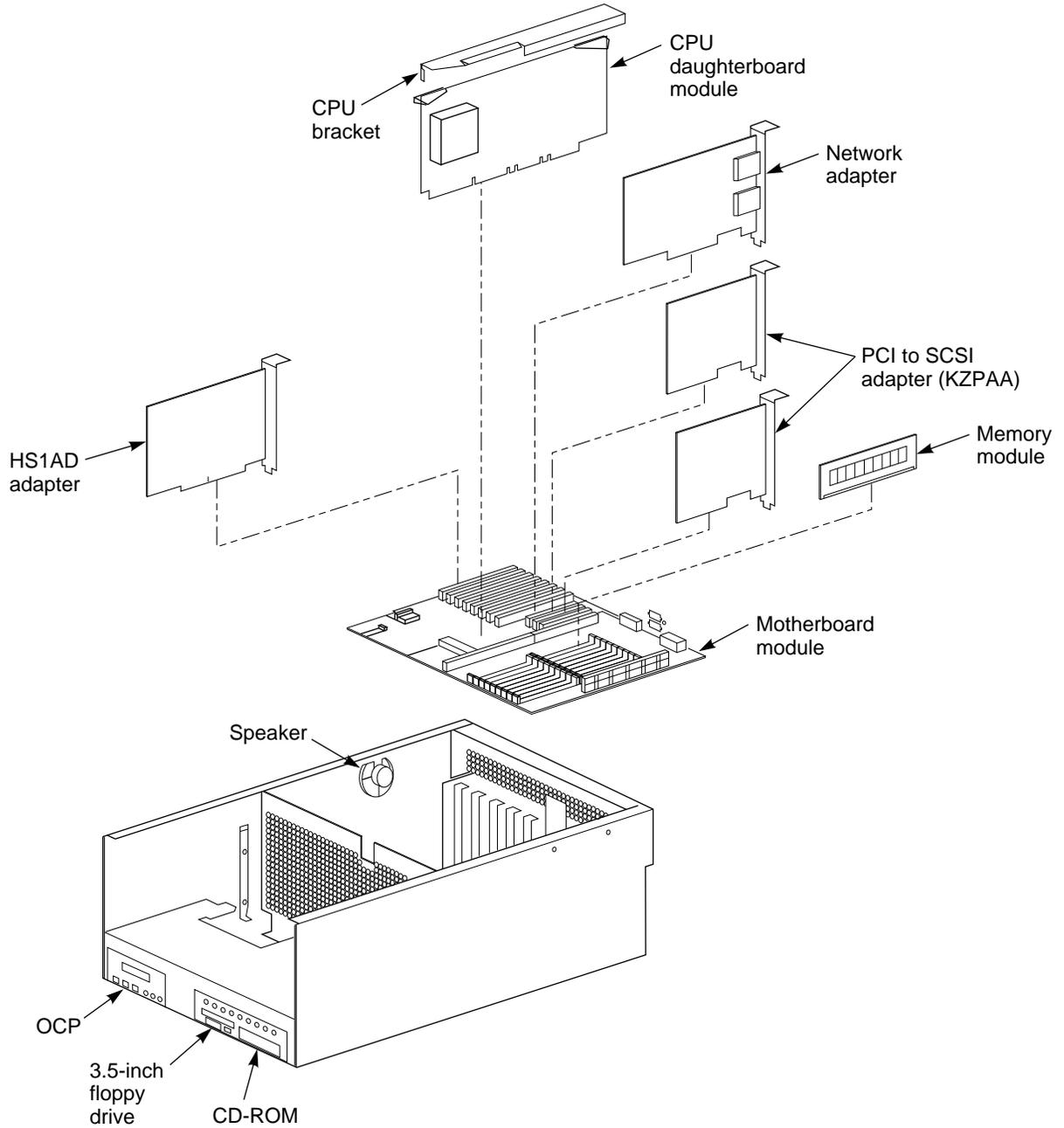
1. Remove the termination jumper (E1) on each KZPAA PCI-to-SCSI adapter, as shown in Figure 2-6.
2. Remove the metal cover from PCI slots 1 and 2. See Figure 2-5
3. Install two KZPAAs into the server processor using screws as shown in Figure 2-7.

Figure 2-6 KZPAA SCSI Termination Jumper Location



4. Replace the server processor top cover.
5. Slide the server processor back into the cabinet.

Figure 2-7 Server Processor Internal Components



CXO-5346A-MC

2.4.4 Replacing the FDDI Adapter and HS1AD Bus Adapters in the Bottom Server Processor

Repeat Section 2.4 for the bottom server processor.

2.5 Shadowed System Disk

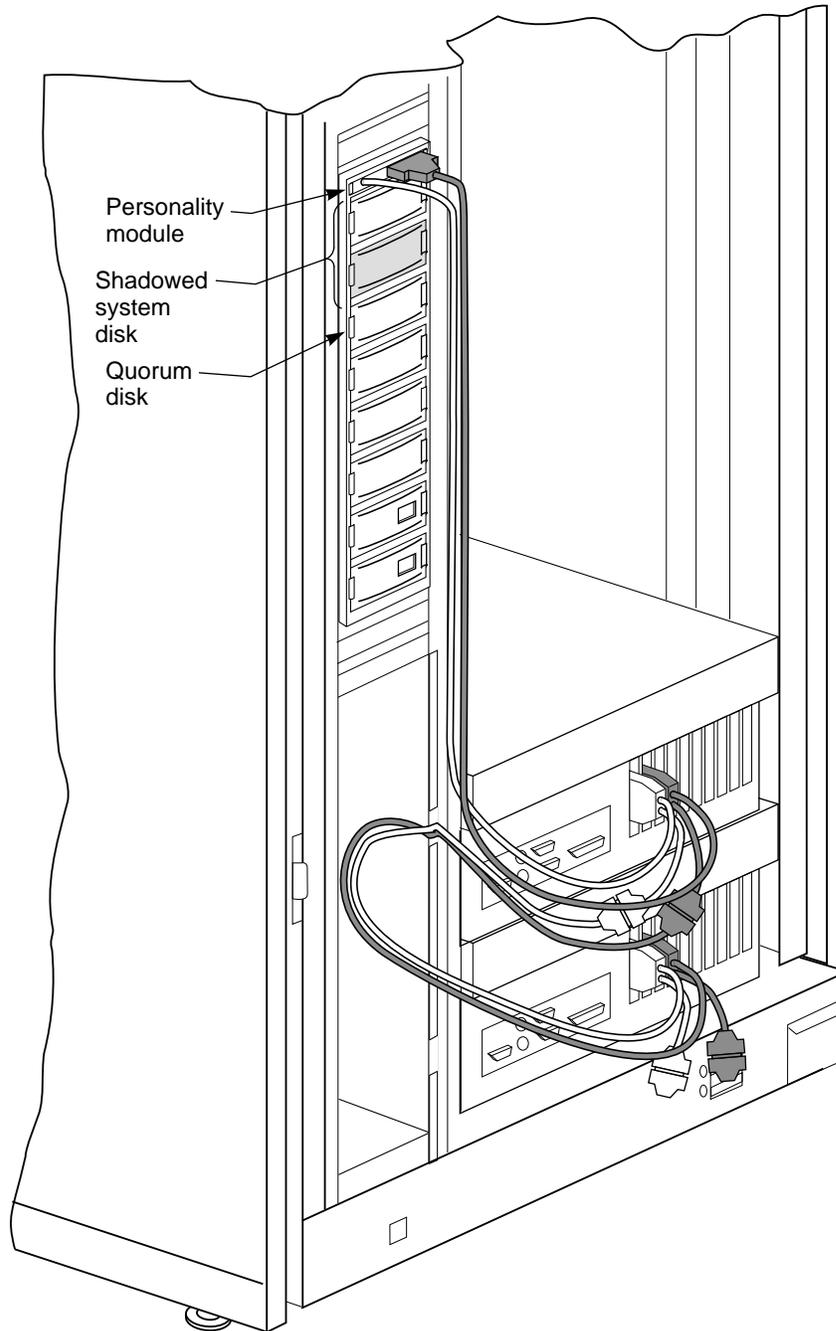
The following procedure explains how to install the shadowed system disk into the StorageWorks Network Storage Array.

2.5.1 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 2–8 for the location to mount the shelf.
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 2–9. 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.

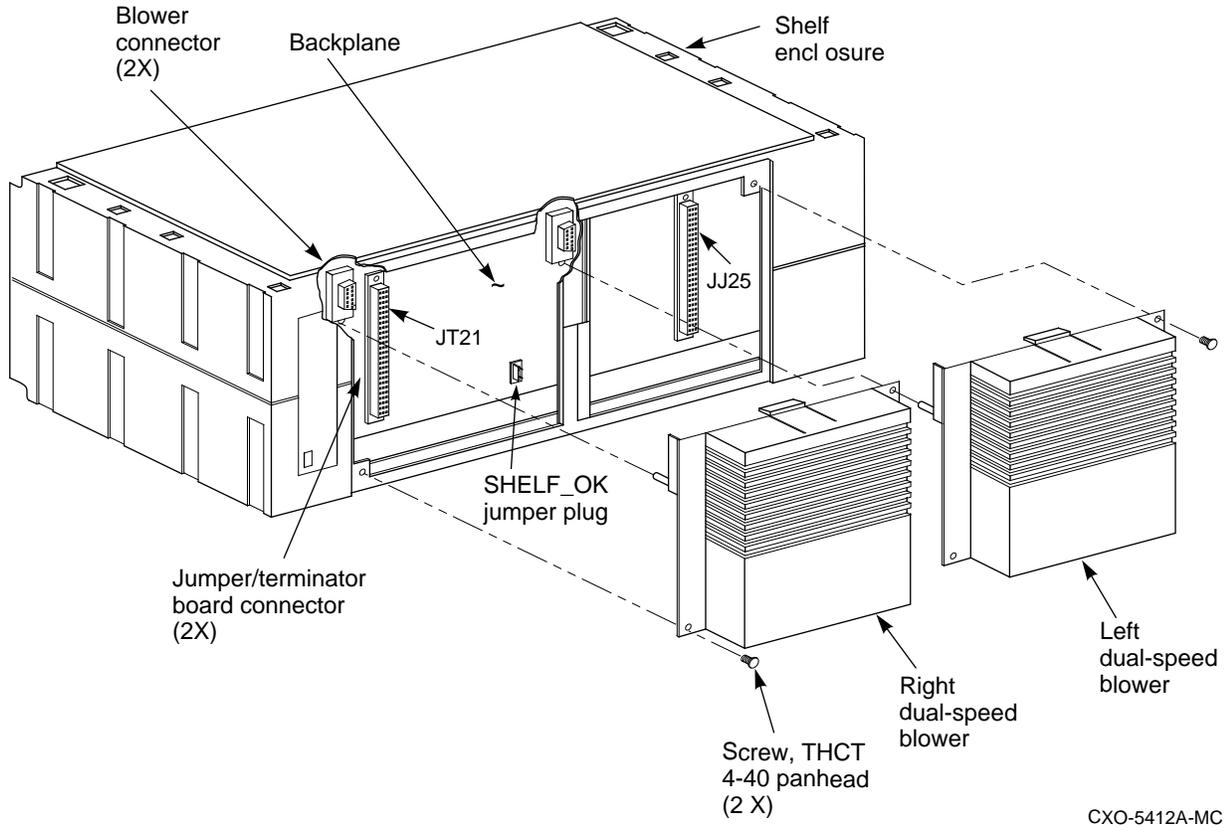
Figure 2–8 Shadowed System Disk



CXO-5285A-MC

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

Figure 2–9 BA356–S Jumper and Terminator Locations



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

Note

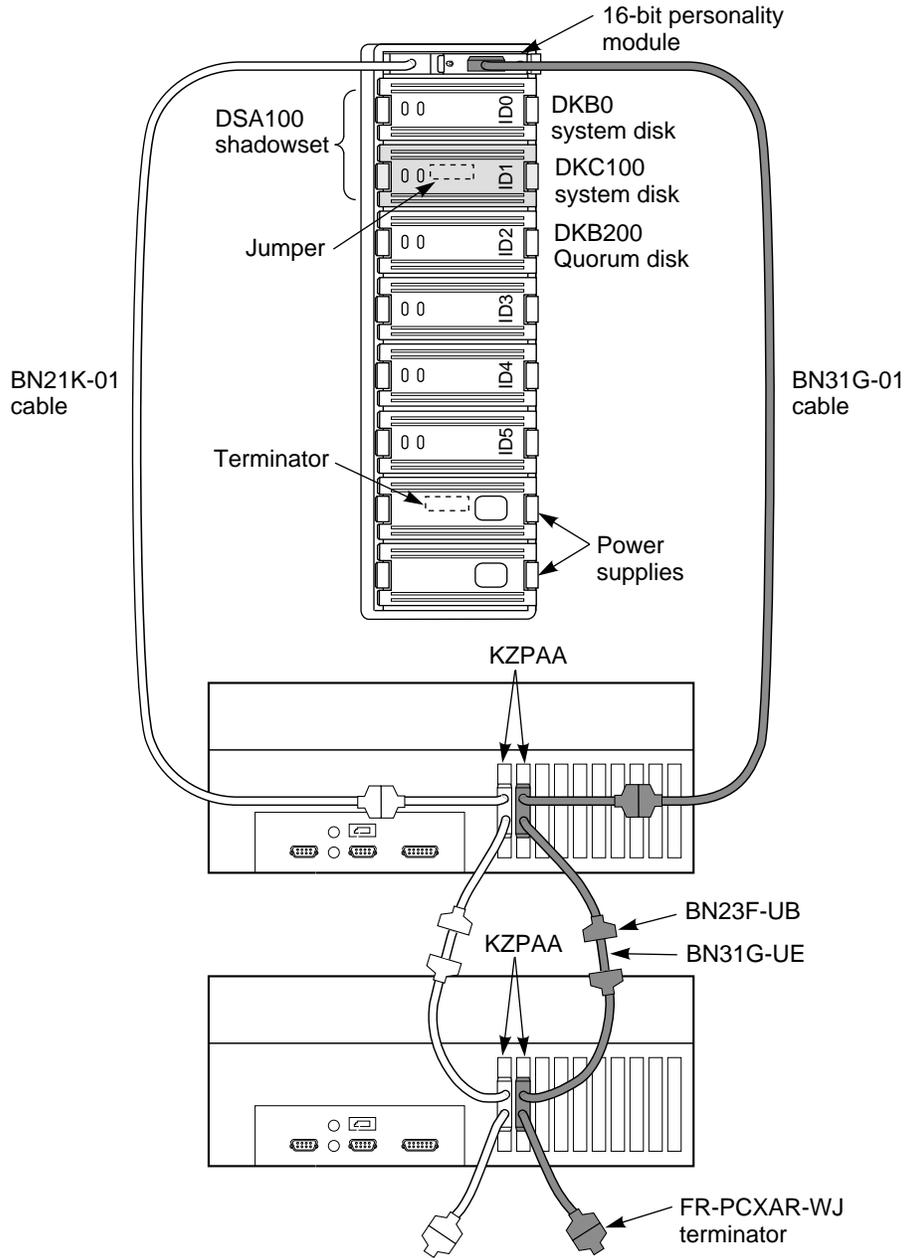
The BA356–S shelf should be mounted so the power supplies will be installed in the bottom of the shelf.

2.5.2 Installing SCSI Cables

Refer to Figure 2–10 as you complete the following steps:

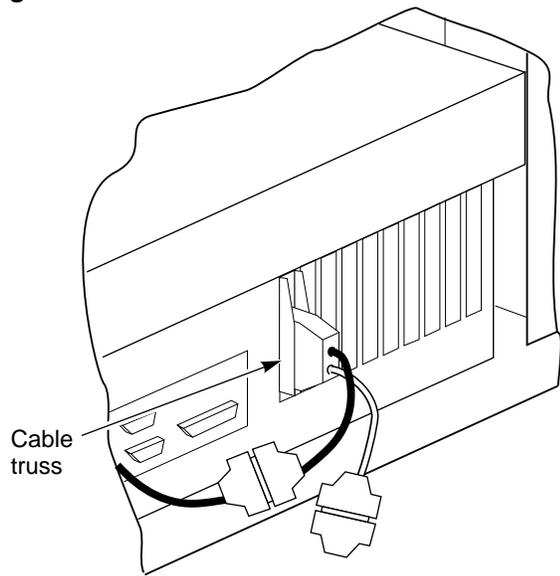
1. Attach the cable trusses to each KZPAA connector in both server processors as shown in Figure 2–11.

Figure 2-10 Shadowed System Disk Interconnection



CXO-5403A-MC

Figure 2–11 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.

2.5.3 Installing Components into the BA356 Shelf

Install the components into the BA356-S shelf by completing the following steps as shown in Figure 2-10:

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.

2.5.4 Replacing Cabinet Panels (If Required)

After all hardware has been installed, replace the cabinet side panels (if removed) **before** reapplying power to the Network Storage Array. To replace the cabinet panels, reverse the steps in Section 2.3.1.

2.6 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 further information on shelf status indicators.
4. Apply DC power to each server processor. The DC power switch is located on the OCP of the server processor.

2.7 Running the EISA Configuration Utility for Each Server Processor

Whenever you add, remove, or move an EISA adapter card, you need to run a utility called the EISA Configuration Utility (ECU). The ECU and a configuration file (CFG) for the device bus adapter are located on the diskette included with the network array's 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.

Do the following for each server processor:

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

Note

Set both device bus adapters in one server processor to SCSI ID 7 and in the second server processor to SCSI ID 6.

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

```
EISA Configuration Utility
Steps in configuring your computer

STEP 1: Important EISA configuration Information
STEP 2: Add or remove boards
STEP 3: View or edit details
STEP 4: Examine required details
STEP 5: Save and exit
>Select=ENTER< <Cancel=ESC>
```

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

```
Step 3: View or edit details

Slot 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. The second server processor will have the same range of IRQs for the device bus adapters but the device IDs will all be 6.

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

```
EISA Configuration Utility
Steps in configuring your computer

STEP 1: Important EISA configuration Information
STEP 2: Add or remove boards
STEP 3: View or edit details
STEP 4: Examine required details
STEP 5: Save and exit
>Select=ENTER< <Cancel=ESC>
```

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

2.8 Customizing Network Array Operating System Parameters

You have now completed the hardware installation of the SWXUA–A1 upgrade kit to upgrade an FDDI Server to an SWXNA–Ax 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.

2.8.1 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

(continued on next page)

Table 2–1 (Cont.) Server Processor Console Parameters

Parameter	Top Server Processor	Bottom Server Processor
scsi_poll	on	on
console	serial	serial
os_type	OpenVMS	OpenVMS

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

1. Connect a terminal to the server processor.
2. For each parameter listed in Table 2–1 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
```

2.8.2 Migrating the Operating System

Now you must move the operating system from the system disk you upgraded 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. Connect a terminal to the server processor which contains the system disk you upgraded in Section 1.4.2.
2. At the boot prompt, use the `SHOW DEVICE` command to identify the CD ROM drive.

```
>>> 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
dkb200.2.0.11.0         DKB200          RZ26L 442D
dkc100.1.0.12.0         DKC100          RZ28  442C
```

3. Insert the V2.1 CD ROM into the CD ROM drive and boot from the CD ROM.

```
>>> 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
```


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–A1 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
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)

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

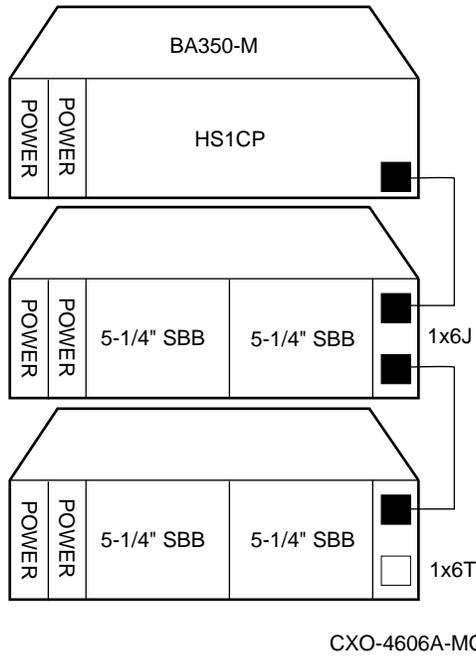
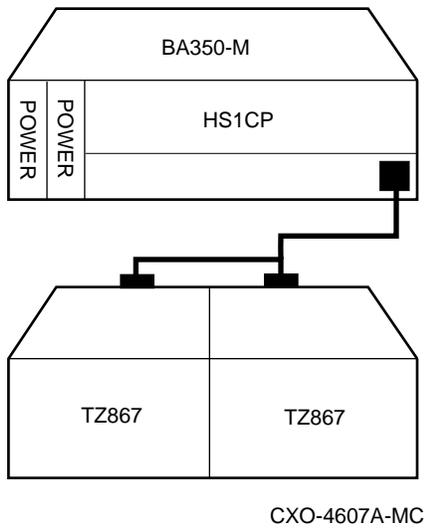


Figure B-2 is an example of two adjacent tape drives attached to a single port of the controller shelf.

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 (2)1x6T	5-0	6
25-30	5	(1)2x3T (4)1x6T	5-0	6
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.

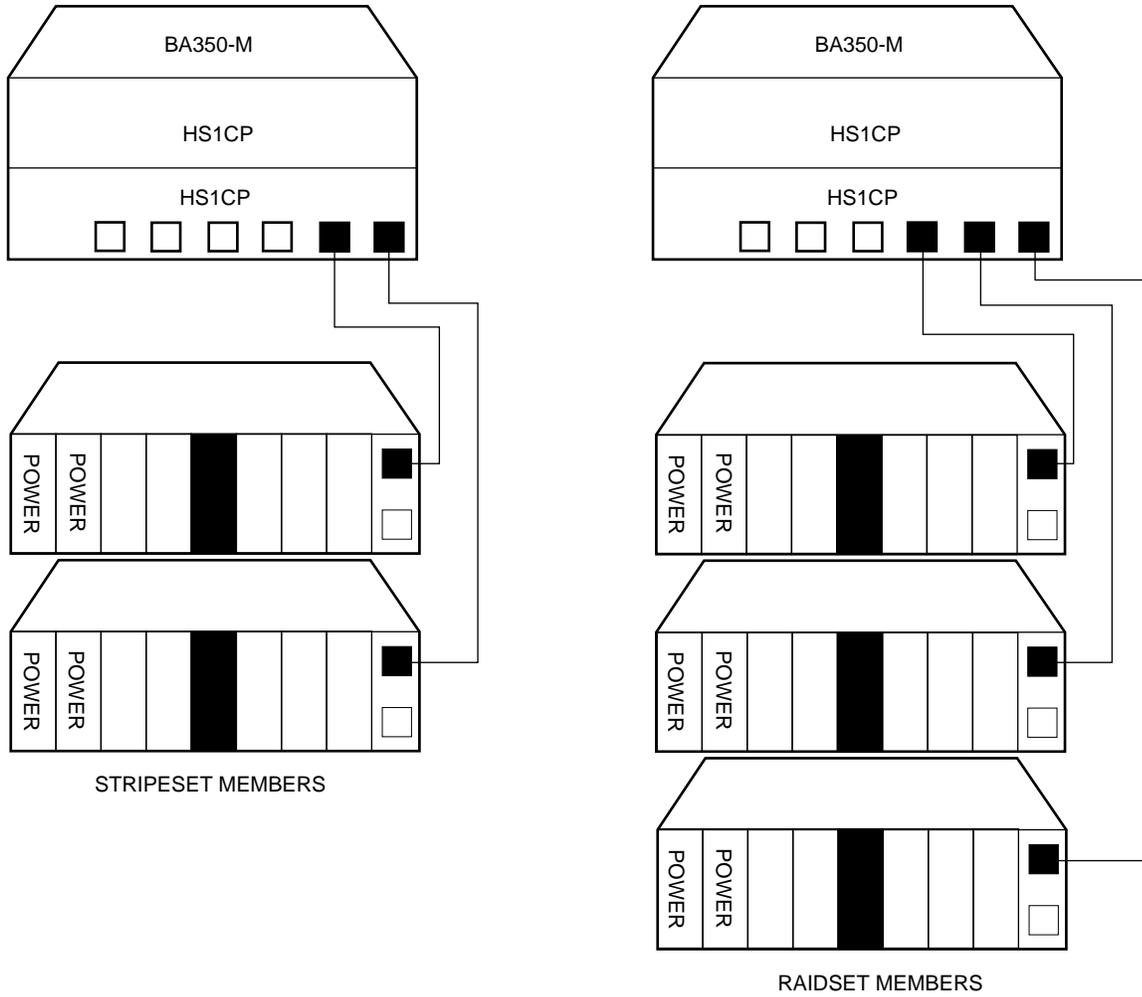
B.2.5 Optimal Availability Configurations

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.

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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