

DIGITAL StorageWorks SCSI Controller Shelf Upgrade/Add-On Kits

User's Guide

Part Number: EK-356MA-UG. A01

January 1998

This manual describes the operation, configuration, use, and specifications of the SCSI controller shelf DS-SWXM1-AA and DS-SWXM1-BA upgrade kits, and the DS-BA356-MD add-on kit.

**Digital Equipment Corporation
Maynard, Massachusetts**

January 1998

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This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Any changes or modifications made to this equipment may void the users authority to operate this equipment.

Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures will be required to correct the interference.

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Preface

The *DIGITAL StorageWorks SCSI Controller Shelf Upgrade/Add-On Kits User's Guide* describes the purpose, function, installation, and use of the SCSI controller shelf, including the configuration rules and procedures, and specifications.

Intended Audience

This publication is for use by DIGITAL customers and employees who are responsible for configuring, installing, and maintaining SCSI controller shelves.

Structure

This manual is organized as follows:

Chapter 1

Describes the controller shelf including functions, uses, components, and features.

Chapter 2

Describes the rules for configuring the shelf power, SCSI bus addressing, the SCSI buses, and cabling.

Chapter 3

Describes the procedures for replacing shelf components.

Chapter 4

Describes the controller shelf physical, electrical, and environmental specifications.

Preface

Chapter 5

Describes the functions of the external cache battery, its use, and how to install an ECB shelf.

Related Documents

The following publications contain additional information about UltraSCSI shelf products.











Publication Title	Order Number
<i>10-Shelf Departmental Server User's Guide</i>	EK-SW500-UG
<i>16-bit SBB User's Guide</i>	EK-SBB16-UG
<i>24-Shelf Data Center Cabinet (SW800 Series) User's Guide</i>	EK-SW800-UG
<i>7-Device, 16-Bit SBB Shelf (BA356-S Series) User's Guide</i>	EK-BA356-UG
<i>Getting Started, HSZ70 Solutions Software V7.0 for DIGITAL UNIX Installation Guide</i>	AA-R60KA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for HP-UX Installation Guide</i>	AA-R84KA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for IBM AIX Installation Guide</i>	AA-R84GA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for Novell Netware — PCI Installation Guide</i>	AA-R8JUA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for OpenVMS Installation Guide</i>	AA-R8A7A-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for SGI IRIX Installation Guide</i>	AA-R8JRA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for Solaris 2.x Installation Guide</i>	AA-R60VA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for Windows NT Server — ALPHA Installation Guide</i>	AA-R84DA-TE
<i>Getting Started, HSZ70 Solutions Software V7.0 for Windows NT Server — Intel Installation Guide</i>	AA-R770A-TE
<i>HSZ70 Array Controller HSOF Version 7.0 CLI Reference Manual</i>	EK-CLI70-RM
<i>HSZ70 Array Controller HSOF Version 7.0 Configuration Manual</i>	EK-HSZ70-CG
<i>HSZ70 Array Controller HSOF Version 7.0 Service Manual</i>	EK-HSZ70-SV
<i>Installing a Host Bus Cable Ferrite Bead</i>	EK-SWXES-IG

Preface

Publication Title	Order Number
<i>Installing an External Cache Battery Cable</i>	EK-HSZ70-TE
<i>SBB Shelf I/O Module User's Guide</i>	EK-SBBIO-UG
<i>SCSI Controller Shelf Upgrade/Add-On Kits Check List</i>	EK-356M1-RM
<i>SCSI Controller Shelf Upgrade/Add-On Kits Installation Guide</i>	EK-356MA-IG
<i>Single-Ended I/O Module (DS-BA35X-MN) Installation Guide</i>	EK-35XMN-IG
<i>SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide</i>	EK-35XRD-IG
<i>UltraSCSI SBB Shelf (DS-BA356 Series) User's Guide</i>	EK-BU356-UG
<i>Using Your Controller in a DS-BA356-M Series Controller Shelf</i>	EK-HSXM1-CG

Documentation Conventions

The documentation conventions used in this publication are as follows:

boldface type	Boldface type indicates the first instance of terms being defined in the text, the glossary, or both.
<i>italic type</i>	Italic type indicates emphasis and publication titles. Italic type in the glossary indicates a cross reference.
A/R	As required
 	The LED is OFF or blinking slowly.
 	The LED is ON.
 	The LED is FLASHING (blinking rapidly).
	Warning The information is essential to the safety of personnel.
	Caution The information is essential in order to avoid damaging the software or hardware.
Note	Notes contain information which might be of special importance to the user.
	Single-ended SCSI bus
	Differential SCSI bus

Manufacturer's Declaration

Electromagnetic Compatibility

You can install this CE-Mark Class A certified product in a commercial or an office environment.

WARNING!

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 adequate measures.

ACHTUNG!

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

AVERTISSEMENT!

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

Manufacturer's Declarations

Acoustic Noise Declarations

DIGITAL declares that the acoustic values of this product are as follows:

Note

There is no difference in the measured acoustic levels when this product is idle or operating.

Acoustics – 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
DS-BA356-MD controller shelf with: 2 each HSZ70 series controllers 2 each 64 MB cache modules 2 each blowers (DS-BA35X-MQ) 2 each 150 W power supplies (BA35X-HF)	5.3	5.3	< 43	< 43
<p>Note</p> <p>Current values for sound power levels are available from DIGITAL representatives. 1 Bel = 10 dBA.</p>				

Manufacturer's Declarations

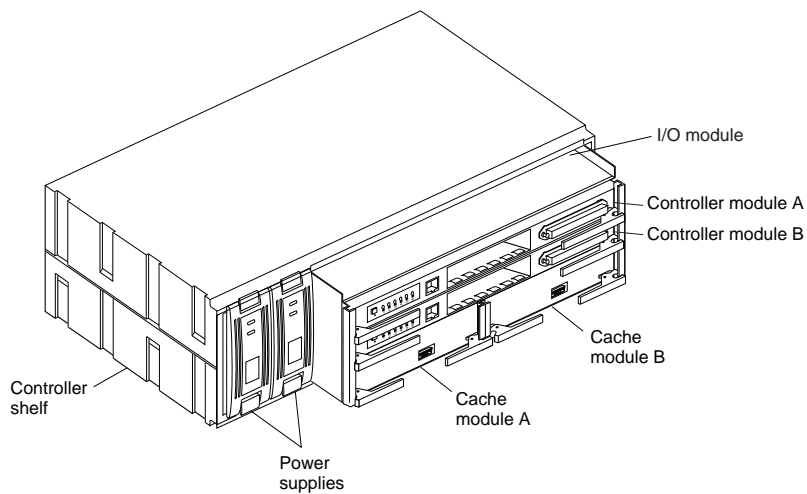
Schallemissionswerte – Wertangaben nach ISO 9296 und ISO 7779/DIN EN27779:				
Gerät	Schalleistungspegel $L_{WA,d}$, B		Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
DS-BA356-MD controller shelf with: 2 each HSZ70 series controllers 2 each 64 MB cache modules 2 each blowers (DS-BA35X-MQ) 2 each 150 W power supplies (BA35X-HF)	5,3	5,3	< 43	< 43
<p>Note</p> <p>Aktuelle Werte für spezielle Ausstattungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 Bel = 10 dBA.</p>				

1

Introducing the Controller Shelf

This chapter describes the DIGITAL™ StorageWorks™ DS-SWXM1-AA and DS-SWXM1-BA SCSI controller upgrade kits and the DS-BA356-MD SCSI controller shelf add-on kit. These descriptions include the shelf layout, power supplies, and the external **small computer system interface (SCSI)** connections (**ports**) for **StorageWorks building block (SBB)** shelves.

Figure 1-1 Typical SCSI Controller Shelf



CXO5212B

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Introducing the Controller Shelf

Product Description

The DIGITAL SCSI controllers in a BA350–M series controller shelf process host data at transfer rates up to *10 MB/sec (FAST 10)* and distribute data at the same rate over six buses to the SBB shelves. The controller-to-SBB shelf SCSI buses are single-ended, 8-bit (narrow).

The DIGITAL UltraSCSI controllers in a DS–BA356–MD series controller shelf (a part of both the upgrade and add-on kits) can process host data *at transfer rates up to 40 MB/sec* in a wide, FAST 20 configuration. The controller then distributes this data at a FAST 10 rate over six buses to the SBB shelves. The controller-to-SBB shelf SCSI buses are single-ended, 8-bit (narrow).

Prerequisites

Installing either the DS–SWXM1–AA or –BA controller upgrade kit requires an operating system specific platform kit that includes one of the following “Getting Started” manuals:

- *Getting Started, HSZ70 Solutions Software V7.0 for **DIGITAL UNIX** Installation Guide*
AA–R60KA–TE
- *Getting Started, HSZ70 Solutions Software V7.0 for **HP–UX** Installation Guide*
AA–R84KA–TE
- *Getting Started, HSZ70 Solutions Software V7.0 for **IBM AIX** Installation Guide*
AA–R84GA–TE
- *Getting Started, HSZ70 Solutions Software V7.0 for **Novell Netware** — **PCI** Installation Guide*
AA–R8JUA–TE
- *Getting Started, HSZ70 Solutions Software V7.0 for **OpenVMS** Installation Guide*
AA–R8A7A–TE
- *Getting Started, HSZ70 Solutions Software V7.0 for **SGI IRIX** Installation Guide*
AA–R8JRA–TE

Introducing the Controller Shelf

- *Getting Started, HSZ70 Solutions Software V7.0 for Solaris 2.x Installation Guide*
AA-R60VA-TE
- *Getting Started, HSZ70 Solutions Software V7.0 for Windows NT Server — ALPHA Installation Guide*
AA-R84DA-TE
- *Getting Started, HSZ70 Solutions Software V7.0 for Windows NT Server — Intel Installation Guide*
AA-R770A-TE

Replacing Subsystem Components

When upgrading a BA350-M series SCSI subsystem you *do not* have to replace the:

- SBB shelves
- SBBs
- Shelf power supplies
- Controller-to-SBB shelf data cables¹

The controller UltraSCSI connectors are 68-pin very high density computer interface (VHDCI). When upgrading a BA350-M series SCSI subsystem you *must* to replace the host-to-controller data cable a compatible 68-pin, VHDCI cable or adapter cable (see Table 1-1).

Caution

HSx70 controllers have 68-pin VHDCI connectors. The host-to-controller cable must have compatible connectors.

¹ In some cases a controller-to-SBB shelf cable may too short. If this is the case, use the BN21H cable included with the controller shelf.

Introducing the Controller Shelf

Table 1-1 UltraSCSI Bus Cables

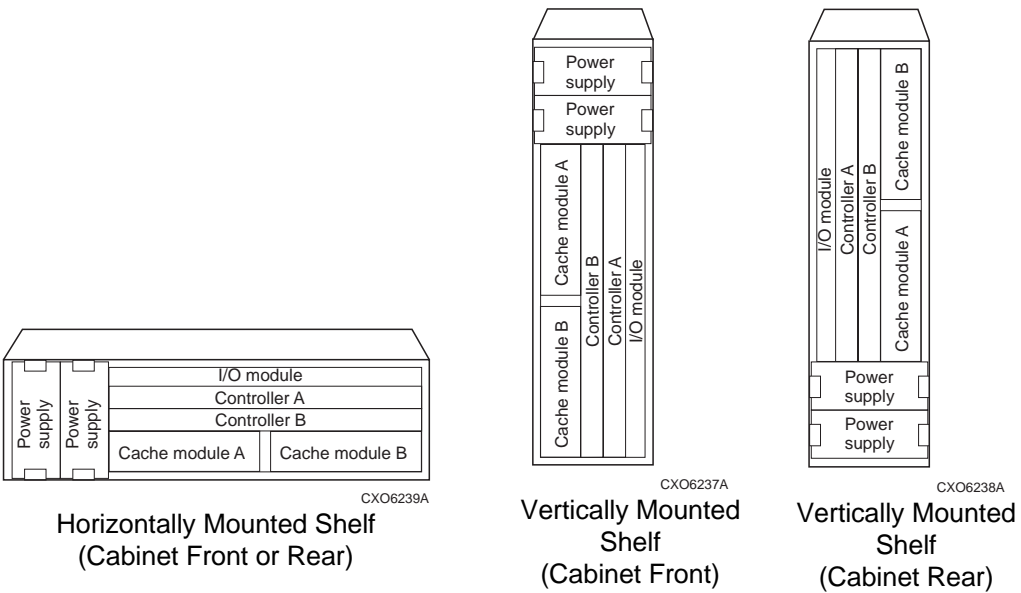
Controller Cable Connector	Host Cable Connector	Use a...
68-pin VHDCI plug	68-pin VHDCI plug	BN37A
Adapter Cables		
68-pin VHDCI plug	68-pin high-density receptacle	BN38B
68-pin VHDCI plug	50-pin high-density receptacle	BN38A
68-pin VHDCI plug	68-pin high-density plug	BN38C
68-pin VHDCI receptacle	68-pin high-density plug	BN38E
68-pin VHDCI receptacle	68-pin high-density right-angle plug	BN37B

Introducing the Controller Shelf

Shelf Orientation

The controller shelf can be mounted either horizontally or vertically (see Figure 1–2) in cabinets with metric mounting rails. In DIGITAL SW500 or SW800 series cabinets, the shelves can be mounted in either the front or rear of a cabinet.

Figure 1–2 Controller Shelf Orientations



Introducing the Controller Shelf

Controller Shelf Power

The controller shelf requires two shelf power supplies rated for at least 150 W, such as the model BA35X–HF. This configuration eliminates the shelf power supplies as a single point of failure.

Caution

Proper operation of this controller shelf requires power supplies rated for at least 150 W or more. This controller shelf cannot operate with 131 W power supplies, such as the BA35X–HA.

SBBs

No storage SBBs can be installed in this shelf.

Controllers

This shelf can accommodate either one or two controllers. Each controller requires a cache module. Each cache module requires an **external cache battery (ECB)**.

Caution

Proper controller cache module operation requires an ECB model DS–HS35X–BC or DS–HS35X–BD, for each module. The ECBs can be mounted either in an SBB shelf slot, or in an ECB shelf (DS–BA35X–BA). See the array controller documentation for information about using the ECBs.

Introducing the Controller Shelf

Buses

The controller receives data from the host, processes it, and distributes data over the six single-ended, 8-bit, FAST 10 SCSI buses to the SBB shelves. Each bus, also referred to as a port or channel, has eight SCSI bus IDs, *0 through 7*. Both controllers connect to the six 50-pin, high-density, SCSI bus connectors located on the I/O module.

Controller A, the primary controller in all configurations, uses SCSI bus ID 7. No other device on the bus can use this address. In the single controller (DS–SWXM1–AA) configuration the maximum number of SBBs on a bus is *seven*, SCSI bus IDs *0 through 6*.

Controller B, the redundant controller (the DS–SWXM1–BA configuration), uses SCSI bus ID 6. No other device on the bus can use this address. In this configuration the maximum number of SBBs on a bus is *six*, SCSI bus IDs *0 through 5*.

The controller distributes data to the SBB shelf through the six I/O module 50-pin, high-density, SCSI-2 receptacles.

Components

This section defines the following:

- The major components of the SCSI controller upgrade kits (see Table 1-2)
- The major components of the SCSI controller shelf add-on kit (see Table 1-3)
- The user-orderable SCSI controller shelf components (see Table 1-4)
- The user-replaceable shelf components (see Table 1-5)

Introducing the Controller Shelf

Table 1-2 SCSI Controller Upgrade Kits

Model Number	Description	DS—SWXM1	
		—AA	—BA
DS-BA356-MD	SCSI controller shelf kit, (see Table 1-3)	1	1
DS-HSZ70-AH	StorageWorks I/O Controller with: 64 MB cache module ECB cable installation kit	1	2
DS-HS35X-BC	Single ECB	1	0
DS-HS35X-BD	Dual ECB	0	1

Table 1-3 SCSI Controller Shelf Add-On Kit

Description	Qty
Controller shelf DS-BA356-MD with: 150 W power supply, BA35X-HF Blower assembly, DS-BA35X-MQ	1 2 2
50-conductor 2 m (6.6 ft) BN21H-02 cable	1
Cache module blank panel	1
Controller blank panel	1
Metric shelf bracket, screw mounting (74-46442-01) Screws, 10-32 x 0.625 inch	2 12
Metric shelf mounting kit, BA35X-RD with: Locking bracket, front shelf, 74-46441-01 Locking bracket, rear shelf, 74-46441-02 Mounting bracket, 74-47506-01 Stop bracket, 74-46440-01	1 2 2 2 2

Introducing the Controller Shelf

Note

The components listed in Table 1-4 are only required for use with the DS-BA356-MD SCSI controller shelf upgrade kit.

Table 1-4 User Ordered SCSI Controller Shelf Components

Description	Qty	Model
DIGITAL array controller with cache memory	1 min. 2 max.	Contact your account representative
Single ECB single	1 per cache	DS-HS35X-BC
Dual ECB	1 per 2 caches	DS-HS35X-BD
ECB shelf	A/R	BA35X-BA
FAST 10 SCSI cables	A/R	BN21H series
Operating system specific platform kit	1 per controller	Contact your account representative

Table 1-5 Controller Shelf Replaceable Components

Description	Model
150 W power supply	BA35X-HF
50-conductor cable	BN21H series
Blower assembly	DS-BA35X-MQ
Array controller with cache module	DS-HSZ70-AH

2

Shelf Configurations

This chapter describes the rules for configuring a controller shelf to include power and SCSI buses. Use these rules, in conjunction with the SBB shelf rules, to plan a system configuration.

Note

Should there be a conflict between the configuration information in this chapter and the information in the DIGITAL controller documentation, use the controller documentation information.

Shelf Configurations

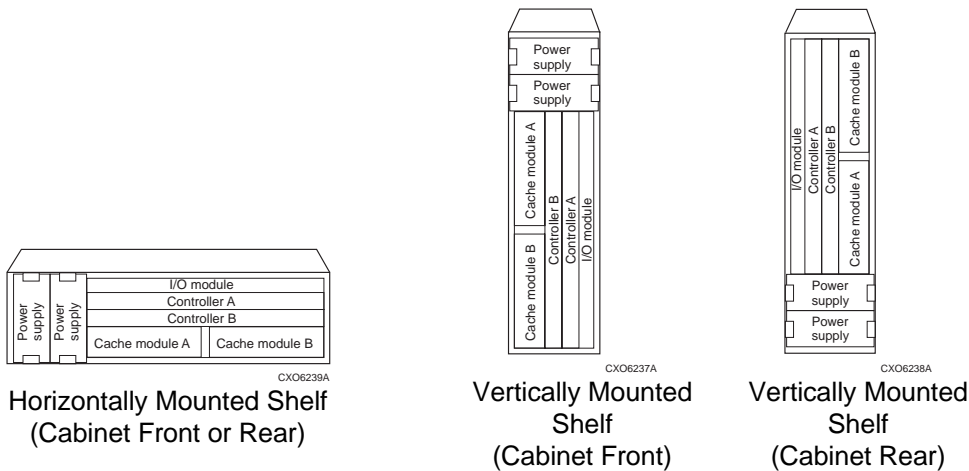
Power

For proper operation, each controller shelf requires a minimum of one shelf power supply (see Figure 2–1) rated for at least 150 W, such as the model BA35X–HF. All controller shelf configurations includes two power supplies, a primary and a redundant supply. This ensures that the shelf power supplies are not a single point of failure.

Caution

This controller shelf cannot operate with a 131 W power supply (BA35X–HA), any dc power supply, or any battery backup unit.

Figure 2–1 Power Supply Locations



SCSI Bus Addressing

The primary controller, controller A, uses SCSI bus ID 7. In this configuration, you can install a maximum of *seven* storage devices on each of the six SCSI buses. These devices can use SCSI bus IDs 0 through 6.

Should you install a second controller, it will use SCSI bus ID 6. In this configuration, you can install a maximum of *six* storage devices on each of the six SCSI buses. These devices can use SCSI bus IDs 0 through 5.

Shelf Configurations

SCSI Bus Description

There are many possible FAST 10 SCSI bus configurations. The primary factors in determining the DIGITAL-supported configurations is the array controller type and the bus termination.

Note

Although you can install 16-bit devices in the SBB shelf, you can only use the lower 8 addressing bits. Similarly, although it is possible to install compatible UltraSCSI storage devices in the SBB shelf, the maximum data transfer rate remains 10 MB/sec.

The array controller determines the number of buses, the types of devices (for example, disk drives, tape drives, CD-ROMs, and so forth) per bus, and the number of devices per bus. The DIGITAL array controller release notes discuss these parameters in detail. The bus speed and termination determines the SCSI bus length.

SCSI Bus Lengths

The length of the SCSI bus is the distance between the controller terminator and the SBB shelf, or the SBB I/O module terminator. The maximum distance between two terminators on a FAST 10 bus is *3 m (9.8 ft)*.

For a BA350-S series SBB shelf the termination is on the shelf. The distance between the input connector and terminator is *approximately 1 m (3.3 ft)*. This then establishes the maximum length of the SCSI cable between to controller and the shelf to *2 m (6.6 ft)*.

Caution

The UltraSCSI SBB shelf differential I/O modules (BA35X-D series) are not compatible with the DS-BA356-MD SCSI controller shelf and cannot be used.

Shelf Configurations

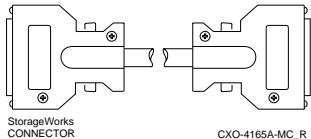
SCSI Bus Cables

The BN21H series cables (see Table 2-1) are typically used to connect SCSI buses between SCSI devices with 50-pin, high-density connectors, such as:

- Controllers and SBB shelves (includes SBB shelf I/O modules)
- Two SBB shelves

Table 2-1 BN21H Series Single-Ended 50-Conductor Cables

Cable Description	Length		Order
	Meters	Feet	Number
50-conductor cable with: 2 each 50-pin, high-density, male, straight connectors with thumb latches	0.3	1.0	BN21H-0C
	0.5	1.6	BN21H-0E
	1.0	3.3	BN21H-01
	1.5	4.9	BN21H-1E
	2.0	6.6	BN21H-02



Connectors

The controller shelf transfers data to the SBB shelves through the six, 50-pin connectors on the controller shelf I/O module and the associated data cables. The maximum data transfer rate on each bus is 10 MB/sec. This transfer rate establishes a maximum SCSI bus length of 3 m (9.8 ft) between terminators.

SBB Shelf I/O Modules

Using a DS-BA356 series SBB shelf requires installing a single-ended, SCSI I/O module (BA35X-MG). No shelf I/O modules are required for the BA350 series SBB shelves.

3

Replacing Controller Shelf Components

The only user replaceable controller shelf components are the controller, the cache module, the cables, the shelf power supplies, and the blowers. The array controller documentation describes the procedures for replacing the controller, the cache module, and the ECBs.

Caution

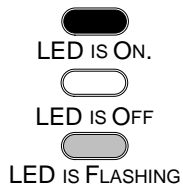
All SCSI buses must be terminated at all times. Removing power, or the controllers, or cache module, or disconnecting data cables can remove termination from the bus and creates an error condition. You must dismount the devices, quiesce the buses, and remove power from all the components before removing components or disconnecting cables.





Replacing Controller Shelf Components

Replacing a Blower Assembly

Each controller shelf has two blowers mounted on the rear. Connectors on the backplane provide the +12 V dc power to operate the blowers. When there is a blower failure, the second blower switches to high speed, and the upper power supply LED is OFF (see Table 3-1).

Table 3-1 Power Supply Blower Status LEDs



If the Power Supply LED displays are...		The status is...
		Both power supplies are operational and at least one blower is not operating.
		

Caution



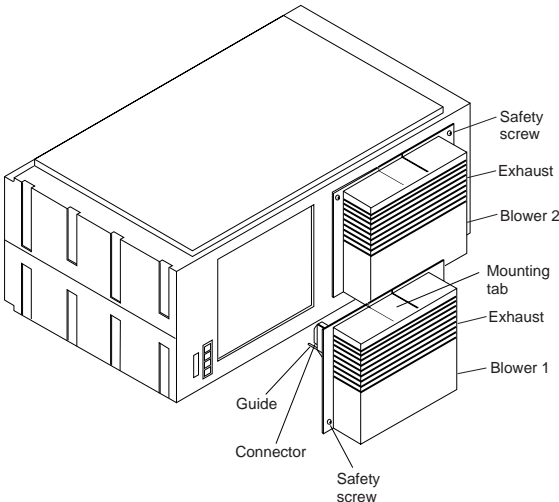
Removing a blower while the shelf is operating significantly changes the air flow pattern. Operating a system with a blower removed for more than 60 seconds can result in a storage device overheating.

The only compatible shelf blower assembly is the model DS-BA35X-MQ dual-speed blower. Do *not* install any other model

Complete the procedure in Table 3-2 to replace a blower.

Replacing Controller Shelf Components

Table 3-2 Blower Replacement

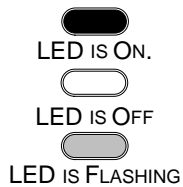
1. To determine the defective blower, place your hand adjacent to the blower exhaust. If there is NO air flow, the blower is defective.
2. Unpack the replacement blower and verify that it is a model DS-BA35X-MQ.
3. Use a Phillips screwdriver to remove the safety screw.
4. Press the upper and lower blower mounting tabs together to release the blower.
5. Pull the blower straight out to disconnect it from the shelf power connector.
 <p style="text-align: right;">CXO6066A</p>
6. Align the replacement blower connector and push the blower straight in, making sure that both mounting tabs lock in place. Check the blower for air flow.
7. Install the safety screw.
8. All power supply LEDs should be ON.

Replacing Controller Shelf Components

Replacing a Shelf Power Supply

In a redundant power supply shelf, you can remove and replace a failed power supply without removing power to the other power supply. Use Table 3-3 to determine which power supply is not operating. Complete the procedure in Table 3-4 to replace a defective power supply.

Table 3-3 Dual Power Supply Status Displays



If the LED displays are...		The power supply status is...
Slot 7	Slot 6	
		Both power supply are operating.
		The Slot 7 shelf power supply is functioning properly. Either the Slot 6 shelf power supply is defective or there is no ac input voltage. Either restore the ac input voltage or replace the Slot 6 power supply.
		The Slot 6 shelf power supply is functioning properly. Either the Slot 7 shelf power supply is defective or there is no ac input voltage. Either restore the ac input voltage or replace the Slot 7 power supply..
		One of the following conditions exists: 1. Both power supplies are not operating. 2. There is no ac power.

Replacing Controller Shelf Components



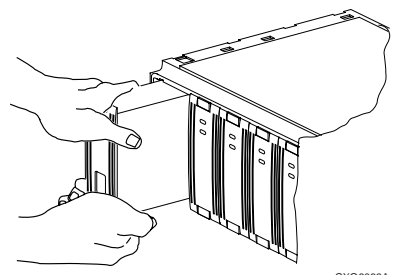
Caution

The DIGITAL-recommended controller shelf power supply is a 150 W, model BA35X–HF. You may also use a 180 W, model DS–BA35X–HH power supply.

You *cannot* use a 131 W, model BA35X–HA shelf power supply, nor any dc shelf power supply or battery backup unit.

To prevent electrostatic discharge (ESD) damage, do not touch the power supply backplane connector.

Table 3-4 Power Supply Replacement

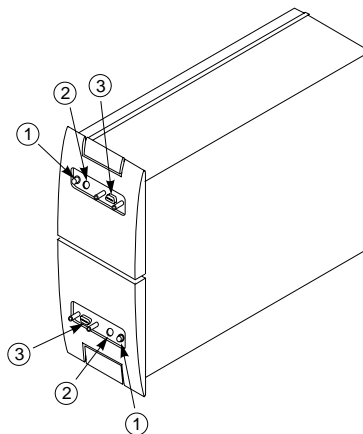
1. Unpack the power supply and verify that it is either a model BA35X–HF or a model DS–BA35X–HH.
2. Disconnect the power cord from the <i>defective</i> shelf power supply.
3. Press the bezel tabs together to release the power supply from the shelf.
4. Remove the power supply.  CXO6063A
5. Insert the replacement supply in the shelf guide slots. Push it in until the bezel tabs engage the shelf.
6. Connect the power cord.
7. The lower LED is ON when the supply is functioning properly.

4

ECB Installation

Each cache module requires an external cache battery (ECB) for proper operation (see Figure 4–1). One 3.5-inch ECB can contain either one or two batteries.

Figure 4–1 Dual ECB



CXO-5459A-MC

1. Battery disable switch
2. ECB Status LED
3. Cache module power connector

ECB Installation


- The DS-SWXM1-AA uses a single ECB (DS-HS35X-BC).
- The DS-SWXM1-BA uses dual ECB (DS-HS35X-BD).
- All redundant controller configuration requires two dual ECBs (DS-HS35X-BD).

None of the ECBs has a backplane connector. Therefore, you can install them in any empty SBB or power supply slot. When there is no empty slot, you must install an ECB shelf (DS-BA35X-BA) using a metric (BA35X-RD) mounting kit.

Each cache module also requires an ECB “Y” cable (see Table 4-1). The only difference between the two cables is the length of leg ③. The only restriction on the ECB location is that the ECB cable *must not* interfere with replacing any module.

Table 4-1 ECB “Y” Cables

Leg ①	Leg ②	Cable A Leg ③	Cable B Leg ③
1.2 m	0.7 m	2 m	4.5 m
3.9 ft	2.2 ft	6.6 ft	15 ft



CXO6263A

Replacing an ECB

To remove an ECB, complete the procedure in Table 4-2.

Table 4-2 Removing an ECB

1. Disconnect the ECB cable.
2. Press the bezel tabs together while pulling out on the ECB.
3. Use both hands to remove the ECB from the shelf.

Complete the procedure in Table 4-3 to install an ECB.

Table 4-3 Installing an ECB

1. Supporting the ECB with both hands, align it with shelf guide slots and insert it.
2. Push the ECB to the rear until the bezel tabs expand and engage the shelf.
3. Connect the ECB cable.

Installing an ECB Cable

Complete the procedures in *Installing an External Cache Battery Cable*, EK-HSZ70-TE to install the ECB cable.

ECB Installation

Installing an ECB Shelf

Complete the procedures in this section to install an ECB shelf (DS-BA35X-BA) in a DIGITAL SW500 series or SW800 series metric cabinet.

Preliminary Procedures

Before you begin the installation you must select the shelf location and inventory the mounting kit.

- The height of this shelf is 150 mm (5.9 in).
- In an SW800-series cabinet you can mount the shelf either horizontally or vertically in either the front or rear of the cabinet.
- In an SW500 series cabinet you can mount the shelf horizontally in either the front or rear of the cabinet.

DIGITAL recommends that you mount this shelf horizontally.

Inventorying the Mounting Kit

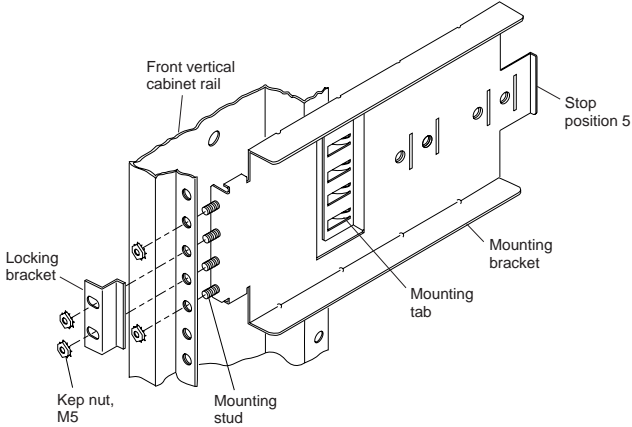


Once you determine the shelf location, you must ensure that you have the components listed in Table 4-4.

Note

For easy identification, the DIGITAL part number is stamped on each bracket.

ECB Installation

Table 4-4 Metric Shelf Mounting Kit Components

Component Description	Qty
<p>Mounting Bracket (part number 74-47506-01)</p>  <p style="text-align: right;">CXO6210A</p>	2
<p>Front Shelf Locking Bracket (part number 74-46441-01)</p>  <p style="text-align: center;">CXO6212A</p>	2
<p>Rear Shelf Locking Bracket (part number 74-46439-01)</p>  <p style="text-align: center;">CXO6213A</p>	2
<p>Stop Bracket (part number 74-46440-01)</p>	2
<p>Screw, 10-32 x 1/2-inch</p>	2
<p>KEP Nut, M5, 8 mm</p>	8

ECB Installation

Note

Use the front locking brackets when mounting a shelf in the front of the cabinet.

Use the rear locking brackets when mounting a shelf in the rear of the cabinet.

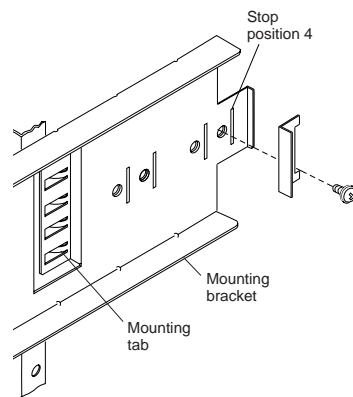
Complete the procedure in Table 4-5 to install an ECB shelf in the front of the cabinet. To install a shelf in the rear of the cabinet, complete the procedures in Table 4-6.

Installing a Shelf in the Front of the Cabinet

Use the procedure in Table 4-5 to install an ECB shelf in the horizontal position.

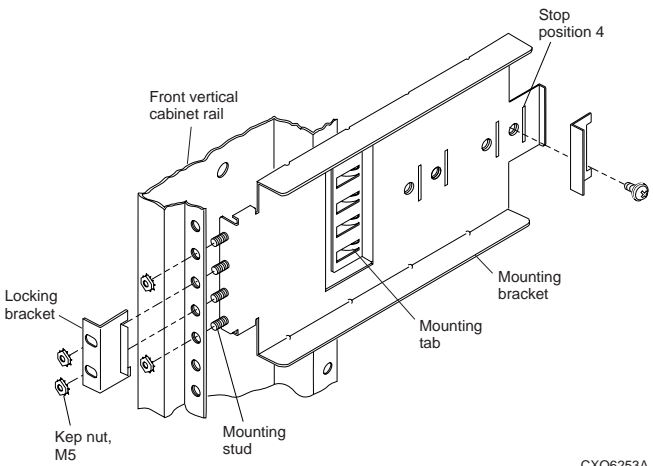
Table 4-5 Mounting an ECB Shelf in the Front of the Cabinet

1. For a shelf mounted in the FRONT of the cabinet, install a stop bracket in *position 4* on both mounting brackets.



CXO6253A

**Table 4–5 Mounting a Shelf in the Front of the Cabinet
(Continued)**

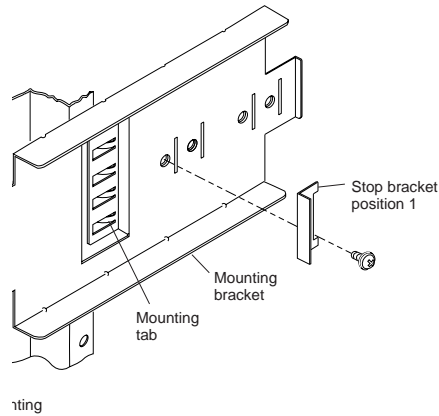
<p>2. Position the first mounting bracket behind the outer flange, and against the inner flange of the vertical cabinet rail</p>  <p style="text-align: right;">CXO6253A</p>
<p>3. Slide the mounting bracket forward to seat the studs and tabs.</p>
<p>4. Install the KEP nuts on the top and bottom stud and fully tighten them.</p>
<p>5. Align the second bracket with the first bracket and repeat Steps 1 through 4.</p>
<p>6. Slide the shelf into the mounting brackets and fully seat it against the stop brackets. The front of the shelf should align with the other shelves in the cabinet.</p>
<p>7. Position the a locking bracket, <i>part number 74-46441-01</i>, over the middle two mounting studs. Finger tighten the KEP nuts on the mounting studs.</p> <p>Push the locking bracket against the shelf to seat it.</p>
<p>8. Tighten the KEP nuts.</p>
<p>9. Repeat Steps 7 and 8 for the other locking bracket.</p>

Installing a Shelf in the Rear of the Cabinet

Use the procedure in Table 4-6 to install an ECB shelf in the horizontal position with metric, tab mounting brackets.

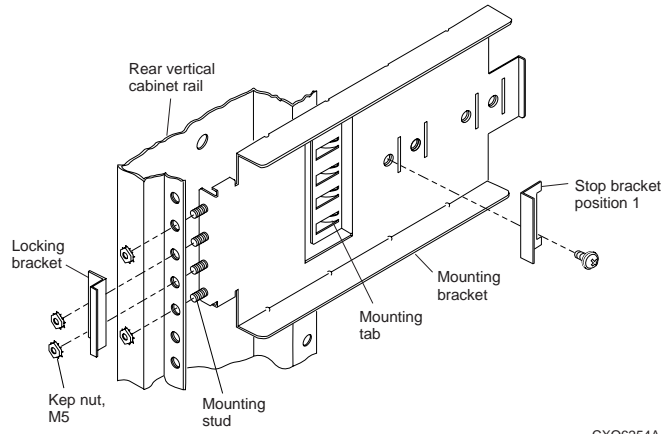
Table 4-6 Mounting an ECB Shelf in the Rear of the Cabinet

1. For a shelf mounted in the REAR of the cabinet, install a stop bracket in *position 1* on both mounting brackets.



CX06254A

**Table 4–6 Mounting a Shelf in the Rear of the Cabinet
(Continued)**

<p>2. Position the first mounting bracket behind the outer flange, and against the inner flange of the vertical cabinet rail.</p>  <p style="text-align: right;">CXO6254A</p>
<p>3. Slide the mounting bracket forward to seat the studs and tabs.</p>
<p>4. Install the KEP nuts on the top and bottom studs and fully tighten them.</p>
<p>5. Repeat Steps 1 through 4 for the other mounting bracket.</p>
<p>6. Slide the shelf into the mounting brackets and fully seat it against the stop brackets. The front of the shelf should align with the other shelves in the cabinet.</p>
<p>7. Position the locking bracket, <i>part number 74-46439-01</i>, over the middle two mounting studs. Finger tighten the KEP nuts on the mounting studs.</p> <p>Push the locking bracket against the shelf to seat it.</p>
<p>8. Tighten the KEP nuts.</p>
<p>9. Repeat Steps 7 and 8 for the other locking bracket.</p>

5

Controller Shelf Specifications

This chapter defines the physical (see Table 5-1), electrical (see Table 5-2), and environmental (see Table 5-3) specifications for the DIGITAL StorageWorks FAST 10, SCSI controller shelf.

Table 5-1 Physical Specifications

Item	Height	Width	Depth	Weight
DS-BA356-MD controller shelf	150 mm (5.9 in)	445 mm (17.5 in)	350 mm (13.8 in)	4.45 kg (10.0 lb) ²
150 W controller shelf power supply (BA35X-HF)	121 mm (4.8 in)	51 mm (2.0 in)	216 mm (8.5 in)	1 kg (2.2 lb)

² With I/O module installed; without power supplies, controllers, or cache modules.

Controller Shelf Specifications

Table 5-2 150W Power Supply (BA35X–HF) Specifications

Item	Specification
Input Line Voltage	90 Vrms—264 Vrms (100—240V ac \pm 10%) 47—63 Hz (50—60 Hz \pm 10%) 2.5 A @ 220—240 V ac 5 A @ 100—120 V ac
Controller Shelf	
DC Output Voltage	+12 V dc 6.25 A <i>maximum</i> continuous +5 V dc 15.0 A <i>maximum</i> continuous Maximum Load 150 W total
SBB Shelf	
DC Output Voltage	+12 V dc 9.0 A <i>maximum</i> continuous +5 V dc 8.4 A <i>maximum</i> continuous Maximum Load 150 W total

Controller Shelf Specifications

Table 5-3 Operating Environments

Condition	Specification
Optimum Operating Environment (Suggested for optimum operation)	
Temperature	18°C to +24°C (+64°F to +75°F) with an average rate of change of 3°C/hour maximum and a step change of 3°C or less
Relative humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	Up to 2400 m (8000 ft)
Air quality	Not to exceed a maximum of 500,000 particles, 0.5 micron or larger, per cubic foot of air.
Nominal airflow	50 cubic ft/minute
Heat Dissipation	3070 BTUs/hr
Minimum Operating Environment (Required for proper operation)	
Temperature	+10°C to +40°C (+50°F to +104°F) Reduce rating by 1.8°C for each 1000 m altitude (1.0°F for each 1000 ft altitude)
Relative humidity	10 to 85% at maximum wet bulb temperature of +32°C (+90°F) and a minimum dew point of +2°C (+36°F)
Altitude	Up to 2400 m (8000 ft)
Air quality	Not to exceed a maximum of 500,000 particles, 0.5 micron or larger, per cubic foot of air.
Nominal airflow	40 cubic ft/minute
Heat Dissipation	3070 BTUs/hr
Non-Operating Operating Environment (Shipping or short term storage)	
Temperature	-40°C to +66°C (-40°F to +150°F)
Relative humidity	10% to 80% noncondensing
Altitude	4900 m (16,000 ft)

Glossary

ac distribution

The method of distributing ac power within a StorageWorks shelf, enclosure, or cabinet.

ac power supply

See shelf power supply.

array controller

See controller.

backplane

The electronic printed circuit board mounted in the rear of the shelf. This board contains the SBB, power supply, and terminator connectors.

blower assembly

An airflow device mounted in a StorageWorks shelf.

cabinet

The StorageWorks enclosure with exterior panels, and doors that contain the cable or power distribution units, shelves, fans, and cables that form a storage subsystem.

cable connector

Any connector that is physically part of a cable assembly attached to backplanes or other non-device connectors.

Glossary

cache memory

A fast storage buffer.

CE-Mark

A European Economic Community (EEC) certification label that identifies electronic devices authorized for sale within member nations.

CE-Mark Class A

Similar to the FCC Class A certification, this certification label appears on electronic devices for use in a commercial environment. You can also use a CE-Mark certified device in the United States.

CE-Mark Class B

Similar to the FCC Class B certification, this certification label appears on electronic devices for use in either a home or a commercial environment. You can also use a CE-Mark certified device in the United States.

certified device

A storage device tested in a specific configuration and found to be in compliance with a country-specific certification standard.

channel

Another term for a SCSI bus.

CLI

Command line interpreter. The operator interface to HS series controller firmware.

cold swap

A method for replacing storage devices with subsystem power removed.. Use this method during initial installation or StorageWorks subsystem upgrades, or when conditions preclude using either the "warm swap" or "hot swap" method

See also **warm swap** and **hot swap**.

command line interpreter

See **CLI**.

Glossary

compatible device

A storage device tested in a specific enclosure and found to be compatible.

controller

(1) A hardware–firmware device that manages communications on behalf of host systems over the SCSI bus to devices, such as the HSC–series, HSJ–series, and HSZ–series controllers. Controllers typically differ by the type of interface to the host and provide functions beyond those the devices support. (2) A standalone device that connects a host adapter to the storage SCSI bus. This device provides RAID functionality, typically has multiple SCSI bus ports, performs the lower layers of the SCSI protocol, and normally operates in the initiator role..

device

The targets, initiators, hubs, converters, and bus expanders, and similar device interconnected to form a SCSI bus. Connectors, expanders, and hubs do not use a SCSI bus ID.

See also **nodes**.

device connector

Any connector physically part of a SCSI device.

differential SCSI bus

A bus in which the potential difference between two wires determines the signal level. A differential bus is more robust and less subject to electrical noise than is a single-ended bus.

disk

A storage device supporting random access to fixed size blocks of data.

disk array controller

See **controller**.

dual redundant configuration

A controller configuration consisting of a primary and backup controller mounted in the same controller shelf. When the primary controller fails, the backup controller assumes control over the devices.

Glossary

electromagnetic interference

See **EMI**.

electrostatic discharge

See **ESD**.

EMI

Electromagnetic interference is the impairment of a signal by an electromagnetic disturbance.

ESD

Electrostatic discharge is the discharge of a potentially harmful static electric voltage as a result of improper grounding.

Fast 20

See **Ultra SCSI**.

FCC

Federal Communications Commission is the federal agency responsible for establishing standards and approving electronic devices within the United States.

FCC Class A

This certification label appears on electronic devices for use only in a commercial environment within the United States. A CE-Mark certified device also meets the equivalent FCC certification standard.

FCC Class B

This certification label appears on electronic for use in either a home or a commercial environment within the United States. A CE-Mark certified device also meets the equivalent FCC certification standard.

Federal Communications Commission

See **FCC**.

host

The primary or controlling computer (in a multiple computer network) to which storage is attached.

Glossary

host adapter

A device that connects the host system I/O bus (for example, a PCI bus) to the storage SCSI bus. A host adapter performs the lower layers of the SCSI protocol and normally operates in the initiator role.

host computer

See **host**.

host controller

A device that connects the host system I/O bus (for example, a PCI bus) to the storage SCSI bus. A host controller provides RAID functionality, typically has multiple SCSI bus ports, performs the lower layers of the SCSI protocol, and normally operates in the initiator role..

hot swap

A method of device replacement whereby the complete system remains on-line and active during device removal or insertion. The device being removed or inserted is the only device that cannot perform operations during this process.

See also **cold swap** and **warm swap**.

hub

A set of three or more bus expanders each coupling a common, short, single-ended bus segment internal to the Ultra SCSI hub to an external bus segment. The external bus segments can be either single-ended or differential. Coupling all of the external bus segments to the internal bus segment also couples the external buses together. Using hubs enables the creation of a radial topology

I/O module

A 16-bit SBB shelf device that integrates the SBB shelf with either an 8-bit single-ended, 16-bit single-ended, or 16-bit differential SCSI bus.

See also **shelf I/O Module**.

initiator

A SCSI device (usually a host system) that requests another SCSI device (a target) to complete an operation.

Glossary

Input/Output module

See I/O module.

MB/sec

The bus width (8- or 16-bit) and the number of bytes per word (1 or 2, respectively) determines the transfer rate in megabytes per second (MB/s).

megabytes per second

See MB/sec.

node

A SCSI bus target or initiator that uses a SCSI bus ID. For example, disk drives, tape drives, controllers, and adapters all have a SCSI bus ID and are nodes. Hubs, expanders, and converters are devices and do not have a SCSI bus ID.

An wide bus can have a maximum of 16 nodes, SCSI bus addresses 0 through 15.

A narrow bus can have a maximum of eight nodes, SCSI bus addresses 0 through 7.

port

(1) A logical route for data in and out of a controller. A port can contain one or more channels, all of which contain the same type data. (2) The hardware and software that connects a host controller to a CI, SCSI, or SDI bus.

quiesce

To make a bus inactive or dormant. For example, you must quiesce SCSI bus operations when warm swapping an SBB.

quiescent

A bus that is inactive, still, or dormant.

radio frequency interference

See RFI.

RAID

Redundant array of independent disks. A set of storage techniques devised to increase the performance and availability of a storage subsystem.

redundant power configuration

A capability of StorageWorks cabinet and shelves to ensure there is no single point of power failure. (1) For a cabinet two ac power sources and two CDUs distributed primary and redundant ac power to shelf power supplies. (2) For a shelf, the primary and redundant shelf SBB power supplies ensure the dc power is available even when there is a failure of one supply, one ac source, or one CDU. Implementing the redundant power configuration provides protection against the loss or corruption of data.

RFI

Radio frequency interference. The impairment of a signal by an unwanted radio signal or radio disturbance.

SBB

StorageWorks building block. Any device conforming to shelf mechanical and electrical standards installed in either a 3.5-inch or 5.25-inch carrier is considered to be an SBB, whether it be a storage device, a power supply, or other device.

SCSI

Small computer system interface. This ANSI interface defines the physical and electrical parameters of a parallel I/O bus used to connect computers and a maximum of seven devices. The StorageWorks subsystem implementation uses SCSI-2, for the synchronous transfer of 8-bit data at rates of up to 10 MB/s.

SCSI bus connector

Any connector used to create a SCSI bus segment. SCSI bus connectors are defined by both their function and their physical placement. There are only two allowed functions: bus-path and stub. There are numerous physical placement descriptions, for example, device stub connector and terminator bus-path connector.

SCSI device

A host computer adapter, a peripheral controller or an intelligent peripheral that can be attached to the SCSI bus.

Glossary

SCSI device ID

The bit-significant representation of the SCSI addressing referring to one of the signal lines numbered 0 through 7 for an 8-bit bus or 0 through 15 for a 16-bit bus. Also known as “target ID”.

SCSI hub

A device that connects multiple SCSI segments within a SCSI domain.

SCSI ID

See **SCSI device ID**.

SCSI port

(1) Software. The channel that controls communications to and from a specific SCSI bus in the system. (2) Hardware. The name of the logical socket at the back of the system unit to which a SCSI device is connected.

Note

There is no provision for a shared bus configuration when a host with a differential bus.

shelf power supply

The power supply that provides +5 V dc and +12 V dc to the StorageWorks shelves. These supplies can be either ac input (120 V ac) or dc (48 V dc).

single-ended SCSI bus

A bus in which the voltage of a single wire in relation to ground determines each signal's logic level.

single-power configuration

A power configuration in which there is only one ac power source and CDU or PDU to distribute ac power.

Small Computer System Interface

See **SCSI**.

storage subsystem

The controllers, storage devices, shelves, cables, and power supplies that form a mass storage subsystem.

StorageWorks

The DIGITAL product set that allows customers to design and configure their own storage subsystem. Components include power, packaging, and interconnections in a StorageWorks shelf. SBBs and array controllers are integrated to form storage subsystems. System-level enclosures house the shelves.

StorageWorks building block

See **SBB**.

subsystem array strategy

A strategy, including packaging, devices, and controllers, that provides an integrated storage subsystem solution.

supported device

(1) A device that has been fully evaluated in an “approved” StorageWorks configuration (that is, shelf, cabinet, power supply, cabling, and so forth) and is in complete compliance with country-specific standards (for example, FCC, CE-Mark, CSA, TÜV, VDE, and so forth) and with all DIGITAL standards. (2) A device supported by a controller or host operating system.

target

A SCSI device that performs an operation requested by an initiator.

target ID

See **SCSI device ID**.

terminators

The interconnect components that form the ends of the transmission lines in bus segments. A SCSI domain must have at least one segment and therefore at least two terminators. The terminators ensure that inactive SCSI bus signals are in a known state. There are special cases where the electrical transmission lines are very short and only one termination or pull-up is required.

There are two basic types of terminators—active and passive.

- Single-ended bus segments use active, linear terminators.
- Differential bus segments use a passive (linear totem pole) terminators.

Glossary

terminator connector

Any connectors physically part of a terminator. It is not uncommon for terminators to have both stub and bus-path connectors.

TERMPower

The electrical current for operating the SCSI bus terminators. An external SCSI bus, the shelf power supply or an ac-dc power converter can be the power source.

UltraSCSI

An improvement in SCSI technology invented in 1993 by the Digital Equipment Corporation StorageWorks Engineering Group. Subsequently the ANSI SCSI standards committee issued standard X3T10 for Ultra SCSI.

The Ultra SCSI improvements over Fast SCSI include the following:

- Maximum transfer rate increases from 10 MHz to 20 MHz.
- Maximum wide bus bandwidth increases from 20 MB/s to 40 MB/s.
- VHDCI (very high density connector interface) cables and connectors are significantly thinner and smaller.

universal ac input power supply

See shelf power supply.

VHDCI

Very High Density Cable Interface. A 68-pin interface with connectors on 8 mm centers. Required for Ultra SCSI.

warm swap

A method of device replacement whereby the complete system remains on-line during device removal or insertion. During device insertion or removal the bus may halt for a brief period of time. Until the replacement System booting or code loading cannot occur until insertion of the replacement device. There is no noticeable impact on user applications that are not dependent upon the devices on the "affected" SCSI bus.

See also cold swap and hot swap.

