StorageWorks Family

BA350–MA Controller Shelf User's Guide

This manual describes the BA350–MA StorageWorks controller shelf and the rules for configuring the shelf and its associated power supplies, device addresses, and SCSI buses. Procedures for replacing power supplies, blowers, and shelves are also described.

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Maynard, Massachusetts

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Preface

The *StorageWorks Family BA350–MA Controller Shelf User's Guide* describes the procedures for configuring, installing, and replacing the BA350–MA controller shelf and its components.

Intended Audience

This manual is intended for use by personnel who will be configuring, using, or replacing the BA350–MA StorageWorks™ controller shelves.

_____ **Note** _____

Shelf installation procedures are cabinet specific and are not included in this manual.

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Structure

This manual is organized as follows:

Chapter 1	Describes the BA350–MA StorageWorks controller shelf to include physical characteristics, layout, components, and StorageWorks products.
Chapter 2	Describes the rules for configuring a BA350–MA controller shelf with an HSJ40 installed.
Chapter 3	Describes the shelf-specific SCSI buses, to include calculating bus length, positioning terminators and jumpers, and determining device location.
Chapter 4	Describes the procedures for replacing the StorageWorks power supplies, blowers, and shelves.
Glossary	Contains definitions of BA350–MA controller shelf terms.
Index	Provides a cross-reference to major topics.

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 Primary Publications†	
StorageWorks Family Configuration Guide	EK–BA350–CG
StorageWorks Family User's Guide‡	EK–BA350–UG
StorageWorks Family StorageWorks Building Blocks User's Guide	EK–SBB35–UG
StorageWorks RAID Array 110 Subsystem	
BA350–EA Modular Storage Shelf User's Guide	EK–350EA–UG
BA35X–VA Vertical Mounting Kit User's Guide	EK–350SV–UG
DEC RAID Utilities User's Guide	EK–DECRA–UG
StorageWorks RAID Array 110 Subsystem User's Guide	EK–SZ200–UG
StorageWorks Array Controller 140-Series	
StorageWorks Array Controller HS Family of Array Controllers User's Guide	EK–HSFAM–UG
StorageWorks BA350–MA Controller Shelf User's Guide	EK–350MA–UG
DECraid+ Rackmount Storage Subsystem	
HSC Intelligent I/O Servers	
HSC Controller User's Guide	AA–PFSQA–TK
HSC Controller Installation Manual	EK–HSCMN–IN
StorageWorks Enclosures	
BA35X–VA Vertical Mounting Kit User's Guide	EK–350SV–UG
StorageWorks Family Desktop Expansion Unit User's Guide	EK–BA353–UG
StorageWorks Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG
StorageWorks RETMA Shelf Rail Kit Installation Guide	EK–35XRB–IG
StorageWorks SW500-Series Data Center Cabinet Installation and User's Guide	EK–SW500–IG
StorageWorks SW800-Series Data Center Cabinet Cable Distribution Unit Installation Guide	EK–SWCDU–IS
StorageWorks SW800-Series Data Center Cabinet Installation and User's Guide	EK–SW800–IG

Legend:
†—Provided with each system
‡—Includes BA350–SA SBB shelf user's guide
§—Available from Digital Account Representative

Table 1 (Cont.) StorageWorks Related Documentation

Document Title	Order Number
Alpha AXP DEC 7000 and DEC 1000 Systems	
BA350–LA Modular Storage Shelf User's Guide	EK–350LA–UG
BA655 SCSI Disk and Tape PIU Installation Guide	EK–BA655–IN
Storage Devices	
Installation Notice—RZ73 Bus Termination and Jumper Installation Guide	EK–RZ73X–IS
RRD42 Disk Drive Owner's Manual	EK–RRD42–OM
RZ Series Disk Drive Installation Guide	EK–DRZ01–IG
RZ Series Disk Drive Reference Manual	EK–RZXXD–RM
RZ24 Hard Disk Drive Installation Guide	EK–RZ24I–IS
RZ26B Disk Drive Installation Guide	EK–RZ26B–IN
RZ2x Hard Disk Drive Upgrade Installation Instructions	EK–RZ2XH–UG
RZ2x Series Drive Bracket Installation Sheet	EK–RZ2XD–UG
TLZ06 Cassette Tape Drive Installation Guide	EK–STEXP–AD
TLZ06 Cassette Tape Drive Owner's Manual	EK–TLZ06–OM
TZ30 Cartridge Tape Drive Operator's Manual	EK–OTZ30–OM
TZ30 Cartridge Tape Drive Reference Card	EK–OTZ30–RC
TZ30 Cartridge Tape Drive Technical Manual	EK–OTZ30–TM
General Reference Publications	
Digital Systems and Options Catalog§	
Small Computer System Interface, An Overview	EK–SCSIS–OV
Small Computer System Interface, A Developer's Guide	EK–SCSIS–DK

Legend:
†—Provided with each system
‡—Includes BA350–SA SBB shelf user's guide
§—Available from Digital Account Representative

Manufacturer's Declarations

The following comments are applicable to the StorageWorks product line:

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 adequate measures.

ACHTUNG !

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

ATTENTION !

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

Acoustic Noise Declaration

Acoustics - Preliminary Declared Values per ISO 9296 and ISO 7779

Product†	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Bystander Positions)	
	Idle	Operate	Idle	Operate
BA350–MA Controller Shelf	5.8	5.8	41	41
Deskside Expansion Enclosure at the Side of the Desk				
BA350–MA Controller Shelf	5.7	5.7	40	40

Product†	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Operator Positions)	
	Idle	Operate	Idle	Operate
Deskside Expansion Enclosure at the Side of the Desk				
BA350–MA Controller Shelf	5.7	5.7	37	37
Deskside Expansion Enclosure on Top of the Desk				
BA350–MA Controller Shelf	5.7	5.7	48	48

† Current values for specific configurations are available from Digital Account Representatives.
‡ 1 B = 10 dBA

Schallemissionswerte - Vorläufige Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779

Gerät†	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Beistehende Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
BA350–MA Controller Shelf	5,8	5,8	41	41
Deskside Expansion Enclosure neben einem Schreibtisch				
BA350–MA Controller Shelf	5,7	5,7	40	40

Gerät†	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Bediener Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
Deskside Expansion Enclosure neben einem Schreibtisch				
BA350–MA Controller Shelf	5,7	5,7	37	37
Deskside Expansion Enclosure auf einem Schreibtisch				
BA350–MA Controller Shelf	5,7	5,7	48	48

† Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich.

‡ 1 B = 10 dBA

Für Bundesrepublik Deutschland
For Federal Republic of Germany
Pour la République féderale d'Allemagne

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und Anmeldepostkarte übergangsweise nicht mit ausgeliefert werden,
kontaktieren Sie bitte das nächstgelegene Digital Equipment Kundendienstbüro.

1

Introducing the BA350–MA StorageWorks Controller Shelf

This chapter describes the BA350–MA StorageWorks **controller shelf**, to include the shelf layout, dimensions, the external Small Computer System Interface (**SCSI**) connections (**ports**) for **StorageWorks building block shelves** (**SBB shelves**), and the general shelf specifications.

Note

The procedures for installing a controller shelf, routing cables, and connecting cables are unique to each cabinet and are described in the cabinet-specific manuals.

1.1 Product Description

The BA350–MA controller shelf (see Figure 1–1) is used for the HS-series of array **controllers**, such as the HSJ40 controller. The only StorageWorks building blocks (SBBs) that can be installed in this shelf are the power supplies. No storage SBBs can be installed in this shelf.

Figure 1–1   BA350–MA StorageWorks Controller Shelf

CONTROLLER 1

CONTROLLER 2

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Introducing the BA350–MA StorageWorks Controller Shelf
1.1 Product Description

As shown in Figure 1–2, each shelf can have the following components:

- Two controllers (Controller 1 and Controller 2)
- Two cache modules (one for each controller)
- Two power supplies

Controller 1 is assigned SCSI device-side, **single-ended device address** 7. Controller 2 is assigned SCSI device-side, single-ended address 6. The cache module for each controller is installed directly beneath the controller.

Note

There are two sets of SCSI device addresses: the *host-side* and the **device-side**. The host-side is for the **host** and controllers. The device-side is for the controllers and the devices. Only the device-side, single-ended, SCSI device addresses are discussed in this manual. Controller device addresses are **initiator** IDs; storage device addresses are **target IDs**.

Figure 1–2 BA350–MA Controller Shelf Layout
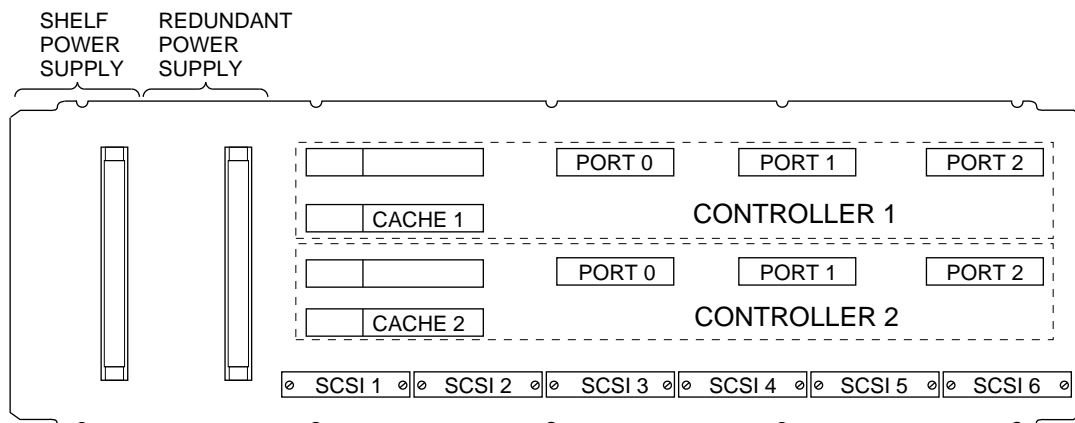
CXO-3839A-MC

Below the Controller 2 cache module are six 50-pin, high-density, female SCSI–2 connectors for connecting SBB shelf SCSI cables. Each controller connector port (three per controller) controls two SCSI buses. The relationship of the controller connectors (ports) to the SCSI bus connectors (ports) are as follows:

Controller Port	SCSI Ports
Port 0	Port 1
	Port 2
Port 1	Port 3
	Port 4
Port 2	Port 5
	Port 6

The controller shelf can be installed in either an SW500-series or the SW800-series **data center cabinet**[1] and oriented either horizontally or vertically. The orientation and location of each controller shelf are described in the cabinet documentation and in the *HS Family of Array Controllers User's Guide*. The dimensions of this shelf, in millimeters (mm) and inches, are as follows:

Dimension	mm	Inches
Height	150	5.9
Width	445	17.5
Depth	350	13.8

The arrangement of shelf components are as follows:

- The shelf ac power supply is mounted in the leftmost slot of a horizontally mounted shelf (the top slot of a vertically mounted shelf).

- The redundant ac power supply is mounted in the second slot from the left (top).

- The redundant power supply slot can be used for a storage SBB, provided no controller has a device initiator ID of 6.

- As shown in Figure 1–3, each shelf has two replaceable blowers mounted on the rear of the shelf.

Figure 1–3 Shelf Blowers

BLOWER 2

BLOWER 1
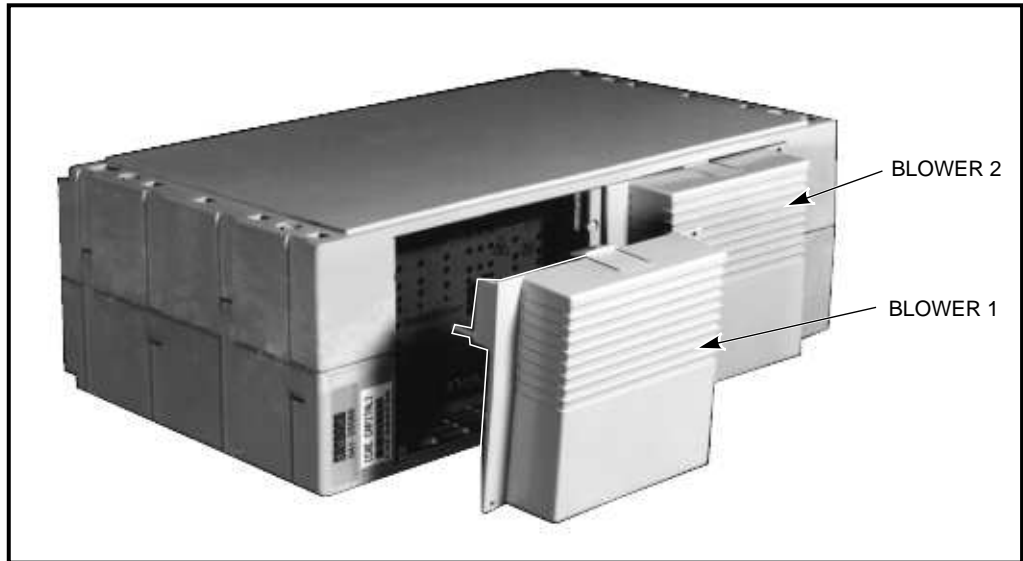
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[1] The BA350–MA shelf is not installed in deskside enclosures.

1.2 BA350–MA Controller Shelf Products

Table 1–1 lists the StorageWorks products that can be used with this shelf. The information in this table is general in nature[2] and is based on the following:

- A BA350–MA controller shelf with HSJ40 array controller with a read cache module

- The BA350–MA controller shelf is installed in an SW800-series data center cabinet.

- The following factors will affect the information presented in Table 1–1:
  - The configuration type (optimal performance; optimal availability)
  - The controller configuration (non-redundant; dual-redundant)
  - The redundant array of independent disks (**RAID**) set (0, 1, 3, or 5) used

Table 1–1 BA350–MA StorageWorks Controller Shelf Products

StorageWorks Product	Min	Max	Comments
SCSI Bus			
Single-ended, device-side, SCSI buses	6	6	Standard
Cooling			
BA35X–MA blower	2	2	Standard
Array Controllers and Read Cache Module			
HSJ40 Controller Module with either a 16 MB or 32 MB cache module	1	2	Two controllers are required for dual-redundant operation.
Power Units			
BA35X–HA ac power supply	1	2	Digital recommends two power supplies per controller shelf and SBB shelf.
Supported Storage Shelf and Storage Device Configurations			
BA350–SA SBB shelves			Digital recommends two power supplies per shelf.
All 3½-inch SBBs	6	6	
All 5¼-inch SBBs	12	12	
3½-inch SBBs			Digital recommends a maximum of 6 3½-inch SBBs per SCSI bus for a maximum of 36 devices per system.
per SCSI bus	1	7	
per HSJ40 system	6	42	
5¼-inch SBB			Requires three slots
per SCSI bus	1	4	
per HSJ40 system	6	24	

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[2] For a detailed description of the recommended configurations, see the *HS Family of Array Controllers User's Guide*.

2

Configuration Rules

This chapter describes the specific rules for configuring a BA350–MA controller shelf system, to include SBBs, power, and SCSI device addressing. These rules are used to plan a system configuration. Subsequent chapters provide detailed procedures for implementing the configuration rules.

Note

The configuration rules in the following sections have precedence over those listed in the *StorageWorks Family Configuration Guide*.

2.1 SBB Configuration Rules

Use the following rules to configure the SBBs in the BA350–SA SBB shelves:

- Refer to the *StorageWorks Family Configuration Guide* for the Digital StorageWorks storage devices available.

- The following factors determine the maximum number of SBBs you can install in an SBB shelf:

  — The SBB physical size (either 3½-inch or 5¼-inch)

  — The bus configuration

  — The controller device address

2.2 Power Configuration Rules

Use the following rules to configure the power:

- Each controller or SBB shelf requires an ac shelf power supply.

- The shelf power supply is installed in the leftmost (top) SBB slot.

- Digital recommends that all controller shelves have a shelf power supply and a redundant power supply. The redundant power supply is installed in the slot next to the shelf power supply.

- Digital recommends that the SBB shelves have a redundant power supply installed.

Note

No SBB shelf can have a redundant power supply when the system is configured for seven storage devices in a shelf.

2.3 SCSI Device Addressing Rules

Use the following rules to assign device addresses to the controllers and SBBs (disk drives, tape drives, and so forth) in a system with an BA350–MA controller shelf:

- The maximum number of device addresses per SCSI bus is eight (0 through 7).

- The maximum number of device addresses per SBB shelf is seven (0 through 6).

- The controllers in the BA350–MA controller shelf are automatically assigned a device address based upon their physical location, as shown in Figure 2–1.

Figure 2–1   BA350 MA Controller Shelf Device Addresses

DEVICE ADDRESS 7

DEVICE ADDRESS 6

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_____ **CAUTION** _____

When Controller 2 is installed in the third BA350–MA controller shelf slot,

- No 3½-inch disk SBB can be installed in slot 6 of any SBB shelf

- No 3½-inch tape drive SBB or any 5¼-inch SBB device address switch can be set to device address 6

or the SCSI bus will malfunction.

3

SCSI Bus Configurations

This chapter describes the BA350–MA StorageWorks controller shelf SCSI buses with HSJ40 array controllers installed.

Note

SCSI bus configurations are controller-specific. The SCSI bus configurations described in this chapter apply only to the HSJ40 controller.

See the *HS Family of Array Controllers User's Guide* for detailed information about the HSJ40 controller.

3.1 SCSI Bus Description

The BA350–MA controller shelf has six, single-ended, SCSI–2 buses. The 50-pin, high-density, female connectors for these buses are located at the bottom of a horizontally mounted shelf (the left side of vertically mounted shelf). These buses are numbered 1 through 6 starting at the left (top).

Each SCSI bus can have a maximum of eight devices connected to it, including the controller. Valid configurations include the following:

	Controller Shelf		SBB Shelf	
Configuration	Controllers	Power SBBs	Devices	Power SBBs
Non-Redundant	1	2	7	1
Dual-Redundant	2	2	6	2

In a non-redundant configuration, the controller (Controller 1) is mounted in the top (righthand) location. In a dual-redundant configuration the second controller (Controller 2) is mounted in the third slot from the top (right).

CAUTION

When Controller 2 is installed in the third slot of the BA350–MA controller shelf,

- No 3½-inch disk SBB can be installed in slot 6 of any SBB shelf

- No 3½-inch tape drive SBB or any 5¼-inch SBB device address switch can be set to device address 6

or the SCSI bus will malfunction.

These buses can transfer data at either 5 MB/s (Megabytes per second) or 10 MB/s. The rate at which data is transferred is affected by many things. However, the two primary concerns are as follows:

- The maximum rate at which the controller or initiator can transmit data

- The maximum rate at which the target device can process data

The total length of a SCSI bus is measured from the terminator on the controller to the terminator on the SBB shelf. The *maximum* length of these buses, including all cables and shelf buses, is shown in Table 3–1:

Table 3–1 Single-Ended, SCSI–2 Bus Parameters

Bus Type	Transfer Rate	Meters	Feet
8-bit, single-ended	5 MB/s	6	19.7
8-bit, single-ended	10 MB/s	3	9.8

3.2 Calculating the SCSI Bus Length for a Single SBB Shelf

The SCSI bus for a single shelf is composed of the following segments:

- **Segment A**—The distance from the controller terminator to the shelf backplane connector (port) and from there to the SCSI bus connector

- **Segment B**—The length of the BN21H-series cable from the controller shelf to the SBB shelf (either 1 meter [3.3 feet] or 2 meters [6.5 feet])

- **Segment C**—For a single SBB shelf this is the distance from the SBB shelf input connector to the shelf SCSI terminator.

Use the information in Table 3–2 and the following formula to calculate the length of a SCSI bus:

$$Total\ Bus\ Length = A + B + C$$

3.3 Calculating the SCSI Bus Length for Multiple SBB Shelves

The SCSI bus for multiple SBB shelves on a single SCSI bus is composed of the following segments:

- **Segment A**—The distance from the controller terminator to the shelf backplane connector (port) and from there to the SCSI bus connector

- **Segment B**—The length of the BN21H-series cable from the controller shelf to the SBB shelf (either 1 meter [3.3 feet] or 2 meters [6.5 feet])

- **Segment D**—The distance from the first SBB shelf input connector to the shelf output connector

- **Segment E**—The length of the BN21H-series cable (0.5 meters or 1.6 feet) that connects the first shelf to the second shelf

- **Segment F**—The distance from the input connector on the second shelf to the bus terminator on the same shelf.

Use the information in Table 3–2 and the following formula to calculate the length of a SCSI bus:

$$Total\ Bus\ Length = A + B + D + E + F$$

Table 3–2   BA350–MA Controller Shelf System SCSI Bus Segments

			Length		
Segment	From	To	Meters	Inches	Feet
BA350–MA Controller Shelf					
A	Controller terminator	SCSI port	0.25	10.3	0.9
Controller Shelf to First SBB Shelf					
B†	Controller shelf output connector	SBB shelf input connector	1.0	39.4	3.3
			2.0	78.8	6.6
Single SBB Shelf					
C	3 device input connector	Terminator in slot 5	0.4	16.4	1.4
	4 device input connector	Terminator in slot 5	0.6	23.6	2.0
	7 device input connector	Terminator in slot 1	0.9	34.7	2.9
Multiple SBB Shelves					
D	7 device input connector	Output connector	0.9	35.7	3.0
E†	Shelf 1 output connector	Shelf 2 input connector	0.5	19.7	1.6
F	3 device input connector	Terminator in slot 5	0.4	16.4	1.4
	4 device input connector	Terminator in slot 5	0.6	23.6	2.0
	7 device input connector	Terminator in slot 1	0.9	34.7	2.9

† BN21H-series cable

3.4 Configuring SCSI Buses

The flexibility of the StorageWorks product family permits the installation of both 3½-inch and 5¼-inch SBBs in the same shelf. This, plus the capabilities of using either one or two controllers or having two separate buses on one SBB shelf, provides for many unique, solution-oriented configurations. Rather than describing all the possible configurations, the material in this section describes the basic configurations, each using either all 3½-inch SBBs or all 5¼-inch SBBs. From the information presented in Table 3–2 and the following sections, you can develop configurations that meet specific system needs.

To quickly identify the number of SCSI buses and the maximum number of devices on each bus, the StorageWorks documentation identifies the bus with a three-character identifier with that has the format *bxd*,
where:

b is the number of SCSI buses
d is the maximum number of devices per bus

The following example defines some of the typical identifiers:

Bus	Definition
6x1	A six SCSI bus system with one device per bus, for a total of six devices.
5x3	A five SCSI bus system with three devices per bus, for a total of 15 devices.

3.4.1 3½-Inch SBB SCSI Bus Configurations

The 3½-inch SBB SCSI bus configurations listed in this section were developed based on the following premises:

- Digital recommends using 6x1 through 6x6 SCSI buses with the following components:

    – Two HSJ40 controllers, a dual-redundant controller configuration

    – Two ac power supplies in the controller shelf

    – Two ac power supplies in each SBB shelf

- An alternate configuration is a 6x7, non-redundant controller configuration that includes the following:

    – A single HSJ40 control installed in the top (righthand) controller shelf location

    – Two ac power supplies in each SBB shelf

    – One ac power supply in the controller shelf

- When the second controller is installed, no SBB can use device address 6.

- Only three BA350-SA SBB shelves are required for 6x1, 6x2, and 6x3 3½-inch SBBs bus configurations.

- Six BA350–SA SBB shelves are required for 6x4, 6x5, 6x6, and 6x7 3½-inch SBB bus configurations

- The device address switches on the rear of the 3½-inch tape drive SBBs must be set as described in the *StorageWorks Family User's Guide* to ensure that there are no duplicate addresses on the bus.

3.4.2 6x1 to 6x3 3½-Inch Bus Configurations

The 6x1 through 6x3 bus configurations require only three SBB shelves. However, adding more devices requires purchasing additional shelves and either reconstructing all the RAID sets or following an involved and time-consuming upgrade process. A six shelf system can be upgraded simply by adding devices to each bus with minimal impact on system operations.

Figure 3–1 shows the cabling and location of the terminators and jumpers on each shelf. These configurations are unique in that they use both SBB shelf SCSI-2 connectors (JA1 and JB1) as input connectors. This results in the following configuration:

- SCSI connector JA1 connects the controller to device addresses 0, 2, and 4.

- SCSI connector JB1 connects the controller to device addresses 1, 3, and 5.

- Digital recommends that a redundant power supply be installed in slot 6.

- Device address 6 cannot be used in a dual-rendundant controller configuration.

- The terminator board in slot 5 actively terminates both SCSI buses.

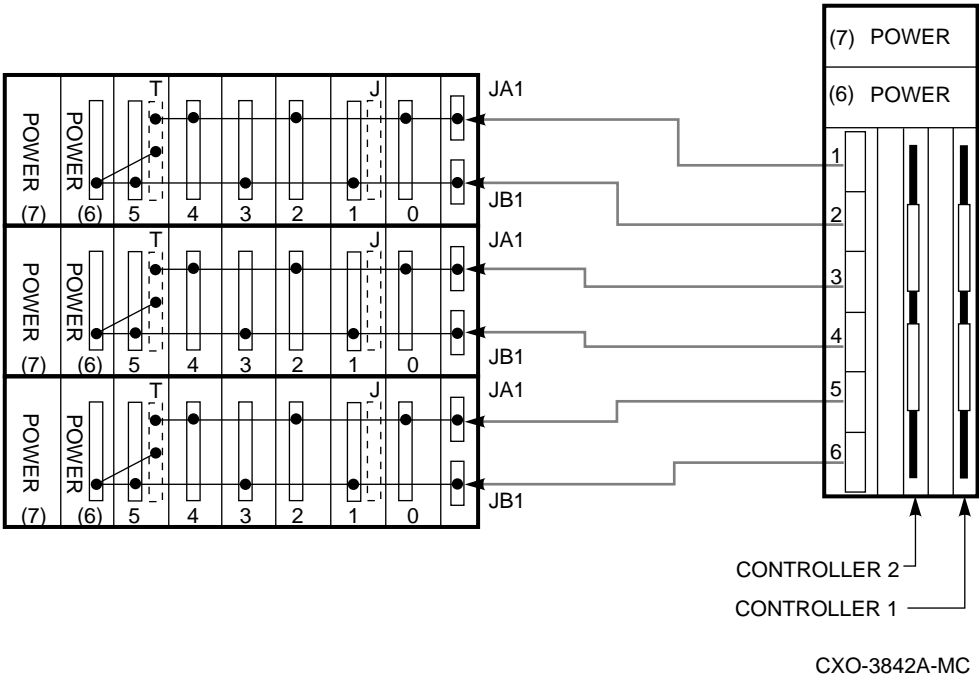- The jumper board installed in slot 1 has no function in this configuration.

_____ **Note** _____

SCSI connector JB1 can only be used as an input connector when a shelf SCSI bus terminator is installed in slot 5.

_____

Figure 3–1   6x1 to 6x3 3½-Inch Buses

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3.4.3 6x1 to 6x7 3½-Inch Bus Configurations

The 6x4 through 6x7 configurations require six SBB shelves. Digital recommends that six shelves also be used for the 6x1 through 6x3 configurations because this will significantly reduce the time required to expand the system.
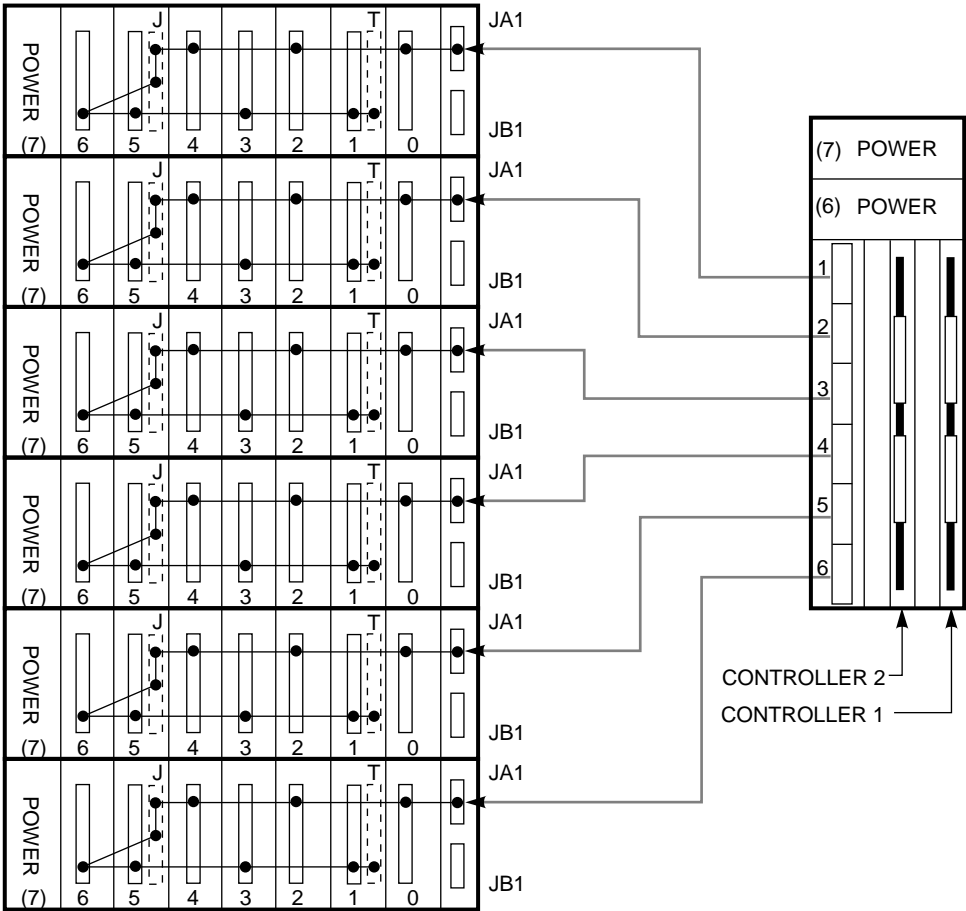
Figure 3–2 shows the cabling and location of the terminators and jumpers on each shelf for the 6x1 through 6x7 configurations. All of these configurations use SCSI-2 connector JA1 as an input connector. This results in the following configuration:

- The jumper board in slot 5 connects the two SBB shelf buses into a single bus.

- SCSI connector JA1 connects the controller to all seven SBB slots (device addresses 0 through 6).

- Digital recommends that a redundant power supply be installed in slot 6.

- Device address 6 cannot be used in a dual-rendundant controller configuration.

- The terminator board in slot 1 actively terminates the SCSI bus.

Figure 3–2   6x4 to 6x7 3½-Inch Buses

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3.4.4 5¼-Inch Bus Configurations

The 6x1 and 6x2 configurations can be installed in six SBB shelves. Expansion to either a 6x3 or a 6x4 5¼-inch bus requires 12 SBB shelves. For systems with only 5¼-inch devices, Digital recommends that 12 shelves also be installed for the 6x1 and 6x2 configurations to permit expansion. This section describes configurations using 12 shelves.

Figure 3–3 shows the cabling and location of the terminators and jumpers on each shelf for the 6x1 through 6x4 configurations. All of these configurations use SCSI-2 connector JA1 as an input connector. This results in the following configuration:

- The first (top) shelf in each pair does not have a terminator installed.

- The jumper board in slot 5 of the first shelf connects the two SBB shelf buses into a single bus and routes them to SCSI connector JB1, the output connector.

- The output connector of the first shelf is connected to the JA1, the input connector on the second shelf.

- SCSI connector JA1 on the second shelf connects the controller to all seven SBB slots (device addresses 0 through 6).
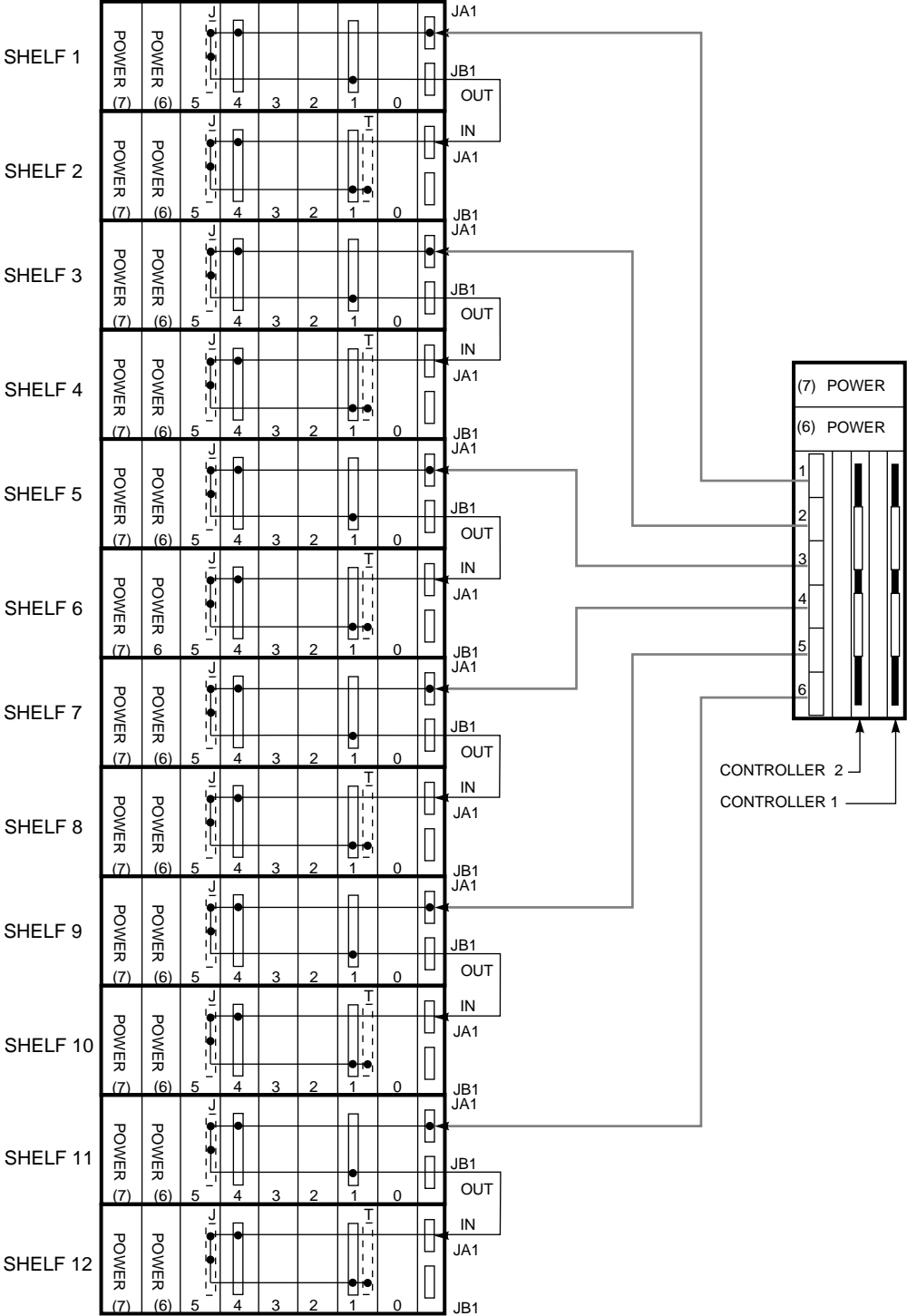
_____ **Note** _____

Connector JB1 can only be used as an output connector on a shelf that has a SCSI bus jumper board installed in slot 5 and no terminator board installed.

_____

Figure 3–3 6x1 to 6x4 5¼-Inch Buses

CXO-3841A-MC

4
Replacement Procedures

This chapter describes the detailed procedures for replacing a power supply or a blower, and the general procedures for replacing a BA350–MA controller shelf.

Note

Detailed procedures for replacing controllers are described in the *HS Family of Array Controllers User's Guide*. Detailed procedures for replacing storage SBBs are described in the *StorageWorks Family User's Guide*.

4.1 Replacing a Power Supply

There are two methods for replacing a power supply: the **hot-swap** method and
the **cold-swap** method.

- Use the hot-swap method to replace power supplies *only* when there are two
  power supplies in a shelf. This method allows you to remove the defective
  power supply while the other supply furnishes the power.

Note

A **hot-swap** is a method of power supply removal that does not disable
the controller shelf or the associated SCSI buses.

- The cold-swap method is normally used during initial installation or when
  there is no operational shelf power supply. Should this occur, the controller
  shelf, the controller, the cache module, and all associated SCSI buses are
  disabled. None of the devices is operational until the power is restored.

Note

The procedures for removing power supplies and SBBs are basically the
same.

Use the following procedure to remove or replace a power unit.

CAUTION

The power supply is relatively heavy and can be damaged if dropped.
Therefore, always use both hands to fully support the power supply
during removal or installation.

---

1. As shown in Figure 4–1, press the two mounting tabs together to release the
   power supply from the shelf.
2. Use both hands and pull the power supply out of the shelf.
3. Insert the replacement power supply into the guide slots and push it in until
   it is fully seated and the mounting tabs engage the shelf.
4. After input power is applied, observe the power supply status LEDs to make
   sure the power supply is functioning properly. Both status LEDs should be
   on.

Figure 4–1 Removing a Power Supply

CXO-3611B-PH

4.2 Replacing a Blower

The BA350–MA StorageWorks controller shelf has blowers mounted on the rear. Connectors on the backplane provide the +12 Vdc power to operate the blowers. When either blower fails, the shelf status (upper) LED on the power SBB is off and an error message is passed to the controller or host.

_____ **WARNING** _____

Service procedures described in this manual that involve blower removal or access to the rear of the shelf must be performed only by qualified service personnel.

To reduce the risk of electrical energy hazard, disconnect the power cables from the shelf power supplies before removing shelf blower assemblies or performing service in the backplane area, such as modifying the SCSI bus.

_____

Use the following procedure to replace a blower (see Figure 4–2).

1. If you cannot access the rear of the shelf, remove the shelf as described in Section 4.3.1.

2. Disconnect the power cables to the shelf power SBBs.

3. Use a Phillips screwdriver to remove the safety screw in the upper right corner or lower left corner of the blower.

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.

6. Align the replacement blower connector and push the blower straight in, making sure that both mounting tabs lock in place.

7. Replace the safety screw.

8. Replace the shelf as described in Section 4.3.2.

9. Connect the shelf power cables and verify that the shelf and all SBBs are operating properly.

_____ **Note** _____

If the upper power supply LED (shelf status) does not come on and all the shelf power supplies are operating, the second blower may have failed or the wrong blower was replaced.

_____

Figure 4–2 Replacing Blowers
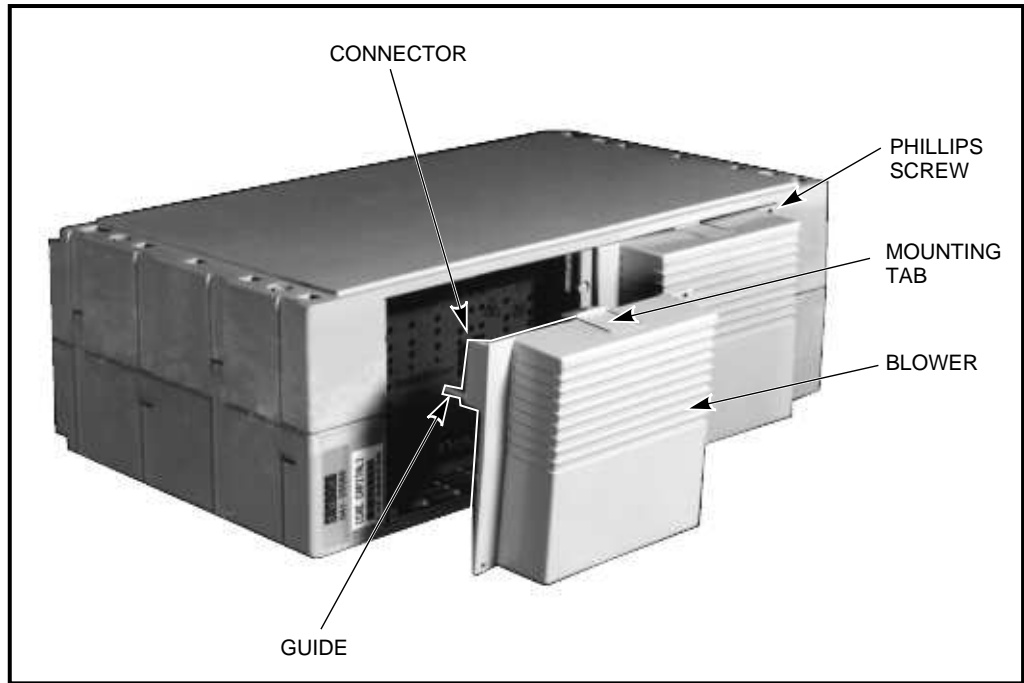
CXO-3659A-PH

4.3 Replacing a StorageWorks Shelf

The procedures for removing or replacing any StorageWorks shelf are basically the same. The major differences are the type of enclosure or cabinet in which the shelf is mounted and the shelf orientation. Usually the only time you would remove a shelf is to replace a blower.

Installing an additional shelf is not within the scope of this publication. Detailed instructions for mounting a shelf in a cabinet are contained in the cabinet installation guide listed in the Related Documents section of the preface.

4.3.1 Removing a Shelf

All shelves are inserted into a set of mounting brackets and secured in place with a front locking bracket. Complete the following procedure to remove a shelf:

1. Turn off the power to the shelf and disconnect the power cords.

2. Record the location of each storage device, controller, and cache module in the shelf.

3. Record the location of each controller interface cable.

4. Remove devices for access to the SCSI cable connectors.

5. Record the location of each SCSI cable.

6. Remove both the front locking brackets.

_____ **CAUTION** _____

Be sure to fully support the weight of the shelf with both hands at all times. Removing all the SBBs will significantly reduce the shelf weight.

_____

7. Note the shelf orientation and carefully slide it out of the mounting brackets.

4.3.2 Installing a Shelf

Complete the following procedure to replace a shelf:

1. Orient the shelf and carefully slide it into the mounting brackets.

2. When it is fully seated, install the front locking brackets.

3. Connect each SCSI cable to the same connector from which it was removed.

4. Install each SBB, controller, and cache module in the same location from which it was removed.

5. Connect each controller interface cable to the same connector from which it was removed.

6. Insert the power SBB and connect the power cord.

7. Turn on power to the shelf and ensure that the shelf, the power supplies, and all devices are functioning properly.

8. If you replaced a shelf blower, ensure that both blowers are functioning.

Glossary

ac distribution

The method of distributing ac power in a cabinet.

adapter

See *SCSI signal bus converter*.

ANSI

American National Standards Institute

array controller

See *controller*.

building block shelf

See *SBB*.

channel

Another term for a SCSI bus.

CI

Computer interface. The computer interconnect bus with two serial paths, each with a transfer rate of 70 Mb/s (8.75 MB/s).

cold-swap

A method of device replacement that requires that power be removed from one or more shelves in a cabinet, thereby affecting other devices therein. User applications that are not dependent upon the devices being swapped are impacted as a result. This method is used when conditions preclude the use of a warm-swap or hot-swap method. Normally, this method is only used when installing or upgrading a StorageWorks subsystem.

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

controller

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 what the devices support.

controller shelf

Any StorageWorks shelf that contains *only* controllers and cache memories, for example, a BA350–MA shelf.

data center cabinet

A generic reference to the large cabinets, such as the SW800 series, in which SBB shelves, controller shelves, or controller and SBB shelves can be mounted.

differential SCSI bus

A signal's level is determined by the potential difference between two wires. 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*.

electromagnetic interference

See *EMI*.

electrostatic discharge

See *ESD*.

EMI

Electromagnetic interference. The impairment of a signal by an electromagnetic disturbance.

ESD

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

full-height

(1) In the storage industry, a device of conventional dimensions. (2) A single device mounted in an 5¼-inch SBB. Full-height devices have an order number suffix of "VA."

FWD SCSI

The fast, wide, differential SCSI bus with a 16-bit data transfer rate of up to 20 MB/s.

See also *FD SCSI* and *SCSI*.

host

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

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. User applications that are not dependent upon the device being swapped are not impacted.

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

initiator

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

port

A logical route for data in and out of a controller. A port, in use, can contain one or more channels, all of which contain the same type data.

RAID

Redundant Array of Independent Disks

SBB

StorageWorks building block. The basic building block of the StorageWorks product line. Any device conforming to shelf mechanical and electrical standards installed in either a 3½-inch or 5¼-inch carrier is considered to be an SBB, whether it be a storage device, a power supply, a CPU, or other device.

SBB shelf

The common name for any StorageWorks shelf that contains only power supply and storage SBBs.

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 device

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

SCSI device ID

The bit-significant representation of the SCSI addressing referring to one of the signal lines numbered 0 through 7. Also referred to as *target ID*.

SCSI device-side device address

The eight device addresses (target IDs) assigned to the SCSI controller and the devices it controls.

See also *SCSI host-side device address*.

SCSI host-side device address

The eight device addresses (target IDs) assigned to the host device and the SCSI controllers and the devices it controls.

See also *SCSI device-side device address*.

SCSI port

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

SCSI–A cable

A 50-conductor (25 twisted pair) cable used for single-ended, SCSI–2 bus connections.

SCSI–P cable

A 68-conductor (34 twisted pairs) cable used for differential bus connections.

single-ended SCSI bus

Each signal's logic level is determined by the voltage of a single wire in relation to ground.

Small Computer System Interface

See *SCSI*.

StorageWorks

The Digital set of enclosure products 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 therein to form storage subsystems. System-level enclosures to house the shelves and standard mounting devices for SBBs are also included.

StorageWorks building block

See *SBB*.

tape

A storage device supporting sequential access to variable sized data records.

tape controller

See *controller*.

target

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

target ID

See *SCSI device ID*.

warm-swap

A method of device replacement whereby the complete system remains on line during device removal or insertion. Activity may be suspended or paused for a brief period of time during device insertion or removal. No booting or loading of code is permitted except on the device being inserted. User applications that are not dependent upon the devices on the *affected SCSI bus* are not noticeably impacted.

See also *cold-swap* and *hot-swap*.

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