ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *DIGITAL/Storage Works DS-BA356-SF* at our website: *Click HERE*

DIGITAL StorageWorks UltraSCSI SBB Shelf (DS–BA356 Series)

User's Guide

Part Number: EK–BU356–UG. A01

November 1997

This publication describes the UltraSCSI SBB shelf features, configurations, operating procedures, power distribution, storage devices, and specifications.

Digital Equipment Corporation
Maynard, Massachusetts

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

November 1997

Digital Equipment Corporation makes no representations that the use of its products in the manner described in this publication will not infringe on existing or future patent rights, nor do the descriptions contained in this publication imply the granting of licenses to make, use, or sell equipment or software in accordance with the description.

Possession, use, or copying of the software described in this publication is authorized only pursuant to a valid written license from Digital or an authorized sublicensor.

© Digital Equipment Corporation 1997. All rights reserved.

Note

This equipment has been tested and found to comply with the limits for a Class B 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 user's authority to operate this equipment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

DIGITAL, StorageWorks, and the DIGITAL logo are trademarks of Digital Equipment Corporation.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table of Contents

Preface

Intended Audience ix
Structure ix
Related Documents x
Documentation Conventions xi

Manufacturer's Declaration

Electromagnetic Compatibility xiii
Acoustic Noise Declarations xiv

1 Introducing the UltraSCSI SBB Shelf

Product Description 1–2
Shelf Status Displays 1–3
SBB Shelf and Pedestal Configurations 1–4
Single-Ended, UltraSCSI, Bus Configurations 1–4
Differential, UltraSCSI, Bus Configurations 1–7
Configure-to-Order (CTO) Shelf (DS–BA356–SG) 1–8

2 Configuration Rules

Buses 2–1
Storage Nodes 2–2
UltraSCSI I/O Modules 2–3
SBB Shelves 2–3
Trilink Connectors 2–3
Bus Expanders 2–4

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

3 Operating an UltraSCSI SBB Shelf

Shelf Status 3–1
SHELF Status Distribution 3–2
Blower Failure 3–3
Power Supply Failure 3–5
Device SBB Faults 3–7
Configuring the SBB Shelf I/O Module 3–8
External SCSI Bus Termination Settings 3–10
Setting the SCSI Bus IDs 3–12
Single Shelf Default Configurations 3–12
Dual Shelf Configurations 3–13
DIGITAL Supported Shelf Configurations 3–14
Single-Channel Configurations 3–15
Dual Channel, Single Shelf Configuration 3–20

4 Power Distribution

Power Supply Description 4–2
Power Supply Status Display 4–4

5 Storage Devices

Handling SBBs 5–2
SBB SCSI Bus IDs 5–3
SBB Status Reporting 5–4
Identifying a Storage Device 5–6
Replacing SBBs 5–8
The SBB Connector 5–8
SBB Replacement Methods 5–8
Hot Swap 5–9
Warm Swap 5–9
Cold Swap 5–9

6 Replacing Components

Replacing a Storage SBB 6–2
Replacing a Shelf Power Supply 6–4
Replacing a Blower Assembly 6–6
Replacing an I/O Module 6–8

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

A SBB Shelf Specifications

Physical Specifications A–1
Electrical Specifications A–2
Operating Environments A–3
SBB Thermal Stabilization A–4

B Connecting an UltraSCSI Subsystem

Components B–2
Selecting Components B–3
BN37A Series UltraSCSI Cables B–4
BN37B Series UltraSCSI Adapter Cables B–4
BN37C Series UltraSCSI “Y” Adapter Cables B–5
BN38A Series UltraSCSI Adapter Cables B–5
BN38B Series UltraSCSI Adapter Cables B–6
BN38E Series UltraSCSI Adapter Cables B–6
SCSI VHDCI Trilink Connector B–7
VHDCI Terminator Blocks B–8

Glossary

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Figures

Figure 1–1 Typical DS–BA356 UltraSCSI SBB Shelf 1–1
Figure 3–1 Shelf Status Jumper 3–3
Figure 3–2 Blower Status LEDs 3–4
Figure 3–3 Power Supply Status LEDs 3–6
Figure 3–4 SBB Status LEDs 3–7
Figure 3–5 Single-Ended UltraSCSI I/O Module 3–8
Figure 3–6 External Termination Switches 3–10
Figure 3–7 Single Shelf Switch Settings 3–12
Figure 3–8 Dual Shelf Switch Settings 3–13
Figure 4–1 Power Supply 4–1
Figure 4–2 Power Supply Status LEDs 4–4
Figure 5–1 SBB Handling 5–2
Figure 5–2 SBB Shelf Layout 5–3
Figure 5–3 SBB Status LEDs 5–4
Figure 5–4 Typical Regulatory Label 5–6
Figure 5–5 Typical SBB Bezel Label 5–7

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Tables

Table 1-1 Single-Ended SBB Shelves—Metric Cabinet (DS–BA356–J Series) 1–5
Table 1-2 Single-Ended SBB Shelves—RETMA Cabinet (DS–BA356–R Series) 1–5
Table 1-3 Single-Ended SBB Shelves (DS–BA356–S Series) 1–6
Table 1-4 Single-Ended SBB Pedestals (DS–BA356–K Series) 1–6
Table 1-5 Differential SBB Shelf (DS–BA356–JF) 1–7
Table 1-6 Differential UltraSCSI SBB Shelf (DS–BA356–SF) 1–7
Table 1-7 Differential UltraSCSI Pedestals (DS–BA356–KH) 1–8
Table 1-8 Configure to Order SBB Shelf (DS–BA356–SG) 1–8
Table 3-1 Single Power Supply Status Displays 3–4
Table 3-2 Dual Power Supply Status Displays 3–6
Table 3-3 SBB Status Displays 3–7
Table 3-4 Setting Bus Termination and Device Addresses 3–9
Table 3-5 Termination Switch Settings 3–11
Table 3-6 Single-Channel, Single Shelf Configuration 3–15
Table 3-7 Single-Channel, Dual Shelf Configuration 3–17
Table 3-8 Dual-Channel, Single Shelf Configuration 3–20
Table 4-1 Power Supply Specifications 4–2
Table 4-2 DIGITAL-Supported Power Configuraitons 4–3
Table 4-3 Single Power Supply Status Displays 4–4
Table 4-4 Dual Power Supply Status Displays 4–5
Table 5-1 SBB Status LEDs 5–5
Table 6-1 SBB Replacement 6–3
Table 6-2 Power Supply Replacement 6–5
Table 6-3 Blower Replacement 6–7
Table 6-4 I/O Module Replacement 6–9

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Preface

The *DIGITAL StorageWorks UltraSCSI SBB Shelf (DS–BA356 Series) User's Guide* describes the purpose, function, installation, and use of the storage shelf including the configuration rules and procedures, power distribution, StorageWorks building blocks (SBBs), and specifications.

Intended Audience

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

Structure

This manual is organized as follows:

Chapter 1
Describes SBB shelves including functions, uses, components, and features.

Chapter 2
Describes the rules for configuring buses, nodes, I/O modules, SBB shelves, trilink connectors, and bus expanders.

Chapter 3
Describes the operation, functions, uses, and configuration procedures for an SBB shelf.

Chapter 4
Describes SBB shelf power distribution, monitoring, and status reporting.

Chapter 5
Describes the SBB handling, monitoring, and status reporting.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Chapter 6
Describes the procedures for replacing shelf components.

Appendix A
Describes the SBB shelf physical, electrical, and environmental specifications.

Appendix B
Describes the interconnection of components required in various configurations of UltraSCSI subsystems.

Glossary
Contains definitions of StorageWorks and SCSI terminology.

Related Documents

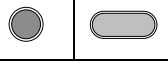
The following publications contain additional information about UltraSCSI shelf products.

Publication Title	Order Number
10-Shelf Departmental Server User's Guide	EK–SW500–UG
16–bit Pedestal (BA356 Series) User's Guide	EK–356KB–UG
16–bit SBB User's Guide	EK–SBB16–UG
24-Shelf Data Center Cabinet (SW800 Series) User's Guide	EK–SW800–UG
RETMA Shelf Rail Kit Installation Guide	EK–35XRB–IG
SBB Shelf I/O Module User's Guide	EK–SBBIO–UG
SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

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.
italic type	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

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Manufacturer’s Declaration

Based on product testing in accordance with country-specific standards, DIGITAL declares that this product is in compliance with the following standards.

Electromagnetic Compatibility

You can install this **CE–Mark**, **Class B certified device** in commercial, office, and home environments.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Acoustic Noise Declarations

DIGITAL declares that the DS–BA356 series, UltraSCSI SBB shelf has the same acoustic values as the StorageWorks BA356–JC SBB shelf:

Acoustics – Declared Values per ISO 9296 and ISO 7779:				
	Sound Power Level L_{WAd}, B		Sound Pressure Level L_{pAm} dBA (bystander positions)	
Product	Idle	Operate	Idle	Operate
BA356–JC SBB Shelf	5.6	5.6	37	37
BA356–JC SBB Shelf with: 7 ea. RZ29B–VA Disk Drives	5.8	5.9	40	41

Note

Current values for sound power levels are available from DIGITAL representatives. 1 Bel = 10 dBA.

Schallemissionswerte — Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779:				
	Schalleistungspegel L_{WAd}, B		Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)	
Gerät	Leerlauf	Betrieb	Leerlauf	Betrieb
BA356–JC	5,6	5,6	37	37
BA356–JC with: 7 ea. RZ29B–VA	5,8	5,9	40	41

Note

Aktuelle Werter für spezielle Austüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 Bel = 10 dBA.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

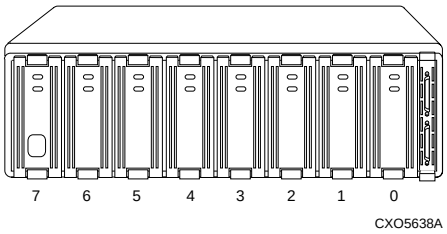
1
Introducing the UltraSCSI SBB Shelf

The **StorageWorks™ UltraSCSI SBB shelf** (SBB Shelf), DS–BA356 series (see Figure 1–1) is a basic component of an UltraSCSI subsystem. This shelf can be installed in either a **data center cabinet**, a **departmental server cabinet**, or a **pedestal**

Note

The DS– model number prefix indicates new DIGITAL storage products and may be similar, *but not interchangeable*, to existing model numbers. Examples of these are the DS–BA356 series UltraSCSI SBB shelves and BA356 series SBB shelves.

Figure 1–1 Typical DS–BA356 UltraSCSI SBB Shelf



™ StorageWorks is a trademark of Digital Equipment Corporation.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Product Description

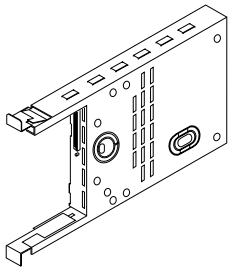
The SBB shelves are factory configured for one of the following storage applications:

- A **single-ended bus** with a single **channel**
- A single-ended bus with dual channels
- A **differential bus** with a single channel

The characteristics of SBB shelves are:

- Each shelf is 150 mm (5.9 in) high, 445 mm (17.5 in) wide, and 350 mm (13.8 in) deep.
- Each shelf can accommodate a maximum of eight 3.5–inch StorageWorks building blocks (SBBs) configured as follows:
  - Seven storage **devices** and one power supply.

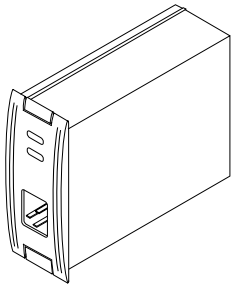
    or
  - Six storage devices and two power supplies.
  - A 5.25-inch SBB uses three SBB slots. Therefore, only a total of two 5.25-inch SBBs can be installed in one shelf.
- The shelf SBB guide slots are designed so that the SBBs automatically align with the backplane connectors.
- The slots are numbered from right to left, 0 through 7.
  - The SBB shelf *I/O module*, located at the right end of the shelf, assigns SCSI bus IDs to the backplane connectors. The default is SCSI bus IDs 0—6. This module provides termination for both the internal shelf bus and the external bus. The termination bus width and implementation are switch selectable by the user.
  - Storage devices mount in Slots 0 through 6.
  - Slots 0 through 5 each have one storage device backplane connector.
  - Slot 6 has two backplane connectors—one for a storage **device connector** and one for a power supply.
  - Slot 7 has only a power supply backplane connector.



Shelf I/O module

CXO6067A

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com



Power supply

CXO6068A

—— The primary power supply (DS–BA35X–HH) *ALWAYS* mounts in Slot 7.

—— The redundant power supply *ALWAYS* mounts in Slot 6. Using a **redundant power configuration** reduces the total number of 3.5-inch storage devices in a shelf to six.

- The shelves can be mounted in DIGITAL™ SW500– and SW800 series cabinets, either horizontally or vertically, using a **metric shelf mounting kit** (BA35X–RD).
- The shelves can be mounted either horizontally or vertically in a cabinet with **RETMA** mounting rails, using a **RETMA mounting kit** (DS–BA35X–RK). This kit is used with the DS–BA356–R series shelves.
- The shelf can be mounted in a pedestal using the DS–BA35X–VB pedestal kit.

Shelf Status Displays

The only conditions that can affect the entire shelf are power and cooling. The power supply status LEDs display the status of the shelf power supplies and the **blower assemblies**.

™ DIGITAL is a trademark of Digital Equipment Corporation.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

SBB Shelf and Pedestal Configurations

DIGITAL has developed a series of shelf and SBB configurations for specific UltraSCSI subsystem requirements. These configurations may be modified to meet specific system requirements.

The primary consideration in developing these configurations is the external SCSI bus configuration, either single-ended or differential.

Single-Ended, UltraSCSI, Bus Configurations

Tables 1–1 through 1–4 list the shelves and pedestals (DS–BA356 series) that are used with single-ended UltraSCSI buses.

- –J series are the SBB shelves with an I/O module and power supply with a metric mounting kit.
- –K series are SBB shelves with an I/O module and a power supply mounted in a pedestal kit.
- –R series are the SBB shelves with an I/O module and power supply with a RETMA mounting kit.
- –S series are SBB shelves with an I/O module, but without mounting hardware or power supplies.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 1-1 Single-Ended SBB Shelves—Metric Cabinet (DS–BA356–J Series)

Component Description	Model No.	Quantity per	
		–JD	–JE
Single-Channel, Single-Ended, I/O Module	DS–BA35X–FA	1	0
Dual-Channel, Single-Ended, I/O Module	DS–BA35X–FB	0	1
Primary, 180 W, Power Supply	DS–BA35X–HH	1	1
16–Bit, SBB Shelf, Jumper Board	BA35X–MF	1	0
16–Bit, SBB Shelf, Terminator Board	BA35X–ME	0	1
Shelf Mounting Kit Brackets—Metric	BA35X–RD	1	1
User-Ordered Components			
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R	A/R

Table 1-2 Single-Ended SBB Shelves—RETMA Cabinet (DS–BA356–R Series)

Component Description	Model No.	Quantity per	
		–RC	–RD
Single-Channel, Single-Ended, I/O Module	DS–BA35X–FA	1	0
Dual-Channel, Single-Ended, I/O Module	DS–BA35X–FB	0	1
Primary, 180 W, Power Supply	DS–BA35X–HH	1	1
16–Bit, SBB Shelf, Jumper Board	BA35X–MF	1	0
16–Bit, SBB Shelf, Terminator Board	BA35X–ME	0	1
Shelf Mounting Kit Brackets—RETMA	BA35X–RK	1	1
User-Ordered Components			
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R	A/R

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 1-3 Single-Ended SBB Shelves (DS–BA356–S Series)

Component Description	Model No.	Quantity per	
		–SD	–SE
Single-Channel, Single-Ended, I/O Module	DS–BA35X–FA	1	0
Dual-Channel, Single-Ended, I/O Module	DS–BA35X–FB	0	1
16–Bit, SBB Shelf, Jumper Board	BA35X–MF	1	0
16–Bit, SBB Shelf, Terminator Board	BA35X–ME	0	1
User-Ordered Components			
Primary, 180 W, Power Supply	DS–BA35X–HH	1	1
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R	A/R
Shelf Mounting Kit Brackets—RETMA	BA35X–RK	1	1
Shelf Mounting Kit Brackets—RETMA	BA35X–RK	1	1
Pedestal Kit	DS–BA35X–VB	A/R	A/R

Table 1-4 Single-Ended SBB Pedestals (DS–BA356–K Series)

Component Description	Model No.	Quantity per	
		–KF	–KG
Single-Channel, Single-Ended, I/O Module	DS–BA35X–FA	1	0
Dual-Channel, Single-Ended, I/O Module	DS–BA35X–FB	0	1
Primary, 180 W, Power Supply	DS–BA35X–HH	1	1
16–Bit, SBB Shelf, Jumper Board	BA35X–MF	1	0
16–Bit, SBB Shelf, Terminator Board	BA35X–ME	0	1
Pedestal Kit	DS–BA35X–VB	1	1
User-Ordered Components			
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R	A/R

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Differential, UltraSCSI, Bus Configurations

Tables 1–5 through 1–7 identify the differential UltraSCSI shelves and pedestals (DS–BA356 series).

Table 1-5 Differential SBB Shelf (DS–BA356–JF)

Component Description	Model No.	Quantity per Shelf
Single-Channel, Differential, I/O Module	DS–BA35X–DA	1
Primary, 180 W, Power Supply	DS–BA35X–HH	1
16–Bit, SBB Shelf Jumper Board	BA35X–MF	1
Shelf Mounting Kit—Metric	BA35X–RD	1
User-Ordered Components		
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R

Table 1-6 Differential UltraSCSI SBB Shelf (DS–BA356–SF)

Component Description	Model No.	Quantity per Shelf
Single-Channel, Differential, I/O Module	DS–BA35X–DA	1
16–Bit, SBB Shelf Jumper Board	BA35X–MF	1
User-Ordered Components		
Primary, 180 W, Power Supply	DS–BA35X–HH	1
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R
Shelf Mounting Kit—Metric	BA35X–RD	A/R
Shelf Mounting Kit—RETMA	BA35X–RB	A/R

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 1-7 Differential UltraSCSI Pedestals (DS–BA356–KH)

Component Description	Model No.	Quantity per Pedestal
Single-Channel, Differential, I/O Module	DS–BA35X–DA	1
Primary, 180 W, Power Supply	DS–BA35X–HH	1
16–Bit, SBB Shelf Jumper Board	BA35X–MF	1
Pedestal Kit	DS–BA35X–VB	1
User-Ordered Components		
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R

Configure-to-Order (CTO) Shelf (DS–BA356–SG)

The DS–BA356–SG UltraSCSI SBB shelf is an “empty” shelf with a 16-bit jumper board. The user is responsible ordering the components to create an operational shelf. This includes power supplies, I/O modules, mounting kits (shelf or pedestal), terminator boards, and storage SBBs.

Table 1-8 Configure to Order SBB Shelf (DS–BA356–SG)

Component Description	Model No.	Quantity per Shelf
16–Bit, SBB Shelf, Jumper Board	BA35X–MF	1
User-Ordered Components		
Primary, 180 W, Power Supply	DS–BA35X–HH	1
Redundant, 180 W, Power Supply	DS–BA35X–HH	A/R
Shelf Mounting Kit—Metric	BA35X–RD	A/R
Shelf Mounting Kit—RETMA	BA35X–RB	A/R
Pedestal Kit	DS–BA35X–VB	A/R
16–Bit, SBB Shelf, Terminator Board	BA35X–ME	A/R
8-bit I/O Module (FAST 10 Only)	BA35X–MG	A/R
16–bit I/O Module (FAST 10 Only)	BA35X–MH	A/R
Single-Channel, Single-Ended, I/O Module	DS–BA35X–FA	A/R
Dual-Channel, Single-Ended, I/O Module	DS–BA35X–FB	A/R
Single-Channel, Differential, I/O Module	DS–BA35X–DA	A/R

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

2
Configuration Rules

The configuration rules contained in this chapter—when applied to UltraSCSI components—reduce possible conflicts and improve subsystem operations.

Note

The use of the terms “device” and “node” interchangeably can cause possible conflicts. In this chapter, the term “node” refers to a SCSI bus device that uses a SCSI bus address.

Buses

The following rules apply to the buses:

1. The following SCSI bus devices use a SCSI bus address and are SCSI bus nodes:
   - **Adapter**s
   - **Controllers**
   - Storage devices
2. The following devices *do not use* a SCSI bus address and *are not* SCSI bus “nodes:”
   - SCSI **bus expanders** (DS–DWZZC series)
   - I/O modules (DS–BA35X–D or DS–BA35X–F series)
   - Shelf power supplies
3. Every node on a bus must have an unique SCSI ID.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

4. The SCSI ID for the primary controller is *always* **7**. This ID *cannot be used* for any other node.
5. When there is a redundant controller, it uses SCSI bus ID **6**. *You may use SCSI bus ID 6 for a storage device only when there is no redundant controller*.
6. There are slots for seven 3.5–inch SBB nodes in a shelf. The I/O module address switch determines the SCSI bus IDs. The default IDs are 0 through 6.

   When there is a redundant controller, SCSI bus ID 6 cannot be used
7. There is a maximum of **14** valid SCSI IDs—0 through 6 and 8 through 14. Although a redundant power supply does not use a SCSI bus ID, when it is installed SCSI bus IDs 6 and 14 are no longer available.
8. With *all* **UltraSCSI device**s, the maximum transfer rate of an UltraSCSI bus is 40 **MB/sec**.
9. If a **FAST 10** device is added to an UltraSCSI system, the UltraSCSI system performance can be degraded.
10. Narrow devices can only use SCSI IDs 0 through 6.
11. A narrow (–VA suffix), FAST 10 device in an UltraSCSI shelf has a maximum transfer rate of 10 MB/sec.
12. A wide (–VW suffix), FAST 10 device has a 20 MB/sec transfer rate.

Storage Nodes

The following rules apply to SCSI storage nodes, such as disks, tapes, and so forth:

1. A storage node cannot use SCSI bus ID 7.
2. A storage node *cannot* use SCSI bus ID 6 when there is a redundant controller.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

UltraSCSI I/O Modules

The following rules apply to I/O modules in SCSI SBB shelves:

1. The only SBB shelf compatible, I/O modules are the DS–BA35X–DA (differential) and the DS–BA35X–F (single-ended) series.
2. Connecting a trilink connector requires that the external bus termination on the associated I/O module **port** be disabled.
3. Neither the BA35X–MG (narrow) nor the BA35X–MH (wide), I/O modules are UltraSCSI bus compatible. Installing these I/O modules restricts the shelf to FAST 10 operation.

SBB Shelves

The following rules apply to the UltraSCSI, SBB shelves:

1. Shelves (DS–BA356 series) are not compatible with the UltraSCSI enclosure (DS–BA370). *Expanding an enclosure bus with these shelves is not possible.*
2. Shelves require 180 W power supplies.
3. Shelves support the following SCSI buses:
   - UltraSCSI (**FAST 20**) with SCSI bus IDs 0 through 6 or 8 through 14 at a maximum transfer rate of 40 MB/sec.
   - Wide, FAST 10, SCSI devices (–VW suffix), SCSI bus IDs 0 through 6 and 8 through 14 at a maximum transfer rate of 20 MB/sec.
   - Narrow, FAST 10, SCSI devices (–VA suffix), SCSI bus IDs 0 through 6 at a maximum transfer rate of 10 MB/sec.

Trilink Connectors

An UltraSCSI trilink connector requires that the external bus termination on the I/O module port be disabled.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Bus Expanders

The following rules apply to the use of bus expanders with an UltraSCSI, SBB shelf:

1. The only UltraSCSI, SBB shelf, compatible expanders are the table-top DS–DWZZC– series.
2. The DWZZA series expanders *are not* UltraSCSI bus compatible.
3. The DWZZB series expanders *are not* UltraSCSI bus compatible.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

3
Operating an UltraSCSI SBB Shelf

This chapter describes the procedures for configuring:

- The StorageWorks fault bus
- Shelf status reporting
- I/O modules
- Specific shelf configurations

Shelf Status

The **shelf power supply** provides dc power, and the blowers cool the components:

- Failure of a shelf blower can result in devices overheating and failing. Internal shelf circuitry ensures that whenever a blower is nonoperational or rotating too slowly, the other blower automatically switches to high speed to increase air flow through the shelf.

  The I/O module circuitry monitors the air flowing through the module. Should the air temperature exceed 32°C ± 2°C (90°F ± 3°F), this circuitry automatically switches both blowers to high speed.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Caution



The only compatible SBB shelf blower is model DS–BA35X–MQ, a dual-speed device. *Do not install any other model.*

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 damaged storage devices.* It is recommended that a replacement blower be available.

- When there is only *one* power supply on a shelf, the failure of that supply causes the storage devices to fail.
- When there are *two* power supplies on a shelf, the failure of *both* supply causes the storage devices to fail.

Each SCSI bus has the status signal, SHELF_OK. This signal is the result of logically "*anding*" a signal based on the speed of the blowers and the "power good" signals for all power supplies on the shelf.

SHELF Status Distribution

The controller can process the SHELF_OK signal only when you configure the shelf to distribute this signal to the controller. The **backplane**, jumper W1 controls distribution of the SHELF_OK signal.

Caution



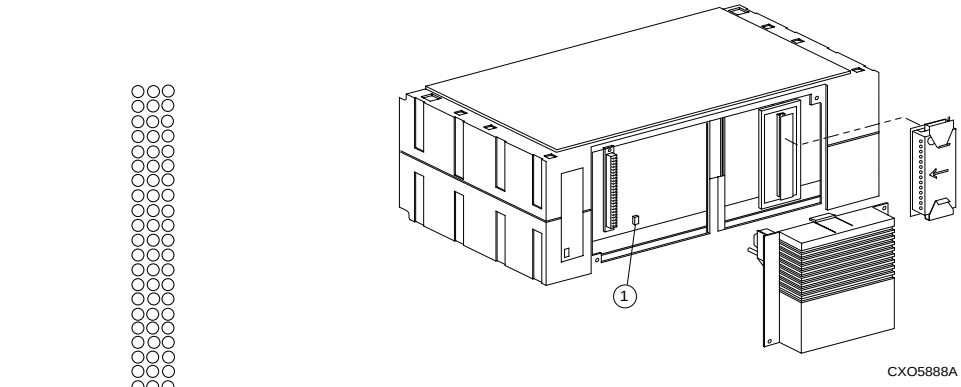
Not all adapters and controllers can process the SHELF_OK signal. *Before* installing the SHELF_OK jumper, read the controller documentation to determine if the controller can process the SHELF_OK signal.

If the controller or adapter does NOT support the signal, do NOT install the SHELF_OK jumper. If the jumper is installed, an incorrect display can be generated.

The SHELF_OK connector ① is located adjacent to connector J12, which is behind the left-hand blower.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Figure 3–1 Shelf Status Jumper



When the controller or adapter can process the SHELF_OK signal, install jumper W1 to route the signal to the I/O module.

Blower Failure

When a blower malfunctions, the SHELF_OK signal changes state and initiates the following actions:

- Turns OFF the SHELF_OK LED on all the shelf power supplies.
- Notifies the adapter or controller that there is a problem (if the adapter or controller support the SHELF_OK signal).
- When a blower malfunctions, the other blower shifts to high speed which provides adequate cooling for up to 100 hours. Continued operation with a malfunctioning blower can adversely affect the SBB.

Removing a defective blower can cause the remaining blower to revert to the low-speed mode of operation. Even if the remaining blower operates at high speed, the change in the shelf air flow pattern can result in devices overheating within 60 seconds.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Caution

To prevent overheating, *do not operate* an SBB shelf with a blower removed for more than 1 minute.

Figure 3–2 Blower Status LEDs

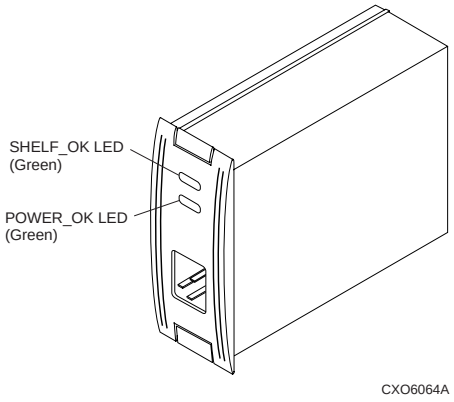
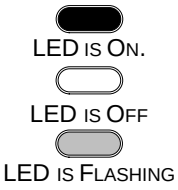


Table 3-1 Single Power Supply Status Displays



If the LED display is…	the Blower status is…
	The shelf blowers and power supply are functioning properly.
	One or more shelf blowers have failed. There is no power supply problem. Identify and replace the defective shelf blower.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com



Caution

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

Note

The power supply LEDs display blower error conditions. However, they do not identify the defective blower.

Power Supply Failure

All SBB shelves can accommodate either one or two power supplies. The failure of either power supply causes the SHELF_OK signal to change. DIGITAL recommends replacing the defective power as soon as possible to restore the subsystem to full operational status.



Caution

The SBB shelf *requires* power supplies rated for a minimum of 180 W. Do *not* use any shelf power supply with a lower rating.

When a power supply malfunctions, the SHELF_OK signal changes state and initiates the following actions:

- Turns OFF the green SHELF_OK LED (upper) on all the shelf power supplies
- Turns OFF the green POWER_OK LED (lower) on the malfunctioning shelf power supply

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Figure 3–3 Power Supply Status LEDs

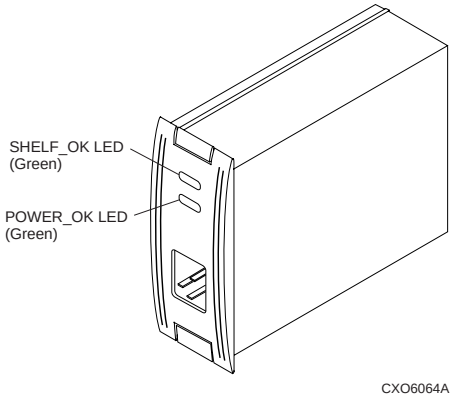


Table 3-2 Dual Power Supply Status Displays

LED IS ON.
LED IS OFF
LED IS FLASHING

If the LED displays are…		
Slot 7	**Slot 6**	**The power supply status is…**
		The Slot 7 shelf power supply is functioning properly. The Slot 6 shelf power supply is nonoperational. Replace the Slot 6 shelf power supply.
		The Slot 6 shelf power supply is functioning properly. The Slot 7 shelf power supply is nonoperational. Replace the Slot 7 shelf power supply.
		One of the following conditions exists: 1. Both power supplies are nonoperational. 2. There is no ac power.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Device SBB Faults

These faults are for SBBs that are attached to adapters or controllers that support fault bus protocol. The controller uses the combination of the SBB shelf status signals to control the amber device fault LED.

Figure 3–4 SBB Status LEDs

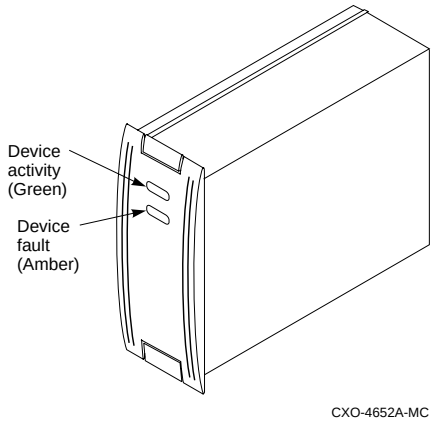


Table 3-3 SBB Status Displays

LED is ON.
LED is OFF
LED is FLASHING

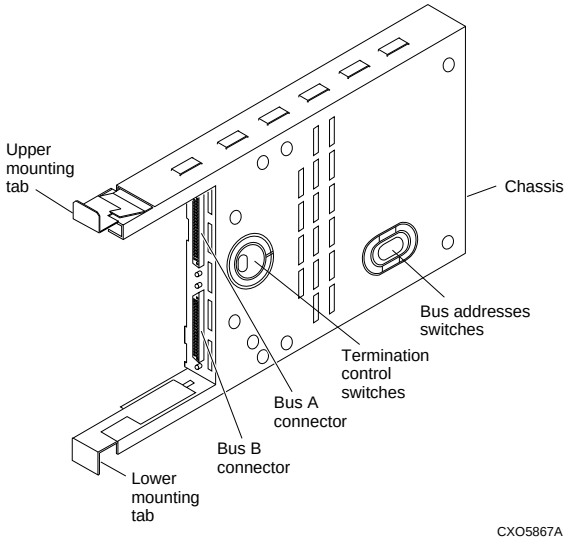
If the LED display is…	the Blower status is…
	The SBB is probably not responding to control signals. DIGITAL recommends that you replace the SBB.
	The SBB is active and is spinning down due to the fault. DIGITAL recommends replacing the SBB after the device has spun down..
	In response to a fault bus message, the controller is spinning down the device. DIGITAL recommends replacing the SBB after the device has spun down.
	The SBB is inactive and spun down. Replace the SBB.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Configuring the SBB Shelf I/O Module

This section is an overview of the procedures for configuring either a single-ended or differential, UltraSCSI shelf, I/O module. These procedures set both the SCSI bus **terminator** and the storage device SCSI bus IDs. For detailed information about the I/O modules, see the *Digital StorageWorks SBB Shelf I/O Modules User's Guide*.

Figure 3–5 Single-Ended UltraSCSI I/O Module

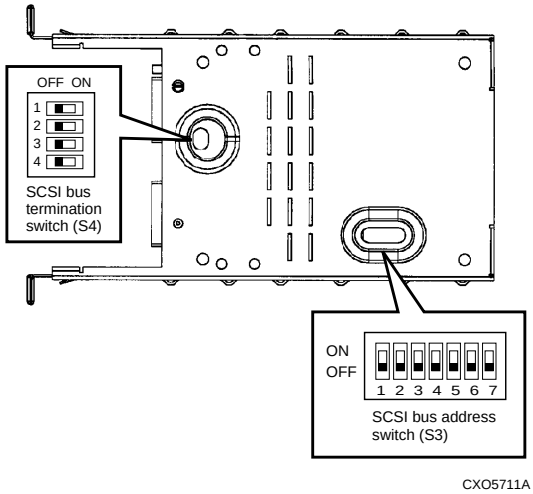


Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Complete the procedure in Table 3-4 to set the bus termination and SBB device addresses.

Table 3-4 Setting Bus Termination and Device Addresses

1. Use switch S4 to set the SCSI bus termination per Table 3-5.



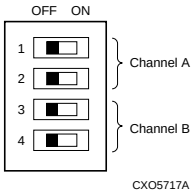
2. Use switch S3 to set the shelf device address per either Figure 3–5 or Figure 3–6.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

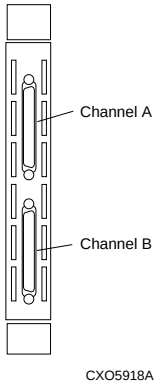
External SCSI Bus Termination Settings

Switch S4 (see Figure 3–6) determines the external SCSI bus terminations.

Figure 3–6 External Termination Switches

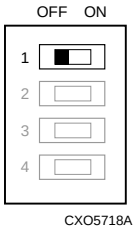
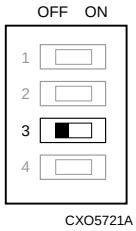
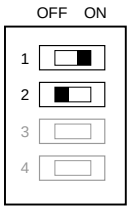
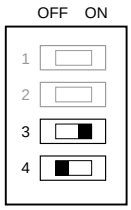
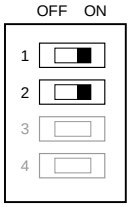
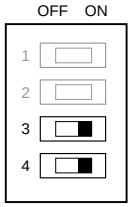


1. The top two switches (S4–1 and S4–2) control termination for channel A on both single-channel and dual-channel, I/O modules.
2. The bottom two switches (S4–3 and S4–4) control termination for channel B on dual-channel I/O modules.



Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 3-5 Termination Switch Settings

Configuration	Channel A	Channel B
16–Bit External Bus Termination This configuration terminates all SCSI bus bits (full termination). Use this configuration when the shelf is the end point in a SCSI bus. As long as Switch–1 is on in Channel A and Switch–3 is on in Channel B, the rest of the switch settings in both channels have no significance.	 CXO5718A	 CXO5721A
8-Bit External Bus Termination This configuration terminates only the upper 8 data bits. Use this configuration when the input bus is a wide (16–bit) bus—it continues as a narrow (8-bit) bus. Use this configuration to extend the bus to a narrow device using a trilink. As long as Switches–1 and –2 are on in Channel A, and Switches–3 and –4 are on in Channel B, the rest of the switch settings in both channels have no significance.	 CXO5719A	 CXO5722A
External Bus Expansion There is no termination on the shelf in this configuration. Use this configuration when the shelf is not an end point of a SCSI bus segment. As long as Switches–1 and –2 are on in Channel A and Switches–3 and –4 are on in Channel B, the rest of the switch settings in both channels have no significance.	 CXO5720A	 CXO5723A

Note

Switches S4–3 and S4–4 have no function on any single-channel I/O module.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

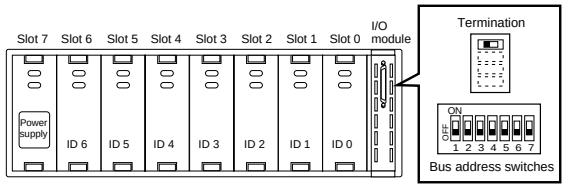
Setting the SCSI Bus IDs

A SCSI bus has 16 SCSI bus IDs, 0 through 15. Each SBB shelf can have a maximum of seven 3.5–inch SBBs. Therefore, 14 devices is the physical limit for two SBB shelves in a single bus configuration.

Single Shelf Default Configurations

The rules for single shelf configurations (see Figure 3–7) are as follows:

Figure 3–7 Single Shelf Switch Settings



- If a second power supply is added, it goes in slot 6.
- When there is a redundant controller, it uses SCSI bus ID 6. This limits the SCSI IDs to six (0 through 5).
- Shelf bus address 0 sets SCSI bus IDs 0 through 6.

DIGITAL supports the following single shelf configurations:

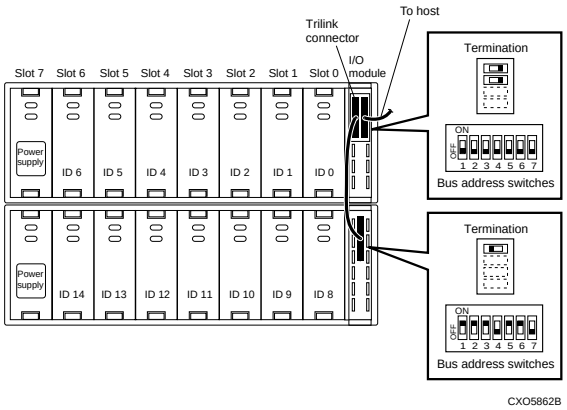
- One power supply and one controller—SCSI IDs 0 through 6
- Two power supplies and one controller—SCSI IDs 0 though 5
- One power supply and dual controllers—SCSI IDs 0 through 5
- Two power supplies and dual controllers—SCSI IDs 0 through 5

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Dual Shelf Configurations

The rules for dual shelf configurations (see Figure 3–8) are as follows:

Figure 3–8 Dual Shelf Switch Settings



- Using two power supplies on both SBB shelves reduce the total number of 3.5–inch devices on a single bus to **12** (SCSI bus IDs 0 through 5, and 8 through 13).
- When shelf bus address switches on shelf one are all set to **OFF**, then the SCSI bus IDs are 0 through 6 on the first shelf.
- When shelf bus address switches 1, 2, 3, 5, and 6 on shelf 2 are set to **ON** and 4 and 7 are set to **OFF**, then SCSI bus IDs are 8 through 14.
- Without a redundant controller, the valid SCSI, storage device IDs are 0 through 6 and 8 through 14—a total of 14 devices.
- When there is a redundant controller (using SCSI ID 6), the valid SCSI storage device IDs are 0 through 5 and 8 through 14—a total of 13 devices.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

DIGITAL Supported Shelf Configurations

There are many possible SBB shelf configurations. However, to ensure optimum operation, DIGITAL recommends using only the following configurations:

- A single-ended bus, single-channel configuration for:
  - Creating a single shelf, 7- or 6–device configuration with SCSI bus IDs 0 through 6 or 0 through 5 (default configuration)
  - Daisy chaining two shelves with a trilink connector to enable a single **host** or controller to control a maximum of 14 devices
- A single-ended bus, dual-channel configuration for connecting two hosts to a single dual-bus mode shelf:
  - Channel A, 4 device address—0, 2, 4, 6
  - Channel B, 3 device address—1, 3, 5
- A differential bus, single-channel configuration for:
  - Creating a single shelf, 7- or 6–device configuration with SCSI bus IDs 0 through 6 or 0 through 5
  - Creating a single shelf, 7- or 6–device configuration with SCSI bus IDs 8 through 14 or 8 through 13
  - Daisy chaining two shelves with a trilink connector to enable a single host or controller to control a maximum of 14 devices

As described in Chapter 1 and Appendix B, each configuration has standard components furnished with all shelves:

- User-ordered components that are required for proper operation, such as cables, power supplies, and so forth
- Optional components to create special configurations

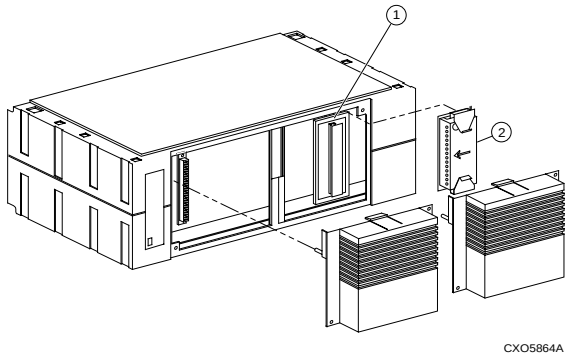
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Single-Channel Configurations

You can configure single-channel, I/O modules to function in either:

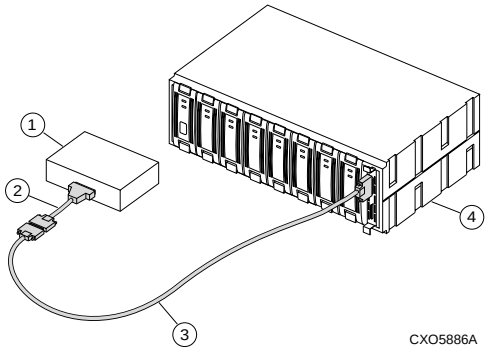
1. A single-channel, single shelf, 6– or 7-SBB configuration (see Table 3–2).
2. A single-channel, dual shelf, 14-SBB configuration (see Table 3–3).

Table 3-6 Single-Channel, Single Shelf Configuration

SBB Shelf Termination

1. 16–Bit Terminator Board (BA35X–ME) 2. EMI Shield

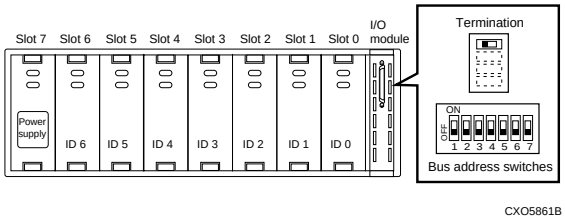
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 3–6 Single-Channel, Single Shelf Configuration (Continued)

Cabling
 1. Adapter or controller 2. Optional adapter cable (BN38x series) 3. 68 conductor VHDCI cable (BN37A series) 4. A single channel shelf or pedestal

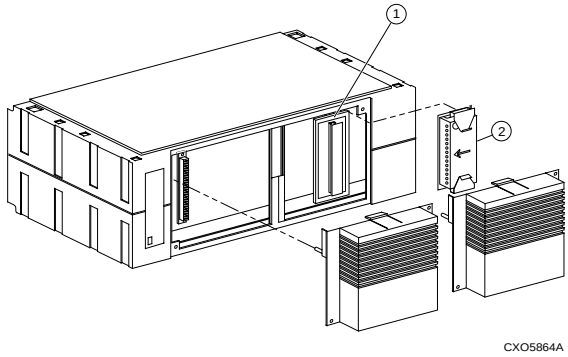
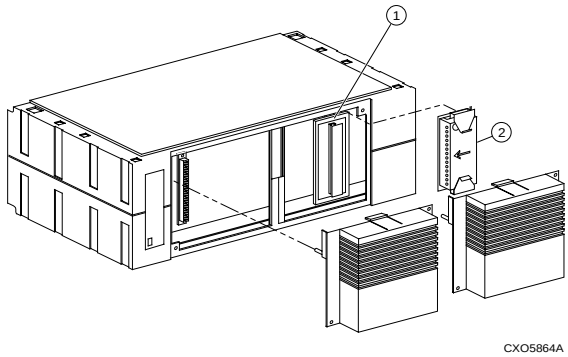
Note

The maximum combined length of cables 2 and 3 is 20 m (65.6 ft

Termination and Address Switch Settings
 1. The I/O module terminates the external bus 2. The terminator board (BA35X–ME) terminates the internal bus. 3. SCSI address 0 sets SBB SCSI IDs 0 through 6

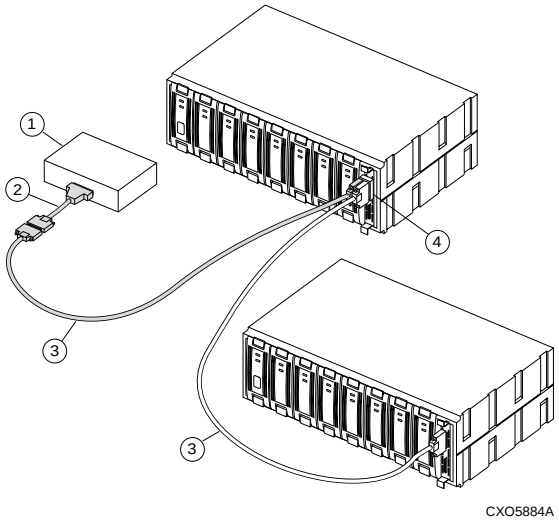
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 3-7 Single-Channel, Dual Shelf Configuration

First SBB Shelf Termination
 1. 16–Bit Jumper (BA35X–MF) 2. EMI Shield
Second SBB Shelf Termination
 1. 16–Bit Terminator Board (BA35X–ME) 2. EMI Shield

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 3–7 Single-Channel, Dual Shelf Configuration (Continued)

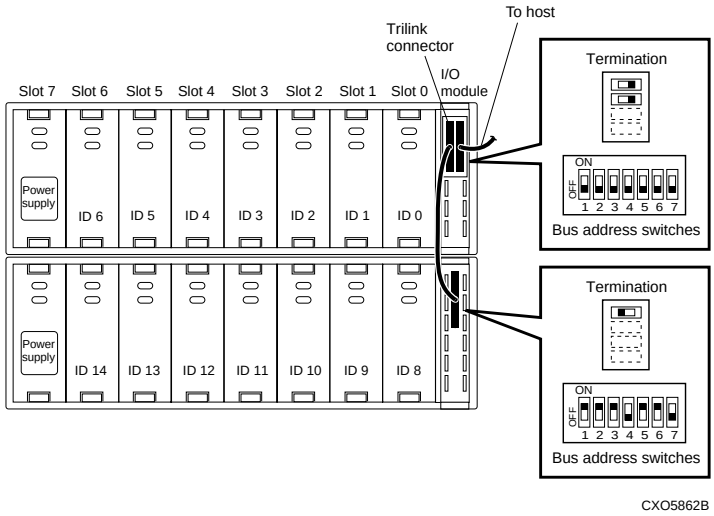
Cabling
 1. Adapter or controller 2. Optional adapter cable (BN38x series) 3. 68 conductor VHDCI cable (BN37A series) 4. Single ended trilink connector (H8861–AA) 5. Two single-channel shelf or pedestal

Note

The maximum combined length of cables 2 and 3 is 4 m (13.1 ft).

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 3–7 Single-Channel, Dual Shelf Configuration (Continued)

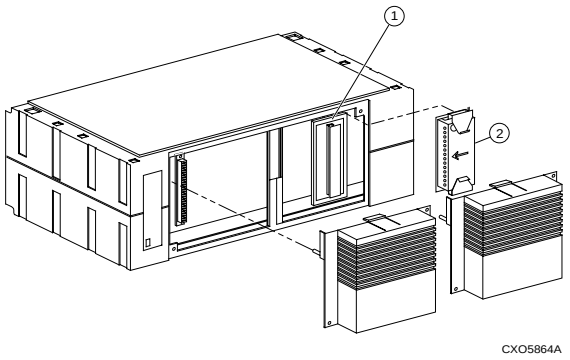
Termination and Address Switch Settings
 **First SBB Shelf** 1. The I/O module terminates the internal bus. 2. SCSI address 0 sets SBB SCSI IDs 0 through 6. **Second SBB Shelf** 1. The I/O module terminates the external and the internal buses. 2. The SCSI bus address 55 sets SBB SCSI IDs 8 through 14.

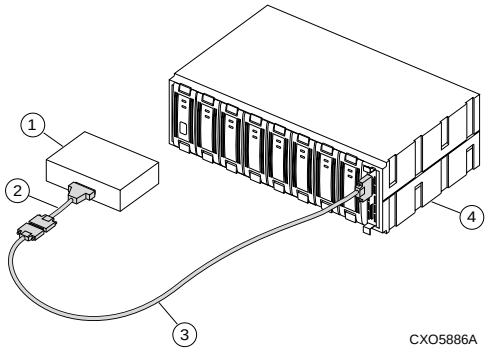
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Dual Channel, Single Shelf Configuration

The following table (Table 3–4) shows a dual-channel, single shelf configuration.

Table 3-8 Dual-Channel, Single Shelf Configuration

SBB Shelf Termination
 1. 16–Bit Terminator Board (BA35X–ME) 2. EMI Shield

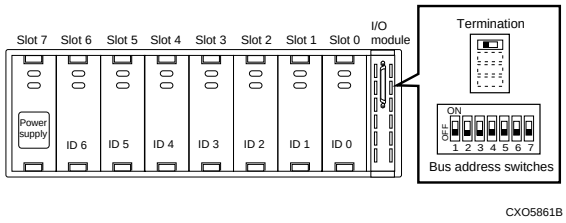
Cabling
 1. Adapter or controller 2. Optional adapter cable (BN38x series) 3. 68 conductor VHDCI cable (BN37A series) 4. A single channel shelf or pedestal

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Note

The maximum combined length of cables 2 and 3 is 20 m (65.6 ft)

Table 3–8 Dual-Channel, Single Shelf Configuration (Continued)

Termination and Address Switch Settings
 1. The I/O module terminates the external bus. 2. The terminator board (BA35X–ME) terminates the internal bus. 3. SCSI address 0 sets SBB SCSI IDs 0 through 6

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

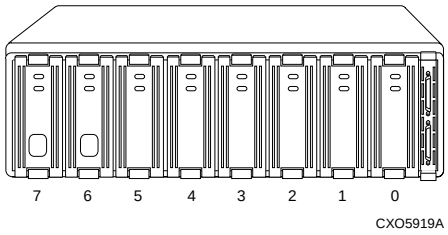
4
Power Distribution

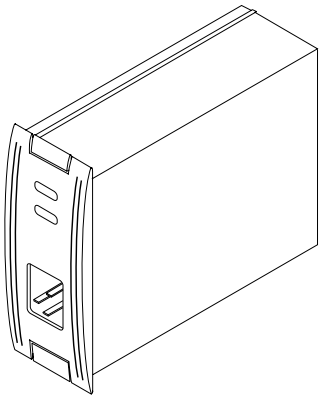
This chapter describes the UltraSCSI, SBB shelf power distribution which includes:

- The SBB shelf power system components and configurations
- The error detection and reporting processes

The primary power supply is installed in Slot 7. The redundant power supply can only be installed in Slot 6.

Figure 4–1 Power Supply





Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Power Supply Description

The SBB shelf has only one power component, the 180 W power supply, model DS–BA35X–HH.

The universal power supply for the input shelf converts ac to +5 V dc and +12 V dc and distributes the dc voltages to all the components through the SBB shelf, backplane connectors.

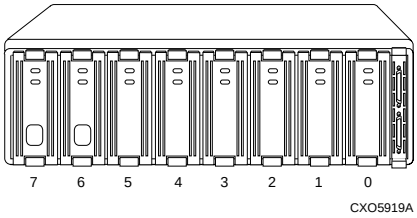
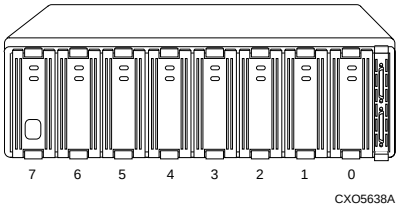
See Table 4-1 for the power supply specifications

Table 4-1 Power Supply Specifications

Item	Specification
Input Line Voltage	90 Vrms—264 Vrms (100—240V ac ±10%) 47—63 Hz (50—60 Hz ±10%) 2.5 A @ 220–240 V ac 5 A @ 100–120 V ac
DC Output Voltage	**+12 V dc** 10 A *maximum* with +5 V dc load of 2 A minimum **+5 V dc** 12 A *maximum* with +12 V dc load of 0 A minimum **Maximum Load** 5 V dc 12 A *maximum* with +12 V dc load of 10 A *maximum*.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 4-2 DIGITAL-Supported Power Configuraitons

Configuration	Description
 Redundant Configuration	The DIGITAL recommended redundant power configuration provides the maximum shelf power redundancy. The shelf becomes nonoperational should any one of the following events occur: • Both power supplies fail • Both power sources fail
 Standard Configuration	The standard, single power supply configuration provides no redundancy. The shelf becomes nonoperational should any one of the following events occur: • The power supply fails • The power source fails

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Power Supply Status Display

Each shelf power supply has two green LEDs (see Figure 4–2) that display the status of the power supply and blower.

Figure 4–2 Power Supply Status LEDs

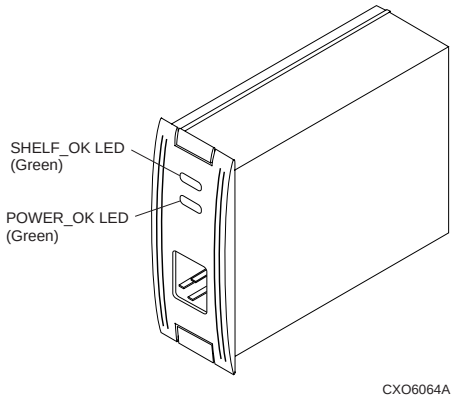
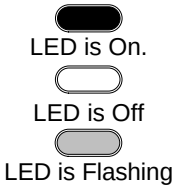
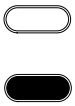
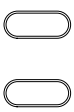


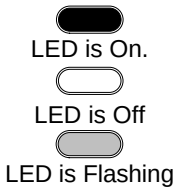
Table 4-3 Single Power Supply Status Displays



If the LED display is…	the Blower and Power Supply status is…
	The shelf blowers and power supply are functioning properly.
	One or more shelf blowers have failed. There is no power supply problem. Identify and replace the defective shelf blower.
	One or more of the following conditions exists: 1. There is no ac power. Check the ac power source. 2. The shelf power is non operational. Replace the shelf power supply.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 4-4 Dual Power Supply Status Displays



If the LED displays are…		
Slot 7	**Slot 6**	**The power supply status is…**
Off	Off	The Slot 7 shelf power supply is functioning properly. The Slot 6 shelf power supply is nonoperational. Replace the Slot 6 shelf power supply.
On	Off	
Off	Off	The Slot 6 shelf power supply is functioning properly. The Slot 7 shelf power supply is nonoperational. Replace the Slot 7 shelf power supply.
Off	On	
Off	Off	One of the following conditions exists: 1. Both power supplies are nonoperational. 2. There is no ac power.
Off	Off	

Note

A single shelf can operate correctly with only one working power supply.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

5
Storage Devices

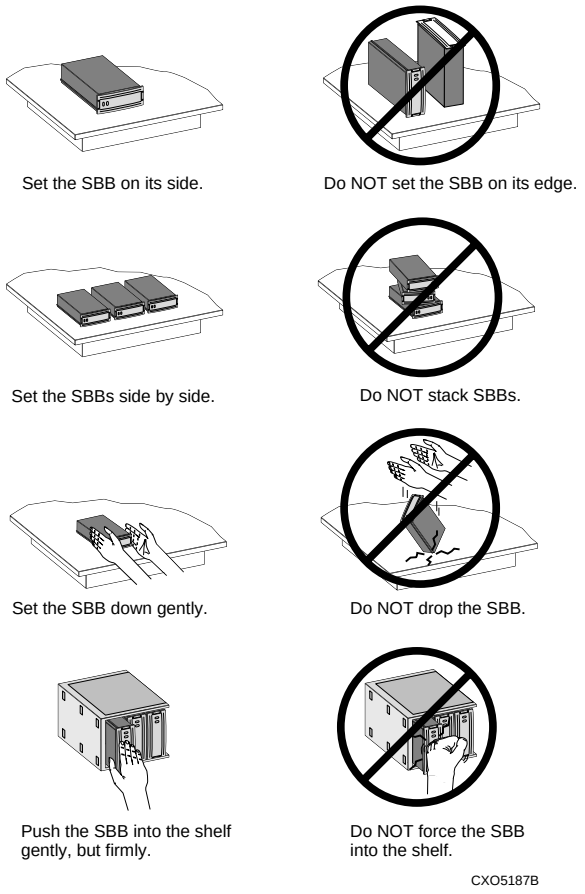
This chapter describes the procedures for handling, addressing, and identifying StorageWorks building block (SBB) disk drives. It also describes error conditions and the SBB LED displays statuses.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Handling SBBs

Handling SBBs properly (see Figure 5–1) reduces the risk of damaging the storage devices.

Figure 5–1 SBB Handling



Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

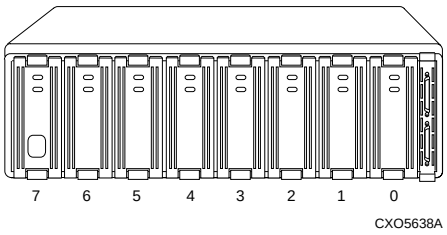
SBB SCSI Bus IDs

Each storage SBB is a node on the SCSI bus, and, as such, uses a SCSI bus ID (address). The sequential SBB shelf slot numbering and SCSI bus ID numbering begins with Slot 0 on the right through Slot 6 on the left (see Figure 5–2). The SCSI bus address switch on the UltraSCSI, I/O module determines the SCSI ID assigned to the SBBs installed in slots 0 through 6. Slot 6 may contain either an SBB or the redundant power supply. When there is a power supply in Slot 6, SBBs can be installed in slots 0 through 5.

Slot 7 always contains the primary power supply and *does not have* a SCSI bus ID.

Chapter 3 contains detailed information about configuring the shelves.

Figure 5–2 SBB Shelf Layout



Caution



The primary controller always uses SCSI bus ID 7 which is the highest priority address. An SBB cannot use this SCSI bus ID.

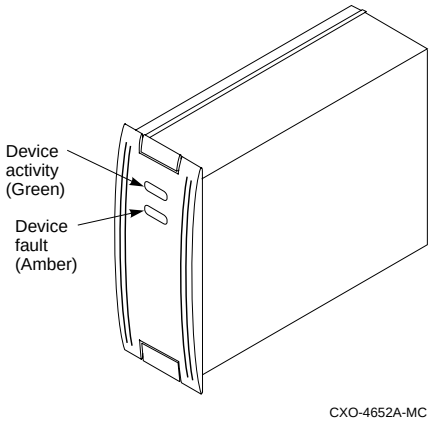
Installing an optional, redundant controller precludes using SCSI bus ID 6 for an SBB.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

SBB Status Reporting

Each storage SBB has two LED indicators which display the status of the SBBs. These LEDs have three states: ON, OFF, and FLASHING.

Figure 5–3 SBB Status LEDs



The upper LED (green) is the device activity LED, and is ON or FLASHING when the SBB is active. This is driven directly by the SBB storage device.

Caution

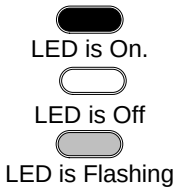
Do not remove a storage SBB when the upper LED is ON or FLASHING. Doing so can cause the loss or corruption of data.

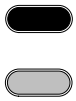
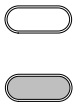
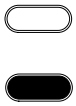
The lower LED (amber) is the storage SBB fault status LED. It indicates an error condition when it is either ON or FLASHING, or it indicates a locate command when it is FLASHING. The controller controls this LED via the fault bus. The **host adapter** or **host controller** documentation describes how these devices support operation of this LED. Not all adapters or controllers support fault bus protocol

See Table 5-1 for SBB status displays.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 5-1 SBB Status LEDs



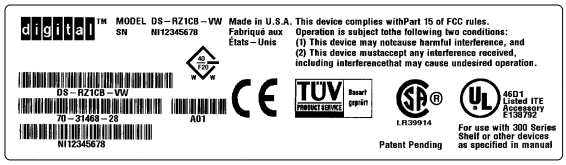
If the LED display is…	The SBB Status is…
	The SBB is probably not responding to control signals. DIGITAL recommends that you replace the SBB.
	1. The SBB is active and is spinning down due to the fault. DIGITAL recommends that you replace the SBB after the device has spun down. or 2. The locate command has been issued by the controller. There is no error condition.
	1. In response to a fault bus message, the controller is spinning down the device. DIGITAL recommends that you replace the SBB after the device has spun down. or 2. The locate command has been issued by the controller. There is no error condition.
	The SBB is inactive and spun down. Replace the SBB.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Identifying a Storage Device

To determine the model number of a device, see the regulatory label (see Figure 5–4) on the side of the SBB or the SBB bezel label (see Figure 5–5).

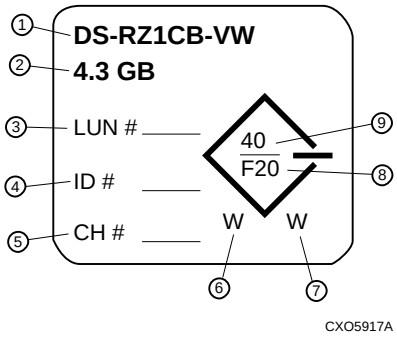
Figure 5–4 Typical Regulatory Label



The SBB bezel label (see Figure 5–5) identifies the device, the SCSI bus type, and lists user-assigned information.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Figure 5–5 Typical SBB Bezel Label



1. The device model number
2. The total amount of data the device stores (capacity)
3. The user-assigned, SCSI logical unit number (LUN)
4. The user-assigned, SCSI identification number (target ID)
5. The user-assigned, array controller channel number (the array controller port or SCSI bus)
6. The device SCSI bus width (wide or narrow) where:
   - **N** is an 8-bit device
   - **W** is a 16–bit device
7. The StorageWorks shelves in which you can install the device where:
   - **N** is a device compatible with an 8-bit shelf
   - W is a device compatible with an 16–bit shelf
   - N/W is a device compatible with both 8-bit and 16–bit shelves
8. The bus speed expressed in megabits (Mb) per second and is identified as follows:
   - **S** is a slow device. For example, **S5** = 5 Mb/sec.
   - **F** is a fast device. For example, **F10** = 10 Mb/sec, **F20** = 20 Mb/sec
9. The rate at which a device can transfer data in megabytes per second (MB/sec).

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Replacing SBBs

This section describes the considerations and procedures for replacing SBBs

The SBB Connector

The StorageWorks SBB connectors ensure that the SBBs operate reliably even when replaced many times.

The SBB, 96–pin, female, DIN connector provides positive mating with the SBB shelf, male, backplane connectors. The connector design ensures that *dc power is present until after* the **SCSI bus connection** is broken and that *dc power is applied before the SCSI bus connection* is made. This feature protects the integrity of the SCSI data bus. This avoids introducing noise on the bus which could either distort data or cause the bus to “hang.”

The SBB connector is a simple, highly reliable mechanism that can support 200 SBB replacement cycles. A replacement cycle consists of removing and replacing an SBB. Over the active product life of 5 years, this is the equivalent of 40 replacement cycles per year, or approximately 1 cycle every 9 days. The replacement cycle limit applies equally to shelf connectors and device connectors.

If the SBB is replaced more often than the recommended cycle, the gold contact coating wears away and the integrity of the connection is destroyed. Environments which require a greater number of replacement cycles are not supported by this product and are considered to be improperly treating or misusing the devices (paragraph 9.4b of U. S. Standard Terms and Conditions). Products or connectors damaged because of a higher number of replacement cycles are not eligible for return under warranty and standard service plans.

SBB Replacement Methods

There are three methods for replacing StorageWorks storage SBBs: **hot swap**, **warm swap**, and **cold swap**. You must determine the appropriate replacement method based on the capabilities of the bus controller before replacing a device.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Hot Swap

Caution



If you are not *positive* that your SCSI controller supports hot swap, DIGITAL recommends using a warm swap to protect the integrity of your data.

Read the controller documentation to determine the controller-supported swap method to use.

When you perform a hot swap, power and data are present on the SBB shelf connector. When the controller does not support hot swap, replacing an SBB using this method results in the corruption or loss of data.

You can use a hot swap to remove and replace SBBs from a system which is on line and active.

Warm Swap

Caution



You can perform a warm swap only when the green device activity LED is OFF.

When you perform a warm swap, power is present on the SBB shelf connector, and there is no data on the bus. *Before* you perform a warm swap, *you must quiesce the bus at the controller*, and observe the green device activity LED on the SBB, and ensure that *it is not* FLASHING.

Cold Swap

When you perform a cold swap, neither power nor data is present on the SBB shelf connector. This requires turning OFF the shelf power in all the UltraSCSI subsystem shelves within a single cabinet

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

6
Replacing Components

This chapter describes the procedures for replacing the following SBB shelf components:

- Storage SBBs
- Power supplies
- Blowers
- I/O modules

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Replacing a Storage SBB

Replacing an SBB is a relatively simple procedure. However, you must consider the following:

- Before replacing an SBB, you must know the device type or model number.
- You can use the SBB bezel label to identify the device model, logical unit number (LUN), SCSI bus ID, and other device characteristics.



Caution

Be sure that the replacement device is the same model as the one you are replacing.

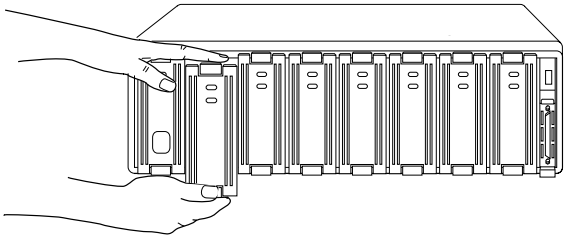
Properly ground yourself before you touch the SBB backplane connector. This prevents an **electrostatic discharge** (**ESD**) from damaging the device.

Complete the procedure in Table 6-1 to replace a storage SBB.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 6-1 SBB Replacement

1. Unpack the replacement SBB and verify that it is the proper model.
2. If the controller supports hot swap, go to Step 5.
3. If the controller does not support hot swap, **quiesce** the bus and go to Step 5.
4. If you cannot quiesce the bus, turn off the controller and remove power from the shelf.
5. Press the bezel tabs together to release the SBB.
6. Use both hands and pull the SBB out of the shelf.



CXO-4439A-MC

7. Insert the replacement SBB into the guide slots and push it in until it seats fully and the bezel tabs engage the shelf.
8. After power is applied, the green device activity LED is either ON, FLASHING, or OFF.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Replacing a Shelf Power Supply

In a redundant power supply shelf, you can remove and replace a failed power supply without removing power from the other power supply.

Caution



The SBB shelf *compatible* power supply is model DS–BA35X–HH. You *cannot* use any other shelf power supply or battery backup unit.

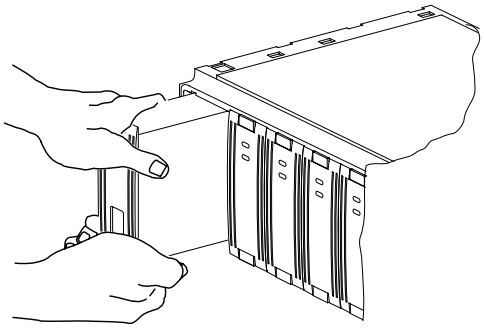
To prevent electrostatic discharge (ESD) damage, do not touch the power supply backplane connector.

Complete the procedure in Table 6-2 to replace a power supply.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 6-2 Power Supply Replacement

1. Unpack the power supply and verify that it is model DS–BA35X–HH.
2. Disconnect the power cord from the *defective* shelf power supply
3. Press the bezel tabs together to release the power supply from the shelf.
4. Remove the power supply.



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.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Replacing a Blower Assembly

Each SBB 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.

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 damage the storage devices.

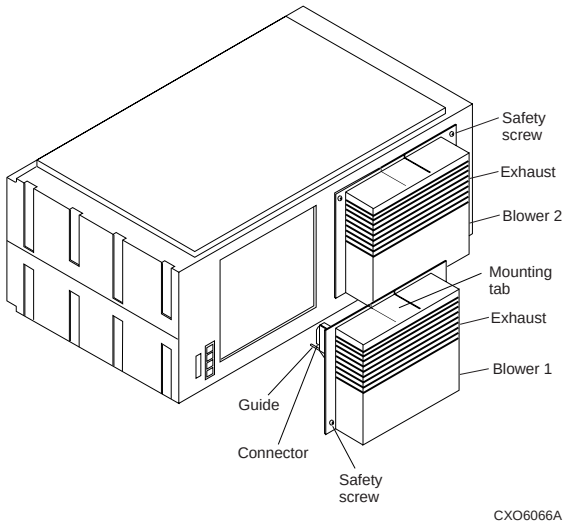
The only compatible SBB shelf blower is model DS–BA35X–MQ, a dual-speed blower. Do *not* install any other model

Complete the procedure in Table 6-3 to replace a blower.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 6-3 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 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.



6. Align the replacement blower connector and push the blower straight in, making sure that both mounting tabs lock in place.
7. Reinstall the safety screw.
8. Both power supply LEDs should be ON.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Replacing an I/O Module

Caution



The only UltraSCSI compatible SBB shelf I/O modules are models DS–BA35X–DA (differential) and DS–BA35X–F series (single-ended).

Installing a FAST 10 I/O module (BA35X–MG or BA35X–MH) precludes UltraSCSI (FAST 20) shelf operations.

Caution



Replacing an I/O module requires you to quiesce the bus to perform a warm swap. If you cannot quiesce the bus, you must remove power from the adapter or controller and the SBB shelf, and perform a cold swap. Failure to implement these procedures can corrupt or cause the loss of data.

Complete the procedure in Table 6-4 to replace an I/O module.

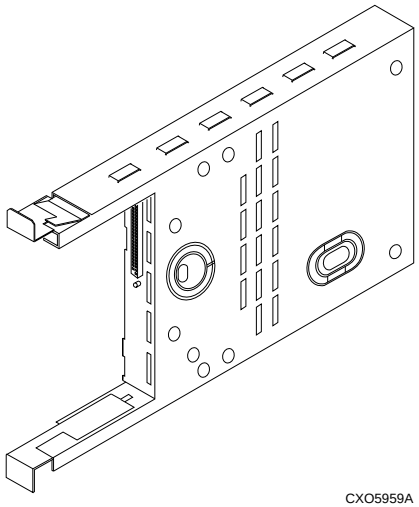
Note

The procedure for replacing either a single-ended or differential UltraSCSI I/O module is the same.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 6-4 I/O Module Replacement

1. Either quiesce the SCSI buses or remove power from all adapters or controllers and the SBB shelf.
2. Press the upper and lower mounting tabs together to release the module.
3. Pull the module out of the shelf.

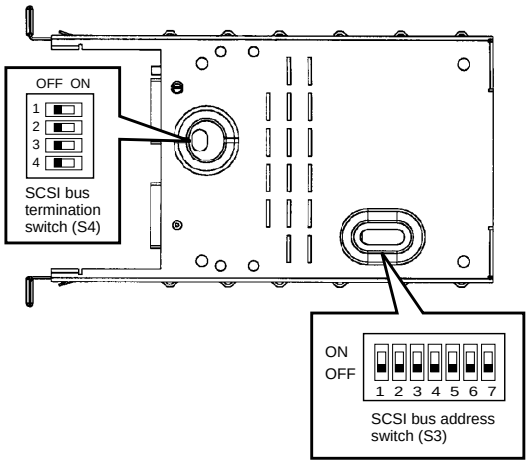


4. Remove all external connectors (cables, trilinks) and label them.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Table 6–4 I/O Module Replacement (Continued)

7. On the defective I/O module, note the settings of the SCSI bus address (S3) and the SCSI bus termination (S4) switches.



8. Set the switches on the replacement module to the identical settings.
9. Attach the external connectors (cables, trilinks).
10. Insert the replacement module into the shelf and slide it into place until it is fully seated and the mounting tabs lock in place.
11. Activate the SCSI bus and verify that the shelf is functioning properly.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

A

SBB Shelf Specifications

This appendix defines the physical, electrical, and environmental specifications for the DIGITAL StorageWorks UltraSCSI SBB shelf (DS–BA356 series).

Physical Specifications

Item	Height	Width	Depth	Weight
DS–BA356 series UltraSCSI SBB shelf	150 mm (5.9 in)	445 mm (17.5 in)	350 mm (13.8 in)	4.45 kg (10.0 lb)[1]
180 W SBB shelf power supply (DS–BA35X–HH)	121 mm (4.8 in)	51 mm (2.0 in)	216 mm (8.5 in)	1 kg (2.2 lb)

[1] With I/O module; without power supply and SBBs.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Electrical Specifications

The following are the electrical specifications of the DS–BA356 SBB shelf:

Item	Specification
Input Line Voltage	90 Vrms—264 Vrms (100—240V ac ±10%) 47—63 Hz (50—60 Hz ±10%) 2.5 A @ 220–240 V ac 5 A @ 100—120 V ac
DC Output Voltage	**+12 V dc** 10 A *maximum* continuous **+5 V dc** 12 A *maximum* continuous **Maximum Load** 180 W total

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Operating Environments

DIGITAL recommends maintaining the following environments to ensure proper operation of this product.

Condition	Specification
Optimum Operating Environment (Suggested for optimum operation)	
Ambient 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.
Minimum Operating Environment (**Required** for proper operation)	
Ambient temperature	+10°C to +35°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.
Nonoperational Operating Environment (Shipping or short term storage)	
Ambient temperature	–40°C to +66°C (–40°F to +150°F)
Relative humidity	10% to 80% noncondensing
Altitude	4900 m (16,000 ft)

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

SBB Thermal Stabilization

For proper operation upon *initial power application*, the DIGITAL SBB temperature should be within the range of 18–29°C (65–85°F).

Caution



Always stabilize SBBs in the operating environment prior to installation or operation. Otherwise, the media or associated electronics can be damaged when power is applied.

Condition			Then You Must …		
When there *is condensation* on the outside of the SBB,			Stabilize the SBB in the operating environment for 6 hours or until the condensation is no longer visible, whichever is longer. Do not insert the SBB into the shelf until it is fully stabilized.		
When there *is no condensation* on the outside of the SBB,			Thermally stabilize the SBB for the time specified.		
Storage Temperature Range			**Storage Temperature Range**		
°C	**°F**	**Stabilize for**	**°C**	**°F**	**Stabilize for**
60 to 66	140 to 151	3 hours	0 to 9	32 to 48	1 hour
50 to 59	122 to 138	2 hours	–10 to –1	14 to 30	2 hours
40 to 49	104 to 120	1 hour	–20 to –11	–4 to 12	3 hours
30 to 39	86 to 102	30 minutes	–30 to –21	–22 to –6	4 hours
18 to 29	64 to 84	None	–40 to –31	–40 to –24	5 hours
10 to 17	50 to 63	30 minutes			

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

B

Connecting an UltraSCSI Subsystem

Connecting an UltraSCSI subsystem usually involves the use of 68-conductor, VHDCI (very high-density, connector interface) cables, such as the BN37A series. However, interfacing to adapters or controllers with other type connectors, such as 50- or 68-pin, high-density connectors, requires using special adapter cables. Also special configurations may require the use of "Y" cables, trilink connectors, or terminators. This appendix lists UltraSCSI connection components.

The I/O module can be connected to the external SCSI bus using a combination of:

- VHDCI cables
- Adapter cables
- Trilink connectors
- VHDCI terminator blocks

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Components

You can connect an UltraSCSI subsystem using the following components:

Description	Model Number	Qty
68-Pin, VHDCI, Trilink, (3–Connector Block)	H8861–AA	A/R
68-Pin, VHDCI, Terminator Block—Single-Ended	H8865–AA	A/R
68-Pin, VHDCI, Terminator Block—Differential	H8863–AA	A/R
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight, receptacle connector with jack screws 1 ea. 68-pin, high-density, right-angle, plug connector with jack screws	BN37B–0B	1[2]
68-conductor SCSI adapter cable with: 1 ea. 68-pin, VHDCI, straight, plug connector with jack screws 1 ea. 50-pin, high-density, receptacle connector	BN38A–0B	1[3]
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight, plug connector with jack screws 1 ea. 68-pin, high-density, straight, receptacle connector	BN38B–01	1[4]
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight, receptacle connector with jack screws 1 ea. 68-pin, high-density, straight, plug connector	BN38E–0B	A/R
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight, plug connector with jack screws 2 ea. 68-pin, VHDCI, straight, receptacle connector with jack screws	BN37C–0C	A/R
Redundant, 180 W, SBB Shelf, Power Supply	DS–BA35X–HH	1[5]
16–Bit, SBB Shelf, Terminator Board	BA35X–ME	A/R
16–Bit, SBB Shelf, Jumper Board	BA35X–MF	A/R

---

2 One adapter cable is required for each 68-pin, high-density, right-angle connection.

3 One adapter cable is required for each 50-pin, high-density connection.

4 One adapter cable is required for each 68-pin, high-density connection.

5 Installing a redundant power supply reduces the maximum number of 3.5–inch disk drives per shelf to six.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Selecting Components

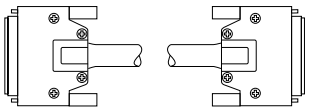
Use the following table to select the VHDCI compatible cables, adapter cables, trilinks, and terminator blocks for connecting an UltraSCSI subsystem:

Connector "A"	Connector "B"	Use a...
68-pin, VHDCI plug	68-pin, VHDCI plug	BN37A
Adapter Cables		
68-pin, VHDCI plug	Two 68-pin, VHDCI receptacles	BN37C
68-pin, VHDCI plug	68-pin, high-density receptacle	BN38B
68-pin, VHDCI plug	50-pin, high-density receptacle	BN38A
68-pin, VHDCI receptacle	68-pin, high-density plug	BN38E
68-pin, VHDCI receptacle	68-pin, high-density, right-angle plug	BN37B
Special Connectors		
Differential, terminator block (68-pin VHDCI plug)		H8863–AA
Single-ended, terminator block (68-pin VHDCI plug)		H8865–AA
Trilink connector (1 ea. 68-pin, VHDCI plug; 2 ea. 68-pin, VHDCI receptacles)		H8861–AA

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

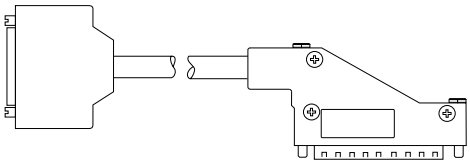
BN37A Series UltraSCSI Cables

You can use these cables to connect devices with 68-pin, VHDCI, receptacle connectors.

Description	Meters	Feet	Part No.
68-conductor, SCSI cable with: 2 ea. 68-pin, VHDCI, straight-plug connectors with jack screws  CXO5702A	0.3 0.5 1.0 1.5 2.0 2.5 3.0 5.0 10.0 15.0 20.0 25.0	1.0 1.6 3.3 4.9 6.6 8.2 9.8 16.4 32.8 49.2 65.6 82.0	BN37A–0C BN37A–0E BN37A–01 BN37A–1E BN37A–02 BN37A–2E BN37A–03 BN37A–05 BN37A–10 BN37A–15 BN37A–20 BN37A–25

BN37B Series UltraSCSI Adapter Cables

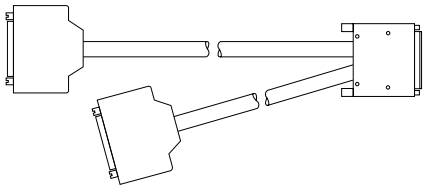
You can use these adapter cables to connect devices with 68-pin, VHDCI, plug connectors to cables or devices with 68-pin, high-density, receptacle connectors.

Description	Meters	Feet	Part No.
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight receptacle connector with screw locks 1 ea. 68-pin, high-density, right-angle, plug connector with jack screws  CXO6184A	0.2	0.6	BN37B–0B

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

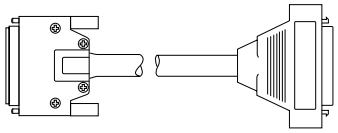
BN37C Series UltraSCSI "Y" Adapter Cables

You can use this adapter cable to connect two devices with 68-pin, VHDCI, plug connectors to cables or devices with a 68-pin, high-density, receptacle connector.

Description	Meters	Feet	Part No.
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight plug connector with jack screws 2 ea. 68-pin, VHDCI, straight-receptacle connector with screw locks  CXO5703A	Leg A–0.4 Leg B–0.2	Leg A–1.3 Leg B–0.6	BN37C–0C

BN38A Series UltraSCSI Adapter Cables

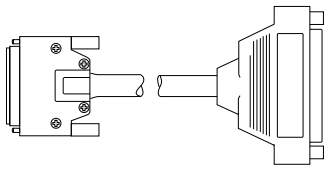
You can use this series of adapter cables to connect devices with 68-pin, VHDCI, receptacle connectors to cables or devices with 50-pin, high-density, plug connectors.

Description	Meters	Feet	Part No.
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight-plug connector with jack screws 1 ea. 50-pin, high-density, receptacle connector with squeeze-to-release posts  CXO5739A	0.2	0.6	BN38A–0B

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

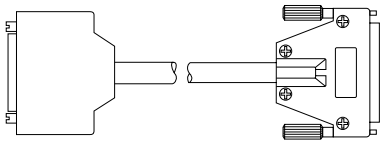
BN38B Series UltraSCSI Adapter Cables

You can use these adapter cables to connect devices with 68-pin receptacle, VHDCI connectors to cables or devices with 68-pin, high-density, plug connectors.

Description	Meters	Feet	Part No.
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight plug connector with jack screws 1 ea. 68-pin, high-density, straight receptacle connector with screw locks  CXO5740A	1.0	3.3	BN38B–01

BN38E Series UltraSCSI Adapter Cables

You can use these adapter cables to connect devices with a 68-pin receptacle, VHDCI connector to cables or devices with a 68-pin, high-density, plug connector.

Description	Meters	Feet	Part No.
68-conductor, SCSI, adapter cable with: 1 ea. 68-pin, VHDCI, straight plug connector with jack screws 1 ea. 68-pin, high-density, straight plug connector with jack screws  CXO6185A	0.2	0.6	BN38E–0B

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

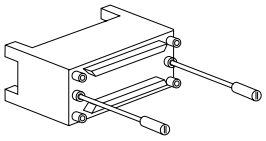
SCSI VHDCI Trilink Connector

You can use these trilink connectors with:

- Devices that have 68-pin, VHDCI, receptacle connectors

  and

- Cables which have 68-pin, VHDCI, plug connectors

Description	Part No.
68-pin, trilink connector with: 2 ea. 68-pin, VHDCI, receptacle connectors with screw locks 1 ea. 68-pin, VHDCI, plug connectors with jack screws  CXO5744A	H8861–AA

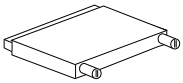
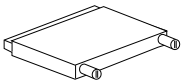
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

VHDCI Terminator Blocks

You can use these terminator blocks with devices, cables, or trilinks which have 68-pin, VHDCI, receptacle connectors.

Caution

Although these terminator blocks are similar, *they are not interchangeable.* Using an incorrect terminator block, such as a single-ended, terminator block on a differential bus or vice-versa, causes the bus to fail.

Description	Part No.
68-pin, active, single-ended, SCSI bus, terminator block plug connectors with jack screws  CXO5745A	H8865–AA
68-pin, differential, SCSI bus, terminator block plug connectors with jack screws  CXO5745A	H8863–AA

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Glossary

adapter

See **SCSI signal bus converter**.

ambient temperature

Ambient temperature is the temperature of the environment in which the system resides.

backplane

A backplane is the electronic, printed circuit board mounted in a shelf. This board contains the SBB, power supply, terminator board, jumper board, and I/O module connectors.

blower assembly

A blower assembly is the device that cools the StorageWorks devices by drawing air in through the front of the shelf, through the devices, and exhausting it out the rear.

branch

A branch is an UltraSCSI bus configuration where an expander, located in the middle of a bus segment, enables the bus to branch or create a "**tree**" configuration, rather than a point-to-point configuration. Also known as a "tree" configuration.

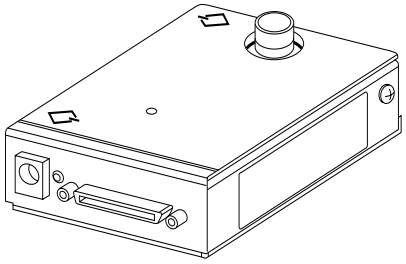
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

bus expander

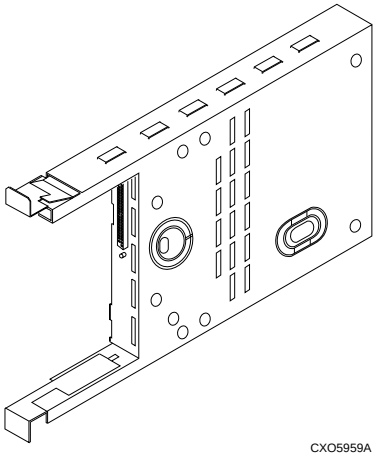
A bus expander is a SCSI device that couples **bus segments** without any impact on the SCSI protocol, the firmware, or software. The DWZZx family includes both single-ended-to-differential and single-ended-to-single-ended **bus extenders**. The term extender is a general term which includes “extender,” “**repeater**,” and “**isolator**.”

Bus expanders can be used to can be used to extend the effective length of an UltraSCSI bus, to couple differential bus segments to single-ended bus segments which allows the mixing of these two devices on same bus, and to allow isolation of bus segments from each other for maintenance purposes.

Expanders do not have to be placed at the physical ends of the bus segments which they join. They can also be used to create a “**branch**” from the middle of an existing bus segment.



CXO5984A



CXO5959A

- The table-top expander functions as both an extender and an isolator. The extender function increases the overall bus length (Segment 2) by + 20 m (65.6 ft). The isolator function separates Bus 1 from Bus 2.
- The single-ended-to-single-ended, SBB shelf, 16–bit, expander, I/O module functions as a both an extender and an isolator. The extender function increases the overall bus length by 1 m (3.3 ft). The isolator function separates the shelf bus, Bus 3 from Bus 2.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

bus extender

See **bus expander**.

bus segment

A SCSI bus segment is defined as an unbroken electrical path consisting of conductors (in cables or on backplanes) and connectors. Every bus segment must have two terminators, one at each end of the bus segment..

Bus segments can be either single-ended (SE) or differential (DF) depending on the type of terminators used in that segment. The terminator properties determine the bus segment type. A bus segment can support only devices of the same type as its terminators. You cannot put a differential SCSI device on a single-ended bus segment.

Caution



The device transceiver type (single-ended or differential) must match the bus segment type. Devices which do not meet this condition cannot operate.

The allowed length of a bus segment depends on the electrical loading, transmission media type, and data transfer rate. In many cases, heavier loading, smaller wires, and higher speeds demand shorter lengths. Loading is produced by increasing the number of devices in a given length of the bus, by using longer stubs, or higher capacitance devices.

bus segment types

The following are SCSI bus segments types:

- Single-ended (SE)
- High-voltage differential (HVD)

The terminator properties (single-ended or differential) determine the bus segment type. Devices which do not have the same transceiver type as the terminators cannot operate in the segment defined by the terminators.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

cabinet

A cabinet is the StorageWorks enclosure that has exterior panels and doors containing the cable or power distribution units, shelves, fans, and cables which form a **storage subsystem**.

cable connector

A cable connector is any connector which physically is part of a cable assembly

cache memory

Cache memory is a fast storage buffer.

carrier

See **modular carrier**.

CE-Mark

A CE-Mark is an European Economic Community (EEC) certification label that identifies devices authorized for sale within member nations.

CE-Mark Class A

A CE-Mark Class A is similar to the FCC Class A certification, but has European limitations. This certification label appears on electronic devices that are used in a commercial environment.

CE-Mark Class B

A CE-Mark Class B is similar to the FCC Class B certification, has European limitations. This certification label appears on electronic devices that are for use in either a home or commercial environment

certified device

A certified device is a storage device that has been tested in a specific configuration and has been determined to be in compliance with a country-specific certification standard.

channel

A channel is another term for a SCSI bus.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

cold swap

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

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

compatible device

A compatible device is a storage device that has been 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. 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.

converter

See **SCSI signal bus converter**.

deskside expansion unit

A deskside expansion unit is an enclosure, commonly referred to as a pedestal, which houses a StorageWorks shelf in a vertical position. This pedestal is assembled from a pedestal kit, a user-supplied SBB shelf, storage SBBs, and an ac power cord. The number of devices that can be used, the SCSI buses supported, and the location of the pedestal is determined by the SBB shelf, the storage SBBs, and the SCSI controller used.

devices

Devices are the **targets**, initiators, **hubs**, converters, bus expanders, and similar devices interconnected to form a SCSI bus. Connectors, expanders, and hubs do not use SCSI bus IDs.

See also **node**.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

device connector

A device connector is any connector that physically is part of a SCSI device. These are the targets, initiators, hubs, converters, bus expanders, and similar devices interconnected to form a SCSI bus. Connectors, expanders, and hubs do not use a SCSI bus ID.

differential bus

A bus is 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 array controller

See **controller**.

dual bus

A dual bus is a single SBB shelf SCSI bus that is configured as two individual buses (a four-device bus and a three-device bus). Commonly referred to as a "split bus."

dual power configuration

See **redundant power configuration**.

dual redundant configuration

A dual redundant configuration is a controller configuration that consists of a primary and a backup controller mounted in the same controller shelf. When the primary controller fails, the backup controller assumes control over the devices.

electromagnetic interference

See **EMI**.

electrostatic discharge

See **ESD**.

EMI

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

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

ESD

Electrostatic discharge (ESD) is the discharge of a potentially harmful static electric voltage which is a result of improper grounding.

FAST 10

FAST 10 is a SCSI bus which transfers data at a rate up to 10 MB/sec.

FAST 20

See **UltraSCSI**.

FCC

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

FCC Class A

The FCC Class A certification label appears on electronic devices that are used only in a commercial environment within the United States.

FCC Class B

This certification label appears on electronics that are used in either a home or commercial environment within the United States.

Federal Communications Commission

See **FCC.**

field replaceable unit

See **FRU**.

FRU

A field replaceable unit (FRU) is a hardware component that can be replaced in the field.

host

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

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

host adapter

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

host computer

See **host**.

host controller

A host controller is 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. It typically has multiple SCSI bus ports, performs the lower layers of the SCSI protocol, and normally operates in the initiator role.

hot swap

A hot swap is a method of replacing devices while the complete system remains online and active during device removal or insertion. The device being removed or inserted is the only device which cannot perform operations during this process.

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

hub

A hub consists of a set of three or more bus expanders each coupling a common, short, single-ended bus segment (internal to the UltraSCSI 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

An I/O module is a 16–bit SBB shelf device that integrates the SBB shelf with either an 8-bit single-ended, 16–bit single-ended, or differential SCSI bus.

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

Input/Output module

See **I/O module.**

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

isolator

See **bus extender**.

logical bus

A logical bus is a single-ended, physical bus that is connected to a differential, physical bus by a SCSI bus signal converter.

logical units

A logical unit is a group of devices that is addressable as a virtual unit.

logical unit number

The software assigned number of a logical unit.

MB/sec

Megabytes per second (MB/s) is the transfer rate data that is determined by the bus width (8- or 16–bit) and the number of bytes per word (1 or 2, respectively).

megabytes per second

See **MB/sec.**

metric mounting kit

A kit containing brackets and associated hardware for mounting a StorageWorks shelf or enclosure in a cabinet with metric mounting rails. Metric mounting rail hole spacing is 25 mm (0.97 in).

modular carrier

A modular carrier is a StorageWorks-compatible plastic container in which storage devices or power supplies are mounted to create SBBs. These **carriers** are available in both 3.5–inch and 5.25–inch devices.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

node

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

A 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.

PDU

A power distribution unit is a data center cabinet that conditions and distributes ac power.

pedestal

A pedestal is the common name for a deskside expansion unit.

See also **deskside expansion unit**.

port

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

qualified device

See **supported device**.

quiesce

Quiesce is to keep quiet or still. To quiesce a bus is to make a bus inactive or dormant. For example, you must quiesce SCSI bus operations when warm swapping an SBB.

quiescent

Quiescent is the state of being still or inactive. A bus which is inactive or dormant is quiescent.

radio frequency interference

See **RFI**.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

redundant power configuration

A redundant power supply configuration is a StorageWorks configuration that utilizes multiple power sources, power controllers, and supplies that are used to eliminate single points of failure.

1. For a cabinet, two ac power sources and two CDUs are used to distribute primary and redundant ac power to shelf power supplies.
2. For a shelf, the primary and redundant, shelf, SBB, power supplies ensure that 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.

repeater

See **bus extender.**

RETMA

Radio Electronics Television Manufacturer's Association. Now the Electronics Industries Association (EIA).

RETMA mounting kit

A kit containing brackets and associated hardware for mounting a StorageWorks shelf or enclosure in a cabinet with RETMA mounting rails.

RFI

A radio frequency interference (RFI) is the impairment of a signal by an unwanted radio signal or radio disturbance.

SBB

A StorageWorks building block (SBB) is any device conforming to shelf mechanical and electrical standards that is installed in either a 3.5–inch or 5.25–inch carrier, and is considered to be an SBB, whether it is a storage device, a power supply, or another device.

SBB shelf

An SBB shelf is the common name for a StorageWorks storage device shelf. This shelf also contains shelf power supply SBBs.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

SCSI

A small computer system interface (SCSI) is an ANSI interface that 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 connection

A SCSI bus connection is a connection between two terminators.

SCSI bus connector

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

SCSI bus signal converter

A SCSI bus, signal converter is also known as an adapter.

1. A connecting device that permits the attachment of accessories or provides the capability to mount or link units.
2. The device that connects a differential SCSI bus to a single-ended SCSI bus.
3. The device that extends the length of a differential or single-ended SCSI bus.

See also **bus expander, shelf I/O module**.

SCSI device

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

SCSI device ID

A SCSI device ID is the bit-significant representation of the SCSI addresses which refers to one of the signal lines numbered 0 through 7 for an 8-bit bus or 0 through 15 for a 16–bit bus. It is also known as the “target ID.”

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

SCSI domain

A SCSI domain is a logical bus consisting of at least one bus segment, at least one initiator, and at least one target. The use of bus extenders can enable multiple bus segments within a domain. Domains are limited by the device addressing scheme. Domains are limited to a total of 16 initiators and targets without the use of logical unit number (LUN) bridges

SCSI hub

A SCSI hub is a device that connects multiple SCSI segments within a SCSI domain. This hub does not use a device ID.

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.

SCSI stubbing connection

A SCSI stubbing connection is a connection in the SCSI bus path that is between a terminator and a connector, such as a trilink connector, and is used to place a controller in the midbus position.

shelf I/O module

A shelf I/O module is the circuit board that connects a 16–bit SBB shelf to a differential or single-ended SCSI bus.

See also **differential I/O module** and **single-ended I/O module**.

shelf power supply

Shelf power supply is the power supply that provides +5 V dc and +12 V dc to the StorageWorks shelves. These supplies can be either ac input (90–264 V ac) or dc (48 V dc).

single-ended bus

A single-ended bus is a bus in which the voltage of a single wire, in relation to a ground, determines each signal’s logic level.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

single power configuration

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

Small Computer System Interface

See **SCSI**.

spin-down

Spin-down is the process that begins when power is removed from a storage device and data transfer halts, and ends when the device is stopped and can be moved. In the case of disk drives, the heads are retracted and the media is stopped.

spin-up

Spin-up is the process that begins when power is applied to a storage device, and ends when the device is determined to be operational and ready for data transfer operations.

split bus

See **dual bus.**

storage array

A storage array is an integrated set of storage devices.

storage array subsystem

See **storage subsystem**.

storage subsystem

A storage subsystem is a collection of controllers, storage devices, shelves, cables, and power supplies that form a mass storage subsystem.

StorageWorks

StorageWorks is 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.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

StorageWorks building block

See **SBB**.

supported device

(1) A device that has been fully evaluated in an "approved" StorageWorks configuration (such as, 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 all DIGITAL standards. (2) A device supported by a controller or host operating system.

target

A target is a SCSI device that performs an operation requested by an initiator.

target ID

See **SCSI device ID**.

terminators

Terminators are the interconnect components that form the ends of the transmission lines in bus segments. A SCSI domain must have at least one segment and 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 passive (linear totem pole) terminators.

topology

Topology is the physical arrangement and relationship of interconnected nodes and SCSI buses in a network. A network topology shows the hosts and the lines between them. A legal topology must satisfy all of the requirements for the associated SCSI bus (FAST 10, UltraSCSI, and so forth).

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

tree

A tree is an UltraSCSI bus configuration where an expander, located in the middle of a bus segment, enables the bus to “branch" or create a tree configuration, rather than a point-to-point configuration. It is also known as a “branch” configuration.

UL

Underwriters Laboratories (UL) is an organization that tests and certifies electrical devices.

UltraSCSI

UltraSCSI is an improvement in SCSI technology that was invented in 1993 by Digital Equipment Corporation StorageWorks Engineering Group. Subsequently the ANSI SCSI standards committee issued standard X3T10 for UltraSCSI.

The UltraSCSI 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/sec to 40 MB/sec.
- VHDCI (very high density, connector interface) cables and connectors are significantly thinner and smaller.

UltraSCSI device

An UltraSCSI device is a device that complies with UltraSCSI specifications.

UltraSCSI domain

An UltraSCSI domain is a single, logical, UltraSCSI bus that is composed of multiple, diverse, bus segments

See also **bus segment**.

Underwriters Laboratories

See **UL**.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

universal ac input power supply

See **shelf power supply**.

VHDCI

A Very High Density Cable Interconnect (VHDCI) has a 68-pin interface with connectors on 8 mm centers. It is required for UltraSCSI.

warm swap

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

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

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP