DWZZH 16–Bit SCSI Bus Hub

User's Guide

EK–DWZZH–UG. B01

Digital Equipment Corporation
Maynard, Massachusetts

Second Edition, April 1998

While DIGITAL believes the information included in this publication is correct as of the date of publication, it is subject to change without notice.

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

This equipment requires the use of shielded SCSI cables such as the Digital Equipment Corporation BN37A-series.

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Revision Record

The Revision Record provides a concise publication history of this guide. It lists the guide revision levels and release dates, and summarizes the changes.

The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the Revision Level column, with the last entry denoting the latest revision. This publication supports the DWZZH 16-Bit SCSI Bus Hub.

Revision Level	Date	Summary of Changes
EK–DWZZH–UG. A01	October 1997	Original Release.
EK–DWZZH–UG. B01	April 1998	Change title page; Add Section 1.2.2 describing DWZZH–05 hub; Change Chapter 2 title from "Installing" to "Using" and add procedures for configuring a SCSI bus using a DWZZH hub.

About This Guide

This chapter tells you what this User's Guide does, identifies the audience, describes the structure and contents (chapter-by-chapter) briefly, and tells you how to get support and services from DIGITAL.

This User's Guide describes the purpose, function, operation, and use of the DWZZH 16-Bit SCSI Bus Hub (the DWZZH Hub or the Hub). The DWZZH Hub allows the connection of up to five ports on one logical SCSI bus.

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http://www.storage.digital.com/

Audience

This guide is intended for end users and for DIGITAL employees responsible for configuring, installing, and maintaining the StorageWorks subsystem and its components.

Related Documentation

You should be familiar with the information contained in the following documentation:

Document Title	Order Number
StorageWorks Solutions Configuration Guide	EK–BA350–CG
StorageWorks Solutions Shelf and SBB User's Guide	EK–BA350–UG
StorageWorks SBB Shelf I/O Modules	EK–SBBIO–UG
StorageWorks UltraSCSI Configuration Guidelines	EK–ULTRA–CG
StorageWorks Solutions BA356–SB 16-bit Shelf User's Guide	EK–BA356–UG

Document Structure

This guide contains the following chapters:

Chapter 1. Introducing the DWZZH Hub

This chapter gives brief functional and physical descriptions of the DWZZH Hub and lists significant product specifications.

Chapter 2. Using the DWZZH Hub

This chapter gives the procedures for configuring a StorageWorks SCSI bus using a DWZZH Hub.

Glossary

The Glossary defines terms that are used frequently with StorageWorks and SCSI bus components.

Support and Services

Who to contact in the Americas

Information and Product Questions:	Local Sales Office / StorageWorks Hotline 1-800-786-7967
Installation Support:	Contact the DIGITAL Distributor where the Storage Solution was Purchased / Local DIGITAL Sales Office.
DIGITAL Multivendor Customer Service (MCS)	
Installation	Contact the DIGITAL Customer Support Center (CSC).
Warranty	Contact the DIGITAL Customer Support Center (CSC) for warranty service after solution is installed and operating.
Remedial	Contact the DIGITAL Customer Support Center (CSC) **Note**: A Service Contract is recommended when the equipment is out of warranty. Contact the local DIGITAL Sales Office.
Customer Support Center (CSC)	1 800-354-9000

Who to contact in Europe

Information and Product Questions, **Installation Support, and Installation:**	Contact the DIGITAL Distributor or reseller from whom the Storage Solution was purchased.
For Warranty Service	See the Warranty Card packaged with the product.
For Remedial Service	Contact the DIGITAL Distributor or reseller from whom the Storage Solution was purchased. **Note**: A Service Contract is recommended when the equipment is out of warranty.

Who to contact in Asia Pacific

For all services, contact the DIGITAL Distributor or reseller from whom the equipment was purchased.

1

Introducing the DWZZH Hub

This chapter describes the DWZZH Hub functions and available versions, and list the Hub functional specifications.

The series of DWZZH Hubs are SCSI–2 and draft SCSI–3 (ANSI X379.2/91–10R3) compliant 16-bit converters capable of data transfer rates of up to 40 Mbytes per second. The series of Hubs consists of the following:

- DWZZH–21 and DWZZH–03 are 3.5" SBB (small) Hubs; the DWZZH–21 contains two single-ended and one differential SCSI ports, while the DWZZH–03 contains three differential SCSI ports.
- DWZZH–05 is a 5.25" SBB (large) Hub that contains 5 differential SCSI ports.

1.1 SCSI Bus Hub Functions

Most device SCSI buses are either 8-bit or 16-bit single-ended, physical buses. Some controllers and hosts use differential buses and others use a single-ended bus. Single-ended and differential physical buses are not compatible. The SCSI protocol disables both buses when they are connected together. However, by using a SCSI bus Hub you can accomplish the following:

- Connect a differential physical bus to a single-ended physical bus.
- Extend the maximum length of a SCSI bus.
- Provide radial disconnect where remaining connections can continue to operate.
- Provide “fair” SCSI arbitration for host nodes (DWZZH-05 SCSI HUB only).

1.2 Product Descriptions

There are two classes of DWZZH Hubs: 3.5" SBB Hubs, and 5.25" SBB Hubs.

1.2.1 3.5" SBB Hubs

The DWZZH small SCSI Hub (Figure 1-1) comes in two versions.

- DWZZH-21 contains two single–ended SCSI bus connections and one differential SCSI connection; Figure 1-2 illustrates the front panel.
- DWZZH-03 contains three differential SCSI bus connections; Figure 1-3 illustrates the front panel.

CAUTION

Connecting a differential bus cable to the single-ended connector, or a single-ended bus cable to the differential connector causes the SCSI bus to fail.

Figure 1–1 DWZZH–21 or DWZZH–03 3.5" SBB Hub

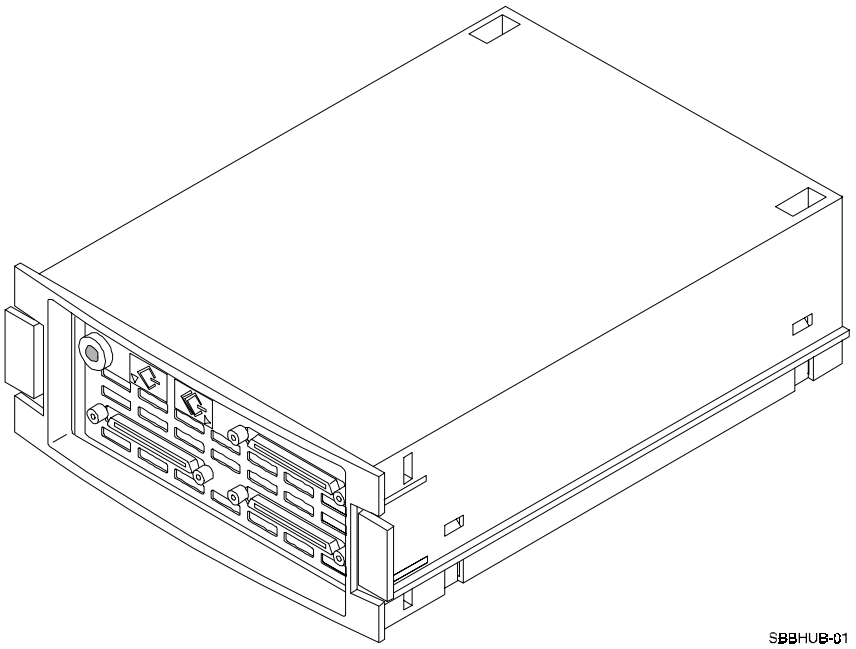
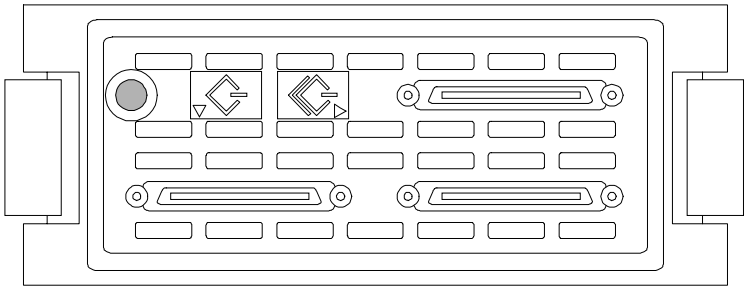


Figure 1–2 DWZZH–21 Front Panel

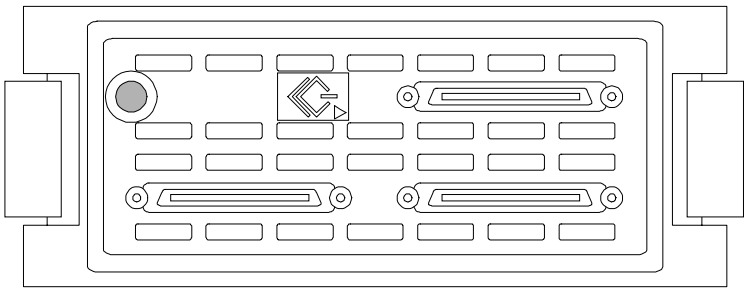


SBBHUB-02

NOTE

The single–ended symbol with the downward–pointing diamond in Figure 1-2 indicates that the lower two connectors are single–ended SCSI connections, while the differential symbol with the right–pointing diamond indicates that the top connector is a differential SCSI connection.

Figure 1–3 DWZZH–03 Front Panel



SBBHUB-03

NOTE

The differential symbol with the right–pointing diamond in Figure 1-3 indicates that the three connectors are differential SCSI connections.

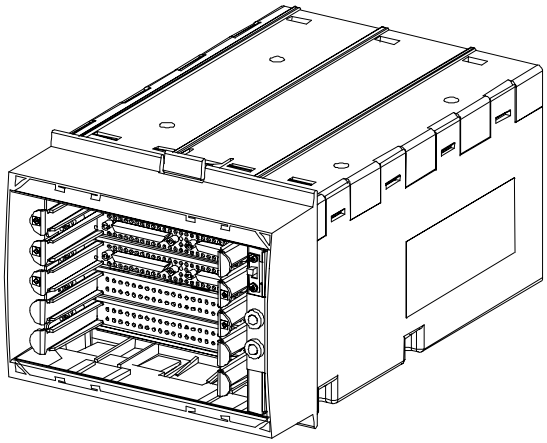
1.2.2 5.25” SBB Hubs

The DWZZH large SCSI Hub (Figure 1-4) comes in a single version that contains five differential SCSI bus connections.

CAUTION

Connecting a differential bus cable to the single-ended connector, or a single-ended bus cable to the differential connector causes the SCSI bus to fail.

Figure 1–4 DWZZH–05 5.25" SBB Hub



1.2.3 SCSI Bus Components

To install a DWZZH SCSI bus converter you need SCSI BN37 series cables. Refer to the StorageWorks Solutions Configuration Guide for a complete list of the available cables.

1.3 Product Specifications

Table 1-1 lists the functional specifications for the DWZZH Hub.

Table 1–1 DWZZH Hub Functional Specifications

Feature	Specification
SCSI ID SCSI Addresses	The SCSI HUB does not use a SCSI ID (small HUB) The large SCSI HUB uses SCSI ID 7 for arbitration.
Overload Protection DTERMPOWER STERMPOWER	TERMPOWER is not supplied to the external ports of the SCSI HUB. Internal TERMPOWER is protected via a resetable fuse. TERMPOWER must be supplied from the remote connection to enable each HUB port.
Shielding Enclosure & Connectors	Shielded for ESD, EMI, and safety requirements
Power-Up Reset	Automatically clears • Initiator detection circuit • Target detection circuit • BSY glitch filter
SCSI Bus Reset	Automatically clears • Initiator detection circuit • Target detection circuit • BSY glitch filter
Single-Ended SCSI Bus Length Ultra (20 megatransfers per second or 40 MB/s)	20 Meters (66 feet) per segment
Differential SCSI Bus Length	25 meters (82 feet) per segment
Data Timing	The relationship between the data and the control signals is brought to SCSI compatibility before transmission to the other SCSI bus.
Design	High reliability SMT

Table 1–1 DWZZH Hub Functional Specifications (Cont'd)

Feature	**Specification**
Cable Fault	DIFFSENSE support and port disable on cable fault
Glitch Elimination	100% glitch free operation during power-up BUSY GLITCH trap eliminates cable length constraint due to wired-OR glitches on the BSY line
Termination	
Singled-ended	Active termination for 16bit operation.
Differential	Termination for 16bit operation.
Service There are no user servicable functions on these products. Contact Digital service personnel all service.	
Agency Approvals UL, CSA, FCC Class B, TUV	
Environmental Specifications	
Relative Humidity	10% to 85% non-condensing
Operating Temperature	10°C to 40°C (50°F to 104°F)
Storage Temperature (non-operating)	–40°C to 66°C (–40°F to 151°F)
Power Requirements	
DWZZH	+5V
Input Current: DWZZH-03 DWZZH-05 DWZZH-21	 2.3 Amp 4.3 Amp 1.8 Amp
TERMPOWER	Supplied to internal terminators only.
SCSI Connectors and Cables	
Single-Ended	Board mounted 68pin VHDCI SCSI connector
Differential	Board mounted 68pin VHDCI SCSI connector
Cables	BN37A-series shielded SCSI cables

2

Using the DWZZH Hub

This chapter discusses fair arbitration of the SCSI bus by the 5.25" SBB Hub, describes addressing configurations, tells you how to use the large Hub front panel, and gives guidelines for selecting the SCSI cables.

UltraSCSI Configuration guidelines are documented in EK-ULTRA-CG. These guidelines include a list of all UltraSCSI components and the last few example configurations include a SCSI Hub. Refer to the configuration guidelines for bus length and SCSI bus data transmission rates.

The UltraSCSI Hubs are designed to be installed in StorageWorks Solutions BA350 and BA356 Shelfs. The small SCSI Hub may be installed in any open SBB slot. The large SCSI Hub may be installed in any slot that will accommodate a 5.25 SBB. The small SCSI Hub does not consume a SCSI ID and uses the shelf only to provide its power and mechanical support. The large SCSI Hub uses SCSI ID 7 to control the fair arbitration of the host port IDs and uses the shelf only to provide its power and mechanical support.

2.1 Large HUB Fair Arbitration

The large Hub configurations utilize a modified SCSI arbitration algorithm. The normal SCSI arbitration scheme is based on the SCSI ID. The highest priority SCSI ID will always win arbitration This will have the effect of ‘starving’ lower priority SCSI ID requests on the bus.

In order to allow up to four ‘host’ SCSI IDs to participate on a single SCSI bus, a fair arbitration (fair arb) scheme is employed. Fair arb works by assigning SCSI ID 7, the highest priority ID to the Hub. When a SCSI arbitration phase occurs, all the arbitrating IDs are captured in a register. The winning ID for this group will be the highest priority ID. After this ID has been serviced, the ID will be removed from the group and at the next arbitration phase, the remaining highest ID will be serviced. This will continue until all of the IDs in the group have been serviced once. All requests from IDs not contained in the register will be “backed off ” using ID 7.

After all the IDs in the group have been serviced, a new group of IDs will be captured at the next arbitration phase. The fair arbitration algorithm only applies to host port SCSI IDs as defined by the assignment in each configuration.

2.2 Large HUB Addressing Configurations

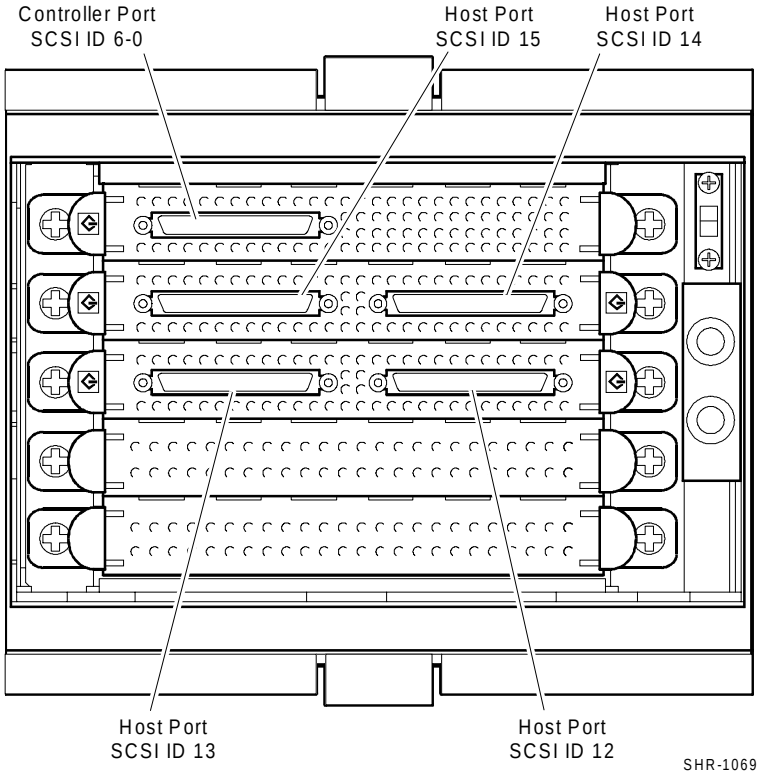
The large SCSI Hub has a specific SCSI ID configuration. The SCSI IDs are assigned to specific physical locations in the Hub. This allows the fair arbitration logic in the Hub to correctly identify the SCSI IDs that are participating in a fair arbitration cycle.

CAUTION

The SCSI ID of the HOST adapter must correspond to the assigned ID of the Hub port. Mismatched SCSI IDs will cause the Hub SCSI bus to hang.

Figure 2-1 shows the physical layout of the ports and their associated SCSI ID assignments.

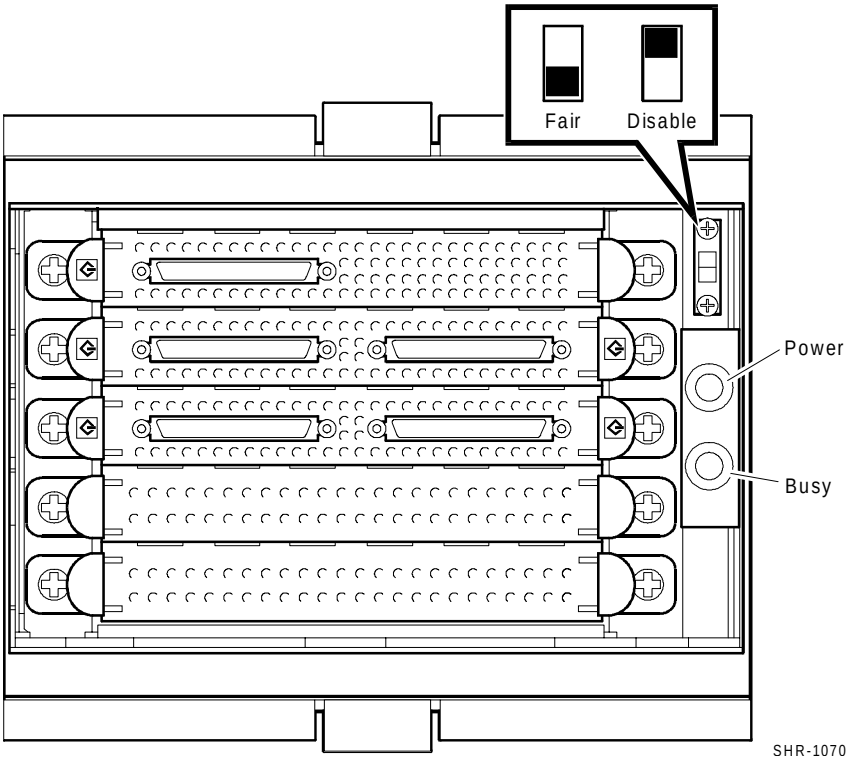
Figure 2–1 DWZZH–05 SCSI ID Assignments



2.3 Front Panel

Figure 2-2 shows the location of the front panel controls and indicators.

Figure 2–2 DWZZH–05 Front Panel



NOTE

The black part of the switch in the diagram indicates the position of the switch.

2.3.1 FAIR ARB Disable

The large Hub contains a switch on the front panel that allows the user to disable the *FAIR ARB* feature of the Hub. When *FAIR ARB* is disabled, the Hub services SCSI arbitration cycles in the conventional SCSI priority order. Host port SCSI ID assignments are not linked to the physical port location in the Hub when *FAIR ARB* is disabled.

2.3.2 Indicators

The large Hub has two indicators on the front panel. The green LED indicates that POWER is applied to the Hub, while the yellow LED indicates that the SCSI bus is BUSY.

2.3.3 Narrow Addressing Setting

The large Hub can be used with SCSI bus architectures that are limited to eight ID assignments (Figure 2-3 shows narrow ID assignments). A jumper on the rear of the Hub (Figure 2-4) must be installed to make the Hub respond to SCSI IDs 3 – 0 on the host ports.

Figure 2–3 DWZZH–05 SCSI Narrow ID Assignments

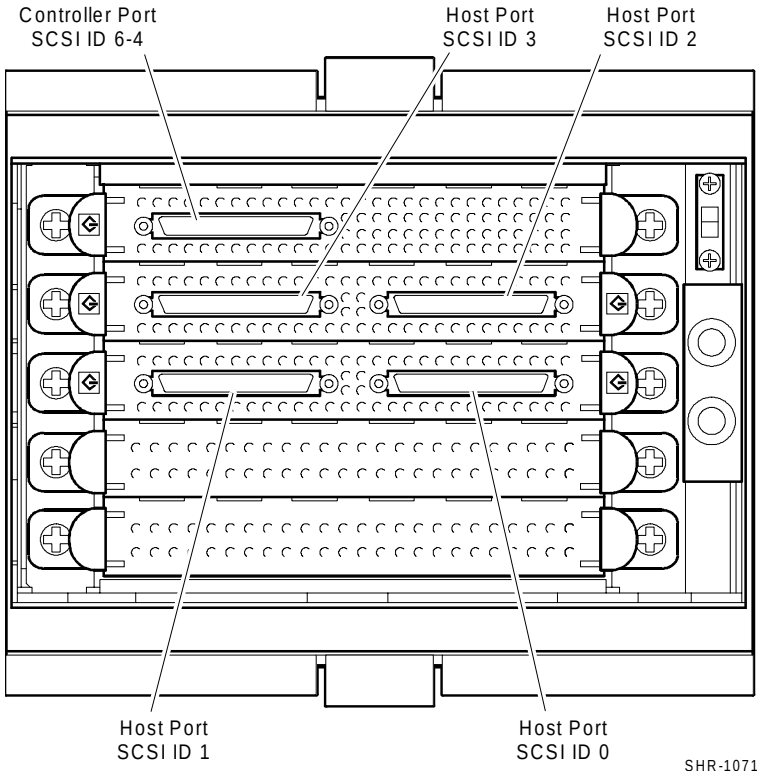
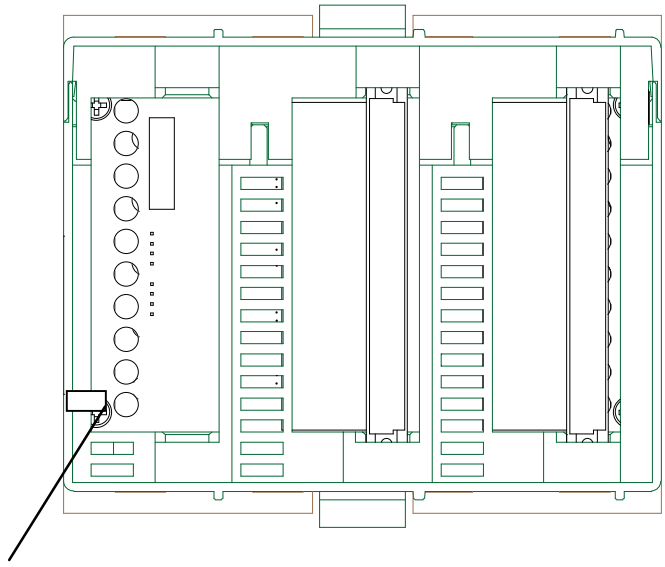


Figure 2–4 DWZZH–05 SCSI Narrow Addressing Jumper



W1 (To enable narrow addressing mode, install a jumper at W1)

2.4 Determining the Configuration

The SCSI Hub is used in end–bus SCSI bus configurations only. The SCSI bus segments require TERMPOWER supplied from the remote connection to enable the SCSI Hub port for that segment. Each port on the SCSI Hub has its own terminators.

All SCSI buses are terminated at the physical ends of the bus. This is true even when using a DWZZH SCSI Hub. DWZZH SCSI Hubs are factory set to terminate the SCSI bus. No user configuration of the SCSI terminators is required.

2.5 Selecting the SCSI Cables

The *StorageWorks Solutions UltraSCSI Configuration Guide* describes SCSI cables in detail. When selecting a cable you must consider the cable connector clearance. Be sure to determine the type connector compatible with the controller connector. In some cases you must use a right–angle connector because there is not enough clearance to use a straight connector. Cables connected to the DWZZH converters are BN37A series.

Glossary

This Glossary includes an alphabetized listing and brief definition of the abbreviations, acronyms, DIGITAL-specific references, and other technical terms that are used in this manual and that may be unfamiliar to the reader.

adapter
See SCSI bus converter.

building block shelf
See SBB shelf.

controller
A hardware/firmware device that manages communications on behalf of host systems over the SCSI bus to devices, such as the HSC-series, HSJ-series, and HSZ-series controllers. Controllers typically differ by the type of interface to the host and provide functions beyond what the devices support.

differential SCSI bus
A signal's level is determined by the potential difference between two wires. A differential bus is more robust and less subject to electrical noise than is a single-ended bus.

DWZZC
A StorageWorks compatible 16-bit SCSI bus converter.
See **SCSI bus converter.**

DWZZH
A StorageWorks compatible 16-bit SCSI bus HUB.

electrostatic discharge
See **ESD**.

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

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

initiator
A SCSI device that requests another device on the bus to perform an operation. Any device on the bus can be an initiator or a target.

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

personality module
The BA356 module that interfaces the SCSI-bus to the BA356 shelf.

physical bus
Two SCSI terminators separated by cables, connectors, and/or the backplane circuitry.

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

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

SCSI
Small Computer System Interface. This ANSI interface defines the physical and electrical parameters of a parallel I/O bus used to connect computers and devices. The StorageWorks subsystem implementation uses SCSI–2 for the transfer of data.

SCSI bus converter
Sometimes referred to 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.

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

SCSI device ID
The bit-significant, representation of the SCSI addressing referring to one of the signal lines numbered 0 through 15. Also referred to as target ID. For example, SCSI device ID 1 would be represented as 00001.

SCSI mid-bus position
The physical location of a controller or a device that the SCSI bus passes through enroute to the controller or device that contains the SCSI bus termination.

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

single-ended SCSI bus
A bus in which each signal's logic level is determined by the voltage of a single wire in relation to ground.

Small Computer System Interface
See SCSI.

StorageWorks
The Digital set of enclosure products that allows customers to design and configure their own storage subsystem. Components include power, packaging, and interconnections in a StorageWorks shelf. SBBs and array controllers are integrated therein to form level enclosures to house the shelves. Standard mounting devices for SBBs are also included.

StorageWorks building block
See **SBB**.

target
A SCSI device that performs an operation requested by an initiator. Any device on the bus can be an initiator or a target.

target ID
See SCSI device ID.

termpower
Is an electrical current that is limited by self-resetting fuses.

Reader's Comments

Manual Order Number:
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