

# StorageWorks™ Solutions

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## Getting Started With Disaster Recovery Solutions

Part Number: EK-SWXDR-GS. B01

**May 1998**

This manual describes the procedures to install and operate a Disaster Recovery Solution.

**Revision/Update Information:**

This manual has been updated to include Disk Storage solutions.

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# Preface

This manual is intended for personnel who must install and maintain a Disaster Recovery Solution.

## About This Guide

Chapters contained in this *Disaster Recovery Solutions Getting Started Guide* are the following:

Chapter 1 — StorageWorks Solutions for Disaster Recovery. An introduction to the disaster recovery solution, including block diagrams.

Chapter 2 — The DWZGA SCSI Bus Extender. A description of the DWZGA SCSI Bus extenders, including theory of operation, features, and front and rear panel indicators.

Chapter 3 — The DS–SWXDR–AA Disaster Recovery Solution Kit. An introduction to the solutions kit including kit contents, the rack mount kit, installing and configuring the solution, and validation of the solution.

Chapter 4 — DWZGA Operator Interface Screens. A description of the various screens available through the DWZGA optional monitor and keyboard.

Chapter 5 — Troubleshooting. A general guide to troubleshooting the Disaster Recovery Solution.

## Associated Documents

Documents associated with the *Disaster Recovery Solutions Getting Started Guide* are the following:

*DWZGA Fiber-Optic UltraSCSI Extender User's Guide* (EK–DWZGA–UG).

*Disaster Recovery Solutions Release Notes* (EK–SWXDR–RN).



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# StorageWorks Solutions for Disaster Recovery

Digital Equipment Corporation has long been concerned with providing disaster recovery capabilities to customers when the customer's primary data processing site experiences problems. DIGITAL's StorageWorks Solutions Group now offers a disaster recovery solution that enables customers to maintain copies of critical data at a site remote from their primary site without the physical movement of media. This disaster recovery solution utilizes technology that extends a SCSI bus to provide access and control to storage at the remote site.

The following sections contain detailed block diagrams that show and describe the following:

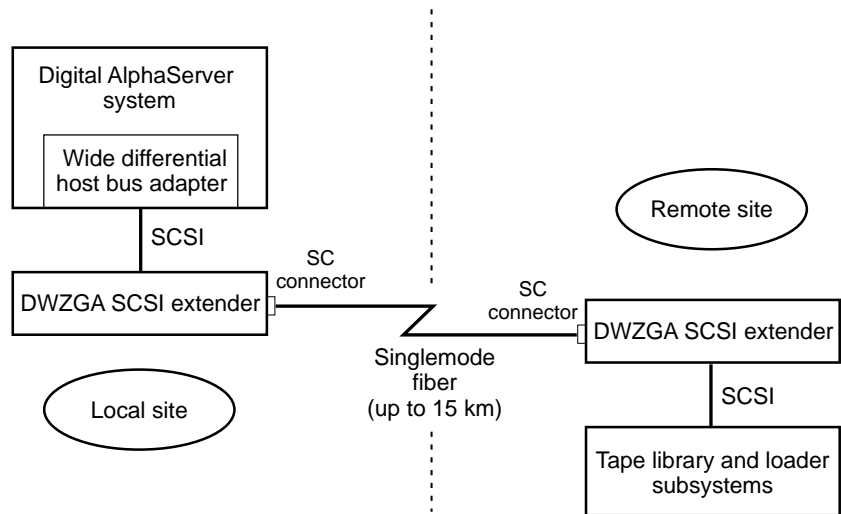
1. Remote tape backup disaster recovery solution
2. Remote Disk Storage disaster recovery system

Specific configuration and cabling information is described in Chapter 3.

## 1.1 Remote Tape Backup Solution

Figure 1-1 shows the remote tape backup solution which utilizes existing DIGITAL tape devices as the remote data storage medium and DWZGA SCSI bus extenders connected with single mode fiber-optic (FO) cable to enable the remote storage. Each DWZGA is packaged in a Pentium-based desktop enclosure, one located at the customer's local site (local DWZGA) and one located at the remote site (remote DWZGA).

**Figure 1-1 Remote Tape Backup Solution**

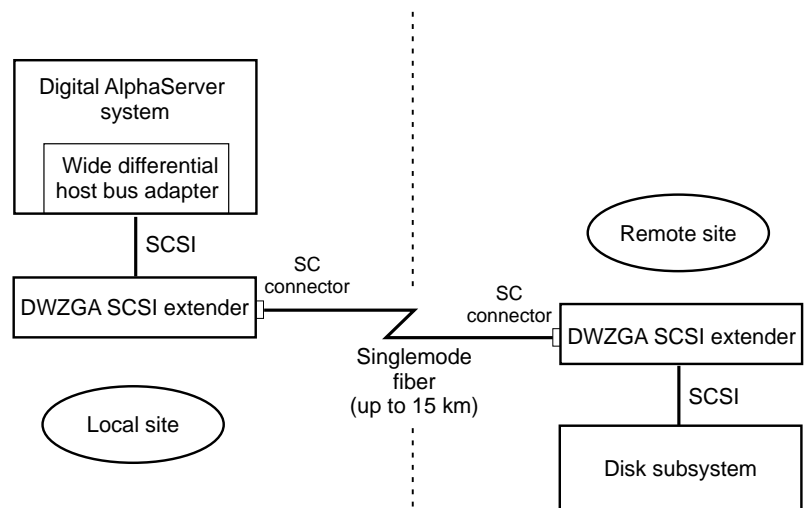


CXO6201A

## 1.2 Remote Disk Storage Solution

Figure 1-2 shows the remote JBOD solution utilizing a remote disk subsystem. The remote JBOD disaster recovery solution utilizes existing DIGITAL disk devices as the remote data storage medium and DWZGA SCSI bus extenders connected back-to-back with single mode fiber-optic (FO) cable to enable the remote storage.

**Figure 1-2 Remote Disk Storage Solution**



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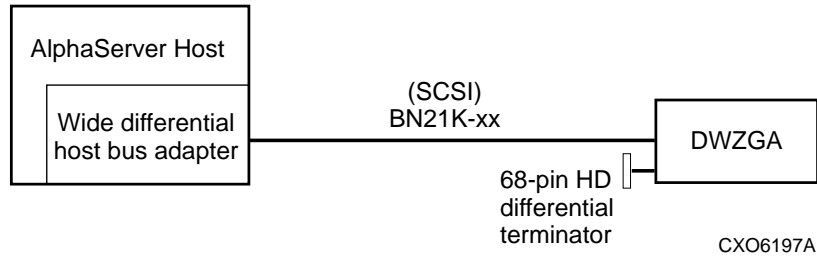
The following sections show more detailed block diagrams that illustrate the technology utilized with the disaster recovery solutions.



### 1.3 Local Host to Local DWZGA Block Diagram

The method used to connect the local host to the local DWZGA is shown in Figure 1-3.

**Figure 1-3 Local Host to Local DWZGA Block Diagram**



### 1.4 Local DWZGA to Remote DWZGA Block Diagram

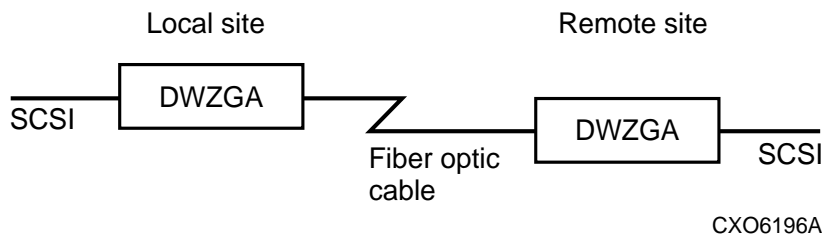
The method used to connect the local site DWZGA to the remote site DWZGA is shown in Figure 1-4.

Up to 15 Km of single-mode fiber cable is used to connect the local DWZGA to the remote DWZGA.

**Note:**

**The fiber-optic cable that connects the two DWZGA SCSI bus extenders is not part of the kit and must be supplied by the customer. The fiber-optic cable is installed in a point-to-point topology. Hubs, switches, and repeaters are not supported.**

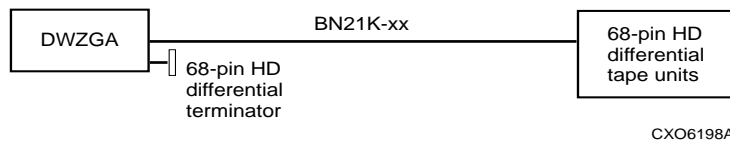
**Figure 1-4 Local DWZGA to Remote DWZGA Block Diagram**



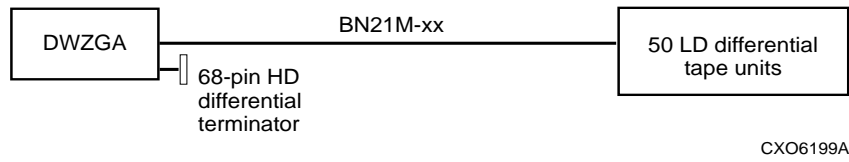
### 1.5 Remote DWZGA to Remote Storage Block Diagrams

Figures 1-5 through 1-8 show different block diagrams for the remote backup solutions' remote DWZGA to remote subsystem. Each method is dependent on the type of tape subsystem used.

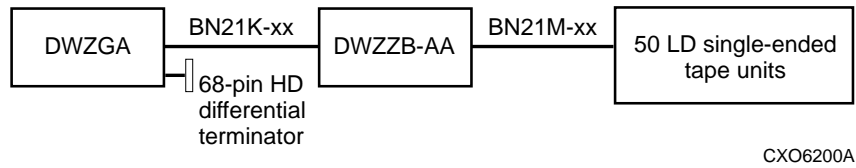
**Figure 1-5 Remote DWZGA to 68-pin HD Differential Tapes Block Diagram**



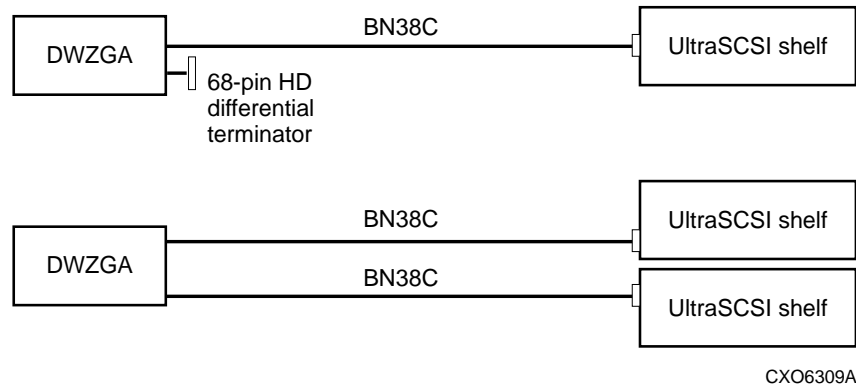
**Figure 1-6 Remote DWZGA to 50-pin LD Differential Tapes Block Diagram**



**Figure 1-7 Remote DWZGA to 50-pin LD Single-Ended Tapes Block Diagram**



**Figure 1-8 Remote DWZGA to UltraSCSI Disk Shelf**



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## The DWZGA SCSI Bus Extender

The DWZGA SCSI bus extender provides high-speed connectivity between SCSI-based host systems and remote storage subsystems, allowing SCSI commands and data to pass between the host and remote subsystems. This chapter includes the following subsections:

1. DWZGA Theory of Operation for Disaster Recovery Solutions
2. DWZGA Features
3. Front Panel Indicators
4. Rear Panel Indicators

### WARNING:

**To avoid personal injury, ensure DWZGA units are de-energized by removing power to the unit before performing any installation or maintenance steps. Never look directly into any fiber-optic connectors or cables.**

### 2.1 DWZGA Theory of Operation for Disaster Recovery Solutions

The DWZGA SCSI extender converts SCSI commands and data packages into a serial stream of commands and data transmitted via fiber-optic cable. The local site DWZGA converts the parallel SCSI command packet from the host into serial SCSI commands and sends that serial stream out via single-mode fiber-optic cable to the fiber port of the remote site's DWZGA. The remote site DWZGA accepts and unpacks the serial stream and converts it back into the originally transmitted SCSI command format sent from the host. The remote site DWZGA sends the parallel SCSI command out via its SCSI adapter port on an ultra-wide differential port to the remote storage subsystem. Detailed information about DWZGA SCSI bus extenders and their operation can be found in the *Fiber-Optic UltraSCSI Extender DWZGA User's Guide* (EK-DWZGA-UG).

### 2.2 DWZGA Features

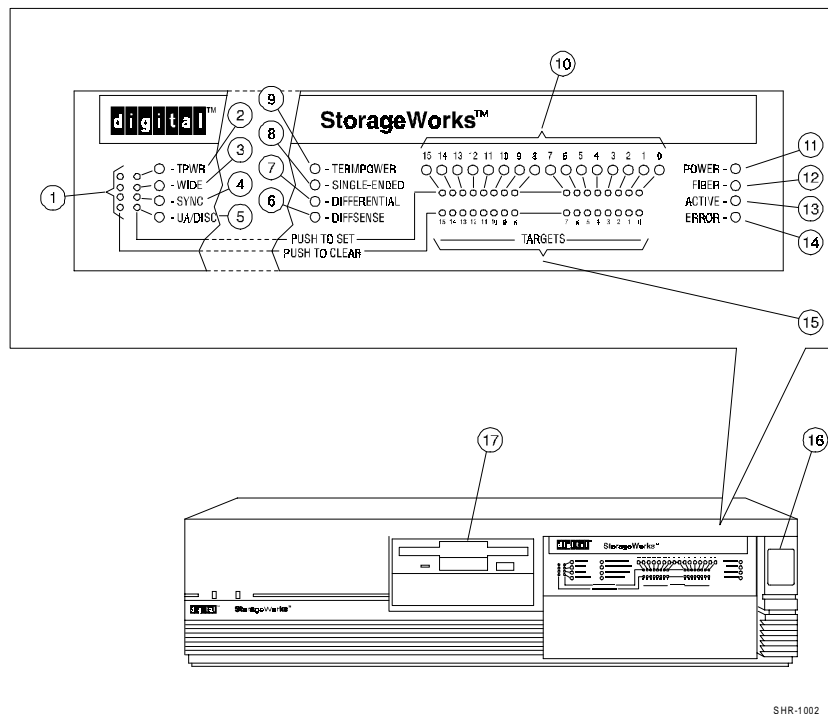
The DWZGA SCSI extender provides the ability to connect local operating systems to remote storage sites, satisfying the requirement that data be maintained at a remote site. By using pairs of SCSI extenders, transmission lengths of up to 15 Km are obtained. Each DWZGA contains one ultra-wide SCSI (UWD SCSI) differential bus and one ¼ speed fiber channel fiber-optic port.

## 2.3 Front Panel Indicators

DWZGA front panel indicators consist of multiple push-to-set/push-to-clear rocker-type DIP switches and light emitting diodes (LEDs) that correspond to the positions of the rocker switches. Four LEDs provide parallel SCSI bus status information while four other LEDs provide system and fiber status. The following list explains the DWZGA front panel indicators. Refer to Figure 2-1 while reading the descriptions about the front panel indicators.

switches and light emitting diodes (LEDs) that correspond to the positions of the rocker switches. Four LEDs provide parallel SCSI bus status information while four other LEDs provide system and fiber status. The following list explains the DWZGA front panel indicators. Refer to Figure 2-1 while reading the descriptions about the front panel indicators.

**Figure 2-1 DWZGA SCSI Bus Extender Front Panel Indicators**



Each number in the following list corresponds to a callout in the above figure. The following indicators are found on the front panel:

1. Four push-to-set and four push-to-clear rocker-type DIP switches located on the left-hand side of the DWZGA front panel that correspond to the LEDs immediately to the right of those DIP switches. (callouts 2, 3, 4, and 5). Also, 16 push-to-set and 16 push-to-clear rocker-type DIP switches located on the right-hand side of the DWZGA front panel that correspond to the 16 TARGET ID LEDs. (callout 10).
2. TPWR LED—LED ON when associated DIP switch is pushed. Relates to LED 9, which is also ON when associated DIP switch is pushed. Indicates that the DWZGA-supplied diode-protected terminator power is enabled.
3. WIDE LED—LED ON when associated DIP switch is pushed. Indicates DWZGA-initiated wide data transfer is enabled (narrow data transfer is always enabled).

4. SYNC LED—LED ON when associated DIP switch is pushed. Indicates DWZGA-initiated synchronous data transfer request is enabled.
5. UA/DISC—LED ON when associated DIP switch is pushed. Indicates DWZGA Unit Attention request is enabled.
6. DIFFSENSE—LED ON indicates that a single-ended device is connected to the differential SCSI bus. This is an error and must be corrected.
7. DIFFERENTIAL—LED ON indicates that the DWZGA senses a differential SCSI bus device.
8. SINGLE-ENDED—LED ON indicates that the DWZGA senses a single-ended SCSI bus device. Default = OFF.
9. TERMPOWER—LED ON indicates that the DWZGA detects SCSI terminator power. Default = ON.
10. TARGET LEDs—LEDs 0-15 correspond directly to the push-to-set and push-to-clear DIP switches below the LEDs. Each LED ON indicates corresponding push-to-set target ID switch is pressed. (See (Step. 15). Targets are enabled only on the remote DWZGA.
11. POWER—LED ON indicates that the DWZGA unit power is ON.
12. FIBER—LED OFF indicates no fiber-optic power detected. This LED ON indicates that connectivity has been established between the local and remote DWZGA.
13. ACTIVE—LED ON indicates that the DWZGA is initiating commands, responding to commands, or transferring commands.
14. ERROR—LED ON indicates that an error has occurred.
15. TARGETS—Sixteen push-to-set and 16 push-to-clear rocker-type DIP switches that, if set, inform the host site initiators attached to the local DWZGA of the SCSI device target IDs attached to the remote DWZGA. Each DIP switch corresponds to a target ID LED, described in Step 10. If cleared, these switches clear the associated LED and inform the host side initiator that the device with that SCSI ID has been deselected.
16. Power Switch—Pressed to ON (1) connects ac power to DWZGA if rear power switch is pressed to ON (1).
17. Floppy Disk Drive—3.5-inch floppy disk drive used for installation/startup diskette, diagnostic diskette, and dump-to-floppy function.

Number 12 in the previous list describes the FIBER indicator LED located on the front of the DWZGA SCSI bus extender. This LED OFF indicates that no fiber-optic power was detected. This LED ON indicates the state of the local DWZGA's connectivity to the remote DWZGA as follows:

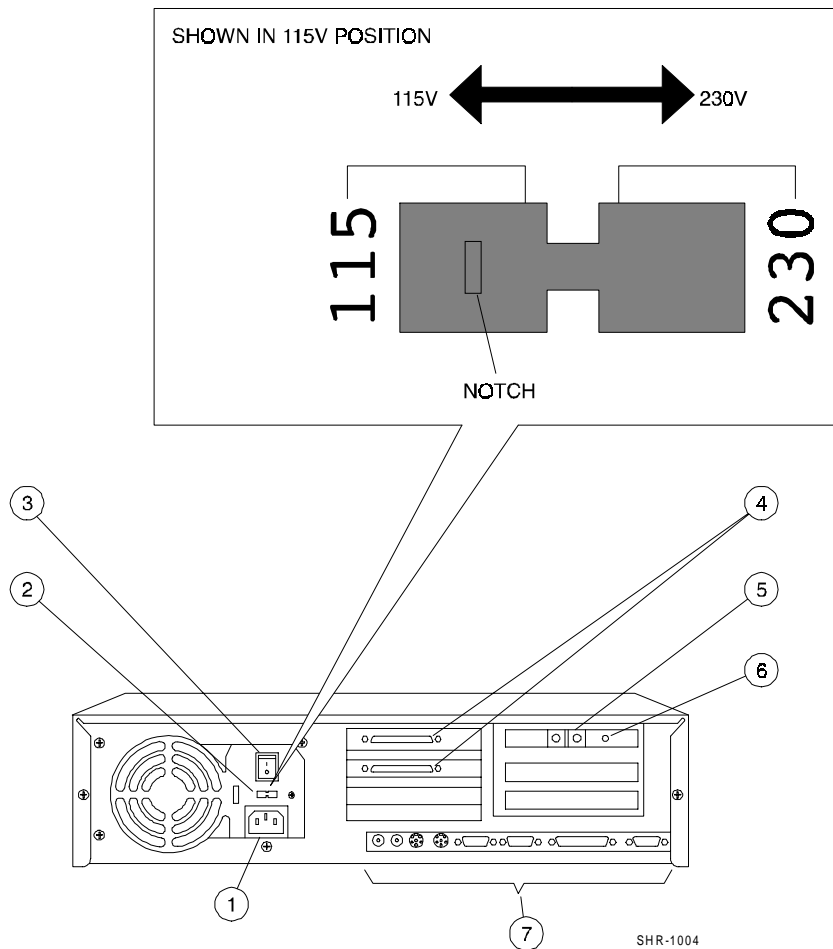
1. LED blinks 1x — Fiber-optic power detected. Waiting for receiver synchronization.
2. LED blinks 2x — Fiber-optic power detected and receiver synchronized. Waiting for fiber interface state change.

3. LED blinks 3x — Other DWZGA reporting itself non-operational.
4. LED blinks 4x — Other DWZGA reporting itself OFF line.
5. LED blinks 5x — Other DWZGA resetting its fiber-optic interface.
6. LED blinks 6x — Waiting for fiber-optic interface reset to complete.
7. LED on solid — Power ON self test complete, connectivity established.

## 2.4 Rear Panel Indicators

Figure 2-2 shows the rear of a DWZGA unit. Refer to Figure 2-2 while reading the following list. The numbers in the list correspond to callouts in the figure.

**Figure 2-2 DWZGA SCSI Bus Extender Rear Panel Indicators**



The following indicators are found on the DWZGA rear panel:

1. ac power inlet—Receptacle that accepts the power cord supplied with each unit to connect to a 100 – 120V ac, 6-amp maximum, or a 200 – 240V ac, 4-amp maximum power source.
2. 115/230 Voltage selector slide switch—Switch is factory-set at 115 position to accept power from a 115V ac source. Moving the switch to 230 position allows the DWZGA to accept power from a 230V ac power source.
3. Power Switch (1/0)—Rocker-type switch that supplies power to the power switch on the front panel when in 1 position. Switch set to 0 position removes power from front panel power switch.
4. SCSI Connectors—Two 68-pin, high-density, SCSI P-type, female SCSI connectors.
5. Fiber Channel Port—Duplex SC connector equipped with a removable rubber plug. Designed to accept laser-based optical data link (ODL) 1300-nanometer wavelength, single-mode cable with 9-micron core diameter. Keying of the fiber-optic connector ensures correct connection.
6. Red LED—LED ON indicates fiber-optic module internal to DWZGA is operational. Associated with Fiber LED on front panel. LED OFF (when power is applied to unit) indicates that the fiber-optic module is defective or the fiber link is open.
7. Various rear panel connectors—Eight connectors, from left to right, for audio out, microphone input, keyboard, mouse, comm 1 port, comm 2 port, parallel, and video. The keyboard and video connectors are used with the optional keyboard and monitor for installation and maintenance purposes. The other connectors are not used.





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# The DS-SWXDR-AA Disaster Recovery Solution Kit

The DS-SWXDR-AA disaster recovery solutions kit provides the technology to extend a customer's local SCSI bus up to 15Km to storage located at a remote site. This enables customers to maintain copies of critical data off site without requiring the physical movement of storage media.

This chapter details the DS-SWXDR-AA disaster recovery solutions kit, specifically the following:

1. Contents of the DS-SWXDR-AA kit, including unpacking and required tools
2. DWZGA Rack Mount Kit
3. Installing and Configuring the DS-SWXDR-AA kit, including the following:
  - Configuring the remote DWZGA to remote storage, including cabling and switch settings
  - Configuring the local DWZGA to remote DWZGA
  - Configuring the local host bus adapter to the local DWZGA, including cabling and switch settings
4. Validating connectivity

## 3.1 DS-SWXDR-AA Kit Contents

This section describes kit contents, unpacking procedures and required tools. Disaster recovery capabilities are utilized by using customer local site components and this kit to extend the customer SCSI bus to remote site storage.

Verify the contents of the kit as you unpack the kit. The DS-SWXDR-AA kit contains the following:

1. DS-DWZGA-AA kit (x2), containing the following:
  - DWZGA SCSI bus extender and power cords (x2)
  - *Fiber-Optic UltraSCSI Extender DWZGA User's Guide* (EK—DWZGA—UG.A01) (x2)
  - Installation/Startup diskette (x2)
  - Diagnostic diskette (x2)
  - Switch setting tool (x2)
  - SCSI bus terminator (x2)

## The DS-SWXDR-AA Disaster Recovery Solution Kit

2. DS-DWZGA-AB rack mount kits (x2), containing rack mount kit installation instructions
3. Solution Documentation
  - *Disaster Recovery Solutions Release Notes* (EK-SWXDR-RN)(x2)
  - *Disaster Recovery Solutions Getting Started Guide* (EK-SWXDR-GS)(x2)

The components of the DS-SWXDR-AA disaster recovery solutions kit are contained in a large shipping container banded to a shipping pallet. Unpack the kit per the following procedure:

1. Remove the Contents Listing from the shipping envelope found on the outside of the shipping container and set it aside.
2. Cut and remove the banding material from the shipping container.
3. Remove the protective corner boards from the shipping container.
4. Carefully cut the tape away from the shipping container.
5. Lift off the shipping container.
6. Inside, you will find the individual components of the DS-SWXDR-AA disaster recovery solutions kit. Check the individual components against the Contents Listing sheet discussed in Step 1 before performing any installation steps.

Tools required during the installation and configuration of the DWZGA SCSI bus extenders are the switch setting tool provided in the kit, used to operate the push-to-set and push-to-clear rocker-type DIP switches on the DWZGA front panel, and a small, flat-head screwdriver used to connect and remove SCSI connectors from the rear of the DWZGA.

An optional 15 inch VGA monitor and optional PS/2 style keyboard can be connected to each DWZGA SCSI extender box for diagnostic purposes. On the back of each DWZGA, connect the monitor to the monitor port and connect the keyboard to the keyboard port.

### **Note:**

**It is the customer's responsibility to purchase both the optional monitor and keyboard. They are not part of the DS-SWXDR-AA kit.**

### **3.1.1 DWZGA Rack Mount Kit**

The DS-SWXDR-AA solution kit contains DWZGA rack mount kits (part number DS-DWZGA-AB) that enable you to mount the DWZGA SCSI bus extenders into cabinets at both the local and remote sites. Follow the instructions contained in the box to install the rack mount kit into your cabinets.

## **3.2 Installing and Configuring the DS—SWXDR—AA Kit**

This section describes installation and configuration of the DS-SWXDR-AA kit specific to the disaster recovery solutions. This section contains the following three subsections

1. Configuring the Remote DWZGA to Remote Storage Subsystems
2. Configuring the Remote DWZGA to the Local DWZGA
3. Configuring the Local Host Bus Adapter to the Local DWZGA

The above sequence, starting at the remote site and progressing to the host or local site, is the preferred installation sequence, as host data processing is minimized. Detailed DWZGA configuration instructions can be found in the *Fiber-Optic UltraSCSI Extender DWZGA User's Guide* (EK-DWZGA-UG.A01).

### 3.2.1 Configuring the Remote DWZGA to Remote Storage Subsystems

The installation and configuration of the remote DWZGA to remote storage subsystems is the most detailed because of the various cabling configurations between the remote DWZGA and the remote storage devices.

The remote site DWZGA SCSI bus extender is connected to the remote subsystem with one of four different cable configurations depending on the type of remote tape subsystem employed.

This section is divided into the following sections:

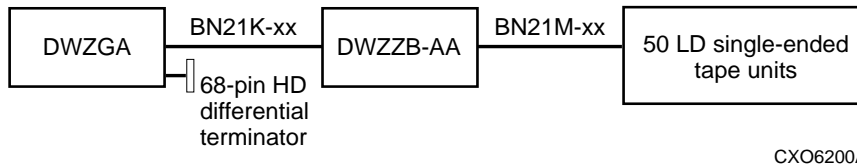
- Cabling the Remote DWZGA to 50-pin Low Density (LD) Single-Ended Tape Subsystems
- Cabling the Remote DWZGA to 50-pin Low-Density (LD) Differential Tape Subsystems
- Cabling the Remote DWZGA to 68-pin High-Density (HD) Differential Tape Subsystems
- Cabling the Remote DWZGA to VHDCI disk storage.

**Note:**

**None of the cables or converters needed to configure the remote DWZGA to remote storage are included in the DS-SWXDR-AA solutions kit. DIGITAL Field Service Engineers and customers must ensure all necessary cables have been ordered before attempting to install this solution. All SCSI bus segments must be properly terminated.**

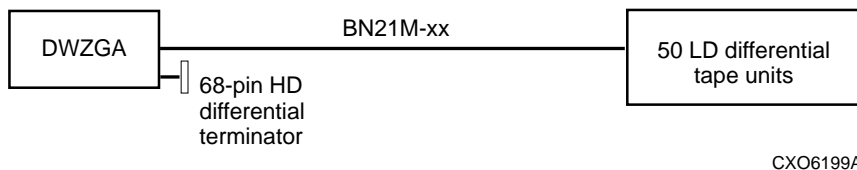
If the tape subsystem employed as remote storage is a 50-pin LD single-ended tape subsystem, the cabling scheme connecting the remote DWZGA to the remote tape subsystem uses both a BN21K-xx cable and a BN21M-xx cable in the following way: (refer to Figure 3-1): a BN21K-xx high-density cable runs from the SCSI output of the remote DWZGA to the SCSI input of a DWZZB-AA: a 68-pin, high-density differential to 68-pin, high-density, single-ended converter. The SCSI output on the other side of the DWZZB-AA converter is connected to the tape subsystem with a BN21M-xx two to 20 meter, 68-pin, high-density to 50-pin, low-density cable. For all configurations, the remote site DWZGA must be terminated with the 68-pin 869515-1 Lo-Profile terminator supplied or the DIGITAL equivalent, a H879-AA 68-pin, high-density SCSI terminator. All cables on the remote site are male ended.

**Figure 3-1 Remote DWZGA to 50-pin LD Single-Ended Tape Units**



If the tape subsystem employed as remote storage is a 50-pin LD differential tape subsystem, the cable used to connect the remote DWZGA to the remote tape subsystem is a BN21M-xx: a two to 20 meter, 68-pin high-density to 50-pin low-density SCSI cable. See Figure 3-2.

**Figure 3-2 Remote DWZGA to 50-Pin LD Differential Tape Units**



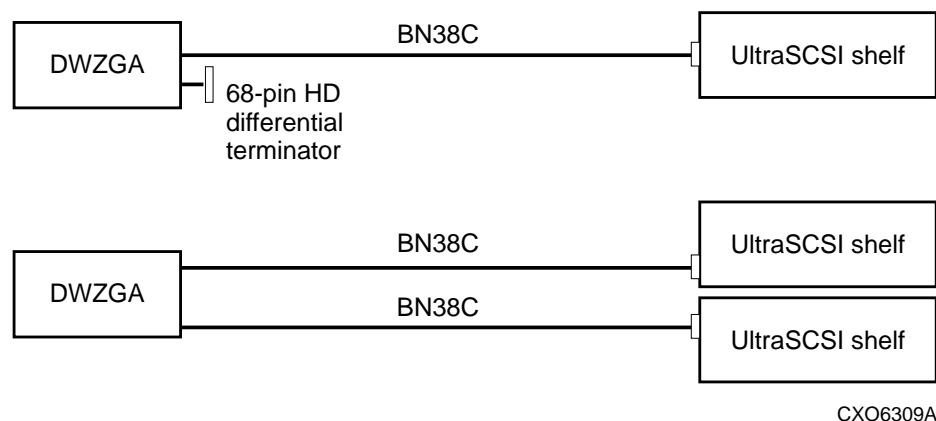
If the tape subsystem employed for storage is a 68-pin HD differential tape subsystem, the cable used to connect the remote DWZGA to the remote tape subsystem is a BN21K-xx: a one to 20 meter, 68-pin high-density SCSI cable. See Figure 3-3.

**Figure 3-3 Remote DWZGA to 68-Pin HD Differential Tape Units**



For the UltraSCSI disk shelf subsystem, the cable used to connect the remote DWZGA to the remote tape subsystem is a BN38C-xx: a two to 20 meter, 68-pin high-density SCSI to VHDCI cable. See Figure 3.4.

**Figure 3-4 Remote DWZGA to VHDCI Disk Storage Units**



### 3.2.1.1 Validating Remote Site Connectivity

Use the following procedure to validate connectivity between components at the remote site:

1. Ensure that the remote site DWZGA rear panel and front panel power switches are in the OFF or 0 position.
2. Verify the ac power source voltage. If the power source is 115V ac, verify that the notch in the 115/230 voltage selector switch located on the rear of the remote DWZGA is at the factory-set 115V position. If the power source is 230V ac, use a small flat-head screwdriver placed in the notch to move the switch to its 230V position.
3. Plug the ac power cord into the ac receptacle on the rear of the remote DWZGA. Plug the other end of the ac power cord into the wall receptacle.
4. On the rear of the remote DWZGA, connect the optional keyboard to the keyboard port and connect the optional monitor to the monitor port. If you decide not to use the optional keyboard and monitor, DWZGA diagnostic and installation screens will not be visible.
5. Connect the SCSI cable from the remote target SCSI devices to either of the SCSI connectors located on the rear of the remote DWZGA. Use the supplied 869515-1 Lo-

Profile, 68-pin, high-density terminator or the DIGITAL equivalent (H879-AA) to terminate the other SCSI connector located on the rear of the remote DWZGA.

6. Apply power to the remote storage devices. Users are responsible for setting the remote storage subsystem SCSI device IDs before continuing this procedure. The information for setting SCSI device IDs is described in the user guides for the specific storage subsystem used. Configure the remote storage subsystem before continuing this procedure.
7. Insert the Diagnostic floppy and apply power to the remote DWZGA by pressing 1 on the DWZGA rear panel power switch (1/0 rocker-type DIP switch on the rear of the remote DWZGA) then press the push-button power switch located on the front panel of the remote DWZGA to 1. Verify that the front panel power indicator lights. Allow the remote DWZGA to perform its self-test. Upon completion of the self-test, the Switch Display Screen is displayed, showing a representation of the DWZGA front panel switches. Pressing the space bar on the DWZGA keyboard updates this screen. Screens will not be visible to users if the optional monitor and keyboard are not connected to the DWZGA.
8. Ensure all TARGETS LEDs 0—15 are **clear**. Use the switch setting tool to clear the push-to-clear switches if not cleared.
9. Press the associated PUSH TO SET switch to light TPWR, enabling terminator power if not already enabled. Always perform this step.
10. Press the associated PUSH TO SET switch to light WIDE, enabling wide (16-bit) data transfer negotiations. WIDE lit is the default setting.
11. Press the associated PUSH TO SET switch to light SYNC, enabling synchronous data transfer negotiations. SYNC lit is the default setting.
12. Press the associated PUSH TO CLEAR switch to extinguish the UA/DISC LED, disabling DWZGA unit attention.
13. Verify that both TERMPower and DIFFERENTIAL LEDs are lit.
14. Verify that both SINGLE-ENDED and DIFFSENSE are not lit.
15. For Steps 7-13, pressing the space bar on the DWZGA keyboard updates the screen information for each step. Failure of any LED to not perform as indicated in each step is cause to send the DWZGA unit back to the vendor.
16. Press <F4> twice. The Set SCSI Parameters screen is displayed on the remote DWZGA monitor. Validate connectivity between the remote site DWZGA and the remote site storage subsystem by entering the Initiator ID and Target IDs on the Set SCSI Parameters screen. Initiator IDs can be any unused SCSI device ID. Target IDs must have been set in Step 6. Choose the Initiator and Target IDs and press <RETURN>. At the FOX> prompt, enter **SI** (SCSI Inquiry) followed by <Enter>. Nonexistent or failing devices will return an error message of SCSI Bus Timeout Selection. All commands that can be entered at the FOX> prompt are described in Chapter 5.
17. Remove power to the remote DWZGA by pressing the front panel push-button power switch.

Verify that the front panel POWER indicator goes off. Press the rear panel power switch to OFF or 0.

18. Remove the Diagnostic disk from the remote DWZGA floppy drive.

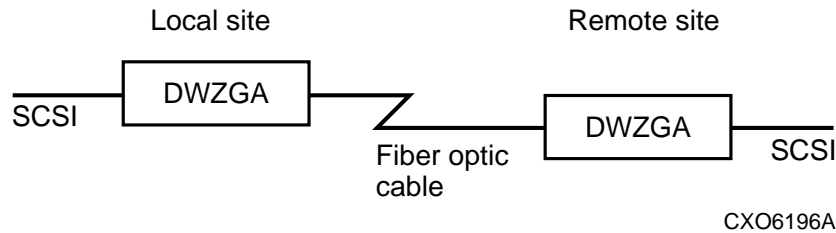
### 3.2.2 Configuring the Local DWZGA to the Remote DWZGA

The local DWZGA is connected to the remote DWZGA with up to 15Km of fiber-optic (FO) cable. See Figure 3-5.

**Note:**

**The fiber-optic cable is not part of the DS-SWXDR-AA kit. Customers and DIGITAL Field Service Engineers must ensure the fiber-optic cable is available before starting the installation.**

**Figure 3-5 Local DWZGA to Remote DWZGA Configuration**



Follow these steps to cable the local DWZGA to the remote DWZGA.

1. Ensure that both the local and remote DWZGA rear panel and front panel power switches are in the OFF or 0 position.
2. Verify the ac power source. If the power source is 115V ac, verify that the notch in the 115/230 voltage selector switch located on the rear of each DWZGA is at the factory-set 115 position. If the power source is 230V ac, use a small flat-head screwdriver placed in the notch to move the switch to its 230 position. This step should have been performed for the remote DWZGA in Section 0; ensure that this step is performed for both DWZGA units.
3. Plug the ac power cord supplied with the kit into the power cord receptacle located on the rear of the local DWZGA and into the ac power source. Ensure that the power cord is compatible with the ac wall outlet. If the power cord is not compatible with the ac source in your region, consult the *Fiber-Optic UltraSCSI Extender DWZGA User's Guide* (EK—DWZGA—UG) for information on obtaining a power cord that meets the power criteria for your region.
4. If not already done, connect the optional monitor and keyboard to the monitor and keyboard ports located on the rear of both the local and remote DWZGA. If you chose not to use the optional keyboard and monitor, diagnostic screens will not be visible to users.
5. At the local site, remove the rubber plug from the fiber-optic port located on the rear of the local DWZGA and insert the optical fiber SC connector attached to the local end of the fiber-optic cable into that connector. Align the connector keys to ensure proper polarity.

**WARNING:**

**To avoid personal injury, ensure that the DWZGA units are de-energized by removing power to the unit before performing any installation or maintenance steps. Never look directly into any fiber-optic connectors or cables.**

6. At the remote site, remove the rubber plug from the fiber-optic port located on the rear of the remote DWZGA and insert the optical fiber SC connector attached to the remote end of the fiber-optic cable into that connector. Align the connector keys to ensure proper polarity.

**WARNING:**

**To avoid personal injury, ensure that the DWZGA units are de-energized by removing power to the unit before performing any installation or maintenance steps. Never look directly into any fiber-optic connectors or cables.**

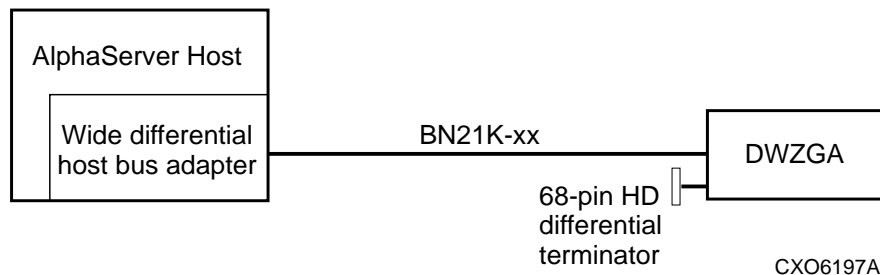
7. Insert the Installation/Startup floppy into both the local and remote DWZGA units. Apply power to both DWZGA units by first pressing the rear power switch to ON or 1, and then pressing the front panel power switch to ON or 1.
8. Upon completion of power up and self tests, verify that the Fiber LED located on both DWZGA front panels lights. This verifies connectivity between the local and remote DWZGA. If the Fiber LED does not light, either the fiber-optic cable polarity is incorrect (check the rear panel fiber connections), the fiber-optic cable is broken, or the DWZGA unit is faulty. The DWZGA monitors attached to each DWZGA should read **FOX Connection Online** on both monitors at this time.
9. On either DWZGA unit keyboard, press <F2> and observe the monitor screen. The screen reports Operating Software Versions for both DWZGA units. The Operating Software Versions must match.
10. Power off both DWZGA units, by first pressing the front panel power switch and then pressing to 0 the rear panel power switch.
11. Leave the Installation/Startup floppy in both DWZGA units.

### 3.2.3 Configuring the Local Host Bus Adapter to the Local DWZGA

The local site DWZGA SCSI bus extender is connected to the DIGITAL AlphaServer host system through a wide differential host bus to SCSI adapter. The host bus adapter must be terminated.

Refer to Figure 3-6 while reading the following text.

**Figure 3-6 Local DWZGA to Host Configuration**



Up to 20 meters of BN21K-xx 68-pin, high-density SCSI cable connects the local DWZGA SCSI bus extender to the host bus adapter. The BN21K-xx high-density SCSI cable comes in various lengths from 1 to 20 meters. The -xx suffix determines the length of the cable.

**Note:**

**The BN21K–xx high density SCSI cable is not part of the DS–SWXDR–AA kit. DIGITAL Field Service Engineers and customers must ensure that this cable is available in order to connect a local site DWZGA to the host system.**

The local site DWZGA must be terminated with either the supplied 869515–1 Lo-Profile, 68-pin, high density terminator or the DIGITAL equivalent, a H879–AA 68-pin, high-density terminator. All cables at the local site are male ended.

Follow these steps to cable the local host bus adapter to the local DWZGA.

1. Power down any hosts to be connected to the local DWZGA.
2. If not done previously, remove power to the local DWZGA by first pressing 0 on the front panel power switch, and then on the rear panel power switch.
3. Verify the ac power source. If the power source is 115V ac, verify that the notch in the 115/230 voltage selector switch, located on the rear of the local DWZGA, is set to the factory-set 115 position. If the power source is 230V ac, use a small flat-head screwdriver placed in the notch to move the switch to its 230 position.
4. Connect the SCSI cable from the host to either of the SCSI connectors on the rear panel of the local DWZGA.
5. Use the supplied terminator or a DIGITAL equivalent to terminate the other SCSI connector on the rear of the local DWZGA.
6. If not done previously, remove the rubber plug from the fiber-optic port on the rear of the local DWZGA and insert the optical fiber duplex SC connector attached to the fiber link into the connector. Align the connector keys to ensure proper polarity.
7. Clear all local DWZGA TARGET LED switches 0 through 15 by using the switch setting tool to push the push-to-clear switches.
8. Use the switch setting tool to set the local DWZGA push-to-set TARGET LED switches to match the SCSI target IDs of the remote SCSI target devices. Users are responsible for setting the remote storage subsystem SCSI device IDs before continuing this procedure. The information for setting SCSI device IDs can be found in the user guides for the specific storage subsystem used. For example, if the remote SCSI device IDs are 0,1,2 and 3, push the corresponding push-to-set switches that match those SCSI IDs.
9. Apply power to the local DWZGA by first pressing the rear panel power switch to 1 and then pressing the front panel power switch to ON or 1.
10. On the local DWZGA, press the associated push-to-set switch to light the TPWR LED, enabling TPWR power. Always perform this step.
11. On the local DWZGA, push the push-to-clear switch associated with the WIDE LED, turning off that LED and disabling wide (16 bit) as well as narrow (8 bit) transfer negotiations.
12. On the local DWZGA, push the push-to-clear switch associated with the SYNC LED, turning off that LED and disabling synchronous data-wide transfers.
13. On the local DWZGA, push the push-to-clear switch associated with the UA/DISC LED, turning off this LED and disabling DWZGA unit attention.
14. Verify that both the TERMPower and DIFFERENTIAL LEDs on the local DWZGA are lit.
15. Verify that both the SINGLE-ENDED and DIFFSENSE LEDs on the local DWZGA are not lit



16. Insert the Installation/Startup floppy into the local DWZGA floppy disk drive and reboot with <Ctrl><Alt><Del>.
17. Verify that the front panel power indicator lights. The local DWZGA unit now performs its self-test.
18. Apply power to the local host and type SHOW DEVICE on the host local command console terminal. Verify that the local host can recognize the remote storage device.
19. Leave the Installation/Startup floppy in both DWZGA units so that the DWZGA units can recover in the event of a power failure.

### 3.3 Validating Solution Connectivity

Connectivity for each piece of the solution has been validated in the previous sections. This section describes how to validate the entire solution after all the components have been installed. A simple test of fiber connectivity is to insert the Installation/Startup floppy into the floppy disk drive of both DWZGA units, apply power, and ensure that the Fiber LED on both DWZGA unit front panels lights. The Fiber LED lit on both DWZGA units guarantees fiber connectivity. If the Fiber LED does not light, a quick test is to reverse the polarity of the dual-ended fiber-optic cable at the rear of one DWZGA. If the Fiber LED still is not lit, perform the same step at the rear panel of the other DWZGA. If the Fiber LED is still not lit, the DWZGA unit may be faulty or the fiber-optic cable may be broken.

**WARNING:**

**To avoid personal injury, ensure DWZGA units are de-energized by removing power to the unit before performing any installation or maintenance steps. Never look directly into any fiber-optic connectors or cables.**

An alternate way to validate connectivity is by using the optional monitor and keyboard and the Startup/Installation floppy. Remove power from the DWZGA units and connect a VGA monitor and keyboard to both the local and remote DWZGAs via the standard VGA and keyboard adapter ports located on the back of each DWZGA. Insert the Installation/Startup floppy and apply power to the DWZGA units. The monitor automatically displays the last screen that had been selected, usually screen one. All keyboard functions can be used at any time while the system is running, with the exception of the <ctrl f> key function (floppy dump function). The <Ctrl><f> or floppy dump function could cause SCSI timeouts on the SCSI bus. The <Ctrl>< f> function is covered in Chapter 5.

Use the following procedure to validate solution connectivity:

1. Attach a monitor and keyboard to both the local and remote DWZGA SCSI extenders.
2. Insert the Startup/Installation floppy into the floppy drives of both DWZGA SCSI extenders and apply power, first with the rear panel power switch and then with the front panel push button power switch. (You can reboot with <Ctrl><Alt><Delete>.) Screen one automatically appears and the last line reads **FOX Connection Online**.
3. Press <F2> on either keyboard. Screen one changes to show connectivity between the two DWZGAs. The screen reads **Other Side FOX Reports Version XXXX** and **This Side FOX Reports Version XXXX**, where XXXX is the current DWZGA software version. Ensure the version numbers match.
4. Apply power to the remote SCSI devices if not already done. Users are responsible for setting the remote storage devices SCSI device IDs prior to this step. The information for setting the SCSI device IDs is described in the user guides for the specific subsystem used.

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5. Remove the Installation/Startup floppy from the remote site DWZGA, insert the Diagnostic floppy, and reboot the remote DWZGA with <Ctrl><Alt><Del>. The Switch Display screen is displayed, showing a visual representation of the remote DWZGA front panel switch settings.
6. Press <F4> twice on the remote site DWZGA keyboard. The Set SCSI Parameters screen is displayed. At the Set SCSI Parameters screen Enter Screen prompt, type in any unused SCSI ID as the Initiator ID, followed by a comma, and then type in any of the SCSI device IDs set on the local DWZGA TARGET ID switches followed by a <Return> or <Enter>. The second number here must be a valid SCSI remote device ID and must have the corresponding TARGET ID switch set on the local DWZGA, which should have been set previous to this. If not set, use the switch setting tool to set the SCSI device IDs of the SCSI devices on the local DWZGA front panel TARGET ID switches. The <Return> removes the Set SCSI Parameters screen and the FOX> prompt is displayed.
7. At the FOX> prompt type **SI** followed by a <Return>. If the remote DWZGA recognizes the remote device SCSI ID, a message similar to the following is displayed.

**Device Found, Target ID = 0X, Device Type = 0X**

**Inquiry Bytes (0-7) = 01 00 02 02 33 00 00 38**

**DEC T289 C DEC1210**

The above message shows the remote SCSI target device found as well as the target ID of the device, where X in the above example corresponds to the target ID you chose. If you chose a target ID that does not exist, (one that is not set on the local DWZGA and is not assigned to a remote storage device), entering a <Return> followed by **SI** at the FOX> prompt displays a SCSI Bus Selection

Timeout error at the next FOX> prompt. A SCSI Buss Selection Timeout may also indicate a failing remote SCSI device.

8. Remove the Diagnostic floppy and insert the Installation/Startup floppy into the floppy disk drive of both DWZGA units. Leave the Installation/Startup floppy in both units so that each DWZGA can recover from a power failure, should one happen.

The local site DWZGA must have the front panel switches set to correspond to the remote site SCSI storage device IDs. The SCSI TARGET LEDs on the local DWZGA correspond to the remote site SCSI storage device IDs. (Example: HSZ70 Target IDs=(0,1,2,3). If you followed the instructions throughout Section 3.2 and validated the solution connectivity as described in Section 3.3, your disaster recovery solution will operate correctly.

## DWZGA Operator Interface Screens

DWZGA units offer an operator interface with various screens. Screen 1 through Screen 8 are available when connected to the optional keyboard and monitor that enable you to view status and performance information. Screens are selected by pressing the corresponding number keys on the keyboard. Most of the screens provide proprietary information that is unavailable to DIGITAL customers and Field Service Engineers. However, Screen 1 does provide some useful status information as well as the ability to test certain features of the DWZGA. Screen 8 shows you a keyboard menu. This section describes all of the screens available to the user via the monitor/keyboard user interface; the primary focus is on Screen 1 and Screen 8.

### 4.1 Screen 1

Screen 1 displays the most basic status of the DWZGA extender. Access Screen 1 by pressing <1> on the keyboard. Figure 4-1 shows Screen 1 for the remote DWZGA and Figure 4-2 shows Screen 1 for the local DWZGA. The text following the figures explains each screen.

**Figure 4-1 Screen 1 for the Remote DWZGA**

Connected <input type="checkbox"/> Online		Digital Equipment Corporation DWZGA SCSI Fiber Optic eXtender Version U240		13:01:28 4*20*98
SCSI .swt	D R/W FEDCBA9876543210	i .....LUN 3	SCSI OP'S 608 508 368 408 208 108	SCSI I/Os Count 879822101
RS-232 Serial	9600 8N1	COM1 → Fiber	COM1 ← Fiber	0 0
<pre> 971208 : 191657 Data Transfer Negotiation for ITL = 704 = 70 x 2 + 15               = 703 = 10 x 21 + 15               = 713               = 711               = 721 971209 : 101209 Other-Side FOX Reports Version U240, TConfig 007F 971209 : 101209 This Side FOX is Version U240, TConfig 0000 </pre>				

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**Figure 4-2 Screen 1 for the Local DWZGA**

<input type="checkbox"/> Connected <input type="checkbox"/> Online		Digital Equipment Corporation DWZGA SCSI Fiber Optic eXtender Version U240		13:01:28 4*20*98
SCSI . . . t	D : t t t t t t t LUN R/W FEDCBA9876543210 3	SCSI OPS 608 508 368 408 208 108	SCSI I/Os Count 879822101	
RS-232 Serial	9600 8N1	COM1 → Fiber	COM1 ← Fiber	0 0
971208 : 191657 Data Transfer Negotiation for ITL = 704 = 10 x 2 + 15 971208 : 191657 Data Transfer Negotiation for ITL = 703 = 10 x 2 + 15  971209 : 101209 Other-Side FOX Reports Version U240, TConfig 007F 971209 : 101209 This Side FOX is Version U240, TConfig 0000				

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The screen is divided into four sections. The top of the screen contains header information, including fiber status (**Connected** and **Online**), the firmware Version Number (U240 for this example), and the current time and date. Date and time is set by pressing F1 during boot up of the DWZGA unit. Pressing F1 displays the Set-Up screen. Use the up and down arrows to toggle between the date and time settings and change the date and time as necessary. Save the Set-Up information by pressing F10. A flashing cursor between the header words **Connected** and **Online** indicates the fiber is busy transferring data.

Immediately below the header section is a horizontal segment that displays the status of the SCSI bus connected to the DWZGA. The remote DWZGA should have the four characters **.swt** under the word SCSI. These characters equate to the front panel switches, UA/DISC, SYNC, WIDE, and TPWR, respectively. The characters, from left to right, mean the following:

- . = Unit Attention Disabled
- s = Initiated Synchronous Data Transfer Negotiation enabled
- w = Initiated Wide Data Transfer Negotiation enabled
- t = Terminator power measured OK

The local site DWZGA, under the word SCSI, has the four characters **...t**, meaning the following:

- . = Unit Attention Disabled
- . = Initiated Synchronous Data Transfer Negotiation disabled
- . = Initiated Wide Data Transfer Negotiation disabled
- t = Terminator power measured OK

The Activity box resides directly to the right of the SCSI bus indicator. The Activity box for both DWZGA units displays the addresses of the two devices involved in a data transfer, one device being the initiator and one device being the target. The Logical Unit Number (LUN) of the target device indicates whether the device is an initiator or a target. This section of the

screen differs slightly between the remote and local site DWZGA units. For the remote DWZGA, the Activity box has the lower case letter I followed by seven colons, `:. .`. The lower case letter I indicates the devices are initiators that have sent a SCSI command. The colons, `:. .`, indicate that the devices are wide devices. (A period, `. .`, would indicate the devices are narrow devices.) For the local DWZGA, the Activity box has a colon, `:. .`, followed by seven lower case `t`'s, corresponding to the front panel target switches for that address set ON. A lower case `t` that is red in color indicates a target address that has not responded to selection.

The boxes to the right of the Activity box show recent SCSI OPs and counts of SCSI I/Os respectively.

SCSI Ops scroll through the display from right to left. The scrolled value is a three digit number, where the first number is the unit number and the second two numbers are the SCSI Operation Code.

The third horizontal segment of Screen 1 contains vendor specific information.

The bottom section of Screen 1 displays status information, stamped with date and time, that scrolls from the bottom of Screen 1 to the top so that the most recent status message is posted at the bottom of the screen. The date and time stamp is formatted as `yymmdd:hhmmss`, where `yy=year`, `mm=month`, `dd=day`, `hh=hour` (using a 24 hour clock), `mm=minute`, and `ss=second`. When status messages scroll off the top of this section of Screen 1, they first scroll to the bottom of Screen 2, then to the top of Screen 2, and then off Screen 2 and are then saved in an extended buffer accessible through Screen 5. If necessary, Screens 1, 2, 3, and 4, plus the extended buffer, can be dumped to a blank DOS formatted floppy disk for further diagnosis. The dump feature is discussed later in this chapter.

## 4.2 Screen 2

Screen 2, as previously described, is used to capture scrolled status messages from Screen 1. Access Screen 2 by pressing `<2>` on the keyboard.

## 4.3 Screen 3

Screen 3 contains cumulative counts of I/O's and bytes transferred and can be cleared at any time by pressing `<Ctl><z>` on the keyboard, even if Screen 3 is not currently displayed. Access Screen 3 by pressing `<3>` on the keyboard. Also on Screen 3 are four sets of time and date; Boot Time, Counter Time, Last Operation Time, and Current Time. Boot Time is the time and date the DWZGA unit was originally booted. Counter Time is the last time and date the counters were zeroed. Last Operation Time is the time and date of the last SCSI operation. The difference between Counter Time and Current Time gives the elapsed time of the counters.

## 4.4 Screen 4

Screen 4 contains information specific to the DWZGA firmware. This information is used by General Signal Networks to look at various firmware related events. Issuing a `SHOW DEVICE` on the host local command console terminal updates this screen's counters to show SCSI Disconnects and SCSI Resets.

## 4.5 Screen 5

Screen 5 is called the Log Functions Screen. Screen 5 allows the user to display the information that was saved in the extended buffer, which is the same information that gets dumped to the floppy. Pressing keyboard number `<5>` displays Screen 5 on the monitor. Use the Screen 5 functions to view the extended log. (Screen 8 is a keyboard menu screen describing the keyboard functions for all screens.)

## 4.6 Screen 6 and Screen 7

Screen 6 and Screen 7 are empty for DIGITAL applications.

## 4.7 Screen 8

Screen 8 displays a master keyboard menu describing the keyboard functions for the DWZGA units optional keyboard and monitor. Access Screen 8 by pressing <8> on the keyboard. Figure 4-3 shows Screen 8.

**Figure 4-3 Screen 8**

Digital Equipment Corporation DWZGA Keyboard Menu			
FUNCTION	KEYSTROKE	FUNCTION	KEYSTROKE
Select Screen #1 (Title)	1	Screen 5 (LOG) Functions:	
Select Screen #2 (Messages)	2	Most Recent Msgs	Home
Select Screen #3 (Counts)	3	Oldest Msgs	End
Select Screen #4 (Firmwave)	4	Next Oldest Msgs (page)	PgUp
Select Screen #5 (LOG)	5	Next Newest Msgs (page)	PgDn
Select Screen #6 (Help #1)	6	Next Oldest Msgs (line)	Up Arrow
Select Screen #7 (Help #2)	7	Next Newest Msgs (line)	Dn Arrow
Select Screen #8 (Help #3)	8		
Console Time-Stamp	F1	Change COM1 Baud Rate	CH-B
Simple Fiber Optic Test	F2	Change COM1 Data Format	CH-D
	F3	Change COM1 Parity	CH-P
	F4	Change COM1 Stop Bits	CH-S
	F5		
	F6	Dump Screens to Floppy	CH-F
	F7	Force SCSI Bus Reset	CH-R
	F8		
SCSI Registers DUMP	F8	Reset Scream Counts	CH-Z
Firmware Flags DUMP	F9		

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This section gives general information on diagnosing and troubleshooting the solution, including the use of the diagnostic floppy provided with each DWZGA.

## 5.1 Extended Target Problems

When experiencing problems related to the extended targets, the DWZGA unit passes the error status and sense information from the target to the host. Comparing host error logs to target sense information could be helpful in the diagnosis of the target.

## 5.2 Using the Diagnostic Floppy at the Remote Site

The diagnostic floppy provided with the each DWZGA allows you to perform tests at the remote site on target devices. The remote DWZGA acts as an initiator, initiating and delivering requests to targets for fulfillment. Tests available are the SI test (loop back test), the ST test (internal loop back test), the SL test (FIFO loop back test), and the SA test, which performs all tests mentioned.

First, insert the Diagnostic floppy into the floppy disk drive located on the front of the remote DWZGA and reboot the unit via the keyboard with <Ctrl><Alt><Del>. A static RAM test is performed automatically on boot, followed by a display. The display shows a representation of the DWZGA front panel switches and target indicators minus the PWR, FIBER, ACTIVE and ERROR LEDs, plus information found on the bottom of the screen on how to access, via keyboard keys, various screens that provide further help about the diagnostics. The <Esc> key removes the display.

Pressing <F1> gives a display showing all available tests. If at any time the display hangs during a test, reboot the test sequence with <Ctrl><Alt><Del>. The following details each available test.

### 5.2.1 SI Test

The SI test validates that the SCSI bus is working by allowing the remote DWZGA to select targets and perform a SCSI inquiry. The following details the SI test.

1. Press the <F4> key on the keyboard. This allows you to set specific SCSI IDs for the SI test.
2. Follow the directions on the screen to pick an initiator ID and a target ID. For the initiator ID, pick any number that is not in use on the SCSI bus. A 7, 0, or f character is usually a good choice. Press <Enter> when ready.
3. The Field Test Screen is displayed with a FOX> prompt at the bottom of the screen.
4. Enter **SI** at the FOX> prompt followed by <Enter>.

5. If successful, the designated target device flashes briefly and the following information is returned to the screen.

**FOX>SI**

**Device Found, Target ID = 04, Device Type = 00**

**Inquiry Bytes (0-7) = 00 00 02 02 5B 00 00 16**

**DEC RZ26L DEC442D**

The returned information informs you that the selected device was found. If the selected device was not found, first check the cable connections. Perform device diagnostics on the storage devices and array controllers second.

### 5.2.2 ST Test

The ST test, or internal loop back test, measures the ability of the DWZGA unit to assert its data and control lines. This test does not assert any signals on the SCSI bus, but uses special loopback facilities built into the DWZGA unit. The diagnostic floppy must have been inserted and the unit rebooted as described above. The following details the ST test.

1. At the FOX> prompt, enter **ST** followed by <Enter>.
2. Counters at the top of the screen flash, indicating data transfers, and the following is displayed;

**FOX>**

**C770 SCSI Data and Control Test: Begin**

3. The ST test runs until interrupted by you pressing <Enter>. The screen displays the following after the <Enter> directly under the previous display line.

**C770SCSI Data and Control Test: Complete**

### 5.2.3 SL Test

The SL test, or FIFO test, tests all command path and data path FIFOs. The test performs writes, reads, and comparisons of both the command path data and data path data. Loopback fiber is required. The following details the SL test.

1. At the FOX> prompt, enter **SL** followed by <Enter>.
2. The display responds with the following:

**FOX>TAXI/DATA FIFO Loop Test: Begin, Any key to stop**

**FIFO Loopback Test: Complete 00000001, Loop Count = 0060**

The returned information indicates a successful FIFO loopback test.

### 5.2.4 SA Test

The SA test performs all of the previously mentioned tests. At the FOX> prompt, enter **SA** followed by <Enter>. The display responds with the following:

**Run All: Begin**

**Run All: Complete = 00A01249/00000001, Loop Count = 0064**

The above display indicates all tests were run successfully.



### 5.3 Using The Floppy Dump Facility

The floppy dump facility allows a user to dump DWZGA log information to a formatted 3.5-inch 1.44 Mbyte floppy disk. The floppy disk is limited to accepting only one dump from the DWZGA. Successive dumps to the floppy result in over writing the previous dump information, as well as any information previously on the floppy, (with the exception of the file FOX.EXE exe boot code file). To use this feature, insert a floppy that does not contain a FOX.EXE exe code file and press <Ctrl> <f> on the keyboard. The dump takes approximately one minute. The floppy dump facility is not used during normal operation. The floppy dump facility is used by DIGITAL MCS.

