



**DIGITAL StorageWorks**  
**Using Your HSZ70 Array Controller in a SCSI Controller**  
**Shelf (DS-BA356-M Series)**

**EK-HSXM1-CG. A01**

Digital Equipment Corporation

**User's Guide**

January 1998

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## Preface

This manual provides configuration information and operating procedures for using your HSZ70 array controller in a DS-BA356-M series SCSI controller shelf.

## Conventions

This manual uses the following typographical conventions and special notices to help you find what you are looking for.

### Typographical Conventions

Convention	Meaning
<b>ALL CAPS BOLD</b>	Command syntax that must be entered exactly as shown, for example: <b>SET FAILOVER COPY=OTHER_CONTROLLER</b>
ALL CAPS	Command discussed within text, for example: “Use the <b>SHOW SPARESET</b> command to show the contents of the spareset.”
Monospaced	Screen display.
<i>Sans serif italic</i>	Command variable or numeric value that you supply, for example: <i>SHOW RAIDset-name</i> or <b>SET THIS_CONTROLLER ID=(n,n,n,n)</b>
<i>italic</i>	Reference to other books, for example: “See <i>HSZ70 Array Controller HSOE Version 7.0 Configuration Manual</i> for details.”
:	Indicates a portion of an example or figure has been omitted, for example: <b>ADD RAIDSET RAID1 DISK10000 DISK20000 INITIALIZE RAID1 : : SHOW RAID1</b>
“this controller”	The controller serving your current CLI session through a local or remote terminal.
“other controller”	The controller in a dual-redundant pair that’s connected to the controller serving your current CLI session.

## Special Notices

This manual does not contain detailed descriptions of standard safety procedures. However, it does contain warnings for procedures that could cause personal injury and cautions for procedures that could damage the controller or its related components. Look for these symbols when you are performing the procedures in this manual:



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**Warning** A warning indicates the presence of a hazard that can cause personal injury if you do not avoid the hazard.

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**Caution** A caution indicates the presence of a hazard that might damage hardware, corrupt software, or cause data loss.

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**Note** A note provides additional information that's important to the completion of the instruction or procedure being discussed.

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## Related Publications

The following table lists some of the documents related to the use of the controller, cache module, and external cache battery.

<b>Document Title</b>	<b>Part Number</b>
<i>DIGITAL StorageWorks SCSI Controller Shelf (DS-BA356-M Series) Installation Guide</i>	EK-356MA-IG
<i>DIGITAL StorageWorks SCSI Controller Shelf (DS-BA356-M Series) User's Guide</i>	EK-356MA-UG
<i>HSZ70 Array Controller HSOF Version 7.0 CLI Reference Manual</i>	EK-CLI70-RM
<i>HSZ70 Array Controller HSOF Version 7.0 Configuration Manual</i>	EK-HSZ70-CG
<i>HSZ70 Array Controller HSOF Version 7.0 Service Manual</i>	EK-HSZ70-SV
<i>HSZ70 Family Array Controller Operating Software (HSOF) Version 7.0 Software Product Description</i>	SPD 64.81. 00
<i>Getting Started—HSZ70 Solutions Software Version 7.0 for...platform</i>	AA-R60xx-TE
Polycenter Console Manager	See the <i>Getting Started</i> guide for the platform-specific order number
<i>StorageWorks Array Controller HSZ70 Array Controller Operating Software HSOF Version 7.0 Release Notes</i>	EK-HSZ70-RN
<i>The RAIDBOOK—A Source for RAID Technology</i>	RAID Advisory Board

## **Revision History**

This is a new document.



## CHAPTER 1

# Overview

This chapter gives an overview of the processes and considerations when configuring your HSZ70 array controller in the DS-BA356-M series SCSI controller shelf.

## The SCSI Controller Shelf

The SCSI controller shelf allows existing HSD30, HSD50, HSJ30, HSJ40, HSJ50, HSZ40, or HSZ50 array controller customers to upgrade to an HSZ70 (Ultra-SCSI) array controller. The SCSI controller shelf fits into an SW500 or SW800 cabinet and allows your HSZ70 array controller to communicate with your existing Fast Narrow (8-bit) StorageWorks building blocks (SBBs).

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**Note** In this manual, the DS-BA356-M series SCSI controller shelf in which your HSZ70 controller operates is referred to as the SCSI controller shelf.

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Benefits include:

- Investment protection and continued use of existing subsystem components, cabinets, device shelves, and StorageWorks devices (see Appendix A for a list of supported devices)
- Low cost, easy field upgrade to the Ultra-SCSI controller
- Faster host interconnect
- Mirrored cache
- Larger cache capacity

The *DIGITAL StorageWorks SCSI Controller Shelf (DS-BA356-M Series) Installation Guide* and the *DIGITAL StorageWorks SCSI Controller Shelf (DS-BA356-M Series) User's Guide* tells you how to install and use new and replacement SCSI controller shelves.



## Setting Up Your Controller

Before you can begin using your HSZ70 controller, you must:

1. Install the HSZ70 array controller.
2. Install the cache module.
3. Install the external cache battery (ECB).
4. Attach the cables connecting your controller-shelf components together.
5. Configure the controller and the devices used in your subsystem.

If you are upgrading from an HSZ40 or HSZ50 array controller, you have two configuration options.

- You may retain your subsystem configuration, including storage sets and partition settings.
- You may initialize your subsystem's devices, deleting all existing subsystem configurations.

However, if you are migrating from an HSD- or HSJ- series array controller, you will need to configure your subsystem as if you were configuring your subsystem for the first time.

See Chapter 2, “Backing Up and Restoring Data to Your Subsystem” for procedures for configuring your controller and subsystem.

## Using This Manual

This manual is intended for use by customers who are installing an HSZ70 array controller into an existing HSJ30, HSJ40, HSD30, HSZ40, HSJ50, HSD50, or HSZ50 subsystem.

This manual supplements the information contained in the HSZ70 array controller documentation that came with your software platform kit and provides the following information:

- An overview of the processes and considerations for configuring your HSZ70 array controller in a SCSI controller shelf
- A summary of the differences between configuring HSD, HSJ, HSZ40, and HSZ50 array controllers and the HZS70 array controller when installed in a SCSI controller shelf.
- Procedures for restoring your configuration data to the new subsystem (see Chapter 2, “Backing Up and Restoring Data to Your Subsystem”)
- Hardware and software supported by the HSZ70 array controller in a SCSI controller shelf (see Appendix A, “Supported Hardware and Software”)

For detailed information and procedures, refer to your HSZ70 array controller documentation.

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**Note** If you are installing the HSZ70 array controller in a SCSI controller shelf and configuring your system for the first time, you must use this document to determine the exceptions and differences in configuring both the controller and the storage devices for use in the SCSI controller shelf. The HSZ70 array controller documentation supplied with your software platform kit was developed for a different shelf and cabinet configuration.

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## Summary of Differences

This section summarizes the differences between configuring HSD, HSJ, HSZ40, and HSZ50 array controllers and the HZS70 array controller.

### Setting Up a New Subsystem

The following features are not supported when an HSZ70 array controller is installed in a SCSI controller shelf:

- Environmental Monitoring Unit (EMU)
- Power Verification and Addressing (PVA) module
- Expansion cabinets

### Upgrading an Existing Subsystem

The following HSZ70 array controller features may be different than those of your current controller:

- Device addressing and the identification of SCSI target ID numbers have changed from those used to support the HSD-, and HSJ-series of controllers, as well as support of the HSZ40 and HSZ50 controllers. See the “Determining Your Device’s Target and LUN” and “Naming Devices with Your Controller” sections in Chapter 3.
- The same unit naming convention is used with the HSZ70 array controller, however, the range of target and LUN numbers is increased.
- You can create more partitions per storage set or disk drive. See the “Number of Partitions Supported” section in Chapter 3.
- Procedures for configuring the HSZ70 array controller include settings that are new or different from those specified for your existing controller. These include:
  - Transparent and multiple bus failover modes in dual-redundant configurations
  - Size of cache and caching techniques supported
  - Range of SCSI target ID numbers supported
  - Range of preferred SCSI ID numbers supported

- Maximum data transfer rate
- Uninterruptible power supply (UPS) support
- Some CLI commands have more options (switches) than before. See the *HSZ70 Array Controller HSOF Version 7.0 CLI Reference Manual* for a complete listing and discussion of CLI commands supported by the HSZ70 controller.

## Configuration Rules

For both new configurations and upgrades, review these differences in the configuration rules for using the HZS70 controller in a SCSI controller shelf before you configure your controller. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for further information regarding configuration rules for the HSZ70 controller.

- Maximum 42 devices supported by a single controller configuration
- Maximum 36 devices supported by a dual controller configuration
- Maximum 64 assignable, host-visible LUNs (maximum 63 assignable when using StorageWorks Command Console)

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**Note** Some operating systems may have additional LUN restrictions. Check the documentation that accompanied your operating system to determine whether additional LUN restrictions apply to your subsystem.

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## CHAPTER 2

# Backing Up and Restoring Data to Your Subsystem

This section provides information about backing up and restoring your data to a configured subsystem.

## Options for Configuring Your Subsystem

Depending on your current host interconnect, the following information explains the steps necessary when you're upgrading to the HSZ70 array controller SCSI interconnect.

### If Your Existing Host Interconnect Is SCSI

If you are upgrading from either an HSZ40 or HSZ50 array controller, you have two configuration options available:

1. Restore your prior subsystem configuration exactly as it was with your previous controller, including the settings and addresses of all units, storage sets, and devices.
2. Plan your subsystem as if you were building a completely new configuration.

### If Your Existing Host Interconnect Is DSSI or CI

If you are upgrading from a DSSI (HSD-series) or CI (HSJ-series) interconnect, you will need to plan your subsystem as if you were configuring your subsystem for the first time. Refer to the *HSZ70 Array Controller HSOE Version 7.0 Configuration Manual* for detailed information on planning and configuring storage sets.

Regardless of the type of host-interconnect you currently have, the basic steps required to configure your subsystem are:

1. Record your configuration information—including storage set, device, unit, and controller settings.
2. Back up your entire subsystem to a SCSI-compatible storage system.
3. Configure your subsystem with the HSZ70 array controller in the SCSI controller shelf.
4. Restore the backed up data to the newly configured subsystem.
5. Verify that the backed up data has been fully restored without errors or data loss.



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**Caution** Use a SCSI-compatible backup medium when you back up your existing data, so that the data can be restored using your HSZ70 SCSI array controller.

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## Recording Your Current Subsystem Configuration

Regardless of the type of interconnect you currently have, follow these procedures before you backup your subsystem configuration data:

1. Show the settings for your existing array controller's configuration and print the results. Use the following syntax to display the configuration settings for "this controller":

**SHOW THIS\_CONTROLLER FULL**

2. Show the settings for your existing storagesets and print the results. Use the following syntax to display the configuration settings for all of your storagesets:

**SHOW STORAGESET FULL**

---

**Note** DIGITAL highly recommends you verify all of your mirrorsets and RAIDsets are normal before installing a new HSZ70 controller in a SCSI controller shelf.

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3. Show the settings for your existing devices and print the results. Use the following syntax to display the configuration settings for all of your devices:

**SHOW DEVICES FULL**

4. Show the settings for your existing units and print the results. Use the following syntax to display the configuration settings for all of your units:

**SHOW UNITS FULL**

5. Install your SCSI controller shelf, the HSZ70 array controller, the cache module, and the external cache battery (ECB). See the *DIGITAL StorageWorks SCSI Controller Shelf (DS-BA356-M Series) Installation Guide* for installation procedures.

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**Note** For the complete syntax and descriptions of the CLI commands used in this procedure, see the *HSZ70 Array Controller HSOE Version 7.0 CLI Reference Manual*.

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## Restoring Your Subsystem Configuration from an Existing HSZ40- or HSZ50-Controlled Subsystem

If you are upgrading from an HSZ40 or HSZ50 array controller and you want to restore your previous configuration, follow these procedures:

1. Configure your HSZ70 array controller, using the configuration data you printed from your previous controller's configuration. See Chapter 2, "Configuring an HSZ70 Array Controller," in the *HSZ70 Array Controller HSOE Version 7.0 Configuration Manual* for detailed configuration procedures.
2. After your controller(s) configuration has been fully configured to the same configuration state you had before you removed your previous array controller, configure your subsystem in the following order:
  - (1) Add devices
  - (2) Add storage sets

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**Note** DIGITAL highly recommends that you only add normal RAID sets back to your configuration.

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**Caution** Do not initialize existing storage sets added to your configuration from prior HSZ40- or HSZ50-controlled subsystems. The HSZ70 controller can read and interpret your existing storage sets metadata.

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- (3) Add units

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**Note** When you restore a previously partitioned device or storage set, the HSZ70 array controller recognizes the previous partition information, if the same containers are used to create the unit.

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3. Use your standard procedures to restore your backed up data to your storage sets. Verify your data has been fully restored without errors or data loss.



## Restoring Your Subsystem Configuration from an Existing HSD- or HSJ-Controlled Subsystem

Existing customers with a CI (HSJ) or DSSI (HSD) host interface are not able to retain existing subsystem configurations. Therefore, all devices must be initialized and all partitions must be created.

1. Configure your HSZ70 array controller using the configuration data you printed from your previous controller's configuration. See Chapter 2, "Configuring an HSZ70 Array Controller," in the *HSZ70 Array Controller HSOE Version 7.0 Configuration Manual* for detailed procedures.
2. After your controllers have been fully configured to the same configuration you had before you removed your previous array controller, configure your subsystem in the following order:
  - (1) Add devices
  - (2) Add storagesets
  - (3) Add units
3. Use your standard procedures to copy your backed up data to your storagesets. Verify your data has been fully restored without errors or data loss.



## CHAPTER 3

# Device and Unit Naming Conventions

This chapter summarizes the differences between naming devices and units with an HSZ70 controller and the naming devices and units with HSD-, HSJ-, HSZ40-, and HSZ50-series controllers. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for detailed information about planning and configuring storagesets.

## Configuring Your Devices and Units

The following sections summarize the major differences to be considered when planning and configuring storagesets with your existing array controller and the HSZ70 array controller.

### Naming Devices with Your Controller

StorageWorks array controllers identify the type and location of a storage device by the Port-Target-LUN (PTL) address number assigned to the device within the subsystem.

- P—Designates the array controller's device port number (1 through 6).
- T—Designates the target identification (ID) number of the device.
- L—Designates the logical unit number (LUN) of the device.

#### Determining Your Device's Port Number

As with the HSD30, HSD50, HSJ30, HSJ40, HSJ50, HSZ40, and HSZ50 array controllers, the port number assigned to a device with the HSZ70 is determined by which row the device is located on.

#### Determining Your Device's Target and LUN

As with the HSD30, HSD50, HSJ30, HSJ40, HSJ50, HSZ40, and HSZ50 array controllers, the target number assigned to a device with the HSZ70 is determined by which column (0 to 6) and the LUN is still usually zero. However, the HSZ70 controller supports target numbers 0 through 15 and two-digit LUNs.

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**Note** Target numbers 8 through 15 are not supported in subsystem cabinets within which the DS-BA356-M Series SCSI Controller Shelf is installed.

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*Addressing Devices with Your Existing Controller—PTL*

The HSD30, HSD50, HSJ30, HSJ40, HSJ50, HSZ40, and HSZ50 array controllers use a three-digit PTL address to indicate a device's location. For example, PTL address 310 indicates:

- Port (device) = 3
- Target = 1
- LUN = 0

Device names created with HSD30, HSD50, HSJ30, HSJ40, HSJ50, HSZ40, and HSZ50 array controllers use the following syntax: *device-name ptl*—for example, DISK310.

*Addressing Devices with the HSZ70 Controller—PTLL*

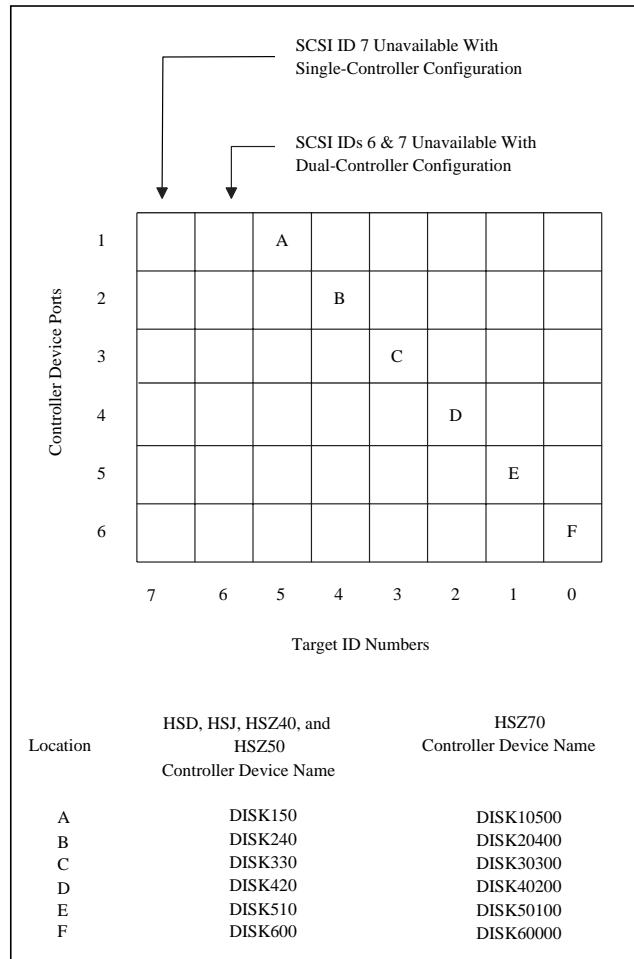
The HSZ70 uses a five-digit PTL address to indicate a device's location. The target and LUN numbers each require two digits. For example, PTL address 30100 indicates:

- Port (device) = 3
- Target = 01
- LUN = 00

Device names created with the HSZ70 array controllers use the following syntax: *device-name ptll*, for example, DISK30100.

You can automatically configure your devices with the HSZ70 array controller using StorageWorks Command Console, the RUN CONFIG utility, or CFMENU. For example, if the controller finds a disk drive at PTL location 30100, it automatically names it DISK30100.

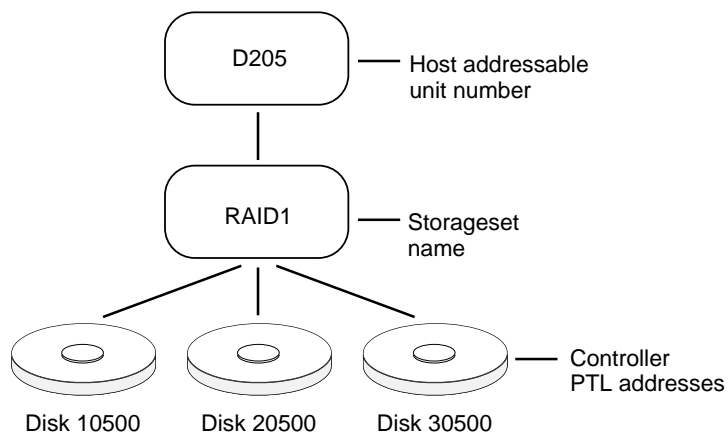
**Figure 3-1 Device Locations for Pre-HSZ70 Array Controllers**



**Note** The HSZ70 controller has six SCSI-2 device ports. In a SCSI controller shelf, the controller's device ports connect to the device shelves. Each device shelf supports 1 to 7 devices (each having a unique target ID number) depending on the number of controllers used in your subsystem. See Figure 3-1 to determine the PTL portion of the device name. All disk drives use LUN 0. Some tape loaders may use LUN 1. Some tape libraries may use several LUNs depending on the number of tapes (each having a unique LUN) in the library.

When your controller receives an I/O request, it identifies the storageset unit number for the request, then correlates the unit number to the storageset name. From the storageset name, the controller locates the appropriate devices for the I/O request. For example, the RAIDset “RAID1” might contain DISK10500, DISK20500, and DISK30500. The controller generates the read or write request to the appropriate device using the PTL addressing convention. Figure 3-2 illustrates the concept of PTL addressing.

**Figure 3-2 Locating Devices using PTLs**



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## Naming Host-Addressable Units

The host communicates with a logical unit through its LUN address. The syntax for host-addressable unit names are the same for HSD30, HSD50, HSJ30, HSJ40, HSJ50, HSZ40, HSZ50, and the HSZ70 array controller.

Omit the leading zeros for storage units associated with the controller's SCSI target ID zero. For example, use D2 instead of D002 for a storageset that is accessed through LUN 2 of the controller's SCSI target ID 0. Table 3-1 shows additional unit numbering examples.

**Table 3-1 Unit Numbering Examples**

---

Unit Number	Device Type	Target ID Number	LUN
D30100	disk	1	0
D1201	disk	12	1
D400	disk	4	0
D107	disk	1	7
D5	disk	0	5

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**Note** The HSZ70 controller supports a maximum of eight host target ID numbers (0 through 15). See the documentation which accompanied your operating system to determine which target ID numbers are supported by your operating system.

---

## Number of Partitions Supported

With the HSZ70 array controller, you can create up to eight partitions per disk drive, RAIDset, mirrorset, stripeset, or striped mirrorset. HSD, HSJ, HSZ40, and HSZ50 array controllers support a maximum of four partitions per storageset or disk drive.



## APPENDIX A

# Supported Hardware and Software

This chapter lists the hardware and software compatible with your HSZ70 array controller operating within a SCSI controller shelf. This information supersedes the supported devices identified in the *Release Notes* contained in your software platform kit.

## Device Support

The HSZ70 array controller in a SCSI controller shelf supports the devices listed in Tables A-1 and A-2 at the indicated hardware and microcode levels.

### Disk Drives

**Table A-1 Supported Disk Drives**

Device	Type <sup>1</sup>	Capacity (GB)	Minimum Microcode Version	Minimum Hardware Version
RZ25-VA	DD	0.426	0900	B01
RZ26-VA	DD	1.05	T392	D02
RZ26L-VA	DD	1.05	440C	A01
RZ28-VA	DD	2.1	435E	B01
RZ28B-VA	DD	2.1	0003	A01
RZ28D-VA/VW <sup>2</sup>	DD	2.1	0008	A01
RZ28M-VA	DD	2.1	466	A01
RZ29B-VA/VW <sup>2</sup>	DD	4.3	0007	B01
DS-RZ40-VA	DD	9.1	LYGO	A01
DS-RZ1BB-VW <sup>2,3</sup>	DD	2.1	LYJ0	A01
DS-RZ1CB-VW <sup>2,3</sup>	DD	4.3	LYJ0	A01
DS-RZ1DB-VW <sup>2,3</sup>	DD	9.1	LYJ0	A01
EZ69-VW <sup>3</sup>	SSD	0.950	V070	A01

<sup>1</sup> Device types are indicated as follows: DD for disk drive and SSD for solid state devices.

<sup>2</sup> Wide disks require SCSI wide device shelves and 8-bit I/O modules.

<sup>3</sup> Do not warm swap solid state devices. Make sure the device shelf power is off when inserting or removing a solid state disk device.

## Tape Drives

**Table A-2 Supported Tape Drives**

Device	Type <sup>1</sup>	Capacity (GB)	Minimum Microcode Version	Minimum Hardware Version
TZ87-VA <sup>4</sup>	TD	10/20 <sup>2</sup>	930A	A01
TZ88N-VA <sup>3,4</sup>	TD	20/40 <sup>2</sup>	CC33	A01
DS-TZ89N-TA	TD	35/70 <sup>3,4</sup>	141F	A01
DS-TZS20-VW	TD	25/50 <sup>2</sup>		

<sup>1</sup> Device type TD is indicates a tape drive.

<sup>2</sup> Values represent compressed data. The compression factor is device-dependent, based on individual device algorithms.

<sup>3</sup> Cannot read TK50, TK70, or TZ30 format tapes.

<sup>4</sup> Tape Device Code load is supported.

---

**Note** Make sure the devices you are planning to include within your subsystem are identified in one of the tables in this section. If not, contact your DIGITAL Customer Service Representative to determine if the device you want to use has been added to the list of supported devices since the publication of this manual.

---

## Supported Operating Systems and Adapters

Your HSZ70 array controller is supported by the following operating system versions:

- DIGITAL UNIX<sup>®</sup> Versions 3.2g and 4.0b
- DIGITAL OpenVMS Alpha Version 7.1-1H1
- Windows NT<sup>®</sup> Server Versions 3.51 and 4.0 (Alpha)
- Windows NT Server Version 4.0 (Intel)

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**Note** See the Release Notes which accompanied your software platform kit for information regarding patches needed to operate the HSZ70 controller with your operating system.

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## Host Adapter Support

### DIGITAL UNIX

The HSZ70 array controller supports the following host adapters when used with the DIGITAL UNIX operating system:

**Table A-3 DIGITAL UNIX Adapter Support**

	Host Adapter	
	KZPBA-CB (PCI to F-20D, single channel)	KZPSA (PCI to FWD)
Adapter Microcode Version	Version 5.53	Version A11
Supported Version of Operating System	3.2g and 4.0b	3.2g and 4.0b
Supported Systems	For DIGITAL AlphaServers 2000/2100/4000/4100/8200/8400.	For DIGITAL AlphaServers 2000/2100/4000/4100/8200/8400.

**DIGITAL OpenVMS Alpha**

The HSZ70 array controller supports the following host adapters when used with the DIGITAL OpenVMS Alpha operating system:

**Table A-4 DIGITAL OpenVMS Adapter Support**

	<b>Host Adapter</b>	
	<b>KZPBA-CB (PCI to F-20D, single channel)</b>	<b>KZPSA (PCI to FWD)</b>
Adapter Microcode Version	Version 5.53	Version A11
Supported Version of Operating System	7.1-1H1	7.1-1H1
Supported Systems	For DIGITAL AlphaServers 2000/2100/ 4100/8200/8500.	For DIGITAL AlphaServers 2000/2100/ 4100/8200/8400.

### Windows NT Server for Alpha

The HSZ70 array controller supports the following host adapters when used with the Windows NT Server operating system using the Alpha processor:

**Table A-5 Supported Host Adapter for Windows NT Server with Alpha Processor**

	Host Adapter	
	KZPBA-CB (PCI to F-20D, single channel)	KZPSA (PCI to FWD)
Adapter Microcode Version	Version 2.28	Version A11
Supported Version of Operating System	3.5.1, 4.0	3.5.1, 4.0
Supported Systems	For DIGITAL AlphaServers 2000/2100/4100.	For DIGITAL AlphaServers 2000/2100/4100.

### Windows NT Server for Intel

The HSZ70 array controller supports the following host adapter when used with the Windows NT Server operating system using the Intel processor:

**Table A-6 Supported Host Adapter for Windows NT Server with Intel Processor**

	Host Adapter
	Adaptec AHA2944UW (PCI to F-20D, single)
Adapter Microcode Version	Version 1.25
Supported Version of Operating System	4.0
Supported Systems	PC servers with PCI bus.

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