



**DIGITAL Storageworks  
HSZ70 Array Controller  
HSOF Version 7.0**

EK-HSZ70-RM. A01

Digital Equipment Corporation  
Maynard, Massachusetts

**CLI Reference Manual**



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**Warning!**

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

**Achtung!**

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

**Avertissement!**

Cet appareil est un appareil de Classe A. Dans un environnement résidentiel cet appareil peut provoquer des brouillages radioélectriques. Dans ce cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.



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# Contents

## Preface

Precautions . . . . .	vi
Electrostatic Discharge Precautions . . . . .	vi
VHDCI Cable Precautions . . . . .	vii
Local-Connection Port Precautions . . . . .	vii
Conventions . . . . .	viii
Typographical Conventions . . . . .	viii
Special Notices . . . . .	ix
Related Publications . . . . .	x
Revision History . . . . .	xi
CLI Overview . . . . .	1
Using the CLI . . . . .	1
Command Overview . . . . .	1
Getting Help . . . . .	2
Entering CLI Commands . . . . .	2
Unit Naming . . . . .	4
Command Syntax . . . . .	6
ADD CDROM . . . . .	7
ADD DISK . . . . .	9
ADD MIRRORSET . . . . .	13
ADD PASSTHROUGH . . . . .	17
ADD RAIDSET . . . . .	19
ADD SPARESET . . . . .	23
ADD STRIPESSET . . . . .	25
ADD UNIT . . . . .	27
CLEAR_ERRORS CLI . . . . .	33
CLEAR_ERRORS <i>controller</i> INVALID_CACHE . . . . .	35
CLEAR_ERRORS <i>unit-number</i> LOST_DATA . . . . .	37
CLEAR_ERRORS UNKNOWN . . . . .	39

CLEAR_ERRORS <i>unit-number</i> UNWRITEABLE_DATA . . . . .	41
CREATE_PARTITION . . . . .	43
DELETE <i>container-name</i> . . . . .	45
DELETE FAILEDSET . . . . .	47
DELETE SPARESET . . . . .	49
DELETE <i>unit-number</i> . . . . .	51
DESTROY_PARTITION . . . . .	53
DIRECTORY . . . . .	55
HELP . . . . .	57
INITIALIZE . . . . .	59
LOCATE . . . . .	63
MIRROR . . . . .	65
REDUCE . . . . .	69
RENAME . . . . .	73
RESTART <i>controller</i> . . . . .	75
RETRY_ERRORS UNWRITEABLE_DATA . . . . .	77
RUN . . . . .	79
SELFTTEST <i>controller</i> . . . . .	81
SET <i>controller</i> . . . . .	83
SET <i>device-name</i> . . . . .	93
SET EMU . . . . .	95
SET FAILEDSET . . . . .	99
SET FAILOVER . . . . .	101
SET <i>mirrorset-name</i> . . . . .	103
SET MULTIBUS_FAILOVER . . . . .	109
SET NOFAILOVER . . . . .	111
SET <i>RAIDset-name</i> . . . . .	113
SET <i>unit-number</i> . . . . .	117
SHOW . . . . .	123
SHUTDOWN <i>controller</i> . . . . .	129
UNMIRROR . . . . .	131

Glossary

Index

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# Tables

Recall and Edit Command Keys .....	4
Unit Numbering Examples.....	6
ADD UNIT Switches for New Containers .....	28
SET <i>controller</i> Switches .....	84
Maximum SCSI-Bus Cable Lengths for Given Data Transfer Rate .....	91
EMU Set Point Temperatures.....	96
SET UNIT Switches for Existing Containers .....	117





# Preface

This book provides information and guidance for operating the command line interface (CLI) for the array controller. This book defines, explains, and presents examples of how you can implement the commands supported by the software accompanying your controller.

This book does not contain information about the operating environments to which the controller may be connected, nor does it contain detailed information about subsystem enclosures or their components. See the documentation that accompanied these peripherals for information about them.

## Precautions

Follow these precautions when you're carrying out the procedures in this book.

### Electrostatic Discharge Precautions

Static electricity collects on all nonconducting material, such as paper, cloth, and plastic. An electrostatic discharge (ESD) can easily damage a controller or other subsystem component even though you may not see or feel the discharge. Follow these precautions whenever you're servicing a subsystem or one of its components:

- Always use an ESD wrist strap when servicing the controller or other components in the subsystem. Make sure that the strap contacts bare skin and fits snugly, and that its grounding lead is attached to a bus that is a verified earth ground.
- Before touching any circuit board or component, always touch a verifiable earth ground to discharge any static electricity that may be present in your clothing.
- Always keep circuit boards and components away from nonconducting material.
- Always keep clothing away from circuit boards and components.
- Always use antistatic bags and grounding mats for storing circuit boards or components during replacement procedures.
- Always keep the ESD cover over the program card when the card is in the controller. If you remove the card, put it in its original carrying case. Never touch the contacts or twist or bend the card while you're handling it.
- Do not touch the connector pins of a cable when it is attached to a component or host.

### **VHDCI Cable Precautions**

All of the cables to the controller, cache module, and external cache battery use very-high-density cable interconnect connectors (VHDCI). These connectors have extraordinarily small mating surfaces that can be adversely affected by dust and movement.

Use the following precautions when you're connecting cables that use VHDCI connectors:

- Clean the mating surfaces with a blast of clean air.
- Mate the connectors by hand, then tighten the retaining screws to 1.5 inch-pounds—approximately 1/4 additional turn after the connectors have fully mated.
- Test the assembly by gently pulling on the cable, which should not produce visible separation.

### **Local-Connection Port Precautions**

The local-connection port generates, uses, and radiates radio-frequency energy through cables that are connected to it. This energy may interfere with radio and television reception. Do not leave a cable connected to this port when you're not communicating with the controller.

## Conventions

This book uses the following typographical conventions and special notices to help you find what you're looking for.

### Typographical Conventions

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<b>Convention</b>	<b>Meaning</b>
<b>ALLCAPS BOLD</b>	Command syntax that must be entered exactly as shown, for example: <b>SET FAILOVER COPY=OTHER_CONTROLLER</b>
ALLCAPS	Command discussed within text, for example: "Use the SHOW SPARESET 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: SHOW <i>RAIDset-name</i> or SET THIS_CONTROLLER ID=( <i>n,n,n,n</i> )
<i>italic</i>	Reference to other books, for example: "See <i>HSZ70 Array Controller HSOF Version 7.0 Configuration Manual</i> for details."
:	Indicates that 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 book doesn't 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're carrying out the procedures in this book:



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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 a loss of data.

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**Tip** A tip provides alternative methods or procedures that may not be immediately obvious. A tip may also alert prior customers that the controller's behavior being discussed is different from prior software or hardware versions.

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

---

## Related Publications

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

Document Title	Part Number
<i>HSZ70 Array Controller HSOF Version 7.0 CLI Reference Manual</i>	EK-CLI70-RM. A01
<i>HSZ70 Array Controller HSOF Version 7.0 Configuration Manual</i>	EK-HSZ70-CG. A01
<i>HSZ70 Array Controller HSOF Version 7.0 Service Manual</i>	EK-HSZ70-SV. A01
HSZ70 Family Array Controller Operating Software (HSOF) Version 7.0 Software Product Description	SPD xx.xx. 00
Getting Started- <i>HSZ70 Solutions Software Version 7.0 for...platform</i>	AA-R60xx-TE. A01
Polycenter Console Manager	See the <i>Getting Started</i> guide for the platform-specific order number
StorageWorks Array Controller HSZ70 Array Controller Operating Software HSOF Version 7.0 Release Notes	EK-HSZ70-RN. A01
StorageWorks Getting Started with Command Console, Version 2.0	AA-R0HJC-TE
DIGITAL StorageWorks Ultra SCSI RAID Cabinet Subsystem (SW600) Installation and User's Guide	EK-SW600-UG
DIGITAL StorageWorks Ultra SCSI RAID Enclosure (BA370-Series) User's Guide	EK-BA370-UG
The RAIDBOOK—A Source for RAID Technology	RAID Advisory Board

## **Revision History**

This is a new document





## CLI Overview

The command line interpreter (CLI) is one of the user interfaces through which you control your StorageWorks array controller in the StorageWorks subsystem. The CLI commands allow you to manage the subsystem by viewing and modifying the configuration of the controller and the devices attached to them. You can also use the CLI to start controller diagnostic and utility programs.

While the CLI provides the most detailed level of subsystem control, a graphical user interface (GUI) is available for use with the CLI. The GUI, named StorageWorks Command Console, replicates most of the functions available within the CLI in graphic form and provides a very user-friendly method of executing CLI commands.

CLI commands for configuring and viewing the controllers in a dual-redundant configuration use the relative terms “this controller” and “other controller.” See “Typographical Conventions,” page viii, for an explanation of these terms.

## Using the CLI

You can access the CLI by connecting a maintenance terminal to the port in the front bezel of the controller (local connection) or by using HSZterm software (remote connection). See the *HSZ70 Array Controller HSOE Version 7.0 Configuration Manual* for instructions explaining how to connect a local terminal to the controller. After you have initially configured the controller, making it visible to the host, you can perform all other configuration tasks through a remote connection.

The section entitled “Local-Connection Port Precautions,” page vii, explains precautions you should observe when operating the CLI through a local connection port.

## Command Overview

The CLI consists of six basic command types:

- **Controller Commands**—Enable you to configure the controller’s SCSI ID numbers, maintenance terminal characteristics, CLI prompt, and so forth. Controller commands are also used to shut down and restart the controller.

- **Device Commands**—Enable you to create and configure containers made from physical devices attached to the controller.
- **Storageset Commands**—Enable you to create and configure complex containers made from groups of device containers. There are four basic types of storagesets: stripesets, RAIDsets, striped-mirrorsets, and mirrorsets. Storageset commands group device containers together and allow them to be handled as single units.
- **Logical Unit Commands**—Enable you to create and optimize access to logical units made from any container type.
- **Failover Commands**—Enable you to configure the controllers to operate in transparent or mulle bus failover while also providing support for dual-redundant configurations.
- **Diagnostic and Utility Commands**—Enable you to perform general controller support functions

## Getting Help

Help on using the CLI is at your fingertips. For an overview of the CLI help system, enter “help” at the prompt. For help on a specific command or to determine what switches are available with a command, enter as much of the command as you know followed by a space and a question mark. For example, to get information on the switches used with the SET THIS\_CONTROLLER command, enter:

```
SET THIS_CONTROLLER ?
```

See the HELP command on page -57 for further information.

## Entering CLI Commands

Use the following tips and techniques when entering CLI commands:

- Commands are not case sensitive.
- For most commands, you only need to enter enough of the command to make the command unique (usually three characters). For example, SHO is the same as entering SHOW.
- The controller processes each command in sequence. You may continue entering subsequent commands while the controller is processing prior commands. A device experiencing heavy data input and output (I/O) may respond slowly to CLI commands.

---

**Note** Due to space limitations the length, some examples in this manual contain commands which exceed one line in length. In such instances, the paragraph proceeding the example will identify which command is continued on the next line.

---

Specific keys or a combination of keys allow you to recall and edit the last four commands. This feature can save time and help prevent mistakes when you need to enter similar commands during the configuration process. Table 1 lists the keys used to recall and edit commands.

**Table 1 Recall and Edit Command Keys**

<b>Key</b>	<b>Function</b>
Up Arrow or Ctrl/B, Down Arrow or Ctrl/N	Steps backward and forward through the four most recent CLI commands.
Left arrow or Ctrl/D, Right arrow or Ctrl/F	Moves the cursor left or right in a command line.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/H or Backspace	Moves the cursor to the beginning of the line.
Ctrl/J or Linefeed	Deletes the word to the left of the cursor.
Ctrl/U	Deletes all characters on the same line as the cursor.
Ctrl/A	Toggles between insert mode and overstrike mode. The default setting is insert mode, which allows you to insert characters at the cursor location, moving the existing characters to the right. Overstrike mode replaces existing characters. The CLI returns to insert mode at the beginning of each line.
Ctrl/R	Recalls the contents of the command line. This is especially helpful if the system issues a message interrupting your typing.

## Unit Naming

The host operating system identifies the location of units based on a logical unit numbering (LUN) scheme.

Each unit number contains the following:

- The first character is a letter indicating the kind of device in the storage unit: use D for disk devices (including CD-ROMs) or P to indicate passthrough devices such as tape devices, loaders, and libraries.

---

**Note** A device letter is automatically supplied when you use the CFMENU utility to configure your storagesets and devices.

---

- If entered, the next one or two digits indicate which target ID number is to access the unit during normal operation. Use one of the controller's SCSI target ID numbers assigned to the controller with the SET *controller ID=* command. Omit leading zeroes for SCSI target ID numbers less than ten. For example, use 2 instead of 02 for a storageset being accessed through the controller SCSI target ID number 0, LUN 2. The SCSI target ID number is initially set with the SET THIS\_CONTROLLER ID= or SET OTHER\_CONTROLLER ID= command. See page -83 for an explanation of these commands.

By carefully choosing the SCSI target ID number when adding units, the preferred paths for all of your storage units in a dual-redundant configuration can be established. Data I/O load to the units can likewise be controlled by equally distributing unit access between the controllers.

If the target ID number is not entered, the unit is still brought online by whatever target ID number is specified in the ADD UNIT command.

---

**Note** When operating in multiple bus failover mode, settings specified with the PREFERRED\_ID= switch takes priority over settings assigned with the SET *controller ID=* switch.

---

- The digit following the SCSI target ID number is always zero.
- The last digit identifies the logical unit number (LUN) for the device or storage unit. Acceptable LUN numbers are 0 through 7.

**Table 2 Unit Numbering Examples**

Unit Number	Device Type	Target ID Number	LUN
D1207	disk	12	7
D401	disk	4	1
D30	(not an acceptable unit number)		
D5	disk	0	5

When a container is partitioned, assign all partitions to the same controller target ID number.

---

**Note** The host communicates with a logical unit based on its LUN address. The controller communicates with a device based on its PTL address.

---

## Command Syntax

Commands to the controller must use the following command structure:

### Command *Parameter Switches*

- **Command.** A word or phrase expressed as a verb used to instruct the controller what to do. Every CLI command begins with a command. Commands are represented in this manual in capitalized form.
- **Parameter.** When required in the command, one or more a words or phrases entered to supply necessary information to support the action of the command. Not all CLI commands require parameters. Parameters are represented in this manual in capitalized form.
- **Switches.** An optional word or phrase which modifies the command. Not all CLI commands require switches. Switches are represented in this manual as capitalized, italicized text.

## ADD CDROM

Names a CD-ROM device and adds it to the controller configuration.

### Syntax

ADD CDROM *container-name* *SCSI-port-location*

### Parameters

#### *container-name*

Assigns a name to the CD-ROM device. This is the same name used with the ADD UNIT command to create a single-disk unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (\_).

#### *SCSI-port-location*

Indicates the PTL address of the CD-ROM used by the controller. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for an explanation of the PTL addressing naming format.

---

**Note** See the *HSZ70 Array Controller HSOF Operating Software Version 7.0 Release Notes* to confirm the compact disc device you are planning to use is compatible with the controller.

---

### Example

This example shows how to add a CD-ROM device named CD\_PLAYER located at port 1, target 8, LUN 0:

```
ADD CDROM CD_PLAYER 1 8 0
```

### See also

ADD UNIT  
DELETE *container-name*  
SHOW CDROM  
SHOW DEVICES





## ADD DISK

Names a disk drive and adds it to the controller's configuration.

### Syntax

ADD DISK *container-name SCSI-port-location*

### Parameters

#### *container-name*

Assigns a name to the disk device. This is the same name used with the ADD UNIT command to create a single-disk unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (\_).

---

**Tip** It is common to name a disk drive DISK<sub>*ptl*</sub>, where *ptl* is the disk's Port-Target-LUN address. Although other naming conventions are certainly acceptable, this naming convention offers the advantage of presenting to the user both the type of disk drive and its SCSI location in an intuitive manner.

---

#### *SCSI-port-location*

Indicates the PTL address of the disk device. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for an explanation of the PTL addressing naming format.

---

**Note** See the *HSZ70 Array Controller HSOF Operating Software Version 7.0 Release Notes* to confirm the disk drive you are planning to use is compatible with the controller.

---

### Switches

*NOTTRANSPORTABLE* (Default)

*TRANSPORTABLE*

Indicates whether a disk drive can be accessed exclusively by StorageWorks controllers.

If the NOTTRANSPORTABLE switch is specified, the controller makes a small portion of a non-transportable disk inaccessible to the host. This restricted space is used to store information (metadata) used to improve data reliability, error detection, and the ability to recover data. Because of this metadata, only StorageWorks controllers can retrieve data from non-transportable devices. Disks used as storagesets cannot be set as being transportable.

Transportable disk drives do not contain any metadata or restricted areas on them. Therefore, transportable disks forfeit the advantage metadata provides. However, transportable disks can be moved to a non-StorageWorks environment with their data intact.

If the NOTTRANSPORTABLE switch is specified and there is no metadata on the unit, the unit must be initialized.

---

**Note** DIGITAL recommends you avoid making a disk transportable unless it is imperative and there is no other way to accomplish moving the data.

---

*TRANSFER\_RATE\_REQUESTED=ASYNCHRONOUS*  
*TRANSFER\_RATE\_REQUESTED=20MHZ (Default)*  
*TRANSFER\_RATE\_REQUESTED=10MHZ*  
*TRANSFER\_RATE\_REQUESTED=5MHZ*

Specifies the maximum data transfer rate at which the controller is to communicate with the disk drive. The transfer rate may need to be limited to accommodate long cables between the controllers and the device, such as with a tape library.

### **Examples**

This example shows how to add DISK10000 at port 1, target 0, LUN 0:

```
ADD DISK DISK10000 1 0 0
```

This example shows how to add DISK40200 as a transportable disk drive to port 4, target 2, LUN 0.

```
ADD DISK DISK40200 4 2 0 TRANSPORTABLE
```

This example shows how to:

- Add a disk drive named DISK30200 as non-transportable device to port 3, target 2, LUN 0
- Set the data transfer rate to 10 MHz.

Enter the following command on one line.

```
ADD DISK DISK30200 3 2 0 NOTTRANSPORTABLE  
TRANSFER_RATE_REQUESTED=10MHZ
```

### **See also**

ADD MIRRORSET  
ADD UNIT  
DELETE *container-name*  
LOCATE  
SHOW DISKS  
SHOW DEVICES  
SET *container-name*



## ADD MIRRORSET

Names a mirrorset and adds it to the controller configuration.

### Syntax

ADD MIRRORSET *mirrorset-name* *disk-name1* [*disk-nameN*]

### Parameters

*mirrorset-name*

Assigns a name to the mirrorset. This is the same name used with the ADD UNIT command to identify the mirrorset as a host-addressable unit.

The mirrorset name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (\_).

---

**Tip** It is common to name a mirrorset MIRR $n$ , where  $n$  is a sequentially assigned, unique identifier. Other naming conventions are acceptable, but this naming convention presents both the type of container and its unique identifier in an intuitive manner.

---

*disk-name1* [*disk-nameN*]

Identifies the disk drives making up the mirrorset. A mirrorset may contain one to six disk drives.

### Switches

*COPY=FAST*

*COPY=NORMAL* (*Default*)

Sets the speed at which the controller copies data from normal mirrorset members to a new member or members when data is being mirrored to the storagesets disk drives.

Specify COPY=FAST when you want the creation of mirrored data is to take priority over other controller operations. When COPY=FAST is specified, the controller uses more resources to create the mirrored data. Copying takes less time. However, overall controller performance is reduced.

Specify `COPY=NORMAL` when operations performed by the other controller should take priority over the copy operation. When `COPY=NORMAL` is specified, the controller uses relatively few resources when creating the mirrored data, resulting in minimal impact on performance.

*POLICY=BEST\_FIT*

*POLICY=BEST\_PERFORMANCE (Default)*

*NOPOLICY*

Sets the selection criteria the controller uses to choose a replacement member from the spareset when a mirrorset member fails.

Specify `POLICY=BEST_FIT` to choose a replacement disk drive from the spareset most closely matching the capacity of the mirrorset. If there is more than one disk drive in the spareset most closely matching the capacity of the mirrorset, the controller selects the disk drive having the best performance.

Specify `POLICY=BEST_PERFORMANCE` to choose a replacement disk drive from the spareset having the best performance. The controller attempts to select a disk on a different port than existing mirrorset members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the capacity of the mirrorset.

Specify `NOPOLICY` to prevent the controller from automatically replacing a failed disk device. The mirrorset operates in a reduced state until a `POLICY=BEST_FIT` or `POLICY=BEST_PERFORMANCE` is selected, or a member is manually replaced in the mirrorset (see “SET,” page 103).

*READ\_SOURCE=disk-name*

*READ\_SOURCE=LEAST\_BUSY (Default)*

*READ\_SOURCE=ROUND\_ROBIN*

Selects the mirrorset member used by the controller to satisfy a read request.

Specify the `READ_SOURCE=disk-name` of a specific member to which you want the controller to direct all read requests. If the member fails out of the mirrorset, the controller selects the first normal member it finds to satisfy its read requests.

Specify `READ_SOURCE=LEAST_BUSY` to direct read requests to the mirrorset member with the least amount of work in its queue.

Specify `READ_SOURCE=ROUND_ROBIN` to sequentially direct read requests to each mirrorset member. The controller equally queries all normal members for each read request.

### Examples

This example shows how to add `DISK10000`, `DISK20100`, and `DISK30200` as a mirrorset with the name `MIRR1`:

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD MIRRORSET MIRR1 DISK10000 DISK20100 DISK30200
```

This example creates a host-addressable unit after the mirrorset `MIRR1` has been created:

```
INITIALIZE MIRR1
ADD UNIT D305 MIRR1
```

### See also

```
ADD DISK
ADD UNIT
DELETE container-name
INITIALIZE
MIRROR
REDUCE
SHOW mirrorset-name
SHOW MIRRORSETS
SHOW STORAGESETS
UNMIRROR
```





## ADD PASSTHROUGH

Creates a passthrough container. A passthrough container bypasses controller processing and allows the host to have direct access to the device. A passthrough device appears as if it were connected directly to the host bus rather than to the controller. Use passthrough containers to communicate with tape devices and tape loaders because they do not require the controller for optimum operation performance.

### Syntax

ADD PASSTHROUGH *passthrough-name SCSI-port-location*

### Parameter

*passthrough-name*

Names the device being added to or changed in a subsystem configuration. This is the same name used with the ADD UNIT command to create a host-addressable unit. You may want to use a name indicating the type of device is being added as a passthrough container, such as TAPE or LOADER.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (\_).

---

**Tip** It is common to name a tape passthrough device TAPE*ptl*, where *ptl* is the tape's Port-Target-LUN address. Although other naming conventions are acceptable, this naming convention offers the advantage of presenting to the user both the type of device and its SCSI location in an intuitive manner.

---

*SCSI-port-location*

Indicates the PTL address of the passthrough device. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for an explanation of the PTL addressing naming format.

---

**Note** See the *HSZ70 Array Controller HSOF Operating Software Version 7.0 Release Notes* to confirm the passthrough device you are planning to use is compatible with the controller.

---

**Switches**

*TRANSFER\_RATE\_REQUESTED=ASYNCHRONOUS*

*TRANSFER\_RATE\_REQUESTED=20MHZ (Default)*

*TRANSFER\_RATE\_REQUESTED=10MHZ*

*TRANSFER\_RATE\_REQUESTED=5MHZ*

Specifies the maximum data transfer rate for the controller to use in communicating with the device. For example, the transfer rate may need to be limited to accommodate long cables between the controller and the device, such as with a tape library. The transfer rate is negotiated immediately and does not require a restart in order to take effect.

**Example**

This example shows how to add tape device TAPE20300 at port 2, target 3, LUN 0:

```
ADD PASSTHROUGH TAPE20300 2 3 0  
ADD UNIT P100 TAPE20300
```

**See also**

ADD UNIT

DELETE *container-name*

SHOW DEVICES

SHOW PASSTHROUGH

SHOW *passthrough-name*

## ADD RAIDSET

Names a RAIDset and adds the RAIDset to the controller's configuration. DIGITAL RAIDsets are often referred to as RAID level 3/5 storagesets because they use the best characteristics of RAID level 3 and RAID level 5. The number of members in the storageset is determined by the number of containers specified by the *container-name* parameter in the command. The data capacity of the RAIDset is determined by the storage size of the smallest member.

### Syntax

```
ADD RAIDSET RAIDset-name container-name1 container-name2  
container-name3 [container-nameN]
```

### Parameters

*RAIDset-name*

Assigns a name to the RAIDset. This name is also used with the ADD UNIT command to identify the RAIDset as a host-addressable unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (\_).

---

**Tip** It is common to name a RAIDset RAID*n*, where *n* is a sequentially assigned, unique identifier. This naming convention presents to the user both the type of container and its unique identifier in an intuitive manner.

---

*container-name1* *container-name2* *container-name3* [*container-nameN*]

Specifies the disks making up the RAIDset.

### Switches

*POLICY=BEST\_FIT*

*POLICY=BEST\_PERFORMANCE* (Default)

*NOPOLICY*

Switches set the selection criteria the controller uses to choose a replacement member from the spareset when a RAIDset member fails.

Specify `POLICY=BEST_FIT` to choose a replacement disk drive from the spareset most closely matching the sizes of the remaining members of the RAIDset. If more than one disk drive in the spareset is the correct size, the controller selects the disk drive giving the best performance.

Specify `POLICY=BEST_PERFORMANCE` to choose a replacement disk drive from the spareset resulting in the best performance of the RAIDset. The controller attempts to select a disk on a different port than existing RAIDset members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the size of the remaining members of the RAIDset selected.

Specify `NOPOLICY` to prevent the controller from automatically replacing a failed disk device. This causes the RAIDset to operate in a reduced state until a `POLICY=BEST_FIT` or `POLICY=BEST_PERFORMANCE` is selected, or a member is manually replaced in the mirrorset. See the “SET,” page 113, for more information regarding this procedure.

*RECONSTRUCT=FAST*

*RECONSTRUCT=NORMAL (Default)*

Sets the speed at which the controller reconstructs data to a new RAIDset member replacing a the failed member.

Specify `NORMAL` to balance other controller operations with the reconstruct operation. The controller uses relatively few resources to perform the reconstruct process. Thus, there is little impact on performance.

Specify `FAST` to allow the reconstruct process to take precedence over other controller operations. When the `RECONSTRUCT=FAST` switch is specified, the controller uses more resources to perform the reconstruction. Reconstruction takes less time, but overall controller performance is reduced during reconstruction.

*REDUCED*

*NOREduced (Default)*

Switches permit the addition of a RAIDset missing a member. Specify the `REDUCED` switch when you add a RAIDset missing a member. Specify the `NOREduced` switch when all RAIDset members making

up the RAIDset are present—for instance, when creating a new RAIDset.

Verify the RAIDset contains at least two disk drives before specifying the REDUCED switch.

### Examples

This example shows how to create a RAIDset named RAID9 containing disks DISK10000, DISK20100, and DISK30200.

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID9 DISK10000 DISK20100 DISK30200
```

This example shows how to create a RAIDset named RAID8 containing disks DISK10000, DISK20100, and DISK30200, and uses the BEST\_FIT switch to indicate the replacement policy. Enter the ADD RAIDSET command on one line.

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID8 DISK10000 DISK20100 DISK30200
POLICY=BEST_FIT
```

This example creates RAIDset named RAID8, and then creates a host-addressable unit.

```
INITIALIZE RAID8
ADD UNIT D304 RAID8
```

This example shows how you can create a three-member RAIDset from the members of an already reduced four-member RAIDset. Do not initialize the RAIDset again because it was initialized when it was added.

---

**Caution** Data contained on the RAIDset is erased if you reinitialize the RAIDset.

---

```
ADD DISK DISK10300 1 3 0
ADD DISK DISK20400 2 4 0
ADD DISK DISK30500 3 5 0
ADD RAIDSET RAID6 DISK10300 DISK20400 DISK30500 REDUCED
```

**See also**

ADD UNIT

DELETE *container-name*

SET RAIDSET

SHOW RAIDSET

SHOW *RAIDset-name*

SHOW STORAGESETS

INITIALIZE

## ADD SPARESET

Adds a disk drive to the spareset and initializes the metadata on it.

### Syntax

ADD SPARESET *disk-name*

### Parameter

*disk-name*

Indicates the name of the disk drive being added to the spareset. Only one disk drive can be added to the spareset with each ADD SPARESET command.

### Example

This example shows how to add a disk drive named DISK20200 and DISK30300 to a spareset:

```
ADD DISK DISK20200 2 2 0
ADD DISK DISK30300 3 3 0
ADD SPARESET DISK20200
ADD SPARESET DISK30300
```

### See also

DELETE SPARESET  
SET FAILEDSET  
SHOW SPARESET  
SHOW STORAGESETS





## ADD STRIPESET

Names a stripeset and adds it to the controller configuration. Stripesets sometimes referred to as RAID level 0 storagesets. The number of members in the stripeset is determined by the number of *container-name* parameters specified. Specified at least two disk drives for RAIDsets.

### Syntax

```
ADD STRIPESET stripeset-name container-name1 container-name2  
[container-nameN]
```

### Parameters

*stripeset-name*

Assigns a name to the stripeset. This is the same name used with the ADD UNIT command to identify the stripeset as a host-addressable unit.

*container-name1 container-name2 [container-nameN]*

Indicates the name of name of the disk drive being added to or changed in a subsystem configuration. This is the same name used with the ADD UNIT command to create a host-addressable unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (\_).

---

**Tip** It is common to name a stripeset STRIPEn, where n is a sequentially assigned, unique identifier. This naming convention presents to the user both the type of container and its unique identifier in an intuitive manner.

---

*container-name1 container-name2 [container-nameN]*

Identifies the disk drives or mirrorsets making up the stripeset.

### Examples

This example shows how to create a stripeset named STRIPE1 with three disks: DISK10000, DISK20100, and DISK30200:

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD STRIPESET STRIPE1 DISK10000 DISK20100 DISK30200
```

This example show how to create a stripeset named STRIPE1 and then create a logical unit from it:

```
INITIALIZE STRIPE1
ADD UNIT D403 STRIPE1
```

This example shows how to create a two-member striped mirrorset (a stripeset whose members are mirrorsets), and how to create a logical unit from it. Because you can initialize the stripeset, you do not need to individually initialize the mirrorsets.

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD DISK DISK40300 4 3 0
ADD MIRRORSET MR1 DISK10000 DISK20100
ADD MIRRORSET MR2 DISK30200 DISK40300
ADD STRIPESET STRIPE1 MR1 MR2
INITIALIZE STRIPE1
ADD UNIT D304 STRIPE1
```

### See also

```
ADD UNIT
ADD MIRRORSET
DELETE container-name
INITIALIZE
SHOW STORAGESET
SHOW STRIPESET
SHOW stripeset-name
```

## ADD UNIT

Creates a logical unit from a device, container, or partition. The controller maps all requests from the host to the logical-unit number as requests to the container specified in the ADD UNIT command.

Initialize the disk drive or storageset container before adding it as a logical unit.

### Syntax

ADD UNIT *unit-number container-name*

### Parameters

*unit-number*

Assigns a number to the unit being created from a device, container, or partition in the subsystem. The host uses this number to indicate the source or target for every I/O request it sends to the controller. The *unit-number* is a host-addressable LUN.

*container-name*

Specifies the name of the container (that is, disk drive, device, storageset, or partition) being used to create the unit.

The maximum of 32 devices are allowed in each unit.

### Switches

Table 3 lists all switches for the ADD UNIT command and identifies which switches may be used with each type of device or storageset. Descriptions of each switch follow the table.

**Table 3 ADD UNIT Switches for New Containers**

Container Type	Switch	ACCESS_ID=ALL	PARTITION=partition-number	MAXIMUM_CACHED_	PREFERRED_PATH	READ_CACHE	RUN	WRITE_PROTECT	WRITEBACK_CACHE
RAIDset		✓	✓	✓	✓	✓	✓	✓	✓
Stripeset		✓	✓	✓	✓	✓	✓	✓	✓
Mirrorset		✓	✓	✓	✓	✓	✓	✓	✓
Non-Transportable Disk		✓	✓	✓	✓	✓	✓	✓	✓
Transportable Disk		✓	✓	✓	✓	✓	✓	✓	
CD-ROM		✓	✓	✓	✓	✓	✓		
Partition		✓	✓	✓	✓	✓		✓	✓
Passthrough					✓				

**Note** Regardless of the storageset type, the RUN and NORUN switches cannot be specified for partitioned units.

*ACCESS\_ID=ALL (Default)*

*ACCESS\_ID=unit identification*

Grants exclusive unit access privileges to the host. The access ID number must be set to the initiator SCSI ID number used by the host to

communicate with the controller. When a specific ID number is assigned, only the initiator' target ID number specified is permitted to read from or write to the unit. When set to ALL, any host may access the unit.

Units added as passthrough LUNs do not accept ACCESS\_ID numbers. The ACCESS\_ID switch for passthrough LUNs is set to ALL by default.

*PARTITION=partition\_number*

Identifies the unit number for a partition on a container. The *partition-number* identifies the partition associated with the unit number being added. Use the SHOW *container-name* command to find the partition numbers used by a storageset or a single-disk unit.

---

**Note** Partitions must be have the same target ID number and must be part of the same container.

---

*MAXIMUM\_CACHED\_TRANSFER=32 (Default)*

*MAXIMUM\_CACHED\_TRANSFER=n*

Sets the largest number of write blocks to be cached by the controller. The controller will not cache any transfers over the set size. Accepted write block sizes are 1 through 1024.

*PREFERRED\_PATH=OTHER\_CONTROLLER*

*PREFERRED\_PATH=THIS\_CONTROLLER*

*NOPREFERRED\_PATH (Default)*

May be set only when dual-redundant controllers are operating in a multiple bus failover configuration. In a multiple bus failover configuration, the host determines which controller the units are accessed through. The host's unit-to-controller settings always take precedence over the preferred path assigned to units with this switch. The target ID numbers assigned with the SET *controller ID=* command determines which target ID number the controller uses to respond to the host.

---

**Note** If your controller are configured to operate in transparent-failover mode, do not set the PREFERRED\_PATH switch with the ADD UNIT or SET *unit-number* command—otherwise, an error message is displayed. The error message indicates the assignment of a preferred controller path at the unit level is valid only when operating

in multiple bus failover mode.

---

When no preferred path is assigned, the unit is targeted through the controller which detects the unit first after the controllers start.

Select `PREFERRED_PATH=THIS_CONTROLLER` to instruct “this controller” to bring the units online.

Select `PREFERRED_PATH=OTHER_CONTROLLER` to instruct the “other controller” to bring the units online.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for information regarding multiple bus failover.



---

**Tip** Subsystem performance is better if target ID numbers are balanced across the dual-redundant pair.

---

*READ\_CACHE (Default)*

*NOREAD\_CACHE*

Switches are used to set the controller’s cache read policy function.

Read caching improves performance in almost all situations. Therefore, it is recommended you leave its default setting `READ_CACHE` enabled. However, under certain conditions, such as when performing a backup, read caching may not be necessary since only a small amount of data is cached. In such instances, it may be beneficial to disable the read cache function and remove the processing overhead associated with caching data.

*RUN (Default)*

*NORUN*

Controls the unit's availability to the host.

Specify `RUN` to make a unit available to the host.

Specify `NORUN` to make a unit unavailable to the host and to cause any data in cache to be flushed to one or more drives. `NORUN` spins down the devices used in the unit. The drives making up the unit spin down after the data has been completely flushed.

---

**Note** Do not specify the RUN and NORUN switches for partitions.

---

*WRITE\_PROTECT*

NOWRITE\_PROTECT (Default)

Instructs the controller whether data contained on the unit can be overwritten.

Specify WRITE\_PROTECT to prevent the host from writing data to the unit. However, the controller may still write to a write-protected RAIDset to complete a reconstruct operation. However, metadata, reconstruct data, and copy data is still written to RAIDsets and mirrorsets.

Specify NOWRITE\_PROTECT to allow the host to write data to the unit. This allows the controller to overwrite existing data.

*WRITEBACK\_CACHE*

NOWRITEBACK\_CACHE (Default)

Enable or disable the write-back data caching function of the controller. The controller's write-back caching feature improves write performance.

Specify WRITEBACK\_CACHE for all new units you want to take advantage of the controller's write-back caching feature.

Specify NOWRITEBACK\_CACHE for units you want to receive data directly from the host without being cached.

---

**Caution** Though there is built-in redundancy to protect data contained in cache, allowing data to be written to write-back cache may result in the loss of data if a catastrophic subsystem failure occur.

---

## Examples

This example shows how to create unit D102 from a single-disk drive named DISK10000 and sets host's access to the unit through "this controller":

```
ADD DISK DISK10000 1 0 0
INITIALIZE DISK10000
ADD UNIT D102 DISK10000 PREFERRED_PATH=THIS_CONTROLLER
```

This example shows how to create unit D107 from a RAIDset named RAID9 and instructs the unit to take advantage of the controller's write-back caching feature.

```
ADD DISK DISK10100 1 1 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30100 3 1 0
ADD DISK DISK40100 4 1 0
ADD RAIDSET RAID9 DISK10100 DISK20100 DISK30100 DISK40100
INITIALIZE RAID9
ADD UNIT D107 RAID9 WRITEBACK_CACHE
```

**See also**

CREATE\_PARTITION  
DELETE *unit-number*  
SET *unit-number*  
SHOW UNITS



## **CLEAR\_ERRORS CLI**

Stops the display of current or previous error messages at the CLI prompt. This command does not clear the error conditions, it only stops the display of errors at the CLI prompt.

After the cause of the error condition has been corrected, issue the CLEAR\_ERRORS CLI command to clear the error message.

Enter this command to clear errors existing from previous error conditions.

### **Syntax**

CLEAR\_ERRORS CLI

### **Example**

This example shows how to clear the message “All NVPM components initialized to their default settings” from the CLI prompt:

```
ALL NVPM COMPONENTS INITIALIZED TO THEIR DEFAULT SETTINGS  
CLEAR_ERRORS CLI
```

### **See also**

CLEAR\_ERRORS INVALID\_CACHE  
CLEAR\_ERRORS LOST\_DATA  
CLEAR\_ERRORS UNKNOWN  
CLEAR\_ERRORS UNWRITEABLE\_DATA



## **CLEAR\_ERRORS** *controller* **INVALID\_CACHE**

Clears an invalid cache error and allows the controller and cache to resume operation. If the error is due to an incorrectly mirrored configuration, the controller indicates mirrored mode status after the error is cleared.

Use this command for the following situations:

- When the controller or cache modules have been replaced, resulting in mismatched data between the controllers.
- When the controller or cache module is replaced while data is still in cache and not properly flushed with the SHUTDOWN or SET NOFAILOVER COPY= commands.

### **Syntax**

CLEAR\_ERRORS *controller* INVALID\_CACHE

Completely spell out the phrase INVALID\_CACHE.

### **Parameters**

*controller*

Identifies which controller is to receive the CLEAR\_ERRORS command. You must specify THIS\_CONTROLLER or OTHER\_CONTROLLER.

*data-retention-policy*

**DESTROY\_UNFLUSHED\_DATA**

**NODESTROY\_UNFLUSHED\_DATA** (*Default*)

Instructs the controller how to handle write-back cached data. Specify NODESTROY\_UNFLUSHED\_DATA (default) to retain the cached data and discard controller information. Specify DESTROY\_UNFLUSHED\_DATA to retain the controller information and discard the cached data.

Specify NODESTROY\_UNFLUSHED\_DATA in the following situations:

- If the controller module has been replaced
- If the controller's nonvolatile memory (NVMEM) has lost its contents, possibly from an NVMEM battery failure

Specify DESTROY\_UNFLUSHED\_DATA in the following situations:

- If the cache module has been replaced
- Any other reason not listed above

---

**Caution** Specifying the DESTROY\_UNFLUSHED\_DATA switch destroys data remaining in cache, which can result in the possible loss of data.

---

### Examples

This example shows how to clear an invalid cache error on “this controller” after you have replaced a controller module. Enter the command on one line.

```
CLEAR_ERRORS THIS_CONTROLLER INVALID_CACHE  
NODESTROY_UNFLUSHED_DATA
```

This example shows how to clear an invalid cache error on the “other controller” after a cache module has been replaced. Enter this command on the same line. Enter the command on one line.

```
CLEAR_ERRORS OTHER_CONTROLLER INVALID_CACHE  
DESTROY_UNFLUSHED_DATA
```

### See also

```
CLEAR_ERRORS CLI  
CLEAR_ERRORS LOST_DATA  
CLEAR_ERRORS UNKNOWN  
CLEAR_ERRORS UNWRITEABLE_DATA
```

## **CLEAR\_ERRORS** *unit-number* **LOST\_DATA**

Clears lost data errors on a unit and All partitions on the unit's container are effected.

The controller reports a lost data error on the unit when you remove a write-back cache module or when the cache module contains unflushed data, possibly due to an interruption in the primary power source with no backup power present. The CLEAR\_ERRORS LOST\_DATA command clears the lost data error but does not recover the lost data.

---

**Note** Clearing lost data errors or lost data block errors on a RAIDset causes a reconstruction of all parity blocks. Clearing lost data errors or lost data block errors on a mirrorset causes members to normalize.

---

### **Syntax**

CLEAR\_ERRORS *unit-number* LOST\_DATA

Completely spell out the phrase LOST\_DATA.

---

**Caution** This command may cause data loss.

---

### **Parameters**

*unit-number*

Identifies the unit on which the lost data error is to be cleared. The *unit-number* is the same name given to the unit when you added it to the controller's configuration.

### **Example**

This example shows how to clear the lost data error on disk unit number D103:

```
CLEAR_ERRORS D103 LOST_DATA
```

**See also**

CLEAR\_ERRORS CLI  
CLEAR\_ERRORS INVALID\_CACHE  
CLEAR\_ERRORS UNKNOWN  
CLEAR\_ERRORS UNWRITEABLE\_DATA

## **CLEAR\_ERRORS UNKNOWN**

Clears unknown errors from a device the controller identifies as unknown or not correctly configured.

If a device failure causes the controller to label the device as unknown, the controller does not check the device again to see if it has been repaired or if the error condition has been corrected. You must enter this command so the controller can recognize the device after the cause of the error has been corrected.

Use this command to force the controller to recognize a failed device, regardless of the controller's prior evaluation of the device's condition.

### **Syntax**

`CLEAR_ERRORS device-name UNKNOWN`

The word UNKNOWN must be completely spelled out.

### **Parameters**

*device-name*

Identifies the device with the unknown error.

### **Example**

This example shows how to force the controller to recognize a previously unknown device named DISK30000:

```
CLEAR_ERRORS DISK30000 UNKNOWN
```

### **See also**

`CLEAR_ERRORS CLI`

`CLEAR_ERRORS INVALID_CACHE`

`CLEAR_ERRORS UNKNOWN`

`CLEAR_ERRORS UNWRITEABLE_DATA`





## **CLEAR\_ERRORS** *unit-number* **UNWRITEABLE\_DATA**

This command clears an unwriteable data error on a unit.

This command affects all partitions on the same container.

If a storage set or disk drive fails before its data has been written to the it, the controller reports an unwriteable data error. The CLEAR\_ERRORS UNWRITEABLE\_DATA command removes the data from the cache and clears the unwriteable data error.

---

**Caution** This command causes the data loss.

---

### **Syntax**

CLEAR\_ERRORS *unit-number* UNWRITEABLE\_DATA

Completely spell out the phrase UNWRITEABLE\_DATA.

### **Parameters**

*unit-number*

Identifies the unit having the unwriteable data error. The *unit-number* is the name given to the unit when it was created with the ADD UNIT command.

### **Example**

This example shows how to clear the unwriteable data error on disk unit D103:

```
CLEAR_ERRORS D103 UNWRITEABLE_DATA
```

### **See also**

CLEAR\_ERRORS CLI  
CLEAR\_ERRORS INVALID\_CACHE  
CLEAR\_ERRORS LOST\_DATA  
CLEAR\_ERRORS UNKNOWN  
RETRY\_ERRORS UNWRITEABLE\_DATA



## CREATE\_PARTITION

This command divides a non-transportable disk drive or single-disk storageset into several, separately addressable storage units. The command marks a specified percentage of a disk drive or storageset to be used as a separately addressable unit. You can divide any nontransportable disk into a maximum of eight partitions. Each partition can be separately presented to the host. Partitions are not supported in multiple bus failover mode. Initialize disks and storagesets before creating partitions.

---

**Note** Partitioned storagesets partitioned single-disk units cannot function in multiple bus failover dual-redundant configurations. Because they are not supported, you must delete your partitions before configuring the controllers for multiple bus failover.

---

After you partition a container, you must initialize it before destroying the partitions.

### Syntax

`CREATE_PARTITION container-name SIZE=percent`

### Parameters

*container-name*

Identifies the disk or storageset to partition. This is the same name given to the disk or storageset when it was created with the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth). Any disk, stripeset, mirrorset, striped mirrorset, or RAIDset can be partitioned. A transportable disk cannot be partitioned. You must initialize the container before creating a partition.

*SIZE=percent*

*SIZE=LARGEST*

Specifies the size of the partition to be created as a percentage of the total container's storageset size.

To create a partition, specify a percentage of the container's total capacity. The entire container is then divided into segments equal to the percentage specified. For example, if `SIZE=20`, the container is divided into five ( $1.0/0.2=5$ ) equal segments. The resulting partition is

slightly smaller than the size specified because metadata also accompanies each partition.

Specify LARGEST in the following situations:

- To have the controller create the largest partition possible from unused space on the disk or storage set.
- To create the last partition on a container. Because the remaining space is not equal to an exact percentage value, specifying LARGEST allows you to optimize use of the remaining space.

### Example

This example shows how to create a RAIDset named RAID9 and divide it into four equal parts. It also creates host-addressable units for each partition:

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID9 DISK10000 DISK20100 DISK30200
INITIALIZE RAID9
CREATE_PARTITION RAID9 SIZE=25
CREATE_PARTITION RAID9 SIZE=25
CREATE_PARTITION RAID9 SIZE=25
CREATE_PARTITIOIN RAID9 SIZE=LARGEST
ADD UNIT D101 RAID9 PARTITION=1
ADD UNIT D102 RAID9 PARTITION=2
ADD UNIT D103 RAID9 PARTITION=3
ADD UNIT D104 RAID9 PARTITION=4
```

### See also

```
ADD UNIT
DELETE unit-number
DESTROY PARTITION
SHOW
```

## DELETE *container-name*

Deletes a container from the controller's configuration. You cannot delete a container in use by a higher-level container. For example, you cannot delete a disk belonging to a member of a RAIDset, or a RAIDset being declared as a unit; you must first delete the higher-level container or containers.

---

**Note** This command does not delete spareset or failedsets. Spareset and failedset containers cannot be deleted.

---

When a container is deleted, the individual disks are free to be used by another container. If the container is again created with the exact same disk configuration, and none of the disks have been used for anything, then the container can be reassembled using its original disks.

### Syntax

DELETE *container-name*

### Parameters

*container-name*

Identifies the container to be deleted. This is the name given to the container when it was created using the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth).

### Examples

This example shows how to delete a disk drive named DISK10000:

```
DELETE DISK10000
```

This example shows how to delete a stripeset named STRIPE1:

```
DELETE STRIPE1
```

This example shows how to delete a RAIDset named RAID9:

```
DELETE RAID9
```

**See also**

DELETE FAILEDSET  
DELETE SPARESET  
UNMIRROR

## DELETE FAILEDSET

Removes a disk drive from the failedset. The failedset contains disk drives removed by the controller from RAIDsets and mirrorsets because they failed or were manually removed using the SET command. Enter the DELETE FAILEDSET command before removing failed members from the storage shelf for testing, repair, or replacement.

Regard disk drives in the failedset defective. Repair or replace defective disk devices.

### Syntax

DELETE FAILEDSET *disk-name*

### Parameter

*disk-name*

Identifies the disk you want to delete from the failedset. Remove only one disk at a time from a failedset.

### Example

This example shows how to delete DISK20200 from the failedset:

```
DELETE FAILEDSET DISK20200
```

### See also

SET FAILEDSET  
SHOW FAILEDSET





## DELETE SPARESET

Removes a disk drive from the spareset.

### Syntax

```
DELETE SPARESET disk-name
```

### Parameter

*disk-name*

Identifies the disk drive being deleted from the spareset. Remove only one disk at a time from a spareset.

### Example

This example shows how to remove DISK20300 from the spareset:

```
DELETE SPARESET DISK20300
```

### See also

```
ADD SPARESET  
SHOW SPARESET
```



## **DELETE** *unit-number*

Deletes a logical unit from the controller configuration. The host cannot address deleted units, deleted devices, storagesets, or partitions. If the controller's write-back caching feature is enabled, the controller flushes the cached data to the unit's devices before deleting the unit.

Before using the DELETE *unit-number* command, clear any errors with the CLEAR\_ERRORS UNWRITEABLE\_DATA or CLEAR\_ERRORS LOST\_DATA commands.

### **Syntax**

DELETE *unit-number*

### **Parameter**

*unit-number*

Identifies the unit number to be deleted. The *unit-number* is the same name given to the unit when it was created using the ADD UNIT command.

### **Example**

This example shows how to delete disk unit number D103:

```
DELETE D103
```

### **See also**

ADD UNIT

CLEAR\_ERRORS LOST\_DATA

CLEAR\_ERRORS UNWRITEABLE\_DATA

DESTROY\_PARTITION



## DESTROY\_PARTITION

Labels a reserved partition as available. The partition is then consolidated with any adjacent available partitions.

---

**Caution** Data contained on a partition is lost when you enter the DESTROY\_PARTITION command.

---

You cannot destroy a partition that has been assigned a unit number. First enter the DELETE *unit-number* command to delete the unit using the partition.

### Syntax

DESTROY\_PARTITION *container-name* PARTITION=*partition-number*

### Parameters

*container-name*

Identifies the disk or storageset containing the partition to be destroyed. This is the name given to the container when it was created using the ADD command (for example, ADD DISK, ADD STRIPESSET, and so forth).

*partition-number*

Identifies the partition to be destroyed. Use the SHOW *container-name* command to identify the correct partition before carrying out the DESTROY\_PARTITION command.

### Example

This example shows how to delete the unit for partition 2 on RAIDset RAID9 and destroy the partition:

```
DELETE D102
DESTROY_PARTITION RAID9 PARTITION=2
```

### See also

CREATE\_PARTITION  
DELETE *unit-number*  
SHOW



## DIRECTORY

Lists the diagnostics and utilities available on “this controller.”

### Syntax

DIRECTORY

### Example

This example shows how to display a directory listing:

#### DIRECTORY

```

HSUTILV70Z  D
FRUTILV70Z  D
CFMENUV70Z  D
CHVSN V70Z  D
CLCP  V70Z  D
CLONE V70Z  D
CONFIGV70Z  D
DILX  V70Z  D
DIRECTV70Z  D
DSTAT V70Z  D
FMU  V70Z  D
VTDPY V70Z  D
    
```

---

**Note** CHVSN and DSTAT are not user utilities. They may be used by DIGITAL authorized service personnel only.

---

### See also

RUN





## HELP

Displays a brief explanation of how to use the question mark (?) to obtain help on any command or CLI function. You must precede the question mark with a space.

### Syntax

HELP

### Example

This example shows how to display information regarding the HELP command:

#### HELP

Help may be requested by typing a question mark (?) at the CLI prompt. This will print a list of all available commands. For further information you may enter a partial command and type a space followed by a (?) to print a list of all available options at that point in the command. For example:

```
SET THIS_CONTROLLER ?
```

Prints a list of all legal SET THIS\_CONTROLLER commands

This example shows how to get help on the SET command using the question mark (?):

#### SET ?

Your options are:

```
EMU
FAILOVER
NOFAILOVER
MULTIBUS_FAILOVER
NOMULTIBUS_FAILOVER
OTHER_CONTROLLER
THIS_CONTROLLER
LOG
FAILEDSET
Unit number or mirrorset or raidset or device name
```



## INITIALIZE

Initializes a container—thus, allowing a logical unit can be associated with it. During initialization, a small amount of disk space is reserved for controller metadata and is made inaccessible to the host. Disks made transportable do not contain controller metadata.

### Syntax

INITIALIZE *container-name*

---

**Caution** The INITIALIZE command destroys all user data on the container unless you enter the NODESTROY switch.

---

If you make a single-disk container transportable, any metadata contained on the disk is destroyed and the entire disk drive is accessible by the host.

Use the INITIALIZE command when:

- Creating a unit from a newly installed disk
- Creating a unit from a newly created RAIDset, stripeset, or mirrorset
- Initializing the data structure of a previously partitioned container

Do not use the INITIALIZE command when:

- Creating a unit from the same disks previously initialized, such as when a RAIDset is moved
- Creating a storageset from deleted members
- Adding a RAIDset with the REDUCED switch

### Parameters

*container-name*

Specifies the container to initialize. This is the same name given to the disk or storageset when it was created using the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth).

## Switches

*CHUNKSIZE=DEFAULT (Default)*

*CHUNKSIZE=n*

Specifies the block chunk size to be used for RAIDsets and stripesets. You can specify the chunk block size by entering *CHUNKSIZE=n*, or allow the controller to determine the optimal chunk block size by entering *CHUNKSIZE=DEFAULT*. The *CHUNKSIZE* switch does not apply to mirrorsets.

The default chunk size for storagesets with less than nine members is 256 blocks, or 128 kilobytes (K). The default chunk size for storagesets with more than nine members is 128 blocks, or 64K. The default values provide optimal storageset performance for a wide variety of applications. A chunk size less than 128 blocks (64K) is not recommended.



**Tip** Accept the default chunk size setting for most applications. Do not change the default setting unless you are fully aware of the impact to the storageset's performance.

---

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for information regarding recommended chunk size settings for your application.

*DESTROY (Default)*

*NODESTROY*

Controls how the metadata on the initialized container is to be handled.

Specify *NODESTROY* to preserve forced error metadata during the initialization process. Use the *NODESTROY* switch only when a unit is to be created from disk drives reduced from mirrorsets. This allows the data on the container to be accessed by a disk, stripeset, or mirrorset unit. The *NODESTROY* switch is ignored for RAIDsets and single-disk configurations.

Specify *DESTROY* to overwrite user data and forced error flags during the initialization.

---

**Note** The *DESTROY* and *NODESTROY* switches are only valid with stripesets and mirrorsets.

---

**SAVE\_CONFIGURATION****NOSAVE\_CONFIGURATION** (*Default*)

Instructs the controller whether to save the controller's configuration to the container being initialized. See also SET *controller* INITIAL\_CONFIGURATION on page -87.

Save configuration is intended only for use with single controller applications. The SAVE\_CONFIGURATION switch requires only one disk to be initialized with this option. However, more disks may be used if desired.

Specify SAVE\_CONFIGURATION to store a copy of the controller configuration on the container being initialized. A new controller can receive information from a container containing configuration information saved with the SAVE\_CONFIGURATION switch. If SAVE\_CONFIGURATION is specified for a multi-device storageset, such as a stripeset, the complete controller configuration information is stored on each disk drive in the storageset.

A disk drive initialized with the SAVE\_CONFIGURATION switch specified has slightly less storage space available for user data.

Specify NOSAVE\_CONFIGURATION if you do not want to store a copy of the controller configuration on a container.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding SAVE\_CONFIGURATION.

**Examples**

This example shows how to initialize container DISK10000 and how to save a copy of the controller configuration on it.

```
ADD DISK DISK10000 1 0 0  
INITIALIZE DISK10000 SAVE_CONFIGURATION
```

The following example shows sample devices with the SAVE\_CONFIGURATION switch enabled:

#### SHOW DEVICES FULL

```

Name          Type          Port Targ Lun      Used by
-----
DISK10000     disk          1    0    0        S2
DEC          RZ28M      (C) DEC 1003
Switches:
NOTTRANSPORTABLE
TRANSFER_RATE_REQUESTED = 20MHZ (synchronous 10.00 MHZ negotiated)
Size: 4108970 blocks
Configuration being backed up on this container
DISK30300     disk          3    3    0        S2
DEC          RZ28M      (C) DEC 1003
Switches:
NOTTRANSPORTABLE
TRANSFER_RATE_REQUESTED = 20MHZ (synchronous 10.00 MHZ negotiated)
Size: 4108970 blocks
Configuration being backed up on this container
TAPE40300     passthrough tape 4    3    0        P1107
DEC          TZS20      (C) DEC 01ab
Switches:
TRANSFER_RATE_REQUESTED = 20MHZ (synchronous 10.00 MHZ negotiated)

```

This example shows how to initialize stripeset STRIPE1 with the default chunk size. The chunk size does not have to be specified. The controller initializes the unit with the default chunk size.

```

ADD DISK DISK10100 1 1 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30100 3 1 0
ADD STRIPESET STRIPE1 DISK10100 DISK20100 DISK30100
INITIALIZE STRIPE1

```

This example shows how to initialize RAIDset RAID9 with a chunk size of 20:

```

ADD DISK DISK10200 1 2 0
ADD DISK DISK20200 2 2 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID9 DISK10200 DISK20200 DISK30200
INITIALIZE RAID9 CHUNKSIZE=20

```

This example shows how to initialize DISK40400 and preserve the data after it is removed (reduced) from a mirrorset:

```

REDUCE DISK40400
INITIALIZE DISK40400 NODESTROY

```

## LOCATE

Indicates the location of configured units, storagesets, and devices by flashing the amber device fault LED on the front of the storage building block (SBB). The device fault LED flashes once per second until turned off with the LOCATE CANCEL command. The LOCATE command can also be used to test the LED itself.

The device fault LED on a failed device stays on continuously. When located, the device fault LED on a good device flashes. The flashing LED helps to distinguish between located devices and failed devices. The device fault LED on failed devices stays on after the LOCATE CANCEL command is entered.

### Syntax

LOCATE *parameter*

### Parameters

Only one of the following parameters may be entered with each LOCATE command.

#### *ALL*

Causes the amber device fault LEDs of all configured devices to flash. You can also use specify ALL to test all of the LEDs at once. Enter LOCATE CANCEL to turn off the LEDs.

#### *CANCEL*

Turns off all amber device fault LEDs turned on with the LOCATE command.

#### *DISKS*

Causes the amber device fault LEDs of all configured disks to flash. Enter LOCATE CANCEL to turn off the LEDs.

#### *OPTICALS*

Causes the amber device fault LEDs of all configured optical devices to flash. Enter LOCATE CANCEL to turn off the LEDs.

#### *PTL (SCSI-location)*

Causes the amber device fault LED on the device at the given SCSI location to flash. See the *HSZ70 Array Controller HSOE Version 7.0*

*Configuration Manual* for an explanation of the PTL addressing naming format.

Not all devices have a device fault LED. Therefore, they do not appear to respond to the LOCATE command.

#### *UNITS*

Causes the amber device fault LEDs of all devices used by the units to flash. This command is useful to determine which devices are not currently configured into logical units. Enter LOCATE CANCEL to turn off the device fault LEDs.

#### *container-name*

Causes the amber device fault LEDs on the devices within the *container-name* to flash. If a device name is given, the device's fault LED is turned on. If a storageset name is given, the fault LED on all of the devices assigned to the storageset turns on. Use LOCATE CANCEL to turn off the LEDs.

#### *unit-number*

Causes the amber device fault LEDs on the devices making up the *unit-number* to flash. Use LOCATE CANCEL to turn off the LEDs.

### **Examples**

This example shows how to cause the amber device fault LED on device DISK10000 to flash:

```
LOCATE DISK10000  
LOCATE CANCEL
```

This example shows how to cause the device fault LEDs on all of the devices assigned to disk unit number D102 to flash:

```
LOCATE D102
```

This example shows how to cause the device fault LEDs on all configured disk devices to flash:

```
LOCATE DISKS
```

This example shows how to turn off the flashing device fault LEDs on all devices:

```
LOCATE CANCEL
```



## MIRROR

Creates a one-member mirrorset from a single disk. This command is used only on disks configured as units or members of a stripeset. Enter the ADD MIRRORSET command to create a mirrorset from disk drives not already members of higher level containers.

After the disk drive is converted to a mirrorset, increase the nominal number of members by entering the SET *mirrorset-name* MEMBERSHIP=*number-of-members* command. Enter the SET *mirrorset-name* REPLACE=*disk-name* command to add more members to the mirrorset.

### Syntax

MIRROR *disk-name mirrorset-name*

### Parameters

*disk-name*

Specifies the name of the disk to convert to a one-member mirrorset. The disk must be part of a unit.

*mirrorset-name*

Assigns a name for the mirrorset.

It is common to name a mirrorset MIRR*n*, where *n* is a sequentially assigned, unique identifier. Other naming conventions are acceptable, but this naming convention presents to the user both the type of container and its unique identifier in an intuitive manner.

### Switches

*COPY=FAST*

*COPY=NORMAL (Default)*

Sets the speed at which the controller copies data from a normal mirrorset member, or members, to new members.

Specify FAST when the creation of mirrored data is to take priority over other controller operations. The controller uses more resources to create the mirrored data. Copying takes less time, but overall controller performance is reduced.

Specify `NORMAL` when other controller operations are to take priority over the copy operation. The controller uses relatively few resources when creating the mirrored data, resulting in minimal impact on performance.

*`POLICY=BEST_FIT`*

*`POLICY=BEST_PERFORMANCE`*

*`NOPOLICY (Default)`*

Sets the selection criteria the controller uses to choose a replacement member from the spareset when a mirrorset member fails.

Specify `POLICY=BEST_FIT` to choose a replacement disk drive from the spareset most closely matching the individual capacities of the remaining members. If there is more than one disk drive in the spareset most closely matching the capacity of the remaining members, the controller selects the disk drive having the best performance.

Specify `POLICY=BEST_PERFORMANCE` to choose a replacement disk drive from the spareset resulting in the best performance. The controller attempts to select a disk on a different port than existing members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the individual capacities of the remaining members.

Specify `NOPOLICY` to prevent the controller from automatically replacing a failed disk device. This causes the mirrorset to operate in a reduced state until a `POLICY=BEST_FIT` or `POLICY=BEST_PERFORMANCE` is selected, or a member is manually replaced in the mirrorset. See “SET,” page 103.

**Example**

This example shows how to create a one-member mirrorset from each member of a stripeset. The succeeding commands set the nominal number of members in each mirrorset to two and add a second disk to each mirrorset. It is not necessary to initialize the mirrorsets or add them as units; the higher-level structure of the stripeset is carried down to the mirrorsets.

```
ADD DISK DISK10100 1 1 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30100 3 1 0
ADD STRIPESET STRIPE1 DISK10100 DISK20100 DISK30100
INITIALIZE STRIPE1
ADD UNIT D102 STRIPE1
MIRROR DISK10100 MIRROR1
SET MIRROR1 MEMBERSHIP=2
SET MIRROR1 REPLACE=DISK20200
MIRROR DISK20100 MIRROR2
SET MIRROR2 MEMBERSHIP=2
SET MIRROR2 REPLACE=DISK30200
MIRROR DISK30100 MIRROR3
SET MIRROR3 MEMBERSHIP=2
SET MIRROR3 REPLACE=DISK10200
```

**See also**

```
ADD MIRRORSET
REDUCE
SHOW MIRRORSETS
UNMIRROR
```



## REDUCE

Removes member disk drives from mirrorsets and decreases the nominal number of members in the mirrorsets.

Unlike the SET *mirrorset-name* REMOVE=*disk-name* command, the controller does not put reduced members into the failedset. When using the REDUCE command to copy a striped mirrorset, you must reduce all mirrorsets at the same time with one command. The CLONE utility does this automatically.

The nominal number of members in a mirrorset is determined the number of members assigned to the mirrorset with the SET *mirrorset-name* MEMBERSHIP=*number-of-members* command or the ADD MIRRORSET *mirrorset-name* *disk-name1* [*disk-nameN*] command—in other words, the number of disks that originally contained in the mirrorset before it is reduced. The actual number of members contained in the mirrorset may be less than the nominal number of members if:

- A disk drive is not added back to the mirrorset
- A member remains removed from the mirrorset
- The mirrorset replacement policy switch NOPOLICY is specified with the SET *mirrorset-name* command
- No spare disks exist

The actual number of members in the mirrorset can never be greater than the nominal number of members. The disks to be removed do not need to be members of the same mirrorset. However, the disks must all be part of the same unit (for example, the same striped mirrorset).

When a disk is reduced from a mirrorset, the controller:

- Pauses I/O to the unit
- Flushes all of the unit's data from write-back data cache
- Removes the specified mirrorset disk(s)
- Decreases the nominal number of members of the mirrorset(s) by the number of disk(s) removed from the mirrorset(s).

For each reduced mirrorset, there must be at least one remaining normal member after the reduction. If this is not true for all of the *disk-names* specified, the mirrorset is not reduced.

Only normal members can be reduced. A normal member is a mirrorset member whose entire contents are the same as all other normal members within the mirrorset.

---

**Note** An error is displayed if you attempt to reduce the only normal mirrorset member.

---

## Syntax

REDUCE *disk-name1 disk-name2 disk-name3...*

## Parameters

*disk-name1 disk-name2 disk-name3...*

Specifies one or more names of one or more normal mirrorset members to be removed. Multiple members can be removed with the REDUCE command.

## Example

This example shows how to remove DISK20100, DISK20500, and DISK40200 from their respective mirrorsets:

### SHOW STRIPE1

Name	Storageset	Uses	Used by
STRIPE1	stripeset	MIRR1 MIRR2 MIRR3	D304

### SHOW MIRRORSETS

Name	Storageset	Uses	Used by
MIRR1	mirrorset	DISK10100 DISK20100	STRIPE1
MIRR2	mirrorset	DISK10200 DISK20500	STRIPE1
MIRR3	mirrorset	DISK30300 DISK40200	STRIPE1

**REDUCE DISK20100 DISK20500 DISK40200**

**SHOW MIRRORSETS**

Name	Storageset	Uses	Used by
MIRR1	mirrorset	DISK10100	STRIPE1
MIRR2	mirrorset	DISK10200	STRIPE1
MIRR3	mirrorset	DISK30300	STRIPE1

**See also**

ADD MIRRORSET  
MIRROR  
RUN CLONE  
SHOW MIRRORSET  
SET *mirrorset-name*





## RENAME

Renames a container.

### Syntax

RENAME *old-container-name new-container-name*

### Parameters

*old-container-name*

Specifies the existing name of the container.

*new-container-name*

Assigns the new name for the container.

See “Command Syntax,” page 6, for information regarding container naming rules.

---

**Note** Units may not be renamed.

---

### Example

This example shows how to rename DISK10000 to MYDISK:

#### SHOW DISKS

Name	Type	Port	Targ	Lun	Used by
DISK10000	disk	1	0	0	D100
DISK10100	disk	1	1	0	D101

#### RENAME DISK10000 MYDISK

#### SHOW DISKS

Name	Type	Port	Targ	Lun	Used by
MYDISK	disk	1	0	0	D100
DISK10100	disk	1	1	0	D101



## RESTART *controller*

Flushes all user data from the specified controller's write-back cache (if present) and restarts the controller.

### Syntax

RESTART *controller*

### Parameters

*controller*

The *controller* parameter indicates which controller is to be restarted. Specify OTHER\_CONTROLLER or THIS\_CONTROLLER.

### Switches

IGNORE\_ERRORS

NOIGNORE\_ERRORS (Default)

Switches control the reaction of the controller based on the status of write-back cache.

---

**Caution** The IGNORE\_ERRORS and IMMEDIATE\_SHUTDOWN switches cause the controller to keep unflushed data in the write-back cache until it restarts and is able to write the data to devices. Do not perform any hardware changes until the controller flushes the cache.

---

Specify IGNORE\_ERRORS to instruct the controller to restart even if the data within write-back cache cannot be written to the devices.

Specify NOIGNORE\_ERRORS to instruct the controller to not restart if the data within write-back cache cannot be written to the devices.

IMMEDIATE\_SHUTDOWN

NOIMMEDIATE\_SHUTDOWN (Default)

Instructs the controller when to shutdown.

Specify IMMEDIATE\_SHUTDOWN to instruct the controller to restart immediately without checking for online devices or before flushing data from the write-back cache to devices.

Specify `NOIMMEDIATE_SHUTDOWN` to instruct the controller not to restart without checking for online devices or before all data has been flushed from write-back cache to the devices.

### **Examples**

This example shows how to restart “this controller”:

**RESTART THIS\_CONTROLLER**

This example shows how to restart the “other controller”:

**RESTART OTHER\_CONTROLLER**

### **See also**

`SELFTEST` *controller*

`SHUTDOWN` *controller*

## **RETRY\_ERRORS UNWRITEABLE\_DATA**

Causes the controller to attempt to write previously unwriteable data from the write-back cache to the devices. If a container fails, preventing the data in write-back cache to be written to the container, an unwriteable data error is reported. If possible, correct the condition causing the unwriteable data and try the write operation again. No data is lost if the retry fails.

### **Syntax**

RETRY\_ERRORS *unit-number* UNWRITEABLE\_DATA

### **Parameter**

*unit-number*

Identifies the unit number to which the data contained in write-back cache tries to write. The unit-number is the same name given to the unit when it was created using the ADD UNIT command.

### **Example**

This example shows how to retry writing the cached data previously marked unwriteable to disk unit D103:

```
RETRY_ERRORS D103 UNWRITEABLE_DATA
```

### **See also**

CLEAR\_ERRORS UNWRITEABLE\_DATA



## RUN

Runs a diagnostic or utility program on “this controller.” Diagnostic and utility programs only run on “this controller.”

### Syntax

RUN *program-name*

### Parameter

*program-name*

The *program-name* parameter specifies the name of the diagnostic or utility program to be run. The following programs can currently be run:

- CFMENU—A utility used to configure storage devices attached to the controller. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding this utility.
- CHVSN—This is not a user utility. This utility may be used by DIGITAL authorized service personnel only.
- CLCP—A utility used to load updated software code or patches. See the *HSZ70 Array Controller HSOF Version 7.0 Service Manual* for more information regarding this utility.
- CLONE—A utility used to partially automates the process of mirroring units to create a snapshot copy of host unit data. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding this utility.
- CONFIG—A utility used to locate and add devices to the controller configuration. CONFIG may be run anytime new devices are added to the subsystem. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding this utility.
- DILX—A utility used to test and verify the controller’s operation with an attached storage device under a high or low I/O load. Run DILX (disk inline exerciser) only when there is no activity on the controller. The total I/O load is handled by the controller, bypassing the host.

The DILX utility automatically:

- Tests all of the disk units configured (selection of specific disk units not permitted)

- Performs thorough tests with writes enabled
- Provides run time and performance summary options.
- Can be run in read-only mode.

---

**Caution** Run the DILX utility only at initial installations. When write operations are enabled, the DILX utility may overwrite existing data.

---

- **DIRECT**—A command used to display a list of all executable diagnostic or utility programs.
- **DSTAT**—This is not a user utility. This utility may be used by DIGITAL authorized service personnel only.
- **FMU**—A fault management utility used to control several spontaneous errors. FMU also displays information regarding the most recent controller and memory system failure.
- **FRUTIL**—A utility used when replacing a failed controller, external cache battery, or cache module.
- **HSUTIL**—A utility used to format a newly installed device or to load new software to a tape or disk device.
- **VTDPY**—A utility used to display the current controller state, performance data, processor utilization, host post activity and status, device state, logical unit state, cache performance, and I/O performance.

See the *HSZ70 Array Controller HSOF Version 7.0 Service Manual* for more information regarding the above utilities.

### Example

This example shows how to start the DILX diagnostic program:

**RUN DILX**

.  
.  
.

**See also**  
DIRECTORY



## SELFTEST *controller*

Flushes the data from the specified controller's write-back cache (if present) and shuts down the controller. It then restarts the controller in self-test mode. Press the controller reset (/) button to take the controller out of self-test mode.

### Syntax

SELFTEST *controller*

### Parameters

*controller*

The *controller* parameter indicates which controller is to perform the self-test program. Specify OTHER\_CONTROLLER or THIS\_CONTROLLER.

### Switches

IGNORE\_ERRORS

NOIGNORE\_ERRORS (Default)

Instruct the controller how to respond to write-back cache errors.

---

**Caution** The IGNORE\_ERRORS switch may cause data to remain in write-back cache. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for considerations when implementing write-back cache.

---

Specify IGNORE\_ERRORS to instruct the controller to ignore any write-back cache errors. Such errors can result from data contained within write-back cache unable to be written to the devices or lost data errors.

Specify NOIGNORE\_ERRORS to instruct the controller not to run the self-test program if the write-back cache errors are detected.

IMMEDIATE\_SHUTDOWN

NOIMMEDIATE\_SHUTDOWN (Default)

Instructs the controller when to shutdown when running the self-test program.

---

**Caution** The IMMEDIATE\_SHUTDOWN switch instructs the controller to immediately shutdown, without regard to any data contained within write-back cache. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for considerations when implementing write-back cache.

---

Select IMMEDIATE\_SHUTDOWN to instruct the controller to run the self-test program immediately without checking for online devices or without flushing user data from write-back cache to devices.

Select NOIMMEDIATE\_SHUTDOWN to instruct the controller to flush data from write-back cache before running the self-test program.

### Examples

This example shows how to start the self-test program on “this controller”:

```
SELFTEST THIS_CONTROLLER
```

This example shows how to run the self-test program on the “other controller,” even if the “other controller” cannot flush all data from the write-back cache:

```
SELFTEST OTHER_CONTROLLER IGNORE_ERRORS
```

### See also

RESTART *controller*

SHUTDOWN *controller*

## SET controller

Changes parameters on the specified controller.

### Syntax

SET controller



---

**Tip** For customers familiar with prior DIGITAL HSx array controllers, the syntax for this command has not changed. It is expressed differently in this manual to improve the manual's organization and consistency.

---

### Parameter

*controller*

Indicates which controller is to be set. Specify OTHER\_CONTROLLER or THIS\_CONTROLLER.

### Switches

Table 4 lists the switches available with this command. Descriptions of the switches follow the table.

**Table 4 SET controller Switches**

Switch	Values
CACHE_FLUSH_TIMER	1–65535 sec, 10 (default)
CACHE_UPS NOCACHE_UPS	None
COMMAND_CONSOLE_LUN NOCOMMAND_CONSOLE_LUN	None
HOST_FUNCTION	A, B, C, D
ID number	0–15 (Maximum of 8 target ID numbers used at a time.)
INITIAL_CONFIGURATION	None
MIRRORED_CACHE NOMIRRORED_CACHE	None
PREFERRED_ID NOPREFERRED_ID	0–15 (Maximum of 8 target ID numbers used at a time.)
PROMPT	1–16 characters
TERMINAL_PARITY NOTERMINAL_PARITY	odd, even
TERMINAL_SPEED	4800, 9600, 19200
TIME	dd–mmm–yyy:hh:mm:ss
TRANSFER_RATE_REQUESTED	5Mhz 10Mhz 20Mhz (default)

*CACHE\_FLUSH\_TIMER=n*

*CACHE\_FLUSH\_TIMER=10 (Default)*

Specifies how many seconds

(1–65535) of idle time may elapse before the write-back cache flushes its entire contents to a given device or RAIDset. The default setting is 10 seconds. When changed, the new value entered for this switch takes effect immediately.

***CACHE\_UPS******NOCACHE\_UPS (Default)***

Specifies whether the controller should perform regular battery condition checks. When changed, you must restart both controllers in order for the new setting to take effect.

Specify **CACHE\_UPS** if your storage subsystem power is supported by an uninterruptable power supply (UPS). The controller does not check the condition of the cache batteries and ignores the battery's state. This causes RAIDsets and mirrorsets to always be available, regardless of the condition of the cache batteries.

---

**Caution** Setting **CACHE\_UPS** without having a UPS or similar backup system in place may result in data loss if power is interrupted.

---

Specify **NOCACHE\_UPS** to instruct the controller to perform regular cache battery checks and evaluate the condition of the cache batteries.

Setting the **CACHE\_UPS** switch for either controller sets the **CACHE\_UPS** switch for both controllers.

***COMMAND\_CONSOLE\_LUN******NOCOMMAND\_CONSOLE\_LUN (Default)***

Enable or disables the virtual LUN used with the StorageWorks Command Console. When changed, the new setting for this switch takes effect immediately.

Select **COMMAND\_CONSOLE\_LUN** to enable the virtual LUN.  
Select **NOCOMMAND\_CONSOLE\_LUN** to disable the virtual LUN.

***HOST\_FUNCTION=mode******HOST\_FUNCTION=(ID,mode)***

Configures the host compatibility mode for a controller target ID number. When changed, you must restart both controllers in order for the new setting to take effect.

Select the **HOST\_FUNCTION=mode** switch to set all of the targets on the host interface to the same mode. The default mode is A.

Select the `HOST_FUNCTION=(ID,mode)` switch to configure the host port on a target-by-target basis for compatibility with various operating systems.

The `HOST_FUNCTION` switch assigns only one host function to the specified target ID number with each `SET` command. You must enter separate `SET` commands to set multiple modes to different target ID number—for example, to support hosts with different operating systems on a single SCSI bus.

Each controller or pair of controllers can service a maximum of two hosts simultaneously as long as they are assigned to different targets. If the `HOST_FUNCTION` switch is changed on a single controller in a dual-redundant configuration, corresponding mode changes are automatically passed on to the other controller. The controller does not have to restart for these changes to take effect.

The following modes can be assigned:

- A—DIGITAL UNIX<sup>®</sup>, OpenVMS, Sun<sup>®</sup>, and Hewlett-Packard<sup>®</sup> HP-UX (Default)
- B—IBM AIX<sup>®</sup>
- C—HSZ15
- D—Windows NT<sup>™</sup> Server

Enter the `SHOW controller` command to display the current Host Function Mode settings.

*ID=(n1,n2,n3...)*

Assigns one to eight SCSI target ID numbers (0 through 15). Multiple target ID numbers allow the controller to present more units to the host. If two or more target ID numbers are entered, the numbers must be enclosed in parentheses and separated with commas. When changed, you must restart both controllers in order for the new setting to take effect.

A controller can present up to eight units to the host on each target ID number. Unit numbers identify both the target ID number and the LUN. For example, D203 indicates a disk is addressed through target 2, LUN 3. D5 is target 0, LUN 5.

If two controllers are in a dual-redundant configuration, both controllers support the same target ID numbers. When the ID numbers are changed on one controller, the other controller is automatically updated.

---

**Note** Use the `PREFERRED_ID` switch along with the `ID=` switch to specify which targets are assigned to each of your controllers. If you do not specify the preference of your targets as you add them, the controller automatically prefers all of the targets to the “other controller.”

---

#### *INITIAL\_CONFIGURATION*

Erases the entire configuration on “this controller” and restores the controller’s default configuration. The default configuration is determined by the configuration information last stored in non-volatile memory with the `INITIALIZE SAVE_CONFIGURATION` command. When entered, this switch takes effect immediately.

The `INITIAL_CONFIGURATION` switch can be specified on “this controller” in nofailover mode only. Enter this switch to ensure all of the old configuration information is removed when a controller is moved from one location to another within the same subsystem.

The controllers stop after this command is carried out. Press the reset buttons on the front of the controllers to restart them.

If the controller cannot find any saved configuration information, an error message is displayed on the terminal screen.

Completely spell out the phrase `INITIAL_CONFIGURATION`.

#### *MIRRORED\_CACHE*

##### *NOMIRRORED\_CACHE (Default)*

Enables the mirrored-write-back-data cache feature on dual-redundant controllers. When changed, both controllers restart for the new switch setting to take effect.

The following tasks are performed when the `NOMIRRORED_CACHE` switch is specified: Both controllers must be operational before this command is accepted.

- Data in write-back cache is flushed when cache is configured in non-mirrored mode.
- Enables mirrored write-back cache on both controllers.
- If an invalid cache configuration exists within the cache modules, an error is generated.

Issue this switch through only one controller. The controller must contain a valid cache configuration before specifying this switch. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for rules regarding valid cache configurations. The controllers automatically restart when this switch is specified.

---

**Note** All unwritten write-cached data is automatically flushed from cache before restart when the `MIRRORED_CACHE` switch is specified. Depending on the amount of data to be flushed, this command may take several minutes to complete before the controller is restarted.

---

The `NOMIRRORED_CACHE` switch disables mirror mode. Data in write-back cache is flushed when this switch is entered from mirrored mode. This switch disables mirrored write-back cache on both controllers. Therefore, this switch is only to be issued through one controller. The controller must contain a valid cache configuration before this switch is assigned. Unlike going from nonmirrored mode to mirrored mode, going from mirrored mode to nonmirrored mode is permitted with a failed cache module. The controller automatically restarts when this switch is specified.

*PREFERRED\_ID=(n1,n2,n3...)*

*NOPREFERRED\_ID (Default)*

In dual-redundant configurations, specifies which targets and units are handled by the specified controller. First, specify, the total set of ID numbers with the preferred ID number switch. If you enter two or more `PREFERRED_ID` numbers, the numbers must be enclosed within parentheses and separated with commas. When changed, the new setting for this switch takes effect immediately.

---

**Note** Only target ID numbers set with the `ID=` switch can be preferred with the `PREFERRED_ID=` switch.

---



Except in a multiple bus failover environment, when the PREFERRED\_ID numbers are assigned on one controller, the other controller is automatically updated to support the remaining ID numbers, if any.

For example, if a dual-redundant pair of controllers is set to ID numbers 0, 1, and 2, one controller can be set to respond to ID numbers 0 and 1; the other controller automatically responds to ID number 2. The first controller presents unit numbers 0 through 7 and 100 through 107. The other controller presents unit numbers 200 through 207 to the controllers.

---

**Note** Setting the PREFERRED\_ID switch in multiple bus failover configurations does not affect how the controller handles units. The controller permits the host operating to determine which controller units are accessed through.

---

Specify NOPREFERRED\_ID for one controller so it is immediately available if the other controller fails. The other controller processes all of the data during normal operation. However, if the other controller fails, the controller assigned the NOPREFFERED\_ID switch assumes control of the targets assigned to the failed controller.

*PROMPT="new prompt"*

Specifies a 1- to 16-character prompt displayed when the controller's CLI prompts for input. Only printable ASCII characters and spaces are valid. The new prompt name must be enclosed within quotes. When changed, the new text entered for this switch takes effect immediately.

*TERMINAL\_PARITY=ODD*

*TERMINAL\_PARITY=EVEN*

*NOTERMINAL\_PARITY (Default)*

Specifies the parity with which data is transmitted and received. When changed, the new setting for this switch takes effect immediately.

*TERMINAL\_SPEED=baud\_rate*

*TERMINAL\_SPEED=9600 (Default)*

Sets the terminal transmission and reception speed (**baud** rate) to 4800, 9600 (default), or 19200 baud. When changed, the new value entered for this switch takes effect immediately.

*TIME=dd-mmm-yyyy:hh:mm:ss*

Sets the date and time. The time is set on both controllers in a dual-redundant configuration. When changed, the new value entered for this switch takes effect immediately.

*TRANSFER\_RATE\_REQUESTED=20MHZ (Default)*

*TRANSFER\_RATE\_REQUESTED=10MHZ*

*TRANSFER\_RATE\_REQUESTED=5MHZ*

Specifies the maximum data transfer rate the controllers use when communicating with the host. The transfer rate may need to be limited to accommodate long cables between the subsystem and the host system. Set the same transfer rate for both controllers in a dual-redundant configuration. When changed in a dual-redundant configuration, you must restart both controllers in order for the new setting to take effect. When changed in a single configuration, restart only the controller on which the new setting will take effect.

The controller must be restarted for any changes to the data transfer rate to take effect.

Table 5 lists the maximum transfer rates for different lengths of fast and slow SCSI buses. These lengths represent cable lengths plus shelf-bus lengths.

**Table 5 Maximum SCSI-Bus Cable Lengths for Given Data Transfer Rate**

<b>Transfer Rate</b>	<b>Meters</b>	<b>Feet</b>
5 MHz	6	19.7
10 MHz	3	9.8
20 MHz	25	82.0

**Examples**

This example shows how to change the other controller's CLI prompt:

```
SET OTHER_CONTROLLER PROMPT="CONTROLLER B"
```

This example shows how to set "this controller" so it responds to requests for target ID numbers 2 and 5:

```
SET THIS_CONTROLLER ID=(2,5)
```

**See also**

```
SHOW THIS_CONTROLLER  
SHOW OTHER_CONTROLLER
```



## SET *device-name*

Changes the transportable characteristics and the maximum data transfer rate between the controller and the specified device.

### Syntax

SET *device-name*

### Parameter

*device-name*

Specifies the name the device to change. This can be a previously named device, disk, passthrough device, or container.

### Switches

*TRANSFER\_RATE\_REQUESTED=ASYNCHRONOUS*

*TRANSFER\_RATE\_REQUESTED=20MHZ (Default)*

*TRANSFER\_RATE\_REQUESTED=10MHZ*

*TRANSFER\_RATE\_REQUESTED=5MHZ*

Specifies the maximum data transfer rate for the controller to use in communicating with the device. You may need to limit the transfer rate to accommodate long cables between the controllers and the device, such as with a tape library.

*TRANSPORTABLE*

*NOTTRANSPORTABLE (Default)*

Indicates whether a disk can be accessed exclusively by StorageWorks controllers.

Set the TRANSPORTABLE switch for disks only. The controller makes a small portion of a non-transportable disk inaccessible to the host. This restricted space is used to store metadata which improves data reliability, error detection, and the ability to recover data. Because of this metadata, only StorageWorks controllers can retrieve data from non-transportable initialized disk devices.

Storage sets cannot be made transportable. Specify NOTTRANSPORTABLE for all disks used in RAID sets, stripe sets, and mirror sets and spare sets.

Transportable disks do not contain any metadata or restricted areas on the disk. Therefore, transportable disks forfeit the advantage metadata

provides. Transportable disks can be moved to a non-StorageWorks environment with their data intact.

If NOTTRANSPORTABLE is specified and there is no metadata on the unit, the unit must be initialized.

---

**Note** DIGITAL recommends you avoid specifying TRANSPORTABLE unless transportability of the device or media is imperative and there is no other way to accomplish moving the data.

---

### **Examples**

This example shows how to set the data transfer rate of DISK20000 to 5MHz:

```
SET DISK20000 TRANSFER_RATE_REQUESTED=5MHZ
```

This example shows how to set DISK10300 to transportable:

```
SET DISK10300 TRANSPORTABLE
```

### **See also**

ADD DISK  
SHOW DISKS

## SET EMU

Sets operating parameters for the environmental monitoring unit (EMU).

### Syntax

SET EMU

### Switches

The SENSOR and FANSPEED switches control both the master and slave EMU settings. The EMU within the primary cabinet instructs the EMUs within the other cabinets to operate at the same SENSOR and FANSPEED settings to which the master EMU is set.

*SENSOR\_1\_SETPOINT nn*

*SENSOR\_2\_SETPOINT nn*

*SENSOR\_3\_SETPOINT nn*

*SENSOR\_x\_SETPOINT 35 (Default)*

Sets the acceptable temperatures at which the subsystem operates. Sensor 1 and Sensor 2 set the maximum operating temperature for the primary subsystem cabinet. Sensor 3 sets the maximum operating temperature for the EMU unit. The allowable range for the setpoint is 0°C (32°F) to 49°C (120°F). The EMU determines the default setpoint for all three sensors.

Table 6 lists the valid EMU set-point temperatures in both Fahrenheit and Celsius.

**Table 6 EMU Set Point Temperatures**

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
0	32	10	50	20	68	30	86	40	104
1	34	11	52	21	70	31	88	41	106
2	46	12	54	22	72	32	90	42	108
3	37	13	55	23	73	33	91	43	109
4	39	14	57	24	75	34	93	44	111
5	41	15	59	25	77	35	95	45	113
6	43	16	61	26	79	36	97	46	115
7	45	17	63	27	81	37	99	47	117
8	46	18	64	28	82	38	100	48	118
9	48	19	66	29	84	39	102	49	120

If any of the setpoints assigned to a slave EMU do not match the corresponding setpoints assigned to the master EMU, the slave EMU settings change to match the corresponding master EMU settings.

Refer to the for detailed information regarding setting the EMU temperature set points.

*FANSPEED=HIGH*

*FANSPEED=AUTOMATIC (Default)*

Sets the speed at which the fan operates.

Select *FANSPEED=HIGH* to force the fans in all connected cabinets to operate at high speed continuously.



Select `FANSPEED=AUTOMATIC` to allow the EMU to control the fan speed for the fans in all connected cabinets.

The EMU instructs the fans to operate at high speed when any of the temperature setpoints are exceeded or when one or more fans are not functioning.

### **Examples**

This example shows how to set EMU sensor number 2 to 34°C:

```
SET EMU SENSOR_2_SETPOINT 34
```

This example shows how to set the EMU fan to operate at high speed:

```
SET EMU FANSPEED=HIGH
```

### **See also**

SHOW



## SET FAILEDSET

Changes the automatic replacement policy for the failedset.

### Syntax

SET FAILEDSET *replacement policy*

### Parameters

*replacement policy*

Specifies the policy to be used by the controller when a disk drive is physically replaced in the failedset.

Specify AUTOSPARE to instruct the controller to automatically move devices replaced in the failedset into the spareset.

Specify NOAUTOSPARE to instruct the controller to leave devices having failed in the failedset. The device, though replaced, remains in the failedset until it is manually removed with the DELETE FAILEDSET command.

In most circumstances, the failed disk placed into the failedset contains no metadata—that is, a new or initialized device. When the AUTOSPARE switch is specified, the controller checks to see if any metadata is present. If the controller detects metadata, the disk remains in the failedset. If the controller does not detect metadata, the controller automatically initializes the disk and moves it from the failedset to the spareset. Now a member of the spareset, the disk is available for any mirrorset or RAIDset requiring a replacement member. If the automatic initialization fails, the disk remains in the failedset.

When you move the disk into the spareset, some metadata is written to it—meaning it is no longer transportable. Additional metadata is written to the disk when it is moved from the spareset into a RAIDset or mirrorset.

To make a failedset disk containing metadata on it available as a spareset replacement disk, perform the following steps.

1. Delete all containers to which the disk belongs.

2. Make the disk transportable.  
**SET DISK10000 TRANSPORTABLE.**
3. Initialize the disk.  
**INIT DISK10000**
4. Delete the disk.  
**DELETE DISK10000**
5. Remove DISK10000 from the cabinet until it is time to replace a failed disk.

### **Example**

This example shows how to enable the automatic spare feature:

```
SET FAILEDSET AUTOSPARE
```

This example shows how to disable the automatic spare feature:

```
SET FAILEDSET NOAUTOSPARE
```

### **See also**

```
SHOW FAILEDSET
```

## SET FAILOVER

Configures both controllers to operate in a dual-redundant, transparent failover, configuration. This allows both controllers to access the storage devices, providing controller fault-tolerant data processing. If one of the two controllers fail, the devices and any cache attached to the failed controller become available to and accessible through the other controller.

---

**Note** The controllers must be present and placed in non-failover mode by entering the SET NOFAILOVER command before they can be set to failover mode.

---

### Syntax

SET FAILOVER COPY=*controller*

### Parameters

*THIS\_CONTROLLER*

*OTHER\_CONTROLLER*

Specifies which controller contains the source configuration for the copy. The companion controller receiving the configuration information restarts after the command is carried out.

---

**Caution** Make sure you know which controller has the good configuration information before entering this command. The device configuration information from the controller specified by the *controller* parameter overwrites the information on the companion controller.

---

Specify *THIS\_CONTROLLER* to copy the device configuration information from the “this controller” to “other controller.”

Specify *OTHER\_CONTROLLER* to copy the device configuration information from the “other controller” to “this controller.”

Due to the amount of information being passed from one controller to the other, this command may take up to one minute to complete.

**Example**

This example shows how to set the controllers in a dual-redundant configuration and copy the configuration information from “this controller” to the “other controller”:

**SET FAILOVER COPY=THIS\_CONTROLLER**

**See also**

SET MULTIBUS\_FAILOVER

SET NOFAILOVER

## SET *mirrorset-name*

Changes the characteristics of a mirrorset, including the addition and removal of members.

### Syntax

SET *mirrorset-name*

### Parameter

*mirrorset-name*

Specifies the name of the mirrorset to modify. This is the same name given to the mirrorset when it was created with the ADD MIRRORSET command.

### Switches

*COPY=FAST*

*COPY=NORMAL (Default)*

Sets the speed at which the controller copies data from normal mirrorset members to new members.

Specify **NORMAL** when other controller operations are to take priority over the copy operation. The controller uses relatively few resources when creating the mirrored data, resulting in minimal impact on performance.

Specify **FAST** when the creation of mirrored data is to take priority over other controller operations. The controller uses more resources to create the mirrored data. Copying takes less time, but overall controller performance is reduced.

*MEMBERSHIP=number-of-members*

Sets the nominal number of mirrorset members to the number you specify for the *number-of-members* value. A maximum of six members can be specified.

---

**Note** No other switches can be set when you specify the MEMBERSHIP switch.

---

If you increase the number of members and specify a replacement policy with the `POLICY=` switch, the controller automatically adds disk drives from the spareset to the mirrorset until the new number of members is reached, or there are no more suitable disk drives in the spareset.

If you increase the number of members and the `NOPOLICY` switch is specified, the `REPLACE=disk-name` switch must be specified to bring the mirrorset up to the new nominal number of members.

You cannot set the nominal number of members lower than the actual number of members. Specify the `REMOVE` switch to reduce the number of disk drives from the mirrorset.

*REMOVE=disk-name*

Instructs the controller to remove a member from an existing mirrorset. The disk drive specified by *disk-name* is removed from the mirrorset specified by *mirrorset-name*. The removed disk drive is added to the failedset.

---

**Note** No other switches can be set when the `REMOVE=` switch is specified.

---

If the mirrorset would not have a normal member remaining if the disk drive were removed, the controller reports an error and no action is taken. A normal member is a mirrorset member whose contents are the same as all other normal members.

For each reduced mirrorset, there must be at least one remaining normal member after the reduction.

Unlike the `REDUCE` command, the `REMOVE` switch does not change the nominal number of members in the mirrorset. If the mirrorset has a replacement policy and there are acceptable disk drives in the spareset, the controller adds disk drives from the spareset to the mirrorset to make the actual number of members equal to the nominal number of members.

---

**Note** Normalizing members exist only when you first create a mirrorset is first created, or when you clear lost data on a mirrored unit. The controller recognizes the member as normal, and all other



original mirrorset members are recognized as “normalizing.” New data is written to the mirrorset is written to all members. The controller copies the data existing before the mirrorset was created on the normal member to the normalizing members. The controller recognizes the normalizing members as normal when the mirrorset member’s block are all the same.

---

*REPLACE=disk-name*

Instructs the controller to add a disk member to an existing mirrorset if the following conditions are met:

- The replacement policy is set to NOPOLICY
- The mirrorset is missing at least one member

If these conditions are met, the disk drive specified by *disk-name* is added to the mirrorset specified by *mirrorset-name*. The nominal number of members does not change.

The disk name used is the name given to a disk when it was added to the configuration with the ADD DISK command.

---

**Note** Do not specify any other switches when the REPLACE= switch is specified.

---

*POLICY=BEST\_FIT*

*POLICY=BEST\_PERFORMANCE (Default)*

*NOPOLICY*

Sets the selection criteria the controller uses to choose a replacement member from the spareset when a mirrorset member fails.

Specify *POLICY=BEST\_FIT* to choose a replacement disk drive from the spareset most closely matching the capacity of the mirrorset. If there is more than one disk drive in the spareset most closely matching the capacity of the mirrorset, the controller selects the disk drive having the best performance.

Specify *POLICY=BEST\_PERFORMANCE* to choose a replacement disk drive from the spareset resulting in the best performance. The controller attempts to select a disk on a different port than existing members. If there is more than one disk drive in the spareset matching

the best performance criteria, the controller selects the disk drive most closely matching the capacity of the mirrorset.

Specify `NOPOLICY` to prevent the controller from automatically replacing a failed disk device. This causes the mirrorset to operate in a reduced state until you choose a `POLICY=BEST_FIT` or `POLICY=BEST_PERFORMANCE`, or you manually replace a member in the mirrorset.

*READ\_SOURCE=disk-name*  
*READ\_SOURCE=LEAST\_BUSY (Default)*  
*READ\_SOURCE=ROUND\_ROBIN*

Selects the mirrorset member used by the controller to satisfy a read request.

Specify the *disk-name* of a specific member to which all read requests are directed. If the member selected fails out of the mirrorset, the controller selects the first normal member found for mirrorset read requests.

Specify `LEAST_BUSY` to direct read requests to the normal mirrorset member with the least amount of work in the queue.

Specify `ROUND_ROBIN` to sequentially direct read requests to each normal mirrorset member. All normal members are equally queried for each read request.

### **Examples**

This example shows how to change the replacement policy of mirrorset `MIRR1` to `BEST_FIT`:

```
SET MIRR1 POLICY=BEST_FIT
```

This example shows how to remove member `DISK30000` from mirrorset `MIRR1` created above. If the mirrorset has a replacement policy and an acceptable disk drive is in the spareset, the controller automatically adds the spare disk drive to the mirrorset.

```
SET MIRR1 REMOVE=DISK30000
```

This example shows how to add disk DISK30200 to the mirrorset MIRR1:

```
SET MIRR1 REPLACE=DISK30200
```

A copy operation begins immediately on DISK30200.

**See also**

```
ADD MIRRORSET  
MIRROR  
REDUCE  
SHOW MIRRORSET  
UNMIRROR
```



## SET MULTIBUS\_FAILOVER

Places “this controller” and the “other controller” into a dual-redundant (failover) configuration within a multiple-bus environment. This allows both controllers to access the storage devices and provide greater throughput. If one controller fails, the devices and cache attached to the failed controller become available to and accessible through the remaining controller. Both controllers must be configured for nofailover before you enter the SET MULTIBUS\_FAILOVER command.

---

**Note** Partitioned storage sets and partitioned single-disk units cannot function in multiple bus failover dual-redundant configurations. Because they are not supported, you must delete your partitions before configuring the controllers for multiple bus failover.

---

### Syntax

```
SET MULTIBUS_FAILOVER COPY=controller
```

### Parameters

*controller*

Specifies which controller contains the source configuration for the copy. The companion controller receiving the configuration information restarts after the command is carried out.

---

**Caution** Make sure you know which controller has the good configuration information before entering this command. The device configuration information from the controller specified by the *controller* parameter overwrites the information on the companion controller.

---

Specify THIS\_CONTROLLER to copy the device configuration information from the “this controller” to “other controller.”

Specify OTHER\_CONTROLLER to copy the device configuration information from the “other controller” to “this controller.”

Due to the amount of information being passed from one controller to the other, this command may take up to one minute to complete.

### **Example**

This example shows how to configure two controllers to operate in dual-redundant mode within a multiple bus environment:

```
SET THIS_CONTROLLER ID=(0,1,2,3)  
RESTART THIS_CONTROLLER  
SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER
```

The configuration on “this controller” is automatically copied to the “other controller” when you issue the SET MULTIBUS\_FAILOVER COPY command. If you want to prefer specific units to specific controllers, use the following command after setting multiple bus failover:

```
SET D100 PREFERRED=THIS_CONTROLLER  
SET D101 PREFERRED=OTHER_CONTROLLER
```

### **See also**

```
SET FAILOVER  
SET NOFAILOVER  
SET NOMULTIBUS_FAILOVER
```

## SET NOFAILOVER

Reconfigures both controllers to operate in a non-dual-redundant (non-failover) configuration. Immediately after entering this command, remove one controller from the shelf because the sharing of devices is not supported by nonredundant controllers.

---

**Note** SET NOFAILOVER and SET NOMULTIBUS\_FAILOVER have the same effect. Either command exits from transparent or multiple bus failover mode.

---

It is recommended that both controllers be present when this command is carried out. Otherwise, the controllers become misconfigured with each other, requiring additional steps to later render their configurations alike.

This command affects both controllers, regardless of the controller on which the command is carried out. All units accessed through the “other controller” failover to “this controller” and the “other controller” is shut down. No configuration information is lost when the SET NOFAILOVER command is carried out.

### Syntax

SET NOFAILOVER

### Switches

*DESTROY\_UNFLUSHABLE\_DATA*

*NODESTROY\_UNFLUSHABLE\_DATA (Default)*

Instructs the controller how to handle data contained within write-back cache. These switches have no effect if both controllers are operational. Select one of these switches to indicate how the controller is to handle data contained in cache if one of the controllers fail before it can properly shut down with the SET NOFAILOVER or SHUTDOWN commands.

Under some circumstances, the data in a failed controller’s write-back cache may not fail over to the operating controller’s write-back cache. For example, if the cache battery fails on the “other controller,” failover mode tries to forward the failed controller’s cached data to the cache area of the “other controller.” Therefore, the write-cache data

configured with “this controller” is unflushable. In this circumstance, “this controller’s” cached data is lost if power is interrupted.

Specify `NODESTROY_UNFLUSHABLE_DATA` to leave the unwritten data intact in the failed controller’s write-back cache. When the failed controller is replaced and placed into service, the write-back cache data is flushed to the appropriate devices.

Specify `DESTROY_UNFLUSHABLE_DATA` to reconfigure the operational controller before replacing the failed controller. The unwritten data of the failed controller may reference devices not present in the new configuration. If you do not destroy the old configuration data, it may conflict with the new configuration and cause the subsystem to behave unpredictably.

---

**Caution** Unflushed data cannot be recovered after it is destroyed.

---

### **Example**

This example shows how to terminate failover mode between two controllers in a dual-redundant configuration:

```
SET NOFAILOVER
```

### **See also**

```
SET FAILOVER
```



## SET RAIDset-name

Changes the characteristics of a RAIDset.

### Syntax

SET RAIDset-name

### Parameters

*RAIDset-name*

Specifies the name of the RAIDset to modify. This is the same name given to the RAIDset when it was created with the ADD RAIDSET command.

### Switches

*POLICY=BEST\_FIT*

*POLICY=BEST\_PERFORMANCE (Default)*

*NOPOLICY*

Switches specify the replacement policy to use when a member within the RAIDset fails.

Specify *BEST\_FIT* to choose a replacement disk drive from the spareset most closely matching the sizes of the remaining members of the RAIDset. If more than one disk drive in the spareset is the correct size, the controller selects the disk drive having the best performance.

Specify *POLICY=BEST\_PERFORMANCE* to choose a replacement disk drive from the spareset resulting in the best performance of the RAIDset. The controller attempts to select a disk on a different port than existing members. If more than one disk drive in the spareset matches the best performance criteria, the controller selects the disk drive most closely matching the size of the remaining members of the RAIDset selected.

Specify *NOPOLICY* to prevent the controller from automatically replacing a failed disk device. This causes the RAIDset to operate in a reduced state until *POLICY=BEST\_FIT* or *POLICY=BEST\_PERFORMANCE* is selected, or a member is manually replaced in the mirrorset.

*RECONSTRUCT=FAST*

*RECONSTRUCT=NORMAL (Default)*

Sets the speed at which the controller reconstructs the data on the new RAIDset member replacing a failed member.

Specify **NORMAL** to balance other controller operations against the reconstruct operation. The controller uses relatively few resources to perform the reconstruct, and there is little impact on performance.

Specify **FAST** when the reconstruct operation must take precedence over other controller operations. The controller uses more resources to perform the reconstruction. Reconstruction takes less time, but overall controller performance is reduced during the reconstruction.

*REMOVE=disk-name*

Instructs the controller to remove a member from an existing RAIDset. The disk drive specified by *disk-name* is removed from the RAIDset specified by *RAIDset-name*. The removed disk drive s added to the failedset.

If a RAIDset is already in a reduced state, an error is displayed and the command is rejected. If a replacement policy is specified, the replacement is taken from the spareset to replace the removed member using the policy specified.

If the **NOPOLICY** switch is specified with the **SET RAIDset** command, the RAIDset continues to operate in a reduced state until a replacement policy is specified or the **REPLACE** switch is specified. See the **REPLACE=disk-name** switch for information on manually replacing a RAIDset member. See the **POLICY** and **NOPOLICY** switches on page -113 for information regarding setting a policy for automatic member replacement.

---

**Note** Do not specify other switches when you use the **REMOVE=** switch.

---

*REPLACE=disk-name*

Instructs the controller to add a disk member to an existing RAIDset if the following conditions are met:

- The replacement policy is set to NOPOLICY.
- The disk member is not in any configuration, including a spareset.

An error is displayed and the command is rejected if the RAIDset is not in a reduced state, if a replacement policy is already specified, or if the disk specified is already being used by a configuration (including a spareset).

---

**Note** Do not specify other switches when you use the REPLACE= switch.

---

### **Examples**

This example shows how to change the replacement policy for RAIDset RAID9 to BEST\_FIT:

```
SET RAID9 POLICY=BEST_FIT
```

This example shows how to remove member DISK10000 from the RAID9 RAIDset:

```
SET RAID9 REMOVE=DISK10000
```

If there is a replacement policy, the controller moves a disk from the spareset to the RAIDset automatically.

This example shows how to add disk DISK20100 to the reduced RAIDset, RAID9:

```
SET RAID9 REPLACE=DISK20100
```

Reconstruction immediately begins on DISK20100.

### **See also**

ADD RAIDSET  
SHOW RAIDSETS





**Table 7 SET UNIT Switches for Existing Containers (Continued)**

Container Type	Switch							
	ACCESS_ID=ALL	PARTITION=partition_number	MAXIMUM_CACHED_	PREFERRED_PATH	READ_CACHE	RUN	WRITE_PROTECT	WRITEBACK_CACHE
Optical Disk	✓	✓	✓	✓	✓	✓	✓	✓
CD-ROM	✓	✓	✓	✓	✓	✓		
Partition	✓	✓	✓	✓	✓		✓	✓
Passthrough				✓				

**Note** Regardless of storageset type, the RUN and NORUN switches cannot be specified for partitioned units.

*ACCESS\_ID=ALL (Default)*

*ACCESS\_ID=n*

Controls the host access to any unit. Set the access ID number set to the initiator SCSI ID number used by the host to communicate with the controller. When a specific you assign ID number, only the initiator ID number specified is permitted to write to or read from the unit. When set to ALL, any host may access the unit.

Passthrough LUNs cannot accept ACCESS\_ID numbers. Passthrough LUNs are set to ALL by default.

*MAXIMUM\_CACHED\_TRANSFER=n*

*MAXIMUM\_CACHED\_TRANSFER=32 (Default)*

Sets the largest number of write blocks to be cached by the controller. The controller does not cache any transfers over the set size. Accepted values are 1 through 1024.

*PREFERRED\_PATH=OTHER\_CONTROLLER*

*PREFERRED\_PATH=THIS\_CONTROLLER*

*NOPREFERRED\_PATH (Default)*

Switches may be set only when dual-redundant controllers are operating in a multiple bus failover configuration. The host determines which controller units are accessed through. The host's settings always take precedence over the preferred path assigned to units. The target ID numbers assigned with the SET *controller ID=* command only determine which target ID number the controller uses to respond to the host.

---

**Note** When the controllers are configured to operate in transparent-failover mode, if you set the PREFERRED\_PATH switch with the ADD UNIT or SET *unit-number* command, an error message displays because you can only assign a preferred controller path at the unit level only when in multiple bus failover mode.

---

If you do not assign preferred path, the unit is targeted through whichever controller detects the unit first when the controller starts.

Select PREFERRED\_PATH=THIS\_CONTROLLER to permit "this controller" to bring the unit online.

Select PREFERRED\_PATH=OTHER\_CONTROLLER to permit the "other controller" to bring the unit online.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for information regarding multiple bus failover.

*READ\_CACHE (Default)*

*NOREAD\_CACHE*

Switches enable or disable the read-cache function for the unit.

Read caching improves performance in almost all situations, so it is generally recommended to leave it enabled. However, under certain types of conditions, such as when performing a backup, read-caching may not be necessary since only a small amount of data is cached. In such instances, it may be beneficial to disable read cache and remove the processing overhead associated with caching.

*RUN (Default)*

*NORUN*

Controls the disk drive's operation and availability to the host.

Specify *RUN* to make a unit available to the host.

Specify *NORUN* to make a unit unavailable to the host and to cause any data in cache to be flushed to one or more drives. *NORUN* spins down the devices making up a unit. The drives making up the unit spin down after the data has been completely flushed.

---

**Note** Do not specify the *RUN* and *NORUN* switches for partitioned units.

---

*WRITE\_PROTECT*

*NOWRITE\_PROTECT (Default)*

Assigns to the unit's a write-protect policy.

Specify *WRITE\_PROTECT* to prevent host write operations to the unit. However, the controller may still write to a write-protected RAIDset to satisfy a reconstruct pass or to reconstruct a newly replaced member. However, metadata, reconstruct, and copy writes are still be allowed to RAIDsets and mirrorsets.

Specify *NOWRITE\_PROTECT* to write data to the unit, overwriting existing data.

*WRITEBACK\_CACHE*

*NOWRITEBACK\_CACHE (Default)*

Specifies whether or not the unit is to take advantage of the controller's write-back caching feature.

Specify *WRITEBACK\_CACHE* for all new RAIDsets, mirrorsets, and units you want to take advantage of write-back caching.

Specify *NOWRITEBACK\_CACHE* for units you want to receive data directly from the host without being cached.

---

**Caution** Specifying *NOWRITEBACK\_CACHE* may result in data loss if the controller fails.

---



---

**Note** The controller may take up to 5 minutes to flush data contained within the write-back cache when you specify the NOWRITEBACK\_CACHE switch.

---

**Example**

This example shows how to enable write protect and turn off the read cache on unit D102:

```
SET D102 WRITE_PROTECT NOREAD_CACHE
```

**See also**

SHOW UNITS

SHOW *unit-number*



## SHOW

Displays information about controllers, storagesets, devices, partitions, and units.

The SHOW command may not display some information for devices accessed through the companion controller in a dual-redundant configuration. When information regarding a device or parameter does not appear, enter the same SHOW command from a terminal on the other controller.

### Syntax

SHOW *controller*  
SHOW *device-type*  
SHOW *device-name*  
SHOW *storage-set-type*  
SHOW *storage-set-name*  
SHOW DEVICES  
SHOW EMU  
SHOW FAILEDSET  
SHOW UNITS  
SHOW *unit-number*

### Parameters

*device-type*

Specifies the type of devices you want to be displayed. Valid choices are:

- DEVICES—Shows all devices attached to the controller
- CDROMS—Shows all CD-ROM devices attached to the controller
- DISKS—Shows all disks attached to the controller
- PASSTHROUGH—Shows all passthrough containers attached to the controller

*device-name*

Specifies the name of a particular device to be displayed. For example, SHOW DISK20100 displays information about the device named DISK20100.

*EMU*

Displays information regarding the status of the environmental monitoring unit (EMU).

*storage-set-type*

Specifies the type of storage set to be displayed. Valid types are:

- STORAGESETS—Shows all storage sets configured with the controller
- RAIDSETS—Shows all RAID sets configured to the controller
- STRIPESETS—Shows all stripe sets configured to the controller
- MIRRORSETS—Shows all mirror sets configured to the controller
- SPARESET—Show the spare set configured to the controller
- FAILEDSET—Shows the failed set configured to the controller

*storage-set-name*

Specifies the name of a particular storage set to be displayed. For example, SHOW STRIPE1 displays information about the stripe set named STRIPE1.

*UNITS*

Displays information for all units configured to the controller.

*unit-name*

Specifies the name of a particular unit to be displayed. For example, SHOW D102 displays information about the unit named D102.

*THIS\_CONTROLLER**OTHER\_CONTROLLER*

Specifies the controller to be displayed.

**Switches***FULL*

Displays additional information about each device, storage set, or controller.

## Examples

This example shows how to display a listing of disks:

### SHOW DISKS

Name	Type	Port	Targ	Lun	Used by
DISK20300	disk	2	3	0	D203
DISK20400	disk	2	4	0	D204

This example shows a full listing of devices attached to the controller:

### SHOW DEVICES FULL

Name	Type	Port	Targ	Lun	Used by	
DISK11200	disk		1	12	0	R0
Switches:						
NOTTRANSPORTABLE						
TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)						
Size: 8378028 blocks						
DISK11400	disk		1	14	0	R0
Switches:						
NOTTRANSPORTABLE						
TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)						
Size: 8378028 blocks						
DISK11500	disk		1	15	0	R0
Switches:						
NOTTRANSPORTABLE						
TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)						
Size: 8378028 blocks						
DISK21200	disk		2	12	0	S0
Switches:						
NOTTRANSPORTABLE						
TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)						
Size: 8377528 blocks						
Configuration being backed up on this container						
DISK21400	disk		2	14	0	S0
DEC RZ28D (C) DEC 0008						
Switches:						
NOTTRANSPORTABLE						
TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)						
Size: 4108970 blocks						
Configuration being backed up on this container						
DISK21500	disk		2	15	0	S0
Switches:						
NOTTRANSPORTABLE						
TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)						
Size: 8377528 blocks						
Configuration being backed up on this container						

This example shows how to display a complete listing of the mirrorset named MIRR1:

### SHOW MIRR1

Name	Storageset	Uses	Used by
MIRR1	mirrorset	DISK50300 DISK60300	S0

Switches:

```

POLICY (for replacement) = BEST_PERFORMANCE
COPY (priority) = NORMAL
READ_SOURCE = LEAST_BUSY
MEMBERSHIP = 2, 2 members present

```

State:

```

NORMAL
DISK60300 (member 0) is NORMAL
DISK50300 (member 1) is NORMAL
Size: 17769177 blocks

```

This example shows the full information for a controller:

### SHOW THIS\_CONTROLLER FULL

```

Controller:

    Not configured for dual-redundancy
    Device port SCSI address 7
    Time: NOT SET

Host port:

    SCSI target(s) (0, 2, 4, 5)
    Preferred target(s) (0, 2, 4)
    TRANSFER_RATE_REQUESTED = 20MHZ
    Host Functionality Mode = A
    Command Console LUN is target 0, lun 4

Cache:

    64 megabyte write cache, version 4
    Cache is GOOD
    Battery is GOOD
    No unflushed data in cache
    CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
    NOCACHE_UPS

Mirrored Cache:

    64 megabyte write cache, version 4
    Cache is GOOD
    Battery is GOOD
    No unflushed data in cache

Extended information:

    Terminal speed 19200 baud, eight bit, no parity, 1 stop bit
    Operation control: 00000001 Security state code: 75580
    Configuration backup disabled

```

This example shows how to display the current settings for the EMU:

**SHOW EMU**

```
EMU CABINET SETTINGS
SENSOR_1_SETPOINT 35 DEGREES C
SENSOR_2_SETPOINT 35 DEGREES C
SENSOR_3_SETPOINT 35 DEGREES C
FANSPEED AUTOMATIC
```





## SHUTDOWN *controller*

Flushes all user data from the specified controller's write-back cache (if present) and shuts down the controller. The controller does not automatically restart. All units accessed through the failed controller failover to the surviving controller.

### Syntax

SHUTDOWN *controller*

### Parameter

*controller*

Indicates which controller is to shut down. Specify OTHER\_CONTROLLER or THIS\_CONTROLLER.

### Switches

IGNORE\_ERRORS

NOIGNORE\_ERRORS (*Default*)

Controls the reaction of the controller based on the status of write-back cache.

---

**Caution** The IGNORE\_ERRORS and IMMEDIATE switches cause the controller to keep unflushed data in the write-back cache until it restarts and is able to write the data to devices. Do not perform any hardware changes until the controller flushes the cache.

---

Specify IGNORE\_ERRORS to instruct the controller to shutdown even if the data within write-back cache cannot be written to the devices.

Specify NOIGNORE\_ERRORS to instruct the controller to stop operation if the data within write-back cache cannot be written to the devices.

IMMEDIATE\_SHUTDOWN

NOIMMEDIATE\_SHUTDOWN (*Default*)

Instructs the controller when to shutdown.

Specify IMMEDIATE\_SHUTDOWN to cause the controller to shutdown immediately without checking for online devices or before flushing data from the write-back cache to devices.

Specify NOIMMEDIATE\_SHUTDOWN to cause the controller not to shutdown without checking for online devices or before all data has been flushed from the write-back cache to devices.

### **Examples**

This example shows how to shut down “this controller”:

**SHUTDOWN THIS\_CONTROLLER**

This example shows how to shut down the other controller, even if it cannot write all of the write-back cached data to the units:

**SHUTDOWN OTHER\_CONTROLLER IGNORE\_ERRORS**

### **See also**

RESTART *controller*

SELFTTEST *controller*

## UNMIRROR

Converts a one-member mirrorset back to a non-mirrored disk drive and deletes its mirrorset from the list of known mirrorsets. This command can be used on mirrorsets already members of higher-level containers (stripesets or units).

The UNMIRROR command is not valid for disk drives having a capacity greater than the capacity of the existing mirrorset. If a mirrorset is comprised of disk drives with different capacities, the mirrorset capacity is limited to the size of the smallest member; larger members contain unused capacity. If a member with unused capacity is the last remaining member of a mirrorset, the UNMIRROR command cannot be used to change the disk drive back to a single-disk unit. This change would cause a change in the reported disk capacity, possibly confusing the operating system.

### Syntax

UNMIRROR *disk-name*

### Parameter

*disk-name*

Specifies the name of the normal mirrorset member to be removed from a mirror storageset.

### Example

This example shows how to convert DISK10300 back to a single device:

```
UNMIRROR DISK10300
```

### See also

ADD MIRRORSET

MIRROR

REDUCE

RUN CLONE

SET *mirrorset-name*



## Glossary

This glossary defines terms pertaining to the HSZ70 array controller. It is not a comprehensive glossary of computer terms.

<b>adapter</b>	A device that converts the protocol and hardware interface of one bus type into another without changing the function of the bus.
<b>array controller</b>	<i>See</i> controller.
<b>autospare</b>	A controller feature that automatically replaces a failed disk drive. To aid the controller in automatically replacing failed disk drives, you can enable the AUTOSPARE switch for the failedset causing physically replaced disk drives to be automatically placed into the spareset. Also called “autonewspare.”
<b>bad block</b>	A data block that contains a physical defect.
<b>backplane</b>	The electronic printed circuit board into which you plug subsystem devices—for example, the SBB or power supply.
<b>BBR</b>	Bad Block Replacement. A replacement routine that substitutes defect-free disk blocks for those found to have defects. This process takes place in the controller, transparent to the host.
<b>block</b>	Also called a sector. The smallest collection of consecutive bytes addressable on a disk drive. In integrated storage elements, a block contains 512 bytes of data, error codes, flags, and the block’s address header.
<b>bootstrapping</b>	A method used to bring a system or device into a defined state by means of its own action. For example, a machine routine whose first few instructions are enough to bring the rest of the routine into the computer from an input device.
<b>cache memory</b>	A portion of memory used to accelerate read and write operations.

<b>CDU</b>	Cable distribution unit. The power entry device for StorageWorks cabinets. The CDU provides the connections necessary to distribute power to the cabinet shelves and fans.
<b>channel</b>	Another term for a SCSI bus. <i>See also</i> SCSI.
<b>chunk</b>	A block of data written by the host.
<b>chunk size</b>	The number of data blocks, assigned by a system administrator, written to the primary RAIDset or stripeset member before the remaining data blocks are written to the next RAIDset or stripeset member.
<b>CLI</b>	Command line interpreter. The configuration interface to operate the controller software.
<b>cold swap</b>	A method of device replacement that requires the entire subsystem to be turned off before the device can be replaced. <i>See also</i> hot swap and warm swap.
<b>configuration file</b>	A file that contains a representation of a storage subsystem's configuration.
<b>container</b>	(1) Any entity that is capable of storing data, whether it is a physical device or a group of physical devices. (2) A virtual, internal, controller structure representing either a single disk or a group of disk drives linked as a storageset. Stripesets and mirrorsets are examples of storageset containers the controller uses to create units.
<b>controller</b>	A hardware device that, with proprietary software, facilitates communications between a host and one or more devices organized in an array. HS family controllers are examples of array controllers.
<b>copying</b>	A state in which data to be copied to the mirrorset is inconsistent with other members of the mirrorset. <i>See also</i> normalizing.
<b>copying member</b>	Any member that joins the mirrorset after the mirrorset is created is regarded as a copying member. Once all the data from the normal member (or members) is copied to a normalizing or copying member, the copying member then becomes a normal member. <i>See also</i> normalizing member.

<b>data center cabinet</b>	A generic reference to large DIGITAL subsystem cabinets, such as the SW600-series and 800-series cabinets in which StorageWorks components can be mounted.
<b>data striping</b>	The process of segmenting logically sequential data, such as a single file, so that segments can be written to multiple physical devices (usually disk drives) in a round-robin fashion. This technique is useful if the processor is capable of reading or writing data faster than a single disk can supply or accept the data. While data is being transferred from the first disk, the second disk can locate the next segment.
<b>differential I/O module</b>	A 16 bit I/O module with SCSI bus converter circuitry for extending a differential SCSI bus. <i>See also</i> I/O module.
<b>differential SCSI bus</b>	A bus in which 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.
<b>DILX</b>	Disk inline exerciser. The controller's diagnostic software used to test the data transfer capabilities of disk drives in a way that simulates a high level of user activity.
<b>dirty data</b>	The write-back cached data that has not been written to storage media, even though the host operation processing the data has completed.
<b>DOC</b>	DWZZA-On-a-Chip. An NCR53C120 SCSI bus extender chip used to connect a SCSI bus in an expansion cabinet to the corresponding SCSI bus in another cabinet.
<b>dual-redundant configuration</b>	A controller configuration consisting of two active controllers operating as a single controller. If one controller fails, the other controller assumes control of the failing controller's devices.
<b>DUART</b>	Dual universal asynchronous receiver and transmitter. An integrated circuit containing two serial, asynchronous transceiver circuits.
<b>DWZZA</b>	A StorageWorks SCSI-bus-signal converter used to connect 8-bit single-ended devices to hosts with 16-bit differential SCSI adapters. This converter extends the range of a single-ended SCSI cable to the limit of a differential SCSI cable. <i>See also</i> SCSI bus signal converter.

<b>DWZZB</b>	A StorageWorks SCSI bus signal converter used to connect a variety of 16-bit single-ended devices to hosts with 16-bit differential SCSI adapters. <i>See also</i> SCSI bus signal converter.
<b>DWZZC</b>	The 16-bit SCSI table-top SCSI bus signal converter used to extend a differential SCSI bus, or connect a differential SCSI bus to a single ended SCSI bus. <i>See also</i> SCSI bus signal converter.
<b>ECB</b>	External cache battery. The unit that supplies backup power to the cache module in the event the primary power source fails or is interrupted.
<b>EMU</b>	Environmental monitoring unit. A unit that provides increased protection against catastrophic failures. Some subsystem enclosures include an EMU which works with the controller to detect conditions such as failed power supplies, failed blowers, elevated temperatures, and external air sense faults. The EMU also controls certain cabinet hardware including DOC chips, alarms, and fan speeds.
<b>ESD</b>	Electrostatic discharge. The discharge of potentially harmful static electrical voltage as a result of improper grounding.
<b>extended subsystem</b>	A subsystem in which two cabinets are connected to the primary cabinet.
<b>external cache battery</b>	<i>See</i> ECB.
<b>failedset</b>	A group of failed mirrorset or RAIDset devices automatically created by the controller.
<b>failover</b>	The process that takes place when one controller in a dual-redundant configuration assumes the workload of a failed companion controller. Failover continues until the failed controller is repaired or replaced.
<b>FCC</b>	Federal Communications Commission. The federal agency responsible for establishing standards and approving electronic devices within the United States.
<b>FCC Class A</b>	This certification label appears on electronic devices that can only be used in a commercial environment within the United States.



<b>FCC Class B</b>	This certification label appears on electronic devices that can be used in either a home or a commercial environment within the United States.
<b>FD SCSI</b>	The fast, narrow, differential SCSI bus with an 8-bit data transfer rate of 10 MB/s. <i>See also</i> FWD SCSI and SCSI.
<b>flush</b>	The act of writing dirty data from cache to a storage media.
<b>forced errors</b>	A data bit indicating a corresponding logical data block contains unrecoverable data.
<b>FRU</b>	Field replaceable unit. A hardware component that can be replaced at the customer's location by DIGITAL service personnel or qualified customer service personnel.
<b>FWD SCSI</b>	A fast, wide, differential SCSI bus with a maximum 16-bit data transfer rate of 20 MB/s. <i>See also</i> SCSI and FD SCSI.
<b>host</b>	The primary or controlling computer to which a storage subsystem is attached.
<b>host adapter</b>	A device that connects a host system to a SCSI bus. The host adapter usually performs the lowest layers of the SCSI protocol. This function may be logically and physically integrated into the host system.
<b>host compatibility mode</b>	A setting used by the controller to provide optimal controller performance with specific operating systems. This improves the controller's performance and compatibility with the specified operating system. The supported modes are: A, Normal (including DIGITAL UNIX®, OpenVMS, Sun®, and Hewlett-Packard® HP-UX); B, IBM AIX®; C, Proprietary; and D, Microsoft Windows NT™ Server.
<b>hot disks</b>	A disk containing multiple hot spots. Hot disks occur when the workload is poorly distributed across storage devices and prevents optimum subsystem performance. <i>See also</i> hot spots.
<b>hot spots</b>	A portion of a disk drive frequently accessed by the host. Because the data being accessed is concentrated in one area, rather than spread across an array of disks providing parallel access, I/O performance is significantly reduced. <i>See also</i> hot disks.

<b>hot swap</b>	A method of device replacement that allows normal I/O activity on a device's bus to remain active during device removal and insertion. The device being removed or inserted is the only device that cannot perform operations during this process. <i>See also</i> cold swap and warm swap.
<b>HSOF</b>	Hierarchical Storage Operating Firmware. Software contained on a removable ROM program card that provides the operating system for the array controller.
<b>initiator</b>	A SCSI device that requests an I/O process to be performed by another SCSI device, namely, the SCSI target. The controller is the initiator on the device bus. The host is the initiator on the host bus.
<b>instance code</b>	A four-byte value displayed in most text error messages and issued by the controller when a subsystem error occurs. The instance code indicates when during software processing the error was detected.
<b>I/O module</b>	A 16-bit SBB shelf device that integrates the SBB shelf with either an 8-bit single ended, 16-bit single-ended, or 16-bit differential SCSI bus. <i>See also</i> I/O Module.
<b>JBOD</b>	Just a bunch of disks. A term used to describe a group of single-device logical units.
<b>local connection</b>	A connection to the subsystem using either its serial maintenance port or the host's SCSI bus. A local connection enables you to connect to one subsystem controller within the physical range of the serial or host SCSI cable.
<b>local terminal</b>	A terminal plugged into the EIA-423 maintenance port located on the front bezel of the controller. <i>See also</i> maintenance terminal.
<b>logical bus</b>	A single-ended bus connected to a differential bus by a SCSI bus signal converter.
<b>logical unit</b>	A physical or virtual device addressable through a target ID number. LUNs use their target's bus connection to communicate on the SCSI bus.
<b>logical unit number</b>	A value that identifies a specific logical unit belonging to a SCSI target ID number. A number associated with a physical device unit during a

task's I/O operations. Each task in the system must establish its own correspondence between logical unit numbers and physical devices.

<b>LRU</b>	Least recently used. A cache term used to describe the block replacement policy for read cache.
<b>maintenance terminal</b>	An EIA-423-compatible terminal used with the controller. This terminal is used to identify the controller, enable host paths, enter configuration information, and check the controller's status. The maintenance terminal is not required for normal operations. <i>See also</i> local terminal.
<b>MB/s</b>	Megabytes per second. A unit designation used to measure the SCSI bus bandwidth.
<b>member</b>	A container that is a storage element in a RAID array.
<b>metadata</b>	The data written to a disk for the purposes of controller administration. Metadata improves error detection and media defect management for the disk drive. It is also used to support storageset configuration and partitioning. Non-transportable disks also contain metadata to indicate they are uniquely configured for StorageWorks environments. Metadata can be thought of as "data about data."
<b>mirroring</b>	The act of creating an exact copy or image of data.
<b>mirrored write-back caching</b>	A method of caching data that maintains two copies of the cached data. The copy is available if either cache module fails.
<b>mirrorset</b>	<i>See</i> RAID level 1.
<b>nominal membership</b>	The desired number of mirrorset members when the mirrorset is fully populated with active devices. If a member is removed from a mirrorset, the actual number of members may fall below the "nominal" membership.
<b>non-redundant controller configuration</b>	(1) A single controller configuration. (2) A controller configuration which does not include a second controller.
<b>normal member</b>	A mirrorset member that, block-for-block, contains the same data as other normal members within the mirrorset. Read requests from the host are always satisfied by normal members.

<b>normalizing</b>	Normalizing is a state in which, block-for-block, data written by the host to a mirrorset member is consistent with the data on other normal and normalizing members. The normalizing state exists only after a mirrorset is initialized. Therefore, no customer data is on the mirrorset.
<b>normalizing member</b>	A mirrorset member whose contents is the same as all other normal and normalizing members for data that has been written since the mirrorset was created or lost cache data was cleared. A normalizing member is created by a normal member when either all of the normal members fail or all of the normal members are removed from the mirrorset. <i>See also</i> copying member.
<b>NVM</b>	Non-Volatile Memory. A type of memory—the contents of which survive loss of power.
<b>OCP</b>	Operator control panel. The control or indicator panel associated with a device. The OCP is usually mounted on the device and is accessible to the operator.
<b>other controller</b>	The controller in a dual-redundant pair that's connected to the controller that's serving your current CLI session. <i>See also</i> this controller.
<b>PCM</b>	Polycenter Console Manager.
<b>PCMCIA</b>	Personal Computer Memory Card Industry Association. An international association formed to promote a common standard for PC card-based peripherals to be plugged into notebook computers. The card commonly known as a PCMCIA card is about the size of a credit card.
<b>parity</b>	A method of checking if binary numbers or characters are correct by counting the ONE bits. In odd parity, the total number of ONE bits must be odd; in even parity, the total number of ONE bits must be even. Parity information can be used to correct corrupted data. RAIDsets use parity to improve the availability of data.
<b>parity bit</b>	A binary digit added to a group of bits that checks to see if there are errors in the transmission.
<b>parity RAID</b>	<i>See</i> RAIDset.

<b>partition</b>	A logical division of a container, represented to the host as a logical unit.
<b>port</b>	<p>(1) In general terms, a logical channel in a communications system. (2) The hardware and software used to connect a host controller to a communications bus, such as a SCSI bus or serial bus.</p> <p>Regarding the controller, the port is: (1) the logical route for data in and out of a controller that can contain one or more channels, all of which contain the same type of data. (2) The hardware and software that connects a controller to a SCSI device.</p>
<b>primary cabinet</b>	The primary cabinet is the subsystem enclosure that contains the controllers, cache modules, external cache batteries, and the PVA module.
<b>program card</b>	The PCMCIA card containing the controller's operating software.
<b>PTL</b>	Port-Target-LUN. The controller's method of locating a device on the controller's device bus.
<b>PVA module</b>	Power Verification and Addressing module.
<b>quiesce</b>	The act of rendering bus activity inactive or dormant. For example, "quiesce the SCSI bus operations during a device warm-swap."
<b>RAID</b>	Redundant Array of Independent Disks. Represents multiple levels of storage access developed to improve performance or availability or both.
<b>RAID level 0</b>	A RAID storage set that stripes data across an array of disk drives. A single logical disk spans multiple physical disks, allowing parallel data processing for increased I/O performance. While the performance characteristics of RAID level 0 is excellent, this is the only RAID level that does not provide redundancy. Raid level 0 storage sets are sometimes referred to as stripesets.
<b>RAID level 0+1</b>	A RAID storage set that stripes data across an array of disks (RAID level 0) and mirrors the striped data (RAID level 1) to provide high I/O performance and high availability. This RAID level is alternatively called a striped mirror set. Raid level 0+1 storage sets are sometimes referred to as striped mirror sets.

<b>RAID level 1</b>	A RAID storageset of two or more physical disks that maintains a complete and independent copy of the entire virtual disk's data. This type of storageset has the advantage of being highly reliable and extremely tolerant of device failure. Raid level 1 storagesets are sometimes referred to as mirrorsets.
<b>RAID level 3</b>	A RAID storageset that transfers data parallel across the array's disk drives a byte at a time, causing individual blocks of data to be spread over several disks serving as one enormous virtual disk. A separate redundant check disk for the entire array stores parity on a dedicated disk drive within the storageset. <i>Contrast</i> RAID level 5.
<b>RAID Level 5</b>	A RAID storageset that, unlike RAID level 3, stores the parity information across all of the disk drives within the storageset. <i>Contrast</i> RAID level 3.
<b>RAID level 3/5</b>	A DIGITAL-developed RAID storageset that stripes data and parity across three or more members in a disk array. A RAIDset combines the best characteristics of RAID level 3 and RAID level 5. A RAIDset is the best choice for most applications with small to medium I/O requests, unless the application is write intensive. A RAIDset is sometimes called parity RAID. Raid level 3/5 storagesets are sometimes referred to as RAIDsets.
<b>RAIDset</b>	<i>See</i> RAID level 3/5.
<b>read caching</b>	A cache management method used to decrease the subsystem's response time to a read request by allowing the controller to satisfy the request from the cache memory rather than from the disk drives.
<b>reconstruction</b>	The process of regenerating the contents of a failed member's data. The reconstruct process writes the data to a spareset disk and then incorporates the spareset disk into the mirrorset, striped mirrorset, or RAIDset from which the failed member came. <i>See also</i> regeneration.
<b>reduced</b>	Indicates that a mirrorset or RAIDset is missing one member because the member has failed or has been physically removed.
<b>redundancy</b>	The provision of multiple interchangeable components to perform a single function in order to cope with failures and errors. A RAIDset is considered to be redundant when user data is recorded directly to one

member and all of the other members include associated parity information.

- regeneration** (1) The process of calculating missing data from redundant data. (2) The process of recreating a portion of the data from a failing or failed drive using the data and parity information from the other members within the storageset. The regeneration of an entire RAIDset member is called reconstruction. *See also* reconstruction.
- RFI** Radio frequency interference. The disturbance of a signal by an unwanted radio signal or frequency.
- replacement policy** The policy specified by a switch with the SET FAILEDSET command indicating whether a failed disk from a mirrorset or RAIDset is to be automatically replaced with a disk from the spareset. The two switch choices are AUTOSPARE and NOAUTOSPARE.
- SBB** StorageWorks building block. (1) A modular carrier plus the interface required to mount the carrier into a standard StorageWorks shelf. (2) any device conforming to shelf mechanical and electrical standards installed in a 3.5-inch or 5.25-inch carrier, whether it is a storage device or power supply.
- SCSI** Small computer system interface. (1) An ANSI interface standard defining the physical and electrical parameters of a parallel I/O bus used to connect initiators to devices. (2) a processor-independent standard protocol for system-level interfacing between a computer and intelligent devices including hard drives, floppy disks, CD-ROMs, printers, scanners, and others.
- SCSI-A cable** A 50-conductor (25 twisted-pair) cable generally used for single-ended, SCSI-bus connections.
- SCSI bus signal converter** Sometimes referred to as an adapter. (1) A device used to interface between the subsystem and a peripheral device unable to be mounted directly into the SBB shelf of the subsystem. (2) a device used to connect a differential SCSI bus to a single-ended SCSI bus. (3) A device used to extend the length of a differential or single-ended SCSI bus. *See also* DWZZA, DWZZB, DWZZC, and I/O module.

<b>SCSI device</b>	(1) A host computer adapter, a peripheral controller, or an intelligent peripheral that can be attached to the SCSI bus. (2) Any physical unit that can communicate on a SCSI bus.
<b>SCSI device ID number</b>	A bit-significant representation of the SCSI address referring to one of the signal lines, numbered 0 through 7 for an 8-bit bus, or 0 through 15 for a 16-bit bus. <i>See also</i> target ID number.
<b>SCSI ID number</b>	The representation of the SCSI address that refers to one of the signal lines numbered 0 through 15.
<b>SCSI-P cable</b>	A 68-conductor (34 twisted-pair) cable generally used for differential bus connections.
<b>SCSI port</b>	(1) Software: The channel controlling communications to and from a specific SCSI bus in the system. (2) Hardware: The name of the logical socket at the back of the system unit to which a SCSI device is connected.
<b>signal converter</b>	<i>See</i> SCSI bus signal converter.
<b>single ended I/O module</b>	A 16-bit I/O module. <i>See also</i> I/O module.
<b>single-ended SCSI bus</b>	An electrical connection where one wire carries the signal and another wire or shield is connected to electrical ground. Each signal's logic level is determined by the voltage of a single wire in relation to ground. This is in contrast to a differential connection where the second wire carries an inverted signal.
<b>spareset</b>	A collection of disk drives made ready by the controller to replace failed members of a storageset.
<b>storage array</b>	An integrated set of storage devices.
<b>storage array subsystem</b>	<i>See</i> storage subsystem.
<b>storageset</b>	(1) A group of devices configured with RAID techniques to operate as a single container. (2) Any collection of containers, such as stripesets, mirrorsets, striped mirrorsets, and RAIDsets.
<b>storage subsystem</b>	The controllers, storage devices, shelves, cables, and power supplies used to form a mass storage subsystem.



<b>storage unit</b>	The general term that refers to storagesets, single-disk units, and all other storage devices that are installed in your subsystem and accessed by the host. A storage unit can be any entity that is capable of storing data, whether it is a physical device or a group of physical devices.
<b>StorageWorks</b>	<p>A family of DIGITAL modular data storage products which allow customers to design and configure their own storage subsystems. Components include power, packaging, cabling, devices, controllers, and software. Customers can integrate devices and array controllers in StorageWorks enclosures to form storage subsystems.</p> <p>StorageWorks systems include integrated SBBs and array controllers to form storage subsystems. System-level enclosures to house the shelves and standard mounting devices for SBBs are also included.</p>
<b>stripe</b>	The data divided into blocks and written across two or more member disks in an array.
<b>striped mirrorset</b>	See RAID level 0+1.
<b>stripeset</b>	<i>See</i> RAID level 0.
<b>stripe size</b>	The stripe capacity as determined by $n-1$ times the chunksize, where $n$ is the number of RAIDset members.
<b>striping</b>	<p>The technique used to divide data into segments, also called chunks. The segments are striped, or distributed, across members of the stripeset. This technique helps to distribute hot spots across the array of physical devices to prevent hot spots and hot disks.</p> <p>Each stripeset member receives an equal share of the I/O request load, improving performance.</p>
<b>surviving controller</b>	The controller in a dual-redundant configuration pair that serves its companion's devices when the companion controller fails.
<b>tape</b>	A storage device supporting sequential access to variable sized data records.
<b>Tape Inline Exerciser</b>	<i>See</i> TILX.

<b>target</b>	(1) A SCSI device that performs an operation requested by an initiator. (2) Designates the target identification (ID) number of the device.
<b>target ID number</b>	The address a bus initiator uses to connect with a bus target. Each bus target is assigned a unique target address.
<b>this controller</b>	The controller that is serving your current CLI session through a local or remote terminal. <i>See also</i> other controller.
<b>TILX</b>	Tape inline exerciser. The controller's diagnostic software to test the data transfer capabilities of tape drives in a way that simulates a high level of user activity.
<b>Ultra SCSI bus</b>	A wide, fast-20 SCSI bus.
<b>unit</b>	A container made accessible to a host. A unit may be created from a single disk drive or tape drive. A unit may also be created from a more complex container such as a RAIDset. The controller supports a maximum of eight units on each target. <i>See also</i> target and target ID number.
<b>unwritten cached data</b>	Sometimes called unflushed data. <i>See</i> dirty data.
<b>UPS</b>	Uninterruptible power supply. A battery-powered power supply guaranteed to provide power to an electrical device in the event of an unexpected interruption to the primary power supply. Uninterruptible power supplies are usually rated by the amount of voltage supplied and the length of time the voltage is supplied.
<b>VHDCI</b>	Very high-density-cable interface. A 68-pin interface. Required for ultra-SCSI connections.
<b>virtual terminal</b>	A software path from an operator terminal on the host to the controller's CLI interface, sometimes called a host console. The path can be established via the host port on the controller (using HSZ term) or via the maintenance port through an intermediary host.
<b>warm swap</b>	A device replacement method that allows the complete system remains online during device removal or insertion. The system bus may be halted, or quiesced, for a brief period of time during the warm-swap procedure.

- write-back caching** A cache management method used to decrease the subsystem's response time to write requests by allowing the controller to declare the write operation "complete" as soon as the data reaches its cache memory. The controller performs the slower operation of writing the data to the disk drives at a later time.
- write-through caching** A cache management method used to decrease the subsystem's response time to a read. This method allows the controller to satisfy the request from the cache memory rather than from the disk drives.
- write hole** The period of time in a RAID level 1 or RAID level 5 write operation when there is an opportunity for undetectable RAIDset data corruption. Write holes occur under conditions such as power outages, where the writing of multiple members can be abruptly interrupted. A battery backed-up cache design eliminates the write hole because data is preserved in cache and unsuccessful write operations can be retried.
- write-through cache** A cache management technique for retaining host write requests in read cache. When the host requests a write operation, the controller writes data directly to the storage device. This technique allows the controller to complete some read requests from the cache, greatly improving the response time to retrieve data. The operation is complete only after the data to be written is received by the target storage device.
- This cache management method may update, invalidate, or delete data from the cache memory accordingly, to ensure that the cache contains the most current data.



# Index

## A

---

abbreviations, x

ADD CDROM command, syntax, 7

ADD *device-name* command

- switches
  - TRANSFER\_RATE\_REQUESTED, 10

ADD DISK command

- switches
  - NOTTRANSPORTABLE, 9
  - TRANSPORTABLE, 9
- syntax, 9

ADD MIRRORSET command

- switches
  - COPY, 13
  - POLICY, 14
  - READ\_SOURCE, 14
- syntax, 13

ADD PASSTHROUGH command

- switches
  - TRANSFER\_RATE\_REQUESTED, 18
- syntax, 17

ADD RAIDSET command

- switches
  - NOPOLICY, 19–20
  - POLICY, 19–20
  - RECONSTRUCT, 20
  - REDUCED, 20
- syntax, 19

ADD SPARESET command, syntax, 23

ADD STRIPESET command, syntax, 25

ADD UNIT command

- switches
  - ACCESS\_ID, 28
  - MAXIMUM\_CACHED\_TRANSFER, 29
  - PARTITION, 29
  - PREFERRED\_PATH, 29

- RUN, 30, 120
  - WRITE\_PROTECT, 31, 120
  - WRITEBACK\_CACHE, 31, 120
- syntax, 27

adding

- CD-ROM drives, 7
- disks, 9
- mirrorsets, 13
- passthrough containers, 17
- sparesets, 23
- stripesets, 25
- units, 27

addressing, units, 4–6

## B

---

BBR, 133

## C

---

cable distribution unit, 134

cables

- SCSI-bus cable lengths, 90
- tightening, vii

cache, setting flush timer, 84

Caution, defined, ix

CD-ROM

- adding to configuration, 7
- deleting, 45
- showing, 123

CD-ROMs

- displaying information, 123

CFMENU, running, 79

chunksize, setting storageset size, 60

CLCP, running, 79

CLEAR\_ERRORS CLI command, syntax, 33

CLEAR\_ERRORS *controller*

- INVALID\_CACHE command
  - syntax, 35
- CLEAR\_ERRORS *controller*
  - INVALID\_CACHE command, syntax, 35
- CLEAR\_ERRORS LOST\_DATA command,
  - syntax, 37
- CLEAR\_ERRORS UNKNOWN command,
  - syntax, 39
- CLEAR\_ERRORS UNWRITEABLE\_DATA
  - command, syntax, 41
- CLI
  - abbreviating commands, 2
  - customizing the prompt, 89
  - definition, 1
  - help, 57
  - overview, 1
- CLONE, running, 79
- command editing keys, 3
- command line interpreter. *See* CLI
- commands
  - abbreviating, 2
  - ADD CDRM, 7
  - ADD DISK, 9
  - ADD MIRRORSET, 13
  - ADD PASSTHROUGH, 17
  - ADD RAIDSET, 19
  - ADD SPARESET, 23
  - ADD STRIPESSET, 25
  - ADD UNIT, 27
  - CLEAR\_ERRORS CLI, 33
  - CLEAR\_ERRORS INVALID\_CACHE, 35
  - CLEAR\_ERRORS LOST\_DATA, 37
  - CLEAR\_ERRORS UNKNOWN, 39
  - CLEAR\_ERRORS
    - UNWRITEABLE\_DATA, 41
  - CREATE\_PARTITION, 43
  - DELETE *container-name*, 45
  - DELETE FAILEDSET, 47
  - DELETE SPARESET, 49
  - DELETE *unit-number*, 51
  - DESTROY\_PARTITION, 53
  - DIRECTORY, 55
  - getting help, 2
  - HELP, 57
  - INITIALIZE, 59
  - LOCATE, 63
  - MIRROR, 65
  - overview, 1
  - REDUCE, 69
  - RENAME, 73
  - RETRY\_ERRORS, 77
  - rules for entering, 2
  - RUN, 79
  - SET *device-name*, 93
  - SET EMU, 95
  - SET FAILEDSET, 99
  - SET FAILOVER, 101
  - SET *mirrorset-name*, 103
  - SET MULTIBUS\_FAILOVER, 109
  - SET NOMULTIBUS\_FAILOVER. *See*
    - SET NOFAILOVER
  - SET *RAIDset-name*, 113
  - SET *unit-number*, 117
  - SHOW, 123
  - syntax, 6
  - typing ahead, 2
  - UNMIRROR, 131
- CONFIG, running, 79
- configuration
  - modifying controller configurations, 1
  - restoring, 61
- connection
  - local, 1
  - remote, 1
- container
  - defined, 134
  - initializing, 59
- controllers
  - "this" and "other" defined, viii
  - displaying information, 123
  - load balancing, 88
  - showing, 123
  - shutting down, 129
- conventions

- abbreviations, x
- typographical, viii
- warnings, cautions, tips, notes, viii
- CREATE\_PARTITION command, syntax, 43
- creating
  - CD-ROMs, 7
  - disks, 9
  - mirrorsets, 13
  - passthrough containers, 17
  - single-disk units, 31
  - sparesets, 23
  - stripesets, 25
  - units, 27

## D

---

- data center cabinet, 135
- DELETE *container-name* command, syntax, 45
- DELETE FAILEDSET command, syntax, 47
- DELETE SPARESET command, syntax, 49
- DELETE *unit-number* command, syntax, 51
- deleting
  - CD-ROMs, 45
  - devices, 45
  - mirrorsets, 45
  - optical disk drives, 45
  - RAIDsets, 45
  - storage sets, 45
  - stripesets, 45
  - tape drives, 45
  - tape loaders, 45
  - units, 51
- DESTROY\_PARTITION command, syntax, 53
- devices
  - locating, 63
  - setting data transfer rate, 10, 18, 93
  - showing, 123
- diagnostics
  - listing of, 55
  - running, 79
- DILX, running, 79
- DIRECT, running, 80
- DIRECTORY command, syntax, 55

- disk drives
  - adding to configuration, 9
  - deleting, 45
  - displaying information, 123
  - initializing, 59
  - making transportable, 93
  - mirroring, 65
  - removing from a mirrorset, 69
  - removing from the failedset, 47
  - removing from the spareset, 49
  - renaming, 73
  - setting device data transfer rate, 10, 18
  - showing, 123
  - transfer rate, 10, 18
- documentation, related, x
- DSTAT, running, 80
- dual-redundant configuration
  - disabling, 111
  - enabling, 101
- DUART, 135
- DWZZA, 135
- DWZZB, 136

## E

---

- electrostatic discharge *See* ESD, vi
- EMU
  - defined, 136
  - setting, 95
- error messages
  - clearing from CLI, 33
  - clearing unwriteable data errors, 41
- ESD
  - defined, 136
  - precautions, vi

## F

---

- failedset, deleting members, 47
- failover
  - defined, 136
  - disabling, 111
- finding devices and storage sets, 63

FMU, running, 80  
FRUTIL, running, 80  
FWD SCSI, 137

## H

---

HELP command, syntax, 57  
history, revision of this manual, xi  
host  
    compatibility mode, 85  
    setting data transfer rate, 90  
hot standby controller, 89  
HSOF, 138  
HSUTIL, running, 80  
HSZterm. *See* remote connection

## I

---

initialize  
    before adding unit, 27  
    saving user data, 60  
INITIALIZE command  
    switches  
        CHUNKSIZE, 60  
        DESTROY, 60  
        SAVE\_CONFIGURATION, 61  
    syntax, 59

## L

---

listing diagnostics and utilities, 55  
load balancing, 88  
local connection, 1  
local connection port, precautions, vii  
local terminal, 138  
LOCATE command, syntax, 63  
lost data error, clearing, 37  
LRU, 139

## M

---

maintenance terminal, defined, 139  
MIRROR command  
    switches

COPY, 65  
POLICY, 66

    syntax, 65

mirrorset

    actual number of members, 69  
    adding to configuration, 13  
    choosing a replacement member, 14, 19  
    converting back to a single device, 131  
    creating from a single disk, 65  
    deleting, 45  
    initializing, 59  
    removing a member, 69  
    setting a replacement policy, 14, 19  
    showing, 123  
    unmirroring, 131

mirrorsets

    displaying information, 123  
    renaming, 73

## N

---

nominal membership, 139  
non-redundant configuration, 139  
nonvolatile, defined  
normalizing member, 140  
Note, defined, ix  
NV. *See* nonvolatile

## O

---

optical disk drives  
    deleting, 45  
    displaying information, 123  
    showing, 123  
other controller, explained, 1

## P

---

partitions  
    creating, 43  
    deleting unit, 51  
    displaying size, 123  
    setting size, 43



- showing, 123
- passthrough containers
  - adding to configuration, 17
  - deleting, 45
  - renaming, 73
  - showing, 123
- port-target-LUN, defined, 141
- precautions
  - electrostatic discharge, vi
  - local connection port, vii
  - VHDCI cables, vii
- preferred SCSI target ID numbers, setting, 88
- PTL
  - defined, 141
  - specifying with ADD CDROM command, 7
  - specifying with ADD DISK command, 9
  - specifying with ADD PASSTHROUGH command, 17
- publications, related, x

## Q

---

- quiesce, 141

## R

---

- RAIDset
  - adding while missing a member, 20
  - changing characteristics, 113
  - deleting, 45
  - displaying information, 123
  - initializing, 59
  - removing a member, 114
  - replacing a member, 115
  - showing, 123
  - specifying chunksize, 60
  - specifying replacement policy, 113
- RAIDsets
  - renaming, 73
- REDUCE command, syntax, 70
- redundancy, defined, 142
- regenerate process, defined, 143
- related publications, x

- remote connection, 1
- removing a mirrorset member, 69
- RENAME command, syntax, 73
- RESTART *controller* command
  - switches
    - IGNORE\_ERRORS, 75
    - IMMEDIATE\_SHUTDOWN, 75–76
    - NOIGNORE\_ERRORS, 75
    - NOIMMEDIATE\_SHUTDOWN, 75–76
  - syntax, 75
- RETRY\_ERRORS command, syntax, 77
- RETRY\_ERRORS UNWRITEABLE\_DATA
  - command, syntax, 77
- revision history, xi
- RUN
  - CFMENU, 79
  - CLCP, 79
  - CLONE, 79
  - command syntax, 79
  - CONFIG, 79
  - DILX, 79
  - DIRECT, 80
  - DSTAT, 80
  - FMU, 80
  - FRUTIL, 80
  - HSUTIL, 80
  - VTDPY, 80

## S

---

- SBB, 143
- SCSI
  - bus cable lengths, 90
  - preferring target ID numbers, 88
  - setting target ID numbers, 86
- SCSI-A cable, 143
- SCSI-B cable, 144
- SELFTEST *controller* command
  - switches
    - IGNORE\_ERRORS, 81
    - IMMEDIATE\_SHUTDOWN, 81
  - syntax, 81
- SET *controller* command, 83

- switches
  - CACHE\_FLUSH\_TIMER, 84
  - CACHE\_UPS, 85
  - COMMAND\_CONSOLE\_LUN, 85
  - INITIAL\_CONFIGURATION, 87
  - MIRRORED\_CACHE, 87
  - PREFERRED\_ID, 88
  - PROMPT, 89
  - target ID number, 86
  - TERMINAL\_PARITY, 89
  - TERMINAL\_SPEED, 89
  - TIME, 90
  - TRANSFER\_RATE\_REQUESTED, 90
- syntax, 83
- SET *device-name*
  - switches
    - TRANSFER\_RATE\_REQUESTED, 93
- SET *device-name* command
  - switches
    - NOTTRANSPORTABLE, 93–94
    - TRANSFER\_RATE\_REQUESTED, 10, 18
    - TRANSPORTABLE, 93–94
  - syntax, 93
- SET EMU command
  - switches
    - FANSPEED, 96
    - SENSOR SETPOINT, 95
  - syntax, 95
- SET FAILEDSET command, syntax, 99
- SET FAILOVER command
  - switches
    - DESTROY\_UNFLUSHABLE\_DATA, 111
  - syntax, 101
- SET *mirrorset-name* command
  - switches
    - COPY, 103
    - MEMBERSHIP, 103
    - POLICY, 105
    - READ\_SOURCE, 106
    - REMOVE, 104
    - REPLACE, 105
  - syntax, 103
- SET MULTIBUS\_FAILOVER command, syntax, 109
- SET NOFAILOVER command
  - switches, 111–112
  - syntax, 111
- SET *RAIDset-name* command
  - switches
    - POLICY, 113
    - RECONSTRUCT, 114
    - REMOVE, 114
    - REPLACE, 115
  - syntax, 113
- SET *unit-number* command
  - switches
    - ACCESS\_ID, 118
    - MAXIMUM\_CACHED\_TRANSFER, 118
    - PREFERRED\_PATH, 119
    - READ\_CACHE, 119
  - syntax, 117
- setting
  - cache flush timer, 84
  - CLI prompt, 89
  - command console LUN, 85
  - command console lun, 85
  - control of metadata, 60
  - controller behavior at restart, 75
  - controller behavior at shutdown, 129
  - controller behavior selftest, 81
  - controller cache flush timer, 84
  - controller cache ups policy, 85
  - controller configuration handling, 61
  - controller data transfer rate, 90
  - controller error handling at restart, 75
  - controller error handling at selftest, 75, 81
  - controller error handling at shutdown, 129
  - controller initial configuration, 87
  - controller preferred target ID number, 88
  - controller target ID number, 86
  - controller transfer rate, 90

- controller's host compatibility mode, 85
- data retention policy, 35
- device data transfer rate, 10, 18, 93
- device transfer rate, 10, 18, 93
- failedset autospare feature, 99
- fan speed, 96
- full display, 124
- host data transfer rate, 90
- mirrored write-back cache, 87
- mirrorset copy data, 65
- mirrorset copy speed, 13, 103
- mirrorset member read source, 14
- mirrorset read source, 14
- mirrorset spareset replacement policy, 14
- number of blocks cached by controller, 29, 118
- number of mirrorset members, 103
- number of unit partitions, 29
- partition size, 35, 43
- preferred path for units, 29, 119
- preferred SCSI target ID numbers, 88
- RAIDset member reconstruct policy, 20, 114
- RAIDset member replacement policy, 14, 19, 113
- RAIDset reduced member policy, 20
- read cache for units, 30, 119
- SCSI target ID numbers, 86
- storageset chunksize, setting, 60
- subsystem temperature sensor setpoint, 95
- terminal parity, 89
- terminal speed, 89
- time, 90
- transportability of devices, 93
- transportability of disks, 9, 93
- unit access ID number, 28, 118
- unit availability to the host, 30, 120
- virtual LUN, 85
- write protect for units, 31, 120
- write-back cache for units, 31, 120

**SHOW** command

- parameters, 123–124
- switches, FULL, 124
- syntax, 123

**SHUTDOWN** *controller* command

- parameters, 129
- switches, 129–130
  - IGNORE\_ERRORS, 129
  - IMMEDIATE\_SHUTDOWN, 129
- syntax, 129

spareset

- adding to configuration, 23
- removing a disk drive, 49

speed. *See* transfer rate

storagesets

- defined, 144
- displaying information, 123
- initializing, 59
- locating, 63
- renaming, 73
- showing, 123

StorageWorks array controller, 1

stripe size, defined, 145

stripe, defined, 145

stripesets

- adding to configuration, 25
- deleting, 45
- displaying information, 123
- initializing, 59
- mirroring, 65
- renaming, 73
- showing, 123
- specifying chunksize, 60

## T

---

tape drives

- deleting, 45
- displaying information, 123
- renaming, 73
- showing, 123

tape loaders

- deleting, 45
- displaying information, 123
- showing, 123

terminal

- setting parity, 89

- setting speed, 89
- testing controllers, 81
- this controller
  - defined, viii
  - explained, 1
  - removing from dual-redundant configuration, 111
  - starting diagnostic or utility programs, 79
- tightening VHDCI cables, vii
- Tip, defined, ix
- transfer rate
  - setting controller, 90
  - setting device, 10, 18, 93
- typographical conventions, viii

## U

---

- units
  - adding to configuration, 27
  - changing characteristics, 117
  - clearing lost data error, 37
  - deleting from the configuration, 51
  - displaying configured units, 124
  - displaying information, 123
  - mirroring, 65
  - number format, 4–6
  - showing, 123
- UNMIRROR command
  - parameters, 131
  - syntax, 131
- unwriteable data error, retrying, 77
- utilities
  - CFMENU, 79
  - CLCP, 79
  - CLONE, 79
  - CONFIG, 79
  - DILX, 79
  - DIRECT, 80
  - DSTAT, 80
  - FMU, 80
  - FRUTIL, 80
  - HSUTIL, 80
  - listing of, 55
  - running, 79

VTDPY, 80

## V

---

- VHDCI cable precautions, vii
- virtual disk, setting. *See* SET *controller*  
COMMAND\_CONSOLE\_LUNcommand
- VTDPY, running, 80

## W

---

- Warning, defined, ix
- write hole, 147
- write-back cache, setting the flush timer, 84