StorageWorks™ Solutions

HSD10 Array Controller User's Guide

Order Number: EK–HSD10–UG. A01

This manual is part of the StorageWorks™ family documentation set. It describes the HSD10 array controller and contains installation and configuration information. For day-to-day operation, this manual includes a description of the user interface commands and procedures to perform routine tasks.

Digital Equipment Corporation
Maynard, Massachusetts

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Any changes or modifications made to this equipment may void the user's authority to operate the equipment.

NOTE: This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Operation of this equipment in a residential area may cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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.

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Contents

4 Operating and Maintaining the HSD10 Array Controller

A Option Ordering Information

B HSD10 Command Utility

Index

Figures

Tables

Preface

This manual describes the procedures for configuring, installing, operating, and replacing the StorageWorks™ HSD10 array controller.

Intended Audience

This manual is intended for use by customers and Digital™ employees responsible for systems using the HSD10 array controller.

Structure

This manual is organized as follows:

Chapter 1	Describes the HSD10 array controller and related StorageWorks components.
Chapter 2	Contains guidelines for configuring the HSD10 array controller.
Chapter 3	Contains guidelines for installing the HSD10 Array Controller and using the onboard command utility to perform site-specific preparations.
Chapter 4	Contains guidelines for maintaining the HSD10 array controller and isolating operational problems.
Appendix A	Describes available HSD10 options and order information.
Appendix B	Describes commands available in the onboard command utility.

Related Documents

Table 1 lists the StorageWorks-related user documents. These documents are the primary reference components in the StorageWorks building block (SBB) family. The documents listed in Table 1 are provided with every StorageWorks system.

Table 1 StorageWorks Related Documentation

Document Title	Order Number
StorageWorks Solutions Configuration Guide	EK–BA350–CG
StorageWorks Family User's Guide[1]	EK–BA350–UG
StorageWorks Family StorageWorks Building Block User's Guide	EK–SBB35–UG

[1]Includes the BA350–SA SBB shelf User's Guide.

Current device and environment support information, as well as topics relating to firmware releases, can be found in the *HSD10 Array Controller Release Notes* (order number EK–HSD10–RN).

Documentation Conventions

The following conventions are used in this manual:

boldface type	Boldface type indicates the first instance of terms being defined in text. In code examples, user input is shown in boldface type.
italic type	Italic type is used for emphasis and complete manual titles. Italics are also used as a placeholder for user input to commands.
OpenVMS VAX	A shortened term indicating the OpenVMS operating system for VAX™ hardware.
OpenVMS Alpha	A shortened term indicating the OpenVMS operating system for Alpha™ hardware.
[ ]	Square brackets indicate optional command arguments.
...	A horizontal ellipsis indicates that a command argument may be repeated as needed.

1
Introduction

This chapter contains an introduction to the HSD10 array controller.

1.1 HSD10 Overview

The HSD10 array controller is a member of the StorageWorks™ HS family of controllers, offering a low-cost, high-performance interface between a Digital Storage Subsystem Interconnect (DSSI) bus and up to seven Small Computer System Interconnect (SCSI) devices.

The HSD10 controller is capable of up to 1000 aggregate read requests/second, with an aggregate read throughput of up to 3.0 megabytes/second.

This chapter presents a basic description of the HSD10 array controller's features, performance, and operating environment. The HSD10 array controller is shown in Figure 1–1. Figure 1–2 presents a typical HSD10 installation, showing the relationship among basic system components.

HSD10 Options

The following options are available for the HSD10 array controller:

- *HSD10–AA*: The standard HSD10 controller option, housed in a 3.5-inch StorageWorks Building Block (SBB) enclosure.
- *HSD10–AD*: Adds 16 MB of data cache to the standard HSD10 controller, also in a 3.5-inch SBB enclosure.
- *HSD10–AF*: Adds 32 MB of data cache to the standard HSD10 controller, also in a 3.5-inch SBB enclosure.

Note

See Appendix A for information on ordering options.

1.2 HSD10 Controller Description

The HSD10 controller incorporates the following features:

- Controller-based RAID 0 capability.
- Read cache capacity up to 32 MB.
- Virtual drive partitioning support.
- Write history logging support.
- User-selectable DSSI and SCSI device IDs.
- User-selectable SCSI bus termination.
- LED indicators for boot, operating and error status.

- Fully compatible with StorageWorks cabling and interconnection rules.
- On-board termination power circuit protection.
- Supports total DSSI cable length of up to 18.3 meters (60 feet).
- Enhanced I/O performance using optional data cache.
- Built-in self-test on powerup and reset.
- Front panel serial communications port allows connection to an external (VCS) console and permits upgrades to functional firmware.

The HSD10 controller consists internally of one or two circuit boards. The main board incorporates all baselevel performance capabilities of the HSD10 controller. This board has two variations:

- The variation used in AA/AD/AF options is designed to be mounted in a 3.5-inch SBB enclosure and has a 68-pin connector for front-panel connection to a DSSI bus.
- An alternative variation is for embedded applications and has a 50-pin connector on its rear edge for connecting to an internal system DSSI bus.

SCSI bus connection for both variations is made through the shelf backplane connector. The main board contains the switches to select the DSSI ID, the SCSI ID, and SCSI bus termination.

The optional second board of the HSD10 controller is used in the AD and AF versions. This daughterboard contains a SIMM memory module for read data cache.

The HSD10 array controller is shipped with a DSSI trilink connector and a DSSI Terminator that fits on the trilink connector. The trilink connector allows the HSD10 array controller to be connected as either an endpoint or a middle (daisy-chained) node on the DSSI bus. The DSSI terminator is needed to properly terminate bus signals.

One or more HSD10 array controllers may be connected on the DSSI bus containing RF*xx*™ /TF*xx*™ drives, host nodes, or other DSSI-compliant nodes (up to eight nodes maximum).

Each device served by the HSD10 array controller is independently addressable. Attached disk, tape, optical, and solid-state drives appear to the host as standard Digital storage architecture (DSA™) devices. Disk allocation class is user-definable, with all attached disks sharing the class value. Tape allocation class is independently user-definable in the same manner.

HSD10 Controller Firmware

HSD10 firmware resides in a flash electrically erasable programmable read-only memory (EEPROM) device that can accept firmware upgrades via the front panel modular jack connector. See Section 4.8 for upgrade procedure information.

Through an on-board firmware command utility, you can set device parameters including node name, system ID, disk and tape allocation classes, and performance optimization parameters. It also can be used for device formatting and qualification and to access device information.

Figure 1–1 HSD10 Array Controller

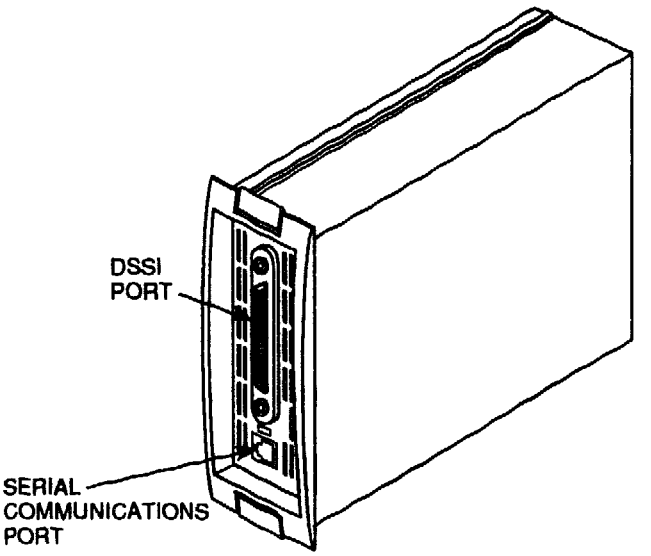
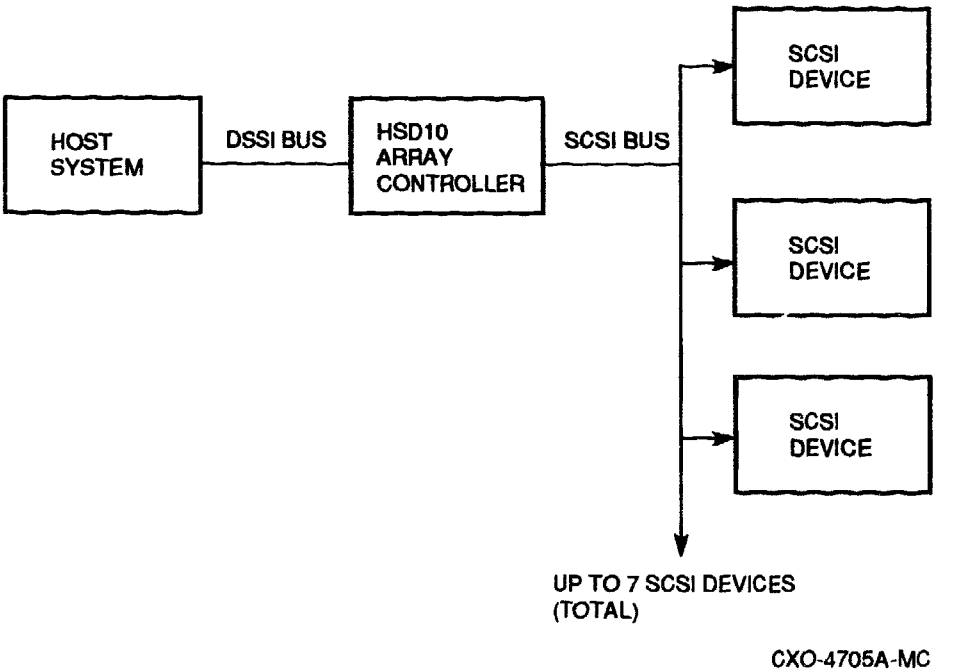


Figure 1–2 HSD10 Array Controller Typical Installation Diagram



Compatibility with StorageWorks Components

The HSD10 array controller is fully compatible with the power and environmental requirements of StorageWorks family devices. In a typical application, the HSD10 array controller can be installed in an SBB shelf without modification to the shelf, the shelf backplane, or other SBB devices. See Section 1.4 for listings of the physical and environmental specifications for the HSD10 array controller and the SBB shelf unit.

1.3 SBB Shelf Overview

This section provides a brief overview of the StorageWorks Building Block (SBB) BA350 shelf and its components.

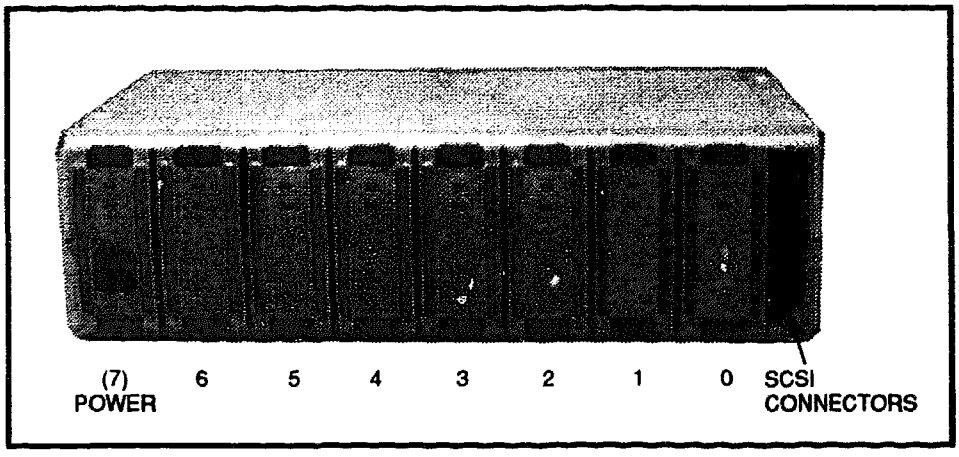
Refer to the StorageWorks documentation listed in Table 1 for further information on SBB shelves and the StorageWorks family of products.

1.3.1 SBB Shelf Capacity

A typical SBB shelf can contain up to eight 3½-inch SBBs. The SBB slots are numbered 0 through 7 from right to left, starting with the slot adjacent to the SCSI connectors. Slot 7 is reserved for the power supply SBB. Slot 6 can be used for either a storage SBB, a redundant power supply, or a battery backup unit (BBU). In some configurations, it also can be used for an HSD10 (see Sections 2.4.5 and 2.4.6).

Cooling for the SBB shelf is supplied by two redundant blowers mounted on the rear of the shelf.

Figure 1–3 Typical SBB Shelf and Slot Numbering



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1.3.2 SBB Shelf SCSI Bus Connections

There are two 50-pin, high-density, female SCSI connectors on the backplane adjacent to slot 0. These connectors are accessible through the front of the SBB shelf. These connectors usually are not used in an HSD10 array controller installation, except when two SBB shelves are connected together (see Section 2.4.3).

1.3.3 SBB Shelf SCSI Bus Addresses

There are seven available SCSI bus device addresses (SCSI IDs) that are numbered 0 through 6. These addresses can be assigned to either 3½-inch or 5¼-inch SBBs. The slot numbers and the SCSI device addresses are the same for slots 0 through 6. Slot 7 is reserved for the shelf power supply.

1.3.4 SBB Shelf Power Supply

The StorageWorks cabinet ac or dc cable distribution unit (CDU) determines the type of power supply to be installed in the shelf.

1.3.5 Wide SCSI Shelf Support

The HSD10 is designed for use in 8 data-bit shelf environments such as the BA350. This does not preclude its use in a 16 bit shelf such as the BA356; see the current *HSD10 Array Controller Release Notes* for additional support information.

1.4 HSD10 Array Controller Specifications

This section contains listings of the physical and environmental specifications for the HSD10 array controller and the SBB shelf unit.

Table 1–1 lists the dimensions of the HSD10 array controller and the SBB shelf.

Table 1–1 HSD10 Array Controller and SBB Shelf Dimensions

Description	Height mm (in)	Width mm (in)	Depth mm (in)
HSD10 SBB	121 (4.8)	51 (2.0)	216 (8.5)
BA350 SBB shelf	150 (5.9)	445 (17.5)	350 (13.8)

The HSD10 array controller is fully compatible with the environmental specifications for the StorageWorks family of products. Table 1–2 lists these specifications.

Table 1–2 StorageWorks Environmental Specifications

Condition	Specification
	Optimum Operating Environment
Temperature *Rate of change* *Step change*	+18° to +24°C (+65° to +75°F) 3°C (5.4°F) 3°C (5.4°F)
Relative humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	From sea level to 2400 meters (8000 feet)
Air quality	Maximum particle count .5 micron or larger, not to exceed 500,000 particles per cubic feet of air
Inlet air volume	.026 cubic meters per second (50 cubic feet per minute)

(continued on next page)

Table 1–2 (Cont.) StorageWorks Environmental Specifications

Condition	Specification
	Maximum Operating Environment (Range)
Temperature	+10° to +40°C (+50° to +104°F) Derate 1.8°C for each 1000 meters (1.0°F for each 1000 feet) of altitude Maximum temperature gradient 11°C/hr (20°F/hr) ±2°C/hr (4°F/hr)
Relative humidity	10% to 90% (noncondensing) Maximum wet bulb temperature: 28°C (82°F) Minimum dew point: 2°C (36°F)
	Maximum Nonoperating or Storage Environment (Range)
Temperature	
Nonoperating	+18° to +29°C (+65° to +85°F)
Storage	–40° to +66°C (–40° to +151°F)
Relative humidity	
Nonoperating	10% to 90% (noncondensing)
Storage	8% to 95% in original shipping container (noncondensing); otherwise, 50% (noncondensing)
Altitude	From –300 meters (–1000 feet) to +3600 meters (+12,000 feet) MSL

2

HSD10 Configuration Information

This chapter contains information on supported configurations for the HSD10 and associated SBB shelves. The information in this chapter supplements the SBB shelf information contained in the StorageWorks documents listed in the Preface under the heading "Related Documents."

2.1 Overview of HSD10 Operating Requirements/Limitations

The standard installation for the HSD10 array controller is in shelf slot 0. This preserves the integrity of the backplane SCSI bus, as the HSD10 array controller normally serves as a terminating end of the SCSI bus. Its factory-default SCSI node address, or SCSI ID, is 7; this assures priority on the SCSI bus. (Shelf slot 7 is always used for a power unit.) Slots 1 and 6 also are used for HSD10 installation under certain configurations and conditions, as described in Section 2.4.

While the HSD10 controller or attached drives may be removed when the SCSI bus is quiesced (warm-swapped), they should not be removed with the SCSI bus active (hot-swapped) to avoid the possibility of data corruption errors.

Total DSSI bus length should be limited to 60 feet with an HSD10 array controller attached to guarantee DSSI bus integrity.

2.2 Shelf Power Configuration Rules

Refer to the *StorageWorks Family User's Guide* and *SBB User's Guide* for specific power unit configuration rules. The term *power unit* describes both power supplies and battery backup units.

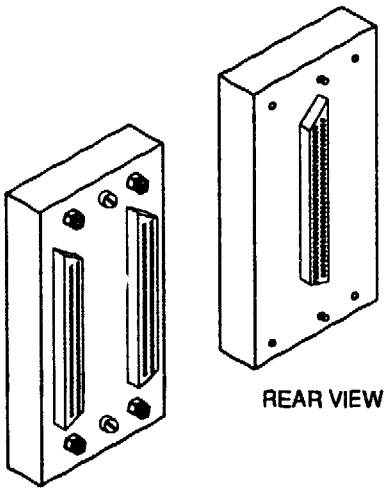
2.3 DSSI Cables

As already noted, the HSD10 can be located at any arbitrary position on the DSSI bus. The cables required to connect to the HSD10 are determined by the adjacent DSSI nodes. If the HSD10 connects directly to a host system, cable type also depends on the system and host adapter.

To maximize signal integrity on the DSSI bus, the system should be configured using the shortest suitable cable. Doing so will keep the signal noise at the lowest possible level, thus minimizing transmission retries and maximizing performance.

Refer to the *HSD10 Array Controller Release Notes* for information on currently supported systems and devices, and the corresponding cables needed for connecting the HSD10.

Figure 2–1 HSD10 DSSI Trilink Connector



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2.3.1 DSSI Cable Handling Guidelines for HSD10 Array Controllers

HSD10 controllers are shipped with a nonconductive mating guide or collar designed for installation around the outside edge of each controller's port connector. This guide was developed to help eliminate the possibility of shorting circuits on the DSSI bus when connecting or disconnecting cables with power applied. (However, Digital recommends care in connecting and disconnecting DSSI host port cable connectors at all times, even if you have a mating guide installed.)

For HSD10 controllers without the mating guide around their connector, *always* handle DSSI cables with power removed. When connecting or disconnecting a node to the DSSI bus, node power should be off. Take all DSSI nodes offline to remove power from all entities on the DSSI bus that will be connected to the HSD10 controller's port. Never leave active DSSI host buses unterminated during service.

DSSI cables connect to the HSD10 using a DSSI trilink connector, illustrated in Figure 2–1.

CAUTION

Currently, component damage may result if DSSI cables are connected or disconnected with power applied, *unless* the mating guide is installed around the outside edge of your controller's port connector. If your HSD10 array controller needs a mating guide, contact your Digital Multivendor Customer Services engineer. The Digital part number is 74–49066–01.

Be aware that the trilink connector block is the interface between the HSD10 array controller and other DSSI cable connections. It is the *trilink* that you may safely disconnect and connect when you have a mating guide installed. In a power on situation, you must work around any DSSI cable or terminator connections to the trilink *without* disconnecting them.

Some DSSI cable and terminator connectors will not provide enough access to the trilink screws for you to disconnect the trilink (without first disconnecting the cable and/or terminator). In these cases you will have

to disconnect power from all bus members and disconnect cables and terminators before disconnecting the trilink connector block.

2.3.2 Maximum DSSI Cable Lengths Using the HSD10 Array Controller

The following maximum DSSI cable lengths are supported with the HSD10 array controller:

- The maximum DSSI cable length between DSSI nodes is 9.2 meters (30 feet).
- The overall (end-to-end) maximum DSSI cable length is 18.3 meters (60 feet).

2.4 Supported Configurations

The HSD10 controller can be configured in a variety of ways to suit a specific operating environment. In addition to the standard single-shelf, single-controller arrangement, the HSD10 also supports dual and split-shelf configurations, as well as failover (redundant) schemes. This section illustrates sample supported configurations and corresponding implementation requirements.

In any configuration, an HSD10 occupies a node on the DSSI bus. It makes no operational difference whether the HSD10 is a middle node or end-of-bus node, but the physical connection and cabling may differ as outlined in Section 2.3. This is illustrated for the standard single-shelf configuration in Figure 2–2 and Figure 2–3. The diagrams in this section show HSD10 controllers connected directly to hosts, but they may be located anywhere on a given DSSI bus.

General Configuration Rules

The following general rules apply to all configurations:

- On a given SCSI or DSSI bus, each node must have a unique ID Number (0 to 7), to a maximum of eight nodes total (see Sections 3.4.2 and 3.4.3).
- The SCSI bus must be properly terminated at both ends (see Section 3.4.4).
- Each DSSI bus must be properly terminated at both ends (see Section 3.4.4).
- Except for the dual-shelf configuration, no SCSI cables should connect to shelf connectors JA1 and JB1.

2.4.1 Connected Devices: Allowable Device Configurations

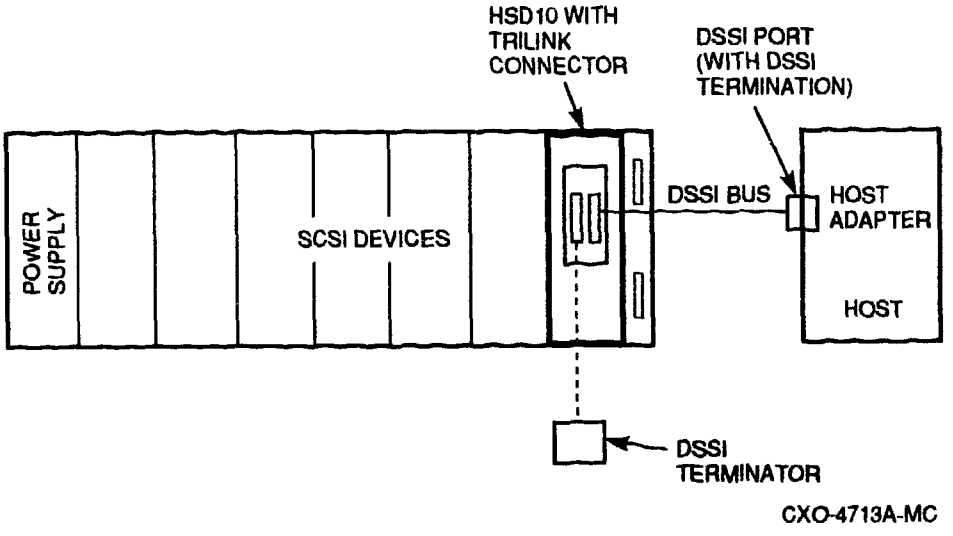
The following disk/tape/solid state disk/optical device configurations are supported on an HSD10 array controller's SCSI bus:

- Up to seven disk or optical storage devices
- Up to two tape and two disk/optical or one tape and five disk/optical devices (and no other devices)
- Up to two solid-state devices (and no other devices)

2.4.2 Standard Single-Controller, Single Shelf Configuration

A typical HSD10 configuration includes a BA350 shelf of one to six drives and connects to a host system's DSSI bus as shown in Figures 2–2 and 2–3. This is the simplest HSD10 configuration.

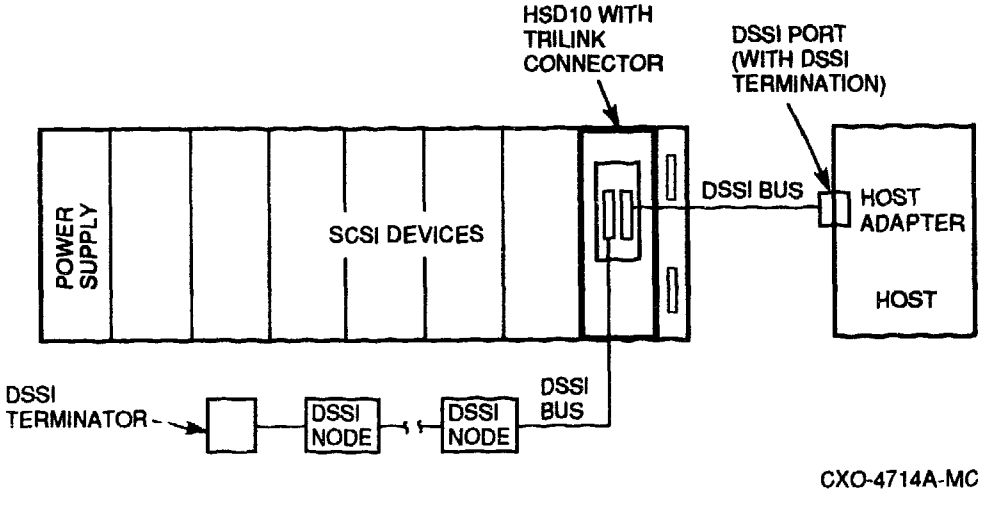
Figure 2–2 Standard Configuration, HSD10 as End DSSI Node



Configuration Requirement

- HSD10 is installed in shelf slot 0.

Figure 2–3 Standard Configuration, HSD10 as Middle DSSI Node



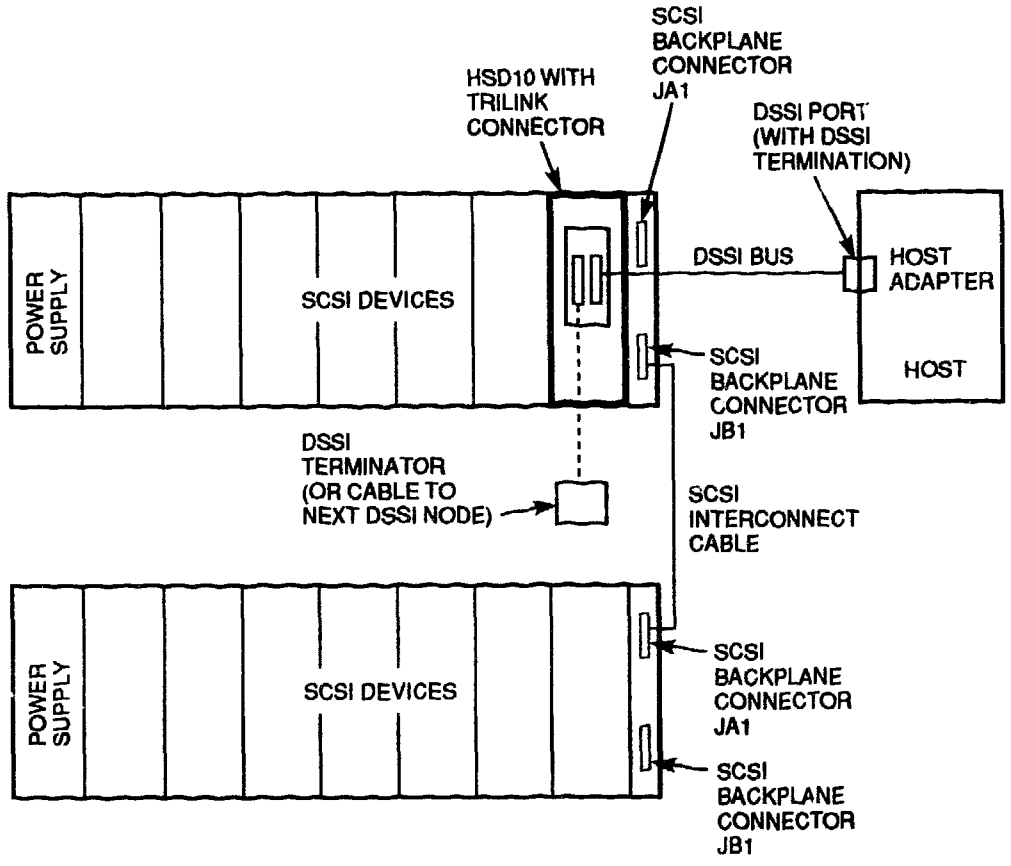
2.4.3 Single-Controller, Dual-Shelf Configuration

The HSD10 supports up to seven SCSI devices, but a maximum of six devices can fit on a single shelf with a power supply and HSD10 installed. Two BA350 shelves can be connected together and their drives served by a single HSD10, as shown in Figure 2–4. This requires a single-ended SCSI cable one meter or less in length, and removal of a SCSI backplane from the shelf containing the HSD10. Refer to the *Storage Works Family Configuration Guide* for additional shelf information.

Configuration Requirements

- HSD10 is installed in slot 0 of first shelf.
- Use SCSI cable type BN21H.
- Maximum of seven devices (even though room exists for more).
- SCSI IDs of drives cannot overlap; each must be unique via shelf slot position or SCSI ID switch setting (if applicable).

Figure 2–4 Single-Controller, Dual-Shelf Configuration



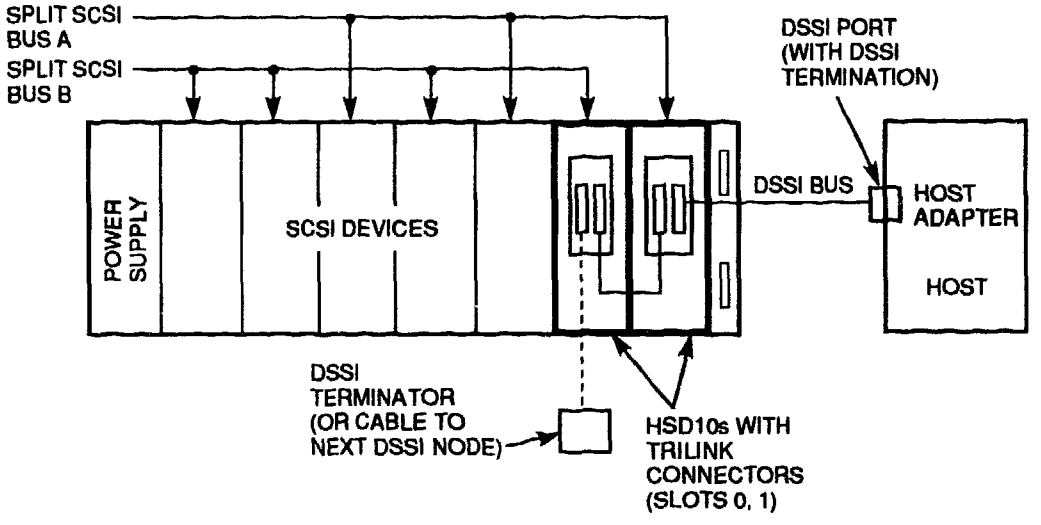
2.4.4 Dual-Controller, Split-Shelf Configuration

The BA350 shelf can be configured as two separate SCSI busses, one with 3 nodes (shelf slots 0, 2, 4), the other with 4 nodes (shelf slots 1, 3, 5, 6) as shown in Figure 2–5. This split-shelf configuration is supported by the HSD10, using either or both resultant busses, and requires swapping of the SCSI backplane terminator and jumper. Refer to the *Storage Works Family Configuration Guide* for additional shelf configuration information.

Configuration Requirements

- HSD10 is installed in shelf slot 0 and/or 1.
- Both SCSI busses must be properly terminated and isolated from each other.
- SCSI backplane terminator and jumper must be swapped.

Figure 2–5 Dual-Controller, Split-Shelf Configuration



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2.4.5 Dual-Controller Failover, Single DSSI Configuration

For added reliability, two HSD10s may share a common SCSI bus and devices attached to that bus. Figure 2–6 illustrates this configuration. When setting up such a configuration, care must be taken to avoid double-terminating the SCSI bus by disabling the SCSI Termination switch in the HSD10 installed in shelf slot 6 (see Section 3.4.1).

Note

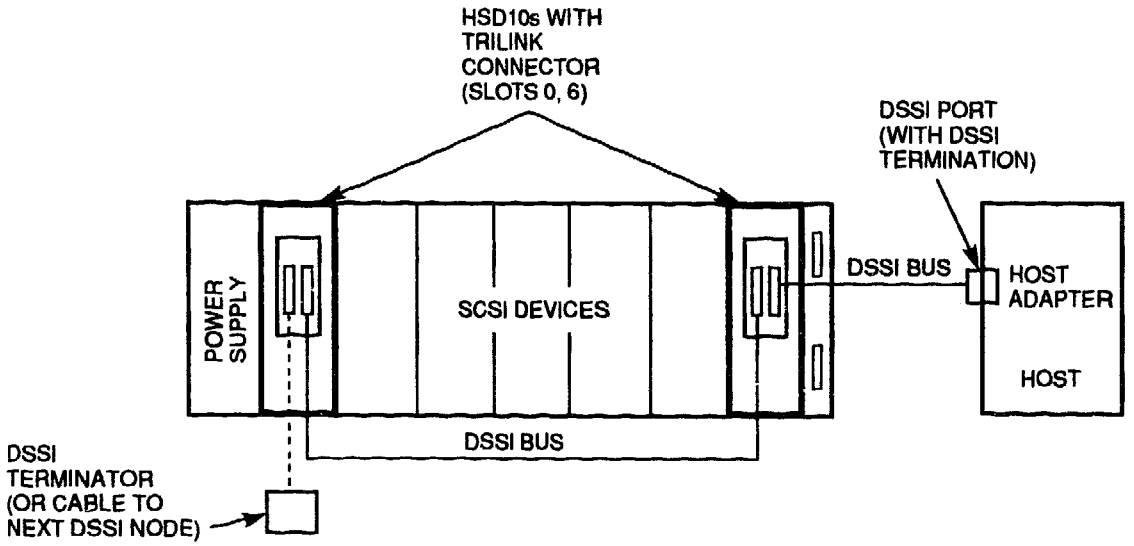
HSD10 array controllers used in failover or redundant configurations require the parameter setting SET CONTROLLER/REDUNDANT=ON. See Appendix B and Chapter 3 for details on setting HSD10 internal parameters.

Configuration Requirements

- HSD10s are installed in shelf slots 0 and 6.
- HSD10 installed in slot 6 must have SCSI termination disabled and SCSI ID set to 6.
- HSD10s must have identical cache configurations.

- HSD10s must have identical parameter settings except node name and system ID (see Section 3.7).

Figure 2–6 Dual-Controller Failover, Single DSSI Configuration



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2.4.6 Dual-Controller Failover, Dual DSSI Configuration

Two HSD10 controllers may be used in conjunction with separate DSSI busses to provide device access with no single points-of-failure in the access path, providing maximum reliability. Figure 2–7 shows this configuration. As with the configuration shown in Figure 2–6, care must be taken to avoid double-terminating the SCSI bus by disabling the SCSI Termination switch in the HSD10 installed in shelf slot 6 (see Section 3.4.1).

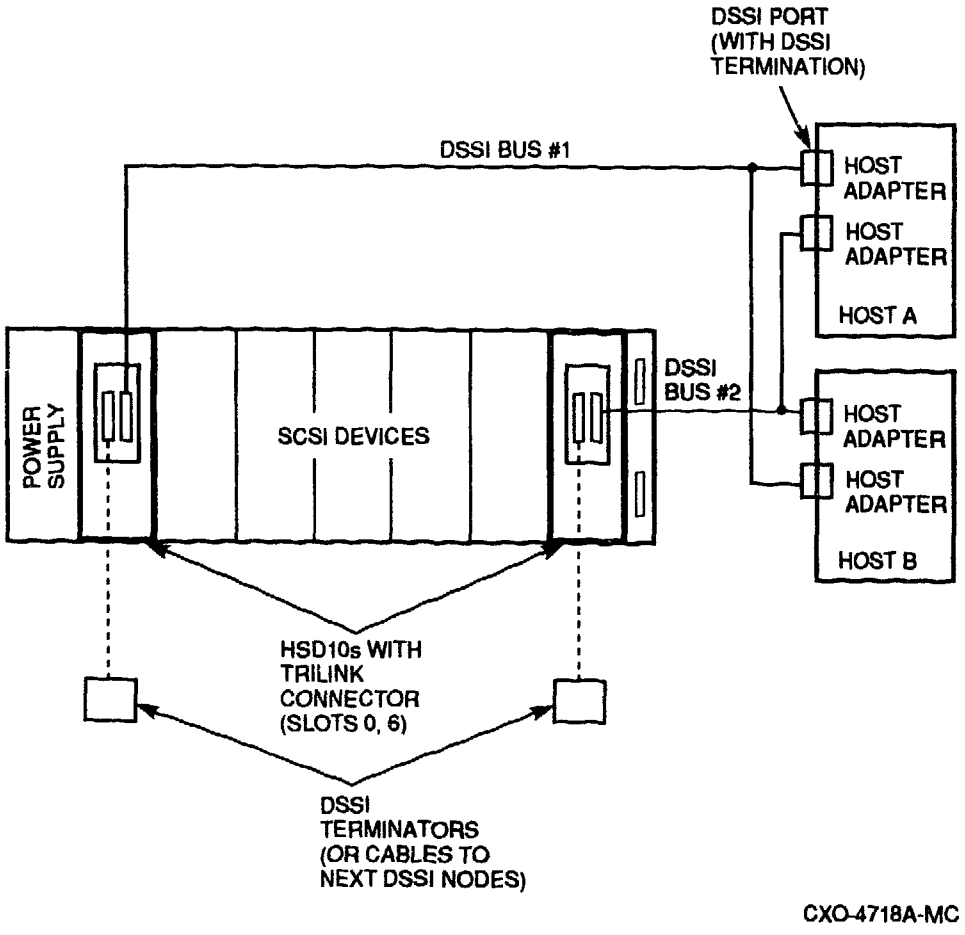
Note

HSD10 array controllers used in failover or redundant configurations require the parameter setting SET CONTROLLER/REDUNDANT=ON. See Appendix B and Chapter 3 for details on setting HSD10 internal parameters.

Configuration Requirements

- HSD10s are installed in shelf slots 0 and 6.
- HSD10 installed in slot 6 must have SCSI termination disabled and SCSI ID set to 6.
- HSD10s must have identical cache configurations.

Figure 2–7 Dual-Controller Failover, Dual DSSI Configuration



- HSD10s must have identical parameter settings except node name and system ID (see Section 3.7).

2.5 Multiple HSD10 Array Controllers on a DSSI Bus

Using multiple HSD10 array controllers on a single DSSI bus is supported. The architectural limit is seven HSD10 controllers and one host on a given DSSI bus, though performance considerations may warrant fewer controllers than this limit.

2.6 HSD10-Served System (Boot) Devices

The system (boot) device may be connected to an HSD10 array controller on supported VAX™ or Alpha™ systems. However, a given drive cannot be used to boot both VAX and Alpha nodes in a mixed-architecture cluster.

Shadowed boot devices may require specification of alternate boot paths to enable autobooting to work properly.

2.7 Unsupported Configurations

This section lists unsupported configurations for the HSD10 controller.

2.7.1 Shadowing Drives of Different Types or Through Different Controllers

Shadow sets composed of drives of different SCSI types are not supported.

Shadow sets of drives configured on unlike controllers are not supported. Drives configured on an HSD10 controller may be shadowed only with drives also configured on an HSD10 controller (see Section 4.3).

2.7.2 Drives Mounted Outside a Shelf

Use of storage devices that are not mountable in a BA350-type shelf is not supported (such as the TZ877™ autoloader).

2.7.3 DWZZA Adapters

Using the HSD10 array controller with the DWZZA (differential SCSI) adapter is not supported.

3

Installing the HSD10 Array Controller

This chapter contains information and procedures for unpacking, configuring, and installing the HSD10 array controller.

3.1 Site Preparation

Site planning and preparation are necessary before installing an HS array controller subsystem. Site preparation activities should have been completed before you received your subsystem order. However, if your planning or preparation was incomplete, complete all required site preparation before you begin the installation process.

WARNING

To prevent damage to equipment and personnel, make sure all power sources meet the specifications required for this equipment.

Your site preparation plan should include:

- Power requirements
- Floor space requirements
- Environmental considerations (such as temperature and humidity)
- Device environment (including maximum altitude for operation and storage)
- Subsystem weight considerations (for floor supports)
- Upgrade considerations (for future subsystem expansion)

Refer to the *StorageWorks SW800-Series Data Center Cabinet Installation Guide* (three phase), the *StorageWorks SW500-Series Cabinet Installation and User's Guide* (single phase), or the *StorageWorks Solutions SW300-Series RAID Enclosure Installation and User's Guide* for details concerning site preparation requirements and unpacking information for your controller's subsystem cabinet.

Using a site preparation plan helps you fulfill the requirements to support your controller subsystem. After verifying that all requirements are met, you are ready to install your controller subsystem.

The following sections contain information you should read before installing your controller subsystem.

3.2 Power and Power Cord Requirements

Before installing your controller subsystem, make sure that the correct power cable for your site is attached to the cabinet's cable distribution unit (CDU), and that the power requirements for your country and your site have been met at the cabinet level.

For specific information about power cord plugs, refer to the StorageWorks cabinet–specific installation and user's guides listed in this chapter.

The HSD10 array controller is fully compatible with all physical, electrical, and environmental specifications for StorageWorks Building Block (SBB) shelves and components. Refer to Section 1.4 for a listing of specifications to be considered when installing or storing the HSD10 array controller.

Environmental Stabilization

To ensure proper operation of Digital storage devices, the SBB shelf temperature must be within 18–29°C (65–85°F). Table 3–1 specifies the time required to thermally stabilize the HSD10 array controller and other SBBs based on the ambient shipping temperature.

CAUTION

Be sure to thermally stabilize the HSD10 array controller in the operating environment prior to installation or operation. Otherwise, the associated electronics may be damaged when power is applied to the unit.

If condensation is visible on the outside of the HSD10 array controller:

Stabilize the HSD10 array controller in the operating environment for 6 hours or until the condensation is no longer visible, whichever is longer. Do not insert the HSD10 array controller into the shelf until it is fully stabilized.

If condensation is not visible on the outside of the HSD10 array controller:

Thermally stabilize the HSD10 array controller for the amount of time specified in Table 3–1.

Table 3–1 Thermal Stabilization Specifications

Ambient Temperature Range °C	Ambient Temperature Range °F	Minimum Stabilization Time
60 to 66	140 to 151	3 hours
50 to 59	122 to 139	2 hours
40 to 49	104 to 121	1 hour
30 to 39	86 to 103	30 minutes
18 to 29	65 to 85	None
10 to 17	50 to 64	30 minutes
0 to 9	32 to 49	1 hour
–10 to –1	14 to 31	2 hours
–20 to –11	–4 to 13	3 hours
–30 to –21	–22 to –5	4 hours
–40 to –31	–40 to –21	5 hours

3.3 Controller/Subsystem Unpacking

This section contains the procedures to unpack the controller subsystem and the HSD10 array controller.

3.3.1 Unpacking Your Subsystem

When delivered, your controller subsystem is packed in a carton and attached to a shipping pallet. Upon receipt of your subsystem, perform the following tasks:

- Check the carton and pallet for signs of shipping damage.
- Report any damage to Digital Multivendor Customer Services or the Digital sales office in your area, and to the local carrier who delivered your equipment.
- Use standard practices found in the StorageWorks model-specific installation and user's guides (listed in the Related Documentation list in the preface of this manual) to unpack and remove your subsystem cabinet from the shipping pallet.
- Keep all packing materials and shipping labels for later use and reference.
- Remove and read your subsystem documentation before beginning the installation process.

3.3.2 Unpacking the HSD10 Array Controller

The HSD10 array controller typically comes preconfigured in a storage subsystem. For sites where this is not the case, use the following procedure to remove the HSD10 array controller from its shipping carton:

1. Before unpacking the HSD10 array controller, inspect the shipping carton for signs of external damage. Report any damage to the local carrier, and to Digital Multivendor Services or your local Digital sales office.
2. Be sure to thermally stabilize the HSD10 array controller as described in Section 3.2 and Table 3–1.
3. After removing the HSD10 array controller from its shipping container, inspect the array controller for signs of external damage. Report any damage to the local carrier, and to Digital Multivendor Services or your local Digital sales office.
4. To prevent damage from electrostatic discharge (ESD), do not touch the HSD10 DSSI or SCSI connectors.

3.4 HSD10 Array Controller Preparation: Switch and Jumper Settings

The HSD10 array controller module board contains bus configuration switches, as shown in Figure 3–1. The switch sections on the configuration switchpack, summarized in Table 3–2, need to be set to configure the HSD10's DSSI ID and the SCSI ID according to the procedures given in Section 3.4.1.

Figure 3–1 Device Configuration Switchpack

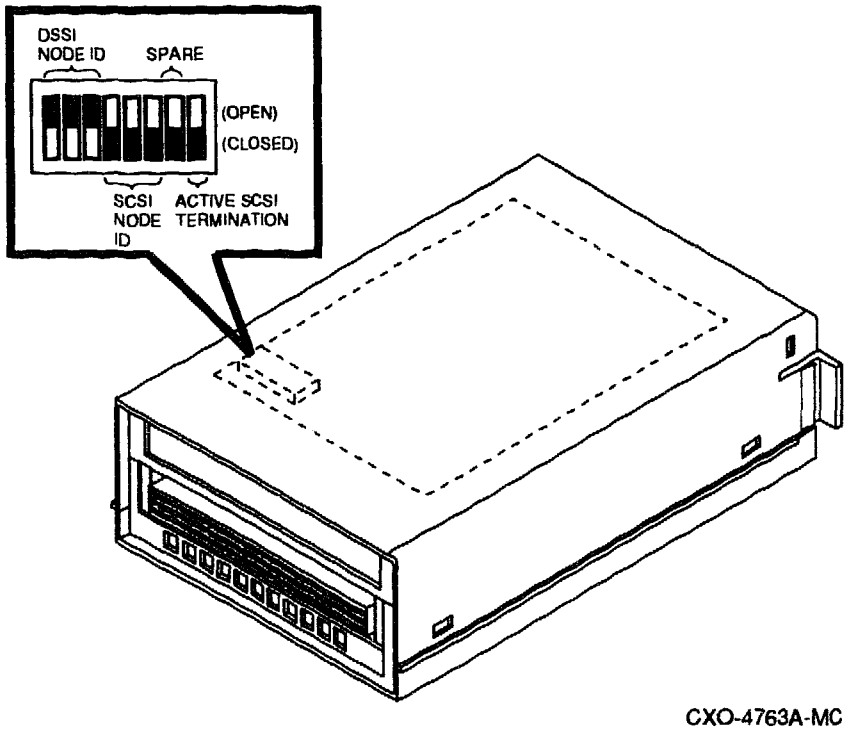


Table 3–2 Device Configuration Switchpack Switches

Switch	Definition	Default
1	MSB of DSSI ID	Open
2	NSB of DSSI ID	Open
3	LSB of DSSI ID	Open
4	MSB of SCSI ID	Closed
5	NSB of SCSI ID	Closed
6	LSB of SCSI ID	Closed
7	Spare	Closed
8	Active SCSI termination	Closed (terminators enabled)

3.4.1 Setting the DSSI/SCSI Configuration on the HSD10 Array Controller

To access the configuration switchpack switches, look through the slot in the back cover of the HSD10 array controller and locate the configuration switchpack, as shown in Figure 3–1.

The device configuration switchpack contains 8 switch elements, divided into DSSI ID and SCSI ID sections as shown in Figure 3–1 and Table 3–2. After determining appropriate values for these IDs for the HSD10, set the corresponding switch elements as described in the following sections.

3.4.2 DSSI ID

The DSSI port on the front panel connects the HSD10 array controller to a standard DSSI bus device, such as a host computer with a DSSI host adapter.

Selecting the DSSI ID

Each device on the DSSI bus requires a unique device address in the range of 0 through 7. The DSSI ID of the HSD10 controller is factory set to 0; you may need to change this ID to one that is currently not being used on your system.

Setting the DSSI ID

Table 3–3 lists the DSSI switches and the corresponding settings for each DSSI ID. On the switchpack, the closed position is with the switch in the down position (closest to the main board), and the open position is with the switch in the up position.

Table 3–3 DSSI ID Switch Settings

DSSI	Switch			
ID	1	2	3	
0	Open	Open	Open	Factory default @DSSI ID=0
1	Open	Open	Closed	
2	Open	Closed	Open	
3	Open	Closed	Closed	
4	Closed	Open	Open	
5	Closed	Open	Closed	
6	Closed	Closed	Open	
7	Closed	Closed	Closed	

Use the following procedure to set the DSSI ID, if required:

1. At the system console prompt, enter the console command SHOW DEVICE on OpenVMS VAX systems, or SHOW CONFIG on OpenVMS Alpha systems, to determine the DSSI ID numbers currently active on the DSSI bus.
2. Select an unused DSSI ID number for the HSD10 array controller.
3. Refer to Figure 3–1 and Table 3–2 to locate the DSSI ID switches on the device configuration switchpack.
4. Using a small blade screwdriver or similar tool, reach through the slot in the rear panel of the HSD10 array controller, and set the switchpack to the DSSI ID number selected in Step 1.

3.4.3 SCSI ID

The SCSI port plugs into the SBB shelf backplane when the HSD10 array controller is installed in the shelf.

Selecting the SCSI ID

Each device on the shelf SCSI bus requires a unique device address in the range of 0 through 7. The HSD10 array controller's SCSI ID is factory set to 7 to give it the highest priority on the SCSI bus. The other devices in the configuration must have SCSI ID numbers between 0 and 6. For normal operation, you should not need to reset the SCSI ID.

Setting the SCSI ID

Table 3–4 lists the SCSI switches and the corresponding sections used to set the SCSI ID. On the switchpack, the closed position is with the switch in the "down" position (closest to the main board), and the open position is with the switch in the "up" position.

Table 3–4 SCSI ID Switch Settings

SCSI ID	Switch 4	Switch 5	Switch 6	
0	Open	Open	Open	
1	Open	Open	Closed	
2	Open	Closed	Open	
3	Open	Closed	Closed	
4	Closed	Open	Open	
5	Closed	Open	Closed	
6	Closed	Closed	Open	
7	Closed	Closed	Closed	Factory default @ SCSI ID = 7

Use the following procedure to set the SCSI ID, if required:

1. Select an unused SCSI ID for the HSD10 array controller.
2. Refer to Figure 3–1 and Table 3–2 to locate the SCSI ID switches on the node configuration switchpack.
3. Using a small blade screwdriver or similar tool, reach through the slot in the rear panel of the HSD10 array controller and set the switchpack to the SCSI ID number selected in Step 2.

3.4.4 Selecting Bus Termination

DSSI and SCSI bus rules require that these buses be terminated at both physical ends.

The DSSI bus can be terminated externally by using a terminator on the DSSI trilink connector (shown in Figure 3–2), supplied with the HSD10 array controller. Because the HSD10 array controller typically occupies one end of the DSSI bus, this terminator is normally installed. Make sure that the other (host) end of the DSSI bus is properly terminated.

Note

The DSSI bus uses two types of connectors: either a microribbon connector or a tab-and-socket connector. If you are connecting to a KFMSA or KFESA host adapter, the cable will have microribbon connectors at both ends. Other host adapters typically use a tab-and-socket connector. The trilink has two microribbon connectors.

Selecting termination on the SCSI bus is dependent on the exact configuration of the SBB shelf in the chain of SCSI devices. The HSD10 array controller is shipped with active SCSI bus termination enabled. When installed in SBB shelf slot 0, it provides termination at the HSD10 array controller end of the SCSI bus. Make sure that the other end of the SCSI bus also is terminated properly using a backplane terminating module.

Refer to the StorageWorks documentation for the rules used to select terminations on the SCSI bus. Section 2.4 contains diagrams of some typical installations of the HSD10 array controller.

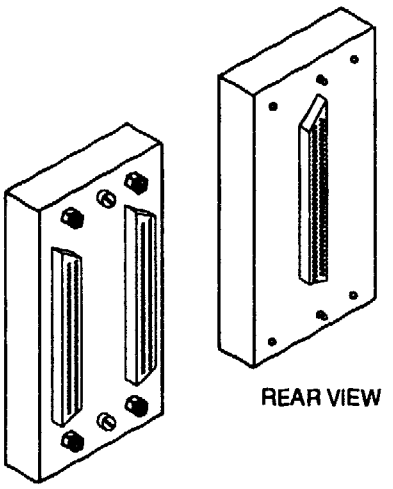
3.4.5 Cache Module Jumper

HSD10 models that include 16 or 32 megabytes of data cache have a jumper connection that sets the accessible cache memory size. The jumper, W1, is located on the cache daughterboard for 16 megabyte models. The jumper should be absent for 32 megabyte models. The jumper setting is preset and should not be changed.

3.5 Installing the HSD10 Array Controller in an SBB Shelf

Before starting this procedure, verify that the SBB shelf receiving the HSD10 array controller is the correct one, and that it is permissible to change any SCSI cables connected to JA1 and JB1 of the shelf to suit the planned configuration.

Figure 3–2 DSSI Trilink Connector



In a standard configuration, the HSD10 array controller should be installed in shelf slot 0. SCSI bus integrity can be compromised if the HSD10 array controller is installed in any other slot of a standard SBB shelf. The only exceptions are a split–shelf configuration or a redundant (failover) configuration. Chapter 2 contains additional information on such configurations. Refer to the StorageWorks documentation for further information on selecting an SBB slot and on cable configuration rules for the SBB shelf.

Installation Procedure

Use the following procedure to install the HSD10 array controller in the SBB shelf in a standard single-controller configuration:

1. Remove power from the shelf by removing the input power cables to the power supply SBBs in the shelf. If there is only one power supply SBB in the shelf, it will be in slot 7.
2. For single-shelf HSD10 array controller configurations, disconnect any cables at JA1 and JB1 of the shelf.
3. For dual-shelf HSD10 array controller configurations, see Figure 2–4 for a diagram showing interconnected shelves.
4. Insert the HSD10 array controller into shelf slot 0.
5. If the plastic collar guide has been removed or is absent from the 68 pin DSSI connector on the HSD10, take all DSSI nodes off line to remove power from the DSSI bus that will be connected to the HSD10 array controller.

CAUTION

Make sure that the trilink connector pins are not bent or damaged before installing it on the HSD10 array controller.

6. Install a DSSI trilink connector (part number 12–39921–02), shown in Figure 3–2, at J1 on the front panel of the HSD10 array controller.
7. Connect the DSSI cables to the trilink connector as directed in either of the the following:
   - If the HSD10 array controller occupies one end of the DSSI bus, connect the DSSI cable to one of the connectors on the trilink. Install a DSSI bus terminator (part number 12–31281–01) on the other trilink connector.
   - If the HSD10 array controller occupies a mid-point of the DSSI bus, connect the DSSI bus cables from adjacent nodes to the trilink connectors. The DSSI bus terminator is not used on the trilink in this configuration.

   Section 2.4 shows several typical HSD10 array controller cable configurations.
8. Restore power to the DSSI bus nodes, but do not boot the host systems at this time.

3.6 HSD10 Powerup and LED Indicators

Apply power to the SBB shelf and the HSD10 array controller as follows:

1. Connect the input power cables to the power supply SBBs in the shelf.
2. Verify that the Shelf Status indicator on the power supply SBB is lit. If this indicator is not lit, refer to the StorageWorks documentation to troubleshoot the cause of the fault.
3. Verify that the following HSD10 array controller indicators, visible from top to bottom on the front panel, are as follows:

Indicator	Color	Status
DS3	Green	On to show that termination power, supplied by either the HSD10 array controller or the SBB shelf, is applied to the SCSI bus
DS2	Green	Blinks during normal operation while the subsystem is booted.
DS1	Amber	Blinks for 10 seconds during module boot. If this indicator blinks for longer than 10 seconds, there is a device fault.

Note

Indicators DS1 and DS2 may blink randomly for a few moments when power is first applied, prior to the 10 second boot sequence. This is considered normal.

3.7 Setting Parameters on the HSD10 Array Controller

The OpenVMS Diagnostic and Utility Protocol (DUP) utility and the 6-pin serial communications port on the front panel provide a gateway to modifying HSD10 array controller parameters. The front panel communications port can be used for connection to a VCS (Virtual Console System) console. Parameter settings can be made this way if desired. You can run the DUP utility from either the system console or from the OpenVMS system prompt.

Note

HSD10 controllers normally come preconfigured in a storage subsystem and require no parameter changes except to suit specific customer requirements. Non-preconfigured HSD10 controllers require use of the front panel communications port to enable logical connection to the DSSI and SCSI buses; see the SET PORT command in Appendix B.

Once a connection to the HSD10 array controller command utility is established, it is used to set and show HSD10 parameters. Chapter 4 contains procedures for using the HSD10 onboard command utility during normal operation and maintenance of the subsystem.

In the following sections, user input is shown in **boldface** type in the examples.

3.7.1 Starting the HSD10 Command Utility from the Console Prompt on OpenVMS VAX Systems

Use the following procedure to start the HSD10 Command Utility from the console prompt on OpenVMS VAX systems using DUP:

1. At the console prompt, enter the SHOW DEVICE command as shown in the following example:

```
>>> SHOW DEVICE
DSSI Node ID 0 (DSSI nodename) ❶

DSSI NODE ID 5 (*)

UQSSP Disk Controller 0 (772150)
-DUA0 (RA82)

Ethernet Adapter
-ESA0 (08-00-2B-13-80-85)
```

❶ This is the HSD10 array controller. The *DSSI nodename* is initially a six-digit number. Do not confuse this number with the DSSI ID value.

2. Depending upon your installation, enter one of the following two command lines to use the DUP utility to establish a connection to the HSD10 array controller:

```
>>> SET HOST/DUP/DSSI a
Starting DUP server...

    Copyright 1995, Digital  All rights reserved

DIRECT V1.0  D  08-17-93 11:50:00
PARAMS V1.0  D  08-17-93 10:50:01

End of directory

Task Name?
```

where *a* is the DSSI ID of the HSD10 array controller.

You may have to explicitly specify the DSSI bus (0 or 1) to properly establish a connection to the HSD10 array controller. In such cases use the following command line:

```
>>> SET HOST/DUP/DSSI/BUS:n a
Starting DUP server...

    Copyright 1995, Digital  All rights reserved

DIRECT V1.0  D  08-17-93 11:50:00
PARAMS V1.0  D  08-17-93 10:50:01

End of directory

Task Name?
```

where:
n is the DSSI bus ID number (0 or 1).
a is the DSSI ID for the HSD10 array controller.

3. At the "Task Name?" prompt, enter PARAMS. If you do not see the "Task Name?" prompt, DUP has not established a connection to the HSD10 array controller. In this event, see your system manager.
4. At the nodename prompt, see Section 3.7.4 to configure HSD10 parameters.

3.7.2 Starting the HSD10 Command Utility from the Console Prompt on OpenVMS Alpha Systems

Use the following procedure to start the HSD10 Command Utility from the console prompt on OpenVMS Alpha systems using DUP:

1. Use the console SHOW DEVICE and SHOW CONFIGURATION commands to help determine the device name needed to access the HSD10. This device name will be of the format PUan1.n2.n3.n4.n5, where:

   a = adapter designator
   n1 = device unit number
   n2 = bus node number
   n3 = channel number
   n4 = slot number
   n5 = hose number

   See your system manager for more information on the use of the format.

2. Enter the following command to use the DUP utility to establish a connection to the HSD10 array controller:

   ```
   >>> SET HOST -DUP d
   ```

   where *d* is the console device name for the HSD10 array controller, as determined in step 1.

   The following command line shows an example of this entry:

   ```
   >>> SET HOST -DUP PUC0.4.0.2.0
   Starting DUP server...

       Copyright 1995, Digital  All rights reserved

   DIRECT V1.0  D  08-17-93 11:50:00
   PARAMS V1.0  D  08-17-93 10:50:01

   End of directory

   Task?
   ```

3. At the "Task?" prompt, enter PARAMS. If you do not see the "Task?" prompt, DUP has not established a connection to the HSD10 array controller. In this event, see your system manager.
4. At the node name prompt, see Section 3.7.4 to configure HSD10 parameters.

3.7.3 Starting the HSD10 Command Utility from the Serial Communications Port

The RS-232 compatible serial communications port on the front panel of the HSD10 controller requires no special starting sequence. Ensure that no DUP connection exists to the HSD10, and set the VCS or terminal communications port of the connecting terminal as follows:

- Set baud rate to 9600
- Set data bits to 8
- Set stop bit to 1
- Set parity to none

Once communications through the serial port are established, the HSD10 responds with a nodename prompt, ready to accept command utility commands.

3.7.4 HSD10 Command Utility Summary of Commands

The HSD10 Command Utility is comprised of commands to set HSD10 and device operating characteristics, define device mapping to hosts, and display current environment information. This utility is accessed via DUP using a task name of PARAMS, or via the serial communications port.

Appendix B describes the HSD10 Command Utility command set in detail, including information on allowed parameters and qualifiers. Table 3–5 summarizes this command set and indicates default parameter values.

Table 3–5 HSD10 Command Utility Summary

Command	Description	Parameter/Default (if applicable)
ABORT	Ends a maintenance operation.	
ADD STRIPESET	Groups a set of disk drives under a logical stripeset name.	
AUTOCONFIG	Scans the SCSI bus connected to the HSD10 and assigns physical names to the devices found.	
CLEAR DSSI_STATS	Resets DSSI statistics counters to zero.	
CREATE DISK	Assigns a physical name to a single disk device.	
CREATE STRIPESET	Creates a logical name for a stripeset.	
CREATE TAPE	Assigns a physical name to a single tape device.	
DELETE DISK	Deletes the physical name for a disk device.	

(continued on next page)

Table 3–5 (Cont.) HSD10 Command Utility Summary

Command	Description	Parameter/Default (if applicable)
DELETE STRIPESET	Deletes a logical stripeset name.	
DELETE TAPE	Deletes the physical name for a tape device.	
DELETE UNIT	Deletes a (T)MSCP device name.	
DESELECT	Returns a device to the pool of physical devices.	
DISKTEST	Initiates the disk test utility.	
EXIT	Exits the Command Utility.	
FACTORY	Restores all controller and device configuration settings to their factory defaults.	
FORMAT	Initiates the disk drive format utility.	
HELP	Outputs a command utility help screen.	
INITIALIZE STRIPESET	Initializes the controller's internal striping mechanisms for the specified stripeset.	/CHUNKSIZE = 1 (chunk of 4096 bytes)
MAP UNIT	Assigns an MSCP device name to a disk device or a TMSCP device name to a tape device.	
MONITOR DSSI_STATS	Displays the DSSI Statistics screen (serial communications port only).	
QUALIFY	Initiates the qualify utility.	
QUIESCE	Pauses SCSI bus activity on all devices attached to the HSD10.	
QUIT	Exits the Command Utility.	
RENAME UNIT	Renames a (T)MSCP device name.	
RESET SCSI_BUS	Forces a reset on the HSD10's SCSI bus.	
RESTART	Forces a reboot of the controller.	
RESUME	Resumes activity on the quiesced SCSI bus.	
SELECT	Selects a disk or tape device for maintenance and removes it from the pool of physical devices.	

(continued on next page)

Table 3–5 (Cont.) HSD10 Command Utility Summary

Command	Description	Parameter/Default (if applicable)
SET CONTROLLER [1]	Sets controller-specific configuration values.	/DEVICE_TYPE = HS (HSX00/HST00) /DISK_ALCS = 0 /MAX_HOSTS = 7 /NODENAME = 211072 + module serial number /SPINUPDELAY = 5 (seconds) /SYSTEM_ID = same as NODENAME /TAPE_ALCS = 0
SET DISK	Divides a disk drive into up to eight partitions.	
SET PORT	Sets port-specific configuration values.	/ENABLE /DISABLE /POWER_ON_RESET = ON
SET STRIPESET	Divides a stripeset into up to eight partitions.	
SET UNIT	Sets various device-specific configuration values.	/CACHE = (Set) /DISCONNECT = (Set) /FAST_SEARCH /IMMEDIATE = (Set) /OFFLINE /ONLINE = (Set) /SHORT_TMARK = (Set) /SPINDOWN = (Set) /SYNC = 10 (MB/sec) /TAGGING = (Set) /TRUNCATE = (Set) /WRPROT /NOCACHE /NODISCONNECT /NOFAST_SEARCH = (Set) /NOIMMEDIATE /NO_SHORT_TMARK /NOSPINDOWN /NOTAGGING /NOTRUNCATE /NOWRPROT = (Set)
SHOW ALL	Combines all the HSD10's SHOW commands into one display.	
SHOW CLUSTER	Displays the status of all nodes in the DSSI cluster.	
SHOW CONTROLLER	Displays a snapshot of information about the controller.	
SHOW DEVICES	Combines the displays from the SHOW DISK, SHOW STRIPESETS, SHOW TAPE, and SHOW UNIT commands.	

[1]Rebooting the system hosts is required whenever any SET CONTROLLER parameter is modified.

(continued on next page)

Table 3–5 (Cont.) HSD10 Command Utility Summary

Command	Description	Parameter/Default (if applicable)
SHOW DISK	Displays a listing of all physical disk device names assigned with the CREATE DISK or AUTOCONFIG commands.	
SHOW DSSI_STATS	Displays a snapshot showing the DSSI statistics at the moment the command is issued.	
SHOW MAINTENANCE	Shows the status of all devices under maintenance.	
SHOW STATS	Same as SHOW DSSI_STATS.	
SHOW STRIPESETS	Displays information about all logical stripesets.	
SHOW TAPES	Displays a listing of all physical tape devices created with the CREATE TAPE or AUTOCONFIG commands.	
SHOW UNIT	Displays information about all devices mapped to (T)MSCP device names.	
TAPETEST	Initiates the controller's tape test utility.	

Note

Digital strongly recommends maintaining a hardcopy listing of current HSD10 parameter settings, particularly those set by the SET CONTROLLER command. This may be useful in recovering from hardware or other failure.

3.7.4.1 Displaying HSD10 Device Parameters

To display the device parameters, enter SHOW ALL at the configuration utility prompt. A sample display with no devices "mapped" to the system is shown in the following example.

```
211072> SHOW ALL

    Controller  HSD10
        Serial No.: 1                       Firmware Revision: B158
        Date/Time: 01-JAN-1990 00:00:00     Uptime:  0 DAYS  00:00:00
        Processor DRAM size:  1   MB        Processor Free Pool:  354 KB
        Device Type    = HS                 Spinup Delay = 5 Seconds
        Redundant Mode = OFF

    SCS Parameters
        Nodename:  211072       System ID: 211072
        DISK_ALCS: 0            TAPE_ALCS: 0
        MAX_HOSTS: 7            DATREQ_PR: LOW
```

```
    Cache
         16 MB read cache
    Ports
        Port 0:   DSSI, id= 0
        Port 1:   SCSI, id= 7, power_on_reset=ON
211072> SHOW DEVICES

No Disks Found.

No Stripe sets Found.

No Tapes Found.

No Units Found.

211072>
```

3.7.4.2 Setting HSD10 Device Parameters

Use the following procedure to set new device parameters:

1. At the nodename prompt, enter the parameters you wish to change, as shown in the following example:

   ```
   211072> SET CONTROLLER/NODENAME = HSD5
   211072> SET CONTROLLER/DISK_ALCS = 10
   ```

   In this example, the NODENAME has been changed to HSD5 and the DISK_ ALCS parameter set to 10.

2. Enter the SHOW ALL command to display your changed parameters.
3. Reboot the HSD10 array controller to use the new parameters:

   ```
   211072> RESTART
   ```

4. If any SET CONTROLLER parameters were modified (as in this example), reboot the host systems.

3.7.5 Mapping Devices to OpenVMS Systems

SCSI devices attached to the HSD10 are not automatically made visible to the host, but must be "mapped" to OpenVMS by the user. This mapping allows translation of physical device names known by the HSD10, to MSCP/TMSCP device names that are visible at the host level.

Physical device names follow the format of *Dpil* or *Tpil*, where D identifies a disk and T a tape. The other identifiers in the format are p = port, i = SCSI ID, and l = LUN (logical unit number). In normal HSD10 usage, p is always 1 (specifying the SCSI port), and l is usually 0.

3.7.5.1 AUTOCONFIG to Scan SCSI Bus

The first step in device mapping is to scan the HSD10's SCSI bus for attached devices. This is done by issuing the AUTOCONFIG command as shown. Devices found will be listed with their physical names:

```
HSD102> AUTOCONFIG/LOG
Scanning SCSI Port 1 ...
```

```
Creating Type   Inquiry Data                          Device Attributes
-------------------------------------------------------------------------
D160     DISK   DEC      RZ26L     440C              Sync TagQ
D150     DISK   DEC      RZ28B     0003              Sync TagQ
D140     DISK   DEC      RZ26      T386              Sync TagQ
D130     DISK   DEC      RZ28      D41C              Sync TagQ
D120     DISK   DEC      RZ26      392A              Sync TagQ
D110     DISK   DEC      RZ26      T386              Sync TagQ
HSD102>
```

3.7.5.2 MAP UNIT to Map Physical Device Names to MSCP Device Names

The second step in device mapping is the MAP UNIT command, which performs the physical device/MSCP device mapping. This must be done for each SCSI device to be made visible to the host.

```
HSD102> MAP UNIT D130 DUA2130
HSD102> MAP UNIT D140 DUA2140
HSD102> SHOW UNIT
Name       Member    Status    Host      Set-members/Modifiers
-------------------------------------------------------------------------
DUA2130    D130 (1)  AVAIL               online, cache, disconnect,
                                         immediate, tagging, truncate,
                                         spindown, sync_rate=10

DUA2140    D140 (1)  AVAIL               online, cache, disconnect,
                                         immediate, tagging, truncate,
                                         spindown, sync_rate=10

HSD102>
```

Device mapping will be maintained across HSD10 restarts (reboots) and power up/power down cycles.

3.8 Controller-Based Stripesets

The HSD10 includes controller-based RAID 0 or stripeset capability. If such stripesets are desired, they are established at device map time. Refer to Appendix B for more information on the CREATE STRIPESET, ADD STRIPESET, INITIALIZE STRIPESET, DELETE STRIPESET and SHOW STRIPESET commands. The following examples are of stripeset creation.

Stripesets may be partitioned using the SET STRIPESET command. However creation of stripesets out of partitions is not supported.

```
NODE>  CREATE DISK D130 D100 D140

Creating   Type   Inquiry Data                  Device Attributes
-------------------------------------------------------------------
D130       DISK   DEC      DSP3107    440c     Sync TagQue
D100       DISK   DEC      DSP3107    440c     Sync TagQue
D140       DISK   DEC      DSP3107    440c     Sync TagQue

NODE> CREATE STRIPESET S0

Stripeset S0 has been created

NODE> ADD STRIPESET S0 D130 D100 D140

Added device D130 to stripeset s0
Added device D100 to stripeset s0
Added device D140 to stripeset s0


NODE> INITIALIZE STRIPESET S0
```

```
Stripeset initialized
NODE> MAP UNIT S0 DUA1020
Stripeset has been mapped to DUA1020
```

3.9 Disk Partitioning

The HSD10 includes disk and stripeset partitioning capability. This allows increased flexibility in the creation of storage units, according to application needs. Each disk or stripeset can be partitioned into up to 8 equally-sized units; refer to the SET DISK, SET STRIPESET, and MAP UNIT commands in Appendix B. An example of partitioning is shown here.

Note that characteristics specified using the SET UNIT command will affect all partitions generated from the unit.

```
HSD102> MAP UNIT D150 DUA2801/PARTITION=1
HSD102> MAP UNIT D150 DUA2801/PARTITION=2
HSD102> SHO UNIT
Name       Member    Status    Host      Set-members/Modifiers
-------------------------------------------------------------------------
DUA2801    D150 (1)  AVAIL               online, cache, disconnect,
                                         immediate, tagging, truncate,
                                         spindown, sync_rate=10
DUA2802    D150 (2)  AVAIL               online, cache, disconnect,
                                         immediate, tagging, truncate,
                                         spindown, sync_rate=10
HSD102>
```

4

Operating and Maintaining the HSD10 Array Controller

This chapter contains information on procedures used in the everyday operation of the HSD10 array controller, including device maintenance utilities, operational restrictions, troubleshooting procedures, and a replacement procedure for the HSD10 controller. Basic instructions on updating HSD10 firmware also are included.

4.1 HSD10 Command Utility Maintenance Operations

Chapter 3 introduced the HSD10 Command Utility, providing a means of setting and displaying operational parameters. It also provides commands to qualify, format, and exercise attached SCSI devices directly from the HSD10. Procedures to use these maintenance commands are described in this section.

Devices are referenced at the HSD10 level by physical device names (using templates *D1il* and *T1il*). These names are used with device commands described in this section. Do not confuse these with the "mapped" MSCP/TMSCP names that the HSD10 presents to the host systems.

4.1.1 Formatting and Qualifying a SCSI Drive

You can format a specified device that is AVAILABLE to the HSD10 array controller using the FORMAT command. After the format operation is completed, you should use the QUALIFY command to verify that the device is ready for use. You should also run the DISKTEST procedure given in Section 4.1.2 and Appendix B to further test the drive before it is returned to service.

Format and Qualify Task Procedure

Use the following procedure to format and qualify a specified device:

1. At the node name prompt, enter the SHOW UNIT command to determine device status.
2. If the device status is not AVAILABLE, enter the appropriate operating system commands to make the device available to the HSD10 array controller.
3. At the node name prompt, enter the SELECT command and specify a physical device name.
4. Verify that the device status has changed to MAINT using the SHOW UNIT command.
5. Enter the FORMAT command and specify the physical device name of the device to be formatted.
6. At the verification prompt, check that the device name given under the Device header of the FORMAT display is the device that you need to format. Answer "Y" or "YES" to begin the format operation.

7. Monitor the status of the format operation using the SHOW MAINTENANCE command. When the status changes back to IDLE, the format operation is complete.
8. Enter the QUALIFY command to begin the qualify operation.
9. At the verification prompt, check that the device name given under the Device header of the QUALIFY display is the device that you need to format. Answer "Y" or "YES" to begin the qualify operation.
10. Monitor the pass counter of the SHOW MAINTENANCE command display until one or more passes have been completed by the utility.
11. Enter the ABORT command to terminate the qualify operation.
12. Enter the DESELECT command to bring the device back to the AVAILABLE status.
13. Enter the appropriate operating system commands to bring the device on line.

4.1.2 Exercising a Disk Device

You can exercise a disk device using the HSD10 Command Utility DISKTEST command. This exercise can be done as part of a FORMAT/QUALIFY operation, or to verify the performance of the device while troubleshooting the system.

DISKTEST Task Procedure

Use the following task procedure to exercise a specified disk device:

1. At the node name prompt, enter the SHOW UNIT command with the *device_name* qualifier to determine device status.
2. If the device status is not AVAILABLE, enter the appropriate operating system commands to make the device available to the HSD10 array controller.
3. At the node name prompt, enter the SELECT command and specify a physical device name.
4. Verify that the device status has changed to MAINT using the SHOW UNIT command.
5. Enter the DISKTEST command and specify the physical device name of the device to be exercised.
6. At the verification prompt, check that the device name given under the Device header of the DISKTEST display is the device that you need to exercise. Answer "Y" or "YES" to begin the device exercise.
7. Monitor the pass counter of the SHOW MAINTENANCE command display until one or more passes have been completed by the utility.
8. Enter the ABORT command to terminate the DISKTEST operation.
9. Enter the DESELECT command to bring the device back to the AVAILABLE status.
10. Enter the appropriate operating system commands to bring the device on line.

4.1.3 Exercising a Tape Device

You can exercise a tape device using the HSD10 Command Utility TAPETEST command. This exercise can be done as part of a FORMAT/QUALIFY operation, or to verify the performance of the device while troubleshooting the system.

TAPETEST Task Procedure

Use the following procedure to exercise a specified tape device:

1. At the node name prompt, enter the SHOW UNIT command to determine device status.
2. If the device status is not AVAILABLE, enter the appropriate operating system commands to make the device available to the HSD10 array controller.
3. At the node name prompt, enter the SELECT command and specify a physical device name.
4. Verify that the device status has changed to MAINT using the SHOW UNIT COMMAND.
5. Verify that the tape device to be exercised contains a scratch tape that can be overwritten by TAPETEST.
6. Enter the TAPETEST command and specify the physical device name of the device to be exercised.
7. At the verification prompt, check that the device name given under the Device header of the TAPETEST display is the device that you need to exercise. Answer "Y" or "YES" to begin the device exercise.
8. Enter the ABORT command to terminate the TAPETEST operation.
9. Enter the DESELECT command to bring the device back to the AVAILABLE status.
10. Enter the appropriate operating system commands to bring the device on line.

4.2 Transporting Drives to/from the HSD10 Environment

Nonstriped, nonpartitioned disk drives written while configured on the HSD10 controller may be physically transported directly to the environments listed below, if they are identified as DIAx devices (as a result of the HSD10 DEVICE_TYPE parameter set to 'HS' or 'RF'):

- HSD30™, HSJ40™, or HSC controllers (equipped with Kscsi modules), and with drives mounted in 'DK' mode
- Other native SCSI adapters

Nonstriped, nonpartitioned drives also can be read and written interchangeably between the HSD10 and HSD05 controllers, as long as the equivalent DEVICE_TYPE parameter settings match.

No other direct media transportability is supported to/from the HSD10 and other environments. Data transportability also can be accomplished by transferring files over the local network or to another transportable medium such as tape.

Drives attached to the HSD10 may be warm swapped, that is, removed or inserted when the SCSI bus is quiesced, using the QUIESCE command.

4.3 Shadowing Restrictions

The HSD10 controller uses a limited set of disk device type identification names when communicating with the host. All attached disk drives by default are identified as HSX00. This identifier can be changed to RA82™ or RF72™ by setting an HSD10 parameter, DEVICE_TYPE, as described in Appendix B under the SET CONTROLLER command. The device type reported to the host does not affect actual accessible disk storage space.

The HSD10 controller supports host-based volume shadowing (host-based RAID 1). Shadowing requires that members of a shadow set have identical device identifiers and disk capacities. Although disk drives on the HSD10 controller may be identified as RF72, they are not identical to an RF72 in capacity or geometry; therefore, *disk drives attached to HSD10 controllers can only be shadowed with identical SCSI drive types.* They may not be shadowed with true RF72 disk drives or with any other disk drive types. For example, if the first member of a HSD10-configured shadow set is an RZ28 disk drive, all other members of the shadow set also must be RZ28 disk drives.

Shadow sets may be composed of drives on different HSD10 controllers, on the same or different DSSI buses, as long as they are part of the same system or cluster. However, *drives attached to an HSD10 controller cannot be shadowed with drives attached to a non-HSD10 controller.* For example, a drive configured on a local SCSI adapter or on an HSC/HSJ-family controller may not be shadowed with a drive on an HSD10 controller, even if it's an identical drive type.

4.4 Using Tape Drives

The HSD10 controller uses two possible tape device type identification names when communicating with the host. All attached tape drives are by default identified as HST00; alternatively they may be identified as TU81™. The device type reported to the host does not affect actual accessible tape storage space.

For tape devices that support multiple densities, density selection is made using the /DENSITY modifier in DCL INIT and MOUNT commands. To select the noncompacted density, use /DENSITY=1600; to select the compacted density, use /DENSITY=6250. The selected density will be shown in a SHOW DEVICE display. The MEDIA_FORMAT=COMPACTION qualifier for the DCL INIT and MOUNT commands is not used for HSD10-served drives.

Note that the HSD10 controller always operates cache-capable tape devices in cached mode, regardless of the setting of the MOUNT/CACHE=TAPE command.

4.5 Using HSD10 Controllers with KFQSA Host Adapters

The KFQSA Q-bus to DSSI host adapter is architecturally unique among Digital's DSSI adapters, in that each of its DSSI nodes must be designated as either a disk-serving node or a tape-serving node. This restriction is normally transparent, but can be a factor when attaching an HSD10 controller (or any HSD controller family member), as the HSD10 controller can serve disks and tapes simultaneously.

When configuring a system that utilizes a KFQSA host adapter connected to an HSD10 controller, ensure that the HSD10 controller's DSSI node on the KFQSA is defined for the desired device type (disk or tape), and that only such devices are attached to the HSD10 controller. Devices not of the specified type will not be visible to the host.

4.6 HSD10 Host-Based RAID Support

The following host-based Redundant Array of Independent Disks (RAID) environments are available for the HSD10 controller:

- POLYCENTER Striping for OpenVMS VAX (RAID 0)
- DEC Disk Striping for Alpha (RAID 0)
- Volume Shadowing™ Software for OpenVMS (Phase II Shadowing—RAID 1)
- StorageWorks RAID Software for OpenVMS (RAID 0 and RAID 5)
- StorageWorks Volume Shadowing Software for OpenVMS (RAID 1)

4.7 Accessing HSD10 Command Utility from the VAX 6000 System Console

The SET HOST/DUP/DSSI command as specified in the Chapter 3 will not work for VAX 6000 consoles; a direct link to the DUP utility is not available. For these systems, it is suggested that the HSD10 Command Utility be accessed from OpenVMS or via the serial communications port. If an HSD10 controller is being reconfigured by changing its internal parameters, it is recommended that the host VAX 6000 system be rebooted after the changes are made to ensure consistency with the modified HSD10 state.

4.8 HSD10 Firmware Upgrade (Flash Boot) Utility

The HSD10 controller is equipped with the ability to accept firmware upgrades via the serial communications port on the front panel. It is called the Flash Boot Utility and executes upon powerup and HSD10 restarts. When invoked, it permits firmware downloading and modification of the serial port baud rate.

Basic instructions for performing an upgrade are presented below; however, upgrades are typically done by Digital service personnel. Upgrading the HSD10 should not be attempted by the user except under direction by a service representative.

4.8.1 Upgrade Prerequisites

To download firmware to the HSD10, some external system with an RS232-compatible serial interface is required. The system must have a communications application that handshakes with the HSD10 and handles the source end of the image transaction. Examples of such systems are a personal computer with an available serial port (COM1, COM2, and so forth), or a VAX system containing hardware to support a DTE terminal port. Specific system setup and operating information is beyond the scope of this guide.

With an appropriate interface system connected to the HSD10 using a standard 6-conductor DECconnect cable, ensure that the following requirements are met before attempting an upgrade. It is not necessary to disconnect the HSD10 from the DSSI or SCSI buses.

- All drives served by the HSD10 must be dismounted.
- Any DUP connections to the HSD10 must be exited.
- Put the upgrade image file in a directory accessible by the external communication system.

- Configure the external communication system to the following parameters:
  - 9600 baud
  - 8 data bits
  - 1 stop bit
  - no parity
  - If 'Flow Control' parameter is available, set to Xon/Xoff
- The external communication system must not intercept a control-C (Ctrl/C) character, as this is needed by the Flash Boot Utility.

4.8.2 Flash Boot Utility Update Procedure

Use the following procedure to update HSD10 firmware. If any errors occur during the update sequence, and retries continue to fail, contact your Digital service representative.

1. Verify that your external communication system is communicating with the HSD10 by pressing Return one or more times; the HSD10's prompt (node name followed by '>') should be visible.
2. Enter the RESTART command; the HSD10 will respond with "Are you sure? (y/n)" To enter Update Mode you must enter 'Y' (omit quotes), press Return, then press Ctrl/C within 3 seconds. If you wait too long, the HSD10 will display its current parameter settings, and you will have to retry the RESTART command again.

Note

When the HSD10's Update Mode has been entered, the amber LED will begin blinking to indicate that the HSD10 is ready to perform a firmware upgrade.

3. Once Update Mode has been entered, the following Utility Options menu will be displayed:

```
FLASH Boot Utility Options

        1) Download new Firmware Image
        2) Change serial baud rate
        9) Restart Controller
Option:
```

4. If your external communication system allows for baud rates faster than 9600, you may wish to increase the communications baud rate to reduce the firmware download time. Downloads at 9600 baud take about 15 minutes. To change the rate, enter '2' at the above menu prompt to go to the Baud Rate Options menu:

```
BAUD Rate Options:

        1) 9600
        2) 19200
        3) 38400
        9) return to previous menu
Option:
```

Enter the appropriate rate option number (or '9' to return to the Utility Options menu). After a Return you will see:

```
BAUD-I-RDY2CNG, Please change your rate and press <RETURN>
```

At this point you should change the rate setting in your external communication system to match the selection above. Pressing Return will bring you back to the Utility Options menu.

5. To make the HSD10 ready to begin receiving the firmware upgrade, enter '1' at the Utility Options prompt and observe the resulting display:

```
FLASH Boot Utility Options

       1) Download new Firmware Image
       2) Change serial baud rate
       9) Restart Controller
Option: 1

SREC Load Utility
  To download the update the host dataport must be configured for
  (x) baud, 8 bit, 1 stop, no parity.  Flow ctrl must be XON/XOFF

SREC-I-BEGIN, Load Sequence beginning - enter CTRL/C to ABORT
```

6. The external communication system should now be used to send the upgrade image file to the HSD10 (use an ASCII or Text file transfer command, do not use Binary transfer). The exact command mechanism will be dependent upon the communications application being used. When the image transfer is initiated, the following will be displayed:

```
SREC-I-VER, Receiving code for HSD10 Version (x)  /
```

The final '/' character will appear to rotate slowly to indicate image transfer progress. Once the transfer completes, the following should be displayed, ending with the Utility Options menu:

```
FLASH-I-LOADCPLT,  Initiating Programming sequence
FLASH-I-ERASING, Erasing Sector ..1..2..3..4..5..6..7

FLASH-I-PROGRAMMING, Programming Sector ..1..2..3..4..5..6..7

FLASH-I-COMPLETE, FLASH Programming Complete

FLASH Boot Utility Options

       1) Download new Firmware Image
       2) Change serial baud rate
       9) Restart Controller
Option:
```

7. If the baud rate was modified in step 4 above, it can now be reset as required for VCS or other serial port communications using the instructions provided in step 4.

8. At the Utility Options menu, enter '9' to restart the HSD10 and leave Update Mode. The amber LED should cease blinking, and the parameter display should reflect the new firmware revision number.

4.9 Analyzing Controller Failures (LED Errors)

The HSD10 controller utilizes two means of trouble notification: via the front-panel and via host error logs. LED indicator codes are used to indicate the source of an internal controller fault. You can also use the OpenVMS Analyze/Error utility to read an HSD10 error log for information about devices connected to the HSD10 Array Controller (see the following section).

LED indicators (DS1 through DS3) are visible on the front panel of the HSD10 array controller. When the HSD10 array controller boots, amber indicator DS1 blinks for 10 seconds before it shuts off. If this indicator blinks for more than 10 seconds or begins blinking during normal operations (except firmware updates), it indicates that the onboard diagnostics have found a controller fault.

The fault code is read out as a two-digit error code on the indicators; each digit of the code is indicated by the number of times the indicator blinks. The first digit of the code is separated from the second digit by a one-second pause. A two-second pause separates the error code from its next repetition. This code is repeated until the HSD10 Array Controller is powered off.

Table 4–1 lists the serviceable error codes and the associated problem. For all other error codes, recheck the integrity of all bus terminator and cable connections and verify that all shelf SBBs are seated properly. Recycle power to the shelf containing the HSD10. If these actions do not resolve the problem, or if the problem recurs, replace the HSD10 array controller.

Table 4–1 HSD10 LED Indicator Codes

Code	Problem	Resolution
11	DSSI port problem	Ensure that DSSI termination power is present on the DSSI bus. Check all DSSI bus connections and terminations.
12	SCSI port problem	Ensure that SCSI termination power is present on the SCSI bus. Check all SCSI bus connections and terminations.

4.10 Analyzing Device Failures (Error Logs)

The HSD10 array controller logs device error conditions in the OpenVMS error log file ERRLOG.SYS. To retrieve this information, use the OpenVMS command ANALYZE/ERROR_LOG. Refer to the applicable OpenVMS documentation to read this error log when troubleshooting the HSD10 array controller.

The HSD10 array controller reports three types of device and port error logs:

- **Type 1** error logs report port errors from the HSD10 SCSI driver.
- **Type 2** error logs report SCSI device check conditions.
- **Type 3** error logs report compare errors found during I/O processing.

Each of these error log types is characterized by unique interpretations of longword data reported in an error log. Each longword in turn is composed of four bytes, arranged as follows:

```
LONGWORD1: Byte 3    Byte 2    Byte 1    Byte 0
LONGWORD2: Byte 7    Byte 6    Byte 5    Byte 4
LONGWORD3: Byte 11   Byte 10   Byte 9    Byte 8
LONGWORD4: Byte 15   Byte 14   Byte 13   Byte 12
LONGWORD5: Byte 19   Byte 18   Byte 17   Byte 16
```

Bytes are typically specified in two-digit hexadecimal values. Byte 0 specifies the error log type, containing a value of 01, 02, or 03. Once the log type is determined, use the following tables to interpret the meaning of each byte or byte field. Abbreviations used are as follows:

LSB = Least Significant Byte or rightmost byte of a 2-byte word
MSB = Most Significant Byte or leftmost byte of a 2-byte word
LSN = Least Significant Nibble or rightmost four bits of a byte
MSN = Most Significant Nibble or leftmost four bits of a byte

Table 4–2 Type 1 Error Log Byte Definitions

Byte	Meaning or Value
0	01 (Type 1 Log)
1	Opcode of SCSI command
2	RAIDset Drive Failure: LSN = Position of failing RAIDset member MSN = Logical Unit Number of failing RAIDset member
3	RAIDset Drive Failure: LSN = SCSI ID of failing RAIDset member MSN = Port number connected to failing RAIDset member
4	SCSI port error (LSB) (see Table 4–5)
5	SCSI port error (MSB) (see Table 4–5)
6-19	Phase history for SCSI command (eee Table 4–6)

Table 4–3 Type 2 Error Log Byte Definitions

Byte	Meaning or Value
0	02 (Type 2 Log)
1	Byte 0 of request sense for Check Condition
2	RAIDset Drive Failure: LSN = Position of failing RAIDset member MSN = Logical Unit Number of failing RAIDset member
3	RAIDset Drive Failure: LSN = SCSI ID of failing RAIDset member MSN = Port number connected to failing RAIDset member
4	Byte 2 of request sense for Check Condition
5	Byte 3 of request sense for Check Condition
6	Byte 4 of request sense for Check Condition
7	Byte 5 of request sense for Check Condition
8	Byte 6 of request sense for Check Condition
9	Byte 12 of request sense for Check Condition
10	Byte 13 of request sense for Check Condition
11	Byte 15 of request sense for Check Condition
12	Byte 16 of request sense for Check Condition
13	Byte 17 of request sense for Check Condition
14	Byte 0 of SCSI Command Descriptor Block
15	Byte 1 of SCSI Command Descriptor Block
16	Byte 2 of SCSI Command Descriptor Block
17	Byte 3 of SCSI Command Descriptor Block
18	Byte 4 of SCSI Command Descriptor Block
19	Byte 5 of SCSI Command Descriptor Block

Table 4–4 Type 3 Error Log Byte Definitions

Byte	Meaning or Value
0	03 (Type 3 Log)
1	MSCP packet opcode
2	Not used
3	Compare Modifier and Compare Unit Flags: Bit 0 = Compare Read Unit flag (least significant bit) Bit 1 = Compare Writes Unit Flag Bit 2 = Not used Bit 3 = Not used Bit 4 = Not used Bit 5 = Not used Bit 6 = Compare Modifier Bit 7 = Not used (most significant bit)
4-7	Starting logical block number of transfer
8-11	No. of bytes compared correctly
12-15	Host data
16-19	Drive data

Table 4–5 SCSI Port Error Codes

Code	Status
2000	A serious problem occurred within the internal synchronization mechanism
4002	Internal inconsistency error; tried to send an unsupported SPORT opcode
4007	Internal inconsistency error; tried to send an unsupported message
8000	Null reselect; target issued a reselect command, which the HSD10 had no reason to expect
8001	A target reselected the HSD10 for a tagged command, but the tag number did not match any stored in the HSD10
8003	Double check condition encountered; check condition status returned on a Request Sense due to previous check condition status
8004	Unsupported SCSI status returned by target
8005	Unsupported message received
8006	Target rejected a nonrejectable message (for example, Identify)
8008	Phase transition timeout
8009	Gross error bit was set in SCSI chip
800A	Parity error bit was set in SCSI chip
800B	Illegal command bit was set in SCSI chip
800C	Device does not exist; 250 millisecond SCSI timeout
800D	Illegal disconnect; target disconnected during data-out, data-in or message-out phase
800E	Hung bus timeout; target connected to the bus for more than 30 seconds
800F	Device did not go bus-free after device reset, abort, abort tag or clear queue
8010	SCSI bus reset detected
8011	Disconnected device timeout
8012	Reselect tag number not outstanding
8013	Reserved
8014	Device transitioned to DIN phase, but firmware expected DOUT
8015	Device transitioned to DOUT phase, but firmware expected DIN
8016	Reselector's ID bit not set
8017	Detected reserved status
8018	Reselect tag number not outstanding for ID/LUN
801S	RETDAT packet timeout
8020	Reserved
8021	Illegal (reserved) SCSI phase

Table 4–6 /SCSI Bus Phase Encoding

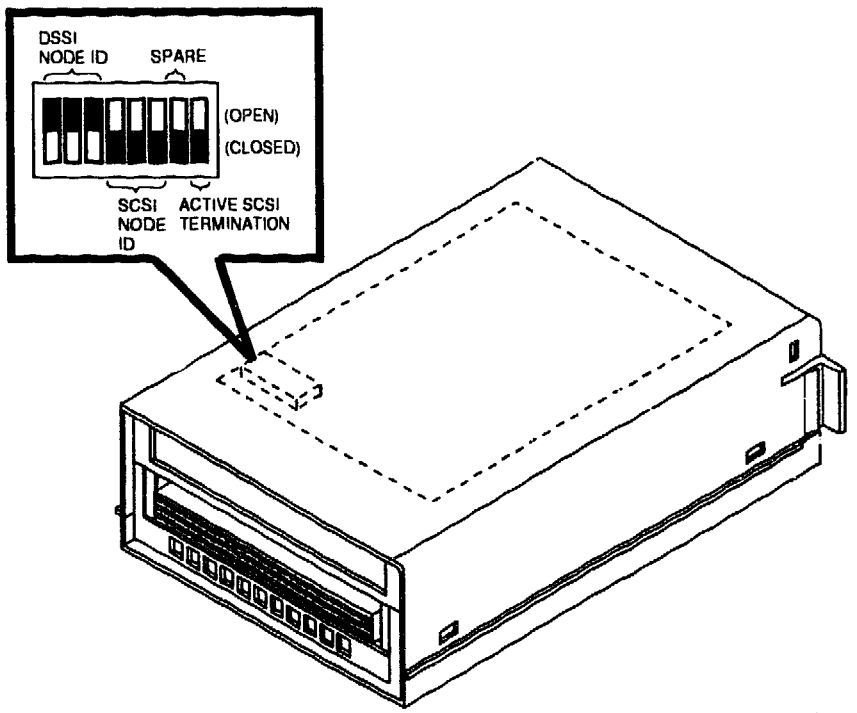
Code	Phase
00	Data Out
01	Data In
02	Command
03	Status
04	Reserved
05	Reserved
06	Message Out
07	Message In

4.11 Replacing the HSD10 Array Controller

In the event an HSD10 controller requires replacement, site configuration and HSD10 parameter settings must be considered to minimize impact to the associated subsystem. Nonpreconfigured HSD10 controllers should be inserted and configured to match the original settings; DSSI and SCSI ports are normally disabled until set otherwise. In such instances, the serial communications port is the only access available to the HSD10 Command Utility (see Section 3.7.3). With the plastic guide referenced in Section 2.3.1 installed, the HSD10 array controller can be replaced using a cold or warm swap procedure:

1. Activity on the HSD10's SCSI bus is assumed to be absent. If in a redundant configuration, quiesce the SCSI bus by issuing a QUIESCE command on the partner HSD10.
2. Disconnect the DSSI trilink connector from the front panel connector of the HSD10 array controller to be replaced. It is not recommended to disconnect the cables and/or terminator from the trilink connector.
3. Press the two mounting tabs on the front together to release the HSD10 array controller.
4. Use both hands to pull the HSD10 array controller out of the shelf.
5. See Figure 4–1 and set the DSSI ID, SCSI ID, and bus termination switches on the replacement HSD10 array controller to the settings on the removed HSD10 array controller. A complete description of the switchpack and the switch setting procedure is given in Section 3.4.
6. Insert the replacement HSD10 array controller into the guide slots of the shelf and push it in until it is fully seated and the mounting tabs engage the shelf.
7. Reconnect the DSSI trilink connector to the front panel connector of the HSD10 array controller.
8. Using a VCS or other terminal connected to the replacement HSD10's serial communications port, set parameters to match those of the removed HSD10 with the SET CONTROLLER command. Use the SET UNIT and MAP UNIT commands as needed to replicate the physical-to-(T)MSCP mapping used on the original HSD10.

Figure 4–1 Device Configuration Switchpack



9. To logically reconnect the HSD10 to the DSSI and SCSI buses, issue the commands SET PORT 0/ENABLE and SET PORT 1/ENABLE followed by RESTART. The serial communications port can now be disconnected if desired.
10. If a QUIESCE command was issued to a partner HSD10, issue a RESUME command to that HSD10.

Without the plastic guide installed, the HSD10 controller should be replaced using a cold swap procedure. In this case, the shelf and all attached DSSI nodes should be powered down prior to removing the trilink connector, and powered back up after the trilink has been installed on the replacement HSD10.

A

Option Ordering Information

Table A–1 lists the HSD10 array controller options.

Table A–1 HSD10 Array Controller Options

Order Number	Description
HSD10–AA	StorageWorks Array Controller, DSSI-SCSI–2 7 Disk/Tape/Optical device support; RAID0; Base Firmware.
HSD10–AD	StorageWorks Array Controller, DSSI-SCSI–2 7 Disk/Tape/Optical device support; 16 MB Read Cache; RAID0; Base Firmware.
HSD10–AF	StorageWorks Array Controller, DSSI-SCSI–2 7 Disk/Tape/Optical device support; 32 MB Read Cache; RAID0; Base Firmware.

Each of the above options is provided in a 3.5-inch StorageWorks Building Block (SBB) module for installation as part of a StorageWorks storage subsystem. Contact a Digital sales representative for more information.

B

HSD10 Command Utility

ABORT

Ends a utility operation.

Format

ABORT D1il|T1il

Parameters

D1il|T1il
Specifies the physical name of the device, where *D* stands for disk, *T* stands for tape, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

The ABORT command terminates a QUALIFY, DISKTEST, or TAPETEST operation. These operations normally run indefinitely until stopped with the ABORT command or by shutting off power to the controller.

ADD STRIPESET

Groups a set of disk drives under a logical stripeset name.

Format

ADD STRIPESET Sx D1il [D1il . . .]

Parameters

Sx
Specifies the logical name of the stripeset to which the disk drives will be assigned. The variable *x* represents any integer from 0 to 9. Refer to stripesets by their logical names, which are first assigned by the CREATE STRIPESET command.

D1il [D1il . . .]
Specifies one or more disk drives to be grouped in a stripeset where *i* represents device SCSI ID and *l* is the logical unit number (usually zero). The disk drives are referenced by their physical names, which are created by the AUTOCONFIG and CREATE DISK commands. (Use the CREATE TAPE command to assign a physical device name to a tape drive.) Separate the disk drive names with spaces.

A stripeset may contain as many as 7 disk drives. The HSD10 will recognize a one-drive stripeset, but in practice you should include at least two drives in each stripeset.

The ADD STRIPESET command is cumulative. The specified disk drives will be added to any drives already assigned to the stripeset. A command specifying a nonexistent or already-assigned drive will reject such a drive, but will still add any valid drives specified in the command.

Description

Groups a collection of disk drives under a logical stripeset name. To complete the creation of the stripeset, you must run the INITIALIZE STRIPESET command and then run MAP UNIT to give the stripeset an MSCP device name and make it available to the operating system.

Examples

1.
```
HSD10>  ADD STRIPESET S1  D110 D140 D150
```

   Assigns the disk drives with physical names D110, D140, and D150 to the logical stripeset name S1.

2.
```
HSD10>  ADD STRIPESET S1 D110
HSD10>  ADD STRIPESET S1 D140 D150
```

   Because the ADD STRIPESET command is cumulative, the two commands shown in this example achieve the same result as the single command in example 1.

AUTOCONFIG

Scans the SCSI bus connected to the HSD10 and assigns physical names to the devices found.

Format

AUTOCONFIG

Parameters

None

Qualifiers

/LOG
Selects verbose mode.

Description

Scans the SCSI bus for attached devices and assigns them physical device names. The controller does not automatically scan its SCSI bus for new devices. Instead it relies on the operator to identify new devices. This can be done individually with the CREATE DISK and CREATE TAPE commands, or for all connected devices with the AUTOCONFIG command.

CLEAR DSSI_STATS

Resets DSSI statistics counters to zero.

Format

CLEAR DSSI_STATS

Parameters

None

Description

Resets the DSSI bus statistics counters (visible via the SHOW DSSI_STATS command) to zero.

CREATE DISK

Assigns a physical name to a single disk device.

Format

CREATE DISK D1il

Parameters

D1ll
Indicates the physical name for the disk device where *i* represents the device SCSI ID and *l* is the logical unit number (usually zero).

Description

Assigns a physical name to a single disk device. You must assign a physical name to a device before issuing further commands to group the device in a stripeset or give it an MSCP device name. Related commands are AUTOCONFIG, which automatically assigns physical names to all disk and tape devices connected to the controller, and CREATE TAPE, which assigns a physical name to a specific tape device.

Example

```
HSD10>  CREATE DISK D120
```

Assigns the physical name D120 to the disk drive at SCSI ID 2, and logical unit number (LUN) 0.

CREATE STRIPESET

Creates a logical name for a stripeset.

Format

CREATE STRIPESET Sx

Parameters

Sx
Indicates the logical name for a stripeset. The variable *x* represents any integer from 0 to 9.

Description

Creates a logical name for a stripeset. The stripeset will be empty and unusable until you assign at least one disk drive to it with the ADD STRIPESET command.

Example

```
HSD10>  CREATE STRIPESET S0
```

Reserves S0 as a logical name for a stripeset.

CREATE TAPE

Assigns a physical name to a single tape device.

Format

CREATE TAPE T1il

Parameters

T1il
Indicates the physical name for the tape device where *i* represents the device SCSI ID and *l* is the logical unit number (usually zero).

Description

Assigns a physical name to a single tape device. You must assign a physical name to a device before issuing further commands, such as MAP UNIT, to give the tape device a TMSCP device name. Related commands are AUTOCONFIG, which automatically assigns physical names to all disk and tape devices connected to the controller, and CREATE DISK, which assigns a physical name to a specific disk device.

Example

```
HSD10>  CREATE TAPE T140
```

Assigns the physical name T140 to the tape drive at SCSI ID 4 and logical unit number (LUN) 0.

DELETE DISK

Deletes the physical name for a disk device.

Format

DELETE DISK D1il

Parameters

D1il
Indicates the physical name for the disk device where *i* represents the device SCSI ID and *l* is the logical unit number (usually zero).

Description

Deletes the physical name for a disk device from the HSD10's device table.

Qualifiers

/ALL
Use the /ALL qualifier instead of the *D1il* parameter if you want to delete all physical disk drive names.

Examples

1. `HSD10> DELETE DISK D120`

   Deletes the physical device name previously created for the disk device at SCSI ID 2 and logical unit number (LUN) 0.

2. `HSD10> DELETE DISK /ALL`

   Deletes the physical device names for all disk devices.

DELETE STRIPESET

Deletes a logical stripeset name.

Format

DELETE STRIPESET Sx

Parameters

Sx
Indicates the logical name of the stripeset, where the variable *x* can represent any integer from 0 to 9.

Description

Deletes the logical name previously assigned to a stripeset with the CREATE STRIPESET command.

Qualifiers

/ALL
Use the /ALL qualifier instead of the Sx parameter if you want to delete all logical stripeset names.

Examples

1. `HSD10> DELETE STRIPESET S0`

   Deletes the logical stripeset name S0.

2. `HSD10> DELETE STRIPESET /ALL`

   Deletes all logical stripeset names.

DELETE TAPE

Deletes the physical name for a tape device.

Format

DELETE TAPE T1il

Parameters

T1il
Indicates the physical name for the tape device where *i* represents the device SCSI ID and *l* is the logical unit number (usually zero).

Description

Deletes the physical name for a tape device from the HSD10's device table.

Qualifiers

/ALL
Use the /ALL qualifier instead of the *T1il* parameter if you want to delete all physical tape device names.

Examples

1. `HSD10> DELETE TAPE T140`

   Deletes the physical name for the tape device at SCSI ID 4 and logical unit number (LUN) 0.

2. `HSD10> DELETE TAPE /ALL`

   Deletes all physical tape device names.

DELETE UNIT

Deletes a (T)MSCP device name.

Format

DELETE UNIT (T)MSCP_device_name

Parameters

(T)MSCP_device_name
Indicates the MSCP device name for disk devices or TMSCP device name for tape devices.

Description

Deletes a (T)MSCP device name that was previously made known to the host with the MAP UNIT command.

Qualifiers

/ALL
Use the /ALL qualifier instead of the (T)MSCP_device_name parameter if you want to delete all (T)MSCP device names.

Examples

1. `HSD10> DELETE UNIT DUA1010`

   Deletes the (T)MSCP device name DUA1010.

2. `HSD10> DELETE UNIT /ALL`

   Deletes all (T)MSCP device names for all devices.

DESELECT

Returns a device to the pool of physical devices.

Format

DESELECT D1il|T1il

Parameters

D1il|T1il
Specifies the physical name for the device, where *D* stands for disk, *T* stands for tape, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

Returns a device to the pool of physical devices after it has been selected for a maintenance utility operation with the SELECT command.

DISKTEST

Initiates the disk test utility.

Format

DISKTEST D1il

Parameters

D1il
Specifies the physical name of the device, where *D* stands for disk, *T* stands for tape, *i* represents the device SCSI ID, and *l*is the logical unit number (usually zero).

Description

The DISKTEST command exercises the selected drive and optionally corrects any media errors. A DISKTEST operation (without the /WRITE qualifier) reads random logical blocks on the disk. In a DISKTEST/WRITE operation, the controller writes to randomly selected logical blocks on the device, then reads and verifies the data, revectoring any bad blocks encountered. If the device you want to test already contains data, omit the /WRITE qualifier, and DISKTEST will simply read from randomly selected blocks. For newly formatted devices, you must use the /WRITE qualifier, or else DISKTEST will have no data to read.

You must SELECT a device before running DISKTEST on it.

If DISKTEST encounters an error that it cannot correct, it will display a message describing the error condition.

DISKTEST will run indefinitely until you issue the ABORT command or turn off power to the controller.

Qualifiers

/WRITE
Forces the controller to write to randomly selected blocks during the DISKTEST. Bad blocks will be revectored and retested.

Caution

A DISKTEST/WRITE operation will cause all existing data on the selected disk to be overwritten.

If DISKTEST is running in a read-only mode bad blocks will not be re-vectored.

Examples

1. HSD10> DISKTEST D110
   03-APR-1995 15:50:52 4706 RIO$15 PIL=110: DISKTEST started

2. HSD10> DISKTEST D120 /WRITE
   DISKTEST will overwrite some or all data on this device. Are you sure? (y/n) Y
   03-APR-1995 15:51:05 4706 RIO$14 PIL=120: DISKTEST started

EXIT

Exits the DUP server.

Format

EXIT

Parameters

None

Description

This command exits the DUP server when you have accessed the command line interface by that method. If you have accessed the command line interface from the controller's serial port, this command has no effect.

FACTORY

Restores all controller and device configuration settings to their factory defaults.

Format

FACTORY

Parameters

None

Description

The FACTORY command restores all configuration settings to their factory defaults, writes the default values to the controller's nonvolatile memory (NOVRAM) and restarts the controller.

FORMAT

Initiates the disk drive format utility.

Format

FORMAT D1il

Parameters

D1il
Specifies the physical name of the device, where *D* stands for disk, *T* stands for tape, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

Use the FORMAT command to format a disk drive that has been selected with the SELECT command.

Caution

A FORMAT operation will cause all existing data on the selected disk to be overwritten.

Because the format operation will overwrite any data on the disk drive, you will be prompted to confirm that you wish to proceed. If you respond negatively, the format will be aborted with no effect on your data. Once initiated, the format operation cannot be aborted with the ABORT command.

FORMAT does produce a message when the operation is completed. You can periodically issue the SHOW MAINTENANCE command to check on the status of the format. It is a good practice to run one or more QUALIFY/WRITE passes on a drive after a format.

Examples

1.
```
HSD10> FORMAT D150
FORMAT will overwrite some or all data on this device. Are you sure? (y/n) Y
HSD10>
03-APR-1995 15:51:44 4700  RIO$11   PIL=150: FORMAT started
```

HELP

Displays basic command information.

Format

HELP

Parameters

None

Description

Outputs a help screen to the console, with command descriptions and a guide to command syntax, parameters and qualifiers.

INITIALIZE STRIPESET

Initializes the specified stripeset.

Format

INITIALIZE STRIPESET Sx

Parameters

Sx
Identifies the logical name of the stripeset to be initialized. The variable x represents any integer from 0 to 9.

Description

Initializes the specified stripeset (RAID 0 array). During the course of the initialization, the controller reserves a portion of each disk, where it stores special configuration data unique to that stripeset.

Qualifiers

/CHUNKSIZE=
Specifies the amount of data that will be written to each drive in each stripe. The chunksize qualifier is expressed in terms of 4 kilobyte multiples and may be set to any integer from 1 to 256. For example, a chunksize qualifier of 10 would result in 40KB (10 x 4KB) being written to each drive in each stripe.

If no /CHUNKSIZE qualifier is given, the default value is 1 for newly created stripesets.

Examples

1. `HSD10> INITIALIZE STRIPESET S0`

   Initializes the stripeset associated with the logical name S0. Chunksize defaults to 4KB.

2. `HSD10> INITIALIZE STRIPESET S1 /CHUNKSIZE=4`

   Initializes the stripeset associated with the logical name S1 and sets the chunksize to 16KB (that is, 4 x 4KB).

MAP UNIT

Assigns an MSCP device name to a disk device or stripeset, or a TMSCP device name to a tape device.

Format

MAP UNIT logical_or_physical_name (T)MSCP_device_name

Parameters

logical_or_physical_name
This parameter is the name assigned to it by the CREATE DISK, CREATE TAPE, CREATE STRIPESET or AUTOCONFIG commands (for example, D100, T140, S1). Stripeset names are logical. Names for other devices are physical, because they reference the device's physical location on the SCSI bus.

(T)MSCP_device_name
This parameter is the MSCP or TMSCP device name to be assigned to the specified device. The (T)MSCP_device_name must begin with DU or DI for disk devices or MU for tape devices.

Description

Assigns a (T)MSCP device name to a physical or logical device name. A host will not recognize an HSD10-supported device until it has been assigned an MSCP or TMSCP device name.

Qualifiers

/PARTITION=
Specifies which partition of the disk device or stripeset is to be mapped to the MSCP device name. This qualifier may be inserted at any point on the command line after the MAP UNIT command, and can be any integer value from 1 to 8.

Tape devices may not be partitioned.

Examples

1. HSD10> MAP UNIT D120 DUA1100

   Maps the disk drive at SCSI ID 2, logical unit number (LUN) 0 to the MSCP device name DUA1100.

2. HSD10> MAP UNIT D130 DUA2300 /PARTITION=2

   Maps the second partition of drive D130 to the MSCP device name DUA2300.

MONITOR DSSI_STATS

Displays the DSSI Statistics screen.

Format

MONITOR DSSI_STATS

Parameters

None

Description

MONITOR DSSI_STATS is a dynamic display of activity on the controller's DSSI buses. This screen is intended as a tool for troubleshooting DSSI problems, particularly cabling and termination issues. Although the information on this screen is technical and designed primarily for service personnel, you may be able to use the screen to identify potential problems with your DSSI interface.

Note

The MONITOR DSSI_STATS command is only valid when issued via the serial communications port on the HSD10 front panel.

If abnormal values are observed on the DSSI Statistics screen:

- Check the DSSI cable for defects, such as a bad wire or a bad solder connection. If possible try swapping the cable with another cable that you believe to be in good condition.
- Check the termination on the DSSI bus. The bus should be terminated at both ends.

Each set of DSSI statistics contains two pages. The first page shows statistics for nodes 0 through 3 and the second page shows statistics for nodes 4 through 7. Use the "N" and "P" keys on the keyboard to navigate between the screens. Press Ctrl-Z to exit the DSSI Statistics screen and "C" to reset all counters to zero.

See SHOW DSSI_STATS for statistics information.

QUALIFY

Initiates the qualify utility.

Format

QUALIFY D1il

Parameters

D1il
Specifies the physical name of the device, where *D* stands for disk, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

The QUALIFY command will verify that the media on a disk drive can be reliably written to and read from. If you use the /WRITE qualifier, the command also detects and replaces bad blocks on the media. Use the QUALIFY command by itself when you want to verify the integrity of a disk drive that already contains data, because the operation only reads from the disk drive. Use the QUALIFY command with the /WRITE qualifier on newly formatted drives for a more thorough test of the drive's integrity.

QUALIFY verifies the entire disk, block by block. It completes when the end of the volume is reached.

You must SELECT a device before performing a QUALIFY operation on it.

Qualifiers

/WRITE
Causes the controller to write 32 kilobyte data chunks to the drive and read them back.

Examples

1.
```
HSD10> QUALIFY D130
03-APR-1995 15:51:18 4703  RIO$13   PIL=130: QUALIFY started
```

2.
```
HSD10> QUALIFY D140 /WRITE
QUALIFY will overwrite some or all data on this device. Are you sure? (y/n) y
HSD10>
03-APR-1995 15:51:32 4703  RIO$12   PIL=140: QUALIFY started
```

QUIESCE

Pauses SCSI bus activity on all devices attached to the HSD10.

Format

QUIESCE

Parameters

None

Description

The QUIESCE command prevents the movement of data on the HSD10's SCSI bus. This allows you to add or remove a SCSI device without causing a glitch on the bus, which can lead to data corruption. Use the RESUME command to restart activity on the bus.

QUIT

Exits the DUP server.

Format

QUIT

Parameters

None

Description

This command exits the DUP server when you have accessed the command line interface by that method. If you have accessed the command line interface from the controller's serial port, this command has no effect.

RENAME UNIT

Renames a (T)MSCP device name.

Format

RENAME UNIT old_(T)MSCP_device_name new_(T)MSCP_device_name

Parameters

old_(T)MSCP_device_name
Current (T)MSCP device name.

new_(T)MSCP_device_name
New (T)MSCP device name.

Description

This command allows you to change the (T)MSCP device name of a disk or tape device that you have already mapped with the MAP UNIT command.

Example

```
HSD10>   RENAME UNIT DUA1100 DUA4320
```

RESET SCSI_BUS

Forces a reset on the HSD10's SCSI bus.

Format

RESET SCSI_BUS

Parameters

None

Description

Isssuing this command invokes a SCSI bus reset.

RESTART

Forces a reboot of the controller.

Format

RESTART

Parameters

None

Description

This command reboots the HSD10 controller, initiating the 10-second boot sequence indicated by the flashing amber LED. With some exceptions, configuration changes to active units and controller and port parameters in the command line interface's editing buffer do not become part of the controller's current operating parameters until you RESTART the controller. This loads the parameter values stored in the nonvolatile memory into the current configuration buffer.

Exceptions to this rule include the SET UNIT qualifiers /CACHE/NOCACHE, /ONLINE/OFFLINE, and /WRPROT/NOWRPROT. These values become part of the controller's current operating parameters immediately upon being changed and do not require a controller RESTART.

Commands affecting unit or stripeset status (ADD STRIPESET, DELETE STRIPESET, DELETE UNIT, MAP UNIT) are also immediate and do not require a controller RESTART.

RESUME

Resumes activity on the quiesced SCSI bus.

Format

RESUME

Parameters

None

Description

The RESUME command restarts the movement of data on the SCSI bus after you have used the QUIESCE command to pause SCSI bus activity.

SELECT

Selects a disk or tape device for maintenance operations and removes it from the pool of physical devices.

Format

```
SELECT  D1il|T1il
```

Parameters

D1ll|T1ll
Specifies the physical name of a disk or tape device, where *D* stands for disk, *T* stands for tape, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

Before you can perform a maintenance function on a device, you must first SELECT it. The act of selecting a device changes its operational status to MAINT (as shown in a SHOW UNIT command). Devices with MAINT status may not be mapped or added to stripesets.

SET DISK

Used to divide a disk drive into one to eight partitions.

Format

SET DISK D1il

Parameters

D1il
Specifies the physical name of the disk drive, where *D* stands for disk, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

Use the SET DISK command to partition a disk drive. You may specify as many as eight (8) partitions. Setting partition count to one (1) essentially un-partitions a disk device.

Qualifiers

/PARTITIONS=
Specifies the number of partitions to be created on the disk drive. Valid entries range from one to eight.

Example

```
HSD10>  SET DISK D100 /PARTITIONS=3
```

Creates three partitions on disk D100.

SET CONTROLLER

Sets controller-specific configuration values.

Format

SET CONTROLLER

Parameters

None

Description

The SET CONTROLLER command configures the HSD10 controller's SCS parameters. The command also configures the controller's use of its onboard cache.

Qualifiers

/SYSTEM_ID=
Sets the system ID of the controller. The range of possible values is from 1 to 268435456 inclusive. The default value is 131072 plus the serial number of the controller.

/NODENAME=
Sets the name used by SCS to identify the controller. May contain up to six alphanumeric characters; dollar signs ($) and underscore (_)characters are not allowed. Must be unique among the other nodes in the cluster. The default name is the same as the default SYSTEM_ID value.

/DISK_ALCS=
Sets the allocation class for all disk devices connected to the controller. In a dual-controller configuration, both controllers must have the same non-zero value. The allocation class may be set to any integer from 0 to 255. Default value is 0.

/TAPE_ALCS=
Sets the allocation class for all tape devices connected to the controller. In a dual-controller configuration, both controllers must have the same non-zero value. The allocation class may be set to any integer from 0 to 255. Default value is 0.

/MAX_HOSTS=
This qualifier is used for internal resource allocation and should always be set to 7. (Note that the HSD10 supports up to four host nodes on a DSSI bus.)

/DEVICE_TYPE=RF | RA | HS
Sets the device type reported to hosts. Default value of "HS" reports disks as HSX00, tapes as HST00. "RF" reports disks as RF72 and tapes as TU81. "RA" reports disks as RA82, tapes as TU81.

/REDUNDANT=ON | OFF
Specifies whether the controller is part of a redundant pair. Default is Off.

/SPINUPDELAY=
Sets the delay (in seconds) between successive disk drive spinups of attached disks. The valid input range is 0 to 255. Default value is 5 seconds.

Example

```
HSD10>  SET CONTROLLER /NODENAME=HSD12
```

Sets the controller's node name to "HSD12."

SET PORT

Sets port-specific configuration characteristics.

Format

SET PORT port

Parameters

port
Specifies the HSD10's SCSI or DSSI port: 0=DSSI, 1=SCSI.

Description

This command permits configuration of port-specific characteristics.

Note

HSD10 controllers ordered in preconfigured storage subsystems are shipped with SCSI and DSSI ports Enabled. Non-preconfigured HSD10 controllers require enabling of ports through the front panel serial communications port.

Qualifiers

/DISABLE
Disables the specified SCSI or DSSI port; RESTART is required before this takes effect.

/ENABLE
Enables the specified SCSI or DSSI port; RESTART is required before this takes effect.

/POWER_ON_RESET=on|off
Specifies whether the controller should initiate a SCSI bus RESET at power up. Default is On.

SET STRIPESET

Divides a stripeset into up to eight partitions.

Format

SET STRIPESET Sx

Parameters

Sx
Specifies the logical name of the stripeset, where the variable *x* can represent any integer from 0 to 9.

Description

Use the SET STRIPESET command to partition a stripeset. You may specify as many as eight (8) partitions.

Qualifiers

/PARTITIONS=
Specifies the number of partitions to be created on the stripeset. Valid entries range from one to eight.

Example

```
HSD10>  SET STRIPESET S1 /PARTITIONS=2
```

Creates two partitions on stripeset S1.

SET UNIT

Sets various device-specific configuration values.

Format

SET UNIT (T)MSCP_device_name

Parameters

(T)MSCP_device_name
Specifies the MSCP device name of a disk device or the TMSCP device name of a tape device.

Description

This command configures the controller's relationship with each device connected to it. There are two sets of qualifiers for this command: one set applies only to disk devices, the other set applies only to tape devices.

Disk Qualifiers

/CACHE
/NOCACHE
Enables or disables the caching of data from the drive. Default value is CACHE.

/WRPROT
/NOWRPROT
Enables or disables write protection for the drive. Default value is NOWRPROT.

/SPINDOWN
/NOSPINDOWN
Enables or disables the controller's capability to spin down drives or eject media when the operating system issues a spin down command such as the DISMOUNT/UNLOAD command. Default value is SPINDOWN.

/TRUNCATE
/NOTRUNCATE
Enables or disables truncation. When enabled, the controller will divide the number of blocks on the disk by 126 and prevent access to any remaining blocks, thus assuring that the number of blocks on the disk is evenly divisible by 126. This improves the performance of VMS volume shadowing catch-ups and promotes compatibility with other controllers in multiple host environments. When disabled, the controller will not truncate the disk. The number of blocks may not necessarily be a multiple of 126. Default value is TRUNCATE.

/ONLINE
/OFFLINE
Sets a device as online or offline. An online device is available to the host for I/O activity; an offline device is not available to the host for I/O activity. Default value is ONLINE.

/DISCONNECT
/NODISCONNECT
Allows or prevents the device to disconnect itself from the SCSI bus while it processes commands. Default value is DISCONNECT.

/SYNC=
Set the maximum transfer rate in megabytes/second at which synchronous transfer negotiations will begin. Range of valid values is 0 to 10. A sync rate of 0 puts the controller in asynchronous mode. Default value is 10.

/TAGGING
/NOTAGGING
Enables or disables tagged command queuing. Default value is TAGGING.

/IMMEDIATE
/NOIMMEDIATE
Toggles the IMMEDIATE bit in the SCSI STOP and START commands. Default value is IMMEDIATE.

Tape Qualifiers

/FAST_SEARCH
/NOFAST_SEARCH
Enables or disables high speed forward and reverse filemark searching. This mode can increase tape drive performance, but it should not be used when you intend to perform a VMS standalone backup, because accurate position information cannot be maintained. Default value is NOFAST_SEARCH.

/SHORT_TMARK
/NOSHORT_TMARK
Enables or disables the writing of short filemarks on Exabyte devices. When disabled all filemarks will be written as long filemarks. This affects the ability to append to an Exabyte tape. Default value is SHORT_TMARK.

/ONLINE
/OFFLINE
Sets a device as online or offline. An online device is available to the host for I/O activity; an offline device is not available. Default value is ONLINE.

/DISCONNECT
/NODISCONNECT
Allows or prevents the device to disconnect itself from the SCSI bus while it processes commands. Default value is DISCONNECT.

/SYNC=
Set the maximum transfer rate in megabytes/second at which synchronous transfer negotiations will begin. Range of valid values is 0 to 10. A sync rate of 0 puts the controller in asynchronous mode. Default value is 10.

/TAGGING
/NOTAGGING
Enables or disables tagged command queuing. Default value is TAGGING.

/IMMEDIATE
/NOIMMEDIATE
Toggles the IMMEDIATE bit in the SCSI STOP and START commands. Default value is IMMEDIATE.

SHOW ALL

Combines all the HSD10's SHOW commands into one display.

Format

SHOW ALL

Parameters

None

Description

Displays all HSD10 parameters and attributes, including currently-mapped devices.

Qualifiers

/PAUSE
Pauses the display between screens.

SHOW CLUSTER

Displays the status of all nodes in the DSSI cluster.

Format

SHOW CLUSTER

Parameters

None

Description

Displays node status and information for all nodes in the DSSI cluster.

Example

```
HSD10> SHOW CLUSTER
   Local                          Remote SCS Systems
SCSPort id     SCSNOD id State  Connections      State     Credit  Activity
-------------------------------------------------------------------------
DSSI    6      BASDRM  7 OPEN   VMS$TAPE_CL_DRV OPEN      10      0
                                VMS$DISK_CL_DRV OPEN      10      0
                                VMS$DUP_CLS_DRV OPEN      20      0

HSD10>
```

SHOW CONTROLLER

Displays a snapshot of information about the controller.

Format

SHOW CONTROLLER

Parameters

None

Description

Displays current controller information, including firmware revision and port status. Automatically displayed upon controller restart.

Example

```
HSD10> SHOW CONTROLLER
    Controller  HSD10
        Serial No.: 0                       Firmware Revision: B158
        Date/Time: 01-MAY-1995 12:40:34     Uptime:  2 DAYS  21:06:28
        Processor DRAM size:  1   MB        Processor Free Pool:  335 KB
        Device Type    = HS                 Spinup Delay = 5 Seconds
        Redundant Mode = OFF

    SCS Parameters
        Nodename:  HSD10       System ID: 211072
        DISK_ALCS: 3           TAPE_ALCS: 3
        MAX_HOSTS: 7           DATREQ_PR: LOW

    Cache
         32 MB read cache
    Ports
        Port 0:   DSSI, id= 6
        Port 1:   SCSI, id= 7, power_on_reset=ON

HSD10>
```

SHOW DEVICES

Combines the displays from the SHOW DISK, SHOW STRIPESETS, SHOW TAPE, and SHOW UNIT commands.

Format

SHOW DEVICES

Parameters

None

Description

Displays current mapped device information for disks, tapes, and stripesets.

SHOW DISK

Displays a listing of all physical disk device names assigned with the CREATE DISK or AUTOCONFIG commands.

Format

SHOW DISK [D1il]

Parameters

D1il
Specifies the physical name of a disk device where *D* stands for disk, *i* represents the device SCSI ID and *l* is the logical unit number (usually zero).

Description

Displays information about the specified disk device name or all disk device names if no parameter is given. The information includes the total number of partitions associated with the disk, the stripeset (if any) that comprises the device, the MSCP device name the device or partition is mapped to, the inquiry data returned by the device, and unit parameters assigned to the device.

Example

```
HSD10> SHOW DISK
Name   Pcnt  Used by     Type    Inquiry Data                    Device Attributes
-------------------------------------------------------------------------------
D130   1                 DISK    DEC       RZ26      392A      Sync TagQ
D160   4                 DISK    DEC       RZ28      D41C      Sync TagQ
D150   4                 DISK    DEC       RZ28      D41C      Sync TagQ
D140   1                 DISK    Quantum   XP32150   556A      Sync TagQ
D110   1                 DISK    DEC       RZ26      392A      Sync TagQ
D120   1                 DISK    Quantum   XP32150   556A      Sync TagQ
```

SHOW DSSI_STATS

Displays a snapshot showing DSSI statistics at the moment the command is issued.

Format

SHOW DSSI_STATS

Parameters

None

Description

SHOW DSSI_STATS is intended as a tool for troubleshooting DSSI problems, particularly cabling and termination issues. Although the information in this report is technical and designed primarily for service personnel, you may be able to use the information to identify potential problems with your DSSI interface.

If abnormal values are observed in a SHOW DSSI_STATS display:

- Check the DSSI cable for defects, such as a bad wire or a bad solder connection. If possible try swapping the cable with another cable that you believe to be in good condition.
- Check the termination on the DSSI bus. The bus should be terminated at both ends.

Use the CLEAR DSSI_STATS command to reset all DSSI counters to zero.

Statistics

No CDRP Count

CDRP, which stands for Class Driver Request Packet, is a buffer the HSD10 uses to stare packet header information. The number displayed in this field is a tally of the instances when the DSSI driver needed a CDRP but no CDRP was available. This number will equal the total of the "RX no CDRP" fields for all nodes.

No Buffers Count

The buffers referenced in this field are used by the HSD10 to store the data portion of a packet. This value will increment each time the DSSI driver attempted to perform a write but could not perform the operation due to lack of buffer space.

Bus Resets Detected

This field increments each time the HSD10 detects a DSSI bus reset. Occasional resets are normal on DSSI. However, if you see this counter incrementing at a rapid rate (once a second or more), you probably have a cabling problem.

Bus Resets Initiated

This field displays the number of times the HSD10 initiated a bus reset on the DSSI. The HSD10 will initiate a bus reset when it detects a parity error. A high number of bus resets initiated could indicate a cable or interface problem.

Interface Fault Count
This field counts the number of times a fault occurs in the DSSI interface chip. Such faults usually occur as a result of a physical cable break in a DSSI connection.

TX ok
The number of packets transmitted successfully.

TX incomplete
The number of packet transmissions that were attempted but failed because the host went bus free before the entire packet could be sent. A high number of TX incomplete could indicate a cabling problem.

TX retry
A count of the number of transmissions retried after an initial failure.

Nak count
The number of negative acknowledgments (Naks) received from the host. A host will issue a Nak when it has no buffer space to receive a packet from a node.

RX ok
The number of packets received successfully from a host.

RX fail
The number of failed transmissions that hosts attempted to send to the HSD10. A failed transmission is usually caused by a bad cable.

RX bad source id
The number of packets rejected by the HSD10 due to a problem with the source ID in the header.

RX bad dest id
The number of packets rejected by the HSD10 due to a problem with the destination ID in the header.

RX bad header
The number of packets rejected by the HSD10 due to a packet header problem other than a bad source or destination ID.

RX no CDRP
The number of packets rejected by the HSD10 due to a lack of CDRP buffer space for the packet header. This field reports the same type of problem as the "No CDRP Count" field at the top of the screen, except it reports the total for a single node rather than an aggregate for all nodes.

RX no SGTD
The number of packets rejected by the HSD10 due to a lack of SGTD (Scatter-Gather Table Descriptor) buffer space for the packet data. This field reports the same type of problem as the "No Buffers Count" field at the top of the screen, except it reports the total for a single node rather than an aggregate for all nodes.

SHOW MAINTENANCE

Shows the status of all devices under maintenance.

Format

SHOW MAINTENANCE

Parameters

None

Description

The result of the SHOW MAINTENANCE command is a listing of information about all devices currently under maintenance. Devices must be selected with the SELECT command to be placed in maintenance mode.

The Flags field of the report indicates whether or not the maintenance operation is Read-Only (RO) or Read-Write (RW). This field may also indicate that a test is in the process of being aborted or that a bad block was detected and is in the process of being replaced. The latter two indicators are momentary at best and may rarely be visible to the user.

The Status field may contain one or more informational items. One of the following shall be used to indicate general drive/operation status.

- Active
- Active LBN = 0xXXXXXXXX
- Test aborted by user
- Idle

When FORMAT or TAPETEST operations are started, the "Active" message is displayed in the status field.

When DISKTEST and QUALIFY are used, the "LBN = 0xXXXXXXXX" message is appended to the "Active" indicator. This represents a snapshot of the current LBN being processed.

Example

```
HSD10> SELECT D110
HSD10> SELECT D120
HSD10> SELECT D130
HSD10> SELECT D140
HSD10> SELECT D150
HSD10> SELECT D160
HSD10> SHOW MAINTENANCE

Device  Test      Flags          Status
------------------------------------------------------------------------------
D130              RO             Idle
D160              RO             Idle
D150              RO             Idle
D140              RO             Idle
D110              RO             Idle
D120              RO             Idle
```

```
HSD10> DISKTEST D110
03-APR-1995 15:50:52 4706  RIO$15   PIL=110: DISKTEST started
HSD10> DISKTEST D120 /WRITE

DISKTEST will overwrite some or all data on this device. Are you sure? (y/n) y

03-APR-1995 15:51:05 4706  RIO$14   PIL=120: DISKTEST started
HSD10> QUALIFY D130
03-APR-1995 15:51:18 4703  RIO$13   PIL=130: QUALIFY started
HSD10> QUALIFY D140 /WRITE

QUALIFY will overwrite some or all data on this device. Are you sure? (y/n) y

HSD10>
03-APR-1995 15:51:32 4703  RIO$12   PIL=140: QUALIFY started
HSD10> FORMAT D150

FORMAT will overwrite some or all data on this device. Are you sure? (y/n) y

HSD10>
03-APR-1995 15:51:44 4700  RIO$11   PIL=150: FORMAT started
HSD10> SHOW MAINTENANCE

Device  Test      Flags          Status
-------------------------------------------------------------------------------

D130    QUALIFY   RO             Active LBN = 0x00004500
D160              RO             Idle
D150    FORMAT    RW
D140    QUALIFY   RW             Active LBN = 0x000010c0
D110    DISKTEST  RO             Active LBN = 0x001c9816
D120    DISKTEST  RW             Active LBN = 0x00384e08
```

SHOW STATS

Same as SHOW DSSI_STATS.

Format

SHOW STATS

Parameters

None

Description

See SHOW DSSI_STATS for command information.

SHOW STRIPESETS

Displays information about all logical stripesets.

Format

SHOW STRIPESETS

Parameters

None

Description

This command lists all logical stripesets. The displays includes information about the total number of partitions associated with the stripeset, the MSCP mapping of the stripeset or stripeset partition, its chunksize, and the physical disk devices assigned to it.

Example

```
HSD10> SHOW STRIPESETS
Name  Pcnt    Used by     Chunksize   Members
-------------------------------------------------------------------------
S0    1       DUA200      4           D110 D120
S1    1       DUA210      4           D130 D140 D150 D160
```

SHOW TAPES

Displays a listing of all physical tape devices created with the CREATE TAPE or AUTOCONFIG commands.

Format

SHOW TAPES [T1il]

Parameters

T1ll
Specifies the physical name of a tape device, where *T* stands for tape, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero). If no parameter is given, the command returns information about all physical tape devices.

Description

Displays information about the specified tape device name or all tape device names if no parameter is given. The information includes each device's TMSCP number if it has been mapped, inquiry data received from each device, and unit parameters set for each device.

Example

```
HSD10> SHOW TAPES
Name      Used by     Type    Inquiry Data              Device Attributes
------------------------------------------------------------------------
T150      MU1050      TAPE    DEC       TK50     440C   Sync
```

SHOW UNIT

Displays information about all devices mapped to (T)MSCP device names.

Format

SHOW UNIT [(T)MSCP_device_name]

Parameters

(T)MSCP_device_name
Specifies the MSCP device name of a disk device or the TMSCP device name of a a tape device.

Description

Displays current status and device information about all devices mapped to (T)MSCP device names.

Example

```
HSD10> SHOW UNIT
Name       Member    Status    Host      Set-members/Modifiers
-------------------------------------------------------------------------
DUA1076    D160 (1)  ONLINE    BASDRM    online, cache, disconnect,
                                         immediate, tagging, truncate,
                                         spindown, sync_rate=10

MUA1075    T150 (1)  ONLINE    BASDRM    online, disconnect, exabyte_stmark,
                                         sync_rate=10

HSD10>
```

The number in parenthesis under Member is the partition number associated with the device.

TAPETEST

Initiates the controller's tape test utility.

Format

TAPETEST T1il

Parameters

T1il
Specifies the physical name of the tape device, where *T* stands for tape, *i* represents the device SCSI ID, and *l* is the logical unit number (usually zero).

Description

TAPETEST exercises the selected tape device by writing, rewinding, and reading each section of tape, up to but not including filemarks. The block size for the initial pass is 32 kilobytes. This is halved on each successive write/rewind/read operation. The test restarts when the block size reaches 1 kilobyte.

You must SELECT a device before running TAPETEST on it. Be sure that the tape device contains enough tape for 10 megabytes of 1 kilobyte blocks, otherwise TAPETEST will not work.

TAPETEST will run indefinitely until you stop the operation with the ABORT command or by turning off power to the controller.

If TAPETEST encounters an error, it will display a message describing the error condition.

Index

A

B

C

D

E

F

H

I

M

N

O

P

Q

R

S

T

U

V

W