HSD10 DSSI-to-SCSI Bus Adapter

Operation Information for VAX 4000 Systems

Order Number: EK–HSD10–OP. A01

Digital Equipment Corporation
Maynard, Massachusetts

October, 1995

The postpaid Reader's Comments form at the end of this document requests your critical evaluation to assist in preparing future documentation.

S3002

This document was prepared using VAX DOCUMENT Version 2.1.

Contents

A HSD10 Command Utility

Index

Figures

Tables

Preface

This manual describes the procedures for configuring and operating the HSD10 DSSI-to-SCSI bus adapter in both BA400-based VAX 4000 and BA42B-based VAX 4000 systems.

Intended Audience

This manual is for customers and Digital employees responsible for BA400-based VAX 4000 systems and BA42B-based VAX 4000 systems using the HSD10 DSSI-to-SCSI bus adapter.

Structure

This manual is structured as follows:

Chapter 1	Contains introductory information, descriptions and specifications for the HSD10 DSSI-to-SCSI Bus Adapter.
Chapter 2	Contains information on configuring, operating, and maintaining the HSD10 DSSI-to-SCSI Bus Adapter.
Appendix A	Contains a description of each of the commands available in the onboard command utility.

Related Documentation

The following documentation may be helpful in using the HSD10 DSSI-to-SCSI bus adapter and the associated SCSI options.

Title	Part Number
BA400-Series Enclosures Storage Devices Installation Procedures	EK–BA44A–IN
VAX 4000 Model 105A/106A Operator Information	EK–512AA–IN
HSD10 DSSI-to-SCSI Bus Adapter Installation Guide for VAX 4000 Systems	EK–HSD10–IN
Rack-mount VAX 4000 Installation Information	EK–465RA–IN
VAX/VMS Guide to Using Command Procedures	AA–H782B–TE
VAX/VMS Command Language User's Guide	AA–DO23C–TE
OpenVMS System Manager's Manual: Essentials	AA–PV5MB–TK
OpenVMS System Manager's Manual: Tuning, Monitoring, and Complex Systems	AA–PV5NB–TK
Guide to VAX/VMS Disk and Magnetic Tape Operations	AA–M539A–TE
VAX/VMS Backup Utility Reference Manual	AA–Z407B–TE

Conventions

The following conventions are used in this manual.

Convention	Description
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 indicates emphasis and complete manual titles.
OpenVMS VAX system	A shortened term indicating the OpenVMS operating system for VAX hardware.
VAX 4000 system	A shortened term indicating that the subject matter applies to both BA400-based VAX 4000 systems and BA42B-based VAX 4000 systems.
NOTE	Provides general information about the current topic.
CAUTION	Provides information to prevent damage to equipment or software.

1

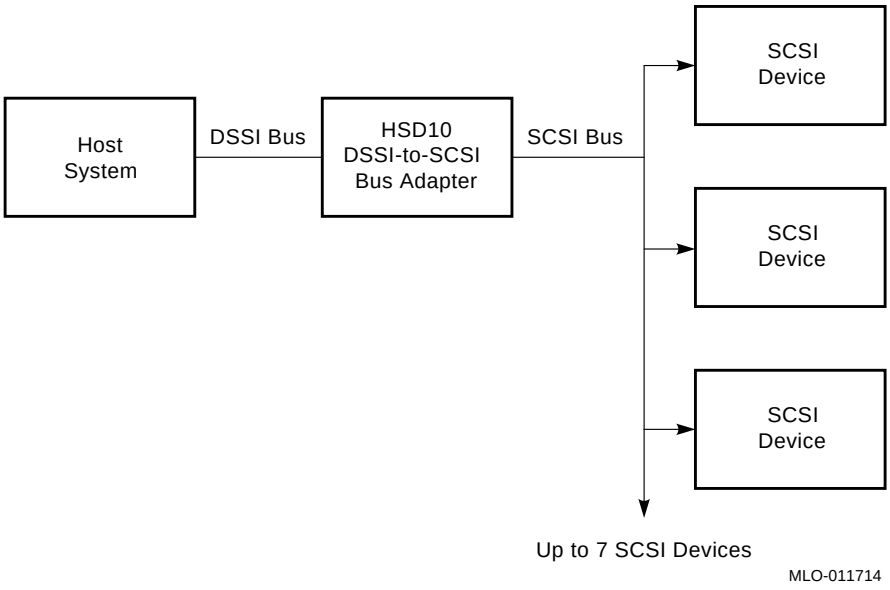
HSD10 DSSI-to-SCSI Bus Adapter Introduction

This chapter presents a basic description of the HSD10 DSSI-to-SCSI bus adapter's features, performance, operating environment, and controls and indicators. It also presents configuration information for the HSD10 DSSI-to-SCSI bus adapter.

The HSD10 DSSI-to-SCSI bus adapter is used to connect a Digital host system's Digital Storage Subsystem Interconnect (DSSI) bus to up to seven small computer system interface (SCSI) drives. Figure 1–1 shows a typical HSD10 installation, and the relationship among basic system components.

HSD10 DSSI-to-SCSI Bus Adapter Introduction

Figure 1–1 Typical HSD10 DSSI-to-SCSI Bus Adapter Installation



1.1 HSD10 DSSI-to-SCSI Bus Adapter Description

The HSD10 DSSI-to-SCSI bus adapter can be used in either a BA400-based VAX 4000 system (pedestal or rackmount) or a BA42B-based VAX 4000 system (desktop). The HSD10 DSSI-to-SCSI bus adapter provides connectivity for up to seven SCSI disks or six SCSI disks/CD–ROMS and one SCSI tape device through a single port on the DSSI bus.

In a BA400-series enclosure, the DSSI bus connects to the HSD10 either internally through the system CPU, or externally through the connector panel to the left of the card cage; SCSI bus connection is made through a backplane connector (J30).

In a BA42B-series enclosure, the DSSI bus is connected through the CPU module. Two accessable connections are also available through the expansion port on the rear of the enclosure.

The HSD10 is a TMSCP/MSCP-compliant device that performs the translations required to support devices conforming to SCSI or SCSI–2 protocols. The HSD10 supports the following embedded devices in VAX 4000 systems:

- TZ86 series cartridge tape subsystem (BA400-based VAX 4000 systems only)
- TZ87 series cartridge tape subsystem (BA400-based VAX 4000 systems only)
- TLZ07 digital audio tape (DAT) drive
- RZ26 disk drive family
- RZ28 disk drive family
- RZ29 disk drive family
- RZ73 disk drive (BA400-based VAX 4000 systems only)
- RZ74 disk drive (BA400-based VAX 4000 systems only)
- RRD43 CD–ROM drive
- RRD45 CD–ROM drive

1.1 HSD10 DSSI-to-SCSI Bus Adapter Description

One or more HSD10 DSSI-to-SCSI bus adapters can be connected on the DSSI bus containing RF-series or TF-series drives, host nodes, or other DSSI-compliant nodes (up to eight nodes maximum).

1.1.1 HSD10 DSSI-to-SCSI Bus Adapter Features and Capabilities

The HSD10 DSSI-to-SCSI bus adapter provides the following features:

- Support for OpenVMS VAX systems
- Multihost support for up to three host DSSI nodes in a cluster environment
- User-selectable SCSI and DSSI node IDs
- DUP support for modifying operating parameters, such as DSSI nodename and device allocation classes
- Controller-based Redundant Array of Independent Disks (RAID) 0 capability (striping)
- Host-based striping
- Host-based volume shadowing (with some restrictions, see Section 1.1.4)
- Read cache capacity up to 32 MB
- Virtual drive partitioning support
- Serial communications port which allows connection to an external console for use by Digital services which permits upgrades to functional firmware
- Supports a total DSSI cable length of up to 18.3 meters (60 feet)

The HSD10 DSSI-to-SCSI bus adapter also exhibits the following performance metrics:

- 500+ requests/second (aggregate)
- 1.7 MB/second sustained throughput (aggregate)

Each device served by the HSD10 DSSI-to-SCSI bus adapter is independently addressable. Attached disk and tape 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.

The HSD10 DSSI-to-SCSI bus adapter identifies itself as a node on the DSSI bus. The HSD10 DSSI-to-SCSI bus adapter identifies attached disk devices as RF72 or RA82 disk drives, and attached tape devices as TU81 tape drives. This identification is in device name only, and does not reflect actual device geometries.

1.1.2 HSD10 Adapter Firmware

HSD10 firmware resides in a flash electrically erasable programmable read-only memory (EEPROM) device that can accept firmware upgrades via the modular jack connector. See Section 2.11 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.

1.1.3 Overview of HSD10 Operating Requirements/Limitations

The HSD10 DSSI-to-SCSI bus adapter normally serves as a terminating end of the SCSI bus. Its factory-default SCSI node address, or SCSI ID, is 7.

To remove either the HSD10 controller, the enclosure and any affected DSSI bus nodes must be powered off, i.e. they may not be warm-swapped. To remove disk drives, only the system power must be turned off.

Depending upon the complexity of the configuration, total DSSI bus length should be limited to 60 feet, with an HSD10 DSSI-to-SCSI bus adapter attached, to guarantee DSSI bus integrity. A maximum length of 30 feet is permitted between individual nodes on the DSSI bus.

The HSD10 DSSI-to-SCSI bus adapter does not support dual pathing or failover operation for attached devices.

The HSD10 DSSI-to-SCSI bus adapter does not sequence disk drives when spinning up. To minimize surge current to the power supply, spin up one or two drives at a time.

1.1.4 OpenVMS VAX Volume Shadowing

The HSD10 DSSI-to-SCSI bus adapter supports host-based volume shadowing, but does not support HSD10-based shadowing assists. No HSD10 DSSI-to-SCSI bus adapter-based Redundant Array of Independent Disks functionality is supported, except for RAID 0 (striping).

The HSD10 DSSI-to-SCSI bus adapter identifies attached disk devices as RF72 or RA82 disk drives, and attached tape devices as TU81 tape drives. This does not affect the actual accessible device storage space. However, the following restrictions apply to creating shadow sets:

- Due to device geometry differences, a disk drive served by the HSD10 DSSI-to-SCSI bus adapter cannot be part of a shadow set with true RF72 (or any other DSSI device) disk drives.

- Shadow sets using HSD10 DSSI-to-SCSI bus adapter-served disk drives must be of the same SCSI device type, for example all RZ26, or all RZ26L, or all RZ28 disk drives.
- Disk drives configured on an HSD05 or HSD10 DSSI-to-SCSI bus adapter may only be shadowed with disk drives that are also configured on an HSD05 or HSD10 DSSI-to-SCSI bus adapter; that is, a disk drive configured on a local SCSI adapter or on an HSC/HSJ-family controller may not be shadowed with a disk drive that is configured on an HSD10 DSSI-to-SCSI bus adapter.

1.1.5 HSD10 Switches and Indicators

The following sections describe switches and indicators for the HSD10 DSSI-to-SCSI bus adapter for both BA400-based and BA42B-based VAX 4000 systems. The BA400-series HSD10 DSSI-to-SCSI bus adapter module board contains switches and indicators, as shown in Figure 1–2. The BA42B HSD10 DSSI-to-SCSI bus adapter module board contains switches and indicators, as shown in Figure 1–3.

Figure 1–2 BA400-Series HSD10 DSSI-to-SCSI Bus Adapter Module Board

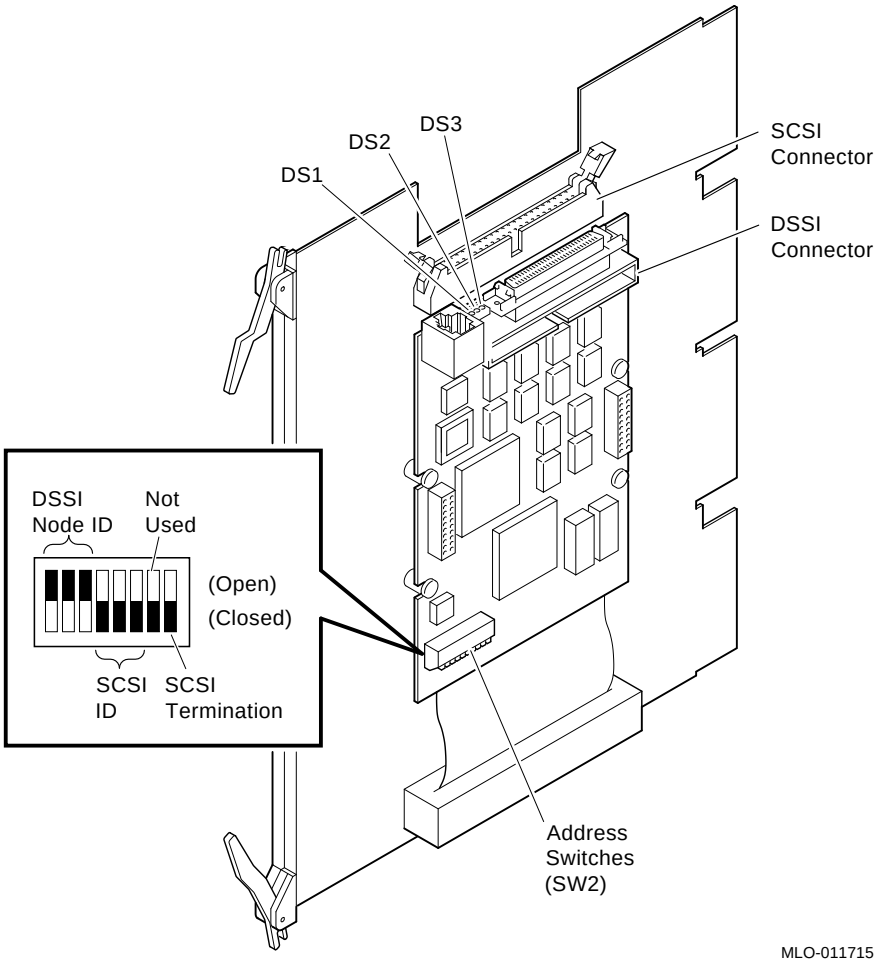
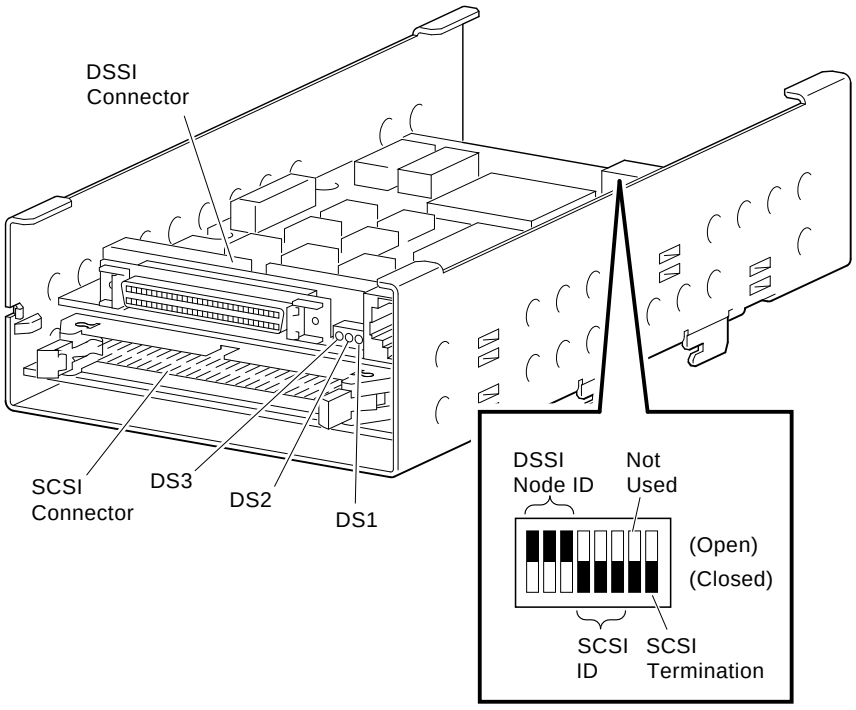


Figure 1–3 HSD10 DSSI-to-SCSI Bus Adapter Module Board



1.1.5.1 HSD10 Switches

Table 1–1 lists the switch sections in the device configuration switchpack (SW2). You need to set these switches according to the procedures given in Section 2.1 to configure the DSSI ID and the SCSI ID.

Table 1–1 HSD10 Device Configuration Switchpack (SW2) Sections

Section	Definition	Default
SW2–1	MSB of DSSI ID	Open (DSSI ID = 0)
SW2–2	NSB of DSSI ID	Open
SW2–3	LSB of DSSI ID	Open
SW2–4	MSB of SCSI ID	Closed (SCSI ID = 7)
SW2–5	NSB of SCSI ID	Closed
SW2–6	LSB of SCSI ID	Closed
SW2–7	Spare	Closed
SW2–8	Active SCSI termination	Closed (terminator installed)

1.1.5.2 HSD10 LED Indicators

Table 1–2 describes the HSD10 DSSI-to-SCSI bus adapter indicators that are used to determine the status of the HSD10 DSSI-to-SCSI bus adapter. On BA400-based systems, these indicators are visible from front to back after removing the module cover; on BA42B-based systems the indicators are visible on the HSD10 after opening the enclosure to expose the top shelf.

CAUTION

In BA400-series VAX 4000 systems, the HSD10 DSSI-to-SCSI bus adapter module cover should only be removed for service or maintenance. This cover needs to be in place for proper air flow and cooling, and to meet international regulatory requirements.

In BA42B-series VAX 4000 systems, the HSD10 DSSI-to-SCSI bus adapter module is embedded within the system, and the indicators are therefore available only to Digital services personnel, or self-maintenance customers who are authorized to remove the enclosure cover. Those persons should refer to *VAX 4000 Model 106A Enclosure Maintenance*, EK–472AB–MG, for the desktop enclosure, or EK–465RA–IN for a rack-mounted VAX 4000 Model 106A system, for instructions on opening the enclosure.

Table 1–2 LED Indicator Statuses

Indicator	Color	Status
DS3	Green	On to show that termination power, 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.

1.1.6 HSD10 DSSI-to-SCSI Bus Adapter Specifications

Table 1–3 lists the environmental specifications for the HSD10 DSSI-to-SCSI bus adapter.

Table 1–3 HSD10 Environmental Specifications

Condition	Specification
	Optimum Operating Environment
Temperature *Rate of change* *Step change*	+18°C to +24°C (+65°F 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 1–3 (Cont.) HSD10 Environmental Specifications

Condition	Specification
Maximum Operating Environment (Range)	
Temperature	+10°C to +40°C (+50°F 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 ±2°C/hr (20°F/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°C to +29°C (+65°F to +85°F)
Storage	–40°C to +66°C (–40°F 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 to +3600 meters (–1000 feet to +12,000 feet) MSL

2

Operating the HSD10 DSSI-to-SCSI Adapter

This chapter contains information on procedures used in the operation of the HSD10 DSSI-to-SCSI adapter, including device configuration, device maintenance utilities, operational restrictions, firmware updates, and error codes.

2.1 Setting the HSD10 DSSI-to-SCSI Bus Adapter Device Configuration

This section explains how to set the switches on the HSD10 DSSI-to-SCSI bus adapter module board before you install the adapter in a VAX 4000 system. Locate the configuration switchpack, as shown in Figure 1–2 for the BA400-series, or in Figure 1–3 for the BA42B-series.

The device configuration switchpack contains 10 switch elements, divided into DSSI ID and SCSI ID sections as shown in Figure 1–2 or Figure 1–3.

2.1.1 Selecting and Setting the DSSI ID

The HSD10 DSSI-to-SCSI bus adapter is connected to the standard DSSI bus 0 on the VAX 4000 host computer and is externally accessable through the DSSI port on the connector panel to the left of the card cage on BA400-based systems, and on the rear external port cover of BA42B-based systems.

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

Table 2–1 lists the sections of SW2 used for setting the DSSI ID and the corresponding settings for each DSSI ID.

Table 2–1 HSD10 DSSI ID Switch Settings

DSSI ID	SW2–1	SW2–2	SW2–3
0	Open	Open	Open (Default)
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:

1. At the system console prompt, enter the console command SHOW DEVICE to determine the DSSI ID numbers currently active on the DSSI bus.
2. Select an unused DSSI ID number for the HSD10 DSSI-to-SCSI bus adapter.
3. For the BA400-series, refer to Figure 1–2 and Table 1–1 to locate the DSSI ID switches on the device configuration switchpack.
4. For the BA42B-series, refer to Figure 1–3 and Table 1–1 to locate the DSSI ID switches on the device configuration switchpack.
5. Using a small blade screwdriver or similar tool, set the switches to the DSSI ID number selected in Step 2. Note that the "Open" position is marked on the switch body.

2.1.2 Selecting and Setting the SCSI ID

In the BA400-series, the SCSI port plugs into the SCSI backplane connector (J30) when the HSD10 DSSI-to-SCSI bus adapter is installed in the card cage. In the BA42B-series, the SCSI port is connected by cable to the internal SCSI devices. In either case, the port must have a unique SCSI ID.

The HSD10 DSSI-to-SCSI bus adapter is factory set to SCSI ID = 7 to give the adapter 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 do not need to reset the SCSI ID.

2.1 Setting the HSD10 DSSI-to-SCSI Bus Adapter Device Configuration

Table 2–2 lists the sections of SW2 used for setting the SCSI ID and the corresponding settings for each SCSI ID. On the switchpack, the closed position is with the switch in the down position, and the open position is with the switch in the up position (toward the "Open" marked on the the switchpack).

Table 2–2 HSD10 SCSI ID Switch Settings

SCSI ID	SW2–4	SW2–5	SW2–6
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 (Default)

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

1. Select an unused SCSI ID for the HSD10 DSSI-to-SCSI bus adapter.
2. For the BA400-series, refer to Figure 1–2 and Table 1–1 to locate the SCSI ID switches on the node configuration switchpack.
3. For the BA42B-series, refer to Figure 1–3 and Table 1–1 to locate the SCSI ID switches on the node configuration switchpack.
4. Using a small blade screwdriver or similar tool, set the switches to the SCSI ID number selected in Step 1.

2.2 Applying Power to the HSD10

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 adapter's serial communications port.

Apply power to the HSD10 DSSI-to-SCSI bus adapter as follows:

1. Place the power switch on the VAX 4000 system in the on position.

2. At the system console prompt, enter the console command SHOW DEVICE on the OpenVMS VAX system to verify that the HSD10 DSSI node address is online to the host system.

2.3 Setting Parameters for the HSD10 DSSI-to-SCSI Bus Adapter

The OpenVMS Diagnostic and Utility Protocol (DUP) utility provides a gateway to modifying HSD10 DSSI-to-SCSI Adapter configuration. The DUP utility can be run from either the system console or from the OpenVMS system prompt. Through this 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.

Once a DUP connection to the HSD10 DSSI-to-SCSI bus adapter is established, the onboard PARAMS configuration utility is used to set and show HSD10 and device parameters. Section 2.7 contains procedures for using the HSD10 onboard device and diagnostic utility during normal operation of the subsystem.

Note

HSD10 adapters normally come preconfigured and require no configuration changes except to suit specific customer requirements. Non-preconfigured HSD10 adapters 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 A.

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

2.3.1 Starting PARAMS from the Console Prompt on OpenVMS VAX Systems

Use the following procedure to start PARAMS from the console prompt on OpenVMS VAX systems:

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 DSSI-to-SCSI bus adapter. The *DSSI nodename* is initially a six-digit number. Do not confuse this number with the DSSI ID value.

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 adapter's serial communications port.

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 adapter:

```
>>> 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 adapter.

You may have to explicitly specify the DSSI bus (0 or 1) to properly establish a connection to the HSD10 adapter. 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 adapter.

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 adapter. In this event, see your system manager.
4. At the nodename prompt, see Section 2.3.3 to configure HSD10 parameters.

2.3.2 Starting the PARAMS Utility from the OpenVMS Prompt

You can start the utility from the OpenVMS prompt if both of the following are true:

- You have the appropriate system manager privileges on the host system.
- The DUP utility on your system has been started.

Activate the DUP server and use the following procedure to start PARAMS:

1. On OpenVMS VAX systems, connect to the DUP server as follows:

```
$ MC SYSGEN CONNECT FYA0/NOADAPTER
```

2. Enter the following to start PARAMS:

```
$ SET HOST/DUP/TASK=PARAMS/SERVER=MSCP$DUP n

Copyright (C) 1994 Digital
       HSD10    Serial No: 8
       Firmware Rev. B1   (X36 )


123456>
```

In the command, *n* is the DSSI nodename of the HSD10.

3. At the nodename prompt, refer to Section 2.3.3 to configure the HSD10 parameters.

2.3.3 HSD10 PARAMS 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.

Appendix A describes the HSD10 PARAMS Command Utility command set in detail, including information on allowed parameters and qualifiers. Table 2–3 summarizes this command set and indicates default parameter values.

Table 2–3 HSD10 PARAMS 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.	
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	Used only by Digital services to restore all adapter and device configuration settings to their factory defaults via an on-board serial port.	

(continued on next page)

Table 2–3 (Cont.) HSD10 PARAMS Command Utility Summary

Command	Description	Parameter/Default (if applicable)
FORMAT	Initiates the disk drive format utility.	
HELP	Outputs a command utility help screen.	
INITIALIZE STRIPESET	Initializes the adapter'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.	
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 adapter.	
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 2–3 (Cont.) HSD10 PARAMS 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.	

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

(continued on next page)

Table 2–3 (Cont.) HSD10 PARAMS Command Utility Summary

Command	Description	Parameter/Default (if applicable)
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 adapter.	
SHOW DEVICES	Combines the displays from the SHOW DISK, SHOW STRIPESETS, SHOW TAPE, and SHOW UNIT commands.	
SHOW DISK	Displays a listing of all physical disk device names assigned with the CREATE DISK or AUTOCONFIG commands.	

(continued on next page)

Table 2–3 (Cont.) HSD10 PARAMS Command Utility Summary

Command	Description	Parameter/Default (if applicable)
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 adapter'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.

2.3.3.1 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>
```

2.3.3.2 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 adapter to use the new parameters:

   ```
   211072> RESTART
   ```

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

2.3.4 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.

2.3.4.1 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>
```

2.3.4.2 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.

2.4 HSD10 Host-Based RAID Support

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

- POLYCENTER Striping for OpenVMS VAX (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)

2.5 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 A 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
```

Note

You must also be sure that the device itself is initialized at the operating system level, in addition to the Stripeset initialize command.

2.6 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 Table 2–3. 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>
```

2.7 HSD10 Command Utility Maintenance Operations

Section 2.3 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.

2.7.1 Formatting and Qualifying a SCSI Drive

You can format a specified device that is AVAILABLE to the HSD10 adapterer 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 2.7.2 and Appendix A 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 (DISMOUNT, for example) to make the device available to the HSD10 adapter.
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.

2.7.2 Exercising a Disk Device

You can exercise a disk device using the HSD10 Command Utility DISKTEST command. This exercise can be run to verify the performance of the device or to aid in 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 (DISMOUNT, for example) to make the device available to the HSD10 adapter.
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.

2.7.3 Exercising a Tape Device

You can exercise a tape device using the HSD10 Command Utility TAPETEST command. This exercise can be run to verify the performance of the device or to aid in 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 adapter.
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.

2.8 Transporting Drives to/from the HSD10 Environment

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

- HSD30™, HSJ40™, or HSC controllers (equipped with K.scsi 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 adapters, 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 not be warm swapped.

2.9 Shadowing Restrictions

The HSD10 adapter uses a limited set of disk device type identification names when communicating with the host. All attached disk drives by default are identified as HS*X*00. This identifier can be changed to RA82™ or RF72™ by setting an HSD10 parameter, DEVICE_TYPE, as described in Appendix A under the SET CONTROLLER command. The device type reported to the host does not affect actual accessible disk storage space.

The HSD10 adapter 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 adapter may be identified as RF72, they are not identical to an RF72 in capacity or geometry; therefore, *disk drives attached to HSD10 adapters can only be shadowed with identical SCSI drive types*. They may not be shadowed with true RF72 disk drives or with any other DSSI 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 HSD05/HSD10 adapters, 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 adapter cannot be shadowed with drives attached to a non-HSD05/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 adapter, even if it's an identical drive type.

2.10 Using Tape Drives

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

2.11 HSD10 Firmware Upgrade (Flash Boot) Utility

The HSD10 adapter is equipped with the ability to accept firmware upgrades via the serial communications port on the HSD10 module. This Flash Boot Utility 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.

2.11.1 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.

2.11.2 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.

2.12 Analyzing HSD10 Adapter Failures (LED Errors)

The HSD10 adapter utilizes two means of trouble notification: via the on-board LEDs 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 adapter (see the following section).

LED indicators (DS1 through DS3) are visible on the HSD10 adapter after opening the system or removing the cover . When the HSD10 adapter 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 adapter is powered off.

Table 2–4 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 recycle the system power. If these actions do not resolve the problem, or if the problem recurs, contact your Digital service representative.

Table 2–4 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.

2.13 Analyzing Device Failures (Error Logs)

The HSD10 adapter 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 adapter.

The HSD10 adapter 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 2–5 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 2–8)
5	SCSI port error (MSB) (see Table 2–8)
6-19	Phase history for SCSI command (see Table 2–9)

Table 2–6 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 2–7 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 2–8 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
8019	RETDAT packet timeout
8020	Reserved
8021	Illegal (reserved) SCSI phase

Table 2–9 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

A

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

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

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 S*x* 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.

DISKTEST

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. FACTORY does not work from a DUP connection; it requires the use of the serial port on the HSD10 module.

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 module and is not typically available the VAX 4000 systems.

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

D1il|T1il
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.)

SET CONTROLLER

/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 adapter's 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 store 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.

SHOW DSSI_STATS

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 bus. 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

T1il

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

C

D

E

F

H

I

T

U

V

W

Reader's Comments

HSD10 DSSI-to-SCSI Bus Adapter
Operation Information for VAX 4000 Systems
EK–HSD10–OP. A01

Your comments and suggestions help us improve the quality of our publications.
Thank you for your assistance.

I rate this manual's:	Excellent	Good	Fair	Poor
Accuracy (product works as manual says)	☐	☐	☐	☐
Completeness (enough information)	☐	☐	☐	☐
Clarity (easy to understand)	☐	☐	☐	☐
Organization (structure of subject matter)	☐	☐	☐	☐
Figures (useful)	☐	☐	☐	☐
Examples (useful)	☐	☐	☐	☐
Index (ability to find topic)	☐	☐	☐	☐
Page layout (easy to find information)	☐	☐	☐	☐

I would like to see more/less _____

_____

What I like best about this manual is _____

_____

What I like least about this manual is _____

_____

I found the following errors in this manual:

Page	Description
_____	_____
_____	_____
_____	_____

Additional comments or suggestions to improve this manual:

_____

_____

_____

For software manuals, please indicate which version of the software you are using: _____

_____

Name/Title _____ Dept. _____

Company _____ Date _____

Mailing Address _____

_____ Phone _____

Do Not Tear – Fold Here and Tape

digital™

No Postage
Necessary
If Mailed
in the
United States

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33 MAYNARD MASS.

POSTAGE WILL BE PAID BY ADDRESSEE

DIGITAL EQUIPMENT CORPORATION
Shared Engineering Services
PKO3-2/A9
129 PARKER STREET
MAYNARD, MA 01754-2195

Do Not Tear – Fold Here