Alpha AXP DSSI VMScluster

Installation and Troubleshooting Guide

Order Number: EK–D4AXP–TS. B01

Digital Equipment Corporation
Maynard, Massachusetts

First Printing, May 1993
Second Printing, May 1994

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

FCC NOTICE: The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

S2453

This document was prepared using VAX DOCUMENT Version 2.1.

Contents

2 Installation

3 Troubleshooting

A Electrical Lengths of Enclosures

B Storage Device Parameters

Index

Figures

Tables

Preface

Purpose of This Guide

This guide describes how to install and maintain a DSSI VMScluster configuration with the following Alpha AXP systems:

- Digital 2100 Server systems
- DEC 4000 AXP systems

Who Should Use This Guide

This guide is intended for system administrators. A system administrator should be an experienced user who is familiar with OpenVMS AXP and OpenVMS VAX operating systems.

Structure of This Guide

This guide is divided into three chapters and two appendixes:

- Chapter 1 describes the types of DSSI VMScluster configurations you can create, as well as restrictions and requirements.
- Chapter 2 describes the hardware-related steps in setting up a DSSI VMScluster system using a Digital 2100 Server or DEC 4000 system.
- Chapter 3 provides troubleshooting tips for solving hardware problems within the DSSI VMScluster configuration.
- Appendix A provides the DSSI connector type and electrical lengths of DSSI buses for DSSI adapters and enclosures.
- Appendix B provides information on how to examine storage device parameters, and describes how OpenVMS uses DSSI parameters.

Finding More Information

The following documents provide information related to DSSI VMScluster systems:

- *VAX Systems DSSI VAXcluster Installation and Troubleshooting*, EK-410AB-MG.
- *VMScluster Systems for OpenVMS*
- *OpenVMS AXP Version 6.1 Upgrade and Installation Manual*, AA-PV6XB-TE.
- *Digital 2100 Server Model 500MP/500MP-R/600MP Series Service Guide*, EK-KN450-SV.
- *DEC 4000 AXP Model 600/700 Series Service Guide*, EK-KN430-SV.
- *StorageWorks Solutions HSD05 Array Controller User's Guide*, EK-HSD05-UG

Conventions

The following coventions are used in this guide.

Convention	Meaning
lowercase	Lowercase letters in commands indicate that commands can be entered in uppercase or lowercase.
Caution	Cautions provide information to prevent damage to equipment or software.
[ ]	In command format descriptions, brackets indicate optional elements.
console command abbreviations	Console command abbreviations must be entered exactly as shown.
`boot`	Console and operating system commands are shown in this special typeface.
italic type	Italic type in console command sections indicates a variable.
{ }	In command descriptions, braces containing items separated by commas imply mutually exclusive items.

1

DSSI VMScluster Configuration and Requirements

Introducing VMScluster Systems

VMScluster Capabilities

The OpenVMS AXP Version 6.1 operating system provides the ability to cluster AXP computers or a combination of VAX and AXP computers. This enhanced clustering environment is referred to as a VMScluster system to reflect support for both VAX and Alpha AXP architectures.

Most VMScluster system capabilities are the same as those for VAXcluster systems. AXP processors in an AXP only cluster and AXP and VAX processors in dual-architecture clusters can share processing resources, data storage, and queues under a single security and management domain, and they can be configured to boot or fail independently.

In This Chapter

This chapter describes DSSI VMScluster configurations and requirements.

- DSSI VMScluster Configurations Using Alpha AXP Systems
- DSSI VMScluster Restrictions
- Licensing and Software Requirements
- DSSI Bus Lengths and Grounding Requirements
- Recommended Guidelines for DSSI VMScluster Systems

DSSI VMScluster Configurations Using Alpha AXP Systems

Two Types of DSSI VMScluster Configurations

Alpha AXP systems can be configured in two types of DSSI VMScluster configurations:

- Alpha AXP systems in an AXP only DSSI VMScluster

  Up to three Alpha AXP systems can share a DSSI.

  Each Digital 2100 Server system must have a KFESA DSSI adapter.

  DEC 4000 AXP systems can coexist as end nodes on a DSSI with Digital 2100 Server systems.

- Alpha AXP and VAX systems in a dual-architecture DSSI VMScluster

  Up to three systems (AXP and VAX) can share a DSSI.

  Digital 2100 Server systems using the KFESA DSSI adapter can coexist as middle node or end nodes on a DSSI with VAX 4000/6000/7000/10000 systems.

  DEC 4000 AXP systems can coexist as end nodes on a DSSI with VAX 4000/6000/7000/10000 systems.

DSSI Nodes Per Bus

Each DSSI bus supports up to eight nodes. Each of the following counts as one DSSI node:

- A DSSI adapter
- An HSD05 array controller
- An RF-disk controller interface
- A TF-tape controller interface

For a two-system DSSI VMScluster system, for instance, a maximum of six RF-disks can be configured per DSSI bus: two DSSI adapters + six disks = eight nodes.

Note

Drives connected through the HSD05 array controller do not count as DSSI nodes; thus, using multiple HSD05 controllers, up to 36 SCSI drives can be configured in a two-system DSSI VMScluster system.

DSSI VMScluster Restrictions

Restrictions for AXP Only DSSI VMScluster Systems

The following restrictions apply to AXP only DSSI VMScluster systems.

- There is no tape serving on AXP processors.
- Because OpenVMS "names" the first SCSI bus it finds in each system as bus A, the second as bus B, and so on, SCSI drives in a DSSI VMScluster can appear to share a common bus between systems. For each SCSI bus that OpenVMS sees as common to the DSSI VMScluster, the total number of drives is limited to eight (node ID plugs 0–7).

Note

Disks connected through an SWXCR-xx controller cannot be striped or shadowed using host-based shadowing. These disks can be served to the cluster, however.

Hardware shadowing of SCSI disks is supported via the HSD30.

Restrictions for Dual-Architecture DSSI VMScluster Systems

The following restrictions apply to dual-architecture DSSI VMScluster systems.

- A VAX CPU and an AXP CPU may not boot from a common system disk. AXP processors must boot from an AXP system disk and VAX processors must boot from a VAX system disk. However, VAX and AXP processors can mount and share access to files on any disk (including system disks) in a VMScluster system.
- Booting of satellite systems across architectures is not supported. AXP satellites must boot from an AXP boot server, and VAX satellites must boot from a VAX boot server.
- There is no tape serving on AXP processors. However, served tapes are supported for VAX systems in dual-architecture VMScluster systems such that VAX systems can serve TMSCP tapes to both AXP and VAX systems in a VMScluster.
- AXP CPUs cannot access shadow or stripe sets created on VAX CPUs by the Volume Shadowing for OpenVMS VAX or VAX Disk Striping products.
- Because OpenVMS "names" the first SCSI bus it finds in each system as bus A, the second as bus B, and so on, SCSI drives in a DSSI VMScluster can appear to share a common bus between systems. For each SCSI bus that OpenVMS sees as common to the DSSI VMScluster, the total number of drives is limited to eight (node ID plugs 0–7).

Note

Disks connected through an SWXCR-xx controller cannot be striped or shadowed using host-based shadowing. These disks can be served to the cluster, however.

Hardware shadowing of SCSI disks is supported via the HSD30.

Licensing and Software Requirements

Software Requirements

Table 1–1 provides the licensing and software requirements for each processor in a DSSI VMScluster system.

Table 1–1 Licensing and Software Requirements for DSSI VMScluster Systems

Processor	License	Operating Software
AXP	VMScluster software license	OpenVMS AXP Version 6.1
VAX	VAXcluster software license	OpenVMS VAX Version 5.5-2 (not Version A5.5-2)
	One full-function DECnet license[1]	

[1]Since DSSI VMScluster systems must also be connected by an Ethernet interconnect for DECnet communications, a full-function DECnet license is required for the first system.

Additional licensing information is described in the VMScluster and VAXcluster Software Product Descriptions.

DSSI Bus Lengths and Grounding Requirements

Maximum Bus Lengths

The maximum DSSI bus length supported, that is, the total distance between end-node terminators on the DSSI bus, is:

- 25 m (82 ft) in a computer room environment
- 20 m (65.6 ft) in an office environment

Refer to Appendix A for a table of electrical lengths for enclosures.

Maintain a Common Ground

The maximum bus lengths are based on grounding conditions typically found in computer room and office environments. Improper grounding can result in voltage potentials, called ground offset voltages, between the enclosures in the configuration. If these voltages exceed certain limits, data transmission across the DSSI bus can be disrupted and the configuration can experience performance degradation or data corruption.

For these reasons, a common ground must be maintained between all systems/enclosures in a DSSI VMScluster at all times. All systems must receive their power from a common power feed. It is not advisable to power systems/enclosures from different circuit breaker panels.

Verify Site Conditions

Before you install a DSSI VMScluster system, you should verify site conditions.

1. A qualified electrician should ensure that site power distribution meets all local electrical codes.
2. The electrician should inspect the entire site power distribution system to ensure that it does not have any of the following faults:
   - Outlets do not have power ground connections
   - Grounding prong is missing from computer equipment power cables
   - Power outlet neutral connections are actual ground connections
   - Grounds for the power outlets are not connected to the same power distribution panel
   - Devices that are not UL or IEC approved are connected to the same circuit breaker as the computer equipment

Offset Limits

Table 1–2 shows acceptable ground offset limits between cabinets in a DSSI VMScluster.

Table 1–2 Acceptable Ground Offset Limits by Length of DSSI Interconnect

DSSI Length	Allowable Offset
Up to 20 m (65 ft)	200 mv (DC); 70 mv (AC)
20–25 m (65–82 ft)	40 mv (DC); 14 mv (AC)

Measuring Grounding Offset Voltage

You can use a hand-held multimeter to measure the grounding offset voltage between any two cabinets. Connect the voltmeter leads to unpainted metal on each enclosure, and compare the reading you obtain to the acceptable offset values in Table 1–2.

The multimeter method provides data only for the moment it is measured. The ground offset values may change over time as additional devices are plugged into the same power source or activated. To ensure that the ground offsets will remain within acceptable limits over time, you need a power survey by an electrician.

Install Grounding Cables

You should install Digital grounding cables between enclosures. Digital supplies ground cables with some hardware kits. You can also order the cables separately (order numbers BC21G-50 and BC21G-25 for the required number 6 cables; the numbers after the hyphen refer to the length).

Maximum Number of Enclosures

When Alpha AXP systems are configured with VAX or MicroVAX systems, up to five enclosures can be configured on a DSSI bus:

- Two systems and up to three expansion enclosures
- Three systems and up to two expansion enclosures

Recommended Guidelines for DSSI VMScluster Systems

General Guidelines

The following are recommended guidelines for configuring a DSSI VMScluster:

- Whenever possible, DSSI adapters of the same performance level (I/Os per second, Table 1–3) should be connected on the same DSSI bus to optimize performance.
- Different types of adapters are allowed in the same system; whenever possible, connect the same types of adapters on the same DSSI bus to maximize performance. Refer to Table 1–3 for information on adapter performance and characteristics.
- Ensure that each DSSI bus is terminated at each end at all times. Breaking a bus connection or removing a DSSI terminator while a cluster is operational may lead to data corruption.
- Do not configure DSSI VMScluster systems with a power bus. Inadvertently bringing down the cluster defeats the added reliability of a DSSI VMScluster.
- You can add an optional uninterruptible power supply (UPS) to the VMScluster configuration to increase the level of availability.

DSSI Adapter Characteristics

Table 1–3 provides adapter information for AXP supported adapters.

Table 1–3 DSSI Adapter Characteristics for AXP Supported Adapters

Adapters	Cluster Traffic Support	Middle-Node[1] Support	I/Os per Second[2]	Type	Cluster Serviceability[3]
KFESA (EISA-to-DSSI)	Yes	Yes	1000 x 1	EISA-bus	Yes
N710 (DEC 4000 AXP)	Yes	No	1200 x 4	Embedded	Yes
SHAC (KA676, KA681, KA691, KA692)	Yes	Bus 0—No Bus 1—Yes	1200 x 2	Embedded	Yes
SHAC (KA670)	Yes	Bus 0—No Bus 1—Yes	800 x 2	Embedded	Yes
SHAC (KA52, KA53)	Yes	With IN/OUT connectors—Yes Without IN/OUT connectors—No	1200 x 2	Embedded	Yes
SHAC (KA660)	Yes	No	800	Embedded	No
EDA640	Yes	No	340	Embedded	No
KFMSA	Yes	Yes, BA variant No, AA variant	800 x 2	XMI	Yes
KFQSA	No	With IN/OUT connectors—Yes Without IN/OUT connectors—No	170	Q–bus	With IN /OUT connectors—Yes Without IN/OUT connectors—No

[1]Middle nodes do not contain embedded DSSI termination, and thus support more than two hosts on their DSSI bus.

[2]Throughput is per DSSI bus. Total throughput may be less than the sum.

[3]Cluster serviceability refers to the ability to service the adapter without violating DSSI bus termination.

2
Installation

In this Chapter

This chapter describes the hardware steps required to set up and install a DSSI VMScluster that uses a KFESA-based Digital 2100 Server system or DEC 4000 AXP system:

- Step 1: Configure Bus Node IDs for Host Adapters
- Step 2: Configure Bus Node ID Plugs
- Step 3: Set HSD05 Array Controller Bus Node ID
- Step 4: Connect Ground Cables Between Enclosures
- Step 5: Connect DSSI Cables Between Enclosures
- Step 6: Set DSSI Device Parameters
- Step 7: Configure SCSI Node ID Plugs
- Step 8: Set Boot Parameters
- Step 9: Complete the Installation

Examples of Configurations

Figure 2–1 shows a sample configuration with two KFESA-based Digital 2100 Model 500MP systems in a DSSI VMScluster.

Figure 2–2 shows a sample configuration with two DEC 4000 AXP systems in a DSSI VMScluster.

Figure 2–3 shows a sample dual-architecture DSSI VMScluster with two KFESA-based Digital 2100 Model 500MP Series systems and a VAX 4000.

Figure 2–4 shows a sample dual-architecture DSSI VMScluster with two DEC 4000 AXP systems and a VAX 4000.

Figure 2–1 AXP Only DSSI VMScluster: Two Digital 2100 Servers

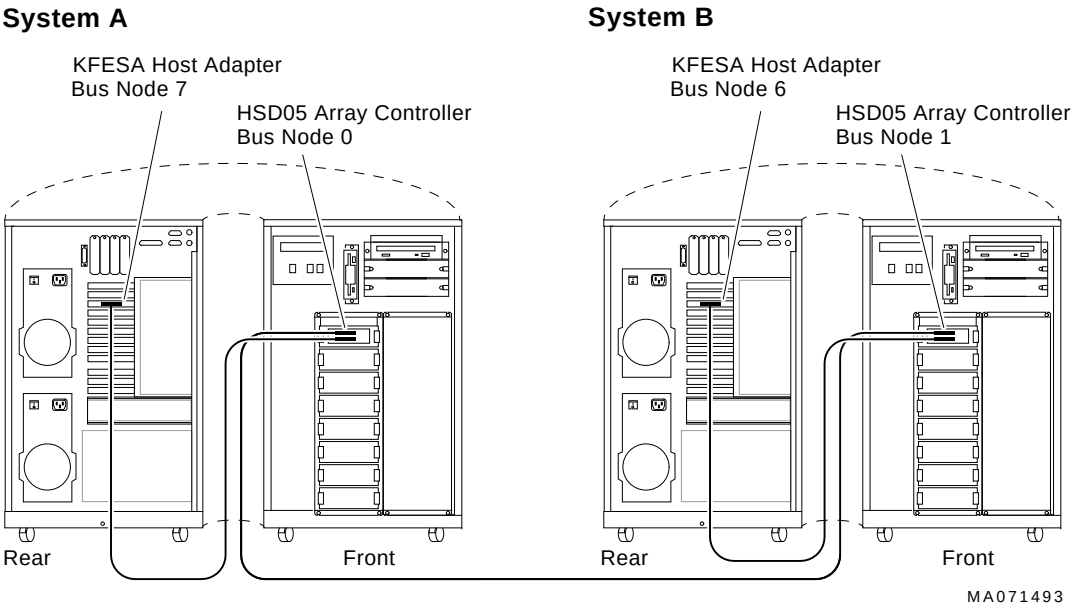


Figure 2–2 AXP Only DSSI VMScluster: Two DEC 4000 Systems

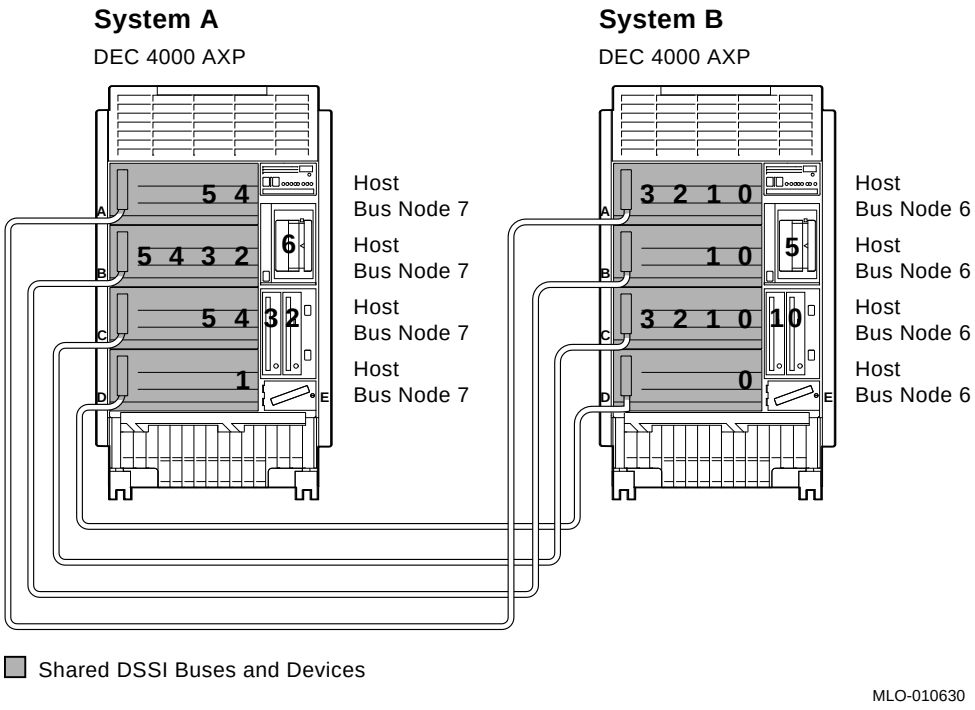


Figure 2–3 Dual-Architecture DSSI VMScluster: Digital 2100 Servers and VAX 4000

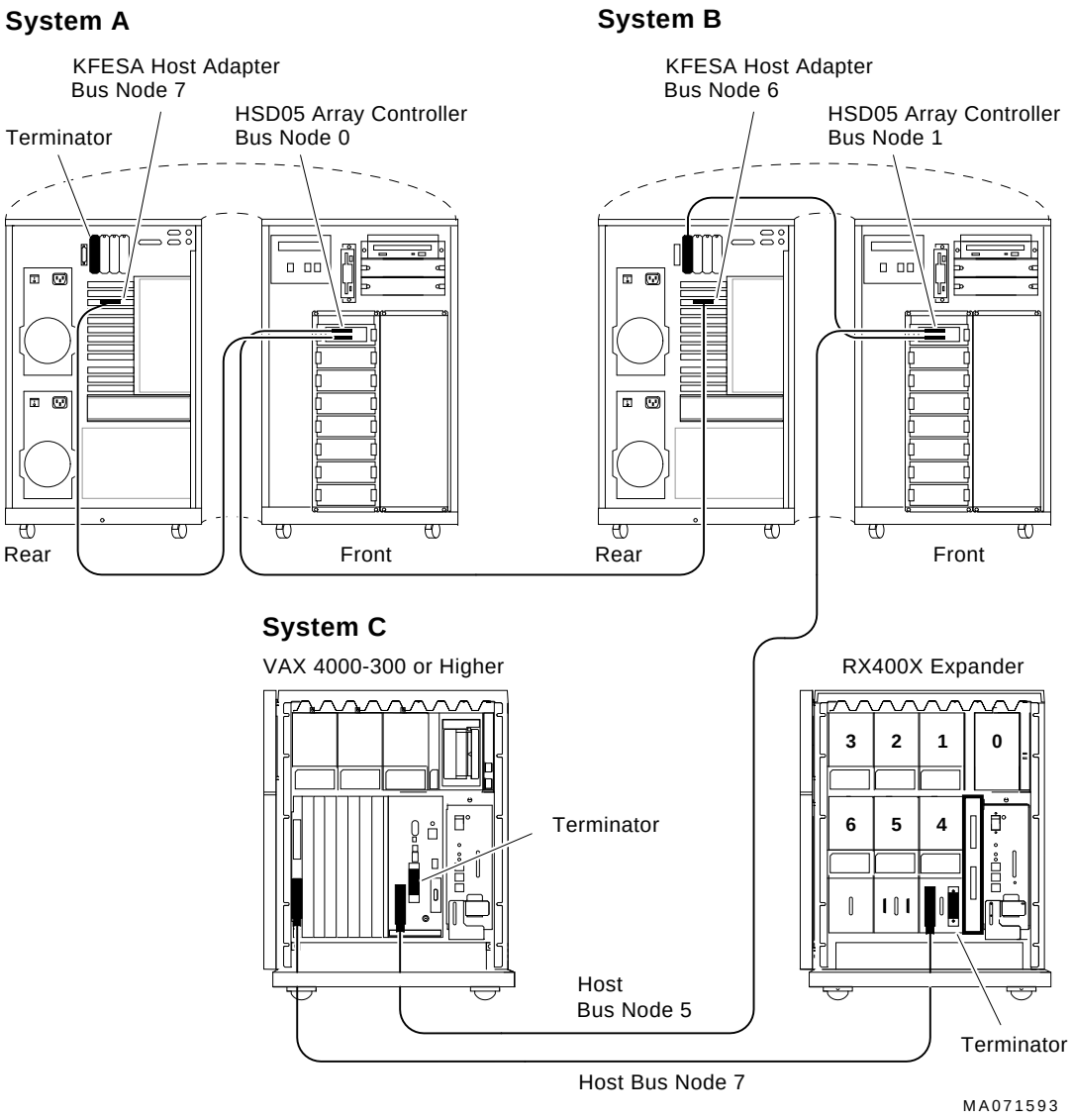
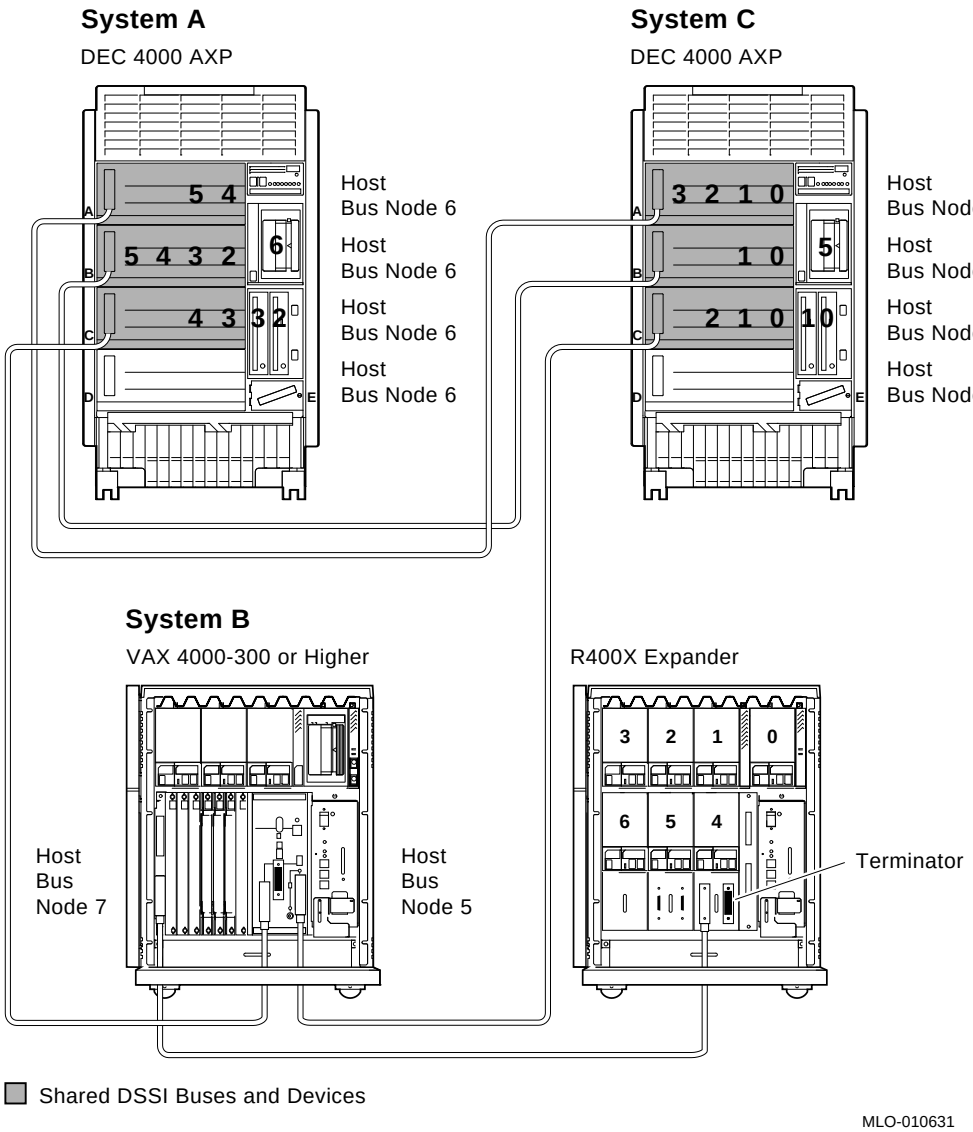


Figure 2–4 Dual-Architecture DSSI VMScluster: DEC 4000 Systems and VAX 4000



Step 1: Configure Bus Node IDs for Host Adapters

DSSI Adapter Bus Node IDs

By convention, host adapters in a two-system DSSI VMScluster are assigned bus node IDs 6 and 7; in a three-system DSSI VMScluster they are assigned 5, 6, and 7.

KFESA Adapter IDs

Digital 2100 Server systems use the KFESA DSSI host adapter. The bus node ID (or device ID) for the KFESA is changed using the EISA Configuration Utility (ECU).

DEC 4000 AXP Adapter IDs

DEC 4000 AXP systems use embedded DSSI host adapters. The bus node ID (or device ID) for DEC 4000 AXP adapters are changed by setting the NCRn_SETUP environment variables.

Changing the KFESA Adapter Bus Node ID (Digital 2100 Server Systems)

Running the ECU

Run the ECU as follows to change the KFESA host bus node ID:

1. Start the ECU according to the instructions provided with your system documentation.
2. After the ECU copyright is displayed, the ECU will load the configuration file for the KFESA. If the file is not included on the ECU diskette, the ECU program will prompt you to insert the configuration diskette for the option.

   While the configuration files are loading, the ECU displays the message:

   ```
   Loading configuration files
   Please wait...
   ```

When the files have finished loading, a menu similar to the following is displayed.

```
        EISA Configuration Utility
         Steps in configuring your computer

  STEP 1: Important EISA configuration Information

  STEP 2: Add or remove boards

  STEP 3: View or edit details

  STEP 4: Examine required details

  STEP 5: Save and exit

>Select=ENTER<  <Cancel=ESC>
```

3. Select the View or edit details option (Step 3 in the example below) and press the Enter key. Scroll through the file until you find the KFESA option and its slot number. The display lists the current settings. A sample file is shown below:

```
        Step 3: View or edit details

Slot 7 -- Digital KFESA DSSI EISA Host Adapter   Added

Host Adapter Interface...................Trigger EDGE
Host Adapter IRQ.........................IRQ 15
Host Adapter DSSI ID.....................Device ID 7
```

   To change the bus node ID setting (edit details), select the "Host Adapter DSSI ID" function or setting and press the Return key.

Note

Never set a host adapter IRQ of 9.

   When you have finished with the option settings, press F10. A main menu similar to the following is displayed.

```
        EISA Configuration Utility
         Steps in configuring your computer

  STEP 1: Important EISA configuration Information

  STEP 2: Add or remove boards

  STEP 3: View or edit details

  STEP 4: Examine required details

  STEP 5: Save and exit
```

```
>Select=ENTER<  <Cancel=ESC>
```

4. Select Save and exit (Step 5 in the example above) and press the Enter key. A screen will verify that you want to save the configuration and a screen similar to the following is then displayed:

```
        EISA Configuration Utility

Your configuration file has been saved, and if possible a backup SYSTEM.SCI file
has been made on the current drive.

To complete your configuration, you must do one of the following:

If you need to install boards or change switches and jumpers on boards already
installed, turn off your computer and do so.

If you want to test your system or install an operating system, press ENTER to
restart your computer, run the configuration utility again, and select the appr
main menu item.

If you are finished configuring, remove the SYSTEM CONFIGURATION diskette if
it is in drive A and press ENTER to restart your system.

Ok=ENTER
```

   Follow the directions on the screen displays until you have saved and exited the ECU.

5. Return to your system documentation for instructions on returning to the SRM console, which supports OpenVMS.

Turn Off System Power

After setting the KFESA host adapter bus node numbers, turn off system power by setting the DC On/Off switch to off.

Changing NCRn_SETUP Environment Variables (DEC 4000 AXP Systems)

Set Bus Mode and Bus Node Numbers

For each DEC 4000 AXP host adapter that will support DSSI devices, set the bus mode to "DSSI."

In addition, for DSSI VMScluster systems with two DEC 4000 AXP systems, change one of the system's bus node numbers for the host adapters to be shared. For each host adapter to be shared, set the bus node number to 6.

Use NCRn_SETUP Environment Variables

In DEC 4000 AXP systems, you change the bus mode and bus node numbers for host adapters by setting NCRn_SETUP environment variables.

Note

When diskless DSSI buses are to be shared (for increased performance and redundancy), you still need to set the bus mode to DSSI, and change the host adapter bus node numbers accordingly.

Host Adapters and Bus Locations

Table 2–1 shows the relationship of the NCRn_SETUP environment variables to the DEC 4000 AXP storage buses.

Table 2–1 Host Adapters for DEC 4000 AXP Systems

Host Adapters	Storage Bus	Location
NCR0_SETUP	0 (or A in console mode)	Top drawer
NCR1_SETUP	1 (or B in console mode)	Second drawer
NCR2_SETUP	2 (or C in console mode)	Third drawer
NCR3_SETUP	3 (or D in console mode)	Bottom drawer
NCR4_SETUP	4 (or E in console mode)	Removable-media storage compartment (SCSI only)

Set NCRn_SETUP Example

In the following example, all four DSSI host adapters in System A and B are assigned a bus mode of DSSI. All four DSSI host adapters in System B are assigned a bus node number of 6.

```
# For System A
>>> show ncr*
ncr0_setup           AUTO 7
ncr1_setup           AUTO 7
ncr2_setup           AUTO 7
ncr3_setup           AUTO 7
ncr4_setup           AUTO 7
>>> set ncr0_setup "DSSI 7"
>>> set ncr1_setup "DSSI 7"
>>> set ncr2_setup "DSSI 7"
>>> set ncr3_setup "DSSI 7"
>>> show ncr*
ncr0_setup           DSSI 7
ncr1_setup           DSSI 7
ncr2_setup           DSSI 7
ncr3_setup           DSSI 7
ncr4_setup           AUTO 7
>>>

# For System B
>>> show ncr*
ncr0_setup           AUTO 7
ncr1_setup           AUTO 7
ncr2_setup           AUTO 7
ncr3_setup           AUTO 7
ncr4_setup           AUTO 7
>>> set ncr0_setup "DSSI 6"
>>> set ncr1_setup "DSSI 6"
>>> set ncr2_setup "DSSI 6"
>>> set ncr3_setup "DSSI 6"
>>> show ncr*
ncr0_setup           DSSI 6
ncr1_setup           DSSI 6
ncr2_setup           DSSI 6
ncr3_setup           DSSI 6
ncr4_setup           AUTO 7
>>>
```

Turn Off System Power

After setting the host adapter bus node numbers and specifying the bus mode, turn off system power by setting the DC On/Off switch to off.

Step 2: Configure Bus Node ID Plugs

Unique Bus Node ID Plugs

Configure bus node ID plugs so that all DSSI devices on a shared bus (mass storage and host adapters) have unique bus node numbers.

DSSI storage devices have bus node ID plugs to provide a DSSI node number for the device. VAX 4000 systems use bus node ID plugs to supply DSSI node numbers for their embedded host adapters. Depending on the number of systems in the cluster, set VAX 4000 host adapters to 6 or 5.

Step 3: Set HSD05 Array Controller Bus Node ID

HSD05 Bus Node ID

Each HSD05 array controller counts as one DSSI node. If your configuration includes HSD05 array controllers, be sure that the HSD05 is assigned a unique DSSI bus node ID. DSSI node IDs for the HSD05 are set by switches on the HSD05 controller module board. The factory default setting is 0.

Refer to the *StorageWorks Solutions HSD05 Array Controller User's Guide*, EK-HSD05-UG, for information on switchpack settings.

Step 4: Connect Ground Cables Between Enclosures

Daisy Chain Ground Cables

Attach a number 6 gauge ground cable to the ground terminal on the system power supply. Ground cables should be daisy chained for systems with multiple enclosures.

Caution

Do not attach more than two ground cables per ground terminal.

Step 5: Connect DSSI Cables Between Enclosures

DSSI Connectors and Cables

Figure 2–5 shows the PS (pedestal style or pin-socket) and MR (midrange or micro ribbon) DSSI connectors. Appendix A provides the connector type for each enclosure and DSSI adapter.

Table 2–2 lists the cable variants used with DSSI VMSclusters. Refer to the *Digital Systems and Options Catalog* for cable order numbers.

Figure 2–5 Midrange and Pedestal Style DSSI Connectors

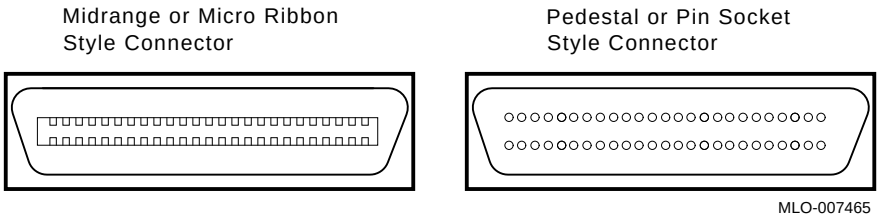


Table 2–2 DSSI Cable Variations

Cable	Type
BC29S-06	KFESA host adapter to HSD05 array controller
BC29U-02	HSD05 array controller to HSD05 array controller (within same enclosure)
BC21M-09	Pedestal to pedestal
BC22Q-*xx*	Pedestal to midrange
BC21Q-*xx*	Midrange to midrange

Check Devices on the Power-Up Configuration Screen

After connecting the DSSI cables, power up the system. Check the system configuration display to see if there are any missing drives. If drives are missing, check that bus node IDs are unique for each:

- DSSI host adapter
- HSD05 array controller
- DSSI storage device

Note

If you change the bus node ID plugs, you must recycle power (press the Reset button or turn on power with the DC On/Off switch) before the new setting will take effect. The system reads the bus node ID values at power-up.

Step 6: Set DSSI Device Parameters

DSSI Device Parameters

In creating a DSSI VMScluster system, you need to set DSSI device parameters according to your configuration:

- ALLCLASS — In a DSSI VMScluster, each device to be served to the cluster must have a nonzero allocation class that matches the allocation class of the system. Each system on a shared DSSI bus must have the same OpenVMS allocation class (ALLOCLASS).

  Note

  For devices connected through the HSD05 array controller, this parameter is called DISK_ALCS.

- UNITNUM — Systems using multiple DSSI buses, as described in Appendix B, require that the default values for DSSI storage devices (supplied by bus node ID plugs) be replaced with unique unit numbers.

  Note

  Devices connected through the HSD05 array controller are automatically assigned unique unit numbers.

- NODENAME — You can provide your own node names for drives; you can use the factory-supplied node names; or use the `cdp` console command to supply node names that relate to the device name conventions for AXP systems. Systems using the HSD05 array controller must use the `set host -dup -task -params device name` console command.

For More on DSSI Parameters

For more information on DSSI parameters and their functions, refer to Appendix B and *VMScluster Systems for OpenVMS*.

cdp Console Command

Caution

The HSD05 array controller does not currently support the `cdp` command. If your configuration includes the HSD05, do not use the `cdp` command. Doing so will cause the console subsystem to hang and you will have to press the Reset button to return to the console prompt.

For systems configured with the HSD05 array controller, use the `set host -dup -dssi` *`device_name`* command to set and examine DSSI parameters using the Diagnostic and Utility Program (DUP).

For examples of the `set host -dup -dssi` command, see the section "Set host -dup -dssi Command." For more information, refer to the *StorageWorks Solutions HSD05 Array Controller User's Guide*, EK-HSD05-UG.

The AXP console command `cdp` allows you to modify the NODENAME, ALLCLASS, and UNITNUM parameters. The `cdp` command automatically connects to the device's DUP server for all devices or any number of specified devices.

Note

When a DSSI bus is shared with a VAX system, the `cdp` console command can connect to all the shared drives, even though they physically reside in the VAX enclosure (and/or expansion enclosure).

Enter `cdp` without an option or target device to list the DSSI parameters for all DSSI drives on the system.

Command Description

cdp ([-{i,n,a,u,o}] [-sn] [-sa allclass] [-su unitnum] [dssi_device])

Arguments:

[dssi_device] Name of the DSSI device or DSSI adapter. Only the parameters for the specified device or devices on this adapter will be modified.

Options:

[-i]	Selective interactive mode, set all parameters.
[-n]	Set device node name, NODENAME (alphanumeric, up to 6 characters).
[-a]	Set device allocation class, ALLCLASS.
[-u]	Set device unit number, UNITNUM.
[-sn]	Set node name (NODENAME) for all DSSI drives on the system to either RF*hscn* or TF*hscn*, where: *h* is the device hose number (0) *s* is the device slot number (0–3) *c* is the device channel number (0) *n* is the bus node ID (0–6).
[-sa]	Set ALLCLASS for all DSSI devices on the system to a specified value.
[-su]	Specify a starting unit number for a device on the system. The unit number for subsequent DSSI devices will be incremented (by 1) from the starting unit number.

DSSI Parameters Displayed Using cdp

A sample display of DSSI device information using the `cdp` is shown below:

```
>>> cdp
    ❶            ❷           ❸              ❹ ❺    ❻
pua0.0.0.0.0    ALPHA0     0411214901371      2  0  $2$DIA0
pua0.1.0.0.0    ALPHA1     0411214901506      2  1  $2$DIA1
pua0.2.0.0.0    ALPHA2     041122A001625      2  2  $2$DIA2
pua0.3.0.0.0    ALPHA3     0411214901286      2  3  $2$DIA3
pua0.4.0.0.0    ALPHA4     0411224904506      2  4  $2$DIA4
pua0.5.0.0.0    ALPHA5     0411233087412      2  5  $2$DIA5
>>>
```

❶ Storage adapter device name

❷ Node name (NODENAME)

❸ System ID (SYSTEMID) — modified during warm swap

❹ Allocation class (ALLCLASS)

❺ Unit number (UNITNUM)

❻ Operating system device name

cdp Example

In the following example, which corresponds to the configuration shown in Figure 2–2:

- The unit numbers for drives on DSSI buses B, C, and D are changed to avoid duplicate unit numbers. Bus B is given unit numbers starting with 10; Bus C starting with 20; and Bus D starting with 30.
- The allocation class for all drives is changed to 1.
- Drive dub0 is given the new node name, SYSTEM.

```
>>> cdp -sa 1
pua0.0.0.0.0    ALPHA0     0411214901371      1  0   $1$DIA0
pua0.1.0.0.0    ALPHA1     0411214901506      1  1   $1$DIA1
pua0.2.0.0.0    ALPHA2     041122A001625      1  2   $1$DIA2
pua0.3.0.0.0    ALPHA3     0411214901286      1  3   $1$DIA3
pua0.4.0.0.0    ALPHA4     0411224904506      1  4   $1$DIA4
pua0.5.0.0.0    ALPHA5     0411233087412      1  5   $1$DIA5
>>> cdp -sa 1 -su 10 dub
pub0.0.0.1.0    SNEEZY     0411214906794      1  10  $1$DIA10
pub1.1.0.1.0    DOPEY      0411214457623      1  11  $1$DIA11
pub2.2.0.1.0    SLEEPY     0478512447890      1  12  $1$DIA12
pub3.3.0.1.0    GRUMPY     0571292500565      1  13  $1$DIA13
pub4.4.0.1.0    BASHFL     0768443122700      1  14  $1$DIA14
pub5.5.0.1.0    HAPPY      0768443122259      1  15  $1$DIA15
>>> cdp -sa 1 -su 20 duc
puc0.0.0.2.0    RF0200     0347500845133      1  20  $1$DIA20
puc1.1.0.2.0    RF0201     0889734564411      1  21  $1$DIA21
puc2.2.0.2.0    RF0202     0411780351455      1  22  $1$DIA22
puc3.3.0.2.0    RF0203     0555613903222      1  23  $1$DIA23
puc4.4.0.2.0    RF0204     0744673884100      1  24  $1$DIA24
puc5.5.0.2.0    RF0205     0298438401226      1  25  $1$DIA25
>>> cdp -sa 1 -su 30 dud
pud0.0.0.3.0    RF0300     0620707250334      1  30  $1$DIA30
pud1.1.0.3.0    RF0301     0889734564411      1  31  $1$DIA31
>>> cdp -n dub0
pub0.0.0.1.0:
Node Name [SNEEZY]? SYSTEM
>>>
```

set host -dup -dssi Command

The `set host -dup -dssi` *`device_name`* command allows you to enter the DUP server utility for a specified device. Through the DUP server utility, you can set and examine DSSI parameters for the specified device. This command must be used in place of the `cdp` command for systems using the HSD05 array controller.

Starting DUP: Example

```
>>> set host -dup -dssi dub34
>>> set host -dup -dssi dub34

starting DIRECT on pub0.3.0.3.1 (HSD05A)

Copyright  1994 Digital
        HSD05    Serial No: 2033
        Firmware Rev. B1   (X36A)

DIRECT V1.0  D  Mar 21 1994 17:09:41
PARAMS V1.0  D  Mar 21 1994 17:09:41
UTILIT V1.0  D  Mar 21 1994 17:09:41

End of directory
Task? params

starting PARAMS on pub0.3.0.3.1 (HSD05A)

Copyright  1994 Digital
        HSD05    Serial No: 2033
        Firmware Rev. B1   (X36A)
PARAMS>
```

Setting Allocation Class

After entering the DUP server utility for a specified device, you can examine and set the allocation class for the device as follows.

Note

Set the ALLCLASS parameter only through console mode, at the PARAMS> prompt. Setting the ALLCLASS parameter from the operating system is not recommended.

Devices connected through the HSD05 array controller use the parameter DISK_ALCS for allocation class; all other DSSI devices use the parameter ALLCLASS.

1. At the PARAMS> prompt, enter `show allclass` (or `show disk_alcs` for HSD05 devices) to check the allocation class of the device to which you are currently connected.
2. Enter `set allclass 1` (or enter the allocation class you desire).
3. Enter `show allclass` to verify the new allocation class.

The following example shows the steps for examining and changing the allocation class for a specified device. In the example, the allocation class is changed from class 0 to class 1 for a device connected through an HSD05.

```
PARAMS> show disk_alcs

DISK_ALCS                0          0         255    DecimalNum
PARAMS> set disk_alcs 1

PARAMS> show disk_alcs

DISK_ALCS                1          0         255    DecimalNum
```

Setting Unit Number

After entering the DUP server utility for a specified device, you can examine and set the unit number for the device as follows.

Note

The HSD05 array controller automatically provides unique unit numbers for its drives. Devices connected through the HSD05 do not need to change this parameter.

1. At the PARAMS> prompt, enter `show unitnum` to check the unit number of the device to which you are currently connected.
2. Enter `set unitnum 10` (or enter the unit number you desire).
3. Enter `set forceuni 0` to override the default unit number value supplied by the bus node ID plug.
4. Enter `show unitnum` to verify the new unit number.
5. Enter `show forceuni` to verify that the current value for the FORCEUNI parameter is 0.
6. Label the device with its unit number, using the unit number labels shipped with your system.

The following example shows the steps for changing the unit number of a specified device from number 0 to number 10.

```
PARAMS>show unitnum
Parameter     Current           Default        Type     Radix
--------- ---------------  ---------------  --------  -----
UNITNUM                 0                0      Word    Dec   U

PARAMS>set unitnum 10
PARAMS>set forceuni 0
PARAMS>show unitnum
Parameter     Current           Default        Type     Radix
--------- ---------------  ---------------  --------  -----
UNITNUM                10                0      Word    Dec   U

PARAMS>show forceuni
Parameter     Current           Default        Type     Radix
--------- ---------------  ---------------  --------  -----
FORCEUNI                0                1   Boolean    0/1   U
```

Setting Node Name

After entering the DUP server utility for a specified device, you can examine and set the node name for the device as follows.

1. At the PARAMS> prompt, enter `show nodename` to check the node name of the device to which you are currently connected.
2. Enter `set nodename sysdsk` (or enter the desired alphanumeric node name of up to eight characters).
3. Enter `show nodename` to verify the new node name.

The following example shows the steps for changing the node name of a specified device from the factory-supplied name to SYSDSK.

```
PARAMS>show nodename
Parameter     Current           Default        Type     Radix
--------- ---------------  ---------------  --------  -----
NODENAME          R7CZZC            RF35       String  Ascii   B

PARAMS>set nodename sysdsk
PARAMS>show nodename
Parameter     Current           Default        Type     Radix
--------- ---------------  ---------------  --------  -----
NODENAME          SYSDSK            RF35       String  Ascii   B
```

Exiting the DUP Server Utility

After you have finished setting and examining DSSI device parameters for a specified device, enter the `write` command at the PARAMS> prompt to save the device parameters you have changed using the SET command. The changes are recorded to nonvolatile memory.

Note

If you have set host to devices connected through the HSD05 array controller, you must enter the `restart` command, and then press the Reset button or enter the `init` command for the new parameters to take effect.

- If you have changed the allocation class or node name of a device, the DUP server utility will ask you to initialize the controller. Answer Yes (Y) to allow the changes to be recorded and to exit the DUP server utility.

```
PARAMS>write
Changes require controller initialization, ok? [Y/(N)] Y

Stopping DUP server...
>>>
```

- If you have not changed the allocation class or node name, enter the `exit` command at the PARAMS> prompt to exit the DUP server utility for the specified device.

Note

You must repeat the procedures in this step for each device for which you want to change parameters.

Step 7: Configure SCSI Node ID Plugs

When to Change SCSI Node Plugs

If systems in a DSSI VMScluster contain SCSI drives, configure SCSI node ID plugs or SCSI node ID switch settings so that OpenVMS sees each SCSI device name as unique.

To determine if you need to change SCSI node ID plugs, consider these points:

- For each system, OpenVMS "names" the first SCSI bus it finds as bus A, the second SCSI bus as bus B, and so on.
- All SCSI drives in the DSSI VMScluster are forced to the allocation class of the host systems.

Example with Conflicting SCSI Device Names

Figure 2–6 and Table 2–3 show a sample configuration that calls for changing SCSI node ID plugs to avoid duplicate device names.

Note

SCSI unit numbers are forced to 100 x node ID (ID plug).

Figure 2–6 Configuration with Duplicate SCSI Device Names

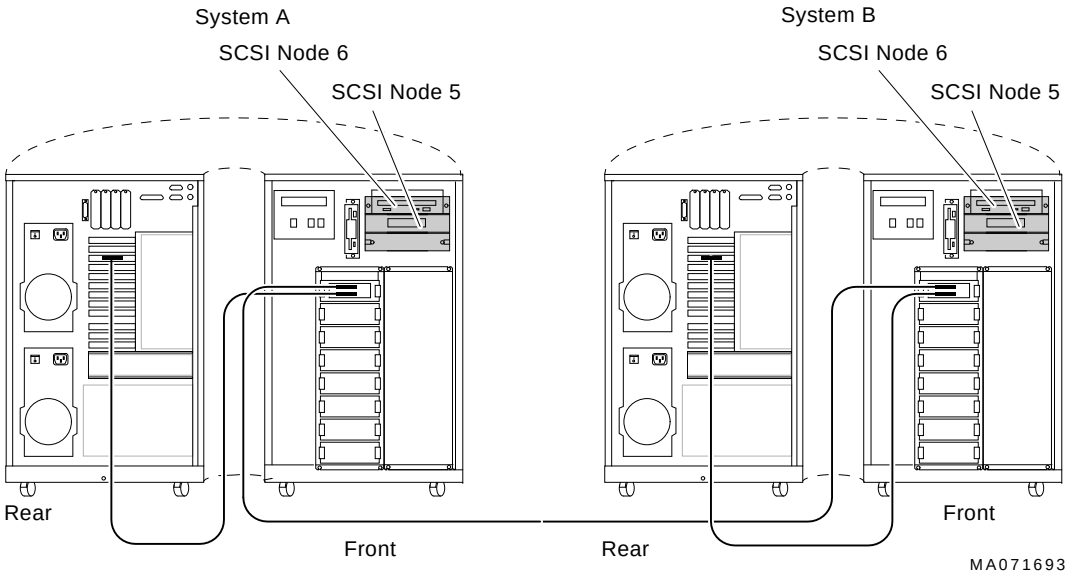


Table 2–3 Configuration with Conflicting SCSI Device Names

System A		
SCSI Node ID	**Console Mode Device Name**	**OpenVMS Device Name**
5	MKA500	1MKA500*
6	DKA600	1DKA600*
System B		
5	MKA500	1MKA500*
6	DKA600	1DKA600*

*Duplicate SCSI device name

Example with Unique SCSI Device Names

To avoid the problem of duplicate SCSI device names, shown in Table 2–3, change the SCSI node ID switch settings for the SCSI drives on System A.

Table 2–4 shows how the devices are uniquely named after you change the SCSI node ID switches for the SCSI devices. The SCSI disks in System A are given node ID settings of 0, 1, and the host SCSI ID is set to 6.

Note that in this example, the node ID for the SCSI host adapter in System A is changed from the default (7) to 6. This allows up to eight SCSI devices to be configured on the SCSI bus, each with a unique SCSI node ID (0–7).

The following commands are used to set SCSI host adapter node IDs:

System	Command
Digital 2100 Server	`set pk*_host_id` *`node_ID`*
DEC 4000 AXP	`set ncr*_setup "SCSI` *`node_ID`*`"`
VAX 4000 Model 100A/100	`SET SCSI_ID` *`bus_number node_ID`*

Table 2–4 Configuration with Unique SCSI Device Names

SCSI Node ID	Console Mode Device Name	OpenVMS Device Name
System A		
0	MKA0	1MKA0[1]
1	DKA100	1DKA100
6	Host adapter	
System B		
5	MKA500	1MKA500
6	DKA600	1DKA600
7	Host adapter	

[1] In this example, the allocation class is 1.

Note

For each SCSI bus that OpenVMS sees as common to both systems, the total number of drives is limited to eight (node IDs 0–7).

Step 8: Set Boot Parameters

Set the boot parameters for booting on each system.

Boot Parameters

Table 2–5 lists the boot environment variables and their related boot parameters.

Table 2–5 Boot Parameters for AXP and VAX Systems

AXP Console Boot Parameters	
`>>> set bootdef_dev dua0`	Sets the device or device list from which booting is to be attempted. In this example, dua0 is specified as the boot device.
`>>> set boot_osflags 0,0`	Sets additional parameters (root number and boot flags) to be passed to the system software during booting if none are specified. In this example, system root 0 [SYS0] with 0 as the boot flag mask.
`>>> set boot_osflags 0,1`	Sets additional parameters (root number and boot flags) to be passed to the system software during booting if none are specified. In this case the system will stop at SYSBOOT.
`>>> set boot_osflags 1,0`	Sets additional parameters (root number and boot flags) to be passed to the system software during booting if none are specified. In this case the system boots from the system root [SYS1] rather than [SYS0].
VAX Console Boot Parameters	
`>>> set boot dua0`	Sets the device or device list from which booting is to be attempted. In this example, dua0 is specified as the boot device.
`>>> set bflag 0`	Sets additional parameters to be passed to the system software during booting if none are specified. In this example, system root 0 [SYS0].
`>>> set bflag 1`	Sets additional parameters to be passed to the system software during booting if none are specified. In this case the system will stop at SYSBOOT.
`>>> set bflag 10000000`	Sets additional parameters to be passed to the system software during booting if none are specified. In this case the system boots from the system root [SYS1] as opposed to [SYS0].

Boot Parameter Examples

AXP Only Example

In the following example, boot parameters are set for two AXP systems in a DSSI VMScluster:

```
# For system A
>>> set boot_osflags 0,0
>>> set bootdef_dev dua0
>>> boot
# For system B
>>> set boot_osflags 1,0
>>> set bootdef_dev dua0
>>> boot
```

Dual-Architecture Example

In the following example, boot parameters are set for a dual-architecture DSSI VMScluster:

```
# For system A (AXP System)
>>> set boot_osflags 0,0
>>> set bootdef_dev dub10
>>> boot
# For system B (VAX System)
>>> set bflag 10000000
>>> set boot dua0
>>> boot
```

Note

In a dual-architecture configuration, the AXP system and the VAX system **cannot** boot from a common disk.

Step 9: Complete the Installation

Complete the software steps of the DSSI VMScluster installation, such as updating cluster_config.com. Refer to the information provided in *Factory Installed Software User Information* or *OpenVMS AXP Version 6.1 Upgrade and Installation Manual* and *VMScluster Systems for OpenVMS*.

3
Troubleshooting

Troubleshooting Procedure

In This Chapter

This chapter provides troubleshooting tips for solving DSSI-related hardware problems.

Common Problems

If hardware failures occur, check these common problem sources first:

- Loose or missing terminators
- Incorrect bus node ID plugs (duplicate device names)
- Duplicate DSSI adapter node IDs
- Loose or damaged cables or connectors

Symptoms and Corrective Action

Table 3–1 lists symptoms and corrective action for Digital 2100 Server systems.

Table 3–2 lists symptoms and corrective action for DEC 4000 AXP systems.

Table 3–1 Digital 2100 Server: DSSI Hardware Installation Troubleshooting

Problem	Symptom	Corrective Action
Drive failure	Fault LED for drive is on (steady).	Replace drive.
Duplicate bus node IDs	Drives with duplicate bus node IDs are missing from the `show config` display.	Correct bus node IDs.
Drive bus node ID set to 7 (reserved for host adapter ID)	Valid drives are missing from the `show config` display. One drive may appear seven times on the display.	Correct bus node IDs. KFESA bus node ID for host adapter is set using the EISA Configuration Utility (ECU).
Missing or loose cables	Drive activity LEDs do not come on. Drive missing from the `show config` display.	Remove device and inspect cable connections.
Terminator missing	Read/write errors in console event log; storage adapter port may fail.	Attach terminators as needed.
KFESA module failure	Problems persist after eliminating the above problem sources.	Replace KFESA module.

Table 3–2 DEC 4000 AXP: Troubleshooting VMScluster Hardware Installation Problems

Symptom	Problem	Corrective Action
Drives are missing from the configuration screen display. A drive defaults to zero.	Duplicate bus node ID plugs (or a missing plug).	Correct bus node ID plugs.
Valid drives are missing from the configuration screen display. One drive appears seven times on the configuration screen display.	Bus node ID set to 7, or that of the host adapter.	Correct bus node ID plugs.
OpenVMS sees duplicate drives.	Duplicate unit numbers (device names are not unique).	Provide unique unit numbers using the `cdp` command.
Disk power failure LED on PSC[1] is on. LDC OK LED on storage compartment front panel is off. Power-up screen reports a failing storage adapter port.	LDC failure	Replace LDC[2].
Fault LED for drive is on (steady).	Drive failure	Replace drive.
Disk power failure LED on PSC is on. LDC OK LED on storage compartment front panel is off. Power-up screen reports a failing storage adapter port.	Storage drawer not properly seated.	Remove drawer and check its connectors. Reseat drawer.

[1]PSC refers to the power system controller.

[2]LDC refers to the disk power supply.

(continued on next page)

Table 3–2 (Cont.) DEC 4000 AXP: Troubleshooting VMScluster Hardware Installation Problems

Symptom	Problem	Corrective Action
Valid drives missing from the configuration screen display; read/write errors in event /error log; storage adapter port may fail.	Loose or damaged external DSSI cable	Inspect external DSSI cable and cable connection.
Cable: Storage device to ID panel—Bus node ID defaults to zero; online LEDs do not come on.	Missing or loose internal cables	Remove storage drawer and inspect cable connections.
Flex circuit: LDC to storage interface module—Disk power failure LED on PSC is on; LDC OK LED on storage compartment front panel is off; and power-up screen reports a failing storage adapter port.		
Cable: LDC to storage interface module—Power-up screen reports a failing storage adapter port; drive LEDs do not come on at power-up.		
Cable: LDC to storage device—Drive does not show up in configuration screen display.		
Read/write errors in console event log; storage adapter port may fail	Terminator missing	Attach terminator to connector port.

(continued on next page)

Table 3–2 (Cont.) DEC 4000 AXP: Troubleshooting VMScluster Hardware Installation Problems

Symptom	Problem	Corrective Action
DSSI terminator LED is off or no termination voltage measured at connector (pin 38, ground pin 1); read/write errors; storage adapter port may fail.	No termination power	Replace LDC (termination power source for fixed-media storage compartments). Replace DC5 converter (termination power source for storageless fixed-media storage compartments).

DSSI Node Fails to Boot

If a DSSI node fails to boot, perform the following steps:

1. Check the `BOOT` command you entered.
2. Check the DSSI node ID for the RF device you are trying to boot from and the unit number specified. Ensure that the unit number specified in the `BOOT` command is correctly programmed into the disk node you wish to boot.
3. Run device tests to check that the boot device is operating.
4. Check that the DSSI bus is terminated.

Termination Problems

It is especially important to check that only two terminators are on every bus (at the ends of the bus), even if none of the above symptoms is present. The SF7*x*, BA440, BA430, KFMSA, and KFQSA may have internal terminators that are not visible externally. These devices do not have the green lights found on the external terminators.

Grounding and Bus Lengths

Excessive ground offset voltages or exceeding the maximum DSSI bus length can cause virtual circuit closures, system crashes, or degradation in performance. All enclosures should be grounded using number 6 gauge wire, and DSSI bus lengths must be within the limits specified in Chapter 1.

For More Information

For additional troubleshooting information, refer to the system service guide.

A

Electrical Lengths of Enclosures

DSSI Bus Lengths by Enclosure

Lengths of Interconnects

Table A–1 gives the maximum electrical lengths of embedded DSSI interconnects within the various enclosures, as well as the number and type of DSSI connector.

Table A–1 Electrical Lengths of Embedded DSSI Interconnects in Enclosures

Enclosure/Device	Connector Type	Internal DSSI Length
KFESA adapter using one connector (end-node)	1 external MR[1]	0.15 m (6.0 in)
KFESA adapter using two connectors (middle-node)	2 external MR[1]	0.6 m (24.0 in)
R400x through-bus mode; no internal terminator; both upper and lower rows	2 external PS[2]	94.5 in (2.40 m)
R400x split bus mode 1; no internal terminator; upper row only	2 external PS	66 in (1.68 m)
R400x split bus mode 2; no internal terminator; lower row only	2 external PS	40 in (1.02 m)
BA640 embedded storage (Bus A–D) has internal terminator; DEC 4000 Model 6xx	4 external PS (one for each of four buses, A–D)	70.9 in (1.8 m)

[1]MR is a midrange or micro ribbon style shielded connector used for bulkhead mounting. This connector mates with MR only.

[2]PS is a pin-and-socket style shielded connector used for bulkhead mounting. This connector mates with PS only.

(continued on next page)

Table A–1 (Cont.) Electrical Lengths of Embedded DSSI Interconnects in Enclosures

Enclosure/Device	Connector Type	Internal DSSI Length
BA641 embedded storage (Bus A–D) has internal terminator; rackmount DEC 4000 Model 6xx	4 external PS (one for each of four buses, A–D)	15 in (0.38 m)
BA440 embedded storage (BUS 0) has internal terminator; VAX 4000-300 and higher	1 external PS	52 in (1.32 m)
BA440 in/out port (BUS 1), no internal terminator; VAX 4000-300 and higher	2 external PS	20 in (0.51 m)
BA440 in/out port (BUS 2), no internal terminator; VAX 4000-300 and higher	2 external PS	56 in (1.4 m)
BA440 in/out port (BUS 3), no internal terminator; VAX 4000-300 and higher	2 external PS	56 in (1.4 m)
BA441 embedded storage (BUS 0) has internal terminator; VAX 4000-300 and higher	1 external PS	96 in (2.45 m)
BA441 in/out port (BUS 1), no internal terminator; VAX 4000-300 and higher	2 external PS	20 in (0.51 m)
BA441 in/out port (BUS 2), no internal terminator; VAX 4000-300 and higher	2 external PS	56 in (1.4 m)
BA441 in/out port (BUS 3), no internal terminator; VAX 4000-300 and higher	2 external PS	56 in (1.4 m)
BA430 embedded storage (BUS 0) has internal terminator; VAX 4000-200	1 external PS	54 in (1.37 m)
BA431 embedded storage (BUS 0) has internal terminator; VAX 4000-200	1 external PS	96 in (2.45 m)
BA42 embedded storage (BUS 0) has internal terminator; VAX 4000-100A/100	1 external PS	30 in (0.76 m)
BA42 embedded storage (BUS 1), no internal terminator; VAX 4000-100A/100	2 external PS	43 in (1.08 m)
BA213; has internal terminator	1 external PS	45 in (1.14 m)
B213F; has internal terminator	1 external PS	20 in (0.51 m)
BA215; has internal terminator	1 external PS	30 in (0.76 m)

(continued on next page)

Table A–1 (Cont.) Electrical Lengths of Embedded DSSI Interconnects in Enclosures

Enclosure/Device	Connector Type	Internal DSSI Length
R215F; no internal terminator	1 external PS	60 in (1.52 m)
R23RF; no internal terminator	2 external PS	39 in (1.0 m)
KFQSA adapter with 1 connector directly attached to KFQSA (for example, BA440)	1 external PS	N/A
KFQSA adapter with 2 connectors directly attached to KFQSA (for example, BA440)	2 external PS	12 in (0.31 m)
SF12 in through-bus mode; 1 to 4 drives per bus; no internal terminator	2 external MR[2]	50 in (1.25 m)
SF35 in through-bus mode; 1 to 6 drives per bus; no internal terminator	2 external MR[2]	84 in (2.13 m)
SF35 in split-bus mode; 1 to 3 drives per bus using internal terminator	1 external MR	42 in (1.07 m)
SF7*x* in through-bus mode; 1 to 4 drives per bus; no internal terminator	2 external MR	168 in (4.27 m)
SF72*x* in split bus mode; 1 or 2 drives using internal SF72 terminator	1 external MR	83.5 in (2.12 m)
TF857; no internal terminator	2 external MR	10 in (0.25 m)

[2] PS is a pin-and-socket style shielded connector used for bulkhead mounting. This connector mates with PS only.

B

Storage Device Parameters

Examining Storage Device Parameters

show device Command

The show device command displays information for all DSSI and SCSI devices in the system.

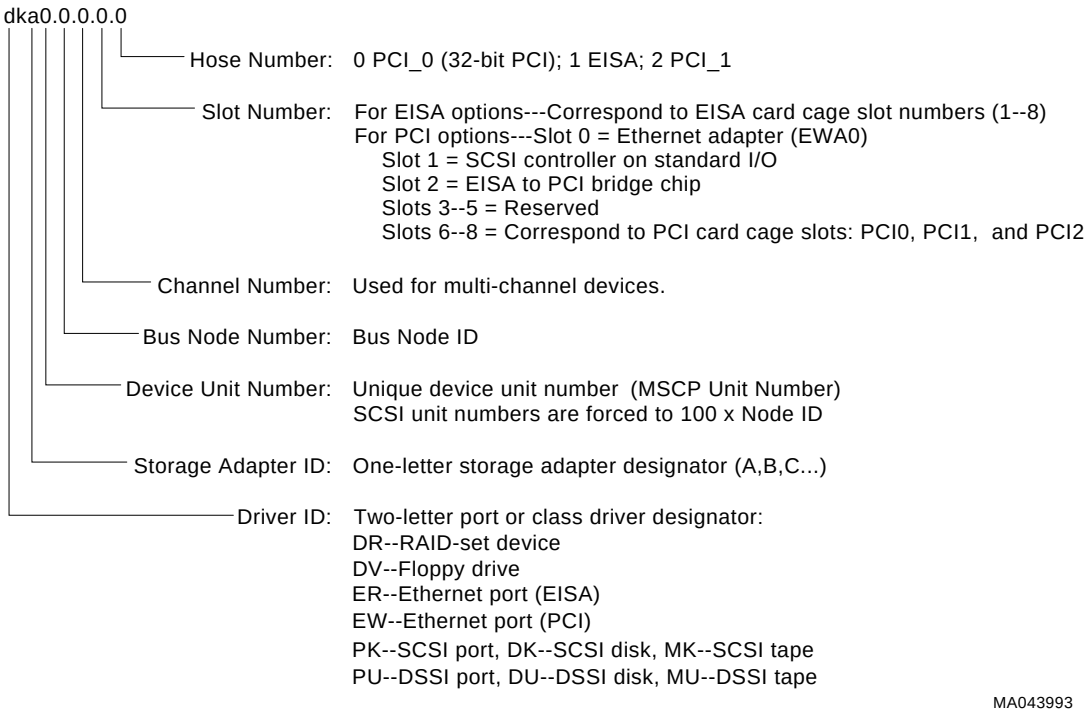
Device Parameters Displayed

show device

Example:

```
>>> show device
    ❶                    ❷       ❸                  ❹     ❺
dka600.6.0.1.0           DKA600                     RRD43  2893
dua0.0.0.2.1             $2$DIA0 (ALPHA0)           RF35
dua1.1.0.2.1             $2$DIA1 (ALPHA1)           RF35
dua2.2.0.2.1             $2$DIA2 (ALPHA2)           RF35
dua3.3.0.2.1             $2$DIA3 (ALPHA3)           RF35
dua4.4.0.2.1             $2$DIA4 (ALPHA4)           RF35
dua5.5.0.2.1             $2$DIA5 (ALPHA5)           RF35
dva0.0.0.0.1             DVA0                       RX26
mka500.5.0.1.0           MKA500                     TLZ06  0435
ewa0.0.0.0.0             EWA0           08-00-2B-3B-42-FD
pka0.7.0.1.0             PKA0               SCSI Bus ID 7
pua0.7.0.2.1             PAA0               DSSI Bus ID 7
pub0.6.0.3.1             PAB0               DSSI Bus ID 6
>>>
```

❶ Console device name:



❷ Operating system device name:

- For an allocation class of zero: NODENAME$DIA*u*

  NODENAME is a unique node name and *u* is the unit number. For example, R7BUCC$DIA0.

- For a nonzero allocation class:

  $ALLCLASS$DIA*u*

  ALLCLASS is the allocation class for the system and devices, and *u* is a unique unit number. For example, 1DIA0.

❸ Node name (alphanumeric, up to 6 characters)

❹ Device type

❺ Firmware version (if known)

DSSI Device Parameters

Principal Parameters

Five principal parameters are associated with each DSSI device:

- Bus node ID
- ALLCLASS (DISK_ALCS for devices connected through the HSD05 controller)
- UNITNUM
- NODENAME
- SYSTEMID

Parameter Descriptions

Bus Node ID

The bus node ID parameter for DSSI storage devices is provided by the bus node ID plug on the front panel of the storage compartment. Each DSSI bus can support up to eight nodes, bus nodes 0–7. Each DSSI adapter, HSD05 array controller, and each DSSI storage device counts as a node. Hence, in a single-system configuration, a DSSI bus can support up to seven devices, bus nodes 0–6 (with node 7 reserved for the adapter); in a two-system DSSI VMScluster configuration, up to six devices, 0–5 (with nodes 6 and 7 reserved for the adapters); in a three-system DSSI VMScluster configuration, up to five devices, 0–4 (with nodes 5, 6, and 7 reserved for the adapters).

Note

Drives connected through the HSD05 array controller do not count as DSSI nodes; thus, using multiple HDS05 controllers, up to 36 SCSI drives can be configured in a two-system DSSI VMScluster.

The bus node ID for the KFESA host adapter is set using the EISA Configuration Utility (ECU). The bus node ID for the HDS05 array controller is set by switches on the HSD05 controller module board.

ALLCLASS

Note

For devices connected through the HSD05 array controller, this parameter is called DISK_ALCS.

The ALLCLASS parameter determines the device allocation class. The allocation class is a numeric value from 0–255 that is used by the OpenVMS AXP operating system to derive a path-independent name for multiple access paths to the same device. The ALLCLASS firmware parameter corresponds to the OpenVMS AXP IOGEN parameter ALLOCLASS.

DSSI devices are shipped from the factory with a default allocation class of zero.

Use the `cdp` command to examine and modify the ALLCLASS parameter. Systems using the HSD05 array controller must use the `set host -dup -dssi` *`device_name`* command.

Note

Each device to be served to a cluster must have a nonzero allocation class that matches the allocation class of the system.

Refer to *VMScluster Systems for OpenVMS* for rules on specifying allocation class values.

UNITNUM

The UNITNUM parameter determines the unit number of the device. By default, the device unit number is supplied by the bus node ID plug on the front panel of the storage compartment.

Note

Systems using multiple DSSI buses require that the default values be replaced with unique unit numbers. See the section "How OpenVMS AXP Uses the DSSI Device Parameters ."

To set unit numbers and override the default values, use the `cdp` console command to supply values to the UNITNUM parameter.

Note

Devices connected through the HSD05 array controller are automatically assigned unique unit numbers.

NODENAME

The NODENAME parameter allows each device to have an alphanumeric node name of up to six characters. DSSI devices are shipped from the factory with a unique identifier, such as R7CZZC, R7ALUC, and so on. You can provide your own node name, keep the factory-supplied node names, or use the `cdp` console command to supply node names that relate to the device name conventions for AXP systems. Systems using the HSD05 array controller must use the `set host -dup -dssi` *`device_name`* command.

SYSTEMID

The SYSTEMID parameter provides a number that uniquely identifies the device to the operating system. This parameter is modified when you replace a device using warm-swapping procedures. The SYSTEMID parameter is changed using the console command: `set host -dup -task -params` *`device name`*.

How OpenVMS AXP Uses the DSSI Device Parameters

Allocation Class Zero

With an allocation class of zero, the operating system can use the default parameter values to provide each device with a unique device name. The operating system uses the node name along with the device logical name as follows:

NODENAME$DIA*u*

NODENAME is a unique node name and *u* is the unit number. For example, R7BUCC$DIA0.

Nonzero Allocation Class

With a nonzero allocation class, the operating system relies on unit number values to create a unique device name. The operating system uses the allocation class along with the device logical name as follows:

$ALLCLASS$DIA*u*

ALLCLASS is the allocation class for the system and devices, and *u* is a unique unit number. For example, 1DIA0.

Multiple and Shared Buses

Using KFESA modules, you can fill two DSSI buses; with DEC 4000 systems you can fill multiple DSSI buses: A–D. Each bus can have up to seven DSSI drives (bus nodes 0–6). When a bus is shared between two systems in a DSSI VMScluster, six DSSI drives can be shared; in a three-system DSSI VMScluster, five DSSI drives can be shared.

When more than one bus is being used, and your system is using a nonzero allocation class, you need to assign new unit numbers for devices on all but one of the DSSI buses, since the unit numbers for all DSSI storage devices connected to a system's associated DSSI buses must be unique.

Note

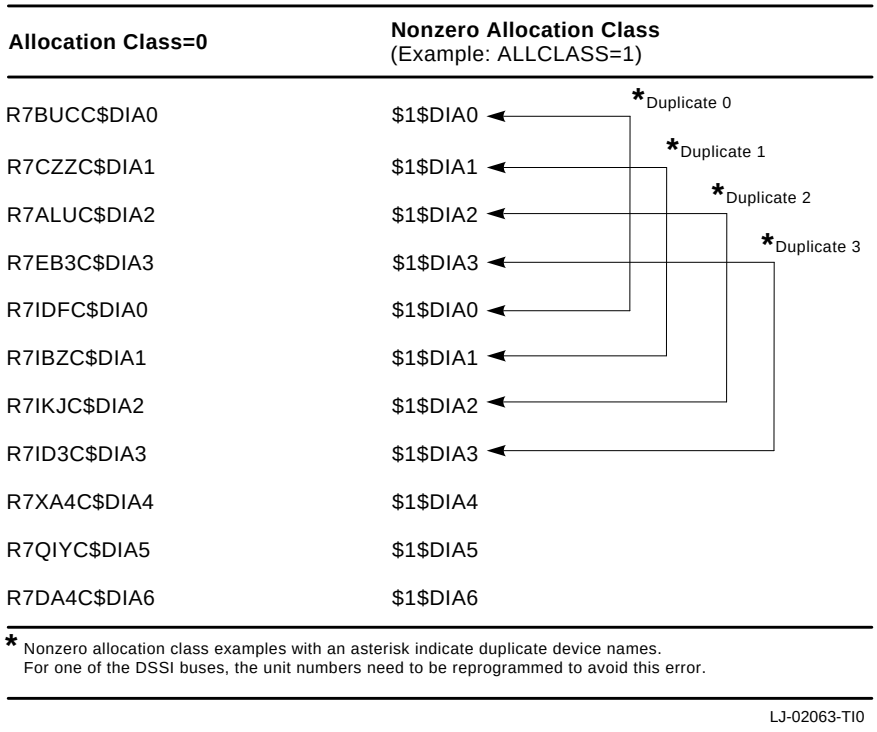
Drives connected through the HSD05 array controller do not count as DSSI nodes; thus, using multiple HDS05 controllers, up to 36 SCSI drives can be configured in a two-system DSSI VMScluster.

Devices connected through the HSD05 array controller are automatically assigned unique unit numbers.

Example of Duplicate Device Names

Figure B–1 illustrates the problem of duplicate operating system device names for a system that is using more than one DSSI bus and a nonzero allocation class. In the case of the nonzero allocation class, the operating system sees four of the devices as having duplicate device names. This is an error, as all unit numbers must be unique. The unit numbers for one of the two DSSI buses in this example need to be reprogrammed.

Figure B–1 How OpenVMS Sees Unit Numbers for DSSI Devices



* Nonzero allocation class examples with an asterisk indicate duplicate device names.
For one of the DSSI buses, the unit numbers need to be reprogrammed to avoid this error.

LJ-02063-TI0

Index

E

F

G

H

I

L

N

S

T

U

V

How to Order Additional Documentation

Technical Support

If you need help deciding which documentation best meets your needs, call 800-DIGITAL (800-344-4825) and press 2 for technical assistance.

Electronic Orders

If you wish to place an order through your account at the Electronic Store, dial 800-234-1998, using a modem set to 2400- or 9600-baud. You must be using a VT terminal or terminal emulator set at 8 bits, no parity. If you need assistance using the Electronic Store, call 800-DIGITAL (800-344-4825) and ask for an Electronic Store specialist.

Telephone and Direct Mail Orders

From	Call	Write
U.S.A.	DECdirect Phone: 800-DIGITAL (800-344-4825) Fax: (603) 884-5597	Digital Equipment Corporation P.O. Box CS2008 Nashua, NH 03061
Puerto Rico	Phone: (809) 781-0505 Fax: (809) 749-8377	Digital Equipment Caribbean, Inc. 3 Digital Plaza, 1st Street Suite 200 Metro Office Park San Juan, Puerto Rico 00920
Canada	Phone: 800-267-6215 Fax: (613) 592-1946	Digital Equipment of Canada Ltd. 100 Herzberg Road Kanata, Ontario, Canada K2K 2A6 Attn: DECdirect Sales
International	————	Local Digital subsidiary or approved distributor
Internal Orders[1] (for software documentation)	DTN: 264-3030 (603) 884-3030 Fax: (603) 884-3960	U.S. Software Supply Business Digital Equipment Corporation 10 Cotton Road Nashua, NH 03063-1260
Internal Orders (for hardware documentation)	DTN: 264-3030 (603) 884-3030 Fax: (603) 884-3960	U.S. Software Supply Business Digital Equipment Corporation 10 Cotton Road Nashua, NH 03063-1260

[1]Call to request an Internal Software Order Form (EN–01740–07).

Reader's Comments

Alpha AXP DSSI VMScluster Installation and Troubleshooting Guide

EK–D4AXP–TS. B01

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
Information Design and Consulting
MRO1–3/J10
200 FOREST STREET
MARLBORO, MA 01752-3011

Do Not Tear – Fold Here