VAX 4000 Model 108

User Information

Part Number: EK-VX108-UI. A01

December 1996

This book introduces the VAX 4000 Model 108 system. Use the information in this book to configure, start, use, update, and troubleshoot your system. You will also find general system information, such as console commands and system care in this book.

Revision/Update Information: This is a new manual.

Digital Equipment Corporation
Maynard, Massachusetts

First Printing, December 1996

[S3267]

FCC NOTICE -- CLASS A DEVICE

Warning!

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

Achtung!

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

Avertissement!

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

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Preface

Welcome to the VAX 4000 Model 108 System

This book introduces the VAX 4000 Model 108 System.

Use the information in this book to configure, start, use, update, and troubleshoot your VAX 4000 Model 108 System. You can also find general system information such as console commands and system care in this book.

Audience

If you will be operating, configuring, or adding options to the VAX 4000 Model 108 System, the information included in this book will be helpful to you.

Organization of the Information

This information for users covers the following topics:

- Chapter 1, *System Overview*, describes the hardware components, including the Small Computer Systems Interface (SCSI) architecture, the controller, the keyboard, the system unit front panel, and the system unit rear panel.
- Chapter 2, *Getting Started*, describes installing, starting, restarting, and turning off the system.
- Chapter 3, *Installing Hardware Options*, describes the system unit components and gives instructions and illustrations to help you remove and replace them.
- Chapter 4, *HSD10 Operation,* presents a basic description of the HSD10 DSSI-to-SCSI bus adapter's features, performance, operating environment, controls, indicators, and configuration information.
- Chapter 5, *Troubleshooting*, describes system troubleshooting.
- Chapter 6, *Diagnostic Tests and Commands*, describes system troubleshooting.

- Appendix A, *Console Commands*, contains a basic description of the console commands.
- Appendix B, *Console Security*, Provides information on setting the security password, and logging in to the privileged console mode.
- Appendix C, *System Defaults*, describes how to set/change the default boot device and how to set/change the default recovery action.
- Appendix D, *Setting SCSI IDs*, describes how to select a unique SCSI ID for any SCSI device installed in or attached to your system.
- Appendix E, *Programming Parameters for DSSI Devices*, describes the console mode procedures for setting and examining parameters for DSSI devices.
- Appendix F, *System Care*, describes how to clean your system, terminal, and keyboard. It also contains instructions for moving and reinstalling your system.
- Appendix G, *Technical Specifications*, describes the technical characteristics of the system.
- Appendix H, *Equipment Log*, contains tables that you can use to record information about your system hardware and software components.

Refer to the Table of Contents for a detailed listing of topics.

Conventions

This guide uses the following conventions:

Convention Example	Description
PARAMS>SHOW NODENAME>	Monospaced, bold text indicates file names, path names, directories, or screen text.
[Enter]	Square brackets surrounding text represent a key on the keyboard.
[Ctrl]+[R]	A plus sign between keyboard keys indicates that the keys shown should be pressed at the same time.
auto_action	Italic text indicates environment variables. Titles of information sources are in italic, and occasionally italic is used for emphasis in the text. Italics such as *n* or *x* are used to indicate numeric variables.
☞	A pointing hand indicates a reference to additional information.

Abbreviations

This guide uses the following abbreviations:

Abbreviation	Meaning
AC	alternating current
amp	ampere
C	Celsius
CD	compact disc
CD-ROM	compact disc read-only memory
CEE	International Commission for Conformity Certification of Electrical Equipment
CFG	configuration file
cm	centimeters
CPU	central processing unit
CSA	Canadian Standards Association
DC	direct current
DMA	direct memory access
DRAM	dynamic random-access memory
FDI	Floppy Drive Interconnect
flashROM	electrically erasable, rewriteable, nonvolatile memory
ft	feet
GB	gigabyte
Hz	hertz
IEC	International Electrotechnical Commission
I/O	input/output
IRQ	interrupt request
ISO	International Organization for Standardization
Kb	kilobit
KB	kilobyte
kg	kilogram
lb	pound
LED	light-emitting diode
m	meter

Abbreviation	Meaning
MAU	media adapter unit
Mb	megabit
MB	megabyte
MHz	megahertz.
mm	millimeter
ns	nanoseconds
NVRAM	nonvolatile random-access memory
ROM	read-only memory
SCSI	small computer system interface
SIMMs	single in-line memory modules
SROM	serial read-only memory
UL	Underwriters Laboratories
VAR	value-added reseller
V AC	volts alternating current
VMS	Open VMS Operating System
W	watt

Special Notices

This guide uses three kinds of notices to emphasize specific information.

WARNING

A WARNING indicates the presence of a hazard that can cause personal injury.

CAUTION

A CAUTION indicates the presence of a hazard that can cause damage to hardware or that might corrupt software.

NOTE

A NOTE gives general information, such as compatibility with other products or pointers to other information.

Additional Information Resources

You may wish to consult the following information resource for additional information about your VAX 4000 Model 108 System:

- *VAX 4000 Model 108 Installation Information* (order number EK-VX108-II), which presents a graphical overview of the system installation.

Contact your distributor or Digital representative for other available product-related information.

Reader’s Comments

Digital welcomes your comments on this or any other manual.

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Shared Engineering Services
PKO3-2/21J
129 Parker Street
Maynard, MA 01754-2199

Please reference order number EK-VX108-UI. A01 in your correspondence.

1
System Overview

Introduction

Congratulations on your purchase of a VAX 4000 Model 108 System. This machine has been designed and tested with the utmost attention to performance and reliability. Your system runs the OpenVMS operating system; its performance range can be extended by the addition of memory and hard disk drives.

This chapter describes the VAX 4000 Model 108 System's hardware components, including the Digital Storage System Interconnect (DSSI) and the Small Computer Systems Interface (SCSI) architectures, the keyboard, the system unit front panel, and the system unit rear panel.

Following the information provided here will assure safe and proper operation of your VAX 4000 Model 108 System.

System Unit

Your VAX 4000 Model 108 System uses a mini-tower desktop enclosure.

The system unit includes:

- CPU module/motherboard with built-in SCSI, NI Bus and port, Console port, and 2 serial ports, as well as:
  10 ns VAX CPU chip
  512 KB of on-board cache memory
- From 64 MB to 512 MB of memory, consisting of single inline memory modules (SIMMs)
- Six accessible/non-accessible drive bays
  a) One with a standard 5.25-inch CD-ROM drive
  b) One with a standard 3.5-inch RZ2x SCSI disk
  c) Two more slots for optional 3.5 or 5.25-inch hard disk or removable-media drives
  d) Two non-accessible drive bays for optional 3.5-inch hard disk drives only.

- One standard SCSI port
- Qbus port
- HSD10 with SCSI port
- KFDDA DSSI port with TriLink adapter
- Second KFDDA DSSI port (optional)
- Synchronous and asynchronous communication adapters (optional).
- ThinWire and Thickwire Ethernet
- Three-year, on-site warranty
- The latest version of OpenVMS (installed)
- OpenVMS 5.5-2xx

☞ Refer to Appendix G, Technical Specifications, for additional information.

Enclosure Front Panel

Figure 1-1 shows a front view of the system enclosure with pointers to the controls and indicators (storage bay door opened for clarity). Table 1-1 describes these items.

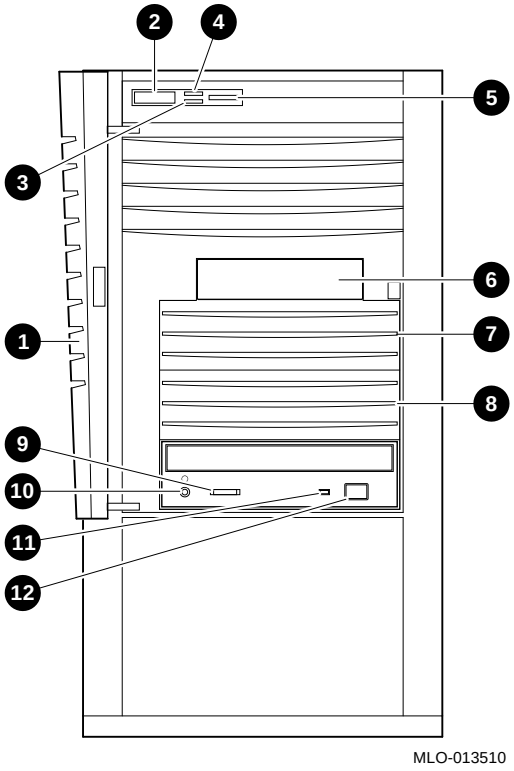

Figure 1-1 Front Controls, Indicators, and Drive Bay Locations

Table 1-1 Front Controls, Indicators and Drive Bay Locations

Figure Legend	Component
1	Front door
2	Power switch
3	Disk drive LED
4	Power LED
5	Reset switch; halts the system and returns it from the operating system to the console mode.
6	RZ 2x SCSI disk (non-accessible)
7	Accessible/Nonaccessible bay for 3.5-inch or 5.25-inch
8	Accessible/Nonaccessible bay for 3.5-inch or 5.25-inch
9	CD-ROM volume switch
10	CD-ROM headphone jack
11	CD-ROM activity light
12	CD-ROM eject button

Enclosure Rear Panel

Figure 1-2 shows the rear controls and connectors. Table 1-2 lists the rear controls and connectors and describes their functions.

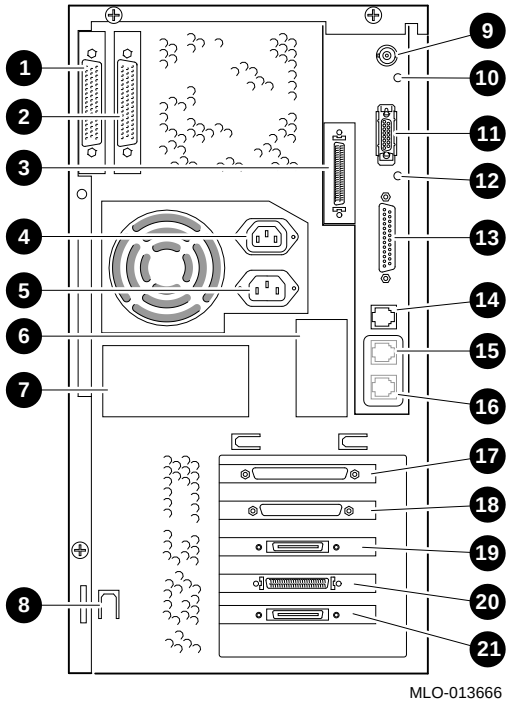

Figure 1-2 Rear Connectors (Rear View)

Table 1-2 Rear Connectors

Figure Legend	Component
1	Qbus Port
2	Qbus Port
3	SCSI Port (terminated when in use)
4	Aux 2A AC Power Outlet
5	AC Power Input Connector
6	Pre-Installed Software Label
7	System Identification Label
8	Lockdown Hasp
9	ThinWire Ethernet
10	ThinWire Ethernet LED
11	ThickWire Ethernet
12	ThickWire Ethernet LED
13	Modem Port (MMJ adapter provided)
14	MMJ Port (for Console only)
15	MMJ Port
16	MMJ Port
17	DHW42 Asynchronous Communication (optional)
18	DSW43 Synchronous Communication (optional)
19	KFDDA DSSI Port (optional)
20	HSD10 SCSI Port
21	KFDDA Port (TriLink Adapter provided)

System Components

Figure 1-3 shows the location of the VAX 4000 Model 108 System components. Table 1-3 lists the system components.

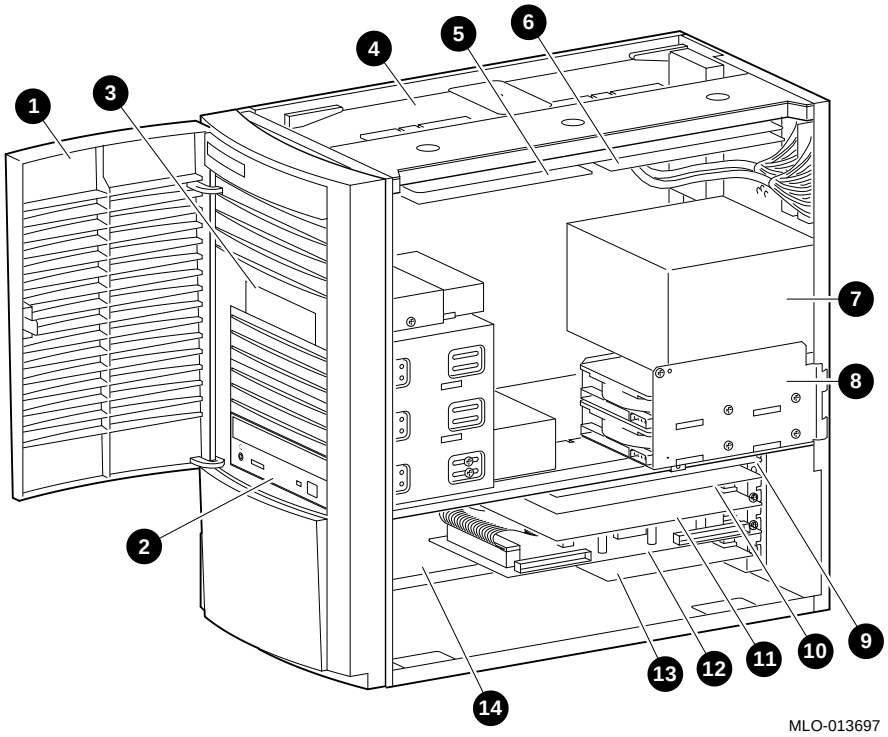

Figure 1-3 System Unit Components

Table 1-3 System Unit Components

Figure Legend	Component
1	Front door
2	CD-ROM
3	System disk drive
4	System board
5	SIMM carrier (required)
6	SIMM carrier (optional)
7	Power supply
8	Rear drive bay
9	DHW42 Asynchronous communications option
10	DSW43 Synchronous communications option
11	KFDDA DSSI (optional)
12	HSD10 DSSI-to SCSI adapter
13	KFDDA DSSI
14	CDAL I/O board

System Board

Figure 1-4 shows the location of the VAX 4000 Model 108 system board components. Table 1-4 describes these components.

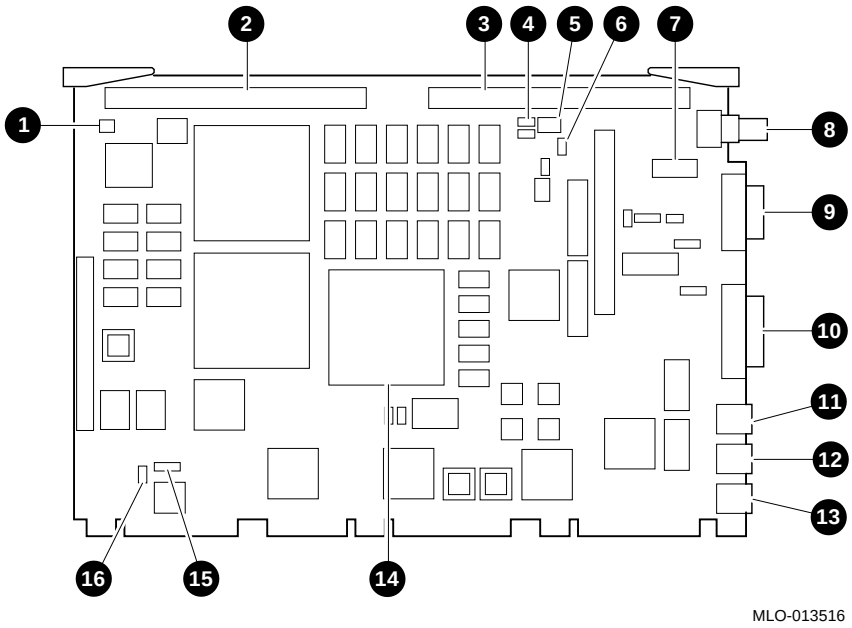

Figure 1-4 System Board Components

Table 1-4 System Board Components

Figure Legend	Components
1	CPU Fan Connector (J25)
2	MEM1 Carrier Connector (J4)
3	MEM2 Carrier Connector (J1)
4	Diagnostic Display LEDs (D26, D29); indicate system and test statuses for Digital services engineers using the on-line Service Guide.
5	Diagnostic Display LEDs (D31); see 4, above
6	Break/Enable Switch and LED; ①
7	Thick/ThinWire Ethernet Jumper (J27) ThinWire Default
8	ThinWire Ethernet Connection (J24)
9	ThickWire Ethernet Connection (J21)
10	Modem Connector (J11)
11	Console Port MMJ (J9)
12	Console Port MMJ (J8)
13	Console Port MMJ (J2)
14	NVAX CPU (E36)
15	19.2/38.4 K baud Jumper (W13) 19.2k baud default
16	19.8 K baud Jumper (J26) Default Installed

① Break/Enable Switch Positions:

a) When the switch is in the up position, the LED is on, and you can halt the system by pressing the break key on the console terminal keyboard.

b) When the switch is in the down position, the LED is off, and you can not halt the system by pressing the break key on the console terminal keyboard.

Internal SCSI Signal Cable Routing

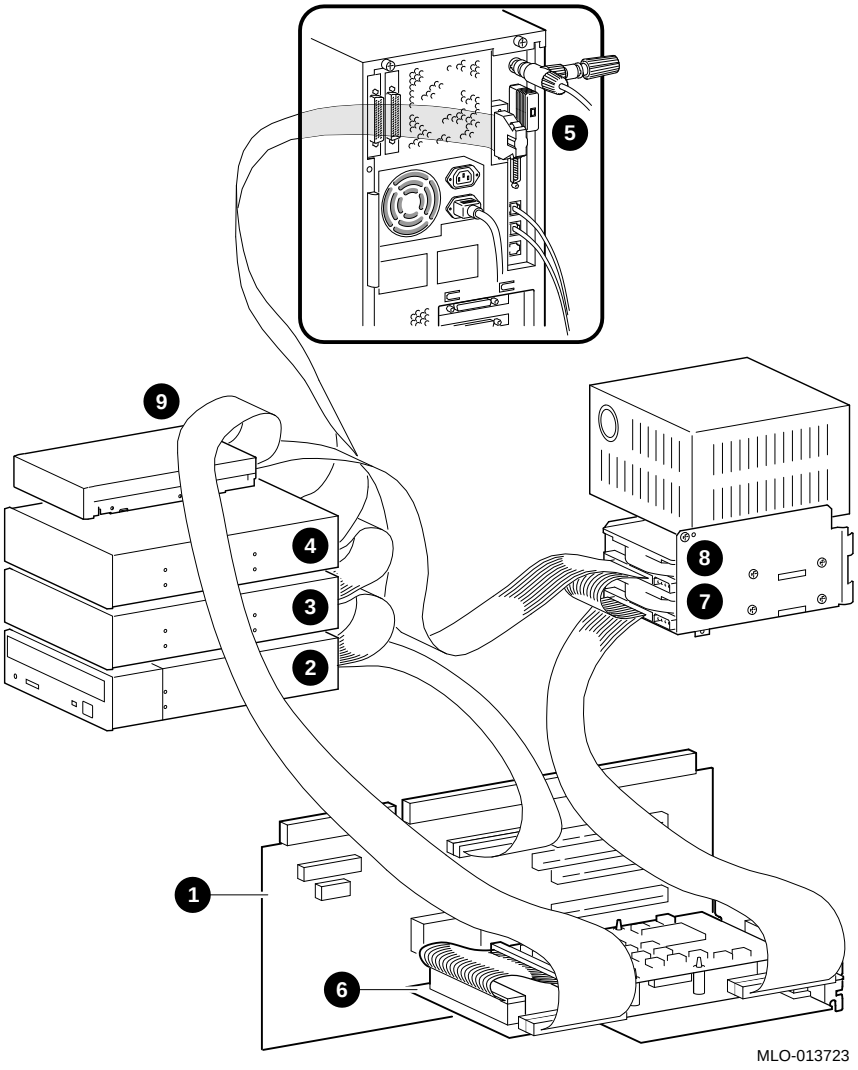

Figure 1-5 SCSI Cable Routing with Optional Removable Media Devices

SCSI cable routing in your VAX 4000 Model 108 system varies according to the devices you are using. The SCSI cable from the HSD10 DSSI to SCSI adapter is always used for all hard drives (non-removable media devices); removable media devices are always connected to the CDAL I/O SCSI connector and to the SCSI port on the rear of the system

These examples show the routing of the SCSI cables in a VAX 4000 Model 108 system with optional removable media devices and with optional hard drives. Unused connectors on the cables are not shown in these examples for clarity.

Table 1-5 SCSI Cable Routing with Optional Removable Media Devices

Figure Legend	Components (Optional Removable Media Devices Installed in Front Drive Bay)
1	CDAL I/O
2	CD-ROM
3	Optional Removable Media Storage Device
4	Optional Removable Media Storage Device
5	Terminated SCSI Port
6	HSD10 DSSI to SCSI Adapter
7	Optional Hard Drive
8	Optional Hard Drive
9	Hard Drive

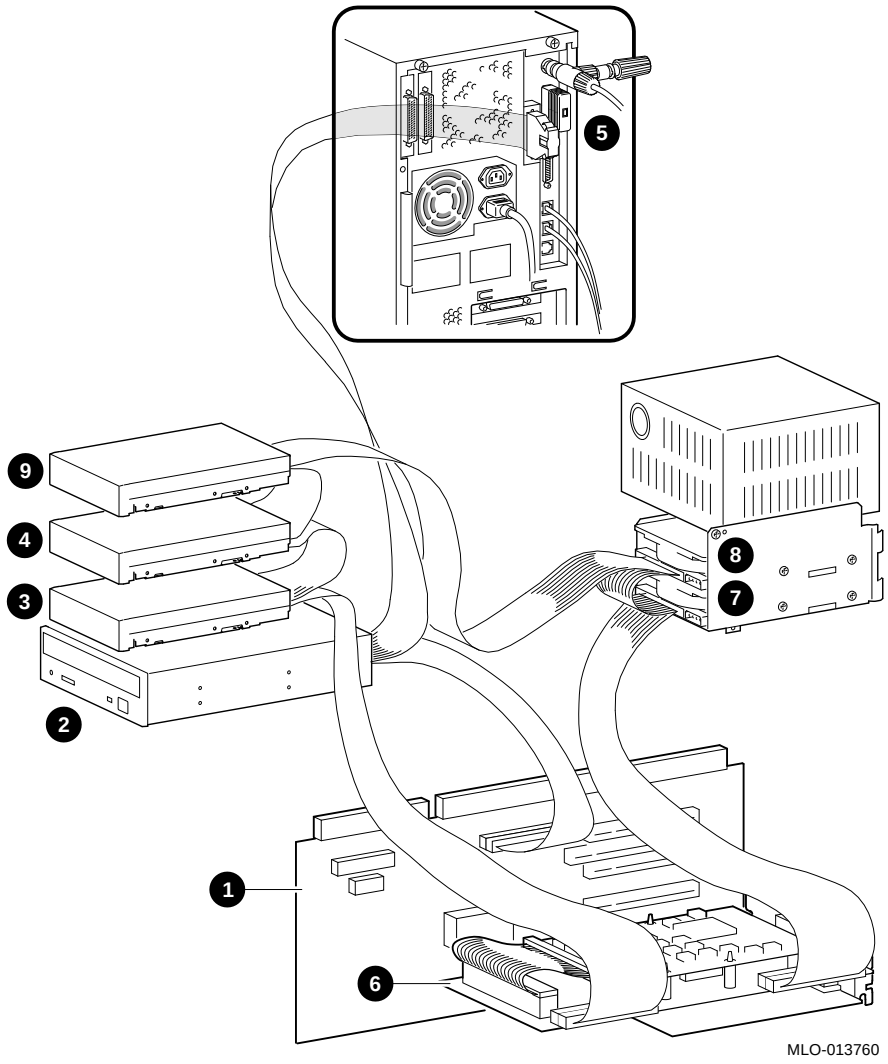

Figure 1-6 SCSI Cable Routing for Optional Hard Drives in Front Drive Bay

Table 1-6 SCSI Cable Routing with Optional Hard Drives in Front Drive Bay

Figure Legend	Components (Optional Hard Drives Installed)
1	CDAL I/O
2	CD-ROM
3	Optional Hard Drive
4	Optional Hard Drive
5	Terminated SCSI Port
6	HSD10 DSSI to SCSI Adapter
7	Optional Hard Drive
8	Optional Hard Drive
9	Hard Drive

Internal Power Cable Routing

The following figure shows the routing of the internal power cable in a VAX 4000 Model 108 system.

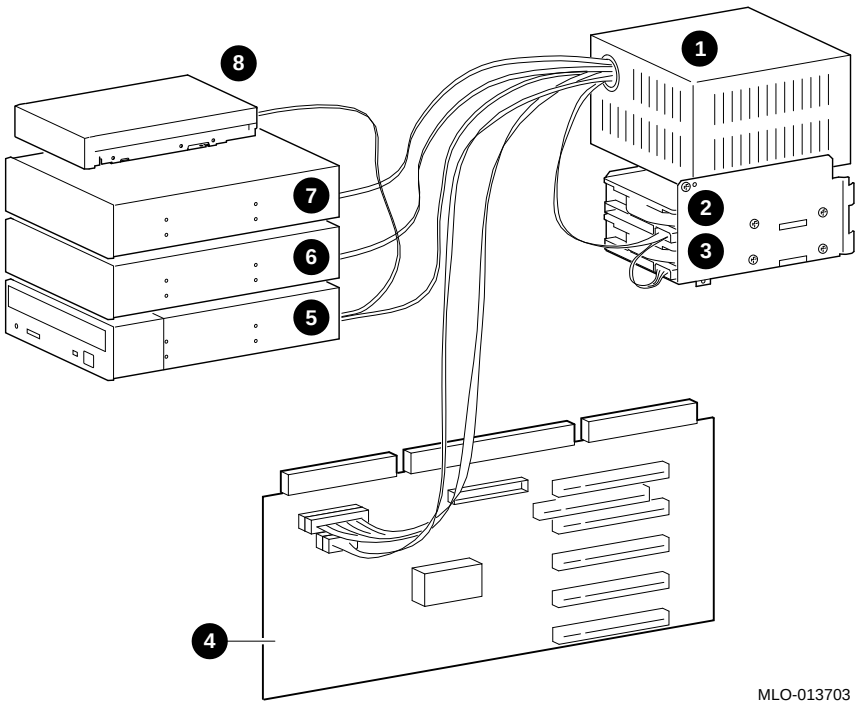

Figure 1-7 Power Cable Routing

Table 1-7 Internal Power Cable Connectors

Figure Legend	Components
1	Power Supply
2	Optional Hard Drive
3	Optional Hard Drive
4	CDAL I/O Board
5	CD-ROM
6	Optional Storage Device
7	Optional Storage Device
8	Hard Drive

The Keyboard

Your system comes equipped with a 101-key enhanced keyboard (ordered separately and shown in Figure 1-8) that allows you to communicate with your system by entering data or commands. Note that some European keyboards have 108 keys. Refer to Table 1-5 for information on keyboard key groups and functions.

☞ Refer to your operating system or application software documentation for software-specific key functions.

NOTE

You can adjust the angle of the keyboard for your comfort. The underside of the keyboard has feet that swing down and lock into place.

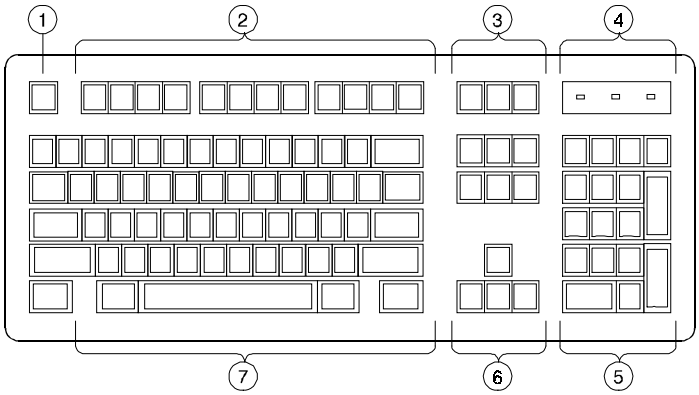

Figure 1-8 Typical Keyboard Layout

Table 1-8 Key Groups and Functions

Figure Legend	Key, Key Group	Function
1	[Escape] key	This key is program-specific. Its function is determined by the installed application software.
2	Function key group	These keys are program-specific. Their functions are determined by the installed application software.
3	Edit key group	These keys are program-specific. Their functions are determined by the installed application software.
4	Indicator lights	These lights indicate whether [NumLock], [CapsLock], or [ScrollLock] has been activated.
5	Numeric keypad	These keys perform numeric functions and software-defined functions, including cursor control. The [NumLock] key allows you to toggle between the numeric functions and software-defined functions.
6	Cursor control key group	These keys control the movement of the highlighted cursor on the terminal screen.
7	Alphanumeric key group	These typewriter-specific keys feature automatic-repeat capability. If you press and hold down any of these keys, the keystroke repeats automatically until released.

2
Getting Started

Introduction

This chapter describes how to install, start, restart, and turn off your VAX 4000 Model 108 System. You can also find information here about preloaded software as well as guidelines for system security. Figure 2-1 shows a typical VAX 4000 Model 108 System in its tower configuration.

WARNING

When unpacking and moving system components, be aware that some components (such as the system unit or terminal) may be too heavy for you to safely lift alone. If you are doubtful about whether you can lift these items alone, please get assistance.

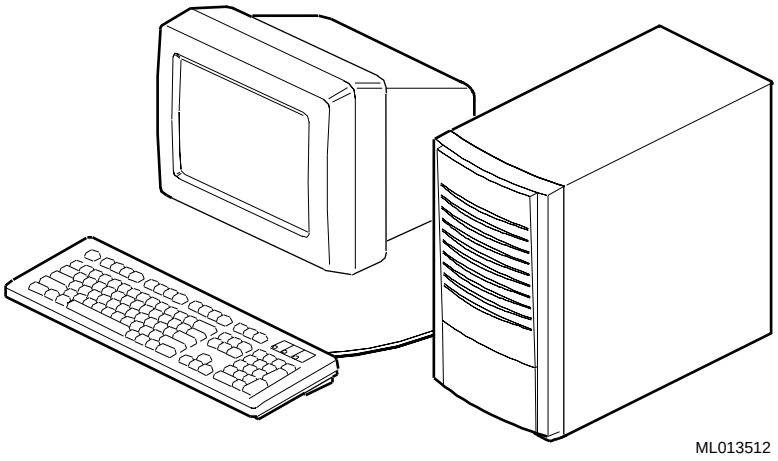

Figure 2-1 VAX 4000 Model 108 System

Before Starting Your System

Before you start your system VAX 4000 Model 108 System, follow this procedure:

1. Read and understand the information supplied with your system.
2. Select a well-ventilated site near a grounded power outlet and away from sources of excessive heat. Also, use an appropriate power strip to isolate the site from electric noise (for example, spikes, sags, and surges) produced by devices such as air conditioners, large fans, radios, and televisions.
3. Save all shipping containers and packing material for repackaging or moving the system later.

NOTES

- Do not install optional hardware or application software until you have started your system and verified that the base system is working correctly.
- On systems that have preloaded software, a label attached to the system unit informs you that there is licensed software installed. Carefully review the software license agreement shipped with your system.

Converting the System to Lie Flat on the Desktop

Your VAX 4000 Model 108 system is shipped in the tower configuration as shown in Figure 2-1. The system can also be used in a desktop configuration as shown in Figure 2-2.

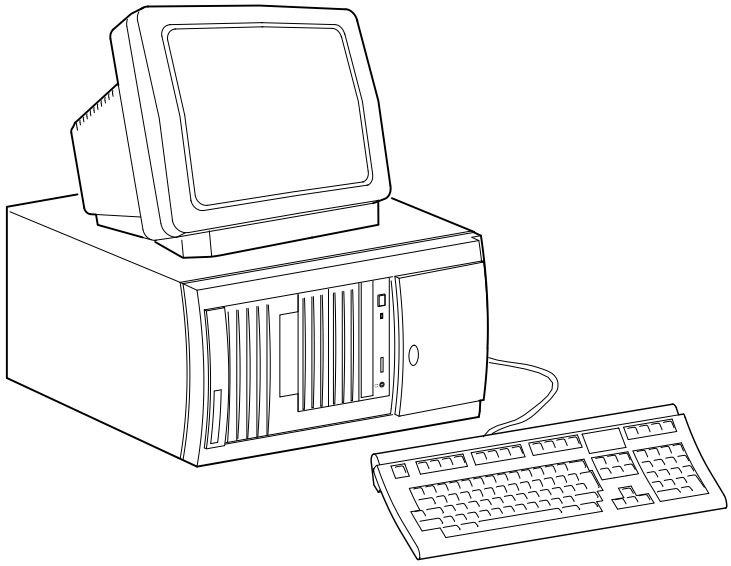

Figure 2-2 Desktop Configuration

Caution

If you will be using your system in the horizontal position as shown, you must use clips that will prevent the CD-ROM media from falling out of the tray when inserting or ejecting it. Please refer to the User Guide that is supplied with the CD-ROM drive for instructions on using the clips.

If you wish to use your VAX 4000 Model 108 system in its desktop configuration, you must first remove the front door.

1. With the door open, push on each hinge as shown to disengage them and lift the door away.

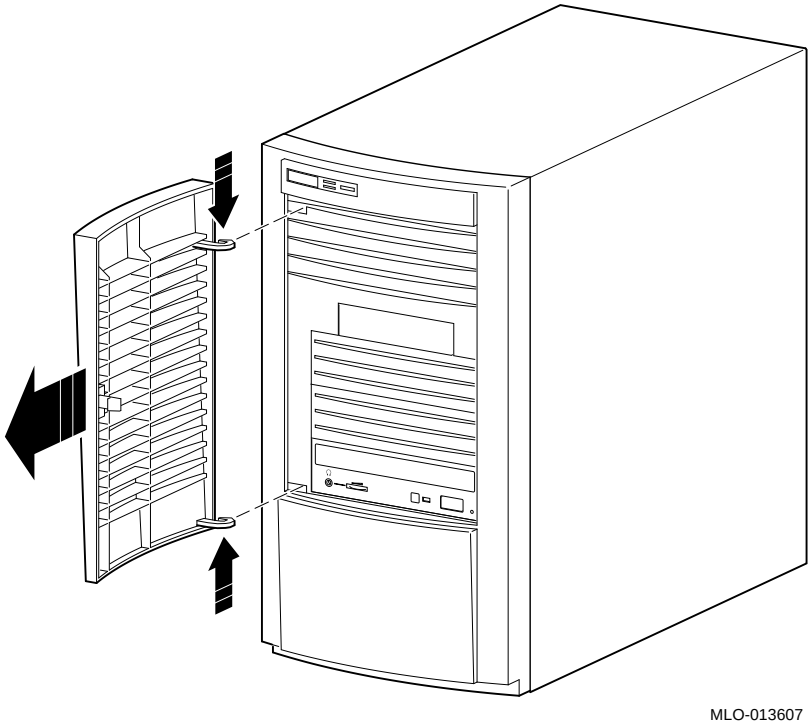

Figure 2-3 Removing the Front Door

2. Set the system down with the power button on the bottom left as shown in Figure 2-2.
3. Place the front door in a secure location in case you wish to use the system in its tower configuration at some other time.

Locking Your System

Your VAX 4000 Model 108 system may be locked and/or secured to a desk or table using a lockdown hasp. Follow these instructions to expose and install the hasp.

CAUTION

- To avoid damage from static discharge, touch bare (unpainted) metal on the system box before you touch anything inside the system.
- To avoid damage from overheating, be careful not to run the system without the cover in place for extended periods of time.

1. Make sure the system is turned off and unplugged.
2. Facing the rear of the unit, locate and loosen the three thumbscrews ❶ that fasten the top cover to the enclosure. Pull back on the cover sides two to three inches, and lift the cover up and away from the enclosure.

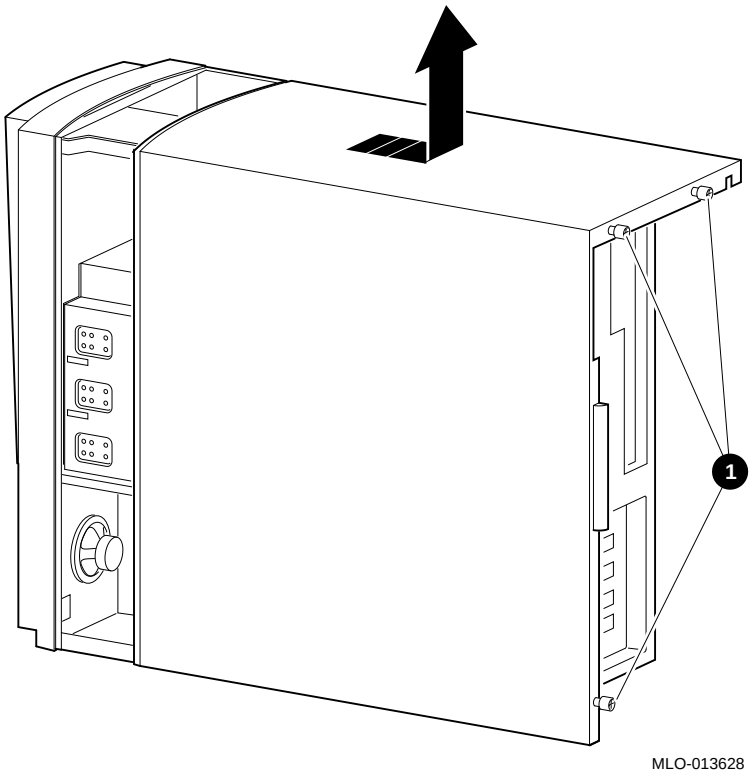

Figure 2-4 Removing the Cover

3. Insert the end of the hasp with the hole in it through the slot on the rear of the enclosure.
4. Place the other end of the hasp securely behind the slot on the rear panel.

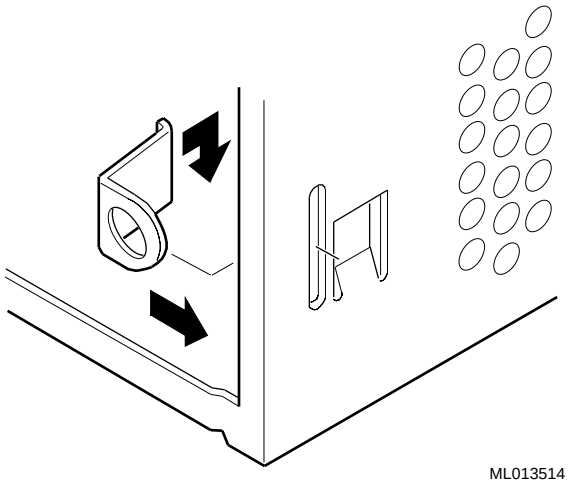

Figure 2-5 Installing the Hasp

You may use a lock, a chain and lock, or cable lock through the hasp to secure the system to a table.

Identifying the Correct AC Power Cord

The proper AC power cord accompanies your VAX 4000 Model 108 System. Because variations exist from one country to another, and systems may be moved, inspect your power cord to ensure that it is the correct one for your country or region. If you are not sure that the supplied AC power cord is correct, contact your authorized Digital service representative or distributor before you use it. Refer to Appendix G, Table G-5 for a list of cords.

WARNING

Do not attempt to modify or use an external 115V AC power cord for 230V AC input power. Modifying the power cord can cause personal injury and severe equipment damage.

Power cords supplied with the VAX 4000 Model 108 System meet the following criteria:

- Cordsets for North America are UL/CSA approved, and rated 120VAC, 10A minimum.
  In Europe, the cordage carries the <HAR> mark. See Table G-5.
- The cordage is terminated in a grounding-type plug and must have approvals showing it is suitable for use within the region.
- The equipment side of the cordset is an IEC320, style C14 appliance connector.
- The cord length does not exceed 4.5 m (14.5 ft).

Installing Your System

The *VAX 4000 Model 108 System Installation Information* you received with your system graphically outlines the steps to follow to install your system.

1. Make sure you received all of your system components. Use Appendix G, Equipment Log, to list your equipment. If something is missing, please contact your distributor or Digital representative.
2. Position your system so that air can flow freely to and from the vents, as shown in Figure 2-6.

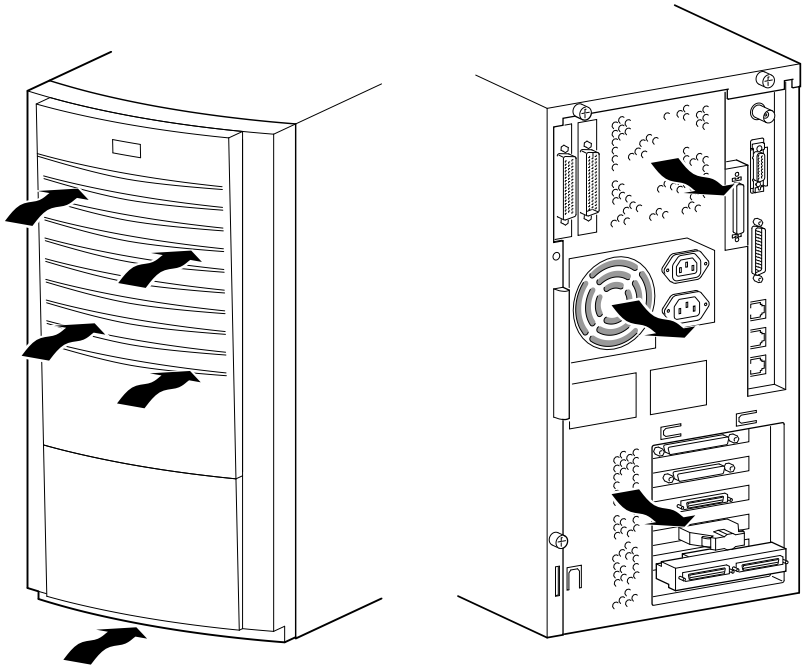

Figure 2-6 System Enclosure Airflow

CAUTIONS

To ensure that your system is properly cooled:

- Make sure that air can freely flow into the front, out of the rear of the system unit.
- Do not remove a filler plate until you are ready to add a new system component.

Connecting System Components

To connect your VAX 4000 Model 108 System, follow this procedure:

NOTE

The VAX 4000 Model 108 System runs on 88V–264V AC and 47–63 Hz.

Connecting the Console Terminal

To connect the console terminal, follow these steps:

1. Connect one end of the terminal cable to the modified modular jack (MMJ) port on the rear of the system (see Figure 2-7).
2. Connect the other end of the cable to the MMJ port on the console terminal itself.
3. Connect the terminal power cord to the terminal and an isolated, grounded circuit. See the terminal documentation for more information.

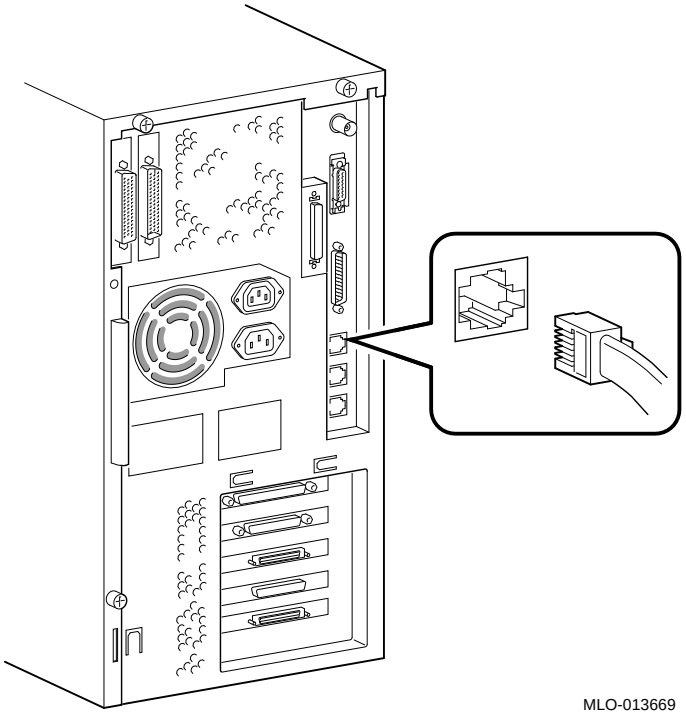

Figure 2-7 Connecting the Console Terminal

NOTE

When the system is shipped, MMJ ports 0 and 1 are covered with an arrow label identifying port 3 as the console port. When port 3 has been identified, the OPA0 arrow label may be removed.

Network Connection and Termination

Your VAX 4000 Model 108 System can be connected to either a ThinWire Ethernet or a ThickWire Ethernet network. A jumper on the system board determines whether you are using ThinWire or Thickwire Ethernet.

If you do not use an Ethernet network, you should install the ThinWire and ThickWire terminators on the back of your system as shown in Figure 2-11 and Figure 2-10,

respectively.

If you will be using either ThinWire or Thickwire Ethernet, follow these general steps, which are detailed in the following sections.

1. Select ThinWire or ThickWire by installing the jumper on the system board.
2. Assemble/connect the network to the appropriate port.
3. Test the network connection.
4. Notify the network coordinator to complete the installation.

Selecting ThinWire or ThickWire Ethernet

Select either ThinWire Ethernet or ThickWire Ethernet by installing the selector jumper on the system board module. Install the jumper in the setting ❶ position for ThinWire Ethernet, and in the setting ❷ position for ThickWire Ethernet (See Figure 2-8).

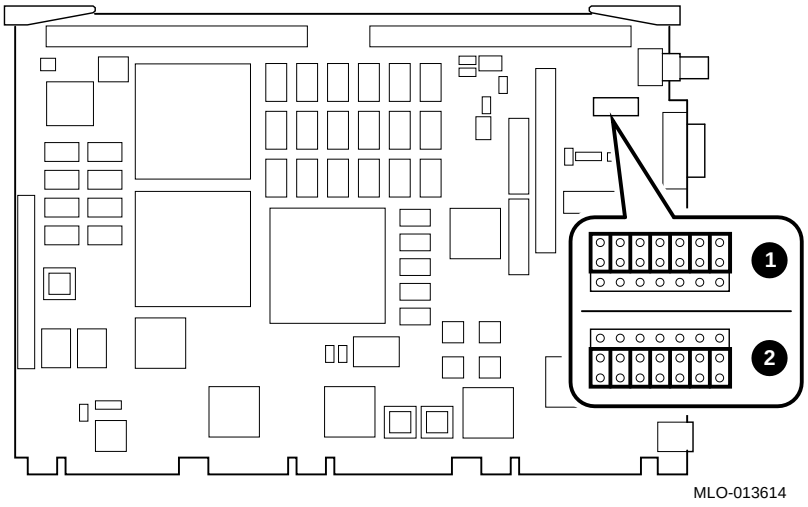

Figure 2-8 Selecting ThinWire or ThickWire Ethernet

Connecting ThinWire Ethernet

If you are using ThinWire Ethernet, follow these steps:

1. Assemble the terminator, extender, t-connector and ThinWire Ethernet Cable connector as shown in Figure 2-9.

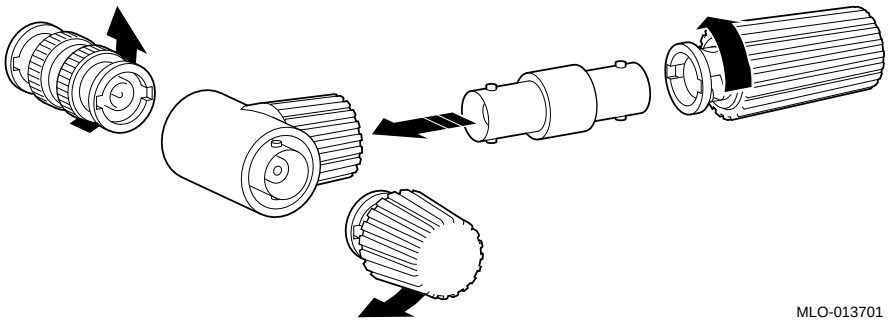

Figure 2-9 Assembling the ThinWire Ethernet Connector

1. Connect the assembly to the ThinWire Ethernet port on the rear of the system.
2. Install the ThickWire Ethernet terminator.

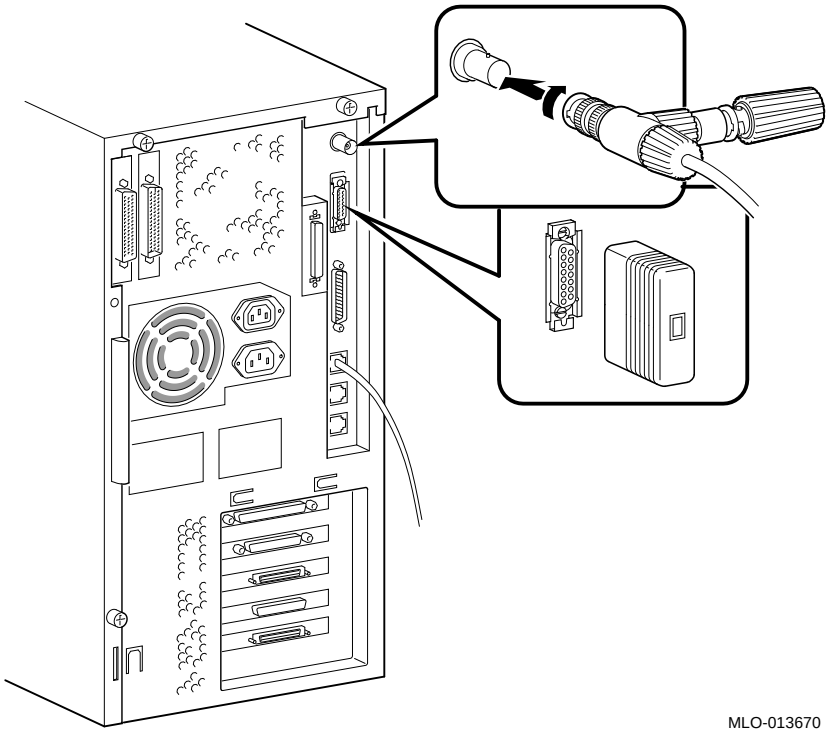

Figure 2-10 Connecting ThinWire Ethernet

Connecting ThickWire Ethernet

If you are using ThickWire Ethernet, connect it as follows:

1. Attach the 15-pin connector on the ThickWire Ethernet transceiver cable to the ThickWire Ethernet port on the rear of the system by sliding the clip upward.
2. Install the ThinWire Ethernet terminator as shown.

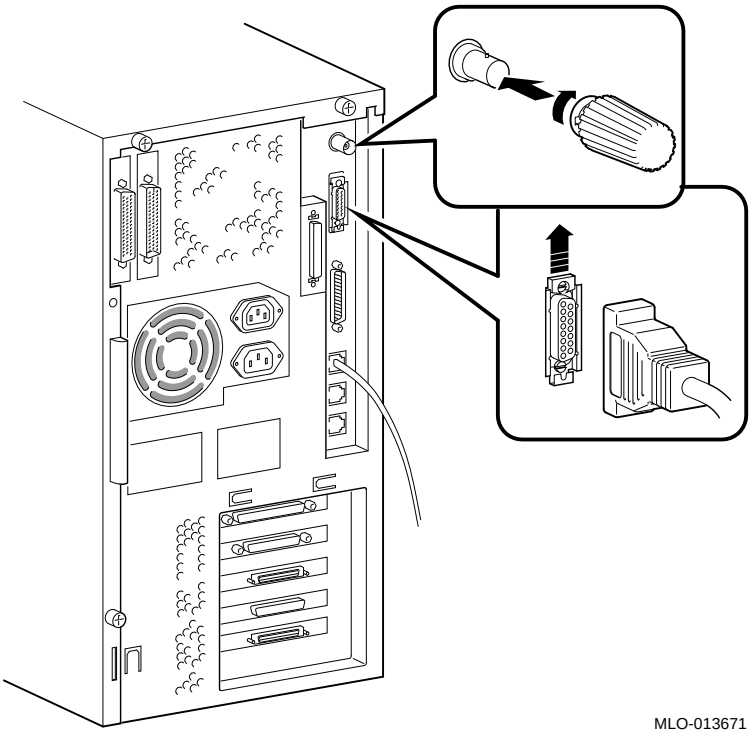

Figure 2-11 Connecting Thickwire Ethernet

Connecting the System Unit to a DECconnect Faceplate

If DECconnect products are installed, a DECconnect faceplate may be on the wall. You can connect VAX systems to DECconnect faceplates using different methods. You can connect either a single VAX system or connect several VAX systems in series. Ask the network coordinator for advice on how to connect the system to the DECconnect faceplate.

If you want to connect only one system to the faceplate, see Figure 2-12 and follow these steps:

1. Remove the ThinWire Ethernet terminator from one side of the T-connector.
2. Attach the ThinWire Ethernet cable to one side of the T-connector.
3. Attach the other end of the ThinWire Ethernet cable to the DECconnect faceplate.

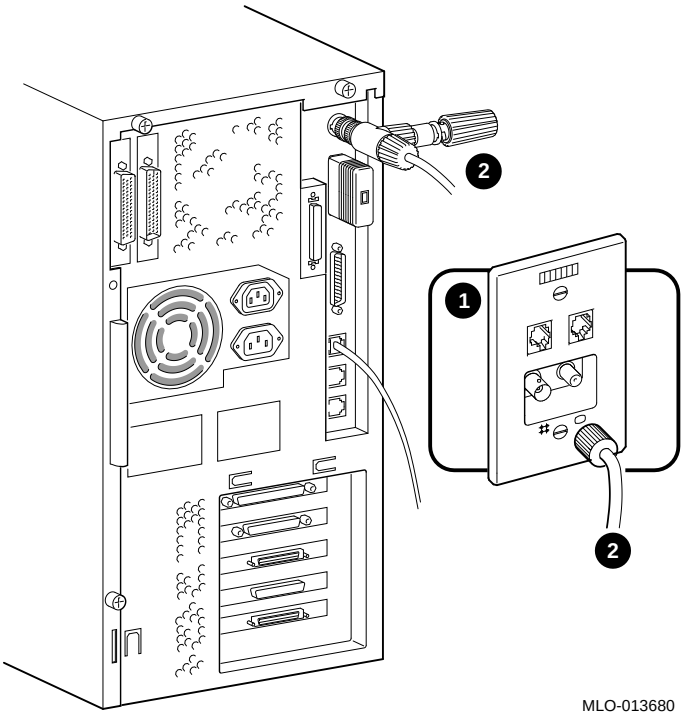

Figure 2-12 Connecting the System to a DECconnect Faceplate

❶ DECconnect Faceplate

❷ ThinWire Ethernet Cable

Connecting External Options to the System

The following subsections contain information on these tasks:

- Connecting peripherals to a DEC423 MMJ port
- Connecting a peripheral to the asynchronous modem control port (port2)

- Connecting peripherals to an optional asynchronous port
- Connecting peripherals to an optional synchronous port

Connecting Peripherals to a DEC423 MMJ Port

To connect peripherals that use DEC423 cables (BC16E) to MMJ ports 0, 1,

or 3, follow these steps:

1. Set the on/off switch on the peripheral to the off (O) position.
2. Verify that the VAX 4000 Model 108 is off and that the power cord is disconnected.
3. Connect one end of the DEC423 cable to either MMJ port 0, 1, or 3
4. Connect the other end of the DEC423 cable to the correct port on the peripheral.
5. Set the on/off switch on the peripheral to the on position.

BC16E cables are available in the following lengths: 10 feet (BC16E-10), 25 feet (BC16E-25), or 50 feet (BC16E-50).

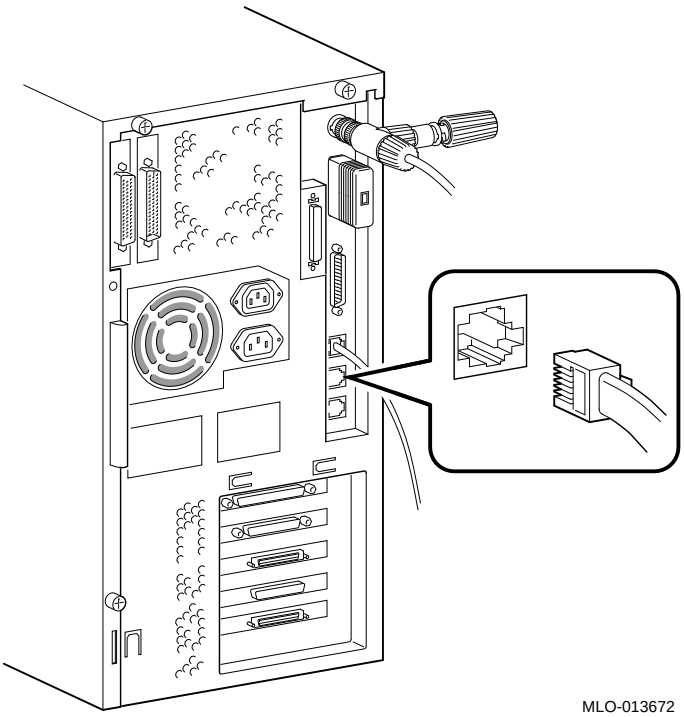

Figure 2-13 Connecting Peripherals to a DEC423 MMJ Port

Connecting a Peripheral to the Asynchronous Modem Control Port

You can connect peripherals that use EIA-232 connectors to the asynchronous modem control port on the back of the system unit. Alternatively, the supplied EIA-232 to DEC423 adapter (H8575-A) allows you to connect peripherals that use DEC423 connectors. This port may be used as a terminal port as well as a modem port.

If you are connecting a peripheral to the asynchronous modem control port using EIA-232 cables, see Figure 2-14 and follow these steps:

a) Set the on/off switch on the peripheral to the off (O) position.

b) Connect the 25-pin D-sub connector of the peripheral cable to the asynchronous modem control port.

c) If the connector has screws on either side, tighten them using a small screwdriver.

d) Connect the other end of the peripheral cable to the correct port on the peripheral.

e) Set the on/off switch on the peripheral to the on position.

EIA-232 cables are available in the following lengths: 10 feet (BC22F-10), 25 feet (BC22F-25), or 50 feet (BC22F-50). The peripheral you are using may require a null-modem extension cable. See the peripheral documentation or contact your Digital sales representative for information on the correct null-modem cable to use.

Caution

The modem control port has default support for non-standard 19.8 Kbaud. To change to 19.2 Kbaud, the user must remove jumper J26 on the system board (see Figure 1-4)

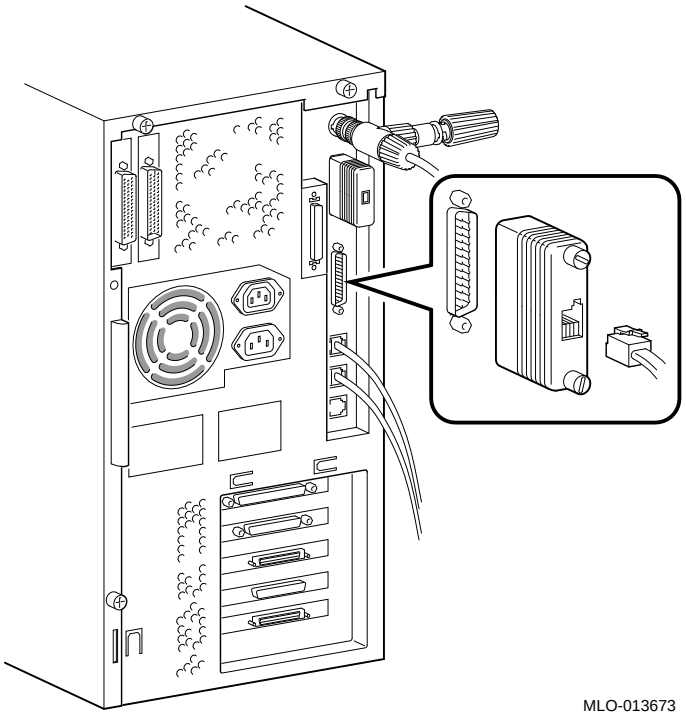

Figure 2-14 Connecting an EIA 232 Connector to the Asynchronous Port

If you are connecting a peripheral using DEC423 cables, follow these steps: Set the on/off switch on the peripheral to the off (O) position.

a) Connect the EIA-232 to DEC423 adapter to the asynchronous modem control port.

b) Tighten the screws on each side of the adapter using a small screwdriver.

c) Connect the DEC423 cable to the MMJ port on the adapter.

d) Connect the other end of the DEC423 cable to the correct port on the peripheral.

e) Set the on/off switch on the peripheral to the on (l) position.

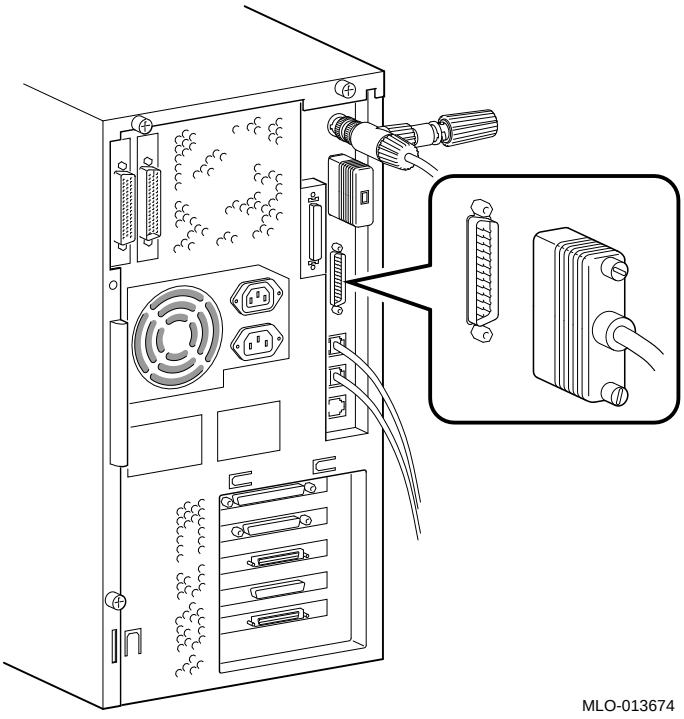

Figure 2-15 Connecting a DEC 423 Connector to the Asynchronous Port

Connecting the SCSI Terminator or Cable

If you have an external small computer system interface (SCSI) interface or SCSI storage box, connect the SCSI cable to the SCSI port on the rear of the system. If you do not have an external interface or storage box, you must connect a SCSI terminator. See the section on SCSI Termination in Chapter 3 for additional information.

1. Connect the SCSI terminator or cable to the SCSI port on the rear of the system.

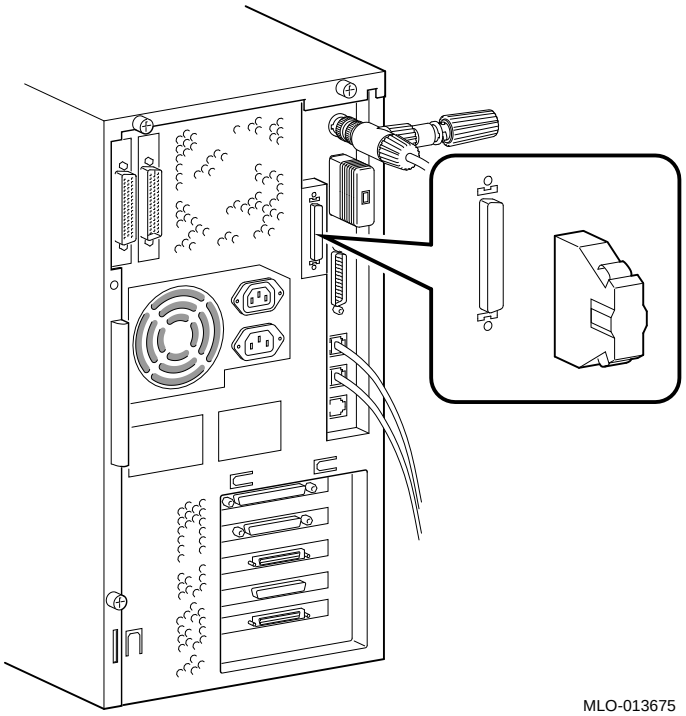

Figure 2-16 Connecting the SCSI Terminator or Cable

Connecting Peripherals to an Optional Asynchronous Port

There are two asynchronous communications options for Micro VAX 4000 108 systems:

- DHW42-BB -- Provides two eight-line data-line-only asynchronous ports
- DHW42-CB -- Provides two four-line asynchronous ports with modem control

If the system has the DHW42-BB asynchronous communications option installed, the system has one or two eight-line data-only asynchronous ports. You can connect up to eight peripherals to each of these ports using the H3104 harmonica.

To connect a peripheral to a DHW42-BB asynchronous port using the H3104 harmonica, follow these steps:

1. Set the on/off switch on the peripheral to the off (O) position.

2. Make sure that the 120-pin-to-2x36-pin cable supplied with your DHW42-BB is installed (Figure 2-17 item ❶).
3. Connect the straight connector of the BC16C-10 cable to one of the asynchronous cable ports on the back of the system unit (Figure 2-17 item ❷).
4. Close the bail lock loops on each side of the connector.
5. Connect the angled connector of the BC16C-10 cable to the H3104 harmonica.
6. Close the bail lock loops on each side of the connector.
7. Connect one end of a DEC423 cable to one of the eight MMJ ports on the harmonica.
8. Connect the other end of the DEC423 cable to a DEC423 port on the peripheral.
9. Set the on/off switch on the peripheral to the on (l) position.

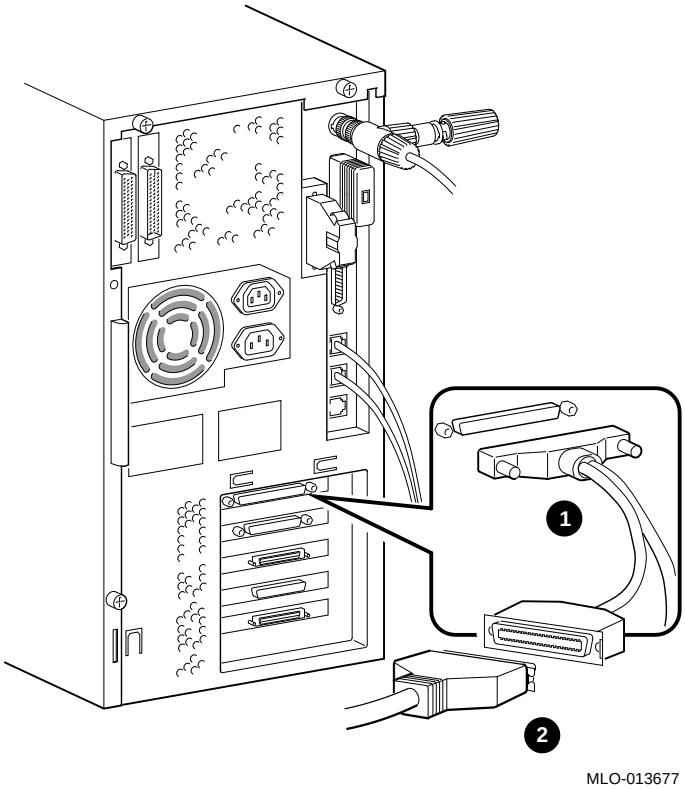

Figure 2-17 Connecting to a DHW42-BB Asynchronous Port

Connecting Peripherals to a DHW42-CB Option

If the system has the DHW42-CB asynchronous communications option installed, the system has two four-line asynchronous ports with modem control. You can connect up to four peripherals to each of these ports using the breakout cable (BC29J-06) supplied with the option.

To connect a peripheral to a DHW42-BB asynchronous port, follow these steps:

1. Set the on/off switch on the peripheral to the off (O) position.
2. Make sure that the 120-pin-to-2x50-pin cable supplied with your DHW42-CB is installed (Figure 2-18 item ❶).
3. Hold in the connector clips on either side of the 50-pin connector of the breakout cable and connect it to one of the asynchronous cable ports on the back of the system unit (Figure 2-18 item ❷).
4. Release the clips. The hooks on the port secure the connector in place.
5. Connect one of the four EIA-232 connectors on the breakout cable to the peripheral.
6. Set the on/off switch on the peripheral to the on (l) position.

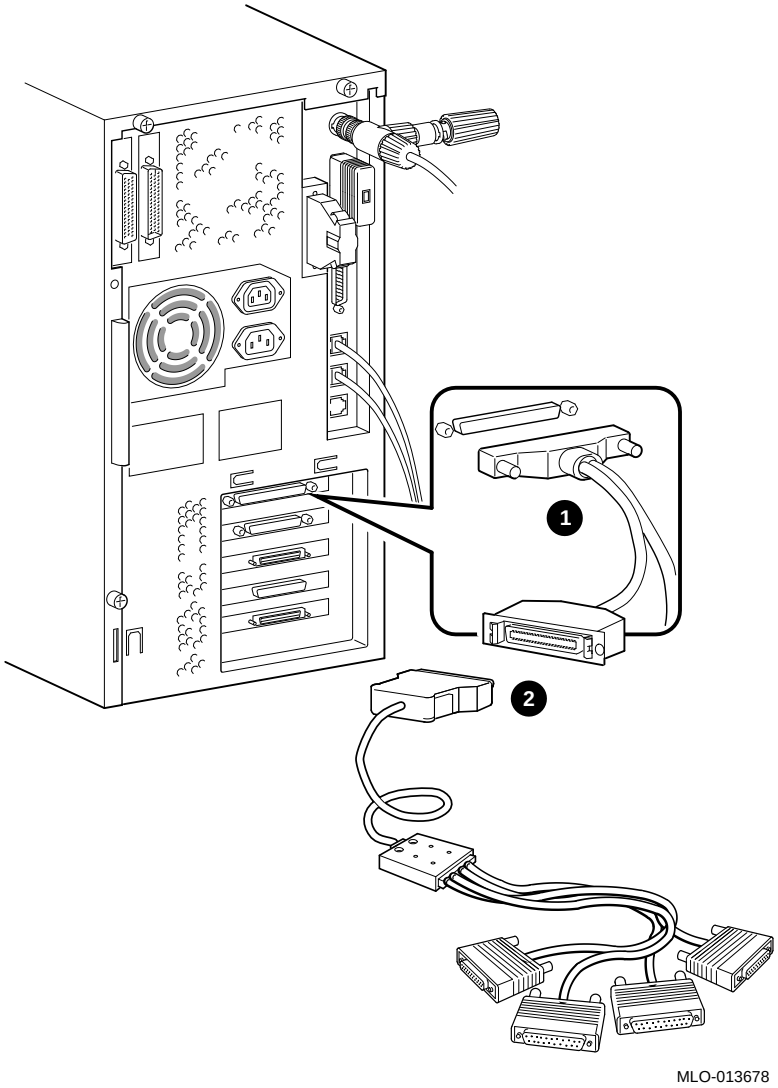

Figure 2-18 Connecting to a DHW42-CB Asynchronous Port

Connecting Peripherals to an Optional Synchronous Port

If the system has the DSW43-AA synchronous communications option installed, the system has two synchronous modem ports. The EIA-232/V.24 cable (BC19D-02) is the standard cable shipped with the option. If you are using a synchronous interface standard

other than EIA-232/V.24, use one of the optional cables listed in Table 3-3 Interface Standards and Cable Part Numbers.

To connect a peripheral to a synchronous port, follow these steps:

1. Set the on/off switch on the peripheral to the off (O) position.
2. Connect the 100-pin-to-2x50-pin cable supplied with your DSW43-AA (Figure 2-19, item ❶).
3. Connect the 50-pin connector of the option cable (Figure 2-19, item ❷) to one of the synchronous cable ports on the back of the system unit.
4. Connect the other connector of the option cable to the communications port on the peripheral.
5. If the option cable connectors are fitted with screws, secure the connectors to the ports by tightening them on each side.
6. Set the on/off switch on the peripheral to the on (l) position.

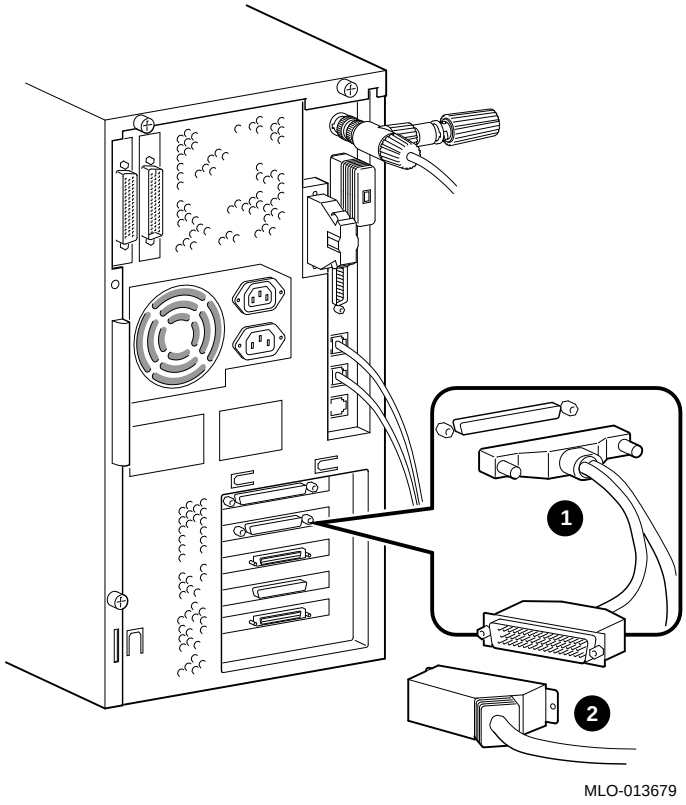

Figure 2-19 Connecting to a DSW43-AA Synchronous Port

Connecting the TriLink Adapter to the KFDDA DSSI Port

The VAX 4000 108 comes with a KFDDA DSSI port at the bottom of the I/O receiver and a TriLink adapter which is to be connected to it. The DSSI port or a device connected to it must be terminated if you do not choose to use the TriLink adapter.

To connect the TriLink adapter to the KFDDA DSSI port (the bottom one), follow these steps:

1. Seat the adapter ❶ onto the DSSI connector; it is keyed so that it can only be seated right-side up.
2. Turn the thumbscrews clockwise to secure the adapter

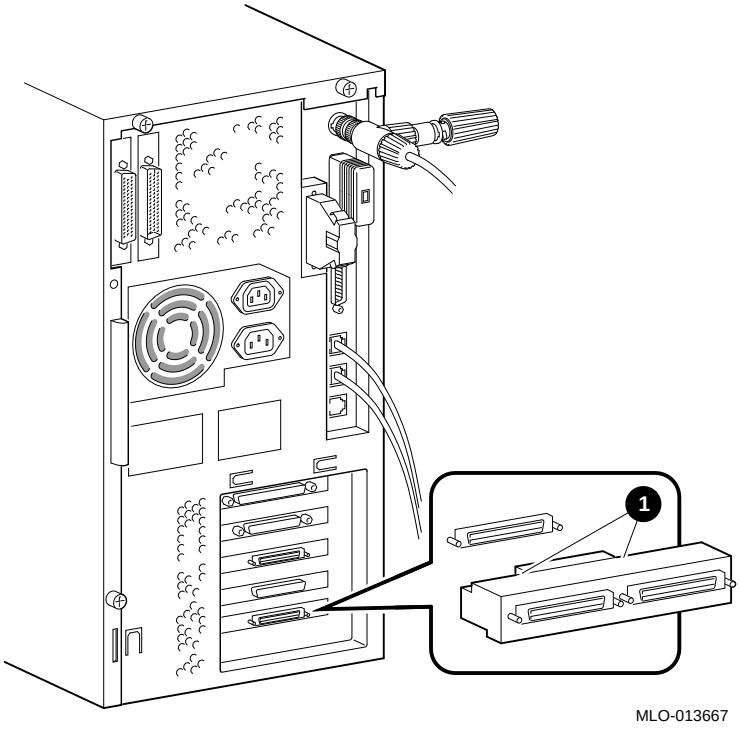

Figure 2-20 Connecting the TriLink Adapter

Connecting a DSSI Device to the TriLink Adapter

The TriLink adapter can be connected to separate DSSI devices which are themselves terminated, or looped out through one connector, through two DSSI devices/clusters, and back to the other TriLink connector.

Each of the two connectors on the TriLink adapter must be either connected or terminated.

To connect the TriLink adapter, follow the steps below:

1. Set the on/off switch on the device to the off (O) position.
2. Connect the DSSI cable(s) and terminator(s).
3. Set the on/off switch on the peripheral(s) to the on (l) position.

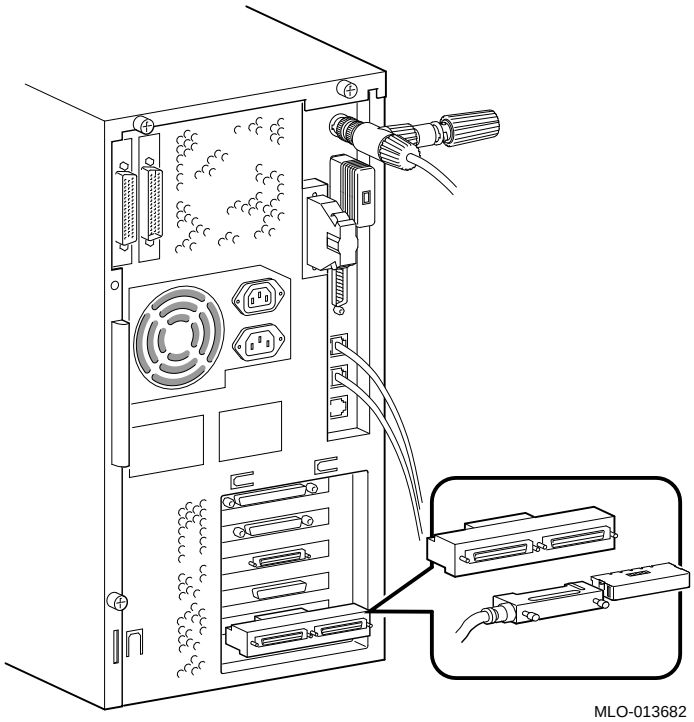

Figure 2-21 Connecting Devices or a Terminator to the TriLink Adapter

Connecting to the HSD10 SCSI Port

The VAX 4000 108 comes with an HSD10 in the second slot up from the bottom on the I/O receiver which must be terminated if not used.

To connect external SCSI devices (Figure 2-22) or a terminator (Figure 2-23) to the HSD10 SCSI port which is the second one up from the bottom, follow these steps:

1. Set the on/off switch on the device to the off (O) position.
2. Remove the SCSI terminator (if attached).
3. Connect the SCSI cable.
4. Set the on/off switch on the peripheral(s) to the on (l) position.

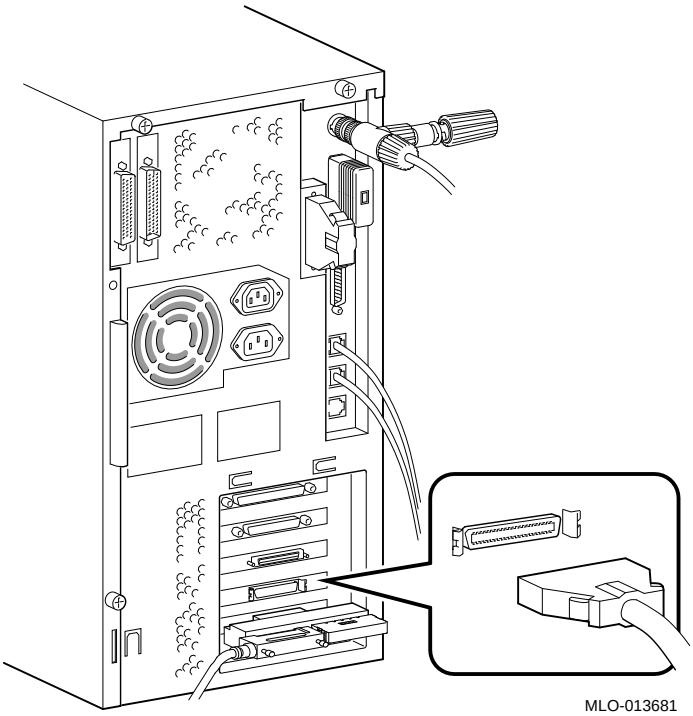

Figure 2-22 Connecting to the HSD10 SCSI Port

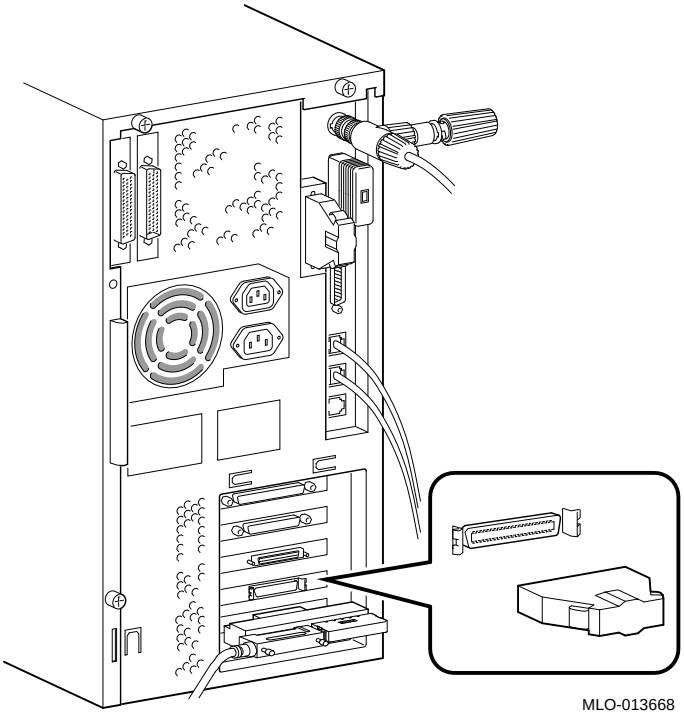

Figure 2-23 Connecting a SCSI Terminator to the HSD10 SCSI Port

Connecting the TriLink Adapter to the optional KFDDA DSSI Port

The VAX 4000 108 comes with an optional KFDDA DSSI port in the third slot up from the bottom of the I/O receiver and a TriLink adapter which is to be connected to it. The DSSI port or a device connected to it must be terminated if you do not choose to use the TriLink adapter.

To connect the TriLink adapter to the optional KFDDA DSSI port, follow these steps:

1. Seat the adapter ❶ onto the DSSI connector; it is keyed so that it can only be seated right-side up.
2. Turn the thumbscrews clockwise to secure the adapter.

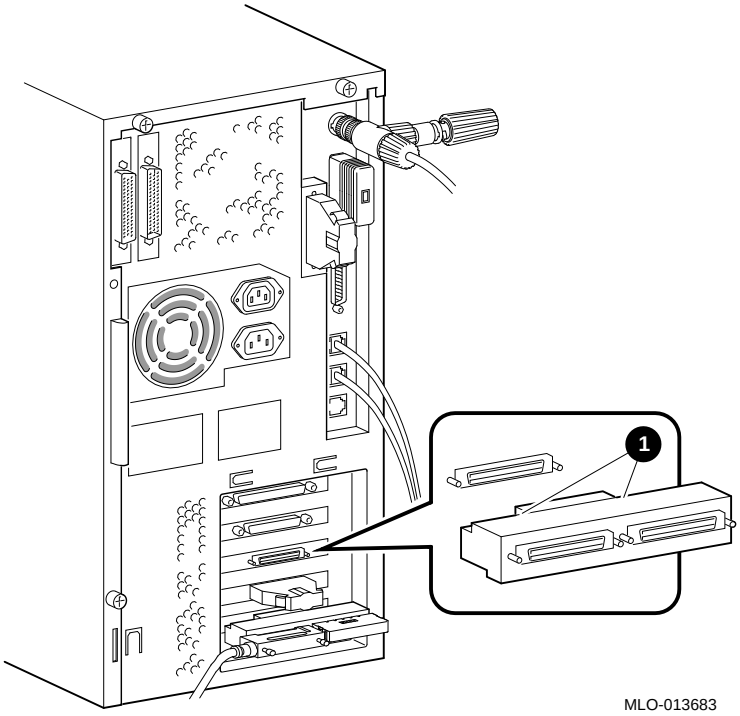

Figure 2-24 Connecting a TriLink Adapter to the Optional KFDDA Port

Connecting a DSSI Device to the TriLink Adapter on the Optional KFDDA Port

The TriLink adapter can be connected to separate DSSI devices which are themselves terminated, or looped out through one connector, through two DSSI devices/clusters, and back to the other TriLink connector.

Each of the two connectors on the TriLink adapter must be either connected or terminated.

To connect the TriLink adapter, follow the steps below:

1. Set the on/off switch on the device to the off (O) position.
2. Connect the DSSI cable.
3. Set the on/off switch on the peripheral(s) to the on (l) position.

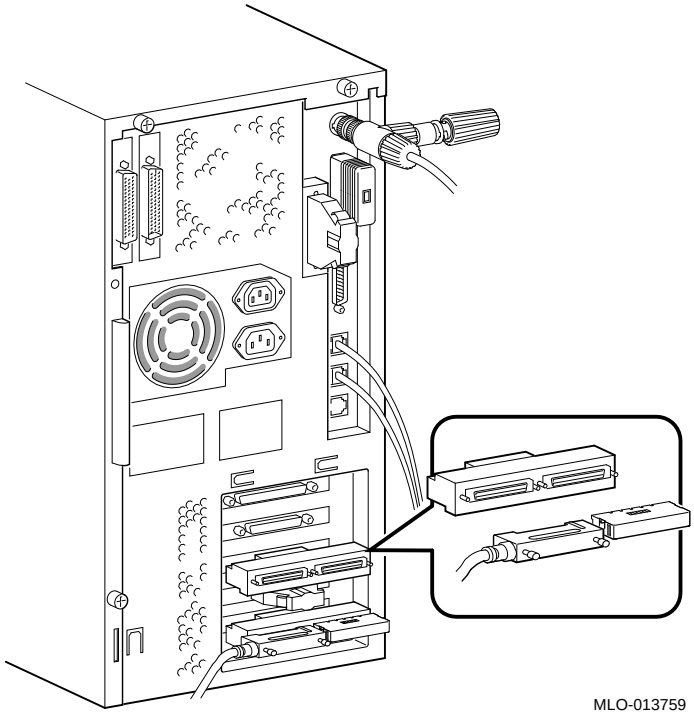

Figure 2-25 Connecting Devices or Terminator to the Optional KFDDA Port

Connecting an External Qbus

To connect an External Qbus, use the Qbus ports on the rear of the enclosure.

1. Attach the Qbus cables to the appropriate Qbus connector.

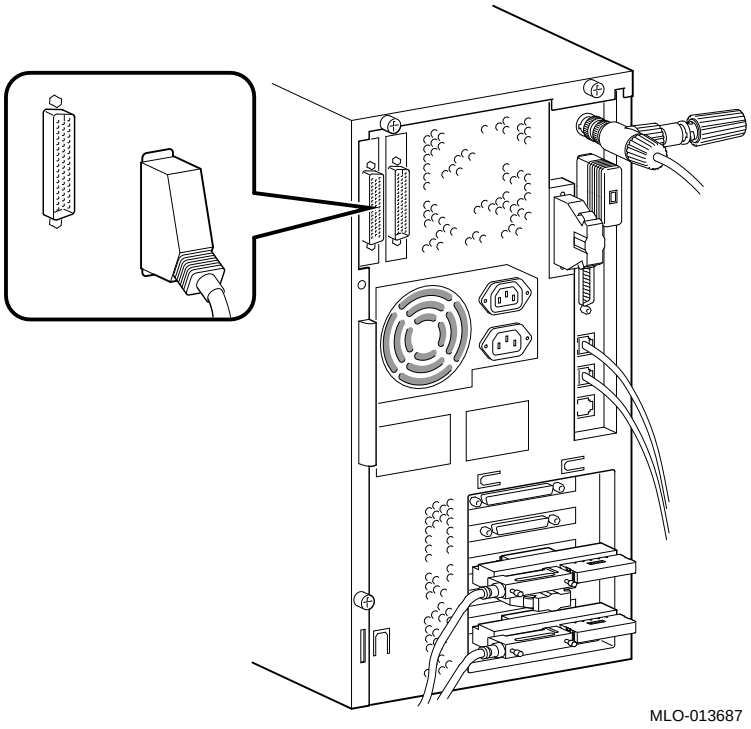

Figure 2-26 Connecting to the Qbus Port

To check the Qbus connection, enter the following:

```
>>>   SHOW QBUS
Scan of Qbus I/O Space
-20001468 (772150) = 0000 RQDX3/KDA50/RRD50/RQC25/KFQSA-DISK
-2000146A (772152) = 0AB0
-20001F40 (777500) = 0020 IPCR
```

```
Scan of Qbus Memory Space
-301E0000 to 3021FFFF (07400000 to 10377777)
>>>
```

External Options

The VAX 4000 108 systems can accommodate the following options:

- DSSI expansion boxes
- SCSI devices and expansion boxes
- Printers, terminals, modems, and other devices that use asynchronous or synchronous connectors

Your Digital sales representative can give you information on how to order a full range of SCSI and Q-bus expansion boxes, printers, terminals, modems, and other devices that are compatible with VAX 4000 Model 108 systems.

See *Installing External Options* in the following chapter for instructions on connecting these devices.

Connecting the Power Cord

Warning

Your VAX 4000 Model 108 system uses a momentary switch for on/off control. Always assume that the system will come on when the AC power cord is installed!

To connect the power cord, follow these steps:

1. Ensure that the system is powered off.
2. Connect the power cord to the rear of the system.
3. Connect the other end of the power cord to a grounded (Earthed) electrical outlet.

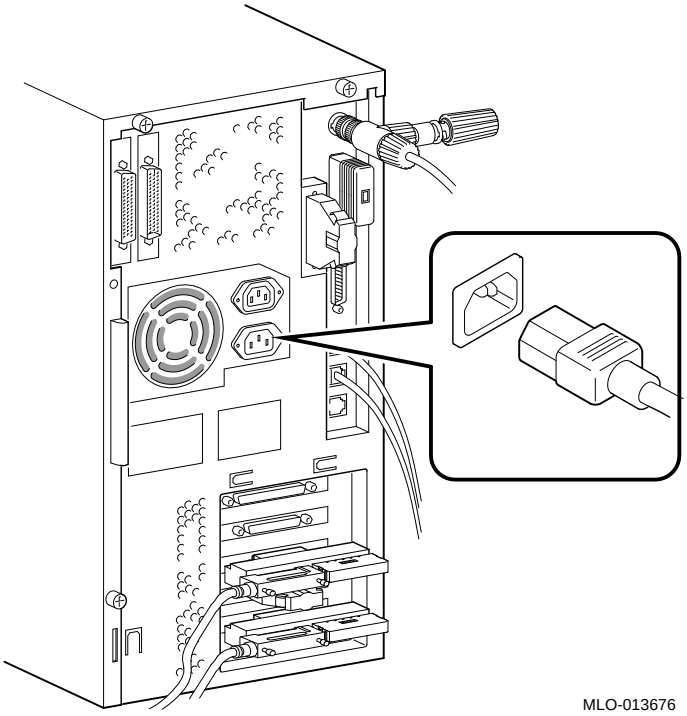

Figure 2-27 Connecting the Power Cord

Starting Your System

To turn on the system, follow these steps:

1. Verify that your system is off by observation of the power LED indicator.
2. Turn on the console terminal. Wait until it completes its power-up self test. See the terminal documentation for more information.
3. Connect the other end of the power cord to an isolated, grounded circuit.
4. Turn on the system unit by momentarily pushing the power switch until the power LED is on.

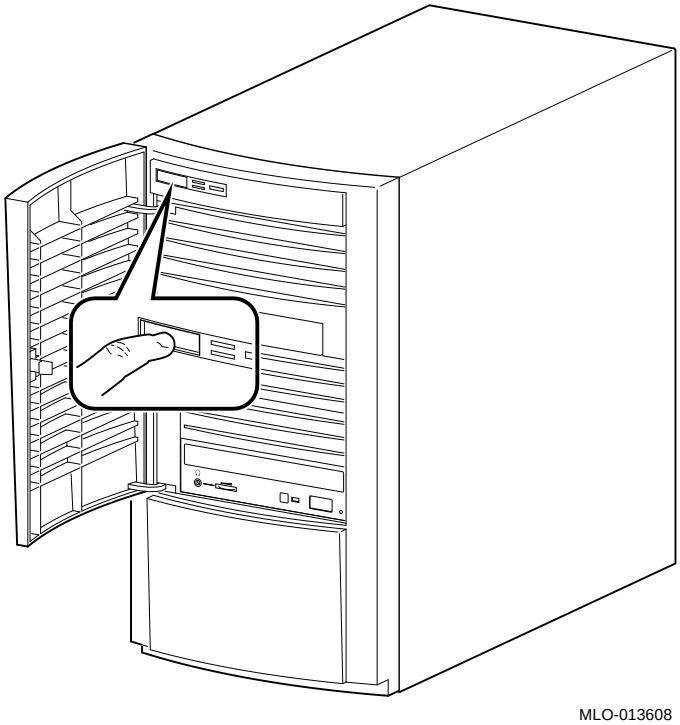

Figure 2-28 Turning the System On

Checking the Power-Up Test Results

The power-up test can take several minutes to complete, depending on the number of installed options you have and on which default settings you use:

A. If the power-up test results on the screen are similar to the results shown below, the system has passed the power-up test.

B. If the power-up test results on the screen are not similar to the results shown below, the system has not passed the power-up test. Go to sub-step 1.

```
KA57-A V1.0, VMB 2.16  ❶
Performing normal system tests.
74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..
58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43..❷
42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..
26..25..24..23..22..21..20..19..18..17..16..15..14..13..12..11..
10..09..08..07..06..05..04..03..
Tests completed.  ❸
>>>  ❹
```

❶ Central Processing Unit (CPU) name, Firmware version number, and Virtual Memory Boot (VMB) version number

❷ Read-Only Memory (ROM) based diagnostics countdown

❸ Status message

❹ Console prompt

1. Write down the error messages and the error summaries. the following example shows an error message and an error summary.
2. Turn the system off and remove the AC power cord.
3. Make sure that all the connections you made in step 3, step 4, step 5, and step 6 are correct.
4. Attach the AC power cord and power the system on.
5. If an error report is still displayed, see the Troubleshooting chapter in this manual.

```
KA57-A V1.0, VMB 2.16
Performing normal system tests.
74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..

? Test_Subtest_31_05 Loop_Subtest=00 Err_Type=FF  DE_Memory_Setup_CSRs.lis ❶
Vec=0000  Prev_Errs=0000   P1=00000000   P2=01000000   P3=00000001
P4=00010000
P5=2101801C P6=00000007 P7=80000003 P8=0000CF4A  P9=00000001 P10=2006B8D8
r0=00000002 r1=21018000 r2=00000008 r3=81000000  r4=00000001  r5=01000000 ❷
r6=2006EB77 r7=21018048 r8=00000000 r9=20140758 r10=00000000 r11=FFFFFFFF
dser=0000 cesr=00000000 intmsk=00 icsr=01 pcsts=FA00 pcadr=FFFFFFF8
pcctl=FC13
cctl=00000020 bcetsts=0360 bcedsts=0F00 cefsts=00019200 nests=00
mmcdsr=01FE6600 mesr=00000000

58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43.. ❸
42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..
26..25..24..23..22..21..20..19..18..17..16..15..14..13..12..11..
10..09..08..07..06..05..04..03..

Memory Set 0: 00000000 to 00FFFFFF, 16MB, 32768 good pages, 0 bad pages

Set 0 on SIMM_carrier_J4 (J5...) (J6...) (J7...) (J8??) ❹

Total of 16MB, 32768 good pages, 0 bad pages, 104 reserved pages

Normal operation not possible. ❺
```

❶ Error message

❷ Error summary

❸ Power-up test completion

❹ Specific error information on the test that failed

❺ Status message

Testing the Ethernet Installation

When you complete the network installation procedure, follow these steps to test the installation:

1. Attach the power cord and power the system on.
2. Enter the following command to test the installation:

>>>T 5F

>>>

3. Run test 5F with the first parameter set to 0 (default) to test the SGEC chip using internal loopback mode. An example of success is shown by the console prompt returning without any messages as shown in the next two examples.

>>>**T 5F**

>>>

4. Another example of test success is shown with test 5F first parameter set to 1 to test the SGEC chip using external loopback mode. This requires a terminator on the selected Ethernet port, either thin wire or thick wire. If the test is run while connected to an active net, it may fail.

>>>**T 5F**

>>>

5. If the device fails the self-test, the system responds with a display similar to the following:

>>>**T 5F**

```
? Test_Subtest_5F_18  Loop_Subtest=0E  Err_Type=FF   DE_SGEC.lis

Vec=010C  Prev_Errs=0000   P1=00000001   P2=00000000   P3=827DFF03  P4=00000000

P5=00000000  P6=00000000   P7=00000000   P8=00000001   P9=00000000 P10=00000000

r0=00000054  r1=000082E2   r2=00000001   r3=000082FA   r4=00008230  r5=00000040

r6=000082E2  r7=20008000   r8=00008000   r9=20140758  r10=13000001 r11=2014044B

 EPC=2005721A dser=0000 cesr=00000000 icsr=01 pcsts=F800 pcctl=FC13

 cctl=00000007 bcetsts=03A0 bcedsts=0400 cefsts=00019200 nests=00

 mmcdsr=00C6C600 mesr=00006000
```

```
>>>
```

If the device fails, see Chapters 5, *Troubleshooting*, and 6, *Diagnostic Tests and Commands*.

Completing the Ethernet Installation

The network coordinator must complete the installation. You must give the following information to the network coordinator:

- A unique node name comprised of a maximum of six alphanumeric characters. Choose any node name and ask the network coordinator to make sure that the node name is unique on the network.
- The system's Ethernet address

To determine the system's Ethernet address, follow these steps:

Enter the following command at the console prompt:

```
>>>SHOW ETHERNET
```

The system displays a response similar to the following:

```
ETHERNET = 08-00-2B-1A-0B-BB
```

The alphanumeric string, shown in the form *nn-nn-nn-nn-nn-nn*, is the Ethernet address.

Write down the Ethernet address and give it to the network coordinator.

If the Network Installation Fails

If the network installation fails, contact your Digital services representative.

Removing the System Unit from a Network

The following subsections describe how to remove the system unit from a network.

Note

Before removing the system unit from a network:

- Get the approval of the network coordinator.
- See the operating system documentation for information on the shutdown procedures before stopping or turning off the system.
- If the system is the server in a network, do not turn off, halt or restart the system without notifying the other network members.

Removing the System Unit from a ThinWire Ethernet Cable

To remove the system unit from a ThinWire Ethernet cable, follow these steps:

1. Power the system off.

Caution

Disconnecting the ThinWire Ethernet terminator or the ThinWire Ethernet cable connectors from the T-connector may cause disruptions to network communications.

2. Disconnect the entire T-connector from the system unit (see Figure 2-10).

Removing the System Unit from a ThickWire Ethernet Cable

To remove the system unit from a ThickWire Ethernet cable, follow these steps:

1. Power the system off.
2. Disconnect the transceiver cable from the ThickWire Ethernet connector on the back of the system unit (see Figure 2-11) and replace it with a terminator (see Figure 2-10).

Booting the Operating System

The system is supplied with factory installed software (FIS) on the system disk. Boot the operating system following the procedures in the *OpenVMS Factory Installed Software User Guide.*

Turning Off Your System

Before turning off your system, make sure to save and close all open files. If you turn the system off without saving and closing files, you could corrupt some or all of your data.

To turn off your system, follow this procedure:

1. Close any application data files you have open as well as any applications you have running. Most application programs prompt you to save the information before closing.
2. Shut down the operating system by typing the following from a privileged account:

   ```
   @sys$system:shutdown
   ```

3. Wait for the operating system to complete the shutdown process and prompt you to use the halt button to get to the console prompt (**>>>**).
4. Do not turn off power to your system and peripherals until the shutdown sequence completes and you are at the console prompt . (**>>>**)

Computer Security

When the security password is set, there are two types of users: privileged users and unprivileged users. Privileged users know the security password and can use the full range of console commands; unprivileged users can only use the following commands:

- LOGIN--use this command with the security password to become a privileged user.
- BOOT-- Use this command without parameters to boot the operating system when the boot device has been set.

See Appendix B for more information on console security and setting the password.

Posture and Work Habits

If you use poor posture while you work or if your equipment is poorly positioned, personal injury may result (as suggested by certain recent scientific articles). Although other articles suggest that there is no cause and effect, we strongly recommend that you read and follow the precautions outlined in Figure 2-29 and Table 2-1. In addition, be sure to adjust your work area so that you are comfortable.

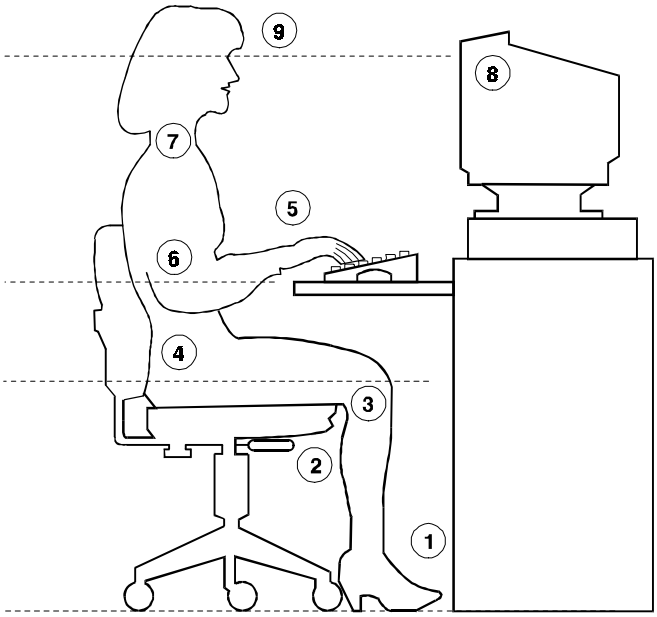

Figure 2-29 Recommendations for Posture and Work Habits

Table 2-1 Recommendations for Posture and Work Habits

Adjust	Figure Callout	To allow the following conditions:
Chair	1	Your feet are flat on the floor.
	2	Your legs are vertical and form a right angle to the floor.
	3	Your thighs are horizontal, and they are not bearing weight. To prevent restriction of the blood flow, keep the backs of your knees away from the seat so you do not compress the area behind them.
	4	Your upper body is erect and your lower back is supported with a backrest.

Adjust	Figure Callout	To allow the following conditions:
Keyboard	5	Your wrists are straight and do not flex more than 15 degrees. They are supported and do not rest on sharp edges. If you use a mouse, rest your hand on the mouse so your wrist is not on the work surface.
	6	Your upper arms are straight down at your sides, and your elbows are close to your sides and support your arm weight. Forearms are at a 70- to 90-degree angle.
Head	7	Avoid neck strain. Your head should incline downward, but no more than 15 to 20 degrees.
Terminal	8	The terminal should be no higher than the level of your eyes and at the correct distance for your vision.
	9	Avoid eye fatigue, which can be caused by glare, image quality, uncomfortable furniture, eye height, and uncorrected vision. If you cannot focus to read at different distances, you may need special glasses. Relax your eyes periodically by focusing on distant objects.
Lighting		Direct lighting or sunlight on the screen causes glare and reflections. Place lighting behind or to the side of your work area, and distribute the lighting evenly on your work area.

Table 2-1 Recommendations for Posture and Work Habits (continued)

Adjust	Figure Callout	To allow for the following conditions:
Noise		Keep background noise at a minimum. Background noise above 65 dBa is tiring. Sound-absorbing materials (for example, curtains, carpeting, and acoustic tile) can help reduce background noise.
Temperature		The temperature should be between 20° and 23°C (68° and 74° F).
Humidity		The humidity should be between 30% and 70%.
Ventilation		Provide adequate air ventilation to operate the equipment and avoid fatigue.
Work Area		Your work area should be greater than 70 cm (28 inches) center to center, preferably 152 cm (60 inches).

WARNING

If you experience pain or discomfort while using your system, rest and review the instructions for posture and work habits. If the pain or discomfort continues after resuming work, discontinue use and report the condition to your job supervisor or physician.

3
Installing Hardware Options

Introduction

This chapter covers the following topics related to installing system options on the Digital VAX 4000 Model 108 System:

- Opening and closing the system cover
- Installing additional system memory
- Installing internal drives
- Installing I/O communications options
- Connecting external devices
- Cable layout for power, and SCSI

CAUTION

- To avoid damage from static discharge, touch bare (unpainted) metal on the system box before you touch anything inside the system.
- To avoid damage from overheating, be careful not to run the system without the cover in place for extended periods of time.

Removing the Cover

To gain access to the inside of the VAX 4000 Model 108 Systems, remove the cover following this procedure:

1. Turn off your system, the terminal, and all external peripheral devices.
2. Unplug the power cord from the wall outlet.
3. Wait at least 15 seconds, to allow time for the power supply capacitors to discharge safely.
4. Facing the rear of the unit, locate and loosen the three thumbscrews ❶ that fasten the top cover to the enclosure. Pull back on the cover sides two to three inches , and lift the cover up and away from the enclosure.

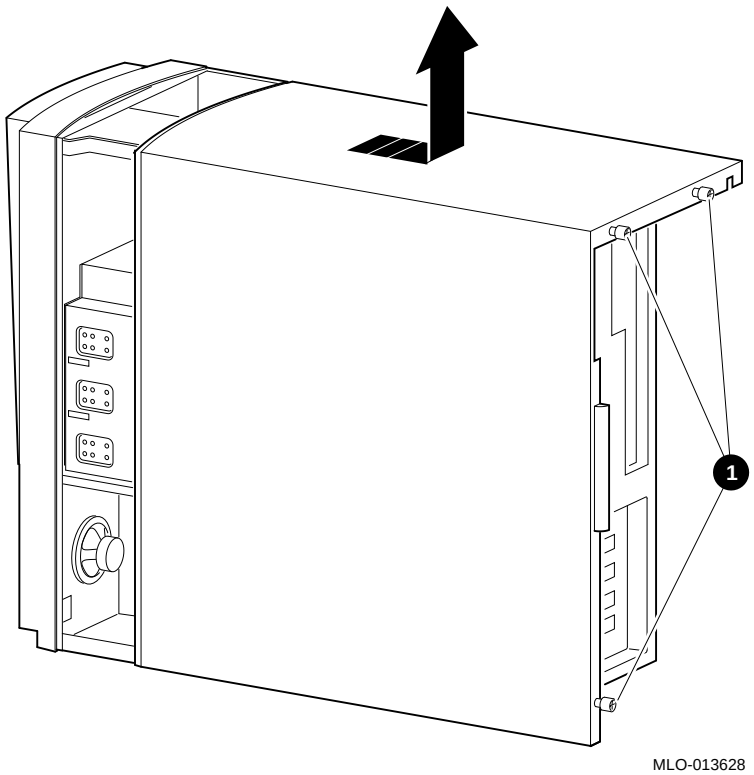

Figure 3-1 Removing the Cover

Cache Memory

The VAX 4000 Model 108 system has 512 KB of cache on the system board.

System Memory

The VAX 4000 Model 108 System has one bank of four Single-In-Line Memory Modules (SIMMS) with 16 MB each, for a total of 64 MB, or optional 32MB SIMMs for a total of 128MB. There are slots for a second optional bank of memory. The memory options include adding a second bank of 16 MB SIMMS (128/196 MB total), or a second bank of 32 MB SIMMs (196/256 MB total). As available, a second SIMM carrier will increase maximum memory size to 512MB.

Memory Configuration Rules

- Random-access memory can be added only in four SIMM increments (four per bank).
- There are two banks, J1-4 and J5-8; always fill at least one bank completely. See Figure 3-2 for SIMM Bank configuration.
- To fill a bank, start at one end of Bank J5-J8 and fill every SIMM socket in the bank. Each bank MUST be completely filled with like SIMMs, if it is filled at all.
- Do not mix SIMMs within a bank
- Use same SIMM size within a bank.

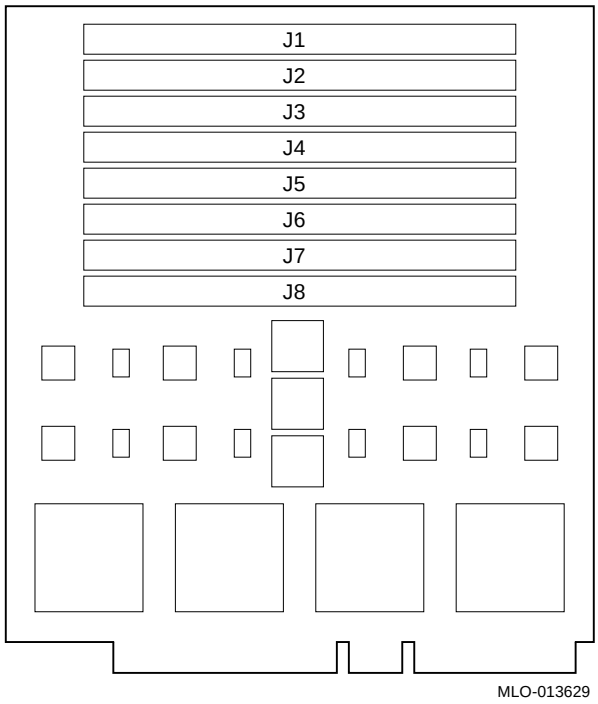

Figure 3-2 SIMM Bank Configuration

Installing or Removing Memory Modules (SIMMs)

To add or remove a set of memory modules (SIMMs) to a bank, see Figure 3-3 and Figure 3-4 and follow this procedure:

1. Turn off your system and unplug the power cord from the wall outlet.
2. Unlock and remove the thumbscrews that secure the top cover and remove the cover, as described earlier in this chapter.
3. Remove the SIMM carrier by pushing back on the latches and lifting it out of its connector.

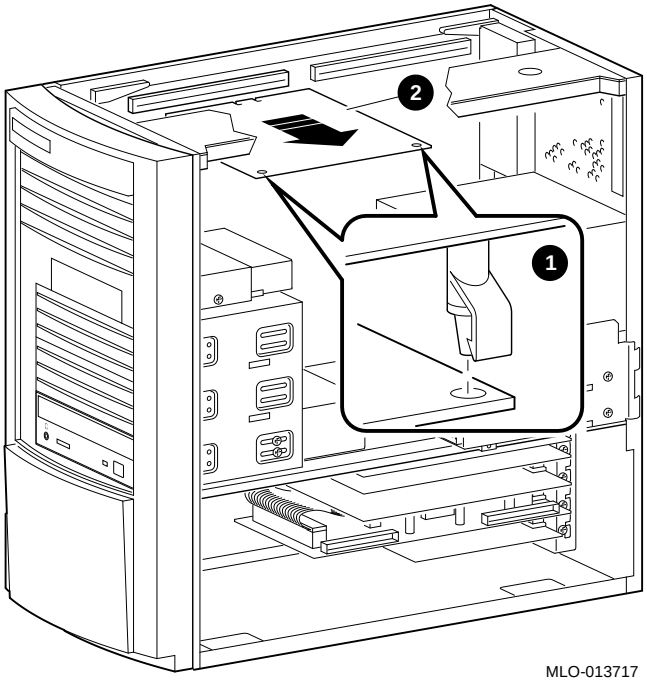

Figure 3-3 Removing a SIMM Carrier

4. Hold the SIMM carrier so that the bottom side of the SIMMs face toward you. Remove the first SIMM by tilting the top of it gently toward you and lifting it out. Remove all other SIMMS in the same manner as necessary.

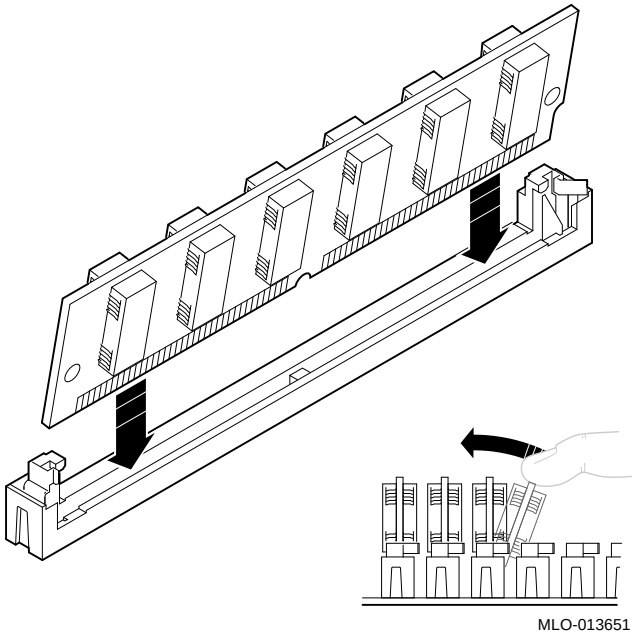

Figure 3-4 Removing and Installing a SIMM

5. Install/reinstall the SIMMs as desired by tipping the top of the SIMM to be placed furthest from you toward you, and inserting its base in the appropriate connector. Install the other SIMMs in the same manner, working toward you.
6. Reinstall the SIMM carrier.
7. Replace the cover, and secure with thumbscrews, as described earlier in this chapter.
8. Connect the power cord and plug it into the wall outlet.

Storage Devices

VAX 4000 Model 108 Systems support six storage devices, one standard RRDxx CD-ROM drive, one standard RZ2x disk drive, two slots for either 3.5-inch or 5.25-inch removable media or non-removable media devices, and two additional slots which can accommodate only 3.5-inch x one-inch high hard drives (RZ2x). See Figure 1-1 and Figure 3-9.

General Information on Installing Drives

This section covers general drive installation information, including internal and external SCSI drives, external SCSI, and cable layouts.

SCSI Addresses (SCSI ID's)

Before installing a SCSI device, you must either set or verify the setting of the device's SCSI address (SCSI ID). The SCSI controller chip is normally assigned device ID 6. Digital recommends that you use Table 3-1 as a guide for the selection of an address for your SCSI drive.

Table 3-1 SCSI Address Recommendations

SCSI Address (ID)	Device (Drive) Recommended
0	Expansion
1	Expansion/hard drive
2	Expansion/hard drive
3	System disk (where your operating system resides)
4	CD-ROM drive
5	Expansion
6	Host adapter (SCSI controller) - Default
7	Expansion

Refer to Appendix F, Setting SCSI Ids, and the section on SCSI Connectors in Appendix E, Technical Specifications, for additional information.

CAUTION

Failure to properly set up the SCSI termination may result in loss of data or damage to the file system.

SCSI Termination

VAX 4000 Model 108 Systems contain an embedded SCSI bus that is used to connect both the internal and external drives. Both ends (and only at the ends) of the SCSI bus MUST be terminated correctly. The controller end of the bus has embedded termination.

External SCSI Connector Termination

An external terminator is required when the SCSI port is not being used.

Internal SCSI Termination

The internal SCSI cable used for the VAX 4000 Model 108 Systems is a flat ribbon cable with integrated on-board termination. Therefore, NO storage devices should have termination enabled.

SCSI Bus Length

The total SCSI bus length, including internal cables and etch on the motherboard as well as the external cables between the system and the storage enclosures must not exceed 6 meters (19.6 feet). The internal SCSI length is 1.2 meters (3.9 feet), leaving 4.8 meters (16.2 feet) for external SCSI use.

Installing Optional Storage Devices

This section tells you how to install optional hard devices into the front and rear storage bays.

To install an optional storage device, follow this procedure:

1. Turn off your system and unplug the power cord from the wall outlet.
2. Remove the cover, as described earlier in this chapter.

Installing Devices in the Front Bay

There are four slots in the front drive bay; the top slot contains the standard 3.5-inch RZxx hard disk drive. The next two can accommodate optional 3.5-inch or 5.25-inch devices, while the lowest slot contains the CD-ROM drive.

NOTE

The two middle slots in the front drive bay can accommodate either 3.5-inch or 5.25-inch devices. If you are installing 3.5-inch devices, there are additional brackets which must be mounted on the device before it is installed in the slot.

To install the brackets on a 3.5-inch device, follow these steps:

1. Align the device ❶ so that the internal cable connectors are away from you.
2. Attach the brackets to the device using the four screws provided.

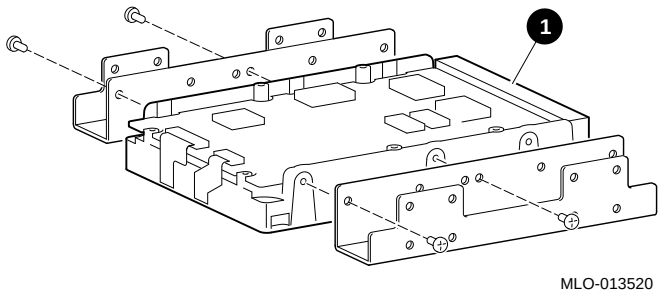

Figure 3-5 Installing the 3.5-Inch Brackets

To install either 3.5-inch optional drives (with mounting bracket attached), or 5.25-inch devices in the front drive bay, follow these steps.

1. Turn off the system, unplug the power cord and remove the cover.
2. Set the SCSI drive device jumpers or switches for the desired SCSI ID (address). This address depends on the unit numbers currently in use. (See Appendix F, Setting SCSI IDs, for a list of typical SCSI ID assignments. Appendix G, Equipment Log, contains space to record your systems SCSI ID assignments.) Follow the guidelines in the manual that came with the drive.
3. Remove the enclosure front bezel by pushing on the inside tab and lifting it up and away from the front of the enclosure.

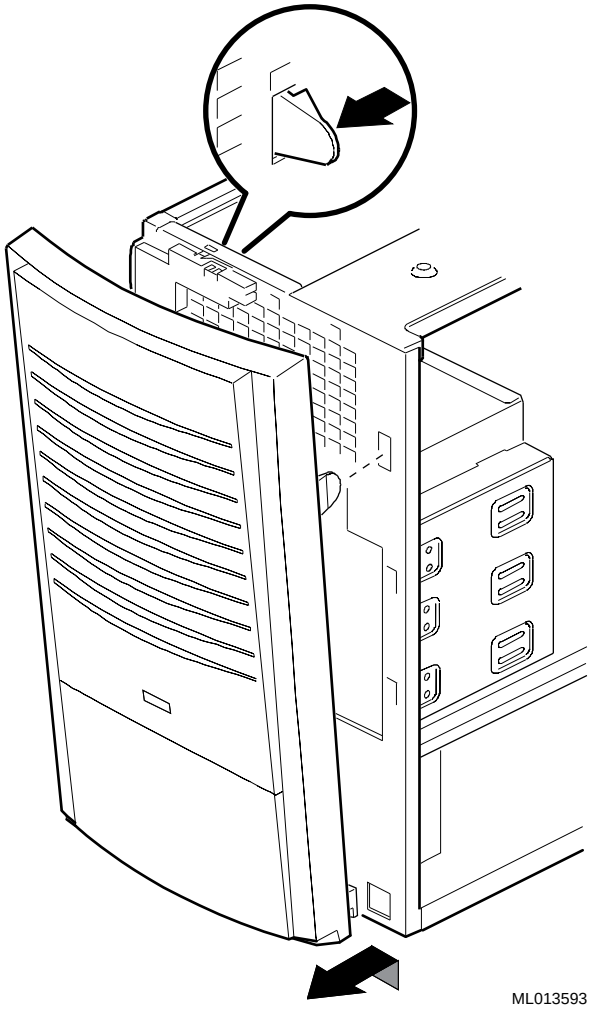

Figure 3-6 Removing the Front Bezel

4. Remove the EMI shield (Figure 3-7 ❷) covering the slot you are filling by pushing it out from the inside of the enclosure.
5. Attach the drive rail ❸ onto the device (or onto the mounted bracket if you are installing a 3.5-inch device) using the two screws provided.
6. Insert the device ❶ through the front of the bay and slide it rearward in the bay so that the cable connectors are inside the enclosure, engaging the bay tabs onto the drive rail. If you are installing a non-removable media device (such as a disk drive) seat it so that the front is flush with the front of the enclosure; seat removable media devices (such as a CD-ROM) so that the front will be even with the front of the bezel after it is reinstalled.
7. Insert the screws ❹ through the side of the bay and into the device as shown. There are two or four screws provided, depending on the particular device It may be necessary to adjust the position of the rail slightly to seat it in the system.

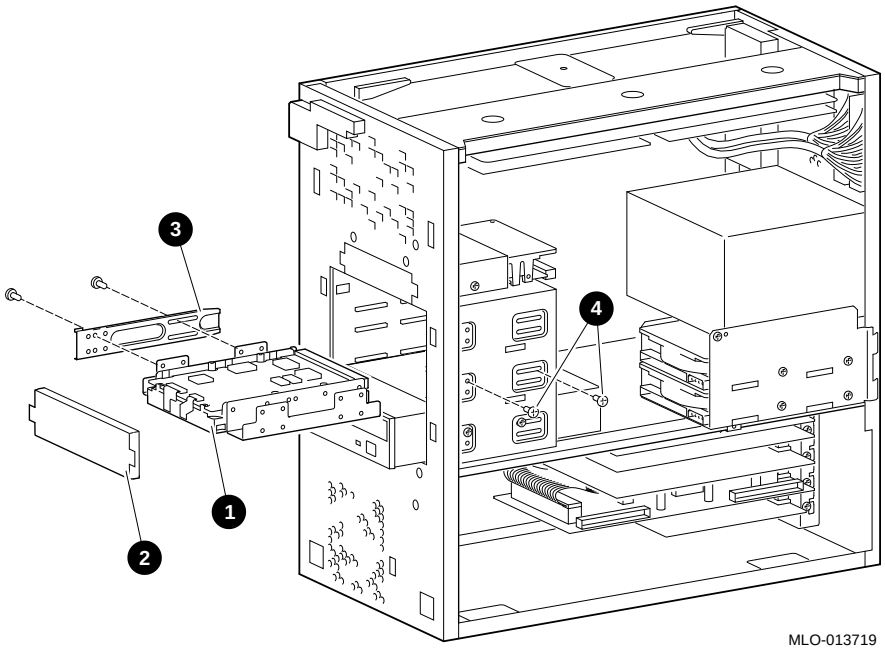

Figure 3-7 Installing Optional Devices in the Front Bay

8. If you are installing a hard drive or other non-removable media device, snap the front EMI shield back into place over the slot in the enclosure. If you are installing a CD-ROM or other removable media device, you will leave the EMI shield off the system so that the front of the device can be accessed. Place the shield in a safe location in case you wish to remove the device later, or replace it with a hard drive.
9. Connect the SCSI and power cables to the device.
10. Reinstall the front bezel, close the cover, connect the power cord and plug it into the wall outlet.

Installing a Hard Disk Drive in the Rear Storage Bay

One or two optional 3.5-inch x 1-inch high hard disk drives can be installed in the rear storage bay.

To install a hard disk in this bay, follow these procedures:

1. Turn off the system, unplug the power cord and remove the cover.
2. Remove the 2 screws ❶ which hold the rear I/O bay in place.
3. Slide the flanges of the bay ❷ out of their retaining slots, and lift the bay out of the enclosure.

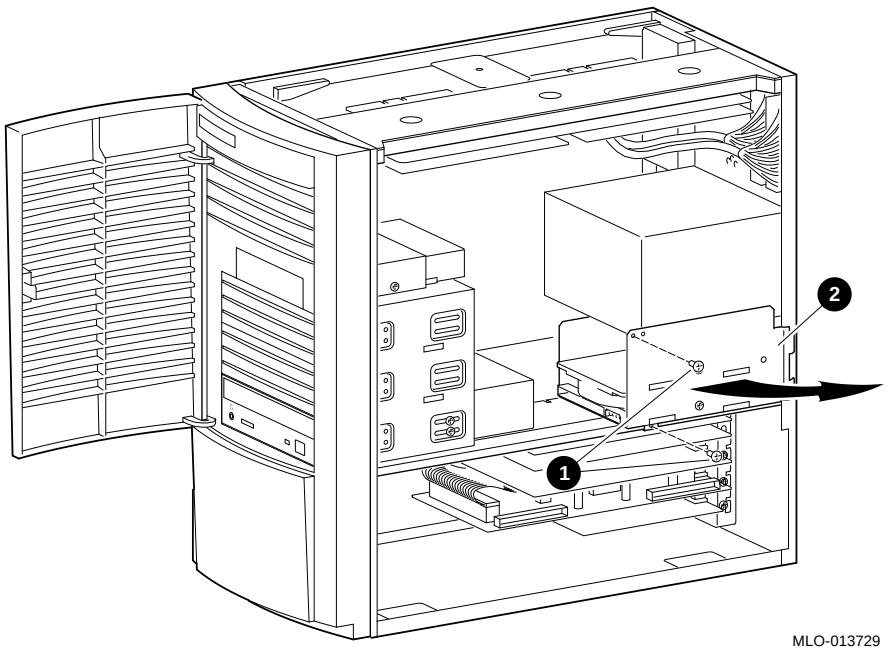

Figure 3-8 Removing the Rear Drive Bay

4. Set the SCSI drive device jumpers or switches for the desired SCSI ID (address). This address depends on the unit numbers currently in use. (See Appendix E, Setting SCSI IDs, for a list of typical SCSI ID assignments. Appendix G, Equipment Log, contains space to record your systems SCSI ID assignments.) Follow the guidelines in the manual that came with the drive.
5. Set the drive into position in the bay (fill the bottom slot of the bay first, as shown, and place the second drive on top of the first).
6. Insert the four screws through the side of the bay and into the device as shown.

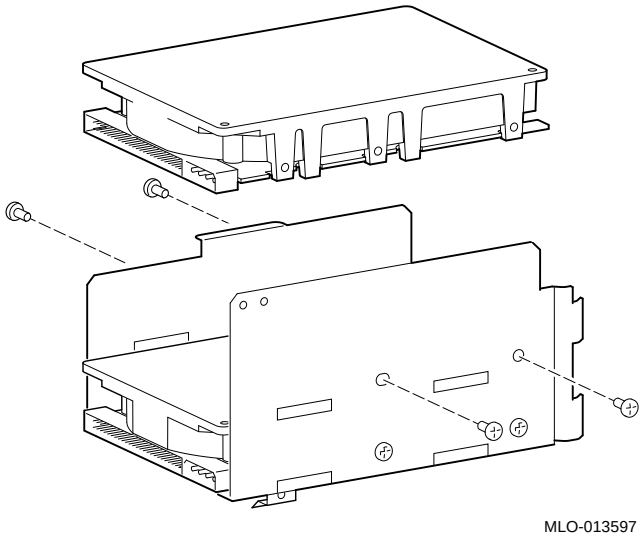

Figure 3-9 Installing Optional Hard Drives in the Rear Bay

7. Reinstall the bay into the enclosure slots and replace the screw.
8. Connect the SCSI and power cables to the device.
9. Close the cover, connect the power cord and plug it into the wall outlet.

Communications Options

There are five CDAL I/O slots at the rear of VAX 4000 108 systems, numbered 1 through 5, with slot 1 at the bottom and slot 5 at the top. Slot 1 contains a KFDDA DSSI port which may be used with a TriLink adapter. Slot 2 contains an HSD10 SCSI port. Slot 3 may be used for an optional KFDDA DSSI port, slot 4 for a synchronous communication option, and slot 5 for an asynchronous communication option.

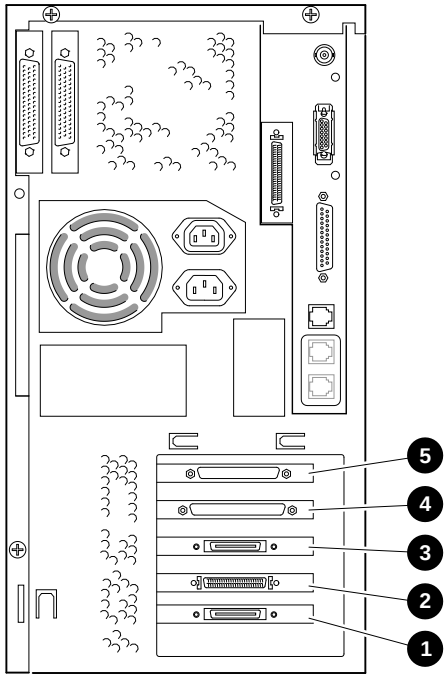

Figure 3-10 CDAL I/O Slots

Table 3-2 CDAL I/O Slots

Slot Number	Use
1	KFDDA DSSI port
2	HSD10 SCSI port
3	Optional KFDDA DSSI port
4	Optional synchronous communication
5	Optional asynchronous communication

Synchronous Communication Option

The VAX 4000 108 system supports the DSW43-AA synchronous communications option. This communications option provides two synchronous communications ports and allows you to connect the system to a peripheral that uses an EIA-232 (V.24) 25-pin connector via a 2-ft cable. You can use other interface standards with this option if you order different cables Table 3-2 lists each interface standard and the part number of the corresponding cable. The BC19*x*-02 cables listed in are 2-foot cables; you must order the extension cables separately. Contact your Digital sales representative for information on ordering any of the different cables that support these interface standards.

Table 3-3 Interface Standards and Cable Part Numbers

Interface Standard	Cable Part Number	Extension Cable Part Number
EIA-232/V.24	BC19D-02	BC22F-*nn* (10, 25, or 50 ft)
EIA-432/V1.0	BC19E-02	BC55D-*nn* (25 or 50 ft)
EIA-422/V.11	BC19B-02	BC55D-*nn* (25 or 50 ft)

Installing the Synchronous Communication Option

The VAX 4000 108 system supports the DSW43-AA synchronous communications option. To install it, follow these instructions:

1. Turn off the system, unplug the power cord and remove the cover.
2. Insert the module ❶ into the slot of the I/O receiver, pressing it firmly into place to seat the connection.

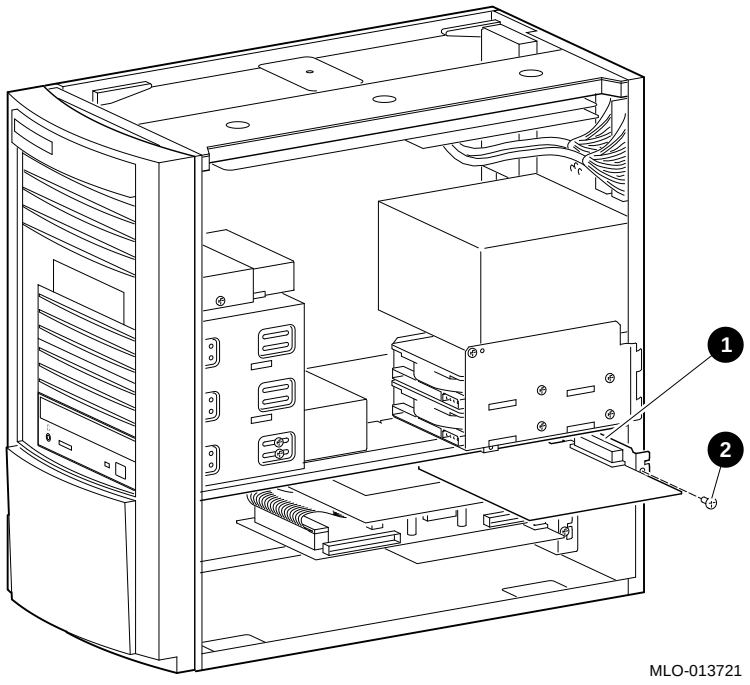

Figure 3-11 Installing the Synchronous Communication Option

3. Insert the screw ❷ through the module and into the I/O shelf as shown.
4. Connect the 100-pin- to-2x50 pin pigtail cables to the new synchronous communications option.
5. Close the cover, connect the power cord and plug it into the wall outlet.

Asynchronous Communication Options

The VAX 4000 108 system supports two different asynchronous communications options. These options are as follows:

- DHW42-BB -- This asynchronous option provides 16 asynchronous DEC423 data-line-only communications lines through two system ports. You can connect up to 16 peripherals using the MMJ ports on two harmonicas (H3104) that connect to the option cables (BC16C-10).

  Use the following cables instead of the BC16C-10 cable if you require longer cable lengths: BC16C-25, BC16C-50, BC16C-A0, or BC16C-B5. Use the following cables between the harmonica (H3104) and the DEC423 peripheral: BC16E-10, BC16E-25, or BC16E-50.

- DHW42-CB -- This asynchronous option provides eight asynchronous EIA-232 modem control lines through two system ports using two breakout cables (BC29J-06).

Attach one of the following cables to a connector on the breakout cable if you require longer cable lengths: BC22F-10, BC22F-25, or BC22F-50. The peripheral you are using may require a null-modem extension cable. See the peripheral documentation or contact your Digital sales representative for information on the correct null-modem cable to use.

Installing the Asynchronous Communication Option

The VAX 4000 108 system supports two different asynchronous communications options, DHW42-BB and DHW42-CB in the top slot of the I/O receiver. To install either of these, follow these instructions:

1. Turn off the system, unplug the power cord and remove the cover.
2. Insert the module ❶ into the top slot of the I/O receiver, pressing it firmly into place to seat the connection.

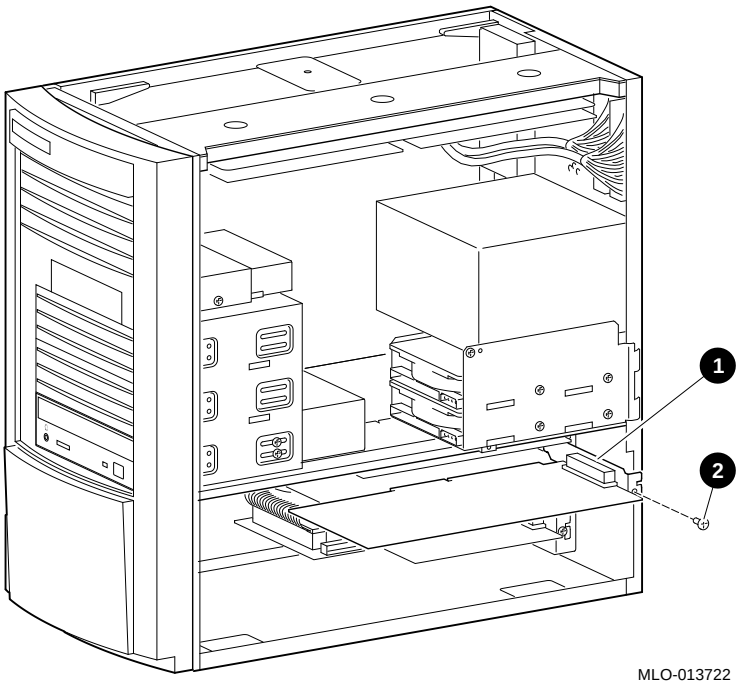

Figure 3-12 Installing the Asynchronous Communication Option

3. Insert the screw ❷ through the option and into the I/O shelf as shown.
4. Close the cover, connect the power cord and plug it into the wall outlet.
5. Connect the 120-pin-to-2x36 or 120-pin-to-2x50 pin pigtail cables to your new asynchronous communications option.

Optional Additional KFDDA DSSI Port

The VAX 4000 Model 108 system supports seven additional external DSSI devices with the KFDDA option.

Installing the KFDDA

The optional external KFDDA DSSI option is installed in the I/O slot which is third from the bottom. To install the KFDDA option, follow these instructions:

1. Turn off the system, unplug the power cord and remove the cover.

2. Insert the module ❶ into the third slot up from the bottom of the I/O receiver, pressing it firmly into place to seat the connection.

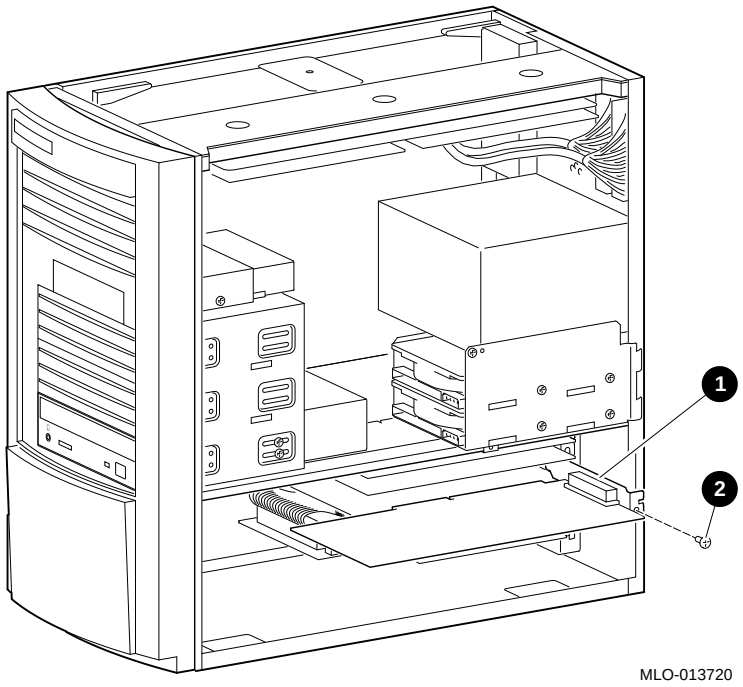

Figure 3-13 Installing the KFDDA DSSI Port Option

3. Insert the screw through the option and into the I/O shelf as shown ❷.
4. Attach the TriLink adapter.
5. Attach external DSSI cable and/or DSSI terminator.
6. Close the cover, connect the power cord and plug it into the wall outlet.

External Options

The VAX 4000 108 systems can accommodate the following options:

- DSSI expansion boxes
- SCSI devices and expansion boxes

- Printers, terminals, modems, and other devices that use asynchronous or synchronous connectors

Your Digital sales representative can give you information on how to order a full range of SCSI and Q-bus expansion boxes, printers, terminals, modems, and other devices that are compatible with VAX 4000 Model 108 systems.

Connecting a DSSI Expansion Box

To attach a DSSI expansion box, see Figure 2-21 and Figure 3-14, which show how to attach a DSSI cable from either a DSSI VAXcluster or a DSSI expansion box to the standard and optional TriLink adapters respectively.
To check expansion box connections, enter the following from the console prompt:

```
>>> SHOW DSSI
DSSI Bus 0 Node 0 (R7ALUC)
-DIA0 (RF72)
DSSI Bus 0 Node 1 (R7EB3C)
-DIA1 (RF72)
DSSI Bus 0 Node 2 (R7EB22)
-DIA2 (RF72)
DSSI Bus 0 Node 5 (TFDR1)
-MIA5 (TU81)
DSSI Bus 0 Node 6 (*)
>>>
```

Connecting Systems Into a DSSI VAXcluster Configuration

Note

A DSSI VAXcluster configuration is supported only under VMS Version 5.5-2xx or later.

A DSSI VAXcluster configuration consists of two or more systems configured as a DSSI VAXcluster and sharing their DSSI devices through a Digital Storage System Interconnect (DSSI) bus. See the illustrations below for typical connections. Each system can have direct access to any of the devices on the DSSI bus, including a shared system disk.

The simplest DSSI VAXcluster configuration, a two-system configuration, can let one system disk be used as the system disk for both systems. Although the system disk resides in one system, both systems have equal access to it and to any other DSSI storage device in either system.

A DSSI device has a built-in DSSI VAXcluster capability that can dynamically serve two or more systems. DSSI adapters, embedded in the system CPU, let you extend a DSSI bus by connecting it to another system.

Using an external DSSI cable, DSSI-based systems can be connected to form a DSSI VAXcluster configuration.

The benefits of a DSSI VAXcluster configuration are:

- VAXcluster features such as shared data across systems and satellite nodes are available to you.
- Higher system availability --- If one of the systems is unavailable due to a system malfunction, the satellites booted through it can continue operating through the other system.

If one system fails, all satellite nodes booted through that system lose connections to the system disk. Each satellite knows that the system disk is available through a second path. The satellite nodes establish a new connection through the other system and continue operation.

To increase system availability, a second system disk can be added to each boot node. If one system disk fails, the other system disk continues to serve one system and the satellite nodes booted through it. As in any VAXcluster, a second system disk improves availability but increases system management tasks.

Figure 2-21 shows how to attach a DSSI cable to a DSSI port on a VAX 4000 Model 108 system. DSSI cables may be attached to either of the DSSI ports in the same way. Figure 3-14 shows a typical DSSI connection between a VAX 4000 Model 108 system's TriLink connector and another VAX 4000 system.

DSSI terminators must be used on all TriLink connectors not connected to DSSI devices.

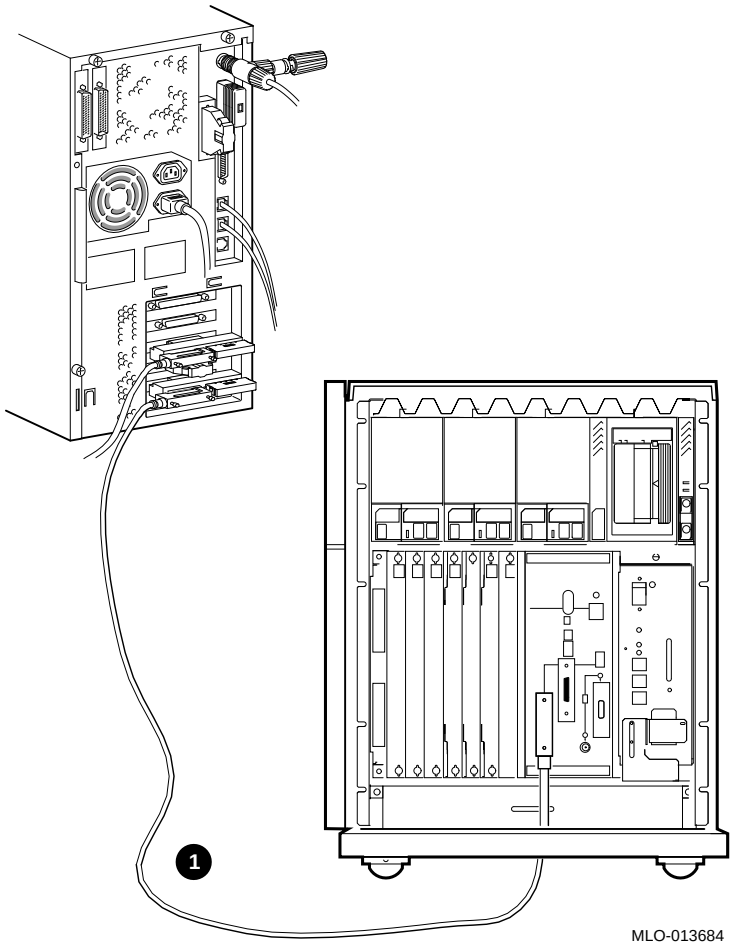

Figure 3-14 Connecting Systems into a VAXcluster

❶ DSSI Cable (BC21M--09)

Connecting an External SCSI Option or Expansion Box

CAUTION

- **The recommended maximum length of SCSI cables (internal length plus external length) is 19.6 feet (6 meters).**
- **Do not connect more than two tape drive devices per SCSI port.**
- **Some expansion boxes are restricted to either 110 V ac or 220 V ac operation. Make sure that the voltage requirement of the expansion box used is compatible with the supply voltage.**
- **Turn on the expansion boxes before you turn on the system unit. This procedure ensures that the device in each expansion box is ready for use and that the system firmware includes the device in the configuration display.**
- **Do not connect or disconnect SCSI expansion boxes while the system is turned on. Doing so can cause damage to the equipment or corrupt data.**
- **Digital cannot guarantee the correct operation of any SCSI bus that uses cable assemblies not supplied by Digital or not configured in accordance with these guidelines.**

Note

Be sure to read the instructions that come with the SCSI device. If the cable supplied with the SCSI device has the wrong type of connector, you will need a different cable.

To connect an external SCSI device, or a SCSI expansion box, follow these steps:

1. Set the drive jumpers or switches for the desired SCSI ID.
2. Remove the SCSI terminator and connect the option's SCSI cable to the port. Be sure that you use a cable with a SCSI 50-pin high-density type connector.
3. Terminate the new end of the bus at the last external SCSI device, using the appropriate terminator. Make sure that any other external SCSI devices have their terminators removed or disabled.

To check expansion box connections, enter the following from the console prompt:

```
>>>   SHOW SCSI
```

```
SCSI Adapter A, SCSI ID 6
-DKA300 (DEC RZ26N)
-DKA400 (DEC RRD45)
```

System Board Access

To access the system board, the enclosure cover must first be removed, then release the two module clips ❶ and gently slide board out part way. Remove the Qbus cable and gently slide the board out the rest of the way. See Figure 3-15.

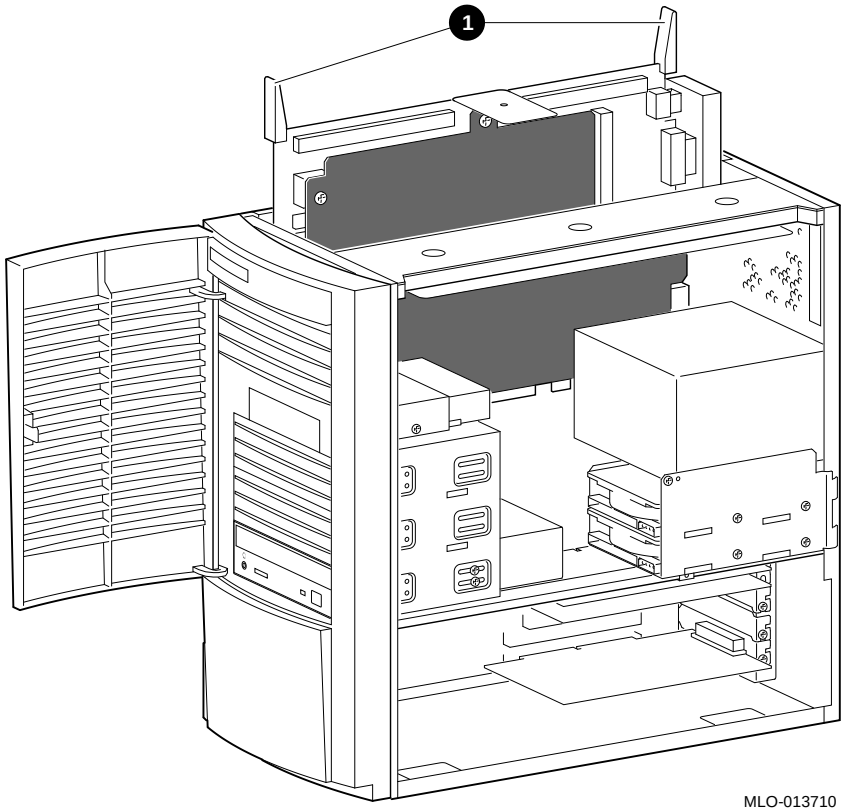

Figure 3-15 Removing the System Board

If you need to access components on the system board that are underneath the plastic cover ❶, remove the two nuts ❷ and the clip ❸. See Figure 3-16.

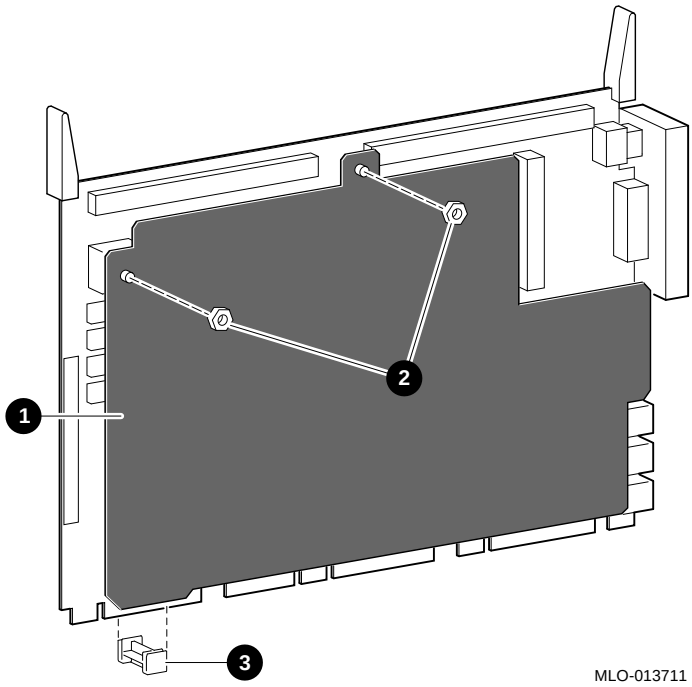

Figure 3-16 Removing the System Board Cover

4
HSD10 Operation

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 4-1 shows the HSD10 and its switches and LEDs.

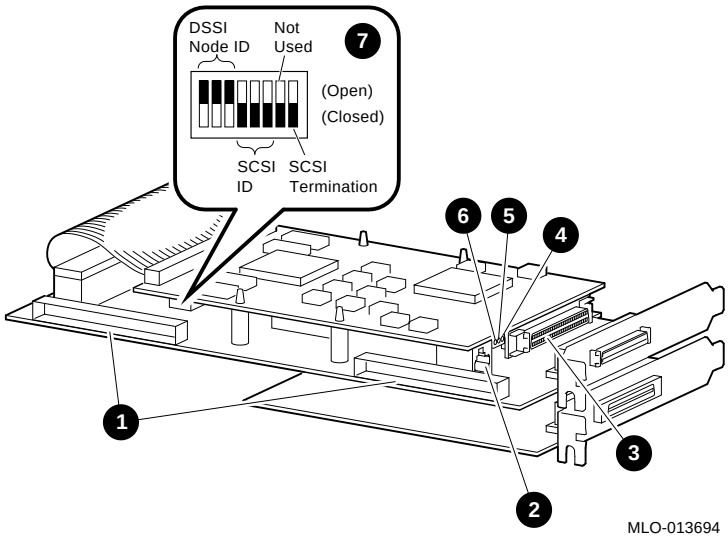

Figure 4-1 HSD10

❶ SCSI Connectors

❷ Console port

❸ DSSI connector

❹ LED - DSW3

❺ LED - DSW2

❻ LED - DSW1

❼ Switchpack

HSD10 DSSI-to-SCSI Bus Adapter Description

The HSD10 DSSI-to-SCSI bus adapter provides connectivity for up to seven SCSI disks or six SCSI disks/CDROMS and one SCSI tape device through a single port on the DSSI bus. The DSSI bus is connected through the CPU module. One accessible connection is 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 embedded SCSI devices in VAX 4000 Model 108 systems

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).

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)
- 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.

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 the *StorageWorks Solutions HSD10 Array Controller User's Guide*, EK-HSD10-UG, 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.

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 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.

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 RZ2x disk drives.
- Disk drives configured on an HSD10 DSSI-to-SCSI bus adapter may only be shadowed with disk drives that are also configured on an 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.

HSD10 Switches and Indicators

The following sections describe switches and indicators for the HSD10 DSSI-to-SCSI bus adapter.

HSD10 Switches

Table 4-1 lists the switch sections in the device configuration switchpack (SW2), and Figure 4-1 shows the switches themselves. You need to set these switches according to the procedures to configure the DSSI ID and the SCSI ID.

Table 4-1 HSD10 Switches

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	NSB of SCSI ID	Closed

SW2-7	Spare	Closed
SW2-8	Active SCSI termination	Closed (terminator installed)

HSD10 LED Indicators

Table 4-2 describes the HSD10 DSSI-to-SCSI bus adapter indicators that are used to determine the status of the HSD10 DSSI-to-SCSI bus adapter.

Table 4-2 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.

Operating the HSD10 DSSI-to-SCSI Adapter

This section 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.

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

To set the switches on the HSD10 DSSI-to-SCSI bus adapter module board before you install the adapter in a VAX 4000 Model 108 system, locate the configuration switchpack see Figure 4-1). The device configuration switchpack contains 8 switch elements, divided into DSSI ID and SCSI ID sections as shown in Figure 4-1.

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 accessible through the DSSI port on the rear of the system.

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.

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

Table 4-3 lists the sections of SW2 used for setting the DSSI ID and the corresponding settings for each DSSI ID.

Table 4-3 HSD10 DSSI ID Switch Settings

DSSI ID	SW2-1	SW2-2	SW2-3
0 (Default)	Open	Open	Open
1	Open	Closed	Closed
2	Open	Closed	Open
3	Open	Open	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. Refer to Figure 4-1 and Table 4-3 to locate the DSSI ID switches on the device configuration switchpack and determine how they are to be set.
4. 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.

Selecting and Setting the SCSI ID

The SCSI port is connected by cable to the internal SCSI devices, and 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.

Table 4-4 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 switchpack).

Table 4-4 HSD10 SCSI ID Settings

SCSI ID	SW2-1	SW2-2	SW2-3
0	Open	Open	Open
1	Open	Closed	Closed
2	Open	Closed	Open
3	Open	Open	Closed
4	Closed	Open	Open
5	Closed	Open	Closed
6	Closed	Closed	Open
7 (Default)	Closed	Closed	Closed

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. Refer to Figure 4-1 and Table 4-4 to locate the SCSI ID switches on the node configuration switchpack and determine how they are to be set.
3. Using a small blade screwdriver or similar tool, set the switches to the SCSI ID number selected in Step 1.

Applying Power to the HSD10

Note

HSD10 controllers ordered in preconfigured systems 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 Model 108 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 on-line to the host system.

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. The section on HSD10 Command Utility Maintenance Operations 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.

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 1996, 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.

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: 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) 1996 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.

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.

The *StorageWorks Solutions HSD10 Array Controller User's Guide*, EK-HSD10-UG, describes the HSD10 PARAMS Command Utility command set in more detail, including information on allowed parameters and qualifiers. Table 4-5 summarizes this command set and indicates default parameter values.

Table 4-5 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 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-	

Command	Description	Parameter/Default (if applicable)
	board serial port.	
FORMAT	Initiates the disk drive format utility.	
HELP	Outputs a command utility help screen.	
INITIALIZE STRIPESE'	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.	
SET CONTROLLER ❶	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

Command	Description	Parameter/Default (if applicable)
		/POWER_ON_RESET = ON
SET STRIPESET	Divides a stripeset into up to eight partitions.	
SET UNIT	Sets various device-specific configuration values.	/CACHE = (Set) /DISCONNECT = (Set) /FAST_SEARCH /IMMEDIATE = (Set) /OFFLINE /ONLINE = (Set) /SHORT_TMARK = (Set) /SPINDOWN = (Set) /SYNC = 10 (MB/sec) /TAGGING = (Set) /TRUNCATE = (Set) /WRPROT /NOCACHE /NODISCONNECT /NOFAST_SEARCH = (Set) /NOIMMEDIATE /NO_SHORT_TMARK /NOSPINDOWN /NOTAGGING /NOTRUNCATE /NOWRPROT = (Set)
SHOW ALL	Combines all the HSD10's SHOW commands into one display.	
SHOW CLUSTER	Displays the status of all nodes in the DSSI cluster.	
SHOW CONTROLLER	Displays a snapshot of information about the adapter.	
SHOW DEVICES	Combines the displays from the SHOW DISK, SHOW STRIPESETS, SHOW	

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

❶ Rebooting the system hosts is required whenever any SET CONTROLLER parameter is modified.

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.

Using the HSD10 Console Terminal

1. To display and use the console terminal procedures which follow, it is necessary to plug your console terminal directly into the HSD10 console port as follows:
2. Power down the system and remove the cover of the enclosure as described in Chapter 3.
3. Remove your console terminal connector from the system console port (see Figure 2-7).
4. Plug the console terminal connector into the HSD10 console port (see Figure 4-1).
5. Power up the system.

6. Perform the procedures you wish, and reverse the steps above to return to normal console operation.

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>
```

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 = HSD10
211072> SET CONTROLLER/DISK_ALCS = 10
```

In this example, the NODENAME has been changed to HSD10 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.

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.

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>
```

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.

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[TM] 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)

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.

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 4-5. 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>
```

HSD10 Command Utility Maintenance Operations

The HSD10 Command Utility provides 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 the HSD10 presents to the host systems.

Formatting and Qualifying a SCSI Drive

You can format a specified device that is AVAILABLE to the HSD10 adapter 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 Table 4-5 and the *StorageWorks Solutions HSD10 Array Controller User's Guide*, EK-HSD10-UG, 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.

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.

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.

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 DIAx devices (as a result of the HSD10 DEVICE_TYPE parameter set to 'HS' or 'RF'):

- HSD30[TM], HSJ40[TM], 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.

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 HSX00. This identifier can be changed to RA82[TM] or RF72[TM] by setting an HSD10 parameter, DEVICE_TYPE, as described in Table 4-5 and the *StorageWorks Solutions HSD10 Array Controller User's Guide,* EK-HSD10-UG, 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.

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[TM]. 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.

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 power-up 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.

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.

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.

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 4-6 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 4-6 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.

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 4-7 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)
5	SCSI port error (MSB)
6-19	Phase history for SCSI command

Table 4-8 Type 2 Error Log Byte Definitions

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

14	Byte 0 of SCSI Command Descriptor Block
15	Byte 1 of SCSI Command Descriptor Block
16	Byte 2 of SCSI Command Descriptor Block
17	Byte 3 of SCSI Command Descriptor Block
18	Byte 4 of SCSI Command Descriptor Block
19	Byte 5 of SCSI Command Descriptor Block

Table 4-9 Type 3 Error Log Byte Definitions

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

Table 4-10 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 time-out
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 time-out
800D	Illegal disconnect; target disconnected during data-out, data-in or message-out phase
800E	Hung bus time-out; 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 time-out
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 time-out
8020	Reserved
8021	Illegal (reserved) SCSI phase

Table 4-11 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

5
Troubleshooting

Introduction

This chapter describes initial and general troubleshooting as well as the error beep codes.

☞ Refer to the documentation supplied with additional options if you are experiencing problems with specific options that you have installed.

Initial Troubleshooting

To troubleshoot your VAX 4000 Model 108 system initially, follow this procedure:

1. Check that the power indicator is on.
2. Check the power indicator on the terminal.
3. Make sure that all cables and connections are secure.
4. Press the Halt/Reset button. If your system fails to boot, turn it off, wait 20 seconds, and turn it back on.
5. Contact your Digital service representative or service provider for software- or hardware-related problems by calling 1-800-354-9000 or 1-800-DIGITAL.

NOTE

If you need to return a failed component, pack it in its original container and return it to Digital Equipment Corporation or to your service provider.

General Troubleshooting

Table 5-1 through Table 5-3 list how to identify and solve problems that could occur with your system, disk drive, and terminal.

Table 5-1 System Troubleshooting

Problem	Possible Cause	Action
Power indicator not on.	System is not plugged in.	Turn off the system, plug it in, and then turn it back on again.
	No power at the wall outlet.	Use another wall outlet.
	Power supply failure.	Contact your service representative.
	Internal power supply cables not reconnected after installing options.	Reconnect cables.
	The overload protection circuitry of the power supply may have shut down because of abnormal condition on the power line.	Turn the system off, then turn it back on.

Problem	Possible Cause	Action
Power is on, but there is no screen display.	Brightness and contrast controls are not correctly set.	Adjust the brightness and contrast controls.
	Terminal is off.	Turn on the terminal.
	Terminal cable or power cord is incorrectly installed.	Check all terminal connections: ensure that the terminal is connected to port 3.
	Fuse may be blown on the terminal.	Replace the fuse.
	Terminal settings may be incorrect.	Check the terminal settings; see terminal documentation.
		Try another terminal.
	Terminal is defective.	Replace the terminal.
	Port to which the terminal connects may be faulty.	Try connecting the terminal to another system. If this solution works, the port to which the terminal was connected is faulty. If the terminal still does not operate, it is faulty. In either case, contact your Digital services representative.
	The terminal cable may be faulty.	Connect the cable to another system and terminal. If that terminal now does not work, the cable is faulty. Contact your Digital services representative for a new one.
	The break/enable switch is in the wrong position.	Turn off the system. Set the break/enable switch (inside the system on the system board) to the down position, then turn the system on.

Problem	Possible Cause	Action
The power up test display contains unexpected characters.	The terminal settings are incorrect, or the console circuitry is faulty.	Make sure the settings are correct, then run the power-up test again. If the terminal is set correctly, and trouble persists, contact your Digital services representative.
The system fails to boot the operating system.	The system defaults are incorrectly set.	Set the system defaults as described in the OpenVMS Factory Installed Software User Guide, then try booting the system again. If the system fails to boot, contact your Digital services representative.
No response to keyboard commands.	Keyboard is not connected.	Connect the keyboard to the keyboard port.

Table 5-2 Disk Drive Troubleshooting

Problem	Possible Cause	Action
Hard disk drive cannot read or write information	Incorrect disk drive jumper settings.	Refer to the disk drive installation instructions.
	Loose or incorrectly installed cables.	Make sure all cables are correctly installed.
	SCSI hard disk drive is not correctly formatted or partitioned.	Format and partition as required using the supplied operating system.

Table 5-3 Terminal Troubleshooting

Problem	Possible Cause	Action
Terminal power indicator is not on.	Terminal is turned off.	Turn on the terminal.
	Power cord is not connected.	Connect the power cord to the system or a wall outlet.
	No power at wall outlet.	Use another outlet.
	Power indicator is defective.	Contact your service representative or Digital Equipment Corporation.
Distorted, rolling, or flickering screen display, or wrong or uneven color	Terminal incorrectly adjusted.	Adjust accordingly.
	Wrong type of terminal.	Try another terminal.
	Defective terminal.	Try another terminal.
	Terminal signal cable incorrectly installed.	Straighten any bent connector pins and then reconnect the terminal.

6
Diagnostic Tests and Commands

There are a number of diagnostic tests and commands that can help you to isolate a problem with the system unit. These tests and commands are as follows:

- Power-up tests
- Diagnostic self-tests and utilities. You can use these tests and commands in privileged console mode only if the console security feature is enabled and the password is set.
- Configuration display
- Error display

Power-Up Tests

The system runs the power-up tests each time you turn on the system. If the system passes the tests, it responds with a display similar to the following example:

```
KA57-A V1.0, VMB 2.16  ❶
Performing normal system tests. ❷
74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..
58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43..
42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..
26..25..24..23..22..21..20..19..18..17..16..15..14..13..12..11..
10..09..08..07..06..05..04..03..
Tests completed.❸

>>> ❹
```

❶ Central Processing Unit (CPU) Name, Firmware Version Number, and Virtual Memory Boot (VMB) Version Number

❷ Read-Only Memory (ROM) based diagnostics countdown

❸ Status Message

❹ Console Prompt

The following is a typical example of a failed test. In this case, test E8 failed testing a SYNC (COMM) option.

```
KA57-A  V1.0, VMB 2.16

Performing normal system tests.

74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..

58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43..

42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..

26..25..24..23..22..21..20..19..18..17..16..15..14..13..12..11..

10..09..


? Test_Subtest_E8_03  Loop_Subtest=00  Err_Type=FF   DE_SYNC.lis

Vec=0000  Prev_Errs=0001   P1=09000001   P2=00000000   P3=00000000  P4=00000000

P5=00000000  P6=00000000   P7=00000000   P8=00000000   P9=00000000 P10=00000000

Stat=0112  FRU=20 LED=00  Ext_Stat 00090014 00EE001D 00020002 0000EFCE 00000000

 20040000 7FDEDFFF 00000000

 dser=0000 cesr=00000000 intmsk=00 icsr=01 pcsts=F800 pcctl=FC13 cctl=00000021

 bcetsts=0000 bcedsts=0000 cefsts=00019220 nests=00 mmcdsr=01111000

 mesr=00006000


08..07..06..05..04..03..


Normal operation not possible.

>>>
```

Diagnostic Self-Tests and Utilities

Self-tests perform the same tests as the power-up tests except for one difference; the power-up tests test all the devices in the system, whereas the self-tests allow you to test a single device.

Execution of the SHOW CONFIG command produces the display showing the failure of the device DZ, shown as follows.

```
>>>SHOW CONF

KA57-A V1.0, VMB 2.16
08-00-2B-2B-16-91
64MB

TstNbr  DevNam      Info
------  --------    -------------------------
     0    CPU_BD    OK
    A8    MEMORY    OK
    E4        DZ    ?? 001 0048 ❶
    E0      SCSI    OK
                    3-RZ28D   4-RRD45   6-Adapter
    5F        NI    OK
    5C      DSSI    OK
     0      QBUS    OK
    E8      COMM    OK
                    DSW41/42 2 CHANNEL V3.11-47
    EC     ASYNC    OK
                    DHW41/2 V1.6
>>>
```

❶ Listing showing failure of DZ

If you encounter an error in the power-up test display or the show configuration display, follow these specific steps:

1. Make sure that all the required cables and terminators are securely connected to the proper ports.
2. Run the self-test on each device that failed.

In the example in this section, the show configuration display shows the DZ device has failed. The self-test number for this device is E4. See. Test E4 should be run by entering **T E4** at the console prompt. If the error remains, show the test results to your Digital services representative.

To obtain a listing of the specific tests for the desired device, enter the command shown in the following display.

```
>>> T 9E

Test
#   Address   Name               Parameters
_____________________________________________________________________________
    20052200  SCB
    20055850  De_executive
30  2006A53C  Memory_Init_Bitmap *** mark_Hard_SBEs ******
31  2006AB34  Memory_Setup_CSRs  *********
32  2005D148  NMC_registers      **********
33  2005D324  NMC_powerup        **
34  2005E6D8  SSC_ROM            ***
35  2005FB90  B_Cache_diag_mode  bypass_test_mask *********
37  20061590  Cache_w_Memory     bypass_test_mask *********
40  2006B5E0  Memory_count_pages First_set Last_set1 Soft_errs_allowed *****
41  20068CEC  Board_Reset        *
42  20061880  Chk_for_Interrupts **********
46  200610C4  P_Cache_diag_mode  bypass_test_mask *********
47  2006AD04  Memory_Refresh     start_a end incr cont_on_err time_seconds *****
48  2006B028  Memory_Addr_shorts start_add end_add * cont_on_err pat2 pat3 ****
4A  2006A23C  Memory_ECC_SBEs    start_add end_add add_incr cont_on_err ******
4B  2006940C  Memory_Byte_Errors start_add end_add add_incr cont_on_err ******
4C  20069BA0  Memory_ECC_Logic   start_add end_add add_incr cont_on_err ******
4D  20068FE8  Memory_Address     start_add end_add add_incr cont_on_err ******
4E  20069188  Memory_Byte        start_add end_add add_incr cont_on_err ******
4F  2006B7F4  Memory_Data        start_add end_add add_incr cont_on_err ******
```

```
51  2005803C  FPA                *********
52  20058530  SSC_Prog_timers    which_timer wait_time_us ***
53  20058818  SSC_TOY_Clock      repeat_test_250ms_ea Tolerance ***
54  20057C18  Virtual_Mode       ********
55  20058E6C  Interval_Timer     *****
58  20065D24  SHAC_RESET         dssi_bus port_number time_secs not_pres *
59  20062778  SGEC_LPBCK_ASSIST  time_secs **
5C  20062D10  SHAC               SHAC_number *********
5F  200619B8  SGEC               environment no_ram_tests ******
62  20058B1C  console_QDSS       mark_not_present selftest_r0 selftest_r1 *****
63  20058CA4  QDSS_any           input_csr selftest_r0 selftest_r1 ******
80  2005D3C0  CQBIC_memory       bypass_test_mask *********
81  200596CC  Qbus_MSCP          IP_csr ******
82  200598AC  Qbus_DELQA         device_num_addr ****
83  2005A85C  QZA_Intlpbck1      controller_number ********
84  2005BF1C  QZA_Intlpbck2      controller_number *********
85  20059A9C  QZA_memory         incr test_pattern controller_number *******
86  20059F44  QZA_DMA            Controller_number main_mem_buf ********
90  20058494  CQBIC_registers    *
91  20058410  CQBIC_powerup      **
99  2005DC4C  Flush_Ena_Caches   dis_flush_VIC dis_flush_BC dis_flush_PC
9A  20063FB0  INTERACTION        pass_count disable_device *******
9B  20068E48  Init_memory        **
9C  2006631C  List_CPU_registers *
9D  2006C250  Utility            Flags *********
9E  2005903C  List_diagnostics   script_number *
9F  200681CC  Create_A0_Script   **********
C1  20057888  SSC_RAM_Data       *
C2  20057A78  SSC_RAM_Data_Addr  *
C5  200589E8  SSC_registers      *
C6  20057AD4  SSC_powerup      *********
D0  20060C70  V_Cache_diag_mode  bypass_test_mask *********
D2  2005DE90  O_Bit_diag_mode    bypass_test_mask *********
DA  2006139C  PB_Flush_Cache     **********
DB  2005E850  Speed              print_speed *********
DC  2006C060  NO_Memory_present  *
DD  2005F0DC  B_Cache_Data_debug start_add end_add add_incr *******
```

```
DE  2005EC64  B_Cache_Tag_Debug  start_add end_add add_incr *******
DF  2005E2A8  O_BIT_DEBUG        start_add end_add add_incr seg_incr ******
E0  2006D4D4  SCSI               environment reset_bus time_s *******
E1  2006D7CC  SCSI_Utility       environment util_nbr target_ID lun ******
E2  2006DA2C  SCSI_MAP           bypass_test addr_incr_data_tst ********
E4  2006DFC8  DZ                 environment ********* ❶
E8  2006E1DC  SYNC               environment *********
E9  2006E2B4  SYNC_Utility       environment *********
EC  2006E398  ASYNC              environment *********

Scripts
#   Description

A0  User defined scripts
A1  Powerup tests, Functional Verify, continue on error, numeric countdown
A3  Functional Verify, stop on error, test # announcements
A4  Loop on A3 Functional Verify
A6  Memory tests, mark only multiple bit errors
A7  Memory tests
A8  Memory acceptance tests, mark single and multi-bit errors, call A7
A9  Memory tests, stop on error
B2  Extended tests plus BF, then loop
B5  Extended tests, then loop
BF  DZ, SYNC, ASYNC with loopbacks

Load & start system exerciser
100 Customer mode, 2 passes
101 CSSE mode, 2 passes
102 CSSE mode, continous until ^C
103 Manuf mode, continous until ^C
104 Manuf TINA mode, continous until ^C
105 Manuf mode, 2 passes
106 CSSE mode, select tests, continous until ^C
107 Manuf mode, select tests, continous until ^C
```

❶ Specific test for the DZ device

NOTE

Tests 101 through 107 are reserved for use by Digital services.

The tests and utilities shown in the following table are for option cards, which may or may not be present, depending upon the options you ordered.

Table 6-1 Option Card Tests

Test	Name	Usage
E8	SYNC	Synchronous COMM option card (DSW41/42/43)
E9	SYNC_Utility	Synchronous COMM option card (DSW41/42/43)
EC	ASYNC	Asynchronous option card (DHW41/42)
F0	SCSI_option	SCSI option card for 2nd SCSI bus B (KZDDA)
F1	SCSI_Opt_Utility	SCSI option card for 2nd SCSI bus B (KZDDA)
F2	SCSI_MAP_Option	SCSI option card for 2nd SCSI bus B (KZDDA)

To run the diagnostic tests, enter either **TEST** or **T** followed by the test number.

You can specify optional parameters for some tests, but you would not do so normally. If you decide to specify optional parameters, then the following conditions apply:

- Each test uses up to 10 parameters, no more than 7 may be inputted on a command line.

  Most of these parameters are assigned values automatically by the system. These parameters are indicated by an asterisk (*) in the parameters column of (t9e).

- If a parameter can be assigned a value, the name of the parameter is shown in the parameters column in (t9e).

  You can use test 9E with the test number as a parameter to show a list of legal parameters and valid values for the test number. For example, enter **T 9E 30** to show a list of legal parameters and valid values for test number 30 (Memory_Init_Bitmap).

- There is a dependency between some tests.
- Failures can occur if dependencies between tests are not followed.

- Any parameter not entered is given a default value. Enter **T 9E nn**, where nn is test number to show defaults. During power-up testing or execution of any script of tests (A0 to BF), the values of parameters are determined by the script, not defaults.
- You may dump the contents of a script by entering **T 9E nn**, where nn is a script to dump. Scripts are always in range of A0 to BF (or 0 for the power-up script).

You must enter three zeros (0) as place holders for the three parameters that occur before the user-specified parameter, **mark_hard_SBEs**. The last value (1) is a parameter. You can then specify the **mark_hard_SBEs** parameter in the Memory_Init_Bitmap

test as follows:

>>> **T 30 0 0 0 1**

The resulting messages differ, depending on the function of the test or utility. However, most failing tests cause the system to display error messages similar to the following:

>>> T 5F 1

```
? Test_Subtest_5F_18  Loop_Subtest=0E  Err_Type=FF   DE_SGEC.lis

Vec=010C  Prev_Errs=0000   P1=00000001   P2=00000000   P3=827DFF03  P4=00000000

P5=00000000  P6=00000000   P7=00000000   P8=00000001   P9=00000000 P10=00000000

r0=00000054  r1=000082E2   r2=00000001   r3=000082FA   r4=00008230  r5=00000040

r6=000082E2  r7=20008000   r8=00008000   r9=20140758  r10=13000001 r11=2014044B

 EPC=2005721A dser=0000 cesr=00000000 icsr=01 pcsts=F800 pcctl=FC13

 cctl=00000007 bcetsts=03A0 bcedsts=0400 cefsts=00019200 nests=00

 mmcdsr=00C6C600 mesr=00006000


>>>
```

Write down the error messages before you contact your Digital services representative.

Power-Up Error Messages

The following are examples of some error messages at power-up.

Example 1

The following is a typical example of a failed test. In this case, test E8 failed testing a SYNC (COMM) option.

```
KA57-A V1.0, VMB 2.16
Performing normal system tests.
74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..
58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43..
42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..
26..25..24..23..22..21..20..19..18..17..16..15..14..13..12..11..
10..09..

? Test_Subtest_E8_03  Loop_Subtest=00  Err_Type=FF   DE_SYNC.lis
Vec=0000  Prev_Errs=0001   P1=09000001   P2=00000000   P3=00000000  P4=00000000
P5=00000000  P6=00000000   P7=00000000   P8=00000000   P9=00000000 P10=00000000
Stat=0112  FRU=20 LED=00  Ext_Stat 00090014 00EE001D 00020002 0000EFCE 00000000
 20040000 7FDEDFFF 00000000
 dser=0000 cesr=00000000 intmsk=00 icsr=01 pcsts=F800 pcctl=FC13 cctl=00000021
 bcetsts=0000 bcedsts=0000 cefsts=00019220 nests=00 mmcdsr=01111000
 mesr=00006000

08..07..06..05..04..03..

Normal operation not possible.
>>>
```

Example 2

The following example represents a case where an additional set of memory SIMMs was added and one of the four SIMMs for the set was not the same type of SIMM as the others. In this example the SIMM installed in J8 of the SIMM carrier in the CPU. J4 is a different size than the others in J7, J6, and J5.

```
KA57-A V1.0, VMB 2.16
```

```
Performing normal system tests.

71..70..69..68..67..66..65..64..63..62..61..60..59..58..57..56..

55..54..53..52..51..50..49..48..47..46..45..44..43..42..41..40..

39..38..37..36..35..34..33..32..31..


Memory configuration error.


? Test_Subtest_40_09  Loop_Subtest=00  Err_Type=FF
DE_Memory_count_pages.lis


30..29..28..27..26..25..24..23..22..21..20..19..18..17..16..15..

14..13..12..11..10..09..08..07..06..05..04..03..


Memory Set 0: 00000000 to 03FFFFFF, 64MBs, 131072 good pages, 0 bad pages

        Set 0 on SIMM_carrier_J4  (J5...)  (J6...)  (J7...)  (J8 ??) ❶

Memory Set 1: 00000000 to 07FFFFFF, 128MBs, 262144 good pages, 0 bad pages
        Set 1 on SIMM_carrier_J4  (J1...)  (J2...)  (J3...)  (J4...)

Total of 192MBs, 393216 good pages, 0 bad pages, 7 reserved pages

Tests completed.

>>>
```

❶ Indicates no memory SIMM installed here or SIMM not correctly installed.

Example 3

The following example represents a case where the SIMM installed in J7 of the carrier installed in J4 of the CPU is bad. In this example SIMM J7 is defective.

```
KA57-A V1.0, VMB 2.16
```

```
    Performing normal system tests.
    74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..
    58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43..
    42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..
    26..25..24..23..22..

    ? Test_Subtest_40_06  Loop_Subtest=00  Err_Type=FF   DE_Memory_count_pages.lis

    21..20..19..18..17..16..15..14..13..12..11..10..09..08..07..06..
    05..04..03..

Memory Set 0: 00000000 to 07FFFFF, 128MBs, 0 good pages, 262144 bad pages
           Set 0 on SIMM_carrier_J4  (J5...)  (J6...)  (J7 ??) ❶  (J8...)

Memory Set 1: 08000000 to 07FFFFFF, 128MBs, 262144 good pages, 0 bad pages
           Set 1 on SIMM_carrier_J4  (J1...)  (J2...)  (J3...)  (J4...)

Total of 256MBs, 393216 good pages, 0 bad pages, 7 reserved pages
Normal Operation not possible.
```

❶ Indicates the SIMM in J7 is defective.

Example 4

The following example represents a case where all SIMMs of a set are missing or incorrectly installed. There is no usable memory for testing to run to completion. All the SIMMs are missing here.

```
KA57-A V1.0, VMB 2.16
Performing normal system tests.
71..70..69..68..67..66..65..64..63..62..61..60..59..58..57..56..55..54..53..
```

```
? Test_Subtest_DC_02  Loop_Subtest=00  Err_Type=FF   DE_NO_Memory_present.lis
Vec=0000  Prev_Errs=0000   P1=EF42EF42   P2=00000000   P3=00000000  P4=00000000
P5=00000000  P6=7F337F7F   P7=00000000   P8=0000EF42   P9=00000001 P10=2006B8D8
r0=00000002  r1=21018000   r2=00000008   r3=00000007   r4=03FFFFE0  r5=80000000
r6=FFFFFFFF  r7=00000000   r8=00000000   r9=20140758  r10=FFFFFFFE r11=FFFFFFFF
 dser=0000 cesr=00000000 intmsk=00 icsr=01 pcsts=FA00 pcadr=FFFFFFF8 pcctl=FC13
 cctl=00000020 bcetsts=0360 bcedsts=0F00 cefsts=00019200 nests=00
 mmcdsr=00666640 mesr=00000000
Normal operation not possible.
```

Example 5

The following example represents a case where only one of the four SIMMs is installed in Set 1.

```
KA57-A V1.0, VMB 2.16
Performing normal system tests.
71..70..69..68..67..66..65..64..63..62..61..60..59..58..57..56..
55..54..53..52..51..
?  Test_Subtest_30_05  Loop_Subtest=01  Err_Type+FF  DE_Memory_Init_Bitmap.lis
Vec=0054     Prev_Errs=00  P1=00000000  P2=00000000  P3=00300000  P4=0700001
P5=07070707  P6=00300000  P7=09D1D000  PP8=80033A00  P9=01000000  P10=2006A8D6
r0=FFFFFFFE  r1=00300000  r2=21018008  r3=00000001  r4=FFFFFFFF  r5=00000001
r6=FFFFFFFE  r7=21018048  r8=00000000  r9=20140758  r10=00000000  r11=201404B
 EPC=2006A4C9  Lis_Add=01Dd  dser=0000 cesr+0000  intmsk=00  icsr=01  pcsts=F800
 pcct1=FC00  cctl=00000006  bcetsts=0000  cefts=001523A
 cefadr=00F00000  nests=00  mmcdsr=09D1D000  mesr=00033000

Memory set 1: 00000000 to 00FFFFFF, 16MBs, 0 good pages, 32768 bad pages
    Set 1 on SIMM_carrier_J4   (J1...)  (J2 ??) ❶ (J3 ??) ❶ (J4 ??) ❶
```

```
Total of 16 Mbs, 0 good pages, 32768 bad pages, 7 reserved pages
Normal operation not possible.
```

❶ These SIMMS are missing or defective.

Example 6

The following example represents a case where there are two SIMM carriers installed, and one SIMM is defective or not installed on one of the carriers.

```
KA57-A V1.0, VMB 2.16
Performing normal system tests.
71..70..69..68..67..66..65..64..63..62..61..60..59..58..57..56..
55..54..53..52..51..50..49..48..47..46..45..44..43..42..41..40..
39..38..37..36..35..34..33..32..31..
?  Test_Subtest_40_06  Loop_Subtest=00  Err_Type+FF  DE_Memory_count_pages.lis

30..29..28..27..26..25..24..23..22..21..20..19..18..17..16..15.
14..13..12..11..10..09..08..07..06..05..04..03..

Memory set 1: 00000000 to 00FFFFFF, 64MBs, 131072 good pages, 0 bad pages
    Set 1 on SIMM_carrier_J4   (J1...)  (J2...)  (J3...)  (J4...)
Memory set 2: 04000000 to 0BFFFFFF, 128MBs, 0 good pages, 262144 bad pages
    Set 2 on SIMM_carrier_J1   (J5...)  (J6...)  (J7 ??) ❶  (J8...)
Memory set 3: 0C000000 to 13FFFFFF ,  128MBs, 262144 good pages, 0 bad pages
    Set 3 on SIMM_carrier_J1   (J1...)  (J2...)  (J3...)  (J4...)

Total of 320MBs, 393216 good pages, 262144 bad pages, 15 reserved pages
Tests completed.
```

❶ The SIMM on J7 of the SIMM carrier installed in J1 of the CPU is defective or not installed.

Configuration Display

The configuration display shows the system configuration and the error messages that were detected while the most recent power-up tests, diagnostic tests, and utilities were running. If you add expansion boxes to the system and do not run the power-up tests or appropriate diagnostic test or utility, the configuration display does not recognize the reconfiguration.

Enter the following command to see the configuration display:

```
>>> Show CONFIG
```

If the system does not detect any errors in the most recent power-up tests or diagnostic utilities, it responds with a configuration display similar to the following:

```
KA57-A V1.0, VMB 2.16

08-00-2B-2B-16-91
64MB
❶       ❷          ❸

TstNbr  DevNam      Info

------  --------    --------------------------

     0    CPU_BD    OK

    A8       MEM    OK

    E4        DZ    OK

    E0      SCSI    OK

                    3-RZ28D   4-RRD45   6-Adapter  ❹

    5F        NI    OK

    5C      DSSI    OK
    0      QBUS    OK
    E8      COMM    OK
                    DSW41/42 2 CHANNEL V3.11-47
    EC     ASYNC    OK
```

```
                    DHW41/2 V1.6
>>>
```

❶ Test Utility Number Column

❷ Device Mnemonic Column

❸ Device Status Column

❹ SCSI IDs and SCSI Device Names

The test numbers listed identify the normal test or script number to run to verify the device listed. There are additional tests and utilities for some devices. Test 0 calls the power-up script.

NOTE

The lines for F0, E8 and EC display only if the applicable option is present.

If the system detects errors in the most recent power-up tests and diagnostic utilities, it responds with a configuration display similar to the following:

```
KA57-A V1.0, VMB 2.16
08-00-2B-2B-16-91
64MB

TstNbr  DevNam      Info
------  --------    -------------------------
     0    CPU_BD    OK
    A8    MEMORY    OK
    E4        DZ    ?? 001 0048  ❶
    E0      SCSI    OK
                    3-RZ28D   4   RRD45   6-Adapter
    5F        NI    OK
```

```
    E8      COMM    OK
                    DSW41/42 2 CHANNEL V3.11-47
    EC     ASYNC    OK
                    DHW41/2 V1.6
>>>
```

❶ Error Information -- Write down this information before you contact your Digital services representative.

Error Display

You can use the error display to display certain errors detected during the last power-up test or diagnostic utility. To see the error display, enter the following command:

```
>>>  SHOW ERROR
```

The system responds with a display similar to the following:

```
?? 001    CPU_BD  0000
         B_Cache  Test_35  Subtest_33  Loop_sub_27  Error_type_FF
            NVAX  Test_54  Subtest_00  Loop_sub_01  Error_type_FF

?? 001        DZ  0030
010 0001 00000031 00000020 00000000 00000002 00000000 0000F1F0
                  Test_E4  Subtest_02  Loop_sub_00  Error_type_FF

?? 020      COMM  0112
005 0014 001E001E 0F0F0311 01010002 00000000 0008001E 80000002 00000000
```

Write down this information before you contact your Digital Services representative.

Contacting Digital Services

If you have followed the procedures in this chapter but the problem remains unsolved, your Digital services representative can help you. Before you place your call, follow these steps:

1. Write down a description of the problem, including the error messages and the number of the tests or utilities that failed.
2. Look at the status LED display on the back of the system unit and write down the numbers of the LEDs that are lit.
3. List the steps you took to correct the problem as well and their results.
4. Write down the serial and model numbers of the system unit and any connected peripheral devices. These numbers are usually printed on a label on the back of the device.

Equipment Log

For your convenience, Appendix G includes a form on which you may record all model numbers and serial numbers for your hardware components (system unit, terminal, keyboard) and system hardware configuration information (CPU, memory size, drive size, ports, and so on).

A

Console Commands

This appendix describes the console commands that you can enter when the system is in console mode.

Entering Console Mode

To use the console commands, the system must be in *console mode*. To enter console mode, you must shut down the operating system software if it is running. Follow these steps to enter console mode.

1. Shut down the operating system software if it is running. See the operating system documentation for information on the shutdown procedures.
2. Press the halt button on the front of the system.
3. The system displays the console prompt (>>>) when it is in console mode.

Console Commands

If the console security feature is enabled and a security password is set, you must log in to privileged console mode before using most of these commands. See Appendix B for information on the console security feature.

The following sections describe all the console commands, give the command format, and describe the significance of each parameter. The *VAX Software Handbook* contains a detailed description of each command and its parameters and qualifiers.

BOOT

The BOOT command initializes the processor and executes the VMB (virtual memory block) program. The VMB program tries to boot the operating system from the specified device or list of devices, or from the default boot device if none is specified. The console qualifies the bootstrap operation by passing a boot flags bitmap to the VMB program in R5.

Format:

BOOT [qualifier-list] [{boot_device},{boot_device},...]

If you do not enter either the qualifier or the device name, the default value is used. Explicitly stating the boot flags or the boot device overrides, but does not permanently change, the corresponding default value.

When specifying a list of boot devices (up to 32 characters, with devices separated by commas and no spaces), the system checks the devices in the order specified and boots from the first one that contains bootable software.

NOTE

If you include the Ethernet device, EZA0, in a string of boot devices, it must be placed only as the last device of the string. The system continuously tries to boot from EZA0.

Set the default boot device and boot flags using the SET BOOT and SET BFLAG commands. If you do not set a default boot device, the processor times out after 30 seconds and continuously tries to boot from the Ethernet device, EZA0. To disable the autoboot feature, use three periods in place of the device name for the SET BOOT command (SET BOOT...).

Qualifiers:

Command specific:

/R5:{boot_flags}	A 32-bit hexadecimal value passed to the VMB program in R5. The console does not interpret this value. Use the SET BFLAG command to specify a default boot flags longword. Use the SHOW BFLAG command to display the longword.
>(/{boot_flags}	Same as /R5:{boot_flags})
[device_name]	A character string of up to 32 characters. When specifying a list of boot devices, the device names should be separated by commas and no spaces. Apart from checking the length, the console does not interpret or validate the device name. The console converts the

string to uppercase, then passes VMB a string descriptor to this device name in R0. Use the SET BOOT command to specify a default boot device or list of devices. Use the SHOW BOOT command to display the default boot device. The factory default device is the Ethernet device, EZA0.

Appendix C lists the boot devices supported by the VAX 4000 Model 108 system.

Examples:

```
>>> SHOW BOOT
DKA300
>>> SHOW BFLAG
00000000
>>> B     !Boot using default boot flags and device.
(BOOT/R5:0 DKA300)

  2..
-DKA300
```

CONTINUE

The CONTINUE command causes the processor to begin instruction execution at the address currently contained in the program counter (PC). This address is the address stored in the PC when the system enters console mode or the address that the user specifies using the DEPOSIT command. The CONTINUE command does not perform a processor initialization. The console enters I/O mode.

Format:

CONTINUE

Example:

```
>>> CONTINUE
$           !OpenVMS DCL prompt
```

DEPOSIT

The DEPOSIT command deposits data into the address specified. If you do not specify an address space or data size qualifier, the console uses the last address space and data size used in a DEPOSIT, EXAMINE, MOVE, or SEARCH command. After processor

initialization, the default address space is physical memory, the default data size is longword, and the default address is zero. If you specify conflicting address space or data sizes, the console ignores the command and issues an error message.

Format:

DEPOSIT [qualifier-list] {address} {data} [data...]

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /G, /I, /M, /P, /V, /U

Arguments:

{address}	A longword address that specifies the first location into which data is deposited. The address can be an actual address or a symbolic address.
{data}	The data to be deposited. If the specified data is larger than the deposit data size, the firmware ignores the command and issues an error response. If the specified data is smaller than the deposit data size, the data is extended on the left with zeros.
[{data}]	Additional data to be deposited (as many as can fit on the command line).

Examples:

```
>>> D/P/B/N:1FF 0 0              ! Clear first 512 bytes of
                                 ! physical memory.
>>> D/V/L/N:3 1234 5             ! Deposit 5 into four longwords
                                 ! starting at virtual memory address
                                 ! 1234.
>>> D/N:8 R0 FFFFFFFF            ! Loads GPRs R0 through R8 with -1.
>>> D/L/P/N:10/ST:200 0 8        ! Deposit 8 in the first longword of
                                 ! the first 17 pages in physical
                                 ! memory.


>>> D/N:200 - 0                  ! Starting at previous address, clear
                                 ! 513 longwords or 2052 bytes.
```

EXAMINE

The EXAMINE command examines the contents of the memory location or register specified by the address. If no address is specified, + is assumed. The display line consists of a single character address specifier, the physical address to be examined, and the examined data.

EXAMINE uses the same qualifiers as DEPOSIT. However, the /WRONG qualifier causes EXAMINE to ignore ECC errors when reading from physical memory. The EXAMINE

command also supports an /INSTRUCTION qualifier that disassembles the instructions at the current address.

Format:

EXAMINE [qualifier-list] [address]

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /G, /I, /M, /P, /V, /U

Command specific:

/INSTRUCTION	Disassembles and displays the VAX MACRO--32 instruction at the specified address.

Arguments:

>([{address}]	A longword address that specifies the first location to be examined. The address can be an actual or a symbolic address. If no address is specified, + is assumed.

Examples:

```
>>> EX PC                          ! Examine the PC.
  G 0000000F FFFFFFFC
>>> EX SP                          ! Examine the SP.
  G 0000000E 00000200
>>> EX PSL                         ! Examine the PSL.
  M 00000000 041F0000
>>> E/M                            ! Examine PSL another way.
  M 00000000 041F0000
>>> E R4/N:5                       ! Examine R4 through R9.
  G 00000004 00000000
  G 00000005 00000000
  G 00000006 00000000
  G 00000007 00000000
  G 00000008 00000000
  G 00000009 801D9000

>>> EX PR$_SCBB                    !Examine the SCBB, IPR 17
  I 00000011 2004A000                            ! (decimal).
```

```
>>> E/P 0                          ! Examine local memory 0.
  P 00000000 00000000

>>> EX /INS 20040000               ! Examine 1st byte of ROM.
  P 20040000   11 BRB     20040019

>>> EX /INS/N:5 20040019           ! Disassemble from branch.
  P 20040019   D0 MOVL    I^#20140000,@#20140000
  P 20040024   D2 MCOML   @#20140030,@#20140502
  P 2004002F   D2 MCOML   S^#0E,@#20140030
  P 20040036   7D MOVQ    R0,@#201404B2
  P 2004003D   D0 MOVL    I^#201404B2,R1
  P 20040044   DB MFPR    S^#2A,B^44(R1)

>>> E/INS                          ! Look at next instruction.
  P 20040048   DB MFPR    S^#2B,B^48(R1)
>>>
```

FIND

The FIND command searches main memory, starting at address zero for a page-aligned 128K-byte segment of good memory, or a restart parameter block (RPB). If the command finds the segment or RPB, its address plus 512 is left in SP (R14). If it does not find the segment or RPB, the console issues an error message and preserves the contents of SP. If you do not specify a qualifier, /RPB is assumed.

Format:

FIND [qualifier-list]

Qualifiers:

Command specific:

/MEMORY	Searches memory for a page-aligned block of good memory, 128K bytes in length. The search checks only memory that is deemed usable by the bitmap. This command leaves the contents of memory unchanged.
/RPB	Searches all physical memory for an RPB. The search does not use the bitmap to qualify which pages are checked. The command leaves the contents of memory unchanged.

Examples:

```
>>> EX SP                    ! Check the SP.
  G 0000000E 00000000
>>> FIND /MEM                ! Look for a valid 128 Kbytes.
>>> EX SP                    ! Note where it was found.
  G 0000000E 00000200
>>> FIND /RPB                ! Check for valid RPB.
?2C FND ERR 00C00004          ! None to be found here.
>>>
```

HALT

The HALT command has no effect. It is included for compatibility with other VAX consoles.

Format:

HALT

Example:

>>> **HALT** ! Pretend to halt.

>>>

HELP

The HELP command gives information about command syntax and usage.

Format:)

HELP

Example:

>>> HELP

Following is a brief summary of all the commands supported by the console:

UPPERCASE denotes a keyword that you must type in
| denotes an OR condition
[] denotes optional parameters
<> denotes a field specifying a syntactically correct value
.. denotes one of an inclusive range of integers
... denotes that the previous item may be repeated

Valid qualifiers:

```
    /B /W /L /Q /INSTRUCTION
    /G /I /V /P /M
    /STEP: /N: /NOT
    /WRONG /U

  Valid commands:
    BOOT [[/R5:]<boot_flags>] [<boot_device>]
    CONFIGURE
    CONTINUE
    DEPOSIT [<qualifiers>] <address> <datum> [<datum>...]
    EXAMINE [<qualifiers>] [<address>]
    FIND [/MEMORY | /RPB]
    HALT
    HELP
    INITIALIZE
    LOGIN
    MOVE [<qualifiers>] <address> <address>
    NEXT [<count>]
    REPEAT <command>
    SEARCH [<qualifiers>] <address> <pattern> [<mask>)]
    SET BFLG <boot_flags>
    SET BOOT <boot_device>
    SET HALT <0..4 |DEFAULT|RESTART|REBOOT|HALT|RESTART_REBOOT>
    SET HOST/DUP/DSSI/BUS:<0..1> <node_number> [<task>]
    SET HOST/DUP/UQSSP </DISK|/TAPE> <controller_number> [<task>]
    SET HOST/DUP/UQSSP <physical_CSR_address> [<task>]
    SET HOST/MAINTENANCE/UQSSP/SERVICE <controller_number>
    SET HOST/MAINTENANCE/UQSSP <physical_CSR_address>
    SET LANGUAGE <1..15>)
```

```
   SET PSE <0..1 | DISABLED | ENABLED>
   SET PSWD <password>
   SET RECALL <0..1 | DISABLED | ENABLED>
   SET SCSI_ID <0..7>
   SHOW BFLG
   SHOW BOOT
   SHOW CONFIG
   SHOW DEVICE
   SHOW DSSI
   SHOW ETHERNET
   SHOW HALT
   SHOW LANGUAGE
   SHOW MEMORY
   SHOW PSE
   SHOW QBUS
   SHOW RECALL
   SHOW RLV12
   SHOW SCSI
   SHOW SCSI_ID
   SHOW TRANSLATION <physical_address>
   SHOW UQSSP
   SHOW VERSION
   START <address>
   TEST [<test_code>) [<parameters>]]
   UNJAM
   X <address> <count>
>>>
```

INITIALIZE

The INITIALIZE command performs a processor initialization.

Format:

INITIALIZE

The following registers are initialized:

Register	State at Initialization
PSL	041F0000
IPL	1F
ASTLVL	4
SISR	0
ICCS	Bits <6> and <0> clear; the rest are unpredictable
RXCS	0
TXCS	80
MAPEN	0
Caches	Flushed
Instruction buffer	Unaffected
Console previous reference	Longword, physical, address 0
TODR	Unaffected
Main memory	Unaffected
General registers	Unaffected
Halt code	Unaffected
Bootstrap-in-progress flag	Unaffected
Internal restart-in-progress flag	Unaffected

The firmware clears all error status bits and initializes the following:

- CDAL bus timer
- Address decode and match registers
- Programmable timer interrupt vectors

- QUART LPR register is set to 9600 baud

Example:

```
>>> INIT
>>>
```

LOGIN

Allows you to put the system in privileged console mode. When the console security feature is enabled and when you put the system in console mode, the system operates in unprivileged console mode. You can access only a subset of the console commands. To access the full range of console commands, you must enter this command. This command may only be executed in secure console mode.

The format of this command is as follows:

LO[GIN]

When you enter the command, the system prompts you for a password as follows:

```
Password:
```

You must enter the current console security password. If you do not enter the correct password, the system displays the error message, ILL PSWD. When you enter the console security password, the system operates in privileged console mode. In this mode, you can use all the console commands. The system exits from privileged console mode when you enter one of the following console commands:

BOOT

CONTINUE

HALT

START

MOVE

The MOVE command copies the block of memory starting at the source address to a block beginning at the destination address. Typically, this command has an /N qualifier so that blocks of data are transferred. The destination correctly reflects the contents of the source, regardless of the overlap between the source and the data.

The MOVE command performs byte, word, longword, and quadword reads and writes to moving the data efficiently. The MOVE command supports physical and virtual address spaces only.

Format:

MOVE [qualifier-list] {src_address} {dest_address}

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /V, /U, /P

Arguments:

{src_address}	A longword address that specifies the first location of the source data to be copied.
{dest_address}	A longword address that specifies the destination of the first byte of data. These addresses may be an actual address or a symbolic address. If no address is specified, + is assumed.

Examples:

```
>>> EX/N:4 0              ! Observe destination.
P 00000000 00000000
P 00000004 00000000
P 00000008 00000000
P 0000000C 00000000
P 00000010 00000000

>>> EX/N:4 200             ! Observe source data.
P 00000200 58DD0520
P 00000204 585E04C1
P 00000208 00FF8FBB
P 0000020C 5208A8D0
P 00000210 540CA8DE

>>> MOV/N:4 200 0          ! Move the data.

>>> EX/N:4 0               ! Observe moved data.
```

```
P 00000000 58DD0520
P 00000004 585E04C1
P 00000008 00FF8FBB
P 0000000C 5208A8D0
P 00000010 540CA8DE
>>>
```

NEXT

The NEXT command executes the specified number of macro instructions. If no count is specified, 1 is assumed. After the last macro instruction is executed, the console reenters console I/O mode.

Format:

NEXT {count}

The console implements the NEXT command using the trace trap enable and trace pending bits in the PSL and the trace pending vector in the SCB.

The console enters the Spacebar Step Mode. In this mode, pressing the spacebar initiates each single step, and a carriage return forces a return to the console prompt. The following restrictions apply:

- If memory management is enabled, the NEXT command works only if the first page in SSC RAM is mapped in S0 (system) space.
- Overhead associated with the NEXT command affects the execution time of an instruction.
- The NEXT command elevates the IPL to 31 for long periods of time (milliseconds) while single-stepping over several commands.
- Unpredictable results occur if the macro instruction being stepped over modifies either the SCBB or the trace trap entry. This means that you cannot use the NEXT command with other debuggers. You must validate PR$_SCCB before using the NEXT command.

Arguments:

{count}	A value representing the number of macro instructions to execute.

Examples:

```
>>> DEP 1000 50D650D4              ! Create a simple program.
>>> DEP 1004 125005D1
>>> DEP 1008 00FE11F9
```

```
>>> EX /INSTRUCTION /N:5 1000          ! List it.
  P 00001000   D4 CLRL    R0
  P 00001002   D6 INCL    R0
  P 00001004   D1 CMPL    S^#05,R0
  P 00001007   12 BNEQ    00001002
  P 00001009   11 BRB     00001009
  P 0000100B   00 HALT
>>> DEP PR$_SCBB 200                  ! Set up a user SCBB...
>>> DEP PC 1000                       ! ...and the PC.
>>>
>>> N                                 ! Single step...
  P 00001002   D6 INCL    R0          ! SPACEBAR
  P 00001004   D1 CMPL    S^#05,R0    ! SPACEBAR
  P 00001007   12 BNEQ    00001002    ! SPACEBAR
  P 00001002   D6 INCL    R0          ! CR
>>> N 5                               ! ...or multiple step the program.
  P 00001004   D1 CMPL    S^#05,R0
  P 00001007   12 BNEQ    00001002
  P 00001002   D6 INCL    R0
  P 00001004   D1 CMPL    S^#05,R0
  P 00001007   12 BNEQ    00001002
>>>  N 7
  P 00001002   D6 INCL    R0
  P 00001004   D1 CMPL    S^#05,R0
  P 00001007   12 BNEQ    00001002
  P 00001002   D6 INCL    R0
  P 00001004   D1 CMPL    S^#05,R0
  P 00001007   12 BNEQ    00001002
  P 00001009   11 BRB     00001009
>>>  N
  P 00001009   11 BRB     00001009
>>>
```

REPEAT

The REPEAT command repeatedly displays and executes the specified command. Press Ctrl/C to stop the command. You can specify any valid console command except the REPEAT command.

Format:

REPEAT {command}

<p>

Arguments:

{command}	A valid console command other than REPEAT.

Examples:

```
>>>  REPEAT EX PR$_TODR  !Watch the clock.
  I 0000001B 5AFE78CE
  I 0000001B 5AFE78D1
  I 0000001B 5AFE78FD
  I 0000001B 5AFE7900
  I 0000001B 5AFE7903
  I 0000001B 5AFE7907
  I 0000001B 5AFE790A
  I 0000001B 5AFE790D
  I 0000001B 5AFE7910
  I 0000001B 5AFE793C
  I 0000001B 5AFE793F
  I 0000001B 5AFE7942
  I 0000001B 5AFE7946
  I 0000001B 5AFE7949
  I 0000001B 5AFE794C
  I 0000001B 5AFE794F
  I 0000001B 5^C
>>>
```

SEARCH

The SEARCH command finds all the occurrences of a pattern and reports the addresses where the pattern was found. If the /NOT qualifier is present, the command reports all addresses in which the pattern did not match.

Format:

SEARCH [qualifier-list] {address} {pattern} [{mask}]

SEARCH accepts an optional mask that indicates bits to be ignored (don't care bits). For example, to ignore bit 0 in the comparison, specify a mask of 1. The mask, if not present, defaults to 0.

A match occurs if (pattern and not mask) = (data and not mask),

where:

Pattern is the target data

Mask is the optional don't care bitmask (which defaults to 0)

Data is the data at the current address

SEARCH reports the address under the following conditions:

/NOT Qualifier	Match Condition	Action
Absent	True	Report address
Absent	False	No report
Present	True	No report
Present	False	Report address

The address is advanced by the size of the pattern (byte, word, longword, or quadword), unless it is overridden by the /STEP qualifier.

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /P, /V, /U

Command specific:

/NOT	Inverts the sense of the match.

Arguments:

{start_address}	A longword address that specifies the first location subject to the search. This address can be an actual address or a symbolic address. If no address is specified, + is assumed.
{pattern}	The target data.

[{mask}] A mask of the bits that the comparison checks for.

Examples:

```
>>> DEP /P/L/N:1000 0 0                ! Clear some memory.
>>>
>>> DEP 300 12345678                   ! Deposit some search data.
>>> DEP 401 12345678
>>> DEP 502 87654321
>>>
>>> SEARCH /N:1000 /ST:1 0 12345678    ! Search for all occurrences
  P 00000300 12345678                 ! of 12345678 on any byte
  P 00000401 12345678                 ! boundary.  Then try
>>> SEARCH /N:1000 0 12345678          ! longword boundaries.
  P 00000300 12345678                 ! Search for all nonzero
>>> SEARCH /N:1000 /NOT 0 0            ! longwords.
  P 00000300 12345678
  P 00000400 34567800
  P 00000404 00000012
  P 00000500 43210000
  P 00000504 00008765
>>> SEARCH /N:1000 /ST:1 0 1 FFFFFFFE  ! Search for odd-numbered
                                       ! longwords on any boundary.
  P 00000502 87654321
  P 00000503 00876543
  P 00000504 00008765
  P 00000505 00000087
>>> SEARCH /N:1000 /B 0 12             ! Search for all occurrences
  P 00000303 12                       ! of the byte 12.
  P 00000404 12
>>> SEARCH /N:1000 /ST:1 /w 0 FE11     ! Search for all words that
>>>                                    ! could be interpreted as
>>>                                    ! a spin (10$: brb 10$).
>>>                                    ! Note that none were found.
```

SET

The SET command sets the parameter to the value you specify.

Format:

SET {parameter} {value}

Parameters:

BFLAG	Sets the default R5 boot flags. The value must be a hexadecimal number of up to eight digits.
BOOT	Sets the default boot device. The value must be a valid device name or list of device names as specified in the BOOT command description.
DSSI_ID	Sets the bus number to 0 or 1, and the DSSI ID to a number in the range from 0 to 7
HALT	Sets the user-defined halt action. Acceptable values are the keywords "default", "restart", "reboot", "halt", "restart_reboot", or a number in the range 0 to 4 inclusive.
HOST	Makes a DUP connection to a DSSI device.
LANGUAGE	Sets the console language and keyboard type. If the current console terminal does not support the multinational character set (MCS), then this command has no effect and the console message is displayed in English. Values are 1 to 15, as follows:

- 1 -- Dansk
- 2 -- Deutsch (Deutschland/Österreich)
- 3 -- Deutsch (Schweiz)
- 4 -- English (United Kingdom)
- 5 -- English (United States/Canada)
- 6 -- Español
- 7 -- Français (Canada)
- 8 -- Français (France/Belgique)
- 9 -- Français (Suisse)
- 10 -- Italiano
- 11 -- Nederlands
- 12 -- Norsk
- 13 -- Português
- 14 -- Suomi
- 15 -- Svenska

PSE	Allows you to enable or disable the console security feature of the system. The SET PSE command accepts the following values: 0 -- Console security disabled 1 -- Console security enabled When the console security feature is enabled, only a subset of the console commands are available to the user. These commands are listed in. To enable the complete set of console commands once the console security feature is enabled, you must use the LOGIN command.
PSWD	Allows you to set or change the console security password..
RECALL	Sets command recall state to either ENABLED (1) or DISABLED (0).
SCSI_ID	Sets the SCSI ID of the SCSI controller to a number in the range 0 to 7. The SCSI ID of the SCSI controller is set to 6 before the system is shipped. Use Ax to change the on-board SCSI controller ID, or Bx to change the optional SCSI controller ID.

Qualifiers: Listed in the parameter descriptions above.

Examples:

```
>>>
>>> SET BFLAG 220
>>>
>>> SET BOOT DKA300
>>>
>>> SET LANGUAGE 5
>>>
>>> SET HALT RESTART
>>>
```

SHOW

The SHOW command displays the console parameter you specify.

Format:

SHOW {parameter}

Parameters:

BFLAG	Displays the default R5 boot flags.
BOOT	Displays the default boot device.
CONFIG	Displays a list of the devices and optional modules present in the system and the status of the hardware.❶ **See the CAUTION below.**
DEVICE	Displays all devices in the system.
DSSI	Shows the status of all nodes that are on the DSSI bus. For each node on the DSSI bus, the console displays the node number, the node name, and the boot name and type of the device, if available. The command does not indicate the "bootability" of the device. The node that issues the command reports a node name of *. The device information is obtained from the media type field of the MSCP command GET UNIT STATUS. In the case where the node is not running or is not capable of running an MSCP server, then no device information is displayed
DSSI_ID	Shows the values of the DSSI ID(s)
ETHERNET	Displays the system hardware Ethernet address.
HALT	Shows the user-defined halt action.
LANGUAGE	Displays console language and keyboard type.
MEMORY	Displays main memory configuration board by board.
PSE	Displays the condition of the console security feature of the system.
QBUS	Displays all Q22-bus I/O addresses that respond to an aligned word read, and speculative device name information. For each address, the console displays the address in the VAX I/O space in hex, the address as it would appear in the Q22-bus I/O space in octal, and the word data that was read in hex. This command may take several minutes to complete. Press CTRL/C to terminate the command. During execution, the

	command disables the scatter-gather map.
RECALL	Shows the current state of command recall, either ENABLED or DISABLED.
RLV12	Displays all RL01 and RL02 disks that appear on the Q22-bus.
UQSSP	Displays the status of all disks and tapes that can be found on the Q22-bus that support the UQSSP protocol. For each such disk or tape on the Q22-bus, the firmware displays the controller number, the controller CSR address, and the boot name and type of each device connected to the controller. The command does not indicate whether the device contains a bootable image. This information is obtained from the media type field of the MSCP command GET UNIT STATUS. The console does not display device information if a node is not running (or cannot run) an MSCP server.
SAVED_STATE	Displays the values of non-volatile console parameters, such as BOOT, BFLG, and SCSI_ID.
SCSI	Shows any SCSI devices in the system (disk drives, or compact disc drives, for example).
SCSI_ID	Shows the SCSI ID of the SCSI controller(s).
TRANSLATION	Shows any virtual addresses that map to the specified physical address. The firmware uses the current values of page table base and length registers to perform its search. It is assumed that page tables have been properly built.
VERSION	Displays the current firmware version.

CAUTION

❶ If you enter the CONFIG command, the configuration data is read from memory. Under certain conditions the configuration data in memory may become corrupt. You can correct the corrupted configuration data by running the test A1. See the TEST console command for more information.

Qualifiers: Listed in the previous parameter descriptions.

Examples:

```
>>>
>>> SHOW BFLAG
00000220
>>>
>>> SHOW BOOT
DKA300
>>> SHOW ETHERNET
Ethernet Adapter
-EZA0 (08-00-2B-0B-29-14)
>>>
>>> SHOW HALT
restart
>>>
>>> SHOW LANGUAGE
English (United States/Canada)
>>>
>>> SHOW MEMORY

64 MB RAM, SIMM Set (0A,0B,0C,0D) present
Memory Set 0: 00000000 to 03FFFFFF, 64MB, 131072 good pages, 0 bad pages

64 MB RAM, SIMM Set (1E,1F,1G,1H) present
Memory Set 1: 04000000 to 07FFFFFF, 64MB, 131072 good pages, 0 bad pages

Total of 128MB, 262144 good pages, 0 bad pages, 160 reserved pages
>>>
>>> SHOW TRANSLATION 1000
```

```
 V 80001000
>>>
>>> SHOW VERSION
KA57-A V1.0, VMB 2.16
>>>
```

START

The START command starts instruction execution at the address you specify. If no address is given, the current PC is used. If memory mapping is enabled, macro instructions are executed from virtual memory, and the address is treated as a virtual address. The START command is equivalent to a DEPOSIT to PC, followed by a CONTINUE. It does not perform a processor initialization.

Format:

START [{address}]

Arguments:

[address]	The address at which to begin execution. This address is loaded into the user's PC.

Example:

>>> **START 1000**

TEST

The TEST command invokes a diagnostic test program specified by the test number. If you enter a test number of 0 (zero), all tests that are allowed to be executed from the console terminal are executed. The console accepts an optional list of up to five additional hexadecimal arguments.

You can see a full listing of all the tests by running test 9E.

Format:

TEST [{test_number} [{test_arguments}]]

Arguments:

{test_number}	A two-digit hexadecimal number specifying the test to be executed. Test 9E displays a full list of all the available tests and their parameters.
{test_arguments}	Up to five additional test arguments. These arguments are accepted, but the console cannot interpret them.

Example:

```
>>>TEST 0

KA57-A V1.0, VMB 2.16
Performing normal system tests.
74..73..72..71..70..69..68..67..66..65..64..63..62..61..60..59..
58..57..56..55..54..53..52..51..50..49..48..47..46..45..44..43..
42..41..40..39..38..37..36..35..34..33..32..31..30..29..28..27..
26..25..24..23..22..21..20..19..18..17..16..15..14..13..12..11..
10..09..08..07..06..05..04..03..
Tests completed.

>>>
```

Example:

```
>>>
>>>             ! Display the CPU registers.
>>>
>>>T 9C

  savpc=20048C68 savpsl=20048C68    sbr=03FA0000    slr=00003040
   p0br=80000000   p0lr=00182000   p1br=00000000   p1lr=00000000
    sid=13001401    sie=03020801  mapen=00000000
   tcr0=00000000   tir0=00000000  tnir0=00000000  tivr0=00000078
   tcr1=00000001   tir1=02AF768E  tnir1=0000000F  tivr1=0000007C
    bdr=3FFB08FF  ssccr=00D05070   scbb=20053400
DZ  csr=0020        tcr=0008        msr=0F75
    scr=0000D000   dser=00000000  qbear=0000000F   dear=00000000
  qbmbr=03FF8000   ipcr=0000
nicsr0=1FFF0003   3=00004030   4=00004050   5=8039FF00   6=83E0F000  7=00000000
nicsr9=04E204E2  10=00040000  11=00000000  12=00000000  13=00000000 15=0000FFFF
NISA=08-00-2B-29-1C-7A    intmsk=00 intreq=00 scdadr=00000000 scddir=0
SCSI_CSRs 0=00 1=00 2=00 3=00 4=00 6=05 5=05 7=00 8=16 9=5B A=5B B=00 C=04
VIC......icsr=00000001    vmar=000007E0     ecr=000000CA
PC......pcctl=FFFFFC13   pcsts=FFFFF800   pcadr=FFFFFFF8
BC_128K..cctl=00000007 bcetsts=000003E0 bcetidx=FFFFFFE0  bcetag=FFFFFE00
```

```
......bcedsts=00000F00 bcedidx=001FFFF8 bcedecc=00000000
........nests=00000000  neoadr=E0055F70  neocmd=8000FF04  neicmd=000003FF
......nedathi=FFFFFFFF nedatlo=FF7F9FFF  cefsts=00019200  cefadr=E00002C0
MEMORY...mesr=00006000    mear=08406010_____Add=21018040  mmcdsr=01111000
......memcon0=80000005 memcon1=00000007   moamr=00000000     ssr=C0CE
NCA......cesr=00000000  cmcdsr=0000C108   cnear=00000000
.......csear1=00000000  csear2=00000000 cioear1=00000000 cioear2=000002C0
.........iccs=00000000    nicr=FFFFD8F0     icr=FFFFD8F0    todr=00000000
>>>
```

Example:

```
>>>

>>>       ; list diagnostics and scripts

>>>T 9E

Test
#   Address   Name               Parameters
_____________________________________________________________________________
    20053800  SCB
    20054590  De_executive
30  200637BC  Memory_Init_Bitmap *** mark_Hard_SBEs ******
31  20064094  Memory_Setup_CSRs  **********
32  20064464  NMC_registers      **********
33  20064600  NMC_powerup        **
34  2005D0A4  SSC_ROM            ***
35  20067394  B_Cache_diag_mode  bypass_test_mask *********
37  200681C4  Cache_w_Memory     bypass_test_mask *********
40  2006242C  Memory_count_pages SIMM_set0 SIMM_set1 Soft_errs_allowed *****
41  200579C0  Board_Reset        *
42  2005B56C  Chk_for_Interrupts **********
46  200670D4  P_Cache_diag_mode  bypass_test_mask *********
47  20063D7C  Memory_Refresh     start_a end incr cont_on_err time_seconds *****
48  20061558  Memory_Addr_shorts start_add end_add * cont_on_err pat2 pat3 ****
4A  200634E0  Memory_ECC_SBEs    start_add end_add add_incr cont_on_err ******
4B  20061D78  Memory_Byte_Errors start_add end_add add_incr cont_on_err ******
4C  20062E90  Memory_ECC_Logic   start_add end_add add_incr cont_on_err ******
```

```
4D  200613BC  Memory_Address     start_add end_add add_incr cont_on_err ******
4E  20061AF8  Memory_Byte        start_add end_add add_incr cont_on_err ******
4F  20062628  Memory_Data        start_add end_add add_incr cont_on_err ******
51  2005BA5C  FPA                **********
52  2005BED8  SSC_Prog_timers    which_timer wait_time_us ***
53  2005C1A8  SSC_TOY_Clock      repeat_test_250ms_ea Tolerance ***
54  2005B670  Virtual_Mode       ********
55  2005C360  Interval_Timer     *****
58  200602F0  SHAC_RESET         port_number time_secs not_pres
59  2005F584  SGEC_LPBCK_ASSIST  time_secs **
5C  2005FAEC  SHAC               bypass_test_mask *******
5F  2005E870  SGEC               loopback_type no_ram_tests ******
63  2005CF48  QDSS_any           input_csr selftest_r0 selftest_r1 ******
80  200649FC  CQBIC_memory       bypass_test_mask *********
81  2005CBA8  Qbus_MSCP          IP_csr ******
82  2005CD70  Qbus_DELQA         device_num_addr ****
83  20058C70  QZA_Intlpbck1      controller_number ********
84  2005A328  QZA_Intlpbck2      controller_number *********
85  20057EE4  QZA_memory         incr test_pattern controller_number *******
86  200583A0  QZA_DMA            Controller_number main_mem_buf ********
90  2005BE54  CQBIC_registers    *
91  2005BDE8  CQBIC_powerup      **
99  200647D0  Flush_Ena_Caches   dis_flush_VIC dis_flush_BC dis_flush_PC
9A  2005D1DC  INTERACTION        pass_count disable_device ****
9B  20064680  Init_memory        ***
9C  2005D1A8  List_CPU_registers *
9D  2005DEC4  Utility            Modify_CPU_type *********
9E  2005C518  List_diagnostics   script_number *
9F  20060888  Create_A0_Script   **********
C1  20057B90  SSC_RAM_Data       *
C2  20057D68  SSC_RAM_Data_Addr  *
C5  2005E770  SSC_registers      *
C6  20057AD4  SSC_powerup        *********
D0  20066C98  V_Cache_diag_mode  bypass_test_mask *********
D2  20065220  O_Bit_diag_mode    bypass_test_mask *********
DA  20067FE8  PB_Flush_Cache     **********
DB  20065A18  Speed              print_speed *********
```

```
DC  200642BC  NO_Memory_present  *
DD  200661FC  B_Cache_Data_debug start_add end_add add_incr *******
DE  20065DB4  B_Cache_Tag_Debug  start_add end_add add_incr *******
DF  20065614  O_BIT_DEBUG        start_add end_add add_incr seg_incr ******
E0  20068498  SCSI               environment reset_bus time_s *******
E1  20068578  SCSI_Utility       environment util_nbr target_ID lun ******
E2  20068630  SCSI_MAP           bypass_test addr_incr_data_tst ********
E4  200689D4  DZ                environment *********
E8  20068B4C  SYNC              environment *********
E9  20068BF4  SYNC_Utility       environment *********
EC  20068CAC  ASYNC              environment *********

Scripts
#   Description

A0  User defined scripts
A1  Powerup tests, Functional Verify, continue on error, numeric countdown
A3  Functional Verify, stop on error, test # announcements
A4  Loop on A3 Functional Verify
A6  Memory tests, mark only multiple bit errors
A7  Memory tests
A8  Memory acceptance tests, mark single and multi-bit errors, call A7
A9  Memory tests, stop on error
B2  Extended tests plus BF
B5  Extended tests, then loop
BF  DZ, SYNC, ASYNC with loopbacks
>>>

>>>
```

UNJAM

The UNJAM command performs an I/O bus reset, by writing a 1 (one) to IPR 55 (decimal).

Format:

UNJAM

Example:

```
>>>  UNJAM
>>>
```

X -- Binary Load and Unload

The X command is for use by automatic systems communicating with the console. The X command loads or unloads (that is, writes to memory or reads from memory) the specified number of data bytes through the console serial line (regardless of console type) starting at the specified address.

Format:

X {address} {count} CR {line_checksum} {data} {data_checksum}

Arguments:

{address}	The address to unload data from or load data to.
{count}	Indicates whether to load or unload data, and also indicates the amount of data to load or unload.
	If bit 31 of the count is clear, data is received by the console and put into memory. If bit 31 is set, data is read from memory and sent by the console. The remaining bits in the count are a positive number indicating the number of bytes to load or unload.)
CR	The console accepts a load or unload command when it receives the carriage return.
{line_checksum}	The line_checksum is the next byte the console receives. The line_checksum is not echoed.
	The line_checksum is verified by adding all the command characters, including the checksum and separating space, into an 8-bit register initially set to zero. The line checksum does not include the terminating carriage return, rub-outs, or characters deleted by a rub-out. If no errors occur, the result is zero.
	If the line_checksum is correct, the console responds with the input prompt and either sends data to the requester or prepares to receive data.
	If the line_checksum is in error, the console responds with an error message. This prevents the operator from inadvertently entering into a mode where the console accepts characters from the keyboard as data and does not provide an escape mechanism.
{data}\	If the command is a load (bit 31 of the count is clear), the console responds with the input prompt (>>>), then accepts the specified number of bytes of data to be put into memory and an additional

	byte of received data_checksum. The data is verified by adding all data characters and the checksum character into an 8-bit register initially set to zero. If the final content of the register is nonzero, the data or checksum is in error, and the console responds with an error message. If the command is a binary unload (bit 31 of the count is set), the console responds with the input prompt (>>>), followed by the specified number of bytes of binary data. As each byte is sent, it is added to a checksum register initially set to zero. At the end of the transmission, the two's complement of the low byte of the register is sent.
{data_checksum}\	If the data_checksum is incorrect on a load, or if memory or line errors occur during the transmission of data, the entire transmission is completed, and the console issues an error message. If an error occurs during loading, the contents of the memory being loaded are unpredictable.)

The console represses echo while it is receiving the data string and checksums. The console terminates all flow control when it receives the carriage return at the end of the command line to avoid treating flow control characters from the terminal as valid command line checksums.

Controlling the Console Serial Line

You can control the console serial line during a binary unload using the control keys (Ctrl/C, Ctrl/S, Ctrl/O, and so on). You cannot control the console serial line during a binary load, because all received characters are valid binary data. The console has the following timing requirements:

- It must receive data being loaded with a binary load command at a rate of at least 1 byte every 60 seconds.
- It must receive the command checksum that precedes the data within 60 seconds of the carriage return that terminates the command line.
- It must receive the data checksum within 60 seconds of the last data byte.

If any of these timing requirements are not met, then the console aborts the transmission by issuing an error message and returning to the console prompt. The entire command, including the checksum, can be sent to the console as a single burst of characters at the specified character rate of the console serial line. The console is able to receive at least 4K bytes of data in a single X command.

(Comment)

The comment character (an exclamation point) is used to document command sequences. It can be placed anywhere on the command line. All characters following the comment character are ignored.

Format: **!**

Example:

```
>>>! The console ignores this line.
>>>
```

B

Console Security

Console Security Feature

The console security feature allows you to disable most of the system console commands. When the security password is set, there are two types of users: privileged users and unprivileged users. Privileged users know the security password and can use the full range of console commands. Unprivileged users can use only the following commands:

- LOGIN Use this command with the security password to become a privileged user.
- BOOT Use this command without parameters to boot the operating system when the boot device has been set.
- CONTINUE Use this command to return to the operating system after pressing the halt button.

Entering Console Mode

To set the security password, the system must be in *console mode* (indicated by a >>> prompt). To enter console mode, you must shut down the operating system software if it is running. Follow these steps to enter console mode.

1. Shut down the operating system software if it is running. See the operating system documentation for information on the shutdown procedures.
2. Press the halt button on the front of the system.
3. The system displays the console prompt (>>>) when it is in console mode.

Setting the Security Password

The console security feature is disabled when you receive the system. To set the security password on the system, follow these steps:

1. Enter the following command at the console prompt (>>>)

   ```
   >>> SET PSWD
   ```

   The system responds with the following prompt:

   ```
   >>> PSWD1 :
   ```

   Note

   The security password must be a string of *exactly* 16 hexadecimal characters (0 through 9 and A through F).
   Write down the security password and store it in a safe place. If you forget the security password, you must call your Digital services representative to disable the console security feature.

2. Enter the security password and press [Enter]
   The system does not display the security password as you type it. The system responds with the following prompt:

   ```
   >>> PSWD2 :
   ```

3. Verify the password by entering it a second time.
   Again the system does not display the entry. If you have typed the same exact password a second time, the system saves the password in nonvolatile memory. The system will not lose the password in the event that power is turned off.
   If the second security password was not identical to the first, the system responds with the following error message:

   ```
   ?63 ILLEGAL PASSWORD
   >>>
   ```

   Repeat steps 1 to 3 if you see this error message.

Enabling the Console Security Feature

When you have successfully set the security password, you must enable the console security feature to use it. To enable the console security feature, enter the following command at the console prompt:

```
>>> SET PSE 1
```

Enter the following command to check whether you have enabled the console security feature:

```
>>> SHOW PSE
```

If you have enabled the console security feature, the system displays the following message:

```
Enabled
```

Logging in to Privileged Console Mode

When the console security feature is enabled, you must enter the security password to log in to privileged console mode. In privileged console mode you can use the full range of console commands. To log into privileged console mode, follow these steps:

Note

You must set the security password before logging into privileged console mode.

1. Enter the following command:

   ```
   >>> LOGIN
   ```

   The system responds with the following prompt:

   ```
   Password
   ```

2. Enter the security password and press [Enter]

   The system does not display the security password as you type it. If you enter the correct security password, the system returns you to the console prompt as a privileged user, and you can now use the full range of console commands.

   If you enter an incorrect security password, the system responds with the following error message:

   ```
   ?63 ILLEGAL PASSWORD
   >>>
   ```

   Repeat steps 1 and 2 if an error message displays.

Changing the Security Password

You must be a privileged user to change the security password. To change the password, follow these steps:

1. Log in to privileged console mode.
2. Enter the following command at the console prompt (>>>)

   ```
   >>> SET PSWD
   ```

   The system responds with the following prompt:

   ```
   >>> PSWD1 :
   ```

   Note

   The security password must be a string of *exactly* 16 hexadecimal characters (0 through 9 and A through F).
   Write down the security password and store it in a safe place. If you forget the security password, you must call your Digital services representative to disable the console security feature.

3. Enter the security password and press [Enter]

   The system does not display the security password as you type it. The system responds with the following prompt:

   ```
   >>> PSWD2 :
   ```

4. Verify the password by entering it a second time.

   Again the system does not display the entry. If you have typed the same exact password a second time, the system saves the password in nonvolatile memory. The system will not lose the password in the event that power is turned off.
   If the second security password was not identical to the first, the system responds with the following error message:

   ```
   ?63 ILLEGAL PASSWORD
   >>>
   ```

   Repeat steps 1 to 4 if you see this error message.

Disabling the Console Security Feature

Caution

When you disable the console security feature, all users can use the full range of console commands.

To disable the console security feature, follow these steps:

1. Log in to privileged console mode.
2. Enter the following command:

```
>>> SET PSE 0
```

Exiting from Privileged Console Mode

When you exit from privileged console mode, privileged users must enter the LOGIN command with the correct password before they can use the full range of console commands. To exit from privileged console mode, enter one of the following commands:

- `BOOT (with any supplied parameters)`
- `CONTINUE`
- `HALT`
- `START`

C

Setting the Defaults

Setting the Default Boot Device

When the system is shipped, it is set to boot from the system disk, DIA0. This RZ-series disk holds the factory installed software (FIS).

If the TOY battery has discharged, the default boot device may have to be set. Use **SHOW BOOT** to verify.

You can set the system to boot from a different default boot device that holds the operating system software. The following table shows the alternative default boot devices and their associated OpenVMS device names:

Table C-1 Alternate Default Boot Devices

Device	OpenVMS Device Name
Hard disk (DSSI ID 0-6)	DIA*u* ❶
Network (the system boots from a remote system) ❸	EZA0
Tape drive (SCSI ID 0-7) ❸	MKA*x*00 ❷
Compact disc (SCSI ID 0-7)	DKA*x*00 ❷

❶ *u* represents the device unit number.
❷ *x* represents the SCSI ID of that device.
❸ This excludes ID number 6, which is the default controller ID

To set an alternative boot device, enter the SET BOOT command using the OpenVMS device name of the alternative device. For example, to set the system to boot over the network, enter the following command.

```
>>> SET BOOT EZA0
```

Setting the Default Recovery Action

There are five default recovery actions. You can change the default recovery action by entering the SET HALT command and the value or keyword associated with the action you want to set. The following table shows the five default recovery actions and their associated values. When the system is shipped, the default recovery action is set to HALT.

Table C-2 Default Recovery Actions and Associated Values

Recovery Action Keyword	Associated Value	Result
DEFAULT	0	The default recovery action is HALT.
RESTART	1	The system tries to restart the operating system; if it fails to restart the operating system, it halts.
BOOT	2	The system tries to boot; if it fails to boot, it halts.
HALT	3	The system halts and displays the console prompt.
RESTART_REBOOT	4	The system tries to restart the operating system; if it fails to restart the operating system, it tries to boot. If it fails to boot, it halts.

To set an alternative default recovery action, enter the SET HALT command using the value or keyword associated with the recovery action you want to set. For example, to set the system to halt, enter one of the following commands.

```
>>> SET HALT 3
      or
>>> SET HALT HALT
```

D

Setting SCSI IDs

Selecting Available SCSI IDs on the System

Each internal or external SCSI device must have a unique SCSI ID, including all devices in a SCSI expansion box. Devices have default SCSI IDs set at the factory before they are shipped. If the default ID of a device is occupied, you must reset the SCSI ID of the device to an unused ID. See the documentation supplied with the device or expansion box for information on setting the SCSI IDs.

There are eight SCSI IDs, numbered from 0 to 7. Table D-1 lists the recommended SCSI Ids for various devices. To identify which SCSI IDs are not occupied before connecting a new device or an expansion box, use the configuration display.

To see the configuration display, enter the following command:

```
>>> ..SHOW CONFIG
```

The system displays information similar to the following:

```
KA57-A V1.0, VMB 2.16

08-00-2B-2B-16-91

64MB


TstNbr  DevNam      Info

------  --------    --------------------------

     0    CPU_BD    OK

    A8    MEMORY    OK

    E4        DZ    OK
```

```
E0      SCSI    OK
                3-RZ28   4-RRD45   6-Adapter
5F        NI    OK
E8      COMM    OK
                DSW41/42 2 CHANNEL V3.11-47
EC     ASYNC    OK
                DHW41/2 V1.6
```

- The letters OK by the SCSI device indicate that it has passed the power-on test.
- The fifth line down on the table shows the SCSI IDs that are occupied by devices on the SCSI bus. For example, the RZ28 disk drive occupies SCSI ID 3 and the RRD45 drive occupies SCSI ID 7.
- SCSI ID 6 is the default ID for the SCSI bus adapter.

Table D-1 Devices and Priorities Normally Associated with SCSI IDs

SCSI ID	Priority	Devices
1	Lowest	Disk drive
1 to 3	-	Disk drive (SCSI ID 3 is normally the system disk)
4	-	CD-ROM or optical drive
5	-	Tape drive
6	-	SCSI controller
7	Highest	Not used, but available

E

Programming Parameters for DSSI Devices

This appendix describes the console mode procedures for setting and examining parameters for DSSI devices.

Note

Before you reprogram DSSI devices, you should have a good understanding of DSSI architecture and VAXcluster software operation. If you do not have that understanding, you should read the VMS manuals which came with your system or call your Digital service representative.

On VAX 4000 Model 108 systems, an embedded DSSI adapter provides the interface between the CPU and the DSSI storage devices.

The KFDDA-BB daughter card adapter provides a DSSI bus that can support up to eight nodes, where the adapter and each DSSI storage device count as one node, hence each DSSI adapter can support up to seven DSSI storage devices (six DSSI storage devices for a two-system DSSI VAXcluster configuration; five DSSI storage devices for a three-system DSSI VAXcluster configuration). The adapter makes a connection between the CPU and the requested device on the respective DSSI bus. Each DSSI device has its own controller and server that contain the intelligence and logic necessary to control data transfers over the DSSI bus.

Note

On some systems, an optional DSSI daughter card (KFDDA--BB) provides a second DSSI interface, so there are two DSSI buses with the same specifications.

DSSI Device Parameters

Seven principal parameters are associated with each DSSI device:

- Bus Node ID
- ALLCLASS
- UNITNUM
- FORCEUNI
- NODENAME
- SYSTEMID
- DSSI NODE ID

Each of these seven parameters, with the exception of the Bus Node ID, are programmed and examined using the console-based Diagnostic and Utility Program (DUP) driver utility. The Bus Node ID is physically determined by jumpers on the disk drive.

A brief description of each parameter follows.

The Bus Node ID parameter is provided by the jumpers on the disks.

Each DSSI bus can support up to eight nodes, 0--7.

Each DSSI adapter and each device count 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 VAXcluster configuration, up to six devices, 0--5 (with nodes 6 and 7 reserved for the adapters); in a three-system DSSI VAXcluster configuration, up to five devices, 0--4 (with nodes 5, 6, and 7 reserved for the adapters).

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

DSSI devices are shipped from the factory with a default allocation class of zero. Each device to be served to a cluster should have a nonzero allocation class that matches the allocation class of the system.

Refer to the *DSSI VMScluster* guide for rules for specifying allocation class values.

The UNITNUM parameter determines the unit number of the device. By default, the device unit number is supplied by the jumpers on the drives. Systems with multiple DSSI busses, as described later in this section, require that the default values be replaced with unique unit numbers. To set unit numbers and override the default values, you use the console-based DUP driver utility to supply values to the UNITNUM parameter and to set a value of zero to device parameter FORCEUNI.

The FORCEUNI parameter controls the use of UNITNUM to override the default device unit number supplied by the jumpers. When FORCEUNI is set to a value of zero, the operating system uses the value assigned to the UNITNUM parameter; when FORCEUNI is set to a value of one, the operating system uses the value supplied by the jumpers.

The NODENAME parameter allows each device to have an alphanumeric node name of up to eight 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.

The SYSTEMID parameter provides a number that uniquely identifies the device to the operating system. That parameter may need to be modified only when replacing a device. Only Digital service representatives and licensed self-maintenance customers should remove devices.

How VMS Uses the DSSI Device Parameters

This section describes how the operating system uses the parameters to form unique identifiers for each device. Configurations that require you to assign new unit numbers for devices are also described.

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 in the following manner.

NODENAME$DIA*u*

where NODENAME is a unique node name, and *u* is the unit number.

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 in the following manner.

$ALLCLASS$DIA*u*

where ALLCLASS is the allocation class for the system and devices, and

u is a unique unit number.

Figure E-1 illustrates the need to program unit numbers for a system using more than one DSSI bus and a nonzero allocation class. In the case of the nonzero allocation class, the operating system sees three of the integrated storage elements (ISEs) as having duplicate device names, which is an error, as all unit numbers must be unique.

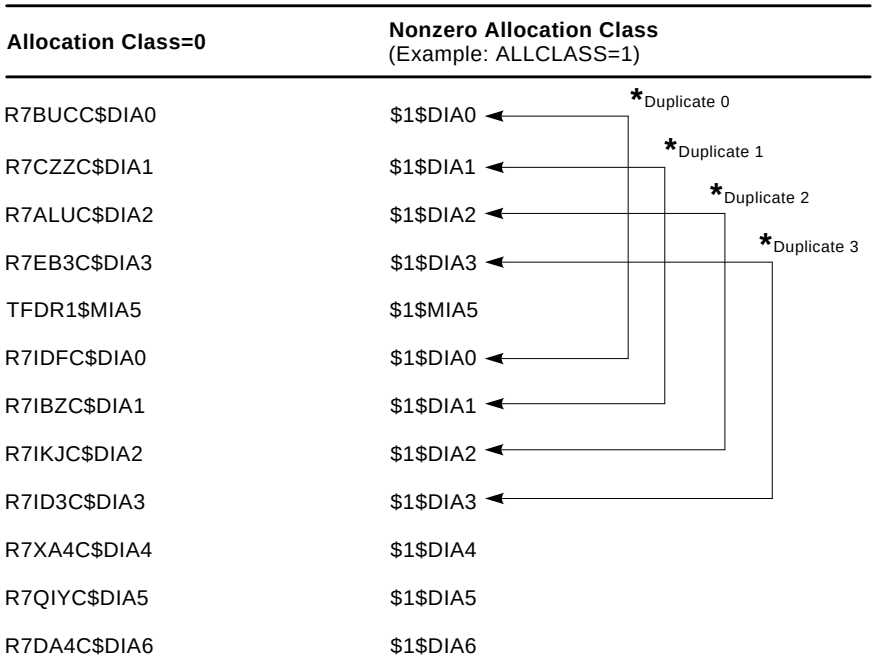

Figure E-1 VMS Operating System Requires Unique Unit Numbers for DSSI

NOTE

You should configure your system to have unique unit numbers even if you have a standalone system using an allocation class of zero. That practice will avoid problems with duplicate device names if you later decide to form a cluster.

Examining and Setting DSSI Device Parameters\Setting_params

The following instructions describe how to change DSSI parameters, using the DUP driver utility. In the example procedures, the allocation class will be set to 2.

1. Enter the console mode.

   The procedure for programming parameters for DSSI devices from console mode requires that you issue commands to those devices at the console prompt >>>. You may enter the commands in either uppercase or lowercase letters. Unless otherwise instructed, enter
   each command, then press Return

   Enter console mode as follows:

   Set the Break Enable/Disable switch on the system console module to the enable position up, position (|)

   Set the Power switch for each unit (both hosts for a dual-host system, and any expanders for expanded systems) to the on position (|).

   Wait for the system to display the console prompt >>>.

2. To display the DSSI devices on embedded DSSI adapters, enter `SHOW DSSI` at the console prompt.
   The firmware displays two lines of information for each device. For embedded DSSI, the firmware displays the following.

   The first line contains the bus number, node number, and node name.

   The second line contains the device name and unit number followed by the device type in parentheses.

   For embedded DSSI, the device name consists of the letters DIA*u* or DIB*u* (MIA*u* or

MIB*u* for the TF-series tape drive). Devices on bus 0 are listed as DIA. The embedded DSSI host is identified by an asterisk (*).

```
>>> SHOW DSSI
DSSI Bus 0 Node 0 (R7ALUC)
-DIA0 (RF72)
DSSI Bus 0 Node 1 (R7EB3C)
-DIA1 (RF72)
DSSI Bus 0 Node 2 (R7EB22)
-DIA2 (RF72)
DSSI Bus 0 Node 5 (TFDR1)
-MIA5 (TU81)
DSSI Bus 0 Node 6 (*)
>>>
```

NOTE

The DUP driver examples throughout this appendix are for RZ-series drives attached to the HSD10 DSSI to SCSI adapter. The displays for the tape drives represent SCSI drives attached to the HSD10.

Entering the DUP Driver Utility

To examine and change DSSI parameters, you must first activate the DUP driver utility by setting host to the specific device for which you want to modify or examine parameters.

Use the following command for embedded DSSI.

```
>>>SET HOST/DUP/DSSI (<node_number>)
```

where (<node_number>) is the bus node ID (0--6) for the device on the bus.

In the following example, <code_example>(SET HOST/DUP/DSSI 0 PARAMS) is entered to start the DUP driver for the ISE at node 0 of embedded DSSI bus 0.

```
>>>SET HOST/DUP/DSSI 0 PARAMS
Starting DUP server...
Copyright (c) 1991  Digital Equipment Corporation
PARAMS>
```

If you wish to examine DSSI bus node 1, enter

```
>>>SET HOST/DUP/DSSI/BUS:1 0 PARAMS
```

Setting the Allocation Class

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

1. At the PARAMS> prompt, enter **SHOW ALLCLASS** to check the allocation class of the ISE to which you are currently connected.
2. Enter **SET ALLCLASS 2** (or enter the allocation class you desire).
3. Enter **SHOW ALLCLASS** to verify the new allocation class.

This example shows the steps for examining and changing the allocation class for a specified device. The allocation class is changed from 0 to 2.

```
PARAMS>SHOW ALLCLASS
Parameter     Current           Default        Type     Radix
--------- ----------------  ----------------  --------  -----
ALLCLASS               0                 0      Byte    Dec  B

PARAMS>SET ALLCLASS 2
PARAMS>SHOW ALLCLASS

Parameter     Current           Default        Type     Radix
--------- ----------------  ---------------  --------  -----
ALLCLASS               2                 0      Byte      Dec B
```

Setting the Unit Number

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

1. At the PARAMS> prompt, enter **SHOW UNITNUM** to check the unit number of the ISE 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.

This shows the steps for changing the unit number of a specified device from 0 to 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
```

6. Label the device with its unit number, using the unit number labels shipped with your system.

Setting the Node Name

After entering the DUP driver 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 ISE 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.

This 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            RF72      String  Ascii  B

PARAMS>SET NODENAME SYSDSK
```

```
PARAMS>SHOW NODENAME

Parameter     Current           Default        Type     Radix
--------- ----------------  ----------------  --------  -----
NODENAME          SYSDSK            RF73     String  Ascii   B
```

Setting the System ID

NOTE

This parameter is modified only when replacing a device. Only Digital service representatives and licensed self-maintenance customers should remove devices. All parameters for the replacement device should be programmed to match those of the original device.

After entering the DUP driver utility for a specified device, you can examine and set the system ID for the device as follows.

1. At the PARAMS> prompt, enter **SHOW SYSTEMID** to check the system ID of the device to which you are currently connected.
2. Enter **SET SYSTEMID *System ID*** (enter the desired serial number-based system ID).
3. Enter **SHOW SYSTEMID** to verify the new system ID.

This shows the steps for changing the system ID of a specified device from the factory-supplied ID to 1402193310841 (the system ID for the replacement device is programmed to match that of the original).

```
PARAMS>SHOW SYSTEMID
Parameter     Current           Default        Type     Radix
--------- ----------------  ----------------  --------  -----
SYSTEMID     0402193310841     0000000000000  Quadword Hex   B

PARAMS>SET SYSTEMID 1402193310841

PARAMS>SHOW SYSTEMID
```

```
Parameter     Current           Default         Type     Radix
--------- ----------------  ----------------  --------  -----
SYSTEMID     1402193310841    0000000000000  Quadword Hex   B
```

Exiting the DUP Server Utility

After you have completed setting and examining DSSI device parameters, 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.

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

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

This shows the procedure for saving parameter changes. The controller is initialized.

```
PARAMS>WRITE
Changes require controller initialization, ok? [Y/(N)]Y
Stopping DUP server...
>>>
```

This example shows the DSSI busses for the embedded DSSI adapters after the unit numbers for the disk devices on bus 0 have been changed from 0, 1, and 2 to 10, 11, and 12. The bus 0 device names are now DIA10, DIA11, and DIA12.

```
>>>SHOW DSSI
DSSI Bus 0 Node 0 (SYSDSK)
-DIA10 (RF72)
DSSI Bus 0 Node 1 (R7EB3C)
-DIA11 (RF72)
DSSI Bus 0 Node 2 (R7EB22)
-DIA12 (RF72)
DSSI Bus 0 Node 5 (TFDR1)
-MIA5 (TU81)
DSSI Bus 0 Node 6 (*)
>>>
```

NOTE

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

F

System Care

Introduction

This appendix describes how to:

- Clean your system, including the outside enclosure, terminal, and keyboard
- Move your system

WARNING

Make sure you turn off the system and disconnect any external devices before cleaning any part of your system. When using a moistened cloth for cleaning, do not allow any excess fluid to leak into the system, keyboard, or terminal. Wait until the system is completely dry before applying power.

Cleaning Your System Unit

Clean the outside of the system periodically with a soft cloth lightly moistened with a mild detergent solution. Do not use solvents or abrasive cleaners.

Cleaning Your Terminal

If the terminal screen gets dirty, clean it with a sponge or chamois lightly dampened with a mild detergent solution. Do not use solvents or abrasive cleaners.

WARNING

If you use a prepackaged screen cleaner, make sure that it is *nonflammable*. Never spray the cleaner directly on the screen. Instead, apply the cleaner to a clean cloth, and then clean the screen.

Cleaning Your Keyboard

Your keyboard keys may get dirty with use. Clean them with a clean cloth that has been lightly dampened with a mild detergent solution.

Moving Your System

Perform the following steps before shipping or moving the system:

1. Back up all files stored on the hard disk drive.
2. Turn off the external peripherals, the system, and the terminal.
3. Disconnect the power cord from the wall outlet and from the back of the system unit.
4. Disconnect the terminal, keyboard, and any other cables from the back of the system unit.
5. Package the system as described in the section on Packing Your System later in this appendix.

WARNING

When packing and moving system components, be aware that some components (such as the system unit or terminal) may be too heavy for you to safely lift alone. If you are doubtful about whether you can lift these items alone, please get assistance.

Packing Your System

If you are moving the system a short distance (for example, from one room to another in the same building), you do not have to pack it. However, if you are shipping the system or moving it by vehicle, pack it in the original packing material and containers. If you did not save the boxes and packing material, use a sturdy carton and cushion the computer well to avoid damage.

Installing Your System at a New Location

After moving the system to a new location, unpack and install it following the installation instructions on the *Installation Information Guid,e* EK-VX108-II.

G

Technical Specifications

Introduction

This chapter lists the hardware specifications of the following:

- System unit
- Internal SCSI devices

System Unit Specifications

The following tables list the specifications for the VAX 4000 Model 108 systems.

Table G-1 System Specifications

Subject	Description
Processor	KA57-AA
Boot and diagnostic firmware ROM	512K bytes
SIMM memory	64 MB or 128 MB base, expandable to 512 MB
Hard disk	RZ28D
Compact disc drive	RRD45
Terminals	Supports the VT series
Interfaces	Standard: one SCSI port, a ThinWire Ethernet port❶, a ThickWire Ethernet port❶, three MMJ ports,one port with modem control. Optional: A second SCSI port, 16 additional asynchronous DEC423 MMJ ports or 8 additional asynchronous ports with modem control, 2

Technical Specifications

Subject	Description
	additional synchronous ports.
Input voltage	Automatically adjusts for proper AC input voltage. See ratings marked on the unit. Range: 100 V ❷ ac to 120 V ac or 220 V ac to 260 V ac
Maximum Inrush Current	40 A ❸ at 110 VAC, 80 A at 220 VAC
Maximum running current (System)	4.3 A at 110 VAC, 2.1 A at 220 VAC.
Maximum running current (Aux Out)	2.0 A at 110 VAC, 1.0 A at 220 VAC.
Maximum power consumption	250 W ❹.
Frequency	49 Hz to 51 Hz.

❶ Both Ethernet types cannot be used simultaneously.

❷ Volts

❸ Amperes

❹ Watts

The following table shows the declared values for the ISO 9296 and ISO 7779 standards. The current values for specific configurations are available from Digital representatives.

Table G-2 Acoustic Levels

Product	Sound Power Level L_{WAd}, B		Sound Pressure Level L_{pAm}, dBA (Operator Position)	
	Idle	Operate	Idle	Operate
Model 108 diskless system enclosure	5.6	5.6	36	36
Per device when installed in system enclosure				
RZ28D	5.9	6.2	40	43
RZ26N	5.9	6.2	40	43
RZ29B	5.9	6.2	40	4.3

NOTE

Current values for specific configurations are available from Digital representatives. 1B=10 dBa.

Table G-3 System Unit Metrics

System Unit	Weight ❶ kg (lb)	Height cm (In)	Width cm (In)	Depth cm (In)
Model 108	15.9 kg (35 lb.)	41 cm (16 in.)	22 cm (8.7in.)	47.5 cm (18.7 in.)

❶ Depends on the configuration. The value shown in this table is a typical value. Values vary depending on the options that you install.

Table G-4 System Operating and Non-operating Conditions

Operating Conditions	Range or Value
Temperature range	10°C (50°F) to 40°C (104°F)
Temperature change rate	11°C (20°F) per hour maximum
Relative humidity	20% to 90% non-condensing
Maximum wet bulb temperature	28°C (82°F)
Minimum dew point	2°C (36°F)
Altitude	3048 m (10,000 ft) at 36°C (96°F)
Nonoperating Conditions (System in Shipping Container) ❶	
Temperature range	--40°C (--40°F) to 66°C (151°F)
Relative humidity	10% to 95% at 66°C (151°F)
Altitude	12,192 m (40 000 ft))
Maximum wet bulb temperature	46°C (115°F)
Minimum dew point	2°C (36°F)

❶ The non-operating conditions are associated with transport and short-term storage (≤60 days).)

Table G-5 AC Power Cords (Country Specific)

Part Number	Country	Voltage	Length meters (feet)	Amps	Plug
BN19P-2E	U.S./Japan	125V	1.9 (6.2)	10	NEMA5-15
BN19H-2E	Australia./ New Zealand	250V	2.5 (8.2)	10	AS 3112 -1981
BN19C-2E	Central Europe	250V	2.5 (8.2)	10	CEE 7/7 Schuko
BN19A-2E	U.K./Ireland	250V	2.5 (8.2)	10	BS 1363
BN19E-2E	Switzerland	250V	2.5 (8.2)	10	SEV 1011
BN19K-2e	Denmark	250V	2.5 (8.2)	10	Afsnit 107
BN24X-2E	Italy	250V	2.5 (8.2)	10	CEI 23-16VII
BN19S-2E	India/South Africa	250V	2.5 (8.2)	10	BS 546
BN18L-2E	Israel	250V	2.5 (8.2)	10	SI 32

H

Equipment Log

Introduction

With the equipment log, you can gather information that you may need if problems occur with your system and you need to call Digital for assistance.

Use the equipment log to record information about your system hardware and software components. Update the equipment log when you add options.

Equipment Log

The log consists of five tables, which you can use to record the following information:

- Your system's hardware components (Table H-1)
- Your SCSI device address settings (Table H-2)
- Your system's system hardware configuration (Table H-3)
- The operating system or application software installed on your VAX 4000 Model 108 system (Table H-4)
- Additional components (Table H-5)

Equipment Log

Table H-1 Hardware Components

Component	Vendor/ Type/Size	Model Number	Serial Number	Date Installed
System unit	Digital VAX 4000			
System unit key number				
Terminal				
Keyboard				
Installed diskette drive				
Additional storage device 1				
Additional storage device 2				
Additional storage device 3				
Additional storage device 4				
Additional storage device 5				

Table H-2 SCSI Address

Device	Address	Device	Address

Table H-3 Hardware Configuration

Component	System Specifics
CPU speed and model	
Firmware version	
Memory size	

Table H-4 Installed Software

Operating System or Application Software	Version Number	License Number	Date Installed

Equipment Log

Table H-5 Additional Component Information

Component	Vendor	Model Number	Serial Number	Date Installed

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