



**AlphaServer DS20E
AlphaStation DS20E
Reference Guide**

Order Number: ER-K8F6W-UA. D01

*This manual is for managers and operators of Compaq
AlphaServer DS20E / AlphaStation DS20E systems.*

Compaq Computer Corporation

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Contents

Prefacexi

Chapter 1 System Overview

1.1 System Enclosures 1-2
1.2 System Parts (Front/Side View)..... 1-4
1.3 System Parts (Rear View)..... 1-6
1.4 Operator Control Panel..... 1-8
1.5 System Board 1-10
1.6 Server Feature Module 1-12
1.7 PCI Slots 1-14
1.8 Power Supplies..... 1-16
1.9 Removable Media Storage..... 1-18
1.10 Hard Disk Drive Storage..... 1-19
1.11 Two-Way Combination Module..... 1-20
1.12 Console Terminal 1-21

Chapter 2 Installing the Pedestal System

2.1 System Dimensions and Service Area..... 2-2
2.2 Power Requirements 2-3
2.3 Shipment Box..... 2-4
2.4 Pedestal Setup 2-5
2.5 System Access 2-6
2.6 Installing a Pedestal Kit..... 2-7

Chapter 3 Installing the Rackmount System

3.1 Rackmount Documentation..... 3-2
3.2 Power Requirements 3-3
3.3 Shipment Box..... 3-4
3.4 Marking the Installation Area 3-5
3.5 Rack Accessories 3-6
3.6 Preparing the System Chassis 3-8
3.7 Preparing the Rack 3-12

3.8	Installing the System Chassis.....	3-16
3.9	Installing the Interlock System	3-18
3.10	Installing the Cable Management Arm	3-20
3.11	Dressing the Cables	3-22
3.12	Attaching the Front Bezel.....	3-24

Chapter 4 Booting and Installing an Operating System

4.1	Setting Boot Options	4-2
4.1.1	auto_action.....	4-3
4.1.2	bootdef_dev	4-5
4.1.3	boot_file.....	4-6
4.1.4	boot_osflags.....	4-7
4.1.5	ei*0_inet_init or ew*0_inet_init.....	4-11
4.1.6	ei*0_protocols or ew*0_protocols.....	4-12
4.2	Booting Tru64 UNIX.....	4-13
4.2.1	Booting Tru64 UNIX over the Network.....	4-16
4.3	Starting a Tru64 UNIX Installation	4-18
4.4	Booting Linux.....	4-20
4.5	Booting OpenVMS.....	4-24
4.6	Booting OpenVMS from the InfoServer	4-26
4.7	Starting an OpenVMS Installation.....	4-28

Chapter 5 Configuring and Installing Components

5.1	Preparing to Install Components.....	5-2
5.2	Removing the Side Cover (Pedestal)	5-3
5.3	Removing the Top Cover (Rackmount)	5-5
5.4	Memory Configuration	5-6
5.4.1	Installing and Removing DIMMs	5-8
5.5	CPU Configuration.....	5-10
5.6	Installing a PCI or ISA Option	5-11
5.6.1	Installing a PCI Option.....	5-12
5.6.2	Installing a Multichannel SCSI Option	5-14
5.7	Installing a Redundant Power Supply	5-16
5.8	Network Configuration	5-18
5.9	Disk Drive Configuration.....	5-20
5.10	Installing Disk Drives.....	5-22
5.10.1	Drive Status LEDs.....	5-24
5.11	Configuring the Storage Subsystem	5-26
5.11.1	Connecting a Four-Slot Subsystem.....	5-26
5.11.2	Installing a Six-Slot Subsystem.....	5-28

5.12	Installing a Tape Drive	5-35
5.13	External SCSI Expansion	5-37
5.14	AlphaBIOS Configuration Utilities.....	5-38
5.15	Updating Firmware	5-41
5.15.1	Sources of Firmware Updates.....	5-42
5.15.2	Updating Firmware from the CD-ROM.....	5-43

Chapter 6 Remote Management Console

6.1	RMC Overview	6-2
6.2	Connecting to RMC	6-3
6.3	Modem Setup	6-4
6.4	Dial-In Procedure.....	6-5
6.5	Halt Assertion	6-7
6.6	RMC Commands	6-8
6.7	RMC Switch Pack	6-14
6.7.1	Changing a Switch Setting	6-16
6.7.2	Resetting the RMC to Factory Defaults.....	6-17
6.8	Troubleshooting	6-18

Chapter 7 Using the SRM Console

7.1	SRM Console Overview	7-2
7.1.1	Invoking the SRM Console	7-4
7.2	Command Summary	7-5
7.3	Getting Help.....	7-10
7.4	Displaying the Configuration.....	7-12
7.5	Displaying the Bootable Devices.....	7-16
7.6	Displaying the Memory Configuration	7-18
7.7	Displaying the Power Status.....	7-19
7.8	Displaying the SRM Console Version	7-20
7.9	Displaying the CPU Status.....	7-21
7.10	Displaying the PALcode Version.....	7-22
7.11	Booting an Operating System	7-23
7.12	Configuring the ISA Bus.....	7-25
7.13	Testing the System.....	7-28
7.14	Starting and Stopping CPUs.....	7-30
7.14.1	halt (or stop).....	7-30
7.14.2	continue	7-30
7.15	Updating Firmware	7-32
7.16	Forcing a System Crash Dump	7-36
7.17	Initializing the System.....	7-37

7.18	Reading a File	7-38
7.19	Configuring a PCI NVRAM Module.....	7-40
7.20	Creating a Power-Up Script.....	7-41
7.21	Loading AlphaBIOS	7-43
7.22	Setting Console Security	7-44
7.22.1	Overview of Secure Mode.....	7-44
7.22.2	Setting the Console Password.....	7-45
7.22.3	Setting the Console to Secure Mode	7-47
7.22.4	Turning Off Security During a Console Session.....	7-48
7.22.5	Returning to User Mode	7-51
7.23	Setting and Viewing Environment Variables	7-52
7.23.1	com*_baud	7-56
7.23.2	console.....	7-57
7.23.3	cpu_enabled	7-58
7.23.4	ei*0_mode or ew*0_mode.....	7-60
7.23.5	kbd_hardware_type	7-61
7.23.6	language.....	7-62
7.23.7	os_type	7-63
7.23.8	pci_parity	7-64
7.23.9	pk*0_fast.....	7-65
7.23.10	pk*0_host_id	7-66
7.23.11	pk*0_soft_term.....	7-67
7.23.12	tt_allow_login.....	7-69

Chapter 8 Troubleshooting

8.1	Error Beep Codes	8-2
8.2	Diagnostic LEDs on OCP	8-3
8.3	Power Problems.....	8-4
8.4	Console-Reported Failures.....	8-5
8.5	Boot Problems	8-6
8.6	Thermal Problems and Environmental Status	8-8
8.7	Operating System Reported Failures	8-9
8.8	Memory Problems	8-10
8.9	PCI Bus Problems	8-11
8.10	SCSI Problems	8-12
8.11	Fail-Safe Booter Utility.....	8-13
8.11.1	Starting the FSB.....	8-13
8.11.2	Preparing Diskettes.....	8-15
8.11.3	Updating Firmware	8-16

Chapter 9 Specifications

9.1	Physical Specifications	9-2
9.2	Environmental Specifications	9-4
9.3	Electrical Specifications	9-5
9.4	Acoustical Data	9-7
9.5	Power Cord Requirements	9-8
9.5.1	General Requirements	9-8
9.5.2	Country-Specific Requirements	9-9

Appendix A Regulatory and Safety Notices

A.1	Class A and Class B Ratings.....	A-1
A.1.1	Class A Device Notices.....	A-2
A.1.2	Class B Device Notices.....	A-4
A.2	Other Safety Notices	A-6
A.2.1	Laser Devices	A-6
A.2.2	Battery Replacement	A-7

Index

Examples

4-1	Booting Tru64 UNIX from a Local SCSI Disk	4-13
4-2	RIS Boot	4-16
4-3	Text-Based Installation Display	4-18
4-4	Linux Boot Output	4-21
4-5	Booting OpenVMS from the Local CD-ROM Drive.....	4-24
4-6	InfoServer Boot	4-26
4-7	OpenVMS Installation Menu	4-28
7-1	Help (or Man).....	7-10
7-2	Show Config	7-12
7-3	Show Device	7-16
7-4	Show Memory.....	7-18
7-5	Show Power.....	7-19
7-6	Show Version	7-20
7-7	Show Cpu	7-21
7-8	Show Pal.....	7-22
7-9	Tru64 UNIX Boot (Abbreviated).....	7-23
7-10	Isacfg	7-25
7-11	Test.....	7-28
7-12	Halt and Continue.....	7-30
7-13	Updating Firmware from Floppy	7-32
7-14	Crash.....	7-36
7-15	Init.....	7-37
7-16	More	7-38
7-17	Prcache.....	7-40
7-18	Editing the Nvram Script	7-41
7-19	Clearing the Nvram Script.....	7-41
7-20	AlphaBIOS	7-43
7-21	Set Password.....	7-45
7-22	Set Secure	7-47
7-23	Login	7-48
7-24	Clear Password	7-51
7-25	Set <i>envar</i> and Show <i>envar</i>	7-52
7-26	User-Created Environment Variable.....	7-52
8-1	Running LFU	8-16

Figures

1-1	DS20E System Variants	1-2
1-2	System Parts	1-4
1-3	Ports and Connectors	1-6
1-4	Control and Status Indicators.....	1-8
1-5	System Board	1-10
1-6	Server Feature Module	1-12
1-7	PCI Slots (Rack Orientation)	1-14
1-8	Power Supplies (Pedestal Orientation)	1-16
1-9	Removable Media Storage.....	1-18
1-10	Four-Slot and Six-Slot Storage Subsystems	1-19
1-11	Combination Module	1-20
1-12	Console Terminal Connections.....	1-21
2-1	System Dimensions	2-2
2-2	Power Supply Requirements.....	2-3
2-3	Unpacking the Shipment	2-4
2-4	Cabling the System	2-5
2-5	System Lock and Key.....	2-6
2-6	Pedestal Kit Contents	2-8
2-7	Installing the Lower Panel.....	2-10
2-8	Installing the Upper Panel	2-12
2-9	Installing the Side Dress Panel	2-13
2-10	Installing the Side Access Cover.....	2-14
2-11	Installing the Door	2-15
3-1	Power Requirements and Connections	3-3
3-2	Rackmount System Shipment Box.....	3-4
3-3	Rackmount Installation Area.....	3-5
3-4	Mounting Hardware.....	3-6
3-5	Attaching Mounting Brackets to Chassis	3-8
3-6	Attaching Slide Brackets to Slides.....	3-10
3-7	Attaching Slide Brackets to Rack Rails	3-12
3-8	Stabilizing the Rack	3-14
3-9	Installing the System into an M-Series Rack	3-16
3-10	Installing Shipping Screws	3-17
3-11	Installing the Interlock System	3-18
3-12	Installing the Cable Management Arm	3-20
3-13	Dressing the Cables	3-22
3-14	Attaching the Front Bezel.....	3-24
5-1	Removing the Side Cover	5-3
5-2	Attaching the Antistatic Wrist Strap.....	5-4

5-3	Removing Top Cover	5-5
5-4	Memory Slot Locations.....	5-6
5-5	Installing DIMMs.....	5-8
5-6	Removing DIMMs	5-9
5-7	PCI Slots (Rack Orientation)	5-11
5-8	Installing a PCI Option.....	5-12
5-9	Multichannel SCSI Installation	5-14
5-10	Adding a Third Supply (Pedestal Orientation)	5-16
5-11	Network Connection.....	5-18
5-12	Installing and Removing Disk Drives	5-22
5-13	Disk Drive LEDs	5-24
5-14	Subsystem Backplane Connections.....	5-26
5-15	Tape Drive Installation	5-35
5-16	AlphaBIOS Boot Screen	5-38
5-17	AlphaBIOS Setup Menu.....	5-39
5-18	Run Maintenance Program Dialog Box	5-40
5-19	Loadable Firmware Update Utility.....	5-41
6-1	RMC Connections.....	6-4
6-2	RMC Switch Pack Defaults	6-14
8-1	LED Patterns During Power-Up (Rack Orientation).....	8-3
8-2	FSB Switch "On" Setting (Rackmount Orientation).....	8-14

Tables

2-1	Pedestal Kit Contents	2-9
3-1	Mounting Hardware Description	3-7
4-1	OpenVMS Boot Flag Settings	4-9
5-1	Four-Slot SCSI ID Orientation	5-20
5-2	Six-Slot SCSI ID Orientation.....	5-21
5-3	Drive Status	5-25
6-1	RMC Command Summary	6-8
6-2	Status Command Fields.....	6-13
6-3	RMC Switch Pack Functions.....	6-15
6-4	Troubleshooting RMC	6-18
7-1	Summary of SRM Console Commands	7-5
7-2	Notation Formats for SRM Console Commands	7-7
7-3	Special Characters for SRM Console	7-8
7-4	Device Naming Conventions	7-16
7-5	PCI Address Assignments.....	7-17
7-6	Environment Variable Summary	7-54
8-1	Error Beep Codes	8-2
8-2	Troubleshooting Power Problems	8-4

8-3	Troubleshooting Console-Reported Failures.....	8-5
8-4	Troubleshooting Boot Problems	8-6
8-5	Operating System Reported Failures	8-9
8-6	Troubleshooting Memory Problems	8-10
9-1	Physical Specifications	9-2
9-2	Environmental Specifications	9-4
9-3	Electrical Specifications	9-5
9-4	Acoustical Data	9-7
9-5	Power Cord Requirements by Country	9-9

Preface

Intended Audience

This manual is for managers and operators of *Compaq AlphaServer DS20E / AlphaStation DS20E* systems.



WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:

1. Remove any jewelry that may conduct electricity.
 2. Wear an anti-static wrist strap when handling internal components.
-

Document Structure

This manual uses a structured documentation design. Topics are organized into small sections, usually consisting of two facing pages. Most topics begin with an abstract that provides an overview of the section, followed by an illustration or example. The facing page contains descriptions, procedures, and syntax definitions.

This manual has nine chapters and one appendix.

- **Chapter 1, System Overview**, describes the components of the system.
- **Chapter 2, Installing the Pedestal System**, gives procedures for setting up the pedestal system.
- **Chapter 3, Installing the Rackmount System**, gives procedures for installing the rack-mountable system into an M-Series cabinet.

Chapter 4, Booting and Installing an Operating System, explains the SRM boot environment variables and gives examples of booting *Tru64 UNIX*, *OpenVMS*, and *Linux*.

Chapter 5, Configuring and Installing Components, shows how to configure and install components such as memory DIMMs and PCI options.

Chapter 6, Remote Management Console, explains how to use the Remote Management Console to monitor and control the system.

Chapter 7, Using the SRM Console, describes the SRM commands and environment variables used to configure the system.

Chapter 8, Troubleshooting, gives basic troubleshooting procedures.

Chapter 9, Specifications, lists the physical, electrical, and environmental specifications for the system.

Appendix A, Regulatory and Safety Notices, supplies the regulatory information for Class A and Class B systems as well as safety notices.

Documentation Titles

Table 1 Documentation

Title	Order Number
DS20E Reference Guide	ER-K8F6W-UA
DS20E Basic Installation	ER-K8F6W-IM
DS20E Processor Upgrade	ER-PD12U-UG
KN311 CPU Installation Card	EK-DSCPU-IN
Memory Option Installation Card	EK-MS340-IN
H9A10/H9A15 Rack-Mounting Template	EK-DS20E-TP
Release Notes	EK-K8F6W-RN

Information on the Internet

Visit the following *Compaq* DS20E Web site for support resources for this system.

http://www.compaq.com/alphaserver/ds_series.html

Information and files for performing firmware updates is available at:

<ftp://ftp.digital.com/pub/Digital/Alpha/firmware/readme.html>

Chapter 1

System Overview

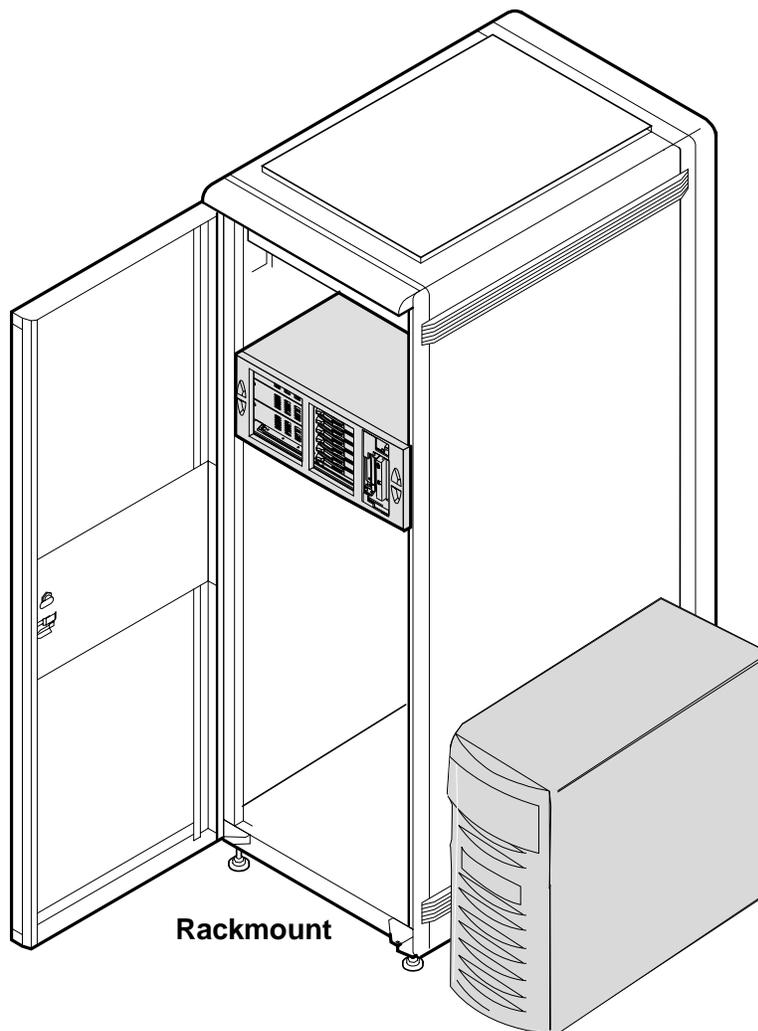
This chapter provides an overview of the *AlphaServer/AlphaStation* DS20E system, including:

- System enclosures
- System parts (front/side view)
- System parts (rear view)
- Operator control panel
- System board
- Server feature module
- PCI slots
- Power supplies
- Removable media storage
- Hard disk drive storage
- Two-way combination module
- Console terminal

1.1 System Enclosures

The DS20E family consists of a standalone pedestal and a rackmount system.

Figure 1-1 DS20E System Variants



Rackmount

Pedestal

CAT0039

Enclosure

The system is housed in an enclosure containing the system board, other logic modules, and two power supplies (maximum of three) with internal fans. The enclosure has bays for internal mass-storage devices, including a combination IDE CD-ROM/floppy disk drive, one available half-height removable bay, and either four 1.6-inch or six 1-inch hot-swap drive bays. An operator control panel includes Power, Reset, and Halt buttons.

The system can be used as a desk-side pedestal in the vertical position, or with the addition of brackets, can be mounted in the horizontal position in a standard rack.

Common Components

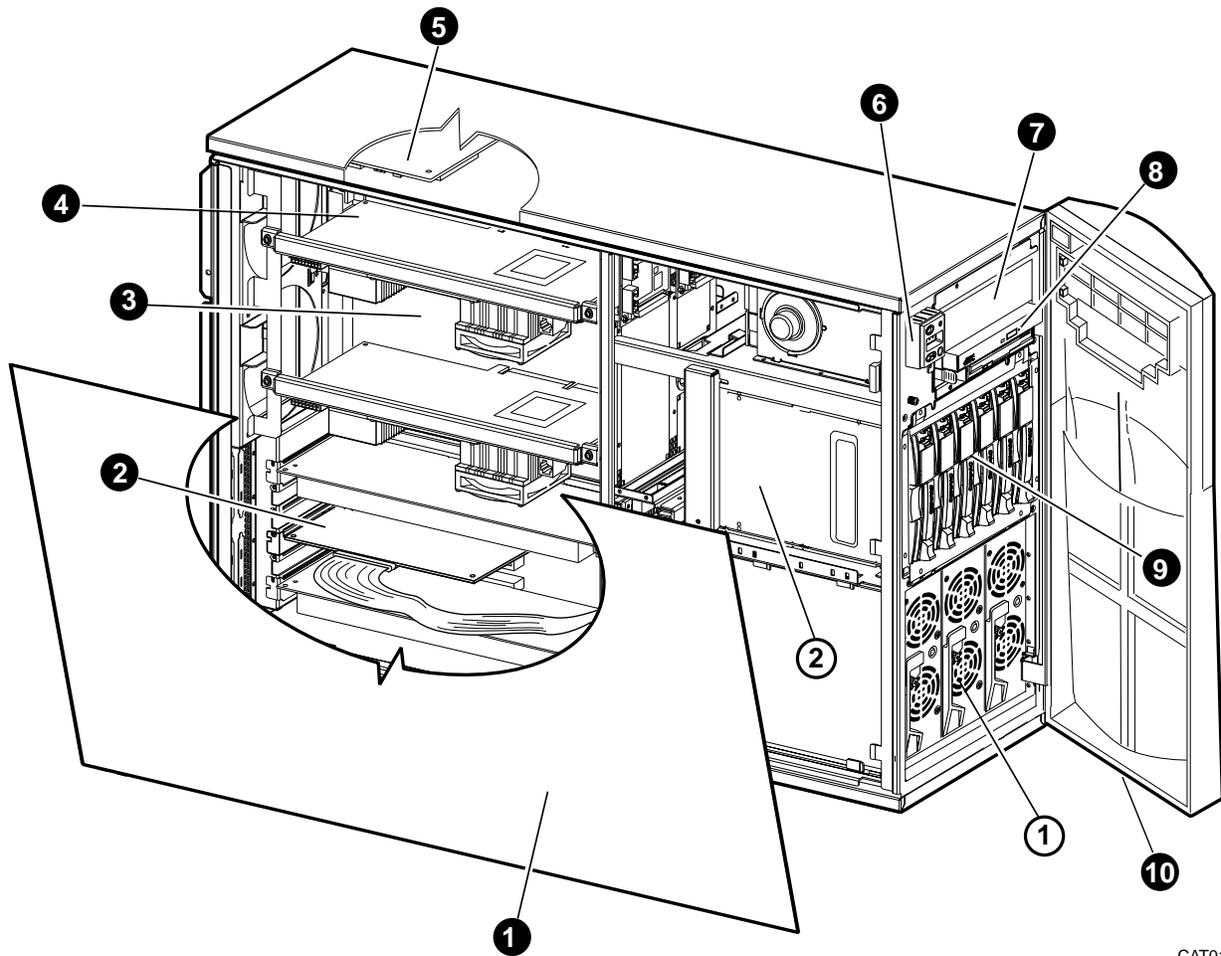
The basic building block of the system is the chassis, which houses the following common components:

- Up to two CPUs, based on the 21264 Alpha chip
- Up to 16, 200-pin memory DIMMs
- Five 64-bit PCI slots and one shared 32-bit ISA or 64-bit PCI slot
- A removable media bay that accommodates one 5.25-inch slim-height CD/floppy disk combination drive and one 5.25-inch half-height tape device
- One storage disk cage that houses four 1.6-inch drives or a cage that houses six 1.0-inch drives
- Two 375-watt power supplies and a bay for a third supply for redundancy
- Two serial ports and one parallel port for external options
- An operator control panel with a Power button, Halt button, and Reset button, and diagnostic LEDs

1.2 System Parts (Front/Side View)

Figure 1-2 identifies the main components of the system in a pedestal version. Components visible from the front and with the side panel removed are shown.

Figure 1-2 System Parts



CAT0151b

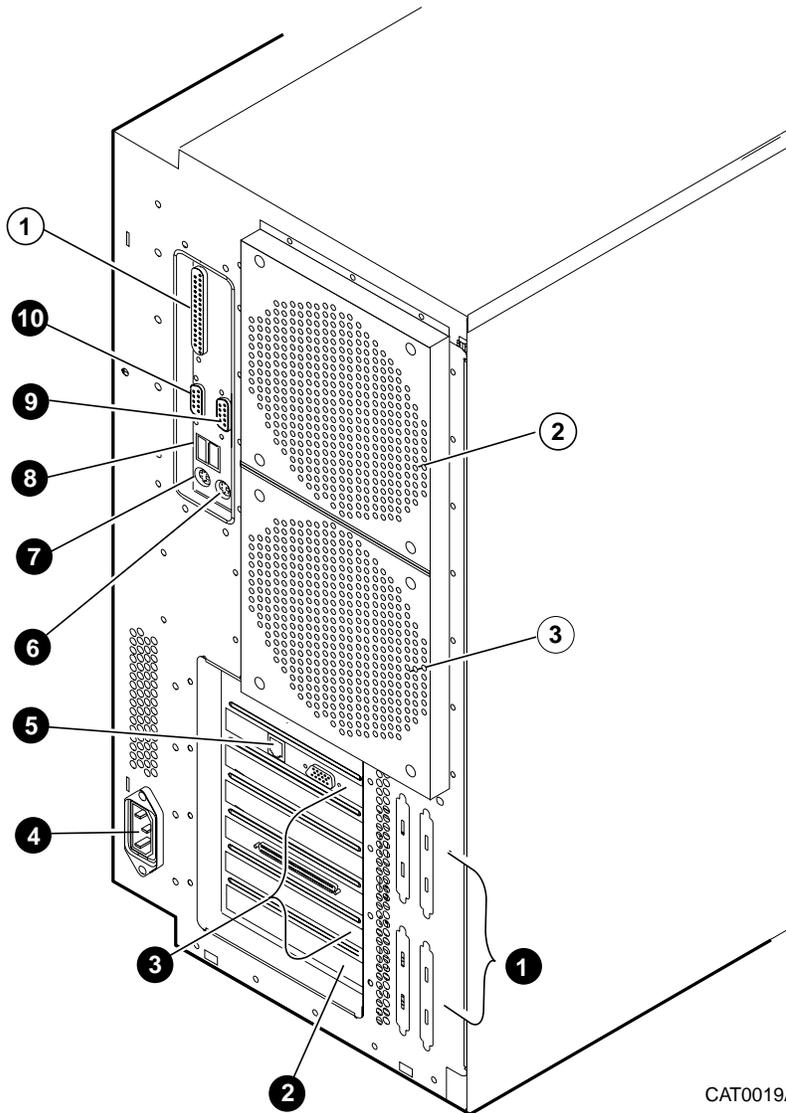
Front Components

- ① Removable side cover
- ② Symbios SCSI adapter board
- ③ System board
- ④ CPU modules
- ⑤ Server feature module
- ⑥ Operator control panel (OCP)
- ⑦ Removable media drive bay
- ⑧ Combination CD-ROM/floppy drive
- ⑨ Hard disk drives
- ⑩ Door
- ① Power supplies
- ② Storage subsystem

1.3 System Parts (Rear View)

Figure 1-3 shows the system ports and connectors on the rear of the chassis.

Figure 1-3 Ports and Connectors



CAT0019A

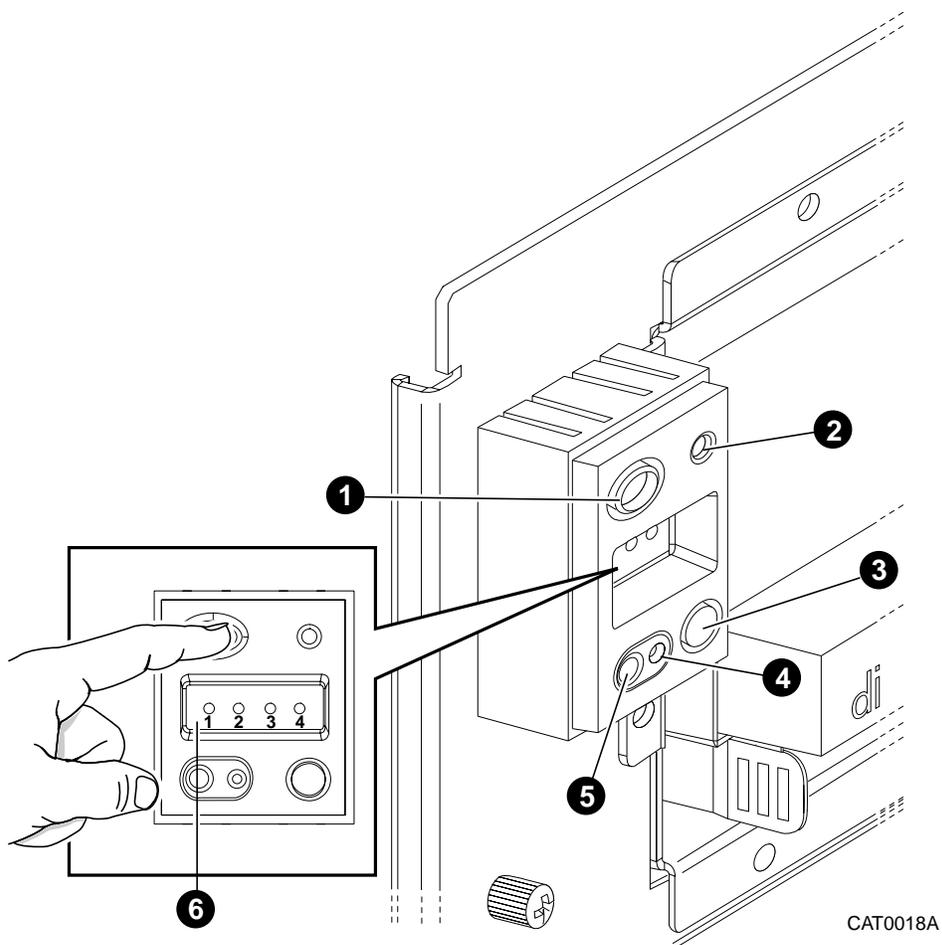
Rear Components

- ❶ SCSI breakouts
- ❷ One shared 64-bit PCI/ 16-bit ISA slot
- ❸ Five 64-bit PCI slots
- ❹ AC power inlet
- ❺ Ethernet port
- ❻ Mouse port
- ❼ Keyboard port
- ❽ Universal serial bus (USB) (not supported)
- ❾ Serial port (COM1)
- ❿ Serial port (COM2)
- ① Parallel port
- ② System fan 0
- ③ System fan 1

1.4 Operator Control Panel

The operator control panel provides system controls and status indicators. The controls are the Power, Halt, and Reset buttons. The panel has a green power LED, a yellow halt LED, and four diagnostic LEDs.

Figure 1-4 Control and Status Indicators



- ❶ Power button. This button is a latching switch. Pressing the Power button on powers on the system. Pressing the button to standby turns off all DC voltages except Aux 5 volts. The 5 volt standby powers the remote management console (RMC). See Chapter 6.
- ❷ Power LED (green). Lights when the Power button is pressed.
- ❸ Reset button. A momentary contact switch that restarts the system and reinitializes the console firmware.
- ❹ Halt LED. Halt condition (yellow). Lights when you press the Halt button.
- ❺ Halt button. Halts the system. Momentary contact switch.
- ❻ Diagnostic LEDs. Programmable by software. Blink at various console states. See Chapter 8 for details.

Remote Commands

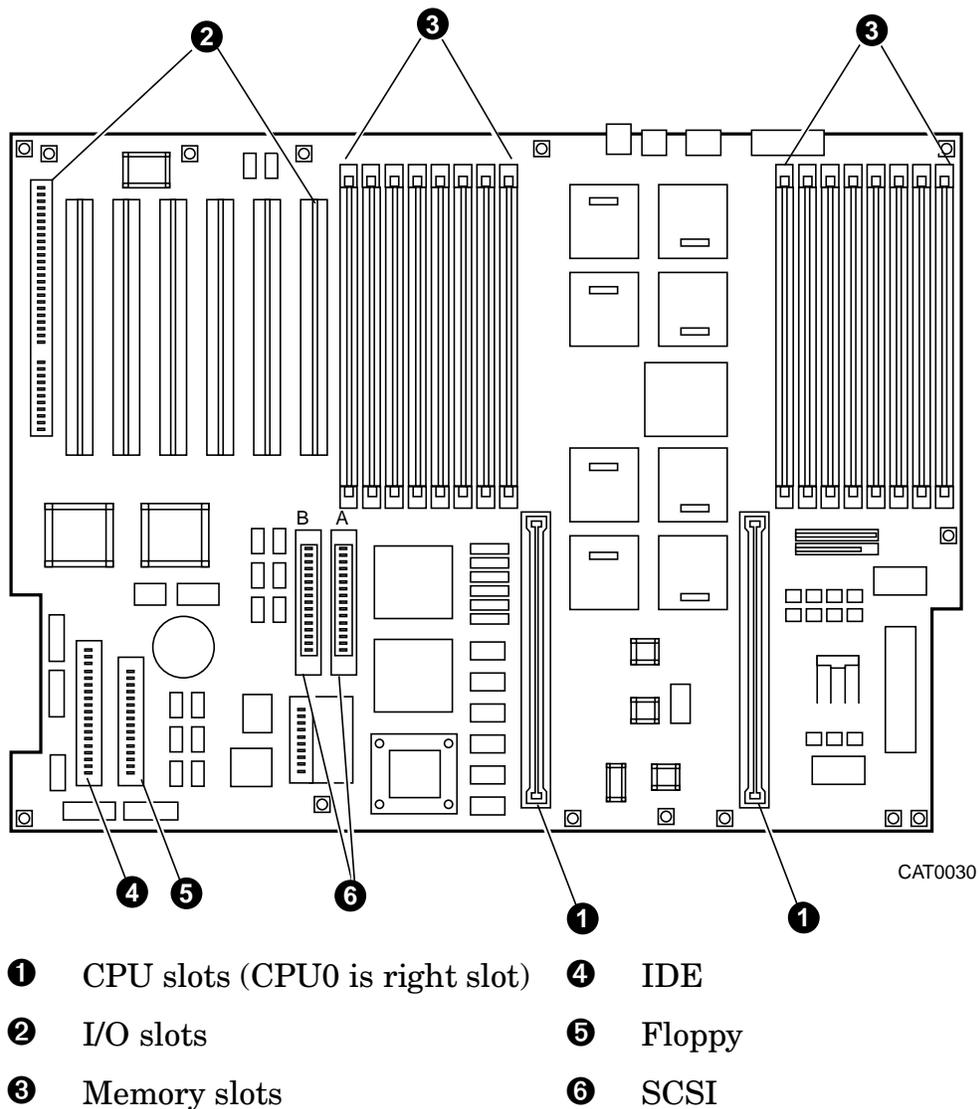
If the system is being managed remotely, commands issued at the remote management console (RMC) can be used to emulate the functions of the operator control panel. See Chapter 6.

RMC Command	Function
poweron	Turns on power. Emulates pressing the Power button to the On position.
poweroff	Turns off power. Emulates pressing the Power button to the Off position.
reset	Resets the system. Emulates pressing the Reset button.
halt	Halts the system.
haltin	Halts the system and causes the halt to remain asserted.
haltout	Releases a halt created with haltin .

1.5 System Board

The system board contains slots for CPUs, memory DIMMs, and I/O options.

Figure 1-5 System Board



All memory and I/O components are located on a single system board that contains a memory subsystem, PCI bus, ISA bus, integrated SCSI fast/wide/Ultra I/O controllers, and option slots for PCI-based and ISA-based option modules.

Processor Module

The system supports up to two processor modules that can be installed on the system board. Each processor module contains a 21264 microprocessor. The 21264 microprocessor is a superscalar chip with out-of-order execution and speculative execution to maximize speed and performance. It contains four integer execution units and dedicated execution units for floating-point add, multiply, and divide. The chip also has an integrated instruction cache and a data cache. Each cache consists of a 64 KB two-way set associative, virtually addressed cache divided into 64-byte blocks. The data cache is a physically tagged, write-back cache.

The EV6 (500 MHz) processor module contains 4 MB secondary B-cache (backup cache) consisting of late-write synchronous DRAMs (dynamic random access memory) that provide low latency and high bandwidth. The EV67 (667 MHz) processor module has an 8 MB DDR (dual data rate). See the documentation that accompanies a processor upgrade for instructions on installing additional processors.

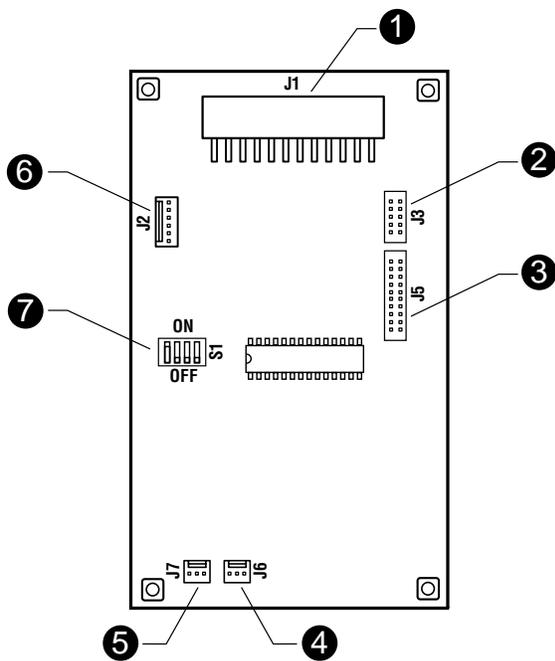
Memory

The system supports up to four banks of memory on the system board. Each bank contains four slots for a total of 16 slots. The system uses 200-pin buffered synchronous dual in-line memory module (DIMMs). See Chapter 5 for instructions on installing DIMMs.

1.6 Server Feature Module

A separate server feature module (SFM) affixed to the system chassis monitors environmental conditions in the system. The SFM supports the two system fans and three power supplies and monitors the state of the CPU fans on the system board.

Figure 1-6 Server Feature Module



PK0981

- 1 Power connector
- 2 Operator control panel connector
- 3 Main logic board connector
- 4 Fan 0 connector
- 5 Fan 1 connector
- 6 Side cover interlock connector
- 7 RMC switch pack (see Chapter 6)

N+1 Fan Configuration

The SFM supports and monitors the two system fans. For optimal cooling, both fans are always running. If one of the fans fails or is hot-swapped for servicing, the system continues to function with the other fan running at full speed.

The fan thermostat is set to drive the fans at their minimum speed in environments below 26°C to keep noise levels low. As system temperature rises, the fan speed increases to increase cooling. If the system temperature rises above 55°C (due to high system loads or high ambient temperature), the system software receives an I/O interrupt and the system shuts down within 30 seconds.

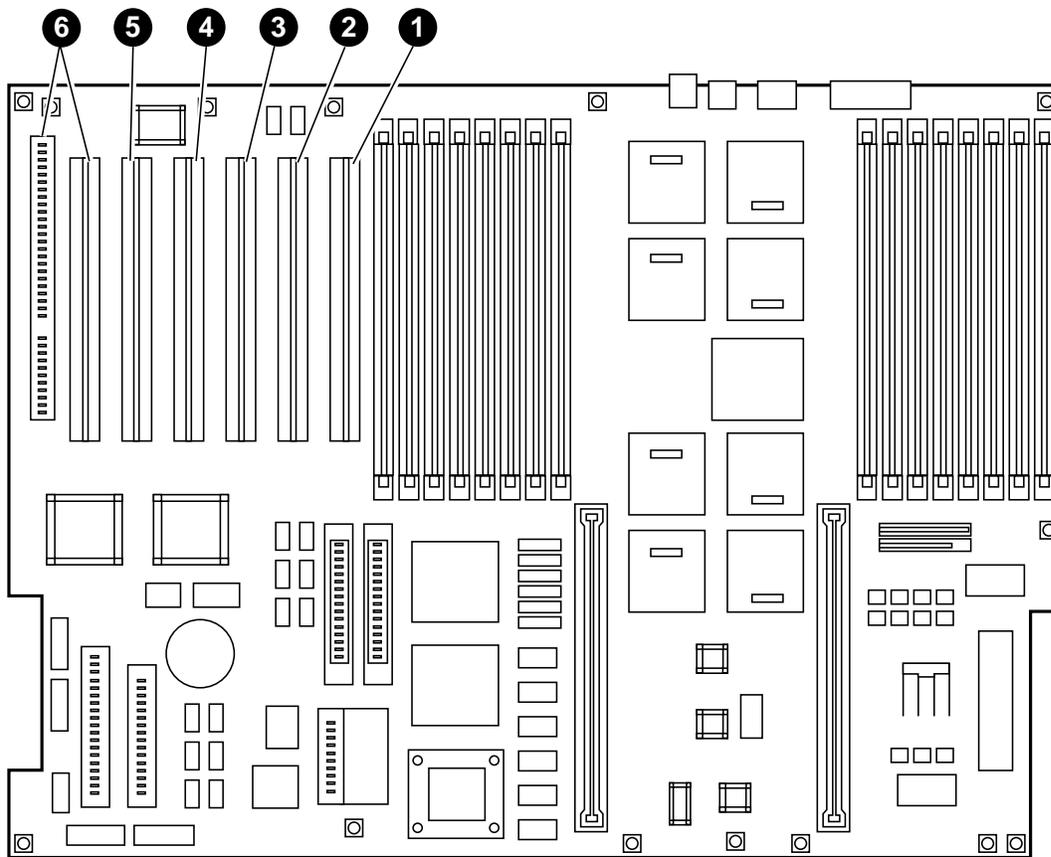
Cover Interlock

The SFM has a side cover interlock connector that prevents the system from operating with the system cover open. System power cannot be turned on until the cover is closed. If the cover is opened while the system is running, power shuts off immediately.

1.7 PCI Slots

The system board has six, 64-bit PCI slots, one of which is a combination PCI/ISA slot. The callouts in Figure 1-7 show the PCI slot locations on the system board. Slot 1 ❶ supports a half-length card only. Slots 2 through 6 support a full-length card. Slot 6 ❹ is shared with an ISA slot (ISA slot 1).

Figure 1-7 PCI Slots (Rack Orientation)



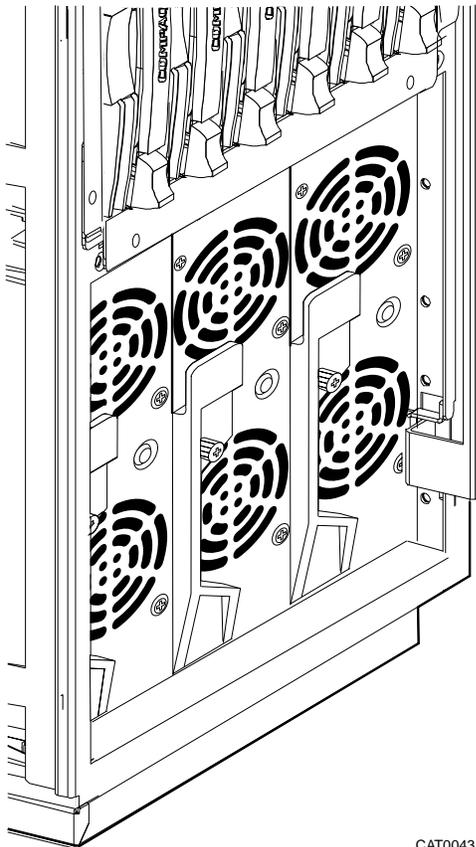
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The system uses a Cypress South Bridge chip (CY82C698), which is a highly integrated peripheral solution for PCI-based motherboards. It provides a bridge between the PCI bus, ISA bus, and the IDE peripherals. See Chapter 5 for information on installing PCI options.

1.8 Power Supplies

The system comes with two 375-watt power supplies that are connected in parallel. A third power supply can be added for redundancy. Power supply 0 (PS0) is the leftmost supply in a pedestal system and the topmost supply in a rackmount system.

Figure 1-8 Power Supplies (Pedestal Orientation)



NOTE: *On a system with two power supplies, a power supply blank is installed to maintain the proper airflow.*

A power backplane integrates the supplies for power distribution, monitoring, and control. The power supplies can be accessed and removed through the front of the enclosure. See Chapter 5 for instructions on adding or replacing a power supply.

The following voltages are provided: +3.3, +5.0, +12.0, -12.0, +5.0 Aux (+5.0 Aux always powered). Two internal fans cool the power supply. The fans are temperature controlled and speed up as the power supply temperature increases.

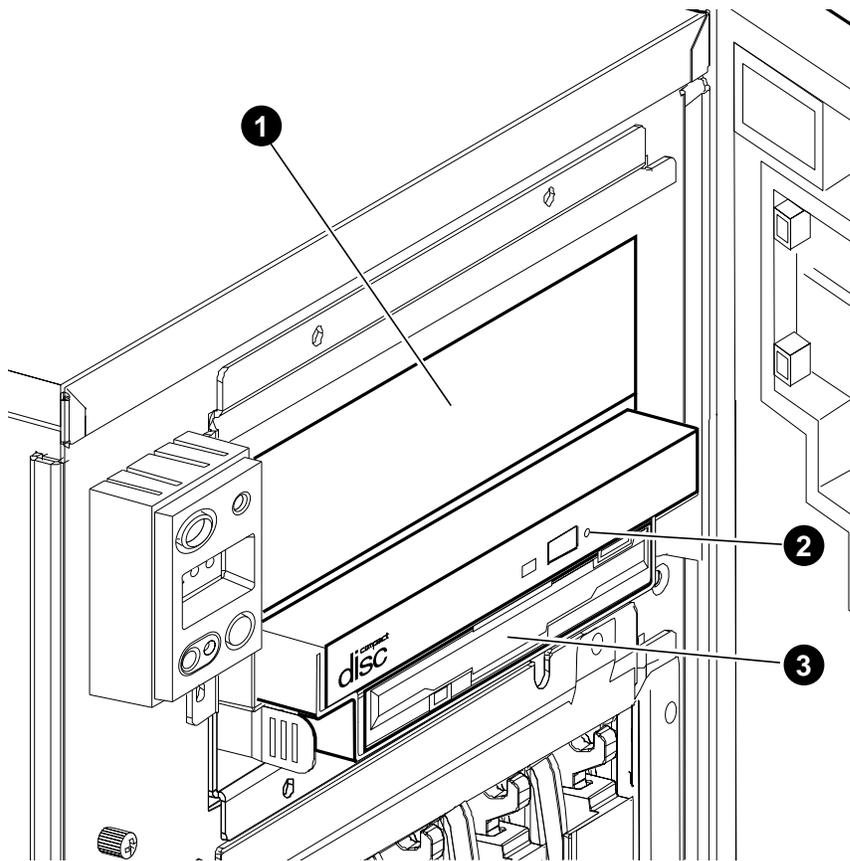
N+1 Power Supply Configuration

Two power supplies must be installed and working for the system to operate. The system shuts down if the number of working power supplies ever falls below two. In a three-power-supply configuration, a power supply may be removed for servicing without interrupting system operation. An I/O interrupt is generated whenever the number of power supplies in operation changes.

1.9 Removable Media Storage

The removable media area contains the removable media bay, which accommodates one 5.25-inch, half-height tape device and a combination CD-ROM/FDD drive.

Figure 1-9 Removable Media Storage



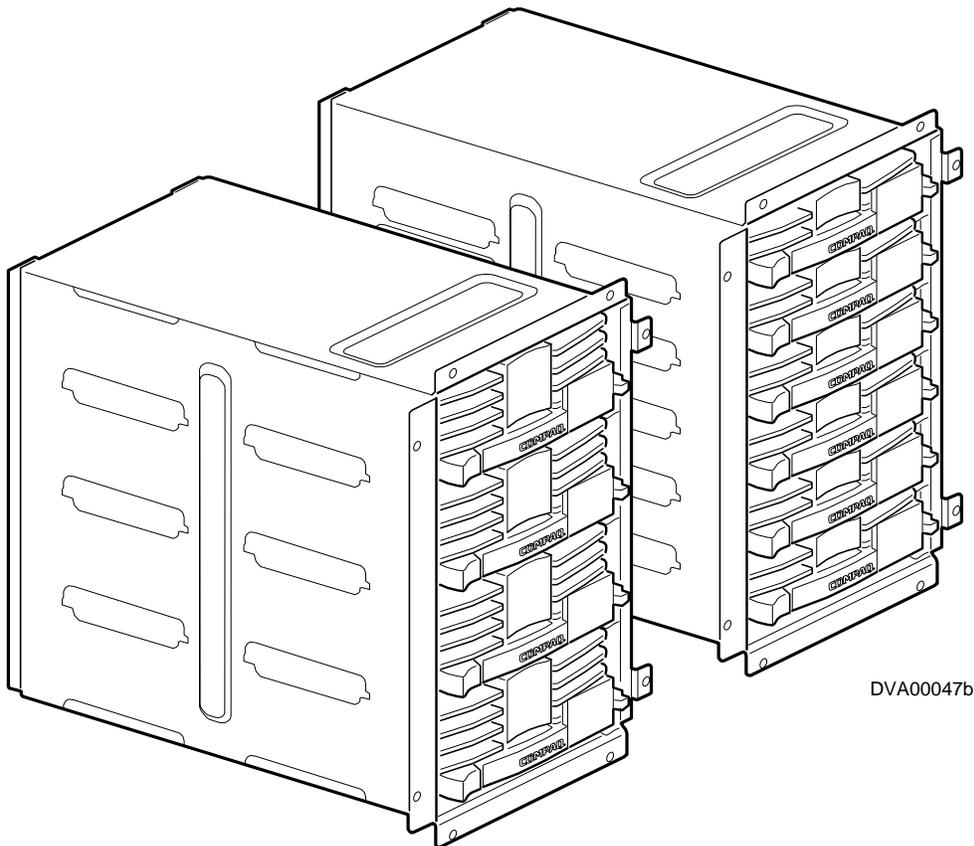
CAT0050

- ❶ Removable media bay
- ❷ CD-ROM drive
- ❸ FDD drive

1.10 Hard Disk Drive Storage

The system comes with either a four-slot storage subsystem that holds 1.6-inch drives or a six-slot storage subsystem that holds 1.0-inch drives. Figure 1-10 shows the storage subsystems.

Figure 1-10 Four-Slot and Six-Slot Storage Subsystems

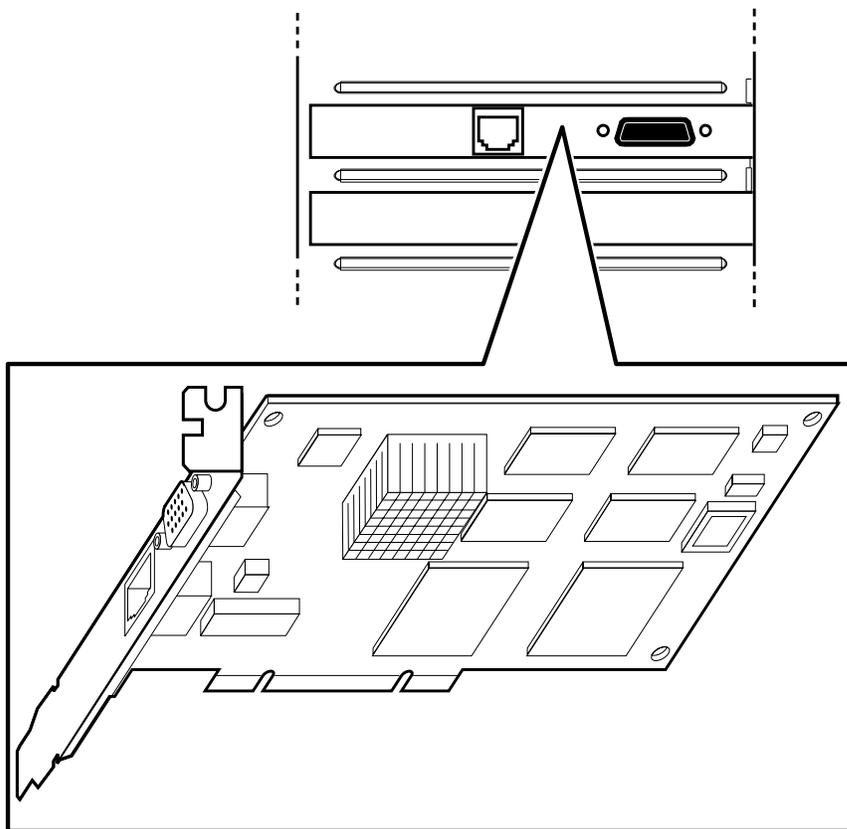


The storage system backplane contains on-board multimode terminators that provide LVD (low voltage differential) termination to the bus when all devices are LVD. If an SE (single-ended) device is installed in the backplane, the terminators automatically switch to SE mode termination. All devices on the bus will operate in SE mode and all transactions will be subject to SE speed and length limitations.

1.11 Two-Way Combination Module

The system supports an optional two-way combination module that can be installed in PCI slot 1. The combination board saves a PCI slot by sharing VGA and Ethernet functions. The Ethernet portion of the combination board uses the Intel 82558 chip.

Figure 1-11 Combination Module



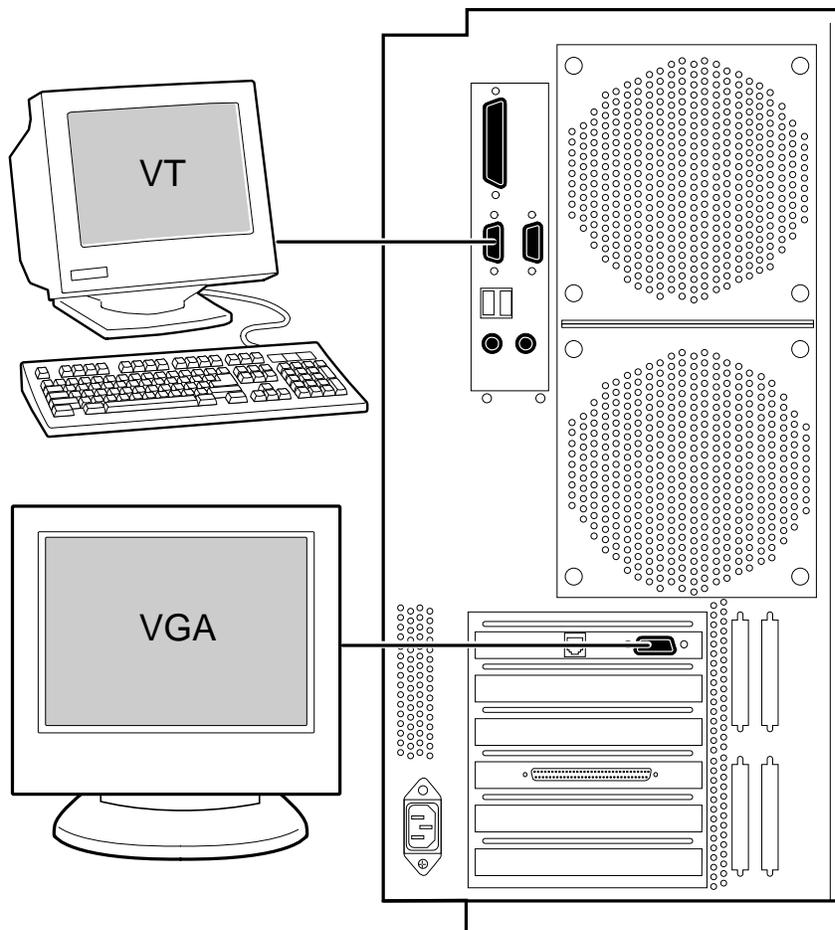
CAT0042

The combination module features 2D/3D video (with 4 MB VRAM), along with 10/100 MB Fast Ethernet. The module provides connections for the VGA (Video Permedia 2) and the Ethernet (NIC functions). You can order the module from Compaq.

1.12 Console Terminal

The console terminal can be a serial (character cell) terminal connected to the COM1 port or a VGA monitor connected to a VGA adapter on PCI slot 1. When a VGA monitor is connected, a keyboard and mouse must also be connected.

Figure 1-12 Console Terminal Connections



CAT0053A

Chapter 2

Installing the Pedestal System

This chapter describes how to set up the pedestal system. It also gives instructions for converting a rackmount system to a pedestal system. The following topics are covered:

- System dimensions and service area
- Power requirements
- Shipment box
- Pedestal setup
- System access
- Installing a pedestal kit

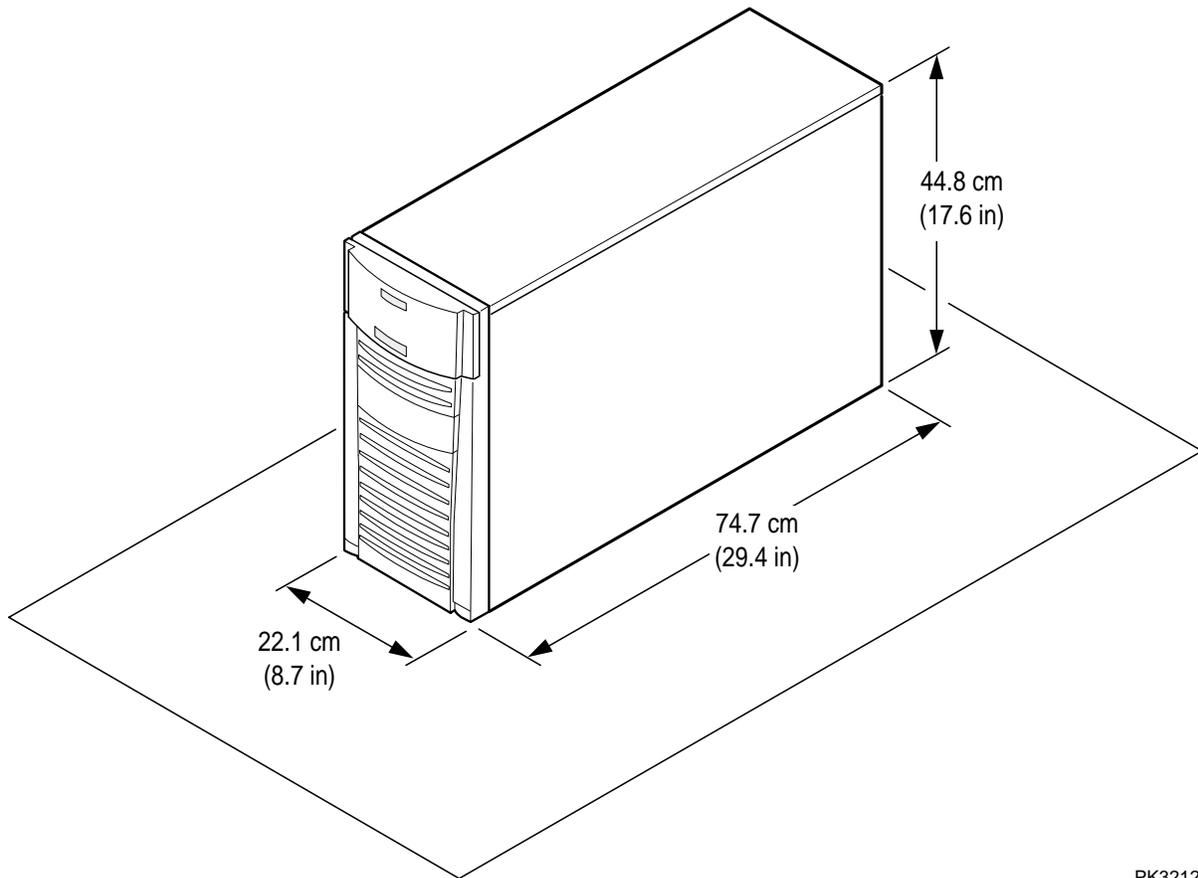


WARNING: The system is very heavy. Two people are needed to lift and maneuver it.

2.1 System Dimensions and Service Area

Figure 2-1 shows the system dimensions and the clearance needed to access the pedestal system for servicing.

Figure 2-1 System Dimensions

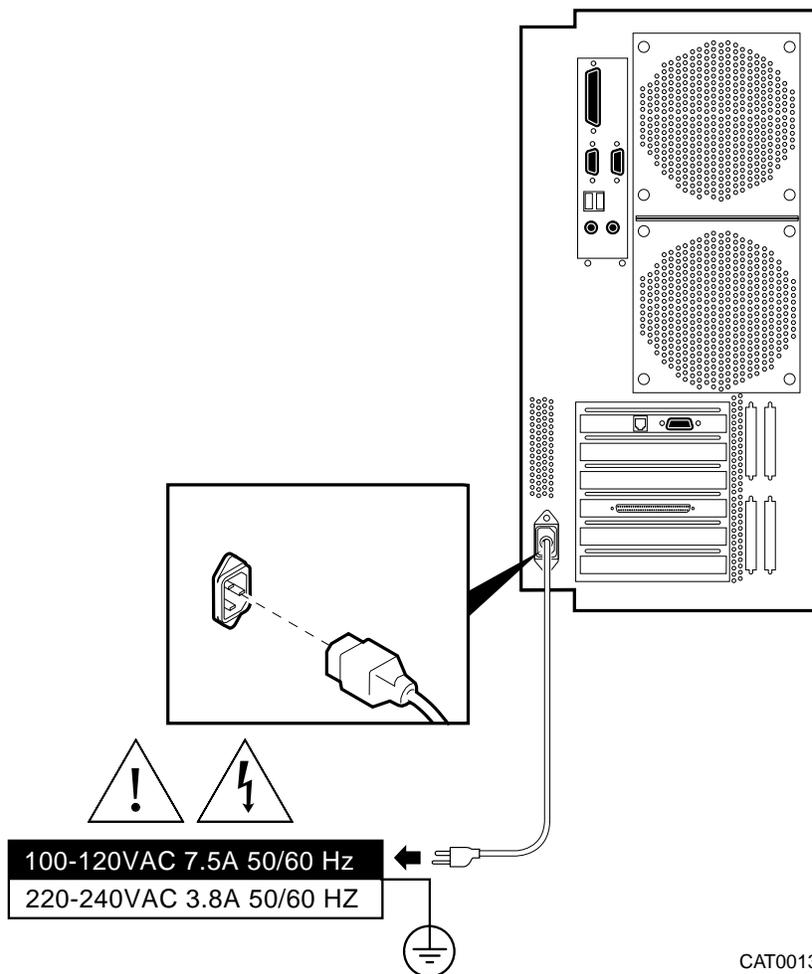


PK3212

2.2 Power Requirements

The system automatically detects the voltage source when it powers up, and adjusts the power supply input to accept that voltage. Figure 2-2 shows maximum current ratings for a fully loaded system (without monitor or terminal). It also shows where to plug in the AC power connector. Power supply ratings and power cord requirements are given in Chapter 9.

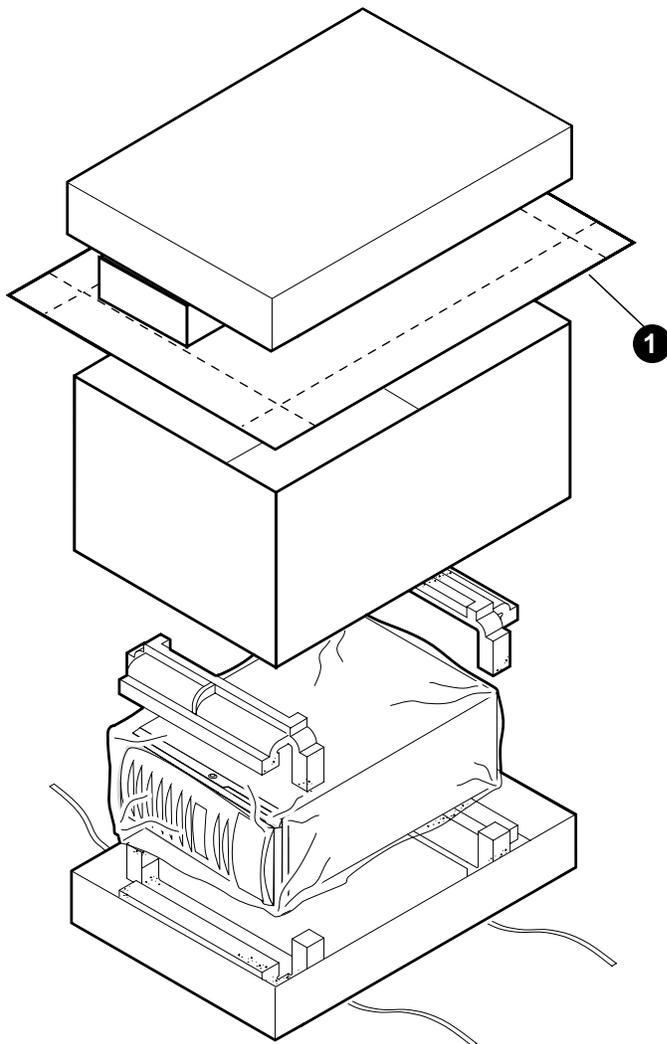
Figure 2-2 Power Supply Requirements



2.3 Shipment Box

The pedestal system is shipped in a single box. The system chassis is completely assembled, with all modules installed. Instructions for unpacking are in the accessories tray ❶. An installation document and this reference guide are also in the tray, along with other accessories.

Figure 2-3 Unpacking the Shipment

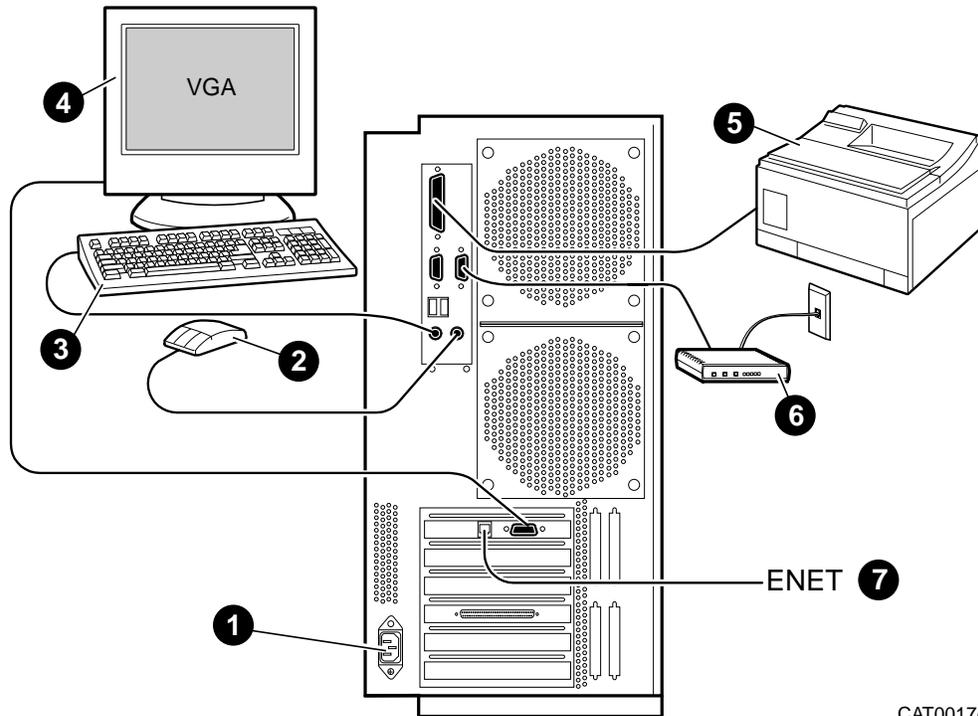


CAT0044a

2.4 Pedestal Setup

Connect the cabling as shown in Figure 2-4.

Figure 2-4 Cabling the System



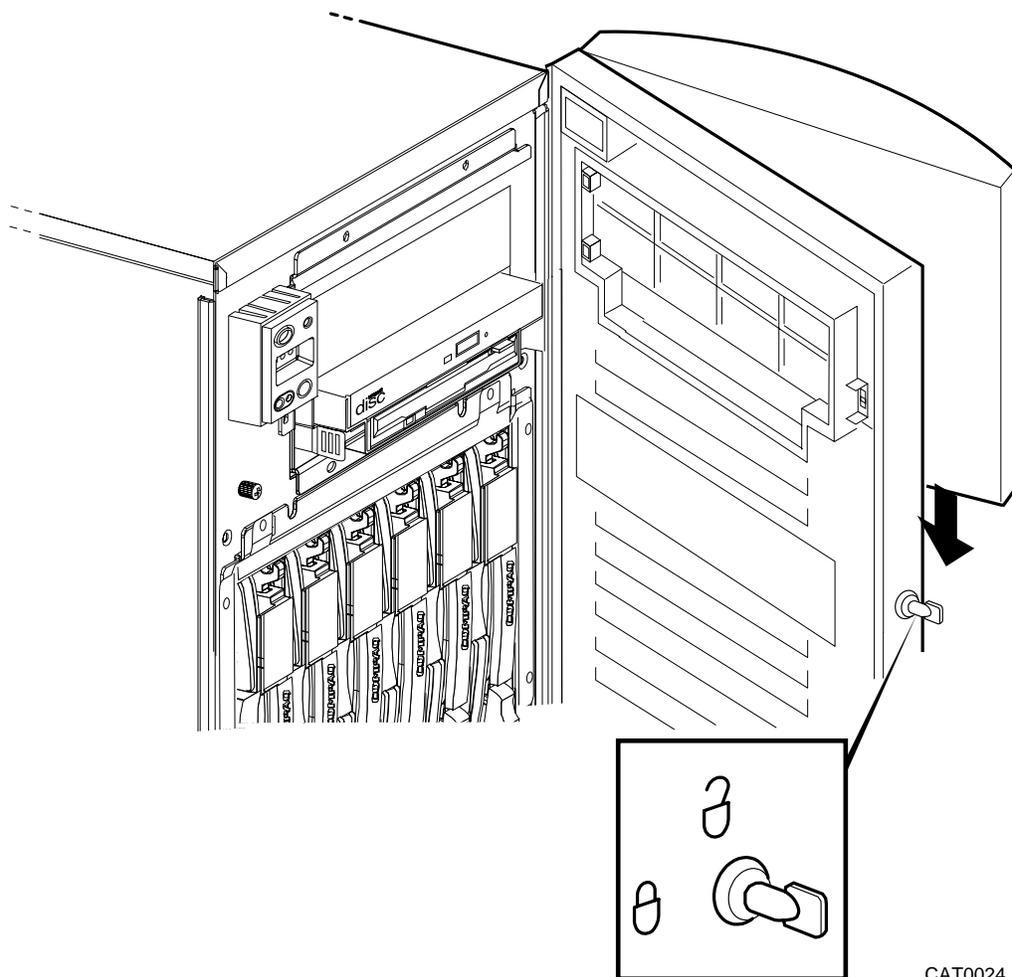
CAT0017c

- ❶ AC power connector
- ❷ Mouse
- ❸ Keyboard
- ❹ Monitor
- ❺ Printer
- ❻ Modem with 10/100Base-T network cable connection ❼, if option ordered

2.5 System Access

The system has a key lock that is located on the front door to prevent unauthorized access. The removable media devices and the system control panel are accessible through an upper front door that opens by sliding down the lock latch as shown in Figure 2-5.

Figure 2-5 System Lock and Key



CAT0024

2.6 Installing a Pedestal Kit

This section is for customers who ordered a pedestal kit. The pedestal kit is used to convert a rackmount system to a pedestal.

CAUTION: *The system is very heavy. Two people are needed to lift and maneuver it.*

NOTE: *Before you begin the conversion procedure, shut down the operating system, turn off power to the system, and unplug the power cord. Review Figure 2-6 and Table 2-1 to verify the contents of the pedestal kit.*

Figure 2-6 Pedestal Kit Contents

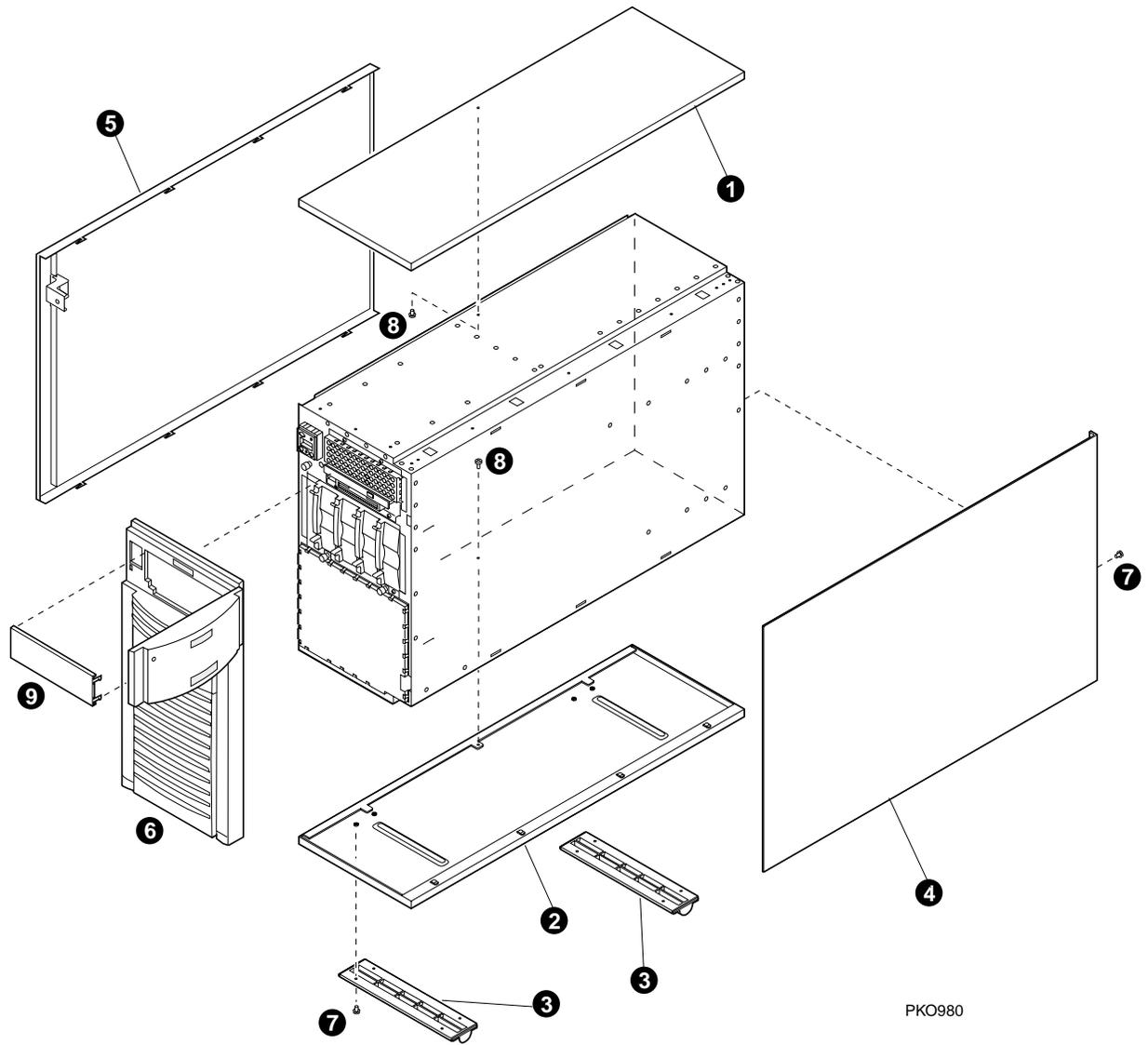
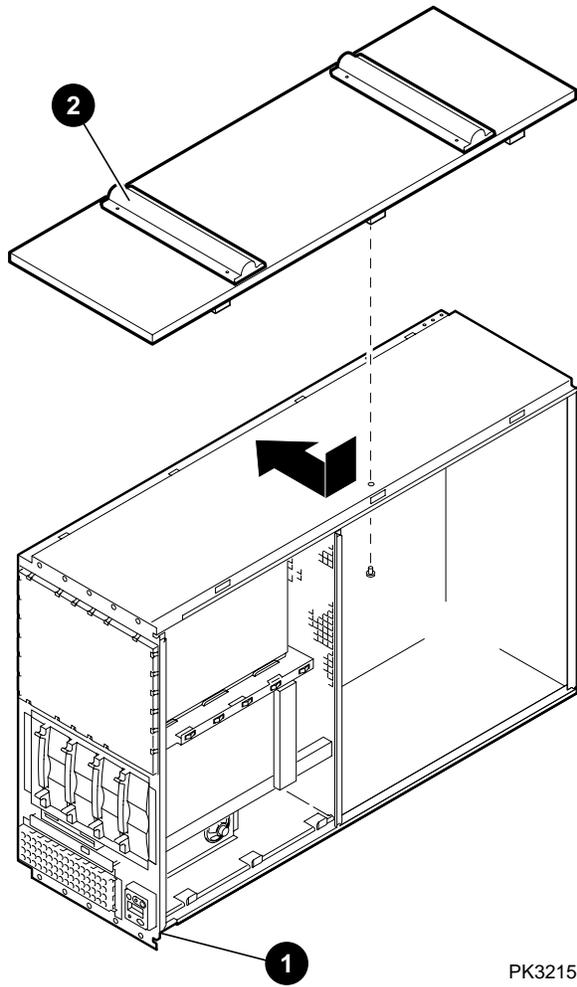


Table 2-1 Pedestal Kit Contents

	Hardware	Part Number	Quantity
❶	Upper panel	74-60248-01	1
❷	Lower panel	74-60248-02	1
❸	Slide feet	74-51716-01	2 (may already be installed on ❷)
❹	Side dress panel	74-60250-01	1
❺	Side access cover (painted)	74-60247-02	1
❻	Front door assembly	70-40254-01	1
❼	Screws, M3x6mm	90-09984-20	9 (for attaching slide feet. If slide feet are attached, only 1 screw loose piece.)
❽	Thumbscrews	74-60270-02	2
❾	Door	74-60337-01	1

Figure 2-7 Installing the Lower Panel



PK3215

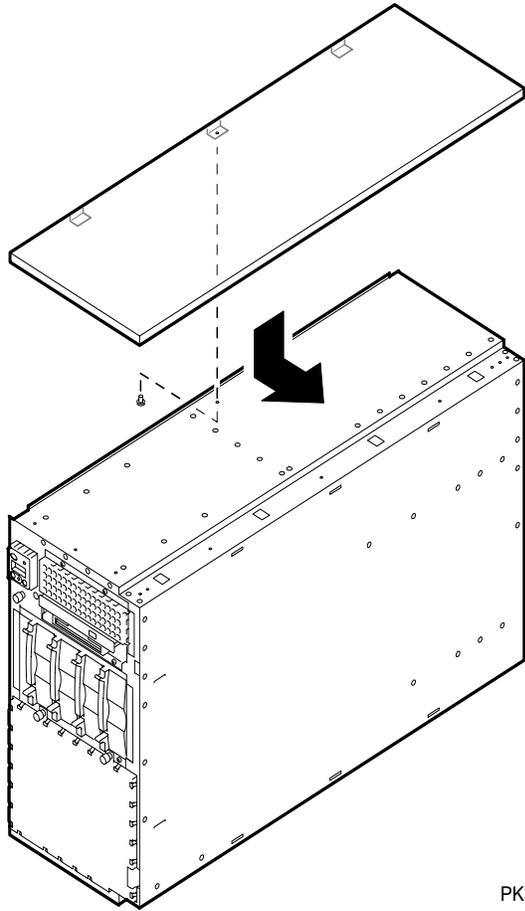
Conversion Procedure

1. Remove the top cover from the rack system by loosening the captive screw and sliding the cover to the rear. Set aside the cover; it will not be reused.
2. Rotate the system chassis so that the operator control panel (OCP) ❶ is at the lower right.
3. Place the lower panel slide feet up ❷, with the large tabs to the right as you face the front of the unit. Slide the panel to the left and seat it firmly. Insert a thumbscrew through the tab into the insert and tighten. See Figure 2-7.
4. Turn the chassis over and rest it on the slide feet. The OCP should now be at the upper left as you face the chassis.

Continued on next page

5. Place the upper panel with the painted surface up and the large tabs to the left on the top of the unit. Slide the panel to the right. Insert a thumbscrew into the tab on the panel and insert it in the box and tighten. See Figure 2-8.

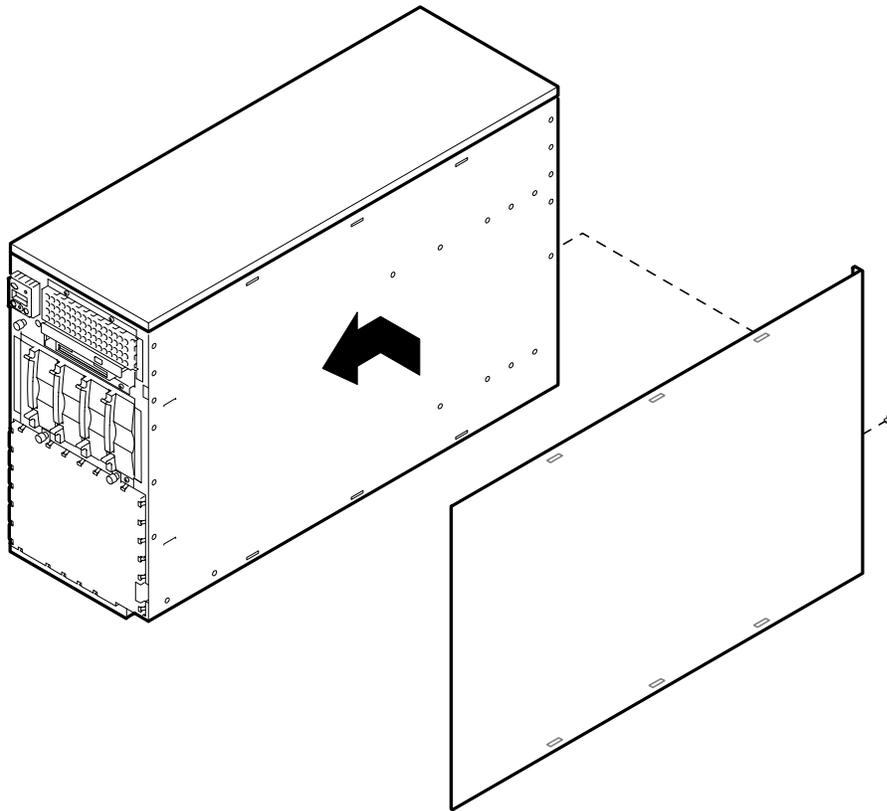
Figure 2-8 Installing the Upper Panel



PK3203

6. Place the right side dress panel on the right side of the unit and engage the tabs in the slots. Push the panel toward the front of the unit. Insert one M3x6mm screw in the hole on the rear of the panel and tighten. See Figure 2-9.

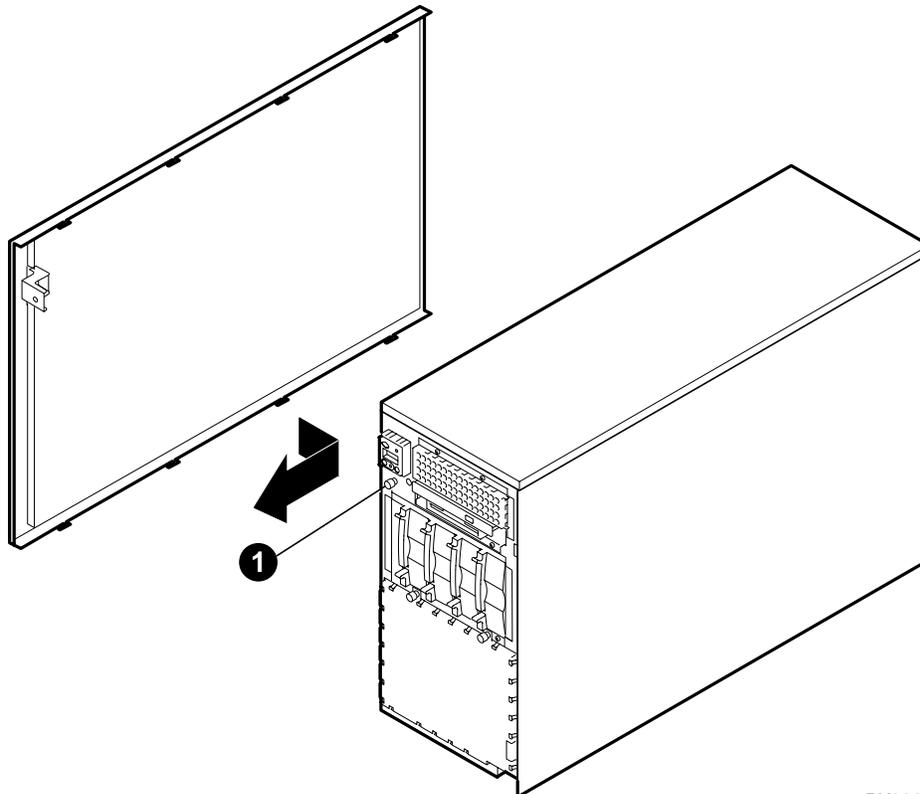
Figure 2-9 Installing the Side Dress Panel



PK3204

7. Install the side access cover by inserting the cover tabs (4 top, 4 bottom) into the slots in the chassis. Slide the cover forward and secure it with the captive screw **1**. See Figure 2-10.

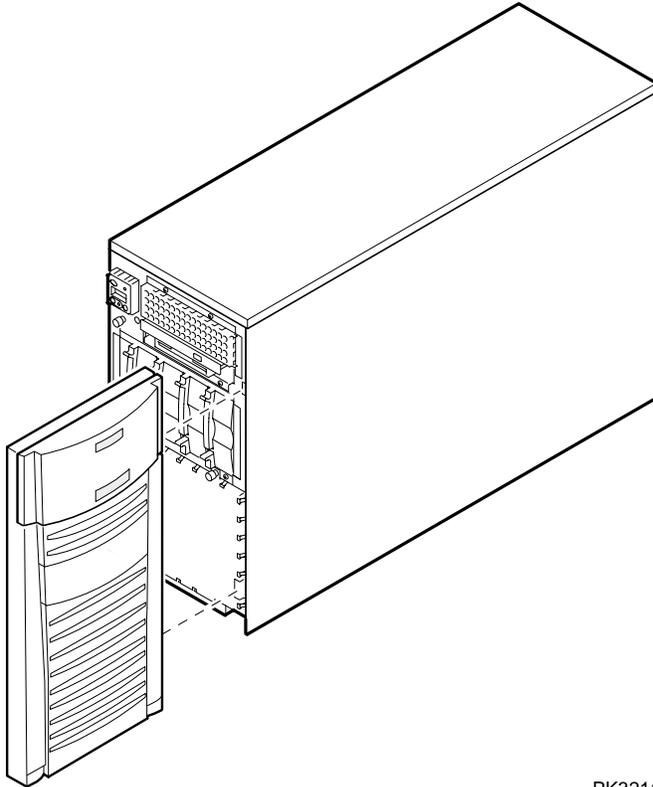
Figure 2-10 Installing the Side Access Cover



PK3205

8. Hold the door so that the hinge is to the right as you face the front of the unit. Rotate the door until it is at a 90-degree angle with the right edge of the unit. Insert the door hinge pins into the mating holes recessed on the right edge of the unit and push down slightly. Close the door.

Figure 2-11 Installing the Door



PK3211

Chapter 3

Installing the Rackmount System

This chapter provides installation procedures for setting up your rack-mountable server. The following topics are covered:

- Rackmount documentation
- Power requirements
- Shipment box
- Marking the installation area
- Rack accessories
- Preparing the system chassis
- Preparing the rack
- Installing the system chassis
- Installing the interlock system
- Installing the cable management arm
- Dressing the cables
- Attaching the front bezel



WARNING: The system is very heavy. Do not attempt to lift it manually. Use a material lift or other mechanical device. At least two people are required to perform the installation.

3.1 Rackmount Documentation

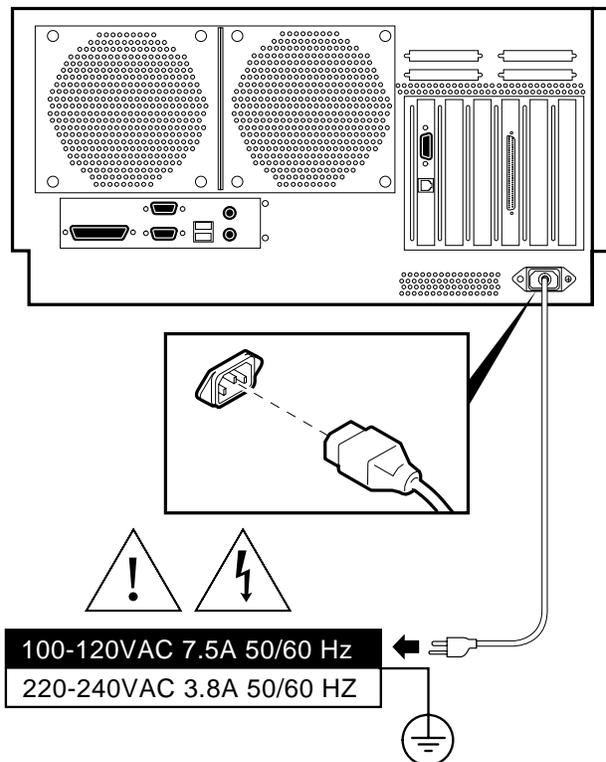
The DS20E system can be installed into either the H9A10 or H9A15 M-Series cabinet. In addition to reading this chapter, consult the M-series documentation listed below, if needed. Use the DS20E installation template for marking the installation area.

Rackmount Installation Template	EK-DS20E-TP (included in 3X-BA56R-RC/RD/RA)
H9A10 M-Series Cabinet Interconnect	B-IC-H9A10-5-DBM
H9A10 M-Series Cabinet Configurations	B-IB-H9A10-5-DBM
H9A10 M-Series Illustrated Parts Breakdown	EK-H9A10-IP
H9A15 M-Series Interconnect	B-IC-H9A15-3-DBM
H9A15 M-Series Configurations	B-IB-H9A15-3-DBM
H9A15 M-Series Illustrated Parts Breakdown	EK-H9A15-IP

3.2 Power Requirements

Figure 3-1 shows maximum current ratings for a fully loaded system (without monitor or terminal). It also shows where to plug in the AC power connector. Power supply ratings and power cord requirements are given in Chapter 9.

Figure 3-1 Power Requirements and Connections

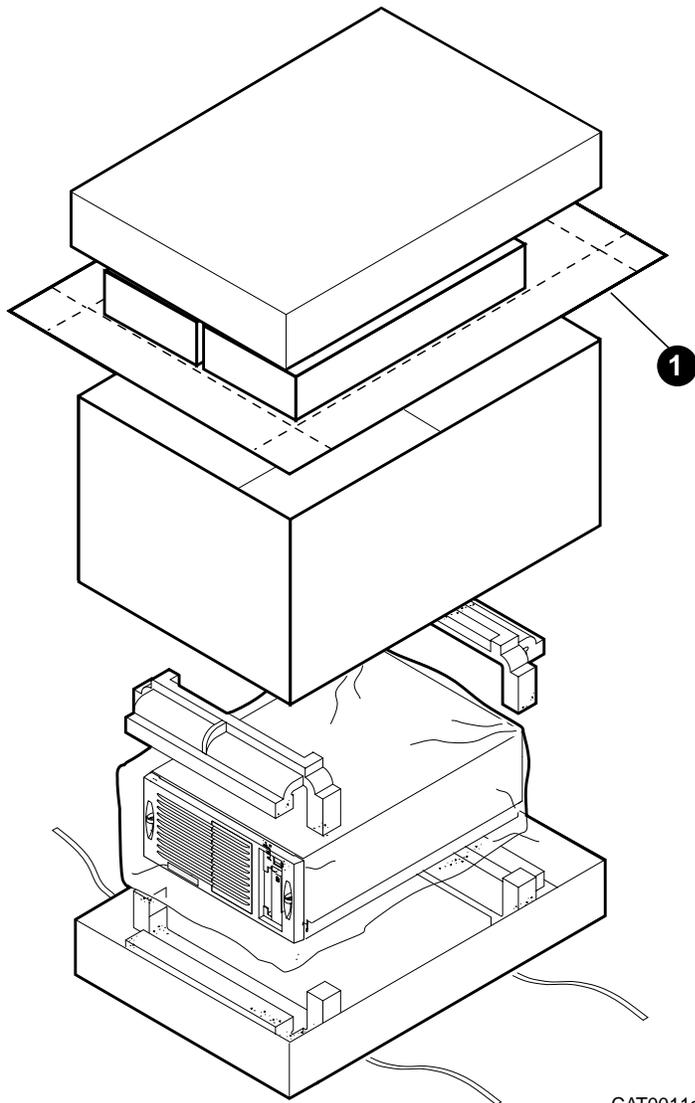


CAT0012A

3.3 Shipment Box

The system is shipped in a single box. Mounting hardware and instructions for unpacking are in the accessories tray ❶.

Figure 3-2 Rackmount System Shipment Box

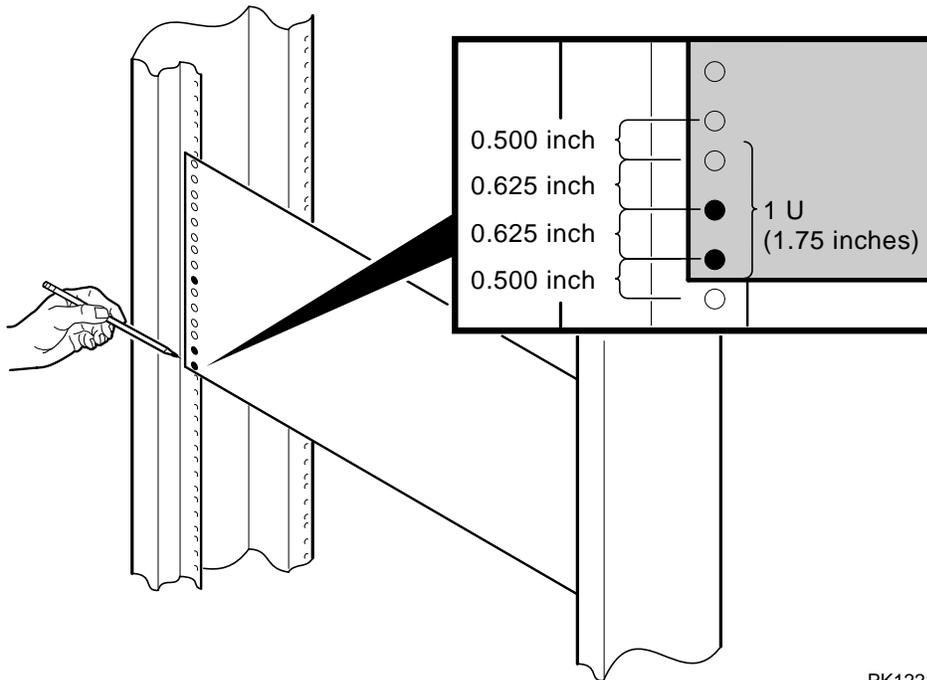


CAT0011a

3.4 Marking the Installation Area

The installation of the rackmount system requires 8.75 inches (5U) of vertical height in the rack. Use the rackmount template to mark the installation area.

Figure 3-3 Rackmount Installation Area



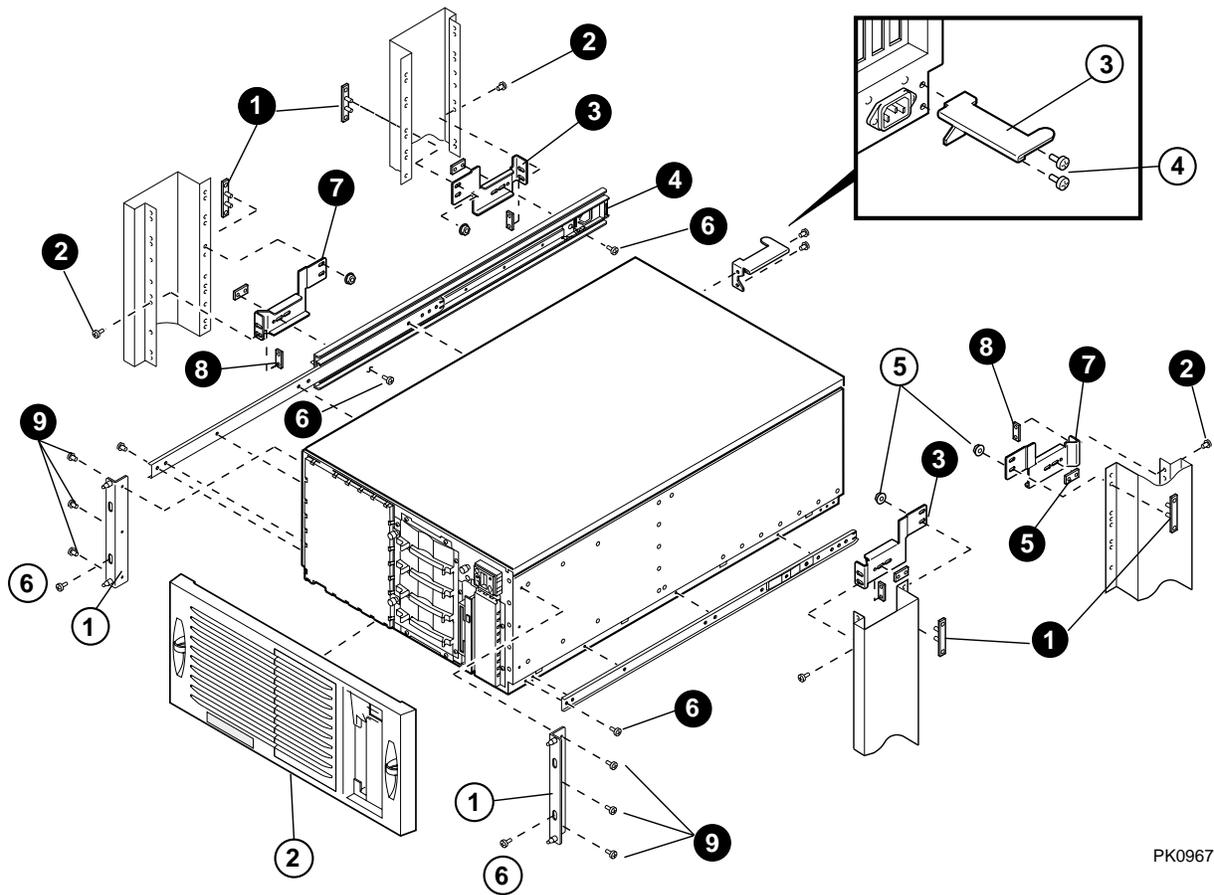
PK1221

1. Mark the midpoint hole on the vertical rail as shown in Figure 3-3. The midpoint hole must be selected so that the holes immediately above and immediately below are equidistant (.625 inches).
2. Mark the corresponding hole on the other three rails.

3.5 Rack Accessories

The mounting hardware is shown in Figure 3-4 and identified in Table 3-1.

Figure 3-4 Mounting Hardware



PK0967

Table 3-1 Mounting Hardware Description

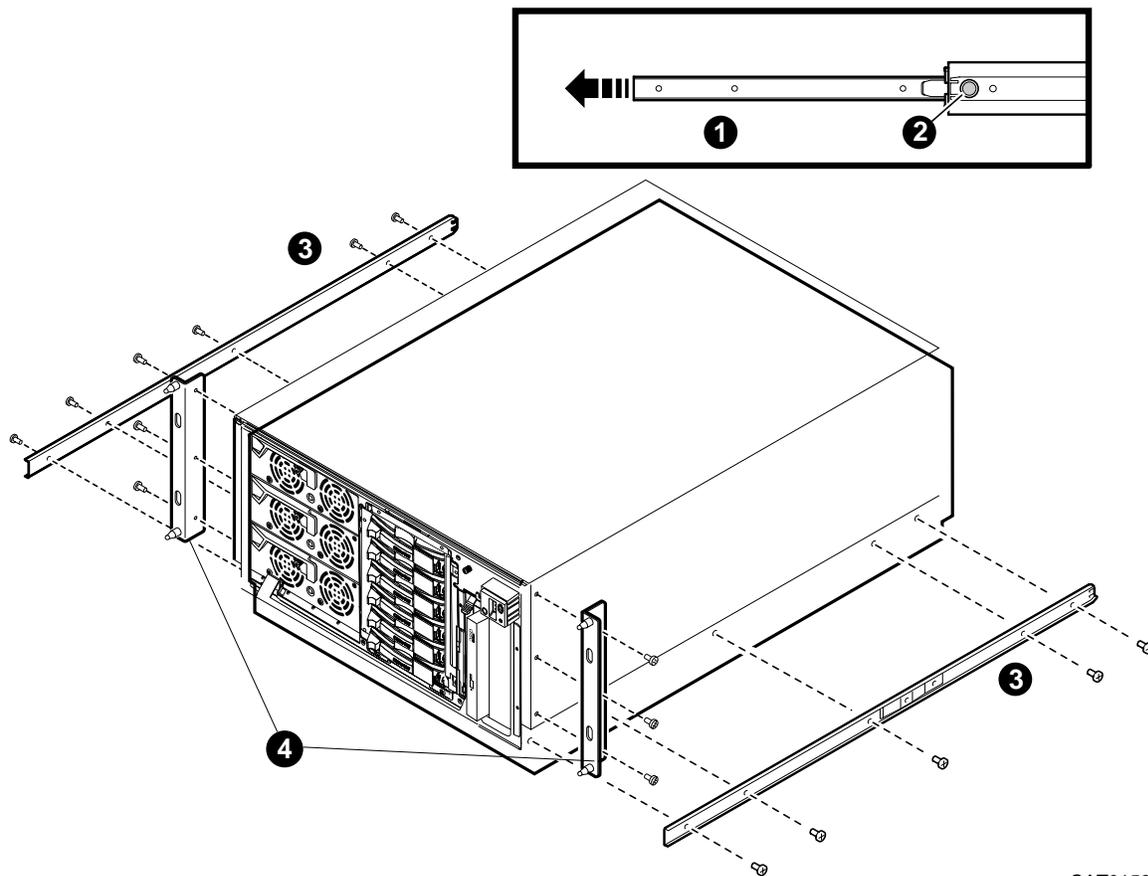
Reference Number	Mounting Hardware
①	Vertical nut bar
②	10-32 x .375-inch hex head screw
③	Bracket slide, right
④	Chassis slide
⑤	Nut plate, horizontal, slide
⑥	M4 x 10 mm, Bossard screw
⑦	Bracket slide, left
⑧	Bar nut
⑨	M3 x 6 mm flat head screw
①	Mounting rail, EIA (bars)
②	Front bezel
③	Actuator bracket, interlock
④	M5 x 8mm pan head, square cone washer
⑤	Nut keps, M4
⑥	10-32 x .5-inch hex head screw
	M3 x 10 mm flat head screw (shown in Figure 3-12)

Screw Size	Torque Value
M3	7.6 in-lbs
M4	17 in-lbs
M5	20 in-lbs
10-32	21 in-lbs

3.6 Preparing the System Chassis

To prepare the system for installation, attach the mounting brackets to the chassis and attach the slide brackets to the slides.

Figure 3-5 Attaching Mounting Brackets to Chassis

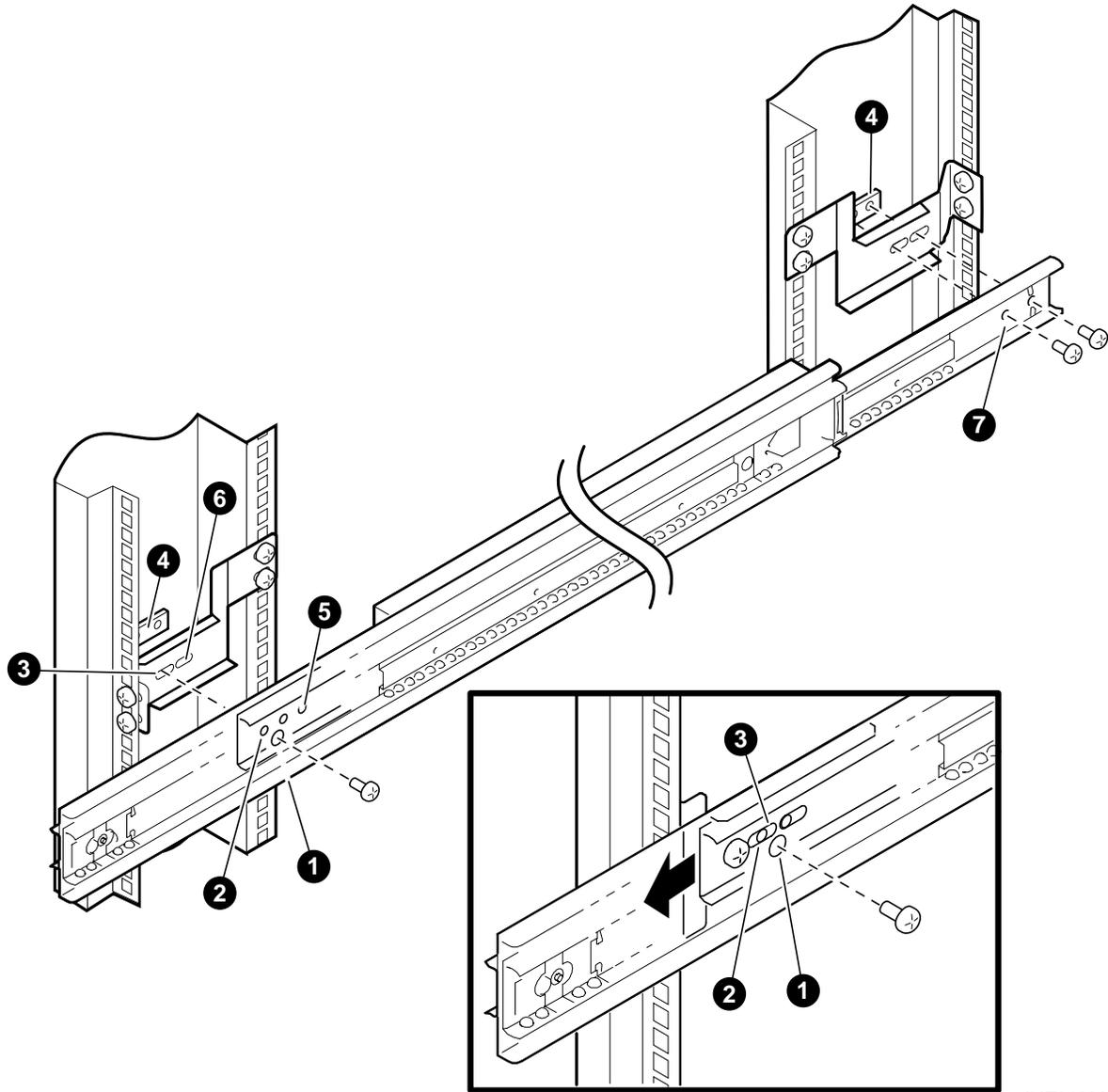


CAT0152

CAUTION: *The slides are lightly greased. Handle them carefully to avoid soiling your clothing.*

1. Attach the front mounting brackets ④ along each edge, using three M3 x 6 flat head Phillips screws per bracket. Tighten to 7.6 in-lbs.
2. Pull the narrow segment of the slide ① out and detach it completely by pressing the green release button ② and continuing to pull.
3. Attach the narrow segment of the slide ③ to the system with five M4 x 10 Bossard screws.
4. Repeat the procedure for the other slide.

Figure 3-6 Attaching Slide Brackets to Slides



CAT0160A

The sliding segment of the slide has an access hole ❶ that provides access to three mounting holes in the stationary segment. You use two of the mounting holes.

Front

1. Insert a cap screw through the access hole ❶ and the first (forward-most) mounting hole ❷ in the slide and through the hole ❸ in the slide bracket. Fasten with one two-hole nut bar ❹ and tighten.
2. Align the access hole with the third mounting hole ❺ in the slide.
3. Insert a cap screw through the access hole and the third hole ❺ in the slide and through the slot ❻ in the slide bracket. Fasten through the nut bar and tighten.

Back

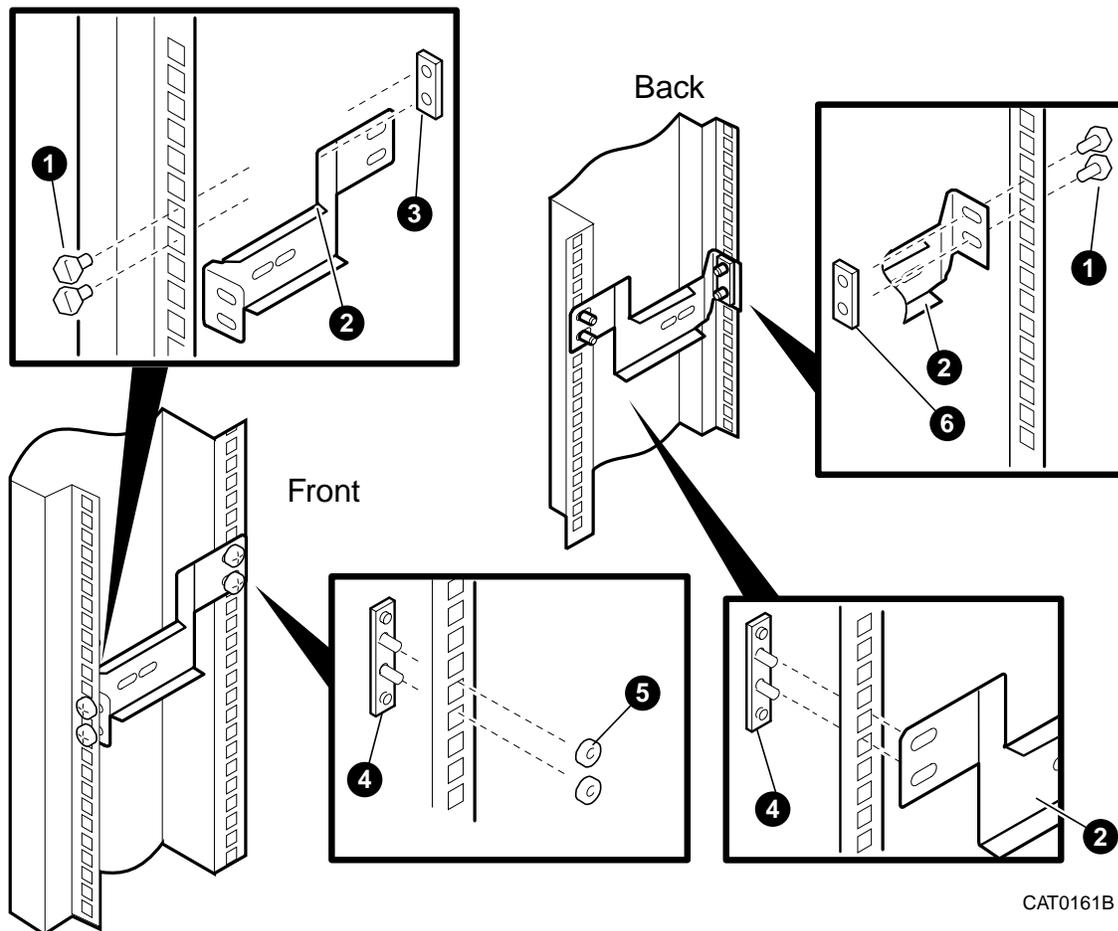
4. Insert a screw through the two holes ❼ in the stationary segment of the slide and through a slot in the slide bracket. Attach to a two-hole nut bar ❹.

Repeat the entire procedure for the other slide.

3.7 Preparing the Rack

Prepare the rack by attaching the slide brackets to the rack rails. Then stabilize the rack.

Figure 3-7 Attaching Slide Brackets to Rack Rails



CAT0161B

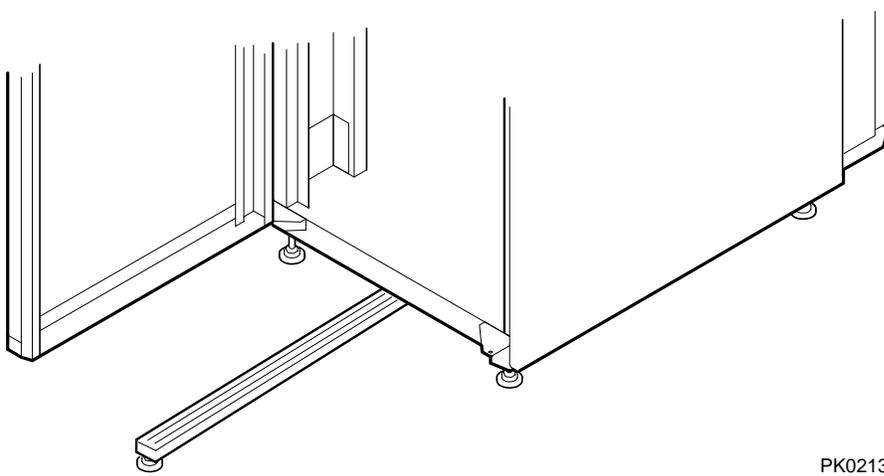
Front

1. Starting at the top marked hole put two hex screws ❶ through the rack rail and the slide bracket ❷. Fasten with a 2-hole nut bar ❸.
2. Fit the posts of a 2-post nut bar ❹ into the holes in the cabinet rail and slide bracket ❷ and fasten with nuts ❺.
3. Repeat the procedure for the other rail.

Back

4. Starting at the top marked hole put two hex screws ❶ through the rack tail and the slide bracket ❷. Fasten with a 2-hole nut bar ❸.
5. Fit the posts of a 2-post nut bar ❹ into the holes in the cabinet rail and slide bracket ❷ and fasten with nuts ❺.
6. Repeat the procedure for the other rail.

Figure 3-8 Stabilizing the Rack



PK0213

The system is intended for installation in one of the following racks, which are equipped with a stabilizer bar:

- H9A10 M-Series Medium Rack
- H9A15 M-Series Tall Rack

Pull out the stabilizer bar and extend the leveler foot to the floor before installing the system.

If you are using a rack other than those listed above, install rack stabilizing feet or provide other means to stabilize the rack before installing the system.

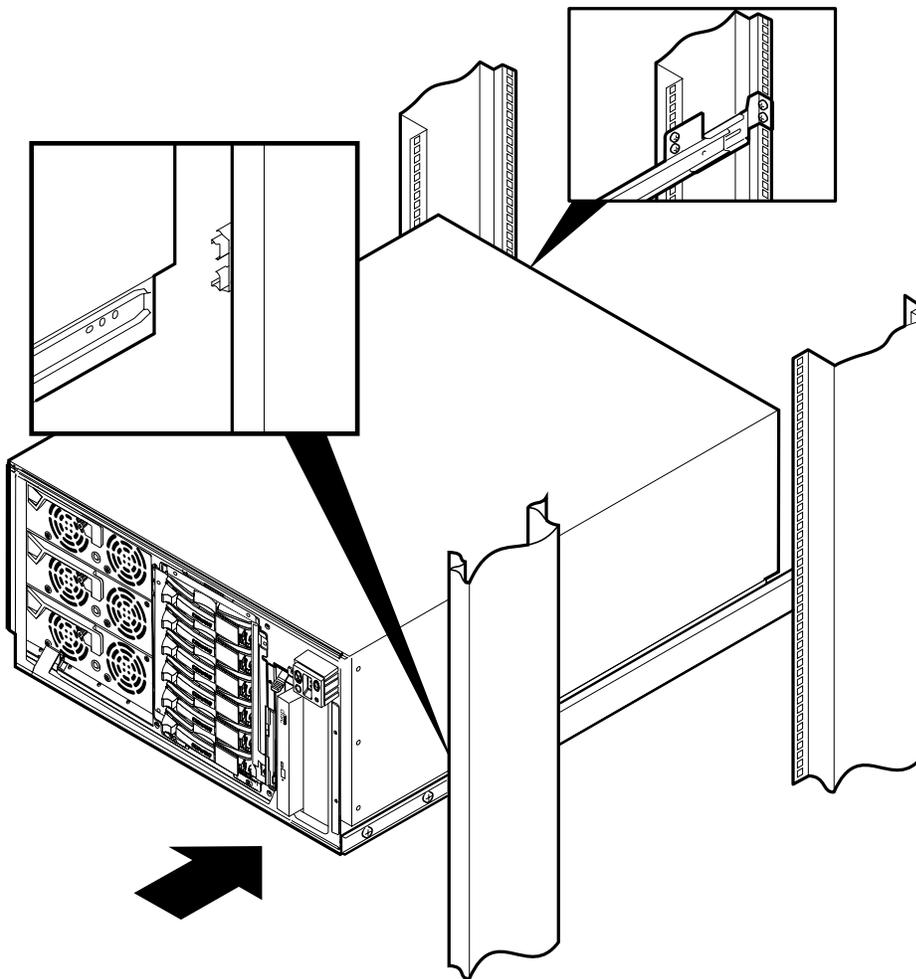
3.8 Installing the System Chassis



WARNING: The system is very heavy. Do not attempt to lift it manually. Use a material lift or other mechanical device.

Before installing the system, make sure that all other hardware in the rack is pushed in and attached.

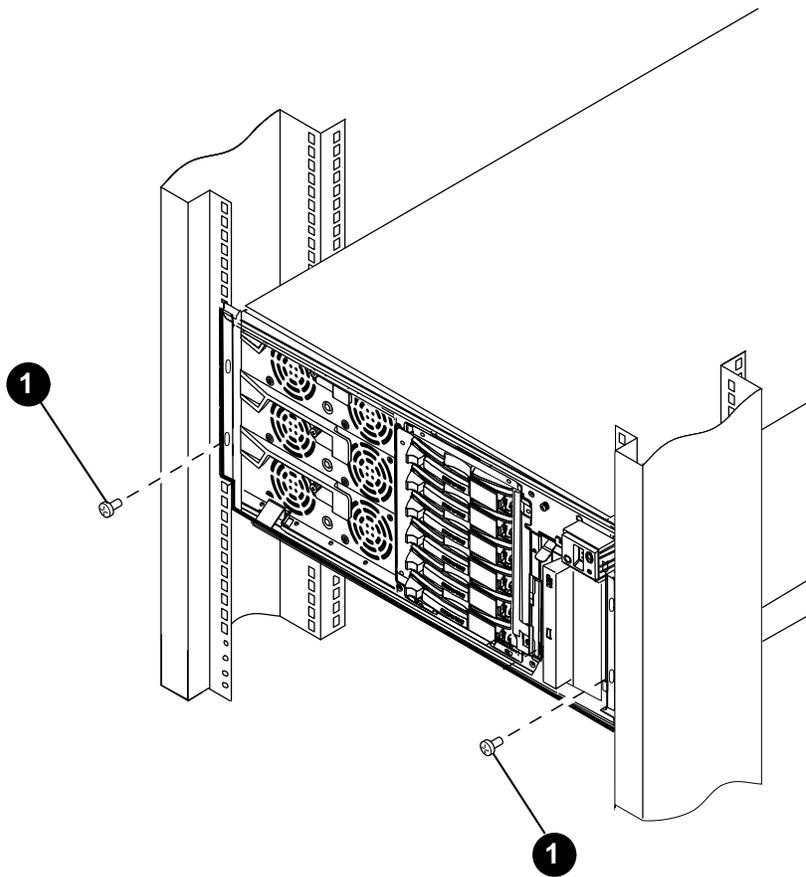
Figure 3-9 Installing the System into an M-Series Rack



CAT0153

1. Extend the fixed portion of the chassis slide until you hear a click. Ensure that the inner ball bearing slide on the chassis slide is pulled to the front of the rail.
2. Align the narrow segment of the slides attached to the system with the slides attached to the rack, and slide the system onto the rail.
3. Depress the green release button on each side and slide the system completely into the rack.
4. Install U-nuts at locations marked for two shipping screws.
5. Install two 10-32 x .500-inch hex head shipping screws **1** and tighten.

Figure 3-10 Installing Shipping Screws

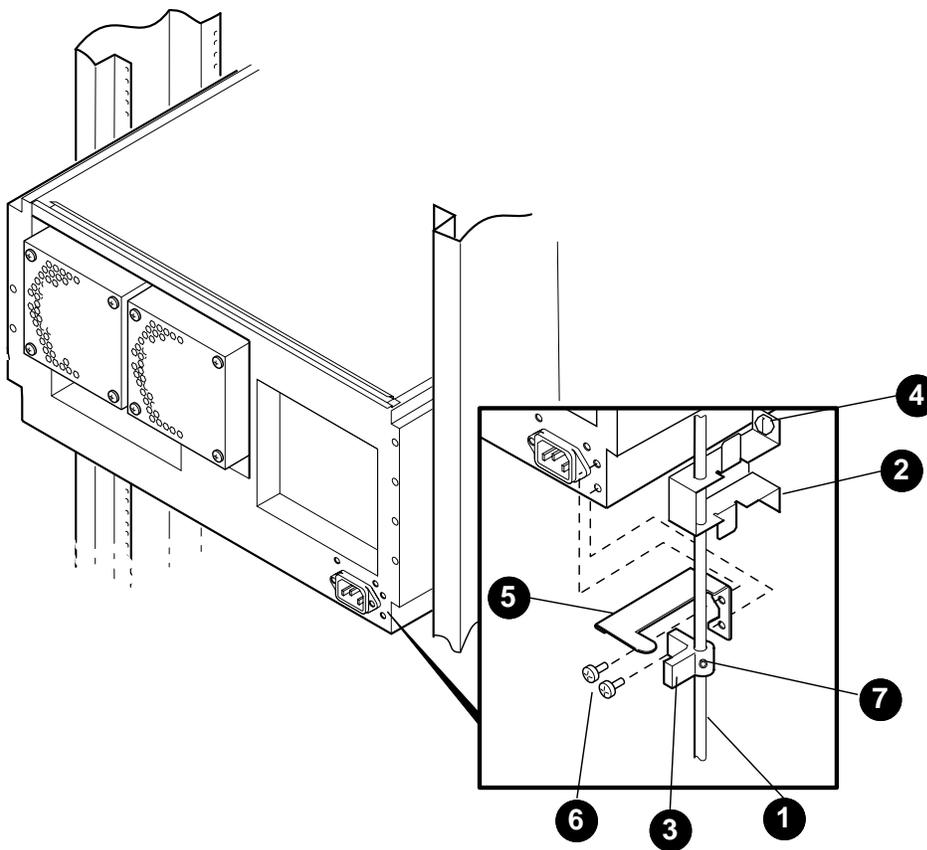


CAT0157B

3.9 Installing the Interlock System

The M-series racks have an interlock system that ensures stability by allowing only one system at a time to be pulled out of the rack. The stabilizer bracket and actuator latch only work in a rack equipped with the interlock system.

Figure 3-11 Installing the Interlock System



PK0965



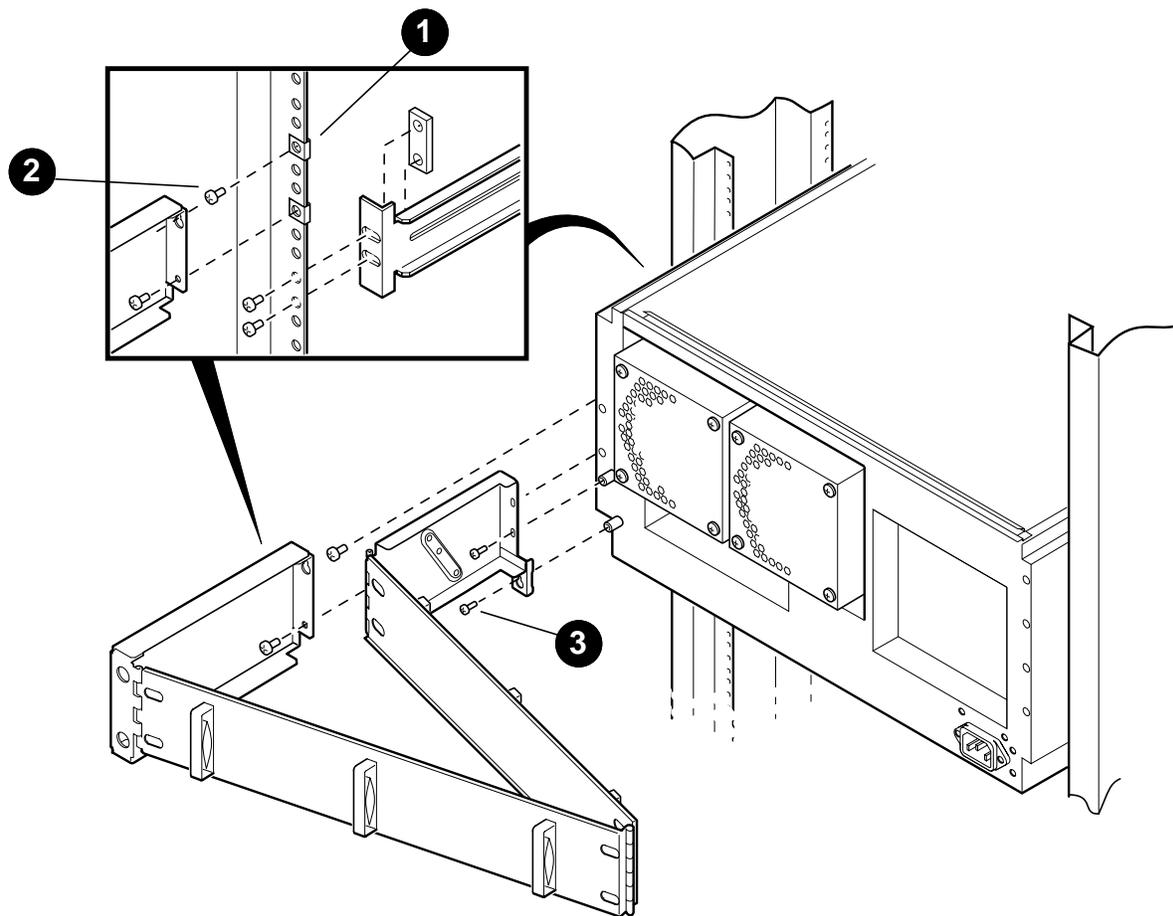
WARNING: If you are installing a rack that does not have the interlock system, you must ensure rack stability by installing rack stabilizing feet or by some other means.

1. At the back of the rack, release the vertical bar ❶ of the interlock system.
2. Insert the stabilizer bracket ❷ and the actuator latch ❸ into the vertical bar so that the actuator latch is below the stabilizer bracket.
3. Reinstall the vertical bar.
4. Secure the stabilizer bracket to the two remaining marked holes on the right rack rail with two 10-32 x .500-inch hex screws ❹. Tighten into the u-nuts.
5. Install the trip mechanism ❺ onto the chassis using two M5 x 8 mm screws ❻.
6. Vertically position the actuator latch ❸ such that the trip mechanism ❺ on the system aligns with the actuator latch.
7. Rotate the actuator latch to orient it like the other actuator latches on the vertical bar.
8. Tighten the Allen screws ❼ on the actuator latch.

3.10 Installing the Cable Management Arm

Attach the cable management arm to the rear rails of the rack. Be sure that you have attached all cables to the rear of the unit before installing the cable management arm.

Figure 3-12 Installing the Cable Management Arm



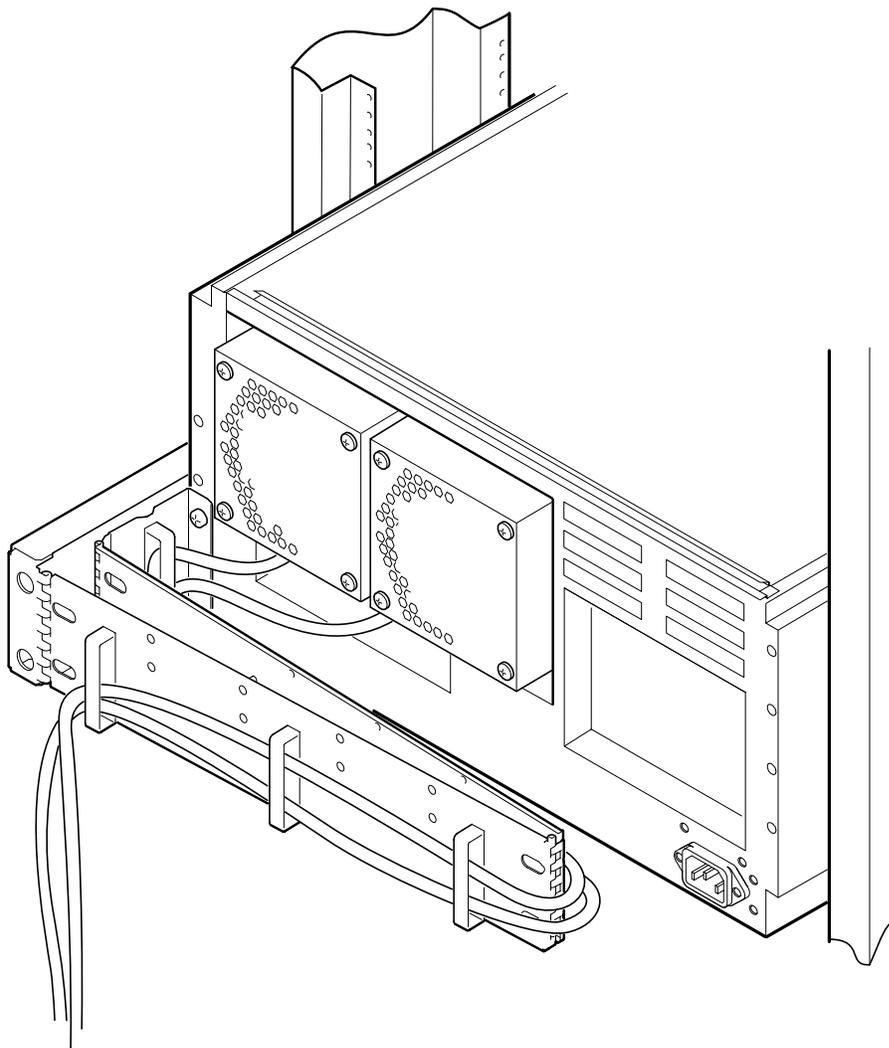
PK0966

1. Clip U-nuts **❶** over the holes in the vertical rail corresponding to the holes in the cable management bracket.
2. Attach the cable management bracket to the rack with two 10-32 x .5-inch screws **❷**.
3. Attach the cable management bracket to the chassis with two M3 x 10 mm screws **❸**.

3.11 Dressing the Cables

Dress the cables through the cable clamps on the cable retractor assembly at the rear of the system.

Figure 3-13 Dressing the Cables



PK1223

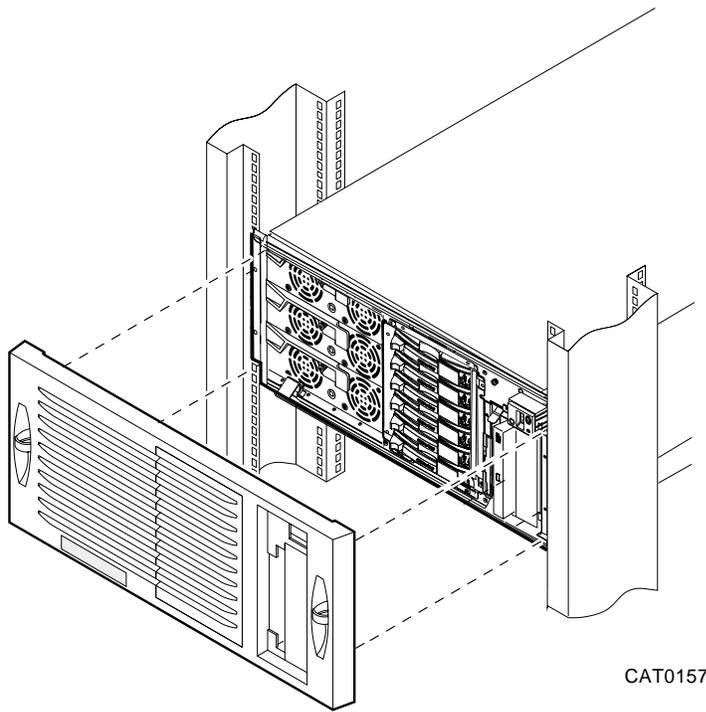
1. Dress the cables through the cable clamps or tie wrap them to the cable retractor assembly.
2. Attach all cables to the member of the cable management arm that is attached to the system.

CAUTION: *Failure to attach the cables to the attached member of the management arm may cause cables to become disconnected.*

3.12 Attaching the Front Bezel

To complete the installation, align the front bezel with the front of the system and snap it into place.

Figure 3-14 Attaching the Front Bezel



Chapter 4

Booting and Installing an Operating System

This chapter gives instructions for booting the *Tru64 UNIX*, *OpenVMS*, and *Linux* operating systems and for starting an operating system installation. It also describes how to switch from one operating system to another. Refer to your operating system documentation for complete instructions on booting or starting an installation.

The following topics are included:

- Setting boot options
- Booting *Tru64 UNIX*
- Starting a *Tru64 UNIX* installation
- Booting *Linux*
- Booting *OpenVMS*
- Starting an *OpenVMS* installation

NOTE: *Your system may have been delivered to you with factory-installed software (FIS); that is, with a version of the operating system already installed. If so, refer to the FIS documentation included with your system to boot your operating system for the first time. Linux-ready systems do not come with factory-installed software.*

4.1 Setting Boot Options

You can set a default boot device, boot flags, and network boot protocols for Tru64 UNIX or OpenVMS using the SRM set command with environment variables. Once these environment variables are set, the boot command defaults to the stored values. You can override the stored values for the current boot session by entering parameters on the boot command line.

The SRM boot-related environment variables are listed below and described in the following sections.

auto_action	Determines the default action the system takes when the system is power cycled, reset, or experiences a failure.
bootdef_dev	Device or device list from which booting is to be attempted when no path is specified on the command line.
boot_file	Specifies a default file name to be used for booting when no file name is specified by the boot command.
boot_osflags	Defines parameters (boot flags) used by the operating system to determine some aspects of a system bootstrap.
ei*0_inet_init or ew*0_inet_init	Determines whether the interface's internal Internet database is initialized from nvram or from a network server (through the bootp protocol). Set this environment variable if you are booting <i>Tru64 UNIX</i> from a RIS server.
ei*0_protocols or ew*0_protocols	Defines a default network boot protocol (bootp or mop).

4.1.1 auto_action

The **auto_action** environment variable specifies the action the console takes any time the system powers up, fails, or resets. The value of **auto_action** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The default setting for **auto_action** is **halt**. With this setting, the system stops in the SRM console after being initialized. To cause the operating system to boot automatically after initialization, set the **auto_action** environment variable to **boot** or **restart**.

- When **auto_action** is set to **boot**, the system boots from the default boot device specified by the value of the **bootdef_dev** environment variable.
 - When **auto_action** is set to **restart**, the system boots from whatever device it booted from before the shutdown/reset or failure.
-

NOTE: *After you set the **auto_action** environment variable, it is recommended that you set the boot device and operating system flags as well, using the **set bootdef_dev** and **set boot_osflags** commands.*

The syntax is:

set auto_action value

The options for value are:

halt	The system remains in console mode after power-up or a system crash.
boot	The operating system boots automatically after the SRM init command is issued or the Reset button is pressed.
restart	The operating system boots automatically after the SRM init command is issued or the Reset button is pressed, and it also reboots after an operating system crash.

Examples

In the following example, the operator sets the **auto_action** environment variable to **restart**. The device specified with the **bootdef_dev** environment variable is **dka0**. When *Tru64 UNIX* is shut down and rebooted, the system will reboot from **dka0**.

```
P00>>> show auto_action
auto_action          halt
P00>>> set auto_action restart
P00>>> init
.
.
.
P00>>> show auto_action
auto_action          restart
P00>>> show bootdef_dev
bootdef_dev          dka0
P00>>> boot
...
[Log in to UNIX and shutdown/reboot]
#shutdown -r now
...
console will boot from dka0
```

In the following example, **auto_action** is set to **restart**, but *Tru64 UNIX* is booted from a device other than the device set with **bootdef_dev**. When *Tru64 UNIX* is shut down and rebooted, the system reboots from the specified device.

```
P00>>> boot dka100
.
.
.
[Log in to UNIX and shutdown/reboot]
#shutdown -r now
...
console will boot from dka100
```

4.1.2 bootdef_dev

The **bootdef_dev** environment variable specifies one or more devices from which to boot the operating system. When more than one device is specified, the system searches in the order listed and boots from the first device with operating system software.

Enter the **show bootdef_dev** command to display the current default boot device. Enter the **show device** command for a list of all devices in the system.

The syntax is:

set bootdef_dev *boot_device*

boot_device The name of the device on which the system software has been loaded. To specify more than one device, separate the names with commas.

Example

In this example, two boot devices are specified. The system will try booting from dkb0 and if unsuccessful, will boot from dka0.

```
P00>>> set bootdef_dev dkb0, dka0
```

NOTE: *When you set the **bootdef_dev** environment variable, it is recommended that you set the operating system boot parameters as well, using the **set boot_osflags** command.*

4.1.3 boot_file

The boot_file environment variable specifies the default file name to be used for booting when no file name is specified by the boot command. The factory default value is null.

The syntax is:

set boot_file *filename*

Example

In this example, the system is set to boot from dka0.

```
P00>>> set boot_file dka0
```

4.1.4 boot_osflags

The `boot_osflags` environment variable sets the default boot flags and, for OpenVMS, a root number.

Boot flags contain information used by the operating system to determine some aspects of a system bootstrap. Under normal circumstances, you can use the default boot flag settings.

To change the boot flags for the current boot only, use the *flags_value* argument with the **boot** command.

The syntax is:

```
set boot_osflags flags_value
```

The *flags_value* argument is specific to the operating system.

Tru64 UNIX Systems

Tru64 UNIX systems take a single ASCII character as the *flags_value* argument.

- a** Load operating system software from the specified boot device (autoboot). Boot to multiuser mode.
- i** Prompt for the name of a file to load and other options (boot interactively). Boot to single-user mode.
- s** Stop in single-user mode. Boots */vmunix* to single-user mode and stops at the # (root) prompt.
- D** Full dump; implies “s” as well. By default, if *Tru64 UNIX* crashes, it completes a partial memory dump. Specifying “D” forces a full dump at system crash.

Example

The following setting will autoboot *Tru64 UNIX* to multiuser mode when you enter the **boot** command.

```
P00>>> set boot_osflags a
```

Linux Systems

The *flags_value* argument for *Linux* is 0 (zero).

Flags_value Arguments for Red Hat Distribution

- 0 Halt. (Do not set init default to this value.)
- 1 Single-user mode.
- 2 Multiuser, without NFS (same as 3, if you do not have networking)
- 3 Full multiuser mode (Default)
- 4 Unused
- 5 X11
- 6 Reboot. (Do not set init default to this value.)

Flags_value Arguments for SuSE Distribution

- 0 Halt. (Do not set init default to this value.)
- S Single-user mode. (Default)
- 1 Multiuser without network
- 2 Multiuser with network
- 3 Multiuser with network and xdm
- 6 Reboot. (Do not set init default to this value.)

Single-user mode is typically used for troubleshooting. To make system changes at this run level, you must have read/write privileges. The command to boot *Linux* into single-user mode is similar to the following example, where “/” root is in partition 2 of DKA0, and the kernel is in /boot/compaq.gz.

```
P00>>> boot -file 2/boot/compaq.gz -flags "root=/dev/sda2 rw s"
```

Example

This following command sets the **boot_osflags** environment variable for *Linux*:

```
P00>>> set boot_osflags 0
```

OpenVMS Systems

OpenVMS systems require an ordered pair as the *flags_value* argument: *root_number* and *boot_flags*.

root_number Directory number of the system disk on which *OpenVMS* files are located. For example:

<i>root_number</i>	Root Directory
--------------------	----------------

0 (default)	[SYS0.SYSEXEXE]
-------------	-----------------

1	[SYS1.SYSEXEXE]
---	-----------------

2	[SYS2.SYSEXEXE]
---	-----------------

3	[SYS3.SYSEXEXE]
---	-----------------

boot_flags The hexadecimal value of the bit number or numbers set. To specify multiple boot flags, add the flag values (logical OR). For example, the flag value 10080 executes both the 80 and 10000 flag settings. See Table 4–1.

Table 4–1 OpenVMS Boot Flag Settings

Flags_Value	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to a running system.
4	2	Stop at initial system breakpoint.
8	3	Perform diagnostic bootstrap.
10	4	Stop at the bootstrap breakpoints.
20	5	Omit header from secondary bootstrap image.
80	7	Prompt for the name of the secondary bootstrap file.
100	8	Halt before secondary bootstrap.
10000	16	Display debug messages during booting.
20000	17	Display user messages during booting.

Examples

In the following *OpenVMS* example, *root_number* is set to 2 and *boot_flags* is set to 1. With this setting, the system will boot from root directory SYS2.SYSEXE to the SYSBOOT prompt when you enter the **boot** command.

```
P00>>> set boot_osflags 2,1
```

In the following *OpenVMS* example, *root_number* is set to 0 and *boot_flags* is set to 80. With this setting, you are prompted for the name of the secondary bootstrap file when you enter the **boot** command.

```
P00>>> set boot_osflags 0,80
```

4.1.5 ei*0_inet_init or ew*0_inet_init

The **ei*0_inet_init** or **ew*0_inet_init** environment variable determines whether the interface's internal Internet database is initialized from nvram or from a network server (through the bootp protocol). Legal values are **nvram** and **bootp**. The default value is **bootp**. Set this environment variable if you are booting Tru64 UNIX from a RIS server.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters "ei" or "ew," for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when using this command.

The syntax is:

set ei*0_inet_init *value* or
set ew*0_inet_init *value*

The *value* is one of the following:

nvram Initializes the internal Internet database from nvram.
bootp Initializes the internal Internet database from a network server through the bootp protocol.

Example

```
P00>>> set ewa0_inet_init bootp
```

4.1.6 ei*0_protocols or ew*0_protocols

The ei*0_protocols or ew*0_protocols environment variable sets network protocols for booting and other functions.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters “ei” or “ew,” for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when entering the command.

The syntax is:

set ei*0_protocols *protocol_value* or
set ew*0_protocols *protocol_value*

The options for *protocol_value* are:

- mop** (default) Sets the network protocol to mop (Maintenance Operations Protocol), the setting typically used with the *OpenVMS* operating system.
- bootp** Sets the network protocol to bootp, the setting typically used with the *Tru64 UNIX* operating system.
- bootp,mop** When both are listed, the system attempts to use the mop protocol first, regardless of which is listed first. If not successful, it then attempts the bootp protocol.

Example

```
P00>>>show device
```

```
dka0.0.0.7.1                    DKA0                    COMPAQ BD018122C9    B016
dka100.1.0.7.1                DKA100                 RZ2CA-LA            N1H0
dka200.2.0.7.1                DKA200                COMPAQ BD018122C9    B016
dka300.3.0.7.1                DKA300                COMPAQ BD00962373    BCJC
dka400.4.0.7.1                DKA400                COMPAQ BD01862376    BCJC
dqa0.0.0.105.0                DQA0                    CD-224E             9.5B
dva0.0.0.0.0                  DVA0
ewa0.0.0.9.0                  EWA0                    00-00-F8-1B-9C-47
P00>>> set ewa0_protocols bootp
P00>>> show ewa0_protocols
ewa0_protocols                bootp
```

4.2 Booting Tru64 UNIX

Tru64 UNIX can be booted from a CD-ROM on a local drive (a CD-ROM drive connected to the system), from a local SCSI disk, or from a UNIX RIS server. Example 4-1 shows a boot from a local SCSI disk drive. The example is abbreviated. For complete instructions on booting Tru64 UNIX, see the *Tru64 UNIX Installation Guide*.

Example 4-1 Booting Tru64 UNIX from a Local SCSI Disk

```
P00>>>boot
/boot dka0.0.0.7.1 -flags A)
block 0 of dka0.0.0.7.1 is a valid boot block
reading 13 blocks from dka0.0.0.7.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 1a00
initializing HWRPB at 2000
initializing page table at 17f5c000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Sun May 14 05:34:40 EDT 2000

Loading vmunix ...
Loading at 0xfffffc0000230000

Sizes:
text = 5122496
data = 946208
bss = 1366480
Starting at 0xfffffc000057e370

Loading vmunix symbol table ... [1416456 bytes]
Alpha boot: available memory from 0x1138000 to 0x17f5a000
Digital UNIX V4.0G (Rev. 1530); Wed Jul 12 11:35:09 EDT 2000
physical memory = 384.00 megabytes.
available memory = 366.14 megabytes.
using 1464 buffers containing 11.43 megabytes of memory
Master cpu at slot 0.
Firmware revision: 5.5-9
PALcode: UNIX version 1.54-51
COMPAQ AlphaStation DS20E 666 MHz
.
.
Starting secondary cpu 1
Checking local filesystems
/sbin/ufs_fsck -p
/dev/rrz0a: 1412 files, 65349 used, 1512300 free (356 frags, 188993 blocks,
0.0)
/dev/rrz0g: File system unmounted cleanly - no fsck needed
Mounting / (root)
user_cfg_pt: reconfigured
```

```
Mounting local filesystems
/dev/rz0a on / type ufs (rw)
/proc on /proc type procfs (rw)
/dev/rz0g on /usr type ufs (rw)
Jul 12 11:40:50 update: started
The system is coming up. Please wait...
Checking for crash dumps
Initializing paging space
Mounting Memory filesystems
Streams autopushes configured
Configuring network
hostname: mech2
Loading LMF licenses
System error logger started
Binary error logger started
Setting kernel timezone variable
ONC portmap service started
NFS IO service started
Mounting NFS filesystems
Preserving editor files
security configuration set to default (BASE).
Successful SIA initialization

Clearing temporary files
Unlocking ptys
SMTP Mail Service started.
Environmental Monitoring Subsystem Configured.
Using snmp service entry port 161.
Can't get a local IP address.
Extensible SNMP master agent started
Base O/S sub-agent started
Server System sub-agent started
Server Management sub-agent started
Compaq Management sub-agent started
Insight Manager Agent started
Environmental Monitoring Daemon started.
Internet services provided.
Cron service started
SuperLAT. Copyright 1994 Meridian Technology Corp. All rights reserved.
LAT started.
Printer service started
The system is ready.
```

Digital UNIX Version V4.0 (mech2) console

login:

Perform the following tasks to boot a *Tru64 UNIX* system:

1. Power up the system. The system stops at the SRM console prompt, P00>>>.
2. Set boot environment variables, if desired. See Section 4.1.
3. Install the boot medium. For a network boot, see Section 4.2.1.
4. Enter the **show device** command to determine the unit number of the drive for your device.
5. Enter the **boot** command and command-line parameters (if you have not set the associated environment variables). In Example 4–1, boot flags have already been set.

4.2.1 Booting Tru64 UNIX over the Network

To boot your Tru64 UNIX system over the network, make sure the system is registered on a Remote Installation Services (RIS) server. See the Tru64 UNIX document entitled *Sharing Software on a Local Area Network* for registration information.

Example 4-2 RIS Boot

```
P00>>> show device
dka0.0.0.7.1          DKA0          COMPAQ BD018122C9  B016
dka200.2.0.7.1       DKA200        COMPAQ BD018122C9  B016
dqa0.0.0.105.0       DQA0          CD-224E           9.5B
dva0.0.0.0.0         DVA0
ewa0.0.0.9.0         EWA0          00-00-F8-1B-9C-47
pka0.7.0.7.1         PKA0          SCSI Bus ID 7
pkb0.7.0.6.0         PKB0          SCSI Bus ID 7
pkc0.7.0.106.0      PKC0          SCSI Bus ID 7
P00>>>

P00>>> set ewa0_protocols bootp
P00>>> set ewa0_inet_init bootp
P00>>> boot ewa0 Da
.
.
.
```

Systems running *Tru64 UNIX* support network adapters, designated ew*0 or ei*0. The asterisk stands for the adapter ID (a, b, c, and so on).

1. Power up the system. The system stops at the SRM console prompt, P00>>>.
2. Set boot environment variables, if desired. See Section 4.1.
3. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
4. Enter the following commands. Example 4–2 assumes you are booting from ewa0. If you are booting from another drive, enter that device name instead.

```
P00>>> set ewa0_protocols bootp
P00>>> set ewa0_inet_init bootp
```

The first command ❷ enables the bootp network protocol for booting over the Ethernet controller. The second command ❸ sets the internal Internet database to initialize from the network server through the bootp protocol.

5. Enter the **boot** command ❹ and command-line parameters (if you have not set the associated environment variables). In Example 4–2 the **boot** command sets the system to boot automatically from ewa0 and specifies a full memory dump (Da) in case of a system shutdown.

For complete instructions on booting *Tru64 UNIX* over the network, see the *Tru64 UNIX Installation Guide*.

4.3 Starting a Tru64 UNIX Installation

Tru64 UNIX is installed from the CD-ROM drive connected to the system. The display that you see after you boot the CD depends on whether your system console is a VGA monitor or a serial terminal.

Example 4-3 Text-Based Installation Display

```
P00>>> b dqa0
/boot dqa0.0.0.15.0 -flags a
block 0 of dqa0.0.0.15.0 is a valid boot block
reading 16 blocks from dqa0.0.0.15.0
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 2000
initializing HWRPB at 2000
initializing page table at 1fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

Tru64 UNIX boot - Thu Dec 16 15:03:19 EST 1999

Loading vmunix ...

.

Initializing system for Tru64 UNIX installation. Please wait...

*** Performing CDROM Installation

Loading installation process and scanning system hardware.

Welcome to the UNIX Installation Procedure

This procedure installs UNIX onto your system. You will be asked a series of system configuration questions. Until you answer all questions, your system is not changed in any way.

During the question and answer session, you can go back to any previous question and change your answer by entering: history
You can get more information about a question by entering:
help

There are two types of installations:

- o The Default Installation installs a mandatory set of software subsets on a predetermined file system layout.
- o The Custom Installation installs a mandatory set of software subsets plus optional software subsets that you select. You can customize the file system layout.

The UNIX Shell option puts your system in single-user mode with superuser privileges. This option is provided for experienced UNIX system administrators who want to perform file system or disk maintenance tasks before the installation.

The Installation Guide contains more information about installing UNIX.

- 1) Default Installation
- 2) Custom Installation
- 3) UNIX Shell

Enter your choice:

1. Boot the operating system from the CD-ROM drive connected to the system.
2. Follow the *Tru64 UNIX* installation procedure that is displayed after the installation process is loaded.
 - If your system console is a VGA monitor, the X Server is started and an Installation Setup window is displayed. Click on the fields in the Installation Setup window to enter your responses to the installation procedure.
 - If your system console is a serial terminal, a text-based installation procedure is displayed, as shown in Example 4-3. Enter the choices appropriate for your system.

See the *Tru64 UNIX Installation Guide* for complete installation instructions.

4.4 Booting Linux

Obtain the Linux installation document and install Linux on the system. Then verify the firmware version, boot device, and boot parameters, and issue the boot command.

The procedure for installing *Linux* on an Alpha system is described in the Alpha *Linux* installation document for your *Linux* distribution. The installation document can be downloaded from the following Web site:

<http://www.compaq.com/alphaserver/linux>

You need V5.6-3 or higher of the SRM console to install *Linux*. If you have a lower version of the firmware, you will need to upgrade. For instructions and the latest firmware images, see the following URL.

<http://ftp.digital.com/pub/DEC/Alpha/firmware/>

Linux Boot Procedure

1. Power up the system to the SRM console and enter the **show version** command to verify the firmware version.

```
P00>> show version
version                               V5.6-3 Nov 30 1999 08:36:11
P00>>
```

2. Enter the show device command to determine the unit number of the drive for your boot device, in this case dka0.0.0.17.0.

```
P00>>>sh dev
dka0.0.0.17.0      DKA0          COMPAQ BD018122C9  B016
dka200.2.0.7.1    DKA200       COMPAQ BD018122C9  B016
dqa0.0.0.105.0    DQA0          CD-224E           9.5B
dva0.0.0.0.0      DVA0
ewa0.0.0.9.0      EWA0          00-00-F8-1B-9C-47
pka0.7.0.7.1      PKA0          SCSI Bus ID 7
pkb0.7.0.6.0      PKB0          SCSI Bus ID 7
pkc0.7.0.106.0    PKC0          SCSI Bus ID 7
P00>>>
```

3. After installing *Linux*, set **boot** environment variables to configure boot parameters for Red Hat 6.2, SuSE 6.4, or TurboLinux 6.0. This example shows settings for booting from the system hard drive (DKA0).

```
P00>>>set bootdef_dev dka0
P00>>>set boot_file
P00>>>set boot_osflags 0
P00>>>show boot*
boot_dev                dka0.0.0.17.0
boot_file
boot_osflags            0
boot_reset             OFF
bootdef_dev
booted_dev
booted_file
booted_osflags
```

4. From SRM enter the **boot** command. The following example shows abbreviated **boot** output.

Example 4-4 Linux Boot Output

```
P00>>>boot
/boot dka0.0.0.17.0 -flags 0)
block 0 of dka0.0.0.17.0 is a valid boot block
reading 152 blocks from dka0.0.0.17.0
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 13000
initializing HWRPB at 2000
initializing page table at 3ff46000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
about: Linux/Alpha SRM bootloader version 0.5
about: switching to OSF/1 PALcode version 1.72
about: valid disklabel found: 2 partitions.
about: booted_dev='scsi 0 17 0 0 0 0 0', guessing boot_device='sda2'
about: loading compressed boot/vmlinux.gz...
about: ok, now starting the kernel...
Linux version 2.2.14 (jestabro@linux04) (gcc version egcs-2.91.66
19990314/Linux (egcs-1.1.2 release)) #1 SMP Wed Jan 26 15:55:11 EST 2000
Jul 24 13:03:21 emperor kernel: Booting GENERIC on Tsunami variation
Catamaran using machine vector DP264 from SRM
Command line: root=/dev/sda2 bootdevice=sda2 bootfile=boot/vmlinux.gz
SMP: 2 CPUs probed -- cpu_present_mask = 3
Console: colour VGA+ 80x25
Calibrating delay loop... 996.15 BogoMIPS
Memory: 2070232k available
Dentry hash table entries: 262144 (order 9, 4096k)
Buffer cache hash table entries: 524288 (order 9, 4096k)
Page cache hash table entries: 262144 (order 8, 2048k)
VFS: Diskquotas version dquot_6.4.0 initialized
POSIX conformance testing by UNIFIX
```

```

SMP starting up secondaries.
atd startup succeeded
recv_secondary_console_msg: on 0 message is 'P01>>>START P01>>>'
Calibrating delay loop... 991.95 BogoMIPS
Total of 2 processors activated (1988.10 BogoMIPS).
Alpha PCI BIOS32 revision 0.04
Probing PCI hardware
SMC37c669 Super I/O Controller found @ 0x3f0
Linux NET4.0 for Linux 2.2
Based upon Swansea University Computer Society NET3.039
Unix domain sockets 1.0 for Linux NET4.0.
Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
Hash tables configured (ehash 524288 bhash 65536)
Starting kswapd v 1.5
parport0: PC-style at 0x3bc [SPP]
Detected PS/2 Mouse Port.
Serial driver version 4.27 with no serial options enabled
ttyS00 at 0x03f8 (irq = 4) is a 16550A
ttyS01 at 0x02f8 (irq = 3) is a 16550A
256 Unix98 ptys configured
using parport0 (polling).
RAM disk driver initialized: 16 RAM disks of 4096K size
registered device at major 7
buffer.c:43 spinlock stuck in kflushd at fffffffc00003512a4(1) owner swapper at
ffffffc00003102dc(0) init/main.c:43
CD-224E, ATAPI CDROM drive
ide0 at 0x1f0-0x1f7,0x3f6 on irq 14
io_request_lock is fffffffc00005d9950
buffer.c:43 spinlock grabbed in kflushd at fffffffc00003512a4(1) 2564 ticks
hda: ATAPI 24X CD-ROM drive, 512kB Cache
Uniform CDROM driver Revision: 2.56
Floppy drive(s): fd0 is 2.88M
FDC 0 is a post-1991 82077
Floppy drive(s): fd0 is 2.88M
DAC960: ***** DAC960 RAID Driver Version 2.2.5 of 23 January 2000 *****
DAC960: Copyright 1998-2000 by Leonard N. Zubkoff <lnz@dandelion.com>
DAC960#0: Configuring Mylex DAC960PRL PCI RAID Controller
DAC960#0: Firmware Version: 4.07-0-29, Channels: 1, Memory Size: 4MB
DAC960#0: PCI Bus: 0, Device: 15, Function: 1, I/O Address: Unassigned
DAC960#0: PCI Address: 0xA800000 mapped at 0xA800000, IRQ Channel: 39
DAC960#0: Controller Queue Depth: 124, Maximum Blocks per Command: 128
DAC960#0: Driver Queue Depth: 123, Maximum Scatter/Gather Segments: 33
DAC960#0: Stripe Size: 64KB, Segment Size: 8KB, BIOS Geometry: 128/32
DAC960#0: Physical Devices:
DAC960#0: 0:0 Vendor: DEC Model: RZ1DF-CB (C) DEC Revision: 0372
DAC960#0: Serial Number: 680101914A
DAC960#0: Disk Status: Online, 17772544 blocks
DAC960#0: 0:1 Vendor: SEAGATE Model: ST34501W Revision: 7B00
DAC960#0: Serial Number: LG517138
DAC960#0: Disk Status: Online, 8386560 blocks
DAC960#0: 0:2 Vendor: SEAGATE Model: ST34501W Revision: 7B00
DAC960#0: Serial Number: LG235961
DAC960#0: Disk Status: Online, 8386560 blocks
DAC960#0: Logical Drives:
DAC960#0: /dev/rd/c0d0: RAID-5, Online, 16773120 blocks, Write Thru
qllogicisp : new isp1020 revision ID (5)
scsi0 : QLogic ISP1020 SCSI on PCI bus 00 device 88 irq 47 I/O base 0xb800

```

```
scsi0 : QLogic ISP1020 SCSI on PCI bus 00 device 88 irq 47 I/O base 0xb800
scsi : 1 host.
  Vendor: COMPAQ      Model: BB00921B91      Rev: 3B05
  Type:   Direct-Access      ANSI SCSI revision: 02
Detected scsi disk sda at scsi0, channel 0, id 0, lun 0
scsi : detected 1 SCSI disk total.
SCSI device sda: hwr sector= 512 bytes. Sectors= 17773524 [8678 MB] [8.7 GB]
PPP: version 2.3.7 (demand dialling)
TCP compression code copyright 1989 Regents of the University of California
PPP line discipline registered.
3c59x.c:v0.99H 11/17/98 Donald Becker
http://cesdis.gsfc.nasa.gov/linux/drivers/
vortex.html
tulip.c:v0.89H 5/23/98 becker@cesdis.gsfc.nasa.gov
eth0: Digital DS21142/3 Tulip at 0x8000, 08 00 2b 86 75 9c, IRQ 29.
eth0: EEPROM default media type Autosense.
eth0: Index #0 - Media 10baseT (#0) described by a 21142 Serial PHY (2)
block.
eth0: Index #1 - Media 10baseT-FD (#4) described by a 21142 Serial PHY (2)
block.
eth0: Index #2 - Media 100baseTx (#3) described by a 21143 SYM PHY (4)
block.
eth0: Index #3 - Media 100baseTx-FD (#5) described by a 21143 SYM PHY (4)
block
eth1: Digital DS21142/3 Tulip at 0x8800, 08 00 2b 86 75 9f, IRQ 30.
eth1: EEPROM default media type Autosense.
eth1: Index #0 - Media 10baseT (#0) described by a 21142 Serial PHY (2)
block.
eth1: Index #1 - Media 10baseT-FD (#4) described by a 21142 Serial PHY (2)
block.
eth1: Index #2 - Media 100baseTx (#3) described by a 21143 SYM PHY (4)
block.
eth1: Index #3 - Media 100baseTx-FD (#5) described by a 21143 SYM PHY (4)
block
.
Partition check:
  sda: sda1 sda2
  rd/c0d0: rd/c0d0p1 rd/c0d0p2
VFS: Mounted root (ext2 filesystem) readonly.
Freeing unused kernel memory: 176k freed
Adding Swap: 1028144k swap-space (priority -1)
Adding Swap: 1026032k swap-space (priority -2)
.
.
.
Red Hat Linux release 6.2 (Zoot)
Kernel 2.2.14 on an alpha
login:
```

NOTE: *The Linux banner is slightly different for the SuSE 6.4 and TurboLinux 6.0 distributions.*

4.5 Booting OpenVMS

OpenVMS can be booted from a CD-ROM on a local drive (the CD-ROM drive connected to the system) or from a CD-ROM drive on the InfoServer.

Example 4-5 Booting OpenVMS from the Local CD-ROM Drive

```
P00>>> show device ❶
dka0.0.0.7.1          DKA0          COMPAQ BD018122C9  B016
dka200.2.0.7.1       DKA200        COMPAQ BD018122C9  B016
dqa0.0.0.105.0       DQA0          CD-224E           9.5B
dva0.0.0.0.0         DVA0
ewa0.0.0.9.0         EWA0          00-00-F8-1B-9C-47
pka0.7.0.7.1         PKA0          SCSI Bus ID 7
pkb0.7.0.6.0         PKB0          SCSI Bus ID 7
pkc0.7.0.106.0       PKC0          SCSI Bus ID 7
P00>>>
.
.
.
P00>>> boot -flags 0,0 dka0 ❷
(boot dka0.0.0.7.1 -flags 0,0)
block 0 of dka0.0.0.7.1 is a valid boot block
reading 898 blocks from dka0.0.0.7.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 70400
initializing HWRPB at 2000
initializing page table at 3ffee000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

OpenVMS (TM) Alpha Operating System, Version V7.2-1
```

Example 4–5 shows a boot from a CD-ROM on a local drive. The example is abbreviated. For complete instructions on booting *OpenVMS*, see the *OpenVMS* installation document.

1. Power up the system. The system stops at the SRM console prompt, P00>>>.
2. Set boot environment variables, if desired. See Section 4.1.
3. Install the boot medium. For a network boot, see Section 4.6.
4. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
5. Enter the **boot** command and command-line parameters (if you have not set the associated environment variables.) In Example 4–5, the **boot** command with the **-flags** option ❷ causes the system to boot from [SYS0.EXE] on device DKA0.

4.6 Booting OpenVMS from the InfoServer

You can boot OpenVMS from a LAN device on the InfoServer. The devices are designated EW*0 or EI*0. The asterisk stands for the adapter ID (a, b, c, and so on).

Example 4-6 InfoServer Boot

```
P00>>> show device ❶
dka0.0.0.7.1          DKA0          COMPAQ BD018122C9  B016
dka200.2.0.7.1       DKA200        COMPAQ BD018122C9  B016
dqa0.0.0.105.0       DQA0          CD-224E           9.5B
dva0.0.0.0.0         DVA0
ewa0.0.0.9.0         EWA0          00-00-F8-1B-9C-47
pka0.7.0.7.1         PKA0          SCSI Bus ID 7
pkb0.7.0.6.0         PKB0          SCSI Bus ID 7
pkc0.7.0.106.0       PKC0          SCSI Bus ID 7
P00>>>
.
.
.
P00>>> boot -flags 0,0 -file apb_0721 ewa0 ❷
      (boot ewa0.0.0.9.0 -file APB_0721 -flags 0,0)
Trying MOP boot.
.....
Network load complete.
Host name: CALSUN
Host address: aa-00-04-00-a4-4e
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 70400
initializing HWRPB at 2000
initializing page table at 3ffee000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

Network Initial System Load Function
Version 1.2

③

```
FUNCTION          FUNCTION
ID
1      -          Display Menu
2      -          Help
3      -          Choose Service
4      -          Select Options
5      -          Stop
Enter a function ID value:
```

Enter a function ID Value: 3

④

```
OPTION          OPTION
ID
1      -          Find Services
2      -          Enter known Service Name
```

Enter an Option ID value: 2

Enter a Known Service Name: ALPHA_V72-1_SSB

OpenVMS (TM) Alpha Operating System, Version V7.2-1

1. Power up the system. The system stops at the P00>>> console prompt.
2. Insert the operating system CD-ROM into the CD-ROM drive connected to the InfoServer.
3. Enter the **show device** command ① to determine the unit number of the drive for your device.
4. Enter the **boot** command and any command-line parameters ②. In Example 4-6 the device is EWA0. APB_0721 is the file name of the APB program used for the initial system load (ISL) boot program.

The InfoServer ISL program displays a menu ③.

5. Respond to the menu prompts ④, using the selections shown in this example.

For complete instructions on booting *OpenVMS* from the InfoServer, see the *OpenVMS* installation document.

4.7 Starting an OpenVMS Installation

After you boot the operating system CD-ROM, an installation menu is displayed on the screen. Choose item 1 (Install or upgrade OpenVMS Alpha). Refer to the OpenVMS installation document for information on creating the system disk.

Example 4-7 OpenVMS Installation Menu

OpenVMS (TM) Alpha Operating System, Version V7.2-1
Copyright © 1999 Digital Equipment Corporation. All rights reserved.

Installing required known files...

Configuring devices...

You can install or upgrade the OpenVMS Alpha operating system
or you can install or upgrade layered products that are included
on the OpenVMS Alpha operating system CD-ROM.

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

- 1) Install or upgrade OpenVMS Alpha Version V7.2-1
- 2) Display products that this procedure can install
- 3) Install or upgrade layered products
- 4) Show installed products
- 5) Reconfigure installed products
- 6) Remove installed products
- 7) Execute DCL commands and procedures
- 8) Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/?) 1

1. Boot the *OpenVMS* operating system CD-ROM.
2. Choose option 1 (Install or upgrade OpenVMS Alpha). To create the system disk, see the *OpenVMS* installation document.

Chapter 5

Configuring and Installing Components

This chapter shows how to configure and install user-replaceable components, including DIMMs, PCI or ISA options, power supplies, disk drives, and tape drives. It also covers configuring CPUs, installing a six-slot storage subsystem, AlphaBIOS configuration utilities, and updating firmware.

Installation of components not covered in this chapter is reserved for service providers and customers who have purchased a self-maintenance contract.



WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:

- 1. Remove any jewelry that may conduct electricity.**
 - 2. Wear an antistatic wrist strap when handling internal components.**
-



WARNING: To prevent injury, unplug the power cord before installing components.

Installation Tools

You need the following tools to install components.

- Phillips #2 screwdriver (a magnetic screwdriver is recommended)
- Antistatic wrist strap

5.1 Preparing to Install Components

To prepare your system for installation or replacement of components, assemble the required equipment, perform shutdown procedures, and attach an antistatic wrist strap.

Who should install components?

Refer to the following table to determine who should install or replace components. Components in the "Customer" column can be added or replaced by customers with appropriate technical training and experience. Components in the "Service Provider" column can be replaced only by authorized service providers or customers with a self-maintenance contract.

Customer	Service Provider
DIMMs	System board
CPU upgrades	System feature module
PCI/ISA options	System backplane
Power supply	Fans
Disk drive cages	Combination CD-ROM/floppy disk drive
	Operator control panel

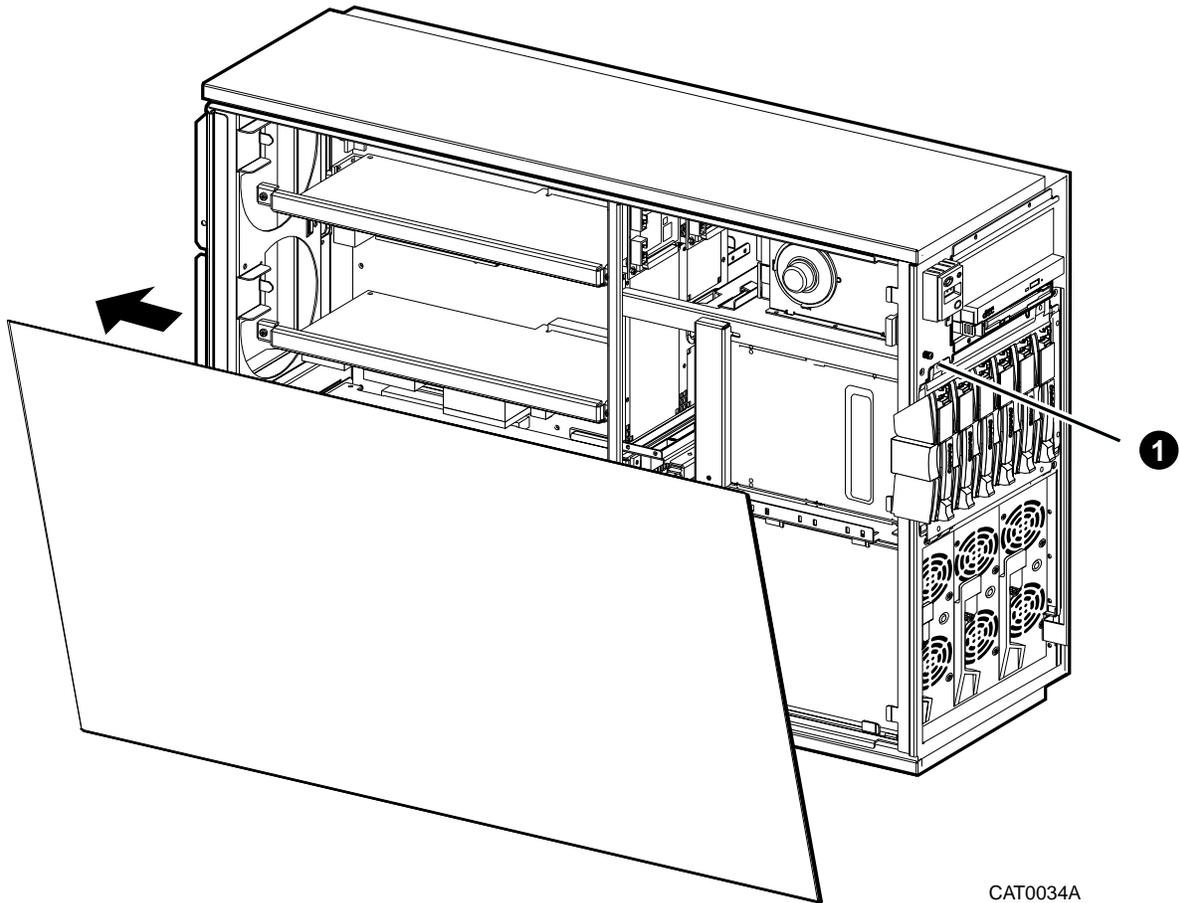
Before installing components:

1. Shut down the operating system, according to the instructions in the operating system documentation.
 2. Shut down peripheral devices.
 3. Press the Power button on the system unit to the Off position.
 4. Unplug the power cord.
 5. Remove the side cover (pedestal) or top cover (rackmount).
 6. Attach an antistatic wrist strap.
-

NOTE: *It is not necessary to shut down the system if you are installing a third power supply for redundancy or if you are replacing a faulty supply in a three-supply configuration.*

5.2 Removing the Side Cover (Pedestal)

Figure 5-1 Removing the Side Cover

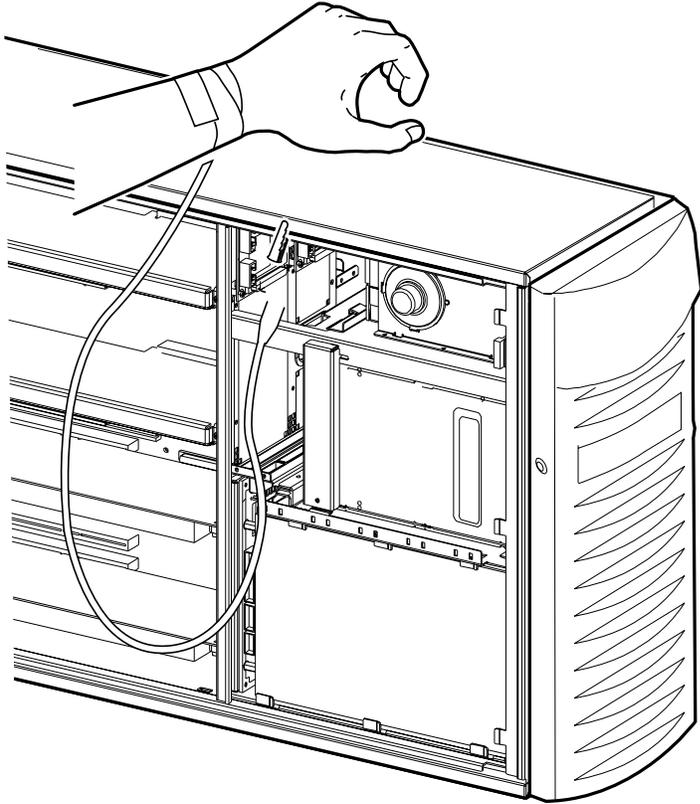


CAT0034A

1. Open the front door.
2. Loosen the thumbscrew **1** that secures the side cover to the chassis.
3. Slide the cover rearward and remove it.

4. Attach an antistatic wrist strap as shown in Figure 5-2.

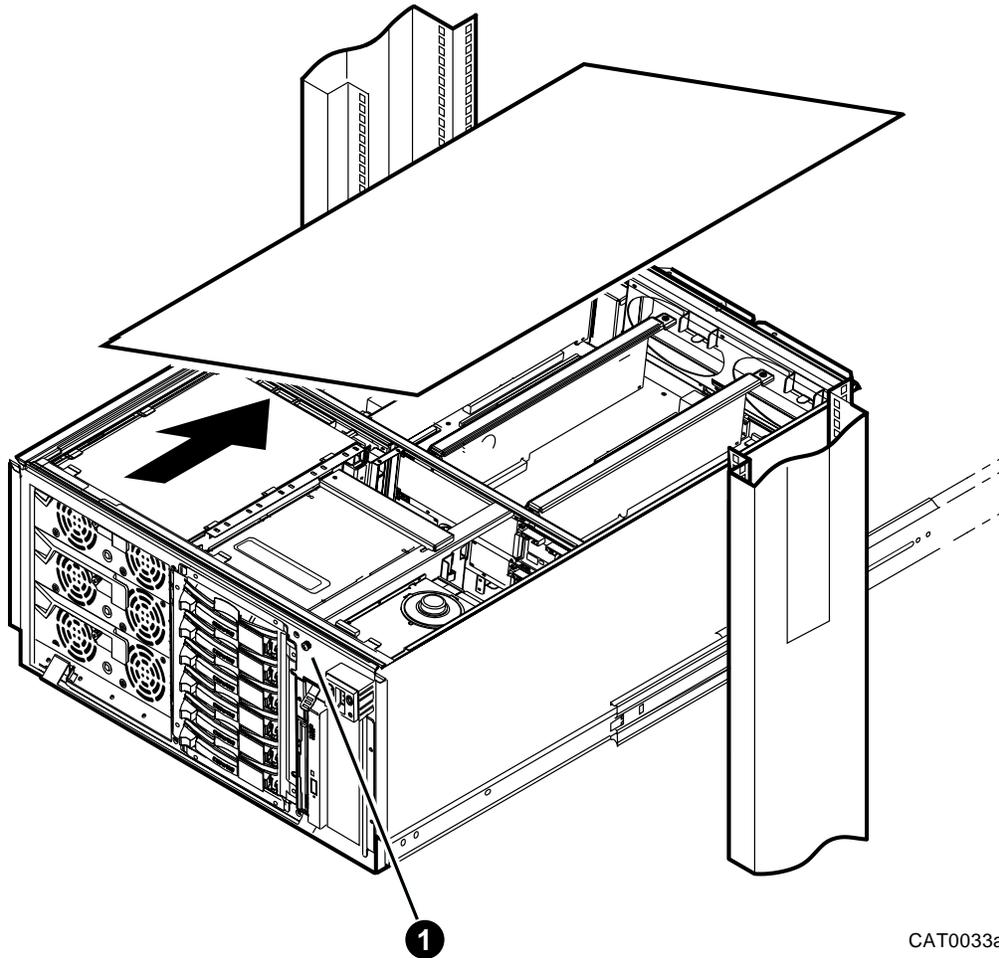
Figure 5-2 Attaching the Antistatic Wrist Strap



CAT0028

5.3 Removing the Top Cover (Rackmount)

Figure 5-3 Removing Top Cover



CAT0033a

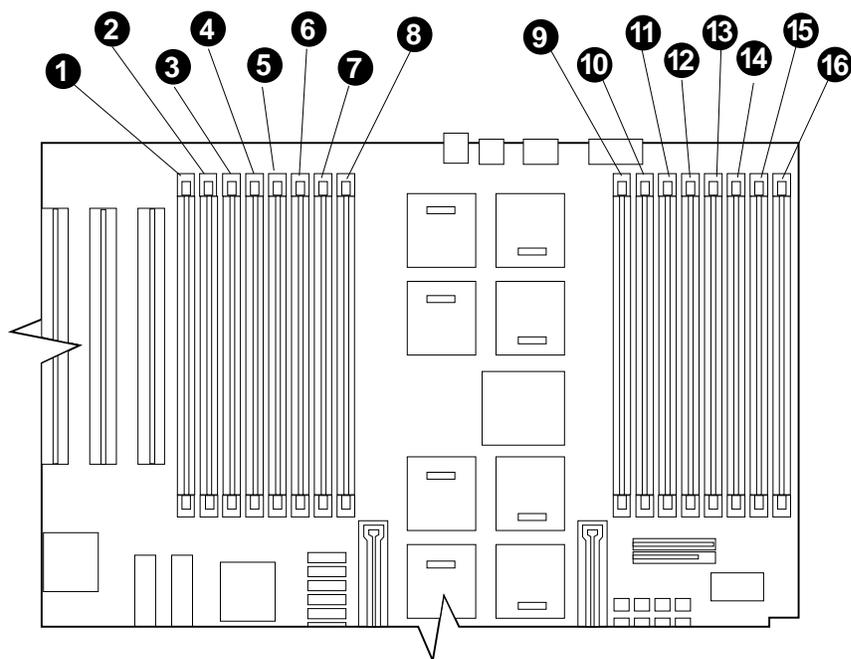
To remove the top cover:

1. Remove the bezel.
2. Loosen the thumbscrew **1** that secures the cover to the chassis.
3. Slide the cover rearward and remove it.
4. Attach an antistatic wrist strap as shown in Figure 5-2.

5.4 Memory Configuration

The system supports a total of 16 DIMMs, divided into four banks of four slots each. DIMMs within a bank must be of the same size and speed. The system supports a maximum of 4 GB of memory.

Figure 5-4 Memory Slot Locations



PKO982

REF #	CONN #	BANK #	REF #	CONN #	BANK #
①	J32	1	②	J31	3
③	J30	1	④	J29	3
⑤	J28	0	⑥	J27	2
⑦	J26	0	⑧	J25	2
⑨	J16	2	⑩	J14	0
⑪	J13	2	⑫	J11	0
⑬	J9	3	⑭	J6	1
⑮	J5	3	⑯	J1	1

PKO983

The following table lists supported memory sizes and the maximum memory for each bank.

<u>BANK 0</u>	<u>BANK 1</u>	<u>BANK 2</u>	<u>BANK 3</u>	<u>TOTAL</u>
<u>32MB x 4</u>	<u>32MB x 4</u>	<u>32MB x 4</u>	<u>32MB x 4</u>	<u>512MB</u>
<u>64MB x 4</u>	<u>64MB x 4</u>	<u>64MB x 4</u>	<u>64MB x 4</u>	<u>1GB</u>
<u>128MB x 4</u>	<u>128MB x 4</u>	<u>128MB x 4</u>	<u>128MB x 4</u>	<u>2GB</u>
<u>256MB x 4</u>	<u>256MB x 4</u>	<u>256MB x 4</u>	<u>256MB x 4</u>	<u>4GB</u>

PKO973

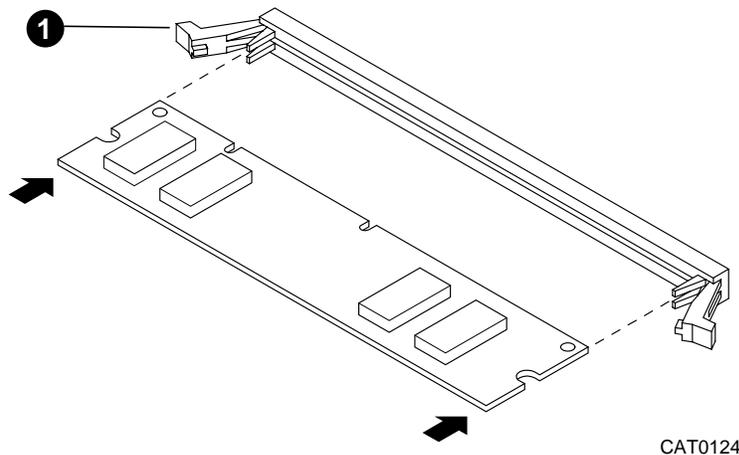
Memory Configuration Rules

- You can install up to 16 DIMMs.
- A maximum of 4 GB of memory is supported.
- There are four memory banks, numbered 0–3, with four slots per bank.
- A memory bank must be populated with four DIMMs of the same size and speed. (See the table above for supported sizes and capacity.)
- Memory banks must be populated in numerical order, starting with bank 0.

5.4.1 Installing and Removing DIMMs

Before installing DIMMs, shut down the operating system, turn off power to the system, and unplug the power cord. Remove the side cover (pedestal) or top cover (rackmount) and attach an antistatic wrist strap.

Figure 5-5 Installing DIMMs

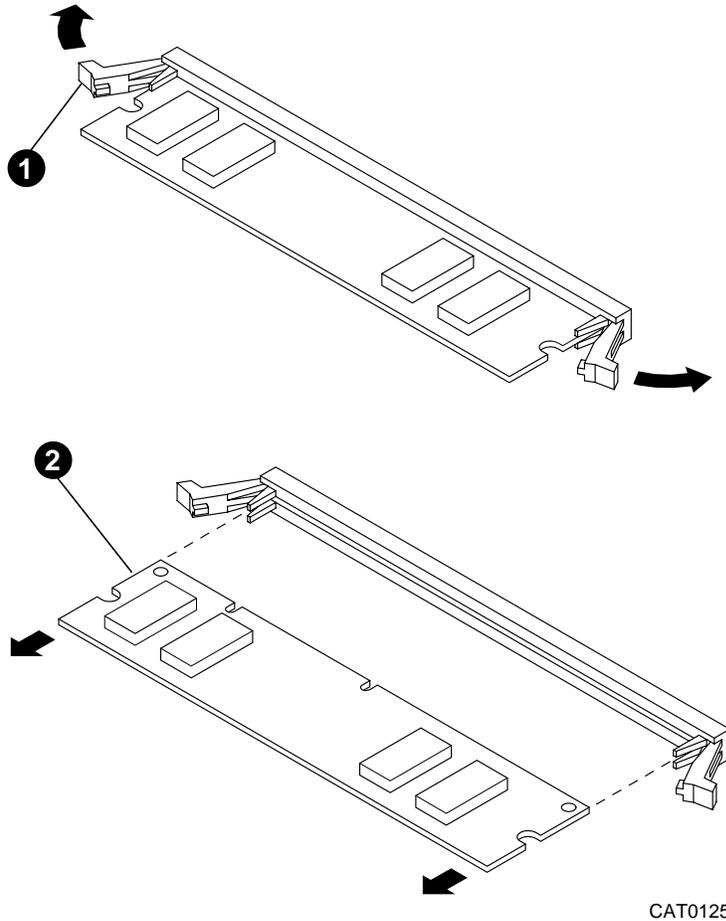


1. Release the latching clips ❶ on the memory connector on the system board.
2. Align the pins of the DIMM with the connector and seat the DIMM firmly in the connector.
3. Secure the DIMM with the latching clips.
4. Replace the side cover (pedestal) or top cover (rackmount).

Verification

1. Turn on power to the system.
2. At the SRM prompt, issue the **show memory** command to display the amount of memory in each bank and the total amount of memory in the system.

Figure 5-6 Removing DIMMs



1. Release the latching clips ❶ on the memory connector on the system board.
2. Pull out the DIMM ❷.

5.5 CPU Configuration

Your system comes with a single Alpha processor installed. You can upgrade by installing a second Alpha processor. This section describes the configuration guidelines for a processor upgrade.

To upgrade to a dual Alpha processor configuration, you must purchase and install one of the following upgrade kits from Compaq. The upgrade kit contains installation instructions.

KN310-BB, -BC, or -BD 500 MHz processor

KN311-BB, -BC, or -BD 667 MHz processor

NOTE: *-BB is for Tru64 UNIX*
-BC is for OpenVMS
-BD is for Linux

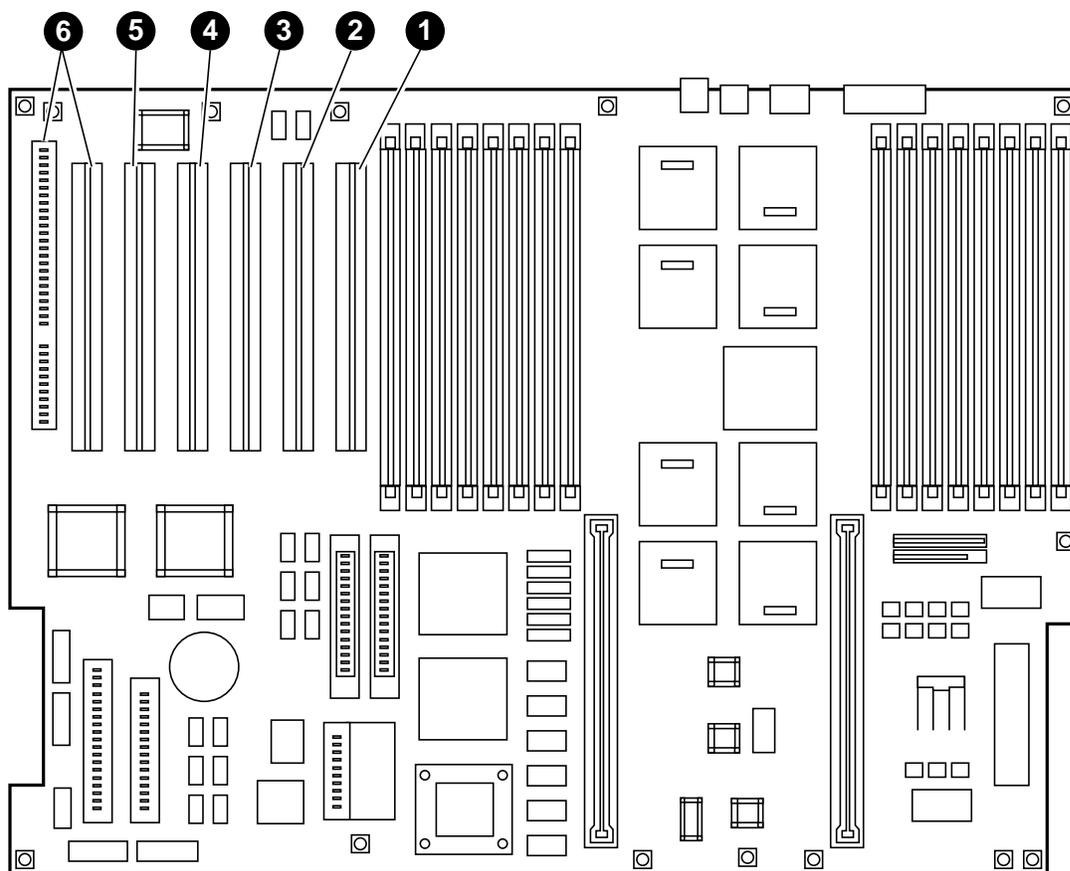
Processor Upgrade Guidelines

- A single processor configuration can be installed in either processor socket.
- A single processor configuration does not require termination in the empty socket.
- Dual processors must be the same speed and same cache size.
- Compaq recommends that dual processor configurations use Alpha processors with the same revisions. Use the show **config | more** command to determine the processor revision.

5.6 Installing a PCI or ISA Option

PCI slot 1 is the rightmost slot in a rackmounted system or the topmost slot in a pedestal system. Slot 1 supports a half-length card only. Slots 2 through 6 support full-length cards. Slot 6 is shared with an ISA slot (ISA slot 1).

Figure 5-7 PCI Slots (Rack Orientation)



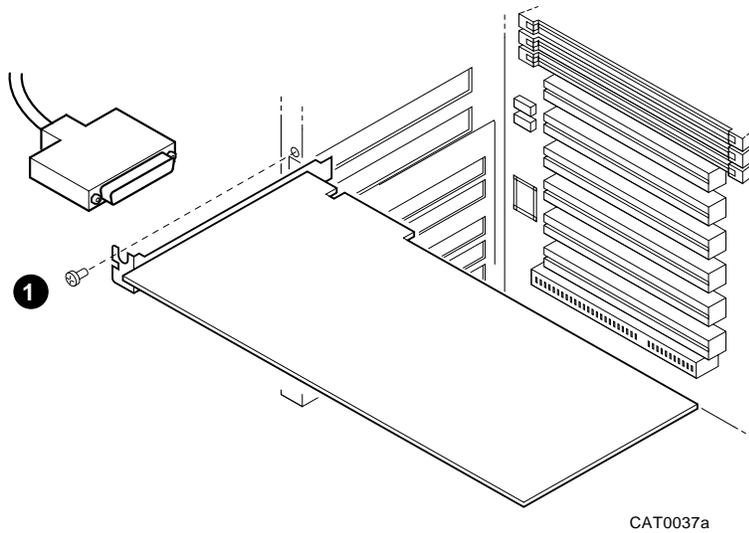
CAT0046

When installing PCI option modules, you do not normally need to perform any configuration procedures. The system configures PCI modules automatically. But because some PCI option modules require configuration utility diskettes, refer to the option documentation.

5.6.1 Installing a PCI Option

Before installing PCI options, shut down the operating system, turn off power to the system, and unplug the power cord. Remove the side cover (pedestal) or top cover (rackmount) and attach an antistatic wrist strap.

Figure 5-8 Installing a PCI Option



To Install a PCI Option

1. Remove the screw ❶ securing the slot cover to the chassis and then remove the slot cover from the system and store it for future use.
2. Carefully install the option module into the appropriate connector on the system board and press it firmly into place.
3. Secure the module using the screw that you removed.
4. Replace the side cover (pedestal) or top cover (rackmount) and plug in the power cords.

Verification

1. Turn on power to the system.
2. At the P00>>> prompt, enter the SRM **show config** command. Examine the PCI bus information in the display to make sure that the new option is listed.
3. If you installed a bootable device, enter the SRM **show device** command to determine the device name.

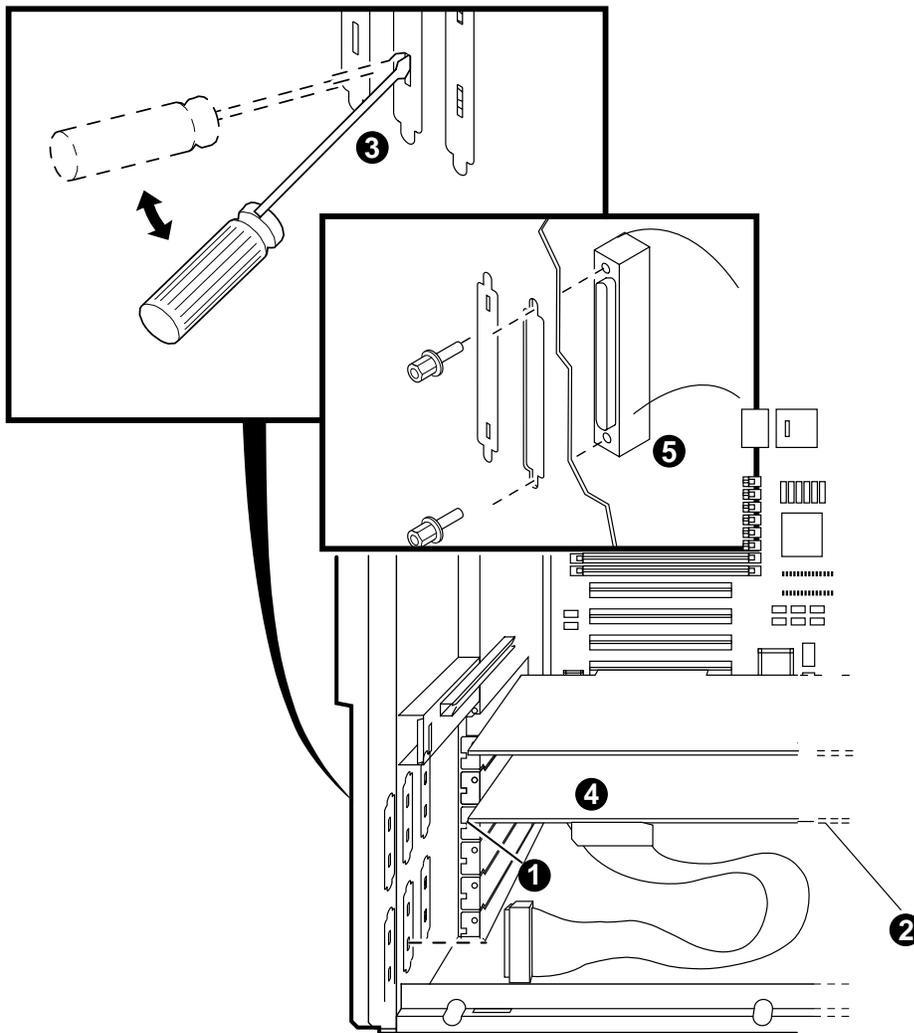
To Remove a PCI Option

1. Disconnect any cables connected to the external (rear) or internal ports on the option module you are removing.
2. Remove the slot cover screw securing the option module to the chassis.
3. Disconnect the option module from the slot connectors on the system board and remove it from the system.
4. If you intend to leave the option slot vacant, install a slot cover and secure it to the chassis using the screw that you removed.
5. Replace the side cover (pedestal) or top cover (rackmount) and plug in the power cords.

5.6.2 Installing a Multichannel SCSI Option

Installing a multichannel SCSI option requires removing a knockout for the PCI cable.

Figure 5-9 Multichannel SCSI Installation



CAT0035a

1. Remove the side cover (pedestal) or top cover (rackmount).
2. Remove the screw ❶ securing the slot cover to the chassis and then remove the slot cover from the system and store it for future use.
3. Install the option module ❷ into the appropriate connector on the system board and press it firmly into place. Secure using the screw that you removed.
4. Using a screwdriver, remove a knockout ❸ for the PCI cable.
5. Connect one end of the option SCSI cable ❹ to the connector on the option module. Screw the other end into place in the SCSI knockout location ❺ you prepared in step 4.
6. Replace the side cover (pedestal) or top cover (rackmount).

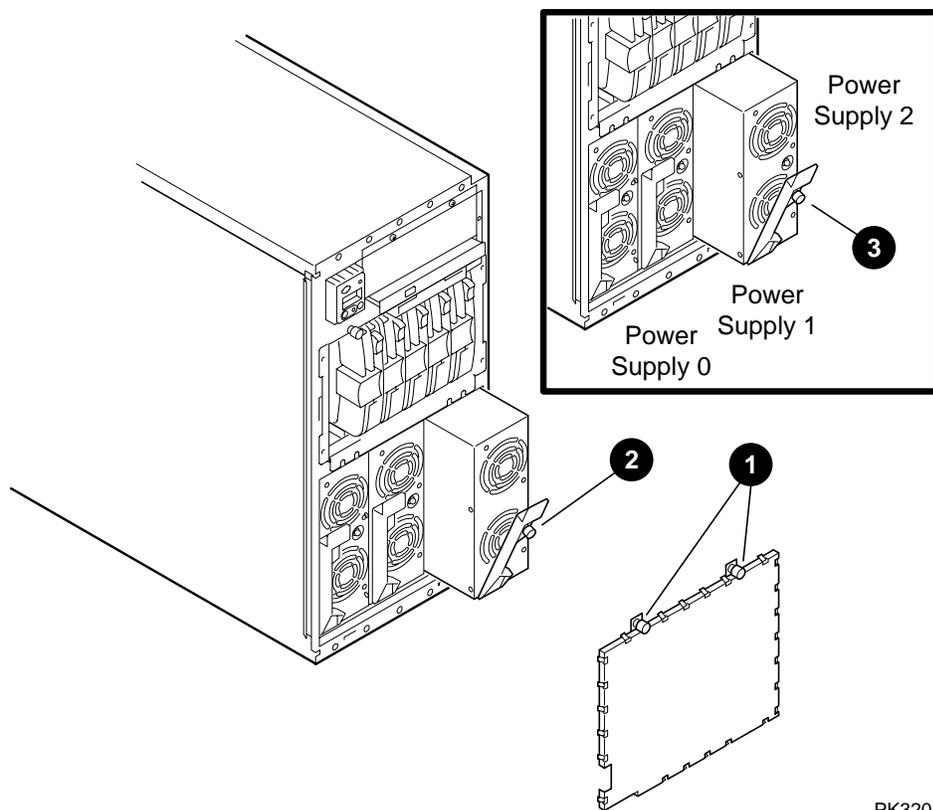
Verification

1. Turn on power to the system.
2. At the P00>>> prompt, enter the SRM **show config** command. Examine the PCI bus information in the display to make sure that the new option is listed.

5.7 Installing a Redundant Power Supply

The system comes with two power supplies. You can add a third supply for redundancy without shutting down the system. In a three-supply configuration, you can replace a supply without shutting down the system.

Figure 5-10 Adding a Third Supply (Pedestal Orientation)



PK3202

To add a third power supply

1. Loosen the thumbscrews ❶ securing the power supply grid and remove and set aside the grid.
2. Loosen the thumbscrew ❷ on the power supply blank and remove the blank from the system.
3. Loosen the thumbscrew ❸ on the power supply handle, open the handle, and insert the new power supply into the bay.
4. Push up on the handle to seat the power supply.
5. Reinstall the power supply grid.

To replace a power supply

NOTE: *In a two-supply configuration, shut down the operating system, press the Power button to the off position, and unplug the power cord before replacing a power supply.*

1. Loosen the thumbscrews ❶ securing the power supply grid, and remove the grid.
2. Loosen the thumbscrew ❸ on the power supply handle, and then pull it down to release it from the power supply backplane.
3. Using the handle, pull the power supply from the system.
4. Install a new supply as described above.

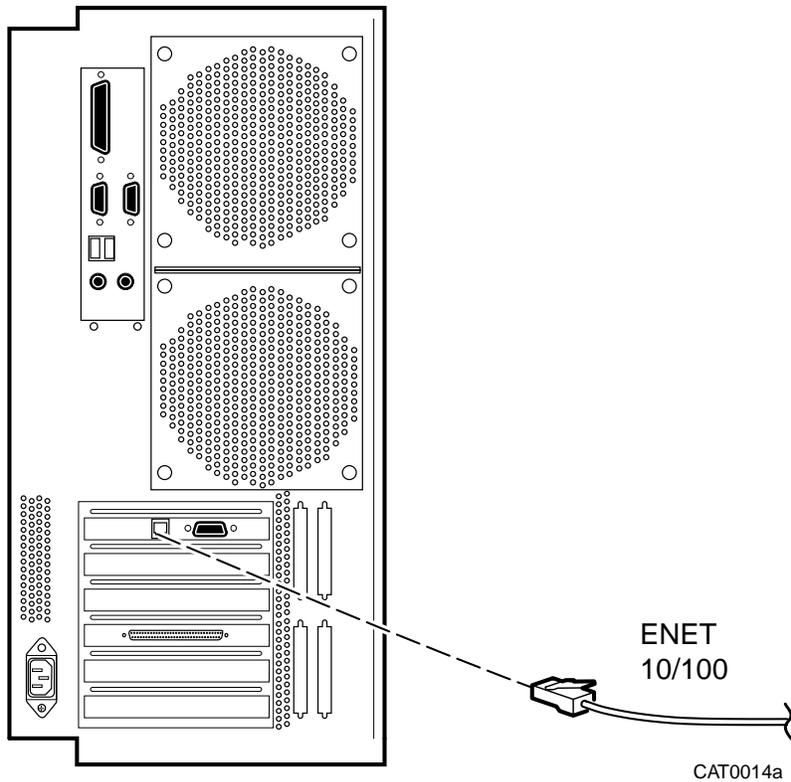
Verification

1. Power up the system.
2. At the P00>>> prompt, enter the **show power** command to verify that the system sees the third supply.

5.8 Network Configuration

An Ethernet option can be installed in any open PCI slot.

Figure 5-11 Network Connection



The DS20E system supports various Ethernet network options. Generally, the system is configured with 10/100 Enet. Supported options are also offered to connect to Fiber Distributed Data Interface (FDDI) and token ring networks.

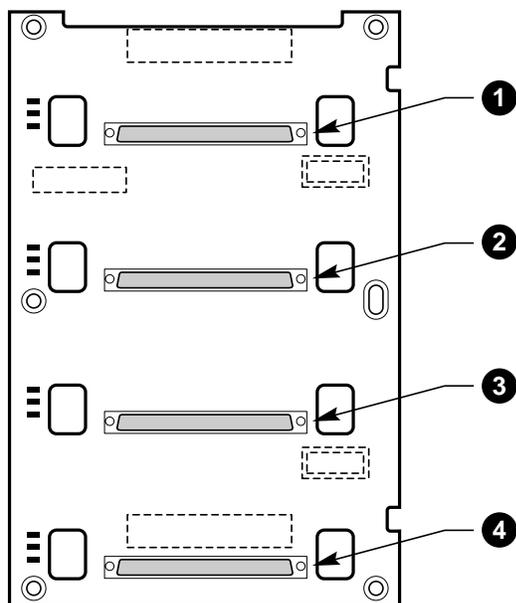
A new network device is initially set to Attachment User Interface (AUI) mode. Use the **set ew*0_mode** or **set ei*0_mode** command described in Chapter 7 to change the mode setting, if necessary.

5.9 Disk Drive Configuration

Table 5-1 and Table 5-2 show the slot numbering for the 4-slot and 6-slot backplanes, respectively. The corresponding illustrations show the backplane drive connectors. The SCSI ID for disk drives is preset on the backplane.

Table 5-1 Four-Slot SCSI ID Orientation

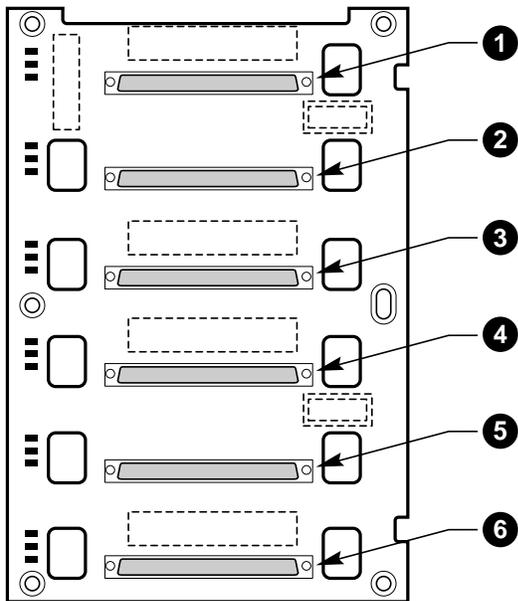
Backplane Connector No.	Slot Number	SCSI ID
J4	①	0
J5	②	1
J6	③	2
J7	④	3



SC0118

Table 5-2 Six-Slot SCSI ID Orientation

Backplane Connector No.	Slot Number	SCSI ID
J4	①	5
J5	②	4
J6	③	3
J7	④	2
J8	⑤	1
J9	⑥	0

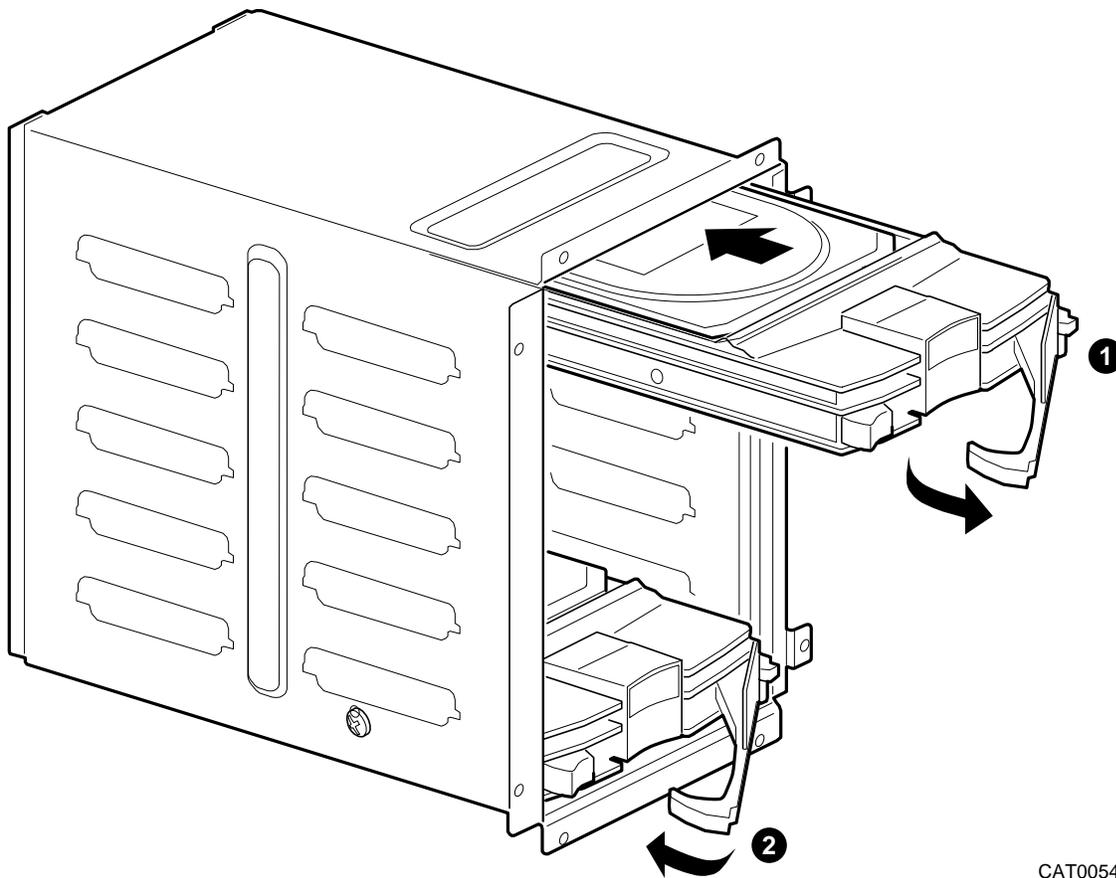


SC0119

5.10 Installing Disk Drives

The storage subsystem backplane is designed to support hot swap, the installation or removal of drives while the backplane is powered and operating. Hot swap allows for removal of non-operating drives and does not affect the power for the drives that are in operation.

Figure 5-12 Installing and Removing Disk Drives



CAT0054

CAUTION: *Do not remove a drive that is in operation. A drive should be removed only when its Activity LED is off.*

Installing Drives

1. Insert the drive carrier into the cage with the front handle ❶ fully open. With the carrier resting on top of the rail guides of the cage, slide the carrier in until it stops.
2. Push the handle ❷ in to make the backplane connection and to secure it into the cage.

Removing Drives

1. To remove the carrier, press the colored rubber button ❶ in to release the handle.
2. Pull the handle ❷ forward to release the SCSI connection and then pull the drive out of the cage.

Verification

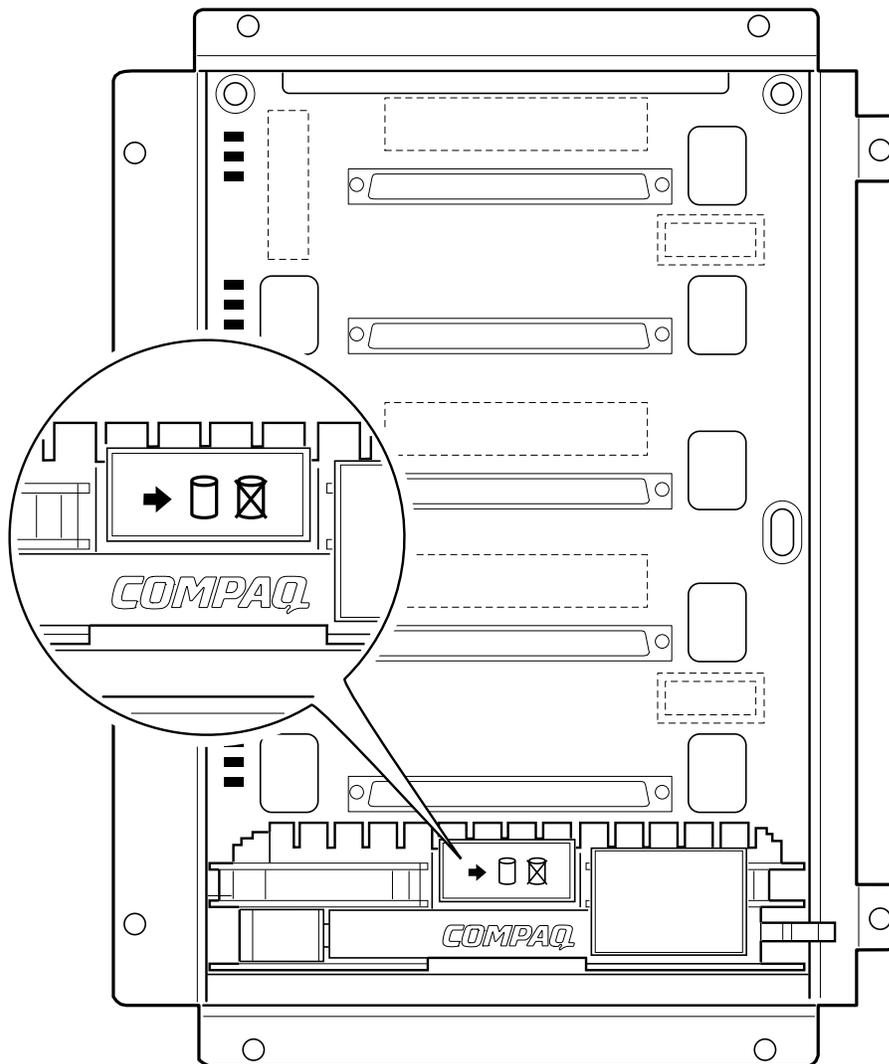
If you hot-swapped a drive, the Activity LED on the new drive flashes when the drive is inserted. If the system was powered off when you installed the drive, the LED flashes on system power-up.

Also, use the **show device** command to verify that the system sees the new drive.

5.10.1 Drive Status LEDs

Three status LEDs display activity, power, and fault. Figure 5-13 shows the LEDs and their positions on the carrier, and Table 5-3 explains the status of each.

Figure 5-13 Disk Drive LEDs



SC0116

Table 5-3 Drive Status

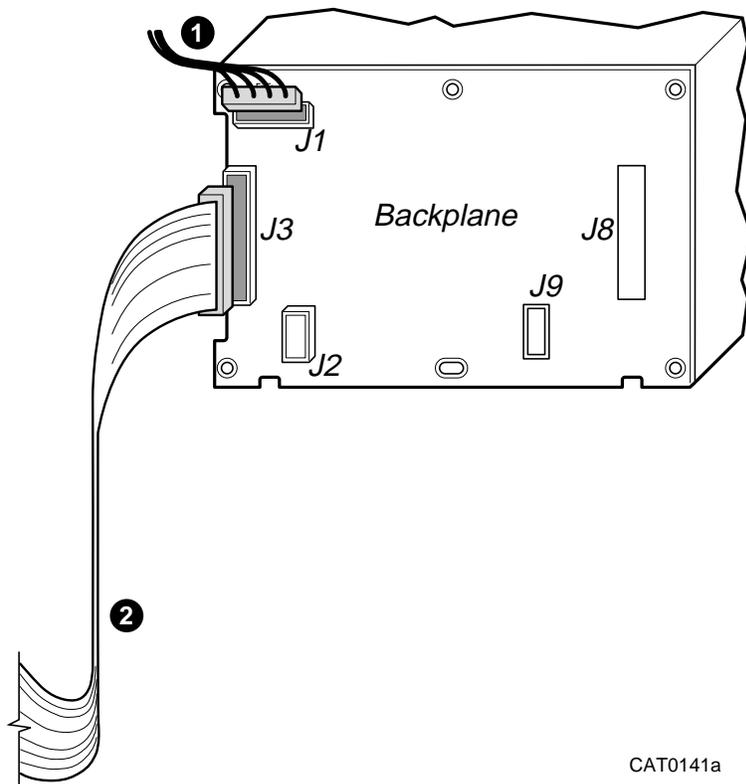
LED	Status
	Green indicates activity.
	Green indicates drive state.
	Amber indicates drive state fault.

5.11 Configuring the Storage Subsystem

The storage subsystem may be expanded by using an expansion box. Section 5.11.1 shows how to connect a four-slot subsystem, and Section 5.11.2 shows how to install a six-slot subsystem.

5.11.1 Connecting a Four-Slot Subsystem

Figure 5-14 Subsystem Backplane Connections

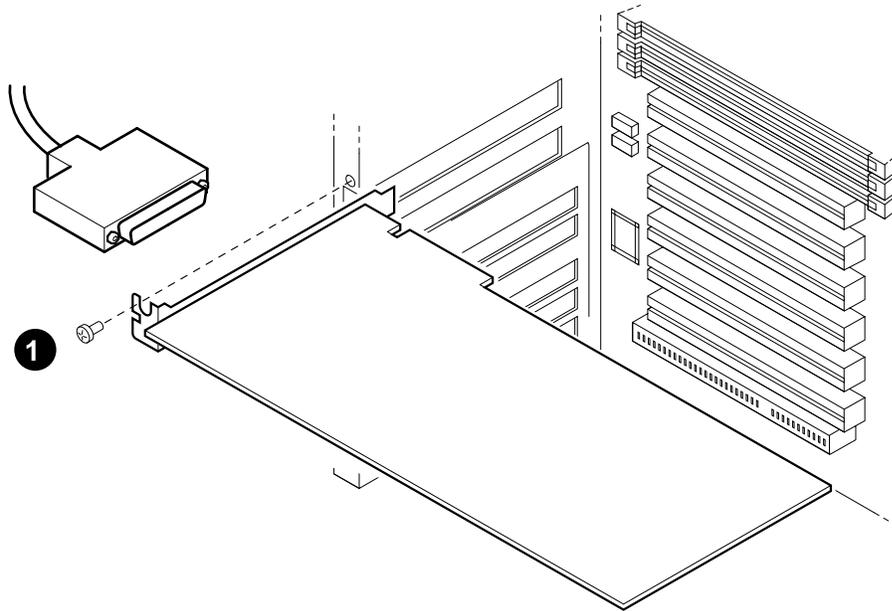


CAT0141a

1. Connect the power source cable ❶ to J1 on the subsystem and the other end to the power source.
2. Connect one end of the SCSI cable ❷ to one of the SCSI connectors on the SCSI controller.
3. Connect the other end of the SCSI cable to J3 (SCSI IN) on the storage backplane.

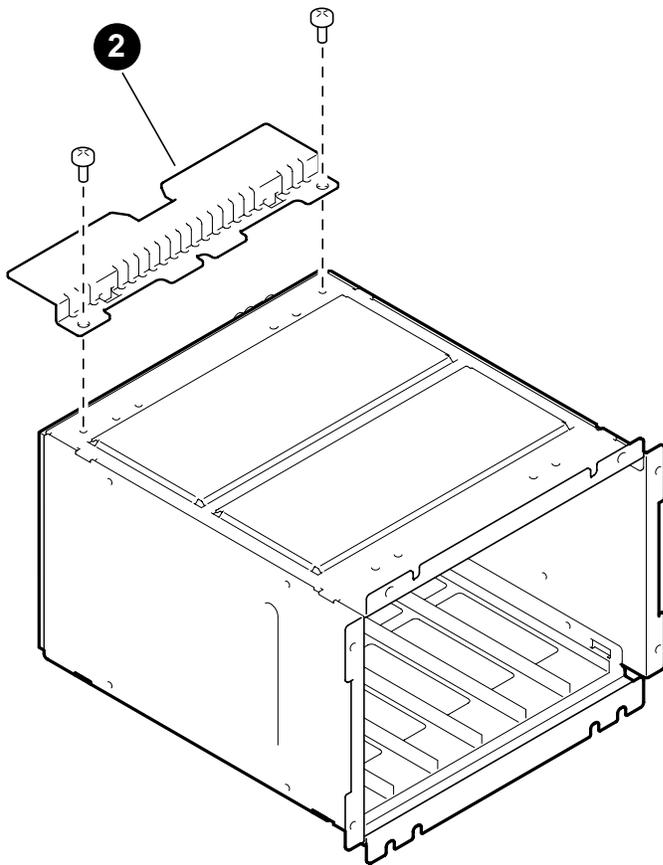
5.11.2 Installing a Six-Slot Subsystem

1. Install a SCSI controller in the PCI backplane, if needed:
 - a. Remove the screw **1** securing the slot cover to the chassis and then remove the blank cover from the system and store it for future use.
 - b. Install the controller on the system board and press it firmly into place. Secure it with the screw that you removed.



CAT0037a

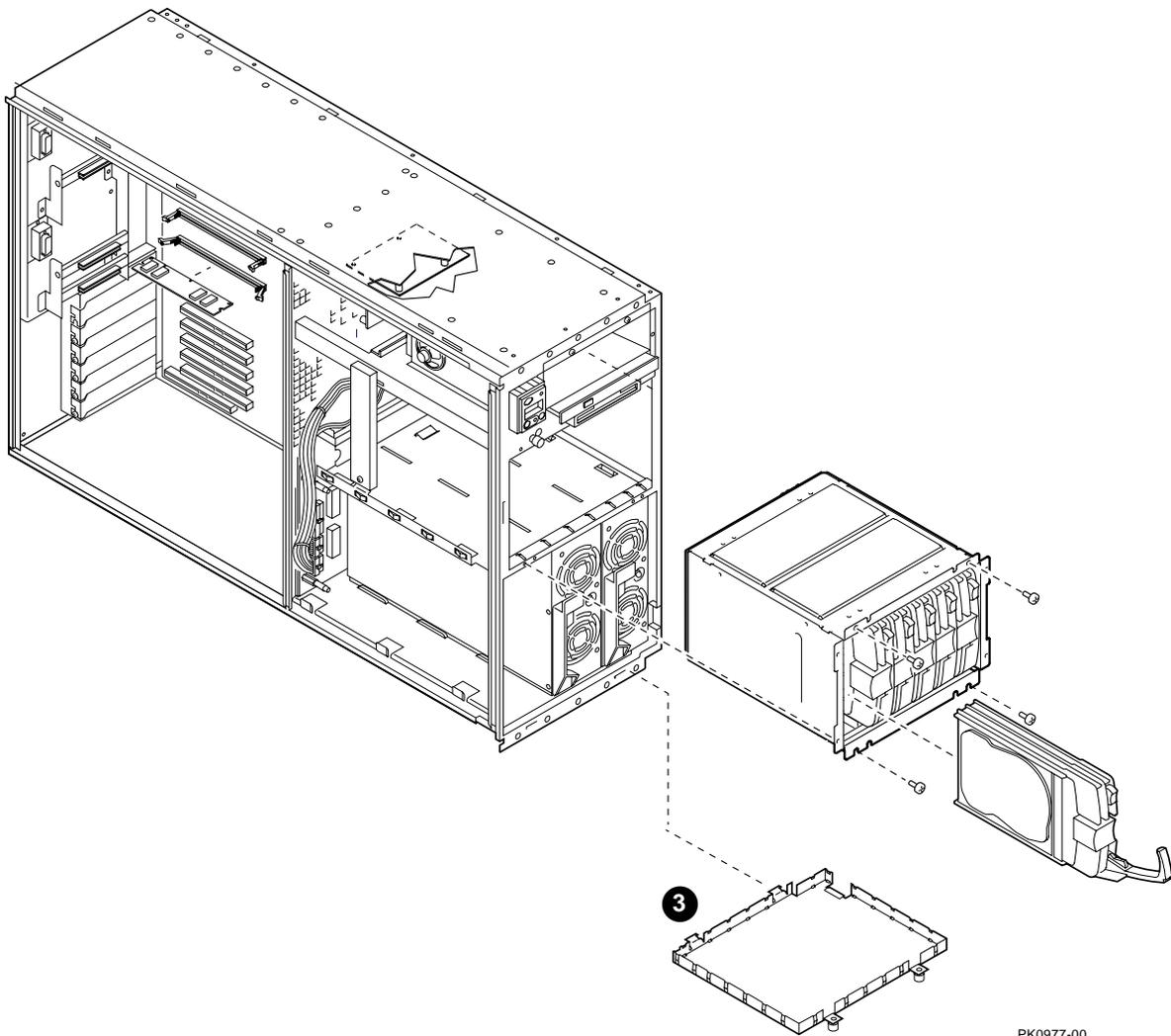
2. If adding a cage to a system that does not have a drive cage installed:
 - Remove and discard the bracket from the disk drive cage. Save the two screws.
 - Unscrew the four screws securing the drive cage filler plate and save them. Remove and discard the filler plate.
 - Remove the bracket **2** from its parking place within the chassis.
 - Orient the drive cage so that the two sets of notches are on the bottom, as shown. Secure the bracket to the top of the drive cage, using the two bracket screws.



PK1285

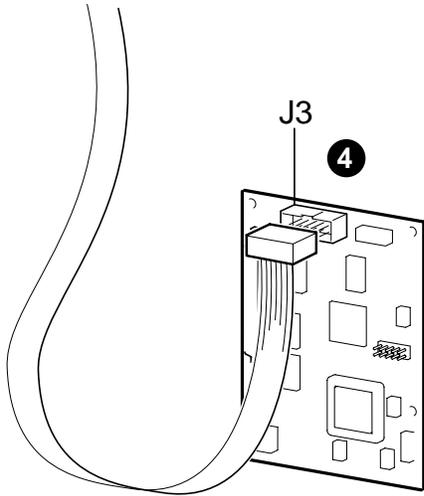
3. If replacing a cage:

- Remove and discard the bracket from the new disk drive cage. Save the two screws.
- Open the power supply door ③ by loosening the two captive fasteners to gain access to the drive cage.
- Remove the four screws securing the old drive cage to the chassis and remove the drive cage. Retain the screws.
- Remove the bracket ② (previous page) from the old drive cage and secure it to the new cage with the two bracket screws.



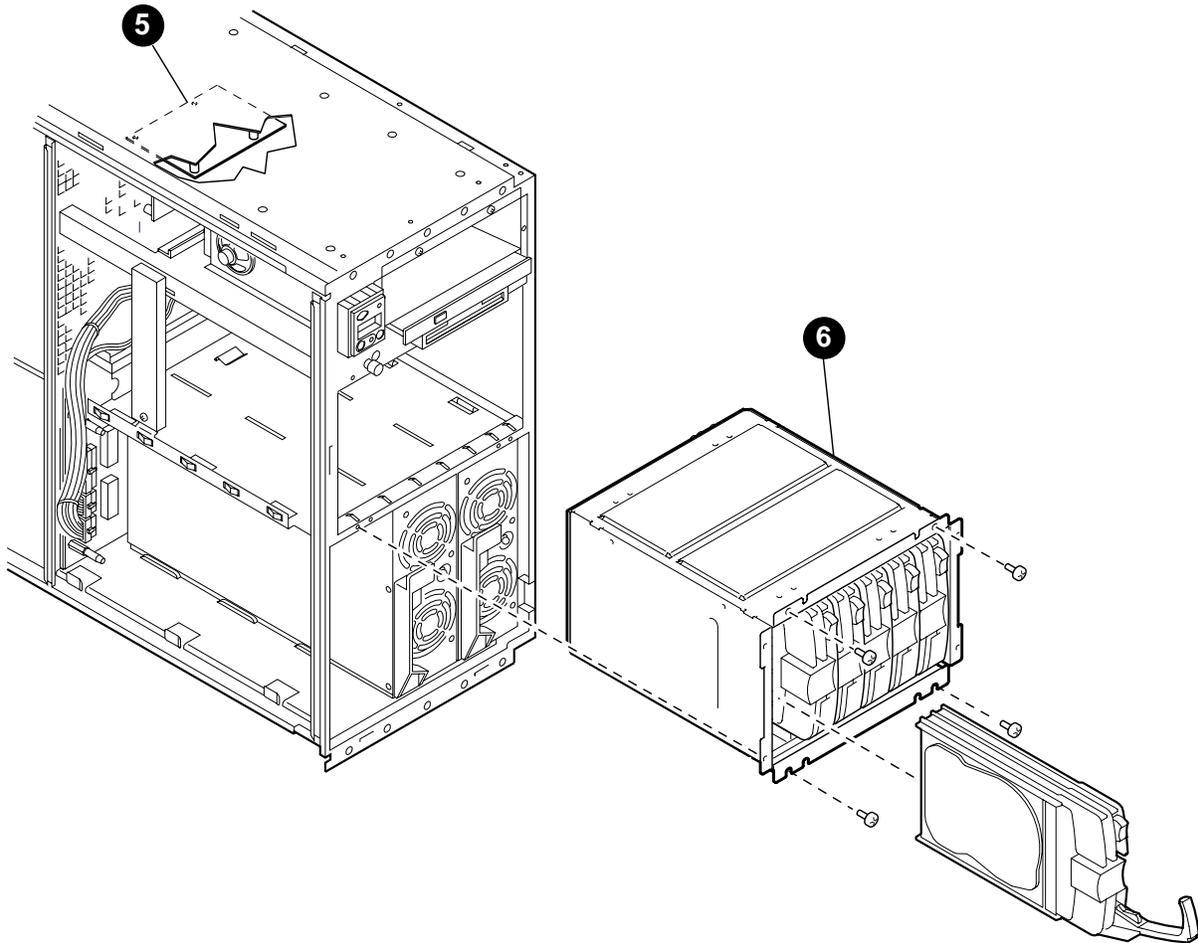
PK0977-00

4. Connect one end of the 10-pin cable (17-03971-11) to J3 ④ on the environmental card included in the 6-slot kit.



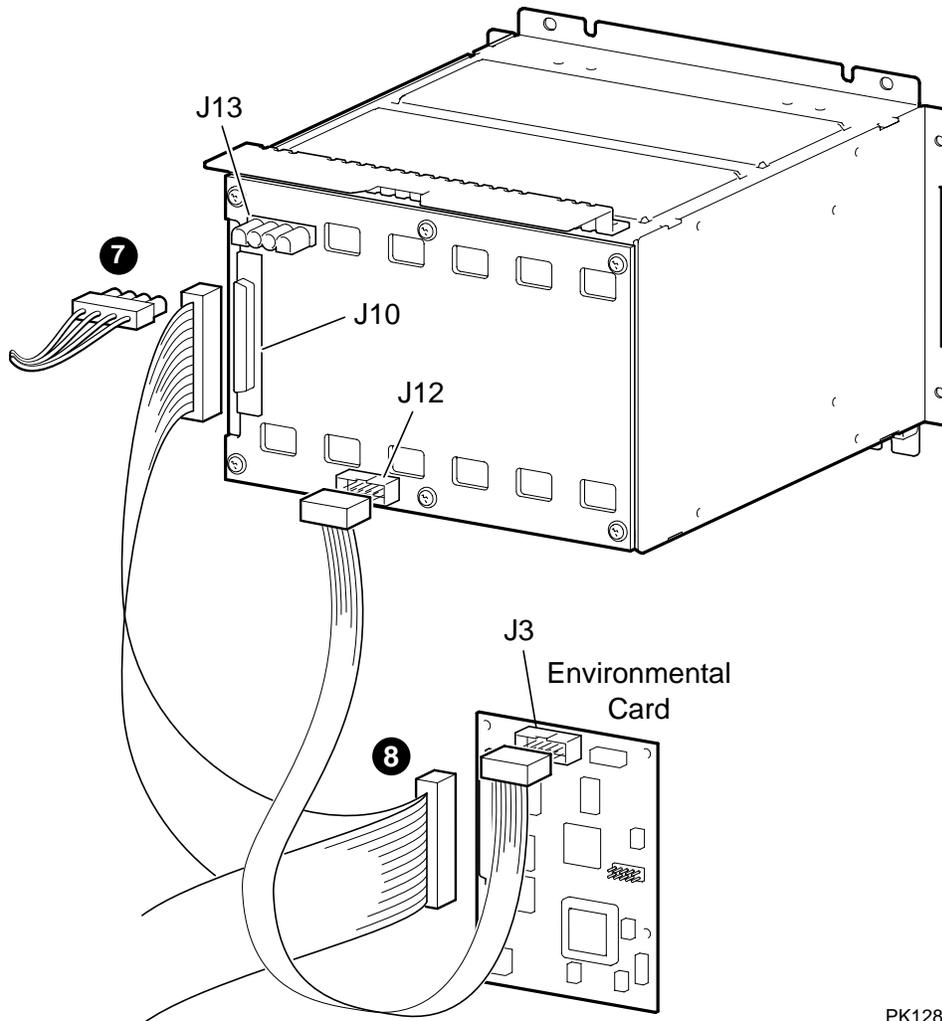
PK2286b

5. Align the mounting holes on the environmental card **5** as shown and snap the environmental card onto the four pop inserts on the side wall of the chassis, behind the removable media cage.
6. Partially slide the drive cage **6** into the system chassis.



PK0973-00

7. Connect the power source cable ⑦ to J13 on the drive cage.
8. Connect the other end of the 10-pin cable to J12 on the drive cage.
9. Connect one end of the 68-pin cable (17-04867-01) to the SCSI connector on the SCSI controller. Connect the middle connector ③ to J2 on the environmental card.
10. Connect the other end of the 68-pin cable to J10 on the drive cage.



PK1286

11. Slide the cage in the rest of the way and attach it with the four screws saved from the drive cage removal or filler plate removal.
12. Close the power supply door and tighten the captive fasteners.
13. Replace the side cover (pedestal) or top cover (rackmount) and tighten the captive screw to secure the cover.
14. Install hard drives.
15. Plug in the power cord.

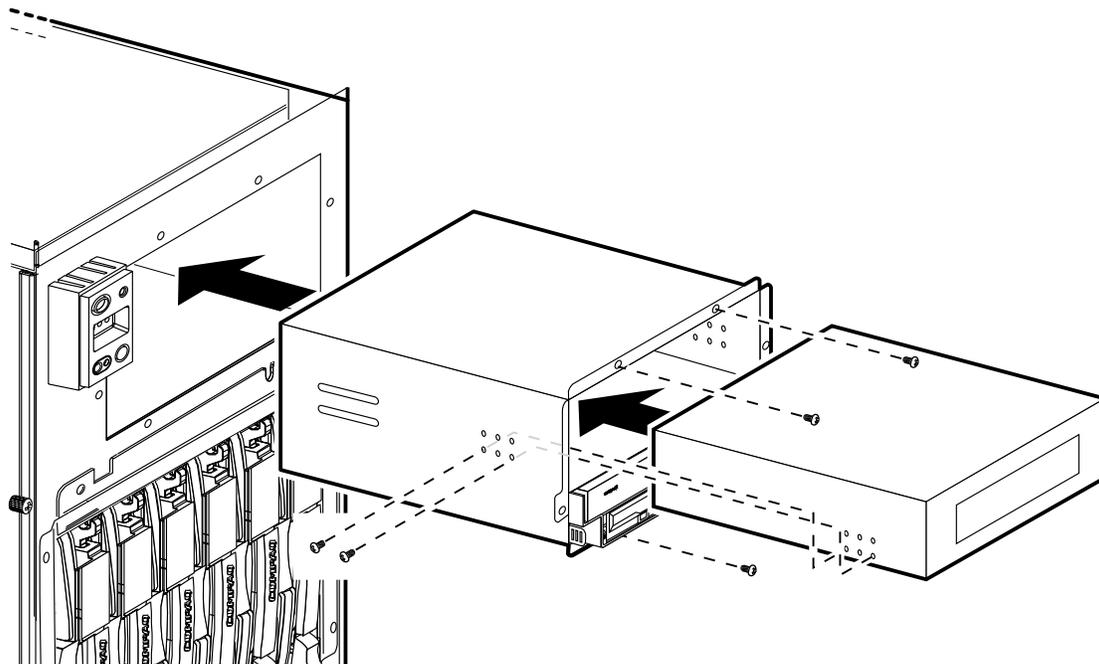
Verification

1. Turn on power to the system.
2. At the P00>>> prompt, enter the SRM **show device** command to display the devices and controllers in the system. The list should include the SCSI controller and disk drives that you installed.

5.12 Installing a Tape Drive

The spare removable media bay is located just above the combination drive in a pedestal system and to the left in a rack system.

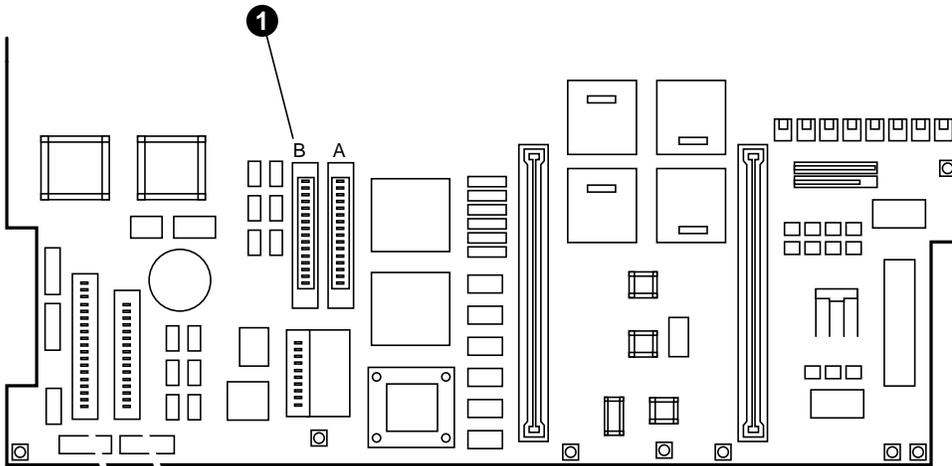
Figure 5-15 Tape Drive Installation



CAT0055

1. Install the drive into the drive holder and secure it with four screws (two on each side).
2. Install the drive holder into the system and secure it with four screws (two on the top and two on the bottom).

3. Plug in one end of the 68-pin SCSI cable to SCSI B ❶ on the system board (3X-BC56C-2F).



CAT0030a

4. Plug in the other end of the SCSI cable to the SCSI connection on the rear of the drive. If you are using a narrow device, use the 50-pin adapter shipped with the cable.

NOTE: *Tape devices added to the spare removable media bay must have their SCSI ID set on the device to avoid conflict with other drives.*

Verification

1. Turn on power to the system.
2. At the P00>>> prompt, enter the SRM **show device** command to display the devices and controllers in the system. The list should include the SCSI tape drive that you installed.

5.13 External SCSI Expansion

External SCSI devices, such as tabletop or rackmounted storage devices, can be connected to the system using PCI-based SCSI adapters.

SCSI Expansion Rules

Observe the following rules to determine if a particular device can be used:

- The device must be supported by the operating system. Consult the software product description for the device or contact the hardware vendor.
- A maximum of 14 devices can be attached to any one wide SCSI channel.
- Each device on the bus must have a unique SCSI ID. You may need to change a device's default SCSI ID to make it unique. For information about setting a device's ID, refer to the guide for that device.
- The entire SCSI bus length, from terminator to terminator, must not exceed 6 meters for fast-differential connection to SCSI or 3 meters for fast single-ended connection.
- Ensure that the SCSI bus is properly terminated and that no devices in the middle of the bus are terminated.
- For best performance, wide devices should be operated in wide SCSI mode.

5.14 AlphaBIOS Configuration Utilities

Certain options, such as RAID disks, are configured from AlphaBIOS, a graphical interface that supports some Alpha utility programs. See your RAID documentation for complete instructions on configuring RAID disks.

Figure 5-16 AlphaBIOS Boot Screen



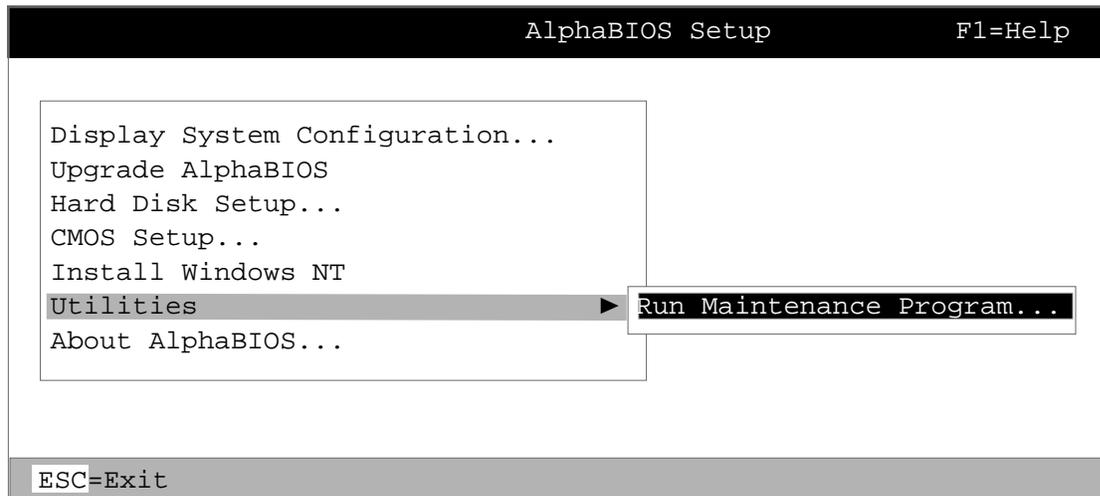
CAT0100

1. To invoke AlphaBIOS, enter the **alphabios** command at the SRM console. A boot screen is displayed.
2. From the Boot screen, press **F2** to bring up AlphaBIOS Setup.

NOTE: *AlphaBIOS Setup supports only the Utilities and About AlphaBIOS selections.*

3. From AlphaBIOS Setup, select **Utilities**, and from the drop-down menu, select **Run Maintenance Program...** and press Enter.

Figure 5-17 AlphaBIOS Setup Menu



PK0954b

4. In the Run Maintenance Program dialog box, type the name of the program to be run in the Program Name: field. The program must be an executable.

NOTE: *If the utility you want to run is on a diskette, you can type the utility's name into the Program Name: field and press Enter to execute the program.*

5. Tab to the Location: list box and select the hard disk partition, diskette, or CD-ROM drive from which to run the program.
6. Press Enter to execute the program.

Figure 5-18 Run Maintenance Program Dialog Box

The image shows a screenshot of a dialog box titled "Run Maintenance Program" with a help key "F1-Help". Inside the dialog, there is a text input field labeled "Program Name:" and a list box labeled "Location: A:". At the bottom of the dialog, there is a status bar with the text "ENTER=Execute" and "ESC=Quit".

CAT0138

5.15 Updating Firmware

Typically, you update system firmware whenever the operating system is updated. You might also need to update firmware if you add I/O device controllers and adapters or if enhancements are made to the firmware. Firmware is updated from a Loadable Firmware Update utility (LFU). The LFU banner is shown in Figure 5-19.

Figure 5-19 Loadable Firmware Update Utility

```
***** Loadable Firmware Update Utility *****
-----
Function      Description
-----
Display      Displays the system's configuration table.
Exit         Done exit LFU (reset).
List         Lists the device, revision, firmware name, and update
            revision.
Lfu          Restarts LFU.
Readme       Lists important release information.
Update       Replaces current firmware with loadable data image.
Verify       Compares loadable and hardware images.
? or Help    Scrolls this function table.
-----
UPD>
```

5.15.1 Sources of Firmware Updates

The system firmware resides in the flash ROM located on the system board. The Alpha Systems Firmware Update Kit comes on a CD-ROM, which is updated quarterly. You can also obtain Alpha firmware updates from the Internet.

Quarterly Update Service

The Alpha Systems Firmware Update Kit CD-ROM is available by subscription from Compaq.

Alpha Firmware Internet Access

You can also obtain Alpha firmware update files from the Internet:

<http://ftp.digital.com/pub/DEC/Alpha/firmware/>

If you do not have a Web browser, you can access files using anonymous ftp:

<ftp://ftp.digital.com/pub/DEC/>

Click down the following directories: [Alpha/firmware/readme.html](#)

The README file explains how to download firmware updates.

5.15.2 Updating Firmware from the CD-ROM

Use the following procedure to update the firmware from the quarterly CD-ROM. See the Alpha Firmware Web site listed in the Preface for other methods of updating the firmware and to obtain files if you are not updating from the CD.

1. Shut down the operating system.
2. Turn the system off and then on.
3. At the SRM console prompt, enter the **show device** command to determine the drive name of the CD-ROM drive.
4. Load the Alpha Systems Firmware Update CD into the drive.
5. Boot the system from the CD, using the drive name determined in step 1 (for example, dqa0).

```
P00>>> boot dqa0
```

6. At the UPD> prompt, enter the **list** command to list the current revisions of the firmware.
7. Enter the **update** command to update the firmware.
8. When the update is complete, enter the **list** command to verify that the images successfully copied and are listed with the correct revisions.
9. Enter the **exit** command to exit the Firmware Update Utility.

Chapter 6

Remote Management Console

This chapter describes how to manage the system using the Remote Management Console (RMC). The RMC circuitry is powered from 5-volt standby. The power is provided to the RMC circuitry as long as the DS20E is plugged into live AC power. This is true even if the power button on the system is off. You can use the RMC from a console terminal at a remote location or from a local console terminal connected to the COM1 port.

Sections in this chapter are:

- RMC overview
- Connecting to RMC
- Modem setup
- Dial-in procedure
- Halt assertion
- RMC commands
- RMC switch pack
- Troubleshooting

6.1 RMC Overview

The remote management console (RMC) is used to monitor and control the system. A command interface lets you reset, halt, and power the system on or off, regardless of the state of the operating system or hardware.

The RMC firmware resides on the server feature module, described in Chapter 1. The RMC can only be accessed through COM1. You can invoke the RMC through a serial console terminal connected to the local system or you can dial in.

- To connect to the RMC locally, connect the console terminal to COM1. Type the default escape sequence at the SRM console prompt on the local serial console terminal to enter RMC mode.
- To dial in, set up the modem, dial, and then type an escape sequence that invokes RMC command mode.

In RMC command mode, you can enter commands to halt or reset the system and turn it on or off. Only one RMC session can be active at a time.

Details of how to connect to RMC are provided in the sections that follow.

CAUTION: *Do not issue most RMC commands until the system has powered up. If you enter certain RMC commands during power-up or reset, the system may hang. In that case you would have to disconnect the power cord at the power outlet. You can, however, use the RMC **halt** command during power-up to force a halt assertion. See Section 6.5.*

6.2 Connecting to RMC

Use the default escape sequence to invoke the RMC mode. You can invoke RMC from the SRM console, the operating system, or an application. The RMC quit command reconnects the terminal to the system console port.

1. To invoke the RMC, type the RMC escape sequence.

```
P00>>> ^] ^] RCM
```

The escape sequence is equivalent to typing a Ctrl/right bracket combination twice, followed by “rcm.” The escape sequence is not echoed on the terminal or sent to the system. When the RCM> prompt is displayed, you can enter RMC commands.

2. To exit RMC and reconnect to the system console port, enter the **quit** command. Press Return to return to whatever you were doing before you invoked RMC.

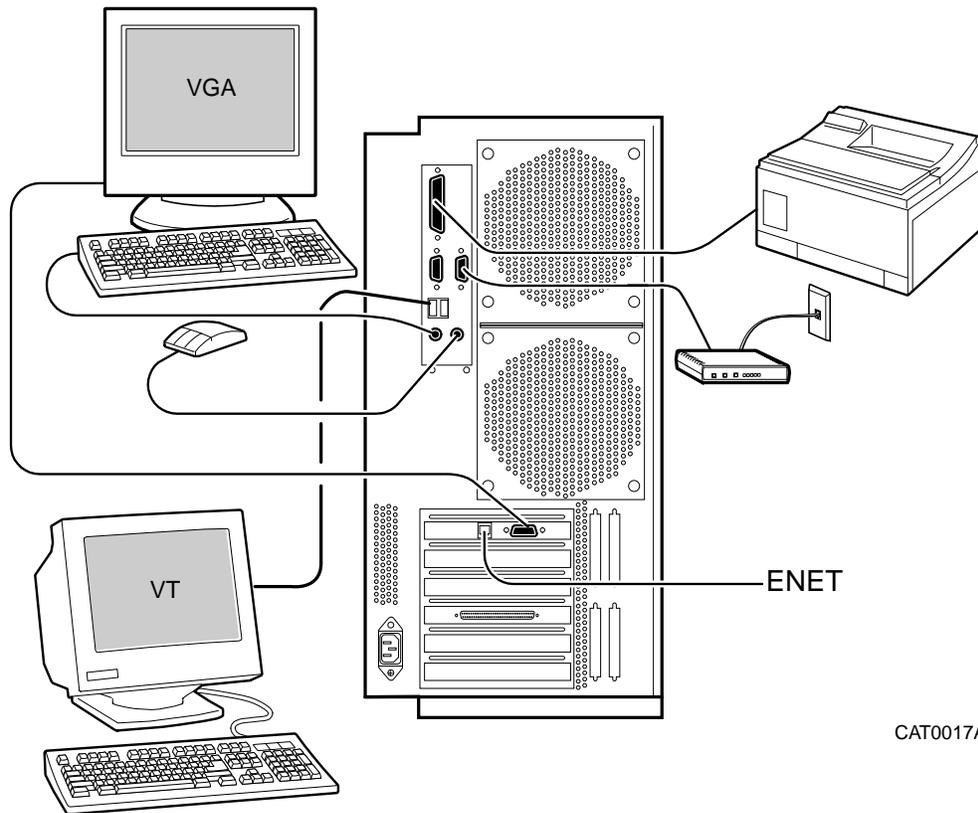
```
RCM> quit  
Focus returned to COM port
```

NOTE: *After you first invoke the RMC, it is recommended that you use the `setpass` command to set a password. See Section 6.6.*

6.3 Modem Setup

To set up the RMC to monitor a system remotely, connect the modem to the COM1 port at the back of the system, configure the modem port for dial-in, and dial in.

Figure 6-1 RMC Connections



CAT0017A

Modem Setup

1. Set the modem to auto answer.
2. Set the modem to 9600 baud.

Refer to your modem manual for details on how to program and save modem settings.

6.4 Dial-In Procedure

To dial in on COM1, dial the modem, and type the escape sequence to bring up the RMC. Use the hangup command to terminate the session.

A sample dial-in dialog would look similar to the following:

```
[Dial up]           ❶  
CONNECT 9600  
  
#                   ❷  
RMC V2.0           ❸  
RCM>
```

Dial-In Procedure

1. Dial the number for the modem connected to the modem port. When the connection is made, the “connect 9600” message ❶ is displayed.
2. If you have set a password with the **setpass** command, a “#” (pound sign) ❷ prompt is displayed. Enter the password. (If no password has been set, the # prompt is not displayed.)

NOTE: *It is recommended that you set a password. See Section 6.6.*

You have three tries to correctly enter the password. After three incorrect tries, the connection is terminated, and the modem is not answered again for 5 minutes. When you successfully enter the password, the RMC banner ❸ is displayed. You are connected to the system COM1 port, and you have control of the SRM console.

NOTE: *At this point no one at the local terminal can perform any tasks except for typing the RMC escape sequence. The local terminal displays any SRM console output entered remotely.*

3. Type the following RMC escape sequence (not echoed). The RCM> prompt is then displayed:

```
^ ] ^ ] RCM  
RCM>
```

The escape sequence is equivalent to typing a Ctrl/right bracket combination twice, followed by “rcm.”

4. To terminate the modem connection, enter the RMC **hangup** command.

```
RCM> hangup
```

If the modem connection is terminated without using the **hangup** command or if the line is dropped due to phone-line problems, the RMC will detect carrier loss and initiate an internal **hangup** command. If the modem link is idle for more than 20 minutes, the RMC initiates an auto hangup.

NOTE: *Auto hangup can take a minute or more, and the local terminal is locked out until the auto hangup is completed.*

6.5 Halt Assertion

A halt assertion allows you to disable automatic boots of the operating system so that you can perform tasks from the SRM console.

Under certain conditions, you might want to force a “halt assertion.” Halt assertion disables automatic boots of the operating system and disables the SRM power-up script. The SRM console displays this message:

```
Halt assertion detected
NVRAM power-up script not executed
AUTO_ACTION=BOOT/RESTART and OS_TYPE=NT ignored, if applicable
```

You can force a halt assertion in either of the following ways:

- Press the momentary Halt button on the operator control panel or enter the RCM **halt** command while the system is powering up or the SRM console is running. The halt signal does not remain asserted.
-

NOTE: Wait 5 seconds after the system begins powering up before pressing the Halt button or entering the RCM **halt** command.

- Enter the RMC **haltin** command at any time. The halt signal remains asserted. To release the halt, enter the RMC **haltout** command or cycle power with the Power button on the operator control panel.

6.6 RMC Commands

The RMC commands given in Table 6–1 are used to control and monitor a system remotely.

Table 6–1 RMC Command Summary

Command	Function
halt	Halts the system.
haltin	Halts the system. The halt signal remains asserted until you enter haltout or power cycle the system.
haltout	Releases a halt created with haltin .
help or ?	Displays the list of commands.
poweroff	Turns off power. Emulates pressing the On/Off button to the off position.
poweron	Turns on power. Emulates pressing the On/Off button to the on position.
quit	Exits console mode and returns to system console port.
reset	Resets the system. Emulates pressing the Reset button.
setesc	Changes the escape sequence for invoking command mode.
setpass	Sets a password for the RMC.
status	Displays system status and sensors.

Command Conventions

- RMC commands are not case sensitive.
- A command must be entered in full.
- You can delete an incorrect command with the Backspace key before you press Enter.
- If you type a valid RMC command, followed by extra characters, and press Enter, the RMC accepts the correct command and ignores the extra characters.
- If you type an incorrect command and press Enter, the command fails with the message:

```
*** ERROR - unknown command ***
```

halt

The **halt** command halts the managed system. The RMC firmware exits command mode and reconnects the user's terminal to the system COM1 serial port.

```
RCM>halt  
Focus returned to COM port
```

haltin

The **haltin** command halts a managed system and causes the halt to remain asserted. This command can be used at any time.

haltout

The **haltout** command releases a halt that was done with the **haltin** command.

help

The **help** or **?** command displays the RMC firmware commands.

poweroff

The **poweroff** command requests the RMC to power off the system. The **poweroff** command is equivalent to pressing the Power button on the control panel to the Off position. If the system is already powered off, this command has no immediate effect.

To power the system on again after using the **poweroff** command, you must issue the **poweron** command.

poweron

The **poweron** command requests the RMC to power on the system. The **poweron** command is equivalent to pressing the Power button on the control panel to the On position. The system Power button must be in the On position.

When the **poweron** command is issued, the RMC exits command mode and reconnects the user's terminal to the system console port.

```
RCM>poweron  
Focus returned to COM port
```

NOTE: *If the system is powered off with the Power button, the system will not power up. The RMC will not override the "Off" state of the power button. If the system is already powered on, the **poweron** command has no effect.*

quit

The **quit** command exits the user from command mode and reconnects the serial terminal to the system console port. The following message is displayed:

```
Focus returned to COM port
```

The next display depends on what the system was doing when the RMC was invoked. For example, if the RMC was invoked from the SRM console prompt, the console prompt will be displayed when you enter a carriage return. Or, if the RMC was invoked from the operating system prompt, the operating system prompt will be displayed when you enter a carriage return.

reset

The **reset** command is equivalent to pressing the Reset button on the operator control panel. The terminal exits RMC and reconnects to the server's COM1 port. You must enter the entire command for the reset to take effect.

```
RCM>reset  
Focus returned to COM port
```

setesc

The **setesc** command resets the default escape sequence for invoking RMC. The escape sequence can be any character string. A typical sequence consists of 2 or more characters, to a maximum of 15 characters. The escape sequence is stored in the module's on-board NVRAM.

NOTE: *Be sure to record the new escape sequence. Although the factory defaults can be restored if you forget the escape sequence, this requires resetting a switch on the RMC switch pack. See Section 6.7.2.*

The following sample escape sequence consists of 5 iterations of the Ctrl key and the letter "o".

```
RCM>setesc
^o^o^o^o^o
RCM>
```

If the escape sequence entered exceeds 15 characters, an error message is displayed. When changing the default escape sequence, avoid using special characters that are used by the system's terminal emulator or applications.

Control characters are not echoed when entering the escape sequence. Use the **status** command to verify the complete escape sequence.

setpass

The **setpass** command allows the user to set or change a password for gaining access to the RMC.

```
RCM>setpass
new pass>*****
RCM>
```

The maximum length for the password is 15 characters. If the password exceeds 15 characters, the command fails with the message:

```
*** ERROR ***
```

The minimum password length is one character, followed by a carriage return. If only a carriage return is entered, the command fails with the message:

```
*** ERROR - illegal password ***
```

If you forget the password, you can set a new password.

status

The **status** command displays the current system temperature, escape sequence, power status, and whether a halt has been asserted. The following is an example of the display. Table 6–2 explains the status command fields.

```
RCM>status
```

```
Firmware Rev: V2.0  
Escape Sequence: ^]^[RCM  
Remote Access: DISABLE  
Temp (C): 26.0  
RCM Power Control: ON  
RCM Halt: Deasserted  
External Power: ON  
Server Power: ON
```

```
RCM>
```

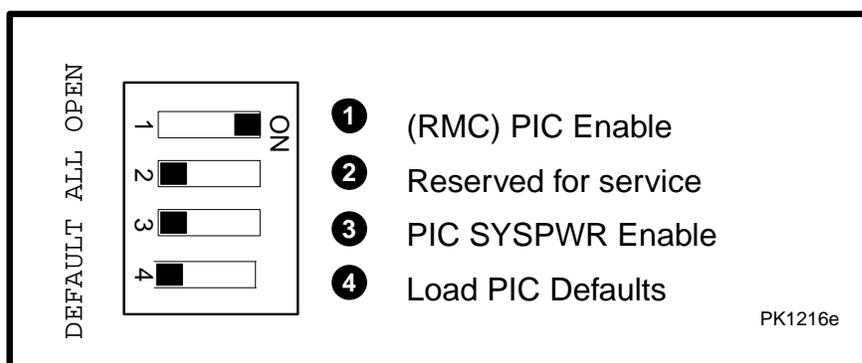
Table 6–2 Status Command Fields

Item	Description
Firmware Rev:	Revision of RMC firmware.
Escape Sequence:	Current escape sequence to invoke RMC.
Remote Access:	Modem remote access state. Always set to DISABLE.
Temp (C):	Current system temperature in degrees Celsius.
RMC Power Control:	Current state of RMC system power control. (ON/OFF)
RMC Halt:	Asserted indicates that halt is asserted with the haltin command. Deasserted indicates that halt has been released.
External Power:	Current state of power to RMC. Always on.
Server Power:	Indicates whether power to the system is on or off.

6.7 RMC Switch Pack

The RMC operating mode is controlled by a switch pack on the server feature module, illustrated in Chapter 1. Use the switches to enable or disable certain RMC functions, if necessary. The switches are numbered on the SFM, as shown in Figure 6-2.

Figure 6-2 RMC Switch Pack Defaults



NOTE: *Under normal circumstances, leave all switches in the default position. Switch 2 is reserved and its setting should never be changed.*

The PIC refers to the RMC microprocessor.

Table 6–3 RMC Switch Pack Functions

Switch	Function
❶ (RMC) PIC Enable	Enables/disables the RMC. When this switch is in its enabled position (closed), the RMC communicates with the device connected to the COM1 port. This switch redirects the system COM1 port's transmit and receive serial lines to the SFM. The hardware flow control lines are not passed to the SFM from the system board. With the switch in the disabled (open) position, RMC functions are disabled.
❷	Reserved
❸ PIC SYSPWR Enable	Bypasses the control signal from the PIC that enables the system to operate. In the default "Off" position (open), the system can be shut down with the poweroff command or by software. With the switch On (closed), the poweroff command will not work.
❹ Load PIC Defaults	If set to on (closed), forces the RMC to its default settings. Set this switch if you forget the escape sequence for entering RMC. See Section 6.7.2.

6.7.1 Changing a Switch Setting



WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:

- 1. Remove any jewelry that may conduct electricity.**
 - 2. Wear an antistatic wrist strap when handling internal components.**
-

To change an RMC switch setting:

5. Shut down the operating system and turn off the system power.
 6. Unplug the AC power cord.
-

NOTE: *If you do not unplug the power cord, the new setting will not take effect when you power up the system.*

7. Remove the system covers.
8. Locate the RMC switch pack on the server feature module (see Chapter 1) and change the switch setting as needed.
9. Replace the system covers and plug in the power cord.

6.7.2 Resetting the RMC to Factory Defaults

You can reset the RMC to factory settings, if necessary. You would need to do this if you forgot the escape sequence for the RMC.



WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:

1. Remove any jewelry that may conduct electricity.
 2. Wear an antistatic wrist strap when handling internal components.
-

1. Turn off the system.
 2. Unplug the AC power cord.
-

NOTE: *If you do not unplug the power cord, the reset will not take effect when you power up the system.*

3. Remove the system covers.
4. Locate the RMC switch pack on the server feature module (see Chapter 1) and set switch 4 to On.
5. Replace the system covers and plug in the power cord.
6. Power up the system to the SRM console prompt. Powering up with switch 4 set to On resets the escape sequence, password, and modem enable states to the factory defaults.
7. Power down the system, unplug the AC power cord, and remove the system covers.
8. Set switch 4 to Off (default).
9. Replace the system covers and plug in the power cord.

6.8 Troubleshooting

Error! Reference source not found. **gives a list of possible causes and suggested solutions for symptoms you might see.**

Table 6-4 Troubleshooting RMC

Symptom	Possible Cause	Suggested Solution
The local console terminal is not accepting input.	Cables not correctly installed. Switch 1 on switch pack set to disable.	Check external cable installation. Set switch 1 to On.
The console terminal is displaying garbage.	System and terminal baud rate set incorrectly.	Set the system and terminal baud rates to 9600 baud.
After the system and RMC are powered up, the COM port seems to hang briefly.	This delay is normal behavior.	Wait a few seconds for the COM port to start working.
The RMC was reset to factory defaults, but the factory settings did not take effect.	AC power cord was not removed before you reset switch 4 on the RMC switch pack.	See Section 6.7.2.
The message “unknown command” is displayed when the user enters a carriage return by itself.	The terminal or terminal emulator is including a linefeed character with the carriage return.	Change the terminal or terminal emulator setting so that “new line” is not selected.

Chapter 7

Using the SRM Console

This chapter explains how to use SRM commands and environment variables. The following topics are covered:

- SRM console overview
- Command summary
- Getting help
- Displaying the configuration
- Displaying the bootable devices
- Displaying the memory configuration
- Displaying the power status
- Displaying the SRM console version
- Displaying the CPU status
- Displaying the PALcode version
- Booting an operating system
- Configuring the ISA Bus
- Testing the system
- Stopping and starting CPUs
- Updating firmware
- Forcing a system crash dump
- Initializing the system
- Reading a file
- Configuring a PCI NVRAM module
- Creating a power-up script
- Loading AlphaBIOS
- Setting console security
- Setting and viewing environment variables

7.1 SRM Console Overview

The SRM console is the command line interface that supports the Compaq Tru64 UNIX and OpenVMS operating systems. The SRM console is used to bootstrap the operating system, configure and test the system hardware, examine system options for errors, and set or change environment variables.

The SRM console works much like a UNIX shell. It views your NVRAM and devices as a pseudo file system. The SRM console contains a fairly large set of diagnostic, setup, and debugging utilities, the details of which are beyond the scope of this document. As in the UNIX shell, you can pipe the output of one command to the input of another. You can also use a **more** command that works like the UNIX **more** command. For a full listing of available commands, enter:

```
P00>>> help | more
```

Console Prompt

The SRM console prompt is some variant of >>> (three right angle-brackets). Typically, the prompt is *Pnn*>>>, where *n* indicates the primary processor. In a two-processor system, the prompt is either P00>>> or P01>>>.

Environment Variables

SRM has environment variables, a number of which are predefined and correspond to locations in NVRAM. You can view the entire list of environment variables and their values with the **show** command (there are quite a few of them, so you will probably want to pipe its output to **more**). You can also use the * (asterisk) wildcard to show variables matching a pattern. For example, **show boot*** displays all the variables starting with “boot.” The environment variables are described in Section 7.23. Boot environment variables are described in Chapter 4.

7.1.1 Invoking the SRM Console

You can invoke the SRM console at power-up or restart or after a system failure. Once you invoke SRM, you enter commands at the console prompt.

Invoking SRM from Tru64 UNIX, Linux, or OpenVMS

The SRM console is invoked automatically at power-up or after a reset or failure. The **auto_action** environment variable is set by default to **halt**, which causes the system to stop in the SRM console.

If the operating system is running, invoke the SRM console by shutting down the operating system. Follow the shutdown procedure described in your operating system documentation.

You can also force entry to the SRM console if the **auto_action** environment variable is set to **boot** or **reset**. To force entry, press the Halt button on the control panel.

CAUTION: *A forced halt interrupts the operating system. Applications that are running may lose data.*

To return to operating system mode, issue the **boot** command.

Returning to SRM from RMC

If you invoked the RMC from the SRM console, you can return to the SRM console by entering the RMC **quit** command.

7.2 Command Summary

Table 7-1 summarizes alphabetically the most frequently used SRM console commands; Table 7-2 gives the command notation formats; and Table 7-3 shows special characters used on the command line.

Table 7-1 Summary of SRM Console Commands

Command	Function
alphabios	Loads and starts the AlphaBIOS console.
boot	Loads and starts the operating system.
clear <i>envvar</i>	Resets an environment variable to its default value.
continue	Resumes program execution on the specified processor or on the primary processor if none is specified.
crash	Forces a crash dump at the operating system level.
edit	Invokes the console line editor on a RAM script or on the user power-up script, “nvram,” which is always invoked during the power-up sequence.
halt	Halts the specified processor. (Same as stop .)
help (or man) <i>command</i>	Displays information about the specified console command.
init	Resets the SRM console and reinitializes the hardware.
isacfg	Displays or modifies parameters for ISA devices.

Continued on next page

Table 7-1 Summary of SRM Console Commands (Continued)

Command	Function
lfu	Runs the Loadable Firmware Update utility.
login	Turns off secure mode, enabling access to all SRM console commands during the current session.
more <i>[filename]</i>	Displays a file one screen at a time.
prcache	Initializes and displays the status of the PCI NVRAM.
set <i>envar</i>	Sets or modifies the value of an environment variable.
show <i>envar</i>	Displays the state of the specified environment variable.
stop	Halts the specified processor. (Same as halt .)
test	Verifies the configuration of the devices in the system.

Table 7-2 Notation Formats for SRM Console Commands

Attribute	Conditions
Length	Up to 255 characters, not including the terminating carriage return or any characters deleted as the command is entered. To enter a command longer than 80 characters, use the backslash character for line continuation (see Table 7-3).
Case	Upper- or lowercase characters can be used for input. Characters are displayed in the case in which they are entered.
Abbreviation	Only by dropping characters from the end of words. You must enter the minimum number of characters to identify the keyword unambiguously. Abbreviation of environment variables is allowed with the show command.
Options	You can use command options, to modify the environment, after the command keyword or after any symbol or number in the command. See individual command descriptions for examples.
Numbers	Most numbers in console commands are in decimal notation.
No characters	A command line with no characters is a null command. The console program takes no action and does not issue an error message; it returns the console prompt. The console supports command-line recall and editing.
Spaces or tabs	Multiple adjacent spaces and tabs are compressed and treated as a single space. Leading and trailing spaces are ignored.

Table 7-3 Special Characters for SRM Console

Character	Function
Return or Enter	Terminates a command line. No action is taken on a command until it is terminated. If no characters are entered and this key is pressed, the console just redisplay the prompt.
Backslash (\)	Continues a command on the next line. Must be the last character on the line to be continued.
Delete	Deletes the previous character.
Ctrl/A	Toggles between insert and overstrike modes. The default is overstrike.
Ctrl/B or up-arrow	Recalls previous command or commands. The last 16 commands are stored in the recall buffer.
Ctrl/C	Terminates the process that is running. Clears Ctrl/S; resumes output suspended by Ctrl/O. When entered as part of a command line, deletes the current line. Ctrl/C has no effect as part of a binary data stream.
Left-arrow	Moves the cursor left one position.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/F or right-arrow	Moves the cursor right one position.
Ctrl/H	Moves the cursor to the beginning of the line.
Backspace	Deletes one character.
Ctrl/J	Deletes the previous word.
Ctrl/O	Stops output to the console terminal for the current command. Toggles between enable and disable. The output can be reenabled by other means as well: when the console prompts for a command, issues an error message, or enters program mode, or when Ctrl/P is entered.

Table 7-3 Special Characters for SRM Console (Continued)

Character	Function
Ctrl/Q	Resumes output to the console terminal that was suspended by Ctrl/S.
Ctrl/R	Redisplays the current line. Deleted characters are omitted. This command is useful for hardcopy terminals.
Ctrl/S	Suspends output to the console terminal until Ctrl/Q is entered. Cleared by Ctrl/C.
Ctrl/U	Deletes the current line.
*	Wildcarding for commands such as show .
" "	Double quotes enable you to denote a string for environment variable assignment.
#	Specifies that all text between it and the end of the line is a comment. Control characters are not considered part of a comment.

7.3 Getting Help

The `help` (or `man`) command displays basic information about a command.

Example 7-1 Help (or Man)

```
P00>>> help set
NAME
    set
FUNCTION
    Set or modify the value of an environment variable.
SYNOPSIS
    set <envar> <value>
        [-integer] [-string]
        where

<envar>={auto_action,bootdef_dev,boot_file,boot_osflags,...}
```

The **help** (or **man**) command displays basic information about the use of console commands when the system is in console mode. The syntax is:

help (or **man**) [*command . . .*]

command . . . Command or topic for which help is requested. The options are:

none Displays the complete list of commands for which you can receive help.

command_name Displays information about the console command.

argument_string Displays information about all commands that begin with that string.
(such as “sh”)

7.4 Displaying the Configuration

Use the show config command to display a list of devices found on the system interconnect and I/O buses. This is the configuration at the most recent initialization.

Example 7-2 Show Config

```
P00>>>show config | more
                                COMPAQ AlphaStation DS20E 666 MHz

SRM Console:      V5.7-8
PALcode:         OpenVMS PALcode V1.79-60, Tru64 UNIX PALcode V1.72-59

Processors
CPU 0             Alpha 21264A-9 666 MHz  SROM Revision: V1.13.44
                  Bcache size: 8 MB

CPU 1             Alpha 21264A-9 666 MHz  SROM Revision: V1.13.44
                  Bcache size: 8 MB

Core Logic
Cchip            DECchip 21272-CA Rev 2.1
Dchip            DECchip 21272-DA Rev 2.0
Pchip 0         DECchip 21272-EA Rev 2.2
Pchip 1         DECchip 21272-EA Rev 2.2

TIG              Rev 4.22
Arbiter          Rev 2.16 (0x1)

MEMORY

Array #          Size      Base Addr
-----
   0             256 MB    000000000
   1             128 MB    010000000

Total Bad Pages = 0
Total Good Memory = 384 Mbytes
```

Continued

- ❶ **Firmware.** Version numbers of the SRM console and PALcode (the code that implements behavior defined by the Alpha architecture).
- ❷ **Processors.** Processors present, processor version and clock speed, and amount of backup cache.
- ❸ **Core logic.** Version numbers of the chips on the system board.
- ❹ **Memory.** Memory arrays and memory size.

5

```

PCI Hose 00
  Bus 00 Slot 05/0: Cypress 82C693
                                Bridge to Bus 1, ISA
  Bus 00 Slot 05/1: Cypress 82C693 IDE
                                dqa.0.0.105.0
                                dqa0.0.0.105.0
                                CD-224E
  Bus 00 Slot 05/2: Cypress 82C693 IDE
                                dqb.0.1.205.0
  Bus 00 Slot 05/3: Cypress 82C693 USB
  Bus 00 Slot 06/0: Adaptec AIC-7895
                                pkb0.7.0.6.0
                                SCSI Bus ID 7
  Bus 00 Slot 06/1: Adaptec AIC-7895
                                pkc0.7.0.106.0
                                SCSI Bus ID 7
  Bus 00 Slot 07: ELSA GLoria Synergy
  Bus 00 Slot 09: DE500-AA Network Controller
                                ewa0.0.0.9.0
                                00-00-F8-1B-9C-47

```

```

PCI Hose 01
  Bus 00 Slot 07: NCR 53C895
                                pka0.7.0.7.1
                                SCSI Bus ID 7
                                dka0.0.0.7.1
                                COMPAQ BD018122C9
                                dka100.1.0.7.1
                                RZ2CA-LA
                                dka200.2.0.7.1
                                COMPAQ BD018122C9
                                dka300.3.0.7.1
                                COMPAQ BD00962373
                                dka400.4.0.7.1
                                COMPAQ BD01862376

```

ISA Slot	Device	Name	Type	Enabled	BaseAddr	IRQ	DMA
0	0	MOUSE	Embedded	Yes	60	12	
	1	KBD	Embedded	Yes	60	1	
	2	COM1	Embedded	Yes	3f8	4	
	3	COM2	Embedded	Yes	2f8	3	
	4	LPT1	Embedded	Yes	3bc	7	
	5	FLOPPY	Embedded	Yes	3f0	6	2

P00>>>

⑤ PCI bus information.

The “Slot” column lists the logical slots seen by the system.

NOTE: *The naming of devices (for example, dqa.0.0.105.0) follows the conventions described in the **show device** command. See Section 7.5.*

In Example 7–2 the following devices are present:

PCI Hose 00

Bus 00	Slots 05/0 through 05/3 are part of the same chip
Slot 05/0	Cypress multifunction controller
Slot 05/1	IDE controller
Slot 05/2	IDE controller
Slot 05/3	No device present. System does not support USB.
Slot 06/0	On-board Adaptec controller
Slot 06/1	On-board Adaptec controller
Slot 07	PCI slot with Elsa Gloria VGA card
Slot 09	PCI slot with DE500-AA Ethernet controller

PCI Hose 01

Bus 00	
Slot 07	NCR 53C895 SCSI controller; bus ID of controller; and devices attached to controller

ISA

Slot 0	Mouse
Slot 1	Keyboard
Slot 2	COM1
Slot 3	COM2
Slot 4	LPT1 parallel port
Slot 5	Floppy drive

7.5 Displaying the Bootable Devices

The `show device` command displays the devices and controllers in the system, including the bootable devices. In Table 7-4, the device name `dka0.0.0.7.1` is used as an example.

Example 7-3 Show Device

```
P00>>>show device
dka0.0.0.7.1          DKA0          COMPAQ BD018122C9  B016
dka100.1.0.7.1       DKA100        RZ2CA-LA         N1H0
dka200.2.0.7.1       DKA200        COMPAQ BD018122C9  B016
dka300.3.0.7.1       DKA300        COMPAQ BD00962373  BCJC
dka400.4.0.7.1       DKA400        COMPAQ BD01862376  BCJC
dqa0.0.0.105.0       DQA0          CD-224E          9.5B
dva0.0.0.0.0         DVA0
ewa0.0.0.9.0         EWA0          00-00-F8-1B-9C-47
pka0.7.0.7.1         PKA0          SCSI Bus ID 7
pkb0.7.0.6.0         PKB0          SCSI Bus ID 7
pkc0.7.0.106.0       PKC0          SCSI Bus ID 7
```

Table 7-4 Device Naming Conventions

	Category	Description
dk	Driver ID	Two-letter designator of port or class driver
		dk SCSI drive or CD ew Ethernet port
		dq IDE CD-ROM fw FDDI device
		dr RAID set device mk SCSI tape
		du DSSI disk mu DSSI tape
		dv Diskette drive pk SCSI port
		ei Ethernet port pu DSSI port
a	Storage adapter ID	One-letter designator of storage adapter (a, b, c...).
0	Device unit number	Unique number (MSCP unit number). SCSI unit numbers are forced to 100 X node ID.
0	Bus node number	Bus node ID.
0	Channel number	Used for multi-channel devices.
7	Logical slot num.	Corresponds to PCI slot number (see Table 7-5).
1	Hose number	0 — PCI 0 1 — PCI 1

Table 7-5 PCI Address Assignments

Slot	PCI 0	PCI 1	ISA
5	ISA bridge (on board)		ISA device
6	Adaptec SCSI (on board)		
7	PCI device	PCI device	
8	PCI device	PCI device	
9	PCI device	PCI device	

7.6 Displaying the Memory Configuration

Use the **show memory** command to display information about each memory bank: slot number, size in megabytes, and the starting address. The display also shows the total amount of good memory. It does not indicate the number of DIMMs or their size.

Example 7-4 Show Memory

```
P00>>> show memory
Array #      Size      Base Addr
-----
    0         128 MB    000000000
    1         128 MB    008000000
    2         128 MB    010000000
    3         128 MB    018000000
Total Bad Pages = 0
Total Good Memory = 512 MBytes
```

7.7 Displaying the Power Status

Use the `show power` command to display information about status of the power supplies, system fans, CPU fans, and temperature. See Chapter 8 for troubleshooting with the `show power` command.

Example 7-5 Show Power

```
P00>>>show power
```

	Status
Power Supply 0	good
Power Supply 1	good
Power Supply 2	good
System Fans	good
CPU Fans	good
Temperature	good

```
Current ambient temperature is 32 degrees C
```

```
System shutdown temperature is set to 55 degrees C
```

```
0 Environmental events are logged in nvram
```

```
P00>>>
```

7.8 Displaying the SRM Console Version

Use the `show version` command to display the version of the SRM console that is installed.

Example 7-6 Show Version

```
P00>>>show version
version                V5.6-3 Nov 30 1999 08:36:11
P00>>>
```

7.9 Displaying the CPU Status

Use the show cpu command to display the status of each CPU. CPU slot 0 is the right slot in a rack system and the top slot in a pedestal system.

Example 7-7 Show Cpu

```
P00>>>show cpu
```

```
Primary CPU:      00
Active CPUs:     00      01      ❶
Configured CPUs: 00      01
SR0M Revision:   V1.13.44  V1.13.44      ❷
```

- ❶ The CPUs have been brought successfully online and are ready to run an operating system
- ❷ SR0M has been loaded and the CPUs are good

7.10 Displaying the PALcode Version

Use the `show pal` command to display the version of Tru64 UNIX or OpenVMS PALcode. The PALcode is the Alpha Privileged Architecture Library code, written to support Alpha processors. It implements architecturally defined processor behavior.

Example 7-8 Show Pal

```
P00>>>show pal
pal                OpenVMS PALcode V1.61-50, Tru64 UNIX PALcode V1.54-51
P00>>>
```

7.11 Booting an Operating System

The **boot** command boots the Tru64 UNIX, Linux, or OpenVMS operating system. You can specify a boot device, operating system-specific boot information (boot flags), and an Ethernet protocol for network boots. You can also specify whether the boot program should halt and remain in console mode.

Example 7-9 Tru64 UNIX Boot (Abbreviated)

```
P00>>>boot
/boot dka0.0.0.7.1 -flags A)
block 0 of dka0.0.0.7.1 is a valid boot block
reading 13 blocks from dka0.0.0.7.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 1a00
initializing HWRPB at 2000
initializing page table at 17f5c000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

```
UNIX boot - Sun May 14 05:34:40 EDT 2000
```

```
Loading vmunix
```

```
.
.
.
```

```
.The system is ready.
```

```
Digital UNIX Version V4.0 (mech2) console
```

```
login:
```

The **boot** command initializes the processor, loads a program image from the specified boot device, and transfers control to that image. If you do not specify a boot device in the command line, the default boot device is used. The default boot device is determined by the value of the **bootdef_dev** environment variable, described in Chapter 4.

If you specify a list of boot devices, a bootstrap is attempted from each device in order. Then control passes to the first successfully booted image. In a list, always enter network devices last, because network bootstraps terminate only if a fatal error occurs or when an image is successfully loaded.

The syntax is:

boot [-file *filename*] [-flags *value*] [-halt] [-protocols *enet_protocol*]
[*boot_dev*]

-file Specifies the name of a file to load into the system. Use the **set**
filename **boot_file** command to set a default boot file. See Chapter 4.

NOTE: *For booting from Ethernet, the filename is limited by the MOP V3 load protocol to 15 characters. The MOP protocol is used with OpenVMS systems.*

-flags Provides additional operating system-specific boot information.
[*value*] In *Tru64 UNIX*, specifies boot flags. In *OpenVMS*, specifies system root number and boot flags. These values are passed to the operating system for interpretation. Preset default boot flag values are 0,0. Use the **set boot_osflags** command to change the default boot flag values. See Chapter 4.

-halt Forces the bootstrap operation to halt and invoke the console program. The console is invoked after the bootstrap image is loaded and page tables and other data structures are set up. Console device drivers are not shut down. Transfer control to the bootstrap image by entering the **continue** command.

-protocols Specifies the Ethernet protocol to be used for the network boot.
enet_protocol Either **mop** (for *OpenVMS*) or **bootp** (for *Tru64 UNIX*) may be specified. Use the **set ew*0_protocols** or **ei*0_protocols** command to set a default network boot protocol. See Chapter 4.

boot_dev A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. Use the **set bootdef_dev** command to set a default boot device. See Chapter 4.

NOTE: *Entering values for boot flags, the boot device name, or Ethernet protocol on the **boot** command overrides the current default value for the current boot request, but does not change the corresponding environment variable. For example, if you have defined a value for **boot_osflags** and you specify the **-flags** argument on the **boot** command line, the **-flags** argument takes precedence for that boot session.*

7.12 Configuring the ISA Bus

Use the `isacfg` command to display or modify the ISA bus configuration data.

Example 7-10 Isacfg

```
P00>>>isacfg -s 0
```

```
=====
handle: MOUSE
etyp: 2
slot: 0
dev: 0
enadev: 1
totdev: 6
iobase0: 60 iobase1: 8000000000000000
iobase2: 8000000000000000 iobase3: 8000000000000000
iobase4: 8000000000000000 iobase5: 8000000000000000
membase0: 8000000000000000 memlen0: 8000000000000000
membase1: 8000000000000000 memlen1: 8000000000000000
membase2: 8000000000000000 memlen2: 8000000000000000
rombase: 8000000000000000 romlen: 8000000000000000
dma0: 80000000 irq0: c
dma1: 80000000 irq1: 80000000
dma2: 80000000 irq2: 80000000
dma3: 80000000 irq3: 80000000
=====
```

```
=====
handle: KBD
etyp: 2
slot: 0
dev: 1
enadev: 1
totdev: 6
iobase0: 60 iobase1: 8000000000000000
iobase2: 8000000000000000 iobase3: 8000000000000000
iobase4: 8000000000000000 iobase5: 8000000000000000
membase0: 8000000000000000 memlen0: 8000000000000000
membase1: 8000000000000000 memlen1: 8000000000000000
membase2: 8000000000000000 memlen2: 8000000000000000
rombase: 8000000000000000 romlen: 8000000000000000
dma0: 80000000 irq0: 1
dma1: 80000000 irq1: 80000000
dma2: 80000000 irq2: 80000000
dma3: 80000000 irq3: 80000000
=====
```

```
=====
handle: COM1
etyp: 2
slot: 0
=====
```

```

dev: 2
enadev: 1
totdev: 6
iobase0: 3f8   iobase1: 8000000000000000
iobase2: 8000000000000000   iobase3: 8000000000000000
iobase4: 8000000000000000   iobase5: 8000000000000000
membase0: 8000000000000000   memlen0: 8000000000000000
membase1: 8000000000000000   memlen1: 8000000000000000
membase2: 8000000000000000   memlen2: 8000000000000000
rombase: 8000000000000000   romlen: 8000000000000000
dma0: 80000000   irq0: 4
dma1: 80000000   irq1: 80000000
dma2: 80000000   irq2: 80000000
dma3: 80000000   irq3: 80000000
=====

```

```

=====
handle: COM2
etyp: 2
slot: 0
dev: 3
enadev: 1
totdev: 6
iobase0: 2f8   iobase1: 8000000000000000
iobase2: 8000000000000000   iobase3: 8000000000000000
iobase4: 8000000000000000   iobase5: 8000000000000000
membase0: 8000000000000000   memlen0: 8000000000000000
membase1: 8000000000000000   memlen1: 8000000000000000
membase2: 8000000000000000   memlen2: 8000000000000000
rombase: 8000000000000000   romlen: 8000000000000000
dma0: 80000000   irq0: 3
dma1: 80000000   irq1: 80000000
dma2: 80000000   irq2: 80000000
dma3: 80000000   irq3: 80000000
=====

```

```

=====
handle: LPT1
etyp: 2
slot: 0
dev: 4
enadev: 1
totdev: 6
iobase0: 3bc   iobase1: 8000000000000000
iobase2: 8000000000000000   iobase3: 8000000000000000
iobase4: 8000000000000000   iobase5: 8000000000000000
membase0: 8000000000000000   memlen0: 8000000000000000
membase1: 8000000000000000   memlen1: 8000000000000000
membase2: 8000000000000000   memlen2: 8000000000000000
rombase: 8000000000000000   romlen: 8000000000000000
dma0: 80000000   irq0: 7
dma1: 80000000   irq1: 80000000
dma2: 80000000   irq2: 80000000
dma3: 80000000   irq3: 80000000
=====

```

```

=====
handle: FLOPPY
etyp: 2
slot: 0

```

```

dev: 5
enadev: 1
totdev: 6
iobase0: 3f0   iobase1: 8000000000000000
iobase2: 8000000000000000   iobase3: 8000000000000000
iobase4: 8000000000000000   iobase5: 8000000000000000
membase0: 8000000000000000   memlen0: 8000000000000000
membase1: 8000000000000000   memlen1: 8000000000000000
membase2: 8000000000000000   memlen2: 8000000000000000
rombase: 8000000000000000   romlen: 8000000000000000
dma0: 2   irq0: 6
dma1: 80000000   irq1: 80000000
dma2: 80000000   irq2: 80000000
dma3: 80000000   irq3: 80000000
=====
P00>>>

```

The syntax is:

isacfg [-slot *slot #*] [-dev *device #*] [{-all | -rm | -mk | -mod | -init}] [-field *value*]

- slot** *slot #* The PCI slot allocated to the ISA bus (0).
- dev** *device #* The ISA device number allocated to the device upon which the **isacfg** command is to operate.
- all** Sets the default parameters to all devices on the ISA bus.
- rm** Removes an entry from the table.
- mk** Adds an entry into the table.
- mod** Modifies an entry in the table.
- init** Initializes the devices indicated by the **-dev** or **-all** switches.
- field** *value* The name of the field followed by the value to be deposited in it.

7.13 Testing the System

Use the test command to run firmware diagnostics for components of the system. Use Ctrl/C to abort testing.

Example 7-11 Test

```
P00>>>test
Default zone extended at the expense of memzone.
Use INIT before booting
Testing Ethernet device(s)
Testing Memory
Testing IDE/ATAPI disks (read-only)
Testing SCSI disks (read-only)
dqa0.0.0.105.0 has no media present or is disabled via the
RUN/STOP switch
file open failed for dqa0.0.0.105.0
Testing floppy drive (dva0, read-only)
^C
P00>>>
```

The **test** command tests the entire system, a subsystem, or a specified device. If no device or subsystem is specified, the entire system is tested.

To run a complete diagnostic test using the **test** command, the system configuration must include a diskette in the floppy disk drive and loopback connectors on COM2 and the parallel port.

The command syntax is:

t[est][-write][-nowrite "list"][-omit "list"][-t time][-q][dev_arg]

- write** Specifies that data will be written to the specified device
- nowrite** Specifies that data will not be written to the device specified in the "list"
- lb** Specifies loopback testing
- omit** Specifies that the devices in the "list" are not to be tested
- t** Specifies the amount of time the test command is to run
- q** Defines data size as a quadword (64 bits). All values default to 8 bytes.
- <dev_arg>** Specifies the target device, group of devices, or subsystem to test

For example:

```
P00>>> t pci0 -t 60
```

In this example, the **test** command tests all devices associated with the PCI0 subsystem. Test run time is 60 seconds. When a subsystem or device is specified, tests are executed on the associated modules first, then the appropriate exercisers are run.

7.14 Starting and Stopping CPUs

Use the **halt** and **continue** commands to stop and continue a program on the specified CPU.

Example 7-12 Halt and Continue

```
P00>>> halt 1
halted CPU 1
halt code = 1
operator initiated halt
PC = ffffffff8007cc68
P00>>> continue &p1
continuing CPU 1
```

7.14.1 halt (or stop)

The **halt** (or **stop**) command stops program execution on a secondary CPU that is still running a booted program. The syntax is:

halt (or **stop**) *processor_number*

The *processor_number* is the logical CPU number displayed by the **show cpu** command.

7.14.2 continue

The **continue** command resumes program execution on the specified processor or on the primary processor if none is specified. The processor begins executing instructions at the address that is currently in the program counter (PC). The processor is not initialized.

The **continue** command is valid only if you have not disturbed the system state and if you halted the system by pressing the Halt button on the control panel or, for *OpenVMS* systems only, by entering Ctrl/P on the console terminal.

The syntax is:

continue [**&pn**] [*address*]

&pn Specifies the processor. *n* is 0 or 1.

address The starting address of the program.

NOTE: *Some console commands, for example, **boot**, can alter the machine state so that program mode cannot be successfully resumed (unless you include **-halt** in the **boot** command). If you cannot resume program execution, reboot the operating system.*

*Other commands that alter machine state are **lfu** and **test**.*

7.15 Updating Firmware

Use the `lfu` command to update firmware. Example 7-13 shows a typical update from floppy. You may need two floppies, depending on whether you want to update option firmware. For more information on updating firmware, see Chapter 5 of this manual and the Alpha Systems Firmware Web site.

Example 7-13 Updating Firmware from Floppy

```
P00>>>lfu

Checking dka500.5.0.2000.1 for the option firmware files. . .
dka500.5.0.2000.1 has no media present or is disabled via the RUN/STOP switch
Checking dva0 for the option firmware files. . .

Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update: dva0
Please enter the name of the options firmware files list, or
Hit <return> to use the default filename (pc264fw.txt) :
Copying pc264fw.txt from dva0. . .
Copying PC264SRM from dva0. . .
Copying PC264NT from dva0. . .
Please insert next floppy containing the options firmware,
Hit <return> when ready. Or type DONE to abort.
Copying PC264FSB from dva0. . .
Copying CCMAB022 from dva0. . .
Copying DFXAA310 from dva0. . .
Copying KZPSAA12 from dva0. . .
Copying CIPCA420 from dva0. . .

***** Loadable Firmware Update Utility *****
```

Function	Description
Display	Displays the system's configuration table.
Exit	Done exit LFU (reset).
List	Lists the device, revision, firmware name, and update revision.
Readme	Lists important release information.
Update	Replaces current firmware with loadable data image.
Verify	Compares loadable and hardware images.
? or Help	Scrolls this function table.

Procedure for Updating from Floppy

1. Copy the firmware files, as described on the Alpha Systems Firmware Web site.
2. Insert disk1 into the floppy drive on the system and enter the **lfu** command from SRM.
3. The update utility runs and says that files were not found on CD or floppy, but then asks on which device the files are located. Type **dva0**.
4. The LFU then prompts for the name of the firmware files list. Press Return. The default file, `pc264fw.txt`, will be on the floppy.
5. The LFU reports as it copies each file. When the three files on disk1 are copied, the LFU prompts for the next floppy.
6. If you have disk2, insert it and press Return; otherwise type **done**.

Continued on next page

Example 7-13 Updating Firmware from Floppy (Continued)

```
UPD> list
Device          Current Revision  Filename          Update Revision
fsb             1.2              fsb_fw            3.2
nt              5.70             nt_fw             5.70
srm             5.5-82           srm_fw            5.6-3
                ccmab_fw         22
                cipca_fw         A420
                dfxaa_fw         3.10
                kzpsa_fw         A12

UPD>u srm
Confirm update on:
srm
[Y/(N)]y
WARNING: updates may take several minutes to complete for each device.

                DO NOT ABORT!

srm             Updating to 5.6-3...  Verifying 5.6-3...  PASSED.

UPD> u fsb

Confirm update on:
fsb
[Y/(N)]y
WARNING: updates may take several minutes to complete for each device.

                DO NOT ABORT!

fsb             Updating to 3.2...  Verifying 3.2...  PASSED.

UPD>list
.
.
.
UPD>exit
```

7. At the UPD> prompt, enter the **list** command to view the firmware revisions. Then enter the **update** command as appropriate to each device.
8. When done, enter the **list** command to see that the images successfully copied and are listed with the correct revision.

7.16 Forcing a System Crash Dump

For fatal errors the operating system will save the contents of memory to a crash dump file. Crash dump files can be used to determine why the system crashed. Use the crash command to force a crash dump.

Example 7-14 Crash

```
P00>>> crash
CPU 0 restarting
DUMP: 401408 blocks available for dumping.
DUMP: 38535 required for a partial dump.
DUMP:0x805001is the primary swap with 401407,start our last
38534
of dump at 362873, going to end (real end is one more,for
header)
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Header to 0x805001 at 401407 (0x61fff)
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Dump to 0x805001: .....: End 0x805001
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Header to 0x805001 at 401407 (0x61fff)
succeeded
halted CPU 0
halt code = 5
HALT instruction executed
PC = fffffc00004e2d64
P00>>>
```

The **crash** command forces a crash dump at the operating system level. This command can be used when an error has caused the system to hang and the system can be halted with the Halt button or the RMC **halt** command. The **crash** command restarts the operating system and forces a crash dump to the selected device. The syntax is:

crash [*device*]

The *device* is the name of the device to which the crash dump is written.

7.17 Initializing the System

The `init` command resets the system and executes the power-up tests.

Example 7-15 `Init`

```
P00>>>init
Initializing...
384 Meg of system memory
probing hose 1, PCI
bus 0, slot 7 -- pka -- NCR 53C895
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 6, function 0 -- pkb -- Adaptec AIC-7895
bus 0, slot 6, function 1 -- pkc -- Adaptec AIC-7895
bus 0, slot 7 -- vga -- ELSA GLoria Synergy
bus 0, slot 9 -- ewa -- DE500-AA Network Controller
Testing the System
Testing the Memory
Testing the Disks (read only)
Testing the Network
System Temperature is 32 degrees C
initializing GCT/FRU at 1ec000

COMPAQ AlphaStation DS20E 666 MHz Console v5.5-9, Aug 31 1999
11:52:26
```

The **`init`** command resets the system. Issuing this command is equivalent to pressing the Reset button. The syntax is:

`init`

After self-tests are executed, the system autoboots unless one of the following is true:

- A halt assertion exists (see Chapter 6).
- The **`auto_action`** environment variable is set to **`halt`**.

If the **`auto_action`** environment variable is set to **`boot`** or **`restart`** and no halt assertion condition exists, the system autoboots. In all other cases, the system stops in console mode and does not attempt to boot.

7.18 Reading a File

The more command displays a file one screen at a time.

Example 7-16 More

```
P00>>>more el
*** keyboard not plugged in...
384 Meg of system memory
probing hose 1, PCI
bus 0, slot 7 -- pka -- NCR 53C895
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 6, function 0 -- pkb -- Adaptec AIC-7895
bus 0, slot 6, function 1 -- pkc -- Adaptec AIC-7895
bus 0, slot 7 -- vga -- ELSA GLoria Synergy
bus 0, slot 9 -- ewa -- DE500-AA Network Controller
resetting the SCSI bus on pka0.7.0.7.1
port pka0.7.0.7.1 initialized, scripts are at 1d2500
port dqa.0.0.105.0 initialized
port dqb.0.1.205.0 initialized
device dqa0.0.0.105.0 (CD-224E) found on dqa0.0.0.105.0
device dka100.1.0.7.1 (COMPAQ BD018122C9) found on
pka0.1.0.7.1
device dka200.2.0.7.1 (COMPAQ BD018122C9) found on
pka0.2.0.7.1
environment variable aa_value_bcc created
environment variable aa_2x_cache_size created
environment variable mstart created
environment variable mend created
--More-- (SPACE - next page, ENTER - next line, Q - quit)
```

The **more** command is similar to the UNIX **more** command. It is useful for displaying output that scrolls too quickly to be viewed. For example, when you power up the system, the system startup messages scroll, and the messages are logged to an event log. When the P00>>> prompt displays, you can use the **more** command to display the contents of the event log file. See Example 7–16.

The syntax is:

more [*file...*]

The *file* is the name of the file to be displayed.

NOTE: *If you misspell the word "more," the console hangs. Enter Ctrl/x to remove the hang condition.*

7.19 Configuring a PCI NVRAM Module

The **prcache** command is used to support Tru64 UNIX systems equipped with a Prestoserve PCI NVRAM module.

Example 7-17 Prcache

```
P00>>> prcache -f
PCI NVRAM Disk Cache: passed
Size:      4MB
PCI Memory Address: 40000000
System ID: 12000000
State:     - not valid
Battery Status: good (Charging)
Battery Disconnect Circuit Status: enabled

P00>>> prcache -z
This command will zero the PCI NVRAM Disk Cache
Do you really want to continue [Y/N] ? : y
clearing disk cache
P00>>>
```

The **prcache** command, with the options listed below, checks PCI NVRAM configuration and battery status, clears data from the NVRAM module, and disables the NVRAM battery disconnect circuit. This command is used only with *Tru64 UNIX* systems. The syntax is:

prcache **-{f,z,u}**

- f** Checks configuration and battery status.
- z** Clears valid data; writes zeros to memory.
- u** Disables the NVRAM battery disconnect circuit.

7.20 Creating a Power-Up Script

The system comes with a special nonvolatile file named “nvram” that is stored in EEROM. Nvram is a user-created power-up script (set of commands) that is always invoked during the power-up sequence. Use the SRM edit command to create or alter the nvram script.

Example 7-18 Editing the Nvram Script

```
P00>>> edit nvram
editing 'nvram'
0 bytes read in
*10 set ewa0_protocols bootp
*list
10 set ewa0_protocols bootp
*exit
27 bytes written out to nvram
```

This example shows how to modify the user-created power-up script, “nvram.” In this example the script is edited to include a command that allows you to boot the *Tru64 UNIX* operating system over the network.

Example 7-19 Clearing the Nvram Script

```
P00>>> edit nvram
editing 'nvram'
20 bytes read in
*10
*exit
0 bytes written out to nvram
P00>>>
```

To clear the script, enter line numbers without any text. This deletes the lines.

Editing the Nvram Script

You can create an nvram script to include any commands you want the system to execute at power-up.

You create and edit the nvram script using the SRM **edit** command. With **edit**, lines may be added, overwritten, or deleted.

The syntax is:

edit *file*

file is the name of the file to be edited.

The editing commands are:

help	Displays the brief help file.
list	Lists the current file prefixed with line numbers.
renumber	Renumbers the lines of the file in increments of 10.
exit	Leaves the editor and closes the file, saving all changes.
quit	Leaves the editor and closes the file without saving changes.
<i>nn</i>	Deletes line number <i>nn</i> .
<i>nn text</i>	Adds or overwrites line number <i>nn</i> with <i>text</i> .

CAUTION: *Use caution when editing the nvram script. It is possible to disable the system by including an inappropriate command. For example, if you include the **init** command in the script, the system will go into an endless loop.*

*To correct this error, press the Halt button or issue the RMC **halt** command, then power up or reset the system. When the P00>>> prompt is displayed, edit the nvram script to remove the illegal command.*

7.21 Loading AlphaBIOS

The `alphabios` command loads and starts the AlphaBIOS console. AlphaBIOS-based utilities, such as the RAID configuration utility (RCU), are run from AlphaBIOS. RAID devices are configured from the AlphaBIOS Utilities menu. For information on running the RCU, see the documentation that comes with the RAID subsystem.

Example 7-20 AlphaBIOS

```
P00>>> alphabios -g
Loading Arc Firmware From Flash
resetting all I/O buses
Arc Firmware Loaded
```

The syntax is:

alphabios

Options

- g** Starts AlphaBIOS on a VGA port. Use this option if the **console** environment variable is set to **serial**, but you want AlphaBIOS to come up on the VGA monitor.

To return to the SRM console, reset the system by pressing the Reset button.

7.22 Setting Console Security

The SRM console firmware has console security features intended to prevent unauthorized personnel from modifying the system parameters or otherwise tampering with the system from the console. The security features include a secure mode and commands to set console security.

7.22.1 Overview of Secure Mode

The SRM console has two modes, user mode and secure mode.

- User mode allows you to use all SRM console commands. User mode is the default mode.
- Secure mode allows you to use only the **boot** and **continue** commands. The **boot** command cannot take command-line parameters when the console is in secure mode. The console boots the operating system using the environment variables stored in NVRAM (**boot_file**, **bootdef_dev**, **boot_flags**).

Secure Function Commands

- The **set password** and **set secure** commands are used to set secure mode.
 - The **clear password** command is used to exit secure mode and return to user mode. All the SRM console commands are available and the console is no longer secure.
 - The **login** command turns off console security for the current console session. Once you enter the **login** command in secure mode, you can enter any SRM command as usual. However, the system automatically returns to secure mode when you enter the **boot** or **continue** command or when you reset the system.
-

NOTE: *The security features work only if access to the system hardware is denied to unauthorized personnel. Be sure the system is available only to authorized personnel.*

7.22.2 Setting the Console Password

Set the console password with the set password command. A password is required for operating the system in secure mode.

Example 7-21 Set Password

```
P00>>> set password ❶  
Please enter the password:  
Please enter the password again:  
P00>>>
```

```
P00>>> set password ❷  
Please enter the password:  
Please enter the password again:  
Now enter the old password:  
P00>>>
```

```
P00>>> set password  
Please enter the password:  
Password length must be between 15 and 30 characters ❸  
P00>>>
```

- ❶ Setting a password. If a password has not been set and the **set password** command is issued, the console prompts for a password and verification. The password and verification are not echoed.
- ❷ Changing a password. If a password has been set and the **set password** command is issued, the console prompts for the new password and verification, then prompts for the old password. The password is not changed if the validation password entered does not match the existing password stored in NVRAM.
- ❸ The password length must be between 15 and 30 alphanumeric characters. Any characters entered after the 30th character are not stored.

The **set password** command sets the console password for the first time or changes an existing password. It is necessary to set the password only if the system is going to operate in secure mode.

The syntax is:

set password

7.22.3 Setting the Console to Secure Mode

To set the console to secure mode, first set the password. Then enter the set secure command. The system immediately enters secure mode.

Example 7-22 Set Secure

```
P00>>> set secure ❶  
Console is secure. Please login.  
P00>>> b dkb0  
Console is secure - parameters are not allowed.  
P00>>> login ❷  
Please enter the password:  
P00>>> b dkb0  
(boot dkb0.0.0.3.1)  
.  
.  
.
```

- ❶ The console is put into secure mode, and then the operator attempts to boot the operating system with command-line parameters. A message is displayed indicating that boot parameters are not allowed when the system is in secure mode.
- ❷ The **login** command is entered to turn off security features for the current console session. After successfully logging in, the operator enters a **boot** command with command-line parameters.

The **set secure** command enables secure mode. If no password has been set, you are prompted to set the password. Once you set a password and enter the **set secure** command, secure mode is in effect immediately and only the **continue**, **boot** (using the stored parameters), and **login** commands can be performed.

The syntax is:

set secure

7.22.4 Turning Off Security During a Console Session

The **login** command turns off the security features, enabling access to all SRM console commands during the current console session. The system automatically returns to secure mode as soon as the boot or continue command is entered or when the system is reset.

Example 7-23 Login

```
P00>>> login ❶  
Secure not set. Please set the password.  
P00>>> set password ❷  
Please enter the password:  
Please enter the password again:  
P00>>> login ❸  
Please enter the password.  
P00>>> show boot*
```

- ❶ The **login** command is entered, but the system is not in secure mode. A password must be set.
- ❷ A password is set.
- ❸ The **login** command is entered. After the password is entered, console security is turned off for the current session and the operator can enter commands.

When you enter the **login** command, you are prompted for the current system password. If a password has not been set, a message is displayed indicating that there is no password in NVRAM. If a password has been set, this prompt is displayed:

Please enter the password:

If the password entered matches the password in NVRAM, when the prompt is redisplayed the console is no longer in secure mode and all console commands can be performed during the current console session.

NOTE: *If you enter the **login** command when a halt assertion exists, the command fails, even if you enter the correct password.*

If You Forget the Password

You can clear the password from the local console terminal or from the RMC.

From the Local Console Terminal

If you forget the current password, use the **login** command in conjunction with the control panel Halt button to clear the password, as follows:

1. Enter the **login** command:

```
P00>>> login
```

2. When prompted for the password, press the Halt button to the latched position and then press the Return (or Enter) key.

The password is now cleared and the console cannot be put into secure mode unless you set a new password.

From the RMC

1. From the SRM console, enter the **login** command:

```
P00>>> login
```

2. At the Enter Password: prompt, type the RMC escape sequence.
3. At the RCM>>> prompt, enter the **halt** command and then the **quit** command:

```
RCM>>> halt  
RCM>>> quit
```

4. At the SRM console, clear the password

```
P00>>> clear password  
  
Please enter the password:  
Password successfully cleared.  
P00>>>
```

7.22.5 Returning to User Mode

The **clear password** command clears the password environment variable, setting it to zero. Once the password is cleared, you are returned to user mode.

Example 7-24 Clear Password

```
P00>>> clear password
Please enter the password:                               ❶
Console is secure
P00>>> clear password
Please enter the password:                               ❷
Password successfully cleared.
P00>>>
```

- ❶ The wrong password is entered. The system remains in secure mode.
- ❷ The password is successfully cleared.

The **clear password** command is used to exit secure mode and return to user mode. To use **clear password**, you must know the current password. Once you clear the password, the console is no longer secure.

To clear the password without knowing the current password, you must use the **login** command in conjunction with the Halt button, as described in Section 7.22.4.

7.23 Setting and Viewing Environment Variables

Use the `set envvar` and `show envvar` commands to set and view environment variables.

Example 7-25 Set *envvar* and Show *envvar*

```
P00>>> set bootdef_dev dkb0
P00>>> show bootdef_dev
Bootdef_dev dkb0
```

Environment variables pass configuration information between the console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. Environment variables are set or changed with the `set envvar` command. Their values are viewed with the `show envvar` command. You can also create nonvolatile environment variables with the `edit` command, as shown in Example 7-26.

Example 7-26 User-Created Environment Variable

```
P00>>> edit nvram
editing 'nvram'
0 bytes read in
*10 set mopv3_boot 1
*exit
17 bytes written out to nvram
P00>>>
```

In this example the nvram script is edited so that an environment variable called `mop3_boot` is created and set to 1 on each power-up. By default, MOP boots send four MOP V4 requests before defaulting to MOP V3. This user-created environment variable forces the SRM console to bypass MOP V4 requests. This speeds up MOP booting on networks with MOP V3 software.

set *envvar*

The **set** command sets or modifies the value of an environment variable. It can also be used to create a new environment variable if the name used is unique. Environment variables pass configuration information between the console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. The syntax is:

set [-default] *envvar value*

-default Restores an environment variable to its default setting.

envvar The name of the environment variable to be modified. See Table 7–6 for a list of environment variables

value The new value of the environment variable.

New values for the following environment variables take effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

console
os_type
pk*0_fast
pk*0_host_id
pk*0_soft_term

show *envvar*

The **show *envvar*** command displays the current value (or setting) of an environment variable. The syntax is:

show *envvar*

envvar The name of the environment variable to be displayed. The **show*** command displays all environment variables.

Table 7–6 summarizes the most commonly used SRM environment variables. These environment variables are described in the following pages.

NOTE: *The environment variables for setting boot options are described in Chapter 4, Booting and Installing an Operating System.*

Table 7–6 Environment Variable Summary

Environment Variable	Function
auto_action	Specifies the console's action at power-up, a failure, or a reset.
bootdef_dev	Specifies the default boot device string.
boot_file	Specifies a default file name to be used for booting when no file name is specified by the boot command.
boot_osflags	Specifies the default operating system boot flags.
com1_baud	Sets the baud rate of the internal COM1 serial interface.
com2_baud	Sets the default baud rate of the COM2 serial port.
console	Specifies the device on which power-up output is displayed (serial terminal or VGA monitor).
cpu_enabled	Enables or disables a specific secondary CPU.
ei*0_mode or ew*0_mode	Specifies the connection type of the default Ethernet controller.
ei*0_protocols or ew*0_protocols	Specifies network protocols for booting over the Ethernet controller.

Table 7-6 Environment Variable Summary (Continued)

Environment Variable	Function
kbd_hardware_type	Specifies the default console keyboard type.
language	Specifies the console keyboard layout.
os_type	Specifies the operating system and sets the appropriate console interface.
password	Sets a console password. Required for placing the SRM into secure mode.
pci_parity	Disables or enables parity checking on the PCI bus.
pk*0_fast	Enables fast SCSI mode.
pk*0_host_id	Specifies the default value for a controller host bus node ID.
pk*0_soft_term	Enables or disables SCSI terminators on systems that use the QLogic ISP1020 SCSI controller.
tt_allow_login	Enables or disables login to the SRM console firmware on other console ports.

7.23.1 com*_baud

The default baud rate for the system is 9600. The **com*_baud** commands set the baud rate for COM1 and COM2.

com1_baud

The **com1_baud** environment variable sets the baud rate for the internal COM1 serial interface.

com2_baud

The **com2_baud** environment variable sets the baud rate to match that of the device connected to the COM2 port.

The syntax is:

set com*_baud *baud_value*

baud_value The new baud rate. A list of possible values is displayed by entering the command without a value.

Example

The following example shows the supported baud rate values.

```
P00>>> set com2_baud
57600
38400
19200
9600
7200
4800
3600
2400
2000
1800
.
.
.
```

7.23.2 console

The console terminal can be either a VGA monitor or a serial terminal. The console environment variable specifies which type of console is used.

The syntax is:

set console *output_device*

The options for *output_device* are:

graphics (default) The console terminal is a VGA monitor or a device connected to the VGA port.

serial The console terminal is the device connected to the COM1 port.

The value of **console** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

Example

```
P00>>> show console
console                graphics
P00>>> set console serial
P00>>> init
.
.
.
P00>>> show console
console                serial
P00>>>
```

7.23.3 `cpu_enabled`

The `cpu_enabled` environment variable sets a bit mask that enables or disables specific CPUs in a multiprocessor system.

Disabling a CPU may be necessary if a number of errors are reported on a specific CPU. These errors might be displayed during power-up or might be displayed with the **show config** command.

Disabled CPUs are prevented from running the console or the operating system. Bit 0 of the mask corresponds to CPU 0 and bit 1 to CPU 1. A zero (0) in the bit mask prevents the corresponding CPU from running; a one (1) allows it to run. The bit mask is expressed as a hexadecimal value.

The value of **`cpu_enabled`** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The **`cpu_enabled`** environment variable is typically used in benchmark testing.

NOTE: *The primary CPU cannot be disabled. The primary CPU is the lowest numbered working CPU.*

The syntax is:

set cpu_enabled *hex_digit*

The *hex_digit* values are shown in the table.

Hex_Digit Value	Binary Equivalent CPU enable 3210 (bit)	Enabled CPUs
0	0000	No CPUs (CPU 0 still comes up)
1	0001	CPU 0
2	0010	CPU 1
3	0011	CPU 0,1

Example

In the following example, CPU 0 and CPU 1 are enabled.

```
P00>>> set cpu_enabled 3
```

7.23.4 ei*0_mode or ew*0_mode

The ei*0_mode or ew*0_mode environment variable sets an Ethernet controller to run an AUI, ThinWire, or twisted-pair Ethernet network. For the fast setting, the device defaults to fast.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters “ei” or “ew,” for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when entering the command.

The syntax is:

```
set ei*0_mode value or  
set ew*0_mode value
```

The options for *value* are:

au	Device type is AUI.
bn	Device type is ThinWire.
fa	Device type is fast 100BaseT.
Fastfd	Device type is fast full duplex 100BaseT.
fu	Device type is full duplex twisted-pair.
twisted-pair	Device type is 10BaseT (twisted-pair).

Example

```
P00>>> set ewa0_mode t  
P00>>> show ewa0_mode  
ewa0_mode          twisted-pair
```

7.23.5 kbd_hardware_type

The `kbd_hardware_type` environment variable sets the keyboard hardware type as either `PCXAL` or `LK411` and enables the system to interpret the terminal keyboard layout correctly.

The syntax is:

set kbd_hardware_type *keyboard_type*

The options for *keyboard_type* are:

pcxal (default) Selects the 102-type keyboard layout.

lk411 Selects the LK411 keyboard layout.

Example

```
P00>>> set kbd_hardware_type lk411
P00>>>
```

7.23.6 language

The language environment variable specifies the keyboard layout, which depends on the language. The setting of the language environment variable must match the language of the keyboard variant.

The factory keyboard setting is 36 English (American).

The value of **language** takes effect only after you reset the system by pressing the Reset button or issuing the **init** command.

The syntax is:

set language *language_code*

The options for *language_code* are:

0	No language	42	Italiano (Italian)
30	Dansk (Danish)	44	Nederlands (Netherlands)
32	Deutsch (German)	46	Norsk (Norwegian)
34	Deutsch (Swiss)	48	Portugues (Portuguese)
36	English (American)	4A	Suomi (Finnish)
38	English (British/Irish)	4C	Svenska (Swedish)
3A	Español (Spanish)	4E	Belgisch-Nederlands (Dutch)
3C	Français (French)	50	Japanese (JIS)
3E	Français (Canadian)	52	Japanese (ANSI)
40	Français (Suisse Romande)		

Example

```
P00>>> set language 3A
```

7.23.7 os_type

The **os_type** environment variable specifies the default operating system. This variable is set at the factory to the setting for the operating system you purchased. Use this command to change the factory default setting.

The value of **os_type** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

```
set os_type os_type
```

The options for *os_type* are:

- unix** Sets the default to *Tru64 UNIX*. The SRM firmware is started during power-up or reset.
- vms** Sets the default to *OpenVMS*. The SRM firmware is started during power-up or reset.

Example

In this example, the default operating system is set to *Tru64 UNIX*. After the system is initialized, the *Tru64 UNIX* banner is displayed.

```
P00>>> set os_type unix
P00>>> init
.
.
.
```

7.23.8 pci_parity

The pci_parity environment variable disables or enables parity checking on the PCI bus.

Some PCI devices do not implement PCI parity checking, and some have a parity-generating scheme in which the parity is sometimes incorrect or is not fully compliant with the PCI specification. A side effect of this behavior is that superfluous PCI parity errors are reported by the host PCI bridge. In such cases, the device can be used as long as parity is not checked.

CAUTION: *Disabling PCI parity checking on this system is not recommended or supported.*

The syntax is:

set pci_parity *value*

The options for *value* are:

on (default) Enables PCI parity checking.

off Disables PCI parity checking.

Example

```
P00>>> show pci_parity
pci parity                    on
```

7.23.9 pk*0_fast

The `pk*0_fast` environment variable enables fast SCSI to perform in either standard or fast mode.

If the system has at least one fast SCSI device, set the default controller speed to fast SCSI (1). Devices on a controller that connects to both standard and fast SCSI devices will perform at the appropriate rate for the device. If the system has no fast SCSI devices, set the default controller speed to standard SCSI (0). If a fast SCSI device is on a controller set to standard, it will perform in standard mode.

To list the controllers on your system, enter the **show device** command. SCSI controllers begin with the letters “pk,” for example, pka0. The third letter is the adapter ID for the specific SCSI controller. Replace the asterisk with the adapter ID letter when entering the **set pk*0_fast** command.

The value of **set pk*0_fast** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

```
set pk*0_fast scsi_speed
```

The options for *scsi_speed* are:

- 0** The controller is in standard SCSI mode.
- 1 (default)** The controller is in fast SCSI mode.

Example

```
P00>>> set pkb0_fast 1
P00>>> init
.
.
.
P00>>> show pkb0_fast
P00>>> pkb0_fast                    1
```

7.23.10 pk*0_host_id

The `pk*0_host_id` environment variable sets the controller host bus node ID to a value between 0 and 7.

Each SCSI bus in the system requires a controller. Buses can support up to eight devices; however, the eighth device must be a controller. Each device on the bus, including the controller, must have a unique ID, which is a number between 0 and 7. This is the bus node ID number.

On each bus, the default bus node ID for the controller is set to 7. You do not need to change the controller bus node ID unless you have two or more controllers on the same bus.

To list the controllers on your system, enter the **show device** command. SCSI controllers begin with the letters “pk” (for example, pka0). The third letter is the adapter ID for the controller. Replace the asterisk with the adapter ID letter when entering the **set pk*0_host_id** command.

The value of **pk*0_host_id** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

```
set pk*_host_id scsi_node_id
```

The value for *scsi_node_id* is the bus node ID, a number from 0 to 7.

Example

In this example, the default bus node ID for a SCSI controller with an adapter ID of “b” is set to bus node ID 6.

```
P00>>> set pkb0_host_id 6
P00>>> init
.
.
.
P00>>> show pkb0_host_id
pkb0_host_id          6
```

7.23.11 pk*0_soft_term

The `pk*0_soft_term` environment variable enables or disables SCSI terminators for optional SCSI controllers. This environment variable applies to systems that use the QLogic SCSI controller, though it does not affect the onboard controller.

The QLogic ISP1020 SCSI controller implements the 16-bit wide SCSI bus. The QLogic module has two terminators, one for the low eight bits and one for the high eight bits.

To list the controllers on your system, enter the **show device** command. SCSI controllers begin with the letters “pk” (for example, pka0). The third letter is the adapter ID for the controller. Replace the asterisk with the adapter ID letter when entering the **set pk*0_soft_term** command.

The value of **pk*0_soft_term** takes effect only after you reset the system by pressing the Reset button or by issuing the **init** command.

The syntax is:

set pk*0_soft_term *value*

The options for *value* are:

- | | |
|---------------------|--|
| off | Disables termination of all 16 bits. |
| low | Enables low eight bits and disables high eight bits. |
| high | Enables high eight bits and disables low eight bits. |
| on (default) | Enables all 16 bits. |

Examples

In this example, both terminators are disabled.

```
P00>>> set pkb0_soft_term off
P00>>> init
.
.
.
P00>>> show pkb0_soft_term
pkb0_soft_term          off
```

In this example, the terminator for the high 8 bits is enabled.

```
P00>>> set pkb0_soft_term high
P00>>> init
.
.
.
P00>>> show pkb0_soft_term
pkb0_soft_term          high
```

7.23.12 tt_allow_login

The `tt_allow_login` environment variable enables or disables login to the SRM console firmware on alternative console ports. “Login” refers to pressing the Return or Enter key to activate the console device.

If the **console** environment variable is set to **serial**, the primary console device is the terminal connected through the COM1 port. The **set tt_allow_login 1** command lets you activate a console device through COM2 or a VGA monitor. The **set tt_allow_login 0** command disables console activation through alternative ports. You might want to disable console access to COM2 as a system security measure or if you want to use COM2 as an “application only” port.

The syntax is:

set tt_allow_login *value*

The options for *value* are:

- 0** Disables login through the COM2 port or the VGA monitor.
- 1 (default)** Enables login through the COM2 port or the VGA monitor.

Example

In the following example, the primary console device is set to the terminal connected through the COM1 port. Then the **set tt_allow_login 0** command is used to disable logins through either the COM2 port or a VGA monitor.

```
P00>>> set console serial
P00>>> init
.
.
.
P00>> set tt_allow_login 0
```


Chapter 8

Troubleshooting

This chapter describes procedures for basic troubleshooting. The following topics are covered:

- Error beep codes
- Diagnostic LEDs on OCP
- Power problems
- Console-reported failures
- Boot problems
- Thermal problems and environmental status
- Operating system reported failures
- Memory problems
- PCI bus problems
- SCSI problems
- Fail-safe booter utility

Before you begin troubleshooting your system, consult your service agreement to determine how much troubleshooting and repair you should undertake yourself.

If you have a self-maintenance contract, use the information in this guide and the *DS20E Service Guide* to help identify and resolve the problem.

8.1 Error Beep Codes

Audible beep codes announce specific errors that might be encountered while the system is powering up. For example, if the firmware in flash ROM is unavailable, you would hear a 1-2-3 beep code (one beep, a pause, a burst of two beeps, a pause, and another burst of three beeps). Table 8-1 identifies the error beep codes.

Table 8-1 Error Beep Codes

Beeps	Message/Meaning	Action to Repair
1-2-3	Indicates fail-safe booter startup. The firmware in flash ROM is unavailable and fail-safe booter has begun running.	Update the firmware. See Section 8.11.
4	No valid header in ROM. Loading entire ROM. The header in the ROM is not valid.	Replace the ROM.
6	Memory error detected. A checksum error occurred after the ROM image was copied into memory. Either memory is misconfigured or a memory DIMM needs to be reseated.	Check memory configuration. Reseat or replace DIMM.

8.2 Diagnostic LEDs on OCP

Diagnostic LEDs on the operator control panel light up during power-up, indicating the internal process of the system and console. The LEDs shut off on successful completion of power-up self-tests. In a rackmount system, LED 1 is at the top. In a pedestal system LED 1 is to the left.

Figure 8-1 LED Patterns During Power-Up (Rack Orientation)

	Starting console	Initializing idle PCB	Initializing semaphores	Setting heap	Setting heap base address	Initializing memory low limit	Initializing driver structures	Initializing idle process PID	Initializing file system	Initializing timer data structures	Lowering IPL	Creating dead_eater	Creating poll	Creating timer	Entering powerup	Entering idle loop	Probing I/O	Starting drivers	
LED1	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	●	●
LED2	●	●	●	●	○	○	○	○	●	●	●	○	○	○	○	○	○	●	●
LED3	●	●	○	○	●	●	○	○	●	●	○	●	●	○	○	○	○	●	●
LED4	●	○	●	○	●	○	●	○	●	○	●	●	○	●	○	○	○	●	○

● = On, ○ = Off

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If the system fails to complete the power-up, and some LEDs remain lit, refer to Figure 8-1 to determine what part of the power-up sequence is failing.

NOTE: *The first two LED patterns (LEDs 1-4 on, followed by LEDs 1-3 on and LED 4 off) are identical to the last two patterns, but represent different startup phases. Observe the LED pattern on power-up to ensure that the first two patterns execute successfully. If power-up does not succeed, and a LED pattern is lit that is the same as one of the first two patterns, the problem lies with one of the last two phases of the power-up sequence.*

8.3 Power Problems

Table 8-2 Troubleshooting Power Problems

If the power indicator is:	Check:
OFF	<ul style="list-style-type: none">• Front-panel power switch• Power at the wall receptacle• AC cord• Power cable connectors• Side cover (pedestal) or top cover (rack). Interlocking sensor switch shuts off power if the cover is removed. <p>Unplug the power cords for 15 seconds, then reconnect.</p>
ON for a few seconds and then goes OFF	<p>Power supply fan. Listen to hear if the power supply fan is spinning at power-up. A failure of the fan causes the system to shut down after a few seconds.</p> <p>NOTE: <i>The power supply shuts off within one second if its internal fan fails.</i></p>
ON, but the monitor screen is blank	<ul style="list-style-type: none">• Monitor power indicator is ON.• Video cable is properly connected.• SRM console environment variable setting. <p>NOTE: <i>A black raster is displayed if the console environment variable is set to serial mode rather than graphics mode.</i></p>

8.4 Console-Reported Failures

Table 8-3 Troubleshooting Console-Reported Failures

Symptom	Action
Power-up tests do not complete.	<p>Use error beep codes or console serial terminal to determine what error occurred.</p> <p>Check the power-up screen for error messages.</p>
Console program reports an error.	<p>Interpret the error beep codes at power-up and check the power-up screen for a failure detected during self-tests.</p> <p>Examine the console event log (use the more el command) to check for embedded error messages recorded during power-up.</p> <p>If the power-up screen or console event log indicates problems with mass storage devices or PCI devices, or if devices are missing from the show config display, see Section 8.10.</p> <p>Use the SRM test command to verify the problem.</p>

8.5 Boot Problems

Table 8-4 Troubleshooting Boot Problems

Problem/Possible Cause	Action
Operating system (OS) software is not installed on the hard disk drive.	Install the operating system and license key.
Target boot device is not listed in the SRM show device or show config command.	Check the cables. Are the cables oriented properly and not cocked? Are there bent pins? Check all the SCSI devices for incorrect or conflicting IDs. Refer to the device's documentation. SCSI termination: The SCSI bus must be terminated at the end of the internal cable and at the last external SCSI peripheral.
System cannot find the boot device.	Use the SRM show config and show device commands. Use the displayed information to identify target devices for the boot command, and verify that the system sees all of the installed devices. If you are attempting to use bootp , first set the following variables as shown: <pre>P00>>>set ewa0_inet_init BOOTP P00>>>set ewa0_protocols BOOTP</pre>

Table 8-4 Troubleshooting Boot Problems (Continued)

Problem/Possible Cause	Action
System does not boot.	Verify that no unsupported adapters are installed.
Environment variables are incorrectly set. This could happen if the main logic board has been replaced, which would cause a loss of the previous configuration information.	Use the SRM show and set commands to check and set the values assigned to boot-related variables such as auto_action , bootdef_dev , and boot_osflags .
System will not boot over the network.	For problems booting over a network, check the ew*0_protocols or ei*0_protocols environment variable settings: Systems booting from a Tru64 UNIX server should be set to bootp ; systems booting from an OpenVMS server should be set to mop . Run the test command to check that the boot device is operating.

8.6 Thermal Problems and Environmental Status

Overtemperature conditions can cause the system to shut down.

The DS20E system operates in an ambient temperature range of 10°C–35°C. Internal sensors monitor system and power supply temperature and shut down the system if maximum limits are exceeded. If the system shuts down unexpectedly:

- Ensure that the side cover (pedestal) or top cover (rack) are properly secured.
- Verify that the ambient temperature does not exceed the specified limits.
- Make sure there are no obstructions to the airflow at the front or rear of the system.
- Check to see that the cables inside the system are properly dressed. A dangling cable can impede airflow to the system.

Troubleshooting with show power command

The **show power** command can help you determine if environmental problems necessitate the replacement of a power supply, system fan, or CPU.

Show power indicates:	Action
Bad power supply (in a redundant configuration)	Replace the bad supply. You do not have to shut down the system as long as two supplies are operating.
Bad system fan	Fan must be replaced. Contact Compaq Services.
Bad CPU fan	CPU must be replaced. Replace it or contact Compaq Services for assistance.
Bad temperature	The problem could be a bad fan or an obstruction to the airflow. Check the airflow first. If there is no obstruction, contact Compaq Services to replace the bad fan.

8.7 Operating System Reported Failures

Table 8-5 Operating System Reported Failures

Symptom	Action
System is hung or has crashed.	<p>If possible, halt the system with the Halt button or the RMC halt command. Then enter the SRM crash command and examine the crash dump file.</p> <p>Refer to the <i>Guide to Kernel Debugging</i> (AA-PS2TD-TE) for information on using the Tru64 UNIX Crash utility.</p>
Errors have been logged and the operating system is up.	Examine the operating system error log files.

8.8 Memory Problems

Table 8–6 Troubleshooting Memory Problems

Symptom	Action
DIMMs ignored by system, or system unstable. System hangs or crashes.	Ensure that each memory bank has identical DIMMs installed.
DIMMs failing memory power-up self-test.	Try another pair of DIMMs.
DIMMs may not have ECC bits.	Some third-party DIMMs may not be compatible with DS20E systems. Ensure memory DIMMs are qualified.
Noticeable performance degradation. The system may appear hung or run very slowly.	This could be a result of hard single-bit ECC errors on a particular DIMM. Check the error logs for memory errors. Ensure memory DIMMs are qualified.

8.9 PCI Bus Problems

PCI bus problems at startup are usually indicated by the inability of the system to detect the PCI device. The following steps can be used to diagnose the likely cause of PCI bus problems.

1. Confirm that the PCI option card is supported and has the correct firmware and software versions.
2. Confirm that the PCI option card and any cabling are properly seated.
3. Check for a bad PCI slot by moving the last installed PCI controller to a different slot.
4. Call the option manufacturer for help.

PCI Parity Error

Some PCI devices do not implement PCI parity, and some have a parity generating scheme that may not comply with the PCI specification. In such cases, the device should function properly if parity is not checked.

Parity checking can be turned off with the **set pci_parity off** command so that false PCI parity errors do not result in machine check errors. However, if you disable PCI parity, no parity checking is implemented for any device. Turning off PCI parity is therefore not recommended or supported.

8.10 SCSI Problems

SCSI problems are generally manifested as data corruption, boot problems, or poor performance.

Check SCSI bus termination.

- Cable is properly seated at system board or option connector.
- Bus must be terminated at last device on cable or at physical cable end.
- No terminators in between.
- Old 50-pin (narrow) devices must be connected with wide-to-narrow adapter (SN-PBXKP-BA). Do not cable from the connector on the card.
- Using 50-pin devices on the bus may significantly degrade performance.

Any external drives must be connected to their associated card, and these cards must have no internal drives connected to them. Use a separate external controller card.

- Ultra-wide SCSI has strict bus length requirements.
- SCSI bus itself cannot handle internal plus external cable.
- Use a separate card for external devices and terminate properly.

8.11 Fail-Safe Booter Utility

The fail-safe booter (FSB) provides an emergency recovery mechanism if the firmware image contained in flash memory becomes corrupted. You can run the FSB and boot another image from a diskette that is capable of reprogramming the flash ROM.

Use the FSB when one of the following failures at power-up prohibits you from getting to the console program:

- Firmware image in flash memory corrupted
- Power failure or accidental power-down during a firmware upgrade
- Error in the nonvolatile RAM (NVRAM) file
- Incorrect environment variable setting
- Driver error

8.11.1 Starting the FSB

Starting the FSB automatically

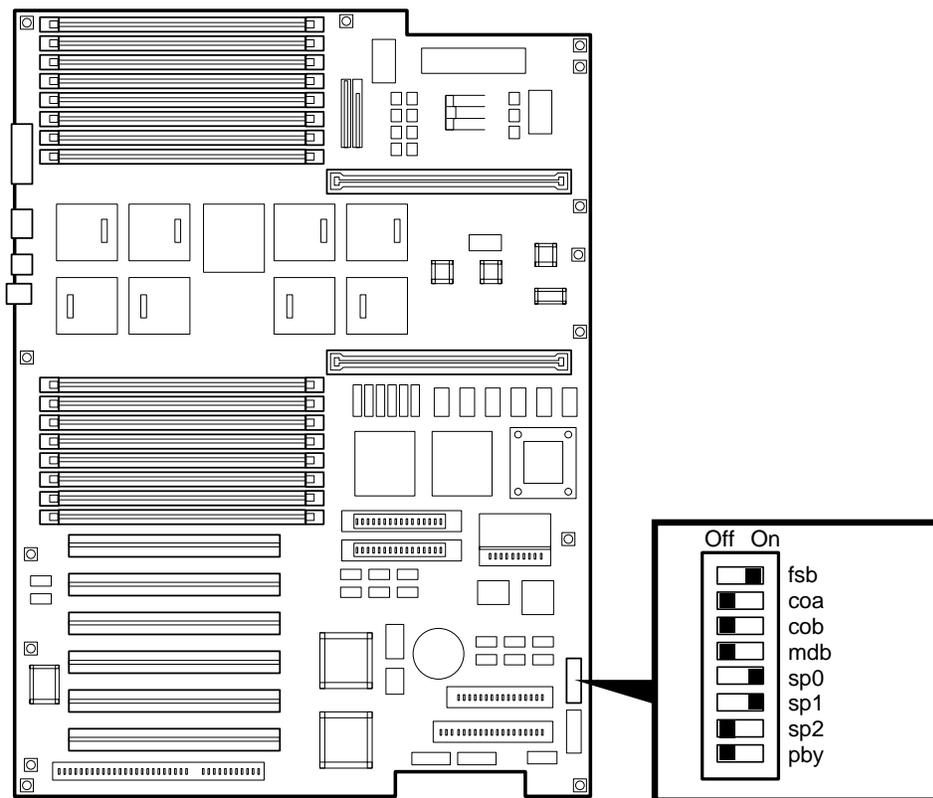
If the firmware image is unavailable when the system is powered on or reset, the FSB runs automatically. When the FSB runs, the system emits a series of beeps through the speaker as beep code 1-2-3; that is, one beep and a pause, followed by two beeps and a pause, followed by three beeps.

1. Create an FSB diskette named DP264SRM.ROM, as described in Section 8.11.2.
2. After the diskette activity light flashes, insert the FSB diskette.
3. Reset the system to restart the FSB. The FSB loads the SRM console from the diskette.
4. Update the firmware as described in Section 8.11.3.

Starting the FSB manually

1. Power the system off, unplug the power supplies, and remove the cover.
2. Remove modules as necessary to gain access to the SW2 switch pack on the system board. See Figure 8–2.
3. Set switch 1 (fsb) of SW2 to the On setting.
4. Reconnect the power supplies and reinstall the system cover. Power up the system to the SRM console.
5. Create FSB diskettes as described in Section 8.11.2.

Figure 8–2 FSB Switch "On" Setting (Rackmount Orientation)



CAT0030d

8.11.2 Preparing Diskettes

The required firmware for your system is preloaded onto the flash ROM. Copies of the firmware files are included on your distribution CD. You can also download the latest firmware files from the Alpha systems firmware Web site:

<ftp://ftp.digital.com/pub/Digital/Alpha/firmware/readme.html>

The utilities that are used to reload or update the firmware expect to find the files on a diskette, so you need to prepare a diskette for each utility with the correct files from the CD or the Web.

For FSB: Copy the file PC264SRM.ROM onto a diskette, renaming it DP264SRM.ROM.

For Updating Firmware: Copy the file PC264SRM.ROM and the file PC264FW.TXT onto a diskette.

8.11.3 Updating Firmware

Be sure to read the information on starting the FSB and preparing diskettes before continuing with this section.

Example 8-1 Running LFU

```
P00>>>lfu
Checking dka400.4.0.7.1 for the option firmware files. . .
Checking dva0 for the option firmware files. . .
```

```
Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just press <return> to proceed with a standard console update: dva0
Please enter the name of the options firmware files list, or
Press <return> to use the default filename (pc264fw.txt) : pc264fw.txt
Copying PC264FW.TXT from dva0. . .
Copying PC264SRM.ROM from dva0. . .
```

```
***** Loadable Firmware Update Utility *****
```

```
-----
Function      Description
-----
Display      Displays the system's configuration table.
Exit         Done exit LFU (reset).
List         Lists the device, revision, firmware name, and update revision.
Readme       Lists important release information.
Update       Replaces current firmware with loadable data image.
Verify       Compares loadable and hardware images.
? or Help    Scrolls this function table.
-----
```

```
UPD> update
.
.
.
UPD>exit
```

Perform the following steps to update the console firmware. Refer to Example 8–1.

1. Insert the firmware diskette named DP264SRM.ROM that you created into the floppy drive.
2. At the SRM console prompt, issue the **lfu** command. This command invokes the Loadable Firmware Update (LFU) utility.
3. Enter the device name **dva0** when prompted for the location of the update files.
4. Enter the filename PC264FW.TXT when prompted. Note that the LFU has already checked the contents of the diskette and should provide PC264FW.TXT as the default.

PC264FW.TXT specifies which firmware is to be updated and passes the names of the files that contain updated firmware.

5. At the UPD> prompt, enter the **update** command.
6. After the update has completed, enter the **exit** command to exit the utility.

Chapter 9

Specifications

This chapter contains the following system specifications and requirements:

- Physical specifications
- Environmental specifications
- Electrical specifications
- Acoustical data
- Power cord requirements

9.1 Physical Specifications

Table 9-1 Physical Specifications

Pedestal		
Dimensions (HxWxD)	18.5 x 8.85 x 27.5 in. / 47.0 x 22.5 x 69.9 cm	
Shipping Dimensions	24 x 26.25 x 40 in. / 61.0 x 66.0 x 101.6 cm	
Weight		
Typical Configuration	80 lb / 36 kg	
Maximum Configuration	88 lb / 40 kg	
Shipping Weight		
Nominal	100 lb / 45 kg	
Maximum	110 lb / 50 kg	
Clearances	Operating	Service
Front	15 in. / 38.1 cm	15 in. / 38.1 cm
Rear	6 in. / 15 cm	29.5 in. / 75 cm
Left Side	None	None
Right Side	None	None

Table 9-1 Physical Specifications (Continued)

Rackmount		
Dimensions (HxWxD)	8.75 x 17.5 x 26 in. / 22.2 x 44.5 x 66.0 cm (5U)	
Shipping Dimensions	24 x 26.25 x 40 in. / 61.0 x 66.0 x 101.6 cm	
Weight		
When lifting:	Nominal 80 lb /36 kg	Maximum 86 lbs/39 kg
Total added to cabinet (brackets, slides, cables):	Nominal 84 lb/38 kg	Maximum 88 lbs/40 kg
Shipping Weight	Nominal 100 lb /45 kg	Maximum 110 lbs/50 kg
Clearance for Service	Minimum 4 ft / 121.9 cm, 28 in. / 71 cm withdrawal on rails	
Rackmount Cabinet		
	H9A10 M-Series	H9A15 M-Series
Dimensions (HxWxD)	67 x 23.6 x 43.27 in./ 170 x 60 x 110 cm	79 x 23.6 x 35.4 in. 200 x 60 x 90 cm
Shipping Dimensions	73 x 36 x 48 in. / 185.5 x 91.5 x 122 cm	85 x 36 x 48 in. / 216 x 91.5 x 122 cm
Weight	Configuration dependent	1000 lb / 450 kg
Shipping Weight	Configuration dependent, maximum payload 1,000 lb	1056 lb / 550 kg (normal) 1,408 lb / 640 kg (maximum))

9.2 Environmental Specifications

Table 9-2 Environmental Specifications

Temperature		
Operating (Pedestal, Rackmount)	50° to 95°F / 10° to 35°C	
Storage (60 days)	-40° to -151°F / -40 to -66°C	
Rate of change	20°F/hr / 11°C/hr	
Relative Humidity		
Operating	20% to 80%	
Non-operating	20% to 80%	
Storage (60 days)	10% to 95%	
Rate of change	20% hr	
Maximum Wet Bulb Temperature	Operating 82°F / 28°C	Storage (60 days) 115°F / 46°C
Maximum Dew Point Temperature	Operating 36°F / 2°C	Storage (60 days) Not tested
Heat Dissipation	Nominal	Maximum
Pedestal	550W, 1,878 BTU/hr	780W, 2,664 BTU/hr
H9A10/H9A15 Cabinets	Configuration dependent	

9.3 Electrical Specifications

Table 9-3 Electrical Specifications

Nominal Voltage (Vac)	100	120	200-240
Voltage Range (Vac) temporary condition	90-100	110-128	180-250
Power Source Phase	Single	Single	Single
Nominal Frequency (Hz)	50/60	50/60	50/60
Frequency Range (Hz)	49-51/59-61	49-51/59-61	49-51/59-61
RMS Current (maximum steady state)			
<i>Pedestal and Rackmount</i>			
Single power cord	7.5A	6.0A	3.8A
Maximum VA	780	765	730
<i>M-series Cabinet (configuration dependent)</i>			
Nominal voltage (Vac)	100	120	220-240
Each Nominal voltage (Vac)	24A	24A	16A
Power Cords			
Pedestal	1 (75 in. / 190 cm)	EC 320 C13 to NEMA 5-15 (N. America) or IEC 320 C13 to country-specific	
Rackmount	1 (14 ft 10 in. / 452 cm)	IEC 320 C13 to NEMA 5-15 (N. America) or IEC 320 C13 to IEC 320 C14 (other countries)	
Cabinet	2 (10 ft 10 in. / 330 cm)	120V non-removable NEMA L5-30P or 200-240V non-removable IEC 309	

Table 9–3 Electrical Specifications (Continued)

Product Safety Approvals	UL: Listed to UL1950 (3rd edition) CSA: Certified to CAN/CSA-C22.2 No. 950-M95 TUV: EN 60950/A11: 1997 VDE 0805 GS marked CB Test Certificate: EN60950/A4:1997	
Reviewed to	AS/NZ 3260:1993 Australian/New Zealand Standard EN 60950/A4: 1997 European Norm IEC 950 (2 nd edition, 4 th amend)	
EMC Approvals	Class A Systems	Class B Systems
	FCC: Part 15, SubPart B (CFR 47, 1995) Class A CE: EN55022:1994 Class A, EN50082-1:1992 VCCI: V-3/97.04 Class A BSMI: CNS13438 Class A C-Tick: AS/NZS 3548:1995 Class A	FCC: Part 15, SubPart B (CFR 47, 1995) Class B CE: EN55022:1994 Class B, EN50082-1:1992 VCCI: V-3/97.04 Class B BSMI: CNS13438 Class B C-Tick: AS/NZS 3548:1995 Class B
<hr/> NOTE: <i>Power supplies are universal, PFC, auto ranging, 100/240 Vac.</i> <hr/>		
Airflow and Quality		
Intake location	Front	
Exhaust location	Rear Pedestal, Rack; Rear/top H9A10/H9A15	
Altitude	Operating 10,000 ft / 3,037m	Non-operating 40,000 ft / 12,192m
Vibration	Operating	10–500 Hz .1 G peak
Mechanical shock	Pedestal	M-series cabinet
Operating	7.5 G, 10 +/- 3 ms	5.0 G, 10 +/- 3 ms

9.4 Acoustical Data

Table 9-4 lists the noise declaration for the DS20E system.

Table 9-4 Acoustical Data

Acoustics — Declared Values per ISO 9296 and ISO 7779

Product	L_{wAd} , B		L_{pAm} , dBA (bystander positions)	
	Idle	Operate	Idle	Operate
AlphaServer DS20E				
with 0 or 1 x HDD	6.5	6.5	46	47
with 6 x HDD	6.9	6.9	51	51

Current values for specific configurations are available from Compaq representatives.
1 B = 10 dBA.

9.5 Power Cord Requirements

The power cord set meets the requirements for use in the country where you purchased your equipment. Power cord sets for use in other countries must meet the requirements of the country where you use the system. For more information on power cord set requirements, contact your Authorized Compaq Dealer.

9.5.1 General Requirements

The requirements listed below are applicable to all countries.

- The length of the power cord must be at least 6.0 ft (1.8 m) and a maximum of 12 ft (3.7 m).
- The power cord set must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord will be used.
- The power cord set must have a minimum current capacity and nominal voltage rating of 10A/125 volts AC, or 10A/250 volts AC, as required by each country's power system.
- The appliance coupler must meet the mechanical configuration of an EN60320/IEC 320 Standard Sheet C13 Connector, for mating with the appliance outlet on the system.

9.5.2 Country-Specific Requirements

Table 9-5 Power Cord Requirements by Country

Country	Accredited Agency	Applicable Note Numbers
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	SETI	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

NOTES:

1. Flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 1.0 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. Flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. Wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V).
3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 1.0 mm² conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

Appendix A

Regulatory and Safety Notices

This appendix contains regulatory compliance notices for this computer system.

A.1 Class A and Class B Ratings

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment. The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have a FCC logo or FCC ID on the label. Class A devices do not have a FCC logo or ID on the label. Once the class of the device is determined, refer to the corresponding statements in the sections that follow.

A.1.1 Class A Device Notices

FCC Notice

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

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

Any modifications to this device • unless expressly approved by the manufacturer • can void the user's authority to operate this equipment under part 15 of the FCC rules.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Taiwanese Notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Japanese Notice

に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Canadian Notice

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Avis Canadien

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

EN55022 (CISPR 22) - Electromagnetic Interference

EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity

EN60950 (IEC950) - Product Safety

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.

Attention!

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

A.1.2 Class B Device Notices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Any modifications to this device - unless expressly approved by the manufacturer - can void the user's authority to operate this equipment under part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) This device must accept any interference that may cause undesirable operation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the device.

Cables

Connections to this device must be made with shielded cables with metallic EMI/RFI connector hoods to maintain compliance with FCC rules and regulations.

Declaration of Conformity for Products Marked with the FCC Logo (United States only)

The device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- The device may not cause harmful interference, and
- The device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this FCC declaration contact:

Compaq Computer Corporation
P.O. Box 661
Marlboro, Massachusetts 01752

To identify the device, refer to the part, series or model number found on the product.

Japanese Notice

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

Canadian Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Avis Canadien

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE Marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of European Community.

A.2 Other Safety Notices

A.2.1 Laser Devices

The CD-ROM drive contains a laser device. All Compaq systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous light; the beam is totally enclosed during all modes of customer operation and maintenance.



WARNING: To reduce the risk of fire, bodily injury, and damage to the equipment, observe the following precautions:

Do not operate controls, make adjustments, or perform procedures to a laser device other than those specified herein or in the CD-ROM drive installation guide.

Allow only Compaq Authorized Service Technicians to repair the laser equipment.

The following label or equivalent is located on the surface of your CD-ROM drive. This label indicates that the product is classified as a CLASS 1 LASER PRODUCT.



A.2.2 Battery Replacement

Your computer is provided with a battery powered Real-Time Clock circuit. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement is to be done by a Compaq Authorized Service Provider using the Compaq spare designated for this product. For more information about Real-Time Clock battery replacement or proper disposal, contact your Compaq Authorized Reseller or your Authorized Service Provider.



WARNING: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Index

?

? command (RMC), 6-10

A

Accessories, rackmount, 3-6
Acoustics, 9-7
alphabios command, 7-43
AlphaBIOS utilities, 5-38
Antistatic wrist strap, 5-4
APB program, 4-27
Attaching front bezel, 3-24
auto_action environment variable, 4-3,
7-4
Autoboot, 4-3

B

Battery replacement notice, A-7
Baud rate, setting, 7-56
Beep codes, 8-2
boot command, 7-23
Boot devices, specifying, 4-5
Boot file, specifying, 4-6
Boot flags
 OpenVMS, 4-9
 UNIX, 4-7
Boot options, 4-2
Boot problems, 8-6
boot_file environment variable, 4-6
boot_osflags environment variable, 4-7
bootdef_dev environment variable, 4-5
Booting
 Linux, 4-20
 OpenVMS, 4-24
 OpenVMS, from InfoServer, 4-26
 OpenVMS, from local CD-ROM, 4-24
 Tru64 UNIX, from the network, 4-16
 UNIX, from SCSI disk, 4-13

bootp protocol, 4-12
Bus node ID, SCSI, 7-66

C

Cabinets, M-Series, 3-2
Cable connections, pedestal system, 2-5
Cable management arm, 3-20
Cables, dressing, 3-22
CD-ROM/FDD drive, 1-18
clear password command, 7-51
COM ports, baud rate, 7-56
com*_baud environment variable, 7-56
Combination module, 1-20
Command syntax, SRM console, 7-7
Components, 1-3
 customer installable, 5-2
 service installable, 5-2
 steps before installing, 5-2
Configuration
 CPUs, 5-10
 memory, 5-6
Configuration utilities, AlphaBIOS,
5-38
Configuring disk drives, 5-20
Configuring storage subsystem, 5-26
Console commands list, 7-5
Console device, activating, 7-69
console environment variable, 7-57
Console terminal, 1-21
Console, specifying, 7-57
Console-reported failures,
 troubleshooting, 8-5
continue command, 7-30
Controllers, SCSI, 7-66
Converting rack system to pedestal, 2-7
Cover interlock, 1-13
CPU, 1-11
CPU configuration, 5-10

- CPU upgrade kits, 5-10
- CPU, enabling, 7-58
- cpu_enabled environment variable, 7-58
- crash command, 7-36

D

- Device naming, 7-16
- Diagnostic LEDs, 1-9, 8-3
- Dimensions, pedestal system, 2-2
- DIMMs
 - installing, 5-8
 - removing, 5-9
- Disk drive configuration, 5-20
- Disk drive status LEDs, 5-24
- Disk drives
 - installing and removing, 5-22
- Diskettes, preparing for FSB, 8-15
- Documentation, rackmount, 3-2
- Dressing cables, 3-22

E

- ei*0_inet_init environment variable, 4-11
- ei*0_mode environment variable, 7-60
- ei*0_protocols environment variable, 4-12
- Electrical specifications, 9-5
- Enclosures, 1-2
- Environment variables, 7-3
 - summary, 7-54
- Environmental specifications, 9-4
- Ethernet, 1-20
- Ethernet settings, 7-60
- ew*0_inet_init environment variable, 4-11
- ew*0_mode environment variable, 7-60
- ew*0_protocols environment variable, 4-12

F

- Factory-installed software (FIS), 4-1
- Fail-safe booter utility, 8-13
- Failures, reported by operating system, 8-9
- Fan configuration, 1-13

- Fast SCSI, 7-65
- FCC notice
 - Class A, A-2
 - Class B, A-4
- Firmware updates
 - from floppy, 7-32
- Firmware, updating, 5-41, 8-16
- Front bezel, 3-24
- Front components, 1-5

H

- Halt assertion, 6-7
- Halt button, 1-9
- Halt button, with login command, 7-49
- halt command, 7-30
- halt command (RMC), 6-10
- halt command, SRM, 7-30
- Halt LED, 1-9
- haltin command (RMC), 6-10
- haltout command (RMC), 6-10
- Hard disk drive storage, 1-19
- help command, 7-10
- help command (RMC), 6-10

I

- InfoServer, 4-27
- init command, 7-37
- Installation area, marking, 3-5
- Installation tools, 5-1
- Installing cable management arm, 3-20
- Installing DIMMs, 5-8
- Installing disk drives, 5-22
- Installing interlock system, rack, 3-18
- Installing ISA options, 5-11
- Installing OpenVMS, 4-28
- Installing PCI options, 5-11, 5-12
- Installing six-slot subsystem, 5-28
- Installing system chassis in rack, 3-16
- Installing tape drive, 5-35
- Installing third power supply, 5-16
- Installing Tru64 UNIX, 4-18
- Interlock system, rack, 3-18
- Interlock, cover, 1-13
- Internet database, initializing, 4-11
- ISA option, installing, 5-11

isacfg command, 7-25
ISL boot program, 4-27

K

kbd_hardware_type environment variable, 7-61
Keyboard
 language variants, 7-62
Keyboard type, setting, 7-61
Keys, 2-6

L

language environment variable, 7-62
Laser safety notice, A-6
LEDs
 disk drive status, 5-24
 OCP, 8-3
Linux
 booting, 4-20
login command, 7-48

M

man command, 7-10
Marking installation area, 3-5
Memory, 1-11
Memory configuration, 5-6
Memory configuration rules, 5-7
Memory modules, installing, 5-8
Memory problems, 8-10
Memory sizes, 5-7
Memory slots, 5-6
modem setup, 6-4
MOP protocol, 4-12
more command, 7-38
Mounting brackets
 attaching to chassis, 3-8
Mounting hardware, rackmount, 3-6, 3-7
M-Series documentation, 3-2

N

Network connection, 5-18
Noise declaration, 9-7
NVRAM script, 7-41

O

OpenVMS
 booting, 4-24
 booting from InfoServer, 4-26
 booting from local CD-ROM, 4-24
 installing, 4-28
Operating system, specifying, 7-63
Operator control panel, 1-8
 indicators, 1-8
os_type environment variable, 7-63
Overtemperature, 8-8

P

Parity checking, 7-64
PCI address assignments, 7-17
PCI bus problems, 8-11
PCI NVRAM module, configuring, 7-40
PCI option, installing, 5-11, 5-12
PCI options, 1-14
PCI parity error, 8-11
PCI slots, 1-14, 5-11
pci_parity environment variable, 7-64
Pedestal kit, 2-7
 contents of, 2-8
 conversion procedure, 2-11
 hardware part numbers, 2-9
Physical specifications, 9-2
pk*0_fast environment variable, 7-65
pk*0_host_id environment variable, 7-66
pk*0_soft_term environment variable, 7-67
Ports and connectors, 1-6
Power button, 1-9
Power cords
 country-specific requirements, 9-9
 general requirements, 9-8
Power LED, 1-9
Power problems, troubleshooting, 8-4
Power requirements, 2-3, 3-3
Power supplies, 1-16
 configuration, 1-17
Power supply
 installing, 5-16
poweroff command (RMC), 6-10

- poweron command (RMC), 6-11
- Power-up script, 7-41
- prcache command, 7-40
- Processor module, 1-11
- Processor upgrades, guidelines, 5-10
- Processor, enabling, 7-58

Q

- QLogic controller, 7-67
- quit command (RMC), 6-11

R

- Rack, stabilizing, 3-14
- Rackmount
 - accessories, 3-6
 - mounting hardware, 3-6
 - shipment box, 3-4
- RAID configuration utility, 7-43
- RAID disks, configuring, 5-38
- Reading a file, 7-38
- Rear components, 1-7
- Regulatory notices, A-1
- Remote dial-in, RMC, 6-5
- Removable media storage, 1-18
- Removal
 - side cover, 5-3
 - top cover, 5-5
- Removing DIMMs, 5-9
- Reset button, 1-9
- reset command (RMC), 6-11
- RIS boot, 4-16
- RMC
 - changing switch settings, 6-16
 - command conventions, 6-9
 - command summary, 6-8
 - commands, 6-8
 - connecting to, 6-3
 - dialing in, 6-5
 - exiting from, 6-3
 - invoking, 6-5
 - invoking locally, 6-3
 - modem connection, 6-4
 - modem setup, 6-4
 - overview, 6-2
 - remote dial-in, 6-5

- resetting to factory defaults, 6-17
- switch pack, 6-14
- troubleshooting, 6-18

S

- SCSI controller IDs, 7-66
- SCSI devices, speed of, 7-65
- SCSI expansion, 5-37
- SCSI ID orientation
 - four-slot, 5-20
 - six-slot, 5-21
- SCSI problems, 8-12
- SCSI terminators, enabling, 7-67
- Secure function commands, 7-44
- Secure mode, setting SRM to, 7-47
- Security, 2-6
- Server feature module, 1-12
- Service area, 2-2
- set command, 7-52
- set password command, 7-45
- set secure command, 7-47
- setesc command (RMC), 6-12
- setpass command (RMC), 6-12
- Setting boot options, 4-2
- Setup, pedestal system, 2-5
- SFM, 1-12
- Shipment box, rackmount, 3-4
- Shipment contents, pedestal, 2-4
- Shipping screws, installing in rack, 3-17
- show command, 7-52
- show config command, 7-12
- show cpu command, 7-21
- show device command, 7-16
- show memory command, 7-18
- show pal command, 7-22
- show power command, 7-19
- show version command, 7-20
- Side cover, removing, 5-3
- Slide brackets, 3-10
 - attaching to rack rails, 3-12
- Special characters, SRM console, 7-8
- SRM console
 - command syntax, 7-7
 - invoking, 7-4
 - overview, 7-2
 - returning to from RMC, 7-4

- setting environment variables, 7-52
- special characters, 7-8
- SRM console commands, listed, 7-5
- SRM console password
 - clearing, 7-51
- SRM console prompt, 7-2
- status command (RMC), 6-13
- stop command, 7-30
- Storage subsystem
 - configuring, 5-26
 - connecting four-slot, 5-26
 - installing six-slot, 5-28
- Storage subsystems, 1-19
- Switch pack, RMC, 6-14
- System access, 2-6
- System board, 1-10
- System dimensions, 2-2
- System enclosures, 1-2
- System parts
 - front/side, 1-4
 - rear, 1-6
- System, installing in rack, 3-16

T

- Tape device, 1-18
- Tape drive, installing, 5-35
- Template, for rack installation, 3-2
- test command, 7-28
- Thermal problems, 8-8
- Tools for installation, 5-1

- Top cover, removing, 5-5
- Troubleshooting
 - boot problems, 8-6
 - failures reported by console, 8-5
 - failures reported by operating system, 8-9
 - memory problems, 8-10
 - PCI bus problems, 8-11
 - power problems, 8-4
 - RMC, 6-18
 - SCSI problems, 8-12
 - thermal problems, 8-8
 - with beep codes, 8-2
 - with LEDs, 8-3
- Tru64 UNIX
 - booting, 4-13
 - booting from SCSI disk, 4-13
 - booting over the network, 4-16
 - installing, 4-18
 - text-based installation display, 4-18
- tt_allow_login environment variable, 7-69

U

- Updating firmware, 5-41, 7-32, 8-16

V

- VGA, 1-20

