COMPAQ

AlphaServer ES40 and AlphaStation ES40

Owner's Guide

Order Number: EK-ES240-UG. B01

This manual is for managers and operators of ES40 systems.

Compaq Computer Corporation

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Preface

Intended Audience

This manual is for managers and operators of *ES40* systems.

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 eight chapters.

- **Chapter 1, System Overview**, gives an overview of the system and describes the components.
- **Chapter 2, Operation**, gives basic operating instructions on powering up and configuring the machine.
- **Chapter 3, Booting and Installing an Operating System**, describes how to boot a supported operating system and how to switch from one operating system to another.
- **Chapter 4, Using the Remote Management Console**, describes the function and operation of the integrated remote management console.
- **Chapter 5, Installing and Configuring Components**, shows how to install components such as memory DIMMs and CPUs.
- **Chapter 6, Updating Firmware**, describes how to update to a later version of system firmware.
- **Chapter 7, Troubleshooting**, gives basic troubleshooting procedures.
- **Chapter 8, Specifications**, gives system specifications.

Documentation Titles

Table 1 ES40 Documentation

Title	Order Number
User Documentation Kit	**QA-6E88A-G8**
Owner's Guide	EK-ES240-UG
User Interface Guide	EK-ES240-UI
Tower and Pedestal Basic Installation	EK-ES240-PD
Release Notes	EK-ES240-RN
Documentation CD (6 languages)	AG-RF9HA-BE
Maintenance Kit	**QZ-01BAB-GZ**
Service Guide	EK-ES240-SV
Service Guide HTML CD	AG-RKAKA-BE
Illustrated Parts Breakdown	EK-ES240-IP
Loose Piece Items	
Rackmount Installation Guide	EK-ES240-RG
Rackmount Installation Template	EK-ES4RM-TP

Support Resources

Support resources for this system are available on the Internet, including a supported options list, firmware updates, and patches.

http://www.digital.com/alphaserver/es40/es40.html

Chapter 1
System Overview

This chapter provides an overview of the system, including:

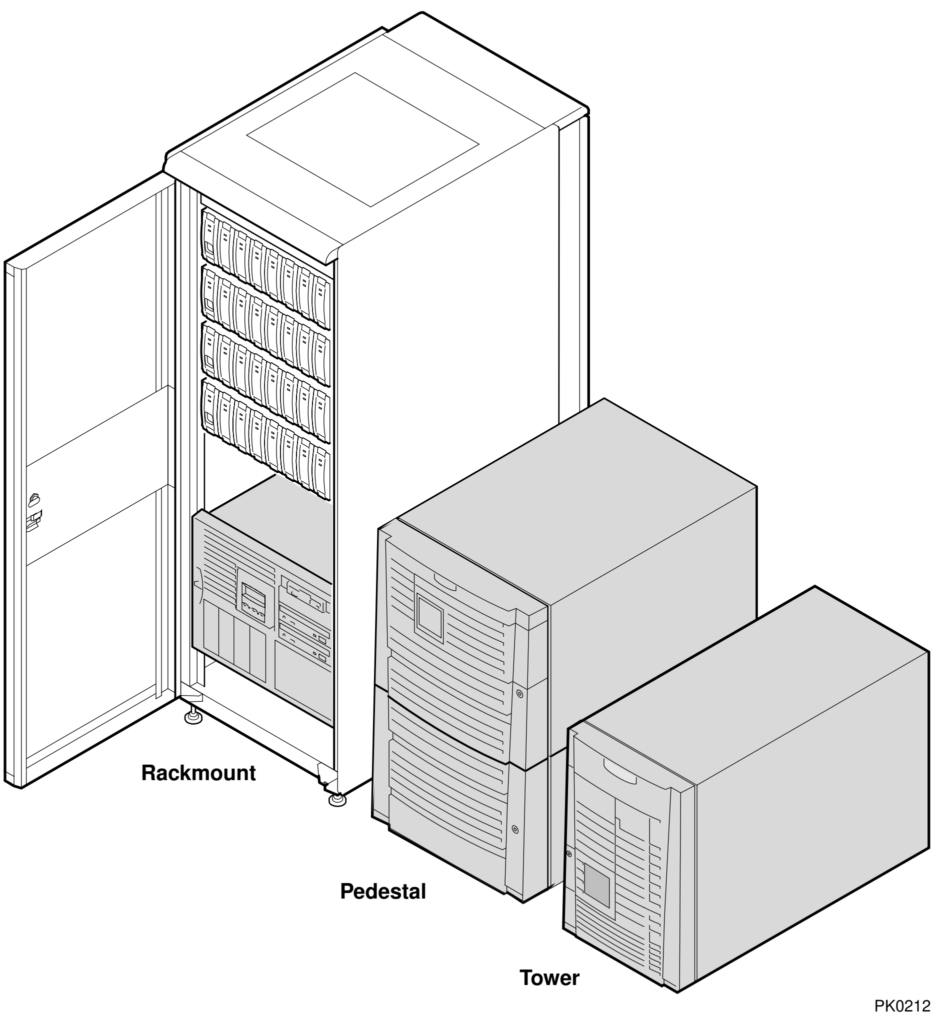
- System Enclosures
- System Chassis—Front View/Top View
- System Chassis—Rear View
- Rear Ports and Slots
- Operator Control Panel
- System Board
- PCI Backplane
- Power Supplies
- Removable Media Storage
- Hard Disk Storage
- System Access
- Console Terminal

NOTE: *See Chapter 5 for warnings and procedures for accessing internal parts of the system.*

1.1 System Enclosures

The ES40 family consists of a standalone tower, a pedestal with expanded storage capacity, and a rackmount system.

Figure 1–1 ES40 Systems



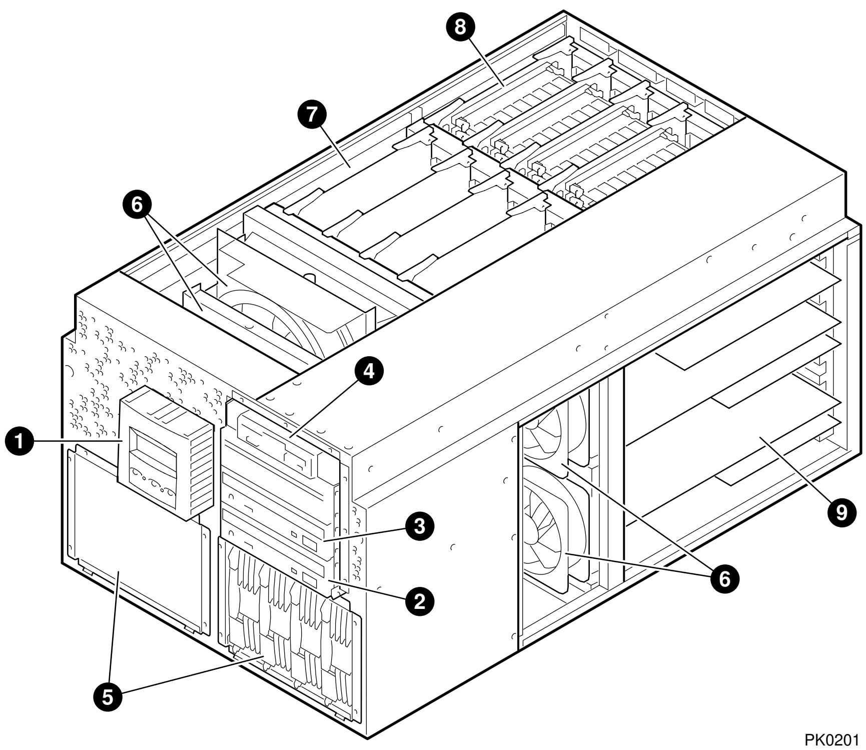
Common Components

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

- Up to four CPUs, based on the EV6 or EV67 Alpha chip
- Memory DIMMs (200-pin); up to 16 or up to 32
- Six or ten 64-bit PCI slots
- Floppy diskette drive (3.5-inch, high density)
- CD-ROM drive
- Two half-height or one full-height removable media bays
- Up to two storage disk cages that house up to four 1.6-inch drives per cage
- Up to three 735-watt power supplies, offering N+1 power
- A 25-pin parallel port, two 9-pin serial ports, two universal serial bus (USB) ports, mouse and keyboard ports, and one MMJ connector for a local console terminal
- An operator control panel with a 16-character back-lit display and a Power button, Halt button, and Reset button

1.2 System Chassis—Front View/Top View

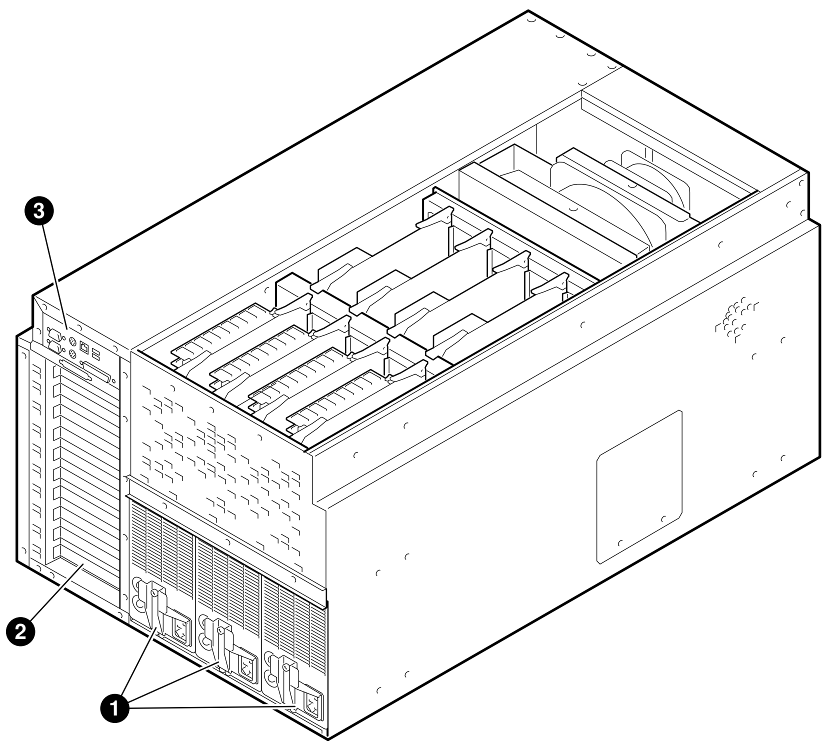
Figure 1–2 Top/Front Components (Pedestal/Rack View)



❶ Operator control panel
❷ CD-ROM drive
❸ Removable media bays
❹ Floppy diskette drive
❺ Storage drive bays
❻ Fans
❼ CPUs
❽ Memory
❾ PCI cards

1.3 System Chassis—Rear View

Figure 1–3 Rear Components (Pedestal/Rack View)



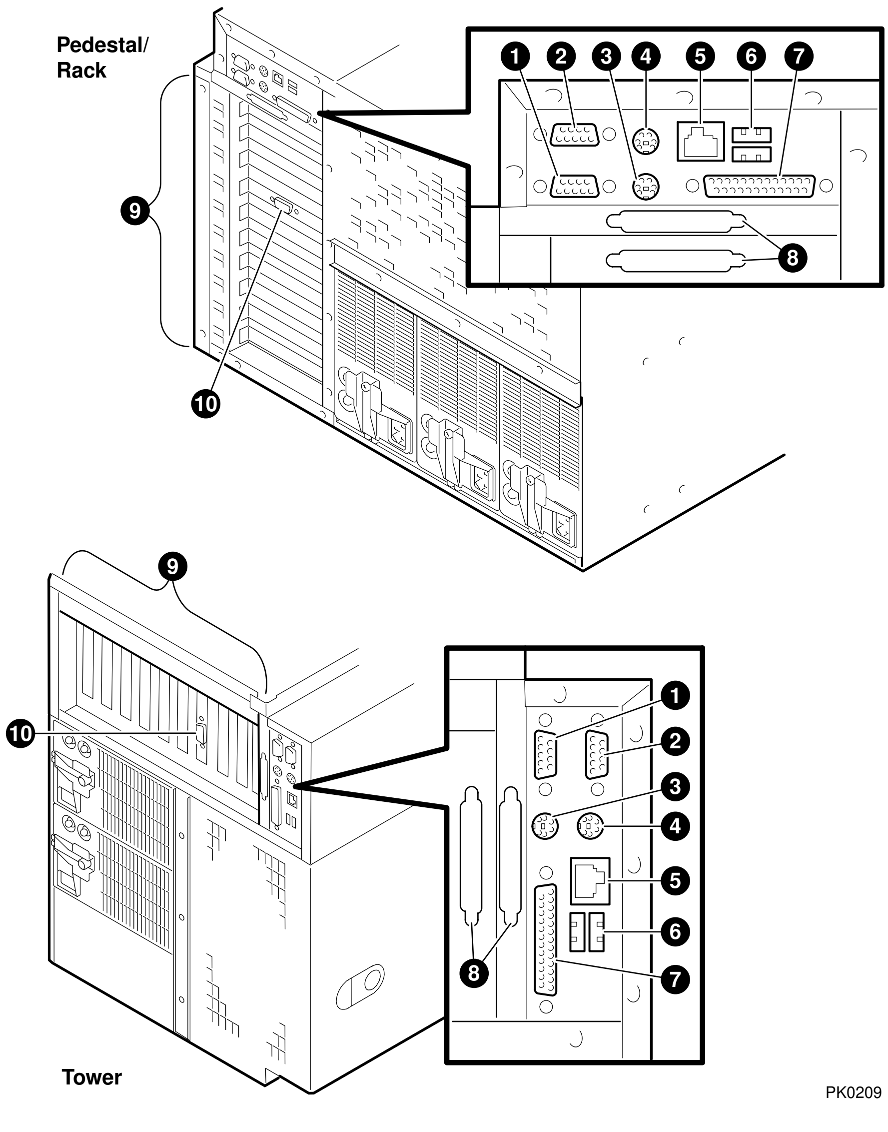
❶ Power supplies

❷ PCI bulkhead

❸ I/O ports

1.4 Rear Ports and Slots

Figure 1–4 Rear Connectors



Rear Panel Connections

❶ Modem port—Dedicated 9-pin port for modem connection to remote management console.

❷ COM2 serial port—Extra port to modem or any serial device.

❸ Keyboard port—To PS/2-compatible keyboard.

❹ Mouse port—To PS/2-compatible mouse.

❺ COM1 MMJ-type serial port/terminal port—For connecting a console terminal.

❻ USB ports.

❼ Parallel port—To parallel device such as a printer.

❽ SCSI breakouts.

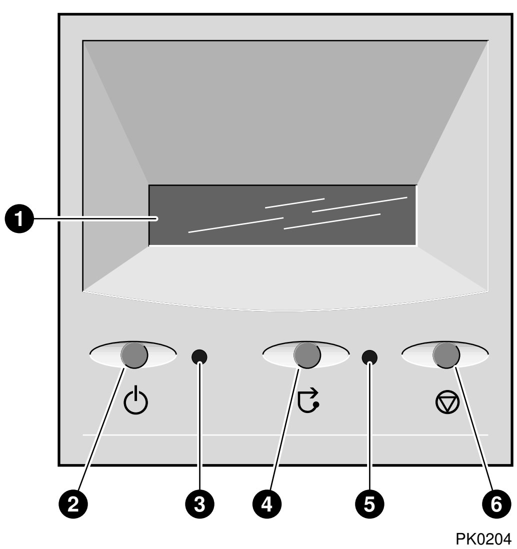
❾ PCI slots—For option cards for high-performance network, video, or disk controllers.

❿ PCI slot for VGA controller, if installed.

1.5 Operator Control Panel

The control panel provides system controls and status indicators. The controls are the Power, Halt, and Reset buttons. A 16-character back-lit alphanumeric display indicates system state. The panel has two LEDs: a green Power OK indicator and an amber Halt indicator.

Figure 1–5 Operator Control Panel



❶ Control panel display. A one-line, 16-character alphanumeric display that indicates system status during power-up and testing. During operation, the control panel is back lit.

❷ Power button. Powers the system on and off.

If a failure occurs that causes the system to shut down, pressing the power button off and then on clears the shutdown condition and attempts to power the system back on. Some conditions that prevent the system from powering on can be determined by entering the **env** command from the remote management console (RMC). The RMC is powered separately from the rest of the system and can operate as long as AC power is present. (See Chapter 4.)

❸ Power LED (green). Lights when the power button is pressed.

❹ Reset button. A momentary contact switch that restarts the system and reinitializes the console firmware. Power-up messages are displayed, and then the console prompt is displayed or the operating system boot messages are displayed, depending on how the startup sequence has been defined.

❺ Halt LED (amber). Lights when you press the Halt button.

❻ Halt button. Halts the system and returns to the SRM console.

If the Halt button is latched when the system is reset or powered up, the system halts in the SRM console. Systems that are configured to autoboot cannot boot until the Halt button is unlatched.

Commands issued from the remote management console (RMC) can be used to reset, halt, and power the system on or off. For information on RMC, see Chapter 4.

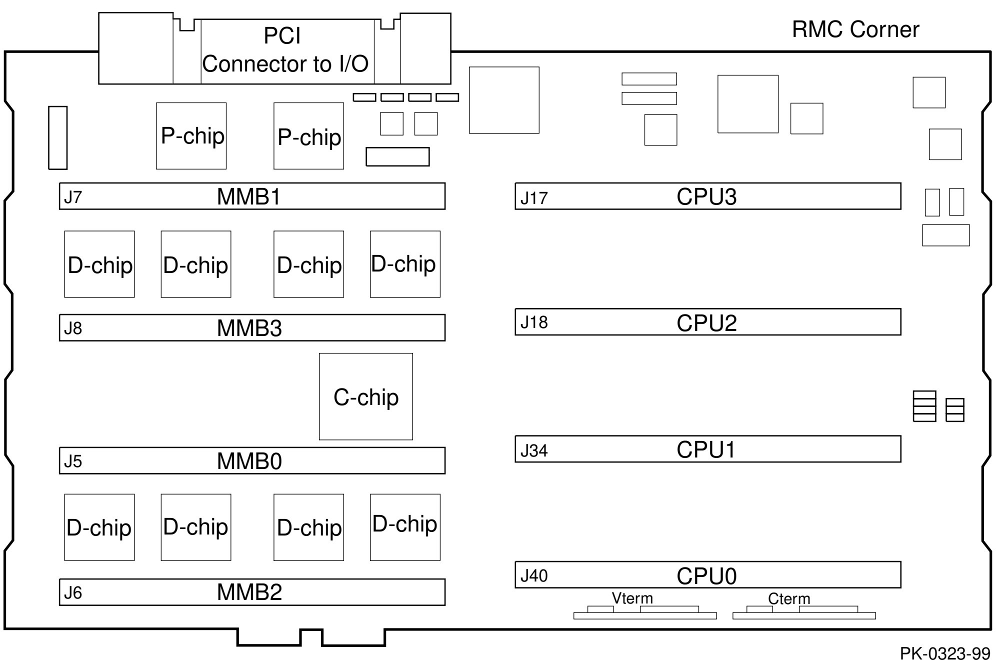
RMC Command	Function
Power {off, on}	Equivalent to pressing the Power button on the control panel to the ON or OFF position.
Halt {in, out}	Equivalent to pressing the Halt button on the control panel to cause a halt (**halt in**) or releasing it from the latched position to deassert the halt (**halt out**).
Reset	Equivalent to pressing the Reset button on the control panel.

1.6 System Board

The system motherboard is located on the floor of the system card cage. It has slots for the CPUs and memory motherboards (MMBs).

The system motherboard has the majority of the logic for the system. It has slots for the CPUs and memory motherboards (MMBs) and has the PCI backplane interconnect. Figure 1–6 shows the location of these modules on the motherboard.

Figure 1–6 Modules on System Motherboard



CPU Card

The system can have up to four CPU cards. The CPU cards are installed on the system board. Each CPU card contains an EV6 or EV67 microprocessor, a current implementation of the Alpha architecture.

The microprocessor is a superscalar CPU 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. It has an instruction cache and a data cache on the chip. Each cache is a 64 KB, two-way, set-associative, virtually addressed cache that has 64-byte blocks. The data cache is a physically tagged, write-back cache.

Each CPU card has a 4 MB secondary B-cache (backup cache) consisting of late-write synchronous static RAMs (SRAMs) that provide low latency and high bandwidth. Each CPU card also has a 5 ->2 volt power regulator that supplies up to 100 watts at 2.2 volts to the CPU.

See Chapter 5 for instructions on installing additional CPUs.

Memory Motherboards (MMBs)

Memory is installed into memory motherboards (MMBs) located on the system board. There are four MMBs. The MMBs have either four or eight slots for installing DIMMs. The system memory uses JEDEC standard 200-pin synchronous DIMMs.

See Chapter 5 for memory configuration rules and installation instructions.

1.7 PCI Backplane

The PCI backplane has two 64-bit, 33 MHz PCI buses that support 64-bit PCI slots. The 64-bit PCI slots are split across two independent 64-bit, 33 MHz PCI buses. The PCI buses support 3.3 V or 5 V options. Figure 1–7 shows the location of the PCI slots in a 6-slot system and a 10-slot system.

Figure 1–7 PCI Backplane (Pedestal/Rack View)

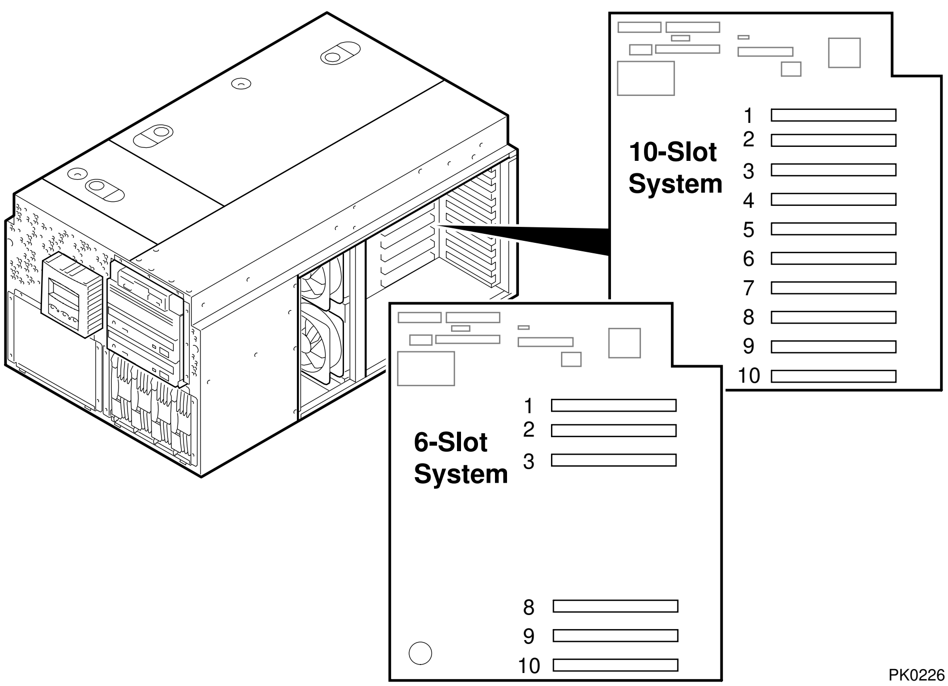


Table 1–1 shows the correspondence between the physical locations of the slots on the PCI backplane and the logical numbering reported with the SRM console **show config** command (described in Chapter 2). See Chapter 5 for instructions on installing PCI options.

Table 1–1 PCI Slot Mapping

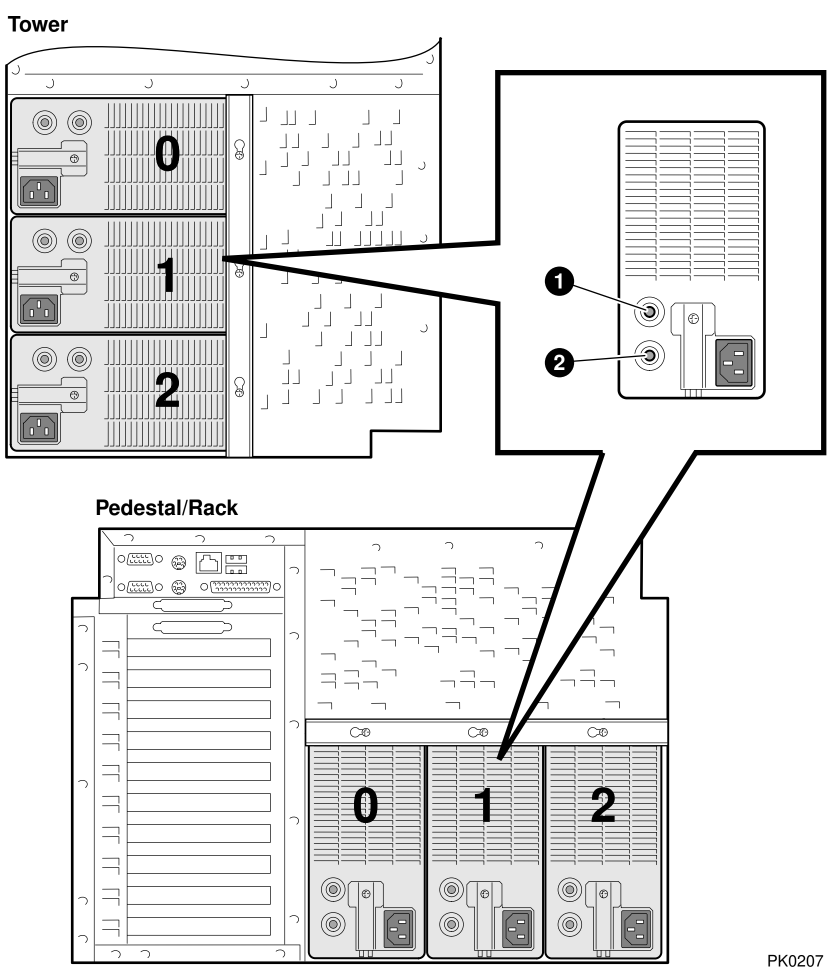
Physical Slot	Logical Slot	PCI 0
1	1	Device
2	2	Device
3	3	Device
4	4	Device
Physical Slot	**Logical Slot**	**PCI 1**
5	1	Device
6	2	Device
7	3	Device
8	4	Device
9	5	Device
10	6	Device

NOTE: *PCI 0 and PCI 1 correspond to Hose 0 and Hose 1 in the logical configuration. On a six-slot system, physical slots 4–7 do not apply.*

1.8 Power Supplies

The power supplies provide power to components in the system chassis. The number of power supplies required depends on the system configuration.

Figure 1–8 Power Supplies



One to three power supplies provide power to components in the system chassis. The system supports redundant power configurations to ensure continued system operation if a power supply fails.

When more than one power supply is installed, the supplies share the load. The power supplies select line voltage and frequency automatically (100 V or 120 V or 200–240 V and 50 Hz or 60 Hz).

Power Supply LEDs

Each power supply has two green LEDs that indicate the state of power to the system.

❶ POK (Power OK)	Indicates that the power supply is functioning. The POK LED is on when the system is running. When the system power is on and a POK LED is off, that supply is not contributing to powering the system.
❷ +5 V Auxiliary	Indicates that AC power is flowing from the wall outlet. As long as the power supply cord is plugged into the wall outlet, the +5V Aux LED is always on, even when the system power is off.

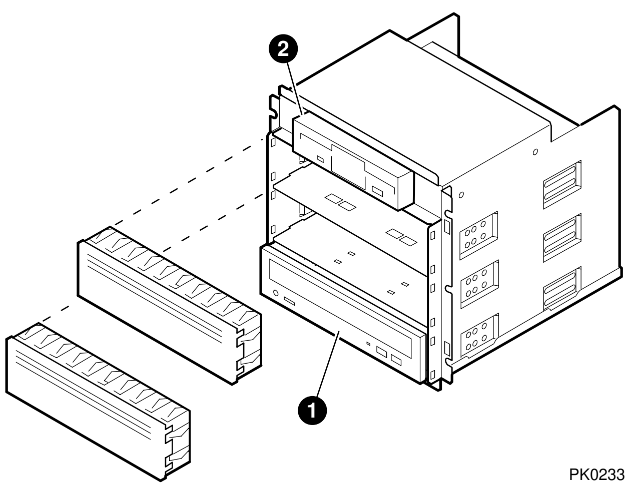
See Chapter 5 for instructions on installing additional power supplies.

1.9 Removable Media Storage

The system chassis houses a CD-ROM drive ❶ and a high-density 3.5-inch floppy diskette drive ❷ and supports two additional 5.25-inch half-height drives or one additional full-height drive. The 5.25-inch half height area has a divider that can be removed to mount one full-height 5.25-inch device.

See Chapter 5 for information on installing a removable media drive.

Figure 1–9 Removable Media Drive Area

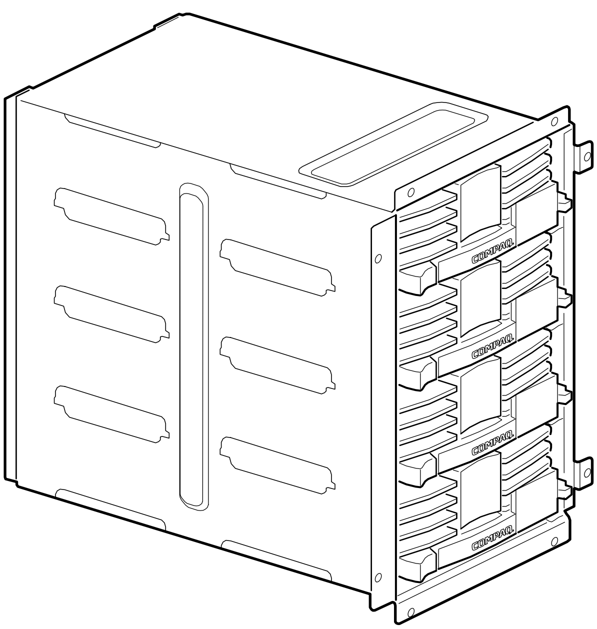


1.10 Hard Disk Storage

The system chassis can house up to two storage disk cages.

You can install four 1.6-inch hard drives in each storage disk cage. See Chapter 5 for information on installing hard disk drives.

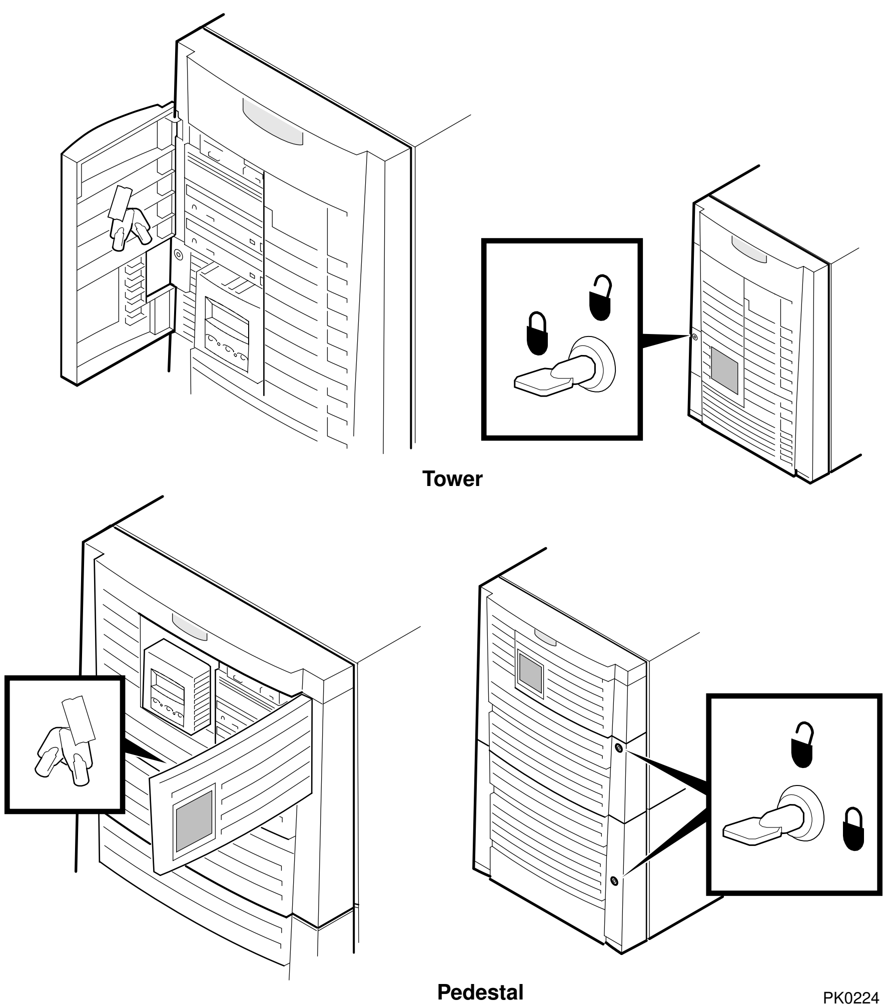
Figure 1–10 Hard Disk Storage Cage with Drives (Tower View)



1.11 System Access

At the time of delivery, the system keys are taped inside the small front door that provides access to the operator control panel and removable media devices.

Figure 1–11 System Keys



Both the tower and pedestal systems have a small front door through which the control panel and removable media devices are accessible. At the time of delivery, the system keys are taped inside this door.

The tower front door has a lock that lets you secure access to the disk drives and to the rest of the system.

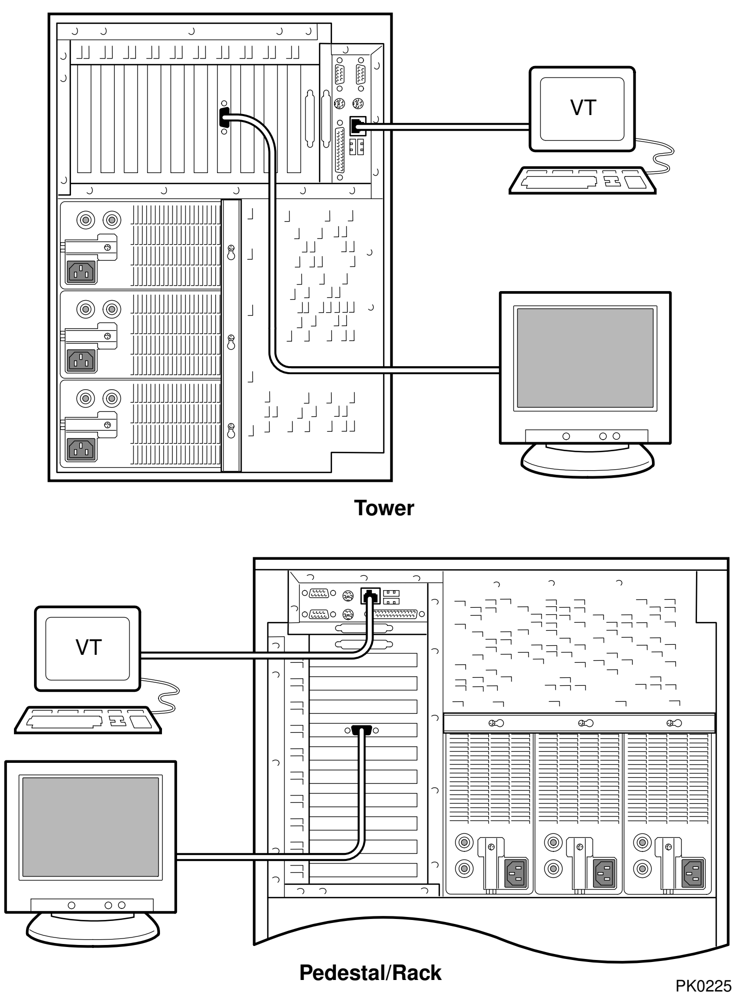
The pedestal has two front doors, both of which can be locked. The upper door secures the disk drives and access to the rest of the system, and the lower door secures the expanded storage.

NOTE: *See Chapter 5 for warnings and procedures for accessing internal parts of the system.*

1.12 Console Terminal

The console terminal can be a serial (character cell) terminal connected to the COM1 or COM2 port or a VGA monitor connected to a VGA adapter on PCI 0. A VGA monitor requires a keyboard and mouse.

Figure 1–12 Console Terminal Connections



Chapter 2
Operation

This chapter gives basic operating instructions, including powering up and configuring the machine. This chapter has the following sections:

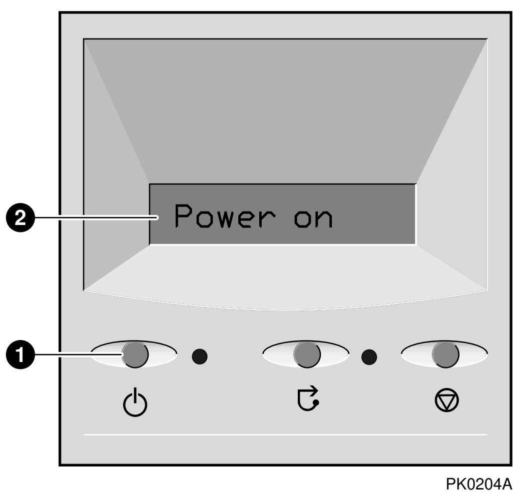
- Powering Up the System
- Power-Up Displays
- System Consoles
- Displaying a Hardware Configuration
- Setting SRM Environment Variables
- Setting SRM Console Security
- Setting Automatic Booting
- Changing the Default Boot Device
- Running AlphaBIOS-Based Utilities

NOTE: *Before using this chapter, it is helpful to become familiar with the user interfaces to the system. See the ES40 User Interface Guide.*

2.1 Powering Up the System

To power up the system, press the power button. Testing begins, and status shows on the console terminal screen and in the control panel display.

Figure 2–1 Operator Control Panel



❶ Power button

❷ Control panel display

2.2 Power-Up Displays

Power-up information is displayed on the operator control panel and on the console terminal startup screen. Messages sent from the SROM (serial read-only memory) program are displayed first, followed by messages from the SRM console.

NOTE: *The power-up text that is displayed on the screen depends on what kind of terminal is connected as the console terminal: VT or VGA.*

If the SRM ***console*** *environment variable is set to* ***serial****, the entire power-up display, consisting of the SROM and SRM power-up messages, is displayed on the VT terminal screen. If* ***console*** *is set to* ***graphics****, no SROM messages are displayed, and the SRM messages are delayed until VGA initialization has been completed.*

- Section 2.2.1 shows the SROM power-up messages and corresponding operator control panel (OCP) messages.
- Section 2.2.2 shows the messages that are displayed once the SROM has transferred control to the SRM console.
- For a complete list of messages displayed on the OCP, see Chapter 7.

2.2.1 SROM Power-Up Display

Example 2–1 Sample SROM Power-Up Display

SROM Power-Up Display	OCP Message	
	`PCI Test`	❶
`SROM V2.3 CPU #00 @  0500  MHz`	`Power on`	❷
`SROM program starting`		
`Reloading SROM`		
`SROM V2.5-F CPU # 00 @  0667  MHz`		
`SROM program starting`	`RelCPU`	❸
`Starting secondary on CPU #1`		
`Starting secondary on CPU #2`	`BC Data`	❹
`Starting secondary on CPU #3`		
`Bcache data tests in progress`		
`Bcache address test in progress`		
`CPU parity and ECC detection in progress`		
`Bcache ECC data tests in progress`	`Size Mem`	❺
`Bcache TAG lines tests in progress`		
`Memory sizing in progress`		
`Memory configuration in progress`		
`Memory data test in progress`		
`Memory address test in progress`		
`Memory pattern test in progress`		
`Memory thrashing test in progress`		
`Memory initialization`		
`Loading console`	`Load ROM`	❻
`Code execution complete (transfer control)`	`Jump to Console`	

❶ When the system powers up, the SROM code is loaded into the I-cache (instruction cache) on the first available CPU, which becomes the primary CPU. The order of precedence is CPU0, CPU1, and so on. The primary CPU attempts to access the PCI bus. If it cannot, either a hang or a failure occurs, and this is the only message displayed.

❷ The primary CPU interrogates the I^2C EEROM on the system board and CPU modules through shared RAM. The primary CPU determines the CPU and system configuration to jump to.

The primary CPU next checks the SROM checksum to determine the validity of the flash SROM sectors.

If flash SROM is invalid, the primary CPU reports the error and continues the execution of the SROM code. Invalid flash SROM must be reprogrammed.

If flash SROM is good, the primary CPU programs appropriate registers with the values from the flash data and selects itself as the target CPU to be loaded.

❸ The primary CPU (usually CPU0) initializes and tests the B-cache and memory, then loads the flash SROM code to the next CPU. That CPU then initializes the EV67 chip) and marks itself as the secondary CPU. Once the primary CPU sees the secondary, it loads the flash SROM code to the next CPU until all remaining CPUs are loaded.

❹ The flash SROM performs B-cache tests. For example, the ECC data test verifies the detection logic for single- and double-bit errors.

❺ The primary CPU initiates all memory tests. The memory is tested for address and data errors for the first 32 MB of memory. It also initializes all the "sized" memory in the system.

If a memory failure occurs, an error is reported. An untested memory array is assigned to address 0 and the failed memory array is deassigned. The memory tests are re-run on the first 32 MB of memory. If all memory fails, the "No Memory Available" message is reported and the system halts.

❻ If all memory passes, the primary CPU loads the console and transfers control to it.

2.2.2 SRM Console Power-Up Display

At the completion of SROM power-up, the primary CPU transfers control to the SRM console program. The console program continues the system initialization. Failures are reported to the console terminal through the power-up screen and a console event log.

Example 2–2 SRM Power-Up Display

```
OpenVMS PALcode V1.69-2,  Tru64 UNIX PALcode V1.62-1
starting console on CPU 0                                      ➊
initialized idle PCB
initializing semaphores
initializing heap
initial heap 200c0
memory low limit = 154000
heap = 200c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing hardware
initializing timer data structures
lowering IPL
CPU 0 speed is 667 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
Memory size 2048 MB
testing memory                                                 ➋
. . .
probe I/O subsystem                                            ➌
probing hose 1, PCI
probing PCI-to-PCI bridge, bus 2
bus 0, slot 4 -- ewa -- DE500-BA Network Controller
bus 2, slot 0 -- pka -- NCR 53C875
bus 2, slot 1 -- pkb -- NCR 53C875
bus 2, slot 2 -- ewb -- DE500-AA Network Controller
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 2 -- vga -- ELSA GLoria Synergy
bus 0, slot 15 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 15 -- dqb -- Acer Labs M1543C IDE
starting drivers                                               ➍
```

❶ The primary CPU prints a message indicating that it is running the console. Starting with this message, the power-up display is sent to any console terminal, regardless of the state of the **console** environment variable.

If console is set to **graphics**, the display from this point on is saved in a memory buffer and displayed on the VGA monitor after the PCI buses are sized and the VGA device is initialized.

❷ The memory size is determined and memory is tested.

❸ The I/O subsystem is probed and I/O devices are reported. I/O adapters are configured.

❹ Device drivers are started.

Continued on next page

Example 2–2 SRM Power-Up Display (Continued)

```
entering idle loop
initializing keyboard
starting console on CPU 1                                    ❺
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 667 MHz
create powerup
starting console on CPU 2
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 2 speed is 667 MHz
create powerup
starting console on CPU 3
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 3 speed is 667 MHz
create powerup
initializing pka pkb ewa ewb dqa dqb
Memory Testing and Configuration Status                      ❻
  Array       Size       Base Address      Intlv Mode
  ---------  ----------  ----------------  ----------
    0         256Mb      0000000060000000    2-Way
    1         512Mb      0000000040000000    2-Way
    2         256Mb      0000000070000000    2-Way
    3        1024Mb      0000000000000000    2-Way

     2048 MB of System Memory
Partition 0, Memory base: 000000000, size: 080000000
initializing GCT/FRU at 1a6000
AlphaServer ES40 Console V5.6-102, built on Dec 2 1999       ❼
at 10:47:31
```

❺ The console is started on the secondary CPUs. The example shows a four-processor system.

❻ Various diagnostics are performed.

❼ The console terminal displays the SRM console banner and the prompt, P*nn*>>>. The number *n* indicates the primary processor. In a multiprocessor system, the prompt could be P00>>>, P01>>>, P02>>>, or P03>>>. From the SRM prompt, you can boot the operating system.

2.3 System Consoles

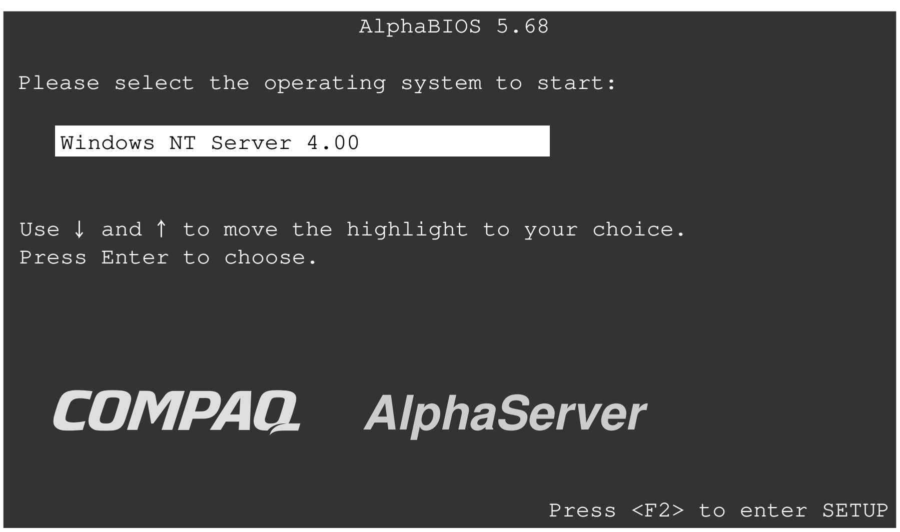
System console programs are located in a flash ROM (read-only memory) on the system board. From the SRM console interface, you can set up and boot the operating system, display the system configuration, and perform other tasks. From AlphaBIOS you can run AlphaBIOS-compliant utilities.

Figure 2–2 SRM Console Example

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

In this example, the SRM **set** command is used to specify boot devices. The system will try to boot from dkb0 and if unsuccessful, will boot from dka0.

Figure 2–3 AlphaBIOS Boot Screen



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SRM Console

The operating system is configured from the SRM console, a command-line interface (CLI). From the CLI you can enter commands to configure the system, view the system configuration, and boot.

For example, to verify that the system sees the bootable devices that are attached, enter:

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

AlphaBIOS Console

The AlphaBIOS console is the enhanced BIOS graphical user interface for Alpha systems. It is used to run certain utilities, such as the RAID Configuration Utility. To enter the AlphaBIOS console, use the following command:

```
P00>>> alphabios
```

After AlphaBIOS initializes, the boot screen shown in Figure 2–3 is displayed. Press F2 to enter the Setup screen See Section 2.9 for information on running AlphaBIOS-based utilities.

2.3.1 Selecting the Display Device

The SRM console environment variable determines to which display device (VT-type terminal or VGA monitor) the console display is sent.

The console terminal that displays the SRM user interface or AlphaBIOS can be either a serial terminal (VT320 or higher, or equivalent) or a VGA monitor.

The SRM **console** environment variable determines the display device.

- If **console** is set to **serial**, and a VT-type device is connected, the SRM console powers on in serial mode and sends power-up information to the VT device. The VT device can be connected to the MMJ port or to COM2.
- If **console** is set to **graphics**, the SRM console expects to find a VGA card connected to PCI 0 and, if so, displays power-up information on the VGA monitor after VGA initialization has been completed.

You can verify the display device with the SRM **show console** command and change the display device with the SRM **set console** command. If you change the display device setting, you must reset the system (with the Reset button or the **init** command) to put the new setting into effect.

In the following example, the user displays the current console device (a graphics device) and then resets it to a serial device. After the system initializes, output will be displayed on the serial terminal.

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

2.3.2 Setting the Control Panel Message

You can create a customized message to be displayed on the operator control panel after startup self-tests and diagnostics have been completed.

When the operating system is running, the control panel displays the console revision. It is useful to create a customized message if you have a number of systems and you want to identify each system by a node name.

You can use the SRM **set ocp_text** command to change this message (see Example 2–3). The message can be up to 16 characters and must be entered in quotation marks.

Example 2–3 Set Ocp_Text Command

```
P00>>> set ocp_text "Node Alpha1"
```

2.4 Displaying a Hardware Configuration

View the system hardware configuration from the SRM console. It is useful to view the hardware configuration to ensure that the system recognizes all devices, memory configuration, and network connections.

Use the following SRM console commands to view the system configuration. Additional commands to view the system configuration are described in the *ES40 User Interface Guide*.

show boot*	Displays the boot environment variables.
show config	Displays the logical configuration of interconnects and buses on the system and the devices found on them.
show device	Displays the bootable devices and controllers in the system.
show fru	Displays the physical configuration of FRUs (field-replaceable units). See Chapter 7 for information on this command.
show memory	Displays configuration of main memory.

2.4.1 Displaying Boot Environment Variables

Use the show boot* command to list the boot environment variables.

Example 2–4 Show Boot*

```
P00>>> show boot*
boot_dev                dka0.0.0.1.1
boot_file
boot_osflags            a
boot_reset              OFF
bootdef_dev             dka0.0.0.1.1
booted_dev
booted_file
booted_osflags
```

2.4.2 Displaying the Logical Configuration

Use the show config command to display the logical configuration. To display the physical configuration, issue the show fru command.

Example 2–5 Show Config

```
P00>>>sh config
                        Compaq Computer Corporation
                          Compaq AlphaServer ES40

Firmware                                                               ➊
SRM Console:    V5.6-102
ARC Console:    v5.70
PALcode:        OpenVMS PALcode V1.69-2, Tru64 UNIX PALcode V1.62-1
Serial Rom:     V2.5-F
RMC Rom:        V1.1
RMC Flash Rom:  V2.2

Processors                                                             ➋
CPU 0           Alpha EV67 pass 2.2.3 667 MHz  8MB Bcache
CPU 1           Alpha EV67 pass 2.2.3 667 MHz  8MB Bcache
CPU 2           Alpha EV67 pass 2.2.3 667 MHz  8MB Bcache
CPU 3           Alpha EV67 pass 2.2.3 667 MHz  8MB Bcache

Core Logic                                                             ➌
Cchip           DECchip 21272-CA Rev 9(C4)
Dchip           DECchip 21272-DA Rev 2
Pchip 0         DECchip 21272-EA Rev 2
Pchip 1         DECchip 21272-EA Rev 2
TIG             Rev 10

Memory                                                                 ➍
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0       256Mb     0000000060000000    2-Way
    1       512Mb     0000000040000000    2-Way
    2       256Mb     0000000070000000    2-Way
    3      1024Mb     0000000000000000    2-Way

     2048 MB of System Memory
```

❶ **Firmware**. Version numbers of the SRM console, AlphaBIOS (ARC) console, PALcode, serial ROM, RMC ROM, and RMC flash ROM

❷ **Processors**. Processors present, processor version and clock speed, and amount of backup cache

❸ **Core logic**. Version numbers of the chips that form the interconnect on the system board

❹ **Memory**. Memory arrays and memory size

Continued on next page

Example 2–5 Show Config (Continued)

```
Slot   Option                  Hose 0, Bus 0, PCI                      ❺
  2     ELSA GLoria Synergy
  7     Acer Labs M1543C                             Bridge to Bus 1, ISA
 15     Acer Labs M1543C IDE    dqa.0.0.15.0
                                dqb.0.1.15.0
                                dqa0.0.0.15.0         TOSHIBA CD-ROM XM-6302B
 19     Acer Labs M1543C USB

        Option                  Hose 0, Bus 1, ISA
        Floppy                  dva0.0.0.1000.0

 Slot   Option                  Hose 1, Bus 0, PCI
  4     DE500-BA Network Con    ewa0.0.0.4.1          00-00-F8-09-90-FF
  6     DECchip 21152-AA                              Bridge to Bus 2, PCI

 Slot   Option                  Hose 1, Bus 2, PCI
  0     NCR 53C875              pka0.7.0.2000.1       SCSI Bus ID 7
                                dka0.0.0.2000.1       RZ2DD-LS
                                dka100.1.0.2000.1     RZ2DD-LS
                                dka200.2.0.2000.1     RZ1CB-CS
  1     NCR 53C875              pkb0.7.0.2001.1       SCSI Bus ID 7
  2     DE500-AA Network Con    ewb0.0.0.2002.1       00-06-2B-00-25-5B
P00>>>
```

❺ PCI bus information.

The "Slot" column lists the logical slots seen by the system. They are not the physical slots into which devices are installed. See Table 2–1 for the correspondence between logical slots and physical slots.

The NCR 53C896 on Hose 0, Bus 0 is a dual-channel Ultra2 SCSI multifunction controller. Two controllers reside on the same chip. They are shown as 2/0 and 2/1. The first number is the logical slot, and the second is the function.

The Acer Labs bridge chip, which is located in PCI logical slot 7, has two built-in IDE controllers. The CD-ROM is on the first controller.

NOTE: *The naming of devices (for example,dqa.0.0.15.0) follows the conventions described in Table 2–2.*

In Example 2–5, the following devices are present:

Hose 0, Bus 0, PCI

Slot 2/0	SCSI controller
Slot 2/1	SCSI controller
Slot 4	VGA controller
Slot 7	PCI to ISA bridge chip
Slot 15	IDE controller and CD-ROM drive
Slot 19	Universal serial bus (USB) controller

Hose 0, Bus 1, ISA
Diskette drive

Hose 1, Bus 0, PCI

Slot 1	SCSI controller and drives
Slot 3	SCSI controller and drives
Slot 4	Ethernet controller
Slot 6	PCI-to-PCI bridge chip to Bus 2

Hose 1, Bus 2, PCI

Slot 0	SCSI controller
Slot 1	SCSI controller
Slot 2	Ethernet controller

Table 2–1 Correspondence Between Logical and Physical PCI Slots

Physical Slot	Logical Slot	PCI 0
1	1	Device
2	2	Device
3	3	Device
4	4	Device
Physical Slot	**Logical Slot**	**PCI 1**
5	1	Device
6	2	Device
7	3	Device
8	4	Device
9	5	Device
10	6	Device

NOTE: *PCI 0 and PCI 1 correspond to Hose 0 and Hose 1 in the logical configuration.*

2.4.3 Displaying the Bootable Devices

Use the show device command to display the bootable devices. DK = SCSI drive; DQ = IDE drive; DV = diskette drive; EI or EW = Ethernet controller; PK = SCSI controller.

Example 2–6 Show Device

```
P00>>> show device
dka0.0.0.1.1            DKA0                           RZ2DD-LS  0306
dka100.1.0.1.1          DKA100                         RZ2DD-LS  0306
dka200.2.0.1.1          DKA200                         RZ1CB-CS  0844
dkb0.0.0.3.1            DKB0                               RZ25  0900
dqa0.0.0.15.0           DQA0        TOSHIBA CD-ROM XM-6302B  1012
dva0.0.0.1000.0         DVA0
ewa0.0.0.4.1            EWA0               00-00-F8-09-90-FF
ewb0.0.0.2002.1         EWB0               00-06-2B-00-25-5B
pka0.7.0.1.1            PKA0                   SCSI Bus ID 7
pkb0.7.0.3.1            PKB0                   SCSI Bus ID 7
pkc0.7.0.2000.1         PKC0                   SCSI Bus ID 7
pkd0.7.0.2001.1         PKD0                   SCSI Bus ID 7
```

Table 2–2 Device Naming Conventions

	Category	Description			
dq	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.			
15	Logical slot number	Corresponds to PCI slot number, as shown in Table 2–1.			
0	Hose number	0 —PCI 0 1 —PCI 1			

2.4.4 Viewing Memory Configuration

Use the show memory command to view the configuration of main memory.

Example 2–7 Show Memory

```
P00>>>show memory
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0        256Mb     0000000060000000    2-Way
    1        512Mb     0000000040000000    2-Way
    2        256Mb     0000000070000000    2-Way
    3       1024Mb     0000000000000000    2-Way

     2048 MB of System Memory
```

The **show memory** display corresponds to the memory array configuration described in Chapter 5. The display does not indicate the number of DIMMs or the DIMM size. Thus, in Example 2–7, Array 3 could consist of two sets of 128-MB DIMMs (eight DIMMs) or one set of 256-MB DIMMs (four DIMMs). Either combination provides 1024 MB of memory.

The output of the **show memory** command also provides the memory interleaving status of the system.

Use the **show fru** command to display the DIMMs in the system and their location. See Chapter 7.

2.5 Setting SRM Environment Variables

You may need to set several SRM console environment variables and built-in utilities to configure the system.

Set environment variables at the P00>>> prompt.

- To check the setting for a specific environment variable, enter the **show *envar*** command, where the name of the environment variable is substituted for *envar*.
- To reset an environment variable, use the **set *envar*** command, where the name of the environment variable is substituted for *envar*.

The boot-related environment variables are described in Chapter 3 of this book. For other environment variables you may need to set, see Chapter 2 of the *ES40 User Interface Guide*.

2.6 Setting SRM Console Security

You can set the SRM console to secure mode to prevent unauthorized personnel from modifying the system parameters or otherwise tampering with the system from the console.

When the SRM is set to secure mode, you can use only two console commands:

- The **boot** command, to boot the operating system
- The **continue** command, to resume running the operating system if you have inadvertently halted the system

The console security commands are as follows:

set password **set secure**	These commands put the console into secure mode.
clear password	Exits secure mode.
login	Turns off console security for the current session.

See the *ES40 User Interface Guide* for details on setting SRM console security.

2.7 Setting Automatic Booting

The system is factory set to halt in the SRM console. You can change this default, if desired.

Systems can boot automatically (if set to autoboot) from the default boot device under the following conditions:

- When you first turn on system power
- When you power cycle or reset the system
- When system power comes on after a power failure
- After a bugcheck (OpenVMS) or panic (Tru64 UNIX or Linux)

2.7.1 Setting Auto Start

The SRM auto_action environment variable determines the default action the system takes when the system is power cycled, reset, or experiences a failure.

The factory setting for **auto_action** is **halt**. The **halt** setting causes the system to stop in the SRM console. You must then boot the operating system manually.

For maximum system availability, **auto_action** can be set to **boot** or **restart**.

- With the **boot** setting, the operating system boots automatically after the SRM **init** command is issued or the Reset button is pressed.
- With the **restart** setting, 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.

To set the default action to **boot**, enter the following SRM commands:

```
P00>>> set auto_action boot
P00>>> init
```

For more information on the **auto_action** environment variable, see the *ES40 User Interface Guide*.

2.8 Changing the Default Boot Device

You can change the default boot device with the set bootdef_dev command.

You can designate a default boot device. You change the default boot device by using the **set bootdef_dev** SRM console command. For example, to set the boot device to the IDE CD-ROM, enter commands similar to the following:

```
P00>>> show bootdef_dev
bootdef_dev   dka400.4.0.1.1
P00>>> set bootdef_dev dqa500.5.0.1.1
P00>>> show bootdef_dev
bootdef_dev dqa500.5.0.1.1
```

See the *ES40 User Interface Guide* for more information.

2.9 Running AlphaBIOS-Based Utilities

Depending upon the type of hardware you have, you may have to run hardware configuration utilities. Hardware configuration diskettes are shipped with your system or with options that you order.

Typical configuration utilities include:

- RAID standalone configuration utility for setting up RAID devices
- KZPSA configuration utility for configuring SCSI adapters

These utilities are run from the AlphaBIOS console

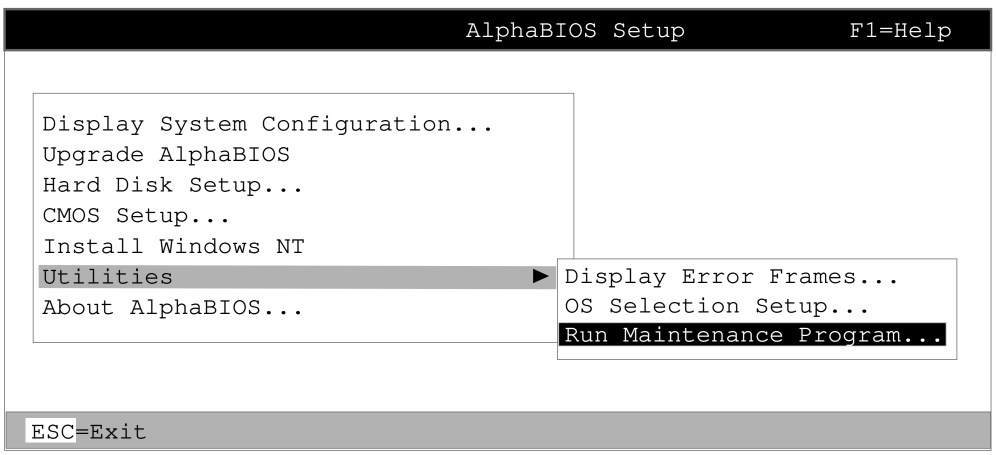
Utilities can be run either in graphics or serial mode. The SRM **console** environment variable controls which mode AlphaBIOS runs in at the time it is loaded by the SRM console.

If you have a VGA monitor attached, set the **console** environment variable to **graphics** and enter the **init** command to reset the system before invoking AlphaBIOS.

2.9.1 Running Utilities from a VGA Monitor

Enter the alphabios command to bring up the AlphaBIOS console.

Figure 2–4 AlphaBIOS Utilities Menu



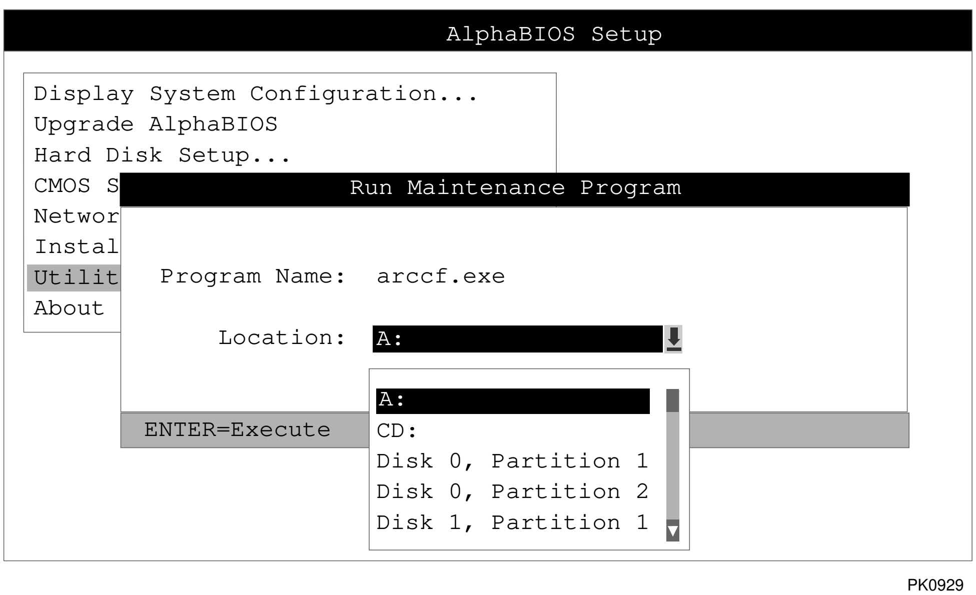
PK0954a

Running a Utility from a VGA Monitor

1. Enter the **alphabios** command to start the AlphaBIOS console.
2. Press **F2** from the AlphaBIOS Boot screen to display the AlphaBIOS Setup screen.
3. From AlphaBIOS Setup, select **Utilities**, then select **Run Maintenance Program** from the sub-menu that is displayed, and press Enter.

4. In the Run Maintenance Program dialog box, type the name of the program to be run in the Program Name field. Then Tab to the Location list box, and select the hard disk partition, floppy disk, or CD-ROM drive from which to run the program.
5. Press Enter to execute the program.

Figure 2–5 Run Maintenance Program Dialog Box



2.9.2 Setting Up Serial Mode

Serial mode requires a VT320 or higher (or equivalent) terminal. To run AlphaBIOS-compliant utilities in serial mode, set the console environment variable to serial and enter the init command to reset the system.

Set up the serial terminal as follows:

1. From the General menu, set the terminal mode to VT*xxx* mode, 8-bit controls.
2. From the Comm menu, set the character format to 8 bit, no parity, and set receive XOFF to 128 or greater.

2.9.3 Running Utilities from a Serial Terminal

Utilities are run from a serial terminal the same way as from a VGA monitor. The menus are the same, but some key mappings are different.

Table 2–3 AlphaBIOS Option Key Mapping

AlphaBIOS Key	VTxxx Key
F1	Ctrl/A
F2	Ctrl/B
F3	Ctrl/C
F4	Ctrl/D
F5	Ctrl/E
F6	Ctrl/F
F7	Ctrl/P
F8	Ctrl/R
F9	Ctrl/T
F10	Ctrl/U
Insert	Ctrl/V
Delete	Ctrl/W
Backspace	Ctrl/H
Escape	Ctrl/[

Continued on next page

1. Enter the **alphabios** command to start the AlphaBIOS console.
2. From the AlphaBIOS Boot screen, press **F2**.
3. From AlphaBIOS Setup, select **Utilities**, and select **Run Maintenance Program** from the sub-menu that is displayed. Press Enter.
4. In the Run Maintenance Program dialog box, type the name of the program to be run in the Program Name field. Then tab to the Location list box, and select the hard disk partition, floppy disk, or CD-ROM drive from which to run the program.
5. Press Enter to execute the program.

Chapter 3
Booting and Installing an Operating System

This chapter gives instructions for booting the Tru64 UNIX, OpenVMS, or 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 covered:

- Setting Boot Options
- Booting Tru64 UNIX
- Starting a Tru64 UNIX Installation
- Booting OpenVMS
- Starting an OpenVMS Installation
- Booting Linux
- OpenVMS Galaxy
- Switching Between Operating Systems

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.*

3.1 Setting Boot Options

You can set a default boot device, boot flags, and network boot protocols by 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:

bootdef_dev	Defines a default boot device
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 to enable specific functions during the boot process
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 UNIX from a RIS server.
ei*0_protocols or **ew*0_protocols**	Defines a default network boot protocol (bootp or mop).

3.1.1 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.

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.*

3.1.2 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 syntax is:

set boot_file *filename*

For Linux systems, the *filename* is specific to the distribution of Linux:

- 2/boot/vmlinux.gz (Red Hat)
- 2/boot/vmlinuz (SuSE)

Example

```
P00>>> set boot_file 2/boot/vmlinux.gz
```

3.1.3 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 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 on an ES40 system is:

```
"root=/dev/sda2"
```

Flags_value Arguments for Red Hat Distribution

0 Halt. (Do not set init default to this.)

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.)

Flags_value Arguments for SuSE

0 Halt. (Do not set init default to this.)

S Single-user mode. (Default)

1 Multi-user without network

2 Multiuser with network

3 Multiuser with network and xdm

6 Reboot. (Do not set init default to this.)

Examples

Single-user mode is typically used for troubleshooting. To make system changes at this run level, you must have read/write privileges.

The following setting will boot Linux into single-user mode with read/write privileges under Red Hat distribution.

```
P00>>> set boot os_flags "root=/dev/sda2 1 rw"
```

The following setting will boot Linux into multiuser mode with network under SuSE distribution:

```
P00>>> set boot os_flags "root=/dev/sda2 2"
```

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:

root_number	Root Directory
0 (default)	[SYS0.SYSEXE]
1	[SYS1.SYSEXE]
2	[SYS2.SYSEXE]
3	[SYS3.SYSEXE]

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 3–1.

Table 3–1 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
```

3.1.4 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 entering the command.

The syntax is:

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

Example

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

3.1.5 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 ei*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
.
.
.
ewa0.0.0.1001.0     EWA0          08-00-2B-3E-BC-B5
ewb0.0.0.12.0       EWB0          00-00-C0-33-E0-0D
ewc0.0.0.13.0       EWC0          08-00-2B-E6-4B-F3
.
.
.
P00>>> set ewa0_protocols bootp
P00>>> show ewa0_protocols
ewa0_protocols        bootp
```

3.2 Booting Tru64 UNIX

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 3–1 Booting UNIX from a Local SCSI Disk

```
P00>>> sho dev                                                            ❶
dka0.0.0.1.1            DKA0                           RZ2ED-LS  0306
dka100.1.0.1.1          DKA100                         RZ2ED-LS  0306
dka200.2.0.1.1          DKA200                         RZ2DD-LS  0306
dka300.3.0.1.1          DKA300                         RZ2DD-LS  0306
dkc0.0.0.1.0            DKC0                           RZ2DD-LS  0306
dkc100.1.0.1.0          DKC100                         RZ2DD-LS  0306
dkc200.2.0.1.0          DKC200                         RZ2DD-LS  0306
dkc300.3.0.1.0          DKC300                         RZ2DD-LS  0306
dqa0.0.0.15.0           DQA0           TOSHIBA CD-ROM XM-6202B  1110
dva0.0.0.1000.0         DVA0
ewa0.0.0.4.1            EWA0                 00-00-F8-10-67-97
pka0.7.0.1.1            PKA0                     SCSI Bus ID 7

P00>>> boot                                                               ❷
(boot dka0.0.0.1.1 -flags a)                                              ❸
block 0 of dka0.0.0.1.1 is a valid boot block
reading 13 blocks from dka0.0.0.1.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 1a00
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 ...
Loading at 0xfffffc0000230000
Current PAL Revision <0x4000500010130>
Switching to OSF PALcode Succeeded
New PAL Revision <0x400050002012d>

Sizes:
text = 4836176
data = 1045600
bss  = 1603520
Starting at 0xfffffc00005671e0
```

```
Loading vmunix symbol table ... [1333528 bytes]
sysconfigtab: attribute Per-proc-address-space not in subsystem proc
Alpha boot: available memory from 0x134c000 to 0x1ffee000
Tru64 UNIX V4.0F-4  (Rev. 1180); Thu Dec  16 15:08:04 EST 1999
physical memory = 512.00 megabytes.
available memory = 492.64 megabytes.
using 1958 buffers containing 15.29 megabytes of memory
Master cpu at slot 0.
Firmware revision: 5.6-102
PALcode: Tru64 UNIX version 1.62-1
Compaq AlphaServer ES40
.
.
.
Tru64 UNIX Version V4.0F

Login:
```

Example 3–1 shows a boot from a local SCSI drive. The example is abbreviated. For complete instructions on booting UNIX, see the *Tru64 UNIX Installation Guide*.

Perform the following tasks to boot a 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 3.1.
3. Install the boot medium. For a network boot, see Section 3.2.1.
4. Enter the **show device** command ➊ to determine the unit number of the drive for your device.
5. Enter the **boot** command ➋ and command-line parameters (if you have not set the associated environment variables). In Example 3–1, boot flags ➌ have already been set.

3.2.1 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 UNIX document entitled *Sharing Software on a Local Area Network* for registration information.

Example 3–2 RISBoot

```
P00>>> show device                                                ❶
dka0.0.0.1.1            DKA0                           RZ2DD-LS  0306
dka100.1.0.1.1          DKA100                         RZ2DD-LS  0306
dka200.2.0.1.1          DKA200                         RZ1CB-CS  0844
dkb0.0.0.3.1            DKB0                               RZ25  0900
dqa0.0.0.15.0           DQA0         TOSHIBA CD-ROM XM-6302B  1012
dva0.0.0.1000.0         DVA0
ewa0.0.0.4.1            EWA0                  00-00-F8-09-90-FF
ewb0.0.0.2002.1         EWB0                  00-06-2B-00-25-5B
pka0.7.0.1.1            PKA0                      SCSI Bus ID 7
pkb0.7.0.3.1            PKB0                      SCSI Bus ID 7
P00>>> set ewa0_protocols bootp                                   ❷
P00>>> set ewa0_inet_init bootp                                   ❸
P00>>> boot ewa0 Da                                               ❹
.
.
.
```

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 3.1.
3. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
4. Enter the following commands. Example 3–2 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 3–2 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*.

3.3 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 3–3 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 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 3–3. Enter the choices appropriate for your system.

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

3.4 Booting Linux

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

The procedure for installing Linux on an ES40 is documented in the *Linux Installation and Configuration Guide for AlphaServer DS10, DS20, ES40, and AlphaStation XP1000 Computers.*

The installation document can be downloaded in either PDF or HTML format:

http://www.digital.com/alphaserver/linux/install_guide.html

Example 3–4 Booting Linux

```
P00>>>show boot*                                    ➊
boot_dev            dka0.0.0.0.0
boot_file           2/boot/vmlinux.gz
boot_osflags        root=/dev/sda2
boot_reset          OFF
bootdef_dev         dka0.0.0.0.0
booted_dev
booted_file
booted_osflags
P00>>> boot                                         ➋
(boot dka0.0.0.0.0 -file 2/boot/vmlinux.gz -flags root=/dev/sda2)
block 0 of dka0.0.0.0.0 is a valid boot block
reading 152 blocks from dka0.0.0.0.0
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 13000
initializing HWRPB at 2000
initializing page table at 3ff8e000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
Linux version 2.2.12 (jestabro@linux04.mro.dec.com) (gcc version
egcs-2.90.29 980515 (egcs-1.0.3 release)) #21 Fri Dec 17 16:55:01
EDT 1999
Booting on Tsunami variation Clipper using machine vector Clipper
Command line: root=/dev/sda2 bootdevice=dka0
bootfile=2/boot/vmlinux.gz
setup_smp: 2 CPUs probed, cpu_present_map 0x3, boot_cpu_id 0
Console: colour VGA+ 80x25
Calibrating delay loop... 996.15 BogoMIPS
Memory: 1033720k available
   POSIX conformance testing by UNIFIX
   Entering SMP Mode.
```

```
secondary_console_message: on 0 from 1 HALT_REASON 0x0 FLAGS
0x1ee
secondary_console_message: on 0 message is 'P01>>>START  P01>>>'
smp_boot_cpus: Total of 2 Processors activated (1992.29
BogoMIPS).
start_secondary: commencing CPU 1 current fffffc003ffe0000
Alpha PCI BIOS32 revision 0.04
PCI: Probing PCI hardware
Linux NET4.0 for Linux 2.2
.
.
.
  General self-test: passed.
  Serial sub-system self-test: passed.
  Internal registers self-test: passed.
  ROM checksum self-test: passed (0x24c9f043)
.
.
.

Red Hat Linux release 6.0 (Hedwig)
Kernel 2.2.12 on an alpha

peng1 login:
```

❶ Enter the **show boot*** command to verify the boot settings. Example 3–4 shows **boot** parameters for Red Hat. The boot file for SuSE is **2/boot/vmlinuz.**

❷ Enter the **boot** command. Example 3–4 shows abbreviated boot output.

3.5 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 3–5 Booting OpenVMS from the Local CD-ROM Drive

```
P00>>> show device                                                    ➊
dka0.0.0.1.1            DKA0                         RZ2CA-LA  N1H0
dka100.1.0.1.1          DKA100                       RZ2CA-LA  N1H0
dqa0.0.0.15.0           DQA0        TOSHIBA CD-ROM XM-6302B  1012
dva0.0.0.1000.0         DVA0
ewa0.0.0.6.1            EWA0              00-00-F8-10-D6-03
pka0.7.0.1.1            PKA0                  SCSI Bus ID 7
P00>>>
.
.
.
P00>>> boot -flags 0,0 dka0                                           ➋
(boot dka0.0.0.1.1 -flags 0,0)
block 0 of dka0.0.0.1.1 is a valid boot block
reading 898 blocks from dka0.0.0.1.1
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 3–5 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 3.1.
3. Install the boot medium. For a network boot, see Section 3.5.1.
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 3–5, the **boot** command with the **-flags** option ❷ causes the system to boot from [SYS0.EXE] on device DKA0.

3.5.1 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 3–6 InfoServer Boot

```
P00>>> show device                                                    ❶
dka0.0.0.1.1           DKA0                          RZ2CA-LA  N1H0
dka100.1.0.1.1         DKA100                        RZ2CA-LA  N1H0
dqa0.0.0.15.0          DQA0        TOSHIBA CD-ROM XM-6302B  1012
dva0.0.0.1000.0        DVA0
ewa0.0.0.6.1           EWA0              00-00-F8-10-D6-03
pka0.7.0.1.1           PKA0                     SCSI Bus ID 7
P00>>>
.
.
.
P00>>> boot -flags 0,0 -file apb_0721 ewa0                            ❷
(boot ewa0.0.0.6.1 -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                        ❸
Version 1.2

      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                         ❹
      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 ❶ to determine the unit number of the drive for your device.
4. Enter the **boot** command and any command-line parameters ❷. In Example 3–6 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 ❸.
5. Respond to the menu prompts ❹, using the selections shown in this example.

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

3.6 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 3–7 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.

3.7 OpenVMS Galaxy

The ES40 system supports the Galaxy Software Architecture on OpenVMS. By creating a Galaxy, you can execute two instances of OpenVMS in a single ES40 system.

Software logically partitions CPUs, memory, and I/O ports by assigning them to individual instances of OpenVMS. Each individual instance is a complete system with the resources it needs to execute independently. Resources such as CPUs can be dynamically reassigned to different instances of OpenVMS.

Documentation for creating an OpenVMS Galaxy computing environment on the ES40 is available on the DS20E-ES40 remedial kit that supports this functionality. The remedial kit is located on the Compaq Services patch site:

http://www.service.digital.com/patches

Click on Search Patches and enter the following kit name:

DEC-AXPVMS-VMS721-DS20E_ES40-V0100--4.PCSI

The documentation will also be included in the *OpenVMS Alpha Galaxy Guide*, available at http://www.openvms.digital.com:8000/.

3.8 Switching Between Operating Systems

The system supports three operating systems. You can install Tru64 UNIX, OpenVMS, or Linux. You can switch from one operating system to another by removing the disk for the operating system that is currently installed and installing the disk for the operating system you want to run.

CAUTION: *The file structures of the operating systems are incompatible. When you switch between operating systems, you cannot read the data off disks associated with the operating system that was running previously.*

Be sure to remove the system and data disks for the operating system you will not be using. Otherwise, you risk corrupting data on the system disk.

3.8.1 Switching Between UNIX and OpenVMS

Follow this procedure if you have already installed an operating system and want to switch to another supported operating system.

CAUTION: *Before switching operating systems, make a note of the boot path and location of the system disk (controller, SCSI ID number, and so on) of the operating system you are removing so that you can restore that operating system at a later date.*

---

1. View and save the boot parameters for the operating system you are removing.
2. Shut down the operating system and power off the system. Unplug the power cord from each power supply.
3. Remove the enclosure panels and system covers as described in Chapter 8.
4. Remove any options that are not supported on the operating system you are installing and replace them with supported options.
5. Remove the system disk and data disks and insert the system and data disks for the operating system you are installing.
6. Plug in the power supplies and power up the system.
7. Set boot parameters and boot the operating system.
8. Set the system date and time.

Chapter 4
Using the Remote Management Console

You can manage the system through the remote management console (RMC). The RMC is implemented through an independent microprocessor that resides on the system board. The RMC also provides configuration and error log functionality.

This chapter explains the operation and use of the RMC. Sections are:

- RMC Overview
- Operating Modes
- Terminal Setup
- Entering the RMC
- SRM Environment Variables for COM1
- RMC Command-Line Interface
- Resetting the RMC to Factory Defaults
- Troubleshooting Tips

4.1 RMC Overview

The remote management console provides a mechanism for monitoring the system (voltages, temperatures, and fans) and manipulating it on a low level (reset, power on/off, halt).

The RMC performs monitoring and control functions to ensure the successful operation of the system.

- Monitors thermal sensors on the CPUs, the PCI backplane, and the power supplies
- Monitors voltages, power supplies, and fans
- Handles hot swap of power supplies and fans
- Controls the operator control panel (OCP) display and writes status messages on the display
- Detects alert conditions such as excessive temperature, fan failure, and power supply failure. On detection, RMC displays messages on the OCP, pages an operator, and sends an interrupt to SRM or AlphaBIOS, which then passes the interrupt to the operating system or an application.
- Shuts down the system if any fatal conditions exist. For example:

  The temperature reaches the failure limit.

  The cover to the system card cage is removed.

  The main fan (Fan 6) and the redundant fan (Fan 5) fail.
- Retrieves and passes information about a system shutdown to SRM or AlphaBIOS at the next power-up. SRM or AlphaBIOS displays a message regarding the last shutdown.
- Provides a command-line interface (CLI) for the user to control the system. From the CLI you can power the system on and off, halt or reset the system, and monitor the system environment.
- Passes error log information to shared RAM so that this information can be accessed by the system.

The RMC logic is implemented using an 8-bit microprocessor, PIC17C44, as the primary control device. The firmware code resides on the microprocessor and in flash memory. If the RMC firmware should ever become corrupted or obsolete, you can update it manually using a Loadable Firmware Update Utility. See Chapter 6 for details. The microprocessor can also communicate with the system power control logic to turn on or turn off power to the rest of the system.

The RMC is powered by an auxiliary 5V supply. You can gain access to the RMC as long as AC power is available to the system (through the wall outlet). Thus, if the system fails, you can still access the RMC and gather information about the failure.

Configuration, Error Log, and Asset Information

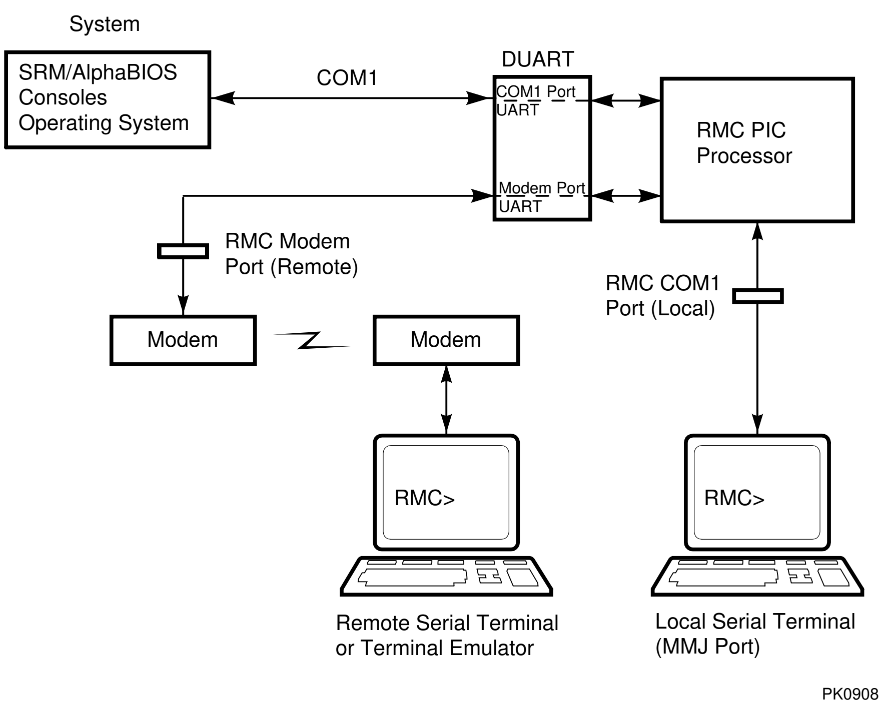
The RMC provides additional functionality to read and write configuration and error log information to FRU error log devices. These operations are carried out via shared RAM (also called dual-port RAM or DPR).

At power-on, the RMC reads the EEPROMs in the system and dumps the contents into the DPR. These EEPROMs contain configuration information, asset inventory and revision information, and error logs. During power-up the SROM sends status and error information for each CPU to the DPR. The system also writes error log information to the DPR when an error occurs. Service providers can access the contents of the DPR to diagnose system problems.

4.2 Operating Modes

The RMC can be configured to manage different data flow paths defined by the com1_mode environment variable. In Through mode (the default), all data and control signals flow from the system COM1 port through the RMC to the active external port. You can also set bypass modes so that the signals partially or completely bypass the RMC. The com1_mode environment variable can be set from either SRM or the RMC. See Section 4.6.1.

Figure 4–1 Data Flow in Through Mode



Through Mode

Through mode is the default operating mode. The RMC routes every character of data between the internal system COM1 port and the active external port, either the local COM1 serial port (MMJ) or the 9-pin modem port. If a modem is connected, the data goes to the modem. The RMC filters the data for a specific escape sequence. If it detects the escape sequence, it enters the RMC CLI.

Figure 4–1 illustrates the data flow in Through mode. The internal system COM1 port is connected to one port of the DUART chip, and the other port is connected to a 9-pin external modem port, providing full modem controls. The DUART is controlled by the RMC microprocessor, which moves characters between the two UART ports. The local MMJ port is always connected to the internal UART of the microprocessor. The escape sequence signals the RMC to enter the CLI. Data issued from the CLI is transmitted between the RMC microprocessor and the active port that enters the RMC.

NOTE: *The internal system COM1 port should not be confused with the external COM1 serial port on the back of the system. The internal COM1 port is used by the system software to send data either to the COM1 port on the system or to the RMC modem port if a modem is connected.*

Local Mode

You can set a Local mode in which only the local channel can communicate with the system COM1 port. In Local mode the modem is prevented from sending characters to the system COM1 port, but you can still enter the RMC from the modem.

4.2.1 Bypass Modes

For modem connection, you can set the operating mode so that data and control signals partially or completely bypass the RMC. The bypass modes are Snoop, Soft Bypass, and Firm Bypass.

Figure 4–2 Data Flow in Bypass Mode

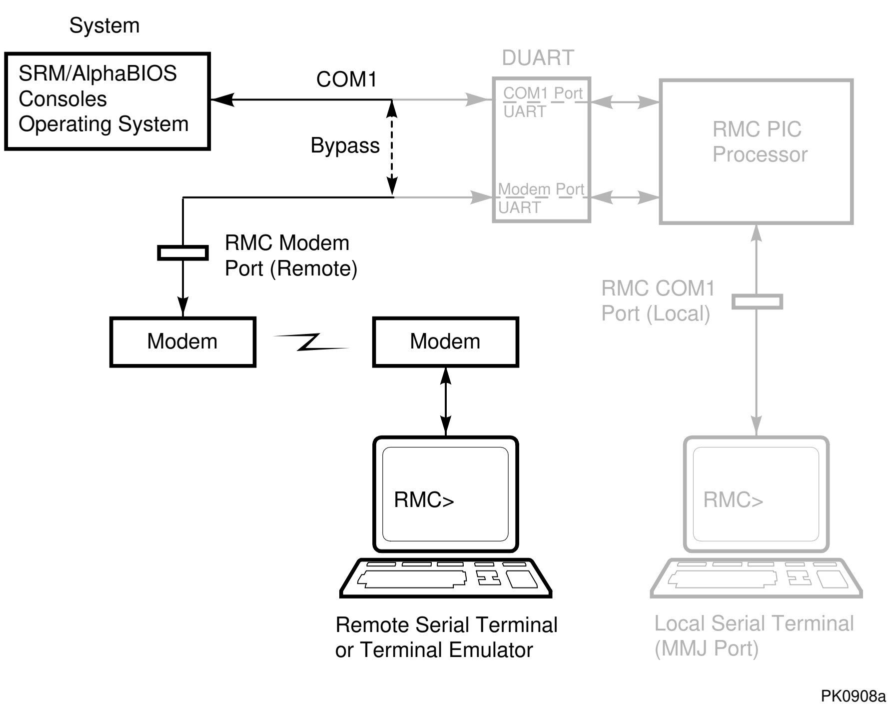


Figure 4–2 shows the data flow in the bypass modes. Note that the internal system COM1 port is connected directly to the modem port.

NOTE: *You can connect a serial terminal to the modem port in any of the bypass modes.*

The local terminal is still connected to the RMC and can still enter the RMC to switch the COM1 mode if necessary.

Snoop Mode

In Snoop mode data partially bypasses the RMC. The data and control signals are routed directly between the system COM1 port and the external modem port, but the RMC taps into the data lines and listens passively for the RMC escape sequence. If it detects the escape sequence, it enters the RMC CLI.

The escape sequence is also passed to the system on the bypassed data lines. If you decide to change the default escape sequence, be sure to choose a unique sequence so that the system software does not interpret characters intended for the RMC.

In Snoop mode the RMC is responsible for configuring the modem for dial-in as well as dial-out alerts and for monitoring the modem connectivity.

Because data passes directly between the two UART ports, Snoop mode is useful when you want to monitor the system but also ensure optimum COM1 performance.

Soft Bypass Mode

In Soft Bypass mode all data and control signals are routed directly between the system COM1 port and the external modem port, and the RMC does not listen to the traffic on the COM1 data lines. The RMC is responsible for configuring the modem and monitoring the modem connectivity. If the RMC detects loss of carrier or the system loses power, it switches automatically into Snoop mode. If you have set up the dial-out alert feature, the RMC pages the operator if an alert is detected and the modem line is not in use.

Soft Bypass mode is useful if management applications need the COM1 channel to perform a binary download, because it ensures that RMC does not accidentally interpret some binary data as the escape sequence.

After downloading binary files, you can set the **com1_mode** environment variable from the SRM console to switch back to Snoop mode or other modes for accessing the RMC, or you can hang up the current modem session and reconnect it.

Firm Bypass Mode

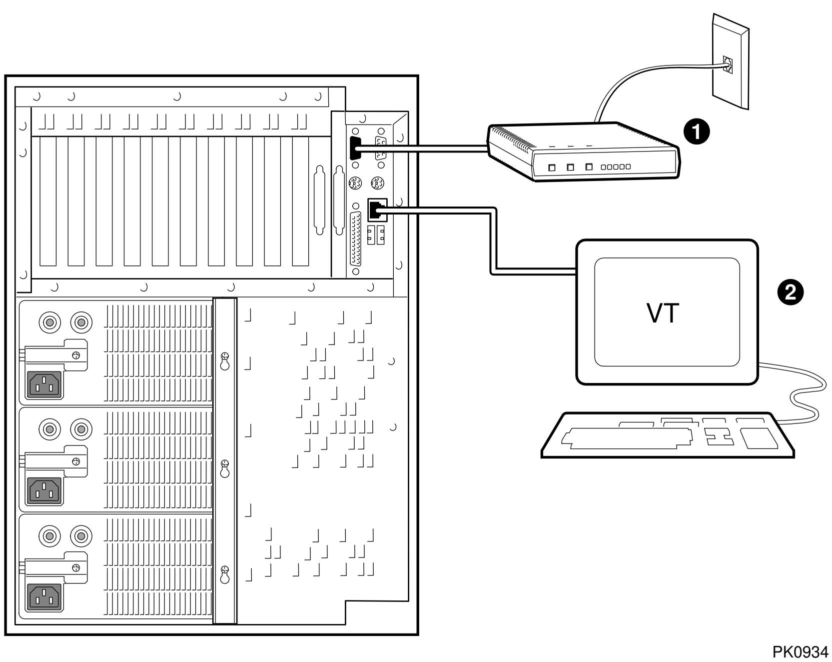
In Firm Bypass mode all data and control signals are routed directly between the system COM1 port and the external modem port. The RMC does not configure or monitor the modem. Firm Bypass mode is useful if you want the system, not the RMC, to fully control the modem port and you want to disable RMC remote management features such as remote dial-in and dial-out alert.

You can switch to other modes by resetting the **com1_mode** environment variable from the SRM console, but you must set up the RMC again from the local terminal.

4.3 Terminal Setup

You can use the RMC from a modem hookup or the serial terminal connected to the system. As shown in Figure 4–3, a modem is connected to the dedicated 9-pin modem port ❶ and a terminal is connected to the COM1 serial port/terminal port (MMJ) ❷.

Figure 4–3 Setup for RMC (Tower View)



4.4 Entering the RMC

You type an escape sequence to invoke the RMC. You can enter RMC from any of the following: a modem, the local serial console terminal, the local VGA monitor, or the system. The "system" includes the operating system, SRM, AlphaBIOS, or an application.

- You can enter the RMC from the local terminal regardless of the current operating mode.
- You can enter the RMC from the modem if the RMC is in Through mode, Snoop mode, or Local mode. In Snoop mode the escape sequence is passed to the system and displayed.

NOTE: *Only one RMC session can be active at a time.*

Entering from a Serial Terminal

Invoke the RMC from a serial terminal by typing the following default escape sequence:

```
^[^[ rmc
```

This sequence is equivalent to typing Ctrl/left bracket, Ctrl/left bracket, rmc. On some keyboards, the Esc key functions like the Ctrl/left bracket combination.

To exit, enter the **quit** command. This action returns you to whatever you were doing before you invoked the RMC. In the following example, the **quit** command returns you to the system COM1 port.

```
RMC> quit
Returning to COM port
```

Entering from the Local VGA Monitor

To enter the RMC from the local VGA monitor, the **console** environment variable must be set to **graphics**.

Invoke the SRM console and enter the **rmc** command.

```
P00>>> rmc
You are about to connect to the Remote Management Console.
Use the RMC reset command or press the front panel reset
button to disconnect and to reload the SRM console.
Do you really want to continue? [y/(n)] y
Please enter the escape sequence to connect to the Remote
Management Console.
```

After you enter the escape sequence, the system enters the CLI and the RMC> prompt is displayed.

When the RMC session is completed, reset the system with the Reset button on the operator control panel or issue the RMC **reset** command.

```
RMC> reset
Returning to COM port
```

4.5 SRM Environment Variables for COM1

Several SRM environment variables allow you to set up the COM1 serial port (MMJ) for use with the RMC.

You may need to set the following environment variables from the SRM console, depending on how you decide to set up the RMC.

com1_baud Sets the baud rate of the COM1 serial port and the modem port. The default is 9600.

com1_flow Specifies the flow control on the serial port. The default is **software**.

com1_mode Specifies the COM1 data flow paths so that data either flows through the RMC or bypasses it. This environment variable can be set from either the SRM or the RMC.

com1_modem Specifies to the operating system whether or not a modem is present.

See the *ES40 User Interface Guide* for information on setting SRM environment variables.

4.6 RMC Command-Line Interface

The remote management console supports setup commands and commands for managing the system.

The RMC commands are listed below.

> **clear {alert, port}**
> **dep**
> **disable {alert, remote}**
> **dump**
> **enable {alert, remote}**
> **env**
> **halt {in, out}**
> **hangup**
> **help** or **?**
> **power {on, off}**
> **quit**
> **reset**
> **send alert**
> **set {alert, com1_mode, dial, escape, init, logout, password, user}**
> **status**

NOTE: *The* **dep** *and* **dump** *commands are reserved for service providers.*

For an RMC commands reference, see the *ES40 User Interface Guide.*

Continued on next page

Command Conventions

Observe the following conventions for entering RMC commands:

- Enter enough characters to distinguish the command.

NOTE: *The* **reset** *and* **quit** *commands are exceptions. You must enter the entire string for these commands to work.*

- For commands consisting of two words, enter the entire first word and at least one letter of the second word. For example, you can enter **disable a** for **disable alert**.
- For commands that have parameters, you are prompted for the parameter.
- Use the Backspace key to erase input.
- If you enter a nonexistent command or a command that does not follow conventions, the following message is displayed:

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

- If you enter a string that exceeds 14 characters, the following message is displayed:

```
*** ERROR - overflow ***
```

- Use the Backspace key to erase input.

4.6.1 Defining the COM1 Data Flow

Use the set com1_mode command from SRM or RMC to define the COM1 data flow paths.

You can set **com1_mode** to one of the following values:

through All data passes through RMC and is filtered for the escape sequence. This is the default.

snoop Data partially bypasses RMC, but RMC taps into the data lines and listens passively for the escape sequence.

soft_bypass Data bypasses RMC, but RMC switches automatically into Snoop mode if loss of carrier occurs.

firm_bypass Data bypasses RMC. RMC remote management features are disabled.

local Changes the focus of the COM1 traffic to the local MMJ port if RMC is currently in one of the bypass modes or is in Through mode with an active remote session.

Example

```
RMC> set com1_mode
Com1_mode (THROUGH, SNOOP, SOFT_BYPASS, FIRM_BYPASS, LOCAL): local
```

NOTE: *For more details, see the ES40 User Interface Guide.*

4.6.2 Displaying the System Status

The RMC status command displays the current RMC settings. Table 4–1 explains the status fields.

```
RMC> status
   PLATFORM STATUS
On-Chip Firmware Revision: V1.0
Flash Firmware Revision: V2.2
Server Power: ON
System Halt: Deasserted
RMC Power Control: ON
Escape Sequence: ^[^[RMC
Remote Access: Enabled
RMC Password: set
Alert Enable: Disabled
Alert Pending: YES
Init String: AT&F0E0V0X0S0=2
Dial String: ATXDT9,15085553333
Alert String: ,,,,,,5085553332#;
Com1_mode: THROUGH
Last Alert: CPU door opened
Logout Timer: 20 minutes
User String:
```

Table 4–1 Status Command Fields

Field	Meaning
On-Chip Firmware Revision:	Revision of RMC firmware on the microcontroller.
Flash Firmware Revision:	Revision of RMC firmware in flash ROM.
Server Power:	ON = System is on. OFF = System is off.
System Halt:	Asserted = System has been halted. Deasserted = Halt has been released.
RMC Power Control:	ON= System has powered on from RMC. OFF = System has powered off from RMC.
Escape Sequence:	Current escape sequence for access to RMC console.
Remote Access:	Enabled = Modem for remote access is enabled. Disabled = Modem for remote access is disabled.
RMC Password:	Set = Password set for modem access. Not set = No password set for modem access.
Alert Enable:	Enabled = Dial-out enabled for sending alerts. Disabled = Dial-out disabled for sending alerts.
Alert Pending:	YES = Alert has been triggered. NO = No alert has been triggered.
Init String:	Initialization string that was set for modem.
Dial String:	Pager string to be dialed when an alert occurs.
Alert String:	Identifies the system that triggered the alert to the paging service. Usually the phone number of the monitored system.
Com1_mode:	Identifies the current COM1 mode.
Last Alert:	Type of alert (for example, power supply 1 failed).
Logout Timer:	The amount of time before the RMC terminates an inactive modem connection. The default is 20 minutes.
User String:	Notes supplied by user.

4.6.3 Displaying the System Environment

The RMC env command provides a snapshot of the system environment.

```
RMC> env

       System Hardware Monitor

Temperature (warnings at 45.0°C, power-off at 50.0°C)                    ❶
    CPU0: 26.0°C    CPU1: 26.0°C    CPU2: 27.0°C    CPU3: 26.0°C         ❷
    Zone0: 29.0°C    Zone1: 30.0°C    Zone2: 31.0°C
Fan RPM
    Fan1: 2295    Fan2: 2295    Fan3: 2205                               ❸
    Fan4: 2235    Fan5: OFF     Fan6: 2518
Power Supply(OK, FAIL, OFF, '----' means not present)                    ❹
    PS0 : OK       PS1 : OK       PS2 : ----
    CPU0: OK       CPU1: OK       CPU2: OK       CPU3: OK
CPU CORE voltage
    CPU0: +2.192V    CPU1: +2.192V    CPU2: +2.192V    CPU3: +2.192V     ❺
CPU IO voltage
    CPU0: +1.488V    CPU1: +1.488V    CPU2: +1.488V    CPU3: +1.488V
Bulk voltage
    +3.3V Bulk: +3.328V    +5V Bulk: +5.076V   +12V Bulk: +12.096V       ❻
         Vterm: +1.824V       Cterm: +2.000V   -12V Bulk: -12.480V
```

❶ CPU temperature. In this example four CPUs are present.

❷ Temperature of PCI backplane: Zone 0 includes PCI slots 1–3, Zone 1 includes PCI slots 7–10, and Zone 2 includes PCI slots 4–6.

❸ Fan RPM. With the exception of Fan 5, all fans are powered as long as the system is powered on. Fan 5 is OFF unless Fan 6 fails.

❹ The normal power supply status is either OK (system is powered on) or OFF (system is powered off or the power supply cord is not plugged in). FAIL indicates a problem with a supply.

❺ CPU CORE voltage and CPU I/O voltage. In a healthy system, the core voltage for all CPUs should be the same, and the I/O voltage for all CPUs should be the same.

❻ Bulk power supply voltage.

4.6.4 Power On and Off, Reset, and Halt

The RMC power {on, off}, halt {in, out}, and reset commands perform the same functions as the buttons on the operator control panel.

Power On and Power Off

The RMC **power on** command powers the system on, and the **power off** command powers the system off. The Power button on the OCP, however, has precedence.

- If the system has been powered off with the Power button, the RMC cannot power the system on. If you enter the **power on** command, the message "Power button is OFF" is displayed, indicating that the command will have no effect.
- If the system has been powered on with the Power button, and the **power off** command is used to turn the system off, you can toggle the Power button to power the system back on.

When you issue the **power on** command, the terminal exits RMC and reconnects to the server's COM1 port.

```
RMC> power on
Returning to COM port
RMC> power off
```

Halt In and Halt Out

The **halt in** command halts the system. The **halt out** command releases the halt. When you issue either the **halt in** or **halt out** command, the terminal exits RMC and reconnects to the server's COM1 port.

```
RMC> halt in
Returning to COM port
RMC> halt out
Returning to COM port
```

The **halt out** command cannot release the halt if the Halt button is latched in. If you enter the **halt out** command, the message "Halt button is IN" is displayed, indicating that the command will have no effect. Toggling the Power button on the operator control panel overrides the **halt in** condition.

Reset

The RMC **reset** command restarts the system. The terminal exits RMC and reconnects to the server's COM1 port.

```
RMC> reset
Returning to COM port
```

4.6.5 Configuring Remote Dial-In

Before you can dial in through the RMC modem port or enable the system to call out in response to system alerts, you must configure RMC for remote dial-in.

Connect your modem to the 9-pin modem port and turn it on. Enter the RMC from either the local serial terminal or the local VGA monitor to set up the parameters.

Example 4–1 Dial-In Configuration

```
RMC> set password                                        ❶
RMC Password: ****
Verification: ****
RMC> set init                                            ❷
Init String: AT&F0E0V0X0S0=2
RMC> enable remote                                       ❸
RMC> status                                              ❹
.
.
Remote Access: Enabled
.
.
.
```

❶ Sets the password that is prompted for at the beginning of a modem session. The string cannot exceed 14 characters and is not case sensitive. For security, the password is not echoed on the screen. When prompted for verification, type the password again.

❷ Sets the initialization string. The string is limited to 31 characters and can be modified depending on the type of modem used. Because the modem commands disallow mixed cases, the RMC automatically converts all alphabetic characters entered in the init string to uppercase.

The RMC automatically configures the modem's flow control according to the setting of the SRM **com1_flow** environment variable. The RMC also enables the modem carrier detect feature to monitor the modem connectivity.

❸ Enables remote access to the RMC modem port by configuring the modem with the setting stored in the initialization string.

❹ Verifies the settings. Check that the Remote Access field is set to Enabled.

Dialing In

The following example shows the screen output when a modem connection is established.

```
ATDT915085553333

RINGING

RINGING

CONNECT 9600/ARQ/V32/LAPM

RMC Password: *********

Welcome to RMC V1.2
P00>>> ^[^[rmc
RMC>
```

1. At the RMC> prompt, enter commands to monitor and control the remote system.
2. When you have finished a modem session, enter the **hangup** command to cleanly terminate the session and disconnect from the server.

4.6.6 Configuring Dial-Out Alert

When you are not monitoring the system from a modem connection, you can use the RMC dial-out alert feature to remain informed of system status. If dial-out alert is enabled, and the RMC detects alarm conditions within the managed system, it can call a preset pager number.

You must configure remote dial-in for the dial-out feature to be enabled. See Section 4.6.5.

To set up the dial-out alert feature, enter the RMC from the local serial terminal or local VGA monitor.

Example 4–2 Dial-Out Alert Configuration

```
RMC> set dial                                              ➊
Dial String: ATXDT9,15085553333
RMC> set alert                                             ➋
Alert String: ,,,,,,5085553332#;
RMC> enable alert                                          ➌
RMC> clear alert                                           ➍
RMC> send alert                                            ➎
Alert detected!
RMC> clear alert                                           ➏
RMC> status                                                ➐
.
.
Alert Enable: Enabled
.
.
```

A typical alert situation might be as follows:

- The RMC detects an alarm condition, such as over temperature warning.
- The RMC dials your pager and sends a message identifying the system.
- You dial the system from a remote serial terminal.
- You enter the RMC, check system status with the **env** command, and, if the situation requires, power down the managed system.
- When the problem is resolved, you power up and reboot the system.

The elements of the dial string and alert string are shown in Table 4–2. Paging services vary, so you need to become familiar with the options provided by the paging service you will be using. The RMC supports only numeric messages.

❶ Sets the string to be used by the RMC to dial out when an alert condition occurs. The dial string must include the appropriate modem commands to dial the number.

❷ Sets the alert string, typically the phone number of the modem connected to the remote system. The alert string is appended after the dial string, and the combined string is sent to the modem when an alert condition is detected.

❸ Enables the RMC to page a remote system operator.

❹ Clears any alert that may be pending. This ensures that the **send alert** command will generate an alert condition.

❺ Forces an alert condition. This command is used to test the setup of the dial-out alert function. It should be issued from the local serial terminal or local VGA monitor. As long as no one connects to the modem and there is no alert pending, the alert will be sent to the pager immediately. If the pager does not receive the alert, re-check your setup.

❻ Clears the current alert so that the RMC can capture a new alert. The last alert is stored until a new event overwrites it. The Alert Pending field of the **status** command becomes NO after the alert is cleared.

❼ Verifies the settings. Check that the Alert Enable field is set to Enabled.

NOTE: *If you do not want dial-out paging enabled at this time, enter the* **disable alert** *command after you have tested the dial-out alert function. Alerts continue to be logged, but no paging occurs.*

Continued on next page

Table 4–2 Elements of Dial String and Alert String

Dial String	
	The dial string is case sensitive. The RMC automatically converts all alphabetic characters to uppercase.
ATXDT	AT = Attention.
	X = Forces the modem to dial "blindly" (not seek the dial tone). Enter this character if the dial-out line modifies its dial tone when used for services such as voice mail.
	D = Dial
	T = Tone (for touch-tone)
9,	The number for an outside line (in this example, 9). Enter the number for an outside line if your system requires it.
	, = Pause for 2 seconds.
15085553333	Phone number of the paging service.

Alert String	
,,,,,,	Each comma (,) provides a 2-second delay. In this example, a delay of 12 seconds is set to allow the paging service to answer.
5085553332#	A call-back number for the paging service. The alert string must be terminated by the pound (#) character.
;	A semicolon (;) must be used to terminate the entire string.

4.6.7 Resetting the Escape Sequence

The RMC set escape command sets a new escape sequence.

The new escape sequence can be any character string, not to exceed 14 characters. A typical sequence consists of two or more control characters. It is recommended that control characters be used in preference to ASCII characters. Use the **status** command to verify the new escape sequence before exiting the RMC.

The following example consists of two instances of the Esc key and the letters "FUN." The "F" is not displayed when you set the sequence because it is preceded by the escape character. Enter the **status** command to see the new escape sequence.

```
RMC> set escape
Escape Sequence: un
RMC> status
.
.
.
Escape Sequence: ^[^[FUN
```

CAUTION: *Be sure to record the new escape sequence. Restoring the default sequence requires moving a jumper on the system board.*

4.7 Resetting the RMC to Factory Defaults

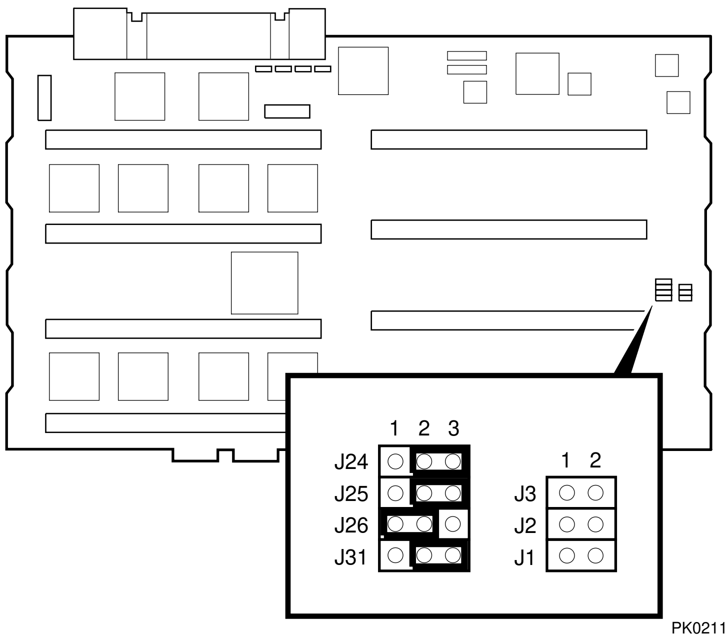
If the non-default RMC escape sequence has been lost or forgotten, RMC must be reset to factory settings to restore the default escape sequence.

WARNING: To prevent injury, access 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.

The following procedure restores the default settings:

1. Shut down the operating system and press the Power button on the operator control panel to the OFF position.
2. Unplug the power cord from each power supply. Wait until the +5V Aux LEDs on the power supplies go off before proceeding.
3. Remove enclosure panels as described in Chapter 5.
4. Remove the system card cage cover and fan cover from the system chassis, as described in Chapter 5.
5. Remove CPU1 as described in Chapter 5.
6. On the system board, install jumper J25 over pins 1 and 2. See Figure 4–4 for the location of J25. (The default jumper positions are shown.)

Figure 4–4 RMC Jumpers (Default Positions)



7. Plug a power cord into one power supply, and then wait until the control panel displays the message “System is down.”
8. Unplug the power cord. Wait until the +5V Aux LED on the power supply goes off before proceeding.
9. Install jumper J25 over pins 2 and 3.
10. Reinstall CPU1, the card cage cover and fan cover and the enclosure panels.
11. Plug the power cord into each of the power supplies.

NOTE: *After the RMC has been reset to defaults, perform the setup procedures to enable remote dial-in and call-out alerts. See Section 4.6.5.*

4.8 Troubleshooting Tips

Table 4–3 lists possible causes and suggested solutions for symptoms you might see.

Table 4–3 RMC Troubleshooting

Symptom	Possible Cause	Suggested Solution
You cannot enter the RMC from the modem.	The RMC may be in soft bypass or firm bypass mode.	Issue the **show com1_mode** command from SRM and change the setting if necessary. If in soft bypass mode, you can disconnect the modem session and reconnect it.
The terminal cannot communicate with the RMC correctly.	System and terminal baud rates do not match.	Set the baud rate for the terminal to be the same as for the system. For first-time setup, suspect the console terminal, since the RMC and system default baud is 9600.
RMC will not answer when the modem is called.	Modem cables may be incorrectly installed.	Check modem phone lines and connections.
	RMC remote access is disabled or the modem was power cycled since last being initialized.	From the local serial terminal or VGA monitor, enter the **set password** and **set init** commands, and then enter the **enable remote** command.
	The modem is not configured correctly.	Modify the modem initialization string according to your modem documentation.

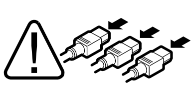
Table 4–3 RMC Troubleshooting (Continued)

Symptom	Possible Cause	Suggested Solution
RMC will not answer when modem is called. (continued from previous page)	On AC power-up, RMC defers initializing the modem for 30 seconds to allow the modem to complete its internal diagnostics and initializations.	Wait 30 seconds after powering up the system and RMC before attempting to dial in.
After the system is powered up, the COM1 port seems to hang or you seem to be unable to execute RMC commands.	There is a normal delay while the RMC completes the system power-on sequence.	Wait about 40 seconds.
New escape sequence is forgotten.		RMC console must be reset to factory defaults.
During a remote connection, you see a "+++" string on the screen.	The modem is confirming whether the modem has really lost carrier. This is normal behavior.	
The message "unknown command" is displayed when you enter a carriage return by itself.	The terminal or terminal emulator is including a line feed character with the carriage return.	Change the terminal or terminal emulator setting so that "new line" is not selected.

Chapter 5
Configuring and Installing Components

This chapter shows how to configure and install components in a tower or pedestal system. Installation of components in a rackmount system is reserved for service providers and self-maintenance customers.

WARNING: To prevent injury, access 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. If accessing the system card cage, power down the system and wait 2 minutes to allow components to cool.
3. Wear an anti-static wrist strap when handling internal components.



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

Installation Tools

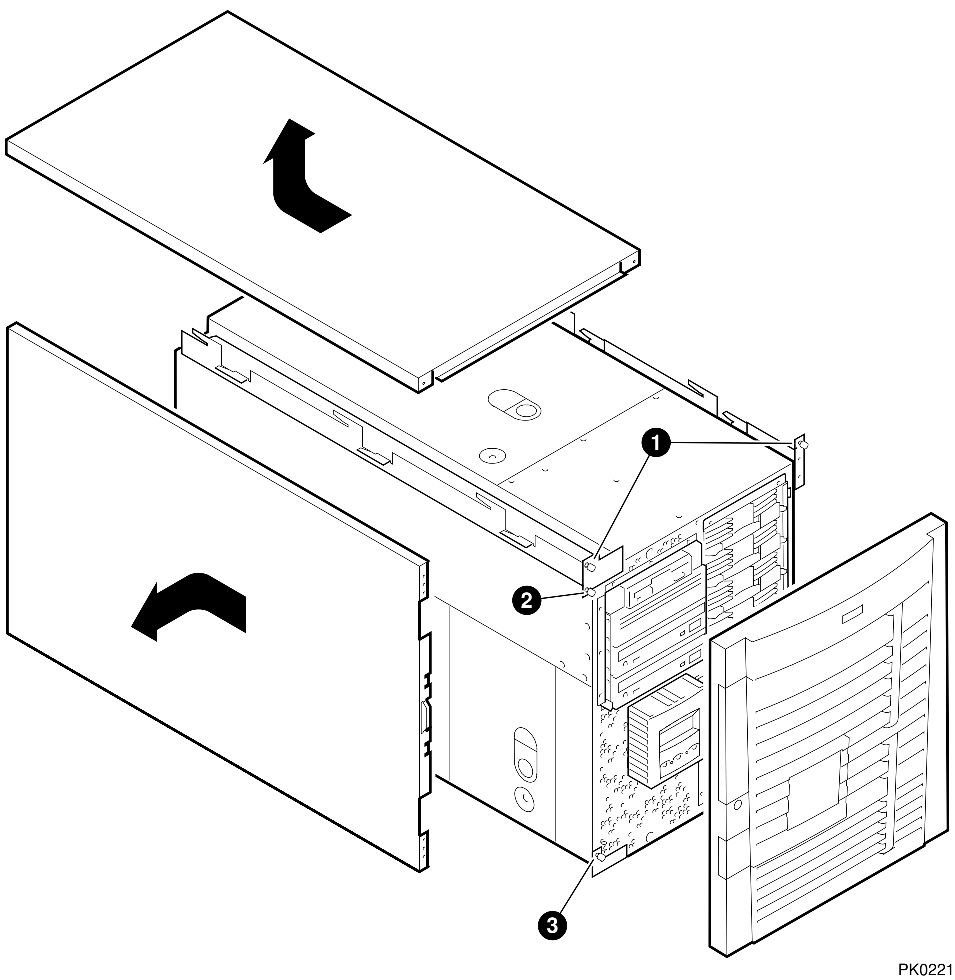
You need the following tools to install components.

- Phillips #2 screwdriver (a magnetic screwdriver is recommended)
- Allen wrench (3 mm)
- Anti-static wrist strap

5.1 Removing Enclosure Panels

Open and remove the front door. Loosen the screws that allow you to remove the top and side panels.

Figure 5–1 Enclosure Panel Removal (Tower)

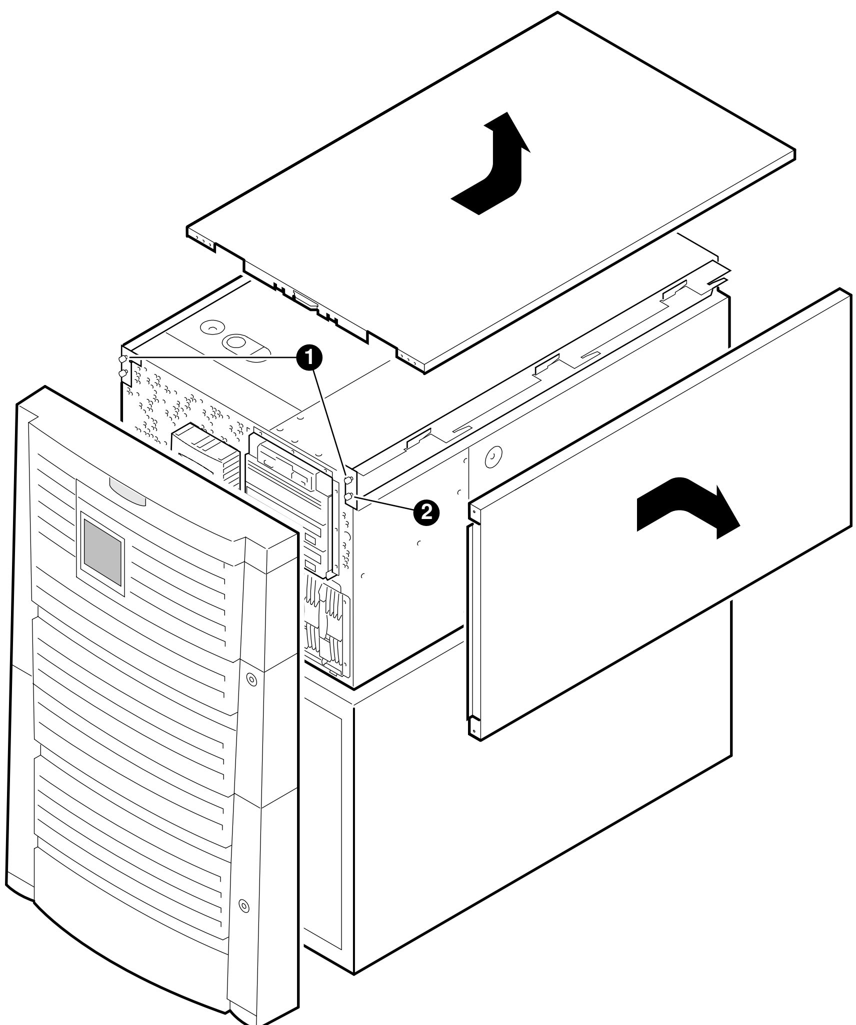


To Remove Enclosure Panels from a Tower

The enclosure panels are secured by captive screws.

1. Remove the front door.
2. To remove the top panel, loosen the top left and top right screws ❶. Slide the top panel back and lift it off the system.
3. To remove the left panel, loosen the screw ❷ at the top and the screw ❸ at the bottom. Slide the panel back and then tip it outward. Lift it off the system.
4. Go to Section 5.2 for instructions on removing covers from the system chassis.

Figure 5–2 Enclosure Panel Removal (Pedestal)



To Remove Enclosure Panels from a Pedestal

The enclosure panels are secured by captive screws.

1. Open and remove the front doors.
2. To remove the top enclosure panel, loosen the captive screws shown in ❶. Slide the top panel back and lift it off the system.
3. To remove the right enclosure panel, loosen the captive screw shown in ❷. Slide the panel back and then tip it outward. Lift the panel from the three tabs.
4. Go to Section 5.2 for instructions on removing covers from the system chassis.

5.2 Removing Covers from the System Chassis

WARNING: To prevent injury, access 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.

=== V @ >240VA

WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with parts or remove power prior to access.

WARNING: Contact with moving fan can cause severe injury to fingers. Avoid contact or remove power prior to access.

Figure 5–3 and Figure 5–4 show the location and removal of covers on the tower and pedestal/rackmount systems, respectively. The numbers in the illustrations correspond to the following:

❶ 3mm Allen captive quarter-turn screw that secures each cover.

❷ Spring-loaded ring that releases cover. Each cover has a pull-up ring.

❸ Fan area cover. This area contains the main system fan and a redundant fan.

❹ System card cage cover. This area contains CPUs and memory DIMMs. To remove the system card cage cover, you must first remove the fan area cover ❸. An interlock switch shuts the system down when you remove the system card cage cover.

❺ PCI card cage cover. This area contains PCI cards and four fans.

Figure 5–3 Removing Covers from a Tower

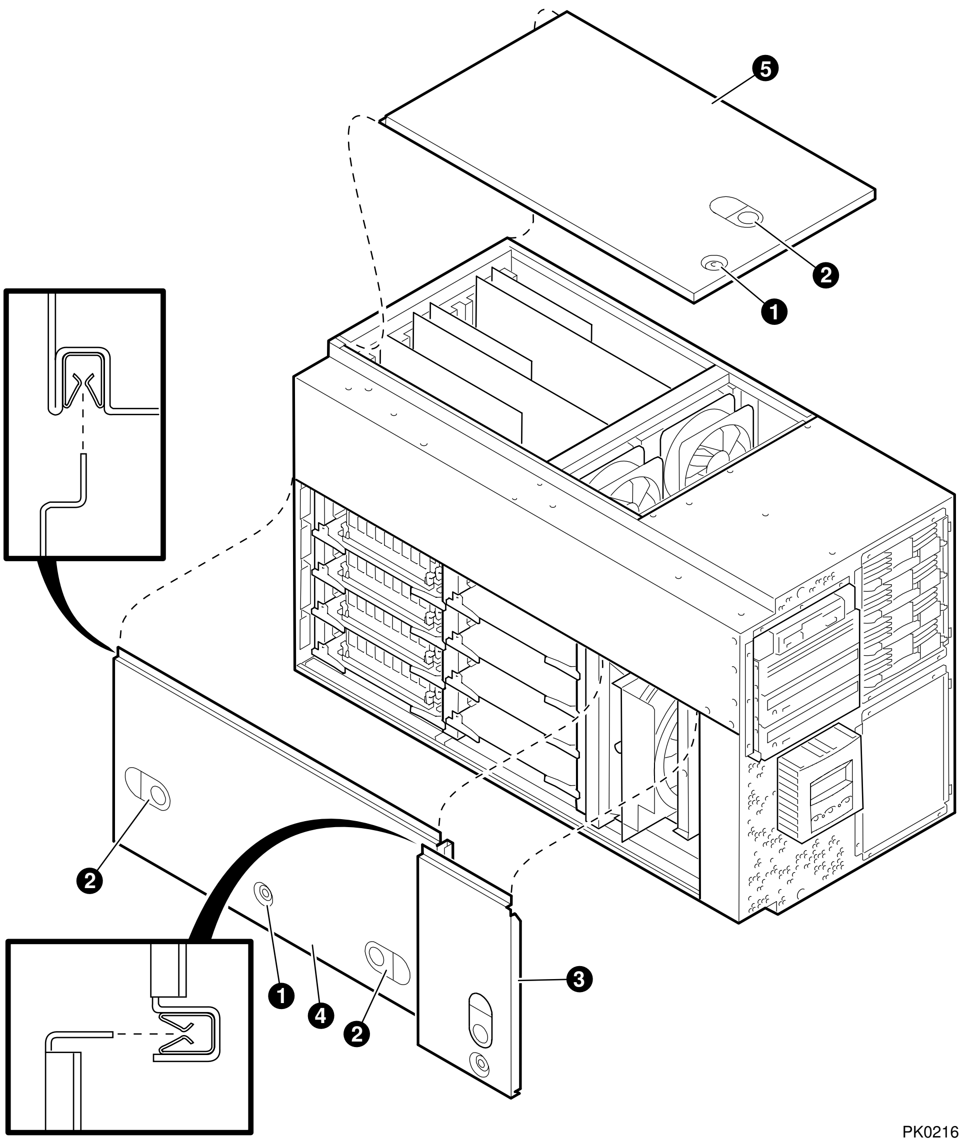
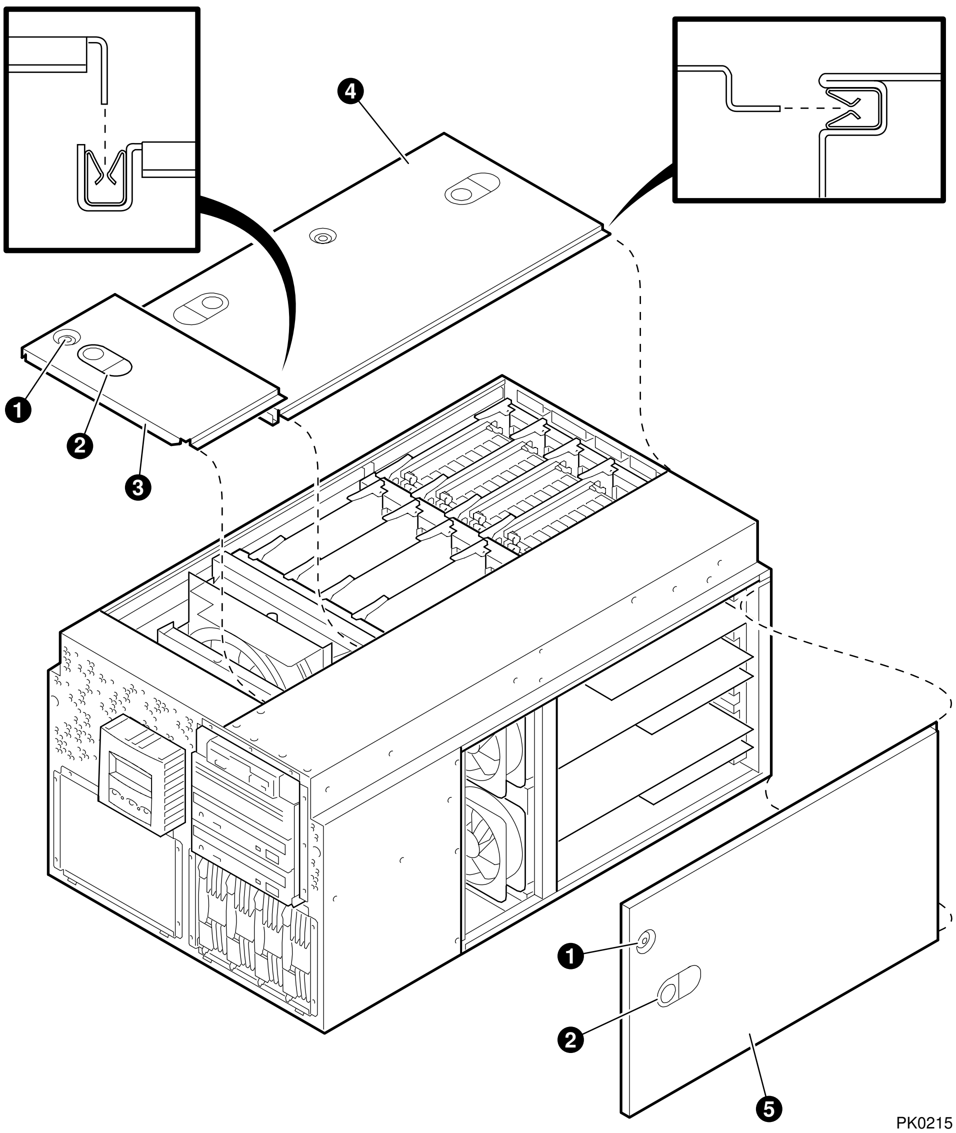


Figure 5–4 Removing Covers from a Pedestal/Rack



5.3 Before Installing Components

You must shut down the operating system, turn off power to the system, and unplug the power cord from each supply before installing CPUs, memory DIMMs, PCI cards, or removable media devices.

NOTE: *You can install a power supply for redundancy at any time without shutting down the system.*

WARNING: To prevent injury, access 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. If accessing the system card cage, power down the system and wait 2 minutes to allow components to cool.
3. Wear an anti-static wrist strap when handling internal components.

Follow the procedure below before installing CPUs, memory DIMMs, PCI cards, or removable media devices:

1. Shut down the operating system according to the instructions in the operating system documentation.
2. Shut down power on all external options connected to the system.
3. Shut down power to the system.
4. Unplug the power cord from each power supply.
5. Become familiar with the location of the module slots and the configuration rules given in this chapter.

5.4 Memory Allocation

The SRM console allocates enough memory for most configurations. If you install options that require more memory than the SRM console has allocated, the console dynamically resizes itself to provide additional memory to support the new configuration.

A crash and reboot cycle can occur several times until the console has allocated enough memory. Example 5–1 shows an abbreviated example of the output to a serial console screen.

Example 5–1 Memory Allocation Crash/Reboot Cycle

```
.
.
.
Memory Testing and Configuration Status
  Array       Size       Base Address
---------  ----------  ----------------
    0        512Mb     0000000040000000
    1       1024Mb     0000000000000000
    2        256Mb     0000000060000000
    3        256Mb     0000000070000000

     2048 MB of System Memory
Testing the System
CPU0: insufficient dynamic memory for a request of 4592 bytes      ❶
Console heap space will be automatically increased in size by 64KB
   PID       bytes  name
-------- ---------- ----
00000000      27360 ????
00000001      23424 idle
00000002        800 dead_eater
00000003        800 poll
00000004        800 timer
00000005     499584 powerup
00000031     129536 pwrup_diag
.
.
.
SYSFAULT CPU0 - pc = 0014faac                                      ❷
exception context saved starting at 001FD7B0
GPRs:
  0: 00000000 00048FF8  16: 00000000 0000001E
  1: 00000000 00150C80  17: 00000000 EFEFEFC8
  2: 00000000 001202D0  18: 00000000 001FD2F8
.
.
.
```

```
Memory Testing and Configuration Status
  Array       Size       Base Address
---------  ----------  ----------------
    0        512Mb     0000000040000000
    1       1024Mb     0000000000000000
    2        256Mb     0000000060000000
    3        256Mb     0000000070000000

     2048 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
Partition 0, Memory base: 000000000, size: 080000000
initializing GCT/FRU at offset 1dc000
AlphaServer ES40 Console V5.5-3059, built on May 14 1999 at 01:57:42

P00>>>show heap_expand                                ❸
heap_expand        64KB
P00>>>
```

The crash and reboot cycle occurs as follows:

1. Drivers try to allocate more "heap space" (space for more memory) but cannot.
2. The console displays a message ❶ indicating insufficient dynamic memory .
3. The console takes an exception ❷.
4. The console allocates more heap space and restarts with memory set to the required size.

After the console completes its final reinitialization, the console banner is displayed, followed by the P00>>> prompt. Enter the **show heap_expand** command ❸ to verify that the console has allocated more memory. You can then boot the operating system. No other action is required, and the crash/reboot cycle should not occur again.

If you subsequently change your configuration, enter the following command to reset the heap space to its default before you boot the system:

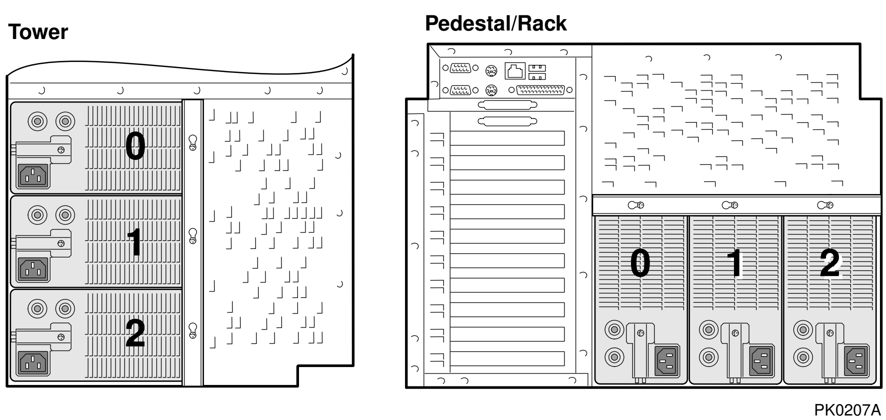
```
P00>>> set heap_expand none
```

Resizing may or may not occur again, depending on whether the console requires additional heap space.

5.5 Power Supply Configuration

The system can have a single power supply or redundant configurations. You can add a power supply for redundancy at any time without shutting down the system.

Figure 5–5 Power Supply Locations



The system can have the following power configurations:

Single Power Supply. A single power supply is provided with entry-level systems, such as a system configured with:

- One or two CPUs
- One storage cage

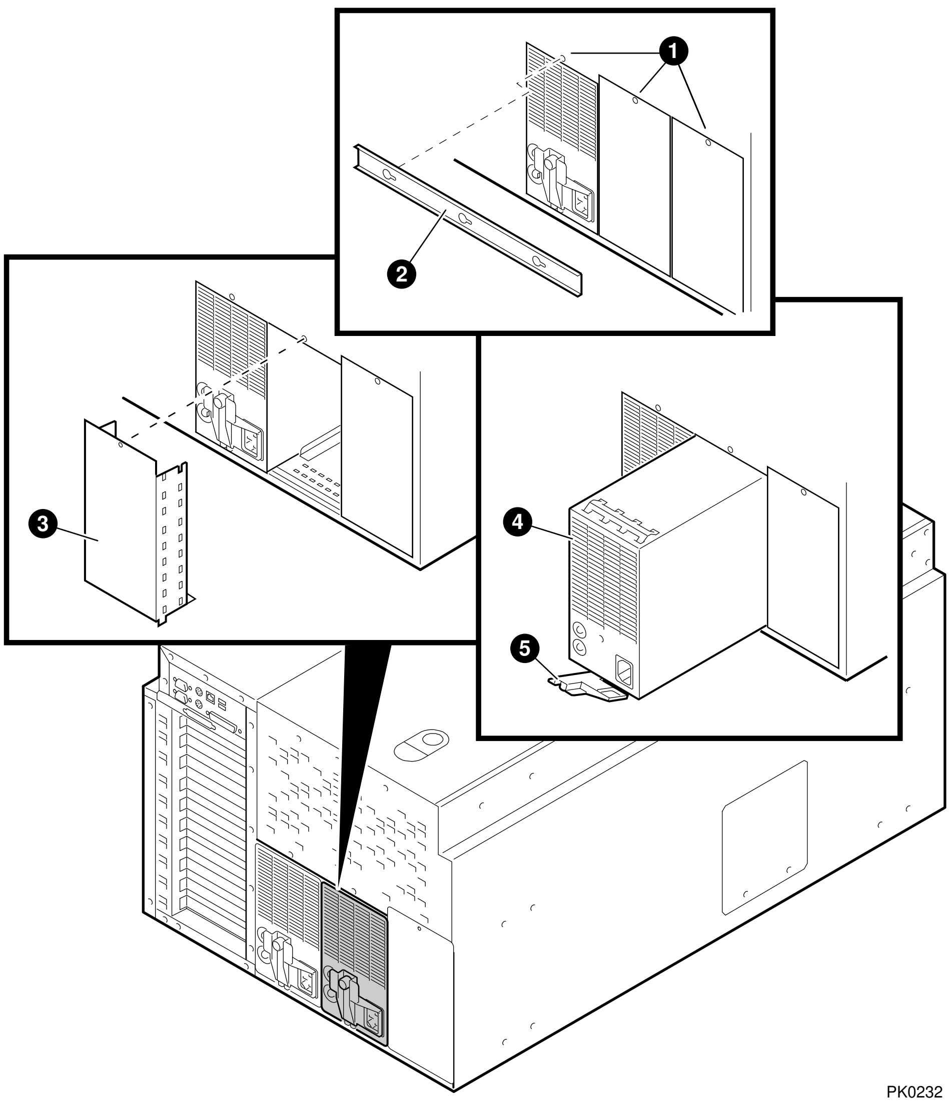
Two Power Supplies. Two power supplies are required if the system has more than two CPUs or if the system has a second storage cage.

Redundant Power Supply. If one power supply fails, the redundant supply provides power and the system continues to operate normally. A second power supply adds redundancy for an entry-level system such as the system described under "Single Power Supply." A third power supply adds redundancy for a system that requires two power supplies.

Recommended Installation Order. Generally, power supply 0 is installed first, power supply 1 second, and power supply 2 third, but the supplies can be installed in any order. See Figure 5–5. The power supply numbering corresponds to the numbering displayed by the SRM **show power** command.

5.6 Removing and Replacing Power Supplies

Figure 5–6 Installing a Power Supply (Pedestal/Rack View)



1. Loosen the three Phillips screws ❶ that secure the power supply bracket. (There is no need to remove the screws.) Remove the bracket ❷.
2. If you are installing a new supply, remove the screw and blank cover ❸. If you are replacing a power supply, release the latch ❺ on the supply and pull the supply out of the system.
3. Insert and seat the new power supply ❹.
4. Swing the latch ❺ to lock the power supply into place. Tighten the captive screw on the latch.
5. Plug the AC power cord into the supply. Wait a few seconds for the POK LED to light.

Verification

Check that both power supply LEDs are lit.

5.7 CPU Configuration

Before installing additional CPUs, become familiar with the location of the CPU slots and the configuration rules.

Figure 5–7 CPU Slot Locations (Pedestal/Rack View)

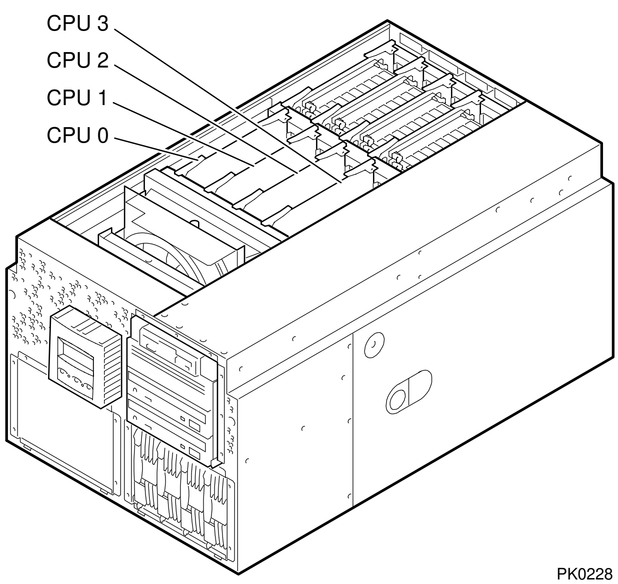
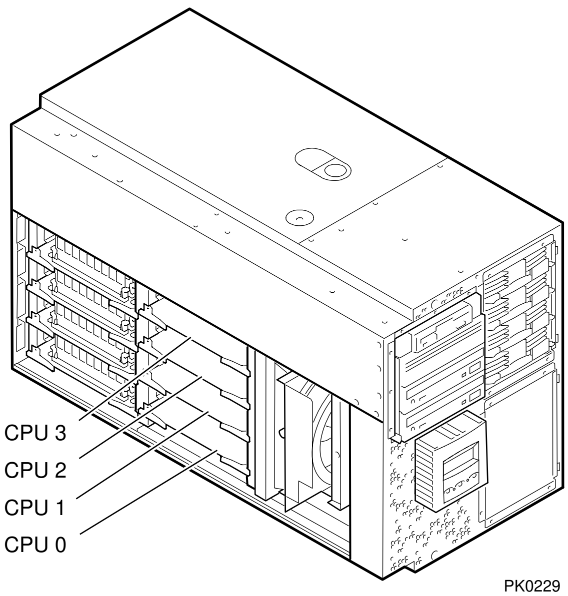


Figure 5–8 CPU Slot Locations (Tower View)

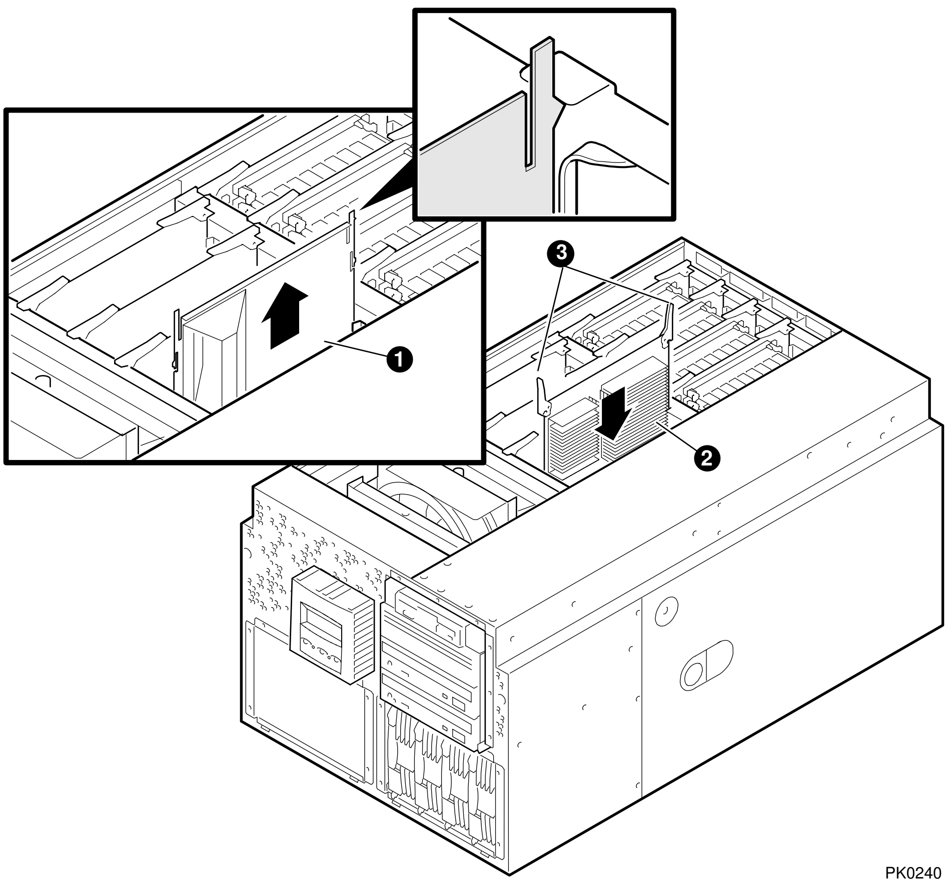


CPU Configuration Rules

1. A CPU must be installed in slot 0. The system will not power up without a CPU in slot 0.
2. CPU cards must be installed in numerical order, starting at CPU slot 0. The slots are populated from left to right on a pedestal or rackmount system and from bottom to top on a tower system. See Figure 5–7 and Figure 5–8.
3. CPUs must be identical in speed and cache size.

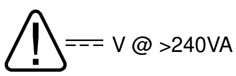
5.8 Installing CPUs

Figure 5–9 CPU Card Installation (Pedestal/Rack View)

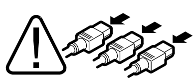


WARNING: To prevent injury, access is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others.

WARNING: CPU cards have parts that operate at high temperatures. Wait 2 minutes after power is removed before touching any module.



WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with parts or remove power prior to access.



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

1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Access the system chassis by following the instructions in Section 5.1.
3. Remove the covers from the fan area and the system card cage as explained in Section 5.2.
4. Determine the slot where you will install the card. See Figure 5–7 or Figure 5–8.
5. Remove and discard the airflow deflector plate ❶ from the CPU slot. See Figure 5–9.
6. Insert the CPU card ❷ in the connector and push down on both latches ❸ simultaneously.
7. Replace the system card cage cover, fan cover, and enclosure covers.
8. Reconnect the power cords.

Continued on next page

Verification

1. Turn on power to the system.
2. During power-up, observe the screen display. The newly installed CPU should appear in the display.
3. Issue the **show config** command to display the status of the new CPU.

5.9 Memory Configuration

Become familiar with the rules for memory configuration before adding DIMMs to the system.

Memory Performance Considerations

Interleaved operations reduce the average latency and increase the memory throughput over non-interleaved operations. With one memory option (4 DIMMs) installed, memory interleaving will not occur. With two identical memory options (8 DIMMs) installed, memory read-write operations are two-way interleaved. With four identical memory options (16 DIMMs) installed, memory read-write operations are four-way interleaved, maximizing memory throughput.

The output of the **show memory** command provides the memory interleaving status of the system.

```
P00>>>show memory
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0        256Mb     0000000060000000    2-Way
    1        512Mb     0000000040000000    2-Way
    2        256Mb     0000000070000000    2-Way
    3       1024Mb     0000000000000000    2-Way

     2048 MB of System Memory
```

Continued on next page

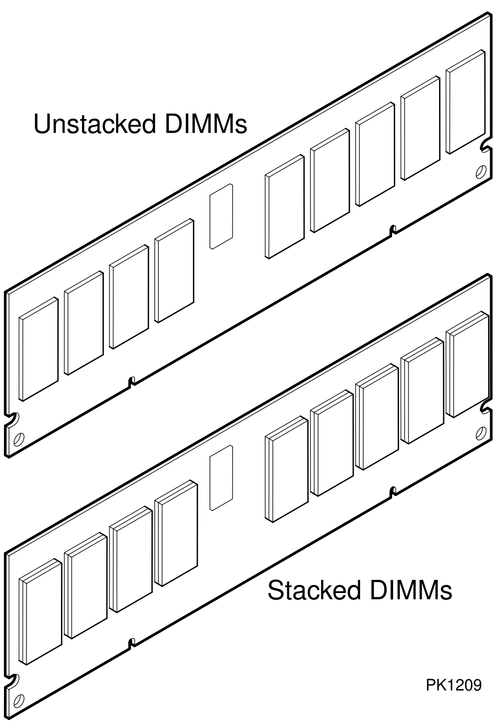
DIMM Information for Model 2 Systems

DIMMs are manufactured with two types of SRAMs, stacked and unstacked (see Figure 5–10). Stacked DIMMs provide twice the capacity of unstacked DIMMs, and, at the time of shipment, are the highest capacity DIMMs offered by Compaq. The system may have either stacked or unstacked DIMMs.

You can mix stacked and unstacked DIMMs within the system, but not within an array. The DIMMs within an array must be of the same capacity and type (stacked or unstacked) because of different memory addressing.

When installing sets 0, 1, 2, and 3, an incorrect mix will not occur. When installing sets 4, 5, 6, or 7, however, you must ensure that the four DIMMs being installed match the capacity and type of DIMMs in the existing array. If necessary, rearrange DIMMs for proper configuration.

Figure 5–10 Stacked and Unstacked DIMMs



Rules for DIMM Installation

Refer to Figure 5–11 or Figure 5–12 and observe the following rules for installing DIMMs.

- You can install up to 16 DIMMs or up to 32 DIMMs, depending on the system model you purchased.
- A n option consists of a set of 4 DIMMs. You must install all 4 DIMMs.
- Fill sets in numerical order. Populate all 4 slots in Set 0, then populate Set 1, and so on.
- An "array" is one set for systems that support 16 DIMMs and two sets for systems that support 32 DIMMs.
- DIMMs in an array must be the same size and type. For example, suppose you have populated Sets 0, 1, 2, and 3. When you populate Set 4, the DIMMs must be the same size and type as those installed in Set 0. Similarly, Set 5 must be populated with the same size and type of DIMMs as are in Set 1, and so on, as indicated in the following table.

Array	System Supporting 32 DIMMs	System Supporting 16 DIMMs
0	Set 0 and Set 4	Set 0
1	Set 1 and Set 5	Set 1
2	Set 2 and Set 6	Set 2
3	Set 3 and Set 7	Set 3

Continued on next page

Figure 5–11 Memory Configuration (Pedestal/Rack View)

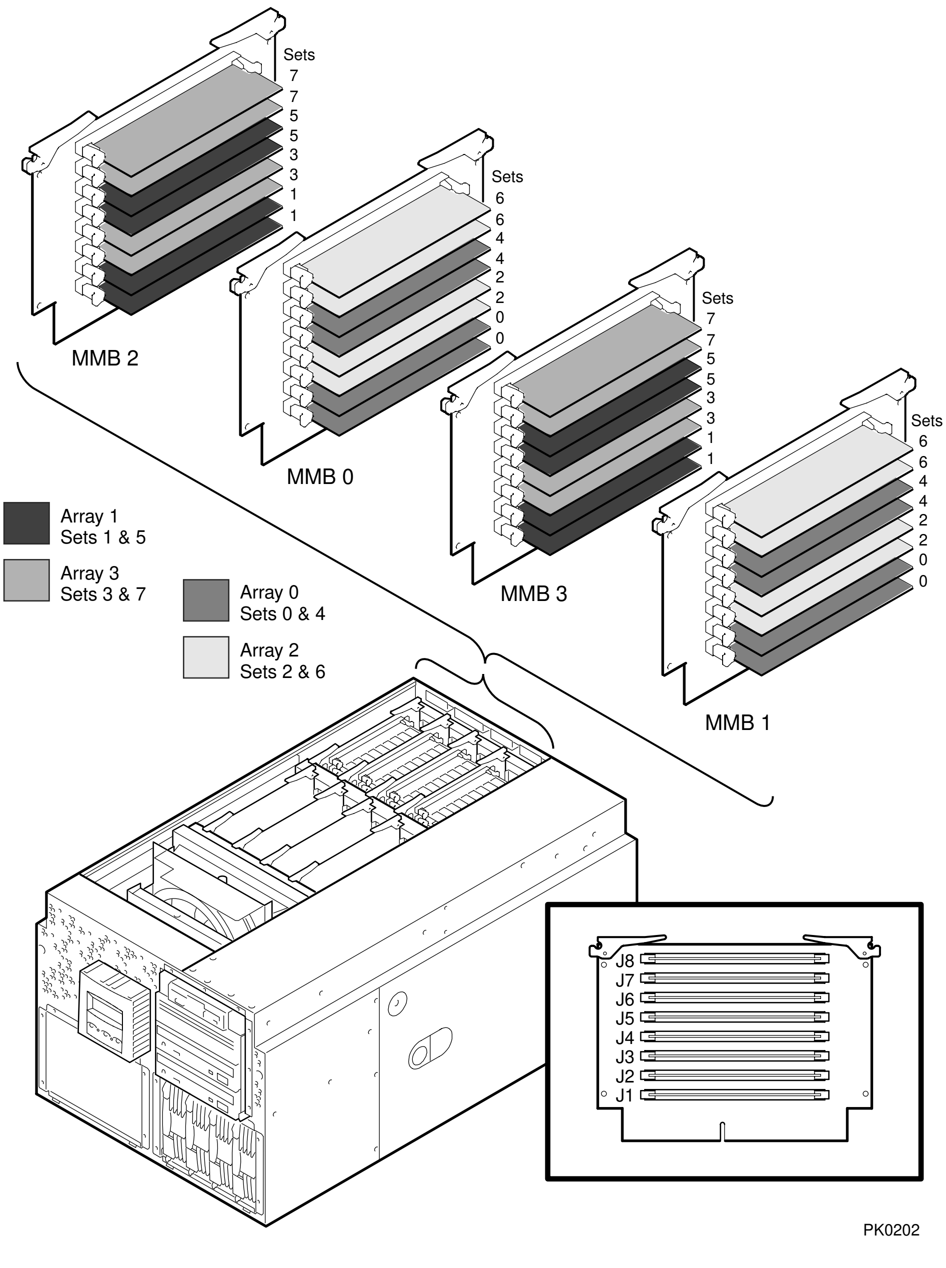
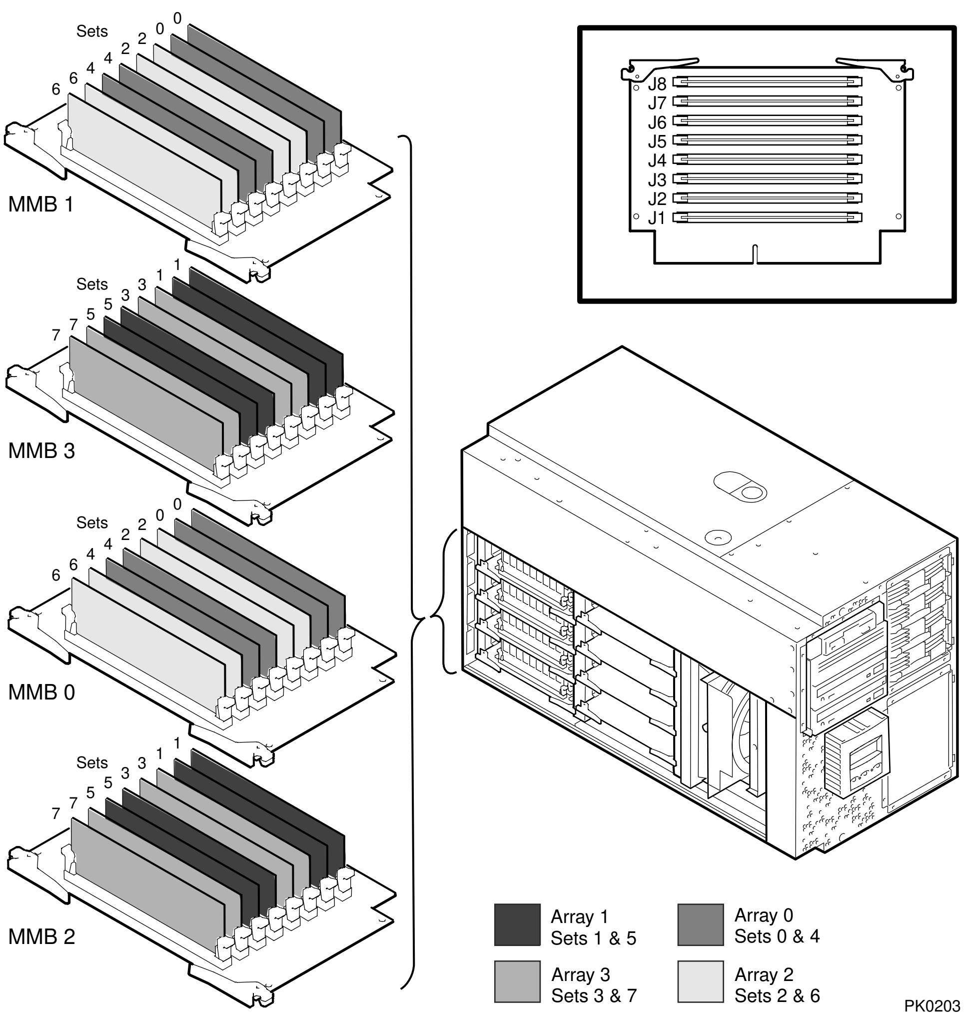
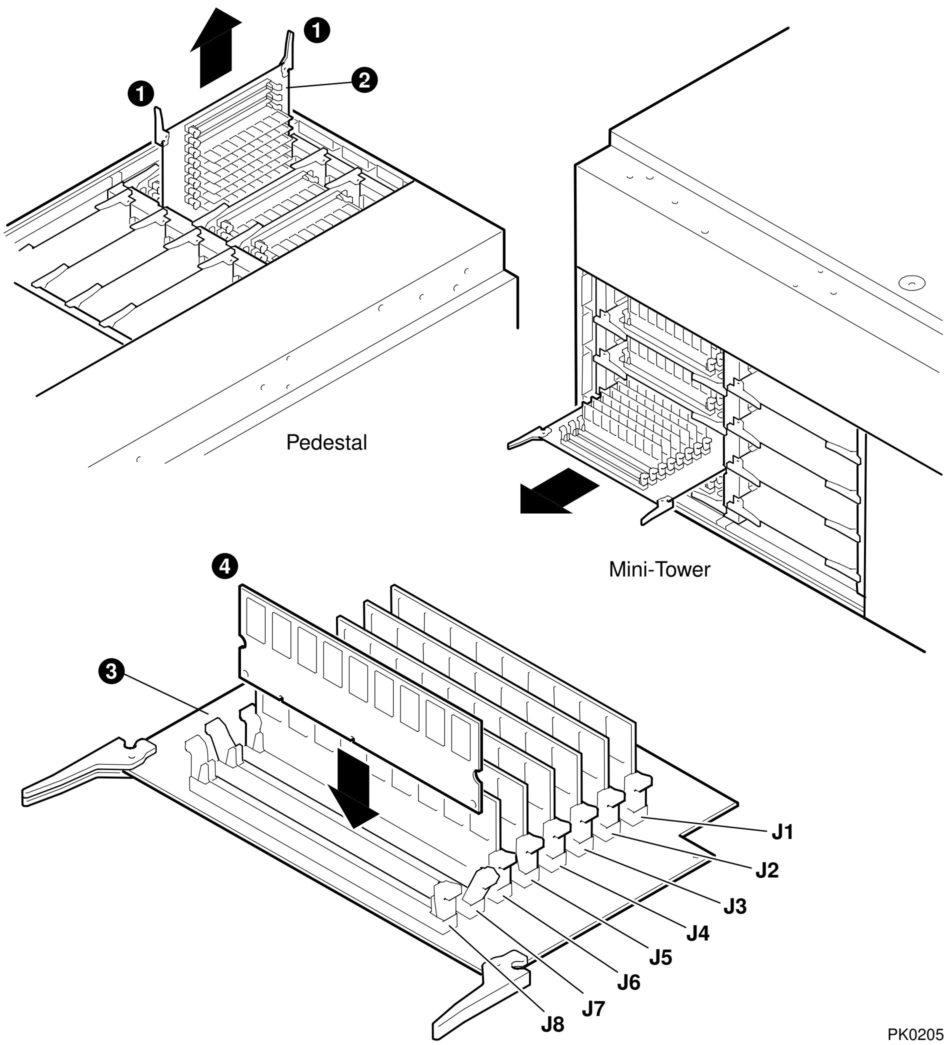


Figure 5–12 Memory Configuration (Tower View)



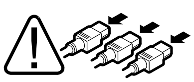
5.10 Installing DIMMs

Figure 5–13 Installing DIMMs

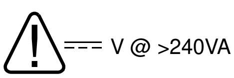


WARNING: To prevent injury, access is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others.

WARNING: Memory DIMMs have parts that operate at high temperatures. Wait 2 minutes after power is removed before touching any module.



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



WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with parts or remove power prior to access.

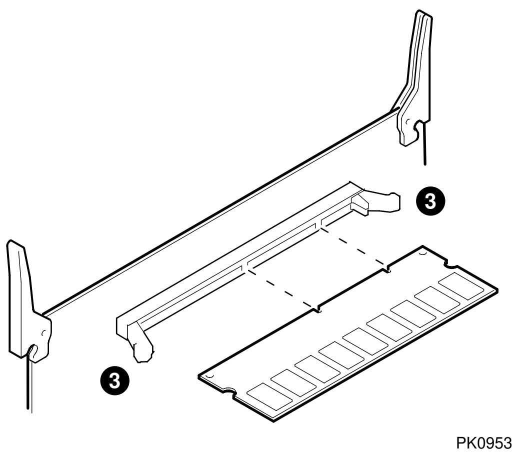
---

1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Access the system chassis by following the instructions in Section 5.2.
3. Remove the fan cover and the system card cage cover.
4. Use Figure 5–11 or Figure 5–12 to determine where sets of memory DIMMs should be installed. Begin with the lowest numbered set.
5. Release the clips ❶ securing the appropriate MMB ❷ and slide out the MMB. See Figure 5–13.
6. Release the clips ❸ on the MMB slot where you will install the DIMM ❹.

Continued on next page

7. To install the DIMM, align the notches on the gold fingers with the connector keys as shown in Figure 5–14.

Figure 5–14 Aligning DIMM in MMB



8. Secure the DIMM with the clips ❸ on the MMB slot.
9. Reinstall the MMB.
10. Replace the system card cage cover and enclosure covers.
11. Reconnect the power cords.

Verification

1. Turn on power to the system.
2. During power-up, observe the screen display for memory. The display shows how much memory is in each array.
3. Issue the **show memory** command to display the total amount of memory in the system.

5.11 PCI Configuration

Note the operating system configuration restrictions before installing PCI cards. The PCI slot locations are shown in Figure 5–15 and Figure 5–16.

The PCI slots are split across two independent 64-bit, 33 MHz PCI buses: PCI0 and PCI1. These buses correspond to Hose 0 and Hose 1 in the system logical configuration. The slots on each bus are listed below.

System Variant	Slots on PCI 0	Slots on PCI 1
Six-slot system	1–3	8–10
Ten-slot system	1–4	5–10

OpenVMS Configuration Restriction

If you have a KZPAC RAID controller, it must be installed in a slot on PCI bus 1. It cannot be installed on PCI bus 0.

Tru64 UNIX Configuration Restriction

Multifunction PCI options cannot be installed in PCI bus 0, slot 1 or slot 2. Multifunction options currently include:

- KZPCM–DA dual Ultra SCSI differential/10/100 MB Ethernet combo
- DE504–BA PCI-based 10/100 Mbit quad channel Ethernet adapter

VGA Controller

If you have a VGA controller, it must be installed on PCI 0.

Figure 5–15 PCI Slot Locations (Pedestal/Rack)

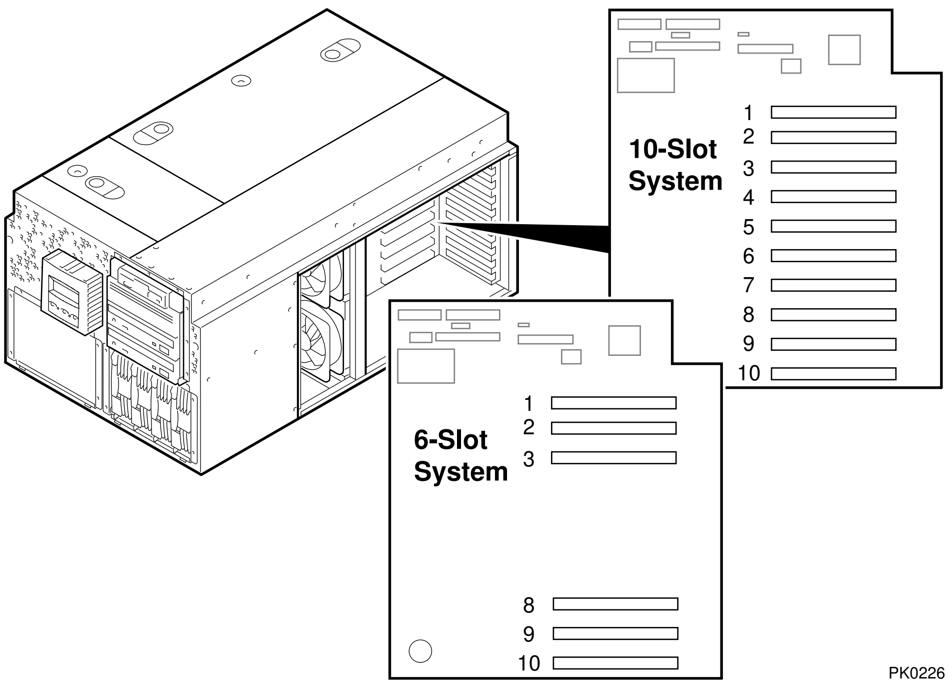
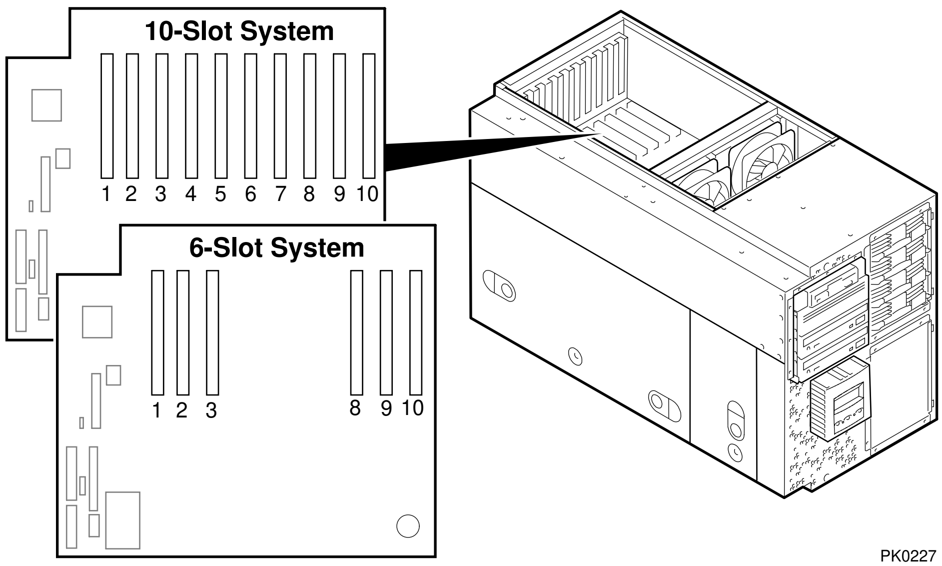


Figure 5–16 PCI Slot Locations (Tower)



5.12 Installing PCI Cards

Some PCI options require drivers to be installed and configured. These options come with a floppy or a CD-ROM. Refer to the installation document that came with the option and follow the manufacturer's instructions.

WARNING: To prevent injury, access 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.

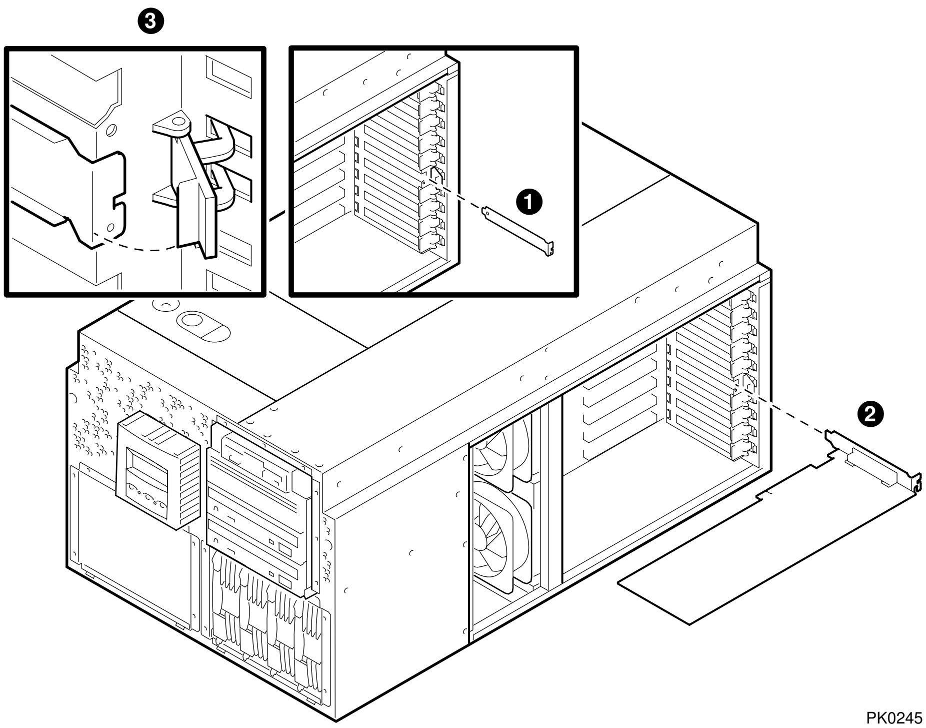
WARNING: To prevent fire, use only modules with current limited outputs. See National Electrical Code NFPA 70 or Safety of Information Technology Equipment, Including Electrical Business Equipment EN 60 950.

=== V @ >240VA

WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with parts or remove power prior to access.

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

Figure 5–17 PCI Card Installation (Pedestal/Rack View)



NOTE: *Some full-length PCI cards may have extender brackets for installing into ISA/EISA card cages. Remove the extender brackets before installing the card.*

---

1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Access the system chassis by following the instructions in Section 5.1. Remove the cover from the PCI card cage area as described in Section 5.2.
3. Determine the location of the PCI slot. See Figure 5–15 or Figure 5–16.
4. Remove and discard the bulkhead filler plate ➊ from the PCI slot.
5. Insert the card into the connector ➋.
6. Connect cables and secure the module to the card cage with the latch ➌.
7. Replace the PCI card cage cover and enclosure covers.
8. Reconnect the power cords.

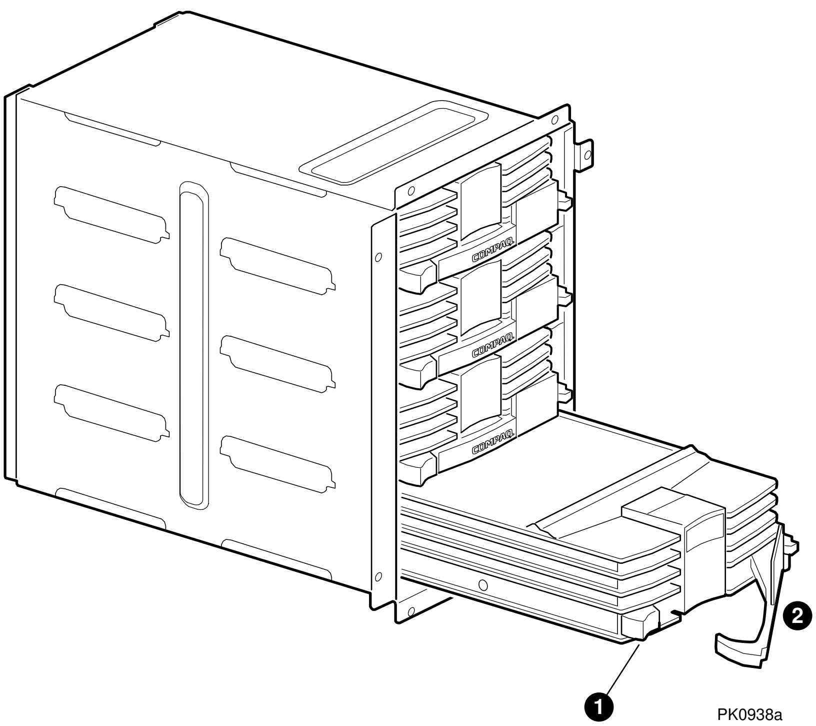
Verification

1. Turn on power to the system.
2. During power-up, observe the screen display for PCI information. The new option should be listed in the display.
3. Issue the SRM **show config** command. Examine the PCI bus information in the display to make sure that the new option is listed.
4. If you installed a bootable device, enter the SRM **show device** command to determine the device name. For example, look for dq, dk, ew, and so on.

5.13 Installing a Hard Drive

WARNING: To prevent injury, access 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.

Figure 5–18 Installing a Hard Drive (Tower View)



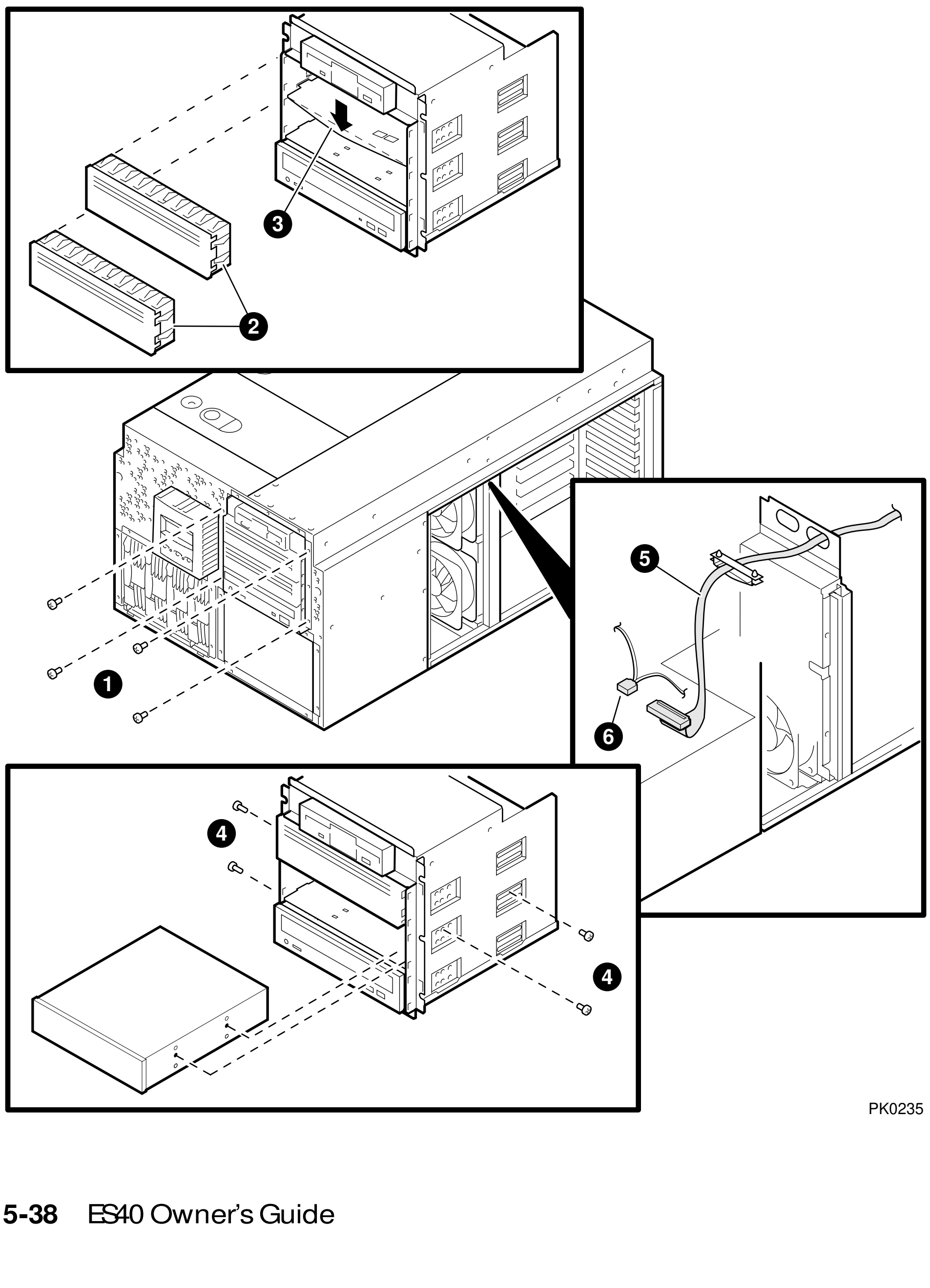
1. Shut down the operating system.
2. Unlock the front door to access the storage drive area.
3. Remove a blank bezel for the next available slot.
4. Push the button ❶ to release the plastic handle ❷ on the front of the drive carrier. Align the drive in the slot and push it into place. Push in the handle to secure the drive.
5. Reboot the operating system.

Verification

The SRM console polls for SCSI devices every 30 seconds. If the device does not appear to be working, access the SRM console and enter the **show device** command to view a list of the bootable devices.

5.14 Installing a Removable Media Device

Figure 5–19 Installing a 5.25-Inch Device (Pedestal/Rack View)



WARNING: To prevent injury, access 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.

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

1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Remove the cover to the PCI card cage area.
3. Unplug the signal and power cables to the CD.
4. Remove and set aside the four screws ❶ securing the removable media cage. Remove the cage.

CAUTION: *Be careful not to tangle the wires to the CD-ROM and floppy.*

5. Remove a blank storage panel ❷ for the desired storage slot by pushing from behind the panel. If you are installing a full-height device, remove two panels.

   If you are installing a full-height device, also remove the divider plate between the top two slots ❸ by pressing the center of the plate and bending it sufficiently to free it from the slots.
6. Set the SCSI ID on the device as desired.
7. Slide the storage device into the desired storage slot and secure the device to the unit with four of the screws ❹ provided inside the removable media drive cage.
8. Slide the removable media cage back in and replace the four screws set aside previously.
9. Plug in the signal cable ❺, route it into the PCI cage, and attach it to the appropriate controller.

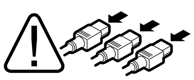
10. Plug the power cable (4-conductor) ❻ into the storage device.
11. Plug the signal and power cables back into the CD.
12. Replace the PCI card cage cover and enclosure covers.
13. Reconnect the power cords.

Verification

1. Turn on power to the system.
2. When the system powers up to the P00>>> prompt, enter the SRM **show device** command to determine the device name. For example, look for dq, dk, ew, and so on.

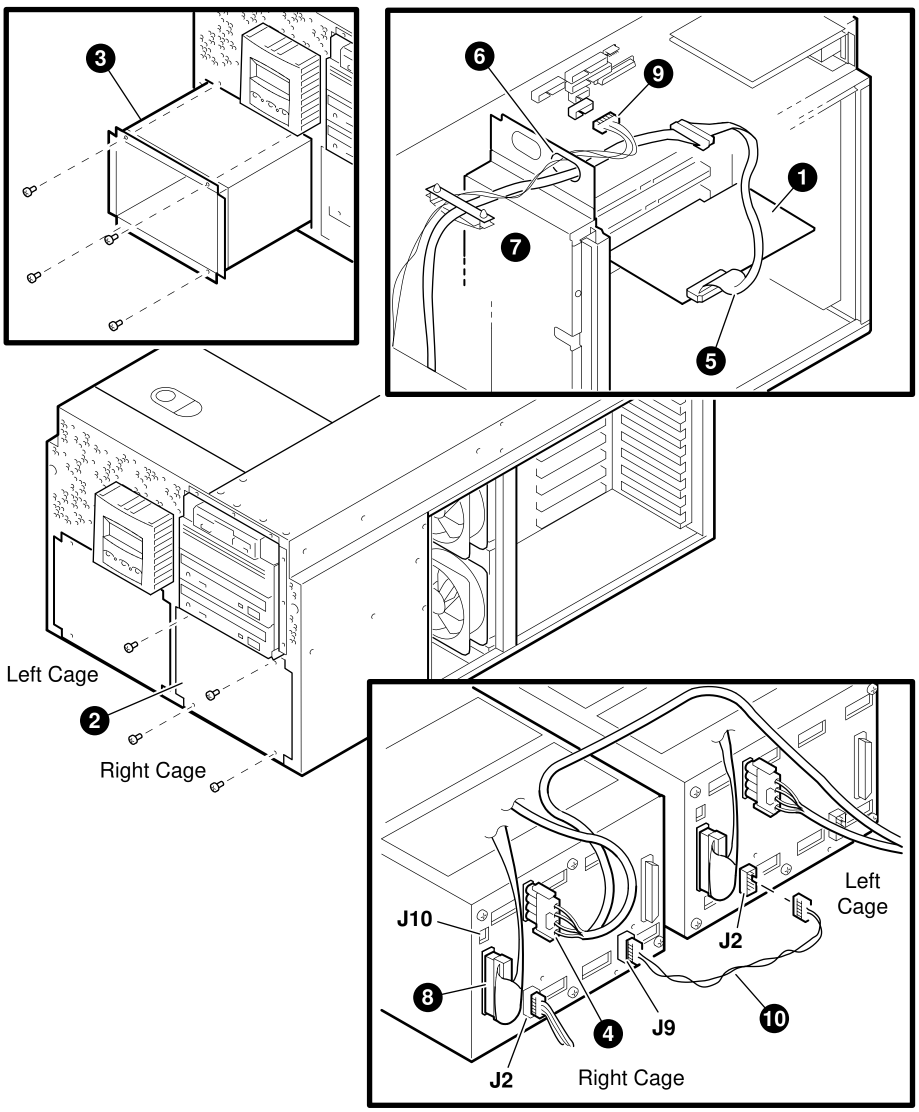
5.15 Installing Four-Slot Disk Cages

WARNING: To prevent injury, access 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.



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

Figure 5–20 Installing Disk Cages



Installing the Right Cage (or Top Cage)

NOTE: *In a pedestal or rackmount system, install the right cage first. In a tower system, install the top cage first.*

---

1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Remove enclosure panels and remove the cover from the PCI card cage.
3. Install a SCSI controller ❶ in the PCI backplane.
4. Unscrew the four screws securing the disk cage filler plate ❷ and set them aside. Discard the filler plate.
5. Set the jumper (J10) to the parked position (one pin only).
6. Slide the cage ❸ into the system chassis, and replace the four screws.
7. Connect the power source cable ❹ to the storage backplane.
8. Plug one end of the 68-conductor SCSI cable ❺ (17-04867-01) into the SCSI controller ❶. Route it through the opening ❻ in the PCI cage. Snap open the cable management clip ❼, route the cable through, and close the clip. Plug the other end ❽ of the cable into the storage backplane.
9. Plug the 16-position end ❾ of the 29-inch cable (17-04914-01) into the PCI backplane. Route the cable through the opening in the PCI cage and plug the 14-position end into the J2 connector on the storage cage.
10. Replace the PCI card cage cover and enclosure panels.
11. Install hard drives.

Installing the Left Cage (or Bottom Cage)

1. Shut down the operating system and turn off power to the system. Unplug the power cord from each power supply.
2. Remove enclosure panels and remove the cover from the PCI card cage.
3. Pull out fans 3 and 4, which are blocking access to the cabling.
4. Install a SCSI controller ❶ in the PCI backplane.
5. Unscrew the four screws securing the disk cage filler plate ❷ and set them aside. Discard the filler plate.
6. Set the jumper (J10) to the on position (across both pins).

7. Slide the cage part way into the system chassis.
8. Connect the power source cable ❹ to the storage backplane.
9. Plug one end of the 68-conductor SCSI cable ❺ (17-04867-01) into the SCSI controller ❶. Route it through the opening ❻ in the PCI cage. Snap open the cable management clip ❼, route the cable through, and close the clip. Plug the other end ❽ of the cable into the storage backplane.
10. Plug the end of the 6-inch cable ❿ (17-04960-01) marked "out" into the J9 connector on the back of the first cage, and plug the end marked "in" into the J2 connector on the second cage.

NOTE: *Cable 17-04914-01 and cable 17-04960-01 are mutually exclusive.*

---

11. Slide the cage the rest of the way into the system chassis and replace the four screws set aside previously.
12. Replace the fans.
13. Replace the PCI card cage cover and enclosure panels.
14. Install hard drives.

Verification

1. Turn on power to the system.
2. When the system powers up to the P00>>> prompt, enter the SRM **show device** command to determine the device name. For example, look for dq, dk, ew, and so on.

5.16 External SCSI Expansion

External SCSI devices, such as tabletop or rack-mounted storage devices, can be connected to the system using PCI-based SCSI adapters. Use the following rules to determine if a particular device can be used:

- The device must be supported by the operating system. Consult the supported options list.
- Do not exceed the maximum number of devices supported on the SCSI controller to be used.
- Each device on the bus must have a unique SCSI ID.
- The entire SCSI bus length, from terminator to terminator, must not exceed the following limits:

Fast differential SCSI or Ultra SCSI HVD	25 meters
Fast single-ended SCSI	3 meters
Ultra-wide SCSI	1.5 meters
Ultra 2 SCSI LVD	12 meters
Ultra 3 SCSI	12meters

- 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.

Chapter 6
Updating Firmware

This chapter describes how to update to a later version of system 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
- If enhancements are made to the firmware
- If the serial ROM or RMC firmware should ever become corrupted

This chapter contains the following topics:

- Sources of Firmware Updates
- Firmware Update Utility
- Manual Updates
- Updating from the CD-ROM
- Updating from an OpenVMS System Disk
- Network Boots
- Updating Firmware in a Galaxy Environment

6.1 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.

6.2 Firmware Update Utility

The system firmware is updated from a Loadable Firmware Update Utility. When you boot the medium containing the update image, the Loadable Firmware Update Utility banner is displayed.

Before updating the firmware, enter the **list** command to list the current revision of the firmware. Enter the **update** command to update the firmware automatically.

Example 6–1 Update Utility Display

```
          ***** 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> list
Device      Current Revision    Filename    Update Revision
Abios        5.69               abios_fw     5.70
SRM          5.5                srm_fw       5.6
```

```
UPD> update

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

                          DO NOT ABORT!
Abios    Updating to V5.70...   Verifying V5.70...  PASSED.
srm      Updating to V5.6-102..  Verifying V5.6-102.  PASSED.

UPD> exit
```

6.3 Manual Updates

If RMC firmware or serial ROM (SROM) ever become corrupted, you can perform a manual update.

1. Boot the update medium.
2. At the UPD> prompt, enter the **exit** command and answer **y** at the prompt:

```
UPD> exit

Do you want to do a manual update [y/(n)] y

AlphaServer ES40 Console V5.6-102, built on Dec 6, 1999 at
05:02:30
```

3. To update RMC firmware, enter **update rmc**. To update the serial ROM (SROM), enter **update srom**. For example:

```
UPD> update srom
```

The remainder of the display is similar to that shown in Example 6–1.

6.4 Updating from the CD-ROM

You can update the system firmware from CD-ROM.

6.4.1 Updating from the SRM Console

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

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

4. Enter the **update** command at the UPD> prompt.
5. When the update is complete, exit from the Firmware Update Utility.

   ```
   UPD> exit
   ```

6.5 Updating from an OpenVMS System Disk

You can update the firmware from an OpenVMS system disk.

1. Download the firmware update image from the Firmware Updates Web site.
2. Rename the downloaded file to fwupdate.exe.
3. Enter the following commands on the OpenVMS Alpha system:

```
$ set file/attr=(rfm:fix,lrl:512,mrs:512,rat:none)
fwupdate.exe
$ copy/contiguous fwupdate.exe "system_disk":[sys0.sysexe]
```

NOTE: *Insert the name of your system disk in place of "system_disk," for example, dka100:.*

4. Shut down the operating system to get to the SRM console prompt.
5. Boot the update utility from the SRM console as follows:

```
P00>>> boot dka100 -flags 0,a0
```

NOTE: *Replace dka100 with the name of the system disk, if different.*

6. After some messages are displayed, you will be prompted for the bootfile. Enter the directory and file name as follows :

```
Bootfile: [sys0.sysexe]fwupdate.exe
```

7. Enter the **update** command at the UPD> prompt.

6.6 Updating from the Network

You can update firmware from the network using the MOP protocol for OpenVMS or the BOOTP protocol for Tru64 UNIX.

6.6.1 Updating Firmware Using BOOTP

1. Download the firmware update image from the Firmware Updates Web site.
2. Copy the downloaded file to a UNIX based network server for BOOTP booting on the system. For details on configuring the BOOTP server, refer to Tru64 UNIX documentation or the system's Firmware Release Notes document.
3. Enter the **update** command at the UPD> prompt.

6.6.2 Updating Firmware Using MOP

1. Download the firmware update image from the Firmware Updates Web site.
2. Copy the downloaded file to an OpenVMS based network server for MOP booting on the system. For details on configuring the MOP server, refer to OpenVMS documentation or the system's Firmware Release Notes document.
3. To ensure that the downloaded file is in a proper VMS fixed record format, enter the following command before using the file for MOP booting:

```
$ set file/attr=(rfm:fix,lrl:512,mrs:512,rat:none) "fwupdate.sys"
```

NOTE: *Replace "fwupdate.sys" with the name of the firmware image you downloaded.*

---

4. Boot the update file. For example:

```
P00>>> boot -file fwupdate ewa0
```

5. Enter the **update** command at the UPD> prompt.

6.7 Updating Firmware in a Galaxy Environment

Before updating the console firmware in an OpenVMS Galaxy environment you must set the lp_count environment variable to zero and initialize the system to return to a traditional SMP configuration.

```
P00>>> set lp_count 0
P00>>> init
```

See the DS20E-ES40 Remedial Kit available from the following URL for instructions on creating an OpenVMS Galaxy environment:

http://www.service.digital.com/patches.

Chapter 7
Troubleshooting

This chapter describes procedures for resolving problems with the system. To correct a problem, locate the troubleshooting table for that problem type and follow the guidelines provided. If you cannot correct the problem, report it to your service provider.

This chapter covers the following topics:

- Power-Up Error Messages
- RMC Error Messages
- SROM Error Messages
- SRM Diagnostics
- Troubleshooting Tables
- Option Card Problems

7.1 Power-Up Error Messages

Three sets of diagnostics are performed at power-up: RMC, SROM, and SRM. As the diagnostics run, messages are displayed on the control panel. Some messages are also displayed on the console terminal. Error messages that are displayed can be used to diagnose problems.

7.1.1 Messages with Beep Codes

A few error messages that appear on the operator control panel are announced by audible error beep codes, an indicated in Table 7–1. For example, a 1-1-4 beep code consists of one beep, a pause (indicated by the hyphen), one beep, a pause, and a burst of four beeps. This beep code is accompanied by the message "ROM err."

Related messages are also displayed on the console terminal if the console device is connected to the serial line and the SRM **console** environment variable is set to **serial**.

Table 7–1 Error Beep Codes

Beep Code	Associated Messages	Meaning
1	Jump to Console	SROM code has completed execution. System jumps to SRM console. SRM messages should start to be displayed. If no SRM messages are displayed, there is a problem. See Section 7.1.2.
1-3		VGA monitor not plugged in. The first beep is a long beep.
1-1-4	ROM err	The ROM err message is displayed briefly, then a single beep is emitted, and Jump to Console is displayed. The SROM code is unable to load the console code; a flash ROM header area or checksum error has been detected. See Section 7.1.2.
2-1-2	Cfg ERR *n* Cfg ERR s	Configuration error on CPU *n* (*n* is 0, 1, 2, or 3) or a system configuration error (s). The system will still power up. Contact your service provider.
1-2-4	BC error CPU error BC bad	Backup cache (B-cache) error. Indicates that a CPU is bad. Contact your service provider.
1-3-3	No mem	No usable memory detected. Some memory DIMMs may not be properly seated or some DIMM sets may be faulty. See Section 7.1.3.

7.1.2 Checksum Error

If Jump to Console is the last message displayed on the operator control panel, the console firmware is corrupted. When the system detects the error, it attempts to load a utility called the fail-safe loader (FSL) so that you can load new console firmware images.

Example 7–1 Checksum Error and Fail-Safe Load

```
Loading console
Console ROM checksum error                                    ❶
Expect: 00000000.000000FE
Actual: 00000000.000000FF
XORval: 00000000.00000001
Loading program from floppy                                   ❷
Code execution complete (transfer control)

OpenVMS PALcode V1.69-2, Digital UNIX PALcode V1.62-1

starting console on CPU 0                                     ❸
.
.
starting drivers
entering idle loop

P00>>> Boot update_cd                                         ❹

OpenVMS PALcode V1.69-2, Digital UNIX PALcode V1.62-1

starting console on CPU 0                                     ❺
.
.
starting drivers
entering idle loop
.
.
.
```

```
          ***** Loadable Firmware Update Utility *****       ❻
-------------------------------------------------------------
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                                                  ❼
```

The sequence shown in Example 7–1 occurs:

❶ The system detects the checksum error and writes a message to the console screen.

❷ The system attempts to automatically load the FSL program from the floppy drive.

❸ As the FSL program is initialized, messages similar to the console power-up messages are displayed. This example shows the beginning and ending messages.

❹ At the P00>>> console prompt, boot the Loadable Firmware Update Utility (LFU) from the Alpha Systems Firmware CD (shown in the example as the variable *update_cd*).

❺ As the LFU program is initialized, messages similar to the console power-up messages are displayed. This example shows a few of the messages.

❻ After the “entering idle loop” message, the banner for the Loadable Firmware Update Utility is displayed.

❼ At the UPD> prompt, enter the **update** command to load the new console firmware images.

7.1.3 No MEM Error

If the SROM code cannot find any available memory, a 1-3-3 beep code is issued (one beep, a pause, a burst of three beeps, a pause, and another burst of three beeps), and the message "No MEM" is displayed. The system does not come up to the console program. This error indicates missing or bad DIMMs.

The console terminal displays text similar to the following:

```
Failed  M:1 D:2                 ❶
Failed  M:1 D:1
Failed  M:0 D:2
Failed  M:0 D:1
Incmpat M:3 D:6                 ❷
Incmpat M:3 D:5
Incmpat M:2 D:6
Incmpat M:2 D:5
Missing M:3 D:2                 ❸
Incmpat M:3 D:1
Illegal M:2 D:2                 ❹
Incmpat M:2 D:1
No usable memory detected
```

❶ Indicates failed DIMMs. M identifies the MMB; D identifies the DIMM. In this line, DIMM 2 on MMB1 failed.

❷ Indicates that some DIMMs in this array are not the same. All DIMMs in the affected array are marked as incompatible (incmpat).

❸ Indicates that a DIMM in this array is missing. All missing DIMMs in the affected array are marked as missing.

❹ Indicates that the DIMM data for this array is unreadable. All unreadable DIMMs in the affected array are marked as illegal.

7.2 RMC Error Messages

Table 7–2 lists the error messages that might be displayed on the operator control panel by the remote management console during power-up. Most fatal error messages prevent the system from completing its power-up. Contact your service provider if a fatal error is displayed. Warning messages require prompt attention but may not prevent the system from completing its power-up.

The VTERM and CTERM regulators referenced in the table are located on the system motherboard.

Table 7–2 RMC Error Messages

Message	Meaning
Fatal Messages	
AC loss	No AC power to the system.
CPU*n* failed	CPU failed. "n" is 0, 1, 2, or 3.
VTERM failed	No VTERM voltage to CPUs.
CTERM failed	No CTERM voltage to CPUs.
Fan5, 6 failed	Main fan (6) and redundant fan (5) failed.
OverTemp failure	System temperature has passed the high threshold.
No CPU in slot 0	Configuration requires that a CPU be installed in slot 0.
CPU door opened	System card cage cover off. Reinstall cover.
TIG error	Code essential to system operation is not running.
Mixed CPU types	Different types of CPU are installed. Configuration requires that all CPUs be the same type.
Bad CPU ROM data	Invalid data in EEROM on the CPU.

NOTE: *The* CPUn *failed message does not necessarily prevent the completion of power-up. If the system finds a good CPU, it continues the power-up process.*

Table 7–2 RMC Error Messages (Continued)

Message	Meaning
Warning Messages	
PS*n* failed	Power supply failed. "n" is 0, 1, or 2.
OverTemp Warning	System temperature is near the high threshold.
Fan*n* failed	Fan failed. "n" is 0 through 6.
PCI door opened	Cover to PCI card cage is off. Reinstall cover.
Fan door opened	Cover to main fan area (fans 5 and 6) is off. Reinstall cover.
3.3V bulk warn	Power supply voltage over or under threshold.
5V bulk warn	Power supply voltage over or under threshold.
12V bulk warn	Power supply voltage over or under threshold.
–12V bulk warn	Power supply voltage over or under threshold.
VTERM warn	Voltage regulator over or under threshold.
CTERM warn	Voltage regulator over or under threshold.
CPU*n* VCORE warn	CPU core voltage over or under threshold. "n" is 0, 1, 2, or 3.
CPU*n* VIO warn	I/O voltage on CPU over or under threshold. "n" is 0, 1, 2, or 3.

7.3 SROM Error Messages

The SROM power-up identifies errors that may or may not prevent the system from coming up to the console. It is possible that these errors may prevent the system from successfully booting the operating system. Errors encountered during SROM power-up are displayed on the operator control panel (OCP). Some errors are also displayed on the console terminal if the console output is set to serial.

Table 7–3 lists the SROM error messages. Contact your service provider.

Table 7–3 SROM Error Messages

Code	SROM Message	OCP Message
FD	PCI data path error	PCI Err
FA	No usable memory detected	No Mem
EF	Bcache data lines test error	BC Error
EE	Bcache data march test error	BC Error
ED	Bcache address test error	BC Error
EC	CPU parity detection error	CPU Err
EB	CPU ECC detection error	CPU Err
EA	Bcache ECC data lines test error	BC Error
E9	Bcache ECC data march test error	BC Error
E8	Bcache TAG lines test error	BC Error
E7	Bcache TAG march test error	BC Error
E6	Console ROM checksum error	ROM Err
E5	Floppy driver error	Flpy Err
E4	No real-time clock (TOY)	TOY Err
E3	Memory data path error	Mem Err
E2	Memory address line error	Mem Err
E1	Memory pattern error	Mem Err
E0	Memory pattern ECC error	Mem Err
7F	Configuration error on CPU #3	CfgERR 3

Table 7–3 SROM Error Messages (Continued)

Code	SROM Message	OCP Message
7E	Configuration error on CPU #2	CfgERR 2
7D	Configuration error on CPU #1	CfgERR 1
7C	Configuration error on CPU #0	CfgERR 0
7B	Bcache failed on CPU #3 error	BC Bad 3
7A	Bcache failed on CPU #2 error	BC Bad 2
79	Bcache failed on CPU #1 error	BC Bad 1
78	Bcache failed on CPU #0 error	BC Bad 0
77	Memory thrash error on CPU #3	MtrERR 3
76	Memory thrash error on CPU #2	MtrERR 2
75	Memory thrash error on CPU #1	MtrERR 1
74	Memory thrash error on CPU #0	MtrERR 0
73	Starting secondary on CPU #3 error	RCPU 3 E
72	Starting secondary on CPU #2 error	RCPU 2 E
71	Starting secondary on CPU #1 error	RCPU 1 E
70	Starting secondary on CPU #0 error	RCPU 0 E
6F	Configuration error with system	CfgERR S

7.4 SRM Diagnostics

The SRM console event log and SRM console commands help you troubleshoot problems that do not prevent the system from coming up to the console.

7.4.1 Console Event Log

A console event log consists of status messages received during power-up self-tests. If problems occur during power-up, error messages indicated by asterisks (***) may be embedded in the console event log. To display a console event log one screen at a time, use the more el command.

Example 7–2 shows a console event log with errors. CPU 1 did not power up and fans 1 and 2 failed.

Example 7–2 Sample Console Event Log

```
>>> more el
*** Error - CPU 1 failed powerup diagnostics ***
  Secondary start error
EV6 BIST         = 1
STR status       = 1
CSC status       = 1
PChip0 status    = 1
PChip1 status    = 1
DIMx status      = 0
TIG Bus status   = 1
DPR status       = 0
CPU speed status = 0
CPU speed        = 0
Powerup time     = 00-00-00 00:00:00
CPU SROM sync    = 0

*** Error - Fan 1 failed ***

*** Error - Fan 2 failed ***
```

7.4.2 Show Device Command

Use the SRM show device command to list the controllers and bootable devices in the system. If storage devices are missing from the display, see Table 7–7.

Example 7–3 Show Device Command

```
P00>>> show device
dka0.0.0.1.1            DKA0                       RZ2DD-LS  0306
dka100.1.0.1.1          DKA100                     RZ2DD-LS  0306
dka200.2.0.1.1          DKA200                     RZ1CB-CS  0844
dkb0.0.0.3.1            DKB0                           RZ25  0900
dqa0.0.0.15.0           DQA0        TOSHIBA CD-ROM XM-6302B  1012
dva0.0.0.1000.0         DVA0
ewa0.0.0.4.1            EWA0              00-00-F8-09-90-FF
ewb0.0.0.2002.1         EWB0              00-06-2B-00-25-5B
pka0.7.0.1.1            PKA0                  SCSI Bus ID 7
pkb0.7.0.3.1            PKB0                  SCSI Bus ID 7
pkc0.7.0.2000.1         PKC0                  SCSI Bus ID 7
pkd0.7.0.2001.1         PKD0                  SCSI Bus ID 7
```

7.4.3 Test Command

The test command verifies all the devices in the system.

Example 7–4 Test Command

```
P00>>> test
Testing the Memory
Testing the DK* Disks(read only)
No DU* Disks available for testing
No DR* Disks available for testing
Testing the DQ* Disks(read only)
Testing the DF* Disks(read only)
No MK* Tapes available for testing
No MU* Tapes available for testing
Testing the DV* Floppy Disks(read only)
Testing the VGA (Alphanumeric Mode only)
Testing the EWA0 Network
Testing the EWB0 Network
P00>>>
```

The **test** command also does a quick test on the system speaker. A beep is emitted as the command starts to run.

The tests are run sequentially, and the status of each subsystem test is displayed to the console terminal as the tests progress. If a particular device is not available to test, a message is displayed. The test script does no destructive testing; that is, it does not write to disk drives.

The syntax is:

test [*argument*]

Use the **-lb** (loopback) argument for console loopback tests.

To run a complete diagnostic test using the **test** command, the system configuration must include:

- A serial loopback connected to the COM2 port (not included)
- A parallel loopback connected to the parallel port (not included)

- A trial diskette with files installed
- A trial CD-ROM with files installed

The test script tests devices in the following order:

1. Memory tests (one pass)
2. Read-only tests: DK* disks, DR* disks, DQ* disks, DU* disks, MK* tapes, DV* floppy.
3. Console loopback tests if **-lb** argument is specified: COM2 serial port and parallel port.
4. VGA console tests: These tests are run only if the console environment variable is set to **serial**. The VGA console test displays rows of the word *compaq*.
5. Network internal loopback tests for EW* networks.

NOTE: *No write tests are performed on disk and tape drives. Media must be installed to test the diskette drive and tape drives.*

7.4.4 Show FRU Command

The show fru command displays a table showing the physical configuration of the field-replaceable units (FRUs) in the system. Use the show fru command with the show error command (Section 7.4.5) to determine if any FRUs have errors logged.

Example 7–5 Show Fru Command

```
❶               ❷  ❸                      ❹          ❺        ❻
P00>>> show fru
FRUname         E  Part#                  Serial#    Misc.    Other
SMB0            00 54-25385-01.E01        NI81561341
SMB0.CPU0       00 54-30158-A5            NI90260078
SMB0.CPU1       00 54-30158-A5            NI90260073
SMB0.CPU2       00 54-30158-A5            NI90260056
SMB0.CPU3       00 54-30158-A5            NI90260071
SMB0.MMB0       00 54-25582-01.B02        AY90112345
SMB0.MMB0.DIM1  00 54-24941-EA.A01CPQ     NI90202001
SMB0.MMB0.DIM2  00 54-24941-EA.A01CPQ     NI90200102
SMB0.MMB0.DIM3  00 54-24941-EA.A01CPQ     NI90200103
SMB0.MMB0.DIM4  00 54-24941-EA.A01CPQ     NI90200104
SMB0.MMB0.DIM5  00 54-24941-EA.A01CPQ     NI90202005
SMB0.MMB0.DIM6  00 54-24941-EA.A01CPQ     NI90202006
SMB0.MMB1       00 54-25582-01.B02        AY90112301
SMB0.MMB1.DIM1  00 54-25053-BA.A01CPQ     NI90112341
SMB0.MMB1.DIM2  00 54-25053-BA.A01CPQ     NI90112342
SMB0.MMB1.DIM3  00 54-25053-BA.A01CPQ     NI90112343
SMB0.MMB1.DIM4  00 54-25053-BA.A01CPQ     NI90112344
SMB0.MMB1.DIM5  00 54-25053-BA.A01CPQ     NI90112345
SMB0.MMB1.DIM6  00 54-25053-BA.A01CPQ     AY80112346
SMB0.MMB2       00 54-25582-01.B02        AY80012302
SMB0.MMB2.DIM1  00 54-25053-BA.A01CPQ     NI90112331
SMB0.MMB2.DIM2  00 54-25053-BA.A01CPQ     AY80112332
SMB0.MMB2.DIM3  00 54-25053-BA.A01CPQ     AY80112333
SMB0.MMB2.DIM4  00 54-25053-BA.A01CPQ     AY80112334
SMB0.MMB2.DIM5  00 54-25053-BA.A01CPQ     AY80112335
SMB0.MMB2.DIM6  00 54-25053-BA.A01CPQ     AY80112336
SMB0.MMB3       00 54-25582-01.B02        AY90112303
SMB0.MMB3.DIM1  00 54-25053-BA.A01CPQ     AY80112341
SMB0.MMB3.DIM2  00 54-25053-BA.A01CPQ     AY80112342
SMB0.MMB3.DIM3  00 54-25053-BA.A01CPQ     AY80112343
SMB0.MMB3.DIM4  00 54-25053-BA.A01CPQ     AY80112344
SMB0.MMB3.DIM5  00 54-25053-BA.A01CPQ     AY80112345
SMB0.MMB3.DIM6  00 54-25053-BA.A01CPQ     AY80112346
SMB0.CPB0       00 54-25573-01            AY80100999
SMB0.CPB0.PCI4  00 ELSA GLoria Synergy
SMB0.CPB0.PCI5  00 NCR 53C895
SMB0.CPB0.PCIA  00 DE500-BA Network Cont
SMB0.CPB0.SBM0  00 -                      -
```

```
PWR0            00 30-49448-01.A02      2P90700557 API-7850
PWR1            00 30-49448-01.A02      2P90700558 API-7850
FAN1            00 70-40073-01           -          Fan
FAN2            00 70-40073-01           -          Fan
FAN3            00 70-40072-01           -          Fan
FAN4            00 70-40071-01           -          Fan
FAN5            00 70-40073-02           -          Fan
FAN6            00 70-40074-01           -          Fan
JIO0            00 54-25575-01           -          Junk I/O
OCP0            00 70-33894-0x           -          OCP

P00>>>
```

❶	FRUname	The FRU name recognized by the SRM console. The name also indicates the location of that FRU in the physical hierarchy. SMB = system board; CPU = CPUs; MMB = memory motherboard; DIM = DIMMs; CPB = PCI backplane; PCI = PCI option; SBM = SCSI backplane; PWR = power supply; FAN = fans; JIO= I/O connector module (junk I/O).
❷	E	Error field. Indicates whether the FRU has any errors logged against it. FRUs without errors show 00 (hex). FRUs with errors have a non-zero value that represents a bit mask of possible errors. See Table 7–4.
❸	Part #	The part number of the FRU in ASCII, either a Compaq part number or a vendor part number.
❹	Serial #	The serial number. For Compaq FRUs, the serial number has the form XXYWWNNNNN. XX = manufacturing location code YWW = year and week NNNNN = sequence number. For vendor FRUs, the 4-byte sequence number is displayed in hex.
❺	Misc.	Miscellaneous information about the FRUs. For Compaq FRUs, a model name, number, or an "a.k.a" name. For vendor FRUs, the manufacturer's name.
❻	Other	Optional data. For Compaq FRUs, the Compaq part alias number (if one exists). For vendor FRUs, the year and week number of manufacture.

Continued on next page

Table 7–4 Bit Assignments for Error Field

Bit	Meaning
Bit 0 is 1	Failure
Bit 1 is 1	TDD error has been logged
Bit 2 is 1	At least one SDD error has been logged
Bit 3 is 1	FRU EEPROM is unreadable
Bit 4 is 1	Checksum failure on bytes 0-62
Bit 5 is 1	Checksum failure on bytes 64-126
Bit 6 is 1	Checksum failure on bytes 128-254
Bit 7 is 1	FRU's system serial does not match system's

NOTE: *Contact your service provider if the E (error) field shows any of these errors.*

7.4.5 Show Error Command

The show error command displays FRUs that have errors logged. If the devices installed do not have any errors in their EEPROM, a show error command redisplays the SRM console prompt. Example 7–6 shows errors logged in the system board's EEPROM. Contact your service provider if the show error command displays an error.

Example 7–6 Show Error Command

```
P00>>> show error
SMB0        TDD - Type: 1 Test: 1  SubTest: 1  Error: 1
SMB0        SDD - Type: 4 LastLog: 1  Overwrite: 0
P00>>>
```

7.4.6 Show Power Command

Use the SRM show power command to determine whether the failure of a system running UNIX or OpenVMS was related to a fan, temperature, or power supply problem. You can use this command if you are able to restart the system. Otherwise, invoke RMC and use the env command.

Example 7–7 Show Power Command

```
P00>>> show power
                            Status
Power Supply 0              Good                      ❶
Power Supply 1              Good
Power Supply 2              Not Available
System Fan 1                Good                      ❷
System Fan 2                Good
System Fan 3                Bad
System Fan 4                Good
System Fan 5                Good
System Fan 6                Good
CPU 0 Temperature           Warning                   ❸
CPU 1 Temperature           Good
CPU 2 Temperature           Good
CPU 3 Temperature           Good
Zone 0 Temperature          Good                      ❹
Zone 1 Temperature          Good
Zone 2 Temperature          Good
P00>>>
```

❶ Power supplies. Power supply 2 is not installed.

❷ System fans. Fan 3 is not working.

❸ Temperature sensors on CPUs. CPU 0 is above threshold.

❹ Temperature sensors on PCI backplane.

7.4.7 Crash Command

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

Example 7–8 Crash Command

```
P00>>> crash

CPU 0 restarting

DUMP: 19837638 blocks available for dumping.
DUMP: 118178 wanted for a partial compressed dump.
DUMP: Allowing 2060017 of the 2064113 available on 0x800001
device string for dump = SCSI 1 1 0 0 0 0 0.
DUMP.prom: dev SCSI 1 1 0 0 0 0 0, block 2178787
DUMP: Header to 0x800001 at 2064113 (0x1f7ef1)
device string for dump = SCSI 1 1 0 0 0 0 0.
DUMP.prom: dev SCSI 1 1 0 0 0 0 0, block 2178787
DUMP: Dump to 0x800001: .......: End 0x800001
device string for dump = SCSI 1 1 0 0 0 0 0.
DUMP.prom: dev SCSI 1 1 0 0 0 0 0, block 2178787
DUMP: Header to 0x800001 at 2064113 (0x1f7ef1)
succeeded

halted CPU 0

halt code = 5
HALT instruction executed
PC = fffffc0000568704
P00>>>
```

The SRM **crash** command forces a crash dump to the selected device. Use this command when the system has hung and you are able to halt it with the Halt button or the RMC **halt in** command. The **crash** command restarts the operating system and forces a crash dump to the selected device.

7.5 Troubleshooting Tables

This section describes some strategies for troubleshooting problems that might prevent the system from completing its power-up or that might prevent you from booting the operating system. Use the troubleshooting tables on the following pages to diagnose the following types of problems.

- Power problems
- Problems that prevent the system from powering up to the SRM console prompt
- Failures reported on the SRM console
- Boot problems
- Errors reported by the operating system

NOTE: *Check your service agreement before handling internal parts of the system. If in doubt, contact your service provider.*

Table 7–5 Power Problems

Symptom	Action
System does not power on.	Check that AC power is available and all power cords are plugged in. Check the Power setting on the control panel. Toggle the Power button to off, then back on to clear a remote power disable. Check error messages on the control panel. Check that the ambient room temperature is within environmental specifications (10–35°C, 50–95°F). Internal power supply cables might not be plugged in at the system board. Contact your service provider.
Power supply shuts down after a few seconds	The system may be powered off by one of the following: —A remote management console command —System software —Fan failure —Over-temperature condition —Power supply failure —Faulty CPU Invoke RMC and use the **env** command for an indication of a hardware problem. See Chapter 4 for information on RMC. Check that the power supplies are installed correctly and correctly seated.

Table 7–6 Problems Getting to Console Mode

Symptom	Action
Power-up screen is not displayed.	Interpret the error beep codes and observe the control panel display at power-up for a failure detected during self-tests. Check keyboard and monitor connections. Press the Return key. If the system enters console mode, check that the **console** environment variable is set correctly. If you are using a VGA monitor as the console terminal, the **console** variable should be set to **graphics**. If you are using a serial console terminal, the **console** environment variable should be set to **serial**. If **console** is set to **serial**, the power-up display is routed to the COM1 serial communication port or MMJ port and cannot be viewed from the VGA monitor. Try connecting a console terminal to the COM1 serial communication port. When using the COM1 port, you must set the **console** environment variable to **serial**. If the system has a customized NVRAM file, try pressing the Halt button and then powering up or resetting the system. This will bypass the NVRAM script.

Table 7–7 Problems Reported by the Console

Symptom	Action
Power-up tests are not completed.	Interpret the error beep codes at power-up and check the power-up screen for a failure detected during self-tests.
The system attempts to boot from the floppy drive after a checksum error is reported (error beep code 1-1-4).	The system automatically reverts to the fail-safe loader to load new SRM and AlphaBIOS firmware. If the fail-safe load does not work, contact your service provider to replace the system board.
Console program reports error:	
Error beep codes report an error at power-up.	Use the error beep codes and control panel messages to determine the error.
Power-up screen includes error messages.	Enter the **more el** command when the SRM prompt is displayed to read the event log.
Power-up screen or console event log indicates problems with mass storage devices.	Check the cabling and seating of the device. If this is not the problem, the device is bad and should be replaced.
Storage devices are missing from the **show config** display.	Check the cabling and seating of the device, then wait 5 seconds for the device to appear in the console display. If the device still does not appear, contact your service provider.
PCI devices are missing from the **show config** display.	See Section 7.6.

Table 7–8 Boot Problems

Symptom	Action
System cannot find boot device.	Check the system configuration for the correct device parameters (node ID, device name, and so on). Use the **show config** and **show device** commands. Check the system configuration for the correct environment variable settings. Examine the **auto_action**, **bootdef_dev**, **boot_osflags**, and **os_type** environment variables. For network boots, make sure **ei*0_protocols** or **ew*0_protocols** is set to **bootp** for UNIX or **mop** for OpenVMS.
Device does not boot.	For problems booting over a network, make sure **ei*0_protocols** or **ew*0_protocols** is set to **bootp** for UNIX or **mop** for OpenVMS. Run the **test** command to check that the boot device is operating.

Table 7–9 Errors Reported by the Operating System

Symptom	Action
System has crashed, but SRM console is operating.	Press the Halt button and enter the SRM crash command to provide a crash dump file for analysis. If the problem is intermittent, run the SRM test command. Refer to the *OpenVMS Alpha System Dump Analyzer Utility Manual* for information on how to interpret OpenVMS crash dump files. Refer to the *Guide to Kernel Debugging* for information on using the Tru64 UNIX Krash Utility.
System is hung and SRM console is not operating.	Contact your service provider.
Operating system has crashed and rebooted.	Contact your service provider. If the problem is intermittent, you might have a defective component.

7.6 Option Card Problems

Option card problems can include problems related to network options and PCI options.

Network Problems

Network problems can vary, depending on the type of network option card that you have installed. See the option card documentation for information on troubleshooting network problems. Make sure you have correctly set the network type for the network interface card.

PCI Parity Errors

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 functions properly as long as 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 PCI device. Turning off PCI parity is therefore not recommended or supported.

PCI Bus Problems

PCI bus problems at startup are usually indicated by the inability of the system to detect the PCI device. Use Table 7–10 to diagnose the likely cause of the problem.

Table 7–10 Troubleshooting PCI Bus Problems

Step	Action
1	Check the cabling and confirm that the PCI card is correctly seated.
2	Run system console PCI diagnostics for devices on the Supported Options List. (If the device is not on the list, refer to the device's documentation.) The Supported Options List is on the World Wide Web: http://www.digital.com/alphaserver/es40/options/es40_options.html • Storage adapter—Run the **test** command to exercise the storage devices off the PCI controller option. • Ethernet adapter—Run the **test** command to exercise an Ethernet adapter.
3	Check for a bad slot by moving the suspected controller to a different slot.
4	Contact the option manufacturer.

Chapter 8
Specifications

This chapter gives specifications for *ES40* systems:

- Physical specifications
- Environmental specifications
- Electrical specifications
- Regulatory approvals
- Acoustic data

8.1 Physical Specifications

Table 8–1 Physical Characteristics — Tower

Dimensions		
Height	50.8 cm (20.0 in.)	
Width	38.7 cm (15.25 in.)	
Depth	78.7 cm (31.0 in.)	
Weight	Nominal: 65 kg (143 lb)	
	Max: 96 kg (211 lb)	
Shipping Container		
Height	82.4 cm (32.2 in.)	
Width	60.2 cm (24.0 in.)	
Depth	101.6 cm (40.0 in.)	
Weight	Nominal: 78 kg (172 lb)	
	Max: 110 kg (242 lb)	
Clearances		
	Operating	**Service**
Front	75 cm (29.5 in.)	75 cm (29.5 in.)
Rear	15 cm (6 in.)	75 cm (29.5 in.)
Left side	None	75 cm (29.5 in.)
Right side	None	None

Table 8–2 Physical Characteristics — Pedestal

Dimensions		
Height	78.2 cm (30.8 in.)	
Width	50.8 cm (20.0 in.)	
Depth	80.6 cm (31.75 in.)	
Weight	Nominal: 127 kg (280 lb) Max: 159 kg (350 lb)	
Shipping Container		
Height	107.7 cm (42.4 in.)	
Width	100.3 cm (39.5 in.)	
Depth	60.7 cm (23.9 in.)	
Weight	Nominal: 149 kg (328 lb) Max: 185 kg (407 lb)	
Clearances		
	Operating	**Service**
Front	75 cm (29.5 in.)	75 cm (29.5 in.)
Rear	15 cm (6 in.)	75 cm (29.5 in.)
Left side	None	None
Right side	None	75 cm (29.5 in.)

Table 8–3 Physical Characteristics — Rackmount

Dimensions		
Height	35.2 cm (13.87 in.)	Fits 14 in. [8U] standard RETMA cabinets
Width	44.7 cm (17.6 in.)	
Depth	76.5 cm (30.1 in.)	
Weight		
1. When lifting	Nominal: 50 kg (110 lb)	Max: 76 kg (167.2 lb)
2. Total added to cabinet (includes brackets, slides, and cables)	Nominal: 59 kg (130 lb)	Max: 92 kg (202.4 lb)
Shipping Container		
Height	73.2 cm (28.8 in.)	
Width	60.7 cm (24.0 in.)	
Depth	101.6 cm (40.0 in.)	
Weight	Nominal: 72 kg (158 lb) Max: 106 kg (233 lb)	
Clearances		
	Operating	**Service**
	See requirements of specific cabinet.	Min: 121.9 cm (4 ft) 76.3 cm (30 in.) withdrawal on rails)

Table 8–4 Physical Characteristics — Cabinets

Dimensions	
H9A10 M-Series	
Height	170 cm (67.0 in.)
Width	60 cm (23.6 in.)
Depth	110 cm (43.27 in.)
Weight	Configuration-dependent Max payload 1000 lb
H9A15 M-Series	
Height	200 cm (79.0 in.)
Width	60 cm (23.6 in.)
Depth	110 cm (43.27 in.)
Weight	Configuration-dependent Max payload 1000 lb
Shipping Container	
H9A10 M-Series	
Height	185.5 cm (73 in.)
Width	91.5 cm (36 in.)
Depth	122 cm (48 in.)
Weight	Nominal: 430 kg (946 lb) Max: 625 kg (1375 lb)
H9A15 M-Series	
Height	216 cm (85 in.)
Width	91.5 cm (36 in.)
Depth	122 cm (48 in.)
Weight	Nominal: 550 kg (1056 lb) Max: 640 kg (1408 lb)

8.2 Environmental Specifications

Table 8–5 Environmental Characteristics — All System Variants

Temperature	Operating	10–35° C (50–95° F)
	Nonoperating	–40 to 66° C (–40 to 151° F)
	Storage (60 days)	–40 to 66° C (–40 to 151° F)
	Rate of change	11° C/hr (20° F/hr)
Relative humidity	Operating	20 to 80%
	Nonoperating	20 to 80%
	Storage (60 days)	10 to 95%
	Rate of change	20%/hr
Max wet bulb temp	Operating	28° C (82° F)
	Storage (60 days)	46° C (115° F)
Min dew point temp	Operating	2° C (36° F)
Heat dissipation	Nominal	Maximum
Tower and Rack	900 w, 3074 BTU/hr	1300 w, 4440 BTU/hr
Pedestal	1480 w, 5054 BTU/hr	2400 w, 8196 BTU/hr
H9A10/H9A15	Config-dependent	4800 w, 16392 BTU/hr
Airflow and quality	Intake location	Front
	Exhaust location	Tower, Pedestal, and Rackmount: Rear H9A10/H9A15: Rear and top
	Particle size	N/A
	Concentration	N/A
Altitude	Operating	3037 m (10,000 ft)
	Nonoperating	12190 m (40,000 ft)
Mechanical shock	Operating	
	Tower/Pedestal	7.5 G, 10 +/– 3 ms
	M-Series Cabinet	5.0 G, 10 +/– 3 ms
Vibration	Operating	10–500 Hz .1 G peak

8.3 Electrical Specifications

Table 8–6 Electrical Characteristics — All System Variants

Nominal voltage (Vac)	100	120	200–240
Voltage range (Vac) temporary condition)	90–110	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 (max. steady state)			
Tower and Rackmount			
Single power cord	11.0 A	8.5 A	5.0 A
Multiple power cords	6.5 A	5.3 A	3.0 A
Max VA	1300 VA	1270 VA (10.6 max)	1250 VA
Pedestal			
Each power cord	12.0 A	10.5 A	6.0 A
Max VA	1960 VA	1900 VA	1880 VA
M-Series cab config.-dependent			
Nominal voltage (Vac)	100	120	220–240
Each power cord	24 A	24 A	16 A

Continued on next page

Table 8–6 Electrical Characteristics—All System Variants (Cont.)

System Variant	Quantity	Power Cords Length	Type
Tower	Up to 3	190 cm (75 in.)	IEC 320 C13 to NEMA 5–15 (N. America) or IEC 320 C13 to country-specific
Pedestal	2	190 cm (75 in.)	120 V nonremovable NEMA 5–15 (N. America) or 200–240 V IEC 320 C13 to country-specific
Rackmount	3	452 cm (14 ft. 10 in.)	IEC 320 C13 to NEMA 5–15 (N. America) or IEC 320 C13 to IEC 320 C14 (other countries)
Cabinet	2	330 cm (10 ft 10 in.)	120 V nonremovable NEMA L5-30P or 200–240 V nonremovable IEC 309

NOTE: *Power supplies are universal, PFC, auto ranging, 100/120/200–240 Vac.*

8.4 Regulatory Approvals

Table 8–7 Regulatory Approvals

Agency approvals	UL: Listed to UL1950 (3rd edition) and to CAN/CSA-C22.2 No. 950-M95 TUV: EN 60950/A4:1997 GS marked FCC: Part 15.B Class A CE: EN55022, en50082 VCCI Class II ITE BCIQ: CISPR22, CNS13438 c-Tick: CISPR22, as/nzs 3548
Reviewed to	AS/NZ 3260:1993 Australian/New Zealand Standard EN 60950/A4: 1997 European Norm IEC 950 (2nd edition, 3rd amend)

8.5 Acoustic Data

Table 8–8 gives the noise declaration for ES40 systems.

Table 8–8 Acoustic Data

Acoustics— Declared Values per ISO 9296 and ISO 7779				
	L_{WAd}, B		L_{pAm}, dBA (bystander positions)	
Product	**Idle**	**Operate**	**Idle**	**Operate**
DH–64AAA-AA (AlphaServerES40) [with 0 x HDD]	6.6	6.6	48	48
DH–64AAA–AA + DS–RZ2ED–16	6.6	6.6	48	48
DH–64AAA–AA + DS-RZ2ED–16 + BA36R–R* + 6 x DS-RZ1ED–VW	6.7	6.8	49	50
	L_{WAd}, B		L_{pAm}, dBA (operator positions)	
Product	**Idle**	**Operate**	**Idle**	**Operate**
DH–64AAA-AA (AlphaStation ES40) [with 0 x HDD]	6.6	6.6	52	52
DH–64AAA–AA + DS–RZ2ED–16	6.6	6.6	52	52
DH–64AAA–AA + DS-RZ2ED–16 + BA36R–R* + 6 x DS-RZ1ED–VW	6.7	6.8	53	54

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

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