AlphaServer DS15 and AlphaStation DS15

Owner's Guide

Order Number: EK-DS150-OG. A01

This manual is for managers and operators of DS15 systems.

Hewlett-Packard Company

September 2003

FCC Notice

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

FCC Rating Label

The rating label on the device shows which class (A or B) of the equipment. Class B devices have an FCC ID on the label. Class A devices do not have an FCC ID on the label. After you determined the class of the device, refer to the following corresponding statement.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for products marked with the FCC logo – United States only

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
For questions regarding your product, contact:

- Hewlett-Packard Company
  P.O. Box 692000, Mail Stop 530113
  Houston, Texas 77269-2000
- 1-800-652-6672 (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P.O. Box 692000, Mail Stop 530113
  Houston, Texas 77269-2000
- 1-281-514-3333

Modifications

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

Cables

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

Mouse Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Notice (Avis Canadien)

Class A Equipment

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

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B Equipment

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

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN55022 (CISPR 22) – Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) – Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) – Power Line Flicker
- EN60950 (IEC60950) – Product Safety

Taiwanese Notice

警告使用者:

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Japanese Notice

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Contents

Chapter 3 Booting and Installing an Operating System

Chapter 4 Configuring and Installing Options

Chapter 5 Firmware

Chapter 6 Remote Console Management

Chapter 7 Troubleshooting

Chapter 8 Specifications

Examples

Figures

Tables

Preface

Intended Audience

This manual is for managers and operators of hp *AlphaServer* DS15 and hp *AlphaStation* DS15 systems.

Document Structure

This manual uses a structured 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 8 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, setting console security, and updating firmware.
- **Chapter 3, Booting and Installing an Operating System**, describes how to boot a supported operating system and how to begin an operating system installation.
- **Chapter 4, Configuring and Installing Options**, shows how to install memory DIMMs, PCI cards, and other options.
- **Chapter 5, Firmware**, describes the SRM firmware, which allows you to configure and boot the *Tru64 UNIX*, Linux, or *OpenVMS* operating system and verify the configuration of devices. It also provides a reference to the SRM commands and environment variables.
- **Chapter 6, Remote Console Management**, describes the function and operation of the integrated remote management console.
- **Chapter 7, Troubleshooting**, gives basic troubleshooting procedures.
- **Chapter 8, Specifications**, provides system specifications.

Documentation Titles

Table 1 hp *AlphaServer* DS15 and hp *AlphaStation* DS15 Documentation

Title	Order Number
User Documentation Kit	QA-72XAA-G8
DS15 AlphaServer and DS15 AlphaStation Owner's Guide	EK–DS150–OG
AlphaServer DS15 Quick Setup	EK–DS150–IG
AlphaServer DS15 Floor Stand Kit	EK–DS150–FS
DS15 AlphaServer and DS15 AlphaStation Service Guide	EK–DS150–SG
CD-ROM Installation Guide	EK–DS152–CD
AlphaServer DS15 Release Notes	EK–DS150–RN

Information on the Internet

Visit the *AlphaServer* Web site at http://h18002.www1.hp.com/alphaserver/ for service tools and more information about the *AlphaServer* DS15 and hp *AlphaStation* DS15 system.

Chapter 1
System Overview

This chapter provides an overview of the system including:

- System Enclosure Configurations
- Common Components
- Front View
- Top View
- Rear Ports and Slots
- Network Connection
- Operator Control Panel
- System Motherboard
- PCI Slots
- Storage Cage Options
- Console Terminal
- Power Connection
- System Access Lock

1.1 System Enclosure Configurations

The DS15 family consists of a rackmount system, a standalone pedestal system, and a desktop system. All have similar features, components, capabilities and options; the desktop system will be shown throughout this manual in illustrations and examples.

Figure 1–1 DS15 Rackmount and Pedestal System

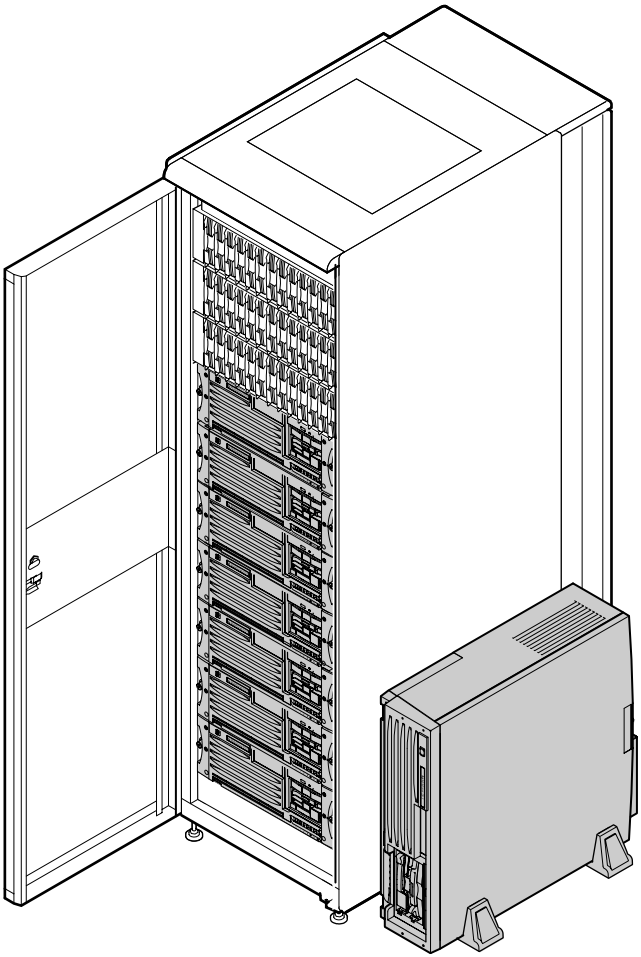


Figure 1–2 DS15 Desktop System with Internal Storage Cage Option

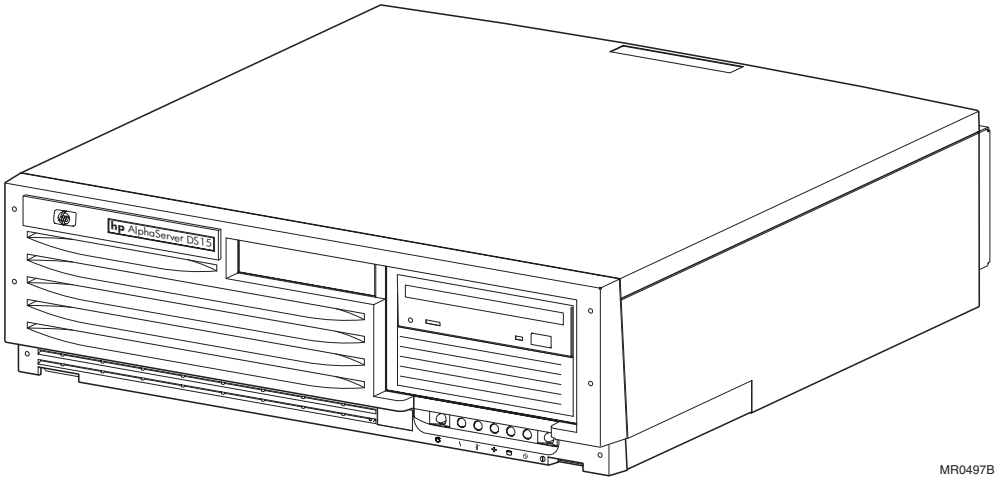
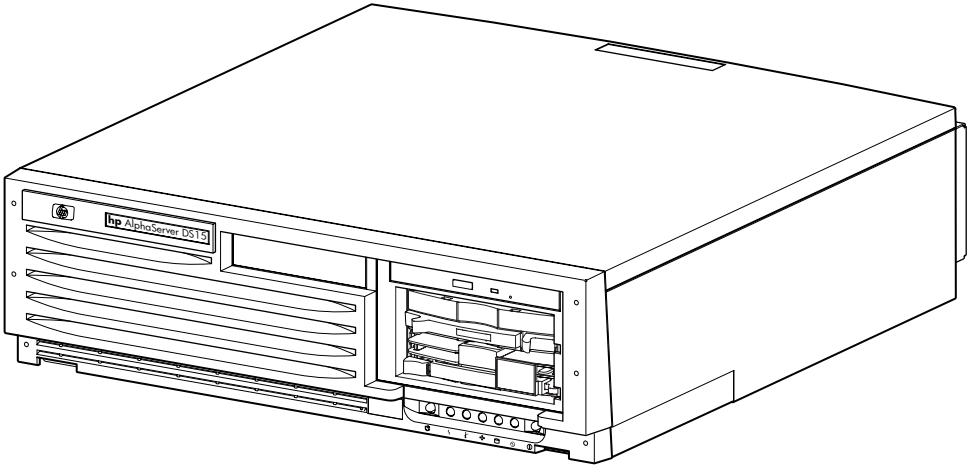


Figure 1–3 DS15 Desktop System with Front Access Storage Cage Option



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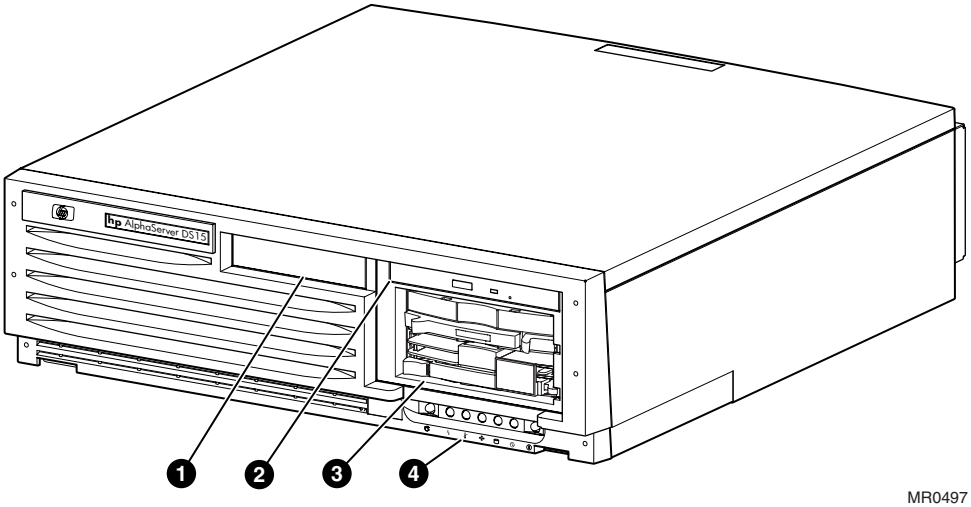
1.2 Common Components

The basic building block of *AlphaServer* DS15 systems is the system enclosure chassis that houses the following common components.

- Alpha 1-GHz CPU with 2-MB onboard ECC cache
- 512-MB, 1-GB, or 2-GB SDRAM memory – expandable to 4-GB maximum memory capacity
- Onboard dual 10/100 BaseT Ethernet ports
- Four 64-bit PCI expansion slots
- Onboard Dual Channel Ultra160 SCSI controller
- Choice of storage cage subsystems:
    a. Internal Storage Cage with a maximum SCSI storage capacity of 218.4 GB
    b. Front Access Storage Cage with a maximum SCSI storage capacity of 435.6-GB
- Two serial ports:
    a. COM1 port with RMC port with modem control and a full-duplex asynchronous communications port
    b. COM2 port with full-duplex asynchronous communications port
- PS/2-style keyboard port and mouse port
- 400W (120/240V, 60/50 Hz) power supply

1.3 Front View

Figure 1–4 Front View with Optional Front Access Storage Cage



❶ Center internal storage bay

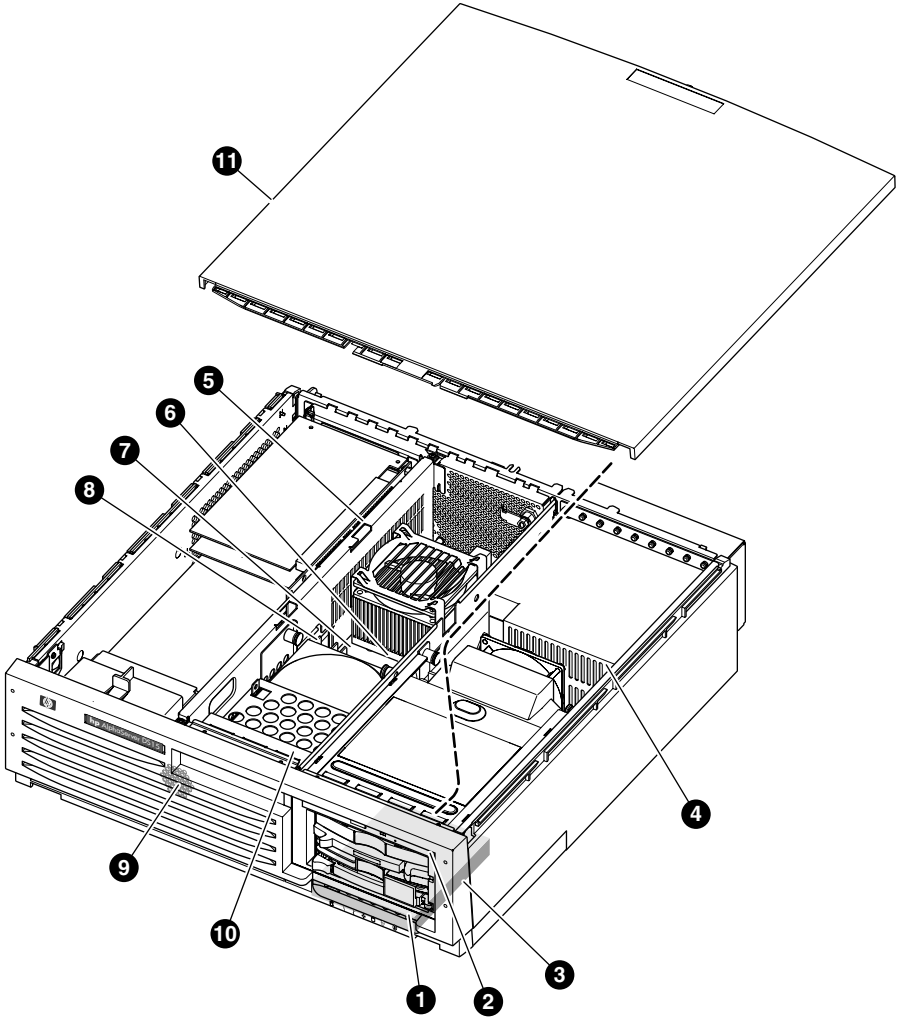
❷ DVD/CD-RW drive

❸ Disk storage

❹ Operator control panel

1.4 Top View

Figure 1–5 Top View



❶ Operator Control Panel

❷ DVD/CD-RW drive

❸ Internal hard drive

❹ Power supply

❺ PCI riser

❻ CPU

❼ System motherboard

❽ Memory

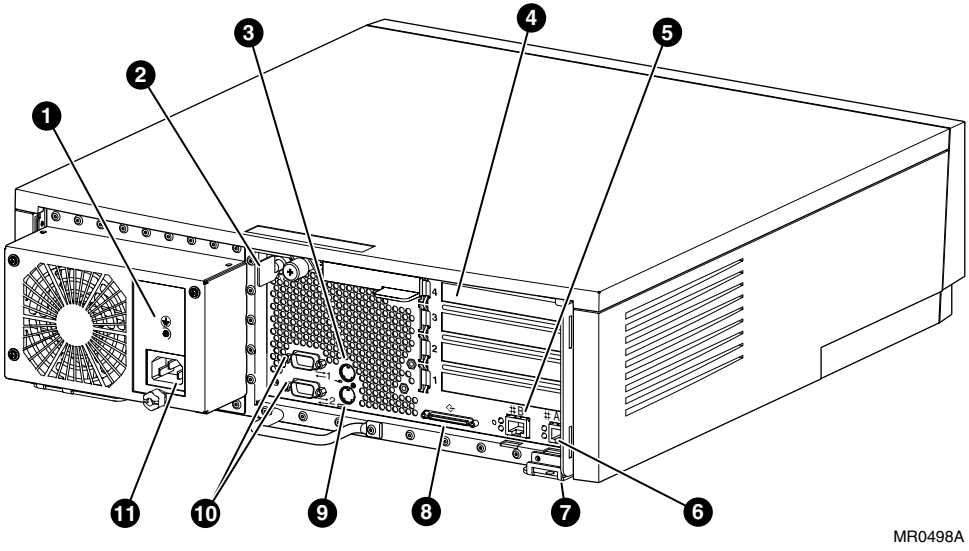
❾ Speaker (hidden)

❿ Center internal storage bay

⓫ Cover

1.5 Rear Ports and Slots

Figure 1–6 Rear Ports and Slots



❶ Power supply ground

❷ Key

❸ Mouse connector

❹ PCI Slots

❺ Ethernet port B

❻ Ethernet port A

❼ Cable run hook

❽ SCSI connector

❾ Keyboard connector

❿ COM 1 serial port (top), COM 2 serial port (bottom)

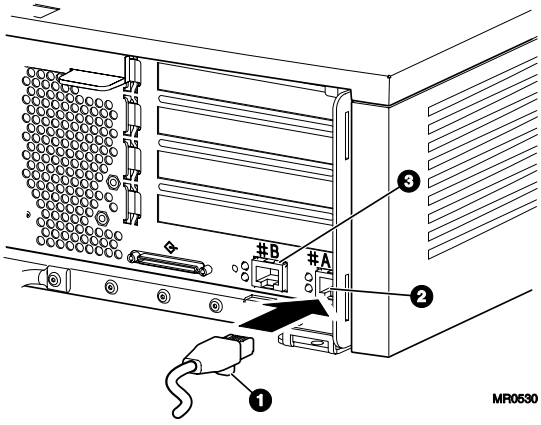
⓫ Power connector

1.6 Network Connections

There are two onboard Ethernet network connectors on the rear of the DS15 system.

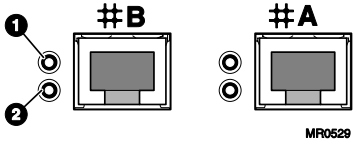
The DS15 system has dual onboard 10/100 BaseT Ethernet ports. You can connect to either or both.

Figure 1–7 Ethernet Network Connection



Connect the Ethernet cable ❶ to either Ethernet connector A ❷ or B ❸.

Figure 1–8 Network LED indicators



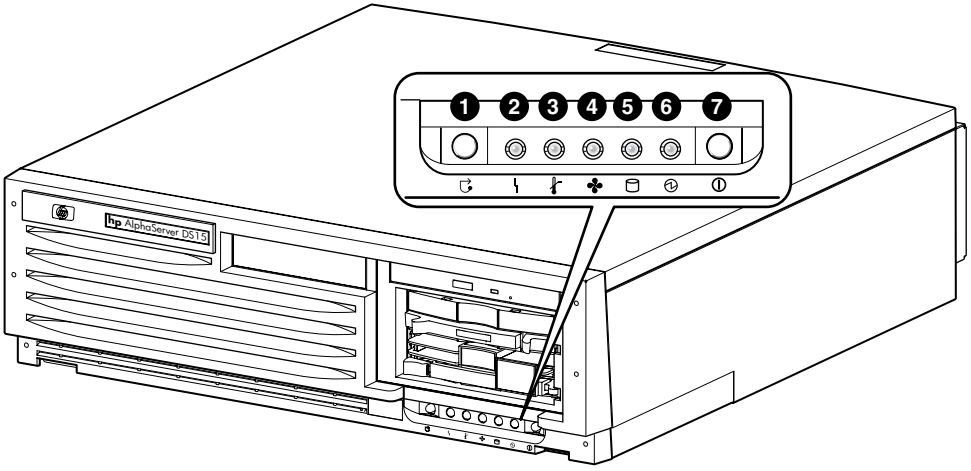
The LEDs to the left of each Ethernet connector indicate its status.

❶ LED Speed/Activity; indicates activity through the connection.
❷ LED Link indicator; network connection exists when this is lit.

1.7 Operator Control Panel

The control panel provides system controls and status indicators. The controls are the Power and Halt/Reset buttons. The panel has a green power LED, a green disk activity indicator LED, and three diagnostic LEDs.

Figure 1–9 Operator Control Panel



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❶ Halt/Reset button

❷ Amber system fault LED

❸ Amber over temperature fault LED

❹ Amber fan fault LED

❺ Green disk activity LED

❻ Green system power LED

❼ System Power Switch (On/Off)

NOTE: *Jumper J22 (pins 13 – 14) must be installed for the halt/reset button to reset.*

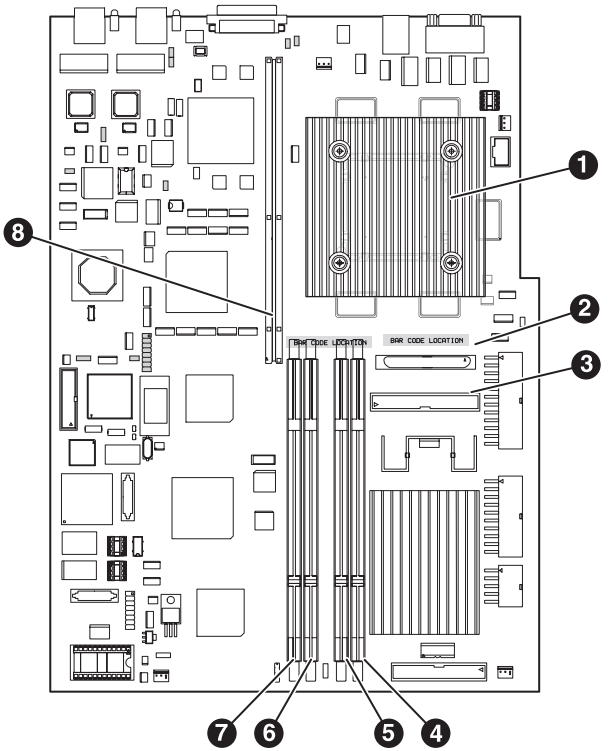
1.7.1 Remote Commands

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 6.

RMC Command	Function
Power on	Turns on power. Emulates pressing the Power button to the On position.
Power off	Turns off power. Emulates pressing the Power button to the Off position.
Halt	Halts the system.
Halt in	Halts the system and causes the halt to remain asserted.
Halt out	Releases a halt created with **halt in**.
Reset	Resets the system.

1.8 System Motherboard

Figure 1–10 System Motherboard



❶ CPU

❷ Internal SCSI connector

❸ IDE connector

❹ Memory DIMM slot - array 2, DIMM 2

❺ Memory DIMM slot - array 0, DIMM 0

❻ Memory DIMM slot - array 2, DIMM 3

❼ Memory DIMM slot - array 0, DIMM 1

❽ PCI riser slot

1.8.1 CPU

The CPU microprocessor is a superscalar pipelined processor packaged in a 675-pin LGA carrier. The CPU has the ability to issue up to four instructions during each CPU clock cycle and a peak instruction execution rate of four times the CPU clock frequency.

1.8.2 DIMMS

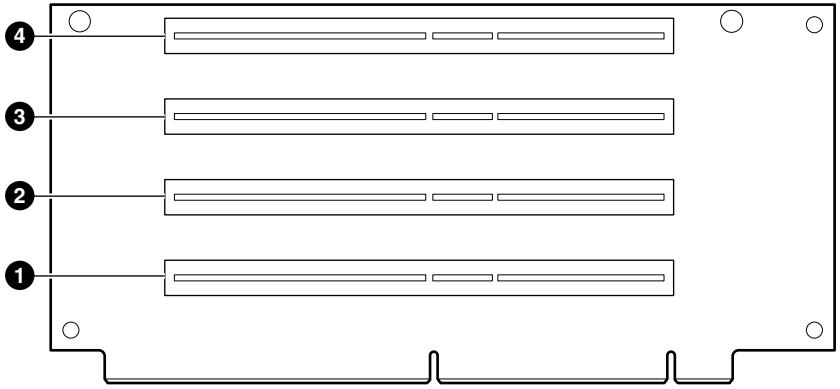
The AlphaServer DS15 system supports up to two pairs of 200-pin synchronous DIMMs. Supported DIMM sizes are 256 MB, 512 MB, and 1 GB, allowing memory to be configured from 512 MB to 4096 MB.

1.8.3 PCI

The *AlphaServer* DS15 system supports two PCI busses, one for the onboard integrated I/O and the other controls the four expansion slots through the PCI riser.

1.9 PCI Slots

Figure 1–11 PCI Slots



MR0502

❶ Slot 1 – 66/33MHz, 3.3v

❷ Slot 2 – 66/33MHz, 3.3v

❸ Slot 3 – 33MHz, 3.3v

❹ Slot 4 – 33MHz, 3.3v

Table 1–1 How Physical I/O Slots Map to Logical Slots

Port	Hose	Physical Slot	SRM Logical Slot
A	2	1	7
		2	8
		3	9
		4	10

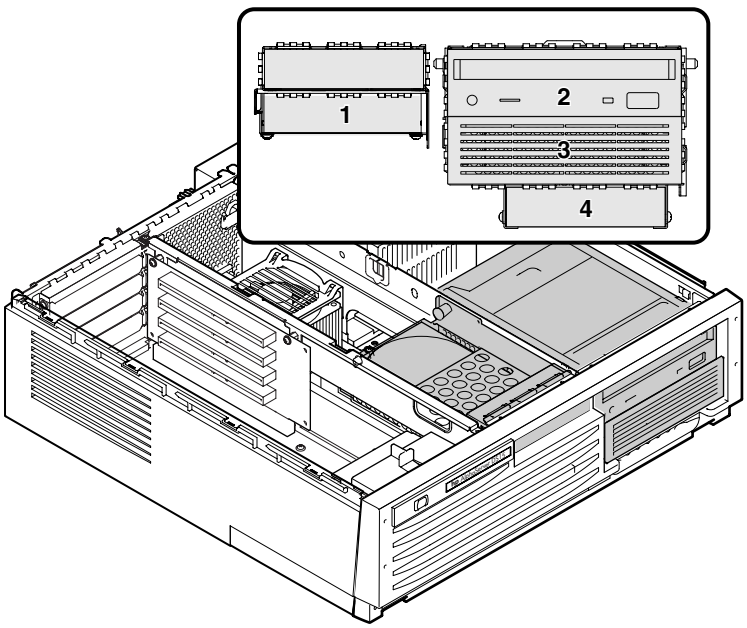
1.10 Storage Cage Options

The AlphaServer DS15 system comes with either an internal storage cage or a front access storage cage.

1.10.1 Internal Storage Cage

Systems configured with an internal storage cage include a half-height DVD/CD-RW drive and a half-height bay for disk, DVD/CD-RW, or tape drives. The cage supports three 3.5-inch x 1-inch hard disk drives *or* two internal 3.5 inch x 1-inch hard disk drives and one 5.25-inch x 1.6-inch removable media device.

Figure 1–12 Internal Storage Cage Configuration



MR0548A

❶ Center internal storage bay

❷ DVD/CD-RW

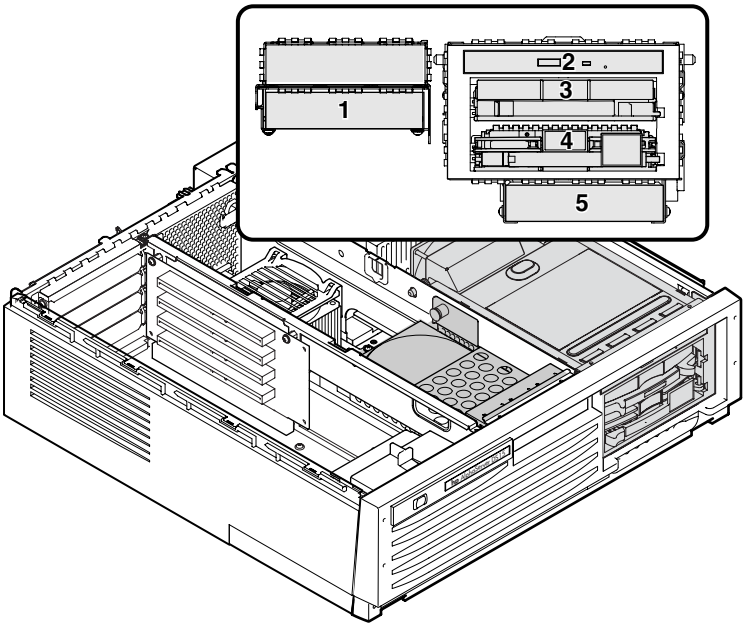
❸ DVD/CD-RW or internal drive bay (disk or tape)

❹ Internal drive bay

1.10.2 Front Access Storage Cage

Systems configured with a front access storage cage include a slim-line DVD/CD-RW drive and two 3.5-inch x 1-inch hard disk drive bays or one front access Universal tape drive bay. The cage supports two front access 3.5-inch x 1-inch hard disk drives and two internal 3.5-inch x 1-inch hard disk drives *or* one front access Universal tape drive (AIT or DAT) and two internal disk drives.

Figure 1–13 Front Access Storage Cage Configuration



MR0549A

❶ Center internal storage bay

❷ DVD/CD-RW

❸ Universal drive bay

❹ Universal drive bay

❺ Internal drive bay

1.11 Console Terminal

The console terminal can be a serial (character cell) terminal connected to the COM1 port or a VGA monitor connected to a VGA adapter.

Figure 1–14 Console Terminal Connected to Com Port

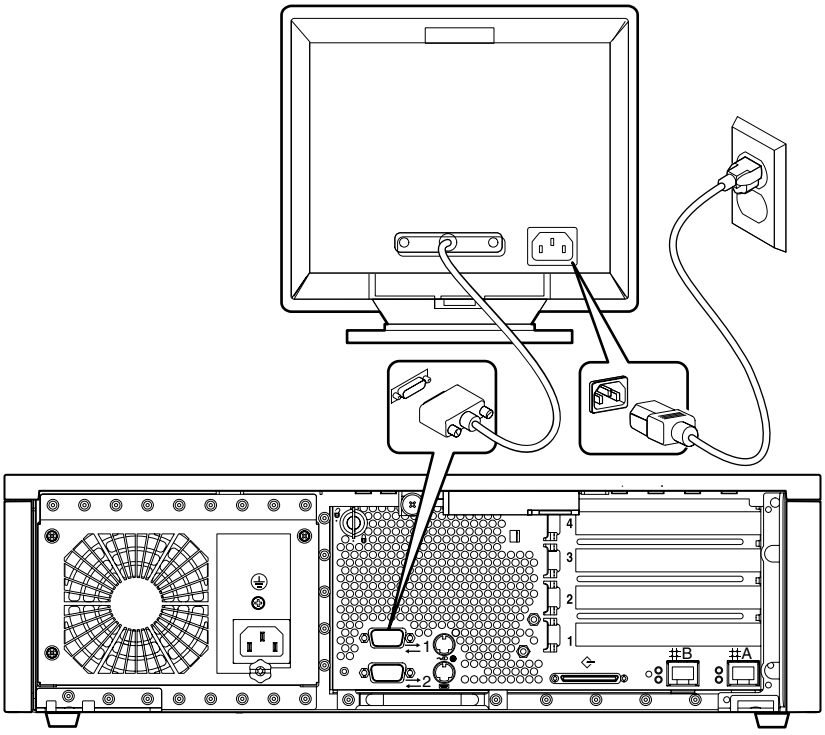
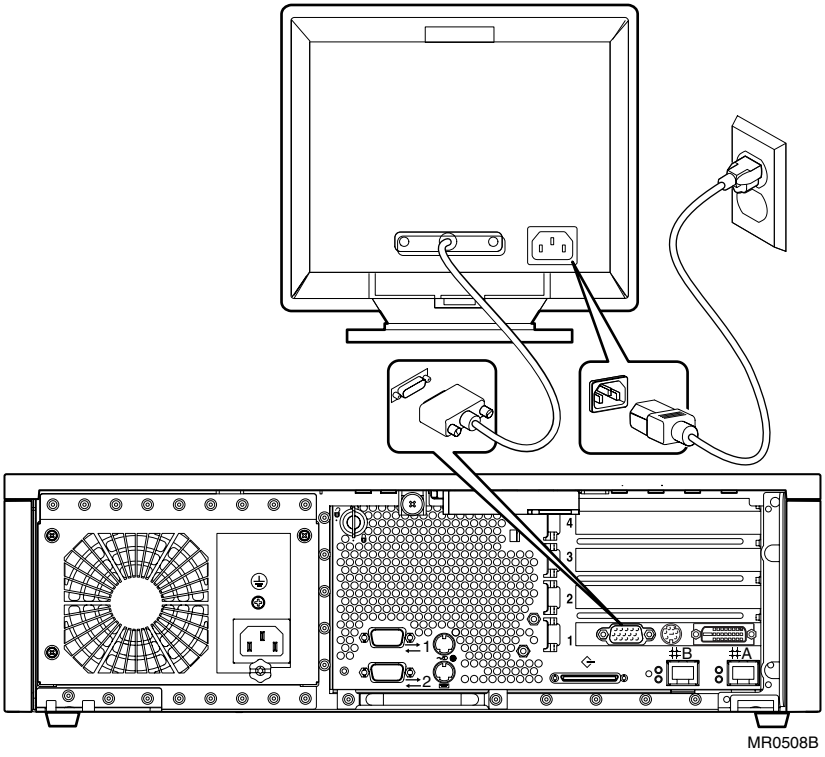


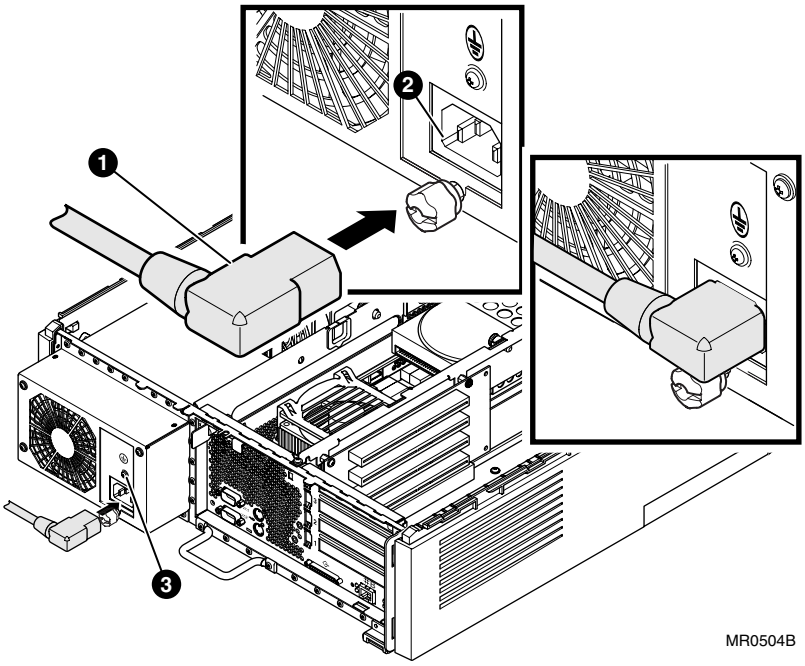
Figure 1–15 Console Terminal Connected to Optional Video Card



1.12 Power Connection

Figure 1–16 shows the power connection for a desktop system.

Figure 1–16 Connecting the Power for the Desktop

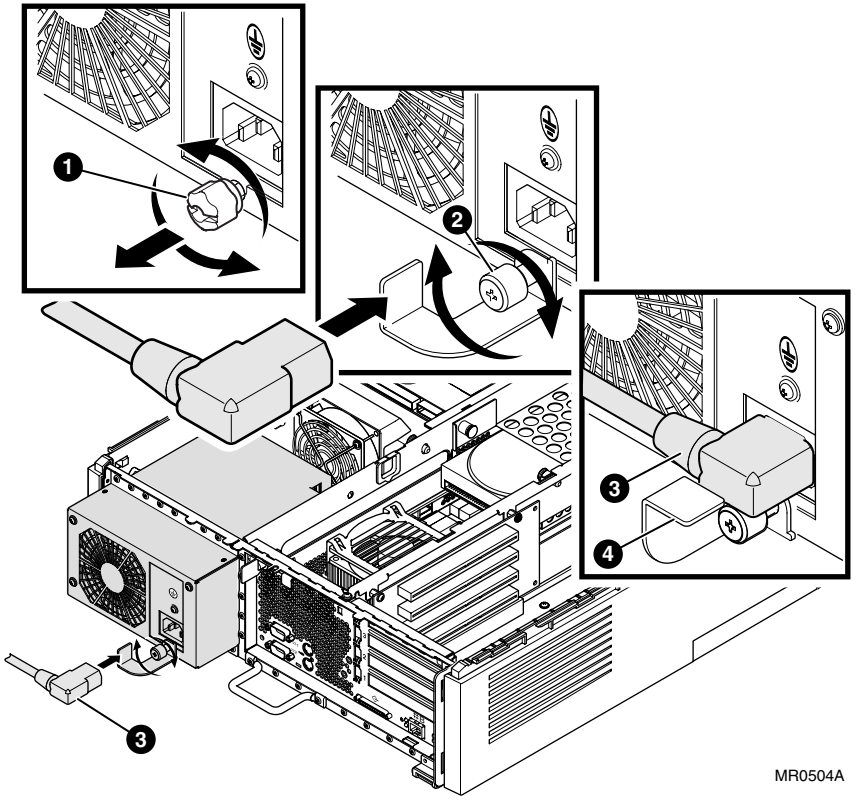


❶ Power cord

❷ Power receptacle

❸ Ground screw

Figure 1–17 Connecting the Power for a Rackmount System



❶ Thumbscrew

❷ Power cord bracket with attached screw

❸ Power cord

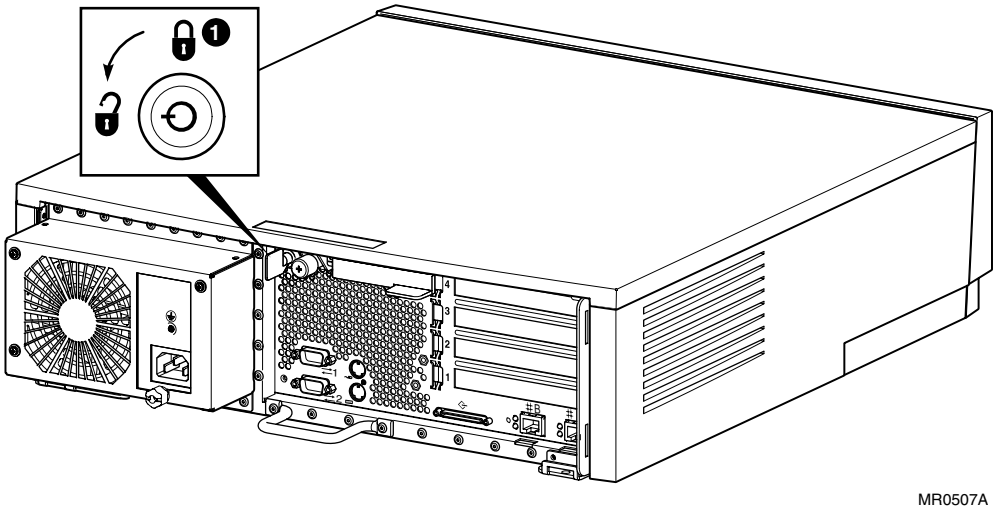
❹ Power cord bracket

To connect the power cord, loosen the thumbscrew, plug the cord in, rotate the bracket so that it supports the Power cord plug, and tighten the attached screw.

1.13 System Access Lock

The DS15 system enclosure has a key lock ❶ for security as shown in the following figure. If you wish to limit access to the inside of the enclosure, keep the system locked and the key in a secure location.

Figure 1–18 System Access Lock



Chapter 2
Operation

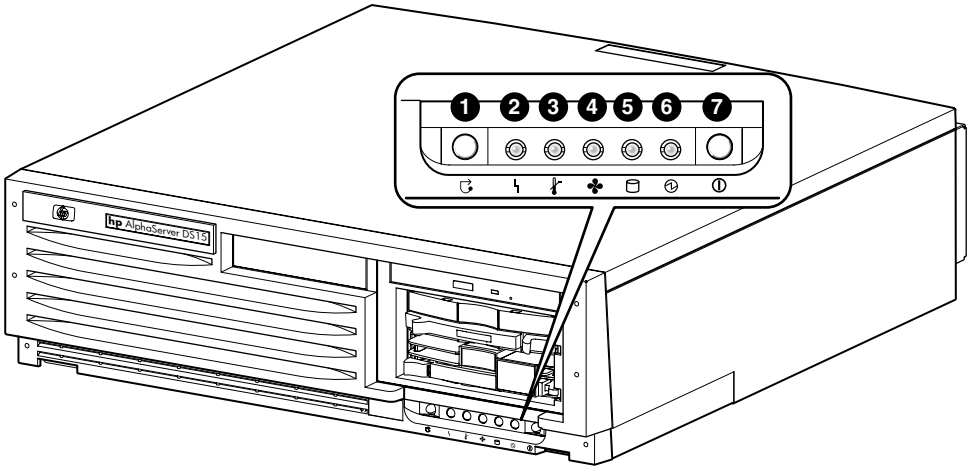
This chapter provides instructions for basic system operation. The following topics are covered:

- Powering Up the System
- Power-Up Displays
- SRM Console
- Displaying the Hardware Configuration
- Setting SRM Environment Variables
- Setting Console Security
- Updating Firmware

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 OCP LEDs



MR0500

❶ Halt/Reset button

❷ Amber system fault LED

❸ Amber over temperature fault LED

❹ Amber fan fault LED

❺ Green disk activity LED

❻ Green system power LED

❼ System Power Switch (On/Off)

NOTE: The power button must be in the On position for the RMC power commands to function.

To control power to the system remotely, invoke the RMC “power off” and “power on” commands.

```
RMC>power off
```

```
RMC>power on
```

2.2 Power-Up Displays

Power-up information is displayed on the operator control panel LEDs 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**, SROM messages are not displayed, and the SRM messages are delayed until VGA initialization has completed. If the COM1_mode is set to **through** or **snoop,** RMC will also display power-up and power-down error messages to COM1.*

2.2.1 SROM Power-Up Display

Example 2–1 Sample SROM Power-Up Display

```
SROM V1.3-F CPU # 00 @  1000  MHz
SROM program starting
Reloading SROM
SROM V1.3-F CPU # 00 @  1000  MHz
System Bus Speed @ 0125  MHz
SROM program starting
Bcache data tests in progress
Bcache address test in progress
CPU parity and ECC detection in progress
Bcache ECC data tests in progress
Bcache TAG lines tests in progress
Memory sizing in progress
Memory configuration in progress
Testing AAR0
Memory data test in progress
Memory address test in progress
Memory pattern test in progress
Memory initialization
Loading console
Code execution complete (transfer control)
```

2.2.2 SRM Console Power-Up Display

At the completion of SROM power-up, the CPU transfers control to the SRM console program, described in Section 2.3. 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

```
                                                                    ❶
OpenVMS PALcode V1.96-40, Tru64 UNIX PALcode V1.90-31

starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 240c0
memory low limit = 218000 heap = 240c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing timer data structures
lowering IPL
CPU 0 speed is 1000 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
1536 MB of System Memory

Testing Memory                                                      ❷
...
probe I/O subsystem                                                 ❸
entering idle loop                                                  ❹
starting drivers

create powerup
initializing GCT/FRU at 23e000
Initializing ega dqa dqb eia pka pkb
```

```
Memory Testing and Configuration Status
  Array       Size       Base Address    Intlv Mode
---------  ----------  -----------------  ----------
    0         512Mb     0000000040000000    1-Way
    2        1024Mb     0000000000000000    1-Way

     1536 MB of System Memory
Testing the System                                                    ❺
Testing the Disks (read only)
Testing the Network
AlphaServer DS15 Console V6.3-1, built on Jun 10 2003 at              ❻
11:51:30
>>>
```

❶ The 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. Memory testing is based on the "memory_test" environment variable – none, partial, full.

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

❹ Device drivers are started.

❺ Various diagnostics are performed. Diagnostic testing is based on the "full_powerup_diags" environment variable – On/Off

❻ The console terminal displays the SRM console banner and the prompt, >>>.

2.3 SRM Console

The SRM console is the command-line interface that allows you to set up and boot the operating system, display the system configuration, set environment variables, and perform basic system troubleshooting. SRM firmware is located in a flash ROM (read-only memory) on the system board. The SRM console firmware is described in detail in Chapter 5, Firmware.

The following sections cover functions you can perform from the SRM console.

Example 2–3 SRM Console Example

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

In this example, the operator enters the SRM **set** command and specifies the devices from which to boot the operating system. At power-up the system will try to boot from SCSI device dkb0 and if unsuccessful, will boot from dka0.

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 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 you use a VT-type device as the console terminal, set the **console** environment variable to **serial**. The VT device must be connected to the Com1 port.
- If you use a VGA monitor as the console terminal, set the **console** environment variable to **graphics.**

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, if configured to reset, RMC reset command, SRM init command) to put the new setting into effect.

In the following example, the operator 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.

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

2.4 Displaying the 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:

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 5 for information on this command.
show memory	Displays configuration of main memory.

***** indicates wildcard notation

2.4.1 Displaying Boot Environment Variables

Use the show boot* command to list the boot environment variables. Use the set command with a variable to set up the boot environment. See Chapter 3 for more information on setting boot environment variables.

Example 2–4 Show Boot*

```
>>> 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
```

boot_dev	Device or device list from which booting is to be attempted, here SCSI device dka0. (read only)
boot_file	The default file name used for the primary bootstrap when no file name is specified by the **boot** command.
boot_osflags	Boot flags, here the *Tru64 UNIX* "a" (autoboot) flag.
boot_reset	Action taken in response to an error halt or **boot** command. OFF, the default, indicates a warm boot (no full reset is performed).
bootdef_dev	Device or device list from which booting is to be attempted when no path is specified on the command line. Here, SCSI device dka0.
booted_dev	The device from which booting occurred. (read only)
booted_file (read only)	The file name used for the primary bootstrap during the last boot.
booted_osflags (read only)	Additional parameters, if any, specified by the last **boot** command that are to be interpreted by system software.

2.4.2 Displaying the Logical Hardware 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

```
>>>show config
                          hp AlphaServer DS15
Firmware                                                              ❶
SRM Console:   X6.6-2092
PALcode:       OpenVMS PALcode V1.98-6, Tru64 UNIX PALcode V1.92-7
SROM Extended:         V1.0-1
SROM Fail Safe:        V1.0-0
RMC Runtime:           V0.6-3
RMC Booter:            V0.5-6
Processors                                                            ❷
CPU 0          Alpha EV68CB pass 4.0 1000 MHz  2MB Bcache
Core Logic                                                            ❸
Cchip          Rev 18
Dchip          Rev 17
PPchip 0       Rev 17
TIG            Rev 1.9
Acer Chip Revision A1-E
Memory                                                                ❹
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0       1024Mb     0000000000000000    2-Way
    2       1024Mb     0000000040000000    2-Way

     2048 MB of System Memory
 Slot   Option                Hose 0, Bus 0, PCI - 33 MHz              ❺
   7    Acer Labs M1543C                          Bridge to Bus 1, ISA
   8/0  Adaptec AIC-7899      pka0.7.0.8.0         SCSI Bus ID 7
                              dka0.0.0.8.0         COMPAQ BF03665A32
                              dka100.1.0.8.0       COMPAQ BF03665A32
   8/1  Adaptec AIC-7899      pkb0.7.0.108.0       SCSI Bus ID 7
   9    Intel 82559ER Ethern  eia0.0.0.9.0         00-02-A5-20-C0-39
  10    Intel 82559ER Ethern  eib0.0.0.10.0        00-02-A5-20-C0-3A
  13    Acer Labs M1543C IDE  dqa.0.0.13.0
                              dqb.0.1.13.0
                              dqa0.0.0.13.0        DW-224E

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

(Continued)

Example 2–5 Show Config (Continued)

```
Slot    Option                Hose 2, Bus 0, PCI - 66 MHz
   7    Radeon 7500 PCI       vga0.0.0.7.2
```

```
SROM loads from Flash                                          ❻
Console loads from SRM
Flash updates are Enabled for RMC
Flash updates are Enabled for SRM
Flash updates are Enabled for FailSafe
Flash updates are Disabled for RMC Booter
Halt/Reset is set to HALT
>>>
```

❶ **Firmware**. Version numbers of the SRM console, PALcode, serial ROM, and RMC.

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

❺ This part of the command output shows the PCI buses.

The "Slot" column lists the slots (logical IDs) seen by the system. Logical IDs identify both installed PCI cards and onboard chips. The logical IDs do not correspond directly to the physical slots into which the devices are installed. See Table 2–1 for the correspondence between logical IDs and physical slots.

The slots in Example 2–5 are explained below.

NOTE: The naming of devices (for example, dqa.0.0.13.0) follows the conventions given in Table 2–2.

Hose 0, Bus 0, PCI

Slot 7 Onboard Acer chip. Provides bridge to ISA Bus 1
Slot 8 Slots 8/0, 8/1 Onboard Dual Channel Adaptec controller
Slot 9 Onboard 10/100 Mb Ethernet (Port A)
Slot 10 Onboard 10/100 Mb Ethernet (Port B)
Slot 13 Onboard Acer chip IDE

Hose 0, Bus 1

The Acer is configured to use a floppy, but the device is not present

Hose 2, Bus 0, PCI

Slots 7 and 8 are 66MHz/33MHz and slots 9 and 10 are 33 MHz
Slot 7 ATI Radeon 7500 Graphics Accelerator running at 66 MHz.

❻ **Jumpers**. State of jumpers

Table 2–1 How Physical I/O Slots Map to Logical Slots

Physical Slot	SRM Logical Slot ID
1	Hose 2 Slot ID 7
2	Hose 2 Slot ID 8
3	Hose 2 Slot ID 9
4	Hose 2 Slot ID 10

2.4.3 Displaying the Bootable Devices

Use the show device command to display the devices from which the operating system can be booted.

Example 2–6 Show Device

```
>>>show dev
dka0.0.0.8.0               DKA0              COMPAQ BF03665A32  3B01
dka100.1.0.8.0             DKA100            COMPAQ BF03665A32  3B01
dqa0.0.0.13.0              DQA0                        DW-224E  A.1J
dva0.0.0.1000.0            DVA0
eia0.0.0.9.0               EIA0              00-02-A5-20-C0-39
eib0.0.0.10.0              EIB0              00-02-A5-20-C0-3A
pka0.7.0.8.0               PKA0                  SCSI Bus ID 7
pkb0.7.0.108.0             PKB0                  SCSI Bus ID 7
>>>
```

Table 2–2 Device Naming Conventions

	Category	Description
The device, dqa0 is used as an example in the following device category and description.		
dq	Driver ID	Two-letter designator of port or class driver dk SCSI drive or CD; dq IDE CD-ROM; dr RAID set device; du DSSI disk; eg Ethernet port; ei Ethernet port; ew Ethernet port; fw FDDI device; mk SCSI tape; mu DSSI tape; pu DSSI port; pz KZPCC-CE RAID controller
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.
13	Logical slot number	IDE that is onboard.
0	Hose number	• 0 PCI 0 • 2 PCI 2

2.4.4 Viewing the Memory Configuration

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

Example 2–7 Show Memory

```
>>> show memory
    Array       Size       Base Address    Intlv Mode
---------  ----------  -----------------  ----------
    0       1024Mb     0000000000000000    1-Way

     1024 MB of System Memory
>>>
```

The **show memory** display corresponds to the memory array configuration described in Chapter 4. The display does not indicate the number of DIMMs or the DIMM size.

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 5.

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 >>> 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 see a list of the environment variables, enter the **show *** command.
- To reset an environment variable, use the **set *envar*** command, where the name of the environment variable is substituted for *envar*.

The environment variables used to set up the boot environment are described in Chapter 3. Chapter 5 covers other environment variables you are likely to use.

2.6 Setting Console Security

You can set the SRM console to secure mode to prevent unauthorized persons 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 **boot** command cannot take command-line parameters when the console is in secure mode. The console boots the operating system using the environment variables stored in NVRAM (**boot_file**, **bootdef_dev**, **boot_osflags**).

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. Once you enter the **login** command in secure mode, you can enter any SRM command as usual. However, the system automatically returns to secure mode when you enter the **boot** or **continue** command or when you reset the system.

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

2.6.1 Setting the Console Password

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

Example 2–8 Set Password

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

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

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

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

The syntax is:

set password

❶ Setting a password. If a password has not been set and the **set password** command is issued, the console prompts for a password and verification. The password and verification are not echoed.

❷ Changing a password. If a password has been set and the **set password** command is issued, the console prompts for the new password and verification, then prompts for the old password. The password is not changed if the validation password entered does not match the existing password stored in NVRAM.

❸ The password length must be between 15 and 30 alphanumeric characters. Any characters entered after the 30th character are not stored.

2.6.2 Setting the Console to Secure Mode

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

Example 2–9 Set Secure

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

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

The syntax is:

set secure

❶ The console is put into secure mode, and then the operator attempts to boot the operating system with command-line parameters. A message is displayed indicating that boot parameters are not allowed when the system is in secure mode.

❷ The **login** command is entered to turn off security features for the current console session. After successfully logging in, the operator enters a **boot** command with command-line parameters.

2.6.3 Turning Off Security During a Console Session

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

Example 2–10 Login

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

❶ The **login** command is entered, but the system is not in secure mode. A password must be set.

❷ A password is set.

❸ The **login** command is entered. After the password is entered, console security is turned off for the current session and the operator can enter commands.

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

```
Please enter the password:
```

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

If You Forget the Password

If you forget the current password, use the **login** command in conjunction with an RMC HALT to clear the password, as follows:

1. Enter the **login** command:

   ```
   >>> login
   ```

2. When prompted for the password, invoke the RMC (esc/esc/rmc), and enter the "HALT IN" command. You are then returned to the SRM console. Press the Return (or Enter) key.
3. Renter the RMC (esc/esc/rmc) and invoke the "HALT OUT" command. to release the halt. The password is now cleared and the console cannot be put into secure mode unless you set a new password.

2.6.4 Returning to User Mode

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

Example 2–11 Clear Password

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

❶ The wrong password is entered. The system remains in secure mode.

❷ The password is successfully cleared.

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

To clear the password without knowing the current password, you must use the **login** command in conjunction with the RMC Halt command, as described in Section 2.6.3.

2.7 Updating Firmware

Typically, you update system firmware whenever the operating system is updated. You might also need to update firmware if you add I/O device controllers and adapters, if enhancements are made to the firmware, or if the serial ROM or RMC firmware become corrupted.

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 HP.

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
      Name (ftp.digital.com:mcdowell): anonymous
      331 Guest login ok, send ident as password.
      Password:
      230 Guest login ok, access restrictions apply.
      Remote system type is UNIX.
      Using binary mode to transfer files.
      ftp> cd /pub/DEC/Alpha/firmware
      ftp> ls
          ...
      ftp> cd v5.0
      ftp> ls
           ...
      ftp> cd ds15
      ftp> get README
```

The README file explains how to download firmware updates.

2.7.1 Firmware Update Utility

The system firmware is updated from a Loadable Firmware Update Utility (LFU). When you boot the medium containing the update image, the LFU banner and command descriptions are displayed. Enter commands at the UPD> prompt.

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 2–12 Update Utility Display

```
Checking dqa0.0.0.16.0 for the option firmware files. . .
Checking dva0.0.0.1000.0 for the option firmware files. . .

Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update:


         ***** 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
 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


SRM                V6.3-1              srm_fw       V6.3-1

srom               V1.3-F              srom_fw      V1.3-F

rt                 V0.5-6               rt_fw       V0.5-9 (rt = RMC Runtime)

                                       cipca_fw     A420

                                       dfxaa_fw        3.20

                                       fca_2354_fw   CS3.81A4

                                       kgpsa_8k_fw   DS3.81A4
                                       kzpcc_smor      1.12
                                       kzpcc_fw      CQ16

                                       kzpsa_fw      A12

UPD>

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

                           DO NOT ABORT!

srm             Updating to 6.3-1...  Verifying 6.3-1...  PASSED.


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

2.7.2 Manual Updates

If the TIG or RMC booter need to be updated, 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:

```
             ***** 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.
 Update      Replaces current firmware with loadable data image.
 Verify      Compares loadable and hardware images.
 ? or Help   Scrolls this function table.
------------------------------------------------------------------

UPD> exit

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


             ***** 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.
 Update      Replaces current firmware with loadable data image.
 Verify      Compares loadable and hardware images.
 ? or Help   Scrolls this function table.
------------------------------------------------------------------

UPD>
```

3. To update the TIG enter **update tig** For example:

```
UPD> update tig

Confirm update on:
tig               [Y/(N)]y

WARNING: updates may take several minutes to complete for each
device.

                            DO NOT ABORT!

tig             Updating to 1.11...  Verifying 1.11...  PASSED.

UPD>
```

2.7.3 Updating from the CD-ROM

You can update the system firmware from CD-ROM.

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

   ```
   >>> boot dqa0
   ```

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

   ```
   UPD> exit
   ```

2.7.4 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:

```
>>> 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.

2.7.5 Updating from the Network

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

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. Boot the update file, >>>boot <update_file> -prot bootp eia0
4. Enter the **update** command at the UPD> prompt.

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.*

5. Boot the update file. For example:

   ```
   >>> boot -file fwupdate eia0
   ```

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

Chapter 3
Booting and Installing an Operating System

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

The following topics are included:

- Setting Boot Options
- Booting *Tru64 UNIX*
- Starting a *Tru64 UNIX* Installation
- Booting Linux
- Booting *OpenVMS*
- Booting *OpenVMS* from the InfoServer
- Starting an *OpenVMS* Installation

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

3.1 Setting Boot Options

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

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

auto_action	Determines the default action the system takes when the system is power cycled, reset, or experiences a failure.
bootdef_dev	Device or device list from which booting is to be attempted when no path is specified on the command line.
boot_file	Specifies a default file name to be used for booting when no file name is specified by the **boot** command.
boot_osflags	Defines parameters (boot flags) used by the operating system to determine some aspects of a system bootstrap.
eg*0_inet_init **ei*0_inet_init** **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 *Tru64 UNIX* from a RIS server.
eg*0_protocols **ei*0_protocols** **ew*0_protocols**	Defines a default network boot protocol (bootp or mop).

3.1.1 auto_action

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

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

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

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

The syntax is:

set auto_action *value*

The options for value are:

halt	The system remains in console mode after power-up or a system crash.
boot	The operating system boots automatically after either the SRM **init** command is issued, the Reset button is pressed (if configured), or the **reset** command is issued from the RMC.
restart	Restarts the operating system and tries to begin where it left off. If that fails, then it will reboot the operating system. The operating system boots automatically after either the SRM **init** command is issued, the Reset button is pressed (if configured), or the **reset** command is issued from the RMC. It also reboots after an operating system crash.

Examples

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

```
>>> show auto_action
auto_action             halt
>>> set auto_action restart
>>> init
.
.
.
>>> show auto_action
auto_action             restart
>>> show bootdef_dev
bootdef_dev             dka0
>>> boot
...
[Log in to UNIX and shutdown/reboot]

#shutdown -r now
...
console will boot from dka0
```

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

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

3.1.2 bootdef_dev

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

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

The syntax is:

set bootdef_dev *boot_device*

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

Example

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

```
>>> 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.*

3.1.3 boot_file

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

The syntax is:

set boot_file *filename*

Example

In this example, the system is set to boot using the file `vmunix`.

```
>>> set boot_file vmunix
```

3.1.4 boot_osflags

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

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

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

The syntax is:

set boot_osflags *flags_value*

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

Tru64 UNIX Systems

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

a Load operating system software from the specified boot device (autoboot). Boot to multi-user mode.

i Prompt for the name of a file to load and other options (boot interactively). Boot to single-user mode.

s Stop in single-user mode. Boots /vmunix to single-user mode and stops at the # (root) prompt.

D Full dump; implies "**s**" as well. By default, if *Tru64 UNIX* crashes, it completes a partial memory dump. Specifying "**D**" forces a full dump at system crash.

Example

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

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

Linux Systems

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

If flags_value is a single character, it corresponds to the line in the systems /etc/aboot.conf file with the single character being the line's tag character.

In addition, flags_value can be a string specifying all of the kernel's arguments. In this case, make sure to quote the string. For example, to specify a root file system on /dev/sda2 with a serial console, flags_value could be "root=/dev/sda2 console=ttyS0"

Flags_value Arguments for the default /etc/aboot.conf in a Red Hat Linux 7.2 for Alpha installation:

0 - boot normally, graphic console
1 - boot normally, serial console
2 - boot normally, graphic console with kernel messages also sent to the serial port
3 - single user mode, graphic console

Single-user mode is typically used for troubleshooting. To make system changes at this run level, you must have read/write privileges. The command to boot Linux into single-user mode is similar to the following example, where "/" root is in partition 2 of dka0, and the kernel is in /boot/compaq.gz.

```
>>> boot –file 2/boot/compaq.gz –flags "root=/dev/sda2 rw single"
```

Example

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

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

OpenVMS Systems

OpenVMS systems require an ordered pair, separated by a comma, as the *flags_value* argument: *root_number*, *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.

```
>>> 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.

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

3.1.5 e*x**0_inet_init

The eg*0_inet_init, 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 “eg”, “ei” or “ew,” for example, ewa0. The third letter is the adapter ID for the specific Ethernet controller. Replace the asterisk (*) with the adapter ID letter when using this command.

The syntax is:

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

The *value* is one of the following:

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

Example

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

3.1.6 ex*_protocols

The eg*0_protocols, 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 “eg,” “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 eg*0_protocols *protocol_value* or
set ei*0_protocols *protocol_value* or
set ew*0_protocols *protocol_value*

The options for *protocol_value* are:

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

Example

```
>>> show device

dqa0.0.0.16.0              DQA0               HL-DT-ST GCE-8302B 2.01
dva0.0.1000.0*             DVA0
ega0.0.0.5.2               EGA0               00-00-00-00-00-00
eia0.0.0.8.0               EIA0               40-00-04-A5-F8-00
pka0.7.0.1.2               PKA0                   SCSI Bus ID 7
pkb0.7.0.101.2             PKB0                   SCSI Bus ID 7

>>>
```

* DS15 systems have no floppy drive.

3.2 Booting Tru64 UNIX

Tru64 UNIX can be booted from a CD-ROM on a local drive (a CD-ROM drive connected to the system), from a local SCSI disk, or from a UNIX RIS server. Example 3–1 shows a boot from a local SCSI disk drive. The example is abbreviated. For complete instructions on booting Tru64 UNIX, see the *Tru64 UNIX Installation Guide*.

Example 3–1 Booting Tru64 UNIX from a Local SCSI Disk

```
>>>boot dka0
(boot dka0.0.0.8.0 -file vmunix)
block 0 of dka0.0.0.8.0 is a valid boot block
reading 14 blocks from dka0.0.0.8.0
bootstrap code read in
base = 2b6000, image_start = 0, image_bytes = 1c00(7168)
initializing HWRPB at 2000
initializing page table at 7fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Wednesday October 16, 2002

Loading vmunix ...
Loading at 0xfffffc0000430000

Sizes:
text =  5214016
data =   852864
bss  =  1780768
Starting at 0xfffffc00004415e0

Alpha boot: available memory from 0x44ec000 to 0x7ffee000
Compaq Tru64 UNIX V5.1B (Rev. 2650); Tue May  6 11:27:46 EST 2003
physical memory = 2048.00 megabytes.
available memory = 1979.00 megabytes.
using 7818 buffers containing 61.07 megabytes of memory

Firmware revision: 6.6-2698
PALcode: UNIX version 1.92-7
AlphaServer DS15
pci0 (primary bus:0) at nexus
isa0 at pci0
gpc0 at isa0
gpc1 not probed
ace0 at isa0
ace1 at isa0
lp0 at isa0
fdi0 at isa0
fd0 at fdi0 unit 0
aha_chim0 at pci0 slot 8
Adaptec AIC-7899 Adapter: H/W Rev 0, Driver Rev 2.274 CHIM V364A3
scsi0 at aha_chim0 slot 0 rad 0
aha_chim2 at pci0 slot 108
```

```
Adaptec AIC-7899 Adapter: H/W Rev 0, Driver Rev 2.274 CHIM V364A3
scsi1 at aha_chim2 slot 0 rad 0
ee0 at pci0 slot 9
ee0: COMPAQ Intel 82559ER (10/100 Mbps) Ethernet Interface
ee0: Driver Rev = V1.0.21, Chip Rev = 9, hardware address: 00-02-A5-20-C0-39
ee1 at pci0 slot 10
ee1: COMPAQ Intel 82559ER (10/100 Mbps) Ethernet Interface
ee1: Driver Rev = V1.0.21, Chip Rev = 9, hardware address: 00-02-A5-20-C0-3A
ata0 at pci0 slot 13
ata0: ACER M1543C
scsi2 at ata0 slot 0 rad 0
ee0: Autonegotiated, 100 Mbps full duplex
ee1: Autonegotiated, 100 Mbps half duplex
scsi3 at ata0 slot 1 rad 0
pci2 (primary bus:2) at nexus
vga0 at pci2 slot 7
 640x480 VGA, 16 colors
vga0: generic VGA driver
Created FRU table binary error log packet
kernel console: ace0
dli: configured
NetRAIN configured.
Random number generator configured.


vm_swap_init: swap is set to lazy (over commitment) mode

INIT: SINGLE-USER MODE
#
```

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

1. Power up the system. The system stops at the SRM console prompt, >>>.
2. Set boot environment variables, if desired. See the beginning of this chapter.
3. Install the boot medium. For a network boot, see Section 3.2.1.
4. Enter the **show device** command to determine the unit number of the drive for your device.
5. Enter the **boot** command and command-line parameters (if you have not set the associated environment variables). In Example 3–1, boot flags 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 Tru64 UNIX document entitled *Sharing Software on a Local Area Network* for registration information.

Example 3–2 RIS Boot

```
>>> show dev                                                    ❶

dka0.0.0.8.0               DKA0              COMPAQ BF03665A32  3B01
dka100.1.0.8.0             DKA100            COMPAQ BF03665A32  3B01
dqa0.0.0.13.0              DQA0                        DW-224E  A.1J
dva0.0.0.1000.0            DVA0*
eia0.0.0.9.0               EIA0              00-02-A5-20-C0-39
eib0.0.0.10.0              EIB0              00-02-A5-20-C0-3A
pka0.7.0.8.0               PKA0                  SCSI Bus ID 7
pkb0.7.0.108.0             PKB0                  SCSI Bus ID 7
>>>


>>> set ega0_protocols bootp                                    ❷
>>> set ega0_inet_init bootp                                    ❸
>>> boot ega0                                                   ❹
.
.
.
```

* DS15 systems have no floppy drive.

Systems running *Tru64 UNIX* support network adapters, designated eg*0, 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, >>>.
2. Set boot environment variables, if desired. See Section 3.1.
3. Enter the **show device** command ❶ to determine the unit number and adapter ID for your device.
4. Enter the following commands. Example 3–2 assumes you are booting from ega0. If you are booting from another adapter, enter that device name instead.

   ```
   >>> set ega0_protocols bootp
   >>> set ega0_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 ega0.

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

```
>>>b dqa0

(boot dqa0.0.0.16.0 -flags 0,0)
block 0 of dqa0.0.0.16.0 is a valid boot block
reading 15 blocks from dqa0.0.0.16.0
bootstrap code read in
base = 310000, image_start = 0, image_bytes = 1e00(7680)
initializing HWRPB at 2000
initializing page table at 5fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Tuesday February 26, 2002

Loading vmunix ...
.
.

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

*** Performing CDROM Installation

Loading installation process and scanning system hardware.

          Welcome to the Tru64 UNIX Installation Procedure
This procedure installs Tru64 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"
Refer to the "Installation Guide" and "Installation Guide - Advanced
Topics" for more detailed information about installing the operating

system.

The following options are available:

<Press RETURN for more>:

o  The "U.S. English Installation" installs the base operating system
   software.

o  The "Installation with Worldwide Language Support" (WLS) lets you
   internationalize your system.  This option installs the base operating
   system software as well as WLS software.  The additional software subsets
   provide support for various countries and their native languages.
```

```
o  The "Exit Installation" option stops the installation and puts your
   system in single-user mode with superuser privileges.  This option
   is intended for experienced UNIX system administrators who want to
   perform file system or disk maintenance tasks before the installation.
   This option may also be used for disaster recovery on a previously
   installed system.

Remember, you can always get extra information by typing help.

1) U.S. English Installation

2) Installation with Worldwide Language Support

3) Exit Installation

Enter your choice:
```

6. Boot the operating system from the CD-ROM drive connected to the system.
7. Follow the *Tru64 UNIX* installation procedure that is displayed after the installation process is loaded.
   - If your system console is a VGA monitor, the X Server is started and an Installation Setup window is displayed. Click on the fields in the Installation Setup window to enter your responses to the installation procedure.
   - If your system console is a serial terminal, a text-based installation procedure is displayed, as shown in Example 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 the firmware version, boot device, and boot parameters, and issue the boot command.

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

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

You need V6.3 or higher of the SRM console to install Linux. If you have a lower version of the firmware, you will need to upgrade. For instructions and the latest firmware images, see the following URL.

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

Linux Boot Procedure

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

```
>>> show version
version                    V6.3 May 1 2003 08:36:11
>>>
```

2. Enter the show device command to determine the unit number of the drive for your boot device, in this case dqa0.0.0.13.0.

```
>>>show dev
dka0.0.0.8.0               DKA0              COMPAQ BF03665A32  3B01
dka100.1.0.8.0             DKA100            COMPAQ BF03665A32  3B01
dqa0.0.0.13.0              DQA0                        DW-224E  A.1J
dva0.0.0.1000.0            DVA0*
eia0.0.0.9.0               EIA0              00-02-A5-20-C0-39
eib0.0.0.10.0              EIB0              00-02-A5-20-C0-3A
pka0.7.0.8.0               PKA0                  SCSI Bus ID 7
pkb0.7.0.108.0             PKB0                  SCSI Bus ID 7
>>>
```

* DS15 systems have no floppy drive.

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

Example 3–4 Linux Boot Output

```
(boot dqa0.0.0.13.0)
block 0 of dqa0.0.0.13.0 is a valid boot block
reading 174 blocks from dqa0.0.0.13.0
bootstrap code read in
base = 2b6000, image_start = 0, image_bytes = 15c00(89088)
initializing HWRPB at 2000
initializing page table at 7fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
aboot: Linux/Alpha SRM bootloader version 0.9b
aboot: switching to OSF/1 PALcode version 1.92
aboot: booting from device 'IDE 0 13 0 0 0 0 0'
aboot: no disklabel found.
Welcome to aboot 0.9b
Commands:

 h, ?                  Display this message
 q                     Halt the system and return to SRM
 p 1-8                 Look in partition <num> for configuration/kernel
 l                     List preconfigured kernels
 d <dir>               List directory <dir> in current filesystem
 b <file> <args>       Boot kernel in <file> (- for raw boot)
 i <file>              Use <file> as initial ramdisk
                       with arguments <args>
 0-9                   Boot preconfiguration 0-9 (list with 'l')
aboot> l
iso: Max size:329552   Log zone size:2048
iso: First datazone:28   Root inode number 57344
#
# Red Hat Linux/Alpha aboot configuration options:
#
#   0 - Boot the Red Hat Linux installer
#   1 - Boot the Red Hat Linux installer with serial console (ttyS0)
#   2 - Boot the Red Hat Linux installer with callback console (srm)
#       (required for "serial" console on AlphaServers ES47, ES80, GS1280)
#   3 - Boot the Red Hat Linux installer in text only mode
#   4 - Boot the Red Hat Linux installer in text only rescue mode
#   5 - Boot the Red Hat Linux installer but allow manual selection of
drivers
#   6 - Boot the Red Hat Linux installer and allow for other than just
#       a CD install (offers http, nfs, ftp, and local disk install methods)
#
# Additional arguments can be provided at the aboot> prompt. For example,
# '6 console=ttyS0' will boot an 'expert' install using a serial console.
#
0:/kernels/vmlinux.gz initrd=/images/cdrom.img
1:/kernels/vmlinux.gz initrd=/images/cdrom.img console=ttyS0
2:/kernels/vmlinux.gz initrd=/images/cdrom.img console=srm



3:/kernels/vmlinux.gz initrd=/images/cdrom.img text
4:/kernels/vmlinux.gz initrd=/images/cdrom.img rescue
5:/kernels/vmlinux.gz initrd=/images/cdrom.img noprobe
6:/kernels/vmlinux.gz initrd=/images/cdrom.img expert
```

```
aboot>
```

NOTE: *The Linux banner may be slightly different on other Linux distributions.*

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

```
>>> show dev                                                    ❶

dka0.0.0.8.0               DKA0              COMPAQ BF03665A32  3B01
dka100.1.0.8.0             DKA100            COMPAQ BF03665A32  3B01
dqa0.0.0.13.0              DQA0                        DW-224E   A.1J
dva0.0.0.1000.0            DVA0*
eia0.0.0.9.0               EIA0              00-02-A5-20-C0-39
eib0.0.0.10.0              EIB0              00-02-A5-20-C0-3A
pka0.7.0.8.0               PKA0                  SCSI Bus ID 7
pkb0.7.0.108.0             PKB0                  SCSI Bus ID 7
>>>



.
.
.
>>> boot -flags 0,0 dqa0                                        ❷
(boot dka0.0.0.7.1 -flags 0,0)
block 0 of dka0.0.0.7.1 is a valid boot block
reading 898 blocks from dka0.0.0.7.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 70400
initializing HWRPB at 2000
initializing page table at 3ffee000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

OpenVMS (TM) Alpha Operating System, Version V7.3-1
```

* DS15 systems have no floppy drive.

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, >>>.
2. Set boot environment variables, if desired. See Section 3.1.
3. Install the boot medium. For a network boot, see Section 3.6.
4. Enter the **show device** command ❶ to determine the unit number of the drive for your device.
5. Enter the **boot** command and command-line parameters (if you have not set the associated environment variables.) In Example 3–5, the **boot** command with the **-flags** option ❷ causes the system to boot from [SYS0.SYSEXE] on device dqa0.

3.6 Booting OpenVMS from the InfoServer

You can boot OpenVMS from InfoServer with a LAN device. The devices are designated eg*0, ew*0, or ei*0. The asterisk stands for the adapter ID (a, b, c, and so on). Example 3–6 lists only ei* devices.

Example 3–6 InfoServer Boot

```
>>> show dev                                                    ❶

dka0.0.0.8.0               DKA0              COMPAQ BF03665A32  3B01
dka100.1.0.8.0             DKA100            COMPAQ BF03665A32  3B01
dqa0.0.0.13.0              DQA0                        DW-224E  A.1J
dva0.0.0.1000.0            DVA0*
eia0.0.0.9.0               EIA0              00-02-A5-20-C0-39
eib0.0.0.10.0              EIB0              00-02-A5-20-C0-3A
pka0.7.0.8.0               PKA0                  SCSI Bus ID 7
pkb0.7.0.108.0             PKB0                  SCSI Bus ID 7
>>>

.
.
.
>>> boot -flags 0,0 -file apb_0731 eia0                         ❷
(boot eia0.0.0.9.0 -file APB_0731 -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
```

* DS15 systems have no floppy drive.

```
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_V73-1_SSB

              OpenVMS (TM) Alpha Operating System, Version V7.3-1
```

1. Power up the system. The system stops at the >>> 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 EIA0. APB_0731 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.

3.7 Starting an OpenVMS Installation

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

Example 3–7 OpenVMS Installation Menu

```
    OpenVMS (TM) Alpha Operating System, Version V7.3-1

Please enter date and time (DD-MMM-YYYY  HH:MM)  10-JUN-2003 14:00
$!  Copyright 2002 Compaq Computer Corporation.

    Installing required known files...

    Configuring devices...
%EIA0, Auto-negotiation mode set by console
%EIA0, FastFD (Full Duplex 100BaseTX) connection selected

    ************************************************************

    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)  Upgrade, install or reconfigure OpenVMS Alpha Version V7.3-1
        2)  Display products and patches that this procedure can install
        3)  Install or upgrade layered products and patches
        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. Boot the *OpenVMS* operating system CD-ROM.
2. Choose option 1 (Install or upgrade OpenVMS Alpha). To create the system disk, see the *OpenVMS* installation document.

Chapter 4
Configuring and Installing Options

This chapter shows how to configure and install user-installable options including the pedestal kit, memory DIMMs, PCI options, storage cages, hard drives, and tape drives. Installation of components not covered in this chapter is reserved for service providers and customers who have purchased a self-maintenance contract.

WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:
1. Remove any jewelry that may conduct electricity.
2. If accessing the system card cage, power down the system and wait 2 minutes to allow components to cool.
3. Wear an antistatic wrist strap when handling internal components.

WARNING: To prevent injury and possible damage to the hardware, unplug the power cord before removing or installing components.

Installation Tools

You need the following tools to install components.

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

4.1 Preparing to Install Options

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

Who should install options?

The following table list options and components that are customer installable. All other options and components can be replaced only by authorized service providers or customers with a self-maintenance contract.

Customer installable Options
Pedestal kit
Memory DIMMs
PCI options
Front access storage cage
Internal storage cage
Optional hard disks

Before opening the enclosure or installing components:

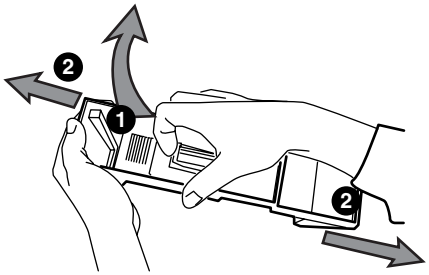
1. Shut down the operating system, according to the instructions in the operating system documentation.
2. Shut down peripheral devices.
3. Press the Power button on the system unit to the Off position.
4. Unplug the power cord.
5. Attach an antistatic wrist strap.

4.2 Installing a Pedestal Kit

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

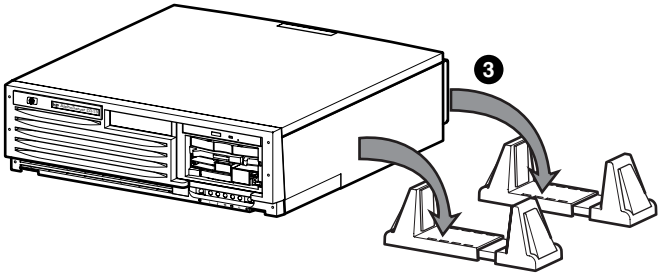
1. The pedestal kit includes two floor stands. Lift up on the release tab ❶ and spread the supports ❷ for each stand. See Figure 4–1.

Figure 4–1 Setting Up the Floor Stands



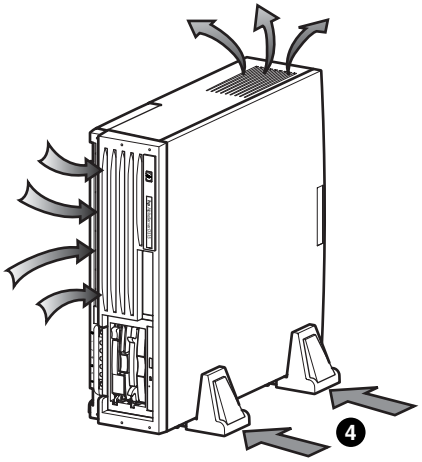
2. Set the floor stands several inches apart as shown in Figure 4–2; lift the system and place it into the floor stands ❸.

Figure 4–2 Placing a System in the Floor Stands



3. Close the supports securely against the system ❹. Pedestal systems must be positioned to allow proper airflow as shown in Figure 4–3.

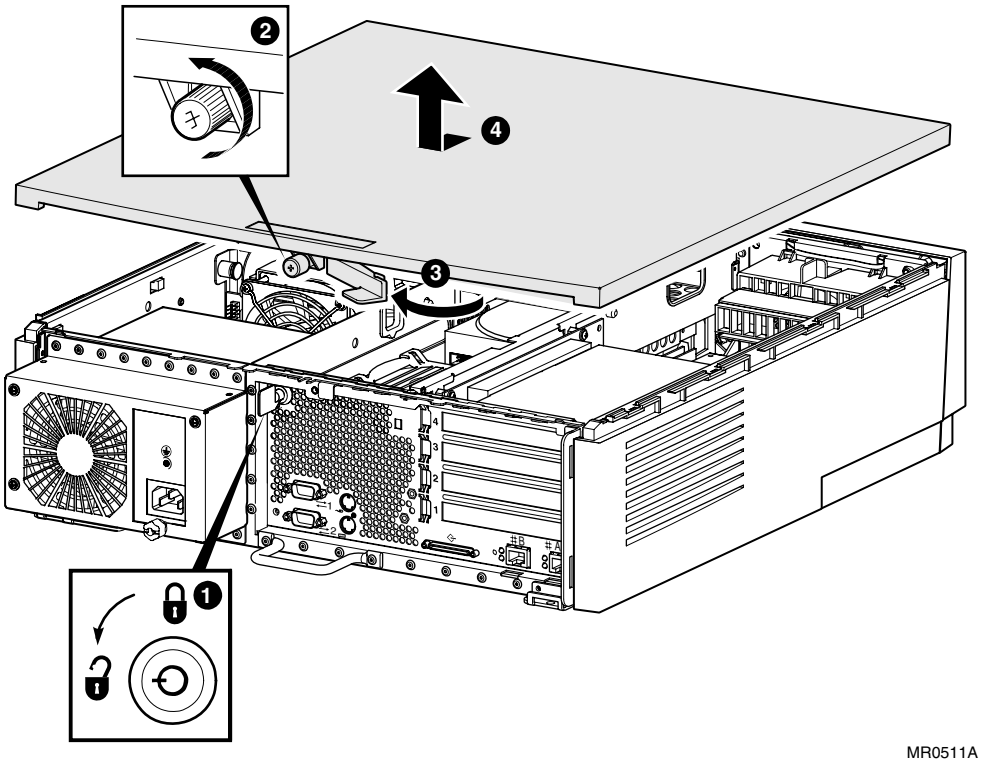
Figure 4–3 Latching the Supports and Ensuring Proper Airflow



4. To remove the pedestal kit, reverse these steps.

4.3 Removing the Top Cover

Figure 4–4 Removing the Top Cover

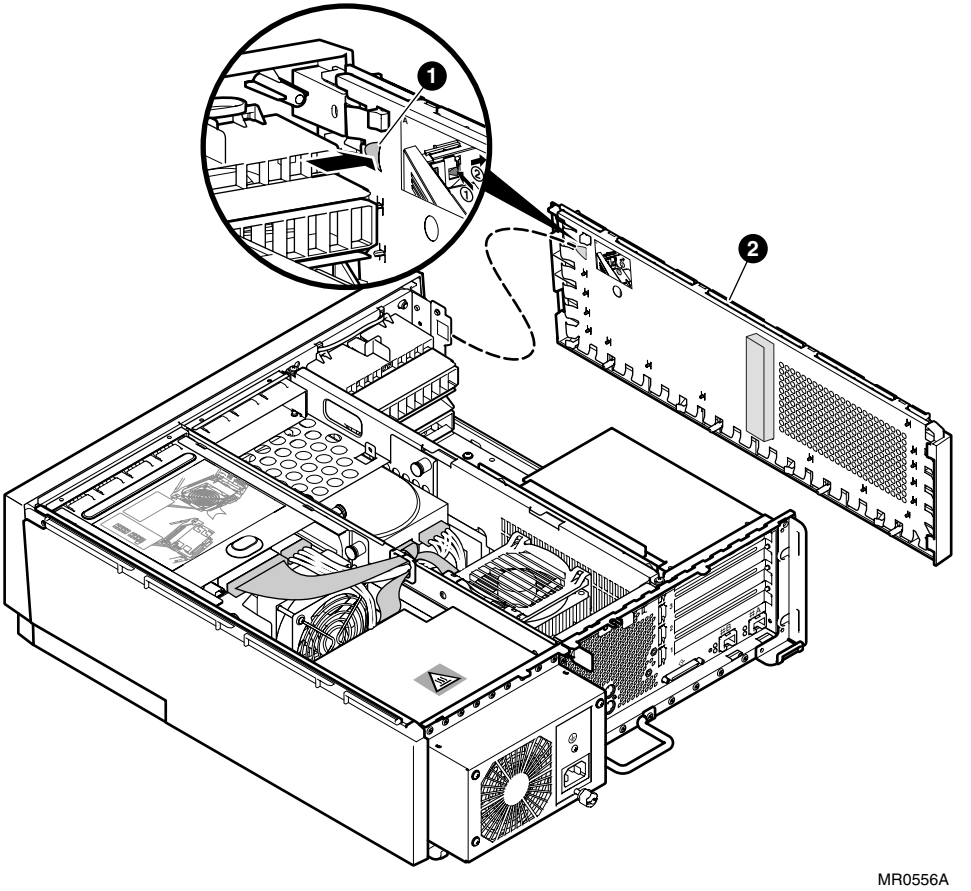


1. Unlock the system ❶ if it is locked.
2. Loosen the thumbscrew ❷ that secures the cover to the chassis.
3. Pull the catch lever rearward ❸ to pry the cover back.
4. Slide the cover rearward and upward to ❹ remove it.
5. To replace the cover, reverse these steps.

4.4 Removing the Side Cover

To remove the side cover, you must first remove the top cover. See Figure 4–5.

Figure 4–5 Removing the Side Cover



1. Press the offset tab ❶ to release the side cover ❷.
2. Slide it back and out.

4.5 Memory Configuration and Installation

The system supports a total of 4 DIMMs, divided into two arrays of two slots each. DIMMs within an array must be of the same size and speed. The system supports a maximum of 4 GB of memory. The minimum memory configuration is 512 MB.

The DS15 memory subsystem is distributed across four memory DIMM slots of SDRAM with PECL clocks. The system supports DIMM sizes of 256MB, 512MB, and 1024MB.

4.5.1 Memory Organization

DS15 memory is organized into two arrays of two DIMMs each. The DIMMs within a given array must be equivalent in every regard (not only size but functionality such as stacked and un-stacked DRAMs), and to have interleaved memory, all DIMMs in the system must be the same. The addressed arrays are 0 and 2.

4.5.2 Physical Layout on the System Board

Chapter 1, section **System Motherboard** shows the DIMM slot layout.

The memory slots are organized as follows:

J14= Array0, DIMM0

J15 = Array2, DIMM2

J12 = Array0, DIMM1

J13 = Array2, DIMM3

4.5.3 Configuration Rules

The following configurations are the only supported options for the DS15 system. If the system contains a memory configuration other than one listed here, the system will not initialize and the appropriate status will be displayed by the console.

- DIMMs must be the same size and speed within each array.
- To maximize performance, both arrays should be populated with the same DIMMs (this allows two-way interleaving between the arrays)

Table 4-1 Memory Configuration

Total Memory	DIMM0 J14	DIMM2 J15	DIMM1 J12	DIMM3 J13	Remarks
512MB	256MB		256MB		Minimum allowed configuration
1024MB	256MB	256MB	256MB	256MB	Recommended for performance
1024MB	512MB		512MB		
1536MB	256MB	512MB	256MB	512MB	
1536MB	512MB	256MB	512MB	256MB	
2048MB	512MB	512MB	512MB	512MB	Recommended for performance
2048MB	1024MB		1024MB		
2560MB	1024MB	256MB	1024MB	256MB	
2560MB	256MB	1024MB	256MB	1024MB	
3072MB	1024MB	512MB	1024MB	512MB	
3072MB	512MB	1024MB	512MB	1024MB	
4096MB	1024MB	1024MB	1024MB	1024MB	Recommended for performance

4.5.4 Installing and Removing DIMMs

Before installing DIMMs, shut down the operating system, turn off power to the system, unplug the power cord, and attach an antistatic wrist strap.

Caution: You must unplug the power cord to the system and wait for the green LED ❶ on the PCI riser card (see Figure 4–6) to go out before removing or installing a DIMM.

To install Memory DIMMs, follow these steps.

1. To prepare to replace or add DIMMs, see section 4.1.
2. Use the instruction in section 4.3 to gain access to the system.
3. Use Table 4-1 and the Memory Configuration Rules to determine where sets of memory DIMMs should be installed.

Figure 4–6 PCI Riser LED

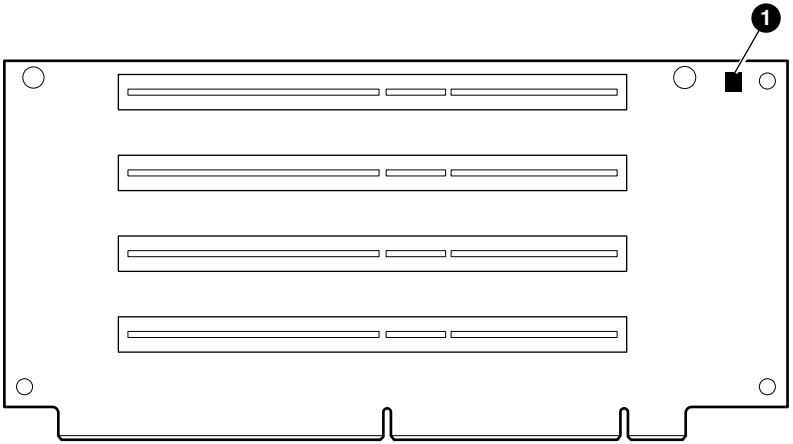


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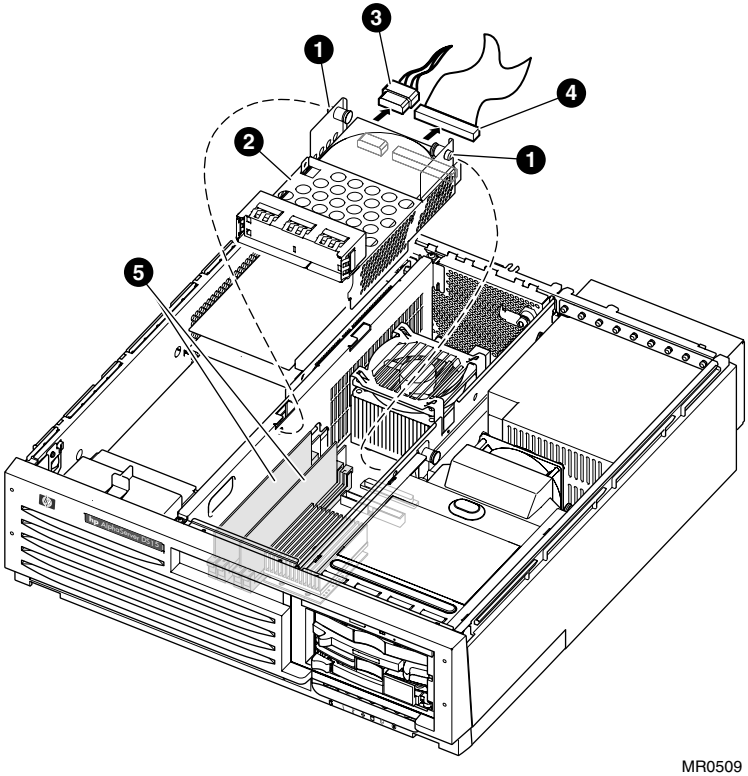
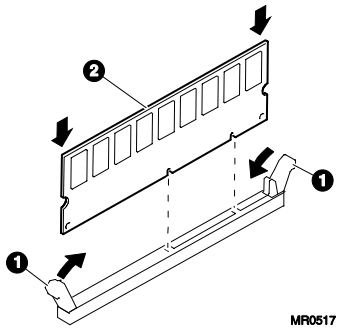
Figure 4–7 Removing the Center Bay Drive



4. Remove the optional center access cage to access the DIMM slots.
   a. Pull the two spring loaded insert posts ❶ (see Figure 4–7).
   b. Disconnect the power ❸ and data cables ❹.
   c. Lift out the cage ❷ to access the DIMM slots ❺.

Figure 4–8 Installing DIMMs

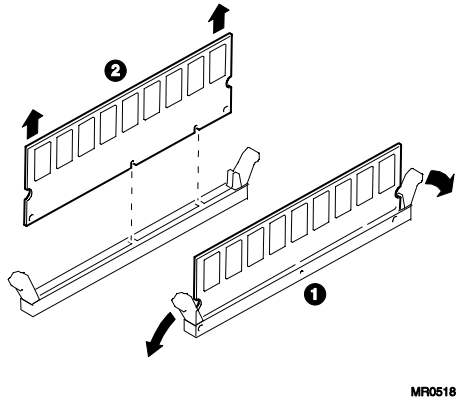


5. To install the DIMM ❷, align the notches on the gold fingers with the connector keys as shown.
6. Secure the DIMM with the clips ❶ on the DIMM slot.

Verification

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

Figure 4–9 Removing DIMMs



1. Release the clips ❶ securing the appropriate DIMM ❷.
2. Slide out the DIMM as shown in Figure 4–9.

4.6 PCI Configuration and Installation

The DS15 PCI slots are all 3.3 volts, and are normally automatically configured when you boot the system after installing the option.

When installing PCI option modules, you do not normally need to perform any configuration procedures; the system configures PCI modules automatically. But because some PCI option modules require and provide their own configuration utility CDs, refer to the option documentation.

4.6.1 PCI Configuration

PCI slot 1 is the bottom slot on a desktop or rackmounted system or the right-hand slot as viewed from the back of a pedestal system. See Section 1.8 for a view of PCI slot numbering.

PCI modules are either designed for 5.0 volts or 3.3 volts, or are universal in design and can plug into either 3.3 or 5.0 volt slots. The DS15 system provides only 3.3 volt slots.

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

There is no direct correspondence between the physical numbers of the slots on the PCI riser and the logical slot identification reported with the SRM console **show config** command (described in Chapter 2). Table 4-2 maps the physical slot numbers to the SRM logical ID numbers for the I/O connectors.

Table 4-2 Comparison of Physical and Logical Slot Numbering

Physical Slot Number	Hose Number	Logical Slot ID
1	2	7
2	2	8
3	2	9
4	2	10

PCI Configuration Rules

To run at 66 MHz, the following conditions must be met:

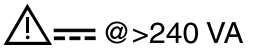
- Both slot 3 and 4 must be empty.
- A 33 MHz module must not be installed in either slot 1 or 2.
- A 66 MHz module must be installed in either slot 1 and/or 2, otherwise the bus will run at 33 MHz.

4.7 PCI Option Installation

Some PCI options require drivers to be installed and configured. These options come with 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.

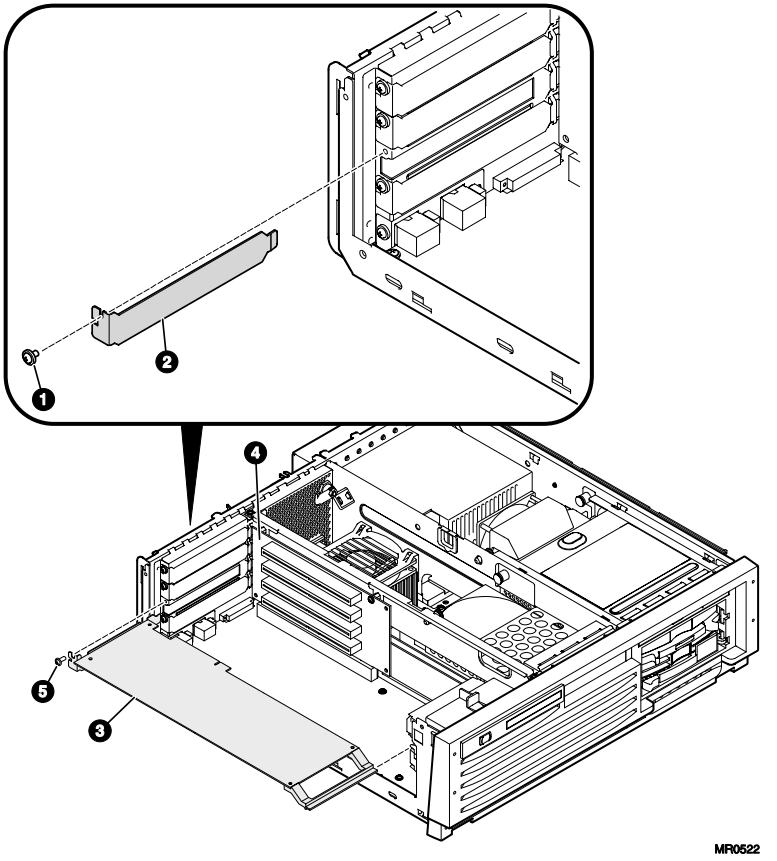


WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with components.

WARNING: The I/O area houses parts that operate at high temperatures. To prevent injury, avoid contact with components.

CAUTION: *Check the keying before you install the PCI module and do not force it in. Plugging a module into a wrong slot can damage it.*

Figure 4–10 Installing a PCI Option



1. Remove the pedestal kit (if applicable); see 4.2 and the top cover, 4.3.
2. Remove the side cover; see 4.4.
3. Remove the slot cover screw ❶ and the slot cover ❷ by sliding it out of the side of the enclosure.
4. Slide the PCI option ❸ into the desired slot and plug it into the PCI riser ❹.
5. Insert the screw ❺ to secure the PCI option.
6. Replace the side and top covers and pedestal stand (if applicable).

Verification

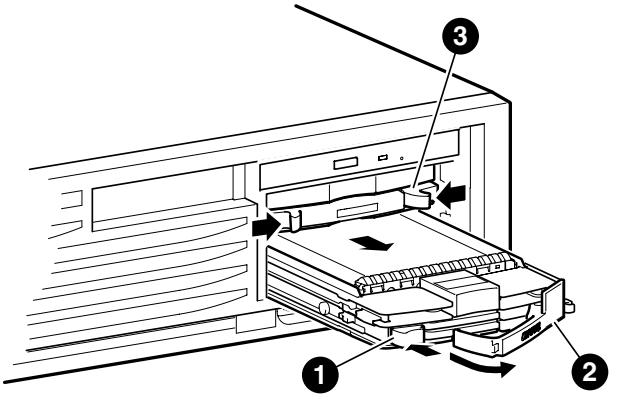
1. Turn on power to the system.
2. At the >>> prompt, enter the SRM **show config** command. Examine the PCI bus information in the display to make sure that the new option is listed.
3. If you installed a bootable device, enter the SRM **show device** command to determine the device name.

See Chapter 1, section **PCI Slots** for more information about PCI slots.

4.8 Installing Disk Drives

The DS15 contains two storage subsystems: either an internal storage cage or a front access storage cage can be used for the bay on the front right, and a drive cage is also used in the center.

Figure 4–11 Installing and Removing Disk Drives (Front Access)



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CAUTION: *Do not remove a drive that is in operation. A drive should be removed only when its Activity LED is off. See Figure 4–18 for location of LEDs.*

Installing Front Access Drives

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

Removing Front Access Drives

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

Removing the Filler

1. Pull both latches ❸ toward the middle to release the filler and then pull it out.

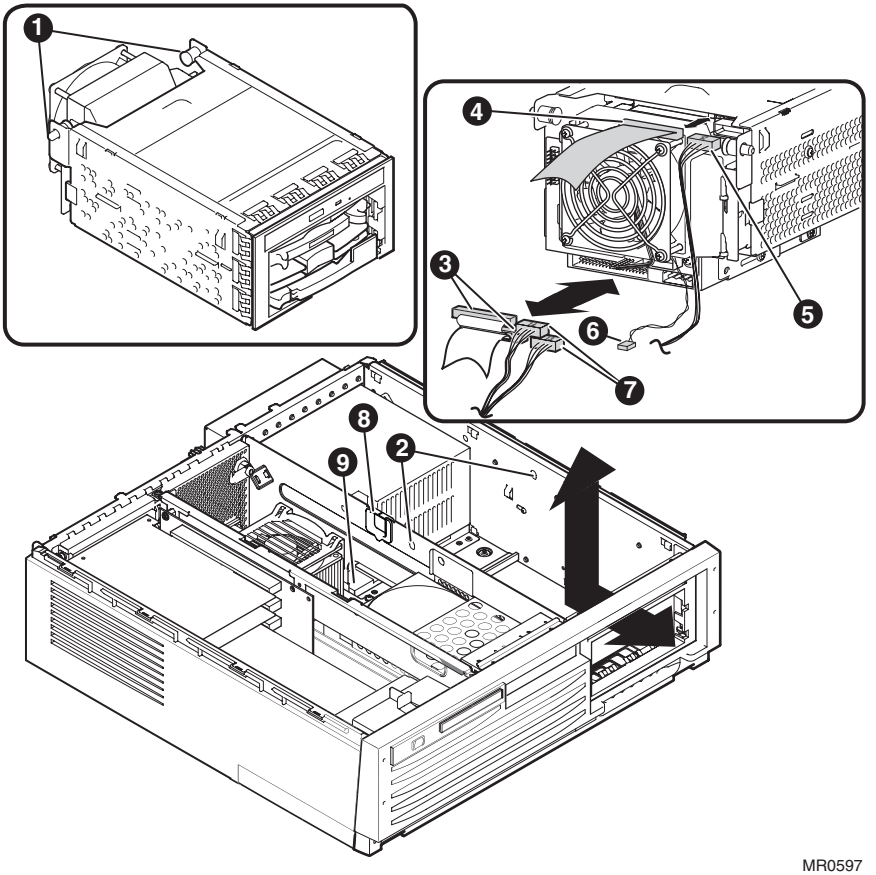
Verification

At the SRM console, you must enter the **init** command and use the **show device** command to verify that the system sees the new drive.

Removing and Installing the Front Access Storage Cage

1. Use the instructions in Section 4.3 to gain access to the system.
2. Remove the IDE data ❹ and power ❺ cables. See Figure 4–12.
3. Disconnect the fan cable ❻ from the main logic board.
4. All the cables are routed through the top slot area ❽ , except the fan cable, which is routed through the lower slot area ❾.
5. Pull the two spring loaded insert posts ❶ inward so that the posts come out of the receiving holes ❷.
6. Pull the storage cage back and up to remove it from the system.
7. Remove the SCSI and power cables ❸ and ❼.
8. Reverse the procedure to install the storage cage.

Figure 4–12 Removing and Installing the Front Access Storage Cage

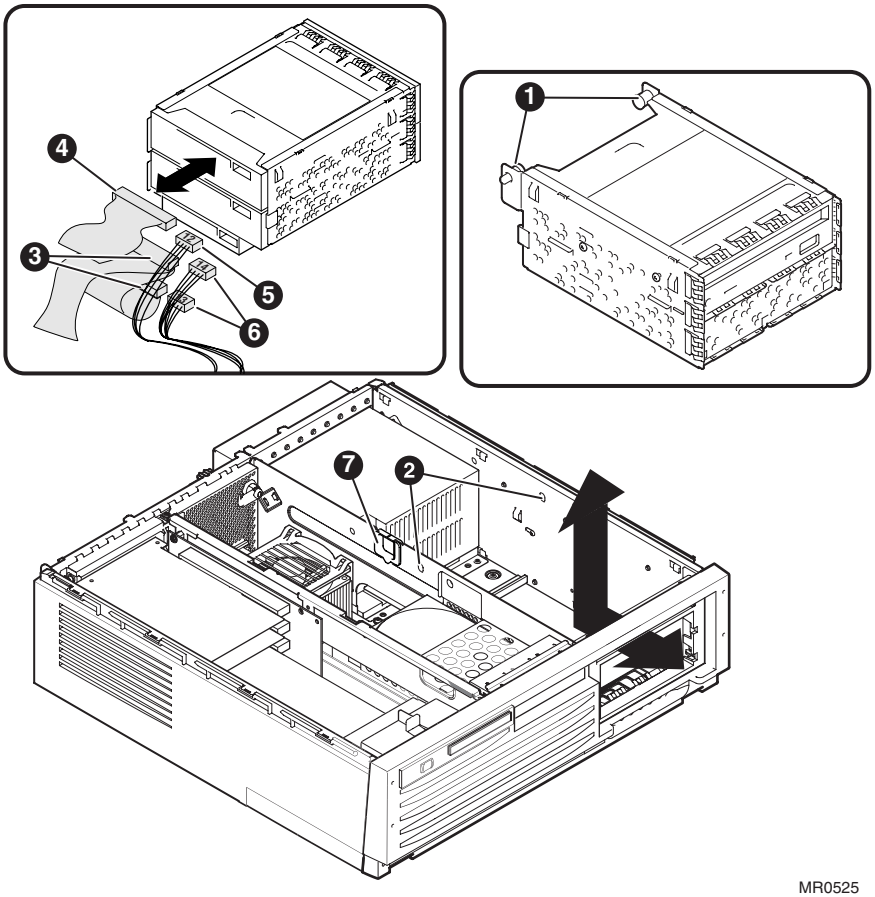


Removing and Installing the Internal Storage Cage

1. Use the instructions in Section 4.3 to gain access to the system.
2. Remove the IDE data ❹ power cables ❺. See Figure 4–13.
3. All the cables are routed through the top slot area❼ .
4. Pull the two spring loaded insert posts ❶ inward so that the posts come out of the receiving holes ❷.
5. Pull the storage cage back and up to remove it from the system.
6. Remove the SCSI and power cables ❸ and ❻.

Reverse the procedure to install the storage cage.

Figure 4–13 Removing and Installing the Internal Storage Cage



Removing and Installing the Bottom Drive on the Front Access Storage Cage

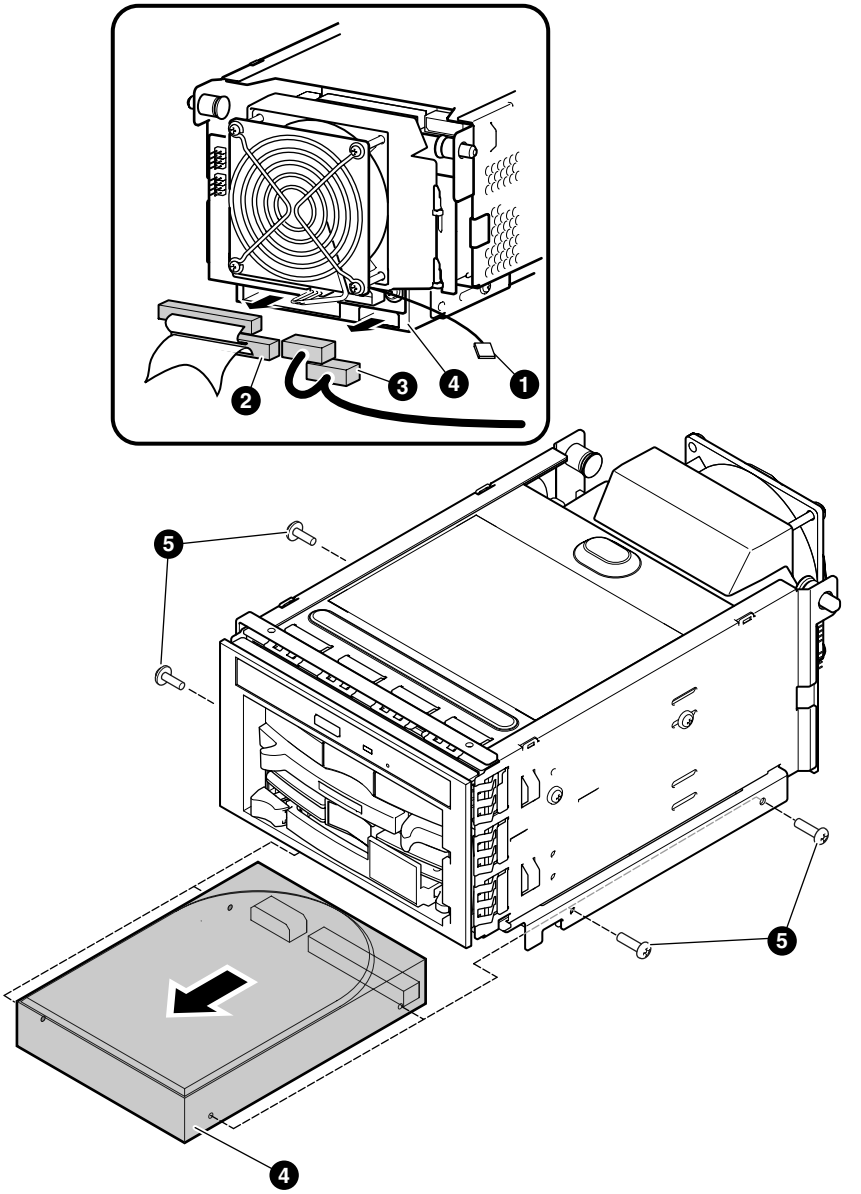
After removing the front access storage cage from the system, perform the following steps:

1. Remove the SCSI ❷ and power cables ❸. See Figure 4–14.
2. Remove the four 6-32 screws ❺ .
3. Slide the drive ❹ out.
4. Reverse the procedure to install the drive.

Verification

At the SRM console, you must enter the **init** command and use the **show device** command to verify that the system sees the new drive.

Figure 4–14 Removing and Installing the Bottom Drive on the Front Access Storage Cage



Removing and Installing the Bottom Drive on the Internal Storage Cage

After removing the internal storage cage from the system, perform the following steps:

1. Disconnect the SCSI ❶ and power ❷ cables. See Figure 4–15.
2. Remove the four 6-32 screws ❹.
3. Remove the drive ❸ .
4. Reverse the procedure to install the drive.

Figure 4–15 Removing and Installing the Bottom Drive on the Internal Storage Cage

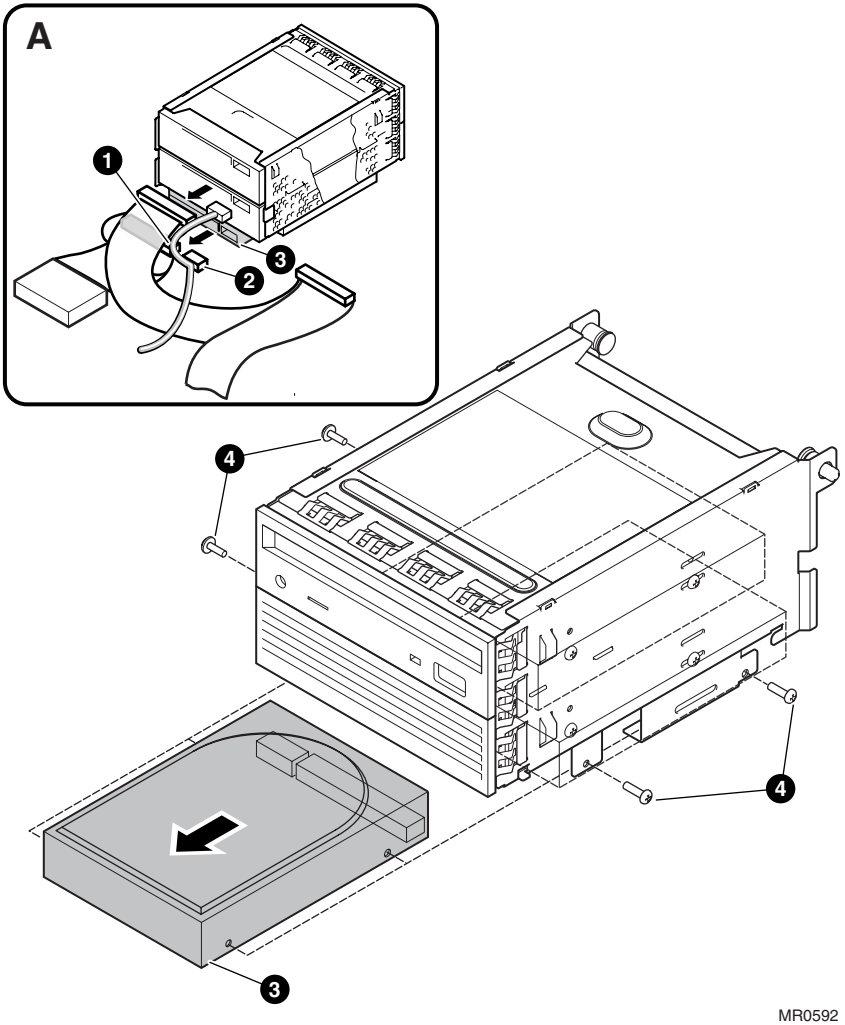
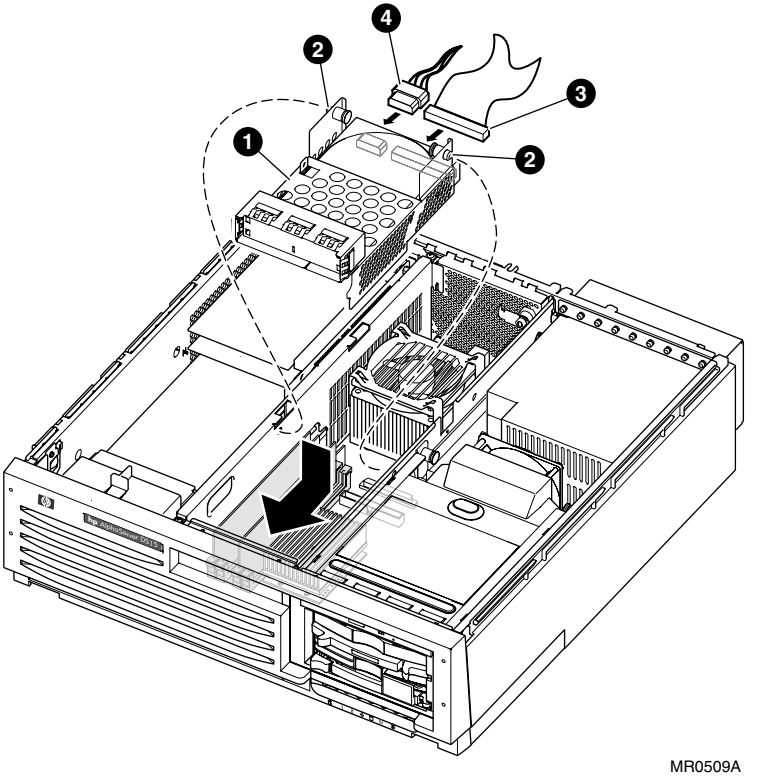


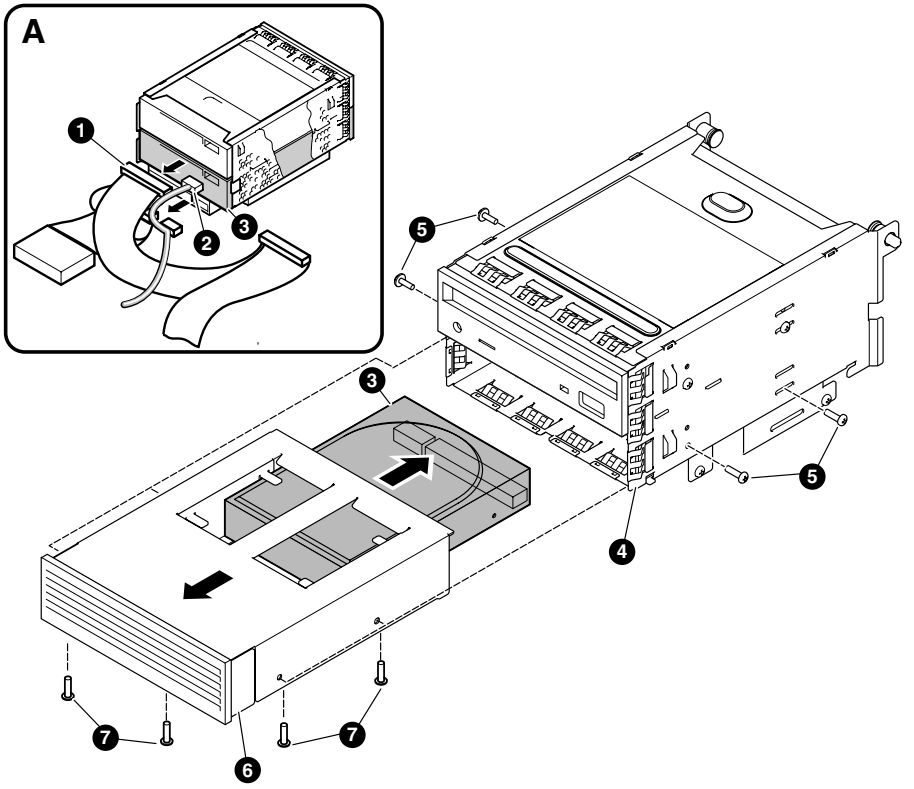
Figure 4–16 Installing and Removing the Center Internal Storage Bay



Installing and Removing Center Internal Storage Bay

1. Use the instruction in section 4.3 to gain access to the system.
2. Plug in the SCSI cable ❸ and the power cable ❹.
3. Insert the drive carrier ❶ into the center internal storage bay as shown and push it forward.
4. Pull the two spring loaded insert posts ❷ inward and push the back of the carrier down.
5. Reverse the procedure to remove the storage bay.

Figure 4–17 Removing and Installing the Middle Drive on the Internal Storage Cage



Removing and Installing the Middle Drive on the Internal Storage Cage

After removing the internal storage cage from the system, perform the following steps:

1. Remove the SCSI ❶ and power ❷ cables from the drive ❸. See Figure 4–17.
2. Remove the four 6-32 screws ❺ and slide the drive assembly ❻ from the cage ❹ .
3. Remove the four 6-32 screws ❼ that hold the drive in the drive assembly and then slide the drive out.
4. Reverse the procedure to install the drive.

4.9 Drive Status LEDs

Three status LEDs display activity, power, and fault. Figure 4–18 shows the LEDs and their positions on the carrier, and Table 4-3 explains the status of each.

Figure 4–18 Disk Drive LEDs

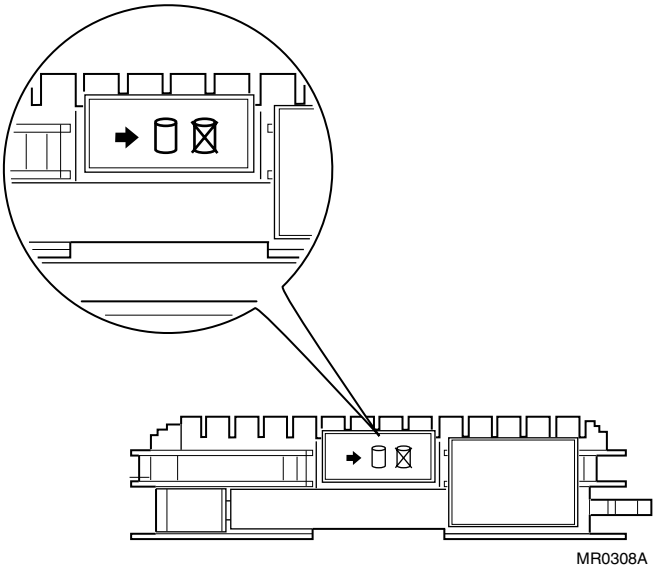


Table 4-3 Drive Status

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

4.10 External SCSI Expansion

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

SCSI Expansion Rules

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

- The device must be supported by the operating system. Consult the 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	12 meters

- 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.

4.10.1 Shared SCSI Support

Tru64 UNIX supports shared SCSI busses using the DS15 embedded external SCSI port. When operating on a shared bus, jumper J41 (see Figure 4–19) must be installed on the system board. This will disable the on-board SCSI terminators for that SCSI bus. Additional setup is required including modifying parameters through the SCSI BIOS. Refer to the appropriate Tru64 UNIX documentation for complete information on shared bus support and setup. Note that when not operating on a shared bus, J41 must removed and all SCSI BIOS parameters must be reset to their default values otherwise unpredictable system behavior may result.

Figure 4–19 Shared SCSI Operation Jumper

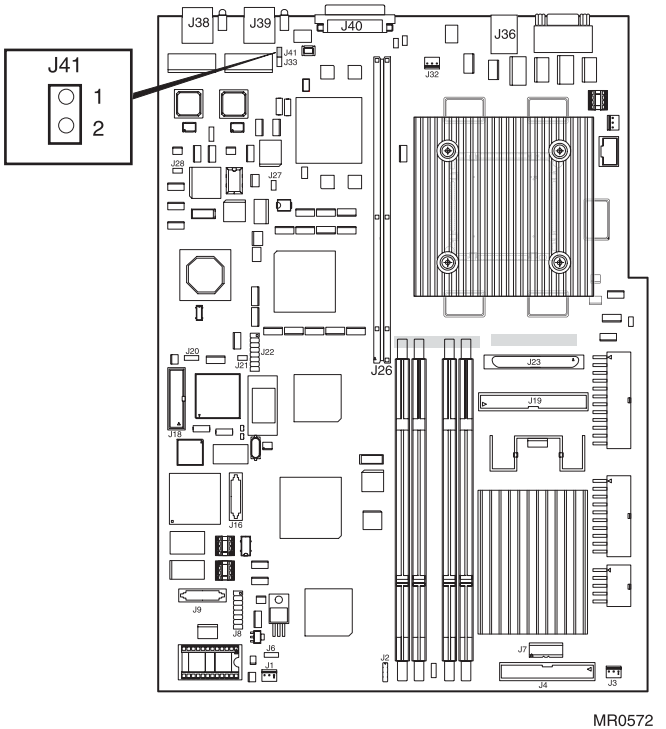


Figure 4–20 External SCSI

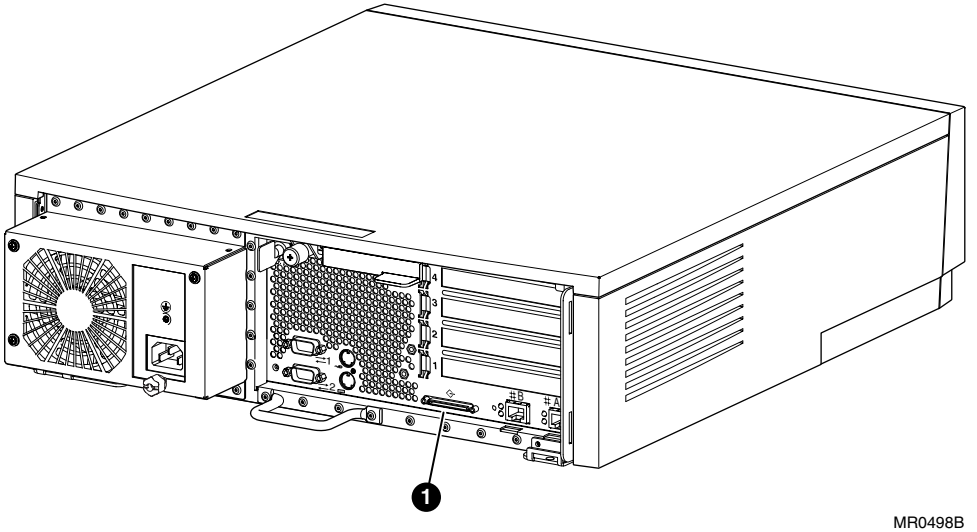


Figure 4–20 shows the location of the external SCSI connector ❶.

4.11 Updating Firmware

Typically, you update system firmware whenever the operating system is updated. You might also need to update firmware if you add I/O device controllers and adapters or if enhancements are made to the firmware. Firmware is updated from the Loadable Firmware Update utility (LFU). The LFU banner is shown in Figure 4–21.

Figure 4–21 Loadable Firmware Update Utility

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

4.11.1 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 HP.

Alpha Firmware Internet Access

You can also obtain Alpha firmware update files from the Internet:
http://ftp.digital.com/pub/digital/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.

4.11.2 Updating Firmware from the CD-ROM

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

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

   ```
   >>> boot dqa0
   ```

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

Chapter 5
Firmware

The SRM user interface is the command-line interface that allows you to configure and boot the operating system and verify the configuration of devices.

This chapter describes typical functions performed from the SRM console and the commands and environment variables used for these functions. Key sections of this chapter are:

- SRM Console Overview
- Command Summary
- Getting Help
- Displaying the Configuration
- Displaying the Bootable Devices
- Displaying the Memory Configuration
- Displaying the Power Status
- Displaying the SRM Console Version
- Displaying the CPU Status
- Displaying the PALcode Version
- Booting an Operating System
- Testing the System
- Updating Firmware
- Forcing a System Crash Dump
- Initializing the System
- Reading a File
- Creating a Power-up Script
- Setting Console Security
- Setting and Viewing Environment Variables

5.1 SRM Console Overview

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

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

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

Console Prompt

The SRM console prompt is some variant of >>> (three right angle-brackets).

Change Prompt

The following is an example of how to show and change the prompt display.

```
>>>show prompt
prompt              >>>
>>>set prompt "system1>"
system1>
system1>
system1>
```

Environment Variables

SRM has environment variables, a number of which are predefined and correspond to locations in NVRAM. You can view the entire list of environment variables and their values with the **show** command (there are quite a few of them, so you will probably want to pipe its output to **more**). You can also use the * (asterisk) wildcard to show variables matching a pattern. For example, **show boot*** displays all the variables starting with “boot.” The environment variables are described in Section 5.20. Boot environment variables are described in Chapter 3.

5.1.1 Invoking the SRM Console

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

Invoking SRM from Tru64 UNIX, Linux, or OpenVMS

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

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

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

Note: *Jumper J22 (pins 13 – 14), on the system motherboard, must not be inserted to force entry with the Halt button. (installed = reset / not installed = halt). Halt is the default mode.*

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

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

Returning to SRM from RMC

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

5.2 Command Summary

Table 5–1 summarizes alphabetically the most frequently used SRM console commands; Table 5–2 gives the command notation formats; and Table 5–3 shows special characters used on the command line.

Table 5–1 Summary of SRM Console Commands

Command	Function
boot	Loads and starts the operating system.
clear ***envar***	Resets an environment variable to its default value.
continue	Resumes program execution on the processor.
crash	Forces a crash dump at the operating system level.
edit	Invokes the console line editor on a RAM script or on the user power-up script, "nvram," which is always invoked during the power-up sequence.
halt	Halts processor. (Same as **stop**.)
help (or man) ***command***	Displays information about the specified console command.
init	Resets the SRM console and reinitializes the hardware.
login	Turns off secure mode, enabling access to all SRM console commands during the current session.
more [filename]	Displays a file one screen at a time.
set envar	Sets or modifies the value of an environment variable.
show envar	Displays the state of the specified environment variable.
stop	Halts the processor. (Same as halt.)
test	Verifies the configuration of the devices in the system.

Table 5–2 Notation Formats for SRM Console Commands

Attribute	Conditions
Length	Up to 255 characters, not including the terminating carriage return or any characters deleted as the command is entered. To enter a command longer than 80 characters, use the backslash character for line continuation (see Table 5–3).
Case	Upper- or lowercase characters can be used for input. Characters are displayed in the case in which they are entered.
Abbreviation	Only by dropping characters from the end of words. You must enter the minimum number of characters to identify the keyword unambiguously. Abbreviation of environment variables is allowed with the **show** command.
Options	You can use command options, to modify the environment, after the command keyword or after any symbol or number in the command. See individual command descriptions for examples.
Numbers	Most numbers in console commands are in decimal notation.
No characters	A command line with no characters is a null command. The console program takes no action and does not issue an error message; it returns the console prompt. The console supports command-line recall and editing.
Spaces or tabs	Multiple adjacent spaces and tabs are compressed and treated as a single space. Leading and trailing spaces are ignored.

Table 5–3 Special Characters for SRM Console

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

Table 5–3 Special Characters for SRM Console (Continued)

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

5.3 Getting Help

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

Example 5–1 Help (or Man)

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

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

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

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

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

none	Displays the complete list of commands for which you can receive help.
command_name	Displays information about the console command.
argument_string (such as “sh”)	Displays information about all commands that begin with that string.

5.4 Displaying the Configuration

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

Example 5–2 Show Config

```
>>>show config
                          hp AlphaServer DS15
Firmware                                                              ❶
SRM Console:   X6.6-2092
PALcode:       OpenVMS PALcode V1.98-6, Tru64 UNIX PALcode V1.92-7
SROM Extended:         V1.0-1
SROM Fail Safe:        V1.0-0
RMC Runtime:           V0.6-3
RMC Booter:            V0.5-6
Processors                                                            ❷
CPU 0          Alpha EV68CB pass 4.0 1000 MHz  2MB Bcache
Core Logic                                                            ❸
Cchip          Rev 18
Dchip          Rev 17
PPchip 0       Rev 17
TIG            Rev 1.9
Acer Chip Revision A1-E
Memory                                                                ❹
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0       1024Mb     0000000000000000    2-Way
    2       1024Mb     0000000040000000    2-Way

     2048 MB of System Memory
 Slot   Option                Hose 0, Bus 0, PCI - 33 MHz              ❺
   7    Acer Labs M1543C                          Bridge to Bus 1, ISA
   8/0  Adaptec AIC-7899      pka0.7.0.8.0          SCSI Bus ID 7
                              dka0.0.0.8.0          COMPAQ BF03665A32
                              dka100.1.0.8.0        COMPAQ BF03665A32
   8/1  Adaptec AIC-7899      pkb0.7.0.108.0        SCSI Bus ID 7
   9    Intel 82559ER Ethern  eia0.0.0.9.0          00-02-A5-20-C0-39
  10    Intel 82559ER Ethern  eib0.0.0.10.0         00-02-A5-20-C0-3A
  13    Acer Labs M1543C IDE  dqa.0.0.13.0
                              dqb.0.1.13.0
                              dqa0.0.0.13.0         DW-224E

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

 Slot   Option                Hose 2, Bus 0, PCI - 66 MHz
   7    Radeon 7500 PCI       vga0.0.0.7.2


SROM loads from Flash                                                 ❻
Console loads from SRM
Flash updates are Enabled for RMC
Flash updates are Enabled for SRM
Flash updates are Enabled for FailSafe
```

```
Flash updates are Disabled for RMC Booter
Halt/Reset is set to HALT
>>>
```

❶ **Firmware**. Version numbers of the SRM console, PALcode, serial ROM, RMC runtime, and RMC booter.

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

❺ This part of the command output shows the PCI buses.

The "Slot" column lists the slots (logical IDs) seen by the system. Logical IDs identify both installed PCI cards and onboard chips. In this example, the onboard controllers and the Acer Labs M1543C IDE.

The logical IDs do not correspond directly to the physical slots into which the devices are installed.

NOTE: The naming of devices (for example,dqa.0.0.13.0) follows the conventions given in Table 5–5.

The slots in Example 5–2 are explained below.

Hose 0, Bus 0, PCI

Slot 7	Onboard Acer chip. Provides bridge to Bus 1 (ISA)
Slot 8	Onboard dual channel Adaptec SCSI controller
Slot 9	Onboard Ethernet controller
Slot 10	Onboard Ethernet controller
Slot 13	Onboard Acer chip IDE

Hose 0, Bus 1 (ISA)

Hose 2, Bus 0, PCI

Slot 7	ATI Radeon 7500 Graphics Accelerator running at 66 MHz

❻ **Jumpers**. State of jumpers

Table 5–4 How Physical I/O Slots Map to Logical Slots

Physical Slot	SRM Logical Slot ID
1	Hose 2 Slot ID 7
2	Hose 2 Slot ID 8
3	Hose 2 Slot ID 9
4	Hose 2 Slot ID 10

5.5 Displaying the Bootable Devices

The show device command displays the devices and controllers in the system, including the bootable devices.

Example 5–3 Show Device

```
>>> show device
dka0.0.0.8.0                DKA0               COMPAQ BF03665A32  3B01
dka100.1.0.8.0              DKA100             COMPAQ BF03665A32  3B01
dqa0.0.0.13.0               DQA0                         DW-224E  A.1J
dva0.0.0.1000.0             DVA0*
eia0.0.0.9.0                EIA0               00-02-A5-20-C0-39
eib0.0.0.10.0               EIB0               00-02-A5-20-C0-3A
pka0.7.0.8.0                PKA0                   SCSI Bus ID 7
pkb0.7.0.108.0              PKB0                   SCSI Bus ID 7
>>>
```

* DS15 systems have no floppy drives.

Table 5–5 Device Naming Conventions

	Category	Description
dk	Driver ID	Two-letter designator of port or class driver dk SCSI drive or CD — ew Ethernet port dq IDE CD-ROM — fw FDDI device dr RAID set device — mk SCSI tape du DSSI disk — mu DSSI tape eg Ethernet port — pu DSSI port ei Ethernet 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.
8	Logical slot number	Corresponds to PCI slot number
0	Hose number	0 — PCI 0 2 — PCI 2

5.6 Displaying the Memory Configuration

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

Example 5–4 Show Memory

```
>>> show memory

    Array       Size       Base Address    Intlv Mode
---------  ----------  -----------------  ----------
    0       1024Mb     0000000000000000    1-Way

     1024 MB of System Memory
>>>
```

5.7 Displaying the Power Status

Use the show power command to display information about status of the power supply, system voltages, fans, and temperature. See Chapter 7 for troubleshooting with the show power command.

Example 5–5 Show Power

```
>>> show power

Voltage Sensor 1.65v - GOOD
Voltage Sensor 2.50v - GOOD
Voltage Sensor  3.3v - GOOD
Voltage Sensor 5.00v - GOOD
Voltage Sensor 12.0v - GOOD
Voltage Sensor -12v - GOOD
Voltage Sensor 3.3vsb - GOOD
Voltage Sensor 5vsb - GOOD
Voltage Sensor 2.85v(A) - GOOD
Voltage Sensor 2.85v(B) - GOOD
Fan Sensor System - GOOD
Fan Sensor PCI - GOOD
Fan Sensor CPU - GOOD
Fan Sensor DISK - GOOD
Thermal Sensor LM75 - GOOD

>>>
```

5.8 Displaying the SRM Console Version

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

Example 5–6 Show Version

```
>>> sho version
version                 V6.3-1 Jun  3 2002 14:05:03
>>>
```

5.9 Displaying the CPU Status

Use the show cpu command to display the status of the CPU.

Example 5–7 Show CPU

```
>>> show cpu

Primary CPU:       00
Active CPUs:       00                                    ❶
Configured CPUs:   00
```

❶ CPU has been brought successfully online and is ready to run an operating system.

5.10 Displaying the PALcode Version

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

Example 5–8 Show Pal

```
>>> sho pal
pal             OpenVMS PALcode V1.96-40, Tru64 UNIX PALcode V1.90-31
>>>
```

5.11 Booting an Operating System

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

Example 5–9 Tru64 UNIX Boot (Abbreviated)

```
>>> boot dka200
boot dka100.2.0.1.2 -flags a)
block 0 of dka200.2.0.1.2 is a valid boot block
reading 14 blocks from dka200.2.0.1.2
bootstrap code read in
base = 314000, image_start = 0, image_bytes = 1c00(7168)
initializing HWRPB at 2000
initializing page table at 5fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

UNIX boot - Wednesday August 01, 2001

Loading vmunix
.
.
.

The system is ready.


Compaq Tru64 UNIX V5.1A (Rev. 1885) (QA0005.mro.cpqcorp.net) console

login:
```

The **boot** command initializes the processor, loads a program image from the specified boot device, and transfers control to that image. If you do not specify a boot device in the command line, the default boot device is used. The default boot device is determined by the value of the **bootdef_dev** environment variable, described in Chapter 3.

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

The syntax is:

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

-file *filename* — Specifies the name of a file to load into the system. Use the **set boot_file** command to set a default boot file. See Chapter 3.

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

-flags [*value*] — Provides additional operating system-specific boot information. In *Tru64 UNIX*, specifies boot flags. In *OpenVMS*, specifies system root number and boot flags. These values are passed to the operating system for interpretation. Preset default boot flag values are 0,0. Use the **set boot_osflags** command to change the default boot flag values. See Chapter 3.

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

-protocols *enet_protocol* — Specifies the Ethernet protocol to be used for the network boot. Either **mop** (for *OpenVMS*) or **bootp** (for *Tru64 UNIX*) may be specified. Use the **set ew*0_protocols**, **ei*0_protocols**, or **eg*0_protocols** command to set a default network boot protocol. See Chapter 3.

boot_dev — A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. Use the **set bootdef_dev** command to set a default boot device. See Chapter 3.

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

5.12 Testing the System

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

Example 5–10 Test

```
>>>test
Testing the Memory (full)
.
No DY* Disks available for testing
No DZ* Disks available for testing
Testing the DK* Disks (read only)
No DR* Disks available for testing
Testing the DQ* Disks (read only)
No DF* Disks available for testing
No MK* Tapes available for testing
No MU* Tapes available for testing
No VGA available for testing
Testing the EI* Network
>>>
```

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

To run a complete diagnostic test using the **test** command, the system configuration must include a CD ROM and a loopback connector on COM2.

The command syntax is:

test[-t time][-q][option]

-t	Specifies the runtime in seconds.
-q	Displays the status display messages as the exerciser processes are started and stopped during test. Sets the environment variable d_verbose to zero.
-lb	Loopback

For example:

```
>>> test -t 60
```

In this example, the **test** command tests and exercises all system devices. Test run time is 60 seconds.

5.13 Starting and Stopping CPU

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

Example 5–11 Halt and Continue

```
>>> halt 00
halted CPU 00
halt code = 00
operator initiated halt
PC = ffffffff8007cc68
>>> continue &p0
continuing CPU
```

5.13.1 halt (or stop)

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

halt (or **stop**) 00 (*where* 00 *is the designated processor number*)

The *processor number* is the designated CPU number displayed by the **show cpu** command.

5.13.2 continue

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

The **continue** command is valid only if you have not disturbed the system state and if you halted the system by pressing the halt/reset button on the control panel (Jumper J22 pins 13-14 must not be installed for the halt/reset button to operate as a halt a button.) or, for *OpenVMS* systems only, by entering Ctrl/P on the console terminal.

The syntax is:

continue [**&p***n*] [*address*]

&p*n*	Specifies the assigned designated processor number
address	The starting address of the program.

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

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

5.14 Updating Firmware

Use the lfu command to update firmware. Example 5–12 shows a typical update from a CD-ROM. For more information on updating firmware, see Chapters 2 and 4 of this manual and the Alpha Systems Firmware Web site.

Example 5–12 Updating Firmware from a CD

```
>>> b dqa0

Checking dqa0.0.0.16.0 for the option firmware files. . .
dqa0.0.0.16.0 has no media present or is disabled via the RUN/STOP switch
Checking dva0.0.0.1000.0 for the option firmware files. . .

Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update: <return>
Please enter the name of the options firmware files list, or
Hit <return> to use the default filename (ds15fw.txt)  :
Copying ds15fw.txt from dqa0. . .
Copying DFXAA320 from dqa0. . .
Copying KZPSAA12 from dqa0. . .
Copying CIPCA420 from dqa0. . .
Copying FC2381A4 from dqa0. . .
Copying KG8381A4 from dqa0. . .
Copying PCCFWQ16 from dqa0. . .
Copying PCCSM112 from dqa0. . .

                ***** 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.
 Update      Replaces current firmware with loadable data image.
 Verify      Compares loadable and hardware images.
 ? or Help   Scrolls this function table.
--------------------------------------------------------------------------------

UPD>

UPD> list

Device          Current Revision       Filename         Update Revision

SRM                V6.3-1              srm_fw           V6.3-1

rt                 V0.6-2               rt_fw            V0.6-2

srom               V1.3-F              srom_fw          V1.3-F

                                       cipca_fw          A420

                                       dfxaa_fw             3.20
```

```
                                        fca_2354_fw        CS3.81A4

                                        kgpsa_8k_fw        DS3.81A4
                                        kzpcc_smor           1.12
                                        kzpcc_fw           CQ16
                                        kzpsa_fw            A12
UPD>
UPD> u srm
Confirm update on:
srm
[Y/(N)]y
WARNING: updates may take several minutes to complete for each device.

                           DO NOT ABORT!

srm             Updating to 6.3-1...  Verifying 6.3-1...  PASSED.

UPD>
UPD> list
. . .
UPD> exit

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

 Initializing....
```

Procedure for Updating from a CD

1. Insert “AlphaSystems Firmware Update” CD.
2. Boot the CD `>>>b dqa0`

   The update utility runs and says that files were not found on CD, but then asks on which device the files are located.
3. Press **Return**. The LFU then prompts for the name of the firmware files list. Press **Return**. The default file, `DS15fw.txt`, will be on the CD.
4. At the UPD> prompt, enter the **list** command to view the firmware revisions. Then enter the **update** command as appropriate to each device.
5. When done, enter the **list** command to see that the images successfully copied and are listed with the correct revision.
6. When completed, type **exit**.
7. Answer ‘n’ to the question ‘Do you want to do a manual update?’ (unless the TIG or RMC booter are to be updated).

5.15 Forcing a System Crash Dump

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

Example 5–13 Crash

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

The **crash** command forces a crash dump at the operating system level. This command can be used when an error has caused the system to hang and the system can be halted with the halt/reset button (Jumper J22, pins 13-14 must not be inserted for the halt/reset button to operate as a halt button.) or the RMC **halt** command if the jumper is configured. The **crash** command restarts the operating system and forces a crash dump to the selected device. The syntax is:

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

5.16 Initializing the System

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

Example 5–14 Init

```
>>>init
Initializing...

OpenVMS PALcode V1.98-6, Tru64 UNIX PALcode V1.92-7

starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 240c0
memory low limit = 1be000 heap = 240c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing timer data structures
lowering IPL
CPU 0 speed is 1000 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
2048 MB of System Memory
Testing Memory
...
probe I/O subsystem
starting drivers
entering idle loop
initializing keyboard
initializing GCT/FRU at 1f0000
Initializing dqa dqb eia eib pka pkb pkc pkd pke pkf
Memory Testing and Configuration Status
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0       1024Mb     0000000000000000    2-Way
```

```
    2       1024Mb     0000000040000000    2-Way

     2048 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
AlphaServer DS15 Console V6.6-10, built on Jun 20 2003 at 09:21:52
>>>
```

In the preceding example, the **init** command resets the system. The syntax is:

init

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

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

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

5.17 Reading a File

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

Example 5–15 More

```
>>>more el
starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 240c0
memory low limit = 1be000 heap = 240c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing timer data structures
lowering IPL
CPU 0 speed is 1000 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
Testing Memory
...
probe I/O subsystem
starting drivers
entering idle loop
initializing keyboard
--More-- (SPACE - next page, ENTER - next line, Q - quit)
port dqa.0.0.13.0 initialized
port dqb.0.1.13.0 initialized
device dqa0.0.0.13.0 (DW-224E) found on dqa0.0.0.13.0
device dka0.0.0.8.0 (COMPAQ BB00912301) found on pka0.0.0.8.0
device dka100.1.0.8.0 (COMPAQ BF03665A32) found on pka0.1.0.8.0
sense key = 'Unit Attention' (29|02) from dka0.0.0.8.0
Change to Internal loopback.
Change to Normal Operating Mode.
Change to Internal loopback.
Change to Normal Operating Mode.
>>>
```

The **more** command is similar to the UNIX **more** command. It is useful for displaying output that scrolls too quickly to be viewed. For example, when you power up the system, the system startup messages scroll, and the messages are logged to an event log. When the >>> prompt displays, you can use the **more** command to display the contents of the event log file. See Example 5–15.

The syntax is:

more [*file*...]

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

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

5.18 Creating a Power-Up Script

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

Example 5–16 Editing the Nvram Script

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

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

Example 5–17 Clearing the Nvram Script

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

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

Editing the Nvram Script

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

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

The syntax is:

edit *file*

file is the name of the file to be edited.

The editing commands are:

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

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

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

5.19 Setting Console Security

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

5.19.1 Overview of Secure Mode

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

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

Secure Function Commands

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

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

5.19.2 Setting the Console Password

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

Example 5–18 Set Password

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

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

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

❶ Setting a password. If a password has not been set and the **set password** command is issued, the console prompts for a password and verification. The password and verification are not echoed.

❷ Changing a password. If a password has been set and the **set password** command is issued, the console prompts for the new password and verification, then prompts for the old password. The password is not changed if the validation password entered does not match the existing password stored in NVRAM.

❸ The password length must be between 15 and 30 alphanumeric characters. Any characters entered after the 30th character are not stored.

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

The syntax is:

set password

5.19.3 Setting the Console to Secure Mode

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

Example 5–19 Set Secure

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

❶ The console is put into secure mode, and then the operator attempts to boot the operating system with command-line parameters. A message is displayed indicating that boot parameters are not allowed when the system is in secure mode.

❷ The **login** command is entered to turn off security features for the current console session. After successfully logging in, the operator enters a **boot** command with command-line parameters.

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

The syntax is:

set secure

5.19.4 Turning Off Security During a Console Session

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

Example 5–20 Login

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

❶ The **login** command is entered, but the system is not in secure mode. A password must be set.

❷ A password is set.

❸ The **login** command is entered. After the password is entered, console security is turned off for the current session and the operator can enter commands.

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

```
Please enter the password:
```

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

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

If You Forget the Password

You can clear the password by using the local console terminal and the RMC.

From the Local Console Terminal

If you forget the current password, use the login command in conjunction with the RMC halt in/out commands to clear the password, as follows:

1. Enter the **login** command:

   ```
   >>> login
   ```

2. When prompted for the password, enter the RMC and issue the **halt in** command, press the **Return** (**Enter**) key.
3. At the SRM prompt (>>>), enter the **clear password** command, then enter the RMC and issue the **halt out** command.

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

Example 5–21 Clearing the Secure Password

Example dialog	Explanation
>>>**login**	
Please enter the password:	Entering RMC using the escape sequence
hp AlphaServer DS15 Remote Management Controller – Revision V0.6-2	
RMC>**halt in**	Invoking the RMC halt in command
Returning to Com port	
>>>**clear password**	Clears the password
>>>	Entering RMC using the escape sequence
hp AlphaServer DS15 Remote management Controller – Revision V0.6-2	
RMC>**halt out**	Invoking the RMC halt out command
Returning to Com port	
>>>	

5.19.5 Returning to User Mode

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

Example 5–22 Clear Password

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

❶ The wrong password is entered. The system remains in secure mode.

❷ The password is successfully cleared.

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

To clear the password without knowing the current password, you must use the **login** command in conjunction with the RMC halt in/out commands, as described in Section 5.19.4.

5.20 Setting and Viewing Environment Variables

Use the set *envar* and show *envar* commands to set and view environment variables.

Example 5–23 Set *envar* and Show *envar*

```
>>> set bootdef_dev dkb0
>>> show bootdef_dev
bootdef_dev dkb0
```

Environment variables pass configuration information between the console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. Environment variables are set or changed with the **set *envar*** command. Their values are viewed with the **show *envar*** command. You can also create nonvolatile environment variables with the **edit** command, as shown in Example 5–24.

Example 5–24 User-Created Environment Variable

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

In this example the nvram script is edited so that an environment variable called **mopv3_boot** is created and set to 1 on each power-up. By default, MOP boots send four MOP V4 requests before defaulting to MOP V3. This user-created environment variable forces the SRM console to bypass MOP V4 requests. This speeds up MOP booting on networks with MOP V3 software.

set *envar*

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

set *envar value*

envar	The name of the environment variable to be modified. See Table 5–6 for a list of commonly used environment variables.
value	The new value of the environment variable.

New values for the following environment variables take effect only after you reset the system by pressing the Reset button (if configured) or by issuing the **init** command. (Jumper J22 pins 13-14 must be installed for the halt/reset button to operate as a reset button.)

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

show *envar*

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

show *envar*

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

Table 5–6 summarizes the most commonly used SRM environment variables. These environment variables are described in the following pages.

NOTE: *The environment variables for setting boot options are described in Chapter 3, Booting and Installing an Operating System.*

Table 5–6 Environment Variable Summary

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

Table 5–6 Environment Variable Summary (Continued)

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

5.20.1 com*_baud

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

com1_baud

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

com2_baud

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

The syntax is:

set com*_baud *baud_value*

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

Example

The following example shows the supported baud rate values.

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

NOTE: *SROM power on output will not display correctly unless COM1 is set to 9600.*

5.20.2 console

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

The syntax is:

set console *output_device*

The options for *output_device* are:

graphics (default)	The console terminal is a VGA monitor or a device connected to the VGA port.
serial	The console terminal is the device connected to the COM1 port.

The value of **console** takes effect only after you reset the system by pressing the Halt/Reset button (if configured) or by issuing the **init** command. (Jumper J22 pins 13-14 must be installed for the halt/reset button to operate as a reset button.)

Example

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

5.20.3 eg*0_mode or ei*0_mode or ew*0_mode

The eg*0_mode or ei*0_mode or ew*0_mode environment variable sets an Ethernet controller to run an AUI, ThinWire, or twisted-pair Ethernet network.

To list the network devices on your system, enter the **show device** command. The Ethernet controllers start with the letters "eg", "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 eg*0_mode *value* or
set ei*0_mode *value* or
set ew*0_mode *value*

The options for ei*_mode and ew*_mode *value* are:

aui	Device type is AUI.
bnc	Device type is ThinWire.
fast	Device type is fast 100BaseT.
Fastfd	Device type is fast full duplex 100BaseT.
full	Device type is full duplex twisted-pair.
twisted-pair	Device type is 10BaseT (twisted-pair).
Auto-Sensing	Sense and adjust to 10/100 MHz speed.
Auto-Negotiate	Automatically negotiates highest common performance with other network controller(s) supporting IEEE 802.3u auto-negotiation. If no Ethernet cable is connected in this mode, the SRM reports a failure: Error (eib0.0.10.0), No link, auto negotiation did not complete. This is applicable for ei*, ew*, and eg* device in auto negotiate.

Example

```
>>> set eia0_mode twisted-pair
Changing to selected mode.
>>> show eia0_mode
eia0_mode         Twisted-Pair
```

The options for eg*_mode *value* are:

auto	Auto negotiation*
10mbps	10 Mb half duplex
10mbps_full_duplex	10 Mb full duplex
100mbps	100 Mb half duplex
100mbps_full_duplex	100 Mb full duplex
1000mbps	1000 Mb half duplex
1000mbps_full_duplex	1000 Mb full duplex

* If no Ethernet cable is connected in this mode, the SRM reports a failure: Error (eib0.0.10.0), No link, auto negotiation did not complete. This is applicable for ei*, ew*, and eg* device in auto negotiate.

5.20.4 kbd_hardware_type

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

The syntax is:

set kbd_hardware_type *keyboard_type*

The options for *keyboard_type* are:

pcxal (default)	Selects the 102-type keyboard layout.
lk411	Selects the LK411 keyboard layout.

Example

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

5.20.5 language

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

The factory keyboard setting is 36 English (American).

The value of **language** takes effect only after you reset the system by pressing the Reset button (if configured) or issuing the **init** command. (Jumper J22 pins 13-14 must be inserted for the halt/reset button to operate as a reset button.)

The syntax is:

set language *language_code*

The options for *language_code* are:

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

Example

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

5.20.6 os_type

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

The value of **os_type** takes effect only after you reset the system by pressing the halt/reset button (if configured) or by issuing the **init** command. Jumper J22 pins 13-14 must be installed for the halt/reset button to act as a reset. When the jumper is not installed the switch acts as a halt button.

The syntax is:

set os_type *os_type*

The options for *os_type* are:

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

Example

In this example, the default operating system is set to *Tru64 UNIX*.

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

5.20.7 pci_parity

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

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

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

The syntax is:

set pci_parity *value*

The options for *value* are:

on (default)	Enables PCI parity checking.
off	Disables PCI parity checking.

Example

```
>>> show pci_parity
pci_parity              ON
```

5.20.8 pk*0_fast

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

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

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

The value of **set pk*0_fast** takes effect only after you reset the system by pressing the Reset button (if configured) or by issuing the **init** command. (Jumper J22 pins 13-14 must be inserted for the halt/reset button to operate as a reset button.)

The syntax is:

set pk*0_fast *scsi_speed*

The options for *scsi_speed* are:

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

Example

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

NOTE: *The PK commands only apply to the KZPBA-CC SCSI controller.*

5.20.9 pk*0_host_id

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

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

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

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

The value of **pk*0_host_id** takes effect only after you reset the system by pressing the Reset button (if configured) or by issuing the **init** command. (Jumper J22 pins 13-14 must be inserted for the halt/reset button to operate as a reset button.)

The syntax is:

set pk*_host_id *scsi_node_id*

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

Example

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

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

5.20.10 pk*0_soft_term

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

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

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

The value of **pk*0_soft_term** takes effect only after you reset the system by pressing the Reset button (if configured) or by issuing the **init** command (Jumper J22 pins 13-14 must be inserted for the halt/reset button to operate as a reset button.)

Syntax

set pk*0_soft_term *value*

The options for *value* are:

off	Disables termination of all 16 bits.
low	Enables low eight bits and disables high eight bits.
high	Enables high eight bits and disables low eight bits.
on (default)	Enables all 16 bits.
diff	Places the bus in differential mode.

Examples

In this example, both terminators are disabled.

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

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

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

5.20.11 tt_allow_login

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

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

The syntax is:

set tt_allow_login *value*

The options for *value* are:

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

Example

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

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

Chapter 6
Remote Console Management

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
- SRM Environment Variables for COM1
- Entering the RMC
- Using the Command-Line Interface
- Resetting the RMC to Factory Defaults
- RMC Command Reference
- Troubleshooting Tips

6.1 RMC Overview

The remote management console provides a mechanism for monitoring the system (voltages, temperature, 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 the thermal sensor on the system motherboard.
- Monitors voltages and fans
- Detects alert conditions such as excessive temperature, fan failure, and voltage failure. On detection, pages an operator, and sends an interrupt to SRM, 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.
  - Any system fan failure.
- 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 the QLogic Zircon baseboard management controller. The RMC logic is responsible for monitoring temperature, fan speed, and all voltages. The RMC firmware images (booter and runtime) are stored in flash ROM. If the firmware should ever become corrupted or obsolete, you can update it manually using the Loadable Firmware Update Utility. See Chapters 2 and 5 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.

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

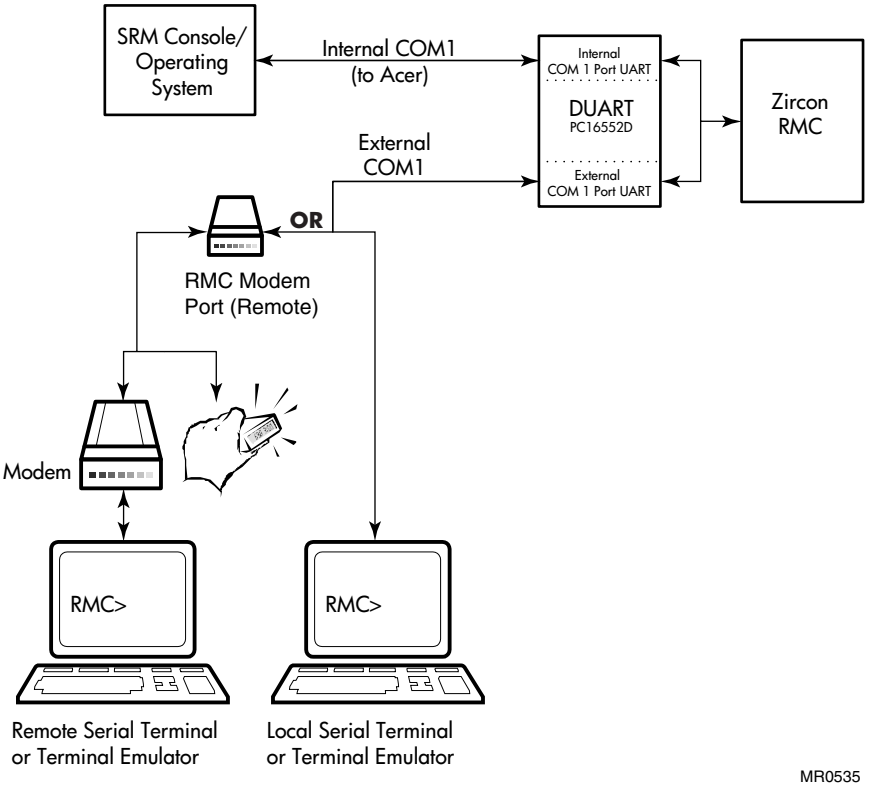
The RMC provides additional functionality to read and write configuration and error log information to FRU error log devices. These operations are carried out via shared RAM (also called dual-port RAM or DPR).

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 the 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.

6.2 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 6.10.

Figure 6–1 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 external COM1 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 6–1 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 COM1, providing full modem controls. The DUART is controlled by the RMC microprocessor, which moves characters between the two UART ports. The escape sequence signals the RMC to enter the CLI. Data issued from the CLI is transmitted between the RMC microprocessor and the external port.

In Through mode, the RMC also broadcasts power-up and power-down error messages through the COM1 port. Additional RMC broadcast messages may occur when the RMC CLI is active.

NOTE: *The internal system COM1 port should not be confused with the external COM1 serial port on the back of the system.*

6.2.1 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 6–2 Data Flow in Bypass Mode

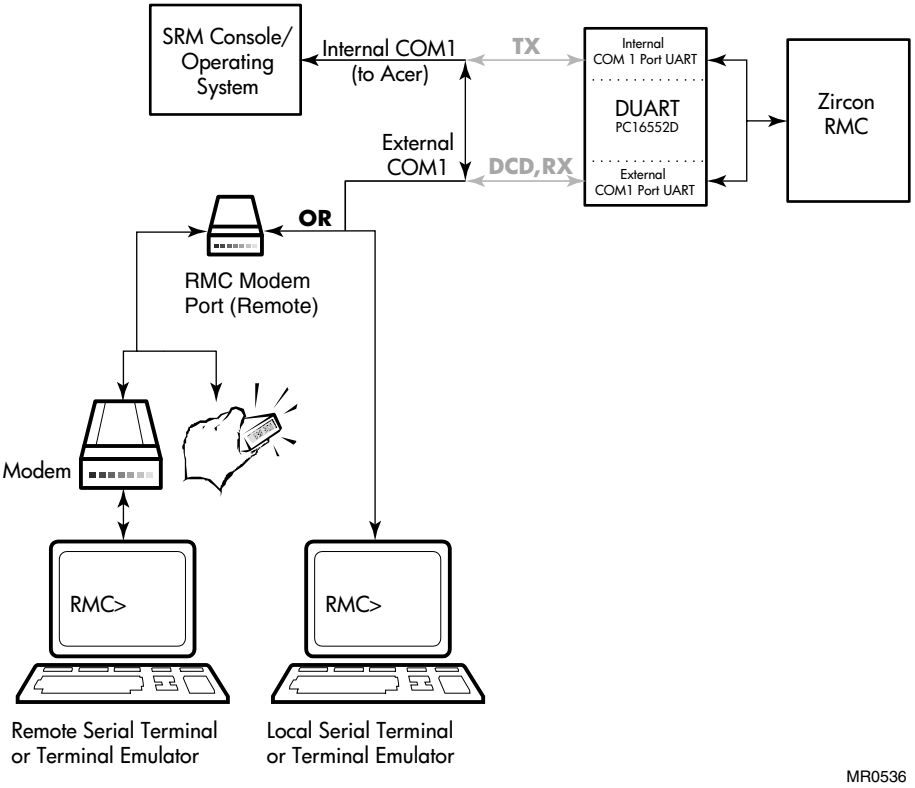


Figure 6–2 shows the data flow in the bypass modes. Note that the internal system COM1 port is connected directly to the external COM1 port.

NOTE: *You can connect a serial terminal to the external COM1 port in any of the bypass modes.*

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 COM1 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 1) the system software does not interpret characters intended for the RMC and 2) you ensure that you don't inadvertently invoke the RMC CLI.

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 system COM1 port and the 9-pin external COM1 port (bypassing the DUART), Snoop mode is useful when you want to monitor the system but also ensure optimum COM1 performance.

In Snoop mode, the RMC also broadcasts power-up and power-down error messages through the COM1 port. Additional RMC broadcast messages may occur when the RMC CLI is active.

Soft Bypass Mode

In Soft Bypass mode all data and control signals are routed directly between the system COM1 port and the external COM1 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. The RMC will also switch back to Snoop mode when the system power is off or when no DCD signal is detected on COM1.

Firm Bypass Mode

In Firm Bypass mode all data and control signals are routed directly between the system COM1 port and the external COM1 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 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.

6.3 Terminal Setup

Figure 6–3 and Figure 6–4 show the connections for a VT terminal and a VGA monitor to the system. To set up the RMC to monitor a system remotely, see section 6.6 for the procedure.

Figure 6–3 Setup for RMC with VT Terminal

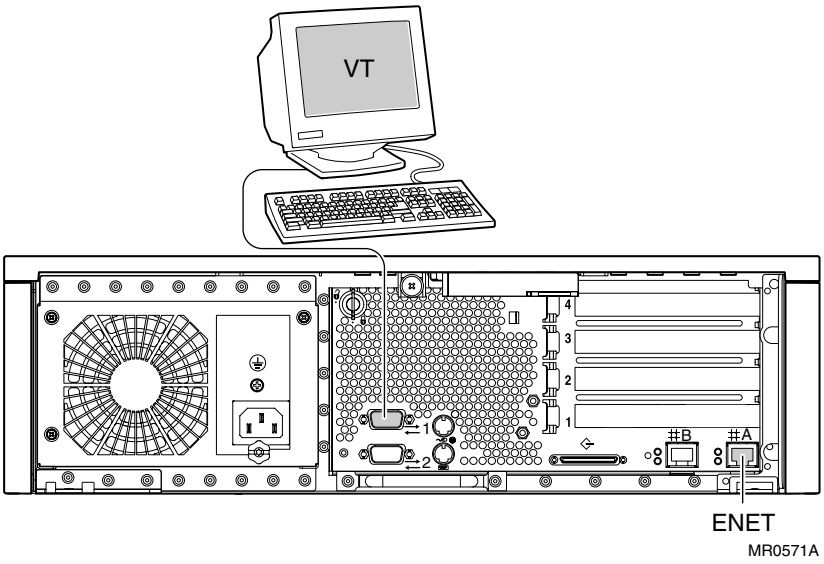
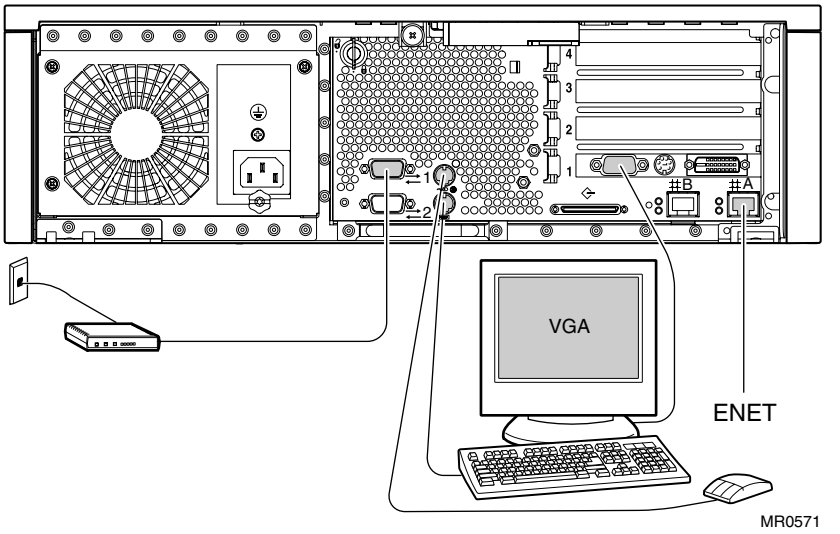


Figure 6–4 Setup for RMC with VGA Monitor



6.3.1 SRM Environment Variables for COM1

Several SRM environment variables allow you to set up the COM1 serial port 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. The default is **9600**. See Chapter 5.
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. The default for com1_mode is **through**. See Section 6.10.
com1_modem	Specifies to the operating system whether or not modem controls are to be utilized on COM1. The default for com1_modem is **off/disabled**.

6.4 Entering the RMC

You type an escape sequence to invoke the RMC. You can enter RMC from any of the following: Modem or terminal connected to the 9-pin external COM1 port or the local VGA monitor through the SRM console.

- You can enter the RMC from the 9-pin external COM1 port if the RMC is in Through mode or Snoop mode. In Snoop mode the escape sequence is passed to the system and displayed.
- You can enter the RMC from the local VGA monitor if COM1_MODE is set to THROUGH mode, the console environment variable is set to graphics, the 9-pin external COM1 port is inactive, and the SRM is loaded.

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 on COM1 before you invoked the RMC.

```
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** and COM1_MODE must be set to THROUGH.

Invoke the SRM console on the VGA monitor and enter the **rmc** command.

```
>>>set Com1_mode through

>>> 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 (if configured) on the operator control panel or issue the RMC **reset** command. (Jumper J22 pins 13-14 must be inserted for the halt/reset button to operate as a reset button.)

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

6.5 Using the Command-Line Interface

The remote management console supports setup commands and commands for managing the system. For detailed descriptions of the RMC commands, see Section 6.10.

Command Conventions

Observe the following conventions for entering RMC commands:

- Enter enough characters to distinguish the command.

  NOTE: *The* **reset**, **quit**, and **rmcreset** *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 enough characters of the second word to distinguish it from others. 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 ***
```

6.5.1 Displaying the System Status

The RMC status command displays the system status and the current RMC settings. Table 6–1 explains the status fields. See Section 6.10 for information on the commands used to set the user-defined status fields.

```
RMC>status

                      hp AlphaServer DS15 Platform Status
RMC Runtime Firmware Revision: V0.6-5
RMC Booter Firmware Revision: V1.0-0
System Power: ON
System Halt: Deasserted
Escape Sequence: ^[^[RMC
Remote Access: Disabled
Modem RMC Defaults: Disabled     Status: Not Initialized
RMC Password: Not Set
Alerts: Disabled     Warning Alerts: Disabled
Alert Pending: NO
Latest Alert: Fan failure
Init String:
Dial String: ATD72125
Alert String: pager #
User String: there is something wrong with my DS15 system
Com1 Baud:9600  Flow:SOFTWARE  Mode:THROUGH  Modem:DISABLED  Rmc:ENABLED
Logout Timer: 10 minutes
Voltage Status: OK
Thermal Status: OK     Thermal Shutdown: Enabled
Warning Threshold:    45.00°C    Fatal/Power-Down Threshold:    50.00°C
Fan Status: OK     Fan Shutdown: Enabled
PCI Riser: Installed
POST DPR: OK     NVRAM: OK     GPIOs: OK     LM75: OK

RMC>
```

Table 6–1 Status Command Fields

Field	Meaning
RMC Runtime Firmware Revision	RMC runtime firmware revision
RMC Booter Firmware Revision	RMC booter firmware revision
System Power	State of system power: ON = System is on. OFF = System is off.
System Halt	System halt state: Asserted = Halt is asserted Deasserted = Halt is not asserted
Escape Sequence	Current escape sequence used to access the RMC
Remote Access	Remote access state: Enabled = System enabled for remote access via modem. Disabled = System is not enabled for remote access via modem.
Modem RMC Defaults	Older AlphaServer / AlphaStation modem-initialization sequence: Enabled = System is configured to append additional fixed commands to the user-supplied modem initialization string Disabled = System will not append additional fixed commands to the user-supplied modem initialization string
Modem RMC Status	Message indicating the current COM1 modem status. Messages include ‘Initialized’, ‘Not Initialized’, ‘Not Present’, and various modem initialization error messages.
RMC Password	Modem access password state Set = Password set for modem access. Not set = Password not set for modem access.
Alerts	Dial-out alert status: Enabled = Dial-out for sending alerts is enabled. Disabled = Dial-out for sending alerts is disabled.
Warning Alerts	Warning alert status: Enabled = System warnings will generate alerts. Disabled = System warnings will not generate alerts.
Alert Pending	Alert pending status: YES = Alert condition is awaiting delivery.

Field	Meaning
	NO = No alert condition is awaiting delivery.
Latest Alert	Text string that describes the last alert generated on the system.
Init String	Initialization string that was set for modem.
Dial String	Dial string that is sent to modem when an alert occurs
Alert String	Identification string to be sent to pager when an alert occurs. Usually set to phone number of alerting system.
User String	System notes supplied by the user.
COM1	State of the system's COM1 settings: COM1_BAUD: 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 57600 COM1_FLOW: NONE, SOFTWARE, HARDWARE, BOTH COM1_MODE: THROUGH, SNOOP, SOFT_BYPASS, FIRM_BYPASS COM1_MODEM: ENABLED, DISABLED COM1_RMC: ENABLED, DISABLED
Logout Timer	The amount of time before the RMC terminates an inactive modem connection (in minutes).
Voltage Status	Current state of system power: OK = All power is good FAIL = One or more of the system voltages has crossed fatal threshold
Thermal Status	System thermal status: OK = Thermal status is good WARNING = Thermal warning threshold has been crossed (fatal threshold has not been crossed) FAIL = Thermal fatal threshold has been crossed
Thermal Shutdown	Thermal failure shutdown status: Enabled = System will shutdown if the thermal fatal threshold is crossed Disabled = System will not shutdown if the thermal fatal threshold is crossed

Field	Meaning
Warning Threshold	The temperature at which a thermal warning is generated.
Fatal/Power-Down Threshold	The temperature at which a thermal failure is generated.
Fan Status	Current fan status: OK = All fans are good WARNING = One or more of the fans has crossed warning threshold (none have crossed fatal threshold) FAIL = One or more fans has crossed fatal threshold
Fan Shutdown	Fan failure shutdown status: Enabled = System will shutdown if a fan crosses its fatal threshold Disabled = System will not shutdown if a fan crosses its fatal threshold
PCI Riser	Indicates if the PCI Riser is installed: Installed = PCI Riser is installed Not Installed = PCI Riser is not installed
POST	Status results of various RMC power-on self tests: DPR (Dual-Port RAM): OK or FAIL NVRAM (RMC Non-volatile storage): OK or FAIL GPIOs (GPIOs/PCF8574 IO Expander): OK or FAIL LM75 (Thermal sensor): OK or FAIL

6.5.2 Displaying the System Environment

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

```
RMC>env

                    System Hardware and Environmental Status

System Voltages:                                                    ❶
1.65V     :     1.66V       2.5V      :     2.49V       3.3V Bulk :     3.37V
5V Bulk   :     5.14V       12V Bulk  :    12.24V       -12V Bulk :   -12.19V
3.3Vsb    :     3.30V       5Vsb Bulk :     5.04V       2.85V (A) :     2.83V
2.85V (B) :     2.85V

System Temperature:                                                 ❷
Inlet Air :    24.00°C
Warning Threshold:    45.00°C    Fatal/Power-Down Threshold:    50.00°C

Fan Speeds:                                                         ❸

System Fan: 1950RPM   PCI Fan  : 1560RPM  CPU Fan : 3450RPM  Disk Fan : 2730RPM

System Status Summary:                                              ❹
Voltage: OK    (System Power is ON)
Temperature: OK
Fan: OK

RMC>
```

NOTE: *If the system is configured with an internal storage cage, there is no disk fan. In this case the output will not display (Disk Fan: xxxRPM).*

❶ System Voltages

❷ System Temperature

❸ Fan Speeds

❹ System Status Summary of: system power, system temperature, and system fans.

6.5.3 Using Power On and Off, Reset, and Halt Functions

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-On Error: Cannot power on system when 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

hp AlphaServer DS15 Remote Management Controller - Revision V1.1-0

RMC> power off

RMC>
```

Halt In and Halt Out

The **halt in** command halts the system, while 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.

Toggling the Power button on the operator control panel overrides the **halt in** condition.

```
hp AlphaServer DS15 Remote Management Controller - Revision V1.1-0

RMC>halt in

Returning to COM port

hp AlphaServer DS15 Remote Management Controller - Revision V1.1-0

RMC>halt out

Returning to COM port
```

Halt

The **halt** command halts the system. This is the same as pressing and releasing the halt button on the Operator Control Panel. (Jumper J22 pins 13-14 must *not* be inserted for the halt/reset button to operate as a halt button.)

```
RMC>halt

Returning to COM port
```

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
```

RMCReset

The **rmcreset** command resets the RMC controller. It does not reset the system.

6.6 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.

You can use either a VT terminal or a VGA monitor to configure the RMC for remote dial-in:

1. Connect to the RMC using either a VT terminal attached to COM1 or through the VGA monitor. See Figure 6–3 and Figure 6–4.
2. Initialize the Remote dial-in configuration as shown in Example 6–1.
3. Complete one of the following:
   a. If you use a VT terminal, disconnect the terminal and connect the modem to COM1.
   b. If you are using a VGA monitor, connect the modem to COM1.

NOTE: *When configuring the system for dial-in access, com1_mode must be set so that you are able to gain access to the RMC via either the VT terminal on COM1 or the VGA monitor.*

Example 6–1 Dial-In Configuration

```
RMC>>>set password                    ❶
RMC Password: *****
Verification: *****
RMC>set init                          ❷
Init String: at&h2e0&c1&d0s0=2
RMC>clear alert                       ❸
RMC>disable modemdef                  ❹
RMC>enable remote                     ❺

Modem will be initialized when it is detected
RMC>status                            ❻
              hp AlphaServer DS15 Platform Status
RMC Runtime Firmware Revision: V1.1-0
RMC Booter Firmware Revision: V1.1-0
System Power: ON
System Halt: Deasserted
Escape Sequence: ^[^[RMC
Remote Access: Enabled
Modem RMC Defaults: Disabled     Status: Not Initialized
RMC Password: Set
```

```
Alerts: Disabled     Warning Alerts: Disabled
Alert Pending: NO
Latest Alert: AC Loss
Init String: AT&H2E0&C1&D0S0=2
Dial String: ATD915085554444
Alert String: ,,,,,,,,,,5551234
User String:
Com1 Baud:9600  Flow:SOFTWARE  Mode:THROUGH  Modem:DISABLED
Rmc:ENABLED
Logout Timer: 20 minutes
Voltage Status: OK
Thermal Status: OK     Thermal Shutdown: Enabled
Warning Threshold:    45.00°C    Fatal/Power-Down Threshold:
50.00°C
Fan Status: OK     Fan Shutdown: Enabled
PCI Riser: Installed
POST DPR: OK     NVRAM: OK     GPIOs: OK     LM75: OK

RMC>
```

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.

❸ Clears the current alert.

❹ Tells the RMC not to append its own fixed flow-control and carrier-detect commands to the user-supplied modem initialization string. Instead, these will be included as part of the user-supplied initialization string.

❺ Enables remote access to the RMC modem port by configuring the modem with the setting stored in the initialization string once the modem is connected to the system.

❻ Status of the RMC configuration.

NOTE: *Once the RMC is configured, disconnect the VT terminal from COM1 (if present) and connect the modem.*

Dialing In

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

```
ATDT915085553333
CONNECT 9600/ARQ/V34/LAPM

RMC Password: *****
```

```
Welcome to RMC V1.1-0

>>>
>>>
hp AlphaServer DS15 Remote Management Controller - Revision V1.1-0

RMC>stat

                      hp AlphaServer DS15 Platform Status
RMC Runtime Firmware Revision: V1.1-0
RMC Booter Firmware Revision: V1.1-0
System Power: ON
System Halt: Deasserted
Escape Sequence: ^[^[RMC
Remote Access: Enabled
Modem RMC Defaults: Disabled     Status: Initialized
RMC Password: Set
Alerts: Disabled     Warning Alerts: Disabled
Alert Pending: NO
Latest Alert: AC Loss
Init String: AT&H2E0&C1&D0S0=2
Dial String: ATD915085554444
Alert String: ,,,,,,,,,,5551234
User String:
Com1 Baud:9600  Flow:SOFTWARE  Mode:THROUGH  Modem:DISABLED  Rmc:ENABLED
Logout Timer: 20 minutes
Voltage Status: OK
Thermal Status: OK     Thermal Shutdown: Enabled
Warning Threshold:    45.00°C    Fatal/Power-Down Threshold:    50.00°C
Fan Status: OK     Fan Shutdown: Enabled
PCI Riser: Installed
POST DPR: OK     NVRAM: OK     GPIOs: OK     LM75: OK

RMC>hangup
+++
NO CARRIER
```

At the RMC> prompt, enter commands to monitor and control the remote system.

When you have finished a modem session, enter the **hangup** command to cleanly terminate the session and disconnect from the server.

Unsetting the password

If the password is forgotten, you can reset it by using the **set password** command.

1. Enter the **set password** command at the RMC prompt.
2. Intentionally type in an incorrect verification password.
3. The following appears:

   *** ERROR – Password verification failed (Password is NOT set) ***

NOTE: *You also may reset RMC to use factory defaults. See section 6.9 which follows.*

Example 6–2 Unsetting the Password

```
RMC> set password
RMC Password: ****
Verification: ******

*** ERROR – Password verification failed (Password is NOT set) ***
```

Modem Initialization Commands

The modem initialization commands in the following table do not necessarily apply to all modems because different modems use different command sets. Consult the user's guide for your modem when determining the modem initialization string for your system configuration.

Table 6–2 Modem Initialization Commands

Modem Command	Description
&H*x*	Flow control, where *x* is as follows: 0: No flow control 1: Hardware flow control 2: Software (XON/XOFF) flow control 3: Both hardware and software flow control
E0	Local echo off
&C1	Normal Carrier Detect (CD) operations
&D0	DTR override
S0=2	Auto answer after 2 rings

6.7 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 6.6.

To set up the dial-out alert feature, enter the RMC from the COM1 serial terminal or local VGA monitor.

Example 6–3 Dial-Out Alert Configuration

```
RMC>set dial                    ❶
Dial String: atd915085554444

RMC>set alert                   ❷
Alert String: ,,,,,,,,,,5551234

RMC>enable remote               ❸

Modem will be initialized when it is detected

RMC>clear alert                 ❹

RMC>enable alert                ❺

RMC>send alert                  ❻

RMC>status                      ❼

                      hp AlphaServer DS15 Platform Status
RMC Runtime Firmware Revision: V1.1-0
RMC Booter Firmware Revision: V1.1-0
System Power: ON
System Halt: Deasserted
Escape Sequence: ^[^[RMC
Remote Access: Enabled
Modem RMC Defaults: Disabled     Status: Not Initialized
RMC Password: Set
Alerts: Enabled     Warning Alerts: Disabled
Alert Pending: YES
Latest Alert: Test alert generated by user request
Init String: AT&H2E0&C1&D0S0=2
Dial String: ATD915085554444
Alert String: ,,,,,,,,,,5551234
```

```
User String:
Com1 Baud:9600  Flow:SOFTWARE  Mode:THROUGH  Modem:DISABLED
Rmc:ENABLED
Logout Timer: 20 minutes
Voltage Status: OK
Thermal Status: OK     Thermal Shutdown: Enabled
Warning Threshold:    45.00°C    Fatal/Power-Down Threshold:
50.00°C
Fan Status: OK     Fan Shutdown: Enabled
PCI Riser: Installed
POST DPR: OK     NVRAM: OK     GPIOs: OK     LM75: OK

RMC>
```

A typical alert situation might be as follows:

- The RMC detects an alarm condition, such as over temperature failure.
- 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. (In many cases, a failure may have already powered the system down.)
- When the problem is resolved, you power up and reboot the system.

The elements of the sample dial string and alert string are shown in Table 6–3. 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 remote access to the RMC's modem port.

❹ Clears current alert condition

❺ Enables the RMC to page a remote system operator.

❻ 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 other alert pending, this alert will be sent to the pager as soon as the modem is connected to the system. If the pager does not receive the alert, re-check your setup.

❼ Status of the RMC configuration.

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.*

Table 6–3 Elements of Dial String and Alert String

Dial String	
ATXDT	The dial string is case sensitive. The RMC automatically converts all alphabetic characters to uppercase. 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.

NOTE: *1. The above sample dial string commands are commonly used sequences that don't necessarily apply to all configurations. Because different modems use different command sets, consult the user's guide for your modem when determining the dial-string for your system configuration.*
2. The above alert string sequence, including the pound and semicolon termination characters, is not necessarily applicable to all configurations. Consult with your paging service to determine the appropriate alert string for your configuration.

6.8 RMC Firmware Update and Recovery

This section contains definitions, explanations, and examples about RMC firmware update and recovery.

Flash Accessibility

Under normal circumstances, the RMC flash part is fully write-enabled. LFU has the ability to update the firmware components contained within this part. However, write access to this flash can be completely disabled by installing the DISABLE_FLASH jumper (J21) on pins 1-2. Installing this jumper disconnects the write-enable line from the RMC to the flash part. This disables LFU (or any other utility) from modifying the contents of the flash part.

RMC Flash Update

The RMC code consists of two images - the booter image and the runtime image Firmware updates for the RMC are performed using the standard SRM Console Loadable Firmware Update (LFU) utility. The runtime image is the FW image most likely to be updated.

Updating the Booter

It is unlikely that this image will ever need to be updated. However, should it become necessary to update the booter image, that image will be included in the 'manual' portion of the LFU update utility. (See Example 6–4) If a booter image update is available, the revision of the image is displayed in favor of "No Update Available".

In order to update the booter, the write enable jumper (BOOTER_ENABLE – J22 7-8) must be installed first. If this jumper is not installed, the booter image update is not allowed.

Example 6–4 Loadable Firmware Update Utility

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

                ***** 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.
 Update      Replaces current firmware with loadable data image.
 Verify      Compares loadable and hardware images.
 ? or Help   Scrolls this function table.
--------------------------------------------------------------------------------

UPD> l

Device          Current Revision     Filename          Update Revision

FSB             X6.6-1783            fsb_fw            X6.6-1978

SRM             X6.6-1977            srm_fw            X6.6-1977

booter          V0.5-6               booter_fw         No Update Available

rt              V0.6-3               rt_fw             V0.6-3

srom            V1.0-1               srom_fw           V1.0-1

tig             1.9                  tig_fw            1.9

UPD>
```

Emergency Runtime Image Recovery

Should the RMC runtime image become corrupted or is otherwise deemed unusable, an emergency recovery mechanism has been placed in the booter. If the situation arises where this mechanism needs to be utilized, remove power (unplug) from the system and install the RMC emergency runtime image recovery jumper (J22 pins 11-12) (see Figure 6–5 which follows). Because this mode requires that the RMC be able to control com1_mode, move jumper J30 to pins 2-3.

After re-applying power to the system (plug in), the RMC comes up in emergency update mode, which utilizes only the booter image. Power the system on using the OCP button (the RMC prompt is not available).

Once at the SRM prompt, use the standard LFU mechanisms to update the runtime image. At the completion of the update, remove power (unplug) and then remove the RMC emergency runtime image recovery jumper. If jumper J30 was moved, return it to its initial position.

NOTE: *1. The booter image cannot be updated while in the emergency runtime image recovery mode.*
2. The amber LEDs on the OCP sequentially blink when updating the RMC images.
3. When the booter detects that the runtime image is corrupt, the system and fan fault LEDs will flash on and off in unison. The user must configure the system for emergency runtime image recovery to correct this problem.
4. When the user configures the system to enter emergency runtime image recovery mode by adding jumper J22 pins 11-12, all three amber lights flash on and off in unison until the FW update is started.
5. For a complete listing of OCP LED indications, see Table 7-3.

6.9 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 unplug the power cord from the power supply.
2. Remove the system cover (see Chapter 4) and wait for all the internal LEDs to go out.
3. Insert the FORCE_DEFAULT jumper (J22 / pins 9 – 10) on the main logic board.
4. Re-install the system cover and plug system in. Note: you do not need to power the system on.
5. When the RMC becomes available on the external COM1 port, the defaults have been reset.
6. Unplug the power cord.
7. Remove the system cover and make sure all the internal system LEDs are not lit.
8. Remove the FORCE_DEFAULT jumper from the main logic board.
9. Re-install the system cover and plug in the system.
10. Press the power button on the OCP to turn the system On.

To set the RMC-related system jumpers to their default settings, configure as follows (see Figure 6–5 for locations):

1. Feature_1 Jumper / J22 pins 13 – 14

   On – OCP halt/reset button performs reset

   Off – OCP halt/reset button performs halt **(default)**

2. Feature_2 Jumper /J22 pins 11 – 12

   On – Forces RMC emergency image recovery mode

   Off – Normal operation **(default)**

3. RMC_PASSTHRU Mode Jumper / J30

   No jumper – Always bypass the RMC

   1 – 2 Always pass through the RMC

   2 – 3 Normal operation **(default)**

   Note: The user selects modes through COM1_MODE.

4. RMC Force_Default Jumper / J22 pins 9 – 10

   On – Forces RMC environment to default state

   Off – Normal operation **(default)**

5. FORCE_DTR Jumper / J28

   On – Forces DTR

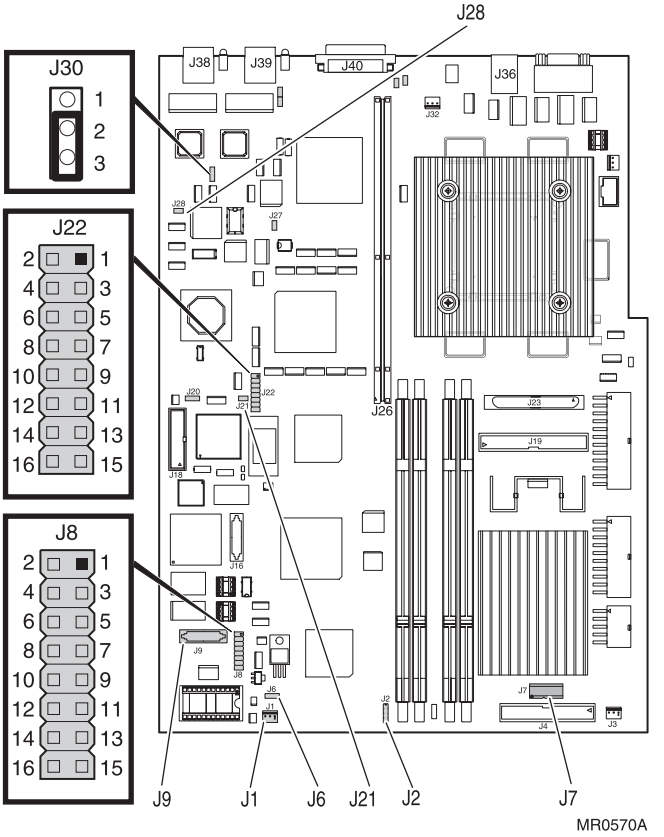
   Off – DTR unaffected **(default)**

6. Booter_enable Jumper / J22 pins 7-8

   On – Allows RMC booter image updates

   Off – Disables RMC booter image updates (**default**)

Figure 6–5 RMC Jumpers (Default Positions)



6.10 RMC Command Reference

This section describes the RMC command set. Commands are listed in alphabetical order.

alert
clear {alert, log, port}
cpu
deposit
disable {alert, fan, modemdef, reboot, remote, thermal, warning, wdt}
dump
enable {alert, fan, modemdef, reboot, remote, thermal, warning, wdt}
env
fwrev
halt {in, out}
hangup
help {<optional-command-word>}
? {<optional-command-word>}
log {<optional-entry-number>}
poe
power {off, on}
quit
reset
rmcreset
send {alert}
set {alert, com1_baud, com1_flow, com1_mode, com1_modem, com1_rmc, dial, escape, init, logout, password, user}
status

NOTE: *The* **CPU, deposit,** *and* **dump** *commands are reserved for service providers.*

alert

The **alert** command displays the latest alert condition along with detailed system status information gathered when the alert was generated.

clear alert

The **clear alert** command clears the current alert condition and causes the RMC to stop paging the system operator. If the alert is not cleared, the RMC pages the operator every 30 minutes (if the dial-out alert feature is enabled).

Once the current alert is cleared, the RMC can capture a new alert. The Alert Pending field of the **status** command becomes NO after the alert is cleared.

clear log

The **clear log** command clears all events from the system event log.

clear port

The **clear port** command clears the UARTs controlled by the RMC in an attempt to clear any 'stuck' conditions that might exist.

disable alert

The **disable alert** command disables the RMC from paging the system operator in the event that an alert condition is detected. System monitoring continues and any alert conditions that are detected will still be logged.

disable fan

The **disable fan** command disables the system from powering off in the event that a fatal fan failure occurs. By default, fan failures result in the system being powered off after a 3 minute lapse.

disable modemdef

Instructs the RMC to utilize the user-supplied modem initialization string without appending additional commands that were automatically appended to the initialization string on older AlphaServer and AlphaStation models.

disable reboot

The **disable reboot** command disables the watchdog timer from rebooting the system when the watchdog timer expires. By default, the system does not reboot if the watchdog timer expires.

NOTE: *The watchdog timer is not available on the AlphaServer/AlphaStation DS15.*

---

disable remote

The **disable remote** command disables remote access to the RMC's modem port and disables automatic dial-out.

disable thermal

The **disable thermal** command disables the system from powering off in the event that a thermal failure occurs. By default, thermal failures powers off the system after a 3 minute lapse.

disable warning

When the **disable warning** command is issued, warning-level events no longer generate system alerts (this is the default state).

disable wdt

The command **disable wdt** disables the operating system watchdog timer (the default state). This does not disable the operating system from providing the watchdog clock; it simply prevents the RMC from monitoring it.

NOTE: *The watchdog timer is not available on the AlphaServer/AlphaStation DS15.*

---

enable alert

The **enable alert** command enables the RMC to page the system operator. Before the **enable alert** command can be used, the system must be configured for remote dial-in and dial-out. See sections 6.6 and 6.7.

enable fan

The **enable fan** command allows the RMC to power off the system in the event of a fatal fan failure condition (the default state) after a 3 minute lapse.

enable modemdef

The **enable modemdef** command instructs the RMC to append additional fixed commands to the user-supplied modem initialization string. These commands were automatically appended to the initialization string on older AlphaServer / AlphaStation models. (See Table 6–4 which follows.)

Table 6–4 DS15 initialization commands with MODEMDEF enabled

Modem Command	Description
&C1	Normal Carrier Detect (CD) operations
&K*x*	Select flow control per the current COM1 settings, where *x* is as follows: 0: No flow control 3: Hardware flow control 4: Software (XON/XOFF) flow control 6: Both hardware and software flow control

enable reboot

The **enable reboot** command enables the watchdog timer to reset the system if the timer should expire. By default, the system does not reset if the watchdog timer expires (and the watchdog timer is enabled).

NOTE: *The watchdog timer is not available on the AlphaServer/AlphaStation DS15.*

enable remote

The **enable remote** command enables remote access to the RMC's modem port. It also allows the RMC to automatically dial the pager number set with the **set dial** command upon the detection of an alert condition, if alerts are enabled. Before the **enable remote** command can be used, the system must be configured for remote dial-in. See section 6.6.

enable thermal

The **enable thermal** command allows the RMC to power off the system in the event of an over-temperature condition. By default, thermal failures powers off the system after a 3 minute lapse.

enable warning

The **enable warning** command allows warning-level events to generate system alerts (by default, warnings do not generate alerts).

Note that alerts are delivered in the order in which they occur. Therefore, a pending warning-level alert blocks the delivery of a fatal-level alert (though the fatal alerts continue to be logged).

enable wdt

The command **enable wdt** enables the operating system watchdog timer (disabled by default).

NOTE: *The watchdog timer is not available on the AlphaServer/AlphaStation DS15.*

---

env

The **env** command provides a current snapshot of the status of the system environment (voltages, temperature, fans). If a sensor has crossed its warning threshold, it is displayed bold; if a sensor has crossed its fatal threshold, the reading is displayed bold and blinking.

fwrev

Displays the RMC-accessible firmware revisions. Note that prior to the first successful SRM-console load, the RMC only has access to the RMC Booter image and RMC Runtime image firmware revisions.

halt

The **halt** command halts the system. This is the same as pressing and releasing the momentary contact halt button on the OCP. (Jumper J22 pins 13-14 must not be installed for the halt/reset button to operate as a halt button.)

halt in

The **halt in** command asserts halt to the system, halting the platform. To deassert a halt, issue the **halt out** command.

NOTE: *Halt will de-assert if system power is cycled.*

---

halt out

The **halt out** command releases the system from the halted state.

hangup

The **hangup** command terminates the current modem session. A modem session automatically terminates after a period of idle time set by the **set logout** command (default = 20 minutes).

help or ?

The **help** or **?** command displays the RMC command set.

help or ? command-word

Issuing the command **help** or **?** followed by the first word of another command provides additional information on all of the commands that start with the supplied word.

log

The **log** command prints out a brief summary of the last 10 system events that have been logged.

log number

Issuing the **log** command followed by a number (0-9) provides detailed information about the selected system event (0=most recent event).

poe

The **poe** command displays the latest power-on error (if any).

power off

The **power off** command performs the same function as releasing the on/off button on the OCP; it turns the system power off.

power on

The **power on** command performs the same function as pressing the on/off button on the OCP; it turns the system power on.

The system cannot be powered on with this command if the OCP power button is in the off position.

quit

The **quit** command exits the RMC and returns the terminal to external control.

reset

The **reset** command restarts the system. It performs the same function as pressing the reset button on the OCP. (Jumper J22 pins 13-14 must be inserted for the halt/reset button to operate as a reset button.)

rmcreset

The **rmcreset** command resets the RMC controller; it does **not** reset the DS15.

send alert

The **send alert** command forces an alert condition. It is used primarily to test the set-up of the dial-out alert function.

set alert

The **set alert** command sets the alert string that is transmitted through the modem when an alert condition is detected.

Generally, the alert string is set to the phone number that can be used to dial-in to the system that is experiencing the alert condition. The alert string is appended to the dial string and the combination is sent to the modem.

set com1_baud

The **set com1_baud** command is used to set the baud rate on the external 9-pin RMC/COM1 port. The available choices are: 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400, and 57600.

This command changes the setting of the SRM environment variable COM1_BAUD.

set com1_flow

The **set com1_flow** command is used to set the flow control that is to be used on the external 9-pin RMC/COM1 port. The available choices are: none, software, hardware, both.

This command changes the setting of the SRM environment variable COM1_FLOW.

set com1_mode

The **set com1_mode** command specifies the COM1 data flow path so that data either passes through the RMC or bypasses it. The available choices are: through, snoop, soft_bypass, firm_bypass.

The **set com1_mode** command changes the setting of the SRM environment variable COM1_MODE.

Com1_Mode Setting	Description
through	All data passes through the RMC and is filtered for the escape sequence that is used to enter the RMC CLI.
snoop	Data partially bypasses the RMC, but the RMC taps into the data

	lines listening for the escape sequence that is used to enter the RMC CLI.
soft_bypass	Data bypasses the RMC; however, the RMC automatically switches into Snoop Mode if the system is powered off or DCD is not detected.
firm_bypass	Data bypasses the RMC. You cannot gain access to the RMC CLI from this mode.

set com1_modem

The **set com1_modem** command is used to indicate whether or not modem control signals are to be used on the external 9-pin RMC/COM1 port. The available choices are: enabled or disabled. This variable is intended for use by the OS; it is not used by the RMC.

This command changes the setting of the SRM environment variable COM1_MODEM.

set com1_rmc

The **set com1_rmc** command is used to enable/disable the ability of the internal COM1 port (Acer) to access the RMC command set. After issuing the command, the user is prompted for the desired setting: enabled or disabled. This command changes the setting of the SRM environment variable COM1_RMC.

The setting of COM1_RMC is generally controlled by the SRM console; under normal circumstances, the user should not change the setting of COM1_RMC and will, therefore, not use this command.

set dial

The **set dial** command sets the string to be used by the RMC to dial out whenever an alert condition occurs. The string must be in the correct format for the attached modem. If a paging service is to be contacted, the string should include the appropriate modem commands to dial the number.

NOTE: *All lowercase characters are converted to uppercase.*

---

set escape

The **set escape** command sets a new escape sequence for invoking the RMC. The escape sequence can be any string, but cannot exceed 14 characters. A typical escape sequence includes two or more control characters.

set init

The **set init** command sets the modem initialization string. The string is limited to 31 characters and is converted to uppercase.

set logout

The **set logout** command sets the amount of time before the RMC terminates an inactive modem connection. The default is 20 minutes.

The settings are in tens of minutes – 0-9. The zero (0) setting disables logout. When logout is disabled, the RMC never disconnects an idle modem session.

set password

The **set password** command allows the user to set or change the password that is prompted for at the beginning of a modem session. A password must be set to enable access through a modem. The string cannot exceed 14 characters and is not echoed to the screen.

set user

The **set user** command allows the user to set a user string to be displayed by the **status** command. This string is typically used to make notes about the current status of the system. The string is limited to 63 characters.

status

The **status** command displays information about the current status of the system and its RMC settings. (See section 6.5.1.)

6.11 Troubleshooting Tips

Table 6–5 lists possible causes and suggested solutions for symptoms.

Table 6–5 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.
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, note that 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. (See section 6.6.)
	The modem is not configured correctly.	Modify the modem initialization string according to your modem documentation.
RMC will not answer when modem is called.	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.

Table 6–5 RMC Troubleshooting (Continued)

Symptom	Possible Cause	Suggested Solution
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 RMC does not always display power on or power off error messages to the external RMC/COM1 port.	The display of these messages varies with the system state and the setting of com1_mode.	Set com1_mode to through mode or snoop mode.

Chapter 7
Troubleshooting

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

- Error Beep Codes
- Diagnostic LEDs on OCP
- Power Problems
- Console-Reported Failures
- Boot Problems
- Thermal Problems and Environmental Status
- Operating System Reported Failures
- Memory Problems
- PCI Bus Problems
- SCSI Problems
- Fail-Safe Booter Utility

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

If you have a self-maintenance contract, use the information in this guide and the *DS15 Service Guide* to help identify and resolve the problem.

7.1 Error Beep Codes

Audible beep codes announce specific errors that might be encountered while the system is powering up. Table 7–1 identifies the error beep codes.

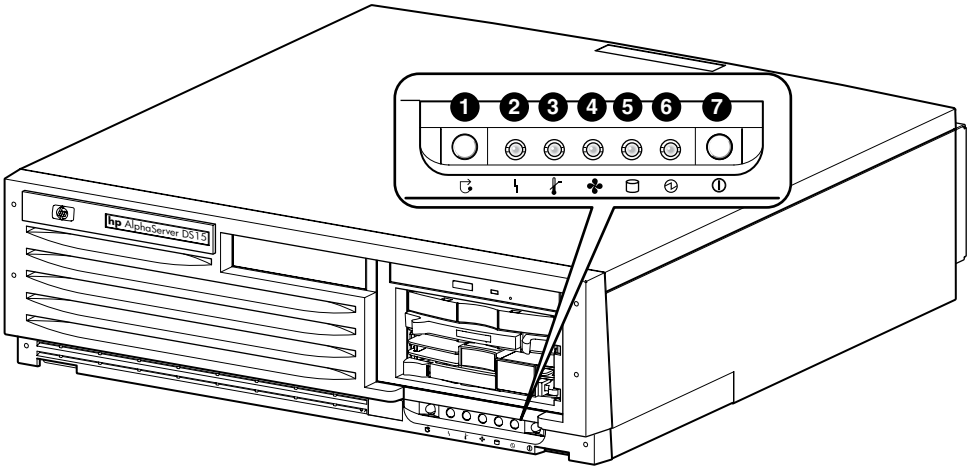
Table 7–1 Error Beep Codes

Beeps	Message/Meaning	Action to Repair
1	Done with execution; jumping to console	No action necessary.
1-3-3	No usable memory available	Check memory and memory configuration.
2-1-2	Configuration error detected	Check system configurations.
1-1-4	ROM checksum error detected	Replace the system board.
1-2-4	Bcache error detected	Possible CPU problem.

7.2 Diagnostic LEDs on OCP

Diagnostic LEDs on the operator control panel indicate error conditions and power-up information.

Figure 7–1 LED Patterns During Power-Up



MR0500

Table 7–2 OCP Switches

Switch	Function
❶	Halt/Reset
❼	System Power Switch (On/Off)

Table 7–3 OCP LED Indications

LED	Color	LED On Function
❻	Green	System power is on.
❺	Green	There is disk activity.
❹	Amber	There is a fan fault.
❸	Amber	The system is over temperature.
❷	Amber	There is a system fault.
❷ and ❹	Amber/blink in unison	RMC image is corrupted but the system is not in emergency runtime image recovery mode or emergency runtime image recovery mode has timed out. If recovery has timed out, unplug the system power cord and wait until the LED on the PCI Riser card turns off. Plug in the power cord and try again.
❷ ❸ ❹	Amber/blink in unison	System is in emergency runtime image recovery mode and is awaiting firmware update.
❷ ❸ ❹	Amber	RMC has failed or the system is configured for emergency runtime image recovery but is not powered on.
❷ ❸ ❹	Amber/blink sequentially	Firmware update is in progress.

7.3 Power Problems

Table 7–4 Troubleshooting Power Problems

If the power indicator is:	Check:
Off	• Front-panel power switch • Power at the wall receptacle • AC cord • Power cable connectors Unplug the power cord for 15 seconds, then reconnect.
On for a few seconds and then goes Off	• Enter the RMC and check the poweron errors “poe” and the event log “log, log #” for symptoms of failure. • Make sure that each jumper is in its default state.
On, but the monitor screen is black for approximately 40 seconds and then turns blue.	• Monitor power indicator is On. • Video cable is properly connected. • SRM **console** environment variable setting may not be set to graphics. **NOTE:** A black raster is displayed if the **console** environment variable is set to serial mode rather than graphics mode.

7.4 Console-Reported Failures

Table 7–5 Troubleshooting Console-Reported Failures

Symptom	Action
Power-up tests do not complete.	Use error beep codes or console serial terminal to determine what error occurred.
	Check the power-up screen for error messages.
	Enter the RMC and check the power-on errors “poe” and the event log “log, log #” for symptoms for failure.
Console program reports an error.	Interpret the error beep codes at power-up and check the power-up screen for a failure detected during self-tests.
	Examine the console event log (use the **more el** command) to check for embedded error messages recorded during power-up.
	If the power-up screen or console event log indicates problems with mass storage devices or PCI devices, or if devices are missing from the **show config** display, see Section 7.10.
	Enter the RMC and check the poweron errors “poe” and the event log “log, log #” for symptoms for failure.
	Use the SRM **test** command to verify the problem.

7.5 Boot Problems

Table 7–6 Troubleshooting Boot Problems

Problem/Possible Cause	Action
Operating system (OS) software is not installed on the hard disk drive.	Install the operating system and license key.
Target boot device is not listed in the SRM **show device** or **show config** command.	Check the cables. Are the cables oriented properly and not cocked? Are there bent pins? Check all the SCSI devices for incorrect or conflicting IDs. Refer to the device's documentation. SCSI termination: The SCSI bus must be terminated at the end of the internal cable and at the last external SCSI peripheral.

System cannot find the boot device.	Use the SRM **show config** and **show device** commands. Use the displayed information to identify target devices for the **boot** command, and verify that the system sees all of the installed devices. If you are attempting to use bootp, first set the following variables as shown. (Replace ewa0 with the appropriate device designation.)
	`>>>set ewa0_inet_init BOOTP`
	`>>>set ewa0_protocols BOOTP`

Table 7–6 Troubleshooting Boot Problems (Continued)

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

7.6 Thermal Problems and Environmental Status

Overtemperature conditions can cause the system to shut down.

The DS15 system operates in an ambient temperature range of 10ºC–40ºC. An internal sensor monitors the system temperature and shuts down the system if maximum limits are exceeded. If the system shuts down unexpectedly:

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

Troubleshooting with show power command

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

Show power indicates:	Action
Bad voltage	Replace the power supply and or the system motherboard. Contact HP Services.
Bad fan	Replace the indicated fan or fans. Contact HP Services.
Bad temperature	The problem could be a bad fan (fans) or an obstruction to the airflow. Check the airflow first. If there is no obstruction, contact HP Services to replace the bad fan.

7.7 Operating System Reported Failures

Table 7–7 Operating System Reported Failures

Symptom	Action
System is hung or has crashed.	If possible, halt the system with the Halt/Reset button or the RMC **halt** command. (J22 pins 13-14 must be removed. If J22 is installed you will reset and you will loose system context and no crash can be acquired.) Then enter the SRM **crash** command and examine the crash dump file. Refer to the *Guide to Kernel Debugging* (AA-PS2TD-TE) for information on using the Tru64 UNIX Crash utility.
Errors have been logged and the operating system is up.	Examine the operating system error log files. Contact HP Services.

7.8 Memory Problems

Table 7–8 Troubleshooting Memory Problems

Symptom	Action
DIMMs ignored by system, or system unstable. System hangs or crashes.	Ensure that each memory array has identical DIMMs installed.
DIMMs failing memory power-up self-test.	Replace the DIMMs that the SROM has isolated on power up. See Example 7–1.
DIMMs may not have ECC bits.	Some third-party DIMMs may not be compatible with DS15 systems. Ensure memory DIMMs are qualified.
Noticeable performance degradation. The system may appear hung or run very slowly.	This could be a result of hard single-bit ECC errors on a particular DIMM. Check the error logs for memory errors.
	Ensure memory DIMMs are qualified.

Example 7–1 Memory Sizing

```
Memory sizing in progress
Memory configuration in progress
Testing AAR2
Memory data test in progress
Memory data path error

ErrAdr: 00000000.00000000
Expect: 00000000.00000001
Actual: 00000000.00000000
XORval: 00000000.00000001

Testing AAR0
Memory data test in progress
Memory address test in progress
Memory pattern test in progress
Memory initialization
Failed DIMM 3
Loading console
Code execution complete (transfer control)
```

7.9 PCI Bus Problems

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

1. Five volt PCI adapters are not allowed.
2. Confirm that the PCI option card is supported and has the correct firmware and software versions.
3. Confirm that the PCI option card and any cabling are properly seated.
4. Check for a bad PCI slot by moving the last installed PCI option card to a different slot.
5. Contact HP Service to replace the PCI riser card.

PCI Parity Error

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

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

7.10 SCSI Problems

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

Check SCSI bus termination.

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

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

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

7.11 Fail-Safe Booter Utility

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

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

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

7.11.1 Starting the FSB Automatically

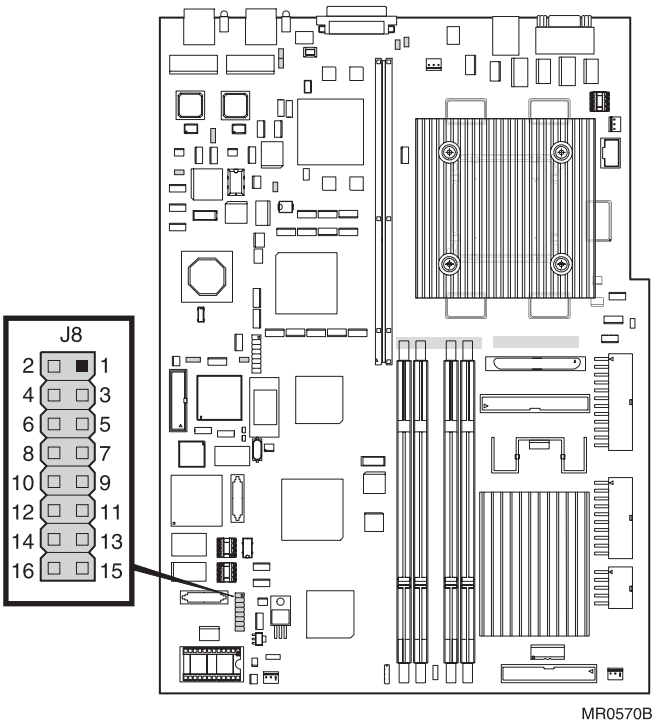
If the firmware image is unavailable when the system is powered on or reset, the FSB runs automatically.

1. Reset the system to restart the FSB. The FSB loads from the flash.
2. Update the firmware as described in Section 7.11.4.

7.11.2 Starting the FSB Manually

1. Power the system off, unplug the AC power cord, and remove the cover.
2. Insert jumper J8 over pins 1 – 2 on the system motherboard. See Figure 7–2.
3. Reconnect the AC power cord and reinstall the system cover. Power up the system to the FSB console.

Figure 7–2 FSB Switch "On" Setting



7.11.3 Required Firmware

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

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

The utilities that are used to reload or update the firmware expect to find the files on a CD.

7.11.4 Updating Firmware

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

Example 7–2 Running LFU

```
>>> boot dqa0

Checking dqa0.0.0.13.0 for the option firmware files. . .
dqa0.0.0.13.0 has no media present or is disabled via the RUN/STOP switch
Checking dqa1.1.0.13.0 for the option firmware files. . .
Checking dva0.0.0.1000.0 for the option firmware files. . .

Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update:

***** 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.
 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

SRM                T6.6-5              srm_fw              T6.6-7
rt                 V0.6-2              rt_fw               V0.6-3
srom               V1.0-1              srom_fw             V1.0-1

UPD> update srm

Confirm update on:
SRM               [Y/(N)]y

WARNING: updates may take several minutes to complete for each device.

                           DO NOT ABORT!

SRM              Updating to X6.6-1977...  Verifying X6.6-1977...  PASSED.

UPD> update rt

Confirm update on:
rt                [Y/(N)]y

WARNING: updates may take several minutes to complete for each device.
```

```
                          DO NOT ABORT!

rt              Updating to V0.6-3...  Verifying V0.6-3...  PASSED.

UPD> exit

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


                ***** 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.
 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

FSB               T6.6-6              fsb_fw              T6.6-8
SRM               T6.6-7              srm_fw              T6.6-7
booter            V0.5-6              booter_fw        No Update Available

rt                V0.6-3              rt_fw               V0.6-3
srom              V1.0-1              srom_fw             V1.0-1
tig                1.9                tig_fw               1.9

UPD> u fsb

Confirm update on:
FSB              [Y/(N)]y

WARNING: updates may take several minutes to complete for each device.

                          DO NOT ABORT!

FSB             Updating to V6.6-8...  Verifying T6.6-8...  PASSED.

UPD> exit

 Initializing....
```

Perform the following steps to update the console firmware. Refer to Example 7–2.

1. Insert the Alpha Firmware CD into the DVD/CD-RW drive.
2. At the SRM console prompt, issue the >>>**b dqa0** command.
3. At the UPD> prompt, enter the **update** command.

After the update has completed, enter the **exit** command to exit the utility.

Chapter 8
Specifications

This chapter contains the following system specifications and requirements:

- Physical Specifications
- Environmental Specifications
- Electrical Specifications
- Acoustical
- Power Cord Requirements

8.1 Physical Specifications

Table 8–1 Physical Characteristics

Dimensions		
Height	13 cm (5.1 in.)	
Width	45 cm (17.6 in.)	
Depth	48 cm (19 in.)	
Weight	Max: 16.3 kg (36 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	7.62 cm (3 in.)	75 cm (29.5 in.)
Right side	None	None

Table 8–2 Physical Characteristics – Cabinets

Dimensions	
H9A10 M-Series	
Height	170 cm (67.0 in.)
Width	60 cm (23.6 in.)
Depth	91.6 cm (36.1 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)

Continued

Table 8–2 Physical Characteristics – Cabinets (Continued)

Dimensions	
10000-Series	
Height	200 cm (78.7 in.)
Width	60 cm (23.7 in.)
Depth	100 cm (36.1 in.)
Weight	Nominal 45.4 kg (100 lb) Configuration-dependent Max payload 1000 lb
Shipping Container	
H9A10 M-Series	
Height	214.5 cm (84.4 in.)
Width	91.5 cm (36 in.)
Depth	122 cm (48 in.)
Weight	Nominal: 215 kg (475 lb) Max: 907 kg (2000 lb)

8.2 Environmental Specifications

Table 8–3 Environmental Characteristics — All System Variants

Temperature	Operating	10–40° C (50–104° F)
	Note: Max operating temp at sea level. Reduce by 1.8C/1000m (1F/1000ft) above sea level.	
	Rate of change (operating)	11° C/hr (20° F/hr)
	Non-operating/storage (60 days)	–40 to 66° C (–40 to 151° F)
	Rate of change (non-operating)	31° C/hr (56° F/hr)
Relative humidity	Operating	10 to 90%
	Nonoperating/storage (60 days)	10 to 95%
Heat dissipation		
Single Unit =	176 Watts =	601 BTU/Hr
Rack of 12 systems =	2112 Watts =	~7,212 BTU/Hr
Airflow and quality	Intake location	Front
	Exhaust location	Desktop: rear & side Pedestal: rear & top Cabinet: rear
	Particle size	N/A
	Concentration	N/A
Altitude (unpressurized)	Operating	3048 m (10,000 ft)
	Nonoperating	12192 m (40,000 ft)
Mechanical shock	Operating	
	Desktop/Pedestal	10 G, 10 ms
	Cabinet	5 G, 10 ms
Vibration	Operating	10–500 Hz 0.1 G peak
	Non-operating	5-300 Hz 1.03 G rms

8.3 Electrical Specifications

Table 8–4 Electrical Characteristics — All System Variants

Nominal voltage (Vac)	100 – 220
Voltage range (Vac) (temporary condition)	90 – 128 / 180 – 265
Power source phase	Single
Nominal frequency (Hz)	50/60
Frequency range (Hz)	59 – 61 / 49 – 51
RMS current (max. steady state)	
Maximum inrush current (Amps)	11 / 22
Power supply (single cord) (Amps)	6.5 / 3.3

	Power Cord		
System Variant	**Quantity**	**Length**	**Type**
Pedestal	2	275 cm (108 in.)	IEC 320 C13 to NEMA 6-15 100–240 V (N. America) or IEC 320 C13 to country-specific
Rackmount	3	452 cm (14 ft 10 in.)	IEC 320 C13 to IEC 320 C14
Cabinet	up to 4	305 cm (10 ft)	100–240 V nonremovable IEC 309 or 100–240 V nonremovable NEMA LG-20P

NOTE: *Power supplies are universal, PFC, auto ranging, 100 – 240 Vac., 50/60 Hz.*

8.4 Regulatory Approvals

Table 8–5 Regulatory Approvals

Agency approvals	UL: Listed to UL1950 3rd edition UL CNL: Certified to CAN/CSA-C22.2 No. 950-1995 TUV: EN60950/A11:1997, GS marked FCC: Part 15.B Class B CE: EN55022, EN50082 VCCI: Class II ITE BSMI: CISPR22, CNS13438 C-Tick: CISPR22, AS/NZS 3548
Reviewed to	AS/NZ 3260: 1993 Australian / New Zealand Standard EN60950/A11: 1997 European Norm IEC950 (2^{nd} edition, 4^{th} amend)

8.5 Acoustics

Table 8–6 gives the acoustic noise declaration for DS15 systems with one or two hard disk drives.

Table 8–6 Acoustics

Acoustics — Declared Values per ISO 9296 and ISO 7779			
DS15 with one or two HDD	***L_{WAd}, B***	***L_{pAm}, dBA (operator position)***	***L_{pAm}, dBA (bystander positions)***
Idle	5.6	49	39
Operating	5.7	50	40

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

Index

K

L

M

N

O

P

Q

R

S

T

U

V