AlphaServer 4000

System Drawer User's Guide

Order Number: EK–4000A–UG. B01

This manual is for anyone who manages, operates, or services the BA30B system drawer in a DIGITAL AlphaServer 4000 system. It covers operation, firmware, initial troubleshooting, and component installation.

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Preface

Intended Audience

This manual is for anyone who manages, operates, or services the BA30B system drawer in an AlphaServer 4000 system.

Document Structure

This manual uses a structured documentation design. Topics are organized into small sections for efficient online and printed reference. Each topic begins with an abstract. You can quickly gain a comprehensive overview by reading only the abstracts. Next is an illustration or example, which also provides quick reference. Last in the structure are descriptive text and syntax definitions.

This manual has seven chapters and four appendixes, as follows:

Part 1: System Drawer

- **Chapter 1, System Drawer Overview,** describes the components in the BA30B system drawer.
- **Chapter 2, Operation,** gives instructions for powering up the system drawer, booting the operating system, updating firmware, and operating the system remotely.
- **Chapter 3, Troubleshooting,** provides basic troubleshooting information for the system drawer.
- **Chapter 4, Installing Components,** gives instructions for adding CPU, memory, PCI, and EISA cards to the system drawer.

Part 2: User Interface

- **Chapter 5, SRM Console,** describes commands in the SRM console, for DIGITAL UNIX and OpenVMS systems.
- **Chapter 6, AlphaBIOS Console,** describes menu selections in the AlphaBIOS console, for Windows NT systems.
- **Chapter 7, Utilities,** shows how to run the EISA and RAID configuration utilities on an AlphaServer 4000 system.

- **Appendix A, How to Find Firmware Updates,** explains the process for downloading AlphaServer firmware from the Internet.
- **Appendix B, Hard Disk Partitioning for AlphaBIOS and Windows NT,** describes the concept of partitioning for AlphaBIOS and Windows NT.
- **Appendix C, Differences Between AlphaBIOS and ARC Firmware,** describes the differences.
- **Appendix D, Acoustical Data,** lists values for the system drawer in various configurations.

Documentation Titles

Table 1 lists the books in the AlphaServer 4000/4100 documentation set.

Table 1 AlphaServer 4000/4100 Documentation

Title	Order Number
User and Configuration Documentation Kit	QZ–00VAB–GZ
System Drawer User's Guide	EK–4000A–UG
Configuration and Installation Guide	EK–4100A–CG
Service Information	
Service Manual (hard copy)	EK–4100A–SV
Service Manual (diskette)	AK–QXBJA–CA
System Drawer Upgrades	EK–4041A–UI
PCI Upgrade	EK–4000A–UI
Reference Information	
KN30n CPU Installation Card	EK–KN300–IN
MS3n0 Memory Installation Card	EK–MS300–IN
H7291 Power Supply Installation Card	EK–H7291–IN
ServerWORKS Manager Administrator User's Guide	ER–4QXAA–UA

Part 1

System Drawer

Chapter 1

System Drawer Overview

The BA30B system drawer is the enclosure for AlphaServer 4000 processor and memory modules, system bus, and PCI bus. The same drawer is used in various AlphaServer 4000 models, such as the pedestal system and the cabinet system.

This chapter provides an overview of the BA30B system drawer in these sections:

- Characteristics
- Architecture
- Parts of the System Drawer
- Console Terminal

1.1 Characteristics

The illustration shows the BA30B system drawer with covers in place. The table lists characteristics of the drawer.

Figure 1–1 BA30B System Drawer

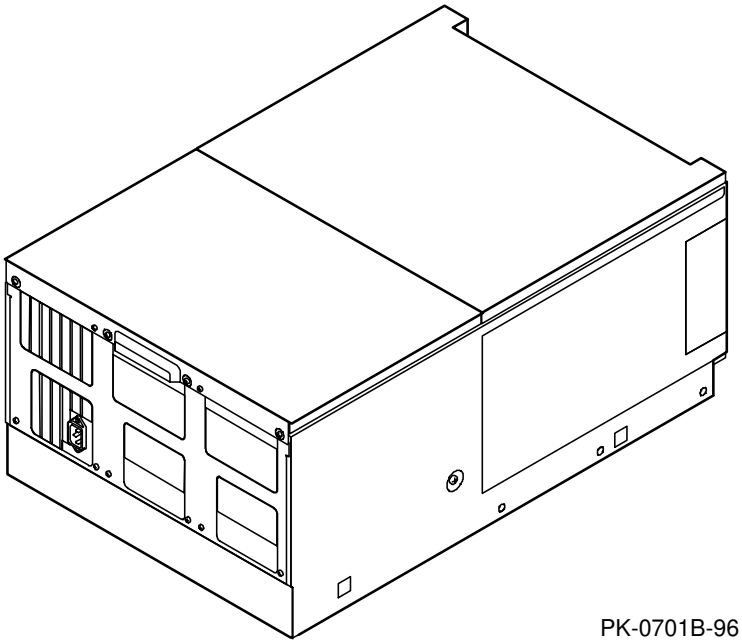


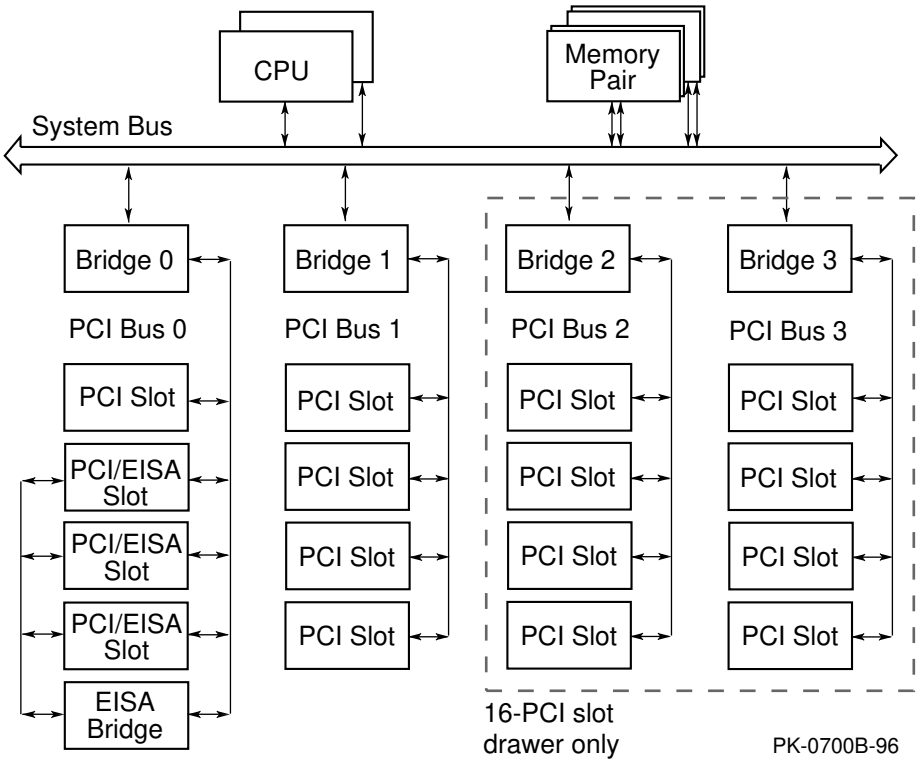
Table 1–1 BA30B System Drawer Characteristics

Characteristic	Specification
Size	30 cm H x 45 cm W x 69 cm D (11.8 in. x 17.7 in. x 27.2 in.)
Weight	45.5 kg (100 lb) fully configured
Clearance	20 cm (7.9 in.) front and rear
Maximum heat dissipation	1100 w (3754 Btu/hr)
Electrical	
Voltage	100–120/200–240 Vac
Phase	Single
Frequency	50–60 Hz
Maximum rated current (single cord set)	8.4 A at 100–120 V 4.2 A at 200–240 V
Maximum rated current (multiple cord sets)	8.0 A at 100–120 V 4.0 A at 200–240 V
Maximum power consumption	700 w
Environmental	
Temperature	Operating: 10° to 35°C (50 to 95°F) Not operating: -40° to 66°C (-40° to 150.8°F) Storage (60 days): -40° to 66°C (-40° to 150.8°F) Rate of change: 11° to 19°C per hour (20° to 35°F per hour)
Humidity	Operating: 20% to 90% (noncondensing) Not operating: 10% to 95% Storage (60 days): 10% to 95%
Altitude	Operating: 2000 m (6560 ft) Not operating: 3600 m (11808 ft)

1.2 Architecture

The system bus, with its logic on the system motherboard, connects the CPU, memory, and system bus to PCI bus bridge modules. The four 64-bit PCI buses each have four slots for PCI options. (Three of the 16 slots can be used for either PCI or EISA options.)

Figure 1–2 System Drawer Block Diagram



The **system bus** is a 144-bit data bus (128 bits for data and 16 for ECC) and a separate 40-bit command/address bus. The logic is on the system motherboard. This bus connects CPU modules, memory modules, and the system bus to PCI bus bridge modules. The clock for the system bus is on the module in CPU slot 0.

The system drawer supports up to two **CPU modules**.

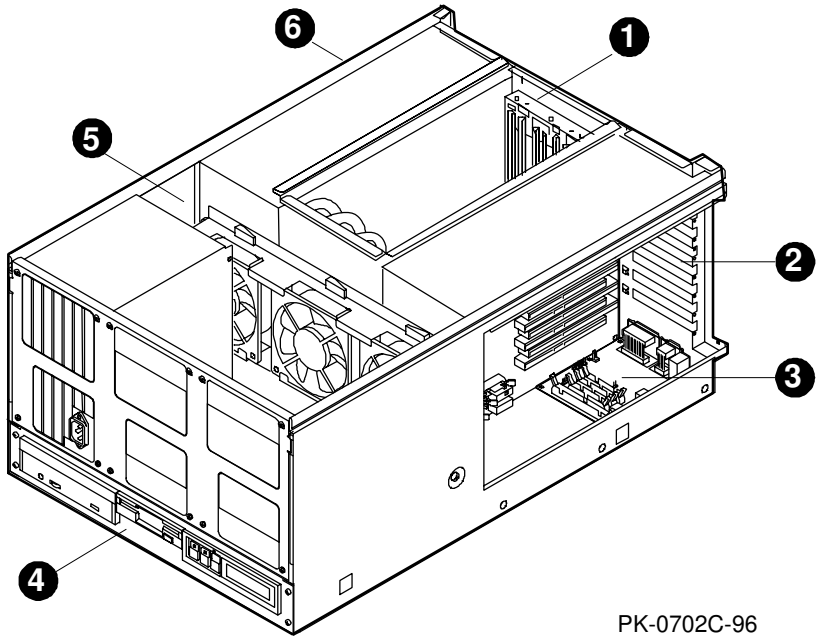
A **memory pair** is two modules of the same size and type, which together make one memory option. Memory pairs can be 128 or 512 MB, or 1 or 2 GB. Each module in the pair drives 72 bits of the 144-bit system bus. The system drawer can have up to two memory pairs.

Each **system bus to PCI bus bridge module** has two PCI bridges. Each bridge supports one 64-bit **PCI bus**. The system can have up to two bridge modules, for a total of four PCI buses. The first PCI bus has one dedicated PCI slot and three slots that can be used for either PCI or EISA options.The other PCI buses each have four slots for PCI options.

1.3 Parts of the System Drawer

The system drawer consists of the system card cage, PCI card cages, control panel, and power and cooling section.

Figure 1–3 System Drawer Sections



The callouts in Figure 1–3 point to these components of the BA30B system drawer:

❶ System card cage, which holds the system motherboard and the CPU, memory, bridge, and power control modules. Refer to Sections 1.3.1 through 1.3.5 for information about these modules.

❷ PCI card cage, which holds the motherboard for PCI 0 and PCI 1, option cards, and the server control module. Refer to Section 1.3.6 for information about the motherboard.

❸ Server control module, which holds the I/O connectors and remote console monitor. Refer to Section 1.3.7.

❹ Control panel assembly, which includes the control panel, a floppy drive, and a CD-ROM drive. Refer to Section 1.3.8.

NOTE: When the system drawer is mounted in a pedestal cabinet, the control panel is mounted in a tray at the top of the drawer.

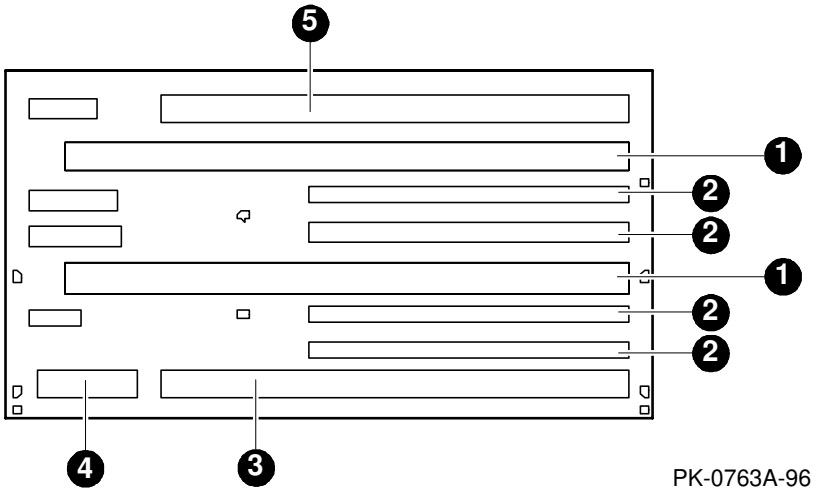
❺ Power and cooling section, which contains one to three power supplies (refer to Section 1.3.9) and three fans.

❻ PCI card cage, which holds the motherboard for PCI 2 and PCI 3 and their option cards (16-PCI slot drawers only). Refer to Section 1.3.6 for information about the motherboard.

1.3.1 System Motherboard

The system motherboard is on the floor of the system card cage. It has slots for the CPU, memory, power control, and bridge modules.

Figure 1–4 System Motherboard



The system motherboard has the logic for the system bus. It is the backplane that holds the CPU, memory, bridge, and power control modules. Figure 1–4 shows the locations of these modules and of connectors on the motherboard.

❶ CPU module

❷ Memory module

❸ Bridge module (PCI 0 and 1)

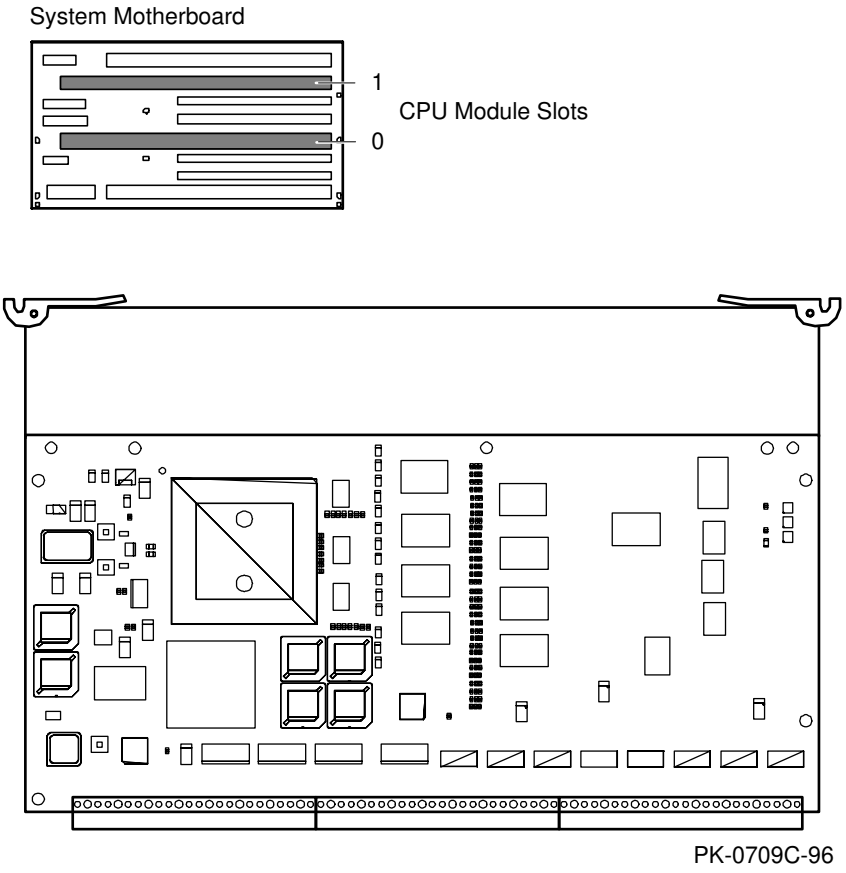
❹ Power control module

❺ Bridge module (PCI 2 and 3 — 16-PCI slot drawer only)

1.3.2 CPU Module

Each CPU module has a fan for cooling. The BA30B system drawer can have up to two CPU modules.

Figure 1–5 CPU Modules



Description

The system drawer can have one or two CPU modules. Each CPU module has a fan for cooling.

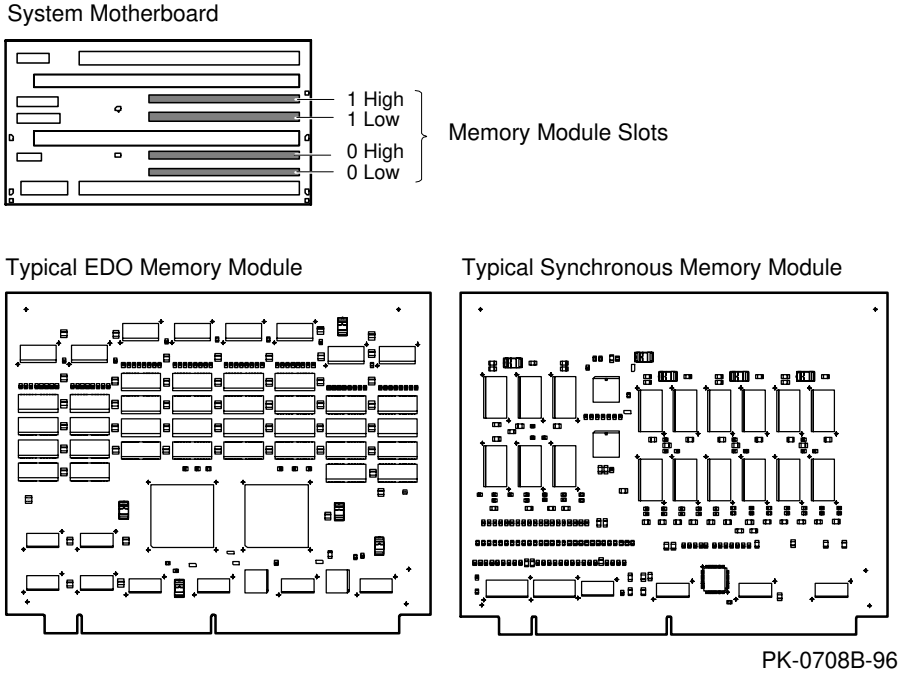
Configuration

- The first CPU module must be in CPU slot 0 to provide the system clock.
- The second CPU module, if present, is installed in CPU slot 1.
- All CPU modules must have the same clock frequency.

1.3.3 Memory Pair

Memory modules are used only in pairs — two modules of the same size and type. Each module provides either the low half or the high half of the memory space. The system drawer can hold up to two memory module pairs.

Figure 1–6 Memory Module



Description

Memory modules are used only in pairs. A memory module pair is two modules of the same size and type; one module in the pair provides the low half and the other the high half of that pair's memory region. Two types of memory modules are available: synchronous and extended data out (EDO).

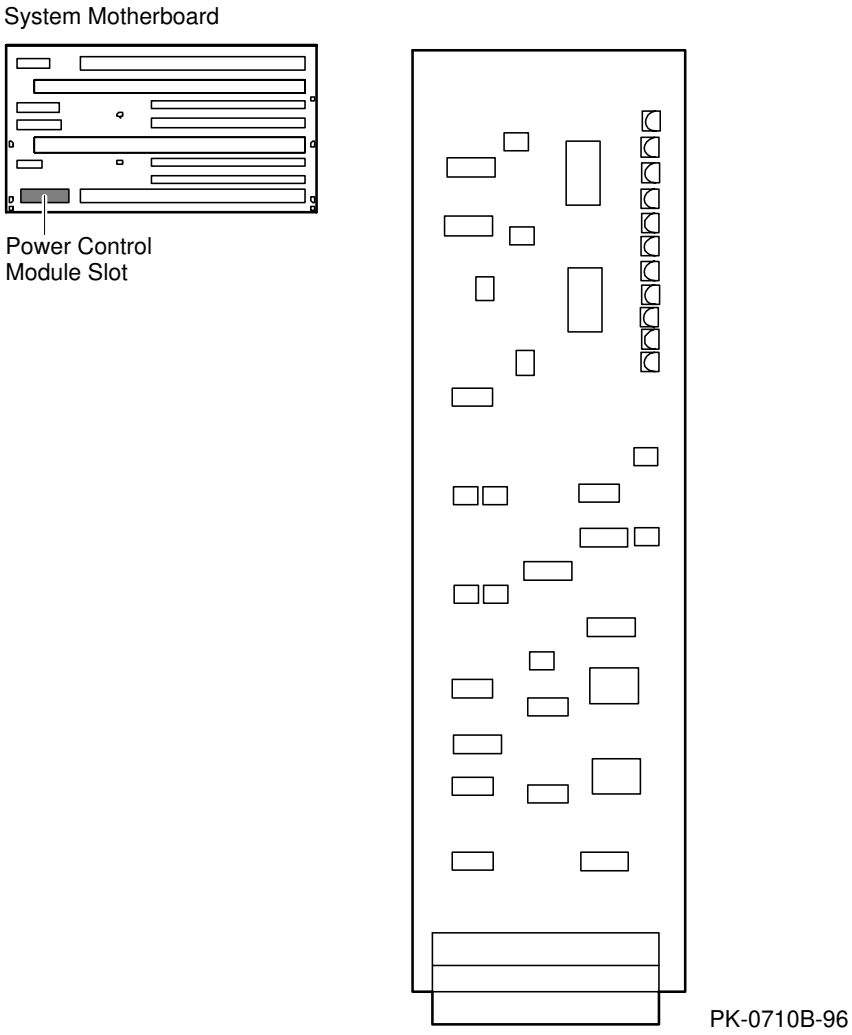
Configuration

- Memory modules are installed and used in pairs. Both modules in a memory pair must be of the same size and type.
- Memory must be configured in descending order. That is, the larger memory pair must be in slots 0 Low and 0 High, and the second pair, if present, in 1 Low and 1 High. (The first memory pair defines the size of the memory region for each pair.)

1.3.4 Power Control Module

The power control module controls power sequencing and monitors power supply voltage, temperature, and fans.

Figure 1–7 Power Control Module



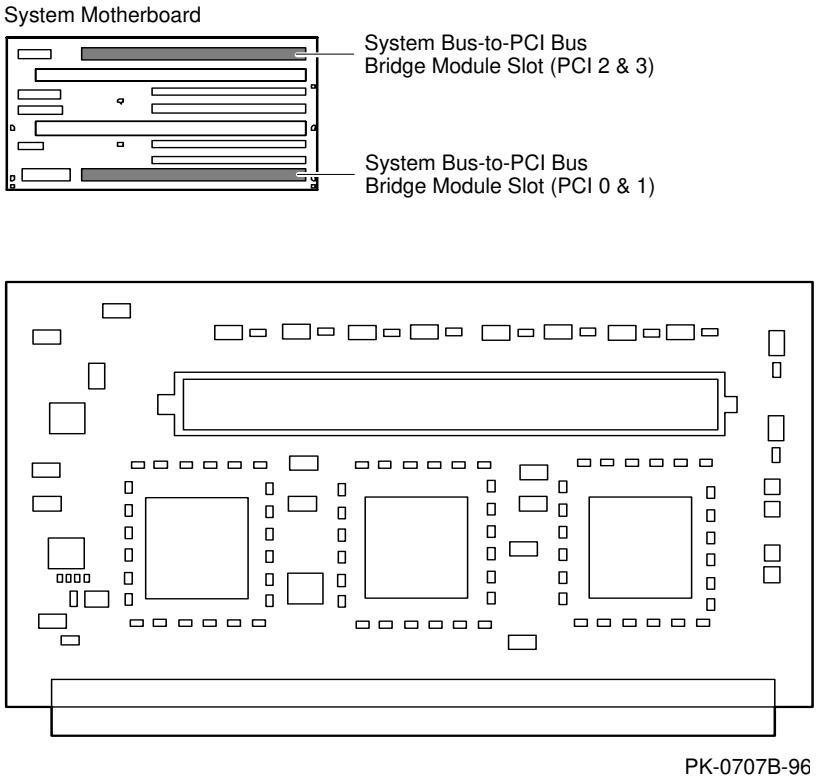
The power control module performs these functions:

- Controls power sequencing.
- Monitors the combined output of power supplies and shuts down power if it is not in range.
- Monitors system temperature and shuts off power if it is out of range.
- Monitors the fans in the system drawer and on the CPU modules and shuts down power if a fan fails.
- Provides visual indication of faults through LEDs.

1.3.5 System Bus to PCI Bus Bridge Module

The bridge module is the physical interconnect between the system motherboard and the PCI motherboard.

Figure 1–8 Bridge Module



The 16-PCI slot system drawer has two bridge modules; the 8-PCI slot drawer has one.

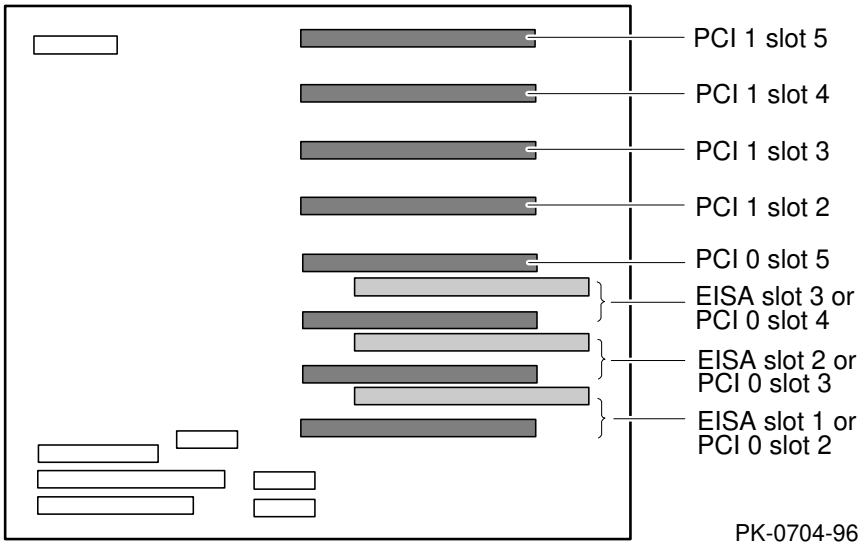
Each bridge module is the physical interconnect between the system motherboard and a PCI motherboard. Each side of a bridge module connects to one PCI bus.

The bridge module converts system bus commands and data addressed to I/O space to PCI commands and data, and it converts PCI bus commands and data addressed to system memory or CPUs to system bus commands and data.

1.3.6 PCI Motherboard

Each PCI motherboard has the logic for two PCI buses. PCI 0 consists of one dedicated PCI slot and three shared PCI/EISA slots; PCI 1, 2, and 3 each have four PCI slots.

Figure 1–9 PCI Motherboard (PCI 0 and 1)



The PCI 0 and 1 motherboard is used in all BA30B system drawers. The PCI 2 and 3 motherboard is found only in 16-PCI slot system drawers.

The logic for two 64-bit PCI buses is on each PCI motherboard. PCI 0 has one dedicated PCI slot and three shared PCI/EISA slots, and PCI 1, 2, and 3 each have four PCI slots. The PCI 0 and 1 motherboard has cable connections to remote I/O (mouse, keyboard, serial port, and parallel port) and to an internal floppy drive, an internal CD-ROM drive, the control panel, and 5V power. Also on this module are the chips for the PCI to EISA bridge and the internal CD-ROM controller.

Figure 1–10 PCI Motherboard (PCI 2 and 3 — 16-PCI Slot Drawer Only)

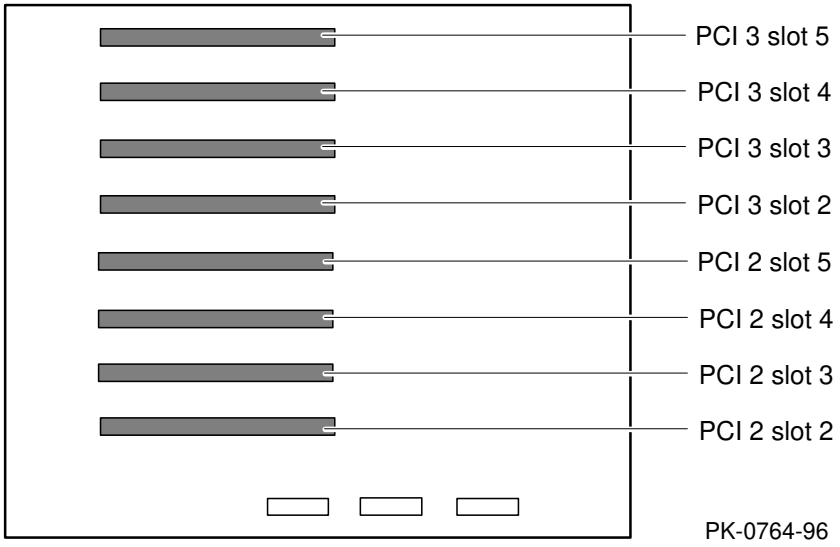


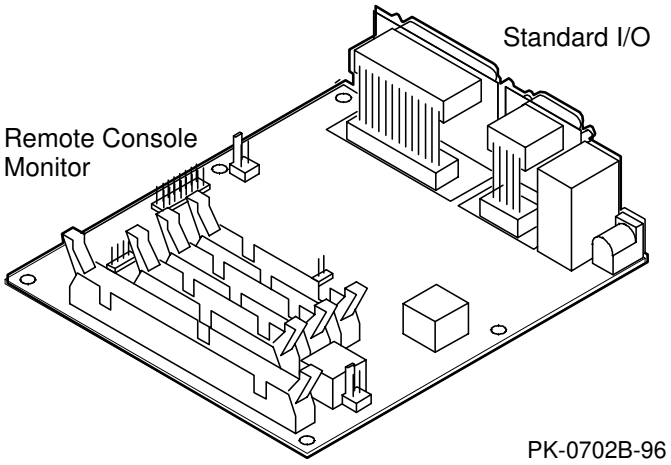
Table 1–2 PCI Bus Slot Numbering

Slot	PCI 0	PCI 1	PCI 2	PCI 3
0	Reserved	Reserved	Reserved	Reserved
1	PCI to EISA bridge	Internal CD-ROM controller	Reserved	Reserved
2	PCI or EISA slot	PCI slot	PCI slot	PCI slot
3	PCI or EISA slot	PCI slot	PCI slot	PCI slot
4	PCI or EISA slot	PCI slot	PCI slot	PCI slot
5	PCI slot	PCI slot	PCI slot	PCI slot

1.3.7 Server Control Module

The server control module enables remote connections to the system drawer's console. It also holds the standard I/O connectors.

Figure 1–11 Server Control Module



The server control module has two sections: the remote console monitor and the standard I/O connectors.

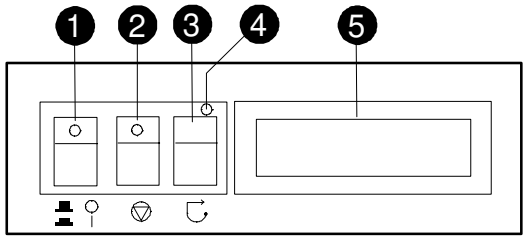
The remote console monitor connects to a modem through the modem port on the bulkhead, and it receives power through the 12V power connector.

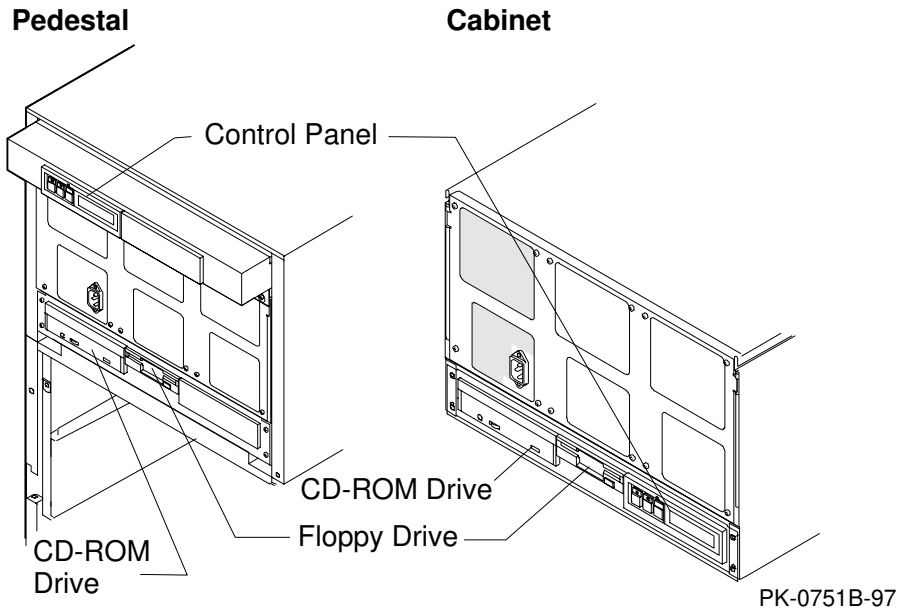
The standard remote I/O ports (keyboard, mouse, COM1 and COM2 serial, and parallel ports) are on the same bulkhead.

1.3.8 Control Panel

The control panel includes the Power, Halt, and Reset buttons and a display. In a pedestal system the control panel is located in a tray at the top of the system drawer. In a cabinet system it is at the bottom of the system drawer with the CD-ROM drive and the floppy drive.

Figure 1–12 Control Panel





The callouts in Figure 1–12 point to these components of the control panel:

❶ Power button — Powers on or off the system drawer. When the LED at the top of the button is lit, the power is on.

NOTE: The LEDs on some modules are on when the line cord is plugged in, regardless of the position of the Power button.

❷ Halt button — Pressing this button in (so the LED at the top of the button is lit) does the following:

- If DIGITAL UNIX or OpenVMS is running, halts the operating system and returns to the SRM console. (The Halt button has no effect on Windows NT.)
- If the Halt button is in when the system is reset or powered up, the system halts in the SRM console, regardless of the operating system. DIGITAL UNIX and OpenVMS systems that are configured for autoboot will not boot if the Halt button is in. Windows NT systems halt in the SRM console; AlphaBIOS is not loaded and started.

❸ Reset button — Initializes the system drawer.

❹ Potentiometer — Controls the intensity of the control panel display. It is accessed through a small hole above the Reset button.

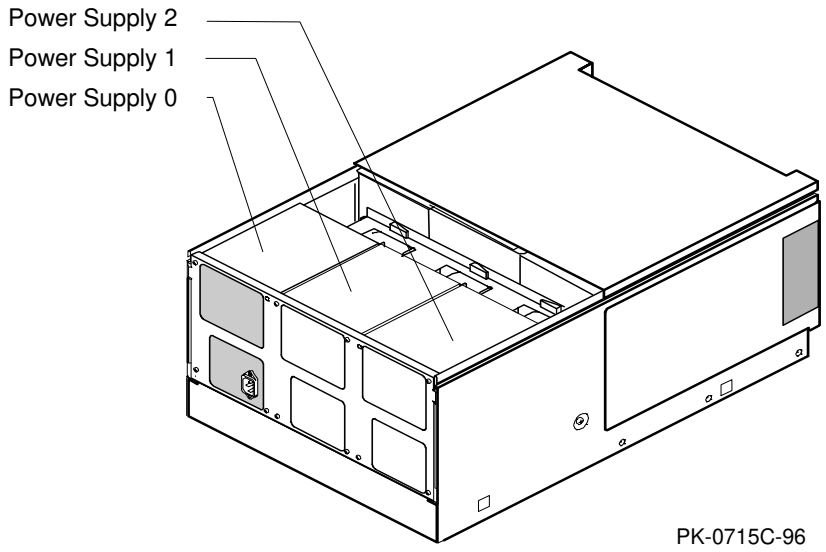
❺ Control panel display — Indicates status during power-up and testing. See Table 3–1 for the messages that are displayed and their meanings.

While the operating system is running, the control panel displays the system type as a default. (This message can be changed by the user with the **ocp_text** SRM environment variable — see Section 5.15.)

1.3.9 Power Supply

The system drawer power supplies provide power only to components in the drawer. One or two power supplies are required, depending on the number of PCI slots. A second or third power supply can be added for redundancy.

Figure 1–13 Power Supply



Description

One to three power supplies provide power to components in the system drawer. (They supply power only for the drawer in which they are located.)

These power supplies share the load, and redundant configurations are supported. They autoselect line voltage (120V to 240V). Each has 450 W output and supplies up to 75A of 3.43V, 50A of 5.0V, 11A of 12V, and small amounts of -5V, -12V, and auxiliary voltage (Vaux).

NOTE: The LEDs on some modules are on when the line cord is plugged in, regardless of the position of the Power button.

Configuration

- The number of power supplies required depends on the number of PCI slots in the drawer. An 8-PCI slot drawer requires one power supply. A 16-PCI slot drawer requires two power supplies. In each case, one extra power supply can be added for redundancy.
- Power supply 0 is installed first, power supply 2 second, and power supply 1 third. See Figure 1–13. (The power supply numbering shown here corresponds to the numbering displayed by the SRM **show power** command.)

1.4 Console Terminal

The console terminal can be either a serial terminal or a graphics monitor. The power-up display prints to this terminal.

Figure 1–14 Comparison of Console Terminals

Condition	Serial Terminal	Graphics Monitor
Does the SROM power-up display print?	Yes	No
Does the XSROM power-up display print?	Yes	No
Does the SRM console power-up display print?	Yes	Yes
Is it supported by the SRM console?	Yes	Yes
Is it supported by the AlphaBIOS console?	Yes	Yes
Is it supported by the DIGITAL UNIX operating system?	Yes	Yes
Is it supported by the OpenVMS operating system?	Yes	Yes
Is it supported by the Windows NT operating system?	No	Yes

The console terminal can be a serial (character cell) terminal connected to the COM1 port or a graphics monitor connected to either a TGA adapter or a VGA adapter on PCI 0. If the console terminal is connected to COM1, the entire power-up display prints. (See Section 2.2 for information about the power-up display.) If the console terminal is either a TGA or VGA monitor, console power-up messages are sent to either of those devices but SROM and XSROM power-up messages are lost.

When the console terminal is a serial terminal, the **console** environment variable is set to **serial**. When it is a graphics monitor, **console** is set to **graphics**. (See Section 5.15 for information about environment variables.)

*NOTE: Regardless of the setting of the **console** environment variable, all three power-up programs send messages to the control panel display.*

If the **console** environment variable is set to **serial**, **os_type** is set to **unix** or **openvms**, and no terminal is attached to COM1, pressing a carriage return on a graphics terminal attached to the keyboard port makes it the console device and the console prompt is sent to it.

If the **console** environment variable is set to **graphics** and no graphics monitor is attached to the keyboard port, pressing a carriage return on a serial terminal attached to COM1 makes it the console device and the console prompt is sent to it.

NOTE: The console prompt displays only after the entire power-up sequence is complete. This can take up to several minutes if the memory is very large.

Chapter 2

Operation

This chapter provides basic operating instructions, including powering up the system drawer and booting the operating system. It also provides information about updating firmware and operating the system from a remote location.

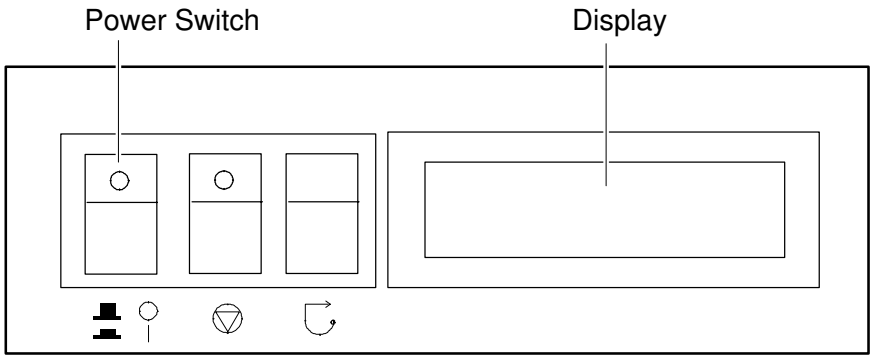
Sections in this chapter are:

- Powering Up the System Drawer
- Power-Up Display
- Booting DIGITAL UNIX
- Installing DIGITAL UNIX
- Booting OpenVMS
- Installing OpenVMS
- Booting Windows NT
- Installing Windows NT
- Updating Firmware
- Operating the System Remotely

2.1 Powering Up the System Drawer

To power up the system drawer, press the Power button (the LED at the top of the button lights). Testing begins, and status shows on the screen and in the control panel display.

Figure 2–1 Power Button and Control Panel Display



PK-0706C-96

Power up the system drawer by pressing the Power button (see Figure 2–1). Testing begins, and screen text similar to that in Example 2–1 displays (if the console terminal is a serial terminal connected to the COM1 port), along with status messages in the control panel display. (See Figure 2–1 for display location. Refer to Table 3–1 for information about the messages in the control panel display.)

NOTE: If the console terminal is a graphics monitor, only the last few lines of the power-up display print. See Section 2.2 for more information.

2.2 Power-Up Display

The entire power-up display prints to a serial terminal (if the console environment variable is set to serial); the last several lines print to either a serial terminal or a graphics monitor. Power-up status also displays on the control panel display.

Example 2–1 Power-Up Display

```
P00>>> initialize
Initializing…

 SROM V2.0 on cpu0                                    ❶
 SROM V2.0 on cpu1
XSROM V3.0 on cpu1                                    ❷
XSROM V3.0 on cpu0
BCache testing complete on cpu1                       ❸
BCache testing complete on cpu0
mem_pair0 - 128 MB                                    ❹
20..20..21..21..23..                                  ❺
please wait 3 seconds for T24 to complete
24..24..
Memory testing complete on cpu1
Memory testing complete on cpu0
```

Continued on next page

❶ On power-up, the SROM code on each CPU module loads into that module's I-cache and tests the processor chip. If all tests pass, the module's LED lights. If any test fails, the LED remains clear and power-up terminates.

The primary CPU is determined for the first of three times. The primary CPU then executes a loopback test on each PCI bridge. If this test passes, the bridge LED lights. If it fails, the LED remains clear and power-up continues. The EISA system controller, PCI-to-EISA bridge, COM1 port, and control panel port are all initialized.

Each CPU prints an SROM message to the device attached to the COM1 port and to the control panel display. (The banner prints to the COM1 port if the **console** environment variable is set to **serial**. If it is set to **graphics**, nothing prints to the console terminal, only to the control panel display, until ❻. See Section 5.15 for information about environment variables.)

❷ The S-cache on each CPU module is initialized, and the XSROM code in the FEPROM on the PCI 0 and 1 motherboard is unloaded into them. (If the unload is not successful, the SROM unloads XSROM code from a different FEPROM sector. If the second try fails, the CPU hangs.) Each CPU starts the XSROM code, which prints an XSROM message to the COM1 port and to the control panel display.

❸ The three S-cache banks on each CPU are enabled, and the B-cache is tested. If a failure occurs, a message is printed to the COM1 port and to the control panel display immediately. Each CPU prints a B-cache completion message to COM1.

❹ The primary CPU is determined for the second time. It then sizes memory. Information on memory pairs is printed to the COM1 port. If an illegal memory configuration is detected, a warning message is printed to the COM1 port and the control panel display.

❺ Memory is initialized and tested, and test traces are printed to the COM1 port and the control panel display. The numbers for tests 20 and 21 might appear interspersed; this is normal behavior. Test 24 can take several minutes if the memory is very large; the message preceding the test 24 trace indicates an estimate of the time this test will take. If a failure occurs, a message is printed to the COM1 port and to the control panel display immediately. Each CPU prints a test completion message to the COM1 port.

Continued on next page

Example 2–1 Power-Up Display (Continued)

```
starting console on CPU 0                                    ❻
sizing memory                                                ❼
  0    128 MB SYNC
starting console on CPU 1
probing IOD1 hose 1                                          ❽
  bus 0 slot 1 - NCR 53C810
probing IOD0 hose 0
  bus 0 slot 1 - PCEB
    probing EISA Bridge, bus 1
  bus 0 slot 2 - S3 Trio64/Trio32
  bus 0 slot 3 - DECchip 21040-AA
  bus 0 slot 5 - NCR 53C810
probing IOD3 hose 3
probing IOD2 hose 2
  bus 0 slot 2 - PCI-PCI Bridge
    probing PCI-PCI Bridge, bus 2
      bus 2 slot 0 - ISP1020
configuring I/O adapters...
  ncr0, hose 1, bus 0, slot 1
  floppy0, hose 0, bus 1, slot 0
  tulip0, hose 0, bus 0, slot 3
  ncr1, hose 0, bus 0, slot 5
  isp0, hose 2, bus 2, slot 0
System temperature is 23 degrees C
AlphaServer 4000 Console V3.0-10, 19-NOV-1996 13:57:07 ❾
P00>>>
```

❻ The primary CPU is determined for the last time. The primary CPU unloads PALcode and decompression code from the FEPROM on the PCI motherboard to its B-cache. The primary CPU then jumps to the PALcode to start the SRM console.

The primary CPU prints a message indicating that it is running the console. Starting with this message, the power-up display is printed to any console terminal, regardless of the state of the **console** environment variable. (If **console** is set to **graphics**, the display from here to the end is saved in a memory buffer and printed to the graphics monitor after the PCI buses are sized and the VGA device is initialized.)

❼ The size and type of each memory pair is determined.

The console is started on each of the secondary CPUs. A status message prints for each CPU.

❽ The PCI bridges (indicated as IOD*n*) are probed and the devices are reported. I/O adapters are configured.

❾ The SRM console banner and prompt are printed. (The SRM prompt is shown in this manual as P00>>>. It can, however, be P01>>>. The number indicates the primary processor.) If the **auto_action** environment variable is set to **boot** or **restart** and the **os_type** environment variable is set to **unix** or **openvms**, the DIGITAL UNIX or OpenVMS operating system boots.

If the system is running the Windows NT operating system (the **os_type** environment variable is set to **nt**), the SRM console loads and starts the AlphaBIOS console.

Refer to Chapter 5 for information about the SRM console and to Chapter 6 for AlphaBIOS.

2.3 Booting DIGITAL UNIX

DIGITAL UNIX® can be booted from a local disk, a disk connected through a cluster, or a remote disk through an Ethernet connection. Refer to the documentation shipped with the operating system for booting instructions.

Example 2–2 Booting DIGITAL UNIX from a Local Disk

```
P00>>> show device                                                    ❶
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKa500                          RRD45  1645
polling ncr1 (NCR 53C810) slot 3, bus 0 PCI, hose 1   SCSI Bus ID 7
dkb100.1.0.3.1     DKb100                          RZ29B  0007
dkb200.2.0.3.1     DKb200                          RZ29B  0007
dkb400.4.0.3.1     DKb400                          RZ29B  0007    ❷
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0    DVA0                             RX23
polling tulip0 (DECchip 21040-AA) slot 2, bus 0 PCI, hose 1
ewa0.0.0.2.1: 08-00-2B-E5-B4-1A

P00>>> boot -file vmunix -flags a dkb400                              ❸
(boot dkb4.4.0.3.1 -file vmunix -flags a)
Building FRU table
block 0 of dkb4.4.0.3.1 is a valid boot block
reading 16 blocks from dkb4.4.0.3.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 2000
initializing HWRPB at 2000
initializing page table at 1f2000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

OSF boot - Mon Aug 5 21:56:39 EDT 1996

Loading vmunix ...
.
.
.
```

Continued on next page

Example 2–2 Booting DIGITAL UNIX from a Local Disk (Continued)

```
The system is ready.


DIGITAL UNIX Version 3.2D                                    ❹
```

❶ The **show device** command displays device information, including name and type of connection to the system. See Section 5.2 for a description of the **show device** command and the device naming convention.

❷ The operating system is on the third disk connected to the system through the controller in slot 3 of PCI1. The name of this device, dkb400, is used as an argument to the **boot** command.

❸ This command loads DIGITAL UNIX from the disk dkb400, using the boot file vmunix and autobooting to multiuser mode. See Section 5.3 for a description of the **boot** command.

The **boot** command accepts the name of a boot device, a boot file name through the **-file** option, and boot flags through the **-flags** option. The environment variables **bootdef_dev**, **boot_file**, and **boot_osflags** can also be used to specify the default boot device or device list, the default boot file, and flag information. When an option and the corresponding environment variable are both in a command string, the option overrides the environment variable. The value of the environment variable, however, is not changed. See Section 5.15 for information about environment variables.

❹ The operating system banner displays.

Example 2–3 Booting DIGITAL UNIX from a Disk on a Cluster

```
P00>>> show boot*                                                    ❶
boot_arg0               0
boot_arg1
boot_dev                dkb0.0.0.5.1
boot_file               vmunix
boot_osflags            a
boot_reset              OFF
bootdef_dev             dkb0.0.0.5.1
booted_dev
booted_file
booted_osflags

P00>>> boot                                                          ❷
(boot dkb0.0.0.5.1 -flags a)
halted CPU 1
halt code = 1
operator initiated halt
PC = fffffc0000264600
Building FRU table
block 0 of dkb0.0.0.5.1 is a valid boot block
reading 16 blocks from dkb0.0.0.5.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 2000
initializing HWRPB at 2000
initializing page table at 1f2000
initializing machine state
setting affinity to the primary CPU
Configuring I/O adapters...
jumping to bootstrap code

OSF boot - Mon Jul 29 21:56:39 EDT 1996

Loading vmunix ...

.
.
.

The system is ready.


DIGITAL UNIX Version 3.2D                                            ❸
```

❶ The **show boot*** command lists all environment variables that begin with the string "boot." In this example, the **bootdef_dev** environment variable sets the default boot device to dkb0.0.0.5.1, and **boot_osflags** indicates that the system will autoboot to multiuser mode. See Section 5.15 for descriptions of these environment variables.

❷ The **boot** command needs no options, since the environment variables pass all necessary information.

The **boot** command accepts the name of a boot device, a boot file name through the **-file** option, and boot flags through the **-flags** option. The environment variables **bootdef_dev**, **boot_file**, and **boot_osflags** can also be used to specify the default boot device or device list, the default boot file, and flag information. When an option and the corresponding environment variable are both in a command string, the option overrides the environment variable. The value of the environment variable, however, is not changed. See Section 5.15 for information about environment variables.

❸ The operating system banner displays.

Example 2–4 Booting DIGITAL UNIX from a Remote Disk

```
P00>>> show device                                                    ❶
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1  SCSI Bus ID 7
dka500.5.0.1.1     DKa500                   RRD45  1645
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0    DVA0                      RX23
polling kzpsa0 (DEC KZPSA) slot 3, bus 0 PCI, hose 0  TPwr 1 Fast 1 Bus ID 7
kzpsa0.7.0.3.0     dkb     TPwr 1 Fast 1 Bus ID 7   N01  A09
dkb100.1.0.3.0     DKb100                   RZ29B  0007
dkb200.2.0.3.0     DKb200                   RZ29B  0007
dkb300.3.0.3.0     DKb300                   RZ29B  0007
dkb500.5.0.3.0     DKb500                   RZ29B  0007
polling ncr1 (NCR 53C810) slot 5, bus 0 PCI, hose 0  SCSI Bus ID 7
dkc400.4.0.5.0     DKc400                   RZ29B  0007
polling tulip0 (DECchip 21040-AA) slot 4, bus 0 PCI, hose 1
ewa0.0.0.4.1: 08-00-2B-E5-B4-1A                                       ❷
polling tulip1 (DECchip 21041-AA) slot 5, bus 0 PCI, hose 1
ewb0.0.0.5.1: 00-00-F8-00-AC-B4

P00>>> boot -flags an -protocols bootp ewa0                           ❸
 (boot ewa0.0.0.4.1 -flags an)
Building FRU table

Trying BOOTP boot.

Broadcasting BOOTP Request...
Received BOOTP Packet File Name: /var/adm/ris/ris0.alpha/hvmunix
local inet address: 16.122.128.26
remote inet address: 16.122.128.59
TFTP Read File Name: /var/adm/ris/ris0.alpha/hvmunix
.....................................................................
.....................................................................
..................
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 9a0fa0
initializing HWRPB at 2000
initializing page table at 1f2000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

Secondary boot program - Thu Aug 1 22:33:13 EST 1996

Loading vmunix ...

.
.
.
```

Continued on next page

Example 2–4 Booting DIGITAL UNIX from a Remote Disk (Continued)

```
The system is ready.

DIGITAL UNIX Version 3.2D                                    ❹
```

❶ The **show device** command displays device information, including name and type of connection to the system. See Section 5.2 for a description of the **show device** command and the device naming convention.

❷ The operating system is on a remote disk accessed through the Ethernet controller in slot 4 of PCI1. The name of this device, ewa0, is used as an argument to the **boot** command.

❸ This command loads DIGITAL UNIX from ewa0, autobooting to multiuser mode. See Section 5.3 for a description of the **boot** command.

The **boot** command accepts the name of a boot device, a boot file name through the **-file** option, and boot flags through the **-flags** option. The environment variables **bootdef_dev**, **boot_file**, and **boot_osflags** can also be used to specify the default boot device or device list, the default boot file, and flag information. When an option and the corresponding environment variable are both in a command string, the option overrides the environment variable. The value of the environment variable, however, is not changed. See Section 5.15 for information about environment variables.

❹ The operating system banner displays.

2.4 Installing DIGITAL UNIX

DIGITAL UNIX is installed from the internal CD-ROM. Refer to the documentation shipped with the CD-ROM for installation instructions.

Example 2–5 Installing DIGITAL UNIX

```
P00>>> boot dka500                                                    ❶
(boot dka500.5.0.1.1 -flags a)
Building FRU table                                                    ❷
block 0 of dka500.5.0.1.1 is a valid boot block
reading 16 blocks from dka500.5.0.1.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 2000
initializing HWRPB at 2000
initializing page table at 1f2000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

OSF boot - Mon Jul 24 21:56:39 EDT 1995

Loading hupdate ...
Starting hupdate at 0x20000000
Using hvmunix

Loading hvmunix ...
Current PAL Revision <0x20000000010111>
Switching to OSF PALcode Succeeded
New PAL Revision <0x20000000020115>
Loading into KSEG Address Space

Sizes:
text = 4460352
data = 5555024
bss  = 1498368
Starting at 0xfffffc0000239290
```

Continued on next page

Example 2–5 Installing DIGITAL UNIX (Continued)

```
Alpha boot: available memory from 0x2dfe000 to 0x7fff6000
physical memory = 2048.00 megabytes.
available memory = 2001.96 megabytes.
using 7856 buffers containing 61.37 megabytes of memory

Firmware revision: 2.0
PALcode: DIGITAL-UNIX/OSF version 1.21
AlphaServer 4000
pci1 at mcbus0 slot 5
psiop0 at pci1 slot 1
.
.
.
Printer service started
The system is ready.



DIGITAL UNIX Version 3.2D

login: root
Password:
```

❶ Use the **boot** command to install the operating system from the internal CD-ROM, which is always dka500.

❷ See your operating system documentation for installation instructions.

2.5 Booting OpenVMS

OpenVMS can be booted from a local disk, a disk connected through a cluster, or a remote disk through an Ethernet connection. Refer to the documentation shipped with the operating system for booting instructions.

Example 2–6 Booting OpenVMS from a Local Disk

```
P00>>> show device                                                    ❶
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKa500                     RRD45  1645
polling ncr1 (NCR 53C810) slot 2, bus 0 PCI, hose 1   SCSI Bus ID 7
dkb0.0.0.2.1       DKb0                       RZ29B  0016
dkb100.1.0.2.1     DKb100                     RZ29B  0016
.
.
.
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0    DVA0                        RX23
polling tulip0 (DECchip 21040-AA) slot 3, bus 0 PCI, hose 0
ewa0.0.0.3.0: 00-00-F8-20-14-61
P00>>> show boot_reset                                                ❷
boot_reset              OFF
P00>>> show bootdef_dev                                               ❸
bootdef_dev             dkb0.0.0.2.1
P00>>> boot                                                           ❹
 SROM V2.0 on cpu0                                                    ❷
 SROM V2.0 on cpu1
XSROM V2.0 on cpu1
XSROM V2.0 on cpu0
.
.
.
System temperature is 24 degrees C
AlphaServer 4000 Console V3.0-10, 20-NOV-1996 15:17:48
```

Continued on next page

Example 2–6 Booting OpenVMS from a Local Disk (Continued)

```
CPU 0 booting

(boot dkb0.0.0.2.1 -flags 0)
Building FRU table
block 0 of dkb0.0.0.2.1 is a valid boot block
reading 1002 blocks from dkb0.0.0.2.1
bootstrap code read in
.
.
.
Welcome to OpenVMS Alpha (TM) Operating System, Version V6.2-1H3❺
```

❶ The **show device** command displays device information, including name and type of connection to the system. See Section 5.2 for a description of the **show device** command and the device naming convention.

❷ The **boot_reset** environment variable was previously set to "on," causing the power-up trace to display when the system initializes (see Section 2.2). See Section 5.9 for commands used with environment variables.

❸ The **bootdef_dev** environment variable specifies the default boot device. In this example, the default boot device was previously set to dkb0.0.0.2.1.

❹ No boot device is specified in the **boot** command; the default boot device was set with the environment variable. See Section 5.3 for a description of the **boot** command.

The **boot** command accepts the name of a boot device, a boot file name through the **-file** option, and boot flags through the **-flags** option. The environment variables **bootdef_dev**, **boot_file**, and **boot_osflags** can also be used to specify the default boot device or device list, the default boot file, and flag information. When an option and the corresponding environment variable are both in a command string, the option overrides the environment variable. The value of the environment variable, however, is not changed. See Section 5.15 for information about environment variables.

❺ The operating system banner displays.

Example 2–7 Booting OpenVMS from a Disk on a Cluster

```
P00>>> show bootdef_dev                                          ❶
bootdef_dev             dua1.8.0.5.1
P00>>> show device                                               ❷
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKa500                    RRD45  1645
polling dac0 (Mylex DAC960) slot 4, bus 0 PCI, hose 1
dra0.0.0.4.1       DRA0                      1 Member JBOD
dra1.0.0.4.1       DRA1                      1 Member JBOD
dra2.0.0.4.1       DRA2                      4 Member RAID 5
polling cipca0 (CIPCA) slot 5, bus 0 PCI, hose 1   cixcd_poll_comp
cipca_a.4.0.5.1    dua     CI Bus ID 4                           ❸
dua24.2.0.5.1      $22$DUA24 (HSC702)        RA92
dua30.2.0.5.1      $22$DUA30 (HSC702)        RA92
.
.
.
dua0.8.0.5.1       $22$DUA0 (RAWHSJ)         HSX1
dua1.8.0.5.1       $22$DUA1 (RAWHSJ)         HSX1              ❸
.
.
.
P00>>>boot                                                       ❹
(boot dua1.8.0.5.1 -flags 0)
Building FRU table
.
.
.
Welcome to OpenVMS Alpha (TM) Operating System, Version V6.2-1H3❺
```

❶ The **bootdef_dev** environment variable specifies the default boot device. In this example, the default boot device was previously set to dua1.8.0.5.1. See Section 5.9 for commands used with environment variables.

❷ The **show device** command displays device information, including name and type of connection to the system. See Section 5.2 for a description of the **show device** command and the device naming convention.

❸ The disk dua1.8.0.5.1 is on the CI cluster that includes this system.

❹ No boot device is specified in the **boot** command; the default boot device was set with the environment variable. See Section 5.3 for a description of the **boot** command.

The **boot** command accepts the name of a boot device, a boot file name through the **-file** option, and boot flags through the **-flags** option. The environment variables **bootdef_dev**, **boot_file**, and **boot_osflags** can also be used to specify the default boot device or device list, the default boot file, and flag information. When an option and the corresponding environment variable are both in a command string, the option overrides the environment variable. The value of the environment variable, however, is not changed. See Section 5.15 for information about environment variables.

❺ The operating system banner prints.

Example 2–8 Booting OpenVMS from a Remote Disk

```
P00>>> show device                                                    ❶
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1      DKa500                        RRD45  1645
polling kzpsa0 (DEC KZPSA) slot 2, bus 0 PCI, hose 1  TPwr 1 Fast 1 Bus ID 5
kzpsa0.5.0.2.1      dkb      TPwr 1 Fast 1 Bus ID 5   N01  A10
polling kzpsa1 (DEC KZPSA) slot 3, bus 0 PCI, hose 1  TPwr 1 Fast 1 Bus ID 5
kzpsa1.5.0.3.1      dkc      TPwr 1 Fast 1 Bus ID 5   N01  A10
polling kzpsa2 (DEC KZPSA) slot 4, bus 0 PCI, hose 1  TPwr 1 Fast 1 Bus ID 5
kzpsa2.5.0.4.1      dkd      TPwr 1 Fast 1 Bus ID 5   P01  A10
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0     DVA0                           RX23
polling kzpsa3 (DEC KZPSA) slot 3, bus 0 PCI, hose 0  TPwr 1 Fast 1 Bus ID 5
kzpsa3.5.0.3.0      dke      TPwr 1 Fast 1 Bus ID 5   P01  A10
polling kzpsa4 (DEC KZPSA) slot 4, bus 0 PCI, hose 0  TPwr 1 Fast 1 Bus ID 5
kzpsa4.5.0.4.0      dkf      TPwr 1 Fast 1 Bus ID 5   P01  A10
polling kzpsa5 (DEC KZPSA) slot 5, bus 0 PCI, hose 0  TPwr 1 Fast 1 Bus ID 5
kzpsa5.5.0.5.0      dkg      TPwr 1 Fast 1 Bus ID 5   F01  A10
dkg0.0.0.5.0        DKg0                        RZ26J  589H
mkg300.3.0.5.0      MKg300                      TLZ09  0165
polling tulip0 (DECchip 21140-AA) slot 5, bus 0 PCI, hose 1
ewa0.0.0.5.1: 00-00-F8-00-42-04                                       ❶
P00>>> boot ewa0 -flags 0                                             ❷
(boot ewa0.0.0.5.1 -flags 0)
Building FRU table

Trying MOP boot.
.............

Network load complete.
.
.
.
Welcome to OpenVMS Alpha (TM) Operating System, Version V6.2-1H3      ❸
```

❶ The **show device** command displays device information, including name and type of connection to the system. In this example the Ethernet connection is ewa0. See Section 5.2 for a description of the **show device** command and the device naming convention.

❷ The **boot** command specifies ewa0 as the boot device. See Section 5.3 for a description of the **boot** command.

The **boot** command accepts the name of a boot device, a boot file name through the **-file** option, and boot flags through the **-flags** option. The environment variables **bootdef_dev**, **boot_file**, and **boot_osflags** can also be used to specify the default boot device or device list, the default boot file, and flag information. When an option and the corresponding environment variable are both in a command string, the option overrides the environment variable. The value of the environment variable, however, is not changed. See Section 5.15 for information about environment variables.

❸ The operating system banner prints.

2.6 Installing OpenVMS

OpenVMS is installed from the internal CD-ROM. Refer to the documentation shipped with the CD-ROM for complete installation instructions.

Example 2–9 Installing OpenVMS

```
P00>>> boot -flags 0,0 dka500                                          ❶
Initializing...
SROM V1.0 on cpu0
.
.  [The initialization display prints. See Section 2.2.]
.

AlphaServer 4000 Console V1.0-1, 2-APR-1996 15:17:48

CPU 0 booting

(boot dka500.5.0.1.1 -flags 0,0)
Building FRU table
block 0 of dka500.5.0.1.1 is a valid boot block
reading 1002 blocks from dka500.5.0.1.1
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 7d400
initializing HWRPB at 2000
initializing page table at 1f2000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

    OpenVMS (TM) Alpha Operating System, Version 6.2-1H3              ❷

%SMP-I-SECMSG, CPU #01 message:   P01>>>START
%SMP-I-CPUBOOTED, CPU #01 has joined the PRIMARY CPU in
multiprocessor operation
```

Continued on next page

Example 2–9 Installing OpenVMS (Continued)

```
Installing required known files...

    Configuring devices...


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

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

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

 Please choose one of the following:

    1)  Install or upgrade OpenVMS Alpha Version 6.2-1H3
    2)  List layered product kits that this procedure can install
    3)  Install or upgrade layered product(s)
    4)  Execute DCL commands and procedures
    5)  Shut down this system

Enter CHOICE or ? to repeat menu: (1/2/3/4/5/?)
```

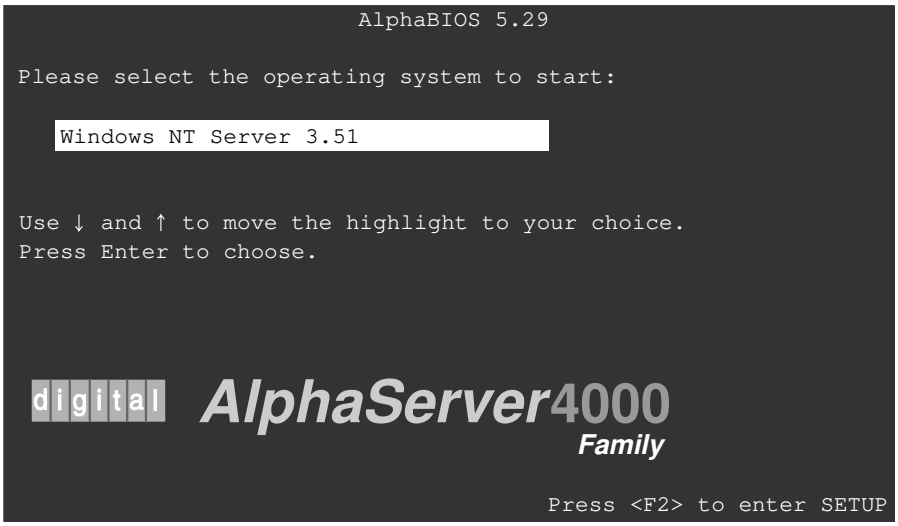
❶ Use the **boot** command to install the operating system from the internal CD-ROM, which is always dka500.

❷ See your operating system documentation for installation instructions.

2.7 Booting Windows NT

Microsoft Windows NT is started from the AlphaBIOS Boot screen.

Figure 2–2 AlphaBIOS Boot Screen



PK-0728B-96

The setting of the SRM **os_type** environment variable determines if AlphaBIOS is loaded and started on reset and power-up. If **os_type** is set to **nt**, after the power-up display (see Section 2.2) the SRM console is loaded and started, and it then loads and starts the AlphaBIOS console. AlphaBIOS must be running before Windows NT can be booted.

The method used for booting Windows NT is determined by the setting of **Auto Start** in the AlphaBIOS **Standard CMOS Setup** screen (see Section 6.7).

- If **Auto Start** is enabled, the primary version of Windows NT starts automatically.
- If **Auto Start** is disabled, use the arrow keys to select the Windows NT version to start. Press Enter to boot Windows NT.

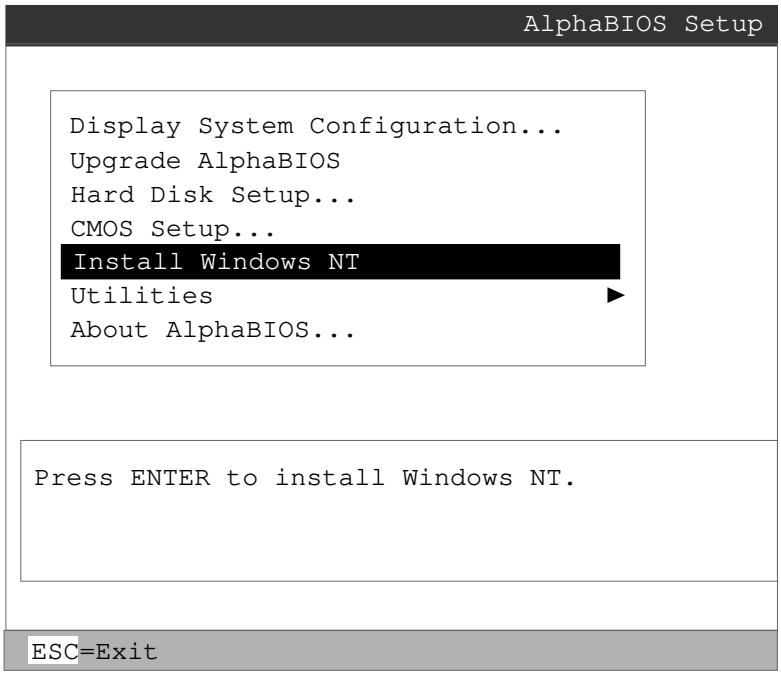
*NOTE: The SRM **console** environment variable must be set to **graphics** before booting Windows NT. (This setting is not necessary to run AlphaBIOS.)*

*If the Halt button is in (the LED on the button is lit), the SRM console will not load AlphaBIOS. This is true even when the **os_type** environment variable is set to **nt**.*

2.8 Installing Windows NT

Windows NT is installed from CD-ROM. Insert the CD-ROM in the drive, start AlphaBIOS Setup, select the menu item Install Windows NT, and follow the prompts.

Figure 2–3 Installing Windows NT



PK-0726B-96

Up to four versions of Windows NT can be resident in a system at one time.

If this is a new Windows NT installation, start with this procedure:

1. Start AlphaBIOS. If the system is in the SRM console, issue the command **alphabios**.
2. From the **AlphaBIOS Boot** screen, enter **AlphaBIOS Setup** by pressing the F2 key.
3. From **AlphaBIOS Setup** select **CMOS Setup**, and press Enter.
4. From **CMOS Setup** set the system date and time.
5. Return to the **AlphaBIOS Setup** screen by pressing the F10 key.
6. Select **Hard Disk Setup**, and press Enter.
7. Perform an express hard disk setup by pressing the F7 key to enter **Express Setup**.
8. Continue the setup by pressing the F10 key.
9. Go to the procedure below.

This procedure is for all Windows NT installations:

1. Put the Windows NT CD into the CD-ROM drive.
2. Start **AlphaBIOS Setup**.
3. Select **Install Windows NT** and press Enter.
4. Follow the prompts to complete the installation. For more information on installing Windows NT, refer to the *Installation Guide* in your Windows NT software package.

2.9 Updating Firmware

Start the Loadable Firmware Update (LFU) utility by issuing the lfu command at the SRM console prompt, booting it from the CD-ROM while in the SRM console, or selecting Update AlphaBIOS in the AlphaBIOS Setup screen.

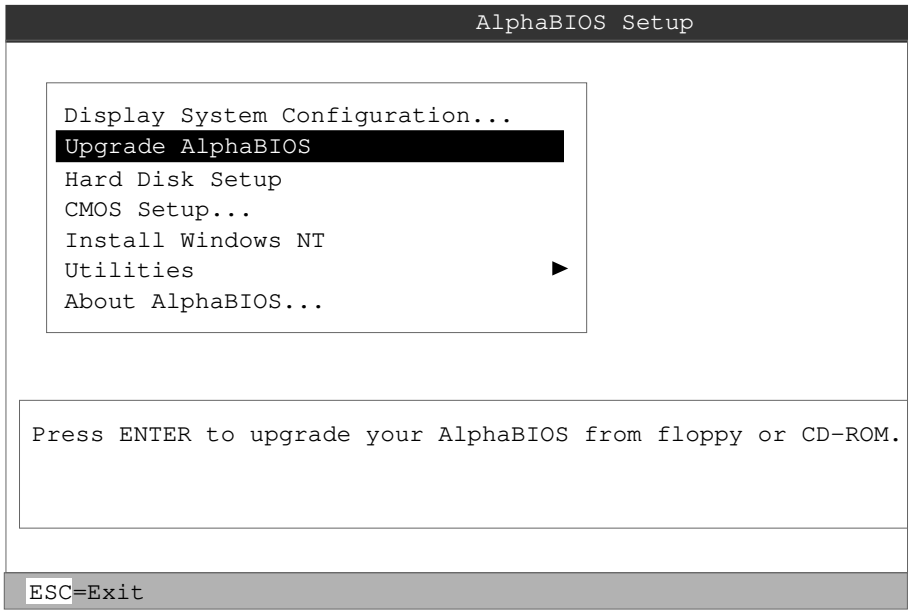
Example 2–10 Starting LFU from the SRM Console

```
P00>>> lfu

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: cda0
.
.
.
UPD>
```

Figure 2–4 Starting LFU from the AlphaBIOS Console



PK-0726A-96

Use the Loadable Firmware Update (LFU) utility to update system firmware.

You can start LFU from either the SRM console or the AlphaBIOS console.

- From the SRM console, start LFU by issuing the **lfu** command (see Example 2–10). Also from the SRM console, LFU can be booted from the Alpha CD-ROM (V3.7 or later), as shown in Example 2–11.
- From the AlphaBIOS console, select **Update AlphaBIOS** from the **AlphaBIOS Setup** screen (see Figure 2–4).

A typical update procedure is:

1. Start LFU.
2. Use the LFU **list** command to show the revisions of modules that LFU can update and the revisions of update firmware.
3. Use the LFU **update** command to write the new firmware.
4. Use the LFU **exit** command to exit back to the console.

The sections that follow show examples of updating firmware from the local CD-ROM, the local floppy, and a network device. Following the examples is an LFU command reference.

Example 2–11 Booting LFU from the CD-ROM

```
P00>>> show dev ncr0
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKa500                   RRD45  1645
P00>>> boot dka500
(boot dka500.5.0.1.1 -flags 0,0)
block 0 of dka500.5.0.1.1 is a valid boot block
.
.
.
jumping to bootstrap code

The default bootfile for this platform is
        [AS4X00]AS4X00_LFU.EXE
Hit <RETURN> at the prompt to use the default bootfile.
Bootfile: <CR>

Starting Firmware Update Utility

          ***** Loadable Firmware Update Utility *****
.
.
.
UPD>
```

2.9.1 Updating Firmware from the Internal CD-ROM

Insert the update CD-ROM, start LFU, and select cda0 as the load device.

Example 2–12 Updating Firmware from the Internal CD-ROM

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: cda0          ❶

Please enter the name of the options firmware files list, or
Press <return> to use the default filename [AS4X00FW]: AS4X00CP    ❷

Copying AS4X00CP from DKA500.5.0.1.1 .
Copying [as4x00]RHREADME from DKA500.5.0.1.1 .
Copying [as4x00]RHSRMROM from DKA500.5.0.1.1 ...................
Copying [as4x00]RHARCROM from DKA500.5.0.1.1 .............

------------------------------------------------------------------
 Function    Description                                          ❸
------------------------------------------------------------------
 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> list                                                          ❹

Device          Current Revision    Filename       Update Revision
AlphaBIOS          V5.12-2          arcrom            V6.40-1
srmflash           V1.0-9           srmrom            V2.0-3
```

Continued on next page

❶ Select the device from which firmware will be loaded. The choices are the internal CD-ROM, the internal floppy disk, or a network device. In this example, the internal CD-ROM is selected.

❷ Select the file that has the firmware update, or press Enter to select the default file. The file options are:

AS4X00FW (default)	SRM console, AlphaBIOS console, and I/O adapter firmware.
AS4X00CP	SRM console and AlphaBIOS console firmware only.
AS4X00IO	I/O adapter firmware only.

In this example the file for console firmware (AlphaBIOS and SRM) is selected.

❸ The LFU function table and prompt (UPD>) display.

❹ Use the LFU **list** command to determine the revision of firmware in a device and the most recent revision of that firmware available in the selected file. In this example, the resident firmware for each console (SRM and AlphaBIOS) is at an earlier revision than the firmware in the update file.

Continued on next page

Example 2–12 Updating Firmware from the Internal CD-ROM (Continued)

```
UPD> update *                                                    ❺
WARNING: updates may take several minutes to complete for each
device.

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

                          DO NOT ABORT!
AlphaBIOS     Updating to V6.40-1... Verifying V6.40-1... PASSED.

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

                          DO NOT ABORT!
srmflash        Updating to V2.0-3...  Verifying V2.0-3...
PASSED.

UPD> exit                                                        ❼
```

❺ The **update** command updates the device specified or all devices. In this example, the wildcard indicates that all devices supported by the selected update file will be updated.

❻ For each device, you are asked to confirm that you want to update the firmware. The default is no. Once the update begins, do not abort the operation. Doing so will corrupt the firmware on the module.

❼ The **exit** command returns you to the console from which you entered LFU (either SRM or AlphaBIOS).

2.9.2 Updating Firmware from the Internal Floppy Disk — Creating the Diskettes

Create the update diskettes before starting LFU. See Section 2.9.3 for an example of the update procedure.

Table 2–1 File Locations for Creating Update Diskettes on a PC

Console Update Diskette	I/O Update Diskette
AS4X00FW.TXT	AS4X00IO.TXT
AS4X00CP.TXT	RHREADME.SYS
RHREADME.SYS	CIPCA214.SYS
RHSRMROM.SYS	DFPAA246.SYS
RHARCROM.SYS	KZPAAA10.SYS

To update system firmware from floppy disk, you first must create the firmware update diskettes. You will need to create two diskettes: one for console updates, and one for I/O.

1. Download the update files from the Internet (see Appendix A).
2. On a PC, copy files onto two FAT-formatted diskettes as shown in Table 2–1.

   From an OpenVMS system, copy files onto two ODS2-formatted diskettes as shown in Example 2–13.

Example 2–13 Creating Update Diskettes on an OpenVMS System

Console update diskette

```
$ inquire ignore "Insert blank HD floppy in DVA0, then continue"
$ set verify
$ set proc/priv=all
$ init /density=hd/index=begin dva0: rhods2cp
$ mount dva0: rhods2cp
$ create /directory dva0:[as4x00]
$ copy as4x00fw.sys dva0:[as4x00]as4x00fw.sys
$ copy as4x00cp.sys dva0:[as4x00]as4x00cp.sys
$ copy rhreadme.sys dva0:[as4x00]rhreadme.sys
$ copy as4x00fw.txt dva0:[as4x00]as4x00fw.txt
$ copy as4x00cp.txt dva0:[as4x00]as4x00cp.txt
$ copy rhsrmrom.sys dva0:[as4x00]rhsrmrom.sys
$ copy rharcrom.sys dva0:[as4x00]rharcrom.sys
$ dismount dva0:
$ set noverify
$ exit
```

I/O update diskette

```
$ inquire ignore "Insert blank HD floppy in DVA0, then continue"
$ set verify
$ set proc/priv=all
$ init /density=hd/index=begin dva0: rhods2io
$ mount dva0: rhods2io
$ create /directory dva0:[as4x00]
$ create /directory dva0:[options]
$ copy as4x00fw.sys dva0:[as4x00]as4x00fw.sys
$ copy as4x00io.sys dva0:[as4x00]as4x00io.sys
$ copy rhreadme.sys dva0:[as4x00]rhreadme.sys
$ copy as4x00fw.txt dva0:[as4x00]as4x00fw.txt
$ copy as4x00io.txt dva0:[as4x00]as4x00io.txt
$ copy cipca214.sys dva0:[options]cipca214.sys
$ copy dfpaa246.sys dva0:[options]dfpaa246.sys
$ copy kzpsaA10.sys dva0:[options]kzpsaa10.sys
$ dismount dva0:
$ set noverify
$ exit
```

2.9.3 Updating Firmware from the Internal Floppy Disk — Performing the Update

Insert an update diskette (see Section 2.9.2) into the internal floppy drive. Start LFU and select dva0 as the load device.

Example 2–14 Updating Firmware from the Internal Floppy Disk

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: dva0          ❶

Please enter the name of the options firmware files list, or
Press <return> to use the default filename [AS4X00IO,(AS4X00CP)]:
AS4X00IO                                                           ❷

Copying AS4X00IO from DVA0 .
Copying RHREADME from DVA0 .
Copying CIPCA214 from DVA0 .
Copying DFPAA252 from DVA0 ...
Copying KZPSAA11 from DVA0 ...
.
.  [The function table displays, followed by the UPD> prompt, as
.  shown in Example 2–12.]

UPD> list                                                          ❸

Device          Current Revision    Filename       Update Revision
AlphaBIOS          V5.12-3          arcrom         Missing file
pfi0                2.46            dfpaa_fw           2.52
srmflash           T3.2-21          srmrom         Missing file
                                    cipca_fw        A214
                                    kzpsa_fw         A11
```

Continued on next page

❶ Select the device from which firmware will be loaded. The choices are the internal CD-ROM, the internal floppy disk, or a network device. In this example, the internal floppy disk is selected.

❷ Select the file that has the firmware update, or press Enter to select the default file. When the internal floppy disk is the load device, the file options are:

AS4X00CP (default)	SRM console and AlphaBIOS console firmware only.
AS4X00IO	I/O adapter firmware only.

The default option in Example 2–12 (AS4X00FW) is not available, since the file is too large to fit on a 1.44 MB diskette. This means that when a floppy disk is the load device, you can update either console firmware or I/O adapter firmware, but not both in the same LFU session. If you need to update both, after finishing the first update, restart LFU with the **lfu** command and insert the diskette with the other file.

In this example the file for I/O adapter firmware is selected.

❸ Use the LFU **list** command to determine the revision of firmware in a device and the most recent revision of that firmware available in the selected file. In this example, the update revision for console firmware displays as "Missing file" because only the I/O firmware files are available on the floppy disk.

Continued on next page

Example 2–14 Updating Firmware from the Internal Floppy Disk (Continued)

```
UPD> update pfi0                                                    ❹
WARNING: updates may take several minutes to complete for each
device.

Confirm update on: pfi0            [Y/(N)] y                        ❺

                          DO NOT ABORT!
pfi0            Updating to 2.52... Verifying to 2.52... PASSED.

UPD> lfu                                                            ❻

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: dva0

Please enter the name of the options firmware files list, or
Press <return> to use the default filename [AS4X00IO,(AS4X00CP)]:❼

.
. (The function table displays, followed by the UPD> prompt.
.  Console firmware can now be updated.)

UPD> exit                                                           ❽
```

❹ The **update** command updates the device specified or all devices.

❺ For each device, you are asked to confirm that you want to update the firmware. The default is no. Once the update begins, do not abort the operation. Doing so will corrupt the firmware on the module.

❻ The **lfu** command restarts the utility so that console firmware can be updated. (Another method is shown in Example 2–15, where the user specifies the file AS4X00FW and is prompted to insert the second diskette.)

❼ The default update file, AS4X00CP, is selected. The console firmware can now be updated, using the same procedure as for the I/O firmware.

❽ The **exit** command returns you to the console from which you entered LFU (either SRM or AlphaBIOS).

Example 2–15 Selecting AS4X00FW to Update Firmware from the Internal Floppy Disk

```
P00>>> lfu

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: dva0

Please enter the name of the firmware files list, or
Press <return> to use the default filename [AS4X00IO,(AS4X00CP)]: as4x00fw

Copying AS4X00FW from DVA0 .
Copying RHREADME from DVA0 .
Copying RHSRMROM from DVA0 ..........................
Copying RHARCROM from DVA0 ..............
Copying CIPCA214 from DVA0
Please insert next floppy containing the firmware,
Press <return> when ready. Or type DONE to abort.
Copying CIPCA214 from DVA0 .
Copying DFPAA246 from DVA0 ...
Copying KZPSAA10 from DVA0 ...
.
.
.
```

2.9.4 Updating Firmware from a Network Device

Copy files to the local MOP server's MOP load area, start LFU, and select ewa0 as the load device.

Example 2–16 Updating Firmware from a Network Device

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: ewa0          ❶

Please enter the name of the options firmware files list, or
Press <return> to use the default filename [AS4X00FW]:             ❷

Copying AS4X00FW from EWA0 .
Copying RHREADME from EWA0 .
Copying RHSRMROM from EWA0 ............................
Copying RHARCROM from EWA0 ............
Copying CIPCA214 from EWA0 .
Copying DFPAA246 from EWA0 ...
Copying KZPSAA11 from EWA0 ...

.
.  [The function table displays, followed by the UPD> prompt, as
.  shown in Example 2–12.]

UPD> list                                                          ❸

Device          Current Revision    Filename       Update Revision
AlphaBIOS          V5.12–2          arcrom            V6.40–1
kzpsa0            A10               kzpsa_fw         A11
kzpsa1            A10               kzpsa_fw         A11
srmflash           V1.0–9           srmrom            V2.0–3
                                    cipca_fw        A214
                                    dfpaa_fw           2.46
```

Continued on next page

Before starting LFU, download the update files from the Internet (see Appendix A). You will need the files with the extension .SYS. Copy these files to your local MOP server's MOP load area.

❶ Select the device from which firmware will be loaded. The choices are the internal CD-ROM, the internal floppy disk, or a network device. In this example, a network device is selected.

❷ Select the file that has the firmware update, or press Enter to select the default file. The file options are:

AS4X00FW (default)	SRM console, AlphaBIOS console, and I/O adapter firmware.
AS4X00CP	SRM console and AlphaBIOS console firmware only.
AS4X00IO	I/O adapter firmware only.

In this example the default file, which has both console firmware (AlphaBIOS and SRM) and I/O adapter firmware, is selected.

❸ Use the LFU **list** command to determine the revision of firmware in a device and the most recent revision of that firmware available in the selected file. In this example, the resident firmware for each console (SRM and AlphaBIOS) and I/O adapter is at an earlier revision than the firmware in the update file.

Continued on next page

Example 2–16 Updating Firmware from a Network Device (Continued)

```
UPD> update * -all                                                    ❹
WARNING: updates may take several minutes to complete for each
device.

                          DO NOT ABORT!
AlphaBIOS    Updating to V6.40-1... Verifying V6.40-1...  PASSED.

                          DO NOT ABORT!
kzpsa0        Updating to  A11    ...  Verifying A11...  PASSED.

                          DO NOT ABORT!
kzpsa1        Updating to  A11    ...  Verifying A11...  PASSED.

                          DO NOT ABORT!
srmflash      Updating to V2.0-3...  Verifying V2.0-3...  PASSED.

UPD> exit                                                             ❺
```

❹ The **update** command updates the device specified or all devices. In this example, the wildcard indicates that all devices supported by the selected update file will be updated. Typically LFU requests confirmation before updating each console's or device's firmware. The **-all** option eliminates the update confirmation requests.

❺ The **exit** command returns you to the console from which you entered LFU (either SRM or AlphaBIOS).

2.9.5 LFU Commands

The commands summarized in Table 2–2 are used to update system firmware.

Table 2–2 LFU Command Summary

Command	Function
display	Shows the physical configuration of the system.
exit	Terminates the LFU program.
help	Displays the LFU command list.
lfu	Restarts the LFU program.
list	Displays the inventory of update firmware on the selected device.
readme	Lists release notes for the LFU program.
update	Writes new firmware to the module.
verify	Reads the firmware from the module into memory and compares it with the update firmware.

These commands are described in the following pages.

display

The **display** command shows the physical configuration of the system. **Display** is equivalent to issuing the SRM console command **show configuration**. Because it shows the slot for each module, **display** can help you identify the location of a device.

exit

The **exit** command terminates the LFU program, causes system initialization and testing, and returns the system to the console from which LFU was called.

help

The **help** (or **?**) command displays the LFU command list, shown below.

```
------------------------------------------------------------------------
 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.
------------------------------------------------------------------------
```

lfu

The **lfu** command restarts the LFU program. This command is used when the update files are on a floppy disk. The files for updating both console firmware and I/O firmware are too large to fit on a 1.44 MB disk, so only one type of firmware can be updated at a time. Restarting LFU enables you to specify another update file.

list

The **list** command displays the inventory of update firmware on the CD-ROM, network, or floppy. Only the devices listed at your terminal are supported for firmware updates.

The **list** command shows three pieces of information for each device:

- Current Revision — The revision of the device's current firmware
- Filename — The name of the file used to update that firmware
- Update Revision — The revision of the firmware update image

readme

The **readme** command lists release notes for the LFU program.

update

The **update** command writes new firmware to the module. Then LFU automatically verifies the update by reading the new firmware image from the module into memory and comparing it with the source image.

To update more than one device, you may use a wildcard but not a list. For example, **update k*** updates all devices with names beginning with k, and **update *** updates all devices. When you do not specify a device name, LFU tries to update all devices; it lists the selected devices to update and prompts before devices are updated. (The default is no.) The **-all** option eliminates the update confirmation requests, enabling the update to proceed without operator intervention.

*CAUTION: Never abort an **update** operation. Aborting corrupts the firmware on the module.*

verify

The **verify** command reads the firmware from the module into memory and compares it with the update firmware. If a module already verified successfully when you updated it, but later failed tests, you can use **verify** to tell whether the firmware has become corrupted.

2.10 Operating the System Remotely

The remote console monitor (RCM) is used to monitor and control the system remotely. The RCM resides on the server control module (see Section 1.3.7) and allows the system administrator to connect remotely to a managed system through a modem, using a serial terminal or terminal emulator.

RCM Console Overview

The RCM has special console firmware that is used to remotely control an AlphaServer system. The RCM firmware resides on an independent microprocessor. It is not part of the SRM console that resides in the flash ROM. The RCM firmware has its own command interface that allows the user to perform the tasks that can usually be done from the system's serial console terminal. RCM console commands are used to reset, halt, and power the system on or off, regardless of the operating system or hardware state. The RCM console commands are also used to monitor the power supplies, temperature, and fans.

The user can enter the RCM console either remotely or through the local serial console terminal. Once in command mode, the user can enter commands to control and monitor the system.

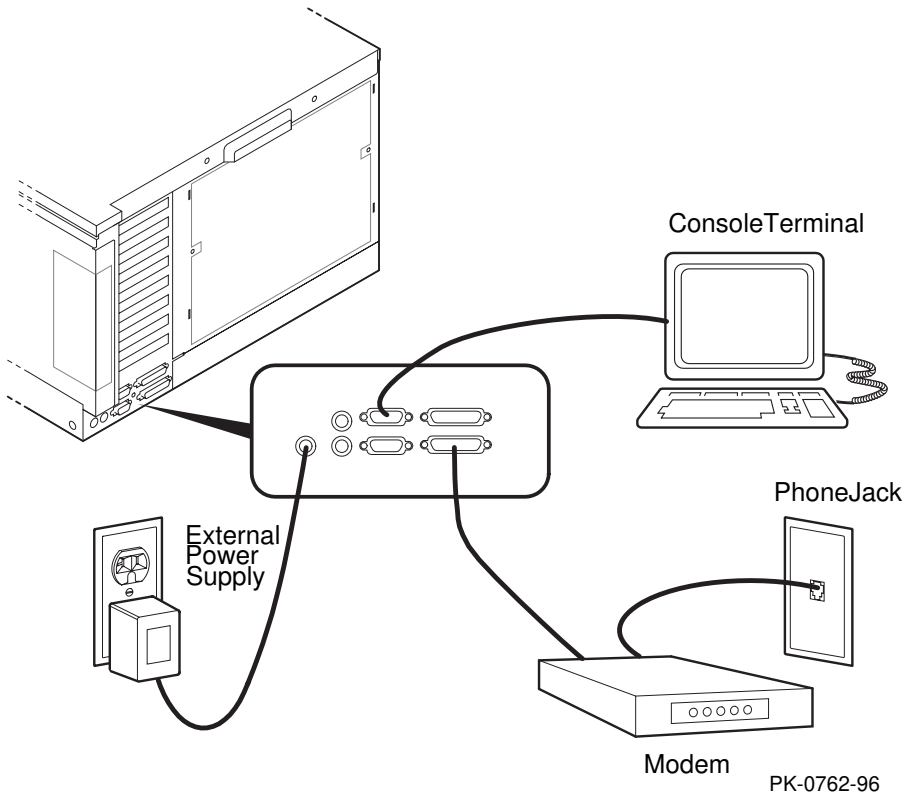
- To enter the RCM console remotely, the user dials in through a modem, enters a password, and then types a special escape sequence that invokes RCM command mode. You must set up the modem before you can dial in remotely. See Section 2.10.1.
- To enter the RCM console locally, the user types the escape sequence at the SRM console prompt on the local serial console terminal.

The RCM also provides an autonomous dial-out capability when it detects a power failure within the system. When triggered, the RCM dials a paging service at 30-minute intervals until the administrator clears the alert within the RCM.

2.10.1 Modem Usage

To use the RCM to monitor a system remotely, first make the connections to the server control module, as shown below. Then configure the modem port for dial-in.

Figure 2–5 RCM Connections



Modem Selection

The RCM requires a Hayes-compatible modem. The controls that the RCM sends to the modem have been selected to be acceptable to a wide selection of modems. The modems that have been tested and qualified include:

Motorola LifeStyle Series 28.8
AT&T DATAPORT 14.4/FAX
Zoom Model 360

The U.S. Robotics Sportster DATA/FAX MODEM is also supported, but requires some modification of the modem initialization and answer strings. See Section 2.10.7.

Modem Configuration Procedure

1. Connect a Hayes-compatible modem to the RCM as shown in Figure 2–5, and power up the modem.
2. From the local serial console terminal, enter the RCM firmware console by typing the following escape sequence:

   ```
   ^]^]rcm
   ```

   The character "^" is created by simultaneously holding down the Ctrl key and pressing the] key (right square bracket). The firmware prompt, RCM>, should now be displayed.
3. Enter a modem password with the **setpass** command. See Section 2.10.3.
4. Enable the modem port with the **enable** command. See Section 2.10.3.
5. Enter the **quit** command to leave the RCM console.
6. You are now ready to dial in remotely.

Dialing In to the RCM Modem Port

1. Dial the modem connected to the server control module. The RCM answers the call and after a few seconds prompts for a password with a "#" character.
2. Enter the password that was loaded using the **setpass** command. The user has three tries to correctly enter the password. On the third unsuccessful attempt, the connection is terminated, and as a security precaution, the modem is not answered again for 5 minutes.

   On successful entry of the password, the RCM banner message "RCM V1.0" is displayed, and the user is connected to the system COM1 port. At this point the local terminal keyboard is disabled except for entering the RCM console firmware. The local terminal displays all the terminal traffic going out to the modem.
3. To connect to the RCM firmware console, type the RCM escape sequence.

Refer to Example 2–17 for an example of the modem dial-in procedure.

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

Example 2–17 Sample Remote Dial-In Dialog

```
ATQ0V1E1S0=0                !When modem dial-in connection is made, a screen display
OK                          similar to this appears.
ATDT30167
CONNECT 9600

#                           !Enter password at this prompt.

RCM V1.0                    !RCM banner is displayed.

^]^]rcm                     !Enter the escape sequence after the banner is displayed.
                            The escape sequence is not echoed on the terminal.

RCM>                        !RCM prompt is displayed. Commands to control and
                            monitor the system can be entered.
```

Terminating a Remote Console (Modem) Session

Terminate the modem session by executing a **hangup** command from the RCM console firmware. This will cleanly terminate the modem connection.

If the modem connection is terminated without using the **hangup** command, or if the line is dropped due to phone line problems, the RCM will detect carrier loss and initiate an internal **hangup** command. This process can take a minute or more, and the local terminal will be locked out until the auto hangup process completes.

If the modem link is idle for more than 20 minutes, the RCM initiates an auto hangup.

2.10.2 Entering and Leaving Command Mode

Use the default escape sequence to enter RCM command mode for the first time. You can enter RCM command mode from the SRM console level, the operating system level, or an application. The RCM quit command reconnects the terminal to the system console port.

Example 2–18 Entering and Leaving RCM Command Mode

```
^]^]rcm                ❶
RCM>

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

Entering the RCM Firmware Console

To enter the RCM firmware console, enter the RCM escape sequence. See ❶ in Example 2–18 for the default sequence.

The escape sequence is not echoed on the terminal or sent to the system. Once in the RCM firmware console, the user is in RCM command mode and can enter RCM console commands.

Leaving Command Mode

To leave RCM command mode and reconnect to the system console port, enter the **quit** command, then press Return to get a prompt from the operating system or system console. (See ❷).

2.10.3 RCM Commands

The RCM commands summarized below are used to control and monitor a system remotely.

Table 2–3 RCM Command Summary

Command	Function
alert_clr	Clears alert flag, stopping dial-out alert cycle
alert_dis	Disables the dial-out alert function
alert_ena	Enables the dial-out alert function
disable	Disables remote access to the modem port
enable	Enables remote access to the modem port
hangup	Terminates the modem connection
halt	Halts server
help or **?**	Displays the list of commands
poweroff	Turns off power to server
poweron	Turns on power to server
quit	Exits console mode and returns to system console port
reset	Resets the server
setesc	Changes the escape sequence for entering command mode
setpass	Changes the modem access password
status	Displays server's status and sensors

Command Conventions

- The commands are not case sensitive.
- A command must be entered in full.
- If a command is entered that is not valid, the command fails with the message:

```
*** ERROR – unknown command ***
```

Enter a valid command.

The RCM commands are described on the following pages.

alert_clr

The **alert_clr** command clears an alert condition within the RCM. The alert enable condition remains active, and the RCM will again enter the alert condition when it detects a system power failure. See Section 2.10.4.

```
RCM>alert_clr
```

alert_dis

The **alert_dis** command disables RCM dial-out capability. It also clears any out - standing alerts. See Section 2.10.4. The alert disable state is nonvolatile. Dial-out capability remains disabled until the **alert_enable** command is issued.

```
RCM>alert_dis
```

alert_ena

The **alert_ena** command enables the RCM to automatically dial out when it detects a power failure within the system. The RCM repeats the dial-out alert at 30-minute intervals until the alert is cleared. The alert enable state is nonvolatile. Dial-out capability remains enabled until the **alert_disable** command is issued.

```
RCM>alert_ena
```

In order for the **alert_enable** command to work, two conditions must be met:

- A modem dial-out string must be entered with the system console.
- Remote access to the RCM modem port must be enabled with the **enable** command.

See Section 2.10.4.

If the **alert_enable** command is entered when remote access is disabled, the following message is returned:

```
*** error ***
```

disable

The **disable** command disables remote access to the RCM modem port.

```
RCM>disable
```

The module's remote access default state is DISABLED. The modem enable state is nonvolatile. When the modem is disabled, it remains disabled until the **enable** command is issued. If a modem connection is in progress, entering the **disable** command terminates it.

enable

The **enable** command enables remote access to the RCM modem port. It can take up to 10 seconds for the **enable** command to be executed.

```
RCM>enable
```

The module's remote access default state is DISABLED.

The modem enable state is nonvolatile. When the modem is enabled, it remains enabled until the **disable** command is issued.

The **enable** command can fail for two reasons:

- There is no modem access password configured.
- The modem is not connected or is not working properly.

If the **enable** command fails, the following message is displayed:

```
*** ERROR – enable failed ***
```

hangup

The **hangup** command terminates the modem session. When this command is issued, the remote user is disconnected from the server. This command can be issued from either the local or remote console.

```
RCM>hangup
```

halt

The **halt** command attempts to halt the managed system. It is functionally equivalent to pressing the Halt button on the system operator control panel to the "in" position and then releasing it to the "out" position. The RCM console firmware exits command mode and reconnects the user's terminal to the server's COM1 serial port.

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

NOTE: Pressing the Halt button has no effect on systems running Windows NT.

help or ?

The **help** or **?** command displays the RCM firmware command set.

poweroff

The **poweroff** command requests the RCM module to power off the system It is functionally equivalent to turning off the system power from the operator control panel.

```
RCM>poweroff
```

If the system is already powered off, this command has no effect.

The external power to the RCM must be connected in order to power off the system from the RCM firmware console. If the external power supply is not connected, the command will not power the system down, and displays the message:

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

poweron

The **poweron** command requests the RCM module to power on the system. For the system power to come on, the following conditions must be met:

- AC power must be present at the power supply inputs.
- The DC On/Off button must be in the "on" position.
- All system interlocks must be set correctly.

The RCM firmware console exits command mode and reconnects the user's terminal to the system console port.

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

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

quit

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

```
Focus returned to COM port
```

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

reset

The **reset** command requests the RCM module to perform a hardware reset. It is functionally equivalent to pressing the Reset button on the system operator control panel.

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

The following events occur when the **reset** command is executed:

- The system restarts and the system console firmware reinitializes.
- The console exits RCM command mode and reconnects the user's terminal to the server's COM1 serial port.
- The power-up messages are displayed, and then the console prompt is displayed or the operating system boot messages are displayed, depending on the state of the Halt button.

setesc

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

NOTE: If you change the escape sequence, be sure to record the new sequence. Although the module factory defaults can be restored if the user has forgotten the escape sequence, this involves accessing the server control module and moving a jumper.

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

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

If the escape sequence entered exceeds 15 characters, the command fails with the message:

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

When changing the default escape sequence, avoid using special characters that are used by the system's terminal emulator or applications.

Control characters are not echoed when entering the escape sequence. To verify the complete escape sequence, use the **status** command.

setpass

The **setpass** command allows the user to change the modem access password that is prompted for at the beginning of a modem session. The password is stored in the module's on-board NVRAM.

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

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

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

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

```
*** ERROR – illegal password ***
```

If the user has forgotten the password, a new password can be entered.

status

The **status** command displays the current state of the server's sensors, as well as the current escape sequence and alarm information.

```
RCM>status

Firmware Rev: V1.0
Escape Sequence: ^]^]RCM
Remote Access: ENABLE/DISABLE
Alerts: ENABLE/DISABLE
Alert Pending: YES/NO (C)
Temp (C): 26.0
RCM Power Control: ON/OFF
External Power: ON
Server Power: OFF

RCM>
```

The status fields are explained in Table 2–4.

Table 2–4 RCM Status Command Fields

Item	Description
Firmware Rev:	Revision of RCM firmware.
Escape Sequence:	Current escape sequence to enter RCM firmware console.
Remote Access:	Modem remote access state. (ENABLE/DISABLE)
Alerts:	Alert dial-out state. (ENABLE/DISABLE)
Alert Pending:	Alert condition triggered. (YES/NO)
Temp (C):	Current system temperature in degrees Celsius.
RCM Power Control:	Current state of RCM system power control. (ON/OFF)
External Power:	Current state of power from external power supply to server control module. (ON/OFF)

2.10.4 Dial-Out Alerts

The RCM can be configured to automatically dial out through the modem (usually to a paging service) when it detects a power failure within the system. When a dial-out alert is triggered, the RCM initializes the modem for dial-out, sends the dial-out string, hangs up the modem, and reconfigures the modem for dial-in. The RCM and modem must continue to be powered, and the phone line must remain active, for the dial-out alert function to operate.

Example 2–19 Configuring the Modem for Dial-Out Alerts

```
P00>>> set rcm_dialout "ATDTstring#;"  ❶

RCM>enable
RCM>status
.
.
Remote Access:  Enable                 ❷
.
RCM>alert_ena                          ❸
```

Example 2–20 Typical RCM Dial-Out Command

```
P00>>> set rcm_dialout "ATXDT9,15085553333,,,,,,5085553332#;"
```

Use the **show** command to verify the RCM dial-out string:

```
P00>>> show rcm_dialout
rcm_dialout       ATXDT9,15085553333,,,,,,5085553332#;
```

Enabling the Dial-Out Alert Function:

1. Enter the **set rcm_dialout** command, followed by a dial-out alert string, from the SRM console (see ❶ in Example 2–19).

   The *string* is a modem dial-out character string, not to exceed 47 characters, that is used by the RCM when dialing out through the modem. See the next topic for details on composing the modem dial-out string.

2. Enter the RCM firmware console and enter the **enable** command to enable remote access dial-in. The RCM firmware **status** command should display "Remote Access: ENABLE." (See ❷.)

3. Enter the RCM firmware **alert_ena** command to enable outgoing alerts. (See ❸.)

Composing a Modem Dial-Out String

The modem dial-out string emulates a user dialing an automatic paging service. Typically, the user dials the pager phone number, waits for a tone, and then enters a series of numbers.

The RCM dial-out string (Example 2–20) has the following requirements:

- The entire string following the **set rcm_dialout** command must be enclosed by quotation marks.
- The characters ATDT must be entered after the opening quotation marks. Do not mix case. Enter the characters either in all uppercase or all lowercase.
- Enter the character X if the line to be used also carries voice mail. Refer to the example that follows.
- The valid characters for the dial-out string are the characters on a phone keypad: 0–9, *, and #. In addition, a comma (,) requests that the modem pause for 2 seconds, and a semicolon (;) is required to terminate the string.

Elements of the Dial-Out String

ATXDT	AT = Attention X = Forces the modem to dial "blindly" (not look for a 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) , = Pause for 2 seconds.
9,	In the example, "9" gets an outside line. Enter the number for an outside line if your system requires it.
`15085553333`	Dial the paging service.
`,,,,,,`	Pause for 12 seconds for paging service to answer
`5085553332#`	"Message," usually a call-back number for the paging service.
;	Return to console command mode. Must be entered at end of string.

2.10.5 Resetting the RCM to Factory Defaults

If the escape sequence has been forgotten, you can reset the controller to factory settings.

Reset Procedure

1. Power down the server and access the server control module, as follows:

   Expose the PCI bus card cage. Remove three Phillips head screws holding the cover in place and slide it off the drawer. If necessary, remove several PCI and EISA options from the bottom of the PCI card cage until you have enough space to access the server control module.

2. Unplug the external power supply to the server control module.

   Locate the password and option reset jumper. The jumper number, which is etched on the board, depends on the revision of the server control module.

   NOTE: If the RCM section of the server control module does not have an orange relay, the jumper number is J6. If the RCM section of the server control module has an orange relay, the jumper number is J7.

3. Move the jumper so that it is sitting on both pins.

4. Replace any panels or covers as necessary so you can power up the system. Press the Halt button and then power up the system to the SRM console prompt. Powering up with the password and option reset jumper in place resets the escape sequence, password, and modem enable states to the factory default.

5. When the console prompt is displayed, power down the system and move the password and option reset jumper back onto the single pin.

6. Replace any PCI or EISA modules you removed and replace the PCI bus card cage cover.

7. Power up the system to the SRM console prompt and type the default escape sequence to enter RCM command mode:

   ```
   ^]^]RCM
   ```

8. Configure the module as desired. You must reset the password and modem enable states in order to enable remote access.

2.10.6 Troubleshooting Guide

Table 2–5 lists a number of possible causes and suggested solutions for symptoms you might see.

Table 2–5 RCM Troubleshooting

Symptom	Possible Cause	Suggested Solution
The local terminal will not communicate with the system or the RCM.	System and terminal baud rate set incorrectly.	Set the system and terminal baud rates to 9600 baud.
	Cables not correctly installed.	Review external cable installation.
RCM will not answer when the modem is called.	Modem cables may be incorrectly installed.	Check modem phone lines and connections.
	RCM remote access is disabled.	Enable remote access.
	RCM does not have a valid password set.	Set password and enable remote access.
	The local terminal is currently in the RCM console firmware.	Issue a **quit** command on the local terminal.
	On power-up, the RCM defers initializing the modem for 30 seconds to allow the modem to complete its internal diagnostics and initialization.	Wait 30 seconds after powering up the system and RCM before attempting to dial in.
	Modem may have had power cycled since last being initialized or modem is not set up correctly.	Enter **enable** command from RCM console.

Continued on next page

Table 2–5 RCM Troubleshooting (Continued)

Symptom	Possible Cause	Suggested Solution
After the system and RCM are powered up, the COM port seems to hang and then starts working after a few seconds.	This delay is normal behavior.	Wait a few seconds for the COM port to start working.
RCM installation is complete, but system will not power up.	RCM Power Control: is set to DISABLE.	Enter RCM console and issue the **poweron** command.
New password, escape sequence, and modem enable state are forgotten when system and RCM module are powered down.	The password and option reset jumper is still installed. If the RCM section of the server control module does not have an orange relay, the jumper number is J6. If it does have an orange relay, the number is J7.	After resetting RCM to factory defaults, move the jumper so that it is sitting on only one pin.
The remote user sees a "+++" string on the screen.	The modem is confirming whether the modem has really lost carrier. This occurs when the modem sees an idle time, followed by a "3," followed by a carriage return, with no subsequent traffic. If the modem is still connected, it will remain so.	This is normal behavior.
The message "unknown command" is displayed when the user enters a carriage return by itself.	The terminal or terminal emulator is including a linefeed character with the carriage return.	Change the terminal or terminal emulator setting so that "new line" is not selected.

Continued on next page

Table 2–5 RCM Troubleshooting (Continued)

Symptom	Possible Cause	Suggested Solution
Cannot enable modem or modem will not answer.	The modem is not configured correctly to work with the RCM.	Modify the modem initialization and/or answer string as described in Section 2.10.7.

2.10.7 Modem Dialog Details

This section provides further details on the dialog between the RCM and the modem and is intended to help you reprogram your modem if necessary.

Phases of Modem Operation

The RCM is programmed to expect specific responses from the modem during four phases of operation:

- Initialization
- Ring detection
- Answer
- Hang-up

The initialization and answer command strings are stored in the RCM NVRAM. The factory default strings are:

Initialization string: `AT&F0EVS0=0S12=50<cr>`

Answer string `ATXA<cr>`

NOTE: All modem commands must be terminated with a <cr> character (0x0d hex).

Initialization

The RCM initializes the modem to the following configuration:

Factory defaults (`&F0`)

No Echo (`E`)

Numeric response codes (`V`)

No Auto Answer (`S0=0`)

Guard-band = 1 second (`S12=50`)

Fixed modem-to-RCM baud rate

Connect at highest possible reliability and speed

The RCM expects to receive a "**0<cr>**" (OK) in response to the initialization string. If it does not, the **enable** command will fail.

This default initialization string works on a wide variety of modems. If your modem does not configure itself to these parameters, the initialization string will need to be modified. See the topic in this section entitled Modifying Initialization and Answer Strings.

Ring Detection

The RCM expects to be informed of an in-bound call by the modem signaling the RCM with the string, "2<cr>" (RING).

Answer

When the RCM receives the ring message from the modem, it responds with the answer string. The "X" command modifier used in the default answer string forces the modem to report simple connect, rather than connect at *xxxx*. The RCM expects a simple connect message, "1<cr>" (CONNECTED). If the modem responds with anything else, the RCM forces a hang-up and initializes the modem.

The default answer string is formatted to request the modem to provide only basic status. If your modem does not provide the basic response, the answer string, and/or initialization string will need to be modified. See the topic in this section entitled Modifying Initialization and Answer Strings.

After receiving the "connect" status, the modem waits for 6 seconds, and then prompts the user for a password.

Hangup

When the RCM is requested to hang up the modem, it forces the modem into command mode and issues the **hangup** command to the modem. This is done by pausing for a minimum of the guard time, sending the modem "+++". When the modem responds with "0<cr>" (OK), the hang-up command string is sent. The modem should respond with "3<cr>" (NO CARRIER). After this interchange, the modem is reinitialized in preparation for the next dial-in session.

RCM/Modem Interchange Overview

Table 2–6 summarizes the actions between the RCM and the modem from initialization to hangup.

Table 2–6 RCM/Modem Interchange Summary

Action	Data to modem	Data from Modem
Initialization command	AT&F0EVS0=0S12=50<cr>	
Initialization successful		0<cr>
Phone line ringing		2<cr>
RCM answering	ATXA<cr>	
Modem successfully connected		1<cr>
Force modem into command mode	<guard_band>+++	
Modem in command mode		0<cr>
Hangup	ATH<cr>	
Successful hangup		3<cr>

Modifying Initialization and Answer Strings

The initialization and answer strings are stored in the RCM's NVRAM. They come pre-programmed to support a wide selection of modems. In the circumstance where the default initialization and answer strings do not set the modem into the desired mode, the following SRM **set** and **show** commands are provided to enable the user to define and examine the initialization and answer strings.

To replace the initialization string:

```
P00>>>set rcm_init "new_init_string"
```

To replace the answer string:

```
P00>>>set rcm_answer "new_answer_string"
```

To display all the RCM user settable strings:

```
P00>>>show rcm*
rcm_answer      ATXA
rcm_dialout
rcm_init        AT&F0EVS0=0S12=50
P00>>>
```

Initialization and Answer String Substitutions

The following modems have been identified as requiring modified initialization and/or answer strings.

Modem Model	Initialization String	Answer String
RCM Defaults	"AT&F0EVS0=0S12=50"	"ATXA"
USRobotics Sportster 28,800 Data/Fax Modem	RCM default	"ATX0&B1&A0A"

Chapter 3

Troubleshooting

This chapter contains basic troubleshooting information. For more about troubleshooting, see the *AlphaServer 4000/4100 Service Manual.*

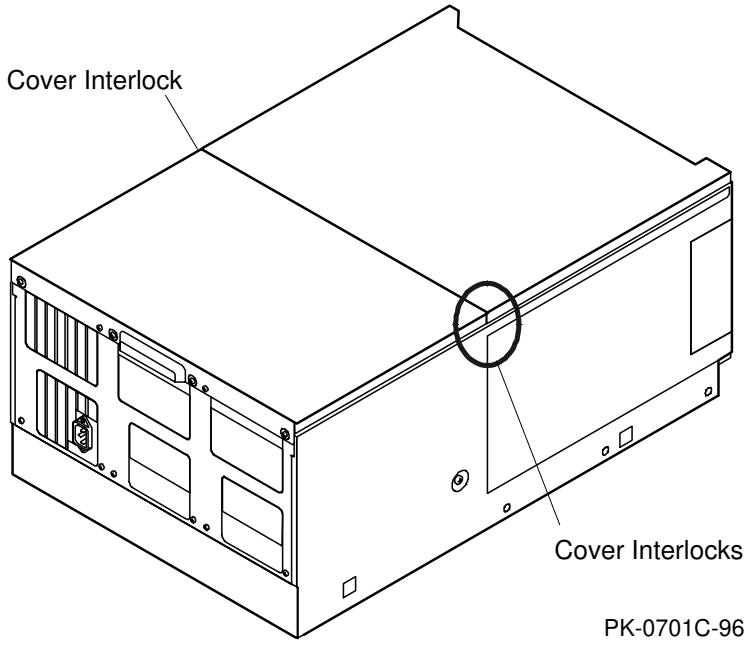
Sections in this chapter are:

- System Drawer Does Not Power Up
- Control Panel Display Is Blank
- Control Panel Display Indicates an Error

3.1 System Drawer Does Not Power Up

When the system drawer does not power up, the problem may be a disconnected power cord, a faulty fan, or a disengaged cover interlock.

Figure 3–1 Location of Cover Interlocks



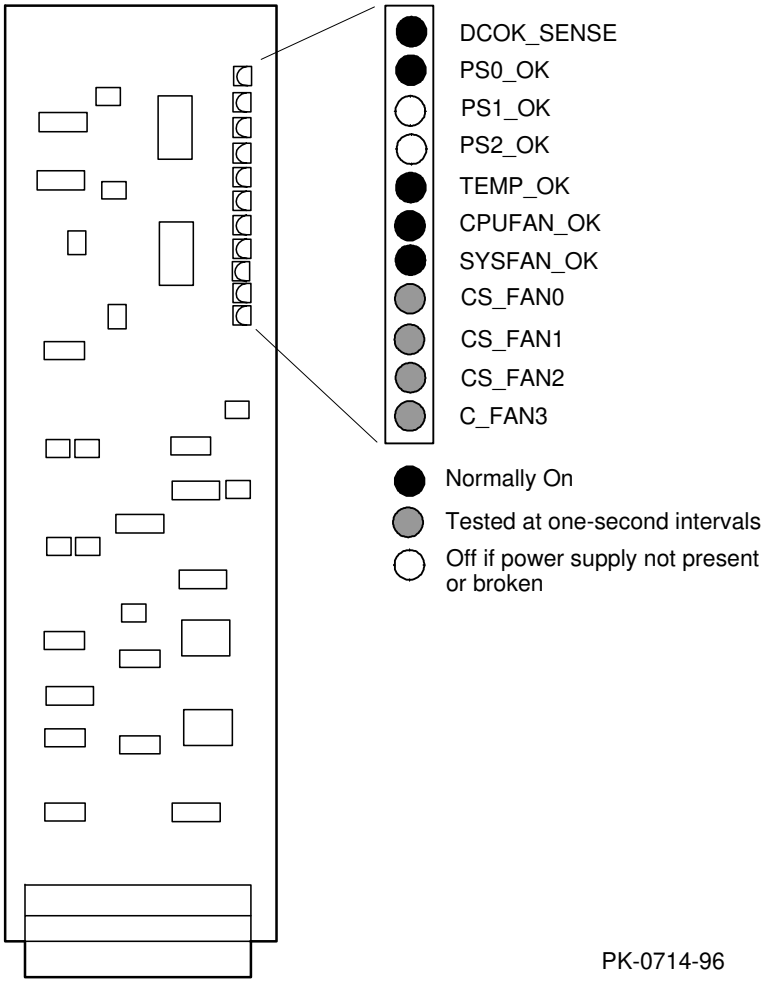
If the system drawer does not power up

- Is the system drawer power cord plugged into the power strip? Is it secure in the system drawer connector?
- Is the pedestal or cabinet AC power cord plugged in?
- Are the covers on the system drawer closed and the interlocks engaged?

  The cover interlocks must be engaged to enable power-up. See Figure 3–1 for interlock locations. (The three interlocks are all in the area highlighted in the illustration.)

- Is the power supply operating?
- Are the system drawer fans operating?
- Are the CPU fans operating?
- Is the power control module securely seated in its connector?
- What is the status of the power control module LEDs?

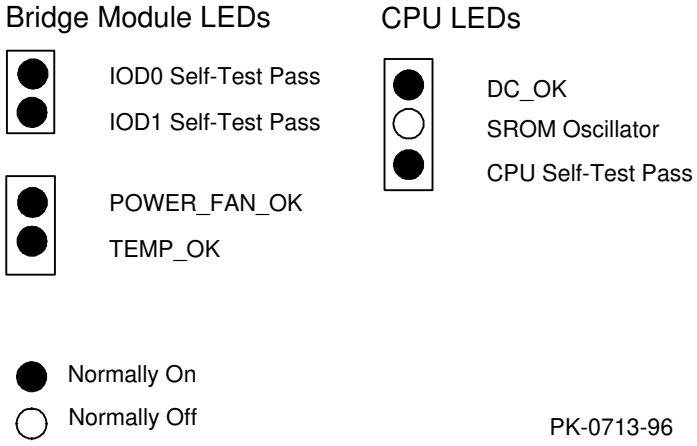
Figure 3–2 Power Control Module LEDs



3.2 Control Panel Display Is Blank

If the system drawer powers up but the control panel display is blank, the problem may be a CPU module, the bridge module, the PCI motherboard, the control panel display, or the cable connecting the PCI motherboard and the display.

Figure 3–3 CPU and Bridge Module LEDs



If the system drawer powers up but the control panel display is blank

- Did all Self-Test Pass (STP) LEDs on the CPU modules light? (See Figure 3–3 for the location of these LEDs.)

NOTE: Running AlphaBIOS causes the CPU STP LEDs to turn off. This is normal behavior.

If all STP LEDs are on, check the connection between the PCI motherboard and the control panel. If the cable is connected and not damaged, the fault may be in either the PCI motherboard or the control panel.

If all STP LEDs are off and the DC_OK LED is on, the fault may be the CPU module or, less likely, the motherboard.

- Did all "OK" LEDs (DC_OK, POWER_FAN_OK, and TEMP_OK) on the CPU modules light?

  If any OK LED is off, the fault may be in the power system. Check the power supplies, power control module, and all connections to both.

- Did all STP LEDs on the bridge module light?

  If all bridge STP LEDs are off, the fault is likely the motherboard or the bridge module. Another possible, but less likely, cause may be the oscillator on CPU 0. If this is a multiprocessor system, insert a different module in the CPU 0 slot.

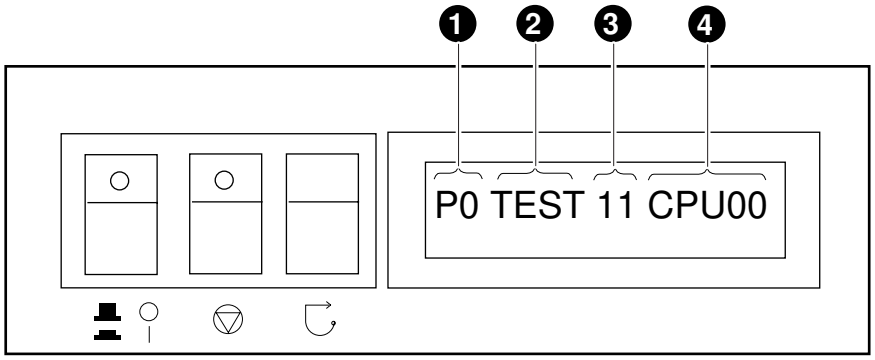
  If one bridge STP LED is off, the fault may be the bridge module or the motherboard.

NOTE: In all cases listed above, the memory modules can be ruled out as a possible cause.

3.3 Control Panel Display Indicates an Error

The control panel display indicates the likely device when testing fails.

Figure 3–4 Control Panel Display



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If the control panel display indicates an error

Check the failing device called out in the control panel display. See Figure 3–4 and Table 3–1 for the location and meaning of the fields in the display.

Table 3–1 Control Panel Display

Field	Content	Display	Meaning
❶	CPU number	P0–P3	CPU reporting status
❷	Status	TEST	Tests are executing
		FAIL	Failure has been detected
		MCHK	Machine check has occurred
		INTR	Error interrupt has occurred
❸	Test number (for DIGITAL use only)		
❹	Suspected device	CPU0–3	CPU module number[1]
		MEM0–3 and L, H, or *	Memory pair number and low module, high module, or either[2]
		IOD0	Bridge to PCI bus 0[3]
		IOD1	Bridge to PCI bus 1[3]
		IOD2	Bridge to PCI bus 2[4]
		IOD3	Bridge to PCI bus 3[4]
		FROM0	Flash ROM[5]
		COMBO	COM controller[5]
		PCEB	PCI-to-EISA bridge[5]
		ESC	EISA system controller[5]
		NVRAM	Nonvolatile RAM[5]
		TOY	Real time clock[5]
		I8242	Keyboard and mouse controller[5]

[1] CPU module

[2] Memory module

[3] Bridge module (PCI 0 & 1)

[4] Bridge module (PCI 2 & 3) (16-PCI slot drawer only)

[5] PCI motherboard

Chapter 4

Installing Components

The system drawer can be upgraded to two CPU modules, two memory pairs, and a total of eight PCI cards and EISA cards (three EISA cards maximum) in a drawer with one PCI card cage or 16 in a drawer with two PCI card cages.

The procedure for opening the system drawer is different for pedestal systems and cabinet systems. Instructions for both systems are included.

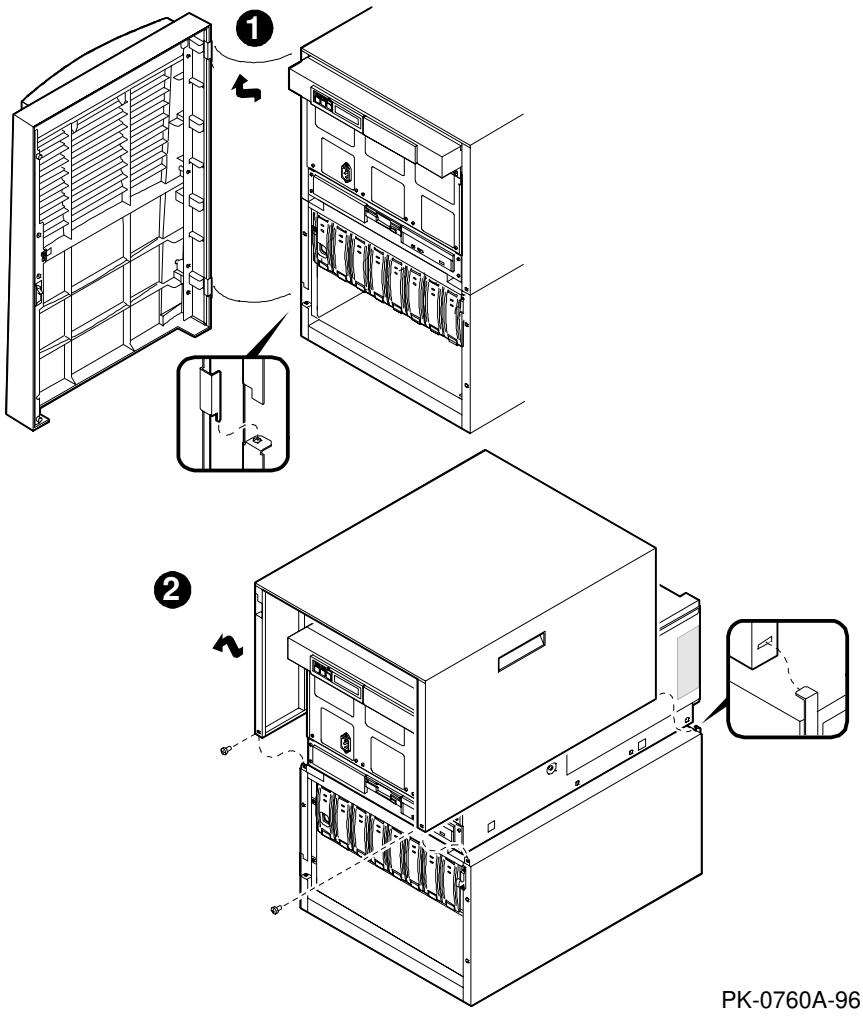
Sections in this chapter are:

- Exposing the System Drawer in a Pedestal
- Exposing the System Drawer in a Cabinet
- Removing Covers from the System Drawer
- Installing a CPU Module
- Installing a Memory Pair
- Installing a PCI or EISA Card
- Installing a Power Supply
- Upgrading the I/O System

4.1 Exposing the System Drawer in a Pedestal

Open and remove the front door, and remove the top cover. For a power supply installation, also remove the pedestal tray.

Figure 4–1 Pedestal Door and Cover Removal



CAUTION: Wear an antistatic wrist strap when working on this system.

For CPU and memory modules, PCI/EISA cards, and power supplies

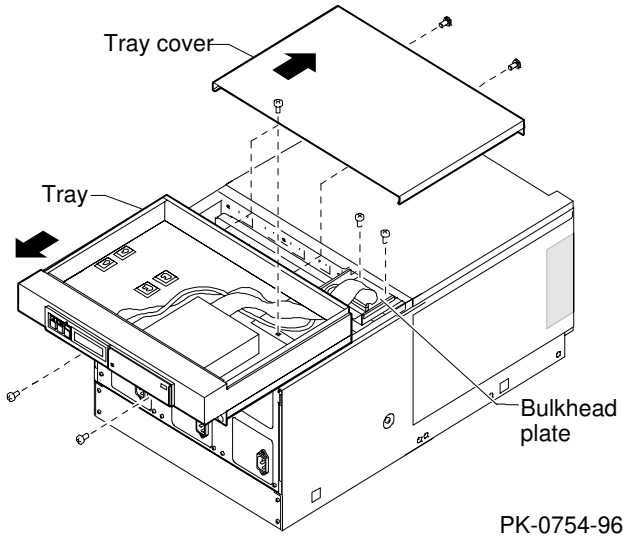
1. Open the front door of the pedestal and remove it by lifting and pulling it away from the system. (See ❶ in Figure 4–1.)
2. Remove the top cover from the pedestal. Remove the two Phillips head retaining screws midway up each side of the pedestal, tilt the cover up, and lift it away from the frame. (See ❷.)
3. If you are installing a power supply, remove the pedestal tray by following the procedure below.

For power supplies

If you are installing a power supply, remove the front door and the top cover of the pedestal, as explained above. You must also remove the pedestal tray:

1. Remove the tray cover by loosening the retaining screws at the back of the tray. (See Figure 4–2.)
2. Disconnect the cables from the control panel and any optional SCSI device to the bulkhead connector in the rear right corner of the tray.
3. Unscrew the Phillips head retaining screw holding the bulkhead to the tray.
4. Unscrew the two Phillips head retaining screws and slide the tray off the drawer.

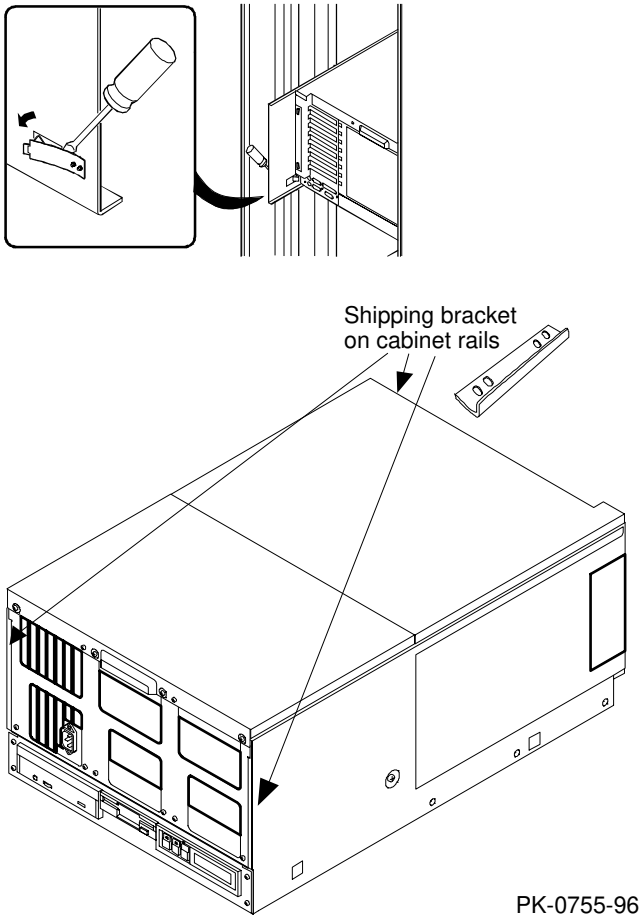
Figure 4–2 Pedestal Tray Removal



4.2 Exposing the System Drawer in a Cabinet

Open both doors, disconnect cables that obstruct movement of the drawer, remove the shipping brackets, and slide the drawer out from the cabinet.

Figure 4–3 Exposing System Drawer in Cabinet



CAUTION: Wear an antistatic wrist strap when working on this system.

For CPU and memory modules and PCI/EISA cards

1. Open the front and rear doors of the cabinet.
2. At the front of the cabinet, unplug the power supplies in the drawer.
3. At the rear, remove the two Phillips screws holding the shipping bracket on the mounting rail at the right.
4. Using a flathead screwdriver, disengage the lock mechanism at the lower left corner of the drawer. Slide the drawer out part way and release the lock mechanism by removing the screwdriver.
5. Slide the drawer out until it locks.

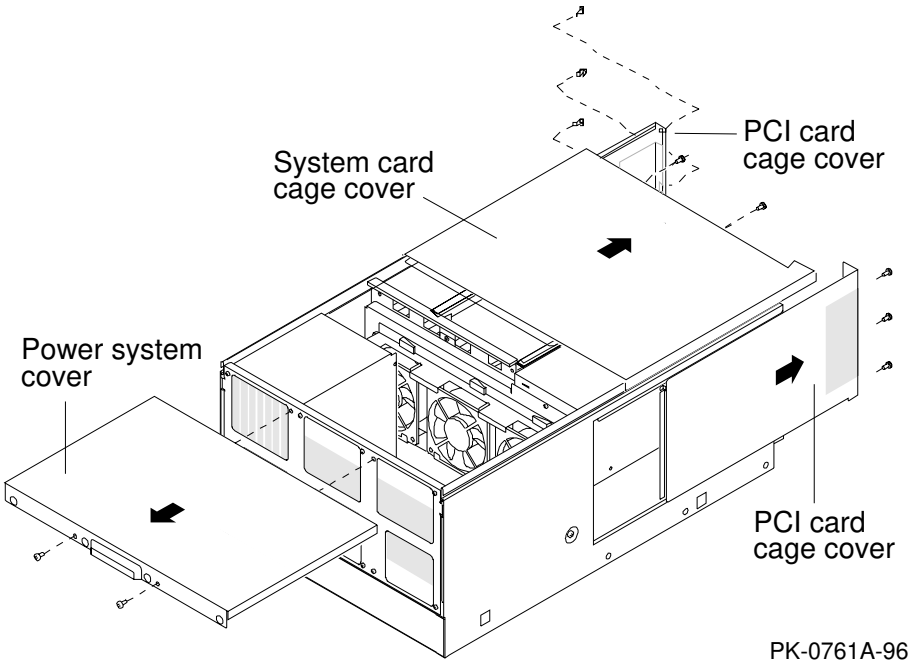
For power supplies

1. Open the front and rear doors of the cabinet.
2. At the rear of the cabinet, if the cables from any PCI options might interfere with pulling the drawer forward, remove the cables.
3. At the front, remove the shipping brackets on the right and left rails that hold the drawer.
4. Pull out the drawer until it locks.

4.3 Removing Covers from the System Drawer

The system drawer has covers on the system bus, PCI, and power sections. Remove a cover by removing the screws and sliding the cover from the system drawer.

Figure 4–4 System Drawer Covers

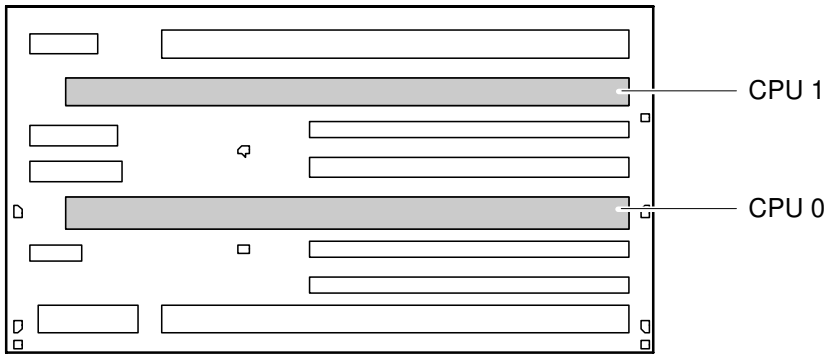


Each of the covers shown in Figure 4–4 is attached to the system drawer by Phillips head screws. The locations of these screws are shown in the illustration. Detach any of the covers by removing the screws and sliding the cover in the direction shown.

4.4 Installing a CPU Module

Remove the system bus cover from the system drawer and insert the module. To verify the installation, issue the show cpu command from the SRM console or display the system bus configuration from the AlphaBIOS console.

Figure 4–5 CPU Module Slots



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

CAUTION: Wear an antistatic wrist strap when working on this system.

Installation

1. Shut down the operating system and power down the system.
2. Expose the system drawer by following the instructions in Section 4.1 for a pedestal system or Section 4.2 for a cabinet system.
3. Remove the cover from the system card cage section of the system drawer. See Section 4.3.

4. Insert the new CPU module:

   a. Determine the location of the module. The first CPU module must be in slot 0; the second is inserted in slot 1. See Figure 4–5.

   b. The module handle has a lever at each end. Insert the module in the connector and push down on both levers at the same time. See Figure 4–6.

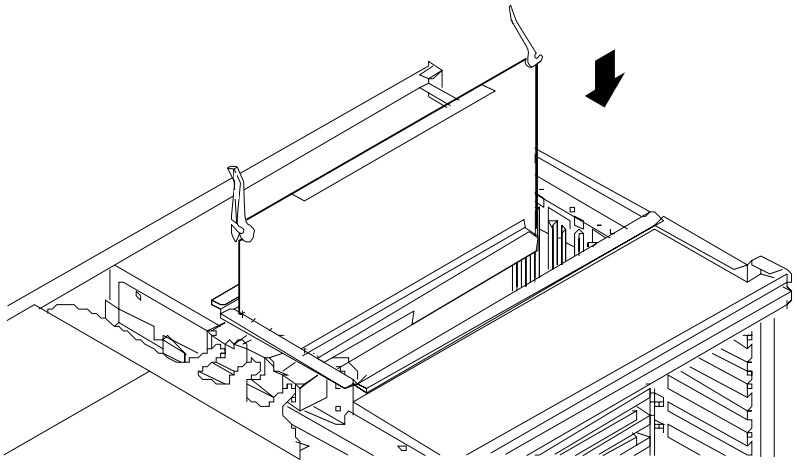
Verification — DIGITAL UNIX and OpenVMS Systems

- Issue the **show cpu** command to display the status of the new module.

Verification — Windows NT Systems

1. Start **AlphaBIOS Setup**, select **Display System Configuration**, and press Enter.
2. Using the arrow keys, select **MC Bus Configuration** to display the status of the new module.

Figure 4–6 CPU Module Installation



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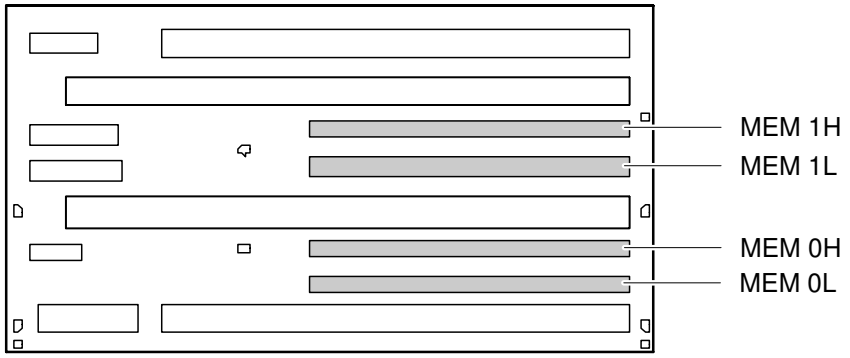
4.5 Installing a Memory Pair

Remove the system bus cover from the system drawer and insert the modules. To verify the installation, issue the show memory command from the SRM console or display the memory configuration from the AlphaBIOS console.

Figure 4–7 Memory Pair Slots



WARNING: Memory modules and CPU modules have parts that ope rate at high temperatures. Wait 2 minutes after power is removed before touching any module.

CAUTION: Wear an antistatic wrist strap when working on this system.

Installation

1. Shut down the operating system and power down the system.
2. Expose the system drawer by following the instructions in Section 4.1 for a pedestal system or Section 4.2 for a cabinet system.
3. Remove the cover from the system card cage section of the system drawer. See Section 4.3.
4. Insert the new memory pair in the appropriate slots.
   a. Determine the location of the two modules. See Figure 4–7, which identifies the slots for the high and low halves of each memory pair. Insert the new pair so that all memory in the system drawer is in descending order by size.

That is, the larger memory must be in slots 0 Low and 0 High, and the second in slots 1 Low and 1 High.

b. The memory module is held in place by a flathead captive screw attached to the top brace of the module. Insert the module and attach the screw. See Figure 4–8.

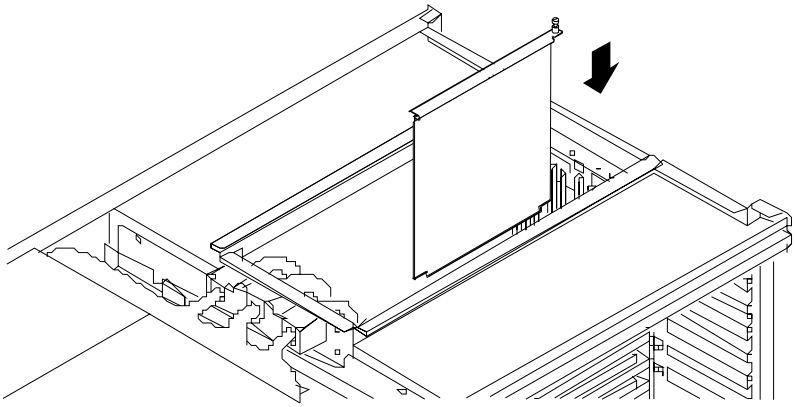
Verification — DIGITAL UNIX and OpenVMS Systems

1. Issue the **show memory** command to display the status of the new memory.
2. Verify the functioning of the new memory by issuing the command **test mem***n*, where *n* is 0, 1, or *.

Verification — Windows NT Systems

1. Start **AlphaBIOS Setup**, select **Display System Configuration**, and press Enter.
2. Using the arrow keys, select **Memory Configuration** to display the status of the new memory.
3. Switch to the SRM console (press the Halt button in so that the LED on the button lights and reset the system). Verify the functioning of the new memory by issuing the command **test mem***n*, where *n* is 0, 1, or *.

Figure 4–8 Memory Module Installation



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4.6 Installing a PCI or EISA Card

Remove the PCI bus cover from the system drawer and insert the card. If it is an EISA card, run the EISA Configuration Utility. To verify the installation, issue the show config and show device commands from the SRM console or display the PCI or EISA configuration from the AlphaBIOS console.

Figure 4–9 PCI and EISA Slots (PCI 0 and 1)

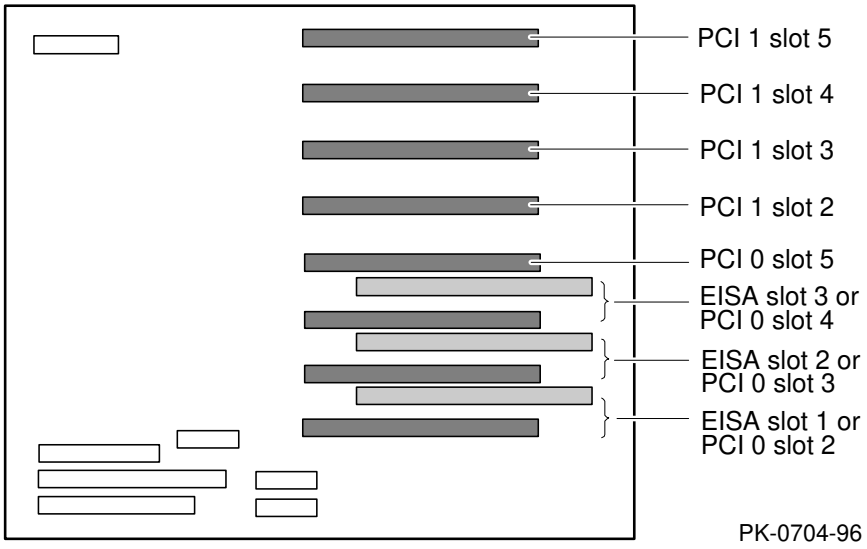
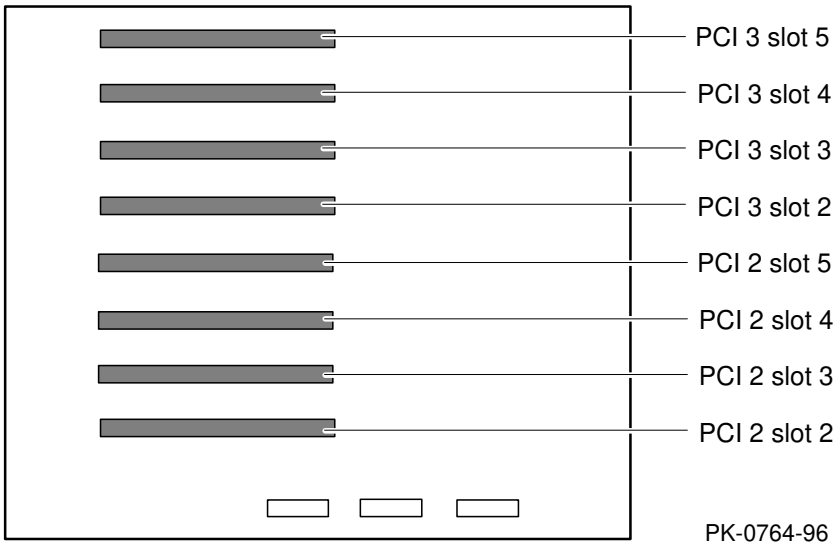


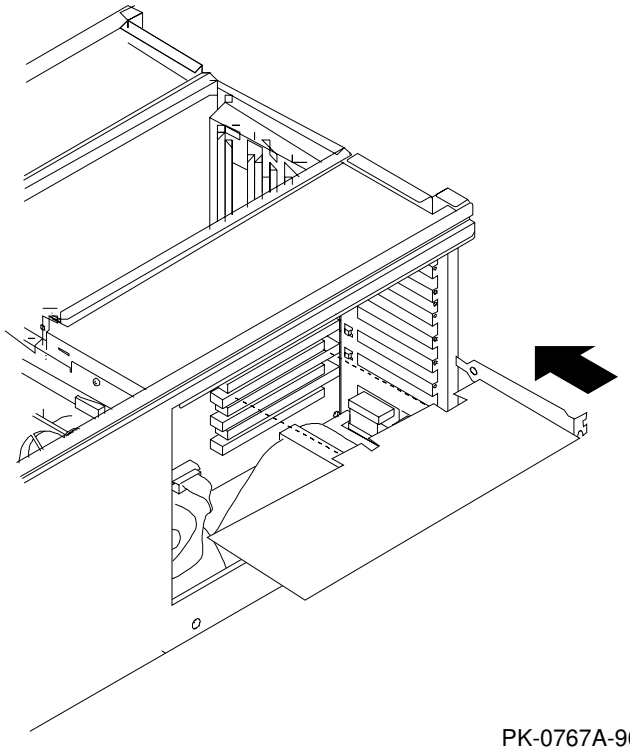
Figure 4–10 PCI Slots (PCI 2 and 3)



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

Installation instructions are on the next page.

Figure 4–11 PCI/EISA Card Installation



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Installation

1. Shut down the operating system and power down the system.
2. Expose the system drawer by following the instructions in Section 4.1 for a pedestal system or Section 4.2 for a cabinet system.
3. Remove the cover from the appropriate PCI card cage section of the system drawer. See Section 4.3.
4. Install the option card:
   a. Determine the location of the card. See Figure 4–9 for the location of PCI and EISA slots on the PCI 0 and 1 motherboard, and Figure 4–10 for the location of PCI slots on the PCI 2 and 3 motherboard.
   b. Remove and discard the bulkhead filler plate from the PCI slot.
   c. Insert the card into the connector as shown in Figure 4–11.
   d. Connect cables and secure the module to the card cage with a Phillips head screw.
5. If you installed an EISA card, after powering up the system run the EISA Configuration Utility. See Chapter 7.

Verification — DIGITAL UNIX and OpenVMS Systems

- Issue the SRM commands **show configuration** and **show device** to determine that the new option is listed.

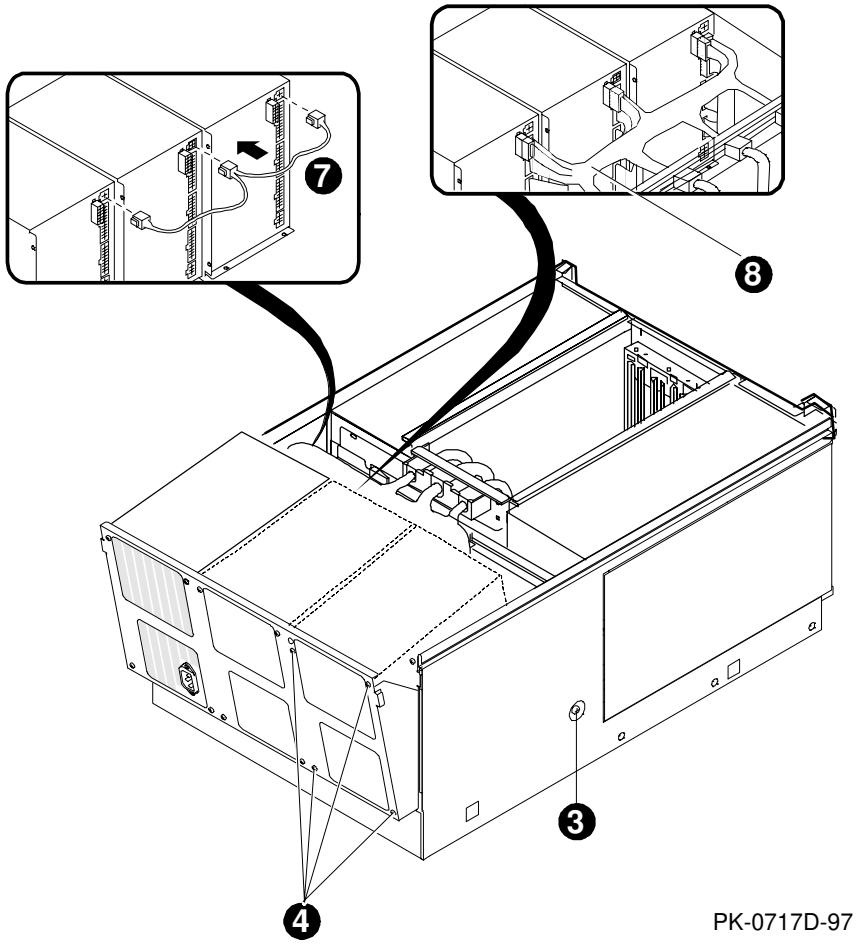
Verification — Windows NT Systems

1. Start **AlphaBIOS Setup**, select **Display System Configuration**, and press Enter.
2. Using the arrow keys, select **PCI Configuration** or **EISA Configuration** to determine that the new option is listed.

4.7 Installing a Power Supply

Remove the power supply cover and the power supply RFI shield. Install the power supply. To verify the installation, issue the show power command from the SRM console.

Figure 4–12 Power System Cabling

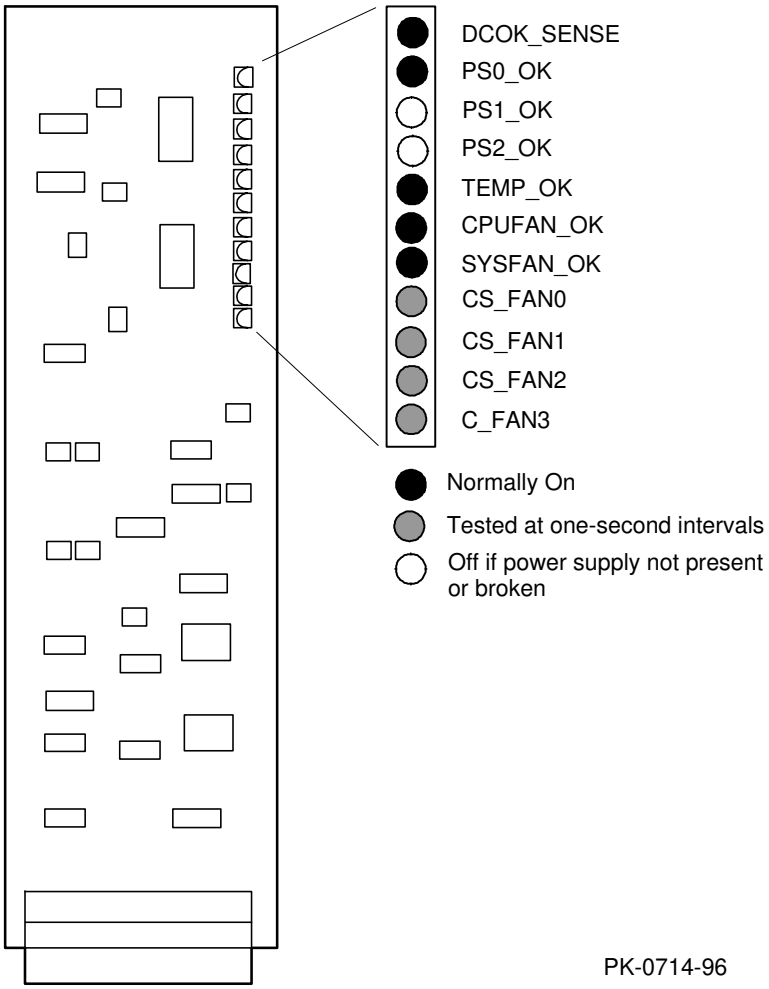


Installation

1. Shut down the operating system and power down the system.
2. Expose the power system section of the system drawer by following the instructions in Section 4.1 for a pedestal system or Section 4.2 for a cabinet system.
3. Remove the two power tray attachment screws. There is one screw on each side of the system drawer (see ❸ in Figure 4–12). Tilt the power tray forward.
4. Determine the space in which the power supply will be installed (see Section 1.3.9 for configuration rules). Remove the RFI cover from that space by removing the four screws at the front of the power tray (see ❹ in Figure 4–12).
5. Insert the power supply in the appropriate space.
6. Insert the screws at the front of the tray to hold the power supply in place:
   a. If you are installing power supply 2, insert three screws (do not place a screw in the upper left corner).
   b. If you are installing power supply 1, insert four screws.
7. Attach the current sharing cable at the rear of the power supply (see ❼ in the inset in Figure 4–12).
8. Attach the other connectors (see ❽).

See page 4-19 for verification instructions.

Figure 4–13 Power Control Module LEDs



Verification

1. Issue the SRM **show power** command to display the status of the new power supply.
2. Check the LEDs on the power control module to determine that the power supply is functioning properly. See Figure 4–13.

4.8 Upgrading the I/O System

A BA30B system drawer with eight PCI slots can be upgraded to 16 PCI slots with the H7150 upgrade kit.

Table 4–1 PCI Upgrade Kit Contents

Part Number	Description
B3040–AB	System bus to PCI bus bridge module
B3051–AA	PCI motherboard
H7291–AA	Power supply
99–06557–03	Bag of 11 M3x5 screws

Upgrading to 16 PCI slots requires the H7150 upgrade kit. Instructions for installing this kit are in the *AlphaServer 4000 PCI Upgrade Manual* (EK–4000A–UI).

Part 2

User Interface

Chapter 5

SRM Console

The SRM console is the command line interface that supports the DIGITAL UNIX and OpenVMS operating systems.

This chapter describes typical functions a user performs, along with descriptions of commands and environment variables. Sections in this chapter are:

- Switching from SRM to AlphaBIOS Console
- Displaying the System Configuration
- Booting the Operating System
- Configuring the System
  - Configuring DSSI
  - Configuring a PCI NVRAM Module
  - Configuring EISA and RAID
- Testing the System
- Stopping and Starting CPUs
- Updating Firmware
- Forcing a System Crash Dump
- Using Environment Variables
- Depositing and Examining Data
- Reading a File
- Initializing the System
- Finding Help
- Command Summary
- Environment Variable Summary

5.1 Switching from SRM to AlphaBIOS Console

It is necessary to switch to the AlphaBIOS console to run configuration utilities. To switch from SRM to AlphaBIOS, issue the alphabios command.

Example 5–1 Switching to the AlphaBIOS Console

```
P00>>> alphabios
```

The **alphabios** command loads and starts the AlphaBIOS console. This is necessary for running AlphaBIOS-based utilities (such as the RAID and EISA configuration utilities). The syntax is:

alphabios

To return to the SRM console, do one of the following:

- If the **os_type** environment variable is set to **unix** or **openvms**, reset the system by pressing the Reset button.
- If the **os_type** environment variable is set to **nt**, press the Halt button in (the LED on the button lights) and reset the system by pressing the Reset button. Alternatively, select **DIGITAL UNIX (SRM)** or **OpenVMS (SRM)** from the **Advanced CMOS Setup** screen and reset the system.

To switch permanently to the AlphaBIOS console (that is, if the permanent operating system is changed to Windows NT), do the following:

1. Set the SRM **os_type** environment variable to **nt**.
2. Set the SRM **console** environment variable to **graphics**.
3. Reset the system with the Reset button or by power cycling.
4. Run the EISA Configuration Utility, using the ECU program for Windows NT. See Chapter 7.

5.2 Displaying the System Configuration

Several commands are used to display the system configuration: show config, show cpu, show device, show fru, show memory, show network, show pal, show power, and show version.

Example 5–2 Show Config Command

```
P00>>> show config
              Digital Equipment Corporation
                    AlphaServer 4000

Console V3.0-10 OpenVMS PALcode V1.19-2, DIGITAL UNIX PALcode V1.21-14

Module                          Type     Rev    Name
System Motherboard              0        0000   mthrbrd0
Memory  128 MB SYNC             0        0000   mem0
Memory  128 MB SYNC             0        0000   mem1
CPU (2MB Cache)                 1        0000   cpu0
CPU (2MB Cache)                 1        0000   cpu1
Bridge (IOD0/IOD1)              600      0021   iod0/iod1
PCI Motherboard                 8        0002   saddle0
Bridge (IOD2/IOD3)              600      0021   iod2/iod3
PCI Motherboard                 8        0000   saddle1

Bus 0 iod0 (PCI0)
Slot   Option Name              Type     Rev    Name
1      PCEB                     4828086  0005   pceb0
2      S3 Trio64/Trio32         88115333 0000   vga0
3      DECchip 21040-AA         21011    0023   tulip0
5      NCR 53C810               11000    0002   ncr1

Bus 1 pceb0 (EISA Bridge connected to iod0, slot1)
Slot   Option Name              Type     Rev    Name

Bus 0 iod1 (PCI1)
Slot   Option Name              Type     Rev    Name
1      NCR 53C810               11000    0002   ncr0

Bus 0 iod2 (PCI2)
Slot   Option Name              Type     Rev    Name
2      PCI-PCI Bridge           11011    0002   pcb0
```

Continued on next page

Example 5–2 Show Config Command (Continued)

```
Bus 2  pcb0 (PCI-PCI Bridge connected to iod2, slot 2)
Slot   Option Name              Type     Rev    Name
0      ISP1020                  10201077 0002   isp0

Bus 0  iod3 (PCI3)
Slot   Option Name              Type     Rev    Name

P00>>>
```

The **show config** command displays a list of devices found on the system bus and I/O buses. This is the configuration at the most recent initialization. The syntax is:

show config

Example 5–3 Show CPU Command

```
P00>>> show cpu

Primary CPU:      00
Active CPUs:      00    01
Configured CPUs:  00    01
SROM Revision:    V2.0  V2.0

P00>>>
```

The **show cpu** command displays the status of all CPUs in the system drawer. The syntax is:

show cpu

Example 5–4 Show Device Command

```
P00>>> show device
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKa500                      RRD45  1645
polling ncr1 (NCR 53C810) slot 3, bus 0 PCI, hose 1   SCSI Bus ID 7
dkb100.1.0.3.1     DKb100                      RZ29B  0007
dkb200.2.0.3.1     DKb200                      RZ29B  0007
dkb400.4.0.3.1     DKb400                      RZ29B  0007
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0    DVA0                         RX23
polling tulip0 (DECchip 21040-AA) slot 2, bus 0 PCI, hose 1
ewa0.0.0.2.1: 08-00-2B-E5-B4-1A

P00>>>
```

The **show device** command displays status for devices and controllers in the system drawer: SCSI and MSCP devices, the internal floppy drive, and the network. The syntax is:

show device [*controller_name*]

controller_name The controller name or abbreviation. When abbreviations or wildcards are used, all controllers that match the type are displayed. If no name is given, the display is a list of all devices and controllers in the system.

An example of a device name is **dka500.5.0.1.1**. Table 5–1 shows the interpretation of this device name.

Table 5–1 Device Naming Convention

	Category	Description			
dk	Driver ID	Two-letter designator of port or class driver			
		dk	SCSI disk	fw	FDDI device
		dr	RAID set device	mk	SCSI tape
		du	DSSI disk	mu	DSSI tape
		dv	Diskette drive	pk	SCSI port
		ew	Ethernet port	pu	DSSI port
a	Storage adapter ID	One-letter designator of storage adapter (a, b, c...).			
500	Device unit number	Unique number (MSCP unit number). SCSI unit numbers are forced to 100 X node ID.			
5	Bus node number	Bus node ID.			
0	Channel number	Used for multi-channel devices.			
1	Logical slot number	Corresponds to PCI slot number, as shown in Table 5–2.			
1	Hose number	0 — PCI 0 1 — PCI 1		2 — PCI 2 3 — PCI 3	

Table 5–2 PCI Slot Numbers

Slot	PCI 0	PCI 1	PCI 2	PCI 3
0	Reserved	Reserved	Reserved	Reserved
1	EISA bridge	Embedded SCSI CD-ROM	Reserved	Reserved
2	PCI device	PCI device	PCI device	PCI device
3	PCI or EISA device	PCI device	PCI device	PCI device
4	PCI or EISA device	PCI device	PCI device	PCI device
5	PCI or EISA device	PCI device	PCI device	PCI device

Example 5–5 Show FRU Command

```
P00>>> show fru
                    Digital Equipment Corporation
                          AlphaServer 4000

Console V3.0-10 OpenVMS PALcode V1.19-2, DIGITAL UNIX PALcode V1.21-14

Module                Part #    Type     Rev    Name      Serial #
System Motherboard    B2001-AA  0        0000   mthrbrd0  AY12345678
Memory  128 MB SYNC   N/A       0        0000   mem0      N/A
CPU (2MB Cache)       B2001-AA  2        0004   cpu0      AY12345678
CPU is disabled       B2001-AA  0        0000   cpu1      AY12345678
Bridge (IOD0/IOD1)    B2001-AA  600      0021   iod0/iod1 AY12345678
PCI Motherboard       B2001-AA  8        0002   saddle0   AY12345678
Bridge (IOD2/IOD3)    B2001-AA  600      0021   iod2/iod3 AY12345678
PCI Motherboard       B2001-AA  0        0000   saddle1   AY12345678

Bus 0  iod0 (PCI0)
Slot   Option Name              Type     Rev    Name
1      PCEB                     4828086  0005   pceb0
2      S3 Trio64/Trio32         88115333 0000   vga0
3      DECchip 21040-AA         21011    0023   tulip0
5      NCR 53C810               11000    0002   ncr1

Bus 1  pceb0 (EISA Bridge connected to iod0, slot 1)
Slot   Option Name              Type     Rev    Name

Bus 0  iod1 (PCI1)
Slot   Option Name              Type     Rev    Name
1      NCR 53C810               11000    0002   ncr0

Bus 0  iod2 (PCI2)
Slot   Option Name              Type     Rev    Name
2      PCI-PCI Bridge           11011    0002   pcb0

Bus 2  pcb0 (PCI-PCI Bridge connected to iod2, slot 2)
Slot   Option Name              Type     Rev    Name
0      ISP1020                  10201077 0002   isp0

Bus 0  iod3 (PCI3)
Slot   Option Name              Type     Rev    Name
P00>>>
```

The **show fru** command displays information for CPU, memory, PCI, and EISA. This information is based on data in the serial control bus EPROM. The syntax is:

show fru

Example 5–6 Show Memory Command

```
P00>>> show memory

Slot     Type       MB     Base
----     ----      ----    --------
 0        EDO       256    0
 1        EDO       128    10000000

Total               384
P00>>>
```

The **show memory** command displays information about each memory pair: slot number (see Figure 1–6 for memory slots), type (synchronous or EDO), size of the memory pair in megabytes, and the starting address of the pair. The syntax is:

show memory

Example 5–7 Show Network Command

```
P00>>> show network
polling tulip0 (DECchip 21040-AA) slot 2, bus 0 PCI, hose 1
ewa0.0.0.2.1: 08-00-2B-E5-B4-1A
P00>>>
```

The **show network** command displays the assigned network device names and other information about network (FDDI and Ethernet) cards. The syntax is:

show network

Example 5–8 Show PAL Command

```
P00>>> show pal
pal  OpenVMS PALcode V1.17-9, DIGITAL UNIX PALcode V1.21-5
P00>>>
```

The **show pal** command displays the versions of DIGITAL UNIX and OpenVMS PALcode. PALcode is the Alpha Privileged Architecture Library code, written to support Alpha processors. It implements architecturally defined processor behavior. The syntax is:

show pal

Example 5–9 Show Power Command

```
P00>>> show power

                    Status
Power Supply 0       good
Power Supply 1       not present
Power Supply 2       good
System Fans          good
CPU Fans             good
Temperature          good

The system was last reset via a system software reset

0 Environmental events are logged in nvram
P00>>>
```

The **show power** command displays status information about the power supplies, system fans, CPU fans, and temperature. This command is useful for displaying the error state of a DIGITAL UNIX or OpenVMS system that shuts down because of a fan, temperature, or power supply failure. If the system can be restarted, use this command. (If it cannot, use the RCM **status** command; see Section 2.10.3.)

The syntax is:

show power

Example 5–10 Show Version Command

```
P00>>> show version
version                 V3.0-10 20-NOV-1996 13:59:28
P00>>>
```

The **show version** command displays the version of the SRM console program that is installed on the system. The syntax is:

show version

5.3 Booting the Operating System

The boot command is used to boot the operating system.

Example 5–11 Boot Command

```
P00>>> boot dkb0
 SROM V2.0 on cpu0
 SROM V2.0 on cpu1
XSROM V3.0 on cpu1
XSROM V3.0 on cpu0
BCache testing complete on cpu1
BCache testing complete on cpu0
mem_pair0 - 128 MB
20..20..21..21..23..
please wait 3 seconds for T24 to complete
24..24..
Memory testing complete on cpu1
Memory testing complete on cpu0
starting console on CPU 0
sizing memory
  0    128 MB SYNC
starting console on CPU 1
probing IOD1 hose 1
  bus 0 slot 1 - NCR 53C810
probing IOD0 hose 0
  bus 0 slot 1 - PCEB
    probing EISA Bridge, bus 1
  bus 0 slot 2 - S3 Trio64/Trio32
  bus 0 slot 3 - DECchip 21040-AA
  bus 0 slot 5 - NCR 53C810
probing IOD3 hose 3
probing IOD2 hose 2
  bus 0 slot 2 - PCI-PCI Bridge
    probing PCI-PCI Bridge, bus 2
      bus 2 slot 0 - ISP1020
configuring I/O adapters...
  ncr0, hose 1, bus 0, slot 1
  floppy0, hose 0, bus 1, slot 0
  tulip0, hose 0, bus 0, slot 3
  ncr1, hose 0, bus 0, slot 5
  isp0, hose 2, bus 2, slot 0
```

Continued on next page

Example 5–11 Boot Command (Continued)

```
System temperature is 23 degrees C
AlphaServer 4000 Console V3.0-10, 19-NOV-1996 13:57:07

CPU 0 booting

(boot dkb0.0.0.2.1 -flags 0)
Building FRU table
.
.
.
setting affinity to the primary CPU
jumping to bootstrap code

    OpenVMS (TM) Alpha Operating System, Version 6.2-1H3
```

The **boot** command initializes the processor, loads a program image from the specified boot device, and transfers control to that image. The syntax is:

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

-file *filename*	The boot file.
-flags [*value*]	Specifies additional information to the loaded image or operating system. In DIGITAL UNIX, specifies boot flags. In OpenVMS, specifies system root number and boot flags. This qualifier overrides the setting of the **boot_osflags** environment variable. See the **boot_osflags** environment variable for a list of settings and their meanings.
-halt	Forces the bootstrap operation to halt and invoke the console program once 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 image by entering the **continue** command.
-protocols *enet_protocol*	Either **mop** (default) or **bootp**. This qualifier overrides the setting of the **ew*0_protocols** environment variable.
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. This qualifier overrides the setting of the **bootdef_dev** environment variable. Use the **bootdef_dev** environment variable to define the default boot device string.

5.4 Configuring the System

5.4.1 Configuring DSSI

The set host command is used for system configuration when a DSSI device is in the system.

Example 5–12 Set Host Command

```
P00>>> show device kfpsa0
   dud0.0.0.3.0               R2YQYA$DIA0             RF72
P00>>> set mode diag
P00>>> config kfpsa*
P00>>> set host -dup dud0
    starting DIRECT on pud0.0.0.3.0 (R2YQYA)

    Copyright (C) 1995  Digital Equipment Corporation
    PRFMON V1.0  D  2-NOV-1995 10:30:58
    DKCOPY V1.0  D  2-NOV-1995 10:30:58
    DRVEXR V2.0  D  2-NOV-1995 10:30:58
    DRVTST V2.0  D  2-NOV-1995 10:30:58
    HISTRY V1.0  D  2-NOV-1995 10:30:58
    DIRECT V1.0  D  2-NOV-1995 10:30:58
    ERASE  V2.0  D  2-NOV-1995 10:30:58
    VERIFY V1.0  D  2-NOV-1995 10:30:58
    DKUTIL V1.0  D  2-NOV-1995 10:30:58
    PARAMS V2.0  D  2-NOV-1995 10:30:58
    Total of 10 programs.
    Task?
P00>>> set host -dup -task params dud0
    starting PARAMS on pud0.0.0.3.0 (R2YQYA)

    Copyright (C) 1995  Digital Equipment Corporation

    PARAMS> show allclass

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

    PARAMS> exit
    Exiting...
P00>>>
```

The **set host** command connects the console program to another DUP server on an MSCP DSSI device. You can use the DUP protocol to examine and modify parameters of a DSSI device. The syntax is:

set host -dup [**-task** *task_name*] *device*

-dup	Connect to an MSCP DUP server. The DUP service may be used to examine and modify parameters of a DSSI device.
-task *task_name*	Specifies the DUP utility to invoke. If **-task** is not specified, a directory of utilities displays.
device	The device to attach to the console program.

5.4.2 Configuring a PCI NVRAM Module

The prcache command is used for system configuration when a PCI NVRAM module is in the system. Used only with DIGITAL UNIX systems.

Example 5–13 Prcache Command

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

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

The **prcache** command is used to check PCI NVRAM configuration information and battery status, to clear data from the NVRAM module, and to set the date of the next battery replacement. This command is used only with DIGITAL UNIX systems. The syntax is:

prcache -{f,z,b}

-f Checks configuration information and battery status.

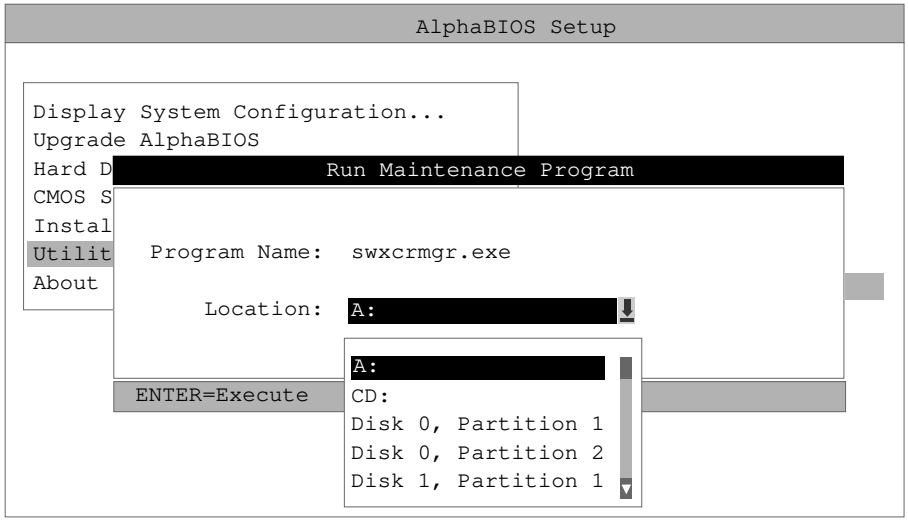
-z Clears valid data; writes zeros to memory.

-b Sets the date (month and year) for battery replacement.

5.4.3 Configuring EISA and RAID

EISA and RAID devices are configured from the AlphaBIOS console.

Figure 5–1 Configuring EISA and RAID Devices



PK-0747-96

Configure EISA and RAID devices from the AlphaBIOS console. Figure 5–1 shows the AlphaBIOS Setup screen, from which you run the configuration utilities. See Chapter 7 for more information about running utility programs.

5.5 Testing the System

The test command runs firmware diagnostics for components of the system drawer. This command is used to test Windows NT systems as well as DIGITAL UNIX and OpenVMS systems.

Example 5–14 Test Command

```
P00>>>test
Console is in diagnostic mode
System test, runtime 1200 seconds

Type ^C if you wish to abort testing once it has started

Configuring adapters..
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKa500                   RRD45  1645
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0    DVA0                      RX23
polling ncr1 (NCR 53C810) slot 5, bus 0 PCI, hose 0   SCSI Bus ID 7
dkb0.0.0.5.0       DKb0                     RZ29B  0014
dkb400.4.0.5.0     DKb400                   RZ29B  0014
polling isp0 (ISP1020) slot 0, bus 2 PCI, hose 2   SCSI Bus ID 7
dkc0.0.0.2000.2    DKc0                     RZ29B  0007
dkc100.1.0.2000.2  DKc100                   RZ29B  0007
dkc200.2.0.2000.2  DKc200                   RZ29B  0007
dkc300.3.0.2000.2  DKc300                   RZ29B  0007
polling tulip0 (DECchip 21040-AA) slot 3, bus 0 PCI, hose 0
ewa0.0.0.3.0       08-00-2B-E5-C3-21

Testing Ethernet device(s)
Testing VGA (alphanumeric mode only)

Starting phase 1 background cache/memory tests, affinity to all CPUs..
Starting phase 1 processor/cache thrasher on CPU1..
Starting phase 1 processor/cache thrasher on CPU0..

Testing SCSI disks
Testing floppy drive (dva0, read-only)

ID        Program  Device      Pass Hard/Soft  Bytes Written  Bytes Read
--------  -------- ----------  ---- ---------  -------------  ----------
0000197b   memtest memory         3    0    0      325058560   325058560
000019be   memtest memory       212    0    0      221222528   221222528
000019ec   memtest memory       142    0    0      147831168   147831168
00001a26  exer_kid dka500.5.0.1   0    0    0              0     1441792
00001a29  exer_kid dkb0.0.0.5.0   0    0    0              0     7061504
00001a2c  exer_kid dkb400.4.0.5   0    0    0              0     7045120
00001a4f  exer_kid dkc0.0.0.200   0    0    0              0     2588672
00001a50  exer_kid dkc100.1.0.2   0    0    0              0     2588672
00001a51  exer_kid dkc200.2.0.2   0    0    0              0     2588672
00001a52  exer_kid dkc300.3.0.2   0    0    0              0     2588672
00001a8f  exer_kid dva0.0.0.100   0    0    0              0           0
```

Continued on next page

Example 5–14 Test Command (Continued)

```
.
.
.
Shutting down phase 1 background cache/memory tests..
Starting phase 2 background cache/memory tests, affinity to all CPUs..

ID        Program  Device      Pass Hard/Soft  Bytes Written  Bytes Read
--------  -------- ----------  ---- ---------  -------------  ----------
000019be   memtest memory      6371    0    0     6678613760  6678613760
000019ec   memtest memory      4893    0    0     5129007616  5129007616
00001a26  exer_kid dka500.5.0.1   0    0    0              0    48037888
00001a29  exer_kid dkb0.0.0.5.0   0    0    0              0   245055488
00001a2c  exer_kid dkb400.4.0.5   0    0    0              0   245039104
00001a4f  exer_kid dkc0.0.0.200   0    0    0              0    91439104
00001a50  exer_kid dkc100.1.0.2   0    0    0              0    91439104
00001a51  exer_kid dkc200.2.0.2   0    0    0              0    91439104
00001a52  exer_kid dkc300.3.0.2   0    0    0              0    91439104
00001a8f  exer_kid dva0.0.0.100   2    0    0              0     6594560
0000298c   memtest memory         1    0    0              0           0
0000298e   memtest memory         1    0    0              0           0
00002991   memtest memory         1    0    0              0           0
000029cd   memtest memory         1    0    0              0           0
000029ec   memtest memory         1    0    0              0           0
.
.
.
Testing aborted. Shutting down tests.
Please wait..
System test complete
^C
P00>>>
```

The **test** command runs console-based exercisers for devices in the system drawer.

Testing can be aborted by Ctrl/C.

*NOTE: If you are running the Microsoft Windows NT operating system, switch from AlphaBIOS to the SRM console in order to enter the **test** command. From the AlphaBIOS console, press in the Halt button (the LED on the button lights) and reset the system, or select **DIGITAL UNIX (SRM)** or **OpenVMS (SRM)** from the **Advanced CMOS Setup** screen and reset the system.*

The syntax is:

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

-t *time* — Specifies the run time in seconds. The default for system test is 1200 seconds (20 minutes).

-q — Disables the display of status messages as exerciser processes are started and stopped during testing. Sets the environment variable **d_verbose** to zero.

option — Either **cpu***n*, **mem***n*, or **pci***n*, where *n* is 0, 1, or *. If nothing is specified, the entire system is tested.

5.6 Stopping and Starting CPUs

The start, halt, and continue commands are used to stop and start a program on the specified CPU.

Example 5–15 Start, Halt, and Continue Commands

```
P00>>> start &p1

P00>>> halt 1

halted CPU 1
CPU 2 is not halted
CPU 3 is not halted

halt code = 1
operator initiated halt
PC = ffffffff8007cc68
P00>>> continue &p1

continuing CPU 1
```

start

The **start** command starts a program that was previously loaded on the processor specified. If none is specified, the program is started on the primary processor. The syntax is:

start [**&p***n*] [*address*]

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

address The starting address of the program.

halt (or stop)

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

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

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

continue

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

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

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

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

address The starting address of the program.

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

*Other commands that alter machine state are **lfu**, **show device**, **show network**, **test**, and **start**.*

5.7 Updating Firmware

The lfu command is used to update firmware from the SRM console prompt.

Example 5–16 Lfu Command

```
P00>>> lfu

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

Select firmware load device (cda0, dva0, ewa0), or
Press <return> to bypass loading and proceed to LFU: cda0

Please enter the name of the options firmware files list, or
Press <return> to use the default filename [AS4X00FW]: AS4X00CP

Copying AS4X00CP from DKA500.5.0.1.1 .
Copying [as4x00]RHREADME from DKA500.5.0.1.1 .
Copying [as4x00]RHSRMROM from DKA500.5.0.1.1 ......................
Copying [as4x00]RHARCROM from DKA500.5.0.1.1 ............

------------------------------------------------------------------------
 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> list

Device         Current Revision    Filename            Update
Revision
AlphaBIOS         V5.12-2          arcrom                 V6.40-1
srmflash          V1.0-9           srmrom                 V2.0-3

UPD> update *
```

Continued on next page

Example 5–16 Lfu Command (Continued)

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

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

                          DO NOT ABORT!
AlphaBIOS       Updating to V6.40-1...  Verifying V6.40-1...  PASSED.

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

                          DO NOT ABORT!
srmflash        Updating to V2.0-3...  Verifying V2.0-3...  PASSED.

UPD> exit
```

The **lfu** command starts the Loadable Firmware Update (LFU) Utility. The syntax is:

lfu

NOTE: If the system has been shut down from a booted program (most commonly, the operating system) or in some other way halted back to the SRM console, the system must be reset before running LFU.

See Chapter 2 for more information about LFU.

5.8 Forcing a System Crash Dump

The crash command forces a crash dump to the selected device on DIGITAL UNIX and OpenVMS systems.

Example 5–17 Crash Command

```
P00>>> crash

CPU 0 restarting

DUMP: 401408 blocks available for dumping.
DUMP: 38535 required for a partial dump.
DUMP: 0x805001 is the primary swap with 401407, start our
last 38534
    : of dump at 362873, going to end (real end is one
more, for header)
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Header to 0x805001 at 401407 (0x61fff)
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Dump to 0x805001: ..................: End 0x805001
DUMP.prom: dev SCSI 1 3 0 4 400 0 0, block 131072
DUMP: Header to 0x805001 at 401407 (0x61fff)
succeeded

halted CPU 0

halt code = 5
HALT instruction executed
PC = fffffc00004e2d64
P00>>>
```

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

crash *[device]*

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

5.9 Using Environment Variables

The set *envar* and show *envar* commands are used to set and view environment variables. The edit command can be used to create a user-defined nonvolatile environment variable.

Example 5–18 Set *envar* and Show *envar* commands

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

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 and set to default values with the **set -default *envar*** command. Their values are viewed with the **show *envar*** command. User-defined nonvolatile environment variables are created with the **edit** command.

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. Environ - ment variables are used to pass configuration information between the console and the operating system. The setting of these variables determines how the system powers up, boots the operating system, and operates. The syntax is:

set [**-default**] *envar value*

-default Restores an environment variable to its default setting.

envar The name of the environment variable to be modified.

value The new value of the environment variable.

Whenever you modify the value of any of the following environment variables, the new value takes effect only after you reset the system by pressing the Reset button or issuing the **initialize** command:

console
kbd_hardware_type
language
ocp_text
os_type

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 wildcard * displays all environment variables.

Example 5–19 Edit Command

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

P00>>>
```

The **edit** command invokes a console editor that behaves much like the line editor for BASIC. Used to add, insert, or delete lines in a RAM file or the "nvram" power-up script or to create a new environment variable.

In Example 5–19 the nvram script is edited so that an environment variable called "mop3_boot" is created and set to 1 on each power-up. By default, MOP boots send four MOP V4 requests before defaulting to MOP V3. This user-created environment variable forces the SRM console to bypass MOP V4 requests. This speeds up MOP booting on networks with MOP V3 software.

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*.

*NOTE: It is possible to disable the system by editing the nvram script. For example, including the command **initialize** in the script will put the system into an endless loop.*

5.10 Depositing and Examining Data

The deposit command stores data in a specified location. The examine command displays the contents of a memory location, a register, or a device.

Example 5–20 Deposit Command

```
P00>>> dep -b -n 1ff pmem:0 0 # Clear first 512 bytes of
                              # physical memory.

P00>>> d -l -n 3 vmem:1234 5  # Deposit 5 into four
                              # longwords starting at
                              # virtual memory address
                              # 1234.

P00>>> d -n 8 r0 ffffffff     # Load GPRs R0 through R8
                              # with -1.

P00>>> d -l -n 10 -s 200 pmem:0 8
                              # Deposit 8 in the first
                              # longword of the first 17
                              # pages in physical memory.

P00>>> d -l pmem:0 0          # Deposit 0 to physical
                              # memory address 0.

P00>>> d + ff                 # Deposit FF to physical
                              # memory address 4.

P00>>> d scbb 820000          # Deposit 820000 to SCBB.
```

Example 5–21 Examine Command

```
P00>>> examine pc             # Examine the program
                              # counter.
PC psr: 0 (    PC)  0000000000001170

P00>>> examine sp             # Examine the stack pointer.
gpr:   F0 (   R30)  0000000000072A60

P00>>> e -n 6 r4              # Examine register R4 and
                              # the next six registers.
```

Continued on next page

Example 5–21 Examine Command (Continued)

```
grp: 20 (    R4) 0000000000005000
grp: 28 (    R5) 000000000FFFE000
grp: 30 (    R6) 00000003F8000C00
grp: 38 (    R7) 0000000053F761AE
grp: 40 (    R8) 0000010000000000
grp: 48 (    R9) 00000003F7800100
grp: 50 (   R10) 00000000000C7FFC

P00>>> examine pmem:400EC     # Examine physical memory.
pmem:  400EC A49D0078A47D0070
```

deposit

The **deposit** command stores data in the location specified. If no options are given with a **deposit** command, the system uses the options from the preceding **deposit** command.

If the specified value is too large to fit in the data size listed, the console ignores the command and issues an error response. If the data is smaller than the data size, the higher order bits are filled with zeros. The syntax is shown below.

examine

The **examine** command displays the contents of a memory location, a register, or a device.

If no options are given with an **examine** command, the system uses the options from the preceding **examine** command. If conflicting address space or data sizes are specified, the console ignores the command and issues an error.

For data lengths longer than a longword, each longword of data should be separated by a space.

The syntax for both commands is:

deposit [-{b,w,l,q,o,h}] [-{n *value*, **s** *value*}**] [**_space_**:]** *address data*

examine [-{b,w,l,q,o,h}] [-{n *value*, **s** *value*}**] [**_space_**:]** *address*

-b	Defines data size as byte.
-w	Defines data size as word.
-l (default)	Defines data size as longword.
-q	Defines data size as quadword.

Continued on next page

-o	Defines data size as octaword.	
-h	Defines data size as hexword.	
-d	Instruction decode (**examine** command only)	
-n *value*	The number of consecutive locations to modify.	
-s *value*	The address increment size. The default is the data size.	
*space***:**	Device name (or address space) of the device to access.	
address	Offset within a device to which data is deposited. Can be:	
	dev_name	A device name.
	fpr- *name*	The floating-point register set; *name* is F0 to F31.
	gpr- *name*	The general register set; *name* is R0 to R31.
	ipr- *name*	The internal processor registers.
	pt- *name*	The PALtemp register set; *name* is PT0 to PT23.
	pmem	Physical memory (default).
	vmem	Virtual memory.
data	Data to be deposited.	

Symbolic forms can be used for the address. They are:

pc The program counter. The address space is set to GPR.

+ The location immediately following the last location referenced in a **deposit** or **examine** command. For physical and virtual memory, the referenced location is the last location plus the size of the reference (1 for byte, 2 for word, 4 for longword). For other address spaces, the address is the last referenced address plus 1.

- The location immediately preceding the last location referenced in a **deposit** or **examine** command. Memory and other address spaces are handled as above.

***** The last location referenced in a **deposit** or **examine** command.

@ The location addressed by the last location referenced in a **deposit** or **examine** command.

5.11 Reading a File

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

Example 5–22 More Command

```
P00>>> more el          #Display the contents of the
                        #SRM console's event log one
                        # screen at a time.

P00>>> help * | more    #Display the contents of online
                        #help one screen at a time.
```

The **more** command is similar to that used in the MS-DOS and UNIX operating systems. It is useful for displaying output that scrolls too quickly to be viewed. For example, when you power up the system, the system startup messages scroll, and the messages are logged to an event log. When the P00>>> prompt displays, you can use the **more** command to display the contents of the event log file. The syntax is:

more [*file*...]

file is the name of the file to be displayed.

5.12 Initializing the System

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

Example 5–23 Initialize Command

```
P00>>> initialize
Initializing…

 SROM V2.0 on cpu0
 SROM V2.0 on cpu1
XSROM V3.0 on cpu1
XSROM V3.0 on cpu0
BCache testing complete on cpu1
BCache testing complete on cpu0
mem_pair0 - 128 MB
20..20..21..21..23..
please wait 3 seconds for T24 to complete
24..24..
Memory testing complete on cpu1
Memory testing complete on cpu0
starting console on CPU 0
sizing memory
  0    128 MB SYNC
starting console on CPU 1
probing IOD1 hose 1
  bus 0 slot 1 - NCR 53C810
probing IOD0 hose 0
  bus 0 slot 1 - PCEB
    probing EISA Bridge, bus 1
  bus 0 slot 2 - S3 Trio64/Trio32
  bus 0 slot 3 - DECchip 21040-AA
  bus 0 slot 5 - NCR 53C810
probing IOD3 hose 3
probing IOD2 hose 2
  bus 0 slot 2 - PCI-PCI Bridge
    probing PCI-PCI Bridge, bus 2
      bus 2 slot 0 - ISP1020
configuring I/O adapters...
  ncr0, hose 1, bus 0, slot 1
  floppy0, hose 0, bus 1, slot 0
  tulip0, hose 0, bus 0, slot 3
  ncr1, hose 0, bus 0, slot 5
  isp0, hose 2, bus 2, slot 0
System temperature is 23 degrees C
AlphaServer 4000 Console V3.0-10, 19-NOV-1996 13:57:07
P00>>>
```

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

initialize

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

- The Halt button on the control panel is pushed in.
- The **auto_action** environment variable is set to **halt**.

If the **auto_action** environment variable is set to **boot** or **restart** and the Halt button is not pushed in, the system autoboots. In all other cases, the system stops in console mode and does not attempt to boot.

5.13 Finding Help

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

Example 5–24 Help (or Man) Command

```
P00>>> help set          # or man set
NAME
      set
FUNCTION
      Set an option or modify the value of an environment
      variable.
SYNOPSIS
      set <option> <value> or <envar> [-] <value>
            where
            <option>={host,mode}
            where
            <envar>={auto_action,bootdef_dev,boot_osflags,...}
            [-default]
```

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.

5.14 Command Summary

The SRM (*Alpha System Reference Manual*) console is a command line interface used when the operating system is either DIGITAL UNIX or OpenVMS. Console commands enable the user to examine and modify the system state.

The commands listed in Table 5–3 are described in the previous sections. Table 5–4 lists command syntax, and Table 5–5 shows special characters.

Table 5–3 Summary of SRM Console Commands

Command	Function
alphabios	Loads and starts the AlphaBIOS console.
boot	Loads and starts the operating system.
clear *envar*	Resets an environment variable to its default value.
continue	Resumes program execution.
crash	Forces a crash dump at the operating system level.
deposit	Writes data to the specified address.
edit	Invokes the console line editor on a RAM file or on the nvram file (power-up script).
examine	Displays the contents of a memory location, register, or device.
halt	Halts the specified processor. (Same as **stop**.)
help	Displays information about the specified console command.
initialize	Resets the system.
lfu	Runs the Loadable Firmware Update Utility.
man	Displays information about the specified console command.
more	Displays a file one screen at a time.
prcache	Utility that initializes and displays status of the PCI NVRAM.

Continued on next page

Table 5–3 Summary of SRM Console Commands (Continued)

Command	Function
set ***envar***	Sets or modifies the value of an environment variable.
set host	Connects to a MSCP DUP server on a DSSI device.
show ***envar***	Displays the state of the specified environment variable.
show config	Displays the configuration at the last system initialization.
show cpu	Displays the state of each processor in the system.
show device	Displays a list of controllers and their devices in the system.
show fru	Displays the serial number and revision level of system bus options.
show memory	Displays memory module information.
show network	Displays the state of network devices in the system.
show pal	Displays the version of the privileged architecture library code (PALcode).
show power	Displays information about the power supplies, system fans, CPU fans, and temperature.
show version	Displays the version of the console program.
start	Starts a program that was previously loaded on the processor specified
stop	Halts the specified processor. (Same as **halt**.)
test	Runs firmware diagnostics for the system.

Table 5–4 Syntax for SRM Console Commands

Parameter	Attribute or Action
Length	Up to 255 characters, not including the terminating carriage return or any characters deleted as the command is entered. A command longer than 80 characters and without the backslash character (see Table 5–5) causes display of an error message.
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. Two exceptions, both of which use hexadecimal notation, are addresses and numbers used in the **deposit** command. The default radix can be overridden by inserting %d before numbers you want to express in decimal, %b before binary, %o before octal, or %x before hexadecimal. Register names (for example, R0) are not considered numbers and use 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. The console program ignores leading and trailing spaces.

Table 5–5 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.
Help	By itself, displays first-level help. When pressed after part of a command, displays options available.
Ctrl/A or F14	Toggles between insert and overstrike modes. The default is overstrike.
Ctrl/B or up-arrow	Recalls previous command or commands. The last 16 commands are stored in the recall buffer.
Ctrl/C or Ctrl/P	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.
Ctrl/D or 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 or Backspace or F12	Moves the cursor to the beginning of the line.
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.
Ctrl/Q	Resumes output to the console terminal that was suspended by Ctrl/S.

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

Character	Function
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.

5.15 Environment Variable Summary

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 and returned to their default values with the clear *envar* command. Their values are viewed with the show *envar* command.

Table 5–6 Environment Variable Summary

Environment Variable	Function
auto_action	Specifies the console's action at power-up, a failure, or a reset.
boot_osflags	Specifies the default operating system boot flags.
bootdef_dev	Specifies the default boot device string.
com*_baud	Changes the default baud rate of the COM 1 or the COM2 serial port.
console	Specifies the device on which power-up output is displayed (serial terminal or graphics monitor).
cpu_enabled	Enables or disables a specific secondary CPU.
ew*0_mode	Specifies the connection type of the default Ethernet controller.
ew*0_protocols	Specifies network protocols for booting over the Ethernet controller.
kbd_hardware_type	Specifies the default console keyboard type.
kzpsa*_host_id	Specifies the default value for the KZPSA host SCSI bus node ID.
language	Specifies the console keyboard layout.

Continued on next page

Table 5–6 Environment Variable Summary (Continued)

Environment Variable	Function
memory_test	Specifies the extent to which memory will be tested. For DIGITAL UNIX systems only.
ocp_text	Overrides the default OCP display text with specified text.
os_type	Specifies the operating system and sets the appropriate console interface.
pci_parity	Disables or enables parity checking on the PCI bus.
pk*0_fast	Enables fast SCSI mode.
pk*0_host_id	Specifies the default value for a controller host bus node ID.
pk*0_soft_term	Enables or disables SCSI terminators on systems that use the QLogic ISP1020 SCSI controller.
tga_sync_green	Specifies the location of the SYNC signal generated by the DIGITAL ZLXp-E PCI graphics accelerator option.
tt_allow_login	Enables or disables login to the SRM console firmware on other console ports.

These environment variables are described in the following pages.

NOTE: These environment variables are specific to the SRM console.

auto_action

Specifies the action the console takes any time the system powers up, fails, or resets. When the setting involves autobooting, the system boots from the default boot device specified by the value of the bootdef_dev environment variable. 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 system boots automatically when it is turned on and halts after a system failure.
restart	The system boots automatically when it is turned on or after it fails.

bootdef_dev

The **bootdef_dev** environment variable specifies one or more devices for booting the operating system. When more than one device is listed, the system searches in the order listed and boots from the first device with operating system software. 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. Enter the command **show bootdef_dev** to display the current default boot device. Enter the command **show device** for a list of all devices in the system.

boot_osflags

The **boot_osflags** environment variable passes information to the **boot** command. That information is dependent on the operating system to be booted.

When the operating system is DIGITAL UNIX, the syntax is:

set boot_osflags *flags_value*

The options for *flags_value* are:

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

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

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

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

When the operating system is OpenVMS, the syntax is:

set boot_osflags *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). See Table 5–7.

Table 5–7 Settings for boot_osflags Bootflags (OpenVMS)

Flags_Value	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to 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.

com*_baud

The default baud rate for the AlphaServer 4000 system is 9600. With the **com*_baud** environment variable, you can set the baud rate to match that of the device connected to the port.

Resetting the baud rate of the COM1 port bypasses the RCM (see Section 2.10). You will be asked to confirm the change, as shown here:

```
P00>>> set com1_baud 19200
Embedded Remote Console only supports 9600 baud. Continue?
(Y/[N]) n
bad value - com1_baud not modified
P00>>>
```

The syntax is:

set com*_baud *baud_value*

baud_value The new baud rate. A list of possible values is displayed by attempting to set this environment variable to an unacceptable value (for example, **set com2_baud xxx**).

console

The console terminal can be either a graphics monitor or a serial terminal. The **console** environment variable specifies which is used. The syntax is:

set console *output_device*

The options for *output_device* are:

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

Whenever you change the value of **console**, you must reset the system by pressing the Reset button or issuing the **initialize** command.

cpu_enabled

Sets a bit mask that enables or disables specific CPUs on a multiprocessor system.

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

NOTE: The primary CPU cannot be disabled.

The syntax is:

set cpu_enabled *hex_digit*

The options for *hex_digit* are 0 – F (hexadecimal).

ew*0_mode

Sets an Ethernet controller to run an AUI, ThinWire, or twisted-pair Ethernet network. The default is **auto-sense**. For the Fast setting, the device defaults to Fast.

The syntax is:

set ew*0_mode *value*

The options for *value* are:

aui	Device type is AUI.
auto-sense	Device type is sensed by the console.
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).

ew*0_protocols

Enables network prococols for booting and other functions. The syntax is:

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 DIGITAL 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.

kbd_hardware_type

Used only on systems with the language variant 3C (Français), this environment variable sets the keyboard hardware type as either PCXAL or LK411 and enables the system to interpret the terminal keyboard layout correctly.

Whenever you change the value of **kbd_hardware_type**, you must reset the system by pressing the Reset button or issuing the **initialize** command.

The syntax is:

set kbd_hardware_type *keyboard_type*

The options for *keyboard_type* are:

pcxal (default)	Selects the default keyboard hardware type.
lk411	Selects the LK411 keyboard layout for use with language variant 3C (Français).

kzpsa*_host_id

See **pk*0_host_id.**

language

Specifies the keyboard layout, which is language dependent. The setting of the **language** environment variable must match the language of the keyboard variant.

Whenever you change the value of **language**, you must reset the system by pressing the Reset button or issuing the **initialize** command.

The syntax is:

set language *language_code*

The options for *language_code* are:

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

memory_test

Determines the extent of memory testing on the next reset. The syntax is:

set memory_test *value*

The options for *value* are:

full (default)	Specifies that the full memory test will be run. Systems using the OpenVMS operating system must run the full memory test.
partial	Specifies that the first 256 MB of memory will be tested.
none	Specifies that memory will not be tested. (However, tests are always run on the first 32 MB.)

ocp_text

Specifies a message to display on the control panel after self-tests and diagnostics have completed.

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

The syntax is:

set ocp_text *message*

The variable *message* can be up to 16 characters and must be enclosed in quotation marks.

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 purchased. Use this command to change the factory default setting.

Whenever you change the value of **os_type**, you must reset the system by pressing the Reset button or issuing the **initialize** command.

The syntax is:

set os_type *os_type*

The options for *os_type* are:

unix	DIGITAL UNIX is the default operating system, and the SRM firmware is started during power-up or reset.
openvms	OpenVMS is the default operating system, and the SRM firmware is started during power-up or reset.
nt	Windows NT is the default operating system. The SRM firmware is started, and it loads and starts the AlphaBIOS firmware during power-up or reset. (If the Halt button is pushed in so that the LED on the button lights, this environment variable is overridden, and the SRM firmware does not load and start the AlphaBIOS console.)

pci_parity

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 aberrant 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; disabling PCI parity checking prevents false parity errors that can cause system problems.

The syntax is:

set pci_parity *value*

The options for *value* are:

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

pk*0_fast

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.

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.

pk*0_host_id

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 theoretically support up to eight devices; however, the eighth device must always 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 place two or more controllers on the same bus.

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

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.

pk*0_soft_term

Enables or disables SCSI terminators. This command applies to systems that use the QLogic ISP1020 SCSI 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.

The syntax is:

set pk*0_soft_term *value*

The options for *value* are:

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

tga_sync_green

Sets the location of the SYNC signal generated by the optional ZLXp-E PCI graphics accelerator (PBXGA). The parameter is a bit mask, where the least significant bit sets the vertical SYNC for the first graphics card found, the second for the second found, and so on.

The default for this environment variable is **ff**. The default must be reset to 00 so the graphics monitor on a system with a ZLXp-E PCI graphics accelerator will synchronize.

The syntax is:

set tga_sync_green *value*

The options for *value* are:

ff (default)	Synchronizes the graphics monitor on systems that do not use a ZLXp-E PCI graphics accelerator.
00	Synchronizes the graphics monitor on systems with a ZLXp-E PCI graphics accelerator.

tt_allow_login

Enables or disables login to the SRM console firmware on alternate console ports. If the environment variable **console** is set to serial, the primary console device is the terminal connected through the COM1 port. The command **set tt_allow_login 1** enables logins through either the COM2 port or a graphics monitor.

The syntax is:

set tt_allow_login *value*

The options for *value* are:

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

Chapter 6

AlphaBIOS Console

AlphaBIOS is the graphical interface that supports the Microsoft Windows NT operating system and some utility programs. This chapter explains how to perform common system management tasks with AlphaBIOS, and it provides a reference for the AlphaBIOS screens.

Sections in this chapter are:

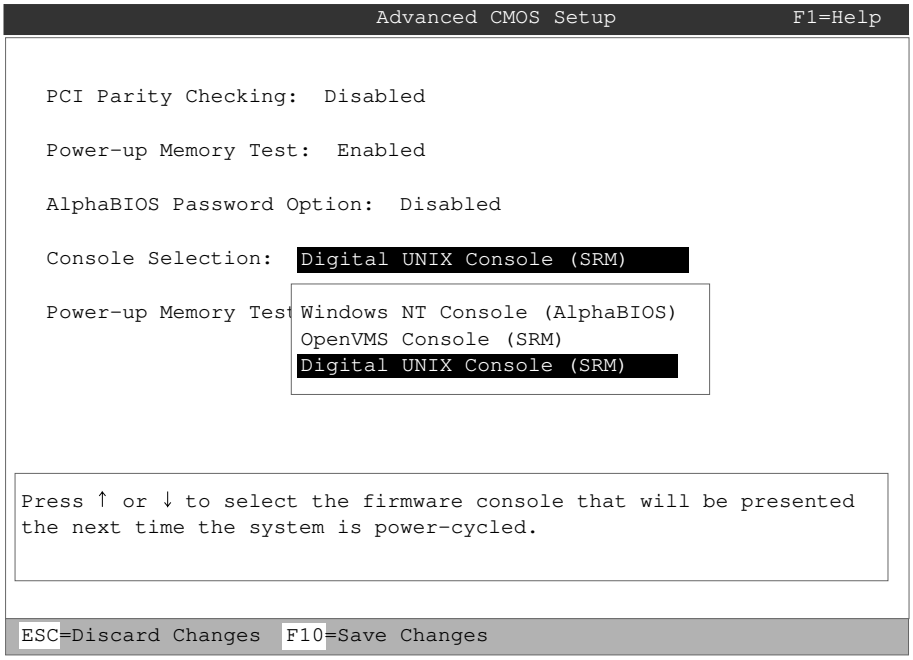
- Switching from AlphaBIOS to SRM Console
- Starting AlphaBIOS
- Keyboard Conventions and Help
- Displaying the System Configuration
- Updating Firmware
- Setting up the Hard Disk
- Performing Setup Tasks
- Installing Windows NT
- Running Utility Programs
- Selecting the Version of Windows NT

*NOTE: To run firmware tests on a Windows NT system, switch to the SRM console and issue the **test** command.*

6.1 Switching from AlphaBIOS to SRM Console

It is necessary to switch to the SRM console to boot DIGITAL UNIX or OpenVMS or to run firmware-based diagnostics. To switch from AlphaBIOS to the SRM console, press the Halt button on the control panel (the LED lights) and reset the system, or select DIGITAL UNIX (SRM) or OpenVMS (SRM) from the Advanced CMOS Setup screen and reset the system.

Figure 6–1 Switching to the SRM Console



PK-0750B-96

DIGITAL UNIX and OpenVMS are booted and firmware-based diagnostics are run from the SRM console. Follow this procedure to switch from AlphaBIOS to SRM:

1. Select **CMOS Setup** and press Enter.
2. In the **CMOS Setup** screen press F6. The **Advanced CMOS Setup** screen displays.
3. Select **DIGITAL UNIX (SRM)** or **OpenVMS (SRM)** and press F10.
4. The **CMOS Setup** screen displays. Press F10 to save the change.
5. Run the EISA Configuration Utility, using the ECU diskette for DIGITAL UNIX and OpenVMS. See Chapter 7.

   NOTE: ECU must be run before booting DIGITAL UNIX or OpenVMS.
6. Reset the system.

Alternatively, you can press the Halt button (the LED on the button lights) and reset the system.

The method you choose depends on how you want the system to function on subsequent resets:

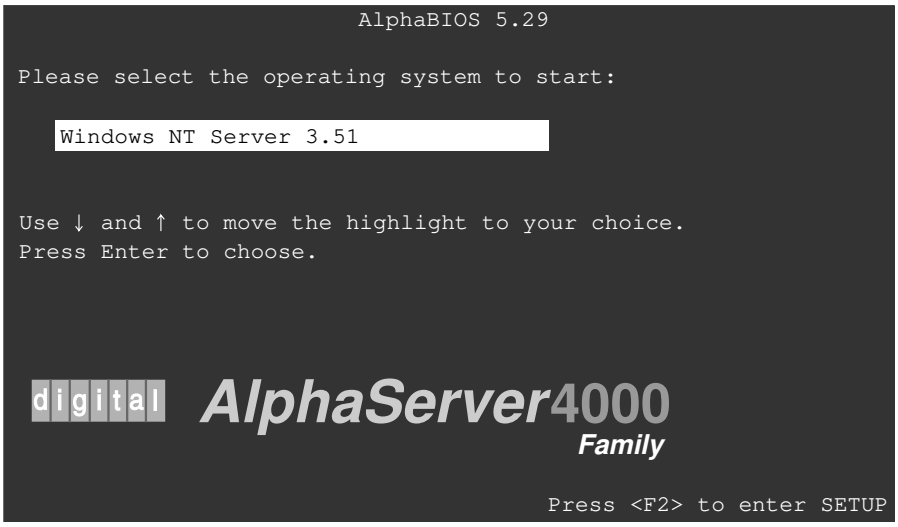
- If you make the selection in the **Advanced CMOS Setup** screen, the system will continue to stop in the SRM console whenever it is powered-up, reset, or initialized until the Windows NT operating system is again specified.
- If you press the Halt button and reset, no system setup information is changed, and AlphaBIOS will start the next time the system is powered-up, reset, or initialized with the Halt button out (the LED is off).

To return to the AlphaBIOS console, issue the command **alphabios** at the SRM console prompt.

6.2 Starting AlphaBIOS

Start AlphaBIOS Setup by pressing F2 from the Boot screen displayed at power-up or reset.

Figure 6–2 Boot Screen

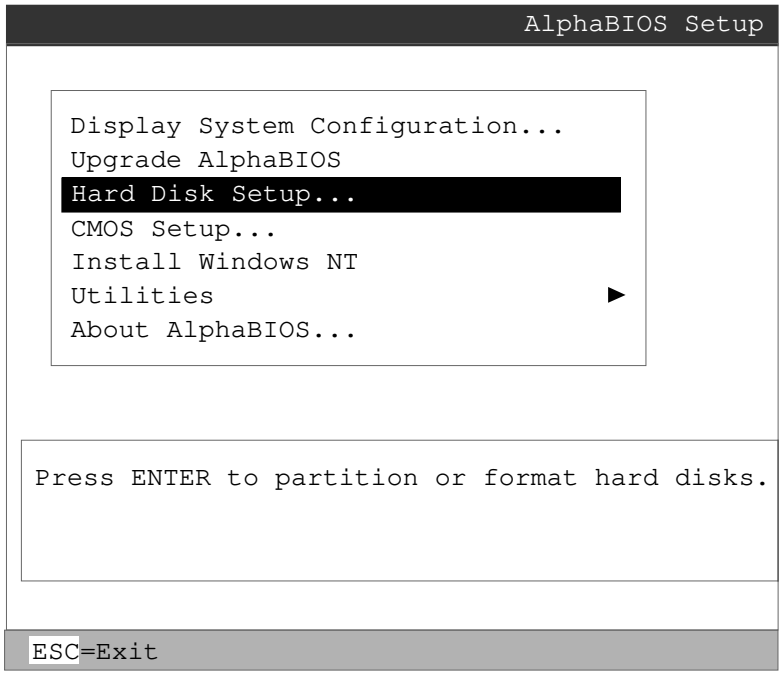


PK-0728B-96

The **Boot** screen shown in Figure 6–2 displays at power-up and reset. Press F2 at this screen to enter the setup program.

The **AlphaBIOS Setup** screen (Figure 6–3) displays. From this screen you can select the tasks to perform. Use the arrow keys to select the menu item you want and press Enter. (Refer to Section 6.3 for information on navigating through the AlphaBIOS screens.)

Figure 6–3 AlphaBIOS Setup Screen

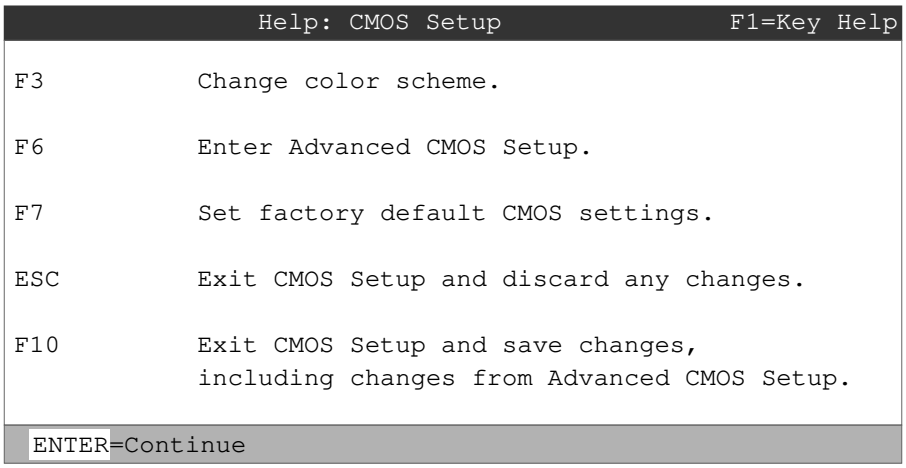


PK-0726-96

6.3 Keyboard Conventions and Help

AlphaBIOS uses universally accepted keys and key combinations for navigating the interface and selecting items.

Figure 6–4 Typical First-Level Help Screen



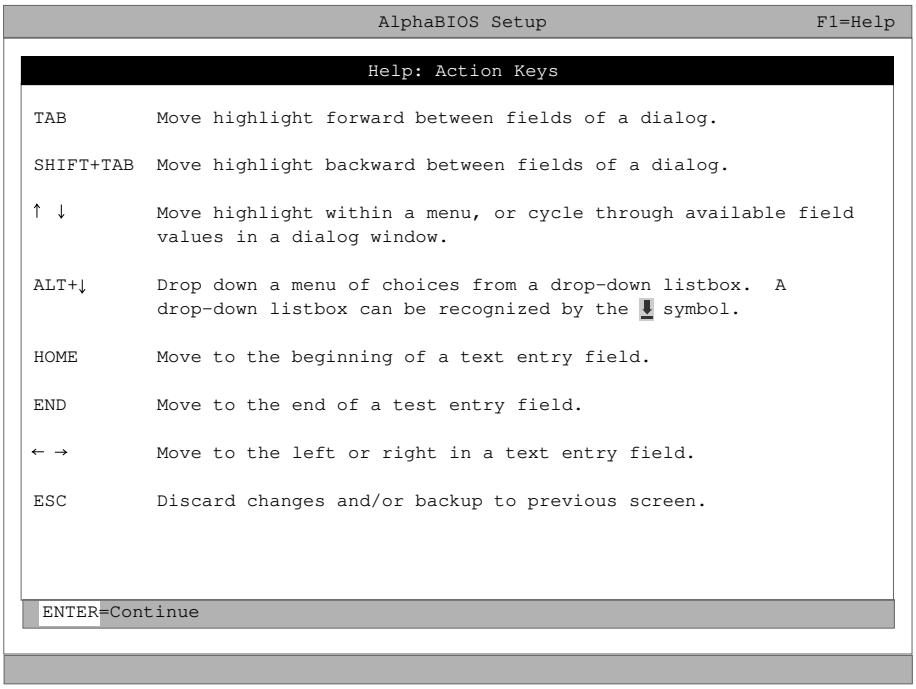
PK-0724-96

AlphaBIOS uses DOS and Windows keyboard conventions for navigating the interface and selecting items. The valid keystrokes are listed in the keyboard help screens.

Two levels of keyboard help are available. The first level, reached by pressing F1 once, shows explanations of the keystrokes available for the specific part of AlphaBIOS currently displayed. An example of the help displayed by pressing F1 once, in this case from the **CMOS Setup** screen, is shown in Figure 6–4.

The second level of keyboard help, reached by pressing F1 from the first help screen, shows explanations of the keystrokes available for navigating the interface throughout AlphaBIOS (see Figure 6–5).

Figure 6–5 Second-Level Help Screen

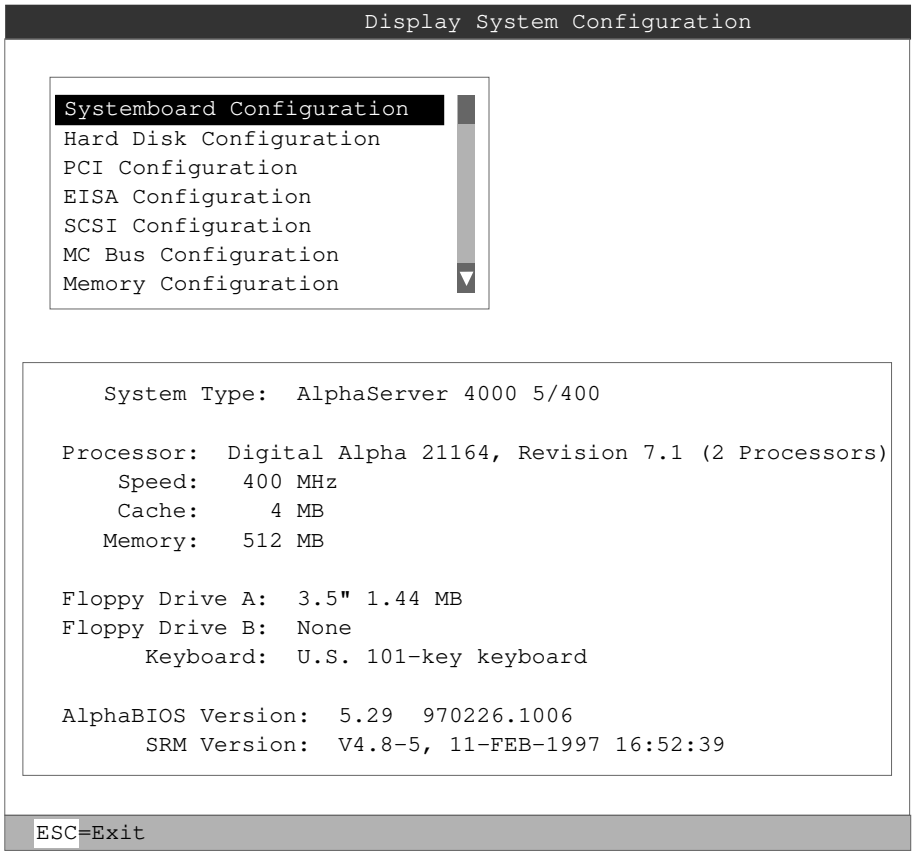


PK-0725-96

6.4 Displaying the System Configuration

The Display System Configuration screen provides information about the system's installed processor, memory, attached devices, and option boards. From the AlphaBIOS Setup screen select Display System Configuration..., then the category for the requisite information.

Figure 6–6 Display System Configuration Screen



PK-0731C-96

Use this procedure to display the system configuration.

1. Start AlphaBIOS, select **Display System Configuration**, and press Enter.
2. In the **Display System Configuration** screen, use the arrow keys to select the configuration category you want to see.

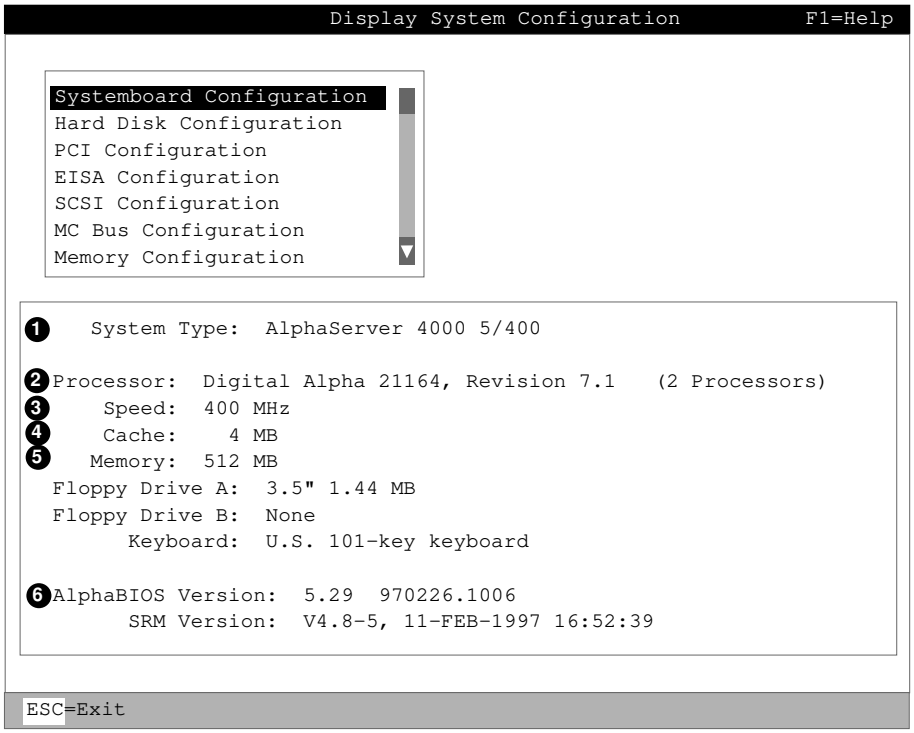
From this screen, you can view configuration information about these system components:

- System motherboard
- Hard disk
- PCI bus
- EISA bus
- SCSI devices
- System bus
- Memory
- Integrated peripherals

The sections that follow explain the display for each component.

6.4.1 System Board Configuration

Figure 6–7 System Board Configuration



PK-0738C-96

❶ System type — The model number of the system.

❷ Processor — The model and revision of the processor chip. Revision level information can be useful in troubleshooting problems with technical support personnel.

❸ Speed — The speed at which the processor runs.

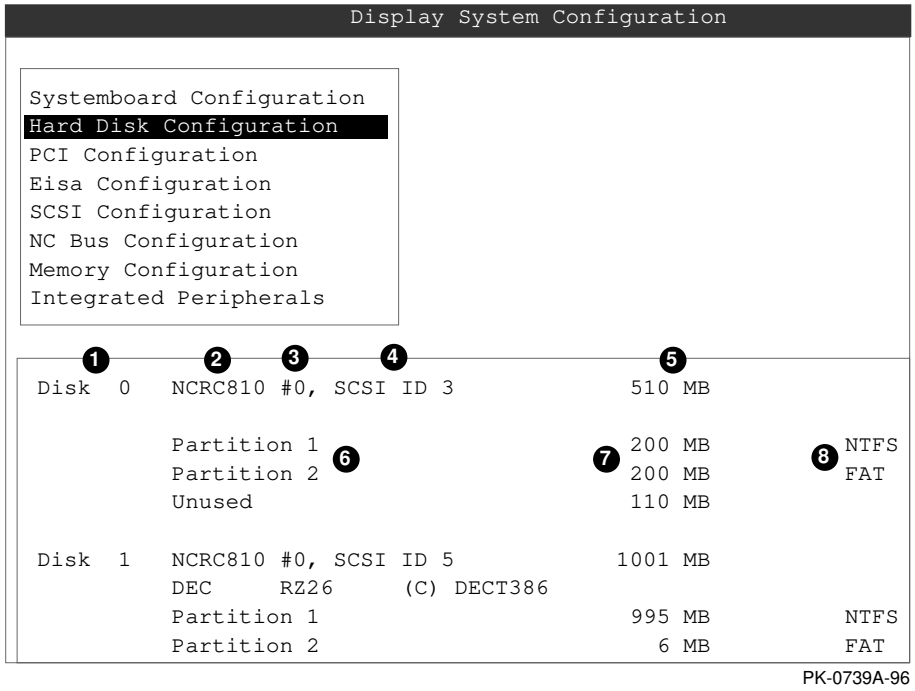
❹ Memory — The amount, in megabytes, of main memory in the system.

❺ Cache — The amount, in kilobytes, of static RAM cache memory installed.

❻ Firmware versions — The versions of AlphaBIOS and SRM currently running on the system.

6.4.2 Hard Disk Configuration

Figure 6–8 Hard Disk Configuration



PK-0739A-96

*NOTE: This screen is for information only; it cannot be edited. To make changes to the hard disk setup, use the **Hard Disk Setup** screen (Section 6.6).*

❶ Physical disk ID — Based on the SCSI ID. The disk with the lowest SCSI ID is disk 0, the disk with the next lowest SCSI ID is disk 1, and so on.

❷ Controller — The brand and model of SCSI chip used on the SCSI controller.

❸ Controller number — Based on how many SCSI controllers of a particular type are installed in the system. The first controller of a type is always numbered 0.

❹ SCSI ID number — A unique number you assign to each SCSI device installed in the system. This is usually done with jumpers or a thumb wheel attached to the drive housing.

❺ Size — The raw capacity of the drive. Formatting the drive with different file systems (for example, FAT and NTFS) may result in different usable sizes because of the differences in how storage is managed under those file systems.

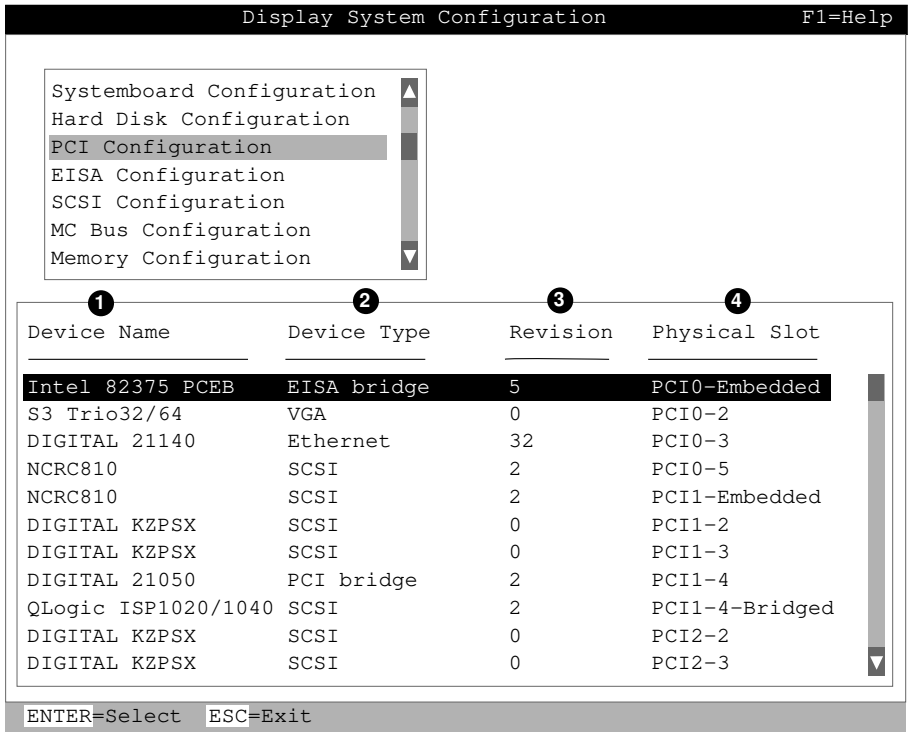
❻ Partition number — Within a single drive, partition numbers are assigned in sequential order: 1, 2, 3, and so on. The partitions populate the drive from the innermost cylinders to the outermost cylinders. If you have a large hard disk (over 800 MB) and plan to use the FAT file system, it is a good idea to break the disk into several smaller partitions because the FAT file system uses disk space more efficiently at smaller partition sizes. This is not a concern for the NTFS file system, however, as it uses disk space very efficiently at all partition sizes.

❼ Partition size — The raw (unformatted) storage capacity of the partition. Actual storage space will differ based on the file system with which the partition is formatted.

❽ Partition format — The file system (if any) used on a partition. This field displays FAT, NTFS, or unknown (if the partition is unformatted).

6.4.3 PCI Configuration

Figure 6–9 PCI Configuration



PK-0740C-97

❶ Device name — The name and model of the device as recorded in the device's firmware.

❷ Device type — Lists the function of the device in the system.

❸ Revision — The revision level of the device signifies the number of times it has been updated by the manufacturer.

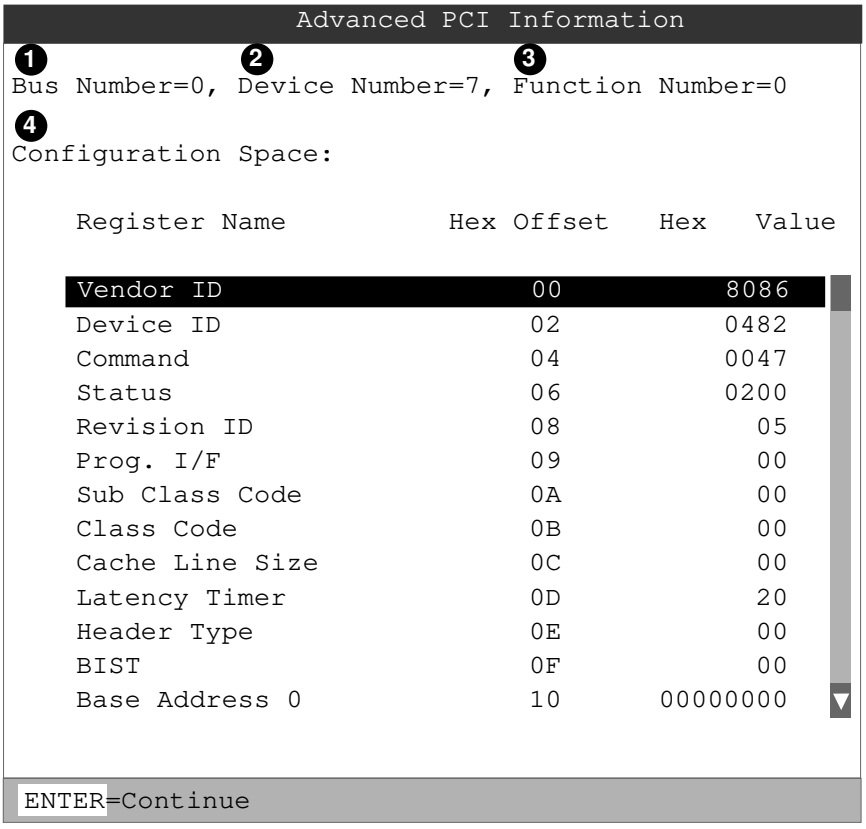
❹ Physical slot — Lists the actual PCI slot number to which the device is attached.

You can find additional detail about any of the PCI devices listed in the **Advanced PCI Information** screen. Follow this procedure to view this screen:

1. Press Enter to enable selection in the device list.
2. Use the arrow keys to select the device for which you want additional detail.
3. Press Enter, and the detail is displayed.
4. Press Escape to return to the table of PCI devices.

The **Advanced PCI Information** screen is shown in Figure 6–10 on the next page.

Figure 6–10 Advanced PCI Information



PK-0741A-96

❶ Bus number — The virtual PCI bus number.

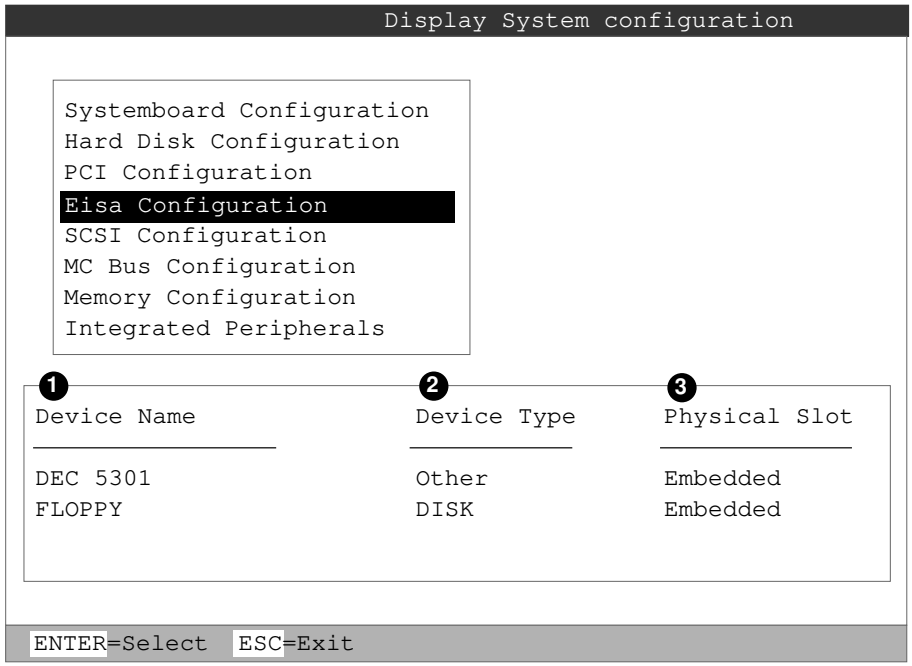
❷ Device number — The PCI bus device number.

❸ Function number — Represents the number assigned to a particular function on a multifunction device. For example, a combination Ethernet/SCSI controller would be listed twice, with the first function listed as 0 and the other as 1.

❹ Configuration header space— Displays the information in the selected device's PCI configuration space.

6.4.4 EISA Configuration

Figure 6–11 EISA Configuration



PK-0742A-96

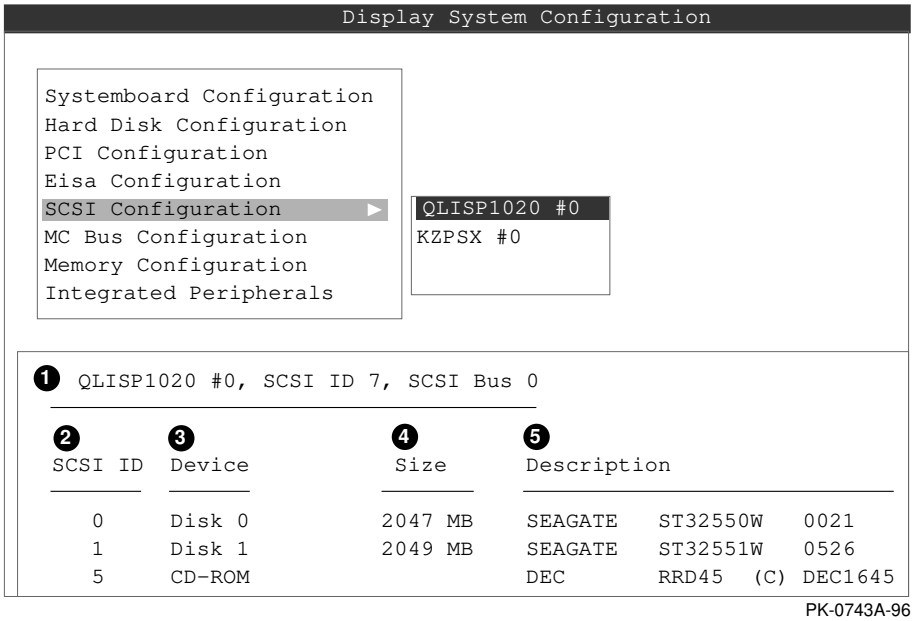
❶ Device name — Includes a three-character manufacturer code, followed by a three-digit board type, followed by a one-digit revision number.

❷ Device type — Identifies the board type (for example, network).

❸ Physical slot — Lists the actual EISA slot number to which the device is attached. The embedded EISA system controller is always first on this list.

6.4.5 SCSI Configuration

Figure 6–12 SCSI Configuration



PK-0743A-96

❶ SCSI controller information — Describes the physical characteristics of the selected SCSI controller. This line includes:

Controller — Brand and model of SCSI chip used on the SCSI controller.

Controller number — Based on the number of SCSI controllers of a particular type in the system. The first controller of a type is always numbered 0.

SCSI ID number — A unique number assigned to the SCSI controller. The standard controller numbering scheme is for controllers to be SCSI ID 7.

SCSI bus number — Indicates if the controller is first or second in the system. The first controller is tied to SCSI bus 0, and the second to SCSI bus 1.

❷ SCSI ID — A unique number you assign to each SCSI device in the system. This is usually done with jumpers or a thumb wheel attached to the drive housing.

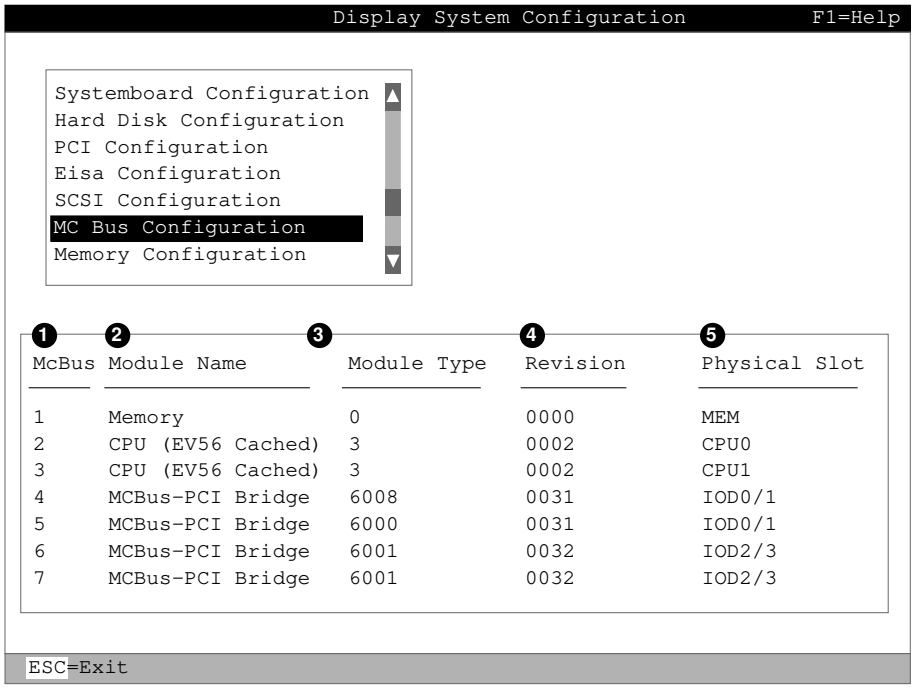
❸ Device type — Displays whether the device is a hard disk, CD-ROM, scanner, or other type of device.

❹ Size — The raw capacity of the drive. Formatting the drive with different file systems (for example, FAT and NTFS) may result in different usable sizes because of differences in the way those file systems manage storage. This is left blank if it is not applicable to a device (for example, a scanner).

❺ Description — The name and model of the device as recorded in the device's firmware.

6.4.6 System Bus Configuration

Figure 6–13 System Bus Configuration



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❶ MC bus number — Identifies the location of a component on the system bus.

❷ Module name — The DIGITAL internal identifier for a system component.

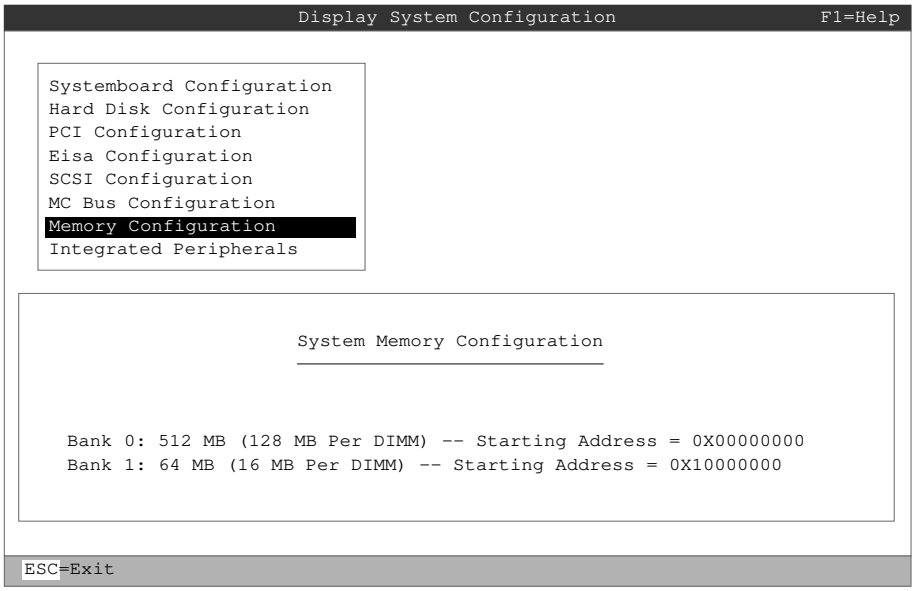
❸ Module type — Identifies the function of the system component.

❹ Revision — A DIGITAL internal number representing the manufacturin g revision level of the system component.

❺ Physical slot — Represents the actual location of the system component on the bus. Refer to Chapter 1 for more information about the system bus and module placement.

6.4.7 Memory Configuration

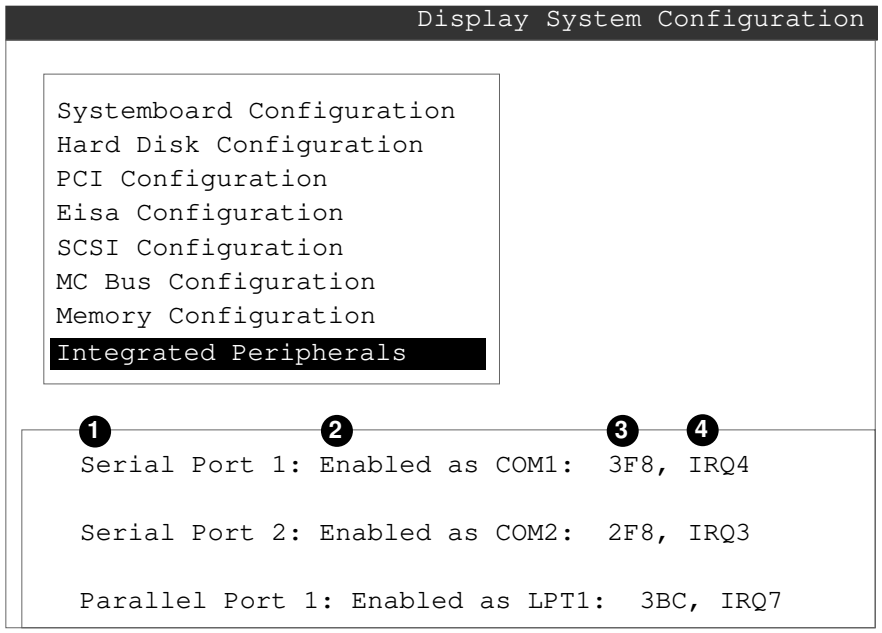
Figure 6–14 Memory Configuration



PK-0745-96

6.4.8 Integrated Peripherals

Figure 6–15 Integrated Peripherals



PK-0746A-96

❶ Device type — The physical device as it exists on the system board

❷ MS DOS name — Shows if the device is enabled, and if it is enabled, the addressable MS-DOS name for the device.

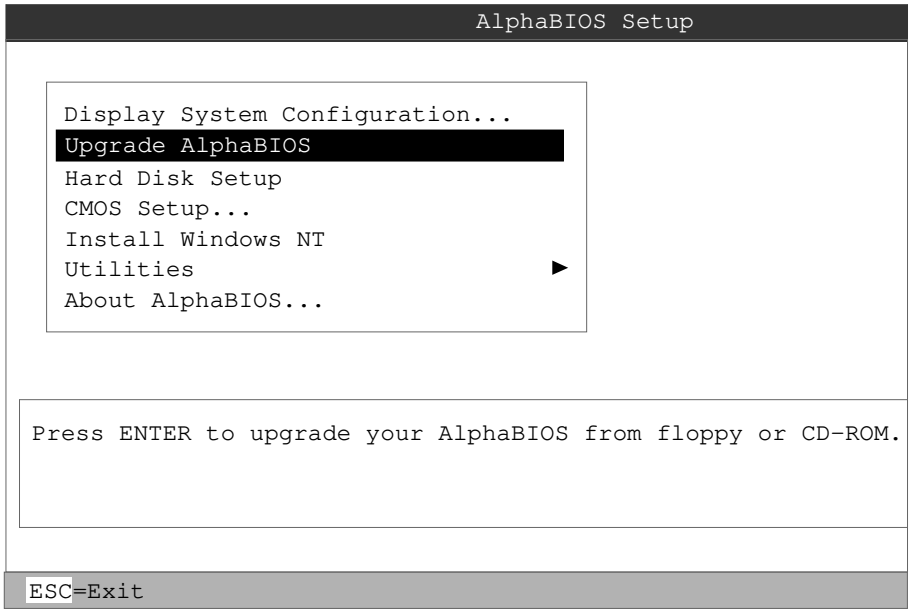
❸ Port address — The physical memory location from and to which data travels as it is received into the device, and sent from the device, respectively.

❹ Interrupt — The interrupt request line (IRQ) used by the device to get the CPU's attention.

6.5 Updating Firmware

Insert the CD-ROM or diskette with the updated firmware and select Upgrade AlphaBIOS from the main AlphaBIOS Setup screen. Use the Loadable Firmware Update (LFU) utility to perform the update. The LFU exit command causes a system reset.

Figure 6–16 Updating Firmware



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As new versions of Windows NT are released, it might be necessary to upgrade AlphaBIOS to the latest version. Additionally, as improvements are made to AlphaBIOS, it might be desirable to upgrade to take advantage of new AlphaBIOS features.

Use this procedure to upgrade from an earlier version of AlphaBIOS:

1. Insert the diskette or CD-ROM containing the AlphaBIOS upgrade.
2. If you are not already running **AlphaBIOS Setup**, start it by restarting your system and pressing F2 when the **Boot** screen is displayed.
3. In the main **AlphaBIOS Setup** screen, select **Upgrade AlphaBIOS** and press Enter.

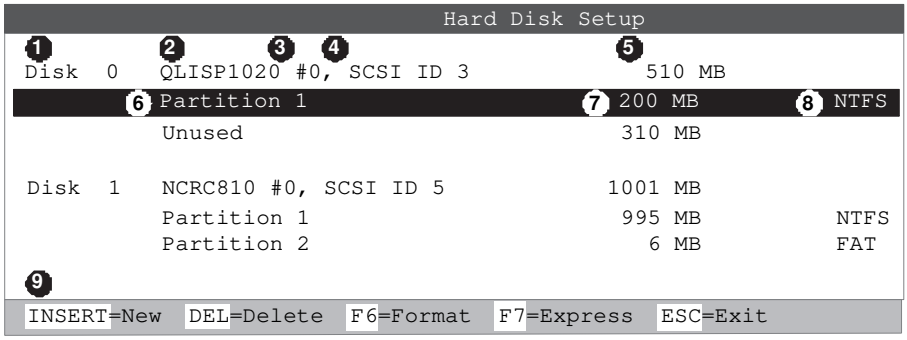
   The system is reset and the Loadable Firmware Update (LFU) utility is started. See Section 2.9.5 for LFU commands.
4. When the upgrade is complete, issue the LFU **exit** command. The system is reset and you are returned to AlphaBIOS.

   If you press the Reset button instead of issuing the LFU **exit** command, the system is reset and you are returned to LFU.

6.6 Setting up the Hard Disk

You can perform either an express or a custom hard disk setup. An express setup, described in this section, creates the recommended partition arrangement on the first hard disk, but it does not map bad sectors. Custom hard disk setup is described in Sections 6.6.1 and 6.6.2.

Figure 6–17 Hard Disk Setup Screen



PK-0732A-96

CAUTION: Hard disk changes are immediate; the changes are made as soon as they are entered. Unintended data loss could occur, so it is important to use care when changing your hard disk arrangement.

❶ Physical disk ID — Based on the SCSI ID. The disk with the lowest SCSI ID is disk 0, the disk with the next lowest SCSI ID is disk 1, and so on.

❷ Controller — Brand and model of SCSI chip used on the SCSI controller.

❸ Controller number — Based on how many SCSI controllers of a particular type are installed in the system. The first controller of a type is always numbered 0.

❹ SCSI ID number — A unique number you assign to each SCSI device in the system. This is usually done with jumpers or a thumb wheel attached to the drive housing.

❺ Size — The raw capacity of the drive. Formatting the drive with different file systems (for example, FAT and NTFS) may result in different usable sizes because of the differences in how storage is managed under those file systems.

❻ Partition number — Within a single drive, partition numbers are assigned in sequential order: 1, 2, 3, and so on. The partitions populate the drive from the innermost cylinders to the outermost. If you have a large hard disk (over 800 MB) and plan to use the FAT file system, it is a good idea to break the disk into several smaller partitions because the FAT file system uses disk space more efficiently at smaller partition sizes. This is not a concern for the NTFS file system, since it uses disk space very efficiently at all partition sizes.

❼ Partition size — The raw (unformatted) storage capacity of the partition. Actual storage space will differ based on the file system with which the partition is formatted.

❽ Partition format — The file system (if any) used on a partition. This field displays FAT, NTFS, or unknown (if the partition is unformatted).

❾ Disk setup options

Insert partition (Insert key) — Use this option to create new partitions. Before creating a new partition, be sure to select an unpartitioned space. Pressing the Insert key while an already partitioned space is selected causes an informational error to be displayed.

Delete partition (Delete key) — Use this option to delete existing partitions. Before deleting a partition, be sure any data you want to save on the partition has been backed up. Deleting a partition deletes all data on that partition but leaves the rest of the disk unaffected. Pressing the Delete key while an unpartitioned space is selected displays an informational error.

Format partition (F6 key) — Format a partitioned space with the FAT file system.

Express setup (F7 key) — Create the default recommended partition arrangement for Windows NT.

Exit (Escape key) — Return to the **AlphaBIOS Setup** screen.

An express hard disk setup creates the recommended partition arrangement on the first hard disk (disk 0). It does not, however, format the large partition with NTFS, and it does not map bad sectors on the disk. The NTFS formatting can be done during Windows NT installation.

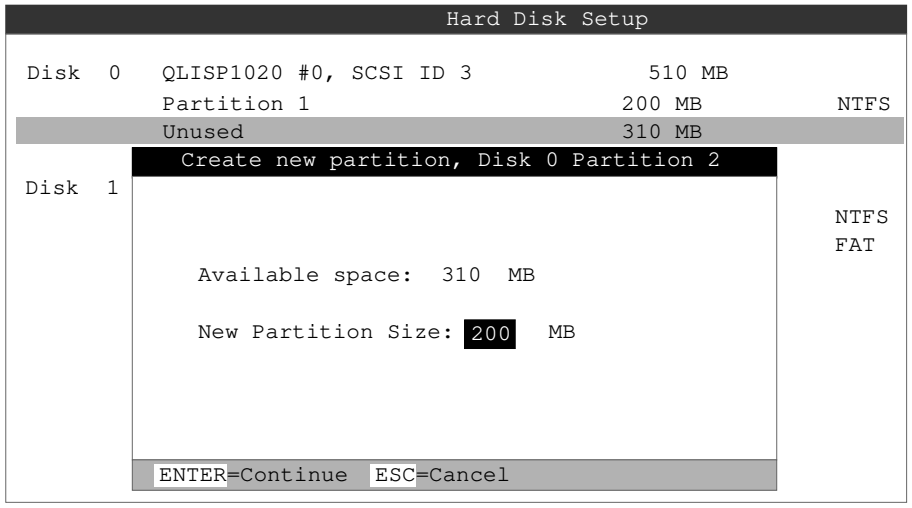
To perform an express hard disk setup

1. If you have any needed information on your disk, back it up before proceeding.
2. Start **AlphaBIOS Setup**, select **Hard Disk Setup**, and press Enter.
3. Press F7 to enter **Express Setup**.
4. Press F10 to continue with the setup.

6.6.1 Manually Creating and Deleting Partitions

Use the Create Partition and Delete Partition options if you need to create a custom hard disk partition arrangement or otherwise manually manage your hard disk partitions.

Figure 6–18 Create New Partition Dialog Box



PK-0733-96

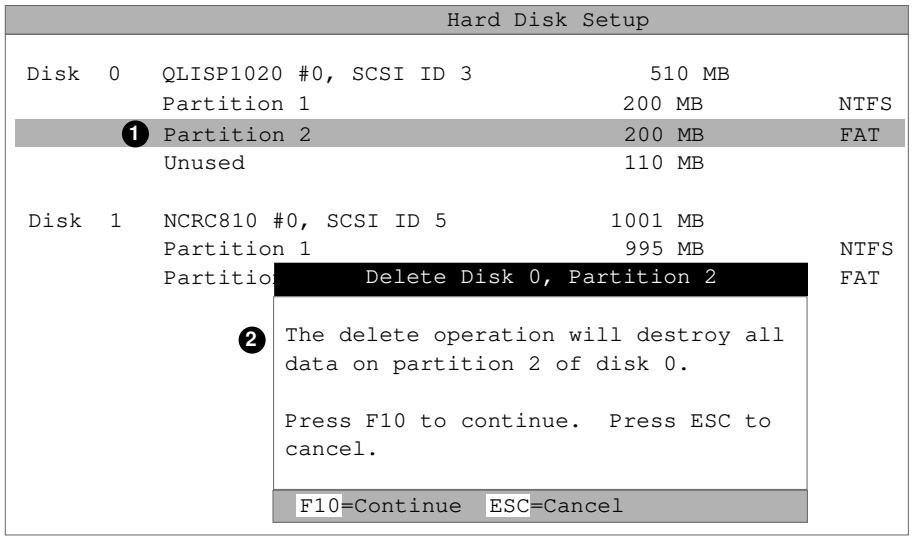
To create a partition

1. Start AlphaBIOS and select **Hard Disk Setup**. Press Enter.
2. Select the disk on which to create the partition.
3. If one or more partitions already exist on the disk, select the unpartitioned space.
4. Press Insert. A dialog box displays, similar to Figure 6–18.
5. Type the size of the partition to create and press Enter.

To delete a partition

1. Start AlphaBIOS and select **Hard Disk Setup**. Press Enter.
2. Select the partition to be deleted (see ❶ in Figure 6–19).
3. Press Delete. A dialog box displays (see ❷).
4. Press F10 to confirm the deletion.

Figure 6–19 Delete Partition Dialog Box

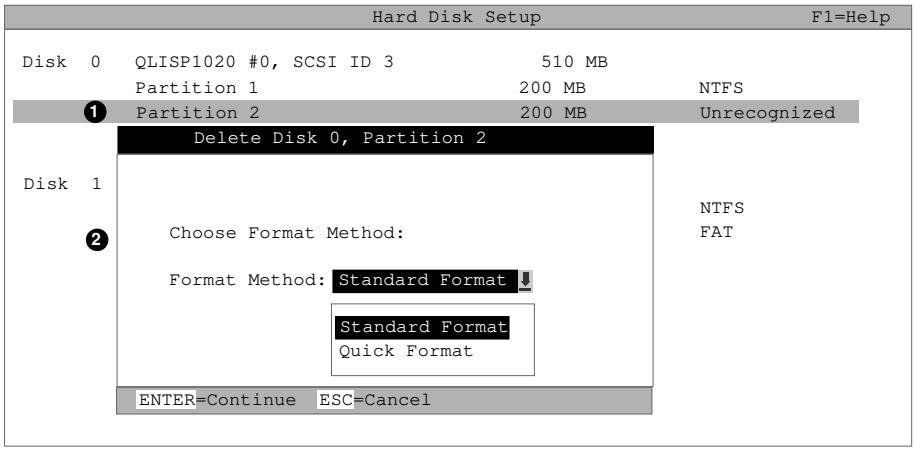


PK-0734A-96

6.6.2 Formatting a FAT Partition

AlphaBIOS can format partitions with the FAT file system. Use Windows NT to format a partition using NTFS.

Figure 6–20 Formatting a FAT Partition

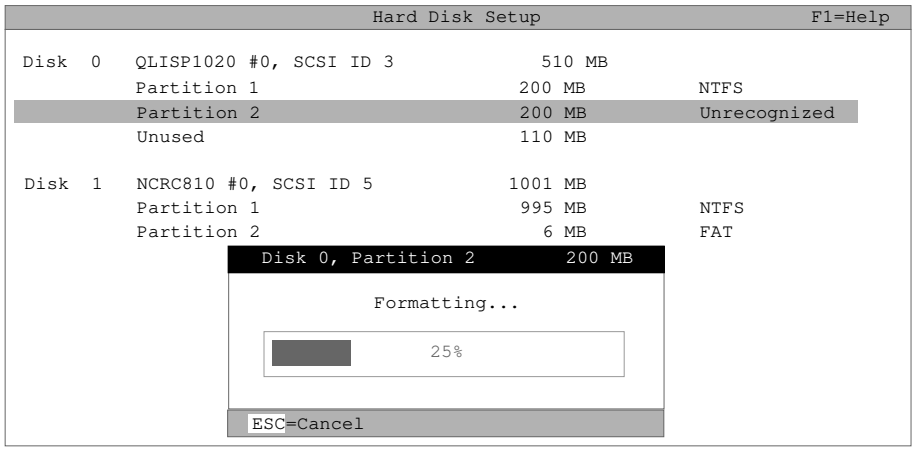


PK-0735A-96

To format a FAT partition

1. Start AlphaBIOS and select **Hard Disk Setup**. Press Enter.
2. Select the partition to be formatted (see ❶ in Figure 6–20).
3. Press F6. A dialog box displays, asking whether to perform a quick or standard format (see ❷). If you select **Quick Format**, the formatting is completed immediately, but no bad sectors are mapped. If you select **Standard Format**, a dialog box similar to that in Figure 6–21 displays while the drive is formatted, showing the progress of the formatting. Standard formatting maps bad sectors.
4. Select a format method, and press Enter.

Figure 6–21 Standard Formatting

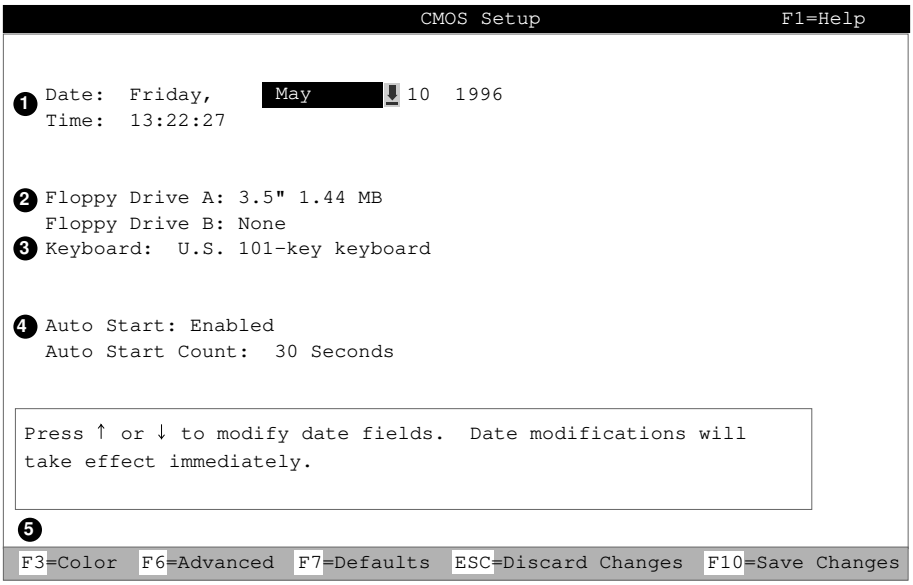


PK-0736-96

6.7 Performing Setup Tasks

CMOS Setup is used to configure several system parameters. CMOS Setup has two modes: Standard CMOS Setup is used to configure basic system parameters; Advanced CMOS Setup is used for system-specific parameters and password protection.

Figure 6–22 Standard CMOS Setup Screen



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To enter Standard CMOS Setup

- Start AlphaBIOS, select **CMOS Setup**, and press Enter.

❶ Date and time — When setting the time, use the 24-hour format. (For example, 10:00 p.m. is 22:00:00.)

❷ Floppy drive — The only drive type supported is 3.5 inch, 1.44 MB.

❸ Keyboard — The keyboard setting makes it possible to use most language keyboards. To ensure correct character mappings, the language of your keyboard, Windows NT, and the keyboard language selection in **CMOS Setup** should all match.

❹ Auto start and auto start count — The **Auto Start** setting determines whether the primary operating system is automatically started after the system is reset or power-cycled. The Auto Start Count setting is the amount of time the **Boot** screen is displayed before the default system is automatically started. This delay gives you the opportunity, after resetting or power-cycling the system, to select another version of Windows NT to start or to enter **AlphaBIOS Setup**.

❺ **Standard CMOS Setup** options

Color (F3 key) — Repeatedly cycles through the available AlphaBIOS color schemes.

Advanced (F6 key) — Displays the **Advanced CMOS Setup** screen.

Defaults (F7 key) — Restores the default **Standard CMOS Setup** values without affecting the **Advanced CMOS Setup** values.

Discard changes (Escape key) — Restores the settings in effect when you started **CMOS Setup**. This option also discards changes made in **Advanced CMOS Setup**.

Save changes (F10) — Saves changes made in both the standard and advanced modes of **CMOS Setup**.

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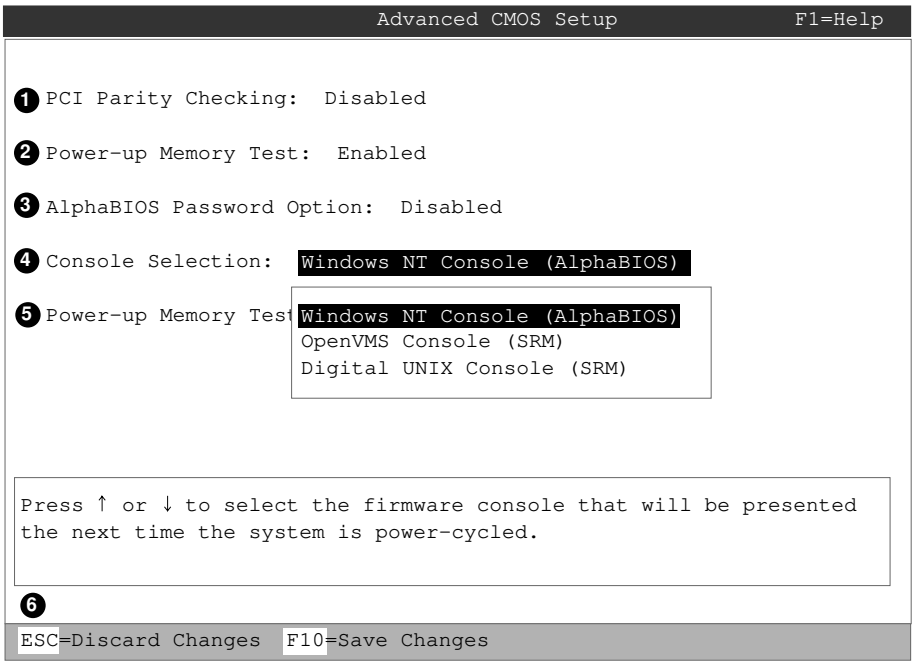
Figure 6–23 Advanced CMOS Setup Screen



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To enter Advanced CMOS Setup

1. Start AlphaBIOS, select **CMOS Setup**, and press Enter.
2. In the **Standard CMOS Setup** screen, press F6.

❶ PCI parity checking — Enables and disables settings for PCI parity checking, which ensures data integrity across the PCI bus. Because some third-party PCI options do not correctly implement PCI parity generation, the default is Disabled.

❷ Power-up memory test — Enables and disables settings for the power-up memory test.

❸ Password setup — Enables and disables settings for password setup.

Password protection provides two levels of security for your system: setup, which requires a password to start **AlphaBIOS Setup**, and startup, which requires a password before the system initializes. Startup protection provides more comprehensive protection than setup protection because the system cannot be used at all until the correct password is entered.

❹ Console selection — Switches from AlphaBIOS to SRM firmware. If you select OpenVMS (SRM) or DIGITAL UNIX (SRM), the next time you reset your system, the SRM firmware will be loaded instead of AlphaBIOS. This menu selection changes the setting of the **os_type** environment variable in the SRM console.

❺ Memory test length — Selects the length of memory testing that will be done the next time the system is power-cycled.

❻ **Advanced CMOS Setup** options

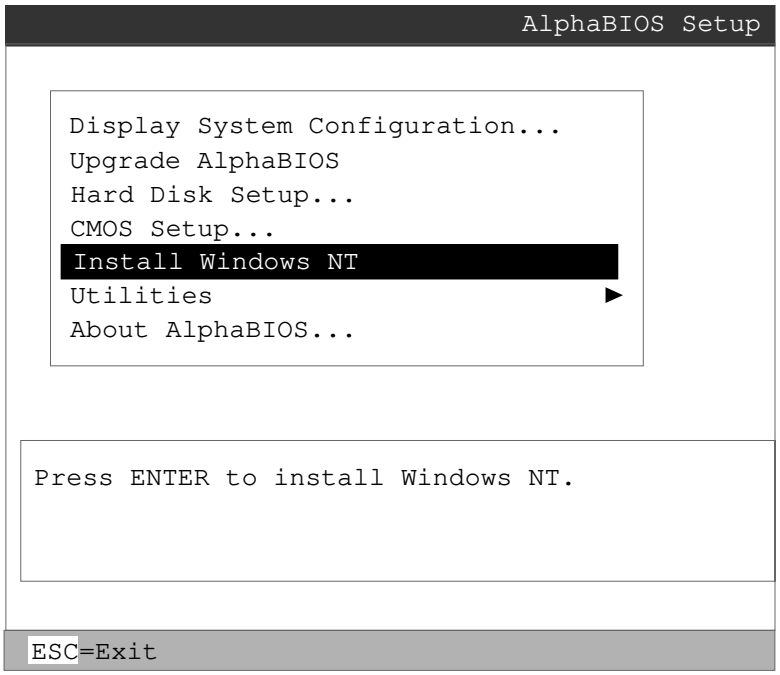
Discard changes (Escape key) —Restores those settings in effect when you started **Advanced CMOS Setup**. This does not discard changes made to **Standard CMOS Setup**.

Save Changes (F10 key) — Saves changes made in **Advanced CMOS Setup**. Note that, when exiting **CMOS Setup**, you must also save your changes at the **Standard CMOS Setup** screen for the changes to be stored permanently.

6.8 Installing Windows NT

Install Windows NT from CD-ROM. Up to four versions of the operating system can be resident in the system at one time.

Figure 6–24 Installing Windows NT



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If Windows NT was installed at the factory, Windows NT setup will start automatically the first time the system powers up. If it was not installed, or if you are installing another version, you must have a CD-ROM drive attached to your system.

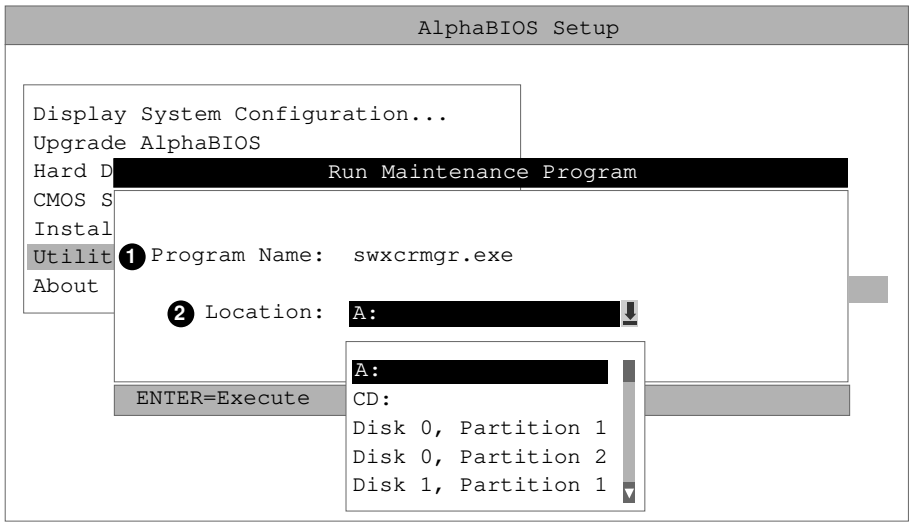
NOTE: Steps 1 and 2 in the following procedure are necessary only when you are first setting up your system. On subsequent installations and upgrades, begin at step 3.

1. Use **CMOS Setup** to set the system date and time: start **AlphaBIOS Setup**, select **CMOS Setup**, and press Enter.
2. Perform an express hard disk setup: return to the main **AlphaBIOS Setup** screen, select **Hard Disk Setup**, and press Enter.
3. Put the Windows NT CD into the CD-ROM drive.
4. Start **AlphaBIOS Setup**, select **Install Windows NT**, and press Enter.
5. Follow the prompts to complete the installation. For more information on installing Windows NT, refer to the *Installation Guide* in your Windows NT software package.

6.9 Running Utility Programs

Maintenance programs such as RAID and EISA configuration utilities are run from the AlphaBIOS Utility menu.

Figure 6–25 Run Maintenance Program Dialog Box



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❶ Program name — The program to be run. It must be an executable program with an .EXE filename extension. However, when entering the program name, it is not necessary to type the extension.

Programs run from AlphaBIOS must be written as ARC compatible images.

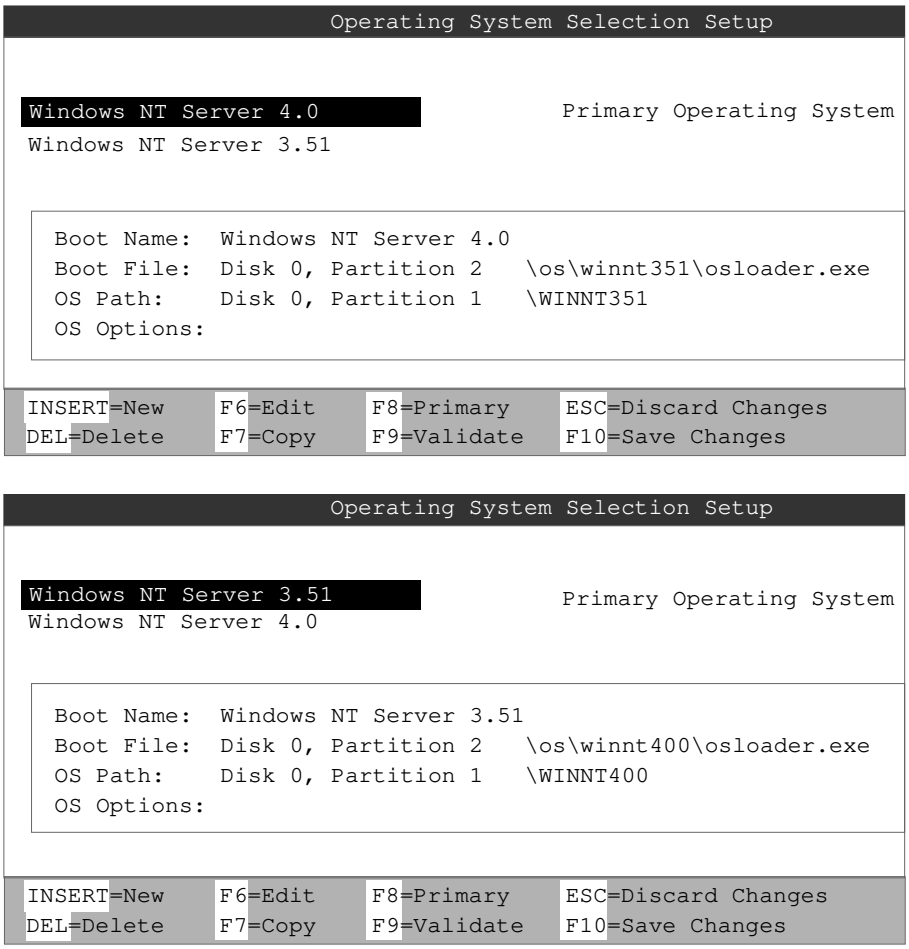
❷ Location — The location from which the program in the Program Name field will be run if no path is entered along with the program name. To display a list of all available disks and partitions, press the Alt and down arrow keys at the same time. Once the list is displayed, use the plus arrow keys to cycle through the selections.

See Chapter 7 for directions for running utilities.

6.10 Selecting the Version of Windows NT

Up to four versions of Windows NT can be resident on the system at one time. It is necessary to select the version that will be started.

Figure 6–26 Operating System Selections



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NOTE: The term "operating system selection," as it is used in this context, refers to a version of Windows NT. It does not pertain to the DIGITAL UNIX and OpenVMS operating systems.

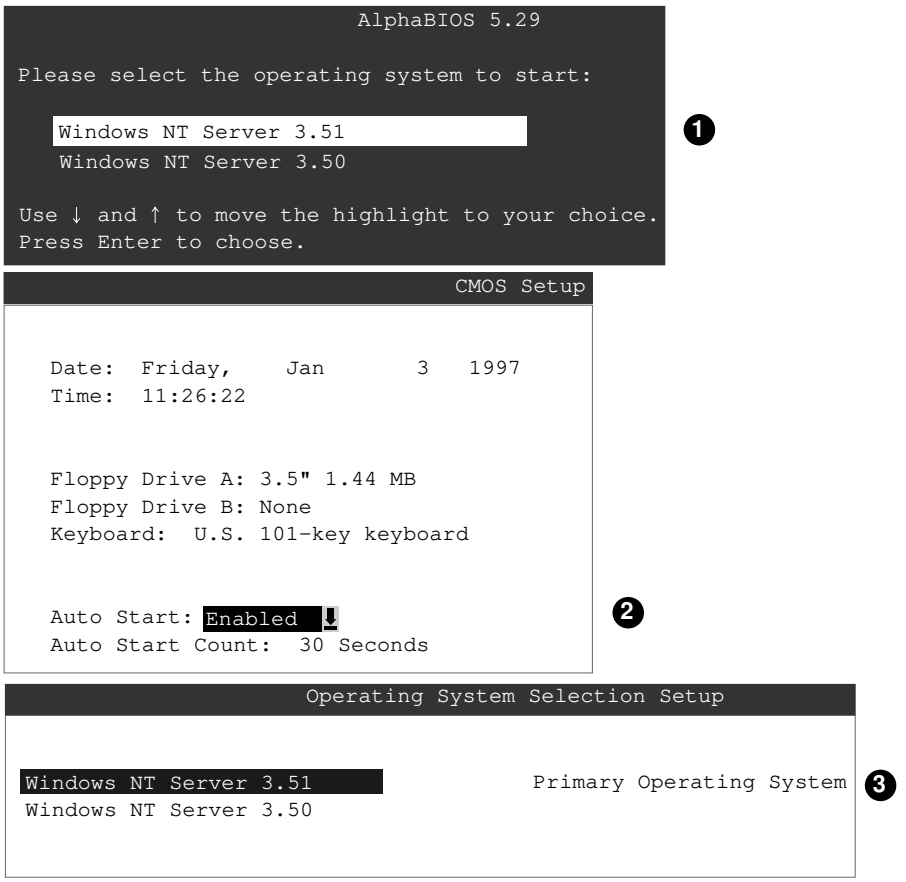
Each operating system selection is a set of information for a version of Windows NT. It describes the disk and partition containing the OSLOADER.EXE file associated with a particular operating system installation, as well as the path to the operating system itself. In addition, the operating system selection contains any options passed to the operating system during boot.

By default, one operating system selection displays on the **AlphaBIOS Boot** screen for each operating system installed on the system. It is not normally necessary to modify operating system selections, as the Windows NT installation creates and modifies operating system selections as needed.

Figure 6–26 shows how operating system selections appear in AlphaBIOS.

6.10.1 Designating a Primary Operating System

Figure 6–27 Primary Operating System



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Multiple versions of Windows NT can be installed at the same time. This can be very useful in a variety of circumstances—for example, when testing application compatibility across different versions of Windows NT.

Each time you install a separate version of Windows NT, a new operating system selection is created. Although you can start any of the installed versions of Windows NT, one of them must be the primary operating system. The version of Windows NT you select as the primary operating system is the one that automatically starts if the **Auto Start** option is enabled in AlphaBIOS.

Figure 6–27 illustrates the relationship between multiple-operating-system installations, **Auto Start**, and the primary operating system.

❶ The primary operating system is listed first on the **Boot** screen.

❷ The primary operating system starts automatically if the **Auto Start** option is enabled in **CMOS Setup**.

❸ The primary operating system can be selected in the **Operating System Selection Setup** screen.

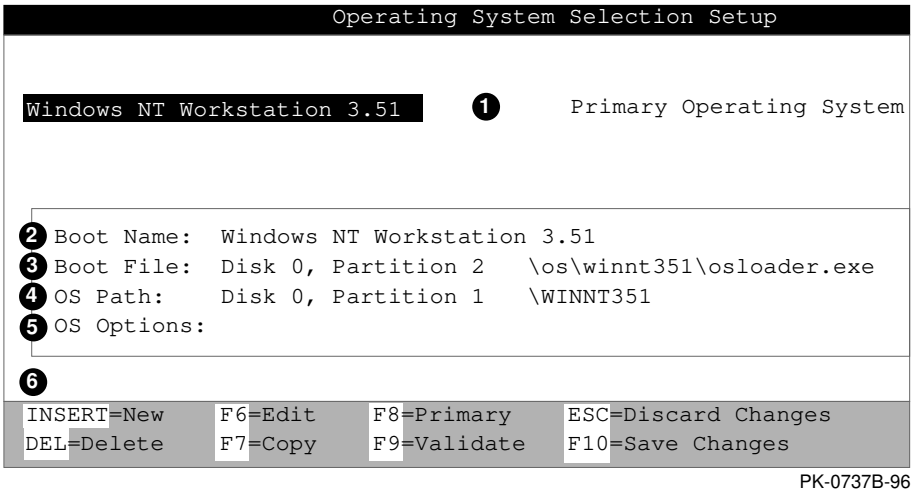
Follow this procedure to designate a new primary operating system:

1. From the **AlphaBIOS Setup** screen select **Utilities**. In the selection box that displays, choose **OS Selection Setup**.
2. The **Operating System Selections Setup** screen displays. Select the primary operating system from the list displayed.

6.10.2 Primary Operating System and the Auto Start Option

The process of setting up your operating system selections is similar to using an editor. You can make changes to your operating system selections and then either save your changes or exit without saving.

Figure 6–28 Operating System Selection Setup



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AlphaBIOS boots Windows NT in two stages. The first stage involves reading an OS Loader program from a disk. As of Windows NT version 3.51, the name of the OS Loader program is OSLOADER.EXE. The selection for the operating system must describe the path where AlphaBIOS will find the OS Loader program. Note that the OS Loader program *must* be located on a partition formatted with the FAT file system.

Once the OS Loader program executes, it uses the services provided by AlphaBIOS to load the operating system components. After the operating system is loaded, the OS Loader starts execution of the operating system.

❶ Primary operating system — The OS that appears first on the **AlphaBIOS Boot** screen. It is also the version of the OS that automatically starts if **Auto Start** is selected. Any of the operating system selections can be the primary operating system.

❷ Boot name — Each boot name is associated with an operating system selection. Windows NT setup automatically creates a boot name each time you install the operating system. Because the boot name is only a name, you can modify it at any time without affecting the rest of the operating system selection. Note that the boot name must have at least one character.

❸ Boot file — Describes the disk, partition, path, and name of the file that AlphaBIOS passes control to during the process of starting the operating system. This setting is created along with the operating system selection during Windows NT setup, and it is usually not modified by the user. However, this setting can be modified if necessary. For example, a developer testing different versions of OSLOADER.EXE can store the different versions in different locations and modify this line to start the operating system with the different versions as needed.

During **Operating System Selection Setup**, you can select the disk and partition for the location of the boot file from a list of choices presented in a list box. To open a list of values for the field, press the Alt and down arrow keys together. When you select a boot file location and name, AlphaBIOS searches for the specified program on the specified partition. If the search fails, a warning displays, saying that the file does not exist. You are given the choice to continue with the changes anyway or to cancel the operation and fix the problem.

Note that because the boot file must be located in a FAT partition, only FAT partitions are available as the boot partition within the list box.

❹ OS path — Describes the disk, partition, and path to the operating system root directory for an operating system selection.

During **Operating System Selection Setup**, you can select the disk and partition for the location of the boot file from a list of choices presented in a list box. To open a list of possible values for the field, press the Alt and down arrow keys at the same time. When you select or enter an OS path, AlphaBIOS searches for the directory. If the search fails, a warning displays, saying that the directory does not exist. You are given the choice to continue with the changes anyway or to cancel the operation and fix the problem.

Continued on next page

❺ OS options — Lists the startup parameters passed to the operating system for an operating system selection. One example of a startup parameter is whether to start the operating system in debug mode. By default, Windows NT does not add any entries to this field. This field can be modified.

❻ **Operating System Selection Setup** options — You can use the options listed at the bottom of the screen to edit operating system selections. When you edit an OS selection, the fields of the OS selection are validated when you exit the **OS Selection Setup** screen. Depending on the option you choose, one of the following dialog boxes will display.

New OS selection (Insert key) — Displays the **Insert New Operating System Selection** dialog box, with default values for the new OS selection already filled in. You can change these values as necessary.

Delete OS selection (Delete key) — Tags the currently selected OS selection for deletion. Although the OS selection is removed from the screen, it is not actually deleted until you save changes.

You can also delete all of your OS selections at once by pressing the Control and Delete keys at the same time while in the **Operating System Selection Setup** screen.

NOTE: If you delete all the OS selections, a dialog box displays informing you that no OS selections exist and offering three options. You can create a new OS selection, exit without saving changes, or exit and save changes.

Edit OS selection (F6 key) — Edit all values of an OS selection by selecting the OS selection to edit and pressing F6. A dialog box displays with current information. You can then edit the OS selection fields.

Copy OS selection (F7 key) — Create a new OS selection by using an existing OS selection as a template. To do this, select the OS selection you want to copy and press F7. A dialog box displays with the values of your OS selection. You can then edit the OS selection fields. Note that if you do not make any changes, a duplicate copy of the OS selection you copied is made.

Primary operating system (F8 key) — Sets the selected OS selection as the primary operating system. When you make an OS selection primary, it is displayed first on the **Operating System Selection Setup** screen with the text "Primary Operating System." In addition, the primary operating system is displayed first on the **AlphaBIOS Boot** screen and is automatically started if Auto Start is enabled.

Validate OS selection (F9 key) — Validates the fields in the currently selected OS selection. The validation routine checks that the OS loader file and OS directory fields contain valid paths, and that the OSLOADER.EXE file exists in the directory specified. At the end of the validation, a dialog box displays describing the results of the validation. If there is an error in an OS selection, the validation routine displays a dialog box describing the component of the OS selection that is in error. At this point you can choose to edit the OS selection to correct the error, or delete the OS selection altogether.

You can also validate all OS selections at once by pressing the Control and F9 keys at the same time. All OS selections are validated in the order they are listed on screen.

Discard changes (Escape key) — Returns to the **AlphaBIOS Setup** screen without saving changes.

Save changes (F10 key) — Saves changes and returns to the **AlphaBIOS Setup** screen.

Chapter 7

Utilities

Utilities that configure EISA options and RAID devices are run from AlphaBIOS. This chapter gives directions for running utilities from both a graphics monitor and a serial terminal.

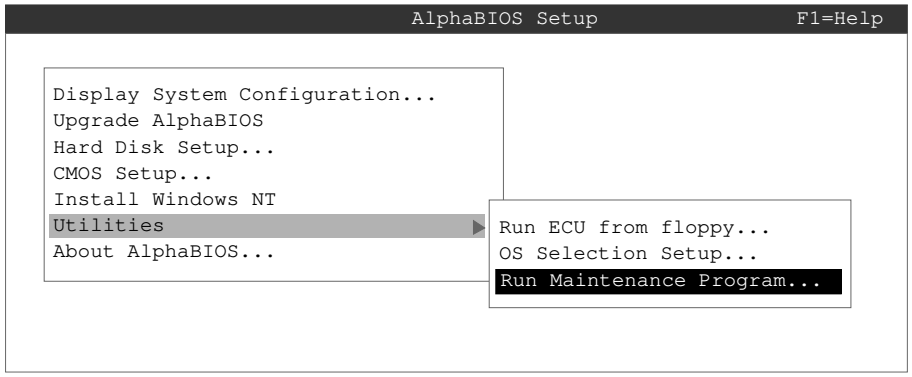
Sections in this chapter are:

- Running Utilities from a Graphics Monitor
- Running Utilities from a Serial Terminal

7.1 Running Utilities from a Graphics Monitor

Start AlphaBIOS and select Utilities from the menu. Then select Run Maintenance Program.

Figure 7–1 Running a Utility from a Graphics Monitor



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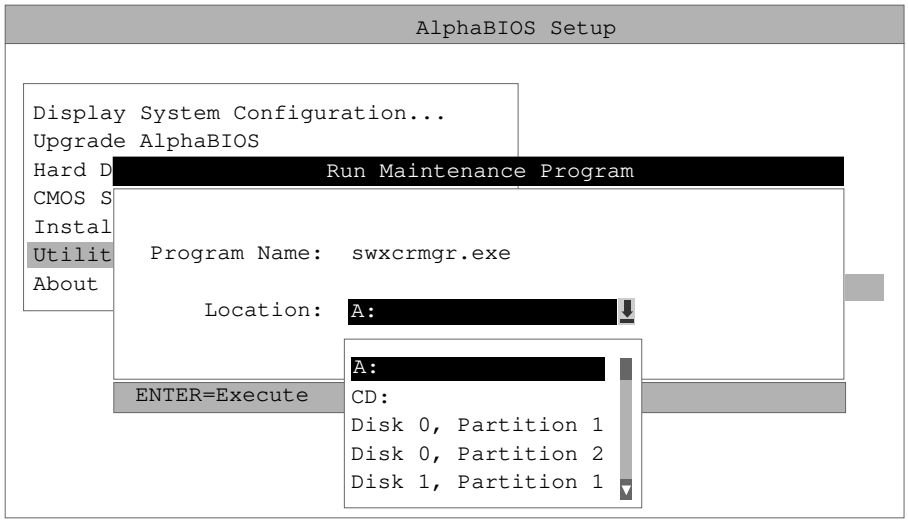
1. Start AlphaBIOS Setup. If the system is in the SRM console, set the SRM **console** environment variable to **graphics** and issue the command **alphabios**.
2. From **AlphaBIOS Setup**, select **Utilities**, then select **Run Maintenance Program** from the submenu that displays, and press Enter.
3. In the **Run Maintenance Program** dialog box, type the name of the program to be run in the Program Name field. Then Tab to the Location list box, and select the hard disk partition, floppy disk, or CD-ROM drive from which to run the program.
4. Press Enter to execute the program.

NOTE: If you are running the EISA Configuration Utility, use the appropriate program for the operating system you intend to boot. If you run the wrong program, your system will behave unpredictably during booting.

See Section 6.3 for information about navigating through AlphaBIOS screens.

Figure 7–2 Run Maintenance Program Dialog Box



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7.2 Running Utilities from a Serial Terminal

Utilities are run from a serial terminal in the same way as from a graphics monitor. The menus are the same, but some keys are different.

Table 7–1 AlphaBIOS Option Key Mapping

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

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

NOTE: If you are running the EISA Configuration Utility, use the appropriate program for the operating system.

Appendix A

How to Find Fimware Updates

Firmware for all AlphaServer systems is available for download from the Internet. You can access the firmware as follows.

- Using a World Wide Web browser (such as Mosaic or Netscape), follow links to AlphaServer 4000 and 4100 systems, then technical resources from URL:
  http://www.digital.com/info/alphaserver/products.html
- Using ftp, copy the file:
  ftp://ftp.digital.com/pub/Digital/Alpha/firmware/

The files are structured as those on the firmware CD and are separated by CD release. For example, the contents of the V3.6 firmware CD are located at:
ftp://ftp.digital.com/pub/Digital/Alpha/firmware/v3.6/

The latest firmware (if released since the last firmware CD) is located at:
ftp://ftp.digital.com/pub/Digital/Alpha/firmware/interim/

Appendix B

Hard Disk Partitioning for AlphaBIOS and Windows NT

The recommended hard disk partition arrangement on the first hard disk in your system is:

- Partition 1 — Six megabytes less than the total size of the drive. This large partition holds the operating system and the application and data files.
- Partition 2 — The remaining six megabytes. This small partition holds only the few files necessary for your computer to boot.

This arrangement provides two benefits.

- Windows NT requires that a boot partition be formatted with the FAT file system. However, the Windows NT file system (NTFS) provides advantages over FAT, such as additional security and more efficient use of disk space. By keeping the FAT boot partition as small as possible, the maximum amount of space is left available for use as an NTFS partition.
- Most applications install themselves onto drive C by default. Although the program installation drive is usually configurable by the user, many people accept the default of drive C. By making the first partition large, drive C becomes the larger drive. This arrangement makes program installation easier and avoids time-consuming insufficient disk space mistakes.

B.1 Hard Disk Error Conditions

B.1.1 Disk Initialization Failed

When you start hard disk setup, if you receive an "Internal error occurred" message, it means that a disk was found, but there was an error in communicating with the disk. The likely conditions that can cause this error are:

- Incompatible or failed disk cables. You may not have the correct cable installed, or the cable might have a broken lead or connector. Try another cable known to be good.
- Disk controller not configured. You may have to run a configuration utility to set up your hard disk controller. Check your controller documentation.

- Disk controller malfunction. Most controllers come with a diagnostic utility to test controller functioning. If a controller error is found, call the manufacturer for a replacement.
- Improper SCSI termination. Many SCSI controllers require that the terminating resistor packs be removed from all drives between the controller and last drive. Only the controller itself, and the last drive connected to the controller (the ends of the "chain"), should have terminating resistor packs left on.

B.1.2 No Hard Disks Found

When you start hard disk setup, if you receive a "No hard drives were found connected to your computer" message, it means that AlphaBIOS could not locate a hard drive. The likely conditions that cause this error are:

- Cable not connected to either the disk or controller. The cable may have worked loose from the connector on the controller or disk drive. Check the cable connections, making sure the cable connectors are fully seated.
- No power to the drive. The power connector may have worked loose from the receptacle on the drive, or the power cable itself may be malfunctioning. Check the cable connections, making sure the cable connectors are fully seated. Try connecting the drive to a different power connector.
- Disk drive malfunction. The disk drive itself may be malfunctioning and not responding to requests from the controller. If this is the problem, then it would appear as though the disk were absent. Replace the drive with a drive known to be good. If the known good drive is correctly detected, then your hard drive is defective. Contact the manufacturer for a replacement.

B.1.3 No Partitions on Disk

If hard disk 0 does not have any partitions defined, then a message will appear when you start hard disk setup, asking if you want to perform an express disk setup. Express disk setup automatically creates the default disk partition arrangement on hard disk 0.

For more information on express setup, see Chapter 6.

B.2 System Partitions

To install Windows NT, a system partition must be defined. If no system partition is found, the user is asked to choose from the available FAT partitions.

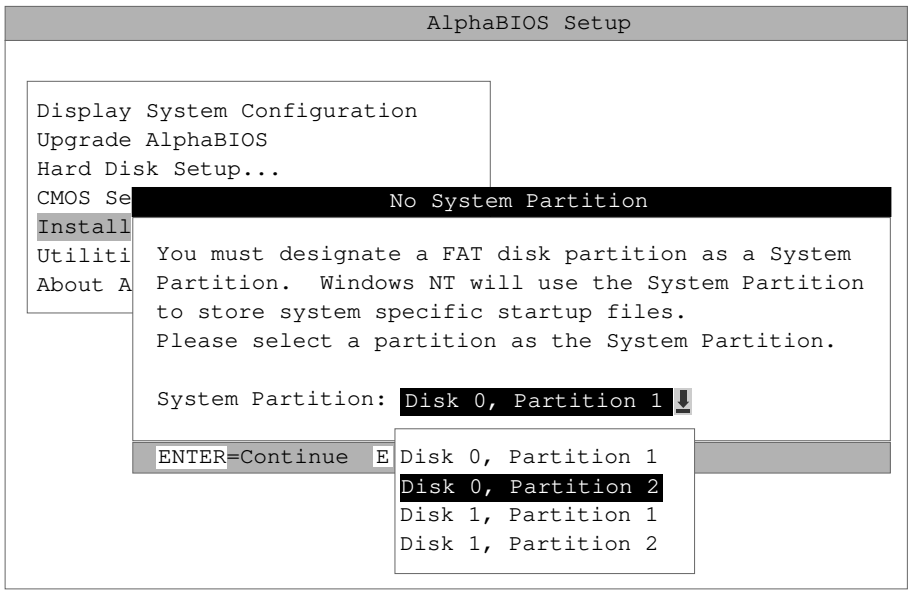
The purpose of the system partition is twofold. First, it tells the Windows NT installation program where to place the OS Loader and hardware support files. Second, upon subsequent restarts of Windows NT, the system partition definition tells AlphaBIOS where the OSLOADER.EXE file is so it can successfully hand off control to the OS Loader and continue the boot process.

The system partition can be the same partition into which Windows NT is installed, or it can be separate. However, the system partition must be formatted with the FAT file system. Because the default recommended partition arrangement on Alpha calls for the partition into which Windows NT is installed to be an NTFS partition, the system partition will almost always be a small FAT partition on the same disk onto which Windows NT is installed.

B.3 How AlphaBIOS Works with System Partitions

If you are installing Windows NT for the first time, AlphaBIOS will determine that a system partition has not been defined when you select **Install Windows NT** in the **AlphaBIOS Setup** screen (see Figure B–1). When this occurs, AlphaBIOS searches for all FAT partitions on the system. If only one FAT partition exists, AlphaBIOS designates that FAT partition as the system partition and continues with the Windows NT installation. If more than one FAT partition exists on your system, AlphaBIOS displays the list of FAT partitions from which you can choose the system partition. After choosing the system partition, the installation process continues.

Figure B–1 System Partition Not Defined



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Appendix C

Differences Between AlphaBIOS and ARC Firmware

This appendix is for users of Alpha systems who are experienced with ARC firmware, and who want an overview of the major differences between ARC and AlphaBIOS firmware.

C.1 Revamped User Interface

AlphaBIOS has a graphical-style windowed interface. Many of the navigational and selection keystrokes implemented in Microsoft Windows are present in AlphaBIOS as well. If you are familiar with navigating Microsoft Windows using a keyboard, AlphaBIOS navigation will also be simple. Additionally, information and selections are grouped more logically. Groups of related tasks can often be performed from a single screen.

C.2 Hard Disk Setup

Using ARC firmware, initial hard disk partitioning and formatting was accomplished with a utility called ARCINST.EXE. This utility is distributed on the Windows NT CD-ROM. This utility was run in a manner similar to how a maintenance program is run with AlphaBIOS; that is, from a command line. Under AlphaBIOS, hard disk setup functionality is integrated into the menu-based interface.

The following list summarizes the new hard disk setup functionality in AlphaBIOS but not found in the ARC program:

- With one keystroke, express disk setup configures your first hard disk with the recommended partition arrangement.
- AlphaBIOS uses the same path descriptions as Windows NT Disk Administrator, rather than the ARC path names used in ARCINST. For example:
- ARC Path Name = scsi(0)disk(0)rdisk(0)partition(1)
- AlphaBIOS Path Name = Disk 0, Partition 1
- All partitions of all disks can be seen at the same time.
- Disk administration is integrated into the BIOS, rather than being a maintenance program.
- No menu hierarchy to navigate.

- Detailed display of disk and partition configuration.
- Windowed interface.

C.3 Changing CMOS and NVRAM Values

With ARC firmware, a number of settings stored in CMOS and NVRAM are set using several separate ARC firmware selections. With AlphaBIOS, these settings are more logically arranged by being integrated into the CMOS Setup program. Table C–1 summarizes the differences between AlphaBIOS and ARC firmware in this regard.

Table C–1 Differences Between AlphaBIOS and ARC Menu Selections

Function	AlphaBIOS Menu	ARC Menu
Set date/time	CMOS Setup	Set System Time
SCSI termination and PCI parity checking	CMOS Setup	Machine specific setup
Floppy and keyboard	CMOS Setup	Set Default Configuration
Default system partition	N/A (handled automatically by hard disk setup)	Set Default Environment Variables
SCSI host ID	N/A	Set Default Configuration
Automatic OS startup	CMOS Setup	Setup AutoBoot
Edit environment variables	N/A (handled automatically by AlphaBIOS)	Edit Environment Variables
Set monitor resolution	N/A	Set Default Configuration

C.4 Working with Operating Systems

Because Alpha systems can have multiple versions of Windows NT installed simultaneously, you can examine, verify, and modify the values associated with each installed version of Windows NT. With ARC firmware, the group of values associated with a particular Windows NT installation are collectively known as a "boot selection." With AlphaBIOS, these values are known as an "operating system selection."

With ARC firmware, working with boot selections is difficult because the various pieces of information necessary are located on separate screens displayed by using the Manage Boot Selections menu. In addition, the interface provides no way to easily see the alternatives available for a given item. For example, if you want to customize a boot selection to use an OSLOADER.EXE file on a different partition or disk, there is no way to see the different choices available while in the menu where you enter that information. This makes it necessary to navigate back and forth between the separate menus these pieces of information are located under and to remember the information for entry into the correct menu.

With AlphaBIOS, working with operating system selections has been greatly simplified by virtue of the revamped user interface. All the functionality available under ARC firmware has been integrated into a single Operating System Selection Setup screen. Alternative choices for values, such as disk and partition numbers, are available with drop-down list boxes, and only valid values are displayed. This makes processes that were once error-prone and clumsy relatively smooth and error-free.

In addition, a new feature, copying operating system selections, makes creating new operating system selections even easier by making it possible to use an existing selection as a template for a new selection.

C.5 Running a Program from the BIOS

The procedure for running configuration programs remains essentially unchanged with AlphaBIOS. With ARC firmware, the menu selection to run a program was located on the Boot menu, whereas, with AlphaBIOS, you can select **Utilities** from the main AlphaBIOS Setup screen to run configuration programs.

Note that the selection name has changed from "Run a program" under ARC, to "Run a maintenance program" under AlphaBIOS.

C.6 Differences in System Configuration Display

The system configuration display in ARC firmware provides general information about system setup. In contrast, the system configuration display in AlphaBIOS displays detailed information categorized by major subsystem. In addition, for many

of the elements listed, you can select the element and obtain additional detailed information.

C.7 Resetting to Factory Defaults

With ARC firmware, the option to reset the system to factory defaults is located on the Setup screen. With AlphaBIOS, the equivalent function is performed by pressing **F7** in the CMOS Setup screen.

C.8 Multilingual Support

Support for multiple languages, which was recently added to ARC firmware, is not currently a feature of AlphaBIOS.

Appendix D

Acoustical Data

Table D–1 Acoustics - Declared Values per ISO 9296 and ISO 7779

	Sound Power Level L_{WAd}, B		Sound Pressure Level L_{pAm}, dBA (bystander positions)	
Product	Idle	Operate	Idle	Operate
BA30A-AA (AlphaServer 4100 drawer as sub-assembly, 1-4 cpu, 1-2 psu)	6.1	6.1	42	42
BA30P-AA/AB (BA30A with 1-4 cpu, 1-2 psu, no drives, in pedestal cab)	6.0	6.0	41	41
BA30A with 1-4 cpu, 1-2 psu + 2xBA356 with 2xRZ29B each, in pedestal cab	6.3	6.4	44	44
H9A10-EB/EC (diskless rack)	6.3	6.3	39	39
BA30A with 1-4 cpu, 1-2 psu, in H9A10	6.1	6.1	42	42
BA356 with 2xRZ29B, in H9A10	6.0	6.1	40	41

[Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.]

Table D–2 Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779

	Schalleistungspegel L_{WAd}, B		Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)	
Gerät	Leerlauf	Betrieb	Leerlauf	Betrieb
BA30A-AA (AlphaServer 4100 Einschubbau-gruppe, 1-4 cpu, 1-2 psu)	6,1	6,1	42	42
BA30P-AA/AB (BA30A mit 1-4 cpu, 1-2 psu, ohne Laufwerke, in Standfußge-häuse)	6,0	6,0	41	41
BA30A mit 1-4 cpu, 1-2 psu + 2xBA356 jeweils mit 2xRZ29B, in Standfußge-häuse	6,3	6,4	44	44
H9A10-EB/EC (Gestell ohne Laufwerke)	6,3	6,3	39	39
BA30A mit 1-4 cpu, 1-2 psu, in H9A10	6,1	6,1	42	42
BA356 mit 2xRZ29B in H9A10)	6,0	6,1	40	41

[Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.]

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