

AlphaServer 800

Service Guide

Order Number: EK-ASV80-SG. A01

This guide describes diagnostics used in troubleshooting system failures, as well as the procedures for replacing field-replaceable units (FRUs).

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Intended Audience

This guide describes the procedures and tests used to service AlphaServer 800 systems and is intended for use by Digital Equipment Corporation service personnel and qualified self-maintenance customers.

The material is presented as follows:

- **Chapter 1, Troubleshooting Strategy**, describes the troubleshooting strategy for AlphaServer 800 systems.
- **Chapter 2, Power-Up Diagnostics and Display**, provides information on how to interpret error beep codes and the power-up display.
- **Chapter 3, Running System Diagnostics**, describes how to run ROM-based diagnostics.
- **Chapter 4, Server Management Console**, describes the use and operation of the remote management console (RMC).
- **Chapter 5, Error Log Analysis**, describes how to interpret error logs reported to the operating system.
- **Chapter 6, System Configuration and Setup**, provides configuration and setup information for the system and system options.
- **Chapter 7, FRU Removal and Replacement**, describes the field replacement procedures for AlphaServer 800 systems.
- **Appendix A**, provides the location and default settings for all jumpers in AlphaServer 800 systems.
- **Appendix B**, provides the pin layout for external and internal connectors.

Conventions

The following conventions are used in this guide:

Convention	Meaning
WARNING:	A warning contains information to prevent injury.
CAUTION:	A caution contains information essential to avoid damage to equipment or software.
NOTE:	A note calls the reader's attention to important information.
[]	In command format descriptions, brackets indicate optional elements.
<i>italic type</i>	In console command sections, italic type indicates a variable.

Related Documentation

Table 1 lists the documentation kits and related documentation for AlphaServer 800 systems.

Table 1 AlphaServer 800 Documentation

Title	Order Number
AlphaServer 800 System Information Kit	QZ-00XAA-GZ
<i>AlphaServer 800 User's Guide</i>	EK-ASV80-UG
<i>AlphaServer 800 Basic Installation</i>	EK-ASV80-IG
AlphaServer 800 Maintenance Kit	QZ-00XAB-GZ
<i>AlphaServer 800 Service Guide</i> (hard copy)	EK-ASV80-SG
<i>Online Service Information</i> (diskette)	AK-R2MAA-CA
<i>AlphaServer 800 Illustrated Parts Breakdown</i>	EK-ASV80-IP
Reference Information	
<i>DEC Verifier and Exerciser Tool User's Guide</i>	AA-PTTMD-TE
<i>Guide to Kernel Debugging</i>	AA-PS2TD-TE
<i>OpenVMS Alpha System Dump Analyzer Manual</i>	AA-PV6UB-TE
<i>DECevent Translation and Reporting Utility for OpenVMS Alpha, User and Reference Guide</i>	AA-Q73KC-TE
<i>DECevent Translation and Reporting Utility for DIGITAL UNIX, User and Reference Guide</i>	AA-QAA3A-TE
<i>DECevent Analysis and Notification Utility for OpenVMS Alpha, User and Reference Guide</i>	AA-Q73LC-TE
<i>DECevent Analysis and Notification Utility for DIGITAL UNIX, User and Reference Guide</i>	AA-QAA4A-TE

Chapter 1

Troubleshooting Strategy

This chapter describes the troubleshooting strategy for AlphaServer 800 systems.

- Questions to consider before you begin troubleshooting
- Diagnostics flows for each problem category
- List of service tools and utilities
- List of information services

1.1 Questions to Consider

Before troubleshooting any system problem, first check the site maintenance log for the system's service history. Be sure to ask the system manager the following questions:

- Has the system been used and did it work correctly?
- Have changes to hardware or updates to firmware or software been made to the system recently? If so, are the revision numbers compatible for the system? (Refer to the hardware and operating system release notes).
- What is the state of the system? Is the operating system running?

If the operating system is down and you are not able to bring it up, use the diagnostic beep codes and console environment diagnostic tools, such as the power-up display on the VGA terminal and ROM-based diagnostics (RBDs).

If the operating system is running, use the operating system environment diagnostic tools, such as the DECEvent management utility (to translate and interpret error logs), crash dumps, and exercisers (DEC VET).

1.2 Problem Categories

System problems can be classified into the following five categories. Using these categories, you can quickly determine a starting point for diagnosis and eliminate the unlikely sources of the problem.

1. Power problems (Table 1-1)
2. No access to console mode (Table 1-2)
3. Console-reported failures (Table 1-3)
4. Boot failures (Table 1-4)
5. Operating system-reported failures (Table 1-5)

Table 1-1 Power Problems

Symptom	Action
System does not power on.	<ul style="list-style-type: none"> • Check the power source and power cord. • Check the On/Off setting on the operator control panel. Toggle the On/Off button to off, then back to the On position to clear a remote power disable. • Check the indicator lights on the operator control panel. If the green Power OK light is off and amber Halt/Remote Power Off light is on, the system may be powered off by one of the following: <ul style="list-style-type: none"> – a remote management console command – system software – fan failure – overtemperature condition – power supply failure – power select switch on power supply is set to 120V for a 220V power source • Check that the ambient room temperature is within environmental specifications (10–40°C, 50–104°F). • Check that internal power supply cables are plugged in at the system motherboard.
Power supply shuts down after a few seconds (fan failure).	<p>Listen to hear if the fan is spinning at power-up. A failure of the fan causes the system to shut down after a few seconds.</p> <p>Enter the remote management console and query system status/alerts (using the status command) for an indication of fan failure or overtemperature condition. Refer to Chapter 4 for instructions.</p>

Table 1-2 Problems Getting to Console Mode

Symptom	Action
Power-up screen is not displayed.	<p data-bbox="667 281 1268 342">Interpret the error beep codes at power-up (Section 2.1) for a failure detected during self-tests.</p> <p data-bbox="667 363 1208 424">Check that the keyboard and monitor are properly connected and turned on.</p> <p data-bbox="667 445 1256 569">If the power-up screen is not displayed, yet the system enters console mode when you press the Return key, check that the console environment variable is set correctly.</p> <p data-bbox="667 590 1268 714">If you are using a VGA monitor as the console terminal, the console variable should be set to graphics. If you are using a serial console terminal, the console environment variable should be set to serial.</p> <p data-bbox="667 735 1268 827">If you are using the standard onboard VGA controller, the VGA enable (J27) jumper on the motherboard must be enabled. Refer to Appendix A.</p> <p data-bbox="667 848 1243 940">If a VGA controller other than the standard on-board VGA controller is being used, refer to Section 6.7 for more information.</p> <p data-bbox="667 961 1268 1043">If console is set to serial, the power-up screen is routed to the COM1 serial communication port (Section 6.7) and cannot be viewed from the VGA monitor.</p>

Table 1-2 Problems Getting to Console Mode (continued)

Symptom	Action
	<p>Try connecting a console terminal to the COM1 serial communication port (Section 6.7). Check the baud rate setting for the console terminal and the system. The system baud rate setting is 9600. When using the COM1 port, you must set the console environment variable to serial.</p>
	<p>If none of the above considerations solve the problem, check that the J1 jumper on the CPU daughter board is not missing. Refer to Appendix A for the standard boot setting.</p>
	<p>If the system has a customized NVRAM file, try powering up or resetting the system with the Halt button set to the “In” position. The NVRAM script will not be executed when powering up or resetting the system with the Halt button depressed.</p>
	<p>For certain situations, power up using the fail-safe loader (Section 2.8) to load new console firmware from a diskette.</p>

Table 1-3 Problems Reported by the Console

Symptom	Action
Power-up tests do not complete.	Interpret the error beep codes at power-up (Section 2.1) and check the power-up screen (Section 2.2) for a failure detected during self-tests.
The system attempts to boot from the floppy drive after a checksum error is reported (error beep code 1-1-2 or 1-1-4).	Reinstall firmware by inserting a fail-safe loader diskette. Refer to the procedure provided with the firmware update documentation.
Console program reports error:	Use the error beep codes (Section 2.1) and/or console terminal (Section 2.2) to determine the error.
<ul style="list-style-type: none">• Error beep codes report an error at power-up.• Power-up screen includes error messages.• Power-up screen or console event log indicates problems with mass storage devices.• Storage devices are missing from the show config display.• Power-up screen or console event log indicates problems with EISA devices.• PCI devices are missing from the show config display.	<p>Examine the console event log (enter the more el command) or the power-up screen (Section 2.2) to check for errors detected during power-up.</p> <p>Use the troubleshooting tables in Section 2.3 to determine the problem.</p> <p>Use the troubleshooting tables in Section 2.3 to determine the problem.</p> <p>Use the troubleshooting tables in Section 2.6 to determine the problem.</p> <p>Use the troubleshooting tables in Section 2.6 to determine the problem.</p>

Table 1-3 Problems Reported by the Console (continued)

Symptom	Action
• Power-up screen or console event log indicates problems with EISA devices.	Use the troubleshooting table in Section 2.7 to determine the problem.
• EISA devices are missing from the show config display.	Use the troubleshooting table in Section 2.7 to determine the problem.
	Run the ROM-based diagnostic (RBD) tests (Chapter 3) to verify the problem.

Table 1-4 Boot Problems

Symptom	Action
System cannot find boot device.	<p>Check the system configuration for the correct device parameters (node ID, device name, and so on).</p> <ul style="list-style-type: none">• For DIGITAL UNIX and OpenVMS, use the show config and show device commands (Section 6.1.4).• For Windows NT, use the AlphaBIOS menus to examine and set the system configuration (Section 6.1.3). <p>Check the system configuration for the correct environment variable settings.</p> <ul style="list-style-type: none">• For DIGITAL UNIX and OpenVMS, examine the auto_action, bootdef_dev, boot_osflags, and os_type environment variables (Section 6.1.4.4). <p>For problems booting over a network, check the ew*0_protocols environment variable settings: Systems booting from a DIGITAL UNIX server should be set to bootp; systems booting from an OpenVMS server should be set to mop (Section 6.1.4.4).</p> <ul style="list-style-type: none">• For Windows NT, examine the Auto Start and Auto Start Count CMOS Setup Menu Options.
Device does not boot.	<p>For problems booting over a network, check the ew*0_protocols environment variable settings: Systems booting from a DIGITAL UNIX server should be set to bootp; systems booting from an OpenVMS server should be set to mop (Section 6.1.4.4).</p> <p>Run the device tests (Chapter 3) to check that the boot device is operating.</p>

Table 1-5 Errors Reported by the Operating System

Symptom	Action
System is hung or has crashed.	<p data-bbox="721 312 1179 405">Press the Halt button and enter the crash command to provide a crash dump file for analysis.</p> <p data-bbox="721 426 1268 518">Refer to <i>OpenVMS Alpha System Dump Analyzer Utility Manual</i> for information on how to interpret OpenVMS crash dump files.</p> <p data-bbox="721 539 1248 632">Refer to the <i>Guide to Kernel Debugging</i> for information on using the DIGITAL UNIX Krash Utility.</p>
Errors have been logged and the operating system is up.	<p data-bbox="721 653 1232 711">Examine the operating system error log files to isolate the problem (Chapter 5).</p> <p data-bbox="721 732 1256 825">If the problem occurs intermittently, run an operating system exerciser, such as DEC VET, to stress the system.</p> <p data-bbox="721 846 1218 930">Refer to the <i>DEC Verifier and Exerciser Tool User's Guide</i> for instructions on running DEC VET.</p>

1.3 Service Tools and Utilities

This section lists the tools and utilities available for acceptance testing, diagnosis, and serviceability and provides recommendations for their use.

Error Handling/Logging Tools (DECevent)

DIGITAL UNIX, OpenVMS, and Microsoft Windows NT operating systems provide recovery from errors, fault handling, and event logging.

The DECevent Translation and Reporting Utility provides bit-to-text translation of event logs for interpretation for DIGITAL UNIX and OpenVMS error logs.

RECOMMENDED USE: Analysis of error logs is the primary method of diagnosis and fault isolation. If the system is up, or you are able to bring it up, look at this information first.

ROM-Based Diagnostics (RBDs)

Many ROM-based diagnostics and exercisers execute automatically at power-up and can be invoked in console mode using console commands.

RECOMMENDED USE: ROM-based diagnostics are the primary means of testing the console environment and diagnosing the CPU, memory, Ethernet, I/O buses, and SCSI and DSSI subsystems. Use ROM-based diagnostics in the acceptance test procedures when you install a system, add a memory module, or replace the following components: CPU module, memory module, motherboard, I/O bus device, or storage device. Refer to Chapter 3 for information on running ROM-based diagnostics.

Loopback Tests

Internal and external loopback tests are used to isolate a failure by testing segments of a particular control or data path. The loopback tests are a subset of the ROM-based diagnostics.

RECOMMENDED USE: Use loopback tests to isolate problems with the COM2 serial port, the parallel port, and Ethernet controllers. Refer to Chapter 3 for instructions on performing loopback tests.

Firmware Console Commands

Console commands are used to set and examine environment variables and device parameters, as well as to invoke ROM-based diagnostics and exercisers. For example, the **show memory**, **show configuration**, and **show device** commands are used to examine the configuration; the **set bootdef_dev**, **set auto_action**, and **set boot_osflags** commands are used to set environment variables; and the **cdp** command is used to configure DSSI parameters.

RECOMMENDED USE: Use console commands to set and examine environment variables and device parameters and to run RBDs. Refer to Chapter 6 for information on configuration-related firmware commands and Chapter 3 for information on running RBDs.

Operating System Exercisers (DEC VET)

The DIGITAL Verifier and Exerciser Tool (DEC VET) is supported by the DIGITAL UNIX, OpenVMS, and Windows NT operating systems. DEC VET performs exerciser-oriented maintenance testing of both hardware and operating systems.

RECOMMENDED USE: Use DEC VET as part of acceptance testing to ensure that the CPU, memory, disk, tape, file system, and network are interacting properly. Also use DEC VET to stress test the user's environment and configuration by simulating system operation under heavy loads to diagnose intermittent system failures.

Crash Dumps

For fatal errors, such as fatal bugchecks, the DIGITAL UNIX and OpenVMS operating systems will save the contents of memory to a crash dump file.

RECOMMENDED USE: Crash dump files can be used to determine why the system crashed. To save a crash dump file for analysis, you need to know the proper system settings. Refer to the *OpenVMS Alpha System Dump Analyzer Utility Manual* or the *Guide to Kernel Debugging* for DIGITAL UNIX.

1.4 Information Services

Several information resources are available, including online information for service providers and customers, computer-based training, and maintenance documentation database services. A brief description of some of these resources follows.

Service Help File

The information contained in this guide, including the field-replaceable unit (FRU) procedures and illustrations, is available in online format. You can download the hypertext file (AS800.HLP) or order a self-extracting .HLP on diskette (AK-R2MAA-CA) or the AlphaServer 800 Maintenance Kit (QZ-00XAB-GZ). The maintenance kit includes hardcopy service guide, diskette, and illustrated parts breakdown.

Alpha Firmware Updates

Under certain circumstances, such as a CPU upgrade or replacement of the system motherboard, you may need to update your system firmware. An Alpha Firmware CD-ROM is available with DIGITAL UNIX, OpenVMS, and Windows NT operating systems. Operating system and firmware revisions must be compatible. The Alpha firmware files can also be downloaded from the Internet as follows:

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

The above README file describes the firmware directory structure, and how the files can be downloaded and used.

New versions of firmware released between shipments of the Alpha Firmware CD-ROM are available in an interim directory:

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

Fail-Safe Floppy Loader

The fail-safe floppy loader diskette (AK-R4VLA-CA) can be ordered. Call 1-800-DIGITAL, or download the firmware from the Internet (using the firmware update address above) to create your own fail-safe loader diskette.

ECU Revisions

The EISA Configuration Utility (ECU) is used for configuring EISA options on AlphaServer systems. Systems are shipped with an ECU kit, which includes the ECU license. Customers who already have the ECU and license, but need the latest ECU revision (a minimum revision of 1.10 for AlphaServer 800 systems), can order a separate kit. Call 1-800-DIGITAL to order.

If the customer plans to migrate from DIGITAL UNIX or OpenVMS to Windows NT, you must re-run the appropriate ECU. Failure to run the operating-specific ECU will result in system failure.

OpenVMS Patches

Software patches for the OpenVMS operating system are available from the World Wide Web as follows:

http://www.service.digital.com/html/patch_service.html

Choose the "Contract Access" option if you have a valid software contract with DIGITAL or you wish to become a software contract customer. Choose the "Public Access" options if you do not have a software service contract.

Late-Breaking Technical Information

You can download up-to-date files and late-breaking technical information from the Internet.

The information includes firmware updates, the latest configuration utilities, software patches, lists of supported options, wide SCSI information, and more.

FTP address:
ftp.digital.com
cd /pub/Digital/Alpha/systems/as800/

World Wide Web address:
http://www.digital.com/info/alphaserver/tech_docs/alphasrv800/

Supported Options

A list of options supported on AlphaServer 800 systems is available on the Internet:

FTP address:

<ftp://ftp.digital.com/pub/Digital/Alpha/systems/as800/>

World Wide Web address:

http://www.digital.com/info/alphaserver/tech_docs/alphasrv800/

You can obtain information about hardware configurations for the AlphaServer 800 from the *DIGITAL Systems and Options Catalog*. The catalog can be used to order and configure systems and hardware options. The catalog presents all products that are announced, actively marketed, and available for ordering.

Access printable postscript files of any section of the catalog from the Internet as follows (be sure to check the Readme file):

<ftp://ftp.digital.com/pub/Digital/info/SOC/>

Training

The following computer-based training (CBT) and lecture lab courses are available:

- Alpha Concepts
- DSSI Concepts: EY-9823E
- ISA and EISA Bus Concepts: EY-I113E-P0
- RAID Concepts: EY-N935E
- SCSI Concepts and Troubleshooting: EY-P841E, EY-N838E

DIGITAL Assisted Services

DIGITAL Assisted Services (DAS) offers products, services, and programs to customers who participate in the maintenance of DIGITAL computer equipment. Components of DIGITAL Assisted Services include:

- Spare parts and kits
- Diagnostics and service information/documentation
- Tools and test equipment
- Parts repair services, including field change orders

Power-Up Diagnostics and Display

This chapter provides information on how to interpret error beep codes and the power-up display on the console screen. In addition, a description of the power-up and firmware power-up diagnostics is provided as a resource to aid in troubleshooting.

- Section 2.1 describes how to interpret error beep codes at power-up.
- Section 2.2 describes how to interpret the power-up screen display.
- Section 2.3 describes how to troubleshoot mass-storage problems indicated at power-up or storage devices missing from the **show config** display.
- Section 2.4 shows the location of storage device LEDs.
- Section 2.5 describes the control panel LEDs.
- Section 2.6 describes how to troubleshoot PCI bus problems indicated at power-up or PCI devices missing from the **show config** display.
- Section 2.7 describes how to troubleshoot EISA bus problems indicated at power-up or EISA devices missing from the **show config** display.
- Section 2.8 describes the use of the fail-safe loader.
- Section 2.9 describes the power-up sequence.
- Section 2.10 describes firmware power-up diagnostics.

2.1 Interpreting Error Beep Codes

If errors are detected at power-up, audible beep codes are emitted from the system. For example, if the SROM code could not find any good memory, you would hear a 1-3-3 beep code (one beep, a pause, a burst of three beeps, a pause, and another burst of three beeps).

Be sure to check that the CPU daughter board is properly seated in its connector if errors are reported.

NOTE: A single beep is emitted when the SROM code completes successfully. The console firmware then continues with its power-up tests.

The beep codes are the primary diagnostic tool for troubleshooting problems when console mode cannot be accessed. Refer to Table 2-1 for information on interpreting error beep codes.

Table 2-1 Interpreting Error Beep Codes

Beep Code	Problem	Corrective Action
1	A single beep is emitted when the SROM code has successfully completed.	Not applicable. No error.
1-3	VGA monitor is not plugged in.	Plug in the graphics monitor. If you do not want the graphics monitor, disable the VGA jumper (J27) on the motherboard. Refer to Appendix A.
1-1-2	ROM data path error detected while loading AlphaBIOS/SRM console code. System automatically attempts to boot a fail-safe loader diskette from the floppy drive.	Insert the fail-safe loader diskette into the floppy drive to load new AlphaBIOS/SRM console code (Section 2.8). If loading new console firmware does not solve the problem, replace the motherboard (Chapter 7).
1-1-4	The SROM code is unable to load the console code: Flash ROM header area or checksum error detected. System automatically attempts to boot a fail-safe loader diskette from the floppy drive.	Insert the fail-safe loader diskette into the floppy drive to load new console code (Section 2.8). If loading new console firmware does not solve the problem, replace the motherboard (Chapter 7).
1-1-7	Floppy read error. System could not locate a valid boot block on the diskette.	Make sure floppy diskette is inserted, or try another diskette.
1-2-1	TOY NVRAM failure.	Replace the TOY NVRAM chip (E78) on system motherboard (Chapter 7).

Continued on next page

Table 2-1 Interpreting Error Beep Codes (continued)

Beep Code	Problem	Corrective Action
1-2-4	Backup cache error.	<p>Replace the CPU daughter board (Chapter 7).</p> <p>The system can be operated with the B-cache disabled until a replacement CPU daughter board is available. Bank 1 of the J1 jumper on the CPU daughter board is used to disable the B-cache. Refer to Appendix A.</p>
1-3-3	No usable memory detected.	<p>Verify that the memory modules are properly seated and try powering up again.</p> <p>Swap memory with known good memory and power up.</p> <p>If populating with known good memory does not solve the problem, replace the CPU daughter board (Chapter 7).</p> <p>If replacing the CPU daughter board does not solve the problem, replace the motherboard (Chapter 7).</p>
3-3-1	Generic system failure. Possible problem sources include the TOY NVRAM chip (Dallas DS1287A) or PCI-to-EISA bridge chipset (Intel 82375EB).	<p>Replace the TOY NVRAM chip (E78) on system motherboard (Chapter 7).</p> <p>If replacing the TOY NVRAM chip does not solve the problem, replace the motherboard (Chapter 7).</p>
3-3-3	Failure of the native SCSI controller (Qlogic) on the system motherboard.	<p>Replace the motherboard (Chapter 7).</p>

2.2 Power-Up Display

During power-up self-tests, test status and results are displayed on the console terminal. Information similar to that in Example 2-1 is displayed on the screen.

Example 2-1 Sample Power-Up Display

```
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.ef.df.ee.f4.
probing hose 0, PCI
probing PCI-to-EISA bridge, bus 1
bus 0, slot 5 -- pka -- QLogic ISP1020
bus 0, slot 6 -- vga -- S3 Trio64/Trio32
bus 1, slot 1 -- ewa -- DE425
bus 0, slot 11 -- ewb -- DECchip 21040-AA
bus 0, slot 13 -- ewc -- DECchip 21040-AA
ed.ec.eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
T4.7-72, built on Oct 22 1997 at 17:47:16
Memory Testing and Configuration Status
    64 Meg of System Memory
    Bank 0 = 64 Mbytes(16 MB Per DIMM) Starting at
0x00000000
    Bank 1 = No Memory Detected

Testing the System
Testing the Disks (read only)
Testing the Network
Change mode to Internal loopback.
Change to Normal Operating Mode.
Change mode to Internal loopback.
Change to Normal Operating Mode.
Change mode to Internal loopback.
Change to Normal Operating Mode.
>>>
```

Table 2-2 provides a description of the power-up countdown for output to the serial console port. If the power-up display stops, use the beep codes (Table 2-1 and Table 2-2) to isolate the likely field-replaceable unit (FRU).

Table 2-2 Console Power-Up Countdown Description and FRUs

Countdown Number	Description	Likely FRU
ff	Console initialization started	Non-specific/Status message
fe	Initialized idle PCB	Non-specific/Status message
fd	Initializing semaphores	Non-specific/Status message
fc,fb,fa	Initializing heap	Non-specific/Status message
f9	Initializing driver structures	Non-specific/Status message
f8	Initializing idle process PID	Non-specific/Status message
f7	Initializing file system	NVRAM TOY chip (E78)
f6	Initializing timer data structures	Non-specific/Status message
f5	Lowering IPL	Non-specific/Status message
f4	Entering idle loop	NVRAM TOY chip (E78)
ef	Start memory configuration (heap)	DIMM memory or backplane
df	Configure PCI and EISA bus	PCI or EISA bridge chips
ee	Start phase 1 drivers: NVRAM driver. Probe EISA and PCI bus for option modules.	NVRAM chip (E14), PCI or EISA option
ed	Start phase 2 drivers:	Non-specific/Status message
ec	Start phase 3 drivers (console select): tt serial line class, TGA graphics, VGA graphics, and keyboard drivers	Keyboard, VGA or TGA option, or backplane
eb	Run power-up memory test	DIMM memory

Table 2-2 Console Power-Up Countdown Description and FRUs (continued)

Countdown Number	Description	Likely FRU
ea	Start phase 4 drivers: console support drivers.	Non-specific/Status message
e9	Build HWRPB CPU information	Non-specific/Status message
e8	Initialize environment variables	Non-specific/Status message
e7	Start SCSI class driver	Backplane (onboard Qlogic)
e6	Start phase 5 drivers: I/O drivers	PCI or EISA option
e5	Restore timers	NVRAM TOY chip (E78)

2.2.1.1 DIGITAL UNIX or OpenVMS Systems

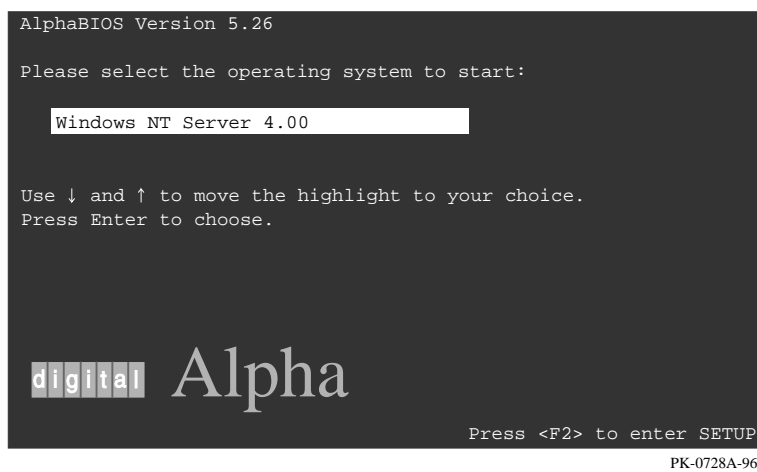
The DIGITAL UNIX and OpenVMS operating systems are supported by the SRM firmware. The SRM console prompt follows:

```
>>>
```

2.2.1.2 Windows NT Systems

The Windows NT operating system is supported by the AlphaBIOS firmware. Systems using Windows NT power up to the AlphaBIOS boot menu as shown in Figure 2-1.

Figure 2-1 AlphaBIOS Boot Menu



Refer to the *AlphaServer 800 User's Guide* for information on the AlphaBIOS firmware.

2.2.2 Console Event Log

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

NOTE: To stop the screen display from scrolling, press Ctrl/S. To resume scrolling, press Ctrl/Q.

*You can also use the **more el** command to display the console event log one screen at a time.*

Example 2-2 shows a console event log that contains two standard error messages.

- ❶ Indicates that the mouse is not plugged in or is not working.
- ❷ Indicates that SROM tests detected a bad DIMM (bank 1, DIMM 3).

Example 2-2 Sample Console Event Log

```
>>> cat el
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.ef.df.ee.f4.
probing hose 0, PCI
probing PCI-to-EISA bridge, bus 1
bus 0, slot 5 -- pka -- QLogic ISP1020
bus 0, slot 6 -- vga -- S3 Trio64/Trio32
bus 1, slot 1 -- ewa -- DECchip 21040-AA
bus 0, slot 11 -- ewb -- DECchip 21040-AA
bus 0, slot 13 -- ewc -- DECchip 21040-AA
ed.ec.

** mouse error **❶

*** Bad memory detected by serial rom
*** SROM failing Bank 1, DIMM 3 ❷
eb.....ea.e9.e8.e7.e6.resetting the SCSI bus on
pka0.7.0.5.0 e5.e4.e3.e2.e1.e0.
>>>
```

2.3 Mass Storage Problems

Mass storage failures at power-up are usually indicated by read fail messages. Other problems are indicated by storage devices missing from the **show config** display.

- Table 2-3 provides information for troubleshooting mass storage problems indicated at power-up or storage devices missing from the **show config** display.
- Table 2-4 provides troubleshooting tips for AlphaServer systems that use a RAID array subsystem.
- Section 2.4 provides information on storage device LEDs.

Use Table 2-3 and Table 2-4 to diagnose the likely cause of the problem.

Table 2-3 Mass Storage Problems

Symptom	Problem	Corrective Action
Drives are missing from the show config display.	Drives have duplicate SCSI IDs.	<p>Correct SCSI IDs.</p> <p>Note: Internal hard disk drives are automatically assigned SCSI IDs 0, 1, 2, and 3 (from left to right for pedestal systems; and bottom to top for rackmount systems). The onboard controller is assigned SCSI ID 7, and the CD-ROM, SCSI ID 4.</p>
	SCSI bus not properly terminated.	<p>Check the following jumpers and terminator to ensure that proper termination is provided for all internal SCSI devices.</p> <ul style="list-style-type: none"> • The SCSI terminator jumper (J51) on the system motherboard should be set to “on.” Refer to Appendix A. • The J5 jumper on the hard disk drive backplane should be set as shown in Appendix A. • The cable terminator at the end of the SCSI removable media cable should be properly seated. <p>For controllers other than the onboard controller, the pk*0_soft_term environment variable is used to enable/disable SCSI terminators. Refer to Table 6-1.</p>

Continued on next page

Table 2-3 Mass Storage Problems (continued)

Symptom	Problem	Corrective Action
Drives are missing from the show config display/One drive appears seven times on the show config display.	Drive SCSI ID set to 7 (reserved for host ID) or Duplicate host IDs on a shared bus.	Correct SCSI IDs. or Change host ID by setting the pk*0_host_id environment variable (set pk*0_host_id) through the SRM console.
LEDs do not come on. Drive missing from the show config display.	Missing or loose cables. Drives not properly seated on the hard disk backplane.	Remove device and inspect cable connections. Reseat drive.
Drives disappear intermittently from the show config and show device displays.	SCSI bus length exceeded.	The entire SCSI bus length, from terminator to terminator, must not exceed 6 meters for fast double-ended SCSI-2, or 3 meters for fast single-ended SCSI-2.

Table 2-3 Mass Storage Problems (continued)

Symptom	Problem	Corrective Action
Read/write errors in the console event log; storage adapter port fails.	Terminator missing or wrong terminator used.	<p>Check the following jumpers and terminator to ensure that proper termination is provided for all internal SCSI devices.</p> <ul style="list-style-type: none"> • The SCSI terminator jumper (J51) on the system motherboard should be set to “on.” Refer to Appendix A. • The J5 jumper on the hard disk drive backplane should be set as shown in Appendix A. • The cable terminator at the end of the SCSI removable media cable should be properly seated. <p>For controllers other than the onboard controller, the <code>pk*0_soft_term</code> environment variable is used to enable/disable SCSI terminators. Refer to Table 6-1.</p>
Devices produce errors or device IDs are dropped.	Extra terminator.	<p>Check that bus is terminated only at beginning and end. Remove unnecessary terminators.</p> <p>Removable media devices should disable termination (check device jumpers or SIPs).</p> <p>For controllers other than the onboard controller, the <code>pk*0_soft_term</code> environment variable is used to enable/disable SCSI terminators. Refer to Table 6-1.</p>
Problems persist after eliminating the problem sources.	SCSI storage controller failure.	Replace failing EISA or PCI storage adapter module (or motherboard for the native SCSI controller).

Table 2-4 provides troubleshooting hints for systems with a StorageWorks RAID array subsystem.

Table 2-4 Troubleshooting RAID Problems

Symptom	Action
Some RAID drives do not appear on the show device d display.	<p>Valid configured RAID logical drives will appear as DRA0--DRAn, not as DKn. Configure the drives by running the RAID Configuration Utility (RCU), following the instructions provided with the StorageWorks RAID array subsystem.</p> <p>Reminder: several physical disks can be grouped as a single logical DRAn device.</p>
Drives on the SWXCR controller power up with the amber Fault light on.	<p>Whenever you move drives onto or off of the controller, run the RAID Configuration Utility to set up the drives and logical units. Follow the instructions provided with the StorageWorks RAID array subsystem.</p>
Cannot access disks connected to the RAID subsystem on Windows NT systems.	<p>On Windows NT systems, disks connected to the controller must be spun up before they can be accessed.</p> <p>While running the ECU, verify that the controller is set to spin up two disks every 6 seconds. This is the default setting if you are using the default configuration files for the controller. If the settings are different, adjust them as needed.</p>

2.4 Storage Device LEDs

Storage device LEDs indicate the status of the device.

- Figure 2-2 shows the hard disk drive LEDs for disk drives in the system enclosure.
- Figure 2-3 shows the Activity LED for the floppy drive. This LED is on when the drive is in use.
- Figure 2-4 shows the Activity LED for the CD-ROM drive. This LED is on when the drive is in use.

For information on other storage devices, refer to the documentation provided by the manufacturer or vendor.

Figure 2-2 Hard Disk Drive LEDs

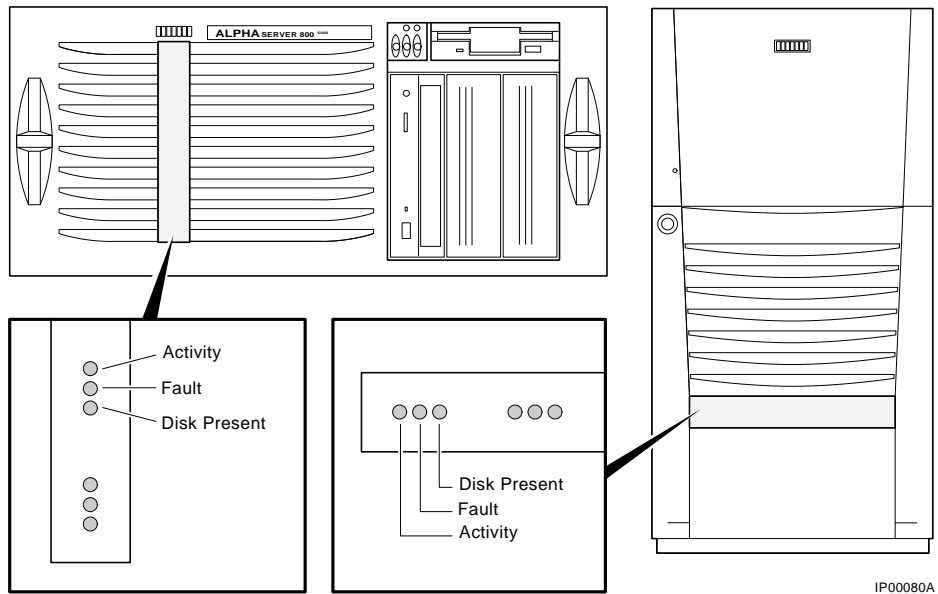


Table 2-5 Hard Disk Drive LEDs

LED	Meaning
Activity (green)	When lit, indicates disk activity.
Fault (amber)	At product introduction, this LED has no function, it may be used with future enhancements.
Disk Present (green)	When lit indicates that a disk drive is installed for that position in the hard disk drive backplane.

Figure 2-3 Floppy Drive Activity LED

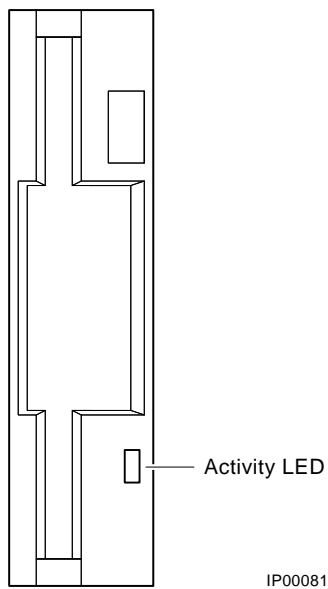
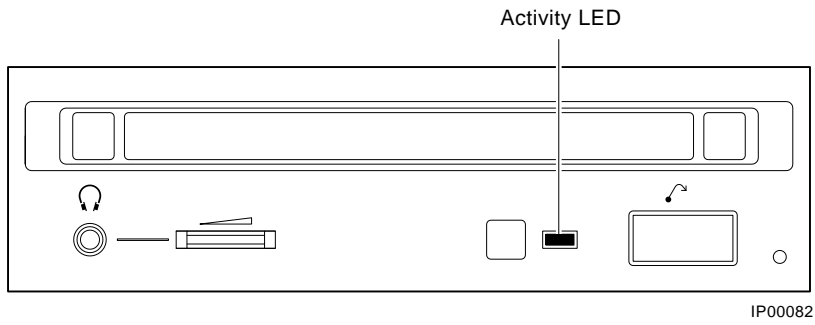


Figure 2-4 CD-ROM Drive Activity LED



2.5 Control Panel LEDs

Control panel LEDs (Figure 2-5) indicate the status of the system. Table 2-6 describes the LEDs.

Figure 2-5 Control Panel LEDs

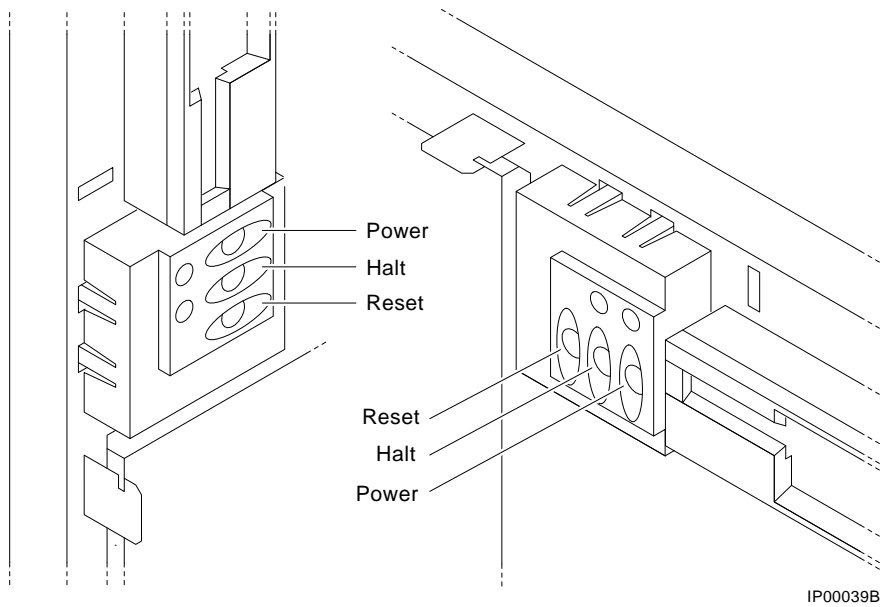


Table 2-6 Control Panel LEDs

Power OK (green)	Halt (amber)	Status
Off	Off	System powered-off using control panel Power button or no AC power is present.
Off	On	System power is enabled using the control panel Power button, but the system has been powered off by one of the following: <ul style="list-style-type: none">• Remote management console command• System software• Fan failure• Overtemperature condition• Power supply failure
On	Off	System is powered-on and is not in a halt state.
On	On	System is powered-on and the Halt button is pressed or a halt in command has been issued at the remote management console.

NOTE: To power up or reset without executing the NVRAM script or initiating an automatic operating system boot, power up or reset with the Halt button depressed.

2.6 PCI Bus Problems

PCI bus failures at power-up are usually indicated by the inability of the system to see the device. Table 2-7 provides steps for troubleshooting PCI bus problems. Use the table to diagnose the likely cause of the problem.

NOTE: Some PCI devices do not implement PCI parity, and some have a parity-generating scheme in which parity is sometimes incorrect or is not compliant with the PCI Specification. In such cases, the device functions properly as long as parity is not checked.

*The **pci_parity** environment variable for the SRM console, or the PCI Parity Checking option on the Advanced CMOS Setup Menu for the AlphaBIOS console, allow you to turn off parity checking so that false PCI parity errors do not result in machine check errors.*

When you disable PCI parity, no parity checking is implemented for any PCI device. The default setting is off, no parity checking.

Table 2-7 PCI Troubleshooting

Step	Action
1	Confirm that the PCI module and cabling are properly seated.
2	Run ROM-based diagnostics for the type of option: <ul style="list-style-type: none">• Storage adapter—Run test to exercise the storage devices off the PCI controller option (Chapter 3).• Ethernet adapter—Run test to exercise an Ethernet adapter (Chapter 3).
3	Check for a bad slot by moving the last installed controller to a different slot.
4	Call the option manufacturer or support for help.

2.7 EISA Bus Problems

EISA bus failures at power-up may be indicated by the following messages:

EISA Configuration Error. Run the EISA Configuration Utility.

Run the EISA Configuration Utility (ECU) when this message is displayed. Other EISA bus problems are indicated by the absence of EISA devices from the **show config** display.

Table 2-8 provides steps for troubleshooting EISA bus problems that persist after you run the ECU.

Table 2-8 EISA Troubleshooting

Step	Action
1	Confirm that the EISA module and any cabling are properly seated.
2	Run the ECU to: <ul style="list-style-type: none">• Confirm that the system has been configured with the most recently installed controller.• See what the hardware jumper and switch setting should be for each ISA controller.• See what the software setting should be for each ISA and EISA controller.• See if the ECU deactivated (<>) any controllers to prevent conflict.• See if any controllers are locked (!), which limits the ECU's ability to change resource assignments.
3	Confirm that the hardware jumpers and switches on ISA controllers reflect the settings indicated by the ECU. Start with the last ISA module installed.
4	Run ROM-based diagnostics for the type of option: <ul style="list-style-type: none">• Storage adapter—Run test to exercise the storage devices off the EISA controller option (Chapter 3).• Ethernet adapter—Run test to exercise an Ethernet adapter (Chapter 3).
5	Check for a bad slot by moving the last installed controller to a different slot.
6	Call the option manufacturer or support for help.

Additional EISA Troubleshooting Tips

The following tips can aid in isolating EISA bus problems:

- Peripheral device controllers need to be seated firmly in their slots to make all necessary contacts. Improper seating is a common source of problems.
- Be sure you run the correct version of the ECU for the operating system. For Windows NT, use ECU diskette DECpc AXP (AK-PYCJ*-CA); for DIGITAL UNIX and OpenVMS, use ECU diskette DECpc AXP (AK-Q2CR*-CA).

The CFG files supplied with the option you want to install may not work on AlphaServer 800 systems. Some CFG files call overlay files that are not required on this system or may reference inappropriate system resources, for example, BIOS addresses. Contact the option vendor to obtain the proper CFG file.

- Peripherals cannot share direct memory access (DMA) channels. Assignment of more than one peripheral to the same DMA channel can cause unpredictable results or even loss of function of the EISA module.
- Not all EISA products work together. EISA is an open standard, and not every EISA product or combination of products can be tested. Violations of specifications may matter in some configurations, but not in others.

Manufacturers of EISA options may have a list of ISA and EISA options that do not function in combination with particular systems. Be sure to check the documentation or contact the option vendor for the most up-to-date information.

- EISA options will not function unless they are first configured using the ECU.
- The ECU will not notify you if the configuration program diskette is write-protected when it attempts to write the system configuration file (system.sci) to the diskette.

2.8 Fail-Safe Loader

The fail-safe loader (FSL) allows you to boot an SRM console from a diskette at power-up. This allows you to power up without running power-up diagnostics and load new SRM and FSL console firmware from the firmware diskette.

NOTE: The fail-safe loader should be used only when a failure at power-up prohibits you from getting to the console program. You cannot boot an operating system from the fail-safe loader.

If a checksum error is detected when the console is loading at power-up (error beep code 1-1-2 or 1-1-4), the fail-safe loader is automatically activated so that you can reinstall the firmware.

The fail-safe loader (FSL) allows you to attempt to recover when one of the following is the cause of a problem getting to the console program under normal power-up:

- A hardware or power failure, or accidental power-down during a firmware upgrade occurred.
- A configuration error, such as an incorrect environment variable setting or an inappropriate NVRAM script.
- A driver error at power-up.
- A checksum error is detected when the SRM console is loading at power-up (corrupted firmware).

The fail-safe loader program is available on diskette (AK-R4VLA-CA), or it can be downloaded from the Internet to create your own diskette.

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

From the FSL program, you can update or load new SRM/AlphaBIOS console firmware and FSL console firmware.

NOTE: When installing new console firmware, you must enable the flash ROM VPP enable jumper (J50) on the motherboard. Refer to Appendix A.

To activate the FSL:

1. Move the jumper at bank 7 of the J1 jumper on the CPU daughter board. The jumper is normally installed in the standard boot setting (position 0). Refer to Figure A-1 in Appendix A.
2. Insert the console firmware diskette and turn on the system.
3. Reinstall the console firmware from diskette.
4. Power down and return the J1 jumper to the standard boot setting (position 0).

2.9 Power-Up Sequence

During the system power-up sequence, the power supplies are stabilized and the system is initialized and tested.

The power-up sequence includes the following:

- Power supply power-up:
 - AC power-up
 - DC power-up
- Two sets of diagnostics:
 - Serial ROM diagnostics
 - Console firmware diagnostics

2.9.1 AC Power-Up Sequence

The following power-up sequence occurs when AC power is applied to the system (system is plugged in) or when electricity is restored after a power outage:

1. The front end of the power supply begins operation and energizes. A minimal set of remote server management logic is powered off the auxiliary 5V power output.
2. The power supply then waits for the DC power to be enabled.

2.9.2 DC Power-Up Sequence

DC power is applied to the system with the DC On/Off button on the control panel. A summary of the DC power-up sequence follows:

1. When the DC On/Off button is pressed, the power supply checks for a POK_H condition.

2. 12V, 5V, 3.3V, and –12V outputs are energized and stabilized. If the outputs do not come into regulation, the power-up is aborted and the power supply enters the latching-shutdown mode.

2.10 Firmware Power-Up Diagnostics

After successful completion of AC and DC power-up sequences, the processor performs diagnostics to verify system operation, loads the system console, and tests the core system (CPU, memory, and system board), including all boot path devices. These tests are performed as two distinct sets of diagnostics:

1. Serial ROM diagnostics—These tests check the basic functionality of the system and load the console code from the FEPRM on the system board into system memory.

Failures during these tests are indicated by error beep codes (Table 2-1) and messages in the console event log (Section 2.2.2).

2. Console firmware diagnostics—These tests are executed by the console code. They test the core system, including all boot path devices.

Failures during these tests are reported to the console terminal through the power-up screen or console event log.

2.10.1 Serial ROM Diagnostics

The serial ROM diagnostics are loaded into the CPU's instruction cache from the serial ROM on the CPU daughter board. The diagnostics test the system in the following order:

1. The CPU and backup cache on the CPU daughter board.
2. The CPU module's system bus interface.
3. The system bus to PCI bus bridge and system bus to EISA bus bridge. If the PCI bridge or EISA bridge fails, an error beep code (3-3-1) sounds. Testing continues despite these errors.
4. The onboard SCSI controller. If the controller fails, an error beep code (3-3-3) sounds.
5. First 32 Mbytes of memory. If the memory test fails, the failing bank is mapped out and memory is reconfigured and retested. Testing continues until good memory is found. If good memory is not found, an error beep code (1-3-3) is generated and the power-up tests are terminated.
6. The data path to the FEPRM on the system board.

7. The console program is loaded into memory from the FEPR0M on the system board. A checksum test is executed for the console image. If the checksum test fails, an error beep code (1-1-4) is generated, the power-up tests are terminated, and the fail-safe loader is activated.

If the checksum test passes, a single audible beep is issued, control is passed to the console code, and the console firmware diagnostics are run.

2.10.2 Console Firmware Diagnostics

Console firmware tests are executed once control is passed to the console code in memory. The console firmware is loaded from the FEPR0M on the system motherboard during power-up. They check the system in the following order:

1. Perform a complete check of system memory.
Steps 2 to 5 may be completed in parallel.
2. Start the I/O drivers for mass storage devices and tapes. A complete check of the machine is made. After the I/O drivers are started, the console program continuously polls the bus for devices (approximately every 20 or 30 seconds).
3. Check that EISA configuration information is present in NVRAM for each EISA module detected and that no information is present for modules that have been removed.
4. Run exercisers on the drives seen by the system.

*NOTE: This step does not ensure that all disks in the system will be tested or that any device drivers will be completely tested. Spin-up time varies for different drives, so not all disks may be online. To ensure complete testing of disk devices, use the **test** command (Section 3.2.1)*

5. Enter console mode or boot the operating system. This action is determined by the **auto_action** environment variable.

If the **os_type** environment variable is set to **NT**, the AlphaBIOS console is loaded into memory and control is passed to the AlphaBIOS console.

Chapter 3

Running System Diagnostics

This chapter tells how to run ROM-based diagnostics.

ROM-based diagnostics (RBDs), which are part of the console firmware, offer many powerful diagnostic utilities, including the ability to examine error logs from the console environment and run system- or device-specific exercisers.

AlphaServer 800 system RBDs rely on exerciser modules to isolate errors. The exercisers run concurrently, providing maximum bus interaction between the console drivers and the target devices. The console firmware allows you to run diagnostics in the background (using the background operator “&” at the end of the command). You run the diagnostics by using console commands.

*NOTE: ROM-based diagnostics, including the **test** command, are run from the SRM console (firmware used by OpenVMS and DIGITAL UNIX operating systems). If you are running a Windows NT system, refer to Section 6.1.2 for the steps used to switch between consoles.*

RBDs report errors to the console terminal and/or the console event log.

3.1 Command Summary

Table 3-1 provides a summary of the diagnostic and related commands.

Table 3-1 Summary of Diagnostic and Related Commands

Command	Function	Section
Acceptance Testing		
test	Quickly tests the core system. The test command is the primary diagnostic for acceptance testing and console environment diagnosis. The test command runs one pass of the tests. To run tests concurrently and indefinitely, use the sys_exer command.	3.2.1
Error Reporting		
cat el	Displays the console event log.	3.2.3
more el	Displays the console event log one screen at a time.	3.2.3
Extended Testing/Troubleshooting		
crash	Forces a crash dump at the operating system level.	3.2.4
memexer	Exercises memory by running a specified number of memory tests. The tests are run in the background.	3.2.5
net -ic	Initializes the MOP counters for the specified Ethernet port.	3.2.7
net -s	Displays the MOP counters for the specified Ethernet port.	3.2.6
sys_exer	Exercises core system. Tests run concurrently.	3.2.2

**Table 3-1 Summary of Diagnostic and Related Commands
(continued)**

Command	Function	Section
Loopback Testing		
sys_exer -lb	Conducts loopback tests for COM2 and the parallel port in addition to core system tests.	3.2.2
test -lb	Conducts loopback tests for COM2 and the parallel port in addition to quick core system tests.	3.2.1
Diagnostic-Related Commands		
kill	Terminates a specified process.	3.2.8
kill_diags	Terminates all executing diagnostics.	3.2.8
show_status	Reports the status of executing tests/exercisers.	3.2.9

3.2 Command Reference

This section provides detailed information on the diagnostic commands and related commands.

3.2.1 test

The **test** command runs one pass of diagnostics for the system. To run tests concurrently and indefinitely, use the **sys_exer** command. Fatal errors are reported to the console terminal.

The **more el** command should be used with the **test** command to examine test/error information reported to the console event log.

By default, no write tests are performed on disk and tape drives. Media must be installed to test the floppy drive and tape drives. A loopback connector is required for the COM2 (9-pin loopback connector, 12-27351-01) port and parallel port (25-pin loopback connector) when the *-lb* argument is used.

The **test** command does not test the DNSES, MEMORY CHANNEL options, or third-party options.

When using the **test** command after shutting down an operating system, you must initialize the system to a quiescent state. Enter the following command at the SRM console:

```
>>> init
.
.
.
>>> test
```

The tests are run in the following order:

1. Memory tests (one pass).
2. Read-only tests: DK* disks, DR* disks, DU* disks, MK* tapes, DV* floppy.
3. Console loopback tests if *-lb* argument is specified: COM2 serial port and parallel port.
4. VGA/TGA console tests. These tests are run only if the **console** environment variable is set to **serial**. The VGA/TGA console test displays rows of the word “digital.”
5. Network external loopback tests for E*A0. This test requires that the Ethernet port be terminated or connected to a live network or the test will fail.

NOTE: Because traffic on live networks is unpredictable, loopback timeouts are considered soft errors.

Syntax

test [-lb]

Argument:

[-lb] The loopback option includes console loopback tests for the COM2 serial port and the parallel port during the test sequence.

Examples

In the following example, the tests complete successfully.

NOTE: Examine the console event log after running tests.

```
>>> test
Testing the Memory
Testing the DK* Disks(read only)
No DU* Disks available for testing
No DR* Disks available for testing
No MK* Tapes available for testing
No MU* Tapes available for testing
Testing the DV* Floppy Disks(read only)
file open failed for dva0.0.0.1000.0
Testing the VGA (Alphanumeric Mode only)
Testing the EWA0 Network
Testing the EWB0 Network
Testing the EWC0 Network
>>>
```

In the following example, the system is tested and the system reports a fatal error message. No network server responded to a loopback message. Ethernet connectivity on this system should be checked.

```
>>> test
Testing the Memory
Testing the DK* Disks(read only)
No DU* Disks available for testing
No DR* Disks available for testing
No MK* Tapes available for testing
No MU* Tapes available for testing
Testing the DV* Floppy Disks(read only)
file open failed for dva0.0.0.1000.0
Testing the VGA (Alphanumeric Mode only)
Testing the EWA0 Network
*** Error (ewa0), Mop loop message timed out from:
08-00 2b-3b-42-fd
*** List index: 7 received count: 0 expected count 2
Testing the EWB0 Network
Testing the EWC0 Network
>>>
```

3.2.2 sys_exer

The **sys_exer** command runs diagnostics for the system. The same tests that are run using the **test** command are run with **sys_exer**, only these tests are run concurrently and in the background. Nothing is displayed, after the initial test startup messages, unless an error occurs.

The diagnostics started by the **sys_exer** command automatically reallocate memory resources, as these tests require additional resources. The **init** command must be used to reconfigure memory before booting an operating system.

Because the **sys_exer** tests are run concurrently and indefinitely (until you stop them with the **init** command), they are useful in flushing out intermittent hardware problems.

When using the **sys_exer** command after shutting down an operating system, you must initialize the system to a quiescent state. Enter the following command at the SRM console:

```
>>> init  
...  
>>> sys_exer
```

By default, no write tests are performed on disk and tape drives. Media must be installed to test the floppy drive and tape drives. A loopback connector is required for the COM2 (9-pin loopback connector, 12-27351-01) port and parallel port (25-pin loopback connector) when the *-lb* argument is used.

Syntax

```
sys_exer [-lb]
```

Argument:

[-lb] The loopback option includes console loopback tests for the COM2 serial port and the parallel port during the test sequence.

Example

```
>>> sys_exer
Default zone extended at the expense of memzone.
Use INIT before booting
Exercising the Memory
Exercising the DK* Disks(read only)
Exercising the Floppy(read only)
Testing the VGA (Alphanumeric Mode only)
Exercising the EWA0 Network
Exercising the EWB0 Network
Type "init" in order to boot the operating system
Type "show_status" to display testing progress
Type "cat el" to redisplay recent errors
>>> show_status
```

ID	Program	Device	Pass	Hard/Soft	Bytes Written	Bytes Read
00000001	idle	system	0	0	0	0
0000550b	memtest	memory	193	0	7243563008	7243563008
00005514	memtest	memory	192	0	7222591488	7222591488
0000551d	exer_kid	dka100.1.0.2	0	0	0	2461184
0000551e	exer_kid	dka400.4.0.2	0	0	0	2460672
00005533	exer_kid	dva0.0.0.100	0	0	0	2311168
00005608	nettest	ewa0.0.0.200	1131	0	12160512	12159632
00005746	nettest	ewb0.0.0.13.	1127	0	12116624	12115280

```
>>> init
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.ef.df.ee.f4.
.
.
.
>>>
```

3.2.3 cat el and more el

The **cat el** and **more el** commands display the contents of the console event log. Status and error messages are logged to the console event log at power-up, during normal system operation, and while running system tests. Standard error messages are indicated by asterisks (***)

When **cat el** is used, the contents of the console event log scroll by. You can use the Ctrl/S key combination to stop the screen from scrolling, Ctrl/Q to resume scrolling.

The **more el** command allows you to view the console event log one screen at a time.

Syntax

```
cat el
```

```
or
```

```
more el
```

Example

The following example shows an abbreviated console event log with an error message that indicates the keyboard is not plugged in or is not working.

```
>>> more el
*** keyboard not plugged in...
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.ef.df.ee.f4.
probing hose 0, PCI
probing PCI-to-EISA bridge, bus 1
.
.
.
>>>
```

3.2.4 crash

The **crash** command forces a crash dump to the selected device for DIGITAL UNIX and OpenVMS systems. Use this command when an error has caused the system to hang and can be halted by the Halt button or the RMC **halt** command. The **crash** command restarts the operating system and forces a crash dump to the selected device.

Refer to *OpenVMS Alpha System Dump Analyzer Utility Manual* for information on how to interpret OpenVMS crash dump files.

Refer to the *Guide to Kernel Debugging* for information on using the DIGITAL UNIX Krash Utility.

Syntax

crash [device]

Argument:

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

Example

```
>>> crash dka100
CPU restarting
DUMP: 401408 blocks available for dumping.
DUMP: 38535 required for 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 100 1 0 5 0 0, block 131072
.
.
.
succeeded
halted CPU
halt code = 5
Halt instruction executed
PC = fffffc00004e2d64
>>>
```

3.2.5 memexer

The **memexer** command tests memory by running a specified number of memory exercisers. The exercisers are run in the background and nothing is displayed unless an error occurs. Each exerciser tests all available memory in twice the backup cache size blocks for each pass.

To terminate the memory tests, use the **kill** command to terminate an individual diagnostic or the **kill_diags** command to terminate all diagnostics. Use the **show_status** display to determine the process ID when terminating an individual diagnostic test.

Syntax

```
memexer [number]
```

Argument:

[number] Number of memory exercisers to start. The default is 1.

The number of exercisers, as well as the length of time for testing, depends on the context of the testing. Generally, running three to five exercisers for 15 minutes to 1 hour is sufficient for troubleshooting most memory problems.

Examples

The following is an example with no errors.

```
>>> memexer 4
>>> show_status

  ID  Program  Device  Pass Hard/Soft Bytes Written  Bytes Read
  ---  -
00000001  idle  system    0 0 0          0          0
000000c7  memtest memory    3 0 0 635651584 62565154
000000cc  memtest memory    2 0 0 635651584 62565154
000000d0  memtest memory    2 0 0 635651584 62565154
000000d1  memtest memory    3 0 0 635651584 62565154
>>> kill_diags
>>>
```

The following is an example with a memory compare error indicating bad DIMMs. In most cases, the failing bank and DIMM position (Figure 3-1) are specified in the error message. If the failing DIMM information is not provided, use the procedure that follows to isolate a failing DIMM.

```
>>> memexer 3
```

```
*** Hard Error - Error #41 - Memory compare error
```

```
Diagnostic Name      ID      Device  Pass  Test  Hard/Soft  11-NOV-1997
memtest             00000193  brd0   114   1      0         12:00:01
Expected value:     25c07
Received value      35c07
Failing addr:       a11848
```

```
*** End of Error ***
```

```
>>> kill_diags
```

```
>>>
```

To find the failing bank, compare the failing address (a11848 in this example) with the **show memory** display or memory portion of the **show config** command display:

1. Banks with no memory present are eliminated as possible failing banks.
2. If the failing address is greater than the bank starting address, but less than the starting address for the next bank, then the failing DIMM is within this bank. (Bank 0 in the example using failing address a11848 and the following memory display.)

```
>>> show memory
```

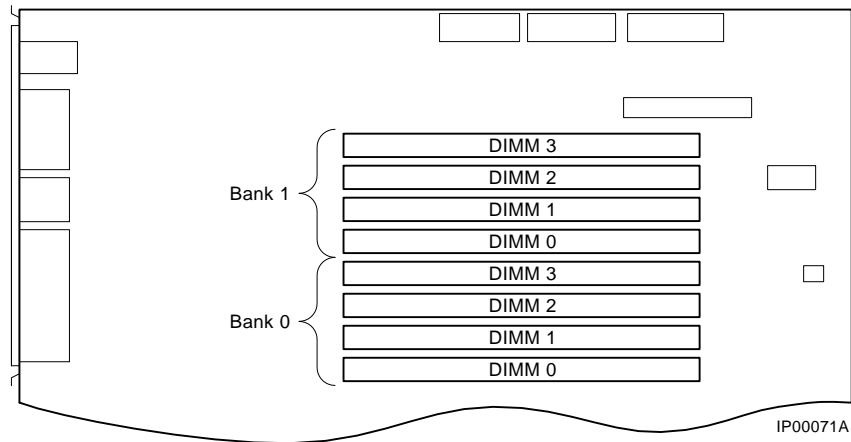
```
Memory
 128 Meg of System Memory
 Bank 0 = 64 Mbytes (16MB per DIMM) Starting at 0x00000000
 Bank 1 = 64 Mbytes (16MB per DIMM) Starting at 0x01000000
>>>
```

To determine the failing DIMM, match the lowest five bits of the failing address in which the bad data is received to the failing DIMM using the table below.

Failing Address Lowest Five Bits	Failing DIMM
0	0
8	1
10	2
18	3

In the example, the lowest five bits (represented by the last or rightmost character in the address) in the failing address is 8 (a11848). Therefore, the failing DIMM is DIMM 1.

Figure 3-1 AlphaServer 800 Memory Layout



3.2.6 net -s

The `net -s` command displays the MOP counters for the specified Ethernet port.

Syntax

```
net -s ewa0
```

Example

```
>>> net -s ewa0
```

```
Status counts:
```

```
ti: 72 tps: 0 tu: 47 tjt: 0 unf: 0 ri: 70 ru: 0  
rps: 0 rwt: 0 at: 0 fd: 0 lnf: 0 se: 0 tbf: 0  
tto: 1 lkf: 1 ato: 1 nc: 71 oc: 0
```

```
MOP BLOCK:
```

```
Network list size: 0
```

```
MOP COUNTERS:
```

```
Time since zeroed (Secs): 42
```

```
TX:
```

```
Bytes: 0 Frames: 0
```

```
Deferred: 1 One collision: 0 Multi collisions: 0
```

```
TX Failures:
```

```
Excessive collisions: 0 Carrier check: 0 Short circuit: 71
```

```
Open circuit: 0 Long frame: 0 Remote defer: 0
```

```
Collision detect: 71
```

```
RX:
```

```
Bytes: 49972 Frames: 70
```

```
Multicast bytes: 0 Multicast frames: 0
```

```
RX Failures:
```

```
Block check: 0 Framing error: 0 Long frame: 0
```

```
Unknown destination: 0 Data overrun: 0 No system buffer: 0
```

```
No user buffers: 0
```

```
>>>
```

3.2.7 net -ic

The **net -ic** command initializes the MOP counters for the specified Ethernet port.

Syntax

```
net -ic ewa0
```

Example

```
>>> net -ic ewa0
>>> net -s ewa0
Status counts:
ti: 72 tps: 0 tu: 47 tjt: 0 unf: 0 ri: 70 ru: 0
rps: 0 rwt: 0 at: 0 fd: 0 lnf: 0 se: 0 tbf: 0
tto: 1 lkf: 1 ato: 1 nc: 71 oc: 0

MOP BLOCK:
  Network list size: 0

MOP COUNTERS:
Time since zeroed (Secs): 3

TX:
  Bytes: 0 Frames: 0
  Deferred: 0 One collision: 0 Multi collisions: 0
TX Failures:
  Excessive collisions: 0 Carrier check: 0 Short circuit: 0
  Open circuit: 0 Long frame: 0 Remote defer: 0
  Collision detect: 0

RX:
  Bytes: 0 Frames: 0
  Multicast bytes: 0 Multicast frames: 0
RX Failures:
  Block check: 0 Framing error: 0 Long frame: 0
  Unknown destination: 0 Data overrun: 0 No system buffer: 0
  No user buffers: 0
>>>
```

3.2.8 kill and kill_diags

The **kill** and **kill_diags** commands terminate diagnostics that are currently executing.

*NOTE: A serial loopback connector (12-27351-01) must be installed on the COM2 serial port for the **kill_diags** command to successfully terminate system tests.*

- The **kill** command terminates a specified process.
- The **kill_diags** command terminates all diagnostics.

Syntax

kill_diags

kill [PID. . .]

Argument:

[PID. . .] The process ID of the diagnostic to terminate. Use the **show_status** command to determine the process ID.

3.2.9 show_status

Use the **show_status** command to display the progress of diagnostics. The **show_status** command reports one line of information per executing diagnostic. The information includes ID, diagnostic program, device under test, error counts, passes completed, bytes written, and bytes read.

Many of the diagnostics run in the background and provide information only if an error occurs.

The following command string is useful for periodically displaying diagnostic status information for diagnostics running in the background:

```
>>> while true;show_status;sleep n;done
```

Where *n* is the number of seconds between show_status displays.

Syntax

```
show_status
```

Example

```
①      ②      ③      ④      ⑤      ⑥      ⑦
>>> show_status
  ID      Program  Device  Pass  Hard/Soft Bytes Written  Bytes Read
-----
00000001  idle system      0      0 0          0          0
0000002d  exer_kid ttal      0      0 0          1          0
0000003d  nettest ewa0.0.0.2.1 43      0 0        1376        1376
00000045  memtest memory      7      0 0       424673280   424673280
00000052  exer_kid dka100.1.0.6 0      0 0          0        2688512
>>>
```

- ① Process ID
- ② Program module name
- ③ Device under test
- ④ Diagnostic pass count
- ⑤ Error count (hard and soft): soft errors are not usually fatal; hard errors halt the system or prevent completion of the diagnostics.
- ⑥ Bytes successfully written by the diagnostic.
- ⑦ Bytes successfully read by the diagnostic.

Chapter 4

Server Management Console

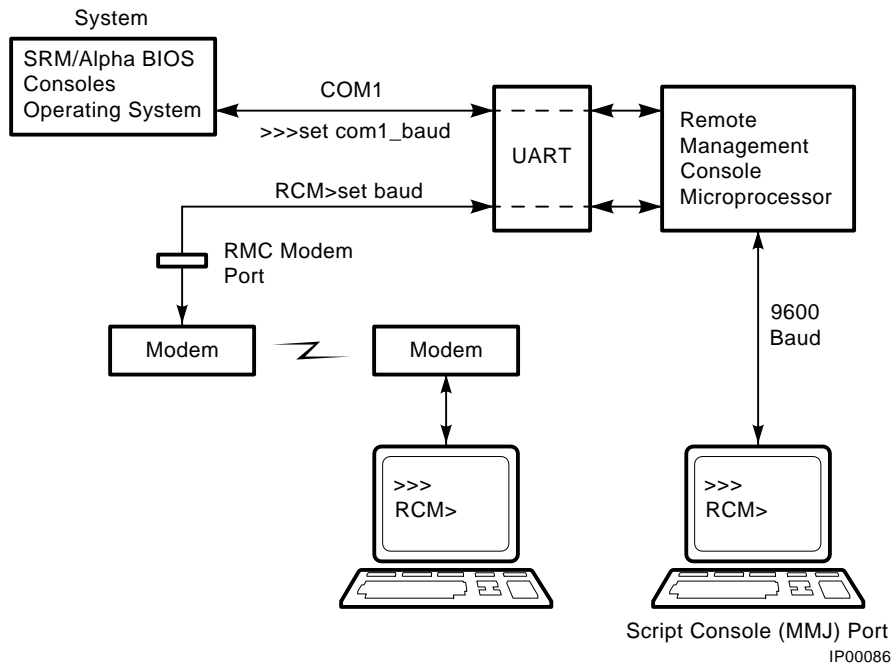
This chapter describes the function and operation of the integrated server management console.

- Section 4.1 describes how the remote management console (RMC) allows you to remotely monitor and control the system.
- Section 4.2 describes the first-time setup procedures for using the RMC modem port and enabling the system to call out to a remote operator.
- Section 4.3 describes the procedure to reset the RMC to its factory settings.
- Section 4.4 describes the RMC commands.
- Section 4.5 provides troubleshooting tips and suggestions for using the RMC.

4.1 Operating the System Remotely

The remote management console (RMC) enables the user to monitor and control the system remotely. The RMC resides on the system backplane and allows a remote operator to connect to the system through a modem, using a serial terminal or terminal emulator.

Figure 4-1 Remote Management Console Block Diagram



You can access the RMC through either of two serial lines: the standard console terminal COM1 (MMJ) port or the RMC modem port (9-pin DIN).

- To enter the RMC console remotely, dial in through a modem, enter a password, and then type a special escape sequence that invokes the RMC command mode. The default escape sequence is `^[^rcm`. This is equivalent to `<Esc><Esc>rcm`, where `<Esc>` is the escape key on a PC keyboard. The default string can be changed using the **set escape** command. Before you can dial in remotely, you must set up the RMC initialization and dial strings. Refer to Section 4.2 for first-time setup instructions.
- To enter the RMC console locally, type the escape sequence at the SRM console prompt on the local serial console terminal.

You can also enter the RMC console from the local graphics monitor by entering the **RMC** command at the SRM console prompt, and then entering the escape sequence. When finished accessing the RMC console from the graphics monitor, enter the **reset** command to restore the RMC and SRM consoles.

Once connected to the RMC, the operator can use a special set of remote console commands, distinct from the standard SRM and AlphaBIOS consoles. The RMC firmware is implemented in a dedicated microprocessor (RMC PIC processor). The RMC commands allow the operator to remotely monitor power supply status, system temperature, and fan status.

RMC commands also allow the remote operator to exercise control over the system, equivalent to using the system control panel: Power off/on, Reset, and Halt (in/out).

The RMC logic can dial a preset telephone number when it detects system alarm conditions. A typical scenario might be:

1. RMC detects an alarm condition due to excessive temperature.
2. RMC dials the operator's pager and sends a message identifying the system.
3. Operator dials the system from a remote serial terminal.
4. Logging into the RMC, the operator checks system status and powers down the system.
5. Later the operator powers up the system and reboots.

The remote operator can disconnect (using the **quit** command) from the RMC and connect to the system's COM1 port. Through the remote terminal, the operator can then communicate with the software and firmware that normally use the local serial terminal:

- SRM and AlphaBIOS firmware consoles
- ECU and RCU configuration utilities
- Operating systems

The RMC also provides a watchdog timer, whose interval is set using the RMC **set wdt** command. If the system fails to respond within the watchdog timer interval, the RMC recognizes an alert and dials the remote operator. (This assumes that dial-out alerts have been enabled using the commands **enable remote**, **set dial**, and **enable alert**). The watchdog timer alert also causes the RMC to reboot the system automatically, if the **enable reboot** command has been issued.

4.2 First-Time Setup

Before you can dial in remotely through the RMC modem port or enable the system to call out to a remote operator in response to system alerts, several RMC strings and parameters must be set. Use the following procedure to set up RMC strings, password and parameters; and to send out a test alert to verify the modem strings are set correctly.

1. From the local console terminal, enter the RMC escape sequence at the SRM prompt. The default escape sequence is `^[^rcm`. This is equivalent to `<Esc><Esc>rcm`, where `<Esc>` is the escape key on a PC keyboard.

You can also enter the RMC from the local graphics monitor by entering the **rcm** command at the SRM console prompt, and then entering the escape sequence. When finished accessing the RMC from the graphics monitor, enter the **reset** command to restore the RMC and SRM consoles.

2. Using the RMC command **set init**, assign the modem initialization string appropriate for your modem. Some typical initialization strings are:

Modem	Initialization String
Motorola 3400 Lifestyle 28.8	<code>at&f0e0v0x0s0=2</code>
AT &T Dataport 14.4/FAX	<code>at&f0e0v0x0s0=2</code>
Hayes Smartmodem Optima 288 V-34/V.FC + FAX	<code>at&fe0v0x0s0=2</code>

Refer to your modem documentation for more information on its initialization strings.

3. Using the RMC commands **set dial** and **set alert**, assign a dial string to be called when the RMC detects an alert condition, as well as a string to be used with a paging service, usually a call-back number for the paging service.

When an alert is sent, the dial string and alert string are concatenated and sent to the modem. Note that the dial and alert strings must be in the correct string format for the attached modem. If a paging service is to be contacted, then the dial and alert strings must include the appropriate modem commands to dial the number, wait for the line to connect, and send the appropriate touch tones to leave a pager message. Elements of a dial and alert string are provided in Table 4-1.

Table 4-1 Dial and Alert String Elements

String Elements	Description
Dial String	
ATXDT	(Enter characters either in all uppercase or all lowercase). AT = Attention X = Forces the modem to dial “blindly” (not look for the dial tone). Enter this character if the dial-out line modifies its dial tone when used for services such as voice mail. D = Dial T = Tone (for touch-tone) , = 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.
Alert String	
,,,,,	Pause for 12 seconds for paging service to answer (each comma (,) provides a two second delay).
5085553332#	“Message,” usually a call-back number for the paging service. The alert string must be terminated by the # character.
;	Return to console command (;) character must be used to terminate the string.

4. Using the RMC command **set password**, assign a password of up to 14 characters that will be stored in nonvolatile memory. This password must be set before access through the modem port can be enabled.
5. Using the RMC command **enable remote**, enable access to the to RMC modem port. This also allows the RMC to automatically dial the phone number set by the dial string upon detection of an alert condition and to send the modem initialization string to the modem.
6. Using the RMC command **enable alert**, enable alert condition to page an external operator.

7. Using the RMC command **send alert**, force an alert condition in order to test the dial out function and verify proper setup of the modem initialization, dial, and alert strings.
8. Once the alert is received successfully, use the RMC command **clear alert**, to clear the current alert condition and cause the RMC to stop paging the remote operator. If the alert is not cleared, the RMC continues to page the remote operator approximately every 30 minutes.

Example: First Time Setup

```
RCM> status
```

```
PLATFORM STATUS:
```

```
Firmware Revision: V1.0
Server Power: OFF
Fanstate:
System Halt:
Temperature: 29.0°C (warnings at 46°C, power-off at 52°C)
RCM Power Control: ON
Escape sequence: ^^[RCM
Remote Access: Disabled
Alert Enable: Disabled
Alert Pending: NO
Init String:
Dial String:
Alert String:
Modem and COM1 baud: 9600
Last Alert:
Watchdog Timer: 60 seconds
Autoreboot : ON
```

```
RCM> set init
init> at&f0e0v0x0s0=2
RCM> set dial
dial> atxdt9,15085553333
RCM> set alert
alert> //,5085553332#;
RCM> set password
new pass> *****
RCM> enable remote
RCM> enable alert
RCM> send alert
RCM> clear alert
```

```
RCM> status
PLATFORM STATUS:
Firmware Revision: V1.0
Server Power: OFF
Fanstate:
System Halt:
Temperature: 29.0°C (warnings at 46°C, power-off at 52°C)
RCM Power Control: ON
Escape sequence: ^^[RCM
Remote Access: Enabled
Alert Enable: Enabled
Alert Pending: NO
Init String: at&f0e0v0x0s0=2
Dial String: atxdt9,15085553333
Alert String: ,,,,,,5085553332#;
Modem and COM1 baud: 9600
Last Alert: RCM User Requested
Watchdog Timer: 60 seconds
Autoreboot : ON
```

4.3 Resetting the RMC to Factory Defaults

If you have forgotten the password, or have changed and forgotten the RMC escape sequence, you can reset the RMC to its factory settings. Use the following procedure to restore the default settings:

1. Unplug the system line cord from the AC power line.
2. Open the system side panel.
3. Install jumper J22 on the system motherboard (refer to Figure A-1).
4. Plug the system line cord into the AC power line for approximately 15 seconds.
5. Unplug the system line cord from the AC power line.
6. Remove jumper J22.
7. Close the system side panel.
8. Plug the system line cord into the AC power line

NOTE: After resetting to default settings, you should complete the first-time setup procedures to enable remote dial in and call out alerts.

4.4 Remote Management Console Commands

The remote management console supports the following commands:

- clear** {alert, port}
- disable** {alert, reboot, remote}
- enable** {alert, reboot, remote}
- halt** {in, out}
- hangup**
- help** or ?
- power** {off, on}
- quit**
- reset**
- send alert**
- set** {alert, baud, dial, escape, init, password, wdt}
- status**

Explanations and examples of the RMC command set follow.

clear alert

The **clear alert** command clears the current alert condition and causes the RMC to stop paging the remote operator. If the alert is not cleared, the RMC continues to page the remote operator every 30 minutes, assuming both remote access and alerts are enabled.

Example:

```
RCM> clear alert
```

```
RCM>
```

clear port

The **clear port** command uses the console port modem control signals to clear any “stuck” conditions on the system’s COM1 port. The object is to attempt to free the port using the COM1 port modem control lines if it is currently locked by some application program without resetting the entire system.

Example:

```
RCM> clear port
```

```
RCM>
```

disable alert

The **disable alert** command disables alert conditions from paging an external operator. Monitoring continues and alerts are still logged in the “last alert” field; however, alerts are not sent to the remote user.

Example:

```
RCM> disable alert  
RCM>
```

disable reboot

The **disable reboot** command disables automatic reboot of the system when the watchdog timer expires.

Example:

```
RCM> disable reboot  
RCM>
```

disable remote

The **disable remote** command disables the remote access to the RMC modem port and disables the automatic dialing on alert condition detection.

Example:

```
RCM>disable remote  
RCM>
```

enable alert

The **enable alert** command enables alert conditions to page an external operator.

Example:

```
RCM> enable alert  
RCM>
```

enable reboot

The **enable reboot** command enables automatic reboot of the system when the watchdog timer expires. The watchdog timer is enabled and operated by the operating system. It periodically interrupts the server management microcontroller and assists in clearing a hung state in the operating system. If the microcontroller does not receive a watchdog timer interrupt for a specified period of time, it will reset the system.

Example:

```
RCM> enable reboot
```

```
RCM>
```

enable remote

The **enable remote** command enables access to the RMC modem port. This command also allows the RMC to automatically dial the phone number set with the **set dial** command upon detection of alert conditions. The **enable remote** command causes the modem initialization string to be sent to the modem (see **set init** command).

*NOTE: The RMC password must be set for the **enable remote** command to succeed.*

Example:

```
RCM>enable remote
```

```
RCM>
```

halt in

The **halt in** command is the equivalent of setting the Halt button on the server front panel to the latching “in” position. After executing the **halt in** command, the user is switched from the RMC monitor to the server’s COM1 port. Note that a local operator physically powering off the system through the system front panel will override this command and reset the **halt** command to the “out” condition.

Example:

```
RCM>halt in
```

```
Returning to COM port.
```

halt out

The **halt out** command is the equivalent of setting the Halt button on the server front panel to the “out” position. After executing the **halt out** command, the user is switched from the RMC monitor to the server’s COM1 port. Note that a local operator physically placing the front panel Halt button to the “In” position takes precedence over the setting of this command.

Example:

```
RCM>halt out
```

Returning to COM port.

hangup

The **hangup** command terminates the modem session. Once issued, the user will no longer be connected to the server.

Example:

```
RCM>hangup
```

```
RCM>
```

help or ?

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

Example:

```
RCM>help
```

```
clear {alert, port}
disable {alert, reboot, remote}
enable {alert, reboot, remote}
halt {in, out}
hangup
help or ?
power {off, on}
quit
reset
send alert
set {alert, baud, dial, escape, init, password, wdt}
status
```

power off

The **power off** command is the equivalent of turning off the system power from the operator control panel. If the system is already powered off this command will have no effect. The system can be powered back on by either issuing a **power on** command or by toggling the power button on the system front panel.

Example:

```
RCM>power off
```

```
RCM>
```

power on

The **power on** command is the equivalent of turning on the system power from the operator control panel. If the system is already powered on or if the system is powered off through the system power button, this command has no effect. After executing the **power on** command from the RMC monitor, the user is switched back to the server's COM1 port.

Example:

```
RCM>power on
```

```
Returning to COM port.
```

quit

The **quit** command is used to exit console monitor mode and return to pass-through mode.

Example:

```
RCM>quit
```

```
Returning to COM port.
```

reset

The **reset** command is the equivalent of pushing the Reset button from the operator control panel. It causes a full re-initialization of the system firmware. When the **reset** command is executed, the user's terminal exits console monitor mode and reconnects to the server's COM1 port.

Example:

```
RCM>reset
```

Returning to COM port.

send alert

The **send alert** command forces an alert condition. This command can be used to test the setup of the alert dial out function or to send an alert condition when a system application program is connected to the RMC monitor program.

Example:

```
RCM> send alert
```

```
RCM>
```

set alert

The **set alert** command sets the alert string that is transmitted through the modem when an alert condition is detected. This string should be set to some meaningful value such as the system remote access phone number. An application on the remote system could monitor incoming alert strings and take appropriate action. The maximum string length is 47 characters. When the alert is sent, the dial string and alert string are concatenated and sent to the modem.

Example:

```
RCM> set alert
```

```
alert> ,,,,,,,5085551212#;
```

```
RCM>
```

“;” is used to cause a 2-second delay, which may be helpful when sending data to numeric paging services.

“#;” must be used to terminate the alert string.

set baud

The **set baud** command sets the baud rate on the RMC modem port and on the COM1 to microcontroller port. Allowed values are 1, 2, and 3. Note that the microcontroller port that is connected to the 6-pin MMJ connector for the local console terminal is not affected. This port is fixed at 9600 baud.

It is important that the baud rate being used by the operating system or console (**com1_baud**) be changed before using this command; otherwise the remote operator will not be able to communicate with the system.

Consider the following before changing the baud rate:

- The value of the SRM **com1_baud** environment variable is saved in nonvolatile memory, while the value of the RMC **set baud** command is not. If you have changed the baud rate and the power fails, the RMC modem baud rate will return to the default value (9600) and the **com1_baud** rate would have to be changed locally before a remote dial in could be reestablished.
- The ECU and RCU configuration utilities only run at the 9600 baud rate setting.
- DIGITAL UNIX requires that a file be edited to match the new baud rate, or the operating system will not reboot successfully.

The following example uses the SRM console.

*NOTE: If a modem is being used, the **enable remote** command must be issued following the **set baud** command in order to set the modem to the new baud rate.*

Example:

```
>>> show com1_baud
com1_baud          9600
>>> set com1_baud 38400
^[^[RCM
RCM> set baud
baud (1=9600, 2=19200, 3=38400)>3
RCM> quit
```

Returning to COM port

```
>>> show com1_baud
com1_baud          38400
>>>
```

set dial

The **set dial** command sets the dial string to be used when the RMC detects an alert condition. Note that this string must be in the correct dial string format for the attached modem. If a paging service is to be contacted, then the dial string must include the appropriate modem commands to dial the number, wait for the line to connect, and send the appropriate touch tones to leave a pager message. The dial string is limited to 31 characters.

Example:

```
RCM> set dial
dial> ATXDT15085551234
RCM>
```

set escape

The **set escape** command allows the user to change the escape sequence used for exiting pass-through mode and entering console monitor mode. The escape sequence can be any character string. A typical sequence consists of two or more control characters for a maximum of 14 characters. It is recommended that control characters be used in preference of ASCII characters.

Example:

```
RCM> set escape
new esc> ^[^[rcm
RCM>
```

set init

The **set init** command sets the modem initialization string. This string is limited to 31 characters and may be modified depending on the type of modem used. Some typical initialization strings are:

Modem	Initialization String
Motorola 3400 Lifestyle 28.8	at&f0e0v0x0s0=2
AT &T Dataport 14.4/FAX	at&f0e0v0x0s0=2
Hayes Smartmodem Optima 288 V-34/V.FC + FAX	at&fe0v0x0s0=2

Example:

```
RCM> set init
init> at&f0e0v0x0s0=2
RCM>
```

set password

The **set password** command allows the user to change the password that is prompted at the beginning of a modem session. The password is stored in nonvolatile memory. The maximum password length is 14 characters. The password is not echoed on the user's terminal. The password must be set before access through the modem can be enabled.

Example:

```
RCM> set pass
new pass> *****
RCM>
```

set wdt

The **set wdt** command sets the time-out period for the system watchdog timer. Allowable values are:

- 0 (disabled)
- 1 (10 seconds)
- 2 (20 seconds)
- .
- .
- .
- 9 (90 seconds)

Example:

```
RCM> set wdt
time (0-9 tens of seconds)> 3
RCM>
```

status

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

Example:

```
RCM> status
```

PLATFORM STATUS:

```
Firmware Revision: V1.0  
Server Power: ON  
Fanstate: OK  
System Halt: Deasserted  
Temperature: 29.0°C (warnings at 46°C, power-off at 52°C)  
RCM Power Control: ON  
Escape sequence: ^^[RCM  
Remote Access: Enabled and connected  
Alert Enable: Disabled  
Alert Pending: NO  
Init String: At&f0e0v0x0s0=2  
Dial String: atxdt815085551212  
Alert String: ,,,,,,,5085551234#;  
Modem and COM1 baud: 9600  
Last Alert:  
Watchdog Timer: 60 seconds  
Autoreboot : ON  
RCM>
```

4.5 RMC Troubleshooting Tips

Table 4-2 lists a number of possible causes and suggested solutions for symptoms you might see.

Table 4-2 RMC Troubleshooting

Symptom	Possible Cause	Suggested Solution
The local terminal will not communicate with the system or RMC console.	System, terminal, or RMC baud rate set incorrectly.	Set the baud rates for the system, RMC, and terminal to 9600 baud. For first-time setup, suspect the console terminal, since the RMC and system default is 9600.
RMC will not answer when the modem is called.	Modem cables may be incorrectly installed.	Check modem phone lines and connections.
	RMC remote access is disabled.	Enable remote access.
	RMC does not have a valid password set.	Set password and enable remote access.
	On power-up, the RMC defers initializing the modem for 30 seconds to allow the modem to complete its internal diagnostics and initializations.	Wait 30 seconds after powering up the system and RMC before attempting to dial in.
	Modem may have had power cycled since last being initialized or modem is not set up correctly.	Enter enable remote command from RMC console.

Continued on next page

Table 4-2 RMC Troubleshooting (continued)

Symptom	Possible Cause	Suggested Solution
After the system is powered up, the COM1 port seems to hang and then starts working after a few seconds.	This delay is normal behavior due to initialization.	Wait a few seconds for the COM1 port to start working.
New password and escape sequence are forgotten.		Reset the RMC to its factory default settings. Refer to Section 4.3.
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 line feed character with the carriage return.	Change the terminal or terminal emulator setting so that “new line” is not selected.
Cannot enable modem or modem will not answer.	The modem is not configured correctly to work with the RMC.	Modify the modem initialization string according to your modem documentation.

Chapter 5

Error Log Analysis

This chapter tells how to interpret error logs reported by the operating system.

- Section 5.1 provides the fault detection and correction components of AlphaServer 800 systems.
- Section 5.2 describes machine checks/interrupts and how these errors are detected and reported.
- Section 5.3 describes how to generate a formatted error log using the DECEvent Translation and Reporting Utility available with OpenVMS and DIGITAL UNIX.

5.1 Fault Detection and Reporting

Table 5-1 provides a summary of the fault detection and correction components of AlphaServer 800 systems.

Generally, PALcode handles exceptions as follows:

- The PALcode determines the cause of the exception.
- If possible, it corrects the problem and passes control to the operating system for reporting before returning the system to normal operation.
- If error/event logging is required, control is passed through the system control block (SCB) to the appropriate exception handler.

Table 5-1 AlphaServer 800 Fault Detection and Correction

Component	Fault Detection/Correction Capability
CPU Daughter Board	
Alpha 21164 microprocessor	Contains error detection and correction (EDC) logic for data cycles. There are check bits associated with all data entering and exiting the microprocessor. A single-bit error on any of the four longwords being read can be corrected (per cycle). A double-bit error on any of the four longwords being read can be detected (per cycle).
Backup cache (B-cache)	EDC check bits on the data store, and parity on the tag address store and tag control store.
Memory Subsystem	
Memory DIMMs	EDC logic protects data by detecting and correcting data cycle errors. A single-bit error on any of the four longwords can be corrected (per cycle). A double-bit error on any of the four longwords being read can be detected (per cycle).
Motherboard	
SCSI controller	SCSI data parity is generated.
EISA-to-PCI bridge chip	PCI data parity is generated.

5.2 Machine Checks/Interrupts

The exceptions that result from hardware system errors are called machine checks/interrupts. They occur when a system error is detected during the processing of a data request. Four types of machine checks/interrupts are related to system events:

- Processor machine check (SCB 670)
- System machine check (SCB 660)
- Processor-detected correctable error (SCB 630)
- System-detected nonfatal error (SCB 620)

NOTE: A fan failure is a fatal, noncorrectable error, but is reported as nonfatal to allow the operating system to perform shutdown.

During the error-handling process, errors are first handled by the appropriate PALcode error routine and then by the associated operating system error handler. The causes of each of the machine check/interrupts are as follows. The system control block (SCB) vector through which PALcode transfers control to the operating system is shown in parentheses.

Processor Machine Check (SCB: 670)

Processor machine check errors are fatal system errors that result in a system crash. The error-handling code for these errors is common across all platforms using the Alpha 21164 microprocessor.

- I-cache data or tag parity error
- S-cache data parity error—I-stream
- S-cache tag parity error—I-stream
- S-cache data parity error—D-stream Read/Read, READ_DIRTY
- S-cache tag parity error—D-stream or system commands
- D-cache data parity error
- D-cache tag parity error
- I-stream uncorrectable ECC data parity errors (B-cache or memory)
- D-stream uncorrectable ECC data parity errors (B-cache or memory)
- B-cache tag parity errors—I-stream
- B-cache tag parity errors—D-stream
- System command/address parity error

System Machine Check (SCB: 660)

A system machine check is a system- or processor-detected error that occurred as a result of an “off-chip” request to the system. The following conditions cause PALcode to build the 660/670 machine check logout frame and invoke the 660 error handler.

- CIA-detected noncorrectable ECC error
- CIA-detected command/address parity error
- CIA-detected nonexistent memory reference
- PCI bus parity error
- PCI command/address parity error
- PCI master abort
- PCI target abort
- Scatter/gather invalid translations table entry
- I/O timeout
- System overtemperature (event)
- Unexpected IPL 23 interrupt request

Processor-Detected Correctable Errors (SCB: 630)

Processor-detected correctable errors are generic Alpha 21164A microprocessor correctable errors. The error-handling code should be common across all platforms that use the Alpha 21164A. The following conditions cause PALcode to invoke the operating system 630 error handler:

- Single-bit I-stream ECC error
- Single-bit D-stream ECC error

System-Detected Nonfatal Error (SCB: 620)

These nonfatal errors are AlphaServer 800-specific correctable errors. The following conditions cause the PALcode to invoke the operating system 620 error handler:

- DMA read errors
- High temperature warning (event)
- Fan warning/failure (event)—This event is fatal and noncorrectable, though reported as nonfatal. The OS then shuts the system down.

5.2.1 Error Logging and Event Log Entry Format

The DIGITAL UNIX and OpenVMS error handlers generate several entry types. Error entries, except for correctable memory errors, are logged immediately. Entries can be of variable length based on the number of registers within the entry.

Each entry consists of an operating system header, several device frames, and an end frame. Most entries have a PAL-generated logout frame, and may contain frames for CPU, memory, and I/O.

5.3 Event Record Translation

Systems running DIGITAL UNIX and OpenVMS operating systems use the DECEvent management utility to translate events into ASCII reports derived from system event entries (bit-to-text translations).

The DECEvent utility has the following capabilities relating to the translation of events:

- Translating event log entries into readable reports
- Selecting input and output sources
- Filtering input events
- Selecting alternate reports
- Translating events as they occur
- Maintaining and customizing the user environment with the interactive shell commands

NOTE: Microsoft Windows NT does not currently provide bit-to-text translation of system errors.

Section 5.3.1 describes the command used to translate the error log information for the OpenVMS operating system using DECEvent.

Section 5.3.2 describes the command used to translate the error log information for the DIGITAL UNIX operating system using DECEvent.

5.3.1 OpenVMS Alpha Translation Using DECEvent

The kernel error log entries are translated from binary to ASCII using the DIAGNOSE command. To invoke the DECEvent utility, enter the DCL command DIAGNOSE.

Format:

```
DIAGNOSE/TRANSLATE [qualifier] [, . . .] [infile [, . . .]]
```

Example:

```
$ DIAGNOSE/TRANSLATE/SINCE=14-JUN-1997
```

For more information on generating error log reports using DECEvent, refer to *DECEvent Translation and Reporting Utility for OpenVMS Alpha, User and Reference Guide*.

System faults can be isolated by examining translated system error logs or using the DECEvent Analysis and Notification Utility. Refer to the *DECEvent Analysis and Notification Utility for OpenVMS Alpha, User and Reference Guide* for more information.

5.3.2 DIGITAL UNIX Translation Using DECEvent

The kernel error log entries are translated from binary to ASCII using the **dia** command. To invoke the DECEvent utility, enter the **dia** command.

Format:

```
dia [-a -f infile [ . . .]]
```

Example:

```
% dia -t s:14-jun-1997:10:00
```

For more information on generating error log reports using DECEvent, refer to *DECEvent Translation and Reporting Utility for DIGITAL UNIX, User and Reference Guide*.

System faults can be isolated by examining translated system error logs or using the DECEvent Analysis and Notification Utility. Refer to the *DECEvent Analysis and Notification Utility for DIGITAL UNIX, User and Reference Guide* for more information.

System Configuration and Setup

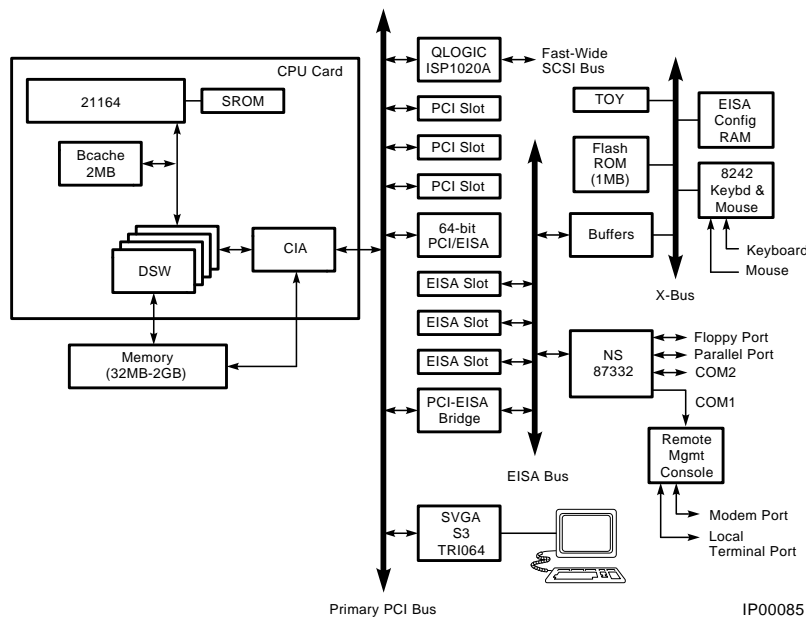
This chapter provides configuration and setup information for AlphaServer 800 systems and system options.

- Section 6.1 describes how to examine the system configuration using the console firmware.
 - Section 6.1.1 describes the function of the two firmware interfaces used with AlphaServer systems.
 - Section 6.1.2 describes how to switch between firmware interfaces.
 - Sections 6.1.3 and 6.1.4 describe the commands used to examine system configuration for each firmware interface.
- Section 6.2 describes the CPU daughter board, memory modules, and motherboard.
- Section 6.3 describes the EISA bus.
- Section 6.4 describes the EISA configuration utility (ECU).
- Section 6.5 describes the PCI bus.
- Section 6.6 describes the SCSI bus and configuration.
- Section 6.7 describes the console port configurations.

6.1 Verifying System Configuration

Figure 6-1 illustrates the system architecture for AlphaServer 800 systems.

Figure 6-1 System Architecture: AlphaServer 800 Systems



6.1.1 System Firmware

The system firmware provides support for the following operating systems:

- DIGITAL UNIX and OpenVMS Alpha are supported under the SRM console, which can be serial or graphical. The SRM firmware is in compliance with the *Alpha System Reference Manual (SRM)*.
- Microsoft Windows NT is supported under the AlphaBIOS console. Refer to the *AlphaServer 800 User's Guide* for more information on AlphaBIOS screens and menus.

The console firmware provides the data structures and callbacks available to booted programs defined in the SRM and AlphaBIOS standards.

SRM Interface

Systems running DIGITAL UNIX or OpenVMS access the SRM firmware through a command-line interface, a UNIX style shell that provides a set of commands and operators, as well as a scripting facility. The SRM console allows you to configure and test the system, examine and alter system state, and boot the operating system.

The SRM console prompt is >>>.

Several system management tasks can be performed only from the SRM console:

- All console test and reporting commands are run from the SRM console.
- Certain environment variables are changed using the SRM **set** command. For example:

```
ew*0_mode  
ew*0_protocols  
pk*0_fast  
pk*0_host_id
```

To run the ECU, you can enter the **ecu** command to load the AlphaBIOS firmware and boot the ECU from diskette. You can also load AlphaBIOS firmware using the **alphabios** command.

AlphaBIOS Menu Interface

Systems running Windows NT access the AlphaBIOS console firmware through menus that are used to configure and boot the system, run the EISA Configuration Utility (ECU), run the RAID Configuration Utility (RCU), adapter configuration utility, or set environment variables.

- You must run the EISA Configuration Utility (ECU) whenever you add, remove, or move an EISA or ISA option in your AlphaServer system. The ECU is run from diskette. Two diskettes are supplied with your system shipment, one for DIGITAL UNIX and OpenVMS and one for Windows NT. For more information about running the ECU, refer to Section 6.4.
- If you have a StorageWorks RAID array subsystem, you must run the RAID Configuration Utility (RCU) to set up the disk drives and logical units. Refer to the documentation included in your RAID kit.

6.1.2 Switching Between Interfaces

For a few procedures it is necessary to switch from one console interface to the other.

- The **test** command and other diagnostic commands are run from the SRM interface.
- The EISA Configuration Utility (ECU) and the RAID Configuration Utility (RCU) are run from the AlphaBIOS interface, as are some option-specific configuration utilities.

Switching from SRM to AlphaBIOS

Two SRM console commands are used to temporarily switch to the AlphaBIOS console:

- The **alphabios** command loads the AlphaBIOS firmware and displays the AlphaBIOS menu interface.
- The **ecu** command loads the AlphaBIOS firmware and then loads and starts the EISA configuration utility from the diskette.

The **console** environment variable determines where AlphaBIOS firmware is displayed. To force the AlphaBIOS output to the graphics display, use the **-g** qualifier with the **alphabios** or **ecu** command.

For systems that boot the Windows NT operating system, return to the AlphaBIOS console by setting the **os_type** environment variable to **NT**, then enter the **init** command:

```
>>> set os_type NT
>>> init
```

Switching from AlphaBIOS to SRM

Switch from the AlphaBIOS console to the SRM console as follows:

1. From the CMOS Setup menu, press F6 to enter Advanced CMOS setup.
2. From the Advanced CMOS Setup menu, select OpenVMS (SRM).
3. Press F10 to save the change.
4. When the "Power cycle the system to implement change" message is displayed, press the Reset button. Once the console firmware is loaded and device drivers are initialized, you can boot the operating system.

NOTE: For information on AlphaBIOS, refer to the AlphaServer 800 User's Guide.

6.1.3 Verifying Configuration: AlphaBIOS Menu Options for Windows NT

The following AlphaBIOS menu options are used for verifying system configuration on Windows NT systems:

- **Display System Configuration menu**—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.

- **CMOS Setup menu**—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.

6.1.4 Verifying Configuration: SRM Console Commands for DIGITAL UNIX and OpenVMS

The following SRM console commands are used to verify system configuration on DIGITAL UNIX and OpenVMS systems:

- **show config** (Section 6.1.4.1)—Displays the buses on the system and the devices found on those buses.
- **show device** (Section 6.1.4.2)—Displays the console bootable devices and controllers in the system.
- **show memory** (Section 6.1.4.3)—Displays main memory configuration.
- **set** and **show** (Section 6.1.4.4)—Set and display environment variable settings.

6.1.4.1 show config

The **show config** command displays all devices found on the system, including PCI and EISA bus devices. You can use the information in the display to identify target devices for commands such as **boot** and **test**, as well as to verify that the system sees all the installed devices.

The configuration display includes the following:

❶ Firmware:

The version numbers for the firmware code, PALcode, SROM chip, and CPU are displayed, along with the CPU clock speed.

❷ System motherboard revision:

The hardware revision number of the system motherboard.

❸ Memory: The memory size and configuration for each bank of memory.

❹ Hose 0, Bus 0, PCI:

All controllers on Hose 0, Bus 0 of the primary PCI bus. The logical slot numbers are listed in the left column of the display.

Slot 5 = SCSI controller on the system backplane, along with storage drives on the bus.

Slot 6 = Onboard VGA video adapter

Slot 7 = PCI to EISA bridge chip

Slots 11–14 correspond to physical PCI card cage slots on the PCI bus:

Slot 11 = PCI11

Slot 12 = PCI12

Slot 13 = PCI13

Slot 14 = PCI14 (64-bit PCI option)

In the case of storage controllers, the devices off the controller are also displayed.

❺ Hose 0, Bus 1, EISA:

All controllers on Hose 0, Bus 1 of the EISA bus. The logical slot numbers in the left column of the display correspond to physical EISA card cage slots (1–3).

In the case of storage controllers, the devices off the controller are also displayed.

❻ Hose 0, Bus 2, PCI:

If PCI options contain a PCI-to-PCI bridge, such as the DECchip 21050-AA in the PCI bus, slot 11, in the show configuration example, the additional bus is represented in the display.

For each option that contains a PCI-to-PCI bridge, the bus number increments by 1, and the logical slot numbers start anew at 0.

For more information on device names, refer to Figure 6-2. Refer to Figure 6-3 for the location of physical slots.

Syntax

show config

Example

>>> **show config**

```
                Digital Equipment Corporation
                AlphaServer 800 5/400

Firmware ❶
SRM Console:      V4.8-29
ARC Console:      v5.8
PALcode:         VMS PALcode V1.19-3, OSF PALcode V1.21-5
Serial Rom:       X0.4

Processor
DECchip (tm) 21164A-1 400MHz

System ❷
Motherboard Revision: 0

Memory ❸
    64 Meg of System Memory
    Bank 0 = 64 Mbytes(16 MB Per DIMM) Starting at 0x00000000
    Bank 1 = No Memory Detected

Slot Option      Hose 0, Bus 0, PCI ❹
  5 QLogic ISP1020 pka0.7.0.5.0    SCSI Bus ID 7
                   dka100.1.0.5.0    RZ28M-S
                   dka200.2.0.5.0    RZ28M-S
                   dka400.4.0.5.0    RRD45

  6 S3 Trio64/Trio32
  7 Intel 82375EB           Bridge to Bus 1, EISA
 11 DECchip 21050-AA       Bridge to Bus 2, PCI
 12 DECchip 21040-AA ewb0.0.0.12.0 00-00-C0-33-E0-0D
 13 NCR 53C825            pkd0.7.0.13.0  SCSI Bus ID 7

Slot Option      Hose 0, Bus 1, EISA ❺
  1 DE425          ewa0.0.0.1001.0 08-00-2B-3E-BC-B5

Slot Option      Hose 0, Bus 2, PCI ❻
  0 DECchip 21040-AA ewa0.0.0.2000.0 08-00-2B-E5-CC-B1
  2 Qlogic ISP1020  pkb0.7.0.2002.0  SCSI Bus ID 7
  3 Qlogic ISP1020  pkc0.7.0.2003.0  SCSI Bus ID 7
                   dkc0.0.0.2003.0  RZ25

>>>
```


Example

```
>>> show device
```

❶	❷	❸	❹
dka100.1.0.5.0	DKA100	RZ28M-S	0021
dka200.2.0.5.0	DKA200	RZ28M-S	0526
dka400.4.0.5.0	DKA400	RRD45	1645
dkc0.0.0.2003	DKC9	RZ25	0900
dva0.0.0.1000.0	DVA0		
ewa0.0.0.1001.0	EWA0	08-00-2B-3E-BC-B5	
ewb0.0.0.12.0	EWB0	00-00-C0-33-E0-0D	
ewc0.0.0.13.0	EWCO	08-00-2B-E6-4B-F3	
pka0.7.0.5.0	PKA0	SCSI Bus ID 7	2.10
pka0.7.0.2002.0	PKB0	SCSI Bus ID 7	2.10
pka0.7.0.2003.0	PKC0	SCSI Bus ID 7	2.10

```
>>>
```

- ❶ Console device name
- ❷ Node name (alphanumeric, up to 6 characters)
- ❸ Device type
- ❹ Firmware version (if known)

6.1.4.3 show memory

The **show memory** command displays information for each bank of memory in the system.

Syntax

```
show memory
```

Example

```
>>> show memory
```

```
64 Meg of System Memory
Bank 0 = 64 Mbytes(16 MB Per DIMM) Starting at 0x00000000
Bank 1 = No Memory Detected
>>>
```

6.1.4.4 set and show (Environment Variables)

The environment variables described in Table 6-1 are typically set when you are configuring a system.

Syntax:

```
set [-default] [-integer] [-string] envvar value
```

*NOTE: Whenever you use the **set** command to reset an environment variable, you must initialize the system to put the new setting into effect. You initialize the system by entering the **init** command or pressing the Reset button.*

```
show envvar
```

Arguments:

envvar	The name of the environment variable to be modified.
value	The value that is assigned to the environment variable. This may be an ASCII string.

Options:

-default	Restores variable to its default value.
-integer	Creates variable as an integer.
-string	Creates variable as a string (default).

Examples

```
>>> set bootdef_dev dka200
>>> show bootdef_dev
bootdef_dev    dka200.2.0.5.0
>>> show auto_action
boot
>>> set boot_osflags 0,1
>>>
```

Table 6-1 Environment Variables Set During System Configuration

Variable	Attributes	Description
auto_action	NV,W ¹	<p>The action the console should take following an error halt or power failure. Defined values are:</p> <p>BOOT — Attempt bootstrap.</p> <p>HALT — Halt, enter console I/O mode.</p> <p>RESTART — Attempt restart. If restart fails, try boot.</p> <p>No other values are accepted.</p>
bootdef_dev	NV,W	<p>The device or device list from which booting is to be attempted when no path is specified. Set at factory to disk with factory-installed software; otherwise NULL.</p>
boot_file	NV,W	<p>The default file name used for the primary bootstrap when no file name is specified by the boot command. The default value is NULL.</p>
boot_osflags	NV,W	<p>Default parameters to be passed to system software during booting if none are specified by the boot command.</p> <p>OpenVMS: Additional parameters are the <i>root_number</i> and <i>boot_flags</i>. The default value is NULL.</p> <p><i>root_number:</i> Directory number of the system disk on which OpenVMS files are located.</p> <p>0 (default)—[SYS0.SYSEXEXE] 1—[SYS1.SYSEXEXE] 2—[SYS2.SYSEXEXE] 3—[SYS3.SYSEXEXE]</p>

¹ NV—Nonvolatile. The last value saved by system software or set by console commands is preserved across system initializations, cold bootstraps, and long power outages.

W—Warm nonvolatile. The last value set by system software is preserved across warm bootstraps and restarts.

Variable	Attributes	Description
boot_osflags (continued)		<p><i>boot_flags</i>: The hexadecimal value of the bit number or numbers to set. To specify multiple boot flags, add the flag values (logical OR).</p> <p>1—Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).</p> <p>2—Map XDELTA to running system.</p> <p>4—Stop at initial system breakpoint.</p> <p>8—Perform a diagnostic bootstrap.</p> <p>10—Stop at the bootstrap breakpoints.</p> <p>20—Omit header from secondary bootstrap file.</p> <p>80—Prompt for the name of the secondary bootstrap file.</p> <p>100—Halt before secondary bootstrap.</p> <p>10000—Display debug messages during booting.</p> <p>20000—Display user messages during booting.</p> <p>DIGITAL UNIX: The following parameters are used with this operating system:</p> <p>a—Autoboot. Boots /vmunix from bootdef_dev, goes to multi-user mode. Use this for a system that should come up automatically after a power failure.</p> <p>s—Stop in single-user mode. Boots /vmunix to single-user mode and stops at the # (root) prompt.</p> <p>i—Interactive boot. Requests the name of the image to boot from the specified boot device. Other flags, such as -kdebug (to enable the kernel debugger), may be entered using this option.</p> <p>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 at system crash.</p> <p>Common settings are a, autoboot, and Da, autoboot and create full dumps if the system crashes.</p>
bus_probe_algorithm	NV	Specifies a bus probe algorithm for the system. This setting is fixed and cannot be altered.

Variable	Attributes	Description
com1_baud	NV,W	<p>Sets the baud rate of the COM1 (MMJ) port. The default baud rate is 9600.</p> <p>Baud rate values are 9600, 19200, 38400.</p> <p>If you change com1_baud to a setting other than 9600, you need to change the RMC baud rate to match.</p>
com2_baud	NV,W	<p>Sets the baud rate of the COM2 port. The default baud rate is 9600.</p> <p>Baud rate values are 300, 600, 1200, 2400, 4800, 9600, and 19200.</p>
com1_flow, com2_flow	NV,W	<p>The com1_flow and com2_flow environment variables indicate the flow control on the serial ports. Defined values are:</p> <p>None—No flow control. Software—Use XON/XOFF (default value). HARDWARE — Use modem signals CTS/RTS. Both— Use software and hardware.</p>
com1_modem, com2_modem	NV,W	<p>Used by the operating system to determine if a modem is present.</p> <p>On— Modem is present. Off—Modem is not present (default value).</p>
console	NV	<p>Sets the device on which power-up output is displayed.</p> <p>Graphics—Sets the power-up output to be displayed at a graphics monitor or device connected to the VGA module.</p> <p>Serial—Sets the power-up output to be displayed on the device that is connected to the COM1 (MMJ) port.</p>
ew*0_mode	NV	<p>Sets the Ethernet controller to the default Ethernet device type.</p> <p>aui—Sets the default device to AUI. bnc—Sets the default device to ThinWire. fast—Sets the default device to fast 100BaseT.</p>

Variable	Attributes	Description
ew*0_mode (continued)		<p>fastfd—Sets the default device to fast full duplex 100BaseT.</p> <p>full—Set the default device to full duplex twisted pair.</p> <p>twisted-pair— Sets the default device to 10Base-T (twisted-pair).</p>
ew*0_protocols	NV	<p>Determines which network protocols are enabled for booting and other functions.</p> <p>mop—Sets the network protocol to MOP: the setting typically used for systems using the OpenVMS operating system.</p> <p>bootp—Sets the network protocol to bootp: the setting typically used for systems using the DIGITAL UNIX operating system.</p> <p>bootp,mop—When the settings are used in a list, the mop protocol is attempted first, followed by bootp.</p>
os_type	NV	<p>Sets the default operating system.</p> <p>vms or unix—Sets system to boot the SRM firmware.</p> <p>nt—Sets system to boot the AlphaBIOS firmware.</p>
pci_parity	NV	<p>Disable or enable parity checking on the PCI bus.</p> <p>On—PCI parity enabled.</p> <p>Off—PCI parity disabled (default value).</p> <p>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. In such cases, the device functions properly so long as parity is not checked.</p>
pk*0_fast	NV	<p>Enables fast SCSI devices on a SCSI controller to perform in standard or fast mode.</p> <p>0—Sets the default speed for devices on the controller to standard SCSI.</p>

Variable	Attributes	Description
pk*0_fast (continued)		<p>If a controller is set to standard SCSI mode, both standard and fast SCSI devices will perform in standard mode.</p> <p>1—Sets the default speed for devices on the controller to fast SCSI mode.</p> <p>Devices on a controller that connect to both standard and Fast SCSI devices will automatically perform at the appropriate rate for the device, either fast or standard mode.</p>
pk*0_host_id	NV	<p>Sets the controller host bus node ID to a value between 0 and 7.</p> <p>0 to 7—Assigns bus node ID for specified host adapter.</p>
pk*0_soft_term	NV	<p>Enables or disables SCSI terminators for optional SCSI controllers. This environment variable applies to systems using the QLogic SCSI controller, though it does not affect the onboard controller.</p> <p>The QLogic SCSI controller implements the 16-bit wide SCSI bus. The QLogic module has two terminators, one for the 8 low bits and one for the high 8 bits. There are five possible values:</p> <p>off—Turns off both low 8 bits and high 8 bits.</p> <p>low—Turns on low 8 bits and turns off high 8 bits.</p> <p>high—Turns on high 8 bits and turns off low 8 bits.</p> <p>on—Turns on both low 8 bits and high 8 bits.</p> <p>diff—Places the bus in differential mode.</p>
tga_sync_green	NV	<p>Sets the location of the SYNC signal generated by the ZLXp-E PCI graphics accelerator (PBXGA).</p>

Variable	Attributes	Description
tga_sync_green (continued)		<p>This environment variable must be set correctly so that the graphics monitor will synchronize. The parameter is a bit mask, where the least significant bit (LSB) sets the vertical SYNC for the first graphics card found, the second for the second found, and so on.</p> <p>The command set tga_sync_green 00 sets all graphics cards to synchronize on a separate vertical SYNC line, as required by some monitors. See the monitor documentation for all other information.</p> <p>ff—Synchronizes the graphics monitor on systems that do not use a ZLXp-E PCI graphics accelerator (default setting).</p> <p>00—Synchronizes the graphics monitor on systems with a ZLXp-E PCI graphics accelerator.</p>
tt_allow_login	NV	<p>Enables or disables login to the SRM console firmware on alternative console ports.</p> <p>0—Disables login on alternative console ports.</p> <p>1—Enables login on alternative console ports (default setting).</p> <p>If the console output device is set to serial, set tt_allow_login 1 allows you to log in on the primary COM1(MMJ) port, or alternate COM2 port, or the graphics monitor.</p> <p>If the console output device is set to graphics, set tt_allow_login 1 allows you to log in through either the COM1(MMJ) or COM2 console port.</p>

*NOTE: Whenever you use the **set** command to reset an environment variable, you must initialize the system to put the new setting into effect. Initialize the system by entering the **init** command or pressing the Reset button.*

6.2 CPU, Memory, and Motherboard

Brief descriptions of the CPU daughter board, memory cards, and motherboard and its connectors are provided in this section.

6.2.1 CPU Daughter Board

The CPU daughter board provides:

- The Alpha 21164 microprocessor
- Backup cache
- ALCOR-2 chipset, which provides logic for external access to the cache for main memory control, and the PCI bus interface
- SROM code

6.2.2 Memory Modules

AlphaServer 800 system architecture supports from 32 Mbytes to 2 Gbytes of memory, although at product introduction, 1 Gbyte of memory is supported. Memory options consist of four dual in-line memory modules (DIMMs) and are available in the following variations:

- 32-Mbyte (consisting of four 8-Mbyte DIMMs)
- 64-Mbyte (consisting of four 16-Mbyte DIMMs)
- 128-Mbyte (consisting of four 32-Mbyte DIMMs)
- 256-Mbyte (consisting of four 64-Mbyte DIMMs)
- 512-Mbyte (consisting of four 128-Mbyte DIMMs)
- 1-Gbyte (consisting of four 256-Mbyte DIMMs)

The motherboard has eight DIMM connectors, grouped in two memory banks (0 and 1) (Figure 6-3).

Memory Configuration Rules

Observe the following rules when configuring memory on AlphaServer 800 systems:

- At least one memory bank must contain a memory option.
- A memory option consists of four DIMMs (0, 1, 2, and 3).
- All DIMMs in a bank must be of the same capacity and part number.

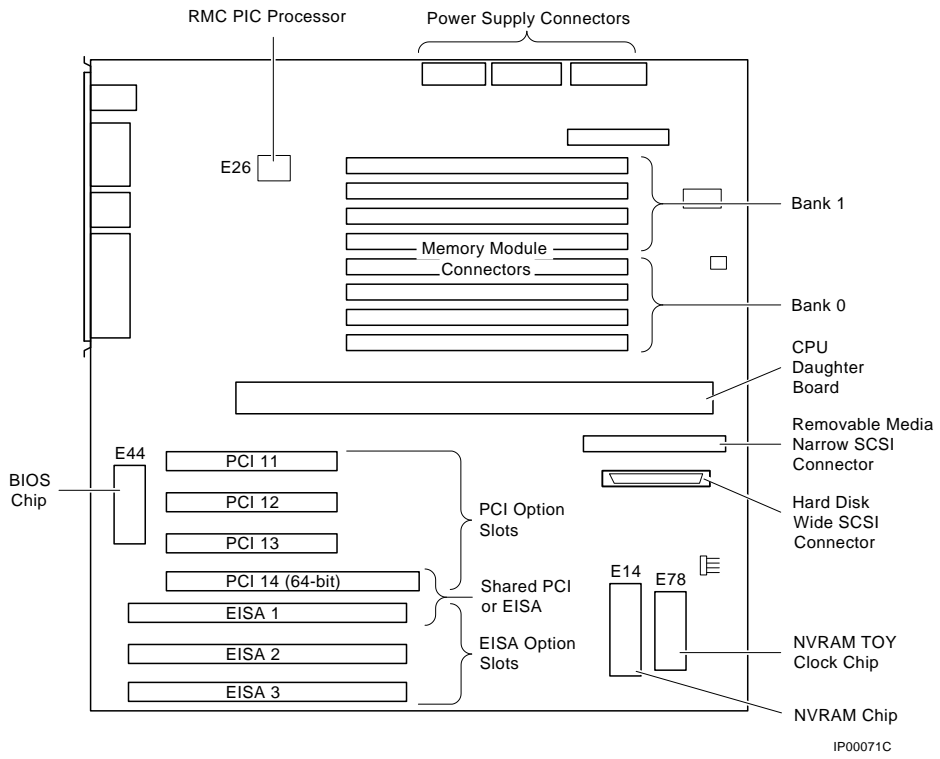
6.2.3 Motherboard

The motherboard provides a standard set of I/O functions:

- A fast, wide SCSI controller chip (Qlogic) that supports up to seven fast wide SCSI drives: Up to three narrow SCSI removable media devices, and up to four wide SCSI hard disk drives.
- The firmware console subsystem on 1 Mbyte of flash ROM
- A floppy drive controller
- Two serial ports with full modem control and a parallel port
- The keyboard and mouse interface
- S3 Trio64 PCI video controller
- The speaker interface
- PCI-to-EISA bridge chipset
- EISA system component chip
- Time-of-year (TOY) clock
- Remote console management PIC processor
- Connectors:
 - EISA bus connectors (Slots 1, 2, and 3)
 - PCI bus connectors (32-bit: Slots 11, 12, and 13)
 - PCI bus connector (64-bit: Slot 14)
 - Memory module connectors (8 DIMM connectors)
 - CPU daughter board connector

Figure 6-3 shows the motherboard and its connectors.

Figure 6-3 Motherboard Connectors



6.3 EISA Bus Options

The EISA (Extended Industry Standard Architecture) bus is a 32-bit industry standard I/O bus. EISA is a superset of the well-established ISA bus. EISA was designed to accept newer 32-bit components while remaining compatible with older 8-bit and 16-bit cards.

The EISA bus is a superset of the well-established ISA bus and has been designed to be backward compatible with 16-bit and 8-bit architecture. EISA offers performance of up to 33 Mbytes/sec for bus masters and DMA devices.

Up to three EISA or ISA modules can be installed. If the 64-bit PCI slot is used, only two EISA options can be installed. All slots are bus master slots. EISA slots can be filled in any order.

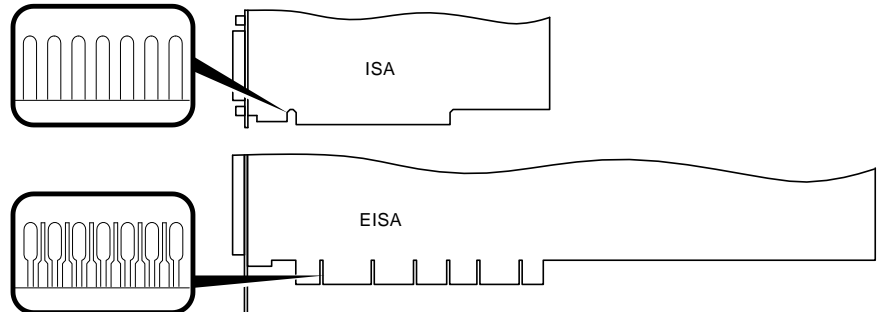
WARNING: For protection against fire, only modules with current-limited outputs should be used.

6.3.1 Identifying ISA and EISA Options

By examining the contacts of the option board you can determine whether a board is EISA or ISA (Figure 6-4):

- ISA boards have one row of contacts and no more than one gap.
- EISA boards have two interlocking rows of contacts with several gaps.

Figure 6-4 EISA and ISA Boards



MA00111

6.4 EISA Configuration Utility

Whenever you add or move EISA options or some ISA options in the system, you need to run the EISA Configuration Utility (ECU). Each EISA or ISA board has a corresponding configuration (CFG) file that describes the characteristics and the system resources required for that option. The ECU uses the CFG file to create a conflict-free configuration. The ECU is a menu-based utility that provides online help to guide you through the configuration process. The ECU is run from the AlphaBIOS console.

The ECU is supplied on a system configuration diskette shipped with the system (one for Windows NT and one for DIGITAL UNIX and OpenVMS). Make a backup copy of the system configuration diskette and keep the original in a safe place. Use the backup copy when you are configuring the system. The system configuration diskette must have the volume label "SYSTEMCFG."

NOTE: The CFG files supplied with the option you want to install may not work on this system if the option is not supported. Before you install an option, check that the system supports the option.

The version of the ECU that ships with AlphaServer 800 systems accommodates eight EISA slots. However, AlphaServer 800 systems have only three EISA slots, slots 1, 2, and 3.

6.4.1 Before You Run the ECU

Before running the ECU:

1. Install EISA option(s). (Install ISA boards *after* you run the ECU).
For information about installing a specific option, refer to the documentation for that option.
2. Familiarize yourself with the utility.
You can find more information about the ECU by reading the ECU online help. Start the ECU (Refer to Section 6.4.2). Online help for the ECU is located under Step 1, “Important EISA Configuration Information.”
3. Familiarize yourself with the configuration procedure for the system:
 - If you are configuring an EISA bus that contains only EISA options, refer to Table 6-2.
 - If you are configuring an EISA bus that contains both ISA and EISA options, refer to Table 6-3.
4. Locate the correct ECU diskette for your operating system. The ECU diskette is shipped in the accessories box with the system. Make a copy of the appropriate diskette, and keep the original in a safe place. Use the backup copy for configuring options. The diskettes are labeled as follows:
 - ECU Diskette DECpc AXP (AK-PYCJ*-CA) for Windows NT
 - ECU Diskette DECpc AXP (AK-Q2CR*-CA) for DIGITAL UNIX and OpenVMS

6.4.2 How to Run the ECU

Complete the following steps to run the ECU:

1. Invoke the console firmware.
 - **For systems running Windows NT**—Shut down the operating system or power up to the AlphaBIOS Setup menu.
 - **For systems running OpenVMS or DIGITAL UNIX**—Shut down the operating system and press the Halt button or power up with the Halt button set to the “In” position. When the console prompt >>> is displayed, set the Halt button to the “Out” position.
2. Start the ECU as follows:

NOTE: Make sure the ECU diskette is not write-protected.

- **For systems running Windows NT**—Select the following menus:
 - a. From the AlphaBIOS Setup menu, select Utilities.
 - b. From submenu, select Run Maintenance Program. Insert the ECU diskette for Windows NT (AK-PYCJ*-CA) into the diskette drive and select Run ECU from floppy.
 - **For systems running OpenVMS or DIGITAL UNIX**—Start the ECU as follows:
 - a. Insert the ECU diskette for OpenVMS or DIGITAL UNIX (AK-Q2CR*-CA) into the diskette drive.
 - b. Enter the **ecu** command (or **ecu -g** command to force output to the graphics display). The **ecu** command will load the AlphaBIOS console and then load and start the ECU from the diskette drive.
3. Complete the ECU procedure according to the guidelines provided in the following sections.
- If you are configuring an EISA bus that contains only EISA options, refer to Table 6-2.
- NOTE: If you are configuring only EISA options, do not perform Step 2 of the ECU, "Add or remove boards." (EISA boards are recognized and configured automatically.)*
- If you are configuring an EISA bus that contains both ISA and EISA options, refer to Table 6-3.
4. After you have saved configuration information and exited from the ECU:
- **For systems running Windows NT**—Remove the ECU diskette from the diskette drive and boot the operating system.
 - **For systems running OpenVMS or DIGITAL UNIX**—Remove the ECU diskette from the diskette drive. Return to the SRM console firmware as follows:
 - a. From the CMOS Setup menu, press F6 to enter Advanced CMOS setup.
 - b. From the Advanced CMOS Setup menu, select OpenVMS (SRM).
 - c. Press F10 to save the change.
 - d. When the "Power cycle the system to implement the change" message is displayed, press the Reset button. (Do not press the On/Off button) Once the console firmware is loaded and device drivers are initialized, you can boot the operating system.
5. Verify that the new options are configured correctly.

6.4.3 Configuring EISA Options

EISA boards are recognized and configured automatically. See Table 6-2 for a summary of steps to configure an EISA bus that contains no ISA options. Review Section 6.6.1. Then run the ECU as described in Section 6.6.2.

*NOTE: It is not necessary to run Step 2 of the ECU, "Add or remove boards."
(EISA boards are recognized and configured automatically.)*

Table 6-2 Summary of Procedure for Configuring EISA Bus (EISA Options Only)

Step	Explanation
Install EISA option.	Use the instructions provided with the EISA option.
Power up and run ECU.	If the ECU locates the required CFG configuration files, it displays the main menu. The CFG file for the option may reside on a configuration diskette packaged with the option or may be included on the system configuration diskette. It is not necessary to run Step 2 of the ECU, "Add or remove boards." (EISA boards are recognized and configured automatically.)
View or Edit Details (optional).	The "View or Edit Details" ECU option is used to change user-selectable settings or to change the resources allocated for these functions (IRQs, DMA channels, I/O ports, and so on). This step is not required when using the board's default settings.)
Save your configuration and restart the system.	The "Save and Exit" ECU option saves your configuration information to the system's nonvolatile memory.
Return to the SRM console (DIGITAL UNIX and OpenVMS systems only) and restart the system.	Refer to step 4 of Section 6.6.2 for operating-system-specific instructions.

6.4.4 Configuring ISA Options

ISA boards are configured manually, whereas EISA boards are configured through the ECU software. See Table 6-3 for a summary of steps to configure an EISA bus that contains both EISA and ISA options. Review Section 6.6.1. Then run the ECU as described in Section 6.6.2.

Table 6-3 Summary of Procedure for Configuring ISA Options

Step	Explanation
Install or move EISA option. Do not install ISA boards.	Use the instructions provided with the EISA option. ISA boards are installed after the configuration process is complete.
Power up and run ECU.	If you have installed an EISA option, the ECU needs to locate the CFG file for that option. This file may reside on a configuration diskette packaged with the option or may be included on the system configuration diskette.
Add the ISA board to the configuration list.	Use the “Add or Remove Boards” ECU option to add the CFG file for the ISA option and to select an acceptable slot for the option. The CFG file for the option may be on a configuration diskette packaged with the option or may be included on the system configuration diskette. If you cannot find the CFG file for the ISA option, select the generic CFG file for ISA options from the configuration diskette.
View or Edit Details (optional).	The “View or Edit Details” ECU option is used to change user-selectable settings or to change the resources allocated for these functions (IRQs, DMA channels, I/O ports, and so on). This step is not required when using the board's default settings.

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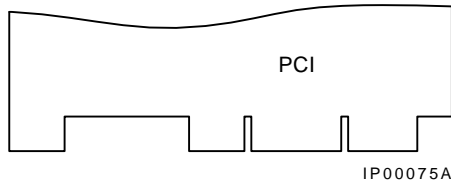
**Table 6-3 Summary of Procedure for Configuring ISA Options
(continued)**

Step	Explanation
Examine and set required switches to match the displayed settings.	<p>The "Examine Required Switches" ECU option displays the correct switch and jumper settings that you must physically set for each ISA option. Although the ECU cannot detect or change the settings of ISA boards, it uses the information from the previous step to determine the correct settings for these options.</p> <p>Physically set the board's jumpers and switches to match the required settings.</p>
Save your configuration.	<p>The "Save and Exit" ECU option saves your configuration information to the system's nonvolatile memory.</p>
Return to the SRM console (DIGITAL UNIX and OpenVMS systems only) and turn off the system.	<p>Refer to step 4 of Section 6.6.2 for information about returning to the console.</p>
Install ISA board and turn on the system.	<p>Use the instructions provided with the ISA option.</p>

6.5 PCI Bus Options

PCI (Peripheral Component Interconnect) is an industry-standard expansion I/O bus that is the preferred bus for high-performance I/O options. The AlphaServer 800 provides three slots for 32-bit PCI options and one slot for 64-bit PCI options. A PCI board is shown in Figure 6-5.

Figure 6-5 PCI Board



Install PCI boards according to the instructions supplied with the option. PCI boards require no additional configuration procedures; the system automatically recognizes the boards and assigns the appropriate system resources.

WARNING: For protection against fire, only modules with current-limited outputs should be used.

6.6 SCSI Bus

The embedded SCSI controller on the motherboard:

- Supports up to seven drives.
- Provides 8-bit fast narrow SCSI support for up to three 5.25-inch internal, half-height removable-media devices.
- Provides 16-bit fast wide SCSI support for up to four 3.5-inch, internal hard disk drives.

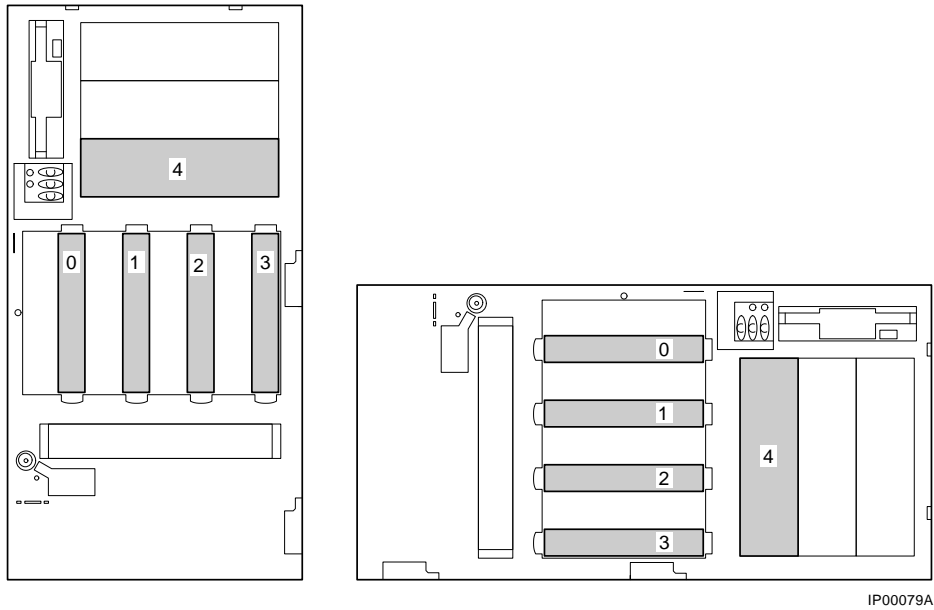
NOTE: Two half-height removable-media devices can be substituted for one 5.25-inch full-height device.

For Windows NT, adding or removing drives may require rebooting the operating system. Certain RAID controllers may permit hotswapping of drives without deallocating drives and rebooting the operating system.

6.6.1 Configuring Internal Storage Devices

The AlphaServer 800 system supports up to seven internal SCSI storage devices. The hard disk drive backplane automatically supplies the SCSI IDs for the hard disk drives as shown in Figure 6-6. The CD-ROM drive is assigned SCSI ID 4 at the factory.

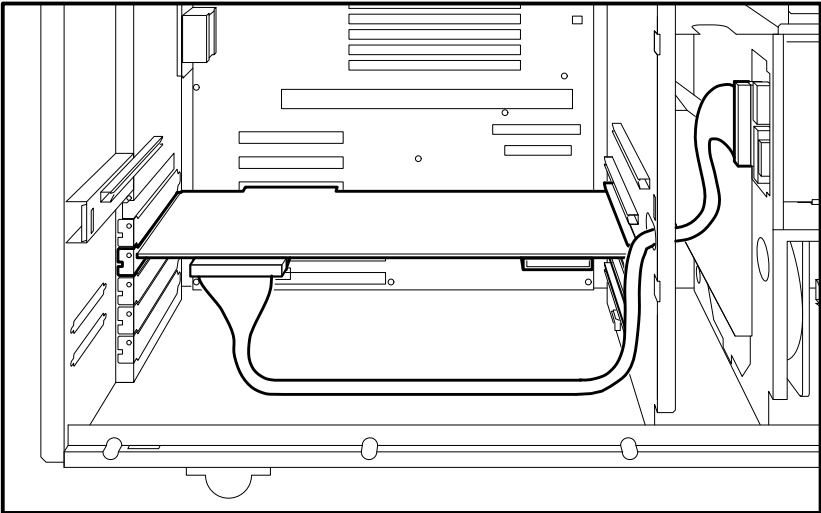
Figure 6-6 SCSI Bus IDs



When configuring the SCSI bus, note the following:

- If you plan to connect the internal hard disk drives to a RAID controller option or a SCSI controller other than the onboard controller, you need to use cable PB8HA-DA. This cable provides additional length needed to reach the connector on the controller option. Figure 6-7 shows the cable routing from the hard disk backplane to the storage controller option.
- If you plan to extend a SCSI bus from a controller through either of the wide SCSI breakouts at the rear of the enclosure, cable BC25V-1H provides a wide 68-pin connector, as shown in Figure 6-8.
- If you plan to extend a SCSI bus from a multi-channel controller to external devices through a vacant PCI/EISA slot bulkhead connector, cable KZPAC-SB provides two 68-pin (Honda miniature) connectors on a bulkhead connector, as shown in Figure 6-9.
- Two of the three 5.25-inch half-height removable-media device slots can be used to provide room for one 5.25-inch full-height device. Remove the divider as shown in Figure 6-10 to convert from two half-height to one full-height slot.

Figure 6-7 RAID/SCSI Cable for Internal Disk Drive Backplane



IP00015A

Figure 6-8 Wide SCSI Cable for Breakouts at Rear of Enclosure

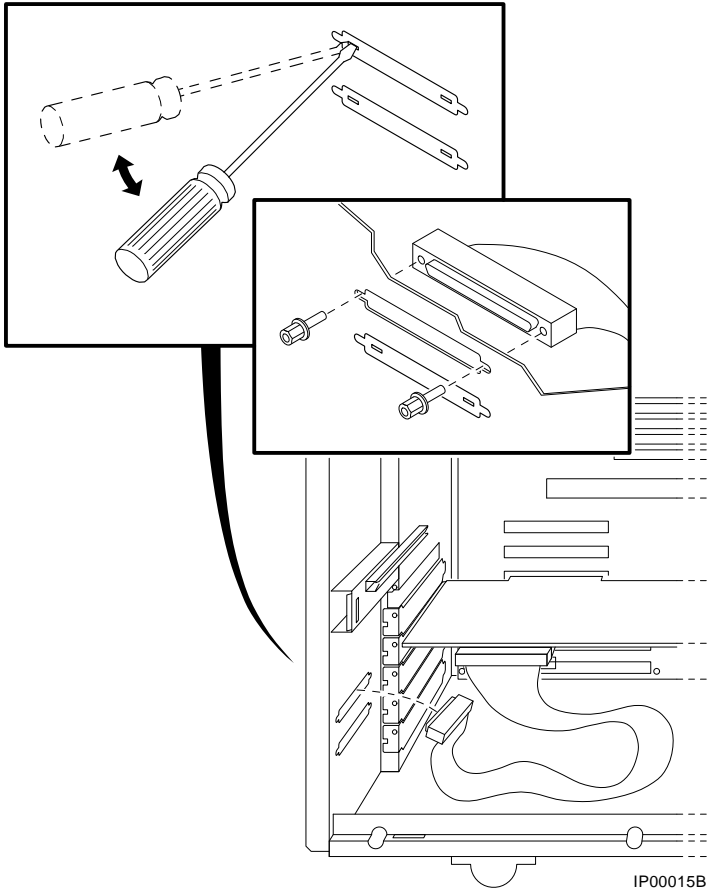


Figure 6-9 Wide SCSI Dual Connector Cable for Standard Bulkhead Connector

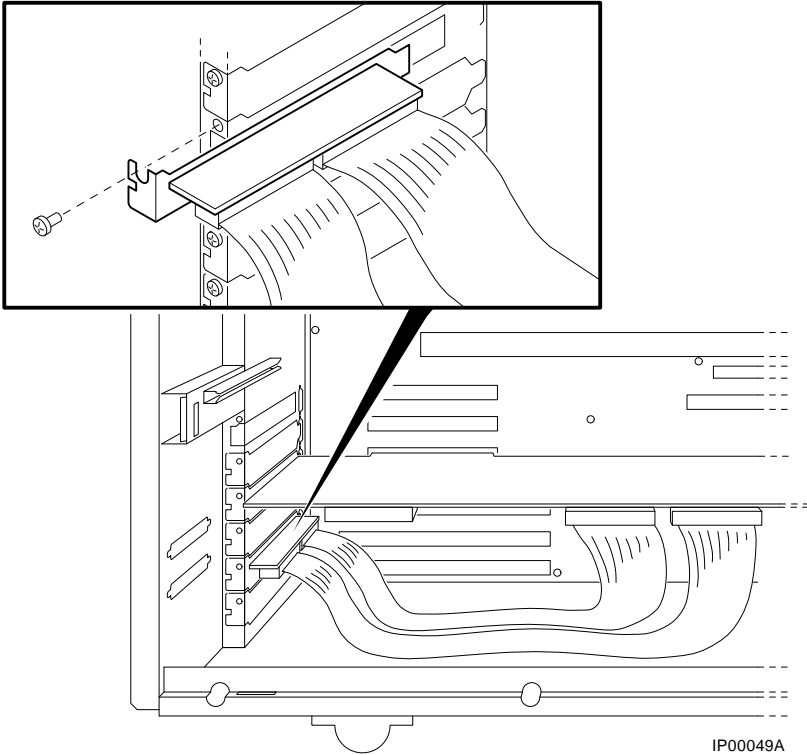
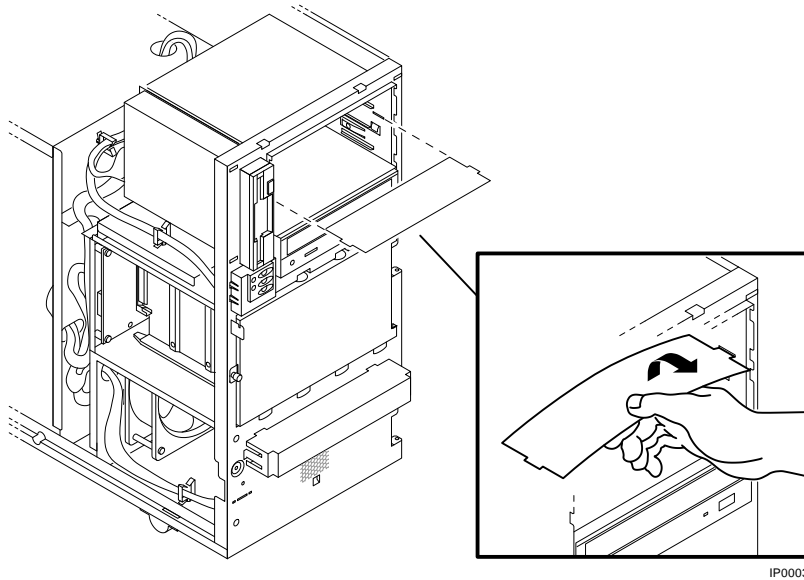


Figure 6-10 Removing Divider to Allow for Full-Height Device



6.6.2 External SCSI Expansion

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

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

6.7 Console Port Configurations

Power-up information is typically displayed on the system's console terminal. The console terminal may be either a graphics monitor or a serial terminal. If you use a serial terminal, it is connected through the COM1 (MMJ) serial port.

Several SRM console environment variables are used to configure the console ports:

Environment Variable	Description
console	Determines where the system will display power-up output. Set this environment variable according to the console terminal that you are using (Section 6.7.1).
tt_allow_login	Enables or disables login to the SRM console firmware on alternative console ports (Section 6.7.2).

In addition, the **tga_sync_green** environment variable (Section 6.7.3) is used to synchronize monitors using the high-performance turbo graphics adapter card (PBXGA).

A serial terminal can also be configured to run the ECU or interface with the AlphaBIOS console (Section 6.7.4).

When using a VGA controller other than the standard onboard VGA, refer to Section 6.7.5.

6.7.1 set console

The setting of the **console** environment variable determines where the system will display power-up output. Power-up information is typically displayed on the console terminal. The console terminal can be either a graphics monitor or a serial terminal. Set this environment variable according to the console terminal that you are using.

Whenever you change the value of this environment variable, you must initialize the firmware with the **init** command or press the Reset button.

Syntax

```
set console output_device
```

Arguments:

graphics	Sets the power-up output to be displayed at a graphics monitor or a device that is connected to the VGA module.
serial	Sets the power-up output to be displayed on the device that is connected to the COM1 (MMJ) port.

Example

```
>>> set console serial
>>> init
.
.
. !Now switch to the serial terminal.
>>> show console
console      serial
```

6.7.2 set tt_allow_login

The setting of the **tt_allow_login** environment variable enables or disables login to the SRM console firmware on alternative console ports.

Syntax

```
set tt_allow_login [0,1]
```

Arguments:

- 1 Enables login on alternative console ports (default setting).

 If the console output device is set to **serial**, you can log in on the COM1(MMJ) port, COM2 port, or the graphics monitor.

 If the console output device is set to **graphics**, you can log in through either the primary graphics monitor or the COM1 (MMJ) or COM2 console ports.
- 0 Disables login on alternative console ports.

Whenever you change the value of this environment variable, you must initialize the system with the **init** command.

Example

```
>>> set console serial  
>>> set tt_allow_login 1  
>>> init
```

6.7.3 set tga_sync_green

The **tga_sync_green** environment variable sets the location of the SYNC signal generated by the ZLXp-E PCI graphics accelerator card.

The correct setting, displayed with the **show** command, is:

```
>>> show tga_sync_green
tga_sync_green
```

If the monitor does not synchronize, set the parameter as follows:

```
>>> set tga_sync_green 00
```

This command sets all graphics cards to synchronize on a separate vertical SYNC line, as required by some monitors. See the monitor documentation for all other information.

6.7.4 Setting Up a Serial Terminal to Run the AlphaBIOS Console and the ECU

You can run the ECU and interface with the AlphaBIOS console from either a VGA-compatible graphics monitor or from a serial terminal (VT200 terminal or higher, or equivalent). Graphics is the default. If you use the serial line, refer to Table 6-4 for serial line equivalents to graphics line keyboard commands. To use a serial terminal with AlphaBIOS or the ECU:

1. Invoke the terminal setup utility as described in the documentation for the serial terminal and change settings as follows:
 - From the General menu, set the terminal mode to VTxxx, 8-bit controls.
 - From the Comm menu, set the character format to 8 bit, no parity, and set receive XOFF to 128 or greater.
 - From the Keyboard menu, set the keyboard so that the tilde (~) key sends the escape (ESC) signal.
2. Enter the following commands at the SRM console prompt to set the console terminal to receive input in serial mode:

```
>>> set console serial
>>> init
.
. !Now switch to the serial terminal)
>>> show console
console      serial
```

Table 6-4 Serial Line Keyboard Commands

Graphics Line Commands	Serial Line Commands
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
ESC	CTRL +[

6.7.5 Using a VGA Controller Other Than the Standard On-Board VGA

When the system is configured to use a PCI- or EISA-based VGA controller instead of the standard onboard VGA (Trio64 PCI), consider the following:

- The VGA jumper (J27) on the motherboard must be set to disable (off).
- The console environment variable should be set to **graphics**.
- With multiple VGA controllers, the system will direct console output to the first controller it finds.

FRU Removal and Replacement

This chapter describes the field-replaceable unit (FRU) removal and replacement procedures for AlphaServer 800 systems, pedestal and rackmount.

- Section 7.1 lists the FRUs.
- Section 7.2 provides the removal and replacement procedures for the FRUs.

7.1 AlphaServer 800 FRUs

Table 7-1 lists the FRUs by part number and description and provides the reference to the figure or section that shows the removal/replacement procedure.

Figures 7-1 and 7-2 show how to open the front door and remove the side and top panels for the pedestal enclosure.

Figure 7-3 shows how to access FRUs in the rackmount enclosure.

Figure 7-4 shows the locations of FRUs within the system for the pedestal and rackmount enclosures.

Table 7-1 AlphaServer 800 FRUs

Part #	Description	Reference
Cables		
17-03970-03	Floppy drive cable	Figure 7-5
17-03971-04	Control panel module cable	Figure 7-6
	Power cord (pedestal systems)	Table 7-2
	Power cord (rackmount systems)	Table 7-3
17-01476-02	Hard disk drive status cable, 20-pin	Figure 7-8
17-04400-01	SCSI (embedded 16-bit) disk drive cable, 68-pin	Figure 7-9
17-04399-01	SCSI (embedded 8-bit) removable-media cable, 50-pin	Figure 7-10
PB8HA-DA	SCSI (16-bit)/RAID option to hard disk backplane cable, 68-pin	Figure 7-11
BC25V-1H	SCSI option to 68-pin breakouts at rear of enclosure	Figure 7-12
KZPAC-SB	SCSI option to 68-pin dual connector for standard PCI/EISA bulkhead connector	Figure 7-13

Table 7-1 AlphaServer 800 FRUs (continued)

Part #	Description	Reference
CPU Modules		
54-24801-01	333 MHz CPU daughter board (EV5.6)	Figure 7-14
54-24801-02	400 MHz CPU daughter board (EV5.6)	Figure 7-14
Fan		
12-23609-24	Fan, 4.75-inch with 3-pin cable	Figure 7-16
Fixed-Disks		
RZ28M-S	2.1 GB SCA2 disk drive	Section 7.2.7
For a complete listing of supported disk options, refer to the <i>DIGITAL Systems and Options Catalog</i> (ftp://ftp.digital.com/pub/Digital/info/SOC/).		
Memory Modules		
54-24354-DA	1M x 72, 60NS, 8 MB DIMM	Section 7.2.8
54-24352-DA	2M x 72, 60NS, 16 MB DIMM	Section 7.2.8
54-24329-DA	4M x 72, 60NS, 32 MB DIMM	Section 7.2.8
54-24344-DA	8M x 72, 60NS, 64 MB DIMM	Section 7.2.8
54-24823-DA	16M x 72, 60NS, 128 MB DIMM	Section 7.2.8
20-47480-D7	32 M x 72, 60NS, 256 MB DIMM	Section 7.2.8
54-24821-DA	Alternate for 54-24344-DA	Section 7.2.8
20-47166-D7	Alternate for 54-24354-DA	Section 7.2.8

Continued on next page

Table 7-1 AlphaServer 800 FRUs (continued)

Part #	Description	Reference
Memory Modules (continued)		
20-47170-D7	Alternate for 54-24352-DA	Section 7.2.8
20-47083-D7	Alternate for 54-24329-DA	Section 7.2.8
20-47167-D7	Alternate for 54-24344-DA	Section 7.2.8
20-47137-D7	Alternate for 54-24823-DA	Section 7.2.8
<i>NOTE: Alternate and standard DIMM options cannot be mixed. Determine DIMM type before ordering.</i>		
Other Modules and Components		
54-24978-01	Control panel module	Section 7.2.5
54-24960-01	Disk status module	Figure 7-21
54-24945-01	SCSI disk drive backplane	Section 7.2.13
54-24803-01	Motherboard	Section 7.2.10
21-29631-02	NVRAM chip (E14)	Section 7.2.11
21-32423-01	NVRAM TOY clock chip (E78)	Section 7.2.11
	PCI/EISA Options	Section 7.2.12
30-47661-02	Power supply	Section 7.2.14
70-32774-01	Speaker with 2-pin cable	Section 7.2.15
30-46117-02	Mouse, 3 button	
LK46W-A2	OpenVMS style keyboard (108 key)	
LK97W-A2	Windows NT/DIGITAL UNIX style keyboard (104 key)	
12-37977-02	Key for door	
Removable Media		
RRD46-AB	CD-ROM drive, half-height	Section 7.2.16
RX23L-MB	Floppy drive	Section 7.2.16

7.2 Removal and Replacement

This section describes the procedures for removing and replacing FRUs.

CAUTION: Static electricity can damage integrated circuits. Always use a grounded wrist strap (29-26246) and grounded work surface when working with internal parts of a computer system.

Unless otherwise specified, you can install a FRU by reversing the steps shown in the removal procedure.

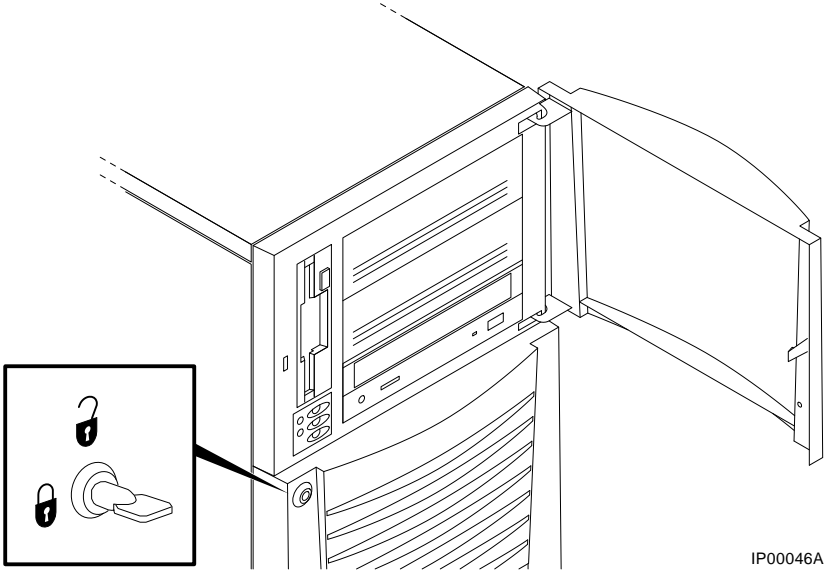
7.2.1 Accessing FRUs, Pedestal Systems

Access pedestal FRUs as follows:

CAUTION: Before removing the top cover and side panels:

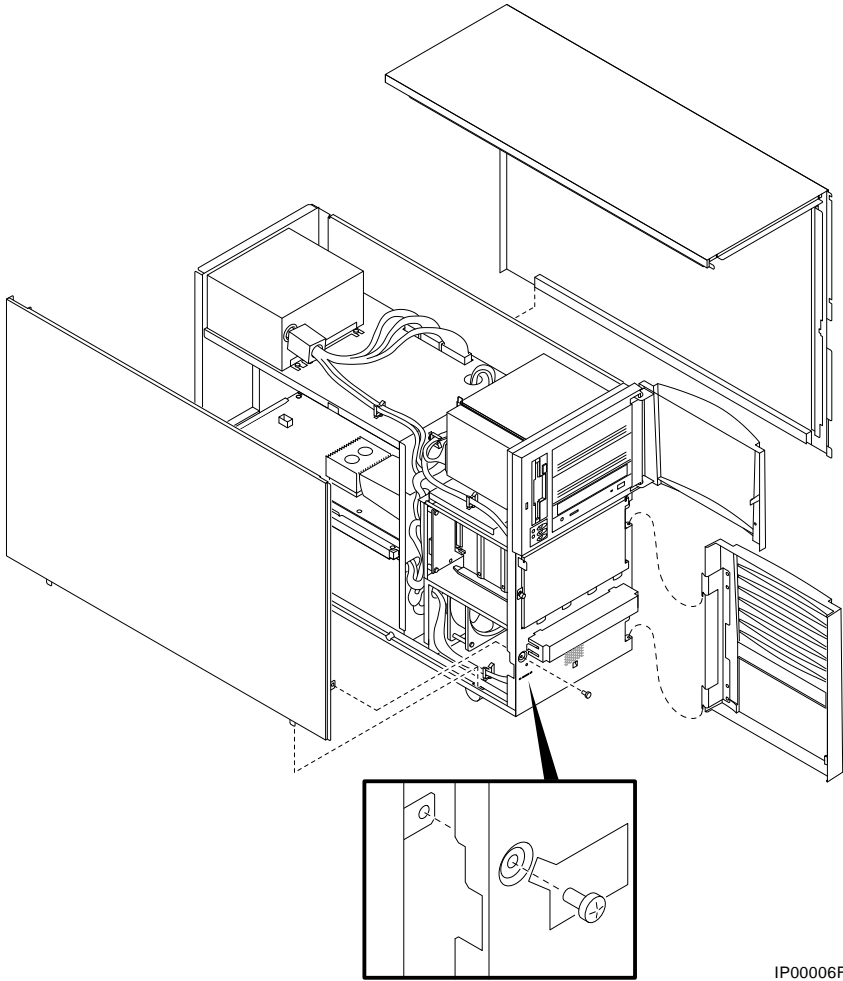
1. Perform an orderly shutdown of the operating system.
2. Set the On/Off button on the operator control panel to off.
3. Unplug the AC power cord.
4. Unlock and open the front door (Figure 7-1).
5. Remove the retaining screw indicated by the yellow label on the lower left side of the front of the system (Figure 7-2).
6. Slide back and remove left side panel (Figure 7-2).
7. Slide back and remove top and right side panel (Figure 7-2).

Figure 7-1 Opening Front Door, Pedestal Systems



IP00046A

Figure 7-2 Removing Top Cover and Side Panels (Pedestal Systems)



IP00006F

7.2.2 Accessing FRUs, Rackmount Systems

Access rackmount FRUs as follows (refer to Figure 7-3):

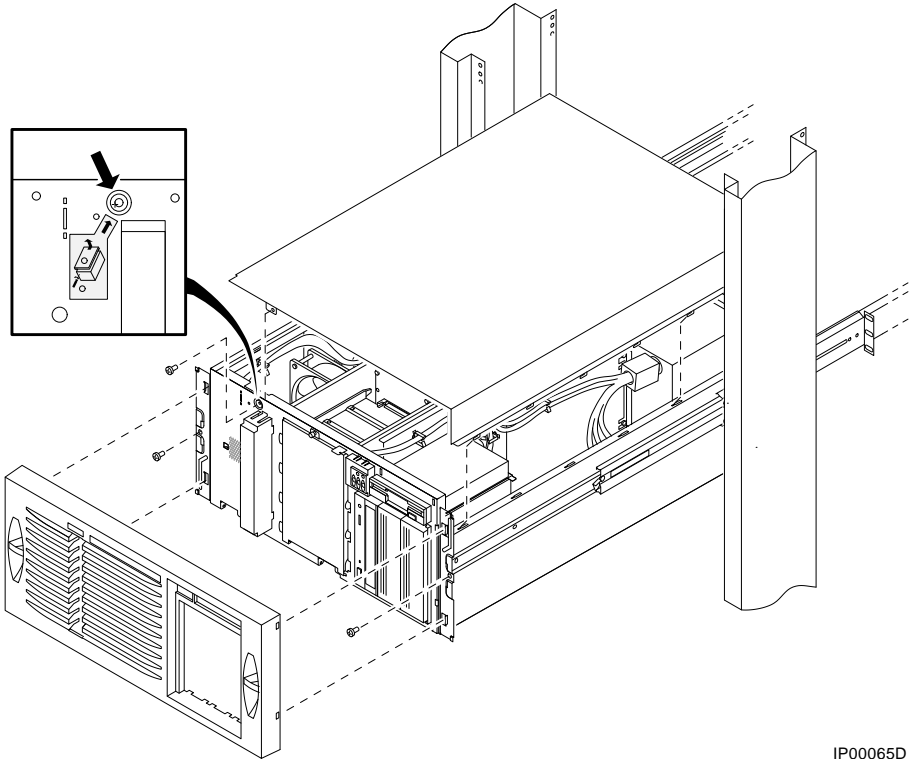
WARNING: The system can weigh 27.45 kg (61 lb). To prevent injury and equipment damage, ensure that only one system is extended out of the cabinet at any one time and that the cabinet is stabilized before pulling the system out on its slides.

The adjustable leveling feet should be down and the cabinet's stabilizing bar fully extended before any component is extended out of the cabinet on slides.

Do not extend more than one slide assembly at a time; cabinet instability may result.

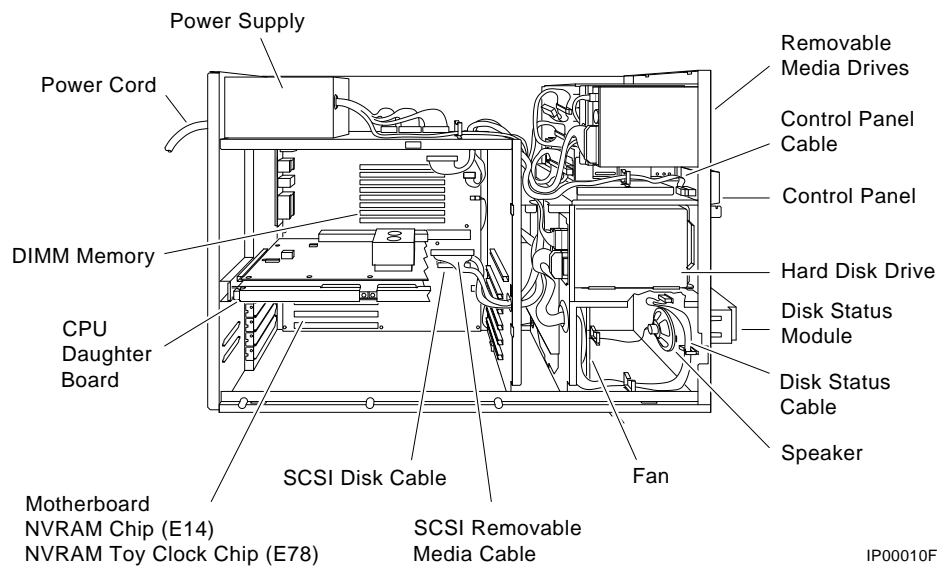
1. Perform an orderly shutdown of the operating system.
2. Set the On/Off button on the operator control panel to off.
3. Unplug the AC power cord.
4. Pull off the front bezel using the two finger holds.
5. Remove the two front screws.
6. Slide the enclosure out on its rails.
7. Remove the retaining screw indicated by the yellow label on the upper left side of the front of the system.
8. Slide back and remove the top cover.

Figure 7-3 Accessing FRUs, Rackmount Systems



IP00065D

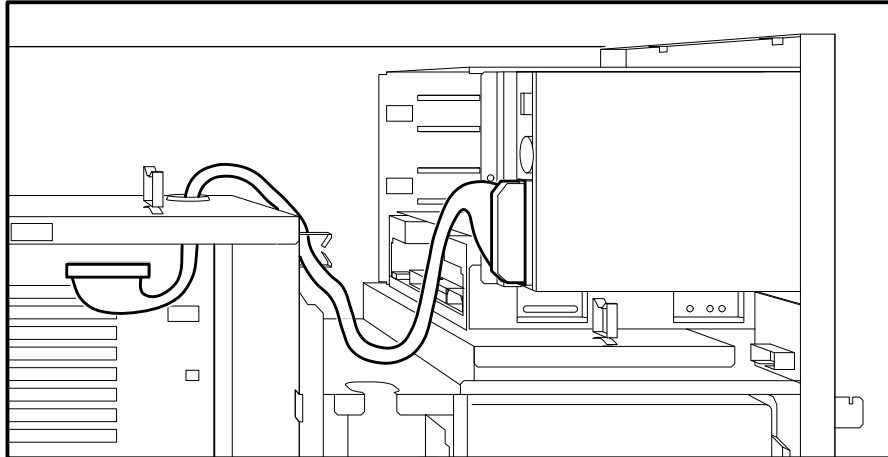
Figure 7-4 FRUs, Pedestal and Rackmount Enclosure



7.2.3 Cables

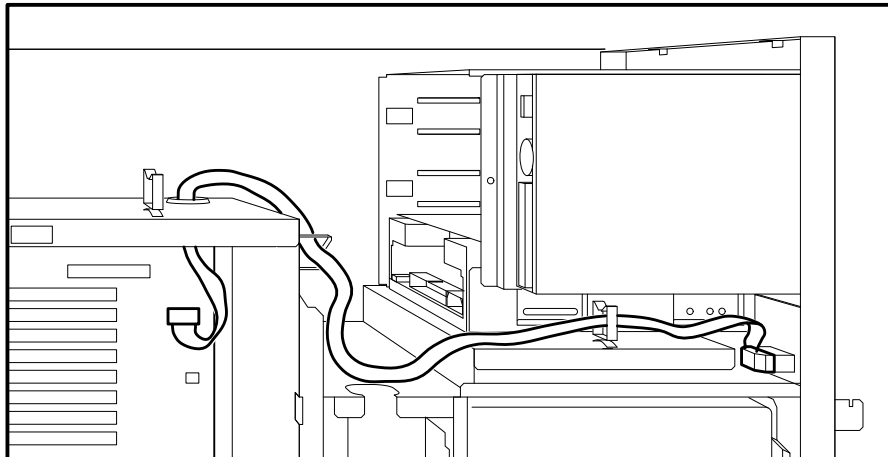
This section shows the routing for each cable in the system.

Figure 7-5 Floppy Drive Cable (34-Pin)



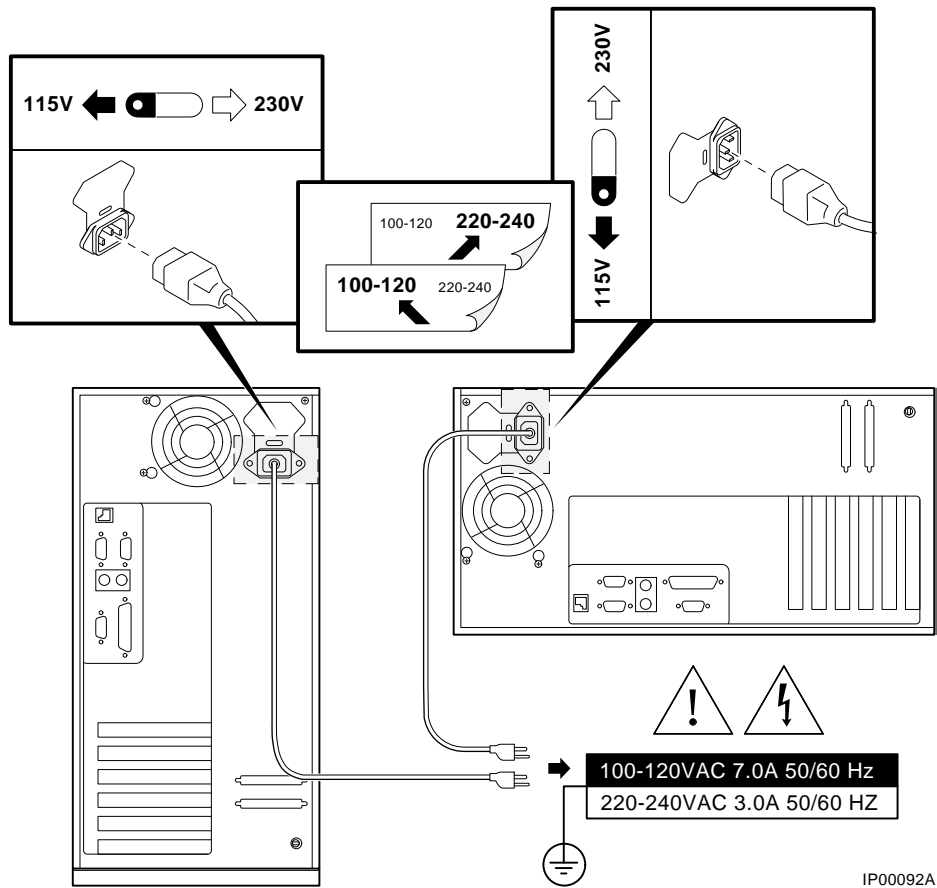
IP00014

Figure 7-6 Control Panel Module Cable



IP00013

Figure 7-7 Power Cords



IP00092A

Table 7-2 lists the country-specific power cords for pedestal systems. Table 7-3 lists the country-specific power cords for rackmount systems.

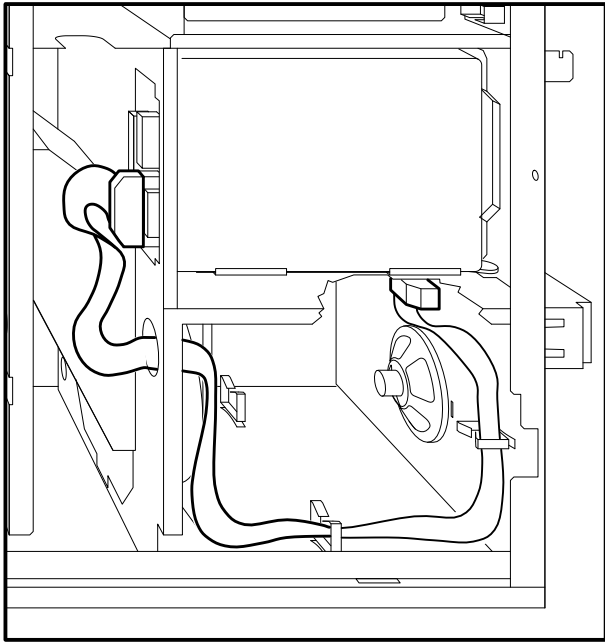
Table 7-2 Power Cord Order Numbers (Pedestal Systems)

Country	Power Cord BN Number	DIGITAL Number
U.S., Japan, Canada	BN09-1K	17-00083-09
Australia, New Zealand	BN019H-2E	17-00198-14
Central Europe (Aus, Bel, Fra, Ger, Fin, Hol, Nor, Swe, Por, Spa)	BN19C-2E	17-00199-21
U.K., Ireland	BN19A-2E	17-00209-15
Switzerland	BN19E-2E	17-00210-13
Denmark	BN19K-2E	17-00310-08
Italy	BN19M-2E	17-00364-18
India, South Africa	BN19S-2E	17-00456-16
Israel	BN18L-2E	17-00457-16

Table 7-3 Power Cord Order Numbers (Rackmount Systems)

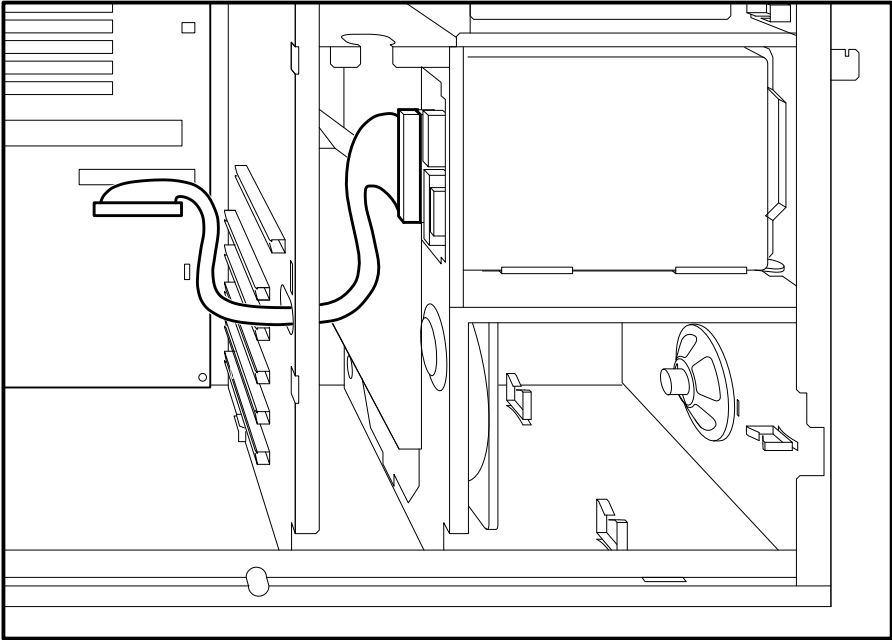
Country	Power Cord Description	DIGITAL Number
U.S., Japan, Canada	120V NEMA	17-00083-58
U.S., Japan, Canada	240V NEMA	17-00083-61
Europe	230V IEC	17-04285-04

Figure 7-8 Hard Disk Drive Status Cable (20-Pin)



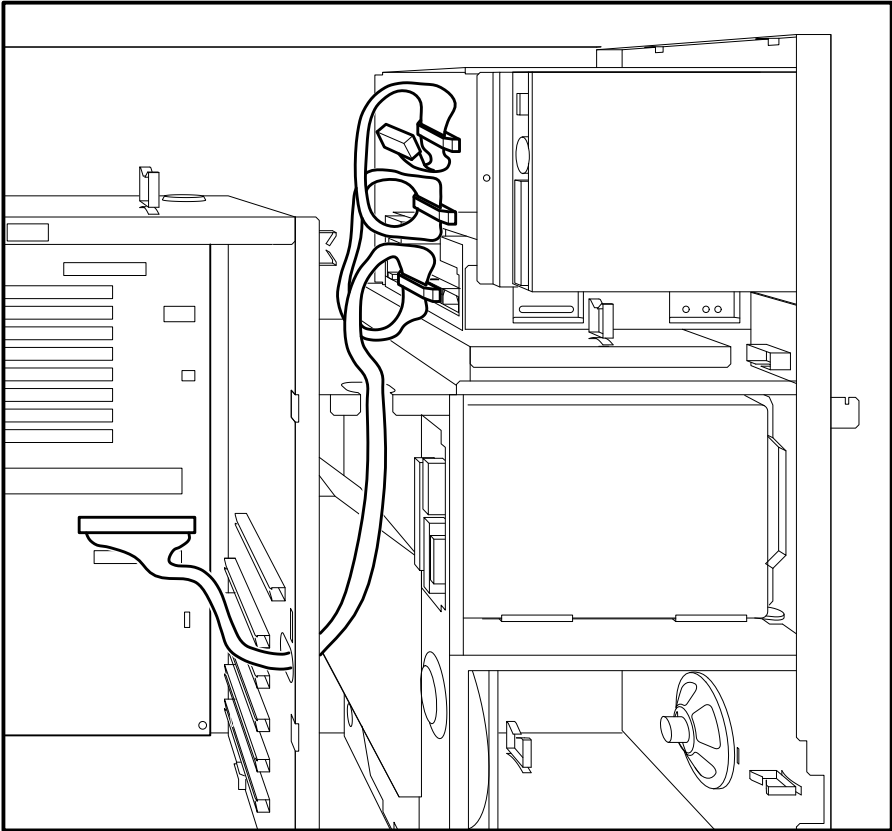
IP00019

Figure 7-9 SCSI (Embedded 16-Bit) Disk Drive Cable (68-Pin)



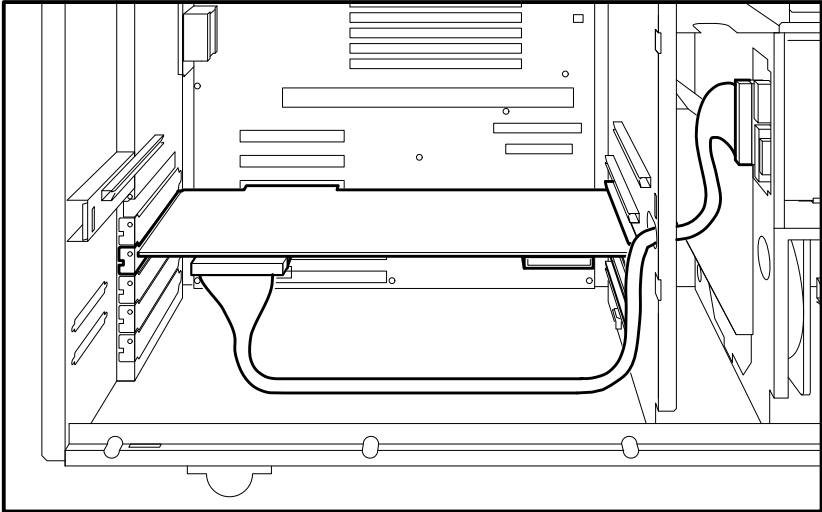
IP00015

Figure 7-10 SCSI (Embedded 8-Bit) Removable-Media Cable (50-Pin)



IP00016

Figure 7-11 SCSI (16-Bit)/RAID Option to Disk Drive Backplane (68-Pin)



IP00015A

Figure 7-12 Wide SCSI Cable for Breakouts at Rear of Enclosure

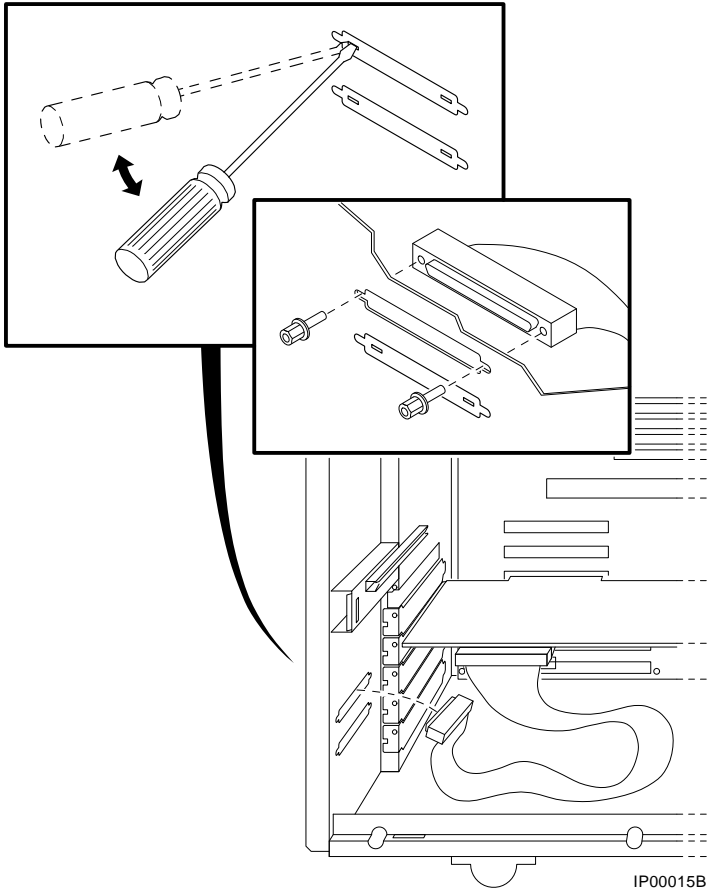
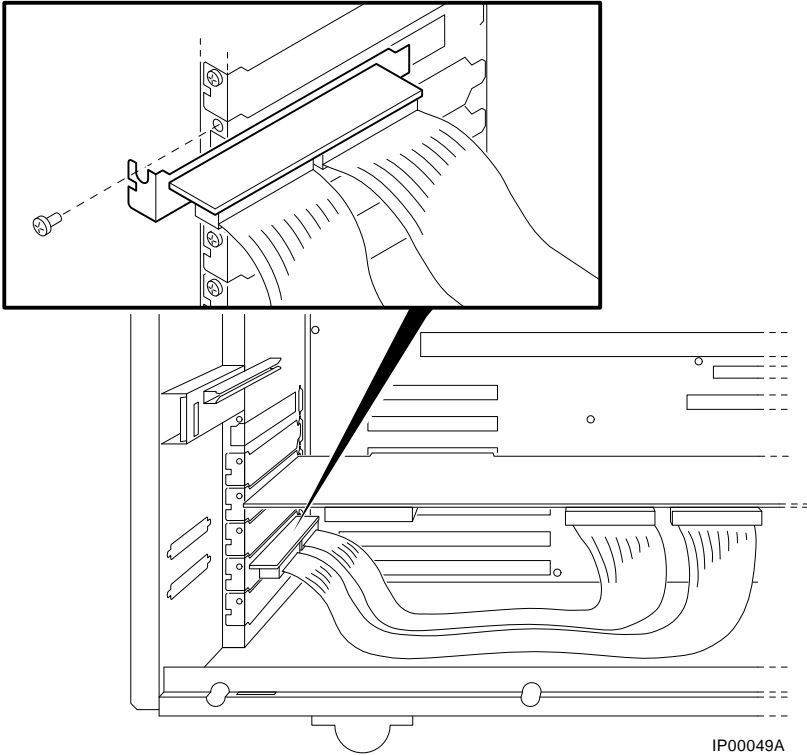
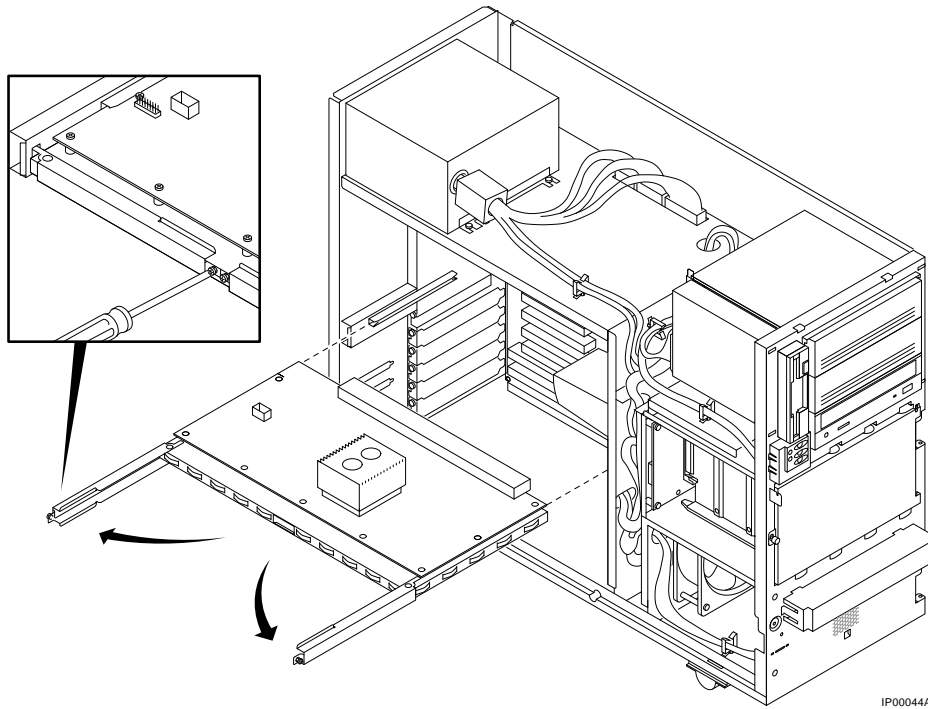


Figure 7-13 Wide SCSI Dual Connector Cable for Standard PCI/EISA Bulkhead Connector



7.2.4 CPU Daughter Board

Figure 7-14 Removing CPU Daughter Board



IP00044A

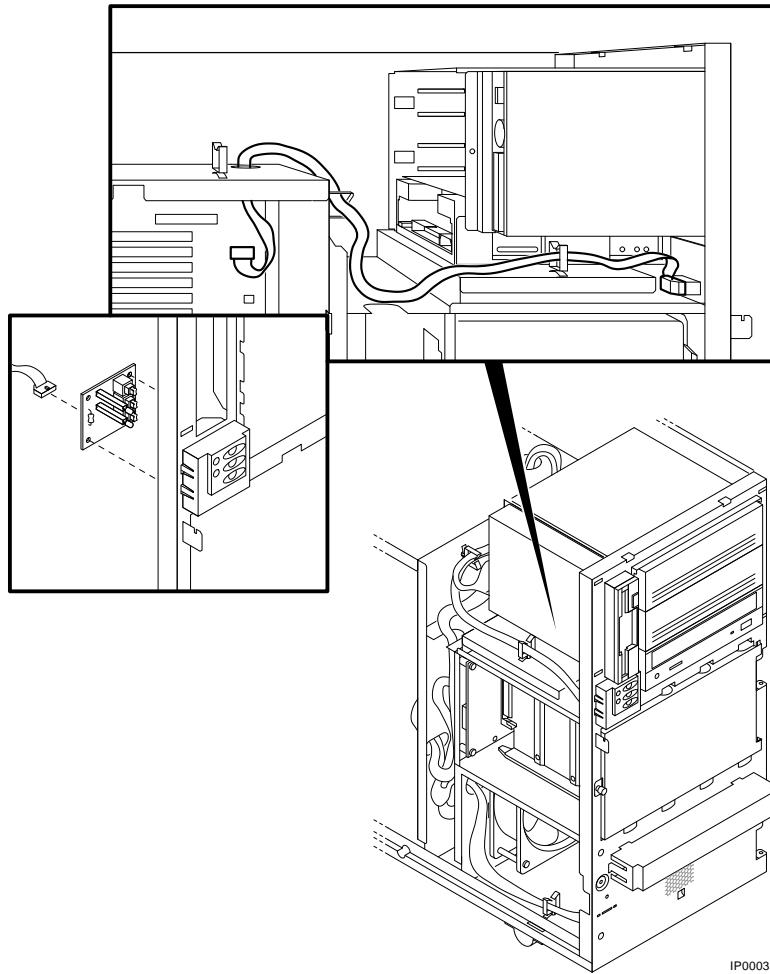
WARNING: CPU and memory modules have parts that operate at high temperatures. Wait 2 minutes after power is removed before handling these modules.

When installing the CPU daughter board, be sure to insert it straight and square, so as not to damage the connector pins. Once the levers are in place and screwed closed, press in on the front of the module to ensure that it is properly seated.

7.2.5 Control Panel Module

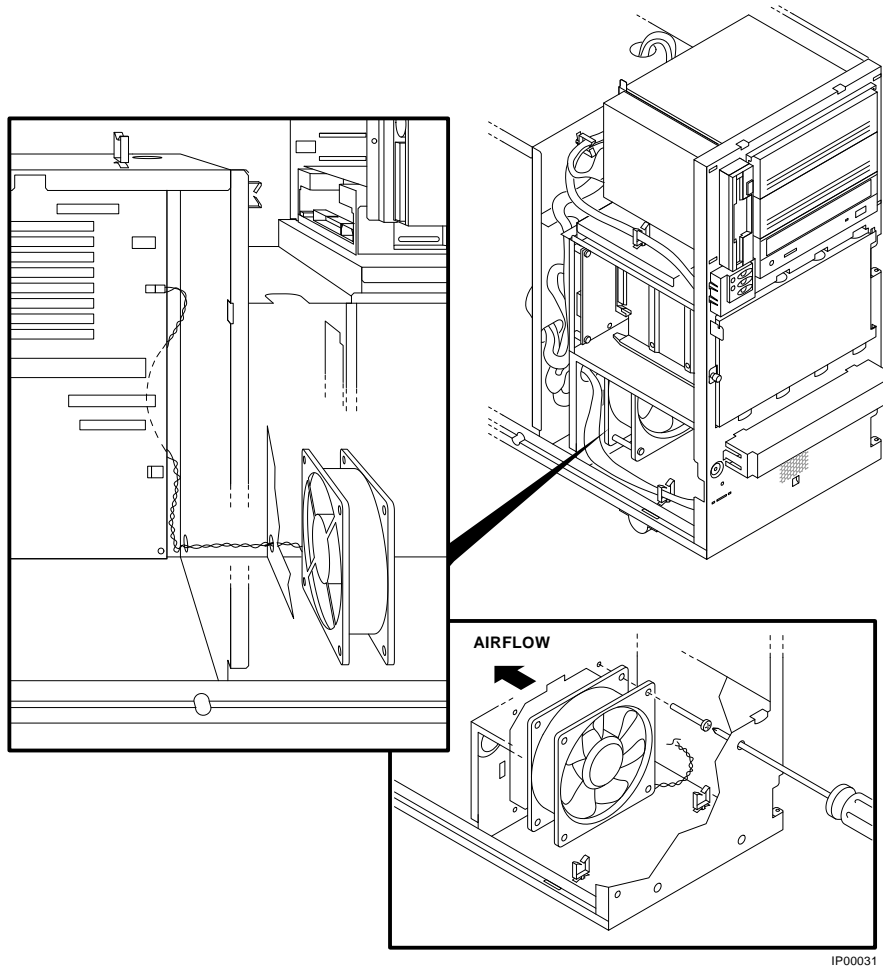
Disconnect the control panel cable and remove the control panel module.

Figure 7-15 Removing the Control Panel Module



7.2.6 Fan

Figure 7-16 Removing Fan

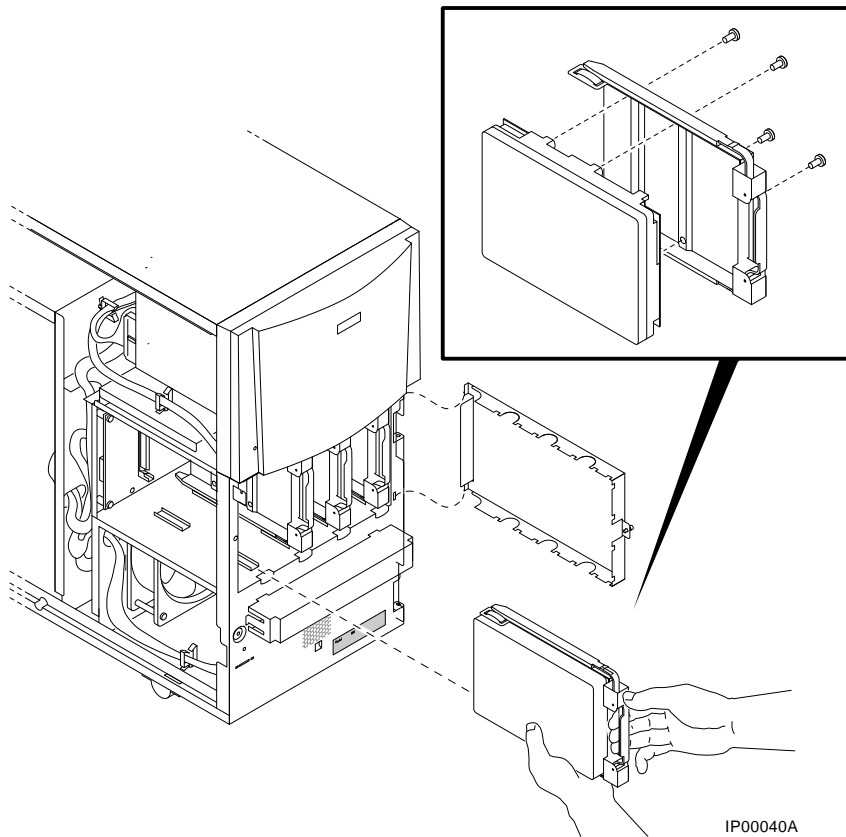


7.2.7 Hard Disk Drives

NOTE: If the drives are plugged into a RAID controller, you can “hot swap” drives; that is, you can add or replace drives without first shutting down the operating system or powering down the server hardware. For more information, see the StorageWorks RAID Array Subsystem Family Installation and Configuration Guide.

If the drives are not plugged into a RAID controller, you will need to shut down the operating system before swapping a drive. However, you will not need to power down the server before installing the drives.

Figure 7-17 Removing Hard Disk Drives



WARNING: When removing the right-most drive (or top-most for rackmount systems, remove the disk drive door to avoid the possibility of hitting your hand against the door.

7.2.8 Memory Modules

The position of the failing dual-inline memory modules (DIMMs) are reported by the SROM power-up scripts (Section 2.2.2) or can be determined using the procedures described with the **memexer** command (Section 3.2.5).

Note the following memory configuration rules when replacing memory:

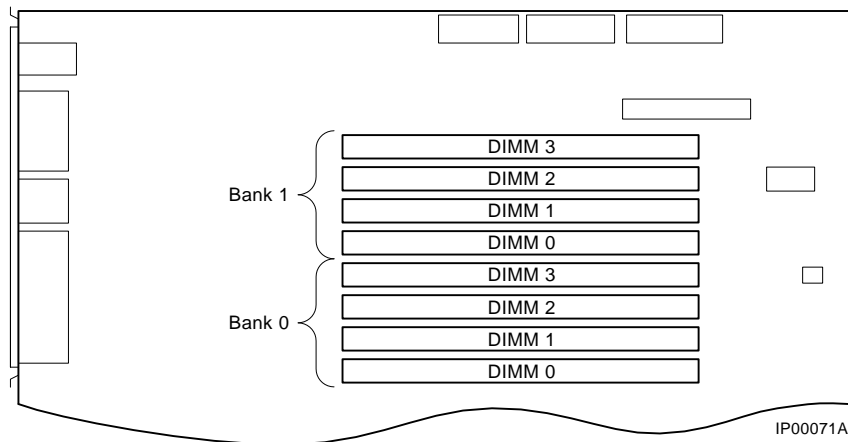
- At least one memory bank must contain a memory option.
- A memory option consists of four DIMMs (0, 1, 2, and 3).
- All DIMMs in a bank must be of the same capacity and part number.

STEP 1: RECORD THE POSITION OF THE FAILING DIMM.

STEP 2: LOCATE THE FAILING DIMM ON THE MOTHERBOARD.

STEP 3: REPLACE THE FAILING DIMMS.

Figure 7-18 Memory Slots on Motherboard



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

CAUTION: Do not use any metallic tools or implements including pencils to release DIMM latches. Static discharge can damage the DIMMs.

Figure 7-19 Removing DIMMs from Motherboard

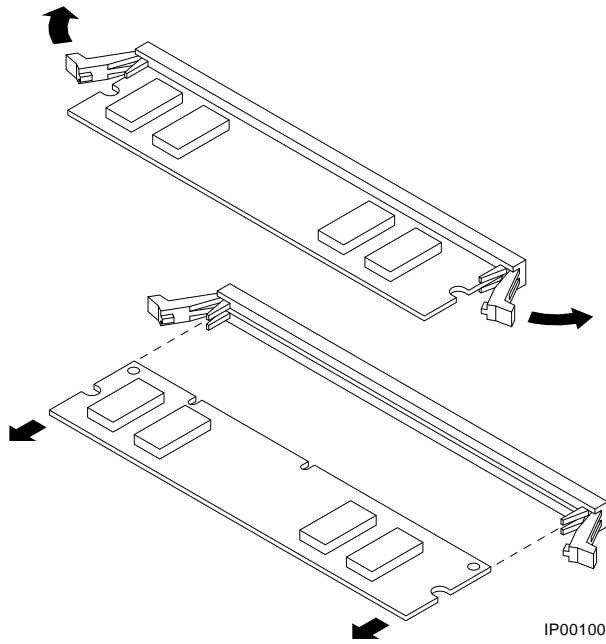
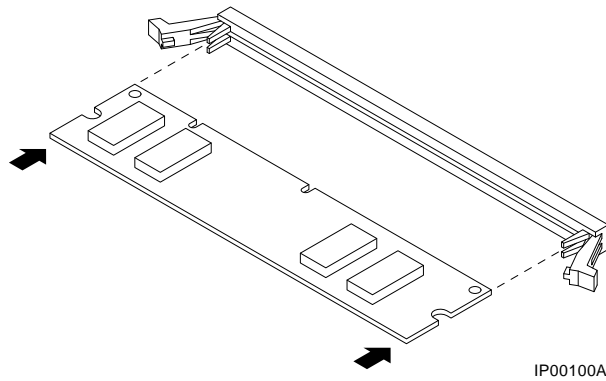


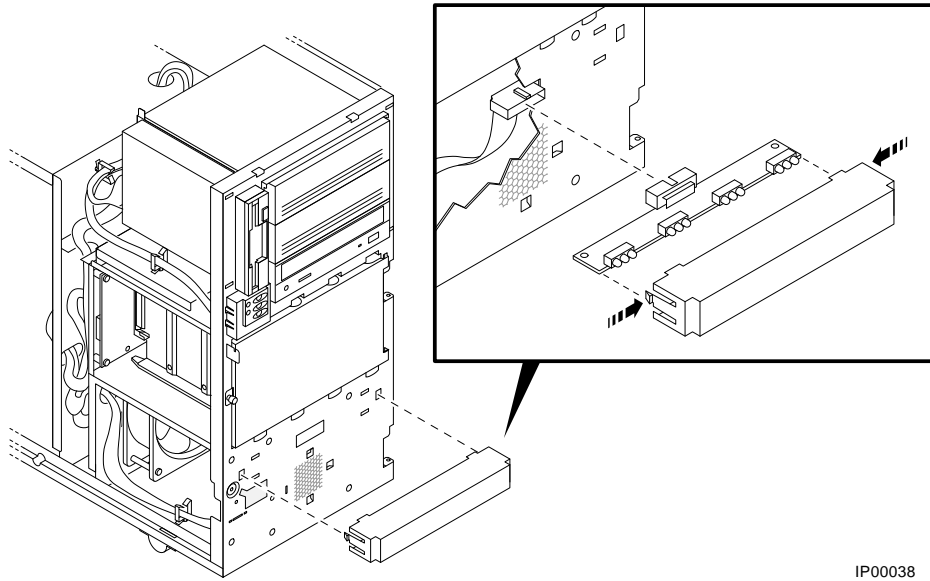
Figure 7-10 Installing DIMMs on Motherboard



NOTE: When installing DIMMs, make sure that the DIMMs are fully seated. The two latches on each DIMM connector should lock around the edges of the DIMMs.

7.2.9 Disk Status Module

Figure 7-21 Removing Disk Status Module



IP00038

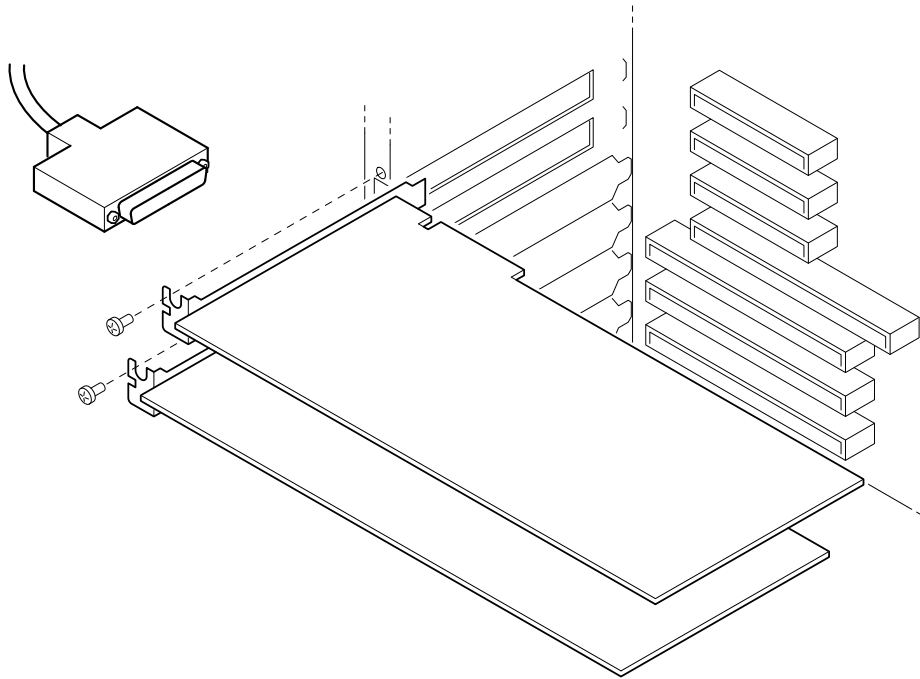
7.2.10 System Motherboard

STEP 1: RECORD THE POSITION OF EISA AND PCI OPTIONS.

STEP 2: REMOVE EISA AND PCI OPTIONS.

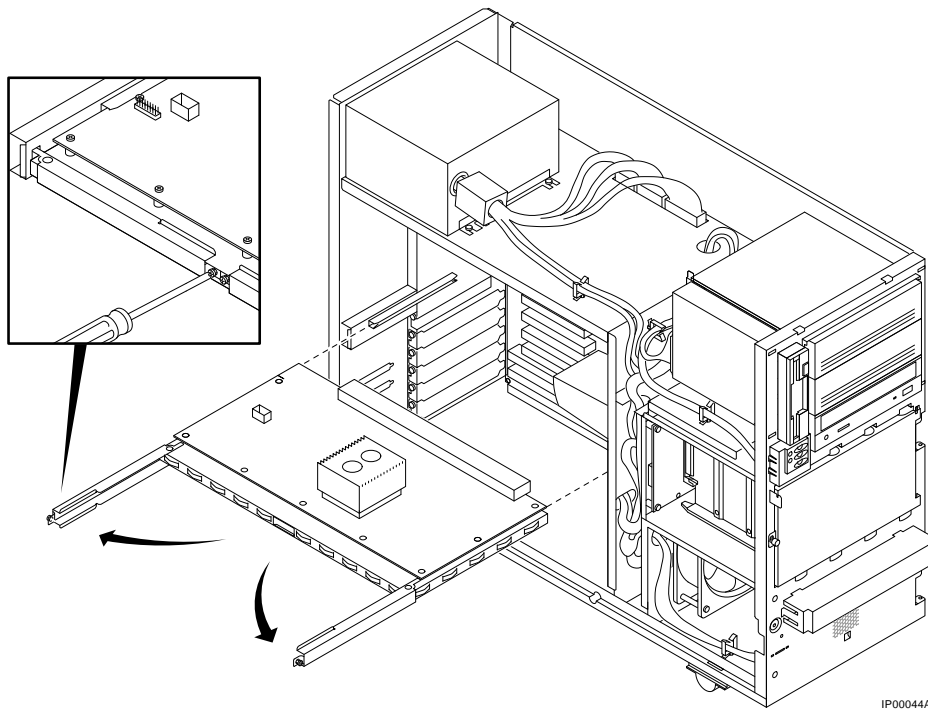
STEP 3: REMOVE THE CPU DAUGHTER BOARD.

Figure 7-22 Removing EISA and PCI Options



IP00049

Figure 7-23 Removing CPU Daughter Board



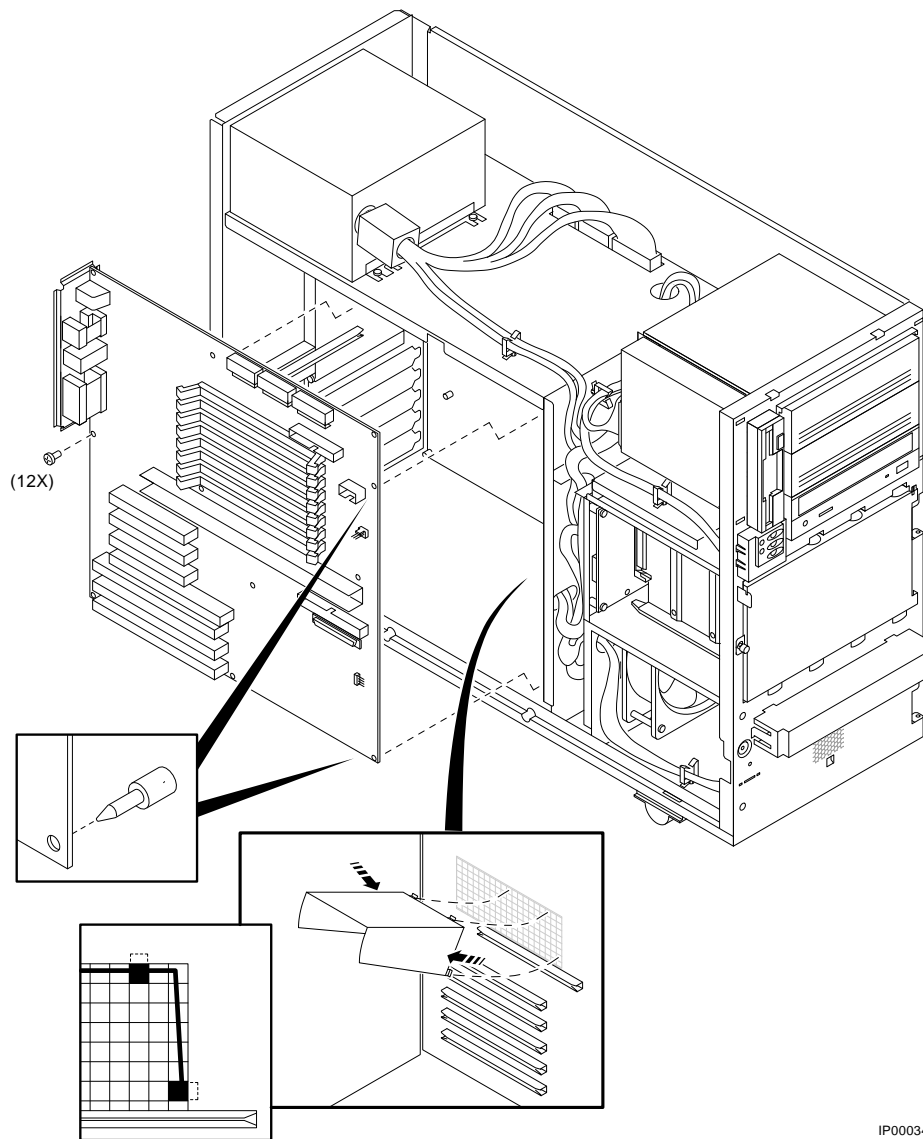
WARNING: CPU and memory modules have parts that operate at high temperatures. Wait 2 minutes after power is removed before handling these modules.

When installing the CPU daughter board, be sure to insert it straight and square, so as not to damage the connector pins. Once the levers are in place and screwed closed, press in on the front of the module to ensure that it is properly seated.

STEP 4: REMOVE AIRFLOW BAFFLE FROM THE MOTHERBOARD.

STEP 5: DETACH MOTHERBOARD CABLES, REMOVE SCREWS, AND MOTHERBOARD.

Figure 7-24 Removing Airflow Baffle and Motherboard

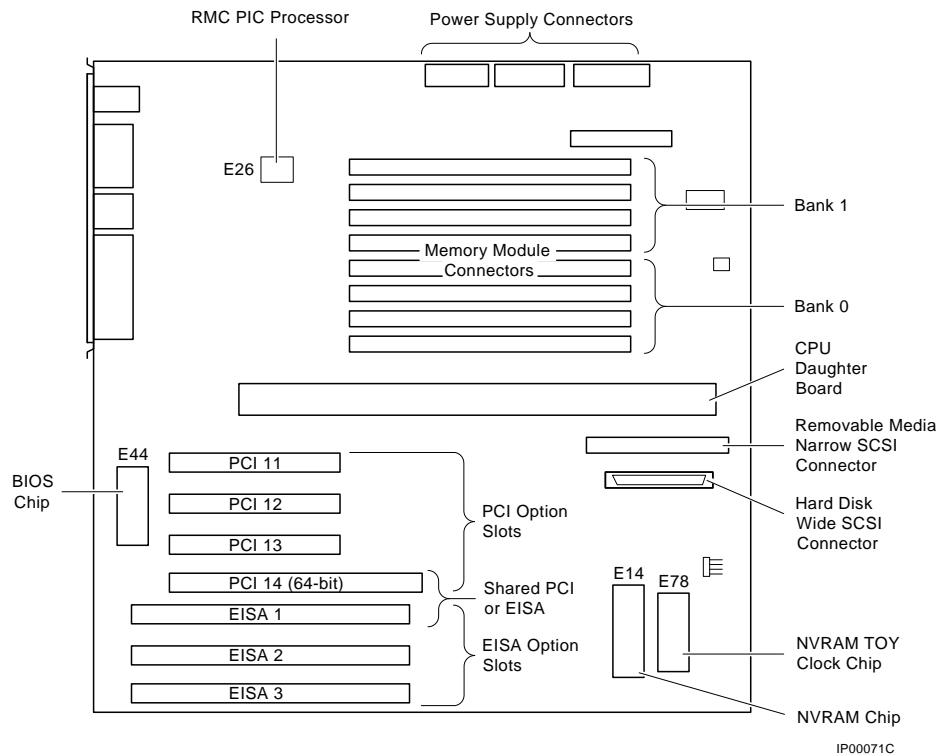


IP00034A

STEP 6: MOVE THE NVRAM CHIP (E14) AND NVRAM TOY CHIP (E78) TO THE NEW MOTHERBOARD.

Move the socketed NVRAM chip (position E14) and NVRAM TOY chip (E78) to the replacement motherboard and set the jumpers to match previous settings.

Figure 7-25 Motherboard Layout



7.2.11 NVRAM Chip (E14) and NVRAM TOY Clock Chip (E78)

See Figure 7-24 for the motherboard layout.

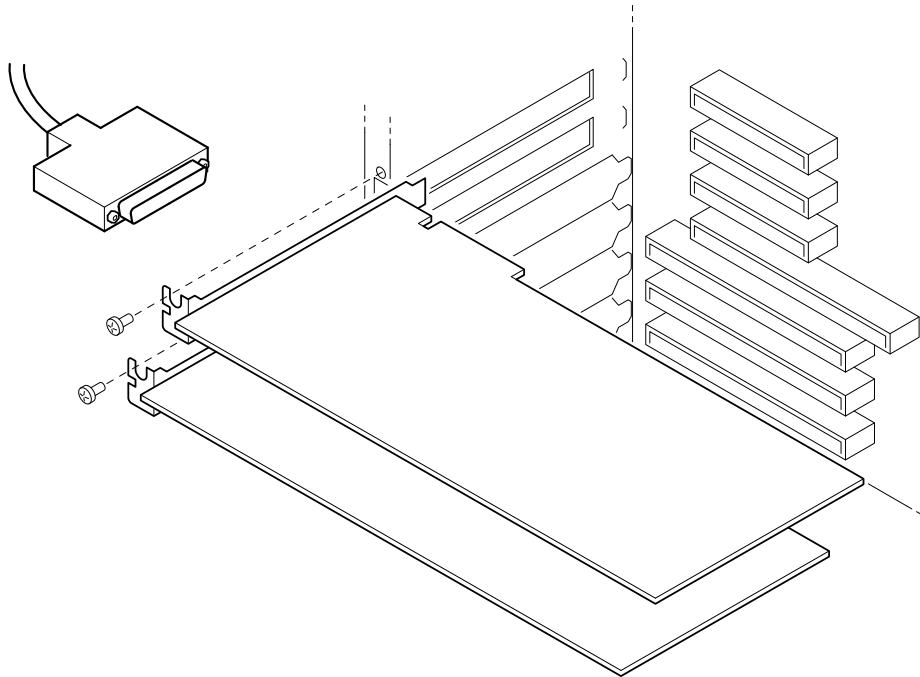
NOTE: The NVRAM TOY chip contains the `os_type` environment variable. This environment variable may need to be reset (Section 6.1.4.4).

7.2.12 PCI/EISA Options

STEP 1: RECORD THE POSITION OF FAILING EISA OR PCI OPTION.

STEP 2: REMOVE FAILING OPTION.

Figure 7-26 Removing PCI or EISA Option

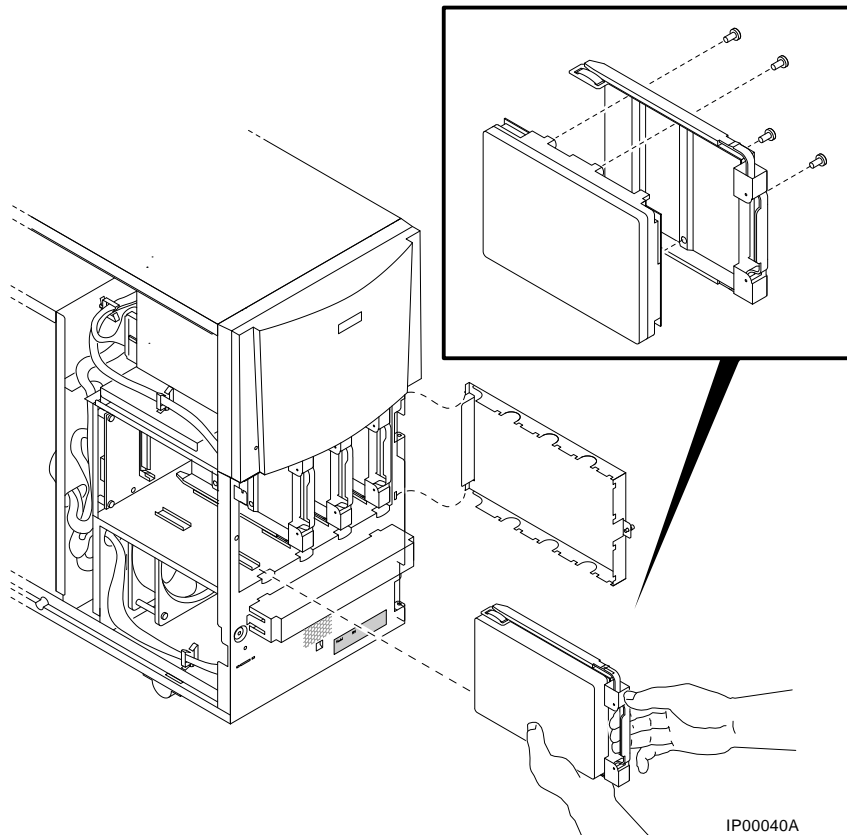


IP00049

7.2.13 SCSI Disk Drive Backplane

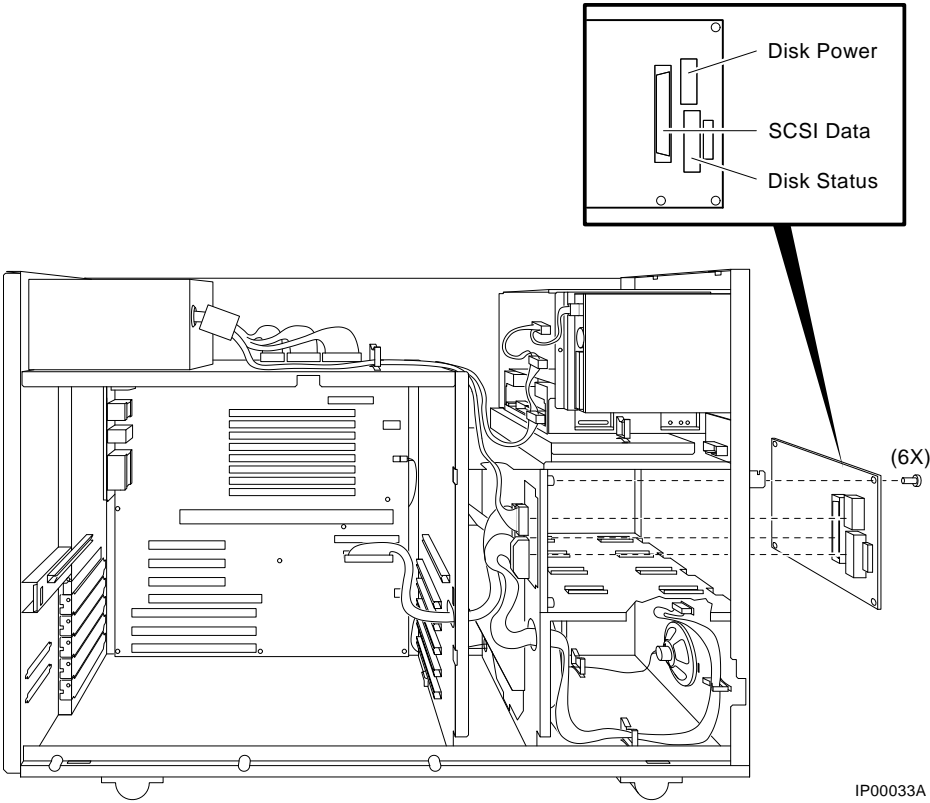
STEP 1: REMOVE HARD DISK DRIVES.

Figure 7-27 Removing Hard Disk Drives



STEP 2: DISCONNECT DISK POWER, DISK STATUS, AND SCSI DATA CABLES FROM THE DISK DRIVE BACKPLANE AND REMOVE BACKPLANE.

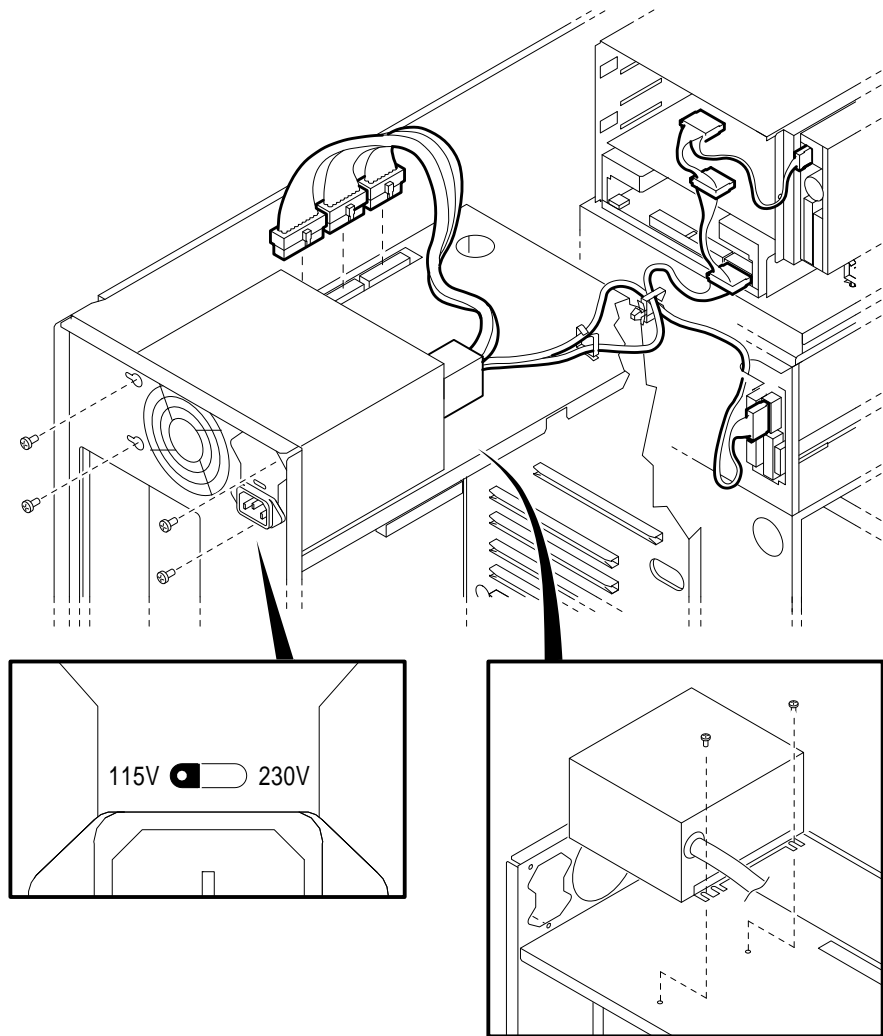
Figure 7-28 Removing Disk Drive Backplane



7.2.14 Power Supply

STEP 1: DISCONNECT POWER SUPPLY CABLES AND REMOVE POWER SUPPLY.

Figure 7-29 Removing Power Supply



IP00012A

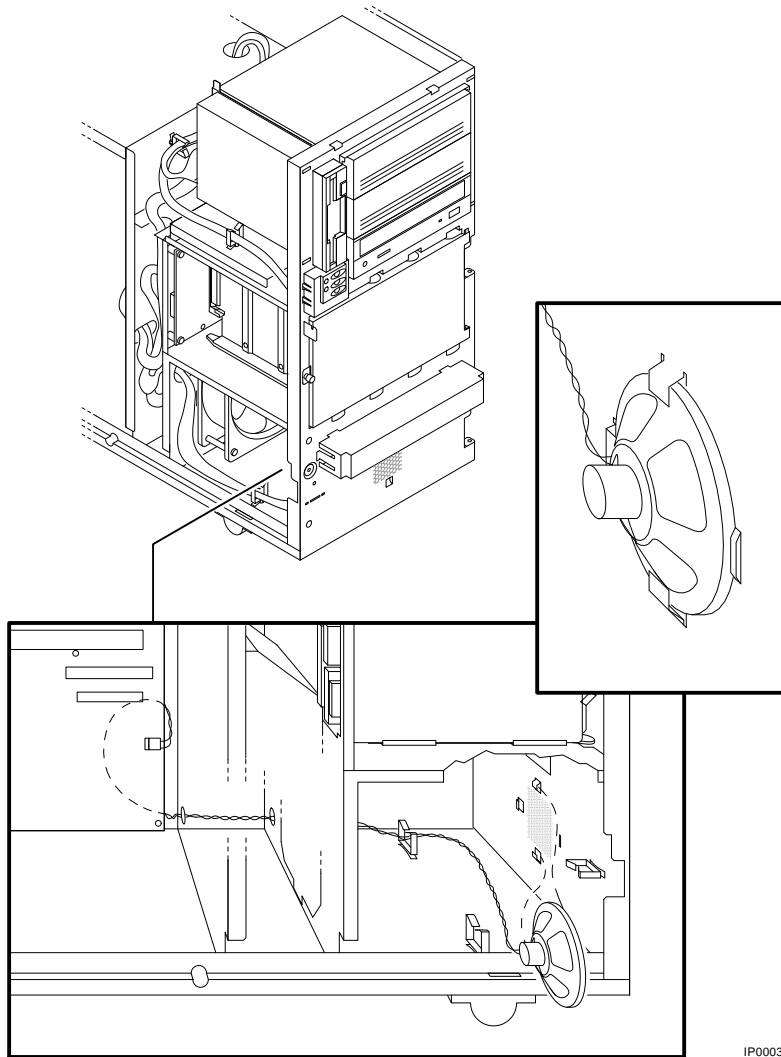
WARNING: Hazardous voltages are contained within the power supply. Do not attempt to service. Return to factory for service.

STEP 2: SET VOLTAGE SELECT SWITCH ON REPLACEMENT POWER SUPPLY AND INSTALL POWER SUPPLY.

CAUTION: Incorrectly setting the voltage select switch can destroy the power supply.

7.2.15 Speaker

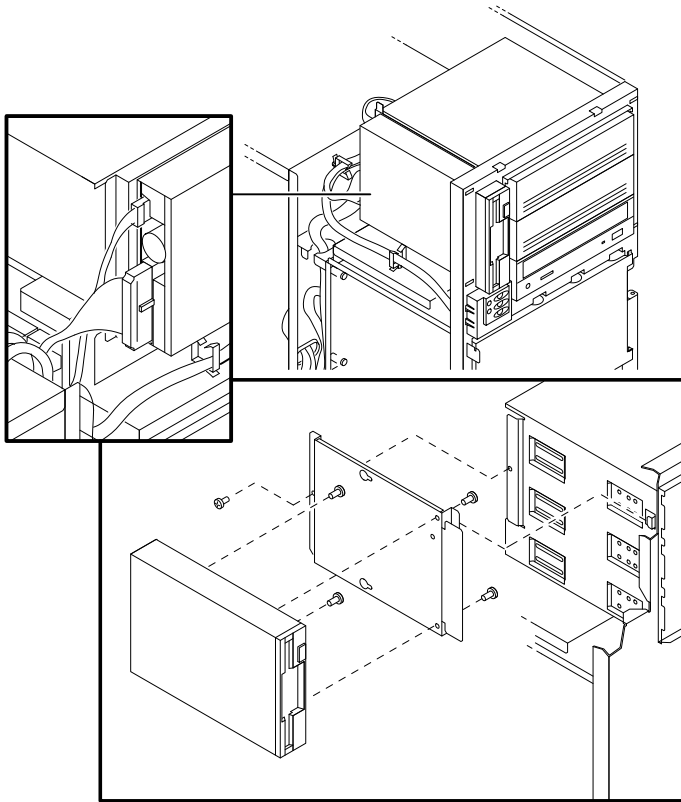
Figure 7-30 Removing Speaker and Its Cable



IP00036

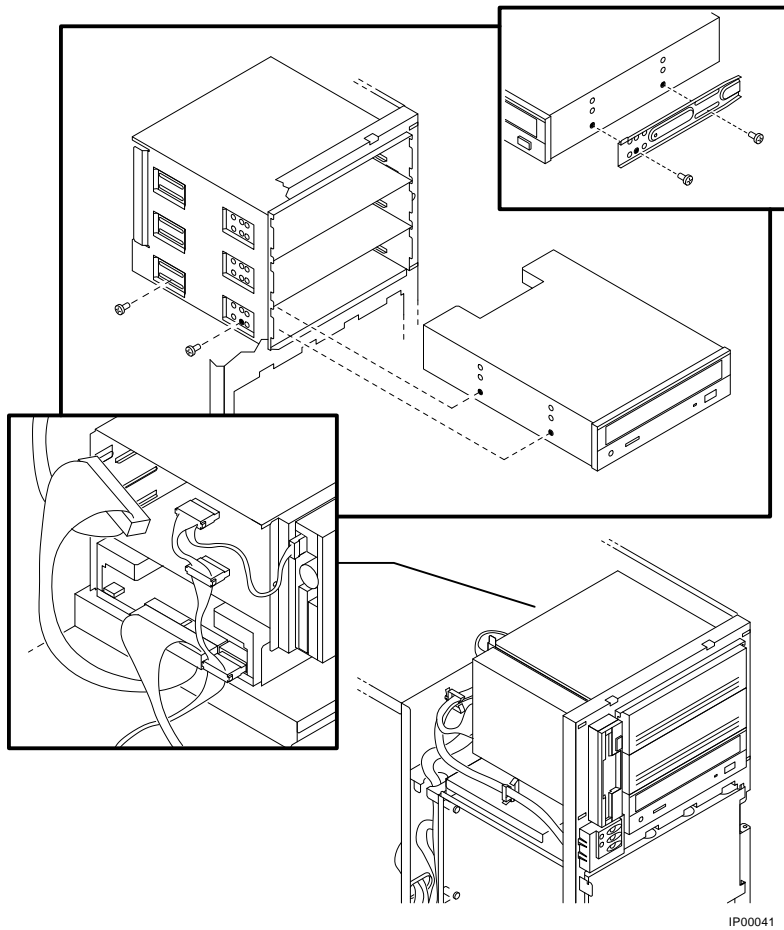
7.2.16 Removable Media

Figure 7-31 Removing the Floppy Drive



IP00042

Figure 7-32 Removing the CD-ROM Drive



NOTE: When removing a 5.25-inch device from the upper two 5.25-inch storage slots, you must first remove the diskette drive in order to access the screws that retain the 5.25-inch device.

Appendix A

Default Jumper Settings

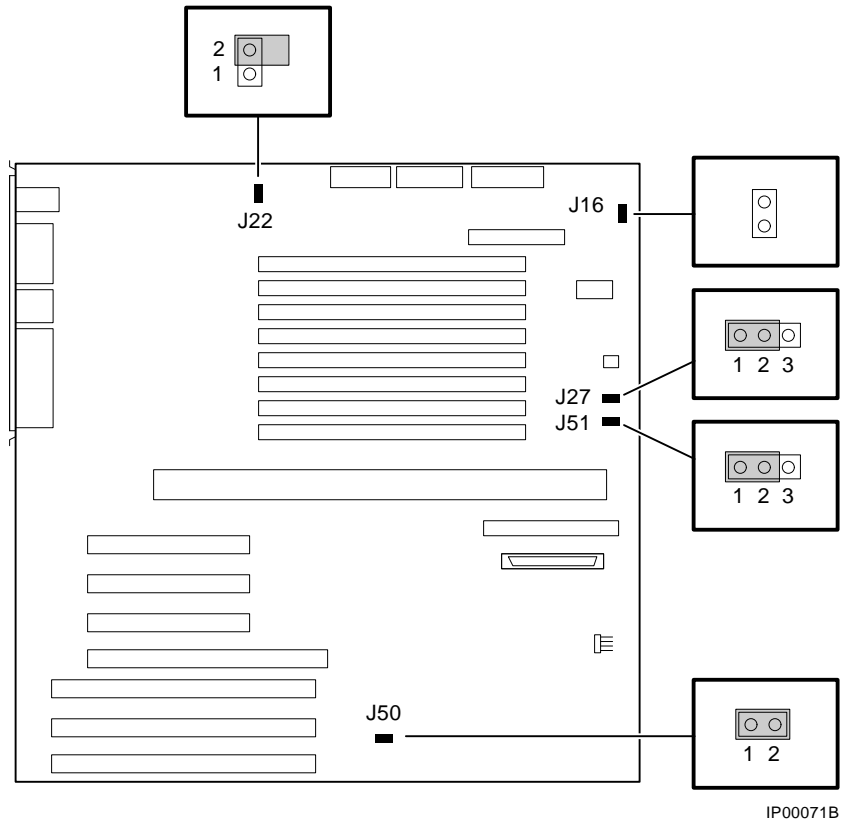
This appendix provides the location and default setting for all jumpers in AlphaServer 800 systems.

- Section A-1 provides location and default settings for jumpers on the motherboard.
- Section A-2 provides the location and supported settings for the J3 jumper on the CPU daughter board.
- Section A-3 provides the location and default setting for the J1 jumper on the CPU daughter board.
- Section A-4 provides the location and supported setting for the J5 jumper on the hard disk backplane.

A.1 Motherboard Jumpers

Figure A-1 shows the location and default settings for jumpers on the motherboard.

Figure A-1 Motherboard Jumpers (Default Settings)

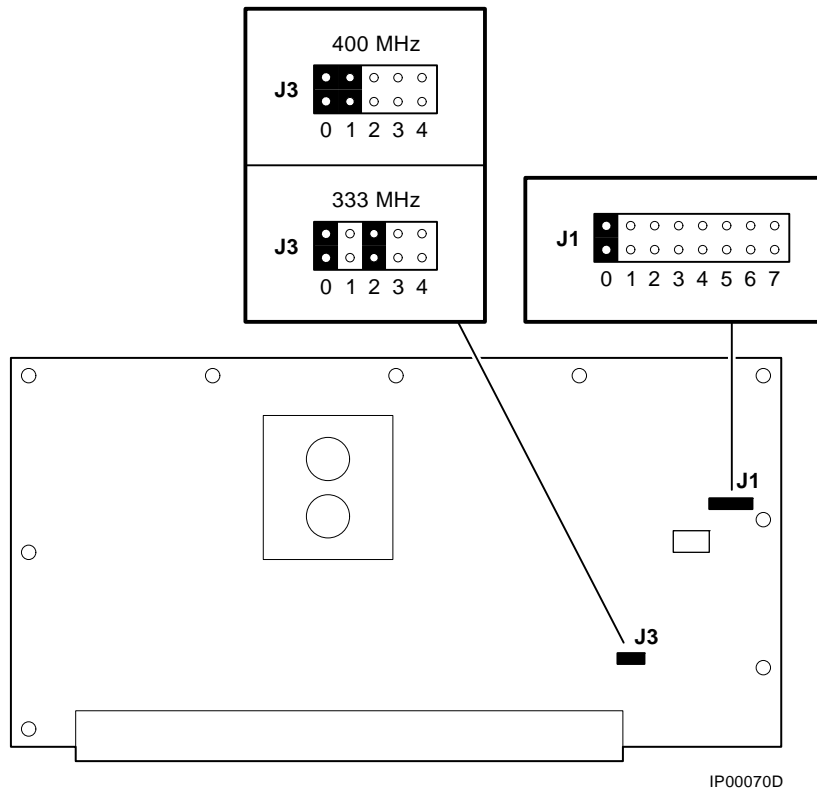


Jumper	Name	Description	Default Setting
J16	Fan fail override	Allows the fan failure detection logic to be disabled to accommodate alternative enclosures.	This jumper is not installed on AlphaServer 800 systems.
J22	Remote management console (RMC)	Sets default values to the RMC NVRAM.	Disabled (as shown in Figure A-1).
J27	VGA Enable	When enabled (as shown in Figure A-1), the on-board VGA logic is activated.	Enabled for onboard VGA; Disabled if an EISA- or PCI-based VGA option is installed.
J50	Flash ROM VPP Enable	Permits the 12V voltage needed to update the flash ROMs.	Jumper installed (enabled).
J51	SCSI Termination	Allows the internal SCSI terminator to be disabled.	Enabled (as shown in Figure A-1.)

A.2 CPU Daughter Board (J3) Supported Settings

Figure A-2 shows the supported AlphaServer 800 5/400 settings for the J3 jumper on the CPU daughter board. This jumper affects the clock speed and other critical system settings.

Figure A-2 AlphaServer 800 5/400 and 5/333 CPU Daughter Board (Jumper J3)

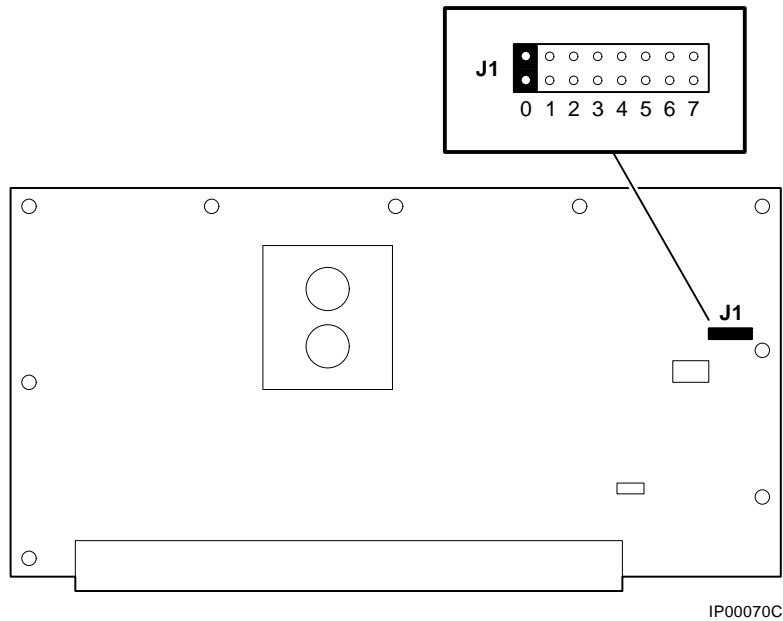


A.3 CPU Daughter Board (J1 Jumper)

Figure A-3 shows the system default setting for the J1 jumper on the CPU daughter board.

For information on the fail-safe loader, which is activated through the J1 jumper, refer to Chapter 2.

Figure A-3 Jumper J1 on the CPU Daughter Board

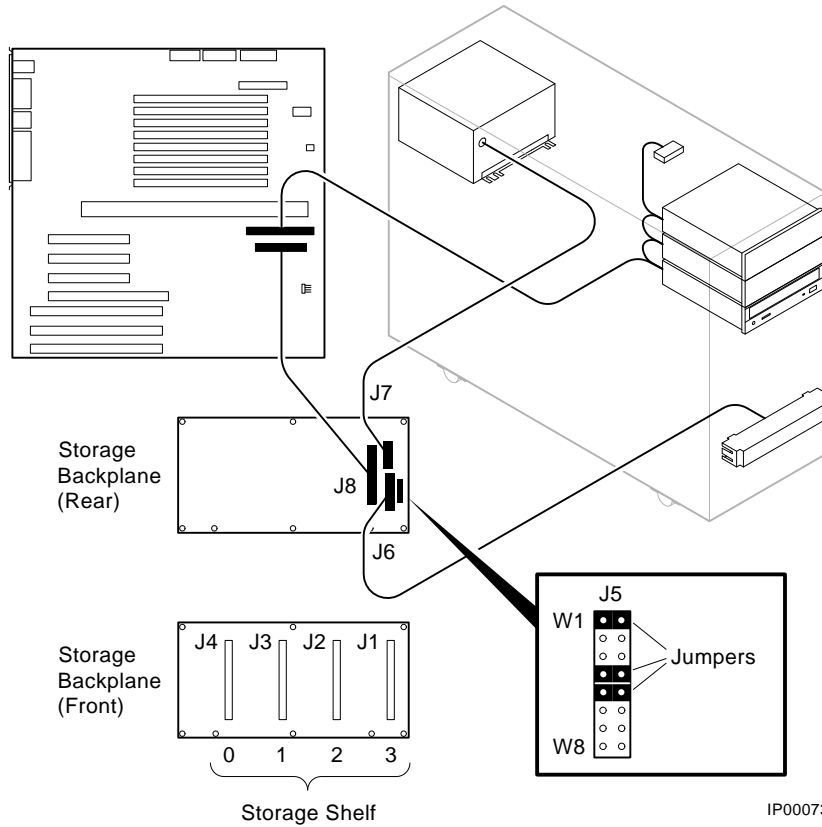


Bank	Jumper Setting Function
0	Standard boot setting
1	Power up with backup cache disabled: Allows the system to run despite bad B-cache until a replacement CPU board is available.
2	Power up to the fail-safe loader with backup cache disabled.
3	Mini console setting (Internal use only)
4	Mini console setting (Internal use only)
5	Mini console setting (Internal use only)
6	Mini console setting (Internal use only)
7	Fail-safe loader setting: Attempt to boot from the fail-safe loader diskette at power-up.

A.4 Hard Disk Drive Backplane (J5) Supported Settings

Figure A-4 shows the supported setting for the J5 jumper on the SCSI hard disk backplane.

Figure A-4 SCSI Hard Disk Backplane Jumper Setting (J5)



Appendix B

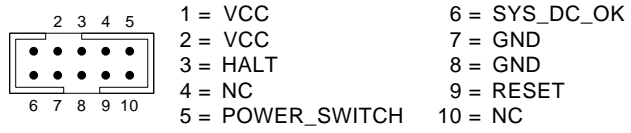
Connector Pin Layout

This appendix provides the pin layout for AlphaServer 800 internal and external connectors.

- Section B-1 provides the layout for internal connectors.
- Section B-2 provides the layout for external connectors.

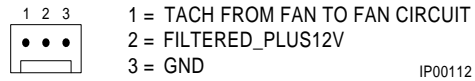
B.1 Internal Connectors

OCP Connector



IP00111

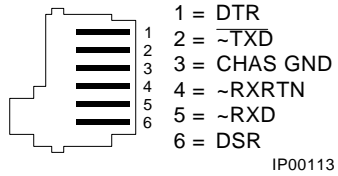
FAN Connector



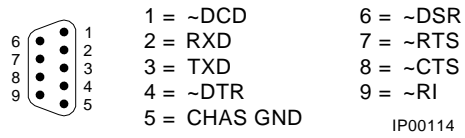
IP00112

B.2 External Connectors

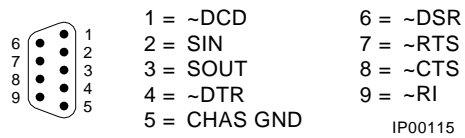
COM1 (MMJ) Connector



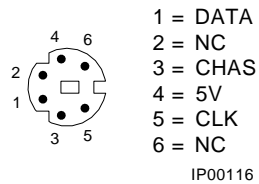
Remote Management Modem Connector



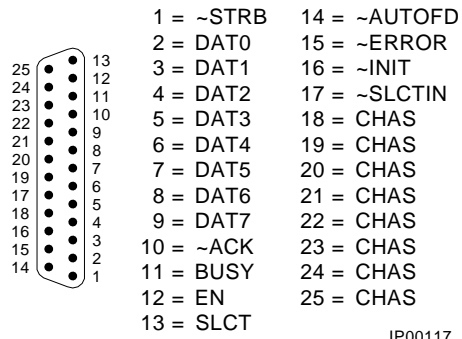
COM2 Connector



Mouse and Keyboard Connectors

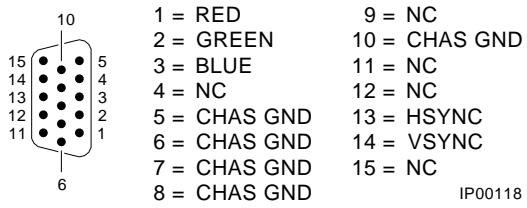


Parallel Port Connector



IP00117

VGA Connector



IP00118

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