AlphaServer 1000

Owner's Guide

Order Number: EK-DTLSV-OG. A01

Digital Equipment Corporation
Maynard, Massachusetts

November 1994

S2734

Information - Class B

FCC ID: AO9-PB70

FCC NOTICE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Any changes or modifications made to this equipment may void the user's authority to operate this equipment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur to radio or television reception. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

The user may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C., 20402. Stock No. 004-00398-5.

All external cables connecting to this basic unit need to be shielded. For cables connecting to option boards, see the option manual or installation instructions.

This digital apparatus does not exceed the Class B limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

ACOUSTIC DECLARATION: Preliminary declared values per ISO 9296 and ISO 7779:

AlphaServer 1000 Model 200 (PB70A-A9)	**L_{WAd}, B**	**L_{pAm}, dBA (Bystander Positions)**
Idle Operating	5.6 5.6	36 36
AlphaServer 1000 Model 200 (PB70A-A9) with 6xRZ26L		
Idle Operating	5.7 5.8	38 39

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

Contents

Preface

1 Overview

2 Hardware Installation

3 Preparing to Install an Operating System

4 Basic Operation 4-1

7 Upgrading

8 Troubleshooting

9 Quick Reference

Glossary of Terms

Index

Preface

About This Guide

Purpose and Audience

This guide describes how to set up, operate, troubleshoot, and maintain your server system. This information is intended for users, system managers, and others who perform system management tasks.

Online Version

Your system shipment includes documentation on a **{**XE "CDROM documentation"**}**CDROM. It contains an easy-to-navigate, electronic version of all the information in this printed user's guide, plus information to help you upgrade your system, add options, obtain support, and order additional products and services.

You can install the CDROM on any personal computer running Microsoft Windows 3.1 or later, Microsoft Windows NT 3.1, or a Windows emulator. The disk on which you install the CDROM must have approximately four megabytes of free **{**XE "Disk space requirements:CDROM documentation"**}**space available.

Before You Use This Guide

If you have not already installed the system, refer to the installation card shipped with the system.

Some procedures in this document require that you refer to your operating system documentation. Please have your operating system documentation available for use with this guide.

Organization

This guide is organized as follows:

The Preface provides an overview of this guide.

- Chapter 1, "Overview," provides an overview of the system features and capabilities.
- Chapter 2, "Hardware Installation," provides instructions for installing your system hardware.
- Chapter 3, "Preparing to Install an Operating System," explains how to prepare your system for installation of an operating system.
- Chapter 4, "Basic Operation," describes how to turn the system on and off, interpret startup messages, use console mode, boot an operating system, and use storage devices.
- Chapter 5, "Installing and Removing Components," explains how to install and remove internal system components and options.
- Chapter 6, "Configuring," describes how to configure the system.
- Chapter 7, "Upgrading," describes how to plan for upgrading the system with additional memory, network connections, power supply, options, and firmware.
- Chapter 8, "Troubleshooting," explains how to identify and solve system problems and how to perform diagnostics.
- Chapter 9, "Quick Reference" contains system messages, jumper settings, SCSI ID settings, specifications, and the system diagram.
- The Glossary defines technical terms related to the system.
- The Index provides a listing of main topics in this guide.

Conventions

The following table lists the typographical conventions used in this guide.

Convention	Meaning
Ctrl/*x*	Ctrl/*x* indicates that you hold down the Ctrl key while you press another key, indicated here by *x*.
Warning:	Warnings contain information to prevent personal injury.
Caution:	Cautions provide information to prevent damage to equipment or software.
Note:	Notes provide important additional information that you may need when performing certain procedures.
`boot`	Commands that you enter are shown in this special typeface. Commands shown in lowercase letters can be entered in either uppercase or lowercase. Commands shown in uppercase letters must be entered in uppercase for the command to work.
`show config`	Console command abbreviations must be entered exactly as shown.
[ ]	In command descriptions, brackets indicate optional elements.
{ }	In command descriptions, braces containing items separated by commas indicate mutually exclusive items.
< >	In console mode online help, angle brackets enclose a placeholder for which you must specify a value.
`italic type`	Italic type in console command sections indicates a variable.
1	In figures, a numbered callout labels a part of a figure. In text, the numbered callout refers to a labeled part of a corresponding figure.

Related Documentation

This section lists related documents that you may find helpful when operating your system or adding options.

To Learn More about the System:

Document	Part Number
Alpha Architecture Concepts (DEC OSF/1)	EY-N389E
Alpha Architecture Concepts (OpenVMS)	EY-K725E

To Install the System:

Document	Part Number
AlphaServer 1000 Basic Installation Card	EK-DTLVSV-IC
AlphaServer 1000 Installation Label (attached to inside of system's top cover)	36-43629-01
DEC OSF/1 AXP Factory Installed Software User Information	EK-SFFIS-UG
OpenVMS Factory Installed Software User Information	EK-A0377-UG

To Install and Operate Options:

Document	Part Number
RRD43 CDROM Disc Drive Operating Guide	EK-RRDDD-IN
RX26 Diskette Drive Owner's Reference Card	EK-RX26D-RC
TZK11 Tape Backup System User's Guide	EK-TZK11-UG
StorageWorks RAID Array 200 Subsystem Family Installation and Configuration Guide	EK-SWRA2-IG

To Service the System:

Document	Part Number
AlphaServer 1000 Service Guide	EK-DTLSV-SV
AlphaServer 1000 Hardware Reference Manual	EK-DTLSV-RM
AlphaServer 1000 Illustrated Parts Breakdown	EK-DTLSV-IP

1 Overview

Introduction

This chapter provides an overview of your system features and capabilities. The following topics are covered:

- System Overview
- Supported Operating Systems
- Console Firmware
- System Features
- Front Panel Controls and Indicators
- Rear Panel Ports and Slots
- Internal System Options
- External Options
- Ordering Options

System Overview

{XE "System:features"**}**This high-performance, single-processor system is intended for use as a local area network (LAN) server or commercial applications server. It is housed in a deskside enclosure, which is divided into two sides. One side contains components: the system board, CPU card, other logic modules, and fans. The other side contains up to two power supplies and a StorageWorks backplane. The system uses the DECchip 21064, a reduced instruction set computer (RISC) microprocessor based on the Alpha architecture, and provides all the power of a 64-bit computing environment. The Alpha Privileged Architecture Library code (PALcode**{**XE "PALcode"**}**) supports multiple operating environments that offer a choice of applications.

{XE "System:uses"**}**This system is intended for the following types of uses:

- As an applications server, running relational databases, electronic mail, communications, or other applications
- As a print server, providing common printing resources to PCs and other systems in a LAN
- As a file server, providing disk storage to PCs and other systems in a LAN
- As a compute server, displaying the output of applications that you run remotely on the server

Supported Operating Systems

This system supports the following **{**XE "Operating systems:supported"**}**operating systems:

- Windows NT
- OpenVMS
- DEC OSF/1

While the operating system is running, it controls the system, which is in **{**XE "Program mode"**}**program mode. When the operating system is *not* running, a second mode, **{**XE "Console mode"**}**console mode, allows *you* to control system management functions, described in the next section.

System Console Firmware

You perform many of the tasks for managing and configuring your server system in console mode, where the system is controlled by the console subsystem, rather than the operating system.

The **{**XE "Console subsystem"**}**console subsystem, located in ROM (read-only memory) on the system board, contains special software, called **{**XE "Firmware:description"**}**firmware, that interacts directly with hardware components and facilitates interaction between the system hardware and the operating system.

Because the system is designed to support multiple operating systems, it offers two separate interfaces to the console subsystem. The Windows NT operating system is supported by the Advanced RISC Computing (ARC) console. The OpenVMS and DEC OSF/1 operating systems are supported by the Alpha System Reference Manual (SRM) console. Regardless of the operating system you use, you need to access both consoles, depending on the particular task.

Console Firmware Tasks

The console **{**XE "Firmware:tasks"**}**firmware allows you to perform the tasks listed in Table 1-1 through either the **{**XE "ARC console"**}**ARC or the **{**XE "SRM console"**}**SRM console.

The Windows NT (ARC) console firmware has a menu-based interface designed to facilitate hardware interaction with the Windows NT operating system.

The OpenVMS and DEC OSF/1 (SRM) console firmware has a command line interface designed to facilitate hardware interaction with the DEC OSF/1 or OpenVMS operating systems. Table 1-1 lists the tasks that you can perform with each **{**XE "Consoles: tasks"**}**console.

Table 1-1 Console Firmware Tasks

If You Are Running...	And You Want to...	Use this Console...
Windows NT	Boot Windows NT	ARC
	Run the EISA Configuration Utility	ARC
	Update firmware	ARC
	Switch to the SRM console	ARC
	Run programs specifically written to run within the ARC firmware	ARC
	List Windows NT device names	ARC
	Change Windows NT boot configurations and environment variables	ARC
	Initialize the system	ARC
	Display system configuration	SRM
	Perform diagnostic tests	SRM
DEC OSF/1 or OpenVMS	Boot DEC OSF/1 or OpenVMS	SRM
	Update firmware	SRM
	Switch to Windows NT console	SRM
	Initialize the system	SRM
	Display system configuration	SRM
	Display system storage devices	SRM
	Set and display environment variables specific to DEC OSF/1 and OpenVMS	SRM

	Set and display environment variables that are common to DEC OSF/1, OpenVMS and Windows NT	SRM
	Perform diagnostic tests	SRM
	Run the EISA Configuration Utility	ARC

System Features

The system provides a number of **{**XE "System:features"**}**special features that enhance its reliability, ensure its availability, and improve its expansion capabilities, as well as facilitate hardware management and improve security.

Reliability/Availability{XE "Reliability"}

64-bit Alpha RISC architecture	Provides significantly better performance than 32-bit architecture.
Error Correction Code (ECC) memory and CPU cache	Allows recovery from most cache and memory errors.
Dual SCSI backplanes	One SCSI controller for each backplane allows fully redundant disk subsystems.
Second power supply	Provides redundant power as backup.
Variable fan speed	Adjusts fan speed according to system temperature.
Internal sensors	Monitor and detect internal system temperature, fan failure, power supply temperature.

System Expansion{XE "Expansion:system"}

Flexible memory architecture	Provides a 128-bit data path with ECC protection. System memory can be upgraded from 16 MB to 512 MB using memory options.
Seven EISA expansion slots, two PCI expansion slots, and one PCI or EISA expansion slot	Accommodates industry-standard option cards such as Ethernet, FDDI, SCSI, and modems.

Integrated Fast SCSI-2 controller with external SCSI-2 connector	Supports tape, CDROM and hard disk drives without use of an expansion slot.
Integrated SVGA controller	Supports management and configuration applications locally without use of an expansion slot.
Capacity for 10 internal storage devices	Accommodates seven 3½-inch half-height drives, two 5½-inch half-height drives (CDROM or tape), and one 3½-inch diskette drive.
External ports	Two serial ports and one parallel port support external options such as a printer, modem or local terminal.
Wide-ready SCSI backplane	Allows upgrade to newer high-performance drive technology.
Hot swap disk capability	Allows replacement of StorageWorks disk drives while the system continues to operate.

Server Management{XE "Server management"}

System diagnostics	Allows local and remote diagnosis of system problems.
Hardware configuration	Allows local and remote system configuration.
Unique asset management	Unique system identifier in nonvolatile memory provides easy asset management.
RAM-based error log	Records startup error messages.
Firmware upgrade utility	Provides verification of firmware versions.
Error information display	Identifies CPU, bus, PCI, and system errors.
Hard drive indicator lights	Provide immediate status information on hard drive activity or failure.
Operator Control Panel (OCP)	Provides a 16-character display for diagnostic and error messages.

System Security{XE "Security"}

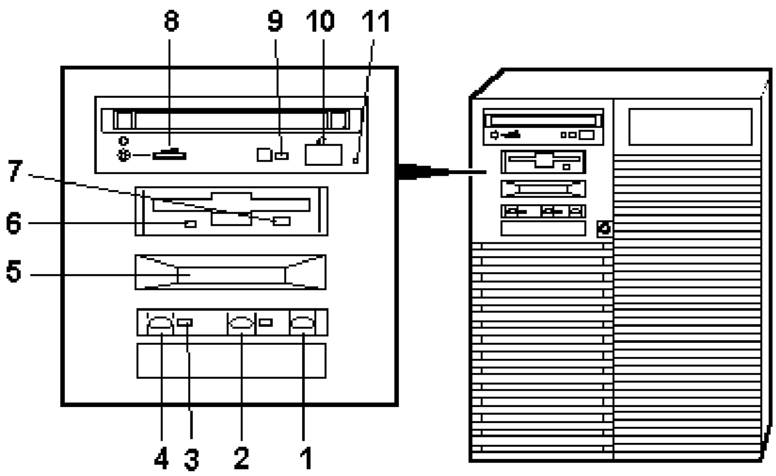
Key lock	Limits access to system components.
Security loop (on rear of system unit)	Allows system to be secured in place.
Interlock sensor switch	Automatically turns off system power if the top cover is removed while power is on.

Front Panel Controls and Indicators

The **{**XE "Controls:front panel"**}**controls and indicators **{**XE "Indicators:front panel"**}**on the front panel of the system unit are shown in Figure 1-1 and described in Table 1-2.

Figure 1-1 shows the locations of the controls and indicators on the front panel of the system unit.

Figure 1-1 Front Panel Indicators



1 Halt switch
2 Reset switch
3 On/Off indicator
4 On/Off switch
5 Operator control panel
6 Diskette drive activity indicator
7 Diskette drive eject button
8 CDROM volume control
9 CDROM activity indicator
10 CDROM eject button
11 CDROM emergency eject hole

Front Panel Controls and Indicators Description

Table 1-2 describes how the **{**XE "Switches:front panel"**}**front panel controls and indicators function.**{**XE "Halt switch"**}{**XE "Reset switch"**}{**XE "On/Off switch"**}**

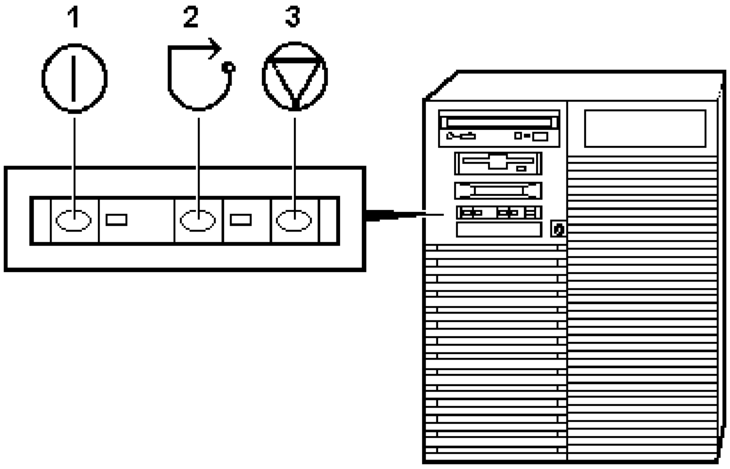
Table 1-2 Front Panel Controls and Indicators

Control or Indicator	Function
Halt switch	Halts an OpenVMS or DEC OSF/1 system, returning it to console mode control Halts a Windows NT system, but you must press the Reset switch to completely reboot the firmware
Reset switch	Reinitializes the system and performs startup tests
On/Off switch	Switches the system unit on and off
On/Off indicator	Lights when the system unit is turned on
Diskette drive activity indicator	Lights when the system is accessing the diskette drive
Diskette drive eject button	Ejects a diskette from the diskette drive
CDROM volume control	Adjusts headphone volume
CDROM drive activity indicator	Lights when the system is accessing the CDROM drive
CDROM eject button	Ejects disc from the CDROM drive
Operator control panel display	Displays diagnostic and error messages

Front Panel Switches

The On/Off, reset, and halt switches are located on the left side of the front panel. They are identified by the icons shown in Figure 1-2.

Figure 1-2   Front Panel Switches

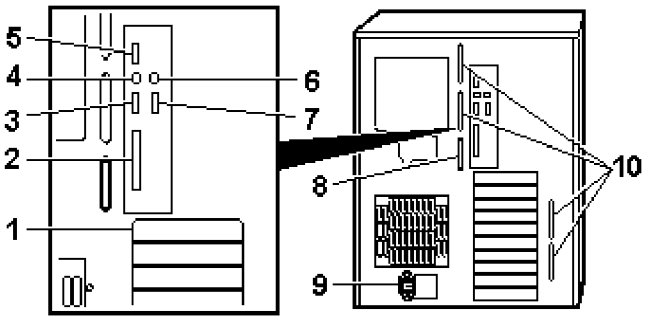


1   On/Off switch
2   Reset switch
3   Halt switch

Rear Panel Ports and Slots

The ports and slots on the rear of the system unit are shown in Figure 1-3 and described in Table 1-3.

Figure 1-3 Rear Panel Ports and Slots



1 PCI/EISA slots

2 Parallel port

3 Serial port/terminal port (COM2)

4 Mouse port

5 VGA port

6 Keyboard port

7 Serial port/terminal port (COM1)

8 SCSI port

9 Power inlet

10 Four additional SCSI ports knockouts

Rear Panel Ports and Slots Description

Table 1-3 describes the rear panel **{**XE "Ports:rear panel"**}**ports and **{**XE "Slots: rear panel"**}**slots shown in Figure 1-3.

Table 1-3 Rear Panel Ports and Slots

Port or Slot	Used to connect....
Up to three PCI slots	Option cards for high-performance network, video, or disk controllers
Up to eight EISA slots	Option cards for network, video, sound, or disk controllers
Parallel port	Parallel device such as a printer
Serial port/terminal port (COM1)	Console terminal or serial-line peripheral such as a modem
Mouse port	PS/2-compatible mouse
VGA port	VGA monitor
Keyboard port	PS/2-compatible keyboard
Serial port (COM2)	Serial-line peripheral such as a modem
SCSI port	External SCSI devices
Power inlet	System unit to a power outlet
Four additional SCSI port knockouts	External SCSI devices without using an adjacent slot

Internal System Options

Your **{**XE "Options:system"**}**system supports the following types of options:

- Storage options
- EISA, ISA, and PCI options
- Memory options

Storage Options

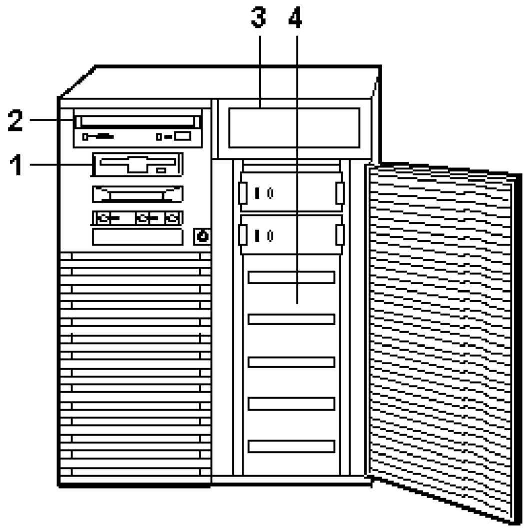
Mass **{**XE "Storage options"**}**storage options **{**XE "Options:storage"**}**are located in several compartments inside the system as shown in Figure 1-4. The system accommodates the following types of storage options:

- One diskette drive
- Two removable-media storage devices, typically, a CDROM drive, a digital audio tape (DAT) drive, or a quarter-inch cartridge (QIC) tape drive

- Up to seven 3½-inch StorageWorks drives

Figure 1-4 shows the locations of the storage option compartments.

Figure 1-4 Storage Option Compartments



1 Diskette drive compartment

2 CDROM drive compartment

3 Tape drive compartment

4 StorageWorks drives shelf

EISA, ISA, and PCI Options

The system **{**XE "EISA options"**}**supports EISA, **{**XE "ISA options"**}**ISA, and **{**XE "PCI options"**}**PCI options, **{**XE "Options:EISA"**}**including **{**XE "Options:ISA"**}**those **{**XE "Options:PCI"**}**for:

- SCSI storage expansion
- Networking
- Communications
- Graphics

Memory Options

You can increase your system's memory to 512 megabytes by using various combinations of memory options. Adding more memory **{**XE "Options:memory"**}**allows your system to run memory-intensive software more quickly.

The system supports the following **{**XE "Memory options"**}**memory option sizes:

- 16 MB
- 32 MB
- 64 MB
- 128 MB

Memory options consist of five single-in line memory modules: a 16-MB option consisting of five 4-MB modules, a 32-MB option consisting of five 8-MB modules, a 64-MB option consisting of five 16-MB modules, or a 128-MB option consisting of five 32-MB modules.

External Options

External **{**XE "Options:external"**}**options that can be added to the system include the following:

- Monitor or terminal
- Expansion boxes
- Printers
- RAID controller

Ordering Options

The list of supported **{**XE "Options:ordering"**}**options is subject to change. Contact your sales representative for information on the current list of supported options and for information on ordering.

2 Hardware Installation

Introduction

This chapter explains how to set up your system hardware. The following topics are discussed:

- Hardware Setup Overview
- Selecting a System Location
- Identifying Accessories
- Connecting a Keyboard, Mouse, or Printer
- Connecting a Monitor or Terminal
- Connecting to Network Hardware
- Verifying Hardware Setup
- Locking Your System

Hardware Setup Overview

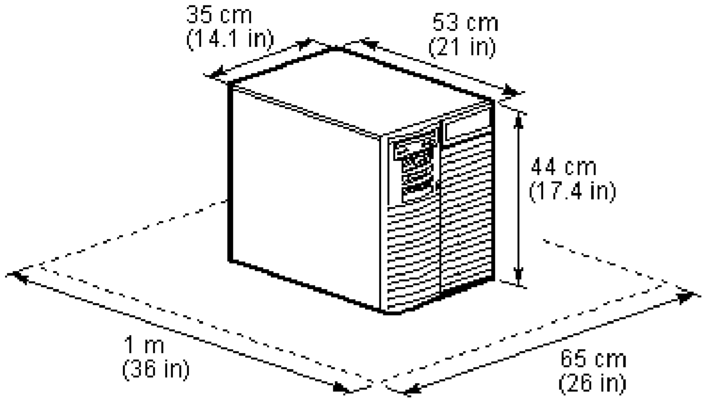
The steps for **{**XE "Setup:overview"**}**setting up your **{**XE "System:setting up"**}**hardware are summarized as follows. Depending on the options you use with your system, these steps may vary.

1. Select a location for the system, giving consideration to service access, environmental conditions, and power requirements.
2. Confirm that you have all the desired accessories that ship with the system and any additional accessories you may want to add.
3. Connect the keyboard, mouse, printer, and monitor or terminal.
4. Connect to the network hardware.
5. Verify your hardware setup.

Selecting a System Location

When choosing a **{**XE "System:dimensions"**}**system location, keep in mind the optimal environmental conditions and power requirements for the system. Be sure to keep the system in an upright position. Figure 2-1 **{**XE "Space requirements:system"**}**shows the system **{**XE "Dimensions:of system"**}**dimensions and the clearance needed to access the system for servicing.

Figure 2-1 System Dimensions and Service Area



Environmental Conditions

Table 2-1 lists the **{**XE "Environmental specifications"**}**environmental conditions in which the system unit best operates.

Table 2-1 Optimal Environmental Conditions

Condition	Specification
Temperature range	The room temperature must be between 10º C and 40º C (50º F and 104º F).
Relative humidity	The relative humidity must be between 10% and 90% (20% to 80% with removable media options).

Air circulation	You must have a minimum clearance of 8 cm (3 inches) on all sides of the system unit to allow sufficient air circulation. Fans inside the system unit circulate the air to prevent excessive heat, which can damage the system components.

Power Requirements

Your **{**XE "Power requirements"**}**system ships with one primary power supply and the option of a **{**XE "Power supply:secondary"**}**second power supply. The second power supply provides redundant power to the system. Both the primary and secondary power supplies connect to an AC outlet. An internal cable connecting the two power supplies is required when using the second power supply.

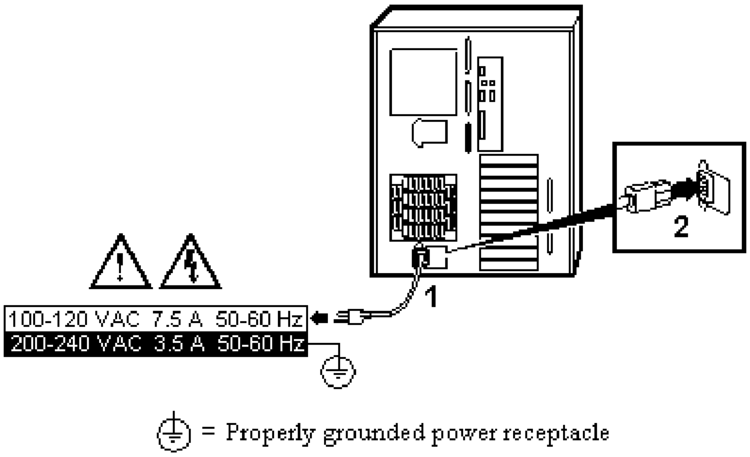
Voltage **{**XE "Voltage:power supply"**}**selection is not required. The system is intended for use at all rated AC-input voltages. Table 2-2 lists the power supply ratings for systems using one or two power supplies. Figure 2-2 shows the power supply requirements for a system with one power supply.

Table 2-2 Power Supply Ratings

Specification	Range
Voltage	100-120/220-240 volts AC
Frequency	50-60 Hz
Current	8.5/4.0 amperes (one power cord) 7.0/3.5 amperes (two power cords)

Note: These ratings are the maximum with a fully loaded system enclosure and do not include a monitor or terminal.

Figure 2-2 Power Supply Requirements (Single Power Supply)



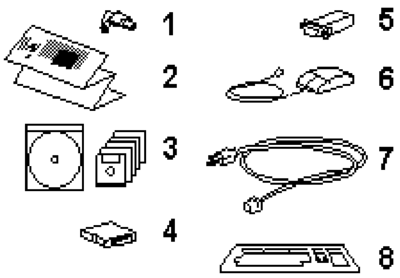
1 Power supply cable

2 Power supply cable socket

Identifying Accessories

Figure 2-3 shows the **{**XE "Accessories:identifying"**}**accessories that are included with the system. Table 2-2 describes the accessories.

Figure 2-3 System Accessories



1 System unit keys (2)
2 Installation card
3 Owner's Guide (CDROM) and EISA Configuration Utility kit
4 External SCSI terminator
5 MMJ Serial Connector
6 Mouse
7 Power cord
8 Keyboard

System Accessories

Table 2-3 describes the accessories that are included with your system.

Table 2-3 System Accessories

Accessory	Description
System unit keys (2)	Locks and unlocks the system unit
Basic Installation card, installation label, and *Owner's Guide* (in hardcopy and CDROM versions)	Installation, operation, and troubleshooting information
EISA Configuration Utility kit	Runs the EISA Configuration Utility
External SCSI terminator	Terminates the SCSI bus at system rear
MMJ serial port connector (H8571-1)	Attaches Digital 423 DECconnect cables
Mouse	PS/2-style mouse
Power cord	Connects AC power to power supply
Keyboard	PS/2-style keyboard

Optional Accessories

Table 2-4 lists optional **{**XE "Accessories:optional"**}**accessories that you may want to order, depending on your system's configuration.

Table 2-4 Optional Accessories

Accessory	Description
Monitor or terminal	VGA or SVGA monitor or terminal
Second power supply	Provides redundant power in case primary power supply fails.
Second power cord	Connects AC power to second power supply
Power supply interconnect cable (with 3-pin connector)	Connects primary and secondary power supplies

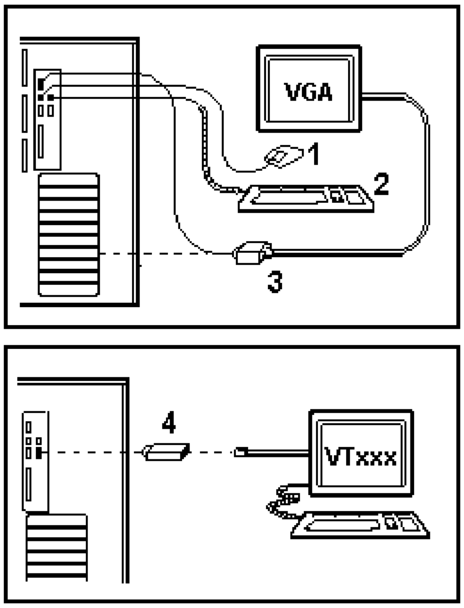
Connecting a Keyboard, Mouse, or Printer

If you are using a **{**XE "Keyboard:connecting"**}**keyboard, a **{**XE "Mouse:connecting"**}**mouse, or a **{**XE "Printer:connecting"**}**printer, connect each to the appropriate connector at the rear of the system. Refer to Figure 1-3, "Rear Panel Ports and Slots," to verify the location of the connectors.

Connecting a Monitor or Terminal

Connect a VGA **{**XE "Monitor:connecting"**}**monitor, an **{**XE "VGA monitor:connecting"**}**SVGA **{**XE "SVGA monitor:connecting"**}**monitor, or a **{**XE "Terminal:connecting"**}**terminal to your system unit, as shown in Figure 2-4.

Figure 2-4 Connecting a {XE "Graphics option slot"**}Monitor or Terminal**



1 Mouse port connection

2 Keyboard port connection

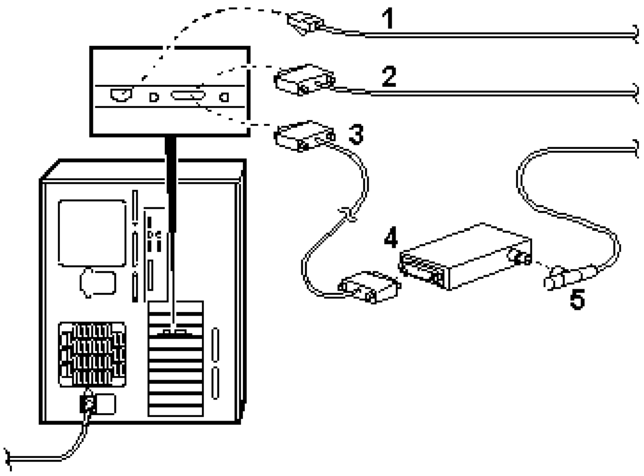
3 High-performance graphics option card slot

4 Terminal port (COM1) connection

Connecting to Network Hardware

Using network adapters, you can connect to the EISA and PCI buses. Your system supports various **{**XE "Network options"**}{**XE "Network hardware:connecting"**}**network options. You can connect to ThinWire, AUI, or 10Base-T Ethernet networks as shown in Figure 2-5.

Figure 2-5 Network Connections



1 10BASE-T cable

2 AUI cable

3 AUI cable

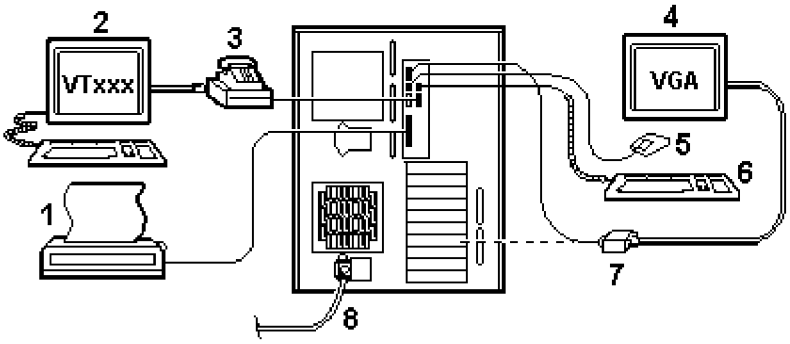
4 MAU adapter

5 ThinWire cable

Verifying Hardware Setup

Before turning on the **{**XE "Setup:verifying"**}**system, check to ensure that you have made all the proper cabling connections on your system. Refer to the section, "Basic Operation," for information about turning on **{**XE "Graphics option:cabling"**}**your system. Figure 2-6 shows the external system **{**XE "Cabling:external"**}**cabling.

Figure 2-6 External System Cabling



1 Printer

2 Terminal

3 Modem

4 VGA monitor

5 Mouse

6 Keyboard

7 High-performance graphics option

8 Power cable

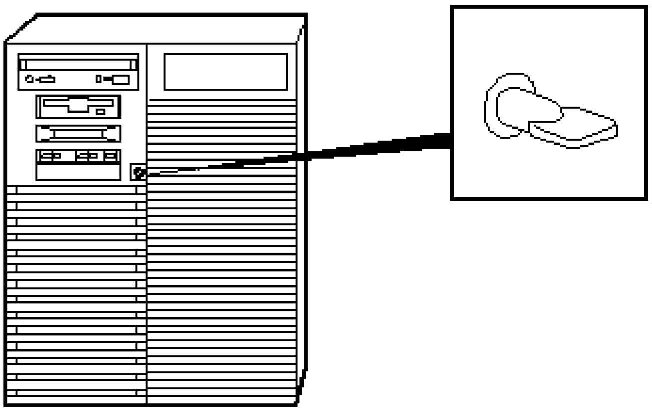
Locking Your System

The system **{**XE "Security"**}**unit is protected by a key **{**XE "Lock:system"**}**lock located on the front door that prevents unauthorized access to the hardware inside the unit. Turning the **{**XE "Key"**}**key to the left locks the front door. When the front door is locked, the top cover and side panels cannot be removed. Turning the key to the right unlocks the system unit and allows you access to install or remove system components. When the system unit is unlocked, push the lock to open the door. Figure 2-7 shows the system lock in the unlocked position.

To remove the top cover, pull down the latch located on the front of the system above the lock, and while holding down the latch, pull the top cover off from the rear of the system.

When the top cover and side panels have been removed, the system cannot be turned on.

Figure 2-7 System Lock and Key

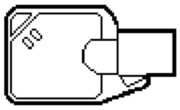


Additional security is provided by a latching loop on the rear panel of the system unit that allows you to attach the system unit to a post or other fixed object.

Recording the System Unit Key Number

Write down the **{**XE "Key:identification number"**}**number and letter of the system unit key and record this information in a safe place in case you need to order a replacement key. Figure 2-8 shows the location of the key number on the system unit key.

Figure 2-8 System Unit Key Number Location



3 Preparing to Install an Operating System

Introduction

This chapter covers the following topics:

- Preparing to Install Windows NT
- Preparing to Install DEC OSF/1
- Preparing to Install OpenVMS

These sections **{**XE "Operating systems:installation"**}**explain how to prepare for installing or upgrading:

Windows NT Server or Workstation 3.5 or later

DEC OSF/1 Version 3.0B or later

OpenVMS Version 6.1-1H2 or later

If your system was shipped with pre-installed software, refer to the software documentation to start up your operating system for the first time.

Preparing to Install Windows NT

Preparing the System

1. **{**XE "Windows NT:preparing to install"**}**Before you install the Windows NT operating system, make sure that you have the **{**XE "Windows NT:verifying version"**}**following items:

- Microsoft Windows NT ARC firmware for the AlphaServer 1000, Version 3.5-12 or later. The ARC firmware is a menu-driven utility to configure your system.
- Microsoft Windows NT Server or Workstation 3.5 or later.
- The EISA Configuration Utility (ECU) diskette for Microsoft Windows NT, Version 1.5 or later.
- Digital AlphaServer 1000 4/200 Cirrus Logic 542x Linear Installation Diskette for Windows NT, Version 3.5.
- A partitioned and formatted hard disk drive installed in your system. If your drive has not yet been prepared, follow the instructions in "Hard Disk Preparation" later in this section.

2. If a Microsoft Windows NT product announcement was included with your system, read the announcement, which contains important READ FIRST information.
3. Contact the administrator of your local area network to obtain the network information you will need. This information will vary depending on the type of network hardware and software installed at your location.

Setting the Operating System Type

1. **{**XE "Operating system type:setting for Windows NT"**}**Turn the system on by pressing the On/Off switch on the front of the system. After a short wait, the operator control panel on the front of the system displays the message "Model 4/200," and the screen displays initialization and testing information.
2. Press the Enter key. If your screen displays the ARC console Boot menu, your system has already been prepared for use with Microsoft Windows NT and you can proceed to the next section, "Updating the Firmware."

   If your screen displays a triple arrow (>>>) prompt instead of the ARC console Boot menu, your system has booted the SRM console. Proceed to step 3.
3. Type the following two commands at the SRM console prompt and press the Enter key after each **{**XE "set console graphics command"**}**command:
   ```
   set console graphics
   set os_type nt
   ```
4. Turn off the power to your system by pressing the On/Off switch on the front of your system. Wait at least 10 seconds, then turn the power back on.

5. The system performs several diagnostics. If you see an error message, you can ignore it, because the remainder of the configuration procedure will correct any configuration errors that are displayed on the screen.

Updating the Firmware

When the ARC Boot menu is displayed, note the **{**XE "Firmware:updating for Windows NT"**}**firmware version number at the top of the screen display. Compare this version number to the required version listed in "Installation Preparation." If no update is required, proceed to the section, "Setting Default Environment Variables." If an update is required, follow these steps:

1. From the Boot menu, use the arrow keys to highlight Supplementary menu, then press the Enter key.
2. Insert the Digital AlphaServer 1000 4/200 Drivers and Firmware Update diskette for Windows NT 3.5 into the diskette drive.
3. From the Supplementary menu, select "Install new firmware" and press the Enter key. The update process begins and the following prompt appears.

   ```
   Apu ->
   ```
4. Type Update and press the Enter key.
5. At the prompt, "Are you ready to program device?" type the letter y and press the Enter key.
6. If the update is successful, the screen displays the message, "ARC ROM update successful." If this message is not displayed, call your technical support representative for further assistance.
7. Turn off the power to your system by pressing the On/Off switch on the front of your system. Wait at least 10 seconds, then turn the power back on.

Setting Default Environment Variables

After updating the **{**XE "Environment variables:setting for Windows NT"**}**firmware, **{**XE "Firmware:verifying version"**}**verify that the correct firmware version number is displayed at the top of the ARC Boot menu. Then follow these steps to set the default environment variables:

1. From the ARC Boot menu, select the Supplementary menu and press the Enter key.
2. Select "Set up the System..." and press the Enter key.
3. Select "Set default environment variables" and press the Enter key.

4. When prompted to enter the system partition location, select "SCSI hard disk" and press the Enter key.
5. When prompted to enter SCSI bus and SCSI ID numbers, enter the SCSI bus and ID for the location for the system partition. These values are used to set an environment variable, which Windows NT uses to determine the correct drive and partition to boot from.

   If you are unsure about these values, simply accept the default values of 0. If these values are incorrect for your particular system (if, for example, your hard drives are on a secondary controller on SCSI bus 1), NT setup will prompt you to run the arcinst utility. The **{**XE "ARCINST utility"**}**arcinst utility provides valid values to choose for setting this environment variable correctly.
6. When prompted to enter the partition number on the disk, verify that it is set to 1, and press the Enter key.

   If you are unsure about your disk configuration, select "Display hardware configuration" to view a summary of your system hardware.
7. Select "Set default configuration" and choose the diskette and keyboard settings that correspond to your system.

Setting the EISA Configuration

1. Insert the **{**XE "EISA Configuration Utility (ECU):using with Windows NT"**}**EISA Configuration Utility diskette for Microsoft Windows NT into the diskette drive on your server.
2. From the Setup menu, select "Run EISA Configuration Utility from floppy" and press the Enter key. After a few moments, the EISA Configuration Utility dialog box appears. Press the Enter key.

   If any of the EISA option cards in your computer have not yet been identified, a Caution dialog box is displayed. You can ignore this dialog box because your option cards will be identified in the following steps.
3. Press the Enter key to display the "Steps in Configuring your Computer" dialog box.
4. Select "Step 3: View or edit details" to verify your system’s configuration (optional).
5. Select "Step 5: Save and Exit" and press the Enter key. At the confirmation prompt, select "Save the configuration" and press the Enter key. When a dialog box appears, indicating that the configuration has been saved, press the Enter key. Your system will restart with the updated information.

Preparing Your Hard Disk

If your first hard **{**XE "Hard disk:preparing for Windows NT"**}**disk is already partitioned and formatted with either the FAT or NTFS file systems, you can omit the steps in the section "Partitioning and Formatting the First Hard Disk" and begin installation of the Microsoft Windows NT software. It is recommended that you partition and format your system's hard disk before installing Windows NT software, even if your hard disk has already been partitioned and formatted. Repartitioning and reformatting reduce the likelihood of operational problems due to conflicting versions of the operating system or disk-related problems.

> **Note:** If the first hard disk in your system currently contains any information that you need, back that information up to another medium before proceeding.

Partitioning and Formatting Your Hard Disk

> **Note**: Omit these steps if you want to maintain your current partitions.

1. Insert the **{**XE "Hard disk:partitioning"**}**Microsoft Windows NT CDROM into your system's CDROM drive.**{**XE "Hard disk:formatting"**}**
2. Turn on your system. After your system performs startup diagnostics, the screen displays the Windows NT (ARC) console Boot menu.
3. From the Boot menu, select "Run a program" and press the Enter key. A "Program to run" prompt appears.
4. Type cd: \alpha\arcinst and press the Enter key. The ARC Installation Program screen is displayed.
5. Select "Configure Partitions" and press the Enter key. The available disk partitioning options appear.
6. Select "Delete Partition" and press the Enter key. If your system has only one hard disk, press the Enter key. If your system has more than one hard disk, select the disk to be prepared, and press the Enter key.

   Depending on the previous disk configuration, you might be notified that no partitions exist, or you may see a list of one or more partitions. Follow the on-screen prompts to delete all partitions on the disk.

7. Select "Create Partition" and press the Enter key. When the list of available disks appears, select the disk to be prepared and press the Enter key. You are prompted for the size of the partition.
8. Type 6 after the "Enter size" prompt, then press the Enter key. A 6-megabyte partition is created. This partition will be a file allocation table (FAT) system partition.
9. Press the Enter key to format the partition. Once the formatting is completed, press the Enter key again.
10. Select "Create Partition" and press the Enter key. When the list of available disks appears, select the first disk again and press the Enter key. You are prompted for the size of the partition.
11. Type the larger of the two values at the "Enter size" prompt, then press the Enter key. The partition is created.
12. Press the Enter key to format the partition. Once the formatting is completed, press the Enter key again.
13. Select "Make Existing Partition into a System Partition" and press the Enter key.

    A message may appear asking whether to overwrite an already defined system partition. Type y.

    If the message, "Boot selections already exist" is displayed, exit the ARCINST program, go to the Setup menu, choose "Manage boot selections," and delete all existing boot selections. Then return to the Boot menu to restart the ARCINST program and return to step 13 in these instructions.
14. When the list of available disks is displayed, select the same disk you just formatted and then press the Enter key. The list of available partitions is displayed.
15. Select "Partition 1" and press the Enter key. Your system is now prepared for installation of Microsoft Windows NT.
16. Select Exit and press the Enter key. Select Exit again and press the Enter key.

Installing Microsoft Windows NT

Note: During installation, you are prompted for the location of the files for Microsoft Windows NT. Install the files into the larger of the two partitions you just created, and when prompted, format that partition with the NTFS file system.

1. From {XE "Windows NT:installing"}the ARC Boot menu, select the Supplementary menu and press the Enter key. When the Supplementary menu appears, select "Install Windows NT from CDROM" and press the Enter key. At this point, installation of Windows NT begins.
2. When prompted to select an Express or Custom installation, select "Custom installation."
3. Select "Fresh copy of Windows NT."
4. When prompted to identify the system type, select "Other." On the next screen, select "AlphaServer 1000."
5. When prompted, elect to change the display driver. Insert the Digital AlphaServer 1000 4/200 Cirrus Logic 542x Linear Installation diskette for Windows NT Server into the diskette drive, then select "Other."
6. Select "Cirrus Logic 542x Linear" and press Enter.
7. From this point, installation proceeds normally. Follow the prompts on the screen to complete the installation.

Preparing to Install DEC OSF/1

Installation Preparation

Before installing {XE "DEC OSF/1:preparing to install"}DEC OSF/1 on your system, make sure that you have the following:

- DEC OSF/1 Version T3.0B-2 or later
- SRM console firmware, Version 1.0 or later
- EISA Configuration Utility (ECU) diskette for DEC OSF/1 and OpenVMS.

Before starting installation, be sure to review the DEC OSF/1 release notes for Version 3.0 ("General Installation") and refer to the DEC OSF/1 installation guide for Version 3.0 for further information.

Setting the Operating System Type

1. Turn the system on. {XE "Operating system type:setting for DEC OSF/1"}After a short wait, the operator control panel on the front of the system displays the message "Model 4/200," and the screen displays initialization and testing information.

2. Press the Enter key. If the screen displays a triple arrow prompt (>>>) you have booted the SRM console and you can proceed to the next section, "Installing DEC OSF/1."

   If the computer booted directly into the ARC Boot menu, and you did not see the >>> prompt, you must switch to the SRM console.

3. From the ARC Boot menu, select the Supplementary menu.
4. From the Supplementary menu, select "Set up the system."
5. From the Setup menu, select "Switch to OpenVMS or OSF console." This allows you to select your operating system console.
6. Select your operating system, then select "Enter" on the Setup menu.

7. When the system displays the message, "Power-cycle the system to implement the change," press the Reset button.

   These steps initiate loading of the firmware. Once the DEC OSF/1 and OpenVMS firmware is loaded and the system is initialized, the system displays the SRM console prompt (>>>).

Installing DEC OSF/1

To install the **{**XE "DEC OSF/1:installing"**}**DEC OSF/1 operating system from a CDROM, follow these steps:

1. Place the CDROM containing the operating system into the CDROM drive on your server.
2. Enter the following command at the DEC OSF/1 and OpenVMS (SRM) console prompt to determine the unit number of the drive for your device:

   >>> `show device`

3. The `show device` command will display output similar to the following example:

   Example 3-1 The show device Command Display

   ```
   dka400.4.0.6.0    DKA400    RRD43  2893
   dva0.0.0.1        DVA0
   ewa0.0.0.13.0     EWA0      08-00-2B-3E-B6-C8
   pka0.7.0.6.0      PKA0      SCSI Bus ID 7
   ```

3. When the device table is displayed, look for the line with the CDROM device string, RRD43, which indicates the CDROM device. The device boot string for your system, which begins with the letters DKA, appears in that line. In the example, the device boot string is DKA400.
4. Enter the `boot` command and the appropriate boot device string for your system. For example:

   Example 3-2 The boot Command and Boot Device String

   >>> `boot DKA400`

Installing DEC OSF/1 with Remote Installation Service

{XE "Remote Installation Service (RIS)"**}**Remote Installation Service (RIS) is a tool that allows remote installation of DEC OSF/1 to Alpha systems over a local area network. Before attempting to install the DEC OSF/1 operating system using Remote Installation Service, be sure to refer to the DEC OSF/1 Version 3.0 manual, *Sharing Software on a Local Area Network*, for information on how to set up a RIS area.

Note: Restriction for ULTRIX Systems

You should be aware of the following restriction when considering installation of DEC OSF/1 with Remote Installation Service.

DEC OSF/1 Version T3.0B-2 does not support RIS installation through the LANCE Ethernet (`ln`) interface from an ULTRIX server. However, you can install DEC OSF/1 Version T3.0B-2 from a DEC OSF/1 server through the LANCE Ethernet interface.

Disk Space Requirements

The RIS area for **{**XE "Disk space requirements:DEC OSF/1"**}**DEC OSF/1 Version T3.0B-2 requires approximately 387 megabytes of disk space.

Products to Install

The following product must be installed in the RIS area from the DEC OSF/1 Version T3.0B-2 kit for the software to work correctly:

ALPHA/BASE

Setting Up a RIS Area on a DEC OSF/1 Server

In **{**XE "DEC OSF/1 servers"**}**addition to the information provided **{**XE "Servers:DEC OSF/1"**}**in the *Sharing Software on a Local Area Network* manual for the DEC OSF/1 operating system, the following notes apply specifically to setting up a RIS area on a DEC OSF/1 server.

If you are using a RIS server that is running DEC OSF/1 Version 1.2, 1.2A, 1.3, 1.3A, or 1.3B, you must perform the following step before you install DEC OSF/1 Version T3.0B-2 on a client. Because DEC OSF/1 Version T3.0B-2 client systems access part of the kit from the server using NFS, you must make sure that the appropriate NFS server capabilities are enabled on the RIS server. (See the `nfssetup`(8) reference page.)

Before installing clients, add the following line to the client `/etc/exports` file for each RIS area that your server is serving to DEC OSF/1 clients. The `/etc/exports` entry includes a path name to the kit directory in the RIS area; there must be no symbolic links in this path name. Entries in the `/etc/exports` file can have either of the following formats:

- If your server's `var` area is separate from the `usr` area, there will be a symbolic link to it at `/usr/var.` In this case, add a line similar to the following to the `/etc/exports` file:

```
/var/adm/ris/ris2.zips/kit  -r=0 -o
```

In the previous example, `ris2.zips` is the product area where the RIS DEC OSF/1 Version T3.0B-2 is installed.

- If your `var` area is part of your `usr` area, add a line similar to the following to the `/etc/exports` file:

```
/usr/var/adm/ris/ris2.zips/kit -r=0 -o
```

In the previous example, `ris2.zips` is the product area where the RIS DEC OSF/1 Version T3.0B-2 kit is installed.

Setting Up a RIS Area on an ULTRIX Server

The **{**XE "ULTRIX servers"**}**information in this **{**XE "Servers:ULTRIX"**}**section applies specifically to setting up a RIS area on an ULTRIX server. Refer to the instructions for setting up such a RIS area in the *Sharing Software on a Local Area Network* manual.

When you use an ULTRIX RIS server for DEC OSF/1 Version T3.0B-2, you must issue some additional commands before clients can boot the software. Use the RIS install software option to extract or link to the DEC OSF/1 Version T3.0B-2 kit. Then, use the following steps.

> **Note:** In the following command lines, *n* is the number of the directory where the product is installed on the ULTRIX server, for example, `ris0.mips`.

1. Move to the directory where the product has been installed:

   `# cd /var/adm/ris`*n*`.mips`

2. Extract the `ROOT` files and create the directory structure required for DEC OSF/1 clients:

   ```
   # restore xf */ROOT ./RisFiles
   # /usr/bin/sh5 RisFiles Extract */ROOT
   ```

You must also add the following line to the client `/etc/exports` file before you can install DEC OSF/1 Version T3.0B-2 on a client. Because DEC OSF/1 Version T3.0B-2 client systems access part of the kit from the server using NFS, you must make sure that the appropriate NFS server capabilities are enabled on the RIS server. (See the `nfssetup`(8) reference page.)

Before installing clients, add the following line to the client `/etc/exports` file for each RIS area that your ULTRIX server is serving to DEC OSF/1 clients. The

`/etc/exports` file can have either of the following formats.

- If your server `var` area is separate from the `usr` area, there will be a symbolic link to it at `/usr/var.` In this case, add a line similar to the following to the `/etc/exports` file:

  ```
  /var/adm/ris/ris2.zips/kit  -r=0 -o
  ```

In the previous example, `ris2.zips` is the product area where the RIS DEC OSF/1 Version T3.0B-2 is installed.

- If your `var` area is part of your `usr` area, add a line similar to the following to the `/etc/exports` file:

  ```
  /usr/var/adm/ris/ris2.zips/kit -r=0 -o
  ```

In the previous example, `ris2.zips` is the product area where the RIS DEC OSF/1 Version T3.0B-2 kit is installed.

Updating the Boot File for New Clients

After you have registered each client, you must add the appropriate node for each one. Use the following `addnode` command for ULTRIX servers:

```
# addnode <hostname> -t /user/var/adm/ris/risn.mips
```

The ris0.mips location is the area into which the product was installed in "Setting Up a RIS Area on an ULTRIX Server."

Before Starting the Boot Procedure

Before **{**XE "Boot procedures"**}**starting the boot procedure, complete the following steps:

1. Clear the `boot_osflags` variable. This ensures that the correct kernel file boots automatically.

   >>> `set boot_osflags`

2. Set the `auto_action` variable to `halt`. This will halt the system at the SRM console prompt each time it is turned on, when it crashes, or when you press the Halt switch.

   >>> `set auto_action halt`

3. Set the boot_file variable. This ensures that an alternate boot file is not set.

   >>> `set boot_file`

Booting over a Network

To boot **{**XE "Network:booting over a"**}**your server over a network, make sure it is registered as a client on a RIS server. See the *Sharing Software on a Local Area Network* manual for information on registering client. Note that the client must be on the same subnet as the server.

Set your device protocols to allow booting from either a DEC OSF/1 server or an ULTRIX server.

To boot from a DEC OSF/1 server, see the next section, "Booting from a DEC OSF/1 Server." To boot from an ULTRIX server, see the section, "Booting from an ULTRIX Server."

Booting from a DEC OSF/1 Server

Use **{**XE "DEC OSF/1 servers:booting from"**}**the `show device` command at the SRM console prompt to determine which network adapter your server is using. The network adapter will have a value such as `ewa0` or `era0`.

```
>>> show device
```

The `show device` command will display output similar to that in Example 3-3:

Example 3-3 The show device Command Display

```
dka400.4.0.6.0    DKA400    RRD43  2893
dva0.0.0.1        DVA0
ewa0.0.0.13.0     EWA0      08-00-2B-3E-B6-C8
pka0.7.0.6.0      PKA0      SCSI Bus ID 7
```

Use the following **{**XE "set device_protocols bootp command"**}**command syntax to boot your system over the network:

```
set device_protocols bootp
```

For example, if the device you are booting from with the bootp protocol is ewa0, enter the commands in Example 3-4:

Example 3-4 Bootp Protocol ewa0

```
>>> set ewa0_inet_init
>>> set ewa0_protocols bootp
>>> boot -fi "" ewa0
```

Booting from an ULTRIX Server

Use t{XE "ULTRIX servers:booting from"}he `show device` command at the SRM console prompt to determine which network adapter your server is using. The network adapter will have a value such as `ewa0` or `era0`.

```
>>> show device
```

The `show device` command will display output similar to that in Example 3-5:

Example 3-5 The show device Command Display

```
dka400.4.0.6.0    DKA400    RRD43  2893
dva0.0.0.1        DVA0
ewa0.0.0.13.0     EWA0      08-00-2B-3E-B6-C8
pka0.7.0.6.0      PKA0      SCSI Bus ID 7
```

Use the following {XE "set device_protocols mop command"}command syntax to boot your system over the network:

```
set device_protocols mop
```

For example, if the device you are booting from with the mop protocol is ewa0, enter the {XE "set ewa0_protocols mop command"}commands in Example 3-6:

Example 3-6 Mop Protocol ewa0

```
>>> set ewa0_protocols mop
>>> boot  "" ewa0
```

Verifying the Installation

To verify that you have installed {XE "DEC OSF/1:verifying version"}all the correct elements from the DEC OSF/1 Version T3.0B-2 kit, check the DEC OSF/1 revision level that appears in the `/etc/motd` file. The correct version strings are as follows:

```
DEC OSF/1 T3.0B-2(Rev.347.45); Fri Sept 16 11:07:49 EDT 1994
```

Preparing to Install OpenVMS

Preparing the System

Before you install the OpenVMS operating **{**XE "OpenVMS:verifying version"**}**system on your system, make sure that you have the following:

- OpenVMS operating system, Version 6.1-1H2 or later
- SRM console firmware, Version 1.0 or later
- EISA Configuration Utility (ECU) diskette for DEC OSF/1 and OpenVMS.

{XE "OpenVMS:preparing to install"**}**Before beginning the installation or upgrade, prepare the required hardware and software components, as described in this section. After preparation is complete, refer to the *OpenVMS AXP Version 6.1 Upgrade and Installation Manual* to install the operating system.

Preparing Hardware Components

To prepare the hardware components, follow these steps:

1. Be sure the hardware has been installed and checked for proper operation.
2. Be sure you know how to turn on and operate your system components, including the system unit, console, monitor or terminal, drives, and printer. Refer to the section, "Basic Operation" in this guide, if necessary.
3. Set up your system to record the installation procedure on either a hardcopy terminal or a printer attached to the console terminal. If you do not do this, the screen messages will be lost. You should record a transcript of screen messages to refer to in case there is a problem during installation.

Preparing Software Components

To prepare the software components, follow these steps:

1. Be sure you have all the items listed on the bill of materials in the software distribution kit. If your distribution kit is incomplete, notify your service representative and request priority shipment of any missing items.
2. Review all cover letters and release notes.

Setting the Operating System Type

To set the operating system type, follow steps 1 through 7.

1. Turn the system on. After a short wait, the operator control panel on the front of the system displays the message "Model 4/200" and the screen displays initialization and testing information.
2. Press the Enter key. If the screen displays a triple arrow prompt (>>>), you have booted the SRM console and you can proceed to the next section.

   If the computer booted directly into the ARC Boot menu, and you did not see the >>> prompt, you must switch to the SRM console.
3. From the ARC Boot menu, select the Supplementary menu.
4. From the Supplementary menu, select "Set up the system."
5. From the Setup menu, select "Switch to OpenVMS or OSF console." This allows you to select your operating system console.
6. Select your operating system, then select Enter on the Setup menu.
7. When the system displays the message, "Power-cycle the system to implement the change," press the Reset button.

   These steps initiate loading of the firmware. Once the DEC OSF/1 and OpenVMS firmware is loaded and the system is initialized, the system displays the SRM console prompt (>>>).

Required PALcode

If your computer console does not have a specific minimum version of the privileged architecture library code (PALcode**{**XE "PALcode"**}**), you may not be able to boot your system during the installation or upgrade procedure. To ensure the correct version, follow these steps before performing an installation or upgrade:

1. At the SRM console prompt (>>>) on your running system, enter the `show configuration` command. The system display will indicate the PALcode version your system is using.
2. Refer to the most recent OpenVMS operating system cover letter or release notes, or contact your service representative to determine whether your system is running the required or recommended version of PALcode.
3. If the PALcode version is below the required or recommended minimum, upgrade your firmware either by following the directions in the section, "Firmware," in Upgrading, or by contacting your service representative.

Installing OpenVMS

Use the **{**XE "OpenVMS:installing"**}**OpenVMS CDROM to install or upgrade the operating system, or to perform operations such as backing up the system disk.

4 Basic Operation

Introduction

This chapter explains how to start and stop your system, issue console commands, and operate other basic system functions. It includes the following topics:

- Turning the System On
- Turning the System Off
- Accessing the System from a Remote Location
- Interpreting Startup Messages
- Using the Consoles
- Booting the Operating System
- Using Storage Drives
- Caring for Your System

This chapter assumes that you have set up the hardware and made all necessary connections, as described in the Hardware Installation chapter.

Basic Operation Overview

This module contains basic information for turning on the system, reading display information, using console mode, booting the operating system and using storage drives. The last topic provides general information on caring for the system.

Turning the System On

Systems with Pre-installed Software

{XE "Operating systems:pre-installed"**}**Your server may be **{**XE "Pre-installed software"**}**equipped with pre-installed operating system software when you receive it. If your system displays the SRM console prompt (>>>) after starting up, you can verify which operating system has been installed by typing the following command:**{**XE "show os_type command"**}**

```
>>> show os_type
```

If no operating system software is pre-installed, the system displays... ?

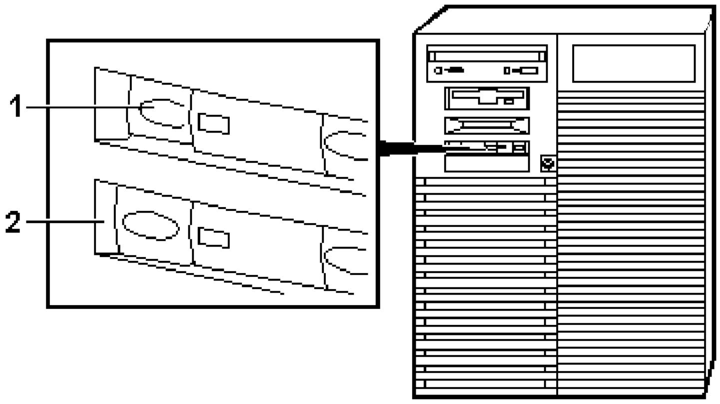
If operating system software is pre-installed, the resulting display will indicate one of three operating systems: Microsoft Windows NT, DEC OSF/1, or OpenVMS.

If your system displays the Windows NT (ARC) console instead after starting up, you can verify which operating system has been installed by switching to the SRM console and entering the `show os_type` command. Refer to "Switching to the DEC OSF/1 and OpenVMS (SRM) Console" in this section.

To turn on a system that has the operating system already installed, follow these steps:

1. Make sure the top cover and side panels of the system unit enclosure are in place. The system will not start if the cover and panels are not in place.
2. Plug the power cord into a wall outlet. If your system has two power supplies, plug in a power cord for each one.
3. Turn on any external options that are connected to the system, such as monitors or terminals, or expansion boxes that house storage devices.
4. Press the On/Off switch on the front of the unit. The green On/Off indicator on the front of the system will light.
5. Figure 4-1 shows the **{**XE "On/Off switch:location"**}**location of the On/Off switch (1 shows the switch in the "on" position; 2 shows the switch in the "off" position). In the "on" position, the switch remains depressed.

Figure 4-1 Location of the On/Off Switch



1 On/Off switch ("on" position)

2 On/Off switch ("off" position)

The screen on your monitor or terminal will display test codes and initialization messages. When the startup procedure is complete, the operator control panel displays the message "Model 4/200." By default, the screen displays the SRM console prompt (>>>).

5. If you encounter a problem, verify that you correctly followed steps 1 through 4. Refer to Chapter 8, "Troubleshooting" for additional information.

Systems without Pre-installed Software

To turn on a system that has no operating system installed, follow these steps:

1. Connect any external options, such as monitors or terminals, or expansion boxes that house storage devices.
2. Make sure the top cover and side panels of the system unit enclosure are in place. The system will not start if the cover and side panels are not in place.
3. Plug the power cord into a wall outlet. If your system has two power supplies, plug in a power cord for each one.
4. Turn on any external options that are connected to the system.
5. Press the On/Off switch on the front of the system unit. The switch stays depressed in the "on" position. The green On/Off indicator on the front of the system will light.

   The screen on your monitor or terminal will display test codes and initialization messages. When the startup procedure is complete, the operator control panel displays the message "Model 4/200." By default, the screen displays the SRM console prompt (>>>).
6. At this point you may have to perform one or all of the following tasks, depending on the startup display messages and the operating system you choose to run:
   - Run the EISA Configuration Utility.
   - Check required environment variable settings.
   - Change the way your system powers up or boots.
   - Verify your configuration.

   Refer to the section "Booting the Operating System" in this chapter for more information on each of these tasks.

7. Install the operating system. (Refer first to Chapter 3, "Preparing to Install an Operating System" and then refer to your operating system documentation.)
8. Reboot the system by pressing the Reset button.
9. If you encounter a problem, verify that you correctly followed steps 1 through 8. Refer to Chapter 8, "Troubleshooting" for more information.

Turning the System Off

You may not need to turn the system off in order to resolve system hangs or similar problems. You can often recover from hangs or other problems by pressing the **{**XE "Reset switch"**}**Reset switch on the operator control panel shown in Figure 1-2.

Caution: Pressing the Reset switch reinitializes the system and causes you to lose the applications you are running.

Within Windows NT, pressing the Ctrl, Alt, and Delete keys simultaneously allows you to reset a window without losing an application.

The following list summarizes the steps for turning the system off.

1. Shut down the operating system, following the instructions in the operating system documentation.
2. Press the On/Off switch on the front of the system unit.
3. Turn off all external options that are connected to the system unit.

Turning the System Off for an Extended Period

If you need to turn off your system for an extended period, first turn off power as described above. Next, unplug the power cords from the power outlets.

Caution: If two power supplies are present, unplug the power cord for each supply.

Accessing the System from a Remote Location

If you are **{**XE "System:remote access to"**}**running the DEC OSF/1 or OpenVMS operating systems, you can invoke console mode from a **{**XE "Remote location:accessing system from"**}**remote device that is connected to your system through one of the serial ports on the rear of the system. The default console port is COM1. (See Figure 1-3, which shows the rear panel ports and slots.)

To access the system from a remote location, follow these steps:

1. Connect to your system from the remote location.
2. Shut down the operating system. (Refer to the operating system documentation, if necessary.)
3. When the shutdown has completed, press Return.

   The SRM console prompt (>>>) is displayed.

   If you want to run the EISA Configuration Utility (ECU) from a terminal connected to a serial line, **{**XE "EISA Configuration Utility (ECU):running from serial line"**}**refer to the section, "EISA Configuration Utility (ECU)" in Chapter 6 for more information.

> **Note:** From a remote location you cannot reset or initialize a system running Windows NT. If the system is running Windows NT when you try to access it from a remote location, attempts to access the system will fail.

Interpreting Startup Messages

After you turn the **{**XE "Startup display"**}**system on, the **{**XE "Operator control panel (OCP):display"**}**operator control panel and your monitor or terminal screen provide the following status information:

- The countdown and ready message on the operator control panel
- The system startup display on your monitor or terminal screen
- The Boot menu (for Windows NT systems) or the console prompt (for DEC OSF/1 or OpenVMS systems) on your monitor or terminal screen

While the system runs the startup tests, the operator control panel on the front of the system displays a series of codes. When the startup tests are complete, the operator control panel displays the following message:

```
Model 4/200
```

During the startup sequence, the startup display scrolls on your monitor or terminal screen. To stop the display from scrolling, type Ctrl/S. To resume scrolling, type Ctrl/Q. The system startup display looks similar to the following example:

The operating system determines whether your system displays a Boot menu (for the Windows NT operating system) or a console prompt (for DEC OSF/1 and OpenVMS operating systems) after the startup display. If the system does not display either a menu or a console prompt, press the Return key several times. If there is no response, refer to the "Troubleshooting" section of this guide for more information.

Systems with Windows NT

If you are using the **{**XE "Startup display:Windows NT"**}{**XE "Windows NT:boot menu"**}**Windows NT operating system, the ARC firmware displays the Windows NT Boot menu after the **{**XE "Boot menu (ARC console):Windows NT"**}**system startup display. The following example shows the Windows NT Boot menu.

Example 4-1: Windows NT Boot Menu

```
ARC Multiboot Alpha AXP Version n.nn
Copyright (c) 1993 Microsoft Corporation
Copyright (c) 1993 Digital Equipment Corporation

Boot menu:


      Boot the default operating system
      Boot an alternate operating system
      Run a program
      Supplementary menu...

Use the arrow keys to select, then press Enter.
```

Systems with DEC OSF/1 or OpenVMS

If you are using the **{**XE "Startup display:DEC OSF/1"**}**DEC OSF/1 or OpenVMS operating systems, the SRM console prompt is displayed after the system startup display. **{**XE "Startup display:OpenVMS"**}**The prompt looks like this:

```
>>>
```

To display any **{**XE "Messages:displaying"**}**messages that may have scrolled by, enter the `cat el` command**{**XE "cat el command"**}** at the prompt.

To stop the display from scrolling, type Ctrl/S. To resume scrolling, type Ctrl/Q.

The following example shows the startup display and SRM console prompt for systems running DEC OSF/1 or Open VMS.

Example 4-2: DEC OSF/1 or OpenVMS SRM Startup Display

```
BIOS Emulation V1.07
Copyright (c) 1993-1994 Digital Equipment Corporation
All Rights Reserved
Patent Pending
eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
X3.3-1476, built on Oct  4  1994  at 14:48:51
>>>
```

Reading the Startup Test Results

The Windows NT **{**XE "Tests:startup"**}{**XE "Startup tests:results"**}**startup test display indicates successful tests with the word *passed*. It indicates tests that fail with the word *failed* and an error code.

The DEC OSF/1 and OpenVMS startup test display indicates successful tests with the word *OK*. It indicates tests that fail with double question marks (??) and an error code.

If the System Passes Startup Tests

If the system passes the startup tests, it either boots the selected operating system or halts in console mode, depending on the system default settings.

If the System Fails Startup Tests

The following list summarizes the steps to follow if the system fails the startup tests.

1. Turn the system unit off, wait approximately 15 seconds, then turn it on again.
2. If the system continues to fail the startup tests, refer to the Troubleshooting section of this guide.

Note: When the startup tests fail, the system ignores the `os_type` setting and enters the DEC OSF/1 and OpenVMS console automatically. If the `os_type` setting is set to NT when the system fails, it returns to the Windows NT firmware when you correct the error.

Using the Consoles

The Windows NT (ARC) console and the DEC OSF/1 and OpenVMS (SRM) console are used to perform different tasks. For example, the EISA Configuration Utility (ECU) is run only from the Windows NT console, and ROM-based diagnostics (such as the `test` command) are run only from the DEC OSF/1 and OpenVMS console, regardless of the operating system you are running.

Invoking Console Mode

To perform tasks from **{**XE "Console mode:invoking"**}**console mode you must first invoke console mode by shutting down the operating system according to the operating system shutdown procedure described in your operating system documentation. If you are running either the DEC OSF/1 or OpenVMS operating system, you can also invoke console mode by pressing the **{**XE "Halt switch"**}**Halt switch on the operator control panel.

Caution: If you are running DEC OSF/1 or OpenVMS operating systems, press the Halt switch only after you have shut down the operating system using the proper shutdown procedure.

The Halt switch halts the Windows NT operating system; you must then press the Reset switch to completely reboot the firmware.

When to Switch Consoles

You can perform **{**XE "Consoles:switching between"**}**most console-related tasks from the interface designed to interact with your operating system. However, the console interfaces are designed so that you can easily switch between them. You will need to switch between the consoles in the following instances:

- If you are running DEC OSF/1 or OpenVMS and need to run the EISA Configuration Utility or the RAID Configuration Utility (RCU), you need to switch to the Windows NT (ARC) console.
- If you are running Windows NT and want to perform any of the following tasks, you need to switch to the DEC OSF/1 and OpenVMS (SRM) console:
  1. Test the system (other than self-tests at system startup)
  2. Examine and verify options that are recognized by the system

3. Set or change some environment variables, such as Ethernet device type and speed for Fast SCSI devices

Switching to the DEC OSF/1 and OpenVMS (SRM) Console

To switch from the **{**XE "SRM console:switching to"**}**Windows NT (ARC) console to the DEC OSF/1 and OpenVMS (SRM) console, follow these steps:

1. From the ARC Boot menu, select the Supplementary menu.
2. From the Supplementary menu, select "Set up the system."
3. From the Setup menu, select "Switch to OpenVMS or OSF console." This allows you to select your operating system console.
4. Select your operating system, then press enter on the Setup menu.
5. When the system displays the message, "Power-cycle the system to implement the change," press the Reset button.

These steps initiate the loading of the firmware. Once the DEC OSF/1 and OpenVMS firmware is loaded and the system is initialized, the system displays the SRM console prompt (>>>).

Switching to the Windows NT (ARC) Console

To switch from the **{**XE "ARC console:switching to"**}**DEC OSF/1 or OpenVMS (SRM) console to the Windows NT (ARC) console, type the following command at the console prompt:

```
>>> arc
```

This command loads the firmware. Once the Windows NT firmware is loaded and the system is initialized, the system displays the Windows NT Boot menu.

Windows NT (ARC) Console Menus

The Windows NT (ARC) **{**XE "ARC console:menus"**}**console has three primary menus: the Boot menu, the Supplementary menu, and the Setup menu.

Boot Menu Functions

The **{**XE "Boot menu (ARC console):functions"**}**Boot menu contains menu items that allow you to perform the following tasks:

- Boot the default boot selection
- Boot an alternative boot selection
- Run a program

- Access the Supplementary menu

Supplementary Menu Functions

The **{**XE "Supplementary menu (ARC console):functions"**}**Supplementary menu contains items that allow you to perform the following tasks:

- Install new firmware
- Install Windows NT from a compact disc
- Access the Setup menu
- List the ARC firmware device names for the installed devices
- Return to the Boot menu

Setup Menu Functions

The **{**XE "Setup menu (ARC console):functions"**}**Setup menu contains menu items that allow you to perform the following tasks:

- Set the **{**XE "Time:setting system"**}**system time
- Set the **{**XE "System partition:setting default"**}**default system partition
- Configure the system **{**XE "Diskette drive:configuring"**}**floppy drives and **{**XE "Keyboard:configuring"**}**keyboard
- Manage the Windows NT (ARC) boot selections
- Set the system to **{**XE "Boot:automatic"**}**boot automatically
- Run the EISA Configuration Utility
- Edit the system **{**XE "Environment variables:editing"**}**environment variables
- Reset the **{**XE "Default settings:resetting"**}**system to factory defaults
- Set the default **{**XE "Operating systems:setting default"**}**operating system and system **{**XE "Firmware:setting default"**}**firmware
- Return to the Supplementary menu, with or without saving Setup menu changes

DEC OSF/1 and OpenVMS (SRM) Console Commands

There are two **{**XE "SRM console:commands"**}**levels of DEC OSF/1 and OpenVMS (SRM) **{**XE "Console commands"**}**console **{**XE "Commands:console"**}**commands:

- Basic
- Comprehensive

Basic Commands

You use **{**XE "Commands:basic"**}**basic commands to perform common tasks described in this guide. Table
 4-1 lists each console task and provides the corresponding command and its syntax.

Comprehensive Commands

Additional **{**XE "Commands:comprehensive"**}**commands are available for system diagnosis and other complex tasks. Use of these commands requires detailed knowledge of your system. Do not use these commands without fully understanding the effect they can have on your system.

To see a list of additional commands, **{**XE "Commands:limiting display"**}**enter `help` or `man` at the SRM console prompt.

> **Note:** When entering a command that results in a lengthy screen display, you can use this format to limit the screen display to 23 lines at a time: >>> `cat el | more`

Table 4-1 Basic SRM Console Commands

Task	Command	Syntax
Boot the Windows NT (ARC) console firmware.	arc	arc
Boot the operating system.	boot	boot [-flags [*longword*,]*longword* [-halt] [*boot_device*]
Display error logs.	cat el	cat el
Resume program execution.	continue	continue
Invoke the EISA Configuration Utility.	ecu	ecu
Display online help on using console commands.	help	help [*command* . . .]
Initialize the system.	init	init
Halt system tests invoked by test command.	kill_diags	kill_diags
Display online help on using console commands.	man	man [*command* . . .]
Display status of all system processes.	ps	ps
Set an environment variable.	set	set [-default] *envar val*
Display the value of an environment variable or display configuration information.	show	show [*envar*] [{config,device,memory,pal, version}]
Test the system and display results.	test	test

Getting Help on the Windows NT (ARC) Console

The Windows NT (ARC) console **{**XE "ARC console:help"**}**provides general help on using the Setup menu, although it does not provide help on all the menu items contained in its menus.

Table 4-2 lists the steps that you follow to display the Setup menu help screen.

Table 4-2 Windows NT (ARC) Console Help

Step	Action	Result
1	If necessary, enter the Windows NT console by shutting down the operating system following the procedure described in the operating system documentation. Turn the system off and then on.	The system displays the Windows NT console Boot menu.
2	Choose "Supplementary menu..."	The system displays the Supplementary menu.
3	Choose "Set up the system..."	The system displays the Setup menu.
4	Choose Help menu and press Enter.	The system displays the Setup menu help screen.

Setup Menu

Example 4-3 shows a partial **{**XE "Setup menu (ARC console):example"**}**Setup menu display with the help menu item selected (shown in bold).

Example 4-3: Setup Menu

```
ARC Multiboot DEC Version  n.nn     Thursday, 6-10-1994
9:49:50 PM
Copyright (c) 1991, 1992 Microsoft Corporation
Copyright (c) 1993  Digital Equipment Corporation

Setup menu:
         .
         .
         .
       Reset system to factory defaults

      Help
      Switch to OpenVMS or OSF console
       Supplementary menu, and do not save changes...

Use the arrow keys to select, then press Enter.
```

Setup Menu Help

Example 4-4 shows the **{**XE "Setup menu (ARC console):help display"**}**Setup menu help display.

Example 4-4: Setup Menu Help Display

```
Do the following steps, in this order, to set up the system:

1.  Set system time.
2.  Set default environment variables.
3.  Set default configuration.
4.  Create at least one boot selection.
5.  Setup autoboot, if desired.
6.  Run the EISA configuration utility.


-> An arrow next to a menu item means that something is wrong
in this area of the machine, and you should select this item
to fix it.

"Reset system to factory defaults" does steps 2 -- 5 for a
typical system.

The ESCape key returns from a menu, and aborts a sequence.

The firmware automatically reboots if the configuration is
changed.

  Press any key to continue. . .
```

Getting Help on the DEC OSF/1 and OpenVMS (SRM) Console

To get online help, enter `help` at the SRM **{**XE "SRM console:help"**}**console prompt. Example 4-5 shows the `help` command**{**XE "help command"**}** and the resulting display.

Example 4-5: The help Command

```
>>> help
NAME
   help or man
FUNCTION
   Display information about console commands.
SYNOPSIS
   help or man [<command>...]
               Command synopsis conventions:
               <item> Implies a placeholder for user
specified item.
               <item>... Implies an item or list of items.
               [] Implies optional keyword or item.
               {a,b,c} Implies any one of a, b, c.
               {a|b|c} Implies any combination of a, b, c.
The following help topics are available:
alloc           boot            bpt             break
cat
check           chmod           clear           continue
create
date            deposit         dynamic         echo
edit
eval            examine         exer            exit
false
find_field      fr_cmd          free            grep
hd
help or man     init            kill            line
ls
more            net             ps              rm
sa
semaphore       set             set host        shell
show
show cluster    show config     show hwrpb      show map
show me
show_iobq       sleep           sp              start
stop
```

`true`	`update`	`wc`	`x`

Booting the Operating System

You may need to **{**XE "Operating systems:pre-boot tasks"**}**perform some of the following tasks before booting your operating system.

- Run the EISA Configuration Utility.
- Check required environment variable settings.
- Change the way your system powers up or boots.
- Verify your configuration.

The remainder of this section contains more information about each of these tasks.

Running the EISA Configuration Utility

If you have added, removed, or moved an EISA or ISA card, you must run the **{**XE "EISA Configuration Utility (ECU):when to use"**}**EISA Configuration Utility before booting the operating system. Refer to the EISA Configuration Utility section of this guide for more information.

Checking Required Environment Variable Settings

If you are running **{**XE "Environment variables:setting"**}**DEC OSF/1 or OpenVMS, you may want to check that settings for the following variables match your configuration. The SRM console command to reset each variable is shown in parenthesis. To see a complete list of environment variables, type `show *` at the SRM console prompt.

Operating system (`set os_type`)

Ethernet device type (`set ew*o_mode`)

Speed for Fast SCSI devices (`set pk*0_fast`)

Boot device (`set bootdef_dev`)

Boot flags (`set boot_osflags`)

Changing Startup and Boot Defaults

You can change the way the **{**XE "Boot defaults:changing"**}**system starts up or boots the operating system. **{**XE "Operating system defaults:changing"**}**For example, you can set the system to autoboot or you can change the default boot device. To make these kinds of changes you need to change default values for your system's **{**XE "Environment variables:changing default"**}**environment variables.

- To change default values for Windows NT systems, which boot automatically, you can prevent autoboot by selecting one of the menu options.
- To change default values for DEC OSF/1 or OpenVMS systems, see "set" in Table 4-1, "Basic SRM Console Commands."

Startup and Boot Environment Variables

The following {XE "Environment variables:boot"}environment variables affect the way the system starts up or boots:

- `auto_action`
- `autoload`
- `countdown`
- `os_type`

Table 4-3 lists the boot environment variables and their values, and briefly describes their effects.

Table 4-3 Startup and Boot Environment Variables

Operating System	Environment Variable	Value	Description
DEC OSF/1 OpenVMS	`auto_action`	Boot Halt Restart	Specifies the system default startup action. Applies only to the DEC OSF/1 and OpenVMS operating systems.
Windows NT	`autoload`	YES or NO	Specifies whether the Windows NT operating system should boot. Does not affect the OpenVMS or DEC OSF/1 operating systems. If the value is YES, the Windows NT firmware boots the system after the COUNTDOWN time-limit expires. If the value is NO, the system halts at the Windows NT firmware Boot menu.
Windows NT	`countdown`	10 seconds (default value)	Specifies the time limit within which you can stop the Windows NT operating system from booting if AUTOLOAD is set to YES. The time limit is specified in seconds. When you turn on the system or reinitialize the firmware, the system displays the seconds remaining before the operating system boots automatically. To stop the system from booting automatically, you must choose another menu item from the Boot menu.
Windows NT DEC OSF/1 OpenVMS	`os_type`	NT OSF VMS	Specifies the system default operating system setting. Depending on the value, the system either boots or restarts the specified operating system, or halts in the specified console. You can modify the value from either the Windows NT (ARC) console or DEC OSF/1 and Open VMS (SRM) console.

Entering the Windows NT Firmware

The system enters and remains in the Windows NT firmware under the following conditions:

- When `os_type` is set to NT and `autoload` is set to NO
- When `autoload` is set to YES and you choose another menu item on the Boot menu before the `countdown` time limit expires.

Entering the DEC OSF/1 and OpenVMS Firmware

The system enters and remains in the DEC OSF/1 and OpenVMS firmware under the following conditions:

- When `auto_action` is set to HALT and `os_type` is set either to OSF or VMS.
- When the startup tests fail, the system ignores the `os_type` setting and enters the DEC OSF/1 and OpenVMS console automatically. If the `os_type` setting is NT when the system fails, it returns to the Windows NT firmware when you correct the error.

Verify Your Configuration

Windows NT Systems

To verify your Windows NT **{**XE "show config command"**}{**XE "Configuration:verifying"**}**configuration, select the ARC console menu option "Display Hardware Configuration," which lists the ARC **{**XE "Boot device names:ARC firmware"**}**boot device names for devices installed in the system. For a more complete listing of the options that are recognized by your system, you may want to enter the DEC OSF/1 and OpenVMS commands described in the section "Viewing the System Configuration" in Chapter 6, "Configuring." To enter these commands, you must switch from the Windows NT (ARC) console to the DEC OSF/1 and OpenVMS (SRM) console. For information about switching to the DEC OSF/1 and OpenVMS (SRM) console, refer to "Switching to the DEC OSF/1 and OpenVMS (SRM) Console" earlier in this section.

> **Note:** Switch back to the Windows NT (ARC) console before booting the Windows NT operating system.

DEC OSF/1 or OpenVMS Systems

Use the following SRM console commands to verify system **{**XE "show device command"**}**configuration for DEC OSF/1 **{**XE "show command"**}**or Open**{**XE "show memory command"**}**VMS systems.**{**XE "set command"**}**

`show config`	Displays the buses on the system and the devices found on those buses
`show device`	Displays the devices and controllers in the system
`show memory`	Displays main memory configuration
`set` and `show`	Set and display environment variable setting

Booting Windows NT

When the system is shipped with the Microsoft Windows NT operating system already installed, the system **{**XE "Default settings:Windows NT"**}**default settings cause the system to boot from the system disk automatically after it successfully completes the startup tests. However, the system **{**XE "Countdown:changing"**}**counts down for 10 seconds after it displays the Boot menu before booting. You can stop the system from booting before this time limit expires by choosing another menu item by using the up or down arrow key.

You can change these system default settings. For example, you can cause the system to halt at the Windows NT firmware Boot menu after the startup tests, or you can increase the countdown time limit.

Changing Windows NT Boot Selections

The Windows NT **{**XE "Boot selections:Windows NT"**}**firmware uses boot selections to identify the location of the operating system files. When the system is shipped, the default boot selection identifies the system disk as the location of the operating system files. Thus, the system boots from the system disk. You can set alternative boot selections if, for example, you want to boot the operating system from a different device.

Using the Windows NT Boot Menu

Example 4-6 shows the Windows NT Boot menu.

Example 4-6: Windows NT Boot Menu

```
ARC Multiboot Alpha AXP Version n.nn
Copyright (c) 1993 Microsoft Corporation
Copyright (c) 1993 Digital Equipment Corporation

Boot menu:


      Boot the default operating system
      Boot an alternate operating system
      Run a program
      Supplementary menu...

Use the arrow keys to select, then press Enter.
```

Table 4-4 lists the steps you must follow to boot Windows NT from the **{**XE "Boot menu (ARC console):steps"**}**Boot menu.

Table 4-4 Booting Windows NT from the Boot Menu

Step	Action	Result
1	To boot the system using the default boot selection, choose "Boot Windows NT" on the Boot menu, and press Return.	The system boots from the system disk, using the default boot selection -- Environment Variables.
2	To boot the system using an alternative boot selection, choose "Boot an alternative operating system" on the Boot menu and press Return.	The system displays a list of the alternative boot selection names.
3	Choose the alternative boot selection name that you want to boot and press Return.	The system boots from the boot selection that you choose.

Windows NT Boot Selection Menu

Use the Windows NT **{**XE "Boot selection menu (ARC console)"**}**Boot selection menu to change **{**XE "Boot selections:changing"**}**boot selections for your system. **{**XE "Default settings:changing"**}**You choose "Supplementary menu" from the Boot menu and then "Manage boot selection menu" to access the Boot selection menu. The following example shows the Windows NT Boot selection menu.

Example 4-7: Windows NT Boot Selection Menu

```
ARC Multiboot Alpha AXP Version n.nn
Copyright (c) 1993 Microsoft Corporation
Copyright (c) 1993 Digital Equipment Corporation

Boot selection menu:
      Add a boot selection
      Change a boot selection
      Check boot selections
      Delete a boot selection
      Dump boot selections
      Rearrange boot selections
      Setup menu...
Use the arrow keys to select, then press Enter.
```

Booting DEC OSF/1 or OpenVMS Operating Systems

The operating system, if **{**XE "DEC OSF/1:booting"**}**supplied, is installed on the system disk.

- For more information on pre-installed DEC OSF/1 software, see the DEC OSF/1 AXP Factory Installed Software user information card.
- For more information on pre-installed **{**XE "OpenVMS:booting"**}**OpenVMS software, see the OpenVMS Factory Installed Software user information card.

When the system is shipped with DEC OSF/1 or OpenVMS software installed, the system default settings cause the system to boot from the system disk automatically after it successfully completes the startup tests. You can change these settings if, for example, you want the system to halt at the console prompt (>>>) after it completes the startup tests.

DEC OSF/1 and OpenVMS System Defaults

The DEC OSF/1 and OpenVMS operating systems use **{**XE "Default settings:DEC OSF/1"**}**default settings to tell the system where the**{**XE "Default settings:OpenVMS"**}** operating system is located and how to boot the system. When the system is shipped, these default settings cause the system to boot from the system disk. You can set different default settings if, for example, you want to boot the operating system from a different device. See "set" in Table 4-1, "Basic SRM Console Commands."

Boot Command

Use the following command to boot either the DEC OSF/1 operating system or the OpenVMS operating system using the default settings.

```
...>>>
...>>> boot
```

If you wish to change any default settings, see "Changing Startup and Boot Defaults" in the section, "Booting the Operating System" earlier in this chapter.

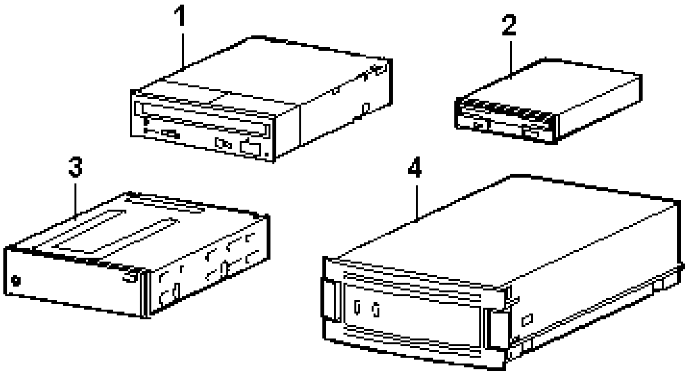
Using Storage Drives

Mass **{**XE "Storage drives:types"**}**storage drives are devices that are used to store large amounts of data for extended periods. The system accommodates the following types of storage devices, shown in Figure 4-2:

- One 3½-inch diskette drive
- Two 5½-inch half-height drives (CDROM or tape)
- Up to seven 3½-inch StorageWorks hard disk drives

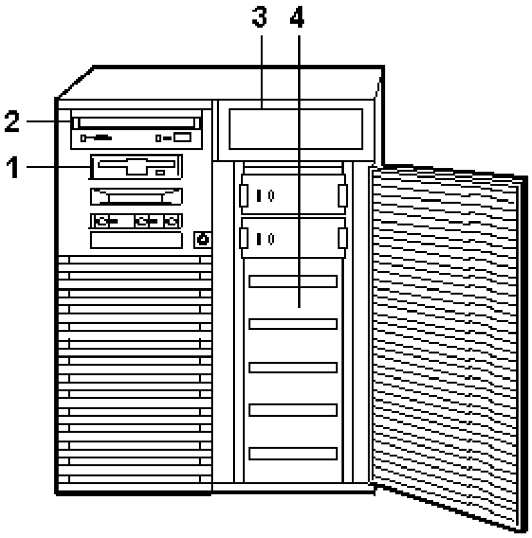
The drives are located in **{**XE "Storage drives:location"**}**compartments inside your system as shown in Figure 4-3.

Figure 4-2 Storage Devices



1 CDROM drive
2 Diskette drive
3 Tape drive
4 StorageWorks hard disk drive

Figure 4-3 Location of Storage Devices



1 Diskette drive compartment
2 CDROM drive compartment
3 Tape drive compartment
4 StorageWorks shelf

Using a Diskette Drive

Diskette drives **{**XE "Diskette drive"**}**read information from removable diskettes.

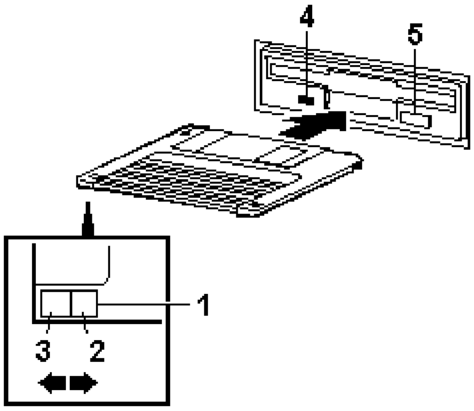
One diskette drive is located to the left of the removable-media mass storage compartment, below the CDROM drive. The diskette drive components are shown in Figure 4-4.

To insert a diskette into a diskette drive:

1. Set the write-protect switch (1 in the figure) on the diskette to either the write-protected (position 3 in the figure) or write-enabled position (position 2 in the figure).
2. Insert the diskette as shown in the figure.

   The activity indicator (4 in the figure) lights when the systems reads the diskette.

Figure 4-4 Diskette Drive Components



1 Write-protect switch
2 Write-protect switch (enabled position)
3 Write-protect switch (protected position)
4 Activity indicator
5 Eject button

To remove a diskette:

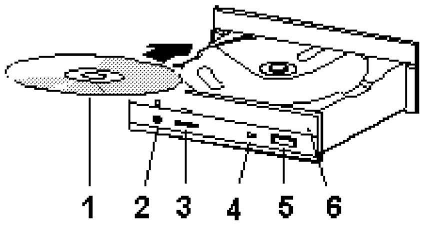
Press the Eject button (5 in the figure) on the diskette drive.

Using a CDROM Drive

CDROM **{**XE "CDROM drive"**}**drives read information from removable CDROMs (read-only compact discs).Your system uses a CDROM drive that has an automatic loading/ejection feature that is functional only when power is supplied. Figure 4-5 shows the components of a CDROM drive.

> **Caution:** Handle a CDROM by its edges. Do not touch the surface of a CDROM. Fingerprints and dust can cause the CDROM to malfunction.

Figure 4-5 CDROM Drive Components



1 CDROM
2 CDROM drive headphone port
3 CDROM drive volume control
4 CDROM drive activity indicator
5 CDROM drive eject button
6 CDROM emergency eject hole

To insert a disc in the drive:

1. Press the drive Eject button (5 in the figure).

   The CDROM drawer opens approximately one inch.
2. Gently pull the drawer far enough out so that you can insert the disc (1 in the figure).
3. Insert the disc into the drawer.
4. Push the drawer back into the drive.

   The activity light (4 in the figure) comes on. When the activity light goes off, the drive is ready to use. To operate the drive, follow the instructions provided with your system software.

To remove a disc from the drive:

1. Press the drive Eject button (5 in the figure).

   The CDROM drawer opens approximately one inch.
2. Gently pull the drawer out far enough so that you can remove the compact disc.
3. Remove the disc from the drawer.
4. Push the drawer back into the drive.

If the CDROM drawer will not open when you press the Eject button, use the following emergency procedure:

Insert the end of a small bar, such as a paper clip,[1] into the emergency eject hole (6 in the figure) and push in gently. The CD drawer will open.

Using a StorageWorks Disk Drive

StorageWorks disk **{**XE "StorageWorks disk drives"**}**drives are mass storage devices. They are located in a seven-bay shelf on the front right of the system unit, behind the door.

When the system is turned on and during periods of activity, the StorageWorks disk drive indicator lights blink, but do not stay on. Table 4-5 explains the meaning of the indicator lights.

Table 4-5 StorageWorks Disk Drive Indicator Lights

Indicator	Status	Meaning
Activity (green)	Blinks	Reading or writing to disk
Fault (amber)	On	Problem exists

[1]Use a bar less than 2.0 mm in diameter. To avoid damage to the CDROM drive, do not insert the bar more than 1 inch (25 mm).

Caring for Your System

Before doing any cleaning of your system, make sure you turn off the system and disconnect any external devices. When using a moistened cloth for cleaning, do not allow any excess fluid to leak into the system, keyboard, or monitor. Wait until the system is completely dry before turning it on.

Cleaning Your System Unit

Clean the **{**XE "Maintenance:system"**}**outside of your **{**XE "System:maintenance"**}**system periodically with a soft cloth lightly moistened with a mild detergent solution. Do not use solvents or abrasive cleaners.

Cleaning Your Mouse

If your mouse does not move **{**XE "Mouse:cleaning"**}**smoothly or if the pointer jumps across the screen when you are using the mouse, the ball inside the mouse may need cleaning. To clean the ball, do the following:

1. Turn the mouse over and remove the plate on the bottom.
2. Remove the rubber ball.
3. Clean the ball and rollers with a cotton swab that has been lightly dampened with a mild detergent.
4. Replace the ball and plate.

Cleaning Your Keyboard

From time to time, your keyboard **{**XE "Keyboard:cleaning"**}**keys may get dirty with use. Clean them with a clean cloth that has been lightly dampened with a mild detergent solution.

Moving Your System

Perform the following steps **{**XE "System:moving"**}**before moving or shipping the system:

1. Back up all files stored on the hard disk drive.
2. Turn off the external peripherals, the system, and the monitor or terminal.
3. Disconnect the power cord from the wall outlet and from the back of the system unit.
4. Disconnect the monitor or terminal, keyboard, mouse, and any other cables from the back of the system unit.

5. Package the system as described in the next section, "Packing Your System."

Packing Your System

If you are moving the **{**XE "System:packing"**}**system a short distance (from one room to another in the same building), you do not need to pack it. If you are shipping the system or moving it by vehicle, pack it to avoid damage.

Pack the system in the original packing material and containers. If you did not save the boxes and packing material, use a sturdy carton and padding to avoid damage.

Installing Your System at a New Location

After moving the system to a new location, follow the installation instructions that came with your system to unpack and install it. Ensure that the new location conforms to the recommendations provided in "Selecting a System Location" in Chapter 2, "Hardware Installation."

5 Installing and Removing Components

Introduction

This chapter explains how to prepare for and perform installation and removal of your system's components. You need to perform these procedures in order to upgrade your system or replace defective components. Topics covered in this chapter are listed below.

Caution: Be sure to follow the appropriate antistatic precautions whenever handling internal components.

Components listed in "Removing/Replacing Other Options" should be handled by qualified service personnel only.

- Preparing to Install or Remove Components
- Top and Side Panels
- Memory Modules
- EISA, ISA, and PCI Option Cards
- Storage Devices
- Network Interface Card
- Power Supply
- CPU Card
- Removing/Replacing Other Options

Preparing to Install or Remove Components

To prepare your system for installation and removal of components, you will need to assemble the required equipment, familiarize yourself with antistatic precautions, and remove the top and side panels of the system unit.

Required Equipment

You need the following **{**XE "Equipment:installation and removal"**}**equipment to perform the installation and removal procedures described in the following sections.

- Flat-head screwdriver
- Phillips screwdriver
- Antistatic wrist strap
- Replacement option board kit or device kit, if necessary

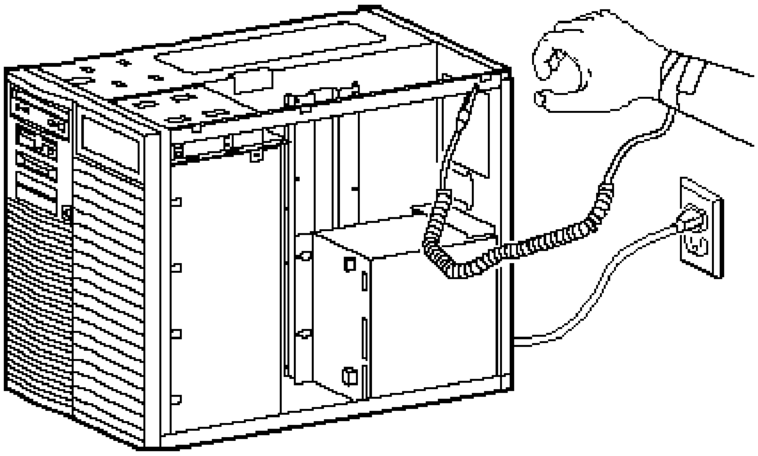
Antistatic Precautions

When handling internal system **{**XE "Antistatic precautions"**}**components, use an antistatic wrist strap to avoid damaging the components.

Caution: Do not disconnect the system unit power cord or unplug the power cord from the power supply socket. The power cord grounds the system unit, preventing damage to the internal components.

Figure 5-1 shows how to attach the antistatic wrist strap to your wrist and to the system unit.

Figure 5-1 Attaching the Antistatic Wrist Strap



Top Cover and Side Panels

The top cover and side panels of the system unit must be removed to install or remove any internal component.

Removing the Top Cover and Side Panels

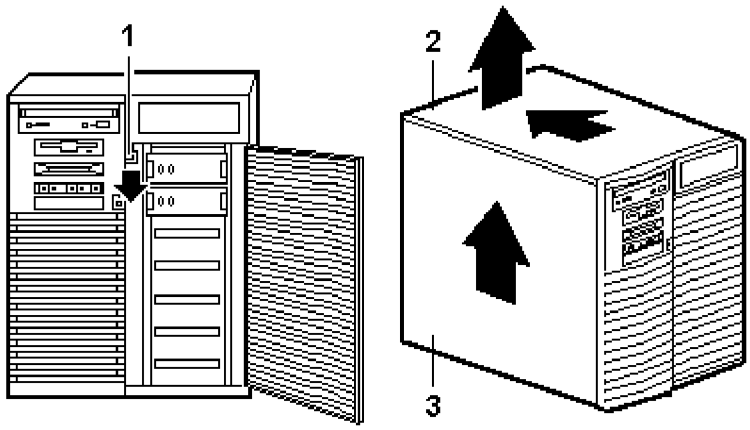
To remove the **{**XE "Top cover:removing"**}**top cover and **{**XE "Side panels:removing"**}**side panels, refer to Figure 5-2 and follow these steps:

Caution: Make sure the system unit On/Off switch is in the "off" position before removing the system cover and panels.

1. Shut down the operating system following the instructions listed in the operating system documentation.
2. Set the On/Off switches on all external options connected to the system to the off position.

3. Set the On/Off switch on the system unit to the off position. An **{**XE "Interlock switch"**}**interlocking sensor switch inside the system unit will automatically turn off the system if you remove the top **{**XE "Top cover:interlock switch"**}**cover and have not turned off the system.
4. Turn the front door lock to the right to unlock the system unit.
5. Pull down the top cover release latch on the front of the system until it catches in the down position.
6. Grasp the finger groove at the rear of the top cover and pull the top cover straight back about four inches, and lift up on the cover.
7. Pull the top of the side panel up and away from the unit and pull up on the panel to remove it. (Repeat this step for the other panel.)

Figure 5-2 Removing the Top Cover and Side Panels



1 Top cover release latch

2 Top cover removal

3 Side panel removal

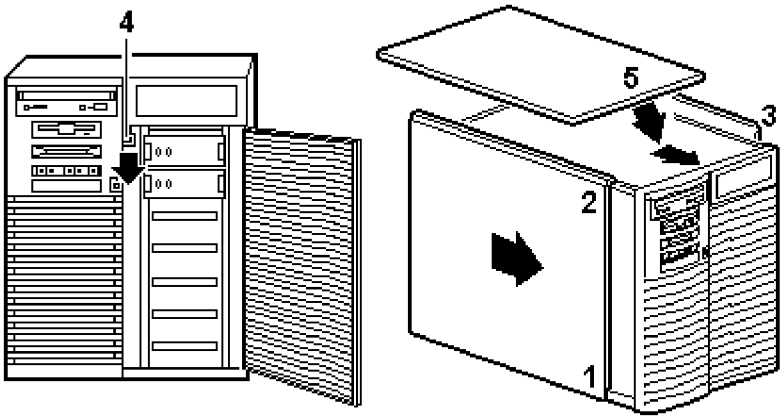
Replacing the Top Cover and Side Panels

Follow these **{**XE "Top cover:replacing"**}**steps and refer to Figure 5-3 to replace the top cover and **{**XE "Side panels:replacing"**}**side panels of the system unit:

1. Align the guides on the top and bottom inside of the side panel with the lip of the system unit frame. Refer to (1) in the figure.
2. Tilt the side panel top towards the unit and lift the flange at the top of the panel over the system unit frame. Refer to (2) in the figure.

3. Slide the panel forward into position. (Repeat steps 1 to 3 for the other panel.) Refer to (3) in the figure.
4. Align the top cover with the top of the side panels and slide the cover gently onto the unit from the rear. Refer to (5) in the figure. Hold down the top cover release latch until the top cover is in place and then release it to secure the cover and panels. Refer to (4) in the figure.
5. Lock the top cover and side panels using the system unit key.
6. Set the On/Off switches on all external options connected to the system to the "on" position.
7. Set the On/Off switch on the system unit to the "on" position.

Figure 5-3 Replacing the Top Cover and Side Panels



1 Bottom side panel guide
2 Top side panel guide
3 Right side panel
4 Top cover release latch
5 Top cover

Memory Modules

The system unit supports 20 single in-line **{**XE "Memory modules"**}**memory module (SIMM) connectors on the system board. The SIMM connectors are grouped in four memory banks consisting of five memory modules, including one for **{**XE "Error Correction Code (ECC)"**}**ECC (Error Correction Code). Figure 5-4 shows the four **{**XE "Memory banks"**}**memory banks and their **{**XE "Memory modules:installation rules"**}**memory module connectors.

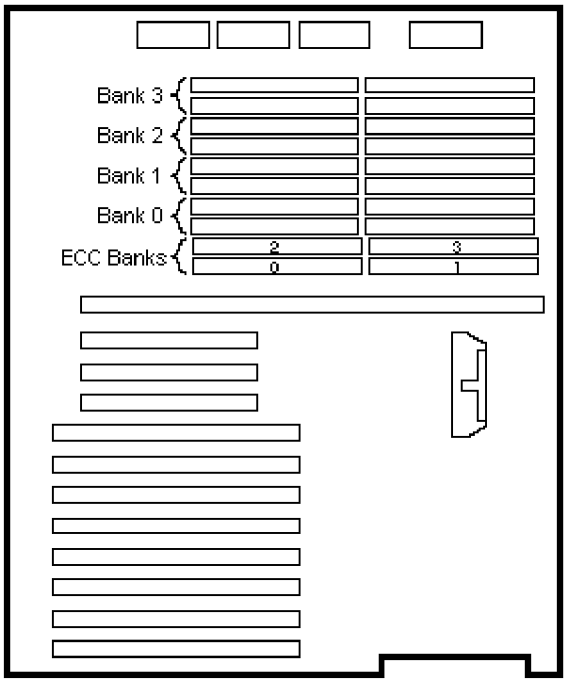
Keep in mind the following rules when installing memory modules:

- Bank 0 must contain a memory option.

- A memory option consists of five memory modules. When you install a memory option in a memory bank, you must install a memory module in all of the connectors in that bank.
- All memory modules within a bank must be of the same capacity.
- Larger SIMM groups must occupy the lower-numbered banks.

The system unit supports four **{**XE "Memory options:sizes"**}**sizes of memory options: 16-, 32-, 64-, and 128-megabytes. Using combinations of these four memory options, the system supports between 16 to 512 megabytes of memory.

Figure 5-4 Memory Banks and Connectors



Removing Memory Modules

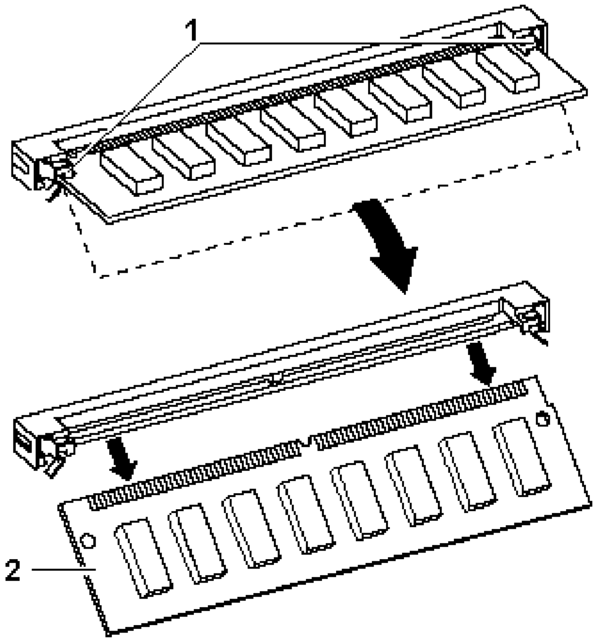
Caution: Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components (see the section, "Antistatic Precautions").

You may need to remove memory modules to either remove or install another memory module. Note the position of any memory modules that you remove.

Figure 5-5 shows the removal procedure for a **{**XE "Memory modules:removing"**}**memory module. To remove a memory module:

1. Remove the appropriate memory modules by pressing the metal clips (1) on both sides of the memory module connector to the side.
2. Tilt the memory module and lift it (2) out of its connector.
   You may want to use a screwdriver to press back on the metal clips.

Figure 5-5 Removing a Memory Module



Installing Memory Modules

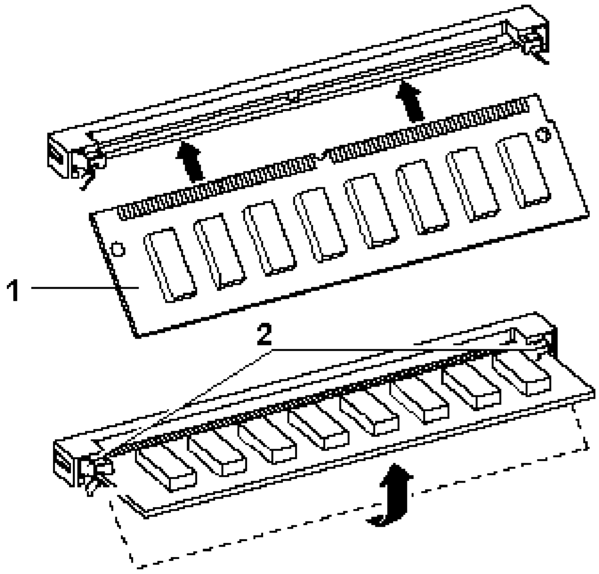
You need to install a new **{**XE "Memory modules:installing"**}**memory module to replace a faulty module or when upgrading a memory bank. You may need to remove memory modules in order to access the memory slots for any new modules (see the earlier section, "Removing Memory Modules"). To install a memory module, refer to Figure 5-6 and follow these steps:

1. Tilt the connecting end of the module and press gently on the module so it slips over the two posts located at each end of the slot (see Figure 5-5).
2. Reinstall any memory modules you may have removed for access purposes.
3. Replace the system covers following the procedures listed in "Replacing the System Unit Covers."
4. Test the memory configuration using the following commands:

```
>>> show memory
>>> test memory
```

For more information, see the section, "Configuring Memory" in Chapter 6, "Configuring."

Figure 5-6 Installing a Memory Module


1
2

EISA, ISA, and PCI Option Cards

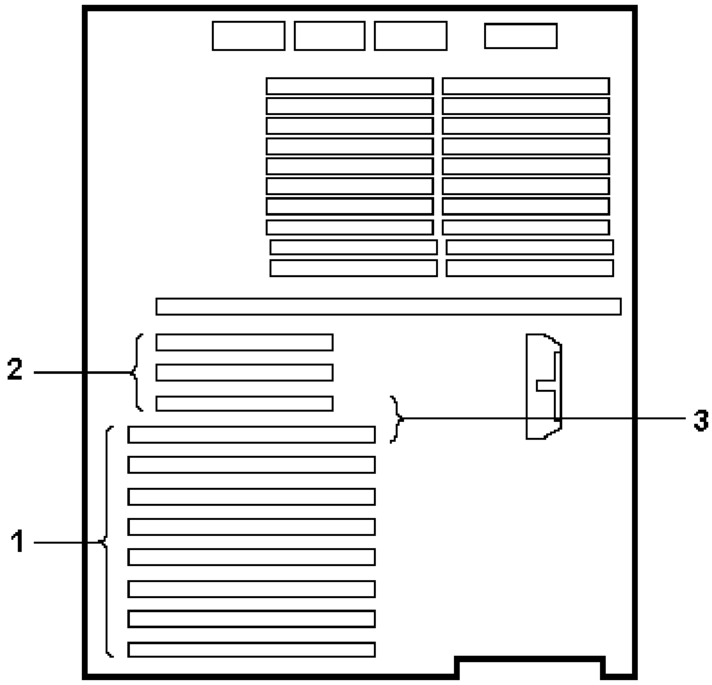
For a description of available system options, see the section, "Upgrade Options," in Chapter 7, "Upgrading."

Installing and removing EISA, ISA, and PCI option cards includes the following tasks:

- Installing an Option Card
- Removing an Option Card
- Testing an Option Card Installation
- Configuring an Option Card

Figure 5-7 shows the option card slots on the system board.

Figure 5-7 EISA, ISA, and PCI Slots on the System Board



1 EISA/ISA option slots

2 PCI option slots

3 PCI or EISA/ISA option slots

Note: If the top EISA option slot is used, the bottom PCI slot cannot be used. If the bottom PCI slot is used, the top EISA slot cannot be used.

Installing an Option Card

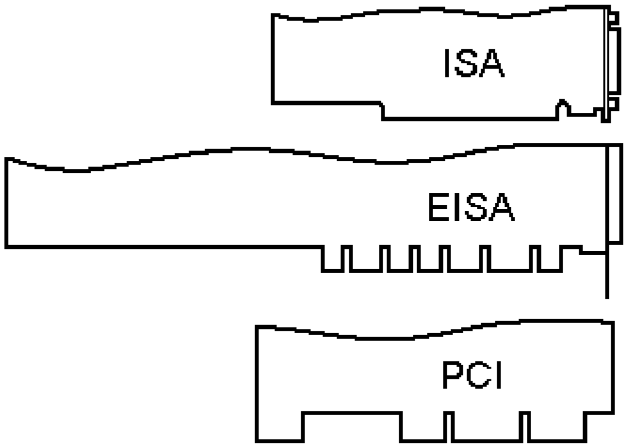
To install an EISA, ISA, or PCI option card on **{**XE "Graphics option:installation"**}**the system board, refer to Figures 5-8 and 5-9, and follow the steps below.**{**XE "SVGA jumper:disabling"**}**

> **Note:** If you want to install a high-performance graphics option card, you must disable the SVGA jumper (J27) on the system board. Figure 9-6 in Chapter 9, "Quick Reference" shows the jumper location.

> **Caution:** Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components. (See "Antistatic Precautions.")

1. Select a vacant **{**XE "Option cards:installing"**}**option card slot on the system board. The top three slots are reserved for PCI options; the bottom eight are for EISA or ISA options. Figure 5-8 shows the three kinds of option cards.

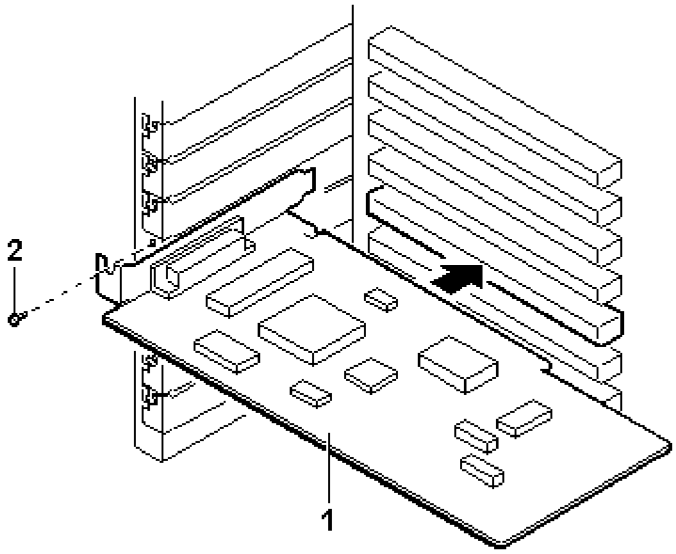
Figure 5-8 EISA, ISA, and PCI Option Cards



2. Remove the screw securing the slot cover to the chassis.

3. Remove the slot cover from the system unit and store it for future use.
4. Carefully install the option card into the appropriate connectors on the system board and press it firmly into place.
5. Secure the option card to the chassis using the screw you removed.
6. If you have finished removing or installing internal options, reassemble the system following the procedure described in "Replacing the Top Cover and Side Panels" earlier in this chapter.
7. Test the option card installation (see the section, "Testing an Option Card Installation" later in this chapter).

Figure 5-9 Installing or Removing an Option Card



1 Option card
2 Slot cover screw

Removing an Option Card

To remove an **{**XE "Option cards:removing"**}**EISA, ISA, or PCI option card from the system unit, refer to Figure 5-9 and follow the steps below.

Caution: Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components.

1. Disconnect any cables connected to the external or internal ports on the option card you want to remove.
2. Remove the slot cover screws (2) securing the option card to the chassis.

3. Carefully disconnect the option card (1) from the slot connectors on the system board and remove it from the system.
4. If you intend leaving the option slot vacant, install a slot cover and secure it to the chassis using the screw that you removed.
5. If you have finished removing or installing internal options, reassemble the system following the procedure described in "Replacing the Top Cover and Side Panels," earlier in this chapter.

Testing an Option Card Installation

To test an option card **{**XE "Option cards:testing installation"**}**installation, follow the steps in Table 5-1 and refer to Example 5-1.

Caution: Reassemble the system following the procedures listed in "Replacing the Top Cover and Side Panels."

Table 5-1 Testing with the show config Display

Step	Action	Result
1	Enter the `show config` command to display the system configuration.	The system responds with a display similar to that shown in Example 5-1.
2	Examine the PCI Bus or EISA bus information in the display to make sure that the new option is listed.	If the option is not listed, see "Troubleshooting."
3	Determine the device name of the new option.	You must know the device name to run diagnostic tests on the option. Enter the `show device` command to see the device name.
4	Run a self-test on the option by entering the `test` command followed by its device name.	If the self-test passes, the system displays the word OK (6) before displaying the console prompt (>>>). If the system displays a failure message, see "Troubleshooting."

Example 5-1 shows the information displayed when you type the `show config` command.

Example 5-1 The show config Display

```
                               Digital Equipment Corporation
                                Alpha AXP (tm) Server
SRM Console x3.7-239 VMS PALcode x5.48-49, OSF PALcode x1.35-34

MEMORY
    64 MB of System Memory
    Bank 0 = 32 MB (8 MB per SIMM) starting at 0x00000000
    Bank 1 = 32 MB (8 MB per SIMM) starting at 0x20000000
    Bank 2 = No Memory Detected
    Bank 3 = No Memory Detected

AlphaServer 1000 Serial ROM version:    x0.6

PCI BUS
    Bus 00  Slot 06:  NCR   810 SCSI  Controller
    Bus 00  Slot 07:  INTEL  8275EB PCI to EISA Bridge
    Bus 00  Slot 11:  Digital DE435 Network Controller

EISA BUS
Slot 3    DEC4220     era0.0.0.3.1  08-00-2B-35-F5-24
Slot 6     CPQ30110
```

Configuring an Option Card

Depending on the type of **{**XE "Option cards:configuring"**}**option card you install, you may or may not need to configure it.

When installing EISA and ISA option cards, refer to the system startup display screen to see if configuration of the card is required. After you turn on the system, the system startup sequence examines the EISA option slots and reports whether you need to run the EISA Configuration Utility.

See the section, "EISA and ISA Options" in Chapter 6, "Configuring" for more information.

When installing PCI option cards, you do not need to perform any configuration procedures. The system configures PCI cards automatically.

Storage Devices

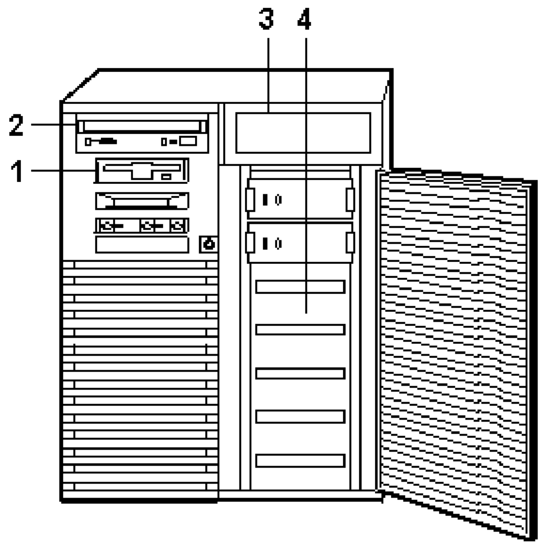
The system unit is designed to accommodate multiple SCSI devices, including a CDROM drive**{**XE "CDROM drive"**}{**XE "Tape drive"**}**, a tape drive, and several **{**XE "StorageWorks disk drives"**}**StorageWorks device options. The diskette drive connects directly to the system board and is *not* a SCSI device.

Whenever you install a **{**XE "SCSI IDs:assigning"**}**SCSI device, you must assign it a unique SCSI ID number. Otherwise, the system will not recognize the device. Depending on how many SCSI devices you are using or how you want them configured, you may need to alter the SCSI cabling to enable all of the devices (see Chapter 6, "Configuring").

Identifying the Drive Bays

The system contains four **{**XE "Storage drives:location"**}**storage drive bays, shown in Figure 5-10.

Figure 5-10 System Drive Bays



1 3½-inch diskette drive bay

2 5¼-inch SCSI CDROM drive bay

3 5¼-inch SCSI tape drive bay

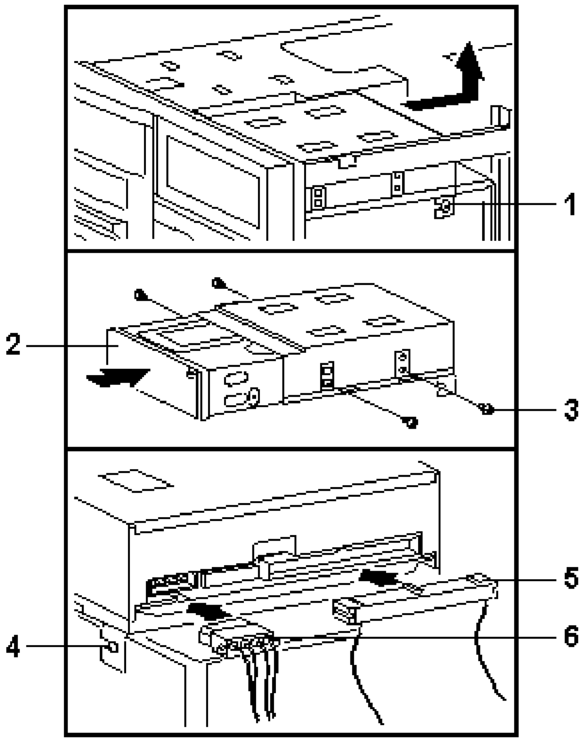
4 3½-inch StorageWorks drives

Installing a Tape Drive

To install or replace a **{**XE "Tape drive:installing"**}**tape drive, refer to Figure 5-11 and follow these steps:

1. If you have not done so already, remove the original drive that you want to replace. To remove the tape drive, reverse the order of steps 3 to 7 in this installation procedure.
2. If you are replacing a drive, set the SCSI ID jumpers on the replacement drive to the same ID as the original drive. If you are installing a drive, set the SCSI device ID to 5. The ID 5 is the default device ID for a tape drive. See the section, "Determining SCSI Storage Device IDs" in Chapter 6, "Configuring" for more information.
3. Remove the tape drive bracket from the bay by loosening the bracket retaining screw and pulling back on the bracket.
4. Slide the tape drive you want to install into the bracket and insert two screws on each side.
5. Slide the drive assembly into the back of the bay until its screw holes are aligned with the tape drive bracket holes.
6. Tighten the single retaining screw in the tape drive bracket.
7. Connect the power cable and the data cable to the back of the drive.

Figure 5-11 Installing a Tape Drive



1 Bracket screw
2 Tape drive and bracket
3. Tape drive screws
4 Bracket screw
5 Data cable
6 Power cable

Removing a Tape Drive

To remove a tape drive, **{**XE "Tape drive:removing"**}**reverse the order of steps 3 to 7 in the installation procedure.

Installing a CDROM Drive

To install or replace a **{**XE "CDROM drive:installing"**}**CDROM drive, refer to Figure 5-12 and follow these steps:

1. Before you can install the CDROM drive, you must first remove the tape drive and tape drive bracket. See "Removing a Tape Drive" earlier in this section.
2. If you have not done so already, remove the drive you want to replace.
3. Set the SCSI ID on the replacement drive to the same ID as the original drive. If you are installing a drive, set the SCSI drive ID to 4. The ID 4 is the default device ID for a CDROM drive. See the section "Determining SCSI Storage Device IDs" in Chapter 6, "Configuring" for more information.

4. Slide the drive into the front of the bay until its screw holes are aligned with the drive bracket holes.
5. Insert two screws into each side of the CDROM drive.
6. Connect the power cable and the data cable to the back of the drive.
7. If necessary, reinstall the tape drive. See "Installing a Tape Drive" earlier in this section.
8. Screw in the holding clip that secures the drives from on top.

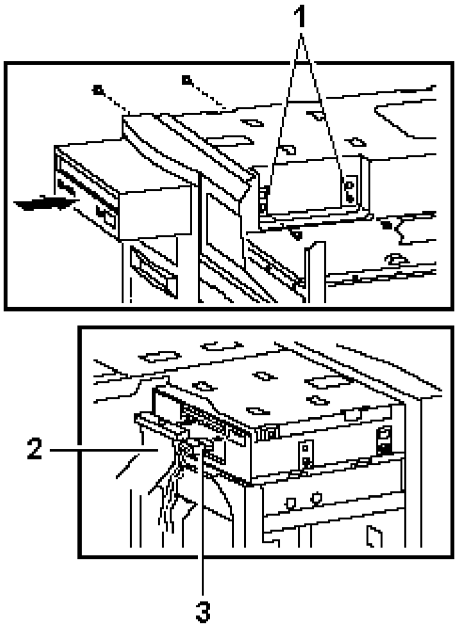
Removing a CDROM Drive

Reverse the order of steps 4 to 8 in the **{**XE "CDROM drive:removing"**}**installation procedure to remove the CDROM drive.

Installing a StorageWorks Disk Drive

If your StorageWorks disk drives **{**XE "StorageWorks disk drives:installing"**}**are plugged into a RAID controller**{**XE "RAID controller"**}**, you can *hot swap* drives, that is, you can **{**XE "Disk drives:hot swapping"**}**install or **{**XE "Disk drives" \t "See also StorageWorks disk drives"**}**replace drives without first shutting down the operating system or turning off the system hardware. For more information, see the *StorageWorks RAID Array 200 Subsystem Family Installation and Configuration Guide* (EK-SWRA2-IG).

Figure 5-12 Installing a CDROM Drive

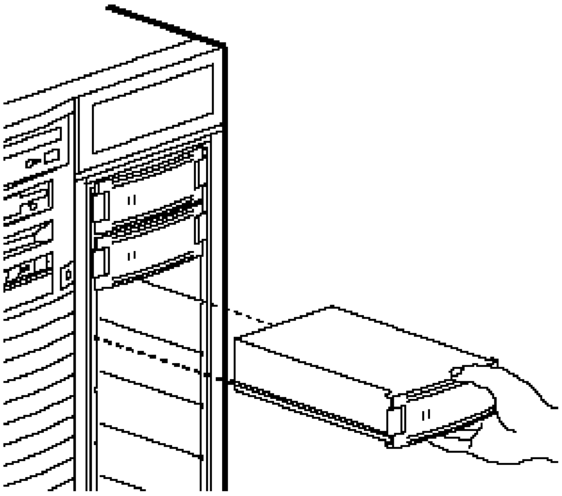


1 Drive bracket holes
2 Data cable
3 Power cable

To install a StorageWorks drive, refer to Figure 5-13 and follow these steps:

1. If your StorageWorks drives are plugged into a RAID controller, go to step 2. If your drives are not plugged into a RAID controller, shut down the operating system before you go to step 2.
2. Remove a blank bezel or drive by pressing the two mounting tabs and pull the unit out of the shelf.
3. Insert the hard disk drive into the guide slots and push the drive in until its tabs lock in place.
4. Check the configuration of the drive. See the section "Determining SCSI Storage Device IDs" in Chapter 6, "Configuring" for more information.

Figure 5-13 Installing a StorageWorks Disk Drive



Removing a StorageWorks Disk Drive

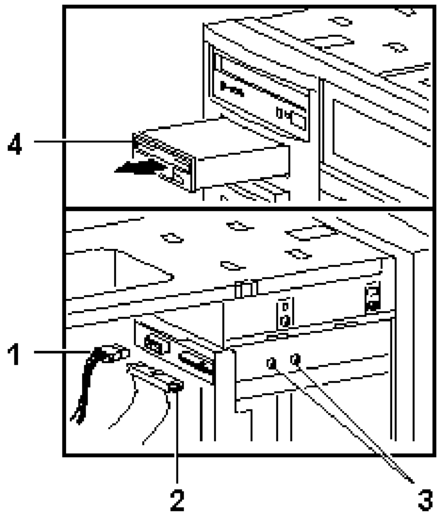
To remove **{**XE "StorageWorks disk drives:removing"**}**StorageWorks disk drives, reverse all steps in the installation procedure.

Installing a Diskette Drive

To replace a 3½-inch **{**XE "Diskette drive:installing"**}**diskette drive, refer to Figure 5-14 and follow these steps:

1. Remove the original diskette drive.
2. Locate the ID select switch toward the rear on the righthand side of the replacement diskette drive. Set the switch to the 1 position.
3. Slide the diskette assembly into the front of the bay until the screw holes line up with the holes on the bracket.
4. Attach the mounting bracket to the replacement diskette drive using the two screws that you removed from the original diskette drive.
5. Connect the power cable and the data cable to the diskette drive.

Figure 5-14 Replacing or Installing a Diskette Drive



1 Power cable
2 Data cable
3 Screws (2)
4 Diskette drive

Removing a Diskette Drive

To remove the **{**XE "Diskette drive:removing"**}**diskette drive, reverse steps 3 to 5 in the installation procedure, and refer to Figure 5-14.

Network Interface Card

The system supports **{**XE "Network interface cards"**}**PCI or EISA network option cards. For information on installing network option cards in your system, refer to the section, "Installing an Option Card" earlier in this chapter. For information on cabling them to destinations outside the unit, refer to the documentation that accompanies the option.

Power Supply

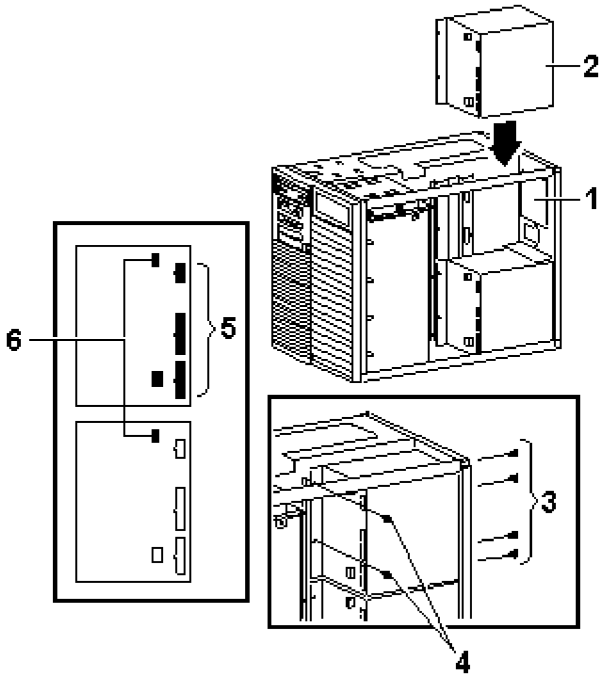
The following procedures describe how to install and remove the primary and optional power supplies. The primary power supply resides in the bottom position, the secondary power supply **{**XE "Power supply:secondary"**}**in the top position. The procedures for installing and removing both power supplies are similar, unless otherwise noted.

Installing the Power Supply

To install a **{**XE "Power supply:installing"**}**power supply, refer to Figure 5-15, and follow these steps:

1. If you are installing a second power supply, remove the four screws that secure the protective shield at the back of the system unit. Remove the shield and store it with the screws for future use.
2. Slide the power supply over its tabs and toward the back panel so that it aligns with the screw holes in the system unit frame. The primary power supply slides directly into the lower position from the side of the system unit. The secondary power supply slides down from above the system unit and rests upon a ledge.
3. Tighten the two screws that secure the internal end of the power supply.
4. Tighten the four screws that secure the power supply to the outside of the unit. Do not use the screws that secured the protective shield.
5. Connect all **{**XE "Power supply:cabling"**}**internal and external cables to the power supply. If you are installing a second power supply, an additional internal cable is required for connecting the two supplies. In addition, each power supply connects directly to an AC outlet.

Figure 5-15 Installing the Power Supply



1 Position for second power supply

2 Second power supply

3 Rear screws (4)

4 Internal screws (2)

5 Cable connections

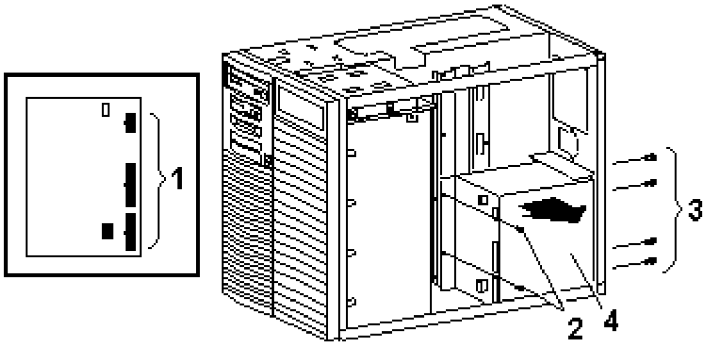
6 Internal connecting cable

Removing the Power Supply

To remove a **{**XE "Power supply:removing"**}**power supply, refer to Figure 5-16 and follow these steps:

1. If an optional power supply is installed, you must remove it before removing the primary power supply.
2. Disconnect all internal and external cables from the power supply.
3. Loosen the four screws that secure the power supply to the outside rear of the unit.
4. Loosen the two screws that secure the internal end of the power supply to the system unit.
5. Slide the power supply towards the internal side and lift it up off its tabs.

Figure 5-16 Removing the Power Supply



1 Cable connections

2 Internal screws

3 Rear screws

4 Power supply removal

CPU Card

Your system comes with the CPU card already installed. On this system, the CPU resides on a card that connects to the system board. If, for example, you wish to upgrade to another CPU type, you need to replace the CPU card, as described below.

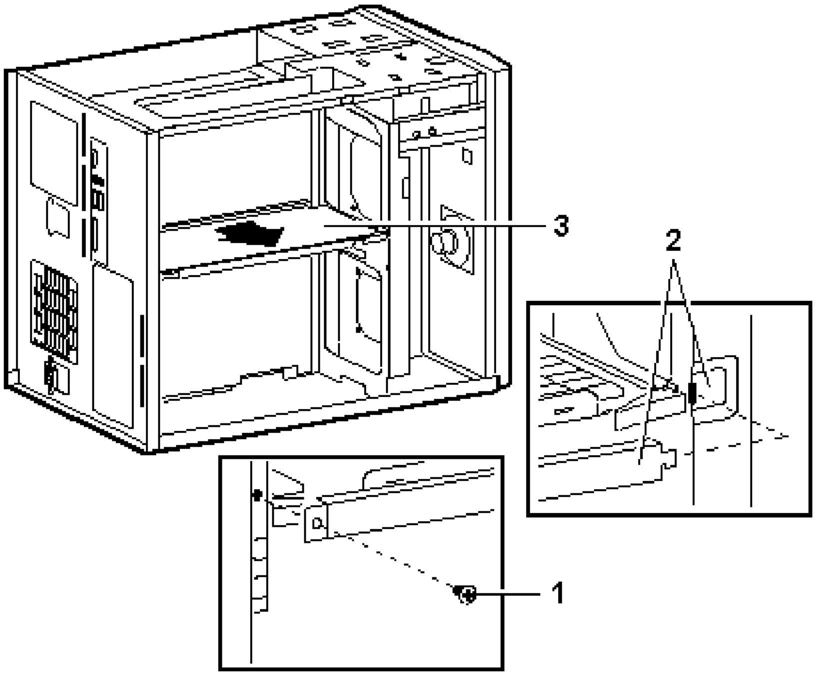
Caution: Be sure to follow the appropriate antistatic precautions whenever handling internal components.

Removing the {XE "CPU card:removing"}CPU Card

To remove the CPU card, refer to Figure 5-17 and follow these steps:

1. Unscrew the crossbar that secures the outer edge of the CPU card.
2. Lift up on the other end of the bar. Release the card by extending the handle clip on each end outward.
3. Holding the outer edge of the card, gently pull it out of its system board slot.

Figure 5-17 Removing and Installing the CPU Card



1 Crossbar retaining screw

2 Handle clips

3 CPU card

Installing the CPU Card

To install the **{**XE "CPU card:installing"**}**CPU card, refer to Figure 5-17 and follow these steps:

1. Slide the card into its designated slot on the system board making sure it slips entirely into the slot.
2. Press inward on the handle clip on each end of the card until they catch in a closed position.
2. Place the crossbar in position and screw in the single retaining screw.

Removing/Replacing Other Options

The following components should be installed by a qualified service representative only:

- System board
- System fans
- Interlocking sensor switch
- Front bezel
- Operator control panel
- SCSI Backplane

For assistance in removing or installing these components, contact your authorized service representative.

6 Configuring

Introduction

To configure your system, you need to note the current configuration, ...(summarize overall task here? User can view config, then configure a component, then test?)

This chapter covers the following topics:

- Viewing the System Configuration
- Memory
- Network Connections
- Power Supply
- Keyboard Type
- EISA and ISA Option Cards
- PCI Option Cards
- Storage Devices

Viewing the System Configuration

Several SRM console commands or ARC console menu options allow you to examine your system **{**XE "Configuration:viewing"**}**configuration and environment variable settings.

To use these commands or menu options, you need to invoke console mode. For information about invoking console mode, refer to the section, "Using the Consoles," in Chapter 4, "Basic Operation."

ARC Console Configuration Options

On systems running the **{**XE "ARC console:verifying configuration"**}**Windows NT operating system, **{**XE "Windows NT:verifying configuration"**}**the following Windows NT (ARC) menu options are used to verify system configuration:

"Display Hardware Configuration"	Lists the Windows NT boot device names for devices installed in the system.
"Set Default Variables"	Allows you to select values for Windows NT firmware environment variables.

Note: For a more complete listing of the options recognized by your system, see the next section, "SRM Console Configuration Commands."

To enter DEC OSF/1 and OpenVMS console commands, you must switch to the SRM console (see the section, "Switching between Consoles," in Chapter 4, "Basic Operation").

Note: Remember to switch back to the Windows NT (ARC) console before booting the Windows NT operating system.

SRM Console Configuration Commands

The following console **{**XE "SRM console:verifying configuration from"**}**commands are used to verify system configuration on systems running either the **{**XE "DEC OSF/1:verifying configuration for"**}**DEC OSF/1 or **{**XE "OpenVMS:verifying configuration"**}**OpenVMS operating system:

`show config`	Displays the buses on the system and the devices found on those buses.
`show device`	Displays the devices and controllers in the system.
`show memory`	Displays main memory configuration.
`set` and `show`	Set and display environment variables.

The show config Command

The `show config` command displays all devices found on the system bus, PCI bus, and EISA bus. 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 devices that are installed.

The configuration **{**XE "show config command:example"**}**display looks similar to that in Example 6-1:

Example 6-1: The show config Command

```
 >>> show config
                Digital Equipment Corporation
                   Alpha AXP (tm) Server

SRM Console X3.3-1476  VMS PALcode X5.48-71, OSF PALcode
X1.35-49

MEMORY
     80 Meg of System Memory
     Bank 0 = 32 Mbytes(8 MB Per Simm) Starting at 0x00000000
     Bank 1 = 32 Mbytes(8 MB Per Simm) Starting at 0x02000000
     Bank 2 = 16 Mbytes(4 MB Per Simm) Starting at 0x04000000
     Bank 3 = No Memory Detected

     Serial Rom Version:      0.8

PCI Bus
     Bus 00  Slot 06: NCR     810 Scsi Controller
     Bus 00  Slot 07: Intel   8275EB PCI to Eisa Bridge

EISA Bus
     Slot 1  CPQ3011
     Slot 3  DEC4220               era0.0.0.3.1           08-
00-2B-BC-F
     Slot 8  DEC2E00
```

For more information on device names, refer to the next section, "The show device Command."

The show device Command

The `show device` command displays the devices and controllers in the system.

Synopsis:

show device [*device_name*]

Arguments:

device_name The device name or device abbreviation. When abbreviations or wild cards are used, all devices that match the type are displayed.

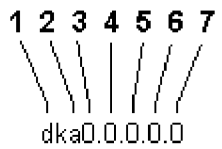
The command and resulting **{**XE "show device command:example"**}**display are shown in Example 6-2. The device name convention used in the display is shown in Figure 6-1 and is explained in the text that follows.

Example 6-2 The show device Command

```
>>> show device

dka400.4.0.6.0     DKA400         RRD43  2893
dva0.0.0.0.1       DVA0
era0.0.0.3.1       ERA0   08-00-2B-BC-F6-CC
pka0.7.0.6.0       PKA0      SCSI Bus ID 7
```

Figure 6-1



Elements of Device Name Convention in Figure 6-1

1 Driver ID

Two-letter port or class driver designator
DR-RAID set device
DV-Floppy drive
ER-Ethernet port (EISA)
EW-Ethernet port (PCI)
PK-SCSI port, DK-SCSI disk, MK-SCSI tape
PU-DSSI port, DU-DSSI disk, MU-DSSI tape

2 Storage Adapter ID: One-letter storage adapter designator (a,b,c. . .)

3 Device Unit Number: Unique device unit number (MSCP Unit Number)
SCSI unit numbers are forced to 100 X Node ID

4 Bus Node ID Number

5 Channel Number: Used for multi-channel devices

6 Slot Number:

For EISA options, corresponds to EISA slot numbers (1-8)

For PCI options, slot = Ethernet adapter (EWA0)

-Slot 1=SCSI controller on standard I/O

-Slot 2=EISA to PCI bridge chip

-Slots 3-5=Reserved

-Slots 6-8=Corresponds to PCI slots: PCI0, PCI1, and PCI2

7 Hose Number: 0 PCI_0 (32-bit PCI_; 1 EISA; 2 PCI_1)

The show memory Command

The `show memory` command displays information for each memory module in the system. **{**XE "show memory command:example"**}**The command and a sample display are shown in Example 6-3.

Example 6-3 The show memory Command

```
POO >>>  show memory
   1        2         3             4             5         6
Module   Size    Base Addr    Intlv Mode    Intlv Unit   Status
----     --      -----        -----         -----        ---

  0      64MB   00000000       1-Way          0          Passed
                                                            1
                                                         Not Installed
                                                            2
                                                         Not Installed
                                                            3


Total Bad Pages 0    7
```

Elements of show memory Command in Example 6-3

1 Module slot number

2 Size of memory module

3 Base or starting address of memory module

4 Interleave mode: number of modules interleaved (1 to 4-way interleaving)

5 Interleave unit number

6 Status (passed, failed, or not installed)

7 Number of bad pages in memory (8 KB/page)

The set and show Commands

The {XE "set command:example"}`set` and `show`{XE "show command:example"}commands are used to set environment variables. Typically, you set environment variables when you configure a system.

Synopsis:

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

show *envar*

Arguments:

envar	The name of the environment variable to be modified.
value	The value that is assigned to the environment variable.

Options:

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

The `set` and `show` commands and a sample display are shown in Example 6-4.

Example 6-4 The set and show Commands

```
>>> set bootdef dev ewa0
>>> show bootdef_dev
ewa0
>>> show auto_action
boot
>>> set boot_osflags 0,1
>>>
```

Note: Remember to switch back to the Windows NT (ARC) console before booting the Windows NT operating system.

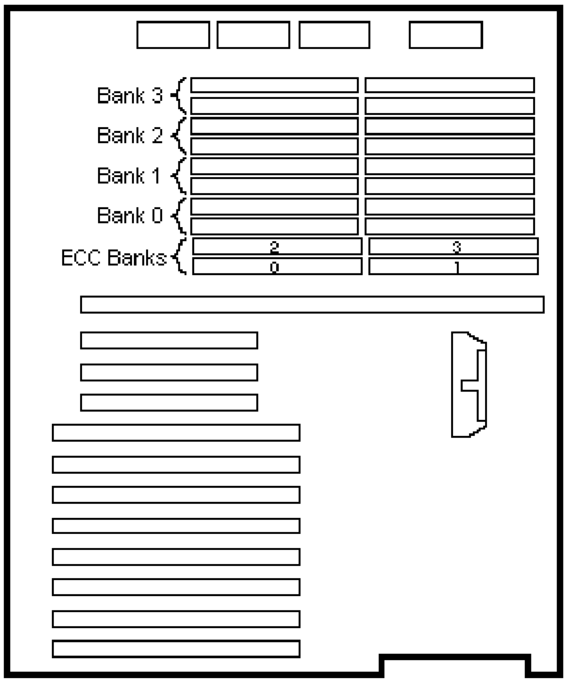
Memory

The system unit supports 20 single in-line memory modules (SIMM) on the system board. The SIMM modules are grouped in four memory banks consisting of five modules: four memory modules plus one memory module in each bank for ECC (Error Correction Code). Figure 6-2 shows the memory bank groupings on the system board.

A minimum of one memory bank (five modules) is required.

> **Warning:** Before installing a memory module, turn off all power to the system. Refer to "Turning the System Off" in Chapter 4, "Basic Operation" for information about turning off power.

Figure 6-2 Memory Banks



Memory requirements for operating systems differ. Requirements for each**{**XE "Operating systems:memory requirements"**}** are shown in Table 6-1.

Table 6-1 Operating System Memory Requirements

Operating System	Memory Requirements
DEC OSF/1 and OpenVMS	32 MB minimum; 64 MB recommended for DEC OSF/1
Windows NT	16 MB minimum; 32 MB recommended
Windows NT Server	32 MB memory; 64 MB recommended

Network Connections

Using network adapters, you can connect to the EISA and PCI buses. Your system supports various **{**XE "Network options"**}{**XE "Network hardware:connecting"**}**network options. You can connect to ThinWire, AUI, or 10Base-T Ethernet networks as shown in Figure 2-5.

Setting Network Configuration

Use the following **{**XE "Network configuration:setting"**}**configuration commands to set the network configuration for the DE435 network option card:

`>>> set ewa0_mode twisted`	(10BASE-T or twisted-pair)
`>>> set ewa0_mode aui`	(AUI or standard)
`>>> set ewa0_mode auto`	(ThinWire)

Power Supply

The system has a single **{**XE "Power supply"**}**power supply that provides all the power your system needs. For added reliability, you can add a second power supply, which provides redundant power for a fully loaded system. Refer to "Installing and Removing Components" for instructions on adding a second power supply to your system.

Keyboard Type

Your system comes **{**XE "Keyboard"**}**equipped with a 101-key enhanced keyboard that allows you to communicate with your system by entering data or commands. Note that some European language keyboards have 102 keys.

Use the ARC console Setup menu to change the keyboard configuration.

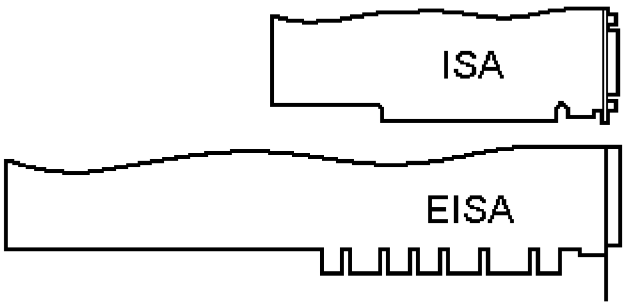
Refer to your operating system or application software documentation for software-specific key functions.

EISA and ISA Options

You can determine whether an option card is an **{**XE "EISA option card:identifying"**}**EISA or **{**XE "ISA option card:identifying"**}**ISA option by examining the contacts of the card (see Figure 6-3):

- EISA cards have two interlocking rows of gold contacts.
- ISA cards have a single row of gold contacts.

Figure 6-3 EISA and ISA Cards



EISA Bus

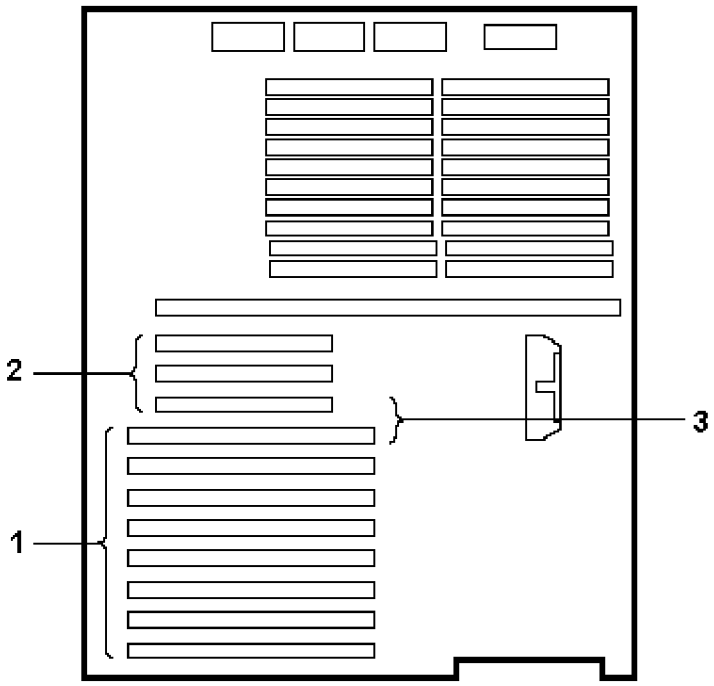
The **{**XE "EISA bus"**}**EISA (Extended Industry Standard Architecture) bus is a 32-bit industry standard input/output bus. EISA is a superset of the well-established 16-bit ISA bus. EISA was designed to accept newer 32-bit components while still remaining compatible with older 8-bit and 16-bit cards.

EISA offers performance of up to 33 MB/sec for cards with bus mastering and DMA capabilities. Up to eight EISA or ISA modules can reside in the EISA bus portion of the system board. All EISA slots are bus master slots, and can be filled in any order.

Figure 6-4 shows the location of **{**XE "EISA option slots:location"**}**EISA and ISA option **{**XE "ISA option slots:location"**}**slots on the system board. To access the slots, you will need to remove the top and left panels of the system enclosure. Be sure to replace the panels before attempting to start the system again.

> **Caution:** Do not remove the system's top cover when the system is running. If you remove the top cover without first properly turning off the system, the system will shut down, with potential loss of data.

Figure 6-4 EISA, ISA, and PCI Option Slots



1   EISA/ISA option slots

2   PCI option slots

3   PCI or EISA/ISA option slot

Note: If the top EISA option slot is used, the bottom PCI slot cannot be used. If the bottom PCI slot is used, the top EISA slot cannot be used.

For information about installing a specific option, refer to the documentation for that option. For information about configuring an EISA option, refer to the sections, "EISA Configuration Utility (ECU)" and "Configuring EISA Options," later in this chapter.

Warning: Before installing EISA bus options, turn off all power to the system. Refer to "Turning the System Off" in Chapter 4, "Basic Operation."

ISA Bus

The **{**XE "ISA bus"**}**ISA (Industry Standard Architecture) bus is an industry-standard, 16-bit I/O bus. 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 architectures. Therefore, ISA modules can be used in your system, provided the operating system supports the device.

Up to eight EISA or ISA modules can reside in the EISA bus portion of the system board. Figure 6-4 shows the location of the ISA option slots on the system board.

To access the system board, you need to remove the top and left panels of the system enclosure. Be sure to replace the panels before attempting to turn on the system again.

Caution: Do not remove the system's top cover when the system is running. If you do so without first properly turning off the system, the system will shut down, with potential loss of data.

For information about installing a specific option, refer to the documentation for that option. For information about configuring an ISA option, refer to the sections, "EISA Configuration Utility" and "Configuring ISA Options" later in this chapter.

Warning: Before installing ISA bus options, turn off all power to the system. Refer to "Turning the System Off" in the Chapter 4, "Basic Operation."

EISA Configuration Utility (ECU)

Whenever **{**XE "EISA Configuration Utility (ECU)"**}**you add, **{**XE "Configuration" \t "See also EISA Configuration Utility (ECU)"\i**}**remove, or move an EISA or ISA card to your system, the EISA Configuration Utility (ECU) must be run. The ECU is a menu-based utility, run from the Windows NT (ARC) firmware, that provides online help to guide you through the configuration process.

Each EISA or ISA card has a corresponding configuration **{**XE "CFG file"**}**(CFG) file, which **{**XE "CFG file" \t "See also EISA Configuration Utility (ECU)"**}**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 supplied on the System Configuration Diskette that was shipped with your system. Make copies 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 if the option is not supported on your system. Before you install an option, check your system's product literature to verify that your system supports the option. Refer to Chapter 7, "Upgrading" for instructions on obtaining information on options.

> **Caution:** Turn the system off before you install EISA options.

Before You Run the ECU

> **Note:** To run the ECU from a terminal connected to a serial line, you must use a VT320 or VTxxx terminal running in 320 mode. From the ARC console, you must also create the environment variable `TERM` with a value of VT320. For example: `TERM=VT320.` If you later want to run the ECU on a video monitor, you must delete this environment variable first.

Before you run the ECU, follow these steps:

1. Refer to the documentation that comes with your option card to determine if it is an EISA or ISA option.
2. Install EISA option card(s). (Install ISA option cards after you run the ECU.)

   For information about installing a specific option, refer to the documentation for that option.
3. Familiarize yourself with the utility.

You can find more information about the ECU by reading the ECU online help. To read the online help, start the ECU (refer to "Configuring EISA Options" later in this chapter). Online help for the ECU is located under Step 1, "Important EISA Configuration Information."

4. Familiarize yourself with the configuration procedure for your system:
   - If you are installing, moving, or removing an EISA option, refer to "Configuring EISA Options" later in this chapter.
   - If you are installing, moving, or removing an ISA option, refer to "Configuring ISA Options" later in this chapter.
5. Locate the ECU diskette for your operating system. It is shipped in the accessories box with your system. Make a copy of the diskette and keep the original in a safe place. Use the backup copy for configuring options.
   - ECU Diskette DECpc AXP for Windows NT
   - ECU Diskette DECpc AXP for DEC OSF/1 and OpenVMS

Configuring EISA Options

EISA **{**XE "EISA options:configuring"**}**options are recognized and configured automatically. To configure an EISA bus that contains no ISA options, follow these steps:

1. Install, move, or remove the EISA option card. See Chapter 5, "Installing and Removing Components.)

   Use the instructions provided with the EISA option.
2. Invoke the console firmware.
   - **For systems running Windows NT:**

     Shut down the operating system or power up to the console Boot menu.
   - **For systems running DEC OSF/1 or OpenVMS:**

     Shut down the operating system and press the Halt switch. When the console prompt >>> is displayed, press the Halt switch to the "out" position.
3. Start the ECU as follows:
   - **For systems running Windows NT:**
     a. From the Boot menu, select "Supplementary menu."
     b. From the Supplementary menu, select "Setup menu." Insert the ECU diskette for Windows NT into the diskette drive.

c. From the Setup menu, select "Run EISA Configuration Utility from floppy." This boots the ECU program. There may be a 10 to 20 second delay in system activity while the system recognizes the ECU.

- **For systems running DEC OSF/1 or OpenVMS:**

  a. Insert the **{**XE "EISA Configuration Utility (ECU):using with DEC OSF/1"**}**ECU diskette for DEC OSF/1 or **{**XE "EISA Configuration Utility (ECU):using with OpenVMS"**}**OpenVMS into the diskette drive.

  b. Enter the `ecu` command.

     The message "loading ARC firmware" is displayed. There may be a 10 to 20 second delay in system activity while the system recognizes the ECU. When the firmware has finished loading, the ECU program is booted.

  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.

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

4. Change settings or resources (optional).

   This step is not required when you are using the card's default settings.

   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).

5. Save your configuration.

   The "Save and Exit" ECU option saves your configuration information to the system's nonvolatile memory.

6. Return to the SRM console (DEC OSF/1 and OpenVMS systems only) and restart the system.

   - **For systems running Windows NT:**

     Remove the ECU diskette from the diskette drive and boot the operating system.

   - **For systems running DEC OSF/1 or OpenVMS:**

     Return to the SRM console as follows:

     a. From the Boot menu, select the Supplementary menu.

     b. From the Supplementary menu, select the "Set up the system" menu.

c. From the Setup menu, select "Switch to OpenVMS or OSF console." This allows you to select your operating system console.

d. Select your operating system, then press enter on "Setup menu."

e. When the message "Power-cycle the system to implement the change" is displayed, press the Reset button. (Do not press the On/Off switch.) Once the console firmware is loaded and device drivers are initialized, you can boot the operating system.

Configuring ISA Options

To configure **{**XE "ISA options:configuring"**}**ISA options, follow these steps:

> **Note:** Do not install ISA cards until after you start the EISA Configuration Utility.

1. Start up the system and run the ECU, as follows:

   - **For systems running Windows NT:**

     a. From the Boot menu, select "Supplementary menu."

     b. From the Supplementary menu, select "Setup menu." Insert the ECU diskette for Windows NT into the diskette drive.

     c. From the Setup menu, select "Run EISA Configuration Utility from floppy." This boots the ECU program. There may be a 10 to 20 second delay in system activity while the system recognizes the ECU.

   - **For systems running DEC OSF/1 or OpenVMS:**

     a. Insert the ECU diskette for DEC OSF/1 or OpenVMS into the diskette drive.

     b. Enter the `ecu` command.

     The message "loading ARC firmware" is displayed. There may be a 10 to 20 second delay in system activity while the system recognizes the ECU. When the firmware has finished loading, the ECU program is booted.

   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.

2. Add the ISA card configuration file to the configuration list.

   Use the "Add or Remove Boards" ECU option to add the configuration (CFG) file for the ISA option and to select an acceptable slot for the option.

In some cases, the CFG file for the ISA option may reside on a configuration diskette packaged with the option. If so, insert that diskette and follow its directions.

For most ISA options, the configuration (CFG) file is not on a diskette. If it is not, you need to use the Generic ISA Adapter Definition option on the ECU diskette.

3. Change settings or resources (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 you are using the card’s default settings.

4. Examine and set required switches to match the displayed settings.

   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 cards, it uses the information from the previous step to determine the correct switch settings for these options.

   Physically set the card’s jumpers and switches to match the required settings.

5. Save your configuration.

   The "Save and Exit" ECU option saves your configuration information to the system’s nonvolatile memory.

6. Return to the SRM console (DEC OSF/1 and OpenVMS systems only) and restart the system.

   - **For systems running Windows NT:** Remove the ECU diskette from the diskette drive and boot the operating system.

   - **For systems running DEC OSF/1 or Open VMS:**

   Return to the SRM console as follows:

   a. From the Supplementary menu, select the Setup menu.

   b. From the Setup menu, select "Switch to OpenVMS or OSF console." This option allows you to select your operating system console.

   c. Select your operating system; then press Enter on the Setup menu.

   d. When the message "Power-cycle the system to implement the change" is displayed, press the Reset button. (Do not press the On/Off switch.)

Once the console firmware is loaded and device drivers are initialized, you can boot the operating system.

7. Install the ISA card using the instructions provided with the ISA option, and turn on the system.

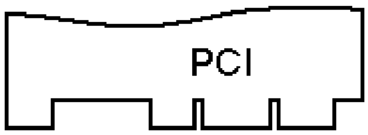
PCI Option Cards

PCI **{**XE "PCI options:configuring"**}**(Peripheral Component Interconnect) is an industry-standard expansion I/O bus that is the preferred bus for high-performance I/O options. The system supports 32-bit PCI options.

The PCI bus is shown in Figure 6-4. The system has two dedicated PCI slots and one slot that can be if the top EISA slot is not used.

A PCI card is **{**XE "PCI options:identifying"**}**shown in Figure 6-5.

Figure 6-5 PCI Option Card



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

For systems running DEC OSF/1 or OpenVMS:

Return to the SRM console as follows:

From the Boot menu, select the Supplementary menu.

a. From the Supplementary menu, select the "Set up the system" menu.
b. From the Setup menu, select "Switch to OpenVMS or OSF console." This allows you to select your operating system console.

> **Warning:** Before installing a PCI option, turn off all power to the system. Refer to "Turning the System Off" in Chapter 4, "Basic Operation" for information about turning off power.

Storage Devices

Configuring the storage devices on your system requires assigning the correct SCSI IDs according to the type of configuration you choose: single-controller, single-controller with jumper, dual-controller, or triple controller.

Determining SCSI Storage Device IDs

When you add or **{**XE "Storage drives:determining SCSI IDs"**}**remove a CDROM drive, a tape drive, or StorageWorks drives, you may want to consider how these are configured and whether you want to reconfigure them. These storage devices all reside on one or more SCSI buses that connect to the system board and to the StorageWorks backplane. The system configuration determines a unique ID for each device. (The diskette drive has its own dedicated bus and is not included in the SCSI configuration.)

When adding or changing devices, be careful to avoid assigning **{**XE "SCSI IDs:storage drive"**}**device IDs (SCSI IDs) already in use. Duplicate IDs result in one or more devices not being recognized by the system.

To determine the available **{**XE "SCSI IDs:assigning"**}**SCSI IDs for all SCSI storage devices, follow the steps in Table 6-2 and refer to Example 6-5.

Table 6-2 Determining Available SCSI IDs

Step	Action	Result
1	Enter the `show device` command to display the SCSI configuration.	The system responds with a display similar to that shown in Example 6-5.
2	Examine the ADDR column in the display.	The ADDR column lists the SCSI address of each device connected to the SCSI bus. The first number in the SCSI address is the SCSI ID. It must be a unique number in the range 0 to 7. Any unused SCSI IDs in this range are available for use by the devices that you want to connect to the system.
3	Write down the list of unused SCSI IDs.	

Example 6-5 The show device {XE "show device command:example"**}Display**

```
>>> show device
dka400.4.0.6.0     DKA400         RRD43  2893
dva0.0.0.0.1       DVA0
era0.0.0.3.1       ERA0   08-00-2B-BC-F6-CC
pka0.7.0.6.0       PKA0      SCSI Bus ID
```

On-board SCSI Bus Configuration

A Fast SCSI-2 controller**{**XE "Fast SCSI-2 controller"**}** on the system board supports the two 5¼-inch removable media devices (typically a CDROM drive and a tape drive) and an internal **{**XE "StorageWorks shelf"**}**StorageWorks shelf that supports up to seven hard disk drives. This controller provides a narrow (8-bit) single-ended SCSI bus for the system.

This bus can be **{**XE "SCSI bus configuration"**}**configured to be a purely internal bus, or to support a restricted set of internal SCSI devices and a single external SCSI device. It can also be configured to support only the 5¼-inch removable media devices, plus up to five external SCSI devices when an alternative SCSI controller option is connected to the StorageWorks shelf.

Internal Configuration

When the SCSI bus is **{**XE "SCSI bus configuration:internal"**}**configured to be a purely internal bus (see Figure 6-7), the bus must be terminated at the bulkhead connector using an external SCSI terminator (12-41667-01). External expansion from the back of the enclosure is not permitted in this configuration because it would violate SCSI bus length rules.

In this configuration, the two halves of the StorageWorks SCSI backplane are jumpered together to form a single backplane. See "Configuring the Backplane with One Controller," later in this chapter for a complete description of this procedure. Note that only seven devices can be connected to this bus; therefore, not all slots in the StorageWorks backplane can be filled (unless there are no 5¼-inch devices in the system).

External Configuration

When the SCSI bus is **{**XE "SCSI bus configuration:external"**}**configured to permit a single external SCSI device (see Figure 6-8), the bus is connected to the two 5¼-inch removable media devices and the top four slots (upper half) of the Storage Works SCSI backplane. A cable connects the bus to an external bulkhead connector. The bus can be terminated at this point using an external SCSI terminator (12-41667-01), or an external SCSI cable can be attached to connect to an external SCSI device. Note that the maximum length of the external **{**XE "SCSI bus:maximum length"**}**SCSI bus must be less than one meter to meet SCSI bus length restrictions.

If an additional SCSI controller option is plugged into the system, the integrated controller can be connected to only the 5¼-inch removable media devices and then routed to an external bulkhead connector (see Figures 6-9 and 6-10). The bus can be terminated at this point using an external SCSI terminator (12-41667-01), or an external SCSI cable can be attached to connect to external SCSI devices. To meet SCSI bus length restrictions, the total external bus length must be less than 1.5 meters.

SCSI Controller Option Cards

All SCSI-2 devices are supported via EISA- or PCI-based SCSI controller cards**{**XE "SCSI devices:configuring"**}**. Use the following **{**XE "SCSI configuration:rules"**}**rules to determine if a SCSI controller or SCSI device can be used on your system.

- The controller/device must be supported by the operating system. Consult the software product description or hardware vendor.
- No more than seven devices can be on any one SCSI-2 controller, and each must have a unique SCSI ID.
- The entire SCSI bus length, from terminator to terminator, must not exceed 3 meters for single-ended SCSI-2.

SCSI Bus Backplane Configurations

Storage devices can be configured on your system in three SCSI bus configurations: single, double, or triple. **{**XE "Backplane:configuring"**}**Each SCSI controller that is used represents one or more buses. Table 6-3 describes the three general types of **{**XE "SCSI bus configuration:types of"**}**SCSI bus configuration.

Table 6-3 SCSI Bus Backplane Configurations

Controller or Bus	Description
Single	Without using a jumper cable, a single-bus configuration configures up to four StorageWorks backplane devices on the same bus as the 5¼-inch removable media devices. The bus is driven by a native Fast SCSI-2 controller on the system board. Using a jumper cable, a single-bus configuration configures as many as seven StorageWorks backplane devices, provided you disable the CDROM and tape drives.
Double	A double-bus configuration configures the 5¼-inch removable media devices on their own bus driven by the native controller. An additional controller option card drives a second SCSI bus that connects to the StorageWorks backplane and its seven StorageWorks backplane devices.
Triple	A triple-bus configuration configures the 5¼-inch removable media devices on their own bus driven by the native controller. Two SCSI controller option cards (or a dual-bus controller option card) assign the StorageWorks backplane devices to two separate buses.

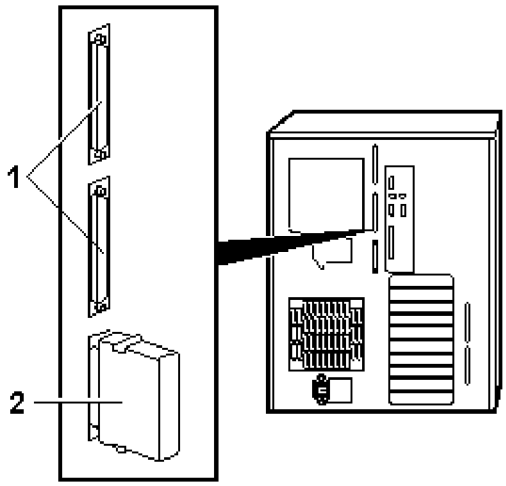
Configuring the Backplane with One Controller

The following procedure describes how to connect the top four StorageWorks slots to the on-board controller, which is the same controller that runs the CDROM drive and the tape drive, if one is installed.

Caution: Avoid bending the SCSI cable when folding it.

1. Insert the end of the SCSI cable (17-03959-01) in its system board connector.
2. Connect the SCSI cable CDROM drive connector to the rear of the CDROM drive.
3. Bring the remainder of the cable over the system board and connect it to the rear of the tape drive, if one is installed.
4. Connect the cable to the 50-pin connector (J1) on the top rear of the backplane. Figure 6-7 shows the location of the J1 connector.
5. Connect one end of the SCSI cable (17-03962-01) to the 50-pin connector (J2) on the StorageWorks backplane and the other end to the bulkhead connector (the lowest of the three cutouts on the rear of the system near the power supply).
7. Terminate the **{**XE "SCSI cable:terminating"**}**bus connecting an external SCSI terminator (12-41667-01). See Figure 6-6.
8. Ensure that the three sets of J3 jumper pins on the backplane are disabled.

Figure 6-6 SCSI Cable Termination



1 Optional SCSI ports

2 SCSI terminator

Single-Controller SCSI Configuration

In the single-controller **{**XE "SCSI configuration:single controller"**}**configuration shown in Figure 6-7, the top four StorageWorks slots are run from the system board SCSI controller. The bottom three StorageWorks slots are unused. The system reserves SCSI ID numbers for the CDROM drive (ID 4) and the tape drive (ID 5).

Table 6-4 shows the SCSI ID settings for this configuration.

Figure 6-7 Single-Controller SCSI Configuration

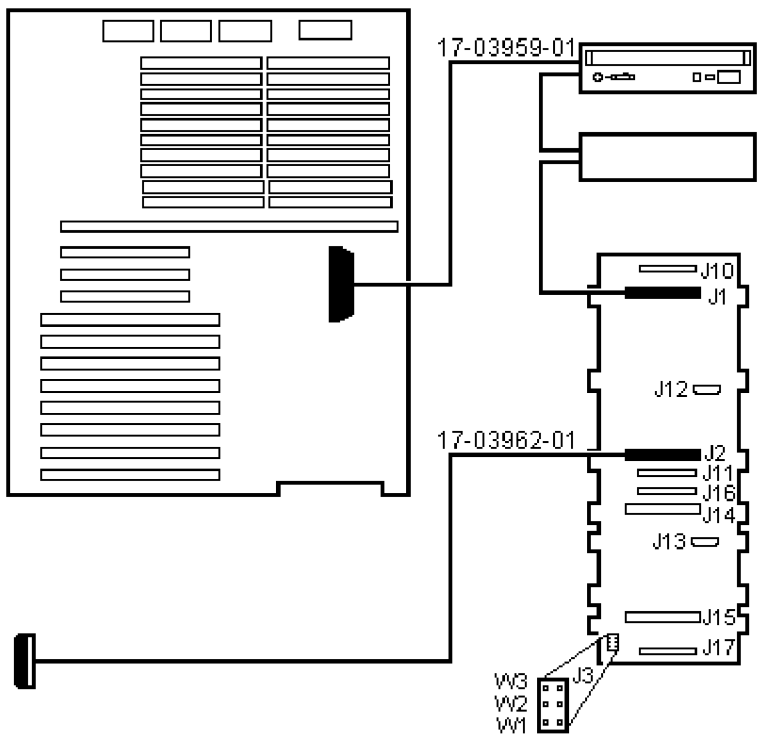


Table 6-4 SCSI IDs for Single-Controller {XE "SCSI IDs:single controller configuration"}Configuration

SCSI Device	Single-Bus ID
CDROM drive	4
Tape drive	5
Slot 0	0
Slot 1	1
Slot 2	2
Slot 3	3

Configuring the Backplane with One Controller and a Jumper Cable

The following procedure **{**XE "Backplane:configuring"**}**describes how to connect the seven StorageWorks slots to the on-board controller, the same controller that runs the CDROM drive and the tape drive. In order to use slot 4, the CDROM drive must be disconnected; in order to use slot 5, the tape drive must be disconnected. Configuration of all seven StorageWorks slots to the integrated controller requires the use of a jumper cable.

Caution: Avoid bending the SCSI cable when folding it.

1. Insert the end of the SCSI cable (17-03959-01) in its system board connector.
2. Connect the SCSI cable CDROM drive connector to the rear of the CDROM drive.
3. Bring the remainder of the cable over the system board and connect it to the rear of the tape drive, if one is installed.
4. Connect the cable to the 50-pin connector (J1) on the top rear of the backplane.
5. Attach a jumper cable (17-03960-01) between the 50-pin connectors (J2 to J14) in the center of the backplane. This unites the upper four and the bottom three drives to the bus.
6. Connect one end of the SCSI cable (17-03962-01) to the 50-pin connector (J15) on the StorageWorks backplane and the other end to the bulkhead connector (the lowest of the three cutouts on the rear of the system near the power supply).
7. Terminate the bus connecting an external SCSI terminator (12-41667-01).
8. Ensure that the three sets of J3 jumper pins on the backplane are disabled.

Single-Controller SCSI Configuration with Jumper Cable

In the single-controller configuration shown in Figure 6-8, all seven StorageWorks slots are run from the system board SCSI controller. The system reserves SCSI ID numbers for the CDROM drive (ID 4) and the tape drive (ID 5). Table 6-5 shows the SCSI ID settings for this configuration.

Figure 6-8 Single-Controller SCSI Configuration with Jumper Cable

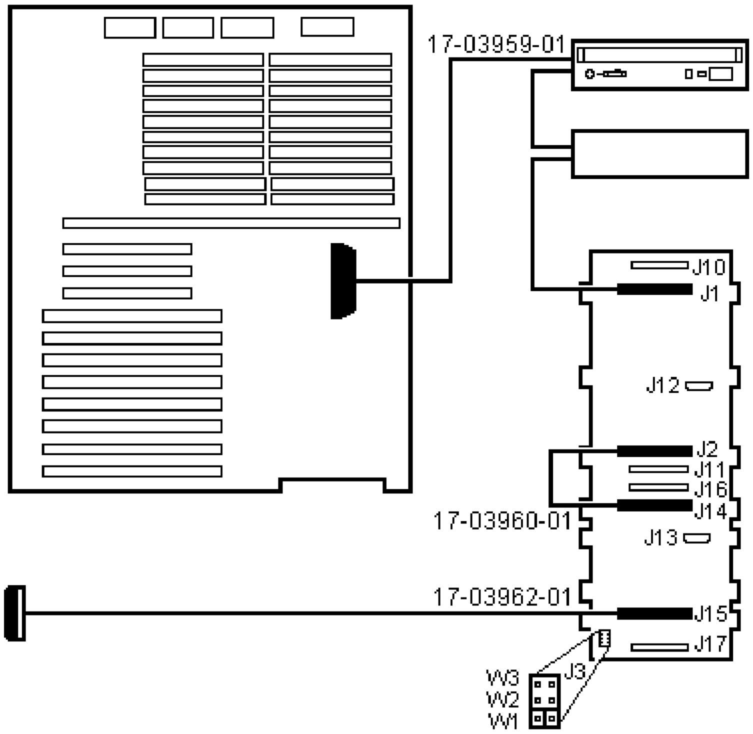


Table 6-5 SCSI IDs for Single-Controller Configuration {XE "SCSI IDs:single controller configuration"}with Jumper Cable

SCSI Device	Single-Bus ID
CDROM drive	4*
Tape drive	5*
Slot 0	0
Slot 1	1
Slot 2	2
Slot 3	3
Slot 4	4*
Slot 5	5*
Slot 6	6

Note: The system does not recognize two drives with the same ID number. Seven drives is the maximum number this configuration can recognize. If you use slots 4 and 5, you must disable the CDROM drive and the tape drive. If you use the CDROM drive and tape drive, you must remove drives from slots 4 and 5.

Configuring the Backplane with Two Controllers

The following procedure **{**XE "Backplane:configuring with two controllers"**}**describes how to connect all seven StorageWorks drives to a PCI or EISA SCSI controller adapter (bus B). Bus A includes the CDROM drive and the tape drive, if one is installed.

Caution: Avoid bending the SCSI cable when folding it.

1. Insert the plug end of the internal SCSI cable (17-03959-01) into its system board connector.
2. Connect the cable to the rear of the CDROM drive.
3. Bring the cable over the system board and connect it to the rear of the tape drive, if one is installed.
4. Connect the end of the internal SCSI cable (17-03959-01) to the plug end of the SCSI cable (17-03962-01) and run the other end to the bulkhead connector (the lowest of the three cutouts on the rear of the system near the power supply).
5. Terminate the A bus by connecting an external SCSI terminator (12-41667-01) to the external SCSI cable.
6. Connect the socket end of the SCSI cable (17-03960-02) to the option card, pass the remainder of the cable beneath the system board, and connect the cable to the 50-pin connector (J15) at the bottom of the StorageWorks backplane.
7. Attach a jumper cable (17-03960-01) between the 50-pin connectors (J2 to J14) in the center of the backplane. This enables the upper four and the bottom three drives to be united on the B bus.
8. Connect the SCSI cable (17-03962-02) to the 50-pin connector (J1) at the top of the backplane. Run the cable beneath the system board and out to one of the two larger cutout slots on the bulkhead.
9. Terminate the B bus by connecting an external SCSI terminator (12-41667-01) to the external SCSI cable.
10. Enable the W1 or lowest set of pins on the J3 jumper on the backplane, and disable the W2 and W3 sets of pins.

Dual-Controller SCSI Configuration

In the dual-controller **{**XE "SCSI configuration:dual controller"**}**configuration shown in Figure 6-9, all seven StorageWorks slots are run from a controller on a PCI or EISA adapter card. A jumper cable connects the J2 and J14 connectors on the backplane. Note that the lowest set of pins (W1) on the J3 jumper are enabled. The CDROM drive and tape drive reside on a dedicated bus. There are two external terminators: one for each SCSI controller used. Table 6-6 shows the SCSI ID settings for this configuration.

Figure 6-9 Dual-Controller SCSI Configuration

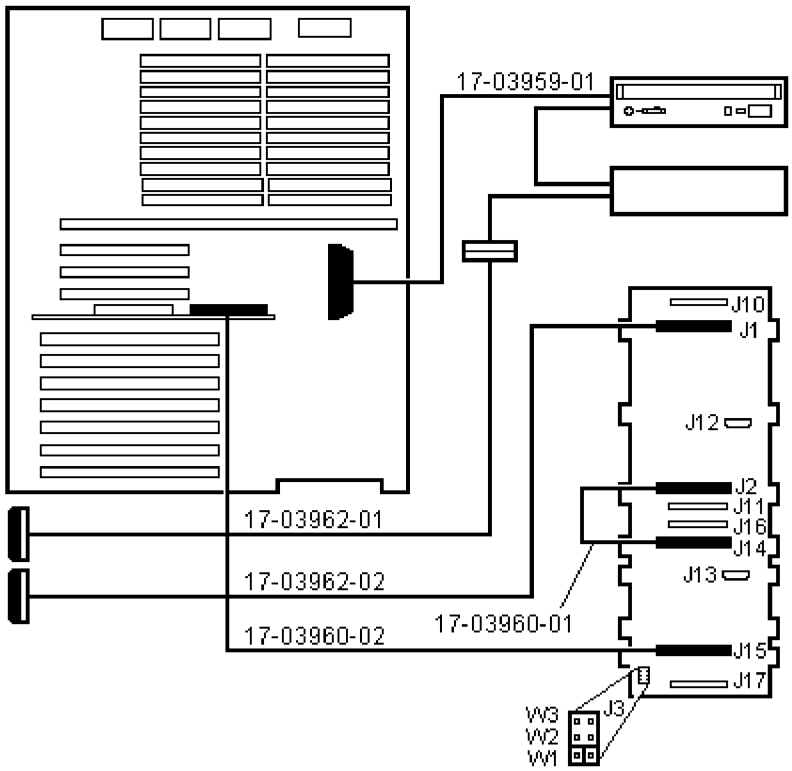


Table 6-6 SCSI IDs for Dual-Controller {XE "SCSI IDs:dual controller configuration"}Configuration

SCSI Device	Single-Bus ID
Bus A	
CDROM drive	4
Tape drive	5
Bus B	
Slot 0	0B
Slot 1	1B
Slot 2	2B
Slot 3	3B
Slot 4	4B
Slot 5	5B
Slot 6	6B

Configuring the Backplane with Three Controllers

The following procedure **{**XE "Backplane:configuring"**}**describes how to divide the seven StorageWorks devices between two PCI or EISA SCSI controller adapters (bus B and bus C). Bus A includes the CDROM drive and the tape drive, if one is installed.

Caution: Avoid bending the SCSI cable when folding it.

1. Insert the plug end of the internal SCSI cable (17-03959-01) in its system board connector.
2. Connect the cable to the rear of the CDROM drive.
3. Bring the cable over the system board and connect it to the rear of the tape drive, if one is installed.
4. Connect the plug end of the SCSI cable (17-03959-01) to the socket end of the SCSI cable (17-03962-01) and run the other end to the bulkhead connector (the lowest of the three cutouts on the rear of the system near the power supply).
5. Terminate the A bus by connecting an external SCSI terminator (12-41667-01) to the SCSI cable.
6. Connect the end of the first SCSI cable (17-03960-02) to the SCSI option card controller, pass the remainder of the cable beneath the system board, and connect the cable to the 50-pin connector (J2) on the backplane.
7. Connect the plug end of the second SCSI cable (17-03960-02) to the second connector on the SCSI option card controller, pass the remainder of the cable beneath the system board, and connect the cable to the 50-pin connector (J15) on the bottom of the backplane.
8. Connect a SCSI cable (17-03962-02) 50-pin connector (J1) at the top of the backplane. Run the cable beneath the system board and out to one of the two larger cutout slots on the bulkhead.
9. Terminate this SCSI cable by connecting an external SCSI terminator (12-41667-01).
10. Connect a second SCSI cable (17-03962-02) to the 50-pin connector (J14) on the backplane. Run the cable beneath the system board and out to the remaining cutout slot on the bulkhead.
11. Terminate this external SCSI cable by connecting an external SCSI terminator (12-41667-01).
12. Ensure that the three sets of pins on the J3 jumper on the backplane are all disabled.

Triple-Controller SCSI Configuration

In the triple-controller **{**XE "SCSI configuration:triple controller"**}**configuration shown in Figure 6-10, two SCSI controllers are used to configure the backplane. There are three external terminators, one for each SCSI controller used. Table 6-7 shows the SCSI ID settings for this configuration.

Figure 6-10 Triple-Controller SCSI Configuration

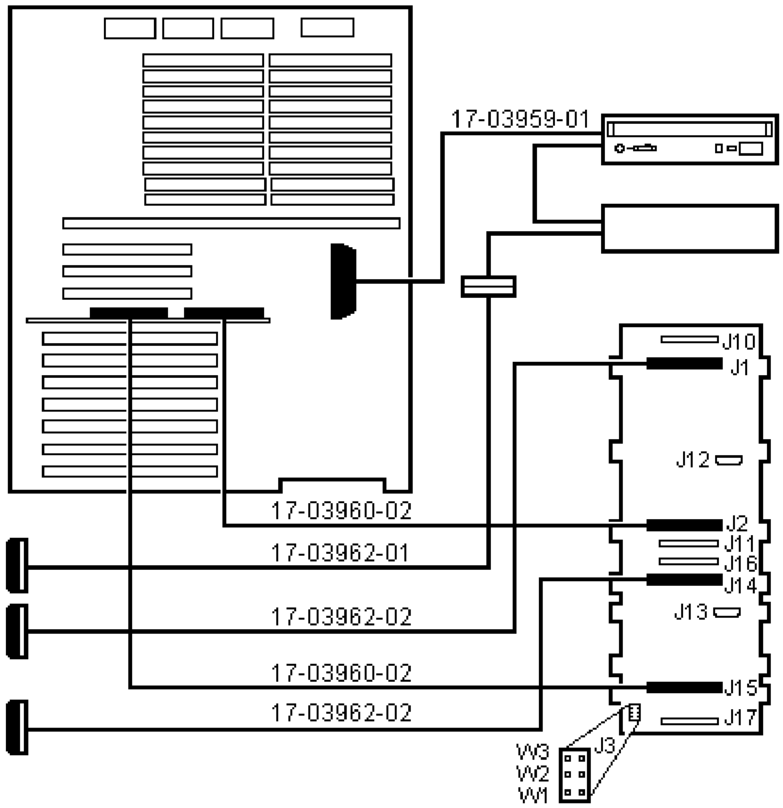


Table 6-7 SCSI IDs for Triple-Controller {XE "SCSI IDs:triple controller configuration"}Configuration

SCSI Device	Single-Bus ID
Bus A	
CDROM drive	4
Tape drive	5
Bus B	
Slot 0	0B
Slot 1	1B
Slot 2	2B
Slot 3	3B
Bus C	
Slot 4	0C
Slot 5	1C
Slot 6	2C

7 Upgrading

Introduction

This chapter includes the following topics:

- Planning Your Upgrade
- Upgrade Options

Planning Your Upgrade

The information in this **{**XE "System:upgrading"**}**section describes how to plan for upgrading your server. Once you have decided which options to add, refer to Chapter 5, "Installing and Removing Components" in this guide for information on how to install new options or replace existing ones.

Refer to the following list of tasks to help you plan an upgrade:

- Determine your current configuration
- Determine your new configuration
- Determine whether you can install the new option yourself
- Order the option
- Install the option
- Configure the option

1. **Determine your current configuration.**

   Refer to your operating **{**XE "Configuration:determining current"**}**system documentation to find out how to get configuration information by using an operating system command.

   You can also obtain configuration information about your system when the server is in console mode. Once the server is in console mode, you can find configuration information as follows:

   - If you are running the Windows NT operating system, get a list of your system's modules and devices by accessing the Windows NT (ARC) console and accessing the Supplementary menu. Choose the "List available boot devices" menu item to see the "Available boot devices" display. Note that this display does not list tape drives or network devices.
   - If you are running the DEC OSF/1 or OpenVMS operating systems, get a list of your system modules and devices by entering the `show config` command at the console prompt.

2. **Determine your new configuration.**

   You can obtain a current list of supported **{**XE "Options:ordering"**}**options from several sources, including:

   - The Digital FTP archive on the Internet
   - CompuServe
   - Digital Systems and Options Catalog

3. **Determine whether you can install the new option yourself, or whether you need to contact a qualified service person.**

   Caution: Internal StorageWorks shelves should be installed only by a qualified service person.

4. **Order the option(s).**
5. **Install the option.**

   To install an option, refer to the documentation that is shipped with the option, and to Chapter 5, "Installing and Removing Components."
6. **Configure the option.**

   To configure an option, refer to Chapter 6, "Configuring."

Access from the Internet

If you are an **{**XE "Internet:accessing options list on the"**}**Internet participant, you can obtain the latest version of the supported options list as follows:

Access the list from the Digital FTP archive:

```
ftp.digital.com:  /pub/Digital/info/misc/1000-options.txt
```

Access the list from the Digital World-Wide Web Server:

```
http://www.digital.com/info/misc/1000-options.abs.html
```

Access from CompuServe

If you subscribe to **{**XE "CompuServe:accessing options list on"**}**CompuServe, you can access the list of supported options for your server from the DEC4WNT forum, Library 4, Hardware Support. The file name is OPTS21.TXT.

Digital Systems and Options Catalog

You can obtain information about hardware configurations for your server from the *Digital Systems and Options Catalog***{***XE "Digital Systems and Options Catalog"***}**. The catalog is regularly published to assist customers in ordering and configuring systems and hardware options. Each printing of the catalog presents all of the products that are announced, actively marketed, and available for ordering. You can also obtain information from the following sources:

Call 1-800-DIGITAL to talk to a consultant about your server's configuration.

Retrieve printable PostScript files of any section of the *Digital Systems and Options Catalog* from the Digital FTP archive on the Internet:

```
gatekeeper.dec.com cd /pub/digital/info/soc
```

Upgrade Options

This section lists the **{**XE "Options:upgrade"**}**types of upgrade options that you may want to choose for your server. Before you attempt to connect third-party devices or install third-party devices inside your **{**XE "Upgrading:options"**}**system unit, you should first check with the third-party vendor to ensure that your system hardware and operating system software support the device.

- Storage devices
- SCSI bus backplane cabling
- Secondary power supply (for redundant operation)
- Memory modules
- CPU card
- EISA, ISA, and PCI options
  - -- Network interface cards
  - -- Graphics cards
  - -- SCSI controller cards
  - -- Video cards
- Operating systems
- RAID controller
- Firmware

Firmware

You may want to update your system **{**XE "Firmware:updating"**}**firmware as later versions become available. The Windows NT (SRM) firmware and the DEC OSF/1 and OpenVMS (SRM) firmware reside in the four FlashROM chips located on the system board. This section describes how to update to a later version of firmware. You may also need to recopy firmware onto the system if the FlashROM should ever become corrupted. To do this, you would use a different procedure. (See "Using the Fail-Safe Loader" in Chapter 8, "Troubleshooting").

You can load firmware into the FlashROM from any of the following sources:

- CDROM
- Network
- Diskette

Updating Firmware Using the CDROM Drive

To update the firmware using a CDROM:

1. Insert the CDROM with the new firmware version in the CDROM drive.
2. Enter the following command at the SRM console prompt:

```
>>> boot dka400
```

3. Load and execute the update utility:

```
APU-> update
```

4. Turn the system off and on.
5. Confirm the update:

```
>>> show version
```

Updating Firmware Using the Network

To update the firmware using the network, refer to the Read Me instructions on the Web Server.

Updating Firmware Using the Diskette Drive

To update the firmware using the diskette drive:

1. Insert the diskette with the new firmware version in the diskette drive.
2. Enter the following command at the SRM console prompt:

```
>>> boot dva0
```

3. Load and execute the update utility:

```
APU-> update
```

4. Turn the system off and on.
5. Confirm the update:

```
>>> show version
```

8 Troubleshooting

Introduction

This chapter describes procedures for resolving problems with the system. The first section provides an overview and a general guide to determining the type of problem that exists. The next two sections describe diagnostic procedures that you can use to identify the source of a particular problem. To correct a problem, locate the troubleshooting table for that problem type and follow the guidelines provided. If you cannot correct the problem, report it to your service representative.

This chapter covers the following topics:

- Troubleshooting Overview
- System Diagnostics
- Power Problems
- Console Problems
- Boot Problems
- Problems Detected by the Operating System
- Storage Problems
- Option Card Problems
- Monitor and Terminal Problems
- Keyboard and Mouse Problems
- Printer Problems
- Overheating Problems
- RAID Device Problems
- Using the Fail-Safe Loader

Troubleshooting Overview

{XE "Troubleshooting:overview"**}**Before you begin troubleshooting your system, consult the service agreement for your system. Your agreement will help you determine how much troubleshooting and repair you should undertake yourself.

- If you plan to maintain the system yourself, use the information in this guide to help identify and resolve the problem.
- If you have a service agreement with a service provider, contact your representative for assistance.

Table 8-1 lists possible problems and the relevant sections in this chapter.

Table 8-1 Determining Where to Look

Task or Problem	Relevant Section
To confirm that EISA cards or memory modules are properly configured.	Option Card Problems
To run a diagnostic test of the whole system, show its status, or terminate the testing.	System Diagnostics
No startup display appears when you turn on the system. The power supply has shut down.	Power Problems
Startup tests do not complete.	Console Problems
The system cannot boot the operating system.	Boot Problems or System Diagnostics
The operating system reports errors, is hung, or crashes.	Problems Detected by the Operating System
The system cannot access a mass storage device. Storage devices are missing from the `show device` display.	Storage Problems
The system indicates network problems, an EISA card is not configured, or a PCI card is unseen by the system.	Option Card Problems
The monitor or the terminal are not working.	Monitor and Terminal Problems
The keyboard and mouse are not working.	Keyboard and Mouse Problems
The system repeatedly shuts down after 10 seconds.	Overheating Problems
System does not see or cannot access RAID drives.	RAID Device Problems
The FlashROM is corrupted, and the system cannot access console mode.	Using the Fail-Safe Loader

System Diagnostics

This section describes three sources of error information that can help you diagnose and troubleshoot system problems. Beep codes are audible error codes emitted by the system for specific problems. The console event log is a record of startup status messages, which may contain helpful diagnostic information. Console command displays, such as the `test` command display, are another source of diagnostic information.

Interpreting Error Beep Codes

Table 8-2 describes **{**XE "Error beep codes"**}**error **{**XE "Beep codes:interpreting"**}**beep codes that you may encounter while using your system. For example, if the SROM (serial read only memory) 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).

Table 8-2 Error Beep Codes

Beep Code	Meaning	Action
1-1-4	The SROM code could not read the flashROM headers, or there was a checksum failure.	Refer to the section, "Using the Fail-Safe Loader."
3-3-1	Generic system failure.	Call your service representative.
1-2-1	TOY NVRAM failure.	Call your service representative.
1-3-3	The SROM code could not find at least 2 MB of good memory, or there was no memory available.	Verify that the memory modules are properly seated. Replace faulty memory modules.

Reading the Console Event Log

The system maintains a **{**XE "Console event log"**}**console event log consisting of status messages received during startup testing. If problems occur during startup, standard error messages may be embedded in the console event log. To display the console event log, use the `cat el` command.

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

The test Command

The `test` command runs **{**XE "test command"**}**firmware diagnostics for the entire core system. The tests are run sequentially, and the status of each subsystem test is displayed to the console terminal as the tests progress. If a particular **{**XE "Diagnostic tests"**}**device is not available to test, a message is displayed.

The test script is made up of several exercisers that can test subsystems. The `test` command runs these exercisers sequentially and the status of each subsystem test is displayed to the console terminal as the tests progress. If a device is not available to test, a message is displayed.

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

- Serial loopback connected to the COM2 port
- Parallel loopback connected to the parallel port
- Connection to a network or a terminator connected to the Ethernet port
- A diskette with files installed
- A CDROM with files installed

The **{**XE "test command:script"**}**test script tests devices in the following order:

1. Memory tests
2. Read-only tests: DK and DR disks, MK tapes, DV diskettes
3. Console loopback tests if `lb` argument is**{**XE "Console tests"**}** specified: COM2 serial port and parallel port
4. VGA **{**XE "VGA console tests"**}**console tests: these tests are run only if the console environment variable is set to "serial." The VGA console test displays rows of the letter "H."
5. Network **{**XE "Network:external loopback tests"**}**external loopback tests for EW: this test is run if a Digital Ethernet controller (EW) is present. The test **{**XE "Network tests"**}**requires that the Ethernet port be terminated or connected to a live network or the test will fail.

> **Note:** By default, no write tests are performed on disk and tape drives. Media must be installed to test the diskette drive and tape drives.

Example 8-1 shows a sample of the `test` command display.

Example 8-1 The test Command

```
>>> test
Requires diskette and loopback connectors on COM2 and
parallel port
type kill_diags to halt testing
type show_status to display testing progress
type cat el to redisplay recent errors
Testing COM2 port
Setting up network test, this will take about 20 seconds
Testing the network
     80 Meg of System Memory
     Bank 0 = 32 Mbytes(8 MB Per Simm) Starting at 0x00000000
     Bank 1 = 32 Mbytes(8 MB Per Simm) Starting at 0x02000000
     Bank 2 = 16 Mbytes(4 MB Per Simm) Starting at 0x04000000
     Bank 3 = No Memory Detected

Testing the memory
Testing parallel port
Testing the SCSI Disks
Non-destructive Test of the Floppy started
serial port not used as main console - VGA test bypassed
Printer offline
file open failed for para
```

The kill and kill_diags Commands

The `kill` and `kill_diags` **{**XE "Tests:halting"**}**commands terminate **{**XE "Diagnostic tests:halting"**}**diagnostics that are currently executing.

The `kill` command terminates a **{**XE "kill command"**}**specified process.

The `kill_diags` command **{**XE "kill_diags command"**}**terminates all diagnostics.

The show_status Command

The `show_status` command reports **{**XE "show_status command"**}**one line of information per executing diagnostic. Many of the diagnostic tests are run in the background and provide information only if an error occurs. Use the `show_status` command to display the progress of the diagnostics.

Power Problems

Table 8-3 describes how to troubleshoot the system when **{**XE "Fan problems:troubleshooting"**}**there is no power **{**XE "Power supply problems:troubleshooting"**}**at the system enclosure.

Table 8-3 Troubleshooting Power Problems

Symptom	Action
No AC power	Check the power source and power cord. Check that the system cover is properly secured. A safety interlock switch shuts off power to the system if the cover is removed. If there are two power supplies, make sure that both power supplies are plugged in.
AC power is present, but system does not power on.	Check the On/Off switch on the operator control panel. Check that the ambient room temperature is within environmental specifications (10–40ºC, 50–140ºF). Check that cable connectors on the system board are properly connected. Check that the internal power supply cables are plugged in at the right place on both the power supply and system backplane. Check the power supply fuse and replace, if necessary.
Power supply shuts down after approximately 10 seconds (fan failure).	Using a flashlight, look through the front (to the left of the internal StorageWorks shelf) to determine if the fans are spinning at startup. Replace the fan that does not spin. If neither fan spins, check the power supply.

Console Problems

Table 8-4 describes how to **{**XE "Monitor" \t "See also SVGA, VGA monitor"**}**troubleshoot the **{**XE "Console problems:troubleshooting"**}**system when, at startup, the console terminal does **{**XE "Graphics options:environment variable"**}**not display the startup screen, or the **{**XE "Startup screen display problems:troubleshooting"**}**startup screen displays **{**XE "Error messages:startup"**}**error messages.

Table 8-4 Troubleshooting Console Problems

Symptom	Action
Startup screen is not displayed.	Check that keyboard and monitor are properly connected and power is on. If the startup 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. If you are using a VGA console terminal, the variable should be set to "graphics." If you are using a serial terminal, the variable should be set to "serial." If `console` is set to "serial," the startup screen is routed to the COM1 serial communication port and cannot be viewed from the VGA monitor. Try connecting a console terminal to the COM1 serial communication port. If necessary use a 9-pin connector. Check baud rate setting for console terminal and system. The system baud rate setting is 9600. When using the COM1 serial port, set the `console` environment variable to "serial." If you have verified that there are no monitor or terminal problems, the problem may be with the firmware. Refer to the section, "Using the Fail-Safe Loader."
Startup screen displays error messages.	If startup screens or the console event log indicate problems with mass storage devices, or if storage devices are missing from the `show config` display, use the troubleshooting tables in the section, "Storage Problems" to determine the problem. If startup screens or the console event log indicate problems with EISA or PCI devices, or if EISA or PCI devices are missing from the `show config` display, use the troubleshooting table in the section, "Option Card Problems" to determine the problem.

Boot Problems

Table 8-5 describes how to **{**XE "Boot problems:troubleshooting"**}**troubleshoot problems that occur while the system is booting operating system software.

Table 8-5 Troubleshooting Boot Problems

Symptom	Action
The system cannot find the boot device.	Verify that your system recognizes the boot device, using the `show device` command. Check that the boot device environment variable correctly identifies the boot device: DEC OSF/1 and OpenVMS: use the `show bootdef_dev` command to display the boot device. Windows NT: Select the ARC console menu option "Display Hardware configuration." Use the Setup menu to change the environment variable.
System does not boot.	Check that the Halt switch is set to the "off" position. Verify that you have not installed an unsupported graphics module or another type of unsupported adapter. Run the `test` command. See the table in the section, "Console Problems."
There is a software problem or the operating system is not installed correctly.	Refer to your operating system software information. Verify that you have the correct firmware revision for your system. See Chapter 3, "Preparing to Install an Operating System."

Problems Detected by the Operating System

Table 8-6 describes possible **{**XE "Operating system problems:troubleshooting"**}**operating system problems and their solutions.

Table 8-6 Troubleshooting Problems Detected by the Operating System

Symptom	**Action**
System is hung or has crashed.	Examine the crash dump file. Refer to the *OpenVMS AXP Alpha System Dump Analyzer Utility Manual* for information on how to interpret OpenVMS crash dump files. Refer to the *Guide to Kernel Debugging* (AA-PS2TA-TE) for information on using the DEC OSF/1 Crash Utility.
No startup display.	The console environment is set to "serial;" thus, the startup screen is routed to the COM1 serial communication port and cannot be viewed from the VGA monitor. If you are using a VGA monitor, set the console environment variable to "graphics." (Use the `set console graphics` command).
Operating system is up.	Have your service provider examine the operating system error log files to isolate the problem. If the problem occurs intermittently, have your service provider run an operating system exerciser, such as DEC VET, to stress the system. Refer to the *DEC Verifier and Exerciser Tool User's Guide* (AA-PTTMA-TE) for instructions on running DEC VET.

Storage Problems

Mass storage device**{**XE "Storage drive problems:troubleshooting"**}** problems at startup are usually indicated by read fail messages. Problems are also indicated by storage **{**XE "Drive problems:troubleshooting"**}**devices missing from the `show config` display. Use the following tables to diagnose the likely **{**XE "SCSI IDs:duplicate"**}**cause of the problem.

- Table 8-7 provides information for troubleshooting fixed-media mass storage problems indicated at startup.
- Table 8-8 provides information for troubleshooting removable-media storage problems indicated at startup.

Table 8-7 Troubleshooting Fixed-Media Problems

Symptom	Problem	Action
Fault indicator light for drive is on (amber).	Drive has failed.	Replace drive.
Drives with duplicate SCSI IDs are missing from the `show config` display.	Duplicate SCSI IDs (when removable-media bus is extended to StorageWorks shelf).	Correct removable-media SCSI device IDs.
Valid drives are missing from the `show config` display. One drive may appear seven times on the configuration screen display.	SCSI ID is set to 7 (reserved for host ID).	Correct SCSI IDs.
The SCSI ID of the drive is not unique or the SCSI drive cables are connected incorrectly.	You cannot access the software or data on the drive.	See Chapter 6, "Configuring" for information on displaying SCSI device configuration. If the device is not listed in the display, check the SCSI cabling and the drive's SCSI ID.
The SCSI drive is faulty.	You cannot access the software or data on the drive.	Contact your service representative.

Table 8-8 lists suggestions for troubleshooting fixed-media mass storage problems at startup or when storage devices are missing from the `show config` display.

Table 8-8 Troubleshooting Removable Media Problems

Problem	Symptom	Action
Drive failure.	Drive fault indicator is on.	Replace the drive.
Duplicate SCSI IDs.	Drives with duplicate SCSI IDs are missing from the `show config` display.	Correct removable-media SCSI IDs.
SCSI ID is set to 7 (reserved for host ID).	Valid drives are missing from the `show config` display. One drive may appear seven times on the configuration display.	Correct SCSI IDs.
Duplicate host IDs on a shared bus.	Valid drives are missing from the `show config` display. One drive may appear seven times on the configuration display.	Change host ID using the `set pk*0_host_id` command.
Faulty cable termination. Missing or loose cables.	Activity indicators do not come on. Drive missing from the `show config` display.	Check cable termination. Remove device and inspect cable connections.
Cable length.	Activity indicators do not come on.	Check cable length: maximum cable length is 3 m for external expansion boxes.
Missing terminator.	Read/write errors in the console event log; storage adapter port may failure.	Attach terminators as needed: internal SCSI terminator or external SCSI terminator.
Extra terminator.	Devices produce errors or device IDs are dropped.	Check that SCSI bus is terminated only at beginning and end. Remove unnecessary terminators.

Option Card Problems

Option card problems can include problems **{**XE "Option card problems:troubleshooting"**}**related to network options, EISA/ISA bus options, and PCI options.

Network Problems

Network problems can **{**XE "Network problems:troubleshooting"**}**vary depending on the type of network option card that you have installed. See the option card documentation for information on troubleshooting network problems. Make sure you have correctly set the network type for the network interface card. See Chapter 6, "Configuring" for more information.

EISA/ISA Bus Problems

EISA bus **{**XE "EISA bus problems:troubleshooting"**}**problems at startup are usually indicated by the following display during startup. Run the **{**XE "EISA Configuration Utility (ECU):error messages"**}**EISA Configuration Utility (ECU) if this message is **{**XE "Error messages:EISA Configuration Utility (ECU)"**}**displayed. Table 8-9 describes the steps for troubleshooting EISA problems.

```
EISA Configuration Error. Run the EISA Configuration
Utility.
```

Table 8-9 Troubleshooting EISA/ISA Bus Problems

Step	Action
1	Check that the EISA card and any cabling are properly seated.
2	Run the ECU as described in Chapter 6, "Configuring" to: • Confirm that the system has been configured with the most recently installed controller. • See what the hardware jumper and switch settings 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 hardware jumpers and switches on ISA controllers reflect the settings indicated by the ECU. Start with the last ISA module installed.
4	Check for a bad slot by moving the last installed controller to a different slot.
5	Call the option manufacturer or your service representative for help.

PCI Bus Problems

PCI bus problems **{**XE "PCI bus problems:troubleshooting"**}**at startup are usually indicated by the inability of the system to detect the PCI device. Use Table 8-10 to diagnose the likely cause of the problem.

Table 8-10 Troubleshooting PCI Bus Problems

Step	Action

1	Confirm that the PCI module and any cabling are properly seated.
2	Check for a bad slot by moving the last installed controller to a different slot.
3	Call the option manufacturer or your service representative for help.

Monitor and Terminal Problems

If the system starts up but has no **{**XE "Monitor problems:troubleshooting"**}**startup display when you turn on **{**XE "Terminal problems:troubleshooting"**}**the system, refer to Table 8-11.

Table 8-11 Troubleshooting Monitor and Terminal Problems

Possible Cause	Action
The monitor or terminal are not turned on.	Check that the monitor or terminal is turned on. Make sure that all cables are connected at both ends.
The monitor or terminal brightness and contrast controls are incorrectly set.	Adjust the monitor or terminal contrast and brightness controls.
Incorrect graphics configuration.	See Chapter 6, "Configuring."
The terminal cable is not corrected to the correct serial port.	Check that the serial port to which the terminal cable is connected. Make sure that it is connected to the left-hand serial port.
If you are using a console terminal, check the baud rate setting for the terminal and system. The system default baud rate setting is 9600.	Connect the console terminal to the COM1 serial communication port and set the console environment variable to serial (`set console serial` command).
The power cord is not connected. The power cord may be faulty. The power cord socket may not be working.	Make sure that all the power cords are connected correctly at both ends. Try a power cord that works or test the power socket with an appliance that works.
The terminal or monitor fuse may have blown.	Replace the blown terminal or monitor fuse. Refer to the terminal or monitor documentation.

The port to which the terminal or monitor connects may not be the correct one. The port to which the terminal or monitor connects may be faulty.	Ensure that your monitor cable is plugged into the correct graphics port if you have an optional graphics card installed. You should plug the cable into the connector of your option card, not the connector on the system board. Try connecting the terminal or monitor to another system using the same terminal or monitor cable. If the terminal or monitor works, the port to which the terminal or monitor was connected is faulty. Contact your service representative.

Keyboard and Mouse Problems

Table 8-12 lists problems that may occur with the **{**XE "Keyboard problems:troubleshooting"**}**keyboard or **{**XE "Mouse problems:troubleshooting"**}**mouse.

Table 8-12 Troubleshooting Keyboard and Mouse Problems

Symptom	Possible Cause	Action
The monitor does not display the character that you type.	The keyboard cable is incorrectly connected.	Make sure that the keyboard cable is connected correctly in the keyboard connector.
	The keyboard has failed.	Replace the keyboard. If the problem persists, contact your Digital service representative.
The monitor displays a message indicating a keyboard error.	The keyboard is not connected correctly.	Make sure that the keyboard is connected to the keyboard port.
The mouse pointer is displayed on the monitor, but does not move correctly.	The mouse is connected incorrectly.	Make sure that the mouse cable is connected correctly in the mouse connector.
	The mouse ball is dirty.	Remove the ball from the mouse and clean it in a lukewarm, mild-soap solution. Dry the ball and replace it in the mouse.
The mouse pointer does not show on the monitor.	The mouse is connected incorrectly or the mouse cable is loose.	Make sure that the mouse cable is connected correctly in the mouse connector.
	The system is in console mode.	The mouse pointer is displayed only when the operating system is running. Boot the operating system.
	The mouse is faulty.	Replace the mouse.

Printer Problems

Verify that the printer is correctly **{**XE "Printer problems:troubleshooting"**}**cabled to the system (see Figure 1-3 to verify the connection) and refer to the printer's documentation if necessary.

Overheating Problems

The system contains internal sensors**{**XE "Overheating problems:troubleshooting"**}** that monitor system and power supply temperature and shut down the system if maximum temperature limits are **{**XE "Temperature sensor"**}**exceeded. If the system shuts down unexpectedly:

- Verify that the ambient temperature does not exceed the limits specified in Table 2-1, "Optimal Environmental Conditions."
- Refer to Table 8-3, "Power Problems" to troubleshoot power supply problems and fan failure.

RAID Device Problems

This section provides troubleshooting hints **{**XE "RAID device problems:troubleshooting"**}**for systems that have the StorageWorks RAID Array 200 Subsystem installed. Table 8-13 **{**XE "RAID Configuration Utility (RCU)"**}**describes symptoms of RAID device problems and recommends actions to resolve those problems.

Table 8-13 Troubleshooting RAID Device Problems

Symptom	Action
Some RAID devices do not appear on the `show device` display.	Valid configured RAID logical drives will appear as DRA0-DRA*n*, not as DK*n*. Configure the drives by running the RAID Configuration Utility (RCU), following the instructions in the *StorageWorks RAID Array 200 Subsystem Family Installation and Configuration Guide*, EK-SWRA2-IG. Note: several physical disks can be grouped as a single logical DRA*n* device.
Drives on the RAID subsystem start up with the amber fault indicator light on.	Whenever you move drives onto or off of the RAID controller, run the RAID Configuration Utility to set up the drives and logical units. Follow the instructions in the *StorageWorks RAID Array 200 Subsystem Family Installation and Configuration Guide.*
Image copy of DRA logical drive does not boot (OpenVMS systems).	If you copy the contents of a system disk to your RAID subsystem using the `BACKUP/IMAGE` command, for example, you need to repeat several steps in the data device installation procedure, as described in the *StorageWorks RAID Array 200 Subsystem Family Software User's Guide for OpenVMS AXP*, AA-Q6WVA-TE, in order to make the second device a bootable device.
Cannot access disks connected to the RAID subsystem on Microsoft Windows NT systems.	On Microsoft Windows NT systems, disks connected to the RAID controller must be spun up before they can be accessed. While running the ECU, verify that the controller is set to spin up two disks every six 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.

Using the Fail-Safe Loader

The **{**XE "Fail-safe loader:using"**}**fail-safe loader (FSL) allows you to boot an **{**XE "Utility update diskette:using"**}**Update Utility diskette in an attempt to repair corrupted console files that reside within the FlashROMs on the system board. Use the FSL only when a failure at startup prevents you from accessing the console mode.

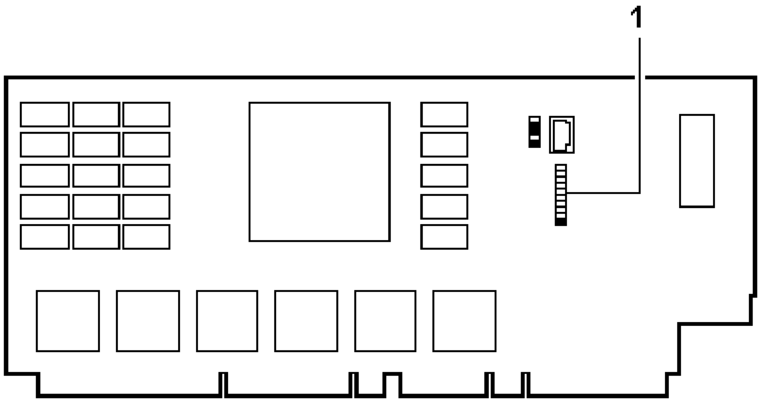
Using the Update Utility

If a **{**XE "Checksum error"**}**checksum error is detected when loading the console at startup, the system automatically loads the Update Utility from diskette into memory.

To activate the fail-safe loader:

1. Turn off the system
2. Install the update utility diskette in the diskette drive.
3. Remove the top cover and side panels (See "Removing Top and Side Panels" in Chapter 5, "Installing and Removing Components").
4. Enable the fail-safe loader by moving the jumper on the CPU card to the position nearest the system board (see Figure 8-1).
5. Replace the top cover and side panels.
6. Turn on the system and confirm the update:
   ```
   >>> show version
   ```
7. Turn off the system.
8. Remove the top and side panels.
9. Disable the fail-safe loader and set the SROM jumpers to their normal operating position.
10. Replace the top cover and side panels.

Figure 8-1 Fail-Safe Jumper on the CPU Card{XE "Fail-safe jumper:location of"}



1 J6 pin (fail-safe jumper)

9 Quick Reference

Introduction

This chapter contains the following reference information:

- Messages
- Hardware Overview
- Indicator lights
- System Board Jumper Settings
- SCSI ID Settings
- Specifications
- Block Diagram

Messages

The system maintains a console event log consisting of status messages received during startup testing. If problems occur during startup, standard error messages may be embedded in the console event log. To display the messages in the console event log, use the `cat el` command.

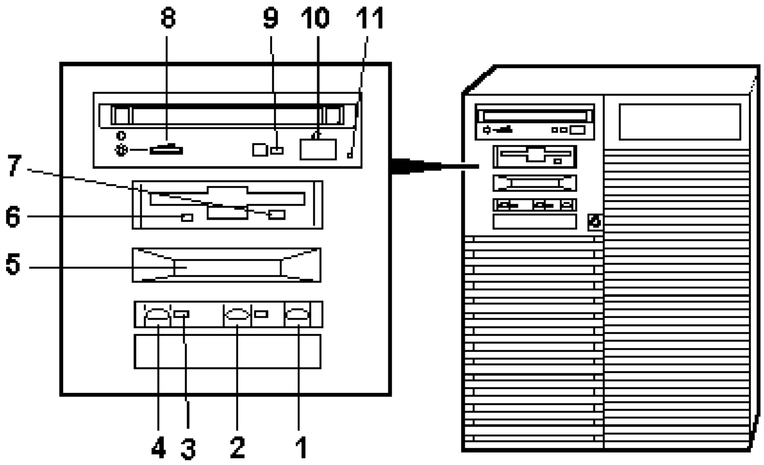
Hardware Overview

This section includes front, rear, and side views of the system unit.

System Front View

Figure 9-1 shows system components **{**XE "System:front panel view (figure)"**}**on the front panel.

Figure 9-1 System Front View

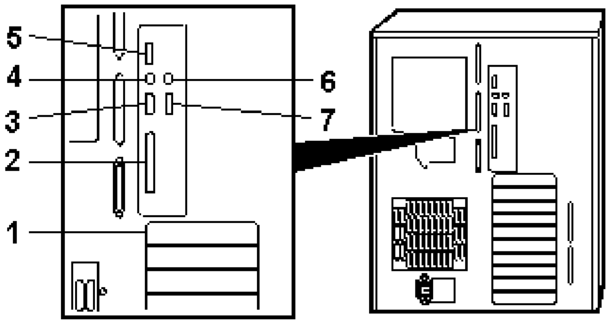


1 Halt switch
2 Reset switch
3 On/Off indicator
4 On/Off switch
5 Operator control panel
6 Diskette drive activity indicator
7 Diskette drive eject button
8 CDROM volume control
9 CDROM activity indicator
10 CDROM eject button
11 CDROM emergency eject hole

System Rear View

Figure 9-2 shows system {XE "System:rear panel view (figure)"}ports and slots on the rear panel.

Figure 9-2 System Rear View



1 PCI/EISA slots

2 Parallel port

3 Serial port/terminal port (COM2)

4 Mouse port

5 VGA port

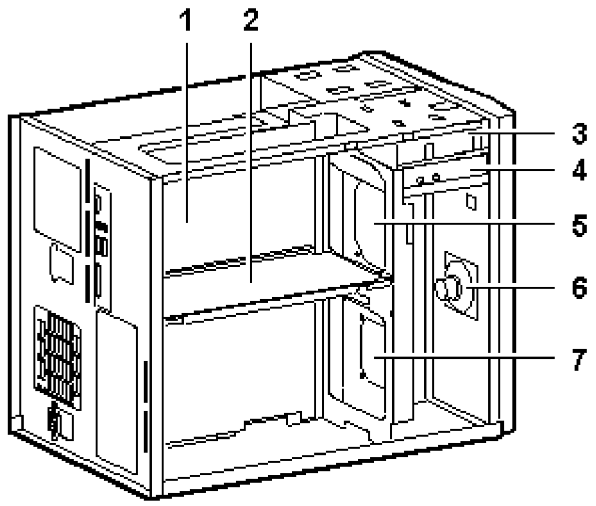
6 Keyboard port

7 Serial port/terminal port (COM1)

System Side View

Figure 9-3 shows system {XE "System:side view (figure)"}components on the system board side with the side panel removed.

Figure 9-3 System Side View: System Board Side



1   System board

2   CPU card

3   CDROM drive

4   Diskette drive

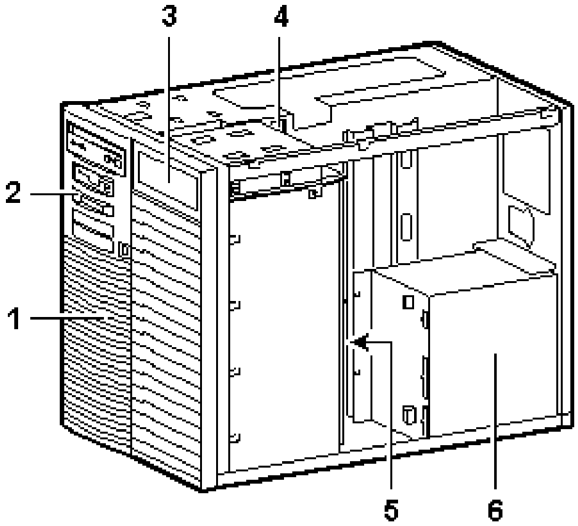
5   Upper fan

6   Speaker

7   Lower fan

Figure 9-4 shows system components on {XE "System:side view (figure)"}the power supply side with the side panel removed.

Figure 9-4 System Side View: Power Supply Side



1 Front bezel

2 Operator control panel display

3 Tape drive housing

4 Sensor switch

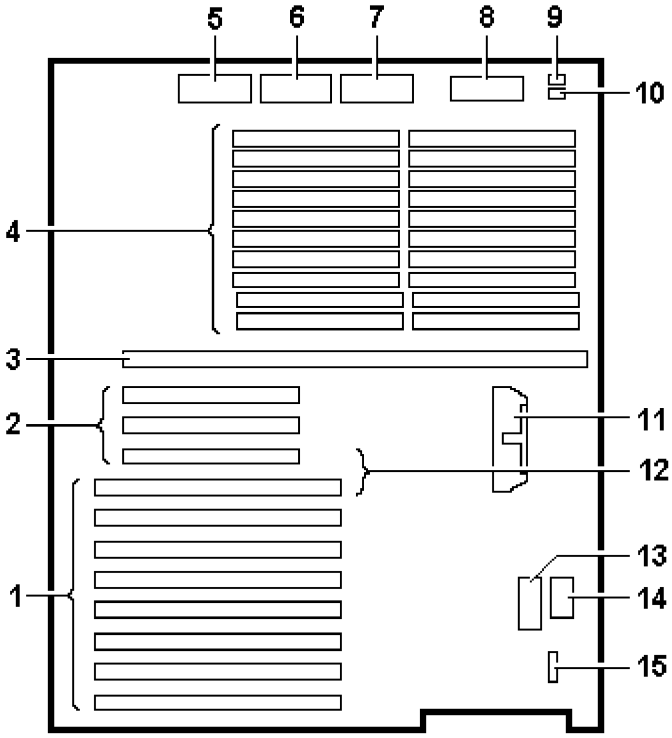
5 Backplane

6 Primary power supply

System Board Connectors, Chips, and Slots

Figure 9-5 shows the location of the {XE "System board (figure)"}system board connectors, chips, and expansion slots.

Figure 9-5 System Board Connectors, Chips, and Slots



1 EISA/ISA expansion slots (1-8, top to bottom)

2 PCI expansion slots (11-13, top to bottom)

3 CPU module connector

4 Memory module connectors (20)

5 Power connector

6 Power connector

7 Power connector

8 Diskette drive connector

9 Upper fan connector

10 Lower fan connector

11 Internal SCSI connector

12 PCI/EISA expansion slots

13 TOY/NVRAM chip (E78 on board)

14 NVRAM chip (E14 on board)

15 Speaker connector

Port Pinouts

This section describes pin **{**XE "Port pinouts:rear panel"**}**functions for port connectors on the rear of the system.

VGA Port Connector

The VGA **{**XE "VGA port:pin assignments"**}**port provides an **{**XE "Pin assignments:VGA port"**}**interface to a VGA terminal. Table 9-1 lists pin assignments for the VGA port.

Table 9-1 VGA Port Pinouts

Pin	Signal	Function
1	Red	Red color driver
2	Green	Green color driver
3	Blue	Blue color driver
4	NC	Not connected
5	GNDB	Video ground
6	GNDB	Video ground
7	GNDB	Video ground
8	GNDB	Video ground
9	NC	Not connected
10	GNDB	Video ground
11	NC	Not connected
12	NC	Not connected
13	HSYNC	Horizontal synch
14	VSYNC	Vertical synch
15	NC	Not connected

Parallel Port Connector

The parallel port provides an interface to a printer or **{**XE "Parallel port:pin assignments"**}**other parallel devices. Table 9-2 lists pin **{**XE "Pin assignments:parallel port"**}**assignments for the parallel port. An asterisk (*) after a signal name indicates an active low signal.

Table 9-2 Parallel Port Pinouts

Pin	Signal	Function
1	STB-R*	Strobe
2	PRTD0	Printer data bit 0
3	PRTD1	Printer data bit 1
4	PRTD2	Printer data bit 2
5	PRTD3	Printer data bit 3
6	PRTD4	Printer data bit 4
7	PRTD5	Printer data bit 5
8	PRTD6	Printer data bit 6
9	PRTD7	Printer data bit 7
10	ACK*	Acknowledge
11	BUSY	Busy
12	PE	Paper end
13	SLCT	Select
14	AUTOFDXT*	Autofeed
15	ERR*	Error
16	INIT*	Initialize printer
17	SLCTIN*	Select input
18 to 25	CHAS	Chassis ground

Serial Port Connectors

The serial port **{**XE "Serial port:pin assignments"**}**connectors consist of two 9-pin D-subminі connectors. Table 9-3 lists their **{**XE "Pin assignments:serial port"**}**pin assignments.

Table 9-3 Serial Port Pinouts

Pin	Signal	Function
1	DCD	Data carrier detect
2	RXD	Receive data
3	TXD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

Keyboard and Mouse Port Connectors

The keyboard **{**XE "Keyboard:connector"**}**and **{**XE "Mouse:connector"**}**mouse **{**XE "Keyboard port:pin assignments"**}**connectors **{**XE "Mouse port:pin assignments"**}**consist of two 6-pin mini-DIN connectors. Table 9-4 lists their **{**XE "Pin assignments:keyboard port"**}**pin assignments**{**XE "Pin assignments:mouse port"**}**.

Table 9-4 Keyboard and Mouse Port Pinouts

Pin	Signal
1	Data
2	Reserved
3	Ground
4	+5 V dc (fused)
5	Clock
6	Reserved

SCSI Port Connector

The external **{**XE "SCSI port:pin assignments"**}**SCSI connector is a 50-pin high-density connector. Table 9-5 lists the **{**XE "Pin assignments:SCSI port"**}**pin assignments.

Table 9-5 SCSI Port Pinouts

Pin	Signal	Pin	Signal
1	GND	26	-DB (0)
2	GND	27	-DB (1)
3	GND	28	-DB (2)
4	GND	29	-DB (3)
5	GND	30	-DB (4)
6	GND	31	-DB (5)
7	GND	32	-DB (6)
8	GND	33	-DB (7)
9	GND	34	-DB (P)
10	GND	35	GND
11	GND	36	GND
12	RESERVED	37	RESERVED
13	OPEN	38	TERMPWR
14	RESERVED	39	RESERVED
15	GND	40	GND
16	GND	41	-ATN
17	GND	42	GND
18	GND	43	-BSY
19	GND	44	-ACK
20	GND	45	-RST
21	GND	46	-MSG
22	GND	47	-SEL
23	GND	48	-CD
24	GND	49	-REQ
25	GND	50	-I/O

Indicator Lights

Table 9-6 describes system **{**XE "Indicators:functions"**}**indicator lights and their function.

Table 9-6 Indicator Lights

Indicator Light	Function
On/Off indicator (green)	Lights when the system unit is turned on.
Diskette drive activity indicator (green)	Lights when the system is accessing the diskette drive.
CDROM drive activity indicator (green)	Lights when the system is accessing the CDROM drive.
StorageWorks Disk Drive (green)	Blinks when reading or writing to disk.
StorageWorks Disk Drive (amber)	Lights when there is a problem with the disk.

System Board Jumper Settings

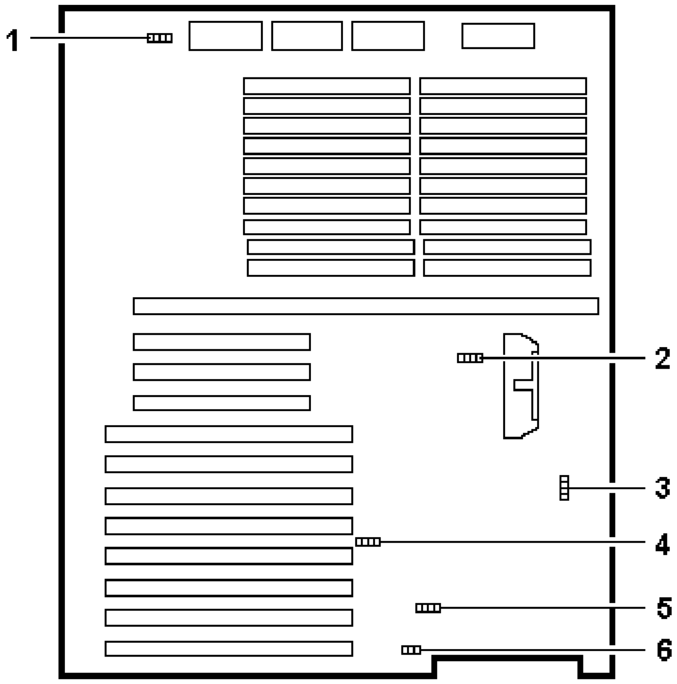
Table 9-7 lists the default jumper **{**XE "Jumper settings:system board"**}**settings for the system board.

Table 9-7 System Board Default Jumper Settings

Number	Name	Description and Default
J49	SCSI terminator	Enables the on-board SCSI terminators. The system specification requires that the SCSI bus be terminated at both ends. Enabled.
J52	Temperature shutdown	Allows the temperature chips to shut down the system in an orderly sequence. Enabled.
J50	FROM VPP enable	Connects 12 volts from the power supply to the VPP pins of the Flash ROMs. Enabled.
J27	VGA enable	Enables the on-board VGA logic. Enabled. Set to the disabled position (pins 2 and 3) when using a graphics option card.
J53	Fan shut	Allows the software to shut down the system in an orderly sequence. Enabled.
J56	Fan fault	Allows hardware to detect a fan fault and shut down the system in an orderly sequence. Enabled. Set to disable if testing the system board or CPU card outside of the enclosure.

Figure 9-6 shows the system board {XE "System board jumpers:settings"}jumper settings for normal operation.

Figure 9-6 System Board Jumper Positions for Normal Operation{XE "System board jumpers:location (figure)"}



1 SVGA jumper (J27)

2 SCSI terminal jumper (J49)

3 Temperature fail jumper (J52)

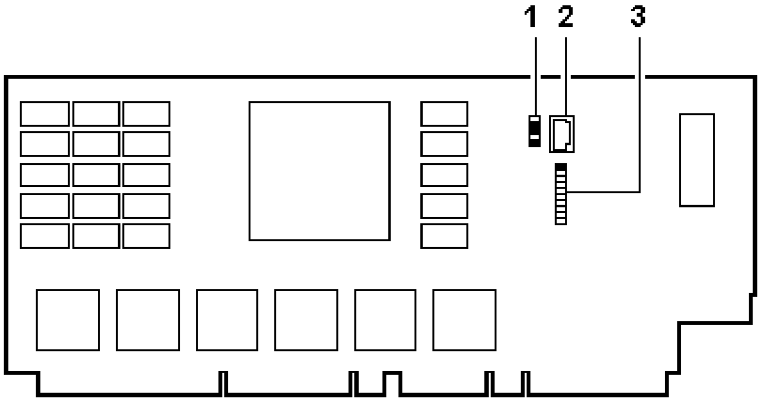
4 Fan off jumper (J53)

5 Fan fault ENA (J56)

6 Flash ROM VPP (J50)

Figure 9-7 shows CPU card **{**XE "CPU card:jumper positions for"**}**jumper settings for normal operation.

Figure 9-7 CPU Card Jumper Positions for Normal Operation



1 System clock jumper (J4)

2 Serial ROM port jumper (J2)

3 Serial ROM data jumper (J1)

Figure 9-8 shows jumper locations for the CDROM drive.

Figure 9-8 RRD43 CDROM Jumper Locations{XE "CDROM drive:jumper positions for"**}**

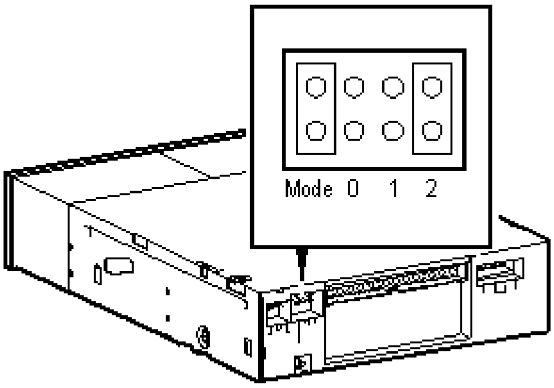
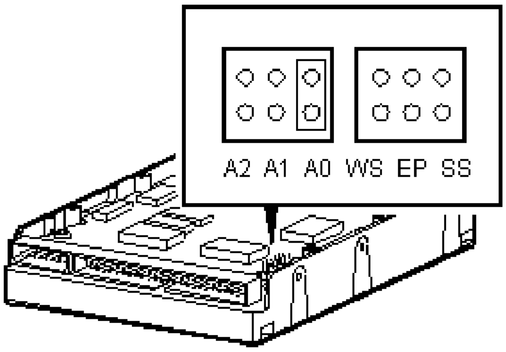


Figure 9-9 shows the jumper locations for the hard disk drive.

Figure 9-9 RZxx Hard Disk Jumper Locations{XE "Hard disk:jumper positions"**}**



SCSI ID Settings

The system **{**XE "Backplane:SCSI ID settings"**}**backplane can **{**XE "SCSI IDs:settings"**}**be configured as a single SCSI bus, a single SCSI bus with a jumper cable, a dual SCSI bus, or a triple SCSI bus arrangement.

For each configuration, the CDROM drive and tape drive IDs are manually set at address 4 and 5, respectively. StorageWorks drive IDs are set automatically by the backplane using a combination of three**{**XE "Jumper settings"**}** jumper settings on the backplane.

Single-Controller Configuration Jumper Options

Table 9-8 shows the SCSI ID settings for a **{**XE "Jumper settings:single controller configuration"**}**system with a single-controller configuration.

Table 9-8 Single-Controller Configuration Jumper Options

Device or Slot	None	J1	J2	J3	J1/J2	J1/J3	J2/J3	J1/J2/J3
Bus A								
CDROM	4	4*	4	4	4	4	4	4
Tape	5	5*	5	5	5	5	5	5
Slot 0	0	0	0	8	0	8	8	8
Slot 1	1	1	1	9	1	9	9	9
Slot 2	2	2	2	10	2	10	10	10
Slot 3	3	3	3	11	3	11	11	11
Slot 4		4*						
Slot 5		5*						
Slot 6		6						

Note: The system does not recognize two drives with the same ID number. Seven drives is the maximum number this configuration can recognize. A backplane jumper cable enables you to configure all seven StorageWorks drives. If you use slots 4 and 5, you must disable the CDROM drive and the tape drive. If you use the CDROM drive and the tape drive, you must remove drives from slots 4 and 5.

Dual-Controller Configuration Jumper Options

Table 9-9 shows the **{**XE "Jumper settings:dual controller configuration"**}**SCSI ID settings for a system with a dual-controller configuration. A jumper cable is used on the backplane to enable all seven StorageWorks slots on a single bus.

Table 9-9 Dual-Controller Configuration Jumper Options

Device or Slot	None	J1	J2	J3	J1/J2	J1/J3	J2/J3	J1/J2/J3
Bus A								
CDROM	4	4	4	4	4	4	4	4
Tape	5	5	5	5	5	5	5	5
Slot 0	0	0	0	8	0	8	8	8
Slot 1	1	1	1	9	1	9	9	9
Slot 2	2	2	2	10	2	10	10	10
Slot 3	3	3	3	11	3	11	11	11
Bus B								
Slot 4	0	4	8	0	12	4	8	12
Slot 5	1	5	9	1	13	5	9	13
Slot 6	2	6	10	2	14	6	10	14

Triple-Controller Configuration Jumper Options

Table 9-10 shows the **{**XE "Jumper settings:triple controller configuration"**}**SCSI ID settings for a system with a triple-controller configuration.

Table 9-10 Triple-Controller Configuration Jumper Options

Device or Slot	None	J1	J2	J3	J1/J2	J1/J3	J2/J3	J1/J2/J3
Bus A								
CDROM	4	4	4	4	4	4	4	4
Tape	5	5	5	5	5	5	5	5
Slot 0	0	0	0	8	0	8	8	8
Slot 1	1	1	1	9	1	9	9	9
Slot 2	2	2	2	10	2	10	10	10
Slot 3	3	3	3	11	3	11	11	11
Bus B								
Slot 4	0	4	8	0	12	4	8	12
Slot 5	1	5	9	1	13	5	9	13
Slot 6	2	6	10	2	14	6	10	14

Specifications

Table 9-11 System {XE "Specifications:system"}Specifications

Attributes	Specification
PCI clock	33 MHz
Data I/O	32-bit PCI
Motherboard RAM	Expandable up to 512 MB

Table 9-12 System Dimensions

Dimension	Specification
Width	35.3 cm (14.1 in.)
Length	53 cm (21 in.)
Height	44 cm (17.4 in.)
Weight - minimum	36 kg (80 lbs) diskless system, single power supply
Weight - maximum	42 kg (93 lbs) fully configured system, two power supplies

Table 9-13 System Environmental Specifications

Condition	Specification
Temperature	The room temperature must be between 10º C and 40º C (50º F and 104º F).
Humidity	The relative humidity must be between 10% and 90% (20% to 80% with removable media options).
Air circulation	Minimum clearance of 8 cm (3 in.) on all sides of the system unit.

Table 9-14 Power Supply Ratings

Specification	Range
Voltage	100-120/220-240 volts AC
Frequency	50-60 Hz
Current	8.5/4.0 amperes (one power cord) 7.0/3.5 amperes (two power cords)

Note: These are the maximum ratings with a fully loaded system enclosure.
These ratings do not include those for a monitor or terminal.

Table 9-15 Acoustics-Declared Values {XE "Acoustics-declared values"**}per ISO 9296 and ISO 7779**

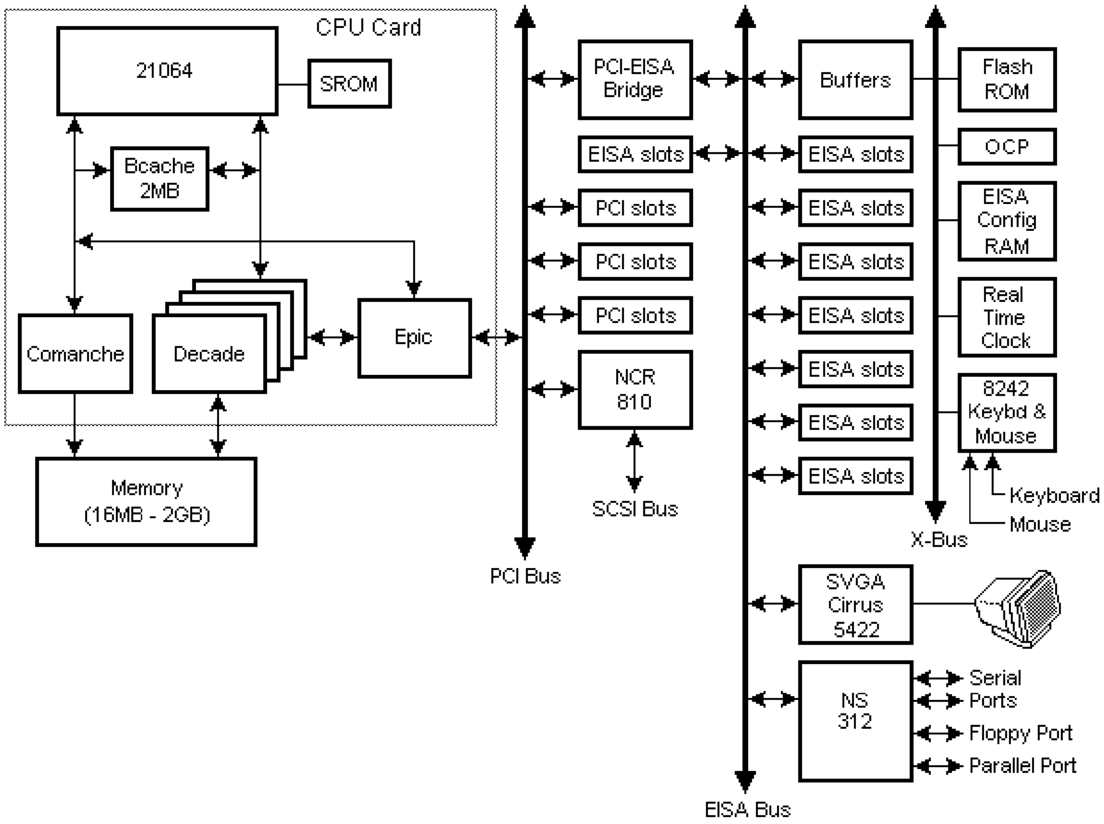
AlphaServer 1000 Model 200 (PB70A-A9)	LWAd, B	LpAm, dBA (Bystander Positions)
Idle Operating	5.6 5.6	36 36
AlphaServer 1000 Model 200 (PB70A-A9) with 6xRZ26L		
Idle Operating	5.7 5.8	38 39

Note: Current values for specific configurations are available from Digital representatives.
1B-10dBa.

System Architecture

Figure 9-10 illustrates the server {XE "Architecture:system"}system {XE "System:architecture"}architecture.

Figure 9-10 System Architecture



Glossary of Terms

10BASE-T Ethernet network

IEEE standard 802.3-compliant Ethernet products used for local distribution of data. These networking products characteristically use twisted-pair cable.

AlphaGeneration

Identifies products and services that take advantage of Digital's Alpha 64-bit computing environments.

AlphaServer

Digital's new generation of server systems based on the Alpha 64-bit computing architecture

ARC

User interface to the console firmware for operating systems that expect firmware compliance with the *Windows NT Portable Boot Loader Specification.* ARC stands for Advanced RISC Computing.

AUI Ethernet network

Attachment unit interface. An IEEE standard 802.3-compliant Ethernet network made of standard Ethernet cable.

autoboot

A system boot initiated automatically by software when the system is powered up or reset.

availability

The amount of scheduled time that a computing system provides application service during the year. Availability is typically measured as a percentage of uptime per year; or, if measured as system unavailability, as the number of hours of downtime per year.

backplane

The main board or panel that connects all of the modules in a computer system.

Short for bootstrap. To load an operating system into memory.

bandwidth

Term used to express the rate of data transfer in a bus or I/O channel. It is expressed as the amount of data that can be transferred in a given time, for example, as megabytes per second.

boot device

The device from which the system bootstrap software is acquired.

boot flags.

boot

A flag is a system parameter set by the user. Boot flags contain information that is read and used by the bootstrap software during a system bootstrap procedure.

bootp

A load host protocol for UNIX host systems.

bootstrap

The process of loading an operating system into memory.

bus

A collection of many transmission lines or wires. The bus interconnects computer system components, providing a communications path for addresses, data, and control information or external terminals and systems in a communications network.

byte

A group of eight contiguous bits starting on an addressable byte boundary. The bits are numbered right to left, 0 through 7.

cache memory

A small, high-speed memory placed between slower main memory and the processor. A cache increases effective memory transfer rates and processor speed. It contains copies of data recently used by the processor and fetches several bytes of data from memory in anticipation that the processor will access the next sequential series of bytes.

CDROM

A read-only compact disc. The optical removable media used in a compact disc reader.

central processing unit (CPU)

The unit of the computer that is responsible for interpreting and executing instructions.

client-server computing

An approach to computing whereby a computer - the "server" - provides a set of services across a network to a group of computers requesting those services - the "clients."

command line interface

One of two interfaces in the AlphaServer operator interface. The command line interface supports the OpenVMS and DEC OSF/1 operating systems. It allows you to configure and test the system, examine and alter system state, and boot the operating system.

console mode

The state in which the system and the console terminal operate under the control of the console program.

console program

The code that firmware executes during console mode.

console subsystem

The subsystem that provides the user interface for a computer system when the operating system is not running.

console terminal

The terminal connected to the console subsystem. It is used to start the system and direct activities between the user and the computer system.

data bus

A bus used to carry data between two or more components of the system.

data cache

A high-speed cache memory reserved for the storage of data.

DEC OSF/1 operating system

A general-purpose operating system based on the Open Software Foundation OSF/1 2.0 technology. DEC OSF/1 V2.0 runs on the range of AlphaGeneration systems, from workstations to servers.

DEC VET

Digital Verifier and Exerciser Tool. A multipurpose system diagnostic tool that performs exerciser-oriented maintenance testing.

DECchip 21064 processor

The CMOS, single-chip processor based on the Alpha architecture and used on many AlphaGeneration computers.

diagnostic program

A program that is used to find and correct problems with a computer system.

direct memory access (DMA)

Access to memory by an I/O device that does not require processor intervention.

DSSI

Digital's proprietary data bus that uses the System Communication Architecture (SCA) protocols for direct host-to-storage communications.

DSSI cluster

A cluster system that uses the DSSI bus as the interconnect between DSSI disks and systems.

DUP server

Diagnostic Utility Program server. A firmware program on-board DSSI device that allows a user to set host to a specified device in order to run internal tests or modify device parameters.

ECC

Error Correction Code. Code and algorithms used by logic to facilitate error detection and correction.

EISA bus

Extended Industry Standard Architecture bus. A 32-bit industry-standard I/O bus used primarily in high-end PCs and servers.

EISA Configuration Utility (ECU)

A feature of the EISA bus that helps you select a conflict-free system configuration and perform other system services. The ECU must be run whenever you change, add, or remove an EISA or ISA controller.

environment variables

Global data structures that can be accessed from console mode. The setting of these data structures determines how a system powers up, boots the operating system, and operates.

ERF/UERF

Error Report Formatter. ERF is used to present error log information for OpenVMS. UERF is used to present error log information for DEC OSF/1.

Ethernet

IEEE 802.3 standard local area network.

fail-safe loader (FSL)

A program that allows users to power up without initiating drivers or running startup diagnostics. From the fail-safe loader users can perform limited console functions.

Fast SCSI

An optional mode of SCSI-2 that allows transmission rates of up to 10 megabytes per second.

FAT

File allocation table file type. All MS-DOS Windows files are of this type.

firmware

Software code stored in hardware.

Flash ROM

Flash-erasable programmable read-only memory. Flash ROMs can be bank- or bulk-erased.

full-height device

Standard form factor for 5 1/4-inch storage devices.

half-height device

Standard form factor for storage devices that are not the height of full-height devices.

halt

The action of transferring control of the computer system to the console program.

hot swap

The process of removing a device from the system without shutting down the operating system or powering down the hardware.

initialization

The sequence of steps that prepare the computer system to start. Occurs after a system has been powered up.

Interrupt request lines (IRQs)

Bus signals that connect an EISA or ISA module (for example, a disk controller) to the system so that the module can get the system's attention via an interrupt.

ISA

Industry Standard Architecture. An 8-bit or 16-bit industry-standard I/O bus, widely used in personal computer products. The EISA bus is a superset of the ISA bus.

LAN

Local area network. A high-speed network that supports computers that are connected over limited distances.

loopback test

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

machine check/interrupts

An operating system action triggered by certain system hardware-detected errors that can be fatal to system operation. Once triggered, machine check handler software analyzes the error.

mass storage device

An input/output device on which data is stored. Typical mass storage devices include disks, magnetic tapes, and CDROM.

MAU

Medium attachment unit. On an Ethernet LAN, a device that converts the encoded data signals from various cabling media (for example, fiber optic, coaxial, or ThinWire) to permit connection to a networking station.

memory interleaving

The process of assigning consecutive physical memory addresses across multiple memory controllers. Improves total memory bandwidth by overlapping system bus command execution across two or four memory modules.

menu interface

One of two interfaces in the AlphaServer operator interface. The menu interface allows users to boot and configure the Windows NT operating system by selecting choices from a simple menu. The EISA Configuration Utility is also run from the menu interface.

MOP

Maintenance Operations Protocol. A transport protocol for network bootstraps and other network operations.

NFS

Network File System protocol that allows a user to remotely access a host file system as if it were the user's local file system.

node

A device that has an address on, is connected to, and is able to communicate with other devices on a bus. Also, an individual computer system connected to the network that can communicate with other systems on the network.

NTFS

Windows NT file system, a high-performance file system.

NVRAM

Nonvolatile random-access memory. Memory that retains its information in the absence of power.

OCP

See operator control panel.

OpenVMS AXP operating system

A general-purpose multiuser operating system that supports AlphaGeneration computers in both production and development environments. OpenVMS AXP software supports industry standards, facilitating application portability and interoperability.

operating system mode

The state in which the system console terminal is under the control of the operating system. Also called program mode.

operator control panel

The panel located behind the front door of the system, which contains the startup/diagnostic display, DC On/Off switch, Halt switch, and Reset switch.

PALcode

Alpha Privileged Architecture Library code, written to support Alpha processors. PALcode implements architecturally defined behavior.

PCI

Peripheral Component Interconnect. An industry-standard expansion I/O bus that is the preferred bus for high-performance I/O options. Available in a 32-bit and a 64-bit version.

PCI-to-EISA bridge

The capability to transfer commonly available EISA and ISA options to the PCI bus.

power-cycle

A process initiated by pressing the reset switch, which causes the system to re-initialize and re-display its startup display.

power-up

The sequence of events that starts the flow of electricity to a system or its components.

RAID

Redundant array of inexpensive disks. technique that organizes disk data to improve performance and reliability. RAID has three attributes:

It is a set of physical disks viewed by the user as a single logical device.

The user’s data is distributed across the physical set of drives in a defined manner.

Redundant disk capacity is added so that the user’s data can be recovered even if a drive fails.

redundant

Describes duplicate or extra computing components that protect a computing system from failure.

reliability

The probability that a device or system will not fail to perform its intended functions during a specified time

Remote Installation Service (RIS)

A tool that allows remote installation of DEC OSF/1 to Alpha systems through a local area network.

RISC

Reduced instruction set computer. A processor with an instruction set that is reduced in complexity.

ROM-based diagnostics

Diagnostic programs resident in read-only memory.

SCSI

Small Computer System Interface. An ANSI-standard interface for connecting disks and other peripheral devices to computer systems. Some devices are supported under the SCSI-1 specification; others are supported under the SCSI-2 specification.

self-test

A test that is invoked automatically when power is supplied to the system.

serial ROM

In the context of the CPU module, ROM read by the DECchip microprocessor after reset that contains low-level diagnostic and initialization routines.

SIMM

Single in-line memory module.

SRM

User interface to console firmware for operating systems that expect firmware compliance with the *Alpha System Reference Manual (SRM).*

StorageWorks

Digital's modular storage subsystem (MSS), which is the core technology of the Alpha SCSI-2 mass storage solution. Consists of a family of low-cost mass storage products that can be configured to meet current and future storage needs.

system board

The main circuit board of a computer. The motherboard contains the base electronics for the system (for example, base I/O, CPU, ROM, and console serial line unit) and has connectors where options (such as I/O and memories) can be plugged in.

system bus

The hardware structure that interconnects the CPUs and memory modules. Data processed by the CPU is transferred throughout the system via the system bus.

system disk

The device on which the operating system resides.

ThinWire

Ethernet cabling and technology used for local distribution of data communications. ThinWire cabling is thinner than thick wire cabling.

twisted-pair cable

Cable made by twisting together two insulated conductors that have no common covering.

uninterruptible power supply (UPS)

A battery-backup option that maintains AC power to a computer system if a power failure occurs.

wide area network

A high-speed network that connects a server to a distant host computer, PC, or other server, or that connects numerous computers in numerous distant locations.

Windows NT

"New technology" operating system owned by Microsoft Corporation.

write-enabled

Describes a device onto which data can be written.

write-protected

Describes a device onto which data cannot be written.

Index

A

B

C

O

P

R

S

T

U

V

W

Filename:	OWNERS~1.DOC
Directory:	C:\USERS\DEFAULT
Template:	C:\WINWORD\D2H_SMAL.DOT
Title:	Alpha 1000 Owner’s Guide
Subject:	
Author:	Valued Digital Customer
Keywords:	
Comments:	
Creation Date:	11/02/94 9:12 AM
Revision Number:	6
Last Saved On:	11/03/94 10:18 AM
Last Saved By:	Valued Digital Customer
Total Editing Time:	86 Minutes
Last Printed On:	02/09/95 11:36 AM
As of Last Complete Printing	
Number of Pages:	212
Number of Words:	34,631 (approx.)
Number of Characters:	197,397 (approx.)