

AlphaServer 2000/2100

Firmware Reference Guide

Order Number: EK-AXPFW-RM. B01

First Printing, October 1994
Revised, February 1995

Digital Equipment Corporation makes no representations that the use of its products in the manner described in this publication will not infringe on existing or future patent rights, nor do the descriptions contained in this publication imply the granting of licenses to make, use, or sell equipment or software in accordance with the description.

Possession, use, or copying of the software described in this publication is authorized only pursuant to a valid written license from Digital or an authorized sublicensor.

© Digital Equipment Corporation 1995. All Rights Reserved.

The postpaid Reader's Comments forms at the end of this document request your critical evaluation to assist in preparing future documentation.

The following are trademarks of Digital Equipment Corporation: AlphaGeneration, AlphaServer, DEC, Digital, OpenVMS, ThinWire, VT, the AlphaGeneration logo, and the DIGITAL logo.

OSF/1 is a registered trademark of Open Software Foundation, Inc. PostScript is a registered trademark of Adobe Systems, Inc. UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Ltd. Microsoft Windows and Microsoft Windows NT are trademarks of Microsoft Corporation.

All other trademarks and registered trademarks are the property of their respective holders.

S2773

This document was prepared using VAX DOCUMENT Version 2.1.

Contents

Preface	xiii
1 Using the SRM Console Interface (DEC OSF/1 and OpenVMS)	
Introduction	1-1
In This Chapter	1-1
Console Firmware Overview	1-2
Firmware Services	1-2
Operating System Support	1-3
SRM Command Line Interface	1-3
SRM-Only Tasks	1-4
ARC Menu Interface	1-5
ARC-Only Tasks	1-5
Switching Between Interfaces	1-6
SRM Console Task Summary	1-7
Tasks and Commands	1-7
Control and Keyboard Characters	1-9
Control Characters	1-9
Keyboard Characters	1-9
SRM Console Commands	1-11
Displaying SRM Commands	1-11
Entering Console Commands	1-12
Console Command Format	1-12
Online Help	1-12
Alpha Console Commands	1-12
arc	1-13
Synopsis	1-13
Description	1-13
Example	1-13
boot	1-14
Synopsis	1-14
Description	1-14
Parameters	1-14

Flags	1-15
Examples	1-15
continue	1-16
Synopsis	1-16
Description	1-16
Examples	1-16
ecu	1-17
Synopsis	1-17
Description	1-17
Example	1-17
help or man	1-18
Synopsis	1-18
Description	1-18
Parameters	1-18
Examples	1-18
init	1-19
Synopsis	1-19
Description	1-19
Example	1-20
man	1-21
set	1-22
Synopsis	1-22
Description	1-22
Parameters	1-23
Flags	1-23
Environment Variables	1-23
set auto_action	1-25
Synopsis	1-25
Description	1-25
Qualifiers	1-25
Example	1-25
set bootdef_dev	1-26
Synopsis	1-26
Description	1-26
Qualifiers	1-27
Example	1-27
set boot_osflags	1-28
Synopsis	1-28
Description	1-28
DEC OSF/1 Systems	1-28
Example	1-29
OpenVMS Systems	1-29
Examples	1-30

set bus_probe_algorithm	1-31
Synopsis	1-31
Description	1-31
Example	1-31
set console	1-32
Synopsis	1-32
Description	1-32
Qualifiers	1-32
Example	1-32
set cpu_enabled	1-33
Synopsis	1-33
Description	1-33
Examples	1-34
set er*0_protocols and set ew*0_protocols	1-35
Synopsis	1-35
Description	1-35
Qualifiers	1-35
Examples	1-36
set ew*0_mode	1-37
Synopsis	1-37
Description	1-37
Qualifiers	1-38
Example	1-38
set host	1-39
Synopsis	1-39
Description	1-39
Parameters	1-39
Flags	1-39
Example	1-40
set language	1-41
Synopsis	1-41
Description	1-41
Qualifiers	1-42
Example	1-42
set ocp_text	1-43
Synopsis	1-43
Description	1-43
Qualifiers	1-43
Example	1-43
set os_type	1-44
Synopsis	1-44
Description	1-44
Qualifiers	1-45

Example	1-45
set pci_parity	1-46
Synopsis	1-46
Description	1-46
Example	1-46
set pk*0_fast	1-47
Synopsis	1-47
Description	1-47
Qualifiers	1-48
Example	1-48
set pk*0_host_id	1-49
Synopsis	1-49
Description	1-49
Qualifiers	1-49
Example	1-49
set pk*0_soft_term	1-50
Synopsis	1-50
Description	1-50
Examples	1-50
set tga_sync_green	1-52
Synopsis	1-52
Description	1-52
Example	1-52
show	1-53
Synopsis	1-53
Description	1-53
Parameters	1-53
Examples	1-54
show config	1-55
Synopsis	1-55
Description	1-55
Example	1-56
show device	1-58
Synopsis	1-58
Description	1-58
Arguments	1-59
Example	1-60
show fru	1-61
Synopsis	1-61
Description	1-61
Example	1-62
show memory	1-63
Synopsis	1-63

Description	1-63
Example	1-63
show pal	1-64
Synopsis	1-64
Description	1-64
Example	1-64
show version	1-65
Synopsis	1-65
Description	1-65
Example	1-65
test	1-66
Synopsis	1-66
Description	1-66
Examples	1-67

2 SRM Console Firmware Security Features

Introduction	2-1
In This Chapter	2-1
Security Features Overview	2-2
Security Commands	2-3
set password	2-3
set secure	2-4
login	2-4
clear password	2-6
Secure Mode Functions	2-7
boot	2-7
Boot Examples	2-7
start and continue	2-7
Ctrl/x	2-8

3 Using the ARC Console Interface (Microsoft Windows NT)

Introduction	3-1
In This Chapter	3-1
Console Firmware Overview	3-2
Firmware Services	3-2
Operating System Support	3-3
SRM Command Line Interface	3-3
SRM-Only Tasks	3-4
ARC Menu Interface	3-5
ARC-Only Tasks	3-5
Switching Between Interfaces	3-6

ARC Interface Introduction	3-7
Summary	3-7
Boot Menu Functions	3-7
Supplementary Menu Functions	3-7
Setup Menu Functions	3-7
Language Selection	3-9
Language Support Files	3-9
Language Selection for Updated Firmware	3-9
Changing to Another Language	3-10
Accessing the Boot Menu	3-12
Summary	3-12
Access Procedure	3-12
Boot Menu Example	3-12
Booting the Default ARC Boot Selection	3-13
Summary	3-13
Booting the Default Boot Selection	3-13
If Errors Occur	3-13
Example	3-14
Booting an Alternative Operating System	3-15
Summary	3-15
Booting an Alternative Operating System	3-15
If Errors Occur	3-15
Example 1	3-16
Example 2	3-16
Running a Program	3-17
Summary	3-17
Valid Programs	3-17
Running a Program	3-17
Device Names	3-17
Path and Program Names	3-18
Example	3-18
Accessing the Supplementary Menu	3-19
Summary	3-19
Accessing the Supplementary Menu	3-19
Supplementary Menu Example	3-20
Accessing the Setup Menu	3-21
Summary	3-21
Accessing the Setup Menu	3-21
Identifying and Correcting Setup Errors	3-21
Setup Menu Example	3-22
Displaying the Hardware Configuration	3-23
Summary	3-23
Displaying Hardware Configuration	3-23

Boot Device Names	3-24
Hardware Configuration Display	3-24
Setting the System Date and Time	3-27
Summary	3-27
Setting the Date and Time	3-27
Set System Time Example	3-28
Setting the Default System Partition	3-29
Summary	3-29
Setting the System Partition	3-29
Default System Partition Example	3-30
Effects of This Procedure	3-31
Configuring the System Floppy Drives and Keyboard Type	3-32
Summary	3-32
Configuring Drives and Keyboard	3-32
Floppy Drive Configuration Example	3-33
Effects of This Procedure	3-34
Setting the System to Boot Automatically	3-35
Summary	3-35
Setting the System to Boot Automatically	3-35
Setup Autoboot Example	3-36
Effects of This Procedure	3-36
Editing the System Environment Variables	3-37
Summary	3-37
Important Information	3-37
Editing Environment Variables	3-38
Example	3-39
Effects of This Procedure	3-39
Default Environment Variables	3-40
Summary	3-40
Important Information	3-40
Default Environment Variables	3-40
Other Environment Variables	3-41
Resetting the System to Factory Defaults	3-42
Summary	3-42
Resetting to Factory Defaults	3-42
Effects of This Procedure	3-43
Getting Help	3-44
Summary	3-44
ARC Firmware Help	3-44
Displaying the Setup Menu Help Screen	3-44
Setup Menu Example	3-45
Help Example	3-46
Saving the System Setup or Quitting the Setup Menu	3-47

Summary	3-47
Saving the System Setup	3-47
Quitting Without Saving	3-47

4 Managing ARC Boot Selections (Microsoft Windows NT)

Introduction	4-1
In This Chapter	4-1
Accessing the Boot Selections Menu	4-2
Summary	4-2
Accessing the Boot Selections Menu	4-2
Boot Selections Menu Example	4-2
Information on Boot Selection Variables	4-3
Summary	4-3
Boot Selection Variables	4-3
Adding a Boot Selection	4-4
Summary	4-4
Adding a Boot Selection	4-4
Example	4-5
Checking the Boot Selections for Errors	4-6
Summary	4-6
Errors in Boot Selections	4-6
Checking the Boot Selections	4-6
Example	4-7
Changing a Boot Selection	4-8
Summary	4-8
Changing a Boot Selection	4-8
Example	4-9
Displaying the System Boot Selections	4-10
Summary	4-10
Displaying the System Boot Selections	4-10
Example	4-11
Changing the Default Boot Selection	4-12
Summary	4-12
Default Boot Selection Definition	4-12
Changing the Default Boot Selection	4-12
Example	4-13
Deleting a Boot Selection	4-14
Summary	4-14
Deleting a Boot Selection	4-14
Example	4-14

Index

Examples

3-1	Boot Menu Example	3-12
3-2	Choosing the Boot Windows NT Menu Item	3-14
3-3	Booting an Alternative Operating System	3-16
3-4	Choosing the Alternative Operating System	3-16
3-5	Accessing the Supplementary Menu	3-20
3-6	Setup Menu	3-22
3-7	Sample Hardware Configuration Display	3-25
3-8	Set System Time Example	3-28
3-9	Setting the Default System Partition	3-30
3-10	Configuring the System Floppy Drives	3-33
3-11	Setting the System to Boot Automatically	3-36
3-12	Creating a User-Defined Environment Variable	3-39
3-13	Selecting the Help Menu Item	3-45
3-14	Setup Menu Help Screen	3-46
4-1	Boot Selections Menu	4-2
4-2	Adding a Boot Selection	4-5
4-3	Checking the Boot Selections for Errors	4-7
4-4	Changing a Boot Selection	4-9
4-5	System Boot Selections Display	4-11
4-6	Changing the Default Boot Selection	4-13
4-7	Deleting a Boot Selection	4-14

Figures

1-1	Special Keyboard Operations	1-10
1-2	Device Name Convention	1-58

Tables

1-1	Task Summary Table	1-7
1-2	Frequently Used Console Commands	1-11
1-3	VAX and Alpha Console Commands Compared	1-12
1-4	Environment Variables	1-23
1-5	OpenVMS Boot Flag Settings	1-30
1-6	Hex Digit Values for CPUs	1-34
3-1	Accessing the Boot Menu	3-12
3-2	Booting the Default Boot Selection	3-13
3-3	Booting an Alternative Operating System	3-15
3-4	Running a Program	3-17
3-5	Accessing the Supplementary Menu	3-19
3-6	Accessing the Setup Menu	3-21
3-7	Displaying the Hardware Configuration	3-23
3-8	Device Names	3-24
3-9	Setting the System Date and Time	3-27
3-10	Setting the Default System Partition	3-29
3-11	Effects of Setting the Default System Partition	3-31
3-12	Configuring the Floppy Drives and Keyboard	3-32
3-13	Effects of Configuring the System Floppy Drives	3-34
3-14	Setting the System to Boot Automatically	3-35
3-15	Effects of Setting the System to Boot Automatically	3-36
3-16	Creating or Editing User-Defined Environment Variables	3-38
3-17	ARC Firmware Environment Variables	3-40
3-18	Resetting the System to Factory Defaults	3-42
3-19	Displaying the Setup Menu Help Screen	3-44
3-20	Saving the System Setup	3-47
3-21	Quitting the Setup Menu	3-47
4-1	Accessing the Boot Selections Menu	4-2
4-2	ARC Boot Selection Variables	4-3
4-3	Adding a Boot Selection	4-4
4-4	Checking the Boot Selections for Errors	4-6
4-5	Changing a Boot Selection	4-8
4-6	Displaying the System Boot Selections	4-10
4-7	Changing the Default Boot Selection	4-12
4-8	Deleting a Boot Selection	4-14

Preface

Purpose of This Guide

This guide describes how to use the console firmware, which is part of the subsystem that controls the system hardware on AlphaServer systems. The guide contains firmware reference information about SRM console commands and ARC firmware menus for the AlphaServer 2000 and AlphaServer 2100 systems.

Online Information

AlphaServer 2000 and AlphaServer 2100 systems are shipped with a set of diskettes called the "Fast Track to Information." Fast Track is an easy-to-navigate, electronic version of all of the information in the owner's guide for each of the servers listed above, as well as the information in this reference guide.

You can install Fast Track on any personal computer or laptop computer running Microsoft Windows V3.1 or later or a Windows emulator. Some versions of Fast Track also run on Windows NT. Approximately four megabytes of disk space are required for installation.

Who Should Use This Guide

This guide is for system managers and others who perform system management tasks that require interaction between the system firmware and the operating system.

Structure of This Guide

This guide contains information about how to use the console firmware.

- Chapter 1 describes how to use the SRM command line interface and provides reference information for the SRM console firmware commands and environment variables.
- Chapter 2 explains how to implement console security features on the system.
- Chapter 3 describes how to use the ARC menu interface for Windows NT to boot the system, change the system setup, and carry out other system management functions.
- Chapter 4 describes how to change boot selections in the ARC menu interface.

For More Information

You may find it useful to have your operating system documentation and your system hardware documentation on hand for use with this guide.

You can download up-to-date files and information for managing AlphaServer 2100 and AlphaServer 2000 systems from the Internet:

Via FTP on <ftp.digital.com> Once connected, go to:

```
/pub/Digital/Alpha/systems
```

Via World Wide Web:

```
http://www.service.digital.com/alpha/server/
```

The information includes firmware updates, the latest configuration utilities, software patches, a list of supported options, and more. There are no restrictions on accessing and downloading these files.

Firmware Updates

Under some circumstances, such as a CPU upgrade, you may need to update your firmware. Firmware updates are shipped quarterly on CD-ROM for the DEC OSF/1 and OpenVMS operating systems. Firmware updates for DEC OSF/1, OpenVMS, and Windows NT are also available on the Internet, as noted above.

Conventions

The following table lists conventions used in this guide.

Convention	Meaning
<code>Return</code>	A key name enclosed in a box indicates that you press that key.
<code>Ctrl/x</code>	<code>Ctrl/x</code> indicates that you hold down the Ctrl key while you press another key, indicated here by <i>x</i> . In examples, this key combination is enclosed in a box, for example, <code>Ctrl/C</code> .
lowercase	Lowercase letters in commands indicate that commands can be entered in uppercase or lowercase.
Warning	Warnings contain information to prevent personal injury.
Caution	Cautions provide information to prevent damage to equipment or software.
[]	In command format descriptions, brackets indicate optional elements.
console command abbreviations	Console command abbreviations must be entered exactly as shown.
<code>boot</code>	Console and operating system commands are shown in this special typeface.
<i>italic type</i>	Italic type in console command sections indicates a variable.
< >	In console mode online help, angle brackets enclose a placeholder for which you must specify a value.
{ }	In command descriptions, braces containing items separated by commas imply mutually exclusive items.
❶ ❷ ❸ . . .	In figures, a numbered callout labels a part of the figure. In text, it refers to a labeled part of a corresponding figure.

1

Using the SRM Console Interface (DEC OSF/1 and OpenVMS)

Introduction

On AlphaServer systems, control of the system hardware is provided by a console subsystem. The console subsystem contains firmware code (software code embedded in hardware) that facilitates interaction between the hardware and the operating system.

Because the AlphaServer 2000 and AlphaServer 2100 systems are designed to support multiple operating systems, these servers offer two separate operator interfaces:

- A command line interface called the SRM interface for DEC OSF/1 and OpenVMS systems. The SRM interface provides bootstrap and other services as defined in the *Alpha System Reference Manual* (SRM) specification.
- A menu interface called the ARC interface for the Windows NT operating system. The ARC interface provides bootstrap and other services as defined in the *Windows NT Portable Boot Loader Specification*.

In This Chapter

This chapter explains how to use the SRM command line interface to carry out operations such as testing the hardware and bootstrapping the system software. The command line interface will be familiar to users of traditional Digital systems.

Note

If you are running the Microsoft Windows NT operating system, refer to Chapter 3.

Console Firmware Overview

The AlphaServer 2000 and AlphaServer 2100 systems contain firmware code that provides service functions, including power-up diagnostics and initialization, console interfaces, and operating system bootstrap and restart.

Firmware Services

At power-up, the firmware tests and initializes the base system. The firmware provides a set of built-in drivers to permit generic access to all the major physical components in the system.

The initialization code is run any time the system is reset. During initialization the base system hardware is tested and configured. All processor caches are set to a consistent state, memory is sized and configured, and the I/O subsystem is reset and configured.

After initialization the firmware starts up its own internal set of class and port drivers. The drivers are used by the console, diagnostics, bootstrap, and the operating system callbacks. This arrangement simplifies the addition of new device support, since it typically requires only the addition of port level drivers.

System self-tests are performed at power-up. These tests include memory diagnostics, individual device test-directed diagnostics executed within a driver's initialization routine, and a concurrent system exerciser. This power-up stream can be customized using both built-in and user scripts.

Operating System Support

The system firmware currently provides support for booting the DEC OSF/1, OpenVMS, and Microsoft Windows NT operating systems.

- DEC OSF/1 and OpenVMS are booted from the SRM firmware. The console terminal used as the operator interface to DEC OSF/1 and OpenVMS can be either a serial terminal (VTxxx or equivalent) or a VGA-compatible graphics terminal.
- Microsoft Windows NT is booted from the ARC firmware. The console terminal used as the operator interface to Windows NT must be a VGA-compatible graphics terminal.

SRM Command Line Interface

Systems running DEC OSF/1 or OpenVMS access the SRM firmware via a command line interface (CLI). The CLI is a UNIX style shell that provides a set of commands and operators, as well as a scripting facility. It allows you to configure and test the system and boot the operating system.

The SRM console prompt is P00>>>.

**SRM-Only
Tasks**

There are several system management tasks that can be performed only from the SRM console command line interface:

- To test the system, use the SRM `test` command.
- To examine system bus options for errors, use the `show fru` command.
- To set or change certain environment variables, use one of the following SRM `set` commands. Each command is explained in detail in the reference section of this chapter.

```
set bus_probe_algorithm
set cpu_enabled
set er*0_protocols
set ew*0_mode
set ew*0_protocols
set ocp_text
set pk*0_fast
set pk*0_host_id
set pk*0_soft_term
set tga_sync_green
```

ARC Menu Interface

Systems running Microsoft Windows NT navigate the ARC console firmware via menus that are used to configure and boot the system, run the EISA Configuration Utility (ECU), run the RAID Configuration Utility (RCU), and set environment variables. The menus are described in Chapter 3 and Chapter 4.

ARC-Only Tasks

The EISA Configuration Utility (ECU) and the RAID Configuration Utility (RCU) are run from the ARC menu interface.

- You must run the EISA Configuration Utility (ECU) whenever you add, remove, or move an EISA or ISA option in your AlphaServer system. The ECU is run from diskette. Two diskettes are supplied with your system shipment, one for DEC OSF/1 and OpenVMS and one for Windows NT. To run the ECU, refer to the instructions in your system documentation.
- If you purchased a StorageWorks RAID Array 200 Subsystem for your server, you must run the RAID Configuration Utility (RCU) to set up the disk drives and logical units. Refer to *StorageWorks RAID Array 200 Subsystem Family Installation and Configuration Guide*, included in your RAID kit.

Switching Between Interfaces

To complete some procedures, it is necessary to switch from one console interface to the other.

- Several commands, including the `test` command, are run under the SRM interface.
- The EISA Configuration Utility (ECU) and the RAID Configuration Utility (RCU) are run under the ARC interface.

Switching from SRM to ARC

To switch from the SRM console to the ARC console, enter the `arc` command at the SRM console prompt `P00>>>`.

Switching from ARC to SRM

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

1. From the Boot menu, select Supplementary menu.
2. From the Supplementary menu, select Set up the system
3. From the Setup menu, select Switch to OpenVMS or OSF console.
4. Select your operating system console, then select the Setup menu and press Enter.
5. When the Power-cycle the system to implement the change message is displayed, press the Reset button.

Once the console firmware is loaded and the system is initialized, the SRM console prompt, `P00>>>`, is displayed.

SRM Console Task Summary

Tasks and Commands

Table 1–1 describes the system management tasks that you can perform from the SRM console and the command used to perform each task. Commands related to system security are described in Chapter 2.

Table 1–1 Task Summary Table

Task	Command
Invoke the ARC console firmware.	arc
Boot the operating system software.	boot
Invoke the EISA Configuration Utility.	ecu
Initialize the system.	init
Change the default startup action.	set auto_action
Change the default boot device.	set bootdef_dev
Change the default boot flags.	set boot_osflags
Set bus probe algorithm to improve bus sizing and configuration on DEC OSF/1 systems running SRM console firmware V3.8 or later.	set bus_probe_algorithm
Change the device on which power-up output is displayed.	set console
Enable or disable specific CPUs on a multiprocessor system.	set cpu_enabled
Set network protocols for booting and other functions (er = DEC 4220 chip).	set er*0_protocols
Set network protocols for booting and other functions (ew = DECchip 21040).	set ew*0_protocols
Set an Ethernet controller to run twisted-pair, AUI, or ThinWire.	set ew*0_mode

(continued on next page)

SRM Console Task Summary

Table 1–1 (Cont.) Task Summary Table

Task	Command
Change the language variant of the keyboard.	set language
Change the power-up/diagnostic display message.	set ocp_text
Set the default operating system.	set os_type
Enable or disable PCI parity checking.	set pci_parity
Enable Fast SCSI speed for Fast SCSI devices on a SCSI controller.	set pk*0_fast
Set the ID for a SCSI controller.	set pk*0_host_id
Enable or disable SCSI terminators on systems that use the QLogic ISP1020 SCSI controller.	set pk*0_soft_term
Set the location of the SYNC signal generated by the turbo graphics adapter (TGA) monitor.	set tga_sync_green
Display the value of an environment variable or display configuration information.	show
Run system diagnostics.	test

Control and Keyboard Characters

Control Characters

Enter control characters by holding down the key labeled Ctrl while pressing another key. You can enter the following control characters in console mode:

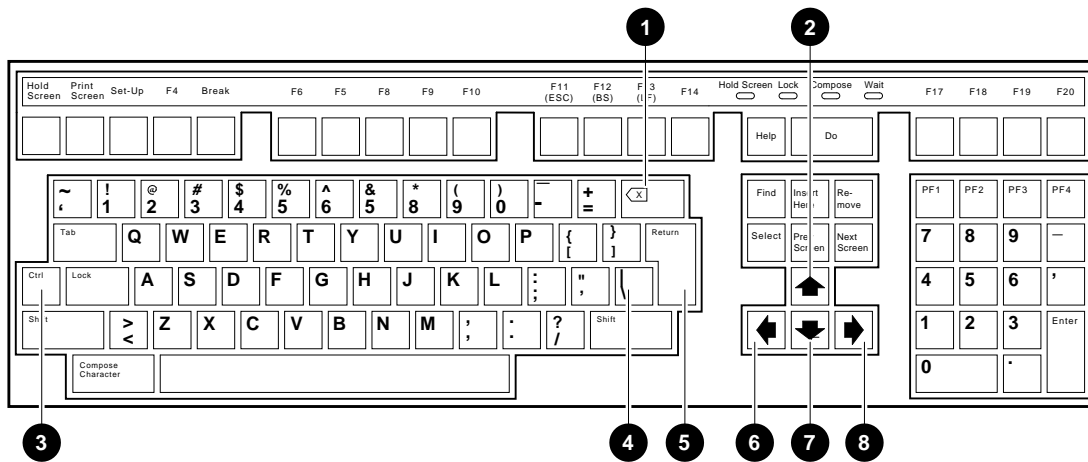
Character	Function
Ctrl/A	Toggles between insertion and overstrike mode so you can edit text on the current command line. Default mode is insert.
Ctrl/C	Interrupts a command process and returns control to the console command line.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/H	Moves the cursor to the beginning of the line.
Ctrl/O	Suppresses output to console terminal until you enter Ctrl/O again. Output is also reenabled when the console prompts for a command, issues an error message, or enters operating system mode.
Ctrl/S	Suspends output to the console terminal until you enter Ctrl/Q.
Ctrl/Q	Resumes output to the console terminal that you suspended with Ctrl/S.
Ctrl/U	Deletes the entire line. Line deletion is followed with a carriage return, line feed, and a new prompt.
Ctrl/R	Redisplays the current line, omitting deleted characters.

Keyboard Characters

Figure 1–1 shows the keyboard characters that operate in console mode. The location of keyboard characters may vary depending on your keyboard. You can, however, enter the following keyboard characters in console mode, regardless of your keyboard type.

Control and Keyboard Characters

Figure 1–1 Special Keyboard Operations



MLO-008207

Callout	Key	Function
1		Deletes the last character you entered. With a hardcopy terminal, is echoed with \ followed by the character being deleted. If you delete several characters consecutively, the system echoes with \, the deleted characters, followed by another \ at the end of the series.
2		Recalls up to 32 previous commands.
3		Begins a control character.
4	\ (Backslash)	Extends a command onto the next line. Must be the last character on the line to be continued.
5		Enters a command on the command line. The cursor need not be at the end of the command line.
6		Moves the cursor left one position.
7		Reverses the order of recalled commands after using .
8		Moves the cursor right one position.

SRM Console Commands

Table 1–2 lists the SRM console commands used to perform typical system management tasks such as booting the operating system or setting environment variables. These commands are documented in alphabetical order in this chapter.

Table 1–2 Frequently Used Console Commands

Command	Syntax	Description
arc	arc	Invokes the ARC console firmware.
boot	boot [-flags [<i>longword</i> ,] <i>longword</i>] [-halt] [<i>boot_device</i>]	Boots the operating system software.
continue	continue	Resumes program execution.
ecu	ecu	Invokes the EISA Configuration Utility.
help	help [<i>command</i> . . .]	Displays online help using console commands. Synonymous with man.
init	init	Initializes the system.
man	man [<i>command</i> . . .]	Displays online help using console commands. Synonymous with help.
set	set [-default] <i>envar val</i>	Sets an environment variable.
set host	set host [-dup] [-task <i>task_name</i>] <i>device</i>	Connects to a MSCP DUP server on a DSSI device.
show	show [<i>envar</i>] [{config,device,memory, pal, version}]	Displays the value of an environment variable or displays configuration information.
test	test	Runs system diagnostics.

Displaying SRM Commands

In addition to the commands described in this chapter, there are some console commands that are used for system diagnostics and development. To view all of the console commands, enter `help` or `man` at the `P00>>>` console prompt. Do not use commands that are not covered in this reference guide unless you fully understand the effect they can have on the system.

Entering Console Commands

Console Command Format

Use the following format when entering console commands. To specify a parameter, precede the parameter with a space. To specify a flag, precede the flag with a space and a hyphen.

```
P00>>> command [-flags] [parameters. . .]
```

For information about entering a specific console command, refer to the console command reference pages, in the next section of this chapter.

Online Help

Once the system is running in console mode, you can get online information about console commands by entering `help` or `man` at the console terminal.

Alpha Console Commands

Most of the console commands on your DEC OSF/1 or OpenVMS system are similar, but not identical to, the console commands supported on VAX systems. See Table 1-3. If you are familiar with VAX console commands, familiarize yourself with the Alpha console commands before proceeding.

Table 1-3 VAX and Alpha Console Commands Compared

VAX Console Command	Alpha Console Command
show boot	show bootdef_dev
show bflags	show boot_osflags
<i>/qualifier</i> (indicates optional qualifiers)	-flag (indicates optional flags)

The remainder of this chapter contains reference information and examples of the SRM console commands.

arc

arc

Synopsis Invoke the ARC firmware.
arc

Description Entering the `arc` command from the console prompt loads the ARC firmware and boots the ARC console. You do not need to restart the system in order to load the ARC firmware.

Example In the following example, the ARC console is invoked from the SRM console.

P00>>> arc

boot

boot

Synopsis

Bootstrap the system.

`boot [-flags [longword,]longword] [-halt] [boot_device]`

Description

Initializes the processor, loads a program image from the specified boot device, and transfers control to that image.

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

The `-flags` option passes additional information to the operating system about the boot that you are requesting.

You can execute the `boot` command by entering `boot` or `b`, followed by `[Return]`. When you enter `boot` or `b`, an environment variable (shown in parenthesis) provides a default value for the following information:

- Boot device (`bootdef_dev`)
- Boot flags (`boot_osflags`)

If you specify the boot device or boot flags on the command line, the current default value is overridden for the current boot request. However, the corresponding environment variable is not changed.

Parameters

Parameter	Description
<i>boot_device</i>	A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. Use the <code>set bootdef_dev</code> command to define the default boot device.

Flags

Flag	Description
<code>-flags [longword,] longword</code>	Specifies additional information to the bootstrap software. In DEC OSF/1, specifies boot flags. In OpenVMS, specifies system root number and boot flags. Refer to the <code>set boot_osflags</code> command for a list of possible settings and their meanings. The default boot flag setting is null. Use the <code>set boot_osflags</code> command to change the default boot flag setting.
<code>-halt</code>	Forces the bootstrap operation to halt and invoke the console program once the bootstrap image is loaded and page tables and other data structures are set up. Console device drivers are not shut down when this qualifier is present. Transfer control to the image by entering the <code>continue</code> command.

Examples

In the following example, an OpenVMS system boots from the SCSI disk, `dka0`. If bootable software cannot be found on `dka0`, the system attempts to boot from Ethernet port `ewa0`. Boot flag settings are 0 and 1.

```
P00>>> boot -flags 0,1 dka0,ewa0
```

In the following example, a DEC OSF/1 system boots from the SCSI disk, `dka0`, using boot flag setting `i`.

```
P00>>> boot -flags i dka0
```

In the following example, the system boots from the SCSI disk, `dka0`, but remains in console mode. Subsequently, you can enter the `continue` command to transfer control to the operating system.

```
P00>>> boot -halt dka0
```

In the following example, the system boots from the default boot device. The console program returns an error message if a default boot device has not been set.

```
P00>>> boot
```

continue

continue

Synopsis Resume program execution on the specified processor.
continue

Description Continues execution on the specified processor, or the primary processor if a processor is not specified. The processor begins executing instructions at the address that is currently in the saved program counter. The processor is not initialized.

The `continue` command is only valid if you have not disturbed the system state and if you halted the system by one of two methods: either by pressing the Halt button on the operator control panel or by entering Ctrl/P on the console terminal.

Note

Some console commands, for example, `boot`, may alter the machine state so that program mode cannot be successfully resumed (unless you include “-halt” in the boot command). If program mode cannot be successfully resumed, you may need to reboot the operating system.

Examples In the following example, a system is commanded to resume operating system mode.

```
P00>>> continue
```

In the next example, a system's second processor is commanded to resume operating system mode.

```
P00>>> continue &p1
```

ecu

Synopsis Invoke the EISA Configuration Utility.
ecu

Description Before you enter the `ecu` command, insert the ECU diskette for your operating system in the diskette drive.

Entering the `ecu` command from the `P00>>>` console prompt invokes the EISA Configuration Utility (ECU).

Before the system reads the ECU diskette, it first loads the ARC console firmware. The load procedure takes approximately two minutes. When the ARC console firmware has finished loading, the ECU program is booted.

After you complete the ECU procedure, you can switch back to the SRM console, if necessary, as described in the section "Console Firmware Overview."

For more information about running the EISA Configuration Utility, refer to your system documentation.

Example In the following example, the EISA Configuration Utility is invoked from the SRM console.

```
P00>>> ecu
loading ARC firmware
.
.
.
```

help or man

help or man

Synopsis Display information about console commands.
help or man [*command* . . .]

Description The `help` command, interchangeable with the `man` command, displays basic information about the use of console commands when the system is in console mode.

- If you enter the `help` command with no options or arguments, the system displays the complete list of commands for which you can receive help.
- If you enter the `help` command followed by the name of a console command, the screen displays information about the console command.
- If you enter the `help` command with an argument string (such as “sh”), the system displays information about all commands that begin with that string.

Parameter	Description
<i>command</i> . . .	Commands or topics for which help is requested.

Examples In the following example, the system is commanded to display the topics for which help is available.

```
P00>>> help
```

In the next example, the system is commanded to display help on all commands that begin with “sh.”

```
P00>>> help sh
```

In the next example, the system is commanded to display help on the `boot` command.

```
P00>>> help boot
```

init

Synopsis Initialize the system.
init

Description Initializes the system. The system resets the software and executes the power-up self-tests.

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

- The Halt button on the operator control panel is set to the “in” position.
- The auto_action environment variable is set to halt.

If the auto_action environment variable is set to boot or restart and the Halt button is set to the “out” position, the system will autoboot (it will stop in console mode if the Halt button is in). If the auto_action environment variable is set to halt, the system will stop in console mode.

init

Whenever you reset the following SRM environment variables, you must initialize the system with the `init` command to put the new setting into effect:

```
auto_action
console
language
ocp_text
os_type
pk*0_fast
pk*0_host_id
pk*0_soft_term
```

For example, to change the device on which power-up output is displayed from a serial terminal to a graphics monitor, set the `console` environment variable to “graphics” and then enter the `init` command as shown in the example.

Example

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

man

man

See help.

set

set

Synopsis Set or modify the value of an environment variable.
set [-default] *envar val*

Description Sets or modifies the value of an environment variable. Environment variables are used to pass configuration information between the console and the operating system. The setting of these variables determines how the system powers up, boots the operating system, and operates.

Whenever you modify the value of the following environment variables, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

- auto_action
- console
- language
- ocp_text
- os_type
- pk*0_fast
- pk*0_host_id
- pk*0_soft_term

set

Parameters

Parameter	Description
<i>envar</i>	The environment variable to be assigned a new value. Refer to the list of commonly used environment variables in Table 1–4.
<i>val</i>	The value that is assigned to the environment variable. Either a numeric value or an ASCII string.

Flags

Flag	Description
-default	Restores an environment variable to its default value.

Environment Variables

Table 1–4 provides a brief description of the environment variables. Each of these environment variables is described in the following sections.

The environment variables for security commands are described in Chapter 2.

Table 1–4 Environment Variables

Variable	Function	Factory Setting
auto_action	Specifies what action the console should take whenever the system is powered up, crashes, or the Reset button is pressed.	Halt
bootdef_dev	Specifies the default boot device to the system.	System device on which Factory Installed Software (FIS) was loaded.
boot_osflags	Sets the boot flags and in OpenVMS, a root number.	Null
bus_probe_algorithm	Sets bus probe algorithm to improve bus sizing and configuration on DEC OSF/1 systems running SRM console firmware V3.8 or later.	

(continued on next page)

set

Table 1–4 (Cont.) Environment Variables

Variable	Function	Factory Setting
console	Specifies the device on which power-up output is displayed.	Matches the system configuration.
cpu_enabled	Enables or disables specific CPUs on a symmetric multiprocessing system.	All CPUs are enabled.
er*0_protocols	Set network protocols for booting and other functions (er = DEC 4200 chip).	
ew*0_mode	Sets the default Ethernet device type on systems with a Digital Ethernet controller (ew*).	
ew*0_protocols	Set network protocols for booting and other functions (er = DECchip 21040).	
language	Sets the console keyboard layout to a supported language.	Determined at factory.
ocp_text	Specifies the message that is displayed on the power-up/diagnostic display.	CPU speed
os_type	Specifies the operating system that will be run on the system. Sets the appropriate console user interface.	Matches the system configuration.
pci_parity	Disables or enables parity checking on the PCI bus.	The default value is “on”—PCI parity is enabled.
pk*0_fast	Enables Fast SCSI devices to perform in fast SCSI mode.	
pk*0_host_id	Sets the default value for a controller host bus node ID.	Bus node ID 7
pk*0_soft_term	Enable or disable SCSI terminators on systems that use the QLogic ISP1020 SCSI controller.	
tga_sync_green	Set the location of the SYNC signal generated by the turbo graphics adapter (TGA) monitor.	

set auto_action

Synopsis Set the console action at power-up and restart.
 set auto_action [-default] *val*

Description Sets the action the console should take any time the system is powered up, crashes, or the Reset button is pressed. When the setting involves autobooting, the system boots from the default boot device that is specified by the value of the bootdef_dev environment variable.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifier	Description
halt	Causes the system to remain in console mode after the system is powered up or it crashes.
boot	Causes the system to boot automatically when it is turned on. Causes the system to halt after a system failure.
restart	Causes the system to boot automatically when it is turned on or after it fails.

Example In the following example, the system's default console action following error, halt, or power-up is changed from halt to boot.

```
P00>>> show auto_action
auto_action    halt
P00>>> set auto_action boot
P00>>> init
...
P00>>> show auto_action
auto_action    boot
```

set bootdef_dev

set bootdef_dev

Synopsis Set the default boot device.
 set bootdef_dev *device_name*

Description Specifies the default boot device to the system. The default boot device is the device from which the bootstrap system software is loaded. In most cases, the default boot device has already been identified on your system as the device on which Factory Installed Software (FIS) was loaded.

Setting the default boot device simplifies the process of booting the operating system as follows:

- You can enter `b` and press Return at the console prompt and the system will find and boot operating system software.
- Assuming the default startup action is set to `boot` or `restart` (using the `set auto_action` command), the system will find and automatically boot the operating system at power-up.

Before identifying the boot device, consider the following:

- Your boot device may already be set. (Enter the command `show bootdef_dev` to display the current default boot device.)
- You can identify multiple boot devices to the system. By doing so, when you enter `b` or `boot` at the console prompt, the system searches for a bootable device from the list of devices that you specify. The system then automatically boots from the first device on which it finds software.
- Whenever you boot the operating system, you can override the default boot device by specifying an alternative device name on the `boot` command line.

set bootdef_dev

Qualifiers

Qualifier	Description
<i>boot_device</i>	Name (or names) of your boot devices.

Example

In the following example, the default device from which the system attempts to boot is set to dka0.

```
P00>>> set bootdef_dev dka0
```

In the next example, the default devices are set to dub0 and dka0.

```
P00>>> set bootdef_dev dub0,dka0
P00>>> show bootdef_dev
bootdef_dev      dub0,dka0
```

set boot_osflags

set boot_osflags

Synopsis Set the default boot flags and, in OpenVMS, a root number.
set boot_osflags *root_number,bootflag*

Description Boot flags contain information that is read and used by the operating system to determine some aspects of a system bootstrap. Under normal circumstances, the default boot flag settings will suit your environment.

To change the boot flags for the current boot only, you can pass boot flags to the operating system on the boot command line with the -flags option (see the boot command).

The interpretation of the boot flags is operating system dependent.

DEC OSF/1 Systems The DEC OSF/1 operating system takes only one boot flag argument: the boot flag.

Possible boot flag settings and their meanings for DEC OSF/1 systems are:

Flag Setting	Meaning
a	Load operating system software from the specified boot device (autoboot). Boot to multiuser mode.
i	Prompt for the name of a file to load and other options (boot interactively). Boot to single user mode.
s	Stop in single-user mode. Boots /vmunix to single-user mode and stops at the # (root) prompt.
D	Full dump, implies "s" as well. By default, if DEC OSF/1 crashes, it completes a partial memory dump. Specifying "D" forces a full dump at system crash.

```
set boot_osflags
```

Example

In the following example on a DEC OSF/1 system, the boot flags are set to autoboot:

```
P00>>> set boot_osflags a
```

OpenVMS Systems

The OpenVMS operating system takes two boot flag arguments: root number and boot flags. If you specify only one argument, the argument designates the boot flag.

Root Number Settings

The root number is the directory number on the system disk on which OpenVMS files are located. For instance:

File Location	Corresponding Root Number
[SYS0.SYSEXE]	0 (default)
[SYS1.SYSEXE]	1
[SYS2.SYSEXE]	2
[SYS3.SYSEXE]	3

Boot Flags (OpenVMS)

Possible boot flag settings and their meanings for OpenVMS systems are shown in Table 1-5.

Note

Using logical ORing, you can identify multiple boot flags.

set boot_osflags

Table 1–5 OpenVMS Boot Flag Settings

Flag Setting	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to running system.
4	2	Stop at initial system breakpoint.
8	3	Perform diagnostic bootstrap.
10	4	Stop at the bootstrap breakpoints.
20	5	Omit header from secondary bootstrap image.
80	7	Prompt for the name of the secondary bootstrap file.
100	8	Halt before secondary bootstrap.
10000	16	Display debug messages during booting.
20000	17	Display user messages during booting.

Examples

In the following OpenVMS example, the root number is set to 1 and the boot flags are set to 2:

```
P00>>> set boot_osflags 1,2  
...
```

In the next OpenVMS example, the boot flags are set to 1 and the root number is not changed:

```
P00>>> set boot_osflags 1  
...
```

set bus_probe_algorithm

set bus_probe_algorithm

Synopsis Sets a bus probe algorithm on AlphaServer 2000 or AlphaServer 2100 systems running the DEC OSF/1 operating system.

```
set bus_probe_algorithm [old/new]
```

Description Setting this environment variable improves bus sizing and configuration on DEC OSF/1 systems. DEC OSF/1 systems running SRM console firmware V3.8 or later must set the bus probe algorithm to new and then power cycle, reset, or initialize the system.

Example

```
P00>>> set bus_probe_algorithm new
P00>>> init
```

set console

set console

Synopsis Set the device on which power-up output is displayed.
set console output_device

Description Power-up information is typically displayed on your console terminal. Your console terminal might be either a graphics terminal or a serial terminal. The setting of this environment variable determines where the system displays power-up output. Set this environment variable according to the console terminal that you are using.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
graphics	Sets the power-up output to be displayed at a graphics terminal, or a device that is connected to the VGA module at the rear of the system.
serial	Sets the power-up output to be displayed on the device that is connected to the COM1 port at the rear of your system.

Example In the following example, the system is set to display power-up output on the serial device that is connected to the COM1 port at the rear of the system.

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


set cpu_enabled

set cpu_enabled

Synopsis Enables or disables a CPU.
set cpu_enabled *hex_digit*

Description Sets a bit mask that enables or disables specific CPUs on a multiprocessor system. Disabled CPUs are prevented from running the console or the operating system. Bit 0 of the mask corresponds to CPU 0; bit 1 corresponds to CPU 1, and so on. This is shown in Table 1-6 as the binary equivalent, 3210 (bit). A zero (0) bit prevents the corresponding CPU from running; a one (1) bit allows the corresponding CPU to run.

By default, the bit mask is set to all one's (hex digit value F in the table below) so that CPU 0, CPU 1, CPU 2, and CPU 3 are all enabled.

To enable and disable CPUs, type the `set cpu_enabled` command followed by the hex digit value for the CPU or CPUs you want to enable or disable. For example, to disable only CPU 1, you would enter the hex digit value "D." As shown in the table, this value corresponds to enabling CPU 0, CPU 2, and CPU 3 and disabling CPU 1 (bit mask is set to 1101).

set cpu_enabled

Table 1–6 Hex Digit Values for CPUs

Hex Digit Value	Binary Equivalent CPU enable 3210 (bit)	Enabled CPUs
0	0000	No CPUs (CPU 0 still comes up)
1	0001	CPU 0
2	0010	CPU 1
3	0011	CPU 0,1
4	0100	CPU 2
5	0101	CPU 0,2
6	0110	CPU 1,2
7	0111	CPU 0,1,2
8	1000	CPU 3
9	1001	CPU 0,3
A	1010	CPU 1,3
B	1011	CPU 0,1,3
C	1100	CPU 2,3
D	1101	CPU 0,2,3
E	1110	CPU 1,2,3
F	1111	CPU 0,1,2,3

Examples

In the following example, CPUs 0, 2, and 3 are enabled, and CPU 1 is disabled.

```
P00>>> set cpu_enabled d
```

In the following example, CPU 0 and CPU 1 are enabled, and CPU 2 and CPU 3 are disabled.

```
P00>>> set cpu_enabled 3
```

In the following example, CPU 3 is enabled, and CPU 0, 1, and 2 are disabled.

```
P00>>> set cpu_enabled 8
```

set er*0_protocols and set ew*0_protocols

set er*0_protocols and set ew*0_protocols

Synopsis Enable network protocols for booting and other functions. This command applies to systems with a Digital Ethernet controller (er* for the DEC 4220 chip; ew* for the DECchip 21040).

set er*0_protocols *qualifier*

set ew*0_protocols *qualifier*

Description When entering this command, replace the asterisk (*) with the adapter ID for the Ethernet controller for which you are setting the default.

To get a list of the network protocols on your system, enter the `show config` command. A list of all system devices is displayed. The Ethernet controllers for which this command setting is pertinent start with the letters “er” or “ew”. The third letter, represented by an asterisk (*), is the adapter ID for the Ethernet controller.

Qualifiers

Qualifier	Description
mop	Sets the network protocol to mop (Maintenance Operations Protocol): the setting typically used for systems using the OpenVMS operating system.
bootp	Sets the network protocol to bootp: the setting typically used for systems using the DEC OSF/1 operating system.
bootp,mop	The bootp and mop qualifiers can be used in a list, separated by a comma. When the settings are used in a list, the system attempts to use the mop protocol first, regardless of which protocol is listed first. If not successful, it then attempts to use the bootp protocol.

set er*0_protocols and set ew*0_protocols

Examples

In the following example, the network protocol is set to mop for the device ewa0.

```
P00>>> set ewa0_protocols mop
P00>>> show ewa0_protocols
ewa0_protocols          mop
```

In the following example, the network protocol is set to bootp for device era0.

```
P00>>> set era0_protocols bootp
P00>>> show era0_protocols
ewa0_protocols          bootp
```

In the following example, the mop protocol is set to mop or bootp for device ewb0.

```
P00>>> set ewb0_protocols mop,bootp
P00>>> show ewb0_protocols
ewa0_protocols          bootp,mop
```

set ew*0_mode

set ew*0_mode

Synopsis Set an Ethernet controller to the default Ethernet device type. This command applies to systems with a Digital Ethernet controller (ew*).

set ew*0_mode *qualifier*

Description Sets an Ethernet controller to run an AUI, ThinWire, or 10BASE-T (twisted-pair) Ethernet network:

- If either an AUI or ThinWire Ethernet network is connected to the Ethernet controller, set the default Ethernet device type to “aui.”
- If a 10BASE-T Ethernet network is connected to the Ethernet controller, set the default Ethernet device type to “twisted-pair.”

When entering this command, replace “*” with the adapter ID for the Ethernet controller for which you are setting the default.

To get a list of the Ethernet controllers on your system, enter the `show config` command. A list of all system devices is displayed. The Ethernet controllers for which this command setting is pertinent start with the letters “ew.” The third letter is the adapter ID for the Ethernet controller.

set ew*0_mode

Qualifiers

Qualifier	Description
au	Sets the default Ethernet device to AUI.
twisted-pair	Sets the default Ethernet device type to 10BASE-T (twisted-pair).
auto-sensing	Reads the device connected to the Ethernet port and sets the default to the appropriate Ethernet device type. (Currently, this option is not implemented.)

Example

In the following example, the default Ethernet device type for Ethernet controller “a” is set to a 10BASE-T (twisted-pair) controller.

```
P00>>> set ewa0_mode twisted-pair
P00>>> show ewa0_mode
ewa0_mode    twisted-pair
```

set host

Synopsis	Connect the console program to the MSCP DUP server on a DSSI device. set host -dup [-task <i>task_name</i>] <i>device</i>						
Description	Connects the console program to another DUP server on a DSSI device. In the syntax, <i>device</i> is the name of the device to attach to the console program. Using the -dup option invokes the DSSI DUP server on the selected device. You can use the DUP protocol to examine and modify parameters of a DSSI device. For more information, refer to the <i>DSSI VMScCluster Installation and Troubleshooting</i> manual.						
Parameters	<table border="1"> <thead> <tr> <th>Parameter</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><i>device</i></td> <td>Specifies the device to attach to the console program.</td> </tr> </tbody> </table>	Parameter	Description	<i>device</i>	Specifies the device to attach to the console program.		
Parameter	Description						
<i>device</i>	Specifies the device to attach to the console program.						
Flags	<table border="1"> <thead> <tr> <th>Flag</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>-dup</td> <td>Specifies connection to an MSCP DUP server. The DUP service may be used to examine and modify parameters of a DSSI device.</td> </tr> <tr> <td>-task <i>task_name</i></td> <td>Specifies which DUP service utility to invoke. Refer to the example that follows for a list of utilities. If you do not specify this qualifier, a directory of utilities is displayed.</td> </tr> </tbody> </table>	Flag	Description	-dup	Specifies connection to an MSCP DUP server. The DUP service may be used to examine and modify parameters of a DSSI device.	-task <i>task_name</i>	Specifies which DUP service utility to invoke. Refer to the example that follows for a list of utilities. If you do not specify this qualifier, a directory of utilities is displayed.
Flag	Description						
-dup	Specifies connection to an MSCP DUP server. The DUP service may be used to examine and modify parameters of a DSSI device.						
-task <i>task_name</i>	Specifies which DUP service utility to invoke. Refer to the example that follows for a list of utilities. If you do not specify this qualifier, a directory of utilities is displayed.						

set host

Example The following example shows how to connect to the MSCP DUP server on a device.

```
P00>>> show device du
dud0.0.0.3.0          R2YQYA$DIA0          RF72
P00>>> set host -dup dud0
starting DIRECT on pud0.0.0.3.0 (R2YQYA)

Copyright (C) 1990 Digital Equipment Corporation
PRFMON V1.0 D 2-NOV-1990 10:30:58
DKCOPY V1.0 D 2-NOV-1990 10:30:58
DRVEXR V2.0 D 2-NOV-1990 10:30:58
DRVST V2.0 D 2-NOV-1990 10:30:58
HISTRY V1.1 D 2-NOV-1990 10:30:58
DIRECT V1.0 D 2-NOV-1990 10:30:58
ERASE V2.0 D 2-NOV-1990 10:30:58
VERIFY V1.0 D 2-NOV-1990 10:30:58
DKUTIL V1.0 D 2-NOV-1990 10:30:58
PARAMS V2.0 D 2-NOV-1990 10:30:58
Total of 10 programs.
Task?
P00>>> set host -dup -task params dud0
starting PARAMS on pud0.0.0.3.0 (R2YQYA)

Copyright (C) 1990 Digital Equipment Corporation

PARAMS> show allclass

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

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

set language

Synopsis Set the keyboard layout, which is language dependent.
`set language language_code`

Description Your terminal keyboard layout depends on the language variant of the keyboard that you ordered. In order for the system to interpret the terminal keyboard layout correctly, the console language setting must match the language of the keyboard variant that you ordered.

The system ships from the factory with a default keyboard setting. Enter `show language` at the console prompt to display the current keyboard setting. If the current setting does not match your keyboard, reset this variable to match your keyboard variant.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

set language

Qualifiers

Possible keyboard language variants and the code that you use to designate them are as follows:

Code	Language
0	none (cryptic)
30	Dansk (Danish)
32	Deutsch (German)
34	Deutsch (Schweiz) (Swiss)
36	English (American)
38	English (British/Irish)
3A	Espanol (Spanish)
3C	Francais (French)
3E	Francais (Canadian)
40	Francais (Suisse Romande)
42	Italiano (Italian)
44	Nederlands (Netherlands)
46	Norsk (Norwegian)
48	Portuguese (Portuguese)
4A	Suomi (Finnish)
4C	Svenska (Swedish)
4E	Belgisch-Nederlands (Dutch)

Example

In the following example, the system is set to be used with the Spanish variant of a terminal keyboard.

```
P00>>> set language 3A
P00>>> init
. . .
```

set ocp_text

Synopsis Set the message that is displayed on the power-up/diagnostic display.

set ocp_text *message*

Description The power-up/diagnostic display on the front of the system is used to display important diagnostic and power-up information. When self-tests and diagnostics are completed, the CPU variant and system model number are displayed—for example, Model 4/200. You can use the set ocp_text command to display a different message of your choice, as shown in the example below.

The power-up/diagnostic display can display up to 16 characters. Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the init command.

Qualifiers

Qualifier	Description
message	<i>your_text</i>

Example In the following example, the system is set to display “Model 4/250” on the power-up/diagnostic display when the operating system is up and running. The text to be displayed must be entered in quotation marks.

```
P00>>> set ocp_text "Model 4/250"
P00>>> init
. . .
```

set os_type

set os_type

Synopsis Set the default operating system.
set os_type *os_type*

Description The operating system is set at the factory to DEC OSF/1, OpenVMS, or Windows NT, depending on the operating system software you purchased. The `set os_type` command is used to change the factory default setting to the operating system you specify. The `os_type` environment variable also sets the firmware environment that will be started whenever the system powers up, is halt or restarted, or the operating system is shut down.

- If *os_type* is set to *vms*, the system always starts the SRM firmware, and OpenVMS is the default operating system.
- If *os_type* is set to *osf*, the system always starts the SRM firmware, and DEC OSF/1 is the default operating system.
- If *os_type* is set to *nt*, the system always starts the ARC firmware, and Windows NT is the default operating system.

If you decide to change operating systems, from DEC OSF/1 or OpenVMS to Windows NT or from Windows NT to DEC OSF/1 or OpenVMS, you must reset the `os_type` environment variable in order to activate the appropriate firmware for the operating system.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

set os_type

Qualifiers

Possible settings are as follows:

Qualifier	Description
nt	Sets the default operating system to Microsoft Windows NT; starts ARC firmware
osf	Sets the default operating system to DEC OSF/1; starts SRM firmware
vms	Sets the default operating system to OpenVMS; starts SRM firmware

Example

In the following example the default operating system is reset from OpenVMS to Microsoft Windows NT. When the system powers up, is halted or restarted, the ARC console firmware will be started.

```
P00>>> show os_type
os_type          vms
P00>>> set os_type nt
P00>>> init
. . .
```

set pci_parity

set pci_parity

Synopsis Disable or enable parity checking on the PCI bus.
set pci_parity [on/off]

Description Some PCI devices do not implement PCI parity checking, and some have a parity-generating scheme in which the parity is sometimes incorrect or is not fully compliant with the PCI specification. In such cases, the device functions properly as long as parity is not checked. The set pci_parity command allows you to turn off PCI parity checking so that false PCI parity errors do not cause system problems. The default value is “on”—PCI parity is enabled.

Note

If you disable PCI parity, no parity checking is implemented on any PCI device, even those devices in full compliance with the PCI specification.

Example In the following example, PCI parity is disabled.

```
P00>>> set pci_parity off
```

set pk*0_fast

set pk*0_fast

Synopsis Enable either standard or fast SCSI mode.
set pk*0_fast *scsi_speed*

Description Enables Fast SCSI devices on a SCSI controller to perform in standard or fast mode.

- If you have at least one Fast SCSI device in your system, set the default controller speed to Fast SCSI (1).
Devices on a controller that connects to both standard and Fast SCSI devices will automatically perform at the appropriate rate for the device, either fast or standard mode.
- If you have no Fast SCSI devices, set the default controller speed to standard SCSI (0).
If a controller is set to standard SCSI mode, both standard and Fast SCSI devices will perform in standard mode.

When entering this command, replace "*" with the adapter ID for the SCSI controller for which you are setting the default.

To get a list of the controllers on your system, enter the `show config` command. A list of all system devices is displayed. The third letter is the adapter ID for the controller.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

set pka0_fast

Qualifiers

Qualifier	Description
0	Sets the default speed for devices on the controller to standard SCSI.
1	Sets the default speed for devices on the controller to Fast SCSI mode.

Example

In the following example, the default speed for devices connected to a SCSI controller with an adapter ID of "a" is set to fast SCSI mode.

```
P00>>> set pka0_fast 1
P00>>> init
...
P00>>> show pka0_fast
pka0_fast      1
```


set pk*0_host_id

set pk*0_host_id

Synopsis Set the controller host bus node ID to a value between 0 and 7.
set pk*0_host_id *scsi_controller_bus_node_id*

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

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

When entering this command, replace “*” with the adapter ID for the SCSI controller for which you are setting the default.

To get a list of the controllers on your system, enter the `show config` command. A list of all system devices is displayed. The third letter is the adapter ID for the controller.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
0-7	Indicates the bus node ID.

Example

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

```
P00>>> set pkb0_host_id 6
P00>>> init
. . .
P00>>> show pkb0_host_id
pkb0_host_id      6
```

set pk*0_soft_term

set pk*0_soft_term

Synopsis Enable or disable SCSI terminators. This command applies to systems that use the QLogic ISP1020 SCSI controller.

set pk*0_soft_term *value*

Description The QLogic ISP1020 SCSI controller implements the 16-bit wide SCSI bus. The QLogic module has two terminators, one for the low 8 bits and one for the high 8 bits. There are five possible values:

Value	Meaning
off	Turns off both low 8 bits and high 8 bits.
low	Turns on low 8 bits and turns off high 8 bits.
high	Turns on high 8 bits and turns off low 8 bits.
on	Turns on both low 8 bits and high 8 bits.
diff	Places the bus in differential mode.

When entering this command, replace the asterisk (*) with the adapter ID for the SCSI controller letter for which you are setting the default, for example, pkb0.

To get a list of the SCSI bus controllers on your system, enter the `show config` command. A list of all system devices is displayed. The adapter ID is shown next to the QLogic ISP1020 listing.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Examples In the following example, both terminators are disabled.

```
P00>>> set pkb0_soft_term off
P00>>> init
.
.
.
P00>>> show pkb0_soft_term
pkb0_soft_term      off
```

```
set pk*0_soft_term
```

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

```
P00>>> set pkb0_soft_term high
P00>>> init
...
P00>>> show pkb0_soft_term
pkb0_soft_term      high
```

```
set tga_sync_green
```

set tga_sync_green

- Synopsis** Sets the location of the SYNC signal generated by the high-performance turbo graphics adapter (TGA) card (PBXGA).
`set tga_sync_green parameter`
- Description** This environment variable must be set correctly so that the TGA monitor will synchronize. The correct setting, displayed with the `show` command is:
- ```
P00>>> show tga_sync_green
tga_sync_green 0
```
- The parameter is a bit mask, where the least significant bit (LSB) sets the vertical SYNC for the first TGA found, the second for the second found, and so on.
- Example** The following command sets all turbo graphics adapters to synchronize on a separate vertical SYNC line, as required by some monitors. See your monitor documentation for all other information.
- ```
P00>>> set tga_sync_green 00
P00>>> show tga_sync_green
tga_sync_green      0
```

show

Synopsis Display an environment variable value or other information.
 show [*envar*] [{config,device,memory,pal,version}]

Description Displays the current value (or setting) for an environment variable that you specify. The SRM environment variables are listed in Table 1–4, earlier in this chapter.

Alternatively, displays other information about the system, according to the parameters that you enter on the command line. For example, you can display the system configuration by entering `show config`.

Parameters

Parameter	Description
<i>envar</i>	Displays the value of the environment variable specified. Refer to the list of commonly used environment variables described in the next table.
config	Displays the current system configuration.
device	Displays devices and controllers in the system.
fru	Displays the serial number and revision level of system bus options and any errors for those options.
memory	Displays the memory module configuration.
pal	Displays the Privileged Architecture Library code (PALcode) version.
version	Displays the console program version.

show

Examples

In the following example, the system displays the version of the console program installed. In the following example, the console program version is V3.6-83.

```
P00>>> show version
version          V3.6-83 Aug  3 1994 14:57:04
P00>>>
```

In the next example, the default system power-up action is displayed.

```
P00>>> show auto_action
auto_action      boot
P00>>>
```

In the next example, a system's default boot device is displayed. The default boot device in the example is ewa0.

```
P00>>> show bootdef_dev
bootdef_dev      ewa0.0.0.6.0
P00>>>
```

In the next example, a system's memory is displayed.

```
P00>>> show memory

Module   Size   Base Addr   Intlv Mode   Intlv Unit   Status
-----
  0      64MB  00000000    1-Way        0            Passed
  1      32MB  04000000    1-Way        0            Passed
Total Bad Pages 0
P00>>>
```

show config

show config

Synopsis Display the system configuration.
show config

Description 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 display includes the following:

- Core system status:
 - CPU, memory, standard I/O are shown with the results of power-up tests: P (pass) or F (fail)
- Hose 0, 32-bit PCI:
 - Slot 0 = Ethernet adapter (ewa0)
 - Slot 1 = SCSI controller on standard I/O, along with storage drives on the bus.
 - Slot 2 = EISA to PCI bridge chip
 - Slots 3–5 = Reserved
 - Slots 6–8 = Correspond to PCI card cage slots: PCI0, PCI1, and PCI2. In the case of storage controllers, the devices off the controller are also displayed.
- Hose 1, EISA:
 - Slot numbers correspond to to EISA card cage slots (1–8). In the case of storage controllers, the devices off the controller are also displayed.
- Hose 2, PCI:
 - Reserved for future expansion.

For more information on device names, refer to the next section, “show device.”

show config

Example

```
P00>>> show config
                                     Digital Equipment Corporation
                                     AlphaServer
Console X3.5-2770                    VMS PALcode X5.48U, OSF PALcode X1.35L
Component      Status  Module ID
CPU 0          P      B2020-AA DECchip (tm) 21064-3
CPU 1          P      B2020-AA DECchip (tm) 21064-3
CPU 2          P      B2020-AA DECchip (tm) 21064-3
CPU 3          P      B2020-AA DECchip (tm) 21064-3
Memory 2       P      B2021-BA 64 MB
I/O            P      -
                                     dva0.0.0.0.1      RX26
Hose 0, PCI
slot 0 DECchip 21040-AA
                                     ewa0.0.0.0.0      08-00-2B-E1-01-ED
slot 1 NCR 53C810
                                     dka0.0.0.1.0      RZ35
                                     pka0.7.0.1.0      SCSI Bus ID 7
slot 2 Intel 82375EB
slot 6 NCR 53C810
                                     dkb0.0.0.6.0      RZ25
                                     pkb0.7.0.6.0      SCSI Bus ID 7
slot 8 NCR 53C810
                                     dkc0.0.0.8.0      RZ35
                                     dkc100.1.0.8.0    RZ35
                                     dkc300.3.0.8.0    RZ35
                                     pkc0.7.0.8.0      SCSI Bus ID 7
Hose 1, EISA
slot 1 MLX0075
                                     dra0.0.0.1.1      2 Member RAID 0 Set
                                     dra1.0.0.1.1      4 Member RAID 5 Set
                                     MLX0075.0.0.1.1
slot 2 DEC2E00
                                     dua0.0.0.2.1      RF36
                                     dua1.1.0.2.1      RF35
                                     dua2.2.0.2.1      RF35
                                     dua3.3.0.2.1      RF35
                                     pua0.5.0.2.1      DSSI Bus ID 5
slot 3 CPQ3011
```


show config

```
slot 4  ADP0001
        dkd0.0.0.4.1  RZ28
        dkd100.1.0.4.1 RZ26
        dkd200.2.0.4.1 RZ26
        dkd300.3.0.4.1 RZ26
        dkd600.6.0.4.1 RRD42
        mkd400.4.0.4.1 TLZ06
        mkg500.5.0.4.1 TANDBERG TDC 3800
        pkd0.7.0.4.1  SCSI Bus ID 7

slot 5  DEC4220
        era0.0.0.5.1  08-00-2B-39-4F-4E

slot 6  MLX0072
        drb0.0.0.6.1  2 Member RAID 1 Set
        MLX0072.0.0.6.1

slot 7  ADP0001
        dke300.3.0.7.1 RRD42
        mke500.5.0.7.1 TZ30
        pke0.7.0.7.1  SCSI Bus ID 7

Hose 2, PCI
P00>>>
```

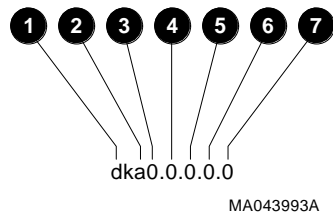
show device

show device

Synopsis Display system devices and controllers.
`show device [device_name]`

Description The `show device` command displays the devices and controllers in the system. The device name convention is shown in Figure 1–2.

Figure 1–2 Device Name Convention



- ❶ **Driver ID**
 - Two-letter port or class driver designator
 - DR–RAID set device
 - DV–Diskette 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
- ❷ **Storage Adapter ID: One-letter storage adapter designator (A,B,C . . .)**
- ❸ **Device Unit Number: Unique device unit number (MSCP Unit Number)**
SCSI unit numbers are forced to 100 X Node ID
- ❹ **Bus Node Number: Bus Node ID**
- ❺ **Channel Number: Used for multi-channel devices.**

show device

- ⑥ Slot Number:
 - For EISA options—Correspond to EISA card cage slot numbers (1–*)
 - For PCI options—Slot 0 = 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 = Correspond to PCI card cage slots: PCI0, PCI1, and PCI2
- ⑦ Hose Number: 0 PCI_0 (32-bit PCI_); 1 EISA; 2 PCI_1

Arguments

[device_name] The device name or device abbreviation. When abbreviations or wildcards are used, all devices that match the type are displayed.

show device

Example

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

❶	❷	❸	❹	❺
dka0.0.0.1.0	DKA0		RZ25L	0006
dka100.1.0.1.0	DKA100		RZ25L	0006
dka600.6.0.1.0	DKA600		RRD43	2893
dva0.0.0.0.1	DVA0		RX26	
mka500.5.0.1.0	MKA500		TLZ06	0435
ewa0.0.0.0.0	EWA0	08-00-2B-3B-42-FD		
pka0.7.0.1.0	PKA0	SCSI Bus ID 7		

```
P00>>> show device dk pk
```

dka0.0.0.1.0	DKA0		RZ25L	0006
dka100.1.0.1.0	DKA100		RZ25L	0006
dka600.6.0.1.0	DKA600		RRD43	2893
dva0.0.0.0.1	DVA0		RX26	
mka500.5.0.1.0	MKA500		TLZ06	0435
pka0.7.0.1.0	PKA0	SCSI Bus ID 7		

```
P00>>>
```

- ❶ Console device name
- ❷ Operating system device name:
 - For an allocation class of zero: `NODENAME$DIAu`
NODENAME is a unique node name and *u* is the unit number. For example, `R7BUCC$DIA0`.
 - For a nonzero allocation class:
`$ALLCLASS$DIAu`
ALLCLASS is the allocation class for the system and devices, and *u* is a unique unit number. For example, `1DIA0`.
- ❸ Node name (alphanumeric, up to 6 characters). Not shown in this example.
- ❹ Device type
- ❺ Firmware version (if known)

show fru

show fru

Synopsis

Display the serial number and revision level of system bus options and any errors for those options.

show fru

Description

Displays module and error information for the following field-replaceable units based on the serial control bus EEPROM data:

- CPU modules
- Memory modules
- I/O modules

For each of the above modules, the slot position, option, part, revision, and serial numbers as well as any reported symptom-directed diagnostics (SDD) and test-directed diagnostics (TDD) event logs are displayed.

In addition, installed PCI and EISA modules are displayed with their respective slot numbers.

show fru

Example

```
P00>>> show fru
  ❶  ❷  ❸                ❹  ❺                ❻
Slot  Option  Part#      Hw Sw  Serial#      SDD  TDD
0     I/O     B2110-AA      C4 0   KA349EVM30   00   00
1     CPU2    B2020-AA      A3 0   ML33800033   00   00
2     CPU0    B2020-AA      A3 0   ML33900059   00   00
3     CPU1    B2020-AA      A3 0   ML33800035   00   00
5     CPU3    B2020-AA      A3 0   ML33900050   00   00
6     MEM2    B2021-BA      A0 0   GA33602844   00   00

PCI Bus
Hose  Slot  Option Name
0     8     NCR 53C810

EISA Bus
Hose  Slot  Option Name
1     1     MLX0075
1     2     DEC2E00
1     3     CPQ3011
1     5     DEC4220
1     6     MLX0072
P00>>>
```

❶ System bus slot number for module (slots 1–7 top to bottom)

Slot 0: Standard I/O module (dedicated EISA/PCI card cage slot)

Slot 1–3, 5: CPU modules

Slot 4–7: Memory modules

❷ Option name (I/O, CPU#, or MEM#)

❸ Part number of option

❹ Revision numbers (hardware and firmware)

❺ Serial number

❻ Events logged:

Numbers other than “00” indicate that errors have been logged.

SDD: Number of symptom-directed diagnostic events logged by the operating system, or in the case of memory, by the operating system and firmware diagnostics.

TDD: Number of test-directed diagnostic events logged by the firmware diagnostics.

show memory

show memory

Synopsis Display information for each memory module in the system.
`show memory`

Description Displays information about each memory module.

Example

```
P00>>> show memory
  ❶  ❷  ❸  ❹  ❺  ❻
Module  Size  Base Addr  Intlv Mode  Intlv Unit  Status
-----  ---  -
0      64MB  00000000  1-Way      0          Passed
Total Bad Pages 0  ❼
P00>>>
```

- ❶ Module slot number
- ❷ Size of memory module
- ❸ Base or starting address of memory module
- ❹ Interleave mode—number of modules interleaved (1–4-way interleaving)
- ❺ Interleave unit number
- ❻ Status (passed, failed, or not configured)
- ❼ Number of bad pages in memory (8 KB/page)

show pal

show pal

Synopsis Display the PALcode version.

show pal

Description Displays the PALcode version. PALcode is the Alpha Privileged Architecture Library code, written to support Alpha processors. It implements architecturally defined behavior.

Example In the following example, the system displays the versions of the PALcode that are installed on the system. The DEC OSF/1 PALcode version is X1.35-23. The OpenVMS PALcode version is X5.48-33.

```
P00>>> show pal
pal      VMS PALcode X5.48-33, OSF PALcode X1.35-23
P00>>>
```


show version

show version

Synopsis Display the console program version.

show version

Description Displays the version of the console program that is installed on the system.

Example In the following example, the system displays the version of the console program that is installed on the system. The console program version is V3.6-83.

```
P00>>> show version
version                    V3.6-83 Aug 3 1994 14:57:04
P00>>>
```

test

test

Synopsis Test the system.
test

Description Runs 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 device is not available to test, a message is displayed.

Note

If you are running the Microsoft Windows NT operating system, switch from the ARC to the SRM console firmware in order to enter the `test` command. Refer to “Console Firmware Overview” at the beginning of this chapter for information about switching from the ARC to the SRM console.

The `test` script tests devices in the following order:

1. Memory tests (1 pass)
2. Read-only tests: DK* disks, DR* disks, MK* tapes, DV* diskettes
3. Console loopback tests if `lb` argument is specified: COM2 serial port and parallel port
4. VGA console tests—These tests are run only if the console environment variable is set to “serial.” The VGA console test displays rows of the letter “H.”
5. Network external loopback tests for EWA0—This test requires that the Ethernet port be terminated or connected to a live network or the test will fail.

test

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.

Examples

In the following example, the system is tested, and the tests complete successfully.

```
P00>>> test
Testing the Memory
Testing the DK* Disks(read only)
dkb600.6.0.2.1 has no media present or is disabled via the RUN/STOP switch
file open failed for dkb600.6.0.2.1
No DR* Disks available for testing
Testing the MK* Tapes(read only)
Testing the DV* Floppy Disks(read only)
file open failed for dva0.0.0.0.1
Testing the VGA(Alphanumeric Mode only)
Testing the EW* Network
P00>>>
```

test

In the next example, the system is tested, and the system reports an error message. The example indicates that no network server responded to a loopback message. Ethernet connectivity on this system should be checked.

```
P00>>> test
```

```
Testing the Memory
```

```
Testing the DK* Disks(read only)
```

```
No DR* Disks available for testing
```

```
Testing the MK* Tapes(read only)
```

```
Testing the DV* Floppy Disks(read only)
```

```
Testing the VGA(Alphanumeric Mode only)
```

```
Testing the EW* Network
```

```
*** Error (ewa0), Mop loop message timed out from: 08-00-2b-3b-42-fd
```

```
*** List index: 7 received count: 0 expected count 2
```

```
P00>>>
```

2

SRM Console Firmware Security Features

Introduction

This chapter explains how to implement security features on the SRM console. The security features are intended to prevent unauthorized persons from tampering with the system from the SRM console interface.

In This Chapter

This chapter contains the following topics:

- Security Features Overview
- Security Commands
- Secure Mode Functions

Security Features Overview

The SRM console firmware V3.9 contains console security features intended to prevent unauthorized personnel from modifying the system parameters or otherwise tampering with the system from the console. The security features include new commands and new parameters to some existing commands. The following two console modes are supported:

- Secure mode allows you to perform a limited number of console commands: `start`, `continue`, `boot` (with stored parameters), and `login` commands.
- User mode allows you to perform all SRM console commands.

Note

The security features work only if access to the system hardware is denied to unauthorized personnel. Be sure to keep the front panel of the system locked and make the key available only to authorized personnel.

Security Commands

set password

The `set password` command allows you to set the console password for the first time or to change an existing password. You do not have to set the password if you do not wish to operate in secure mode.

- If the password has been set previously, the console prompts you for the new password and verification, then prompts you for the old password. The password is not changed if the validation password entered does not match the existing password in the NVRAM.
- If the password has not been set, the console prompts you for the new password and verification.

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

Examples:

Set Password for the First Time (Successful)

```
P00>>> set password
Please enter the password: < password is not echoed >
Please enter the password again: < validation is not echoed >
P00>>>
```

Change an Existing Password (Successful)

```
P00>>> set password
Please enter the password:
Please enter the password again:
Now enter the old password:
P00>>>
```

Password Too Short Error

```
P00>>> set password
Please enter the password: < input is not echoed >
Password length must be between 15 and 30 characters
P00>>>
```

Security Commands

Password Validation Error

```
P00>>> set password
Please enter the password: < password is not echoed >
Please enter the password again: < validation is not echoed >
Validation error
P00>>>
```

set secure

The `set secure` command allows you to enable the security features without requiring you to restart the console. If the password has been set, the console will be secured and only the `start`, `continue`, `boot` (using the stored parameters), and `login` commands can be performed. If the password has not been set, you are prompted to set the password. See the `set password` command for instructions.

Examples:

Set Secure When Password Has Been Set

```
P00>>> set secure
Console is secure
P00>>>
P00>>> show boot_file
Console is secure
```

Set Secure When Password Has Not Been Set

```
P00>>> set secure
Secure not set. Please set the password.
P00>>>
```

login

The `login` command allows you to turn off the security features and gain access to all of the SRM console commands during a particular session. The system automatically returns to secure mode as soon as you enter one of the following commands: `boot`, `continue`, `start` or when you initialize the system.

The `login` command works as follows: When you enter `login`, you are prompted for the current system password. If no password has been set, you are prompted that there is no password in NVRAM. You do not have to set a password if you do not wish to.

- If the password has been set, the following prompt is displayed:

```
Please enter the password:
```


Security Commands

- If the password you enter matches the password in NVRAM when the prompt is redisplayed, the console is no longer in the secure mode and all of the console commands can be performed.
- If you have forgotten the current password, use the login command in conjunction with the Halt button to clear the password, as described below:
 1. Make sure the Halt button is in the “out” position (not lit).
 2. Enter the login command:

```
P00>>> login
```
 3. When the Enter Password: prompt is displayed, press the Halt button (the button should light up), then press .
 4. Press the Halt button to the “out” position (not lit). The password is now cleared and the console cannot be put into secure mode unless you set a new password.

Note

If you enter login with the Halt button in (lit), the command will fail, even if you entered the correct password. This prevents an intruder from depressing the Halt button and locking the front panel. Also, if you leave the Halt button in (lit) after you clear the password, the system will not boot.

Examples:

Valid Login When Secure Feature Is Not Set

```
P00>>> login
Secure not set. Please set the password.
P00>>>
```

Valid Login When Secure Feature Is Set

```
P00>>> login
Please enter the password: < password is not echoed >
P00>>>
```

Security Commands

Invalid Login When Secure Feature Is Set

```
P00>>> login
Please enter the password: < password is not echoed >
Invalid password
P00>>>
```

clear password

The `clear password` command clears the environment variable, `password`, setting it to zero. This command is used when you want access to all of the SRM console commands, but the system is in secure mode. In order to use `clear password`, you must know the current password.

To clear the password without knowing the current password, you must use the `login` command in conjunction with the `Halt` button, as described in the section on the `login` command.

Examples:

Successful Clear Password Command

In this example, the `clear password` command was entered with the valid password:

```
P00>>> clear password
Please enter the password: < enter password (not echoed) >
Password successfully cleared
P00>>>
```

Unsuccessful Clear Password Command

In this example, the `clear password` command was entered with an invalid password:

```
P00>>> clear password
Please enter the password: < invalid password entered
(not echoed) >
Console is secure
P00>>>
```

Secure Mode Functions

Secure mode allows you to perform only the boot command (using the stored parameters) and login, continue and start commands.

boot

When the console is in the secure mode, the boot command will not accept command line parameters. The console will boot using the environment variables stored in NVRAM (boot_file, bootdef_dev, boot_flags).

After a successful boot, the console is secured if there is a valid password. The boot command will accept parameters when the console is not in secure mode.

Boot Examples

Successful Boot from Secure System

```
P00>>> boot
/boot eza0.0.6.0 -file myfile.sys -flags 0

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

Unsuccessful Boot from Secure System

```
P00>>> set boot_file myfile.sys
Console is secure
P00>>>
P00>>> boot -file myfile_ev4p2
Console is secure - parameters are not allowed
P00>>> boot -halt
console is secure - parameters are not allowed
P00>>> boot ezb0
Console is secure - parameters are not allowed
P00>>>
```

start and continue

The start and continue commands are valid on a secure console. After the commands are executed, the console is secured if there is a valid password. This prevents an intruder from halting the system and having access to a console that is not secure.

Secure Mode Functions

Ctrl/x

Ctrl/x will not create a foreground shell during the power-up script.

Ctrl/x is disabled during the power-up sequence to prevent an unauthorized user from initiating a foreground shell that may not be secure.

Using the ARC Console Interface (Microsoft Windows NT)

Introduction

On Alpha AXP systems, underlying control of the system hardware is provided by a console subsystem. The console subsystem contains firmware code (software code embedded in hardware) that facilitates interaction between the hardware and the operating system.

Because the AlphaServer 2000 and 2100 systems are designed to support multiple operating systems, these servers offer two separate operator interfaces:

- A command line interface called the SRM interface for DEC OSF/1 and OpenVMS systems. The SRM interface provides bootstrap and other services as defined in the *Alpha System Reference Manual* (SRM) specification.
- A menu interface called the ARC interface for the Microsoft Windows NT operating system. The ARC interface provides bootstrap and other services as defined in the *Windows NT Portable Boot Loader Specification*.

In This Chapter

This chapter explains how to use the ARC menu interface to carry out operations such as bootstrapping the system software and performing configuration tasks. The menu interface will be familiar to users of windowing systems.

Note

If you are running either the DEC OSF/1 or OpenVMS operating system, refer to Chapter 1.

Console Firmware Overview

The AlphaServer 2000 and AlphaServer 2100 systems contain firmware code that provides service functions, including power-up diagnostics and initialization, console interfaces, and operating system bootstrap and restart.

Firmware Services

At power-up, the firmware tests and initializes the base system. The firmware provides a set of built-in drivers to permit generic access to all the major physical components in the system.

The initialization code is run any time the system is reset. During initialization the base system hardware is tested and configured. All processor caches are set to a consistent state, memory is sized and configured, and the I/O subsystem is reset and configured.

After initialization the firmware starts up its own internal set of class and port drivers. The drivers are used by the console, diagnostics, bootstrap, and the operating system callbacks. This arrangement simplifies the addition of new device support, since it typically requires only the addition of port level drivers.

System self-tests are performed at power-up, including memory diagnostics, individual device test-directed diagnostics executed within a driver's initialization routine, and a concurrent system exerciser. This power-up stream can be customized using both built-in and user scripts.

Operating System Support

The system firmware currently provides support for booting the DEC OSF/1, OpenVMS, and Microsoft Windows NT operating systems.

- DEC OSF/1 and OpenVMS are booted from the SRM firmware. The console terminal used as the operator interface to DEC OSF/1 and OpenVMS can be either a serial terminal (VTxx or equivalent) or a VGA-compatible graphics terminal.
- Microsoft Windows NT is booted from the ARC firmware. The console terminal used as the operator interface to Windows NT must be a VGA-compatible graphics terminal.

SRM Command Line Interface

Systems running DEC OSF/1 or OpenVMS access the SRM firmware via a command line interface (CLI). The CLI is a UNIX style shell that provides a set of commands and operators, as well as a scripting facility. It allows you to configure and test the system, examine and alter system state, and boot the operating system.

The SRM console prompt is P00>>>.

SRM-Only Tasks

There are several system management tasks that can be performed only from the SRM console command line interface:

- To test the system, use the SRM `test` command.
- To examine system bus options for errors, use the `show fru` command.
- To set or change certain environment variables, use one of the following SRM `set` commands. Each command is explained in detail in the reference section of this chapter.

```
set cpu_enabled
set er*0_protocols
set ew*0_mode
set ew*0_protocols
set ocp_text
set pk*0_fast
set pk*0_host_id
set pk*0_soft_term
```


ARC Menu Interface

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

ARC-Only Tasks

The EISA Configuration Utility (ECU) and the RAID Configuration Utility (RCU) are run from the ARC menu interface.

- You must run the EISA Configuration Utility (ECU) whenever you add, remove, or move an EISA or ISA option in your AlphaServer system. The ECU is run from diskette. Two diskettes are supplied with your system shipment, one for DEC OSF/1 and OpenVMS and one for Windows NT. To run the ECU, refer to the instructions in your system documentation.
- If you purchased a StorageWorks RAID Array 200 Subsystem for your server, you must run the RAID Configuration Utility (RCU) to set up the disk drives and logical units. Refer to *StorageWorks RAID Array 200 Subsystem Family Installation and Configuration Guide*, which is included in your RAID kit.

Switching Between Interfaces

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

- Several commands, including the `test` command, are run only from the SRM interface.
- The EISA Configuration Utility (ECU) and the RAID Configuration Utility (RCU) are run only from the ARC interface.

Switching from SRM to ARC

The following console commands can be used to switch to the ARC console:

- The `arc` command loads the ARC firmware and switches to the ARC menu interface.
- The `set os_type nt` command, followed by the `init` command, activates the ARC firmware. Upon next power-up, the ARC console firmware is booted.

Switching from ARC to SRM

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

1. From the Boot menu, select Supplementary menu.
2. From the Supplementary menu, select Set up the system
3. From the Setup menu, select Switch to OpenVMS or OSF console.
4. Select your operating system console, then select the Setup menu and press Enter.
5. When the Power-cycle the system to implement the change message is displayed, press the Reset button.

Once the console firmware is loaded and the system is initialized, the SRM console prompt, `P00>>>`, is displayed.

ARC Interface Introduction

Summary	The ARC user interface is menu based. It has three primary menus: the Boot menu, the Supplementary menu, and the Setup menu.
Boot Menu Functions	<p>The Boot menu contains selections that allow you to perform the following tasks:</p> <ul style="list-style-type: none">• Boot the default boot selection• Boot an alternative boot selection• Run a program• Access the Supplementary menu
Supplementary Menu Functions	<p>The Supplementary menu contains selections that allow you to perform the following tasks:</p> <ul style="list-style-type: none">• Install new firmware• Install Microsoft Windows NT from a compact disc• Access the Setup menu• Display the hardware configuration• Return to the Boot menu
Setup Menu Functions	<p>The Setup menu contains selections that allow you to perform the following tasks:</p> <ul style="list-style-type: none">• Set the system time• Set the default system partition• Configure the system floppy drives and keyboard• Manage the ARC boot selections (See Chapter 4)• Set the system to boot automatically• Run the EISA Configuration Utility (See your system documentation.)• Edit the system environment variables

ARC Interface Introduction

- Reset the system to factory defaults
- Set the default operating system and system firmware
- Return to the Supplementary menu, with or without saving Setup menu changes

Language Selection

Versions of the ARC console firmware, numbered V3.9 or higher, are available in six languages: English, French, German, Italian, Japanese, and Spanish. The default language is English.

Language Support Files

A diskette containing the language support files is provided with new systems. If you wish to install a language other than English, locate the diskette before you proceed. Once you install the language of your choice, that language will be displayed whenever you use the ARC firmware menus. You can switch to a different language at any time.

Updated language support files are provided with firmware updates. You can download these updates from the following on-line locations:

- On CompuServe, in the DEC4WNT forum in the Library Section [4], Hardware Support.
- Via FTP on ftp.digital.com. Once connected, go to /pub /Digital/Alpha/systems.

Language Selection for Updated Firmware

If your ARC Console firmware version is numbered lower than V3.9, you must first update your firmware before you can utilize the multi-language feature. For information on updating your firmware, follow the instructions in the Windows NT Release Notes that came with your Windows NT kit or refer to the *Firmware Update Utility User Guide and Release Notes* shipped with firmware updates.

After you update the firmware, you can change the language selection, if desired, as follows:

1. Turn on power to the system. After a short time, the Language selection menu is displayed.
2. From the Language selection menu, select Other language.
3. Insert the language diskette or CD-ROM into the appropriate drive.
4. From the Language menu that is displayed, select the language of your choice.

Language Selection

5. When prompted to save the language files to hard disk, select yes.
6. At the Choose hard disk location for language files: menu, select Default.

Note

While it is possible to save the language files to another disk or FAT partition, it is highly recommended that you accept the default location. Do not save language files to a disk that will be removed.

This completes the language installation.

Changing to Another Language

Use the following procedure if you are using the default language (English) and wish to change to another language or if you have already selected a language and wish to change it.

1. Turn on the power to your system. After a short wait, the ARC Boot menu is displayed.
2. Select Supplementary menu.
3. From the Supplementary menu, select Set up the system.
4. From the Setup menu, select Set system language.
5. Insert the language diskette or CD-ROM into the appropriate drive. If the language files are already on your hard drive, skip this step.
6. From the Language Selection menu, select Other language.
7. From the Language Location menu, select Floppy Disk, CD-ROM, or Hard Disk as appropriate.
8. From the Language menu that is displayed, select the language of your choice.

Language Selection

9. At the **Save language files to hard disk?** menu, select **yes**.
10. At the **Choose hard disk location for language files:** menu, select **Default**.

Note

While it is possible to save the language files to another disk or FAT partition, it is highly recommended that you accept the default location. Do not save language files to a disk that will be removed.

11. This completes the language change.

Accessing the Boot Menu

Summary This section describes how to access the ARC firmware Boot menu.

Access Procedure Table 3–1 lists the steps to access the ARC firmware Boot menu from different system states.

Table 3–1 Accessing the Boot Menu

Step	Action	Result
1	Shut down the operating system following the instructions in the operating system documentation.	The system enters either the SRM firmware or the ARC firmware.
2	If the system was running DEC OSF/1 or OpenVMS, enter the <code>set os_type nt</code> command to select the ARC firmware.	This command causes the system to enter the ARC firmware when you turn it off and then turn it on again.
3	Turn the system off, then turn it on again.	The system completes the power-up tests, checks the EISA configuration, then displays the Boot menu.

Boot Menu Example Example 3–1 shows a sample Boot menu.

Example 3–1 Boot Menu Example

```
ARC Multiboot Alpha AXP Version n.nn  
Copyright (c) 1993 Microsoft Corporation  
Copyright (c) 1994 Digital Equipment Corporation
```

Boot menu:

```
  Boot Windows NT  
  Boot an alternate operating system  
  Run a program  
  Supplementary menu...
```

Use the arrow keys to select, then press Enter.

Booting the Default ARC Boot Selection

Summary This section describes how to boot the default boot selection.

Booting the Default Boot Selection Table 3–2 lists the steps to boot the default boot selection on your system.

Table 3–2 Booting the Default Boot Selection

Step	Action	Result
1	Access the ARC firmware Boot menu.	The system displays the Boot menu.
2	Choose the first menu item and press Enter. The first menu item takes the form Boot <boot selection name>. Usually, the boot selection name is Windows NT. Alternatively, you can wait for the system to autoboot the default boot selection.	The system displays boot messages as it boots Windows NT or displays an error message if the boot selection is incorrectly defined.

If Errors Occur Refer to Chapter 4 if the system displays an error message when you attempt to boot the default boot selection.

Booting the Default ARC Boot Selection

Example

Example 3–2 shows the ARC firmware Boot menu.

Example 3–2 Choosing the Boot Windows NT Menu Item

```
ARC Multiboot Alpha AXP Version n.mn  
Copyright (c) 1993 Microsoft Corporation  
Copyright (c) 1994 Digital Equipment Corporation
```

Boot menu:

```
  Boot Windows NT  
  Boot an alternate operating system  
  Run a program  
  Supplementary menu...
```

Use the arrow keys to select, then press Enter.

Seconds until auto-boot, select another option to override: 30

Booting an Alternative Operating System

Summary This section describes how to boot an alternative operating system.

Booting an Alternative Operating System Table 3–3 lists the steps to boot an alternative operating system.

Table 3–3 Booting an Alternative Operating System

Step	Action	Result
1	Access the ARC firmware Boot menu.	The system displays the Boot menu.
2	Choose Boot an alternate operating system and press Enter.	The system displays a selection menu listing the system boot selections.
3	Choose the operating system that you want to boot and press Enter.	The system displays boot messages as it boots the chosen selection or displays an error message if the selection is incorrectly defined.

If Errors Occur See Chapter 4 if the system displays an error message when you attempt to boot an alternative operating system.

Booting an Alternative Operating System

Example 1

Example 3–3 shows the ARC firmware Boot menu.

Example 3–3 Booting an Alternative Operating System

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.

Example 2

Example 3–4 shows the boot selection menu.

Example 3–4 Choosing the Alternative Operating System

Boot menu:

```
Boot Windows NT (Default)
Boot OSF/1
Boot OpenVMS
```

Use the arrow keys to select, then press Enter.

Running a Program

Summary This section describes how to run a program using the Run a program menu item.

Valid Programs Digital supplies specially compiled and linked programs that you can run from the ARC firmware to perform various tasks. You can run these programs from any file allocation table (FAT) or NT file system (NTFS) formatted device. This facility allows you to install new firmware by running the firmware update utility, or configure your EISA and ISA options by running the ECU or RCU, from a disk drive partition rather than compact disc or floppy.

Running a Program Table 3-4 lists the steps to run a program from the ARC firmware Boot menu.

Table 3-4 Running a Program

Step	Action	Result
1	Access the ARC firmware Boot menu.	The system displays the Boot menu.
2	Choose Run a program and press Enter.	The system displays a prompt asking you to enter the name of the program.
3	Enter the name of the program, giving the complete device, path, and program name (see the subsection entitled "Example").	The system searches the device and path that you specify for the program. If it finds the program, it executes it. When you exit the program, the system displays the Boot menu again.

Device Names The ARC device names are listed in the hardware configuration display. The following example shows the device name for a SCSI disk drive with SCSI ID 0 on bus 0:

```
scsi(0)disk(0)rdisk(0)
```

Running a Program

See the section “Displaying the Hardware Configuration ,” later in this chapter, for information on displaying the hardware configuration. To specify partition 1 on this device, you must specify the following device name:

```
scsi(0)disk(0)rdisk(0)partition(1)
```

Alternatively, you can define an environment variable to represent the device name, for example:

```
A:=eisa()disk()fdisk()
```

See the section “Editing the System Environment Variables ,” later in this chapter, for information on defining environment variables.

Path and Program Names

The path and program names use the full Microsoft Windows NT file and directory names, for example:

```
\os\nt\osloader.exe
```

See the operating system documentation for information on file and directory names.

Example

The following example shows how to run the executable, ECU.EXE, from a directory called ECU on partition 1 of a disk with SCSI ID 0 on bus 0:

```
Program to run: scsi()disk()rdisk()partition(1)\ecu\ecu.exe
```

Alternatively, if you have an environment variable defining C: as the same partition on the disk drive, you can use the following program name:

```
Program to run: c:\ecu\cf.exe
```

Accessing the Supplementary Menu

Summary This section describes how to access the Supplementary menu in the ARC firmware.

Accessing the Supplementary Menu Table 3–5 lists the steps to access the Supplementary menu.

Table 3–5 Accessing the Supplementary Menu

Step	Action	Result
1	Access the ARC firmware Boot menu.	The system displays the Boot menu.
2	Choose Supplementary menu... and press Enter.	The system displays the Supplementary menu.

Accessing the Supplementary Menu

Supplementary Menu Example

Example 3–5 shows the Supplementary menu.

Example 3–5 Accessing the Supplementary Menu

```
ARC Multiboot Alpha AXP Version n.mn  
Copyright (c) 1993 Microsoft Corporation  
Copyright (c) 1994 Digital Equipment Corporation
```

Supplementary menu:

```
    Install new firmware  
    Install Windows NT from CD-ROM  
    Set up the system...  
    Display hardware configuration  
    Boot menu...
```

Use the arrow keys to select, then press Enter.

Accessing the Setup Menu

Summary This section describes how to access the Setup menu.

Accessing the Setup Menu Table 3–6 lists the steps to access the Setup menu.

Table 3–6 Accessing the Setup Menu

Step	Action	Result
1	Access the Supplementary menu.	The system displays the Supplementary menu.
2	Choose Set up the system... and press Enter.	The system displays the Setup Menu.

Identifying and Correcting Setup Errors

The system can detect setup errors that may prevent the system from booting. When you access the setup menu, an arrow symbol (->) indicates the menu item that you must choose to correct the error. The menu item is highlighted in yellow. There are two methods that you can use to correct these errors:

- Choose each menu item that indicates an error, starting from the top of the menu, and correct the errors.
- Choose Reset system to factory defaults.

See the section “Resetting the System to Factory Defaults ,” later in this chapter, for more information on this menu item.

Caution

Choosing this option deletes all boot selections and environment variables and replaces them with factory default values. Use this option with caution.

Accessing the Setup Menu

Setup Menu Example

Example 3-6 shows the Setup menu.

Example 3-6 Setup Menu

Setup menu:

```
Set system time
Set default environment variables
->Set default configuration
Set system language
Manage boot selection menu
Setup autoboot

Run EISA configuration utility from floppy
Edit environment variables
Reset system to factory defaults

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

Use the arrow keys to select, then press Enter.

Note

The system language option is available with Version 3.9 or higher of the firmware.

Displaying the Hardware Configuration

- Summary** This section describes how to display the hardware configuration. There are several parts to the hardware display:
- The first screen displays the boot devices.
 - The second screen displays processor information, the amount of memory installed, and the type of video card installed.
 - The third and fourth screens display information about the adapters installed in the system's EISA and PCI slots, respectively.

Displaying Hardware Configuration Table 3-7 lists the steps to display the hardware configuration.

Table 3-7 Displaying the Hardware Configuration

Step	Action	Result
1	If necessary, access the Supplementary menu.	The system displays the Supplementary menu.
2	Choose Display hardware configuration and press Enter. Press any key to continue to the next screen.	The system displays the hardware configuration screens.

Displaying the Hardware Configuration

Boot Device Names

Table 3–8 explains the device names listed on the first screen of the hardware configuration display.

Note

The hardware configuration display does not list tape drives or network devices.

Table 3–8 Device Names

Name	Description
multi(0)key(0)keyboard(0) multi(0)serial(0) multi(0)serial(1)	The multi() devices are located on the system module. These devices include the keyboard port and the serial line ports.
eisa(0)video(0)monitor(0) eisa(0)disk(0)fdisk(0)	The eisa() devices are provided by devices on the EISA bus. These devices include the monitor and the floppy drive.
scsi(0)disk(0)rdisk(0) scsi(0)cdrom(5)fdisk(0)	The scsi() devices are SCSI disk or CD-ROM devices. These examples represent installed SCSI devices. The disk drives are set to SCSI ID 0, and the CD-ROM drive is set to SCSI ID 5. The devices have logical unit numbers of 0.

Hardware Configuration Display

Example 3–7 shows a sample hardware configuration display.

Displaying the Hardware Configuration

Example 3-7 Sample Hardware Configuration Display

Wednesday, 8-31-1994 10:51:32 AM

Devices detected and supported by the firmware:

①		②		③
eisa(0)video(0)monitor(0)				
multi(0)key(0)keyboard(0)				
eisa(0)disk(0)fdisk(0)	(Removable)			
multi(0)serial(0)				
multi(0)serial(1)				
scsi(0)disk(0)rdisk(0)	(1 Partition)	DEC RZ26L	(C)DEC440C	
scsi(0)cdrom(5)fdisk(0)	(Removable)	DEC RRD43	(C)DEC 0064	

Press any key to continue...

Wednesday, 8-31-1994 10:51:32 AM

Alpha AXP Processor and System Information:

Processor ID	21064
Processor Revision	3
System Revision	0
Processor Speed	190.11 Mhz
Physical Memory	128 MB

Video Option detected:

BIOS controlled video card

Press any key to continue...

Wednesday, 8-31-1994 10:51:32 AM

EISA slot information:

Slot	Device	Identifier
0	Other	DEC2A01
1	Disk	ADP0001
2	Network	DEC4220
5	Network	DEC3002
6	Network	DEC4250
7	Display	CPQ3011
0	Disk	FLOPPY

Press any key to continue...

Wednesday, 8-31-1994 10:51:32 AM

PCI slot information:

(continued on next page)

Displaying the Hardware Configuration

Example 3–7 (Cont.) Sample Hardware Configuration Display

Bus	Virtual Slot	Function	Vendor	Device	Revision	Device type
0	1	0	1000	1	1	SCSI
0	2	0	8086	482	3	EISA bridge
0	7	0	1011	2	23	Ethernet
1	0	0	1011	2	21	Ethernet
1	1	0	1000	1	2	SCSI
1	2	0	1077	1020	1	SCSI
1	3	0	1077	1020	1	SCSI
2	0	0	1011	2	23	Ethernet
2	1	0	1011	2	23	Ethernet
2	2	0	1011	2	23	Ethernet
2	3	0	1011	2	23	Ethernet

Press any key to continue...

- ❶ Device—Indicates the type of device, for example, EISA or SCSI.
- ❷ Configuration—Indicates how the device is configured, the number of partitions, and whether the device is a removable device.
- ❸ Identifier string—Indicates the device manufacturer, model number, and other identification.

Setting the System Date and Time

Summary This section describes how to set the system date and time from the ARC firmware.

Setting the Date and Time Table 3–9 lists the steps to set the system date and time.

Table 3–9 Setting the System Date and Time

Step	Action	Result
1	Access the Setup menu.	The system displays the Setup menu.
2	Choose the Set system time menu item and press Enter.	The system displays a prompt that asks you to enter the date and indicates the date format that it expects (mm-dd-yy).
3	Enter the date in the required format and press Enter.	The system saves the date that you set in the nonvolatile random-access memory (NVRAM). It then displays a prompt that asks you to enter the time and indicates the time format that it expects (hh-mm-ss).
4	Enter the time in the required format and press Enter.	The system saves the date that you set in the NVRAM, returns to the Setup menu, and displays the new day, date, and time at the top of the screen.

Setting the System Date and Time

Set System Time Example

Example 3–8 shows how to set the system date and time to 11:59 a.m., December 31, 1994. Entries are in 24-hour time. For example, to set the time to 11:59 p.m., you would enter 23:59:00.

Example 3–8 Set System Time Example

```
Sunday, 3-15-1994 12:13:33 AM
Enter the new date (mm-dd-yy) : 12-31-94
Enter time (hh:mm:ss) : 11:59:00
```

Setting the Default System Partition

Summary This section describes how to set the default system partition. The system partition is the partition that contains the operating system loader (OSLOADER.EXE for Windows NT).

Setting the System Partition Table 3–10 lists the steps to set the default system partition.

Table 3–10 Setting the Default System Partition

Step	Action	Result
1	Access the Setup menu.	The system displays the Setup menu.
2	Choose Set default environment variables and press Enter.	The system displays a list of three device types: SCSI Hard Disk, Floppy Disk, and CD-ROM.
3	Select one of the device types and press Enter.	The system displays different prompts depending on the device that you selected.
4	Choose the storage device containing the system partition to use. <ul style="list-style-type: none"> • If you chose SCSI Hard Disk, specify the SCSI ID and the partition number and press Enter. • If you chose Floppy Drive, specify the floppy drive number and press Enter. • If you chose CD--ROM, specify the SCSI ID and press Enter. 	The firmware holds the values you specify in memory. See the section entitled "Saving the System Setup or Quitting the Setup Menu " for information on saving these values.

(continued on next page)

Setting the Default System Partition

Table 3–10 (Cont.) Setting the Default System Partition

Step	Action	Result
5	When you have finished making changes in the Setup menu, save your system setup. For information, see the section entitled “Saving the System Setup or Quitting the Setup Menu .”	Your setup information is saved.

Default System Partition Example

Example 3–9 shows an example of setting up the default system partition as partition 1 on a SCSI disk drive with SCSI ID 1.

Example 3–9 Setting the Default System Partition

```
Enter location of default system partition:  
  Select media:  
  Scsi Hard Disk  
  Floppy Disk  
  CD-ROM  
  Enter SCSI bus number: 0  
  Enter SCSI ID: 1  
  Enter partition (must be FAT or NTFS) : 1
```

Note

Refer to the Windows NT Release Notes for your system for information on the recommended partition arrangement.

Effects of This Procedure

Table 3–11 describes how this procedure affects other system settings and the actions that you must take as a result of using the procedure.

Table 3–11 Effects of Setting the Default System Partition

Effect	Suggested Action
Sets the SYSTEMPARTITION environment variable value.	None.
Sets the FWSEARCHPATH environment variable to the same value as the SYSTEMPARTITION environment variable.	None.
Clears the floppy drive information in the default system configuration.	For information on setting the floppy drive information in the system configuration, see the section “Configuring the System Floppy Drives and Keyboard Type ,” later in this chapter.
Clears all boot selection environment variables except SYSTEMPARTITION.	For information on adding a boot selection before you try to boot Windows NT, see Chapter 4.
Clears the AUTOLOAD and COUNTDOWN environment variables.	For information on setting the AUTOLOAD and COUNTDOWN environment variables, see the section entitled “Setting the System to Boot Automatically .”

Configuring the System Floppy Drives and Keyboard Type

Summary This section describes how to configure the Microsoft Windows NT system floppy drives and keyboard type.

Configuring Drives and Keyboard Table 3–12 lists the steps to configure the system floppy drives and keyboard type.

Table 3–12 Configuring the Floppy Drives and Keyboard

Step	Action	Result
1	Access the Setup menu.	The system displays the Setup menu.
2	Choose Set default configuration and press Enter.	The system displays a prompt asking you to choose the floppy drive capacity.
3	Choose the first floppy drive's capacity and press Enter.	The firmware holds a value indicating the floppy drive capacity in memory. The system displays a prompt asking you to specify whether there is a second floppy drive.
4	Choose whether your system contains a second floppy drive. <ul style="list-style-type: none">If the system does not contain a second floppy drive, choose No and press Enter. Then go to step 5.If the system contains a second floppy drive, choose Yes and press Enter. Enter a value for the floppy drive capacity. Then go to step 5.	If the system does not contain a second floppy drive, you are prompted for the keyboard language. If the system contains a second floppy drive, you are prompted for the floppy drive capacity.

(continued on next page)

Configuring the System Floppy Drives and Keyboard Type

Table 3–12 (Cont.) Configuring the Floppy Drives and Keyboard

Step	Action	Result
5	Choose the language for the keyboard that you ordered.	The system prompts you to select the keyboard from a list. The system holds a value indicating the keyboard language in memory, then displays the Setup menu.
6	When you have finished making changes in the Setup menu, save your system setup. See the section entitled “Saving the System Setup or Quitting the Setup Menu .”	The system saves the changes.

Floppy Drive Configuration Example

Example 3–10 shows an example of configuring a system with two floppy drives.

Example 3–10 Configuring the System Floppy Drives

```
Select floppy drive capacity:
5.25" 1.2MB
3.5" 1.44MB
3.5" 2.88MB

Is there a second floppy:
Yes
No

Select floppy drive capacity:
5.25" 1.2MB
3.5" 1.44MB
3.5" 2.88MB
```

(continued on next page)

Configuring the System Floppy Drives and Keyboard Type

Example 3–10 (Cont.) Configuring the System Floppy Drives

Select keyboard:

U.S.	101-key keyboard
Japanese	106-key keyboard
French	102-key keyboard
German	102-key keyboard
Spanish	102-key keyboard
Spanish variation	
Canadian French	102-key keyboard
Swiss	102-key keyboard
Italian	102-key keyboard
Finnish/Swedish	keyboard
Norwegian	keyboard
Danish	102-key keyboard

Effects of This Procedure

Table 3–13 describes how this procedure affects other system settings and the actions that you must take as a result of using the procedure.

Table 3–13 Effects of Configuring the System Floppy Drives

Effect	Suggested Action
Sets the FLOPPY environment variable to 0, 1, or 2.	None.
Sets the FLOPPY2 environment variable to N, 0, 1, or 2.	None.
Affects the EISA configuration.	Run the EISA Configuration Utility following the instructions listed in your system documentation.

Setting the System to Boot Automatically

Summary This section describes how to set the system to boot automatically when you turn it on or when you switch from the SRM firmware to the ARC firmware.

Setting the System to Boot Automatically Table 3–14 lists the steps to set the system to boot automatically.

Table 3–14 Setting the System to Boot Automatically

Step	Action	Result
1	Access the Setup menu.	The system displays the Setup menu.
2	Choose Setup autoboot and press Enter.	The system displays a prompt asking you whether you want the system to boot automatically.
3	If you do not want the system to boot automatically, choose No and press Enter.	The system displays the Setup menu.
4	If you want the system to boot automatically, choose Yes and press Enter.	The system prompts you to enter the countdown value. You specify the countdown value in seconds. The countdown value gives you that number of seconds to stop the system from booting.
5	Enter a value for the countdown and press Enter.	The system displays the Setup menu.
6	When you have finished making changes in the Setup menu, save your system setup. See the section entitled “Saving the System Setup or Quitting the Setup Menu”.	The system saves the changes.

Setting the System to Boot Automatically

Setup Autoboot Example

Example 3–11 shows an example of setting the system to autoboot and setting the countdown value to 10 seconds (default).

Example 3–11 Setting the System to Boot Automatically

```
Should the system autoboot:  
  Yes  
  No  
  
Enter Countdown value (in seconds): 10
```

Effects of This Procedure

Table 3–15 describes how this procedure affects other system settings and the actions that you must take as a result of using the procedure.

Table 3–15 Effects of Setting the System to Boot Automatically

Effect	Suggested Action
Sets the AUTOLOAD environment variable to YES or NO.	None.
Sets the COUNTDOWN environment variable to a value in seconds.	None.
Causes the system to begin a boot countdown sequence when you access the Boot menu.	Use the up arrow or down arrow keys to choose another menu item to cancel the boot countdown and remain in the ARC firmware.

Editing the System Environment Variables

Summary

This section describes how to edit or create user-defined Microsoft Windows NT system environment variables.

Important Information

Caution

Editing the values of the default ARC firmware environment variables could result in corrupted data or make the system inoperable.

Use the procedure described here only to edit or create your own environment variables. If you accidentally delete or modify one of the default ARC firmware environment variables, immediately reset the value back to the default as described in the section “Resetting the System to Factory Defaults ,” later in this chapter.

Editing the System Environment Variables

Editing Environment Variables

Table 3–16 lists the steps to edit the environment variables.

Table 3–16 Creating or Editing User-Defined Environment Variables

Step	Action	Result
1	Access the Setup menu.	The system displays the Setup menu.
2	Choose Edit environment variables and press Enter.	The system displays the environment variable edit screen.
3	Use the up arrow key or down arrow key to select the name of an existing environment variable or enter a new environment variable name.	Pressing the up arrow key or down arrow key displays the environment variables names in the list.
4	If necessary, edit the environment variable name. Press Enter when the environment name is correct.	The system displays the current value of the environment variable, if it already exists.
5	If you want to update the environment variable value, edit or enter the environment variable value and press Enter.	The system includes the modified or new environment variable at the bottom of the list.
6	If you want to delete the environment variable, leave the value field blank and press Enter.	The system deletes the environment variable from the list.
7	Press the escape (ESC) key to return to the Setup menu.	The system displays the Setup menu.
8	When you have finished making changes in the Setup menu, save your system setup. See the section entitled “Saving the System Setup or Quitting the Setup Menu ,” later in this chapter.	The system saves the changes.

Editing the System Environment Variables

Example

Example 3–12 illustrates the addition of a user-defined environment variable. C: is defined as the search path to be used by the ARC firmware to locate SCSI devices.

Example 3–12 Creating a User-Defined Environment Variable

Use Arrow keys to select a variable, ESC to exit:

```
Name: C:
Value: scsi()disk(0)rdisk()partition(1)
```

```
Environment variables:
CONSOLEIN=multi()key()keyboard()console()
CONSOLEOUT=eisa()video()monitor()console()
FWSEARCHPATH=scsi()disk(0)rdisk()partition(1)
TIMEZONE=PST8PDT
A:=eisa()disk()fdisk()
FLOPPY2=N
FLOPPY=1
AUTOLOAD=YES
COUNTDOWN=10
KEYBOARDTYPE=0
DISABLEPCIPARITYCHECKING=FALSE
```

Effects of This Procedure

This procedure creates an environment variable that you use in other parts of the ARC firmware.

Default Environment Variables

Summary This section describes the default ARC firmware environment variables.

Important Information

Caution

Do not edit or delete the default firmware ARC environment variables. Editing the values of the default ARC firmware environment variables could result in corrupted data, or make the system inoperable.

Default Environment Variables

Table 3–17 lists and explains the default ARC firmware environment variables.

Table 3–17 ARC Firmware Environment Variables

Variable	Description
CONSOLEIN	The console input device. The default value is multi()key()keyboard()console().
CONSOLEOUT	The console output device. The default value is eisa()video()monitor()console().
FWSEARCHPATH	The search path used by the ARC firmware and other programs to locate particular files. The default value is the same as the SYSTEMPARTITION environment variable value.
TIMEZONE	The time zone in which the system is located. This variable accepts ISO/IEC9945-1 (POSIX) standard values.
A:	The default floppy drive. The default value is eisa()disk()fdisk().
FLOPPY	The capacity of the default floppy drive, either 1 (1.2 MB), 2 (1.44 MB), or 3 (2.88 MB).

(continued on next page)

Table 3–17 (Cont.) ARC Firmware Environment Variables

Variable	Description
FLOPPY2	The capacity of an optional second floppy drive, either N (not installed), 1, 2, or 3.
AUTOLOAD	The default startup action, either Y (boot) or N or undefined (remain in ARC firmware).
COUNTDOWN	The default time limit in seconds before the system boots automatically when AUTOLOAD is set to yes. The default value is 10.
KEYBOARDTYPE	The keyboard language. The default is U.S. (English).
DISABLEPCIPARITY CHECKING	Disables parity checking on the PCI bus in order to prevent machine check errors that can occur if the PCI device has not properly set the parity on the bus. The default value is FALSE—PCI parity checking is enabled.
Note	
Refer to the discussion of the <code>set pci_parity</code> SRM environment variable for more information.	

Other Environment Variables The operating system or other programs, for example, the ECU, may create either temporary or permanent environment variables for their own use. Do not edit or delete these environment variables.

Resetting the System to Factory Defaults

Summary This section describes how to reset the system to the factory default settings.

Resetting to Factory Defaults Table 3–18 lists the steps to reset the system to the factory default settings.

Table 3–18 Resetting the System to Factory Defaults

Step	Action	Result
1	Access the Setup menu.	The system displays the Setup menu.
2	Choose <code>Reset system to factory defaults</code> and press <code>Enter</code> .	The system displays a selection menu asking you to confirm your choice.
3	Choose <code>NO</code> and press <code>Enter</code> if you do not want to continue.	The system displays the Setup menu.
4	Choose <code>YES</code> and press <code>Enter</code> if you want to continue.	The system sets the default environment variables, sets the default configuration, creates at least one boot selection, and sets the <code>AUTOLOAD</code> environment variable to <code>YES</code> . It then displays the Setup menu.
5	When you have finished making changes in the Setup menu, save your system setup. See the section entitled “Saving the System Setup or Quitting the Setup Menu ,” later in this chapter.	The system saves the changes.

Resetting the System to Factory Defaults

Effects of This Procedure

Resetting the system to factory defaults clears the EISA configuration information and clears any user-defined environment variables. You must run the ECU on the system before you try to boot the operating system. See your system documentation for information on using the ECU.

Caution

Choosing this option deletes all boot selections and environment variables and replaces them with factory default values. Use this option with caution.

Getting Help

Summary This section describes how to get help on the ARC firmware.

ARC Firmware Help The ARC firmware does not provide help on all the items contained in its menus. However, it provides general help on using the Setup menu.

Displaying the Setup Menu Help Screen Table 3–19 lists the steps to display the Setup menu help screen.

Table 3–19 Displaying the Setup Menu Help Screen

Step	Action	Result
1	Enter the ARC firmware 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 ARC firmware Boot menu.
2	Choose Supplementary menu... from the Boot menu.	The system displays the Supplementary menu.
3	Choose Set up the system... from the Supplementary menu.	The system displays the Setup menu.
4	Choose Help from the Setup menu and press Enter.	The system displays the Setup menu help screen.

Setup Menu Example 3–13 shows the Setup menu.
Example

Example 3–13 Selecting the Help Menu Item

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

Getting Help

Help Example Example 3–14 shows the Setup menu help screen.

Example 3–14 Setup Menu Help Screen

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.

-> A menu item with an arrow represents a section of the NVRAM with a problem. Select these items (in top to bottom order) to repair the NVRAM before attempting to boot or install Windows NT.

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

Home, End, Delete, and Backspace will help you edit strings.
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...

Saving the System Setup or Quitting the Setup Menu

Summary This section describes how to exit from the Setup menu with or without saving the changes you make to the system setup.

Saving the System Setup Table 3–20 lists the steps to save the system setup after you make changes to it.

Table 3–20 Saving the System Setup

Step	Action	Result
1	Choose Supplementary menu, and save changes... and press Enter.	The system saves the changes that you have made in the NVRAM and then displays the Supplementary menu.

Quitting Without Saving Table 3–21 lists the steps to quit from the Setup menu without saving the changes that you made to the system setup.

Table 3–21 Quitting the Setup Menu

Step	Action	Result
1	Choose Supplementary menu, and do not save changes... and press Enter.	The system discards the changes that you have made and then displays the Supplementary menu.

4

Managing ARC Boot Selections (Microsoft Windows NT)

Introduction

This chapter describes how to manage the boot selections that the Microsoft Windows NT operating system uses when booting.

Note

If you are running either the DEC OSF/1 or OpenVMS operating system, you do not need to read this chapter.

In This Chapter

This chapter contains the following sections:

- Accessing the Boot Selections Menu
- Information on Boot Selection Variables
- Adding a Boot Selection
- Checking the Boot Selections for Errors
- Changing a Boot Selection
- Displaying the System Boot Selections
- Changing the Default Boot Selection
- Deleting the Boot Selection

Accessing the Boot Selections Menu

Summary This section describes how to access the Boot selections menu.

Accessing the Boot Selections Menu Table 4–1 lists the steps to access the Boot selections menu.

Table 4–1 Accessing the Boot Selections Menu

Step	Action	Result
1	If necessary, access the Setup menu.	The system displays the Setup menu.
2	Choose the Manage boot selections menu item and press Enter.	The system displays the Boot selections menu.

Boot Selections Menu Example Example 4–1 shows the Boot selections menu.

Example 4–1 Boot Selections Menu

```
ARC Multiboot Alpha AXP Version n.nn  
Copyright (c) 1993 Microsoft Corporation  
Copyright (c) 1994 Digital Equipment Corporation
```

Boot selections 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.

Information on Boot Selection Variables

Summary This section describes the ARC Boot selection variables that the system uses when booting.

Boot Selection Variables Table 4–2 lists and explains the boot selection variables.

Table 4–2 ARC Boot Selection Variables

Variable	Description
LOADIDENTIFIER	The name of the boot selection, for example, Windows NT. You can specify any string value. The firmware does not check the value of this string.
SYSTEMPARTITION	The ARC-defined device name for the partition containing the operating system loader (OSLOADER.EXE for Windows NT).
OSLOADER	The full file name of the operating system loader, including partition device name, directories, and file name.
OSLOADPARTITION	The ARC-defined device name for the partition containing the operating system kernel.
OSLOADFILENAME	The directory name of the root directory for the operating system directory tree, \WINNT35.
OSLOADOPTIONS	A string that is passed to the operating system at load time. This string can be used to modify operating system behavior. The firmware does not check the value of this string.

Adding a Boot Selection

Summary This section describes how to add a boot selection.

Adding a Boot Selection Table 4–3 lists the steps that you must follow to add a boot selection.

Table 4–3 Adding a Boot Selection

Step	Action	Result
1	If necessary, access the Boot selections menu.	The system displays the Boot selections menu.
2	Choose Add a boot selection and press Enter.	The system displays a series of selection menus and prompts relating to the Windows NT operating system.
3	If you have not changed the location of the operating system files, you can use the default answers and choices provided by the procedure.	The system includes the boot selection in the list of boot selections and then displays the Boot selections menu.
4	If you have changed the location of the operating system files, you must edit the default answers or choose selections other than those provided by the procedure. See your operating system documentation for more information.	The system includes the boot selection in the list of boot selections and then displays the Boot selections menu.
5	If you have finished modifying the boot selections, choose Setup menu... and press Enter.	The system displays the Setup menu.

Example

Example 4–2 shows an example of adding a boot selection.

Example 4–2 Adding a Boot Selection

```
Select a system partition for this boot selection:
Scsi Hard Disk 0 Partition 1
New system partition

Enter location of system partition for this boot selection:
Select media:
Scsi Hard Disk
Floppy Disk
CD-ROM

Enter SCSI ID: 4

Enter the osloader directory and
name: \os\nt\osloader.exe

Is the operating system in the same partition as the osloader:
Yes
No

Enter location of os partition:
Select media:
Scsi Hard Disk
Floppy Disk
CD-ROM

Enter SCSI ID: 0
Enter partition : 1

Enter the operating system root directory: \winnt

Enter a name for this boot selection: Windows NT
Do you want to initialize the debugger at boot time:
Yes
No
```

Checking the Boot Selections for Errors

Summary This section describes how to check the system boot selections for errors.

Errors in Boot Selections There are two main causes of errors in boot selections:

- **The boot selection is defined incorrectly**
This causes the system to search in the wrong locations for the operating system files.
- **The operating system is installed incorrectly**
This causes the system to fail when it tries to locate the operating system files.

You must consider both possibilities when trying to correct any errors detected in the boot selection.

Checking the Boot Selections Table 4–4 lists the steps that you must follow to check the boot selections for errors.

Table 4–4 Checking the Boot Selections for Errors

Step	Action	Result
1	If necessary, access the Boot selections menu.	The system displays the Boot selections menu.
2	Choose Check boot selections and press Enter.	The system checks the boot selections for errors. If it does not detect any errors, it remains in the Boot selections menu. If it does detect errors, it displays the name of the boot selection in which it detected the error, a selection menu, and a message indicating the cause of the error.

(continued on next page)

Checking the Boot Selections for Errors

Table 4–4 (Cont.) Checking the Boot Selections for Errors

Step	Action	Result
3	If you want to change the boot selection variables causing the error, choose the Change this boot selection menu item and press Enter. Follow the steps listed in Table 4–5 starting at step 4 for information on changing the variable values.	The system displays the Boot selection edit display, listing the boot selection variables and their values.
4	If you want to delete the boot selection, choose Delete this boot selection and press Enter.	The system deletes the boot selection. If the system detects more boot selections with errors, it repeats the display for that boot selection. Otherwise, it displays the Boot selections menu.
5	If you want to ignore errors in the boot selection, choose Ignore problems with this boot selection and press Enter.	If the system detects more boot selections with errors, it repeats the display for that boot selection. Otherwise, it displays the Boot selections menu. When you return to the Setup menu, the Manage boot selections menu item error indicator (->) remains.
6	If you have finished modifying the boot selections, choose Setup menu... and press Enter.	The system displays the Setup menu.

Example

Example 4–3 shows an example of the display that results when the system detects an error in a boot selection.

Example 4–3 Checking the Boot Selections for Errors

```
Problems were found with Windows NT . Choose an action:
  Ignore problems with this boot selection
  Delete this boot selection
  Change this boot selection

OSLOADPARTITION cannot be found, value is:
  scsi()disk(0)rdisk()partition(2)
```

Changing a Boot Selection

Summary This section describes how to change a boot selection by modifying the values of the boot selection variables.

Changing a Boot Selection Table 4–5 lists the steps to change the value of a boot selection variable.

Table 4–5 Changing a Boot Selection

Step	Action	Result
1	If necessary, access the Boot selections menu.	The system displays the Boot selections menu.
2	Choose Change a boot selection and press Enter.	The system displays a selection menu listing the names of the system boot selections.
3	Choose the name of the boot selection that you want to change and press Enter.	The system displays the Boot selection edit display, listing the boot selection variables and their values.
4	Press the up arrow key or down arrow key to select the name of a variable.	Pressing the up arrow key or down arrow key displays the boot selection variable names in the list.
5	Press Enter when the system displays the name of the variable whose value you want to change.	The system displays the current value of the variable.
6	To update the boot selection variable value, edit the existing value and press Enter.	The system includes the modified or new boot selection variable in the boot selection display.
7	Press the escape (ESC) key to return to the Boot selections menu.	The system displays the Boot selections menu.

(continued on next page)

Table 4–5 (Cont.) Changing a Boot Selection

Step	Action	Result
8	If you have finished modifying the boot selections, choose Setup menu... and press Enter.	The system displays the Setup menu.

Example

Example 4–4 shows an example of the display used for changing a boot selection.

Example 4–4 Changing a Boot Selection

Use Arrow keys to select a variable, ESC to exit:

```
Name: OSLOADFILENAME
Value: \winnt
```

Environment variables for boot selection 1:

```
LOADIDENTIFIER=Windows NT
OSLOADPARTITION=scsi()disk(0)rdisk()partition(2)
OSLOADER=scsi()disk(0)rdisk()partition(1)\osloader.exe
SYSTEMPARTITION=scsi()disk(0)rdisk()partition(1)
OSLOADFILENAME=\winnt
OSLOADOPTIONS=nodebug
```

Displaying the System Boot Selections

Summary This section describes how to fully display the system boot selections.

Displaying the System Boot Selections Table 4–6 lists the steps to fully display the system boot selections.

Table 4–6 Displaying the System Boot Selections

Step	Action	Result
1	If necessary, access the Boot selections menu.	The system displays the Boot selections menu.
2	Choose Dump boot selections and press Enter.	The system displays the system boot selections. The boot selection variable values for each boot selection are separated by semicolons (;). When possible, the values share the same line to save space on the screen.
3	When you have finished examining the boot selections, press Enter or any other key.	The system displays the Boot selections menu.

Displaying the System Boot Selections

Example

Example 4–5 shows an example of a boot selections display.

Example 4–5 System Boot Selections Display

```
LOADIDENTIFIER=Windows NT 2;Windows NT ;Windows NT 3
SYSTEMPARTITION=scsi()disk(0)rdisk()partition(1);
                 scsi()disk(1)rdisk()partition(1);
                 scsi()disk(0)rdisk()partition(1)
OSLOADER=scsi()disk(0)rdisk()partition(1)\os\nt\osloader.exe;
          scsi()disk(0)rdisk()partition(1)\os\nt\osloader.exe;
          scsi()disk(0)rdisk()partition(1)\osloader.exe
OSLOADPARTITION=scsi()disk(0)rdisk()partition(1);
                 scsi()disk(0)rdisk()partition(1);
                 scsi()disk(0)rdisk()partition(2)
OSLOADFILENAME=\winnt;\winnt;\winnt
OSLOADOPTIONS=nodebug;nodebug;nodebug

Press any key to continue...
```

Changing the Default Boot Selection

Summary This section describes how to change the default boot selection.

Default Boot Selection Definition The default boot selection is the first boot selection on the system boot selections list. It is the boot selection that the system attempts to boot automatically if the AUTOLOAD environment variable is set to YES.

Changing the Default Boot Selection Table 4–7 lists the steps to change the default boot selection.

Table 4–7 Changing the Default Boot Selection

Step	Action	Result
1	If necessary, access the Boot selections menu.	The system displays the Boot selections menu.
2	Choose Rearrange boot selections and press Enter.	The system displays a selection menu listing the names of the system boot selections.
3	If you do not want to change the default boot selection, press the escape (ESC) key.	The system displays the Boot selections menu without changing the default boot selection.
4	If you want to change the default boot selection, choose the name of the boot selection that you want to become the default boot selection and press Enter.	The system places that boot selection at the top of the system boot selection list where it becomes the default boot selection.
5	Press the escape (ESC) key when you have finished rearranging the order of the boot selections.	The system displays the Boot selections menu.
6	If you have finished modifying the boot selections, choose Setup menu... and press Enter.	The system displays the Setup menu.

Changing the Default Boot Selection

Example

Example 4–6 shows an example of changing the default boot selection.

Example 4–6 Changing the Default Boot Selection

Pick selection to move to the top, ESC to exit:

```
Windows NT  
Windows NT 2  
Windows NT 3
```

Deleting a Boot Selection

Summary This section describes how to delete a boot selection.

Deleting a Boot Selection Table 4–8 lists the steps to delete a boot selection.

Table 4–8 Deleting a Boot Selection

Step	Action	Result
1	If necessary, access the Boot selections menu.	The system displays the Boot selections menu.
2	Choose Delete a boot selection and press Enter.	The system displays a selection menu listing the names of the system boot selections.
3	If you do not want to delete a boot selection, press the escape (ESC) key.	The system then displays the Boot selections menu without deleting a boot selection.
4	If you want to delete a boot selection, choose the name of that boot selection and press Enter.	The system deletes the boot selection and displays the Boot selections menu.
5	If you have finished modifying the boot selections, choose Setup menu... and press Enter.	The system displays the Setup menu.

Example Example 4–7 shows an example of deleting a boot selection.

Example 4–7 Deleting a Boot Selection

```
Selection to delete:  
Windows NT  
Windows NT 2  
Windows NT 3
```

Index

A

A: environment variable (ARC), 3-40
Alternative operating system, booting (ARC), 3-15
arc command (SRM), 1-13
ARC firmware
 accessing the Boot menu, 3-12
 adding a boot selection, 4-4
 boot device names, listing, 3-23
 Boot menu functions, 3-7
 Boot selections menu, 4-2
 booting default boot selection, 3-13
 changing boot selections, 4-8
 changing the default boot selection, 4-12
 configuring floppy drives, 3-32
 default environment variables, 3-37, 3-40
 deleting a boot selection, 4-14
 device names, 3-17
 discarding Setup menu changes, 3-47
 displaying boot selections, 4-10
 editing environment variables, 3-37
 hardware configuration display, 3-24
 help, 3-45
 interface menus, 3-1
 introduction, 3-7
 invoking from SRM firmware, 1-13
 keyboard and keys, 3-7
 monitor program, 3-7
 resetting to defaults, 3-42
 running a program from, 3-17
 saving Setup menu changes, 3-47
 setting default system partition, 3-29

ARC firmware (cont'd)
 setting time and date, 3-27
 Setup menu, 3-21, 3-45
 Setup menu functions, 3-7
 Supplementary menu, 3-19
 Supplementary menu functions, 3-7
 updating, 3-20
 using, 3-1
ARC interface
 help menu, 3-44
 key functions, 3-7
Autoboot
 DEC OSF/1, 1-25
 OpenVMS, 1-25
 Windows NT (ARC), 3-35
AUTOLOAD environment variable (ARC), 3-30, 3-35, 3-41
auto_action environment variable (SRM), 1-23

B

boot command (SRM), 1-14
boot command, in secure mode, 2-7
Boot device, default
 setting for DEC OSF/1, 1-26
 setting for OpenVMS, 1-26
 setting for Windows NT, 4-12
Boot devices
 ARC firmware names listing, 3-23
 in hardware configuration display, 3-24
Boot examples (SRM), 1-15
Boot flags (SRM), 1-15

- Boot menu (ARC)
 - accessing, 3–12
 - functions, 3–7
- Boot procedure
 - ARC boot selections, 4–1
 - booting alternative operating system (ARC), 3–15
 - booting DEC OSF/1 automatically, 1–25
 - booting default boot selection (ARC), 3–13
 - booting OpenVMS automatically, 1–25
 - booting Windows NT automatically, 3–35
- Boot selection variables (ARC)
 - displaying, 4–10
 - editing, 4–8
 - LOADIDENTIFIER, 4–3
 - OSLOADER, 4–3
 - OSLOADFILENAME, 4–3
 - OSLOADOPTIONS, 4–3
 - OSLOADPARTITION, 4–3
 - SYSTEMPARTITION, 4–3
- Boot selections (ARC)
 - adding, 4–4
 - alternative, booting, 3–15
 - changing, 4–8
 - checking for errors, 4–6
 - default, booting, 3–13
 - default, changing, 4–12
 - deleting, 4–14
 - displaying, 4–10
 - managing, 4–1
- Boot selections menu (ARC)
 - accessing, 4–2
- bootdef_dev environment variable (SRM), 1–23
- Bootstrap
 - command (SRM), 1–14
 - examples (SRM), 1–15
 - flags (SRM), 1–15
- boot_osflags environment variable (SRM), 1–23
- Bus probe algorithm, setting, 1–31
- Buses, displaying (SRM), 1–58

- bus_probe_algorithm environment variable (SRM), 1–23

C

- C: environment variable, 3–18
- Changes
 - discarding in ARC firmware, 3–47
 - saving in ARC firmware, 3–47
- Characters, control, supported in console mode, 1–9
- Characters, keyboard, supported in console mode, 1–9
- clear password, security command, 2–6
- Commands
 - See* Console commands (SRM)
- Compact disc drive
 - running Windows NT programs from, 3–17
- Configuration capacities
 - floppy drive, 3–33
- Console action
 - setting at power-up, 1–25
- Console commands
 - arc, 1–13
 - boot, 1–14
 - continue, 1–16
 - ecu, 1–17
 - help, 1–18
 - init, 1–19
 - language, 1–41
 - man, 1–18
 - set, 1–22
 - set auto_action, 1–25
 - set bootdef_dev, 1–26
 - set boot_osflags, 1–28
 - set bus_probe_algorithm, 1–31
 - set console, 1–32
 - set cpu_enabled, 1–33
 - set er*0_protocols, 1–35
 - set ew*0_mode, 1–37
 - set ew*0_protocols, 1–35
 - set host, 1–39
 - set ocp_text, 1–43
 - set os_type, 1–44

Console commands (cont'd)

- set pci_parity, 1-46
- set pk*0_fast, 1-47
- set pk*0_host_id, 1-49
- set pk*0_soft_term, 1-50
- set tga_sync_green, 1-52
- show, 1-53
- show config, 1-55
- show device, 1-58
- show fru, 1-61
- show memory, 1-63
- show pal, 1-64
- show version, 1-65
- test, 1-66

Console commands (SRM)

- differences between VAX and Alpha, 1-12
- displaying, 1-12
- displaying information about, 1-18
- editing, 1-10
- extending to a second line, 1-10
- format, 1-12
- list of, 1-7, 1-11
- online help, 1-12
- recalling, 1-10
- set os_type, 3-12

console environment variable (SRM), 1-23

Console firmware

- ARC, updating, 3-20
- DEC OSF/1, 1-3, 3-3
- OpenVMS, 1-3, 3-3
- operating system support, 1-2, 3-2
- overview, 1-2, 3-2
- services, 1-2, 3-2
- setting default, 1-44
- updating, xv
- Windows NT, 1-2, 3-2

Console interfaces

- switching between, 1-6, 3-6

Console mode

- keyboard characters, 1-9
- supported control characters on VT-series terminals, 1-9

Console modes

- secure mode, 2-2
- user mode, 2-2

CONSOLEIN environment variable (ARC),

3-40

CONSOLEOUT environment variable (ARC),

3-40

continue command (SRM), 1-16

Control characters

- use of with VT-series terminal, 1-9

Controllers, displaying (SRM), 1-58

COUNTDOWN environment variable (ARC),

3-30, 3-35, 3-41

cpu_enabled environment variable (SRM),

1-23

Ctrl/x command, secure mode, 2-8

D

Date

- setting for ARC firmware, 3-27

Default ARC boot

- selection, booting, 3-13
- selection, changing, 4-12

Default boot device

- setting (SRM), 1-26

Default boot flags

- setting (SRM), 1-28

Default system partition

- setting from ARC interface, 3-29

Defaults

- resetting ARC firmware to, 3-42

Device names

- ARC firmware, 3-17

Device naming convention, 1-58

Devices

- ARC firmware boot names listing, 3-23
- displaying (SRM), 1-58
- in hardware configuration display, 3-24

DISABLEPCIPARITYCHECKING

- environment variable (ARC), 3-41

Disabling CPUs, 1-33

Disk drives

- device names, 3-18
- running programs from, 3-18

DUP server, connecting console program to, 1-39

E

ECU

invoking, 1-17

ecu command (SRM), 1-17

EISA Configuration Utility (ECU), 1-5

EISA devices, displaying, 3-23

Enabling CPUs, 1-33

Environment variables

default ARC, 3-40

Environment variables (ARC)

See also Boot selection variables

A:, 3-40

AUTOLOAD, 3-30, 3-35, 3-41

C:, 3-18

CONSOLEIN, 3-40

CONSOLEOUT, 3-40

COUNTDOWN, 3-30, 3-35, 3-41

creating, 3-37

DISABLEPCIPARITYCHECKING, 3-41

editing for Windows NT, 3-37

FLOPPY, 3-32, 3-40

FLOPPY2, 3-32, 3-41

FWSEARCHPATH, 3-30, 3-40

KEYBOARDTYPE, 3-41

other, 3-41

resetting default variables, 3-37

SYSTEMPARTITION, 3-31

TIMEZONE, 3-40

Environment variables (SRM)

list of, 1-23

preset values, 1-23

setting or modifying, 1-22

value, displaying, 1-53

er*0_protocols environment variable (SRM),

1-23

Errors

checking the ARC boot selections, 4-6

commands to report, 1-61

Ethernet option, configuring (SRM), 1-37

er*0_protocols environment variable (SRM), 1-23

Exiting, ARC Setup menu, 3-47

F

Factory defaults

resetting for Windows NT, 3-42

FAT file format, 3-17

File formats

FAT, 3-17

for running programs, 3-17

NTFS, 3-17

Firmware

See Console firmware

Firmware version

displaying information for (SRM), 1-65

Floppy disk drive

capacities, 3-33

configuring for Windows NT, 3-32

FLOPPY environment variable (ARC), 3-32,

3-40

running Windows NT programs from, 3-17

FLOPPY2 environment variable (ARC),

3-32, 3-41

Formats, hardware configuration display,

3-23

FRUs

commands to report errors, 1-61

FWSEARCHPATH environment variable

(ARC), 3-30, 3-40

H

Hardware configuration display, ARC, 3-24

Hardware configuration, displaying, 3-23

Hardware devices

See Devices

Help

accessing in console mode (SRM), 1-12

on ARC firmware, 3-45

help command (SRM), 1-18

Help menu item

ARC firmware, 3–45

Help screen

on ARC firmware Setup menu, 3–45

I

init command (SRM), 1–19

Initialization, system, 1–19

K

Keyboard

ARC firmware keys, 3–7

Keyboard characters, supported in console mode, 1–9

KEYBOARDTYPE environment variable (ARC), 3–41

L

language environment variable (SRM), 1–23

Language, setting default, 1–41

LOADIDENTIFIER boot selection variable (ARC), 4–3

login, security command, 2–4

M

man command (SRM), 1–18

Memory module

displaying information for (SRM), 1–63

Monitor

ARC keyboard keys, 3–7

N

Network protocols, enabling (SRM), 1–35

NTFS file format, 3–17

O

ocp_text environment variable (SRM), 1–23

Online help

in console mode (SRM), 1–12

Operating system

setting default, 1–44

OSLOADER boot selection variable (ARC), 4–3

OSLOADFILENAME boot selection variable (ARC), 4–3

OSLOADOPTIONS boot selection variable (ARC), 4–3

OSLOADPARTITION boot selection variable (ARC), 4–3

os_type environment variable (SRM), 1–23

P

PALcode version

displaying information for (SRM), 1–64

Parity checking, disabling, 1–46

Partitions, system

names, 3–18

setting default from ARC interface, 3–29

pci_parity environment variable (SRM), 1–23

pk*0_soft_term environment variable (SRM), 1–23

Power-up output, displaying (SRM), 1–32

Power-up/diagnostic display

setting message on (SRM), 1–43

Program, resuming, 1–16

Program, Windows NT

running, 3–17

valid ARC firmware programs, 3–17

Q

QLogic ISP1020 controller, enabling or disabling (SRM), 1–50

Quitting, ARC Setup menu, 3–47

R

RAID Configuration Utility (RCU), 1-5
Reset
 Windows NT factory defaults, 3-42
Root number, 1-29

S

SCSI controller bus node ID
 setting default (SRM), 1-49
SCSI controller, QLogic ISP1020, enabling or
 disabling (SRM), 1-50
SCSI devices
 in hardware configuration display, 3-24
SCSI devices, displaying, 3-23
SCSI, fast
 configuring (SRM), 1-47
Secure mode, 2-2
Secure mode functions, 2-7
Security commands
 clear password, 2-6
 login, 2-4
 set password, 2-3
 set secure, 2-4
set auto_action command (SRM), 1-25
set bootdef_dev command (SRM), 1-26
set boot_osflags command (SRM), 1-28
 boot flags argument (DEC OSF/1), 1-28
 boot flags argument (OpenVMS), 1-29
 root number argument (DEC OSF/1),
 1-28
 root number argument (OpenVMS), 1-29
set bus_probe_algorithm command (SRM),
 1-31
set command (SRM), 1-22
set console command (SRM), 1-32
set cpu_enabled command (SRM), 1-33
set er*0_protocols command (SRM), 1-35
set ew*0_mode command (SRM), 1-37
set ew*0_protocols command (SRM), 1-35
set host command (SRM), 1-39

set language command (SRM), 1-41
 supported languages, 1-42
set ocp_text command (SRM), 1-43
set os_type command (SRM), 1-44
set password, security command, 2-3
set pci_parity command (SRM), 1-46
set pk*0_fast command (SRM), 1-47
set pk*0_host_id command (SRM), 1-49
set pk*0_soft_term command (SRM), 1-50
set secure, security command, 2-4
set tga_sync_green command (SRM), 1-52
Setup menu, ARC, 3-45
 accessing, 3-21
 discarding changes, 3-47
 example, 3-22
 exiting or quitting, 3-47
 functions, 3-7
 saving changes, 3-47
show command (SRM), 1-53
show config command (SRM), 1-55
show device command (SRM), 1-58
show fru command (SRM), 1-61
show memory command (SRM), 1-63
show pal command (SRM), 1-64
show version command (SRM), 1-65
SRM console commands
 See Console commands (SRM)
SRM interface
 switching to, 1-6, 3-6
 switching to ARC from, 1-6, 3-6
start and continue commands, secure mode,
 2-7
Supplementary menu, ARC
 accessing, 3-19
 example, 3-19
 functions, 3-7
System
 resetting to ARC firmware defaults, 3-42
System date and time
 setting from ARC interface, 3-27
System devices
 ARC firmware boot device names, 3-23
System initialization, 1-19

System partition
 defined, 3-29
 setting from ARC interface, 3-29
System setup, Windows NT
 quitting without saving, 3-47
 saving, 3-47
System, testing, 1-66
SYSTEMPARTITION boot selection variable
 (ARC), 4-3
SYSTEMPARTITION environment variable,
 3-31

T

Terminal
 ARC firmware keys, 3-7
 test command (SRM), 1-66
Testing system, 1-66
TGA monitor, synchronizing, 1-52
tga_sync_green environment variable (SRM),
 1-23

Time
 setting for ARC firmware, 3-27
TIMEZONE environment variable (ARC),
 3-40

U

User mode, 2-2

V

VAX console commands, 1-12
VT420 keyboard, 1-10

W

Windows NT
 booting alternative operating system,
 3-15
 booting automatically, 3-35

How to Order Additional Documentation

Technical Support

If you need help deciding which documentation best meets your needs, call 800-DIGITAL (800-344-4825) and press 2 for technical assistance.

Electronic Orders

If you wish to place an order through your account at the Electronic Store, dial 800-234-1998, using a modem set to 2400- or 9600-baud. You must be using a VT terminal or terminal emulator set at 8 bits, no parity. If you need assistance using the Electronic Store, call 800-DIGITAL (800-344-4825) and ask for an Electronic Store specialist.

Telephone and Direct Mail Orders

From	Call	Write
U.S.A.	DECdirect Phone: 800-DIGITAL (800-344-4825) Fax: (603) 884-5597	Digital Equipment Corporation P.O. Box CS2008 Nashua, NH 03061
Puerto Rico	Phone: (809) 781-0505 Fax: (809) 749-8377	Digital Equipment Caribbean, Inc. 3 Digital Plaza, 1st Street Suite 200 Metro Office Park San Juan, Puerto Rico 00920
Canada	Phone: 800-267-6215 Fax: (613) 592-1946	Digital Equipment of Canada Ltd. 100 Herzberg Road Kanata, Ontario, Canada K2K 2A6 Attn: DECdirect Sales
International	-----	Local Digital subsidiary or approved distributor
Internal Orders ¹ (for software documentation)	DTN: 264-3030 (603) 884-3030 Fax: (603) 884-3960	U.S. Software Supply Business Digital Equipment Corporation 10 Cotton Road Nashua, NH 03063-1260
Internal Orders (for hardware documentation)	DTN: 264-3030 (603) 884-3030 Fax: (603) 884-3960	U.S. Software Supply Business Digital Equipment Corporation 10 Cotton Road Nashua, NH 03063-1260

¹Call to request an Internal Software Order Form (EN-01740-07).

Reader's Comments

AlphaServer 2000/2100
Firmware Reference Guide
EK-AXPFW-RM. B01

Your comments and suggestions help us improve the quality of our publications.

Thank you for your assistance.

I rate this manual's:	Excellent	Good	Fair	Poor
Accuracy (product works as manual says)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completeness (enough information)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clarity (easy to understand)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organization (structure of subject matter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Figures (useful)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examples (useful)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Index (ability to find topic)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Page layout (easy to find information)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would like to see more/less _____

What I like best about this manual is _____

What I like least about this manual is _____

I found the following errors in this manual:

Page	Description
_____	_____
_____	_____
_____	_____

Additional comments or suggestions to improve this manual:

For software manuals, please indicate which version of the software you are using: _____

Name/Title _____ Dept. _____

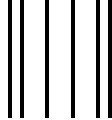
Company _____ Date _____

Mailing Address _____

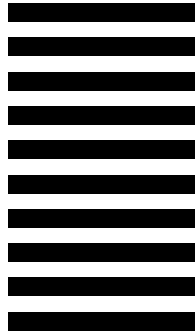
Phone _____

Do Not Tear - Fold Here and Tape

digital™



No Postage
Necessary
If Mailed
in the
United States



BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 33 MAYNARD MASS.

POSTAGE WILL BE PAID BY ADDRESSEE

DIGITAL EQUIPMENT CORPORATION
Information Design and Consulting
MRO1-3/J10
200 Forest Street
Marlboro, MA



Do Not Tear - Fold Here