DIGITAL Alpha VME 4/224 and 4/288 Single Board Computer

Firmware Update Procedures

Digital Equipment Corporation
Maynard, Massachusetts

First Printing, September 1996
Revised, December 1996
Revised, March 1997
Revised, August 1997
Revised, October 1997
Revised, February 1998
Revised, June 1998
Revised, Sept 1998
Revised, March 1999

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.

FCC NOTICE: The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

Copyright © Digital Equipment Corporation, 1996, 1997, 1998, 1999. All Rights Reserved.

COMPAQ, the Compaq logo and the Digital logo Registered in U.S. Patent and Trademark Office.

Alpha, DECchip, DECnet, DIGITAL, OpenVMS, ULTRIX, and VAX are trademarks of Compaq Computer Corporation.

QLogic is a trademark of QLogic Corporation.

VxWorks is a registered trademark of Wind River Systems, Inc.

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

This document was prepared using VAX DOCUMENT Version 2.1.

Contents

Preface v

1 Overview of the Update Process

1.1 Supported CPU Modules and New Features 1–1
1.2 Firmware Update Files 1–2
1.3 Updating the Firmware 1–2

2 Preparing the System for a Firmware Update

2.1 Shutting Down the Operating System 2–1
2.2 Enable Updates 2–1
2.3 Halting the System 2–1
2.4 Disabling Automatic Boot Option 2–1
2.4.1 Disable Power-On Diagnostics 2–2
2.5 Resetting the System 2–2
2.6 Identifying the Current Firmware and PALcode Versions 2–2

3 Updating the Firmware

3.1 Updating the Firmware from CD–ROM 3–1
3.1.1 Booting the Firmware Update Utility 3–1
3.1.2 Updating the Firmware 3–2
3.2 Updating the Firmware from a Network Server 3–3
3.2.1 Copying MOP and BOOTP Loadable Files from the CD–ROM 3–3
3.2.2 Updating MOP 3–4
3.2.3 Updating BOOTP 3–4

4 Post-Update Instructions

Tables

1–1 Operating System Firmware Revision Requirements 1–2
1–2 Firmware Update Utility Files 1–2

Preface

Purpose of This Guide

This document discusses changes that have been made to the DIGITAL Alpha VME 4 firmware since DIGITAL Alpha VME 4 modules started shipping. This document also explains how to use the DIGITAL Alpha VME Firmware Update Utility to update DIGITAL Alpha VME 4 firmware electronically.

Intended Audience

This document is for:

- Manufacturing personnel responsible for updating DIGITAL Alpha VME 4 firmware.
- Repair personnel responsible for upgrading DIGITAL Alpha VME modules.
- Individuals responsible for maintaining DIGITAL Alpha VME systems, typically field service representatives and system managers.

Release Notes

Major functional changes that have been made to the DIGITAL Alpha VME firmware since DIGITAL Alpha VME 4 modules started shipping include support for:

- The QLogic ISP1020 SCSI Controller
- An enhanced PCI configuration routine
- DEFPZ PMC FDDI support

Conventions

The following conventions are used in this guide:

Convention	Description
RZ2*x*	RZ2*x* refers to an RZ-series fixed disk drive, such as the RZ24L, RZ25, or RZ26.
Return	A key name in a box indicates that you press the corresponding key on the keyboard.
Ctrl/*x*	A sequence such as Ctrl/*x* indicates that you must hold down the key labeled Ctrl while pressing key *x*.
show config	Command names appear in bold type. Commands are note case-sensitive except where specifically indicated.
`>>> show auto_action`	This typeface denotes example input and output.

Convention	Description
>>> set *variable*	Variables for which you must supply a value are shown in italic type.

Associated Documentation

For information on how to use the console firmware commands or for a listing of command error codes, see the following documentation:

Title	Order Number
DIGITAL Alpha VME 4/224 and 4/288 Single Board Computer User Guide and Technical Description	EK–DAVME–TD
DIGITAL Alpha VME 4/224 and 4/288 Single Board Computer User Guide and Technical Description (EK–DAVME–TD. A01) Errata	See Note

Note

The errata is located on the firmware CD–ROM at [ALPHAVME]DAVME-TD_ERRATA.PS (located on the ISO side of the CD).

Reader Comments

DIGITAL welcomes comments on this or any other manual. Send your comments to DIGITAL at the following address:

Digital Equipment Corporation
Shared Engineering Services
129 Parker Street
PKO3-2/21J
Maynard, MA 01754-2199

1

Overview of the Update Process

The DIGITAL Alpha VME firmware resides in Flash Erasable Programmable Read Only Memory (FEPROM) on the VME system module. FEPROMs provide non-volatile storage of the DIGITAL Alpha VME PALcode, diagnostics, console interface, and bootstrap. An advantage of this technology is that you can erase, reprogram, and verify the entire image in the FEPROMs in circuit without replacing parts.

The FEPROM technology for DIGITAL Alpha VME modules requires you to erase an entire part before reprogramming it. Hence, there is a small "window of vulnerability", when the DIGITAL Alpha VME has inoperable firmware. Normally, this window is less than thirty seconds. Nonetheless, you should allow an update to run to completion without interruption.

The only DIGITAL Alpha VME Firmware image that you can update is the Alpha SRM firmware image (512KB) used for booting the DIGITAL UNIX operating system or VxWorks for Alpha AXP kernel.

The update utility first performs consistency checks to verify that the image is appropriate for the system and that the new version supersedes the current version. It then erases, reprograms, and verifies the entire FEPROM.

Once the update completes successfully, you must cycle power the sytsem to allow it to unload the firmware from the FEPROMs. You can then resume normal system operation.

1.1 Supported CPU Modules and New Features

This firmware update, V1.3, supports the following CPU modules:

- DIGITAL Alpha VME 4/224
- DIGITAL Alpha VME 4/288

New features include support for:

- The DEFPZ PMC FDDI network card

1.1 Supported CPU Modules and New Features

Table 1–1 lists the operating system firmware revision requirements.

Table 1–1 Operating System Firmware Revision Requirements

SRM Firmware	DIGITAL UNIX	VxWorks
1.1	3.2F	5.2
1.2	4.0a or higher	5.2 or higher
1.3	4.0a or higher	5.2 or higher

1.2 Firmware Update Files

Table 1–2 lists the files that are relevant to the update process.

Table 1–2 Firmware Update Utility Files

File	Blocks	Usage
alphavme_v1_3.exe	1656	Used for CD–ROM and BOOTP Bootable Updates.
alphavme_v1_3.sys	1655	Used as bootable mop version
alphavme_v1_3.sys	1025	Used for Maintenance Operation Protocol (MOP) Network Updates.
alphavme_v13_fw_relnote.ps	~250	Firmware update utility release notes in PostScript format.
alphavme_v13_fw_relnote.txt	~100	Firmware update utility release notes in ASCII text format.

1.3 Updating the Firmware

The procedure for updating the firmware takes about five minutes. Chapters 2 through 4 explain the steps associated with:

- Preparing the system for the firmware update
- Updating the firmware
- Completing post-update instructions

If you have problems with the update procedure, contact your local Customer Support Center.

2

Preparing the System for a Firmware Update

To prepare a DIGITAL Alpha VME system for a firmware update, you must:

1. Shut down the operating system
2. Enable updates
3. Halt the system
4. Disable the automatic boot option
5. Disable power-on diagnostics
6. Reset the system
7. Identify the current version of the firmware and PALcode

This chapter explains how to complete these steps.

2.1 Shutting Down the Operating System

The first step to updating the DIGITAL Alpha VME firmware is to place the DIGITAL Alpha VME system in a quiescent state by shutting down the operating system.

Note

Before shutting down the operating system, be sure to consult the system manager.

2.2 Enable Updates

After shutting down the operating system, enable firmware updates by closing module DIP switch #2.

2.3 Halting the System

After you enable updates, halt the system by pressing the HALT button on the system's front panel. The SRM console prompt (>>>) should appear on the operator console.

2.4 Disabling Automatic Boot Option

Once the console prompt appears, disable the automatic boot option (if the option is enabled) by setting the environment variable AUTO_ACTION to HALT. The following example uses the console command **show** to check the variable's current setting and uses the command **set** to set the value to HALT.

```
>>>  show auto_action
auto_action          BOOT
>>>  set auto_action halt
>>>  show auto_action
auto_action          HALT
>>>
```

2.4.1 Disable Power-On Diagnostics

You must also make sure that power-on diagnostics are disabled. To disable the diagnostics, use the **set** command to set the environment variable MODE to FASTBOOT. For example:

```
>>>  set mode fastboot
>>>
```

Note

You should keep a record of the environment variables that you set so you can set them back to their original values after completing the update.

2.5 Resetting the System

Once the environment is configured correctly, you must place the system in an initialized state by resetting the system. To reset the system, press the RESET button on the front panel. The DIGITAL Alpha VME should reset itself and return the console prompt (>>>).

2.6 Identifying the Current Firmware and PALcode Versions

After resetting the system, identify the current version of the firmware and PALcode. To determine the versions, enter the **show** command with the environment variables VERSION and PAL, respectively. For example:

```
>>>  show version
version                V1.1-0  Jul 1 1996, 10:!6:59
>>>  show pal
pal                    VMS PALcode X5.56-4, OSF PALcode X1.45-8
>>>
```

3
Updating the Firmware

You can update the firmware from either of the following:

- CD–ROM
- A network server

Note

Be sure to wait for updates to run to completion without interruption.

3.1 Updating the Firmware from CD–ROM

To update the firmware from CD–ROM:

1. Power down the DIGITAL Alpha VME system.
2. Connect the proper CD–ROM drive to the SCSI bus.
3. Use the **show device** command to verify the CD–ROM drive is configured and installed correctly.
4. Insert the firmware upgrade CD–ROM into the CD–ROM drive.
5. Boot the Firmware Update Utility.
6. Update the firmware.

Sections 3.1.1 and 3.1.2 explain how to boot the Firmware Update Utility and update the firmware.

3.1.1 Booting the Firmware Update Utility

To boot the Firmware Update Utility, enter the **boot** command at the console prompt with the name of the CD–ROM drive in which the firmware upgrade CD–ROM has been inserted. If you do not know the name of the CD–ROM drive, you can get the name by using the **show device** console command.

The system responds to the **boot** command by displaying:

- System-specific "README-FIRST" information
- The name of the latest Firmware Update Utility boot file
- The prompt `Bootfile:`

The following example shows how to boot the Firmware Update Utility from CD–ROM drive dka400:

```
>>>  boot dka400
(boot dka400.4.0.2.0)
block 0 of dka400.4.0.2.0 is a valid boot block
reading 1002 blocks from dka400.4.0.2.0
bootstrap code read in
base = 102000, image_start = 0, image_bytes = 7d400
initializing HWRPB at 2000
initializing page table at f4000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
Bootfile:
```

At this point, press Return or Enter to load the current version of the utility or type the name of a specific boot file (for example, `[alphavme]alphavme_v1_1.exe`) to load a previous version of the utility.

Note

The name of the boot file changes with each new release.

For example:

```
Bootfile: Return

VMS PALcode V5.56-4, OSF PALcode X1.45-8

starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 1c0c0
memory low limit = 120000
heap = 1c0c0, 17fc0
initializing driver structures
initializing idle process PID
XDELTA not enabled.
initializing file system
initializing DECchip 21071-DA CSRs
initializing timer data structures
lowering IPL
CPU 0 speed is 3.47 ns (288MHz)
16 Meg of system memory
2MB Bcache
probing hose 0, PCI
entering idle loop
probing PCI-to-PCI bridge, bus 1
bus 0, slot 1 -- ewa -- DECchip 21040-AA
bus 0, slot 2 -- pka -- NCR 53C810
Skipping powerup tests...
AlphaVME 4/288 Common Console V1.1-0, built on Jul  1 1996 at 10:16:59
>>>
```

3.1.2 Updating the Firmware

After booting the image of the Firmware Update Utility, update the firmware on the DIGITAL Alpha VME module by issuing the **update** command. For example:

```
>>>  update
new: 1.3

Note: Module DIP Switch #2 must be CLOSED to enable Updates!
```

```
                    FEPROM UPDATE UTILITY
                    -----> CAUTION <-----
       EXECUTING THIS PROGRAM WILL CHANGE YOUR CURRENT ROM!

Do you really want to continue [Y/N] ? :  y

       DO NOT ATTEMPT TO INTERRUPT PROGRAM EXECUTION!
       DOING SO MAY RESULT IN LOSS OF OPERABLE STATE.

The program will take at most several minutes.

Erasing the target flash device...
........
Erasure completed.
Programming...
........
Programming completed
Verifying...
Update successful

       Note: Module DIP Switch #2 should be OPENED to disable Updates!

>>>
```

Note

When updating the flash ROMs on DIGITAL Alpha VME modules, the output text that is displayed is dependent on the CPU being used and may differ from the preceding example.

3.2 Updating the Firmware from a Network Server

To update the firmware from a network server:

1. Copy the MOP and BOOTP loadable files from the CD–ROM onto your server system.
2. Update MOP.
3. Update BOOTP.

3.2.1 Copying MOP and BOOTP Loadable Files from the CD–ROM

The first step to updating the firmware from a network server is to copy the MOP and BOOTP loadable files from the CD–ROM to your DIGITAL UNIX or openVMS server system.

The .sys and .exe files are located on the CD in the ISO 9660 file structure. To access this file structure on a VMS system, the CD must be mounted using the following command:

```
$ mount/media=cd [diskdrivename] UPDATE_V53
```

On a VMS system, the files are located in the directory [ALPHAVME].

On a DIGITAL UNIX system, the files are located in directory /ALPHAVME/.

If you are using an Information Server, the console image resides in the directory `[sys0.sysexe]` directory on the CD–ROM.

Note

The file names change with each new release.

Copy the MOP loadable file (.sys) to the MOM$LOAD directory of the server and enable MOP services.

Copy the BOOTP loadable file (.exe) to the appropriate area on the server and enable BOOTP services.

3.2.2 Updating MOP

Issue the following **update** command, to update MOP:

```
>>>  boot -file  alphavme_v1_3 -protocol mop ewa0
(boot -path mopdl: alphavme_v1_3/ewa0 )
.....
Network load complete.
Host name: host responding to MOP request
Host address: address of above host

new: 1.3-0
>>>
at the prompt >>> ,type update

Note: Module DIP Switch #2 must be CLOSED to enable Updates!

            FEPROM UPDATE UTILITY
            -----> CAUTION <-----
          EXECUTING THIS PROGRAM WILL CHANGE YOUR CURRENT ROM!

         Do you really want to continue [Y/N] ? : y

          DO NOT ATTEMPT TO INTERRUPT PROGRAM EXECUTION!
          DOING SO MAY RESULT IN LOSS OF OPERABLE STATE.

         The program will take at most several minutes.

Erasing the target flash device...
........
Erasure completed.
Programming...
........
Programming completed
Verifying...
Update successful

Note: Module DIP Switch #2 should be OPENED to disable Updates!

>>>
```

Note

When updating the flash ROMs on DIGITAL Alpha VME modules, the output text that is displayed is dependent on the CPU being used and may differ from the preceding example.

3.2.3 Updating BOOTP

To update BOOTP, issue the **update** command as follows:

```
>>>  boot -file alphavme_v1_3.exe -protocol tftp ewa0
(update -path bootp:<REF alphavme_v1_3.exe/ewa0)
.....
Network load complete.

new: 1.3-0
>>>
at the prompt >>> ,type update
```

```
Note:  Module DIP Switch #2 must be CLOSED to enable Updates!

                FEPROM UPDATE UTILITY
                -----> CAUTION <-----
             EXECUTING THIS PROGRAM WILL CHANGE YOUR CURRENT ROM!

            Do you really want to continue [Y/N] ? :  y

            DO NOT ATTEMPT TO INTERRUPT PROGRAM EXECUTION!
            DOING SO MAY RESULT IN LOSS OF OPERABLE STATE.

            The program will take at most several minutes.

Erasing the target flash device...
........
Erasure completed.
Programming...
........
Programming completed
Verifying...
Update successful

Note:  Module DIP Switch #2 should be OPENED to disable Updates!

>>>
```

Note

When updating the flash ROMs on DIGITAL Alpha VME modules, the output text that is displayed is dependent on the CPU being used and may differ from the preceding example.

4
Post-Update Instructions

When you finish updating the firmware, you must:

1. Restore environment variables, such as AUTO_ACTION and MODE, to their original state.
2. Open module DIP switch #2 to disable further updates of the console image.
3. Cycle power or reset the system to unload the FEPROMs and start running the new firmware.
4. Reboot the operating system.

If the update fails, contact your local Customer Support Center.