Alpha Microprocessors Motherboard

Windows NT 3.51 and 4.0 Installation Guide

Order Number: EC–QLUAH–TE

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Contents

Preface v
1. Requirements 1
   1.1 Hardware 1
   1.2 Software 2
2. AlphaBIOS 3
   2.1 AlphaBIOS Conventions 3
   2.2 Starting the AlphaBIOS Setup Program 4
   2.3 Upgrading AlphaBIOS 5
   2.4 Performing CMOS Setup Tasks 5
      2.4.1 Setting Up Your Hard Disk 6
      2.4.2 Displaying Your System Configuration 7
      2.4.3 Running a Maintenance Program 9
   2.5 Installing the Windows NT Operating System 11
      2.5.1 Before Installing Windows NT 11
      2.5.2 Starting Windows NT Setup 11
3. Windows NT ARC Firmware 12
   3.1 Firmware Conventions 13
   3.2 Firmware Menus Access 13
   3.3 Firmware Menus Structure 14
   3.4 Firmware Menus Descriptions 16
      3.4.1 Boot Menu 16
      3.4.2 Supplementary Menu 17
      3.4.3 Setup Menu 18
      3.4.4 Boot Selections Menu 21
      3.4.5 Machine Specific Setup Menu 23
   3.5 Firmware Update Utility 24
      3.5.1 Updating Firmware in a Flash ROM 24
      3.5.2 Updating Firmware in a UVPROM 25
   3.6 Disk Partition Utility 25
      3.6.1 Using the Disk Partition Utility 26
      3.6.2 Creating the System Partition 26
   3.7 Installing the Windows NT Operating System 27
      3.7.1 Before Installing Windows NT 27

3.7.2 Starting Windows NT Setup 28
4. Troubleshooting 29
4.1 Beep Codes 31
4.2 Post Codes 33
4.3 Fail-Safe Booter 44
4.3.1 Starting the Fail-Safe Booter 44
5. Support, Products, and Documentation 46
5.1 DIGITAL Semiconductor Products 47
5.2 DIGITAL Semiconductor Documentation 48
5.3 Ordering Third-Party Software and Documentation 50
5.4 Obtaining the Hardware Compatibility List for Windows NT 50

Figure 1 AlphaBIOS Boot Screen 4
Figure 2 Display System Configuration 8
Figure 3 Run Maintenance Program Submenu 9
Figure 4 Entering the Program Name 10
Figure 5 Windows NT ARC Firmware Menus 15

Table 1 Computer Types and Installation Diskette Requirements for Windows NT 3.51 28
Table 2 Computer Types and Installation Diskette Requirements for Windows NT 4.0 28
Table 3 Beep Codes for AlphaPC 164SX 31
Table 4 Beep Codes for AlphaPC 164LX 31
Table 5 Beep Codes for AlphaPC 164 32
Table 6 Beep Codes for EB164 32
Table 7 Post Codes for AlphaPC 164SX 33
Table 8 Post Codes for AlphaPC 164LX 35
Table 9 Post Codes for AlphaPC 164 37
Table 10 Post Codes for EB164 39
Table 11 Post Codes for AlphaPC 64 41
Table 12 Post Codes for EB66+ 42
Table 13 Post Codes for EB66 43

Preface

This document describes how to install the Microsoft Windows NT Workstation and Microsoft Windows NT Server operating systems on the following Alpha microprocessor motherboards:

- AlphaPC 164SX Motherboard (AlphaPC 164SX)
- AlphaPC 164LX Motherboard (AlphaPC 164LX)
- AlphaPC 164 Motherboard (AlphaPC 164)
- Alpha 21164 Evaluation Board (EB164)
- AlphaPC 64 Evaluation Board (AlphaPC 64)
- Alpha 21066A Evaluation Board (EB66+)
- Alpha 21064 and Alpha 21064A PCI Evaluation Board (EB64+)
- Alpha 21066 and Alpha 21068 Evaluation Board (EB66)

The DIGITAL Semiconductor AlphaPC 164SX and AlphaPC 164LX motherboards run new firmware called AlphaBIOS. The DIGITAL Semiconductor AlphaPC 164, EB164, AlphaPC 64, EB66+, EB64+, and EB66 motherboards run the Windows NT ARC firmware.

DIGITAL recommends that you read this entire document before installing the Windows NT Workstation or Windows NT Server operating system.

Document Conventions and Terms

In this document, the term motherboard refers to the AlphaPC 164SX Motherboard, the AlphaPC 164LX Motherboard, the AlphaPC 164 Motherboard, the EB164 Evaluation Board, the AlphaPC 64 Evaluation Board, the EB66+ Evaluation Board, the EB64+ Evaluation Board, and the EB66 Evaluation Board, unless otherwise noted.

The following conventions are used in this document:

Convention	Description
boldface type	Boldface type in text indicates a command or menu selection.
Caution	Cautions contain information to prevent damage to software or hardware.
Italic type	Italic type emphasizes important information and indicates complete titles of manuals.
Note:	Notes provide additional information about a topic.

The following terms are used in this document:

Term	Description
AlphaBIOS	A new enhanced Basic Input Output System (BIOS) for certain Alpha system families based on the Alpha processor
Alpha SDK and firmware update compact disc	The compact disc labeled *Alpha Motherboards Software Developer's Kit and Firmware Update*
ARC firmware	Advanced RISC Computing (ARC) firmware
Microsoft Windows NT installation guide	The *Windows NT Workstation Installation Guide* and the *Windows NT Server Installation Guide*
Motherboard	An Alpha microprocessor motherboard
System	All of the hardware and software components associated with an Alpha microprocessor motherboard
Windows NT	The Microsoft Windows NT Workstation and Windows NT Server operating systems

Related Documentation

Documentation referenced in this document, such as the *Alpha Motherboards Software Developer's Kit and Firmware Update Read Me First* and platform-specific README files can be found on the Alpha SDK and firmware update compact disc.

See Section 5 for information about ordering related documentation.

1. Requirements

This section describes the hardware, software, and firmware requirements to install and boot Windows NT on Alpha microprocessor motherboard systems.

1.1 Hardware

You need the following hardware to run Windows NT on Alpha motherboard systems:

- A supported video adapter and monitor
- A 166MB (or larger) hard drive

  Note: For information about IDE/ATA hard drives, ATAPI CD–ROM drives, and support for QLogic ISP 1020 SCSI host adapters, see the platform-specific READNT.TXT file on the Alpha SDK and firmware update compact disc or the platform-specific README.TXT file on the Windows NT firmware installation diskette.
- A SCSI or ATAPI CD–ROM drive
- A 3.5-in, 1.44MB diskette drive
- A PS/2 keyboard
- Memory:
  - 16MB of memory (RAM) is required for the Windows NT Workstation operating system; 32MB is recommended
  - 32MB of memory (RAM) is required for the Windows NT Server operating system
- Optional components:
  - A PS/2 mouse or other supported pointing device
  - One or more supported network adapters if you want to use Windows NT on a network

To obtain the hardware compatibility list for Windows NT, see Section 5.4.

1.2 Software

You need different software to install Windows NT on an Alpha motherboard system running AlphaBIOS firmware than on an Alpha motherboard system running Windows NT ARC firmware.

AlphaPC 164SX and AlphaPC 164LX

You need the following software to install Windows NT on the AlphaPC 164SX and the AlphaPC 164LX.

Software	Vendor
Microsoft Windows NT compact disc	Microsoft Corporation
AlphaBIOS Firmware diskette	Digital Equipment Corporation
Windows NT 4.0 Installation diskette	Digital Equipment Corporation

AlphaPC 164, EB164, AlphaPC 64, EB66+, EB64+, and EB66

You need the following software to install Windows NT on the AlphaPC 164, EB164, AlphaPC 64, EB66+, EB64+, and EB66.

Software	Vendor
Microsoft Windows NT compact disc	Microsoft Corporation
Manufacturer-supplied hardware support files	Digital Equipment Corporation
Update and Windows NT ARC firmware diskette[1]	Digital Equipment Corporation

[1] Depending on your computer type, this diskette may or may not be required for Windows NT. See Table 1 and Table 2 to determine if your computer type requires an installation diskette. Future versions of Windows NT may not require this diskette. Contact your OEM or system vendor for details.

2. AlphaBIOS

The AlphaPC 164SX and the AlphaPC 164LX motherboards ship with AlphaBIOS firmware and online documentation that describes how to configure the firmware for Windows NT. This firmware initializes the system and enables you to install and boot the Windows NT operating system. The AlphaBIOS firmware resides in the flash ROM on the motherboard.

2.1 AlphaBIOS Conventions

AlphaBIOS uses the following keys and key combinations for navigating the interface and selecting items. If you are familiar with MS-DOS or Microsoft Windows keyboard conventions, navigating AlphaBIOS is simple.

Key or Key Combination	Description
Tab	Move highlight forward between fields of a dialog.
Shift + Tab	Move highlight backwards between fields of a dialog.
↓ or ↑	Move highlight within a menu, or cycle through available field values in a dialog window.
Alt + ↓	Drop down a menu of choices from a drop-down listbox. A drop-down listbox can be recognized by the symbol ⇓.
Home	Move to the beginning of a text entry field.
End	Move to the end of a text entry field.
← or →	Move to the left or right in a text entry field.
Esc	Discard changes and back up to previous screen.

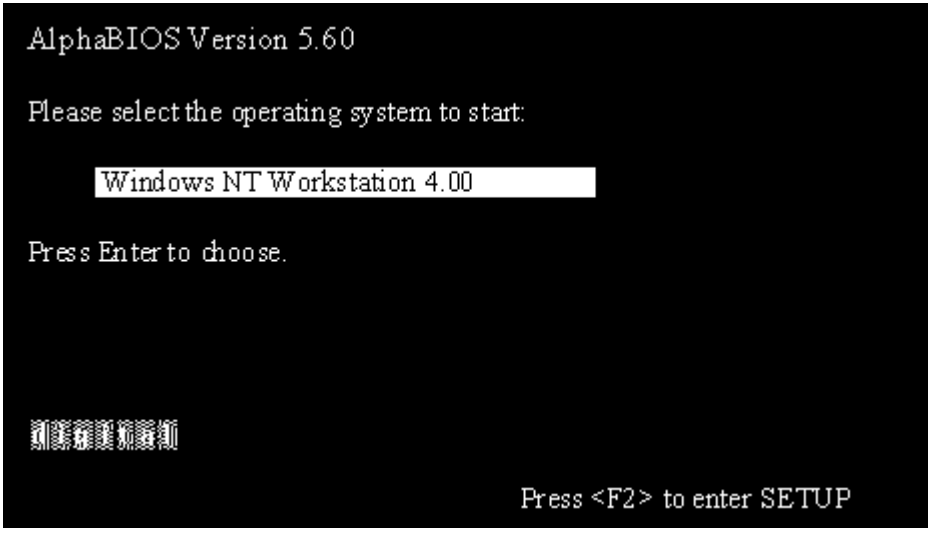
Two levels of keyboard help are available:

- Press **F1** once to display explanations of the keystrokes available for the *currently displayed* part of AlphaBIOS.
- Press **F1** twice to display explanations of the keystrokes available for navigating throughout AlphaBIOS.

2.2 Starting the AlphaBIOS Setup Program

When you power up or reset your system, the boot screen with the system logo is displayed. Figure 1 shows an example of an AlphaBIOS Boot Screen with the "Press <F2> to enter SETUP" message at the bottom. Press **F2** to start the AlphaBIOS setup program.

Figure 1 AlphaBIOS Boot Screen



2.3 Upgrading AlphaBIOS

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

To upgrade from an earlier version of AlphaBIOS:

1. Insert the diskette or CD–ROM containing the AlphaBIOS upgrade.
2. Run the AlphaBIOS Setup program by restarting your system and pressing **F2** when the boot screen is displayed.
3. In the main AlphaBIOS Setup screen, select Upgrade AlphaBIOS and press **Enter**.

   This menu option is used to upgrade to later versions of AlphaBIOS. When you choose this option, the existing AlphaBIOS searches for an executable AlphaBIOS update file, first on CD–ROM, then on diskette. Once the update file has been found, AlphaBIOS executes it, and the firmware is upgraded.
4. After the upgrade is complete, the system either resets automatically or prompts you to reset it.

2.4 Performing CMOS Setup Tasks

CMOS Setup is divided into two modes, standard and advanced. The following table lists the tasks that you can perform in standard and advanced setup mode.

Standard CMOS Setup	Advanced CMOS Setup
Autostart	Memory test
Date and time	PCI parity
Floppy	Password protection
Keyboard	SCSI termination SCSI BIOS emulation

To enter standard CMOS Setup:

1. Start AlphaBIOS Setup.
2. Select CMOS Setup.
3. Press **Enter**.

To enter advanced CMOS Setup:

1. Start AlphaBIOS Setup.
2. Select CMOS Setup.
3. Press **Enter**.
4. In the CMOS Setup screen, press **F6**.

2.4.1 Setting Up Your Hard Disk

Express hard-disk setup is an easy way to create the recommended partition arrangement on your first hard disk, disk 0. Note, however, that express hard-disk setup does not format the large partition with NTFS. You will have the opportunity to do this during the Windows NT installation.

Note: AlphaBIOS assigns “disk 0” to the hard disk with the lowest SCSI ID number on the first bus in your system. If no SCSI devices are present, AlphaBIOS assigns disk 0 to the first IDE hard drive.

Caution: If you have any information on your disk that you want to save, be sure to back it up before using express hard-disk setup.

To perform express hard-disk setup:

1. Start AlphaBIOS Setup.
2. Select Hard Disk Setup.
3. Press **Enter**.
4. Press **F7** to enter express hard-disk setup.
5. Press **F10** to continue with the setup.

For information on manually managing hard disks, see the online documentation.

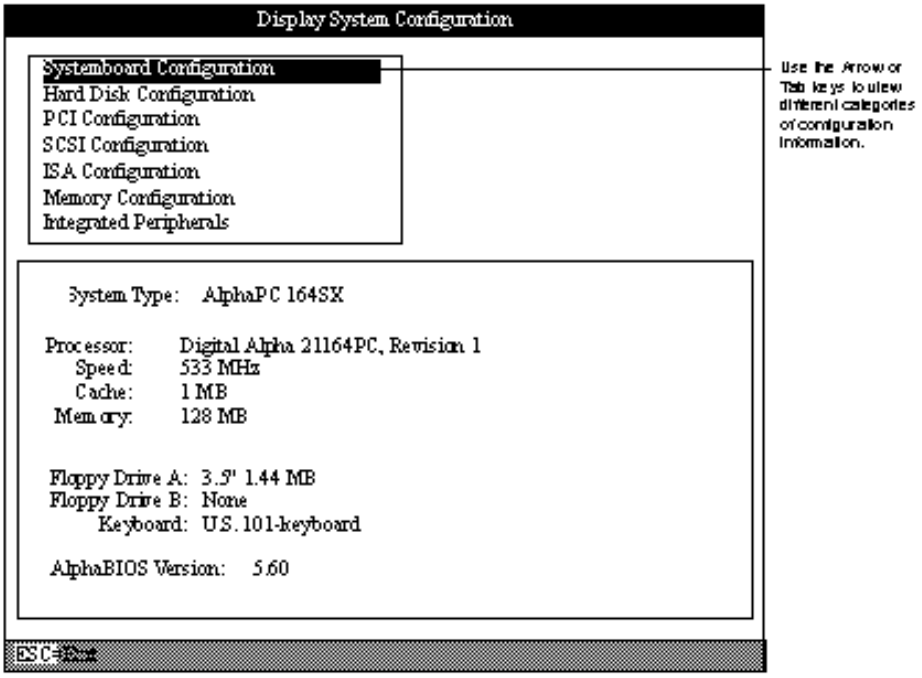
2.4.2 Displaying Your System Configuration

You can use AlphaBIOS to display your system configuration in a clear, easy-to-read format, organized by categories: system board, memory, hard disk, PCI, SCSI, and peripherals.

To display your system configuration:

1. Start AlphaBIOS Setup.
2. Select Display System Configuration.
3. Press **Enter**.
4. In the Display System Configuration screen (see Figure 2), use the arrow keys to select the configuration category that you want to see.

Figure 2 Display System Configuration



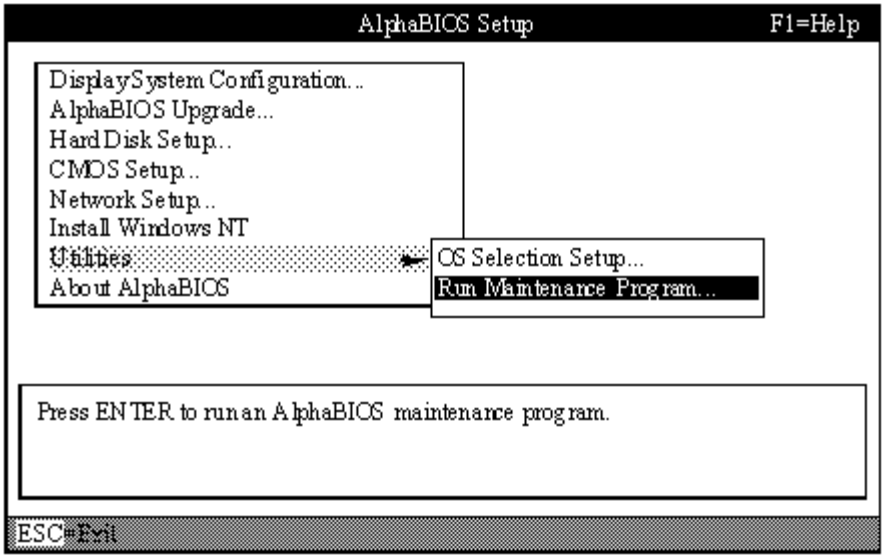
2.4.3 Running a Maintenance Program

You can run maintenance programs such as RAID and other configuration utilities directly from the AlphaBIOS utility menu.

To run a maintenance program:

1. Start AlphaBIOS Setup.
2. Select Utilities.
3. Select Run Maintenance Program from the submenu shown in Figure 3.
4. Press **Enter**.

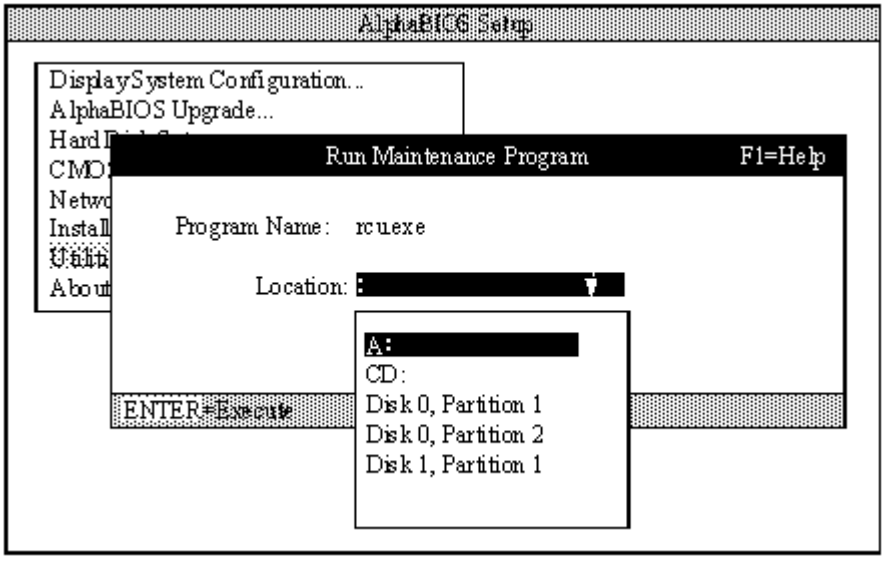
Figure 3 Run Maintenance Program Submenu



5. In the Run Maintenance Program dialog box, type the name of the program to be run at the Program Name prompt, as shown in Figure 4. Then tab to the Location listbox and select the hard-disk partition, floppy diskette, or CD–ROM drive from which to run the program.

6. Press **Enter** to execute the program.

Figure 4 Entering the Program Name



If you are running a utility from a floppy diskette, you can simply type the utility's name into the Program Name field, and press **Enter**. This is because the floppy drive is the default selection in the Current Partition field.

Use Alt + ↓ when a listbox is selected to open the list.

2.5 Installing the Windows NT Operating System

This section supplements the Microsoft Windows NT installation guide for installing the Windows NT operating system on an AlphaPC 164SX and the AlphaPC 164LX systems.

If you have a previous version of Windows NT installed, see the Microsoft Windows NT installation guide for information about how to upgrade to a new version of the operating system.

2.5.1 Before Installing Windows NT

Before installing Windows NT, ensure that you have completed the following tasks:

- Use the CMOS Setup program to:
  - Set the system date and time.
  - Verify that all other standard CMOS settings match your system.

    Refer to Section 2.4 for more information about the CMOS Setup program.
- Perform an express hard-disk setup. This configures the first hard disk that AlphaBIOS detects in your system with the recommended default partition arrangement. See Section 2.4.1 for more information on setting up your hard disk. If you do not want to use the express hard-disk setup, refer to the online AlphaBIOS documentation for other hard-disk setup options.

2.5.2 Starting Windows NT Setup

Windows NT Setup, located on the Microsoft Windows NT compact disc, installs the Windows NT operating system. Windows NT Setup provides a brief description of available key functions at the bottom of the screen.

During the Windows NT installation procedure, you may be prompted for the type of computer that you have. For the AlphaPC 164SX system, choose DIGITAL AlphaPC 164SX. For the AlphaPC 164LX system, choose DIGITAL AlphaPC 164LX. If the appropriate system is not shown, choose “other” after you have inserted the system-specific *Windows NT 4.0 Installation* diskette. The

following procedure supersedes the Starting Setup on a RISC-Based Computer section of the Microsoft Windows NT installation guide.

To start the Windows NT Setup program:

1. Insert the Windows NT compact disc in the CD–ROM drive.
2. Restart your computer.
3. Start AlphaBIOS Setup.
4. Select Install Windows NT.
5. Press **Enter**.
6. Follow the instructions on the screen.

3. Windows NT ARC Firmware

This section describes how to use and update the Windows NT ARC firmware. This firmware is provided on your Alpha SDK and firmware update compact disc and is required to install and boot Windows NT on the following Alpha motherboard systems: AlphaPC 164, EB164, AlphaPC 64, EB66+, EB64+, and EB66.

The Windows NT ARC firmware initializes the system and enables you to install and boot Windows NT. Depending on the type of motherboard you have, the firmware resides in either a flash ROM or a UVPROM. Updating to the newest firmware allows you to take advantage of new functionality.

The following table lists the minimum ARC firmware version required for running Windows NT. To determine if your firmware requires updating, compare the minimum firmware version for your system with the version displayed in the firmware menus.

System	Minimum Firmware Version
AlphaPC 164	4.49-4
EB164	4.35
AlphaPC 64	3.5-10
EB66+	3.5-10
EB64+	3.5-4 (H1.6)
EB66	3.5-4 (H1.7)

Note: Firmware versions that are earlier than the minimum firmware versions shown in the previous table must be updated before the installation.

3.1 Firmware Conventions

To select and choose different options in the Windows NT ARC firmware menus, use the following keys:

Key	Description
Arrow	The arrow keys are used to select different options.
Enter	The Enter key is used to choose the highlighted option.
Esc	The Esc key is used to close a menu or cancel an operation.

3.2 Firmware Menus Access

When you power up your system, the firmware displays a blue screen on the monitor, initializes the firmware drivers, and displays the Boot menu, the first menu of the Windows NT ARC firmware menus. The currently selected option in the menu is highlighted.

Note: If autoboot is enabled, you must cancel autoboot to interact with the firmware. To cancel autoboot, press the Esc key before the timeout period expires.

3.3 Firmware Menus Structure

Figure 5, which appears on the following page, shows the structure of the Windows NT ARC firmware menus.

Note: The text of some of the options may differ, and some options may not always be available.

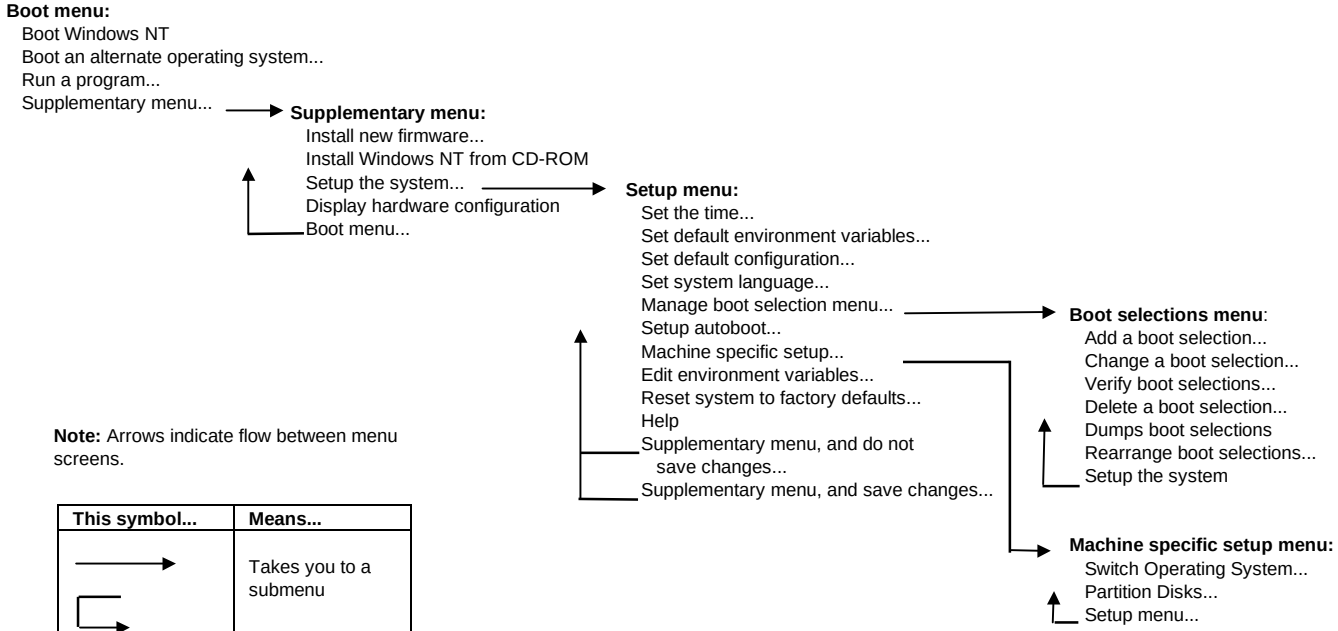


Figure 5 Windows NT ARC Firmware Menus

3.4 Firmware Menus Descriptions

This section describes the Windows NT ARC firmware menus and the options on the menus. (See Figure 5.)

3.4.1 Boot Menu

This section describes the Boot menu options.

Boot menu . . .
→ Boot Windows NT

Boots the default boot selection. The name of your default boot selection appears in place of the string "Windows NT."

Boot menu . . .
→ Boot an alternate operating system . . .

Provides a menu of all boot selections; choose one to boot the system.

Boot menu . . .
→ Run a program . . .

Runs an ARC application. This option prompts you for the path to the application and runs it.

Boot menu . . .
→ Supplementary menu. . .

Takes you to the Supplementary menu.

3.4.2 Supplementary Menu

This section describes the Supplementary menu options.

Boot menu . . .
→ Supplementary menu . . .
→ Install new firmware . . .

Runs the firmware update program.

Note: If you want to update firmware on an EB64+ or EB66 motherboard, see Section 3.5.2. Otherwise, you can update firmware using a CD–ROM or diskette. The firmware update utility is provided only on a compact disc; a diskette is not provided. For information about how to create a firmware update diskette, see the *Alpha Motherboards Software Developer's Kit and Firmware Update Read Me First.*

Load either the compact disc or the diskette in the appropriate drive. Choose **Install new firmware** to start the firmware update utility.

Your system will appear to restart as the firmware update utility reinitializes the system. See Section 3.5 for directions on how to update your firmware once the firmware update utility has started.

Boot menu . . .
→ Supplementary menu . . .
→ Install Windows NT from CD-ROM

Starts an installation of Windows NT from a CD–ROM. See Section 3.7 for more information about installing Windows NT.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .

Takes you to the Setup menu.

Boot menu . . .
→ Supplementary menu . . .
→ Display hardware configuration

Displays your hardware configuration in three screens. The first screen displays information about your processor and memory, as well as the firmware version. The second screen displays the name of the firmware-supported devices that were detected. The third screen displays information about PCI devices found in your system.

Boot menu . . .
→ Supplementary menu . . .
→ Boot menu . . .

Returns you to the Boot menu.

3.4.3 Setup Menu

This section describes the Setup menu options.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Set the time . . .

Allows you to set the system date and time.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Set default environment variables . . .

Allows you to set the default system partition. The system partition is the disk partition where the Windows NT osloader, PALcode, and HAL reside. Choosing this option removes all current boot selections.

If you are unsure of the values for your system, use the following typical values:

Media:	**SCSI Hard Disk**
SCSI bus number:	**0**
SCSI ID:	**0**
Partition:	**1**

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Set default configuration . . .

Allows you to describe your system's monitor resolution, diskette capacity, keyboard type, and SCSI host ID to the firmware.

If you are unsure of the values for your system, use the following typical values:

Monitor resolution:	**1024** x **768**
First diskette drive capacity:	**3.5" 1.44MB**
Second diskette drive capacity:	**None**
Keyboard:	**U.S. 101-key keyboard**
SCSI host ID:	**7**

Note: SCSI host ID refers to the SCSI ID of the SCSI host adapter on a given SCSI bus.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Set system language . . .

Allows you to specify the language that you want to use while interacting with the firmware. American English is the only language built into the firmware. If you want to use another language, ensure that your firmware language support disk is in your diskette drive before choosing this option.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Manage boot selection menu . . .

Takes you to the Boot selections menu.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Setup autoboot . . .

Allows you to specify whether or not the system should autoboot your default boot selection. If you choose to autoboot, you will also be prompted for the number of seconds to wait before autoboot should occur.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Machine specific setup . . .

Takes you to the Machine specific setup menu.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Edit environment variables . . .

Allows you to edit the firmware environment.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Reset system to factory defaults . . .

Resets all options to the factory defaults.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Help

Provides rudimentary help for the Setup menu.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Supplementary menu, and do not save changes . . .

Returns you to the Supplementary menu, discarding any changes made from the Setup menu.

Boot menu . . .
→ Supplementary menu . . .
→ Setup the system . . .
→ Supplementary menu, and save changes . . .

Returns you to the Supplementary menu, saving any changes made from the Setup menu. Note that if you have not made any changes, this option might not appear.

3.4.4 Boot Selections Menu

This section describes the Boot selections menu options.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Add a boot selection . . .

Allows you to manually add a new boot selection (usually you do not need to do this because installing Windows NT will automatically add a boot selection for the newly installed operating system).

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Change a boot selection . . .

Allows you to modify a boot selection.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Verify boot selections . . .

Checks your boot selections and reports any problems found.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Delete a boot selection . . .

Allows you to delete a boot selection from a list of all boot selection names.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Dumps boot selections

Displays all your boot selections.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Rearrange boot selections . . .

Allows you to rearrange your boot selections, changing which is the default boot selection.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Manage boot selection menu . . .
→Setup the system

Returns you to the Setup menu.

3.4.5 Machine Specific Setup Menu

This section describes the Machine specific setup menu options.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Machine specific setup . . .
→Switch Operating System . . .

Switch which firmware is active on reset or power-up.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Machine specific setup . . .
→Partition Disks . . .

Starts the disk partition utility. See Section 3.6 for information about this utility.

Boot menu . . .
→Supplementary menu . . .
→Setup the system . . .
→Machine specific setup . . .
→Setup menu . . .

Returns you to the Setup menu.

3.5 Firmware Update Utility

If you have an EB64+ or EB66 motherboard, see Section 3.5.2 for directions on how to update your firmware.

3.5.1 Updating Firmware in a Flash ROM

The following procedure updates the flash ROM using the firmware update utility. (To start the firmware update procedure, see Section 3.4.2.)

1. From the Firmware Update menu, choose whichever selection appears:
   - Update Windows NT ARC firmware.
   - Update Firmware.
2. When prompted to continue the update, choose **Yes**. If the console selection does not match the firmware that you flashed, you will be prompted to update the console selection.
3. If you are prompted to update the console selection, choose **Yes**.
4. When the update has completed, restart your computer.

3.5.2 Updating Firmware in a UVPROM

If you do not have an EB64+ or EB66 motherboard, see Section 3.5.1 for directions on how to update your computer type's firmware.

The Windows NT ARC firmware is provided only on the compact disc; a UVPROM is not provided. To program your own UVPROM, see the *Alpha Motherboards Software Developer's Kit and Firmware Update Read Me First*.

Replacing the UVPROM

To update the firmware on a motherboard after you have programmed your UVPROM, follow this procedure:

1. Power off the system.
2. Locate and, noting the correct orientation of the ROM, remove one of the UVPROMs from the motherboard.
3. Using the correct orientation, insert the new Windows NT ARC firmware UVPROM.
4. Select the new Windows NT ARC firmware UVPROM device with the UVPROM select jumper, as described in the motherboard's user's guide.
5. Power on the system.

3.6 Disk Partition Utility

The disk partition utility, which first appears in Windows NT ARC firmware Version 4.48, is used to partition your hard drive and to format a partition with a FAT file system. The disk partition utility also displays information about the drive, such as the manufacturer and model ID strings and the ARC path. See Section 3.4.5 for instructions on how to start the disk partition utility.

Function Keys

The following table lists the disk partition utility function keys and their functions:

Key	Description
↑ or ↓	Change selections in the active cell.
← or →	Change the active cell.
Esc	Exits the disk partition utility.
Keyboard commands	Listed in the Keyboard Commands box. To perform a specific action on the current selection, type the key associated with the action.

Help

The disk partition utility provides context-sensitive on-screen help. The keyboard commands available for the current selection in the active cell are shown in the Keyboard Commands box.

3.6.1 Using the Disk Partition Utility

When you start the disk partition utility, the default selection is the first partition on the first disk on your system. If no partitions exist on that disk, the default selection is the unpartitioned space on the first disk.

Note: Although the disk partition utility displays changes immediately, partition changes are not actually committed until you either exit the utility or perform an action that requires the changes to be committed, such as formatting. You will always be prompted for confirmation before changes are committed.

3.6.2 Creating the System Partition

To make a partition the system partition, select the partition and type S.

3.7 Installing the Windows NT Operating System

This section supplements the Microsoft Windows NT installation guide for installing the Windows NT operating system on the AlphaPC 164, EB164, AlphaPC 64, EB66+, EB64+, and EB66.

If you have a previous version of Windows NT installed, see the Microsoft Windows NT installation guide for information about how to upgrade to a new version of the operating system.

3.7.1 Before Installing Windows NT

Before you install Windows NT, ensure that you have completed the following tasks:

- Defined the environment variables for the default system partition. For more information about describing your system configuration, see the description for **Set default environment variables . . .** in Section 3.4.3.
- Described your system configuration to the firmware. For more information about describing your system configuration, see the description for **Set default configuration . . .** in Section 3.4.3.
- Provided the required system partition on your hard disk. For more information on creating the system partition, see Section 3.4.5.

The following table specifies the free space and file-system requirements for installing Windows NT:

Item	Free Space Required	File-System Requirement
System partition	5MB	FAT[1]
Windows NT	161MB	FAT or NTFS

[1] System partition must be FAT.

The system partition is the disk partition that contains the hidden files `OSLOADER.EXE` and `HAL.DLL` in the subdirectory `\OS\WINNT351`. If the system partition is large enough, it can also contain Windows NT, or you may choose to use a separate partition. The system partition and Windows NT may be on different hard disks.

3.7.2 Starting Windows NT Setup

Windows NT Setup, located on the Microsoft Windows NT compact disc, installs Windows NT. Windows NT Setup provides a brief description of the available key functions at the bottom of the screen.

During the Windows NT installation procedure, you may be prompted for your computer type. Use Table 1 or Table 2 to determine your computer type and to determine whether an installation diskette is required, based on the version of Windows NT.

Table 1 Computer Types and Installation Diskette Requirements for Windows NT 3.51

System	Choose this system…	Installation diskette required?
AlphaPC 164 EB164 EB66+ EB66	Digital AlphaPC164 Alpha EB164 Alpha EB66+ Alpha EB66	Yes; create an installation diskette.
AlphaPC 64 EB64+	Digital AlphaPC64 Digital AlphaPC64	No.

Table 2 Computer Types and Installation Diskette Requirements for Windows NT 4.0

System	Choose this system…	Installation diskette required?
AlphaPC 164 EB164 AlphaPC 64 EB64+	Alpha EB164 Alpha EB164 Digital AlphaPC64 Digital AlphaPC64	No.
EB66+ EB66	Alpha EB66+ Alpha EB66	Yes; create an installation diskette.

If your motherboard does not appear as one of the choices, then insert the update and Windows NT firmware diskette. The following procedure supersedes the Starting Setup on a RISC-Based Computer section of the Microsoft Windows NT installation guide.

To start the Windows NT Setup program, follow this procedure:

1. Insert the Microsoft Windows NT compact disc in the CD-ROM drive.
2. Restart your computer.
3. From the Boot menu, choose **Supplementary menu . . . .**
4. From the Supplementary menu, choose **Install Windows NT from CD–ROM**.
5. Follow the instructions on the screen.

Note: If you have an Alpha Windows NT driver diskette for your video card, you can use the driver to install Windows NT. Follow this procedure:

1. Choose Custom Setup.
2. Choose display type Other, and insert the graphics disk driver when asked for the manufacturer-supplied hardware support disk.

4. Troubleshooting

This section provides solutions to some of the common problems that you may encounter while using the Windows NT firmware and installing Windows NT.

Problem

When you turn on your computer, nothing displays.

Solutions

Ensure that the video card is correctly connected to the monitor.

Ensure that the flash ROM update procedure was performed correctly. If you have a terminal attached to COM1, check the output for error messages after verifying that the flash ROM update procedure was performed correctly.

Problem

While booting Windows NT, you receive one of the following error messages:

- `The required system file DISPLAY_DRIVER.DLL is bad or missing.`
- `The required system file DISPLAY_DRIVER.SYS is bad or missing.`

Solutions

These error messages indicate video driver problems. Use the following table to solve common video driver problems.

If the...	**Then...**
Driver becomes disabled	Boot the Windows NT operating system with the last known good configuration.
Incorrect video driver is chosen while installing the Windows NT operating system	Reinstall the Windows NT operating system with the correct driver.
New video card was installed before the driver was installed	Reinstall the old video card, boot the Windows NT operating system, and install the driver for the new video card. Then install the new video card and reboot the Windows NT operating system.

The rest of this section provides descriptions of available beep and post codes, and instructions on how to use the fail-safe booter.

4.1 Beep Codes

Beep codes provide error information about the motherboard.

The following table lists and describes the beep codes for the AlphaPC 164SX.

Table 3 Beep Codes for AlphaPC 164SX

Beep Code	Description
1–2–3[1]	This sequence represents the fail-safe booter startup
4	No valid header found in ROM; loading entire ROM
5	No memory found
6	Checksum error detected when image was read back from memory

[1] One beep and a pause, followed by two beeps and a pause, followed by three beeps.

The following table lists and describes the beep codes for the AlphaPC 164LX.

Table 4 Beep Codes for AlphaPC 164LX

Beep Code	Description
1–2–3[1]	This sequence represents the fail-safe booter startup
4	No valid header found in ROM; loading entire ROM
5	No memory found
6	Checksum error detected when image was read back from memory

[1] One beep and a pause, followed by two beeps and a pause, followed by three beeps.

The following table lists and describes the beep codes for the AlphaPC 164.

Table 5 Beep Codes for AlphaPC 164

Beep Code	Description
1–2–3[1]	This sequence represents the fail-safe booter startup
4	No valid header found in ROM; loading entire ROM
5,6,7	Same meaning as AlphaPC 164 post code 3F fatal error subcodes

[1] One beep and a pause, followed by two beeps and a pause, followed by three beeps.

The following table lists and describes the beep codes for the EB164.

Table 6 Beep Codes for EB164

Beep Code	Description
2	Jumping to system code
4	No valid header found in ROM; loading entire ROM
5,6,7	Same meaning as fatal error subcodes

4.2 Post Codes

Post codes indicate the progress of the SROM and Windows NT firmware.

The following table lists and describes the post codes for the AlphaPC 164SX.

Table 7 Post Codes for AlphaPC 164SX

Source	Post Code (hex)	Description
SROM	00	Firmware initialization is complete
	01	CPU speed detected
	02	CPU speed converted
	03	Configuration jumpers read
	04	Bcache configuration value computed
	05	Bcache control value computed
	0C	Memory sized and memory bank 0 written
	0D	Enable Dcache
	13	All of memory rewritten (good data parity written)
	14	Memory errors cleared; start reading system ROM
	15	Loading ROM without SROM decompression
	16	Loading ROM using SROM decompression
	17	System ROM loaded to memory
	18	Icache flush code written to memory
	19	CPU errors cleared; jump to system code
	20	ISA bus reset
	3A	Jump to Mini-Debugger

Source	Post Code (hex)	Description
	3F	Fatal error. Second code identifies source of error: 05 = No memory found 06 = Checksum error detected when image was read back from memory
AlphaBIOS	98	Firmware has control
	97	Buses initialized
	95	Video console opened
	51	FATAL–returned from boot menu selection
	50	FATAL–firmware fatal error
	42	Firmware drivers have been started
	00	Firmware has been initialized
Fail-safe booter	FD	I/O bus initialization
	FC	I/O initialization complete
	FB	UART initialization
	BF	Fail-safe booter is scanning diskette
	1	Fail-safe booter is loading the Windows NT AlphaBIOS
	2	Fail-safe booter is loading the Debug Monitor
	3	Fail-safe booter is loading the SRM console
	4	Fail-safe booter is loading the Linux miniloader

The following table lists and describes the post codes for the AlphaPC 164LX.

Table 8 Post Codes for AlphaPC 164LX

Source	Post Code (hex)	Description
SROM	00	Firmware initialization is complete
	01	CPU speed detected
	02	CPU speed converted
	03	Configuration jumpers read
	04	Bcache configuration value computed
	05	Bcache control value computed
	06	Bcache turned off
	0C	Memory sized and memory bank 0 written
	0F	Bcache turned on
	13	All of memory rewritten (good data parity written)
	14	Memory errors cleared; start reading system ROM
	15	Loading ROM without SROM decompression
	16	Loading ROM using SROM decompression
	17	System ROM loaded to memory
	18	Icache flush code written to memory
	19	CPU errors cleared; jump to system code
	20	ISA bus reset

Source	Post Code (hex)	Description
	3F	Fatal error. Second code identifies source of error: 05 = No memory found 06 = Checksum error detected when image was read back from memory
AlphaBIOS	98	Firmware has control
	97	Buses initialized
	95	Video console opened
	51	FATAL–returned from boot menu selection
	50	FATAL–firmware fatal error
	42	Firmware drivers have been started
	00	Firmware has been initialized
Fail-safe booter	FD	I/O bus initialization
	FC	I/O initialization complete
	FB	UART initialization
	BF	Fail-safe booter is scanning diskette
	1	Fail-safe booter is loading the Windows NT AlphaBIOS
	2	Fail-safe booter is loading the Debug Monitor
	3	Fail-safe booter is loading the SRM console
	4	Fail-safe booter is loading the Linux miniloader

The following table lists and describes the post codes for the AlphaPC 164.

Table 9 Post Codes for AlphaPC 164

Post Code (hex)	Description
00	Firmware initialization is complete
01	CPU speed detected
02	CPU speed converted
03	Configuration jumpers read
04	Bcache configuration value computed
05	Bcache control value computed
06	Bcache turned off
07	Memory timing registers written
08	Memory control register written
09	Memory bank 0 register written
0B	DRAMs awakened
0C	Memory sized and memory bank 0 written
0F	Bcache turned on
13	All of memory rewritten (good data parity written)
14	Memory errors cleared; start reading system ROM
15	Loading ROM without SROM decompression
16	Loading ROM using SROM decompression
17	System ROM loaded to memory
18	Icache flush code written to memory
19	CPU errors cleared; jump to system code
20	ISA bus reset

Post Code (hex)	Description
3A	Jumping to SROM Mini-Debugger
3F	Fatal error. Second code identifies source of error: 05 = No memory found 06 = Checksum error detected when image was read back from memory 07 = Could not determine the SIMM type
41	Firmware environment has been loaded
42	Firmware services have been initialized
50	A fatal error has occurred (FATAL)
51	The Boot menu illegally returned (FATAL)
75	System initialization is complete—start firmware setup
76	Checking system information for sanity
77	About to initialize the video subsystem
78	PCI configuration is complete; about to initialize the keyboard
79	About to configure PCI devices
80	About to initialize the PCI bus (hard restart)
81	About to initialize the PCI bus (soft restart)
85	About to validate the SCB
86	Early initialization of firmware API
87	About to initialize the system chipset
88	Initialize vendor API
89	The firmware kernel debugger module is starting
95	Video subsystem and keyboard are okay; using graphic console

Post Code (hex)	Description
96	Video or keyboard is missing or broken; using COM1 as console
97	Trying to initialize video subsystem and keyboard as graphic console
98	Serial ports have been initialized; firmware initialization is starting
99	The firmware is about to initialize the serial ports
FD	I/O bus initialization
FC	I/O initialization complete
FB	UART initialization
BF	Fail-safe booter is scanning diskette
0	Fail-safe booter is loading the firmware update utility

The following table lists and describes the post codes for the EB164.

Table 10 Post Codes for EB164

Post Code (hex)	Description
00	ISA bus reset
01	CPU speed detected
02	CPU speed converted
03	Configuration jumpers read
04	Bcache configuration value computed
05	Bcache control value computed
06	Bcache turned off
07	Memory timing registers written

Post Code (hex)	Description
08	Memory control register written
09	Memory bank 0 register written
0B	DRAMs awakened
0C	Memory sized and memory bank 0 written
0F	Bcache turned on
13	All of memory rewritten (good data parity written)
14	Memory errors cleared; start reading system ROM
15	Loading ROM without SROM decompression
16	Loading ROM using SROM decompression
17	System ROM loaded to memory
18	Icache flush code written to memory
19	CPU errors cleared; jump to system code
3A	Jumping to SROM Mini-Debugger
3F	Fatal error. Second code identifies source of error: 05 = No SIMMs found when sizing memory 06 = Checksum error detected when image was read back from memory 07 = Could not detect SIMM type during memory sizing

The following table lists and describes the post codes for the AlphaPC 64.

Table 11 Post Codes for AlphaPC 64

Post Code (hex)	Description
00	ISA bus reset
01	CPU speed detected
02	CPU speed converted
05	Bcache timing parameters computed
06	BIU_CTL register written
07	Memory global timing register written
08	Memory refresh timing register written
09	Bank 0 timing register written
0A	Bank 1 timing register written
0B	DRAMs awakened
0C	Bank 0 configuration register written
0D	Bank 1 configuration register written
0E	Memory general control register written
0F	Bcache flushed (good tag parity written)
10	Tag enable register written
11	Final memory general control register written
12	ABOX_CTL register written
13	All of memory rewritten (good data parity written)
14	Memory errors cleared; start reading system ROM
15	Loading ROM without SROM decompression
16	Loading ROM using SROM decompression
17	System ROM loaded to memory

Post Code (hex)	Description
18	Icache flush code written to memory
19	CPU errors cleared

The following table lists and describes the post codes for the EB66+.

Table 12 Post Codes for EB66+

Post Code (hex)	Description
00	ISA bus reset
01	CPU speed detected
03	CPU speed converted; Bcache disabled
06	Preconfigure memory banks
07	DRAMs awakened
08	Bcache timing established
09	Bcache flushed (good tag parity written)
0A	Bank timing registers written
0D	Bank configuration registers written
0E	Bank base addresses established
10	ABOX_CTL register written
11	All of memory rewritten (good data parity written)
12	Memory errors cleared; start reading system ROM
15	Loading ROM without SROM decompression
16	Loading ROM using SROM decompression
17	System ROM loaded to memory
18	Icache flush code written to memory
19	CPU errors cleared

The following table lists and describes the post codes for the EB66.

Table 13 Post Codes for EB66

Post Code (hex)	Description
00	ISA bus reset
01	CPU speed detected
02	CPU speed converted
04	Memory global timing register written
05	Read system configuration data
06	Preconfigure memory banks
07	DRAMs awakened
08	Bcache timing established
09	Bcache flushed (good tag parity written)
0A	Bank 0 timing register written
0B	Bank 1 timing register written
0C	Bank configuration registers written
0D	Bank base addresses established
0F	ABOX_CTL register written
10	All of memory rewritten (good data parity written)
14	Memory errors cleared; start reading system ROM
15	Loading ROM (header located)
16	Loading ROM (image located)
17	System ROM loaded to memory
18	Icache flush code written to memory
19	CPU errors cleared

4.3 Fail-Safe Booter

The fail-safe booter, currently available for use on the AlphaPC 164SX, the AlphaPC 164LX, and the AlphaPC 164 only, provides an emergency recovery mechanism when the primary firmware image contained in flash memory has been corrupted. When flash memory has been corrupted, such that no image is safely loaded from the flash, the fail-safe booter can be run to facilitate booting another image from a diskette that is capable of reprogramming the flash.

4.3.1 Starting the Fail-Safe Booter

The fail-safe booter can be started in one of two ways for each system listed below.

AlphaPC 164SX and AlphaPC 164LX

- If the primary firmware image is unavailable when the system is powered on or reset, the fail-safe booter runs automatically. When the fail-safe booter runs, the system emits a series of beeps through the speaker as beep code 1–2–3; this is, one beep and a pause, followed by two beeps and a pause, followed by three beeps. After the diskette activity light flashes:

  1. Insert the system-specific *AlphaBIOS Firmware* diskette. The fail-safe booter will load and run AlphaBIOS from this diskette.

  2. Go to Section 2.3 and follow the procedure for upgrading AlphaBIOS.

- You can also start the fail-safe booter manually as follows:

  1. Power off your system.

  2. Add jumper CF7 as described in the system-specific motherboard Windows NT user's manual.

  3. Power on your system.

4. Insert the system-specific *AlphaBIOS Firmware* diskette into the diskette drive

5. Go to Section 2.3 and follow the procedure for upgrading AlphaBIOS.

AlphaPC 164

- If the primary firmware image is unavailable when the system is powered on or reset, the fail-safe booter runs automatically. When the fail-safe booter runs, the system emits a series of beeps through the speaker as beep code 1–2–3; this is, one beep and a pause, followed by two beeps and a pause, followed by three beeps. After the diskette activity light flashes, insert the update and Windows NT firmware diskette containing the file FWUPDATE.EXE.

- You can also start the fail-safe booter manually as follows:

  1. Add jumper CF7 as described in the *AlphaPC 164 Motherboard User's Manual*.

  2. Insert the update and Windows NT firmware diskette into the diskette drive.

  3. Go to Section 3.5 for information on how to update the flash ROM using the firmware update utility.

5. Support, Products, and Documentation

If you need technical support, a *DIGITAL Semiconductor Product Catalog*, or help deciding which documentation best meets your needs, visit the DIGITAL Semiconductor World Wide Web Internet site:

http://www.digital.com/semiconductor

You can also call the DIGITAL Semiconductor Information Line or the DIGITAL Semiconductor Customer Technology Center. Please use the following information lines for support.

For documentation and general information:	
DIGITAL Semiconductor Information Line	
United States and Canada:	1–800–332–2717
Outside North America:	1–510–490–4753
Electronic mail address:	semiconductor@digital.com

For technical support:	
DIGITAL Semiconductor Customer Technology Center	
Phone (U.S. and international):	1–978–568–7474
Fax:	1–978–568–6698
Electronic mail address:	ctc@hlo.mts.dec.com

5.1 DIGITAL Semiconductor Products

To order Alpha microprocessors and motherboards, contact your local distributor.

Note: The following products and order numbers might have been revised. For the latest versions, contact your local distributor.

Product	Order Number
DIGITAL Semiconductor Alpha 21164 600 MHz Microprocessor	21164–MB
DIGITAL Semiconductor Alpha 21164 533 MHz Microprocessor	21164–P8
DIGITAL Semiconductor Alpha 21164 466 MHz Microprocessor	21164–IB

Motherboard Kits

Motherboard kits include the motherboard, the motherboard's user's manual, and firmware.

Product	Order Number
DIGITAL Semiconductor AlphaPC 164SX Motherboard for Windows NT	21A05–A0
DIGITAL Semiconductor AlphaPC 164SX Motherboard for DIGITAL UNIX	21A05–A1
DIGITAL Semiconductor AlphaPC 164LX Motherboard for Windows NT	21A04–C0
DIGITAL Semiconductor AlphaPC 164LX Motherboard for DIGITAL UNIX	21A04–C1
DIGITAL Semiconductor AlphaPC 164 Motherboard for Windows NT	21A04–B0
DIGITAL Semiconductor AlphaPC 164 Motherboard for DIGITAL UNIX	21A04–B2

Design Kits

Design kits include full documentation and schematics. They do not include motherboards or related hardware.

Product	Order Number
DIGITAL Semiconductor AlphaPC 164 Motherboard Design Kit	QR–21A04–12

5.2 DIGITAL Semiconductor Documentation

The following table lists some of the available DIGITAL Semiconductor documentation.

Title	Order Number
Alpha AXP Architecture Reference Manual[1]	EY–T132E–DP
Alpha Architecture Handbook[2]	EC–QD2KB–TE
DIGITAL Semiconductor Alpha 21164PC Microprocessor Hardware Reference Manual	EC–R2W0A–TE
DIGITAL Semiconductor Alpha 21164 Microprocessor Hardware Reference Manual	EC–QP99B–TE
DIGITAL Semiconductor AlphaPC 164SX Motherboard Product Brief	EC–R57CA–TE
DIGITAL Semiconductor AlphaPC 164LX Motherboard Product Brief	EC–R2RZA–TE
AlphaPC 164SX Motherboard Windows NT User's Manual	EC–R57DA–TE
AlphaPC 164LX Motherboard Windows NT User's Manual	EC–R2ZQD–TE
DIGITAL Semiconductor AlphaPC 164LX Motherboard Technical Reference Manual	EC–R46WA–TE
DIGITAL Semiconductor AlphaPC 164 Motherboard Product Brief	EC–QUQKC–TE
AlphaPC 164 Motherboard User's Manual	EC–QPG0B–TE
DIGITAL Semiconductor AlphaPC 164 Motherboard Technical Reference Manual	EC–QPFYB–TE

[1] To purchase the *Alpha AXP Architecture Reference Manual*, contact your local distributor or call Butterworth-Heinemann (Digital Press) at 1–800–366–2665.

[2] This handbook provides information subsequent to the *Alpha AXP Architecture Reference Manual*.

Title	Order Number
DIGITAL Semiconductor AlphaPC 164 Motherboard Design Kit Read Me First	EC–QPFZA–TE
DIGITAL Semiconductor AlphaPC 164 Motherboard DIGITAL UNIX Product Brief	EC–QZT6B–TE
AlphaPC 164 Motherboard DIGITAL UNIX User's Manual	EC–QZT5B–TE
DIGITAL Semiconductor Alpha Motherboards Software Developer's Kit and Firmware Update V3.1 Product Brief	EC–QXQKC–TE
Alpha Motherboards Software Developer's Kit and Firmware Update Read Me First	EC–QERSH–TE
Alpha Microprocessors Motherboard Debug Monitor User's Guide	EC–QHUVF–TE
Alpha Microprocessors Motherboard Software Design Tools User's Guide	EC–QHUWD–TE
Alpha SRM Console for Alpha Microprocessor Motherboards User's Guide	EC–QK8DF–TE
Alpha Microprocessors SROM Mini-Debugger User's Guide	EC–QHUXC–TE
PALcode for Alpha Microprocessors System Design Guide	EC–QFGLC–TE

5.3 Ordering Third-Party Software and Documentation

To order Microsoft software and documentation, contact your local Microsoft sales office. The following products and documentation are available from Microsoft.

Title	Vendor Address
Microsoft Windows NT Workstation Microsoft Windows NT Server Windows NT Workstation Installation Guide Windows NT Server Installation Guide	Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399

5.4 Obtaining the Hardware Compatibility List for Windows NT

The Hardware Compatibility List is available through the following sources:

- Microsoft's customer service representatives at **1–800–426–9400**
- CompuServe Information Systems in Library 1 of the WINNT forum (GO WINNT) or Library 17 of the MSWIN32 forum (GO MSWIN32)
- Microsoft's World Wide Web Internet site: `http://www.microsoft.com`