



# Alpha PCI 164–266/300

---

## Read Me First

Order Number: EK-ALPCI-CL. A01

**Revision/Update Information:** This is a new document.

---

**April 1996**

While Digital believes the information included in this publication is correct as of the date of publication, it is subject to change without notice.

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

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.

Digital Equipment Corporation grants to the purchaser of Alpha microprocessor or peripheral sample designs and design tools a fully paid-up, nonexclusive, irrevocable, perpetual and worldwide license to copy, use, reproduce or have developed products based on or that incorporate all, or a portion of the sample board designs and to manufacture, have manufactured, market, sell, lease, license or otherwise distribute such products based on, or that incorporate the sample Digital Alpha microprocessor or peripheral products.

© Digital Equipment Corporation 1995, 1996.

All rights reserved.

AlphaGeneration, DEC, DECchip, DECladdebug, Digital, OpenVMS, VAX, VAX DOCUMENT, the AlphaGeneration design mark, and the DIGITAL logo are trademarks of Digital Equipment Corporation.

Digital Semiconductor is a Digital Equipment Corporation business.  
Digital UNIX Version 3.2 for Alpha is a UNIX 93 branded product.

ABEL is a trademark of Data I/O Corporation.

CompuServe is a registered trademark of CompuServe, Inc.

Intel is a trademark of Intel Corporation.

Motorola is a registered trademark of Motorola, Inc.

NT and Windows NT are trademarks of Microsoft Corporation.

PAL and MACH are trademarks of Advanced Micro Devices, Inc.

PKZIP is a trademark of PKWARE, Inc.

PostScript is a registered trademark of Adobe Systems, Inc.

Powerview and Viewsim are trademarks of Viewlogic Systems, Inc.

UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Ltd.

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

This document was prepared using VAX DOCUMENT, Version 2.1.

## 1 Introduction to the Alpha PCI 164–266/300

The Alpha PCI 164–266/300 is a motherboard containing an Alpha 21164 microprocessor. The board supports the Microsoft Windows NT operating system through firmware in a flash ROM. In addition, the firmware contains a mini-debugger to assist you as you install the Alpha PCI 164–266/300 into your application.

---

### Note

---

The Windows NT operating system is not included and must be purchased separately.

---

## 2 Alpha PCI 164–266/300 Documentation

Table 1 provides a list of the documentation available for the Alpha PCI 164–266/300.

**Table 1 Related Alpha PCI 164–266/300 Motherboard Documentation**

Title	Order Number
<b>Alpha PCI 164–266/300 Motherboard Documentation</b>	
Alpha PCI 164–266/300 User's Manual	EK–AL266-UM <sup>1</sup>
Alpha PCI 164–266/300 Design Guide	EK–AL266-UG <sup>1</sup>
<b>Alpha 21164 Microprocessor Documentation</b>	
Alpha AXP Architecture Handbook	EC–QD2KA–TE
Alpha 21164 Microprocessor Data Sheet	EC–QAEPB–TE
Alpha 21164 Microprocessor Product Brief	EC–QAENB–TE
Alpha 21164 Microprocessor Hardware Reference Manual	EC–QAEQB–TE
<b>Alpha PCI 164–266/300 Motherboard Documentation</b>	
Alpha Microprocessors Motherboard Debug Monitor User's Guide	EK–AMEBD–UG <sup>1</sup>

<sup>1</sup>Available as part of the Alpha PCI 164–266/300 documentation set EK–AL266–DK; not orderable separately.

(continued on next page)

**Table 1 (Cont.) Related Alpha PCI 164–266/300 Motherboard Documentation**

<b>Title</b>	<b>Order Number</b>
<b>Alpha PCI 164–266/300 Motherboard Documentation</b>	
Alpha Microprocessors SROM Mini-Debugger User's Guide	EK-AMSMD-UG <sup>1</sup>
Alpha PCI 164–266/300 Windows NT Installation Guide	EK-AL266-IG <sup>1</sup>
<b>Associated DECchip Documentation</b>	
DECchip 21171 Core Logic Chipset Product Brief	EC-QC3EB-TE
DECchip 21171 Core Logic Chipset Technical Reference Manual	EC-QE18A-TE
<sup>1</sup> Available as part of the Alpha PCI 164–266/300 documentation set EK-AL266-DK; not orderable separately.	

### **3 Addition to the Documentation**

The *Alpha PCI 164–266/300 User's Guide* and *Alpha PCI 164–266/300 User's Manual* state that the keyboard lock switch connects to header J2 pins 20 and 22, with pin 22 as ground. Some third-party connectors may connect the keyboard lock switch to pins 18 and 20, with pin 18 as ground. Either arrangement is acceptable.

## 4 Additional Hardware Requirements

Before turning on the power to your Alpha PCI 164–266/300, you must provide the following components in addition to those supplied in the kit. The components needed depend upon the intended use of the Alpha PCI 164–266/300 board.

- A 275-watt industry-standard PC power supply that includes a 3.3-V, 16.0-A dc output
- A terminal or a serial line connection to another system running a terminal emulation package

You may want to provide a system enclosure that will accept a full-size motherboard (optional).

The following additional components are required to install the Windows NT operating system on the Alpha PCI 164–266/300:

- A PS/2 compatible 101-key keyboard
- A PS/2 compatible mouse
- A supported PCI or ISA bus graphics card, cables, and a compatible monitor
- A supported PCI or ISA bus SCSI controller and cables
- An IDE or SCSI CD-ROM drive
- An IDE or SCSI hard drive

For more information about hardware requirements and for the location of board connectors and jumpers, see the System Configuration and Connectors chapter in the *Alpha PCI 164–266/300 User's Manual*, EK-AL266-UM.

Refer to the *Alpha PCI 164–266/300 Microsoft Windows NT Installation Guide*, EK-AL266-IG, and the Microsoft *Hardware Compatibility List*<sup>1</sup> for Windows NT to determine which SCSI controllers and graphics cards are supported.

---

<sup>1</sup> To obtain the *Hardware Compatibility List*, contact Microsoft's Customer Service representatives at 1-800-426-9400. You can also access CompuServe Information Systems in Library 1 of the WINNT forum (GO WINNT) or Library 17 of the MSWIN32 forum (GO MSWIN32).

## 5 Starting Up and Using the Alpha PCI 164–266/300

After all the required hardware components have been assembled, connect them to the Alpha PCI 164–266/300 by using the module connectors. For a standard system (without Windows NT), follow the procedure listed in Section 5.1. For a system using Windows NT, perform the additional steps listed in Section 5.2. For information about the location of the module connectors, refer to the System Configuration and Connectors chapter of the *Alpha PCI 164–266/300 User's Manual*.

Two firmware programs have been loaded into the Alpha PCI 164–266/300 1MB flash ROM. They are the debug monitor and the Windows NT ARC firmware. The debug monitor is a serial line monitor program used to perform software and hardware debug functions. The Windows NT ARC firmware is used to install and boot the Windows NT operating system. The Alpha PCI 164–266/300 system has been configured to start the debug monitor by default. Once the debug monitor is running, you can switch to Windows NT ARC firmware.

### 5.1 Starting the Debug Monitor

To start the debug monitor on your Alpha PCI 164–266/300, follow this procedure:

1. Connect the 9-pin serial port adapter cable, provided in the kit, to the COM1 connector at J27. Insert the connector in the proper orientation, so that pin 1 on the cable matches pin 1 on the board header (as indicated on the module).
2. Connect your terminal to the COM1 port, using a cable arrangement appropriate to your terminal. Set the terminal to 9600 baud, 8 data bits, 1 stop bit, no parity.
3. Connect the power supply to the Alpha PCI 164–266/300 board, as shown in Figure 1, with standard power to J29 and +3.3Vdc power to J18. If you use Digital's recommended power supply, connect power supply plug P8 to J29 pins 1–6 and P9 to J29 pins 7–12, and P11 to J18 pins 7–12 and P12 to J18 pins 1–6. (The board connectors appear to be 12-pin connectors, but each accepts two 6-pin power supply plugs.)

---

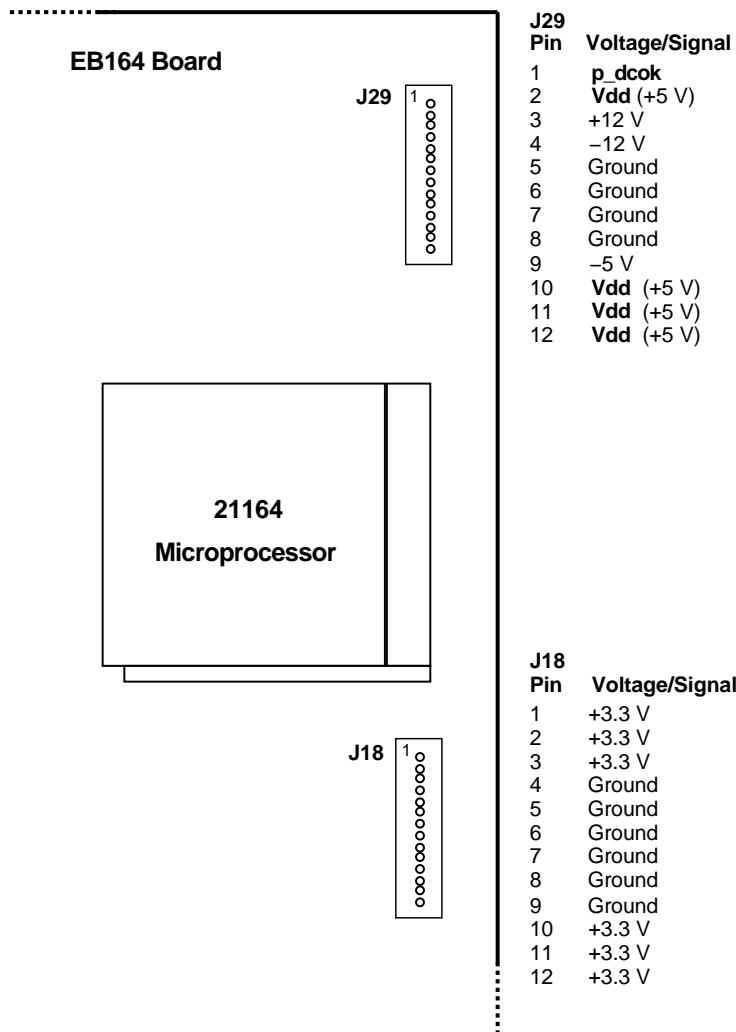
#### Caution

---

The four power supply plugs are not keyed, so pay particular attention to Figure 1 when installing them.

---

Figure 1 EB164 Power Connectors



MK-2306-28

4. Connect the supplied 3.5-inch diskette drive using a 34-pin diskette drive cable from connector J31 on your Alpha PCI 164-266/300 to the diskette drive. The drive should be connected after the twist in the cable. Attach a power connector to the drive. Again, make sure to insert the connector

in the proper orientation so that pin 1 on the cable matches pin 1 on the board header (as indicated on the module).

5. If you plan to use your Alpha PCI 164–266/300 on a network, install the Ethernet controller board (DE435) in one of the PCI connectors as outlined in the DE435 documentation.
6. Turn on the power to your terminal and to the Alpha PCI 164–266/300.
7. Observe the debug monitor messages that immediately follow when the Alpha PCI 164–266/300 is turned on. These messages describe your system configuration, version dates, and memory size, and conclude with the EB164> system prompt.
8. Verify the memory size and system configuration information displayed.
9. If you do not see the debug monitor messages, turn off the power to the Alpha PCI 164–266/300. Verify that the previous steps were performed correctly, verify the seating of the memory SIMMs, and check that all the jumpers are in their default positions. Then repeat steps 6 through 8.

The Alpha PCI 164–266/300 is ready to be used. Refer to the *Alpha Microprocessors Motherboard Debug Monitor User's Guide* for a complete list of commands.



## 5.2 Starting Windows NT ARC Firmware

If you plan to install the Windows NT operating system on your Alpha PCI 164–266/300, turn off the power to the Alpha PCI 164–266/300 and proceed with the following hardware configuration procedure:

1. Connect the keyboard cable to connector J32.
2. Connect the mouse cable to connector J34.
3. If you will be using any SCSI devices, such as a SCSI CD-ROM drive or hard disk, install the SCSI controller in any free PCI or ISA slot. Then connect the drives, being sure *only* the last drive connected to the cable is terminated, or use a cable terminator if the last drive does not have SCSI bus termination capability. Follow the drive manufacturer's installation instructions to set each drive on the bus to a unique ID number and each drive except the last to non-terminated. The primary drive on the bus should be a hard drive.
4. If you will be using one or more IDE CD-ROMs, hard drives, or other IDE devices, attach your IDE cable to connector J26 in the proper orientation. An IDE hard drive should be configured as the primary device on the IDE bus. Refer to the manufacturer's instructions for setting up the hard drive.
5. Install the graphics card into either a PCI or ISA connector, depending on the card you are using. Connect the graphics card to a compatible monitor following the graphics card manufacturer's instructions.
6. Verify that the jumper from J14-2 to J14-3 is inserted, allowing the flash ROM to be written. If the Windows NT ARC firmware is unable to write to flash ROM, it prints the device error message and stops.
7. Turn on the power to the Alpha PCI 164–266/300, and verify that the debug monitor configuration messages displayed are accurate. If the debug monitor does not start or if a configuration problem is noted, review your hardware configuration and then proceed to the next step.

8. The firmware contained in the serial ROM on your Alpha PCI 164–266/300 determines which firmware image is loaded from the flash ROM at power-up. At this point, you want the serial ROM to load the Windows NT ARC firmware so you can proceed with installing Windows NT on your Alpha PCI 164–266/300.

The serial ROM firmware uses a value stored in the nonvolatile RAM of the realtime clock to determine which firmware image to load.

Use the following debug monitor commands to select Windows NT ARC firmware and to verify the selection:<sup>1</sup>

```
EB164> bootopt nt
O/S type selected: "The Windows NT Operating System"
...Firmware type: "Windows NT Firmware"

EB164> bootopt
Predefined bootoptions are...
"0" "Alpha Evaluation Board Debug Monitor" "DBM"
"1" "The Windows NT Operating System" "NT"
"2" "OpenVMS" "VMS"
"3" "Digital UNIX" "UNIX"

O/S type selected: "The Windows NT Operating System"
...Firmware type: "Windows NT Firmware"

EB164>
```

The presence of a jumper at J1–25/26 (see CONF11 on the module) forces the serial ROM firmware to load the alternate image selected by the value in the nonvolatile RAM. Turn off the power to the Alpha PCI 164–266/300 and install the jumper at J1–25/26. (The absence of this jumper overrides the value stored in the nonvolatile RAM.)

9. Turn on the power to the Alpha PCI 164–266/300. After the power-up diagnostics are run, the ARC console boot menu appears on the graphics display.

If the ARC console boot menu does not appear, check the output of COM1 for error messages and review your hardware configuration.

You are ready for software installation. Refer to the *Alpha PCI 164–266 /300 Microsoft Windows NT Installation Guide* for instructions.

---

<sup>1</sup> The Alpha PCI 164–266/300 uses the same firmware as the EB164, so firmware prompts appear as EB164>.

### 5.3 Returning from Windows NT ARC Firmware to the Debug Monitor

You may use either of these two methods to return to the debug monitor after the Windows NT ARC firmware has been selected:

1. Turn off the power to the Alpha PCI 164-266/300, remove the jumper from J1-25/26 (CONF11 on the module), then turn on the power to the Alpha PCI 164-266/300.
2. Use the ARC firmware menus to choose the debug monitor.
  - a. At the Boot menu, choose **Supplementary menu...**
  - b. At the Supplementary menu, choose **Setup the system...**
  - c. At the Setup the system menu, choose **Machine specific setup...**
  - d. At the Machine specific setup menu, choose **Debug Monitor**.
  - e. Turn off the power to the Alpha PCI 164-266/300, then turn the power back on.

## **6 Technical Support**

If you need technical support with your Alpha PCI Motherboard, contact your local Digital representative. Please provide your local representative with the model number and if possible a brief description of the problem you are encountering.

Additional technical documentation is available from Digital on the major Digital semiconductor components used on your PCI Motherboard. A complete list of these documents can be obtained from your local representative.

And be sure to visit Digital Equipment's home page at UIC:

<http://www.digital.com>

Select the Semiconductor InfoCenter for pointers to relevant technical documentation.