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Alpha PCI 64–275

Read Me First

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1 Introduction to the Alpha PCI 64–275

The Alpha PCI 64–275 is a motherboard containing an Alpha 21064A 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 64–275 in your application.

_____ **Note** _____

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

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2 Alpha PCI 64–275 Documentation

Table 1 provides a list of the documentation available for the Alpha PCI 64–275.

Table 1   Associated Alpha PCI 64–275 Motherboard Documentation

Title	Order Number
Alpha PCI 64–275 Motherboard Documentation	
Alpha PCI 64–275 User's Manual	EK–AL275–UM[1]
Alpha PCI 64–275 Design Guide	EK–AL275–UG[1]
Alpha 21064A Documentation	
Alpha Architecture Handbook	EC–QD2KA–TE
Alpha 21064A Microprocessor Product Brief	EC–QH0RA–TE
Alpha 21064A–233, –275 Microprocessor Data Sheet	EC–QFGKA–TE
Alpha 21064 and Alpha 21064A Microprocessors Hardware Reference Manual	EC–Q9ZUB–TE
Alpha PCI 64–275 Software Documentation	

[1]Available as part of the Alpha PCI 64–275 documentation set EK–AL275–DK; not orderable separately.

Table 1 (Cont.)   Associated Alpha PCI 64–275 Motherboard Documentation

Title	Order Number
Alpha PCI 64–275 Software Documentation	
Alpha Microprocessors Motherboard Debug Monitor User's Guide	EK–AMEBD–UG[1]
Alpha Microprocessors SROM Mini-Debugger User's Guide	EK–AMSMD–UG[1]
Alpha PCI 64–275 Windows NT Installation Guide	EK–AL275–IG[1]
Associated DECchip Documentation	
DECchip 21071 and DECchip 21072 Core Logic Chipsets Product Brief	EC–QH0QA–TE
DECchip 21071 and DECchip 21072 Core Logic Chipsets Data Sheet	EC–QAEMA–TE

[1]Available as part of the Alpha PCI 64–275 documentation set EK–AL275–DK; not orderable separately.

3 Additional Hardware Requirements

Before turning on the power to your Alpha PCI 64–275, you must provide the following components. The components needed depend upon the intended use of the Alpha PCI 64–275 board.

- A 275-W industry-standard PC power supply that includes a +3.3 V 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 baby-AT-size motherboard (optional).

The following additional components are required to install the Windows NT operating system on the Alpha PCI 64–275:

- 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 *Alpha PCI 64–275 User's Manual* and the *Alpha PCI 64–275 Design Guide*.

Refer to the *Alpha PCI 64–275 Windows NT Installation Guide* and the Microsoft *Hardware Compatibility List*[1] for Windows NT to determine which SCSI controllers and graphics cards are supported.

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[1] 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).

4 Starting Up and Using the Alpha PCI 64–275

After all the required hardware components have been assembled, connect them to the Alpha PCI 64–275 by using the module connectors. For a standard system (without Windows NT), follow the procedure listed in Section 4.1. For a system using Windows NT, perform the additional steps listed in Section 4.3. For information about the location of the module connectors, refer to the System Jumpers and Connectors chapter in the *Alpha PCI 64–275 User's Manual*.

Two firmware programs have been loaded into the Alpha PCI 64–275 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 load and boot the Windows NT operating system. The Alpha PCI 64–275 system has been configured to start the debug monitor by default. When the debug monitor is running, you can switch to Windows NT ARC Firmware.

4.1 Starting the Debug Monitor

To start the debug monitor on your Alpha PCI 64–275, follow this procedure:

1. Connect a 9-pin serial port adapter cable to the COM1 connector at J32. 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 by using a cable arrangement appropriate to your terminal. Set the terminal to 9600 baud, 8 data bits, 1 stop bit, no parity.

3. Connect a power supply to the Alpha PCI 64–275 motherboard, as shown in Figure 1, with standard power to J29 and J31 and with +3.3Vdc power to J27 and J28. If you use Digital's recommended power supply, connect P8—J31, P9—J29, P11—J27, and P12—J28. J29 and J31 are mounted inline to appear as a single 12-pin connector on the board, but accept two 6-pin plugs.

———————————————— **Caution** ————————————————

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

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Figure 1   Alpha PCI 64–275 Power Connectors
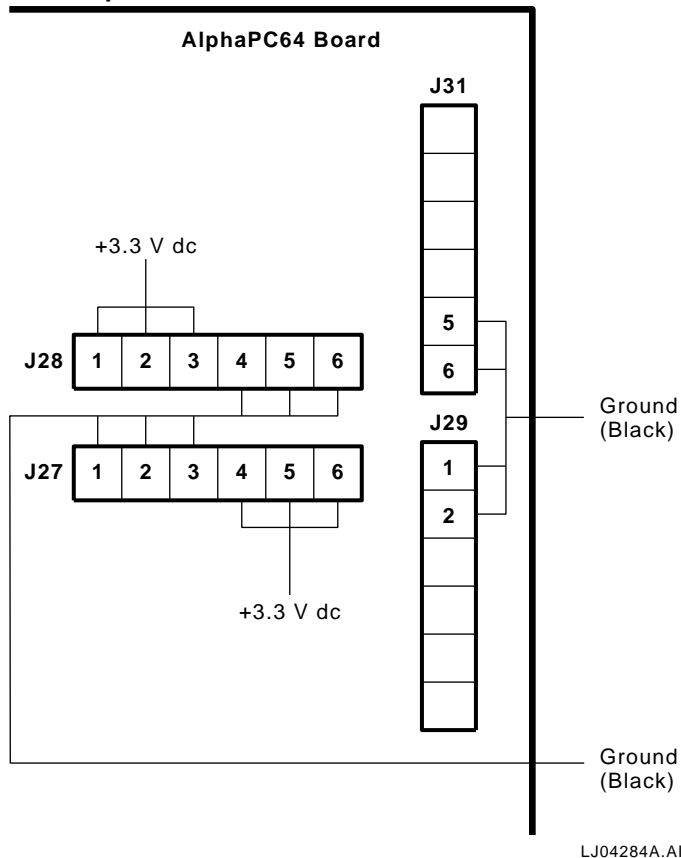
LJ04284A.AI

4. Connect a 3.5-in diskette drive. The 34-pin diskette drive cable goes from connector J24 on your Alpha PCI 64–275 to the diskette drive. 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 64–275 on a network, install an Ethernet controller board (for example, a Digital DE435) in one of the PCI connectors as outlined in the Ethernet board's documentation.

6. Check that all board jumpers are installed correctly. Refer to Section 4.2 for default jumper positions.

7. Turn on the power to your terminal and to the Alpha PCI 64–275.

8. Observe the debug monitor messages that immediately follow when the Alpha PCI 64–275 is turned on. These messages describe your system configuration, version dates, and memory size, and conclude with the `AlphaPC64>` system prompt.

9. Verify the memory size and system configuration information displayed.

10. If you do not see the debug monitor messages, turn off the power to the Alpha PCI 64–275. 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 64–275 is ready to be used. Refer to the *Alpha Microprocessors Debug Monitor User's Guide* for a complete list of commands.

4.2 Board Jumpers

Figure 2 shows the location of the jumpers on the motherboard. Figure 3 shows the J3 jumper positions in detail. Table 2 and Table 3 describe what the various jumper positions signify.

Figure 2   Alpha PCI 64–275 Board Jumpers
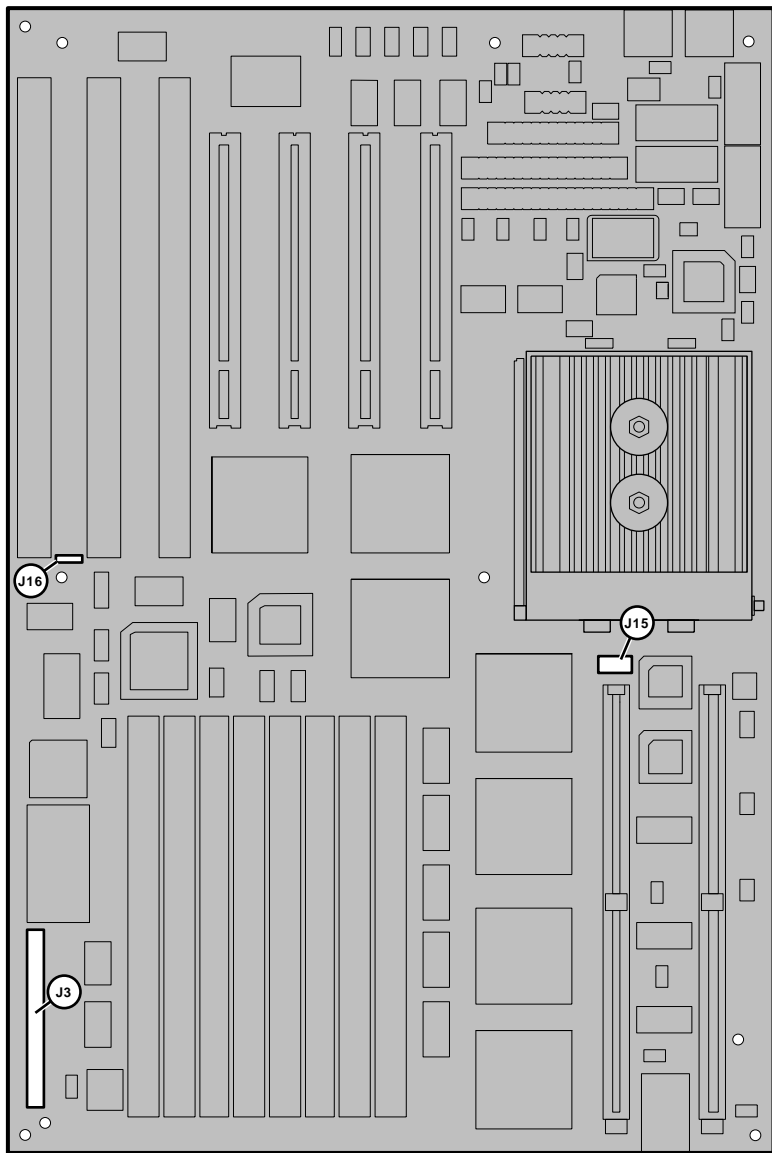
LJ-04459.AI5

Figure 3   J3 Jumpers/Connectors

sysclkdiv	1	2	
jmp_irq2	3	4	
jmp_irq1	5	6	
jmp_irq0	7	8	
(not used)	9	10	
sp_bit0	11	12	
sp_bit1	13	14	
sp_bit2	15	16	
sp_bit3	17	18	
sp_bit4	19	20	
sp_bit5	21	22	
sp_bit6	23	24	
sp_bit7	25	26	**gnd**
	27	28	**reset_button**
hd_act_l	29	30	
hd_led_l	31	32	**gnd**
spkr	33	34	**key_lock**
+5V	35	36	**gnd**
gnd	37	38	**(not used)**
+5V	39	40	**power_led_l**

To Speaker

LJ-04132.SW

8
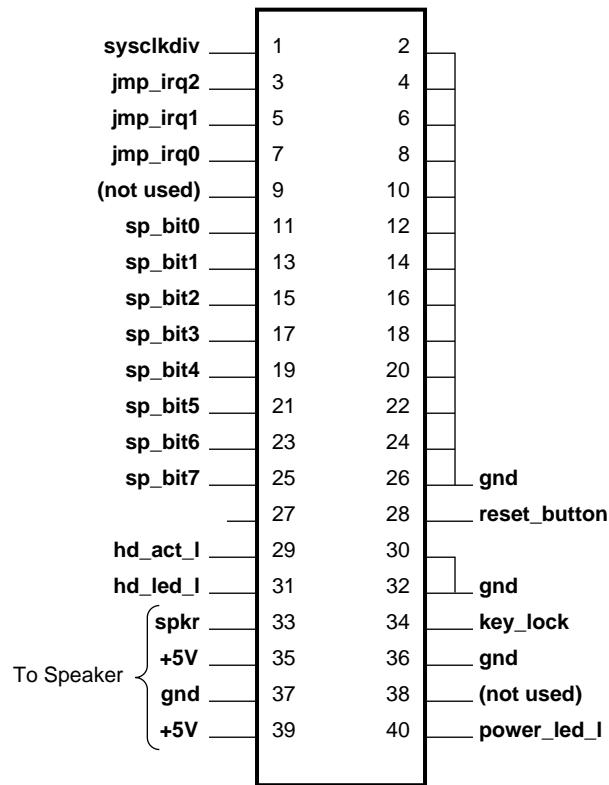
Table 2 Jumper Position Descriptions

Select Bit	Register Bit Name	Function
sp_bit7	BOOT_OPTION	Jumper out—Boot first image in flash ROM. Jumper in (**default**)—Boot one of several alternate images in flash ROM as specified by NVRAM location 3F in TOY RAM.
sp_bit6	MINI_DEBUG	Jumper out (**default**)—Boot selected image in flash ROM. Jumper in—Trap to SROM debug port (J2).
sp_bit<5:3>	BC_SPEED<2:0>	L2 cache speed selection is shown here.

BC_SPEED			
<2> J3-21	<1> J3-19	<0> J3-17	L2 Cache Access Time
In	In	In	Reserved
In	In	Out	6 ns
In	Out	In	8 ns
In	Out	Out	10 ns
Out	In	In	**12 ns** (default)
Out	In	Out	15 ns
Out	Out	In	Reserved
Out	Out	Out	Reserved

Table 2 (Cont.)   Jumper Position Descriptions

Select Bit	Register Bit Name	Function
sp_bit<2:0>	BC_SIZE<2:0>	L2 cache size selection is shown here.

	BC_SIZE			
	<2> J3-15	**<1> J3-13**	**<0> J3-11**	**L2 Cache Size**
	In	In	In	Disables L2 cache
	In	In	Out	512KB
	In	Out	In	1MB
	In	Out	Out	**2MB** (default)
	Out	In	In	4MB
	Out	In	Out	8MB
	Out	Out	In	Reserved
	Out	Out	Out	Reserved

Table 3   Alpha PCI 64–275 Board Jumpers

Connector	Pins	Description

<div align="center">L2 Cache Address Lines</div>

Connector	Pins	Description
J15	4	**Adr<22:19>** L2 cache; pins 22:19 are identified on the board. Pin 19 corresponds to J15-1, and so forth.

J15-1 Adr19	J15-2 Adr20	J15-3 Adr21	J15-4 Adr22	Size
Out	Out	Out	Out	512KB
In	Out	Out	Out	1MB
In	In	Out	Out	**2MB** (default)
In	In	In	Out	4MB
In	In	In	In	8MB

<div align="center">Flash ROM</div>

Connector	Pins	Description
J16	3	Flash ROM update enable/disable connector. Pin 1 of J16 is identified on the board as pin 7; pin 3 is identified as pin 9. Pin 2 is center. Jumper from pin 1 to pin 2 disables flash ROM update. Jumper from pin 2 to pin 3 enables flash ROM update (**default**).

Table 3 (Cont.)   Alpha PCI 64–275 Board Jumpers

Connector	Pins	Description

		Board Clock Functions
J3	4	**21064A** CPU clock divisor selection.

J3-1 sysclkdiv	J3-3 jmp_irq2	J3-5 jmp_irq1	J3-7 jmp_irq0	Divisor
In	In	In	In	2
In	In	In	Out	3
In	In	Out	In	4
In	In	Out	Out	5
In	Out	In	In	6
In	Out	In	Out	7
In	Out	Out	In	8
In	Out	Out	Out	9
Divisor 9 is used for 275 MHz (default).				
Out	In	In	In	10
Out	In	In	Out	11
Out	In	Out	In	12
Out	In	Out	Out	13
Out	Out	In	In	14
Out	Out	In	Out	15
Out	Out	Out	In	16
Out	Out	Out	Out	17

4.3 Starting Windows NT ARC Firmware

If you plan to install the Windows NT operating system on your Alpha PCI 64–275, turn off the power to the Alpha PCI 64–275, and proceed with the following hardware configuration procedure:

1. Connect the keyboard cable to connector J33.

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 shold 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 J16-2 to J16-3 is inserted, allowing the flash ROM to be written. If the Windows NT ARC Firmware is unable to write to flash ROM, it will print the `device error` message and stop.

7. Turn on the power to the Alpha PCI 64–275, 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 64–275 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 64–275.

   The serial ROM firmware uses a value stored in the nonvolatile RAM of the real-time 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:[1]

```
AlphaPC64> bootopt nt

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

AlphaPC64> bootopt

Predefined bootoptions are...
  "0" "Alpha Evaluation Board Debug Monitor" "DBM"
  "1" "The Windows NT Operating System" "NT"
  "2" "OpenVMS" "VMS"
  "3" "DEC OSF/1" "OSF"

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

AlphaPC64>
```

The presence of a jumper at J3-25 (see SP7 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 64–275 and install the jumper at J3-25. (The absence of this jumper overrides the value stored in the nonvolatile RAM.)

9. Turn on the power to the Alpha PCI 64–275. 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 64–275 Windows NT Installation Guide* for instructions.

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[1] The Alpha PCI 64–275 uses the same firmware as the AlphaPC64, so firmware prompts appear as `AlphaPC64>`.

4.4 Returning from Windows NT ARC Firmware to the Debug Monitor

You may use either of the following two methods to return to the debug monitor from the Windows NT ARC Firmware:

- Turn off the power to the Alpha PCI 64–275, remove the jumper from J3-25 (SP7 on the module), and then turn on the power to the Alpha PCI 64–275.

- Use the Windows NT ARC Firmware menus to choose the debug monitor, as follows:

  1. At the Boot menu, choose **Supplementary menu...**.

  2. At the Supplementary menu, choose **Setup the system...**.

  3. At the Setup the system menu, choose **Machine specific setup...**.

  4. At the Machine specific setup menu, choose **Debug Monitor**.

  5. Turn off the power to the Alpha PCI 64–275, then turn the power back on.

5 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.