AlphaPC 164LX Motherboard Windows NT

User's Manual

Order Number: EC–R2ZQE–TE

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1
About This Manual

This manual describes the AlphaPC 164LX motherboard, a module for computing systems based on the DIGITAL Semiconductor Alpha 21164 microprocessor and the companion DIGITAL Semiconductor 21174 core logic chip. It describes the motherboard's features and how to set its configuration jumpers. This manual helps users to install and populate the AlphaPC 164LX motherboard with memory modules and peripheral cards.

1.1 Manual Conventions and Terminology

The following conventions are used in this manual.

Caution: Cautions indicate potential damage to equipment, software, or data.

Note: Notes provide additional information about a topic.

Numbering: All numbers are decimal or hexadecimal unless otherwise indicated. In case of ambiguity, a subscript indicates the radix of nondecimal numbers. For example, 19 is a decimal number, but 19_{16} and 19A are hexadecimal numbers.

Extents: Extents are specified by a single number or a pair of numbers in square brackets ([ ]) separated by a colon (:), and are inclusive. For example, bits [7:3] specify an extent including bits 7, 6, 5, 4, and 3. Multiple bit fields are shown as extents.

Register Figures: Register figures have bit and field position numbering starting at the right (low-order) and increasing to the left (high-order).

Signal Names: All signal names are printed in **boldface** type. Signal names that originate in an industry-standard specification, such as PCI or IDE, are printed in the case as found in the specification (usually uppercase). Active low signals have either a pound sign "#" appended, or a "not" overscore bar; for example, **DEVSEL#** and **$\overline{\text{RESET}}$**.

Italic Type: *Italic* type emphasizes important information and indicates complete titles of documents.

Terms: The following terms are used in this manual:

This term...	Refers to...
Microsoft Windows NT installation guide	The Microsoft *Windows NT Workstation Installation Guide* and the *Windows NT Server Installation Guide*.
Windows NT	The Microsoft Windows NT Workstation and the Windows NT Server operating systems.

2
Features of the AlphaPC 164LX Motherboard

Table 2–1 provides an overview of the AlphaPC 164LX motherboard's features.

Table 2–1 AlphaPC 164LX Features

Feature	Description
Microprocessor	DIGITAL Semiconductor Alpha 21164 microprocessor (64-bit RISC)
Core logic chip	DIGITAL Semiconductor 21174 core logic chip, comprising a single control chip that provides an interface to system memory and the PCI bus
Synchronous DRAM (SDRAM) memory	32MB to 512MB memory array –- Two banks of 128-bit memory; 168-pin unbuffered SDRAM DIMMs
Caching:	
L1 Icache	8KB, direct-mapped instruction cache on the CPU chip
L1 Dcache	8KB, direct-mapped data cache on the CPU chip
L2 Scache	96KB, three-way, set-associative, write-back unified instruction and data cache on the CPU chip
L3 backup cache	Onboard 2MB, direct-mapped, synchronous SSRAM backup cache with 128-bit data path
I/O and miscellaneous support	32-bit and 64-bit, 33-MHz PCI Two 64-bit and two 32-bit PCI expansion slots
	PCI/IDE control (CMD PCI0646)
	Intel 82378ZB PCI-to-ISA bridge chip
	Two dedicated ISA expansion slots
	SMC FDC37C935 combination controller chip provides control for diskettes, two UARTs with modem control, parallel port, keyboard, mouse, and time-of-year clock
	1MB flash ROM
Firmware	Windows NT AlphaBIOS firmware

Figure 2–1 shows the AlphaPC 164LX motherboard and its components.

Figure 2–1 AlphaPC 164LX Jumper/Connector/Component Location

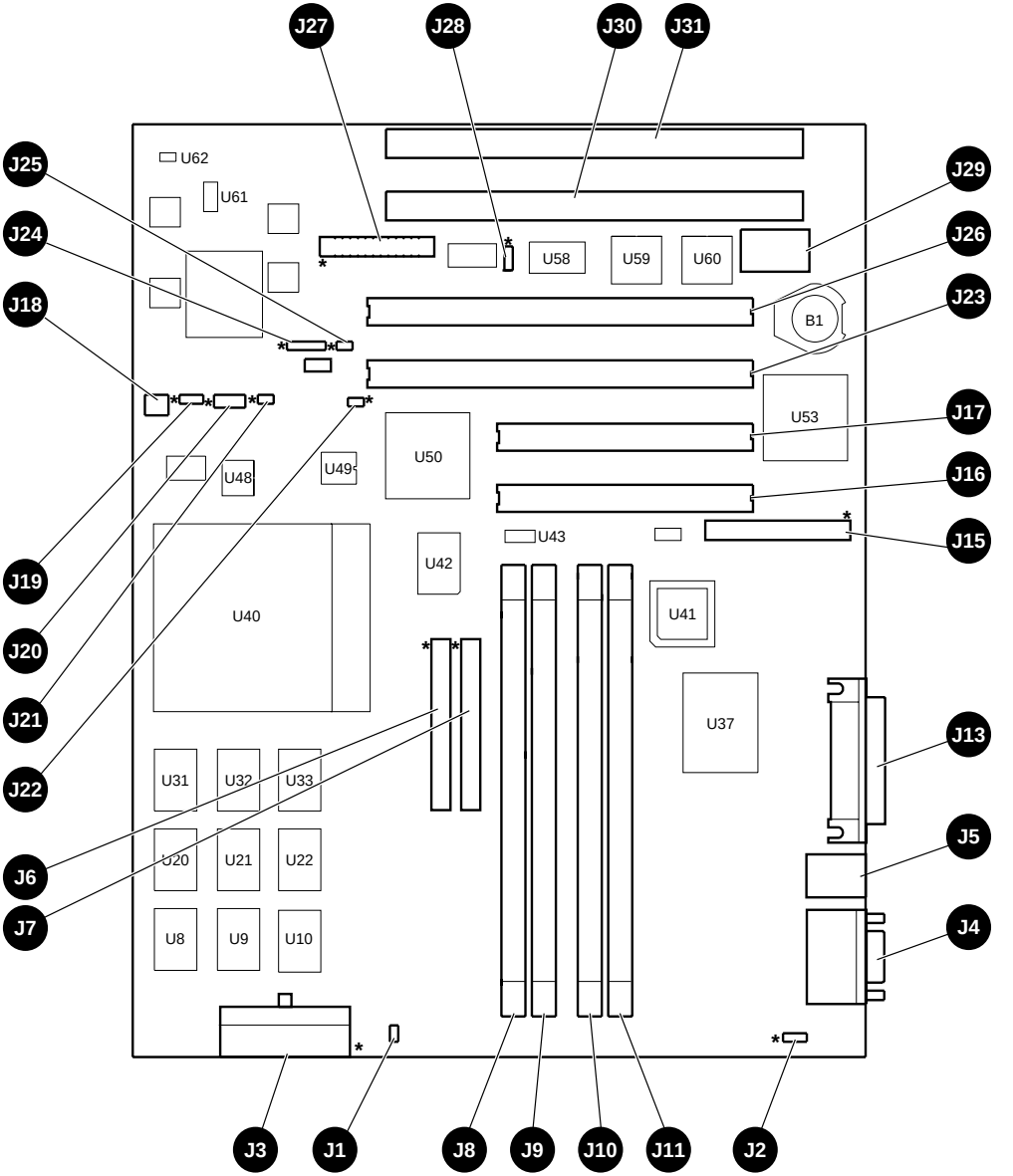


Table 2–2 AlphaPC 164LX Jumper/Connector/Component List

Item No.	Description	Item No.	Description
B1	RTC battery (CR2032)	J25	Hard-drive LED connector
J1	Soft power connector	J26	PCI slot 0 (64-bit)
J2	Fan power, enclosure (+12V)	J27	System configuration jumpers
J3	Power (+3V, +5V, -5V, +12V, -12V)	J28	Flash ROM update enable/disable jumper
J4	COM1/COM2 (DB9) connectors	J29	SROM test port connector
J5	Keyboard/mouse connectors	J30	ISA slot 1
J6	EIDE drive 2/3 connector	J31	ISA slot 0
J7	EIDE drive 0/1 connector	U8 to U10	Cache SRAM (L3)
J8	SDRAM DIMM 0 [0:63] connector	U20 to U22	Cache SRAM (L3)
J9	SDRAM DIMM 1 [64:128] connector	U31 to U33	Cache SRAM (L3)
J10	SDRAM DIMM 2 [0:63] connector	U37	I/O interface and address control (DSC 21174-CA)
J11	SDRAM DIMM 3 [64:128] connector	U40	Microprocessor, socket (DSC Alpha 21164)
J12	Reserved	U41	Patch 8K PAL
J13	Parallel I/O connector	U42	EIDE controller
J14	Reserved	U43	System clock PLL (CY2308)
J15	Diskette (floppy) drive connector	U48	Microprocessor clock synthesizer (MC12439)
J16	PCI slot 3 (32-bit)	U49	Serial ROM, socketed (Xilinx XC17128D)
J17	PCI slot 2 (32-bit)	U50	PCI-to-ISA bridge (Intel 82378ZB)
J18	Microprocessor fan/fan sense connector	U53	Combination controller, Super I/O (SMC FDC37C935)
J19	Enclosure fan +12V power connector	U58	Flash ROM (1MB)
J20	Speaker connector	U59	PCI arbiter PAL
J21	Reset button connector	U60	PCI interrupt request PAL
J22	Halt button connector	U61	Power controller
J23	PCI slot 1 (64-bit)	U62	Power sense
J24	Power LED connector		

2.1 Power Requirements

The AlphaPC 164LX motherboard has a total power dissipation of 100 W, excluding any plug-in PCI and ISA devices. Table 2–3 lists the power requirement for each dc supply voltage.

The power supply must be ATX-compliant.

Table 2–3 Power Supply DC Current Requirements

Voltage/Tolerance	Current[1]
+3.3 V dc, ±5%	5.0 A
+5 V dc, ±5%	14.0 A
–5 V dc, ±5%	0 A
+12 V dc, ±5%	1.0 A
–12 V dc, ±5%	100.0 mA

[1] Values indicated are for an AlphaPC 164LX motherboard with an Alpha 21164 microprocessor operating at 600 MHz, with 64MB SDRAM, excluding adapter cards and disk drives.

Caution: **Fan sensor required**. The 21164 microprocessor cooling fan *must* have a built-in sensor that will drive a signal if the airflow stops. The sensor is connected to motherboard connector J18. When the signal is generated, it resets the system.

2.2 Environmental Requirements

The 21164 microprocessor is cooled by a small fan blowing directly into the chip's heat sink. The AlphaPC 164LX motherboard is designed to run efficiently by using only this fan. Additional fans may be necessary depending upon cabinetry and the requirements of plug-in cards.

The AlphaPC 164LX motherboard is specified to run within the environment listed in Table 2–4.

Table 2–4 AlphaPC 164LX Motherboard Environmental Requirements

Parameter	Specification
Operating temperature	10°C to 40°C (50°F to 104°F)
Storage temperature	–55°C to 125°C (–67°F to 257°F)
Relative humidity	10% to 90% with maximum wet bulb temperature 28°C (82°F) and minimum dew point 2°C (36°F)
Rate of (dry bulb) temperature change	11°C/hour ±2°C/hour (20°F/hour ±4°F/hour)

2.3 Physical Parameters

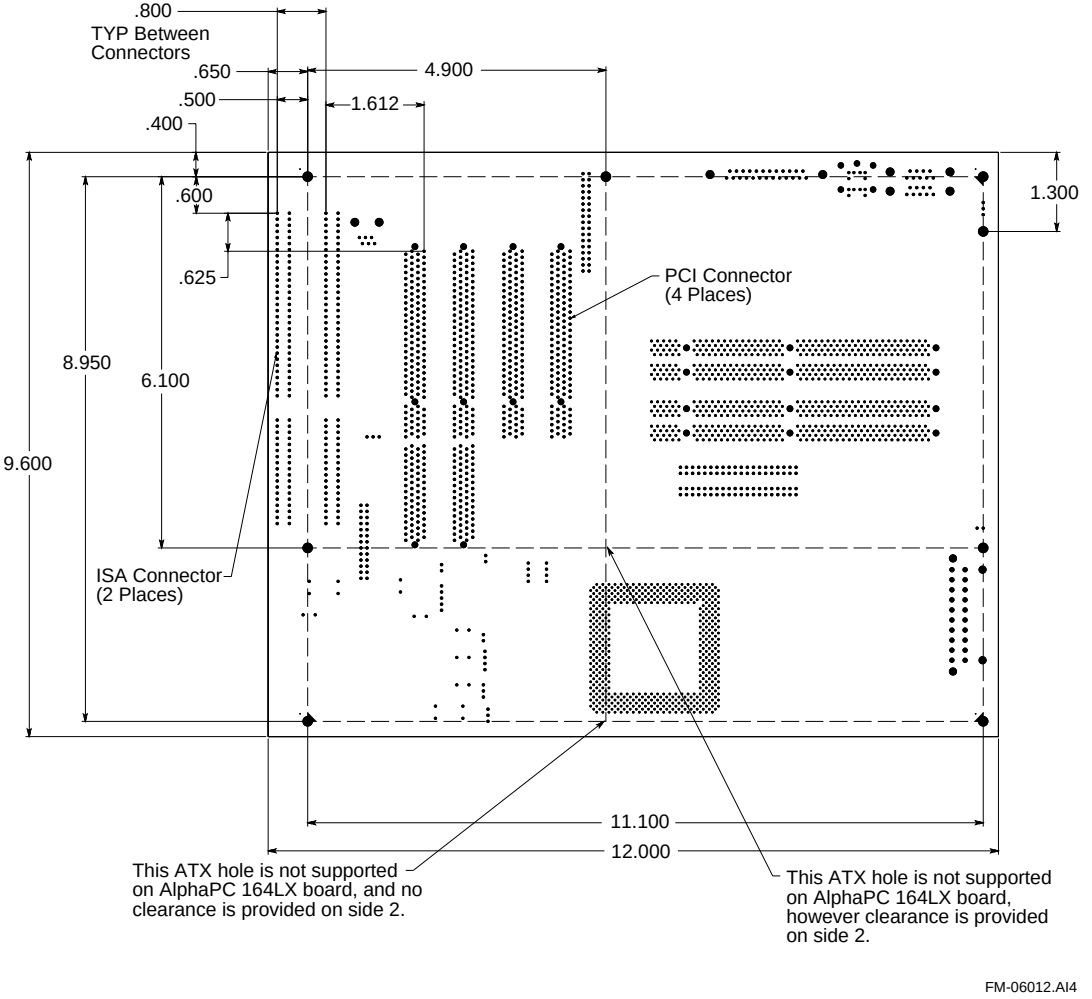
The AlphaPC 164LX motherboard is an ATX-size printed-wiring board (PWB) with the following dimensions:

- Length: 30.48 cm (12.0 in ±0.0005 in)
- Width: 24.38 cm (9.6 in ±0.0005 in)
- Height: 6.86 cm (2.7 in)

2.3.1 ATX Hole Specification

Figure 2–2 shows the ATX Hole Specification for the AlphaPC 164LX.

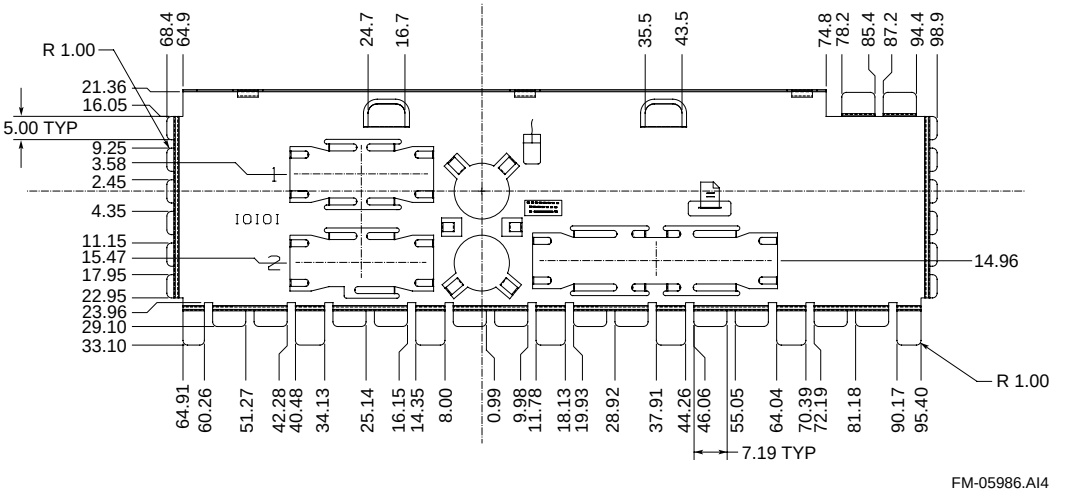
Figure 2–2 ATX Hole Specification



2.3.2 ATX I/O Shield Requirements

Figure 2–3 shows the ATX I/O shield dimensions for the AlphaPC 164LX.

Figure 2–3 ATX I/O Shield Dimensions



3
AlphaPC 164LX Jumper Configuration

The AlphaPC 164LX motherboard has two groups of jumpers located at J27 and J28, as shown in Figure 2–1. These jumpers set the hardware configuration and boot options. Figure 3–1 shows these jumper configurations.

3.1 CPU Speed Selection

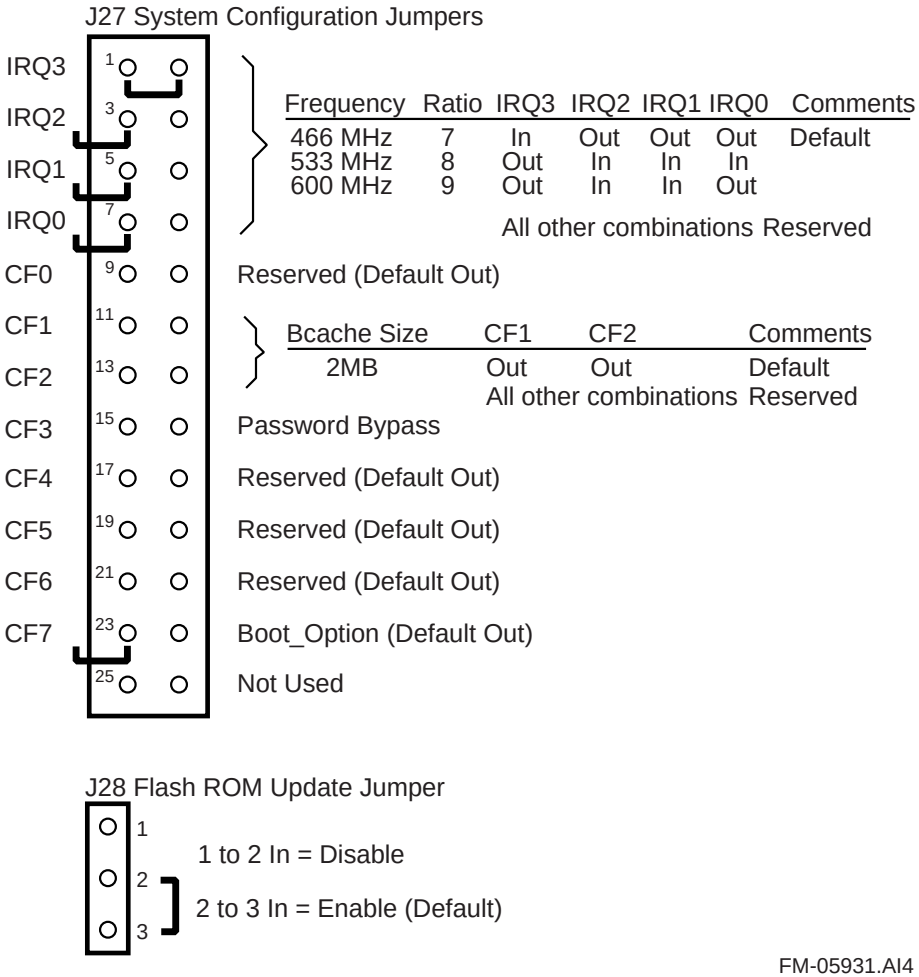
The clock synthesizer at location U47 makes it possible to change the frequency of the microprocessor's system clock output without having to change the clock crystal. Simply set the system clock divisor jumpers to adjust the frequency of the microprocessor's system clock output. These system clock divisor jumpers are located at J27–1/2 (IRQ3), J27–3/4 (IRQ2), J27–5/6 (IRQ1), and J27–7/8 (IRQ0). The jumper configuration is set in IRQ3 through IRQ0. These four jumpers set the speed at power-up as listed in Figure 3–1. The microprocessor frequency divided by the ratio determines the system clock frequency.

3.2 Bcache Size Jumpers (CF1 and CF2)

The Bcache size jumpers are located at J27–11/12 (CF) and J27–13/14 (CF2). These jumpers configure the Bcache as specified in Figure 3–1.

Bcache Size Jumpers (CF1 and CF2)

Figure 3–1 AlphaPC 164LX Configuration Jumpers



3.3 Password Bypass Jumper (CF3)

AlphaBIOS provides password protection. However, Password Bypass is provided for system setup or startup when the AlphaBIOS password is unavailable.

Password Bypass is enabled by inserting jumper CF3 in the J27 System Configuration Jumper Block. This disables the AlphaBIOS password verification and enables the user to set up or start up their system without the AlphaBIOS password. Password Bypass also clears the password.

3.4 Boot Option Jumper (CF7)

The boot option jumper is located at J27–23/24 (CF7). The default position for this jumper is out (Figure 3–1). This jumper selects the image to be loaded into memory from the system flash ROM. With the jumper out, the AlphaBIOS Console firmware is loaded. With the jumper in, the fail-safe booter is loaded. For more information about the fail-safe booter, refer to Section 8.5.

3.5 Flash ROM Update Jumper (J28)

When J28–2/3 are jumpered together (default), the flash ROM is write-enabled. When J28–1/2 are jumpered together, the flash ROM is write-protected.

4
AlphaPC 164LX Connector Pinouts

This chapter contains pinouts for all of the AlphaPC 164LX connectors. See Figure 2–1 for connector locations.

4.1 PCI Bus Connector Pinouts

Table 4–1 shows the PCI bus connector pinouts.

Table 4–1 PCI Bus Connector Pinouts *(Sheet 1 of 2)*

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
32-Bit and 64-Bit PCI Connectors (J16, J17, J23, J26)							
A1	**TRST#**	A2	**+12V**	A3	**TMS**	A4	**TDI**
A5	**Vdd**	A6	**INTA**	A7	**INTC**	A8	**Vdd**
A9	—	A10	**Vdd**	A11	—	A12	**Gnd**
A13	**Gnd**	A14	—	A15	**RST#**	A16	**Vdd**
A17	**GNT#**	A18	**Gnd**	A19	—	A20	**AD[30]**
A21	**+3V**	A22	**AD[28]**	A23	**AD[26]**	A24	**Gnd**
A25	**AD[24]**	A26	**IDSEL**	A27	**+3V**	A28	**AD[22]**
A29	**AD[20]**	A30	**Gnd**	A31	**AD[18]**	A32	**AD[16]**
A33	**+3V**	A34	**FRAME#**	A35	**Gnd**	A36	**TRDY#**
A37	**STOP#**	A38	**STOP#**	A39	**+3V**	A40	**SDONE**
A41	**SBO#**	A42	**Gnd**	A43	**PAR**	A44	**AD[15]**
A45	**+3V**	A46	**AD[13]**	A47	**AD[11]**	A48	**Gnd**
A49	**AD[09]**	A50	Not used	A51	Not used	A52	**C/BE#[0]**
A53	**+3V**	A54	**AD[06]**	A55	**AD[04]**	A56	**Gnd**
A57	**AD[02]**	A58	**AD[00]**	A59	**Vdd**	A60	**REQ64#**
A61	**Vdd**	A62	**Vdd**	B1	**-12V**	B2	**TCK**
B3	**Gnd**	B4	**TDO**	B5	**Vdd**	B6	**Vdd**
B7	**INTB**	B8	**INTD**	B9	**PRSNT1#**	B10	—

Table 4–1 PCI Bus Connector Pinouts *(Sheet 2 of 2)*

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
B11	**PRSNT2#**	B12	**Gnd**	B13	**Gnd**	B14	—
B15	**Gnd**	B16	**CLK**	B17	**Gnd**	B18	**REQ#**
B19	**Vdd**	B20	**AD[31]**	B21	**AD[29]**	B22	**Gnd**
B23	**AD[27]**	B24	**AD[25]**	B25	**+3V**	B26	**C/BE#[3]**
B27	**AD[23]**	B28	**Gnd**	B29	**AD[21]**	B30	**AD[19]**
B31	**+3V**	B32	**AD[17]**	B33	**C/BE#[2]**	B34	**Gnd**
B35	**IRDY#**	B36	**+3V**	B37	**DEVSEL#**	B38	**Gnd**
B39	**LOCK#**	B40	**PERR#**	B41	**+3V**	B42	**SERR#**
B43	**+3V**	B44	**C/BE#[1]**	B45	**AD[14]**	B46	**Gnd**
B47	**AD[12]**	B48	**AD[10]**	B49	**Gnd**	B50	Not used
B51	Not used	B52	**AD[08]**	B53	**AD[07]**	B54	**+3V**
B55	**AD[05]**	B56	**AD[03]**	B57	**Gnd**	B58	**AD[01]**
B59	**Vdd**	B60	**ACK64#**	B61	**Vdd**	B62	**Vdd**
64-Bit PCI Connectors Only (J23, J26)							
A63	**Gnd**	A64	**C/BE#[7]**	A65	**C/BE#[5]**	A66	**Vdd**
A67	**PAR64**	A68	**D[62]**	A69	**Gnd**	A70	**D[60]**
A71	**D[58]**	A72	**Gnd**	A73	**D[56]**	A74	**D[54]**
A75	**Vdd**	A76	**D[52]**	A77	**D[50]**	A78	**Gnd**
A79	**D[48]**	A80	**D[46]**	A81	**Gnd**	A82	**D[44]**
A83	**D[42]**	A84	**Vdd**	A85	**D[40]**	A86	**D[38]**
A87	**Gnd**	A88	**D[36]**	A89	**D[34]**	A90	**Gnd**
A91	**D[32]**	A92	—	A93	**Gnd**	A94	—
B63	—	B64	**Gnd**	B65	**C/BE#[6]**	B66	**C/BE#[4]**
B67	**Gnd**	B68	**D[63]**	B69	**D[61]**	B70	**Vdd**
B71	**D[59]**	B72	**D[57]**	B73	**Gnd**	B74	**D[55]**
B75	**D[53]**	B76	**Gnd**	B77	**D[51]**	B78	**D[49]**
B79	**Vdd**	B80	**D[47]**	B81	**D[45]**	B82	**Gnd**
B83	**D[43]**	B84	**D[41]**	B85	**Gnd**	B86	**D[39]**
B87	**D[37]**	B88	**Vdd**	B89	**D[35]**	B90	**D[33]**
B91	**Gnd**	B92	—	B93	—	B94	**Gnd**

4.2 ISA Expansion Bus Connector Pinouts

Table 4–2 shows the ISA expansion bus connector pinouts.

Table 4–2 ISA Expansion Bus Connector Pinouts (J30, J31)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	**Gnd**	2	**IOCHCK#**	3	**RSTDRV**	4	**SD7**
5	**Vdd**	6	**SD6**	7	**IRQ9**	8	**SD5**
9	**–5V**	10	**SD4**	11	**DRQ2**	12	**SD3**
13	**–12V**	14	**SD2**	15	**ZEROWS#**	16	**SD1**
17	**+12V**	18	**SD0**	19	**Gnd**	20	**IOCHRDY**
21	**SMEMW#**	22	**AEN**	23	**SMEMR#**	24	**SA19**
25	**IOW#**	26	**SA18**	27	**IOR#**	28	**SA17**
29	**DACK3#**	30	**SA16**	31	**DRQ3**	32	**SA15**
33	**DACK1#**	34	**SA14**	35	**DRQ1**	36	**SA13**
37	**REFRESH#**	38	**SA12**	39	**SYSCLK**	40	**SA11**
41	**IRQ7**	42	**SA10**	43	**IRQ6**	44	**SA9**
45	**IRQ5**	46	**SA8**	47	**IRQ4**	48	**SA7**
49	**IRQ3**	50	**SA6**	51	**DACK2#**	52	**SA5**
53	**TC**	54	**SA4**	55	**BALE**	56	**SA3**
57	**Vdd**	58	**SA2**	59	**OSC**	60	**SA1**
61	**Gnd**	62	**SA0**	63	**MEMCS16#**	64	**SBHE#**
65	**IOCS16#**	66	**LA23**	67	**IRQ10**	68	**LA22**
69	**IRQ11**	70	**LA21**	71	**IRQ12**	72	**LA20**
73	**IRQ15**	74	**LA19**	75	**IRQ14**	76	**LA18**
77	**DACK0#**	78	**LA17**	79	**DRQ0**	80	**MEMR#**
81	**DACK5#**	82	**MEMW#**	83	**DRQ5**	84	**SD8**
85	**DACK6#**	86	**SD9**	87	**DRQ6**	88	**SD10**
89	**DACK7#**	90	**SD11**	91	**DRQ7**	92	**SD12**
93	**Vdd**	94	**SD13**	95	**MASTER#**	96	**SD14**
97	**Gnd**	98	**SD15**	—	—	—	—

4.3 SDRAM DIMM Connector Pinouts

Table 4–3 shows the SDRAM DIMM connector pinouts.

Table 4–3 SDRAM DIMM Connector Pinouts (J8 through J11)[1] *(Sheet 1 of 2)*

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	**Gnd**	2	**DQ0**	3	**DQ1**	4	**DQ2**
5	**DQ3**	6	**+3V**	7	**DQ4**	8	**DQ5**
9	**DQ6**	10	**DQ7**	11	**DQ8**	12	**Gnd**
13	**DQ9**	14	**DQ10**	15	**DQ11**	16	**DQ12**
17	**DQ13**	18	**+3V**	19	**DQ14**	20	**DQ15**
21	**CB0**	22	**CB1**	23	**Gnd**	24	NC
25	NC	26	**+3V**	27	**$\overline{\text{WE}}$**	28	**DQMB0**
29	**DQMB1**	30	**$\overline{\text{S0}}$**	31	NC	32	**Gnd**
33	**A0**	34	**A2**	35	**A4**	36	**A6**
37	**A8**	38	**A10**	39	**A12**	40	**+3V**
41	**+3V**	42	**CK0**	43	**Gnd**	44	NC
45	**$\overline{\text{S2}}$**	46	**DQMB2**	47	**DQMB3**	48	NC
49	**+3V**	50	NC	51	NC	52	**CB2**
53	**CB3**	54	**Gnd**	55	**DQ16**	56	**DQ17**
57	**DQ18**	58	**DQ19**	59	**+3V**	60	**DQ20**
61	NC	62	NC	63	**CKE1**	64	**Gnd**
65	**DQ21**	66	**DQ22**	67	**DQ23**	68	**Gnd**
69	**DQ24**	70	**DQ25**	71	**DQ26**	72	**DQ27**
73	**+3V**	74	**DQ28**	75	**DQ29**	76	**DQ30**
77	**DQ31**	78	**Gnd**	79	**CK2**	80	NC
81	NC	82	**SDA**	83	**SCL**	84	**+3V**
85	**Gnd**	86	**DQ32**	87	**DQ33**	88	**DQ34**
89	**DQ35**	90	**+3V**	91	**DQ36**	92	**DQ37**
93	**DQ38**	94	**DQ39**	95	**DQ40**	96	**Gnd**
97	**DQ41**	98	**DQ42**	99	**DQ43**	100	**DQ44**
101	**DQ45**	102	**+3V**	103	**DQ46**	104	**DQ47**
105	**CB4**	106	**CB5**	107	**Gnd**	108	NC
109	NC	110	**+3V**	111	**$\overline{\text{CAS}}$**	112	**DQMB4**
113	**DQMB5**	114	**S1**	115	**$\overline{\text{RAS}}$**	116	**Gnd**
117	**A1**	118	**A3**	119	**A5**	120	**A7**
121	**A9**	122	**BA0**	123	**A13**	124	**+3V**

Table 4–3 SDRAM DIMM Connector Pinouts (J8 through J11)[1] *(Sheet 2 of 2)*

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
125	**CK1**	126	**BA1**[2]	127	**Gnd**	128	**CKE0**
129	**$\overline{S3}$**	130	**DQMB6**	131	**DQMB7**	132	**PD**[3]
133	**+3V**	134	NC	135	NC	136	**CB6**
137	**CB7**	138	**Gnd**	139	**DQ48**	140	**DQ49**
141	**DQ50**	142	**DQ51**	143	**+3V**	144	**DQ52**
145	NC	146	NC	147	**PD**	148	**Gnd**
149	**DQ53**	150	**DQ54**	151	**DQ55**	152	**Gnd**
153	**DQ56**	154	**DQ57**	155	**DQ58**	156	**DQ59**
157	**+3V**	158	**DQ60**	159	**DQ61**	160	**DQ62**
161	**DQ63**	162	**Gnd**	163	**CK3**	164	NC
165	**SA0**	166	**SA1**	167	**SA2**	168	**+3V**

[1] Pins 1 through 84 are on the front side and pins 85 through 168 are on the back side.
[2] The AlphaPC 164LX uses **BA1** as both **BA1** and **ADDR12**. Therefore, four-bank DIMMs using **ADDR[11:0]** are the maximum size. (Two-bank DIMMs can use **ADDR[12:0]**.)
[3] Pull-down.

4.4 EIDE Drive Bus Connector Pinouts

Table 4–4 shows the EIDE drive bus connector pinouts.

Table 4–4 EIDE Drive Bus Connector Pinouts (J6, J7)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	**$\overline{RESET}$**	2	**Gnd**	3	**IDE_D7**	4	**IDE_D8**
5	**IDE_D6**	6	**IDE_D9**	7	**IDE_D5**	8	**IDE_D10**
9	**IDE_D4**	10	**IDE_D11**	11	**IDE_D3**	12	**IDE_D12**
13	**IDE_D2**	14	**IDE_D13**	15	**IDE_D1**	16	**IDE_D14**
17	**IDE_D0**	18	**IDE_D15**	19	**Gnd**	20	NC (key pin)
21	**MARQ**	22	**Gnd**	23	**$\overline{IOW}$**	24	**Gnd**
25	**$\overline{IOR}$**	26	**Gnd**	27	**CHRDY**	28	**BALE**
29	**MACK**	30	**Gnd**	31	**IRQ**	32	**$\overline{IOCS16}$**
33	**ADDR1**	34	NC	35	**ADDR0**	36	**ADDR2**
37	**$\overline{CS0}$**	38	**$\overline{CS1}$**	39	**$\overline{ACT}$**	40	**Gnd**

4.5 Diskette Drive Bus Connector Pinouts

Table 4–5 shows the diskette (floppy) drive bus connector pinouts.

Table 4–5 Diskette (Floppy) Drive Bus Connector Pinouts (J15)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	**Gnd**	2	**DEN0**	3	**Gnd**	4	NC
5	**Gnd**	6	**DEN1**	7	**Gnd**	8	**INDEX**
9	**Gnd**	10	**MTR0**	11	**Gnd**	12	**DR1**
13	**Gnd**	14	**DR0**	15	**Gnd**	16	**MTR1**
17	**Gnd**	18	**DIR**	19	**Gnd**	20	**STEP**
21	**Gnd**	22	**WDATA**	23	**Gnd**	24	**WGATE**
25	**Gnd**	26	**TRK0**	27	**Gnd**	28	**WRTPRT**
29	**ID0**	30	**RDATA**	31	**Gnd**	32	**HDSEL**
33	**ID1**	34	**DSKCHG**	—	—	—	—

4.6 Parallel Bus Connector Pinouts

Table 4–6 shows the parallel bus connector pinouts.

Table 4–6 Parallel Bus Connector Pinouts (J13)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	**STB**	2	**PD0**	3	**PD1**	4	**PD2**
5	**PD3**	6	**PD4**	7	**PD5**	8	**PD6**
9	**PD7**	10	**ACK**	11	**BUSY**	12	**PE**
13	**SLCT**	14	**AFD**	15	**ERR**	16	**INIT**
17	**SLIN**	18	**Gnd**	19	**Gnd**	20	**Gnd**
21	**Gnd**	22	**Gnd**	23	**Gnd**	24	**Gnd**
25	**Gnd**	—	—	—	—	—	—

4.7 COM1/COM2 Serial Line Connector Pinouts

Table 4–7 shows the COM1/COM2 serial line connector pinouts.

Table 4–7 COM1/COM2 Serial Line Connector Pinouts (J4)

COM1 Pin (Top)	COM1 Signal	COM2 Pin (Bottom)	COM2 Signal
1	**DCD1**	1	**DCD2**
2	**RxD1**	2	**RxD2**
3	**TxD1**	3	**TxD2**
4	**DTR1**	4	**DTR2**
5	**SG1**	5	**SG2**
6	**DSR1**	6	**DSR2**
7	**RTS1**	7	**RTS2**
8	**CTS1**	8	**CTS2**
9	**RI1**	9	**RI2**

4.8 Keyboard/Mouse Connector Pinouts

Table 4–8 shows the keyboard/mouse connector pinouts.

Table 4–8 Keyboard/Mouse Connector Pinouts (J5)

Keyboard Pin (Top)	Keyboard Signal	Mouse Pin (Bottom)	Mouse Signal
1	**KBDATA**	1	**MSDATA**
2	NC	2	NC
3	**Gnd**	3	**Gnd**
4	**Vdd**	4	**Vdd**
5	**KBCLK**	5	**MSCLK**
6	NC	6	NC

4.9 SROM Test Data Input Connector Pinouts

Table 4–9 shows the SROM test data input connector pinouts.

Table 4–9 SROM Test Data Input Connector Pinouts (J29)

Pin	Signal	Name
1	NC	—
2	**SROM_CLK_L**	Clock out
3	**Gnd**	—
4	NC	—
5	**TEST_SROM_D_L**	SROM serial data in
6	NC	—

4.10 Input Power Connector Pinouts

Table 4–10 shows the input power connector pinouts.

Table 4–10 Input Power Connector Pinouts (J3)[1]

Pin	Voltage	Pin	Voltage	Pin	Voltage	Pin	Voltage
1	**+3.3 V dc**	2	**+3.3 V dc**	3	**Gnd**	4	**+5 V dc**
5	**Gnd**	6	**+5 V dc**	7	**Gnd**	8	**P_DCOK**
9	**5 V SB**	10	**+12 V dc**	11	**+3.3 V dc**	12	**–12 V dc**
13	**Gnd**	14	**PS_ON**	15	**Gnd**	16	**Gnd**
17	**Gnd**	18	**–5 V dc**	19	**+5 V dc**	20	**+5 V dc**

[1] This pinout is ATX-compliant.

4.11 Enclosure Fan Power Connector Pinouts

Table 4–11 shows the enclosure fan power connector pinouts.

Table 4–11 Enclosure Fan (+12 V dc) Power Connector Pinouts (J2, J19)

Pin	Voltage
1	**Gnd**
2	**+12 V dc**
3	**Gnd**

4.12 Speaker Connector Pinouts

Table 4–12 shows the speaker connector pinouts.

Table 4–12 Speaker Connector Pinouts (J20)

Pin	Signal	Name
1	**SPKR**	Speaker output
2	**Gnd**	—
3	**Gnd**	—
4	**Gnd**	—

4.13 Microprocessor Fan Power Connector Pinouts

Table 4–13 shows the microprocessor fan power connector pinouts.

Table 4–13 Microprocessor Fan Power Connector Pinouts (J18)

Pin	Signal	Name
1	**+12V**	—
2	**FAN_CONN_L**	Fan connected
3	**Gnd**	—

4.14 Power LED Connector Pinouts

Table 4–14 shows the power LED connector pinouts.

Table 4–14 Power LED Connector Pinouts (J24)

Pin	Signal	Name
1	**POWER_LED_L**	Power LED input
2	**Gnd**	—
3	NC	—
4	NC	—
5	NC	—

4.15 IDE Drive LED Connector Pinouts

Table 4–15 shows the IDE drive LED connector pinouts.

Table 4–15 IDE Drive LED Connector Pinouts (J25)

Pin	Signal	Name
1	**HD_ACT_L**	Hard drive active
2	**HD_LED_L**	Hard drive LED input

4.16 Reset Button Connector Pinouts

Table 4–16 shows the reset button connector pinouts.

Table 4–16 Reset Button Connector Pinouts (J21)

Pin	Signal	Name
1	**RESET_BUTTON**	Reset system
2	**Gnd**	—

4.17 Halt Button Connector Pinouts

Table 4–17 shows the halt button connector pinouts.

Table 4–17 Halt Button Connector Pinouts (J22)

Pin	Signal	Name
1	**HALT_BUTTON**	Halt system
2	**Gnd**	—

Note: The Halt button is not used with the Windows NT operating system.

4.18 Soft Power Connector Pinouts

Table 4–18 shows the soft power connector pinouts.

Table 4–18 Soft Power Connector Pinouts (J1)

Pin	Signal	Name
1	**Input**	System power on/off
2	**Gnd**	—

5
Memory and Microprocessor Configuration

For higher system speed or greater throughput, you can upgrade SDRAM memory by replacing DIMMs with those of greater size.

When configuring or upgrading SDRAM, observe the following rules:

- Each DIMM must be a 168-pin unbuffered version and have a frequency of 100 MHz.
- All DIMMs must be of equal size if they are in the same bank.

5.1 Configuring SDRAM Memory

Although not an exhaustive list, Table 5–1 lists the tested SDRAM memory configurations available.

For a list of vendors who supply components and accessories for the AlphaPC 164LX, see Appendix A.

Refer to Figure 2–1 for DIMM connector locations.

Note: 1Mb x 72 is not supported.

Table 5–1 AlphaPC 164LX SDRAM Memory Configurations *(Sheet 1 of 2)*

Total Memory	Bank 0 (J8 and J9)	Bank 1 (J10 and J11)
32MB	2Mb x 72	—
64MB	2Mb x 72	2Mb x 72
	4Mb x 72	—
96MB	4Mb x 72	2Mb x 72

Table 5–1 AlphaPC 164LX SDRAM Memory Configurations *(Sheet 2 of 2)*

Total Memory	Bank 0 (J8 and J9)	Bank 1 (J10 and J11)
128MB	4Mb x 72	4Mb x 72
	8Mb x 72	—
160MB	8Mb x 72	2Mb x 72
192MB	8Mb x 72	4Mb x 72
256MB	8Mb x 72	8Mb x 72
	16Mb x 72	—
512MB	16Mb x 72	16Mb x 72

5.2 Upgrading SDRAM Memory

You can upgrade memory in the AlphaPC 164LX by adding more DIMMs or replacing the ones that you have with a greater size. Refer to Figure 2–1 for DIMM connector locations.

Use the following general guidelines:

1. *Observe antistatic precautions.* Handle DIMMs only at the edges to prevent damage.
2. Remove power from the system.
3. Open levers and align the DIMM.
4. Firmly push the module into the connector. Ensure that the DIMM snaps into the plastic locking levers on both ends.
5. Restore power to the system.

5.3 Increasing Microprocessor Speed

This section describes how to complete the following actions to increase microprocessor speed:

- Replace the DIGITAL Semiconductor 21164 microprocessor with an Alpha chip that has a higher speed rating.
- Reconfigure the clock divisor jumpers.

5.3.1 Preparatory Information

Caution: Static-Sensitive Component – Due to the sensitive nature of electronic components to static electricity, anyone handling the microprocessor *must* wear a properly grounded antistatic wriststrap. Use of antistatic mats, ESD approved workstations, or exercising other good ESD practices is recommended.

A DIGITAL Semiconductor 21164 microprocessor with a higher speed rating is available from your local distributor. See Appendix A for information about supporting products.

When replacing the microprocessor chip, also replace the thermal conducting GRAFOIL pad. See Appendix A for information about the parts kit, which includes the heat sink, GRAFOIL pad, two hex nuts, heat-sink clips, 60-mm fan, fan guard, and four screws.

5.3.2 Required Tools

The following tools are required when replacing the microprocessor chip:

A TS30 manual nut/torque driver (or equivalent) with the following attachments is required to affix the heat sink and fan to the microprocessor's IPGA package:

- 1/4-inch hex bit
- 7/16-inch socket with 1/4-inch hex drive
- #2 Phillips-head screwdriver bit

5.3.3 Removing the 21164 Microprocessor

Remove the microprocessor currently in place at location U40 by performing the following steps:

1. Unplug the fan power/sensor cable from connector J18 (see Figure 2–1).
2. Remove the four 6-32 X 0.875-inch screws that secure the fan and fan guard to the heat sink.
3. Remove the fan and fan guard.
4. If the sink/chip/fan clip is used, remove it by unhooking its ends from around the ZIF socket retainers.
5. Using a 7/16-inch socket, remove the two nuts securing the heat sink to the microprocessor studs.

6. Remove the heat sink by gently lifting it off the microprocessor.
7. Remove and discard the GRAFOIL heat conduction pad.
8. Thoroughly clean the bottom surface of the heat sink before affixing it to the new microprocessor.
9. Lift the ZIF socket actuator handle to a full 90° angle.
10. Remove the microprocessor chip by lifting it straight out of the socket.

5.3.4 Installing the 21164 Microprocessor

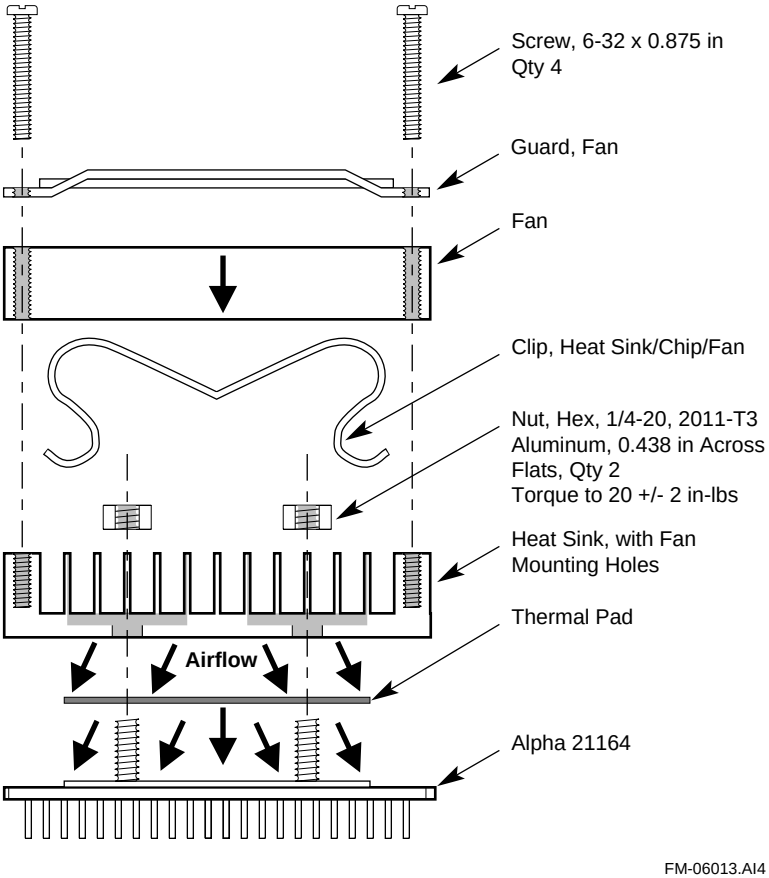
Install the new microprocessor in location U40 by performing the following steps:

Note: Install the heat sink only after the microprocessor has been assembled to the ZIF socket.

1. Observe antistatic precautions.
2. Lift the ZIF socket actuator handle to a full 90° angle.
3. Ensure that all the pins on the microprocessor package are straight.
4. The ZIF socket and microprocessor are keyed to allow for proper installation. Align the microprocessor, with its missing AD01 pin, with the corresponding plugged AD01 position on the ZIF socket. Gently lower into position.
5. Close the ZIF socket actuator handle to its locked position.
6. Install the heat sink and heat-sink fan as directed in the following steps. A heat-sink/fan kit is available from the vendor listed in Appendix A . Refer to Figure 5–1 for heat-sink and fan assembly details.

Figure 5–1 shows the Fan/Heat-Sink Assembly on AlphaPC 164LX.

Figure 5–1 Fan/Heat-Sink Assembly



a. Put the GRAFOIL thermal pad in place. The GRAFOIL pad is used to improve the thermal conductivity between the chip package and the heat sink by replacing micro air pockets with a less insulative material. Perform the following steps to position the GRAFOIL pad:

   1. Perform a visual inspection of the package slug to ensure that it is free of contamination.

   2. Wearing clean gloves, pick up the GRAFOIL pad. *Do not* perform this with bare hands because skin oils can be transferred to the pad.

3. Place the GRAFOIL pad on the gold-plated slug surface and align it with the threaded studs.

b. Attach the microprocessor heat sink. The heat-sink material is clear anodized, hot-water-sealed, 6061-T6 aluminum. The nut material is 2011-T3 aluminum (this grade is critical). Perform the following steps to attach the heat sink:

1. Observe antistatic precautions.
2. Align the heat-sink holes with the threaded studs on the ceramic package.
3. Handle the heat sink by the edges and lower it onto the chip package, taking care not to damage the stud threads.
4. Set a calibrated torque driver to 20 in-lbs, ±2 in-lbs (2.3 Nm, ±0.2 Nm). The torque driver should have a mounted 7/16-inch socket.
5. Insert a nut into the 7/16-inch socket, place on one of the studs, and tighten to the specified torque. Repeat for the second nut.
6. If the sink/chip/fan clip is used, properly install it by positioning it over the assembly and hooking its ends around the ZIF socket retainers.

c. Attach the heat-sink fan assembly:

1. Place the fan assembly on top of the heat sink, aligning the fan mounting holes with the corresponding threaded heat-sink holes. Align the fan so that the fan power/sensor wires exit the fan closest to connector J18 (see Figure 2–1). Fan airflow must be directed into the heat sink (fan label facing down toward the heat sink).
2. Place the fan guard on top of the fan. Orient the guard so that the corner mounting areas lay flush against the heat sink.
3. Secure the fan and fan guard to the heat sink with four 6-32 X 0.875-inch screws.
4. Plug the fan power/sensor cable into connector J18.

Important: When installing the microprocessor, you must change the frequency of its clock output by setting the system clock divisor jumpers, as described in Section 3.1.

6
Interrupts and ISA Bus Addresses

This section lists the system and I/O interrupt assignments. It also lists the physical AlphaPC 164LX I/O space assignments.

6.1 Interrupts

Table 6–1 lists each AlphaPC 164LX ISA interrupt and its source.

Table 6–1 ISA Interrupts *(Sheet 1 of 2)*

Interrupt Number	Interrupt Source
IRQ0	Internal timer 1
IRQ1	Keyboard
IRQ2	Interrupt from controller 2
IRQ3	COM2
IRQ4	COM1
IRQ5	Available
IRQ6	Diskette (floppy)
IRQ7	Parallel port
IRQ8#[1]	Reserved
IRQ9	Available
IRQ10	Available
IRQ11	Available
IRQ12	Mouse

Table 6–1 ISA Interrupts *(Sheet 2 of 2)*

Interrupt Number	Interrupt Source
IRQ13	Available
IRQ14	IDE
IRQ15	IDE

[1] The # symbol indicates an active low signal.

6.2 ISA I/O Address Map

Table 6–2 lists the AlphaPC 164LX ISA I/O space address mapping.

Table 6–2 ISA I/O Address Map

Range (hex)	Usage
000-00F	8237 DMA #1
020-021	8259 PIC #1
040-043	8253 timer
060-061	Ubus IRQ12 and NMI control
070	CMOS RAM address and NMI mask register
080-08F	DMA page registers
0A0-0A1	8259 PIC #2
0C0-0DF	8237 DMA #2
2F8-2FF	Serial port—COM2
370-377	Secondary diskette (floppy)
3BC-3BF	Parallel port—LPT1
3F0-3F7	Primary diskette (floppy)
3F8-3FF	Serial port—COM1
800	FLASH_ADR19 register
801	AlphaPC 164LX configuration register
804-806	PCI interrupt registers

6.2.1 Flash ROM Address Map

The address range for the flash ROM is FFF8.0000–FFFF.FFFF. Flash space of 1MB is obtained by double mapping this 512KB space. FLASH_ADR19 register at I/O location 800_{16} provides this function. Writing a 0 to this location enables the lower 512KB of flash. Writing a 1 to this location enables the upper 512KB of flash.

7
Configuring for Windows NT

This chapter contains a subset of the online documentation necessary to start up your system. You can access the complete documentation online when your system is up and running.

The online documentation describes configuration information for Alpha systems running AlphaBIOS. The online documentation resides on a diskette labeled *AlphaPC 164LX AlphaBIOS Firmware* diskette. The documentation is available as a text file and a Help file compatible with Windows NT 4.0 and Windows 95.

7.1 AlphaBIOS

The AlphaPC 164LX motherboard ships 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 AlphaPC 164LX motherboard.

7.1.1 AlphaBIOS Conventions

AlphaBIOS uses universally accepted 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. Table 7–1 shows the keys to use for navigating and selecting items in AlphaBIOS.

Table 7–1 Action Keys

Press...	To...
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
← →	Move to the left or right in a text entry field
ESC	Discard changes and back up to previous screen

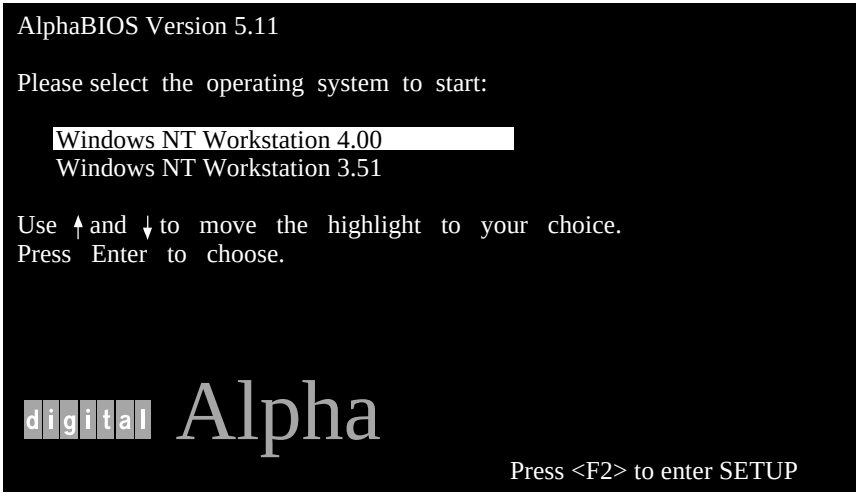
Two levels of keyboard help are available:

- 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.

7.1.2 Starting the AlphaBIOS Setup Program

When you power up or reset your system, the boot screen with the system logo is displayed. Pressing **F2** at this screen starts the setup program. Figure 7–1 shows an example of an AlphaBIOS Boot Screen with the “Press <F2> to enter SETUP” message at the bottom.

Figure 7–1 AlphaBIOS Boot Screen



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7.1.3 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 the system.

7.1.4 Performing CMOS Setup Tasks

CMOS Setup is divided into two modes, standard and advanced. Table 7–2 lists the tasks that you can perform in standard and advanced setup mode.

Table 7–2 CMOS Setup Tasks

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:

- Start AlphaBIOS Setup, select CMOS Setup, and press **Enter**.

To enter advanced CMOS Setup:

1. Start AlphaBIOS Setup, select CMOS Setup, and press **Enter**.
2. In the CMOS Setup screen, press **F6**.

7.1.5 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, select Hard Disk Setup, and press **Enter**.
2. Press **F7** to enter express hard-disk setup.
3. Press **F10** to continue with the setup.

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

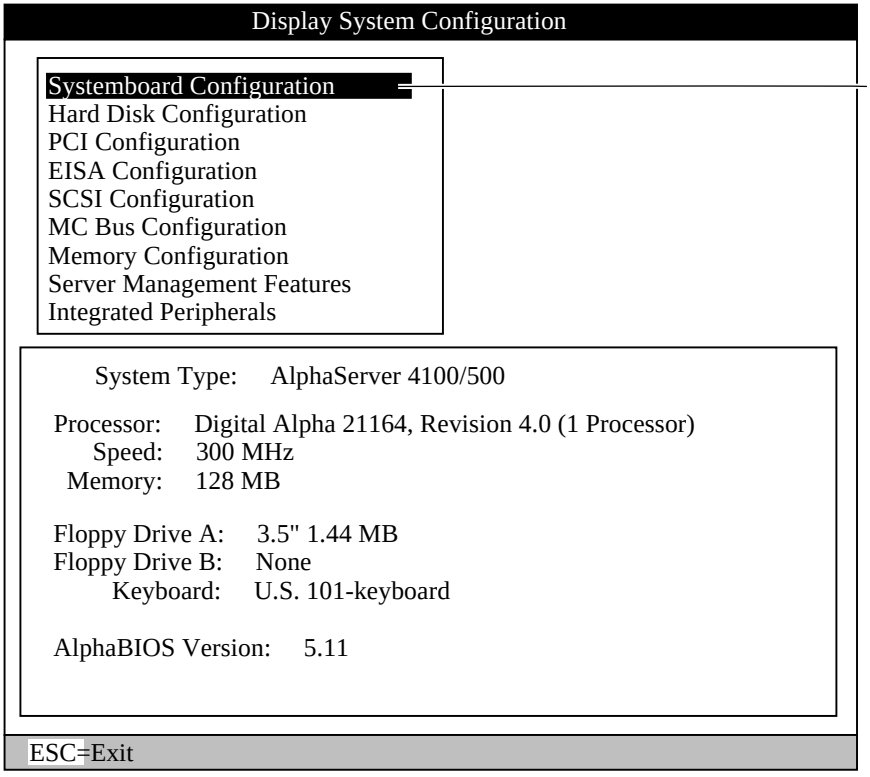
7.1.6 Displaying Your System Configuration

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, select Display System Configuration, and press **Enter**.
2. In the Display System Configuration screen, use the arrow keys to select the configuration category that you want to see, such as the example shown in Figure 7–2.

Figure 7–2 Display System Configuration



FM-05957.AI4

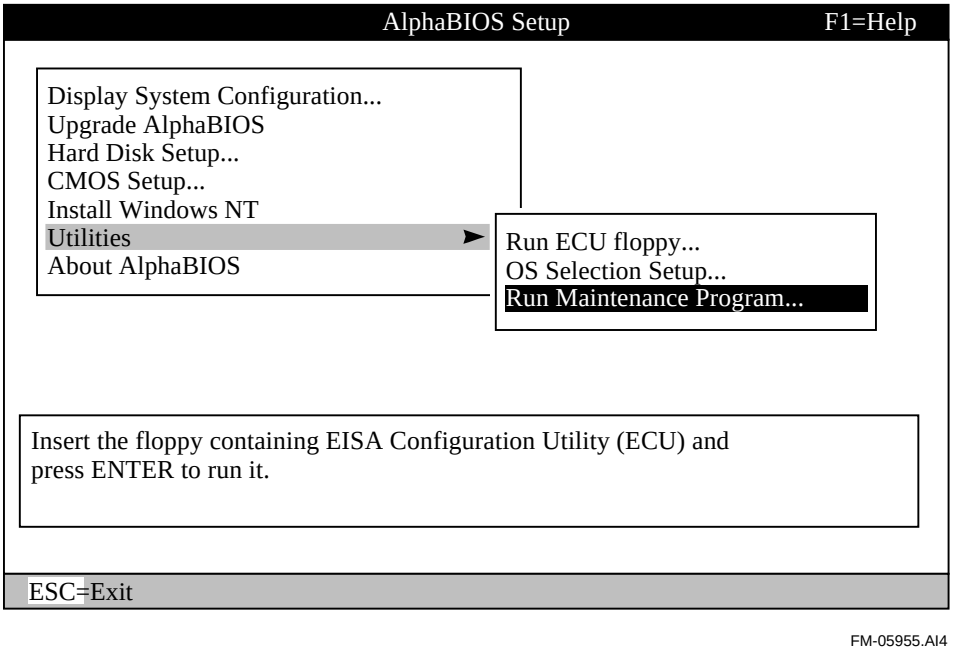
7.1.7 Running a Maintenance Program

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, select Utilities, select Run Maintenance Program from the submenu shown in Figure 7–3, and press **Enter**.

Figure 7–3 Run Maintenance Program Submenu



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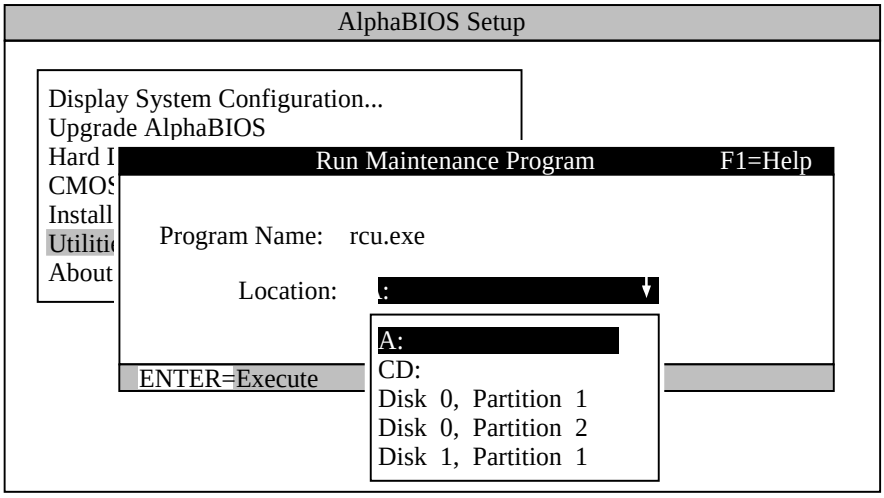
2. In the Run Maintenance Program dialog box, type the name of the program to be run at the Program Name prompt, as shown in Figure 7–4. Then tab to the Location listbox and select the hard-disk partition, floppy diskette, or CD-ROM drive from which to run the program.
3. Press **Enter** to execute the program.

Figure 7–4 Entering the Program Name



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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.

7.2 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 164LX system.

If you already 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.

7.2.1 Requirements

You need the following hardware and software to install the Windows NT operating system on an AlphaPC 164LX system:

- A 100MB or larger drive

Note: For information regarding supported IDE/ATA hard drives, ATAPI CD-ROM drives, SCSI hard drives, CD-ROM drives, and controllers supported as boot/installation devices, see the README.TXT file on the *AlphaPC 164LX AlphaBIOS Firmware* diskette.

- 32MB or more of memory
- The Microsoft Windows NT compact disk
- The *AlphaPC 164LX AlphaBIOS Firmware* diskette
- The *AlphaPC 164LX Windows NT 4.0 Installation* diskette

Note: The *AlphaPC 164LX Windows NT 4.0 Installation* diskette is required for the Windows NT 4.0 operating system. Future versions of Windows NT may not require this diskette. Contact your OEM or system vendor for details.

7.2.2 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 7.1.4 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 7.1.5 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.

7.2.3 Starting Windows NT Setup

Windows NT Setup, located on the Microsoft Windows NT compact disk, installs the Windows NT operating system. 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 the type of computer that you have. For the AlphaPC 164LX system, choose DIGITAL AlphaPC 164LX. If AlphaPC 164LX is not one of the choices, choose "other" *after* you have inserted the *AlphaPC 164LX 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, select Install Windows NT, and press **Enter**.
4. Follow the instructions on the screen.

8
Troubleshooting

This chapter contains information about troubleshooting hardware and software during AlphaPC 164LX startup.

8.1 Password Bypass

AlphaBIOS provides password protection. However, Password Bypass is provided for system setup or startup when the AlphaBIOS password is unavailable.

Password Bypass is enabled by inserting jumper CF3 in the J27 System Configuration Jumper Block (see Figure 3–1). This disables the AlphaBIOS password verification and enables the user to set up or start up their system without the AlphaBIOS password. Password Bypass also clears the password.

8.2 Hardware Startup

Use the following troubleshooting steps if video is not working on your system. If you still have no video after reviewing these steps, please call your system vendor.

Troubleshooting Steps: No Video

1. Check the connection to the ac outlet.
2. Check the voltage setting on the power supply (115 V ac in the U.S.).
3. Check that the frequency/jumper selection matches the speed of the Alpha chip.
4. Check that the oscillator is installed into the motherboard correctly.
5. Check that the CPU fan is connected and spinning.
6. 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.
7. Reseat the video card and ensure that it is connected to the monitor.

8. Reseat the DIMMs.
9. Replace the DIMMs.

8.3 Beep Codes

The beep codes provide error information about the AlphaPC 164LX system. Table 8–1 lists and describes the beep codes.

Table 8–1 Beep Codes

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.

8.4 Post Codes

The post codes indicate the progress of the SROM and AlphaBIOS firmware. Table 8–2 lists and describes the post codes.

Table 8–2 Post Codes *(Sheet 1 of 2)*

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

Table 8–2 Post Codes *(Sheet 2 of 2)*

Source	Post Code (hex)	Description
	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
	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	BF	Fail-safe booter startup

8.5 Fail-Safe Booter

The fail-safe booter provides an emergency recovery mechanism when the primary firmware image contained in flash memory has been corrupted. When flash memory has been corrupted, and no image can be loaded safely from the flash, you can run the fail-safe booter and boot another image from a diskette that is capable of reprogramming the flash.

Starting the Fail-Safe Booter

You can start the fail-safe booter in one of two ways:

- 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; that 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 *AlphaPC 164LX AlphaBIOS Firmware* diskette. The fail-safe booter will load and run AlphaBIOS from this diskette. Proceed to Section 7.1.3 and follow the procedure for updating your flash ROM.

- You can also start the fail-safe booter manually as follows:
  1. Power off your system.
  2. Add jumper CF7 as described in Section 3.4.
  3. Power on your system.
  4. Insert the *AlphaPC 164LX AlphaBIOS Firmware* diskette into the diskette drive.
  5. Proceed to Section 7.1.3 and follow the procedures.

8.6 Windows NT Startup

While booting the Windows NT operating system, you may 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.`

These error messages indicate video driver problems. Use the following chart 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.

9
Battery Recycle/Disposal Information

NOTICE

Recycle or dispose of batteries promptly in accordance with your organization's environmental policies. If this is a LITHIUM battery, the following additional precautions may apply:

- Replace batteries correctly to prevent possible explosion.
- Replace batteries with the same or equivalent type.
- Prior to disposal or recycling, protect all batteries against accidental short circuiting by affixing nonconductive tape across battery terminals or conductive surfaces.
- Keep batteries away from small children.

A
Supporting Products

This appendix lists sources for components and accessories that are not included with the AlphaPC 164LX. For the latest information, visit the Alpha website at URL: **http://www.alpha.digital.com**. Click on **Motherboard Products**. The hardware compatibility list (HCL) and the qualified-memory vendor list are also available at this location.

A.1 Memory

The following list of dual inline memory modules (DIMMs) is updated frequently. For the most recent additions, please visit the Alpha website at URL: **http://www.digital.com/semiconductor/alpha/alpha-memlist.htm**.

Advantage Memory Corporation

P.O. Box 30
Danvers, MA 01923
attn: Paul Johnson
Phone: 1-800-839-5041
Fax: 978-762-4998

ATP Electronics, Inc.

750 North Mary Avenue
Sunnyvale, CA 94086
attn: Regina Kao
Phone: 408-732-3936
Fax: 408-732-5055

Dataram

P.O. Box 7528
Princeton, NJ 08543
Phone: 1-800-DATARAM (328-2726), ext. 239

Memory

Kingston Technology Company

17600 Newhope Street
Fountain Valley, CA 92708
Phone: 1-800-845-2545

Micron Semiconductor Products, Inc.

8000 South Federal Way
Mail Stop 607
Boise, ID 83706
Phone: 208-368-3900
Fax: 208-368-5018

NEC Electronics, Inc.

The Meadows Building, 4th Floor
161 Worcester Road
Framingham, MA 01701
Phone: 508-935-2000
Fax: 508-935-2233

Samsung America, Inc.

3655 N. First Street
San Jose, CA 95134
Phone: 1-800-423-7364

Viking Components

30200 Avenida de la Banderas
Rancho Santa Margarita, CA 92688
attn: Jeff Jones, OEM Development Executive
Phone: 1-800-338-2361, ext. 423
Fax: 714-643-7250

A.2 Thermal Products

Components included in this heat-sink and fan solution are heat sink, GRAFOIL pad, two hex nuts, heat-sink clips, 60-mm fan, and four screws. These are available from:

United Machine and Tool Design

River Road
Fremont, NH 03044
Phone: 603-642-5040
Fax: 603-642-5819
PN 70-32810-02

A.3 Power Supply

An ATX form-factor power supply, suitable for use with the AlphaPC 164LX (+3.3 V, +5 V, –5 V, +12 V, –12 V), is available from:

Quantum Power Labs, Inc.

1410 Gail Borden Place C-4
El Paso, TX 79935
Phone: 915-599-2688
Fax: 915-599-2699
PN AP2-5300FRV (300 W)

Antec, Inc.

2859 Bayview Drive
Fremont, CA 94538
Phone: 510-770-1200, ext. 312
PN PP-253V (250 W)

A.4 Enclosure

An enclosure, suitable for housing the AlphaPC 164LX and its power supply, is available from:

Axxion Group Corporation

7801 Trade Center Avenue
El Paso, TX 79912
Phone: 915-877-5288
PN DL17

B
Associated Documentation

You can order the following associated documentation directly from the vendor.

Title	Vendor
Alpha AXP Architecture Reference Manual PN EY–T132E–DP	Call your local distributor or call Butterworth-Heinemann (DIGITAL Press) at 1-800-366-2665
Alpha Architecture Handbook[1] PN EC–QD2KB–TE	See previous entry
DIGITAL Semiconductor 21164 Alpha Microprocessor Hardware Reference Manual PN EC–QP99B–TE	Digital Equipment Corporation DIGITAL Semiconductor 77 Reed Road Hudson, MA 01749 USA Online, World Wide Web access at URL: **http://www.digital.com/semiconductor**
DIGITAL Semiconductor 21164 Alpha Microprocessor Data Sheet PN EC–QP98B–TE	See previous entry
DIGITAL Semiconductor 21174 Core Logic Chip Technical Reference Manual PN EC–R12GB–TE	See previous entry
PCI Local Bus Specification, Revision 2.1 PCI Multimedia Design Guide, Revision 1.0 PCI System Design Guide PCI-to-PCI Bridge Architecture Specification, Revision 1.0 PCI BIOS Specification, Revision 2.1	PCI Special Interest Group U.S. 1–800–433–5177 International 1–503–797–4207 Fax 1–503–234–6762

Title	Vendor
82420/82430 PCIset ISA and EISA Bridges (includes 82378IB/ZB SIO) (PN 290483)	Intel Corporation Literature Sales P.O. Box 7641 Mt. Prospect, IL 60056 Phone: 1-800-628-8686 FaxBACK Service: 1-800-628-2283 BBS: 1-916-356-3600
Super I/O Combination Controller (FDC37C935) Data Sheet	Standard Microsystems Corporation 80 Arkay Drive Hauppauge, NY 11788 Phone: 1-516-435-6000 Fax: 1-516-231-6004

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