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About This Manual

This manual describes the AlphaPC 164UX/BX motherboard, a module for computing systems based on the 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 164UX/BX motherboard with memory modules and peripheral cards.

1.1 Difference between AlphaPC 164UX and 164BX

- AlphaPC 164UX motherboard has the Ethernet LAN Controller and Ultra Wide SCSI Controller which are not on AlphaPC 164BX motherboard.
- The size of AlphaPC 164BX motherboard's L3 cache is 2MB.
- The size of AlphaPC 164UX motherboard's L3 cache is 2MB or 4MB.
- Except the above, AlphaPC 164UX motherboard and 164BX motherboard are the same.
- **The following sections are about AlphaPC 164UX motherboard only.**

1.2 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.

Manual Conventions and Terminology

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 **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 <i>Windows NT Workstation Installation Guide</i> and the <i>Windows NT Server Installation Guide</i> .
Windows NT	The Microsoft Windows NT Workstation and the Windows NT Server operating systems.

Features of the AlphaPC164UX Motherboard

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

Table 2–1 AlphaPC 164UX Features

Feature	Description
Microprocessor	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
Main memory	32MB to 3GB memory array -- Three banks of 128-bit memory; 168-pin unbuffered SDRAM DIMMs with ECC
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/4MB, direct-mapped, synchronous SSRAM backup cache with 128-bit data path
I/O and miscellaneous support	32-bit and 64-bit, 33-MHz PCI One 64-bit and five 32-bit PCI expansion slots One dedicated ISA expansion slot DEC 21052 PCI-to-PCI Bridge chip Intel 82371SB PCI-to-ISA bridge chip DEC 21143 10/100 Mb/s Ethernet LAN Controller Symbios 53C875 Ultra wide SCSI Controller SMC FDC37C666 combination controller chip provides control for diskettes, two UARTs with modem control, parallel port 1MB flash ROM
Firmware	Windows NT ARCSBIOS firmware

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

Figure 2-1 AlphaPC 164UX Jumper/Connector Location

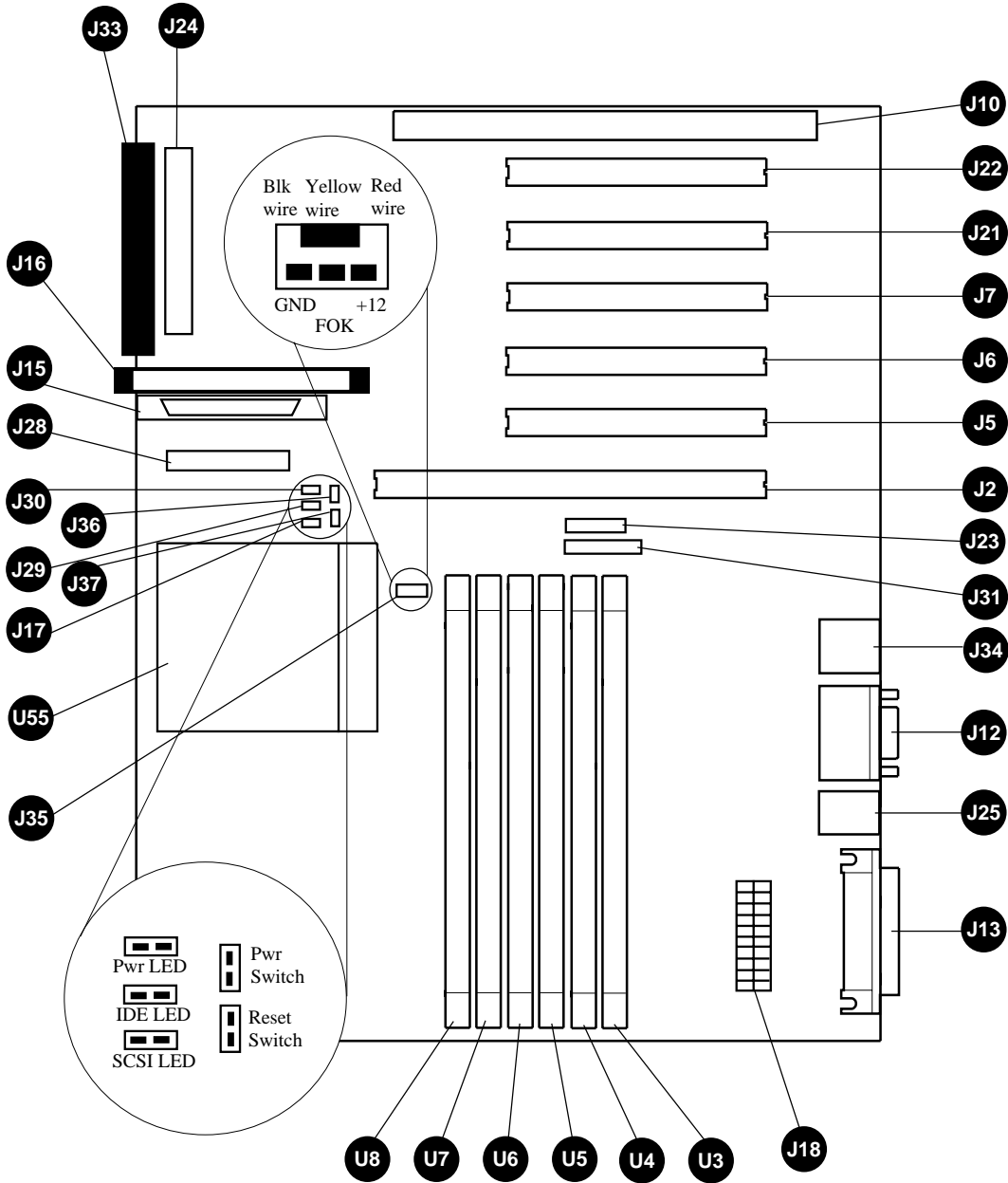


Table 2–2 AlphaPC 164UX Jumper/Connector List

Item No.	Description	Item No.	Description
J2	Full length 64 bit PCI slot	U3	DIMM socket 0
J5	Half length 32 bit PCI slot	U4	DIMM socket 1
J6	Full length 32 bit PCI slot	U5	DIMM socket 2
J7	Full length 32 bit PCI slot	U6	DIMM socket 3
J10	Full length ISA slot	U7	DIMM socket 4
J12	Serial Port connector	U8	DIMM socket 5
J13	Parallel port connector	U55	Microprocessor socket(21164 Alpha)
J15	Ultra Fast and Wide SCSI Connector		
J16	Narrow SCSI connector		
J17	SCSI LED connector		
J18	Power connector		
J21	Full length 32 bit PCI slot		
J22	Full length 32 bit PCI slot		
J23	Speaker connector		
J24	IDE drive connector		
J25	Keyboard/Mouse connector		
J28	Configuration jumpers		
J29	IDE LED connector		
J30	2 pin Power LED connector		
J31	5 pin Power LED connector		
J33	Floppy drive connector		
J34	10/100 Mbit ethernet connector		
J35	Microprocessor fan/fan sense connector		
J36	Power switch connector		
J37	Reset switch connector		

Power Requirements

2.1 Power Requirements

The AlphaPC 164UX motherboard requires a minimum of a 300 watt power supply. The power supply must be ATX-compliant.

Table 2–3 Power Supply DC Current Requirements

Voltage	Current
+3.3Vdc,±5%	14 A
+5 Vdc,±5%	25 A
-5 Vdc,±5%	0.5 A
+12 Vdc,±5%	10 A
-12 Vdc,±5%	0.5 A

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 the motherboard connector J35. When the signal is generated, the speaker generates a tone..

2.2 Environmental Requirements

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

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

Table 2–4 AlphaPC 164UX 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 a 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)

Physical Parameters

2.3 Physical Parameters

This section has two parts: the first illustrates the distances between the board mounting holes and the edges of the board; the second shows the vertical clearances required by the board components at all points within the border of the AlphaPC 164UX.

All holes and board measurements are compliant with the ATX 2.01 specification. The AlphaPC 164UX exceeds the ATX height indications in two places. The first is at the location of the 21164 (the 2.5' region). The second is at the location of the SCSI connectors (the 1.0' region to the left of the second PCI slots).

The AlphaPC 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)

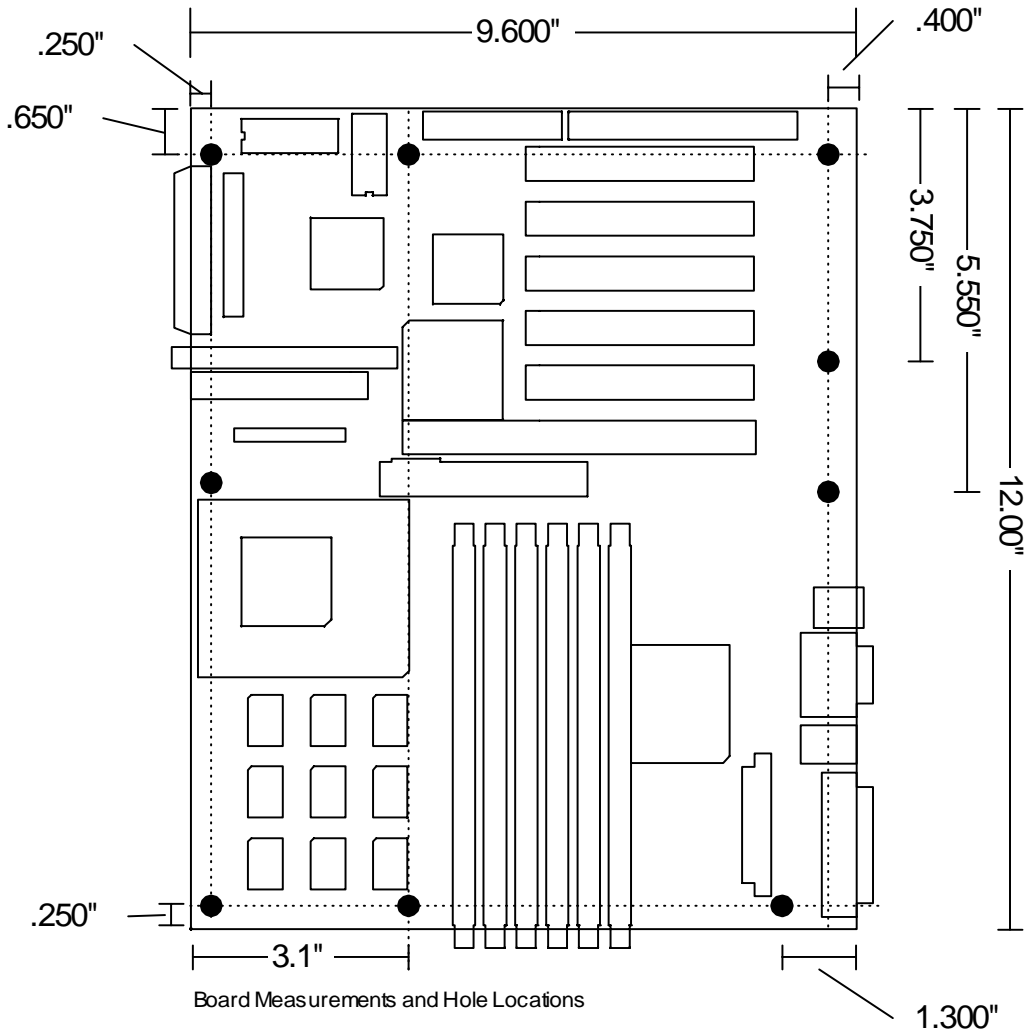
The board can be used in certain desktop and desktside systems that have adequate clearance for the 21164 heat sink and its cooling fan. All ISA and PCI expansion slots are usable in standard desktop or desktside enclosures.

2.3.1 Board Measurements and Hole Locations

Figure 2–2 shows the Board measurements and hole locations for the AlphaPC 164UX

Physical Parameters

Figure 2-2 Board measurement and Hole Position Diagram

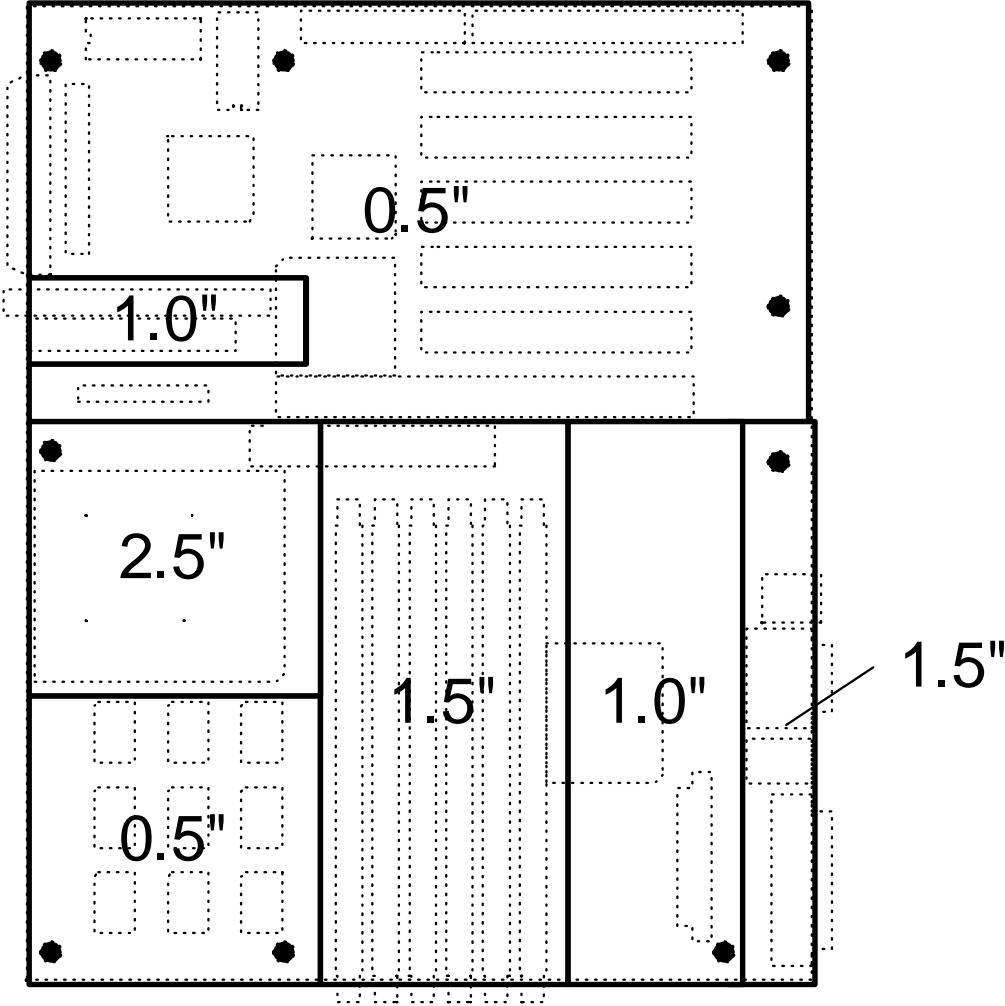


2.3.2 Vertical Clearance

Figure 2-3 shows the Board Vertical Clearance for the AlphaPC 164UX

Physical Parameters

Figure 2-3 Board Vertical Clearance Diagram



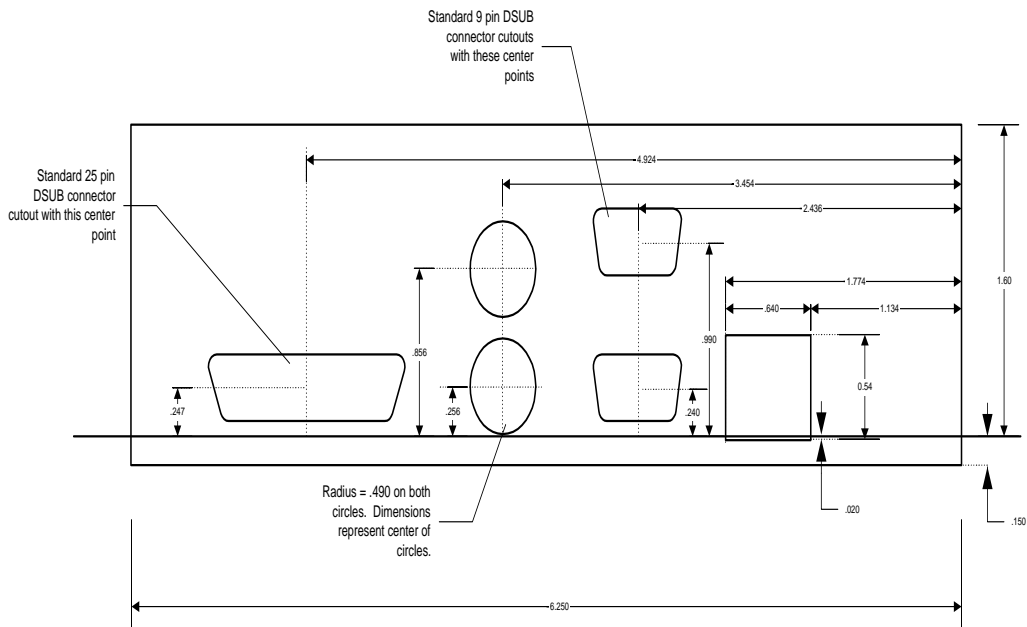
Vertical Clearance Requirements

Physical Parameters

2.3.3 ATX Cutout Information

In the event that an OEM or system integrator would like to use a chassis that supports a standard ATX back-panel cutout, we have included the mechanical drawing used to create standard cutout.

Figure 2-4 ATX Back Panel Dimension



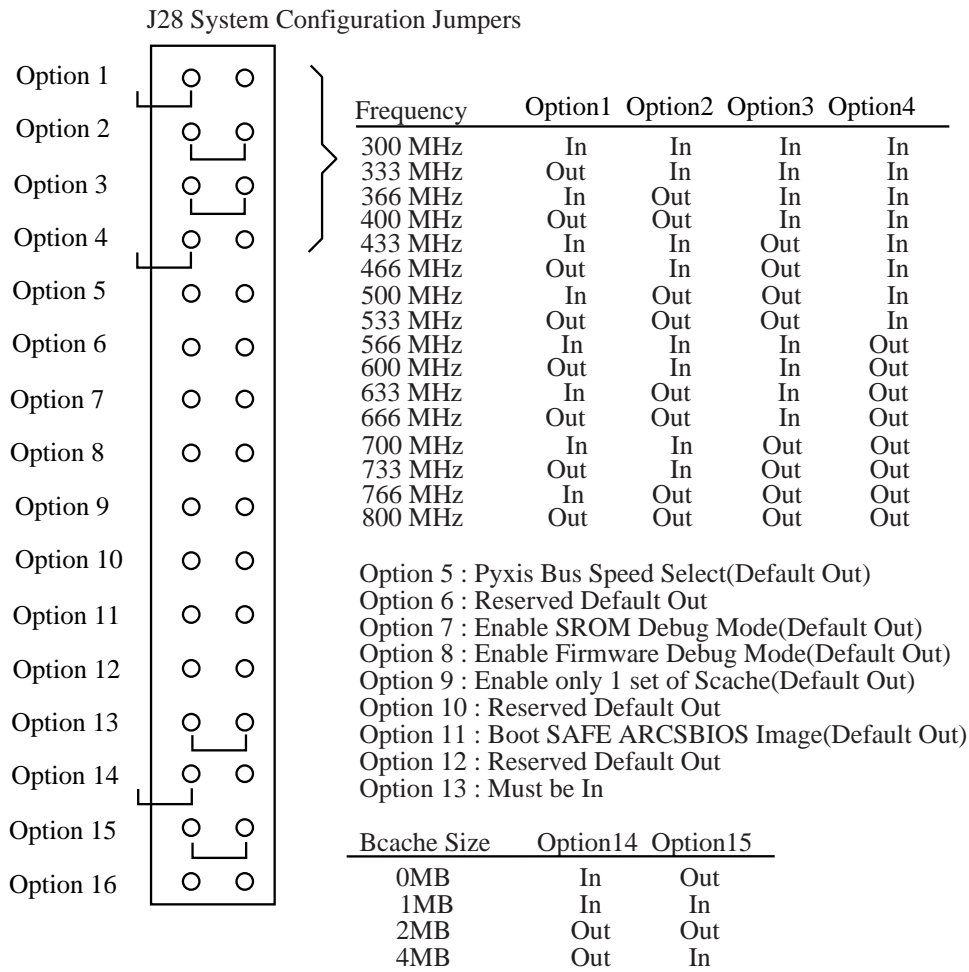
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AlphaPC 164UX Jumper Configuration

The AlphaPC 164UX has one set of jumpers located at J28. These jumpers set the hardware configuration and boot options. Figure 2-1 shows the jumper location on the AlphaPC 164UX motherboard. Figure 3-1 shows the jumper functions for each group.

CPU Speed Selection (Option 1,2,3, &4)

Figure 3-1 AlphaPC 164UX Configuration Jumpers



Option 5 : Pyxis Bus Speed Select(Default Out)
 Option 6 : Reserved Default Out
 Option 7 : Enable SROM Debug Mode(Default Out)
 Option 8 : Enable Firmware Debug Mode(Default Out)
 Option 9 : Enable only 1 set of Scache(Default Out)
 Option 10 : Reserved Default Out
 Option 11 : Boot SAFE ARCSBIOS Image(Default Out)
 Option 12 : Reserved Default Out
 Option 13 : Must be In

Option 16 : FAN OK Signal Do not ever populate(Default Out)

3.1 CPU Speed Selection (Option 1,2,3, &4)

The clock synthesizer makes it possible to change the frequency of the microprocessor's clock input without having to change the clock crystal. Simply set the speed jumpers to adjust the frequency of the microprocessor's clock. These speed jumpers are located at J28-1/2 (Option 1), J28-3/4 (Option 2), J28-5/6 (Option 3), and J28-7/8 (Option 4). These four jumpers set speed at power-up as listed in Figure 3-1.

Bcache Size Jumpers (Option 14,15)

3.2 Bcache Size Jumpers (Option 14,15)

The Bcache size jumpers are located at J28–27/28 (Option14) and J28–29/30 (Option15), as shown in Figure 3–1. The AlphaPC 164UX-2/-4 is configured with 2MB/4MB of Bcache during production ; the other jumpers shown in Figure 3–1 (0,1) are for other implementations.

Note: The standard motherboard is manufactured with 128K × 18 or 256K × 18 data SSRAMs.

3.3 Boot Option Jumper (Option 11)

The boot option jumper is located at J28-21/22 (Option 11). 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 ARCSBIOS firmware is loaded. With the jumper in, the Safe ARCSBIOS is loaded.

4

AlphaPC 164UX Connector Pinouts

This section lists the pinouts of all AlphaPC 164UX 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 (J2, J5, J6, J7, J21, J22)							
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	—

PCI Bus Connector Pinouts

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 (J2)							
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

ISA Expansion Bus Connector Pinouts

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 (J10)

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	—	—	—	—

SDRAM DIMM Connector Pinouts

4.3 SDRAM DIMM Connector Pinouts

Table 4–3 shows the SDRAM DIMM connector pinouts.

Table 4–3 SDRAM DIMM Connector Pinouts (U3 through U8)¹

(Sheet 1 of 2)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	Gnd	2	DQ0	3	DQ1	4	DQ2
5	DQ3	6	3.3V	7	DQ4	8	DQ5
9	DQ6	10	DQ7	11	DQ8	12	Gnd
13	DQ9	14	DQ10	15	DQ11	16	DQ12
17	DQ13	18	3.3V	19	DQ14	20	DQ15
21	CB0	22	CB1	23	Gnd	24	NC
25	NC	26	3.3V	27	WE	28	DQMB0
29	DQMB1	30	S0	31	NC	32	Gnd
33	A0	34	A2	35	A4	36	A6
37	A8	38	A10	39	A12	40	3.3V
41	3.3V	42	CK0	43	Gnd	44	NC
45	S2	46	DQMB2	47	DQMB3	48	NC
49	3.3V	50	NC	51	NC	52	CB2
53	CB3	54	Gnd	55	DQ16	56	DQ17
57	DQ18	58	DQ19	59	3.3V	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	3.3V	74	DQ28	75	DQ29	76	DQ30
77	DQ31	78	Gnd	79	CK2	80	NC
81	NC	82	SDA	83	SCL	84	3.3V
85	Gnd	86	DQ32	87	DQ33	88	DQ34
89	DQ35	90	3.3V	91	DQ36	92	DQ37
93	DQ38	94	DQ39	95	DQ40	96	Gnd
97	DQ41	98	DQ42	99	DQ43	100	DQ44
101	DQ45	102	3.3V	103	DQ46	104	DQ47
105	CB4	106	CB5	107	Gnd	108	NC
109	NC	110	3.3V	111	CAS	112	DQMB4
113	DQMB5	114	S1	115	RAS	116	Gnd
117	A1	118	A3	119	A5	120	A7
121	A9	122	BA0	123	A13	124	3.3V

EIDE Drive Bus Connector Pinouts

Table 4–3 SDRAM DIMM Connector Pinouts (U3 through U8)¹ *(Sheet 2 of 2)*

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
125	CK1	126	BA1 ²	127	Gnd	128	CKE0
129	S3	130	DQMB6	131	DQMB7	132	PD ³
133	3.3V	134	NC	135	NC	136	CB6
137	CB7	138	Gnd	139	DQ48	140	DQ49
141	DQ50	142	DQ51	143	3.3V	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	3.3V	158	DQ60	159	DQ61	160	DQ62
161	DQ63	162	Gnd	163	CK3	164	NC
165	SA0	166	SA1	167	SA2	168	3.3V

¹ Pins 1 through 84 are on the front side and pins 85 through 168 are on the back side.

² The AlphaPC 164UX 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 (J24)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	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	IOW	24	Gnd
25	IOR	26	Gnd	27	CHRDY	28	BALE
29	MACK	30	Gnd	31	IRQ	32	IOCS16
33	ADDR1	34	NC	35	ADDR0	36	ADDR2
37	CS0	38	CS1	39	ACT	40	Gnd

Diskette Drive Bus Connector Pinouts

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 (J33)

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	—	—	—	—	—	—

COM1/COM2 Serial Line Connector Pinouts

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 (J12)

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 (J25)

Keyboard Pin (Bottom)	Keyboard Signal	Mouse Pin (Top)	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

Input Power Connector Pinouts

4.9 Input Power Connector Pinouts

Table 4–9 shows the input power connector pinouts.

Table 4–9 Input Power Connector Pinouts (J18)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.

4.10 Narrow SCSI Bus Connector (UX only)

Table 4–10 shows the narrow SCSI bus connector pinouts

Table 4–10 Narrow SCSI Bus Connector (J16)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	$\overline{SD0}$	3	GND	4	SDI
5	GND	6	$\overline{SD2}$	7	GND	8	$\overline{SD3}$
9	GND	10	$\overline{SD4}$	11	GND	12	$\overline{SD5}$
13	GND	14	$\overline{SD6}$	15	GND	16	$\overline{SD7}$
17	GND	18	\overline{SDPO}	19	GND	20	GND
21	GND	22	BUS_PRES	23	GND	24	GND
25	NC	26	TERMPWR	27	GND	28	GND
29	GND	30	GND	31	GND	32	SATN
33	GND	34	GND	35	GND	36	\overline{SBSY}
37	GND	38	\overline{SACK}	39	GND	40	\overline{SRST}
41	GND	42	\overline{SMSG}	43	GND	44	SSEL
45	GND	46	\overline{SCD}	47	GND	48	\overline{SREQ}
49	GND	50	\overline{SIO}				

Fast and Wide SCSI Bus Connector (UX only)

4.11 Fast and Wide SCSI Bus Connector (UX only)

Table 4–11 shows the Fast and Wide SCSI bus connector pinouts

Table 4–11 Fast and Wide SCSI Bus Connector Pinouts (J15)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	GND	3	GND	4	GND
5	GND	6	GND	7	GND	8	GND
9	GND	10	GND	11	GND	12	GND
13	GND	14	GND	15	GND	16	GND
17	TERMPWR1	18	TERMPWR1	19	NC	20	GND
21	GND	22	GND	23	GND	24	GND
25	GND	26	GND	27	GND	28	GND
29	GND	30	GND	31	GND	32	GND
33	GND	34	GND	35	$\overline{\text{SDI2}}$	36	$\overline{\text{SDI3}}$
37	$\overline{\text{SDI4}}$	38	$\overline{\text{SDI5}}$	39	$\overline{\text{SDPI}}$	40	$\overline{\text{SD0}}$
41	$\overline{\text{SD1}}$	42	$\overline{\text{SD2}}$	43	$\overline{\text{SD3}}$	44	$\overline{\text{SD4}}$
45	$\overline{\text{SD5}}$	46	$\overline{\text{SD6}}$	47	$\overline{\text{SD7}}$	48	$\overline{\text{SDP0}}$
49	GND	50	BUS_PRES	51	TERMPWR1	52	TERMPWR1
53	NC	54	GND	55	$\overline{\text{SATN}}$	56	GND
57	$\overline{\text{SBSY}}$	58	$\overline{\text{SACK}}$	59	$\overline{\text{SRST}}$	60	$\overline{\text{SMSG}}$
61	$\overline{\text{SSEL}}$	62	$\overline{\text{SCD}}$	63	$\overline{\text{SREQ}}$	64	$\overline{\text{SIO}}$
65	$\overline{\text{SD8}}$	66	$\overline{\text{SD9}}$	67	$\overline{\text{SDI0}}$	68	$\overline{\text{SDI1}}$
69	GND	70	GND				

4.12 10/100 Mbit Ethernet Connector Pinouts (UX only)

Table 4–12 shows the 10/100 Mbit Ethernet connector pinouts

Table 4–12 10/100 Mbit Ethernet Connector Pinouts (J34)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	TD_P	2	TD_M	3	RD_P	4	U1
5	U2	6	RD_M	7	U3	8	U4
9	MP1	10	MP2				

Speaker Connector Pinouts

4.13 Speaker Connector Pinouts

Table 4–13 shows the speaker connector pinouts.

Table 4–13 Speaker Connector Pinouts (J23)

Pin	Signal	Name
1	SPKR	Speaker output
2	NC	—
3	VDD	—
4	GND	—

4.14 Microprocessor Fan Power Connector Pinouts

Table 4–14 shows the microprocessor fan power connector pinouts.

Table 4–14 Microprocessor Fan Power Connector Pinouts (J35)

Pin	Signal	Name
1	+12V	—
2	FAN_OK_L	Fan connected
3	GND	—

4.15 Pin Power LED Connector Pinouts

Table 4–15 shows the power LED connector pinouts.

Table 4–15 Power LED Connector Pinouts (J31)

Pin	Signal	Name
1	Powerpullup	Power pullup
2	NC	—
3	GND	—
4	NC	—
5	NC	—

IDE Drive LED Connector Pinouts

4.16 IDE Drive LED Connector Pinouts

Table 4–16 shows the IDE drive LED connector pinouts.

Table 4–16 IDE Drive LED Connector Pinouts (J29)

Pin	Signal	Name
1	ACTIVITY	Hard drive active
2	ACTIVUTYPULLUP	

4.17 Reset Switch Connector Pinouts

Table 4–17 shows the reset switch connector pinouts.

Table 4–17 Reset Switch Connector Pinouts (J37)

Pin	Signal	Name
1	GND	—
2	RSTSWITCH	Reset system

4.18 Soft Power Switch Connector Pinouts

Table 4–18 shows the soft power switch connector pinouts.

Table 4–18 Soft Power Switch Connector Pinouts (J36)

Pin	Signal	Name
1	GND	—
2	PWRSWITCH	System power on/off

4.19 SCSI LED Connector Pinouts

Table 4–19 shows the SCSI LED connector pinouts.

Table 4–19 SCSI LED Connector Pinouts (J17)

Pin	Signal	Name
1	SCSI_BUSY	—
2	SCSI_BSY2	—

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-bit 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 164UX, see Appendix A.

Refer to Figure 2–1 for DIMM connector locations.

Table 5–1 AlphaPC 164UX SDRAM Memory Configurations

Total Memory	Bank 0		Bank 1		Bank 2	
	U3	U4	U5	U6	U7	U8
32MB	16MB	16MB				
64MB	16MB	16MB	16MB	16MB		
	32MB	32MB				
96MB	16MB	16MB	16MB	16MB	16MB	16MB
	32MB	32MB	16MB	16MB		

Configuring SDRAM Memory

Table 5–1 AlphaPC 164UX SDRAM Memory Configurations

Total Memory	Bank 0		Bank 1		Bank 2	
	U3	U4	U5	U6	U7	U8
128MB	32MB	32MB	16MB	16MB	16MB	16MB
	32MB	32MB	32MB	32MB		
	64MB	64MB				
160MB	32MB	32MB	32MB	32MB	16MB	16MB
	64MB	64MB	16MB	16MB		
192MB	32MB	32MB	32MB	32MB	32MB	32MB
	64MB	64MB	16MB	16MB		
192MB	64MB	64MB	32MB	32MB		
224MB	64MB	64MB	32MB	32MB	16MB	16MB
256MB	64MB	64MB	32MB	32MB	32MB	32MB
	64MB	64MB	64MB	64MB		
	128MB	128MB				
288MB	128MB	128MB	16MB	16MB		
320MB	64MB	64MB	64MB	64MB	32MB	32MB
	128MB	128MB	16MB	16MB	16MB	16MB
	128MB	128MB	32MB	32MB		
352MB	128MB	128MB	32MB	32MB	16MB	16MB
384MB	64MB	64MB	64MB	64MB	64MB	64MB
	128MB	128MB	32MB	32MB	32MB	32MB
	128MB	128MB	64MB	64MB		
416MB	128MB	128MB	64MB	64MB	16MB	16MB
448MB	128MB	128MB	64MB	64MB	32MB	32MB
512MB	128MB	128MB	64MB	64MB	64MB	64MB
	128MB	128MB	128MB	128MB		
	256MB	256MB				
544MB	128MB	128MB	128MB	128MB	16MB	16MB
	256MB	256MB	16MB	16MB		
576MB	128MB	128MB	128MB	128MB	32MB	32MB
	256MB	256MB	16MB	16MB	16MB	16MB
	256MB	256MB	32MB	32MB		
608MB	256MB	256MB	32MB	32MB	16MB	16MB
640MB	128MB	128MB	128MB	128MB	64MB	64MB

Upgrading SDRAM Memory

Table 5–1 AlphaPC 164UX SDRAM Memory Configurations

Total Memory	Bank 0		Bank 1		Bank 2	
	U3	U4	U5	U6	U7	U8
	256MB	256MB	32MB	32MB	32MB	32MB
	256MB	256MB	64MB	64MB		
672MB	256MB	256MB	64MB	64MB	16MB	16MB
704MB	256MB	256MB	64MB	64MB	32MB	32MB
768MB	128MB	128MB	128MB	128MB	128MB	128MB
	256MB	256MB	64MB	64MB	64MB	64MB
	256MB	256MB	128MB	128MB		
800MB	256MB	256MB	128MB	128MB	16MB	16MB
832MB	256MB	256MB	128MB	128MB	32MB	32MB
896MB	256MB	256MB	128MB	128MB	64MB	64MB
1024MB	256MB	256MB	128MB	128MB	128MB	128MB
	256MB	256MB	256MB	256MB		
1056MB	256MB	256MB	256MB	256MB	16MB	16MB
1088MB	256MB	256MB	256MB	256MB	32MB	32MB
1152MB	256MB	256MB	256MB	256MB	64MB	64MB
1280MB	256MB	256MB	256MB	256MB	128MB	128MB
1536MB	256MB	256MB	256MB	256MB	256MB	256MB

Note: The following are important items to remember

- in order for the ECC memory feature to work, all DIMMs must be 72bit.
- To populate a bank, you must use 2 matched DIMMs.

5.2 Upgrading SDRAM Memory

You can upgrade memory in the AlphaPC 164UX 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.

Increasing Microprocessor Speed

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 21164 microprocessor with an AlphaPC chip that has a higher speed rating.
- Reconfigure the CPU speed selection jumpers (J28 Option 1~4).

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 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

Increasing Microprocessor Speed

5.3.3 Removing the 21164 Microprocessor

Remove the microprocessor currently in place at location U55 by performing the following steps:

1. Unplug the fan power/sensor cable from connector J35 (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 U55 by performing the following steps:

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

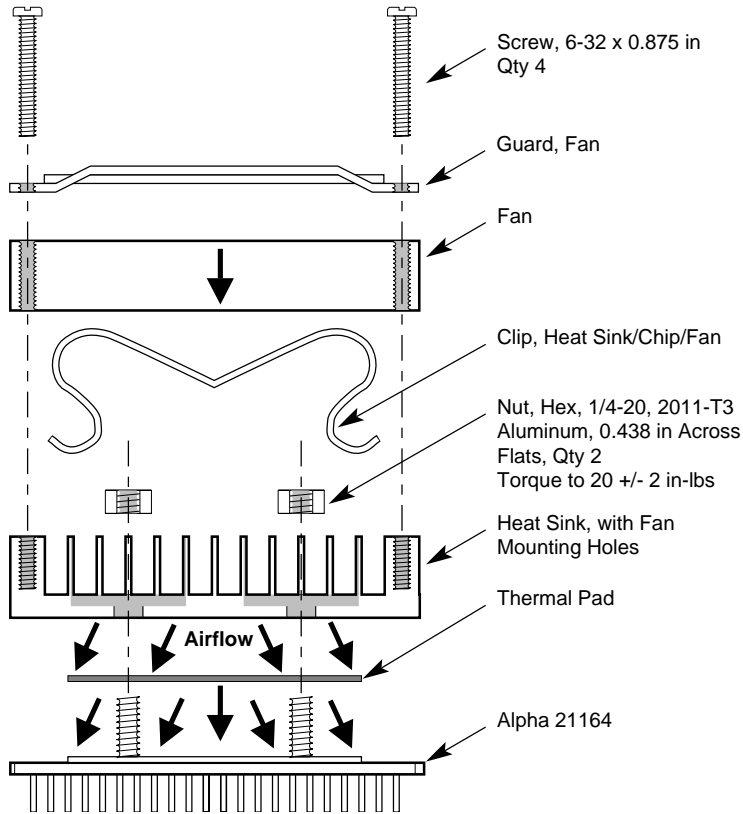
1. Observe antistatic precautions.
2. Lift the ZIF socket actuator handle to a full 90° angle.
3. Ensure that all the pins on the microprocessor package are straight.
4. The ZIF socket and microprocessor are keyed to allow for proper installation. Align the microprocessor, with its missing AD01 pin, 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.

Increasing Microprocessor Speed

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 at the beginning of this procedure. Refer to Figure 5–2 for heat-sink and fan assembly details.

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

Figure 5–2 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.

Increasing Microprocessor Speed

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 J35 (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 J35.

Important: When installing the microprocessor, you must change the frequency of its clock output by setting the CPU speed selection jumpers (J28 Option 1~4), 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 Alpha 164UX I/O space assignments.

6.1 Interrupts

Table 6–1 lists each Alpha 164UX ISA interrupt and its source.

Table 6–1 ISA Interrupts

(Sheet 1 of 2)

Interrupt Number	Interrupt Source
IRQ0	Internal timer
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

ISA I/O Address Map

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 Alpha 164UX ISA I/O space address mapping.

Table 6–2 ISA I/O Address Map

Range (hex)	Usage
060-060	i8042 PRT
064-064	i8042 PRT
1F0-1F7	ATAPI
2F8-2FE	Serial port—COM2
378-37B	Parallel Port—LPT2
3F0-3F5	Floppy
3F6-3F6	ATAPI
3F7-3F7	Floppy
3F8-3FE	Serial port—COM1

6.2.1 Flash ROM Address Map

The flash ROM is mapped to three regions of memory. Access to the first two regions is RO. The first two regions provide the software necessary to initialize the system and transfer execution to the next level of software. When power is turned on, address ranges 0 to 00.00FF.FFFF and 0F.FC00.0000 to 0F.FFFF.FFFF are enabled. After the system has been initialized, these two address ranges are disabled. Byte mode is then enabled in the 21164 and 21174. Byte mode is the only way to access the flash ROM in address range 87.C000.0000 to 87.FFFF.FFFF. 21164 byte

ISA I/O Address Map

instructions LDBU and STB must be used to access this region. Any other instruction will produce UNDEFINED results with the possibility of damaging the flash ROM.

7

Configuring for Windows NT

This chapter describes the ARCSBIOS and gives instruction to begin the installation of Windows NT.

7.1 ARCSBIOS

The AlphaPC 164UX motherboard ships with the ARCSBIOS firmware. This firmware initializes the system and enables you to boot the Windows NT operating system. The ARCSBIOS firmware resides in the flash ROM on the AlphaPC 164UX motherboard.

7.1.1 Navigating the ARCSBIOS

Table 7-1 shows the keys used to navigate the ARCSBIOS and their function

Table 7-1 Navigation Keys

Press...	To...
ENTER	Select a highlighted option in a menu
↑ or ↓	Move highlight within a menu.
→ or ←	Cycle through available field values.
SPACE	Cycle through available field values.
ESC	Move up one level in the menu structure

7.1.2 Exploring the ARCSBIOS

The main screen of the ARCSBIOS is displayed when the motherboard is booted. It displays information about the processor, memory, serial ports, parallel port, mouse, and drives attached to the system. Figure 7-0 shows the main bios screen.

ARCSBIOS

Figure 7-1 Main Bios Screen

ARCSBios 1.3.060/SN 3010000,510026 (C) Copyright 1993-1998 Deskstation Technology				APC 164UX/BX 67MHz/600MHz																																
Boot Options																																				
<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 80%;"> Windows NT Workstation 4.0 Enter Setup </div>																																				
CPU	REV	Primary Cache	Secondary Cache	External Cache	Total Memory	Free Memory																														
21164A	5	8/8 KB	96KB	4096KB	131072KB	130008KB																														
ECC Mem : Yes		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Serial</th> <th style="text-align: center;">Port</th> <th style="text-align: center;">IRQ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">COM 1(0)</td> <td style="text-align: center;">03F8</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">COM 2(0)</td> <td style="text-align: center;">02F8</td> <td style="text-align: center;">3</td> </tr> </tbody> </table>			Serial	Port	IRQ	COM 1(0)	03F8	4	COM 2(0)	02F8	3	<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 80%;"> Mouse : PS/2(0) </div>																						
Serial	Port	IRQ																																		
COM 1(0)	03F8	4																																		
COM 2(0)	02F8	3																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">DIMM</th> <th style="text-align: center;">Size</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Bank 1</td> <td style="text-align: center;">64/64</td> </tr> <tr> <td style="text-align: center;">Bank 2</td> <td style="text-align: center;">0/0</td> </tr> <tr> <td style="text-align: center;">Bank 3</td> <td style="text-align: center;">0/0</td> </tr> </tbody> </table>		DIMM	Size	Bank 1	64/64	Bank 2	0/0	Bank 3	0/0	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Parallel</th> <th style="text-align: center;">Port</th> <th style="text-align: center;">IRQ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">LPT2(0)</td> <td style="text-align: center;">0378</td> <td style="text-align: center;">7</td> </tr> </tbody> </table>			Parallel	Port	IRQ	LPT2(0)	0378	7																		
DIMM	Size																																			
Bank 1	64/64																																			
Bank 2	0/0																																			
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LPT2(0)	0378	7																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Adaptor</th> <th style="text-align: center;">ID</th> <th style="text-align: center;">Type</th> <th style="text-align: center;">Model</th> <th style="text-align: center;">Size</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">FDC0</td> <td style="text-align: center;">A:</td> <td style="text-align: center;">Floppy</td> <td style="text-align: center;">3 1/2"</td> <td style="text-align: center;">1.44MB</td> </tr> <tr> <td style="text-align: center;">SCSI0</td> <td style="text-align: center;">6</td> <td style="text-align: center;">DISK</td> <td style="text-align: center;">SAMSUNG WNR-32501S 020</td> <td style="text-align: center;">2.41GB</td> </tr> <tr> <td style="text-align: center;">SCSI0</td> <td style="text-align: center;">7</td> <td style="text-align: center;">HA</td> <td style="text-align: center;">Symbios 53C8XX SCSI Adapter</td> <td></td> </tr> <tr> <td style="text-align: center;">SCSI1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">CDROM</td> <td style="text-align: center;">SAMSUNG SCR-2430 MS102 1.0</td> <td style="text-align: center;">520MB</td> </tr> <tr> <td style="text-align: center;">SCSI1</td> <td style="text-align: center;">255</td> <td style="text-align: center;">HA</td> <td style="text-align: center;">ATAPI IDE Controller</td> <td></td> </tr> </tbody> </table>							Adaptor	ID	Type	Model	Size	FDC0	A:	Floppy	3 1/2"	1.44MB	SCSI0	6	DISK	SAMSUNG WNR-32501S 020	2.41GB	SCSI0	7	HA	Symbios 53C8XX SCSI Adapter		SCSI1	0	CDROM	SAMSUNG SCR-2430 MS102 1.0	520MB	SCSI1	255	HA	ATAPI IDE Controller	
Adaptor	ID	Type	Model	Size																																
FDC0	A:	Floppy	3 1/2"	1.44MB																																
SCSI0	6	DISK	SAMSUNG WNR-32501S 020	2.41GB																																
SCSI0	7	HA	Symbios 53C8XX SCSI Adapter																																	
SCSI1	0	CDROM	SAMSUNG SCR-2430 MS102 1.0	520MB																																
SCSI1	255	HA	ATAPI IDE Controller																																	

The upper left hand corner of the screen displays the revision of the ARCSBIOS and the system serial number. The upper right hand corner of the screen displays the speed that the AlphaPC 164UX is running. The first number is the clock speed of the system bus. The second number is the clock speed of the 21164 microprocessor. The remaining section of the bios screen are discussed below.

- a. **Boot Options.** The boot options section is the only interactive part of the main bios screen. It allows you to select which NT installation you would like to boot or it allows you to enter setup.
- b. **Processor Information.** The next line displays information about the microprocessor. It also displays the sizes of the primary, secondary, and external caches. The primary and secondary caches are built into the Alpha 21164 microprocessor. The external cache is built onto the AlphaPC 164UX motherboard.

ARCSBIOS Setup.

- c. **Memory Information.** The Total Memory section displays the total amount of memory in the system in Kilobytes. The Free Memory section displays the amount of memory available to the operating system. The ECC Mem indicator tells if the memory in the system allows the system to use error correcting codes. The DIMM table shows what banks are populated with DIMMS and what size they are.
- d. **I/O Section.** The serial port section show what serial ports were detected in the system. The Mouse section shows the type of mouse that was detected on the system. The type of mouse to be detected is set in the Set Device Option portion of Advanced Setup (see Section 7.2.3). The Parallel section shows the parallel port that is detected on the system. The IRQ of the parallel port can be set in the Set Device Options section of Advanced Setup (see Section 7.2.3).
- e. **The Drive Section.** The drive section displays the floppy drives, IDE devices, and SCSI devices attached to the motherboard. In Figure 7-0 the type section is left blank for the hard drive and CD-ROM drive. In a real system the manufacturer and model of the drives would be displayed.

7.2 ARCSBIOS Setup.

If you choose the enter setup option on the main screen, you will be taken to another screen with the setup menu in the foreground and the system configuration tree in the background. The following selections are listed on the menu: Run a Program, Environment Variables, Set Time & Date, System Configuration, Print Configuration, and Add-in Board Utilities.

7.2.1 Run a Program

Selecting the Run a Program option will bring up a window that says Enter full path of program to run -->. This allows you to run programs from floppy, hard disk, or CD-ROM drive. This option is used to begin the installation of Windows NT or to run a system configuration utility. The path is composed of the drive letter (use CD for the CD-ROM drive) followed by a colon and a backslash and the name of the directory it is in, if any, followed by a back slash and the file name.

7.2.2 Environment Variables

The environment variables tell the system where to look to boot Windows NT. They are created when Windows NT is installed. They should not be changed under normal circumstances.

ARCSBIOS Setup.

Caution : Changing the environment variables may cause Windows NT to fail to boot.

There are 4 selections on the Environment Variable menu. **Edit Environment Variable Set** allows you to change an existing environment variable set. **Select Default Environment Variable Set** allows you to select which boot selection will boot automatically if the autoloading feature is enabled. **Create Environment Variable Set** allows you to create a new environment variable set. You will be prompted to enter the system partition, the OS partition, and then select the version of Windows NT you are trying to boot. **Delete Environment Variable Set** allows you to delete an existing environment variable set.

7.2.3 Advanced Setup

This option brings up a submenu with 6 options. These options are described below.

- a. **Display Disk Resources.** This option displays the drive section of the main ARCSBIOS screen.
- b. **Display Device Resources.** This option brings up a menu that allows you to decide which device resources you wish to view. The following options are available: **Interrupt Resources, DMA Channel, I/O Port Resources, and Memory Resources.**
- c. **Set NVRAM Options.** This option brings up another menu with three selections. These selections are described below.
 1. **Set Device Options.** This selection brings up a screen that allows you to set the following options. Floppy Drive 0 is used to set the size of the first floppy drive installed in the system. Floppy Drive 1 is used to set the size of the second floppy drive installed in the system. The default is for Floppy Drive 0 to be set to **1.44M 3 1/2" Drive** and Floppy Drive 1 to be set to **Not Installed**. The next section allows you to set the interrupt level of the parallel port. The default is for LPT1 and LPT 3 to be set to **Not installed** and LPT 2 to be set to **IRQ 7**. The Pointing Device setting allows you to set the type of pointing device the system tries to detect. The default is **Autodetect**. The next 3 settings give you the option of enabling or disabling the onboard Network, SCSI, and IDE controllers. The default for all of these is **Yes** to enable them. Load Embedded SCSI Drivers should be set to **Yes**. This loads the SCSI drivers built into the ARCSBIOS. Load Soft SCSI Drivers and Enable SCSI Delays should both be set to **No**. The Enable IDE Hard Drive Driver option is set default to **No**. This option should only be set to **Yes** if you are using an old IDE drive that does not work with the ATAPI driver.

ARCSBIOS Setup.

The option to Enable X86 Emulation is set default to **Yes**. This option allows an operating system to use the X86 emulator built into the ARCSBIOS to emulate the video BIOS built into most video adapters. The DIMM Bank Memory type settings can allow you to get a performance increase if you know the manufacturer of the SDRAM chips on your DIMMs. If the Manufacturer is NEC, or Toshiba use the setting for them. If there it is another manufacturer use either the **Other Mode** or the **Safe Mode**. If you don't know the SDRAM manufacturer then use the **Safe Mode**.

2. **SCSI Miniport Order.** This section allows you to set the order in which SCSI and ATAPI devices are detected. The default settings are as follows:
 - Symbios 53C8xx SCSI Adapter: **0**
 - ATAPI IDE Controller : **1**
 - <Empty SCSI Miniport Driver Slot> : **Disabled**
3. **Configure PCI devices.** This section should not be used. The ARCSBIOS will automatically configure PCI devices.
- d. **Upgrade Firmware.** The section allows you to upgrade the ARCSBIOS firmware (see Section 7.3).
- e. **Show Firmware Revision.** This option displays the revision of the ARCSBIOS firmware and shows if it is a valid image or not.

7.2.4 System Time and Date

The option allows you to set the time and date for the real time clock. Times should be entered in military time. Press the **ENTER** key after typing in each entry. Press **ESC** to exit the section.

7.2.5 System Configuration

This option allows you to look at the system configuration tree. You can move around the tree by using the arrow keys. If you move the highlight to a disk and press **ENTER**, you will be given a menu of options. The first option is **Configure Component**. This option should not be used. The next option is **Directory**. With this option you will be prompted to select which partition's directory you wish to see.

Note: The ARCSBIOS cannot read the NTFS file system. It can only give directories of FAT partitions.

The third option is Copy Files. When this is selected you will be prompted to enter the path of the source file, then the path of the destination file. The file will then be copied.

Upgrading the ARCSBIOS Firmware.

7.2.6 Print Configuration

This option will dump the information in the configuration tree to the parallel port so that it may be printed.

7.2.7 Add-in Board Utilities

This option allows you to run configuration utilities for add-in cards that have been ported to the AlphaPC 164UX motherboard. At the time of printing there are no utilities available.

7.3 Upgrading the ARCSBIOS Firmware.

To upgrade the ARCSBIOS firmware, you will need to have an ARCSBIOS Firmware Upgrade floppy. To upgrade the firmware follow the following steps.

1. Insert the Firmware Upgrade for AlphaPC 164UX diskette into the floppy drive.
2. Get the motherboard to the bios level.
3. From the main ARCSBIOS screen select Enter Setup.
4. From the Setup Menu, select Advanced Setup.
5. From the Advanced Setup Menu, select Upgrade Firmware.
6. Press ENTER to begin the upgrade.

7.4 Installing Windows NT

This section supplements the Microsoft Windows NT installation guide for installing Windows NT on a AlphaPC 164UX system.

7.4.1 Requirements

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

- A 100MB or larger hard drive
- 32 MB or more of memory
- The Microsoft Windows NT compact disk
- The Install Floppy for Windows NT 4.0 for AlphaPC 164UX diskette

Note: The Install Floppy for Windows NT 4.0 for AlphaPC 164UX diskette is required for Windows NT 4.0 operating system. Future versions may not require diskette. Contact your OEM or system vendor for details.

Installing Windows NT

7.4.2 Before Installing Windows NT

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

- In the Setup section of the bios use the Time and Date option to verify the correct time and date. (see Section 7.2.4).

Note: Some programs look at the dates on all files on the system to determine if their license is expired or not. If the date and time are not set correctly before installation some programs may not run.

- Determine the type of drives installed in your system. You can do this by looking at the main ARCSBIOS screen. In the drive section, in the adapter column you will see a list of the SCSI busses. Note what SCSI bus your hard drives and CD-ROM drive are on. Next locate the host adapter entry for each bus. They have HA in the type column. Read the description in the model column. This will tell you whether the drives on that bus are IDE or SCSI.
- Use the Arcinstall utility to create a system partition. Follow the steps below:
 1. Insert the Windows NT CD into the CD-ROM drive.
 2. From the main ARCSBIOS screen select **Enter Setup**.
 3. Select **Run a Program** from the setup menu.
 4. Type in: **CD:\alpha\arcinst.exe**
 5. Press **ENTER**
 6. The Arcinstall Utility will start. In the menu shown select Configure Partitions and press **ENTER**.
 7. On the next menu that comes up select **Create System Partition** and press **ENTER**.
 8. If you have more than one hard drive, you will be asked to select the hard drive on which you wish to create the system partition. Select the appropriate drive and press **ENTER**.
 9. You will be prompted to enter the size in MB of the partition. Type in 10 and press **ENTER**.
 10. The system will format the partition. When it is finished you will be prompted to press any key to continue. Press a key.
 11. Select Exit on the menu that comes up and press **ENTER**.
 12. Select Exit on the next menu and press **ENTER**.
- **If you want to install Windows NT using with other SCSI device (or on BX),Follow the steps below:**

Installing Windows NT

1. Insert the Windows NT4.0 install Floppy for the AlphaPC 164UX diskette into drive A:
2. From the main ARCSBIOS screen select **Enter Setup**.
3. select **Run a Program** from the setup menu and press **Enter**.
4. Type in: **A:\miniport.exe** and press **Enter**.
5. Maintain Flash Device will start. In the Menu shown select **Add SCSI Miniport to Flash** and press **Enter**
6. Remove the Windows NT4.0 install Floppy for the AlphaPC 164UX diskette from drive A:
7. Insert the disk labeled manufacturer supplied hardware support disk into drive A:
8. Type SCSI Driver File Name for SCSI card.
ex) Type A:\xxxx.sys and press Enter
9. The next screen displayed will say **what would you like to call the Flash file?-->**
press ENTER to accept : [xxxx.sys]
If you want to accept, press **Enter**
Please enter a description of the FLASH file-->
Type description and press **Enter**
ex) Adaptec
10. In Maintain Flash Device Menu select **save changes to Flash and Exit** and Enter
11. If upgrade Firmware completed, press **Enter**
12. Restart your computer
13. From the main ARCSBIOS screen select **Enter Setup**
14. In Advanced setup->Set NVRAM options->SCSI miniport order press **Enter**
15. In SCSI Miniport Detection Order Menu select **Adaptec**(description)
16. Change **Disable to 0** with <-- key and --> key.
17. press **ESC** Twice
18. In Save Configuration Menu displayed will say **Save changes to Non-Volatile RAM(Y/N)**
19. Press **Y** and **Enter**.
20. if you restart your computer, your SCSI Device will be detected.
21. If you want to delete SCSI Device file, In Maintain Flash device Menu select **Delete SCSI Miniport from Flash**

7.4.3 Windows NT Setup

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

Installing Windows NT

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 CD in the CD-ROM drive.
2. Restart your computer.
3. Select **Enter Setup and Run a Program**.
4. Type **CD:\alpha\setupldr** and press **ENTER**

The Windows NT Setup program will start. It will begin copying files to memory. Setup will come up with the message: Setup could not determine the type of computer you have. There will be a list of computer types in a list box. Highlight the **Other** option and press **ENTER**. You will be prompted to "Please insert the disk labeled manufacturer supplied hardware support disk into drive A:. *Press enter when ready *." Make sure that the Windows NT 4.0 Install Floppy for the AlphaPC 164UX diskette is in drive A: and press **ENTER**. A list box with **APC 164UX Alpha 56/xxx** in it will be displayed. Press **ENTER**. Setup will begin copying files again.

Note: The next steps depend on the type of drives that you have.

You must have determined if you have IDE , SCSI, or a combination of drives.

Setup will come up with a screen that says: "Setup could not determine the type of one or more mass storage device(s)". Point 1 below describes what to do if you have only SCSI drives. Point 2 describes what to do if you have only IDE drives. Point 3 describes what to do if you have a combination of IDE and SCSI drives.

1. If you have only SCSI drives, then press **S**. A list box of adapters will be displayed. **Other** should be highlighted. Press **ENTER**. You will be prompted to "Please insert the disk labeled manufacturer supplied hardware support disk into drive A:. *Press enter when ready *." Make sure that the Windows NT 4.0 Install Floppy for the AlphaPC 164UX diskette is in drive A: and press **ENTER**. A list box will be displayed. It will contain 2 entries, AlphaPC 164UX PCI Ultra SCSI (Symbios Logic 53C875), and AlphaPC 164UX PCI IDE (ATAPI). Highlight **AlphaPC 164UX PCI Ultra SCSI** and press **ENTER**. The next screen displayed will say "Setup will load support for the following device(s). AlphaPC 164UX PCI Ultra SCSI (Symbios Logic 53C875)". Press the **ENTER** key to continue with setup.

Installing Windows NT

2. If you have only IDE drives, press **S**. A list box of adapters will be displayed. **Other** should be highlighted. Press **ENTER**. You will be prompted to "Please insert the disk labeled manufacturer supplied hardware support disk into drive A:." *Press enter when ready *." Make sure that the Windows NT 4.0 Install Floppy for the AlphaPC 164UX diskette is in drive A: and press **ENTER**. A list box will be displayed. It will contain 2 entries, AlphaPC 164UX PCI Ultra SCSI (Symbios Logic 53C875), and AlphaPC 164UX PCI IDE (ATAPI). Highlight **AlphaPC 164UX PCI IDE (ATAPI)**. And press **ENTER**. The next screen displayed will say "Setup will load support for the following device(s). AlphaPC 164UX PCI IDE (ATAPI)". Press the **ENTER** key to continue with setup.
3. If you have a combination of IDE and SCSI drives, press **S**. A list box of adapters will be displayed. **Other** should be highlighted. Press **ENTER**. You will be prompted to "Please insert the disk labeled manufacturer supplied hardware support disk into drive A:." *Press enter when ready *." Make sure that the Windows NT 4.0 Install Floppy for the AlphaPC 164UX diskette is in drive A: and press **ENTER**. A list box will be displayed. It will contain 2 entries, AlphaPC 164UX PCI Ultra SCSI (Symbios Logic 53C875), and AlphaPC 164UX PCI IDE (ATAPI). Highlight **AlphaPC 164UX PCI Ultra SCSI** and press **ENTER**. The next screen displayed will say "Setup will load support for the following device(s). AlphaPC 164UX PCI Ultra SCSI (Symbios Logic 53C875)". Press **S**. You will return to the list box of drives with other highlighted. Press **ENTER**. You will be prompted to "Please insert the disk labeled manufacturer supplied hardware support disk into drive A:." *Press enter when ready *." Make sure that the Windows NT 4.0 Install Floppy for the AlphaPC 164UX diskette is in drive A: and press **ENTER**. The list box of AlphaPC 164UX drivers will be displayed again. Highlight **AlphaPC 164UX PCI IDE (ATAPI)** and press **ENTER**. The next screen displayed will say "Setup will load support for the following device(s). AlphaPC 164UX PCI Ultra SCSI (Symbios Logic 53C875) and AlphaPC 164UX PCI IDE (ATAPI)". Press the **ENTER** key to continue with setup.

Setup will copy more files. Then it will initialize the kernel. This will be seen as a blue screen with AlphaPC 164UX in large letters on it. After this a screen titled "Welcome to Setup" will be displayed. Press **ENTER**.

The next screen will say "Setup has recognized the following mass storage devices in your computer." And it will display the drivers you selected off the Windows NT 4.0 Install Floppy for the AlphaPC 164UX diskette earlier. Press **ENTER**.

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The next screen will display the Microsoft Windows NT license agreement. Press **page down** to scroll through it as you read it. When you get to the end press **F8** to accept the terms and conditions.

The next screen display will say: "Setup has determined that your computer contains the following hardware and software components". All of these selections should be OK unless you are using a video card that requires a driver that is not on the Windows NT CD-ROM. Point 1 below describes the steps to follow if your video card's driver is on the Windows NT CD-ROM. Point 2 describes the steps if your video card's driver is not on the Windows NT CD-ROM.

1. If your video card's driver is on the Windows NT CD-ROM, then make sure that the highlight is on **The above configuration matches my system** and press **ENTER**.
2. If your video card's driver is not on the Windows NT CD-ROM, then move the highlight to the Display option. Press **ENTER**. A list of video cards will be displayed with other highlighted. Press **ENTER**. You will be prompted to "Please insert the disk labeled manufacturer supplied hardware support disk into drive A:." *Press enter when ready *." Put the video card's driver disk in drive A: and press **ENTER**. A list of drivers on the disk will be displayed. Select the appropriate driver and press **ENTER**. The display will return to the hardware and software component screen. Highlight **The above list matches my computer** and press **ENTER**.

The next screen displayed will say: "The list below shows existing partitions and spaces available for creating new partitions". Select the location on the hard drive you wish to install Windows NT and press **ENTER**. Do not try to install Windows NT on the 10 MB partition you created earlier. There is not enough room on it. Setup limits you to installing Windows NT to a 3 GB or smaller partition. 500 MB is the smallest partition recommended.

The next screen displayed will say: "A new partition for Windows NT has been created". Select the file system that you would like to have on the partition and press **ENTER**. Setup will format the partition.

After the formatting is complete the next screen will say: "Setup Installs Windows NT files on your hard disk. Choose where you want these files to be installed". The default selection is **\winnt**. If you wish to change it do so. Press **ENTER**. You will then be prompted that "Setup will now examine your disk for corruption". Press **ENTER**. Setup will check the disk and then begin copying files. You may be prompted to insert different floppies if you installed video drivers off a floppy.

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After setup finishes copying files a screen will be displayed that says: " This portion of setup has completed successfully. Press enter to restart your computer." Press **ENTER**.

The system will reboot and begin to boot the graphical portion of Windows NT Setup. If you formatted the partition to NTFS, then the system will run check disk on the partition and convert the file system then reboot the system.

The system will boot into the graphical portion of Windows NT Setup. Setup will begin by copying files. Then a screen will be displayed that says "Windows NT Setup. 1) Gathering information about your system". Click on the **NEXT** button.

The Setup Options screen will be displayed next. Select the type of installation you wish to do. **Typical** is recommended. Click on the **NEXT** button.

The next screen displayed will prompt you to "Enter the name and organization." Enter these into the fields specified and click the **NEXT** button.

The CD key screen is the next screen displayed. It will prompt you to "Enter the CD Key." That can be found on the jewel case or cardboard sleeve that your Windows NT CD-ROM came in. Enter the number into the field and click the **NEXT** button.

The next screen prompts you to "Enter the computer name." This is the name it will use on the network. It must be a unique name that no other machine on the network has. Enter the name and click the **NEXT** button.

The administrator account screen prompts you to "Enter the administrator password." Enter it into the field provided then type it in the other field to confirm it. Click on the **NEXT** button.

The next screen asks "Do you want to create an emergency repair disk." Select yes or no and then click on the **NEXT** button.

The Windows NT Components screen is the next displayed. It asks "Would you like to install the most common components or would you like to select which components get installed." Make your selection and click on the **NEXT** button. If you chose to select the components a list will be displayed. Select the components you wish to install and click on the **NEXT** Button.

The next screen will say "Windows NT Setup. 2) Installing Windows NT Networking". Click on the **NEXT** button.

The next screen will prompt you with: " Windows NT needs to know how this computer will participate on the network." **Select This computer will participate on a network and select wired to a network.** Click the **NEXT** Button.

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The next window that comes prompts you: "To have setup start searching for a network adapter click the start search button." Do not click the start search button. Click on the **Select from List** button. A pop-up window titled Select Network Adapter will come up. Make sure the Windows NT 4.0 Installation Floppy for the AlphaPC 164UX diskette is in A:. Click on the **Have Disk** button. Another pop-up window will come up prompting you to enter the path to the drivers. Press **ENTER**. A window titled Select Oem Option will come up. The only driver displayed will be **AlphaPC 164UX PCI Fast Ethernet DEC21143**. Click the **OK** button. You will go back to the screen that prompts you to click the start search button. Click **NEXT**.

The next window allows you to setup the networking protocols. Select the protocols you wish to use. Click the **NEXT** button.

The next window allows you to select which services will be installed. Select the ones you wish and click **NEXT**.

A window saying "Windows NT is now ready to install networking components that you selected," will be displayed. Click the **OK** button.

A pop-up window titled DEC DC21143 based adapter setup will come up. Scroll down the list to **Autodetect**. Click the **OK** button.

Setup will now copy files to the hard drive. The next screen that is displayed will say: Windows NT is now ready to start the network so that you can complete the installation of the network. Click on the **NEXT** button. There will be a pause. This may take up to 2 minutes while Windows NT starts the network.

The next screen displayed will tell you: "Select whether your computer will participate in a workgroup or a domain and enter the name of the workgroup or domain". Fill in the appropriate information and click the **NEXT** button.

The next screen will display "Windows NT 3) Finishing Setup". Click the **FINISH** button.

The Date and Time Properties screen is the next to be displayed. Set the time zone. Click on the **CLOSE** button.

The next screen that is displayed is the Display Properties screen. A pop-up window will be displayed in front of it. It will either display the type of video adapter detected or it will say that an unknown video type was detected. Point 1 below describes the steps to take if the video adapter was detected. Point 2 describes the steps to take if it was not.

1. Click the **OK** button on the pop-up window.
2. Click the **OK** button on the pop-up window. On the Display Properties screen

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click the Display Type button. In the **Display Type** windows click the **Change** button. Insert the driver disk for the video card in A:. In the Change Display window click the **Have Disk** button. Select the appropriate driver from the disk. Click the **OK** button. Click the **Close** button on the Display Type window.

Make any changes to the settings in the Display Properties window that you want and then press the **Test** button. A pop-up window will come up saying "the test pattern will be displayed for 5 seconds." Click the **OK** button. The test pattern will be displayed. After the test pattern is done, a pop-up windows will ask if you saw the pattern OK. If the pattern appeared right click the **YES** button. If it did not, then click the **NO** button and change the display properties and click the **Test** button again. After you see the test pattern correctly, click the **OK** button on the Display Properties window.

Setup will copy files and then display a screen saying: "Windows NT 4.0 has been installed successfully **Restart your computer.**" Press the Restart Computer button. The system will reboot. You may now boot Windows NT.

You will want to install Service Pak 3 after installation is complete. If you have a system with IDE drives as you are installing Service Pak 3 you will be prompted " The file ATAPI.sys has been identified as an OEM-installed file. Would you like to overwrite the version of the file with the version on the service pak ?" Click **YES**.

Reboot your system after the service pak is installed. Log into Windows NT, make sure the Windows NT 4.0 Installation Floppy for the AlphaPC 164UX is in A:. Press the **Start** button. Select **Run** from the start menu. Enter **A:\idedma.reg** into the field and click the **OK** button. This will enable the IDE driver to use DMA and result in better performance if your hard drive supports DMA. You will need to reboot the system before these changes can take effect.

8

Troubleshooting

This chapter contains information about trouble shooting hardware and software during AlphaPC 164UX startup. Technical support is available through e-mail.

The address is **huedoc@sec.samsung.com**.

8.1 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.

8.1.1 Troubleshooting steps: No Video

1. Check the connection to the ac outlet.
2. Check the voltage setting on the power supply.
3. Check that the frequency/jumper selection matches the speed of the Alpha chip.
4. Check that the CPU fan is connected and spinning.
5. Ensure that the flash ROM update procedure was performed correctly.
6. Reseat the video card and ensure that it is connected to the monitor.
7. Reseat the DIMMs.
8. Replace the DIMMs.

8.1.2 Troubleshooting steps: Keyboard error on boot up.

1. Verify that the keyboard is plugged securely into the proper connector.
2. Verify that the cable to all IDE drives and the IDE connector on the AlphaPC 164UX motherboard is oriented properly.

Beep Codes

3. Replace the keyboard.

Note: If you have the network drivers installed, but do not have the AlphaPC 164UX connected to a network, there will be a noticeable increase in the time it takes for NT to start-up after the login. This is caused by the network drivers having to wait for a time out.

8.2 Beep Codes

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

Table 8-1 Beep Codes

Beep Code	Description
1 Very long beep	No Fan. Shut down the system immediately.
1 Long, 1 short	Cannot measure CPU speed.
1 Long, 2 short	Invalid DIMM configuration
1 Long, 3 short	Cached Memory Error
1 Long, 4 short	Noncached Memory Error
1 Long, 5 short	SROM had bad checksum
1 Long, 6 short	PAL has bad checksum
1 Long, 7 short	Error copying FLASH to memory.Failed noncached verify
1 Long, 8 short	Error copying FLASH to memory.Failed refill from DIMM verify
1 Long, 9 short	Error copying FLASH to memory.Failed refill from Bcache verify
2 Long, 1 short	ARCSBIOS has bad checksum, will boot safe ARCSBIOS.
2 Long, 2 short	Safe ARCSBIOS has bad checksum
3 Long	No video
4 Long	No keyboard
Continuous	No Fan,shut down system immediately

8.3 Post Codes

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

Safe ARCSBIOS

Table 8–2 Post Codes

Source	Post Codes	Description
SROM	00	Initialize Chipsets, Measure CPU speed
	01	Normal Beep, Compute external cache parameters
Normal	02	Initialize memory controller
Srom	03	Initialize external cache
Codes	04	Test memory cached
	05	Test memory noncached
	07	Verify SROM checksum, PAL checksum, copy PAL to memory
ARCSBIOS	08	Initialize registers for PAL, jump into PAL
	80	No Fan
	81	Can not measure CPU speed
	82	Invalid DIMM configuration
	83	Cached memory error
Error Codes	84	Noncached memory error
	85	SROM has bad checksum
	86	PAL has bad checksum
	87	Error copying FLASH to memory, Failed noncached verify
	88	Error copying FLASH to memory, Failed refill from DIMM verify
	89	Error copying FLASH to memory, Failed refill from Bcache verify
Error Codes	8A	Standard ARCSBIOS has a bad checksum
	8B	Safe ARCSBIOS has a bad Codeschecksum
	8C	No video
	8D	No keyboard

8.4 Safe ARCSBIOS

The safe ARCSBIOS provides an emergency recovery mechanism when the primary firmware image contained in the flash has been corrupted. When the flash memory has been corrupted, and no image can be loaded safely from the flash, you can run the safe ARCSBIOS to reprogram the flash.

Safe ARCSBIOS

8.4.1 Starting the Safe ARCSBIOS

You can start the safe ARCSBIOS in one of two ways:

- If the primary firmware image is unavailable when the system is powered on or reset, the safe ARCSBIOS runs automatically. When the safe ARCSBIOS runs, the system will emit 1 long beep and 2 short beeps. Follow the procedure in Section 7.3 for updating the flash ROM.
- You can also start the safe ARCSBIOS manually as follows:
 1. Power off your system.
 2. Add jumper to Option 11 as described in Section 3.3
 3. Power on the system
 4. Proceed to section 7.3 and follow procedures.
 5. Remove the jumper from Option 11 after upgrade.

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 164UX.

A.1 Memory

Dual inline memory modules (DIMMs) are available from the following sources:

Samsung Semiconductor Inc.
3566 North First St.
San Jose, CA 95134 USA
Phone: 1-408-544-4322

Table A-1 Samsung DIMM Part Number List

Size	Part Number (# of Bank)	Width	ECC
16MB	KMM374S203BTN (2 Bank) KMM374S203BTL (2 Bank)	72bit	Yes
32MB	KMM374S403ATN (2 Bank) KMM374S403BTN (2 Bank) KMM374S403BTL (2 Bank)	72bit	Yes
64MB	KMM374S803AT (2 Bank) KMM374S823AT (4 Bank) KMM374S823ATL (4 Bank)	72bit	Yes
128MB	KMM374S1600AT (2 Bank) KMM374S1623AT (4 Bank) KMM374S1623ATL (4 Bank)	72bit	Yes

VisionTek
1175 Lakeside Dr.
Gurnee, IL 60031
Phone: 847-360-7500
Fax: 847-360-7403

Memory

Table A–2 VisionTek DIMM Part Number List

Size	Part Number	Width	ECC
16MB	VT16455.0	72bit	Yes
64MB	VT164.0	72bit	Yes
128MB	VT164V6.0	72bit	Yes

Viking Components
11 Columbia
Laguna Hills, Ca 92656
Phone: 800-338-2361
Fax : 408-643-7250

Table A–3 Viking Components DIMM Part Number List

Size	Part Number	Width	ECC
16MB	VE2721U4SN3-DC01	72bit	Yes
32MB	VE4721U4SN3-DC01	72bit	Yes
64MB	VE8721U4SN3-DC01	72bit	Yes
128MB	VE16722U4SN3-DC01	72bit	Yes

QesTec, Inc.
23 Midstate Drive, Suite 104
Midstate Office Park
Auburn, Ma 01501
Phone: 508-832-5006
Fax: 508-832-5441

Table A–4 QesTec DIMM Part Number List

Size	Part Number	Width	ECC
16MB	QS272SG	72bit	Yes
32MB	QS472SG	72bit	Yes
64MB	QS872SG	72bit	Yes

Thermal Products

DeskStation Technology - Dist. for Dense-Pac
15729 College Blvd
Lenexa, KS 66219
Phone: 800-793-3375

Table A-5 Dense-Pac Microsystems DIMM Part Number List

Size	Part Number	Width	ECC
64MB	DN06408x72-00	72bit	Yes
128MB	DN12816x72-00	72bit	Yes
256MB	DN25632x72-00	72bit	Yes

A.2 Thermal Products

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 164UX (+3.3 V, +5 V, -5 V, +12 V, -12 V), is available from:

Emacs Electronics USA, Inc.
1410 Gail Borden Place C-4
El Paso, TX 79935
Phone: 915-599-2688
PN AP2-5300F (300 W)

Enclosure

A.4 Enclosure

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

Axxion
11 B Leigh Fisher
El Paso, Tx. 79906
Phone: 915-772-0360
Fax: 915-778-3200
PN: DL17

Addtronics Industrial
43263 Osgood Road
Fremont, Ca 94539
Phone: 510-490-9898
Fax: 510-490-7132
PN EX-6890A

California PC Products
205 Apollo Way
Hollister, Ca. 95023
Phone: 408-637-2250
Fax: 510-490-7132
PN: 6D3APD,6C6APD

B

Support, Products and Documentation

If you need technical support, an Alpha CPU *brochure*, or help deciding which documentation best meets your needs, visit the Samsung Semiconductor World Wide Web Internet site:

<http://www.samsungsemi.com>

You can also call or e-mail to Samsung CPU Marketing Team. Please use the following information lines for support.

For documentation and general information:

Korea	82-331-209-3285
United States and Canada:	1-408-544-4510
Europe	49-6196-663410
Electronic mail address:	alphainfo@sec.samsung.com

For technical support:

Phone	82-331-209-3282
Fax	82-331-209-4492
Electronic mail address:	alphatech@sec.samsung.com

Samsung Alpha Products

To order the AlphaPC 164UX motherboard, contact your local distributor. The following tables list some of the semiconductor products available from Samsung Electronics.

Chips	Order Number
Samsung Electronics 21164 Alpha microprocessor (466 MHz)	KP21164-466CN
Samsung Electronics 21164 Alpha microprocessor (500 MHz)	KP21164-500CN
Samsung Electronics 21164 Alpha microprocessor (533 MHz)	KP21164-533CN
Samsung Electronics 21164 Alpha microprocessor (566 MHz)	KP21164-566CN
Samsung Electronics 21164 Alpha microprocessor (600 MHz)	KP21164-600CN
Samsung Electronics 21164 Alpha microprocessor (633 MHz)	KP21164-633CN
Samsung Electronics 21164 Alpha microprocessor (667 MHz)	KP21164-667CN

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

Motherboard Kits	Order Number
Samsung Electronics AlphaPC 164LX Motherboard Kit for Windows NT	MB164LX
Samsung Electronics AlphaPC 164UX Motherboard Kit for Windows NT	MB164UX
Samsung Electronics AlphaPC 164BX Motherboard Kit for Windows NT	MB164BX

Samsung Alpha Documentation

The following table lists some of the available documentation.

Title	Order Number
21164 Alpha Microprocessor Hardware Reference Manual	KP164-HR-1
21164 Alpha Microprocessor Data Sheet	KP164-DS-1
AlphaPC 164LX Motherboard Technical Reference Manual	MB164LX-TM1
AlphaPC 164LX Motherboard Windows NT User's Manual	MB164LX-UM2
AlphaPC 164UX/BX Motherboard Technical Reference Manual	MB164UX/BX-TM1
AlphaPC 164UX/BX Motherboard Windows NT User's Manual	MB164UX/BX-UM1

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
Samsung 21164 Alpha Microprocessor Hardware Reference Manual KP164-HR1-0397	Samsung Electronics Ltd. San #24, Nongseo-ri, Kiheung-eup Yongin-city, Kyungki-do, Korea 449-900 Online, World Wide Web access at URL http://www.sec.samsung.com
Samsung 21164 Alpha Microprocessor Data Sheet KP164-DS1-0397	See previous entry
Digital Semiconductor 21174 Core Logic Chip Technical Reference Manual PN EC-R12GB-TE (Available Summer, 1997)	Digital Equipment Corporation Digital Semiconductor 77 Reed Road Hudson, MA 01749 USA Online, World Wide Web access at URL: http://www.digital.com/semiconductor

Title	Vendor
PCI Local Bus Specification, Revision 2.1	PCI Special Interest Group
PCI Multimedia Design Guide, Revision 1.0	U.S. 1-800-433-5177
PCI System Design Guide	International 1-503-797-4207
PCI-to-PCI Bridge Architecture Specification, Revision 1.0	Fax 1-503-234-6762
PCI BIOS Specification, Revision 2.1	
82420/82430 PCIset ISA and EISA Bridges (includes 82371SB)	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 (FDC37C666) 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*.