PCM-48E26

486 DX5 Half EBX PC

User Manual

Rev 1.0.3

EMAC, inc.
EQUIPMENT MONITOR AND CONTROL
2390 EMAC Way, Carbondale, Illinois 62901
World Wide Web: http://www.emacinc.com
Phone: (618) 529-4525 Fax: (618) 457-0110

Contents

General information

Features

- Ultra-compact size fully integrated Panel PC (5.75” x 4.5”) (Half EBX)
- On-board AMD DX5-133 (5x86-133) CPU
- Up to 64 MB on-board EDO/Fast Page-mode DRAM
- Local-bus SVGA display controller (LCD, EL and CRT displays).
- On-board 16-bit Ethernet 10 BaseT interface
- Supports M-Systems Disk-On-Chip ® 2000 Flash memory
- On-board keyboard/mouse interface
- Four serial ports: three RS-232, one RS-422/485
- Expansion through 16 bit PC/104 connector
- +5 V power supply required

Standard SBC functions

- **CPU:** Embedded AMD DX5-133 (5x86-133) processor.
- **BIOS:** General Software Embedded BIOS 128 KB Flash memory.
- **Chipset:** Radisys R400EX.
- **System memory:** One 72-pin SIMM sockets (4 MB, 8 MB, 16 MB, 32 MB, and 64 MB). Supports FPM or EDO DRAM from 4 MB to 64 MB.
- **Serial ports:** Four serial ports based on a 16550 UART (one of the serial ports utilizes the RS422/485 interface, the other three are standard RS-232).
- **Keyboard/mouse connector:** connector supports standard PC/AT keyboard and a PS/2 mouse.
- **Flash Disk:** Supports M-Systems' Disk-On-Chip ® 2000 Flash disk up to 288 MB.
- **Sound:** Standard on-board PC speaker.

Local-bus flat panel/VGA interface

- **Chipset:** C&T 65550
- **Display memory:** 1 MB DRAM
- **Display type:** Supports CRT and flat panel (EL, LCD and gas plasma flat panel) displays. Can display CRT and flat panel simultaneously.
- **Flat panel display mode:** Panel resolution supports up to 1024 x 768.
- **CRT display mode:** Non-interlaced CRT monitors resolutions up to 1024 x 768 @ 8 colors.

Ethernet interface

- **Chipset:** SMC 9196 10BaseT
- **Configuration:** I/O & IRQ settings via jumper settings

Mechanical and environmental

- **Dimension:** 6.1 " (L) x 4.5" (W)
- **Power supply voltage:** +5 V (4.75 V to 5.25 V)
- **Maximum power requirements:** +5 V @ 1.5 A (typical)
- **Operating temperature:** 32° F to 140° F (0° C to 60° C)
- **Weight:** .5 lb. (approximate weight of board with extra connectors)

Standard Parts Inventory

- PCM-48E26 SBC.
- Keyboard/Mouse Y cable
- Three Serial Port cables (DB9 to 10pinn headers)
- 26 pin to DB25 Parallel Port Cable
- Floppy Drive Cable
- Standard 40 pin Hard Drive Cable
- CD-ROM with manual and drivers

PCM-48E26 Configuration

Jumper & Connector Descriptions

The PCM-48E26 comes factory configured and ready to operate. In the event that jumpers need to be verified or modified this section provides the information required, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all the safety precautions before you begin any configuration procedure. See Appendix A for connector pin-outs and Appendix B for Jumper Settings.

Table 1 Jumpers

Label	Function
JP1	LCD Voltage
JP2	LCD Type
JP4	Ethernet Base Address and IRQ

Table 2 Connectors

Label	Function
CN1	Power
CN2	VGA
CN3	Keyboard/Mouse
CN4	Ethernet
CN7	Com 1

Table 3 Headers

Label	Function
HDR1	Floppy drive connector
HDR2	44 Pin LCD connector
HDR3	Printer Port
HDR4	Com 3
HDR5	Com 4
HDR6	
HDR7	Com 2
HDR8	IDE connector

Powering Up the PCM-48E26

The PCM-48E26's power connector (CN1) is a standard floppy, four-pin type connector commonly found on most PC type power supplies. The PCM-48E26's logic only requires 5 volts DC. The 12v pin (CN1 pin 1) is routed to the PC/104 connector and may be used by some PC/104 expansion cards. The pin-out for the CN1 power connector is as follows:

Pin	Signal
1	+5 V
2	GND
3	GND
4	+12 V

Remember before powering-up the PCM-48E26 make sure the memory SIMM and the DOC are correctly orientated, firmly seated and check any cables to make sure that plugged on correctly in relation to pin 1.

Note: The PCM-48E26 requires less than 2 amps typical which is not enough current to load the main switcher in some larger PC power supplies (this can be verified with a voltmeter measuring the 5 volt supply). If this is the case you can try to load the power supply by adding 5 volt devices, or order a compatible power supply from EMAC.

Memory - Installing DRAM (SIMMs)

You can install anywhere from 4 MB to 64 MB of on-board DRAM memory using 4, 8, 16, 32 or 64 MB 72-pin SIMMs (Single In-Line Memory Modules). DRAM access time £ 60ns.

- NOTE: The modules can only fit into a socket one way and their gold or silver pins must point down into the SIMM socket. Make sure you are adequately grounded to avoid memory and PCM-48E26 damage.

The procedure for installing SIMMs appears below. Please follow these steps carefully.
1. Ensure that all power supplies to the system are switched Off.
2. Install the SIMM stick. Install the SIMM so that its pins point down into the SIMM socket.
3. Slip the SIMM into the socket at a 45-degree angle and carefully fit the bottom of the card against the connectors.
4. Gently push the SIMM into a perpendicular position until the clips on the ends of the SIMM sockets snap into place.
5. Check to ensure that the SIMM is correctly seated and all connector contacts touch. The SIMM should not move around in its socket.

Ethernet

The PCM-48E26 utilizes the SMC 91C96 10 BaseT full duplex Ethernet chip and terminates to a standard RJ-45 connector. It can be connected straight to a hub, or another computer via a crossover Ethernet cable. JP4 is used to set the Ethernet I/O address and IRQ. The default settings for this jumper block are jumpers in place at positions A and B. This configuration sets the I/O address at 320H and IRQ 9. Link and Activity (Rx/Tx) LEDs are provided to monitor network activity.

Serial Ports

The PCM-48E26 is equipped with four serial ports. All four serial ports are standard X86, 16550, 16 byte FIFO UARTS.

COM1 is set to be RS232, is configured by default to 3F8H using IRQ 4, and is available via the DB9 connector on the edge of the board.

COM2 is hardware configured to run RS422/485, and is set by default to I/O address 2F8H using IRQ 3. This comport is available via a 10 pin header (HDR7). The UART's RTS signal is used to turn the transmitter on and off.

COM3 and COM4 are both configured as RS232 ports. These are available to the user on connectors HDR4 & HDR5 respectively. The default I/O address and IRQ for COM3 is 3E8H using IRQ 5 and default I/O address and IRQ for COM4 is 2E8H using IRQ 11.

Keyboard/Mouse

The PCM-48E26 is equipped with a keyboard and mouse interface. Both the keyboard and the mouse utilize the same PS/2 connector (CN3) through the use of the included Y cable. Though a standard PS/2 keyboard can be plugged directly into the connector, to be able to use both a keyboard and mouse you must use the Y adapter cable or a serial mouse.

Disk-On-Chip Flash Disk

The PCM-48E26 does not come with a DOC flash drive chip installed by default, but one can be ordered from EMAC and installed by the user or integrated at the time the PCM-48E26 is ordered.

The DOC is a solid state flash disk and as such is extremely rugged when compared to a conventional hard drive. The DOC is a paged memory device and is mapped at segment address D000 Hex, and by use of the device's firmware emulates a hard drive. Thus any installed operating system will be able use the device similar to a hard drive.

Warning: Be extremely careful when installing the DOC into its socket. Plugging it in backwards, and turning on power, will *destroy* the DOC and *damage* the PCM-48E26 rendering both inoperable! Any information on the DOC will be unrecoverable at this point.

Always double-check the orientation of the DOC when it has been removed from the board and reinserted.

Parallel port

The PCM-48E26 comes with a Standard Parallel port interface, This is available to the user via a 26-pin header (HDR3).

IDE connector

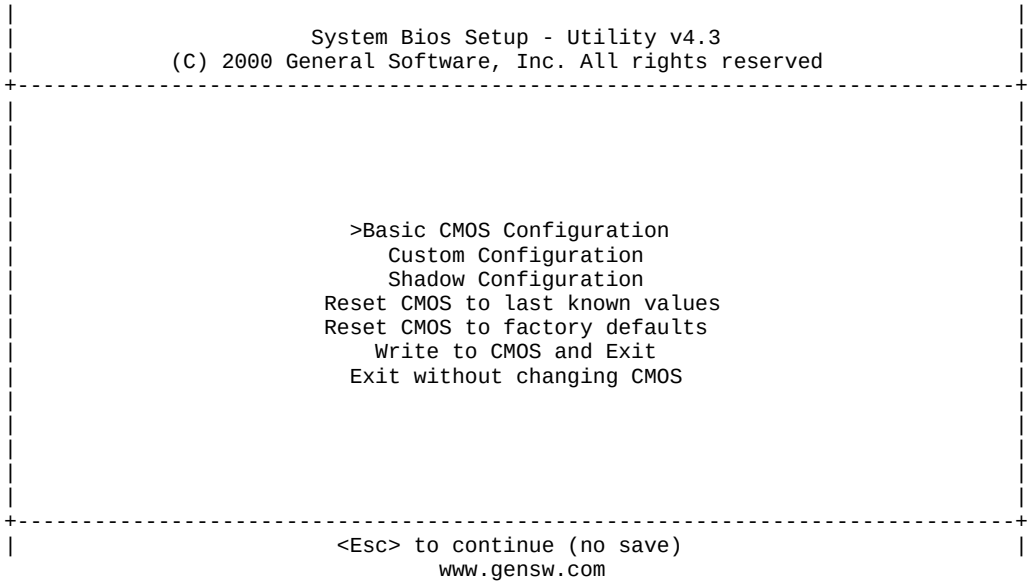
The PCM-48E26 is equipped with a standard IDE interface available to the user via the standard 40-pin header (HDR8) on the board

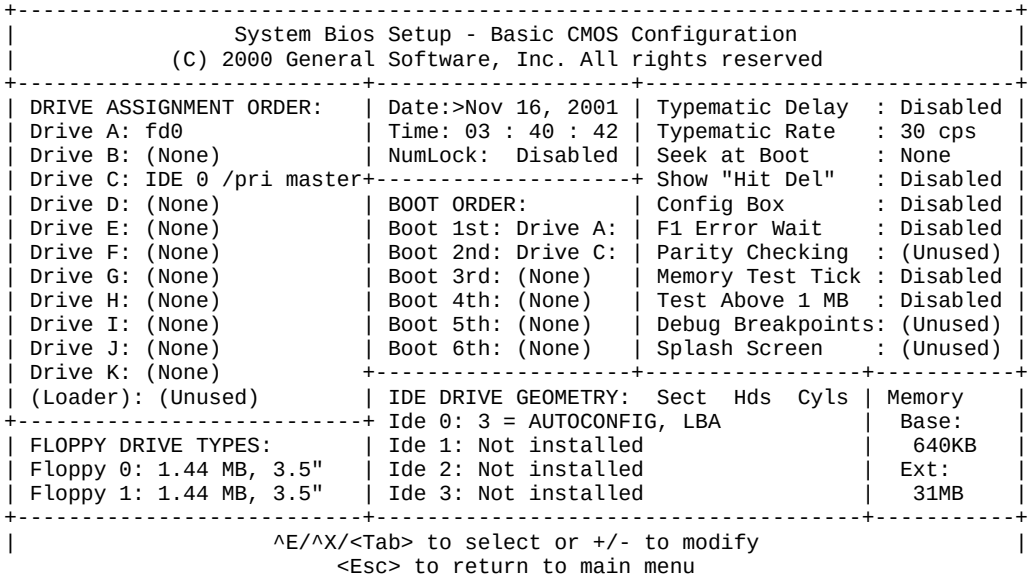
Floppy Drive connector

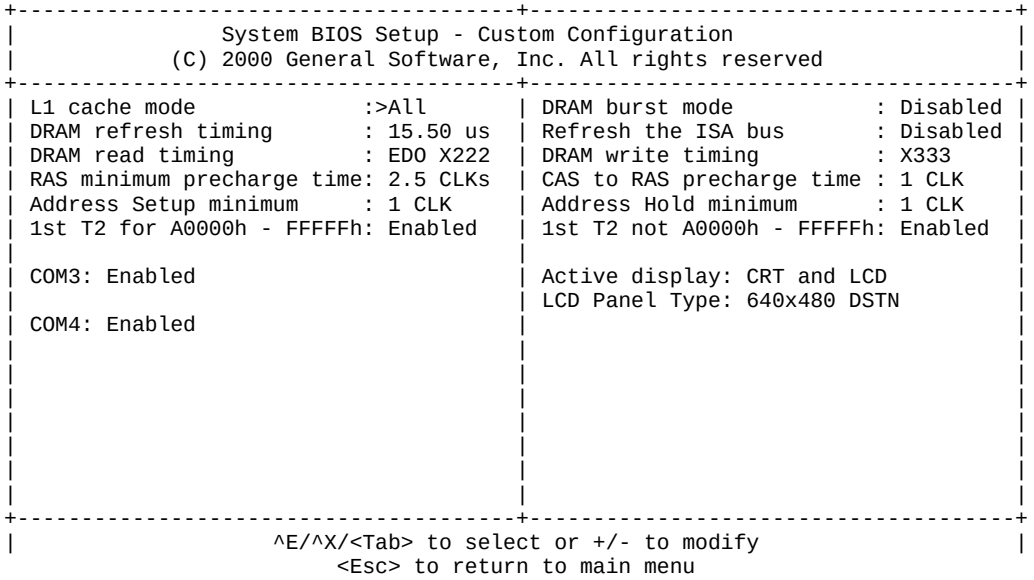
The PCM-48E26 is equipped to operate a standard 3.5" 1.44Mb floppy drive via the standard 34-Pin header (HDR1).

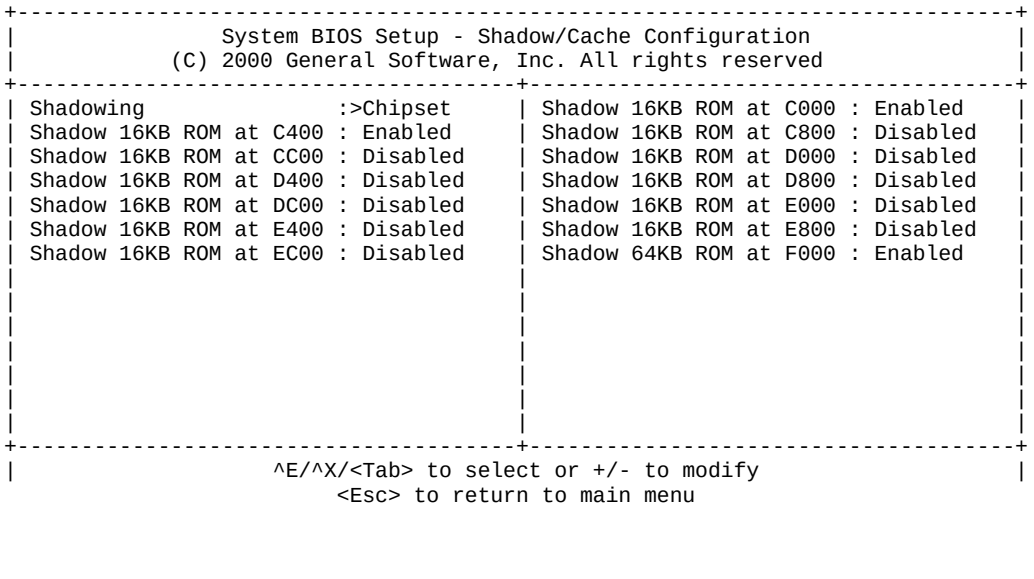
PCM-48E26 BIOS Defaults

The PCM-48E26 uses a General Software BIOS. To enter the BIOS you must press the <Del> key when prompted. The following BIOS screen shots indicate the BIOS options and the default factory values of each option. Note: These are the factory set options should not require changing.




System Bios Setup - Basic CMOS Configuration
(C) 2000 General Software, Inc. All rights reserved
DRIVE ASSIGNMENT ORDER:
Drive A: fd0
Drive B: (None)
Drive C: IDE 0 /pri master
Drive D: (None)
Drive E: (None)
Drive F: (None)
Drive G: (None)
Drive H: (None)
Drive I: (None)
Drive J: (None)
Drive K: (None)
(Loader): (Unused)
FLOPPY DRIVE TYPES:
Floppy 0: 1.44 MB, 3.5"
Floppy 1: 1.44 MB, 3.5"
Date:>Nov 16, 2001
Time: 03 : 40 : 42
NumLock: Disabled
BOOT ORDER:
Boot 1st: Drive A:
Boot 2nd: Drive C:
Boot 3rd: (None)
Boot 4th: (None)
Boot 5th: (None)
Boot 6th: (None)
IDE DRIVE GEOMETRY: Sect Hds Cyls
Ide 0: 3 = AUTOCONFIG, LBA
Ide 1: Not installed
Ide 2: Not installed
Ide 3: Not installed
Typematic Delay : Disabled
Typematic Rate : 30 cps
Seek at Boot : None
Show "Hit Del" : Disabled
Config Box : Disabled
F1 Error Wait : Disabled
Parity Checking : (Unused)
Memory Test Tick : Disabled
Test Above 1 MB : Disabled
Debug Breakpoints: (Unused)
Splash Screen : (Unused)
Memory
Base:
640KB
Ext:
31MB
^E/^X/<Tab> to select or +/- to modify
<Esc> to return to main menu


System BIOS Setup - Custom Configuration
(C) 2000 General Software, Inc. All rights reserved
L1 cache mode :>All
DRAM refresh timing : 15.50 us
DRAM read timing : EDO X222
RAS minimum precharge time: 2.5 CLKs
Address Setup minimum : 1 CLK
1st T2 for A0000h - FFFFFh: Enabled
COM3: Enabled
COM4: Enabled
DRAM burst mode : Disabled
Refresh the ISA bus : Disabled
DRAM write timing : X333
CAS to RAS precharge time : 1 CLK
Address Hold minimum : 1 CLK
1st T2 not A0000h - FFFFFh: Enabled
Active display: CRT and LCD
LCD Panel Type: 640x480 DSTN
^E/^X/<Tab> to select or +/- to modify
<Esc> to return to main menu


System BIOS Setup - Shadow/Cache Configuration
(C) 2000 General Software, Inc. All rights reserved
Shadowing :>Chipset
Shadow 16KB ROM at C400 : Enabled
Shadow 16KB ROM at CC00 : Disabled
Shadow 16KB ROM at D400 : Disabled
Shadow 16KB ROM at DC00 : Disabled
Shadow 16KB ROM at E400 : Disabled
Shadow 16KB ROM at EC00 : Disabled
Shadow 16KB ROM at C000 : Enabled
Shadow 16KB ROM at C800 : Disabled
Shadow 16KB ROM at D000 : Disabled
Shadow 16KB ROM at D800 : Disabled
Shadow 16KB ROM at E000 : Disabled
Shadow 16KB ROM at E800 : Disabled
Shadow 64KB ROM at F000 : Enabled
^E/^X/<Tab> to select or +/- to modify
<Esc> to return to main menu

Configuring the Bios

Setting the bios to boot from DOC

To boot from a DOC device you need to set the boot sequence so that it boots from Drive C:. This can occur before or after the floppy disk (drive A: or B:) seek. If the DOC is the only device in the system then "DRIVE ASSIGNMENT ORDER" should be (None), and "IDE DRIVE GEOMETRY" should be disabled.

***** NOTE**: If there is a hard drive connected to the SBC at the same time as a DOC, the DOC's firmware will need to updated to make the DOC the FIRST or primary boot device. Please see the documentation on the DOC manufacturer's website.

Setting the Bios for hard drive detection:

There are three parts to IDE detection and booting:
Detection of the drives is done in the IDE geometry section, this is where the type of the drive is set, (autoconfig LBA) will cover 99% of all hard drives; (autoconfig Physical) is used for drives less than 2gb.; (autoconfig Phoenix) is for phoenix type hard drives. There is also a user definable section, where the user puts in the heads, cylinders, and sector information for the drive.

Configuring the drive letter:
Setting Drive C: to IDE0 Pri/master (sets the normal C drive up) Where as setting Drive C: to IDE1 Pri/Slave Sets up the second drive on the IDE chain as the C drive.

Configuring the boot sequence:
This section allows the user to pick the BOOT ORDER for the board's drives.
The fewer number of drives the user selects in this section will affect the boot time of the board. For example if the board is set to boot A, D, B, C the board will boot slower than if the board is set to boot directly to the C drive. This is because the bios will seek out each drive and wait for it to timeout before trying to boot from the next drive.

Special BIOS features:

COM 3 &4 disable
In the custom "Custom Configuration", the option to disable or enable COM's 3 and 4 will turn off the comports. Thus allowing the user to use the resources of the comports for add-on PC/104 modules.

LCD settings
The section of the "Custom Configuration" screen "Active display", allows the user to set the Active display to CRT, LCD or CRT and LCD. This turns on and off the said functions

The section of the "Custom Configuration" screen "LCD Panel Type", allows the user to select and set the correct video mode for displaying on different LCD screens. The default is "640x480 DSTN."

Changing BIOS settings on headless boards
To enter the BIOS on a headless board (a board with no video adapter installed). The user must hit delete just after the keyboard lights flash. Then the BIOS is redirected to COM 1 at 9600 8-N-1 (baud rate 9600, 8 data bits, No parity, one stop bit, and no flow control). So using a null modem cable and another computer or a serial terminal you can change the BIOS settings on the board.

Ctrl-e moves up
Ctrl-x moves down
Tab moves across
+ Toggle selections up
- Toggle selections down

**** Note: this does not work if there is a video card attached to the system. The BIOS will be displayed on the monitor or LCD that is attached to the board.

Resetting the BIOS
Anytime the Battery on the CMOS configuration is shorted out or “Reset CMOS to factory defaults” is selected, the system will restore all the factory settings. So going in and changing all the custom options is mandatory.

Appendix A

Connector Pinouts

Power Supply Connector (CN1)

Pin	Signal
1	+5 V
2	GND
3	GND
4	+12 V

VGA Connector (CN2)

Pin	Signal	Pin	Signal
1	Red video	2	Key (no pin)
3	Green video	4	Sync return (GND)
5	Blue video	6	Monitor ID (not used)
7	Not used	8	Monitor ID (not used)
9	GND	10	Horizontal sync
11	Red return (GND)	12	Vertical sync
13	Green return (GND)	14	NC
15	Blue return (GND)	16	NC

Keyboard/Mouse PS/2 Connector (CN3)

Pin	Signal
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

Ethernet 10Base-T Connector (CN4)

Pin	Signal
1	XMT+
2	XMT-
3	RCV+
4	N/C
5	N/C
6	RCV-
7	N/C
8	N/C

Com 1 RS232 DB9 Connector (CN7)

Pin	DB9 Description
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Floppy drive connector (HDR1)

Pin	Signal	Pin	Signal
1	GND	2	DENSITY SELECT
3	GND	4	N/C
5	GND	6	N/C
7	GND	8	INDEX
9	GND	10	MOTOR 0
11	GND	12	DRIVE SELECT 1
13	GND	14	DRIVE SELECT 0
15	GND	16	MOTOR 1
17	GND	18	DIRECTION
19	GND	20	STEP
21	GND	22	WRITE DATA
23	GND	24	WRITE GATE
25	GND	26	TRACK 0
27	GND	28	WRITE PROTECT
29	GND	30	READ DATA
31	GND	32	HEAD SELECT
33	GND	34	DISK CHANGE

LCD 44 Pin Connector (HDR2)

Pin	Signal	Pin	Signal
1	+12 V DC	2	+12 V DC
3	GND	4	GND
5	Vcc(+5V/+3.3V)	6	Vcc(+5V/+3.3V)
7	ENA VEE	8	GND
9	P0	10	P1
11	P2	12	P3
13	P4	14	P5
15	P6	16	P7
17	P8	18	P9
19	P10	20	P11
21	P12	22	P13
23	P14	24	P15
25	P16	26	P17
27	P18	28	P19
29	P20	30	P21
31	P22	32	P23
33	GND	34	GND
35	SHFCLK	36	FLM (V SYS)
37	M	38	LP (H SYS)
39	GND	40	ENABKL
41	NC	42	SHFCLK /ASHFCLK
43	NC	44	NC

Parallel Port Connector (HDR3)

Pin	Signal	Pin	Signal
1	\STROBE	2	\AUTOFD
3	D0	4	ERR
5	D1	6	\INIT
7	D2	8	\SLCTINI
9	D3	10	GND
11	D4	12	GND
13	D5	14	GND
15	D6	16	GND
17	D7	18	GND
19	\ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	N/C

COM 3 & 4 RS-232 serial ports (HDR4 &HDR5)

Pin	Signal	DB9 Description
1	DCD	DCD
2	DSR	RxD
3	RxD	TxD
4	RTS	DTR
5	TxD	GND
6	CTS	DSR
7	DTR	RTS
8	RI	CTS
9	GND	RI
10	NC	--

COM 2 RS-422/485 serial port (HDR7)

Pin	Signal	DB9 Description
1	NC	NC
2	NC	Tx+(A)
3	Tx+(A)	Tx-(B)
4	Rx+(A)	NC
5	Tx-(B)	NC
6	Rx-(B)	NC
7	NC	Rx+(A)
8	NC	Rx-(B)
9	GND	NC
10	NC	--

IDE Connector (HDR8)

Pin	Signal	Pin	Signal
1	Reset	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	N.C.
21	N.C.	22	GND
23	I OW	24	GND
25	IOR	26	GND
27	IORDY	28	BALE
29	N.C.	30	GND
31	IRQ 14	32	-I/O CS16
33	A1	34	N.C.
35	A0	36	A2
37	CS0	38	CS1
39	-ACT	40	GND

Appendix B

Jumper Settings

JP1 LCD Voltage

Jumper	Setting
No Jumper	Not Available
Pins 1 & 2*	5v LCD output
Pins 2 & 3	3V LCD output

* Default setting.

JP2 LCD Type

Jumper	Setting
Pins 1 & 2	Special STN
Pins 2 & 3*	TFT and Standard STN displays

* Default setting, should work for most LCD screens. The Special Setting is designed to provide a different timing signal for special types of STN LCD screens

JP4 Ethernet Settings

Config #	I/O	IRQ	ROM	Media	Jumper
0	0x300	5	No	10bT	A B C
1*	0x320	9	No	10bT	A B
2	0x340	11	No	10bT	A C
3	0x360	7	No	10bT	A
7	0x300	5	yes	10bT	none

Note1: The jumpers are applied across the jumper pins at the designator
(i.e. A1 to A2) (**Not** A1 to B1 or A2 to B2)

Note2: Config #7 is for Remote Boot and expects a 16kb boot ROM at address CC000. This can be accomplished by putting the boot ROM in the DOC socket.

* Default setting