PPC-E5

486 DX5 Panel PC

User Manual

Rev 1.13

Contents

General information

Features

- Ultra-compact size fully integrated Panel PC (6.1" x 4.5")
- 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
- Two serial ports: one RS-232, one RS-232/422/485
- Expansion through 16 bit PC/104 connector
- Green engine with sleep mode and low power consumption
- +5 V and 12 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:** Two RS-232 ports based on a 16550 UART (one of the serial ports may be converted to RS422/485 as a factory installed option).
- **Keyboard/mouse connector:** connector supports standard PC/AT keyboard and a PS/2 mouse Via specialized Y cable.
- **Power management:** Supports power saving, APM 1.1 compliant.
- **Flash Disk:** Supports M-Systems' Disk-On-Chip ® 2000 Flash disk up to 288 MB.
- **Sound:** Amplified PC speaker interface with software controlled volume (speaker not included).

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 1280 x 1024 @ 16 colors.
- **Contrast:** Software controlled contrast and Backlight control.

LCD

- **Display Type:** 5.7" STN Color LCD
- **Resolution:** 320 x 240 @ 256K Colors
- **Dot pitch:** 0.12mm x 0.36mm
- **Luminance:** 160 (cd/m²)
- **Viewing Angle:** 100°
- **LCD MTBF:** 40,000 Hrs.
- **Backlight:** Side-edge type CFL

Touchscreen

- **Type:** 4 Wire Analog Resistive
- **Resolution:** Continuous
- **Light Transparency:** 79%
- **Controller:** Dynapro On board
- **Driver:** WinCE, DOS, Linux
- **Durability:** Over one million touches

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) & +12 V
- **Maximum power requirements:** +5 V @ 2 A (typical)
- **Operating temperature:** 32° F to 140° F (0° C to 60° C)
- **Weight:** 1 lb. (approximate weight of total package)

Standard Parts Inventory

- PPC-E5 Assembly with 5.7" touchscreen
- Touchscreen inverter attached to bottom of touchscreen
- Installed 16 meg. EDO, 72 Pin SIMM RAM stick.
- Installed 16 meg. DOC, flash disk loaded with Operating System
- Keyboard/Mouse Y cable
- Two Serial Port cables
- Video Port Cable

PPC-E5 Configuration

Jumper & Connector Descriptions

The PPC-E5 comes factory configured. 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 pinouts and Appendix B for Jumper Settings.

Table 1 Jumpers

Label	Function
JP1	LCD Voltage
JP2	LCD Type
JP3	Serial IRQ
JP4	Ethernet Base Address and IRQ

Table 2 Connectors

Label	Function
CN1	Reset
CN2	Ethernet
CN3	Keyboard/Mouse
CN4	VGA
CN5	CCFL Cathode Control Florescent
CN6	Kyocera LCD
CN7	Standard LCD (not used)
CN8	Power
CN9	Touch Screen
CN10	Com 3
CN11	Com 4
CN12	Floppy
CN13	Speaker

Powering Up the PPC-E5

The PPC-E5's power connector (CN8) is a standard floppy, four-pin type connector commonly found on most PC type power supplies. While the PPC-E5's logic only requires 5 volts DC, the LCD backlight inverter requires 12 volts DC to operate. Both of these voltages are found on the floppy type connector. The pinout for the CN8 power connector is as follows:

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

Remember before powering-up the PPC-E5 make sure the memory SIMM and the DOC are firmly seated and check any cables to make sure that plugged on correctly in relation to pin 1.

Note: The PPC-E5 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 PPC-E5 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 gold 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 SMC 91C96 10 BaseT full duplex Ethernet chip uses 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 PPC-E5 is equipped with four serial ports, two which are used for on-board functionality, and two which are available to the user. COM1 and COM2 are used on-board for the SLCC and the touchscreen controller respectively. COM1 is initialized to 9600 and COM2 is initialized 2400 baud. Both COM1 and COM2 use 1 start, 1 stop, 8 data bits, and no parity. The user should refrain from reconfiguring these ports as it may disable the touchscreen and SLCC functionality. The default I/O address and IRQ for COM1 is 3F8H using IRQ 4. The default I/O address and IRQ for COM2 is 2F8H using IRQ 3.

COM3 and COM4 are available to the user on connectors CN10 and CN11 respectively. These are standard X86, 16550, 16 byte FIFO UARTS. The default I/O address and IRQ for COM3 is 3E8H using IRQ 5. The default I/O address and IRQ for COM4 is 2E8H using IRQ 11.

COM3 and COM4 are both by default configured as RS232 ports. COM3 can be optionally factory configured to an RS422/485 port.

Sound and LCD Contrast Controller (SLCC)

The contrast and on-board Speaker volume are software settable via the on-board Sound and LCD Contrast Controller (SLCC).

Following is the description of the serial data strings that the SLCC accepts and returns. In the description, XX or xx represent valid hexadecimal numbers in the range 00 to FF and YYYY or yyyy represent valid hexadecimal words in the range 0000 to FFFF, and AA or aa represent a valid hexadecimal address from 00 to 3F.   The hexadecimal digits are and must be uppercase only.

Contrast
{CXX} Sets the contrast to the value XX (00 is darkest, FF is brightest).

Volume
{VXX} Sets the volume to the value XX (00 is low, FF is high).

Display
{D} Returns the current settings of the contrast and volume as {CxxVxx}.

EEPROM Write
{WAA,YYYY} Writes the 16 bit hexadecimal word YYYY to memory location AA.
Note: Location 00 is the contrast setting and 01 is the volume setting so changing these values will change the contrast and volume on reset. Locations 2 – 5 are not currently used but are reserved for future use so should not be used in your application.

EEPROM Read
{RAA} Returns the 16 bit hexadecimal word from location AA as {Raa,yyyy}.

Upon receiving the last character (which is '}') of a valid string, the SLCC returns the valid string, including the '{' and '}'. If an invalid string is sent, nothing happens and no string is returned. The SLCC is case sensitive and will only accept capital letters for data.

The contrast and volume settings are stored in the serial EEPROM, and these values are applied on power-up. The EEPROM is a non-volatile storage that does not lose its data on power loss or disconnection.

Keyboard/Mouse

The PPC-E5 is equipped with a keyboard and mouse interface although in normal operation they are not required if using the touchscreen. Both the keyboard and the mouse utilize the same PS/2 connector (CN3) through the use of the included Y cable.

Disk-On-Chip Flash Disk

The PPC-E5 comes with a 16 Meg. DOC and 16 Meg. of RAM. The DOC and RAM can be increased to 32 Meg. Optionally.

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 D000H.

Warning: Be extremely careful when installing the DOC into its socket. Plugging it in backwards will *destroy* the DOC and *damage* the PPC-E5 rendering it inoperable! The DOC comes factory installed and should not be removed from its socket under normal use.

PPC-E5 BIOS Defaults

The PPC-E5 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 factory set options should not require changing.

```
+------------------------------------------------------------------------------+
|                                                                              |
|                      System Bios Setup - Utility v4.2                        |
|              (C) 1999 General Software, Inc. All rights reserved             |
+------------------------------------------------------------------------------+
|                                                                              |
|                                                                              |
|                                                                              |
|                       >Basic CMOS Configuration                             |
|                         Custom Configuration                                |
|                         Shadow Configuration                                |
|                     Reset CMOS to last known values                         |
|                     Reset CMOS to factory defaults                          |
|                         Write to CMOS and Exit                              |
|                       Exit without changing CMOS                            |
|                                                                              |
+------------------------------------------------------------------------------+
|                        <Esc> to continue (no save)                           |
```

```
+------------------------------------------------------------------------------+
|              System Bios Setup - Basic CMOS Configuration                    |
|              (C) 1999 General Software, Inc. All rights reserved             |
+--------------------------+--------------------+------------------------------+
| DRIVE ASSIGNMENT ORDER:  | Date: Apr 24, 2001 | Typematic Delay  : Disabled |
| Drive A: fd0             | Time: 23 : 44 : 42 | Typematic Rate   : 30 cps   |
| Drive B: fd1             | NumLock:  Disabled | Seek at Boot     : None     |
| Drive C: (None)          +--------------------+ Show "Hit Del"   : Enabled  |
| Drive D: (None)          | BOOT ORDER:        | Config Box       : Enabled  |
| Drive E: (None)          | Boot 1st: Drive C: | F1 Error Wait    : Disabled |
| Drive F: (None)          | Boot 2nd: (None)   | Parity Checking  : (Unused) |
| Drive G: (None)          | Boot 3rd: (None)   | Memory Test Tick : Disabled |
| Drive H: (None)          | Boot 4th: (None)   | Test Above 1 MB  : Enabled  |
| Drive I: (None)          | Boot 5th: (None)   | Long Memory Test : (Unused) |
| Drive J: (None)          | Boot 6th: (None)   | Hexadecimal Case : Upper    |
| Drive K: (None)          +--------------------+-----------------+-----------+
| (Loader): (Unused)       | IDE DRIVE GEOMETRY:  Sect  Hds  Cyls | Memory    |
+--------------------------+ Ide 0: (Unused)                      | Base:     |
| FLOPPY DRIVE TYPES:      | Ide 1: (Unused)                      |   640KB   |
| Floppy 0: 1.44 MB, 3.5"  | Ide 2: (Unused)                      | Ext:      |
| Floppy 1:>1.44 MB, 3.5"  | Ide 3: (Unused)                      |   15MB    |
+--------------------------+--------------------------------------+-----------+
|                  ^E/^X/<Tab> to select or +/- to modify                      |
|                      <Esc> to return to main menu                            |
```

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```
+------------------------------------------------------------------------+
|                                                                        |
|                 System BIOS Setup - Custom Configuration               |
|             (C) 1999 General Software, Inc. All rights reserved        |
+------------------------------------+-----------------------------------+
| L1 cache mode           : All      | DRAM burst mode          : Normal |
| DRAM refresh timing     : Test     | Refresh the ISA bus     : Disabled|
| DRAM read timing        : EDO X333 | DRAM write timing        : X333   |
| RAS minimum precharge time: 2.5 CLKs| CAS to RAS precharge time : 1 CLK|
| Address Setup minimum   : 1 CLK    | Address Hold minimum     : 1 CLK  |
| 1st T2 for A0000h - FFFFFh: Enabled| 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) 1999 General Software, Inc. All rights reserved        |
+------------------------------------+-----------------------------------+
| Shadowing              : Chipset   | Shadow 16KB ROM at C000 : Enabled  |
| Shadow 16KB ROM at C400 : Enabled  | Shadow 16KB ROM at C800 : Enabled  |
| Shadow 16KB ROM at CC00 : Enabled  | Shadow 16KB ROM at D000 : Disabled |
| Shadow 16KB ROM at D400 : Disabled | Shadow 16KB ROM at D800 : Disabled |
| Shadow 16KB ROM at DC00 : Disabled | Shadow 16KB ROM at E000 : Disabled |
| Shadow 16KB ROM at E400 : Disabled | Shadow 16KB ROM at E800 : Disabled |
| Shadow 16KB ROM at EC00 :>Disabled | Shadow 64KB ROM at F000 : Enabled  |
|                                    |                                   |
|                                    |                                   |
|                                    |                                   |
|                                    |                                   |
|                                    |                                   |
|                                    |                                   |
+------------------------------------+-----------------------------------+
|             ^E/^X/<Tab> to select or +/- to modify                     |
|                     <Esc> to return to main menu                       |
```

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Appendix A

Connector Pinouts

Ethernet 10Base-T connector (CN2)

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

Keyboard/Mouse PS/2 connector (CN3)

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

VGA connector (CN4)

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

LCD (CN6) (Kyocera - 8 Bit, STN, 320x240)(KCS3224ASTT-X1 LCD)

Pin	Signal
1	FRM
2	LOAD
3	CP
4	DISP
5	VDD
6	VSS
7	VEE
8	D7
9	D6
10	D5
11	D4
12	D3
13	D2
14	D1
15	D0

LCD connector (CN7)

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

Main Power Connector(CN8)

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

Touch Screen (CN9) (Resistive Touch Screen)

Pin	Singnal
1	Horizontal Resistance
2	Vertical Resistance
3	Horizontal Resistance
4	Vertical Resistance

COM 3 & 4 RS-232 serial ports (CN10 &CN11)

Pin	Signal	DB9 Pin #
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 3 Optional RS-422/485 serial port (CN11)

Pin	Signal	DB9 Pin #
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	--

Speaker (CN13)

Pin	Signal
1	Speaker +
2	NC
3	Speaker -

Floppy drive connector (CN12)

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

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, for Kyocera LCD.
```

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
```

JP3   Serial Port (COM3 / COM4) Configuration

```
Row of jumpers closest to ABC letters
      Jumper Shorting AB* Com 4 on IRQ 11
      Jumper Shorting BC  Com 4 on IRQ 7

Second row of jumpers next to the above jumpers
      Jumper shorting AB* Com 3 on IRQ 5
      Jumper Shorting BC  Com 3 on IRQ 9

      * Default Setting
```

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
4	NA				
5	NA				
6	NA				
7	0x300	5	yes	10bT	none

Note: 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
```

Appendix C
Mechanical drawing of PCB with dimensions