

PPC-E5

586 SC520 Panel PC

User Manual
Rev 2.0

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General information

Features

- Ultra-compact size fully integrated Panel PC (6.1" x 4.5")
- On-board AMD SC520-133 (5x86-133) CPU
- Up to 128 MB on-board SDRAM
- PCI SVGA display controller (LCD, EL and CRT displays).
- On-board PCI Ethernet 10/100 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 PPC Specifications

- **CPU:** Embedded AMD SC520-133 (5x86-133) processor.
- **BIOS:** General Software Embedded BIOS 128 KB Flash memory.
- **System memory:** On-Board 32 MB SDRAM standard with options of 64 MB and 128 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 optional Y cable.
- **FDD Interface:** Supports up to two floppy disk drives, 3.5" (720KB, 1.44MB, and 2.88MB) and/or 5.25" (360KB and 1.2MB)
- **IDE Interface:** Enhanced IDE interface that supports 2 IDE devices PIO mode 3,4 with bus mastering up to 14 MB/sec.
- **Power management:** Supports power saving, APM 1.1 compliant.
- **Flash Disk:** Supports M-Systems' Disk-On-Chip ® 2000 Flash disk up to 1 Gig.
- **Sound:** Amplified PC speaker interface with software controlled volume for external speaker (speaker not included) in addition to small on-board speaker.
- **PC/104 Expansion:** 104-pin 16-bit PC/104 module connector

PCI flat panel/VGA interface

- **Chipset:** Lynx SM712 2D video processor
- **Display memory:** 2 MB DRAM Standard 4 MB optional
- **Display type:** Supports CRT and flat panel LCD displays. Can display CRT and flat panel simultaneously.
- **Display mode:** Panel resolution supports up to 1024 x 768. Default 320 x 240 on LCD, 640 x 480 on CRT with 16 bit color.
- **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:** TSharc On board
- **Driver:** WinCE, DOS, Linux
- **Durability:** Over one million touches

Ethernet interface

- **Chipset:** Realtek™ RTL8139D 10/100 BaseT
- **Ethernet Interface:** On-Board RJ-45 connector
- **Configuration:** I/O & IRQ settings auto configured in software

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
- **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 32 meg. DOC, flash disk loaded with Operating System
- Two Serial Port cables
- Parallel Port cable
- Floppy cable
- 44 pin Hard Drive 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 | Boot Configuration Jumpers |
| JP2 | Debug |
| JP3 | CMOS Setup Erase |
| JP4 | COM 3 RS232/422/485 select |

Table 2 Connectors

| Label | Function |
|-------|---------------------------------------|
| CN1 | VGA Video |
| CN2 | CCFL Cathode Control Florescent Power |
| CN3 | PPC Power |
| CN4 | Touch Screen |
| CN5 | Alternate LCD (not populated) |
| CN6 | External Speaker |
| JK1 | Ethernet RJ-45 |
| JK2 | Keyboard/Mouse |
| HDR1 | Kyocera LCD |
| HDR2 | COM 2 Serial Port |
| HDR3 | COM 3 Serial Port |
| HDR4 | Floppy |
| HDR5 | Parallel Port |
| HDR6 | IDE |
| HDR7 | JTAG |
| J1 | 64 Pin PC/104 |
| J2 | 40 Pin PC/104 |

Powering Up the PPC-E5

The PPC-E5's power connector (CN3) 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 CN3 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 DOC is firmly seated and installed with the proper orientation. Also check any cables to make sure that they are 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.

Ethernet

The Realtek™ RTL8139D 10/100 Base-T 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. The RTL8139 is a PCI device and as such is plug & play, no jumper configuration is required. Link and Activity (Rx/Tx) LEDs are provided to monitor network activity.

Serial Ports

The PPC-E5 is equipped with four serial ports, two of which are used for on-board functionality, and which two are available to the user. COM1 and COM4 are used on-board for the touchscreen controller and the SLCC Co-Processor respectively. COM1 is initialized to 2400 and COM4 is initialized 9600 baud.

Both COM1 and COM4 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 COM4 is 2E8H using IRQ 10.

COM2 and COM3 are available to the user on connectors HDR2 and HDR3 respectively. These are standard X86, 16550, 16 byte FIFO UARTS. The default I/O address and IRQ for COM2 is 2F8H using IRQ 3. The default I/O address and IRQ for COM3 is 3E8H using IRQ 5. COM2 and COM3 are both by default configured as RS232 ports. COM3 can be alternately configured as an RS422/485 port through jumper selection using JP4.

When using COM3 in the RS422/485 mode, a terminating resistor (~120 Ohm) is recommended on the two far ends of the network. Also when using COM3 in the RS485 mode, tie the A connections together and the B connections together. This then gives a single A connection and a single B connection which is used to connect to the 485 network. In order to transmit on this network the RTS line must be asserted.

All Serial Ports can be configured to alternate settings using the BIOS setup screen.

Sound and LCD Contrast Controller (SLCC)

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

Following is the description of the ASCII 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).

Backlight

{BXX} Turns the Backlight on or off (00 is off, any other value is on.).

Display

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

Caution: If the user turns down the contrast using the included application, connecting an external monitor may be necessary to reset the contrast in order to be able to view the LCD. Likewise, if an application sets the contrast or if the EEPROM gets corrupted an external monitor may be necessary to reset the contrast in order to be able to view the LCD.

Note: The PPC Contrast will darken somewhat as the LCD heats up. Therefore it is recommended to set the contrast after the PPC has been powered up for 15 or more minutes.

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. The Backlight on/off setting is not stored and thus will be turned on if power is removed and restored to the PPC.

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 needed if using the touchscreen. Both the keyboard and the mouse utilize the same PS/2 connector (JK2). A keyboard can be plugged directly into this jack. However, if a mouse is needed, an optional Y cable is required.

Disk-On-Chip Flash Disk

The PPC-E5 comes equipped standard with a 16 Meg. DOC and 32 Meg. of RAM. The DOC and RAM can be both increased 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. This can be altered if necessary in the BIOS setup screen.

Warning: Be extremely careful when installing the DOC into its socket. Plugging it in backwards will *destroy* the DOC and can *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 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 normally require changing.

```

+-----+
|                                             |
|                    System Bios Setup - Utility v4.3      |
|                    (C) 2000 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)                 |
|          ^E/^X/<Tab> to select                       |
|-----+-----+

```

```

+-----+-----+
|                                             |
|                    System Bios Setup - Basic CMOS Configuration |
|                    (C) 2000 General Software, Inc. All rights reserved |
|-----+-----+
| DRIVE ASSIGNMENT ORDER: | Date:>Feb 08, 2003 | Typematic Delay : 250 ms |
| Drive A: Floppy 0       | Time: 12 : 35 : 46 | Typematic Rate   : 30 cps |
| Drive B: (None)         | NumLock: Disabled | Seek at Boot     : Floppy |
| Drive C: (None)         | +-----+-----+ | Show "Hit Del"   : Enabled |
| Drive D: (None)         | | BOOT ORDER:      | Config Box       : Disabled |
| Drive E: (None)         | | Boot 1st: Drive C: | Fl Error Wait    : Disabled |
| Drive F: (None)         | | Boot 2nd: Drive A: | Parity Checking  : (Unused) |
| Drive G: (None)         | | Boot 3rd: (None)  | Memory Test Tick : Enabled |
| Drive H: (None)         | | Boot 4th: (None)  | Test Above 1 MB : Enabled |
| Drive I: (None)         | | Boot 5th: (None)  | Debug Breakpoints: Enabled |
| Drive J: (None)         | | Boot 6th: (None)  | Splash Screen    : (Unused) |
| Drive K: (None)         | +-----+-----+ |
| Boot Method: Boot Sector | IDE DRIVE GEOMETRY: Sect Hds Cyls | Memory |
|-----+-----+ | Ide 0: Not installed | Base: |
| FLOPPY DRIVE TYPES:      | Ide 1: Not installed | 640KB |
| Floppy 0: 1.44 MB, 3.5" | Ide 2: Not installed | Ext: |
| Floppy 1: 1.44 MB, 3.5" | Ide 3: Not installed | 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
|-----+
| ECC Memory           :>Disabled | SDRAM Device Timing   : Slow
| Write Buffer         : Disabled  | Cache Mode            : Write-Through
| CPU speed           : 133 MHz   | Lpt Address/IRQ      : 378h/7
| Disk On Chip Address : D000:0000 | Lpt Mode              : Printer
| Com1 setting        : 3F8h/4    | Com2 setting          : 2F8h/3
| Com3 setting        : 3E8/5    | Com4 setting          : 2E8/10
| Bios Version        : 7.7       | 64K Memory hole      : Disabled
|
|
|
|
|
|
|
|
|
|-----+
|
|               ^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 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 : Enabled
| Shadow 16KB ROM at E400 : Enabled  | Shadow 16KB ROM at E800 : Enabled
| Shadow 16KB ROM at EC00 : Enabled  | Shadow 64KB ROM at F000 : Enabled
|
|
|
|
|
|
|
|
|
|-----+
|
|               ^E/^X/<Tab> to select or +/- to modify
|               <Esc> to return to main menu
|

```

Appendix A Connector Pinouts

Ethernet 10/100 Base-T connector (JK1)

| 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 (JK2)

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

VGA connector (CN1)

| Pin | Signal |
|-----|--------------------|
| 1 | Red video |
| 2 | Green video |
| 3 | Blue video |
| 4 | Not used |
| 5 | GND |
| 6 | Red return (GND) |
| 7 | Green return (GND) |
| 8 | Blue return (GND) |
| 9 | 5 V |
| 10 | GND |
| 11 | Not Used |
| 12 | VGA DATA |
| 13 | Horizontal sync |
| 14 | Vertical sync |
| 15 | VGA CLOCK |

LCD (HDR1) (Kyocera - 8 Bit, STN, 320x240)(KCS3224ASTT-X1 LCD)

| Pin | Signal | 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 | 16 | NC |

LCD connector (CN5)

| Pin | Signal | Pin | Signal |
|-----|------------|-----|-------------|
| 1 | +12 V DC | 2 | +12 V DC |
| 3 | GND | 4 | GND |
| 5 | Vcc(+3.3V) | 6 | Vcc(+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 |

Main Power Connector(CN3)

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

Touch Screen (CN4) (Resistive Touch Screen)

| Pin | Signal |
|-----|-------------------------|
| 1 | Horizontal Resistance + |
| 2 | Vertical Resistance + |
| 3 | Horizontal Resistance - |
| 4 | Vertical Resistance - |

COM 2 & 3 RS-232 serial ports (HDR2 & HDR3)

| 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 Configured as RS-422/485 serial port (HDR3)

| 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 | -- |

Note: When using in the RS485 mode tie the A connection together and the B connections together.

Speaker (CN6)

(8 ohm 1 watt max)

| Pin | Signal |
|-----|-----------|
| 1 | Speaker + |
| 2 | NC |
| 3 | Speaker - |

Floppy drive connector (HDR4)

| 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 |

IDE Connector (HDR6)

| 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 | IOW | 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 |
| 41 | 5 V | 42 | 5 V |
| 43 | GND | 44 | NC |

Printer Port (HDR5)

| 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 |

JTAG Interface (HDR7)

| Pin | Signal | Pin | Signal |
|-----|--------------|-----|------------|
| 1 | GND | 2 | PWR GOOD |
| 3 | JTAG_TCK | 4 | CMDACK |
| 5 | JTAG_TMS | 6 | BR/TC |
| 7 | JTAG_TDI_1 | 8 | STOP/TX |
| 9 | JTAG_TDO_MPU | 10 | TRIG/TRACE |
| 11 | -SRESET | 12 | N.C. |

Appendix B *Jumper Settings*

JP1 Boot Configuration Jumpers

| Jumper | Setting |
|---------------|-------------------------|
| Pins 1 & 2* | Should be installed |
| Pins 3 & 4* | Should be installed |
| Pins 5 & 6 | Should not be installed |

* Default setting

JP2 Debug

| Jumper | Setting |
|---------------|-----------------|
| Pins 1 & 2 | Processor Debug |

* Default setting, no jumper installed

JP3 CMOS Setup Erase

| Jumper | Setting |
|---------------|---------------------------|
| Pins 1 & 2* | Battery Power provided |
| Pins 2 & 3 | No Battery Power provided |

* Default Setting

JP4 Serial Port COM3 Configuration

| Jumper | Setting |
|---------------|----------------|
| Pins 1 & 2* | RS232 |
| Pins 3 & 4 | RS422 |
| Pins 5 & 6 | RS485 |

* Default setting

Appendix C Mechanical drawing of PCB with dimensions

