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# OPERATIONS MANUAL
# PPM-LX800-G

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**REVISION HISTORY**

**P/N 400-0359-000**

| Date Code | Rev Level | ECO Number |
|---|---|---|
| 101019 | B | 10-64 |
| 090609 | B | |

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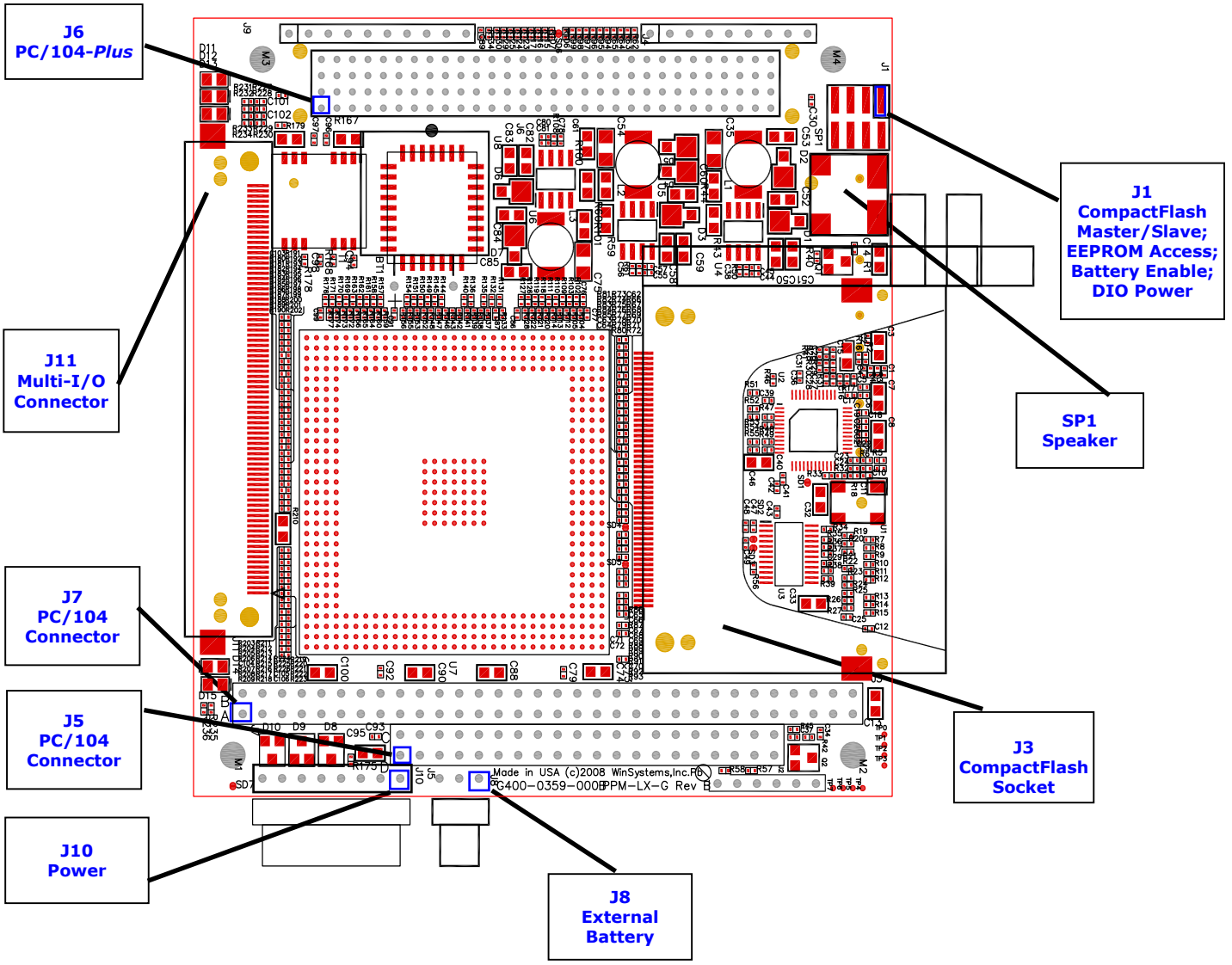
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# Visual Index – Quick Reference

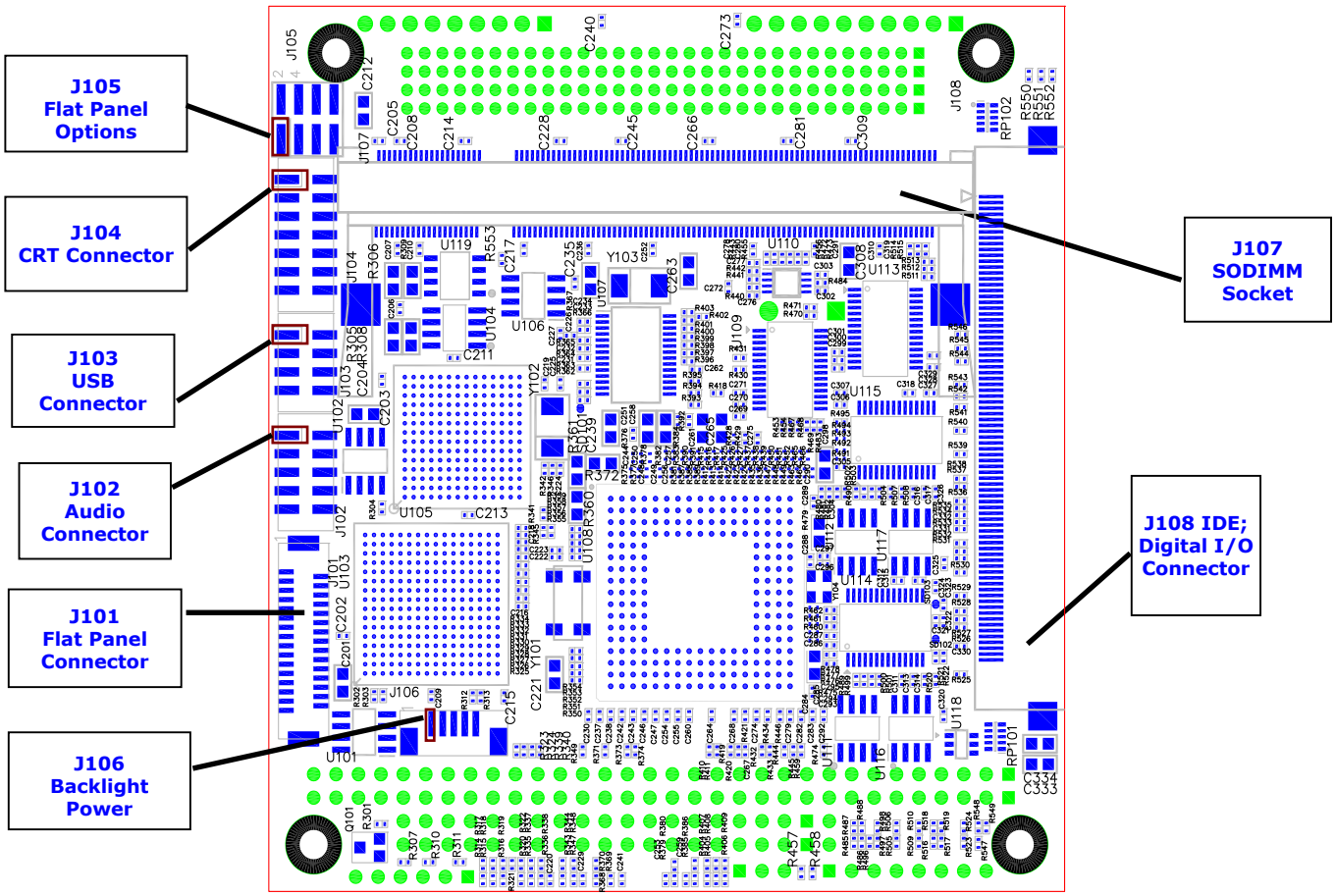
**Top View**




**NOTE:** The reference line to each component part has been drawn to Pin 1, and is also highlighted with a square, where applicable.

# Visual Index – Quick Reference

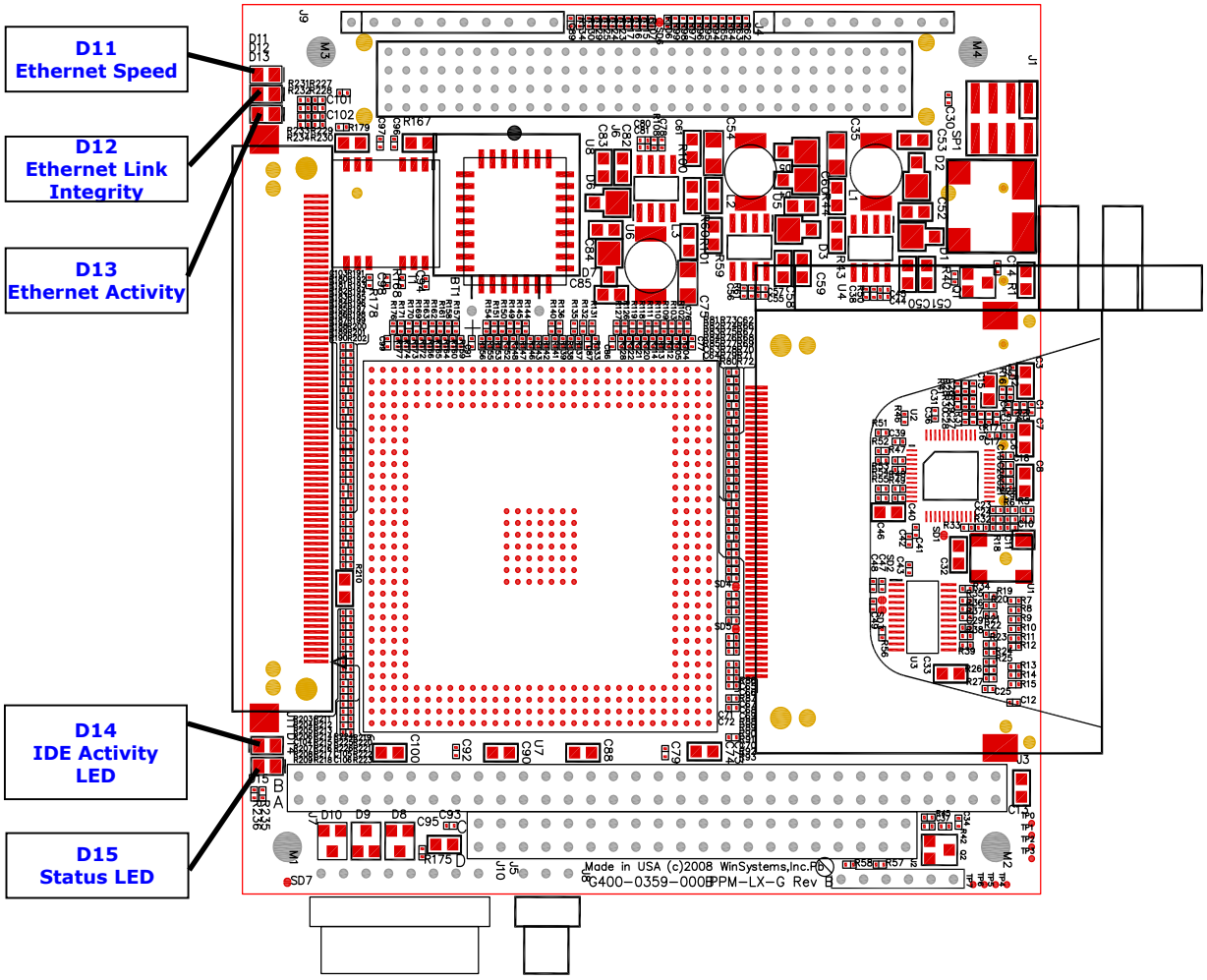
**Bottom View**




**NOTE:** The reference line to each component part has been drawn to Pin 1, and is also highlighted with a square, where applicable.

# Visual Index – Quick Reference

**Top View - LEDs**



# Introduction

This manual is intended to provide the necessary information regarding configuration and usage of the PPM-LX800-G board. WinSystems maintains a Technical Support Group to help answer questions not adequately addressed in this manual. Contact Technical Support at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

# Features

**Processor**
- AMD Geode™ LX800

**Compatible Operating Systems**
- Windows XP Embedded, Linux, DOS, Windows XP, x86 RTOS

**Memory**
- Up to 1028 MB of 200-pin SODIMM PC2700 DDR SDRAM (Socketed)

**Video**
- CRT or Flat Panel operation (simultaneous operation supported)
- Up to 1920x1440 CRT resolution
- Up to 1600x1200 Flat Panel resolution
- Up to 18-bits/pixel color panel support

**Ethernet**
- Intel 82551ER 10/100 Mbps controller

**Digital I/O**
- 16-bit bidirectional TTL lines capable of event sense and interrupt generation

**Serial I/O**
- Four (4) serial ports (Two (2) RS-232, Two (2) RS-232/422/485)

**Line Printer Port**
- Bidirectional (SPP)

**USB**
- Two (2) USB 2.0 ports

**Interrupts**
- Two (2) interrupt controllers

**Watchdog Timer**
- Up to 255 minute reset

**CompactFlash**
- Types I & II supported

**IDE**
- One (1) Ultra DMA IDE port supports up to two (2) devices

**Power**
- +5V required, 1.2A typical

**Industrial Operating Temperature Range**
- -40°C to 85°C

**Form Factor**
- PC/104-*Plus*-compliant
- 3.60” x 3.80” (90 mm x 96 mm)

**Additional Features**
- RoHS compliant
- PC/104 and PC/104-*Plus* expansion connectors
- Insyde BIOS
- Backlight power supported
- Custom splash screen on start up
- Real-time clock
- Activity status LEDs on-board
- AC97 Support
- PS/2 Keyboard Supported
- PS/2 Mouse Supported

# Functional Capability

## System Processor

The PPM-LX800-G board is based upon a 533 MHz AMD Geode™ LX800 and the CS5536 companion chip. These devices incorporate the CPU, 128 KB of cache, FPU, DDR SDRAM controller, Flash/ROM controller, an integrated display controller, audio controller, PCI controller and the RTC/CMOS RAM.

## Memory

Visual Index

The PPM-LX800-G can support a maximum of 1 GB of RAM with the SODIMM socket located on the back of the board at **J107**.

Qualified SODIMMS are available directly from WinSystems.

The RAM can be user supplied, but must meet the following criteria:

**200-Pin SODIMM PC2700 DDR SDRAM with gold fingers (up to 1 GB)**

WinSystems cannot guarantee the operation of systems using nonqualified SODIMM modules.

Installation is accomplished by inserting the module into the connector at approximately a 30 degree angle. Press firmly to fully seat the module into the connector and then press the module downward to snap it into the retaining clamps.

Removal is accomplished by gently pulling outward on the retaining clamps until the module springs up to the appropriate removal angle.

## Interrupt Routing

Two 82C59A-compatible interrupt controllers accept inputs from the on-board peripherals and the PC/104 Bus connectors. The configuration of interrupt inputs is achieved in the BIOS CMOS setup discussed in the BIOS Supplemental later in this manual.

## Interrupt Status Register

One of the unique features of the PPM-LX800-G is the Interrupt Status Register located at 1ECH. This read-only register allows all COM channels to share interrupts and thus frees interrupts for other peripherals. If more than one COM port is configured in the BIOS to use the same interrupt, the Interrupt Status Register can be read to determine which port generates an interrupt. Once a pending interrupt is serviced, the status register should be read again to see if another interrupt is pending before exiting the routine.

**Interrupt Status Register - 1ECH**

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| N/A | N/A | N/A | N/A | COM4 | COM3 | COM2 | COM1 |

**Note:** A **1** will be read for the device(s) with an interrupt pending.

WinSystems does not provide software support for implementing the Interrupt Status Register to share interrupts. Some operating systems, such as Windows XP and Linux, have support for sharing serial port interrupts and examples are available. The user will need to implement the appropriate software to share interrupts for the other devices.

## Power and Reset Interface

Visual Index

Power is supplied to the PPM-LX800-G through the 8-pin Molex connector at **J10**. The definitions for **J10** are:




An optional reset button can be connected between pin 8 and ground. Momentary contact between pin 8 and ground will cause the PPM-LX800-G to reset. There is also a reset push-button supplied on the CBL-251-G-1-1.5 Multi-I/O cable.

## Power Fail Reset

A precision voltage comparator monitors the +5V status. Upon detection of an out-of-tolerance condition, the board is reset. This action is critically important in the event of brown-out or power fail conditions. The reset circuit also ensures that the power is nominal before releasing reset. A reset condition occurs when VCC drops between 4.6V and 4.75V for more than 130 ms.

## Real-Time Clock/Calendar

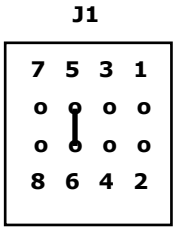
A real-time clock is used as the AT-compatible clock/calendar. It supports a number of features including periodic and alarm interrupt capabilities. In addition to the time and date keeping functions, the system configuration is kept in CMOS RAM contained within the clock section.

## Battery Backup

Visual Index

An optional external battery, connected at **J8**, supplies the PPM-LX800-G board with standby power for the real-time clock and CMOS setup RAM. An extended temperature lithium battery capable of backing up the PPM-LX800-G is available from WinSystems, part number BAT-LTC-E-36-27-1 (or BAT-LTC-E-36-16-1 if applicable). Contact your WinSystems' Application Engineer for additional information.

A power supervisory circuit contains the voltage sensing circuit and an internal power switch to route the battery or standby voltage to the circuits selected for backup. The battery automatically switches ON when VCC drops below the battery voltage and back OFF again when VCC returns to normal.




| | |
|---|---|
| Enables Battery (default) | 5-6 |
| Disables Battery | 5 6 |

**WARNING: BAT-LTC-E-36-27-1 (or BAT-LTC-E-36-16-1 if applicable) must be connected at J8. Improper connection may result in explosive failure. It is possible for the battery to violently explode if installed incorrectly. Please be careful to note correct connection at location J8.**

## Rotational Disk Support

Visual Index

An industry standard 16-bit IDE interface is provided to support up to two hard disks. An IDE activity LED, **D14**, provides visual status during IDE data transfers. The IDE interface is provided via connector **J108**, which is an 80-pin high density connector. WinSystems offers the cable CBL-352-G-1-1.5 to simplify the connection. The pinout for the connector and cable is listed in detail in the cable drawing.

## CompactFlash

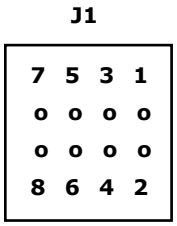
Visual Index

The PPM-LX800-G supports solid state CompactFlash storage devices for applications where the environment is too harsh for mechanical hard disks or floppy drives.

**NOTE:** The CompactFlash is an IDE device. Use of a CompactFlash device therefore reduces the number of available hard disks to one.

The CompactFlash socket at **J3** supports modules with TrueIDE support. WinSystems offers industrial grade CompactFlash modules that provide high performance and extended temperature operation (-40ºC to +85ºC). An IDE activity LED is present at **D14**.

When using a CompactFlash device, Master/Slave selection is made using jumper field **J1**.




| | |
|---|---|
| CompactFlash Master | 1-2 |
| CompactFlash Slave (default) | 1 2 |

Optionally, a USB FLASH drive can be connected in addition to, or instead of the CompactFlash device. Legacy USB operation is supported by the system BIOS.

## Serial Interface

Visual Index

Four independent, asynchronous serial channels are on-board. Interface is provided at connector **J11**, which is an 80-pin high-density connector. WinSystems offers the cable CBL-251-G-1-1.5 to simplify the connection. Configuration options for RS-232, RS-422 and RS-485 are listed on the following page.

All serial channels are configured as Data Terminal Equipment (DTE). Both the send and receive registers of each channel have a 16-byte FIFO. All serial ports have 16C550-compatible UARTs.

Independent control of transmit, receive, line status and data set interrupts are on all channels. Each channel is setup to provide internal diagnostics such as loopback and echo mode on the data stream. An independent, software programmable baud rate generator is selectable from 50 through 115.2 kbps. Individual modem handshake control signals are supported for all channels.

RS-232 interface levels are supported on all four serial ports. The RS-232 drivers have a charge pump to generate the plus and minus voltages so that the PPM-LX800-G only requires +5V to operate.

All COM ports support RS-232 and can be enabled in the BIOS. COM1 and COM2 also have RS-422/RS-485 support. RS-422/485 provides separate balanced transmit and receive signal pairs. For RS-485 multidrop lines, one signal pair can be used for "party line" network structures.

### COM1 and COM2 Configuration Options

1. RS-232 Mode
2. RS-422 Mode with RTS transmitter enable
3. RS-422 Mode with auto transmitter enable
4. RS-485 Mode with RTS transmitter enable
5. RS-485 Mode with RTS transmitter enable and echo back
6. RS-485 Mode with auto transmitter enable
7. RS-485 Mode with auto transmitter enable and echo back

Modes 2, 4 and 5 require the RTS bit (MCR Bit 1) be set in order to transmit. Mode 4 requires that RTS (MCR Bit 1) be de-asserted in order to receive.

If termination is required, then terminating resistors will need to be external to the board. Delta termination is required if using auto terminating modes (described above). Optional on-board terminating resistors are available in OEM quantities. Contact your WinSystems Applications Engineer for more assistance.

### COM3 and COM4 Configuration Options

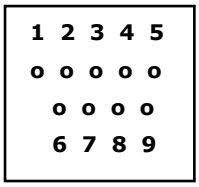
Please see the BIOS Supplemental for further details.

## Serial Connector Summary

Visual Index

| | RS-232 Mode | RS-422 Mode | RS-485 Mode |
|---|---|---|---|
| 1. | DCD | N/A | N/A |
| 2. | RX | TX+ | TX/RX+ |
| 3. | TX | TX- | TX/RX- |
| 4. | DTR | N/A | N/A |
| 5. | GND | GND | GND |
| 6. | DSR | RX+ | N/A |
| 7. | RTS | RX- | N/A |
| 8. | CTS | N/A | N/A |
| 9. | RI | N/A | N/A |

**DB9 Male**



## Video Interface

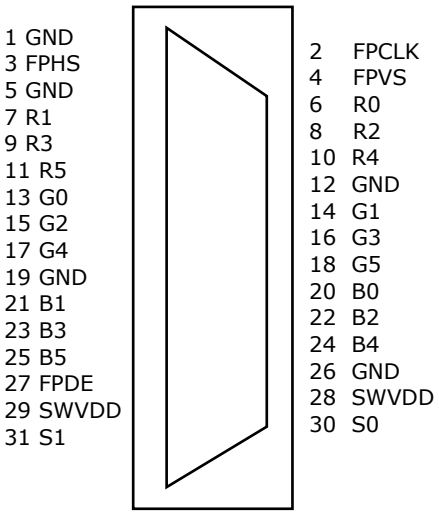
The PPM-LX800-G has an integrated display controller that interfaces to both CRT and flat panel displays. The video output mode is selected in the CMOS setup. Simultaneous flat panel and CRT mode is also supported. The CRT connector is located at **J104**. The direct digital flat panel interface is located at **J101**. The mode is selected in the BIOS. The backlight power connector is located at **J106**.

**NOTE: J105** must be jumpered to match the display panel and backlight inverter. Incorrect jumpering can damage the panel and SBC. Extreme care should be exercised to avoid damaging or destroying the display and/or the SBC. More detailed information is located in the Jumper Reference section in the back of this manual.

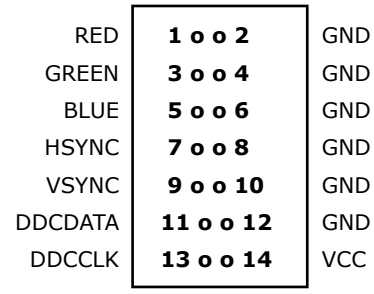
**HAZARD WARNING: LCD panels can require a high voltage for the panel backlight. This high-frequency voltage can exceed 1000 volts and can present a shock hazard. Care should be taken when wiring and handling the inverter output. To avoid the danger of shock and to avoid the panel, make all connection changes with the power removed.**

Contact your WinSystems' Applications Engineer for information about available cable kits and supported panels. **This manual does not attempt to provide any information about how to connect to specific LCDs.**

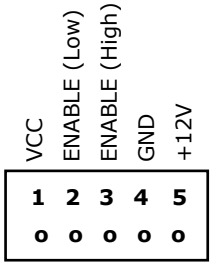
**J101**



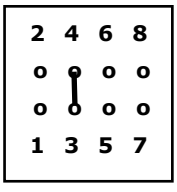

**J104**




**J106**




**J105**







**Avoid Simultaneous Jumpering of pins 1-2 and 3-4.**
Misjumpering panel power could cause damage to the board and/or the Flat Panel.

| | | |
|---|---|---|
| Panel Power | 5V<br>3.3V (default) | 1-2, 3 4<br>1 2, 3-4 |
| Panel Options | S0 Low<br>S0 High | 5-6<br>5 6 |
| | S1 Low<br>S1 High | 7-8<br>7 8 |

## Ethernet Controller

Visual Index

An Intel 82551ER 32-bit PCI Ethernet controller chip is used for high-speed data transfer. It has auto-negotiation capability for speed, duplex and flow control. It supports IEEE 802.3 10Base-T and 100Base-T in either full- or half-duplex mode at both 10 and 100 Mbps. In full-duplex mode, it adheres to the IEEE 802.x Flow Control Specification.

The Ethernet interface is provided at Multi-I/O connector **J11**, which is an 80-pin high density connector. WinSystems offers the cable CBL-251-G-1-1.5 to simplify the connection. The pinout for the connector and cable is listed in detail in the cable drawing.

There are three light emitting diodes (LEDs) on the PPM-LX800-G to provide a visual indication of the link status, network activity and network speed. The yellow Link Integrity LED is lit when a valid connection is detected. The green Activity LED blinks on and off when activity is detected on the wire. The red LED is on if a 100Base-T link is detected and off if a 10Base-T link is detected.

Ethernet activity signals are also provided at connector **J11** to allow optional status LEDs to be mounted off-board. The Ethernet activity signals are active low and require an external resistor to limit current to 12-16 mA.

**J11**

| | | | |
|---|---|---|---|
| **D12** | **LED 0** | **(YELLOW)** | **LINK INTEGRITY** |
| **D13** | **LED1** | **(GREEN)** | **ACTIVITY** |
| **D11** | **LED2** | **(RED)** | **SPEED** |
| **D15** | **LED3** | **(GREEN)** | **STATUS** |

**NOTE:** WinSystems cannot provide technical support for direct programming of the 82551ER controller. We suggest utilizing a TCP/IP stack or Network OS that allows the use of preexisting 82551ER drivers.

## Status LED

Visual Index

A red status LED is populated on the board at **D15** which can be used for any application specific purpose. The LED can be turned on in software by writing a **1** to I/O port 1EDH. The LED can be turned off by writing a **0** to 1EDH.

## Digital I/O

Visual Index

The PPM-LX800-G has 16 open collector digital I/O bits with 10K pullup with a default base address of 120H. These 16 lines are capable of fully latched event sensing with sense polarity being software programmable. A 50-pin connector allows for easy mating with industry standard I/O racks. **J4**, shown below, is the digital I/O connector on the CBL-352-G-1-1.5 cable.

**J4**

| | | |
|---|---|---|
| NC | **1 o o 2** | NC |
| NC | **3 o o 4** | NC |
| NC | **5 o o 6** | NC |
| NC | **7 o o 8** | NC |
| NC | **9 o o 10** | NC |
| NC | **11 o o 12** | GND |
| NC | **13 o o 14** | GND |
| NC | **15 o o 16** | GND |
| Port 1 Bit 7 | **17 o o 18** | GND |
| Port 1 Bit 6 | **19 o o 20** | GND |
| Port 1 Bit 5 | **21 o o 22** | GND |
| Port 1 Bit 4 | **23 o o 24** | GND |
| Port 1 Bit 3 | **25 o o 26** | GND |
| Port 1 Bit 2 | **27 o o 28** | GND |
| Port 1 Bit 1 | **29 o o 30** | GND |
| Port 1 Bit 0 | **31 o o 32** | GND |
| Port 0 Bit 7 | **33 o o 34** | GND |
| Port 0 Bit 6 | **35 o o 36** | GND |
| Port 0 Bit 5 | **37 o o 38** | GND |
| Port 0 Bit 4 | **39 o o 40** | GND |
| Port 0 Bit 3 | **41 o o 42** | GND |
| Port 0 Bit 2 | **43 o o 44** | GND |
| Port 0 Bit 1 | **45 o o 46** | GND |
| Port 0 Bit 0 | **47 o o 48** | GND |
| +5V | **49 o o 50** | GND |

### Digital I/O VCC Enable

The I/O connectors can provide +5V to an I/O rack or for miscellaneous purposes by jumpering **J1**. When **J1** is jumpered (7-8), +5V is provided at pin 49 of **J4**. It is the user's responsibility to limit current to a safe value (less than 400 mA) to avoid damaging the CPU board.

**J1**

| | | | |
|---|---|---|---|
| **7** | **5** | **3** | **1** |
| **o** | **o** | **o** | **o** |
| **o** | **o** | **o** | **o** |
| **8** | **6** | **4** | **2** |

| | |
|---|---|
| +5V is provided at pin 49 of **J4** | 7-8 |
| No Power at Pin 49 of **J4** (default) | 7 8 |

**WS16C48 Compatible Digital I/O**
This device provides 16 lines of digital I/O. The following table summarized the registers and the text that follows provides details on each of the internal registers.

| I/O Address Offset | Page 0 | Page 1 | Page 2 | Page 3 |
|---|---|---|---|---|
| 00H | Port 0 I/O | Port 0 I/O | Port 0 I/O | Port 0 I/O |
| 01H | Port 1 I/O | Port 1 I/O | Port 1 I/O | Port 1 I/O |
| 02H | RESERVED | RESERVED | RESERVED | RESERVED |
| 03H | RESERVED | RESERVED | RESERVED | RESERVED |
| 04H | RESERVED | RESERVED | RESERVED | RESERVED |
| 05H | RESERVED | RESERVED | RESERVED | RESERVED |
| 06H | Int_ Pending | Int_ Pending | Int_ Pending | Int_ Pending |
| 07H | Page/Lock | Page/Lock | Page/Lock | Page/Lock |
| 08H | N/A | Pol_0 | Enab_0 | Int_ID0 |
| 09H | N/A | Pol_1 | Enab_1 | Int_ID1 |
| 0AH | N/A | Pol_2 | Enab_2 | Int_ID2 |

**Register Details**

**Port 0 through 1 I/O –** Each I/O bit in each of the six ports can be individually programmed for input or output. Writing a **0** to a bit position causes the corresponding output pin to go to a high-impedance state (pulled high by external 10 KΩ resistors). This allows it to be used as an input. When used in the input mode, a read reflects the inverted state of the I/O pin, such that a high on the pin will read as a **0** in the register. Writing a **1** to a bit position causes that output pin to sink current (up to 12 mA), effectively pulling it low.

**INT_PENDING –** This read-only register reflects the combined state of the INT_ID0 through INT_ID2 registers. When any of the lower three bits are set, it indicates that an interrupt is pending on the I/O port corresponding to the bit position(s) that are set. Reading this register allows an Interrupt Service Routine to quickly determine if any interrupts are pending and which I/O port has a pending interrupt.

**PAGE/LOCK –** This register serves two purposes. The upper two bits select the register page in use as shown here:

| D7 | D6 | Page |
|---|---|---|
| 0 | 0 | Page 0 |
| 0 | 1 | Page 1 |
| 1 | 0 | Page 2 |
| 1 | 1 | Page 3 |

Bits 5-0 allow for locking the I/O ports. A **1** written to the I/O port position will prohibit further writes to the corresponding I/O port.

**POL0 - POL2 –** These registers are accessible when Page 1 is selected. They allow interrupt polarity selection on a port–by–port and bit-by-bit basis. Writing a **1** to a bit position selects the rising edge detection interrupts while writing a **0** to a bit position selects falling edge detection interrupts.

**ENAB0 - ENAB2** – These registers are accessible when Page 2 is selected. They allow for port-by-port and bit-by-bit enabling of the edge detection interrupts. When set to a **1** the edge detection interrupt is enabled for the corresponding port and bit. When cleared to **0**, the bit's edge detection interrupt is disabled. Note that this register can be used to individually clear a pending interrupt by disabling and re-enabling the pending interrupt.

**INT_ID0 – INT_ID2** – These registers are accessible when Page 3 is selected. They are used to identify currently pending edge interrupts. A bit when read as a **1** indicates that an edge of the polarity programmed into the corresponding polarity register has been recognized. Note that a write to this register (value ignored) clears ALL of the pending interrupts in this register.

## Audio Interface

Visual Index

The PPM-LX800-G has an audio interface designed to provide high-quality audio reproduction for embedded systems use. The PPM-LX800-G provides a 2-channel line level input, 2-channel line level output and microphone input.

**J102** (on the bottom side of the board) provides connection to the audio interface. WinSystems offers cable CBL-270-G-1-1.5 to simplify this connection.

**J102**

| | | |
|---|---|---|
| OUT_R | **1 o o 2** | MIC1_PWR |
| OUT_L | **3 o o 4** | MIC1 |
| GND | **5 o o 6** | GND |
| LINE_R | **7 o o 8** | GND |
| LINE_L | **9 o o 10** | GND |

## Speaker

Visual Index

An on-board speaker, **SP1**, is available for sound generation.

## Beep Codes

Reference the chart below for the appropriate Insyde BIOS Beep Codes.

| Number of Beeps | Beep Code Description |
|---|---|
| 1 | No problem |
| 2 | Time/Date/CMOS checksum failure |
| 3 or more | Video RAM failure |

## Line Printer Port

Visual Index

The LPT port is a multimode parallel printer port that supports the PS/2 Standard Bidirectional Parallel Port (SPP). The output drivers support 8 mA per line.

The LPT interface is provided at connector **J11**, which is an 80-pin high density connector. WinSystems offers the cable CBL-251-G-1-1.5 to simplify the connection. The pinout for the connector and cable is listed in detail in the cable drawing.

The printer port can also be used as two additional general-purpose I/O ports if a printer is not required. The first port is configured as eight input or output only lines. The other port is configured as five input and three output lines.

## Keyboard

Visual Index

An integrated 80C42 equivalent keyboard controller supports a PS/2 keyboard which is terminated at connector **J11.** Optionally, a USB keyboard can be connected in addition to, or instead of the standard PS/2 keyboard.

## Mouse Interface

Visual Index

A PS/2 mouse port provides connection for a compatible mouse and is terminated at connector **J11**. Optionally, a USB mouse can be connected in addition to, or instead of the standard PS/2 mouse.

## USB

Visual Index

The PPM-LX800-G provides two channels of USB 2.0 compatible support. These are terminated to an 8-pin, 2 mm connector at **J103**. An adapter cable CBL-275-G-1-1.0 is available from WinSystems for connection. The pinout for the connector is:

**J103**

| | | |
|---|---|---|
| USBVCC | **1 o o 2** | USBVCC |
| D1- | **3 o o 4** | D4- |
| D1+ | **5 o o 6** | D4+ |
| USBGND | **7 o o 8** | USBGND |

## Multi-I/O Interface

Visual Index

The interface to I/O serial channels, the printer port, Ethernet, reset, mouse and keyboard are all terminated via the connector at **J11**. A cable, part number CBL-251-G-1-1.5, is available from WinSystems to adapt to the conventional I/O connectors. The interface to digital I/O and IDE hard disk drives are terminated at **J108**. A cable part number CBL-352-G-1-1.5 is used to provide connection. Pinouts for both the **J11** and **J108** are below.

**J11**

| | | |
|---|---|---|
| STROBE (LPT) | **A1 o o B1** | (COM1) DCD |
| AUTOFD (LPT) | **A2 o o B2** | (COM1) DSR |
| PD0 (LPT) | **A3 o o B2** | (COM1) RX |
| ERROR (LPT) | **A4 o o B4** | (COM1) RTS |
| PD1 (LPT) | **A5 o o B5** | (COM1) TX |
| INIT (LPT) | **A6 o o B6** | (COM1) CTS |
| PD2 (LPT) | **A7 o o B7** | (COM1) DTR |
| SLCTIN (LPT) | **A8 o o B8** | (COM1) RI |
| PD3 (LPT) | **A9 o o B9** | (COM1) GND |
| GND (LPT) | **A10 o o B10** | (COM2) DCD |
| PD4 (LPT) | **A11 o o B11** | (COM2) DSR |
| GND (LPT) | **A12 o o B12** | (COM2) RX |
| PD5 (LPT) | **A13 o o B13** | (COM2) RTS |
| GND (LPT) | **A14 o o B14** | (COM2) TX |
| PD6 (LPT) | **A15 o o B15** | (COM2) CTS |
| GND (LPT) | **A16 o o B16** | (COM2) DTR |
| PD7 (LPT) | **A17 o o B17** | (COM2) RI |
| GND (LPT) | **A18 o o B18** | (COM2) GND |
| ACK (LPT) | **A19 o o B19** | (COM3) DCD |
| GND (LPT) | **A20 o o B20** | (COM3) DSR |
| BUSY (LPT) | **A21 o o B21** | (COM3) RX |
| GND (LPT) | **A22 o o B22** | (COM3) RTS |
| PE (LPT) | **A23 o o B23** | (COM3) TX |
| GND (LPT) | **A24 o o B24** | (COM3) CTS |
| SLCT (LPT) | **A25 o o B25** | (COM3) DTR |
| RX+ (ETH) | **A26 o o B26** | (COM3) RI |
| RX-(ETH) | **A27 o o B27** | (COM3) GND |
| TX+ (ETH) | **A28 o o B28** | (COM4) DCD |
| TX-(ETH) | **A29 o o B29** | (COM4) DSR |
| LED0 (ETH LINK) | **A30 o o B30** | (COM4) RX |
| LED1 (ETH ACTIVITY) | **A31 o o B31** | (COM4) RTS |
| LED2 (ETH SPEED) | **A32 o o B32** | (COM4) TX |
| LED3 (STATUS) | **A33 o o B33** | (COM4) CTS |
| +5V | **A34 o o B34** | (COM4) DTR |
| RESET | **A35 o o B35** | (COM4) RI |
| GND | **A36 o o B36** | (COM4) GND |
| MDAT (MOUSE) | **A37 o o B37** | (KYBD) KCLK |
| GND (MOUSE) | **A38 o o B38** | (KYBD) KDAT |
| +5V (MOUSE) | **A39 o o B39** | (KYBD) GND |
| MCLK (MOUSE) | **A40 o o B40** | (KYBD) +5V |

**J108**

| | | |
|---|---|---|
| RESET (IDE) | **A1 o o B1** | (DIO) NC |
| GND (IDE) | **A2 o o B2** | (DIO) GND |
| D7 (IDE) | **A3 o o B3** | (DIO) NC |
| D8 (IDE) | **A4 o o B4** | (DIO) GND |
| D6 (IDE) | **A5 o o B5** | (DIO) NC |
| D9 (IDE) | **A6 o o B6** | (DIO) GND |
| D5 (IDE) | **A7 o o B7** | (DIO) Port 1 Bit 7 |
| D10 (IDE) | **A8 o o B8** | (DIO) GND |
| D4 (IDE) | **A9 o o B9** | (DIO) Port 1 Bit 6 |
| D11 (IDE) | **A10 o o B10** | (DIO) GND |
| D3 (IDE) | **A11 o o B11** | (DIO) Port 1 Bit 5 |
| D12 (IDE) | **A12 o o B12** | (DIO) GND |
| D2 (IDE) | **A13 o o B13** | (DIO) Port 1 Bit 4 |
| D13 (IDE) | **A14 o o B14** | (DIO) GND |
| D1 (IDE) | **A15 o o B15** | (DIO) Port 1 Bit 3 |
| D14 (IDE) | **A16 o o B16** | (DIO) GND |
| D0 (IDE) | **A17 o o B17** | (DIO) Port 1 Bit 2 |
| D15 (IDE) | **A18 o o B18** | (DIO) GND |
| GND (IDE) | **A19 o o B19** | (DIO) Port 1 Bit 1 |
| NC (IDE) | **A20 o o B20** | (DIO) GND |
| REQ (IDE) | **A21 o o B21** | (DIO) Port 1 Bit 0 |
| GND (IDE) | **A22 o o B22** | (DIO) GND |
| IOW# (IDE) | **A23 o o B23** | (DIO) Port 0 Bit 7 |
| GND (IDE) | **A24 o o B24** | (DIO) GND |
| IOR# (IDE) | **A25 o o B25** | (DIO) Port 0 Bit 6 |
| GND (IDE) | **A26 o o B26** | (DIO) GND |
| IORDY (IDE) | **A27 o o B27** | (DIO) Port 0 Bit 5 |
| NC (IDE) | **A28 o o B28** | (DIO) GND |
| DACK# (IDE) | **A29 o o B29** | (DIO) Port 0 Bit 4 |
| GND (IDE) | **A30 o o B30** | (DIO) GND |
| IRQ14 (IDE) | **A31 o o B31** | (DIO) Port 0 Bit 3 |
| NC (IDE) | **A32 o o B32** | (DIO) GND |
| PDA1 (IDE) | **A33 o o B33** | (DIO) Port 0 Bit 2 |
| DET (IDE) | **A34 o o B34** | (DIO) GND |
| PDA0 (IDE) | **A35 o o B35** | (DIO) Port 0 Bit 1 |
| PDA2 (IDE) | **A36 o o B36** | (DIO) GND |
| PDSC1# (IDE) | **A37 o o B37** | (DIO) Port 0 Bit 0 |
| PDCS3# (IDE) | **A38 o o B38** | (DIO) GND |
| ACT# (IDE) | **A39 o o B39** | (DIO) +5V |
| GND (IDE) | **A40 o o B40** | (DIO) GND |

## Watchdog Timer

The PPM-LX800-G features an advanced watchdog timer which can be used to guard against software lockups. Three interfaces are provided to the watchdog timer. The Advanced interface is the most flexible and recommended for new designs. The other two interface options are provided for software compatibility with older WinSystems single board computers.

Visual Index

### Advanced

The watchdog timer can be enabled in the BIOS Settings by entering a value for Watch-Dog Timeout on the Peripherals screen. Any non-zero value represents the number of minutes prior to reset during system boot. Once the operating system is loaded, the watchdog can be disabled or reconfigured in the application software.

**NOTE:** It is recommended that a long timeout be used if the watchdog is enabled when trying to boot any operating system.

The watchdog can be enabled, disabled or reset by writing the appropriate values to the configuration registers located at I/O addresses 565h and 566h. The watchdog is enabled by writing a timeout value other than zero to the I/O address 566h and disabled by writing **00h** to this I/O address. The watchdog timer is serviced by writing the desired timeout value to I/O port 566h. If the watchdog has not been serviced within the allotted time, the circuit resets the CPU.

The timeout value can be set from 1 second to 256 minutes. If port 565h bit 7 equals **0**, the timeout value written into I/O address 566h is in minutes. The timeout value written to address 566h is in seconds if port 565 bit 7 equals **1**.

**Watchdog Timer Examples**

| Port Address | Port Bit 7 Value | Port Address | Value | Reset Interval |
|---|---|---|---|---|
| 565H | x | 566H | 00h | DISABLED |
| 565H | 1 | 566H | 03h | 3 SECONDS |
| 565H | 1 | 566H | 1Eh | 30 SECONDS |
| 565H | 0 | 566H | 04h | 4 MINUTES |
| 565H | 0 | 566H | 05h | 5 MINUTES |

### Standard

The watchdog can be enabled or disabled via software by writing an appropriate timeout value to I/O port 1EEH. See the chart provided below.

| Port Address | Value | Reset Interval |
|---|---|---|
| 1EEH | 00h | DISABLED |
| | 01h | 3 SECONDS |
| | 03h | 30 SECONDS |
| | 05h | 300 SECONDS |
| 1EFH | ANY | RESET TIMER |

### Legacy

The Legacy watchdog timer has a fixed reset interval of 1.5 seconds. The watchdog can be enabled by writing 1 or disabled by writing a 0 to I/O port address 1D0.

| Port Address | Value | Reset Interval |
|---|---|---|
| 1D0 | 00h | DISABLED |
| | 01h | Enabled 1.5 sec |
| 1D8H | ANY | RESET TIMER |

## PC/104 Bus Interface

Visual Index

The PC/104 bus is electrically equivalent to the 8- and 16-bit ISA bus. Standard PC/104 I/O cards can be populated on PPM-LX800-G's PC/104 bus, located at **J5** and **J7**. The interface does not support hot swap capability. The PC/104 bus connector pin definitions are provided here for reference. Refer to the PC/104 Bus Specification for specific signal and mechanical specifications.

**J5**

| | | |
|---|---|---|
| GND | **D0 o o C0** | GND |
| MEMCS16# | **D1 o o C1** | SBHE# |
| IOCS16# | **D2 o o C2** | LA23 |
| IRQ10 | **D3 o o C3** | LA22 |
| IRQ11 | **D4 o o C4** | LA21 |
| IRQ12 | **D5 o o C5** | LA20 |
| IRQ15 | **D6 o o C6** | LA19 |
| IRQ14 | **D7 o o C7** | LA18 |
| DACK0# | **D8 o o C8** | LA17 |
| DRQ0 | **D9 o o C9** | MEMR# |
| DACK5# | **D10 o o C10** | MEMW# |
| DRQ5 | **D11 o o C11** | SD8 |
| DACK6# | **D12 o o C12** | SD9 |
| DRQ6 | **D13 o o C13** | SD10 |
| DACK7# | **D14 o o C14** | SD11 |
| DRQ7 | **D15 o o C15** | SD12 |
| +5V | **D16 o o C16** | SD13 |
| MASTER# | **D17 o o C17** | SD14 |
| GND | **D18 o o C18** | SD15 |
| GND | **D19 o o C19** | KEY |

**J7**

| | | |
|---|---|---|
| IOCHK# | **A1 o o B1** | GND |
| SD7 | **A2 o o B2** | RESET |
| SD6 | **A3 o o B2** | +5V |
| SD5 | **A4 o o B4** | IRQ9 |
| SD4 | **A5 o o B5** | -5V |
| SD3 | **A6 o o B6** | DRQ2 |
| SD2 | **A7 o o B7** | -12V |
| SD1 | **A8 o o B8** | SRDY# |
| SD0 | **A9 o o B9** | +12V |
| IOCHRDY | **A10 o o B10** | KEY |
| AEN | **A11 o o B11** | SMEMW# |
| SA19 | **A12 o o B12** | SMEMR# |
| SA18 | **A13 o o B13** | IOW# |
| SA17 | **A14 o o B14** | IOR# |
| SA16 | **A15 o o B15** | DACK3# |
| SA15 | **A16 o o B16** | DRQ3 |
| SA14 | **A17 o o B17** | DACK1# |
| SA13 | **A18 o o B18** | DRQ1 |
| SA12 | **A19 o o B19** | REFRESH# |
| SA11 | **A20 o o B20** | BCLK |
| SA10 | **A21 o o B21** | IRQ7 |
| SA9 | **A22 o o B22** | IRQ6 |
| SA8 | **A23 o o B23** | IRQ5 |
| SA7 | **A24 o o B24** | IRQ4 |
| SA6 | **A25 o o B25** | IRQ3 |
| SA5 | **A26 o o B26** | DACK2# |
| SA4 | **A27 o o B27** | TC |
| SA3 | **A28 o o B28** | BALE |
| SA2 | **A29 o o B29** | +5V |
| SA1 | **A30 o o B30** | OSC |
| SA0 | **A31 o o B31** | GND |
| GND | **A32 o o B32** | GND |

# = Active Low Signal

**NOTES**:
1. Rows C and D are not required on 8-bit modules.
2. B10 and C19 are key locations. WinSystems uses key pins as connections to GND.
3. Signal timing and function are as specified in ISA specification.
4. Signal source/sink current differ from ISA values.

## PC/104-*Plus* Bus Interface

Visual Index

The PPM-LX800-G supports peripheral expansion using the PC/104-*Plus* connector at **J6**. Up to three PC/104-*Plus* modules can be stacked onto the PPM-LX800-G. PC/104-*Plus* modules should be attached and configured beginning at slot 1. The PC/104-*Plus* bus pin definitions are shown here for reference purposes only. Refer to the PC/104-*Plus* Bus Specification for signal definitions, timing and mechanical details.

| Pin | A | B | C | D |
|---|---|---|---|---|
| 1 | GND | RESERVED | +5 | AD00 |
| 2 | VI/O | AD02 | AD01 | +5V |
| 3 | AD05 | GND | AD04 | AD03 |
| 4 | C/BE0# | AD07 | GND | AD06 |
| 5 | GND | AD09 | AD08 | GND |
| 6 | AD11 | VI/O | AD10 | M66EN |
| 7 | AD14 | AD13 | GND | AD12 |
| 8 | +3.3V | C/BE1# | AD15 | +3.3V |
| 9 | SERR# | GND | RESERVED | PAR |
| 10 | GND | PERR# | +3.3V | RESERVED |
| 11 | STOP# | +3.3V | LOCK# | GND |
| 12 | +3.3V | TRDY# | GND | DEVSEL# |
| 13 | FRAME# | GND | IRDY# | +3.3V |
| 14 | GND | AD16 | +3.3V | C/BE2# |
| 15 | AD18 | +3.3V | AD17 | GND |
| 16 | AD21 | AD20 | GND | AD19 |
| 17 | +3.3V | AD23 | AD22 | +3.3V |
| 18 | IDSEL0 | GND | IDSEL1 | IDSEL2 |
| 19 | AD24 | C/BE3# | VI/O | IDSEL3 |
| 20 | GND | AD26 | AD25 | GND |
| 21 | AD29 | +5V | AD28 | AD27 |
| 22 | +5V | AD30 | GND | AD31 |
| 23 | REQ0# | GND | REQ1# | VI/O |
| 24 | GND | REQ2# | +5V | GNT0# |
| 25 | GNT1# | VI/O | GNT2# | GND |
| 26 | +5V | CLK0 | GND | CLK1 |
| 27 | CLK2 | +5V | CLK3 | GND |
| 28 | GND | INTD# | +5V | RST# |
| 29 | +12V | INTA# | INTB# | INTC# |
| 30 | -12V | REQ3# | GNT3# | GND |

NOTE: 1. The shaded area denotes power or ground signals.

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# BIOS Supplemental

## General Information

Visual Index

The PPM-LX800-G includes BIOS from Insyde Software, Inc. to assure full compatibility with PC operating systems and software. The basic system configuration is stored in battery backed CMOS RAM within the clock/calendar. As an alternative, the CMOS configuration may be stored in EEPROM for operation without a battery. For more information of CMOS configuration, see the BIOS Settings Storage Options section of this manual. Access to this setup information is via the Setup Utility in the BIOS.

## Entering Setup

To enter setup, power up the computer and press **F1** when either the splash screen is displayed or when the **Press F1 for Setup** message is displayed. It may take a few seconds before the main setup menu screen is displayed.

## Navigation of the Menus

Use the **Up** and **Down** arrow keys to move among the selections and press **Enter** when a selection is highlighted to enter a sub-menu or to see a list of choices. Pressing the letter corresponding to each menu option is a shortcut that opens the next dialogue box with one key press.

Following are images of each menu screen in the default configuration along with a brief description of each option where applicable. Available options are listed in reference tables. Menu values shown in **bold** typeface are factory defaults.

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

| **Main Menu** |
|---|
| A. Time 22:40:32 |
| B. Date 06/09/2009 |
| |
| C. Peripheral Device, PCI, USB, and PC-104 Buses |
| D. Memory and Cache |
| E. Environmental |
| F. Power Management |
| G. Miscellaneous Configuration |
| H. Serial Console |
| L. Load Defaults |
| O. Boot Order |
| |
| Q. Exit Without Save |
| S. Save Changes Without Exit |
| T. Save Changes to EEPROM and Exit |
| X. Save Changes and Exit |
| Z. Clear EEPROM |
| |
| |

Each available option is listed in detail in the following sections.

Navigation to the screens is located at the top of each screen’s layout.

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## C. Peripheral Device, PCI, USB, and PC-104 Buses >

## A. Storage

**IDE Configuration**

Primary ATA Controller: **Enabled**

BIOS Support: **Enabled**

Cable Sense: **Auto**

DMA/UDMA Support: **Enabled**

Drive 1 Mode: **Auto**

Drive 2 Mode: **Auto**

*Options:*

| **Primary ATA Controller:** | **BIOS Support:** | **Cable Sense:** | **DMA/UDMA Support:** | **Drive 1 Mode:** | **Drive 2 Mode:** |
|---|---|---|---|---|---|
| Enabled | Enabled | Auto | Enabled | Auto | Auto |
| Disabled | Disabled | None (Disabled) | Disabled | PIO 0 | PIO 0 |
| | | Force 40 Conductor Cable | | PIO 1 | PIO 1 |
| | | Force 80 Conductor Cable | | PIO 2 | PIO 2 |
| | | | | PIO 3 | PIO 3 |
| | | | | PIO 4 | PIO 4 |
| | | | | MDMA 0 | MDMA 0 |
| | | | | MDMA 1 | MDMA 1 |
| | | | | MDMA 2 | MDMA 2 |
| | | | | UDMA 0 | UDMA 0 |
| | | | | UDMA 1 | UDMA 1 |
| | | | | UDMA 2 | UDMA 2 |
| | | | | UDMA 3 | UDMA 3 |
| | | | | UDMA 4 | UDMA 4 |
| | | | | UDMA 5 | UDMA 5 |

USB Floppy Support: **Enabled**

*Options:*
Enabled
Disabled

Force USB Floppy to Drive A: **Enabled**

*Options:*
Enabled
Disabled

CD-ROM Boot Support: **Enabled**

*Options:*
Enabled
Disabled

## C. Peripheral Device, PCI, USB, and PC-104 Buses >
## B. Peripherals

**Serial Ports**

| | | | | |
|---|---|---|---|---|
| Port A: **Enabled** | BRG: **LO** | Addr: **0x03F8** | IRQ: **4** | I/F: **RS232** |
| Port B: **Enabled** | BRG: **LO** | Addr: **0x02F8** | IRQ: **3** | I/F: **RS232** |
| Port C: **Enabled** | BRG: **LO** | Addr: **0x03E8** | IRQ: **5** | I/F: RS232 |
| Port D: **Enabled** | BRG: **LO** | Addr: **0x02E8** | IRQ: **6** | I/F: RS232 |

*Options:*

| **Port x:** | **BRG:** | **Addr:** | **IRQ:** | **I/F:** |
|---|---|---|---|---|
| Enabled<br>Disabled | LO<br>HI | 0x0100-0xfff8 | None<br>3<br>4<br>5<br>6<br>7<br>9<br>10<br>11<br>12<br>14<br>15 | RS232<br>RS422 RTS<br>RS422 Auto<br>RS485 RTS<br>RS485 RTS w/Echo<br>RS485 Auto<br>RS485 Auto x/Echo |

| | | | |
|---|---|---|---|
| Parallel Port: **Enabled** | Addr: **0x0378** | IRQ: **7** | MODE: **Compatible** |

*Options:*

| **Parallel Port:** | **Addr:** | **IRQ:** | **MODE:** |
|---|---|---|---|
| Enabled<br>Disabled | 0x0100 - 0xfff8 | None<br>3<br>4<br>5<br>6<br>7<br>9<br>10<br>11<br>12<br>14<br>15 | Compatible<br>PS/2 Bidir |

| | | |
|---|---|---|
| Digital I/O: **Enabled** | Addr: **0x0120** | IRQ: **None** |

*Options:*

| **Digital I/O:** | **Addr:** | **IRQ:** |
|---|---|---|
| Enabled<br>Disabled | 0x0100 - 0xfff8 | None<br>3<br>4<br>5<br>6<br>7<br>9<br>10<br>11<br>12<br>14<br>15 |

**Assign IRQ 12 to Mouse: Enabled**

*Options:*
Enabled
Disabled

**Watch-Dog Timeout: 0**

*Options:*
{Enter any value between 0-255 for minutes.}

## C. Peripheral Device, PCI, USB, and PC-104 Buses >
## C. Graphics

Internal Controller Mode: **Secondary Controller**

*Options:*
Secondary Controller
Disabled
Primary Controller

| Graphics Memory: **24** | Driver Controls Init: **Disabled** |
|---|---|
| *Options:*<br>*{*Enter any value between 2-254 for graphics memory size.*}* | *Options:*<br>Enabled<br>Disabled |
| Output Display: **CRT** | DOTPLL Bypass: **Disabled** |
| *Options:*<br>CRT<br>Flat Panel<br>Panel and CRT<br>Auto | *Options:*<br>Disabled<br>Enabled |

**Flat Panel Configuration** (All properties and options are disabled by default due to Output Display set to CRT.)

Type: **TFT**

*Options:*
TFT
LVDS
Auto

| Resolution: **800x600** | HSYNC Polarity: **Active Low** |
|---|---|
| *Options:*<br>800x600<br>1024x768<br>1152x864<br>1280x1024<br>1600x1200<br>320x240<br>640x480 | *Options:*<br>Active Low<br>Active High |
| Data Bus Type: **9-24 bits, 1 ppc** | VSYNC Polarity: **Active Low** |
| *Options:*<br>9-24 bits, 1 ppc<br>18,24 bits, 2 ppc | *Options:*<br>Active Low<br>Active High |
| Refresh Rate: **60 Hz** | LP Active Period: **Free Running** |
| *Options:*<br>*60 Hz*<br>*70 Hz*<br>*72 Hz*<br>*75 Hz*<br>*85 Hz*<br>*90 Hz*<br>*100 Hz* | *Options:*<br>Free Running<br>Active Only |
| | SHFCLK Active Period: **Free Running** |
| | *Options:*<br>Free Running<br>Active Only |

**Software Backlight Control** (All properties and options are disabled by default due to Output Display set to CRT.)

| Backlight Enable: **Enabled** | Initial Brightness: **Last Value** |
|---|---|
| *Options:*<br>Enabled<br>Disabled | *Options:*<br>Last Value<br>0% (Off)<br>10%<br>20%<br>30%<br>40%<br>50%<br>60%<br>70%<br>80%<br>90%<br>100% (Full On) |

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## C. Peripheral Device, PCI, USB, and PC-104 Buses >
## D. PCI and USB Buses

| | |
|---|---|
| **PCI Interrupt Steering** | |
| PCI INTA#: **IRQ 11** | PCI INTB#: **IRQ 10** |
| PCI INTC#: **IRQ 10** | PCI INTD#: **IRQ 11** |
| *Options:*<br>None<br>IRQ 3<br>IRQ 4<br>IRQ 5<br>IRQ 6<br>IRQ 7<br>IRQ 9<br>IRQ 10<br>IRQ 11<br>IRQ 12<br>IRQ 14<br>IRQ 15 | |
| **USB Settings** | |
| OHCI: **Enabled** | EHCI: **Enabled** |
| *Options:*<br>Enabled<br>Disabled | *Options:*<br>Enabled<br>Disabled |
| UDC: **Disabled** | UOC: **Disabled** |
| *Options:*<br>Enabled<br>Disabled | *Options:*<br>Enabled<br>Disabled |
| Overcurrent Reporting: **Disabled** | Port 4 Assignment: **Host** |
| *Options:*<br>Enabled<br>Disabled | *Options:*<br>Host<br>Device<br>Not Used |

## C. Peripheral Device, PCI, USB, and PC-104 Buses >
## E. PC-104 Bus

| **PC-104 Bus Interrupt Steering** |
|---|
| IRQ3: **Disabled** |
| IRQ4: **Disabled** |
| IRQ5: **Disabled** |
| IRQ6: **Disabled** |
| IRQ7: **Disabled** |
| IRQ9: **Disabled** |
| IRQ10: **Disabled** |
| IRQ11: **Disabled** |
| IRQ12: **Disabled** |
| IRQ14: **Disabled** |
| IRQ15: **Disabled** |

*Options:*
Enabled
Disabled

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## D. Memory and Cache

| | |
|---|---|
| Cache Enable: **Enabled** | Cache Mode: **Write-Back** |
| *Options:*<br>Enabled<br>Disabled | *Options:*<br>Write-Back<br>Write-Through |
| L2 Cache Enable: **Enabled** | Cache Allocate: **Disabled** |
| *Options:*<br>Enabled<br>Disabled | *Options:*<br>Enabled<br>Disabled |

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## E. Environmental

**Thermal SetPoints**

Ambient High Temperature: **45**

*Options:*
*{Enter temperature value in Celsius.}*

CPU High Temperature: **80**

*Options:*
*{Enter temperature value in Celsius.}*

**Read Current Temperatures and Voltages...**
(default values vary depending on current temperatures and voltages)

Ambient Temperature: **0**

CPU Temperature: **0**

2.60V Voltage: **0**

1.26V Voltage: **0**

3.30V Voltage: **0**

5.00V Voltage: **0**

12.0V Voltage: **0**

1.30V Voltage: **0**

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## F. Power Management

BIOS PM at Boot: **Disabled**

*Options:*
Enabled
Disabled

APM Available: **Yes**

*Options:*
Yes
No

ACPI Available: **Yes**

*Options:*
Yes
No

S1 Clocks: **On (Most Power)**

*Options:*
On (Most Power)
Off (Least Power)
Off (With PS2 Wake) (Middle Power)

P-State Limit: **P0**

*Options:*
P0
P1

CPU Clock Gating: **Enabled**

*Options:*
Enabled
Disabled

Chipset Clock Gating: **Enabled**

*Options:*
Enabled
Disabled

## G. Miscellaneous Configuration

Display F1 Messages: **Enabled**

*Options:*
Enabled
Disabled

**Splash Screen Configuration**

Splash Screen: **Enabled**

*Options:*
Enabled
Disabled

Splash Screen Timeout: **0**

*Options:*
*{Enter milliseconds to wait (0, 1-65535 - 0=default:3000).}*

Clear Splash Screen: **Enabled**

*Options:*
Enabled
Disabled

**Summary Screen/AUX BIOS Message Configuration**

Summary Screen/AUX BIOS Messages: **Enabled**

*Options:*
Enabled
Disabled

Summary Screen Timeout: **0**

*Options:*
*{Enter milliseconds to wait (0, 1-65535 - 0=default:3000).}*

**PC Speaker Configuration**

AC Beeper: **Enabled**

*Options:*
Enabled
Disabled

**Setup Password Configuration**

Set Password Enable: **Disabled**

*Options:*
Enabled
Disabled

Setup Pin: **0**

*Options:*
{1,1-9999}
Unsigned decimal number (Prefix with x or $ for Hex)

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## H. Serial Console

Console Type: **Normal Video/Keyboard** *Baud rate defaults to 38400

*Options:*
Normal Video/Keyboard
Serial Console Only
Keyboard/Video and Serial

Port: **COM1 (3F8 IRQ 4)**

*Options:*
COM1 (3F8 IRQ 4)
COM2 (2F8 IRQ 3)
COM3 (3E8 IRQ 5)
COM4 (2E8 IRQ 6)

Baud Rate: **38400**

*Options:*
*1200*
*2400*
*4800*
*9600*
*19200*
*38400*
*57600*
*115200*

* Serial console in Normal Video/Keyboard mode is still available using WINCOM when attached to COM1 using 38400.

Note: Defaults are indicated in **bold** for BIOS properties. Default options that cannot be user-modified are indicated with grey text.

## O. Boot Order

| **Boot Order** |
| --- |
| **1. Hard Drive** |
| **2. USB Floppy Disk** |
| **3. USB Hard Disk/Flash Drive** |
| **4. USB CD-ROM Drive** |
| **5. CD-ROM Drive** |

*Options:*
None
Hard Drive
CD-ROM Drive
USB Floppy Disk
USB Hard Disk/Flash Drive
USB CD-ROM Drive

# BIOS Settings Storage Options

## CMOS Storage Location

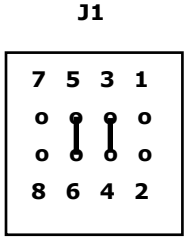
The PPM-LX800-G's BIOS configuration is stored in three (3) locations:

(1) CMOS RAM (nonvolatile if battery backed)
(2) EEPROM (nonvolatile storage for user defaults)
(3) FLASH PROM (nonvolatile storage for factory defaults)

## Saving the CMOS Configuration

The Real-Time Clock and the CMOS RAM settings can be maintained by an optional battery when the board is powered off. The battery can be enabled/disabled with jumper pins 5 and 6 at **J1**. A battery is always required to maintain time and date functions when the board is powered off.

The EEPROM feature allows the user to save CMOS configuration settings to nonvolatile storage that does not require a battery. This feature can be enabled/disabled using pins 3 and 4 of **J1**. When enabled, the user's CMOS settings can be saved to EEPROM from the BIOS utility's Main Menu. If the board is powered off with no battery, the user's CMOS settings will be restored from EEPROM but time and date information will be lost and returned to default values.




| | |
|---|---|
| Enables EEPROM BIOS Settings (default) | 3-4 |
| Disables EEPROM BIOS Settings | 3 4 |
| Enables Battery (default) | 5-6 |
| Disables Battery | 5 6 |

At system boot, the BIOS first performs a checksum validation on the contents of the CMOS RAM. Invalid checksums usually occur due to a low or disabled battery. If the checksum is valid, the system boots using values stored in CMOS RAM. If a checksum error occurs, the BIOS attempts to load CMOS values from the EEPROM.

After a checksum validation, the BIOS configuration is loaded from the EEPROM and the boot process continues. If the EEPROM is disabled or the contents of the EEPROM fail the checksum validation, the system loads the factory default settings from the FLASH PROM and continues the boot sequence.

For applications where the battery is present, CMOS settings should be saved to both the CMOS RAM and to the EEPROM. If the battery fails, the CMOS defaults will be loaded from the EEPROM so the system can continue to function without user interaction and only time and date information will be lost.

## Resetting CMOS to EEPROM defaults

If a battery is present, you can reset the CMOS RAM to the values stored in EEPROM by turning the system off and removed the jumper from **J1** pins 5 and 6 for a few seconds. Replace the jumper and reboot. When power is applied to the board, the system will boot with the CMOS settings that were stored in EEPROM.

## Resetting CMOS and EEPROM to Factory Defaults

The PPM-LX800-G can normally be returned to the factory default BIOS configuration by selecting option **L. Load Defaults** on the BIOS Main Menu. If you need to reload the factory defaults, be sure to save them to CMOS RAM and to EEPROM using the options on the BIOS Main Menu.

If you have saved CMOS values that prevent you from accessing the BIOS menus, the board can be reset to factory defaults as follows:

1) Turn the system off.
2) Remove the jumper from pins 3-4 on **J1**.
3) Turn the system on and enter the BIOS Main Menu using the **F1** key.
4) Select **L. Load Defaults**.
5) Replace the jumper on pins 3-4 at **J1**.
6) Save the restored defaults to CMOS and EEPROM (options S and T, respectively).

## Updating the BIOS FLASH PROM

The most recent PPM-LX800-G BIOS is available on the WinSystems website. However, it is highly recommended that an Applications Engineer be consulted prior to any BIOS FLASH PROM update. If the BIOS PROM is updated, the steps described above must be followed to reset the CMOS and EEPROM to the newly loaded factory defaults and to clear the data from the previous BIOS version.

# Serial Console Reference

## Introduction

This section documents the usage of the WinSystems Serial Console feature present on the PPM-LX800-G board. The serial console consists of special BIOS code and a special terminal program used to communicate with the board. The serial console WINCOM.EXE provides access to the Insyde CMOS setup options via a serial port. This allows embedded system designers and technicians access to CMOS setup on the PPM-LX800-G using only a laptop computer with a serial port.

## WINCOM.EXE Serial Console Client

WINCOM.EXE is a DOS application that runs on a laptop or other 100% PC-compatible system. The client is started on the DOS command line with:

**wincom [port] [interrupt] [baud_rate]**

(NOTE: Words in [] represent command arguments)

Argument **port** is replaced with the I/O port address of the desired COM port in hex (i.e. 3F8 for COM1 and 2F8 for COM2). This allows for the usage of nonstandard addresses for COM ports.

Argument **interrupt** is replaced with the IRQ number assigned to the desired COM port. Typically the values would be 4 for COM1 and 3 for COM2.

Argument **baud rate** is replaced with one of the following values which is the baud rate to use for the connection.
1200
2400
4800
9600
19200
38400
57600
115200

**NOTE**: WINCOM runs best in a pure DOS environment. It is possible to use WINCOM in a DOS box under Windows, but there are a number of limitations in doing so and success is not guaranteed due to differences in low-level hardware drivers. It is recommended that a DOS boot disk be made containing WINCOM.EXE, which can be used when access to the PPM-LX800-G is desired.

When run in a pure DOS environment, WINCOM passes all keys and key combinations directly to the target PPM-LX800-G. For example, **<CTRL><ALT><DEL>** will cause the PPM-LX800-G to reboot. If WINCOM is run from a DOS box under Windows, the same key combination will be interpreted as a Windows command. WINCOM will not receive the keystrokes and cannot pass them to the serial console.

There are however, three keystroke combinations reserved by WINCOM and are not passed to the target system:

| | |
|---|---|
| **<ALT><END>** | Exits WINCOM. |
| **<ALT><PgUp>** | Prompts for upload filename. (Used in conjunction with SCOPY.EXE) |
| **<ALT><PgDn>** | Prompts for download filename. (Used in conjunction with SCOPY.EXE) |

## Getting Started with the Serial Console

The PPM-LX800-G defaults to a standard video/keyboard configuration. In order to gain access to the system via the serial console for the first time, the following steps must be followed.

1. Copy WINCOM.EXE onto a DOS boot disk for the client (terminal) machine.
2. Attach a Null-Modem cable between COM1 of the PPM-LX800-G and a free COM port on the client machine.
3. Boot up the client machine and run WINCOM.EXE. If attached to COM1 on the client, type: **wincom 3f8 4 38400 <Enter>**, or if attached to COM2 on the client, type: **wincom 2f8 3 38400 <Enter>**
4. Wait for WINCOM to finish initializing and the screen to clear. A totally blank screen is perfectly normal at this point.
5. Apply power to the PPM-LX800-G. The BIOS should sense the WINCOM attachment to its COM1 port and turn on the serial console for that port at the default rate of 38400 baud.
6. The **Press F1 for Setup** messages should be visible on the WINCOM client screen. Press <**F1>** to access CMOS setup. Several key presses are often necessary.
7. Make whatever CMOS changes are required. If permanent serial console access is desired, select the **Serial Console Configuration** option and select the desired mode, COM port and baud rate. Refer to the next section for details on selecting these items.
8. Exit CMOS setup, saving the changes as desired.

## Copy File using the Serial Console

Besides being useful for accessing the CMOS setup menu, the serial console can be used effectively with non-graphical DOS applications or for command prompt access. The serial console can also be used in conjunction with the SCOPY.EXE utility to provide the ability to serially upload or download files from the PPM-LX800-G to the client PC and vice versa.

To use SCOPY, or any other DOS program, it must already be present on a disk currently accessible to the PPM-LX800-G. SCOPY is invoked at the DOS command prompt on the PPM-LX800-G with the command :

**scopy [ com1 | com2 ] [-rq | -sq] file name [-bbaud_rate]**

**[com1 | com2]** is the COM port in use. This should match the COM port used by the PPMLX800-G for serial console operations.

**[-rq | -sq]** is the direction flag. -rq will cause the PPM-LX800-G to receive a file. -sq will cause the PPM-LX800-G to send a file.

**file name** is the name of the file to be sent or received.

**File Upload**

To send a file called APP.EXE from a WINCOM client PC to the PPM-LX800-G, run SCOPY on the PPM-LX800-G from WINCOM. Assuming the serial connection is using COM2 on the PPM-LX800-G at a baud rate of 115200, a file upload would be initiated with following command:

**scopy com2 -rq app.exe -b115200**

Once SCOPY has been started on the PPM-LX800-G in receive mode, WINCOM must be told to send the file. To start the upload, press <ALT><PgUp> on the WINCOM client keyboard and WINCOM will present the following prompt:

**File to upload :**

Type the name of the file to be sent and press **<ENTER>**. If no file path is provided, the file must exist in the current directory on the WINCOM client PC. Otherwise, a path must be specified.

When a transfer starts, WINCOM will display the progress of the transfer as the number of records processed, similar to the statement below:

**Sending Record Number 000040**

When the file transfer is completed successfully, WINCOM reports:

**wincom : File transfer complete**

SCOPY also reports the result of the transfer:

**scopy : File transfer complete**

If there is a problem, either WINCOM or SCOPY will report that an error has occurred.

**File Download**

Assuming the same connection settings as those referenced above, to send a file called APP.EXE from the PPM-LX800-G to a WINCOM client PC, use the following command:

**scopy com2 -sq app.exe -b115200**

If no file path is provided, the file must exist in the current directory on the PPM-LX800-G. Otherwise, a path must be specified.

Once SCOPY has been started on the PPM-LX800-G in send mode, WINCOM must be told to receive the file. To start the download, press <ALT><PgDn> on the WINCOM client keyboard. WINCOM will respond with:

**File to Download :**

Type the name of the file to be downloaded and press **<ENTER>.**

# I/O Port Map

Following is a list of PC I/O ports. I/O addresses marked with '**' are generally unused and should be the basis for the first choices in I/O address selection for external I/O boards.

**NOTE:** The PPM-LX800-G uses a PnP BIOS resource allocation. Care must be taken to avoid contention with resources allocated by the BIOS.

| Hex Range | Usage |
|---|---|
| 000-00F | 8237DMA Controller #1 |
| **010-01F | Free |
| 020-021 | 8259 PIC #1 |
| **022-03F | Free |
| 040-043 | 8254 PIT |
| **044-04D | Free |
| 04E-04F | Reserved for on-board configuration |
| **050-05F | Free |
| 060-06F | 8042 Keyboard / Mouse Controller |
| 070-07F | CMOS RAM, Clock / Calendar |
| 080-09F | DMA Page Registers |
| 0A0-0BF | 8259 PIC #2 |
| 0C0-0DF | 8237 DMA Controller #2 |
| **0E0-0EF | Free |
| 0F0-0F1 | Math Co-processor Control |
| **0F2-0F7 | Free |
| 0F8-0FF | Math Co-processor |
| 100-102 | Video Controllers |
| **103-11F | Free |
| 120-12F | Digital I/O |
| **130-14F | Free |
| 150 | Reserved for on-board configuration |
| **151-1CF | Free |
| 1D0-1DF | Legacy Watchdog (1D0-Enabled; 1D8 - Pet) |
| 1E8-1EB | Reserved for on-board configuration |
| 1EC | Interrupt Status Register |
| 1ED | Status LED |
| 1EE-1EF | Watchdog Timer Control |
| 1F0-1FF | IDE Controller #1 |
| **200-277 | Free |
| **278-27F | Free (Option for LPT) |
| **280-2A7 | Free |
| **2A8-2AF | Free (Option for on-board serial ports) |
| 2B0-2DF | Video Controllers |
| **2E0-2E7 | Free |
| 2E8-2EF | COM4 – (Default) |
| **2F0-2F7 | Free |
| 2F8-2FF | COM2 – (Default) |
| **300-377 | Free |
| 378-37B | LPT (Default) |
| **37C- 3A7 | Free |
| **3A8- 3AF | Free (Option for on-board serial ports) |
| 3B0-3BB | Video Controllers |
| **3BC-3BF | Free (Option for LPT) |
| 3C0-3DF | Video Controllers |
| **3E0-3E7 | Free |
| 3E8- 3EF | COM3 – (Default) |
| **3F0-3F7 | Free |
| 3F8-3FF | COM1 – (Default) |
| 564-568 | Advanced Watchdog |

## Interrupt Map

Hardware Interrupts (IRQs) are supported for both PC/104 (ISA) and PC/104-*Plus* (PCI) devices. The user must reserve IRQs in the BIOS CMOS configuration for use by legacy devices. The PCI/PnP BIOS will use unreserved IRQs when allocating resources during the boot process. The table below lists IRQ resources as used by the PPM-LX800-G.

| | |
|---|---|
| IRQ0 | 18.2 Hz heartbeat |
| IRQ1 | Keyboard |
| IRQ2 | Chained to Slave controller (IRQ 9) |
| IRQ3 | COM2 * |
| IRQ4 | COM1 * |
| IRQ5 | COM3 * |
| IRQ6 | COM4 * |
| IRQ7 | LPT * |
| IRQ8 | Real Time Clock |
| IRQ9 | FREE ** |
| IRQ10 | PCI Interrupts |
| IRQ11 | PCI Interrupts |
| IRQ12 | Mouse |
| IRQ13 | Floating point processor |
| IRQ14 | IDE |
| IRQ15 | FREE ** |

* These IRQ references are default settings that can be changed by the user in the CMOS Settings utility. Reference the PCI Configurations section under Advanced Settings.

** IRQ15 is currently unavailable under the Windows XPe or CE operating systems. IRQ9 is used by ACPI in XP and is unavailable for other uses.

Some IRQs can be freed for other uses if the hardware features they are assigned to are not being used. To free an interrupt, use the CMOS setup screens to disable any unused board features or their IRQ assignments.

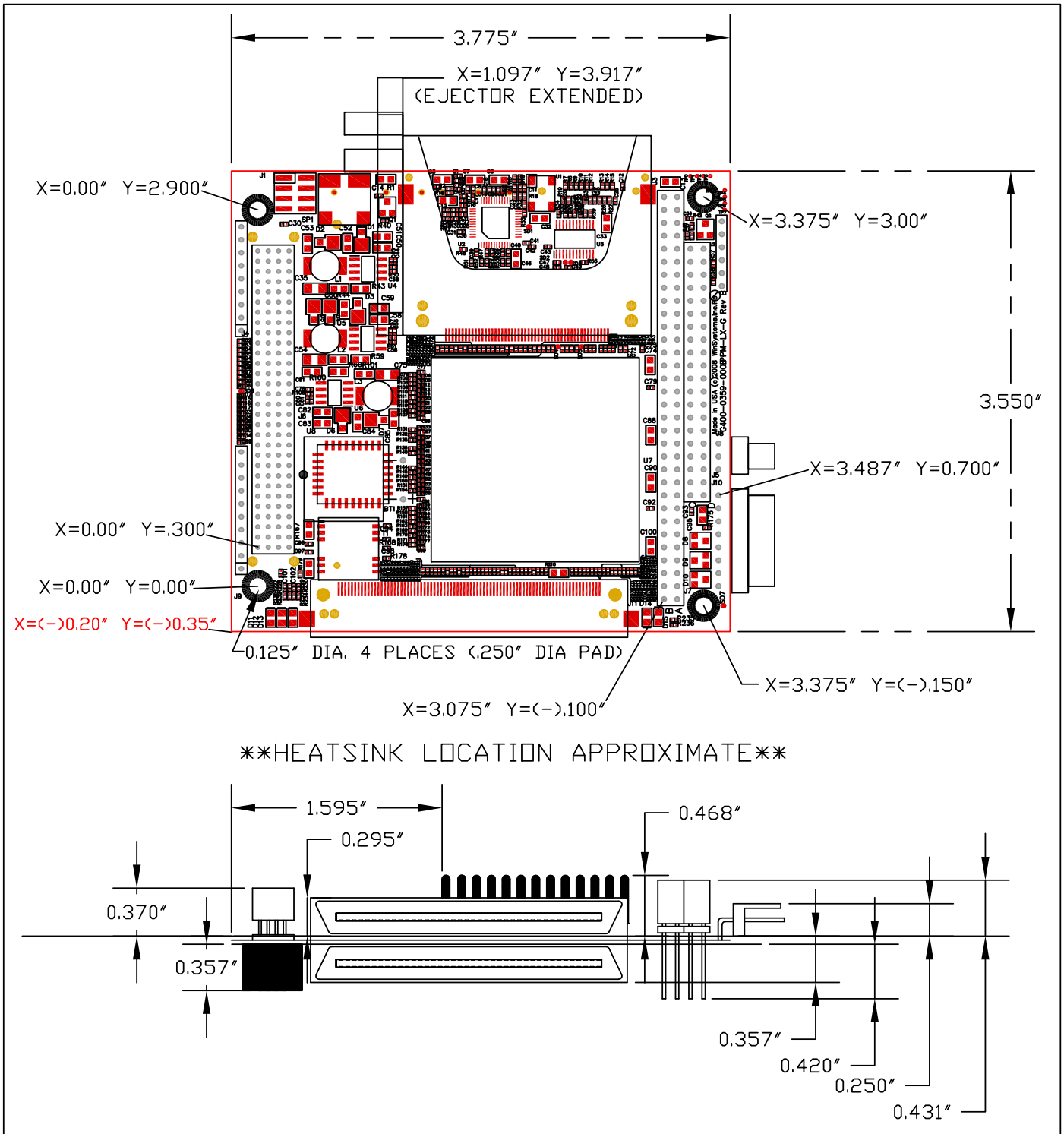
# Cables

| Part Number | Description |
|---|---|
| **CBL-SET-359-G-1** | Various cables for the PPM-LX800-G includes: |
| CBL-234-G-1-1.375 | 14-pin ribbon to 15-pin D-Sub CRT Adapter |
| CBL-251-G-1-1.5 | 1-ft., Multi-I/O Cable |
| CBL-174-G-1-1.5 | 18-in., 8-wire Power Cable |
| CBL-270-G-1-1.5 | Stereo Audio Access Cable |
| CBL-275-G-1-0.5 | 2-mm., 8-pin, Dual USB |
| CBL-352-G-1-1.5 | IDE and Digital I/O Breakout |
| BAT-LTC-36-16-1 | External 3.6V, 1600 mAH battery with plug-in connector |

# Software Drivers & Examples

| | |
|---|---|
| **BIOS** | |
| PPM-LX800-G BIOS | See WinSystems website. |
| | |
| **Ethernet Driver** | |
| (Drivers for 82551ER/82559ER 10/100 Ethernet Controller) | |
| NDIS 4 (Windows 98) | 82559ERWIN98.zip |
| NDIS 4 (Windows NT4/2000) | e100ndis4.zip |
| Windows NT Embedded 4.0 | e100ent.zip |
| Windows XP/2000 | e100exp.zip |
| DOS | e100bdos.zip |
| Linux 2.4, 2.6 10/100 Adapter Base Driver | e100-3.5.14.tar.gz |
| Linux 2.2, 10/100 Adapter Base Driver | e100-2.1.15.tar.gz |
| DOS Packet Drivers | packet.zip |
| | |
| **Examples** | |
| (For WS16C48 Compatible Digital I/O Chip) | |
| DOS Driver - C Functions | uio48ebc.zip |
| Linux Drivers - Kernel 2.2, 2.4 | linux_uio48_96.zip |
| Linux Drivers - Kernel 2.6 | uio48io_kernel_2.6.zip |
| Windows XP Driver | wsuio48_96xp.zip |
| | |
| (Counter Timer Demo) | |
| Reprogramming DOS tick for high resolution timing | tickdemo.zip |
| | |
| **Serial Console Utilities** | |
| Serial Console Client | wincom.zip |

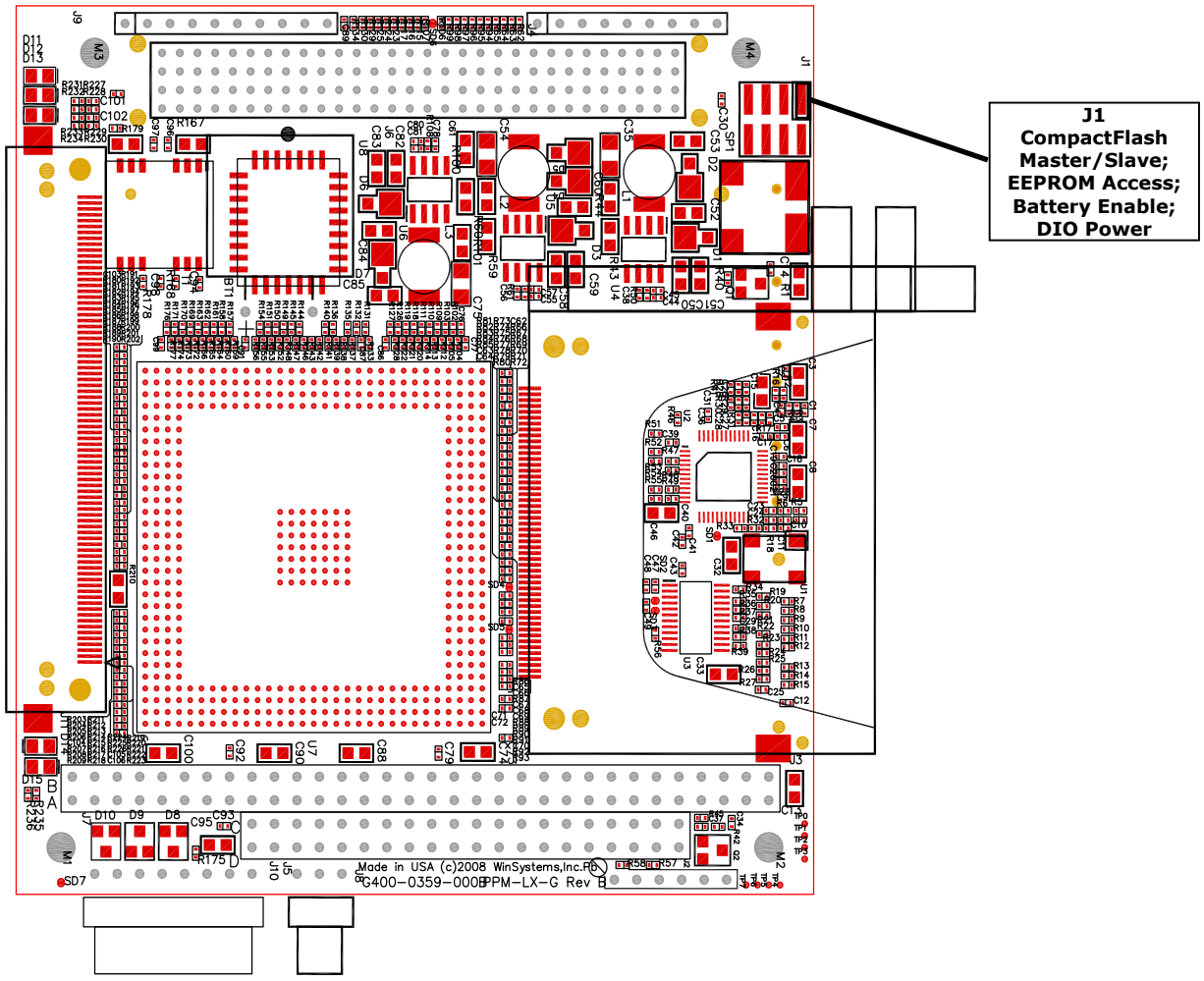
# Mechanical Drawing



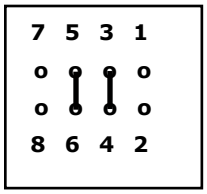

| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE: FRACTIONS: ANGLES: ± 1/2° DECIMALS: .XX ± .03 .XXX ± .010 | MACHINE FINISH √ | WinSystems, Inc. "THE EMBEDDED SYSTEMS AUTHORITY" | |
| CUSTOMER | DATE | PPM-LX800-G-ST MECHANICAL DIMENSIONS | |
| APPRV | DATE | SIZE A / CAGE 1AU87 / DRAWING NO. PPM-LX_MECH / REV A | |
| CHKD | DATE | | |
| DRAFT/DESIGN M.BROWNING | DATE 02.18.2009 | SCALE / CAD ID: / SHEET NO. 1 OF 1 | |

# Jumper Reference

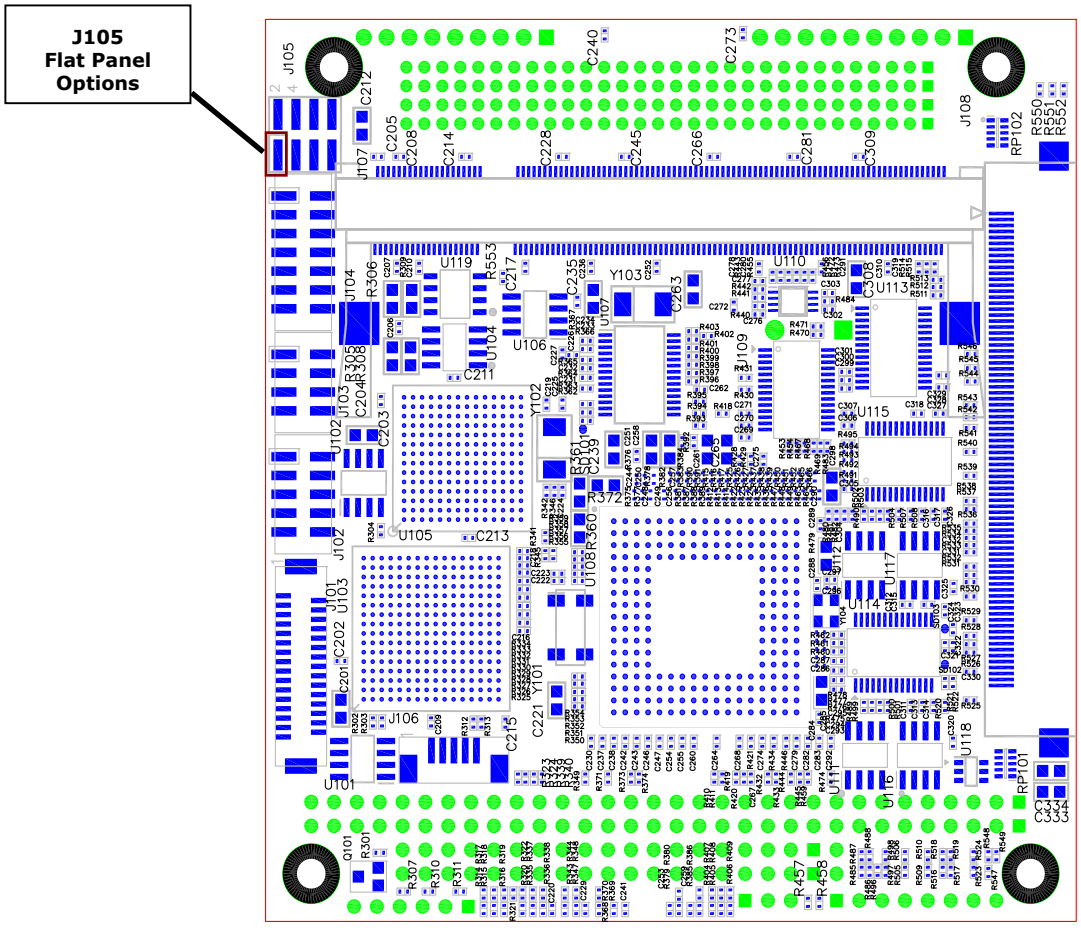
***Drawings ONLY*** - for more detailed information on these parts, refer to the descriptions shown previously in this manual.



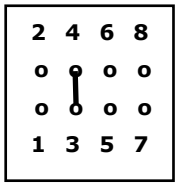

**J1**




| | | |
|---|---|---|
| CompactFlash | Master<br>Slave (default) | 1-2<br>1 2 |
| EEPROM | Enabled (default)<br>Disabled | 3-4<br>3 4 |
| Master Battery | Enabled (default)<br>Disabled | 5-6<br>5 6 |
| DIO (power) | Enabled<br>Disabled (default) | 7-8<br>7 8 |




**J105**




**Avoid Simultaneous Jumpering of pins 1-2 and 3-4.**

Misjumpering panel power could cause damage to the board and/or the Flat Panel.

| | | |
|---|---|---|
| Panel Power | 5V<br>3.3V (default) | 1-2, 3 4<br>1 2, 3-4 |
| Panel Options | S0 Low<br>S0 High | 5-6<br>5 6 |
| | S1 Low<br>S1 High | 7-8<br>7 8 |

# Specifications

**Electrical**

| | |
|---|---|
| **PPM-LX800-G CPU** | :AMD Geode™ LX800 |
| **Clock** | :533 MHz |
| **PC/104 Interface** | :16-bit, stackthrough optional |
| **PC/104-*Plus* Interface** | :32-bit PCI, stackthrough optional |
| **Ethernet data rate** | :10/100 Mbps |
| **USB Interface** | :Two (2) USB 2.0 ports |
| **Serial Interface** | :Four (4) Serial channels with RS-232 levels plus RS-422/485 on COM1 and COM2 |
| **CRT** | :Up to 1920x1440 resolution |
| **Flat Panel** | :Up to 1600x1200 resolution |
| **Audio** | :AC97 with MIC in, SPKR out and CD line in |
| **LPT Interface** | :Bidirectional (SPP) |
| **IDE Interface** | :Supports two (2) drives (UDMA) |
| **Keyboard** | :Standard PS/2 or USB interface |
| **Mouse** | :Standard PS/2 or USB interface |
| **VCC** | :+5V required, 1.2A typical |

**System Memory**

| | |
|---|---|
| **Capacity** | :Up to 1 GB 200-pin PC2700 SDRAM SODIMM |
| **Solid State Disk Device** | :One (1), Type I/II CompactFlash card |

**Mechanical**

| | |
|---|---|
| **Dimensions** | :3.6” x 3.8” (90 mm x 96 mm) |

**Connectors**

| | |
|---|---|
| **COM1-4, LPT, Mouse, Keyboard, ENET, Reset** | :80-pin Hirose |
| **Digital I/O and IDE** | :80-pin Hirose |
| **CRT** | :14-pin, 2 mm |
| **Flat Panel** | :31-pin Hirose |
| **Backlight Power** | :5-pin inline Molex |
| **USB** | :8-pin, 2mm |
| **Audio** | :10-pin, 2 mm |
| **PC/104 Bus** | :64-pin, 0.100”<br>:40-pin, 0.100” |
| **PC/104-*Plus*** | :120-pin (4 x 30, 2 mm) |
| **Power** | :8-pin inline Molex |

**Environmental**

| | |
|---|---|
| **Operating Temperature** | :-40°C to +85°C |
| **Noncondensing relative Humidity** | :5% to 95% |
| **Weight** | :4.6 oz (130 g) |
| **MTBF** | :7.60 years |

# Warranty Information

**WARRANTY**
(http://www.winsystems.com/company/warranty.cfm)

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