

OPERATIONS MANUAL

EPX-GX500

NOTE: *This manual has been designed and created for use as part of the WinSystems' Technical Manuals CD and/or the WinSystems' website. If this manual or any portion of the manual is downloaded, copied or emailed, the links to additional information (i.e. software, cable drawings) will be inoperable.*

WinSystems reserves the right to make changes in the circuitry
and specifications at any time without notice.

©Copyright 2006 by WinSystems. All Rights Reserved.

REVISION HISTORY

P / N 400-0322-000

Date Code

Rev Level

060106
060926

Preliminary
A

Table of Contents

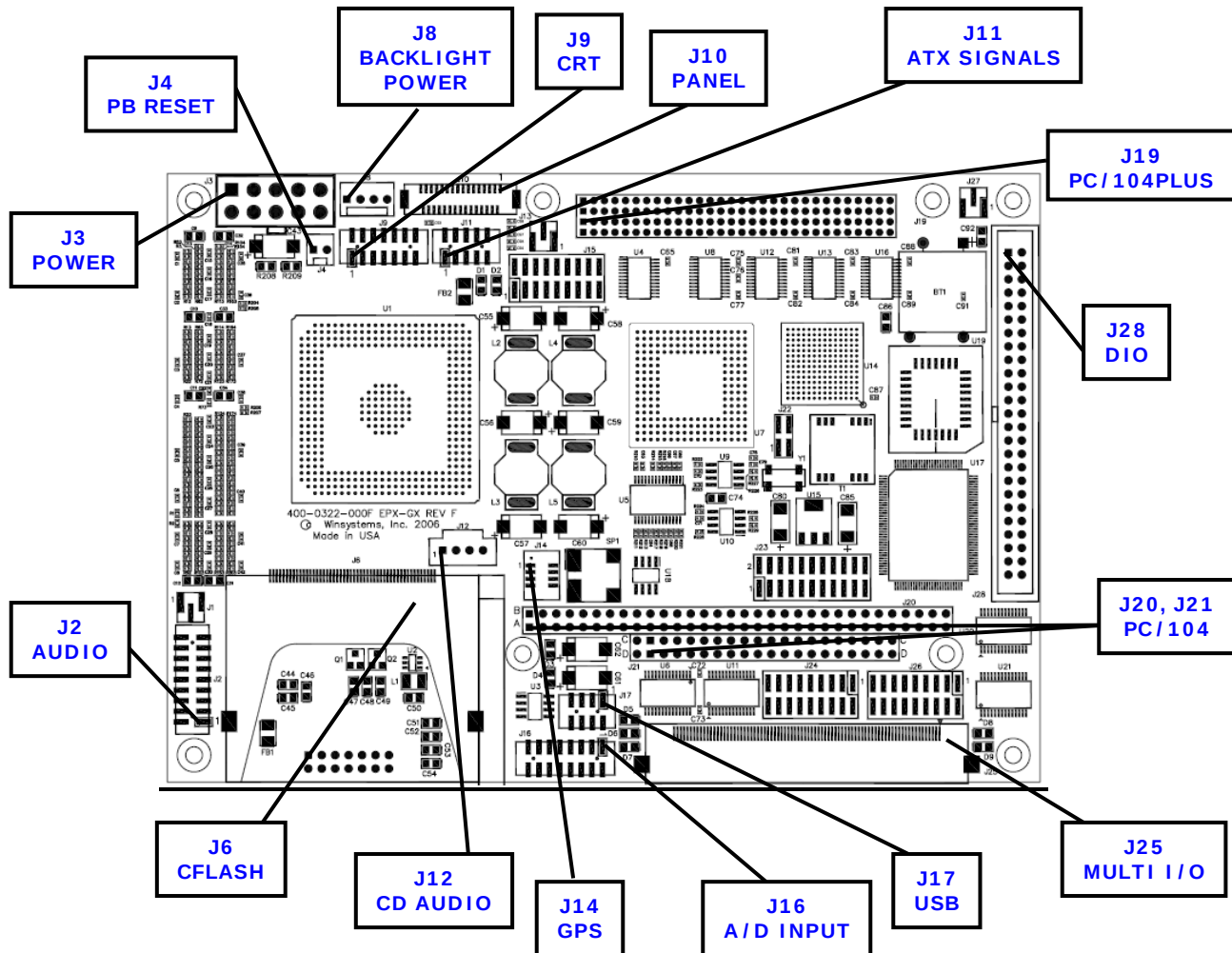
<u>Visual Index – Quick Reference</u>	<u>i</u>
Top View – Connectors	<u>i</u>
Top View- Jumpers	<u>ii</u>
Top View - LEDs	<u>iii</u>
Bottom View	<u>iv</u>
<u>Introduction</u>	<u>1</u>
<u>General Information</u>	<u>1</u>
Features	<u>1</u>
Software Support	<u>2</u>
<u>Functional Capability</u>	<u>3</u>
Processor	<u>3</u>
Memory	<u>3</u>
Direct Memory Access (DMA)	<u>3</u>
Interrupt Routing	<u>4</u>
Interrupt Status Register	<u>4</u>
Power and Reset Interface	<u>4</u>
Reset	<u>5</u>
BIOS	<u>6</u>
Rotational Disk Support	<u>6</u>
Solid State Disk (SSD) Support	<u>6</u>
Serial Communications	<u>7</u>
Video Interface	<u>9</u>
Ethernet Controller	<u>10</u>
A/D Converter Interface	<u>11</u>
Parallel I/O	<u>12</u>
Audio Interface	<u>13</u>
mini-PCI/802.11 Wireless Support	<u>14</u>
GPS Interface	<u>15</u>
Line Printer Port	<u>15</u>
Keyboard	<u>15</u>
Mouse Controller	<u>16</u>
USB	<u>16</u>
Timers	<u>16</u>
Real-Time Clock/Calendar	<u>16</u>
Watchdog Timer	<u>17</u>
Battery Back-up	<u>17</u>
Speaker	<u>17</u>
PC/104 Bus Interface	<u>18</u>
PC/104-Plus Bus Interface	<u>19</u>
PC/104-Plus VIO Voltage Selection	<u>19</u>
<u>I/O Port Map</u>	<u>20</u>
<u>Interrupt Map</u>	<u>21</u>
<u>Optional Address and IRQ Summary</u>	<u>22</u>

<u>Datasheet Reprint</u>	23
<u>Cables</u>	23
<u>Software Drivers & Examples</u>	23
<u>Software Summary</u>	25
<u>BIOS Supplemental</u>	30
<u>Serial Console Reference</u>	43
<u>Mechanical Drawing</u>	48
<u>Jumper Reference – (<i>Drawings ONLY</i>)</u>	49
<u>Specifications</u>	53
<u>Warranty and Repair Information</u>	

Visual Index – Quick Reference

Top View – Connectors

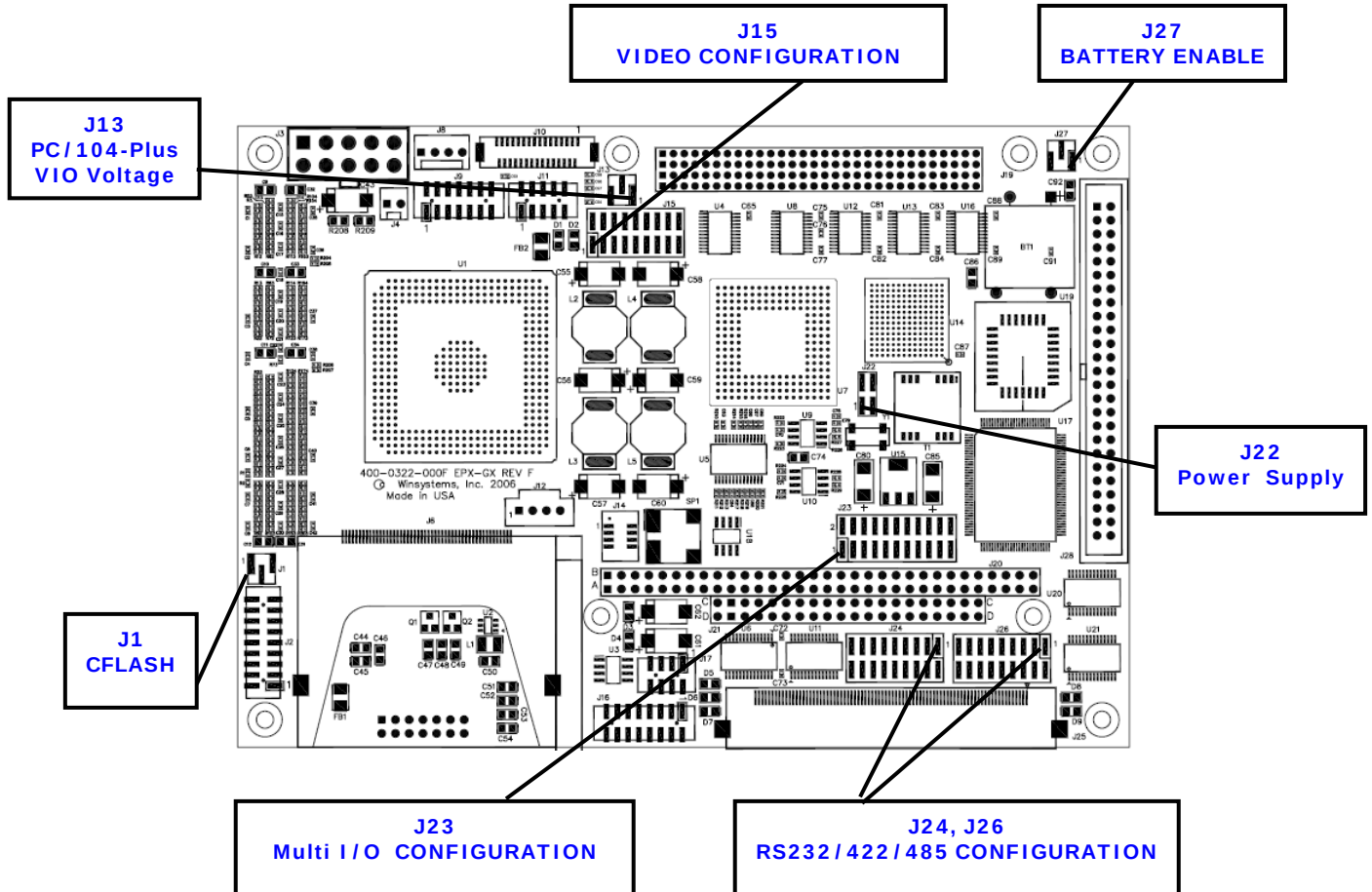
For the convenience of the user, a copy of the Visual Index has been provided with direct links to connector and jumper configuration data.



Visual Index – Quick Reference

Top View – Jumpers

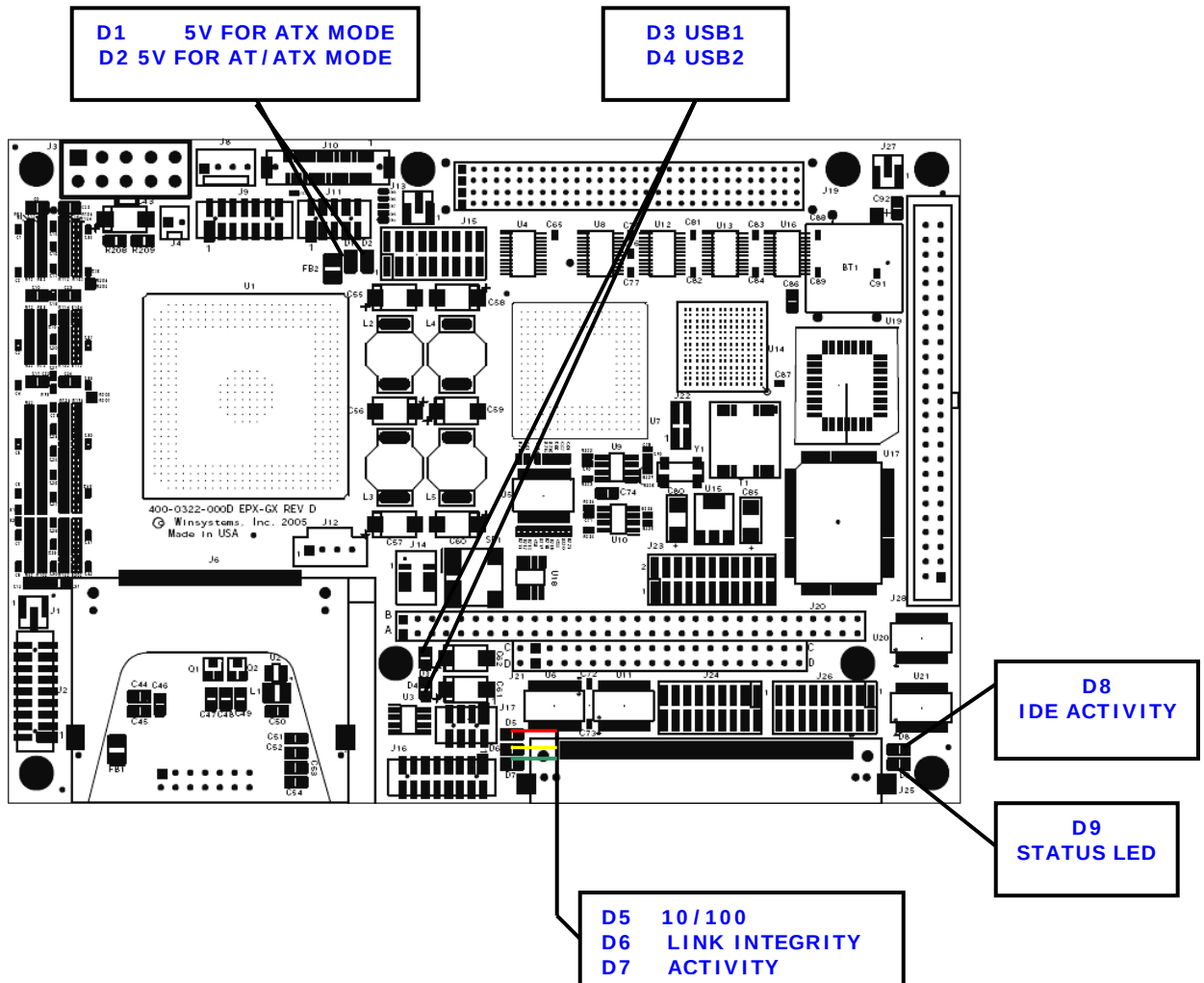
For the convenience of the user, a copy of the Visual Index has been provided with direct links to connector and jumper configuration data.



Visual Index – Quick Reference

Top View – LEDs

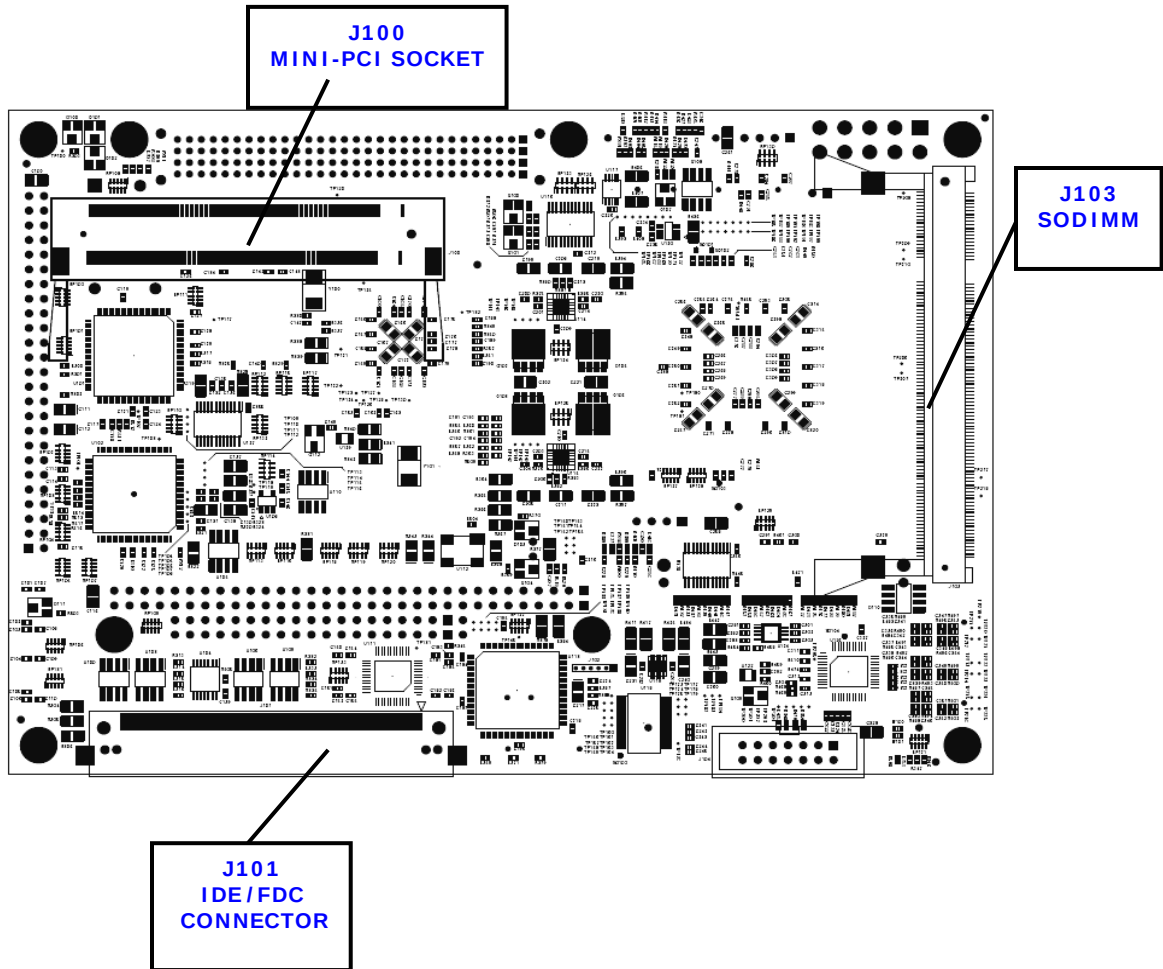
For the convenience of the user, a copy of the Visual Index has been provided with direct links to connector and jumper configuration data.



Visual Index – Quick Reference

Bottom View

For the convenience of the user, a copy of the Visual Index has been provided with direct links to connector and jumper configuration data.



Introduction

This manual is intended to provide the necessary information regarding configuration and usage of the EPX-GX500 board. WinSystems maintains a Technical Support Group to help answer questions regarding usage, or programming of the board. For answers to questions not adequately addressed in this manual, contact Technical Support at (817) 274-7553 between 8AM and 5PM Central Time.

General Information

Features

- AMD Geode™ GX500@1.0W processor
- EPIC-compliant board
- 128 to 512MB of system PC2700 DDR SDRAM supported in a 200-pin SODIMM socket
- Type I and II CompactFlash (CF) cards supported
- PC-compatible supports Linux, Windows® CE and XP embedded, DOS plus other x86-compatible RTOS
- High-resolution video controller supports
 - Color panels up to 18-bits/pixel
 - Panel resolutions up to 1280 x 1024
 - Backlight power supported
 - CRT supports 1600 x 1200 pixels
- 10/100 Mbps Intel PCI Ethernet controller
- 4 RS-232 serial ports with FIFO, COM1 & COM2 with optional RS-422/485 support
- Bi-directional LPT port supports EPP/ECP
- 24 bi-directional TTL digital I/O lines (WS16C48)
- Two USB 1.1 ports onboard
- MiniPCI connector for 802.11 a/b/g wireless module
- Floppy disk controller supports up to 2 drives
- Ultra DMA 66 EIDE hard disk controller
- Optional 12-bit A/D with up to 8 SE or 4 DI channels, with independent software programmable input ranges of $\pm 5V$, $\pm 10V$, 0-5V, and 0-10V
- AC97 Audio support
- PC/104 and PC/104-Plus expansion connectors
- AT keyboard controller and PS/2 mouse support
- GPS support via external serial mini-GPS module
- Activity LEDs onboard for visual status

The EPX-GX500 is an AMD Geode 500@1.0W-based, EPIC-compatible single board computer (SBC). AMD Geode processors have extremely low power dissipation which allows fanless operation.

The board accepts up to 512MB of PC2700 DDR SDRAM. Also, a 10/100 Ethernet controller, video with CRT and flat panel interfaces, four serial COM channels, 24 digital I/O lines, AC97 audio, and the standard AT peripheral feature set are

included. It supports 2 floppy disk drives and two Ultra-DMA 33/66 IDE drives. Additionally, the EPX-GX500 has two USB 1.1 channels that support USB keyboard, mouse, floppy and storage devices. Legacy USB operation is supported by the system BIOS. Booting from the USB drive is supported.

The EPX-GX500 measures 4.5 x 6.5-inches (115mm x165mm) and is compliant with the EPIC (Embedded Platform for Industrial Computing) standard. It offers additional I/O expansion with PC/104 and PC/104-Plus connectors.

There is a socket for bootable Type I and II Compact-Flash cards. The EPX-GX500 also includes a socket for a miniPCI wireless 802.11 a/b/g card. A connector is included to support a remote GPS receiver.

The board will operate from -40° to +85°C without requiring a fan, for rugged embedded applications. It is ideal for low-power, high-performance, battery-powered and portable applications.

SOFTWARE SUPPORT

Software - The EPX-GX500 is an x86-compatible SBC. It is designed to run both 16-bit and 32-bit x86 instruction set software and is compatible with Microsoft's Windows® CE and XP operating systems as well as the applications that run on them. It also supports Linux, DOS and other operating systems such as QNX or VxWorks. Its x86-PC software compatibility assures a wide range of tools to aid in developing and checkout of your application's program.

Software Developers Kit - WinSystems offers the software developers kits to provide the necessary hardware, software and cables to begin program development with the EPX-GX500 board. The configuration consists of an operating system, DVD-ROM drive, a hard disk, a 3.5-inch floppy disk, plus required cables and triple output power supply housed in an enclosure. This packaging permits easy access to the board, PC/104 modules and peripherals during program development.

Functional Capability

Processor

This board is based upon an AMD Geode GX500 and the CS5535 companion chip. These devices incorporate the CPU, 32KB of cache, FPU, DDR SDRAM Controller, Flash/ROM Controller, an integrated display controller, audio controller, PCI Controller and the RTC/CMOS RAM.

The AMD processor runs at 333MHz with a typical power consumption of 1.1W allowing operation in extended temperature environments. AMD Geode Solutions assigns model numbers to better reflect total performance beyond just the clock speed. The Geode GX500 model number reflects performance as a 500MHz processor. The processor is not user replaceable or upgradeable.

Memory

The EPX-GX500 can support a maximum of 512Mb of RAM with the SODIMM socket located on the back of the board at **J103**.

A blue oval icon with a dashed border containing the text "Visual Index".

Visual
Index

Qualified SODIMMS are available directly from WinSystems. WinSystems cannot warrant the operation of systems using non-qualified SODIMM modules.

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

128, 256, 512Mb 200-Pin SODIMM DDR SDRAM PC2700 with gold fingers

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.

Direct Memory Access (DMA)

DMA is supported. Channel 2 is dedicated to the floppy disk controller. The LPT is plug-and-play configurable. The other 8-bit DMA channels are wired to the PC/104 connector. 16-bit channels 5, 6, and 7 are not supported on the AMD GX500 processor.

Interrupt Routing

Two 82C59A-compatible interrupt controllers accept inputs from the onboard 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 to the EPX-GX500 is an Interrupt Status Register located at 1ECH. This register allows some on-board devices to share an interrupt(s) and thus free an interrupt(s) for another peripheral. It is the same technique used to share interrupts on multi-port serial cards for many years. If two devices are configured in the BIOS to use the same interrupt, the Interrupt Status Register can be read to determine which device 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.

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.

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	PPS	ADC	DIO	COM4	COM3

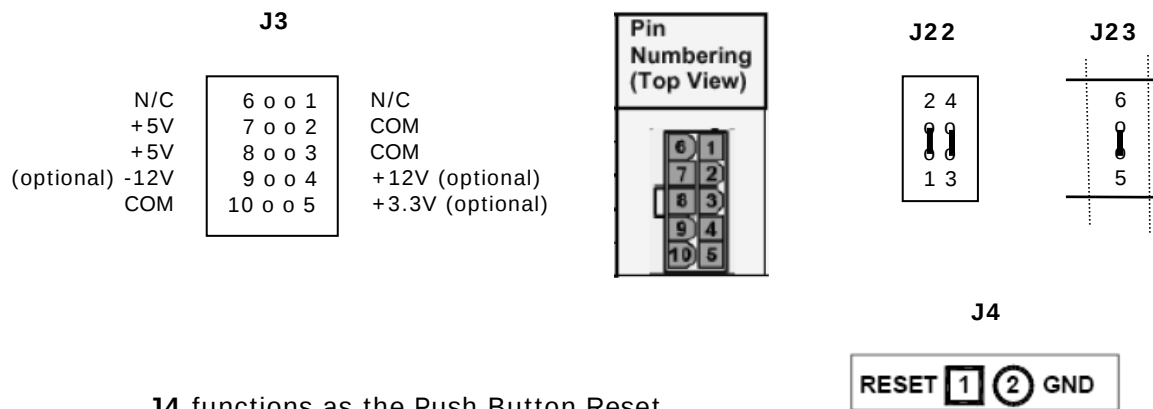
Note: A 1 will be read for the device(s) with an interrupt pending.

Power and Reset Interface

Power Supply Selection – The EPX-GX500 supports either AT or ATX type power supplies. **J22** specifies the style of supply connected to the single board computer. AT Power is a simple on/off power supply with no interaction with the single board computer. Most embedded systems use this type of power supply and it is the default setting.

Visual Index

AT Type Power Supply Connections



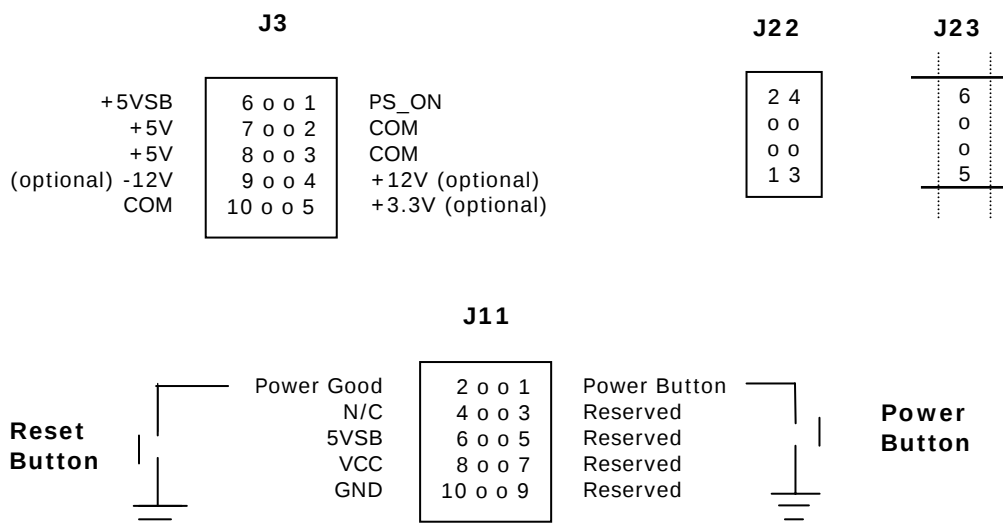
J4 functions as the Push Button Reset

ATX type power supplies function with a "soft" on/off power button and a +5VSB (Stand By). If an ATX compatible power supply is connected, **J22** should be set accordingly and a power button (momentary contact) connected between pin 1 of

J11 and ground. The +5VSB provides the Stand By voltage to the EPX-GX500 but does not power any other features of the board. When the power button is pressed, the GX500 pulls PS_ON (Power Supply On) low and the power supply turns on all voltages to the single board computer. When the power button is pressed again, the BIOS signals the event so ACPI compliant operating systems can be shutdown before the power is turned off. Since this is software driven, it is possible that a software lockup could prevent the power button from functioning properly. For the BIOS to report the ATX supply to ACPI compatible operating systems, **J23** pins 5 and 6 should be open.

Note: True ATX power supplies are not applicable for embedded systems. They are typically 300 Watt supplies and may not regulate properly with low power embedded systems such as the EPX-GX500.

ATX Type Power Supply Connections



Reset

A precision voltage comparator monitors the +5 volt status. Upon detection of an out-of-tolerance condition, the board is reset. This action is critically important in order to detect brown-out or power fail conditions. The reset circuit also ensures that the power is nominal before executing a power-on reset. This circuit also inhibits the processor's memory write line, preventing invalid data from being written to non-volatile memory during power fluctuations.

BIOS

Visual
Index

The BIOS provides configuration flexibility, performance and AT-compatibility. It is located in an EEPROM that can be modified and upgraded without removing the device from the board. The EPX-GX500 BIOS will operate without a keyboard or video attached. Configuration options and instructions are discussed in more detail in the [BIOS Supplemental](#) later in this manual.

When a jumper is installed between **J23** pins 17 and 18, a user can save specific BIOS settings to the EEPROM. These user settings will then be loaded from the EEPROM, if a CMOS checksum error or battery failure occurs. The factory defaults can be restored at anytime by removing the jumper from **J23** pins 17 and 18.

Rotational Disk Support

Visual
Index

An industry-standard 16-bit IDE interface is provided to support up to 2 hard disks. A status LED D8 provides visual status during IDE data transfers. Up to two, 3.5" or 5.25" floppy disk drives are also supported. Interface is provided at connector **J101** which is an 80-pin high density connector. WinSystems offers the cable [CBL-252-1](#) to simplify the connection. The pinout for the connector and cable is listed in detail in the [cable drawing](#).

Optionally, a USB disk drive can be connected in addition to, or instead of the standard IDE or Floppy drives. Legacy USB operation is supported by the system BIOS. System boot from the USB drive is supported.

Solid State Disk (SSD) Support

Visual
Index

The EPX-GX500 supports solid state CompactFlash storage devices for applications where the environment is too harsh for mechanical hard disks or floppy drives.

The CompactFlash socket at **J6** supports modules with true IDE support. WinSystems offers industrial grade CompactFlash modules that provide high performance and extended temperature operation (-40° to +85°C). A red IDE activity LED is present at D8.

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

CFLASH (J1)



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. System boot from the USB drive is supported.

Serial Communications

A blue oval icon with a dotted border containing the text "Visual Index".

Visual
Index

Four independent, full-duplex, RS-232 asynchronous serial channels are onboard. Interface is provided at connector **J25** which is a 80-pin high density connector. WinSystems offers the cable [CBL-251-1](#) to simplify the connection. The pinout for the connector and cable is listed in detail in the [cable drawing](#). Connector variations for RS-232, RS-422 and RS-485 are shown below.

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 dual 16C550-compatible UARTs that offer software compatibility with PC-type driver programs.

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 on-chip software programmable baud rate generator is selectable from 50 through 115.2 kbits/sec. Individual modem handshake control signals are supported for all channels.

RS-232 interface levels are supported on all four channels. The RS-232 drivers have an on-chip charge pump to generate the plus and minus voltages so that the EPX-GX500 only requires +5 volts to operate.

COM1 and COM2 also have jumper selectable RS-422/485 support. RS-422/485 provides separate balanced transmit and receive signal pairs. For RS-485 multi-drop lines, one signal pair can be used for "party line" network structures. This configuration is accomplished at jumper field **J24** & **J26** respectively as shown below.

COM1 and COM2 Configuration - Both COM1 and COM2 can be individually configured for any one of the following operating modes:

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.

Each of the RS-422/RS-485 modes also allows for jumper selection of transmit and/or receive termination resistor(s). There is a 11-pin configuration jumper for COM1 and COM2 that allows the user to select the operating mode and its optional features and termination. The jumper numbers and corresponding port numbers are shown on the following pages. There are three choices for termination when RS-422 or RS-485 modes are used.

TX(100) : Places a 100 Ohm resistor across the “TX+”/“TX-” pair

RX(100) : Places a 100 Ohm resistor across the “RX+”/“RX-” pair

TX/RX(300) : Places a 100 Ohm Resistor from +5V to “TX/RX+”, a 100 Ohm resistor from “TX/RX -” to ground and a 100 resistor between “TX/RX+” and “TX/RX-”.

COM1/COM2 RS-232/RS-422/RS-485 Modes - COM1 is configured by setting jumpers at **J26** and COM2 is configured by setting jumpers at **J24**, as shown in the tables below. The tables provide the appropriate jumpering for the various modes.



COM1 (J26)

Mode #	Description	Jumpers	Termination		
			TX (100)	RX (100)	TX/RX (300)
1	RS-232	1-2	N/A	N/A	N/A
2	RS-422 RTS Enable	3-4, 9-10	13-14	17-18	11-12 13-14 15-16
3	RS-422 Auto Enable	3-5, 9-10 (One node must use TX/RX 300 Termination)	N/A	17-18	11-12 13-14 15-16
4	RS-485 RTS Enable	3-4, 7-8	13-14	N/A	11-12 13-14 15-16
5	RS-485 RTS Enable with Echo-Back	3-4, 6-8	13-14	N/A	11-12 13-14 15-16
6	RS-485 Auto Enable	3-5, 7-8 (One node must use TX/RX 300 Termination)	13-14	N/A	11-12 13-14 15-16
7	RS-485 Auto Enable with Echo-Back	3-5, 6-8 (One node must use TX/RX 300 Termination)	N/A	N/A	11-12 13-14 15-16

COM2 (J24)

Mode #	Description	Jumpers	Termination		
			TX (100)	RX (100)	TX/RX (300)
1	RS-232	1-2	N/A	N/A	N/A
2	RS-422 RTS Enable	3-4, 9-10	13-14	17-18	11-12 13-14 15-16
3	RS-422 Auto Enable	3-5, 9-10 (One node must use TX/RX 300 Termination)	N/A	17-18	11-12 13-14 15-16
4	RS-485 RTS Enable	3-4, 7-8	13-14	N/A	11-12 13-14 15-16
5	RS-485 RTS Enable with Echo-Back	3-4, 6-8	13-14	N/A	11-12 13-14 15-16
6	RS-485 Auto Enable	3-5, 7-8 (One node must use TX/RX 300 Termination)	13-14	N/A	11-12 13-14 15-16
7	RS-485 Auto Enable with Echo-Back	3-5, 6-8 (One node must use TX/RX 300 Termination)	N/A	N/A	11-12 13-14 15-16

Serial Connector Summary (DB9 Pinout) for all four ports

Visual
Index

DB9 Male	RS-232 Mode	RS-422 Mode	RS-485 Mode
1 2 3 4 5	1. DCD	1. N/A	1. N/A
0 0 0 0 0	2. RX	2. TX+	2. TX/RX+
0 0 0 0	3. TX	3. TX-	3. TX/RX-
6 7 8 9	4. DTR	4. N/A	4. N/A
	5. GND	5. GND	5. GND
	6. DSR	6. RX+	6. N/A
	7. RTS	7. RX-	7. N/A
	8. CTS	8. N/A	8. N/A
	9. RI	9. N/A	9. N/A

COM3 and COM4 – COM3 and COM4 support RS-232 only and can be enabled or disabled in the BIOS. Please see the [BIOS Supplemental](#) for further details.

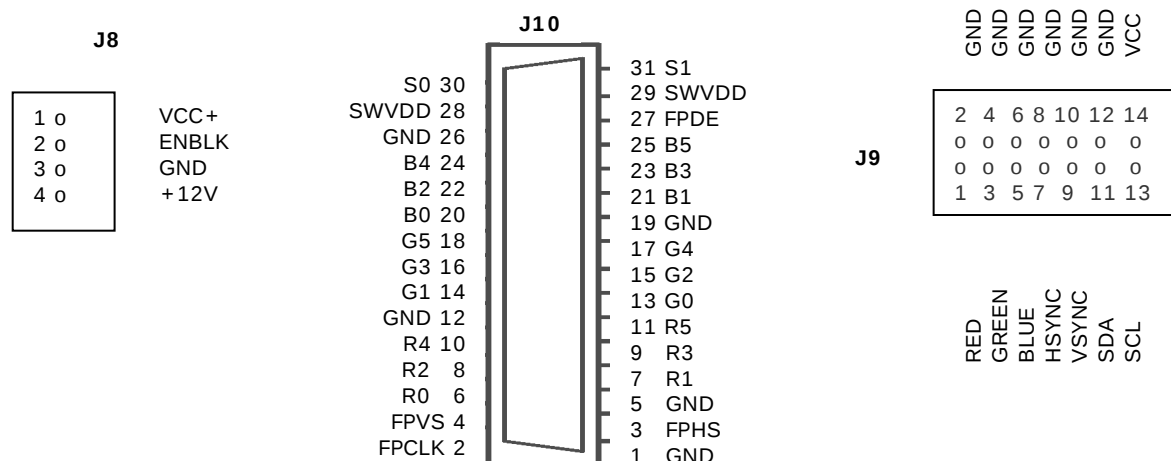
Video Interface

Visual
Index

The EPX-GX500 has an integrated display controller that provides both CRT and flat panel display interface. The video output mode is selected with pins 17 & 18 of jumper **J15**. CRT mode is selected by jumpering these pins. If these pins are left open, flat panel mode is selected. Simultaneous CRT and flat panel modes are not supported. The CRT connector is located at **J9**. The direct digital flat panel interface is located at **J10**. The EPX-GX500 supports flat panel display resolutions of 640x480, 800x600 and 1024x768. The mode is selected at **J23**. WinSystems offers a LVDS adapter to support interfacing to LVDS style flat panel displays. The backlight power connector is located at **J8**.

Note: **J15** must be jumpered specific to a particular display panel and backlight inverter. Extreme care should be exercised to avoid damaging or destroying the display and/or the SBC.

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.**



Ethernet Controller



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 10-BaseT and 100BaseT 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.

Two large 3Kbyte transmit and receive FIFOs help prevent data underruns and overruns. It has fast back-to-back transmission support with minimum interframe spacing. It also has improved dynamic transmit chaining with multiple priorities transmit queues.

Interface is provided at connector **J25** which is a 80-pin high density connector. WinSystems offers the cable [CBL-251-1](#) 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 EPX-GX500 to provide a visual indication of the link status, network activity and network speed. The yellow Link Integrity LED is lit when there is a valid connection 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.

The Ethernet activity signals are also provided at connector **J25** to allow optional status LEDs to be mounted off-board. WinSystems offers the cable CBL-251-1 to simplify the connection. The pinout for the connector and cable is listed in detail in the cable drawing. The Ethernet activity signals are active low and require an external resistor to limit current to 12-16-mA.

D6	LED 0	(YELLOW)	LINK INTEGRITY
D5	LED2	(RED)	10/100
D7	LED1	(GREEN)	ACTIVITY

The 82551ER chip is very popular both in the commercial and industrial PC-compatible market. This means that most PC-compatible drivers, utilities and 10/100 Ethernet supported operating systems will work directly. The configuration information describing the device's architecture, address, interrupt, etc. is stored in a serial EEPROM.

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

Status LED – A red status LED is located at D9 on the EPX-GX500. This LED 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.

A/D Converter Interface

The EPC-GX500 provides Analog-to-Digital conversion input using the 12-bit Linear Technologies LTC 1857CG. This very flexible device supports up to 8 channels with software-selectable input modes and ranges that can be programmed for each channel on the fly. The channel configuration word selects whether an input will operate in single ended or differential mode and the desired input range (0V to 5V, 0V to 10V, +/- 5V and +/- 10V).

The LTC1857CG uses a successive approximation algorithm and an internal sample-and-hold circuit to convert an analog input signal to 12-bit digital data. The output is two's complement binary for bipolar mode and offset binary for unipolar mode.

Programming information for the A/D controller is provided in the [Software Summary](#) chapter of this manual.

A 16-pin connector (**J16**) provides interface to the A/D converter.

CH0	1 0 0 2	GND
CH1	3 0 0 4	GND
CH2	5 0 0 6	GND
CH3	7 0 0 8	GND
CH4	9 0 0 10	GND
CH5	11 0 0 12	GND
CH6	13 0 0 14	GND
CH7	15 0 0 16	GND

NOTE: When the board is powered off, the A/D input has a 20K input impedance and is protected to +/- 20V. When the board is powered on, the A/D differential channel input has a 31K input impedance, the single-ended channel input has a 42K input impedance and the inputs are protected to +/- 25V.

Parallel I/O



The EPC-GX500 utilizes the WinSystems WS16C48 ASIC high-density I/O chip mapped at a base address of 120H. The 24 lines are each individually programmable as input or output and capable of fully latched event sensing with software programmable polarity.

The parallel I/O feature can be enabled or disabled in the CMOS setup utility. (See description in [BIOS Supplemental](#).)

The I/O connector (**J28**) can provide +5 volts to an I/O rack or for miscellaneous purposes by jumpering J23, pins 21-22. When pins 21-22 are jumpered, +5V is provided at pin 49 of J28. It is the user's responsibility to limit current to a safe value (less than 400mA) to avoid damaging the CPU board.

Programming information for the Parallel I/O controller is provided in the [Software Summary](#) chapter of this manual.

A 50-pin connector (**J28**) allows for easy mating with industry standard I/O racks.

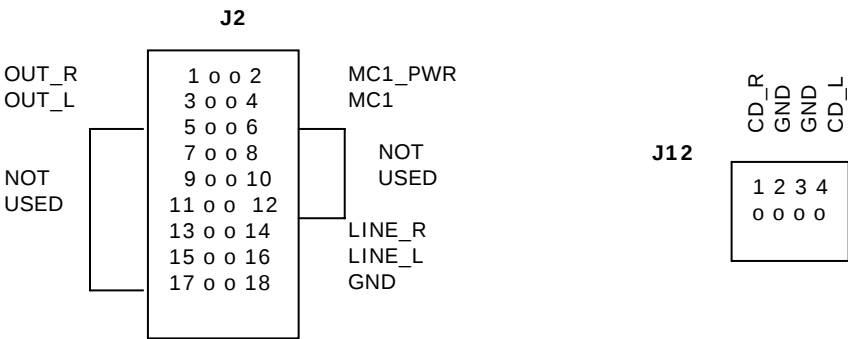
J28

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

Audio Interface

The EPX-GX500 has an audio interface designed to provide high-quality audio reproduction for embedded systems use. The EPX-GX500 provides a 2-channel line level input, 2-channel line level output, microphone input, and a secondary line level input for audio CD use.

J2 provides connection to Line and Microphone inputs. **J12** provides the CD Audio connection.



mini-PCI / 802.11 Wireless Support

Visual
Index

The EPX-GX500 includes a miniPCI socket (**J100**) as another means to add functionality. Though the socket can support other devices, it is most often used to add wireless Ethernet cards from Intel, Broadcom, Foxconn (Atheros), or others.

WinSystems offers a kit which includes an Intel® PRO/Wireless 2200BG mini-PCI card, an antenna and the necessary cable. An Intel PRO/Wireless 2200BG card is a standards-based, Wi-Fi Certified wireless local area network (WLAN) solution that allows up to 54 million bits of data to be transferred per second. It is designed to maintain high throughput at longer ranges depending upon the type of antenna used. The Intel PRO/Wireless 2200BG network connection fully supports today's security standards such as Wi-Fi Protected Access (WPA) and can be upgraded via software downloads for future security standards such as 802.11i.

mini-PCI Device Interface (J100)

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	N/C	2	N/C	63	3.3V	64	FRAME#
	KEY		KEY	65	CLKRUN#	66	TRDY#
3	N/C	4	N/C	67	SERR#	68	STOP#
5	N/C	6	N/C	69	GROUND	70	3.3V
7	N/C	8	N/C	71	PERR#	72	DEVSEL#
9	N/C	10	N/C	73	C/BE(1)#	74	GROUND
11	N/C	12	N/C	75	AD(14)	76	AD(15)
13	N/C	14	N/C	77	GROUND	78	AD(13)
15	N/C	16	RESERVED	79	AD(12)	80	AD(11)
17	INTB#	18	5V	81	AD(10)	82	GROUND
19	3.3V	20	INTA#	83	GROUND	84	AD(09)
21	RESERVED	22	RESERVED	85	AD(08)	86	C/BE(0)#
23	GROUND	24	3.3V AUX	87	AD(07)	88	3.3V
25	CLK	26	RST#	89	3.3V	90	AD(06)
27	GROUND	28	3.3V	91	AD(05)	92	AD(04)
29	REQ#	30	GNT#	93	RESERVED	94	AD(02)
31	3.3V	32	GROUND	95	AD(03)	96	AD(00)
33	AD(31)	34	PME#	97	5V	98	RESERVED_WIP ⁵
35	AD(29)	36	RESERVED	99	AD(01)	100	RESERVED_WIP ⁵
37	GROUND	38	AD(30)	101	GROUND	102	GROUND
39	AD(27)	40	3.3V	103	N/C	104	M66EN
41	AD(25)	42	AD(28)	105	N/C	106	N/C
43	RESERVED	44	AD(26)	107	N/C	108	N/C
45	C/BE(3)#	46	AD(24)	109	N/C	110	N/C
47	AD(23)	48	IDSEL	111	N/C	112	RESERVED_WIP ⁵
49	GROUND	50	GROUND	113	N/C	114	GROUND
51	AD(21)	52	AD(22)	115	N/C	116	N/C
53	AD(19)	54	AD(20)	117	N/C	118	N/C
55	GROUND	56	PAR	119	N/C	120	N/C
57	AD(17)	58	AD(18)	121	RESERVED	122	N/C
59	C/BE(2)#	60	AD(16)	123	N/C	124	3.3V AUX
61	IRDY#	62	GROUND				

GPS Interface

Visual Index

The EPX-GX500 board has provisions for supporting the Lassen SQ GPS receiver module. The necessary serial interface is terminated to an 8-pin header connector (**J14**) compatible with the GPS receiver. The receiver module and a sample antenna are available from WinSystems. Contact your WinSystems' Applications Engineer for additional information.

The optional GPS can also provide a pulse per second (PPS) interrupt. The receiver generates a 4 microsecond wide positive pulse every second with the leading edge synchronized to UTC time within ± 95 nanoseconds when valid position fixes are being reported. WinSystems' onboard implementation degrades this accuracy by buffering the PPS output using a 74HCT14 Schmidt trigger device which also inverts the signal. Since PC interrupts are edge triggered on the rising edge, the actual interrupt will occur 4 microseconds plus the inverter propagation time later (typical 17nS). This added delay is actually insignificant to any software synchronizing routines as the entire hardware interrupt acknowledge process will consume many additional microseconds in a best-case scenario. The PPS signal begins immediately at power up and continues even if the receiver loses GPS lock. The drift of the signal without GPS lock is unspecified.

Line Printer Port

Visual Index

The LPT port is a multi-mode parallel printer port that supports the PS/2 standard bi-directional parallel port (SPP), Enhanced Parallel Port (EPP), or Extended Capabilities Port (ECP). The output drivers support 14 mA per line.

Interface is provided at connector **J25** which is a 80-pin high density connector. WinSystems offers the cable [CBL-251-1](#) 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 8 input or output only lines. The other port is configured as 5 input and 3 output lines.

Keyboard

Visual Index

An integrated 80C42 equivalent keyboard controller supports a PC/AT-type keyboard. Interface is provided at connector **J25** which is a 80-pin high density connector. WinSystems offers the cable [CBL-251-1](#) to simplify the connection. The pinout for the connector and cable is listed in detail in the [cable drawing](#). Optionally, a USB keyboard can be connected in addition to, or instead of the standard PS2 keyboard. Legacy USB operation is supported by the system BIOS.

Mouse Controller

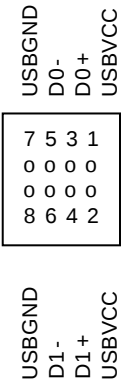


A PS2 mouse port provides a PS2 connection for a compatible Mouse. Interface is provided at connector **J25** which is a 80-pin high density connector. WinSystems offers the cable [CBL-251-1](#) to simplify the connection. The pinout for the connector and cable is listed in detail in the [cable drawing](#). Optionally, a USB mouse can be connected in addition to, or instead of the standard PS2 mouse. Legacy USB operation is supported by the system BIOS.

USB



The EPX-GX500 provides 2 channels of USB 1.1 compatible support. These are terminated to an 8-pin 2mm connector at **J17**. An adapter cable CBL-275-1 is available from WinSystems for connection. The pinout for the connector is:



Timers

Three, independent 82C54 compatible 16-bit timers are supported.

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.

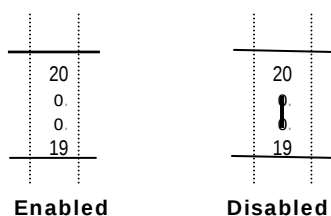
Watchdog Timer

Visual
Index

The EPX-GX500 features a watchdog timer, which can be used to guard against software lockups. When a jumper is placed on pins 19-20 of J23, the watchdog circuit is totally disabled and can never reset the processor. When pin 19-20 are left open, the circuit will function as configured from the CMOS setup utility. (See description in [BIOS Supplemental](#).) The selection in the CMOS setting serves as the default timeout value as the processor boots but can be changed in the application software as shown below. The watchdog timer is serviced by writing any value to I/O port 1EFH. If the watchdog is not been serviced within the allotted time the circuit resets the CPU.

Note: It is recommended that the long timeout (300 seconds) be used with the watchdog enabled when trying to boot any operating system.

J23



Watchdog Timer (must be enabled at J23)

Port Address	Value	Reset Interval
1EEH	00h	DISABLED
	01h	3 SECONDS
	02h	30 SECONDS
	04h	300 SECONDS
1EFH	ANY	RESET TIMER

Battery Back-up

A 350-mAH battery supplies the EPX-GX500 board with standby power for the real-time clock and CMOS set-up RAM.

Visual
Index

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

Master Battery Enable (J27)

ENABLE	1-2
DISABLE	2-3

Speaker

An onboard speaker is available for sound generation. A beep code is generated that corresponds to any BIOS error codes (if required) during the power up or reset sequence.

PC/104 Bus Interface

Visual
Index

The EPX-GX500 supports the PC/104 bus which is basically the original ISA bus with the 16-bit extensions. A vast array of PC/104 stack-on modules are available from WinSystems and other PC/104 suppliers. 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.

J20

GND	B1 ○ ○ A1	IOCHK*
RESET	B2 ○ ○ A2	BD7
+5V	B3 ○ ○ A3	BD6
IRQ9	B4 ○ ○ A4	BD5
-5V	B5 ○ ○ A5	BD4
DRQ2	B6 ○ ○ A6	BD3
-12V	B7 ○ ○ A7	BD2
SRDY*	B8 ○ ○ A8	BD1
+12V	B9 ○ ○ A9	BD0
GND	B10 ○ ○ A10	IOCHRDY
MEMW*	B11 ○ ○ A11	AEN
MEMR*	B12 ○ ○ A12	SA19
IOW*	B13 ○ ○ A13	SA18
IOR*	B14 ○ ○ A14	SA17
DACK3*	B15 ○ ○ A15	SA16
DRQ3	B16 ○ ○ A16	SA15
DACK1*	B17 ○ ○ A17	SA14
DRQ1	B18 ○ ○ A18	SA13
REFRESH*	B19 ○ ○ A19	SA12
SYSCLK	B20 ○ ○ A20	SA11
IRQ7	B21 ○ ○ A21	SA10
IRQ6	B22 ○ ○ A22	SA9
IRQ5	B23 ○ ○ A23	SA8
IRQ4	B24 ○ ○ A24	SA7
IRQ3	B25 ○ ○ A25	SA6
DACK2*	B26 ○ ○ A26	SA5
TC	B27 ○ ○ A27	SA4
BALE	B28 ○ ○ A28	SA3
+5V	B29 ○ ○ A29	SA2
OSC	B30 ○ ○ A30	SA1
GND	B31 ○ ○ A31	SA0
GND	B32 ○ ○ A32	GND

J21

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

PC/104-Plus Bus Interface

Visual
Index

The EPX-GX500 supports peripheral expansion using the PC/104-Plus connector at **J19**. Up to three PC/104-Plus modules can be stacked onto the EPX-GX500. 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.

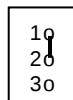
Pin	A	B	C	D
1	GND/5.0 Key	RESERVED	+5V	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0*	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD06
8	+3.3V	C/BE1*	AD15	+3.3V
9	SERR*	GND	SB0*	PAR
10	GND	PERR*	+3.3V	SDONE
11	STOP*	+3.3V	LOCK*	GND
12	+3.3V	TRDY*	GND	DEVSEL*
13	FRAME*	GND	IRDY*	+3.3V
14	GND	AD16	+3.3V	C/BE3*
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*

PC/104-Plus VIO Voltage Selection

Visual
Index

PC/104-Plus VIO voltage is selected by jumpering **J13**.

J13 jumpered 1-2 supports +5V (default)
J13 jumpered 2-3 supports +3.3V



+5V
VIO
+3.3V

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 EPX-GX500 uses a PnP BIOS resource allocation. Care must be taken to avoid contention with resources allocated by the BIOS.

<u>Hex Range</u>	<u>Usage</u>
000-00F	8237DMA Controller #1
**010-01F	Free
020-021	8259 PIC #1
**022-03F	Free
040-043	8254 PIT
**044-05F	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
120-127	Digital I/O (Default)
**128-1EA	Free
1E8-1EB	A/D (Default)
1EC	Interrupt Status
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	Floppy Disk Controller #1
3F8-3FF	COM1 – (Default)

Interrupt Map

Hardware Interrupts (IRQs) are supported for both PC/104 (ISA) and PC/104Plus (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 EPX-GX500.

IRQ0	18.2 Hz heartbeat
IRQ1	Keyboard
IRQ2	Chained to Slave controller
IRQ3	COM2 *
IRQ4	COM1 *
IRQ5	COM3 *
IRQ6	Floppy Disk
IRQ7	LPT *
IRQ8	Real Time Clock
IRQ9	ACPI (only under ACPI compliant OS)
IRQ10	Not Used
IRQ11	PCI Interrupts
IRQ12	Mouse
IRQ13	Floating point processor
IRQ14	IDE
** IRQ15	COM4 *

* 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.

** This interrupt is currently unavailable under the Windows XPe or CE operating systems. COM4 and COM3 can share interrupt 5 under that scenario.

IRQs 6,7,9,12 & 14 can easily be stolen for other uses if those features are not required by turning them off in the CMOS setup. IRQ 15 works everywhere but Windows XP or CE.

Optional Address and IRQ Summary

The first column of this table lists the default CMOS selection for each item. The other columns list the optional alternatives that are available as address/IRQ pairs.

	Default						
COM1	3F8h/4	2F8h/3	3E8h/5	2E8h/9	3A8h/4	2A8h/3	Disable
COM2	2F8h/3	3E8h/5	2E8h/9	3A8h/4	2A8h/3	3F8h/4	Disable
UARTA(GPS)	Disable	3F8h/4	2F8h/3	3E8h/5	2E8h/9		
UARTB(COM3)	3E8h/5	3A8h/5	3E8h/12	3A8h/12	3E8h/15	3A8h/15	Disable
UARTC(COM4)	2E8h/15	2A8h/15	2E8h/5	2A8h/5	2E8h/12	2A8h/12	Disable

Notice for these items the address and IRQ are separately selectable. The first of each are CMOS defaults.

LPT	378h	278h	3BCh	Disable	IRQ 7, 9, 10, 11, 5
A/D	1E8h	Disable	IRQ NONE, 12, 15		
DIO	120h	Disable	IRQ NONE, 5, 10		

This item does not require I/O space. The IRQ is selectable as shown.

PPS	IRQ NONE, 7, 9
-----	----------------

Notes:

COM ports are 8 contiguous bytes

LPT port is 4 contiguous bytes

A/D is 4 contiguous bytes

DIO is 8 contiguous bytes

PPS (Pulse Per Second) uses no I/O space and requires optional GPS module

Datasheet Reprint

LTC1857 Datasheet	185789f.pdf
-------------------	-----------------------------

Cables

Part Number	Description
CBL-234-1	VGA Convertor Cable
CBL-251-1	Multi I/O Cable
CBL-252-1	Multi Drive Cable
CBL-265-1	SDK4/PS80 power cable
CBL-265-2	Un-terminated power cable
CBL-270-3-1.5A	Audio breakout cable
CBL-275-1	Dual USB cable
CBL-276-1	Analog input cable (flying lead, un-terminated on one end)
CBL-277-1	PS control/LED cable (flying lead, un-terminated on one end)
CBL-278-1	GPS Cable

Software Drivers & Examples

Latest BIOS and Update utility	EpxGxBiosR060413.zip
Splash Screen Utilities	gxsplash.zip
Windows XP Drivers	
Graphics	GX2_XP_XPe_Graphics.zip
Audio	GX2_XP_XPe_WDM_Audio.zip
Examples and Drivers for on-board A/D	
DOS	EpxGxAD_DOS.zip
Windows XP	EpxGxAD_XP.zip
Linux 2.6.x	EpxGxAD_Linux.zip
Drivers for Intel 82551ER/82559ER 10/100 Ethernet Controller	
Linux Kernels - 2.4.x & 2.6.x kernels	e100-3.5.14.tar.gz
Latest known to compile for 2.2.x kernels	e100-2.1.15.tar.gz
NDIS4 (Windows 98)	82559erWin98.zip
NDIS4 (Windows NT 4 & 2000)	e100ndis4.zip
Windows NT Embedded 4.0	e100ent.zip
Windows XP/2000	e100exp.zip
Windows CE 3.0	e100ce3.zip
Windows CE.NET	e100ce.zip
DOS	e100bdos.zip
DOS Packet Drivers	packet.zip
Examples for WS16C48 Digital I/O chip	
DOS Example C functions	uio48ebc.zip
Linux Drivers	
Kernel 2.2, 2.4	linux_uio48_96.zip
Kernel 2.6	uio48io_kernel_2.6.zip
Windows XP Driver	wsuio48_96xp.zip

Example of reprogramming DOS tick for high resolution timing	tickdemo.zip
Serial Console Utilities:	
Generic 38400baud Serial console redirect for COM1	scon1.zip
Generic 38400baud Serial console redirect for COM2	scon2.zip
Generic 9600baud Serial console redirect for COM1	sc19600.zip
Generic 9600baud Serial console redirect for COM2	sc29600.zip

Software Summary

Parallel I/O

The EPX-GX500 uses the WinSystems exclusive ASIC device, the WS16C48. Half of the device is used on this board providing 24 lines of Digital I/O. There are 17 unique registers within the WS16C48. The following table summarizes the registers and the text that follows provides details on each of the internal registers as supported on this board.

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	Port 2 I/O	Port 2 I/O	Port 2 I/O	Port 2 I/O
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

Software samples and drivers are available at these links:

DOS Example C functions	uio48ebc.zip
Linux Drivers	
Kernel 2.2, 2.4	linux_uio48_96.zip
Kernel 2.6	uio48io_kernel_2.6.zip
Windows XP Driver	wsuio48_96xp.zip

Register Details

Port 0-2 I/O – Each I/O bit in each of the 3 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 10K ohm 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 the output pin to sink current (up to 12mA), 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 3 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 registers allows an Interrupt Service Routine to quickly determine if any interrupts are pending and which I/O port has pending interrupts.

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

<u>D7</u>	<u>D6</u>	<u>Page</u>
0	0	Page 0
0	1	Page 1
1	0	Page 2
1	1	Page 3

Bits 2-0 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 a '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 reenabling 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.

A/D Converter

The Linear Tech LTC 1857CG is a 12-bit, 8 channel A/D converter with software-selectable input modes and ranges. Programming of the device is simple with 2 write registers and 3 read registers located at a base address of 1E8.

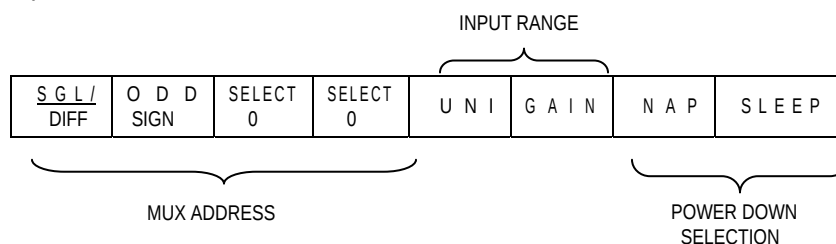
Write Register

Address	Name	Bit definition
1E8	Command	(Reference Table 1 below)
1E9	Interrupt	bit 7 = 1 force interrupt, bit 0 = 1 ENABLE interrupt bit 0 = 0 DISABLE interrupt

Read Register

Address	Name	Bit definition
1E8	Status	bit 7 = 1 interrupt pending bit 0 = 1 A/D busy
1E9	LSB Data	A/D data LSB
1EA	MSB Data	A/D data MSB

The 8-bit command register provides for configuring an input as single ended or differential mode and also sets the desired input range (0V to 5V, 0V to 10V, +/- 5V and +/- 10V).



Multiplexer Channel Selection

MUX ADDRESS			DIFFERENTIAL CHANNEL SELECTION								MUX ADDRESS			SINGLE-ENDED CHANNEL SELECTION										
SGL/ DIFF	ODD SIGN	SELECT 1 0	0	1	2	3	4	5	6	7	SGL/ DIFF	ODD SIGN	SELECT 1 0	0	1	2	3	4	5	6	7	COM		
0	0	0 0	+	-							1	0	0 0	+									-	
0	0	0 1			+	-					1	0	0 1			+							-	
0	0	1 0					+	-			1	0	1 0					+					-	
0	0	1 1							+	-	1	0	1 0							+			-	
0	1	0 0	-	+							1	1	0 0		+								-	
0	1	0 1			-	+					1	1	0 1				+						-	
0	1	1 0					-	+			1	1	1 0						+				-	
0	1	1 1							-	+	1	1	1 1								+		-	

Channel Selection

The first 4 bits of the command register assign the channel configuration for the requested conversion. The converter will measure the voltage between the two channels indicated by the + and - signs in the table above. In differential mode measurements are from adjacent input pairs in either polarity. In single-ended

mode, all input channels are measured with respect to GND. Both the + and – inputs are sampled simultaneously so common mode noise is rejected.

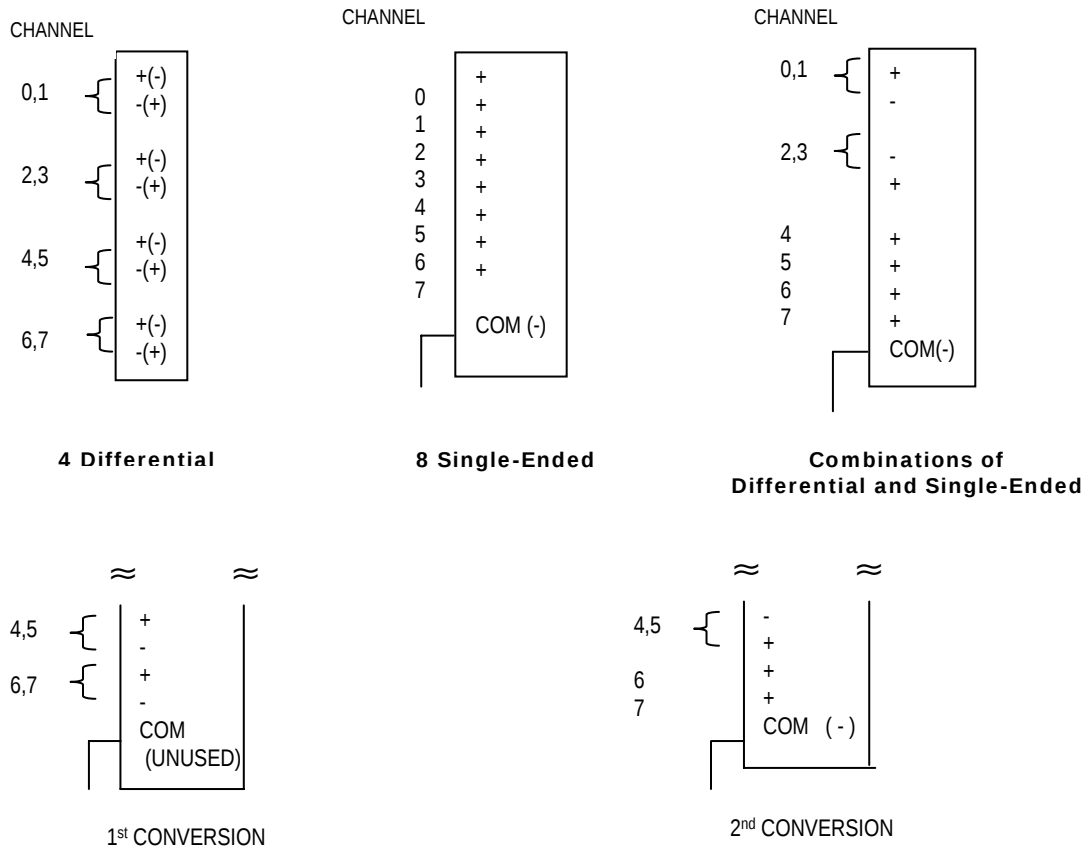
Range Selection - The 5th and 6th bits of the command register determine the input range for the conversion. Setting UNI to a logical one selects a unipolar conversion while a zero selects bipolar. The GAIN bit selects the input span for the conversion in conjunction with the UNI bit. The table below defines the selection options.

Input Range Selection

UNI	GAIN	INPUT RANGE
0	0	±5V
1	0	0V to 5V
0	1	±10V
1	1	0V to 10V

Power Down Selection – The last two bits of the input word are normally set to 0. The power down modes offer a negligible power savings on the EPX-GX500 and will not be discussed here. Please refer to the [LTC1857 Datasheet](#).

Examples of Multiplexer Options



Changing the MUX Assignment "On the Fly"

NOTE: When the board is powered off, the A/D input has a 20K input impedance and is protected to +/- 20V. When the board is powered on, the A/D differential channel input has a 31K input impedance, the single-ended channel input has a 42K input impedance and the inputs are protected to +/- 25V.

Examples and Drivers for on-board A/D	
DOS	EpxGxAD_DOS.zip
Windows XP	EpxGxAD_XP.zip
Linux 2.6.x	EpxGxAD_Linux.zip

BIOS Supplemental

General Information

The EPX-GX500 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. The configuration may alternatively be stored in FLASH for operation without a battery. 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.

Restoring Factory Defaults

There are three methods to restore the EPX-GX500 BIOS to the Factory Defaults.

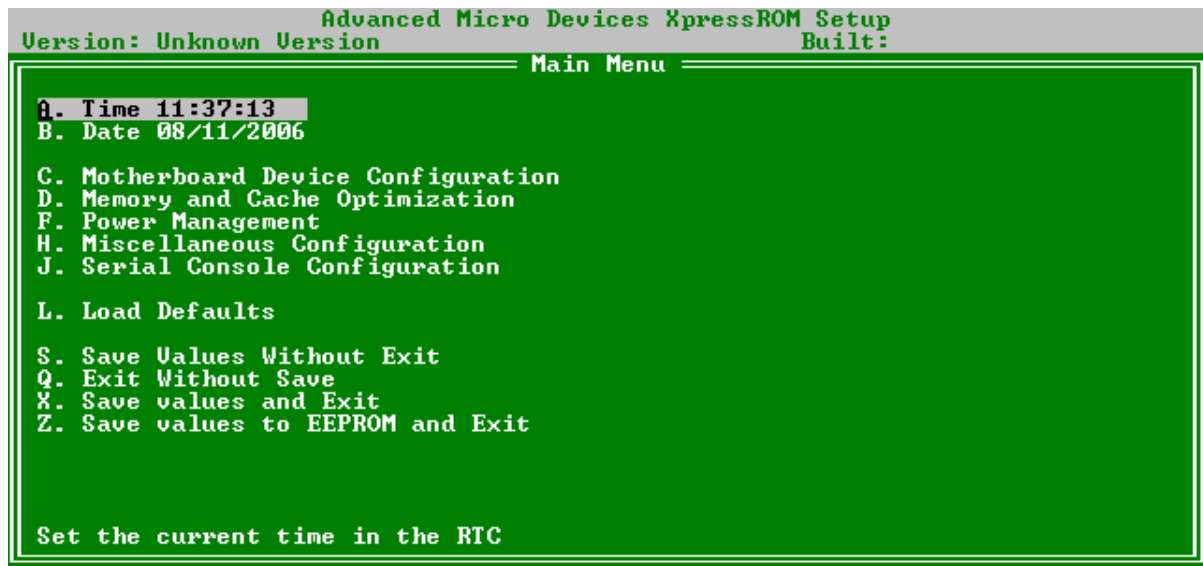
- 1) Choosing **L. Load Defaults** from the Main Menu described below.
- 2) If the console is disabled, reset the EPX-GX500 three times in a row as soon as the splash screen appears. The BIOS will assume a problem exists and load the Factory Defaults.
- 3) If the board is not booting due to an incorrect BIOS setting, the Factory Defaults can be restored by turning off the power supply, removing the jumper from J23 pins 17-18, moving the jumper at J27 to pins 2-3, then powering up the board. Be sure to save the Factory Defaults before exiting the BIOS Setup Menu.

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 short cut that opens the next dialogue box with one key press.

An image of each Menu screen is shown below in the default configuration and is followed by a brief description of each option where applicable. Values shown in **bold** typeface are factory defaults while descriptions and options are italicized. Options that are simple yes/no or enable/disable are not listed, unless further explanation is required.

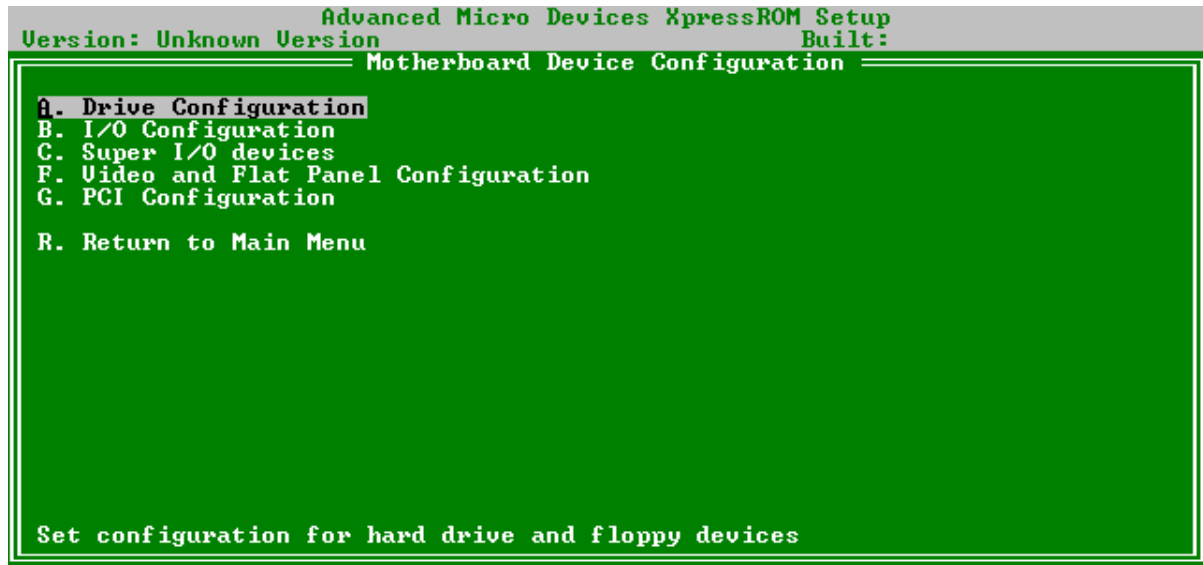
Main Menu



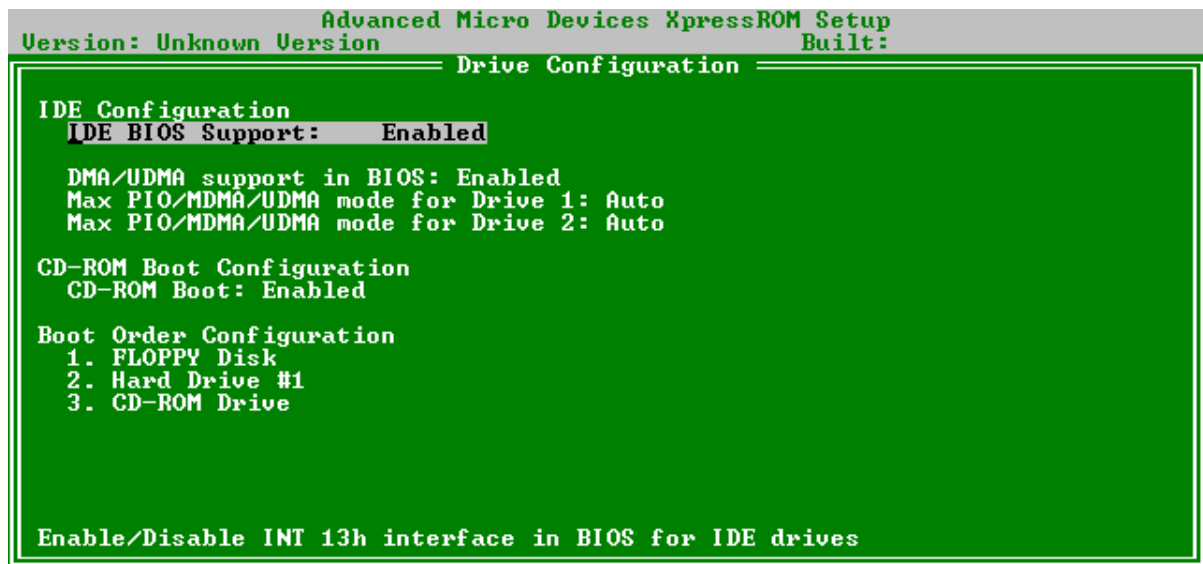
- A. Time - *Set the time in the real time clock.*
- B. Date - *Set the calendar to the current month, day and year in the RTC.*
- C. Motherboard Device Configuration - *Opens menu to configure the following items.*
 - A. Drive Configuration
 - B. I/O Configuration
 - C. Super I/O devices
 - F. Video and Flat Panel Configuration
 - G. PCI Configuration*Each option is described in detail in the following sections.*
- D. Memory and Cache Optimization - *The Memory and Cache options are not discussed in this document. They are factory settings and should not be changed during normal operation.*
- F. Power Management - *Displays Power Management Configuration Menu which is described in detail in the following sections.*
- H. Miscellaneous Configuration – *Opens menu to configure the following:*
 - Splash Screen
 - BIOS Summary Screen Configuration
 - Power Button Configuration
 - PC Speaker Configuration*Each option is described in detail in the following sections.*
- J. Serial Console Configuration – *Displays menu to enable and configure BIOS level serial console. The options are described in detail in the following sections.*

- L. Load Defaults – *Selecting this option restores the Factory BIOS Defaults. As with all other options, the values MUST BE SAVED and will become active upon the next boot.*
- S. Save Values Without Exit – *The current BIOS values will be saved to the CMOS RAM and you can continue to configure the BIOS.*
- Q. Exit Without Save – *No changes will be saved and the boot process will continue.*
- X. Save values and Exit – *Save the current BIOS values to CMOS RAM and continue the boot process.*
- Z. Save values to EEPROM and Exit – *When a jumper is installed between J23 pins 17 and 18, a user can save specific BIOS settings to the EEPROM. These user settings will then be loaded from the EEPROM if a CMOS checksum error or battery failure occurs. The factory defaults can be restored at anytime by selecting option “**L. Load Defaults**” described above. If the board is not booting due to an incorrect BIOS setting, the Factory Defaults can be restored by turning off the power supply, removing the jumper from J23 pins 17-18, moving the jumper at J27 to pins 2-3, then powering up the board. Be sure to save the Factory Defaults before exiting the BIOS Setup Menu.*

Motherboard Device Configuration Menu



Drive Configuration



IDE Configuration

IDE BIOS Support: **Enabled**

[Enabled] - Must be enabled to boot from IDE devices

[Disabled] - Disables BIOS support for IDE devices

DMA/UDMA support in BIOS: **Enabled**

Enable/Disable BIOS setup of DMA/UDMA timings

Max PIO/MDMA/UDMA mode for Drive 1: **Auto**

Max PIO/MDMA/UDMA mode for Drive 2: **Auto**

[Auto] - Allow BIOS to determine maximum timings for IDE devices

[PIO 0] – *Override to maximum PIO Mode 0*
[PIO 1] – *Override to maximum PIO Mode 1*
[PIO 2] – *Override to maximum PIO Mode 2*
[PIO 3] – *Override to maximum PIO Mode 3*
[PIO 4] – *Override to maximum PIO Mode 4*
[MDMA 0] – *Override to maximum Multi-word DMA 0*
[MDMA 1] – *Override to maximum Multi-word DMA 1*
[MDMA 2] – *Override to maximum Multi-word DMA 2*
[UDMA 0] – *Override to maximum Ultra-DMA 0*
[UDMA 1] – *Override to maximum Ultra-DMA 1*
[UDMA 2] – *Override to maximum Ultra-DMA 2*
[UDMA 3] – *Override to maximum Ultra-DMA 3*
[UDMA 4] – *Override to maximum Ultra-DMA 4*

CD-ROM Boot Configuration

CD-ROM Boot: **Enabled**

Enable/Disable CD-ROM Boot

Boot Order Configuration

1. **FLOPPY Disk**
2. **Hard Drive #1**
3. **CD-ROM Drive**

[NONE]

[FLOPPY Disk]

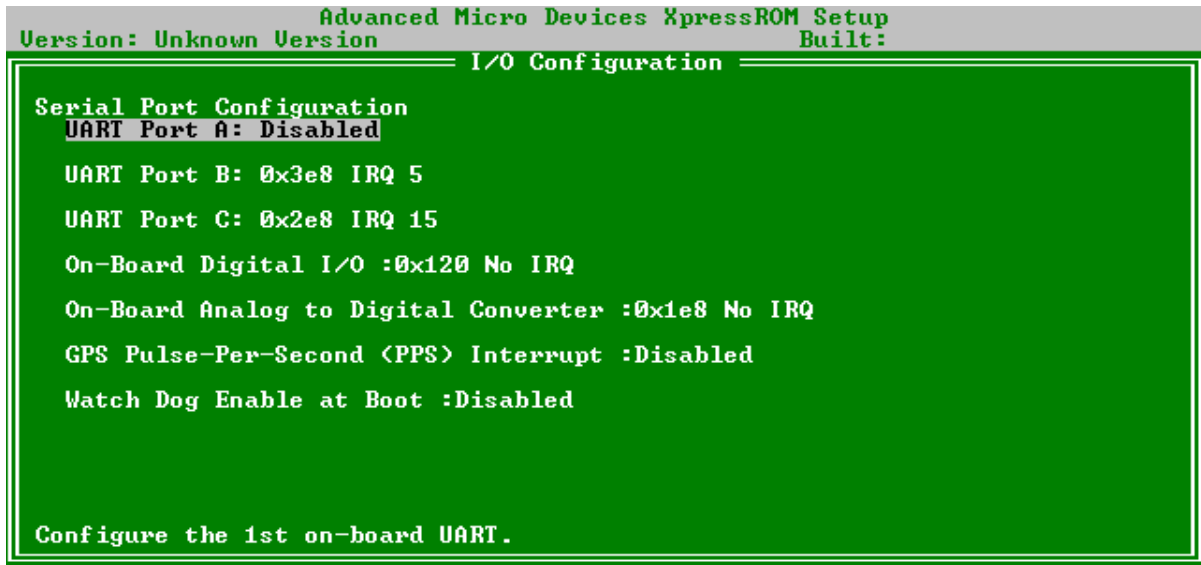
[HARD Drive #1]

[CD-ROM Drive]

** At least one bootable device must be selected*

*** The EPX-GX500 also supports bootable USB devices at the BIOS level. These devices appear as the last drive and will only boot if no other bootable device is located. To boot from a USB drive, include Hard Drive #1 in the Boot Order Configuration with IDE BIOS Support disabled or no other drives connected.*

I/O Configuration



UART Port A: **Disabled** (GPS)

[0x3f8 IRQ 4]
[0x2f8 IRQ 3]
[0x3e8 IRQ 5]
[0x2e8 IRQ 9]

UART Port B: **0x3e8 IRQ 5** (COM3)

[0x3a8 IRQ 5]
[0x3e8 IRQ 12]
[0x3a8 IRQ 12]
[0x3e8 IRQ 15]
[0x3a8 IRQ 15]
[Disabled]

UART Port C: **0x2e8 IRQ 15** (COM4)

[0x2e8 IRQ 5]
[0x2a8 IRQ 5]
[0x2e8 IRQ 12]
[0x2a8 IRQ 12]
[0x2a8 IRQ 15]
[Disabled]

On-Board Digital I/O : **0x120 No IRQ**

[0x120 IRQ 10]
[0x120 IRQ 5]
[Disabled]

On-Board Analog to Digital Converter : **0x1e8 No IRQ**

[0x1e8 IRQ 15]
[0x1e8 IRQ 12]
[Disabled]

GPS Pulse-Per-Second (PPS) Interrupt : **Disabled**
[IRQ 7]
[IRQ 9]

Watch Dog Enable at Boot : **Disabled**
[30 Second Timeout]
[300 Second Timeout]

Super I/O Device Configuration



Serial Port 1: **0x3f8 IRQ 4 (COM1)**
[0x2f8 IRQ 3]
[0x3e8 IRQ 5]
[0x2e8 IRQ 9]
[0x3a8 IRQ 4]
[0x2a8 IRQ 3]
[Disabled]

Serial Port 2: **0x2f8 IRQ 3 (COM2)**
[0x3f8 IRQ 4]
[0x3e8 IRQ 5]
[0x2e8 IRQ 9]
[0x3a8 IRQ 4]
[0x2a8 IRQ 3]
[Disabled]

Parallel Port: **0x378 (LPT)**
[0x278]
[0x3BC]
[Disabled]

MODE: **Compatible**
[PS/2 Bi-directional]
[EPP 1.7]
[EPP 1.9]
[ECP]

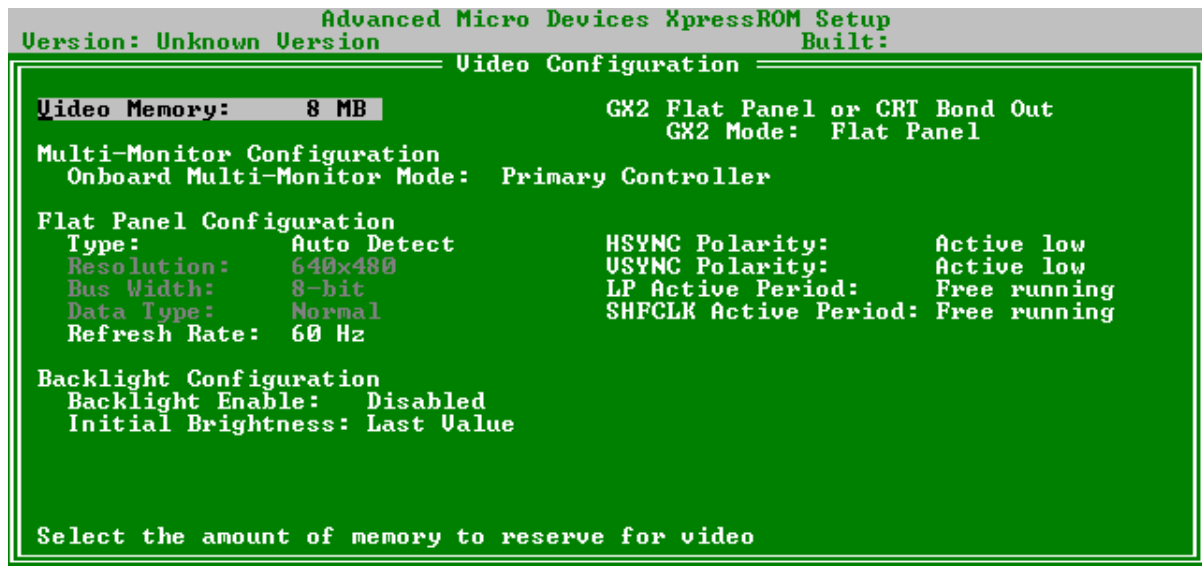
IRQ: **IRQ 7**
[IRQ 5]
[IRQ 9]
[IRQ 10]
[IRQ 11]
[Disabled]

DMA: **None**
[Channel 1]
[Channel 3]

Floppy Configuration
LPC Floppy: **Enabled**

Assign IRQ 12 for Mouse : **Enabled**

Video and Flat Panel Configuration



Video Memory: 8 MB

- [None]
- [4 MB]
- [5 MB]
- [6 MB]
- [7 MB]
- [9 MB]
- [10 MB]
- [11 MB]
- [12 MB]
- [13 MB]
- [14 MB]
- [15 MB]
- [16 MB]

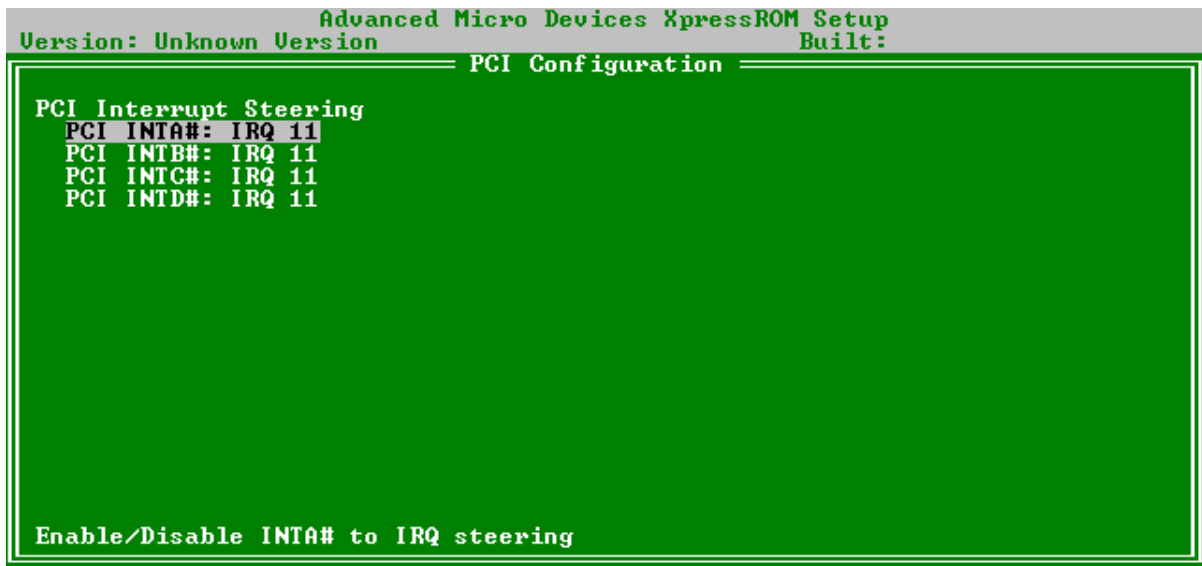
* The EPX-GX500 uses shared memory for the video. The amount of video memory selected will be subtracted from the installed SDRAM.

Onboard Multi-Monitor Mode: **Primary Controller**

- [Secondary Controller]
- [Disabled]

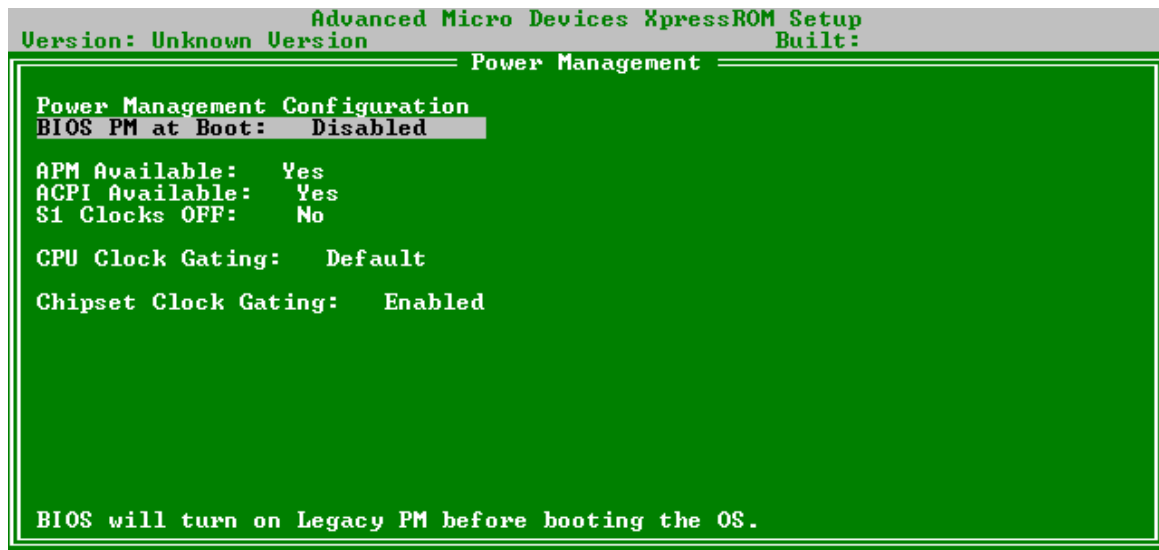
** The video settings are also controlled by jumper setting at J15 and J23. The video mode selected by these jumpers may change the options available in the BIOS Video Configuration Menu.

PCI Configuration



By default the four PCI slots are all routed to IRQ 11. Depending on PC/104-PLUS peripheral modules and software, it may be necessary to route a different interrupt or individual interrupts. Care must be taken not to create resource conflicts, however.

Power Management



Power Management Configuration
BIOS PM at Boot: **Disabled**

Enables or disables APM (Advanced Power Management) support at boot-up. This provides some BIOS level APM support for operating systems that do not support the power management, such as DOS. Operating systems that support APM can still use the power management features, once booted.

APM Available: **Yes**

[Enabled] - Allows APM aware operating systems and applications to control power management features of the EPX-GX500.

[Disabled] – Completely disables APM support on the EPX-GX500.

ACPI Available: **Yes**

[Yes] – Enables Advanced Configuration and Power Interface on the EPX-GX500. ACPI establishes industry-standard interfaces for OS-directed configuration and power management.

[No] – Completely disables ACPI support in the BIOS and allows IRQ 9 to be used for other purposes.

*** Note some operating systems, such as Windows XP/XP Embedded, assume IRQ 9 is assigned to ACPI regardless of the hardware settings.*

S1 Clocks OFF: **No**

The factory setting should not be changed during normal operation.

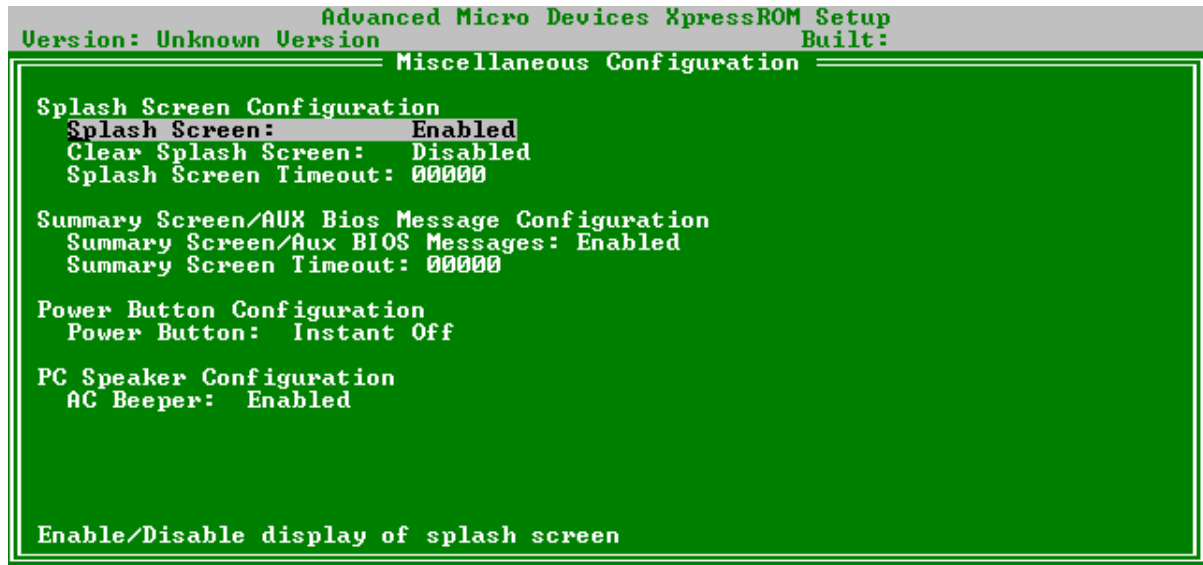
CPU Clock Gating: **Default**

The factory setting should not be changed during normal operation.

Chipset Clock Gating: **Enabled**

The factory setting should not be changed during normal operation.

Miscellaneous Configuration



Splash Screen Configuration

Splash Screen: **Enabled**

Enable or Disable the BIOS Splash Screen.

Clear Splash Screen: **Disabled**

When enabled, allows the splash screen to be cleared with a key press.

Splash Screen Timeout: **00000**

This sets the amount of time the splash screen is displayed in milliseconds. 0=no wait; 1-65535 milliseconds.

Summary Screen/AUX Bios Message Configuration

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

When disabled, hides the BIOS Summary Screen and "Press F1 for Setup."

Summary Screen Timeout: **00000**

This sets the amount of time the summary BIOS screen is displayed in milliseconds. 0=no wait; 1-65535 milliseconds.

Power Button Configuration

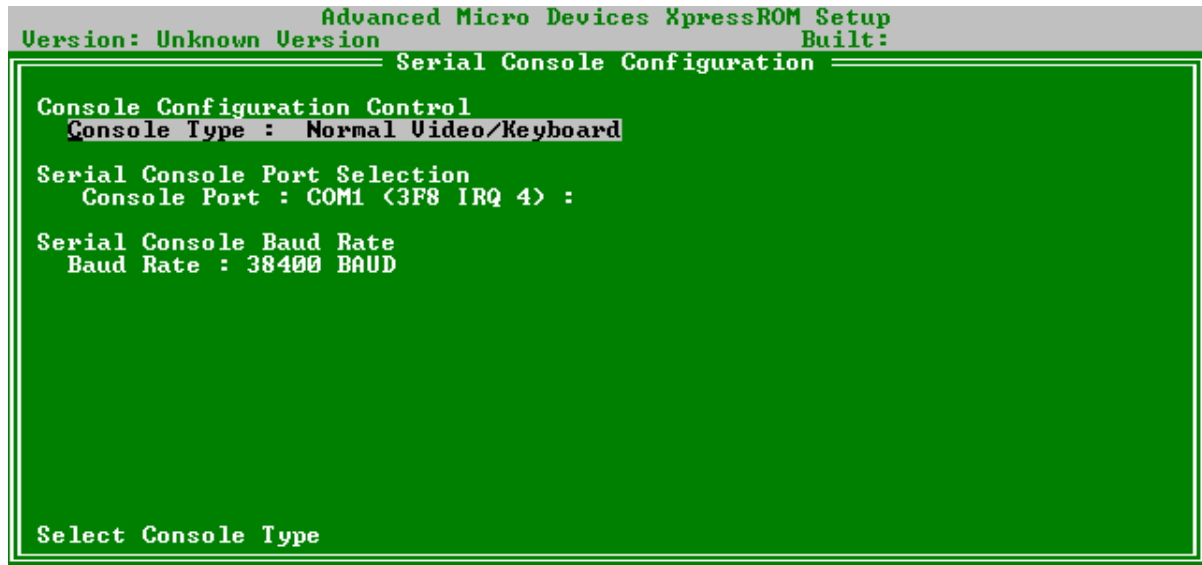
Power Button: **Instant Off**

[ACPI Mode] – Will attempt to power down using ACPI "soft" power down. Typically not used for embedded systems.

PC Speaker Configuration

AC Beeper: **Enabled**

Serial Console Configuration Menu



Console Configuration Control

Console Type: **Normal Video/Keyboard**

[Normal Video/Keyboard] – Console acts normally through video and keyboard.

[Serial Console Only] – The console output is redirected through the serial port specified.

[Keyboard/Video and Serial] – The console is simultaneously directed through the keyboard/video and serial port.

[No Console] – There is no console output.

****Note:** It is still possible to enter the BIOS Setup screen via COM1 and Wincom when a serial console is not enabled. If Wincom is running and connected to COM1 prior to power-on or reset in these modes, the BIOS will detect the connection and temporarily enable the serial BIOS access at 38400 baud.

Serial Console Port Selection

Console Port : **COM1 (3F8 IRQ 4) :**
[COM2 (2F8 IRQ 3)]

Serial Console Baud Rate

Baud Rate : **38400 BAUD**
[1200 BAUD]
[2400 BAUD]
[4800 BAUD]
[9600 BAUD]
[19200 BAUD]
[57600 BAUD]
[115200 BAUD]

SERIAL CONSOLE REFERENCE

Introduction - This section documents the usage of the WinSystems Serial Console feature present on the EPX-GX500 board. The serial console consists of special BIOS code and a special terminal program used to communicate with the board. The principal design criteria for the serial console was the ability to access the Insyde CMOS setup options without the need for a standard keyboard or video adapter and monitor. This allows embedded system designers and technicians access to CMOS setup on the EPX-GX500 using only a laptop computer with a hardware serial port.

Wincom.exe Serial Console Client - Wincom.exe is the application run on the laptop or other 100% PC compatible in order to access the EPX-GX500. The client is started on the DOS command line with:

wincom port interrupt baud_rate

'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 non standard addresses for COM ports.

'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.

'Baud rate' is replaced with one of the following values

1200
2400
4800
9600
19200
38400
57600
115200

which is the baud rate to use for the connection. Higher baud rates mean snappier response but may be limited due to the client PC. The best compromise for speed and reliability in testing was 38400. The baud rate MUST be matched to the "Console Baud Rate" selected in CMOS setup (discussed later) in order for the systems to communicate.

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 to doing so and success is not always a sure thing due to differences in low-level hardware drivers. It is recommended that a DOS boot-floppy be made containing Wincom.exe which can be used when access to the EPX-GX500 is desired.

When run in a "pure" DOS environment, all keys and key combinations are passed directly to the target EPX-GX500 such that even the infamous three-finger-salute <CTL><ALT> will result in the target system performing a warm reboot. There, are however, three keystroke combinations reserved by WINCOM.

<ALT><END> Exits WINCOM back to DOS
<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 EPX-GX500 defaults to a standard video/keyboard configuration. In order to gain access to the system 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 EPX-GX500 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 EPX-GX500. The BIOS should sense the WINCOM attachment to it's 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 client screen. Press F1 to access CMOS setup. Several key presses are often necessary.
7. Make whatever changes are required in "Setup". 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.

Serial Console Setup - In the “Serial Console Configuration” of the CMOS setup are several options relating to usage of the serial console feature. Each of these options will be discussed in the paragraphs to follow.

Console Type - This selection allows selection of the console type. The available choices are:

Normal Video/Keyboard	(Default)	Normal keyboard and video routing
Serial Console Only		video and keyboard BIOS calls are routed through the serial routines only.
Keyboard/Video and Serial		video and keyboard BIOS calls are routed through the serial routines as well as to their normal locations.
No Console		No console I/O is provided.

Serial Console Port Selection - This selection allows for the choice of serial port to be used for console I/O. If “Normal Video/Keyboard” is chosen for the “Console Type” this selection has no meaning. The available selections are :

COM1 The COM1 port is used 3F8, IRQ4
COM2 The COM2 port is used 2F8, IRQ3

Serial Console Baud Rate - This option allows for selection of the baud rate to be used in connecting with WINCOM on a client PC. The available choices are.

1200Bps
2400Bps
4800Bps
9600Bps
19200Bps
38400Bps
57600Bps

Factory testing shows that the best tradeoff between speed and reliability with most PC clients is 38400.

Copy Files using the Serial Console - Besides being useful for accessing the CMOS setup menu, the serial console can be used effectively with non-graphic based DOS applications. Standard file operations including Fdisk, format, copy, etc. can all be accessed through the serial console. The serial console can also be used in conjunction with the “SCOPY.EXE” utility to provide the ability to serially upload or download applications and/or data from the EPX-GX500 to the client PC and vice versa.

To use SCOPY it must already be present on a disk currently accessible to the EPX-GX500.

COPY is invoked at the DOS command line on the EPX-GX500 with the command :

```
scopy [ com1 | com2 ] [-rq | -sq] file name [-aport_address] [-iirq_num] [-bbaud_rate]
```

The first argument must be the COM port in use. This should match the COM port used by the EPX-GX500 for serial console operations, i.e. COM1 or COM2.

The next argument is the direction flag '-rq' indicates a desire to have the EPX-GX500 receive a file, a direction flag of '-sq' indicates that the EPX-GX500 will send a file.

The last argument is the name of the file to be sent or the name with which to save the file to be received.

A couple of examples illustrate the usage. In this first case, we wish to send our revised application, called "APP.EXE", to the EPX-GX500. We are currently connected to the serial console using COM2 on the EPX-GX500. To initiate the reception we type :

```
scopy com2 -rq app.exe
```

The reverse of this would be to retrieve a data file "APP.DAT" from the EPX-GX500 for analysis. To start the upload we would type :

```
scopy com2 -sq app.dat
```

Once Scopy has been started on the EPX-GX500 we now need to tell Wincom to send or receive a file. If we specified '-r' to Scopy we wanted the EPX-GX500 to receive and Wincom to send. This is called an "upload". To start the upload we press <ALT><PgUp> on the client keyboard and Wincom presents us with a prompt:

File to up load :

We type in the name of the file we're sending. The file must be in the current directory on the client PC or else a path must be specified. In our previous upload example we type:

```
app.exe
```

Wincom responds with the message:

```
Send ing app.exe
```

And then begins a synchronization process with the EPX-GX500. Once they're synchronized, wincom presents a tally of records sent so far such as :

```
Sending Record Number 000040
```

When the file transfer is complete. Wincom reports:

```
wincom : File Transfer Complete
```

scopy then reports on the result:

```
scopy : File transfer complete
```

As long as both parties agree, the file arrived at the destination correctly. If there is a problem either Wincom or Scopy will report that an error has occurred.

Downloading a file from the EPX-GX500 to the client PC is done in an identical matter except that '-sq' is used with SCOPY and <ALT><PgDn> is used with WINCOM.

ADDITIONAL SCOPY COMMAND ARGUMENTS

Scopy versions 2.00 and later support additional command line options that were not present in the original version.

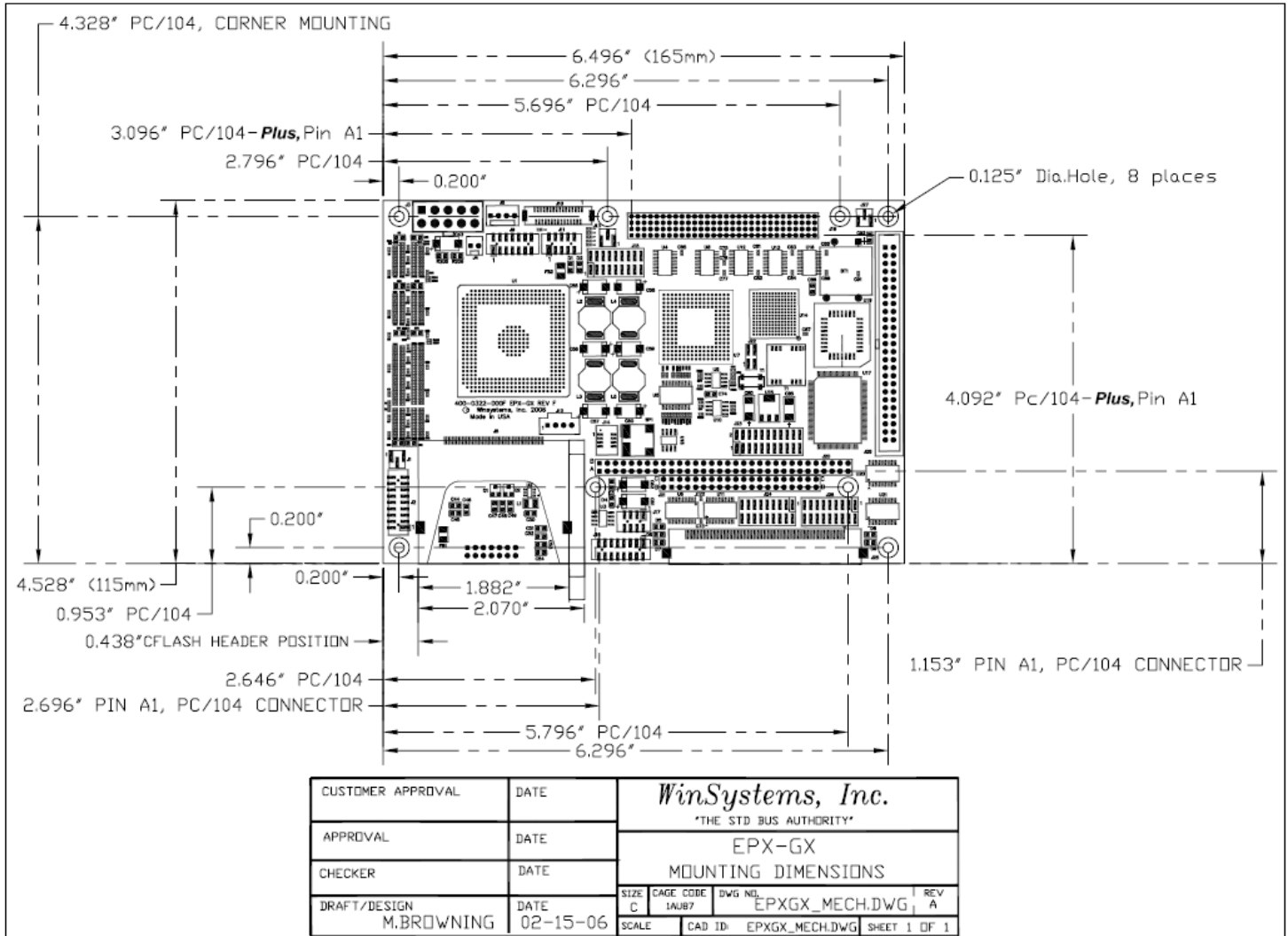
For compatibility reasons, these options were added on at the end. The new options are :

-Aport_address	Where port_address is a hex value from 100H-3FFH. This overrides the COM1 or COM2 option and specifies the I/O address of the COM port.
-lirq_num	Where irq_num is a decimal value from 3 to 15 indicating the IRQ assigned to the COM port.
-Bbaud_rate	Where baud_rate is the desired communications rate. The values are in decimal and can be any of the following: 2400 4800 9600 19200 38400 57600 115200

When used on a system with an enabled serial console, only the baud rate argument can be used and is only necessary if the console is running at a rate other than 38400. An example upload to the EPX-GX500 with a serial console enabled on COM1 at 9600 baud would look like this.

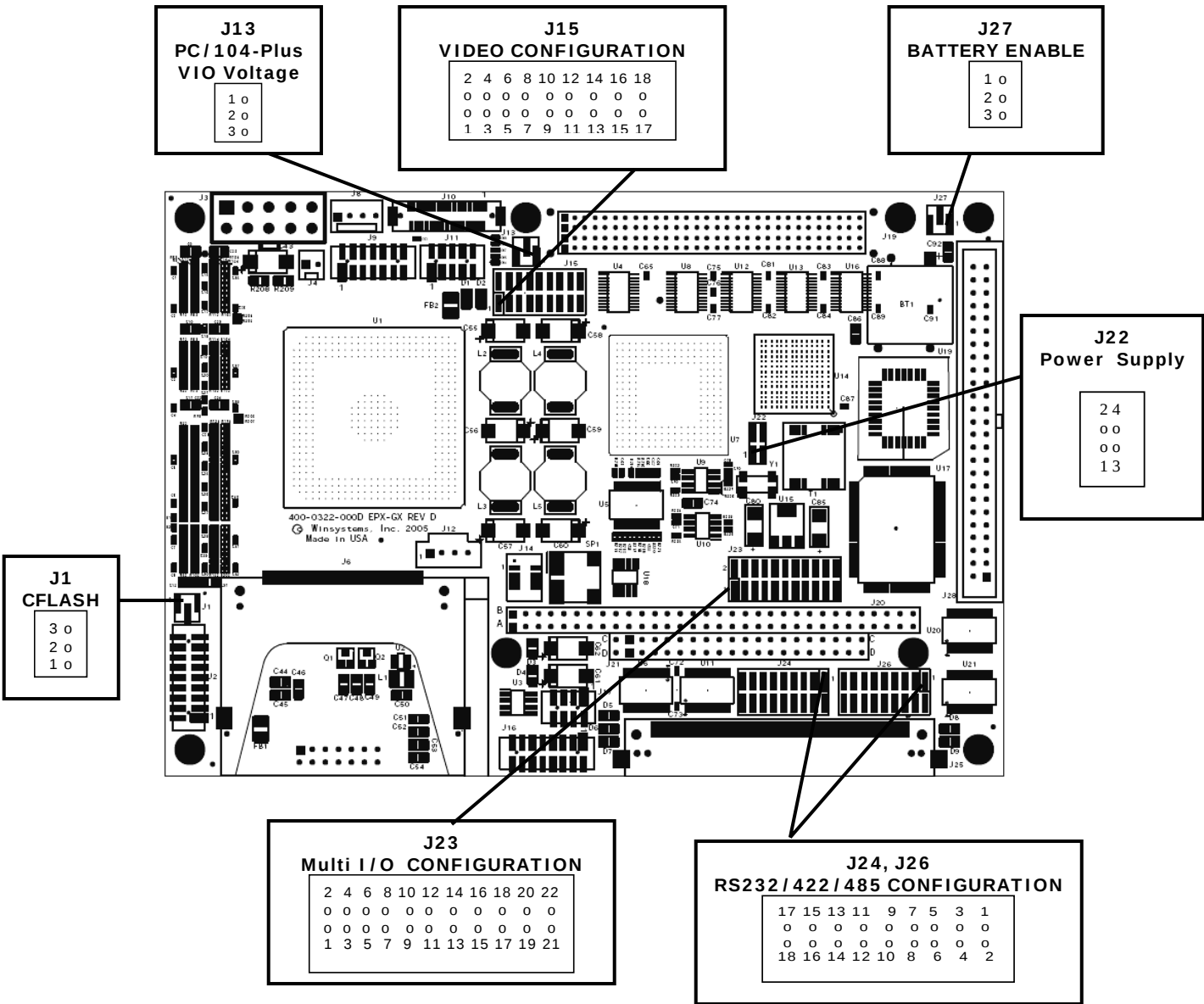
```
scopy COM1 -rq app.exe -B9600
```

Mechanical Drawing



Jumper Reference

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

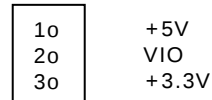


CFLASH (J1)



PC/104-Plus VIO Voltage Selection (J13)

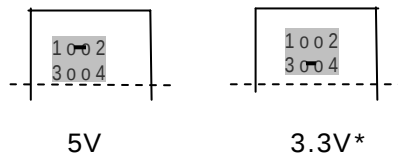
J13 jumpered 1-2 supports +5V (default)
J13 jumpered 2-3 supports +3.3V



Video Configuration (J15)

The video options for the EPX-GX500 are controlled by the various pin configurations on J15.

Panel Video Option:

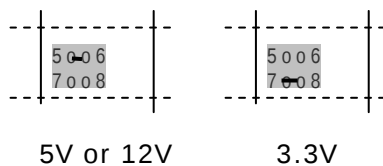


5V 3.3V*
* must be 3.3V when used with approved WinSystems' LVDS converter.

J15

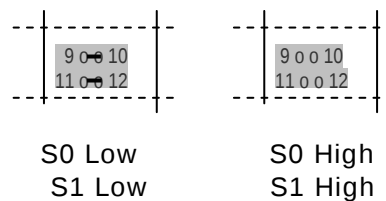
2	4	6	8	10	12	14	16	18
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
1	3	5	7	9	11	13	15	17

Backlight Video Option:



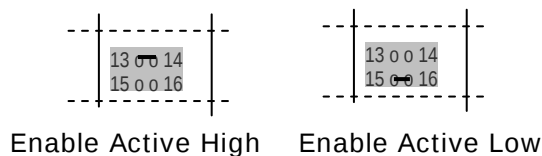
5V or 12V 3.3V

Panel Options: for panels supporting image reversal.



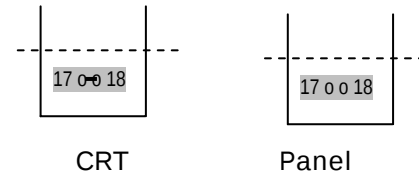
S0 Low S0 High
S1 Low S1 High

Backlight Enable:



Enable Active High Enable Active Low

CRT/Panel Enable:



CRT Panel

Power Selection (J22)

	1-2	3-4
AT POWER	ON	ON
ATX POWER	OFF	OFF

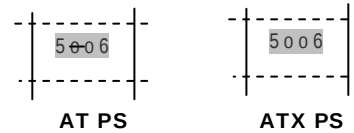
Multi I/O Configuration (J23)

J23

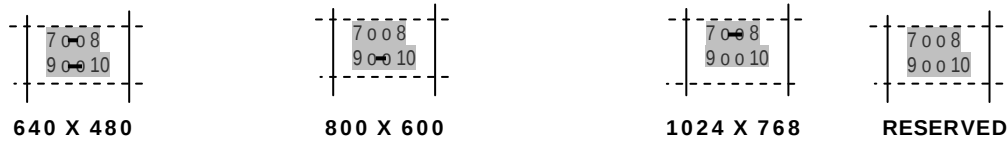
2	4	6	8	10	12	14	16	18	20	22
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
1	3	5	7	9	11	13	15	17	19	21

1 -4 NOT USED

ACPI reports:

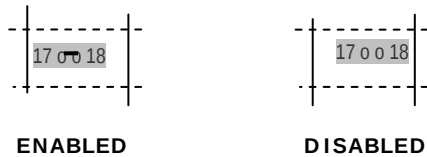


Panel:

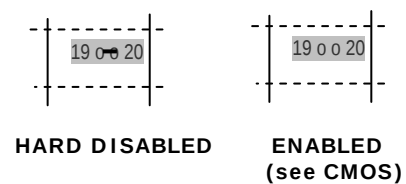


11-16 NOT USED

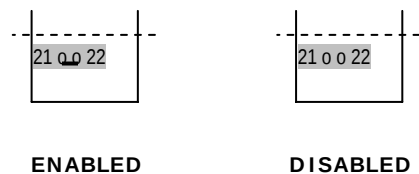
CMOS EEPROM:



Watchdog Timer:



UIO Power:



J24, J26**RS232/422/485 Configuration (J24, J26)**

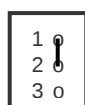
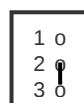
17	15	13	11	9	7	5	3	1
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
18	16	14	12	10	8	6	4	2

COM1 (J26)

Mode #	Description	Jumpers	Termination		
			TX (100)	RX (100)	TX/RX (300)
1	RS-232	1-2	N/A	N/A	N/A
2	RS-422 RTS Enable	3-4, 9-10	13-14	17-18	11-12 13-14 15-16
3	RS-422 Auto Enable	3-5, 9-10 (One node must use TX/RX 300 Termination)	N/A	17-18	11-12 13-14 15-16
4	RS-485 RTS Enable	3-4, 7-8	13-14	N/A	11-12 13-14 15-16
5	RS-485 RTS Enable with Echo-Back	3-4, 6-8	13-14	N/A	11-12 13-14 15-16
6	RS-485 Auto Enable	3-5, 7-8 (One node must use TX/RX 300 Termination)	13-14	N/A	11-12 13-14 15-16
7	RS-485 Auto Enable with Echo-Back	3-5, 6-8 (One node must use TX/RX 300 Termination)	N/A	N/A	11-12 13-14 15-16

COM2 (J24)

Mode #	Description	Jumpers	Termination		
			TX (100)	RX (100)	TX/RX (300)
1	RS-232	1-2	N/A	N/A	N/A
2	RS-422 RTS Enable	3-4, 9-10	13-14	17-18	11-12 13-14 15-16
3	RS-422 Auto Enable	3-5, 9-10 (One node must use TX/RX 300 Termination)	N/A	17-18	11-12 13-14 15-16
4	RS-485 RTS Enable	3-4, 7-8	13-14	N/A	11-12 13-14 15-16
5	RS-485 RTS Enable with Echo-Back	3-4, 6-8	13-14	N/A	11-12 13-14 15-16
6	RS-485 Auto Enable	3-5, 7-8 (One node must use TX/RX 300 Termination)	13-14	N/A	11-12 13-14 15-16
7	RS-485 Auto Enable with Echo-Back	3-5, 6-8 (One node must use TX/RX 300 Termination)	N/A	N/A	11-12 13-14 15-16

Battery Enable (J27)**ENABLE****DISCHARGE or
NO BATTERY OPERATION**

SPECIFICATIONS

Electrical

EPX-GX500 CPU	:AMD Geode 500@1.0W-based
PC/104 Interface	:16-bit, non-stackthrough
PC/104-Plus Interface	:32-bit PCI, non-stackthrough
Ethernet data rate	:10/100 megabits per second
USB Interface	:Two USB 1.1-compliant ports
Serial Interface	:4 Serial channels with RS-232 levels plus RS-422/485 on COM1 and COM2
LPT Interface	:Bi-directional LPT with ECP/EPP
Parallel Interface	:24 I/O lines, TTL compatible
UDMA66/33 EIDE Interface	:supports 2 drives
Floppy Disk Interface	:BIOS supports one or two 1.44M drives
Vcc	:+5V $\pm$ 5% at 1.5 Amps typ. Full power mode

Note: A flat panel backlight inverter often requires +12V to operate, refer to the manufacturer's specification for their current requirements.

System Memory

Addressing	:Up to 512 Megabytes 200-pin SODIMM DDR (supplied and installed by user)
Solid State Disk Device	:One Type I or II CompactFlash card

Mechanical

Dimensions	: 4.5" x 6.5" (115mm x 165mm)
Weight	: .40 lbs/(0.180)kg <i>approximate weight</i>

Environmental

Operating Temperature	:-40°C to +85°C
MTBF	: 7.3 yrs.

WARRANTY REPAIR INFORMATION

WARRANTY

WinSystems warrants to Customer that for a period of two (2) years from the date of shipment any Products and Software purchased or licensed hereunder which have been developed or manufactured by WinSystems shall be free of any material defects and shall perform substantially in accordance with WinSystems' specifications therefor. With respect to any Products or Software purchased or licensed hereunder which have been developed or manufactured by others, WinSystems shall transfer and assign to Customer any warranty of such manufacturer or developer held by WinSystems, provided that the warranty, if any, may be assigned. Notwithstanding anything herein to the contrary, this warranty granted by WinSystems to the Customer shall be for the sole benefit of the Customer, and may not be assigned, transferred or conveyed to any third party. The sole obligation of WinSystems for any breach of warranty contained herein shall be, at its option, either (i) to repair or replace at its expense any materially defective Products or Software, or (ii) to take back such Products and Software and refund the Customer the purchase price and any license fees paid for the same. Customer shall pay all freight, duty, broker's fees, insurance charges for the return of any Products or Software to WinSystems under this warranty. WinSystems shall pay freight and insurance charges for any repaired or replaced Products or Software thereafter delivered to Customer within the United States. All fees and costs for shipment outside of the United States shall be paid by Customer. The foregoing warranty shall not apply to any Products or Software which have been subject to abuse, misuse, vandalism, accidents, alteration, neglect, unauthorized repair or improper installations.

THERE ARE NO WARRANTIES BY WINSYSTEMS EXCEPT AS STATED HEREIN, THERE ARE NO OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN NO EVENT SHALL WINSYSTEMS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF DATA, PROFITS OR GOODWILL. WINSYSTEMS' MAXIMUM LIABILITY FOR ANY BREACH OF THIS AGREEMENT OR OTHER CLAIM RELATED TO ANY PRODUCTS, SOFTWARE, OR THE SUBJECT MATTER HEREOF, SHALL NOT EXCEED THE PURCHASE PRICE OR LICENSE FEE PAID BY CUSTOMER TO WINSYSTEMS FOR THE PRODUCTS OR SOFTWARE OR PORTION THEREOF TO WHICH SUCH BREACH OR CLAIM PERTAINS.

WARRANTY SERVICE

1. To obtain service under this warranty, obtain a return authorization number. In the United States, contact the WinSystems' Service Center for a return authorization number. Outside the United States, contact your local sales agent for a return authorization number.
2. You must send the product postage prepaid and insured. You must enclose the products in an anti-static bag to protect from damage by static electricity. WinSystems is not responsible for damage to the product due to static electricity.