

# **OPERATIONS MANUAL**

## **PPM-520**

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## REVISION HISTORY

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# 1

## GENERAL INFORMATION

### 1.1 Features

- PC/104 Compliant Form Factor
- AMD Elan SC520 Chipset/Processor
- 5x86 Processor at 133MHz
- 16KB Write Back Cache
- On Chip Floating Point Coprocessor
- User Upgradeable SODIMM SDRAM Memory
- Solid State Disk (DiskOnChip) support
- Intel 82559ER 10/100 Ethernet Port
- 4 RS-232 Serial ports with 16 byte FIFO's
- PS/2 Keyboard and Mouse support
- 32-Bit PC/104Plus Expansion Bus
- 16-Bit PC/104 Expansion Bus
- Single 5Volt supply requirement
- Industry Standard Phoenix BIOS in user upgradeable Flash
- SPP/EPP/ECP PnP Parallel printer Port
- Standard PC-AT architecture runs DOS, Windows, and other PC Software

### 1.2 General Description

The PPM-520 is a highly integrated PC/104 and PC/104Plus module with x86 compatibility and standard PC-AT architecture. It utilizes the latest of AMD's embedded processors, the Elan SC520. The SC520 incorporates a 5x86 CPU core running at 133MHz along with a full 33MHz PCI host bridge, internal AT style peripherals, dual serial ports, and an IDE interface. The addition of the SMSC 37B727 adds the keyboard/mouse controller, two more plug-n-play serial ports, and a SPP/EPP/ECP parallel printer port, and dual floppy disk interface, adds to the expansive feature set. Also onboard the PPM-520 is the popular Intel 82559ER10/100 Ethernet controller making this board an excellent choice for embedded applications requiring integrated networking. The 133Mhz 5x86 CPU core and the integrated floating point processor offer an excellent compromise between computing power and power consumption. Feature expansion is also supported via either the popular PC/104 expansion bus or through the newer high-performance PCI type PC/104Plus expansion bus. The PPM-520 supports both standard rotational media drives, floppy and hard disk, or the popular Disk-On-Chip flash modules in sizes ranging from 8 to 288 Mbytes.

## 1.3 Specifications

### 1.3.1 Electrical

Bus Interface :	PC/104 8-bit or 16-Bit expansion bus PC/104Plus 32-bit expansion bus
System Clock :	33Mhz
PCI Clock :	33Mhz
VCC :	+5V +/-5% at 900 mA typical with 256MBytes SDRAM installed.
VCC1 :	+12V +/-5% (Not required. PC/104 Expansion Only)
VCC2 :	-12V +/-5% (Not required. PC/104 Expansion Only)

### 1.3.2 Memory

Addressing :	256 Megabyte Addressing
BIOS :	512Kbyte Flash
SDRAM :	32 to 256 Megabyte SDRAM SODIMM w/gold fingers (PC66 to PC100)
SSD :	M-Systems 32-pin DiskOnChip (8Mb to 288Mb)

### 1.3.3 Mechanical

Dimensions :	3.6 X 3.8 X .60 inches (without expansion modules or cables)
PC-Board :	FR-4 Epoxy Glass with 6 signal layers and 2 power planes with screened component legend, and plated through holes.
Jumpers :	AMDebug : 0.025" square posts on 0.10" centers others : 0.5 mm square posts on 2 mm centers.
Connectors :	Multi-I/O and Multi-Disk - Hirose FX2A-80P-0.635SH  PC/104 Bus : 64 pin SAMTEC type ESQ-132-12-G-D 40-pin SAMTEC type ESQ-120-12-G-D  PC/104Plus Bus : SAMTEC type TS-30Q  Power/Reset : 8-pin AMP

1.3.4 Environmental

Operating Temperature : -40 to +85 C

Non-Condensing Relative Humidity : 5 to 95%

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## 2

# PPM-520 Technical Reference

This section of the manual is intended to provide sufficient information regarding configuration and usage of the PPM-520 board. WinSystems maintains a technical support group to help answer questions regarding configuration, usage, or programming of this board. For answers to questions not adequately addressed in this manual, contact Technical Support at (817) 274-7553 between and 8AM and 5PM Central Time.

## 2.1 Introduction

The PPM-520 uses the latest AMD embedded processor/chipset solution, the Elan SC520. The SC520 contains the following subsystems :

- 133Mhz Am5X86 CPU core with floating point unit and a 16KB write-back cache
- Integrated PCI 2.2 compliant host bridge running at 33MHz
- SDRAM Controller
- ROM/Flash Controller
- Programmable Interval Timers
- Real Time clock/CMOS RAM
- Programmable Interrupt Controllers
- Programmable DMA Controllers
- Twin 16550 Compatible Serial Ports
- Dual IDE Chip Selects
- PS/2 Style Gate A20 and reset functions

The PPM-520 augments the inherent feature set of the AMD SC520 by adding the SMSC 37C727 PnP Super I/O chip. This chip contains these subsystems.

- Dual Floppy disk interface
- PS/2 Mouse controller
- PS/2 Keyboard controller
- Two 16550 compatible serial ports
- SPP/EPP/ECP compatible parallel printer port

The PPM-520 also utilizes the Intel 82559ER 10/100 Ethernet Controller for compatibility with a variety of network operating systems and software.

Support for the M-Systems Disk-On-Chip device is present which allows for Flash drives in sizes from 8 to 288MB.

## 2.2 AMD Elan SC520 Processor

The AMD SC520 is the latest in AMD's line of embedded processors. The SC520 incorporates the CPU, FPU, DRAM Controller, Flash/ROM Controller, PCI Controller, RTC/CMOS RAM, and Chip selects for DOC support and the IDE interface.

The processor is supplied from AMD in a 388-pin PBGA package and is soldered directly to the board at the factory. This part is not user replaceable or upgradeable. The core CPU runs at a base clock frequency of 33Mhz. An internal software controlled multiplier of either 3X or 4X results in internal processor speeds of either 100Mhz or 133Mhz. The multiplier selection is user definable using the Phoenix BIOS Setup utility (See Section 3).

## 2.3 Memory Selection and Installation

The PPM-520 comes from the factory with 0MB of RAM. RAM memory must be installed by the user and must meet the following criteria :

32, 64, 128, 256MB 144-Pin SODIMM SDRAM PC66 minimum with gold fingers

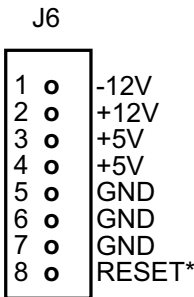
WinSystems qualified SODIMMS are available online through the WinSystems web site at [www.winsystems.com](http://www.winsystems.com) or directly from WinSystems. WinSystems cannot warrant the operation of systems using non-qualified SODIMM modules.

Installation is accomplished by inserting the module into the connector on the back of the board 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.

## 2.4 Power/Reset Connection

Power is supplied to the PPM-520 through the 8-pin Molex connector at J6. The pin definitions for J6 are shown here :

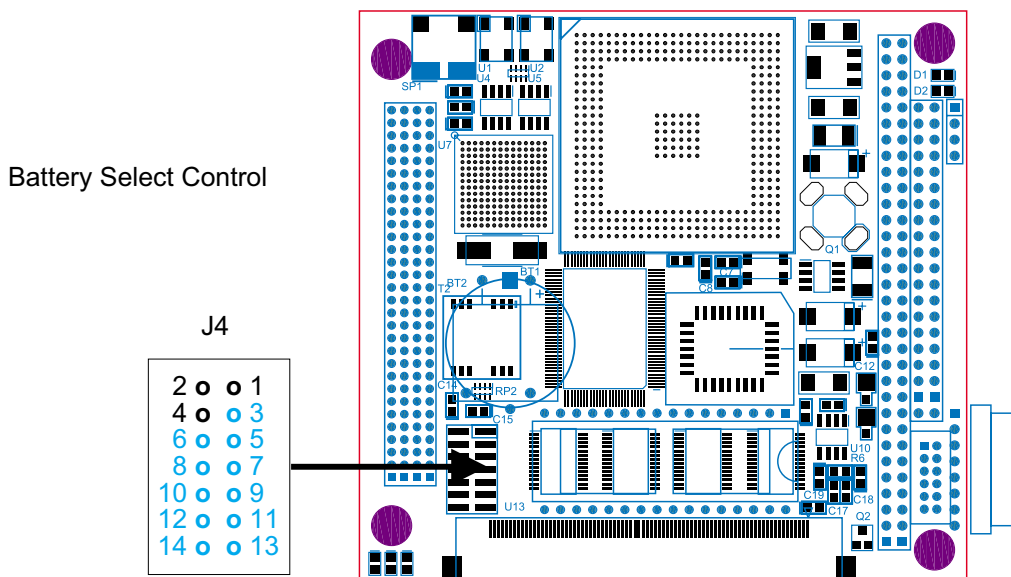


An optional momentary-contact, normally-open reset button can be connected between pin 8 and ground. There is also a reset push-button supplied on the CBL-251-1 Multi-I/O cable.

## 2.5 Mouse Interface

The PPM-520 supports a standard PS/2 type mouse. The mouse connection is made through the Multi-I/O cable P/N CBL-251-1. There are two PS/2 style connectors on the CBL-251-1, the mouse connects on the same ribbon cable as the ethernet and printer port. The cable is terminated with the standard 6 pin mini din connector.

## 2.6 Real Time Clock and CMOS Setup RAM



The onboard lithium battery provides power to the real time clock and the CMOS setup RAM when power is removed. If it ever becomes necessary to have the CMOS RAM settings return to their default factory settings, with power off, reposition the J4 jumper from pins 1-2 to pins 2-4 for approximately 30 seconds and then return the jumper to pins 1-2. At the next powerup the BIOS will load the factory defaults.

## 2.7 Keyboard Interface

The PPM-520 contains an onboard PS/2 style keyboard controller. Connection is made through the Multi-I/O cable connection at J7. An adapter cable P/N CBL-251-1 is available from WinSystems to make ready access to all of the devices terminated at the Multi-I/O connector. Users who may wish to construct their own cables should refer to the Multi-I/O connector pin definitions given later in this manual.

**Note :** The keyboard and mouse connections are both present on the CBL-251-1 cable. The keyboard connector is on the same flat ribbon cable as the four DB9 serial connectors.

## 2.8 Serial Interface

The PPM-520 contains four 16550 compatible RS-232 serial ports. All four ports are terminated at the Multi-I/O connector at J7. When using the WinSystems adapter cable CBL-251-1, COM1 can be identified by the red stripe on the ribbon cable. COM2, COM3, and COM4 follow consecutively on the cable.

COM1 and COM2 are resident inside the AMD SC520 processor/chipset and can be enabled or disabled using the Phoenix BIOS setup menus.

COM3 and COM4 are present in the SMSC 37C727 Super I/O chip and are fully plug-n-play compatible (PnP) and are also configurable using the BIOS Setup menus.

The pin definitions for all 4 serial ports are the same and are shown here :

### COM1-COM4 DB9 Pin Definitions

- 1 DCD
- 2 RX Data
- 3 TX Data
- 4 DTR
- 5 GND
- 6 DSR
- 7 RTS
- 8 CTS
- 9 RI

## 2.9 Parallel Printer Port

The PPM-520 supports a parallel printer port contained in the SMSC super I/O chip. This port is fully PnP compatible and is configurable using the Phoenix BIOS setup menus. The Parallel port can be configured for SPP, EPP and ECP modes. The pin definitions for the DB25 connector when using the CBL-251-1 cable are shown here :

STROBE	1	14	AUTOFD
PD0	2	15	ERROR
PD1	3	16	INIT
PD2	4	17	SLIN
PD3	5	18	GND
PD4	6	19	GND
PD5	7	20	GND
PD6	8	21	GND
PD7	9	22	GND
ACK	10	23	GND
BUSY	11	24	GND
PE	12	25	GND
SLCT	13		

## 2.10 Speaker/Sound Interface

An onboard audio transducer provides a high level audio output which is compatible with the standard PC speaker. This output is used by the BIOS to signal POST errors and may be used by user software for signaling purposes.

## 2.11 Floppy Disk Interface

The PPM-520 and the Phoenix BIOS support up to two 5 ¼" or 3 ½" floppy disk drives. The drive types are configured using the BIOS setup menus. Drive attachment is most easily accomplished using the WinSystems adapter cable P/N CBL-252-1. This cable supports a single 3 ½" floppy drive as well as up to two IDE devices. The pin definitions for the 34-pin IDC connector are shown here for reference :

GND	1	2	RPM/LC
GND	3	4	N/C
GND	5	6	N/C
GND	7	8	INDEX
GND	9	10	MTR0
GND	11	12	DRV1
GND	13	14	DRV0
GND	15	16	MTR1
GND	17	18	DIR
GND	19	20	STEP
GND	21	22	WDATA
GND	23	24	WGATE
GND	25	26	TRK0
GND	27	28	WPRT
GND	29	30	RDATA
GND	31	32	HDSSEL
GND	33	34	DSKCHG

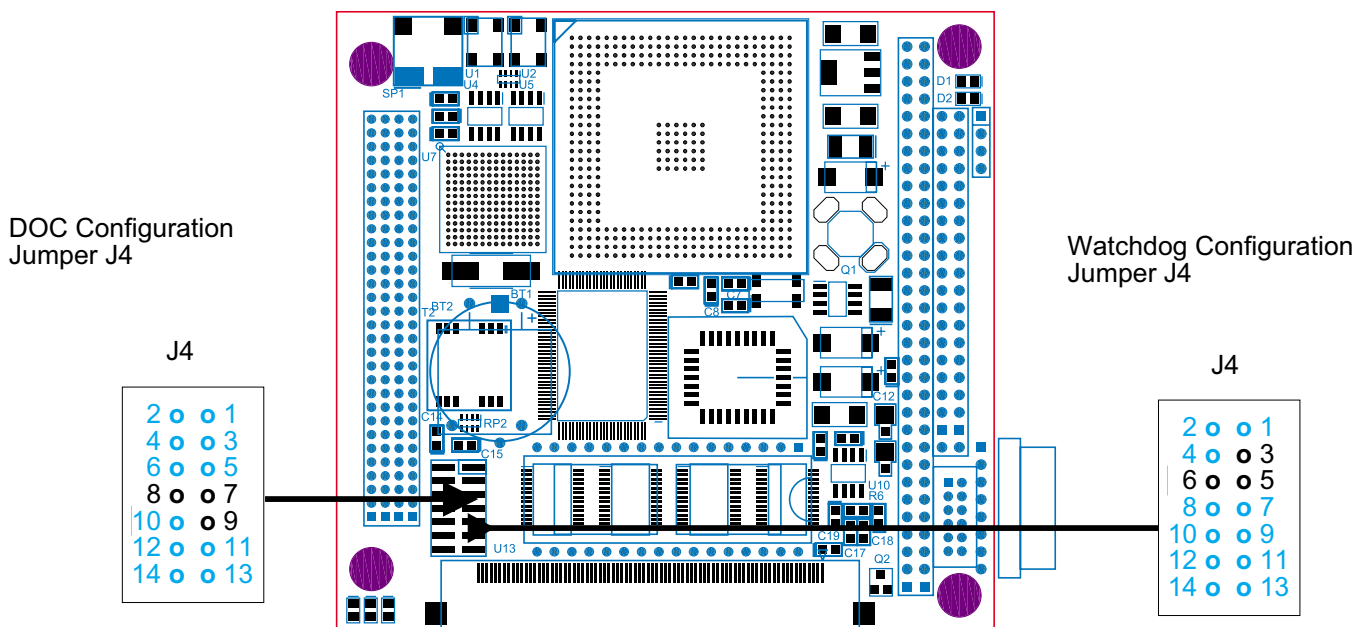
## 2.12 IDE Interface

The PPM-520 supports up to two IDE devices. Connection to IDE Hard disks and CD-ROMs is most easily accomplished when using the WinSystems adapter cable P/N CBL-252-1 connected to J8. This cable allows for the attachment of two standard 40-pin IDE devices. Configuration of the IDE devices is accomplished using the Phoenix BIOS setup menus.

The pin definitions for the 40-pin IDC connectors are shown here for reference :

RESET	1	2	GND
D7	3	4	D8
D6	5	6	D9
D5	7	8	D10
D4	9	10	D11
D3	11	12	D12
D2	13	14	D13
D1	15	16	D14
D0	17	18	D15
GND	19	20	N/C
GND	21	22	GND
IOW	23	24	GND
IOR	25	26	GND
N/C	27	28	ALE
N/C	29	30	GND
INTRQ	31	32	IOCS16
A1	33	34	N/C
A0	35	36	A2
HDCS0	37	38	HDCS1
N/C	39	40	GND

## 2.13 Watchdog Timer Configuration



The PPM-520 features a power-on voltage detect and a power-down/power brownout circuit to protect memory and I/O from faulty CPU operation during periods of illegal voltage levels. This supervisory circuit also features a watchdog timer which can be used to guard against software lockups. An internal self-timer with a period of 1.5 seconds will, when enabled, reset the CPU if the watchdog has not been serviced (petted) within the allotted time. There are three watchdog operational modes available on the PPM-520. With a jumper placed on pins 5-6 of J4 the watchdog circuit is totally disabled and can never reset the processor. When J4 3, 5, 6 are open, the watchdog timer is permanently enabled and timing begins immediately at power up. This mode is NOT compatible with the Phoenix BIOS or with MS-DOS but is available for directly embedded code that replaces the BIOS. The watchdog must be accessed at least every 1.5 seconds or a reset will occur. Petting in this mode is accomplished with a single I/O write (value ignored) to address 1EFH.

The alternate mode of operation is via software control to enable or disable the watchdog's operation. This mode is set by jumpering J4 pins 3-5. In this mode the watchdog powers-up disabled and must be enabled in software before timing will begin. Enabling the watchdog is accomplished by writing a 1 to I/O port 1EEH. Writing a 0 to I/O address 1EEH will disable the watchdog. Once the watchdog is enabled, it must be serviced at least every 1.5 seconds or a reset will occur. Petting in this mode is accomplished with a single I/O write (value ignored) to address 1EFH.

## 2.14 Status LED

An onboard LED can be used by software for signaling status or error conditions. The LED is illuminated by writing a 1 to I/O port 1EDH. The LED is turned off by writing a 0 to I/O address 1EDH.

## 2.15 DiskOnChip Configuration

The PPM-520 supports solid state disks using the M-Systems DiskOnChip flash devices ([www.m-sys.com](http://www.m-sys.com)). These devices are available in sizes ranging from 8MBytes to the currently available maximum size of 288Mbytes. These devices are inherently supported by the BIOS and DOS (They appear as a hard disk to DOS) and are supported by a variety of other operating systems. Current non DOS driver support is available directly from the M-Systems web site.

The DOC device is ordinarily used in systems without an actual hard disk. In these cases the hard drive settings for both the C: and D: drives should be set to NONE in the CMOS setup Menu. The DOC will then appear as drive C: and standard partitioning and formatting software may be used to prepare it to boot. The boot-up time may be dramatically improved by disabling the SC520 IDE controller in the CMOS setup when an actual hard will not be connected.

When the DOC is used in conjunction with an actual hard disk it becomes the secondary or D: drive. This can be useful when it is desired to load a DOC with a large number of files that may currently reside on the hard disk. This characteristic of becoming a secondary drive to an actual hard disk is referred to by M-Systems as "Last Drive". This characteristic may be altered such that the DOC will become the primary drive (or First Drive) by using the *DFORMAT* utility available from M-Systems. In this case it is possible to boot from the DOC and access the hard disk as the D: drive. Refer to the utilities documentation accompanying the download from M-Systems for more info if this mode is required.

The DOC device is installed in the socket-strips designated as U13. Pin 1 of the DOC should be oriented toward the board's power connector.

The DOC is enabled and disabled by use of the jumper block at J4. The jumpering configurations for J4 are shown here :



## 2.16 Ethernet Controller

One of the principal features of the PPM-520 is the inclusion of the 10/100 Ethernet controller. The popular Intel 82559ER high-integration NIC supports both IEEE 802.3 10BASE-T and 100BASE-TX in a fully auto-negotiating mode. The 82559ER integrates both the Media Access Controller (MAC) and the physical layer (PHY) on a single chip. The 82559ER is a full bus mastering PCI controller and also incorporates 6K of buffer memory. Full duplex operation provides throughput of up to 200Mbps on fast Ethernet segments.

Intel provides a vast array of driver support for all of the popular network operating systems including: Windows CE, Windows 95, Windows 98, Windows98SE, Windows ME, Windows NT, Windows 2000, Novell Netware 3.11-4.1, Solaris, Linux, and Unix.

The Ethernet section of the PPM-520 is a full PCI PnP (plug-n-play) implementation coupled with the Phoenix PCI BIOS which assigns the necessary I/O, Memory, DMA, and IRQ resources required by the controller. Connection to the network is most easily accomplished using the adapter cable CBL-251-1 from WinSystems which terminates in the RJ-45 suitable for Ethernet and fast-Ethernet connectivity. There are three Ethernet status LEDs on one corner of the board. The purpose of each LED is shown here :

- D5 (Yellow) Link Active
- D6 (Red) Speed Indication - Lit = 100BASE-TX
- D7 (Green) Activity

**NOTE:** WinSystems cannot provide technical support for direct programming of the 82559ER controller. We suggest utilizing a TCP/IP stack or Network O/S that allows the use of preexisting 82559ER drivers.

## 2.16.1 Ethernet Drivers

The 82559 is software compatible with the Intel line of Pro 100+ PCI adapters. The 82559 is supported by a number of operating systems directly. Intel provides the latest drivers through their web site at :

<http://developer.intel.com/design/network/drivers/>

Alternately, most drivers will be available from the WinSystems site at :

<http://www.winsystems.com>

## 2.17 PC/104 Bus Interface

The PPM-520 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.

GND	D0	o	o	C0	GND	IOCHK*	A1	o	o	B1	GND
MEMCS16*	D1	o	o	C1	SBHE*	SD7	A2	o	o	B2	RESET
IOCS16*	D2	o	o	C2	LA23	SD6	A3	o	o	B3	+5V
IRQ10	D3	o	o	C3	LA22	SD5	A4	o	o	B4	IRQ9
IRQ11	D4	o	o	C4	LA21	SD4	A5	o	o	B5	-5V
IRQ12	D5	o	o	C5	LA20	SD3	A6	o	o	B6	DRQ2
IRQ15	D6	o	o	C6	LA19	SD2	A7	o	o	B7	-12V
IRQ14	D7	o	o	C7	LA18	SD1	A8	o	o	B8	SRDY
DACK0*	D8	o	o	C8	LA17	SD0	A9	o	o	B9	+12V
DRQ0	D9	o	o	C9	MEMR*	IOCHRDY	A10	o	o	B10	KEY
DACK5*	D10	o	o	C10	MEMW*	AEN	A11	o	o	B11	SMEMW*
DRQ5	D11	o	o	C11	SD8	SA19	A12	o	o	B12	SMEMR*
DACK6*	D12	o	o	C12	SD9	SA18	A13	o	o	B13	IOW*
DRQ6	D13	o	o	C13	SD10	SA17	A14	o	o	B14	IOR*
DACK7*	D14	o	o	C14	SD11	SA16	A15	o	o	B15	DACK3*
DRQ7	D15	o	o	C15	SD12	SA15	A16	o	o	B16	DRQ3
+5V	D16	o	o	C16	SD13	SA14	A17	o	o	B17	DACK1*
MASTER*	D17	o	o	C17	SD14	SA13	A18	o	o	B18	DRQ1
GND	D18	o	o	C18	SD15	SA12	A19	o	o	B19	REFRESH*
GND	D19	o	o	C19	KEY	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

## 2.17.1 PC/104 add-on Modules

The GP bus provided by the AMD Elan SC520 processor does a reasonably good job of implementing the ISA (PC/104) bus. There are however a few caveats and limitations that may not allow certain PC/104 add-on modules to function properly

<b>Pin Number</b>	<b>Pin Name</b>	<b>Caveat/Limitation</b>
A1	IOCHK*	There is no bus level NMI support
B5	-5V	There is no support for -5 volts
B8	SRDY	There is no support for 0 wait state. All bus timing is fixed by the SC520
B19	Refresh/DACK0	There is no support for Refresh to the ISA bus.
B20	BCLK	This is an asynchronous 8MHz clock
B30	OSC	This is an asynchronous 14.318MHz clock
D8	DACK0	There is no DMA channel 0 available
D9	DRQ0	There is no DMA channel 0 available
D12	DACK6	There is no support for DMA channel 6
D13	DRQ6	There is no support for DMA channel 6
D14	DACK7	There is no support for DMA channel 7
D15	DRQ7	There is no support for DMA channel 7
D17	MASTER	There is no support for alternate bus masters on the ISA bus

In addition to the table of above it must also be recognized that because of the large complement of I/O devices onboard. There may be few, if any, bus interrupts available to PC/104 add-on cards. In some cases turning off the onboard peripheral will free up the interrupt for use on the PC/104 bus.

The table below shows the standard interrupt assignments and if they are available if the associated peripheral is disabled.

<b>IRQ Number</b>	<b>Peripheral</b>	<b>Free when peripheral disabled</b>
0	Heartbeat Tick	NO
1	Keyboard	NO
2	Slave PIC	NO
3	COM2	YES
4	COM1	YES
5	Unassigned	N/A
6	Floppy Controller	NO
7	Parallel Port	YES
8	RTC	NO
9	COM3	YES
10	PCI Routing	NO
11	COM4	YES
12	Mouse	NO
13	FPU	NO
14	Hard Disk	NO

**IMPORTANT NOTE:** Due to limitations with the Programmable Address Registers (PAR) within the SC520 processor, the I/O address range accessible via the PC/104 bus alters fairly significantly dependent upon the presence and type of video adapter installed. When a PC/104Plus video card is used I/O addresses below 200H are not accessible on the PC/104 Bus and all I/O cards must be mapped above 200H. This limitation does not exist when using a PC/104 video card, or when no video card, is present.

## 2.18 PC/104Plus Interface

The PPM-520 also supports peripheral expansion using the PC/104Plus connector at J3. Up to three PC/104Plus modules may be stacked onto the PPM-520. The onboard Ethernet is attached to Slot 4 and PC/104Plus modules should be attached and configured beginning at slot 1. The PC/104Plus bus pin definitions are shown here for reference purposes only. Refer to the PC/104Plus 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	RTS*
29	+12V	INTA*	INTB*	INTC*
30	-12V	Reserved	Reserved	GND/3.3V Key

## 2.19 Multi-I/O Connector

All of the peripherals connect to the PPM-520 through two 80-pin high-density connectors at J7 and J8. The pin definitions for connectors J7 and J8 are provided here for reference purposes. Cable drawings for the CBL-251-1 and CBL-252-1 are provided in the appendices to document the connections from the Multi-I/O connections to the appropriate peripheral connector.

### J7

PSTB (LPT)	A1	■ ■	B1	(COM1) DCD
AUTOFD (LPT)	A2	■ ■	B2	(COM1) DSR
PD0 (LPT)	A3	■ ■	B3	(COM1) RX
ERROR (LPT)	A4	■ ■	B4	(COM1) RTS
PD1 (LPT)	A5	■ ■	B5	(COM1) TX
INIT (LPT)	A6	■ ■	B6	(COM1) CTS
PD2 (LPT)	A7	■ ■	B7	(COM1) DTR
SLIN (LPT)	A8	■ ■	B8	(COM1) RI
PD3 (LPT)	A9	■ ■	B9	(COM1) GND
GND (LPT)	A10	■ ■	B10	(COM2) DCD
PD4 (LPT)	A11	■ ■	B11	(COM2) DSR
GND (LPT)	A12	■ ■	B12	(COM2) RX
PD5 (LPT)	A13	■ ■	B13	(COM2) RTS
GND (LPT)	A14	■ ■	B14	(COM2) TX
PD6 (LPT)	A15	■ ■	B15	(COM2) CTS
GND (LPT)	A16	■ ■	B16	(COM2) DTR
PD7 (LPT)	A17	■ ■	B17	(COM2) RI
GND (LPT)	A18	■ ■	B18	(COM2) GND
ACK (LPT)	A19	■ ■	B19	(COM3) DCD
GND (LPT)	A20	■ ■	B20	(COM3) DSR
BUSY (LPT)	A21	■ ■	B21	(COM3) RX
GND (LPT)	A22	■ ■	B22	(COM3) RTS
PE (LPT)	A23	■ ■	B23	(COM3) TX
GND (LPT)	A24	■ ■	B24	(COM3) CTS
SLCT (LPT)	A25	■ ■	B25	(COM3) DTR
RX+ (ETH)	A26	■ ■	B26	(COM3) RI
RX- (ETH)	A27	■ ■	B27	(COM3) GND
TX+ (ETH)	A28	■ ■	B28	(COM4) DCD
TX- (ETH)	A29	■ ■	B29	(COM4) DSR
LED0 (ETH)	A30	■ ■	B30	(COM4) RX
LED1 (ETH)	A31	■ ■	B31	(COM4) RTS
LED2 (ETH)	A32	■ ■	B32	(COM4) TX
LED3 (ETH)	A33	■ ■	B33	(COM4) CTS
+5V	A34	■ ■	B34	(COM4) DTR
RESET	A35	■ ■	B35	(COM4) RI
GND	A36	■ ■	B36	(COM4) GND
MDAT (MOUSE)	A37	■ ■	B37	(KYBD) KCLK
GND (MOUSE)	A38	■ ■	B38	(KYBD) KDAT
+5V (MOUSE)	A39	■ ■	B39	(KYBD) GND
MCLK (MOUSE)	A40	■ ■	B40	(KYBD) +5V

J8

RESET (IDE)	A1	■ ■	B1	GND
GND (IDE)	A2	■ ■	B2	DRV DEN
D7 (IDE)	A3	■ ■	B3	GND
D8 (IDE)	A4	■ ■	B4	N/C
D6 (IDE)	A5	■ ■	B5	GND
D9 (IDE)	A6	■ ■	B6	DRV DEN
D6 (IDE)	A7	■ ■	B7	GND
D10 (IDE)	A8	■ ■	B8	INDEX
D4 (IDE)	A9	■ ■	B9	GND
D11 (IDE)	A10	■ ■	B10	MTR0
D3 (IDE)	A11	■ ■	B11	GND
D12 (IDE)	A12	■ ■	B12	DS1
D2 (IDE)	A13	■ ■	B13	GND
D13 (IDE)	A14	■ ■	B14	DS0
D1 (IDE)	A15	■ ■	B15	GND
D14 (IDE)	A16	■ ■	B16	MTR1
D0 (IDE)	A17	■ ■	B17	GND
D15 (IDE)	A18	■ ■	B18	DIR
GND (IDE)	A19	■ ■	B19	GND
N/C	A20	■ ■	B20	STEP
N/C	A21	■ ■	B21	GND
GND (IDE)	A22	■ ■	B22	WDATA
IOWR (IDE)	A23	■ ■	B23	GND
GND (IDE)	A24	■ ■	B24	WGATE
IORD (IDE)	A25	■ ■	B25	GND
GND (IDE)	A26	■ ■	B26	TRK0
GND (IDE)	A27	■ ■	B27	GND
A28 (IDE)	A28	■ ■	B28	WRT PRT
N/C	A29	■ ■	B29	GND
GND (IDE)	A30	■ ■	B30	RDATA
IRQ (IDE)	A31	■ ■	B31	GND
IOCS16 (IDE)	A32	■ ■	B32	HDSEL
A1 (IDE)	A33	■ ■	B33	GND
N/C	A34	■ ■	B34	DSKCHG
A0 (IDE)	A35	■ ■	B35	N/C
A2 (IDE)	A36	■ ■	B36	N/C
HDCS0 (IDE)	A37	■ ■	B37	N/C
HDCS1 (IDE)	A38	■ ■	B38	N/C
LED (IDE)	A39	■ ■	B39	N/C
GND	A40	■ ■	B40	N/C

## 2.20 Jumper/Connector Summary

Jumper/ Connector	Description	Page Number
J1	PC/104 Connector	2-9
J2	AmDebug Config Jumper	N/A
J3	PC/104Plus Connector	2-11
J4	VBAT/DOC/Watchdog Configuration jumper	2-3
J5	AmDebug Connector	N/A
J6	Power/Reset Connector	2-3
J7	Multi-I/O Connector	2-12
J8	Multi-Drive Connector	2-13

## 3 Phoenix BIOS

### 3.1 General Information

The PPM-520 comes equipped with a standard Phoenix BIOS 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. Access to this setup information is via the Setup utility in the Phoenix BIOS.

### 3.2 Entering Setup

To enter setup, power up the computer and press F2 when either the splash screen is displayed (when enabled) or when the “Press F2 for Setup” message is displayed.

Alternately, under certain error conditions a message similar to :

“Press F1 to Continue or F2 for Setup”

May be displayed. Press the desired key for the appropriate action. The BIOS will display the message :

“Entering Setup”

and will continue with the remainder of the POSTt routines. It may take a number of seconds before the main setup menu screen is displayed.

### 3.3 Setup Main Menu

The main menu screen is shown on the following page. Each of the available options will be discussed in this section. Use the ‘Up’ and ‘Down’ arrow keys to move among the sections. Use the ‘Left’ and ‘Right’ arrow keys to move to another menu page. Hit ‘+’ or ‘-’ to scroll through selections or hit Enter when a selection is highlighted to enter a sub-menu or to see a list of choices.

**System Time :** This option allows for the setting of the time in the clock/calendar. Enter is used to move from hours, to minutes, to seconds while the +/- keys adjust the value.

**System Date :** This option allows for setting the calendar to the current month, day, and year. Movement from field to field is accomplished with the Enter key. Values are changes using the +/- keys.

PhoenixBIOS Setup Utility	
Main Advanced Boot Exit	
System Time : 11:34:27 System Date : 08/21/2001	Item Specific Help
Legacy Diskette A: [1.44/1.2MB ½"] Legacy Diskette B: [Disabled]	<Tab>, <Shift-Tab>, or <Enter> selects field.
Primary Master [None] Primary Slave [None]	
System Memory : 640KB Extended Memory 63MB	
<i>F1</i> Help <i>Select</i> Item <i>-/+</i> Change Values <i>F9</i> Setup Defaults <i>ESC</i> Exit <i>Ö</i> Select Menu <i>Enter</i> Select Sub-Menu <i>F10</i> Save and Exit	

Legacy Diskette A: This option allows for setting the type of the first floppy drive attached. If no drive is attached, "disabled" should be selected. The option list is shown here :

Disabled  
 360 KB        5 ¼"  
 1.2 MB        5 ¼"  
 720 KB        3 ½"  
 1.44/1.25 MB 3 ½"  
 2.88 MB       3 ½"

Legacy Diskette B: This option allows for setting the type of the second floppy drive attached. If no drive is attached, "disabled" should be selected. The option list is shown here :

Disabled  
 360 KB        5 ¼"  
 1.2 MB        5 ¼"  
 720 KB        3 ½"  
 1.44/1.25 MB 3 ½"  
 2.88 MB       3 ½"

Primary Master : This option sets the drive type for the first fixed disk. Unlike older systems with fixed drive type numbers, the Phoenix BIOS relies primarily on the self-identification feature of modern IDE drives. This allows the BIOS to auto-detect the drive type and parameters. Support is also provided for user defined drive parameter definitions as well as support for Bootable CD-ROMs and removable ATAPI drives.

The Selection choices for this menu option are :

- Auto
- None
- CD-ROM
- ATAPI Removable
- User

When no fixed disk is to be attached, select 'None' to minimize startup time. The 'Auto' mode is the most versatile and works with nearly all modern hard disks, CD-ROMs, and ATAPI-Removable drives.

Primary Slave : This option sets the drive type for the second fixed disk. Unlike older systems with fixed drive type numbers, the Phoenix BIOS relies primarily on the self-identification feature of modern IDE drives. This allows the BIOS to auto-detect the drive type and parameters. Support is also provided for user defined drive parameter definitions as well as support for Bootable CDROMs and removable ATAPI drives.

The Selection choices for this menu option are :

- Auto
- None
- CD-ROM
- ATAPI Removable
- User

When no fixed disk is to be attached, select 'None' to minimize startup time. The 'Auto' mode is the most versatile and works with nearly all modern hard disks, CD-ROMs and, ATAPI-Removable drives.

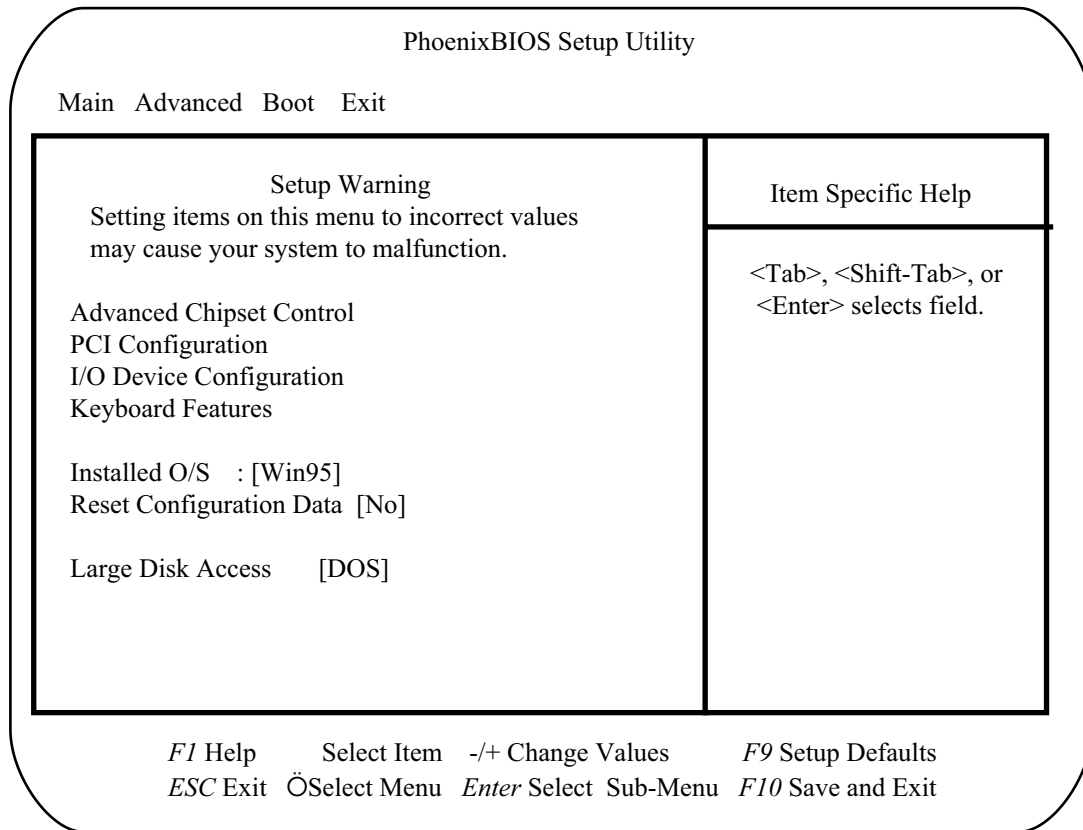
System Memory : This field is displayed by the BIOS and cannot be changed. It shows the amount of memory below 1MB that the system found.

Extended Memory : This is also a display only field. It represents the amount of extended memory above 1MB that was found in the system.

## 3.4 Advanced CMOS Setup

The advanced CMOS setup allows for the configuration of all of the non-disk related Setup items. There are several sub-menus that allow control of a number of System and Chipset Features. Each of the setup options will be discussed in the sections that follow.

The Advanced CMOS setup screen is shown on the following page.



### 3.4.1 Advanced Chipset Control

This submenu allows configuration of the chipset portion of the AMD SC520 processor/chipset. Each of the selections will be discussed in the following sections. The Advanced Chipset Control Menu Screen is shown on the following page.

CPU Speed : This option allows for setting the CPU operating speed. In all cases the base frequency is 33Mhz and it's the internal CPU divisor that is changed by this option. The choices are :

- 133 Mhz
- 100 Mhz

Cache Mode : The SC520 has an on chip 16KB cache. The cache mode may be configured using this setup menu option. The options are :

- Write Back
- Write Through

Advanced Chipset Control		Item Specific Help
CPU Speed	[133]	
Cache Mode	[Write Back]	
CAS Latency	[2T]	
RAS to CAS Delay	[2T]	
RAS Precharge Time	[2T]	
Refresh Cycle Time	[15.6 us]	
SDRAM Buffer	[Enabled]	
Delay Transaction	[Enabled]	
Host-Pci Write Buffer	[Enabled]	

*F1* Help    *Select* Item    *-/+* Change Values    *F9* Setup Defaults  
*ESC* Exit    *Ö*Select Menu    *Enter* Select Sub-Menu    *F10* Save and Exit

CAS Latency : This selection allows the cache latency time to be varied by a number of (T)clock cycles. The available choice are :

- 3T
- 2T

RAS to CAS delay: This selection allows for control of the RAS to CAS timing delay. It too is expressed in clock (T) cycles. The choices are :

- 2T
- 3T
- 4T

RAS Precharge time : This selection controls the precharge time for DRAM cycles. The selections are expressed in 'T' (clock) cycles. The available selections are :

- 2T
- 3T
- 4T
- 6T

Refresh Cycle Time: This selection allows control of the SDRAM refresh timing. This selection must match the requirements of the SDRAM actually installed. The available selections are :

7.8 us  
15.6 us  
31.2 us  
62.5 us

SDRAM Buffer : This option allows for enabling or disabling the SDRAM buffer function. The available choices are:

Enabled  
Disabled

Delay Transaction: This selection allows for configuring the delayed transaction processing feature. The choices are :

Enabled  
Disabled

Host-PCI Write Buffer : This selection allows for control of the Host-pci write buffer. The selections are :

Enabled  
Disabled

### 3.4.2 PCI Configuration

This menu allows setup configuration of the PCI bus resources. This menu should only be used by knowledgeable users. It is possible to configure the PCI resources so as not to allow the onboard peripherals to function due to lack of resources.

The PCI Configuration Menu Screen is shown on the following page. The sections that follow will describe each of the menu items and selections.

PCI Device Slot #1 : This Submenu allows control of several parameters relating to modules attached as the PCI Slot 1 device. These include :

Option ROM Scan : If the PCI Device contains a BIOS extension, its scan can be controlled using this option

Enable Master : This option allows the device to serve as a PCI bus master if Enabled.

PhoenixBIOS Setup Utility	
Advanced	
PCI Configuration	Item Specific Help
PCI Device, Slot #1	Setup items for Configuring the Specific PCI Device
PCI Device, Slot #2	
PCI Device, Slot #3	
PCI IRQ Line 1 [Auto Select]	
PCI IRQ Line 2 [Auto Select]	
PCI IRQ Line 3 [Auto Select]	
PCI IRQ Line 4 [Auto Select]	
PCI/PNP ISA UMB Region Exclusion	
PCI/PNP ISA IRW Exclusion	
ISA Graphics device installed. [No]	

*F1* Help    *Select* Item    *-/+* Change Values    *F9* Setup Defaults  
*ESC* Exit    *Ö*Select Menu    *Enter* Select Sub-Menu    *F10* Save and Exit

Latency Timer :                      This selection controls the latency timer value. The available choices are :

- Default
- 0020h
- 0040h
- 0060h
- 0080h
- 00A0h
- 00C0H
- 00E0H

PCI Device Slot #2 : This Submenu allows control of several parameters relating to modules attached as the PCI Slot 1 device. These include :

Option ROM Scan :                      If the PCI Device contains a BIOS extension, its scan can be controlled using this option.

Enable Master :                          This option allows the device to serve as a PCI bus master if Enabled.

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Latency Timer : This selection controls the latency timer value. The available choices are :

Default  
0020h  
0040h  
0060h  
0080h  
00A0h  
00C0H  
00E0H

PCI Device Slot #3 : This Submenu allows control of several parameters relating to modules attached as the PCI Slot 1 device. These include :

Option ROM Scan : If the PCI Device contains a BIOS extension, its scan can be controlled using this option.

Enable Master : This option allows the device to serve as a PCI bus master if Enabled.

Latency Timer : This selection controls the latency timer value. The available choices are :

Default  
0020h  
0040h  
0060h  
0080h  
00A0h  
00C0H  
00E0H

PCI IRQ Line 1 : This option selects the IRQ to be routed to IRQ Line 1 (A). The choices are :

Disabled  
Auto Select  
3  
4  
5  
7  
9  
10  
11  
12  
14  
15

PCI IRQ Line 2: This option selects the IRQ to be routed to IRQ Line 2 (B). The choices are :

Disabled  
Auto Select  
3  
4  
5  
7  
9  
10  
11  
12  
14  
15

PCI IRQ Line 3: This option selects the IRQ to be routed to IRQ Line 3 (C). The choices are :

Disabled  
Auto Select  
3  
4  
5  
7  
9  
10  
11  
12  
14  
15

PCI IRQ Line 4: This option selects the IRQ to be routed to IRQ Line 4 (D). The choices are :

Disabled  
Auto Select  
3  
4  
5  
7  
9  
10  
11  
12  
14  
15

PCI/PNP ISA UMB Region Exclusion - This menu option allows specific upper memory blocks to be reserved so that they will not be used by PCI or ISA PnP devices. There are 6 address blocks that may be individually selected as either 'Available' or 'Reserved'. These blocks are :

C800 - CBFF  
CC00 - CFFF  
D000 - D3FF  
D400 - D7FF  
D800 - DBFF  
DC00 - DFFF

PCI/PNP ISA IRQ Resource Exclusion - This option like the previous one, allow a resource (IRQ) to be reserved so that it will not be assigned to a PCI or ISA PnP device. Each of the listed IRQs may either be selected as 'Available' or 'Reserved'. The selectable IRQ resources are :

IRQ 3  
IRQ 4  
IRQ 5  
IRQ 7  
IRQ 9  
IRQ 10  
IRQ 11  
IRQ 15

ISA Graphics device installed - This option when selected 'Yes' allows a ISA (Non VGA) graphics device to access palette data in the PCI VGA device. The options are :

Yes  
No

### 3.4.3 I/O Device Configuration

This menu allows configuration of a number of peripheral devices. The I/O Device Configuration Setup screen is shown on the following page. Each of the menu options will be discussed in the sections that follow.

SC520 IDE Adapter : This configuration option controls the internal IDE interface. The available options are :

Enabled  
Disabled

When no IDE devices are to be connected, turning this option to 'Disabled' will result in a significant reduction in the time to boot.

PhoenixBIOS Setup Utility	
Advanced	
I/O Device Configuration	Item Specific Help
SC520 IDE Adapter : [Enabled] Floppy disk Controller : [Enabled] SC520 Serial Port A : [Enabled] SC520 Serial Port B: [Enabled] Serial Port A : [Auto] Serial Port B : [Auto] Parallel Port : [Auto] Mode : [Bi-directional]	Enable the integrated SC520 IDE adapter.
<i>F1</i> Help <i>Select</i> Item <i>-/+</i> Change Values <i>F9</i> Setup Defaults <i>ESC</i> Exit <i>Ö</i> Select Menu <i>Enter</i> Select Sub-Menu <i>F10</i> Save and Exit	

Floppy Disk controller : This option controls the configuration of the floppy disk controller. The options are :

- Enabled
- Disabled

SC520 Serial Port A : This option configures the first serial port (COM1). The selection options for this menu item are:

- Enabled
- Disabled

SC520 Serial Port B : This option configures the second serial port (COM2). The selection options for this menu item are:

Enabled  
Disabled

Serial Port A : This option controls the first serial port in the SMSC 37C727 super I/O chip (COM3). The available Selections are :

Disabled  
Enabled  
Auto  
OS Controlled

When the Port is selected as 'Enabled', two submenu choices become visible.

Base I/O address - This selection configures the base I/O address. The choices are

:

3E8H  
2E8H  
3A8H  
2A8H

Interrupt : This selects the desired interrupt for this port. The selections are :

IRQ 9  
IRQ 11

Serial Port B : This option controls the second serial port in the SMSC 37C727 super I/O chip. (COM3). The available selections are :

Disabled  
Enabled  
Auto  
OS Controlled

When the Port is selected as 'Enabled', two submenu choices become visible.

Base I/O address - This selection configures the base I/O address. The choices are:

3E8H  
2E8H  
3A8H  
2A8H

Interrupt : This selects the desired interrupt for this port. The selections are :

IRQ 9  
IRQ 11

Parallel Port : The option controls the configuration of the onboard printer port. The available selections are :

Disabled  
Enabled  
Auto  
OS Controlled

Mode : This submenu allows selection of the parallel port operating mode. The selections are :

Output only  
Bi-directional  
EPP  
ECP

When the port is selected for 'Enabled', two additional submenu choices become visible :

Base I/O address : This option selects the base I/O address. The choices are :

378  
278  
3BC

Interrupt : This option selects the parallel port interrupt. The selections are :

IRQ 5  
IRQ7

#### 3.4.4 Keyboard Features

This menu allow for configuration of the keyboard operating parameters. There are four items on this menu. Each of the selections will be discussed in the section that follows.

Numlock : This option determines the status of the Numlock LED. The available options are:

Auto  
On  
Off

Key Click : This selection enables or disables the sound produced when a key is pressed. The options are:

Disabled  
Enabled

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Keyboard auto repeat rate : This option controls the repeat rate (typematic) when a key is held down.  
The options are :

30/sec  
26.7/sec  
21.8/sec  
18.5/sec  
13.3/sec  
10/sec  
6/sec  
2/sec

Keyboard auto repeat delay : This option controls the time that a key must be held down before it begins to repeat. The selections are :

1/4 sec  
1/2 sec  
3/4 sec  
1 sec

### 3.4.5 Miscellaneous Functions

The following items are also present on the advanced Setup menu.

Installed OS : This feature allows for the selection of O/S type. The selections are :

Win95  
Other

Reset Configuration Data : This option when enabled, resets the PnP and other configuration data which may be programmed by the BIOS into its flash memory. This will cause all devices and settings to be fully enumerated at the next boot. The available options are :

No  
Yes

Large Disk Access : This option sets the Large disk (greater than 528MB) access mode. The selections are :

Other  
DOS

### 3.5 Boot Setup

This menu screen allows selection of a number of Boot options. The Boot Setup Menu Screen is shown on the following page. Each of the menu items will be described in the following sections.

PhoenixBIOS Setup Utility	
Boot	
	Item Specific Help
Summary screen	[Enabled]
QuickBoot Mode	[Enabled]
Boot-time Diagnostic Screen	[Disabled]
	+Removable Devices
	+Hard Drive
	Atapi CD-ROM Drive
	Network Boot
	Display system configuration on boot

*F1* Help    *Select* Item    *-/+* Change Values    *F9* Setup Defaults  
*ESC* Exit    *Ö*Select Menu    *Enter* Select Sub-Menu    *F10* Save and Exit

**Summary Screen :** This option allows for control of the system summary screen. When enabled a configuration box will be displayed for three seconds prior to boot. The selection options are :

- Enabled
- Disabled

QuickBoot Mode : This option allows for a shortened POST process. When this option is 'Enabled' the memory test is shortened significantly, reducing the time to boot. The choices are :

Disabled  
Enabled

Boot-time Diagnostic Screen : This option allows control of the Splash screen and the BIOS Post and sign-on messages. When Enabled, the splash screen is off, and the BIOS messages will be displayed. Refer to the section on the Logo utility for information on creating custom BIOS splash screens. The choices are :

Disabled  
Enabled

Boot Order : This option allows the available boot devices to be ordered according to the desired boot priority. Removable devices (floppy), Hard Disks, CD-ROM drives, and Network boot items may be moved up or down the priority list using the keys as shown on the boot menu screen

## 3.6 Exit Setup

This menu screen is used for exiting the setup menu and for saving or discarding any changes made.

Exit Saving Changes : This option when selected saves all of the changes made to the CMOS RAM and exits the Setup utility. A warm start reboot is attempted. In some cases depending upon system conditions and changes made, the restart will not be successful and either a power-down or a manual reset may be required.

Exit Discarding Changes : This option exits the Setup utility and restarts the system. Any changes made (other than Date/Time will not be saved).

Load Setup Defaults : This option when selected loads the CMOS RAM with all factory defaults.

Discard Changes : This option removes any changes made but does not exit the setup utility.

Save Changes : This option saves all changes made to CMOS RAM but does not exit the Setup utility.

## 3.7 Phlash Utility

The Phoenix BIOS onboard the PPM-520 is stored in Flash memory. BIOS updates may be programmed onboard using the Phoenix Phlash utility. *Phlash.exe* is a DOS executable that may be run from the command prompt such as :

```
plash bios.rom
```

This will execute the *PHLASH.EXE* program and start reprogramming of the BIOS with the specified file, *BIOS.ROM*. The Phlash utility also requires the presence of the file *PLATFORM.BIN*. The utility can be run from floppy, hard disk, or Disk-on-Chip. It may also be run "in the blind" without keyboard or video present by adding its invocation into the *AUTOEXEC.BAT* file on the boot media.

### 3.8 Logo Utility

The *LOGO.EXE* utility combined with the *BMP2PGX.EXE* program and MS-Windows *PAINT.EXE* allows for the creation of a custom splash screen that will be displayed during the BIOS post process. The steps for creating a custom splash screen are as follows :

1. In Windows Paint or another graphic utility capable of generating Windows .BMP files, create your desired screen with a resolution of 640 X 480 pixels in 16 colors. This resolution and color count must be adhered to if the graphic is to be displayed properly. Save the file in a .BMP format.

2. Run the *BMP2PGX.EXE* utility to convert the .BMP file to a .PGX file which is a compressed graphic format used by the Phoenix BIOS display manager. The invocation line is like this :

```
bmp2pgx logo.bmp
```

This will create the .PGX file required for the next step. The name will be the same as the .BMP file with a .PGX extension.

3. Run the *LOGO.EXE* utility to place the new .PGX file into the BIOS image file. If the BIOS image file is named *BIOS.ROM* and the logo file is called *LOGO.PGX*, then the command :

```
logo bios.rom logo.pgx
```

will load the new logo file into the *BIOS.ROM* file at the proper position.

4. Use the *Phlash.exe* utility described in the previous section to program the new BIOS image.
5. Using the BIOS Setup, on the Boot Menu, Disable the Boot-time Diagnostic Screen.

During the POST routines, your screen will be displayed. You can still press <ESCAPE> to return to the diagnostic screen or <F2> to enter setup.

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## 4

## APPENDIX A - I/O Port Map

The following is a list of PC I/O ports. Addresses marked with a '-' or not used on the PPM-520 but their use should be carefully evaluated so as not to conflict with other I/O boards. I/O addresses marked with a '+' are used on the PPM-520 and are unique to the WinSystems design. 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-520 uses a PnP BIOS for both the PC/104Plus and the PC/104 bus I/O resource allocations. Care must be taken to avoid contention with resources allocated by the BIOS.

Hex Range	Usage
000-00F	8237 DMA 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 Coprocessor Control
**0F2-0F7	Free
0F8-0FF	Math Coprocessor
100-102	VGA Control Register
**103-16F	Free
170-177	IDE Controller #2
**178-1EC	Free
+1ED-1EF	Watchdog/LED control
1F0-1FF	IDE Controller #1
200-207	Game Port
**208-237	Free
238-23B	Bus Mouse
23C-23F	Alt. Bus Mouse
**240-277	Free
278-27F	Parallel Printer
**280-2A7	Free
2A8-2AF	Serial Port
2B0-2BF	EGA
2C0-2CF	EGA
2D0-2DF	EGA
2E0-2E7	GPIB Interface
2E8-2EF	Serial Port

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**2F0-2F7	Free
2F8-2FF	Serial Port
**300-32F	Free
370-377	Floppy Disk Controller #2
378-37F	Parallel Printer
**380-3A7	Free
3A8-3AF	Serial Port
3B0-3BB	MDA
3BC-3BF	Parallel Printer
3C0-3CF	EGA/VGA
3D0-3DF	CGA
**3E0-3E7	Free
3E8-3EF	Serial Port
3F0-3F7	Floppy Disk Controller #1
3F8-3FF	Serial Port

## 5

## APPENDIX B - Interrupt Map

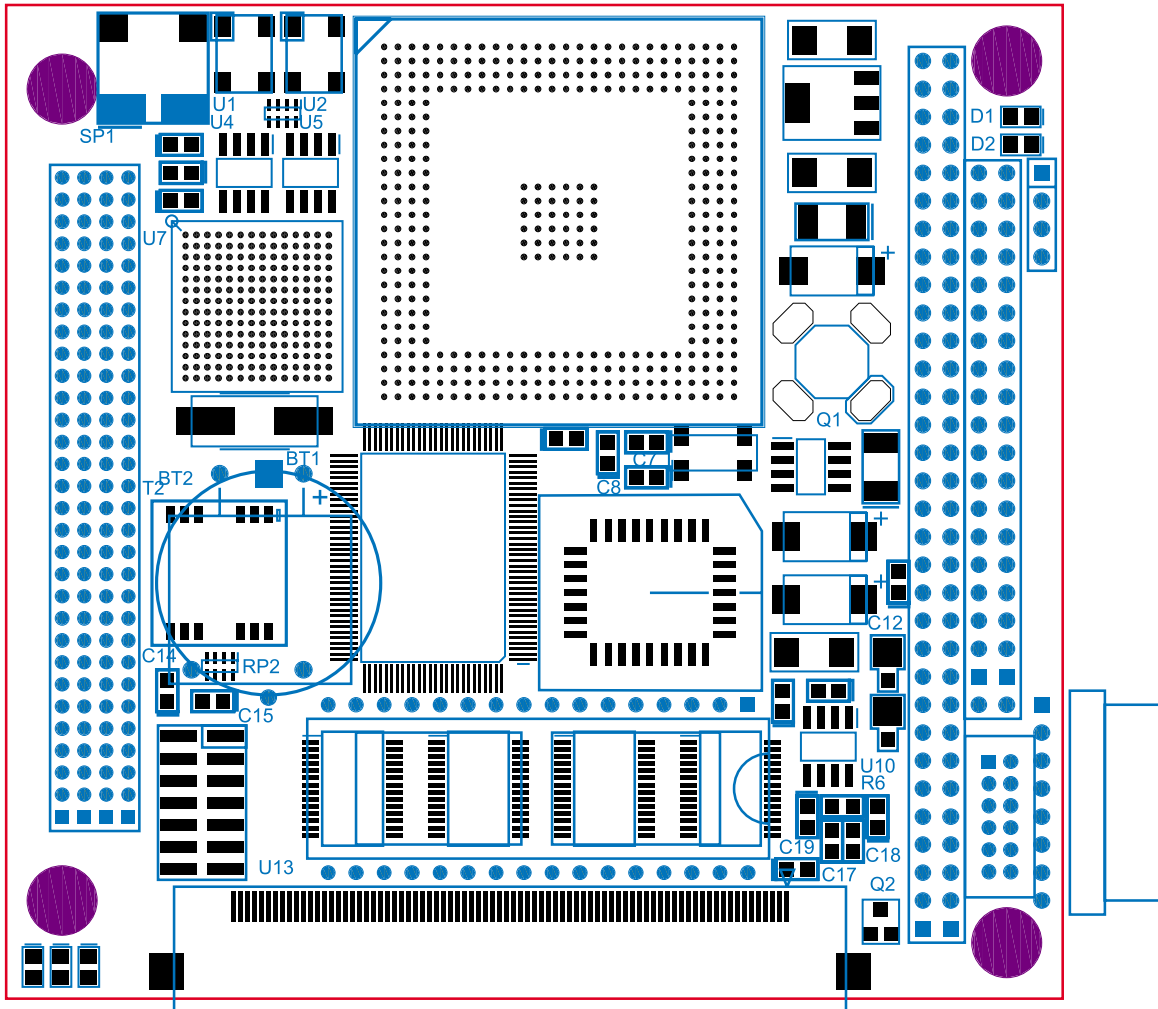
No.	Address	Type	Description
0	00	CPU	Divide by Zero
1	04	CPU	Single Step
		386+	Debug Exception
2	08	CPU	NMI
3	0C	CPU	Breakpoint
4	10	CPU	Overflow
5	14	BIOS	Print Screen
		186+	Bounds exception
6	18	186+	Invalid Opcode
7	1C	186+	Coprocessor unavailable
8	20	Hardware	IRQ 0 - 18.2Hz heartbeat
		286+	LIDT - Double fault exception
9	24	Hardware	IRQ 1 - Keyboard
		286+	Coprocessor segment
A	28	Hardware	IRQ 2 - Chained to Slave
		286+	Invalid TSS exception
B	2C	Hardware	IRQ 3 - COM2
		286+	Segment not present
C	30	Hardware	IRQ 4 - COM1
		286+	Stack fault exception
D	34	Hardware	IRQ 5
		286+	Protection fault
E	38	Hardware	IRQ 6 - Floppy Disk
		386+	Page fault
F	3C	Hardware	IRQ 7 - LPT1
10	40	BIOS	Video BIOS functions
		286+	Coprocessor exception
11	44	BIOS	BIOS equipment check
		486+	Alignment check exception
12	48	BIOS	BIOS memory size
		P5+	Machine check
13	4C	BIOS	BIOS disk functions
14	50	BIOS	BIOS serial functions
15	54	BIOS	BIOS cassette/misc functions
16	58	BIOS	BIOS keyboard functions
17	5C	BIOS	BIOS printer functions
18	60	BIOS	SROM Basic Entry (IBM)
19	64	BIOS	BIOS Boot function
1A	68	BIOS	BIOS time of day functions
1B	6C	BIOS	BIOS keyboard break
1C	70	BIOS	BIOS chained timer tick
1D	74	BIOS	BIOS video initialization
1E	78	BIOS	BIOS diskette parameter table
1F	7C	BIOS	BIOS CGA graphics font
20	80	MS-DOS	Program Terminate

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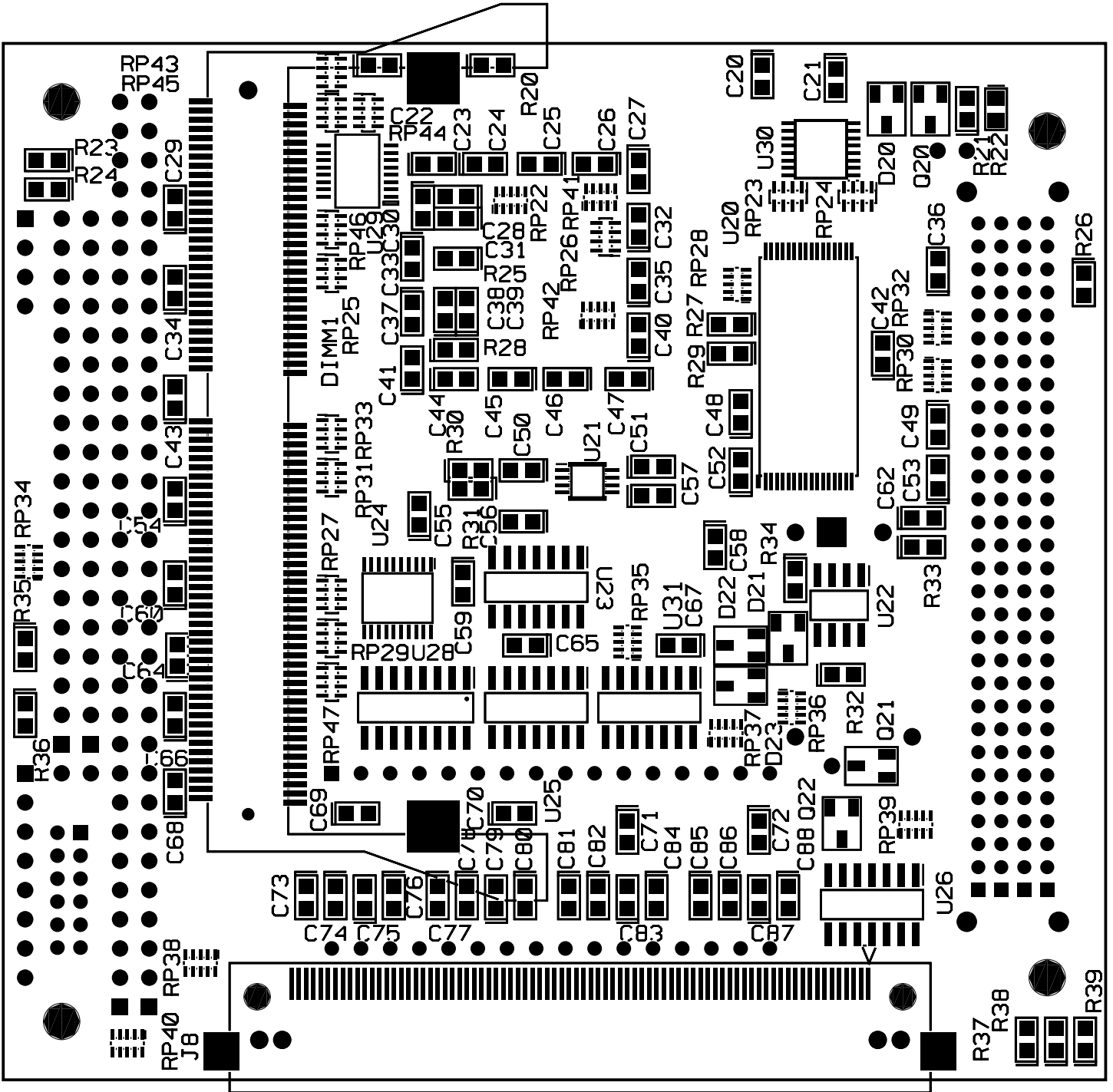
21	84	MS-DOS	DOS function calls
22	88	MS-DOS	Terminate address
23	8C	MS-DOS	Ctrl-Break Address
24	90	MS-DOS	Fatal Error vector
25	94	MS-DOS	Absolute disk read
26	98	MS-DOS	Absolute disk write
27	9C	MS-DOS	Terminate
28	A0	MS-DOS	Idle signal
29	A4	MS-DOS	TTY output
2A	A8	MS-DOS	MS-Net services
2F	BC	MS-DOS	Print Spool
30	C0	MS-DOS	Long jump interface
33	CC	MS-DOS	Mouse functions
3F	FC	MS-DOS	Overlay interrupt
40	100	BIOS	BIOS floppy redirect
41	104	BIOS	BIOS Fixed disk 1 table
42	108	BIOS	EGA Chain
43	10C	BIOS	EGA Parameter table pointer
44	110	BIOS	EGA graphics font
46	118	BIOS	BIOS Fixed disk 2 table
4A	128	BIOS	AT Alarm exit address
50	140	BIOS	AT Alarm interrupt
51	144	BIOS	Mouse functions
5A	168	NET	NET functions
5B	16C	NET	boot chain
5C	170	NET	NET BIOS entry
67	19C	MS-DOS	EMS functions
6D	1B4	VGA	VGA service
70	1C0	Hardware	IRQ 8 - Real time clock
71	1C4	Hardware	IRQ 9 - Redirected IRQ 2
72	1C8	Hardware	IRQ 10 - Unassigned
73	1CC	Hardware	IRQ 11 - Unassigned
74	1D0	Hardware	IRQ 12 - Mouse
75	1D4	Hardware	IRQ 13 - Coprocessor
76	1D8	Hardware	IRQ 14 - IDE hard disk
77	1DC	Hardware	IRQ 15 - Unassigned

# 6 APPENDIX C

## PPM-520 Parts Placement Guide - TOP SIDE



PPM-520 Parts Placement Guide - BOTTOM SIDE



# **7** APPENDIX D

PPM-520 Parts List

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PAGE 1

ASSM ITEM FROM: PPM-520-133-OM  
PARENT LOC FROM: <FIRST>

DEFAULT COMPONENT LOCATION: ARLIN

ASSM ITEM THRU: PPM-520-133-OM  
PARENT LOC THRU: <LAST>

LVL	ITEM KEY	ITEM DESCRIPTION	BOM COMMENT	ITEM TYPE	QTY REQUIRED
	PPM-520-133-OM	PC/104PLUS, 133 MHZ 586 SBC WITH 10/100	PC/104PLUS, 133 MHZ 586 SBC WITH 10/100 ET	F	1.0
1	999-9999-001	SPECIAL NOTES	11-26-01 MEB ECO 01-50(REVD)	I	1.0
1	999-9999-001	SPECIAL NOTES	10-09-01 MEB ECO 01-50	I	1.0
1	999-9999-001	SPECIAL NOTES	08-09-01 MEB (ECBOM REVB)	I	1.0
1	999-9999-001	SPECIAL NOTES	06/12/01 MEB (REVA)	I	1.0
1	999-9999-001	SPECIAL NOTES	SPECIAL NOTES	I	1.0
1	0301-000-0000D	ASSY SMT-TOP PPM-SC520 CPU REV.D	ASSY SMT-TOP PPM-SC520 CPU REV.D	F	1.0
2	999-9999-001	SPECIAL NOTES	11-26-01 MEB ECO 01-50	I	1.0
2	999-9999-001	SPECIAL NOTES	10/09/01 MEB ECO 01-50	I	1.0
2	999-9999-001	SPECIAL NOTES	08-09-01 MEB (ECBOM CHANGE-REVB,VARIOUS)	I	1.0
2	999-9999-001	SPECIAL NOTES	06/07/01 MEB (REVA)	I	1.0
2	650-0104-0DA	CONNECTOR PC/104 COMM CON 50752C-104G2	J1	I	1.0
2	601-0101-503	RES 100 Ohm 5% 1/10w 0805	R1	I	1.0
2	601-0103-503	RES 10K Ohm 5% 1/10W 0805	R2,R6	I	2.0
2	601-0200-503	RES 20.0 Ohm 5% 1/10w 0805	R4	I	1.0
2	601-0272-503	RES 2.7K Ohm 5% 1/10w 0805	R5	I	1.0
2	601-1501-303	RES 1.5K Ohm 1% 1/10w 0805	R7	I	1.0
2	601-2491-303	RESISTOR 2.49K 1% 0805 SMT	R3	I	1.0
2	602-0330-524	RN 33 Ohm, 5%, 4RES ARRAY	RP1	I	1.0
2	602-0750-524	RN 75 Ohm, 5%, 4RES ARRAY	RP2	I	1.0
2	603-1047-803	CAP .1uF 50v 20% CER 0805	C3,C6,C12,C14,C18,C19	I	6.0
2	603-1055-807	CAP 1uF 25v 20% CER 1812	C4,C9	I	2.0
2	603-1065-82D	CAP 10uF 25v 20% TAN 6032	C1,C2,C13	I	3.0
2	603-1517-803	CAP 150pF 50v 5% CER 0805	C17	I	1.0
2	603-1527-803	CAP .0015uF 50v 20% CER 0805	C15	I	1.0
2	603-2245-803	CAP .22uF 0805 X7R 25V	C16	I	1.0
2	603-3372-82F	CAP 330uf TANT 10v 20%	C5,C10,C11	I	3.0
2	606-0006-000	IC, 5VH 4AMP TRANSFORMER	T1	I	1.0
2	606-0007-000	IC, 10/100 LAN MAGNETICS	T2	I	1.0
2	607-0005-005	LED, GREEN SMT	D7	I	1.0
2	607-0006-005	LED, RED SMT	D1,D2,D6	I	3.0
2	607-0007-005	LED, YELLOW SMT	D5	I	1.0
2	607-0010-013	IC UPS5819 POWERMITE SCHOTTKY DIODE 1A	D3,D4	I	2.0
2	620-0014-025	IC, ELANSC520-133AC 5X86 CPU W/NORTH &	U6	I	1.0
2	621-0035-025	IC, GD82559ER FAST ETHERNET PCI CNTRLR	U7	I	1.0
2	621-0032-016	FDC37B727 SUPER I/O QFP	U8	I	1.0
2	622-0019-001	IC, ZERO DELAY BUFFER 3.3V	U4,U5	I	2.0
2	650-0032-002	SOCKET 32P AMP 822498-1 (28)	U9	I	1.0
2	650-0120-0BA	PC104 PLUS,120POS.COMM CON 50825-120G	J3	I	1.0
2	650-2014-0G0	HDR, 2X7 2MM SMT	J4	I	1.0
2	650-7080-000	CONN, 80PIN RA SMT HIROSE	J7	I	1.0
2	665-0001-102	TRANSISTOR 2N7002 (SOT-23)	Q2	I	1.0
2	665-0003-108	IC, IRF7311 HEXFET POWER MOSFET	Q1	I	1.0
2	670-0003-026	IC LT1963EST-2.5 2.5V LDO REGULATOR	U3	I	1.0
2	673-0002-019	IC, MAX211ECAI RS232 TRANSCEIVER	U11,U12,U14,U15	I	4.0
2	677-0004-001	REGULATOR, HIGH PWR SYNC SW./LTC 1530CS8	U10	I	1.0

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PAGE 2

ASSM ITEM FROM: PPM-520-133-0M  
PARENT LOC FROM: <FIRST>

DEFAULT COMPONENT LOCATION: ARLIN

ASSM ITEM THRU: PPM-520-133-0M  
PARENT LOC THRU: <LAST>

LVL	ITEM KEY	ITEM DESCRIPTION	BOM COMMENT	ITEM TYPE	QTY	
2	681-0001-005	XTAL 25MHZ U49SM-18-250F	Y1	I	1.0	
2	681-0004-001	XTAL 32.768KHZ SMT	Y2	I	1.0	
2	682-0001-006	14.31818 OSC 5X7 CER.SMT CMOS 50PPM 5V	U1	I	1.0	
2	682-0002-006	OSC 33.33333 MHZ	U2	I	1.0	
2	690-0001-000	TRANSDUCER, AUDIO STAR MQT-03D	SP1	I	1.0	
-----						
SUB-ASSEMBLY TOTAL: 0301-000-0000D		ARLIN - 44 Items				
-----						
1	0301-001-0000D	ASSY SMT-BOT PPM-SC520 CPU REV.D	ASSY SMT-BOT PPM-SC520 CPU REV.D	F	1.0	
2	999-9999-001	SPECIAL NOTES	11-26-01 MEB ECO 01-50	I	1.0	
2	999-9999-001	SPECIAL NOTES	10-09-01 MEB ECO 01-50	I	1.0	
2	999-9999-001	SPECIAL NOTES	08-09-01 MEB (ECBOM REVB)	I	1.0	
2	999-9999-001	SPECIAL NOTES	06/07/01 MEB (REVA)	I	1.0	
2	400-0301-000D	PCB, PPM-SC520 CPU BOARD	Rev D PCB, PPM-SC520 CPU BOARD	Rev D	I	1.0
2	601-0000-503	RES 0 Ohm 5% 1/10w 0805	R26	I	1.0	
2	601-0100-503	RES 10 Ohm 5% 1/10w 0805	R22	I	1.0	
2	601-0102-503	RES 1K Ohm 5% 1/10W 0805	R20,R21	I	2.0	
2	601-0104-503	RESISTOR 100K 5% 0805 SMT RESISTOR	R34	I	1.0	
2	601-0331-503	RES 330 Oh, 5%, 0805	R35-R39	I	5.0	
2	601-0470-503	RES 47 Ohm 5% 1/10w 0805	R25	I	1.0	
2	601-0471-503	RES 470 Ohm 20% 1/10w 0805	R23,R24	I	2.0	
2	601-0472-503	RES 4.7K Ohm 5% 1/10w 0805	R28	I	1.0	
2	601-1210-303	RES 121 Ohm 1% 1/10w 0805	R32	I	1.0	
2	601-1501-303	RES 1.5K Ohm 1% 1/10w 0805	R30,R31	I	2.0	
2	601-5490-303	RES 549 Ohms 1% 0805	R27	I	1.0	
2	601-6040-303	RES 604 Ohms 1% 1/10W 0805	R29	I	1.0	
2	602-0100-524	RN 10 Ohm, 5%, 4RES ARRAY	RP25,RP26,RP27,RP29,RP31,RP33,RP44	I	7.0	
2	602-0102-515	RN 1K Ohm, 5%, 8 PIN, 10 RES BUSSED	RP34,RP35,RP39	I	3.0	
2	602-0103-515	RN 10K Oh, 5%, 8 Res. 10pin	RP22,RP28,RP30,RP32,RP36,RP37,RP38,RP40,	I	10.0	
2	999-9999-001	SPECIAL NOTES	RP41,RP42	I	1.0	
2	602-0330-524	RN 33 Ohm, 5%, 4RES ARRAY	RP23,RP24	I	2.0	
2	603-1027-803	CAP 1000pF 50v 20% CER 0805	C39	I	1.0	
2	603-1037-803	CAP .01uF 50v 20% CER 0805	C23,C25,C30,C32,C35,C38,C41,C45,C46	I	9.0	
2	603-1047-803	CAP .1uF 50v 20% CER 0805	C20,C21,C22,C24,C26,C27,C29,C31,C33,C34,	I	52.0	
2	999-9999-001	SPECIAL NOTES	C36,C37,C40,C42,C43,C44,C47,C48,C49,C50,	I	1.0	
2	999-9999-001	SPECIAL NOTES	C54,C55,C56,C57,C58,C59,C60,C64-C88	I	1.0	
2	603-1052-803	CAP 1uF 10v 20% CER 0805	C28	I	1.0	
2	603-2245-803	CAP .22uF 0805 X7R 25V	C51	I	1.0	
2	603-2207-503	CAP 22PF 50v 2% NPO 0805	C52,C53	I	2.0	
2	603-82R7-303	CAP 8.2pF 50v .50pF CER 0805	C62	I	1.0	
2	607-0008-000	DIODE SMT SCHOTTKY SOT-23	D20-D23	I	4.0	
2	611-0074-001	IC, 74HC74D (SM)	U23,U26	I	2.0	
2	612-0032-001	IC, 74HCT32	U25	I	1.0	
2	612-0688-017	IC 74HCT688PW TSSOP PACKAGE	U24	I	1.0	
2	622-0002-019	IC, LTC1726EMS8-5 SUPERVISOR	U21	I	1.0	
2	635-0001-001	IC, 24C02 SEEPROM S08 IS93C46-3GR	U22	I	1.0	

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WinSystems, Inc.

PAGE 3

ASSM ITEM FROM: PPM-520-133-0M  
PARENT LOC FROM: <FIRST>

DEFAULT COMPONENT LOCATION: ARLIN

ASSM ITEM THRU: PPM-520-133-0M  
PARENT LOC THRU: <LAST>

LVL	ITEM KEY	ITEM DESCRIPTION	BOM COMMENT	ITEM TYPE	QTY
2	611-0138-001	IC, 74HC138M (SM)	U28	I	1.0
2	650-4144-000	CONN, AMP S0-DIMM SOCKET 390112-1	DIMM1	I	1.0
2	650-7080-000	CONN, 80PIN RA SMT HIROSE	J8	I	1.0
2	660-0002-002	TRANS MMBT2222ALT1 SOT-23	Q20	I	1.0
2	665-0001-102	TRANSISTOR 2N7002 (SOT-23)	Q21	I	1.0
2	61A-0169-117	IC 74LVC169PW PRESETTABLE SYNC.4-BIT UP	U30	I	1.0
2	672-0002-021	IC, IDTQS3257Q QUAD 2:1 MUX/DEMUX	U29	I	1.0
2	602-0221-524	RN 220 Ohm, 5%, 8P, 4RES	RP46,RP47	I	2.0
2	999-9999-001	SPECIAL NOTES	RP43,RP45 (POPULATION OPTION)	I	0.0

SUB-ASSEMBLY TOTAL: 0301-001-0000D ARLIN - 46 Items

1	0301-100-0000D	SUB ASSY PPM-SC520 CPU REV.D	SUB ASSY PPM-SC520 CPU REV.D	F	1.0
2	999-9999-001	SPECIAL NOTES	11-26-01 MEB ECO 01-50 (REV.D)	I	1.0
2	999-9999-001	SPECIAL NOTES	10-09-01 MEB ECO 01-50	I	1.0
2	999-9999-001	SPECIAL NOTES	08-09-01 MEB (ECBOM REVB)	I	1.0
2	999-9999-001	SPECIAL NOTES	06/07/01 MEB (REVA)	I	1.0
2	201-0002-005	JUMPER PLUG, 2MM SAMTEC 2SN-BK-G	J4=1-2, 5-6, 7-9	I	3.0
2	111-0001-000	BAT 3V LI COIN CR2032-H04 (SONY)	BT2	I	1.0
2	201-0008-602	HDR 8 POS RA, MOLEX 22-12-2084	J6	I	1.0
2	250-0326-200	SOCKET 32 P MT ICT-326-S-TG (720)	U13	I	1.0
2	637-0005-015	FLASH, 512X8(4meg) 5V 32P PLCC	U9 CS=_____ SPRINT\PPM520\_____.BIN	I	1.0
2	910-0030-000	LABEL, AWARD BIOS	NOTE: INSTALL ON PC104 CONN.	I	1.0
2	502-0016-000	HEAT SINK,BDN14-3CB 1.41"SQUARE x.355"HT	NOTE: INSTALL ON U6 (ELANSC520)	I	1.0
2	502-0009-000	HEAT SINK 1' X 1" MATERIAL/PART# RD-339C	NOTE: ATTACH TO HEAT SINK.	I	1.0
2	500-0200-179	SCREW M2 x 10 PAN PHILLIPS M/S Z/P	NOTE: INSTALL ON J7, J8.	I	2.0
2	500-0200-180	HEX NUT M2 ZINC PLATED	INSTALL ON J7, J8.	I	2.0
2	500-0200-181	LOCKWASHER M2 ZINC PLATED	INSTALL ON J7, J8.	I	2.0

SUB-ASSEMBLY TOTAL: 0301-100-0000D ARLIN - 15 Items

1	910-0024-000	LABEL, STATIC SENSITIVE 130-02	LABEL, STATIC SENSITIVE 130-02	I	1.0
1	950-0001-000	BAG STATIC BARRIER 07-0610 6X10	BAG STATIC BARRIER 07-0610 6X10	I	1.0
1	500-0200-174	VINYL, PC-104 PROTECTIVE ESD CAP.	VINYL, PC-104 PROTECTIVE ESD CAP.	I	1.0
1	KIT-PCM-STANDOFF-2	PC/104 STANDOFF KIT CONSISTING OF 2	PC/104 STANDOFF KIT CONSISTING OF 2	F	1.0
2	CONTRACT LABOR	OUTSIDE CONTRACT LABOR		L	.1
2	999-9999-001	SPECIAL NOTES	04-28-95 MEB (NEW BOM)	I	1.0
2	500-0200-091	SPACER M/F RAF 4000-440-N-MODL.600	SPACER M/F RAF 4000-440-N-MODL.600	I	2.0
2	500-0200-033	SCREW PPH 4-40 X 1/4"	SCREW PPH 4-40 X 1/4"	I	2.0
2	500-0200-092	NUT HEX NYLON 4-40	NUT HEX NYLON 4-40	I	2.0
2	525-0304-001	SIZE 3 COIN ENVLPE 2.5" X 4.25" 50260	SIZE 3 COIN ENVELOPE 2 1/2 X 4 1/4	I	1.0

SUB-ASSEMBLY TOTAL: KIT-PCM-STANDOFF-2 ARLIN - 6 Items

TOP ASSEMBLY TOTAL: PPM-520-133-0M ARLIN - 12 Items

REPORT RECAP

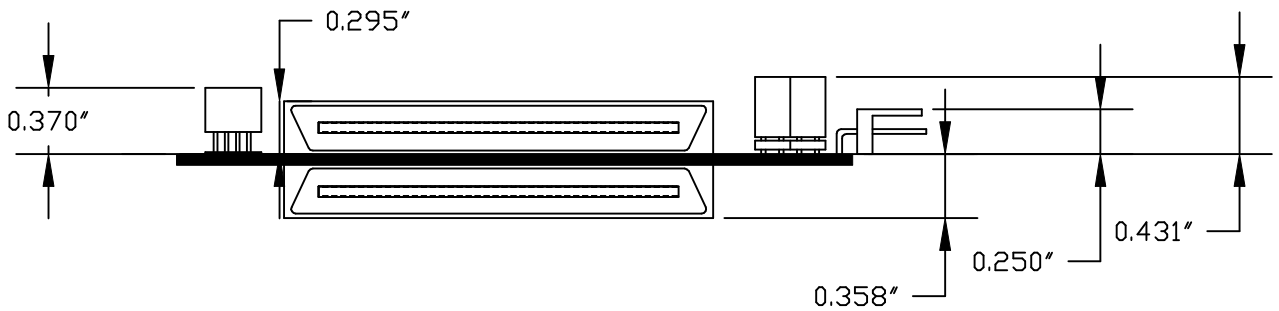
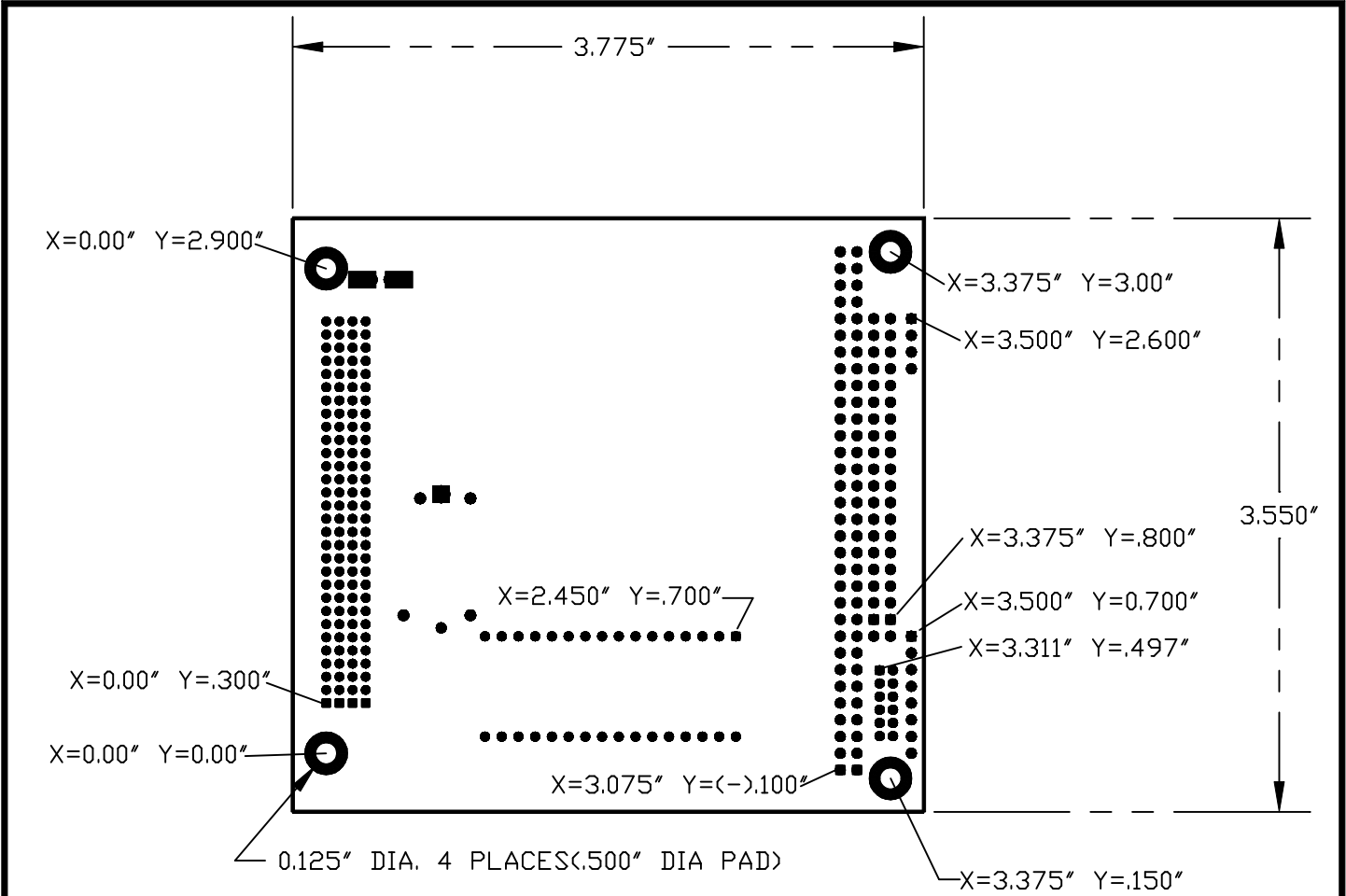
0 WARNING(S)

# **8** APPENDIX E

PPM-520 Mechanical Drawings

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UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES.  
TOLERANCE:  
FRACTIONS: ANGLES:  $\pm 1/2^\circ$   
DECIMALS: .XX  $\pm .03$   
.XXX  $\pm .010$

MACHINE FINISH



*WinSystems, Inc.*  
"THE EMBEDDED SYSTEMS AUTHORITY"

PPM-520/TX  
MECHANICAL DIMENSIONS

CUSTOMER	DATE
APPRV	DATE
CHKD	DATE
DRAFT/DESIGN	M.BROWNING
DATE	08/31/01

SIZE A	CAGE 1AU87	DRAWING NO. DIMSPPM520	REV B
SCALE	CAD ID: DIMSPPM520	SHEET NO. 1 OF 1	

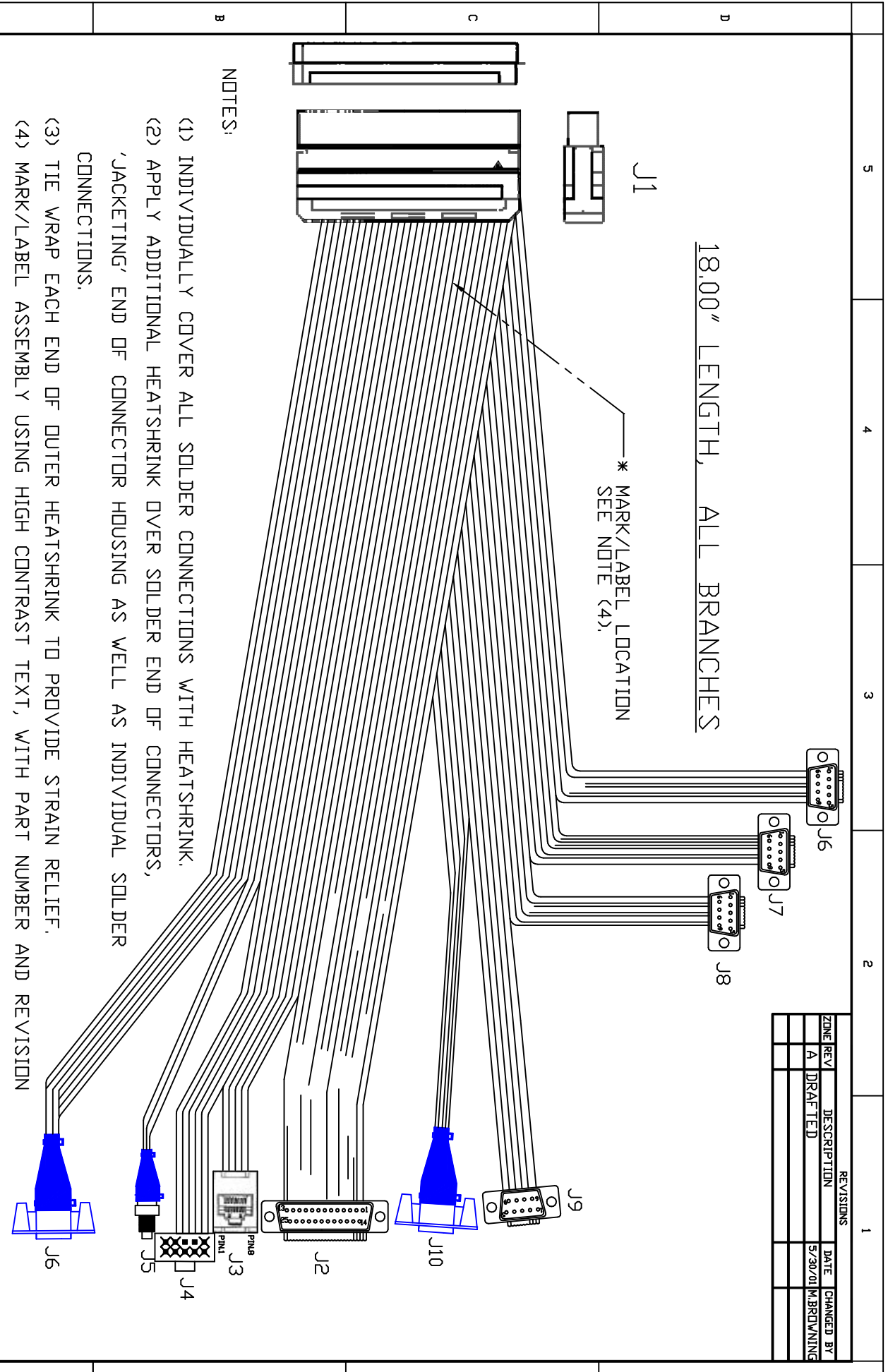
# 9 APPENDIX F

PPM-520 Interface Cable Drawings

*WinSystems* - "The Embedded Systems Authority"

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REVISONS		DATE	CHANGED BY
ZONE	REV	DESCRIPTION	
A	DRAFTED	5/30/01	M.BROWNING



J1  
18.00" LENGTH, ALL BRANCHES  
\* MARK/LABEL LOCATION  
SEE NOTE (4).

NOTES:

- (1) INDIVIDUALLY COVER ALL SOLDER CONNECTIONS WITH HEATSHRINK.
- (2) APPLY ADDITIONAL HEATSHRINK OVER SOLDER END OF CONNECTORS, 'JACKETING' END OF CONNECTOR HOUSING AS WELL AS INDIVIDUAL SOLDER CONNECTIONS.
- (3) TIE WRAP EACH END OF OUTER HEATSHRINK TO PROVIDE STRAIN RELIEF.
- (4) MARK/LABEL ASSEMBLY USING HIGH CONTRAST TEXT, WITH PART NUMBER AND REVISION LETTER, USE PERMANENT TYPE MARKING.

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES.

FRACTIONS	TOLERANCE	ANGLES	+/- 1/2"
DECIMALS	.XX ± .03	.XXX ± .00	

CUSTOMER APPROVAL

APPROVAL	DATE
CHECKER	DATE

DRAFT/DESIGN M.BROWNING

DATE 05/30/01

**WinSystems, Inc.**  
"THE STD BUS AUTHORITY"

CBL-251-1 MULTI I/O  
SERIAL, PS2, KYBD, LPT, ENET,  
RESET, PS2, MOUSE

SIZE CODE DWG NO. CBL251S1.DWG | REV. A

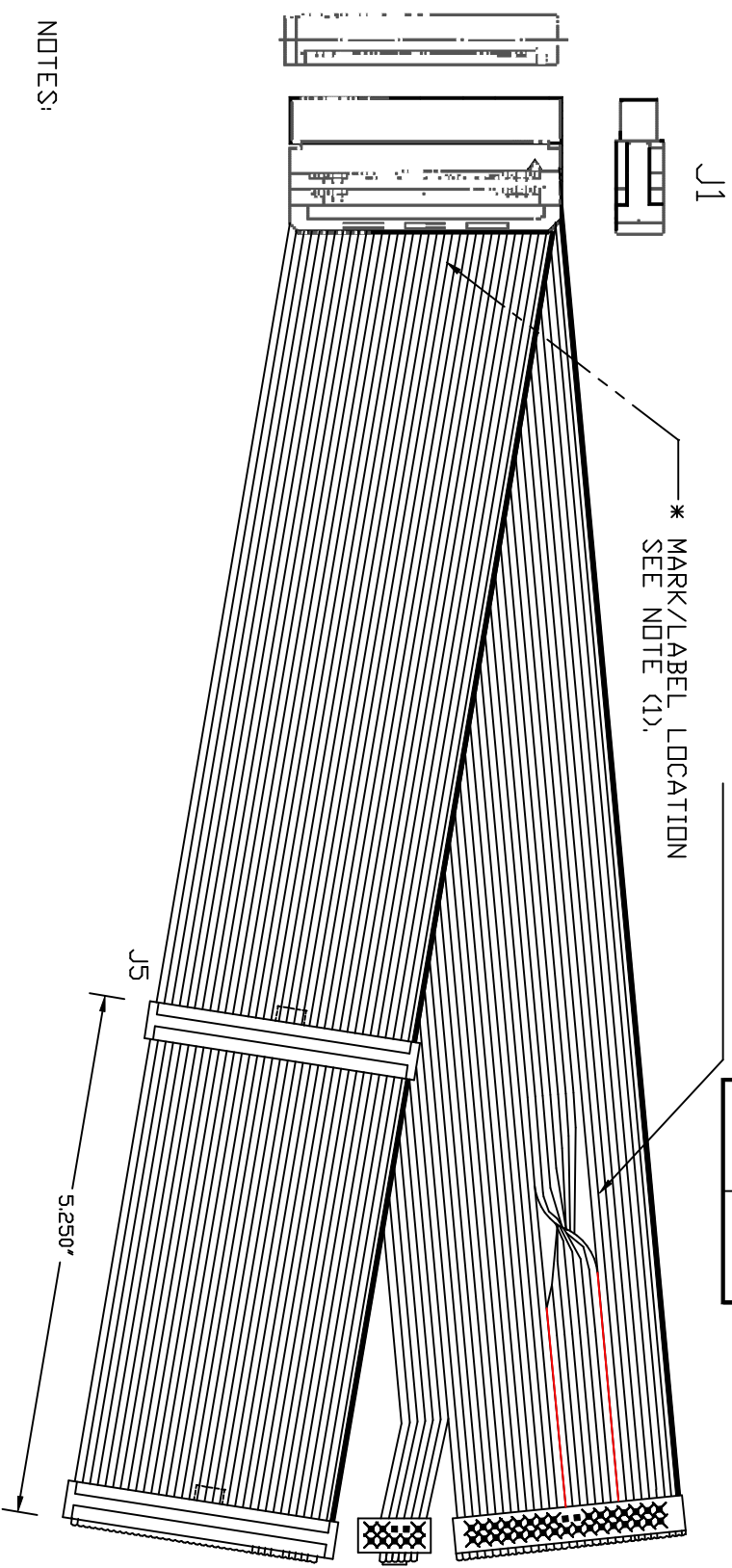
SCALE CAD ID SHEET 1 OF 2

18.00" LENGTH, ALL BRANCHES

NOTE: WIRE ALL CONNECTIONS PER PAGES 3&4 EXCEPT AS NOTED IN THIS WIRE LIST.

TWIST IN CABLE

J3 WIRE LIST	CONN.
TWIST	16
10	16
11	15
12	14
13	13
14	12
15	11
16	10



\* MARK/LABEL LOCATION SEE NOTE (1).

J3 <DD NOT KEY>

NOTES:

(1) MARK/LABEL ASSEMBLY USING HIGH CONTRAST TEXT, WITH PART NUMBER AND REVISION LETTER, USE PERMANENT TYPE MARKING.

ZONE	REV	DESCRIPTION	DATE	CHANGED BY
A	DRAFTED		5/30/01	M.BROWNING
B	ADD Q40 PINS, MOVED EXISTING		8/06/01	M.BROWNING
C	REMOVE KEY FROM J3 EOD 01-56		10/29/01	M.BROWNING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. FRACTIONS ANGLES +/- 1/2" TOLERANCE DECIMALS .XX ± .03 .XXX ± .00		CUSTOMER APPROVAL		DATE
MACHINE FINISH ✓		APPROVAL	DATE	
DRAFT/DESIGN M.BROWNING		CHECKER	DATE	
05/30/01			DATE	
CBL-252-1 MULTI DRIVE DUAL IDE, FLOPPY, USB		<b>WinSystems, Inc.</b> "THE S110 BUS AUTHORITY"		
SIZE CAGE CODE	DWG NO.	CBL2521S1.DWG	REV	C
SCALE	CAD ID		SHEET	1 OF 2