PMPC2 USERS MANUAL

REVISION 1.0

Mesa Electronics
4175 Lakeside Drive, Suite #100
Richmond, CA 94806-1950
Tel (510) 223-9272 - Fax (510) 223-9585
E-Mail: tech@mesanet.com - Website: www.mesanet.com

TABLE OF CONTENTS

TABLE OF CONTENTS

HANDLING PRECAUTIONS

LITHIUM CELL

The PMPC2 card contains a lithium cell which can create a fire or explosion hazard if improperly handled.

Do not expose battery to temperatures in excess of 100 degrees Celsius or dispose of in fire.

Do not attempt to charge battery or modify battery related circuitry on the PMPC2.

Do not short circuit battery (take care not to set the PMPC2 on conductive surfaces).

STATIC ELECTRICITY

The CMOS integrated circuits on the PMPC2 can be damaged by exposure to electrostatic discharges. The following precautions should be taken when handling the PMPC2 to prevent possible damage.

A. Leave the PMPC2 in its antistatic bag until needed.
B. All work should be performed at an antistatic workstation.
C. Ground equipment into which PMPC2 will be installed.
D. Ground handling personnel with conductive bracelet through 1 Meg resistor to ground.

INTRODUCTION

GENERAL

The PMPC2 is a small, low cost panel mount display computer for user interface applications. The overall dimensions of the PMPC2 are 5.43"H x 11.06"W x 2.75"D with the numeric keypad, and 5.43"H x 7.24"W x 2.75"D without. The PMPC2 is housed in a BOPLA COMBICARD case which allows great flexibility in mounting and other mechanical details.

The PMPC2 is a complete embedded system user interface CPU with display, keyboard, serial and parallel I/O, network interface, and solid state disk.

The PMPC2 has ROM-DOS pre-installed in its BIOS EPROM, and needs only your application program to make a complete user interface.

The PMPC2 display is a 320 by 240 resolution passive monochrome LCD with variable brightness CCFL backlight. Display dot pitch is .3 mm.

The display controller is fully VGA compatible but displays the upper left 1/4 of a standard VGA screen. BIOS support is provided to scroll through the full VGA region.

PMPC2 backlight intensity can be adjusted via built-in software commands.

The keyswitch array surrounds the display area so that the keys can be labeled in the display. The keypad scanner can scan up to 96 keys for custom keypads.

The PMPC2 requires +5V @ 1.5 A max. The PMPC2 CPU is a 40 MHz 386SX PC compatible processor (ALI M6117) with 4 or 8M bytes of RAM standard. A numeric co-processor can be ordered as an option. EEPROM setup storage and watchdog timer improve system reliability.

The standard flash disk has a capacity of 4M bytes but the PMPC2 can be ordered with up to 16M bytes of flash disk. The flash disk uses NAND flash chips for high performance and long life. The flash filing system is built into the PMPC2 BIOS. Utilities for using the flash disk are provided with the PMPC2.

On card I/O includes a battery backed clock/calendar, 10BaseT Ethernet interface, floppy interface, IDE interface, two 16C550 compatible serial ports, one of which can be ordered with a RS-485 interface, a bi-directional parallel printer port, 24 user I/O bits, a standard PC/AT keyboard port, and an 8 input, 12 bit A-D converter.

Additional I/O can be added via the 16 bit PC/104 expansion site on the back of the PMPC2.

HARDWARE CONFIGURATION

GENERAL

The PMPC2 has four hardware setup jumpers accessible from the back side of the PMPC2 unit. When changing these option jumpers or installing I/O connectors. the PMPC2 should be set display side down on a soft pad. In the following discussions, when the words "up", "down", "right", and "left" are used it is assumed that the PMPC2 card has been set display side down with the PC/104 expansion connector at the bottom edge of the card (nearest the person doing the configuration).

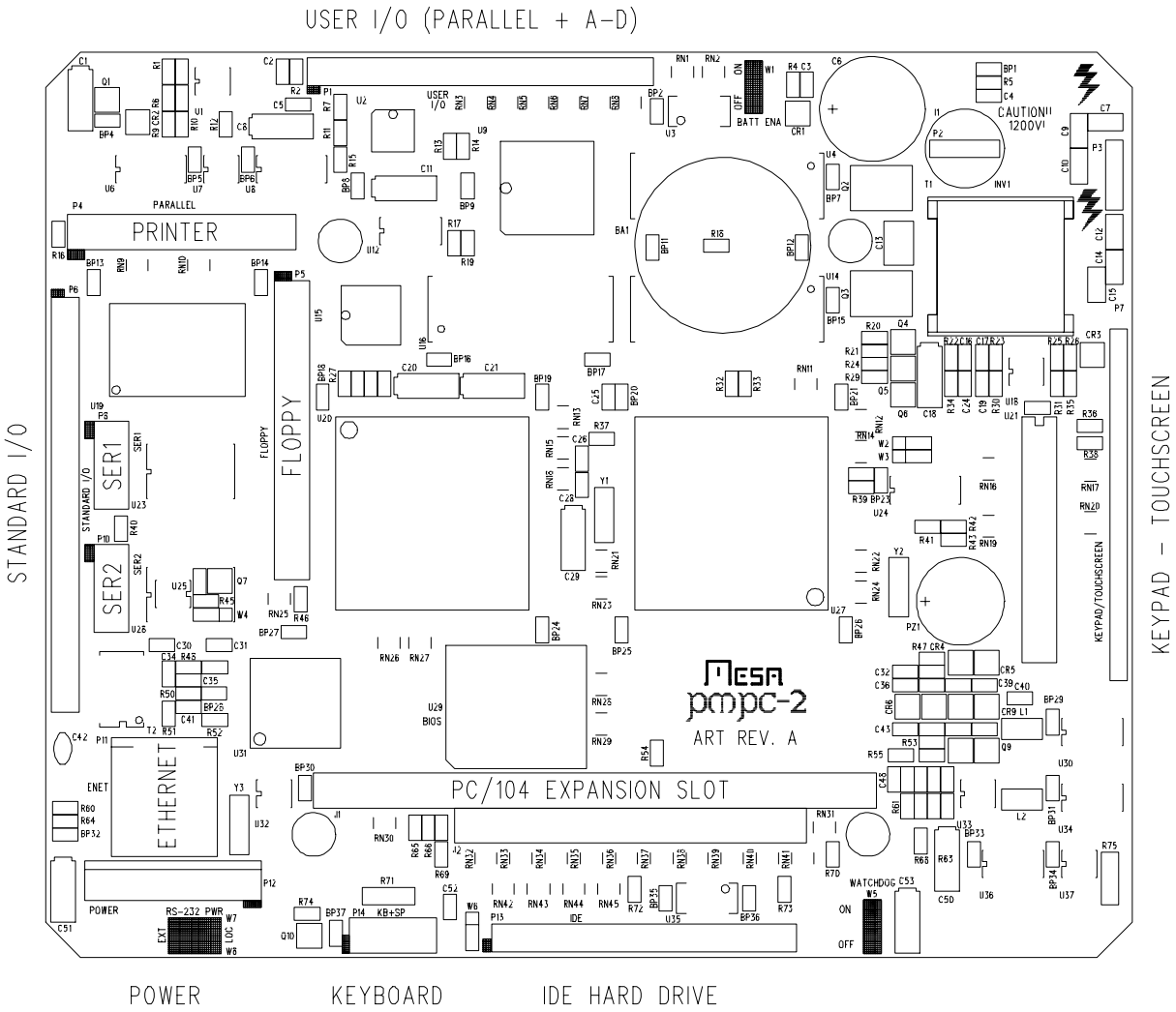
DEFAULT JUMPER SETTINGS

Factory default PMPC2 jumpering is as follows:

FUNCTION	JUMPER(S)	SETTING
Lithium cell connect	W1	up - enabled
watchdog enable	W5	up - enabled
RS-232 power source	W7/W8	both right - local

HARDWARE CONFIGURATION

JUMPER LOCATIONS AND I/O CONNECTORS



HARDWARE CONFIGURATION

WATCHDOG ENABLE

The PMPC2 has a hardware watchdog timer to provide continuos operation in unattended applications, where the application software may hang or crash. This watchdog timer is normally reset by the BIOS tic clock routine, and will only function in a DOS/WINDOWS environment. If another operating system is used, you will have to disable the watchdog timer. The watchdog timer is enabled by setting jumper W5 to the up position.

LITHIUM CELL CONNECT

The PMPC2's Lithium cell can be disconnected if long term storage is planned. To disconnect the Lithium cell from all PMPC2 circuitry, move jumper W1 to the down position. ***When W1 is set to the down position, the clock/calendar forgets the time and date!***

RS-232 POWER SOURCE

The PMPC2 generates local power for the RS-232 ports so that +12 and -12 V power are not needed. In some cases, however it may be necessary to power the RS-232 interfaces from external sources. For example if a serial mouse is installed, it gets its power from the serial port. The local power supply is not likely to be able to supply enough current to run the mouse, so in this case, the RS-232 power should be supplied externally. To select local RS-232 power, jumpers W7 and W8 are moved to the right hand position. To select external RS-232 power, jumpers W7 and W8 are moved to the left hand position.

INSTALLATION

GENERAL

When the PMPC2 has been properly configured for its application, expansion PC/104 cards can be installed on the back of the card. These need to be installed last as they cover jumpers and the printer and floppy connectors. The PC/104 card can be secured to the PMPC2 with 4/40x3/8" machine screws, or if more than one PC/104 card is added, a combination of male-female spacers and machine screws. The screws should then be tightened to secure the expansion card(s) in place.

MOUNTING

The PMPC2 uses the BOPLA COMBICARD series of cases for maximum flexibility in mounting and case style. The basic PMPC2 is supplied with only the bezel part of the case. A wide variety of case styles and options are available including panel mount (DIN 43700 compatible) and portable. Case depth can be extended to accommodate several PC/104 add-on cards if needed.

I/O CONNECTOR ORIENTATION

The serial port and keyboard connectors on the PMPC2 are 10 pin, .1" headers. The keyboard connector has pin 3 missing to prevent plugging the keyboard adapter cable on the serial port connector. Pin 10 of the serial port connector can be cut, and a keying plug installed in the cable mount header if desired. This will prevent plugging the serial cable on the keyboard port connector.

All connectors on the PMPC2 have their pin one ends marked with a white square on the circuit card. This corresponds with the red stripe on typical flat cable assemblies.

The parallel port on the PMPC2 is a 26 pin .1" header . If not used, the 5V output pin (pin 26) can be cut. If this is done, a key may be installed in the pin 26 location of the IDC cable mount receptacle to prevent reverse installation.

The power connector normally has pin 3 removed in order to act as a key. If the power or ground pins on the user I/O connector are not needed, one of them can be cut to serve as a key.

CONNECTORS

POWER CONNECTOR

The PMPC2 power connector (P12) is a 10 pin, single row, .1" header. The suggested mating connector is an AMP MTA type connector 641191-10 (non-feedthrough) or 641199-10 (feedthrough). These are both gold plated type connectors for 24 AWG wire size.

Note that the +12 and -12 volt power pins on the power connector only supply the PC/104 expansion connector, and are not necessary for normal PMPC2 operation. Since the power connector on the PMPC2 powers the PC/104 expansion bus, it is suggested that only gold plated connectors be used. Tin plated connectors have a pronounced tendency to fail over time via increased contact resistance when anywhere near their rated current is drawn.

Power connector pinout is as follows:

PIN	SIGNAL	CURRENT RATING
1	+5V	1A
2	GND	1A
3	GND	1A
4	+5V	1A
5	GND	1A
6	-12	200 MA
7	+12	200 MA
8	GND	1A
9	KEY	
10	GND	1A

KEYBOARD CONNECTOR

P14 is the AT keyboard, reset-in and speaker connector. P12 is a 10 pin dual row .1" header. The suggested mating connector is AMP PN 499934-1. This is an IDC (flat cable) type connector.

An external reset switch input and speaker output are also available on P8. The reset circuit works by grounding the EXTPF signal. The speaker output is intended to drive high impedance speakers (40 ohms or more) . Eight Ohm speakers will be too quiet for most applications. The speaker output idles at +5V so the speaker common is +5V. Keyboard connections are also available on the standard I/O connector.

CONNECTORS

KEYBOARD CONNECTOR

Keyboard connector P12 pin-out is as follows:

PIN	SIGNAL	FUNCTION
1	KBCLK	Clock from keyboard
2	KDATA	Data from keyboard
3	KEY	(Pin missing - key)
4	KGND	Keyboard power return
5	KVCC	Keyboard +5V power
6	KBINH	Keyboard lock
7	RGND	Reset-in common (ground)
8	EXTPF	Reset-in
9	SPKOUT	Speaker output
10	SPKVCC	Speaker common (+5V)

Notice that the first 5 signals match the signal order on the AT keyboard. If a flat cable is used, the first 5 wires can be split off for connection to the keyboard. If you make your own keyboard adapter cable, make sure you get the connections to the DIN connector correct (the pins on the DIN connector are not in ascending sequence) A keyboard adapter cable is available from MESA.

SERIAL PORT CONNECTORS

P8 and P10 are the serial port connectors. P8 is referred to as SERIAL-1 and is a 16C550 compatible serial port with a default port assignment of COM1. P10 is referred to as SERIAL-2 and is a 16C550 compatible serial port with a default port assignment of COM2. All serial ports use a 10 pin dual row .1" header. The suggested mating connector is AMP PN 499934-1. This is an IDC (flat cable) type connector. Both serial port connections are available on the standard I/O connector.

When the flat cable from a 10 pin serial port connector is terminated with a male 9 pin D type connector (suggested connector AMP 747306-4), the 9 pin connector will have a similar pin-out to the AT type 9 pin serial port. The pin 10 wire must be stripped from the cable before installing the D connector. A foot long serial port adapter cable, and a five foot long download cable are available from MESA.

CONNECTORS

SERIAL PORT CONNECTORS

Serial port connectors P1 and P2 pin-out is as follows:

HDR PIN	DSUB PIN	SIGNAL	FUNCTION
1	1	CD	Handshake in
2	6	DSR	Handshake in
3	2	XD	Data in
4	7	RTS	Handshake out
5	3	TXD	Data out
6	8	CTS/RS-485A	Handshake out
7	4	DTR	Handshake out
8	9	RI/RS-485B	Handshake in
9	5	GND	Signal ground
10	NC	+5V	+5V user power

NOTE: SERIAL-2 can optionally be configured to be RS-485 compatible (data leads only). In this case only pins 6,8, 9, and 10 are used. This is a factory assembly option. When the RS-485 option is installed make sure that you do not connect any RS-232 signals to the RS-485 pins (6 and 8) or you may damage the RS-485 transceiver chip(s).

ETHERNET CONNECTOR

The PMPC2 has an optional built-in 10BaseT Ethernet interface. The 8 pin RJ45 connector is P11. The Ethernet connections are also available on the standard I/O connector.

FLOPPY CONNECTOR

Connector P5 is the floppy disk interface. The PMPC2 hardware currently supports 720K and 1.44M floppy drives. The PMPC2 supports two floppy drives, using the standard twisted floppy disk cable. P5 is a 34 pin connector with pin 4 missing. Be careful to observe the orientation of the cable. A reversed cable will not damage the PMPC2 or the floppy drive(s), but will destroy information on any diskette that is inserted in the drive.

CONNECTORS

PRINTER PORT CONNECTOR

The PMPC2 has a single printer port. The printer port connector is P3. P3 is a 26 pin, .1" header. Suggested mating connector is AMP PN 746285-6 When the flat cable from the 26 pin printer port connector is terminated with a female 25 pin D type connector (pin 26 unconnected) the 25 pin connector will have the standard PC printer port pinout. The printer port connections are also available on the standard I/O connector.

HDR PIN	DSUB PIN	SIGNAL	FUNCTION
1	1	/PSTB	Strobe (out)
2	14	/PAFD	Auto LF (out)
3	2	PD0	Data 0
4	15	/PERROR	Printer error (in)
5	3	PD1	Data 1
6	16	/PINIT	Reset printer (out)
7	4	PD2	Data 2
8	17	/PSLIN	Select printer (out)
9	5	PD3	Data 3
10	18	GND	Ground
11	6	PD4	Data 4
12	19	GND	Ground
13	7	PD5	Data 5
14	20	GND	Ground
15	8	PD6	Data 6
16	21	GND	Ground
17	9	PD7	Data 7
18	22	GND	Ground
19	10	/PACK	Printer Ack (in)
20	23	GND	Ground
21	11	PBUSY	Data in (in)
22	24	GND	Ground
23	12	PPE	Paper out (in)
24	25	GND	Ground
25	13	PSLCT	Printer selected (in)
26	NC	+5V	Key

CONNECTORS

USER I/O

The PMPC2 has a 50 pin connector for USER I/O. This connector is P1. There are 8 analog inputs and 24 I/O bits available on P1. P1 pinout is as follows:

HDR PIN	SIGNAL	FUNCTION
1	GND	Ground
2	AIN0	Analog in 0
3	AIN1	Analog in 1
4	AIN2	Analog in 2
5	AIN3	Analog in 3
6	AIN4	Analog in 4
7	AIN5	Analog in 5
8	AIN6	Analog in 6
9	AIN7	Analog in 7
10	3.75V	Reference voltage
11	GND	Ground
12	NC	No connect
13	NC	No connect
14	NC	No connect
15	NC	No connect
16	NC	No connect
17	NC	No connect
18	NC	No connect
19	NC	No connect
20	VCC	+5V power
21	NC	No connect
22	NC	No connect
23	VCC	+5Vpower
24	GND	Ground

CONNECTORS

USER I/O

25	USR0	Parallel bit 0 (PA0)
26	USR1	Parallel bit 1 (PA1)
27	USR2	Parallel bit 2 (PA2)
28	USR3	Parallel bit 3 (PA3)
29	USR4	Parallel bit 4 (PA4)
30	USR5	Parallel bit 5 (PA5)
31	USR6	Parallel bit 6 (PA6)
32	USR7	Parallel bit 7 (PA7)
33	USR8	Parallel bit 8 (PB0)
34	USR9	Parallel bit 9 (PB1)
35	USR10	Parallel bit 10 (PB2)
36	USR11	Parallel bit 11 (PB3)
37	USR12	Parallel bit 12 (PB4)
38	USR13	Parallel bit 13 (PB5)
39	USR14	Parallel bit 14 (PB6)
40	USR15	Parallel bit 15 (PB7)
41	USR16	Parallel bit 16 (PC0)
42	USR17	Parallel bit 17 (PC1)
43	USR18	Parallel bit 18 (PC2)
44	USR19	Parallel bit 19 (PC3)
45	USR20	Parallel bit 20 (PC4)
46	USR21	Parallel bit 21 (PC5)
47	USR22	Parallel bit 22 (PC6)
48	USR23	Parallel bit 23 (PC7)
49	GND	Ground
50	VCC	+ 5V power

PC/104 EXPANSION

The PMPC2 provides an full 16 bit PC/104 expansion connector for user supplied I/O cards. Note that +12 and - 12V power for the expansion connector comes from the PMPC2's power connector P12.

CONNECTORS

STANDARD I/O CONNECTOR

The PMPC2 combines several of the standard I/O interface connections on a single connector. This connector allows a paddle board with the standard I/O to be located at the back of the PMPC2 enclosure. This avoids the tangle of cables needed to do this individually. The standard I/I connector is a 60 pin 2mm connector with the following pinout:

HDR PIN	SIGNAL	FUNCTION
1	/PSTB	Strobe (out)
2	GND	Ground
3	/PAFD	Auto LF (out)
4	PD0	Data 0
5	/PERROR	Printer error (in)
6	PD1	Data 1
7	/PINIT	Reset printer (out)
8	PD2	Data 2
9	/PSLIN	Select printer (out)
10	PD3	Data 3
11	PD4	Data 4
12	PD5	Data 5
13	PD6	Data 6
14	PD7	Data 7
15	/PACK	Printer Ack (in)
16	PBUSY	Data in (in)
17	PPE	Paper out (in)
18	PSLCT	Printer selected (in)
19	GND	Ground
20	VCC	+5V power

CONNECTORS

STANDARD I/O CONNECTOR (continued)

HDR PIN	SIGNAL	FUNCTION
21	DCD1	Serial 1 DCD
22	DSR1	Serial 1 DSR
23	RXD1	Serial 1 RXD
24	RTS1	Serial 1 RTS
25	TXD1	Serial 1 TXD
26	CTS1	Serial 1 CTS
27	DTR1	Serial 1 DTR
28	RI1	Serial 1 RI
29	GND	Ground
30	VCC	+5V power
31	DCD2	Serial 2 DCD
32	DSR2	Serial 2 DSR
33	RXD2	Serial 2 RXD
34	RTS2	Serial 2 RTS
35	TXD2	Serial 2 TXD
36	CTS2	Serial 2 CTS
37	DTR2	Serial 2 DTR
38	RI2	Serial 2 RI
39	GND	Ground
40	VCC	+ 5V power

CONNECTORS

STANDARD I/O CONNECTOR (continued)

HDR PIN	SIGNAL	FUNCTION
41	KBCLK	Keyboard clock
42	KBDATA	Keyboard Data
43	MSCLK	Mouse Clock
44	MSDATA	Mouse Data
45	KBINH	Keyboard lock
46	/EXTRST	External reset in
47	GND	Ground
48	SPKOUT	Speaker out
49	GND	Ground
50	VCC	+5Vpower
51	NC	No Connection
52	ETX+	Ethernet TX+
53	ETX-	Ethernet TX-
54	NC	No Connection
55	ERX+	Ethernet RX+
56	ERX-	Ethernet RX-
57	NC	No Connection
58	LANLED	Ethernet Data LED
59	NC	No Connection
60	LINKLED	Ethernet Link ok LED

CPU OPERATION

POWER CONSUMPTION

The PMPC2 is an all CMOS CPU, so power consumption exclusive of backlight is typically less than 4 watts (about 800 mA at 5V) running and about 250 mA with the CPU halted. The backlight brightness of the CCFL version can be varied to suit the environment and will consume less power when running at reduced intensity. Power consumption of the CCFL backlight inverter is about 3 watts (600 mA at 5V) at maximum intensity. The EL backlight inverter draws about 150 mA when on.

WATCHDOG TIMER

The PMPC2 is intended mainly for embedded system applications where there is no one to hit the reset switch should something go awry. To prevent a crashed or otherwise hung system from remaining so indefinitely, the PMPC2 is provided with a built in watchdog timer that will reset the PMPC2 if not 'fed' regularly. The time-out period of this counter is about 1 second . The default INT 1C (user tic clock) task 'feeds' the watchdog. User software must be careful not to disable interrupts for more than the timeout period or the watchdog may bite! Any program that intercepts INT 1C must either chain through the old vector, or be responsible for 'feeding' the watchdog itself.

STARTUP ERRORS

The BIOS performs a variety of system tests at startup. Serious problems are reported by beep codes. The red LED is also flashed at the same time as the speaker beep. The BIOS beep codes are as follows:

BEEPS	ERROR
2	Bad external ROM checksum
3	External ROM initialization error
4	No system memory found
5	Can't boot - no resident language
6	BIOS ROM checksum error
7	Bad local RAM
8	VGA ROM initialization faulure
9	Invalid system configuration data (or forced default)
10	No ROM BIOS image found
11	Corrupted BIOS module found

CPU OPERATION

RS-485 OPERATION

The PMPC2 has assembly time options to allow SERIAL2 to be built with RS-485 interfaces instead of RS-232. Note that this is an either-or option, you can not have RS-232 and RS-485 on the same port. RS-485 communication uses the RTS bit in the modem control register to control transmit enable.

RS-485 communication on the PMPC2 is always half-duplex, because of the fact that the receiver is disabled when the transmitter is enabled and vice-versa. When RS-485 is used with asynchronous serial ports, it is important that the idle (non-driven) line voltages be held in the marking state. This can be done by providing a 1K pull-up resistor (to +5V) on the RS-485A line and a 1K pull down resistor (to ground) on the RS-485B line somewhere on the RS-485 bus. When using RS-485, it is the responsibility of the character or packet output routine to enable and disable the RS-485 transmitter.

The Pascal include file SERIAL.PAS in the source directory of the distribution disk have some low level serial port and RS-485 enable-disable procedures that can be used as examples for writing your own code.

ETHERNET INTERFACE

The PMPC2 has a built-in 10BaseT Ethernet interface. This interface uses the Crystal Semiconductor CS8900 Ethernet chip. NDIS, packet, ODI, Linux and PSOS Drivers are provided on a separate CS8900 driver diskette.

PRINTER PORT

The PMPC2 printer port is a PC compatible port with bidirectional PS/2, EPP and ECP capabilities. The default port address is 278H. This can be changed with the supplied utility SETSUIO.EXE.

SERIAL PORTS

The PMPC2 has two serial ports, serial-1 and serial-2. The serial-1 and serial-2 ports are 16C550A (FIFOed) compatible serial ports. They are fully compatible with standard PC serial ports. The default port assignment sets serial-1 to be COM1 (Port 3F8H, IRQ4) and serial-2 to be COM2 (Port 2F8H, IRQ3). These default port locations can be changed if necessary with the supplied utility SETSUIO.EXE.

The PMPC2 BIOS has some INT 1A functions that support serial-1 as the system console port.

CPU OPERATION

USER PARALLEL I/O

24 general purpose I/O bits are available on the USER I/O connector. All bits have a 10K pullup resistor. These bits come from a 82C55 The base address of this 82C55 is 0208H. For more detailed information on manipulating the I/O bits, in you should consult an 82C55 data sheet.

USING THE A-D CONVERTER

The PMPC2 has a built-in 12 bit A-D converter. There are 8 available inputs for user applications. The A-D converter is read with a BIOS call. The BIOS A-D read function F_SYSATODRAWREAD returns an unsigned 16 bit number (0 to 65535 full scale) regardless of A-D resolution. The reference voltage is 3.75V, so a full scale reading of 65535 represents an input of 3.75V.

The READAD program is an simple example of using the A-D. The source code for READAD is in the \SOURCE\PAS subdirectory of the distribution disk.

CONSOLE SWITCHING

The PMPC2 can use an AT keyboard, the scanned keypad or the serial port for console input. Console out can be directed to a video card, the LCD module or the serial port. To determine which console option is used, the PMPC2 supports extended BIOS functions that allow dynamic switching of console input and output.

If no video card is detected in the system, output defaults to the LCD screen and the default console in comes from the AT keyboard port. Console output defaults to a video card if a video card is detected in the system. If a video card is detected, the console input comes from the AT keyboard port.

The PMPC2 distribution disk has some batch files in the DEMO directory that dynamically reroute the console in and out. Consult the BATREAD.ME file in that directory for more information on those files.

CPU OPERATION

BIOS EXTENSIONS

Console I/O redirection, and some other miscellaneous control functions on the PMPC2 are accessed via a set of BIOS extension calls.

The entry point for these calls is a near jump located in the BIOSID section of the BIOS. For information on the BIOSID structure, refer to the BIOSID.H, BIOSID.INC or BIOSID.PAS files in the SOURCE directory of the PMPC2 distribution disk.

The calling convention used in all these calls is as follows: register BX is the offset part of the structure pointer, and register CX is the segment part of the structure pointer. CX:BX points to a structure, the first byte of which is the function number, and the second byte is the returned status byte. After these first bytes, a variable number of byte or word parameters follow.

For a full description of the BIOS extension functions, you should refer to the PCPUSRVC.H, PCPUSRVC.INC, or PCPUSRVC.PAS files in the source directory of the PMPC2 distribution disk. The following is a brief list of extended BIOS functions for quick reference:

F_PUBSRVCINFOQ
Get code revision level, etc.

F_PUBSRVCXABLEKB
Xable PC keyboard input.

F_PUBSRVCUSERINFOLENQ
Get number of bytes of user information.

F_PUBSRVCUSERINFOQ
Get user information.

F_PUBSRVCNUMCONFIGWORDSQ
Inquire number of user configuration words available.

CPU OPERATION

BIOS EXTENSIONS

F_PUBSRVCCONFIGWORDREAD,
Read configuration word.

F_PUBSRVCCONFIGWORDWRITE
Write configuration word.

F_PUBSRVCCPUREVQ
Get CPU card revision number.

F_PUBSRVCMEMBSCANINFO
Set membrane keyboard event handler particulars.

F_PUBSRVCMEMBSCANINFOQ
Get current membrane keyboard event handler particulars.

F_PUBSRVCATODTYPE
Get local A-to-D converter type.

F_PUBSRVCATODRAWREAD
Raw read of A-to-D converter channel.

F_PUBSRVCMEMBKBXABLE
Xable membrane keyboard input.

F_PUBSRVCMEMBKBXABLEQ
Inquire membrane keyboard input xable state.

CPU OPERATION

BIOS EXTENSIONS

F_PUBSRVCDISPCONTRAST
Set display contrast.

F_PUBSRVCDISPCONTRASTQ
Get current display contrast.

F_PUBSRVCBACKLITEBRITENESS
Set display backlight brightness. (no-op on EL backlight versions)

F_PUBSRVCBACKLITEBRITENESSQ
Get display backlight brightness.

F_PUBSRVCDISPTIMEOUT
Set display shut-off timeout.

F_PUBSRVCDISPTIMEOUTQ
Get display shut-off timeout.

CPU OPERATION

SETUP STORAGE

Many PMPC2 options can be saved in the serial EEPROM on the PMPC2 card. These options include: initial baud rate, LCD parameters, contrast setting, etc. These parameters can be set with the INT 1A functions or the provided utility SETPMPC2.EXE

SETPMPC2.EXE reads a text file of setup options, and programs these into the PMPC2's EEPROM. These setup files have a default extension of .CF. SETPMPC2 and a number of configuration files are located in the UTILS directory of the PMPC2 distribution floppy. SETPMPC2 is invoked with the configuration file name as a parameter: For example:

```
SETPMPC2 PMPC2.CF
```

Would configure the PMPC2 with the EEPROM settings in the PMPC2.CF configuration file.

SETPMPC2 has three command line switches: /D, /N and /Q. These command line switches follow the file name. The /D option causes the PMPC2 EEPROM to be initialized to it's default configuration. When the /D option is used, no file name is needed. The /N option causes the configuration file to modify the default configuration, and store the result into the EEPROM. If /N is not specified, all options not specifically changed in the configuration file will remain at their previous settings.

As long as the /N or /D switches are not used, configuration files loaded with SETPMPC2 only affect the options specified in the file. This makes it possible to separate the configuration files into pieces that only affect a certain aspect of PMPC2 operation.

Note that EEPROM settings do not take effect until the PMPC2 is reset.

DISK EMULATOR OPERATION

GENERAL

The PMPC2 has a built in nonvolatile disk emulator with a capacity of up to 16M bytes using NAND flash devices.

PMPC2 flash options are:

-F4M One 4Mbyte flash chip
-F8M One 8Mbyte flash chips
-F16M Two 8Mbyte flash chips

In the 16M case , the two flash chips can be used together as a single drive or each chip can be configured as an independent drive.

The PMPC2 disk emulator is viewed as a hard disk by system software. This means that the first emulated drive will be drive **C**: , and the next emulated drive will be drive **D**: etc.

RELIABILITY

In an embedded system environment where a system that won't boot is basically a failed system, it is important to understand some characteristics of the DOS operating system that applies to disk access. When DOS writes a file, it writes to the FAT and directory areas of the drive (emulated or real).

If there is any chance that a system can be reset or power can fail when writing to this disk, all information on the disk could become inaccessible, not just the file that was being written.

The reason is that when DOS writes a directory entry it always writes a full sector, not just the directory or FAT entry required. If the sector write is not completed, the sector with the directory or FAT entry that was being written will have an invalid CRC. This can affect any file on the drive!

In applications that do frequent disk writes, there are two possible solutions to this problem. The first solution is to disable emulated disk CRC checking. This will make a partially re-written sector readable by the operating system. This will only improve the odds of surviving a power off or reset during a file write, not totally eliminate the problem. Turning off CRC's will also mask possible hardware problems, so is not generally suggested. The second solution is to configure a two drive system, with a drive (usually C:) used as the software drive, and the other drive (usually D:) used as the data drive. Any files writes during normal operation would be done to the D: drive. If any problem occurs on the D: drive, software on the C: drive can attempt to recover the data, and then re-initialize the D: drive.

As a further precaution the data drive can be split into two logical drives with FDISK. If the data drive was physical drive D, the two logical drives would be drive D: and drive E:. When this is done, data corruption on one logical drive will not effect the other drive, allowing a dual write scheme to be used to protect valuable data.

All this being said, the flash filing system does have some protection for failed sector writes. There is always an older copy of the last sector written available to the filing system. If the requested sector is corrupted, the previous copy of that sector will be used instead. This will result in loss of the data just written, but the filing system will be consistent.

DISK EMULATOR OPERATION

DISK EMULATOR INITIALIZATION

Before using the disk emulator, it needs to be initialized so that the PMPC2 BIOS knows the size, chip type, and organization of the disk emulator. This is normally done at the factory, and should not have to be re-done unless there hass been some kind of disk emulator failure.

This initialization is done with INITRMDB.EXE. INITRMDB.EXE is supplied in the DISK subdirectory of the PMPC2 distribution disk. If INITRMDB is run with a /L parameter, it will list the types of disk emulator chips supported by the PMPC2 BIOS. Each type of disk emulator chip has a corresponding Devicetype number.

To initialize a disk emulator, you invoke INITRAMD as follows:

```
INITRMDB /CStartChip /NNumberOfChips /T [/Y]
```

Where StartChip is 0 or 1, and NumberOfChips is 1 or 2. The /T parameter causes the program to create a bad block map for use later. The /Y parameter is neccesary to overwrite the low level formatting of a previously formatted drive

On the PMPC2, there are 2 available chips, INITRMDB numbers these chips 0 and 1.

If you wanted to initialize a 2 chip disk emulator using device type 1, and starting at chip 0, the INITRMDB command would be:

```
INITRMDB /C0 /N2 /T /Y
```

(Initialize a disk emulator starting at chip 0, using 2 chips.)

It is also possible to initialize two independent disk emulators by invoking INITRAMD twice, once per socket:

```
INITRMDB /C0 /N1 /T /Y
```

(Initialize disk starting at chip 0, using 1 chip.)

```
INITRAMDB /C1 /N1 /T /Y
```

(Initialize disk starting at chip 1, using 1 chip.)

Once the disk emulator has been initialized, the PMPC2 needs to be reset before the new disk will be recognized by the operating system.

After the low level formatting has been done, you need to run the normal FDISK and FORMAT programs to create a usable DOS drive.

LCD OPERATION

GENERAL

The PMPC2 display is a 320H by 240V pixel LC display with a .30 mm pixel size. Overall active display dimensions are 3.78H x 2.83V. The PMPC2 display is a 1/4 VGA display. It displays the upper left corner of the standard VGA 640x480 screen. The screen memory map matches the standard VGA memory map, so standard appplications and drivers will work with the PMPC2, but you will only see the upper left corner of the full VGA screen. The PMPC2 BIOS supports a 40 x 12 line text mode to make simple DOS level operation simpler.

BACKLIGHT CONTROL

CCFL backlit versions of the PMPC2 can vary the backlight intensity and turn off the backlight after a period of inactivity if desired. The backlight intensity, backlight timeout value and backlight turn on events are specified in the PMPC2.CF file.

EL backlit versions of the PMPC2 have fixed backliight intensity. Due to the shorter lifetime of EL backlights, it is suggested to always enable the backlight turn-off feature on EL backlit models.

KEYPAD OPERATION

GENERAL

The PMPC2 has a built-in membrane keypad with 13 display labeled keys and an optional 15 key numeric keypad. This is designed to simplify embedded instrument and controller applications where a standard keyboard is inappropriate. The keypad scanning is done with a PIC microcomputer. The keypad scanning PIC can be have a keycode table downloaded as required by the keypad type.

The program SETKBSIM can be used to change the default keypad mapping plus set various keypad parameters.

DISPKEYS

DISPKEYS is a simple utility provided with the PMPC2 for the purpose of displaying keyboard scancodes and keynames. You exit DISPKEYS by pressing the same key 5 times in a row.

REFERENCE INFORMATION

SPECIFICATIONS

	MIN	MAX	UNIT	
POWER SUPPLY:				
VCC voltage	4.75	5.25	V	
VCC current	---	1500	mA	
CCFL Backlight current	20	850	mA	(off/full on)
EL Backlight current	---	180	mA	
EXPANSION BUS LOADING AND DRIVE:				
Input capacitance	---	15	pF	
Input leakage current	---	5	uA	
Output drive capability	100	---	pF	
Output sink current	---	6	mA	
ENVIRONMENTAL:				
Temperature range (display opr.)	0	70	°C	
Relative humidity	0	90	Percent Non-condensing	

REFERENCE INFORMATION

WARRANTY

Mesa Electronics warrants the products it manufactures to be free effects in material and workmanship under normal use and service for the period of 2 years from date of purchase. This warranty shall not apply to products which have been subject to misuse, neglect, accident, or abnormal conditions of operation.

In the event of failure of a product covered by this warranty, Mesa Electronics, will repair any product returned to Mesa Electronics within 2 years of original purchase, provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may at its option, replace the product in lieu of repair.

With regard to any product returned within 2 years of purchase, said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident, or abnormal conditions of operation, repairs will be billed at a nominal cost.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS, OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. MESA ELECTRONICS SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE.

If any failure occurs, the following steps should be taken:

1. Notify Mesa Electronics, giving full details of the difficulty. On receipt of this information, service data, or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the product, in its original protective packaging, transportation prepaid to Mesa Electronics. Repairs will be made at Mesa Electronics and the product returned transportation prepaid.

REFERENCE INFORMATION

REFERENCE INFORMATION

SCHEMATICS