FPTX USERS MANUAL

Version 1.3

Copyright 1998 by MESA ELECTRONICS Emeryville, CA. Printed in the United States of America. All rights reserved. This document and the data disclosed herein is not to be reproduced, used, disclosed in whole or in part to anyone without the written permission of MESA ELECTRONICS.

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 FPCX 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 FPCX.

Do not short circuit battery (take care not to set the FPCX on conductive

STATIC ELECTRICITY

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

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

INTRODUCTION

GENERAL

The FPTX is a small, low cost panel mount display computer for user interface applications. The overall dimensions of the FPTX are 4.6" H x 9.5"W x 2.75"D with the numeric keypad, and 4.6" H x 5.7"W x 2.75"D without.

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

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

The FPTX display is a 320 by 240 resolution active matrix color LCD with variable brightness CCFL backlight . Display dot pitch is .33 mm. The particular display used with the FPTX has a wide (-30 to +85 C) temperature range making it suitable for vehicular and industrial applications.

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.

FPTX 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 FPTX requires +5V @ 1.2 A max (CPU power) and 9-16V @ 1.0 A max (backlight power) for operation, An optional regulator allows operation on a single 9-16V supply

The FPTX CPU is a 40 MHz 386SX PC compatible processor (ALI M6117) with 4 M bytes of RAM standard. Additional RAM can be added by the user up to a total of 8 M bytes. 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 2M bytes but the FPTX can be ordered with up to 8M 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 FPTX BIOS. Utilities for using the flash disk are provided with the FPTX.

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, 8 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 FPTX.

HARDWARE CONFIGURATION

GENERAL

The FPTX has two hardware setup jumpers and I/O connectors accessible from the back side of the FPTX unit. When changing these option jumpers or installing I/O connectors. the FPTX 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 FPTX 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). Note that these jumpers will not be accessible if a PC/104 expansion card is installed on the FPTX.

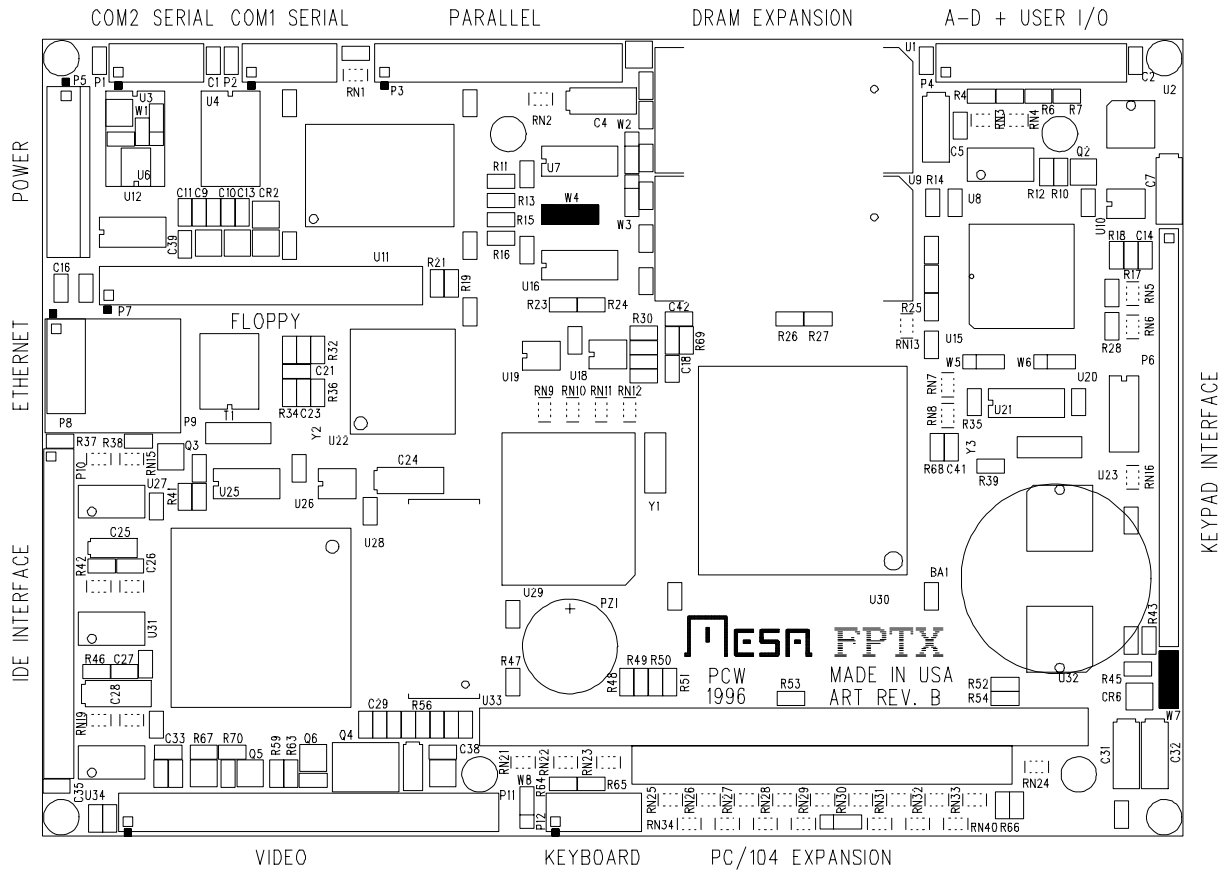
DEFAULT JUMPER SETTINGS

Factory default FPTX jumpering is as follows:

FUNCTION	JUMPER(S)	SETTING
Watchdog enable	W4	Enabled
Lithium cell connect	W7	Enabled

HARDWARE CONFIGURATION

JUMPER LOCATIONS AND I/O CONNECTORS



HARDWARE CONFIGURATION

WATCHDOG ENABLE

The FPTX 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 watcgdog timer. The watchdog timer is enabled by setting jumper W4 to the left hand position.

LITHIUM CELL CONNECT

The FPTX's Lithium cell can be disconnected if long term storage is planned. To disconnect the Lithium cell from all FPTX circuitry, move jumper W7 to the down position. ***When W7 is set to the down position, the clock/calendar forgets the time and date!***

ADDING EXPANSION RAM

The FPTX is available with 4 or 8M of system RAM. 4M FPTXs can be upgraded to 8M by installing two 1Mx16 DRAM chips in the 42 pin SOJ sockets provided on the FPTX card. These sockets are located above the CPU chip. Suggested part number is Toshiba TC5118180AJ-70.

INSTALLATION

GENERAL

When the FPTX 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 the configuration jumpers and the serial-0 and floppy connectors. The PC/104 standoffs should then be tightened to secure the expansion card(s) in place.

MOUNTING

The FPTX is intended for panel mounting from behind a user supplied panel or on the front of a user supplied panel using the MESA supplied bezel. The FPTX bezel is a frame that surrounds the FPTX front panel , and clamps it to the user panel via screws inserted from the rear of the panel.

I/O CONNECTOR ORIENTATION

The serial port and keyboard connectors on the FPTX 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 FPTX 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 FPTX 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 FPTX power connector (P5) is a 9 pin, single row, .1" header. The suggested mating connector is an AMP MTA type connector 641191-9 (non-feedthrough) or 641199-9 (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 FPTX operation. The BKLPWR and BKLGND pins supply power to the LCD backlight inverter. These pins must be supplied with a +9V to +15V DC source. Maximum current is 800mA. These pins are separated to keep inverter noise out of the FPTX +12V power.

Since the power connector on the FPTX 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	BKLGND	1A
9	BKLPWR	1A

KEYBOARD CONNECTOR

P12 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. An external PNP transistor can be used to drive an eight Ohm speaker to obnoxious volume levels if required.

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	NC	(No Connection)
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

P1 and P2 are the serial port connectors. P2 is referred to as SERIAL-1 and is a 16C550 compatible serial port with a default port assignment of COM1. P1 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.

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-2can 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 FPTX has a built-in 10BaseT Ethernet interface. The 8 pin RJ45 connector is P9. The FPTX can optionally be assembled with 10 pin header P8 instead of the RJ45 connector. This allows use of the panel mount RJ45 adapter (MESA TAU) that also provides link status LEDS.

FLOPPY CONNECTOR

Connector P7 is the floppy disk interface. The FPTX hardware currently supports 720K and 1.44M floppy drives. The FPTX supports two floppy drives, using the standard twisted floppy disk cable. P7 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 FPTX or the floppy drive(s), but will destroy information on any diskette that is inserted in the drive.

CONNECTORS

PRINTER PORT CONNECTOR

The FPTX 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.

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 FPTX has a 20 pin connector for USER I/O. This connector is P4. There are 8 analog inputs and 8 I/O bits available on P4. P4 pinout is as follows:

HDR PIN	SIGNAL	FUNCTION
1	PC0	Parallel bit 0
2	PC1	Parallel bit 1
3	PC2	Parallel bit 2
4	PC3	Parallel bit 3
5	PC4	Parallel bit 4
6	PC5	Parallel bit 5
7	PC6	Parallel bit 6
8	PC7	Parallel bit 7
9	GND	Signal ground
10	VCC	Power
11	AIN0	Analog input 0
12	AIN1	Analog input 1
13	AIN2	Analog input 2
14	AIN3	Analog input 3
15	AIN4	Analog input 4
16	AIN5	Analog input 5
17	AIN6	Analog input 6
18	AIN7	Analog input 7
19	GND	Signal ground
20	VCC	3.75V reference

PC/104 EXPANSION

The FPTX 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 FPTX's power connector P5.

CPU OPERATION

POWER CONSUMPTION

The FPTX is an all CMOS CPU, so overall power consumption of the is typically less than 6 watts (about 1200 mA) running and about 250 mA whith the CPU halted. The backlight brightness can be varied to suit the environment and will consume less power when running at reduced intensity. Backlight current at 12V is typically 750 mA at maximum brightness and can be reduced to 20 mA or so at Minimum brightness.

WATCHDOG TIMER

The FPTX 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 FPTX is provided with a built in watchdog timer that will reset the FPTX 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

IRQ15

IRQ15 is used by the FPTX for keypad scanning and display timeout functions. No add-on peripheral may use IRQ15. Since IRQ15 is normally used by secondary IDE drives this shoukd not normally be a problem.

CPU OPERATION

RS-485 OPERATION

The FPTX 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 FPTX 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 FPTX 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 the installation disk. The are in the ETHERNET subdirectory.

PRINTER PORT

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

CPU OPERATION

USER PARALLEL I/O

8 general purpose I/O bits are available on the USER I/O connector. These bits are port A of the 82C55 that is used for membrane keypad scanning. The base address of this 82C55 is 0204H. Because port B and C of this chip must remain in the B=IN, Clow=OUT, Chigh=IN mode, the only valid 82C55 mode register settings are: 08AH (A=OUT), , and 09AH (A=IN). For more detailed information you should consult an 82C55 data sheet.

USING THE A-D CONVERTER

The FPTX 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 FPTX 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 FPTX 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 FPTX 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.

The key pad console in option must be explicitly enabled by calling the appropriate extended BIOS function.

CPU OPERATION

BIOS EXTENSIONS

Console I/O redirection, and some other miscellaneous control functions on the FPTX 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 FPTX 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 FPTX 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. (No-op on FPTX.)

F_PUBSRVCDISPCONTRASTQ
Get current display contrast. (Returns dummy value on FPTX.)

F_PUBSRVCBACKLITEBRITENESS
Set display backlight brightness.

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 FPTX options can be saved in the serial EEPROM on the FPTX 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 SETFPTX.EXE

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

```
SETFPTX FPTX.CF
```

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

SETFPTX has three command line switches: /D, /N and /Q. These command line switches follow the file name. The /D option causes the FPTX 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 SETFPTX 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 FPTX operation.

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

DISK EMULATOR OPERATION

GENERAL

The FPTX has a built in nonvolatile disk emulator with a capacity of up to 8M bytes using NAND flash devices.

FPTX flash options are:

-F2M One 2Mbyte flash chip
-F4M Two 2Mbyte flash chips
-F8M Two 4Mbyte flash chips

I n the 4M and 8M case , the two flash chips can be used together as a single drive or each chip can be configured as an independent drive.

The FPTX 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 FPTX BIOS knows the size, chip type, and organization of the disk emulator.

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

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

```
INITRAMD /CStartChip /NNumberOfChips /DDeviceType [/F [O | D]]
```

Where StartChip is 0 or 1,NumberOfChips is 1 or 2 and DeviceType is a number listed by the INITRAMD /L command.

The /F parameter invokes a built-in FDISK and FORMAT option. The /F option can be followed by a D or O. The D or O specifies whether a DOS format (D) or ROM-DOS format (O) is used.

The ROM-DOS format is specially optimized for small drives, and wastes a minimum of disk space. The DOS format wastes more space, but is compatible with most version of MS-DOS. ***Do not use the ROMDOS format with DOS or unpredictable file system behavior will result!***

On the FPTX, there are 2 available chips, INITRAMD 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 INITRAMD command would be:

```
INITRAMD /C0 /N2 /D1 /FD
```
(Initialize a disk emulator starting at chip 0, using 2 chips and device type 1 - DOS format)

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

```
INITRAMD /C0 /N1 /D2 /FO
```
(Initialize disk starting at chip 0, using 1 chip and device type 2 - ROMDOS format)
```
INITRAMD /C1 /N1 /D2 /FO
```
(Initialize disk starting at chip 1, using 1 chip and device type 2 - ROMDOS format)

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

Unlike previous MESA disk emulator software, you should not normally need to run FDISK or FORMAT as long as you specify the /F parameter when initializing a drive.

LCD OPERATION

GENERAL

The FPTX display is a 320H by 240V pixel Active TFD display with a .33 mm pixel size. Overall active display dimensions are 4.158H by 3.11V. The FPTX 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 FPTX, but you will only see the upper left corner of the full VGA screen. The FPTX BIOS supports a 40 x 12 line text mode to make simple DOS level operation simpler.

BACKLIGHT CONTROL

The CCFL inverter on the FPTX 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 FPTX.CF file.

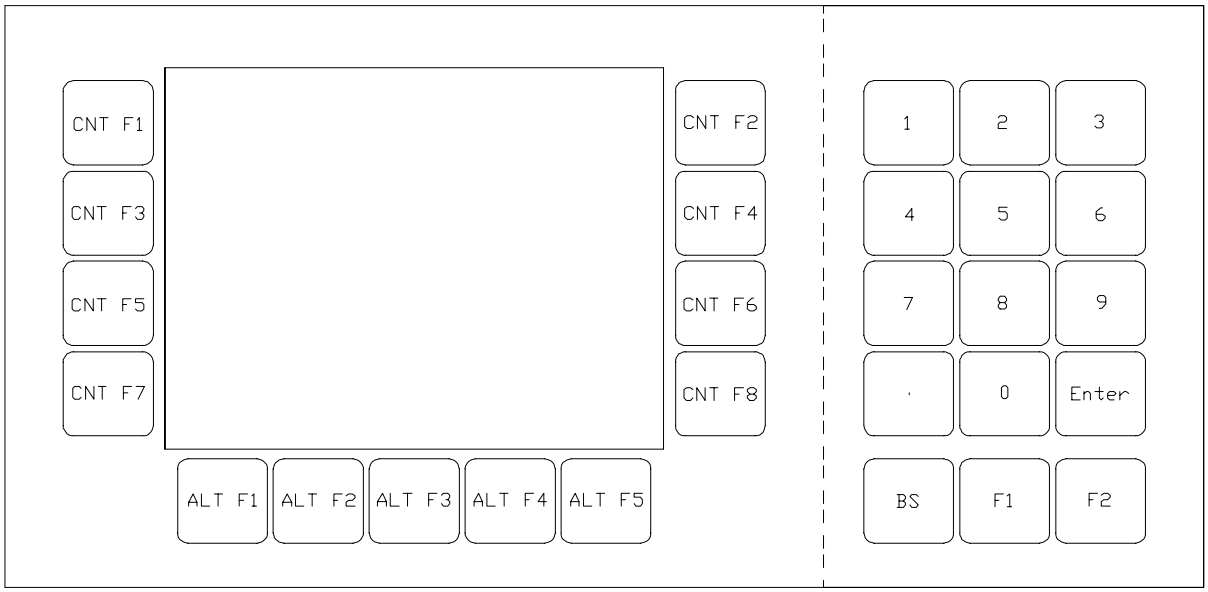
KEYPAD OPERATION

GENERAL

The FPTX has the 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 enabled via an INT 1A function. Running the batch file KEYPAD.BAT gives a simple demonstration of keypad operation.

The BIOS returns a fixed set of scan codes from the keypad array. The default key codes returned by the keypad array are as follows:



DISPKEYS

DISPKEYS is a simple utility provided with the FPTX 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	
Backlight voltage	9	15	V	
VCC current	---	1200	mA	
Backlight current	20	850	mA	(off/full on)
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

REFERENCE INFORMATION

MECHANICAL DRAWINGS