USER MANUAL

SPACEPC® 1232 SERIES
PC/104 SINGLE BOARD COMPUTER

(ALSO KNOWN AS THE CPU-1232)

5/18/2005

MNL-0501F-01

ABOUT THIS MANUAL

This manual is meant for engineers and programmers who wish to use the Parvus SpacePC® 1232. It contains technical specifications, and describes the connectors and how to properly use and configure the product.

NOTICE

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CONVENTIONS

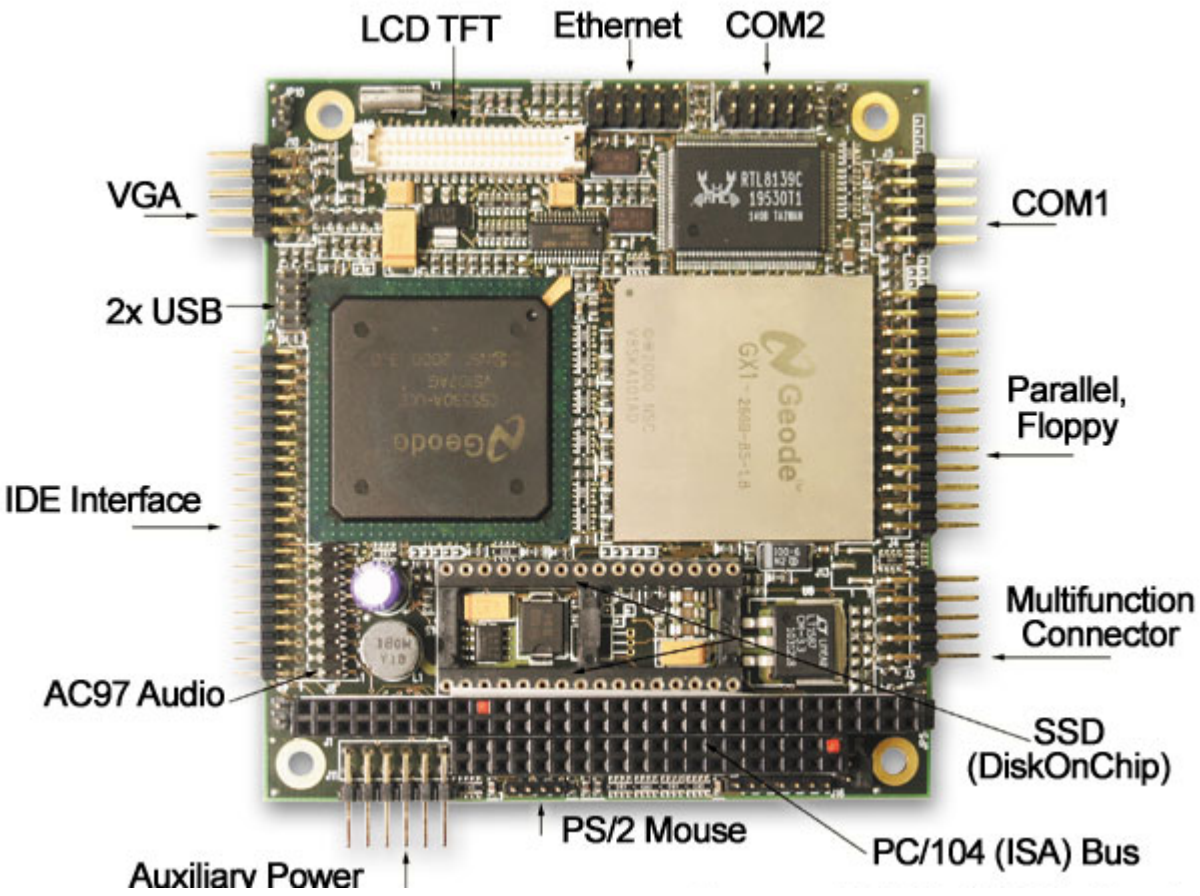
The following table lists conventions that are used throughout this guide.

Icon	Notice Type	Description
	**Information note**	Important features or instructions
	**Warning**	Information to alert you to potential damage to a program, system or device or potential personal injury

For a complete list of Parvus products and updated BIOS and drivers, please go to our Web site: **www.parvus.com**

Table of Contents

Chapter 1 Product Overview



The SpacePC 1232 is a highly integrated PC/104 CPU module, based on the AMD / National Semiconductor Geode GX1 MMX Enhanced microprocessor. It is also known as the CPU-1232.

Related Products:

- Development kit for SpacePC 1232 / multifunction adapter
- Cable set for SpacePC 1232
- AC97-CODEC and USB adapter
- Parallel to Floppy adapter
- Ethernet RJ45 adapter

For a complete list of our products please go to our web site: **www.parvus.com**

In the following paragraphs, you will find a brief description of the SpacePC 1232.

SpacePC 1232 Functional Block Diagram

The figure below shows the functional blocks diagram of the module.

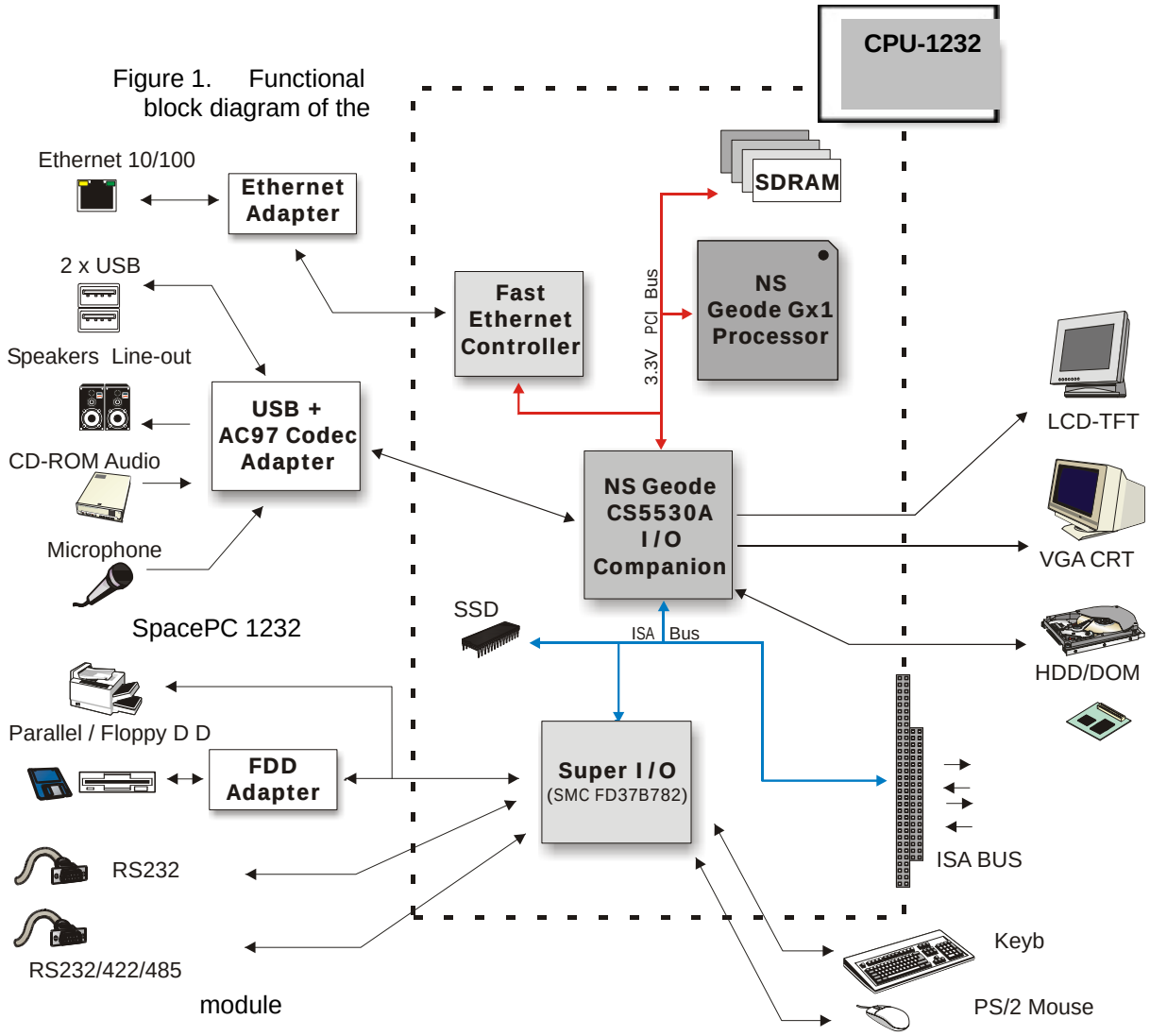


Figure 1. Functional block diagram of the

Product Definition

SpacePC 1232 PC/104 CPU Module

- PC/AT compatible.
- PC/104 Form Factor: 3.550” x 3.775” (90 X 96 mm); height: 15 mm (0.6”)
- Low power consumption.
- High reliability.
- Operating systems supported: DOS (from 3.0 to 6.22), QNX, VxWorks, PSOS, Windows 3.11, Windows 95, Windows 98, Windows NT, Windows 2000, Linux.

AMD / NS Geode GX1 MMX Enhanced microprocessor

- 266MHz clock speed (300MHz version only available with a minimum quantity purchase)
- 1.8V core voltage processor supply
- 3.3V I/O interface voltage supply
- 16 KB unified L1 cache
- Six-stage pipelined integer unit
- Integrated Floating Point Unit (FPU)
- Supports a wide variety of Power Management standards:
  - APM (Advanced Power Management) for Legacy power management
  - ACPI (Advanced Configuration and Power Interface) for Windows power management

(Note: Geode processor family was acquired by AMD from National Semiconductor in 2003)

Memory Configurations

- 64 - 128 Mbytes surface mount SDRAM
- Integrated system memory and graphic frame memory (Unified Memory Architecture – UMA)

Solid State Disk

- A 640 KB of flash memory is available as re-programmable device (that is to say read-only disk)
- One 32-pin socket for 32DIL Solid State Disk such as Disk On Chip (2000 and Millennium series)
- The SpacePC 1232 supports all Flash IDE devices such as DOM, Compact Flash, ATA Flash and 2.5” IDE-Flash disk

DMA, Interrupts, Timers

- Two cascaded 8237 DMA controllers (6 DMA channels)

- Two cascaded 8259 interrupt controllers (15 interrupt channels)
- Three 8254 counter/timers (There are no extra timers)
- Three extra timers

Peripherals

- Two serial ports UART 16550A-compatible: one selectable between RS232/422/485 and one RS232 only
- One bidirectional parallel port: selectable between EPP, ECP, SPP
- One USB port compliant with the Open Host Controller Interface (OHCI)
- One AC97 port (CODEC board needed)
- One floppy disk interface available on the parallel port (J5) through an external adapter, or on FPC (Flat Printed Circuit) connector (J15). They are mutually exclusive so only one FDD can be used
- One PC/AT keyboard interface
- One PS/2 mouse connector
- One speaker port
- One standard EIDE HD interface
- One 10/100 Fast Ethernet Controller (RJ45 Ethernet Adapter needed)
- Software programmable watchdog from 1 second to 255 seconds or from 1 minute to 255 minutes
- Real time clock (external battery required for date and time backup)

BIOS

- The Parvus/Eurotech BIOS is stored into a reprogrammable on board device.
- Utilities for BIOS upgrade provided in the utility disk
- Setup parameters stored in Flash memory
- Virtual Peripheral (V.P.) operating mode: remote control of the CPU module through the serial port.
- Boot selectable from floppy, SSD, HD, CD-ROM and V.P.
- Fast Boot selectable
- Embedded features implemented

VGA interface

- Backward compatibility to SVGA standards
- Full VGA and VESA mode support
- 2D graphics accelerator
- Display Compression Technology architecture

- Display resolutions up to 1280x1024 8-bit per pixel
- UMA (Unified Memory Architecture)

LCD-TFT interface

- Also LCD-TFT flat panels can be connected to the SpacePC 1232

If LCD-TFT and CRT screens are used at the same time, the refresh frequency of the CRT video will be modified according to the LCD-TFT setting. It may be possible to view flickering on the CRT screen.

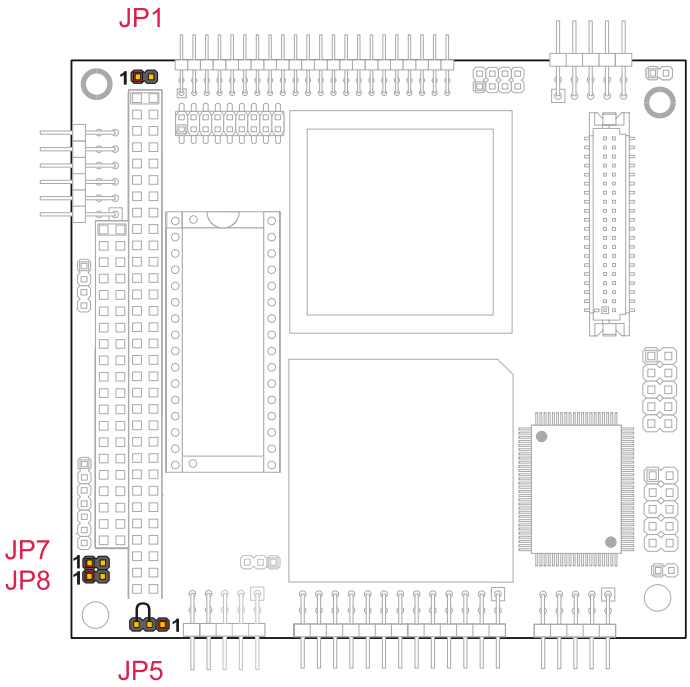
Chapter 2 Jumper Description

This chapter shows the jumpers layout and explains how to setup the jumpers.

Jumper Layout and Configuration

Figure below, shows the jumper layout of the SpacePC 1232 module.

In the below figure, the jumpers are indicated as **JP** followed by the jumper's number, while pin 1 of every jumper is indicated by a red square pad.



∩ = Jumper (short circuit)

Figure 2. Jumpers and solder jumpers on the SpacePC 1232 module

The following jumpers are located on the module:

One 3-pin jumper (JP5) for which there are only two possibilities:

- Connecting pin 1 to pin 2 (which will be indicated as 1-2)
- Connecting pin 2 to pin 3 (which will be indicated as 2-3)

Three 2-pin jumpers (JP1, JP7, JP8), which can be set as follows:

- Pin 1 connected to pin 2 (which will be indicated as *'Closed'*)
- Pin 1 and pin 2 not connected (which will be indicated as *'Open'*)

The following table provides a quick cross-reference for the SpacePC 1232 module's jumpers.

Table 1. Jumper Settings

PIN#	Type	Function	Default
JP1	2 pin jumper	Write protection on Bios Flash Closed: Write not allowed on Boot Block Open: Boot Block can be written	Open
JP5	2 pin jumper	Power Supply Source Selection for SSD Socket 1-2: Battery 2-3: VDD	2-3
JP7	2 pin jumper	Invalid Setup Open: Module starts with saved parameters Closed: Module starts with default settings	Open
JP8	2 pin jumper	External BIOS Open: Module starts with internal BIOS (inside Flash EPROM) Closed: Module starts with External BIOS	Open

Chapter 3 Connectors Description

This chapter provides a brief description of the SpacePC 1232 module's connectors, with their positions and functions.

Connectors Layout

In the following figure are shown the connectors with their layout and function/s.

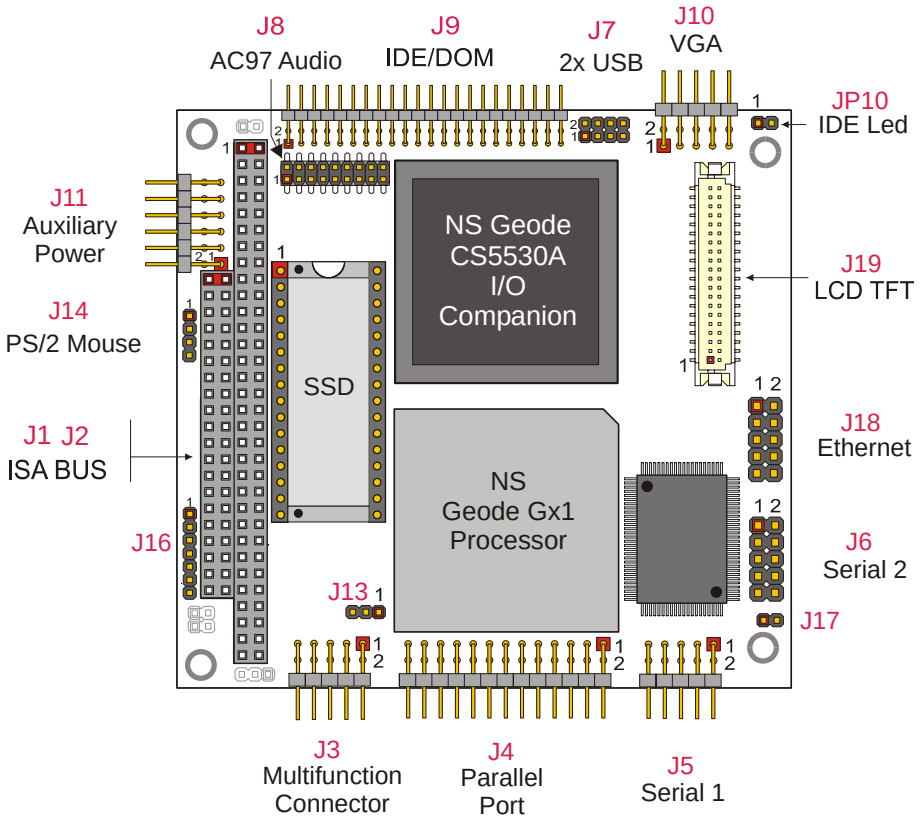


Figure 3. Connectors layout

Note: in the previous figure, a red square pad indicates pin 1 of each connector.

Table below lists the name of the connectors with their function and the reference page.

Table 2. Connector Functions

Connector	Function	Page
J1-J2	ISA BUS (PC/XT)	20
J3	Multifunction Connector	22
J4	Parallel Port / Floppy	26
J5	Serial Port 1	28
J6	Serial Port 2	28
J7	USB ports (A and B)	29
J8	AC97 Audio Interface Connector	30
J9	IDE/DOM	33
J10	VGA	34
J11	Auxiliary Power Supply	35
J13	Fan	36
J14	PS/2 Mouse	24
J16	Reserved	-
J17	Reserved	-
J18	Fast Ethernet	37
J19	LCD TFT	39
SSD	Solid State Disk socket DIL 32 (Disk on Chip)	-
JP10	IDE Activity Led	33

J1 and J2 for the ISA Bus

The ISA BUS

Connectors J1 and J2 carry the signals for the ISA Bus. These signals match definitions of the IEEE P996 standard. Below is shown a picture of the ISA BUS

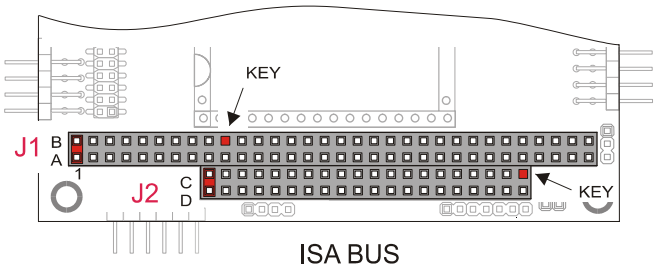


Figure 4. ISA BUS layout

According to PC/104 specifications, KEYs are filled holes in the upper side and missing pins in the lower side of the bus connector. This is made to avoid the wrong insertion in/of another module.

For further info about ISA (PC/104) bus, please refer to the PC/104 Consortium Web site at www.pc104.org.

How to connect to the CPU other PC/104 & PC/104 devices: the stack assembly

The ISA Bus connectors of the module are designed to allow the connection onto a stack of other PC/104 and/or PC/104Plus devices. We recommend you to follow the procedure below ensuring that stacking of the modules does not damage connectors or electronics parts.

1. Turn off power to the PC/104 system or stack.
2. Select and install standoffs to properly position the module on the PC/104 stack.
3. Touch a grounded metal part of the rack to discharge any accumulation of static electricity.
4. Remove the module from its anti-static bag.
5. Check that keying pins in the bus connector are properly positioned.
6. Check the stacking order; make sure an XT bus card will not be placed between two AT bus cards or it will interrupt the AT bus signals.
7. Hold the module by its edges and orient it so that the bus connector pins line up with the matching connector on the stack.

8. Press evenly the module onto the PC/104 stack.

The picture below shows a typical module stack with 2 PC/104 modules, 1 PC/104 16-BIT module, and 1 PC/104 8-BIT module.
The maximum configuration for the PCI bus of PC/104 modules is 4 plus the Host Board.
If standard PC/104 modules are used in the stack, they must be the top module(s) because they will normally not include the PCI bus.

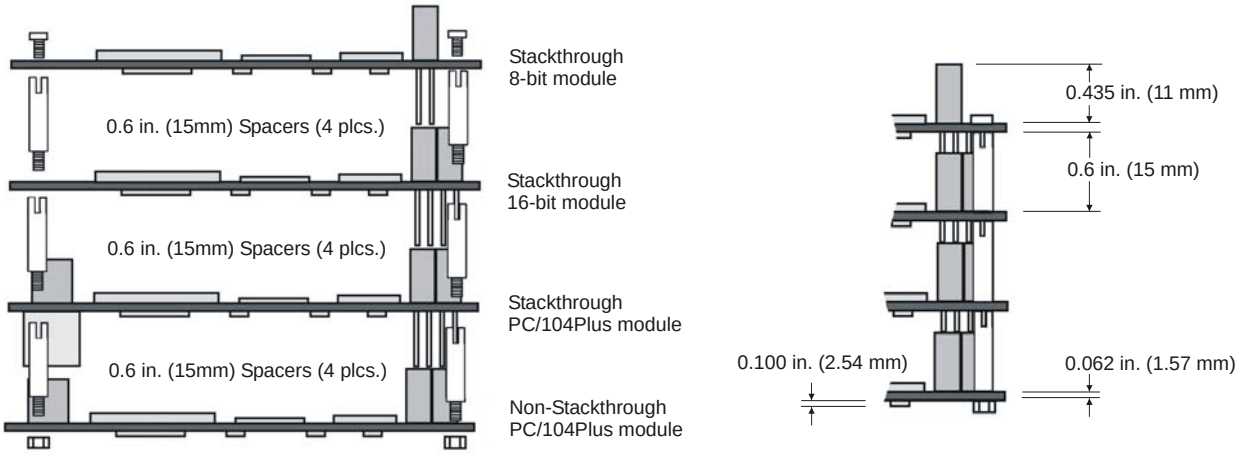


Figure 5. The Module Stack

Do not force the module onto the stack! Wiggling the module or applying too much pressure may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

J3 for Multifunction & J14 for Mouse

J3 is a double row 5 x 2 pin with 2.54-mm step connector and allows the connection of a speaker, a keyboard, and a battery to the SpacePC 1232 module.

J14 is a 4 pin with 2-mm step connector and allows the connection of a PS/2 compatible mouse.

Later on there is a brief description about the Parvus Multifunction Adapter and the VGA and the Ethernet.

J3 Multifunction Connector

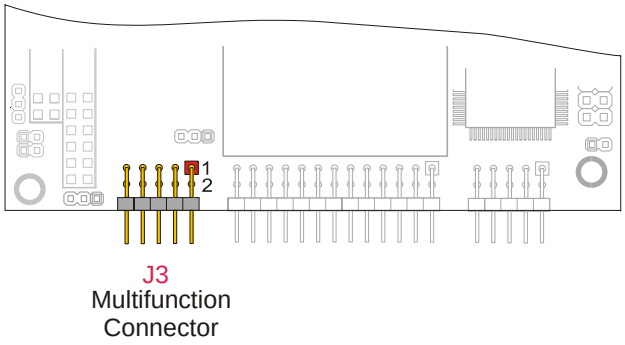


Figure 6. J3 Connector layout

This connector implements the following functions:

- MULTIFUNCTION
  - AT Keyboard
  - System reset
  - External battery
  - Speaker
  - Power button

Below is shown the connector pinout:

Table 3. Multifunction connector

Pin	Signal	Function
1	SPKR-	Speaker output
2	SPKR+	Speaker output (+5V)
3	RESET	External reset
4	WDTL	Watch dog timeout latch
5	KBD	Keyboard data
6	KBC	Keyboard clock
7	GND	Ground signal
8	KBP	Keyboard power (+5V)
9	BAT	External Battery input
10	P_B	External Power Button

This section of the connector implements the following functions:

- **Keyboard**
  An AT compatible keyboard can be connected to the module through connector J3. The following table lists the pin-out of connector J3.

Table 4. Keyboard connector

Pin	Signal	Function
5	KBD	Keyboard data
6	KBC	Keyboard clock
7	GND	Ground signal
8	+5V	Power supply

- **System reset**
  Connecting the pin 3 of the multifunction connector to ground performs a hardware reset of the module. It is possible to use an external push-button, normally open. J3 provides a connection for an external normally-open pushbutton to manually reset the system. Connect the other side of the switch to ground. The reset signal is “de-bounced” on the board.

- **External Battery**
  Pin 9 of the multifunction connector allows the connection of an external backup battery (typically from 3 to 3.9 V). This battery is used at power down to preserve the date-time in the Real Time Clock.
  The typical battery consumption with the module off is 7 uA.

- **Speaker**
  A transistor to supply 0.1 watt of power to an external speaker controls these outputs. A transistor amplifier buffers the speaker signal. Use a small general purpose 2 or 3-inch permanent magnet speaker with an 8-ohm voice coil.

The audio output is based on two signals: one come from the output of Timer 2, and the other come from I/O port 61h compliant with the AT Standard.

- **Power button**
  If the soft power management is enabled, a low signal in the pin10 turns the system on or off.

J14 Mouse Connector

A PS/2 compatible mouse can be connected to the J14 connector (4pins, 2-mm step).

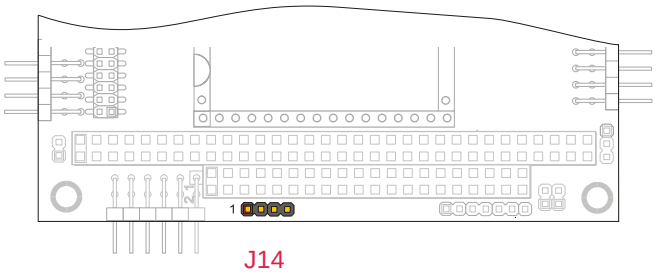


Figure 7. J14 Connector layout

The J14 pin out is given below.

Table 5. J14 for Mouse connector

Pin #	Signal	Function
1	+5V	Power supply
2	MSCLK	Mouse clock
3	GND	Ground signal
4	MDAT	Mouse data

Parvus Multifunction Adapter

Parvus Multifunction Adapter simplifies the connection of mouse and keyboard with two PS/2 connectors, providing also a speaker, a battery and a reset pushbutton.

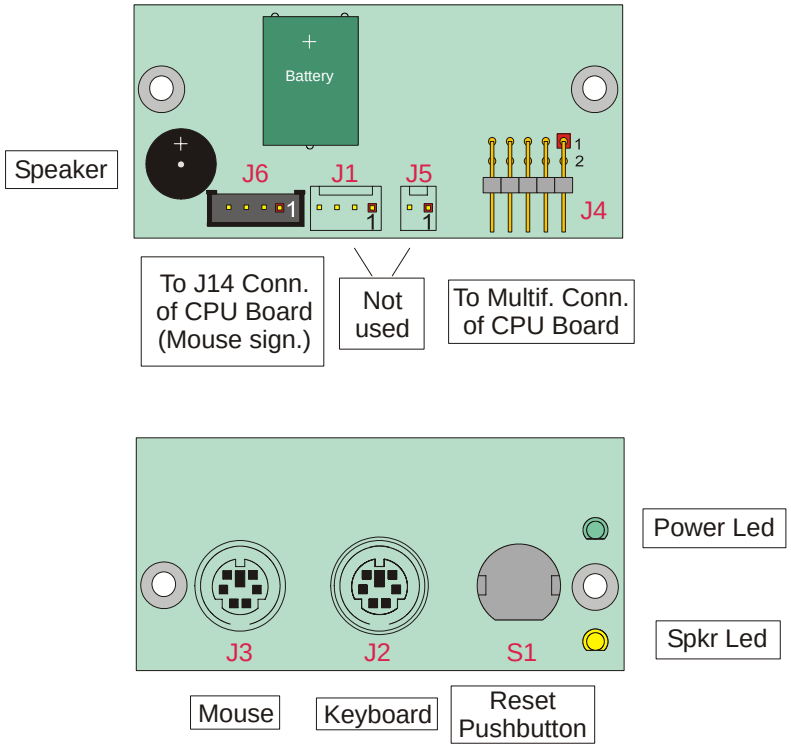


Figure 8. Multifunction Adapter (both sides)

Table 6. J4 To CPU Multifunction Connector

PIN #	SIGNAL
1	SPKR
2-8	+5V
3	RES_PB_IN
4-10	N.C.
5	KBDAT
6	KBCLK
7	GND
9	BATT_IN

Table 7. J6 To CPU J14 (Mouse signals)

PIN #	SIGNAL
1	+5V
2	MSCLK
3	GND
4	MSDAT

J4 for PARALLEL or FDD

A parallel port is available on connector J4 of the SpacePC 1232 module. This connector is a 13x2 pin with 2.54-mm step.

Connector J4 has two operating modes:

- Parallel port mode
- Floppy disk interface mode

The selection between the two modes can be performed in the BIOS Setup (see Chapter 4).

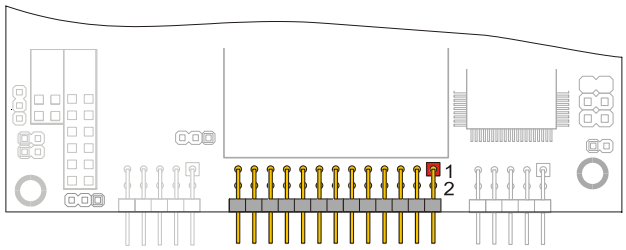


Figure 9. J4 Connector Layout

The following table gives the pin-out of connector J4 for both functions (parallel port and floppy).

Table 8. J4 Parallel/Floppy port connector

Parallel Function					Floppy Function			
Pin	**Signal**	**Function**	**in/out**	**DB25**	**Signal**	**Function**	**In/out**	**Pin**
1	STB# (*)	Strobe Data	out	1	DSO# (*)	Drive Select 0	In/out	**1**
2	AFD# (*)	Autofeed	out	14	DENSEL# (*)		Out	**2**
3	PD0	LSB of printer Data	out	2	INDEX# (*)	Index Pulse Inp	In	**3**
4	ERR# (*)	Printer error	in	15	HDSEL# (*)	Head Select	Out	**4**
5	PD1	Printer Data 1	out	3	TRK0# (*)	Track 0	In	**5**
6		Initialize printer	out	16	DIR# (*)	Step Direction	Out	**6**
7	PD2	Printer Data 2	out	4	WP# (*)	Write protect	Out	**7**
8	SLIN# (*)	Select printer	out	17	STEP# (*)	Step Pulse	Out	**8**
9	PD3	Printer Data 3	out	5	RDATA# (*)	Read Data	In	**9**
10	GND	Signal ground	--	18	GND	Signal ground	--	**10**
11	PD4	Printer Data 4	out	6	DSKCHG# (*)	Disk Change	In	**11**
12	GND	Signal ground	--	19	GND	Signal ground	--	**12**
13	PD5	Printer Data 5	out	7	MEDIA-ID0# (*)		In	**13**

14	GND	Signal ground	--	20	GND	Signal ground		**14**
15	PD6	Printer Data 6	out	8	MTR0# (*)	Motor On 0	In/out	**15**
16	GND	Signal ground	--	21	GND	Signal ground	--	**16**
17	PD7	MSB Printer Data	out	9	MEDIA-ID1# (*)		In	**17**
18	GND	Signal ground	--	22	GND	Signal ground	--	**18**
19	ACK# (*)	Character accepted	in	10	DS1#	Drive Select 1	Out	**19**
20	GND	Signal ground	--	23	GND	Signal ground	--	**20**
21	BSY	Busy	in	11	MTR1# (*)	Motor On 1	Out	**21**
22	GND	Signal ground	--	24	GND	Signal ground	--	**22**
23	PE	Paper End	in	12	WDATA# (*)	Write Disk Data	Out	**23**
24	GND	Signal ground	--	25	GND	Signal ground	--	**24**
25	SLCT	Ready To Receive	in	13	WGATE# (*)	Write Gate	Out	**25**
26	NC	Reserved	--	---	---	---	---	**26**

(*) The “#” stands for: signal active low

Note. FDD shouldn’t be directly connected to the J4 connector. Before using a Floppy Disk, an adapter must be inserted between the parallel port flat cable and the Floppy Disk Drive.

HOW TO USE THE PARVUS FDD ADAPTER

There are two configurations available for the Parvus FDD Adapter:

1. - J1A :Male configuration (for plugging to the Floppy Disk Flat Cable)
2.- J1 :Female configuration (for direct plugging to the Floppy Disk Drive)

J2 :Power supply (5V) used to power the adapter.
(This connector can’t power the FDD that needs its normal power supply).

J3 :Parallel Port Flat Cable Connector

A picture of this adapter is shown below.

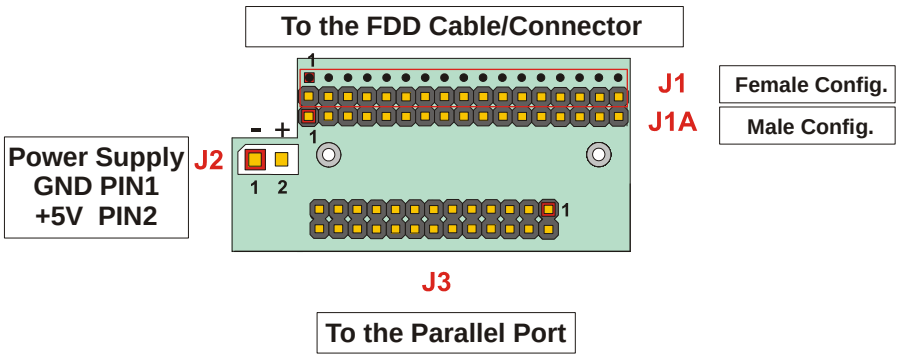


Figure 10. Parvus Floppy Disk Drive Adapter

WARNING! TO AVOID MALFUNCTIONS, BE CAREFUL TO CONNECT THE FLOPPY DRIVE CABLE IN THE FOLLOWING WAY:

The most diffuse Floppy Drive flat cable that is possible to find on the market is structured as shown in the following schematic picture. With this type of cable only the second connector can be connected to the Parvus Floppy Disk Drive Adapter. The “FDD connector” end of the cable is connected to the rear connector of the Floppy Drive.

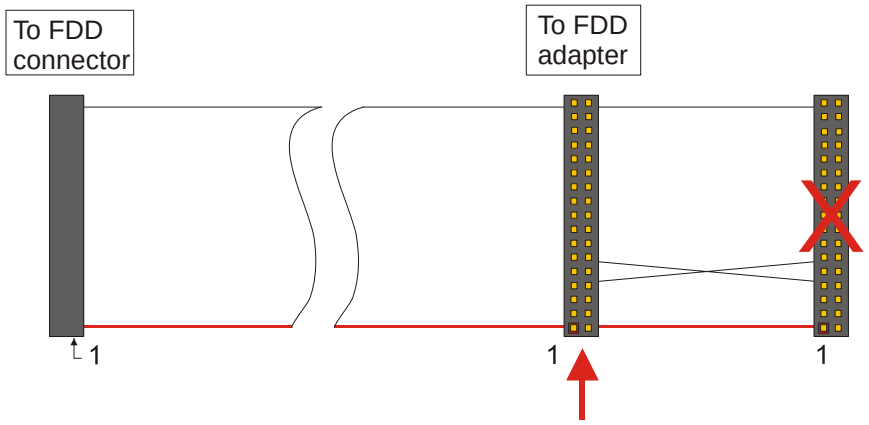


Figure 11. Floppy Drive Cable

J5 and J6 Serial Port Interfaces

Two serial ports are available on connectors J5, J6 of the SpacePC 1232 module. These connectors are 5x2 pin with 2.54-mm step.

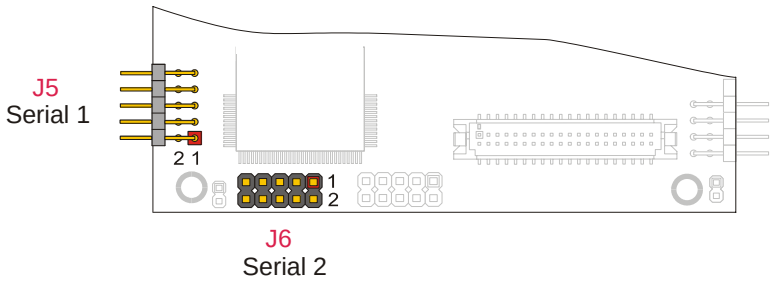


Figure 12. J5 and J6 Connectors layout

Both can be set as RS232 but only one (J5) can be set as RS422-485.
Refer to the following tables for the serial ports pinout assignment in RS232/422/485 modes.

Table 9. J5, J6 Serial Port Connectors in RS232 mode

Pin	Signal	Function	DB25	DB9
1	DCD	Data Carrier Detect	8	1
2	DSR	Data Set Ready	6	6
3	RX	Receive Data	3	2
4	RTS	Request To Send	4	7
5	TX	Transmit data	2	3
6	CTS	Clear To Send	5	8
7	DTR	Data Terminal Ready	20	4
8	RI	Ring Indicator	22	9
9,10	GND	Signal Ground	7	5

Table 10. J5 Serial Port Connector in RS422-RS485 modes

RS422				RS485			
Pin	**Signal**	**Function**	**In/out**	**Signal**	**Function**	**In/out**	**Pin**
1	-TX	Transmit data	out	-TX/-RX	Transmit/Receive data	out/in	**1**
2	--	Not connected	--	--	Not connected	--	**2**
3	+TX	Transmit Data	out	+TX/+RX	Transmit/Receive data	out/in	**3**
4	--	Not connected	--	--	Not connected	--	**4**
5	-RX	Receive Data	in	--	Not connected	--	**5**
6	--	Not connected	--	--	Not connected	--	**6**
7	+RX	Receive Data	in	--	Not connected	--	**7**
8	--	Not connected	--	--	Not connected	--	**8**
9,10	gnd	Signal ground	--	gnd	Signal ground	--	**9,10**

Note. If the Serial port is used in RS485 mode, the bi-directional line must be controlled via software, using the Data Terminal Ready (DTR) signal of the serial controller. This signal is defined by bit 0 of the UART Modem Control Register (MCR) and the bi-directional line is controlled as follows:

- bit 0 of the MCR register = 0 means RS485 line receiving
- bit 0 of the MCR register = 1 means RS485 line transmitting

The I/O address of the MCR is "Serial port Base address"+4H.

See Chapter 4 for info about the Serial ports configuration.

J7 for 2 x USB, J8 for AUDIO-CODEC

J7 for 2 x USB

J7 is a double row 4 x 2 pin with 2.00-mm step connector.

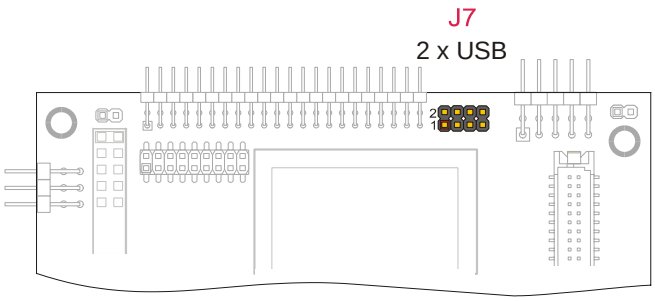


Figure 13. J7 Connector layout

Two USB ports are provided on the SpacePC 1232 module for the connection of USB devices.

Table 11. J7 2 x USB connector

Pin	Signal	Function
1	PE	USB power enable
2	OC	USB over current sense
3	USB1N	USB port 1 differential line (minus line)
4	USB2N	USB port 2 differential line (minus line)
5	USB1P	USB port 1 differential line (plus line)
6	USB2P	USB port 2 differential line (plus line)
7	GND	Ground signal
8	GND	Ground signal

All the timers have the same input clocks with a nominal frequency of 1MHz.
All the gate inputs are pulled high by a 4.7K resistor

Note. USB devices shouldn't be directly connected to the J4 connector. Parvus USB/Audio CODEC Adapter can be used. In fact it provides for two USB standard connectors (but only USB1 is useful for this CPU) and furthermore it provides for a better ESD (Electric Static Discharge) and Over Current protection. Before using a different adapter please refer to the Parvus Customer Support Service

J8 for AC97 Audio port Section

J8 is a double row 9 x 2 pin with 2.00-mm step connector.

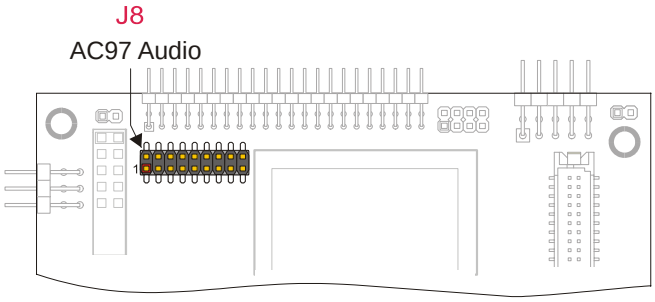


Figure 14. J8 Connector layout

The SpacePC 1232 module provides one AC97 (Specification Revision 1.3, 2.0, and 2.1) audio interface adding audio capabilities to the PC/104 system. The Parvus Audio CODEC Adapter (but also any AC97 CODEC which supports an independent input and output sample rate conversion interface can be used) provides an AC97 and a CODEC for the SpacePC 1232 and should be connected between the audio device and the J8 connector via a flat ribbon cable.

Table 12. J8 pinout connectors

Pin	Signal	Function
1	5V	Power supply
2	5V	Power supply
3	SDATA_OUT	Serial DATA Out This output transmit audio serial data to the codec
4	GPIO0	General Purpose I/O
5	GND	Ground Signal
6	GPIO1	General Purpose I/O
7	PC_BEEP	Legacy PC/AT speaker output
8	GND	Ground Signal
9	RESETDRV	
10	BIT_CLK	Audio Bit Clock The serial bit clock from the codec
11	GND	Ground Signal
12	GND	Ground Signal
13	GND	Ground Signal
14	SYNC	Serial Bus Synchronization This bit is asserted to synchronize the transfer of data between the module and the AC97 codec

15	SDATA_IN	Serial DATA In This input receives audio serial data from the codec
16	GND	Ground Signal
17	GND	Ground Signal
18	NC	Reserved

Note. Audio devices (i.e. Speaker, Microphone, MIDI device, …) cannot be directly connected to the J8 connector. The Parvus Audio CODEC Adapter board can be connected between them.

Parvus USB/AC97-AudioCODEC Adapter

Before using a USB and/or an Audio Device, the Parvus USB/AC97-AudioCODEC Adapter can be connected to the CPU board. The connection between the Parvus adapter and the CPU board is established by a cable set provided with the adapter.

A picture of the adapter is given in the next page.

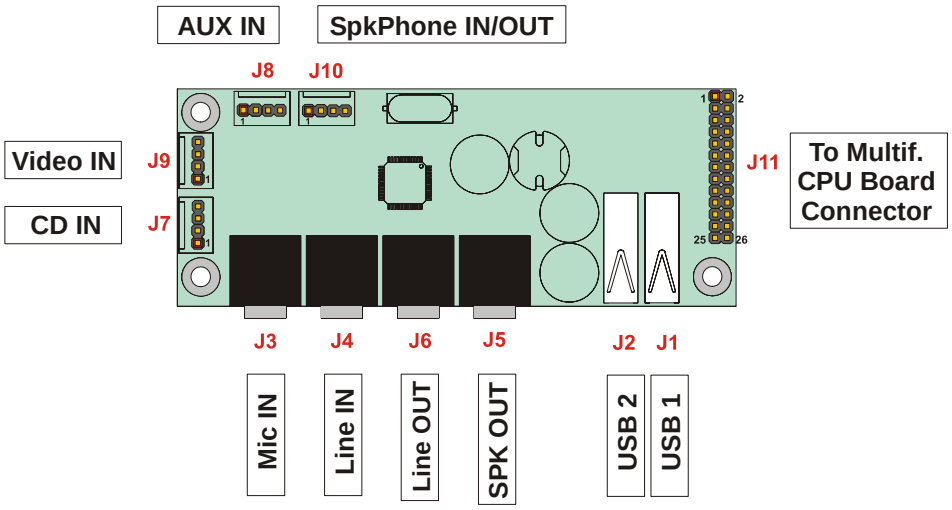


Figure 15. USB/AC97-AudioCODEC Adapter

The table below shows the adapter connectors description.

Table 13. USB/AC97-AudioCODEC Connectors

Connector#	Function

J1	USB1
J2	USB2
J3	Microphone IN
J4	Line IN
J5	Speaker OUT
J6	Line OUT
J7	CD IN
J8	Aux IN
J9	Video IN
J10	Speakerphone IN/OUT
J11	To CPU Board Connector (J4)

This adapter is composed of 2 functional sections:

- USB section, with 2 USB ports which are EMI protected and filtered, and can also supply power to the peripheral device connected (5V, 500mA);
- Audio section, which is equipped with the LM4549 National, an AC97 compliant I.C.
  The AC97 architecture separates the analog and digital functions of the PC audio system allowing both for system design flexibility and increased performance.
  The LM4549 is an Audio CODEC for PC systems, which is fully PC98 compliant and performs the analog intensive functions of the AC97 Rev2.1 architecture. Using 18-bit Sigma-Delta A/D's and D/A's, the LM4549 provides 90dB of Dynamic Range.
  This board, in its Audio Section, is provided with 4 stereo inputs, 1 microphone input, 1 stereo line input, 1 stereo earphone output (200mW) and 1 speakerphone Input/Output that can be connected to a telephone/modem set.

J9 IDE Connector, JP10 IDE LED Connector

The SpacePC 1232 module provides an interface for one or two Integrated Device Electronics (IDE) devices.

J9 IDE Connector

J9 is a 22x2 pin connector with 2.0 mm step.

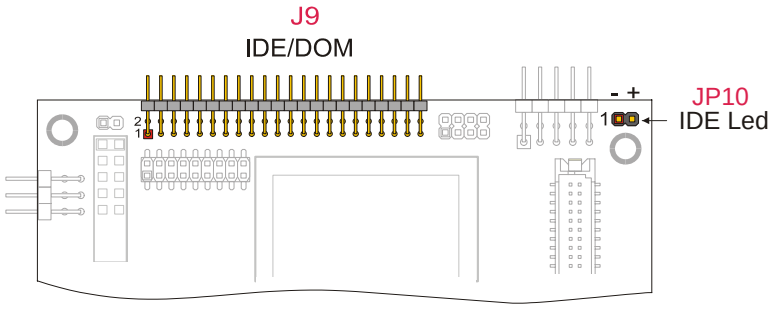


Figure 16. J9 and JP10 Connectors layout

To install the hard disk, perform the following operations:

- *Hardware installation.* Connect the hard disk to the module using a data cable, and then connect the hard disk to the power supply respecting the device's specifications. Make sure that pin 1 of connector J9 and pin 1 of the drive or drives are correctly connected. Pin 1 of the interface cable is usually indicated by a stripe along the edge of the cable. If two hard disks need to be connected, they must be configured for common operation (i.e. master/slave or cable select connection).
- *IDE BIOS Setup.* The hard disk parameters can be configured using the Setup program. If the hard disk is connected to the module without setup configuration or with a wrong setup configuration, a time-out for a few minutes occurs, then the boot is performed from the floppy disk.
- *Software initialization for specific operating systems. R*efer to the OS documentation.

JP10 IDE LED Connector

The IDE HDD activity LED output is implemented on connector JP10.
This is a 2-pin connector with 2-mm pitch header.

To this connector is possible to connect a led that display the IDE activity.

Check the pin out and pin functions on the following table:

Table 14. JP10 IDE LED Connector

Pin	Signal	Function
1	Ground	IDE LED anode (-)
2	IDELED (+)	IDE LED cathode (+)

J10 VGA Connector

The J10 is a 5x2 pin connector with step =2.54 mm.

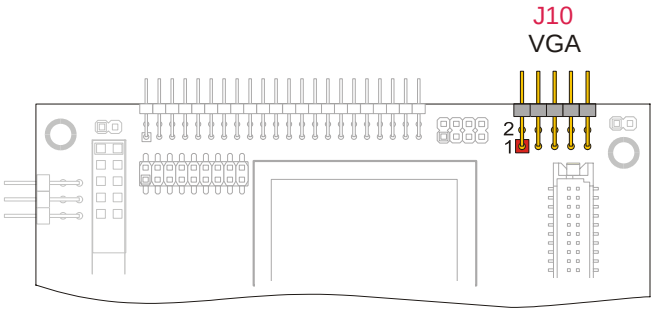


Figure 17. J10 Connector layout

Refer to the following table for the VGA connector assignment.

Table 15. J10 VGA Connector

Pin	Signal	Function
1	VSYNC	Vertical synchronization
2	HSYNC	Horizontal synchronization
3	DDC0	Display Data Channel - Data
4	RED	Analog RED
5	DDC1	Display Data Channel - Clock
6	GREEN	Analog GREEN
7	NC	
8	BLUE	Analog BLUE
9	GND	Analog ground
10	GND	Analog Ground

The following table shows the supported CRT-VGA Display Modes[1]

Table 16. Table CRT Display Modes[1]

Resolution	Simultaneous Colors	Refresh Rate (Hz)
640x480	8bpp 256 colors	60, 72, 75, 85
640x480	16bpp 64K colors	60, 72, 75, 85
800x600	8bpp 256 colors	60, 72, 75, 85
800x600	16bpp 64K colors	60, 72, 75, 85
1024x768	8bpp 256 colors	60, 70, 75, 85
1024x768	16bpp 64K colors	60, 70, 75, 85
1280x1024	8bpp 256 colors	60, 75, 85

1.- This list is not meant to be a complete list of all the possible supported CRT display modes

J11 Auxiliary Power Connector

One auxiliary connector is available on the SpacePC 1232 module. J11 is a 6x2 pin connector with 2.54-mm step used to power the module in alternative to the PC/104 bus.

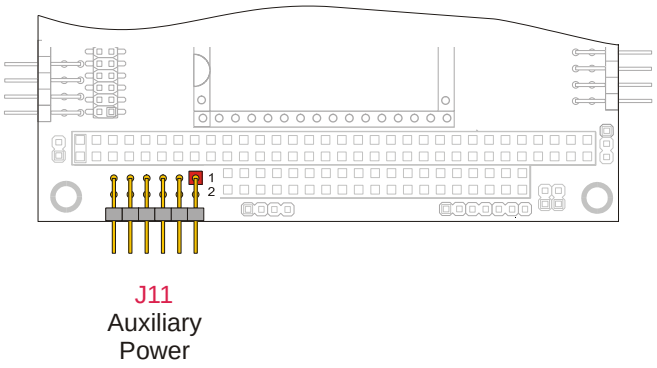


Figure 18. J11 Connector layout

Check pinout and functions on the following table.

Table 17. J11 Auxiliary Power Connector

Pin	Signal	Description
1	GND	Ground
2	VDD (+5VDC)	+5VDC signal
3	N.C.	Not connected
4	+12VDC	+12VDC signal
5	N.C.	Not connected
6	-12VDC	-12VDC signal
7	GND	Ground
8	VDD (+5VDC)	+5VDC signal
9	N.C.	Not connected
10	N.C.	Not connected
11	+5VSB	Always high (ATX only)
12	ATX ON	ATX Power on signal

The number and position of the pins that have to be connected depends on the Power Supply model. Refer to the following topics in order to perform the right connections.

AT Power Supply

- Connect pin 1 and pin 7 to the ground signal of the AT Power Supply Unit.
- Connect pin 2 and pin 8 to the +5VDC source on the AT Power Supply Unit.
- Connect pin 4 to the +12VDC and pin 6 to the –12VDC sources on the AT Power Supply Unit only if requested by other boards connected to the PC/104 ISA bus (see the following note).

ATX Power Supply

- Connect pin 1 and pin 7 to the ground signal of the ATX Power Supply Unit.
- Connect pin 2 and pin 8 to the +5VDC source on the ATX Power Supply Unit.
- Connect pin 4 to the +12VDC and pin 6 to the –12VDC sources on the ATX Power Supply Unit only if requested by other boards connected to the PC/104 ISA bus (see the following note).
- Connect pin 11 to the +5VSB source on the ATX Power Supply Unit. This signal is always high, even if the power supply is turned off.
- Connect pin 12 to the ATX ON signal of the ATX Power Supply Unit. This signal is used to power on the Power Supply itself.

Power button
If the soft power management is enabled, a low signal in this pin turns the system on or off.

Note. The +12VDC and -12VDC voltages are neither used nor generated by the SpacePC 1232 module: they are only conveyed on the PC/104 bus (connector J1) and can be used by other devices or modules that are stacked onto the CPU module.

WARNING! IMPROPER CONNECTION OF THE POWER SUPPLY WILL RESULT IN SERIOUS DAMAGE FOR THE MODULE.

J13 Fan power supply connector

It is possible to connect a fan to this connector (3pin, 2.54-mm step) according to these electrical requirements: 5V, 500mA max.

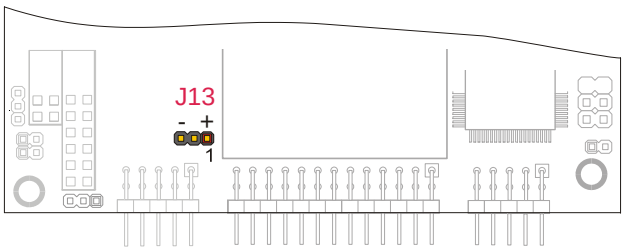


Figure 19. J13 Connector layout

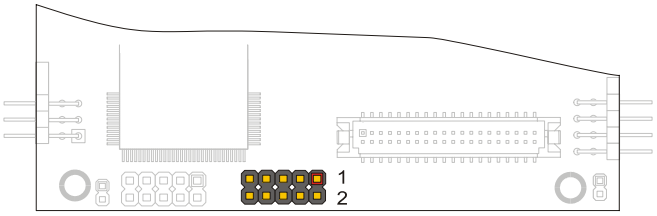
The connector pin out is shown below.

Table 18. J13 Pin out Connector

PIN	SIGNAL
1	+VDD
2	N.C.
3	GND

J18 for Ethernet

The SpacePC 1232 module features a single-chip Fast Ethernet controller that provides 32-bit performance, 10/100Mbps auto-sensing, and full compliance with IEEE 802.3u 100Base-T specifications and IEEE 802.3x Full Duplex Flow Control.
Ethernet connector J18 is a 5x2 pin with 2.54-mm step. Refer to the following table for the Ethernet connector assignment.



J18
Ethernet
Figure 20. J18 Connector layout

Table 19. J18 Ethernet Connector

Pin#	Signal	Function
1	5V	Power Supply
2	LED0	On sending packets
3	RX+	100/10Base-T receive data
4	RX-	100/10Base-T receive data
5	LED1	Link 10/100
6	GND	Ground signal
7	LED2	On receiving packets
8	GND	Ground signal
9	TX+	100/10Base-T transmit data
10	TX-	100/10Base-T transmit data

Note: To establish a connection to the Ethernet, the Parvus Ethernet Adapter can be plugged between the board (to the J18 connector) and the net cable.

It is shown below.

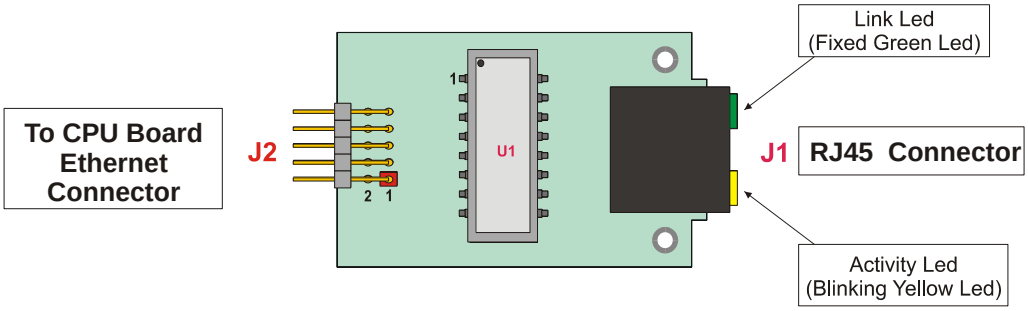


Figure 21. Parvus Ethernet Adapter

The green led is fixed, and signals the correct connection of the module.
The yellow led blinks when there is activity (data IN/OUT) on the net connection.

With RJ45 connectors, only twisted pair cables can be used.

Important Note. Connection to a 100BASE-TX hub for 100 Mbps operation requires Cat. 5 Unshielded Twisted-Pair (UTP) cable or Cat. 5 Shielded Twisted-Pair (STP) cable. The maximum length between the 100BASE-TX hub and the adapter is 100 meters. Connection to a 10BASE-T hub for 10 Mbps operation requires a Cat. 3, 4, 5 UTP cable or Cat. 5 STP cable. Preferred maximum cable length between SpacePC 1232 module and Ethernet adapter is 10 cm (4”)

The SpacePC 1232 module features a single-chip Fast Ethernet controller that provides 32-bit performance, 10/100Mbps auto-sensing, PCI bus master capability, and full compliance with IEEE 802.3u 100Base-T specifications and IEEE 802.3x Full Duplex Flow Control.

Net drivers

The available drivers are supplied in a CD-ROM coming with the SpacePC 1232 module. There are several OSs supported by the RTL8139 Ethernet controller. Check the Parvus web site in order to get the latest information on driver availability for your operating system.

J19 LCD-TFT Section

LCD-TFT flat panels can be connected to J19 that is a double row 20 x 2 pin with 1.25-mm step connector.

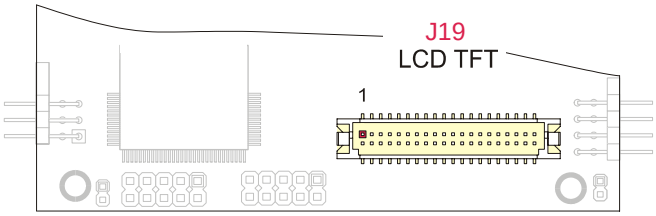


Figure 22. J19 Connector layout

Table 20. J19 TFT Digital Interface connector pinout

Pin Number	Function	Pin Number	Function
2	Reserved	**1**	GND
4	GND	**3**	GND
6	NC	**5**	VDD
8	GND	**7**	VDD
10	GREEN5 (MSB)	**9**	FP_HSYNC
12	GREEN4	**11**	GND
14	GREEN3	**13**	FP_VSYNC
16	GREEN2	**15**	VDD
18	GND	**17**	VDD
20	GREEN1	**19**	Data Enable
22	GREEN0 (LSB)	**21**	GND
24	BLUE5 (MSB)	**23**	RED5 (MSB)
26	BLUE4	**25**	RED4
28	GND	**27**	RED3
30	BLUE3	**29**	VDD Enable
32	BLUE2	**31**	BackLight Enable
34	BLUE1	**33**	RED2
36	BLUE0 (LSB)	**35**	RED1
38	GND	**37**	RED0 (LSB)
40	Dot Clock	**39**	GND

The following table shows the supported LCD-TFT video resolutions

Table 21. LCD-TFT video resolutions (*)

Resolution	Simultaneous Colours	Refresh Rate (Hz)
640x480	8bpp 256 colors	60

640x480	16bpp 64K colors	60
800x600	8bpp 256 colors	60
800x600	16bpp 64K colors	60
1024x768	8bpp 256 colors	60
1024x768	16bpp 64K colors	60

(*)- This list is not meant to be a complete list of all the possible supported TFT video

Refer to Chapter 4 to get info about how to set the flat panels.

For further information about other/new LCD-TFT flat panels supported or how to connect a flat panel to the CPU module, please refer to Application Note An-0031 available on the Parvus Web site or contact Parvus' Technical Customer Support at tsupport@parvus.com.

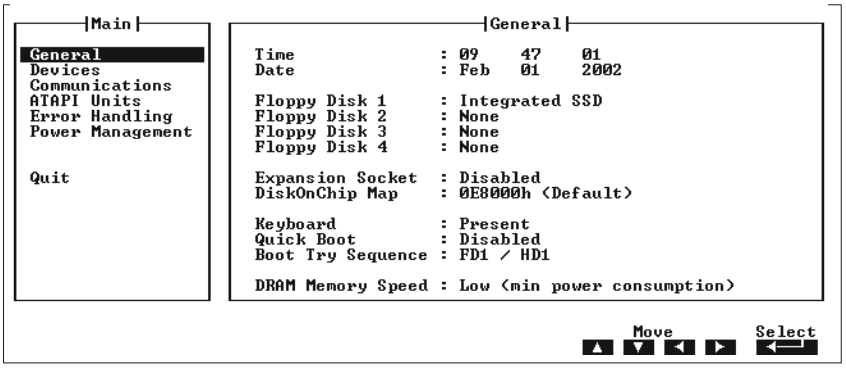
Chapter 4 The Setup Program

This chapter explains how to use and modify the setup options. These options allow configuring properly the CPU board.

Note. The Setup Program can be improved to match the technical requirements.

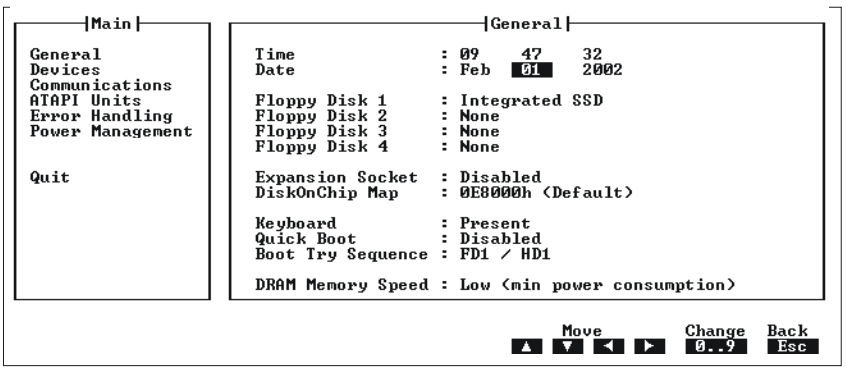
How to use the Setup program

To enter in the Setup Program, reboot or switch-on your module and then press the "**F2**" key.
After waiting a few seconds the main menu will appear.

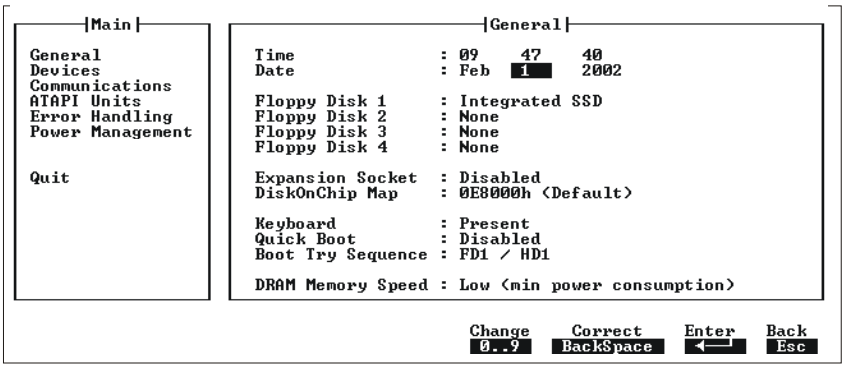


The Main menu of the setup program shows a list of options that are available.
A highlight shows which option is currently selected.
Use the cursor arrow keys to move the highlight to other options.
When an option (i.e.: *General*) is highlighted, it is possible to execute it by pressing the "**Enter**" key.

A table of items will be displayed on the right side of the screen.

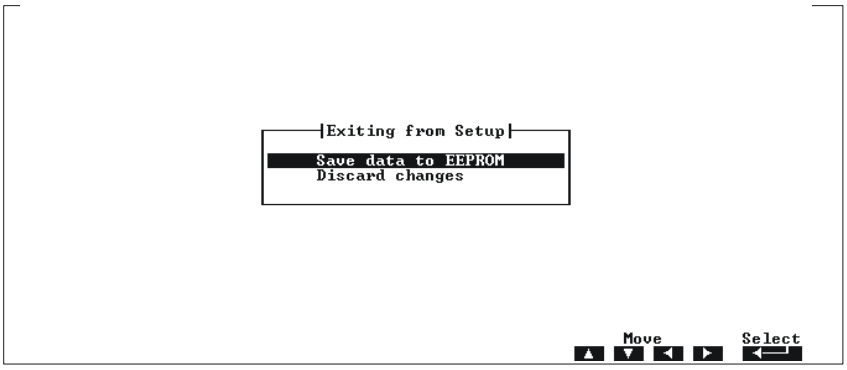


Now it is possible to select among several items (i.e.: *Time, Date, Floppy Disk 1*,…) using the arrow keys and the "**Enter**" key.
When an item is highlighted, it is possible to change its value by pressing the "**PageUp**" and "**PageDown**" keys.
Time and *Date* items are set using the keys "**PageUp**" and "**PageDown**" and the keys from "**0**" to "**9**"; press "**Enter**" to confirm. To correct errors press the "**BackSpace**" key.



Press the "**ESC**" key to return to the items of the Main menu.

Select "*Quit*" to exit from the Setup program.
The follow screen will be displayed:



Select with the "**ENTER**" key the first option *Save data to EEPROM* to store the parameters into the EEPROM. Select *Discard changes* to leave unaltered the previous stored parameters.

The Setup pages

The Setup Program is composed of several pages. They are listed below:

- General
- Devices
- Communications
- ATAPI Units
- Error Handling
- Power Management

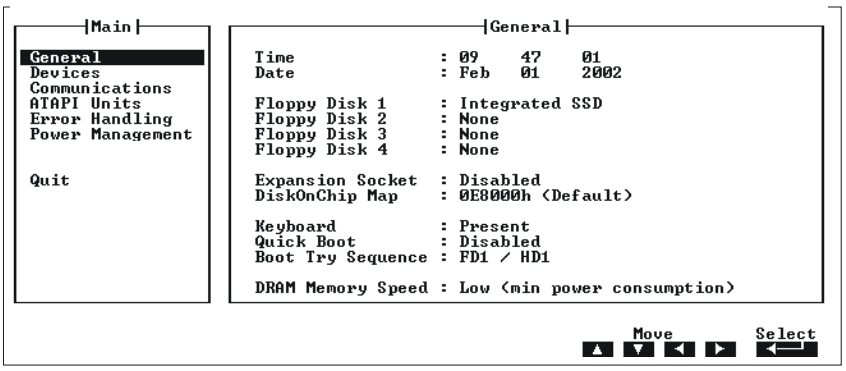
General *Page*

NOTE: The pictures below show the default configuration of the CPU Setup Program. In case of bad/wrong setup configurations, returning to this one assure the correct working.

(*) An asterisk in the following tables indicates the default configuration.

This page contain, as shown below, the setting for the following devices:

- Time
- Date (for the Real Time Clock)
- Floppy Disk 1..4
- Expansion Socket
- DiskOnChip Map
- Keyboard
- Quick Boot
- Boot Try Sequence
- DRAM memory Speed



Time

The *time* is displayed in standard format: *hh mm ss* (hours - minutes - seconds); all the three fields contain numerical values only.

Date

The *date* is displayed in standard format: MMM DD YYYY (month - day - year); all the three fields contain numerical values only.

Floppy disks 1..4

Each system incorporates a controller capable of driving up to four floppy disks, according to the hardware mounted on-board. The floppy disks are numbered starting from *one* and the BIOS maps these drivers starting form the letter "A".

Note: during the floppy disk assignment it is a good practice filling the devices consecutively, without any "hole" from one device to another.

Note: when the *boot sequence* starts from floppy disk number one (DOS letter "A"), any device selected as *floppy disk 1* can be a bootable disk. Obviously this device must represent a real bootable disk, with a proper boot sector and containing a valid O.S.

Note: In the SpacePC 1232 only one external FDD can be connected.

All the *floppy disks* can be configured with the same options:

Option	*Description*	*Note*
None	No floppy disk selected	
360 KB	Floppy disk 5 ¼ - size 360 Kbytes	
1.2 MB	Floppy disk 5 ¼ - size 1.2 Mbytes	
720 KB	Floppy disk 3 ½ - size 720 Kbytes	
1.44 MB	Floppy disk 3 ½ - size 1.44 Mbytes	Common used size
Integrated SSD	On-board Flash EEPROM	Always available on all boards

The following one is the default configuration (as shown in the previous picture):
Floppy Disk 1: Integrated SSD
Floppy Disk 2: None
Floppy Disk 3: None
Floppy Disk 4: None

Note: **with the previous default configuration, the Integrated SSD (that is a READ ONLY MEMORY) is seen with the DOS letter "A", and the system bootstraps from it.** ***If you want to use also a real Floppy Disk, you must set it as Floppy Disk 2. It will be seen with the DOS letter "B".***

Note: the floppy controller use the *same connector used by the parallel port*. In this case when the floppy controller is enabled, the parallel port is automatically disabled, even if it was already enabled in the Setup. The parallel port can be used again after disabling the floppy disk controller.

Expansion Socket

The *Expansion Socket* is available to mount different type of *solid-state* memory devices. If you want to use a PEROM or a SRAM, you must also configure a "Floppy Disk 1..4" as Expansion Socket. Anyway a Disk On Chip (DOC) is always seen as a hard disk, and it doesn't need a further setting in the "Floppy Disk 1..4" section. If the assigned floppy is *FD1* and the *boot try sequence* is *FD1/HD1*, the system starts bootstrapping from the memory mounted on the expansion socket.

Option	Description	Note
Disabled (*)	No device selected	**(*) = Default setting**
Disk On Chip	Solid-state memory device - size: 2 ... 144 MB	
PEROM 512 KB	Programmable and Erasable ROM -size 512 KB	
SRAM 512 KB	Static RAM - size 512 KB	

DiskOnChip Map

This option allows to chose the starting address of Disk On Chip (DOC) memory window

Option	Description	Note
0CC000h	The starting address is 0CC000h	
0D0000h	The starting address is 0D0000h	
0D4000h	The starting address is 0D4000h	
0D8000h	The starting address is 0D8000h	
0DC000h	The starting address is 0DC000h	
0E0000h	The starting address is 0E0000h	
0E4000h	The starting address is 0E4000h	
0E8000h (*)	The starting address is 0E8000h	**(*) = Default setting**

IMPORTANT NOTE: **With Win NT**

Keyboard

If the *keyboard* is not really necessary in the system, you can disable it. In this way the system can bootstrap ignoring the keyboard.

Option	Description	Note
Not Present (*)	Keyboard presence ignored	Useful for embedded systems **(*) = Default setting**
Present	BIOS look for keyboard	

Quick Boot

With quick boot enabled, the system takes less than 5 seconds for a bootstrapping. This improvement is obtained to the disadvantage of BIOS tests (the setup must be correct and the peripheral must be connected to the module and ready at the boot); in particular the following test are skipped:

- system memory pattern test
- keyboard detection
- floppy disk presence (seek test)

- RTC time test

Option	*Description*	*Note*
Disabled (*)	Normal BIOS test are used	**(*) = Default setting**
Enabled	Reduce set of BIOS test are used	

Boot Try Sequence

The *Boot Try Sequence* allows exchanging the boot disk order among Floppy Disk 1 and Hard Disk 1.

Option	*Description*	*Note*
FD1 / HD1 (*)	Bootstrap starts from the FD1 then try with HD1	**(*) = Default setting**
HD1 / FD1	Bootstrap starts from the HD1 then try with FD1	

DRAM Memory Speed

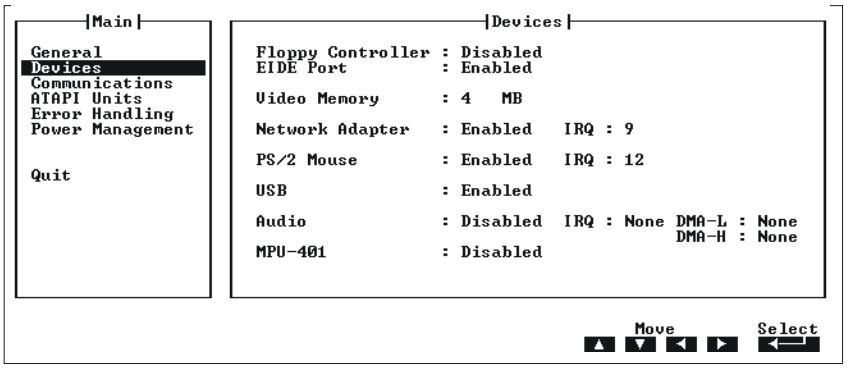
The working speed of the DRAM memory can set as follows:

Option	*Description*	*Note*
Low (*)	Low speed whit minimal power consumption	**(*) = Default setting**
High	High speed for maximum performance	

Devices *Page*

This page controls all the *on-board system-devices*; in particular:

- Floppy Disk Controller
- EIDE Ports
- Video memory
- Network Adapter
- PS/2 Mouse
- USB
- Audio
- MPU-401



Floppy Controller

This option enables or disables the *on-board floppy disk controller*. For example, if an external floppy disk controller needs to be used, the internal one must be disabled.

Option	*Description*	*Note*
Disabled (*)	Disable the on-board floppy disk controller	An external controller can be used **(*) = Default setting**
Enabled	Enable the on-board floppy disk controller	

- ***Note:*** The floppy controller use the *same connector used by the parallel port*. In this case when the floppy controller is enabled, the parallel port is automatically disabled, even if was already enabled in the Setup. The parallel port can be used again after disabling the floppy disk controller.

EIDE Port

This option enables or disables the *on-board EIDE hard disk controller*. For example, if an external hard disk controller needs to be used, the internal one must be disabled.

Option	*Description*	*Note*
Disabled	Disable the on-board hard disk controller	An external controller can be used
Enabled (*)	Enable the on-board hard disk controller	**(*) = Default setting**

Video Memory

The *video memory size* can be adjusted according the user necessities: more space is reserved for video, less space is available for the applicative programs and vice versa.

Option	*Description*	*Note*

1 MB	1 Megabyte reserved for Video Memory	
2 MB	2 Megabyte reserved for Video Memory	
4 MB (*)	4 Megabyte reserved for Video Memory	**(*) = Default setting**

Network Adapter

The user can manually enables or disables the *on-board network adapter*.

Option	*Description*	*Note*
Disabled	Disable the on-board network controller	
Enabled (*)	Enable the on-board network controller	**(*) = Default setting**

- ***Note:*** if an external network controller is connected on the ISA bus, be sure don't use the same address space or IRQ, to avoid possible conflicts.

Option	*Description*	*Note*
9 (*)	IRQ 9 for ISA network controller	**(*) = Default setting**
10	IRQ 10 for ISA network controller	
11	IRQ 11 for ISA network controller	
12	IRQ 12 for ISA network controller	

PS/2 Mouse

If not used, the PS/2 mouse can be disabled. In this way the interrupt *IRQ 12*, normally reserved for mouse, is free for PCI bus or other devices.

- ***Note:*** the interrupt reserved for mouse is fixed (IRQ 12); it is displayed for information only.

Option	*Description*	*Note*
Disabled	Disable the on-board mouse controller	
Enabled (*)	Enable the on-board mouse controller	**(*) = Default setting**

USB

This option allows enabling and disabling the USB Port.

Option	*Description*	*Note*
Disabled	Disable the on-board USB interface	
Enabled (*)	Enable the on-board USB interface	**(*) = Default setting**

Audio

This option allows enabling and disabling the Audio emulator.

Option	*Description*	*Note*
Disabled (*)	Disable the Audio emulator	**(*) = Default setting**
0220h	Audio emulator address selected at 220h	
0240h	Audio emulator address selected at 240h	
0260h	Audio emulator address selected at 260h	

0280h	Audio emulator address selected at 280h

Audio IRQ number

Option	*Description*	*Note*
None (*)	No IRQ selected	**(*) = Default setting**
5	IRQ 5 selected	
7	IRQ 7 selected	
10	IRQ 10 selected	

8 bit DMA channel

Option	*Description*	*Note*
None (*)	No DMA channel selected	**(*) = Default setting**
0	DMA 0 selected	
1	DMA 1 selected	
3	DMA 3 selected	

16 bit DMA channel

Option	*Description*	*Note*
None (*)	No DMA channel selected	**(*) = Default setting**
5	DMA 5 selected	
6	DMA 6 selected	
7	DMA 7 selected	

MPU-401

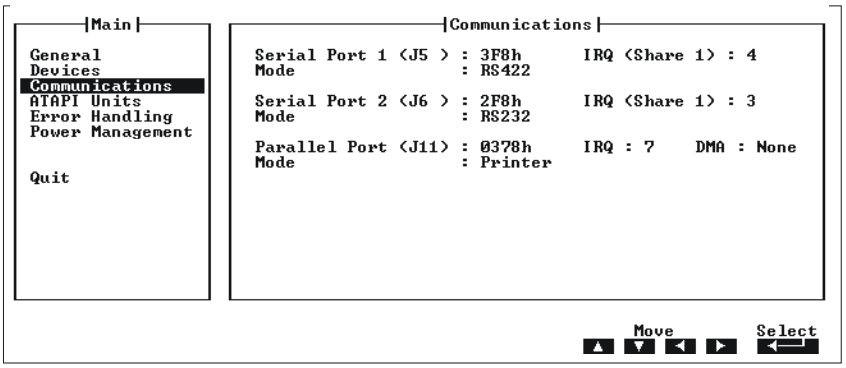
This option allows enabling and disabling the MIDI emulator.

Option	*Description*	*Note*
Disabled (*)	Enable the MIDI emulator	**(*) = Default setting**
0300h	MIDI emulator address selected at 300h	
0330h	MIDI emulator address selected at 330h	

Communications *Page*

This page concerns all the on-board communication interfaces:

- Serial Port1
- Serial Port2
- Parallel Port



Serial Ports 1 and 2

The number of serial ports is two. The Serial Port Mode is selectable (RS232, RS 422 and RS 485), like the IRQ number.

Serial Port1 (J5)

The user according the device connected to the interface can choose The Serial Port1 Mode. The default mode is *RS232.*

Serial Port1 Modes

Option	*Description*	*Note*
RS 232	RS 232 Mode selected	"Standard" serial mode
RS 422 (*)	RS 422 Mode selected	**(*) = Default setting**
RS 485	RS 485 Mode selected	

Serial Port1 Addresses

Option	*Description*	*Note*
Disabled	Disable the serial port	
3F8h (*)	Serial Port address selected at 3F8h	**(*) = Default setting**
2F8h	Serial Port address selected at 2F8h	
3E8h	Serial Port address selected at 3E8h	
2E8h	Serial Port address selected at 3E8h	

Serial Port1 IRQ

Option	*Description*	*Note*
None	No IRQ selected	
3	IRQ 3 selected	
4 (*)	IRQ 4 selected	**(*) = Default setting**
5	IRQ 5 selected	
7	IRQ 7 selected	
9	IRQ 9 selected	
10	IRQ 10 selected	
11	IRQ 11 selected	**See Note(!) below**
12	IRQ 12 selected	

- ***Note(!):*** **IRQ 11 can't be used by peripherals connected to the ISA BUS if the printed circuit board code ends with the letter "S" (PC100112S). If the printed circuit board code ends with the letter "A" (PC100112S), there aren't any problems.**

- ***Note:*** not all consecutive IRQ numbers from 3 to 15 can be used; to help the selection, the Setup program displays legal IRQ numbers only.

- ***Note:*** if the IRQ is *shared*, all the ports using the same *share number* can use the *same IRQ number*.

Serial Port2 (J6)

The Serial Port2 Mode is fixed: **RS232**

Serial Port2 Addresses

Option	*Description*	*Note*
Disabled	Disable the serial port	
3F8h	Serial Port address selected at 3F8h	
2F8h (*)	Serial Port address selected at 2F8h	**(*) = Default setting**
3E8h	Serial Port address selected at 3E8h	
2E8h	Serial Port address selected at 3E8h	

Serial Port2 IRQ

Option	*Description*	*Note*
None	No IRQ selected	
3 (*)	IRQ 3 selected	**(*) = Default setting**
4	IRQ 4 selected	
5	IRQ 5 selected	
7	IRQ 7 selected	
9	IRQ 9 selected	
10	IRQ 10 selected	
11	IRQ 11 selected	**See Note(!) below**
12	IRQ 12 selected	

- ***Note(!):*** **IRQ 11 can't be used by peripherals connected to the ISA BUS if the printed circuit board code ends with the letter "S" (PC100112S). If the printed circuit board code ends with the letter "A" (PC100112A), there aren't any problems.**

Parallel Port

Parallel Port Address

Option	*Description*	*Note*
Disabled	Disable the serial port	
0378h (*)	Parallel Port address selected at 378h	**(*) = Default setting**
0278h	Parallel Port address selected at 278h	

Parallel Port IRQ number

Option	*Description*	*Note*

None	No IRQ selected	
3	IRQ 3 selected	
4	IRQ 4 selected	
5	IRQ 5 selected	
7 (*)	IRQ 7 selected	**(*) = Default setting**

- ***Note:*** not all consecutive IRQ numbers from 3 to 15 can be used; to help the selection, the Setup program displays legal IRQ numbers only.

Parallel DMA Channel

Option	*Description*	*Note*
None (*)	No DMA selected for the Parallel Port	**(*) = Default setting**
0	DMA Channel 0 selected	
1	DMA Channel 1 selected	
3	DMA Channel 3 selected	

Parallel Port Mode

The user according the parallel device connected to the interface can choose The Parallel Port Mode. The default mode is *Bidirectional.*

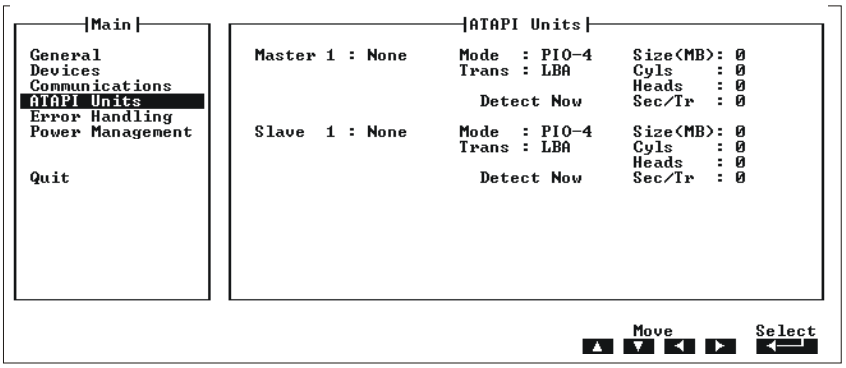
Option	*Description*	*Note*
Printer (*)	Standard mono-directional printer interface	**(*) = Default setting**
Bidirectional	Bidirectional printer interface	
EPP-1.9 and SPP	EPP and SPP mode	
EPP-1.7 and SPP	EPP and SPP mode	
ECP	ECP mode	
ECP and EPP-1.9	ECP and EPP mode	
ECP and EPP-1.7	ECP and EPP mode	

ATAPI Units *Page*

This option concerns about mass storage devices using a standard *EIDE* interface.
The CPU board has two EIDE controllers, so the *ATAPI Units* can be separated in two parts: *ATAPI Primary* and *ATAPI Secondary*. In any case the options are the same.

- ***Note:*** ATAPI (or EIDE) devices can be both *hard disks* and *CD_ROM* devices or, sometimes, storage *tape-units*.

- ***Note:*** each EIDE interface supports two peripherals, called *master* unit and *slave* unit. Remember to select as *master unit* a bootable disk (containing any valid O.S.).



ATAPI unit type

Option	*Description*	*Note*
None (*)	No unit selected	Default setting for both ATAPI Units (Master1 & Slave1) **(*) = Default setting**
Auto	Unit auto-detection	
LBA	LBA unit selected	
CHS	CHS unit selected	
CD-ROM	CD-ROM unit selected	
Other	Other unit selected	

- ***Note:*** when the *Auto* feature is selected, the BIOS ignores any other data (like Mode, Cyls, Head, etc.). Use this option for the most of hard disks or other ATAPI devices.

- ***Note:*** *LBA* and CHS are two different types of ATAPI units addressing mode. The first one is normally used with modern hard disk, from 512 Kbytes to above 8 Gbytes. For both modes you have to know the *physical hard-disk structure* in terms of Cylinders, Heads and Sectors. So, for an easy use of any kind of disk, the *Auto* option is preferable.

- ***Note:*** to speed-up the *bootstrap* select the option *None* for unused ATAPI devices.

PIO Mode

PIO is a special data-transfer system between two or more EIDE devices, where all the data pass through the processor. There are five transfer rates, called *PIO mode n* (with n=0..4). If the *Auto* (autodetect) option is disabled, the PIO mode must be specified.

Option	*Description*	*Note*
PIO-0	Transfer Rate of 3.3 MBps	
PIO-1	Transfer Rate of 5.2 MBps	
PIO-2	Transfer Rate of 8.3 MBps	
PIO-3	Transfer Rate of 11.1 MBps	
PIO-4 (*)	Transfer Rate of 16.6 MBps	Default setting for both ATAPI Units (Master1 & Slave1) **(*) = Default setting**

Translation Mode
Modern hard-disks have more cylinders than maximum number of cylinders permitted by DOS, so, theoretically, a DOS machine couldn't use a modern big-sized hard disk. This problem is solved using a special addressing mechanism. This "mechanism" is called *translation*. The most common translation methods are *LBA (Logical Block Addressing)* and *ECHS (Enhanced Cylinders - Heads - Sectors).*

Option	*Description*	*Note*
LBA (*)	LBA translation	Default setting for both ATAPI Units (Master1 & Slave1) **(*) = Default setting**
ECHS	Extended CHS translation	

Cylinders
Number of *hard-disk cylinders* (normally written on the disk label). If the autodetection is used (suggested method!), the cylinders value is ignored by the BIOS.

Option	*Description*	*Note*
0..65536	Number of cylinders	0 is the default setting for both ATAPI Units (Master1 & Slave1)

Heads
Number of *hard-disk heads* (normally written on the disk label). If the autodetection is used (suggested method!), the heads value is ignored by the BIOS.

Option	*Description*	*Note*
0..64	Number of heads	0 is the default setting for both ATAPI Units (Master1 & Slave1)

Sect/Tr
Number of *sectors per track* (normally written on the disk label). If the autodetection is used, the sectors value is ignored by the BIOS.

Option	*Description*	*Note*
0..255	Number of sectors per track	0 is the default setting for both ATAPI Units (Master1 & Slave1)

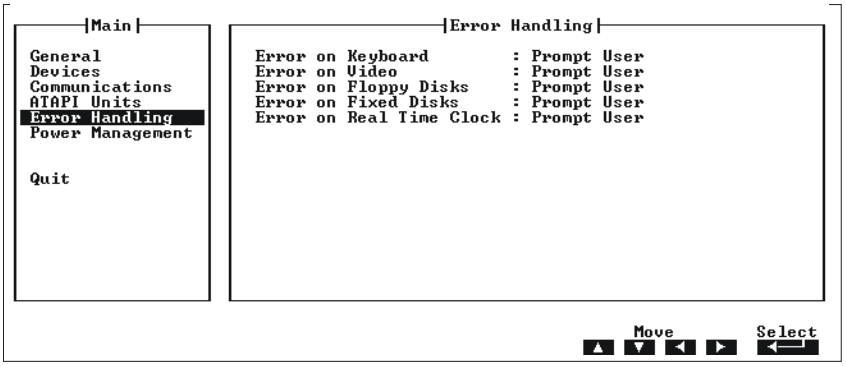
Size (MB)
This is the *hard-disk size*, in Mbytes, calculated by the BIOS, using either the autodetect method or the user hand-written values (for cylinders, heads and sectors).

- ***Note:*** the size cannot be changed directly by the user.

Detect Now
Using the *Detect Now* option, the user can start manually the *hard-disk autodetect procedure* and see immediately the result, as well as the size (in Mbytes), in terms of cylinders, heads and sectors numbers.

Error Handling *Page*

Generally, in a normal desktop BIOS, when an error is encountered by the POST sequence, the bootstrap stops and waits for a reboot. For example a simple keyboard absence represents an irrecoverable error. This can be a serious problem in embedded systems. Using the *Error Handling* page, the user can decide to ignore one or more of errors that could be encountered during the boot.



Error on Keyboard

The user can decide for himself if a *keyboard error* must stop the boot process or not.

Option	*Description*	*Note*
Ignore	The keyboard error is ignored	
Prompt User (*)	When a keyboard error occurs, the system stops and waits for the user	**(*) = Default setting**

Error on Video

The user can decide for himself if a *video error* must stop the boot process or not.

Option	*Description*	*Note*
Ignore	The video error is ignored	
Prompt User (*)	When a video error occurs, the system stops and waits for the user	**(*) = Default setting**

Error on Floppy Disks

The user can decide for himself if a *floppy disks error* must stop the boot process or not.

Option	Description	Note
Ignore	The floppy disks error is ignored	
Prompt User (*)	When a floppy disks error occurs, the system stops and waits for the user	**(*) = Default setting**

Error on Fixed Disks
The user can decide for himself if a *floppy disks error* must stop the boot process or not.

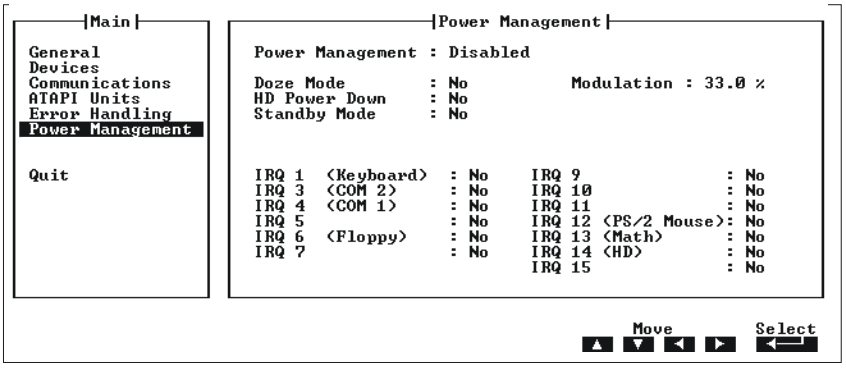
Option	Description	Note
Ignore	The fixed disks error is ignored	
Prompt User (*)	When a fixed disks error occurs, the system stops and waits for the user	**(*) = Default setting**

Error on Real Time Clock
The user can decide for himself if a *Real Time Clock (RTC) error* must stop the boot process or not.

Option	Description	Note
Ignore	The RTC error is ignored	
Prompt User (*)	When a RTC error occurs, the system stops and waits for the user	**(*) = Default setting**

Power Management

Not available at this moment.
This function is **DISABLED**



Chapter 5 How to update the BIOS. The SSD

This chapter explains how to use the BTOOL Program and gives information about the Integrated Solid State Disk.

Warning: The BTOOL Program can be different for each CPU and each BIOS version. For the last versions visit the site: www.parvus.com.

How to update the BIOS: the BTOOL Program

The BTOOL program is a utility used to program the BIOS (that is stored in the Flash EPROM) in the following cases:

- BIOS upgrade;
- Installation of a MiniDOS compatible program into the Flash (Integrated SSD);
- Installation of a BIOS Extension into the Flash.

PLEASE NOTE:
BTOOL program must be run under MS-DOS environment, **not DOS WINDOW**, (so, if it is necessary, create a bootable floppy disk, with the command FORMAT/S. The diskette must be formatted as a 1.44 MB disk.).
Power supply must be assured during all the program execution.
Please run AUTOEXEC.BAT and CONFIG.SYS without any parameters!
Please don't run any memory manager. If HIMEM.SYS or EMM386 are running, the BTOOL program doesn't work!

It will be useful if the BTOOL program is stored in a Floppy Disk (for example in the bootable disk)

The program must be run using the **BTOOL** (or **BTOOL.EXE**) command line at the DOS prompt. The on line help, with the available options will be displayed, as follow:

```
A:\>BTOOL.EXE

BTOOL - CPU 1231/1232/1432 BIOS Update and Configuration Tool.
        Eurotech S.p.A. - Ver. 4.04 - 2002

Use : BTOOL options

      /S          -> Run Setup Program
      /L          -> Lock Integrated Setup
      /U          -> Unlock Integrated Setup
      /G FILENAME -> Get Setup Data from system and save to file
      /P FILENAME -> Read Setup Data from file and put to system
      /B FILENAME -> Update entire BIOS Firmware
      /V FILENAME -> Update Video BIOS Firmware only
      /E FILENAME -> Update Emergency BIOS Firmware
      /DA         -> Build Integrated SSD from Disk "A:"
      /DB         -> Build Integrated SSD from Disk "B:"


A:\>
```

OPTIONS EXPLANATION

BTOOL /S	This option runs the Setup program without the necessity of rebooting the system and then pressing “F2”
BTOO L/L	This option locks the setup. In this way the access to the Setup Program is denied.
BTOOL /U	This option unlocks the setup. In this way the access to the Setup Program is re-established.
BTOOL /G FILENAME (*)	This option gets the Setup Data from the system and save it in a file with the name “FILENAME.BIN”.
BTOOL /P FILENAME (*)	This option reads the Setup Data from the file named “FILENAME.BIN” and put it in the system
BTOOL /B FILENAME (*)	This option updates the entire BIOS firmware with the version stored in the file named “FILENAME.BIN”; for example BIOS.BIN, stored on a floppy.
BTOOL /V FILENAME (*)	This option updates only the video BIOS firmware with the new version stored in the file named “FILENAME.BIN”
BTOOL /U FILENAME (*)	This option updates the Emergency BIOS Firmware with the new version stored in the file: “FILENAME.BIN” (this option is not used in the SpacePC 1232)
BTOOL /DA	This option creates the image of the Floppy “A:” in the Integrated SSD
BTOOL /DB	This option creates the image of the Floppy “B:” in the Integrated SSD

(*): all these files are in binary (.BIN) format

The BTOOL program always ends with a module’s hardware reset (pressing CTRL+ALT+DEL is not enough). It is necessary to switch off and then switch on the CPU in order that the changes take effect.

EXAMPLE: Update the BIOS

For the BIOS files and for upgrades, visit www.parvus.com. It is very useful to store the new BIOS version in a floppy disk.

- Before proceeding, you have to be running DOS (or ROM-DOS) environment without any memory manager
- Type the following command at the DOS prompt and press “ENTER”:

A:\>BTOOL /B BIOS.BIN (*) (*) The file name can be different according to technical needs.

- The program will store the new BIOS version.
- Follow all the instructions the BTOOL gives you
- BTOOL will inform you about the results of the operation,
- Power off and then power on the CPU module.

The Integrated Solid State Disk

A portion of the Flash EPROM can be used as an Integrated SSD. This Integrated SSD is like a write-protected floppy disk for storing files.
In the SpacePC 1232, the portion is 768 KB, and before enabling it needs to be written-to using the **BTOOL** program.

Then it is possible to copy data from a real floppy disk.

EXAMPLE: Create an image of a floppy disk into the Integrated SSD

- The internal Solid State Disk can be either enabled or disabled in the Setup (Floppy Disk 1..4).
- Before proceeding, you have to format a new floppy disk, with the command **FORMAT/U** (or **FORMAT/S** if you want to create a bootable floppy).
- Create the "image disk" copying into the diskette all the files and the directories you need. During this copying process **don't delete any file/data on the floppy, because this will create empty sectors that will be mirror-like stored into the SSD, wasting space.** Restart over again with the format procedure if you have any troubles or mistakes occur. **Data stored on floppy mustn't go above 640 KB** (which is the effective Flash size dedicated to be used as Solid State Disk).
- Type the following command at the DOS prompt:

  A:\>BTOOL /D A (**BTOOL /D B**)

- The program will ask you to insert the "image disk" in drive A (or B).
- Follow all the instructions the BTOOL gives you: the program will proceed by erasing the Flash device blocks and then writing and verifying them with the data present on the "image disk".
- BTOOL will inform you about the results of the operation. If everything is ok and if you have already enabled the SSD please reset the system with CTRL+ALT+DEL. If you haven't enabled the SSD before, you can use the Setup Program to enable the Solid State Disk; quit the Setup Program saving data to EEPROM (in this case, rebooting the system with CTRL+ALT+DEL is not necessary).

Chapter 6 Virtual Peripherals

This chapter describes how to control the SpacePC 1232 module directly from a Laptop or a standard PC compatible computer:
Use this mode when the PC/104 system doesn't have I/O devices connected to it.

The "Virtual Peripherals" mode

The SpacePC 1232 module is designed to be used in industrial environments as a stand-alone module, independent from specific peripherals. Nevertheless, it might become necessary, for operation or maintenance, to interface the module with I/O devices: keyboard, monitor, and floppy disk.

The SpacePC 1232 module can operate in a specific modality, called "Virtual Peripheral" mode. Thanks to this modality the CPU can use the peripherals of another PC compatible computer (called Host computer), which are not directly connected to the module's PC/104 bus.

To enable this modality, the SpacePC 1232 module must be connected to the Host computer through a serial port or a parallel port, and the VP program must run on the Host computer. In "Virtual Peripheral" mode, the operator runs with the SpacePC 1232 module using the I/O devices of the PC or AT compatible computer. The PC's I/O are redirected on a serial (or parallel) line.

Local and redirected peripherals

In “Virtual Peripherals” mode, two types of peripherals are used:

- The peripheral directly connected to the module (keyboard, video interface, SSD and floppy) named “local peripherals”
- The Host computer’s peripherals used for the remote control of the module (keyboard, video interface and Floppy) named “remote or redirected peripheral”.

You can select which remote peripherals are redirected in your VP connection: all the Host computer’s peripherals or only some of them.

“Virtual Peripherals” connection

To perform the “Virtual Peripheral” connection, you need the following items:

- The CPU module with power supply and one free serial/parallel port;
- The Utility Disk (CD-ROM) provided with the SpacePC 1232 module;
- A PC or AT compatible computer (the Host computer) with a serial port working at 115Kbaud, or a parallel bi-directional port and **the possibility to boot in ROM-DOS OS (Not in NT or Win95/98/2000!)**;
- A VP cable (parallel or serial cable). **Parvus doesn’t supply any VP cable. You must make it according to the tables on the following pages.** If you are using a serial cable, you must make a VP adjustment (as described in the following figure) in it. **A short circuit must be provided between the RTS and CTS (or DTR and RI) signals on the end facing the Multifunction cable;**

The Virtual Peripherals connection can be performed as follows:

- Connect the Host computer to the SpacePC 1232 module through the parallel port or through the serial port using the multifunction cable and the VP cable. Turn on the Host computer
- Run the **VP2000.EXE** program on the Host computer
- Turn on the CPU

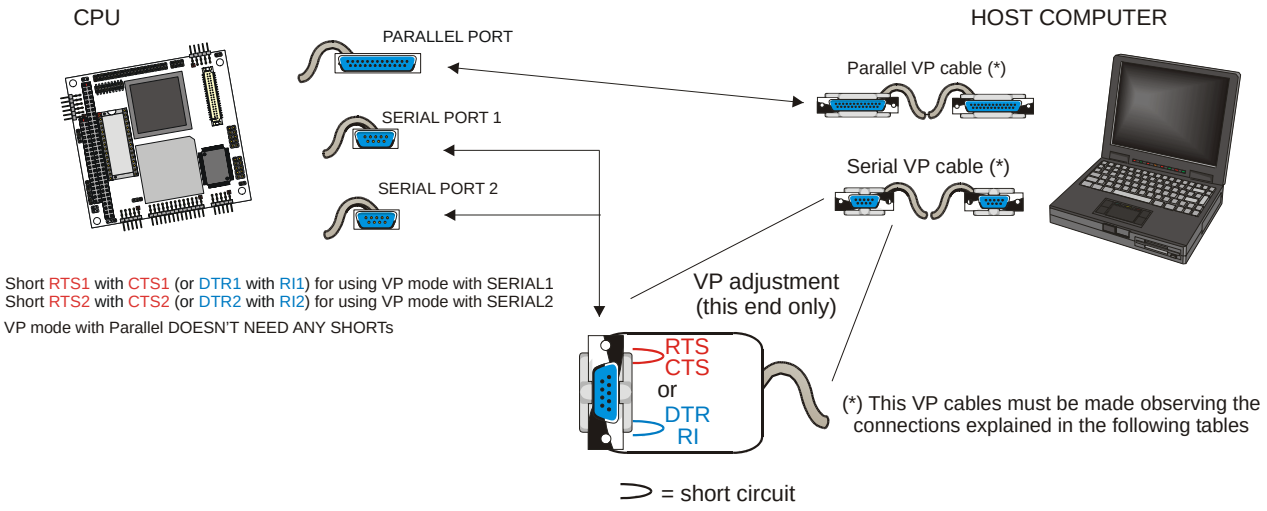


Figure 23. Completing the VP connection

Table 22. Serial1 and 2 VP cable connections

PC/104 serial interface					HOST PC serial interface		
J5 SERIAL1 PIN Nr.	**DB25 PIN Nr.**	**DB9 PIN Nr.**	**Signal**	**Function**	**Signal**	**DB25 PIN Nr.**	**DB9 PIN Nr.**
3	3	2	RX	Receive Data	TX	2	3
5	2	3	TX	Transmit data	RX	3	2
9, 10	7	5	GND	Signal Ground	GND	7	5

For VP mode connect RTS1 with CTS1, or DTR1 with RI1.

Pins not included in the table above are not connected

Table 23. Parallel VP cable connections

From PC/104 Parallel connector	VP2000 Cable				To Host Computer
J5 PARALLEL PIN Nr.	**DB25 PIN Nr.**	**Signal**	**Signal**	**DB25 PIN Nr.**	**Parallel port**
1	1	STB#*	ACK#*	10	
2	14	AFD#	BSY	11	
3,5,7,9,11,13,15,17	2..9	PD#*	PD#*	2..9	
6	16	INIT#*	PE	12	
8	17	SLIN#*	SLCT	13	
19	10	ACK#*	STB#*	1	
21	11	BSY	AFD#	14	
23	12	PE	INIT#*	16	
25	13	SLCT	SLIN#*	17	

10,12,14,16, 18,20,22,24	18..25	GND	GND	18..25	

(*) The “#” stands for: signal active low

Pins not included in the table above are not connected

IMPORTANT NOTE: The VP2000 functionality performed via the parallel cable may not work with some host computers.

It is important to set the host computer parallel port to "bi-directional".

Start the **VP2000.EXE** program (you will find it in the CPU utility CD-ROM or in www.parvus.com tech support area) on the **Host computer**. Select the following options based on the Host computer serial or parallel port used.

EXAMPLE: A:\VP2000 /COM=1 /A

A:\VP2000 [/COM=n] [/V] [/K] [/D [/C] [/A]

/COM=1 - Use Serial Port at 3F8H (IRQ=4)
/COM=2 - Use Serial Port at 2F8H (IRQ=3)
/COM=3 - Use Serial Port at 3E8H (IRQ=4)
/COM=4 - Use Serial Port at 2E8H (IRQ=3)

/LPT=1 - Use Parallel Port at 378h
/LPT=2 - Use Parallel Port at 278h
7LPT=3 - Use Parallel Port at 3BCh

The COM ports listed above, refer to the serial port on the Host computer.

/V - Redirect Video
/K - Redirect Keyboard
/D - Redirect Diskette A:
/C - Redirect Console (Video + Keyboard)
/A - Redirect All (Video + Keyboard + Diskette A:)

At the end of this procedure this message will appear:

Connection on serial port at 3F8H. (=COM1)
Use PrintScreen KEY to EXIT VP2000…

Now turn on the SpacePC 1232 module.

If you select the [/A] parameter, the VP connection will be performed according to the following rules:

- All the remote peripherals are redirected in VP connection.
- The local keyboard, video interface and floppy disk are disabled.
- The Boot is performed from the remote floppy.

If you select the [/V] [/K] [/D] [/C] parameters, the VP connection will be performed according to the following rules:

- Only the selected remote peripherals are redirected in VP connection.
- The local peripherals connected are used according to the setup.
- If the floppy disks are redirected, it is not possible to use the local Host computer floppy for PC operations.
- The Boot is performed from the selected peripheral.

From now on, the host computer's peripherals selected are at the disposal of the SpacePC 1232 module. It is now possible to boot from the host computer's floppy disk/CD-ROM, or to debug a program and edit files using the host computer's peripherals.

Pressing the "printscreen" key will terminate the VP2000 program returning the CPU module to DOS.
To re-connect the SpacePC 1232 module to the host computer, run the VP2000.EXE program again.
This message will appear:

Connection on serial port at 3F8H. (=COM1)
Use PrintScreen KEY to EXIT VP2000…

Important note

- While the VP2000 program is running, the CTRL+ALT+DEL key combination on the host computer causes the restart in the host computer and **NOT in the SpacePC 1232 module!**
- The Virtual Peripheral mode doesn't support the "Format" command.
- **Virtual peripheral handles the BIOS services of the redirected devices. It is therefore not possible to use programs performing direct accesses to video memory, keyboard, floppy disk or hard disk.**

Chapter 7 Watchdog Timer

This chapter describes the configuration of the Watchdog Timer with some examples.

The watch dog is a part of the on–board SUPER I/O device *SMSC FDC 37B782*

The Super I/0 watchdog allows managing time-outs in order to seconds or minutes (depending on the Super I/O programming).

Watchdog modalities

The watchdog function resets the board at the end of the countdown.
There are two ways to program the watchdog:

- Using *BIOS INT 52h*
- Using direct *Super I/O registers programming*

BIOS INT 52h - functions 0Ch, 0Dh, 0Eh

This method can be used under DOS or under Operating Systems using the board BIOS (i.e. not under Linux which erases the BIOS after the boot and autonomously manage the module hardware).
The functions implemented from the BIOS are:

INT 52h, function 0Ch: watchdog enabling with a fixed time of 2 seconds. This function programs and starts immediately the watchdog counter.

INT 52h, function 0Dh: watchdog erasing. Counting is interrupted and watchdog disabled.

INT 52h, function 0Eh: watchdog refresh. Every call to this function restarts the counting from the initial value.

When the watchdog is activated, the countdown starts immediately. If no refresh occurs, when the default timeout expires, the board reset is executed. So the watchdog must be enabled and continuously refreshed, avoiding in this way the board reset.

Example:

```
...
MOV    AH, 0Ch
INT    52h              ; Enable the watchdog (fixed timeout = 2 seconds)
...
```

Super I/O registers programming

This method must be used when the OS doesn't manage the BIOS (i.e. Linux) or when a personalized watchdog programming is required.
The following example shows how to change the Super I/O (SPIO) *FDC 37B782* watchdog registers:

```
; SPIO: enter in configuration mode ...

        MOV    DX, 03F0h                ; SPIO Index Port
```

```
        MOV     AL, 55h             ; SPIO Configuration Mode Enable Key
        OUT     DX, AL              ; Enter in configuration mode

; Select Logical Device 8 (watch dog) ...

        MOV     DX, 3F0h            ; SPIO Index Port
        MOV     AL, 07h             ; Logical Device selector is the register 7
        OUT     DX, AL              ; Point to Logical Device selector

        INC     DX                  ; SPIO Data Port
        MOV     AL, 08h             ; Logical Device number 8
        OUT     DX, AL              ; Select the Logical Device 8

; Select the time base (seconds or minutes) ...

        MOV     DX, 3F0h            ; SPIO Index Port
        MOV     AL, F1h             ; Watchdog timer units register (WDT_UNITS)
        OUT     DX, AL              ; Point to register WDT_UNITS

        INC     DX                  ; SPIO Data Port
        IN      AL, DX              ; Read WDT_UNITS

        OR      AL, 01h             ; Mask reserved bits and set time in seconds
;       AND     AL, FEh             ; Mask reserved bits and set time in minutes

        MOV     BL, AL              ; Save new WDT_UNITS value

        MOV     DX, 3F0h            ; SPIO Index Port
        MOV     AL, F1h             ; Watchdog timer units register (WDT_UNITS)
        OUT     DX, AL              ; Point to register WDT_UNITS

        INC     DX                  ; SPIO Data Port
        MOV     AL, BL              ; WDT_UNITS value
        OUT     DX, AL              ; Write the new WDT_UNITS value

; Select the watchdog timer timeout value ...

        MOV     DX, 3F0h            ; SPIO Index Port
        MOV     AL, F2h             ; Watchdog timeout value (WDT_VAL)
        OUT     DX, AL              ; Point to register WDT_ VAL

        INC     DX                  ; SPIO Data Port
        MOV     AX, 37              ; New WDT_ VAL value (from 0 to 255 - seconds in this
case)
        OUT     DX, AL              ; Write the new WDT_ VAL value

; SPIO: exit from configuration mode ...

        MOV     DX, 3F0h            ; SPIO Index Port
        MOV     AL, 0AAh            ; SPIO Configuration Mode Disable Key
        OUT     DX, AL              ; Exit from configuration mode
```

- ***Note:*** for further information about the watchdog programming, refer to *"FDC 37B78x Advance Information"* manual from *SMSC*.

Watchdog time-out pin

For external control purposes, the status of the watchdog time-out event is provided to connector J11 pin 9. This signal goes high when the watchdog resets the system. The software can reset this signal by setting and resetting bit 2 of the I/O port 110h. This signal is also initialized by hardware at power-on.

The following example shows how to reset the watchdog time-out pin:

```
MOV   DX, 110h          ; Control Port
IN    AL, DX            ; Read actual value

OR    AL, 04h           ; Mask reserved bits and set bit 2
OUT   DX, AL            ; Write new value

AND   AL, FBh           ; Mask reserved bits and reset bit 2
OUT   DX, AL            ; Write new value
```

Chapter 8 Troubleshooting

Many problems that you may encounter with operation of your SpacePC 1232 module are due to common errors like bad connections or wrong settings in the Setup Program.
This chapter will help you for getting your system operating properly.

It contains:

- • Common problems and solutions
- • Troubleshooting a PC/104 system
- • How to obtain technical support
- • How to return a product

Common Problems and Solutions

The following table lists some of the common problems that you may encounter while using your SpacePC 1232 module, and suggests possible solutions. If you are having problems with your SpacePC 1232 module, please review this table *before* contacting technical support.

Table 24. Common problems and solutions

SpacePC 1232 Module "will not boot"	
No power or wrong polarity	Check for correct power on PC/104 bus connectors
Incorrect Setup (video disabled, etc.)	Reboot and press "**F2**" key to run Setup
Defective or mis-connected device on bus	Check for misaligned bus connectors, remove other cards from stack
Cable connected backwards	Verify all cables are connected correctly
SSD installed backwards	Check for an SSD memory installed in socket backwards
SpacePC 1232 Module will not boot from particular drive or device	
Device not bootable	Use sys command on drive or reformat the device using the "Format /s" option
Device not formatted	Format drive using "Format /s" option
Power not connected to boot drive	Connect the power cable to floppy or hard drive
Floppy/HardDisk cable connected backwards (floppy drive light always on)	Verify that all cables are properly connected
SpacePC 1232 Module will not boot from DiskOnModule	
DiskOnModule is not the only hard drive in system	Disable other hard drive(s) in system and set DOM as master
Hard disk is not set as boot device	Run Setup and set Hard Drive as boot device
SpacePC 1232 Module will not boot when video card is removed	
Illegal calls to video controller	Look for software trying to access non existent video controller for video, sound, or beep commands
SpacePC 1232 Module erratic operation	
Excessive bus loading	Reduce number of PC/104 modules in stack, remove termination components from bus signals
Power supply noise	Examine power supply output with oscilloscope, glitches below 4.75Vdc will trigger a reset, add bypass caps
Power supply limiting	Examine power supply output with oscilloscope, check for voltage drop

	below 4.75V when hard drive or floppy drive starts, add bypass caps
Temperature too high	Add fan, processor heat sink, or other cooling device(s)
Memory address conflict	Check for two hardware devices (e.g. Ethernet, SSD, PCMCIA) trying to use the same memory address Check for two software devices (e.g. EMM386, PCMCIA drivers, etc.) trying to use the same memory addresses Check for an address range shadowed while in use by another hardware or software device
I/O address conflict	Check for another module trying to use I/O addresses reserved for the Module between 0E0h and 0EAh check for two modules (e.g. I/O Modules, PCMCIA cards, Ethernet) trying to use the same I/O addresses
	Keyboard does not work
Keyboard interface damaged by misconnection	Check if LEDs on the keyboard (i.e.: Num lock) are working
Wrong keyboard type	Verify keyboard is an 'AT' type or switch to 'AT' mode
	Two hard drives will not work, but one does
Both drives configured as master	Set one drive as master and the other as slave operation (consult drive documentation)
	Date and time not saved when power is off
No backup battery	Connect a backup battery to the multifunction connector

Troubleshooting a PC/104 System

If you have reviewed the preceding table and still cannot isolate the problem with your SpacePC 1232 module, please try the following troubleshooting steps. Even if the resulting information does not help you find the problem, it will be very helpful if you contact technical support.

- **Simplify the system**. Remove items one at a time and see if one particular item seems to cause the problem.
- **Swap components.** Try replacing items in the system one-at-a-time with similar items.

Technical/Sales Assistance

If you have a technical question, please call Parvus Customer Support Service at one of the numbers below, or e-mail our technical support team at:

- Email: tsupport@parvus.com

- Phone: 801-483-1533
- Fax: 801-483-1523

If you have a sales question, please contact your local Parvus Sales Representative or the Regional Sales Office for your area.

Additional and latest information is available at Parvus website:

http://www.parvus.com

Returning For Service

Before returning any of Parvus' products, you must contact Parvus and **obtain a Returned Material Authorization (RMA) number.**

Note. You must have the RMA number in order to return any product for any reason!

The following information is needed to expedite the shipment of a replacement to you:

- Your company name and address for invoice
- Shipping address and phone number
- Product I.D. number
- The name of a technically qualified individual at your company familiar with the mode of failure on the board
- A detailed description of the problem and of the current configuration including OS and software loaded.

If the unit is out of warranty, service is available at a predesignated service charge. Contact Parvus for pricing and please supply a purchase order number for invoicing the repair. Pack the board in anti-static material and ship in a sturdy cardboard box with enough packing material to adequately cushion it.

Warning! Any product returned to Parvus improperly packed will immediately void the warranty for that particular product!

Appendix

A.1 Electrical and Environmental Specifications

The following section provides tables and illustrations showing the electrical, mechanical and environmental specifications for the SpacePC 1232 module.

In the following tables you will find:

- Operating Characteristics
  - Electrical operating characteristics
  - Operating temperature Range
  - Battery backup characteristics
- Absolute maximum ratings
- MTBF
- Power Consumption

Operating Characteristics

Electrical Operating Characteristics

Table 25. DC Operating Characteristics

Supply Voltage	Vcc=+5V+/-5% (4.75V to 5.25V).
Battery current draw (board off, without any device on the SSD)	7 uA.

Note. This CPU module is not warranted against damage caused by overheating due to improper or insufficient cooling or airflow.

Operating Temperature Range

For proper operation of the CPU module, the ambient air temperature must remain inside this range: 0°C to +60°C (+32°F to +140°F).

Note. In order to ensure proper operation and good reliability up to +60°C of ambient air temperature, the Geode GX1 chip and the Geode CS5530 I/O Companion are supplied with an attached passive heat sink.

Battery Backup Characteristics

There is no configuration data saved by the BIOS into the CMOS Real Time Clock. Therefore, the module does not need a battery except in the case of applications that need to hold the date and time at power-off.

Note. Setup data is stored into the BIOS Flash EPROM; it is therefore impossible to lose the setup data due to a lack of backup-battery supply.

Absolute Maximum Ratings

Table 26. Absolute Maximum Ratings

Supply Voltage:	Vcc: 0.00 to 7.00V
Storage Temperature Range:	-40°C to +85°C (-40°F to +185°F)
Non-Condensing Relative Humidity:	<95% at 40°C (+104°F)
Operating Temperature Range:	0°C to +60°C (+32°F to +140°F)

A SpacePC 1232 CPU module with an extended Operating Temperature Range, –40°C to +85°C, is also available.

Warning! Stressing the device beyond the "Absolute Maximum Ratings" may cause permanent damage. These are stress ratings only. Operation beyond the "Operating Conditions" is not recommended. Extended exposure beyond the "Operating Conditions" may affect device reliability.

MTBF

Hours: 615,000 **Standard:** MIL-STD-217 ground benign **Temperature:** 25.0 °C

Power Consumption

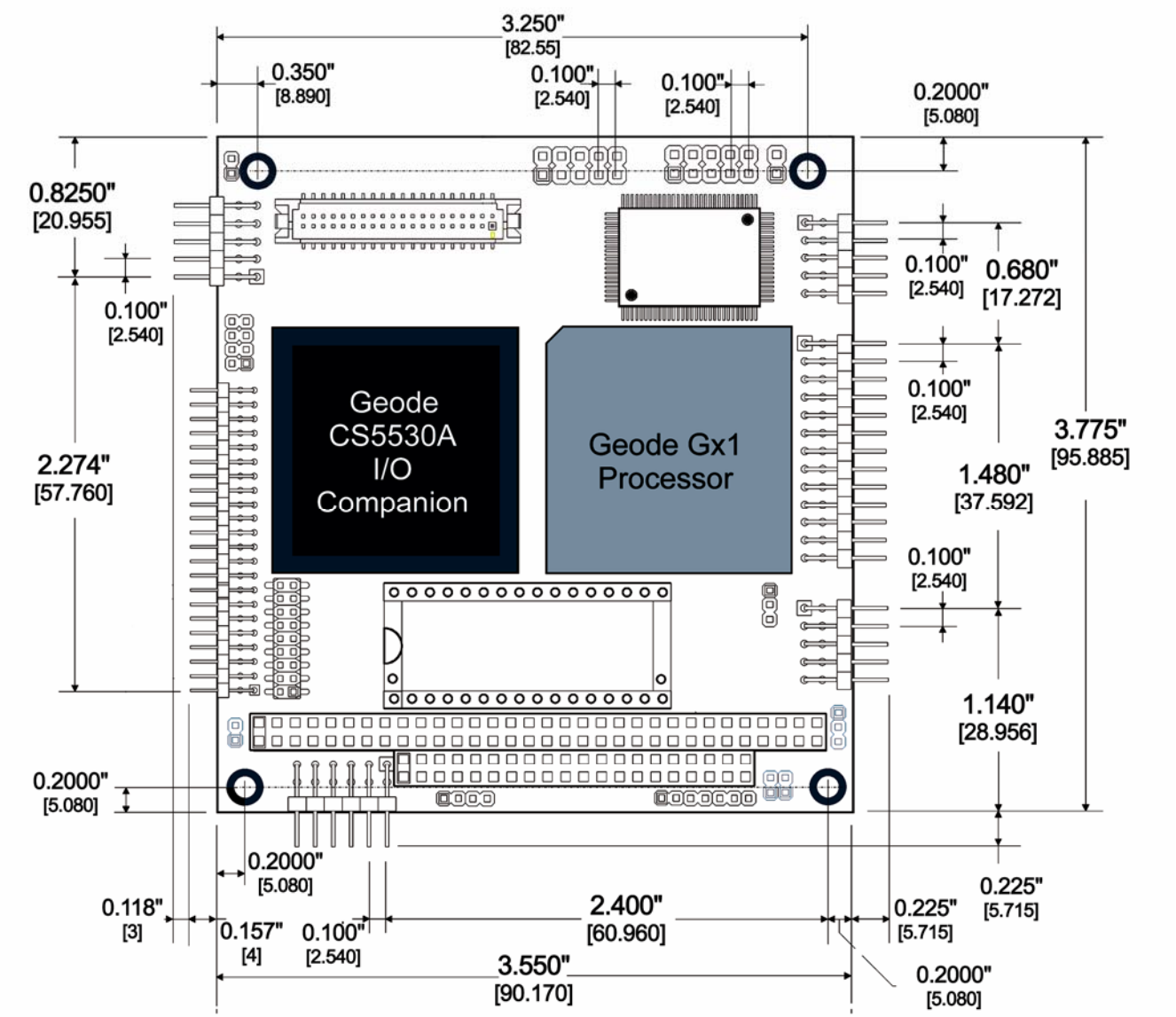
Table 27. Power Consumption

Frequency	64MB	128 MB
266MHz	1030mA	1080mA

A.2 Mechanical Dimensions

CPU Dimensions

The SpacePC 1232 module's mechanical dimensions are shown in the following picture:



- Dimensions: 90 X 96 mm (3.6"X3.8"), height:15 mm (0.6")

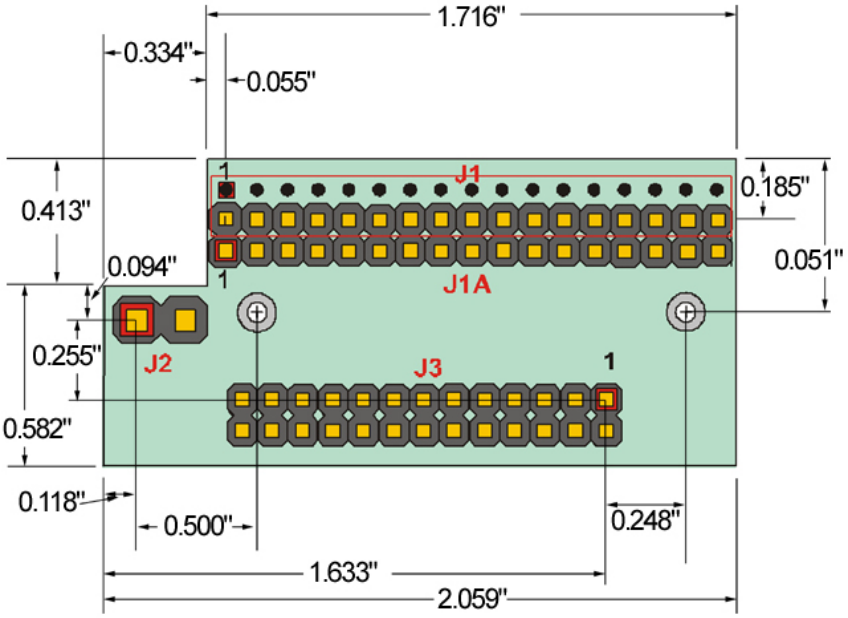
Dimensions are in millimeters

Figure 24. SpacePC 1232 Board dimensions

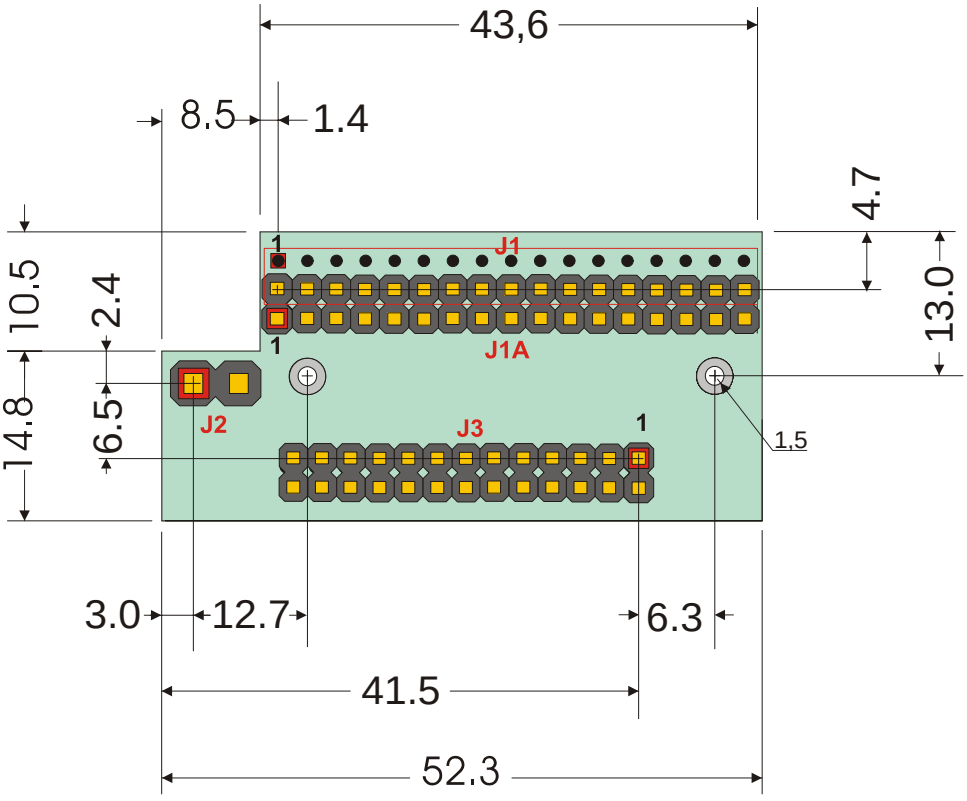
Note: For further information about the mechanical dimensions of ISA and PCI buses please refer to the pc104 consortium site (www.pc104.org)

FDD Adapter Dimensions

In the following picture are shown the FDD Adapter mechanical dimensions:



Dimensions are in inches

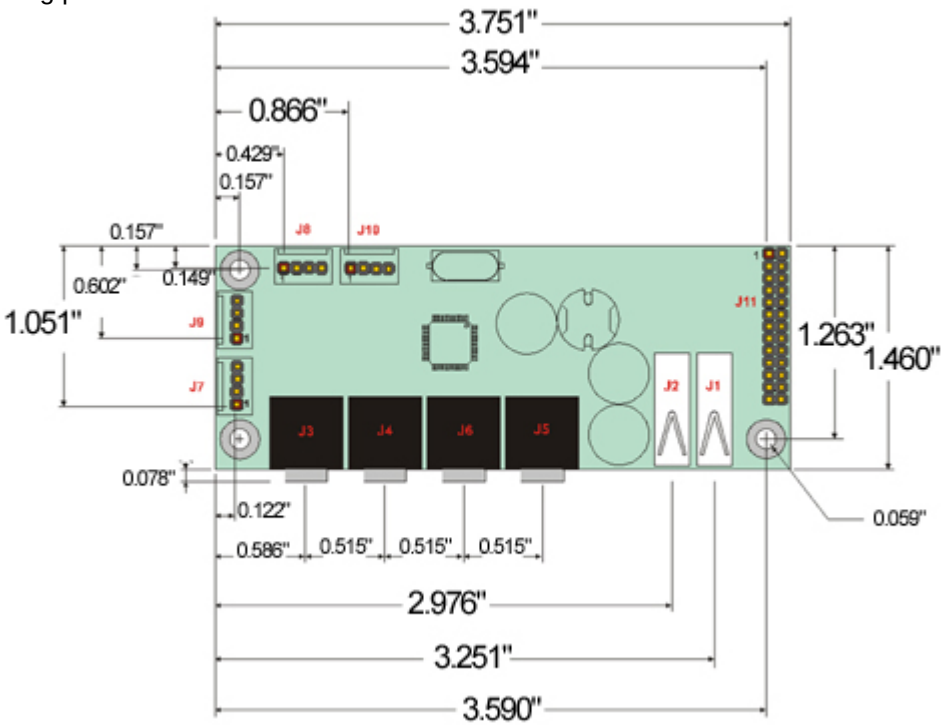


Dimensions are in millimeters

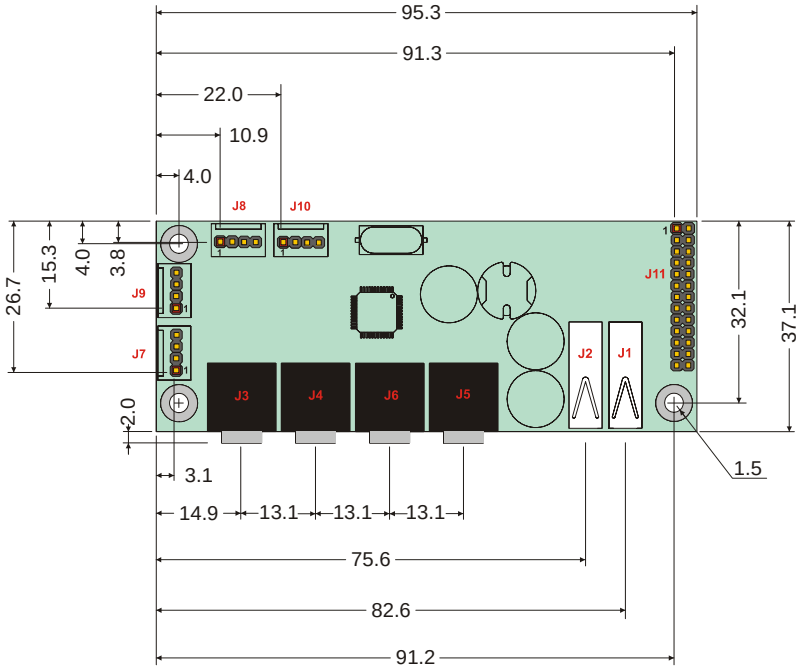
Figure 25. FDD Adapter Dimensions

USB Audio CODEC Dimensions

In the following picture are shown the USB Audio CODEC mechanical dimensions:



Dimensions are in inches



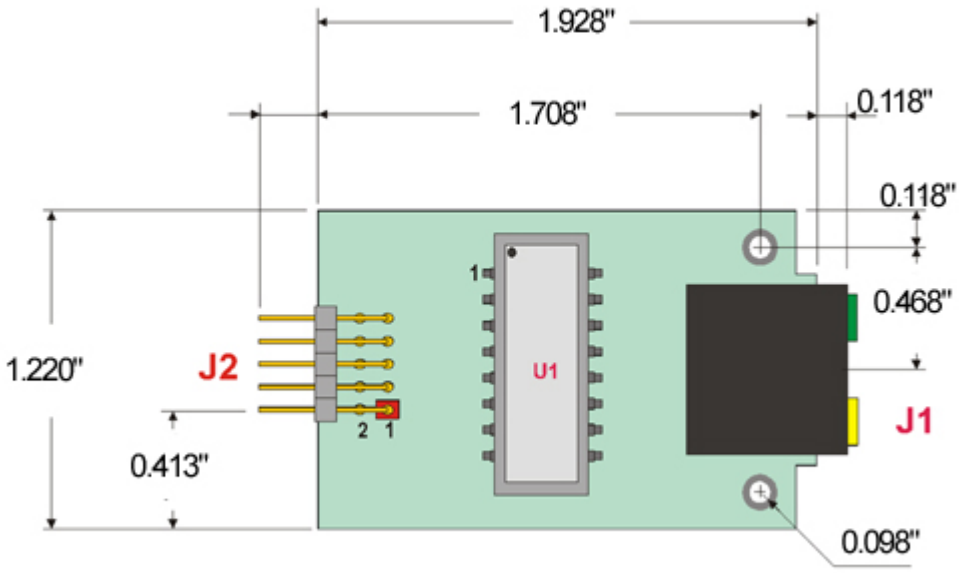
Dimensions are in millimeters

USB Audio CODEC Dimensions

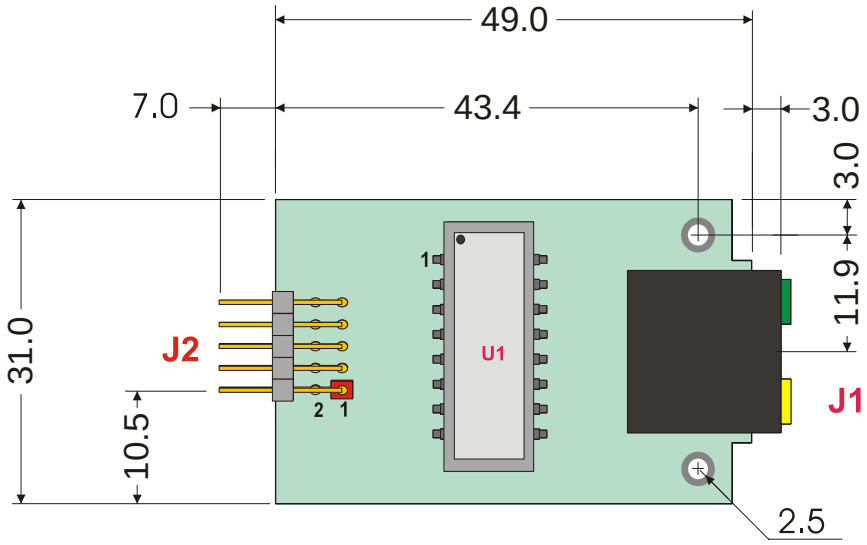
Figure 26. USB Audio CODEC Dimensions

Ethernet Adapter Dimensions

In the following picture are shown the Ethernet Adapter mechanical dimensions:



Dimensions are in inches



Dimensions are in millimeters

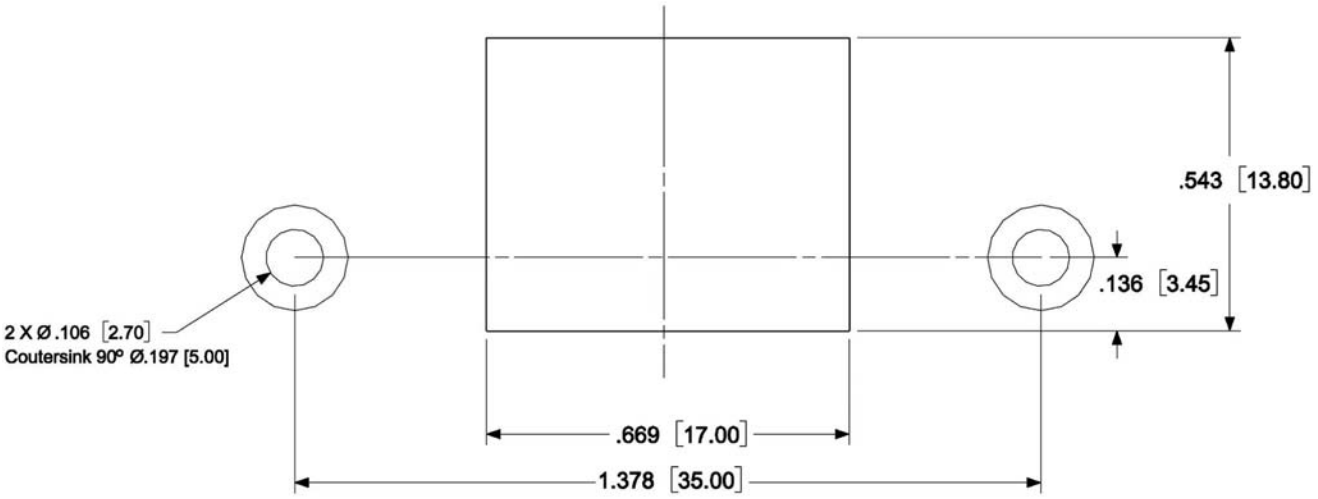


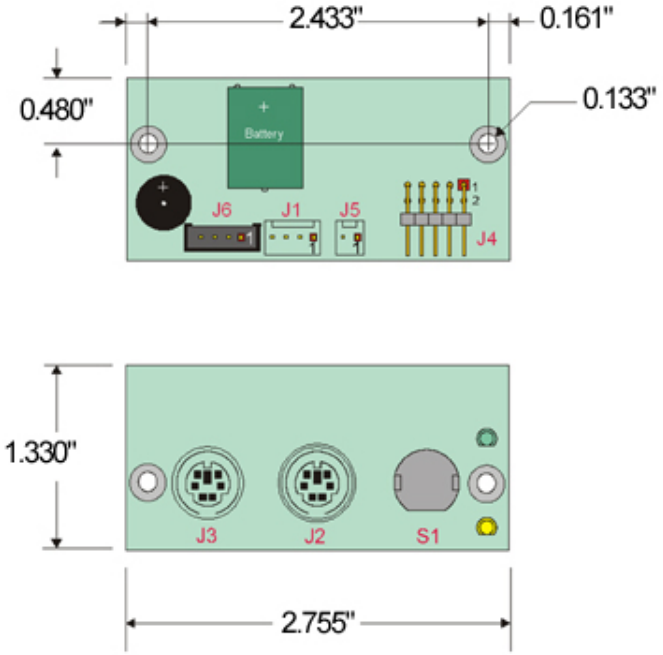
Figure 27. Ethernet Adapter Dimensions

Figure 28.

Figure 29. Recommended Mounting Hole Locations for Ethernet Adapter Module

Multifunction Adapter Dimensions

In the following picture are shown the Multifunction Adapter mechanical dimensions:



Dimensions are in inches

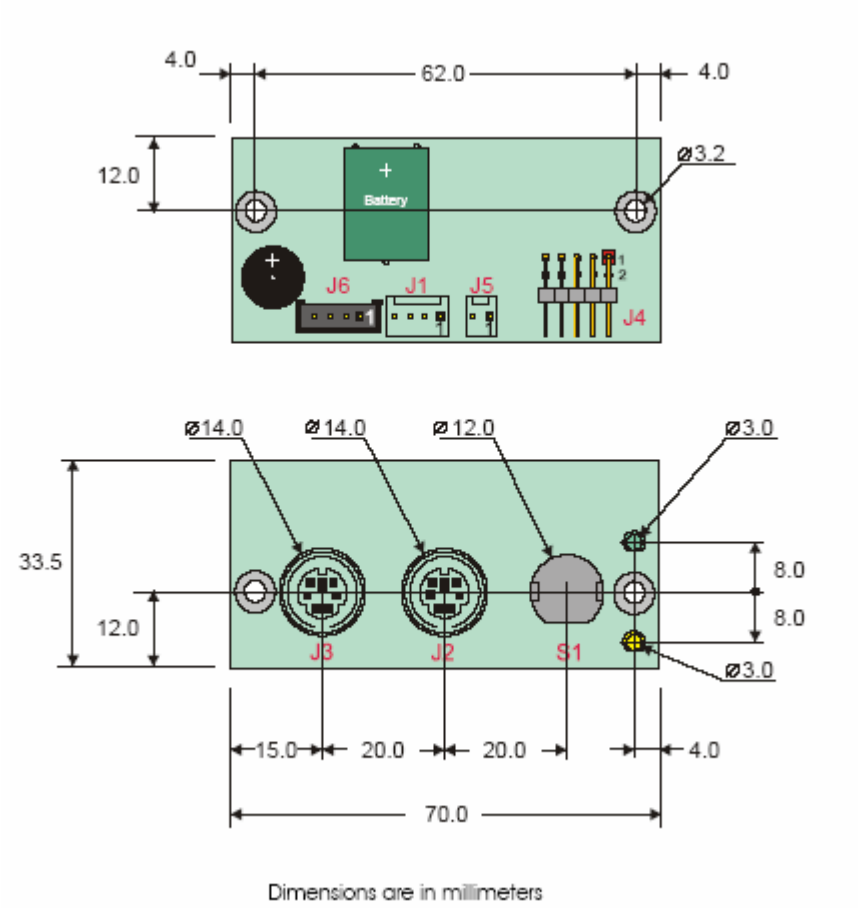


Figure 30. Multifunction Adapter Dimensions

A.3 Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Parvus assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Parvus is aware. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the Instrument

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. The equipment is supplied with a three-conductor ac power cable; the power cable must be plugged into an approved three-contact electrical outlet, with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electro technical Commission QEC) safety standards.

Do Not Substitute Parts or Modify Equipment

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the equipment. Contact Parvus technical staff or your local representative for service and repair to ensure that safety features are maintained.

Flammability

All Parvus PWBs (printed wiring boards) are manufactured by UL-recognized manufacturers, with a flammability rating of UL-V0.

EMI Caution

This equipment generates, uses and can radiate electromagnetic energy. It may cause or be susceptible to electromagnetic interference (EMI) if not installed and used in a cabinet with adequate EMI protection.

CE Notice

This product complies with the EMC Directive (89/336/EEC). Compliance with this directive implies conformity to the following European Norms:

- EN55022 (CISPR 22) Radio Frequency Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) Electromagnetic Immunity

The product also fulfills EN60950 (product safety), which is essentially the requirement for the Low Voltage Directive (73/23/EEC). This product was tested in a representative system to show compliance with the above-mentioned requirements. A proper installation in a CE-marked system will maintain the required EMC/safety performance.

Disclaimer of Warranty

THIS MANUAL IS PROVIDED ’AS IS’ WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. The laws of some states and countries do not allow the disclaimer of express or implied warranties in certain transactions; therefore, this statement may not apply to you. As such, the above warranty disclaimer shall only apply to the extent permitted by law.

Notice

While reasonable efforts have been made to assure the accuracy of this document, Parvus assumes no liability resulting from any omissions in this document, or from the use of the information contained therein. It is not warranted that the contents of this publication or any accompanying source code examples, whether individually or as one or more groups, will meet your requirements or that the publication or the accompanying source code examples are error-free. This publication could include technical inaccuracies or typographical errors.

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Reliability

Parvus has taken extra care of product design in order to ensure reliability. The two major ways in which reliability is achieved are:

- The product is designed in top-down fashion, utilizing the latest in hardware and software techniques, so unwanted side effects and unclean interactions between parts of the system are eliminated.
- Parvus / Eurotech tests each board by exercising its functions, burns it in under power, and retests it to ensure that the infant mortality phase is passed before the product is shipped.

Life Support Policy

Parvus products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of Parvus.

Acronyms and Abbreviations

ACPI	Advanced Configuration and Power Interface
AGP	Accelerated Graphic Port
APM	Advanced Power Management
ATA	AT Attachment
ATAPI	ATA Packet Interface
BIOS	Basic I/O System
CRT	Cathode Ray Tube
DDC	Display Data Channel
DDC2B	DDC *Standard, Version 2.0,* Level B
DMA	Direct Memory Access
DSTN	Double Supertwisted Nematic
ECC	Error Correction Code
ECP	Enhanced Capabilities Port
FAT	File Allocation Table
FDC	Floppy Disk Drive Controller
FDD	Floppy Disk Drive
FDDI	Fiber Distributed Data Interface
FIFO	First In First Out
FM	Frequency Modulation
fps	frames per second
GSM	Global System for Mobile communications
HDC	Hard Disk Drive controller
HDD	Hard Disk Drive
IDE	Integrated Device Electronics
IEEE	Institute for Electrical and Electronics Engineers, Inc.
I/O	Input/Output
IP	Internet Protocol
IRQ	Interrupt Request
ISA	Industry Standard Architecture
KB	Kilobyte
Kbps	Kilobits per Second
KHz	Kilohertz
LAN	Local Area Network
LBA	Logical Block Addressing
LCD	Liquid Crystal Display
LPT	Line Printer
LVD	Low Voltage Differential
MB	Megabyte
Mbps	Megabits per second
MHZ	Megahertz
MIDI	Musical Instrument Digital Interface
MPEG	Moving Picture Expert Group
NIDS	Network Driver Interface Specification
NMI	Nonmaskable Interrupt
NTSC	National Television System Committee
OEM	Original Equipment Manufacturer
PAL	Phase Alternation Line
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
PIC	Programmable Interrupt Controller
PIO	Programmed I/O
POST	Power-On Self Test
RAM	Random Access Memory
RAMDAC	RAM digital-to-analog converter
RGB	Red-Green-Blue
SECAM	SEquential Coleur A Memoire
SCSI	Small Computer System Interface
SMBus	System Management Bus
TCP/IP	Transmission Control Provocol/Internet Protocol
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
V	Volts
VESA	Video Electronics Standards Association
VGA	Video Graphics Array
WAN	Wide Area Network

For more information about this or other products in the Parvus line of embedded development tools and control systems call (801) 483-1533 from 8:00AM to 5:00PM Mountain Time, E-mail us at parvus@parvus.com or visit our web-site at: http://www.parvus.com

LIMITED WARRANTY

Parvus Corporation warrants this product to be free of defects in materials and workmanship, and that the product meets or exceeds the current specifications published by Parvus. This Warranty is valid for a period of one (1) year from the date of purchase. Parvus reserves the right to repair or replace any Warranted products at its sole discretion. Any product returned to Parvus for repair or replacement under the provisions of this warranty must be accompanied by a valid Return Material Authorization (RMA) number issued by the Parvus Customer Service Department.

Parvus Corporation makes no warranty not expressly set forth in this document. Parvus disclaims and excludes all implied warranties of merchantability and fitness for a particular purpose. The aggregate liability of Parvus arising from or relating to (regardless of the form of action or claim) is limited to the total of all payments made to purchase the product. Parvus shall not in any case be liable for any special, incidental, consequential, indirect or punitive damages, even if Parvus has been advised of the possibility of such damages. Parvus is not responsible for lost profits or revenue, loss of the use of software, loss of data, costs of recreating lost data, or the cost of any substitute equipment or program.

This Warranty shall be governed by the laws of the United States of America and the State of Utah, and any claim brought under this Warranty may only be brought in state or federal court located in Salt Lake County, State of Utah, and purchaser hereby consents to personal jurisdiction in such courts.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: The equipment described herein has been designed to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) designed to comply with the Class B limits may be attached to this computer.

INSTRUCTIONS TO USER: This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or TV reception. It has been designed to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

For further information contact:

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