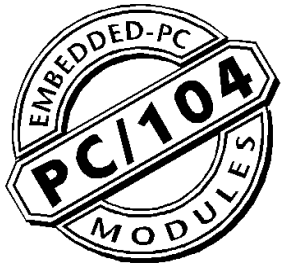
parvus ®
CORPORATION

USER MANUAL

PC/104 ENVIRONMENTAL MANAGEMENT BOARD



12/11/97

MNL-0410C-01

INTRODUCTION

The parvus Environmental Processor closely controls the environmental characteristics of an enclosure by providing internal circulating air and monitoring of internal chassis conditions based on temperature and several external analog inputs. A thermostat is provided on board that does not require processor interruption. Besides the analog inputs, there are multiple digital inputs, outputs, and connections to external temperature sensors which allow the Environmental Processor to control and integrate into complex environmental management schemes.

INSTALLATION

Hardware Installation

Remove the card from the anti-static bag. Make any desired connections such as Analog input (remote temperature sensing), Digital input/output, or add an external temperature sensor. The I/O address for the card selected by JP1 should not be set to conflict with anything else in the system, and should be recorded if the software is going to be used. Install the card onto the PC/104 stack. Ensure that JP2, the three-pin jumper next to J2, has pins 2 and 3 shorted for compatibility with all microprocessors.

Software Installation

Use the included software to set the high and low temperatures for fan activation, which are then stored in an on-board EEPROM. Customization of the software is easily achieved for applications requiring it. Contact parvus for more information in this area. A User Manual exist titled "Environmental Board Test Utility Software", MNL-0414X-01, which details operation of the supplied software.

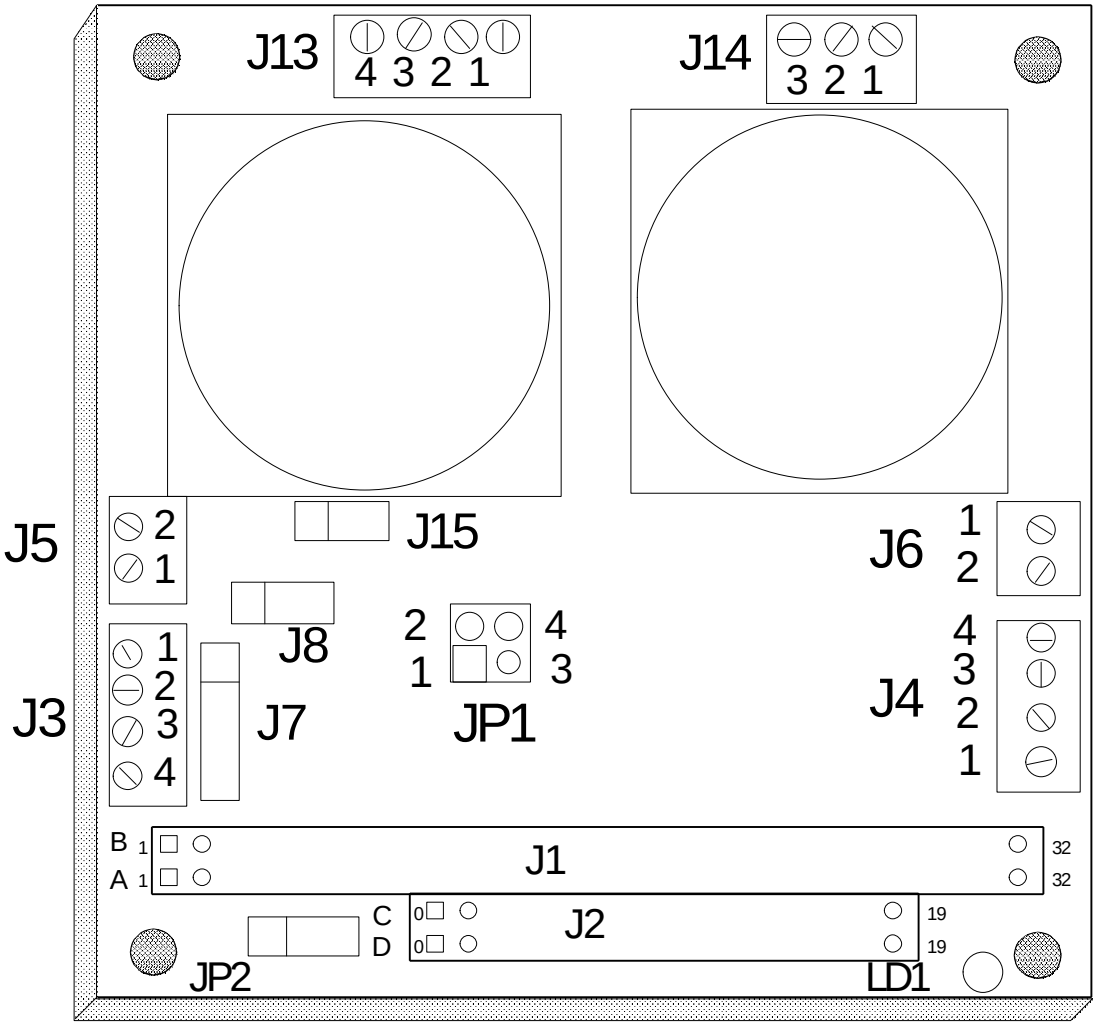
CONNECTION

PC/104 BUS CONNECTORS

	J1		J2	
Pin	Row A	Row B	Row C	Row D
0 -	--	--	GND	GND
1 -	/IOck	GND	/SBHE	/MCS16
2 -	SD7	Rstdrv	LA23	/IOCS16
3 -	SD6	+5v	LA22	IRQ10
4 -	SD5	IRQ9	LA21	IRQ11
5 -	SD4	-5v	LA20	IRQ12
6 -	SD3	DRQ2	LA19	IRQ15
7 -	SD2	-12v	LA18	IRQ14
8 -	SD1	/Exfer	LA17	/DA0
9 -	SD0	+12v	/MR	DRQ0
10 -	IOrdy	(key)	/MW	/DA5
11 -	AEN	/SMW	SD8	DRQ5
12 -	SA19	/SMR	SD9	/DA6
13 -	SA18	/IOW	SD10	DRQ6
14 -	SA17	/IOR	SD11	/DA7
15 -	SA16	/DA3	SD12	DRQ7
16 -	SA15	DRQ3	SD13	+5v
17 -	SA14	/DA1	SD14	/MSTR
18 -	SA13	DRQ1	SD15	GND
19 -	SA12	/Rfrsh	(key)	GND
20 -	SA11	SCLK	--	--
21 -	SA10	IRQ7	--	--
22 -	SA9	IRQ6	--	--
23 -	SA8	IRQ5	--	--
24 -	SA7	IRQ4	--	--
25 -	SA6	IRQ3	--	--
26 -	SA5	/DA2	--	--
27 -	SA4	TC	--	--
28 -	SA3	BALE	--	--
29 -	SA2	+5v	--	--
30 -	SA1	OSC	--	--
31 -	SA0	GND	--	--
32 -	GND	GND	--	--

The PC/104 bus always uses Row A and B, while Row C and D are for 16 bit systems. B10 and C19 are keyed locations.

CONNECTOR PLACEMENT DIAGRAM



JP1 - I/O Address Select

Use this jumper block to set the Input/Output Address Space at which the intelligent fan board may be accessed.

I/O	Pins 1-2	Pins 3-4
210h	Short	Short
218h	Short	Open
220h	Open	Short
228h	Open	Open

J3, J4 - Analog Inputs

Analog inputs, four available, are converted to a 12 bit signal from 0-5vdc. They are available on two connections. Each connection also has power and ground to drive external analog devices such as a humidity sensor.

J3	1 - +5V	J4	4 - +5V
	2 - AI1		3 - AI2
	3 - AI0		2 - AI3
	4 - Gnd		1 - Gnd

J5, J6 - Fans #1 & #2 Power & Control

J5	1 - +5V	J6	2 - +5V
	2 - Fan Control		1 - Fan Control

J7 - External Temperature Sensor, DS1620

An external temperature sensor can be applied to the environmental board. This sensor must be a DS1620 part. Two jumpers are used to indicate the presence of a secondary, external sensor. J8 is installed for no external sensor and removed if an external sensor is present. J15 is only installed if the primary sensor is not installed on the PCB but is remote.

1 - Gnd
2 - +5
3 - DQ
4 - Clk
5 - NRst

One Primary Sensor, On-board	J8-Installed, J15-Removed
One Primary Sensor, Off-board	J8-Removed, J15-Installed
Two Sensors, Primary and Secondary	J8-Removed, J15-Removed

J13 - Relay Connector

The digital outputs available on the Environmental Board are in the form of isolated relay contacts. Only normally open contacts are available. These outputs can be used to turn on and off external cooling and heating devices.

1 - DO0 Common
2 - DO0 Normally Open
3 - DO1 Common
4 - DO1 Normally Open

J14 - Digital Input Connections

Two digital inputs are available. Both inputs are active low with on-board 10k pull-ups to +5v. These inputs can be used for door contact closure indicators and external thermostats.

1 - Gnd
2 - DI1
3 - DI0

LD1 - Fan Activity Indicator

This LED is lit when the fans are running.

PROGRAMMING

All analog data is 8 bits over their entire range, while the temperature data is 9 bits. The temperature is readable from -55C to +125C. The analog inputs are unipolar at 0-5 Vdc. The external inputs are active low logic level. The external outputs are active low logic level outputs. 1 of 5 base addresses can be selected for usage: 210, 218, 220, 228. The interface between the card and the CPU is through 4 registers. Two are direct readable while two are sequence written. The high and low temperature settings are actually written to EEPROM and therefore should not be written to the component continuously.

+0 Temp Command Byte, Read/Write
- 7 - Command Bit, 1-Command, 0-no operation
- 6 - 1-Write, 0-Read
- 5 - unused
- 4 - unused
- 3 - unused
- 2,1 - +00h - Command 1
  - +02h - Command 2
  - +04h - Command 3
  - +06h - Command 4
- 0 - 9th bit for Temp Data Byte
- ex. C4 - Write command #3

+1 Temp Data Byte, Read/Write
- Command 1, Unused
- Command 2, Current Temperature
- Command 3, Low Temperature limit
- Command 4, High Temperature limit

+2 Local Command Byte, Write
- 7 - unused
- 6 - unused
- 5 - Thermostat Disable, 1-Disable
- 4 - Force Fan On, 1-On
- 3 - unused
- 2 - unused
- 1 - Digital Out 1
- 0 - Digital Out 0

+2 Status Byte, Read

7 - unused
6 - unused
5 - Thermostat Disable, 1-Disable
4 - Force Fan On, 1-On
3 - Digital In 1
2 - Digital In 0
1 - Digital Out 1
0 - Digital Out 0

+3 Analog Command, Write

7 - 0 - All configured channels converted
1 - Specified channel converted
6 - 0 - Single ended conversion
1 - Differential conversion
5 - 0 - Unipolar conversion 0 to +Vref
1 - Bipolar conversion +-Vref
4 - 0 - Conversion starts after write cycle
1 - Conversion inhibited
3 - 0 - Normal operation
1 - Powered down operation
2,1,0 - Channel selection 0-7 or 0-3

+3 Analog Data, Read

Converted unipolar or bipolar analog data.

Temperature Representation: The temperature that is read and available locally on the board has a 9 bit representation from +125c to -55c. The nine bits are spread over the Temp Data Byte and the LSB of the Temp Command Byte.

Temp Bits	**Hex**	
	8 7----------0	
+125 C	0 11111010	00FAh
+ 25 C	0 00110010	0032h
+ .5 C	0 00000001	0001h
0 C	0 00000000	0000h
- .5 C	1 11111111	01FFh
- 25 C	1 11001110	01CEh
- 55 C	1 10010010	0192h

To set temperature commands and read current temperatures the following BASIC scenario should be followed:

Setting Temperatures:

```
IF Value > 255 THEN Bit9 = 1 ELSE Bit9 = 0          ' Set 9th bit
IOBase = &H210                                      ' Base address of board
Change = &H40                                ' Mark for write operation
Addr = Cmd * 2                               ' Cmd shifted left by 2, 0-3
OUT IOBase + 1, &H0                ' Hold for multi byte write
OUT IOBase + 0, Value AND &HFF               ' Only write 8 bits
OUT IOBase + 1, &H80 + Change + Addr + Bit9     ' Send to Board
```

Reading Temperatures:

```
OUT IOBase+0, &H82                           ' Request Current Temperature

A = INP(IOBase+0)                                   ' Read Command register
B = INP(IOBase+1)                                   ' Read Data Register
IF (A AND &HFE)=&H82 THEN                ' Current Temperature response
  CTemp = ((A AND 1) * 256) + B  ' Assemble Temperature
ELSEIF (A AND &HFE)=&H84 THEN                ' Low Set Temperature response
  LTemp = ((A AND 1) * 256) + B  ' Assemble Temperature
ELSEIF (A AND &HFE)=&H86 THEN                ' High Set Temperature response
  HTemp = ((A AND 1) * 256) + B  ' Assemble Temperature
  END IF
```

The board will start proper operation after the low and high temperature settings have been made. Current temperature can be read by simply writing an 82h to the Temp Command Byte and reading the Temp Data and Command Bytes. If the thermostat operation bit is set the fans will turn on and off automatically as the temperature passes those limits. A current temperature lower than the low limit or a current temperature higher than the high limit will request fan activation. The fans can also be manually turned on and off with the Force Fans bit.

For more information about this or other products in the parvus line of development tools or control systems call (801) 483-1533 from 8:00AM to 5:00PM Mountain Time, email **parvus@parvus.com**, or visit our website at **WWW.PARVUS.COM**.

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