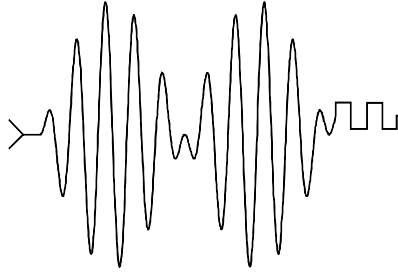


**CM7202**  
**PC/104-Plus Fast Ethernet**  
**Controller User's Manual**



**rttd** USA

**Real Time Devices USA, Inc.**

*"Accessing the Analog World"®*

Publication No. CM7202 5/3/2000

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# **CM7202**

## **PC/104-Plus Fast Ethernet Controller**

### **User's Manual**

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# Chapter 1 INTRODUCTION

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This manual gives information on the CM7202 PC/104-Plus Fast Ethernet utilityModule.

## **CM7202 PC/104-Plus Fast Ethernet utilityModule**

This module provides a twisted-pair 100 Mbit ethernet connection to support the Real Time Devices PC/104-Plus cpuModules and other PC/104-Plus processor modules.

### **Features**

The following are major features of the CM7202 utilityModule.

- **Chipset :** Digital DEC21140 PCI Fast Ethernet Controller and ICS1890Y 10/100BaseTX integrated physical transceiver

Software Included

- **Drivers:** The DEC21140 is supported by DOS, Windows 3.1, Windows 95, Windows NT (ver.3.5 and 4.0), VxWorks and QNX. For Windows 3.1 and DOS RTD supplies the drivers. For WindowsNT and Windows95 the drivers are supplied by Microsoft along with the operating system. For VxWorks and QNX please contact them directly.

### **Connectors and Switches**

Connectors provided are:

- **CONNECTORS:**
  - J1, J2 : PC104 connectors
  - J3: PC/104-Plus Connector
  - J4: RJ45
  - J5: MII interface connector
  - J6: LEDs

Jumpers provided are:

- **Jumpers**
  - JP1: Physical reset jumper selection.
  - JPS1: Internal or External 3,3 Volt Selection.

Switches provided are:

- **DipSwitch**
  - SW1: Phy address and module SLOT selection.

## General Specifications

- Operating conditions:
- Temperature: -40 - +85 degrees C
- Relative humidity: 0 - 95%, non-condensing
- Storage temperature: -55 to +125 degrees C

### Electrical

- Compatible with PCI Specification, version 2.1.
- Compatible with PC/104 Plus version 1.1

#### *Power Requirements:*

Power requirements	Minimum	Typical	Maximum
5V Supply Voltage	4.75 V	5.00 V	5.25 V
3.3V Supply Voltage	3.3 V	3.00 V	3.6 V
Supply Current 5V	-----	500 mA	640 mA
Supply Current 3.3V	-----	135 mA	190 mA

### Mechanical

- Compatible with PC/104 Plus version 1.1
- Dimensions: 3.8 x 3.9 x 0.6" (97 x 100 x 16 mm)
- Weight (mass): 3.0 ounces (85 grams)

### Environmental

- Operating Temperature : 0° to 55° C
- Storage Temperature : -40° to +85° C
- Non-Condensing Relative Humidity : < 95% at 40°C

## WARNING!

Like all equipment using CMOS devices, the CM7202 must be protected from static discharge. Never touch any of the parts except at static-free workstation. Use anti-static bag shipped with the CM7202 to handle the board



## Chapter 2 CONFIGURING THE UTILITYMODULE

The following sections contain information on configuring the utilityModule. Please read this entire section before attempting to use the utilityModule!

### Jumpers and Switches

#### Locations

The figure below shows switch and jumper locations.

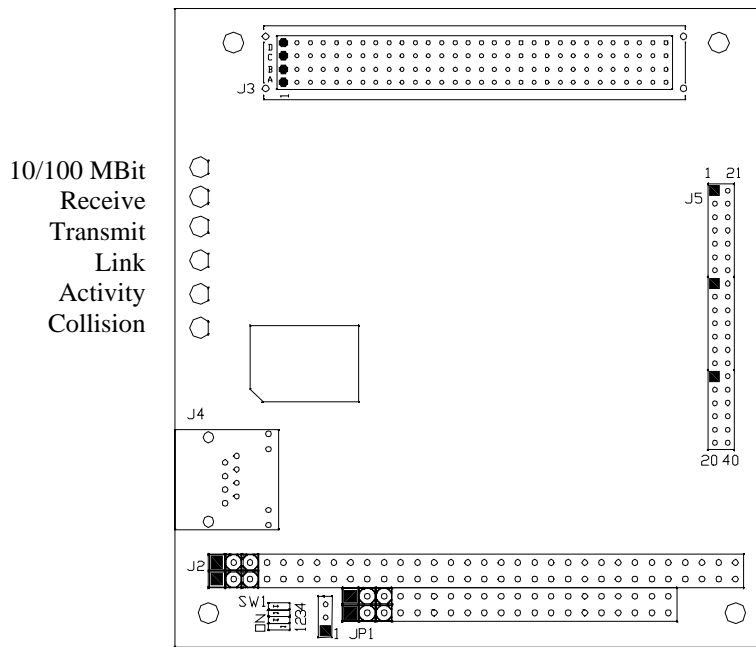


Figure 1 Switch & Jumper Locations

#### Switch Settings

PHY Address	SW1-1	SW1-2
1	OFF	ON
0 OR NOT ATTACHED	ON	OFF

Table 1 PHY address selection

Note: In order to use MII connector for an external transceiver the user must set the PHY address to 0 in order to have the physical interface isolated and set the JUMPER JP1 to the position 2-3.

SLOT Selected	SW1-3	SW1-4
1	ON	ON
2	OFF	ON
3	ON	OFF
4	OFF	OFF

**Table 2 Module slot address selection**

## Chapter 3 CONNECTORS

---

### *PC/104 Bus Connectors, J1 and J2*

Connectors J1 and J2 provide PC/104 bus connections. J1 carries XT bus signals, and J2 carries additional signals for the AT bus. The signals on J1 and J2 conform to the IEEE P966 standard for the PC/104 bus.

The following tables list the connector pinouts:

<b>PC/104 XT Bus Connector, J1</b>		
<b>Pin</b>	<b>Row A</b>	<b>Row B</b>
1	IOCHCHK*	0V
2	SD7	RESETDRV
3	SD6	+5V
4	SD5	IRQ9
5	SD4	-5V
6	SD3	DRQ2
7	SD2	-12V
8	SD1	ENDXFR*
9	SD0	+12V
10	IOCHRDY	(KEYING PIN)
11	AEN	SMEMW*
12	SA19	SMEMR*
13	SA18	IOW*
14	SA17	IOR*
15	SA16	DACK3
16	SA15	DRQ3
17	SA14	DACK1*
18	SA13	DRQ1
19	SA12	REFRESH
20	SA11	SYSCLK
21	SA10	IRQ7
22	SA9	IRQ6
23	SA8	IRQ5
24	SA7	IRQ4
25	SA6	IRQ3
26	SA5	DACK2*
27	SA4	TC
28	SA3	BALE
29	SA2	+5V
30	SA1	OSC
31	SA0	0V
32	0V	0V

**Table 5 PC/104 XT Bus Connector**

<b>PC/104 AT Bus Connector, J2</b>		
<b>Pin</b>	<b>Row C</b>	<b>Row D</b>
0	0V	0V
1	SBHE*	MEMCS16*
2	LA23	IOCS16*
3	LA22	IRQ10
4	LA21	IRQ11
5	LA20	IRQ12
6	LA19	IRQ15
7	LA18	IRQ14
8	LA17	DACK0*
9	MEMR*	DRQ0
10	MEMW*	DACK5*
11	SD8	DRQ5
12	SD9	DACK6*
13	SD10	DRQ6
14	SD11	DRQ6
15	SD12	DRQ7
16	SD13	+5V
17	SD14	MASTER*
18	SD15	0V
19	(KEYING PIN)	0V

**Table 6 PC/104 AT Bus Connector**

---

**Note:** Two locations on the bus have mechanical keying pins to help prevent misconnection of the PC/104 bus. These keying pins are a part of the PC/104 standard, and we strongly recommend you leave them in place.

If you have other modules without keying pins, we suggest you modify them to include keying.

---

### ***J3 PC/104-Plus PCI connector:***

Connector J3 carries the signals of the PC/104-Plus PCI bus. These signals match definitions of the PCI Local Bus specification Revision 2.1. The following tables list the pinouts of the PC/104-Plus bus connector.

#### **PC/104-Plus Bus Signal Assignments**

Pin	A	B	C	D
1	GND/5.0V KEY <sup>1</sup>	Reserved	+5V	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0*	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1*	AD15	+3.3V
9	SERR*	GND	SBO*	PAR
10	GND	PERR*	+3.3V	SDONE
11	STOP*	+3.3V	LOCK*	GND
12	+3.3V	TRDY*	GND	DEVSEL*
13	FRAME*	GND	IRDY*	+3.3V
14	GND	AD16	+3.3V	C/BE2*
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3*	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0*	GND	REQ1*	VI/O
24	GND	REQ2*	+5V	GNT0*
25	GNT1*	VI/O	GNT2*	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	INTD*	+5V	RST*
29	+12V	INTA*	INTB*	INTC*
30	-12V	Reserved	Reserved	GND/3.3V KEY <sup>1</sup>

## Notes:

1. The KEY pins are to guarantee proper module installation. Pin-A1 will be removed and the female side plugged for 5.0V I/O signals and Pin-D30 will be modified in the same manner for 3.3V I/O. It is recommended that both KEY pins (A1 and D30) be electrically connected to GND for shielding.

## **PC/104-Plus PCI Bus Signals**

The following table contains brief descriptions of the PC/104-Plus PCI bus signals.

### ***Address and Data***

**AD[31:00]** -- Address and Data are multiplexed. A bus transaction consists of an address cycle followed by one or more data cycles.

**C/BE[3:0]\*** -- Bus Command/Byte Enables are multiplexed. During the address cycle, the command is defined. During the Data cycle, they define the byte enables.

**PAR** -- Parity is even on AD[31:00] and C/BE[3:0]\* and is required.

### ***Interface Control Pins***

**FRAME\*** -- Frame is driven by the current master to indicate the start of a transaction and will remain active until the final data cycle.

**TRDY\*** -- Target Ready indicates the selected devices ability to complete the current data cycle of the transaction. Both IRDY\* and TRDY\* must be asserted to terminate a data cycle.

**IRDY\*** -- Initiator Ready indicates the master's ability to complete the current data cycle of the transaction.

**STOP\*** -- Stop indicates the current selected device is requesting the master to stop the current transaction.

**DEVSEL\*** -- Device Select is driven by the target device when its address is decoded.

**IDSEL** -- Initialization Device Select is used as a chip-select during configuration.

**LOCK\*** -- Lock indicates an operation that may require multiple transactions to complete.

### ***Error Reporting***

**PERR\*** -- Parity Error is for reporting data parity errors.

**SERR\*** -- System Error is for reporting address parity errors.

### ***Arbitration (Bus Masters Only)***

**REQ\*** -- Request indicates to the arbitrator that this device desires use of the bus.

**GNT\*** -- Grant indicates to the requesting device that access has been granted.

### ***System***

**CLK** -- Clock provides timing for all transactions on the PCI bus.

**RST\*** -- Reset is used to bring PCI-specific registers to a known state.

### ***Interrupts***

**INTA\*** -- Interrupt A is used to request Interrupts.

**INTB\*** -- Interrupt B is used to request Interrupts only for multi-function devices.

**INTC\*** -- Interrupt C is used to request Interrupts only for multi-function devices.

**INTD\*** -- Interrupt D is used to request Interrupts only for multi-function devices.

### ***Power Supplies and VIO***

**+5V** -- +5 volt supply

**+12V** -- +12 volt supply

**-12V** -- -12 volt supply

**+3.3V** -- +3.3 volt supply

**VIO** -- This signal typically is the I/O power to the bus drivers on a PCI bus card.

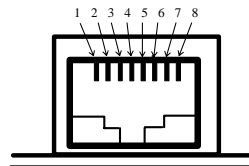
## ***J4 Twisted Pair Ethernet:***

Connector J4 is for UTP (Unshielded Twisted Pair) wiring normally used for 10/100Base-T Ethernet.

The following table gives the pinout of J4.

<b>Pin</b>	<b>Signal</b>	<b>Function</b>	<b>in/out</b>
1	TX+	Transmit +	out
2	TX-	Transmit -	out
3	RX+	Receive +	in
4	N.C.	Reserved	
5	N.C.	Not connected	
6	RX-	Receive -	in
7	N.C.	Not connected	
8	N.C.	Not connected	

The figure below shows the pin numbering of J4 when **looking into the connector**:



RJ-45 Jack Connector

J4 is a standard female RJ-45 connector. One example of a mating plug is:

- AMP 5-554739-3 (unshielded)

### ***J5 MII connector:***

Pin Number	I/O	Type	Name	Description
1, 20, 21, 40		Power	+5V	5 Volt supply
22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39		Power	GND	Ground
2	I/O	TTL	MDIO	Management Data Input Output
3	I	TTL	MDC	Management Data Clock
4	O	TTL	RXD3	Receive Data 3
5	O	TTL	RXD2	Receive Data 2
6	O	TTL	RXD1	Receive Data 1
7	O	TTL	RXD0	Receive Data 0
8	O	TTL	RXDV	Receive Data Valid
9	O	TTL	RXCLK	Receive Clock
10	O	TTL	RXER	Receive Error
11	-----	Pulldown	-----	-----
12	O	TTL	TXCLK	Trasmit Clock
13	I	TTL	TXEN	Trasmit Enable
14	I	TTL	TXD0	Trasmit Data 0
15	I	TTL	TXD1	Trasmit Data 1
16	I	TTL	TXD2	Trasmit Data 2
17	I	TTL	TXD3	Trasmit Data 3
18	O	TTL	COL	Collision Detect
19	O	TTL	CRS	Carrier Sense

**Table 3 MII Connector Layout**

## ***J6 LEDs***

This connector is made for direct connection to the LEDs on the Board. The connector is a 1x12, 2.54 mm pin strip. The connector's layout is the following:

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	LED 1 ANODE	Collision LED
2	LED 1 CATHODE	Collision LED
3	LED 2 ANODE	Activity LED
4	LED 2 CATHODE	Activity LED
5	LED 3 ANODE	Link LED
6	LED 3 CATHODE	Link LED
7	LED 4 ANODE	Trasmit LED
8	LED 4 CATHODE	Trasmit LED
9	LED 5 ANODE	Receive LED
10	LED 5 CATHODE	Receive LED
11	LED 6 ANODE	10/100 Selection
12	LED 6 CATHODE	10/100 Selection

**Table 4 J6 LED connector layout**

## ***JPS1:***

The CM7202 can use the 3,3 Volt supply by the PC/104-*Plus* connector or from the internal linear regulator. The default setting is from the Internal Linear regulator. It is set to the position **1-2**.

---

## Chapter 4 INSTALLING THE UTILITYMODULE

---

Since the utilityModule uses a PC/104 stackthrough bus, the only hardware installation you will do is placing the module to the PC/104 stack. To do this, you will connect the PC/104 bus connector with the matching connector of another module.

### ***Recommended Procedure***

We recommend you follow the procedure below to ensure that stacking of the modules does not damage connectors or electronics.

- Turn off power to the PC/104 system or stack.
- Select and install standoffs to properly position the utilityModule on the PC/104 stack.
- Touch a grounded metal part of the stack to discharge any buildup of static electricity.
- Remove the utilityModule from its anti-static bag.
- Check that keying pins in the PC/104 bus connector are properly positioned.
- 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.
- Hold the utilityModule by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
- Gently and evenly press the utilityModule onto the PC/104 stack.

---

**CAUTION:** Do not force the module onto the stack! Wiggling the module or applying too much force 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.

---

Connecting the utilityModule

The following sections describe connectors of the utilityModule.

### ***Finding Pin 1 of Connectors***

A white area silk-screened on the PC board indicates pin 1 of connectors. A square solder pad visible on the bottom of the PC board also indicates it.

## Chapter 5 RETURN POLICY AND WARRANTY

---

### ***Return Policy***

If the utilityModule requires repair, you may return it to us by following the procedure listed below:

---

**Caution:** Failure to follow this return procedure will *almost always* delay repair! Please help us expedite your repair by following this procedure.

---

- 1) Read the **Limited Warranty** that follows.
- 2) Contact the factory and request a Returned Merchandise Authorization (RMA) number.
- 3) On a sheet of paper, write the name, phone number, and fax number of a technically competent person who can answer questions about the problem.
- 4) On the paper, write a detailed description of the problem with the product. Answer the following questions:
  - Did the product ever work in your application?
  - What other devices were connected to the product?
  - How was power supplied to the product?
  - What features did and did not work?
  - What was being done when the product failed?
  - What were environmental conditions when the product failed?
- 5) Indicate the method we should use to ship the product back to you.
  - We will return warranty repairs by UPS Ground at our expense.
  - Warranty repairs may be returned by a faster service at your expense.
  - Non-warranty repairs will be returned by UPS Ground or the method you select, and will be billed to you.
- 6) Clearly specify the address to which we should return the product when repaired.
- 7) Enclose the paper with the product being returned.
- 8) Carefully package the product to be returned *using anti-static packaging!* We will not be responsible for products damaged in transit for repair.
- 7) Write the RMA number on the outside of the package.
- 8) Ship the package to:

Real Time Devices  
200 Innovation Blvd.  
State College PA 16803  
USA

## ***Limited Warranty***

Real Time Devices, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from REAL TIME DEVICES. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, REAL TIME DEVICES will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to REAL TIME DEVICES. All replaced parts and products become the property of REAL TIME DEVICES. Before returning any product for repair, customers are required to contact the factory for an RMA number.

THIS LIMITED WARRANTY DOES NOT EXTEND TO ANY PRODUCTS WHICH HAVE BEEN DAMAGED AS A RESULT OF ACCIDENT, MISUSE, ABUSE (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by REAL TIME DEVICES, "acts of God" or other contingencies beyond the control of REAL TIME DEVICES), OR AS A RESULT OF SERVICE OR MODIFICATION BY ANYONE OTHER THAN REAL TIME DEVICES. EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND REAL TIME DEVICES EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED HEREIN. ALL IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES FOR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS WARRANTY. IN THE EVENT THE PRODUCT IS NOT FREE FROM DEFECTS AS WARRANTED ABOVE, THE PURCHASER'S SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. UNDER NO CIRCUMSTANCES WILL REAL TIME DEVICES BE LIABLE TO THE PURCHASER OR ANY USER FOR ANY DAMAGES, INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOST PROFITS, LOST SAVINGS, OR OTHER DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT.

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THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.