User's Guide

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OMG-VERSACOMM4-PCI

Four Port PCI RS-232 Interface Board

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Introduction

Overview

The Omega Engineering **OMG-VERSA COMM+4.PCI** provides the PC with four RS-232 asynchronous ports. The **OMG-VERSA COMM+4.PCI** allows for connection to any device utilizing the RS-232 electrical interface, such as modems, data-entry terminals, and plotters.

What's Included

The **OMG-VERSA COMM+4.PCI** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **OMG-VERSA COMM+4.PCI** Serial I/O Adapter
- DB-37 to four DB-25 'Spider Cable' (DB-9 Spider Cable is available)
- Serial Utility Software
- User Manual

Card Setup

Clock Modes

The **OMG-VERSA COMM+4.PCI** employs a unique clocking option that allows the end user to select from divide by 4, divide by 2 and divide by 1 clocking modes. This mode is selected at J5.

To select the Baud rates commonly associated with COM: ports (i.e. 2400, 4800, 9600, 19.2, … 115.2K Bps) place the jumper in the divide by 4 mode (silk-screen DIV4).

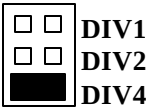


Figure 1 - Clocking Mode 'Divide By 4'

To double these rates up to a maximum rate for 230.4K bps place the jumper in the divide by 2 (silk-screen DIV2) position.

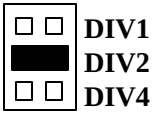


Figure 2 - Clocking Mode 'Divide By 2'

To select the maximum data rate (460.8K bps) place the jumper in the divide by 1 (silk-screen DIV1) position.

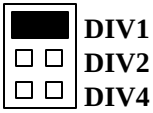


Figure 3 - Clocking Mode 'Divide By 1'

Baud Rates and Divisors for the 'Div1' mode

The following table shows some common data rates and the rates you should choose to match them if using the adapter in the 'Div1' mode.

For this Data Rate	Choose this Data Rate
1200 bps	300 bps
2400 bps	600 bps
4800 bps	1200 bps
9600 bps	2400 bps
19.2K bps	4800 bps
57.6 K bps	9600 bps
115.2 K bps	19.2K bps
230.4K bps	57.6 K bps
460.8K bps	115.2 K bps

If your communications package allows the use of Baud rate divisors, choose the appropriate divisor from the following table:

For this Data Rate	Choose this Divisor
1200 bps	384
2400 bps	192
4800 bps	96
9600 bps	48
19.2K bps	24
38.4K bps	12
57.6K bps	8
115.2K bps	4
230.4K bps	2
460.8K bps	1

Baud Rates and Divisors for the 'Div2' mode

The following table shows some common data rates and the rates you should choose to match them if using the adapter in the 'Div2' mode.

For this Data Rate	Choose this Data Rate
1200 bps	600 bps
2400 bps	1200 bps
4800 bps	2400bps
9600 bps	4800 bps
19.2K bps	9600 bps
38.4K bps	19.2K bps
57.6 K bps	38.4K bps
115.2 K bps	57.6 K bps
230.4 K bps	115.2 K bps

If your communications package allows the use of Baud rate divisors, choose the appropriate divisor from the following table:

For this Data Rate	Choose this Divisor
1200 bps	192
2400 bps	96
4800 bps	48
9600 bps	24
19.2K bps	12
38.4K bps	8
57.6K bps	4
115.2K bps	2
230.4K bps	1

Address and IRQ selection

The **OMG-VERSA COMM+4.PCI** is automatically assigned I/O addresses and IRQs by your motherboard BIOS. Only the I/O address may be modified by the user.

Adding or removing other hardware may change the assignment of I/O addresses and IRQs.

Installation

Operating System Installation

DOS

Refer to the 'PCI.txt' file found in the \DOS\PCI sub-directory on the supplied Serial Utilities Diskette.

Windows 3.1x

Refer to the Win3x.hlp file found in the \Windows\3.1x sub-directory on the supplied Serial Utilities Diskette.

Windows 95

Refer to the PCI.hlp file found in the \Windows\95 sub-directory on the supplied Serial Utilities Diskette.

Windows NT

Refer to the PCI.hlp file found in the \Windows\NT sub-directory on the supplied Serial Utilities Diskette.

Other Operating Systems

Refer to the appropriate directory on Disk 1 of the Serial Utilities Software.

Hardware Installation

The **OMG-VERSA COMM+4.PCI** can be installed in any of the PCI expansion slots and contains a single jumper strap that must be set for proper operation. Please see the Card Setup section of the manual for information on this jumper.

1. Turn off PC power. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an available PCI slot and remove the blank metal slot cover.
4. Gently insert the **OMG-VERSA COMM+4.PCI** into the slot. Make sure that the adapter is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord.

Installation is complete.

Technical Description

The **OMG-VERSA COMM+4.PCI** utilizes the 16C554 UART. This chip features programmable baud rate, data format, interrupt control and a 16-byte input and output FIFO, and is functionally 4 16C550 UARTs. The 16C654 UART is also available on this card, which has a 64-byte FIFO as opposed to the 16-byte FIFO available in the 16C554.

Interrupts

A good description of an interrupt and it's importance to the IBM PC can be found in the book 'Peter Norton's Inside the PC, Premier Edition':

" One of the key things that makes a computer different from any other kind of man-made machine is that computers have the capability to respond to the unpredictable variety of work that comes to them. The key to this capability is a feature known as interrupts. The interrupt feature enables the computer to suspend whatever it is doing and switch to something else in response to an interruption, such as the press of a key on the keyboard."

A good analogy of a PC interrupt would be the phone ringing. The phone 'bell' is a request for us to stop what we are currently doing and take up another task (speak to the person on the other end of the line). This is the same process the PC uses to alert the CPU that a task must be preformed. The CPU upon receiving an interrupt makes a record of what the processor was doing at the time and stores this information on the 'stack'; this allows the processor to resume its predefined duties after the interrupt is handled, exactly where it left off. Every main sub-system in the PC has it's own interrupt, frequently called an IRQ (short for **I**nterrupt **R**e**Q**uest). The following IRQ table will define the system IRQs as well as show typically free IRQs.

In these early days of PCs Omega Engineering decided that the ability to share IRQs was an important feature for any add-in I/O card. Consider that in the IBM XT the available IRQs were IRQ0 through IRQ7. Of these interrupts only IRQ2-5 and IRQ7 were actually available for use. This made the IRQ a very valuable system resource. To make the maximum use of these system resources Omega Engineering devised an IRQ sharing circuit that allowed more than one port to use a selected IRQ. This worked fine as a hardware solution but presented the software designer with a challenge to identify the source of the interrupt. The software designer frequently used a technique referred to as 'round robin polling'. This method required the interrupt service routine to 'poll' or interrogate each UART as to its interrupt pending status. This method of polling was

sufficient for use with slower speed communications, but as modems increased their through put abilities this method of servicing shared IRQs became inefficient.

Why use an ISP?

The answer to the polling inefficiency was the **I**nterrupt **S**tatus **P**ort (ISP). The ISP is a read only 8-bit register that sets a corresponding bit when an interrupt is pending. Port 1 interrupt line corresponds with Bit D0 of the status port, Port 2 with D1 etc. The use of this port means that the software designer now only has to poll a single port to determine if an interrupt is pending.

The ISP is at Base+7 on each port (Example: Base = 280 Hex, Status Port = 287, 28F… etc.). The **OMG-VERSA COMM+4.PCI** will allow any one of the available locations to be read to obtain the value in the status register. All four status ports on the **OMG-VERSA COMM+4.PCI** are identical, so any one of the four can be read.
Example: This indicates that Channel 2 has an interrupt pending.

Bit Position:	7	6	5	4	3	2	1	0
Value Read:	0	0	0	0	0	0	**1**	0

Note: Bits 4 – 7 are not driven and can report back as a 1 or a 0. Most application software will mask the unused bits to determine if an interrupt is pending.

Connector Pin Assignments

DB-25 (RS-232 DTE)

Signal	Name	Pin #	Mode
GND	Ground	7	
TD	Transmit Data	2	Output
RTS	Request To Send	4	Output
DTR	Data Terminal Ready	20	Output
RD	Receive Data	3	Input
CTS	Clear To Send	5	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	8	Input
RI	Ring Indicator	22	Input

DB-9 (EIA-574 DTE)

Signal	Name	Pin #	Mode
GND	Ground	5	
TD	Transmit Data	3	Output
RTS	Request To Send	7	Output
DTR	Data Terminal Ready	4	Output
RD	Receive Data	2	Input
CTS	Clear To Send	8	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	1	Input
RI	Ring Indicator	9	Input

DB-37

Port #	**1**	**2**	**3**	**4**
GND	33	14	24	5
TD	35	12	26	3
RTS	17	30	8	21
DTR	34	13	25	4
RD	36	11	27	2
CTS	16	31	7	22
DSR	18	29	9	20
DCD	37	10	28	1
RI	15	32	6	23

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0º to 50º C (32º to 122º F)	-20º to 70º C (-4º to 158º F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Manufacturing

- All Omega Engineering Printed Circuit boards are built to U.L. 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Power Consumption

Supply line	+12 VDC	-12 VDC	+5 VDC
Rating	60 mA	100 mA	250 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	4.9 inches	(12.446 cm.)
Board Height including Goldfingers	3.3 inches	(8.382 cm.)
Board Height excluding Goldfingers	2.975 inches	(7.557 cm.)

Appendix A - Troubleshooting

A Serial Utility Diskette is supplied with the Omega Engineering adapter and will be used in the troubleshooting procedures. By using this diskette and following these simple steps, most common problems can be eliminated without the need to call Technical Support.

1. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.

2. Configure your Omega Engineering adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.

3. Make sure the Omega Engineering adapter is using a unique IRQ. While the Omega Engineering adapter does allow the sharing of IRQs, many other adapters (i.e. SCSI adapters & on-board serial ports) do not. The IRQ is typically selected via an on-board header block. Refer to the section on Card Setup for help in choosing an I/O address and IRQ.

4. Make sure the Omega Engineering adapter is securely installed in a motherboard slot.

5. When running DOS, Windows 3.x or other operating systems refer to the Serial Utilities Disk 1 and the User Manual to verify that the Omega Engineering adapter is configured correctly. The supplied software contains a diagnostic program 'SSD' that runs under DOS and will verify if an adapter is configured properly. This diagnostic program is written with the user in mind and is easy to use. Refer to the README.txt file on the supplied diskette for detailed instructions on using 'SSD'.

6. For Windows 95/98 and Windows NT, the diagnostic tool 'WinSSD' is installed in the Omega Engineering folder on the Start Menu during the setup process. First find the ports using the Device Manager, then use 'WinSSD' to verify that the ports are functional.

Always use the Omega Engineering diagnostic software when troubleshooting a problem. This will help eliminate any software issues and identify any hardware conflicts

Appendix B - How To Get Assistance

Please refer to Appendix A - Troubleshooting prior to calling Technical Support.

1. Read this manual thoroughly before attempting to install the adapter in your system.
2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.

RETURN AUTHORIZATION MUST BE OBTAINED FROM OMEGA ENGINEERING BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING OMEGA ENGINEERING AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C - Electrical Interface

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232-C/D/E or EIA/TIA-232-C/D/E. It is defined as "*Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange*". The mechanical implementation of RS-232 is on a 25-pin D sub connector. The IBM PC computer defined the RS-232 port on a 9 pin D sub connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard has defined as the "*9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange"*. Both implementations are in wide spread use and will be referred to as RS-232 in this document. RS-232 is capable of operating at data rates up to 20K bps / 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4K bps over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denote a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification define two types of interface circuits **D**ata **T**erminal **E**quipment (**DTE**) and **D**ata **C**ircuit-Terminating **E**quipment (**DCE***)*. The Omega Engineering Adapter is a DTE interface.

Appendix D - Asynchronous Communications

Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. The end of the character is defined by the transmission of a pre-defined number of stop bits (usual 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.

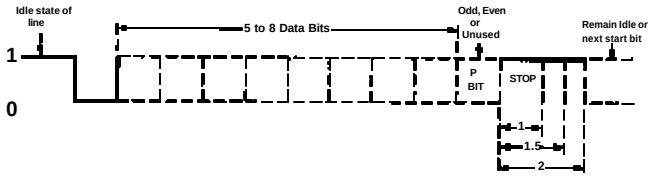
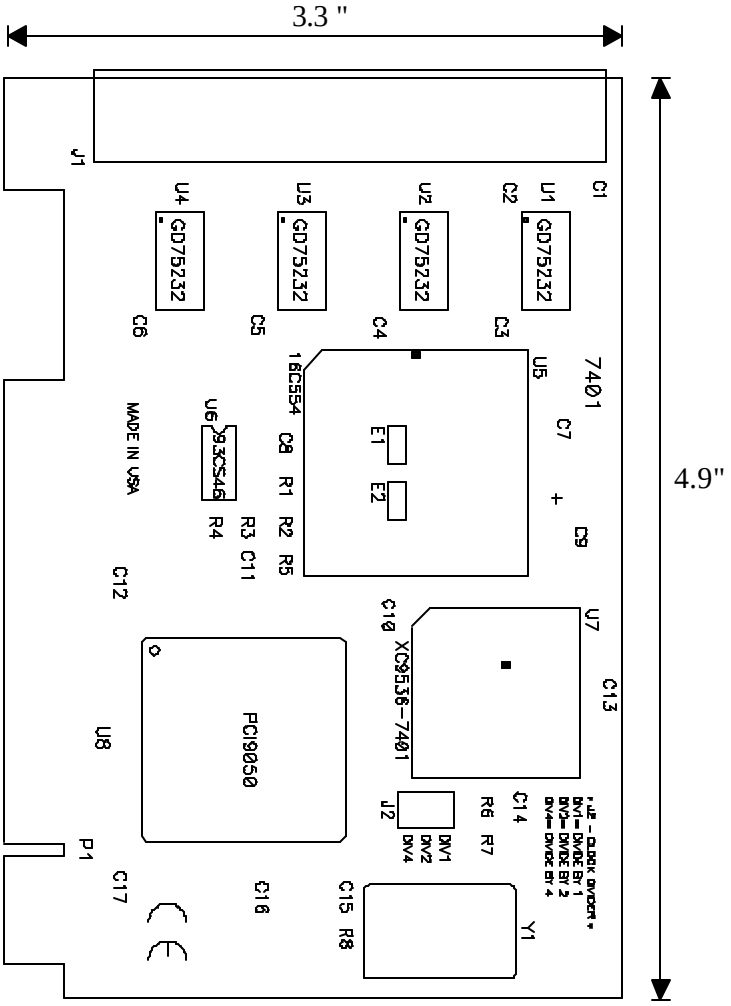


Figure 4 - Asynchronous Communications Bit Diagram

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is refereed to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600,N,8,1).

Appendix E - Silk-Screen



Appendix F - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at his own expense.

EMC Directive Statement

CE

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

- **EN55022 Class A** - "Limits and methods of measurement of radio interference characteristics of information technology equipment"
- **EN50082-1** - "Electromagnetic compatibility - Generic immunity standard" Part 1 : Residential, commercial and light industry
- **EN60950 (IEC950)** - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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