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Introduction

Overview

The Omega Engineering **OMG-COMM8-A** provides the PC with eight RS-232 asynchronous ports. The **OMG-COMM8-A** 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-COMM8-A** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **OMG-COMM8-A** Serial I/O Adapter
- "Octopus" Cable providing 8 DB-25 connectors.
- 3.5″ Serial Utility Diskette
- User Manual

Factory Default Settings

The **OMG-COMM8-A** factory default settings are as follows:

Port #	Base Address	IRQ
Port 1	280	2/9
Port 2	288	3
Port 3	290	4
Port 4	298	5
Port 5	2A0	2/9
Port 6	2A8	3
Port 7	2B0	4
Port 8	2B8	5

To install the **OMG-COMM8-A** using factory default settings, refer to the Installation section of this manual.

For your reference, record installed **OMG-COMM8-A** settings below:

Port #	Base Address	IRQ
Port 1		
Port 2		
Port 3		
Port 4		
Port 5		
Port 6		
Port 7		
Port 8		

The following table shows which port is connected to which connector and the corresponding address in the Factory Default setting.

Port #	DB-25#	Address	Example
1	1	Base+0	280-287
2	2	Base+8	288-28F
3	3	Base+16	290-297
4	4	Base+24	298-29F
5	5	Base+32	2A0-2A7
6	6	Base+40	2A8-2AF
7	7	Base+48	2B0-2B7
8	8	Base+56	2B8-2BF

Card Setup

The **OMG-COMM8-A** contains several jumper straps that must be set for proper operation.

Address Selection

The **OMG-COMM8-A** occupies 64 I/O locations and can be addressed two different ways. If header E1 is set to the "Switch" position the **OMG-COMM8-A** occupies 64 consecutive I/O locations and the DIP-switch is used to set the base address for these locations. The starting address for these 64 I/O locations must be on a 64-byte boundary i.e.: Hex 200, 240, 280, or 2C0. Be careful when selecting the base address as some selections conflict with existing PC ports. The following table shows several examples that usually do not cause a conflict.

Address	Switch Position Setting:						
	1	2	3	4	5	6	7
100-13F	On	On	On	On	Off	On	On
180-1BF	On	On	On	On	Off	Off	On
240-27F	On	On	On	Off	On	On	Off
280-2BF	On	On	On	Off	On	Off	On
2C0-2FF	On	On	On	Off	On	Off	Off
300-3FF	On	On	On	Off	Off	On	On
500-53F	On	On	Off	On	Off	On	On
580-5BF	On	On	Off	On	Off	Off	On
1500-153F	Off	On	Off	On	Off	On	On
1580-15BF	Off	On	Off	On	Off	Off	On

Figure 1 - Address Selection Table

Note: Some of these selections may not be valid for your system, due to port contention. If in doubt, call Sealevel Technical Support (864) 843-4343 for assistance. These addressing restrictions are simplified when using the "PAL" option.

Note: If Xenix is the operating system and COM1 is not installed, use base address 500 Hex and IRQ 4 (Xenix COM1:). If COM1: is installed, then select 580 Hex as a base address and IRQ 3 (Xenix COM2:).

The following illustration shows the correlation between the DIP-switch setting and the address bits used to determine the base address. In the example below, address 280 (Factory Default) is selected as a base.
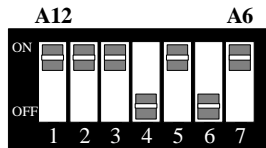
Figure 2 - DIP-switch Illustration

Note: Setting the switch "On" or "Closed" corresponds to a "0" in the address, while leaving it "Off" or "Open" corresponds to a "1".

Refer to Appendix A for common address contentions.

"PAL" Addressing

If header E11 is set to the "PAL" position, the board can be addressed at many customized locations. Using the "PAL" option will allow you to obtain COM1: - COM4: addresses, XENIX COM: addresses, or any other standard or nonstandard address configuration. Using the "PAL" feature is a very cost-effective means of solving complex addressing problems. For more information on implementing the "PAL" option, please contact Omega Engineering Technical Support.

IRQ Selection

The **OMG-COMM8-A** has an interrupt selection jumper that corresponds to each port that may have to be set prior to use. The software you are using with the board will determine which interrupts, if any are to be used. The DOS serial port interface software does not use interrupts, while interrupt buffer programs do. DOS does not require the interrupt to be set, while most Multi - User Operating Systems will. Consult the particular manual for the software that you are using to determine the proper setting.

To set the interrupt for a particular port, first select the header for the port desired. Headers E1-E8 correspond to Ports 1-8. Next select an IRQ by placing one of the jumpers on the header location that corresponds to the IRQ number that you wish to use. Below is an example of a selected IRQ.
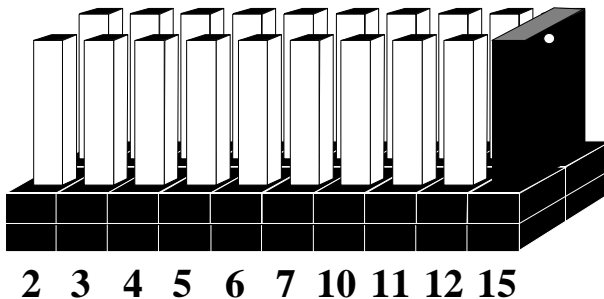
Figure 3 - Headers E1 to E8 (IRQ15 selected)

Interrupt Mode Options

The **OMG-COMM8-A** will allow each port to have an independent interrupt level or share an interrupt with another port on the adapter. The **OMG-COMM8-A** will even share interrupts with a compatible port that is located on another adapter. The **OMG-COMM8-A** can operate in three interrupt modes. Header E9 determines the interrupt mode for Ports 1-4 and header E10 determines the interrupt mode for ports 5-8.

"**N**" indicates the (**N**)ormal, single interrupt per port mode. "**S**" Indicates the (**S**)hared interrupt mode, which allows more than one port to access a single IRQ. Any two or more ports can share a common IRQ by placing the jumpers on the same IRQ setting, and setting the appropriate selections at E5. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper. "**M**" indicates the inclusion of a 1K ohm pull-down resistor required on one port when sharing interrupts.
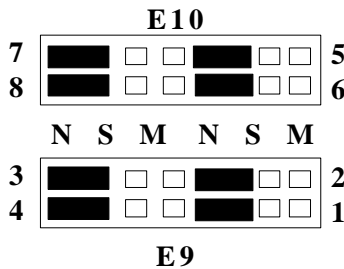
Figure 4 - Header E9 and E10, Normal IRQ Mode

Set jumpers to "**S**" for shared interrupt mode on all blocks sharing an IRQ except one. Set that port block for "**M**". This provides the pull-down resistor circuit that makes sharing of IRQ possible. If you are using more than one **OMG-COMM8-A** or a compatible adapter in a bus you should only have one port set to "**M**". The following example shows all four ports sharing a single IRQ.
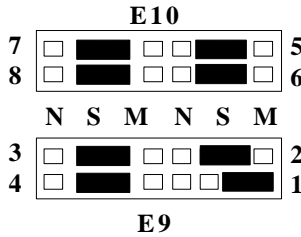
Figure 5 - Header E9 and E10, Shared IRQ Mode

Set jumper to "**S**" if you are using more than one **OMG-COMM8-A** in a bus or you wish to completely remove the pull-down resistor for hardware compatibility. **Setting the OMG-COMM8-A in this configuration when it is not accompanied by a pull-down resistor will prevent the ports from triggering an interrupt**.

Figure 6 - Header E9 and E10, Sharing IRQ's with another adapter

Installation

The **OMG-COMM8-A** can be installed in any of the full size PC expansion slots, but to access the "AT" or (E)ISA IRQs (10, 11, 12, 15) it must be installed in one of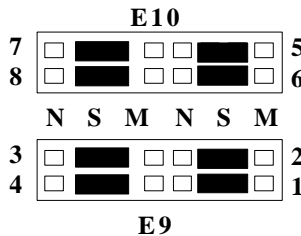 the 16 bit slots. The **OMG-COMM8-A** contains several jumper straps for each port that must be set for proper operation prior to installing the **OMG-COMM8-A** into the computer.

1. Turn off PC power. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an available slot and remove the blank metal slot cover.
4. Gently insert the **OMG-COMM8-A** into the slot. Make sure that the adapter is seated properly.
5. Replace the screw.
6. Install the "Octopus" Cable
7. Replace the cover.
8. Connect the power cord.

Installation is complete.

Operating System Installation

Windows 3.x, Windows 95, Windows NT

Please refer to the /WINDOWS sub-directory on the Serial Utilities Diskette for help files and current information on the installation of the **OMG-COMM8-A** in these operating systems.

OS/2

Please refer to the /OS2 sub-directory on the Serial Utilities Diskette for application notes on the installation of the **OMG-COMM8-A** in this operating system.

QNX

Please refer to the /QNX sub-directory on the Serial Utilities Diskette for application notes on the installation of the **OMG-COMM8-A** in this operating system

Technical Description

The Sealevel **OMG-COMM8-A** provides 8 additional serial ports for terminals, modems, printers, etc. The **OMG-COMM8-A** utilizes the 16550 UART chip. This chip features programmable baud rate, data format, interrupt control and a 16 byte FIFO.

Features

- Eight RS-232 Ports with full modem control signals

- "PAL" addressing option allowing "Turn Key" configurations

- Selectable/Sharable Interrupts (IRQ's 2/9-7,10,11,12,& 15)

- Interrupt status port for Windows™ NT (listed in the NT Hardware compatibility list) and Green Leaf™ COM: libraries

- 8 DB-25 male connectors provided using the Omega Engineering "Octopus Cable"

Interrupt Status Port

The **OMG-COMM8-A** provides the user with an **I**nterrupt **S**tatus **P**ort (ISP) for greater throughput when servicing multiple ports on a single interrupt line. 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 ISP can be addressed two different ways. If header E11 is in the "Switch" position the Status Register is located at Base+7 on each port (Example: Base = 280 Hex, Status Port = 287, 28F… etc.). This allows any one of eight locations to be read to obtain the value in the status register. All eight status ports on the **OMG-COMM8-A** are identical, so any one of the eight can be read. If header E11 is in the "PAL" position, the status port can be addressed at any location. Please contact Omega Engineering for information on PAL programming and custom configurations.

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

DB-25 Connector Pin Assignments

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

Figure 7 - DB-25 Connector Pin Assignments

DB-78 Connector Pin Assignments

Port #	1	2	3	4	5	6	7	8
TD	36	12	27	3	75	51	66	42
RD	37	11	28	2	76	50	67	41
RTS	17	31	8	22	56	70	47	61
CTS	16	32	7	23	55	71	46	62
DTR	35	13	26	4	74	52	65	43
DSR	18	30	9	21	57	69	48	60
DCD	38	10	29	1	77	49	68	40
RI	15	33	6	24	54	72	45	63
GND	34	14	25	5	73	53	64	44

Figure 8 - DB-78 Connector Pin Assignments

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

- IPC 610-A Class-III standards are adhered to with a 0.1 visual A.Q.L. and 100% Functional Testing.

- 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	50 mA	50 mA	200 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	8.0 inches	(20.32 cm)
Board Height including Goldfingers	4.2 inches	(10.66 cm)
Board Height excluding Goldfingers	3.9 inches	(9.91 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) <u>do not</u>. 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. Use the supplied diskette and User Manual to verify that the Omega Engineering adapter is configured correctly. The supplied diskette contains a diagnostic program "SSD" that 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" file on the supplied diskette for detailed instructions on using "SSD".

6. The following are known I/O conflicts:

    - The 278 and 378 settings may conflict with your printer I/O adapter.
    - 3B0 cannot be used if a Monochrome adapter is installed.
    - 3F8-3FF is typically reserved for COM1:
    - 2F8-2FF is typically reserved for COM2:
    - 3E8-3EF is typically reserved for COM3:
    - 2E8-2EF is typically reserved for COM4:

7. Please refer to your included diskette for any postproduction manual updates and application specific information.

8. Always use the Omega Engineering diagnostic software when troubleshooting a problem. This will eliminate the software issue from the equation.

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.

3. Omega Engineering maintains a Home page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.

4. Technical support is available Monday to Friday from 8:30 a.m. to 6:00 p.m. Eastern time. Technical support can be reached at (800)826-6342 x2295

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 20 Kbps / 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 Kbps 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) denotes 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. Character boundaries for asynchronous communications are defined by a starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8). 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.
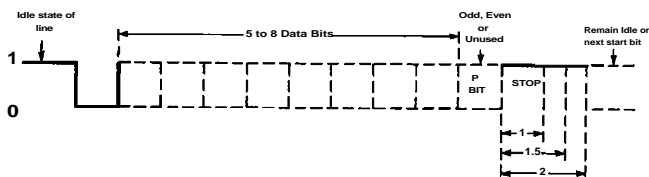

Figure 9 - Asynchronous Communications Bit Diagram

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 referred 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 - 3421 Addendum

The **OMG-COMM8-A** can be equipped with a higher speed oscillator and the Startech 16C654 UART. This UART has a significantly larger FIFO (64 bytes as opposed to the 16 of the 16C554). The **OMG-COMM8-A** equipped in this manner can be ordered as the part number 3421.

The 3421 has a 7.3728 MHz oscillator, as opposed to the standard 1.8432 MHz oscillator, that allows data rates up to 460.8 K bps. To use the 3421 with a standard communications package, or to achieve standard data rates (i.e. 1200, 2400, 9600…115.2K) simply select a data rate that is your target data rate divided by 4. For example, if you need a data rate of 9600, you would choose 2400, $9600 \div 4 = 2400$.

The following table shows some common data rates and the rates you should choose to match them.

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
38.4K bps	9600 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

Appendix F - Silk-Screen

Appendix G - 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

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

Omega Engineering, Inc. warrants this product to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, Omega Engineering will, at it's option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Omega Engineering assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Omega Engineering will not be liable for any claim made by any other related party.

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.

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Technical Support is available from 8:30 a.m. to 6 p.m. Eastern time.
Monday - Friday

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