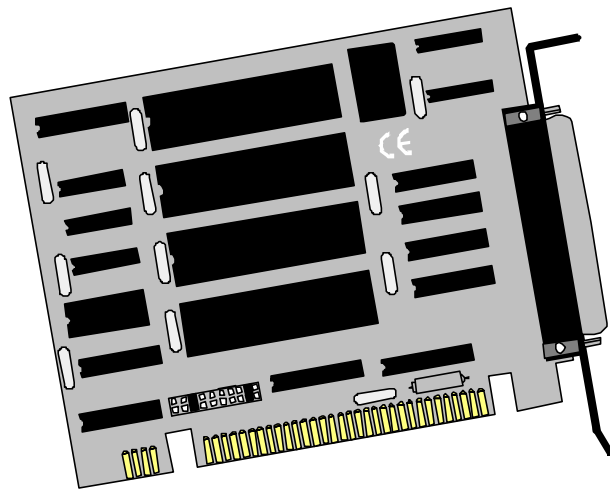


TURBO COMM+4™
USER MANUAL



Part # 3400

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Introduction

Overview

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

What's Included

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

- **TURBO COMM+4** Serial I/O Adapter
- "Spider" Cable providing 4 DB-25 connectors
- Serial Utility Software
- User Manual

Factory Default Settings

The **TURBO COMM+4** factory default settings are as follows:

Port #	Base Address	IRQ
Port 1	2E0	3
Port 2	2E8	3
Port 3	2EF	3
Port 4	2F8	3

To install the **TURBO COMM+4** using factory default settings, refer to the Installation section of this manual.

For your reference, record installed **TURBO COMM+4** settings below:

Port #	Base Address	IRQ
Port 1		
Port 2		
Port 3		
Port 4		

Card Setup

The **TURBO COMM+4** contains several jumper straps which must be set for proper operation.

Address Selection

The **TURBO COMM+4** occupies 32 consecutive I/O locations. The DIP-switch is used to set the base address for these locations. 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 Settings							
	1	2	3	4	5	6	7	8
280-29F	On	On	On	Off	On	Off	On	On
2A0-2BF	On	On	On	Off	On	Off	On	Off
380-39F	On	On	On	Off	Off	Off	On	On
3A0-3BF	On	On	On	Off	Off	Off	On	Off
1A0-1BF	On	On	On	On	Off	Off	On	Off
2E0-2FF	On	On	On	Off	On	Off	Off	Off
500-51F	On	On	Off	On	Off	On	On	On
580-59F	On	On	Off	On	Off	Off	On	On

Figure 1 - Address Selection Table

Refer to Appendix A for common address contentions.

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 2E0 is selected as a base.

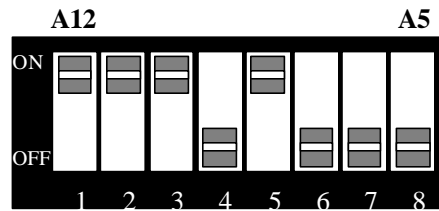


Figure 2 - DIP-Switch Illustration

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.

IRQ Selection

The **TURBO COMM+4** has an interrupt selection jumper which may have to be set prior to use. The software you are using with the adapter will determine which interrupt, if any, is to be used. DOS typically does not use interrupts, while interrupt buffer programs do. DOS and BASIC do 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, place one of the jumpers on the header (E1) location that corresponds to the IRQ number that you wish to use. Refer to Figure 3.



Figure 3 - Header E1

Also located on header E1 is a multiple interrupt jumper selection. This is enabled by placing a jumper on the position labeled “M” (see Figure 3). This option should be selected on only one adapter when two or more adapters are using the same interrupt line. If there is only one **TURBO COMM+4** installed, this option must be selected. Figure 3 is shown in the factory default configuration.

Jumper option ‘O’ on header E1 provides a unique anti-lockup feature. Most software will not require this option. The purpose of this jumper is to provide a "pulsed" interrupt request line in the event of a lockup due to mishandling of the hardware during an interrupt service routine. Again, well written, debugged interrupt drivers do not have this problem. The interrupt request lines on the PC are rising edge triggered. If more than one port is asserting an interrupt on the same IRQ line, both ports must be serviced in order for the IRQ line to return to the low level. If only one port is serviced, the line will remain high, and prevent further edges from triggering an interrupt, thus locking up the communications interrupt handler routine. If you are experiencing a similar problem, try installing the “O” jumper, and consult Sealevel Systems Technical Support Staff.

Installation

Operating System Installation

For Windows Users

Start by choosing **Install Software at the beginning of the CD. Choose Asynchronous COM: Port Software, SeaCOM.**

Other Operating Systems

Refer to the appropriate section of the Serial Utilities Software.

System Installation

The **TURBO COMM+4** can be installed in any of the PC ISA expansion slots, but to access the “AT” or (E)ISA IRQ’s (10, 11, 12, 15) it must be installed in one of the 16 bit slots. The **TURBO COMM+4** contains several jumper straps for each port which must be set for proper operation prior to installing the adapter 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 **TURBO COMM+4** into the slot. Make sure that the adapter is seated properly.
5. Replace the screw.
6. Install the “Spider” Cable
7. Replace the cover.
8. Connect the power cord.

Installation is complete.

Technical Description

The Sealevel **TURBO COMM+4** provides 4 additional serial ports for terminals, modems, printers, etc. The **TURBO COMM+4** utilizes the 16550 UART chip. This chip features programmable baud rate, data format, interrupt control and a 16 byte FIFO.

Features

- Provides a COM1: through COM4: Turnkey Solution
- Four RS-232 Ports with full modem control signals
- Selectable Interrupt (IRQ's 2(9)-7,10,11,12, & 15)
- 4 DB-25 male connectors provided using the Sealevel Systems "Spider Cable"

Modem Control Signal Considerations

Some software packages require the use of the modem handshake signals such as CTS or DCD. Refer to your application software manual to determine the requirements for modem control signals. If no requirements are mentioned, a safe configuration is to tie DTR to DSR and DCD, and tie RTS to CTS. This configuration will typically satisfy the modem control signal requirements for most communications software.

Connector Pin Assignments

DB-25 (RS-232 DTE) (DB25 MALE)

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 4 - DB-25 Connector Pin Assignments

DB-37 Connector Pin Assignments (DB37 MALE)

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

Figure 5 - DB-37 Connector Pin Assignments

Technical Note: Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help insure you get the best performance from your adapter.

Specifications

Environmental Specifications

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

Manufacturing

- All Sealevel Systems 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	5.3 inches	(13.46 cm)
Board Height including Goldfingers	4.2 inches	(10.66 cm)
Board Height excluding Goldfingers	3.9 inches	(9.91 cm)

Appendix A - Troubleshooting

Serial Utility test software is supplied with the Sealevel Systems adapter and will be used in the troubleshooting procedures. By using this software 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 Sealevel Systems 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 Sealevel Systems adapter is using a unique IRQ. 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 Sealevel Systems adapter is securely installed in a motherboard slot.
5. When running DOS, Windows 3.x or other operating systems refer to the Serial Utilities software for that operating system and the User Manual to verify that the Sealevel Systems 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 DIAG.txt file in the dos\diag directory for detailed instructions on using 'SSD'.
6. For Windows 95/98 and Windows NT, the diagnostic tool 'WinSSD' is installed in the Sealevel 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.

-
7. 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:
8. Always use the Sealevel Systems diagnostic software when Troubleshooting a problem. This will eliminate software issues and help 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.
3. Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. Eastern time. Technical support can be reached at (864) 843-4343.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS 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 **Data Terminal Equipment (DTE)** and **Data Circuit-Terminating Equipment (DCE)**. The Sealevel Systems 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 (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.

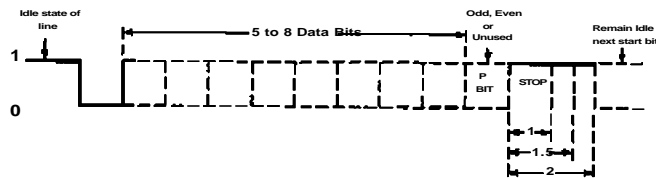
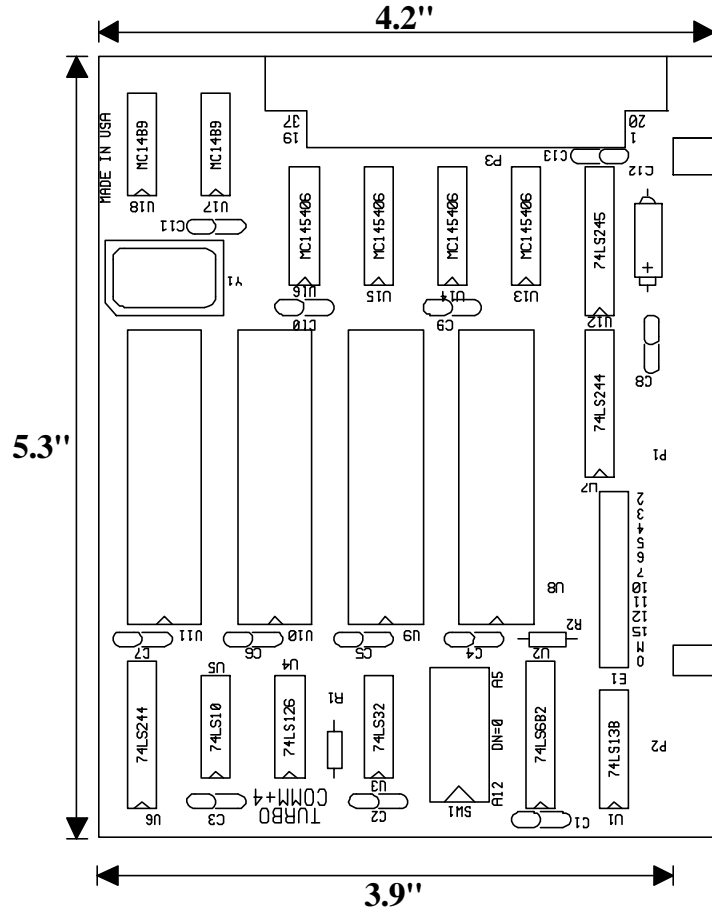


Figure 6 - Asynchronous Communications Bit Diagram

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 - Silk-Screen



Appendix F - Schematic

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”
- **EN55024** - ‘Information technology equipment Immunity characteristics Limits and methods of measurement.
- **EN60950 (IEC950)** - “Safety of information technology equipment, including electrical business equipment”

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

Sealevel Systems, Inc. provides a lifetime warranty for this product. Should this product fail to be in good working order at any time during this period, Sealevel Systems will, at its 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.

Sealevel Systems 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. Sealevel Systems will not be liable for any claim made by any other related party.

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