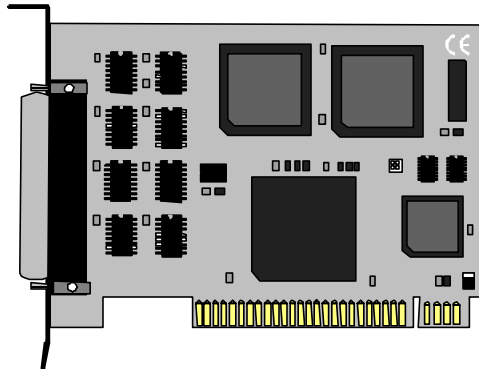


AV-COMM™

USER'S MANUAL

Part Number 3086



Sealevel Systems, Inc
155 Technology Place
P.O. Box 830
Liberty, SC 29657

Phone: (864) 843-4343
Fax: (864) 843-3067
www.sealevel.com

Contents

INTRODUCTION	1
OVERVIEW	1
WHAT'S INCLUDED	1
FACTORY DEFAULT SETTINGS	1
CARD SETUP.....	2
ADDRESS SELECTION	2
PORT ENABLE / DISABLE.....	3
IRQ SELECTION.....	3
INTERRUPT MODES	4
INTERFACE SELECTION.....	5
INSTALLATION.....	6
OPERATING SYSTEM INSTALLATION	6
For Windows Users.....	6
Other Operating Systems	6
TECHNICAL DESCRIPTION	7
CONNECTOR PIN ASSIGNMENTS.....	7
SMPTE	7
RS-232	8
RS-422 / PA-422.....	8
C2.....	10
MIDI	10
SPECIFICATIONS.....	11
ENVIRONMENTAL SPECIFICATIONS	11
MANUFACTURING.....	11
POWER CONSUMPTION.....	11
MEAN TIME BETWEEN FAILURES (MTBF).....	11
PHYSICAL DIMENSIONS	11
APPENDIX A - TROUBLESHOOTING	12
APPENDIX B - HOW TO GET ASSISTANCE	14
APPENDIX C - ELECTRICAL INTERFACE.....	15
RS-422/PA-422.....	15
SMPTE	15
MIDI	16
RS-232	16

APPENDIX D - ASYNCHRONOUS COMMUNICATIONS	17
APPENDIX E - SILK-SCREEN.....	18
APPENDIX F - SCHEMATIC.....	19
WARRANTY	21
Trademarks	21

Figures

Figure 1 - Address Selection Table	2
Figure 2 - DIP-Switch Illustration.....	2
Figure 3 - Header E2 and E3, IRQ Selection.....	3
Figure 4 - Header E5, Normal IRQ Mode.....	4
Figure 5 - Header E5, Shared IRQ Mode	4
Figure 6 - Header E5, Sharing IRQ's with another adapter.....	5
Figure 7 - Interface Selection Table.....	5
Figure 8 - Asynchronous Communications Bit Diagram.....	17

© 1996e Sealevel Systems, Incorporated. All rights reserved.

Introduction

Overview

The Sealevel **AV-COM** provides the PC with 2 additional Asynchronous serial ports with DIP jumper selection for SMPTE 207m, RS-232, PA-422 (RS-422), and Musical Instrument Digital Interface (MIDI) Interfaces. The **AV-COM** also provides a DIP jumper to select the same pinout as the Sealevel COMM+2 (p/n 3083) in RS-422 mode. The AV-COM can be configured as COM1: through COM4:, or any other I/O address up to 3FF Hex, providing a versatile interface for various multimedia products such as video editing, Digital Audio Tape (DAT), Musical Instrument Digital Interface (MIDI) and sound system control (PA-422).

What's Included

The **AV-COM** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **AV-COM** Serial I/O Adapter
- Serial Utility Software
- User Manual

Factory Default Settings

The **AV-COM** factory default settings are as follows:

Port #	Base Address	IRQ	Electrical Specification
Port 1	3F8	4	SMPTE 207M
Port 2	2F8	3	SMPTE 207M

To install the **AV-COM** using factory default settings, refer to Installation on page 6.

For your reference, record installed **AV-COM** settings below:

Port #	Base Address	IRQ	Electrical Specification

Card Setup

The **AV-COM** contains several jumper straps which must be set for proper operation.

Address Selection

Each port on the **AV-COM** occupies 8 consecutive I/O locations. A 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 ports. The following table shows several examples that typically do not cause a conflict. SW1 sets the I/O address for port 1 of the **AV-COM** and SW2 sets the address for port 2.

Address Hex	Binary		Switch Position Setting						
	A9	A0	1	2	3	4	5	6	7
280-287	1010000XXX		Off	On	Off	On	On	On	On
2A0-2A7	1010100XXX		Off	On	Off	On	Off	On	On
2E8-2EF	1011101XXX		Off	On	Off	Off	Off	On	Off
2F8-2FF	1011111XXX		Off	On	Off	Off	Off	Off	Off
3E8-3EF	1111101XXX		Off	Off	Off	Off	Off	On	Off
300-307	1100000XXX		Off	Off	On	On	On	On	On
328-32F	1100101XXX		Off	Off	On	On	Off	On	Off
3F8-3FF	1111111XXX		Off	Off	Off	Off	Off	Off	Off

Figure 1 - Address Selection Table

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 300 is selected as a base. Address 300 in binary is XX11 0000 0XXX where X = a non-selectable address bit.

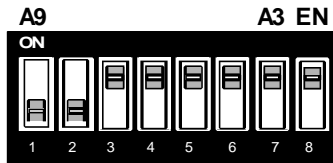


Figure 2 - DIP-Switch Illustration

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.

Port Enable / Disable

Each port on the **AV-COM** can be enabled or disabled with switch position 8 on the DIP-switch. The port is enabled with the switch “On” or “Closed” and disabled when “Off” or “Open”. If any port is disabled, be sure to disable the interrupt request for that port by removing the IRQ jumper.

IRQ Selection

Headers E2 and E3 select the interrupt request for each serial port. If COM1: is selected, the corresponding jumper must be on the IRQ4 setting. If COM2: is selected, the corresponding jumper must be on IRQ3.

Note: Most communications software applications default COM3: to IRQ4 and COM4: to IRQ3. This requires the sharing of interrupts between COM1: and COM3:, and between COM2: and COM4:. While this is the default, it is not always the preferred setting. Check your software configuration instructions to determine the most appropriate IRQ selection.

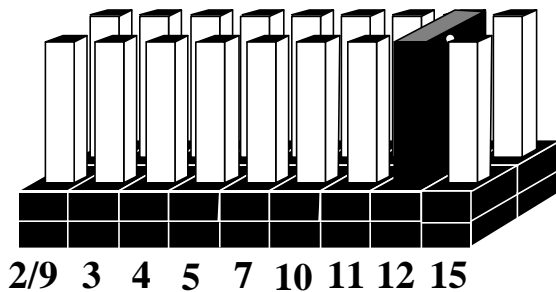


Figure 3 - Header E2 and E3, IRQ Selection

Note: The actual Silk-Screen for the **AV-COM** may have a “2” in place of the IRQ “2/9” selection.

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 E1. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper.

Interrupt Modes

Header E1 selects the interrupt mode for each port. Each port must be set in the correct mode to insure proper installation.

“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 E1. 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.

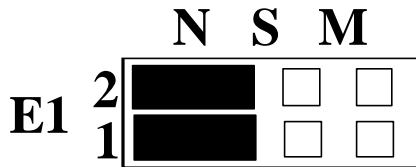


Figure 4 - Header E5, Normal IRQ Mode

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's possible. If you are using more than one AV-COM or a compatible adapter in a bus you should only have one port set to “M”. The following example shows both ports sharing a single IRQ.

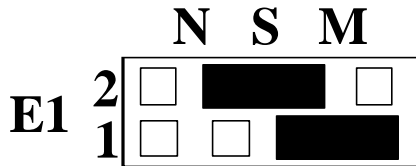


Figure 5 - Header E5, Shared IRQ Mode

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

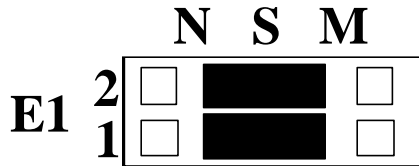


Figure 6 - Header E5, Sharing IRQ's with another adapter

Interface Selection

Each port on the **AV-COM** can be selected for a particular interface by installing the provided DIP shunts in the appropriate sockets. To select an interface, install the DIP shunt in the corresponding socket. All interface options are shown below.

Port #	MIDI	SMPTE	PA-422	C2	RS-232
1	E5	E10	E11	E9	E6
2	E8	E4	E7	N/A	N/A

Figure 7 - Interface Selection Table

Installation

The **AV-COM** can be installed in any of the PC 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 **AV-COM** contains several jumper straps for each port that 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 **AV-COM** 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.

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.

Technical Description

The Sealevel **AV-COM** provides the PC with 2 additional serial ports with DIP jumper selection for SMPTE 207M, RS-232, PA-422, and MIDI Interfaces. The **AV-COM** also provides a DIP jumper to select the same pinout as the Sealevel COMM+2 (p/n 3083) in RS-422 mode. The **AV-COM** can be configured As COM1: through COM4:, or any other I/O address up to 3FF Hex.

The **AV-COM** utilizes the 16550 UART. This chip features programmable baud rate, data format, interrupt control and a 16 byte input and output FIFO.

Features Include:

- Full independently configurable serial ports
- Addressable as COM1: - COM4: or any other I/O address up to 3FF Hex
- "Shareable" IRQ's allow more than one port to share a single IRQ
- IRQ's 2-5, 7, 10, 11, 12, 15 supported

Connector Pin Assignments

SMPTE

The Society of Motion Picture and Television Engineers (SMPTE) 207M protocol allows the control of video and audio tape decks for editing purposes. Commands are sent to the tape deck instructing it to play, record, fast forward, rewind, stop, or to go to a particular frame.

Name		DB-9S Pin #	Mode
TD+	Transmit Data +	3	Output SMPTE
TD-	Transmit Data -	8	Output SMPTE
RD+	Receive Data +	7	Input SMPTE
RD-	Receive Data -	2	Input SMPTE
GND	Ground	1,4,6,9	
Loop P4 to P5		5	

RS-232

The **AV-COM** meets the RS-232C specifications, and provides an asynchronous serial I/O port for a modem, plotter, serial printer or serial mouse. This is the standard port configuration found on the IBM "AT" computer except that the connector is a "Female" type connector. A "Male to Male" gender-changer can be added to convert this connector to a male connector. **This pin out is available only on Port 1 (P3) with DIP shunt E6 installed.**

	Name	Pin #	Mode
TD	Transmit Data	3	Output RS-232
RTS	Request To Send	7	Output RS-232
DTR	Data Term Ready	4	Output RS-232
GND	Ground	5	
RD	Receive Data	2	Input RS-232
DCD	Data Carrier Detect	1	Input RS-232
DSR	Data Set Ready	6	Input RS-232
CTS	Clear To Send	8	Input RS-232
RI	Ring Indicator	9	Input RS-232

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.

RS-422 / PA-422

RS-422 allows very long distance (5000 feet at 9600 baud) communications with virtually error free differential drive characteristics. PA-422 is a standard that has been used for Sound System Control.

Name		Pin #	Mode
TX +	Transmit Data +.	8	Output RS-422
TX-	Transmit Data -	9	Output RS-422
DTR+	Data Terminal Ready +	6	Output RS-422
DTR-	Data Terminal Ready -	7	Output RS-422
GND	Ground	3	
RX+	Receive Data +.	4	Input RS-422
RX-	Receive Data -.	5	Input RS-422
DSR+	Data Set Ready +	1	Input RS-422
DSR-	Data Set Ready. -	2	Input RS-422

C2

This is the standard port configuration found on the Sealevel Systems COMM+2 serial adapter except that the connector is a "Female" type connector. A "Male to Male" gender changer can be added to convert this connector to a male connector. **This pin out is available only on Port 1 (P3) with DIP shunt E9 installed.**

	Name	Pin #	Mode
TX+	Transmit Data +	4	Output RS-422
TX-	Transmit Data -	3	Output RS-422
GND	Ground	5	
RX+	Receive Data +	1	Input RS-422
RX-	Receive Data -	2	Input RS-422

MIDI

Musical **I**nstrument **D**igital **I**nterface (MIDI) is a specification allowing multiple devices from a wide variety of vendors to communicate electronically, allowing control and response to musical information. Keyboards, sound modules, and drum machines all can be interconnected and driven by sequencing software. MIDI has been updated recently to include tape deck control for automated recording and stage & light show control for real-time theatrical production.

	Name	Pin #	Mode
MTX +	Transmit Data +.	5	Output MIDI
MTX-	Transmit Data -	9	Output MIDI
GND	Ground	2,6	
MRX+	Receive Data +.	4	Input MIDI
MRX-	Receive Data -.	8	Input MIDI
	MIDI Thru +	3	Output MIDI
	MIDI Thru -	7	Output MIDI

Note: The MIDI setting also changes the clock to the 16550 from a 1.8432 MHz to 2.0MHz. This allows the 31.25 Kbps rate that is the MIDI standard to be implemented (using a divisor of 4 for the Baud Rate Divisor).

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

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

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	8.5 inches	(21.59 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 Sealevel Systems 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 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. While the Sealevel Systems adapter does allow the sharing of IRQ's, 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 Sealevel Systems adapter is securely installed in a motherboard slot.
5. Use the supplied diskette and User Manual to verify that the Sealevel Systems 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 post production manual updates and application specific information.
8. Always use the Sealevel Systems 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. Sealevel Systems maintains a forum on CompuServe providing utilities and new product information. This forum is accessed by typing "GO Sealevel" at the command prompt.
4. 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-422/PA-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once.

RS-422 signal levels range from 0 to +5 volts. While RS-422 does not define a physical connector, PA-422 is a standard that has been used for Sound System Control and defines a mechanical connector and pin assignments which the **AV-COM** does meet.

SMPTE

The **Society of Motion Picture and Television Engineers (SMPTE)** 207M protocol allows the control of video and audio tape decks for editing purposes. Commands are sent to the tape deck instructing it to play, record, fast forward, rewind, stop, or to go to a particular frame. This protocol is often referred to as the “Sony 9-pin” protocol and is essentially RS-422 with a defined mechanical connector and pin assignments.

MIDI

The **Musical Instrument Digital Interface (MIDI)** specification grew out of the need for electronic musicians to link together synthesizers, drum machines, and all manner of other electronic instruments. Until the implementation of MIDI, each manufacturer of electronic musical equipment had its own proprietary method of passing data. With MIDI, a universal language for synthesizer control could be adopted by all manufacturers. MIDI was introduced in 1983 and very quickly was considered the standard for passing data between musical instruments. The MIDI specification has been continually updated and in 1987 was edited to include MIDI Time Code and in 1992 MIDI Machine Control. The MIDI specification is administered by the MIDI Manufacturers Association. From a hardware stand point, MIDI is a simple current loop data signal traveling serially at 31.25K bits per second. MIDI defines the mechanical connector as a 5 pin DIN connector. There are only two ways to connect the instruments with cables: MIDI-IN on one instrument to MIDI-OUT on another or connect the MIDI-THRU to the MIDI-IN. The MIDI-THRU cable “echo’s” or re-transmits the data from the MIDI-IN port, thus providing a means of “daisy chaining” MIDI instruments.

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 or EIA/TIA-232. 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 is 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 at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RRS-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. The RS-232 and the EIA/TIA-574 specification defines two type of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface, but will require a male to male “gender-changer” to fully qualify as a compatible 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.

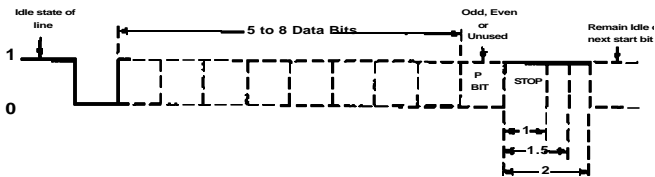
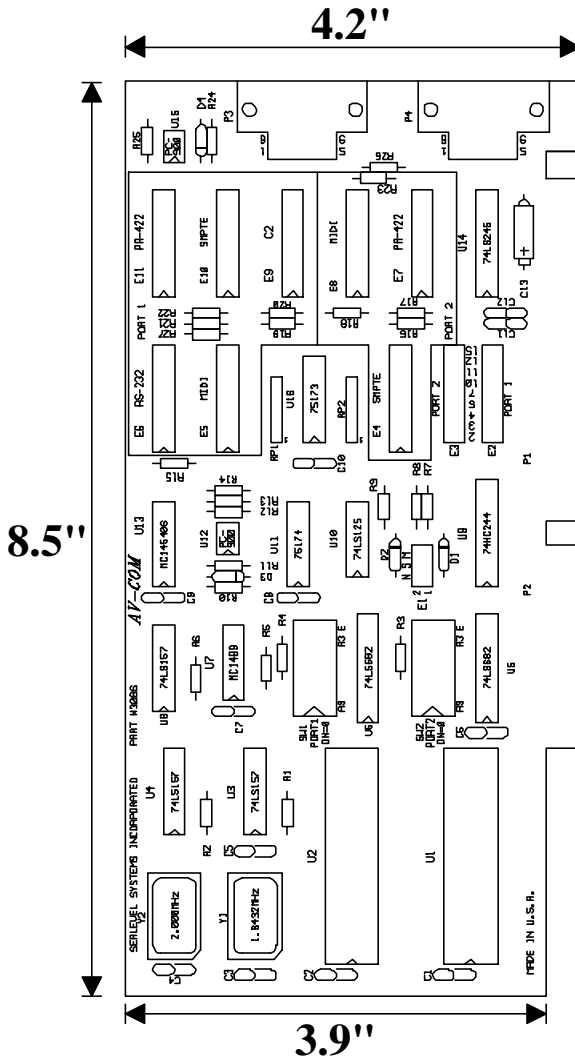


Figure 8 - Asynchronous Communications Bit Diagram

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

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.

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.

Sealevel Systems, Incorporated
155 Technology Place
P.O. Box 830
Liberty, SC 29657 USA
(864) 843-4343 FAX: (864) 843-3067
email: Internet: support@sealevel.com

Technical Support is available from 8 a.m. to 5 p.m. Eastern time.
Monday - Friday

Trademarks

Sealevel Systems, Incorporated acknowledges that all trademarks referenced in this manual are the service mark, trademark, or registered trademark of the respective company.

AV-COM is a trademark of Sealevel Systems, Incorporated.