COMM+422™

USER'S MANUAL

Part Number 3067

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Introduction

Overview

The Sealevel Systems **COMM+422** provides the PC with four RS-422/485 asynchronous communication ports. The **COMM+422** allows for connection to any device utilizing the RS-422/485 electrical interface, such as modems, data-entry terminals, and programmable logic controllers.

What's Included

The **COMM+422** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- (1) **COMM+422** serial interface adapter card
- (1) DB-9 cable assembly
- (1) 3.5" Serial Utility Diskette
- User manual

Factory Default Settings

The **COMM+422** factory default settings are as follows:

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

To install the **COMM+422** using factory default settings, refer to Installation on page 5.

For your reference, record installed **COMM+422** settings below:

	Base Address	IRQ
Port 1		
Port 2		
Port 3		
Port 4		

Card Setup

The **COMM+422** contains several jumper straps for each port which must be set for proper operation.

Address Selection

The **COMM+422** 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**
280-29F	Off	On	Off	On	On
2A0-2BF	Off	On	Off	On	Off
380-39F	Off	Off	Off	On	On
1A0-1BF	On	Off	Off	On	Off
2E0-2FF	Off	On	Off	Off	Off

Figure 1 - Address Selection Table

Refer to Appendix A for common address contentions. The 2E0-2FF setting in conjunction with an IRQ3 interrupt selection will let the PC recognize COM2:(2F8) and COM4:(2E8).

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. Address 2E0 in binary is XX 10 111X XXXX where X = a non-selectable address bit.
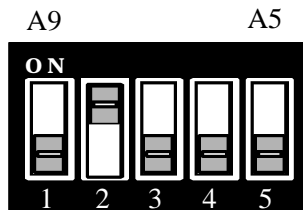

Figure 2 - DIP-Switch Illustration

Port #	Connector Location	Address	Example (Base=280)
1	J1	Base+0	280-287
2	J2	Base+8	288-28F
3	J3	Base+16	290-297
4	J4	Base+24	298-29F

Figure 3 - Port to Connector Table

IRQ Selection

The **COMM+422** has an interrupt selection jumper which should be set prior to use if an interrupt is required by your application software. Consult the user manual for the application software being used to determine the proper setting. The four interrupts are OR'ed together to form a single interrupt request (IRQ). This signal is converted to open collector active high pull-up allowing multiple **COMM+422** adapters to share the same IRQ line. The IRQ can be set at jumper E1 for IRQ 2/9, 3, 4, or 5. In the following example, the IRQ is set as IRQ3.
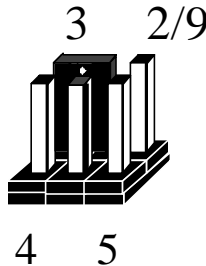

Figure 4 - Header E1, IRQ Selection shown. (IRQ3 Selected)

Note: The actual silk-screen for the **COMM+422** may have a "2" in place of the IRQ "2/9" selection.

RS-485 Enable

Header E2 selects whether the RS-485 driver is enabled by the UART signal **R**equest **T**o **S**end (RTS) or is always enabled. With the jumper installed, RTS enables the driver. Removing the jumper enables the driver regardless of RTS. These jumpers should only be installed if you are running the board in a multi-drop polled environment such as RS-485. For normal point to point RS-422 (such as terminal emulation), remove these jumpers.

E2

```
 ┌─────────────┐
 │ ○ ○ ○ ○ │
 │ ○ ○ ○ ○ │
 └─────────────┘
   4  3  2  1
```
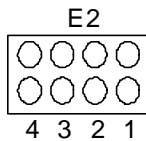
Figure 5 - Header E2 (RTS enable)

Note: Each port on the **COMM+422** can be independently selected as RS-422 or RS-485. The number below Header E2 represents the port number (i.e. 1 = Base address, 2 = Base+8 etc.) that is effected when the jumper is installed. In the above example all ports are set to "Driver permanently enabled". This is the default for Header E2**.**

Installation

The **COMM+422** can be installed in any of the PC expansion slots. The **COMM+422** contains several jumper straps for each port which must be set for proper operation.

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 **COMM+422** into the slot. Make sure that the adapter is seated properly.
5. Install the **COMM+422** in a slot, and then install the extra two port cable bracket in the slot toward the power supply from the board.
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 **COMM+422** provides four RS-422/485 serial ports, each utilizing a 16550 UART. This chip features programmable baud rate, data format, interrupt control and a 16 byte input and output FIFO. The **COMM+422** is configured as four consecutively addressed UARTs with full RS-422/485 signal drivers and receivers.

Features

- Four RS-422/485 ports
- Selectable interrupts (IRQs) 2/9, 3, 4, 5
- Multiple cards or ports can share the same IRQ
- 16550 UART standard

Connector Pin Assignments

Signal	Name	Pin #	Mode
GND	Ground	5	
TX +	Transmit Data Positive	4	Output
TX-	Transmit Data Negative	3	Output
RTS+	Request To Send Positive	6	Output
RTS-	Request To Send Negative	7	Output
RX+	Receive Data Positive	1	Input
RX-	Receive Data Negative	2	Input
CTS+	Clear To Send Positive	9	Input
CTS-	Clear To Send Negative	8	Input

Figure 6 - Connector Pin Assignments

Modem Control Signal Considerations

Some software packages require the use of the modem handshake signals. The **COMM+422** provides modem control signals **R**equest **T**o **S**end (RTS) and **C**lear **T**o **S**end (CTS). The signal CTS is biased via a resistor network to a "True" or "On" state when left disconnected. All other modem control signals associated with the UART are tied to the "True" or "On" state. This configuration will typically satisfy the modem control signal requirements for most communications software.

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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

Power Consumption

Supply line	+5 VDC
Rating	550 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	4.9 inches	(12.45 cm)
Board Height including Goldfingers	4.2 inches	(10.66 cm)
Board Height excluding Goldfingers	3.9 inches	(9.91 cm)

Please see Appendix E for board layout and dimensions.

Appendix A - Troubleshooting

A Serial Utility Diskette supplied with the Sealevel Systems adapter is 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 not a 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 260-27F and 360-37F settings may conflict with your printer I/O adapter.
   - 3A0-3BF cannot be used if a Monochrome Display adapter is installed.
   - 2E0 to 2FF includes the standard address for COM2: (2F8) and COM4: (2E8). This is a valid setup option for the **COMM+422.** However, since only 10 address lines are actually decoded, a possible conflict with an advanced video card emulating the IBM XGA adapter (8514 register set) may occur.

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 available. 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. Sealevel Systems Internet address for email is: support@sealevel.com.

5. 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

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. RS-422 does not define a physical connector.

RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for partyline or multi-drop applications. The output of the RS-422/485 driver is capable of being **Active** (enabled) or **Tri-State** (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. The output modem control signal RTS controls the state of the driver. Some communication software packages refer to RS-485 as RTS enable or RTS block mode transfer. RS-485 can be cabled in two ways, two wire and four wire mode. Two wire mode does not allow for full duplex communication, and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector..

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.
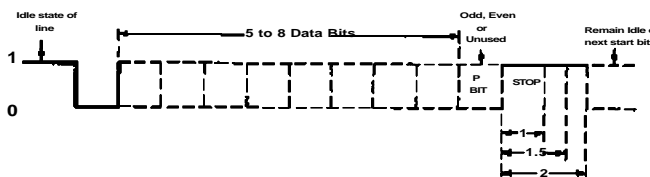

Figure 7 - Asynchronous Communications Bit Diagram

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 - 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 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.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the calling, 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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Technical Support is available from 8 a.m. to 5 p.m. Eastern time.
Monday - Friday

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