SeaLINK USB Serial Manual

User Manual | SeaLINK DIN Rail USB Serial Family

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Contents

Introduction

SeaLINK DIN Rail USB serial interface adapters are the perfect way to add RS-232, RS-422, or RS-485 serial peripherals such as barcode scanners, serial displays, and data acquisition modules to any USB port.

Offering one or two DB9M serial ports, models are available for RS-232, RS-422/485, and RS-232/422/485 interfaces. Serial ports are configurable via dip switches accessible through the case. There is never a need to open the enclosure, which simplifies field installation and service.

Optically isolated models prevent damage caused by surges and ground loops commonly found in industrial environments. Status LEDs display transmit and receive activity, and data rates up to 921.6K bps are supported.

The serial ports appear as standard COM ports to the host computer enabling compatibility with legacy software. SeaLINK USB serial interface adapters are USB bus powered, eliminating the need for external power supplies.

All models integrate the patent-pending SeaLATCH USB port, which is fully compatible with standard USB cables. When used with the included USB cable with a SeaLATCH USB type B connector, the metal thumbscrew provides a secure connection to the device and prevents accidental cable disconnection.

Ready for DIN rail mounting, SeaLINK USB serial interface adapters include a removable plastic clip that snaps onto 35mm DIN rail. The clip can also be attached to a wall, under a counter, or inside a panel with optional screws.

Sealevel DIN Rail USB Serial Adapters Family

This manual covers the installation and operation of these devices:

Product	Part No.	Description
SeaLINK+Multi.DIN	(P/N 2109)	- 1 Port RS-232/422/485
SeaLINK+232I.DIN	(P/N 2111)	- 1 Port Isolated RS-232
SeaLINK+485I.DIN	(P/N 2112)	- 1 Port Isolated RS-422/485
SeaLINK+I.DIN	(P/N 2113)	- 1 Port Isolated RS-232/422-485
SeaLINK+2.DIN	(P/N 2209)	- 2 Port RS-232/422/485
SeaLINK+2/232I.DIN	(P/N 2211)	- 2 Port Isolated RS-232
SeaLINK+2/485I.DIN	(P/N 2212)	- 2 Port Isolated RS-422/485
SeaLINK+2I.DIN	(P/N 2213)	- 2 Port Isolated RS-232/422/485

Before You Get Started

What's Included

The SeaLINK DIN Rail USB Serial Adapters ship with the following items. If any of these items is missing or damaged, please contact Sealevel for replacement.

- **SeaLINK USB Serial Adapter** – (see part numbers on previous page)
- **CA356** – USB Type A to SeaLATCH USB Type B Cable, 6' in Length
- **LB101** – DB9F Serial Loopback Adapter

Advisory Conventions

Warning
The highest level of importance used to stress a condition where damage could result to the product, or the user could suffer serious injury.

Important
The middle level of importance used to highlight information that might not seem obvious or a situation that could cause the product to fail.

Note
The lowest level of importance used to provide background information, additional tips, or other non-critical facts that will not affect the use of the product.

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the SeaLINK USB Serial Adapters to real-world signals. All items can be purchased from our website (www.sealevel.com) or by calling (864) 843-4343. For applicable accessories, pin out diagrams are located on the website.

- **CA127** – DB9 female to DB9 male serial extension cable. Extends a DB9 serial connection by 72".
- **CA176** – DB9 female (RS-422) to DB25 male (RS-530) cable, 10" in length. Converts Sealevel DB9 RS-422 pinout to the RS-530 DB25 pinout, useful where RS-530 cabling already exists.
- **CA177** – DB9 female to DB25 male modem cable, 72" in length. A standard RS-232 modem cable providing a convenient connection to serial peripherals with DB25 connectors. Connects to the host system via a DB9 connector.
- **DB103** – DB9 female (RS-422) to DB9 female (Opto 22 Optomux) converter.
- **RJ9S8** – DB9 female to RJ45 modular adapter. Helpful for converting DB9 serial port to RJ45 connector for using existing CAT5 infrastructure wiring.
- **TB05** – A terminal block with a DB9 female connector breaking out to 9 screw terminals. Simplifies field wiring of RS-422/485 networks with differing pin out configurations.
- **TB06** – A terminal block with dual DB9 female connectors breaking out to 18 screw terminals. Simplifies field wiring of RS-422/485 networks with differing pin out configurations.
- **Seal/O-270U** – Sealevel's powered 7-port USB hub providing 1500 VAC of optical isolation to the host system. Integrated SeaLATCH locking USB type A & type B connectors (refer to the SeaLATCH USB section of this manual for detailed information on SeaLATCH locking USB connectors and cables).
- **HUB7i** – Sealevel's powered 7-port USB hub providing up to 5500 VAC of optical isolation to the host system.

Hardware Description

SeaLINK USB 1-Port Devices

Common Features

- Appears as virtual COM port to host machine.
- Supports data rates to 921.6K bps.
- Innovative SeaLATCH locking USB port provides secure cable connection.
- Status LEDs display serial transmit and receive activity.
- Popular DB9 male connector.
- Easily snaps onto 35mm DIN rail.
- USB bus powered eliminates external power supplies.

SeaLINK+Multi.DIN (Item# 2109) Features

- Configurable for RS-232, RS-422, or RS-485 via dip switches.
- Change configurations without opening the enclosure.
- Automatic RS-485 enable/disable.
- Non-isolated version.

SeaLINK+232I.DIN (Item# 2111) Features

- Single RS-232 DB9 male serial port.
- No dip switches to set; all changes can be made in software.
- Easy way to connect RS-232 device to a USB port.
- Optical isolation provides protection against surges and ground loops.

SeaLINK+485I.DIN (Item# 2112) Features

- Configurable for RS-422 or RS-485 via dip switches.
- Change configurations without opening the enclosure.
- Automatic RS-485 enable/disable.
- Optical isolation provides protection against surges and ground loops.

SeaLINK+I.DIN (Item# 2113) Features

- Configurable for RS-232, RS-422, or RS-485 via dip switches.
- Change configurations without opening the enclosure.
- Automatic RS-485 enable/disable.
- Optical isolation provides protection against surges and ground loops.

SeaLINK USB 2-Port Devices

Common Features

- Appears as virtual COM ports to host machine.
- Supports data rates to 921.6K bps.
- Innovative SeaLATCH locking USB port provides secure cable connection.
- Status LEDs display serial transmit and receive activity.
- Popular DB9 male connectors.
- Easily snaps onto 35mm DIN rail.
- USB bus powered eliminates external power supplies.

SeaLINK+2.DIN (Item# 2209) Features

- Configurable for RS-232, RS-422, or RS-485 via dip switches.
- Change configurations without opening the enclosure.
- Automatic RS-485 enable/disable.
- Non-isolated version.

SeaLINK+2/232I.DIN (Item# 2211) Features

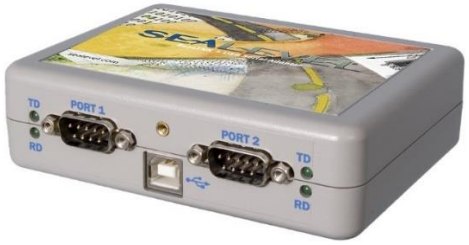
- Two RS-232 DB9 male serial ports.
- No dip switches to set; all changes can be made in software.
- Easy way to connect RS-232 devices to a USB port.
- Optical isolation provides protection against surges and ground loops.

SeaLINK+2/485I.DIN (Item# 2212) Features

- Configurable for RS-422 or RS-485 via dip switches.
- Change configurations without opening the enclosure.
- Automatic RS-485 enable/disable.
- Optical isolation provides protection against surges and ground loops.

SeaLINK+2I.DIN (Item# 2213) Features

- Configurable for RS-232, RS-422, or RS-485 via dip switches.
- Change configurations without opening the enclosure.
- Automatic RS-485 enable/disable.
- Optical isolation provides protection against surges and ground loops.

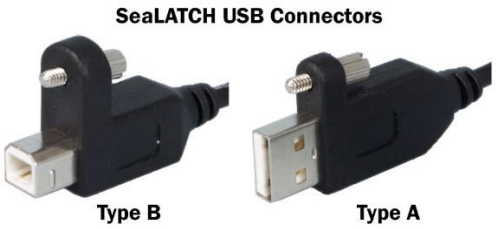


SeaLATCH™ USB

SeaLINK USB serial adapters integrate the patent-pending SeaLATCH USB port, which is fully compatible with standard USB cables. When used with the included USB cable (Item# CA356) with a SeaLATCH USB type B connector, the metal thumbscrew provides a secure connection to the device and prevents accidental cable disconnection.

SeaLATCH™ USB

SeaLATCH Locking USB Cables

SeaLATCH USB Connectors	
SeaLATCH locking USB cables integrate a small thumbscrew into each USB connector. SeaLATCH USB cables are fully interchangeable with standard USB cables. The thumbscrew provides a secure metal-to-metal connection preventing accidental disconnection. SeaLATCH USB cables are available in three configurations.	
Item# CA356	
The CA356 is a 72" USB cable with a SeaLATCH type B connector and a standard USB type A connector. This cable provides a secure connection between Sealevel products with a SeaLATCH type B port and legacy USB type A ports. The CA356 is included with Sealevel devices with a SeaLATCH type B port.	
Item# CA332	
The CA332 is a 72" cable with both SeaLATCH type A and B connectors. This cable secures both ends of the cable to devices with SeaLATCH USB ports and offers complete protection against accidental cable disconnection.	
Item# CA355	
The CA355 is a 72" cable with a standard USB type B and a SeaLATCH type A connector. This cable provides a secure connection between legacy USB devices and Sealevel products with a SeaLATCH type A port, such as the isolated USB hub (Item# 270U).	

Hardware Configuration

RS-232/422/485 Multi-Interface Products

Items# 2109, 2113, 2209, 2213

Dip switches on SeaLINK USB multi-interface serial adapters provide the ability to communicate with RS-232, RS-422 or RS-485 devices. These switches are also used to set RS-485 enable modes and termination options. Single port models have a single eight-position dip switch. Two port models have a pair of eight-position dip switches allowing each port to be individually configured. All configuration changes can be made without opening the enclosure.

DIP Switches

Switch	ON	OFF
8	2 Wire –	4 Wire –
7	2 Wire +	4 Wire +
6	RD 1K PU	–
5	RD 1K PD	–
4	120Ω Termination	–
3	Echo Off	Echo On
2	RS-485	RS-422
1	RS-422/485	RS-232

Switch	Function
8	RS-485 Option, OFF for RS-232, RS-422 ON: Connects TX– and RX– for two-wire operation OFF: Separates TX– and RX– for four-wire operation
7	RS-485 Option, OFF for RS-232, RS-422 ON: Connects TX+ and RX+ for two-wire operation OFF: Separates TX+ and RX+ for four-wire operation
6	RS-485 Option, OFF for RS-232, RS-422 ON: Adds a 1K Ω pull-up resistor to RX+ OFF: Leaves RX+ floating
5	RS-485 Option, OFF for RS-232, RS-422 ON: Adds a 1K Ω pull-down resistor to RX– OFF: Leaves RX– floating
4	RS-422, RS-485 Option, OFF for RS-232 ON: Adds a 120Ω termination resistor between RX+ and RX– OFF: No line termination
3	Two-Wire RS-485 Option, OFF for RS-232, RS-422, Four-Wire RS-485 ON: ECHO Off. The receiver is disabled when the transmitter is enabled. In a two-wire setup the receiver will not echo back transmitted data OFF: ECHO On. The receiver is always enabled. In a two-wire setup the receiver will echo back all transmitted data
2	Mode Selection ON: RS-485 mode. The transmitter lines TX+ and TX– are switched to high impedance when the device is not actively transmitting data OFF: RS-422 mode. The transmitter lines TX+ and TX– are always driven
1	Mode Selection ON: RS-422, RS-485 mode OFF: RS-232 mode

Dip Switches (continued)

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. One of the unique features of SeaLINK USB serial devices is the ability to be RS-485 compatible without the need for special software or drivers (RS-485 auto-enable).

Typically, each end of the RS-485 bus must have a line-terminating resistor (RS-422 terminates the receive end only). A 120Ω resistor is across each RS-422/485 input in addition to a 1KΩ pull-up and a 1KΩ pull-down combination that biases the receiver inputs.

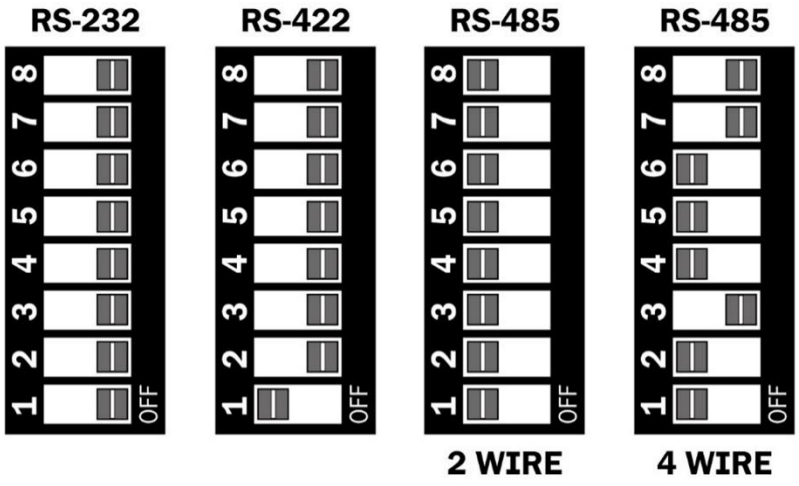
Only the ends of an RS-485 network should have the 120Ω terminating resistor. The resistor may be removed or inserted using dip switch #4. This allows you to customize the electrical interface to your specific requirements.

To add the termination/bias resistors, use dip switches #4, #5, and #6 to select the 'On' position, and to remove it, select the 'Off' position. If multiple devices are configured in an RS-485 network, only the devices at each end should have switches #4, #5, and #6 'On'.

The final option that is configurable is the 'Echo' option. Two-wire RS-485 connects the TX± to the RX±. Every time a character is transmitted it is also received. This can be beneficial if the software can handle echoing (i.e., using received characters to throttle the transmitter), or it can confuse the system if the software does not. Switch #3 is used to control the RS-485 enable/disable functions for the receiver circuit. To select the 'No Echo' mode set switch #3 to 'On'.

Common SeaLINK device configurations are shown in the examples below.

Example Settings



RS-422/485 Products

Items# 2112, 2212

Dip switches on SeaLINK USB RS-422/485 serial adapters provide the ability to communicate with RS-422 or RS-485 devices. These switches are also used to set RS-485 enable modes and termination options. Single port models have a single eight-position dip switch. Two port models have a pair of eight-position dip switches allowing each port to be individually configured. All configuration changes can be made without opening the enclosure.

Dip Switches

Switch	ON	OFF
8	2 Wire –	4 Wire –
7	2 Wire +	4 Wire +
6	RD 1K PU	–
5	RD 1K PD	–
4	120Ω Termination	–
3	Echo Off	Echo On
2	RS-485	RS-422
1	RS-422/485	–

Switch	Function
8	RS-485 Option, OFF for RS-422 ON: Connects TX– and RX– for two-wire operation OFF: Separates TX– and RX– for four-wire operation
7	RS-485 Option, OFF for RS-422 ON: Connects TX+ and RX+ for two-wire operation OFF: Separates TX+ and RX+ for four-wire operation
6	RS-485 Option, OFF for RS-422 ON: Adds a 1K Ω pull-up resistor to RX+ OFF: Leaves RX+ floating
5	RS-485 Option, OFF for RS-422 ON: Adds a 1K Ω pull-down resistor to RX– OFF: Leaves RX– floating
4	RS-422, RS-485 Option ON: Adds a 120Ω termination resistor between RX+ and RX– OFF: No line termination
3	Two-Wire RS-485 Option, OFF for RS-422, Four-Wire RS-485 ON: ECHO Off. The receiver is disabled when the transmitter is enabled. In a two-wire setup the receiver will not echo back transmitted data OFF: ECHO On. The receiver is always enabled. In a two-wire setup the receiver will echo back all transmitted data
2	Mode Selection ON: RS-485 mode. The transmitter lines TX+ and TX– are switched to high impedance when the device is not actively transmitting data OFF: RS-422 mode. The transmitter lines TX+ and TX– are always driven
1	Mode Selection ON: RS-422, RS-485 mode OFF: Must be 'ON'

Dip Switches (continued)

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. One of the unique features of SeaLINK USB serial devices is the ability to be RS-485 compatible without the need for special software or drivers (RS-485 auto-enable).

Typically, each end of the RS-485 bus must have a line-terminating resistor (RS-422 terminates the receive end only). A 120Ω resistor is across each RS-422/485 input in addition to a 1KΩ pull-up and a 1KΩ pull-down combination that biases the receiver inputs.

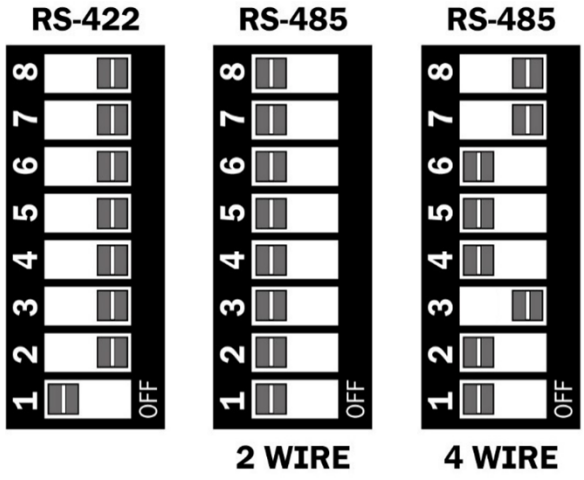
Only the ends of an RS-485 network should have the 120Ω terminating resistor. The resistor may be removed or inserted using dip switch #4. This allows you to customize the electrical interface to your specific requirements.

To add the termination/bias resistors, use dip switches #4, #5, and #6 to select the 'On' position, and to remove it, select the 'Off' position. If multiple devices are configured in an RS-485 network, only the devices at each end should have switches #4, #5, and #6 'On'.

The final option that is configurable is the 'Echo' option. Two-wire RS-485 connects the TX± to the RX±. Every time a character is transmitted it is also received. This can be beneficial if the software can handle echoing (i.e., using received characters to throttle the transmitter), or it can confuse the system if the software does not. Switch #3 is used to control the RS-485 enable/disable functions for the receiver circuit. To select the 'No Echo' mode set switch #3 to 'On'.

Common SeaLINK device configurations are shown in the examples below.

Example Setting



RS-232 Products

Items# 2111, 2211

SeaLINK RS-232 only serial devices **do not require** any hardware settings, and the enclosures should not be opened. All configuration (e.g., baud rate, parity, etc.) settings can be made through the SeaCOM software driver or application interface.

Proceed with installing the SeaCOM software driver as directed on the software installation page Be sure to install all software prior to plugging the SeaLINK USB device into a USB port.

Software Installation

Windows Installation

Do not connect the device to a USB port until the software has been fully installed.

Only users running Windows 7 or newer should utilize these instructions for accessing and installing the appropriate driver via Sealevel's website. If you are utilizing an operating system prior to Windows 7, please contact Sealevel by calling 864.843.4343 or emailing support@sealevel.com to receive access to the proper driver download and installation instructions.

For Windows Users

1. Begin by locating, selecting, and installing the correct software from the Sealevel software driver database.

2. Select the Part Number (2213, 2113, etc..) for your device from the listing. If you cannot locate the device that you are installing, skip to #5 below and download the SeaCOM software before installing the hardware.

3. Click the 'Download Now' link to download SeaCOM for Windows.

4. The setup file will automatically detect the operating environment and install the proper components.

5. The SeaCOM Asynchronous Serial Software Suite, SeaCOM for Microsoft Windows and other utility software can also be downloaded from Sealevel's website. Sealevel's SeaCOM enhanced serial driver makes using the features of our asynchronous serial products easy. In addition to being completely compatible with the Microsoft Windows Serial Driver, SeaCOM also makes use of advanced UART features of our board-based adapters without requiring changes to your software application.

6. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.

7. During setup, the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.

To confirm that the SeaCOM driver has been successfully installed, click on the 'Start' button, and then select 'All Programs'. You should see the 'SeaCOM' program folder listed.

You are now ready to proceed with connecting the adapter to your system. Refer to the Hardware Installation section for details.

Windows NT is not USB aware and thus cannot support this device.

Third Party Software Support

Third party software support for many HMI/MMI and other process control software is also available from the Sealevel software database. For the most up to date information on third party software support, please visit the 3rd-Party Software Archives - Sealevel.

Other Operating Systems

Refer to the appropriate section of the Serial Utilities Software.

LINUX INSTALLATION

Refer to Linux Archives - Sealevel. This link contains valuable information on installing your serial adapter in the various Linux releases. Also included is a series of files explaining proper Linux syntax and typical Linux serial implementations.

For additional software support, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00 AM - 5:00 PM Eastern Time, Monday through Friday. For email support contact: support@sealevel.com.

Physical Installation

SeaLINK USB serial adapters can be connected to any spare USB port.

Do not connect the device to a USB port until the software has been fully installed.

1. Connect the SeaLINK USB serial adapter to a USB port using the supplied USB device cable.
2. The software drivers installed during setup will automatically recognize and configure the device.
3. You should see one or more “New Hardware Found” windows, indicating the actual device being created.

The installation will repeat twice for each COM port (a total of 4 times on two port devices). This is a limitation in the way Windows installs external serial devices.

4. Next, view your system’s Device Manager.
5. You should have new COM: ports in the Ports (COM & LPT) Device Class indicating the installation was successful.
6. You can access your new COM: port by using the assigned COM: identifier. This assignment will vary from system to system.
7. To verify operation, use Sealevel Systems supplied WinSSD diagnostic utility. WinSSD can be found in the Start, Programs group.

Your SeaLINK USB serial adapter is now ready for use.

Connector Pin Assignments

RS-232 (DB9 Male)

This pin out covers the following products:
2109, 2111, 2113, 2209, 2211, and 2213.

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

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 ensure you get the best performance from your adapter.

RS-422/485 (DB9 Male)

This pin out covers the following products:
2109, 2112, 2113, 2209, 2212, and 2213.

Pin #	Signal	Name	Mode
1	RD+	Receive Data Positive	Input
2	RD-	Receive Data Negative	Input
3	TD-	Transmit Data Negative	Output
4	TD+	Transmit Data Positive	Output
5	GND	Ground	
6	-	No Connect	
7	-	No Connect	
8	-	No Connect	
9	-	No Connect	

Mounting Options

DIN Rail Mounting	
SeaLINK USB serial adapters ship ready for mounting on DIN rail. A small, rugged plastic clip (shown below) is included that snaps onto 35mm DIN rail. This offers a clean installation by locating the USB serial adapters near the industrial control equipment on the DIN rail. Additionally, innovative SeaLATCH locking USB ports help prevent accidental USB cable disconnection.	
Wall Panel Mounting	
As an alternative to DIN rail, the versatile plastic clip includes mounting holes that allow SeaLINK USB serial adapters to be mounted to walls, under counters, or inside panels. The plastic clip can be permanently mounted to a surface while still allowing the SeaLINK serial adapter to be easily removed for service or configuration changes.	
Table/Desktop Mounting	
SeaLINK USB serial adapters are perfect for table or desktop use. The units ship with four rubber feet that help prevent the devices from sliding due to vibration and help protect surfaces from scratches. The small enclosures take up very little space.	

Technical Specifications

Power Requirements

Part No.	Supply Line	Rating
2109 2111	+5 VDC	100mA
2112 2113 2209 2211 2212	+5VDC	200mA
2213	+5VDC	300mA

Physical Dimensions

Board Length	4.5 inches (115 mm)
Board Width	3.5” (89 mm)
Board Height	1.3 inches (32 cm)

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0° to 70° C (32°F – 158°F)	-50° to 105° C (-58°F – 221°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 UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Appendix A – Troubleshooting

Sealevel 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. If your adapter isn't working, first check to make sure that USB support is enabled in the System BIOS and it is functioning properly in the operating system. This can be done by using either the Windows 98/ME or Windows 2000 Device Manager.
2. Ensure that the Sealevel Systems software has been installed on the machine so that the necessary files are in place to complete the installation.
3. When the SeaLINK USB serial adapter is configured properly, Sealevel's WinSSD utility and a loopback plug can be used to check communications. You can make a simple Loopback in the field by connecting the TX and RX pins. If you decide to test the Modem Control Signals, a full pin loopback plug will be required. Details on loopback plugs are included within WinSSD. Contact Sealevel Systems if you need further assistance.
4. When testing the SeaLINK USB serial adapter in loopback mode, you should see both the TD and RD echoed as data on the screen. The loopback test first transmits a HEX pattern, 55AA, and then an ASCII string of data. If this test passes, then the SeaLINK serial adapter is ready for use in your application.
5. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate any software issues from the equation.

If these steps do not solve your problem, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00 AM - 5:00 PM Eastern Time, Monday through Friday. For email support contact: support@sealevel.com

Appendix B – How To Get Assistance

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

Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed, please see below.

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.

Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp.

Sealevel Systems maintains a web page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our web site.

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 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 widespread 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. 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. 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 SeaLINK+16.VC is a DTE device.

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.

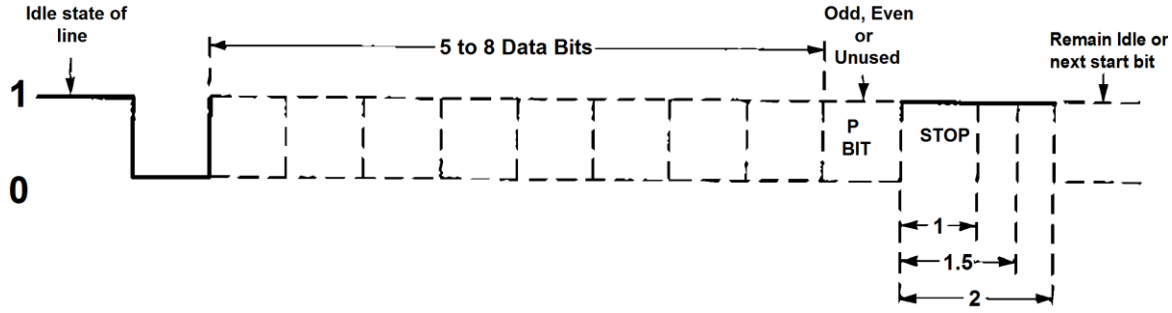
RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for party line 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. 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.

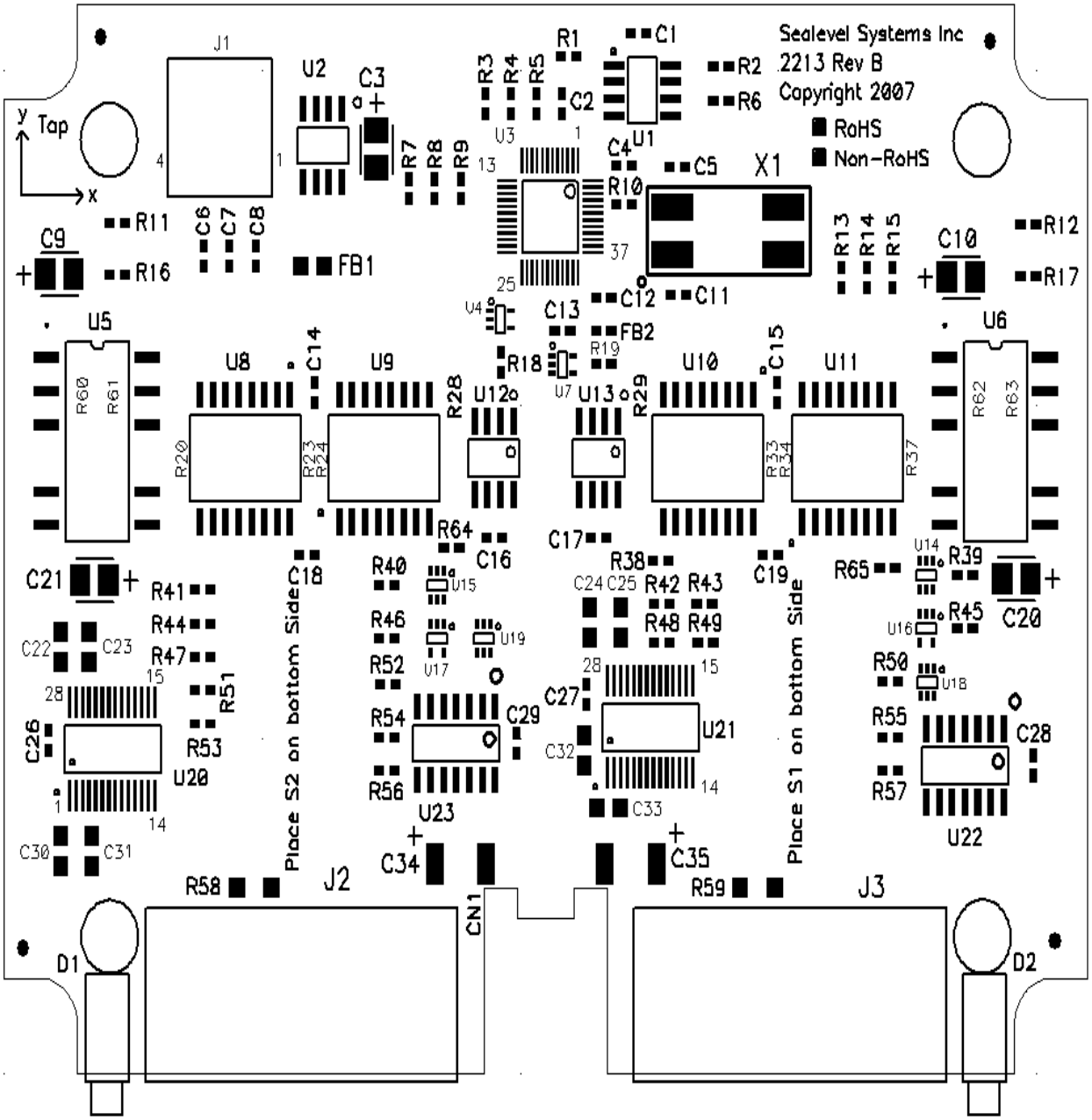
Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A start 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 (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.



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 – Compliance Notices

Federal Communications Commission (FCC) Statement

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 the user's 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".

United Kingdom Conformity Assessed Statement

Products with UKCA marking are in conformity with the essential requirements of the UK Electromagnetic Compatibility Regulations 2016:

- *Equipment must be designed and manufactured to ensure that the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment cannot operate as intended.*
- *The equipment has a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of its intended use.*

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 to prevent or correct the interference.

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's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured I/O products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing. Sealevel achieved ISO-9001:2015 certification in 2018.

Warranty Policy

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for the warranty period. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect, abuse, accidents, or acts of nature are not covered under this warranty.

Warranty service may be obtained by delivering the Product to Sealevel and providing proof of purchase. Customer agrees to ensure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

Non-Warranty Repair/Retest

Products returned due to damage or misuse and Products retested with no problem found are subject to repair/retest charges. A purchase order or credit card number and authorization must be provided in order to obtain an RMA (Return Merchandise Authorization) number prior to returning Product.

How to obtain an RMA (Return Merchandise Authorization)

If you need to return a product for warranty or non-warranty repair, you must first obtain an RMA number. Please contact Sealevel Systems, Inc. Technical Support for assistance:

Available	Monday – Friday, 8:00AM to 5:00PM EST
Phone	864-843-4343
Email	support@sealevel.com

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