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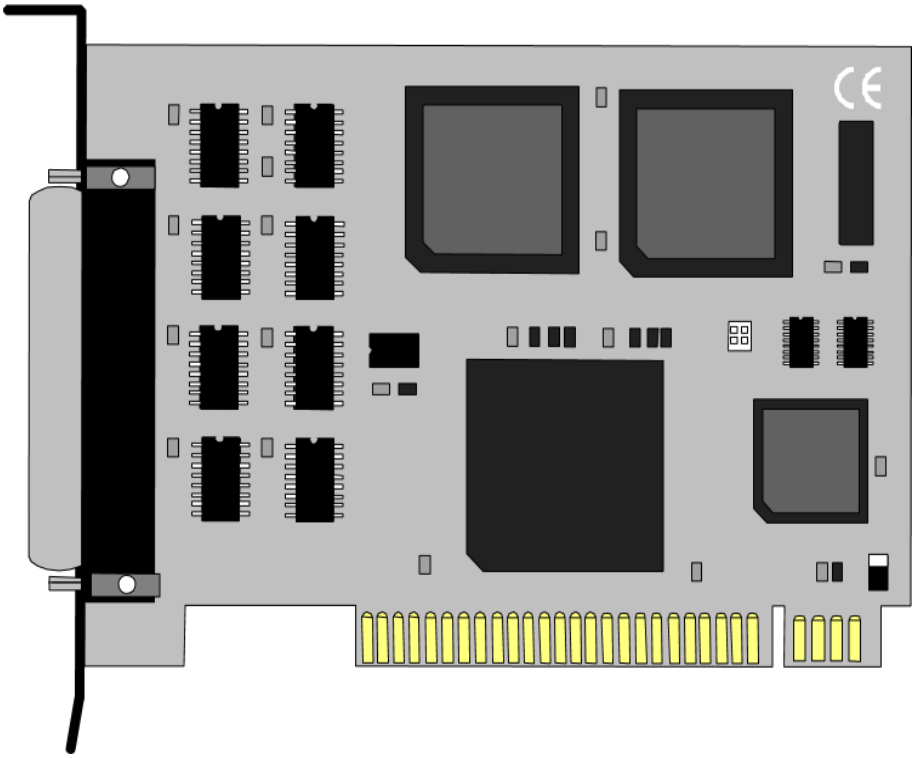
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™ SIO-485

User Manual | 3054



SEALEVEL®

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Introduction

Overview

The Sealevel Systems **SIO-485** provides the PC with one asynchronous RS-422/485 serial port which can interface to a variety of industrial equipment.

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Before You Get Started

What's Included

The **SIO-485** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **SIO-485** Serial I/O 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.

Factory Default Settings

The **SIO-485** factory default settings are as follows:

Base Address	IRQ	Electrical Specification
3F8	4	RS-422

To install the **SIO-485** using factory default settings, refer to the Installation page on Page 8.

For your reference, record installed **SIO-485** settings below:

Base Address	IRQ	Electrical Specification

Card Setup

The SIO-485 contains several jumper straps which must be set for proper operation.

Address Selection

The SIO-485 occupies eight 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 SIO-485 has a total of eight I/O address selections, if more than one switch is closed the board will be non-functional. Leaving all eight switches open will disable the port.

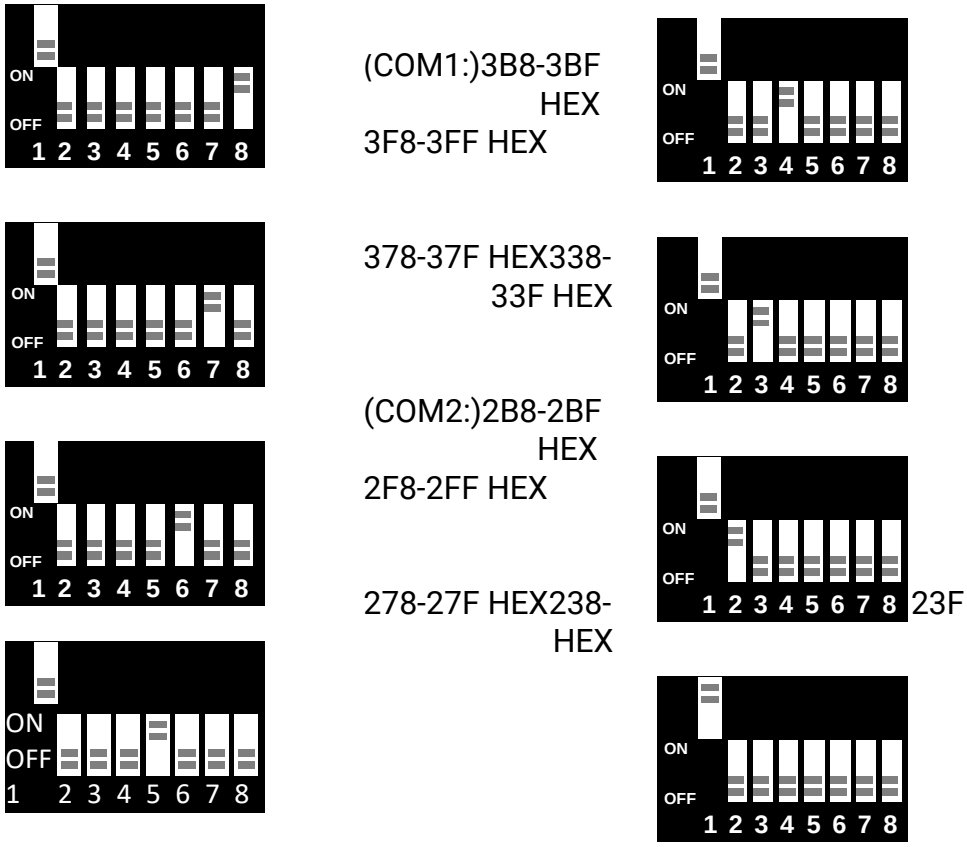


Figure 1 - DIP -Switch Illustration

Refer to Appendix A for common address contentions.

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CARD SETUP, CONTINUED

Interface Selection

RS-422

The RS-422 option is selected when the RS-422/485 driver/receiver pair are installed at U6 (**75176**) and U7 (**75174**) and Header E2 is removed or set to one pin.

RS-485

The RS-485 option is installed when the RS-422/485 chips are installed at U6 (**75176**) and U7 (**75174**). The output of the RS-422/485 driver is capable of being **Active** (enabled) or **Tri-State** (disabled) for RS-485 compatibility. Header E2 selects whether the RS-485 driver is enabled by the UART signal **R**equest **T**o **S**end (RTS) or always enabled. With the jumper installed at Header E2, RTS enables the driver (RS-485). Removing the jumper from Header E2 enables the driver regardless of RTS (RS-422).

Header E1, IRQ Selection

The **SIO-485** has an interrupt selection jumper that should be set prior to use. Consult the user manual for the application software being used to determine the proper setting. E1 selects the interrupt request for the port. A jumper at position 3 of E1 selects IRQ3, at position 4, IRQ4 is selected. If no IRQ is required, remove the jumper completely.

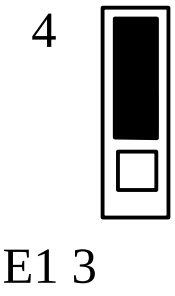


Figure 2 - Header E1, IRQ Selection (Shown in Factory Default)

Header E2, RTS Enable option for RS-485

Header E2 selects whether the RS-485 driver is enabled by the UART signal **R**equest **T**o **S**end (RTS) or always enabled. With the jumper installed, RTS enables the driver. Removing the jumper enables the driver regardless of RTS.

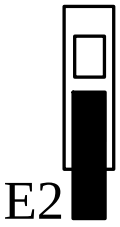


Figure 3- Header E2, RS-485 Mode, RTS Enable (Factory Default)

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INSTALLATION

Hardware Installation

The SIO-485 can be installed in any of the PC expansion slots. The SIO-485 contains several jumper straps for each port which must be set for proper operation.

1. Determine the interface required and configure the SIO-485 accordingly. (Refer to the section on Card Setup)
2. Turn off PC power. Disconnect the power cord.
3. Remove the PC case cover.
4. Locate an available slot and remove the blank metal slot cover.
5. Gently insert the SIO-485 into the slot. Make sure the adapter is seated properly.
6. Replace the screw.
7. Replace the cover.
8. Connect the power cord.

Installation is complete.

INSTALLATION, CONTINUED

SeaCOM Software Installation

Windows 98/ME/2000/XP/Vista™ Operating Systems

1. To obtain the most current software driver package from Sealevel's website, download from here:
    - SeaCOM for Windows
    - SeaCOM for Linux
2. Click on the SeaCOM link in the 'Downloads' section to download the current driver.
3. Once downloaded, double-click on the executable to launch the InstallShield wizard and initiate the driver installation.

To install Sealevel Systems software, you must log in as an administrator or have administrator privileges in Windows.

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

Technical Description

The **SIO-485** utilizes the 16550 UART chip. This chip features programmable baud rate, data format, interrupt control and has a 16 byte transmit and receive FIFO.

Features

- *Port can be addressed as COM1:, COM2, or six other pre-defined addresses*
- *Interrupt Request (IRQ) lines are jumper selected for IRQ 3 and 4*
- *Interrupt can be shared with other sharable interrupts*

Connector Pin Assignments

RS-422/485

Signal	Name	Pin #	Mode
GND	Ground	7	
RX+	Receive Positive	12	Input
RX-	Received Negative	13	Input
TX+	Transmit Positive	24	Output
TX-	Transmit Negative	25	Output

Line Termination

Typically, each end of the RS-422/485 bus must have line terminating resistors. Sealevel Systems provides a 100 Ohm Resistor across each RS-422/485 input and a 1K Ohm pull-up/pull-down combination to bias the receiver inputs. If more than two **SIO-485** boards are connected together in a bus, the 100 Ohm resistor must be removed.

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 Requirements

Supply Line	+12VDC	-12VDC	+5 VDC
Rating	50 mA	50 mA	480 mA

Mean Time Between Failure (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)

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

The adapter should provide years of trouble-free service. However, in the event that it appears to be functioning incorrectly, the following tips can eliminate most common problems 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 IRQs, 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. A diagnostic program 'SSD' is incorporated in the software which will verify if an adapter is configured properly. This diagnostic program is written with the user in mind and is easy to use.
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. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate any software issues from the equation.
8. The following are known I/O conflicts: • The 278 and 378 settings may conflict with your printer I/O adapter.
    a. 3B8-3BF cannot be used if a Monochrome adapter is installed.
    b. 3F8-3FF is typically reserved for COM1:
    c. 2F8-2FF is typically reserved for COM2:
    d. 238-23F may conflict with a Bus Mouse
9. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate the software issue 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 to 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 Interfaces

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.

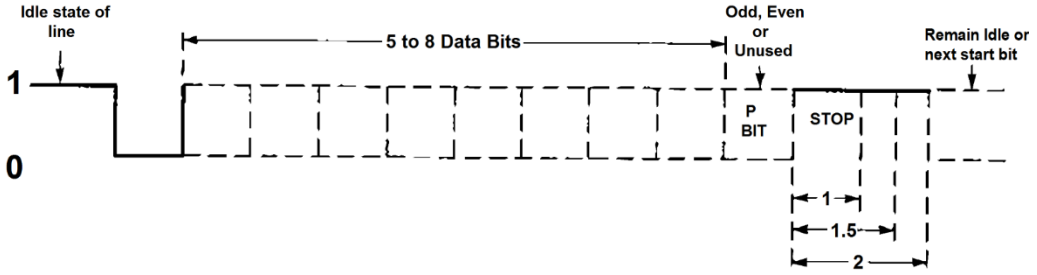
RS-485

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. The driver is in a tri-state or high impedance condition when this occurs. Only one driver may be active at a time and the other driver(s) must be tri-stated. The output modem control signal **R**equest **T**o **S**end (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.

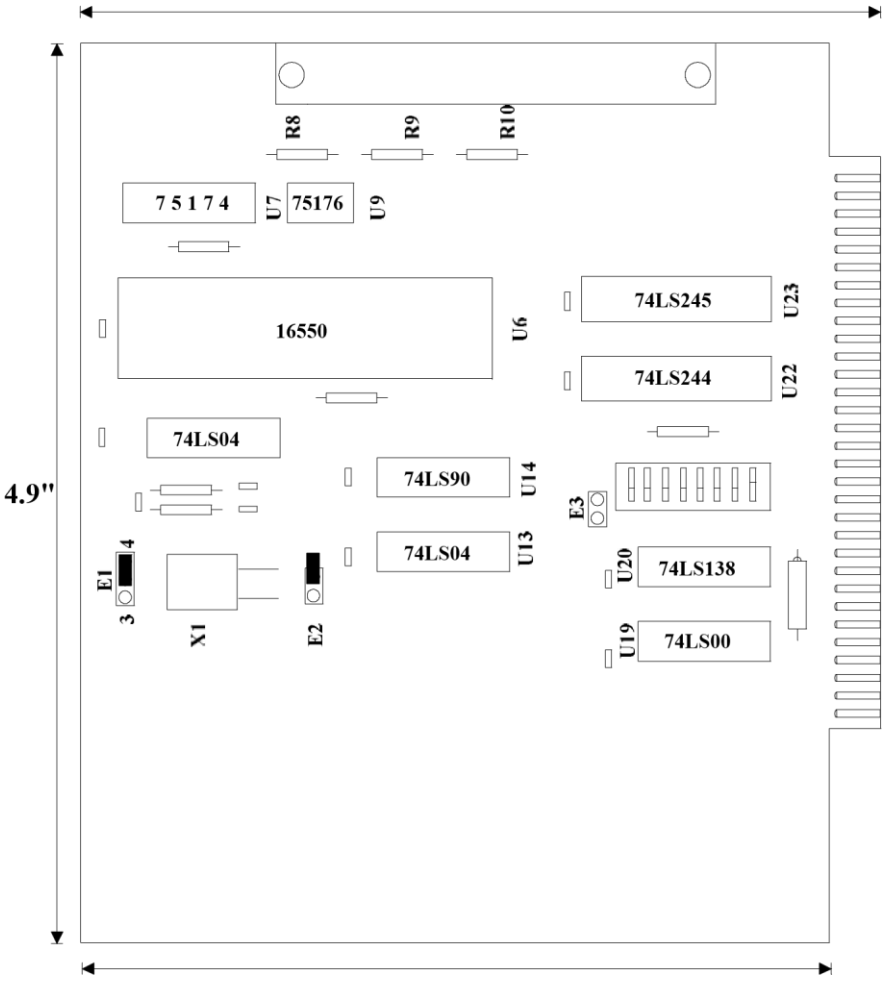
Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. 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



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Appendix F – Schematic

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Appendix G – 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".



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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