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Ultra 485™

User Manual | 3055



SEALEVEL®

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Introduction

The Sealevel Systems ULTRA 485 provides the PC with an additional RS-422/485 serial port for terminals, PLC communication, laboratory instrumentation, etc.

The unique feature of the ULTRA 485 is the ability to be RS-485 compatible without the need for special software or drivers. This is especially useful in Windows, Windows NT, and OS/2 environments where the lower level I/O control is abstracted from the application program. Which means that the user can effectively use the ULTRA 485 in an RS-485 application with existing (i.e., standard RS-232) software drivers.

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Before You Get Started

What's Included

The Ultra 485 is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- **Ultra 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 Ultra 485 factory default settings are as follows:

Port #	Base Address	IRQ	Electrical Specification
Port 1	280	5	RS-485 'Auto'

To install the Ultra 485 using factory default settings, refer to Installation.

For your reference, record installed Ultra 485 settings below:

Port #	Base Address	IRQ	Electrical Specification

Card Setup

The ULTRA 485 contains several jumper straps that must be set for proper operation.

Address Selection

'RS-485 Data Enable Mode'. The 'Data' enable mode uses the transmit data stream to enable/disable the transmitter. When the data bit is High (logic 1), the transmitter will be tri-stated and relies on the line biasing resistors to place the line in the proper state. For this reason, line termination cannot be used thus reducing the data rate and maximum cable length. This mode should only be used in applications that prevent the use of the RS-485 Auto Mode or Sealevel Systems' serial driver.

The ULTRA 485 occupies 8 consecutive I/O locations and looks to the PC as a standard serial port. A DIP-switch (SW1) is used to set the port address options for the ULTRA 485. Be careful when selecting the port addresses as some selections may conflict with existing ports. The following table shows the addressing options available with the standard PAL. If different address options are required, please contact Sealevel Systems Technical Support about a custom PAL option.

Port1 J2	SW1-1	SW1-2	SW1-3	SW1-4
Disabled	On	On	On	On
3F8	On	On	On	Off
2F8	On	On	Off	On
3E8	On	On	Off	Off
2E8	On	Off	On	On
3220	On	Off	On	Off
3228	On	Off	Off	On
4220	On	Off	Off	Off
4228	Off	On	On	On
238	Off	On	On	Off
300	Off	On	Off	On
308	Off	On	Off	Off
280	Off	Off	On	On
288	Off	Off	On	Off
290	Off	Off	Off	On
298	Off	Off	Off	Off



Each COM port in the system should have a unique address. Typically, COM1: - COM4: addresses are 3F8, 2F8, 3E8 & 2E8 Hex.

Card Setup, Continued

IRQ Selection

Header E1 selects 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.

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.

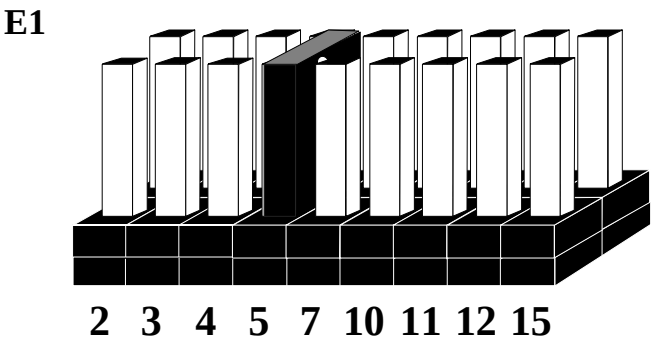


Figure 1 - Header E1, IRQ Selection

Any two or more ports can share a common IRQ by placing the jumpers on the same IRQ setting at header E1 and setting the appropriate selections at E2. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper.

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Card Setup, Continued

Interrupt Modes

Header E2 selects the interrupt mode for the ULTRA 485.

'**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.

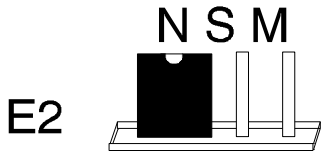


Figure 2 - Header E2, Normal IRQ Mode

Set the jumper to '**S**' if you are using more than one ULTRA 485 in a bus or 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.

Set the 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 IRQs possible. If you are using more than one ULTRA 485 or a compatible adapter in a bus you should only have one port set to '**M**'. The following example shows two ULTRA 485 adapters sharing a single IRQ.



Figure 3 - Header E2, Shared IRQ Mode

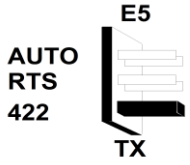
© Sealevel Systems, Inc.

RS-485 Enable Modes

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver (not dual-state) 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. 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) is typically used to control the state of the driver. Some communication software packages refer to RS-485 as RTS enable or RTS block mode transfer.

One of the unique features of the ULTRA 485 is the ability to be RS-485 compatible without the need for special software or drivers. This ability is especially useful in Windows, Windows NT, and OS/2 environments where the lower level I/O control is abstracted from the application program. This ability means that the user can effectively use the ULTRA 485 in a RS-485 application with existing (i.e., standard RS-232) software drivers.

Header E5 is used to control the RS-485 mode functions for the transmitter circuit. The selections are 'RTS' enable, 'Auto' enable, or '422' which means always enabled. The 'Auto' enable feature automatically enables/disables the RS-485 transmitter circuit. The 'RTS' mode uses the 'RTS' modem control signal to enable the RS-485 transmitter circuit and provides backward compatibility with existing software products. The '422' mode allows the port to be used in a point to point RS-422 application where the tri-stating of the transmitter circuit is not required.



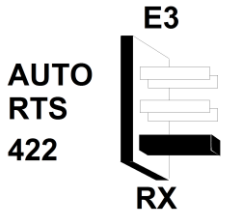
AUTO	Driver automatically enabled/disabled
RTS	Driver enabled by UART RTS signal
422	Driver always enabled

The jumper in the above example is in the '422' position. This is the only setting in which the modem control outputs (RTS, DTR) are valid.

Figure 4 - Header E5 RS-485 Transmit Mode

Card Setup, Continued

Header E3 is used to control the RS-485 enable/disable functions for the receiver circuit. The RS-485 'Echo' is the result of connecting the receiver inputs to the transmitter outputs. 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. The selection at E3 should follow the selection made at E5 if 'No Echo' is desired. If Echo suppression is not desired then leave the jumper in the '422' position. Also note, the modem control inputs (DSR, DCD, CTS) are only valid when Header E3 is in the 422 mode. These header blocks are described in the illustration and table that follow.



AUTO	Receiver automatically enabled/disabled
RTS	Receiver enabled by UART RTS signal
422	Receiver always enabled

Figure 5 - Header E3 RS-485 Receive Mode

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Card Setup, Continued

Connector Pin Assignments

EIA-530

DIP-shunt E4 selects the pin out for the DB-25 connector P3. With the 5 position shunt in the EIA-530 mode, the ULTRA 485 complies with the EIA-530 pin out with the following signals supported:

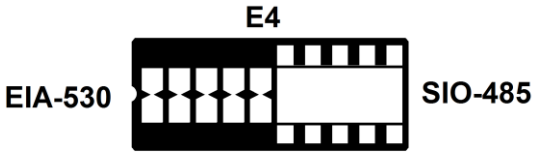


Figure 6 - DIP-shunt E4 (EIA-530 Mode)

Signal		Name	Pin #	Mode
GND		Ground	7	
RDB	RX+	Receive Positive	16	Input
RDA	RX-	Receive Negative	3	Input
CTSB	CTS+	Clear To Send Positive	13	Input
CTSA	CTS-	Clear To Send Negative	5	Input
DSRB	DSR+	Data Set Ready Positive	22	Input
DSRA	DSR-	Data Set Ready Negative	6	Input
DCDB	DCD+	Data Carrier Detect Positive	10	Input
DCDA	DCD-	Data Carrier Detect Negative	8	Input
TDB	TX+	Transmit Positive	14	Output
TDA	TX-	Transmit Negative	2	Output
RTSB	RTS+	Request To Send Positive	19	Output
RTSA	RTS-	Request To Send Negative	4	Output
DTRB	DTR+	Data Terminal. Ready Positive	23	Output
DTRA	DTR-	Data Terminal Ready Negative	20	Output

Card Setup, Continued

SIO-485

With the 5-position shunt in the SIO-485 mode, the **ULTRA 485** is compatible with the Sealevel Systems SIO-485 (part# 3054) with the following signals supported:

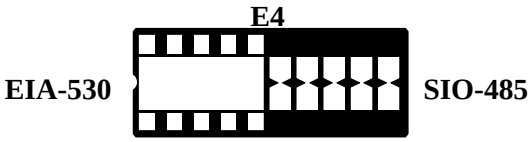


Figure 7 - DIP-shunt E4 (SIO-485 Mode)

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

Line Termination

Typically, each end of the RS-485 bus must have line terminating resistors (RS-422 terminates at the receive end only). A 100-ohm resistor is across each RS-530/422/485 input in addition to a 1K ohm pull-up/pull-down combination that biases the receiver inputs. DIP-switch SW2 provides the ability to customize this interface to system requirements. Each switch position corresponds to a specific portion of the interface. If multiple ULTRA 485 adapters are configured in a RS-485 network, only the boards on each end should have switches T, P & P ON**.** Refer to the following table for each position's operation:

Name	Function
T	Adds or removes the 100 ohm termination.
P	Adds or removes the 1K ohm pull-down resistor in the RS-422/RS-485 receiver circuit (Receive data only).
P	Adds or removes the 1K ohm pull-up resistor in the RS-422/RS-485 receiver circuit (Receive data only).
L	Connects the TX+ to RX+ for RS-485 two-wire operation.
L	Connects the TX- to RX- for RS-485 two-wire operation.

Figure 8 - SW2, Line Termination

Software Installation

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

Do not connect the device to a USB port until the software is installed.

1. Begin by locating, selecting, and installing the correct SeaCOM software from the Sealevel software driver database.
2. Select the Part Number (3055) for your device from the listing.
3. The setup file will automatically detect the operating environment and install the proper components. Follow the information presented on the installation screens that follow.
4. 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.
5. During setup, you 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 included to remove the driver and all registry/INI file entries from your system.
6. Proceed with the physical installation of your SeaLINK USB serial adapter.



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

Other Operating Systems

Refer to the appropriate section of the Serial Utilities Software System Installation.

Hardware Installation

The ULTRA 485 can be installed in any of the PC expansion slots. The ULTRA 485 contains several jumper straps for each port that 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 ULTRA 485 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.

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Technical Description

The ULTRA 485 utilizes the 16550 UART. This chip features programmable baud rates, data format, interrupt control and a 16-byte input and output FIFO. A full array of advanced UARTS is also available.

The unique feature of the ULTRA 485 is the ability to be RS-485 compatible without the need for special software or drivers. This is especially useful in Windows, Windows NT, and OS/2 environments where the lower level I/O control is abstracted from the application program. Which means that the user can effectively use the ULTRA 485 in a RS-485 application with existing (i.e., standard RS-232) software drivers.

Features

- Automatic RS-485 driver enable/disable allows card to appear to be standard COM: port requiring no additional drivers
- 'PAL' option allows for unique OEM address selection
- 'Shareable' IRQs allow more than one port to share a single IRQ provided a polling type driver is used
- IRQs 2/9-7, 10, 11, 12, 14, 15 supported
- 16550 buffered UART standard
- 16 Bit address decode allows for easier integration

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

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.

Power Consumption

Supply line	+5 VDC
Rating	160 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	5.0 inches (12/70 cm)
Board height including Goldfingers	4.2 inches (10.66 cm)
Board height excluding Goldfingers	3.9 inches (9.91 cm)
Board weight	0.22 Lbs.

Appendix A – Troubleshooting

Serial Utility test software is supplied with the Sealevel Systems adapter and will be used in the troubleshooting procedures. By using this software and following these simple steps, most common problems can be eliminated without the need to call Technical Support.

1. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.

2. Configure your Sealevel Systems adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.

3. Make sure the Sealevel Systems adapter is using a unique IRQ. The IRQ is typically selected via an on-board header block. Refer to the section on Card Setup for help in choosing an I/O address and IRQ.

4. Make sure the Sealevel Systems adapter is securely installed in a motherboard slot.

5. When running DOS, Windows 3.x or other operating systems refer to the Serial Utilities software for that operating system and the User Manual to verify that the Sealevel Systems adapter is configured correctly. The supplied software contains a diagnostic program 'SSD' that runs under DOS and will verify if an adapter is configured properly. This diagnostic program is written with the user in mind and is easy to use. Refer to the DIAG.txt file in the dos\diag directory for detailed instructions on using 'SSD'.

6. For Windows 95/98 and Windows NT, the diagnostic tool 'WinSSD' is installed in the Sealevel folder on the Start Menu during the setup process. First find the ports using the Device Manager, then use 'WinSSD' to verify that the ports are functional.

7. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will help eliminate any software issues and identify any hardware conflicts.

8. 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:

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 Troubleshooting Guide prior to calling Technical Support.

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

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 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.

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

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. For email support contact support@sealevel.com.

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-530

RS-530 (a.k.a. EIA-530) compatibility means that RS-422 signal levels are met, and the pin-out for the DB-25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pin-out and define a full set of modem control signals that can be used for regulating flow control and line status. The RS-530 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE 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 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.

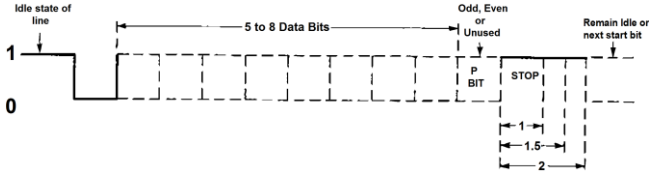


Figure 9 - Asynchronous Communications Bit Diagram

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 - 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

Trademarks

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

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

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