

PC-SIO™

USER'S MANUAL

Part Number 3600-485, 3600-422, 3601



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Contents

INTRODUCTION	1
OVERVIEW	1
WHAT'S INCLUDED.....	1
CARD SETUP.....	2
INSTALLATION.....	3
OPERATING SYSTEM INSTALLATION	3
For Windows Users	3
Other Operating Systems	3
PC CARD INSERTION	3
TECHNICAL DESCRIPTION.....	4
MODEM CONTROL SIGNAL CONSIDERATIONS	4
CONNECTOR PIN ASSIGNMENTS	5
RS-232.....	5
RS-422/485/530.....	5
SPECIFICATIONS.....	6
ENVIRONMENTAL SPECIFICATIONS.....	6
POWER CONSUMPTION	6
MEAN TIME BETWEEN FAILURES (MTBF)	6
PHYSICAL DIMENSIONS.....	6
APPENDIX A - TROUBLESHOOTING.....	7
APPENDIX B - HOW TO GET ASSISTANCE.....	10
APPENDIX C - SEAPC AND SSENABLE SOFTWARE.....	11
SEAPC	11
SeaPC System Requirements.....	11
Installation of SeaPC.....	12
Executing the Driver.....	12
SSENABLE.....	14
APPENDIX D - ELECTRICAL INTERFACE.....	15
RS-232	15
RS-422.....	15
RS-485.....	16
RS-530.....	16
APPENDIX D - COMPLIANCE NOTICES	17
FEDERAL COMMUNICATIONS COMMISSION STATEMENT	17
CANADIAN RADIO INTERFERENCE REGULATIONS	18
EMC DIRECTIVE STATEMENT	18
WARRANTY.....	19

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Introduction

Overview

Congratulations! You have now entered the world of mobile communications via the Sealevel Systems **PC-SIO** Serial Interface.

In the last few years, the portable and notebook market has grown by leaps and bounds. Most early laptops and notebooks handled I/O expansion through proprietary expansion slots. These slots provided limited expansion for specific peripherals such as modems and FAX peripherals. Mass storage peripherals were factory installed and could not be easily changed. Interconnectivity through local area networks offered limited performance through slow parallel port network interfaces.

During this time period, two standards organizations, JEIDA and PCMCIA, were working on the standardization of memory IC cards. These cards were designed as strictly non-volatile silicon storage. JEIDA was the first to propose the 68 pin connector standard for memory cards. In 1989, PCMCIA adopted the JEIDA 68 pin standard and worked with JEIDA on further developments.

As the notebook market grew, the need for a standard I/O bus was seen. The PCMCIA groups saw an opportunity to meet this need with an expanded version of the 68 pin interface. Further development occurred and within one year, release 2.0 of the standard was completed. Release 2.0 was a major update to Release 1.0 and included full hardware support for I/O devices. Release 2.0 coincided with JEIDA's 4.1 release and is identical.

The **PC-SIO** continues the Sealevel Systems tradition of an easy to use, highly reliable, and technically advanced serial I/O solution.

What's Included

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

- **PC-SIO** PCMCIA Serial Interface Adapter
- DB-25 cable assembly
- DB25 to DB9 Adapter (P/N 3601 only)
- Impact Resistant Carrying Case (Jewel Case)
- Serial Utility Software
- User Manual

Card Setup

Card and Socket Services must be loaded on the system prior to installing the **PC-SIO** card. Card and Socket Services are typically supplied by the PCMCIA slot provider, (i.e. the computer manufacturer or the PC adapter manufacturer).

Socket Services are the lowest level of the PCMCIA Software hierarchy. Socket Services provide a standard interface to the higher level drivers and isolate the socket controller's specific hardware details. Socket Services provide the 'BIOS' interface to the socket controller hardware. Socket Services are typically hidden under Card Services and are rarely directly accessible by application software.

Card Services provide the interface to application software and drivers. Card Services are responsible for allocating card resources and ensuring that card resources do not interfere with other existing system resources. Card Services are typically implemented as a driver and loaded via CONFIG.SYS during boot up. Almost all PCMCIA type cards require some sort of software driver. In the case of the **PC-SIO**, the generic Card Services driver supplied with the computer system should provide adequate support for most applications. If the generic Card Services are not sufficient, an 'Enabler' is provided with the **PC-SIO** that will address unique interfacing requirements (i.e. non standard I/O addressing, different IRQ selection etc.). Please refer to Appendix C for information on the SEAPC enabler and the diagnostic tool SSEnable. Please note that SEAPC is not stand alone and does require Card and Socket Services.

Installation

Card and Socket Services must be loaded on the system prior to installing the **PC-SIO** card. Card and Socket Services are typically supplied by the PCMCIA slot provider (i.e. the computer manufacturer or the PC adapter manufacturer). These Services must be installed for the **PC-SIO** to operate properly. Refer to the Card Setup section of this manual and your Serial Utilities Software for aid in configuring common Card and Socket Services.

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.

PC Card Insertion

Connecting the **PC-SIO** to the computer requires no special technical skills. It is installed by simply sliding the card into a PCMCIA Type II compliant slot on the personal computer. The PCMCIA slot is keyed so that the **PC-SIO** cannot be installed backwards or upside down. The card should install with a minimal amount of pressure. Do not force the card into the slot. Forcing the card can result in damage to the **PC-SIO** or to the PCMCIA slot. After the card has been installed into the PCMCIA slot, the I/O cable should be connected to the card. The cable is keyed to prevent it from being installed incorrectly.

Technical Description

The **PC-SIO** provides one RS-485/422/530 (Part # 3600) or RS-232 (Part # 3601) serial port utilizing the 16550 UART (Universal Asynchronous Receiver Transmitter).

The **PC-SIO** is addressable as any COM: port (i.e. COM1:, COM2:,etc.) The **PC-SIO** provides for selectable IRQs (3,4,5,7,9,10,11,12,15). I/O address and IRQ combinations are very flexible, and information on selecting these combinations is available in the Card Services Documentation and the supplied diskette. Please refer to the README.DOC supplied with the **PC-SIO** for any manual updates, corrections and software specific changes.

Each COM Port requires a minimum of one block of eight I/O addresses, for example COM1: is usually hex address 3F8. 3F8 is the base address, and the COM: ports extends through 3FF. In most applications, each COM: port will utilize one IRQ. It is noteworthy that some DOS based applications allow IRQs to be shared between COM: ports, however most advanced operating environments (Windows 95, OS/2) require each COM: port to have a unique IRQ setting.

Modem Control Signal Considerations

Some software packages require the use of the modem handshake signals such as CTS or DCD. Refer to your application software manual to determine the requirements for modem control signals. If no requirements are mentioned, a safe configuration is to tie DTR to DSR and DCD, and tie RTS to CTS. This configuration will typically satisfy the modem control signal requirements for most communications software.

Connector Pin Assignments

RS-232

Signal	Name	DB-25	DB-9*	Mode
GND	Ground	7	5	
TD	Transmit Data	2	3	Output
RTS	Request To Send	4	7	Output
DTR	Data Terminal Ready	20	4	Output
RD	Receive Data	3	2	Input
CTS	Clear To Send	5	8	Input
DSR	Data Set Ready	6	6	Input
CD	Carrier Detect	8	1	Input
RI	Ring Indicator	22	9	Input

* **Note:** These assignments meet EIA/TIA/ANSI-574 DTE for DB-9 type connectors.

RS-422/485/530

Note: The **PC-SIO** comes in two versions for the RS-422/485/530 electrical interface. One, the **PC-SIO-422**, (part # 3600-422), has both the transmitter and receiver always enabled. This allows for “Point to Point RS-422/530 operation. The other option is the **PC-SIO-485**, (part # 3600-485). This version requires **the assertion of the RTS line prior to transmitting and released after transmission, (RS-485 Mode).**

Signal	Name	Pin #	Mode
GND	Ground	7	
TX +	Transmit Data Positive	14	Output
TX-	Transmit Data Negative	2	Output
RTS+	Request to Send Positive	19	Output *
RTS-	Request to Send Negative	4	Output *
RX+	Receive Data Positive	16	Input
RX-	Receive Data Negative	3	Input
CTS+	Clear to Send Positive	13	Input *
CTS-	Clear to Send Negative	5	Input *

* **Note:** The RTS modem control signals are only available if using the PC-SIO-422 version (part # 3600-422).

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0° to 50° C (32° to 122° F)	-20° to 70° C (-4° to 158° F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Power Consumption

Supply Line	Product	Rating (mA)
+5 VDC	3600/3601	25 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

The **PC-SIO** conforms to the physical dimensions for all PCMCIA Type 2 cards as defined in the PCMCIA specification 2.0.

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. Make sure Card and Socket Services have been loaded and are functioning correctly.
3. 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.
4. Make sure the Sealevel Systems adapter is using a unique IRQ. Refer to the section on Card Setup for help in choosing an I/O address and IRQ.
5. Make sure the Sealevel Systems adapter is securely inserted in a PC Card slot.
6. 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'.
7. 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.
8. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will help eliminate any software issues and identify any hardware conflicts.

The next few pages identify common errors and specific remedies

Problem: Card Services reports that the PC Card cannot be found.

Possible Cause: The PC Card internal Card Information Structure (CIS) is not being read correctly by Card Services.

Solution: Use the supplied Client enabler program **SeaPC** (see page 13) to install the PC Card.

Problem: Card services or **SeaPC** successfully allocates the I/O address or IRQ but the port fails to operate.

Possible Cause: When using the I/O Client enabler program **SeaPC**, there is the possibility that the selected I/O address or Interrupt is already in use by another adapter in the system. Card services usually check for an available I/O address during installation or during the boot process. If new hardware or software is installed in the system that may cause an I/O address or IRQ conflict, Card Services may not be able to arbitrate the specified resources.

Solution: Select a different I/O address and IRQ.

Problem: **SeaPC** will not enable the port at the specified I/O address and Interrupt.

Possible Cause: Card Services flags certain I/O addresses and Interrupts as used and will not allow other Client Enabler Driver, like SEAPC to use them.

Solution: Select a different I/O address and IRQ in the **SeaPC** setup file.

Problem: The host system will not configure the card or the system shuts down after the PC Card is inserted.

Possible Cause: Host hardware may not supply enough power to the PCMCIA slot.

Solution: Check to make sure the PCMCIA slot is rated to supply enough power to the card. On some palmtop and battery powered systems, there is a specified limit to the available power a PCMCIA slot can use. In this case, try installing the card when the system is powered by the AC adapter.

Problem: Card Services will not respond to card insertion events.

Possible Cause: Memory conflict, External floppy or hard disks, VGA video cards, SCSI adapters, LAN Network adapters.

Solution: Consult the Card Services documentation for instruction on memory requirements. If using DOS, it will probably be necessary to exclude a specified memory range in the CONFIG.SYS file.

Problem: PC Cards that are inserted will not configure properly or Card Services reports that the card is not recognized.

Possible Cause: Memory shadowing conflicts.

Solution: Make sure that memory shadowing in the PC is disabled in the regions that memory windows are being used by the host PCMCIA adapter.

Appendix B - How To Get Assistance

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

1. Read this manual thoroughly before attempting to install the adapter in your system.
2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.
3. Sealevel Systems maintains a Home page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.
4. Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. Eastern time. Technical support can be reached at (864) 843-4343.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C - SeaPC and SSenable Software

SeaPC

SeaPC is a PCMCIA Version 2.0 compliant DOS only client that will enable the selected PC Cards I/O address and IRQ when inserted. The **SeaPC** driver is located on the supplied software in the PCMCIA directory. Please refer to the README.DOC file for additional information.

Features

- Allows unique addressing and IRQ selection
- Provides the highest level of compatibility with installed systems compliant with PCMCIA standard 2.0 or higher

When should I use the enabler?

This PC Card Client Enabler is not needed in all situations. **SeaPC** should be used if one or more of the following conditions occur:

- The PCMCIA system software (Card and Socket Services) on the host computer will not configure the cards automatically.
- The PCMCIA system software on the host computer does not supply a configuration utility to allow the PC Card to be configured automatically.
- The configuration utility with the PCMCIA system software does not function properly.

SeaPC System Requirements

SeaPC was designed to operate on an x86 based computer. **SeaPC** requires approximately 3 kilobytes of free conventional memory. If **SeaPC** is loaded more than once, an additional 3 kilobytes plus buffer space is required for each resident copy. **SeaPC** may be used with memory managers and loaded into expanded memory. **SeaPC** requires MS-DOS or PC-DOS version 3.00 or higher and Card and Socket Services that are compliant with PCMCIA version 2.00 or higher.

Installation of SeaPC

Executing the Driver

SeaPC is a DOS Terminate and Stay Resident (TSR) program that can be executed from the DOS command prompt or from the AUTOEXEC.BAT file. For additional information on the AUTOEXEC.BAT file please refer to the DOS manual. When **SeaPC** is executed, a setup file must be specified on the command line.

Command Line Options

To display the available command line options, Type “**SeaPC /?**” at the DOS command prompt. The following should be displayed.

```
C:>SeaPC /?  
Sealevel Systems, Inc. SeaPC PC Card I/O Enabler Version 1.00  
Sealevel Systems Inc. (C) 1994. All rights reserved.
```

Syntax: **SeaPC** [/F:file] [/U] [/I] [/V] [/?]
/F:[file] Where file is the configuration file
/U Unconditional installation
/I Display info on resident copies of **SeaPC** without installing the enabler
/V Show verbose installation information
/? Display command line options, inhibit driver from loading

Note: That the /F: option is the only required command line parameter. If the setup file is not located in the default directory, the drive and path must be specified. The following section details the syntax of the setup file.

Setup File

An example setup file named **SeaPC.INI** is provided on the diskette. This file may be edited with the DOS EDIT utility. The following is the syntax for a PC Card configuration:

```
[card]
BaseIO = Base I/O address
IRQ = Interrupt Request Signal
Type = Device Type
Interface = Electrical Interface Utilized
```

Note: All items in *italics* need to be provided by the user. The following is a description of each entry in the setup file:

BaseIO	Base I/O address in Hexadecimal. Valid ranges are from 0 – 3FF Hex. Some ranges may be reserved by the PCMCIA system software or occupied by other peripherals in the host computer system.
IRQ	Interrupt Request Signal in Decimal. Valid ranges are from 2-15. Please note that some IRQs be reserved by the PCMCIA system software or occupied by other peripherals in the host computer system.
Type	Device Type. Valid option is UART for the 3600 or 3601
Interface	Electrical Interface Utilized. Valid options are RS-232, RS-422, RS-485. (In the scope of the driver, RS-422 and RS-485 are viewed as the same value.)

A semicolon (;) at the beginning of a line denotes a comment and the remainder of that line is ignored. Note the above syntax is an example for one card. Multiple cards (up to eight) may be configured using the following syntax:

```
;First Card
[card]
BaseIO=238
IRQ=10
Type = UART
Interface=RS-232
```

Using the PC Card on platforms other than ISA

Most PCMCIA systems are based on the standard PC (ISA) architecture, however in some situations it may be necessary to install the PC Card in a non ISA system (for example Micro-channel or PCI). For this reason the setup file has an additional parameter that allows pulse mode interrupts. An ISA system uses level mode interrupts which is the default setting. To enable pulse mode interrupts, add the following line to the setup file:

```
IRQMode = Pulse
```

Remember this feature will only work on a platform that supports pulse mode interrupts, and if the Card and Socket services support pulse mode interrupts.

SSEnable

SSEnable is a PCMCIA DOS only utility that will allow the use of your PC Card without loading card and socket services. The utility is provided for applications that conflict with card and socket services. Please note that this utility does NOT use card and socket services and greatly reduces the features of the PCMCIA card.

One very important thing to remember about SSEnable is that it does not provide 'Hot Swapping' capability for the PCMCIA socket. Hot insertion or removal of the PC Card while using SSEnable could cause damage to the PCMCIA socket or the card.

The command line parameters for the program are listed by typing **SSEnable** at the DOS prompt. The following are example command line entries for the **SSEnable** program:

Enable base I/O address 238 hex, -IRQ 5, -memory range d000-dffff, (which has been excluded from any memory manager and is reserved for the PC Card attribute memory) and the PC Card is in socket 1

```
SSEnable /b:238 /i:5 /m:d000 /s:1
```

To remove the configuration on socket 1 type:

```
SSEnable /s:1 /r
```

Note: **SSEnable** will only work with Intel PCIC compatible socket controllers.

Appendix D - 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 wide spread use and will be referred to as RS-232 in this document. RS-232 is capable of operating at data rates up to 20 Kbps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 Kbps over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. 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. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denotes a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification defines two type of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

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.

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.

Appendix D - Compliance Notices

Federal Communications Commission Statement

This equipment has been tested and found to comply with the limits for Class B 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 residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Caution

Sealevel Systems, Inc. is not responsible for any radio or television interference caused by unauthorized modifications of this equipment or the substitution of attachment of connecting cables and equipment other than those specified by Sealevel Systems. Such unauthorized modifications, substitutions, or attachments may void the user's authority to operate the equipment. The correction of interference caused by such unauthorized modifications, substitutions, or attachments will be the responsibility of the user.

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 directives.

Canadian Radio Interference Regulations

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet Appareil numérique de la classe B respecte toutes les exigences de Règlement sur le matériel du Canada

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 B - 'Limits and methods of measurement of radio interference characteristics of information technology equipment'

- **EN55024** - 'Information technology equipment Immunity characteristics Limits and methods of measurement.'
- **EN60950 (IEC950)** - 'Safety of information technology equipment, including electrical business equipment'

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 EMC directives.

Warranty

Sealevel Systems, Inc. provides a lifetime warranty for this product. Should this product fail to be in good working order at any time during this period, Sealevel Systems will, at its option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

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