COMM+232.PCI
User Manual | 7202c

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Introduction

Overview

The Sealevel COMM+232.PCI (Item# 7202c) is a PCI compliant interface adapter with two RS-232 asynchronous serial ports supporting data rates exceeding 1 Mbps for industrial automation and control applications.

All RS-232 modem control signals are implemented for maximum compatibility with a wide range of serial peripherals. The Sealevel SeaCOM for Windows software driver and utilities make installation and operation easy in Windows 7/10 and the 7202c works out of the box on many Linux distributions.

The COMM+232.PCI ships with a Standard Height PCI bracket and will only work in a Standard Height PCI slot. The product is RoHS compliant and meets the requirements of RoHS (2011/65/EU) directive and (EU) 2015/863.

Features

- Two RS-232 serial ports

- Ultra High-speed UART with 256-byte TX and RX FIFOs

- Asynchronous data rates exceeding 1 Mbps

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Before You Get Started

What's Included

The COMM+232.PCI is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- **DB9 Female Serial Loopback Adapter**
- **Standard Height Bracket**

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.

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Optional Items

Depending upon your application, you are likely to find one or more of the following items useful with the 7202c. All items can be purchased from our website (www.sealevel.com) or by calling our sales team at (864) 843-4343.

Cables

DB9 to DB25 Serial Cable (Part Number CA177)
The CA177 is a standard AT-style RS-232 modem cable with a DB9 female connector on one end and a DB25 male connector on the other end. Simply connect the DB-9F connector to the DB9 serial port on your computer or host, and then connect the DB-25M connector to your RS-232 serial modem or other compatible RS-232 serial device. The six-foot cable is fully shielded with dual thumbscrews at each connector. The molded connectors integrate strain relief to prevent damage to the cable or connectors. All DB9 modem control signals are implemented, and the cable is pinned to EIA-232 standards.

DB9 Serial Extension Cable (Part Number CA127)
The CA127 is a standard DB9F to DB9M serial extension cable. Extend a DB9 cable or locate a piece of hardware where it is needed with this six-foot (72 inch) cable. The connectors are pinned one-to-one, so the cable is compatible with any device or cable with DB9 connectors. The cable is fully shielded against interference and the connectors are molded to provide strain relief. Dual metal thumbscrews secure the cable connections and prevent accidental disconnection.

Terminal Block

Terminal Block Kit - (Part Number KT105)
The KT105 terminal block kit breaks out a DB9 connector to 9 screw terminals to simplify field wiring of serial connections. It is ideal for RS-422 and RS-485 networks, yet it will work with any DB9 serial connection, including RS-232. The KT105 includes one DB9 terminal block (part number TB05) and one CA127 extension cable. The TB05 includes holes for board or panel mounting. The TB05 is designed to connect directly to Sealevel DB9 serial cards or any cable with a DB9M connector. TB05 terminal block can be purchased as a standalone accessory if desired.
Terminal Block Kit - (Part Number KT106)
The TB06 terminal block has been designed to connect directly to any Sealevel dual DB9 serial board or to serial boards with DB9 cables. If you need to extend the length of your dual DB9 connection, the KT106 includes the TB06 terminal block and two CA127 DB9 extension cables. TB06 terminal block can be purchased as a standalone accessory if desired.

Card Setup

Addresses and IRQ Selection

The 7202c is automatically assigned memory addresses and IRQs by your motherboard BIOS or by a "Plug-n-Play" Operating System. Adding or removing other hardware or moving the adapter to another slot may change the assignment of memory addresses and IRQs.

Clock Modes and Baud Rates

The 7202c derives a 125MHz clock for the Baud Rate Generator (BRG) from a 100MHz onboard, dual-channel clock buffer. The internal BRG offers a wide range of possible baud rates configurable by software. The best choice of clock divisor for a given baud rate is made automatically by the driver, with no need to manually set clock divisor jumpers. The bit rate difference is within the +/− 2% recommended tolerance for proper serial communication.

Technical Description

The Sealevel Systems 7202c provides a PCI interface adapter with two (2) RS-232 asynchronous serial ports providing interfaces for modems, printers, and plotters, as well as interfaces for industrial automation and control applications.

The 7202c provides UARTs with 256-byte TX and RX FIFOs, programmable baud rates, data format, and interrupt control.

DB9 Male Cable Pin Assignments

The DB9M connectors are compatible with a variety of serial peripherals. Their RS-232 pin assignment meets EIA/TIA/ANSI-574 DTE specifications for DB9 type connectors.

Pin#	RS-232
1	DCD (I)
2	RD (I)
3	TD (O)
4	DTR (O)
5	GND
6	DSR (I)
7	RTS (O)
8	CTS (I)
9	RI (I)

(I) = Input
(O) = Output

N Please terminate any unused control signals. The most common way to do this is RS-232 mode is to connect RTS to CTS and RI, and to connect DTR to DCD and DSR.

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Technical Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range:	0º to 70º C (32º to 158º F)	-40º to 85º C (-58º to 221º F)
Humidity Range:	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

MTBF (Telcordia SR-332 prediction method)

Mean Time Between Failure	3,601,303 hours	At 25º C ambient

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

Typical Power Draw:	1.3W
Supply Voltage:	+3.3 VDC
Rating:	398 mA

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Software Installation

⚠️ Do not connect the hardware until the software has been successfully 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.

This section contains helpful information pertaining to the installation of supported Sealevel Systems, Inc. software packages. First, the process of acquiring the software is discussed. Next, the installation is detailed in a step-by-step guide for Windows and Linux operating systems.

Where to Get Software

Current versions of Sealevel software packages can be obtained from the Sealevel website. If you already have all the required software, proceed to the installation section for your operating system.

- For Windows:
  - Software for Windows
  - Click on the 'Download File' link to download the current version.
  - Proceed to the Windows Installation section.
- For Linux:
  - No Sealevel software required. Proceed to Linux Installation section.

Windows Installation

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

1. Open Windows Explorer and navigate to the downloaded Sealevel software. For example: C:\Downloads\SS030705.exe.

2. Right click on the installer executable and choose "Run as Administrator".

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3. Once opened Select 'Next' as demonstrated in the image below.
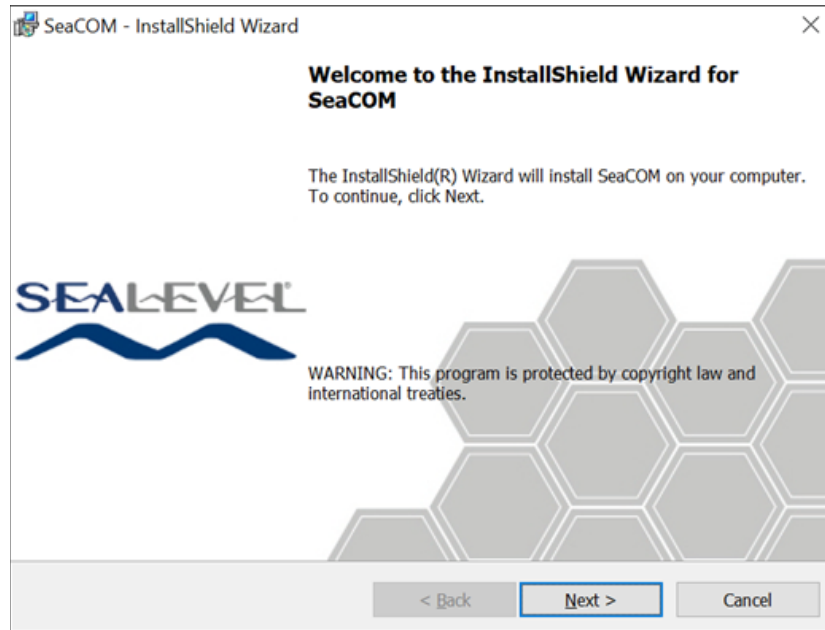
4. When the 'License Agreement' window appears, accept the terms and click 'Next' to continue. If you do not accept the terms of the agreement, the wizard will stop.
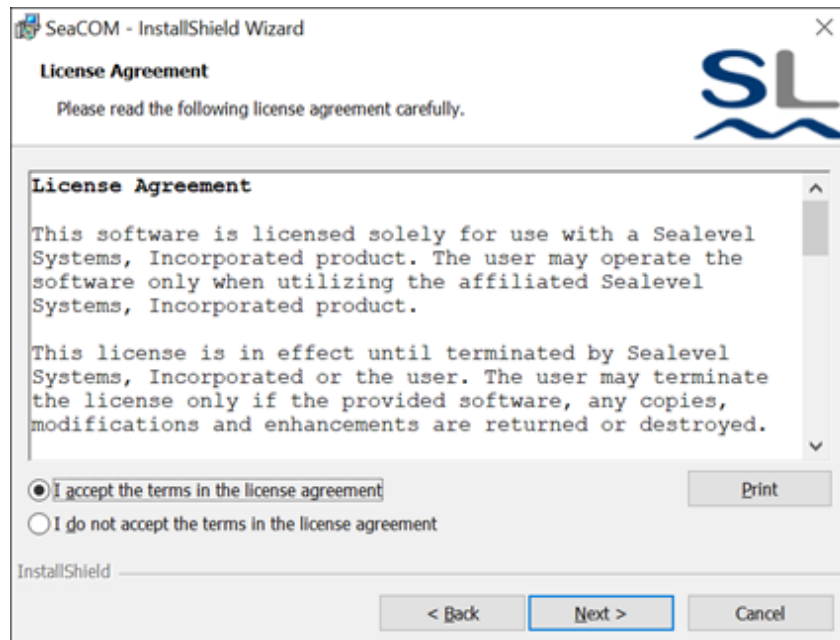
5. When the 'Ready to Install the Program' window appears, click the 'Install' button to install the software onto the hard drive of your computer. Some versions of Windows will halt the installation and provide you with a dialog box which will ask you for permission for the installer to make changes to your computer. Click on the button to continue installation of your Sealevel software.
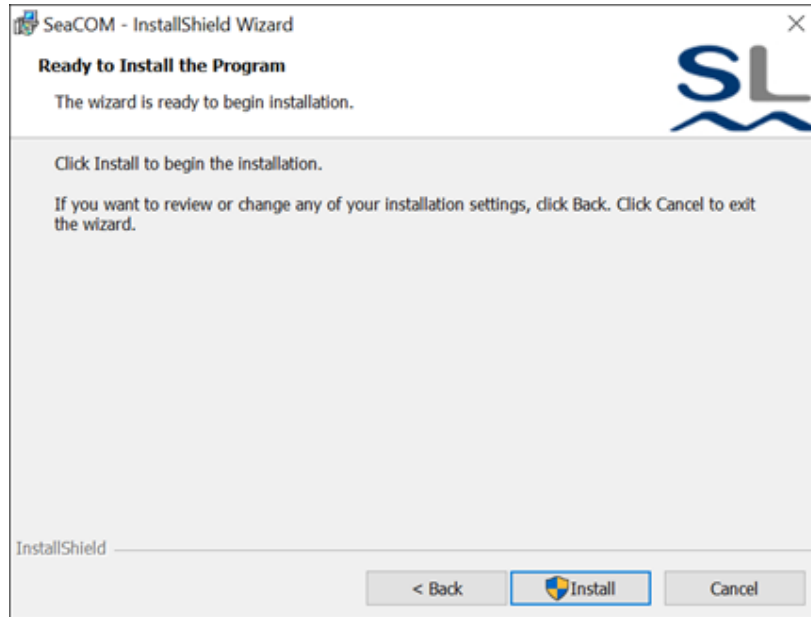
The below warning will appear when installing the driver on Windows 7. Select "Install this driver anyway" on the warning.
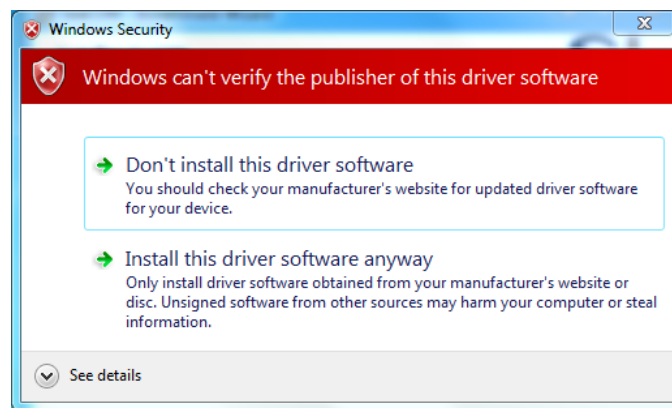
6. Click 'Finish' to complete the installation of SeaCOM onto your PC.
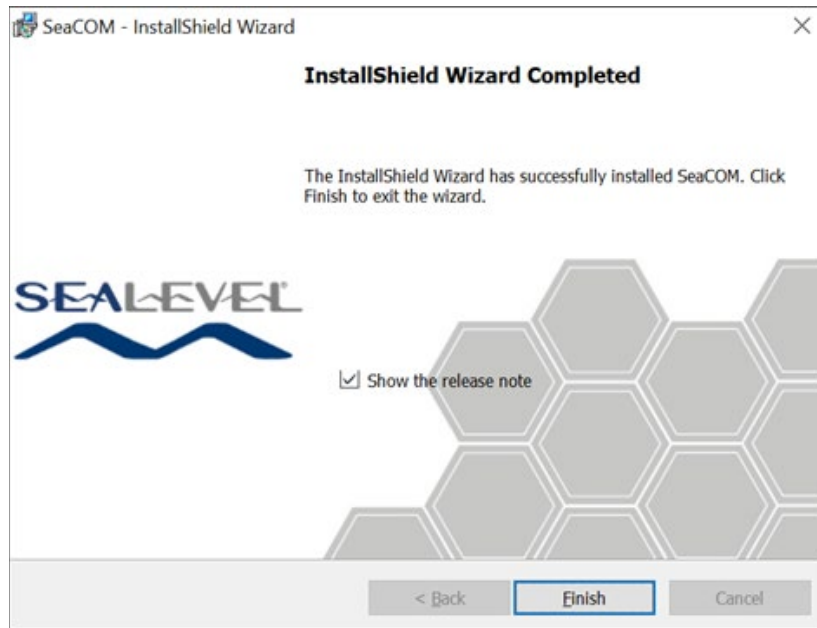
7. If prompted, reboot your computer for changes to take effect.

Linux Installation

No installation is required if your system meets the following requirements:

- Linux Kernel Version 4.1 or higher
- 8250_exar kernel module installed

Check Kernel Version

You may determine your kernel version by running the command below:

```
$ uname -a
```

If *uname* is not present on your system, you can try:

```
$ cat /proc/version
```

Check presence of 8250_exar driver

The 8250_exar driver is included by default many distributions, but you can use the following commands to verify it is present on your system.

If 8250_exar is installed, the command below will output detailed information about the driver.

```
$ modinfo 8250_exar
```

If *modinfo* is not present on your system, you can try the alternative below. If 8250_exar is installed, the command below will output the file path of the driver.

```
$ find /lib/modules/$(uname -r)/kernel/drivers/ -iname
      8250_exar.ko
```

Refer to the   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 or if you have any questions about using 7202c in your system, 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.

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Hardware Installation

⚠️ Do not install the PCI board until the software has been successfully installed.

Install the 7202c into an available PCI slot and boot the computer. The drivers that were installed during the software installation process will automatically be used to configure the adapter.

ℹ️ Once the hardware installation is complete, you may need to restart the computer to finalize the installation process.

Verifying Installation on Linux

To confirm the serial port has been installed, open a terminal, and run the command below. If the 7202c is installed, you should see output indicating the assigned ttyS* ports.

```
$ dmesg | grep XR17V35X

[    1.295217] 0000:01:00.0: ttyS0 at MMIO 0xdfcfc000 (irq = 24,
base_baud = 7812500) is a XR17V35X

[    1.295306] 0000:01:00.0: ttyS1 at MMIO 0xdfcfc400 (irq = 24,
base_baud = 7812500) is a XR17V35X
```

Verifying Installation on Windows

To confirm that the serial port has been successfully installed, look in Device Manager under 'Ports (COM &LPT)' and in parentheses should be a COM number assigned to each port number.

ℹ️ Your system will assign the next available COM number, which will vary by computer (COM17 and COM18 are shown in this example).
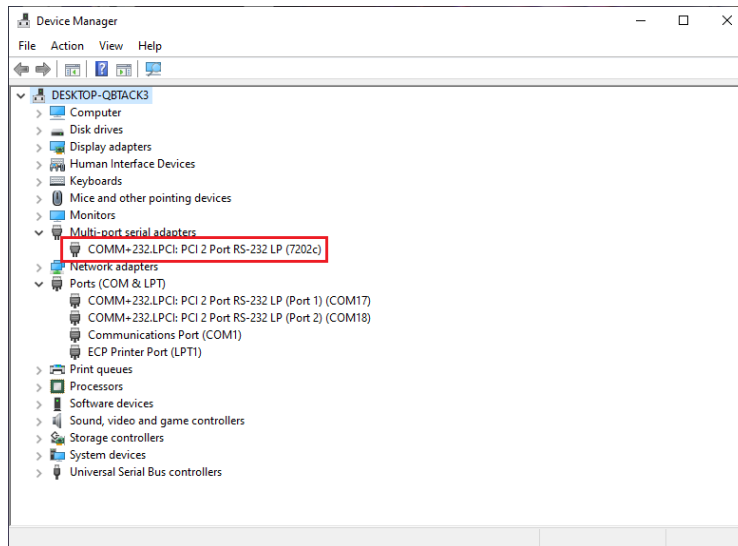
Uninstall Instructions

The SeaCOM software program adds entries to the system registry that are necessary for specifying the operating parameters for your device. To completely remove the hardware and associated software, follow the steps in the order they appear.

⚠️ Start with the hardware installed in a PCI slot. Do not remove until instructed to do so.

Remove-Hardware Using Device Manager

To access Device Manager, follow the steps below:

1. Open Windows Explorer.

2. Right click on 'Computer' or 'My Computer' icon.

3. Click 'Manage' in the fly out menu to launch the 'Computer Management' console window.

4. In the left pane under 'System Tools', click 'Device Manager'.

5. In the right pane, expand the 'Multi-port serial adapters' section by double clicking it.

6. Locate the COMM+232.PCI device in the listing.

7. Right click on the entry for the 'COMM+232.PCI' device and click 'Uninstall'.

8. Confirm that you want to uninstall the device by clicking the 'OK' button. This will remove the hardware, COM ports and all registry entries from your computer. Keep the device connected.

9. The window will refresh and the entry for the device will no longer appear. Proceed with removing the software via Windows Control Panel.

If you want to completely remove the hardware and software from your computer, power down your computer, remove the device from the PCI slot, and then reboot your computer to complete the uninstallation.

Appendix A – Troubleshooting

Once you have confirmed that the serial adapter COM ports are listed in Device Manager, use the Sealevel WinSSD utility to verify communications. Detailed help is included in the WinSSD utility.

If you have a loopback plug, put it on the adapter connector. If you do not have a loopback plug, you can use female jumper wires to make the connection to verify the functionality.

RS-232 requires pins 2 (Receive) & 3 (Transmit) to be jumpered as shown in this graphic:
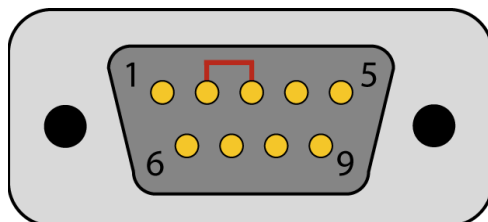
If you do not have a loopback plug or jumper wires handy, you can use a metal device such as a knife, screwdriver, key, or paperclip to short pins two and three.

To test communications, launch the WinSSD utility in the SeaCOM folder in the 'Start' menu.

On the 'Port Information' tab, select the associated COM port and click the 'Open' button.

This will first open the COM port. From this tab the port can also be closed (See image below). Click the 'Settings' button to open the COM Port Properties dialog box. This will allow the Port Settings to be altered.
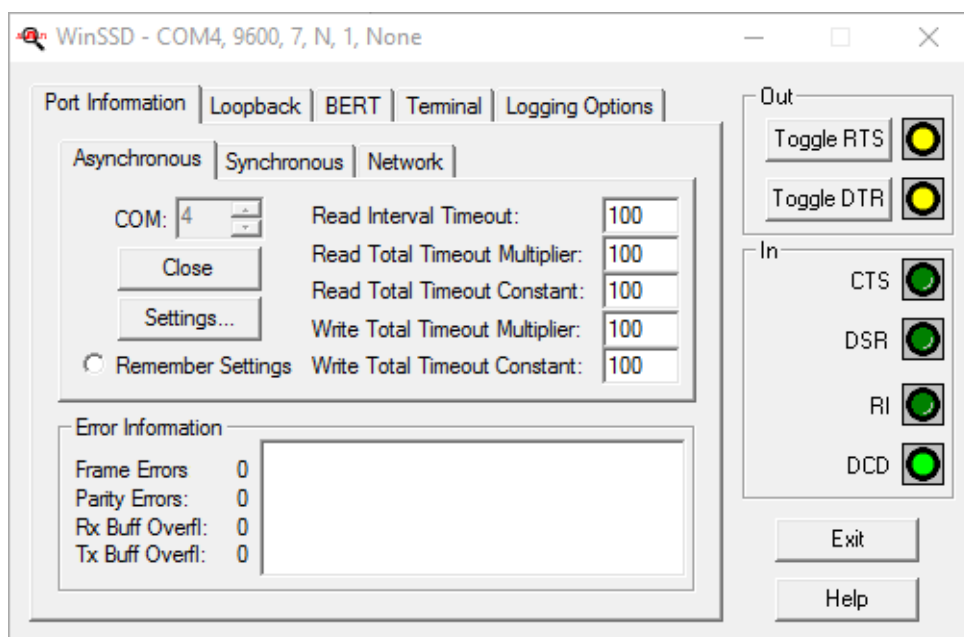
Change your parameters to 9600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control, as pictured below.
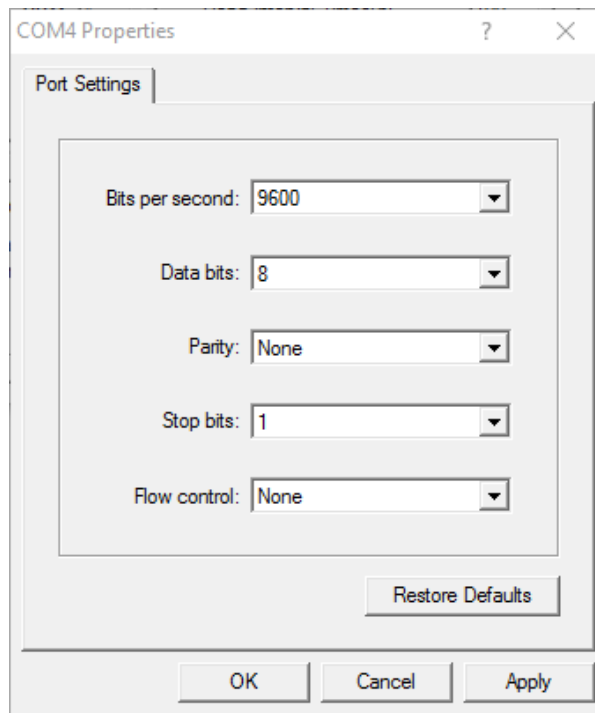
Click 'Apply' and 'OK'.

In the main WinSSD window, click on the 'BERT' tab (Bit Error Rate Test).

Click on the 'Start' button.
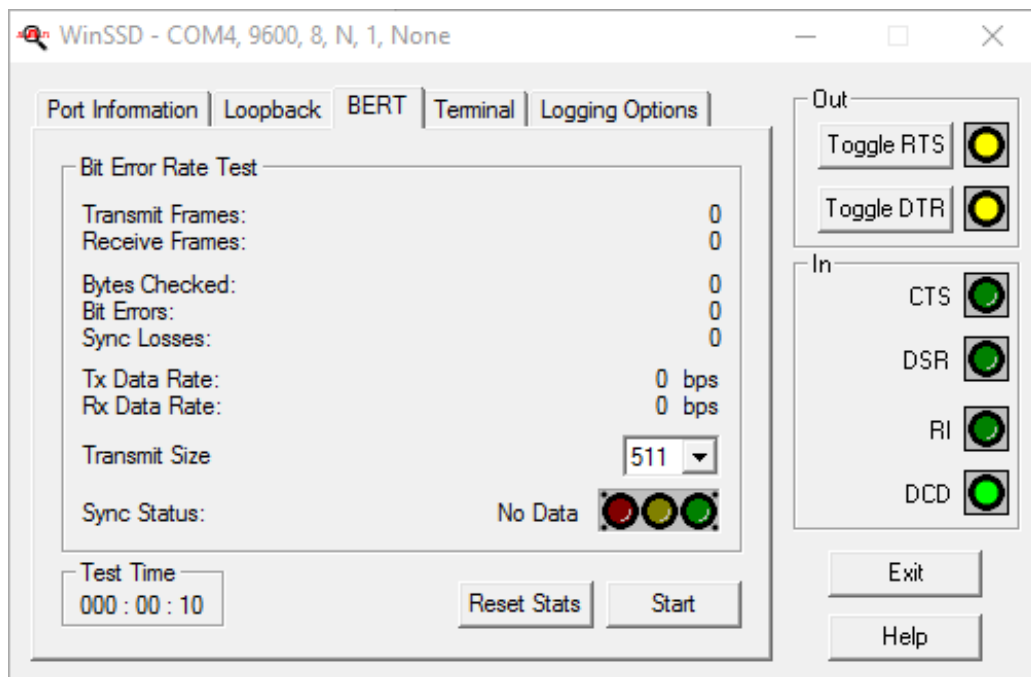
If the COM port is properly working, the Sync Status green light will glow, and the Transmit Frames and Receive Frames will increase. The Tx and Rx Data Rates will show the calculated data rate.
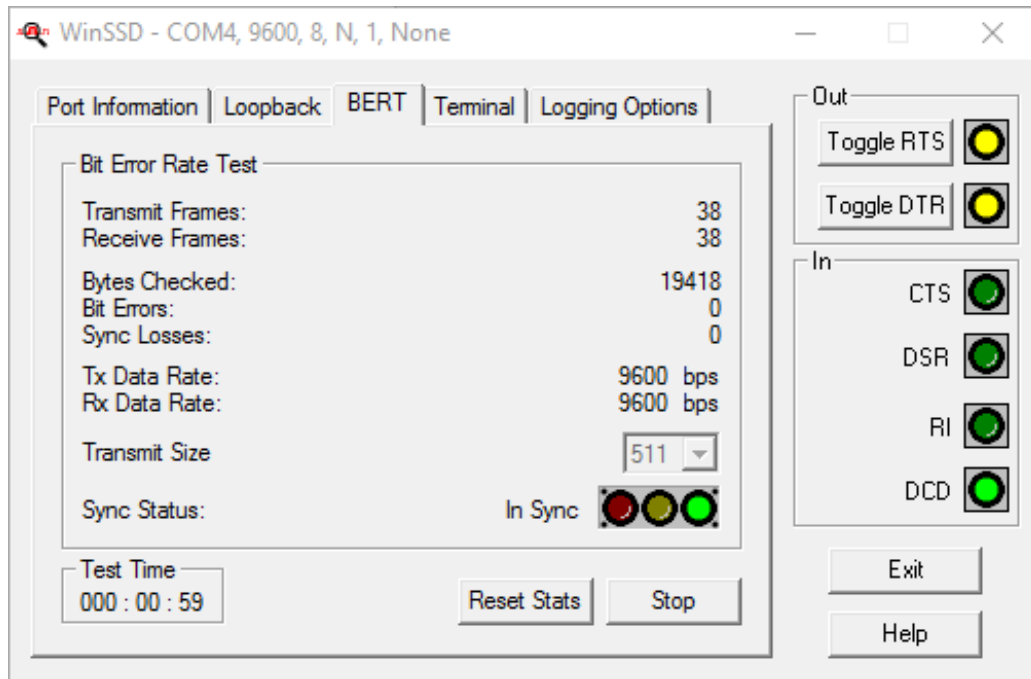
This verifies that the adapter is working properly. You can continue testing this port with different configurations or proceed with testing other ports, if necessary.

Appendix B - Handling Instructions

ESD Warnings

Electrostatic Discharges (ESD)

A sudden electrostatic discharge can destroy sensitive components. Proper packaging and grounding rules must therefore be observed. Always take the following precautions:

- Transport boards and cards in electrostatically secure containers or bags.

- Keep electrostatically sensitive components in their containers until they arrive at an electrostatically protected workplace.

- Only touch electrostatically sensitive components when you are properly grounded.

- Store electrostatically sensitive components in protective packaging or on anti-static mats.

Grounding Methods

The following measures help to avoid electrostatic damages to the device:

- Cover workstations with approved antistatic material. Always wear a wrist strap connected to a properly grounded workplace.

- Use antistatic mats, heel straps, and/or air ionizers for more protection.

- Always handle electrostatically sensitive components by their edge or by their casing.

- Avoid contact with pins, leads, or circuitry.

- Turn off power and input signals before inserting and removing connectors or connecting test equipment.

- Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.

- Use field service tools such as cutters, screwdrivers, and vacuum cleaners that are conductive.

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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-C/D/E or EIA/TIA-232-C/D/E. It is defined as "Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange".

The mechanical implementation of RS-232 is on a 25-pin D sub connector. 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 has 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 20K bps / 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4K bps 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) denote a binary 1 (mark). 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 Sealevel Systems Adapter is a DTE interface.

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 communication 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 starting 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.
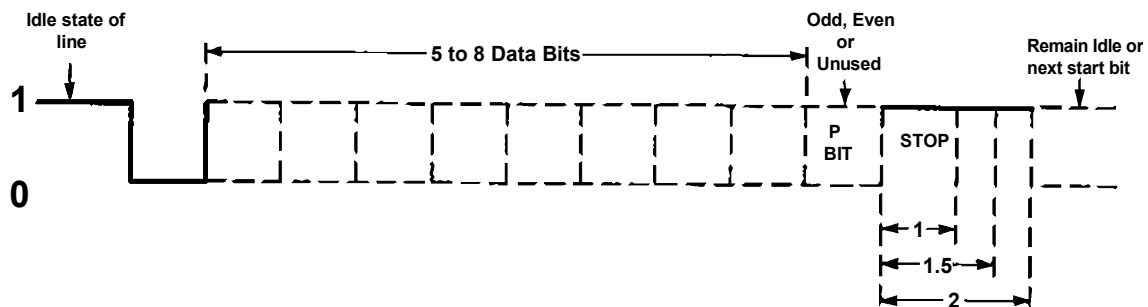
Asynchronous Communications Bit Diagram

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 need 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 – Mechanical Drawing
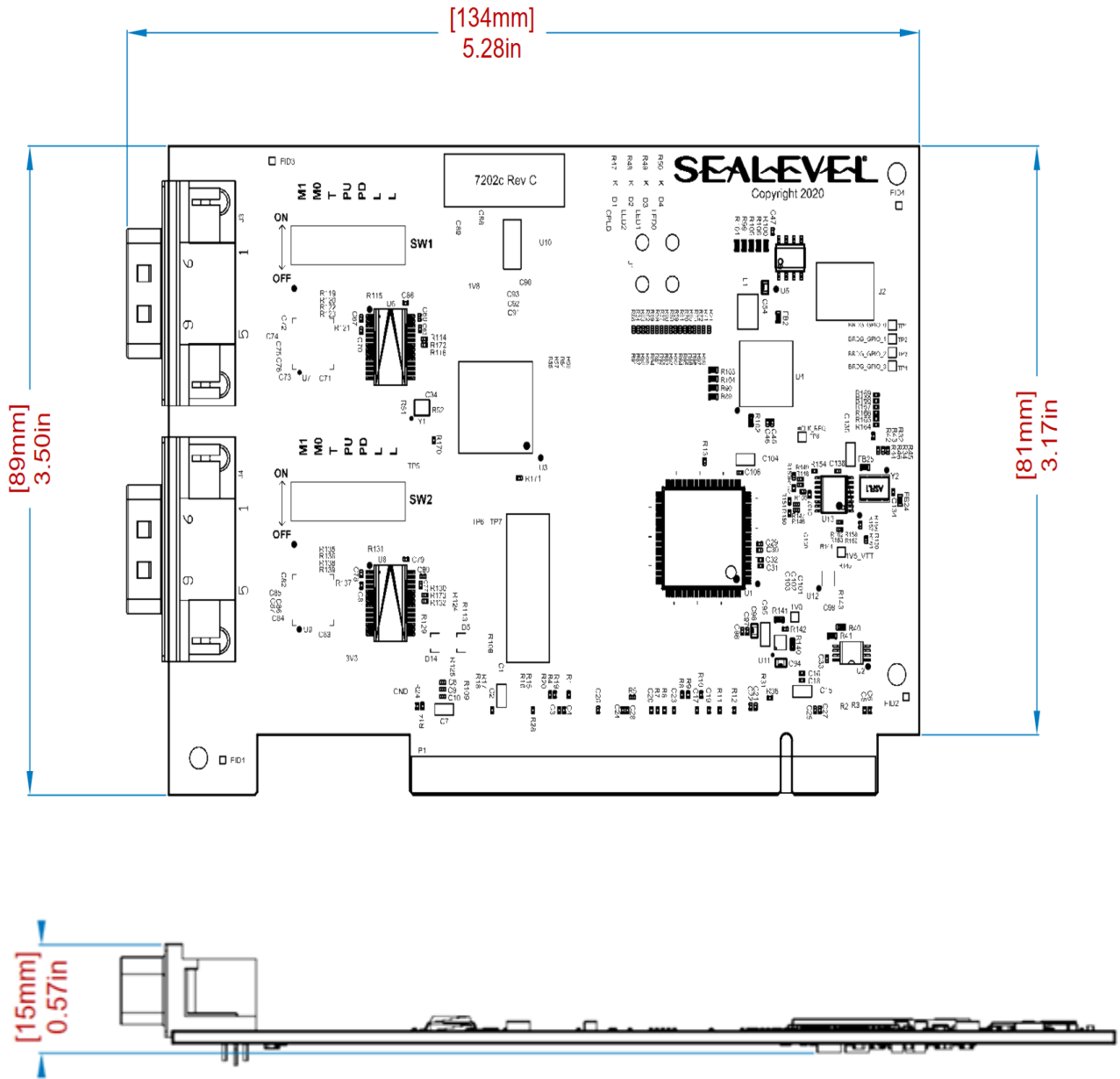
Appendix F – 7202 versus 7202c

This section will describe the minor differences between the 7202 and the 7202c. Mainly describing any features on the 7202 that are not present on the 7202c and vice versa.

Features	7202	7202c
UART	16C850	XR17V352
FIFO	128 Bytes	256 Bytes
Clock Modes	Manual (DIV1/DIV4 Jumper)	Automatic
Max Baud Rate	Up to 460.8 Kbps	1 Mbps or more
Interrupt Status Port (ISP)	Yes	No
Register Space	Port Mapped	Memory Mapped
Minimum OS Required	Windows XP	Windows 7

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Appendix G – PCIe Native Control

Some systems require PCIe native control to be disabled for the 7202c to fully enumerate in the system. See the steps below for disabling PCIe Native Control using bcdedit.

1. Open a Windows command prompt as an administrator.
2. Enter the command:

```
bcdedit /set {current} pciexpress forcedisable
```
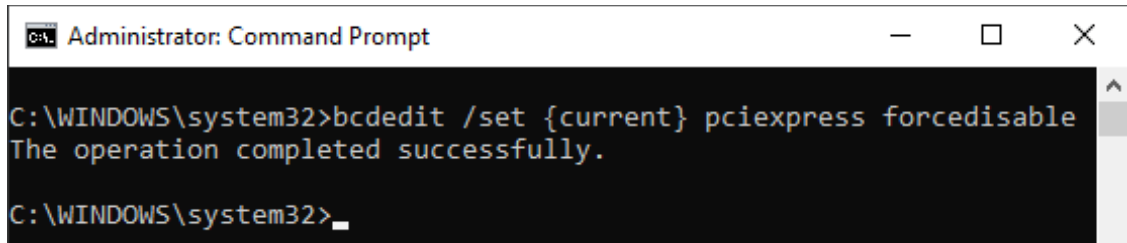

3. Restart the computer.
4. You may revert the change by running the command:

```
bcdedit /set {current} pciexpress default
```

Appendix H - Compliance Notices

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

ISED Canada

- **CAN ICES-003(A) / NMB-003(A)**

EMC Directive Statement

This equipment has been evaluated or tested and found in compliance with the requirements of the following directives issued by the European Commission:

- EMC Directive **2014/30/EU**

- RoHS Directive **2011/65/EU + (EU) 2015/863**

CE marking is recognized in the UK as an acceptable method of demonstrating compliance for certain categories of products, including one described in this manual.

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 the 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. Relio™ industrial computers are warranted for a period of two years and the R9 family is warranted for a five-year period from date of purchase. 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-9001:2008 certification in 2011.

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 insure 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 the 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, 8:00 AM to 5:00 PM EST
Phone	864-843-4343
Email	support@sealevel.com

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