Ultra COMM+8.PCI

User Manual | 7804c

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Contents

Introduction

The Sealevel **Ultra COMM+8.PCI** (Item# 7804c) is a PCI compliant interface adapter with eight field selectable RS-232/422/485 asynchronous serial ports from a single PCI slot supporting data rates exceeding 1 Mbps for industrial automation and control applications.

Configure the serial ports as RS-232 for standard serial COM port requirements. Choose the RS-422 mode for long distance device connections up to 4000ft. where noise immunity and high data integrity are essential. Select RS-485 and capture data from multiple peripherals in an RS-485 multi-drop network. Up to 31 RS-485 compliant devices can be connected to each port to automate your data collection. You can even mix the ports in any of the electrical interface combinations to provide maximum flexibility in your application.

Under Windows, in RS-485 mode the transmitter is automatically enabled in hardware, eliminating the need for application software control. This allows the 7804c to be used with standard serial communications applications and removes the risk of bus contention and data corruption. In RS-232 mode, all 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 7/10/11 and the 7804c works out of the box on many Linux distributions.

The product is RoHS compliant and meets the requirements of RoHS (2011/65/EU) directive and (EU) 2015/863.

Features

- Eight serial ports configurable for RS-232/422/485

- On board DIP switch configuration with Windows device driver override

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

- Asynchronous data rates exceeding 1 Mbps

- Automatic RS-485 enable/disable for Windows applications

- Includes 36" cable that terminates to eight DB9M connectors
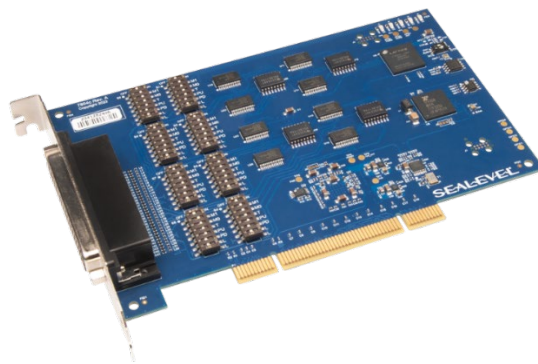
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Before You Get Started

What's Included

The Ultra COMM+8.PCI is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- **Ultra COMM+8.PCI Adapter**
  - **7804c – Eight Port Asynchronous Serial PCI Card**
- **DB78M to (8) port cable, 36in Length**
  - **CA145 – DB78M to (8) DB9M Cable, 36" in Length**

Advisory Conventions

Warning

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

Important

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

Note

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

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful with the 7804c. All items can be purchased from our website (www.sealevel.com) by calling our sales team at (864) 843-4343.

RS-422 to RS-530 Cable (Part Number CA176)

DB9 Female (RS-422) to DB25 Male (RS-530) Cable, 10 inch Length. Convert any Sealevel RS-422 DB9 Male Async Adapter to an RS-530 DB25 Male pinout. Useful in situations where RS-530 cabling exists, and a multiport Sealevel RS-422 adapter is to be used.

DB78 Extension Cable (Part Number CA233)

DB78 Male to DB78 Female, 72 inch Length Extension Cable. Can be used to extend the length of any Sealevel cable with a DB78 connector.

DB9 Serial Extension Cable (Part Number CA127)

The CA202 is a 36 inch cable with a micro DB68 connector breaking out to eight DB25 male connectors. This is the replacement for the break-out cable that ships with the 7803 and 7161 PCI serial boards.
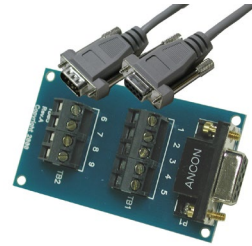
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Option Items Continued

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 (Item# TB05) and one DB9M to DB9F 72 inch extension cable (Item# CA127). 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.

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.

Terminal Block Kit (Part Number TB34-8)

The TB34-8 kit includes eight TB34 terminal blocks and simplifies RS-422 and RS-485 field wiring. Each terminal block adapter includes a DB9 female connector and five screw terminals.

The terminal block is compatible with 2-wire and 4-wire RS-485 networks and matches the RS-422/485 pin-out on Sealevel serial devices with DB9 male connectors. A pair of thumbscrews secures the adapter to the serial port and prevents accidental disconnection. The TB34 is compact and allows multiple adapters to be used on multi-port serial devices, such as Sealevel USB serial adapters, Ethernet serial servers and other Sealevel serial devices with two or more ports.

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Card Setup

Address and IRQ Selection

The 7804c 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 7804c 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.

Electrical Interface Selection via Hardware

Each serial port on the 7804c has the ability to be used as RS-232, RS-422, or RS-485. Configuration is selectable via independent per-port DIP switches. Please use the following examples to configure your adapter.

Mode selection via hardware (DIP switches)

M1 Switch	M0 Switch	Mode
OFF	OFF	RS-232
OFF	ON	RS-422 (Default)
ON	OFF	RS-485 with Echo
ON	ON	RS-485 without Echo

Line Termination Selection via Hardware

Typically, the device at each end of the RS-485 bus must have line-terminating resistors (RS-422 terminates at the receive end only). When the end device is a 7804c port, the board DIP switches can be used to connect a built in 120-ohm resistor between each RS-422/485 input pair in addition to a 1K ohm pull-up/pull-down combination that biases the RX+ and RX− receiver inputs. Independent per-port DIP switches allow the user to customize each port individually to their specific requirements. If multiple 7804c ports are configured in a RS-485 network, only the ports at each end should have switches T, PU, and PD ON.

If using the board in an RS-485 two-wire network, enable the two switches labeled 'L', which electrically connect the TX− and RX− pins together and the TX+ and RX+ pins together.

Switch	Default	Selection if ON
T	ON	Enables RS-422/RS-485 120 ohm termination between RX+ and RX−
PU	ON	Enables RS-422/RS-485 RX+ 1K ohm pull-up to 3.3V (biasing)
PD	ON	Enables RS-422/RS-485RX− 1K ohm pull-down to GND (biasing)
L	OFF	Enables RS-485 two-wire mode, connecting TX− to RX−
L	OFF	Enables RS-485 two-wire mode, connecting TX+ to RX+

Electrical Interface selection via Hardware

The 7804c supports selection of RS232, RS422, and RS485 electrical modes via hardware dip switches. Refer to the images below for common configurations.
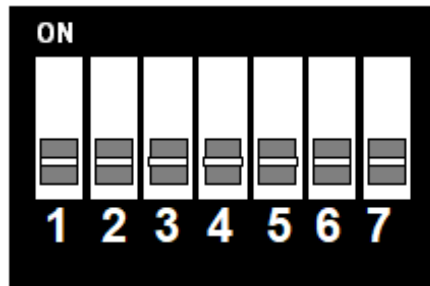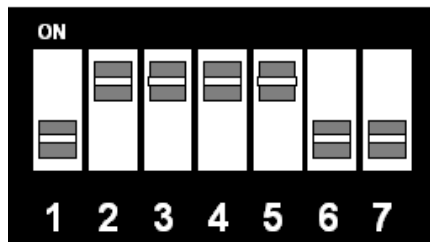

Figure 1 - RS-232 Mode

Figure 2 - RS-422 Mode
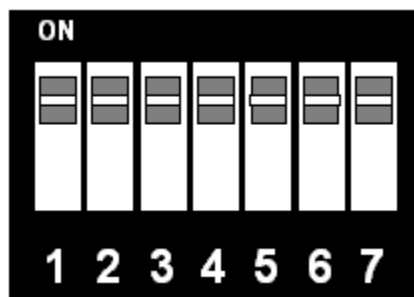

Figure 3 - RS-485 with 'Echo'

Figure 4 - RS-485 No 'Echo'

RS-485 'Echo'

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. An RS-485 'No Echo' option is selected by placing both Mode switches (M0, M1) in the 'On' position.

RS-485 Enable Modes

RS-485 is ideal for multi-drop or network environments. Only one driver may be active at a time, so RS-485 requires the transmitter to be electrically removed from the line when not active. This is referred to as the transmitter being in a tristate or high impedance condition. This condition is controlled by the RS485 direction control signal, which may be either RTS or DTR, depending on the scenario, and the transmitter can be automatically tri-stated using the Auto RS485 Enable feature of the 7804C.

Windows

Under Windows, Auto RS485 Enable is configured automatically and uses DTR as the RS485 direction control signal. DTR is asserted to enable the transmitter, and de-asserted to tri-state the transmitter.

Linux

Under Linux, Auto RS485 Enable is not configured automatically, but can be enabled by an RS485 aware application using the SER_RS485_ENABLED IOCTL specified in the kernel.

Alternatively, Auto RS485 Enable can be configured via the Auto switch on SW1 for use with applications that are not RS485 aware. Refer to SW1 section for more information.

⚠️ Kernel version 5.15.149 or newer is required to use SER_RS485_ENABLED on the 7804c

The direction control signal used to tri-state the transceiver depends on the specifics of your kernel version and the application being used. Refer to the table below to determine the control signal used by the UART.

Kernel Version	RS485 Aware Application (SER_RS485_ENABLED)	Control Signal	Notes
6.7+	No	RTS	
	Yes	DTS	
5.15.49 – 6.6X	Yes	RTS	
Below 5.15.149	Not Supported	N/A	Auto RS485 not supported by the kernel driver prior to 5.15.149. Please contact Sealevel Tech Support for assistance.

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SW1 – Auto RS485 and Direction Control Signal

SW1 is available for enhanced Linux compatibility when using kernel versions and/or applications which do not natively support RS485.

Switch	Default	Selection if ON
AUTO	OFF	Enable Auto RS485 half-duplex direction control.
RTS/DTR	ON	Use DTR as the RS485 direction control signal

⚠️ AUTO switch is ignored on Linux unless a kernel patch is applied. Contact Sealevel Tech Support for details. .

⚠️ RTS/DTR switch needs to match the current UART direction control configuration. Refer to RS-485 Enable Modes" section for information on which signal is used in different scenarios under Windows and Linux. .

SW1 Positions

Figure 5: Auto-RS485 is DISABLED and RTS is selected as the RS-485 direction control signal

Figure 6: Auto-RS485 is DISABLED and DTR is selected as the RS-485 direction control signal

This is the default configuration for SW1 on the 7804c.

Figure 7: Auto-RS485 is ENABLED and RTS is selected as the RS-485 direction control signal

Figure 8: Auto-RS485 is ENABLED and DTR is selected as the RS-485 direction control signal

Auto-RS485 Enable Switch [SW1; AUTO]

The Auto-RS485 switch can be used to start up all 8 ports in the Auto RS-485 Half-Duplex Direction control mode.

This switch position is sampled by the UART during power up, following a hardware reset (RST#) or soft reset (register RESET). This means that the switch must be configured prior to power-up or reset.

SW1; AUTO – OFF

- Standard ST16C550 mode.

SW1; AUTO - ON

- Enable Auto RS485 half-duplex direction control for ALL ports.
- RTS/DTR output changes from HIGH to LOW when finished sending the last stop bit of the last character out of the TSR register.
- RTS/DTR changes from LOW to HIGH when a data byte is loaded into the THR or transmit FIFO. The change to HIGH occurs prior to sending the start-bit.

⚠ SW1; AUTO switch is ignored on Linux unless a kernel patch is applied. Contact Sealevel Tech Support for details.

⚠ SW1; AUTO must be configured prior to power-up.

Ⓝ It is not necessary to use the AUTO RS485 switch when using an RS485 (SER_RS485_ENABLED) aware application and kernel.


Ⓝ SW1 is not applicable when using Windows.

Direction Control Switch [SW1; RTS/DTR]

The SW1; RTS/DTR switch allows for selection of either RTS or DTR as the transceiver control signal. If you are planning to use Auto-RS485 Auto-Enable, please refer to 'RS-485 Enable Modes' for information on which direction control signal is used by the UART in different scenarios.

SW1; RTS/DTR	Control Signal	Signal Level	Transmitter
OFF	RTS	De-asserted (Logic High)	Active
		Asserted (Logic Low)	Tri-Stated
ON	DTR	De-asserted (Logic High)	Tri-Stated
		Asserted (Logic Low)	Active

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Electrical Interface Selection via Software

When a 7804c has been installed under Windows, the DIP switch Electrical Interface configuration can be overridden by software settings via the SeaCOM PortManager.NET utility. Changing one port to be overridden by software will automatically change all other ports to also be software overridden. The initial software override configuration of each port is adopted from its DIP switch configuration. All COM ports of the 7804c should be closed before changing the port configuration.
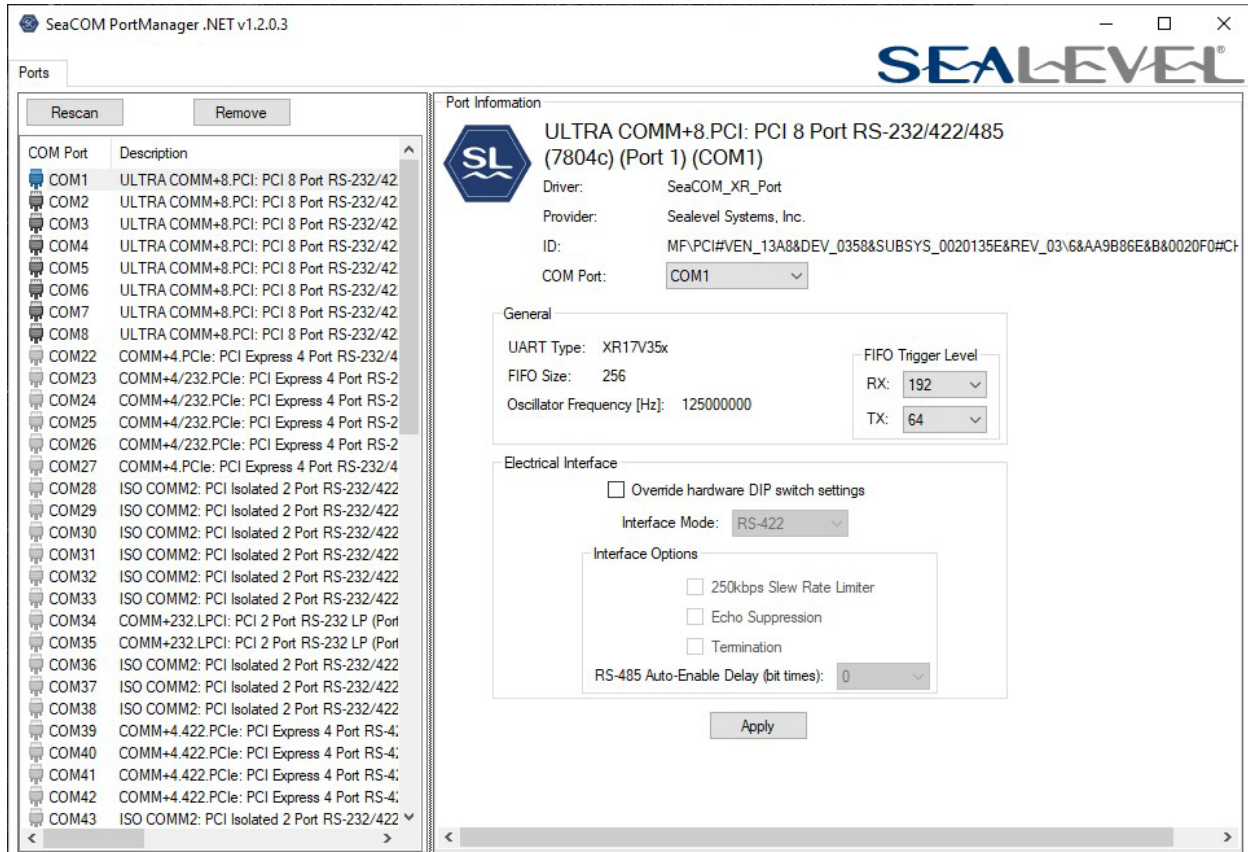
RS-485 Auto-Enable Delay

RS-485 Auto-Enable Delay is an additional configuration setting available only via software selection. It provides the ability to select a 0 to 15 bit-time delay that is inserted after the end of the last stop-bit of the last transmitted character. This delay controls when to automatically disable the RS-485 transmitter. This delay may be useful in long-cable networks.

On-Board LED Signal Indicators

LED Name	Power Indicator LED		Driver State	FPGA/CPLD Heartbeat	Port 1 Mode		
LED	**D1**		**D2**	**D5**	**D3**	**D4**	
LED Behavior	**ON**	UART powered.	MPIO[15:12] in undefined state	N/A	**OFF**	**OFF**	2-wire RS485 w/Echo
	OFF	UART unpowered	Driver not Loaded	No heartbeat	**ON**	**OFF**	2-wire RS485 no Echo
	Slow Blink	N/A	Software control	CPLD running	**OFF**	**ON**	RS422
	Fast Blink	N/A	DIP switch Control	N/A	**ON**	**ON**	RS232

Notes:

a) Power LED (D1) is lit when card is powered.

b) If the driver is not loaded, LED D5 will be OFF.

   i) The serial port remains in tristate mode until the driver loads.

c) If the driver is loaded, two (2) LEDs (D3−D4) reflect the current Port 1 mode in accordance with the table above, whether the mode was set by DIP switch or software control.

d) LED States Defined:

   i) ON = Solidly Lit

   ii) OFF = Completely Off

   iii) Slow Flash = 1 sec on / 1 sec off

   iv) Fast Flash = 250mS on / 250mS off

Technical Description

The Sealevel Systems 7804c provides a PCI interface adapter with eight (8) asynchronous serial ports providing versatile, field selectable RS-232 interfaces for modems, printers, and plotters, as well as RS-422/485 interfaces for industrial automation and control applications.

The 7804c provides UARTs with 256 byte TX and RX FIFOs, programmable baud rates, data format, and interrupt control.

DB78 Female Connector Pin Assignments

The 7804c includes a DB78 female connector for attaching the included cable (Part Number CA145).

Pin#	RS-232	RS-422/485	Pin#	RS-232	RS-422/485
1	Port 4 DCD (I)	Port 4 RX+ (I)	40	Port 8 DCD (I)	Port 8 RX+ (I)
2	Port 4 RD (I)	Port 4 RX− (I)	41	Port 8 RD (I)	Port 8 RX− (I)
3	Port 4 TD (O)	Port 4 TX− (O)	42	Port 8 TD (O)	Port 8 TX− (O)
4	Port 4 DTR (O)	Port 4 TX+ (O)	43	Port 8 DTR (O)	Port 8 TX+ (O)
5	GND	GND	44	GND	GND
6	Port 3 RI (I)	Port 3 CTS+ (I)	45	Port 7 RI (I)	Port 7 CTS+ (I)
7	Port 3 CTS (I)	Port 3 CTS− (I)	46	Port 7 CTS (I)	Port 7 CTS− (I)
8	Port 3 RTS (O)	Port 3 RTS− (O)	47	Port 7 RTS (O)	Port 7 RTS− (O)
9	Port 3 DSR (O)	Port 3 RTS+ (O)	48	Port 7 DSR (O)	Port 7 RTS+ (O)
10	Port 2 DCD (I)	Port 2 RX+ (I)	49	Port 6 DCD (I)	Port 6 RX+ (I)
11	Port 2 RD (I)	Port 2 RX− (I)	50	Port 6 RD (I)	Port 6 RX− (I)
12	Port 2 TD (O)	Port 2 TX− (O)	51	Port 6 TD (O)	Port 6 TX− (O)
13	Port 2 DTR (O)	Port 2 TX+ (O)	52	Port 6 DTR (O)	Port 6 TX+ (O)
14	GND	GND	53	GND	GND
15	Port 1 RI (I)	Port 1 CTS+ (I)	54	Port 5 RI (I)	Port 5 CTS+ (I)
16	Port 1 CTS (I)	Port 1 CTS− (O)	55	Port 5 CTS (I)	Port 5 CTS− (I)
17	Port 1 RTS (O)	Port 1 RTS− (O)	56	Port 5 RTS (O)	Port 5 RTS− (O)
18	Port 1 DSR (O)	Port 1 RTS+ (O)	57	Port 5 DSR (O)	Port 5 RTS+ (O)
19	N/C	N/C	58	N/C	N/C
20	N/C	N/C	59	N/C	N/C

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Pin#	RS-232	RS-422/485	Pin#	RS-232	RS-422/485
21	Port 4 DSR (O)	Port 4 RTS+ (O)	60	Port 8 DSR (O)	Port 8 RTS+ (O)
22	Port 4 RTS (O)	Port 4 RTS− (O)	61	Port 8 RTS (O)	Port 8 RTS− (O)
23	Port 4 CTS (I)	Port 4 CTS− (I)	62	Port 8 CTS (I)	Port 8 CTS− (I)
24	Port 4 RI (I)	Port 4 CTS+ (I)	63	Port 8 RI (I)	Port 8 CTS+ (I)
25	GND	GND	64	GND	GND
26	Port 3 DTR (O)	Port 3 TX+ (O)	65	Port 7 DTR (O)	Port 7 TX+ (O)
27	Port 3 TD (O)	Port 3 TX− (O)	66	Port 7 TD (O)	Port 7 TX− (O)
28	Port 3 RD (I)	Port 3 RX− (I)	67	Port 7 RD (I)	Port 7 RX− (I)
29	Port 3 DCD (I)	Port 3 RX+ (I)	68	Port 7 DCD (I)	Port 7 RX+ (I)
30	Port 2 DSR (O)	Port 2 RTS+ (O)	69	Port 6 DSR (O)	Port 6 RTS+ (O)
31	Port 2 RTS (O)	Port 2 RTS− (O)	70	Port 6 RTS (O)	Port 6 RTS− (O)
32	Port 2 CTS (I)	Port 2 CTS− (I)	71	Port 6 CTS (I)	Port 6 CTS− (I)
33	Port 2 RI (I)	Port 2 CTS+ (I)	72	Port 6 RI (I)	Port 6 CTS+ (I)
34	GND	GND	73	GND	GND
35	Port 1 DTR (O)	Port 1 TX+ (O)	74	Port 5 DTR (O)	Port 5 TX+ (O)
36	Port 1 TD (O)	Port 1 TX− (O)	75	Port 5 TD (O)	Port 5 TX− (O)
37	Port 1 RD (I)	Port 1 RX− (I)	76	Port 5 RD (I)	Port 5 RX− (I)
38	Port 1 DCD (I)	Port 1 RX+ (I)	77	Port 5 DCD (I)	Port 5 RX+ (I)
39	N/C	N/C	78	N/C	N/C

"N/C" = Not Connected (unused)

"−" = Reserved

(I) = Input

(O) = Output

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DB9 Male Cable Pin Assignments

The 7804c includes a cable (Part Number CA145) with a DB78 male connector terminating to eight DB9 male connectors. The DB78M connector on the cable plugs into the DB78F connector on the board. 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	RS-422/485
1	DCD (I)	RX+ (I)
2	RD (I)	RX− (I)
3	TD (O)	TX− (O)
4	DTR (O)	TX+ (O)
5	GND	GND
6	DSR (I)	RTS+ (O)
7	RTS (O)	RTS− (O)
8	CTS (I)	CTS− (I)
9	RI (I)	CTS+ (I)

(I) = Input

(O) = Output

N Please terminate any unused control signals. The most common way to do this in RS-232 mode is to connect RTS to CTS and RI, and to connect DTR to DCD and DSR. In RS-422/485 mode connect RTS+ to CTS+ and RTS− to CTS−. Terminating these pins, if not used, will help ensure the best performance from the adapter.

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Technical Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0º to 70º C (32º to 158º F)	-50º to 105º 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	1,235,832 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

Supply Voltage	+3.3 VDC	+5 VDC
Typical Current Draw @ Idle	40mA	32 mA
Typical Current Draw @ Full Load	320mA	800mA
Typical Power Draw @ Idle	300mW	
Typical Power Draw @ Full Load	5100mW	

Software Installation

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

W 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.
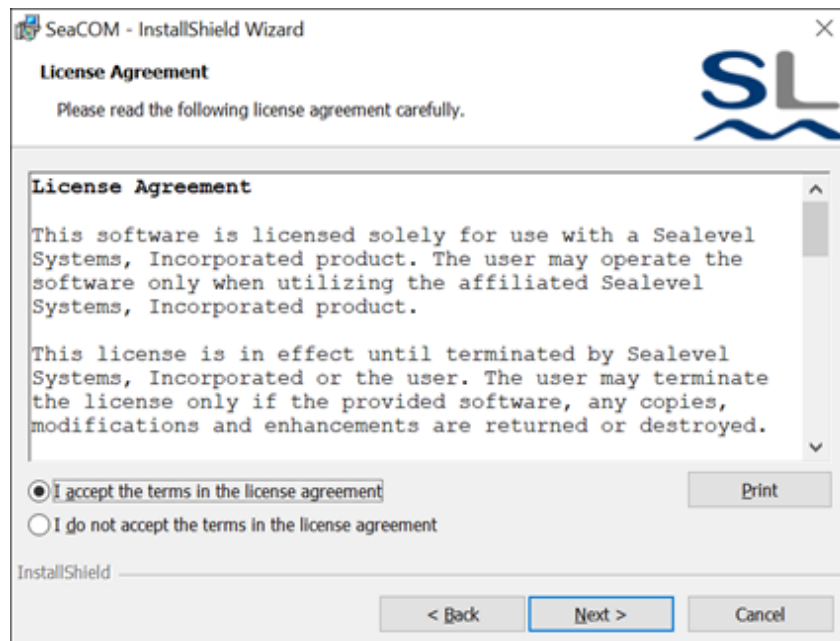
Windows Installation

N 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'.

3. Once opened Select 'Next' as demonstrated in the image below.
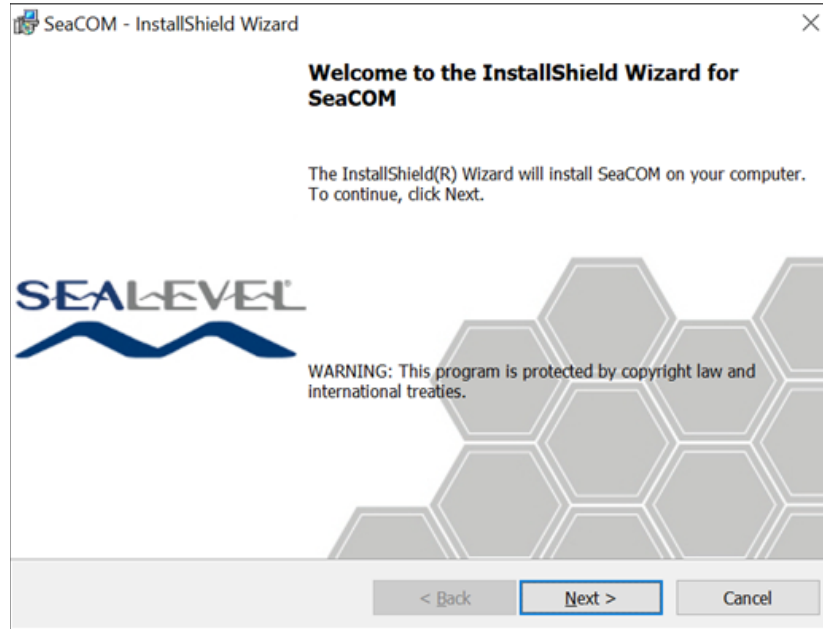
4. When the 'License Agreement' window appears, accept the terms, and click 'Next' to continue. If you do not accept the terms of the agreement, the wizard will stop.

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.
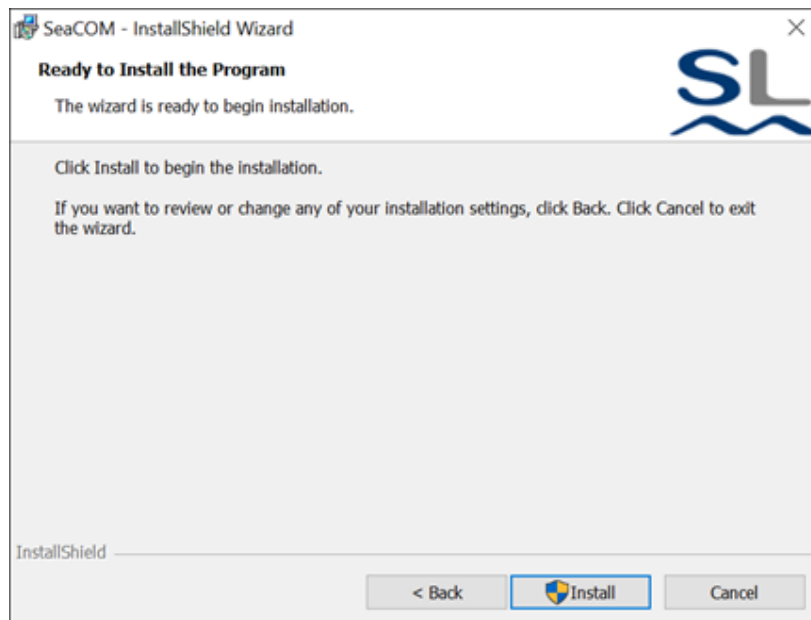
N   The below warning will appear when installing the driver on Windows 7. Select "Install this driver anyway" on the warning.

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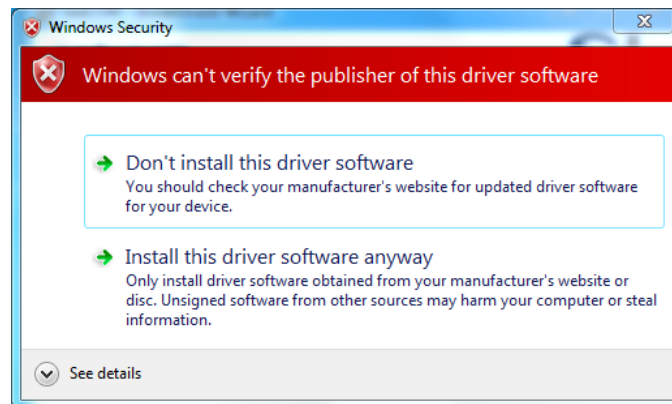
6. Click 'Finish' to complete the installation of SeaCOM onto your PC.
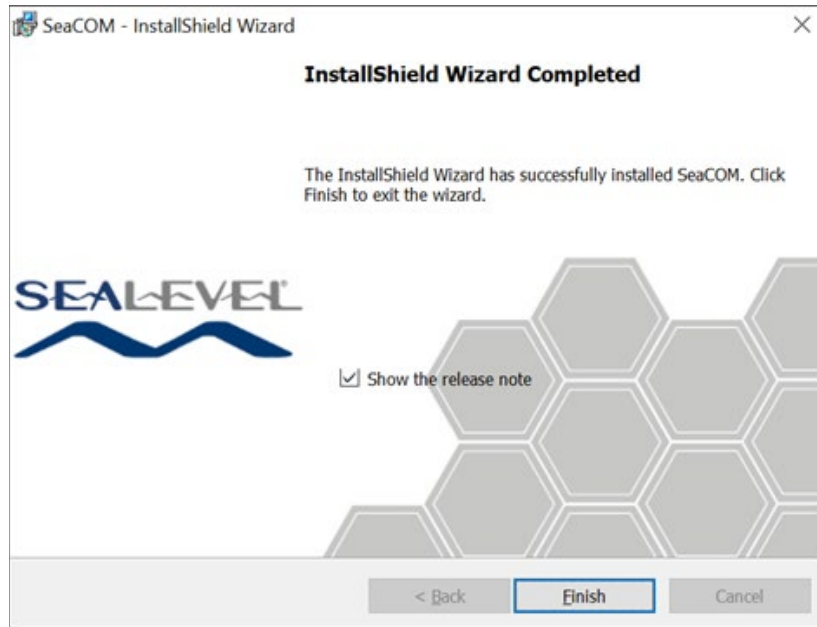
7. If prompted, reboot your computer for changes to take effect.

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

> ⚠️ Auto RS-485 requires kernel 5.15.149 or newer. Refer to patch [59c221f](#).

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 the 7803c 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 7804c 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.

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 7803c is installed, you should see output indicating the assigned ttyS* ports.

```
$ dmesg | grep XR17V35X

[    1.295217] 0000:01:00.0: ttyS0 at MMIO 0xf5cfc000 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295306] 0000:01:00.0: ttyS1 at MMIO 0xf5cfc400 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295395] 0000:01:00.0: ttyS2 at MMIO 0xf5cfc800 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295484] 0000:01:00.0: ttyS3 at MMIO 0xf5cfcc00 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295573] 0000:01:00.0: ttyS4 at MMIO 0xf5cfd000 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295662] 0000:01:00.0: ttyS5 at MMIO 0xf5cfd400 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295751] 0000:01:00.0: ttyS6 at MMIO 0xf5cfd800 (irq = 24,
  base_baud = 7812500) is a XR17V35X

[    1.295840] 0000:01:00.0: ttyS7 at MMIO 0xf5cfdc00 (irq = 24,
  base_baud = 7812500) is a XR17V35X
```
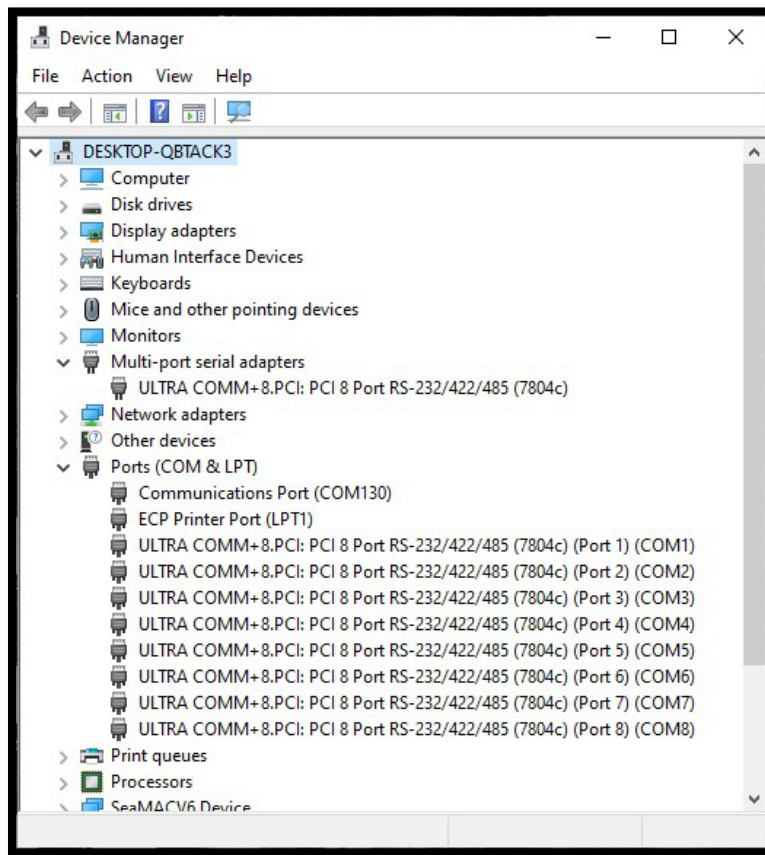
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Verifying Installation on Windows

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.

N Your system will assign the next available COM number, which will vary by computer (COM1 through COM8 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 SeaCOM 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.

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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.

Please set the adapters Electrical Interface for either RS-232 or RS-422.

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:
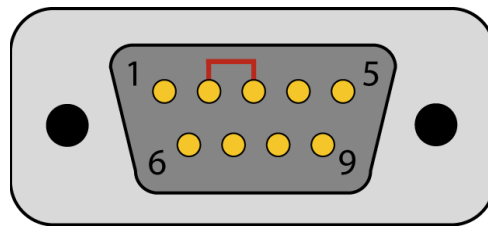
RS-422 requires pins 1 & 4 (Receive + and Transmit +) and also pins 2 & 3 (Receive - and Transmit -) to be jumpered as shown in this graphic:
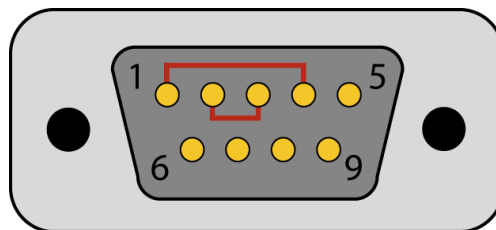

N If you do not have a loopback plug or jumper wires handy, you can use a metal device such as a knife, screwdriver, key, or paperclip to short pins two and three.

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.
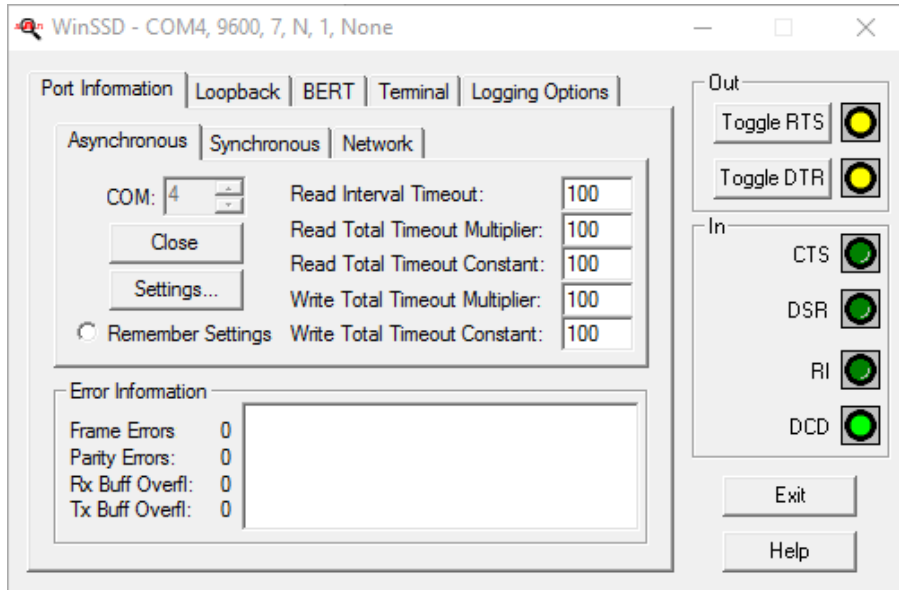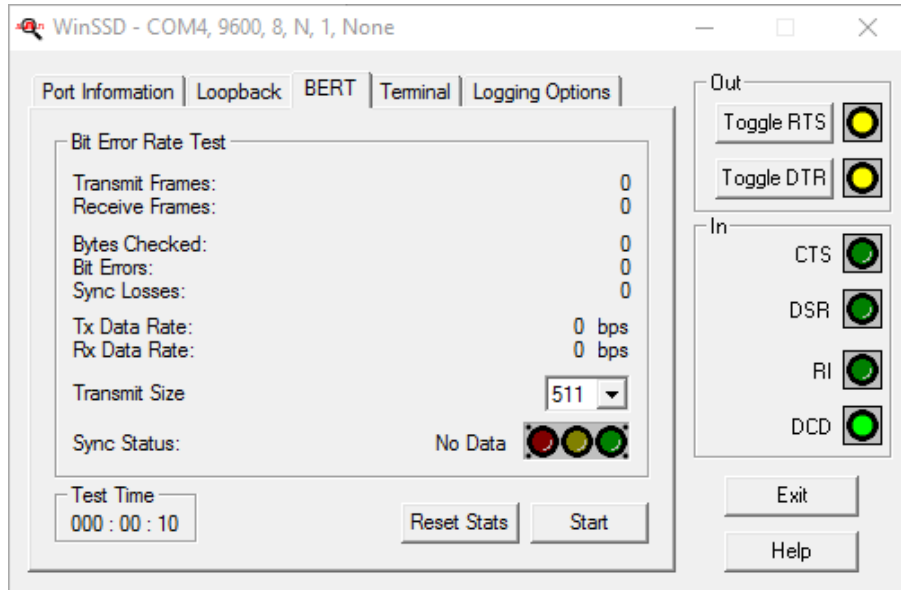
Change your parameters to 9600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control, as pictured below.
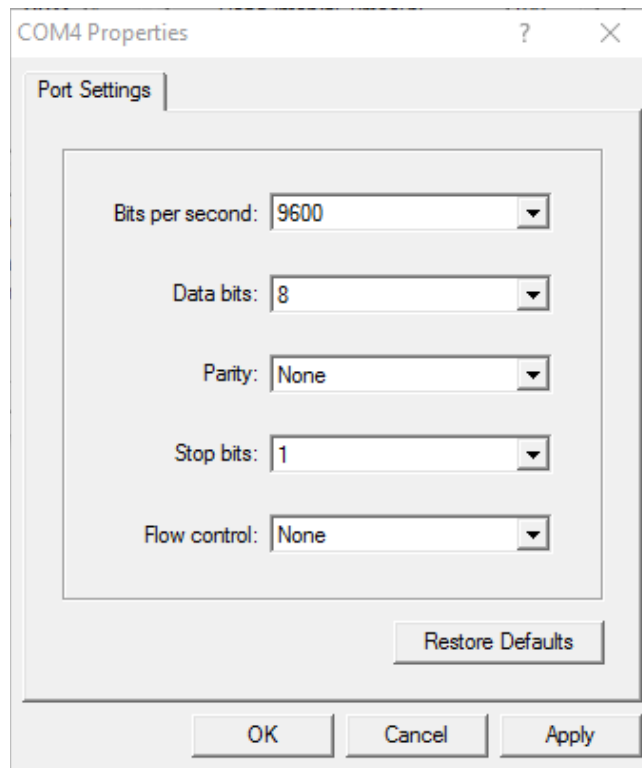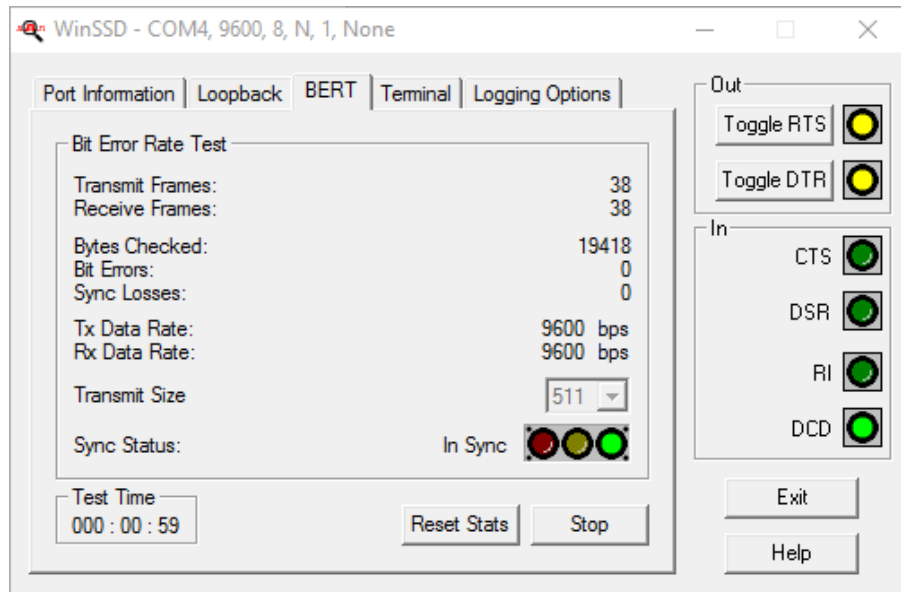

Click 'Apply' and 'OK'.

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

Click on the 'Start' button.

If the COM port is working properly, 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.

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 A.M.- 5:00 P.M. Eastern Time Monday through Friday. For email support contact support@sealevel.com.

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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.

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.

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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. The 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 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.
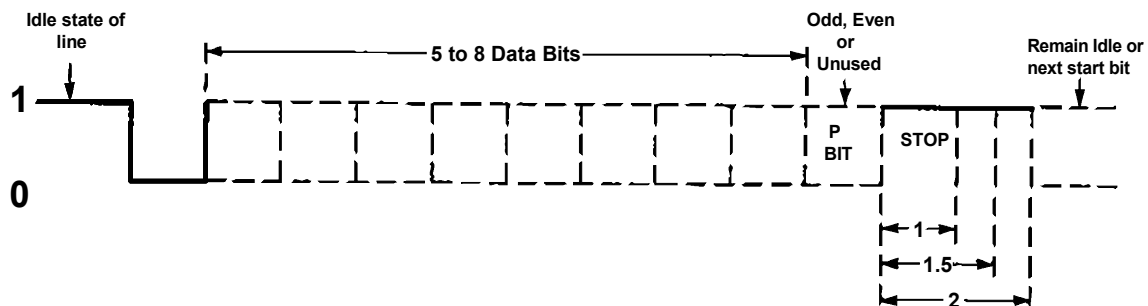

Figure 9 - Asynchronous Communications Bit Diagram

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 – Ground Loop Phenomenon

What is Ground Loop?

Ground loop Phenomenon occurs when two (or more) pieces of equipment are connected together with a common ground and a different ground potential exists at each location. This current can cause the connected equipment to experience noise that in turn causes data transmission errors. In the extreme this ground current can cause equipment malfunction or even destruction.

Cabling Recommendations

When connecting the 7804c in a RS-485 network, care should be taken that both ends of the network are not isolated from ground (see Figure 8). This "floating" ground condition could cause the capacitive or inductive coupling of voltages that will cause a breakdown in the DC to DC converter circuit or in the opto-isolator circuit. This condition will cause data errors and possibly destruction of the receiver circuit.
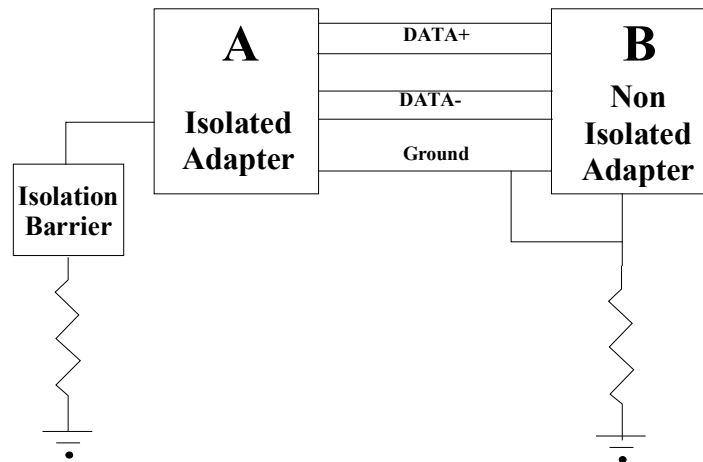
Appendix F – Mechanical Drawing
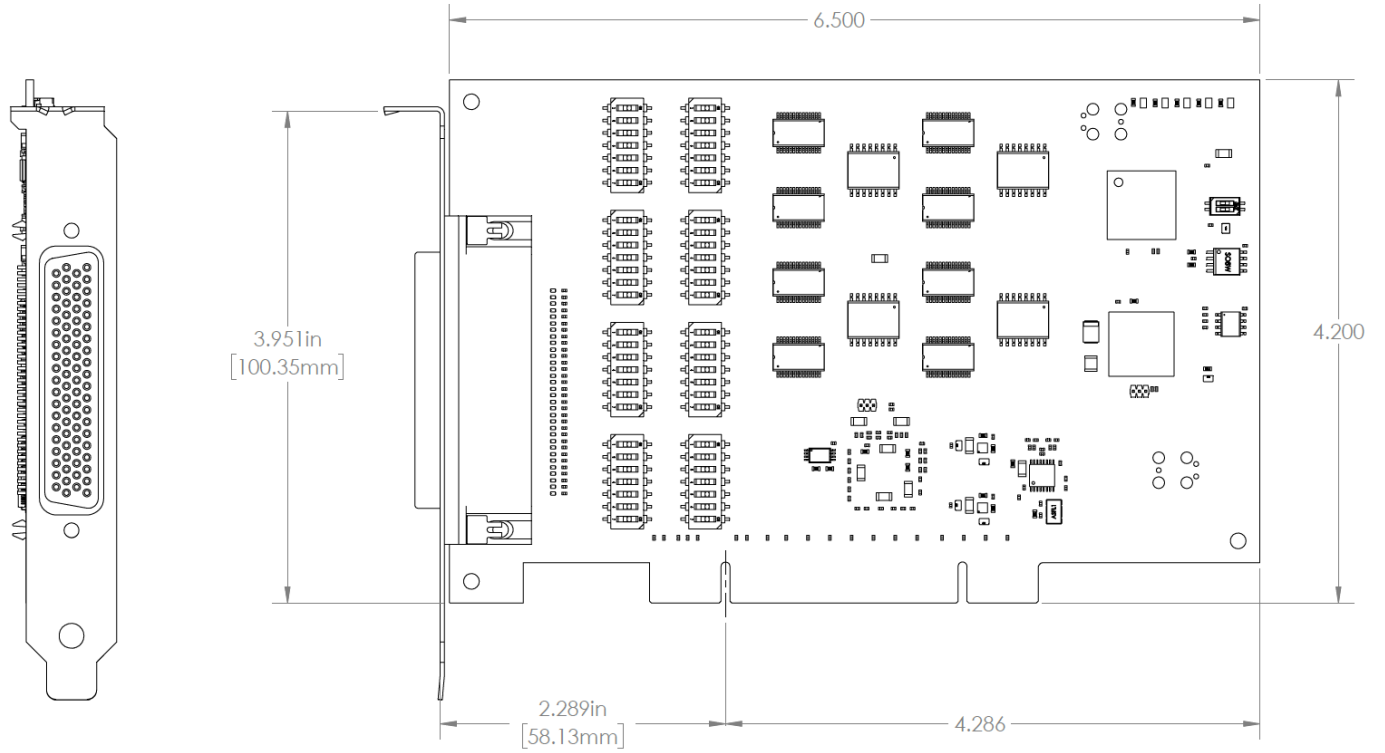
Appendix G – 7804 versus 7804c

This section will describe the minor differences between the 7804 and the 7804c. Mainly describing any features on the 7804 that are not present on the 7804c and vice versa.
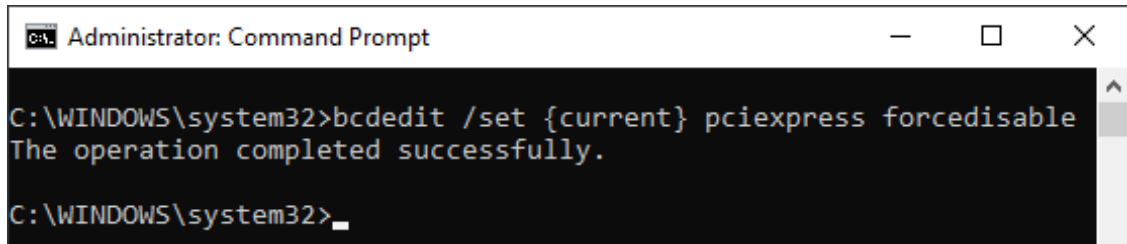
Features	7804	7804c
UART	16C850	XR17V358
FIFO	128 Bytes	256 Bytes
Clock Modes	Manual (DIV1/DIV4 Jumper)	Automatic
Max Baud Rate	Up to 460.8 Kbps	1 Mbps or more
Interrupt Status Port (ISP)	Yes	No
Register Space	Port Mapped	Memory Mapped
Minimum OS Required	Windows XP	Windows 7

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Appendix H – PCIe Native Control

Some systems require PCIe native control to be disabled for the 7804c 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
```

```
Administrator: Command Prompt                                    —    □    ×

C:\WINDOWS\system32>bcdedit /set {current} pciexpress forcedisable
The operation completed successfully.

C:\WINDOWS\system32>
```

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

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

Appendix I - 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.

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. 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. The warranty is valid only for the 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, 8:00AM to 5:00PM EST
Phone	864-843-4343
Email	support@sealevel.com

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