SEALEVEL SIO-485.CF Interface Card User Manual

Contents

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SEALEVEL SIO-485.CF Interface Card

Overview

The SIO-485.CF card is an RS-422/485 CompactFlash™ serial card with the following features:

- Type I CompactFlash™ form factor for CF+ equipped PDAs, Handheld PCs, laptops, etc.
- Software support provided for Windows and PocketPC
- 16C550 compatible, buffered UART with 16-byte FIFO
- Data rates to 921.6K bps
- Switchable x1 or x8 baud rate supports up to 921.6K baud
- Automatic RS-485 tri-state enable/disable
- 3.3V or 5V compatible
- All modem control signal signals implemented
- Compatible with all standard serial COM software
- ESD-protected RS-422/485 drivers
- Software-controlled power management
- Low power consumption
- Detachable cable with DB-9M connector

Introduction

The SIO-485.CF card is an RS-422/485 serial card designed using a 16C550 compatible UART. The serial data and control lines are buffered using ESD protected RS-422/485 transceivers. Industry standard baud rates up to 921.6K bps are supported, together with 16-byte TX and RX FIFOs. A small switch is located at the back edge of the card, which allows selection of “x1” or “x8” baud rate multiplier. This feature allows up to 921.6K bps operation without needing special device drivers on the host (in x8 mode you simply multiply the setting shown on the host by 8 to get the real serial data rate – e.g., 19.2K bps set in software with “x8” mode gives 153.6K bps data rate physically in hardware). See section5 for the switch settings.
The SIO-485.CF conforms to the industry standard CompactFlash+™ interface that allows connection of peripherals to the system bus of a laptop, handheld PC or PDA. The CF+ specification extends the earlier

memory-only CompactFlash™ interface to allow I/O devices and extra power for the card. The SIO-485.CF is an I/O type device and requires a CF+ capable slot.

Before You Get Started

What's Included

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

- SIO-485.CF – RS-422/485 Serial Interface Adapter
- 12" cable that terminates with a DB-9M connector with female jackscrews

Advisory Conventions

- **Warning**
  The highest level of importance is 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.

Installation the SIO-485.CF

Software Installation

- Do not install the Adapter in the machine until the software has been fully 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** to receive access to the proper driver download and installation instructions.

You will first need to install SeaCOM prior to using the SIO-485.CF. Installing SeaCOM software that is available Sealevel's website (www.sealevel.com) will copy the necessary files into the proper Windows folders. Windows will use these files to "recognize" the SIO-485.CF card.

1. Begin by locating, selecting, and installing the correct software: Sealevel Seacom Software.
2. Select the link for 'SeaCOM for Windows'.
3. The setup file will automatically detect the operating environment and install the proper components.

To confirm that the SeaCOM driver has been successfully installed, click on the 'Start' button, and then select 'All Programs'. You should see the 'SeaCOM' program folder listed. You are now ready to proceed with connecting the 3102 to your system. Refer to the Hardware Specification section for details.

- Windows NT4 requires additional third-party Card & Socket Services (additional charge, not included)
- The diagnostic tool ‘WinSSD’ is installed in the SeaCOM 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

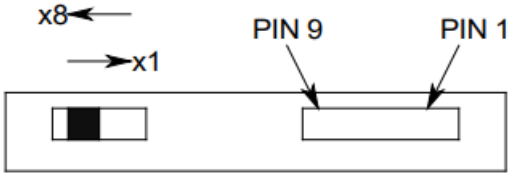
Windows CE, PocketPC
There is no need to install any software for Windows CE or PocketPC. Simply insert the SIO-485.CF card and it will appear in a list when you go to set up a “Connection”. For Windows CE and PocketPC, the utility ‘vxHpc’ is available from Cambridge Computer Corporation, free for a 30-day evaluation or a nominal charge for a license. ‘vxHpc’ is a high-performance serial and telnet communication software application that can help you connect to various terminal devices and can also be used to perform a simple loopback test.
The latest version and instructions are available here:
https://web.archive.org/web/20101212202122/http://cam.com/vxhpc.html
For additional information on connecting your PocketPC or if you are using older versions of Windows, such as Windows 95/98/ME/NT/2000, please call Sealevel Systems’ Technical Support, (864) 843-4343. Our technical support is free and available from 8:00 AM to 5:00 PM Eastern Time Monday through Friday. For email support contact **support@sealevel.com**.

Hardware Specification

Pinout
The SIO-485.CF is supplied with a detachable 12” cable that terminates with a DB-9M connector with female jackscrews (to match the port at the back of a PC). The pinout below applies to the SIO-485.CF and the DB9M connector on the supplied cable (the cable is pinned one-to-one).

PIN	NAME	FUNCTION
1*	RXD-	Receive Data inverting input
2	RXD+	Receive Data non-inverting input
3	TXD-	Transmit Data inverting output
4	TXD+	Transmit Data non-inverting output
5	GND	GROUND
6	CTS-	Clear To Send inverting input
7	RTS-	Request To Send inverting output
8	CTS+	Clear To Send non-inverting input
9	RTS+	Request To Send non-inverting output
Shield	–	See note **

- Pin 1 is nearest the edge of the card.
- The cable shield is grounded at the card-end, runs the full length of the cable, and is not connected at the equipment end (i.e., does not connect to the DB-9 shell) to help to avoid ground loops.
- Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS- to CTS- and connect RTS+ to CTS+. Terminating these pins, if not used, will help insure you get the best performance from your adapter.
- The mating connector type: Honda RMC-E9F2S-BSLA2N-A2



Electrical

- **ESD PROTECTION:** All RS-422/485 signal lines on the SIO-485.CF card are protected against electrostatic discharge (ESD) >1kv – IEC1000-4-4

- **UART CLOCK SPEED:** Switch selectable Baud rate multiplier: /x1: UART CLOCK is 1.8432MHz ->115.2K bps max x8: UART CLOCK is 14.7456MHz -> 921.6K bps max
- **RS-422 MODE:** CTS/RTS flow control signals available
- **RS-485 MODE:** Auto-tristate of TXD driver when not transmitting. Delay from last TX stop bit to high-Z typ. 4ms (+/-10%).
- **TERMINATORS:** None in card. Use external termination resistor as req.
- **FAIL-SAFE FEATURE:** The receiver inputs include a fail-safe feature that guarantees a logic high on the receiver when the inputs are open circuit.

Power Consumption

- **COMMUNICTION ACTIVE:** 80mA typical @ 5V, 55mA typical @ 3.3V (Includes 45mA consumed by terminating resistors)
- **IDLE MODE:** 22mA typical @ 5V, 10mA typical @ 3.3V

Mechanical

- **CARD MASS:** 10g typical (0.352 oz.)
- **FORM FACTOR:** 36.4mm x 42.8mm x 3.3 mm overall (1.43” x 1.68” x 0.13”)

Environmental

- **HUMIDITY:** <80% R.H. (non-condensing)
- **TEMP:** 0-50°C ambient (32-122°F)

Notes on Serial Data Throughput
The maximum bit rate of 921.6K bps does not imply that the maximum sustained throughput rate of the serial port will be as high. The actual throughput that can be achieved depends on many factors including the host PC speed, the serial data block size, duty cycle, and overall host interrupt latency.

Baud Rate Settings
The table below illustrates the common baud rate values available for each of the baud rate multiplier switch positions:

HOST SETTING	SWITCH = x1	SWITCH = x8
300 bps	300 bps	2400 bps
1200 bps	1200 bps	9600 bps
2400 bps	2400 bps	19.2K bps
4800 bps	4800 bps	38.4K bps
9600 bps	9600 bps	76.8K bps
19.2K bps	19.2K bps	153.6K bps
38.4K bps	38.4K bps	307.2K bps
57.6K bps	57.6K bps	460.8K bps
115.2K bps	115.2K bps	921.6K bps

Register Interface
For reference, the SIO-485.CF behaves as a 5V card to the host system. This is to make the host system default to 5V when possible, giving the highest RS-422/485 output signals and therefore best noise margins. The Card Information Structure does not define any 3.3V tuples because some platforms will take this as a sign to run at 3.3V, even when 5V is available. On a PDA or HPC, the host will power the card at 5V if it is available, otherwise it will be powered at 3.3V (despite the absence of 3.3V tuple entries).

Using The SIO-485.CF Card

Termination
RS-422 and RS-485 lines should be terminated at the end of the main branch of the receiver with the cables characteristic impedance. These terminating impedances reduce signal reflections at the cable end. It is not necessary to terminate the transmitter end of the cable. The most common method of termination is to install a terminating resistor, typically with a value of 120Ω, at a single receiver. The SIO-485.CF does not have internal termination resistors. If required, a 120Ω resistor should be connected between RXD+ and RXD- pins of the DB-9M connector. For RS-422 applications, a terminating resistor will also be required between the CTS+ and CTS- pins. Using a DB-9 terminal block (p/n: TB05, available separately) will simplify field wiring requirements.

Fail Safe Biasing
A transmission line enters an indeterminate state if no drivers are transmitting on it, or the line has been cut. This indeterminate state can cause the receivers to receive invalid data bits from noise picked up on the cable. To prevent reception of these data bits, the SIO-485-CF receiver inputs incorporate 1.2kΩ pull-up and pull-down biasing resistors to ensure that the differential voltage on the RXD and CTS pairs is greater than the 200mV input logic “1” threshold (even in the presence of an external 120Ω terminating resistor).

TXD and RTS Drivers
The RTS signal on the SIO-485.CF is always enabled, regardless of the mode in which the card is being used. The SIO-485.CF incorporates an auto-tristate feature on the TXD signal driver. The driver is enabled only when

data is in the process of being transmitted. This feature can prevent bus contention in RS-485 networks caused by multiple transmitters driving the line in opposing states. The auto-tristate feature is always in operation, regardless of the mode in which the card is being used.

When multiple characters are transmitted back-to-back, the output drivers stay active for the entire duration of the transmission (i.e., the drivers do not go in and out of tri-state for each character in a multi-character block).

RS-422 Operation
In RS-422 systems, all eight signal lines from the DB-9M connector are used. Typically, four twisted pair cables are used, one pair for each of the four signals: TXD, RXD, RTS, and CTS. The RS-422 electrical interface allows data to be transmitted and received simultaneously since each signal has its own pair of wires.

RS-485 Operation
The SIO-485.CF can be used for both half-duplex (one twisted pair) and full-duplex (two twisted pairs) configuration. However, for half-duplex mode, the link between the TXD and RXD signals must be made externally on the DB-9M connector.
The transmitted characters will always be received in this mode. The RXD receiver is not disabled during transmission.
The handshaking signals RTS and CTS are still driven by the card but are not usually connected to another node. However, if required by the application software, to force the CTS signal input on the SIO-485.CF true, the RTS signals must be looped back to the CTS inputs.

Appendix A – Troubleshooting

The adapter should provide years of trouble-free service. However, in the event that device appears to not be functioning incorrectly, the following tips can eliminate most common problems without the need to call Technical Support.

1. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.
2. Configure your Sealevel Systems adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O space.
3. Try the Sealevel Systems adapter with a unique IRQ. While the Sealevel Systems adapter does allow the sharing of IRQs, many other adapters (i.e., SCSI adapters & on-board serial ports) do not.
4. Make sure the Sealevel Systems adapter is securely installed.
5. In Windows, the diagnostic tool ‘WinSSD’ is installed in the SeaCOM 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.
6. For Windows CE and PocketPC, the utility ‘vxHpc’ is available from Cambridge Computer Corporation, free for a 30-day evaluation or a nominal charge for a license. ‘vxHpc’ is a high performance serial and telnet communication software application that can help you connect to
   various terminal devices and can also be used to perform a simple loopback test. The latest version and instructions are available here: **https://web.archive.org/web/20101212202122/ http://cam.com/vxhpc.html**
7. Remember, if ‘No Echo’ mode is selected, a data loopback cannot be accomplished.
8. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will help eliminate any software issues and identify any hardware conflicts.

If these steps do not solve your problem, please call Sealevel Systems’ Technical Support, (864) 843-4343. Our technical support is free and available from 8:00 AM to 5:00 PM Eastern Time Monday through Friday. For email

support contact **support@sealevel.com**.

Appendix B – How To Get Assistance

Please refer to Troubleshooting Guide prior to calling Technical Support.

1. Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed, please see below.
2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.
3. Sealevel Systems provides a FAQ section on its website. Please refer to this to answer many common questions. This section can be found at **http://www.sealevel.com/faq.htm**.
4. 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 which can be accessed from our home page.
5. Technical support is available Monday to Friday from 8:00 A.M. to 5:00 P.M. Eastern Time. Technical support can be reached at (864) 843-4343.

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.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel-manufactured I/O products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing. Sealevel achieved ISO-9001:2015 certification in 2018.

Warranty Policy
Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for the warranty period. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect, abuse, accidents, or acts of nature are not covered under this warranty.
Warranty service may be obtained by delivering the Product to Sealevel and providing proof of purchase. Customer agrees to ensure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.
This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

Non-Warranty Repair/Retest
Products returned due to damage or misuse and Products retested with no problem found are subject to repair/retest charges. A purchase order or credit card number and authorization must be provided in order to obtain an RMA (Return Merchandise Authorization) number prior to returning Product.

How to obtain an RMA (Return Merchandise Authorization)
If you need to return a product for warranty or non-warranty repair, you must first obtain an RMA number. Please

contact Sealevel Systems, Inc. Technical Support for assistance:

- **Available Monday –** Friday, 8:00 AM to 5:00 PM EST
- **Phone** 864-843-4343
- **Email** support@sealevel.com

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

Documents / Resources

	SEALEVEL SIO-485.CF Interface Card [pdf] User Manual SIO-485.CF Interface Card, SIO-485.CF, Interface Card, Card

References

- Sealevel - I/O & Computing Products, Engineering and Manufacturing
- FAQs - Sealevel
- Cambridge - vxHpc (Telnet / Serial)