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SeaLINK User Manual



Ethernet Serial Server Family

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Introduction

SeaLINK Ethernet serial servers offer the easiest way to network enable RS-232, RS-422, and RS-485 serial devices. Powered by a 32-bit embedded microprocessor, SeaLINK products reliably communicate over multiple ports at sustained rates up to 230.4K bps. All SeaLINK devices use industry-standard TCP/IP protocol (RFC-2217) and allow any host to access serial ports as virtual COM ports. Serial tunneling is also supported, allowing two native serial devices to communicate over a network.

System Requirements

Minimum Computer Requirements

- Intel-compatible PC with Pentium-class processor
- Windows 98, ME, NT 4.0 SP6, 2000, XP SP1, Server 2003
- Windows Installer 2.0 or later. This software is included in Windows XP and is available for NT 4.0 and 2000 from the Microsoft Download Center. For Windows 98, it is included in Internet Explorer 5.5
- Internet Explorer 4.0 or later (version 5.5 for Windows 98)
- 4MB free space on hard drive

Network requirements

- An Ethernet network connection from the computer running the SeaLINK software to the SeaLINK Ethernet serial server
- Firewalls in the network path must allow TCP connections to the server on the port numbers (sockets) on which the SeaLINK device provides the serial devices

QuickStart Guide

A printed QuickStart Guide is included with your Sealevel SeaLINK Ethernet serial server and includes simplified instructions for installing and configuring SeaLINK software and hardware. A copy of the QuickStart Guide can also be downloaded from the product page of the Sealevel web site. Locate your part number on the Sealevel website (www.sealevel.com) and click the link to down the Ethernet QuickStart Guide.

Detailed installation and configuration instructions are also covered in the SeaLINK Software Installation section of this manual.

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Sealevel Ethernet Serial Server Product Family

This manual covers the installation and operation of these devices:

SeaLINK.232	(P/N 4101)	- 1 Port RS-232 Serial Server
SeaLINK.485	(P/N 4102)	- 1 Port RS-422/485 Serial Server
SeaLINK.Ultra	(P/N 4103)	- 1 Port Isolated RS-232/422/485 Serial Server With Isolated Input and Reed Relay Output
SeaLINK.Multi	(P/N 4104)	- 1 Port RS-232/422/485 Serial Server
SeaLINK+2.232	(P/N 4201)	- 2 Port RS-232 Serial Server
SeaLINK+2.485	(P/N 4202)	- 2 Port RS-422/485 Serial Server
SeaLINK+2.Multi	(P/N 4203)	- 2 Port RS-232/422/485 Serial Server
SeaLINK+4.232	(P/N 4401)	- 4 Port RS-232 Serial Server
SeaLINK+4.422	(P/N 4402)	- 4 Port RS-422/485 Serial Server
SeaLINK+4.Ultra	(P/N 4403)	- 4 Port RS-232/422/485 Serial Server
SeaLINK+8.232	(P/N 4801)	- 8 Port RS-232 Serial Server
SeaLINK+8.422	(P/N 4802)	- 8 Port RS-422/485 Serial Server
SeaLINK+8.Ultra	(P/N 4803)	- 8 Port RS-232/422/485 Serial Server
SeaLINK+16.232	(P/N 4161)	- 16 Port RS-232 Serial Server
SeaLINK+16.422	(P/N 4162)	- 16 Port RS-422/485 Serial Server
SeaLINK+16.Ultra	(P/N 4163)	- 16 Port RS-232/422/485 Serial Server

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Before You Get Started

What's Included

All Ethernet serial servers ship with the following items. If any of these items is missing or damaged, please contact Sealevel for a replacement.

- Ethernet Serial Server – (see part numbers on previous page)
- Power Supply – (described below)
- Ethernet Patch Cable – Item# CA246, 7' Ethernet patch cable (blue)
- Ethernet Crossover Cable – Item# CA251, 7' Ethernet crossover cable (yellow)
- Serial Loopback – (described below)
- Sealevel Software CD – includes SeaLINK software and PDF manuals
- Printed QuickStart Guide

Power Supplies

The following power supplies are included with the corresponding Ethernet serial server listed below. Replacement power supplies can be purchased from the Sealevel website.

- Item# TR101 – 5VDC/120VAC @ 3A power adapter
  Ships with: 4401, 4402, 4403, 4801, 4802, and 4803
- Item# TR104 – 12VDC/120VAC @ 500mA power adapter
  Ship with: 4103 only
- Item# TR107 – 5VDC/120VAC @ 1A power adapter
  Ships with: 4101, 4102, 4104, 4201, 4202, and 4203
- Item# TR117 – 12VDC/120VAC @ 1A power adapter
  Ships with: 4161, 4162, and 4163

Loopback Adapters

All Ethernet serial servers with DB9M connectors include a 9-pin serial loopback adapter, item# LB101. Only the data pins are looped back on the LB101.

For Ethernet serial servers with RJ45 connectors, the following loopback adapters are included:

- Item# LB117 (Red) – RS-232 loopback plug, ships with 4161 and 4163
- Item# LB118 (Yellow) – RS-422 loopback cable, ships with 4162 and 4163
- Item# LB119 (Green) – RS-485 loopback cable, ships with 4162 and 4163

Additional accessories are available at www.sealevel.com

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Hardware Description

Common Product Features

- Ethernet 10/100BaseT (auto sense)
- Appears as virtual COM port to host machine
- Data rates to 230.4K bps
- Hot-swappable
- Built-in watchdog/reset circuit for fault tolerance

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0°C – 70°C (32°F – 158°F)	-50°C – 105°C (-58°F – 221°F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

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SeaLINK 1- Port Devices

SeaLINK.232 (Item# 4101) Features

- RS-232 serial server with DB-9M connector
- All modem control signals implemented

SeaLINK.485 (Item# 4102) Features

- RS-422/485 serial server with DB-9M connector
- Configurable for RS-422 or RS-485
- Automatic RS-485 enable/disable

SeaLINK.Multi (Item# 4104) Features

- RS-232/422/485 serial server with DB-9M connector
- Configurable for RS-232, RS-422 or RS-485
- Automatic RS-485 enable/disable

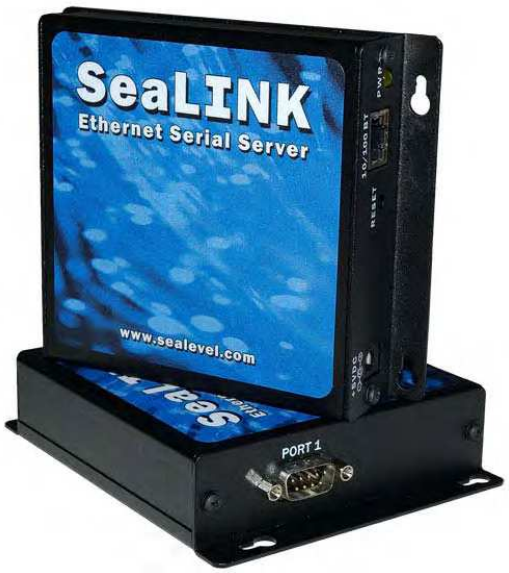
Power Requirements

- +5VDC @ 500mA
- 2.1mm x 5.5mm center positive

Dimensions

L *	W	H
5.00”	4.17”	1.14”
127mm	106mm	29mm

* Length includes non-removable ears



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SeaLINK 1-Port Isolated

SeaLINK.Ultra (Item# 4103) Features

- RS-232/422/485 serial server with DB-9M connector
- Configurable for RS-232, RS-422 or RS-485
- Automatic RS-485 enable/disable
- Serial port is optically isolated
- Optically isolated digital input for monitoring +5V to +24V
- Reed relay output: 60VDC @ 500mA max

Power Requirements

- +9-30VDC @ 3.25W Minimum
- Removable 6-position terminal block

Dimensions

L *	W	H
4.45”	4.17”	1.14”
113mm	106mm	29mm

* Length including removal terminal block is 4.84” (123mm)



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SeaLINK 2- Port Devices

SeaLINK+ 2.232 (Item# 4201) Features

- RS-232 serial server with DB-9M connectors
- All modem control signals implemented

SeaLINK+ 2.485 (Item# 4202) Features

- RS-422/485 serial server with DB-9M connectors
- Each port configurable for RS-422 or RS-485
- Automatic RS-485 enable/disable

SeaLINK+ 2.Multi (Item# 4203) Features

- RS-232/422/485 serial server with DB-9M connectors
- Each port configurable for RS-232, RS-422 or RS-485
- Automatic RS-485 enable/disable

Power Requirements

- +5VDC @ 500mA
- 2.1mm x 5.5mm center positive

Dimensions

L *	W	H
5.00”	4.17”	1.14”
127mm	106mm	29mm

* Length includes non-removable ears



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SeaLINK 4- Port Devices

SeaLINK+ 4.232 (Item# 4401) Features

- RS-232 serial server with DB-9M connectors
- All modem control signals implemented

SeaLINK+ 4.422 (Item# 4402) Features

- RS-422/485 serial server with DB-9M connectors
- Each port configurable for RS-422 or RS-485
- Automatic RS-485 enable/disable

SeaLINK+ 4.Ultra (Item# 4403) Features

- RS-232/422/485 serial server with DB-9M connectors
- Each port configurable for RS-232, RS-422 or RS-485
- Automatic RS-485 enable/disable

Power Requirements

- +5VDC @ 1A
- 2.1mm x 5.5mm center positive

Dimensions

L	W	H
8.62”	6.10”	2.00”
219mm	155mm	51mm



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SeaLINK 8- Port Devices

SeaLINK+ 8.232 (Item# 4801) Features

- RS-232 serial server with DB-9M connectors
- All modem control signals implemented

SeaLINK+ 8.422 (Item# 4802) Features

- RS-422/485 serial server with DB-9M connectors
- Each port configurable for RS-422 or RS-485
- Automatic RS-485 enable/disable

SeaLINK+ 8.Ultra (Item# 4803) Features

- RS-232/422/485 serial server with DB-9M connectors
- Each port configurable for RS-232, RS-422 or RS-485
- Automatic RS-485 enable/disable

Power Requirements

- +5VDC @ 1A
- 2.1mm x 5.5mm center positive

Dimensions

L	W	H
8.62”	6.10”	2.00”
219mm	155mm	51mm



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SeaLINK 16- Port Devices

SeaLINK+ 8.232 (Item# 4801) Features

- RS-232 serial server with RJ45 connectors
- Transmit/Receive LEDs on each RJ45 port
- Standard 19” rack enclosure

SeaLINK+ 8.422 (Item# 4802) Features

- RS-422/485 serial server with RJ45 connectors
- Each port configurable for RS-422 or RS-485
- Automatic RS-485 enable/disable
- Transmit/Receive LEDs on each RJ45 port
- Standard 19” rack enclosure

SeaLINK+ 8.Ultra (Item# 4803) Features

- RS-232/422/485 serial server with RJ45 connectors
- Each port configurable for RS-232, RS-422 or RS-485
- Automatic RS-485 enable/disable
- Transmit/Receive LEDs on each RJ45 port
- Standard 19” rack enclosure

Power Requirements

- +9-30VDC @ 10W Minimum
- 1.3mm x 5.5mm center positive

Dimensions

L*	W	H
16.75”	7.00”	1.75”
219mm	155mm	51mm

* Length excludes removable ears.



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Hardware Configuration

SeaLINK devices supporting RS-422/485 need to be properly configured prior to installation. The configuration requirements for each device are outlined below.

The following devices do not require any hardware settings and the enclosures should not be opened. All configurations settings can be made through the SeaLINK driver and/or the device's onboard web page:

- 4101 – 1-port RS-232 serial server
- 4201 – 2-port RS-232 serial server
- 4401 – 4-port RS-232 serial server
- 4801 – 8-port RS-232 serial server
- 4161 – 16-port RS-232 serial server
- 4162 – 16-port RS-422/485 serial server
- 4163 – 16-port RS-232/422/485 serial server

Single and Dual Port Serial Servers

SeaLINK one and two port multi-interface devices are configured by setting dipswitches inside the enclosure and by changing configuration options through the onboard web server. The electrical interface (RS-232, RS-422, or RS-485) for each port must be set properly in both places. The hardware default is RS-422 mode. This section covers the configuration of the following serial servers:

- 4102 – 1-port RS-422/485 serial server
- 4104 – 1-port RS-232/422/485 serial server
- 4202 – 2-port RS-422/485 serial server
- 4203 – 2-port RS-232/422/485 serial server

Note: The configuration settings for the 4103 are covered in the next section.

Dipswitches

Switch	Label	Function
1	M1	Set to On
2	M0	On for RS-485, Off for RS-232/422
3	L	Link TX- to RX- for RS-485 two wire operation
4	L	Link TX+ to RX+ for RS-485 two wire operation
5	T	Adds or removes the 120Ω termination
6	PD	Adds or removes the 1KΩ pull-down resistor in the RS-422/485 receiver circuit (Receive data only).
7	PU1	Adds or removes the 1KΩ pull-up resistor in the RS-422/485 receiver circuit (Receive data only)
8	PU2	Adds or removes the 4.7KΩ pull-up resistor in the RS-422/485 CTS circuit (compensates for RS-232 biasing)

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Dipswitches (continued)

Dipswitches on the PCB provide SeaLINK devices the ability to communicate with RS-232, RS-422 or RS-485 devices. These switches are also used to set RS-485 enable modes and termination options. The 4102 and 4104 have a single dipswitch labeled (S2). On the 4202 and 4203, a pair of dipswitches are labeled (S2) and (S3).

To access the dipswitches, you will need to remove the PCB from the metal housing. On the end of the device with the DB9 connector, remove the two black machine screws and set aside. Make sure you are properly grounded before proceeding. Gently slide the PCB out of the housing. The dipswitches are located on the PCB adjacent to the DB9 connector.

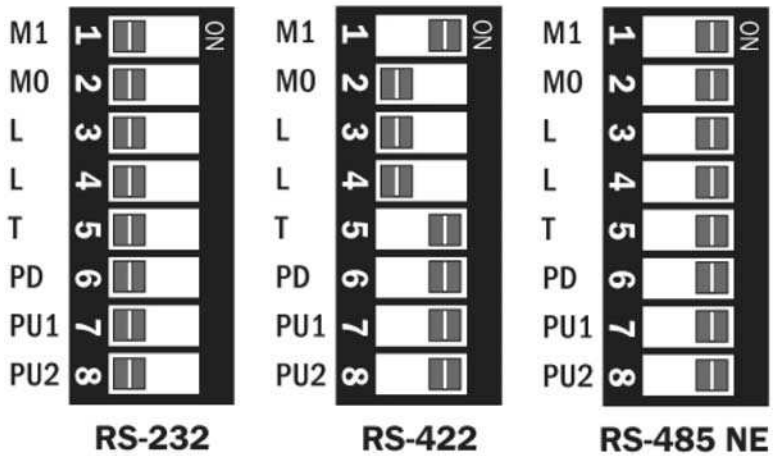
RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. One of the unique features of SeaLINK devices is the ability to be RS-485 compatible without the need for special software or drivers (RS-485 auto-enable).

Typically, each end of the RS-485 bus must have a line-terminating resistor (RS-422 terminates the receive end only). A 120Ω resistor (silk-screen 'T') is across each RS-422/485 input in addition to a 1KΩ pull-up (silk-screen 'PU1') and a 1KΩ pull down (silk-screen 'PD') combination that biases the receiver inputs. The SeaLINK device has RS-232 transceivers with built-in biasing, even when disabled. This is compensated for by adding a 4.7KΩ pull-up (silk-screen 'PU2) to the CTS circuit.

Only the ends of an RS-485 network should have the 120Ω terminating resistor. These resistors may be removed or inserted using the dipswitch "T". This allows the user to customize the electrical interface to their specific requirements. Each switch position corresponds to a specific portion of the interface.

To add the termination/bias resistors, select the 'On' position, and to remove it, select the 'Off' position. If multiple adapters are configured in an RS-485 network, only the boards on each end should have switches T, PD, PU1 & PU2 'On'.

Example Settings



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Isolated Single Port Serial Server (4103)

The SeaLINK 4103 is configured by setting dipswitches inside the enclosure and by changing configuration options through the onboard web server. The electrical interface (RS-232, RS-422, or RS-485) must be set properly in both places. The hardware default is RS-422 mode. This section covers the configuration of the following serial server:

- 4103 – Isolated 1-port RS-232/422/485 serial server

Note: To access the optically isolated input and Reed relay output, please refer to the Modbus TCP section of this manual.

Dip Switch (SW1)

Switch	Label	Function
1	1	On for RS-232, Off for RS-422/485
2	2	On for RS-485, Off for RS-232/422
3	3	On for RS-422/485, Off for RS-232
4	T	Adds or removes the 120Ω termination
5	P	Adds or removes the 1KΩ pull-down resistor in the RS-422/485 receiver circuit (Receive data only)
6	P	Adds or removes the 1KΩ pull-up resistor in the RS-422/485 receiver circuit (Receive data only)
7	L	Connects the TX+ to RX+ for RS-485 two wire operation
8	L	Connects the TX- to RX- for RS-485 two wire operation
9	E	On for No Echo, Off for Echo
10	-	Not Used

A dipswitch labeled (SW1) on the PCB provides the 4103 with the ability to communicate with RS-232, RS-422 or RS-485 devices. The switch is also used to set RS-485 enable modes and termination options. To access the dipswitch, you will need to remove the PCB from the metal housing. On the end of the device with the RJ45 jack and DB9 connector, remove the two black machine screws and set aside. Make sure you are properly grounded before proceeding. Gently slide the PCB out of the housing. The dipswitch is located just behind the DB9 connector.

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. One of the unique features of the 4103 is the ability to be RS-485 compatible without the need for special software or drivers (RS-485 auto-enable).

Typically, each end of the RS-485 bus must have a line-terminating resistor (RS-422 terminates the receive end only). A 120Ω resistor (silk-screen ‘T’) is across each RS-422/485 input in addition to a 1KΩ pull-up (silk-screen ‘P’) and a 1KΩ pull down (silk-screen ‘P’) combination that biases the receiver inputs.

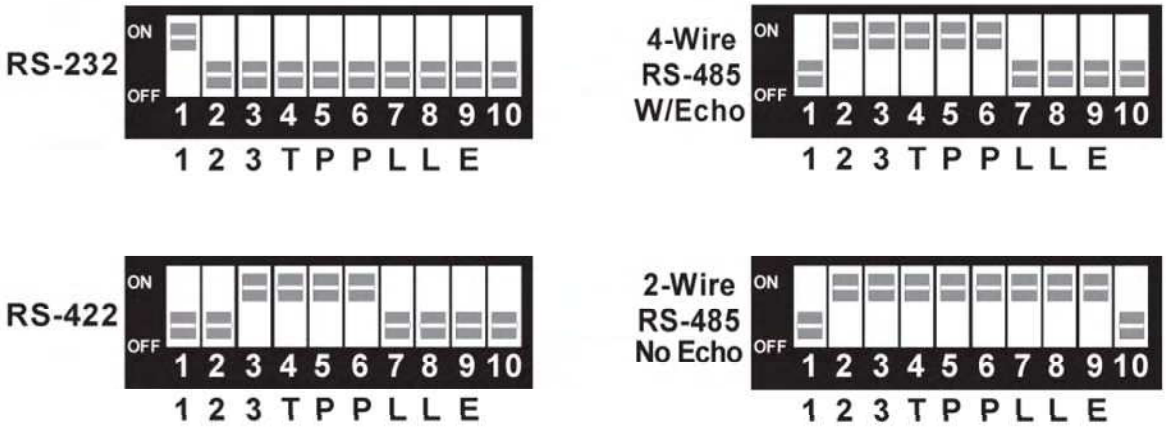
Only the ends of an RS-485 network should have the 120Ω terminating resistor. These resistors may be removed or inserted using the dipswitch ‘T’. This allows the user to customize the electrical interface to their specific requirements. Each switch position corresponds to a specific portion of the interface.

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To add the termination/bias resistors, select the ‘On’ position, and to remove it, select the ‘Off’ position. If multiple adapters are configured in an RS-485 network, only the boards on each end should have switches T, P & P ‘On’.

The last option that is configurable via SW1 is the ‘Echo’ option (silk-screen ‘E’). Two-wire RS-485 connects the TX± to the RX±. 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. Switch 9 is used to control the RS-485 enable/disable functions for the receiver circuit. To select the ‘No Echo’ mode set switch 9 to ‘On’. The following shows example switch settings.

Example Settings



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4- Port and 8- Port Serial Servers

SeaLINK four and eight port multi-interface devices are configured by setting dipswitches inside the enclosure and by changing configuration options through the onboard web server. The electrical interface (RS-232, RS-422, or RS-485) for each port must be set properly in both places. The hardware default is RS-422 mode. This section covers the configuration of the following serial servers:

- 4402 – 4-port RS-422/485 serial server
- 4403 – 4-port RS-232/422/485 serial server
- 4802 – 8-port RS-422/485 serial server
- 4803 – 8-port RS-232/422/485 serial server

Dipswitches

Switch	Label	Function
1	EN	On for RS-422/485, Off for RS-232 - Adds or removes the 4.7K Ω pull-up resistor in the RS-422/485 CTS circuit (Compensates for RS-232 biasing)
2	T	Adds or removes the 120Ω termination
3	PD	Adds or removes the 1KΩ pull-down resistor in the RS-422/485 receiver circuit (Receive data only)
4	PU	Adds or removes the 1KΩ pull-up resistor in the RS-422/485 receiver circuit (Receive data only)
5	EN	On for RS-422/485, Off for RS-232 - Adds or removes the 4.7K Ω pull-up resistor in the RS-422/485 CTS circuit (Compensates for RS-232 biasing)
6	T	Adds or removes the 120Ω termination
7	PD	Adds or removes the 1KΩ pull-down resistor in the RS-422/485 receiver circuit (Receive data only)
8	PU	Adds or removes the 1KΩ pull-up resistor in the RS-422/485 receiver circuit (Receive data only)

Dipswitches on the PCB provide SeaLINK devices the ability to communicate with RS-232, RS-422 or RS-485 devices. These switches are also used to set RS-485 enable modes and termination options. The 4402 and 4403 have a pair of dipswitches labeled (S3) and (S4). On the 4802 and 4803, four sets of dipswitches, labeled (S1 – S4), are used to set configuration options.

To access the dipswitches, you will need to open the metal housing. On each side of the device, remove two black machine screws (four total) and set aside. Make sure you are properly grounded before proceeding. Remove the cover to access the PCB. The dipswitches are located on the PCB behind each pair of DB9 connectors.

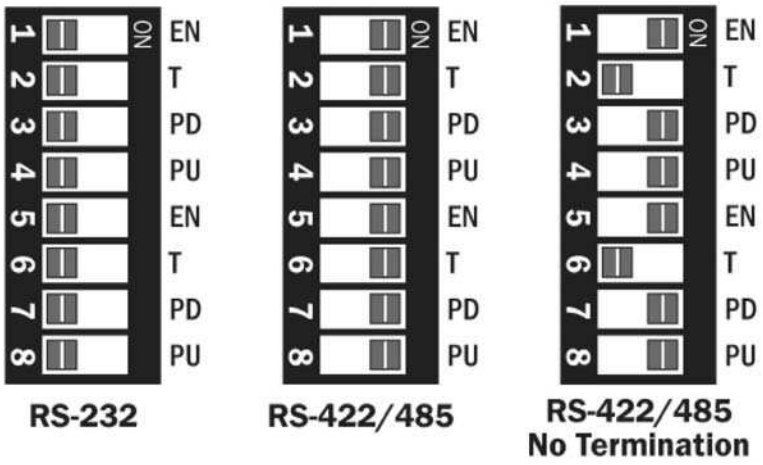
RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. One of the unique features of the SeaLINK device is the ability to be RS-485 compatible without the need for special software or drivers.

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Typically, each end of the RS-485 bus must have a line-terminating resistor (RS-422 terminates the receive end only). A 120Ω resistor (silk-screen 'T') is across each RS-422/485 input in addition to a 1KΩ pull-up (silk-screen 'PU') and a 1KΩ pull down (silk-screen 'PD') combination that biases the receiver inputs. Only the ends of an RS-485 network should have the 120Ω terminating resistor. These resistors may be removed or inserted using the dipswitches. This allows the user to customize the electrical interface to their specific requirements. Each switch position corresponds to a specific portion of the interface. Each group of four switches controls one serial port (refer to PCB for port numbers).

To add the termination/bias resistors, select the 'On' position, and to remove it, select the 'Off' position. If multiple adapters are configured in an RS-485 network, only the boards on each end should have switches T, PD, & PU 'On'.

Example Settings



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SeaLINK Redirector Overview

Virtual COM Port Basics

SeaLINK software is a serial COM port redirector that creates virtual COM ports and provides access to serial devices connected to a SeaLINK Ethernet serial server. SeaLINK allows you to configure Microsoft Windows applications to communicate with networked serial devices as easily as if they were physically installed in or directly connected to the PC.

This means that your serial device applications can communicate with serial devices connected to SeaLINK Ethernet serial servers without software changes. Since the virtual COM ports work like standard Windows COM ports, your application software sees no difference between a local serial device and one connected to a SeaLINK Ethernet serial server.

The redirector (SeaLINK software) connects to the SeaLINK device (Ethernet serial server) when an application opens the COM port and disconnects from the SeaLINK device when the COM port is closed. The redirector uses TCP network connections to the SeaLINK device to gain access to the connected serial devices.

The SeaLINK redirector can create up to 256 virtual COM ports, from COM1 to COM256. Applications on the local computer can open virtual COM ports to use multiple networked serial devices at the same time. The redirector handles each active virtual COM port as a separate TCP connection to the SeaLINK device.

Note: Some legacy applications are only able to use COM ports in the range of COM1 to COM4, which limits the number of virtual COM ports they can use.

Application Compatibility

Using a SeaLINK Ethernet serial server adds a network connection and the SeaLINK device to the data path between an application and the serial device it is using. For most applications, these differences are negligible. The SeaLINK software and SeaLINK device both support the COM Port Control protocol (IETF RFC 2217), which is designed to provide the best possible duplication of the behavior of a local COM port. The software uses this network protocol to relay additional control and signal information to the SeaLINK device.

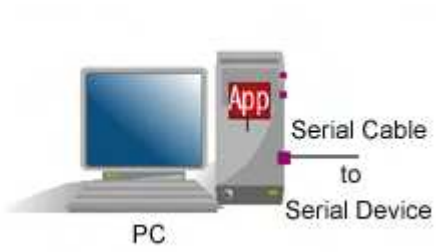
SeaLINK software and devices fully support applications that need to control (at run-time) the baud rate, parity, framing, and status signals of serial devices connected to the virtual COM ports. Serial port settings can also be configured on the SeaLINK Ethernet serial server's internal web page. Configuration settings on the SeaLINK device can allow application changes or override them.

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Introduction to Shared COM Ports

Local COM ports on Windows- based PCs

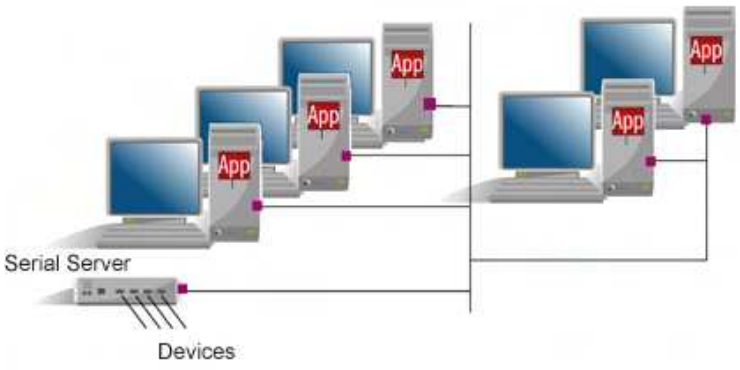
Most serial devices in use are directly connected to the PC serial port via a cable. This common "local device" configuration can be illustrated as follows:



This picture shows a serial device physically connected to the PC via a serial cable. The Windows operating system provides Windows COM ports that applications use for input, output, and control operations that "reach" through the serial cable to the device.

Serial Servers

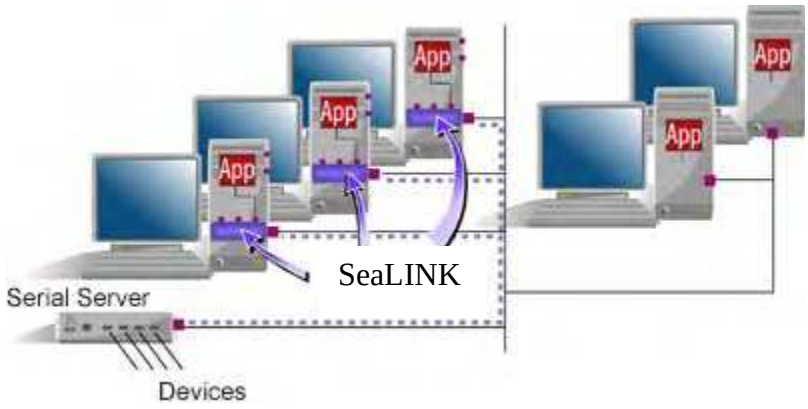
If a PC is running more than one or two applications that use a serial device, you can quickly run out of places to attach them. Fortunately, you can employ an Ethernet serial server that provides a pool of virtual COM ports for client computers on the network to access. The serial server is situated between the desktop PCs and the remote serial devices and appears to the network like this:



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SeaLINK COM Ports

SeaLINK software is essentially an add-on package for Windows that adds virtual COM ports to the Windows operating system. These COM ports can look and work like conventional COM ports, but they are accessed on the serial server instead of the local PC.



The pieces fit together in the following way:

1. You configure the serial server to provide one or more serial devices for access by client computers.
2. For each of its virtual COM ports, SeaLINK uses the IP address of the serial server on the network and the "port number" (socket) on the serial server that provides the COM port.
3. When the application opens the SeaLINK virtual COM port, it actually sees a device on the serial server. Connections are established just as if the device were connected directly to the PC rather than over the network.

Benefits of Shared COM Ports

There are two primary benefits to a serial server-based approach:

1. Economical.
   By using a serial server to share serial devices, you eliminate the separate serial lines and devices that would otherwise be attached to individual PCs. Monitoring the serial devices becomes easier and more cost effective.
2. Centralized Maintenance.
   Serial servers concentrate all of the hardware required for serial device communications into one location, typically a server room. This makes it easier to setup, access and service the devices.

Although the serial server solves many of the hardware issues surrounding shared serial resources, it does not tackle a primary software requirement: setting up the Windows COM ports that most Windows communications software requires. This is where SeaLINK software comes into the picture.

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Device Configuration

Locating the Device and Assigning an IP Address

Before the SeaLINK device can be used, it must be assigned an IP address valid to your network. When first powered up, the device will attempt to automatically find an IP address using DHCP. If the device is linked but cannot locate a DHCP server, the link LED on the box will flash, indicating that the device does not have valid network setting. In that case, you will need to assign it a static address using the configuration utility provided. The configuration utility 'SeaLINK Config' (Start Programs SeaLINK SeaLINK Config) is also useful for locating devices to determine the IP address. The method depends on your operating system, so see the appropriate section below.

Device Configuration with Windows

Windows device configuration is performed through the 'SeaLINK Config' utility provided with the software installation. When started, the utility will display all devices on the local network (the utility cannot see devices on the other side of a router). If your device is not listed, verify that it is connected to the network (see the Troubleshooting section). To assign a static IP address, select your device in the list, click 'Settings, then uncheck the box that says "Enable DHCP." Change the "IP", "Gateway", and "Network Mask" fields to values valid on your network. You can also change the "Name" of the device to something appropriate (i.e., location, connected equipment, etc.). Click "Apply Changes" and the device will reboot and temporarily disappear from view. You may need to click "Search Again" to relocate the device. You can also set the IP Address, Gateway, Network Mask, and Device Name through the onboard web server, discussed in the following sections.

Device Configuration with Linux

Refer to the Raw Data section of this manual.

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SeaLINK Software Installation

This section provides instructions for both expert and novice Windows users on how to install and configure the SeaLINK client. Experienced users will likely find sufficient information in the printed QuickStart guide included with the device. Those requiring more detailed instructions and serial server background information should read through the rest of this manual to gain more familiarity with SeaLINK software and virtual COM ports.

Pre- Installation Checklist

Before installing the SeaLINK client on your PC, you or an administrator should first prepare your serial server for operation. The checklist below helps to ensure that both your PC and serial server are ready for SeaLINK.

- You are using an Intel-compatible PC with a Pentium class CPU running Windows 98, ME, NT 4.0 SP6, 2000, XP SP1, or Server 2003.
- Your PC has at least 4 megabytes of local disk storage for a complete installation of SeaLINK software and documentation. The SeaLINK installation program will place several small files in the Windows system folder. All other files will be located in the installation directory that you designate during installation.
- Your PC is networked to a SeaLINK serial server on a TCP/IP network.

Note: The Microsoft Windows operating systems include Microsoft's TCP/IP networking software, and SeaLINK is tested only with this software. If the Microsoft TCP/IP networking software is missing or has been replaced, SeaLINK may not function properly.

SeaLINK does not run under multi-user operating systems such as Citrix Metaframe and Windows Terminal Services and is not supported on Windows 95.

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Windows 98/ ME/ NT/ 2000/ XP Installation

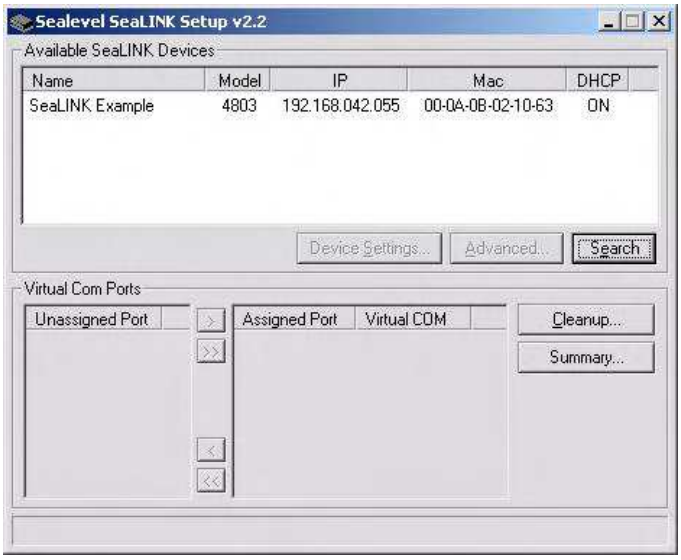
1. Start Windows and log in as a user with Administrator privileges and quit all Windows applications that use COM ports. Make sure the SeaLINK device is connected to power and a valid network port.
2. Insert the Sealevel Software CD into your CD drive.
3. If 'Auto-Start' is enabled for this drive, the CD menu will automatically launch. If the menu does not appear, double-click on the 'autorun' file located in the root directory of the CD.
4. When the menu appears, click on the 'Install' button.
5. On the next screen, type in or select the Part Number for your device from the listing, then click the 'Install Drivers' button.
6. The Installation Wizard will start. SeaLINK will install the Ethernet port redirector (SeaLINK) software and test utility (WinSSD) – affirm the license agreement and installation begins.
7. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.
8. During setup the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.
9. A 'readme.txt' file will open. Please read the release notes and close. For future reference, a copy of the text file can be found in the installation directory.
10. Once SeaLINK has completed installation, a window titled "Select Ports" opens – CLOSE this window.
11. Continue with the following section for instructions on creating and configuring SeaLINK virtual COM ports.

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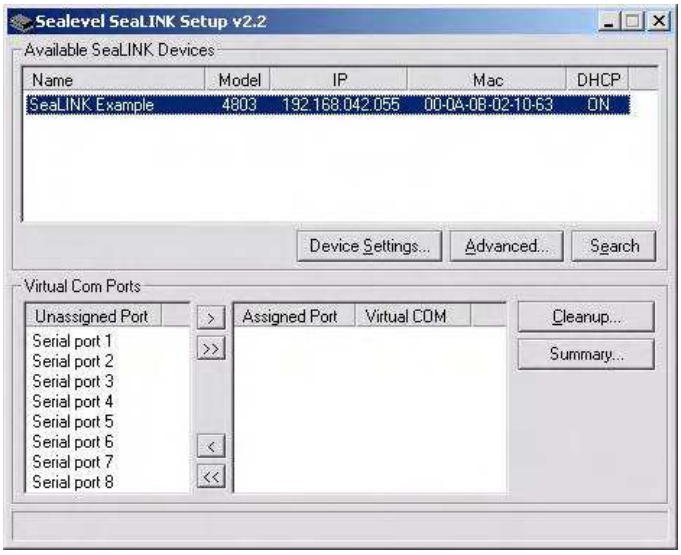
Create and Configure SeaLINK Virtual COM Ports

SeaLINK creates virtual COM ports that Windows applications will use to communicate with remote serial devices on the serial server. SeaLINK virtual COM ports follow the same naming/numbering convention as Windows COM ports. In this step, you tell SeaLINK which serial ports to create as virtual COM ports.

1. Launch the 'SeaLINK Config' utility (Start Programs SeaLINK SeaLINK Config) and it will automatically locate SeaLINK devices on the network.

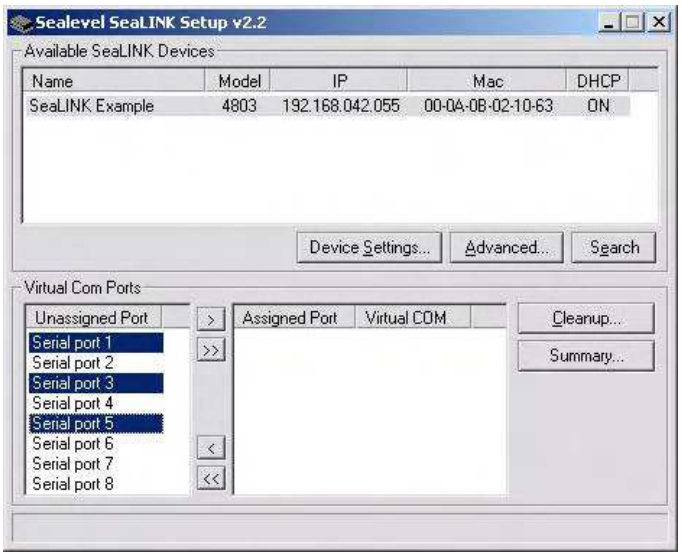


2. Select a SeaLINK device in the 'Available SeaLINK Devices' list. The serial ports that can be assigned to virtual COM ports will be shown in the 'Virtual COM Ports' pane.



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3. Select the serial ports you wish to map and press the Add '>' button (or you can press the Add All '>>' button to map all the available serial ports).



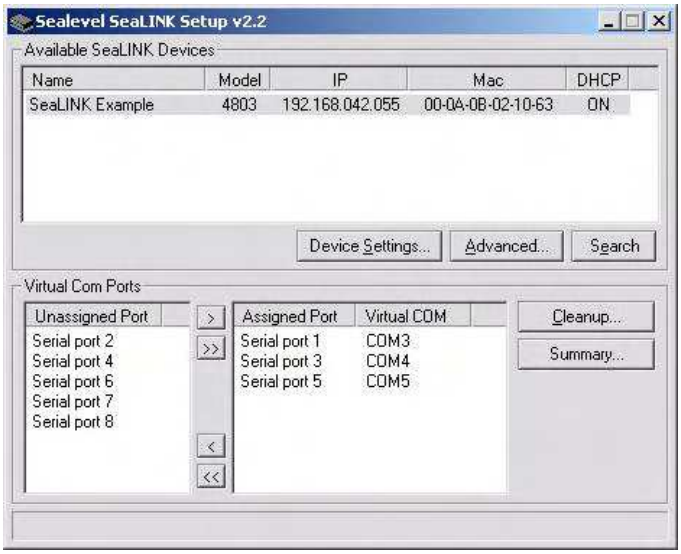
4. In the 'Local Virtual COM Port' listing, select a starting virtual COM port and click 'Ok'.



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5. The selected serial ports will be mapped to virtual COM ports in sequential order. The COM ports in the 'Virtual COM' listing are now available for use by Windows applications.

   For applications that use modems, you may want to run the Windows modem installation wizard to install the correct modem driver for each new virtual COM port used by a modem. This is explained in detail in the Create Modem Devices section of this manual.

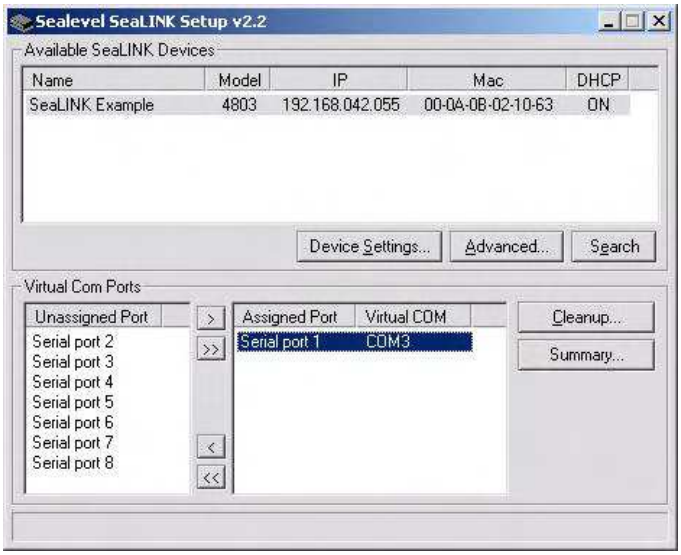


Note: Some legacy applications cannot display COM ports higher than COM4. If you will be using a legacy application, consider selecting ports in the COM 1-4 range. You may need to disable these COM ports in the system BIOS to make them available to SeaLINK.

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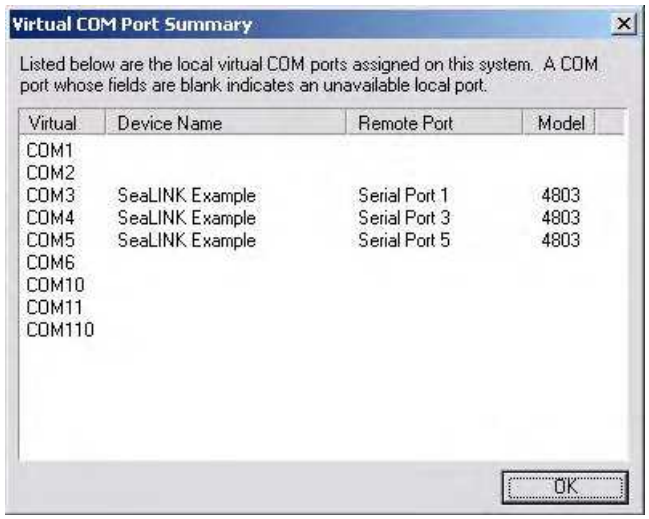
Additional SeaLINK Configuration Options

In the 'Virtual COM' ports listing in the 'Virtual COM Ports' pane, you should see a listing of all virtual COM ports assigned to the selected device. If you need to remove a virtual COM port, select the ports you want to remove and click the remove '<' button (or click the remove all '<<' button) to un-map the virtual COM ports. In the example from above, virtual COM ports 3 and 5 have been removed (as shown below).



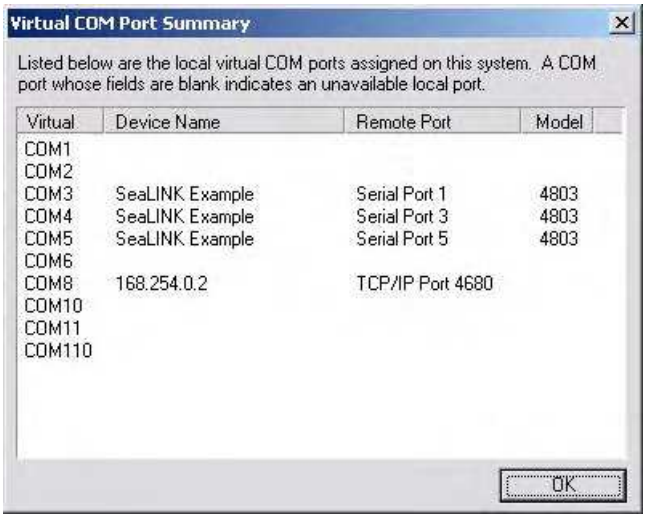
Virtual COM Port Summary

When you click on the 'Summary' button (shown above), you'll see a list of all the virtual COM ports in use by the system. The 'Device Name' listing shows the virtual COM ports assigned by SeaLINK.



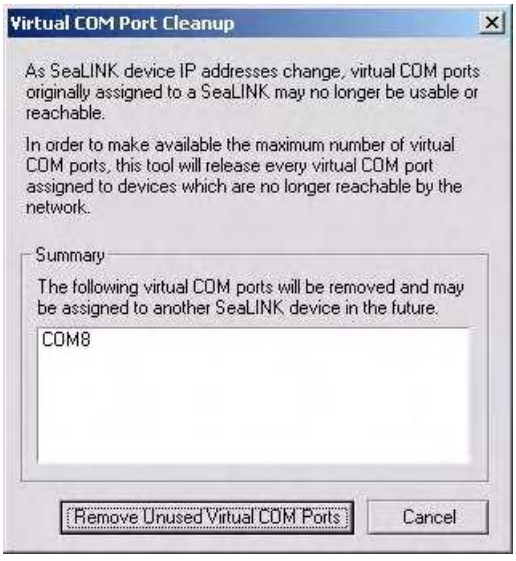
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In the example below, COM8 had been assigned previously, but the device is no longer available on the network. SeaLINK only displays the IP address assigned to COM8.



Virtual COM Port Cleanup

Click on the "Cleanup…" button (just above the 'Summary' button shown on the previous page) to fix the broken COM8 assignment from the example above. In the example shown below, the 'Virtual COM Port Cleanup' utility found COM8 and asks if you want to un-map the virtual COM port and make it available for future use. Simply click the 'Remove Unused Virtual COM Ports' button. COM8 will now be available to SeaLINK to assign to other devices.



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Network Settings

In the SeaLINK Setup window, make a selection from the list of available devices. Click the 'Device Settings...' button. In the new window (shown below), the follow controls are available:

- Enable DHCP Configuration - When checked, the device will seek out a DHCP server for automated configuration of its network parameters.
- IP Address, Network mask, Gateway - These IP addresses configure how the device responds on the network. Contact your network administrator for more information.

After updating your configuration, click 'Apply Network Settings Changes' to enable the new configuration.



Firmware Updates

In the 'SeaLINK Device Settings' window (shown above), click the 'Update Firmware...' button. In the 'Update SeaLINK Device Firmware' window (shown below), click the 'Browse' button and locate the firmware file you wish to apply. All firmware files end in '_APP.s19' as shown. Select your file and click the 'Begin Update' button.



Note: All new firmware update files are located on the Sealevel FTP site: ftp://ftp.sealevel.com/pub/software/sealink/firmware/current/

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Uninstalling the Software

The SeaLINK uninstall procedure automatically shuts down SeaLINK if necessary, removes all SeaLINK files from your hard drive, and removes all SeaLINK virtual COM ports for your PC. Follow these easy steps:

- Run Add/Remove Programs in the Control Panel.
- Select 'SeaLINK Version 4.5' from the list of installed software.
- Click the Add/Remove button to start the uninstall wizard.
- In the 'Select Uninstall Method' dialog, choose the default, Automatic.
- Click Next, and then click Finish.
- Restart your computer to complete the uninstall process.

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Raw Data Sockets

Raw Data Sockets are probably the easiest way for a software developer to control a serial port, but provide the least control from a software standpoint. You simply configure the device's webpage to operate in Raw Data mode, open a socket to the device on the Raw Data TCP port corresponding to the serial port you want, and stream data back and forth. The data will not be inspected or modified in any way.

This method provides the least control because serial port functions such as baud rate and modem control signals cannot be monitored or changed programmatically. However, Raw Data is platform-independent and requires no software installation. If your purposes do not require dynamic serial port control, Raw Data may be the most efficient choice for you.

1. Configuration
    - Since Raw Data does not allow for programmatic changing of serial port controls, the serial ports must be configured before use via the onboard web server (see the Web Configuration section). From the Port Settings page, configure the ports to the desired settings and click Submit at the bottom of the page. The serial ports will automatically be set to these defaults when opened Selection).
2. Usage Details
    - To access a serial port using Raw Data mode, open a TCP socket to the device's IP address on port 4760, which corresponds to the serial port on the device.

Device Serial Port	TCP Port Number (Socket)
1	4760
2	4761
3	4762
4	4763
5	4764
6	4765
7	4766
8	4767
9	4768
10	4769
11	4770
12	4771
13	4772
14	4773
15	4774
16	4775

NOTE: Only one client can open each serial port at a time. All further socket requests to a TCP port will be denied.

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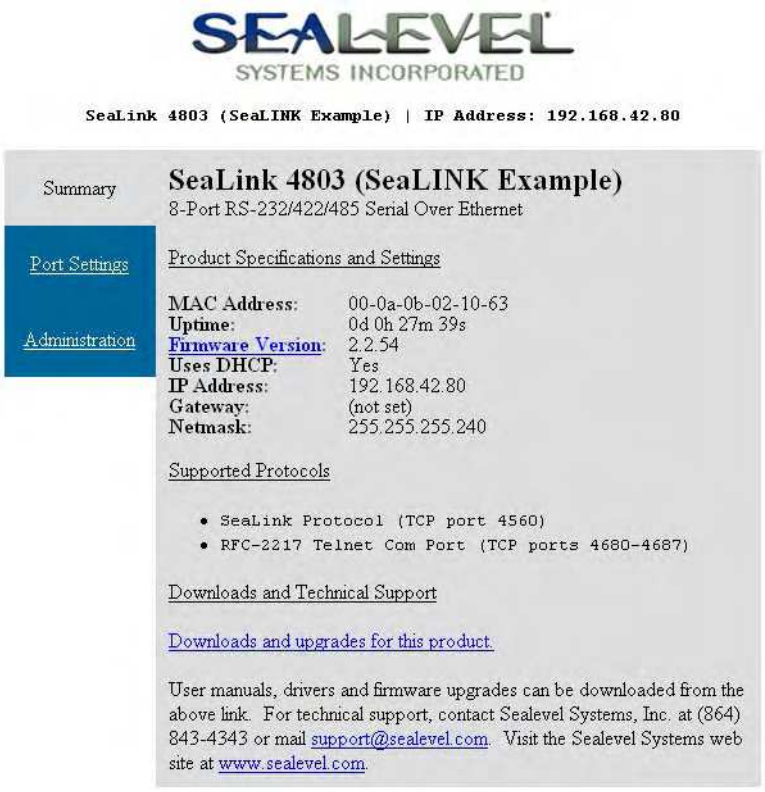
Onboard Web Server Configuration

Once the SeaLINK device has been assigned an IP address, you can configure it through the onboard web server. Start the SeaLINK setup and configuration tool, select your device, and click 'Advanced…'. Alternately, you may open a web browser (Internet Explorer, Firefox, Netscape, etc.) and type 'http://xxx.xxx.xxx.xxx' into the URL field, where 'xxx.xxx.xxx.xxx' is the IP address of the SeaLINK device.

The configuration utility 'SeaLINK Config' (Start Programs SeaLINK SeaLINK Config) can be used to determine the IP address. The web interface provides three separate pages selectable by tabs on the left side of the screen. A Summary page lists various details about the device, a Port Settings page allows you to configure aspects of each serial port, and an Administration page lets you change the network and security settings. Some options or settings may not be available depending on the model SeaLINK device you are using.

Summary Page

The Summary page lists the name of the SeaLINK device and part number. A user defined device name is shown in parenthesis and can be set on the Administration page. A brief description of the SeaLINK device capabilities is shown and the Product Specifications and Settings section follows.



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Product Specifications and Settings

The following is a list of settings that are displayed on the Summary page.

MAC Address – The hardware address of the SeaLINK device. This is assigned at the factory.

Uptime – Displays the amount of time (in days, hours, minutes, seconds) the SeaLINK device has been running since the last power interruption or device reboot.

Firmware Version – The version number of the firmware installed.

Uses DHCP – Displays 'Yes' if using DHCP set IP Address and 'No' if using a static IP Address. Default is 'Yes'.

IP Address – Address number set by the DHCP server or set by the user on the Administration page.

Gateway – Default is '(not set)'. A Gateway is a point of entry to and from an Ethernet network; a node that translates between two different networks or network segments

Netmask – Default is '(not set)'. The Netmask (Network Mask) is used by the TCP/IP protocol to decide how the network is divided into sub-networks and is used to identify the local portion of an Ethernet network.

Supported Protocols

RFC-2217 Telnet COM Port (TCP Ports 4680-4687) – the protocol used by the SeaLINK Windows driver and any socket based application

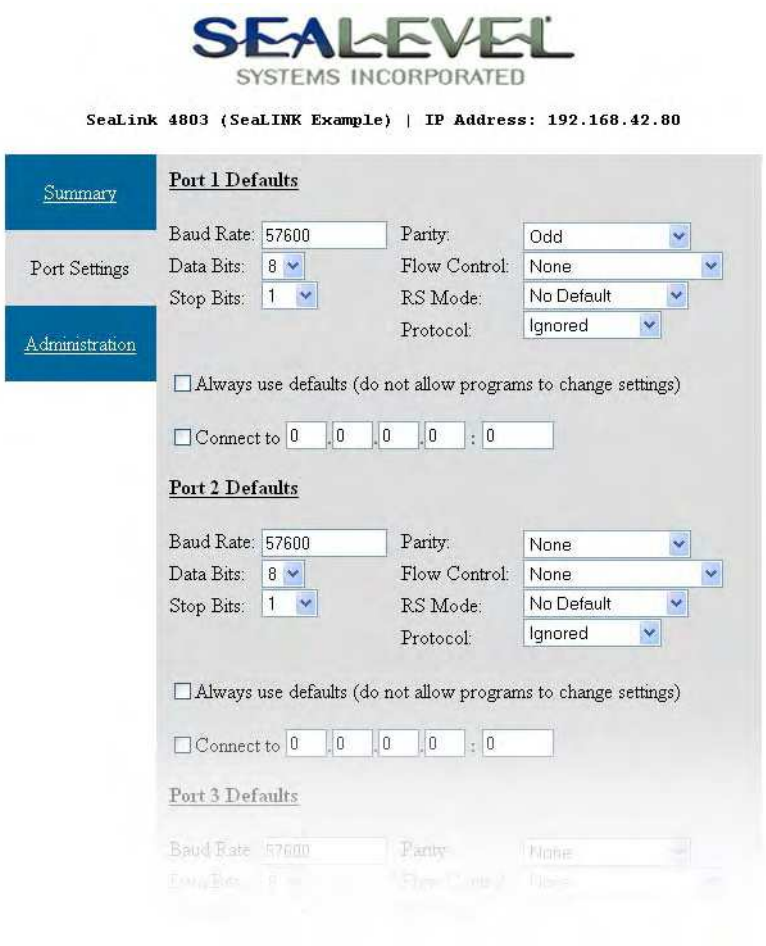
Unformatted Streamed Data (TCP Ports 4760-4767) – the protocol used for socket based communications. When a port is opened, all data sent over Ethernet is transmitted to COM port(s) and all data received from COM port(s) is transmitted back over network.

As they are added to the firmware, support for other protocols may be listed.

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Port Settings Page

The Port Settings page allows you to configure each serial port individually. If you are using a virtual serial port protocol such as SeaLINK software, application programs may change these settings dynamically after opening the ports. If you want to prevent programs from changing these settings, click the “Always use defaults” checkbox and submit changes. This can be useful if you specify a custom baud rate that is not available from your operating system. The ‘Port Settings’ are explained in detail on the following page.



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Port 'x' Defaults

The following is a list of settings that are displayed on the Port Settings page. Default settings are in brackets:

- Baud Rate – [57600] Text box

  You can enter any number from 1to 921600, but Windows limits the maximum baud rate to 230400. It may not be possible to hit the exact desired baud rate, however the 16C950 compatible UART will attempt to set it as closely as possible and will be within the acceptable 2% range. Enter any valid baud rate and click Submit. The page will refresh and display the nearest calculated baud rate.

- Data Bits – 5, 6, 7, [8]
- Stop Bits – [1], 1.5, 2
- Parity – [none], even, odd, mark (forced 1), space (forced 0)
- Flow Control – [none], Software (Xon/Xoff), Hardware (RTS/CTS)
- RS Mode – [No Default], RS 232, RS 422, RS 485 (no echo), RS 485 (echo)

  You should change this setting to match the electrical interface on the serial device you are using. Certain SeaLINK devices also require dipswitches to be properly configured – refer to the Hardware Configuration section for more information. On multi-interface products, each port is individually configurable.

- Protocol – [Ignored], Modbus RTU

  Enable if communicating with Modbus serial COM devices. When enabled, the SeaLINK device won't transmit until a full Modbus packet has been received, which helps keep Modbus packets intact.

- Termination – [Terminated], Non-Terminated

  For SeaLINK devices with software selectable termination (currently 4162 and 4163) using RS-422 or RS-485 mode and no hardware termination jumpers, this dropdown list can enable/disable line termination.

- 'Always use defaults' – Checkbox

  When using a virtual serial port protocol (SeaLINK software), application programs may change the port settings dynamically after opening the ports. To prevent programs from changing these settings, click the "Always use defaults" checkbox and submit. This can be useful if you specify a custom baud rate that is not available from your operating system. Applications can still attempt changes, but the SeaLINK device will ignore them.

(Continued…)

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- Connect to xxx . xxx . xxx . xxx : xxxx – Checkbox & IP/Port Address

  To enable serial tunneling, click the checkbox and fill out the IP address and TCP port number (socket) of the serial server you wish to connect to. When the serial server detects serial data present on the serial port and no connection is active, the serial server will connect to the IP address specified on the webpage and send the data. SeaLINK devices support bidirectional serial tunneling.

  The TCP port number is the socket assigned to the COM port you are setting up and the numbers range from 4680 to 4695. The first device's serial port is always port 4680 (regardless of virtual COM port mapping) and the numbers increment by one, with the 16th serial port always being TCP port (socket) 4696.

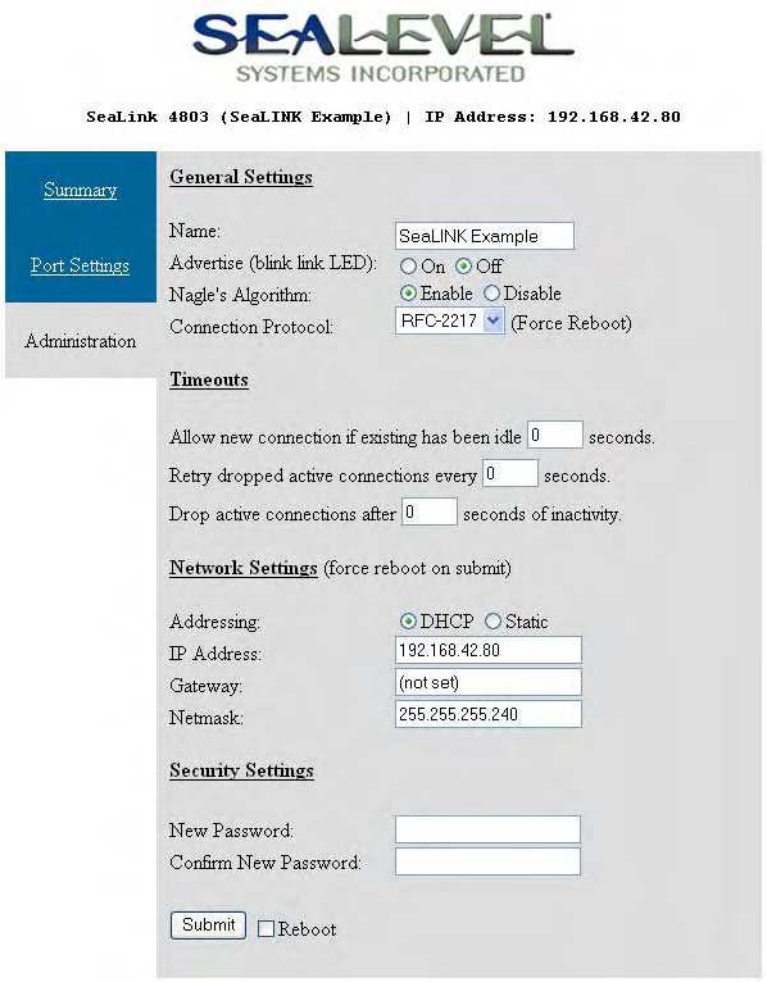
  For example, if you have a serial device connected to the 4th serial port of a SeaLINK 4401 (four port device) that you want to set up to serial-tunnel to a SeaLINK 4101 (single port device). On the webpage of the 4401, you type the IP address of the 4101 with a TCP port number (socket) of 4680. If the serial data is bidirectional, you will also set up serial tunneling on the 4101. On the webpage of the 4101 you will type in the IP address of the 4401. Since you are connecting to the 4th serial port, you will use TCP port number 4683. The table below illustrates the TCP port numbers (sockets) assigned to the SeaLINK device serial ports.

Device Serial Port	TCP Port Number (Socket)
1	4680
2	4681
3	4682
4	4683
5	4684
6	4685
7	4686
8	4687
9	4688
10	4689
11	4690
12	4691
13	4692
14	4693
15	4694
16	4695

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Administration Page

The Administration page is where you can set general SeaLINK device settings. You can set the device name, IP address, Gateway, network mask, timeouts, etc. You can set a password to prevent unauthorized access to the SeaLINK device, thus avoiding accidental configuration changes.



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General Settings

- Name – Text box

  This is the user assignable name of the SeaLINK device, useful for giving the device a meaningful name (i.e., location, connected equipment, etc.)

- Advertise (blink link LED) – On or [Off]

  Set to 'On' and submit. The LINK LED will blink until it is disabled again. This option only works on 4-port and 8-port SeaLINK devices. The 1-port, 2-port, and 16-port SeaLINK devices do not have a LINK LED.

- Nagle's Algorithm – [Enable] or Disable

  Referred to as "Nagling", which is a method (IETF RFC 896) to reduce the number of small packets transmitted over an Ethernet network. Devices that support Nagling will buffer data until 1500 bytes have been received or 200ms has passed. Disable if serial COM devices are timing out due to latency delays. You may have to disable Nagling at the host or network level to further reduce host or network latency.
  Note: Disabling Nagle's Algorithm will increase packet traffic.

- Connection Protocol – [RFC-2217] or Raw Data

  Sets the connection protocol for all serial ports on the SeaLINK device. RFC-2217 supports COM port control signals such as DTR, CTS, DCD, etc. and is required for connections made via the SeaLINK virtual COM port software. Raw has no protocol associated with it and accepts standard TCP/IP socket connections.

Timeouts

- Allow new connection if existing has been idle 'x' seconds: – [30]

  SeaLINK devices automatically prevent multiple users from opening the same serial port at the same time. If a serial port is in use (open), all other socket connection requests are refused. Certain events (i.e., a system crash) may break the serial connection without the SeaLINK device receiving notification that the connection has ended. No further connections can be made to that port unless the device is reset. By setting this option, after 'x' seconds of inactivity, the SeaLINK device will allow an incoming connection to override the existing connection.

- Retry dropped active connections every 'x' seconds: – [10]

  Setting a timeout period prevents an active connection, via serial tunneling, from trying to connect repeatedly to the assigned IP address (i.e., if the timeout is set to 10 seconds, the failed serial tunnel connection will not be attempted again until 10 seconds have passed). This helps reduce network overhead where multiple serial devices may share the same network.

- Drop active connections after 'x' seconds of inactivity: – [10]

  Active connections, via serial tunneling, are made when the SeaLINK device receives serial data and are closed when the receiving device closes the connection. This setting will automatically disconnect the serial connection after 'x' seconds of serial data inactivity.

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Network Settings

(Force reboot on Submit) – changes will be reflected on Submit, but will not take effect until SeaLINK device has been rebooted. The SeaLINK device defaults to DHCP and will attempt to obtain an IP Address from a DHCP server. If an IP address cannot be obtained from a valid DHCP server, you can set the device to a static IP address. You can also assign a Gateway and Network Mask, if required.

- Addressing – [DHCP] or Static
- IP Address – Text box
- Gateway – Text box
- Netmask – Text box

Security Settings

You can assign a password to the SeaLINK device to prevent unauthorized configuration changes via the web interface. Once a password has been set, a new field appears next to the Submit button. You must enter the correct password and press the Submit button before the SeaLINK device will accept new changes. The password does not prevent the user from viewing the onboard web pages. If you forget your password, see the Resetting to Factory Defaults section.

- New Password – Text box
- Confirm New Password – Text Box

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Resetting to Factory Defaults

If you have forgotten your password or need to reset the device to the factory defaults, manually browse to “http://xxx.xxx.xxx.xxx/debug.htm” (where xxx.xxx.xxx.xxx is the IP Address of the SeaLINK device) and click the button marked “Reset to Factory Defaults”. For the username, enter “debug”. In the password field, type in the MAC address (no dashes or spaces) of the unit, located either on the summary page or on the label on the bottom of the SeaLINK device.

The configuration utility ‘SeaLINK Config’ (Start Programs SeaLINK SeaLINK Config) can also be used to determine the MAC address number.

Note: The Debug Threshold settings on this page have no meaning to the end user and are only used for factory testing and diagnostics.



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Application Requirements

Check Application Requirements

Nearly all Windows applications can use SeaLINK virtual COM ports and remote serial devices instead of direct-connected devices. Applications with special requirements will usually work after properly configuring SeaLINK software and hardware.

Most Windows applications perform only common read/write operations. Some applications, however, require COM Port Control. SeaLINK serial servers support COM Port Control, thus offering the degree of control that most of these special applications require. Typically, the applications are one of three types:

1. Fax applications, which require very close interaction with the modem that only COM Port Control can provide.
2. Custom applications that must set specific baud rates and framing. A common workaround is to manually make these settings on the serial server.
3. Custom applications, such as some data collection programs that connect to remote equipment, which requires serial line status signals.

Create Modem Devices

Windows modem devices allow Windows applications to more easily use different types of modems. Windows Dial-Up Networking, Windows HyperTerminal and many other applications can and sometimes must use Windows modem devices. If your application needs a specific modem device, as opposed to a COM port, follow the instructions here to create a modem device for the remote modem on the server.

When you create a Windows modem device, you use Windows 'Add Hardware' wizard for modems found in the Windows Control Panel. You will need to answer two basic questions:

1. What modem driver should be used for the remote modem?
2. What SeaLINK COM port reaches the remote modem? When prompted by the wizard, choose the appropriate COM port from the list presented.

Choosing the Right Modem Definition (Modem Driver)

A common problem in using remote modems is a mismatch between the Windows modem driver and the modem that is actually connected to the serial server. This results from choosing the wrong modem driver when creating a Windows modem device. Windows may already contain a modem definition for your modem, especially if it is an external modem. If not, most modems usually ship with a CD-ROM containing the proper modem driver in the form of an INF file (a file with a name ending in ".INF"). You can also obtain the correct driver from the modem manufacturer's website. It is very important that you use the correct modem driver before you create the Windows modem device. If the wrong driver is installed for a COM port, SeaLINK will not work.

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Creating a Windows Modem Device

All versions of Windows include a hardware wizard that simplifies the process of creating a modem device for a standard modem on a serial server. This wizard is accessed through the Windows Control Panel. Because the wizard is implemented slightly different in each Windows version, the following instructions are generalized for all versions of Windows. Refer to your Windows documentation if additional details are needed.

1. Determine the make and model of the modem(s) on the serial server.
2. Verify that the manufacturer of any modems connected to the serial server has provided a modem driver file. If the original INF file cannot be located, check the support pages on the manufacturer's web site.

   Note: Windows includes a number of INF files for popular modems. The hardware wizard will list these during the process of creating the modem device. Standard modems and generic drivers should be avoided.
3. Open the Windows Control Panel and click on the 'Modems' file or icon.
4. Click 'Add' to begin adding a new modem.
5. If Windows offers to detect the modem, check the box that prevents automatic detection. You need to manually select the modem manufacturer and model from a list.
6. You will now see the list of modem manufacturers and models directly supported by Windows. In most cases, however, you will direct Windows to the directory, diskette or CD-ROM containing the INF file for your modem.
7. Select the SeaLINK virtual COM port that will access the modem to complete the process.

   Note: Windows typically lets you install the same driver for multiple ports in one step, thus saving time.
8. Windows should now indicate that the modem has been successfully set up and show which COM port SeaLINK is using. You may need to click on a 'Properties' button to see this information.
9. After installing the driver, it is highly recommended that you reboot your PC.

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Application Settings & Examples

The final step in configuring an application is to change the application settings to use either a SeaLINK COM port directly or the Windows modem device that refers to the remote modem on the serial server. The general procedure is:

1. Find the 'Settings', 'Preferences', 'Options' command setting in the application that allows you to specify the COM port or modem device to be used by the program.
2. Choose the SeaLINK COM port, or the modem device that uses the SeaLINK COM port, to access the remote modem.

   Note: Some older Windows applications do not recognize COM ports higher than COM4, including some versions of Windows HyperTerminal. If you need to use such an application, consider creating COM ports in the COM1-COM4 range. You may need to disable COM ports in your system BIOS to make them available to SeaLINK.

Application Example: Windows HyperTerminal

Windows HyperTerminal is one useful application for testing your SeaLINK configuration. Before trying it out, there are two things to know about HyperTerminal that affect its use with SeaLINK COM ports:

- HyperTerminal can use SeaLINK COM ports directly or through Windows modem devices.
- HyperTerminal for Windows 98 is unable to directly use COM ports above COM4.

Using HyperTerminal:

1. Run the Windows HyperTerminal application from the Accessories portion of the Windows Start menu. Create a new connection with the name Test and click OK.
2. Open the Test Properties window under the File pull-down menu and select Test Properties.
3. In the Connect Using box, choose one of the modem devices you set up previously that correspond to one of SeaLINK's virtual COM ports. Click OK.
4. Initiate the connection using the Call command in the Call menu. If your PC is unable to communicate with the port server, HyperTerminal will issue error messages.
5. Test to see if the serial server is providing a modem on this port by typing the AT command in HyperTerminal's main window. An OK response indicates proper working order (This test works only if you have selected a COM port rather than a modem device).
6. Open the SeaLINK Port Monitor window by right clicking on the system tray icon and choosing Port Monitor. You should see the status indicators for the SeaLINK COM port opened by HyperTerminal.

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Connector Pin Assignments

Connector Pin Assignments - DB9

The following pin out diagrams cover all Ethernet serial servers with a DB9 connector, excluding the 4103, which is covered on the following page.

RS-232 (DB9 Male)

This pin out covers the following products:
4101, 4104, 4201, 4203, 4401, 4403, 4801, and 4803

Pin #	Signal	Name	Mode
1	DCD	Data Carrier Detect	Input
2	RX	Receive Data	Input
3	TX	Transmit Data	Output
4	DTR	Data Terminal Ready	Output
5	GND	Ground	
6	DSR	Data Set Ready	Input
7	RTS	Request To Send	Output
8	CTS	Clear To Send	Input
9	RI	Ring Indicator	Input

Technical Note: 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 RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

RS-422/485 (DB9 Male)

This pin out covers the following products:
4102, 4104, 4202, 4203, 4402, 4403, and 4803

Pin #	Signal	Name	Mode
1	RX+	Receive Data Positive	Input
2	RX-	Receive Data Negative	Input
3	TX-	Transmit Data Negative	Output
4	TX+	Transmit Data Positive	Output
5	GND	Ground	
6	RTS+	Request To Send Positive	Output
7	RTS-	Request To Send Negative	Output
8	CTS-	Clear To Send Negative	Input
9	CTS+	Clear To Send Positive	Input

Technical Note: Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS (connect positive to positive and negative to negative). Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

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Connector Pin Assignments - 4103

RS-232 (DB9 Male)

This pin out covers the 4103 only.

Pin #	Signal	Name	Mode
2	RX	Receive Data	Input
3	TX	Transmit Data	Output
5	GND	Ground	
7	RTS	Request To Send	Output
8	CTS	Clear To Send	Input

RS-422/485 (DB9 Male)

This pin out covers the 4103 only.

Pin #	Signal	Name	Mode
1	RX+	Receive Data Positive	Input
2	RX-	Receive Data Negative	Input
3	TX-	Transmit Data Negative	Output
4	TX+	Transmit Data Positive	Output
5	GND	Ground	
6	RTS+	Request To Send Positive	Output
7	RTS-	Request To Send Negative	Output
8	CTS-	Clear To Send Negative	Input
9	CTS+	Clear To Send Positive	Input

Technical Note: Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS (connect positive to positive and negative to negative). Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

Relay / Input Connections

This pin out covers the removable terminal block on the 4103 only. Refer to the 4103 Digital I/O section for information on using the input and relay.

Pin #	Signal	Name
1	V+	9-30 VDC Input
2	V-	Supply Power Ground
3	Relay 2	Relay Contact 2
4	Relay 1	Relay Contact 1
5	Input 2	Optically Isolated Input
6	Input 1	Optically Isolated Input

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Connector Pin Assignments – RJ45

RS-232 (RJ45 Female)

This pin out covers the 4161 and 4163.

Pin #	Signal	Name	Mode
1	RTS	Request To Send	Output
2	DTR	Data Terminal Ready	Output
3	GND	Ground	
4	TX	Transmit Data	Output
5	RX	Receive Data	Input
6	DCD	Data Carrier Detect	Input
7	DSR	Data Set Ready	Input
8	CTS	Clear To Send	Input

Technical Note: Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

RS-422/485 (RJ45 Female)

This pin out covers the 4162 and 4163.

Pin #	RS-422	RS-485	Name	Mode
1	TX+	Data+	Transmit Data Positive	Output
3	GND	GND	Ground	
4	TX-	Data-	Transmit Data Negative	Output
5	RX+		Receive Data Positive	Input
8	RX-		Receive Data Negative	Input

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Relay and Input Configuration

The 4103 has a single Relay contact and a single optically isolated sensor input for general purpose I/O. These functions are available via a Modbus/TCP interface or can be 'Aliased' to UART modem control signals. These functions are configured in software via the onboard web server configuration interface. Refer to the next section for Modbus/TCP communication syntax.

Modbus TCP

Modbus is a standard field bus protocol designed to make reading and writing I/O device-independent. Modbus/TCP is a variant of the Modbus protocol that uses TCP/IP as its communication medium. Per the Modbus/TCP specification, each I/O point on a device is mapped to an address that can be specified within Modbus commands. The mapped address is relative to the type of I/O. The 4103 has one coil (readable/writeable bit) mapped to coil address 0, and one discrete input (readable bit) mapped to discrete input address 0.

The 4103 accepts Modbus/TCP connections on TCP port 502.

Supported Modbus commands
READ_COILS (0x01)
READ_DISCRETE_INPUTS (0x02)
WRITE_SINGLE_COIL (0x05)
WRITE_MULTIPLE_COILS (0x0f)
READ_DEVICE_IDENTIFICATION (0x2b)

Note: Some Modbus/TCP software is one-based, meaning that address ranges begin with 1 instead of 0. For more information on Modbus/TCP or Modbus protocols, visit http://www.modbus.org

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Appendix A - Technical Notes

SeaLINK as the Software Cable

Correctly determining the source of a SeaLINK problem can be elusive but there are clues to speed up this process. For example, when troubleshooting a local device, there are only three things to consider: the device itself, the COM port and cable, and the PC application software. When SeaLINK and SeaLINK serial servers enter the picture, the number of potential error sources increases significantly. This can make it more difficult to determine why a particular application is not working properly.

The Software Cable Concept

SeaLINK has one simple function: to pass data between a remote TCP/IP connection and a virtual COM port on a client PC. The analogy of a "software cable" is appropriate, as SeaLINK's primary mission is to pass data between the PC and the device.

This important point it is worth repeating: all SeaLINK serves to do is pass data between the PC and the device.

When you suspect problems lie with SeaLINK configuration, first consider whether the types of problems that are occurring would happen if a faulty device cable were suspected on a local device.

SeaLINK and the TCP/ IP Routing Table

To allow Microsoft's Dial-Up Networking to function with remote modems regardless of LAN topology, SeaLINK may need to manipulate the client PC's routing table. Depending upon several factors — including the number of network cards present in the PC, the entries in the routing table, and the location of the serial server — there may be situations where SeaLINK is unable to correctly configure the routing table.

SeaLINK automatically reads the routing table on startup, and will determine if it needs to insert additional routes. For each COM port, it reads the IP address of the specified serial server, and will insert a route if both of the following are true:

1. The SeaLINK serial server's IP address is not on the same subnet as the PC.
2. The route to the server's address is handled via a "default" route. A default route is one with a network address of 0.0.0.0.

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What SeaLINK Does

If SeaLINK determines that an additional route is necessary, then it needs to calculate the correct information for that route. SeaLINK builds this route using the first default route found in the routing table. It builds a "specific" route using the IP address of the server and a network mask of 255.255.255.255. It uses the same gateway address as is used in the default route.

For example, consider the following (abbreviated) routing table:

Network Address	Netmask	Gateway	Interface	Metric
0.0.0.0	0.0.0.0	10.0.0.1	10.0.0.47	1
10.0.0.0	255.255.255.0	10.0.0.47	10.0.0.47	1
10.0.0.47	255.255.255.255	127.0.0.1	127.0.0.1	1

This example for a PC with an address of 10.0.0.47, on a class C subnet (a netmask of 255.255.255.0). Only addresses 10.0.0.1 through 10.0.0.254 are accessible in this subnet, which is specified in the second route listed. The first route is the default route, which specifies that all other address outside the range of the 10.0.0.x subnet be delivered via the gateway at 10.0.0.1.

Now suppose that the SeaLINK serial server's IP address is 10.2.2.55, which is not on the client PC's subnet. SeaLINK will take the gateway address of the default route, a netmask of 255.255.255.255, the IP address of the PC, and add a new route so that the routing table will now read:

Network Address	Netmask	Gateway	Interface	Metric
0.0.0.0	0.0.0.0	10.0.0.1	10.0.0.47	1
10.0.0.0	255.255.255.0	10.0.0.47	10.0.0.47	1
10.2.2.55	255.255.255.255	10.0.0.1	10.0.0.47	1
10.0.0.47	255.255.255.255	127.0.0.1	127.0.0.1	1

The new route specifies that the address 10.2.2.55 can be reached via the 10.0.0.1 gateway, and singles out that address over and above the other addresses reachable via the default route. This guarantees that the server will be accessible even if the default route changes.

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Why SeaLINK Does This

At first glance this additional route appears to be redundant. It is, after all, specifying the gateway address that is already listed in the default route. So, why bother?

The issue is that Dial-Up Networking sessions also manipulate the routing table. Consider this hypothetical Dial-Up Networking session to an ISP. Once dialed-in, the ISP will assign the calling PC an IP address of 10.23.0.135, and specify that a default route use the gateway at 10.23.0.1 (presumably this gateway knows how to route packets to the rest of the Internet). What happens next is that the routing table gets a new default route added, so the top two entries in the routing table look like this:

Network Address	Netmask	Gateway	Interface	Metric
0.0.0.0	0.0.0.0	10.23.0.1	10.23.0.135	1
0.0.0.0	0.0.0.0	10.0.0.1	10.0.0.47	2

The crux of the problem is this: with the above routing table, all packets outside the range 10.0.0.1 to 10.0.0.254 will be routed via 10.23.0.1 to the ISP — not to the gateway on the LAN. This includes the serial server, which is at 10.2.2.55! Dial-Up Networking has, in effect, sawed off the limb it is sitting on by updating the routing table such that the server is no longer accessible to the PC.

Dial-Up Networking doesn't have this problem with a local modem because the modem can always send and receive data to the PC regardless of the state of the routing table. Modems on servers, however, can be cut off from the PC if the routing table suddenly makes them inaccessible. By adding the specific route to the 10.2.2.55 address, the server is guaranteed to be always accessible, because the server is not dependent upon the default route.

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Problem #1: Multiple Default Routes

SeaLINK can run into problems when the PC's routing table contains more than one default route. The two most common situations where this occurs are:

1. The PC is "multi-homed," meaning it has more than one network card, each of which connects to a different subnet on the LAN.
2. The PC has been configured to have redundant default routes, with one intended to act as the backup for the other.

The problem is that SeaLINK needs to determine which gateway address to use for the additional routes (see above), and with multiple default routes it is forced to guess which gateway is the correct one. In lieu of more information, SeaLINK will always use the gateway address from the first default route in the routing table. In either case listed above, this means that SeaLINK may have guessed wrong.

In the first case, the serial server may not in fact be accessible via the network card chosen for the gateway. In the second case, sometimes the backup gateway address is not online. In either situation, you will see connection errors occur in the Configuration Wizard even when you have specified a correct IP address.

There are two solutions to this problem:

1. Avoid using default routes when at all possible. Unless your LAN can also route to the Internet, using a default route to route to other subnets is somewhat misleading. If the routing table is adjusted to specify the other subnets directly rather than using a default route, then the problem goes away.
2. Manually add a static route to the routing table that specifies which gateway to use for the serial server. In NT/2000/XP this is done with the "-p" option to the route command, and on Windows 98/Me it can be done with a batch file in the startup folder.

Problem #2: No Route Command

SeaLINK performs all of the routing table inspection and manipulation using the Microsoft-supplied "route" command that ships with all Windows installations. If this command has been deleted or moved, or if you are using another vendor's TCP/IP stack, SeaLINK may run into problems attempting to run the route command.

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Appendix B - Troubleshooting

Troubleshooting Overview

In most cases, installing SeaLINK is easy and straightforward. All SeaLINK needs to know is an IP Address and TCP Port Number (socket). The Configuration Wizard can usually determine the rest of its settings automatically.

If a problem arises somewhere between the PC running SeaLINK and the serial server, SeaLINK will usually indicate that a problem has occurred. Sometimes pinpointing the exact cause takes a little more work. Experience shows that most problems are related to the configuration of the application or the serial server, not with SeaLINK software.

WinSSD Software (detailed on following page) is supplied by Sealevel Systems and will be useful in troubleshooting procedures. Using WinSSD and following these simple steps can eliminate most common problems, usually without the need to call Technical Support.

1. Verify that the Power LED is lit and remains on.
2. Verify that the Link LED remains on to determine that the 10/100 Base-T connections and the polarity are correct. If the Link LED is lit, you have a valid Link condition.
3. Verify that the Ethernet LED remains on to determine that the 10/100 Base-T connections and the polarity are correct. If the Ethernet LED is lit, you have a working Ethernet connection
4. Verify that the correct cable is being used (i.e. 'Straight-thru' for switch/hub connection and 'cross over' for direct connection to NIC), and that all cables are connected securely.
5. Verify that the Ethernet Hub, Switch, and any other network devices between the network server and the SeaLINK device are powered up and operating.
6. Ensure that the serial server and Client are in the same sub-net (Broadcast Domain) and not behind a router or bridge.
7. Ensure that the IP address in the Client is the same as the IP address of the Server. If using DHCP this address is subject to change after a Server reboot.
8. To isolate the unit from the network, use a 'crossover' Ethernet cable to connect the unit directly to the NIC card in the server.
9. Reboot the serial server by disconnecting from power for 10 seconds and reconnecting.
10. Ensure that SeaLINK software is correctly loaded.
11. Remove and reload SeaLINK software.
12. Update the firmware (Firmware files, if available, and directions for updating can be found at the following link on the Sealevel FTP site): ftp://ftp.sealevel.com/pub/software/sealink/firmware/current/

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Using WinSSD

WinSSD is a tool used to test serial ports, as well as the quality of the connection between two different ports. It provides maximum flexibility to the user, allowing them to modify a number of operating parameters, such as timeouts and flow control. Because of this, it is useful in many situations, both for the end user and for the software/driver developer. It is provide as a utility in the Start Programs SeaLINK folder, as well as a help file that describes its use.

Pinpointing the Problem

When trouble arises, the first challenge (and often the most difficult part of the problem) is to determine where a configuration issue is occurring. The following procedure is recommended:

1. Make sure the IP Address and Port Number for the SeaLINK serial server are correct. SeaLINK will not be able to connect to the remote devices unless it is configured with the proper information.
2. Run the Configuration Wizard to verify the IP Address and Port Number. If the Configuration Wizard does not run successfully, then SeaLINK will not be able to function using the specified IP Address and Port Number. There are many reasons why a Configuration Wizard session may fail. The most common reason is the following:
    - Entering the incorrect IP port number in the SeaLINK Manager window.

A common mistake is to assume the TCP/IP port number is the "device number" on the server. These numbers should be in the range of 4680 to 4696

Note: Any port number that is not in this range is wrong.

If more information is necessary, see the Wizard Status and Error Messages section in Chapter Four.

3. Verify the make and model of Windows Modem Device installed. Many applications (such as Windows HyperTerminal and Dial-Up Networking) require a Windows modem device to automatically dial. If the installed device driver on the local PC does not match the modem(s) in the serial server, then dialing will not succeed even when the Configuration Wizard does succeed.
4. Verify the Application Requirements. Certain applications require COM Port Control. See the Applications Settings section in Chapter Three to see if this may be a requirement for you.
5. If the application still fails, collect trace data and look for problems. In the event you need to contact Sealevel Systems support group, one of the first things you may be asked for is a trace file collected during the application failure. It is helpful to be familiar with the procedure for doing this in advance. Because reading trace data is fairly self-explanatory, many users can pinpoint the cause of certain problems from this information. See the trace window discussion in Chapter Four for details.

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Problems Relating to Windows Modem Devices (as applicable)

It is very important to ensure that the Windows Modem Devices installed on the local PC match the modems provided by the server. A common symptom of this problem is that the Configuration Wizard succeeds, but then programs such as Windows HyperTerminal and Dial-Up Network fail to dial successfully. Many users mistakenly believe that this is a problem caused by SeaLINK, when in fact SeaLINK is simply a conduit for data between Windows and the modem, where the real configuration problem may be.

Chapter Five's SeaLINK as the Software Modem Cable overview discusses this problem and how SeaLINK fits into a typical Windows installation.

Try raising the baud rate setting from its default setting (often 19200 or 38400) to 115200 baud. ISDN modems in particular are susceptible to this problem. Try this remedy if dialing fails even after you have verified that the installed modem is in fact correct.

Other Problem Causes

1. The Modem Group (or "hunt group" or "rotary") is configured improperly or contains bad modems. A symptom of this problem is that not every connection access succeeds. Connections may require one or two tries, and then the Configuration Wizard succeeds. This problem is caused by the device group containing bad entries (such as non-existent ports); malfunctioning devices; devices that are turned off; or devices with faulty connections to the telephone network. Try detecting this problem by repeatedly running the Configuration Wizard. If any Wizard session fails to detect a modem, then investigate the serial server configuration settings.
2. The serial server does not support faxing. For faxing to work, the modems themselves must be capable of fax.
3. The fax software is not configured for Class 2 or 2.0 fax. Because of the tight timing constraints of Class 1 faxing, it is only possible to use a faxmodem in the Class 2 or 2.0 fax mode. This is not a limitation of SeaLINK, but rather a limitation of using networked modems for fax.
4. The client program is not set to use the right modem and/or COM port. It is surprisingly easy to forget to set all client applications to access the SeaLINK virtual COM port for remote device use.
5. Incorrect dial-up networking username or password. If the dial-up networking connection runs into trouble, first check the username and password that you are providing for the connection.
6. The Windows "route" command is missing or moved. SeaLINK uses the "route" utility in Windows to manage the PC's routing table. If the route.exe file is missing from the Windows system (or system32) directory, SeaLINK will not function properly. See Chapter Five's TCP/IP routing table discussion for more information.

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Wizard Status & Error Messages

When you first run the Configuration Wizard for a SeaLINK COM port, the Wizard answers two important questions:

1. Can SeaLINK communicate with the serial server? The Wizard attempts to establish communications (using a Windows Winsock socket) with the server, and then detects the protocols supported by the server.
2. Is a remote device available? As it works, the Wizard indicates its progress in the Status panel and then provides more details of its interchange with the server in the Log panel.

Status Panel Error Conditions

The following errors are detected by the Wizard and displayed in the Status Panel:

1. Server connection failure. The Wizard window here shows a simple communication problem. In this case, the Wizard indicates that cannot connect to the IP address and port number set for this SeaLINK COM port.
2. Normal progress messages. When the Wizard's work proceeds normally, the messages summarize the interaction with the server. These messages include:
   - Connected to Server
   - COM Port Control Support Detected
   - Telnet Protocol Detected
   - Server signature: [`server name`]
   - Modem Detected
   - Session Completed
3. Communications error messages. If the Wizard encounters a problem with the server, the Status panel will contain one of the following messages:
   - Cannot connect to [`server IP address`]
   - Error sending data.

If such errors appear:

1. If the Restored Failed Connections feature is enabled, the "cannot connect" to server message is never displayed. SeaLINK will continually retry the connection every 15 seconds.
2. Verify that your serial server is at the IP address you expect.
3. Verify your server configuration is providing devices for access at the port number you expect.

   Note: In many cases the Port Number is determined when the port server is configured. There is no "correct" value that works for every type of port server.

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4. Modem detection error messages. If the "test for presence of a modem" box is checked in the Configuration Wizard, then a Wizard session will first establish communications with the server. Next, the Wizard attempts to issue simple "AT" commands to a modem and analyze the responses. If the Wizard does not see output that matches expected modem behavior, it will report a modem detection problem with the Status panel containing one of the following messages:
    - Could not elicit AT/OK response from modem
    - Modem jabbering — may need to be reset
    - Unexpected data received from modem
    - Internal modem detection error

The most likely causes of such errors are:

1. An external modem is powered off or the data cable is disconnected.
2. A modem is not currently available in a modem pool.
3. Non-modem device connected to server.

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Log Panel Error Conditions

If the Status panel indicates an error, the Log panel will display one or more messages that provide more details. These messages include:

- Bad IP address
- Server disconnected prematurely
- Internal error

The Log panel can also contain error messages showing error codes that sometimes relate to specific causes. They include:

1. CONNREFUSED

   Most likely cause: The IP port number is incorrect, or the serial server is not properly configured to accept connections at that port number.

2. NETUNREACH, TIMEDOUT, or HOSTUNREACH

   Most likely cause: The IP address number is incorrect.

3. NAMETOOLONG, AFNOSUPPORT

   Most likely cause: The IP address as entered is a malformed hostname.

4. ADDRNOTAVAIL

   The specified address is not available.

5. NETDOWN

   The network has failed or the specified IP address is incorrect.

6. CONNABORTED, CONNRESET, NOTCONN, SHUTDOWN, EDISCONN

   The server has disconnected from the network. This may be caused either by a server failure, an incorrect IP address and/or Port number, or by an incorrectly configured server.

7. All errors containing Internal error, contact tech support

   These messages indicate serious errors conditions that require the attention of your company's technical support resource.

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Using the Trace Window

SeaLINK's Trace Window feature helps to solve difficult configuration problems. This window lets you monitor all interactions between the client application and the remote device. The window works by recording the interactions both on-screen and in a file that can be examined off-line or sent to others for analysis. The Trace Window is available by right clicking on the SeaLINK system tray icon.

Selecting the Trace Window menu option opens the SeaLINK Port Monitor 3.0 window, with the Trace Window tab enabled. To begin tracing, check the Enable Trace box at the bottom of this window.

Using Tracing

To collect trace data, follow these four steps:

1. Be sure you are logged in as administrator.
2. Enable tracing as described above.
3. Recreate the problem condition that you are debugging.
4. Allow the Trace Window to show and record the history of communications activity between SeaLINK and the serial server.
5. To save the trace data for future review, use the File pull-down menu option and select "Save As." Give the file a name and directory destination. SeaLINK then saves trace data automatically in its native *.silog binary file format. Files saved in this format open natively in the SeaLINK Port Monitor window.

You can also save files for examination in text editors, such as Windows Notepad, by first running a trace and then by selecting "Copy" from the Edit pull-down menu option. Copy places the text content into the Windows clipboard, where it can then be pasted into any text editor program.

If a support representative requests a log file during the course of a support incident, it will be necessary to email the file as an attachment to the regular message.

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Overview of the Trace Window

In addition to the Trace Window's primary data screen, the window provides the following user options:

1. Clear button. This clears any data captured from a previous trace session.
2. Enable Trace box. Check this box to begin recording data in a new trace session. Be sure to check this before attempting to make a connection.
3. Hex Display check box. Check this box to toggle the recorded data between the default ASCII text and hexadecimal format.

   Note: Do not send a Hex trace to Sealevel Systems support team unless requested.
4. Auto Scroll box. Check this box to allow the display to automatically scroll forward as new session data arrives in real-time in the data screen.

   Note: This is useful for analyzing a SeaLINK session as it is underway.
5. Always On Top box. Check this box to keep the SeaLINK Port Monitor window always on top of other open applications in Windows.

The Trace Window displays a series of events, one event per line. Every event is tagged with the current time (shown in hour:minute:second.millisecond format), and the COM port where the event occurred. There are three types of events:

1. Transmit events. Shown in green and preceded by "»", these indicate that the application software transmitted data to the COM port. The remainder of the line shows the data transmitted, either in ASCII or hexadecimal format, depending upon the current display mode.
2. Receive events. Shown in red and preceded by "«", these indicate that the application software received data from the COM port. The remainder of the line shows the data received, either in ASCII or hexadecimal format, depending upon the current display mode.
3. Control events. Shown in blue and preceded by "|", these indicate non-data events. These events can include the setting of session parameters (such as Telnet); opening and closing a port; connecting to the serial server; setting a device control or status line (DTR, DSR, DCD, etc); and the configuration of baud rate and framing parameters.

   Note: The trace display is updated only once per second to avoid introducing large changes in system timing; as a result, there may be noticeable delays in seeing changes. Do not run SeaLINK with tracing enabled except for special situations because of the extra memory (1MB) required for the trace data.

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Independent Diagnostics

Various Windows utilities and administration commands can be used to help debug problems relating to SeaLINK or the configuration of the serial server. This section discusses use of the following diagnostic tools and procedures:

- Using ping to check the network
- Using route to check the routing table
- Using telnet to check remote modems
- Using WinSSD to verify the creation of SeaLINK COM ports

DOS Prompt Command Diagnostics

1. Using "ping" to check the network.

   Ensure that the PC is connected to the server using the Microsoft TCP/IP networking software supplied with Windows. Open a DOS command prompt window and type in the ping command, using the server's network address or domain name in place of the xxx.xxx.xxx.xxx:

   C:\ ping xxx.xxx.xxx.xxx

   <>

   The output should indicate that ping has reached the server. If not, SeaLINK will not be able to use the server until the problem is resolved. Contact your system administrator for help.

2. **Using "route" to check the routing table.**

   SeaLINK uses the route command to read, and sometimes add to, the PC's routing information during SeaLINK operation. This is a part of SeaLINK's support for accessing servers that are not on the same subnet as the PC. In this case, SeaLINK needs to calculate a static route to be added to the routing table. If there is more than one default route, SeaLINK may not be able to determine a correct static route to the server and will display a warning dialog. Follow this process:

   - Check the PC's route table for multiple default routes. Open a DOS command prompt and use the route print command:

     C:\ route print ...

     (multiple lines of output showing the routes in effect)

   The output will indicate whether there is only one default route. In the command's output, the default routes appear at the top and show a Network Address value of 0.0.0.0. If the PC has more than one default route, SeaLINK may not be able to access a server that is not on the same subnet. Additional information is available in Chapter Five.

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- In Windows XP, NT and 2000, make sure you are logged into an account with administrator privileges. Use the Windows NT User Manager or check with your system administrator if you are not sure of the status of your current account.

3. Using "telnet" to check remote devices.

   Type the **telnet** command from the DOS prompt to establish a connection to one of the ports on the server. This, in turn, opens a Telnet window session.

   - In the example that follows, the server is at IP address 192.168.1.100 and is configured to provide TCP/IP port number 7000. Replace the address and port number values with those that apply to your server.

   Note: You can run the telnet command from a DOS prompt, or by using the Run command in the Start menu. If your server has a name on your network, you may be able to use the server's name instead of the numeric address.

   - Check the results of the telnet command. If you see any errors or output to the telnet window, review the error conditions discussed below.
   - With a telnet window session open, you can manually check the remote device, in this case a modem, by typing the AT command. Then check for the "OK" response from the modem.

     AT <--- typed by you, might not echo as in the example below

     OK <--- response from the modem

   The OK response indicates that the server has provided access to a modem that supports AT commands and issues text responses. If you do not see an OK in response to your AT command, then:

1. Ensure that a modem is connected to the server. If it is an external modem, check for power and good cable connections.
2. If the initial telnet command produces the error message "connection refused," then:
   - Fall back to the ping diagnostic described above.
   - Check the SeaLINK serial server configuration to verify that it is waiting for a connection on the expected IP port number.
3. If the initial telnet command results in output to the telnet window, then:
   - If the output is asking for a number to dial, the SeaLINK server has not been configured to provide a modem directly for dial-out. Consult the documentation for instructions regarding dial-out ports.

     If the AT command does not echo to the DOS prompt window, then:

   - Verify that your port server does have a modem attached to the dial-out port that you are accessing. AT commands are processed by both internal and external modems.
   - The modem may be configured to disable echo of AT commands. With the telnet window session open, you can type the ATE1 command to turn on local echo.

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4. If the OK response does not appear, or another response appears, then:
    - The modem may not be operational. Consult the instructions provided with the modem for diagnostic procedures to determine whether the modem is working properly.
    - The modem may be configured to provide numeric responses instead of text responses to AT commands. Most Windows applications, including Dial-Up Networking, require text responses. With the telnet window session open, you can type ATV1 to turn on text messages.

Verifying the creation of SeaLINK COM ports in Windows 98/ Me/ NT

If you are running Windows 98, ME, or NT, you can verify the presence of SeaLINK ports from any system port list. To see a complete list of COM ports, including those used by SeaLINK, use the following procedure:

1. Run System in the Control Panel.
2. Select the Device Manager tab.
3. Expand the Ports (COM & LPT) entry.
4. The SeaLINK (COMx) entries should correspond to those checked in the Select Ports Window.

Note: Windows XP and 2000 will not show the ports in this way, but the ports will be available as choices when installing modems or other devices.

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Appendix C - How To Get Assistance

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

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.

Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp

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

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.

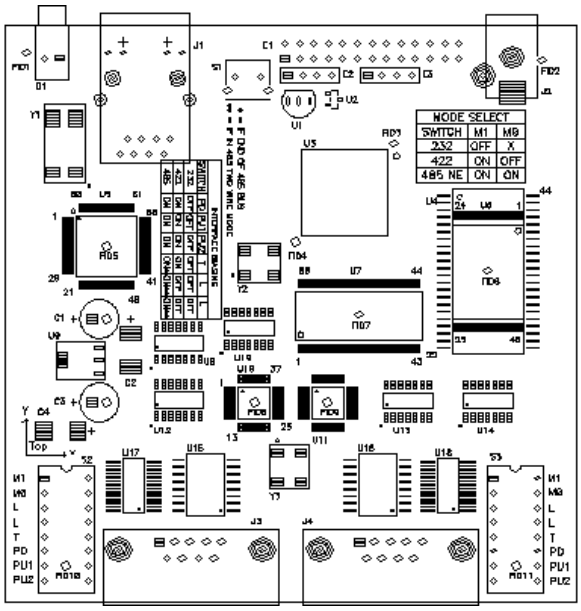
Technical Support

1. When calling for technical assistance, please have your user manual and current serial server settings. If possible, please have the serial server installed on the network and ready to run diagnostics.
2. Sealevel Systems maintains a website at www.sealevel.com. The latest software drivers, firmware updates, and product manuals are available on our website.
3. Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp.
4. Technical support is provided Monday through Friday from 8:00 a.m. to 5:00 p.m. EST (excluding national US holidays). Technical support can be reached by phone at (864) 843-4343 and via e-mail at mailto:support@sealevel.com.
5. Refer to the last page of this manual for product warranty and return/repair instructions. An RMA (Return Material Authorization) is required for all merchandise returns.

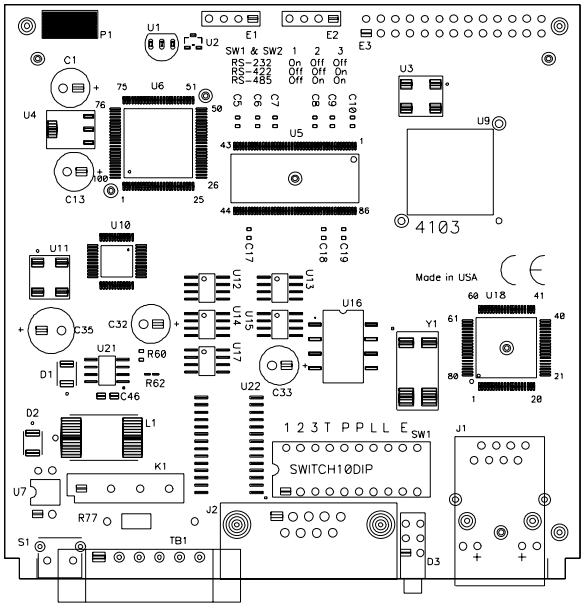
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Appendix D - Silk Screens

4101, 4102, 4104, 4201, 4202, 4203 PCB

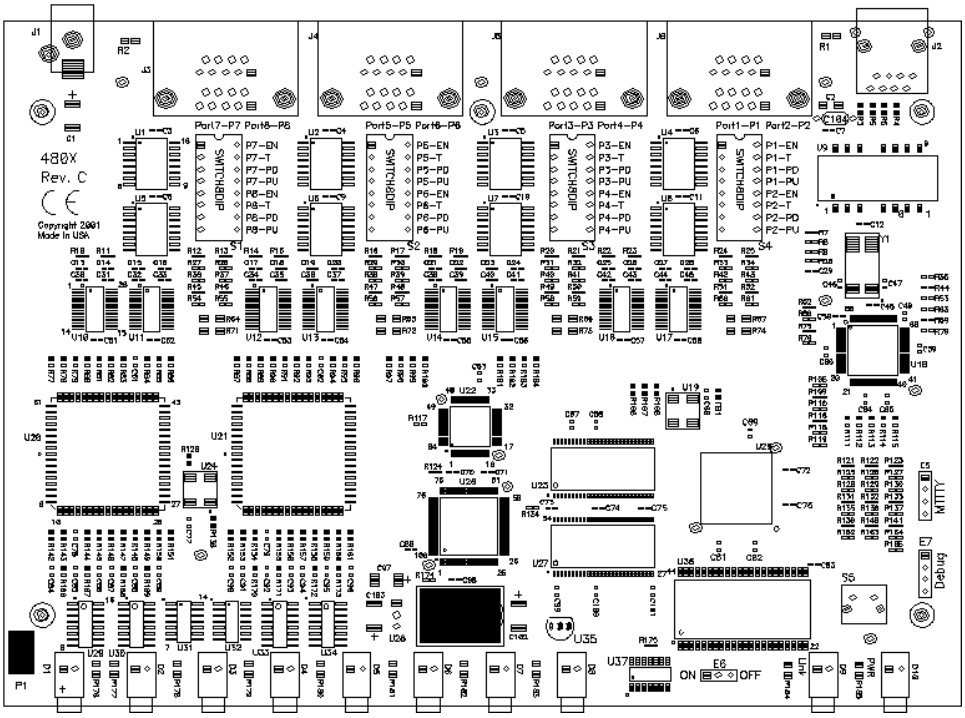


4103 PCB



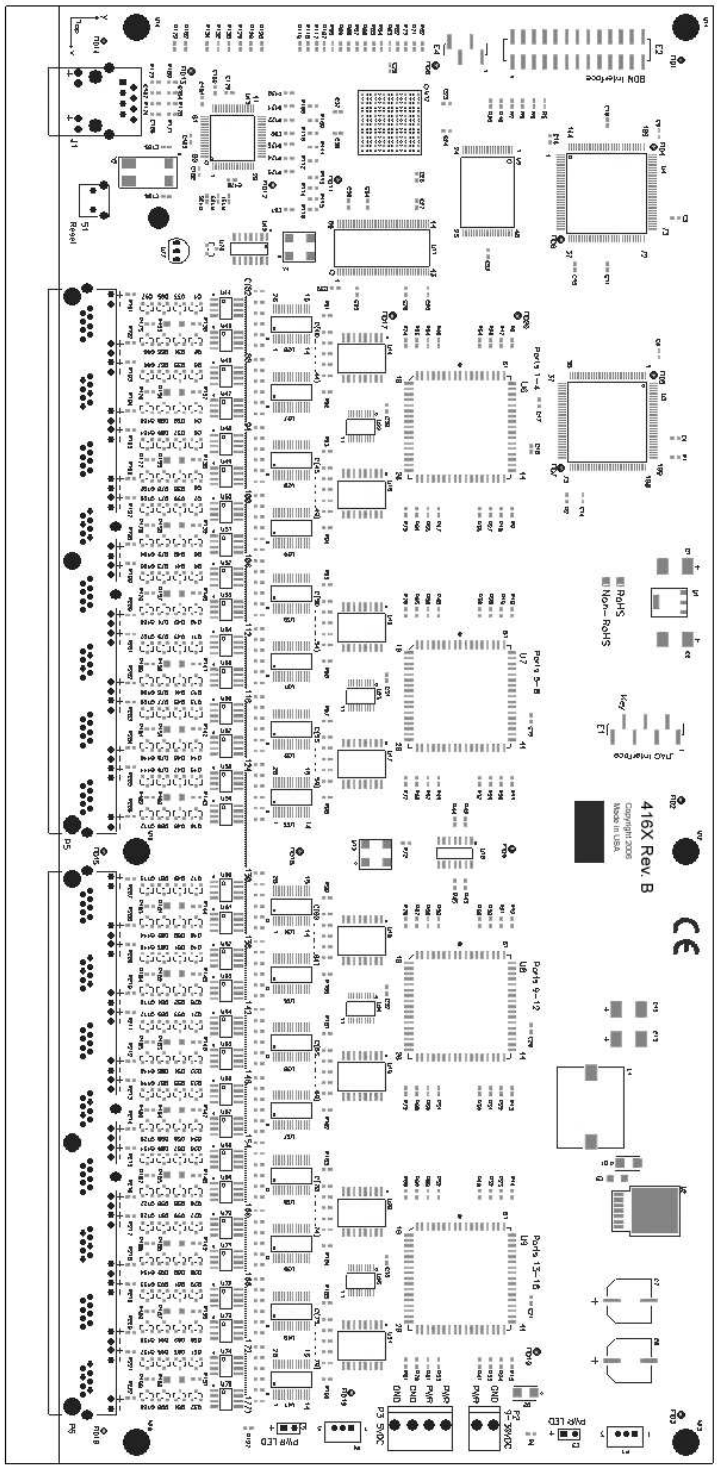
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4401, 4402, 4403, 4801, 4802, 4803 PCB



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4161, 4162, 4163 PCB



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Appendix E - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at the users expense.

EMC Directive Statement



Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class A - “Limits and methods of measurement of radio interference characteristics of information technology equipment”

EN55024 – “Information technology equipment Immunity characteristics Limits and methods of measurement”.

EN60950 (IEC950) - “Safety of information technology equipment, including electrical business equipment”

Warning
This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

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Warranty



Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured 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 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 life. 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 or abuse are not covered under this warranty.

Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase. Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number. The 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.

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

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

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Technical Support is available Monday - Friday from 8 a.m. to 5 p.m. Eastern time

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