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Application Note 56

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Interfacing to RS-485 Sensors

A few Sea-Bird instruments use the RS-485 protocol for transmitting setup commands to the instrument and receiving data from the instrument. However, most personal computers (PCs) do not come with an RS-485 port. This Application Note covers interfacing our RS-485 instruments with a PC by the following methods:

- Connecting the instrument to an external RS-485/RS-232 Interface Converter that plugs into an existing RS-232 port on the PC.
- OR**
- Installing an RS-485 interface card (and associated software) in the PC, and then connecting the instrument directly to the new RS-485 port in the PC.

External RS-485/RS-232 Interface Converter

RS-485/RS-232 Interface Converters are available commercially. These converters plug into the RS-232 port on the PC, and allow an RS-485 device to be connected through the converter. Sea-Bird tested a converter from one manufacturer with our instruments, and verified compatibility. The manufacturer and tested converter is:

**Black Box (www.blackbox.com) –
IC520A-F with RS-232 DB-25 female connector and RS-485 terminal block connector**

Other converters from this manufacturer, and converters from other manufacturers, **may** also be compatible with Sea-Bird instruments. We recommend testing other converters with the instrument before deployment, to verify that there is no problem.

Follow this procedure to use the IC520A-F Converter:

1. Connect the Converter to the PC:
 - If the PC has a 25-pin male RS-232 connector, plug the Converter directly into the PC connector.
 - If the PC has a 9-pin male RS-232 connector, plug the Converter into a 25-pin to 9-pin adapter (such as Black Box FA520A-R2 Adapter). Plug the 25-pin to 9-pin adapter into the PC.
2. On the Converter, measure the voltage between XMT+ and ground and between XMT- and ground. Connect whichever has the highest voltage to RS-485 'A' and the other to RS-485 'B'. The ground terminal can be left unconnected.

RS-485 Interface Card and Port in the PC

An RS-485 Interface Card installs in the PC, and allow an RS-485 device to be connected to the RS-485 port. These Interface Cards are available commercially. When using with a Sea-Bird instrument:

- **RS-485 Transmitter -**
The Interface Card must be configured to automatically handle the RS-485 driver enable.
- **Two-Wire Interface -**
TX+ and RX+ on the Interface Card must be connector together and to 'A' on the instrument.
TX- and RX- on the Interface Card must be connected together and to 'B' on the instrument.
Note: Some Interface Cards have a jumper to make the connections internally, while for other Cards the connections must be made in a jumper cable.

- **Terminal Program Compatibility -**

If the Interface Card uses shared interrupts, SEATERM (our Windows terminal program) must be used to communicate with the instrument.

If the Interface Card is configured as a standard COM port, either SEATERM or our DOS-based terminal programs may be used to communicate with the instrument.

Sea-Bird tested two Interface Cards from one manufacturer with our instruments, and verified compatibility. The manufacturer and tested cards are:

National Instruments (www.ni.com) -
 AT-485/2
 PCI-485/2

Other Cards from this manufacturer, and Cards from other manufacturers, **may** also be compatible with Sea-Bird instruments. We recommend testing other Cards with the instrument before deployment, to verify that there is no problem.

Follow this procedure to use the AT-485/2 or PCI-485/2 Interface Card:

1. Install the RS-485 driver software (provided with Interface Card) on your PC before installing the Interface Card.
2. Install the RS-485 Interface Card.
3. Configure the RS-485 Interface Card in your PC (directions are for a PC running Windows XP):
 - A. Right click on My Computer and select Properties.
 - B. In the System Properties dialog box, click on the Hardware tab. Click the Device Manager button.
 - C. In the Device Manager window, double click on Ports. Double click on the desired RS-485 port.
 - D. In the Communications Port Properties dialog box, click the Port Settings tab. Click the Advanced button.
 - E. In the Advanced Settings dialog box, set Transceiver Mode to 2 wire TxRdy Auto.
4. Make a jumper cable (**do not use a standard adapter cable**) to connect the Interface Card to the instrument's I/O cable. Pin outs are shown for a Sea-Bird 9-pin (current production) or 25-pin (older production) I/O cable:

DB-9S (connect to PC)	DB-9P (connect to Sea-Bird I/O cable PN 801385)	DB-25P (connect to Sea-Bird I/O cable PN 801046)
pin 1 common	pin 5 common	pin 7 common
pin 4 TX+	pin 3 'A'	pin 2 'A'
pin 8 RX+	pin 3 'A'	pin 2 'A'
pin 5 TX-	pin 2 'B'	pin 3 'B'
pin 9 RX-	pin 2 'B'	pin 3 'B'

5. Run SEATERM (these Cards use shared interrupts, so the DOS terminal programs cannot be used):
 - A. In SEATERM's Configure menu, select the desired instrument.
 - B. In the Configuration Options dialog box, set Mode to RS-485 and set COMM Port to the appropriate RS-485 port.