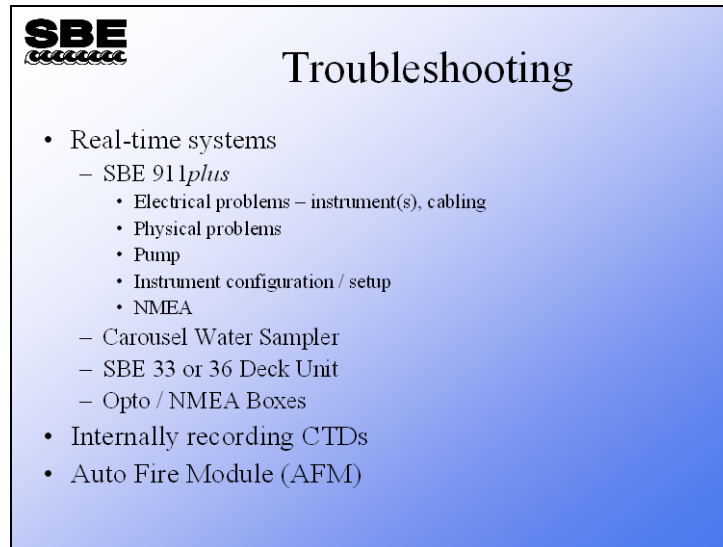


Module 15

Troubleshooting

Overview

A blue rectangular slide with a white border. In the top left corner is the SBE logo, which consists of the letters 'SBE' in a bold, sans-serif font above a stylized wave pattern. To the right of the logo, the word 'Troubleshooting' is written in a large, black, serif font. Below the title, there is a bulleted list of items. The first item is 'Real-time systems', which is followed by a sub-list of items: 'SBE 911plus', 'Electrical problems – instrument(s), cabling', 'Physical problems', 'Pump', 'Instrument configuration / setup', and 'NMEA'. The second item in the main list is 'Carousel Water Sampler', followed by 'SBE 33 or 36 Deck Unit' and 'Opto / NMEA Boxes'. The third item is 'Internally recording CTDs', and the fourth is 'Auto Fire Module (AFM)'.

SBE
Troubleshooting

- Real-time systems
 - SBE 911*plus*
 - Electrical problems – instrument(s), cabling
 - Physical problems
 - Pump
 - Instrument configuration / setup
 - NMEA
 - Carousel Water Sampler
 - SBE 33 or 36 Deck Unit
 - Opto / NMEA Boxes
- Internally recording CTDs
- Auto Fire Module (AFM)

In this module we will discuss troubleshooting. Troubleshooting is an art based on a fundamental understanding of the way your equipment is supposed to work. We will attempt to cover the most common problems in this broad topic, ranging from problems with electronic circuits to mechanical parts that need to be cleaned.

Troubleshooting


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Troubleshooting: The Basics

- The first step is determining which part of the system has the problem:
 - Do the sensors have valid output?
 - Is the data properly acquired, formatted, and telemetered or stored?
 - Is the data properly received and converted to scientific units?

```
graph TD; S[SENSORS] --> A[ACQUISITION AND TELEMETRY]; A --> P[POWER & TELEMETRY DECODING]; P -- INTERNAL RECORDING --> C[Computer]; P -- REAL TIME --> M[Monitor];
```

Troubleshooting

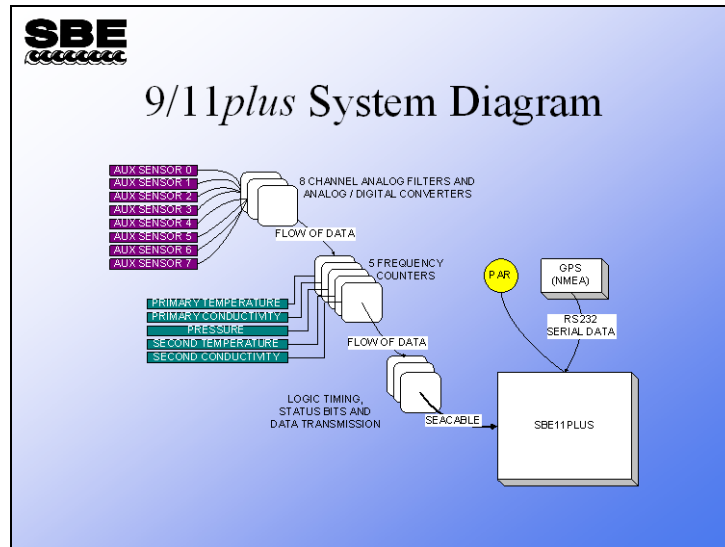


**Troubleshooting –
Real-Time vs Internally Recording**

- Real-time systems
 - SBE *9plus* with SBE *11plus* Deck Unit
 - SBE 33 or 36 Deck Unit with CTD
 - Opto/NMEA Boxes with CTD
 - etc.
- Internally recording instruments
 - SBE *16plus /19plus*
 - SBE 25
 - SBE 37
 - SBE 39
 - etc.


We will address troubleshooting by first looking at real-time acquisition systems, and then internally recording systems.

Troubleshooting: 911plus



The *911plus* is a highly modular system. You can exploit this characteristic of the instrument in troubleshooting. You can swap sensors, swap cables, and if necessary, swap printed circuit boards to see if trouble follows any one of these components.

Troubleshooting: 911*plus* (continued)



Note about 911*plus* Data Flow

- 9*plus* data is transmitted serially
 - First are the status bits
 - Second are the frequency channels
 - Last are the A/D channels
- A bad printed circuit card will shorten the length of each data scan
 - A bad A/D board will result in no A/D data
 - If the first frequency counter is bad, there will be no A/D data and the first frequency will be missing
 - If the third frequency counter is bad, there will be no A/D data and the first and second frequency will be missing
 - And so on...

The 9*plus* transmits its data serially. A sensor, or in the case of analog channels a group of sensors, is measured and the data is passed from one circuit board to the next and through the output section onto the sea cable. Therefore, if one PCB malfunctions, the data from all the cards below it will be missing from the data stream. You can check out each channel in the data stream via the 11*plus* front panel display.

Troubleshooting: Real-Time Systems



SBE 11plus Deck Unit

- No lights on the deck unit front panel
 - Check the main power fuse (2 A slow blow for 120 V and 1A slow blow for 240 V supply).
 - Check that power is being supplied to the deck unit (120 or 240 VAC)!
- Most lights on, but green data light not lit
 - Check the sea cable fuse (1/2 A fast blow).
 - Check that the underwater unit is receiving power – *be careful* (250 VDC)!

After the obvious things, like checking the fuse and the power outlet the deck unit is plugged into, check that the underwater unit is receiving power. If you disconnect the sea cable underwater connector from the CTD, you should find a large DC voltage (150 – 250V) between the large pin and the small pin. Note that the large pin is ground.

Real-time systems that are running via an *Interface Box* or *Opto-Box* will have only 10 – 15 volts across the sea cable connector.

We'll talk more about some less common Deck Unit problems in a few minutes.

Troubleshooting: 911plus (continued)




Auxiliary Sensor (0 – 5V analog) Not Working (no signal)

- Could be the sensor
 - Swap sensor for another on a working channel, check deck unit. Note: 4095 A/D counts = 0 V, 0 A/D counts = 5 V
- Could be the cable
 - Check bulkhead connectors for signs of corrosion
 - If possible, swap in a spare cable
- Could be the low pass filter card or the A/D card
 - Channels 0 – 3 are on one low pass filter card, 4 – 7 on other; try both cards
 - If no channels are working, it is probably A/D card or first frequency counter card is not passing A/D data to next counter card

The front end of the analog-to-digital system consists of 2 printed circuit boards with 4 channels on each. If you have problems in one channel, switch to the other analog input card. If the problem disappears, it is in the analog input PCB. If the problem persists, it may be in the analog-to-digital conversion PCB.

Troubleshooting: 911*plus* (*continued*)




**Auxiliary Sensor (0 – 5V analog)
Not Working (no signal) (*continued*)**

- Test the voltage channel with a 'D' Cell battery
 - Referencing the end cap drawing for the SBE *9plus*, connect the positive terminal to signal and the negative terminal to signal ground
 - A new 'D' cell should read approximately 2800 on the deck unit display or 1.5VDC for the voltage channel in Seasave
- Check that power is being supplied to the sensor
 - Referencing the end cap drawing for the SBE *9plus*, connect a voltmeter between pins 1 and 6 of the 6 pin connector
 - There should be approximately 14VDC between pins 1 and 6 with the deck unit powered on

The first test substitutes a D cell battery for the auxiliary sensor, and checks if the A/D card is interpreting the voltage from the battery correctly. If the *9plus* fails this test, it is like that the *9plus* A/D card needs to be replaced.

If the *9plus* fails the second test, it is likely that the *9plus* power supply needs to be replaced.

Troubleshooting: 911*plus* (continued)




Temperature, Conductivity, or Pressure Not Working (no signal)

- Check the sensor
 - Swap the sensor for another on a working channel, check the deck unit
- Check the cable
 - If the sensor works on another channel, swap cables
- Check the counter card
 - If the primary T or C is affected, switch to the secondary T or C
 - If pressure is affected, open the SBE 9*plus*, swap counter cards, and check the deck unit display
- Check that power is being supplied to the sensor
 - Referencing the end cap drawing for the SBE 9*plus*, connect a voltmeter between pins 1 and 3 (for temperature or conductivity channel) of the 3-pin connector
 - There should be approximately 14VDC between pins 1 and 3 with the deck unit powered on

Similarly, there are 5 frequency channels in the 9*plus*. These are interchangeable; you can quickly isolate a problem in the CTD section of the instrument by swapping cables and counter channels. By doing this you can determine if the problem lies with a sensor, a cable, or a counter card.

If the 9*plus* fails the power test, it is likely that the 9*plus* power supply needs to be replaced.

Troubleshooting: 911*plus* (continued)




Pump Not Working

- Could be the pump
 - Hook the pump up directly to a 12 VDC power supply, and verify the pump impeller is spinning
 - Swap the pump out if a spare is available
- Could be the cable
 - Install a spare cable if possible

Symptoms of pump malfunction include:

- A big mismatch between downcast and upcast data. Even with a non-functioning pump, on the downcast some water is forced through the plumbing by the movement of the system through the water. However, on the upcast, the forcing of water through the plumbing is reduced.
- Large differences in data from primary and secondary T and C sensors for *9plus* with primary and optional secondary T and C sensors, indicating that one pump is malfunctioning.
- Erratic, undulating data.

Troubleshooting: 911*plus* (continued)



Pump Not Working (continued)

- Test the pump on deck (standard pump circuitry)
 - Temporarily connect the primary temperature sensor to the primary conductivity channel (JB2)
 - The primary conductivity frequency must be greater than 3500 Hz for 60 seconds to turn the pump on (monitor the frequency on the deck unit display)
 - Turn the deck unit on
 - The pump should be powered after 60 seconds
 - Verify the pump impeller is spinning

To test a pump on a 9*plus* with standard pump circuitry, we substitute a temperature sensor for the conductivity sensor. At temperatures above approximately 10 °C, the temperature sensor output is greater than the 3500 Hz required on the primary conductivity channel to turn on the pump.

Troubleshooting: 911plus (continued)

SBE
Seasave Pump Not Working (continued)

- Test the pump on deck (water contact pin)
 - Connect a jumper from the contact pin to one of the end cap screws
 - Turn the deck unit on
 - After 60 seconds the pump should be powered
 - Verify the pump impeller is spinning
- Test the pump on deck (modem controlled turn-on)
 - Start real-time acquisition in Seasave (second communication port must be connected to the modem channel)
 - Select *Pump On* in the Real-Time Control menu
 - Verify the pump impeller is spinning

The SBE *9plus* is available with custom modifications allowing pump turn-on to be independent of water conductivity, which can be useful for fresh water applications:

- Water contact pump control – This allows the pump to automatically turn on 60 seconds after a contact pin is immersed in water (salt **or** fresh), and automatically turn off when the contact pin is removed from the water. The contact pin is on a special dummy plug that connects to JB6 on the *9plus* bottom end cap; modifications to the *9plus* internal wiring to JB6 for this feature prevent use of JB6 for a bottom contact switch.
- Manual pump control - This allows you to manually turn the pump on and off. Pump control commands are sent through the SBE *11plus* Deck Unit *Modem Channel* connector, but pump control does not interfere with water sampler operation. Seasave V7 supports this feature from within the user interface (enable/disable manual pump control on the Pump Control tab in the Configure Inputs dialog box; turn the pump on and off from the Real-Time Control menu). Earlier versions of Seasave supported this feature if the software was started with the *-pc* option from the command line.

Troubleshooting: 911*plus* (continued)



Modulo Errors

- Modulo errors are normally a symptom of sea cable issues
 - A modulo error will normally cause a spike in **ALL** of the sensors installed on the SBE *9plus*
 - If the number of modulo errors increases over time, it may be necessary to re-terminate the sea cable connection
 - All cables and connectors on the SBE *9plus* and sensors should be inspected for any signs of corrosion or excessive wear

Troubleshooting: 911*plus* (*continued*)




How Can I Tell if My Wet End Termination Needs to be Replaced?

- Intermittent data dropouts, error light blinks on deck unit, check modulo errors
- Sea cable fuse blows in deck unit
- Fish works fine on test cable
- Fish works on deck, but not underwater

The part of the sea cable that connects to the instrument package receives a lot of wear and is under a great deal of stress. The cross-sectional area of most instrument packages causes a huge load on the cable every time the ship rolls. The *9plus* data stream has an 8-bit counter that increments at each data scan, returning to 0 after 255. Missing scans show up as a missing number in the count. Because decoding the *9plus* counters requires a scan and the scan before it, missing scans show up as data spikes. Usually, data errors of this sort are caused by intermittent connection in the mating end of the sea cable.

Troubleshooting: 911plus (continued)



How Do I Know It Isn't the Slip Ring?

- Disconnect fish and deck unit
- Connect volt meter to signal wire and sea cable armor; check for small DC voltage
 - Wet end terminations usually fail when seawater intrudes into splice between underwater connector and cable. Dissimilar metals and seawater will cause a battery to be formed. This manifests itself as a small DC voltage between signal wire and armor.

Like other troubleshooting activities, the solution here is *divide and conquer*. Check the sea cable as described above. If everything seems normal, disconnect the slip-ring from the sea cable and the cabling that runs into the computer room. The slip-ring should present very low resistance on all of its conductors through a whole rotation. Switch to another conductor if you find one that has high resistance or becomes intermittent.

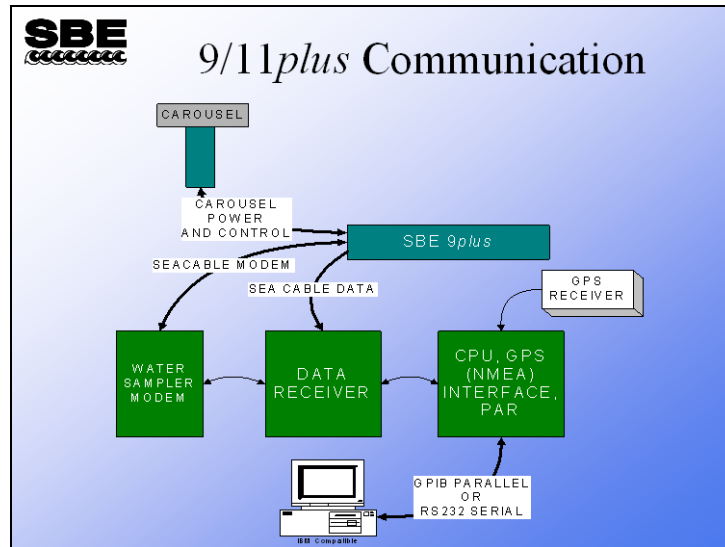
Troubleshooting: 911*plus* (continued)



Why Can't I Use the Ohm Setting on My Multimeter?

- You can BUT:
 - 10 kilometers of cable has capacitance, and when wound on winch spool may have some inductance
 - These properties can give confusing readings on your multimeter in Ohm setting

Troubleshooting: 911plus (continued)



Here is a signal flow diagram for the circuit boards in the 11plus, the 9plus, the Carousel, and your PC. Note that water sampler commands pass from your computer to the 11plus CPU board, to the receiver board, to the modem board, to the 9plus, and into the Carousel.

Troubleshooting: 911*plus* (continued)



SBE 11*plus* Fish/Tape Switch

- Fish/tape switch
 - If the fish/tape switch is accidentally moved to the tape position, the display will show all 0's

Troubleshooting: 911*plus* (continued)



SBE 11*plus* Deck Unit Communications

- Baud Rates
 - Normally 19200 baud from the computer to the deck unit
 - Modem channel is 300 baud from the computer to the deck unit
- Two communication ports must be available to acquire real-time data and fire bottles from the computer

Troubleshooting: 911*plus* (continued)




**SBE 11*plus* Deck Unit,
No Communication with Computer**

- Green *Computer Interface Receive* LED does not flash
 - Check cable
 - Check serial port
 - Wrong interface selected
- Red *Underwater Unit Error* LED does not flash during initialization
 - Wrong baud rate

In considering the deck unit end of the system, first look to the cabling between the PC and 11*plus*. When Seasave starts, it communicates setup information to the 11*plus*. This data transmission causes the 11*plus* *Computer Interface Receive* LED to flash. If the 11*plus* is correctly receiving the setup information, the computer interface red *Underwater Unit Error* light will flash briefly during this time. If the red *Underwater Unit Error* LED does not flash, the baud rate is not correctly set. Check the Comm port setup on the Serial Ports tab in Configure Inputs in *Seasave*.

Troubleshooting: 911*plus* (continued)




SBE 11*plus* Keeps Blowing Fuses

- Main power fuse
 - If the main power fuse continues to blow when the deck unit is powered on and the sea cable is not connected, the main supply transformer could be bad
- Sea cable fuse
 - Disconnect equipment until fuse does not blow
 - Disconnect the SBE 9*plus*
 - Disconnect the sea cable
 - Connect the SBE 9*plus* to the deck unit using a test sea cable

A bad main supply transformer is usually caused by installing a main power fuse with an incorrect rating - **do not try to solve the problem of blowing the fuse by installing a bigger one!**

Troubleshooting: NMEA Problems




Troubleshooting NMEA Interface

- Navigational data must be in the proper format, NMEA 0183
- It must transmit at the proper speed, 4800 baud (9600 also available for SBE 11*plus*), with 8 data bits and 1 stop bit, no parity
- Use the NMEA simulator program NMEATest (supplied with the software CD and installed in the SBE Data Processing folder on your computer)
- Capture some data from your GPS for comparison

Adding navigational information to your data can be troublesome. Manufacturers of GPS receivers are not scrupulous in following the NMEA data format. You can check the transmit rate, data bits, and parity as well as output format of your GPS with your PC and a terminal program. If these do not match the NMEA standard, then you may not get latitude and longitude appended to your data. If you think that there is a problem with the deck unit receiving data, you can use your PC and the simulation program found in Seasoft. NMEA and GPS installation and troubleshooting is discussed in detail in the deck unit(s) manual.

Troubleshooting: NMEA Problems (*continued*)



NMEA Simulation

- Sea-Bird provides a simulation program that you can run on a second computer or on the same computer if the computer has a spare COM port
 - Cable your computer to the NMEA port on the deck unit
 - Run the simulator program; if it works, the problem is with your cabling or your GPS

You can test the deck unit and Seasave with the NMEA simulation program, NMEATest. Cable the NMEA port on the deck unit to a second PC with the provided cable. Alternatively, you can run the simulation using only one computer if the computer has a spare COM port. The simulation program sends NMEA messages in the RMA, RMC, GGA, or GLL format.

Troubleshooting: NMEA Problems (*continued*)



Capture Some Data for Comparison

- Cable your computer to your GPS
- Use Seaterm to check the transmit speed, data bits, etc.
- Use Seaterm to capture some data to compare with the standard NMEA formats shown in the deck unit manual

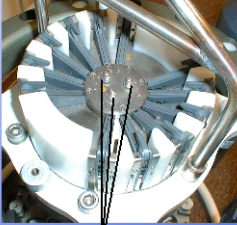
Standard NMEA data formats are shown in the deck unit manual. You can use the capture facility to collect some data from your GPS. If the data is not in the proper format, check your GPS manual to determine the configuration that will yield the correct data format.

Troubleshooting: Carousel Water Sampler

SBE
SCIENTIFIC BOTTLE EXTRACTOR

Water Sampler Physical Problems

- Soak triggers in soap and water
- Never lubricate triggers
- Check 3 screws holding trigger assembly to pylon for over-tightening, which causes distortion of trigger assembly
- Lanyards must run straight from trigger to water sampler



Check screws for over-tightening

Many general water sampler problems such as *bottles don't close* can be traced to physical problems with the sampling system. The Carousel triggers are coated with an oxide-type layer that is meant to water lubricate. The coating absorbs oil and becomes gummed up and sticky. Often, giving the triggers a good soak in hot soapy water will return them to their original state. Conversely, honing the latch parts to remove the coating will remove the lubricating layer and make them more susceptible to sticking. If you do remove your triggers for cleaning, be sure that you don't over tighten the three screws that hold the triggers to the magnet assembly. Over tightening will cause the trigger plates to warp and will cause the triggers to bind.

The SBE 55 ECO uses the same triggers as the SBE 32 Carousel. Follow the same maintenance procedures for cleaning the triggers.

Troubleshooting: Carousel Water Sampler (*continued*)




Water Sampler Electrical Problems

- SBE 11*plus* carrier detect LED must be lit and 9*plus* carrier detect bit must be set
- Computer must have a functioning second communication port for sampler control
- SBE 11*plus* modem board switch settings must match sampler type (G.O. 1016, SBE 32, etc.)
- Check cables
 - If the cable is suspected, install a spare cable if possible

Water sampler control is carried out over a 300-baud modem channel. This channel is full duplex (both up and down communication) and shares the wire with the main data channel. Indications that the 9/11*plus* system has proper modem communication are found on the front panel of the 11*plus* and in the status bits of the 9*plus*. If the 11*plus* modem carrier frequency is detected in the 9*plus*, a status bit is set. If the 9*plus* carrier frequency is detected in the 11*plus*, a carrier LED is lit. For the SBE 33 Carousel deck unit, an LED flashes when communication is received from the SBE 32 Carousel or SBE 55 ECO.

Troubleshooting: SBE 33 or SBE 36



**SBE 33 or 36 Deck Unit
Troubleshooting**

- Random bottle fire lights after the deck unit is turned on
 - This is usually a symptom of a cable problem or a blown sea cable fuse
- Deck unit must be set correctly for the NMEA message and CTD baud rate
 - Set via dip switches for older units (firmware < 3.0)
 - Set via commands in Seaterm for newer units

Use the same procedure to isolate the cause of a blown sea cable fuse as we discussed for the SBE 11*plus* deck unit: disconnect equipment until the fuse does not blow.

- Disconnect the CTD
- Disconnect the sea cable
- Connect the CTD to the deck unit using a test sea cable

Troubleshooting: SBE 33 or SBE 36

SBE SBE 33 or 36 Deck Unit
Troubleshooting (continued)

- Check voltage on PDIM or Carousel 4-pin connector
 - Connect sea cable to PDIM or Carousel 2-pin sea cable connector
 - Disconnect CTD from 4-pin connector on PDIM or 4-pin serial data interface connector on Carousel
 - Power deck unit
 - There should be approximately 14 VDC between pins 1 and 4 of 4-pin connector

The diagram illustrates the electrical connections for the SBE 33 or 36 Deck Unit. It features a central PDIM (Power Distribution Interface Module) with a 4-pin connector. The PDIM is connected to a sea cable via a 2-pin connector. The sea cable is also connected to a CTD (Conductivity, Temperature, and Depth) sensor. The diagram shows the following connections:


- CTD power and data:** Connected to the sea cable.
- Anode:** Connected to the sea cable.
- Sea cable:** Connected to the PDIM.
- Standard Connector XSG-4-BCL-HP:** Connected to the PDIM.
- J1 Sea Cable Connector Pin Signal:** Connected to the PDIM.
- Optional Wet-pluggable Connector MCBH-4MP (WB), AL:** Connected to the PDIM.
- Optional Wet-pluggable Connector MCBH-2MP (WB), AL:** Connected to the PDIM.

Dimensions shown in the diagram include 43 mm (1.7 in.) for the sea cable connector, 254 mm (10.0 in.) for the PDIM, and 99 mm (3.9 in.) for the optional connectors.

This test is useful for checking if power is going to the CTD.

The diagram above is for a PDIM, which is used with the SBE 36 Deck Unit. The same test is used for a system including the SBE 33 Deck Unit – check the voltage between pins 1 and 4 on the optional serial data interface connector on the SBE 32 Carousel Water Sampler.

Troubleshooting: Opto / NMEA Boxes

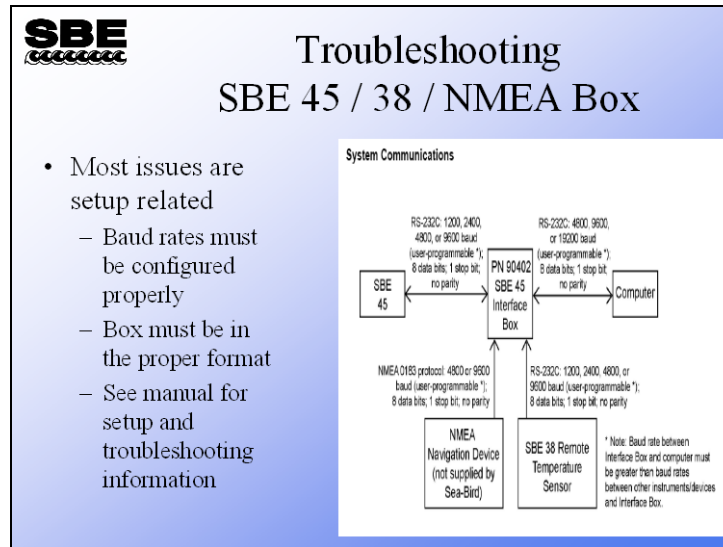


**Opto/NMEA Box
Troubleshooting**

- Most problems are setup or cable related
- Configuring baud rates
 - Box with firmware version < 3.0
 - Configure baud rates using dip switches
 - Box with firmware version \geq 3.0
 - Configure baud rates in Seaterm; in the Configure menu, select the instrument being used with the Box

Sea-Bird has manufactured a variety of different models of Opto / NMEA Boxes over the years. The current production model is called the *Seacat/Sealogger RS-232 and Navigation Interface Box*, and is available in AC-powered (PN 90488) and DC-powered (PN 90545) versions. This Box is supplied as a standard component with the SBE 21 Thermosalinograph, and can also be used with an SBE 16, *16plus*, 19, *19plus*, or 25 CTD.

Troubleshooting: Opto / NMEA Boxes



Sea-Bird manufactures an interface box specifically for the use with SBE 45 MicroTSG thermosalinograph, called the *SBE 45 Power, Navigation, and Remote Temperature Interface Box*. Note that the **baud rate between the Interface Box and the computer must be greater than the baud rates between the other instruments / devices and the Interface Box**.

Troubleshooting: Internally Recording Instruments



Troubleshooting Internally Recording Instruments

- Internally recording instruments' electronics are not modular like the SBE *9plus*, especially those instruments with integrated sensors
- Most user-serviceable problems with internally recorded instruments involve instrument configuration or setup
- For the SBE 25 with external T and C, follow the SBE *9plus* procedures for sensor problems

Troubleshooting: Internally Recording Instruments



No Communication

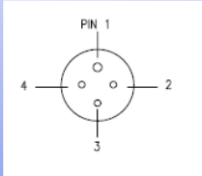
- Change the batteries
- I/O cable
 - Try a spare cable if one is available
- Comm Port
 - Verify computer and comm port are functioning properly by connecting to another instrument if one is available

Troubleshooting: Internally Recording Instruments

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Troubleshooting I/O Cable

- Perform a loop-back test to test the computer, comm port, and cable
- With the I/O cable connected to the computer:
 - Disconnect the I/O cable from the CTD
 - Use a bent paper clip to insert into pins 2 and 3 at the CTD end of the cable
 - Any characters typed in terminal program should echo on the screen (the paper clip creates a loop back to the computer)



The diagram shows a circular connector with four pins. Pin 1 is at the top, Pin 2 is on the right, Pin 3 is at the bottom, and Pin 4 is on the left. Each pin is represented by a small circle with a line extending outwards to its respective label.

If the I/O cable fails this test, disassemble the hood part of the cable connector at the computer end of the cable, and check the solder connections.

Troubleshooting: Internally Recording Instruments



Reset Switch

- Reset switch is at the bottom of the battery compartment
- For instruments with volatile memory (SBE 16/19, 25, etc.), **data in memory will be lost if the reset switch is used**
- Reset switch is most useful on newer instruments that have flash memory (SBE 16*plus*/19*plus*, 37, 39, etc.)
 - Using the reset switch will reset the instrument CPU if it has become corrupt
 - Data in memory will **not** be lost


Troubleshooting: Auto Fire Module (AFM)



AFM Troubleshooting

- Most AFM issues (bottle misfires, bottles not firing, etc.) are cable or setup related
- The AFM uses the DTR line to allow communication to the AFM and CTD through 1 comm port
 - Most DB-9/DB-25 extender cables do not have the DTR line connected, so it is recommended to connect the AFM I/O cable directly to the computer comm port
- Random bottle misfires could be a symptom of a bad CTD/AFM cable
 - A bad cable will sometimes cause erroneous data to be transmitted from the CTD to the AFM, causing a bottle misfire

Troubleshooting: Deployment Problems



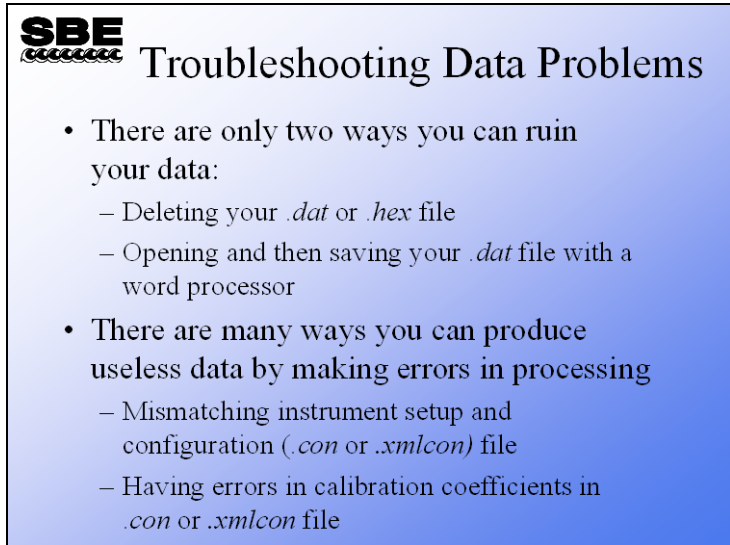
Deployment Problems

- All the air must be able to escape your plumbing
- The pump turn-on is triggered by the rising conductivity signal
- SBE 13 and SBE 23 dissolved oxygen sensors have a long turn-on transient, up to 10 minutes

A lot of deployment problems can be avoided by being careful when you prepare your instrument for deployment and by being patient and waiting for a surface soak.

- Secure loose cables and make sure your plumbing is going to properly vent air.
- Soak your instrument package near the surface for at least 2 -3 minutes before lowering away. If you are using an older dissolved oxygen sensor, soak for 10 minutes to ensure the electrode is properly polarized before beginning your cast.

Troubleshooting: Data Problems

A blue rectangular box with a black border. In the top left corner is the SBE logo, which consists of the letters 'SBE' in a bold, sans-serif font above a stylized wave pattern. To the right of the logo, the text 'Troubleshooting Data Problems' is written in a serif font. Below this title is a bulleted list of troubleshooting tips.

SBE
Seasave Troubleshooting Data Problems

- There are only two ways you can ruin your data:
 - Deleting your *.dat* or *.hex* file
 - Opening and then saving your *.dat* file with a word processor
- There are many ways you can produce useless data by making errors in processing
 - Mismatching instrument setup and configuration (*.con* or *.xmlcon*) file
 - Having errors in calibration coefficients in *.con* or *.xmlcon* file

As we mentioned earlier, older (<6.0) versions of Seasave created a *.dat* file for data from an SBE 911*plus*. Versions 7.0 and later create a *.hex* data file for data from all supported instruments.

Troubleshooting: Data Problems (*continued*)

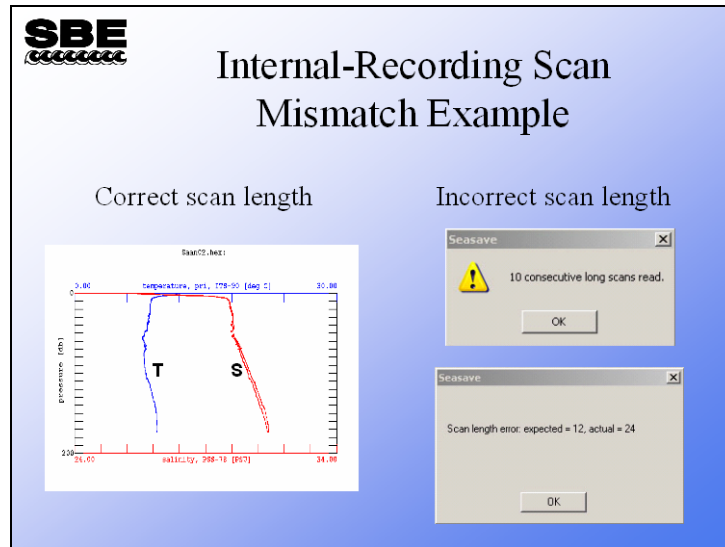


Data Scan Mismatch

- Internally recording instruments have varying scan length depending on the number of voltages that are stored
- The SBE *9plus* has varying scan length, because unused voltage or frequency channels can be suppressed
- However, *Seasave* and *Data Conversion* both check the scan length of the configuration (*.con* or *.xmlcon*) file against the *.dat* or *.hex* file.

You can only harm yourself with data scan mismatch with internally recording instruments. It is always good idea to take a look at your data before you initialize (erase) the memory in your internally recording CTD.

Troubleshooting: Data Problems (*continued*)



To check for incompatibility between the data file and the .con file, it is always a good idea to select *Options* -> *Check Scan Length* in Seasave.

Activity

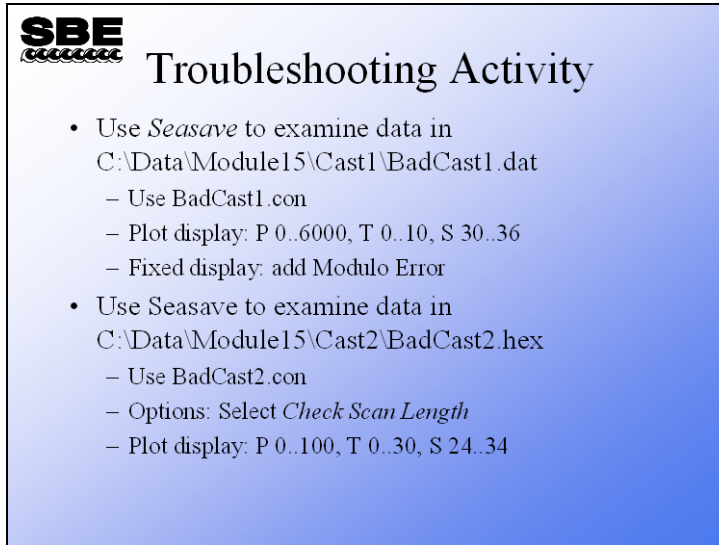
SBE
ccccccc

Troubleshooting Activity

- What is wrong with this instrument?



Activity

A blue rectangular box with a black border containing the SBE logo and a list of troubleshooting steps. The SBE logo is in the top left corner, followed by the title "Troubleshooting Activity". Below the title is a bulleted list of instructions for using Seasave to examine data in two different files: BadCast1.dat and BadCast2.hex. Each file entry includes a list of specific settings to use in Seasave.

SBE
Seasave Troubleshooting Activity

- Use *Seasave* to examine data in
C:\Data\Module15\Cast1\BadCast1.dat
 - Use BadCast1.con
 - Plot display: P 0..6000, T 0..10, S 30..36
 - Fixed display: add Modulo Error
- Use *Seasave* to examine data in
C:\Data\Module15\Cast2\BadCast2.hex
 - Use BadCast2.con
 - Options: Select *Check Scan Length*
 - Plot display: P 0..100, T 0..30, S 24..34

To speed up the playback, click *Archived Data -> No Wait*.