# Seabird CTD-Carousel Setup & Deck Unit Diagnostics

Conventional two-pin Seabird pigtail terminations are standard on NOAA vessels and usually performed by the ET. So interfacing the CTD deck unit only requires the attachment of the sea cable to the deck unit. This is done by connecting a two-conductor wire, such as Seabird part no. 31371 (http://www.seabird.com/sales_info/Cables/31371b.pdf) or a coaxial cable equipped with MS3106A connector, from the winch junction box in the CTD lab to the Sea Cable port on the back of the deck unit.

Once the sea cable is connected to the Seabird 9+ and Seabird 11 deck unit, the deck unit can be powered on. If cabled properly and all electronics are functioning, the numeric LED panel of the deck unit should display numbers. These values are different for each channel which can be selected by rotating the Word Select dial to the right of the LED panel.

If the LED panel displays "0.0.0.0.0.0.0.0" then the deck unit and CTD "fish" are not handshaking correctly. Turn the deck unit off and wait 60secs before touching any exposed wire. Typically, with only two pins, the problem is reversed polarity so switching the wires in the junction box will correct this issue. Please note that powering on the deck unit with reversed polarity may blow the fuse(s). So after switching the wires and before re-powering on the deck unit, check both the 1/2A and 2A fuses on the back of the deck unit & replace if necessary. It is prudent to keep a good supply of these fuses on hand. Power on the deck unit and hopefully, the LED panel has numbers.

Please note in the photos, yellow tape is used to keep the deck unit Signal Source set to Fish. If the switch is toggled to Tape, the deck unit will not communicate with the CTD. The yellow tape prevents the switch from changing from Fish to Tape unintentionally.

(SIO-CalCOFI's method of terminating the sea cable uses a custom pig-tail to terminate a multi-strand conductive wire that allows each individual conductor to be used in any combination. Terminating the sea cable using this technique may be viewed on calcofi.org: http://calcofi.org/references/clhandbook/295-art-ctdtermination.html)
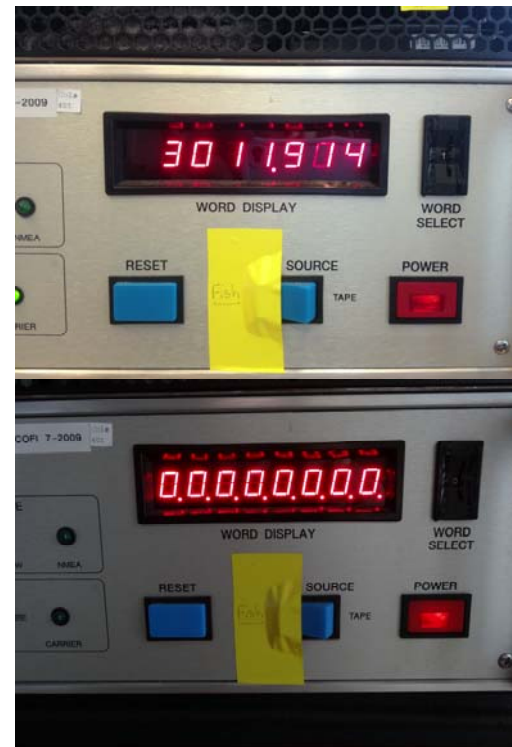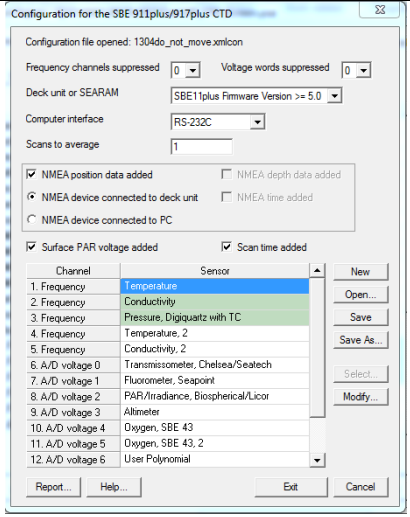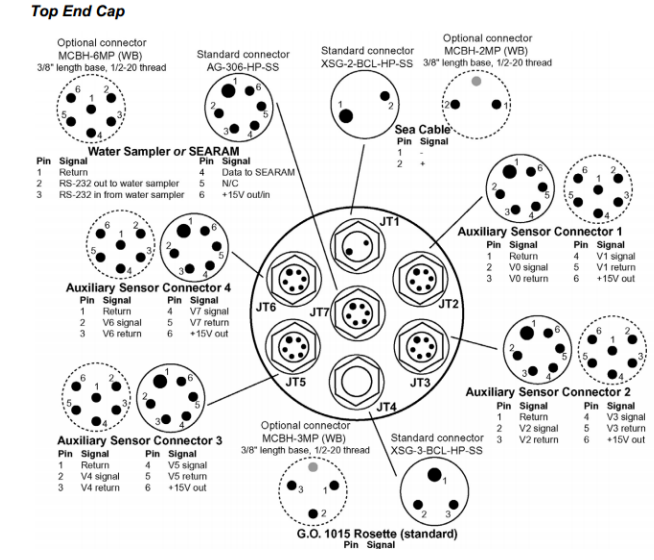
Seasave Setup

Once the deck unit and fish are 'talking', it is time to interface the deck unit and data acquisition computer. Seasave v7 requires Microsoft Windows and a minimum of two serial ports. On computers that do not have serial ports, an usb to serial adapter is necessary. Please note it is difficult to configure Windows 8 to run Seasave or use an usb to serial adapter, use Windows XP or 7 if possible.
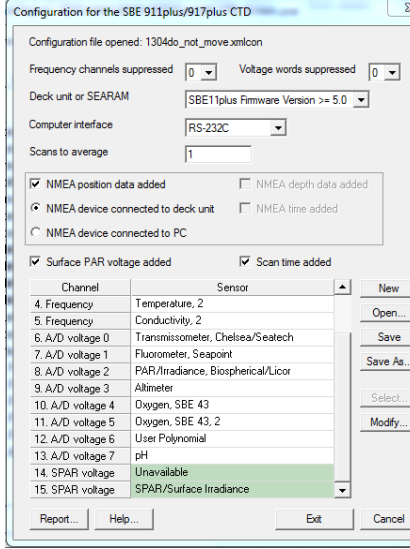
Instrument Configuration:

Proper setup of the sensor configuration on the fish is the most critical aspect of Seasave setup. Not only do you have to configure the proper sensor to each channel but recording the serial numbers is required for proper calibration coefficients setup. It is important during the connecting of sensor cables to the fish to write down the CTD channel (see fig), sensor type & serial number. This sensor 'map' is used to configure the instrument in Seasave. Seabird provides a disc with specific calibration files for each sensor so the importing of coefficients may be done without key-entering numbers. This will eliminate common transcription errors.
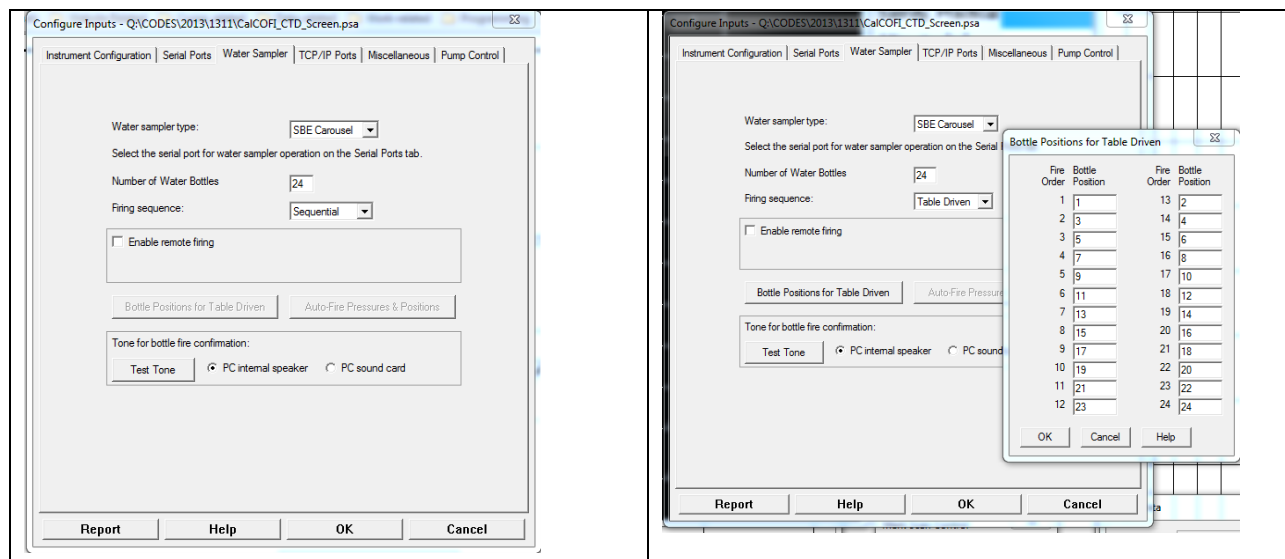
Serial Ports:

Once the instrument configuration has been completed, move to the next tab in Seasave – Serial Ports. Data acquisition is typically configured on com 1 (or the first serial com port available) using the default com settings (see fig). The water sampler modem channel is configured on com 2 (or the 2nd com port available). GPS may be configured on a third serial port, if available, or attached directly to the deck unit NMEA port, with a MS3106A connector (http://www.seabird.com/sales_info/Cables/32786C.pdf).
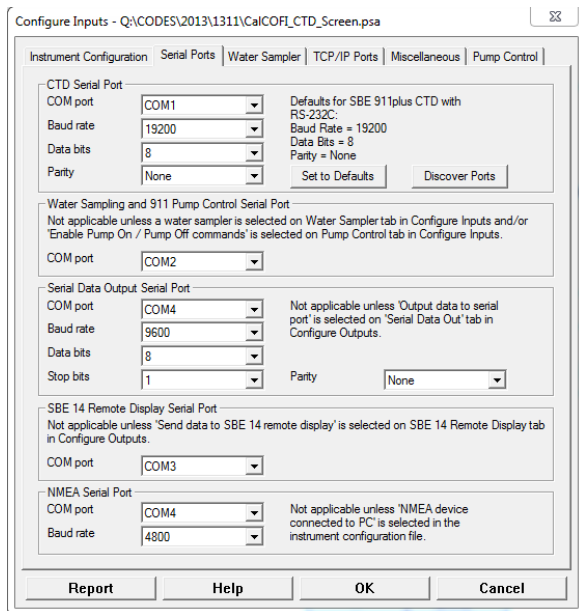
Water Sampler:

The SBE Carousel water sampler is typically setup for sequential firing (see fig). The sampler may also be programmed, table-driven, where the fire order is programmed. This is often used when only 12 bottles are fired on a 24-bottle system, creating a balanced load for recovery.

TCP/IP Ports:

These are not typically changed or used so no changes are recommended.

Miscellaneous

Default settings are typically fine (see fig). Entry of the working area median latitude may be entered so depth & sound velocity can be correctly calculated when GPS in not available.
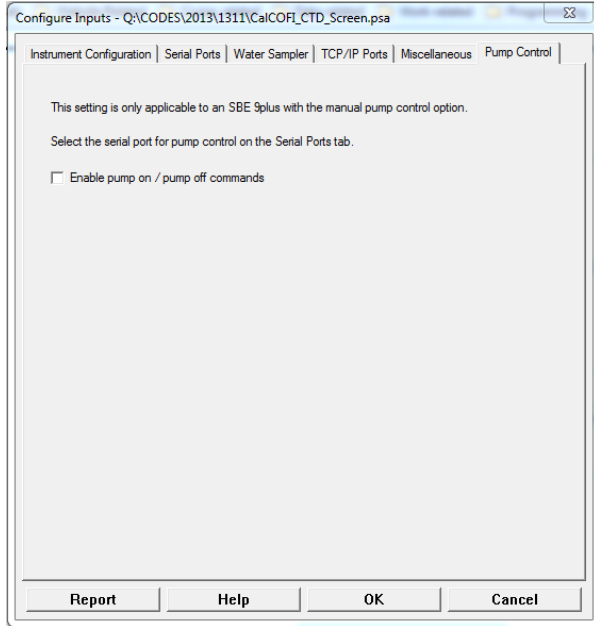
Pump Control:

The pumps automatically turn on when the conductivity sensor detects seawater. So this setting is only applicable to SBE 9+ with a manual control option.

Starting Data Acquisition

Since the deck unit is successfully talking to the fish (LED deck unit panel is displaying numbers) and the instrument has been configured, it is time to start data acquisition.

Power on the deck unit and monitor the LED panel and lights, they will go through a startup series of flashes and number rotations. After several seconds, the LED panel value should stabilize. If the GPS is attached to the deck unit and communicating properly, the NMEA light will be lite green.

In Seasave, select Real-Time Data from the menu then Start. Select an output data file name then verify the configuration is the one created when the sensors were mapped and coefficients entered. Click Start to begin data communications, typically data are not archived immediately. The system will go through a series of handshaking, checking communications with the deck unit, the carousel, and GPS. If everything is talking, data should begin displaying on the screen. Verifying the sensor pairs agree is important for determining the coefficients and sensor channels are correct. Check the numbers, particularly the temperature since salinity will be ~0 and oxygen unstable out of water. But verify the salinity and oxygen sensor values are between 0 – 7, and not some impossible values. Verify other sensor measurements

are responsive – for PAR, cap & uncap the sensor, monitoring values changes; fluorometer, place a chlorophyll standard (or fingertip, which will fluoresce; do not touch the optical surface) in the optical path; transmissometer, unblocked & blocked; then address any misconfiguration issues.
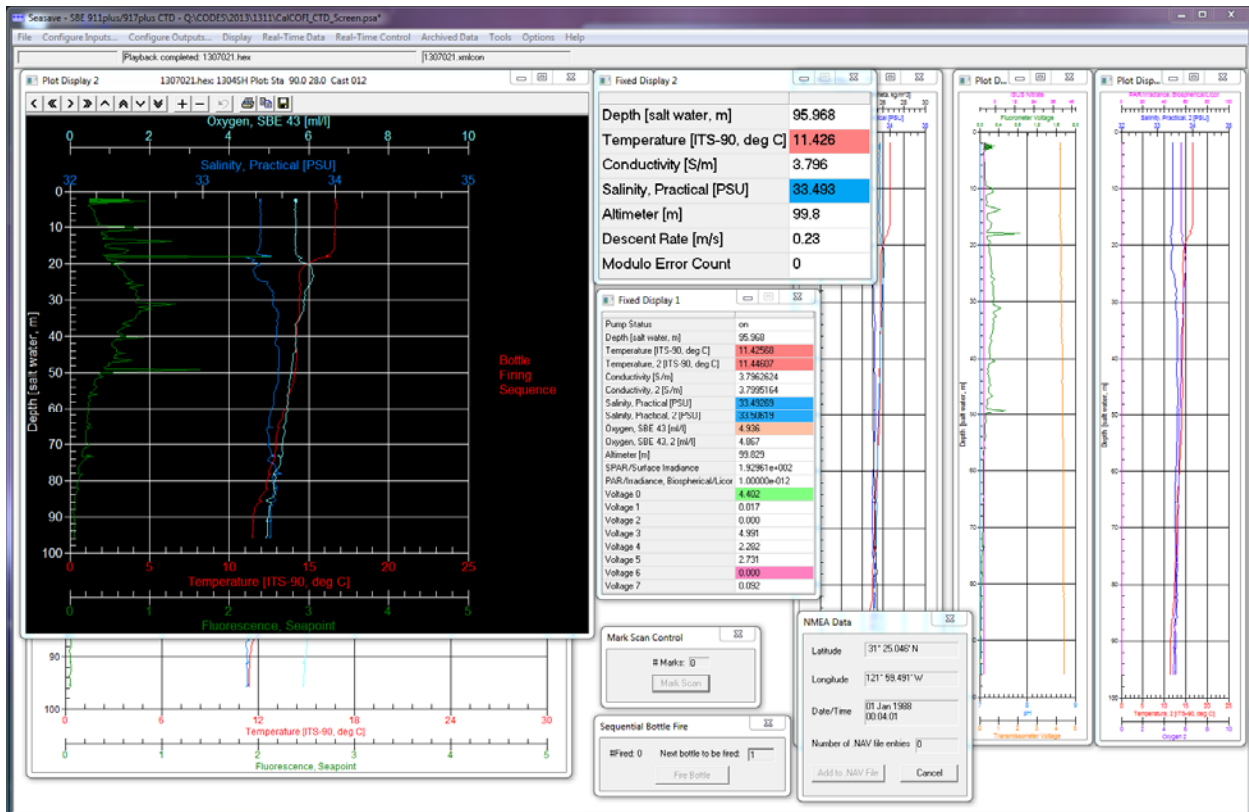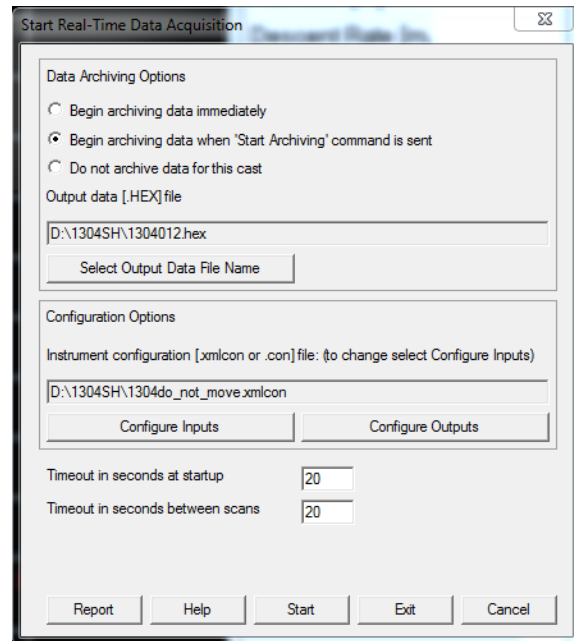
Example of a typical CalCOFI Seasave CTD cast screen

Testing the Water Sampler

Once you are sure the all systems are communicating, it is time to test the water sampler. This typically requires two people, two radios. Once person sits at the CTD console and manually fires each bottle position; one stands over the carousel and puts tension on each sequential release trigger. It takes the deck unit a few seconds to recharge the capacitor so wait 5secs minimum between button presses/bottle fires. This should **NOT** be done with open bottles since closing them in air can crack the bottle. All 24 positions should be triggered and confirmed.

Transmissometer Calibration

If a transmissometer is mounted on the system, a deck calibration is usually done to calculate the M & B coefficients (see Seabird Application Note #7: http://www.seabird.com/application_notes/AN07.htm). This is performed by cleaning the optics of the transmissometer (SIO-CalCOFI uses a mild soap squirt bottle to rinse the two optical lenses without abrading the optical surfaces), recording the maximum voltage, then blocking one end and recording the minimum value. These values combined with the factory coefficients are used to calculate M & B – these coefficients are entered into the Seabird sensor configuration. This calibration allows transmissometer beam attenuation coefficient & % light transmission measurements recorded by the CTD to be accurate.

This typically concludes the CTD setup and the system is ready for its first deployment. Please refer to the CTD General Practices document for additional instructions.

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