

SOP 4: Hydrographic Survey

Version 1

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	New Version #
[none]	Oct. 2010	S. Danielson, W. Johnson, L. Sharman, G. Eckert, B. Moynahan	Initial version	1

1.0 Field Preparations

1.1 Supplies to Have Available

Assemble CTD and general field gear (see Appendix C), lowering line and hardware, distilled water and Triton X-100 solution containers/squirt bottles for cleaning/rinsing the CTD, field logs, GPS and spares kit. Appendix C also outlines equipment needed to complete oceanographic surveys. Use the CTD's wooden box for transportation, particularly on unpaved roads in a car. Vibrations due to transportation result in broken connections or sensors. Please treat the instrument carefully (it is very expensive!). After the instrument is loaded onto the vessel, be sure to secure the end of the ground line to the CTD using 2 metal carabiners and the other end to the vessel. The CTD communications, battery, memory and date/time checks can be done on board at the dock or in a lab.

1.2 Check Computer to CTD Communications

Before deployment of the CTD in the field, check the "status" of the instrument using the Seasoft software module *seaterm.exe*. A test CTD cast off the dock in Bartlett Cove would help to verify proper CTD operation. See details of communication and operation in SOP 5 and/or the SBE-19 operator's manual for help.

1.3 Check Battery Voltage

Check battery status within the SeaTerm program. If the **Vmain** is less than **10V**, replace the 9 D-cell batteries.

1.4 Memory Check and Clear

Ensure that the CTD memory is empty (info was cleared after the last cruise). In the SeaTerm window, press **F3** or click on the **Connect** button. The display should read >10V Vmain for the 9 alkaline D-Cell batteries and cleared memory (nsamples = 0, memory = 0). To clear memory, enter the **InitLog** command in SeaTerm.

1.5 Check Date and Time

Next, check to see that the time and date are current for **GMT time**. Note that GMT is either 8 or 9 hours away from Alaska Local time depending on whether or not Daylight Savings is in effect (8 hours when DST is in effect and 9 hours when it is not). If the CTD is not synchronized to

GMT, enter the **ST** command in SeaTerm. The program will prompt you to type in the correct date, then the correct time. Synchronizing your watch with CTD time can help avoid mistakes when entering information in the Field Log. It is important that GMT time be employed so that future analyses can accurately relate the timing of the tidal signal to the timing of the CTD cast. Tidal analyses are carried out with respect to GMT, so avoiding the use of local time will help avoid errors introduced by switching in and out of Daylight Savings.

1.6 Soak the Dry Conductivity Cell

When removed from dry storage, the conductivity cell needs to soak before being deployed. Fill the cell with a 0.1% Triton X-100 for at least one hour. When ready to use, drain the Triton X-100 solution; there is no need to rinse the cell. Do not allow Triton X-100 to flow through to the dissolved oxygen sensor, which may be adversely affected.

1.7. Test Cast, Download Test Data and Verify Proper Operation

Perform a test cast off the Bartlett Cove Dock before heading to the field to ensure proper CTD operation before beginning valuable ship time. Data can be downloaded and viewed as described below.

2.0 Field Operations

2.1 Selection of Sampling Sequence

The Vessel Operator and Project Leader will work together to determine the order with which to occupy stations. Consideration for personnel, vessel and equipment safety should be taken into account when assessing weather conditions and the short-term forecast. It is desirable to occupy stations south of Station 04 on the incoming tide for data collection consistency purposes, but it is more important that all target stations are occupied.

2.2 Navigate to Station

The Vessel Operator will navigate to each station in turn using GPS navigation and ensure that the CTD cast is initiated within 200 m of the nominal station location.

2.3 Complete CTD Station Log

See Appendix B for a copy of the log form. See Appendix A for a listing of the nominal station locations and depths. At the start of a new Field Log form, fill out the top header information, including:

1. Vessel name
2. Cruise identifier
3. The CTD number employed (CTD number is local to the NPS SEAN system and defined in Appendix F).
4. The Data Dump Number (sequential number for download. Check previous data dump log for current number to use, see also Appendix B).
5. The names of observers responsible for conducting the CTD cast.

At the beginning of the CTD cast, record on the Field Log form:

1. The sequential cast number (1, 2, 3, 4...)
2. The station name (01, 04, 07, ...)

3. The latitude and longitude of the cast location, using decimal degrees in WGS 84 Alaska datum (Or mark a waypoint on the GPS and record the waypoint number in the logbook. See section 2.9, below.)
4. The waypoint number for future reference on the cruise.
5. The station date and time. Record time as GMT date and time; note there are different offsets for Alaska Standard Time (add 9 hours) and Alaska Daylight Savings Time (add 8 hours).
6. The bottom depth as measured by the fathometer.
7. The target depth for the CTD (i.e., the amount of line to pay out).
8. Comments documenting any item of note associated with this cast. Use extra room on the bottom or the back of the Field Log form if needed.

2.4 Initiate Data Logging

Slide the magnetic switch to the “ON” position. Record the time “on” in the field notebook. See Figure SOP 4.1 for details of the CTD sensor layout and on/off switch location.

2.5 Equilibrate the CTD Just Below the Surface

Lower the CTD into the water, just below the surface, to equilibrate for a minimum of two minutes. (Have you first removed the syringe assembly from the temperature/salinity intake duct fitting? Have you removed the DO sensor closed tubing loop and reconnected the sensor to the in-line CTD tubing?) Employ a stopwatch with timer alarm to ensure a full 120-second soak period is observed. This equilibration time will allow 45 seconds for the pump to turn on, provide time for the instrument to adjust to ambient temperature, and for the conductivity cell to flush. Also, it allows the data processing program the ability to remove the first 90 seconds of data collected, resulting in improved measurements over the uppermost few meters of the water column.

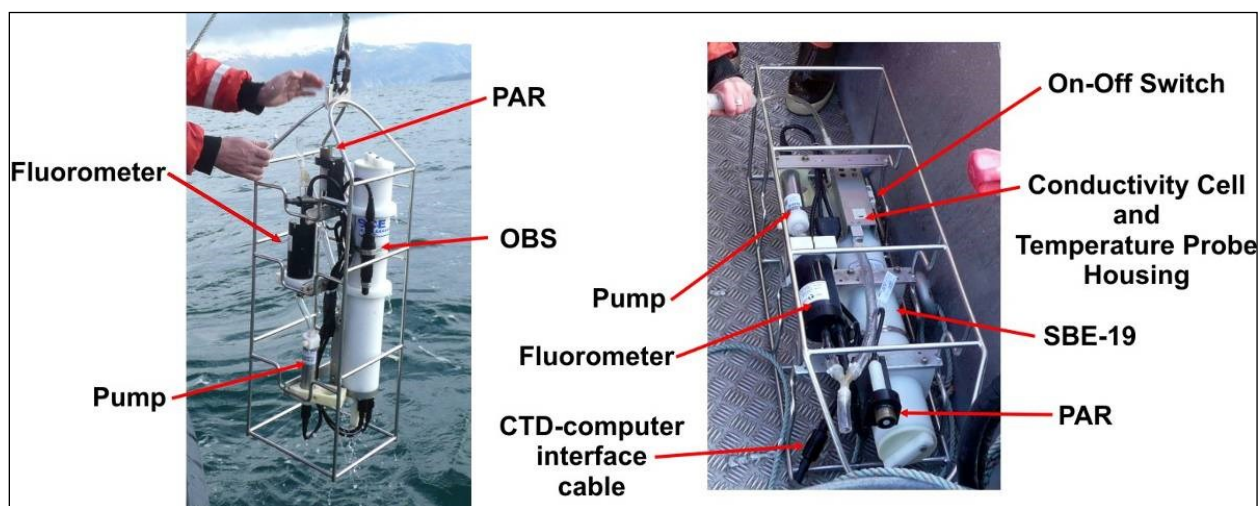


Figure SOP 4.1. Typical location of SBE-19 CTD sensors and on/off switch. CTD #1 is illustrated. Other CTDs may have somewhat different physical configurations.

2.6 Lower CTD to Target Depth

Lower the CTD at using 3/8" nylon, 3-braid line marked at 10-m intervals (timed as 10 meters per 10 seconds). The lowering speed should be **30 meters per minute (1/2 meter per second) for the uppermost 50 m** and can be increased to **60 meters per minute (1 meter per second) below 50 m depth**. Blue tape markers indicate 10-m intervals, red tape indicates 50-m intervals, and green tape indicates 100-m intervals. The instrument should be dropped no more than 90% of the depth at the station and never more than the **maximum depth of 600 m**. The CTD is usually dropped to no more than 550 m as a safety precaution.

2.7 Haul CTD Back to Surface

Retrieve the CTD with a power block/davit or a long-line drum. Note that data are collected by the CTD on both the down- and up-casts; however, the up-cast data are not typically used for analysis (down-cast data are more accurate because the sensors are receiving and measuring a nearly-undisturbed water column on the way down) — so there is no need to go slowly on the way up. Be careful, however, as the instrument nears the surface, and be sure to control the power block so the CTD is not jerked up out of the water and into the davit block or against the side of the boat. Be careful when bringing CTD back onto boat.

2.8 Terminate Data Logging

Turn the instrument off with the magnetic switch.

2.9 Complete CTD Station Log

Record any irregularities about the cast on the data sheet. Include comments about such events as, e.g., the magnetic switch arriving at the surface in the “off” position, forcing a duplication of that station’s cast. If you marked a GPS waypoint for the cast’s location, enter the coordinates onto the data sheet now to prevent loss of the waypoint when others use the GPS later.

2.10 Freshwater Rinse

Rinse entire instrument with distilled water, poured from jug or by using a squirt bottle. In particular, make sure to douse all of the optical sensors with the fresh water. Rinse the irradiance meter with distilled water and replace the cover. Flush the conductivity cell with syringe of Triton X-100 solution (preferred) or distilled fresh water. Syringe and Tygon tubing should be left attached to cell to avoid drying out between usages.

2.11 Stow CTD for Transit

With air temperatures greater than 5°C above freezing, the CTD may remain on deck. In freezing and near-freezing conditions, bring the CTD into the cabin between stations and during transit to avoid freezing and breaking the conductivity cell.

2.12 Data Download

At the end of the day, download the CTD cast data to a local computer according to SOP 5, which includes basic quality assurance steps.

3.0 Post-cruise Operations

3.1 Storage of the CTD and Associated Hardware and Spares

Stow CTD until next field effort. For long-term storage procedures, see SOP 1.

For overnight short-term storage, the CTD may be left on board the survey vessel. Bring the CTD into the cabin to avoid freezing and breaking the conductivity cell.

3.2 Data Transfer to Network

After each cruise, transfer data to network according to details of SOP 5.

3.3 Plot Data

Once cruise data has been transferred to the network, plot each cast for QA purposes using SOP 7.