Module 2

Setup and Acquiring Data

Overview

We are going to discuss Seaterm, the user interface or terminal program for internally recording instruments. We will also discuss Seasave, an application that collects real-time data and saves it to a file. By the end of this module you should be able to:

- Use Seaterm to prepare an internally recording instrument for deployment.

- Use Seaterm to transfer data stored in an internally recording instrument to your computer.

- Set up Seasave to collect data in the manner that best suits your application.

- Use Seasave to manipulate your .con file as appropriate for your instrument and auxiliary sensors.

- Use Seasave's capability for making file header annotations.

- Use Seasave's capability for marking points of interest in the real-time data and saving marked data into a file.

Seaterm: User Interface for Internally Recorded Instruments

Below is a summary of the function of each of the buttons:

Connect: To begin communicating with your instrument, you must first establish communication by clicking the Connect button. After Seaterm has received the *S>* prompt from the instrument, it will allow you to use the other buttons.

Status: Sends the command to cause the instrument to transmit its current status.

Headers: Sends the command to cause the instrument to list the headers for each of the recorded casts.

Coefficients: For instruments that are capable of transmitting data in scientific units (e.g., temperature in deg C), causes the instrument to list its calibration coefficients.

Init Log: Sets up the instrument for logging; memory is cleared and the instrument is put to sleep. Not applicable to all instruments.

Capture: Causes Seaterm to write everything received from the remote instrument to a file; useful for some real-time operations and for diagnostics.

Upload: Starts the protocol for transferring data between the instrument and your computer.

Convert: A conversion utility for the SBE 37 and 39; converted data can be processed with Seasoft.

Diagnostics: Starts a protocol for saving diagnostic information to a file that you can e-mail to Sea-Bird.

Stop: Sends 10 escape characters, causing the instrument to halt data transfers or continuous measurements.

Disconnect: Causes Seaterm to release the serial port so you can run another program, such as Seasave, without exiting Seaterm.

The status panel across the bottom shows which instrument Seaterm thinks it is connected to, the version of the firmware that the instrument is running, the Com port that Seaterm is using, and the communication parameters (baud, data bits, stop bits, parity). Also shown in the status panel are the data transfer protocol and if the program is capturing communications to a file.

Seaterm: Selecting an Instrument Configuration
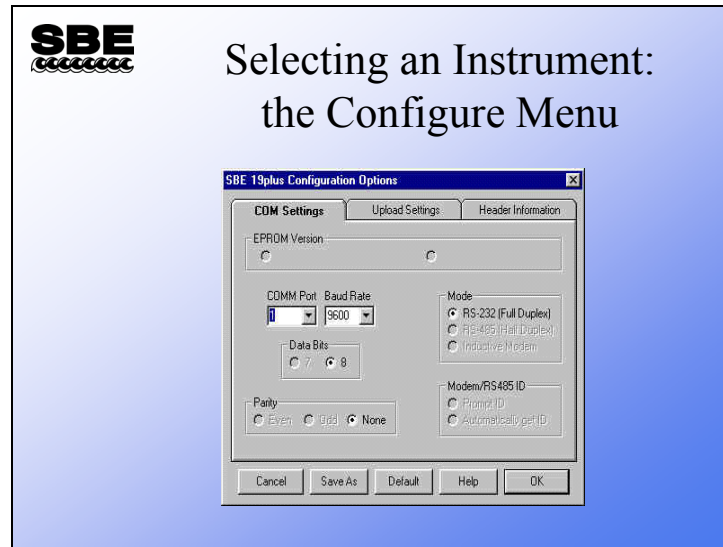
Seaterm supports all of Sea-Bird's internally recording instruments. To select which instrument you will be communicating with, click the Configure menu and select the appropriate instrument. The Configuration dialog box for the instrument you have chosen will pop up. The first tab has choices for firmware revision; older firmware does not have the capabilities that newer ones do, so some of your choices are limited by the firmware revision of your instrument. Com port, baud rate, data bits, and parity are those appropriate to your instrument. Mode selects communication mode: RS-232, RS-485, or Inductive Modem. RS-232 is standard serial communications. RS-485 is 4-wire serial communications, which allows instruments to be placed in parallel on the communications cable and each instrument to be addressed uniquely. Inductive Modem is a proprietary protocol that Sea-Bird has developed for use in moorings; it also supports instruments deployed in parallel, with each instrument assigned a unique address.

If RS-485 or Inductive Modem is chosen, Seaterm will query the instrument for its address or you may input one.

Seaterm: Instrument Status
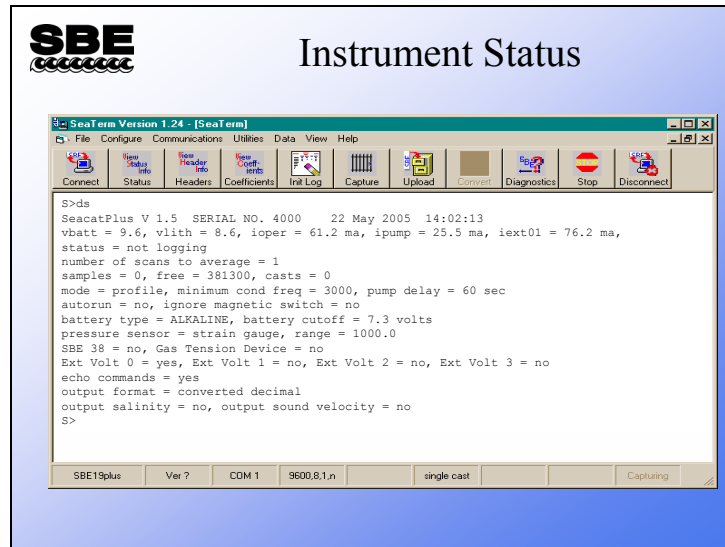
The instrument status report contains much valuable information:

- The instrument type, firmware revision, serial number, and date and time.
- The main battery voltage and the back-up battery voltage. Operating current, pump current, and current to external voltage sensors provide an indication of the battery lifetime you can expect, as well as the health of the instrument in general.
- The status entry indicates whether the instrument is logging data or not.
- The number of scans to average sets the sample rate.
- Memory: scans collected, number of scans that can fit in the remaining memory, and the number of casts collected.
- The SBE 19*plus* can operate in profiling mode or moored mode. In profiling mode the instrument is powered continuously, while in moored mode the instrument powers down between samples. The 19*plus* waits until the conductivity sensor's frequency rises, indicating that there is water in the cell, to turn on the pump. The threshold for the pump turn-on is the minimum conductivity frequency. In addition, there is a time delay from when that frequency is reached to the pump turn-on to allow air to leave the plumbing.
- If the 19*plus* is set to autorun=yes, it starts logging automatically when external power is applied. If the 19*plus* is set to ignore its magnetic switch, it can only be made to collect data via commands sent by the terminal program.
- Battery type can be Alkaline, NiMH, or Ni-Cad. Battery type influences the cutoff voltage, which is the power level that causes the instrument to shut itself off because it does not have sufficient power to sample.
- Pressure sensor type and range are entered at the factory.
- Which auxiliary sensors are logged.
- Whether to show entered commands on screen as you type.
- Output data format.

Activity
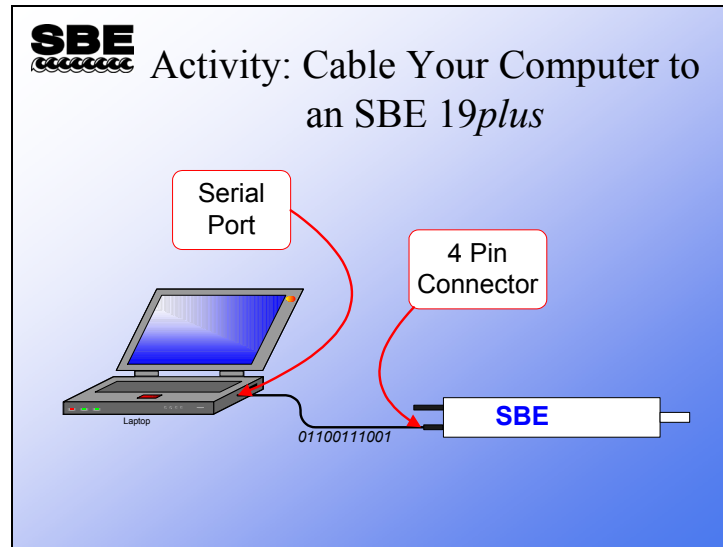
If you are using a USB to RS-232 converter, you'll need to know what COM port your computer has assigned to the connection. Follow these directions (written for Windows XP Professional) to determine the COM port:

1. Select Start / Control Panel.
2. Select System.
3. Click the Hardware tab.
    A. Click *Device Manager.*
    B. Click *Ports.*
    C. Write down what COM port designation has been assigned to the USB port.

Activity

> ### Activity: Set Up SBE 19*plus* and Collect Some Data
>
> - Run Seaterm
> - Select Configure / SBE 19plus
>   - Verify COM port matches connection to computer, baud is 9600
> - Click Connect button
> - Type in the list of commands in your notes
>   - As you type commands, read the description so you know what you are doing
> - Move magnetic switch to *ON*
> - Blow on thermometer
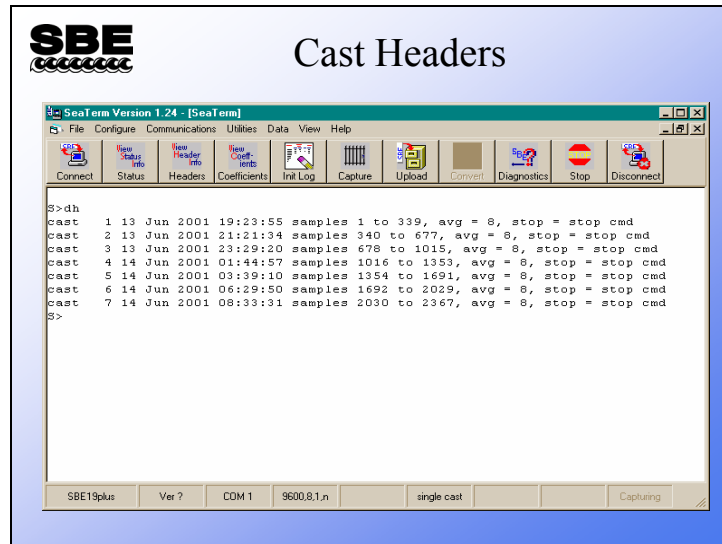> - When you get bored, move magnetic switch to *OFF*

Click Start -> Programs -> Sea-Bird -> Seaterm

Select SBE 19*plus* from opening dialog

Select Configure -> SBE 19*plus* – verify COM port matches computer connection, baud=9600

Click the *Connect* button

COMMAND	DESCRIPTION
MP	Set instrument to profiling mode
BATTERYTYPE=ALKALINE	Instrument has alkaline batteries
VOLT0=N	No auxiliary sensor 0 installed
VOLT1=N	No auxiliary sensor 1 installed
VOLT2=N	No auxiliary sensor 2 installed
VOLT3=N	No auxiliary sensor 3 installed
SBE38=N	No auxiliary temperature sensor installed
GTD=N	No gas tension device installed
PTYPE=1	Strain gauge pressure sensor installed
NAVG=1	Sample at 4 Hz
SAMPLENUMBER=0	Resets memory
IGNORESWITCH=N	Enables magnetic switch
OUTPUTFORMAT=2	Raw data transmitted as decimal numbers
TSR	Request a scan of raw data, conductivity frequency is 2nd
MINCONDFREQ=CCCC	Set pump start frequency to dry cell conductivity frequency (from TSR) + 500
PUMPDELAY=40	Set logging delay to allow time for air to leave the plumbing
OUTPUTFORMAT=0	Raw data transmitted as hexadecimal numbers
DS	Verify setup with status command

Stored Cast Headers


```
S>dh
cast    1 13 Jun 2001 19:23:55 samples 1 to 339, avg = 8, stop = stop cmd
cast    2 13 Jun 2001 21:21:34 samples 340 to 677, avg = 8, stop = stop cmd
cast    3 13 Jun 2001 23:29:20 samples 678 to 1015, avg = 8, stop = stop cmd
cast    4 14 Jun 2001 01:44:57 samples 1016 to 1353, avg = 8, stop = stop cmd
cast    5 14 Jun 2001 03:39:10 samples 1354 to 1691, avg = 8, stop = stop cmd
cast    6 14 Jun 2001 06:29:50 samples 1692 to 2029, avg = 8, stop = stop cmd
cast    7 14 Jun 2001 08:33:31 samples 2030 to 2367, avg = 8, stop = stop cmd
S>
```

The cast header lists the start date and time, number of scans, number of samples averaged per scan, and reason the cast ended for each cast.

Transferring Stored Data
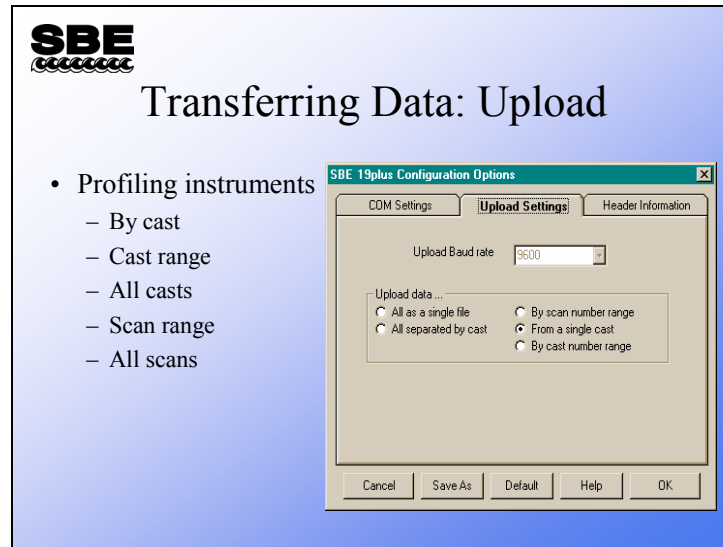
Data from an internally recording instrument can be transferred to your computer in one of five ways:

By cast: At the start of data transfer, Seaterm prompts for which cast you want.

By cast range: At the start of data transfer, Seaterm prompts for which cast range you want. If header information is to be added to the file, Seaterm prompts for it before uploading each cast.

All casts: Seaterm transfers all casts stored in the instrument, placing each cast in a separate file identified by a 3-digit cast number which is appended to the uploaded file name. If appropriate, Seaterm prompts for headers at the start of each cast transfer.

By scan range: At the start of data transfer, Seaterm prompts for which scan range you want. This is useful for instances when data is not arranged in casts or when only part of a cast is desired.

All scans: All scans in the instrument are transferred.
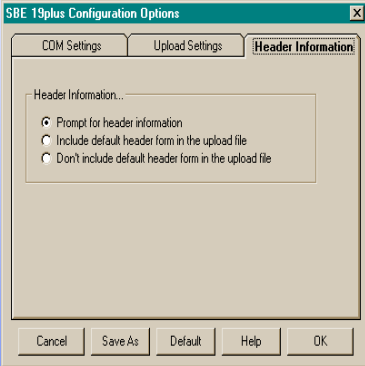
SBE 19s and SBE 25s can transfer data at a faster baud rate than they normally use to communicate. This allows real-time data to be transmitted at a slow baud rate, but data transfer to occur more quickly. When appropriate, the Upload Baud rate selection is enabled.
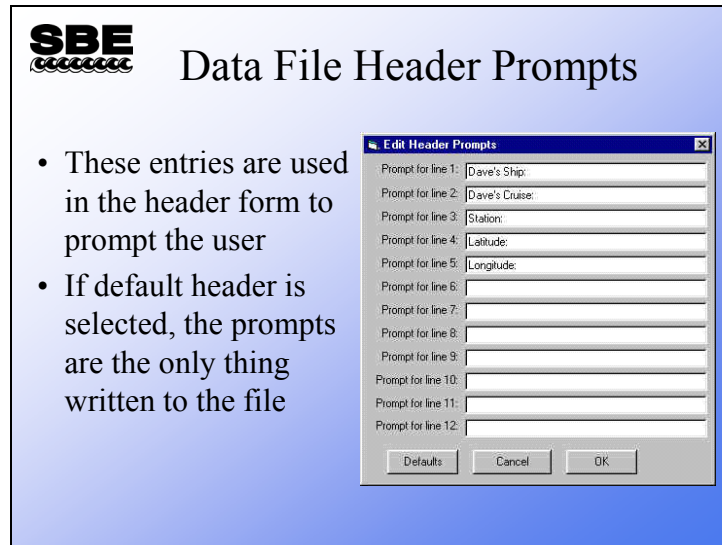
Data File Headers

User headers may be placed in uploaded data files. The header is based on user entries in a form with user prompts, or a default header where the same header is placed in every data file. The prompts are entered from the Configure menu: click Configure, Header Form.

Data File Header Prompts

These prompts are used in the header form to guide the user's file annotation. Any
information pertinent to the use of the instrument may be included. If *default header* is
selected in the Configuration Options dialog box, these are the only entries that will be
added to the file's header; the default entries should reflect more complete information.

Activity

SBE Activity: Transfer Data From the Profiler to Your Computer

- Run Seaterm
- Click *Connect*
- Click *Upload*
- Save the data in your C:\Data folder!
  - Save your data as "intrec": C:\Data\intrec.hex

Seaterm: Capturing ASCII Data

The capture facility allows Seaterm to place all characters received into a file. This is useful for testing instruments, performing diagnostics, or in some cases recording real-time data. Note that there is no testing of data integrity and the act of displaying the characters on the screen while they are being written to a file may cause some characters to be lost.

Seasave: Setup for Real-Time Data Acquisition

SBE

Profiling Setup and
Data Acquisition

- Set up Seasave for real-time
  data acquisition
  - SBE 9*plus*/11*plus*
  - SBE 25
  - SBE 19 and SBE 19*plus*
  - SBE 49
- Enumerate the files that Seasave creates
  during real-time data collection

Next, we are going to discuss Seasave, an application that collects real-time data and
saves it to a file. We will learn how to set up Seasave and what files are created in the
process of data collection.

Seasave: Instrument Configuration

SBE

Real-Time Data — Seasave

- Instrument configuration
  - What kind of instrument
  - How many sensors
  - What type of sensors
  - Communication issues
    - Which computer interface
    - What data transmission protocol
- How does Seasave know all this stuff?

Without this information Seasave is not able to properly process the data stream that is received from an instrument. This is the template for all communications and data processing.

Seasave: *.con* File

SBE   Setup Parameters are Stored
in the *.con* File

- Configuration data is stored in a file
  (for example, seasoft.con)
- In addition, calibration coefficients are
  stored in this file
- You may edit *.con* file directly from
  Seasave or the data processing software
  (SBE Data Processing) we will discuss later
  in the course

We are beating this topic to death because one of the most common problems people have is mistakes in the .con file. All of Sea-Bird's profiling instruments produce a coded data file. The information to decode this file is found in the .con file. The .con file allows one application to service many instrument types.

Seasave: Selecting a Configuration File
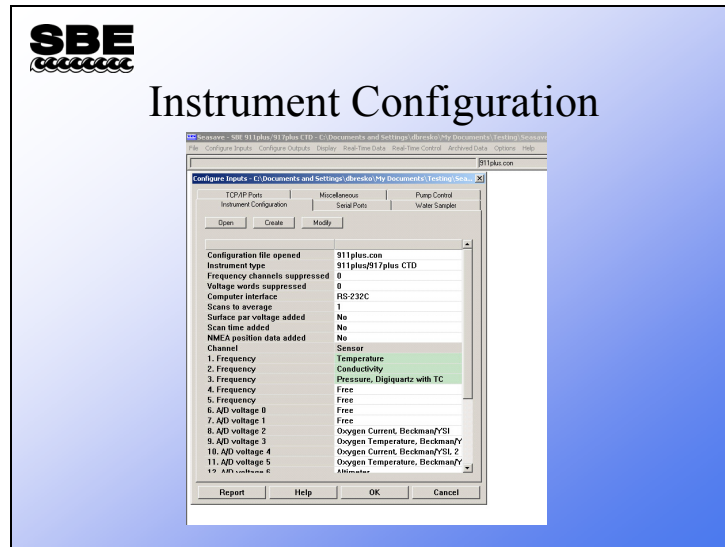
Click the Configure Inputs menu to get the Configure Inputs dialog box; the first tab is the Instrument Configuration tab. From the Instrument Configuration tab, you can open and examine an existing .con file, or create a new .con file.

Seasave: Configuration File Contents
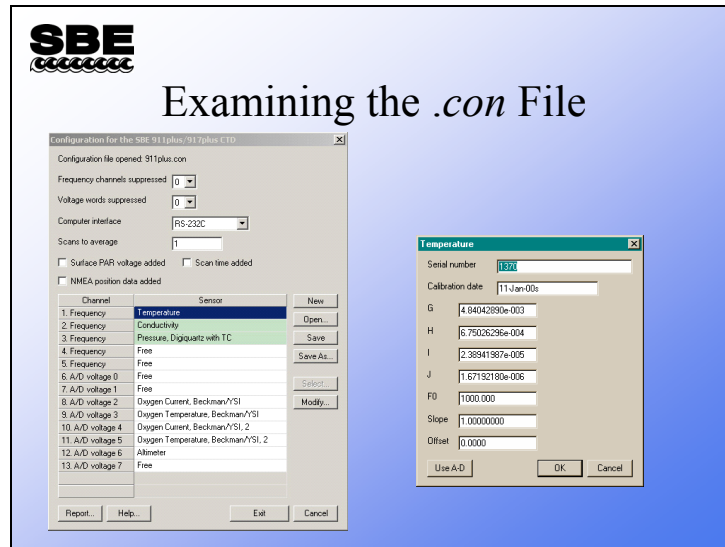
The *.con* file contains information about your instrument configuration and the calibration coefficients for your sensors. For example, you can suppress unused frequency channels; many 9*plus* CTDs only have one temperature and one conductivity sensor. Suppressing 2 frequency channels allows you to collect data from the 9*plus* without 2 frequency channels that will always be zero. Similarly, you can suppress unused voltage channels in pairs (shown as voltage words). You must suppress pairs because of constraints on the binary data format that comes from the 9*plus*. For example, if you have 1 temperature sensor, 1 conductivity sensor, a fluorometer, and an SBE 43 dissolved oxygen sensor, you can suppress 2 frequency channels and 3 voltage words, saving 14 bytes per data scan.

The .con file also has a selection of computer interface, RS-232 or IEEE-488. If your computer is equipped with an IEEE-488 board, you may select IEEE-488. The IEEE-488 communication protocol is faster than the serial port and was more commonly used when computers were slower than those available today.
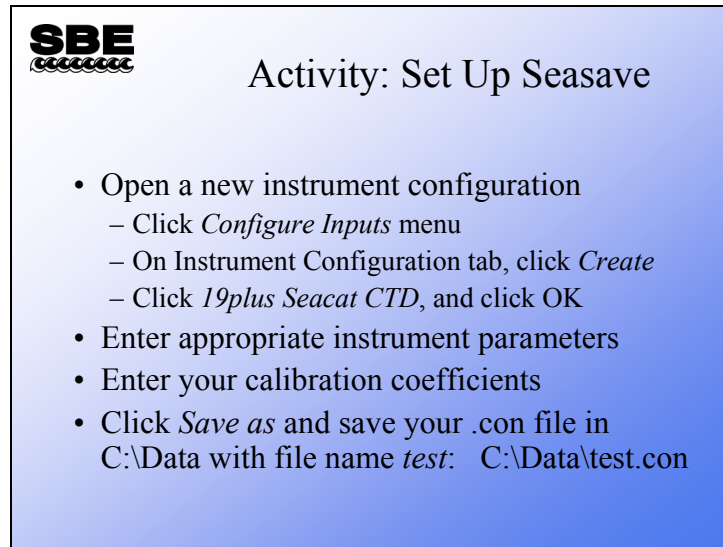
The 11*plus* can average incoming scans and present the result to your computer. This will also reduce the file space needed to store your data. However, modern computers have large memories, and the loss of resolution in your CTD data makes averaging any more than 2 scans unattractive for most applications.

You may plug a light meter into the 11*plus* and include Surface PAR (photosynthetically active radiation) in your data stream. This is useful for determining percent available PAR as your CTD equipped with a PAR sensor descends into the darkness.

Time and position may be added to the data scans as well. The *Scan time added* check box causes Seasave to append your computer system time to each scan and the NMEA position check box appends a Latitude and Longitude from a GPS receiver that is transmitting NMEA message 0183.

Each data channel can then be assigned a sensor.

Activity

Activity: Set Up Seasave

- Open a new instrument configuration
  – Click *Configure Inputs* menu
  – On Instrument Configuration tab, click *Create*
  – Click *19plus Seacat CTD*, and click OK
- Enter appropriate instrument parameters
- Enter your calibration coefficients
- Click *Save as* and save your .con file in C:\Data with file name *test*:   C:\Data\test.con

Click Start -> Programs -> Sea-Bird -> SeasaveV7

Click menu item Configure Inputs ->
                                Create ->
                                        19 Seacat plus CTD
                                                OK

Select:
        Strain gauge
        0 external voltages
        profile mode
        1 scan to average

In the Sensor list, click on *Temperature*, click the *Modify* button.
In the dialog that pops up, type the calibration coefficients from the calibration sheet, leave slope as 1.0 and offset as 0.0, click OK.

Click on *Conductivity*, click the *Modify* button.
In the dialog that pops up, type the calibration coefficients from the calibration sheet, leave slope as 1.0 and offset as 0.0, click OK.

Click on *Pressure, Strain Gauge*, click the *Modify* button.
In the dialog that pops up, type the calibration coefficients from the calibration sheet, leave offset as 0.0, click OK.

Important! Click *Save As…* and save your file as test.con in your C:\Data directory.

Seasave: Default Display
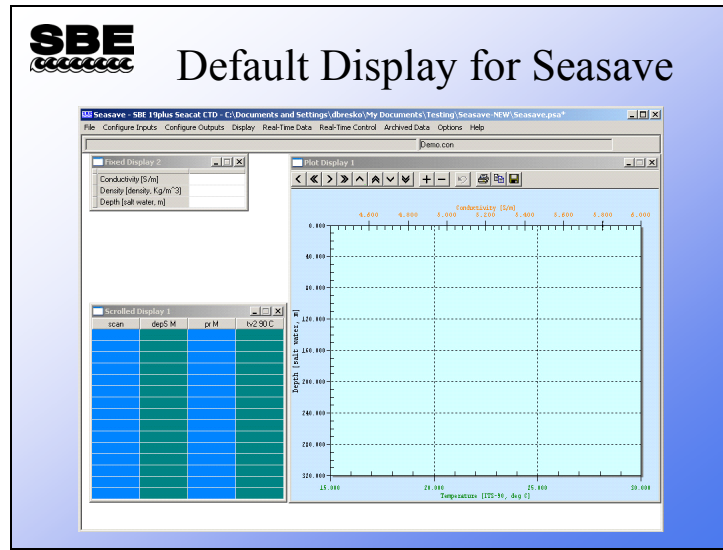
The slide above has all three data windows visible. The top left window is a fixed display and the bottom left window is a scrolling display. The right window is a multi-axis plot.

Seasave: Displaying Archived Data
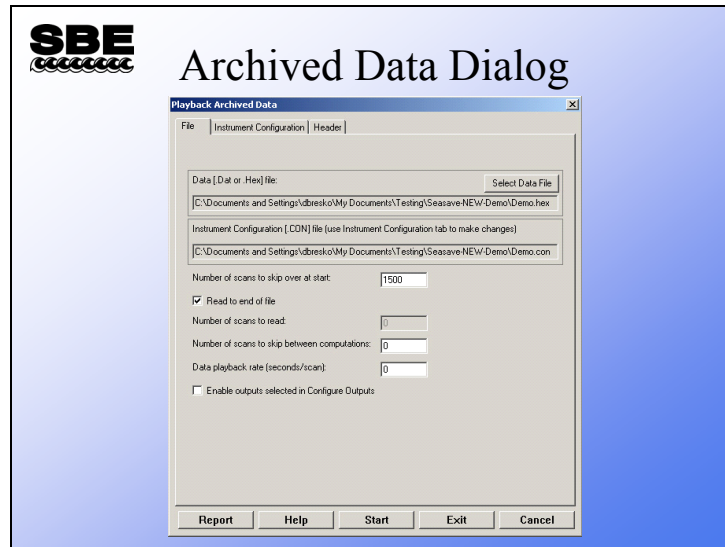
You have the option of skipping data scans at the beginning of the file; this allows you to skip scans collected while the instrument was on deck and going into the water. There is also the option to skip scans when displaying the data; for very long casts this allows you to decimate the data. You can skip 1 or more seconds between scans displayed. You can play back the data at the same rate it was acquired, or you can play it back really fast (set Data playback rate to 0) to generate a plot quickly.

If desired, you can *Enable outputs selected in Configure Outputs*, such as outputs to a serial port, TCP/IP port, shared file, or SBE 14 Remote Display. If enabled, the archived data will be written to / sent to those devices / files as if real-time data was being collected at the designated data playback rate. We'll talk more about Configure Outputs in a few minutes.

Activity

> **SBE**
>
> ### Activity: Display Your Bench Cast
>
> - Run Seasave
> - Right click in each of the display windows
>   - Set the scrolled display for time, temperature, conductivity; note the digits after the decimal
>   - Set the fixed display the same
>   - Set the plot to values appropriate for your data: there are suggestions in your notes
> - Click *Archived Data*, *Start*
>   - Select your *.hex* data file: C:\Data\intrec.hex
>   - Select your *.con* configuration file: C:\Data\test.con

Click Configure Inputs ->
    Click Open
    Select the .con file you created (test.con) and click Open
    Click OK

Right click on the scrolled display -> Modify
    Click Delete All
    With the first row in the table highlighted, double click Time, Elapsed -> seconds
    With the second row in the table highlighted, double click Temperature -> ITS-90 -> deg C
    With the third row in the table highlighted, double click Conductivity -> S/m
    Set the Digits (right of decimal place) to 0 for time, 3 for temperature, and 3 for conductivity
    Click OK

Right click on the fixed display -> Modify
    Click Delete All
    With the first row in the table highlighted, double click Time, Elapsed -> seconds
    With the second row in the table highlighted, double click Temperature -> ITS-90 -> deg C
    With the third row in the table highlighted, double click Conductivity -> S/m
    Set the Digits (right of decimal place) to 0 for time, 3 for temperature, and 3 for conductivity
    Click OK

Right click on the plot display -> Modify
    Click the Plot Setup tab ->
        Set Plot type to Single Y – Multiple X
        Set Number of Axes to 3
    Click the Y axis tab ->
        Click Select Variable button, select Time, Elapsed -> seconds, click OK
        Set the axis minimum to 0 and maximum to 600
    Click the X-Axis 1 tab
        Click Select Variable button, select Temperature -> ITS-90 -> deg C, click OK
        Set the axis minimum to 20 and maximum to 25
    Click the X-Axis 2 tab
        Click Select Variable button, select Conductivity -> S/m, click OK
        Set the axis minimum to -0.01 and maximum to 0.01

    Click OK

Seasave: Configuring Seasave

SBE

Things to Configure for Real-Time Data Collection

Configure Inputs
- Instrument configuration (.con file) – discussed already
- Serial ports – can set up in Configure Inputs or Configure Outputs
- Water sampler
- TCP/IP ports – can set up in Configure Inputs or Configure Outputs
- Miscellaneous
- Pump control (custom SBE 9*plus* only)

Configure Outputs
- Serial data output
- Shared file output
- Mark variable selection
- TCP/IP output
- SBE 11*plus* alarms – pressure, altimeter, bottom contact switch
- SBE 14 Remote display / alarms – pressure, altimeter, bottom contact switch
- Header form / prompts
- Diagnostics
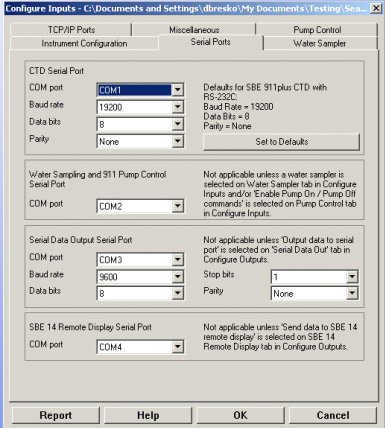
We'll talk about most of these briefly.

Seasave: Configuring Serial Ports

Entries for CTD Serial Port are always required. The other entries are ignored if the applicable input or output is not enabled.

CTD Serial Port

- For the SBE 11*plus* Deck Unit, this is the COM port connected to the *SBE 11 Interface* connector.

- For the SBE 33 or 36 Deck Unit, this is the COM port connected to the *Serial Data* connector

Water Sampler / 911 Pump Control Serial Port

- For the SBE 11*plus* Deck Unit, this is the COM port connected to the *Modem Channel* connector.

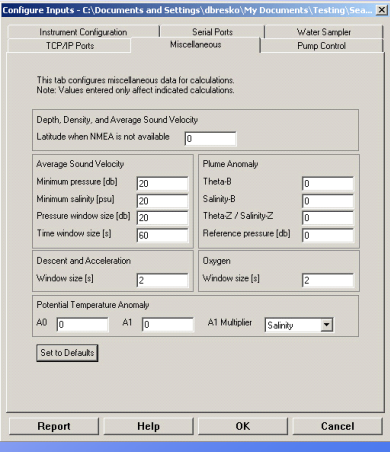- For the SBE 33 Deck Unit, this is the COM port connected to the *Carousel Data* connector.
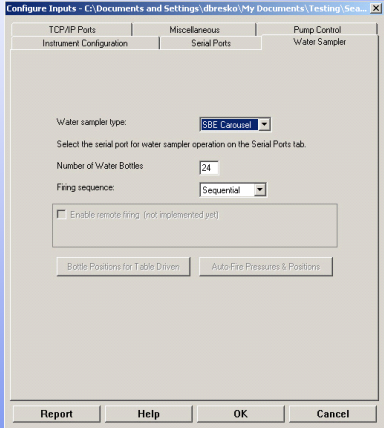
Serial Ports can be defined in Configure Inputs or in Configure Outputs – changes you make in one dialog box are automatically shown in the other.

Seasave: Configuring Water Sampling

Real-Time Water Sampling

- Water sampler configuration
  - Type: SBE 32 Carousel, GO 1015, GO 1016
- Bottle closure protocol
  - Sequential
  - Operator-prompted
  - List-driven
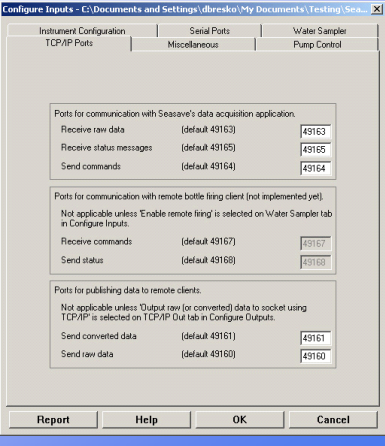
Don't forget to select the desired COM port for communication with the water sampler on the Serial Ports tab!

Seasave: Configuring TCP/IP Ports

Entries for ports for communication with Seasave's data acquisition application are always required.

- Seasave is actually 2 applications – Seasave.exe automatically launches SeasaveAcq.exe when data acquisition is commanded to start, and both programs runs simultaneously on the same computer.

Entries for all other ports are ignored if the applicable input or output is not enabled.

Note: The remote bottle firing client will be implemented in a future release of Seasave.

TCP/IP Ports can be defined in Configure Inputs or in Configure Outputs – changes you make in one dialog box are automatically shown in the other.

Seasave: Defining Miscellaneous Parameters

The Miscellaneous tab defines parameters required for output of specific variables. These entries are used only if you are outputting the associated variable to a display window, shared file, remote device, TCP/IP port, etc. For example, if you do not select Oxygen as an output variable for a display window or on any tab in the Configure Outputs dialog box, Seasave ignores the value entered here for Oxygen window size.

Seasave: Configuring Serial Data Output

An ASCII stream of data can be sent out a spare serial port on your computer. The data scan contains parameters that you have selected, displayed to the precision you have set.

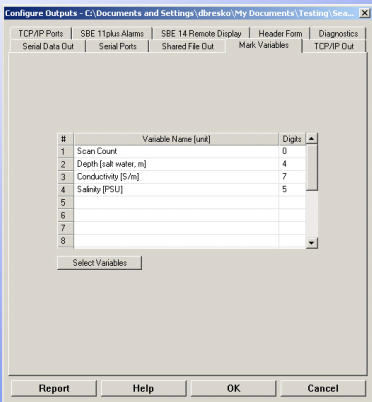## Seasave: Configuring Shared File Output
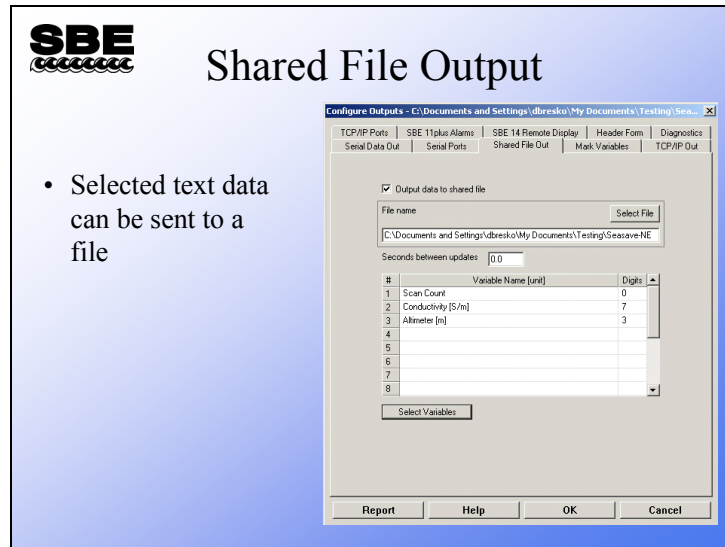
An ASCII stream of data can be sent out to a shared file on a network. The data scan contains parameters that you have selected, displayed to the precision you have set.
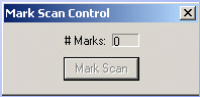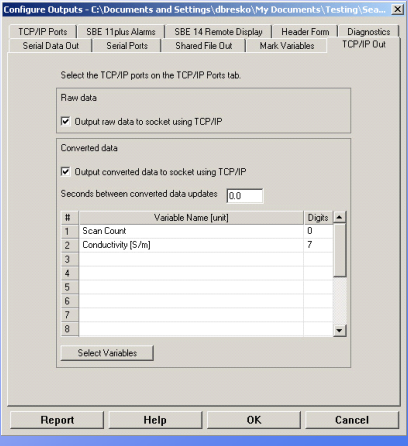
Seasave: Configuring Mark Variables

Mark Variables annotate a real-time plot with operator-chosen parameters. When *Mark Scan* is clicked, a line is placed across the plot and the requested variables are written on the line. A file is also created with a *.mrk* extension. This file contains a line for each mark with the selected mark variables.

Seasave: Configuring TCP/IP Output

Data (raw and/or converted data) can be sent out using the TCP/IP ports. For converted data, the data scans contain parameters that you have selected, displayed to the precision you have set.

Seasave: Configuring SBE 11*plus* Alarms
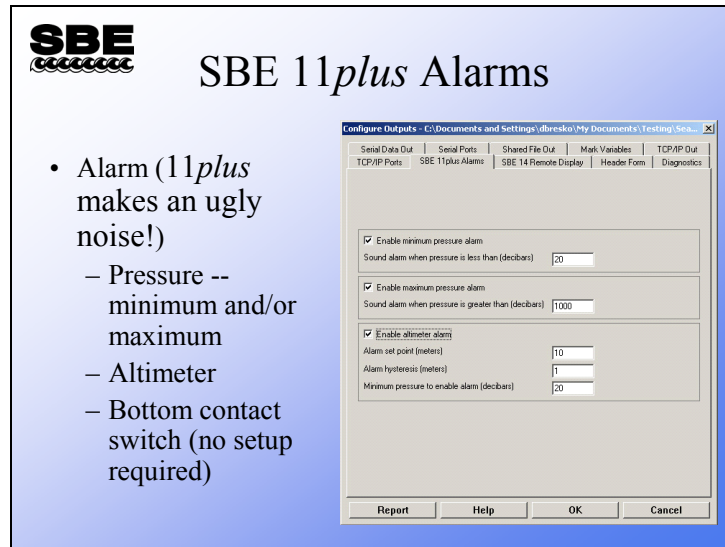
The SBE 11*plus* Deck Unit has an alarm that can be set up to operate based on minimum pressure, maximum pressure, data from an altimeter, and/or data from a bottom contact switch.
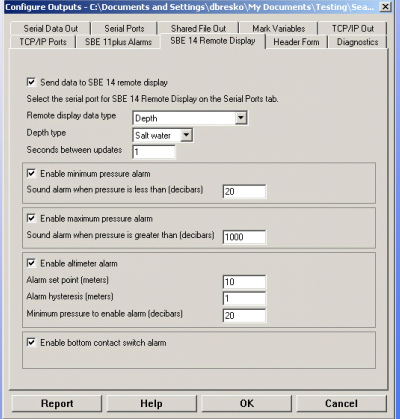
- The alarm sounds based on minimum pressure, providing a warning that the CTD is nearing the surface.

- The alarm sounds based on maximum pressure, providing a warning that the CTD is deeper than desired.

- The alarm sounds based on the output from an altimeter integrated with the 9*plus* CTD, providing a warning that the CTD is nearing the bottom. This alarm requires a set point (the height above the bottom where it sounds), a hysteresis value (keeps it from going on…off...on...off...on… as the boat rocks), and a minimum pressure to enable (to keep spurious data from setting off the alarm, like when the instrument package goes into the water).

- The alarm also sounds based on the output from a bottom contact switch integrated with the 9*plus* CTD, providing a warning that the CTD is nearing the bottom. No setup is required for the alarm to operate based on bottom contact switch data.

## Seasave: Configuring SBE 14 Remote Display

The SBE 14 remote display receives pressure, depth, and/or altimeter data and displays it on a large, liquid-crystal display. The SBE 14 may be placed anywhere it is useful, for example: in the winch dog house, in the wet lab, on the bridge, or in the chief scientist's stateroom to name just a few. The SBE 14 also has an audible alarm that may be triggered by minimum pressure, maximum pressure, altimeter data, and/or bottom contact switch data.

Setup of the alarm parameters is similar to that for an SBE 11*plus* with one exception. If you want an alarm based on bottom contact switch data, you must enable it on this tab.

Cabling a Remote Display
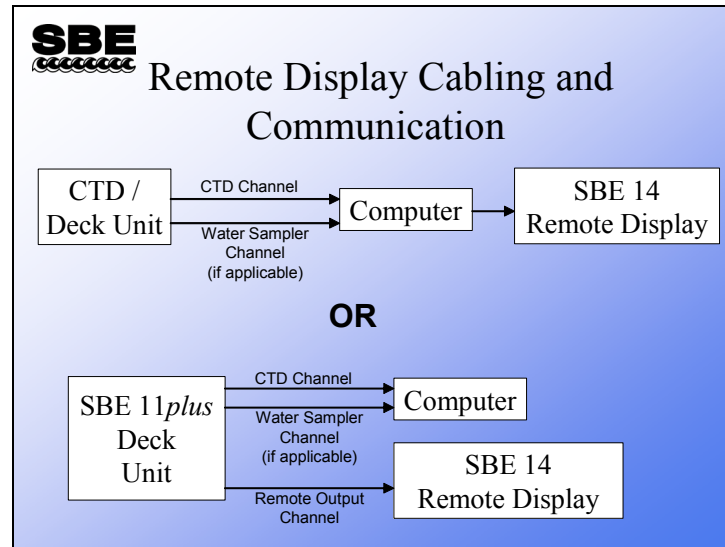
The SBE 14 remote display can be cabled to your system in one of two ways:

- Connected to one of the com ports on your PC (applicable to use of the SBE 14 with any of our CTDs/Deck Units, including the SBE 11*plus*), or

- Connected directly to the SBE 11*plus* – If connected this way, setup of the Remote Display is not done in Seasave; see the 11*plus* manual.
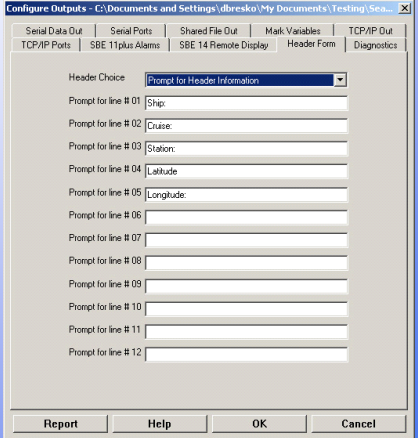
Note that the deck unit requires either a com port or a GPIB port (GPIB port only available for 11*plus*), and the water sampler requires a com port. If the remote display is connected to the computer, it requires an additional com port.

Seasave: Configuring Cast Headers
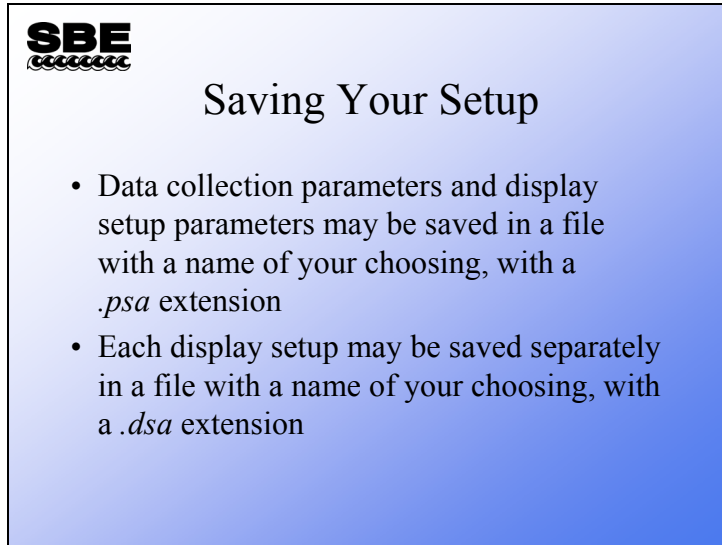
User headers allow the CTD operator to add annotation to the data file. This can take the form of an operator filled out table or a set of default text. The header form may be skipped altogether if desired.

Seasave: Saving Your Setup

Setup files are handy for different instrument types or for pre-deployment instrument checkout *vs.* deployment display. For example, you might use fixed display or scrolled display for pre-deployment check out and then switch to a full screen plot for the cast.

Seasave: Acquiring Real-Time Data
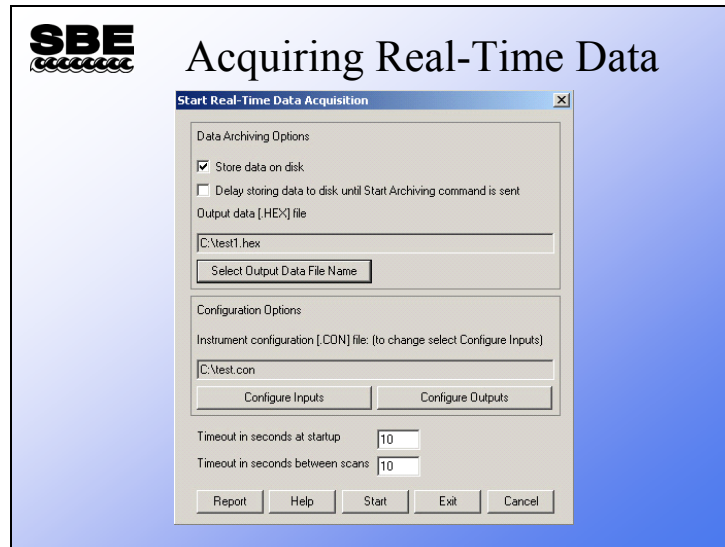
Click the Real-Time Data menu to get the Start Real-Time Data Acquisition dialog box.

Acquiring real-time data requires the operator to select a .con file, and decide whether or not to store data to a file and what the name of the file should be. Clicking *Start* initializes the CTD/Deck Unit, sends operator choices regarding channel suppression and averaging, and begins displaying data.

Note: Don't forget to configure the Com port(s) in Configure Inputs or Configure Outputs before you click *Start*!

Seasave: File Types

SBE

What Files Does Seasave Create?

- Data file, *.hex* (ASCII representation of binary)
- Header file, *.hdr*
- Configuration file, *.con*
  - instrument configuration for cast of matching file name
- Mark file, *.mrk*
- Bottle file, *.bl*
- Navigation file, *.nav*
- *All these files have the same name as the .hex data file, with different extensions*

If you select *store on disk* for a file name of *MyFile*, Seasave creates the following files:

- *MyFile.hex* has an ASCII (text) representation of binary data in hexadecimal format plus the header in ASCII (text) at the beginning of the file.

AND

- *MyFile.hdr* has the header information only, in ASCII.

- *MyFile.con* has the instrument configuration and calibration coefficients.

- *MyFile.mrk* has data scans with the chosen mark file variables.

- *MyFile.bl* has scans that were collected when the bottle closure confirm was received (if a water sampler is used).

- *MyFile.nav* has navigational information collected during the cast

Note: Older versions (<6.0) of Seasave created a binary data file (.dat) instead of a .hex file during SBE 911*plus* data acquisition. *MyFile.dat* had binary data plus the header in ASCII (text) at the beginning of the file. The rest of the output files were the same as the current version of Seasave.

Seasave: Header Files

* Sea-Bird SBE 9 Raw Data File:
* FileName = H:\tests\USERS\mikev\Tau Test 2.hex
* Software Version Seasave Win32 v%s
* Temperature SN = 4022
* Conductivity SN = 4022
* Number of Bytes Per Scan = 14
* Number of Voltage Words = 0
* System UpLoad Time = Jun 11 2001 09:51:47
** Ship: RV TestBath
** Cruise: Tau test
** Station: Bellevue WA
** 11 Jun 01 bath 0 Tau Test with 19plus #2
END

Seasave: Mark Files

SBE

Mark Files: *.mrk*

- Contains 1 data scan for each time *Mark Scan* button is clicked (variables set up on Mark Variables tab of Configure Outputs)
- Same file name as data (*.hex*) file

```
e:\hot-101\0008A001.MRK:
        Scan    Pressure    TempP90   CondPS/m    SalnP,P
mark number 1, system time is Jan 15 1999 02:41:57
     44617    1021.872      4.1177    3.268962    34.4987
mark number 2, system time is Jan 15 1999 02:47:06
     52033     770.993      4.7046    3.294753    34.3185
```

Seasave: Bottle Data Files

SBE

Bottle Data File: *.bl*

- Created when water sampling is enabled
- Contains bottle fire sequence number and position, date and time, and beginning and ending scan number corresponding to 1.5-second duration for each bottle
- Data written to .bl file each time confirm bit in data stream is set or when a confirmation is received from water sampler

Whenever a bottle confirmation is received by Seasave from either the confirm status bit or via the modem port, a line is written to the output file with a .bl extension. This contains the bottle firing sequence number, bottle position, date, time, and beginning and ending scan number for the fired bottle. It is used in data processing to build up a larger file of data parameters collected while the water sampler was being closed.

Using Internally Recording Instruments for Real-Time Applications

SBE Real-Time Data With Internally Recording Instruments

- SBE 19, 19*plus*, or 25 may be used for real-time data; casts are recorded in instrument memory as well as on a computer by Seasave
- One method is to connect CTD directly to computer
  - This is for 1600 m sea cables and low baud rates (600 baud)
  - SBE 19 requires optional optical isolation for communication lines
- Another method is to deploy CTD with SBE 33 Deck Unit and SBE 32 Carousel Water Sampler or SBE 36 Deck Unit and PDIM
  - This is for 10000 m sea cables

SBE 19s may be outfitted with high power cable drivers and optical isolation for transmitting real-time data. The SBE 19*plus* and 25 come standard with this equipment. With the addition of a Deck Unit and associated underwater equipment listed above, the data telemetry is the same as discussed for the SBE 911*plus*.

Instrument Preparation for Real-Time Data Collection

SBE

Instrument Preparation for Real-Time Data Collection

- Check memory, clear if necessary
- Check batteries, replace if necessary
- Put instrument to sleep (QS)
  - SBE 19 and 25 do not perceive the magnetic switch if they are already awake

Water Sampling with Internally Recording Instruments

SBE   Real-Time Data For Internal
Recording With Water Sampling

- Water sampling requires SBE 33 Carousel
  Deck Unit and interface option in SBE 32
  Carousel Water Sampler
- Interface option in SBE 32 provides power
  at underwater package and telemetry similar
  to 9*plus*
- Allows data transmission over 10 km
  sea cables

The SBE 19, 19*plus*, and 25 can be equipped with water sampling equipment. The
SBE 32 Carousel and SBE 33 Carousel Deck Unit provide power and telemetry for the
CTD very similar to the 11*plus*/9*plus* setup. In addition to water sampling, this equipment
allows data telemetry over 10 km of sea cable and supplies more than enough power for
the CTD and auxiliary sensors.

Activity

SBE Activity: Take a *Bench* Cast

- Cable SBE 19*plus* to your laptop
- Run Seasave
- Check the display
  – Is it appropriate for the conditions of the "cast"?
- Click *Configure Inputs*
  – Instrument Configuration: Open your test.con file
  – Serial Ports: CTD Serial Port: COM port = COM1 (or other port as applicable), Baud Rate = 9600, Data bits = 8, Parity = None; Communication parameters for other ports not applicable
  – Water Sampler: Set Water sampler type to *None*
- Click *Configure Outputs*
  – Serial Data Out, Shared File Out, & SBE 14 Remote Display tabs: Disable outputs
- Click *Real-Time Data*, *Start*
  – Select *Store data on disk*
  – Store your data in C:\Data directory with file name *realtime*:   C:\Data\realtime.hex
  – Select your test.con file
  – Click *Start*
- Turn on SBE 19*plus* magnetic switch