

# **Operator's Manual for the Labview Net Plankton Acquisition software**

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## 1.0 General Information

This acquisition and control program is intended to be used with a Seabird SBE9Plus CTD mounted on a Towed NET frame along with an SIO built controller to trip the nets.

Main features:

- Acquires and stores Real-time data from the CTD.
- Controls the NET motor and sends commands to close Plankton nets.
- Acquires and stores Flow Meter and Net Trip data.
- Acquires and stores data from the GPS via RS232 or UDP ports.
- All data is displayed on strip charts and XY plots.
- Acquired data can be played back and displayed.
- Data is stored in the Seabird format so that it can be processed and viewed using the Seabird data processing software. In addition the Labview software uses Seabird XMLcon files to input Sensor calibration coefficients.
- Produces a standard formatted Proc file and supplementary NET data files.
- Currently supports the Seabird SBE 911Plus CTD system as the acquisition instrument and deck unit.
- Supports dual T&C sensors. Sensors can be pumped or not pumped.
- Supports sensors that can be plugged into Seabird CTD's such as Fluorometers, transmissometers, oxygen sensors, altimeters, PAR sensors etc.
- Utilizes an SIO/STS built Plankton NET interface located on the frame to control the Net tripping motor and acquire data from the flowmeter and net response sensors.

- Utilizes an SIO/STS built NET Angle sensor that is mounted directly on the frame.
- Ability to monitor Net Release motor and CTD voltages during the tow.
- Supports an additional flowmeter.
- Supports the use of two confirmation (RSP) switches.
- The Net Release motor is powered through the CTD - not by a battery pack.

## 1.2 Minimum Systems Requirements

Windows 7/8/10/xp 32 or 64 bit

Minimum monitor display resolution 1980x1080

3 or more RS232 serial ports

## 2.0 System setup

There are two installer programs. The primary installer (Lvpki\_vxxx\_Installer.exe) contains the program and drivers. It is used if the Labview drivers are not already installed. The ND version (Lvpki\_vxxx\_Installer\_ND.exe) is a smaller file and contains just the program and is used if the drivers are already installed. After the installer has completed restart the PC.

Make a folder called C:\LVpki. Create a xmlcon file using Seabird's Seasave program for the CTD and sensors that are installed on the plankton net frame and put it into C:\LVpki.

There is an optional installer called LV\_Datafolder.exe that will make the C:\LVpki folder and will put a basic set of data files along with the documentation into the data folder structure. In the C:\LVpki\XML folder there is a NET\_Angle.xml file that can be imported into the XMLcon file using Seasave. Choose User polynomial for the sensor type and import NET\_Angle.xml for V0 and User polynomial2 and import NET\_Roll for V1.

Connect the serial cable between the SBE11 deck unit and the CTD\_Port port on the PC. Connect another serial cable between the 300 baud modem port on the deck unit and the selected serial port on the PC. Connect the NMEA serial cable between the GPS source and the selected serial port on the PC. Depth sounder or gyro NMEA messages can be added by selecting additional NMEA ports. NMEA messages can also be acquired through UDP ports instead of serial ports.

On the underwater package the flowmeter(s), motor and response switch should be connected to the STS modem interface. The STS modem interface connects to the SBE9 CTD modem connector. The CTD T&C sensors are installed as usual and connected to the CTD. All components are powered from the SBE9 CTD. The NET Angle and NET Roll sensors are plugged into one of the A/D ports on the CTD as configured in the XMLcon file.

On Windows systems be sure to add Lvpki.exe to the list of excluded processes in the anti-virus

configuration settings.

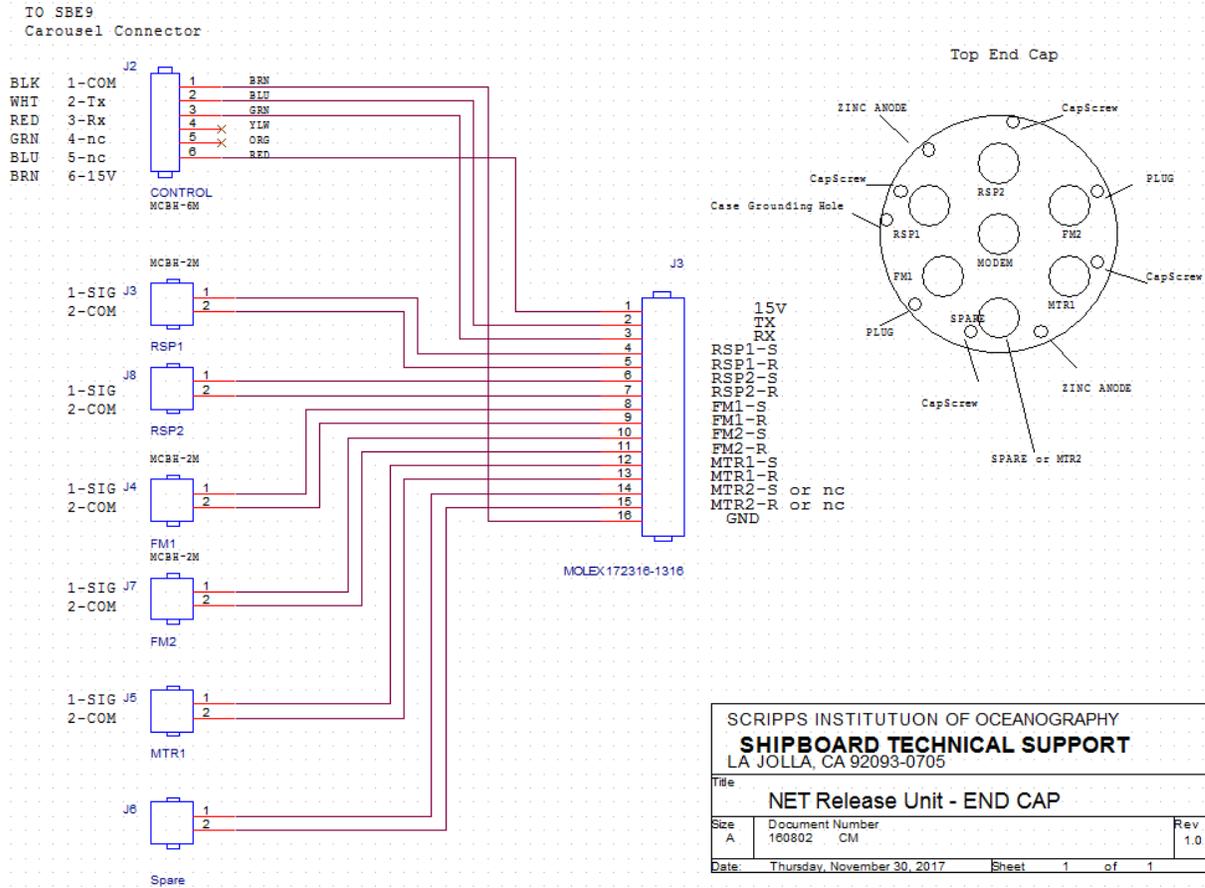


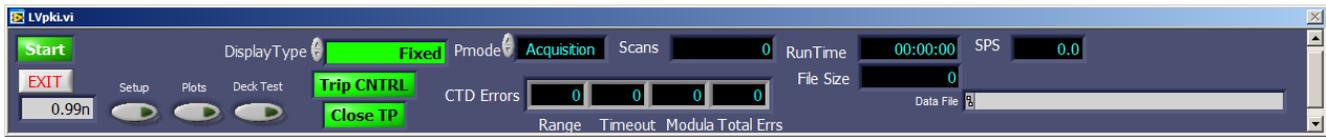
Illustration 1: System Hookup Diagram

## 2.1 Net Angle Sensor

The net angle sensor should be mounted flat so that when the frame is laying horizontal on the deck the connector of the net angle sensor should be up and the arrow is pointing toward the direction of the tow which is toward the front of the frame or bow of the ship. The square base is intended to mount downward and bolted to the frame so that the base is in the same horizontal plane as the frame, the flat side of base that is on the same side as the arrow is oriented to point to the front of the frame and perpendicular to the long side of the frame.

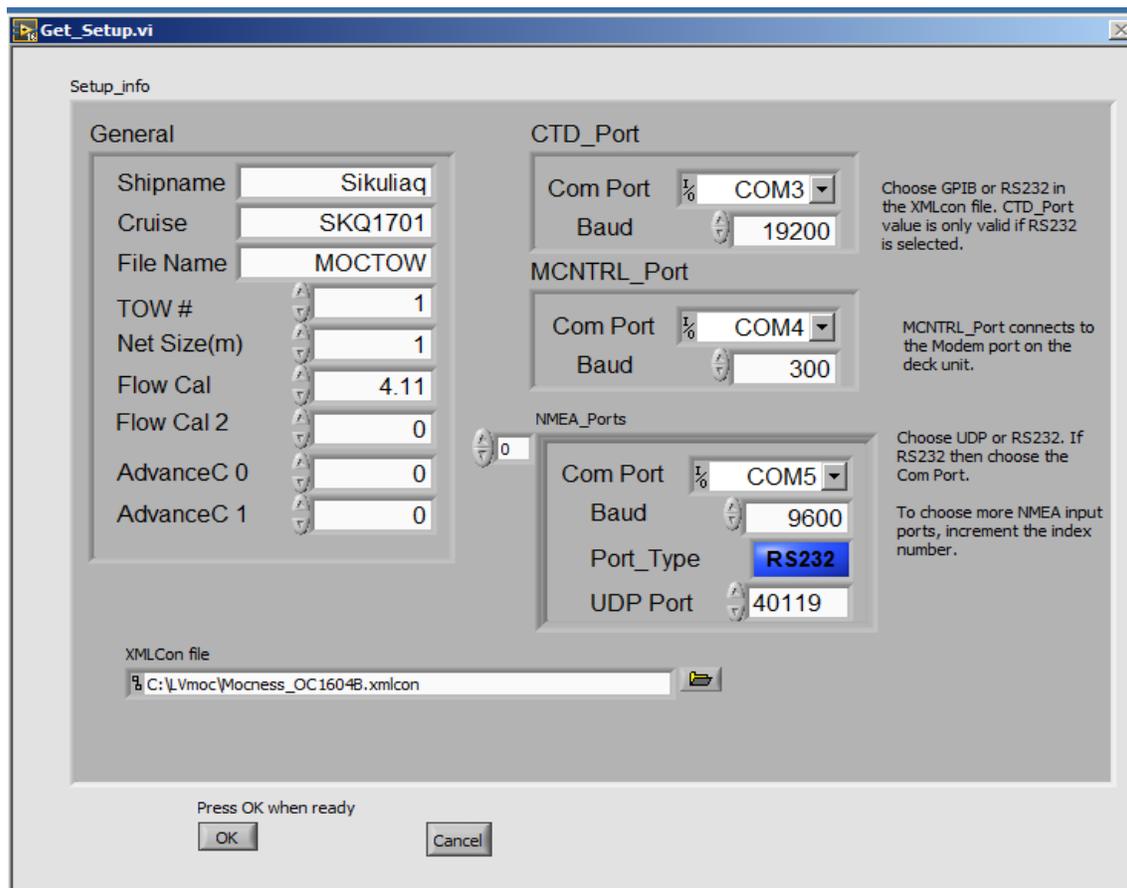
When the frame is sitting flat (horizontal to the deck) then the net angle will read 90 deg and when the frame hangs vertical so that the arrow is pointed straight up then the angle should read 0 deg.

## 3.0 Program Operation



### 3.1 Setup for the Tow

Run the LVpki program. The LVpki control panel will appear. Click on the “Setup” control. A configuration window will appear.



Select the desired XMLcon file. If this file does not exist then a new one can be made using the Seabird Seasave program or the MK-XMLcon program. Next enter the Ship-name, CruiseName, File Name, Tow number, Net Size, Flowmeter calibration factor and AdvanceC0 AdvanceC1 values. If the T&C sensors are not pumped then enter 0.0 for both values. If they are pumped using the Seabird SBE5T pump then enter 0.073 for both values.

If the deck unit is connected to the PC using GPIB then that needs to be indicated in the XMLcon file using the selected XMLconfile builder program. If GPIB is selected then the CTD\_Port serial data section is ignored. Next enter the serial port number for the MCNTRL\_Port. And lastly enter the serial port number for the NMEA data. Optionally you can input this data using a UDP port instead of serial.

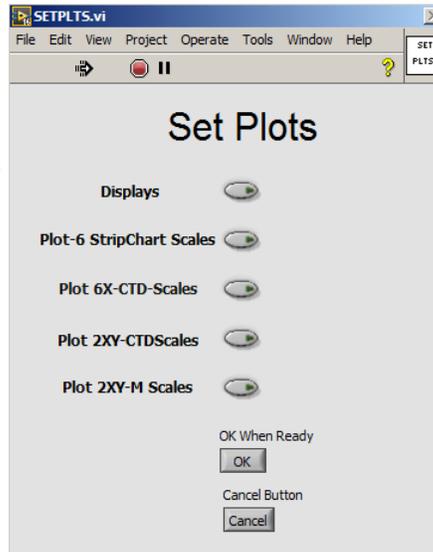
### 3.1 Deck Test

The Deck Test control allows testing of the Net Release motor, FlowMeter and Response switches without having to start a full acquisition. First turn on the SBE11 deck unit. Ensure that the data indicator on the deck unit is green and that there are no errors. Click on the “Deck Test” button. The NET TRIP window will appear. The data from the underwater unit will be displayed in the Modem Data indicator. This will indicate that a connection has been established. The Motor Volts and CTD Volts will also be displayed. When ready to test trip a net click on the Trip NET button. The Trip in Progress and Motor ON indicators will come on. The Trip in Progress signal is an acknowledgment that the underwater unit has received the TRIP command. The Motor ON indicator confirms that power has been applied to the motor. If either indicator does not come on then it means that the NET did not trip. The lack of a Trip in Progress signal could indicate a communications/connection problem. The lack of the Motor ON signal could mean a hardware problem. Trip a NET and then flip the RSP switch to ensure that the confirmation is functional. Spin the flowmeter to ensure that flow counts increment. If desired press the Reset Trip or Reset Flow counts to ensure that the count gets reset properly The Motor can be Single stepped by clicking on the Single Step Motor control. To prevent accidental resets then lock the reset controls by clicking on the lock button. It can be unlocked again by clicking on the unlock button. When finished testing click on small stop button in the lower right corner. At this time time the deck test feature only tests the functionality of the PKI interface unit. It does not test the CTD data. In order to check the CTD then it is necessary to start the lvpki program normally and select a data file for testing purposes.



### 3.2 Setup Plots

The plots can be setup in advance of the tow. Press the “Plots” button. These plots can also be modified anytime during the tow by clicking on the Plot Scales on the currently displayed page.



### 3.3 Acquisition

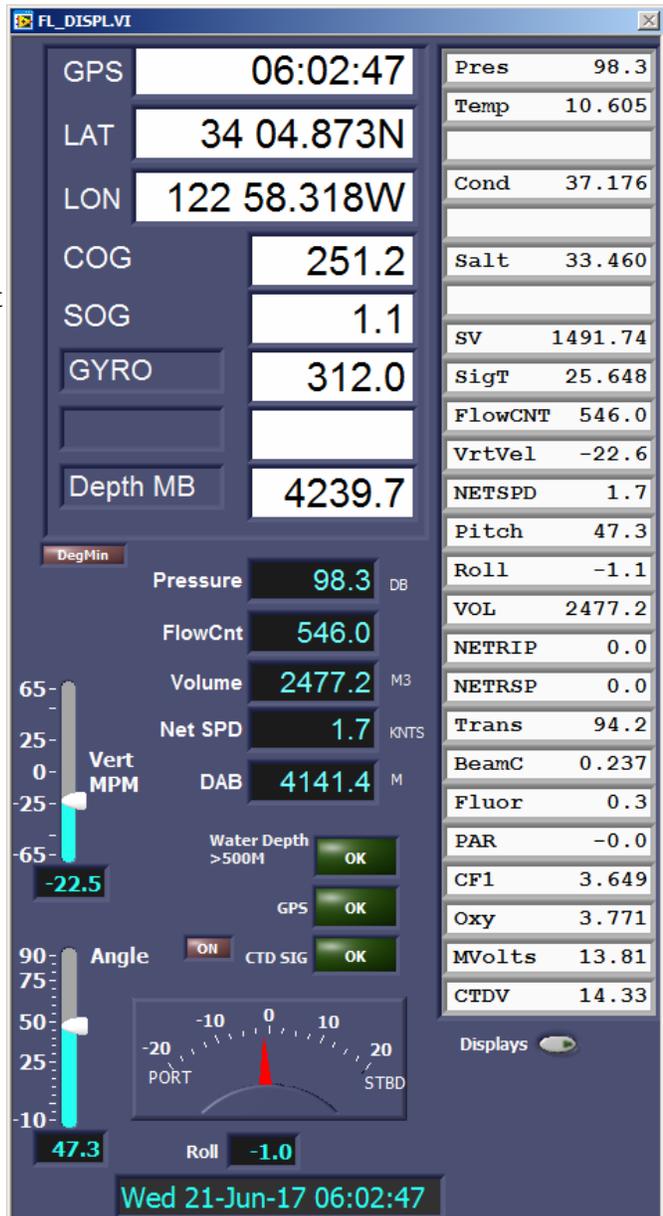
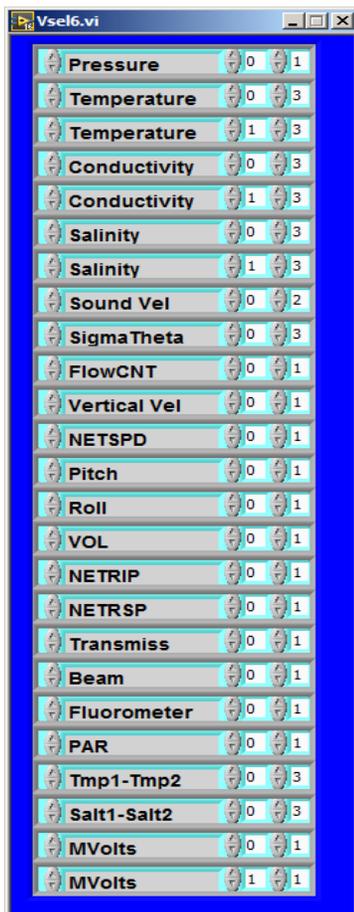
When ready to start the system open the LVpki program. Click on the Setup control in the lower left and setup the cast parameters as well as selecting the XMLcon file. In the middle of the panel there is a control labeled Pmode. It should be set on Acquisition. On the upper left side of the panel is a control with a green background labeled Start. First turn on the SBE11 deck unit. Ensure that the data indicator on the deck unit is green and that there are no errors. Click on the Lvпки Start button. A small popup will appear – Click on the OK button.

Once data is being acquired observe the indicator labeled CTD Errors located near the bottom of the screen. If all is well there should be no errors. If there are timeout errors it indicates that the data is not coming into the program and the connections should be checked to see if they are properly connected and that the deck unit is connected to the underwater unit. If there are modula errors then the settings in the XMLcon file should be checked. If there are no errors then look at the SPS indicator. It should read 24 if there are no frames averaged in the deck unit. If frames are averaged it should read 24 divided by the number of frames averaged. The Runtime and Scan indicators should also be incrementing.



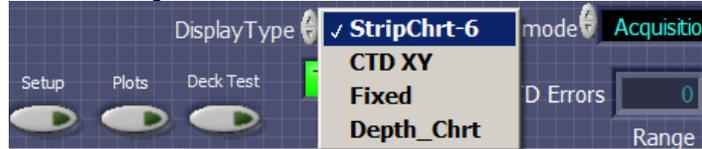
On the upper left panel, GPS data should be displaying. Near the bottom of the panel the Net Angle indicator should be seen. There are two green warning indicators that will flash red if there is a problem with either the CTD or NMEA signals. Latitude and Longitude can be displayed in either traditional or decimal format by clicking on the DegMin or Decimal button

Click on the “Displays” Control to select parameters in the display box on the right.

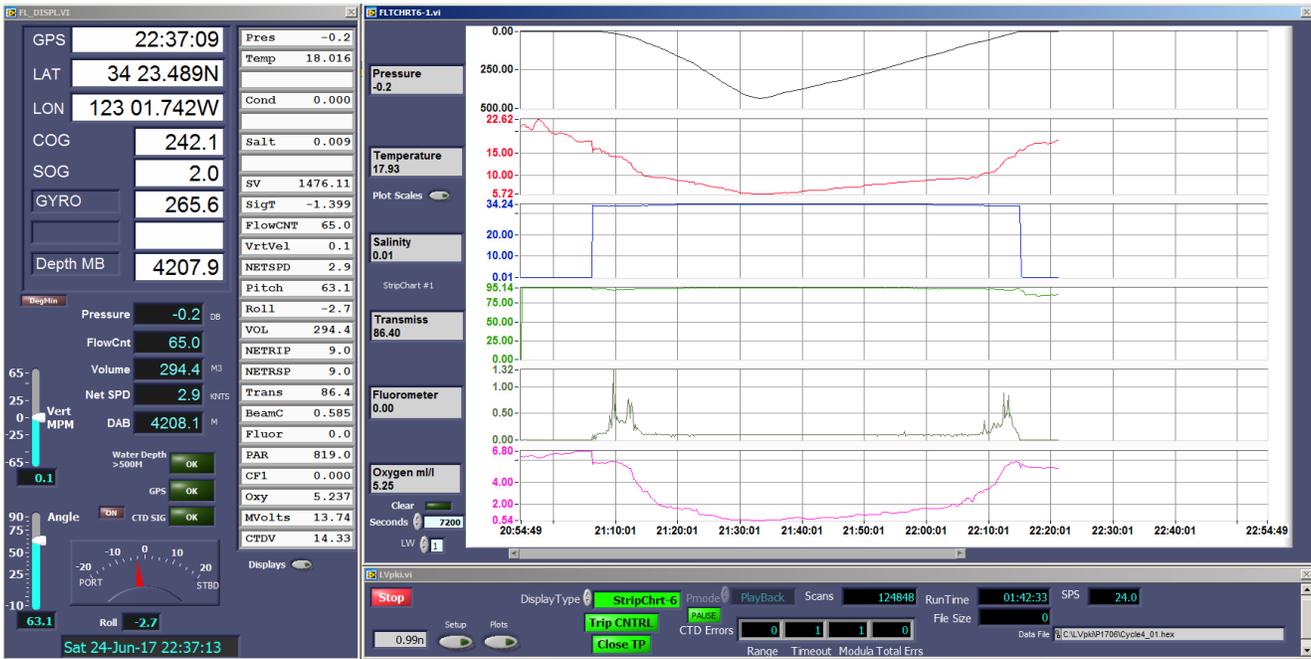


Different pages can be selected by clicking on the control labeled DisplayType. There are four choices.

1. Stripchart – 6 stripcharts are displayed that plots data vs time.
2. CTD XY - A Multi XY plot that plots data vs CTD Depth
3. Fixed - CTD data in tabulated form
4. Depth Chart – Depth vs Time strip chart

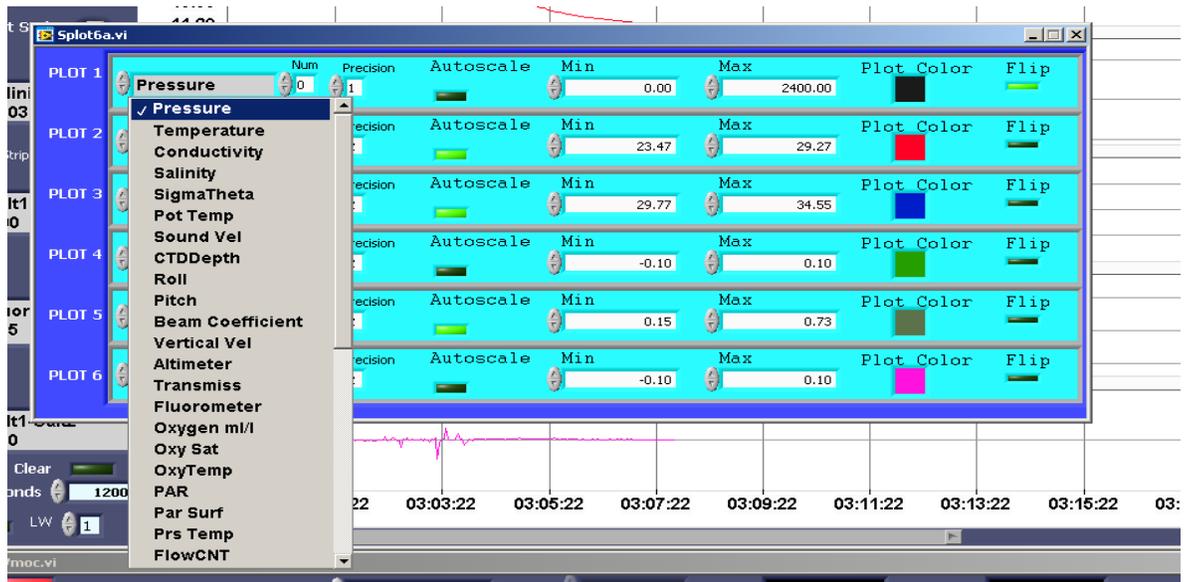


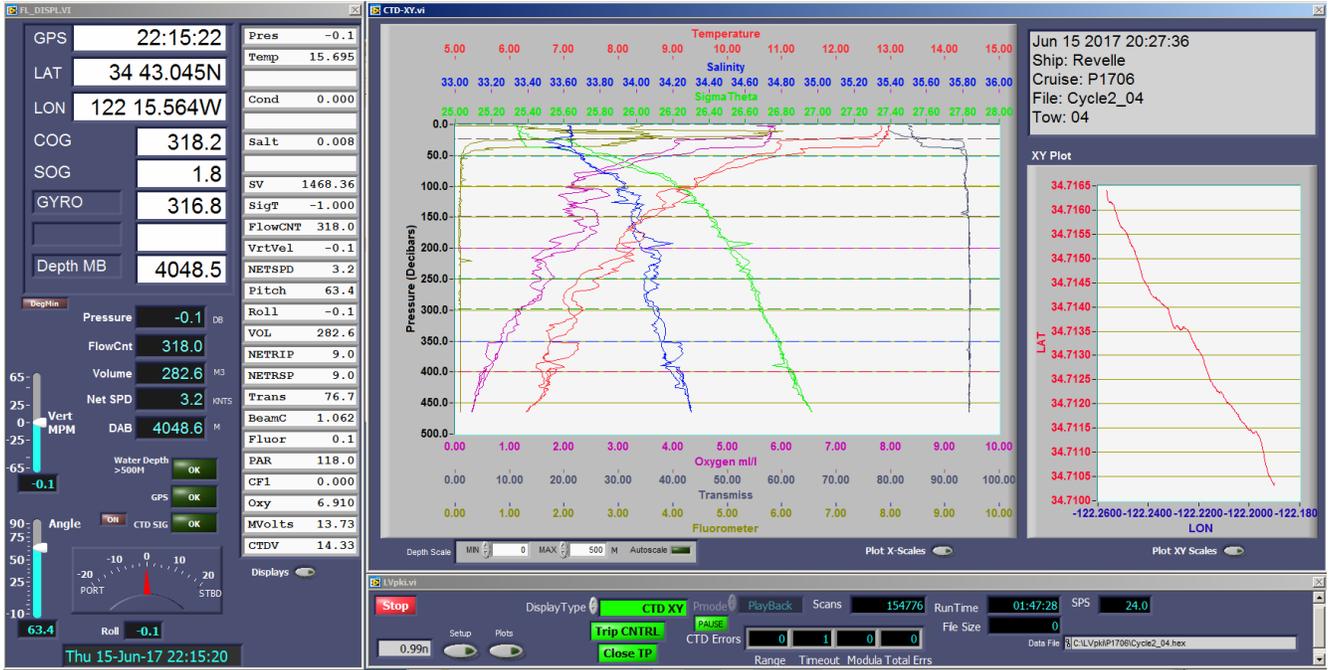
Stripchart plots



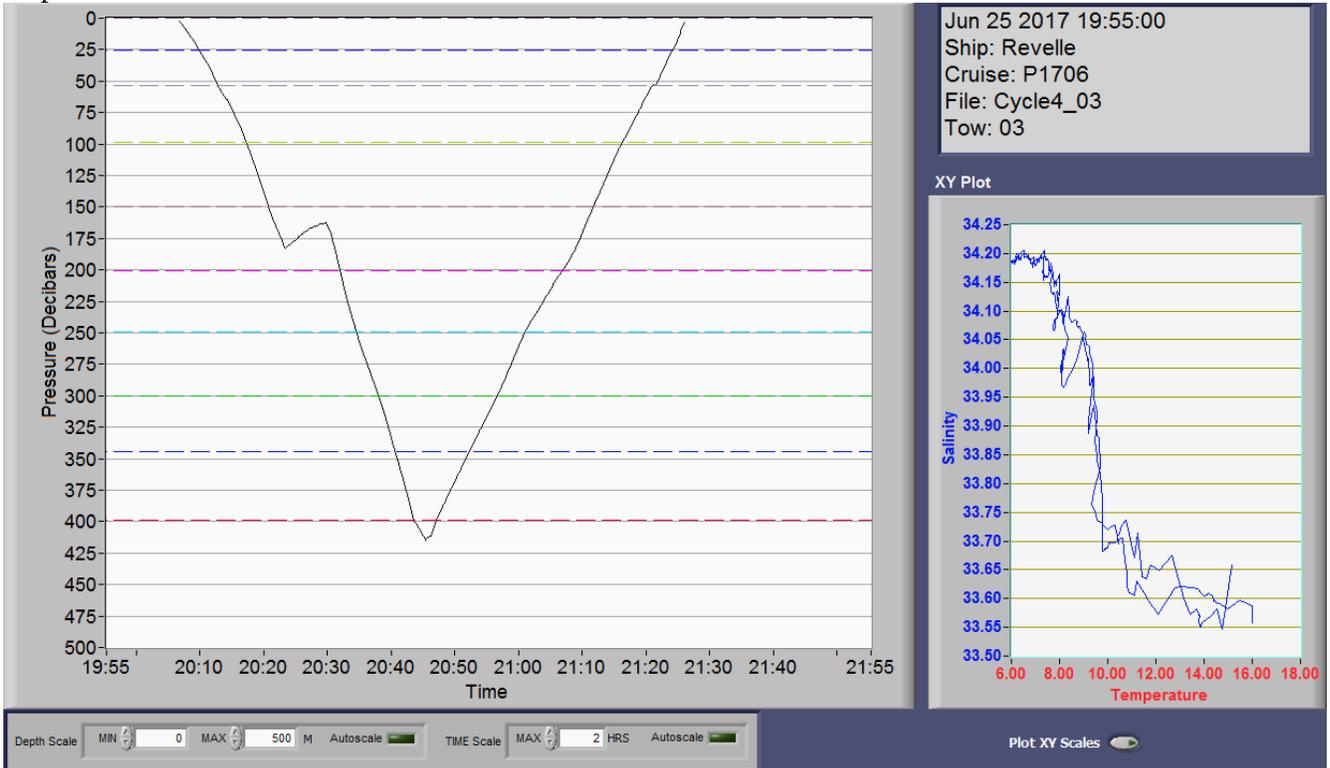
Plot Scales Control

CTD XY Plot





Depth Vs Time



### 3.4 NET Trip

The NET trip control window can be brought up by clicking on the Trip CNTRL button located on the lower main panel. In this window the Net Trip info is displayed along with Flow count data from the Flowmeter. The operation of this panel is the same as the description in the Deck Test section. When ready to trip a net press the green Trip NET button. Once it is pressed the on the Trip in Progress indicators will come on. This indicates a NET trip is in progress. When the NET response switch is toggled signaling that the Net has closed then the confirmation indicator will come on. If the response switch does not toggle within 60 seconds then the confirmation indicator will not change and the Trip in Progress indicator will go out. The Net Trip data from both the Trip signal and the response signal is recorded in the data file. If desired then the operator can select the Manual Confirm button to confirm the NET closure. NET confirmations are indicated by a colored dashed line on both the CTD XY plots and the Depth Profile Strip Chart pages.

### TRIP CONTROL

	Trip RSP	Date	Time	Pres	Net Angle	Flow Cnts	Volume
1		170620	063418	398.9	29.2	557	3329.6
2		170620	063716	350.3	31.3	56	318.5
3		170620	064249	300.7	38.2	104	553.2
4		170620	064822	250.4	38.9	116	605.8
5		170620	065323	201.1	40.3	112	569.9
6		170620	065855	150.4	39.5	119	612.4
7		170620	070321	99.9	37.3	99	524.1
8		170620	070653	49.7	40.9	82	416.0
9		170620	070851	26.4	42.0	47	232.5

Trip Count  Flow Cnts  Flow Cnts 2

Confirms  VOL

Modem Data

Motor Volts

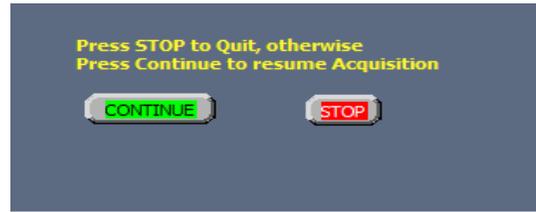
CTD Volts

Trip in Progress

Motor ON

### 3.5 Ending the TOW acquisition

When the acquisition is over click on the STOP button and verify that you want to end the acquisition. When the program stops it will create a hard-copy of the XY plot and put it in the in the images sub-folder.



## 3.6 Playback Mode

To play back a data file change the Pmode control to Playback. Next click on Setup and select the XMLcon file that is associated with the data file that is intended to be played back. This file may be located in the same data folder as the HEX and MCN files. Click on Start and navigate to the desired HEX data file and click ok.

The program will read the data from both the HEX and MCN files and display the data on all display pages, strip charts and XY plots. After finished viewing the played back data click on STOP and the plots will terminate and a hard-copy of the XY plot will be placed in the images sub-folder.

## 4.0 Data Files

The Lvpki Acquisition program produces seven different files for each NET Tow deployment. The files are written into [C:\LVpki](#) in a sub-folder by cruise name. The First four files are Seabird formatted files. The last three are specific to NET Data.

1. Hex file – Main data file from the Seabird SBE9 CTD.
2. HDR file – Header information – Seabird format.
3. BL file – Trip info - Seabird bottle format.
4. XMLCON file – XMLcon file copy.
5. NET file – NET Trip data in text format.
6. PROC file – Traditional Processed data file.
7. MCN file – contains all other related data that is not included in the Hex file.

Information on the formatting content of the HEX, HDR and BL files can be found in the Seabird Seasave manual. The PRO processed data file is created during the real-time data acquisition during a deployment. This file can also be created during the Playback mode while playing back and displaying archived data files. The file created during acquisition is indicated by an 'A' at the end of the filename but before the extension e.g. HAUL\_03A.PRO. The file created during data playback is indicated by a 'P' e.g. HAUL\_03P.PRO. This is useful in case change(s) have been made to the calibration coefficients after the data was acquired. Each data line in the PRO file is recorded at a rate of one data line per second.

The MCN data file is an ascii text file:

21 Fields delimited by commas recorded at one data line per second.

1. Date yymmss
2. Time hhmmss
3. System Time (Seconds since 1/1/1970)
4. Flow counts
5. Volume M3
6. NET Trips
7. NET Response
8. NET Speed (Knots)
9. NET Angle
10. Latitude
11. Longitude
12. COG Course over ground
13. SOG Speed over ground (Knots)
14. Gyro
15. Water depth – (Meters)
16. GPSTime
17. Speed Log (Knots)
18. Motor Volts
19. CTD Volts
20. Flow Counts 2 (From 2<sup>nd</sup> Flowmeter)
21. Volume 2 M3 (From 2<sup>nd</sup> Flowmeter)
22. CTD Pressure (DB)

NET Angle and NET Roll are also recorded in the HEX file as this sensor plugs directly into the CTD.

### MCN File example:

170626,065743,1498460264,18,82.51,8,8,2.6,46.6,34.49209,-122.98498,277.9,2.1,284.2,4165.9,25061,-99.0,13.15,14.33,0,0.00,43.3,97234  
170626,065744,1498460265,18,82.51,8,8,2.6,46.6,34.49209,-122.98499,281.7,2.1,284.2,4165.9,25062,-99.0,13.15,14.33,0,0.00,43.2,97258  
170626,065745,1498460266,20,82.51,8,8,2.6,46.6,34.49209,-122.98500,283.6,2.2,284.1,4165.9,25063,-99.0,13.18,14.33,0,0.00,43.1,97282  
170626,065746,1498460267,20,91.47,8,8,2.6,46.6,34.49210,-122.98502,283.4,2.2,284.1,4165.9,25064,-99.0,13.18,14.33,0,0.00,42.9,97306  
170626,065747,1498460268,20,91.47,8,8,2.6,46.6,34.49210,-122.98503,285.7,2.3,284.1,4165.9,25065,-99.0,13.18,14.33,0,0.00,42.6,97330  
170626,065748,1498460269,20,91.47,8,8,2.6,46.6,34.49210,-122.98504,289.1,2.3,284.1,4168.0,25066,-99.0,13.18,14.33,0,0.00,42.4,97354

### The NET Trip File format is as follows:

NET FILE:Cycle4\_04\_net.txt

Jun 26 2017 05:50:05

Ship: Revelle

Cruise: P1706

File: Cycle4

Tow: 04

Date	Time	TC	CNF	FC	VOL	Pres	Temp	Cond	Salinity	Fluor	Trans	Oxy	Angle
170626	062915	1	1	302	1732.70	399.4	6.438	34.2433	34.216	0.09	94.90	0.502	32.2
170626	063319	2	2	91	461.56	349.5	6.878	34.6009	34.197	0.09	94.95	0.652	40.5
170626	063652	3	3	88	439.88	300.6	7.212	34.8546	34.167	0.09	94.92	0.899	41.4
170626	064143	4	4	121	586.14	250.4	7.680	35.2334	34.142	0.09	94.90	1.154	43.5
170626	064542	5	5	108	520.44	200.7	8.064	35.5008	34.078	0.09	94.80	1.716	43.7
170626	064908	6	6	74	330.10	150.2	8.903	36.2176	34.050	0.09	94.55	1.905	48.0
170626	065314	7	7	76	339.78	100.7	9.574	36.6732	33.907	0.09	94.46	2.149	47.8
170626	065702	8	8	76	338.46	51.1	10.658	37.4201	33.676	0.16	94.29	3.513	48.1
170626	065928	9	9	64	292.24	25.4	13.379	39.8705	33.610	0.27	93.41	5.402	46.7

TC – Trip Count

CNF – Confirmation Count

FC - Flow Counts

VOL - Volume

Pres - Pressure(DB)

Temp -Temperature Deg C

Cond Conductivity S/M

Salinity PSU

Fluor -Fluorometer ug/l

Trans - Transmissometer %

Oxy - Oxygen ml

Angle – NET Angle