

<b>WinFrog Device Group:</b>	<b>ROV</b>										
<b>Device Name/Model:</b>	<b>CRABBS Sonsub</b>										
<b>Device Manufacturer:</b>											
<b>Device Data String(s) Output to WinFrog:</b>	See Telegram Specification section below.										
<b>WinFrog Data String(s) Output to Device:</b>	See Telegram Specification section below.										
<b>WinFrog Data Item(s) and their RAW record:</b>	<table> <tr> <td>ROV DATA</td> <td>496</td> </tr> <tr> <td>BOTTOMDEPTH</td> <td>411</td> </tr> <tr> <td>HEADING</td> <td>409</td> </tr> <tr> <td>ATTITUDE</td> <td>413</td> </tr> <tr> <td>ROV REF VEH</td> <td>NONE</td> </tr> </table>	ROV DATA	496	BOTTOMDEPTH	411	HEADING	409	ATTITUDE	413	ROV REF VEH	NONE
ROV DATA	496										
BOTTOMDEPTH	411										
HEADING	409										
ATTITUDE	413										
ROV REF VEH	NONE										

### **DEVICE DESCRIPTION:**

This device is designed to read ROV type data from the CRABBS Sonsub ROV and to output positional data for the ship and ROV to the CRABBS system.

## ***DEVICE CONFIGURATION INSTRUCTIONS***

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### **WINFROG I/O DEVICES > EDIT I/O:**

Serial  
Configurable Parameters

### **WINFROG I/O DEVICES > CONFIGURE DEVICE:**

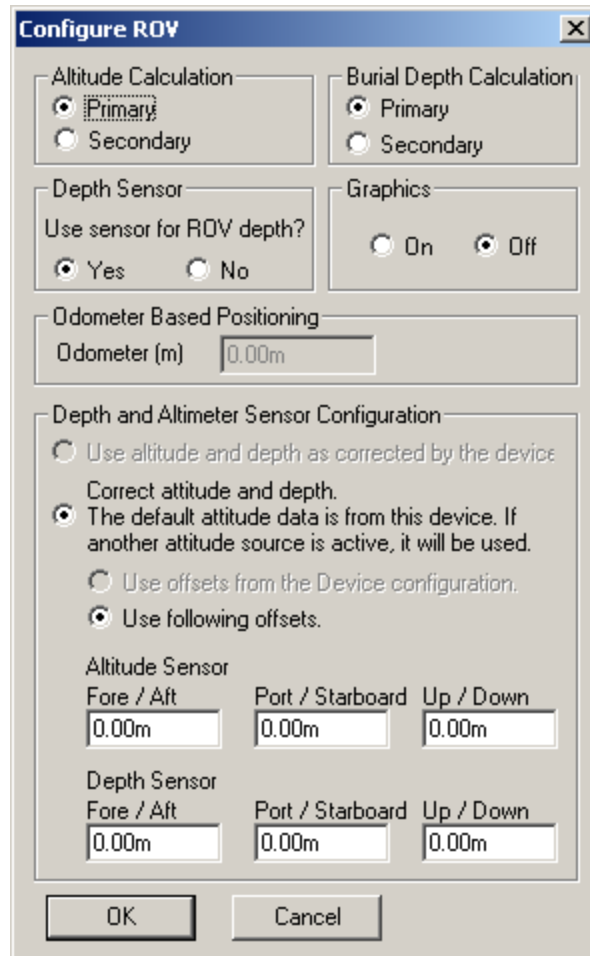
No configuration is required at the I/O Device window level.

### **WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:**

Adding the CRABBS Sonsub device creates five data items: ROV DATA, BOTTOMDEPTH, HEADING, ATTITUDE and ROV REF VEH. Once the data items have been added to the vehicle, they must be edited to suit the application.

#### **Data item: ROV, CRABBS Sonsub, ROV DATA**

This data item is designed to read specific ROV type data from this device. Highlight this data item in the ROV's device list and click the Edit button to open the Configure ROV dialog box as seen below.



**Altitude Calculation:**

Primary will result in this vehicle’s altitude being determined from the observed altitude value found in the string from this device minus the altitude offset also found on this dialog. This value can be displayed in the Vehicle Text window as ROV Alt.

Secondary will result in no calculation or assignment of the vehicle’s altitude from this device. The raw data is still always recorded.

**Burial Depth Calculation:**

Primary will result in the burial depth (if applicable) being determined from the observed burial depth value found in the string from this device. This value will be assigned to the vehicle.

Secondary will result in no calculation or assignment of the burial depth from this device. The raw data is still always recorded.

**Graphics:**

Select the On radio button to display the device name and a square at the location of the hydrophone, within the Graphics and Bird’s Eye windows.

**Use sensor for ROV depth:**

Selecting the Yes radio button will cause the depth of this vehicle's CRP to be determined from the observed depth value found in the string from this device plus the depth offset below. This vehicle's elevation will be the negative of this value. This value will be used to calculate the bottom depth.

The bottom depth will be determined as:

Observed depth + Depth Offset + observed altimeter - altitude Offset

The offsets (see below) are not corrected for pitch and roll when determining the water depth.

Selecting the No radio button will result in this device obtaining the depth of the CRP from the vehicle itself, as opposed to assigning it to the vehicle as above. You must assign another device to determine the depth of the vehicle (e.g. USBL and assigning it as the source for depth).

Note: The observed altimeter value is always used for depth determination regardless of the prime/secondary altimeter setting.

**Odometer Based Positioning:**

This is only used by the ROV device Sonsub Innovator3.

**Depth and Altimeter Sensor Configuration:**

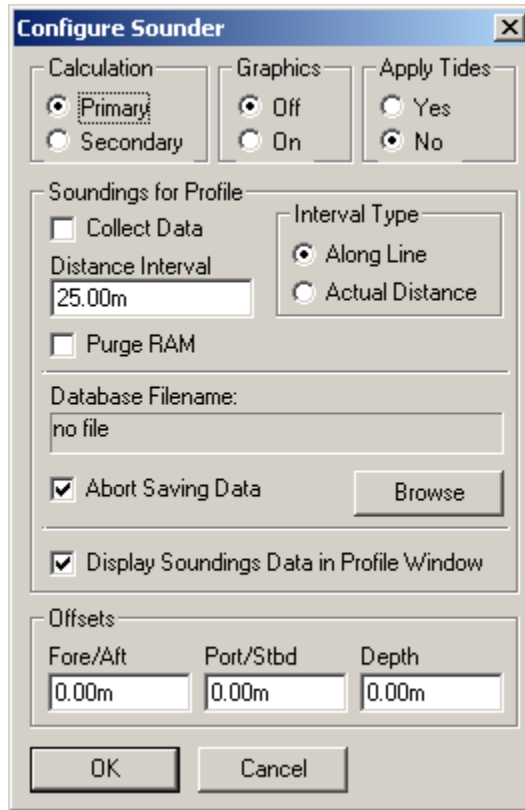
For all ROV devices except Deep Blue ROV, the radio button settings cannot be changed. See the Deep Blue ROV device documentation for information on setting these radio buttons.

Vertical offsets of the altitude and depth sensors, relative to the CRP, can be entered here. The Altitude Offset is the vertical distance (positive up) from the ROV's CRP to the acoustic beacon tracking the seafloor. The Depth Offset is the vertical distance (positive up) from the ROV's CRP to the sensor that provides depth information of the ROV.

The offset position will be corrected for pitch and roll then the vertical offsets will be applied to determine the depth of the ROV and height of the ROV above the bottom.

**Data item: ROV, CRABBS Sonsub, BOTTOMDEPTH**

If the bottom depth data from this device is deemed accurate then this data item can be added to the ROV's device list. Highlight the BOTTOMDEPTH data item in the vehicle's device list and click the Edit button to open the Configure Sounder dialog box as seen below.



**Calculation:**

Set the type of calculation to Primary or Secondary using the appropriate radio button. WinFrog will only utilize (i.e. display and record) data from a Primary depth sensor device. If there is more than one Primary depth sensor attached to a vehicle's device list, WinFrog will not mean the data (as is done with positional devices), but rather alternate between the devices. Data from a Secondary status depth sensor will simply be monitored.

**Graphics:**

Select the On radio button to display a labeled square representing the location of the depth sensor in the Graphics and/or Bird's Eye windows.

**Apply Tides:**

If the Yes radio button is selected, WinFrog will apply tidal corrections to the observed water depths. Depths displayed in the Vehicle Text window and recorded in automatic event (i.e. .DAT, .SRC, and .RCV) and type 351 raw files will refer to the datum corrected depths. Note that type 411 raw data records will remain truly raw and will not reflect the tide correction.

The tide information can be supplied by a real time telemetry system or by predicted tide files. Either way, the tide "device" must also be attached to the same vehicle's device list. For more information, refer to documentation on Tide devices.

### **Soundings for Profile:**

This section of the Configure Sounder dialog permits the collection of sounding data to an .mdb database file for display in WinFrog's Profile window. This collection is completely separate from automatic event or raw data collection.

#### **Collect Data**

Select this checkbox to enable the collection of data to an .mdb database file.

#### **Interval Type**

Select to utilize either Along Line or Actual Distance (i.e. between successive position updates) calculations for data collection intervals. Selecting Along Line requires that you also enable survey line tracking.

#### **Distance Interval**

Specify the distance interval at which the data will be collected.

#### **Purge RAM**

Sounding data is stored in the RAM memory of the computer. Any data collected which will not be required at later time can be deleted by selecting the Purge RAM checkbox, then clicking the OK button to exit the dialog box.

#### **Database filename**

Click the Browse button to define where and to what filename the .mdb file will be written. The file name and location is displayed in this window.

#### **Abort Saving Data**

Select this checkbox to abort saving data to the .mdb file. In other words, to save data to the .mdb file ensure that this box is NOT checked.

#### **Display Soundings Data in Profile Window**

Select this checkbox to enable the display of this data in WinFrog's Profile window.

### **Offsets**

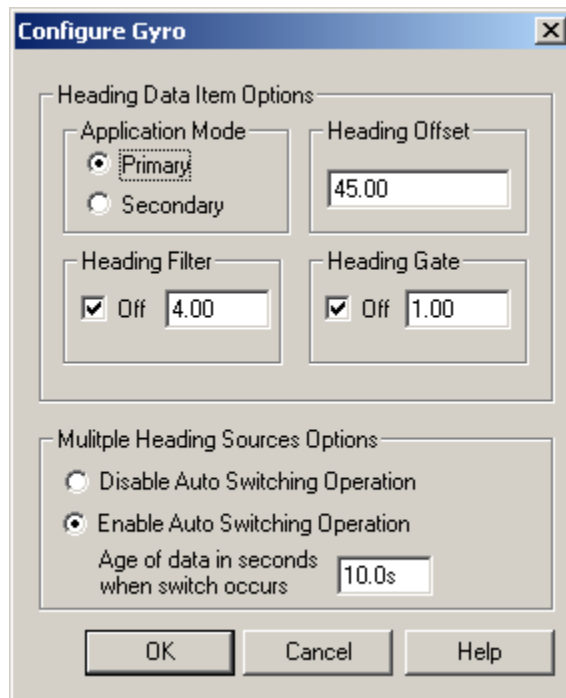
This section of the dialog allows for entry of offset values as measured from the vessel's Common Reference Point (CRP). Note that the Fore/Aft and Port/Stbd offsets are used for "cosmetic" visual purposes only: A depth sensor is not a positioning device, and hence its horizontal offsets have no application. If the depth sensor's position is to be recorded correctly, you must create and enable a vehicle Tracking Offset for that specific location. The offsets entered here can simply be used as a means of graphically confirming that the Tracking Offset values have been entered correctly.

The Depth Offset is applied; the entered value will be added to the received depth sensor data.

Depths displayed in the Vehicle Text window and recorded in automatic event (i.e. .DAT, .SRC, and .RCV) and type 351 raw files will refer to the corrected depths. Note that type 411 raw data records will remain truly raw and will not reflect the depth offset correction.

### Data item: ROV, CRABBS Sonsub, HEADING

If the heading data from the CRABBS Sonsub is deemed to be accurate this data item can be used to orient the ROV. Highlight this data item in the ROV's device list and click the Edit button to open the Configure Gyro dialog box as seen below.



#### Heading Data Item Options:

##### Application Mode(Primary/Secondary):

Set the type of calculation to Primary or Secondary by selecting the appropriate radio button. Devices set to Primary are used to provide the vehicle heading information. Devices set to Secondary are simply monitored, and are not used in the vehicle's calculations.

Note that WinFrog supports automatic switching from a designated Primary to a Secondary in the event that data from the Primary fails (see Multiple Heading Sources Options).

##### Heading Offset:

A correction value (as determined from a gyro calibration) can be input in the Heading Offset box. This value is added to the heading value from the device to

provide a corrected heading for the vehicle. Note that positive or negative values can be entered.

**Heading Filter/Heading Gate:**

The Heading Filter is used to “smooth” heading values used by the vehicle. The value entered in the Heading Filter indicates the number of headings that will be used to predict the next heading value. The larger the value entered, the “heavier” the filter will be – i.e. the slower the vehicle’s heading will respond to changes.

The Heading Gate defines a tolerance value to limit the use of anomalies in gyro readings. If the next observed gyro value received falls outside the specified range of predicted values (i.e. plus or minus the entered value), the value will not be used.

**Multiple Heading Sources Options:**

WinFrog supports automatic switching from a designated Primary source to an alternate Secondary source in the event that the Primary fails. The first Secondary source to receive data after the Primary has failed becomes the alternate Primary providing the heading for the vehicle. When the designated Primary is detected as active again, the alternate Primary source reverts to Secondary and the designated Primary provides the heading data to the vehicle.

If an alternate Secondary fails and there are additional Secondary sources, it in turn is detected by the first of the remaining operational Secondary sources to receive data after the failure, at which time this Secondary becomes the alternate Primary.

Note that this option is only available if more than one HEADING source is associated with the respective vehicle. Changes made to the Auto Switching options for any one of the HEADING data items are automatically assigned to the others upon exiting this dialog with OK. If the Auto Switching option is enabled and the respective HEADING source has been set to Primary, all others are automatically set to Secondary. The exception to this is when configuring a WinFrog Controlled Remote (WinFrog with a Remote module) from a Controller. In this case, changes made to one HEADING source are not automatically made to other HEADING sources. The operator must explicitly make them for each HEADING source.

This option is not available in the WinFrog Remote package.

**Disable/Enable Auto Switching Operation:**

Select the mode you wish to operate WinFrog.

**Age of data in seconds when switch occurs:**

Enter the age of data that is permitted before the source is considered to have failed.

## Data item: ROV, CRABBS Sonsub, ATTITUDE

If the pitch and roll data is to be used then this data item can be added to the ROV's device list. Highlight the ATTITUDE data item and click the Edit button to open the Attitude dialog box as seen below.

The screenshot shows the 'Attitude' dialog box with the following settings:

- Application Control:**
  - On  Off
  - Do not use data if error flag is set
  - High frequency update rate (apply interpolated data)
  - Low frequency update rate (apply closest data)
- Pitch Controls:**
  - Pitch Correction (d.dd) (+ is Bow Up): 0.000000
  - Filter incoming data
  - Filter Length (Max 30 samples): 30
  - Data rejection threshold +/- the filter median value (d.dd): 10.00
- Roll Controls:**
  - Roll Correction (d.dd) (+ is Starboard Down): 0.000000
  - Filter incoming data
  - Filter Length (Max 30 samples): 30
  - Data rejection threshold +/- the filter median value (d.dd): 10.00
- Primary Attitude Device Selection:** (Empty dropdown)
- Primary Device Auto Switch:**
  - On  Off
  - Age of data when switch occurs: 20.00
- Offsets:**
  - Fore/Aft: 0.000
  - Port/Stbd: 0.000
  - Height: 0.000
- Acoustic Options:**
  - This data type is associated with an LBL system. Select the transponder to use for Attitude data. Note that the corrections for the selected transponder will be used.
  - (Empty dropdown)

Buttons: OK, Cancel, Help

### Attitude

By default, the sensor mode is off, meaning that data from the device will not be used in the vehicle's calculations. To turn the sensor on, and begin using the inclination corrections in the position output, click the 'On' radio button.

### Error flag testing

The error flag check box is applicable to those devices that output a code indicating the data is either good or bad. If checked and the device supports such a code in its telegram, WinFrog will look at the code and if the data is indicated as bad, WinFrog will not use the data.



### **Sensor Update Frequency Rate**

If the associated attitude sensor has a high frequency update rate (e.g. 10Hz and higher) it is appropriate to extract attitude data for application by either interpolating or extrapolating for a given epoch. In this case, the *High frequency update* option should be selected. Some attitude sensors have slow update rates, in particular those installed in acoustic transponders that require interrogation. For these sensors interpolation/extrapolation can produce a bad value as there is insufficient information to determine the correct shape of the curve (aliasing). Thus the most current attitude needs to be used. In this case, select the *Low Frequency update* option. This option applies to the use of the attitude data by the following data items:

- POSITION
- ELEVATION
- ALTITUDE
- XPONDER
- LBL TRANSCEIVER
- PROFILE

### **Pitch and Roll**

There are two control groups, one for each of pitch and roll. Correction values can be added in this section of the window. The correction values (entered in units of degrees-decimal degrees) are added to the raw pitch and roll values received from the device before the data is applied to the vehicle's calculations. Ensure that entered values adhere to the sign convention used by WinFrog. You can verify that the corrections are entered properly by viewing the pitch and roll values in the I/O Device window and the Vehicle Text window.

### **Filtering**

Additionally you may filter the incoming values to remove extraneous noise or spikes – check boxes are provided to switch this feature on or off. A filter length (up to 30 samples) and a threshold value (applied to the median of the samples in the filter to obtain lower and upper bounds) can be entered. Any pitch or roll values outside of the bounds are rejected and not used in the vehicle calculations, but will be recorded in the RAW files. If either one of pitch or roll is rejected, both values are ignored, although you may set up the filtering parameters for them separately. The status of the filters, including the current valid range for each of pitch and roll, and the percentage of values rejected, can be viewed in the calculations window, selecting the appropriate ATTITUDE data item.

#### ***Important:***

Do not enable filtering unless there is a high enough data rate (say 10hz) to correctly determine the shape of the curve. Essentially, if the low frequency update rate is selected above, do not enable filtering.

### **Primary Attitude Device Selection**

If more than one attitude device is present, you may select one of them to be primary and the others to be secondary and allow WinFrog to automatically switch between them should the primary system stop sending data or has bad data. There must be at least two attitude data items added to the vehicle to use this feature.

(Note: The attitude and offset data displayed in this dialog is for the attitude device corresponding to the data item that is being edited. Selecting a Primary Attitude Device from the drop down list does not affect these values for any attitude device in the list. Every attitude device needs to be set up for its own corrections and offsets.)

### **Primary Device Auto Switch**

Select the On radio button to turn on this feature. Then enter the time out time in the edit box. If WinFrog does not receive data from the primary attitude device, or if it receives bad data for this length of time, it will switch to the next secondary that is enabled and has good data.

### **Auto Switch Feature Usage**

To use this feature first turn the sensor on as described in the Attitude section above. Next, select the attitude device that you wish to be primary from the drop down list box. Then turn the primary device auto switch on and enter the time out time. Then edit all the other attitude data items and enable them in the Attitude group box. Note that the same selected primary will be displayed for all attitude data items; similarly, the automatic feature will be turned on and the time out time will be the same. However, you must individually enable each attitude device in the Attitude group box.

### **Offsets**

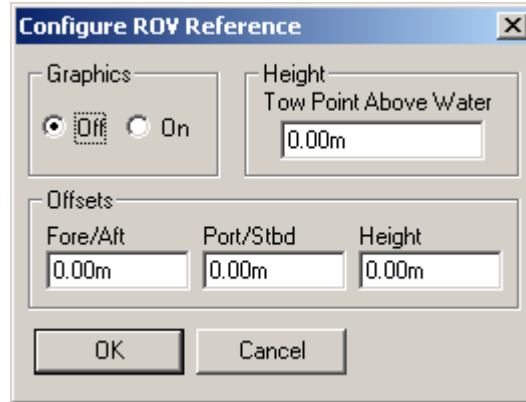
These are not applicable in this case.

### **Acoustic Options**

This applies to long base line acoustic transponders that have inclinometers. See chapter 17 for more information.

### **Data item: ROV, CRABBS Sonsub, ROV REF VEH**

This data item is added to the ship's device list to allow the ship's positional data to be included in the data telegram output to the ROV control system. Highlight the ROV REF VEH data item in the ship's device list and click the Edit button to open the Configure ROV Reference dialog box as seen below.



**Graphics:**

Select the On radio button to display the device name and a square at the location of the ROV, within the Graphics and Bird's Eye windows.

**Tow Point Height:**

The height of the tow point above water is added for layback calculations only if a towed vehicle model is used and is therefore not used by this device.

**Offsets:**

The X,Y,Z Offsets are applied from CRP to the Scanning Head Location. These values are set similar to values that would be applied to any device offset within WinFrog.

*Note: It is advised to use the waterline as the vertical CRP reference when sub-sea positioning devices are employed.*

**TELGRAM SPECIFICATION:**

The input data telegram contains the following data;

```
//Input $PSIIA,<ROV depth>,<ROV altitude>,<ROV heading>,<ROV pitch>,<ROV
roll>,<Burial depth>*<checksum><CRLF>
// Units: ROV depth (m)
// ROV altitude (m)
// ROV heading (degrees)
// ROV pitch (degrees)
// ROV roll (degrees)
// Burial depth (m)
```

The output data telegram contains the following data;

```
"$PRACA,shiplat,shiplon,rovlat,rovlon,rovkpCKSUM
```