WinFrog Device Group:	**ROV**
Device Name/Model:	**CMR2 ROV**
Device Manufacturer:	
Device Data String(s) Output to WinFrog:	See Telegram Specification section below.
WinFrog Data String(s) Output to Device:	See Telegram Specification section below.
WinFrog Data Item(s) and their RAW record:	PLOWDATA 490 HEADING 409 ATTITUDE 413 BOTTOMDEPTH 411 ROV REF VEH NONE

DEVICE DESCRIPTION:

This is a driver designed to read the above-mentioned data from the CMR2 ROV. The PLOWDATA data item is included to allow WinFrog to record burial depth data from the CMR2. Note: not all items are logged in the RAW data files.

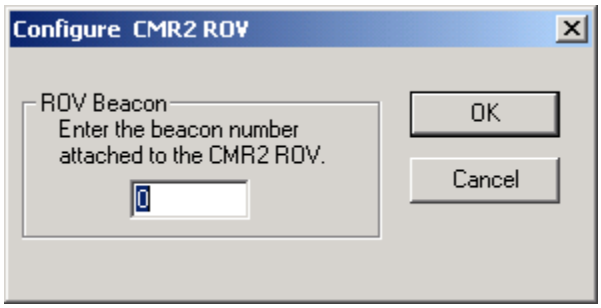
DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Serial
Configurable Parameters

WINFROG I/O DEVICES > CONFIGURE DEVICE:

This device must be configured at the I/O Device window level. In the I/O Devices window, click the device name to select it, then right-click and select Configure Device. The Configure CMR2 ROV dialog box appears, as seen below.



The x,y,z coordinates from the USBL are included as part of the data string output from WinFrog to the ROV. You must enter the number of the USBL beacon currently being used to track the ROV in order for WinFrog to output the desired x,y,z coordinates to the ROV. If you switch beacons during ROV operations, the beacon number must be changed in this dialog box as well.

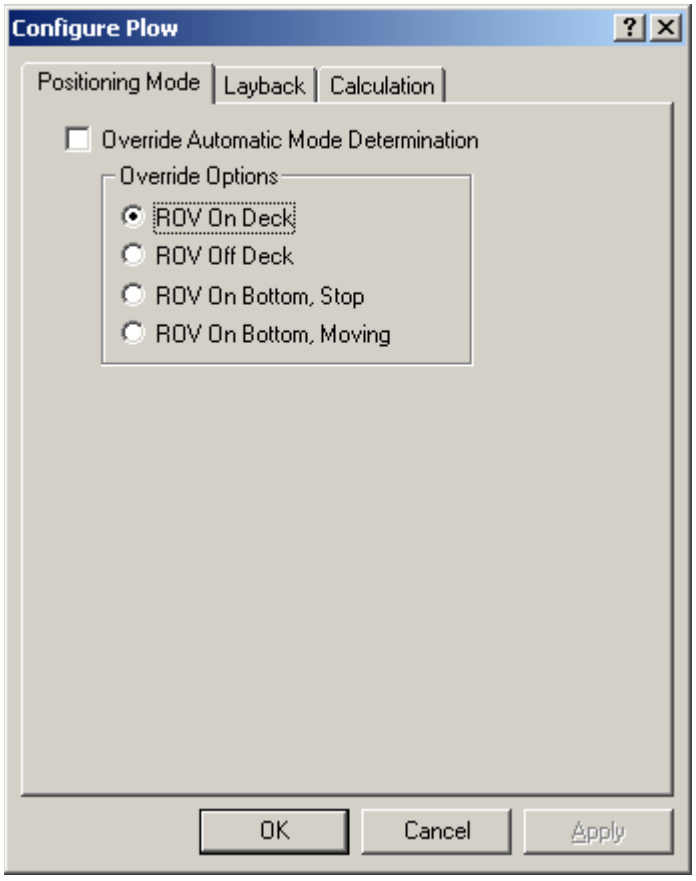
WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the CMR2 ROV device creates five data items: PLOWDATA, HEADING, ATTITUDE, BOTTOMDEPTH 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, CMR2 ROV, PLOWDATA

This data item is attached to the ROV vehicle in WinFrog. It is typically used to read data from the plow or ROV, in this case burial depth and trench depth data, from the CMR2.

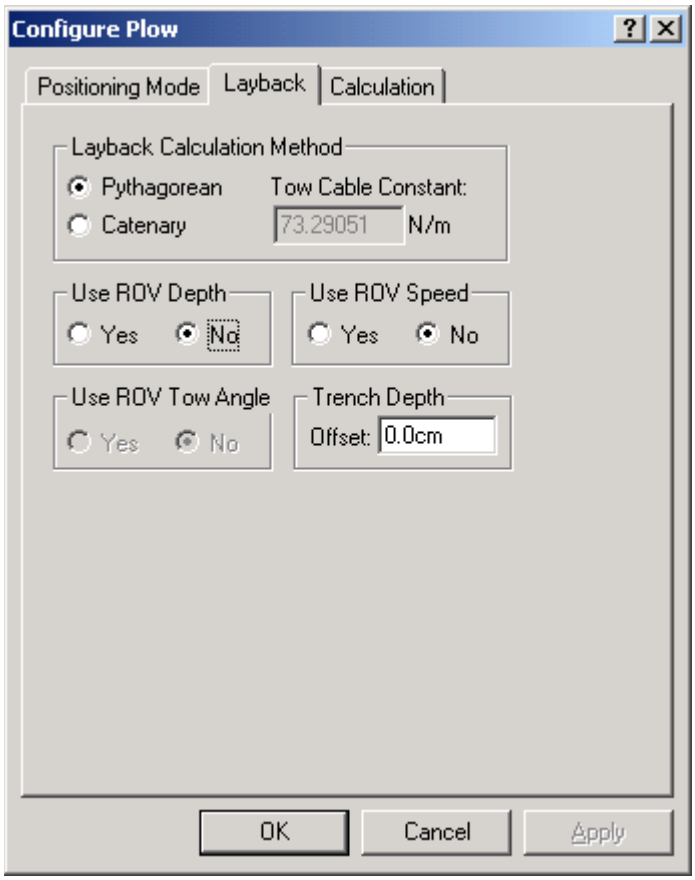
Highlight the PLOWDATA data item in the vehicle's device list and click the Edit button to open the Configure Plow dialog box as seen below.



Positioning Mode tab

This tab is used for towed vehicles such as plows. ROV's such as the CMR2 are typically positioned by acoustic devices such as USBL systems, therefore the options on this tab are not used for this device.

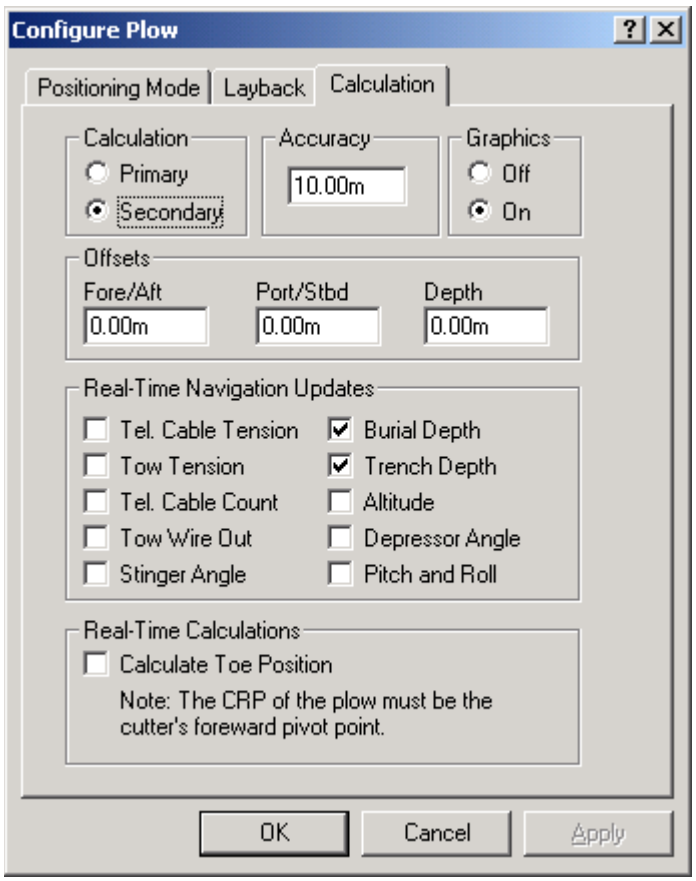
Layback tab



This tab is used for towed vehicles such as plows. ROV's such as the CMR2 are typically positioned by acoustic devices such as USBL systems, therefore the only option on this tab that may be used for this device is the Trench Depth Offset.

Trench Depth
Offset – If the Trench depth checkbox is selected on the Calculation tab (see below), then this value, 0.0 or otherwise, will be assigned as this vehicle's trench depth.

Calculation tab



Calculation
Primary – when selected, the layback described above will be used to calculate this vehicle's position, which will be assigned to it. However, since the CMR2 is typically positioned by acoustic devices, this should be set to Secondary.
Secondary – when selected, this device will not determine this vehicle's position. However, selecting Secondary and the relevant options on this tab from the Real Time Navigation updates section will allow for the recording of relevant data.

Accuracy
This option is not used by this device.

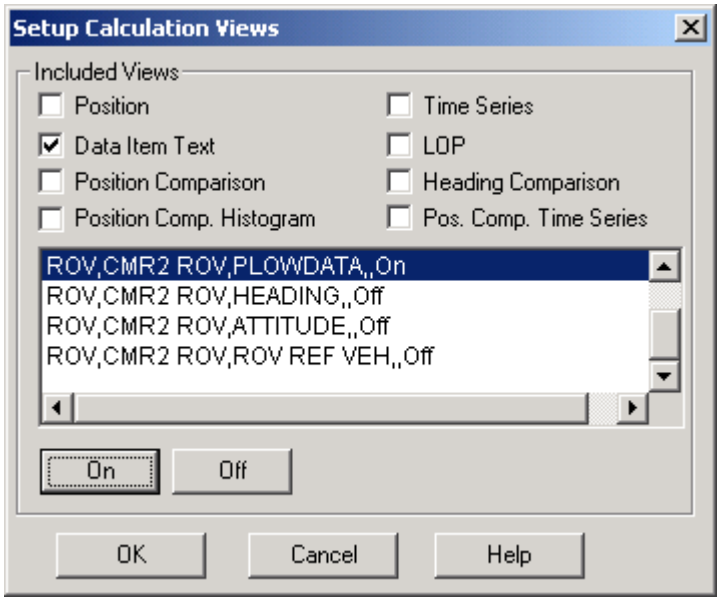
Graphics
Select the On radio button to display a square in the Graphics and Bird's Eye windows at the offset position below.

Offsets
These options are not used by this device.

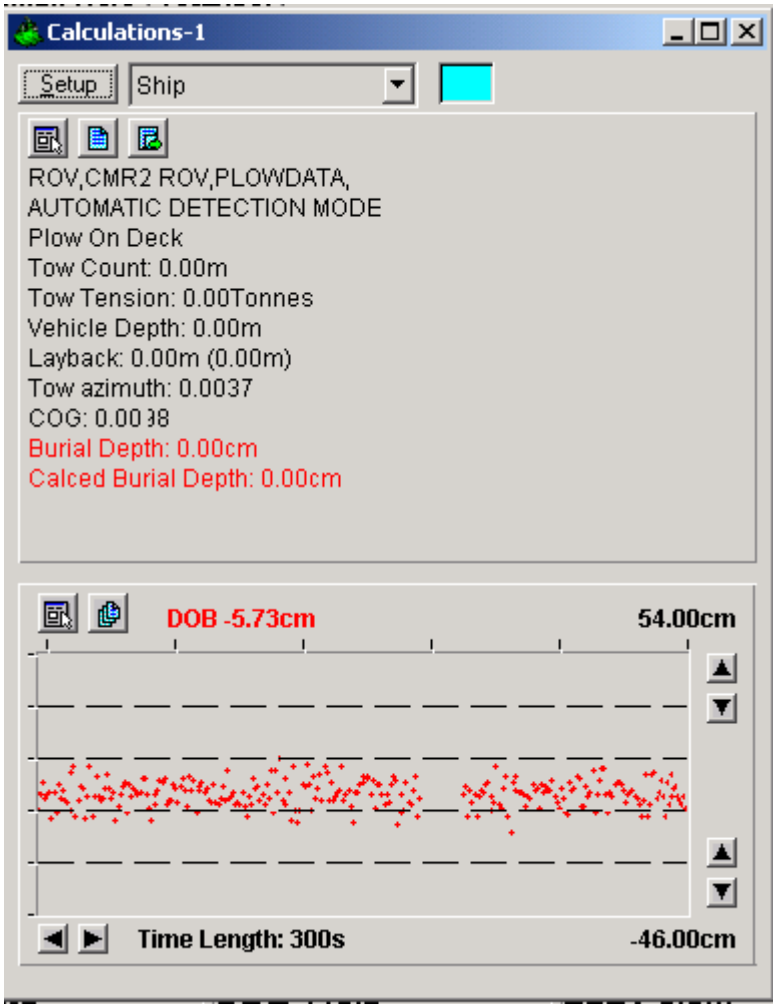
Real-Time Navigation Updates
The CMR2 ROV has the ability to provide real-time data updates via an umbilical. The only relevant data from this device is the burial depth and trench data. You should only select these two checkboxes for data output by the device, as leaving the other checkboxes selected causes data to be assigned to the vehicle. Since the CMR2 does not output the other types of data, 0 will be assigned for each item left selected and this will cause values from other devices to be overwritten.

Real-Time Calculations
Calculate Toe Position – This option is not used by this device.

The burial depth data can be viewed in a Calculations window. To display the Calculations window, select View > Calculations from the main menu. Select the appropriate vehicle from the dropdown list and click the Setup button. Select the **Data Item Text** and **Time Series** options and turn the data item **ROV, CMR2 ROV, PLOWDATA** on by highlighting it and clicking the **ON** button as seen below.



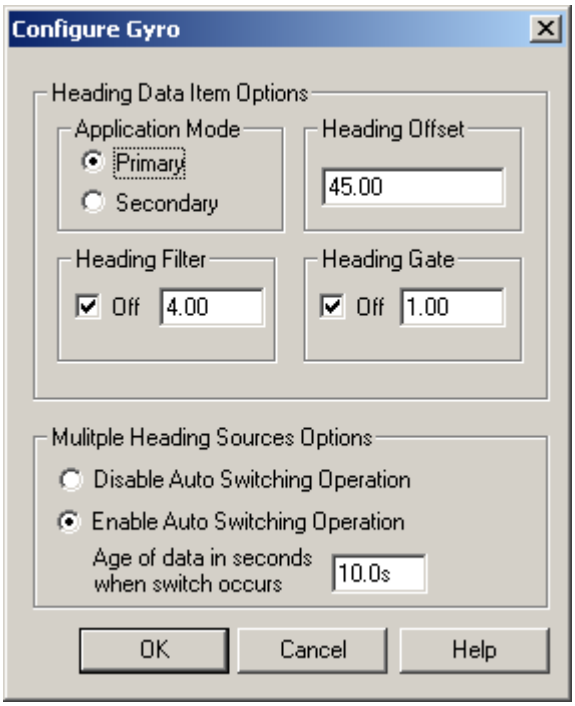
Exit with OK to display the Calculations window as seen below.



From this window you can monitor the burial depth data both numerically and graphically. This Calculation window also provides a shortcut to the Configure Plow dialog box by clicking the button.

Data item: ROV, CMR2 ROV, HEADING

If the heading data from the CMR2 ROV is deemed to be accurate, this data item can be used to orient the vehicle. Highlight this data item in the vehicle'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.

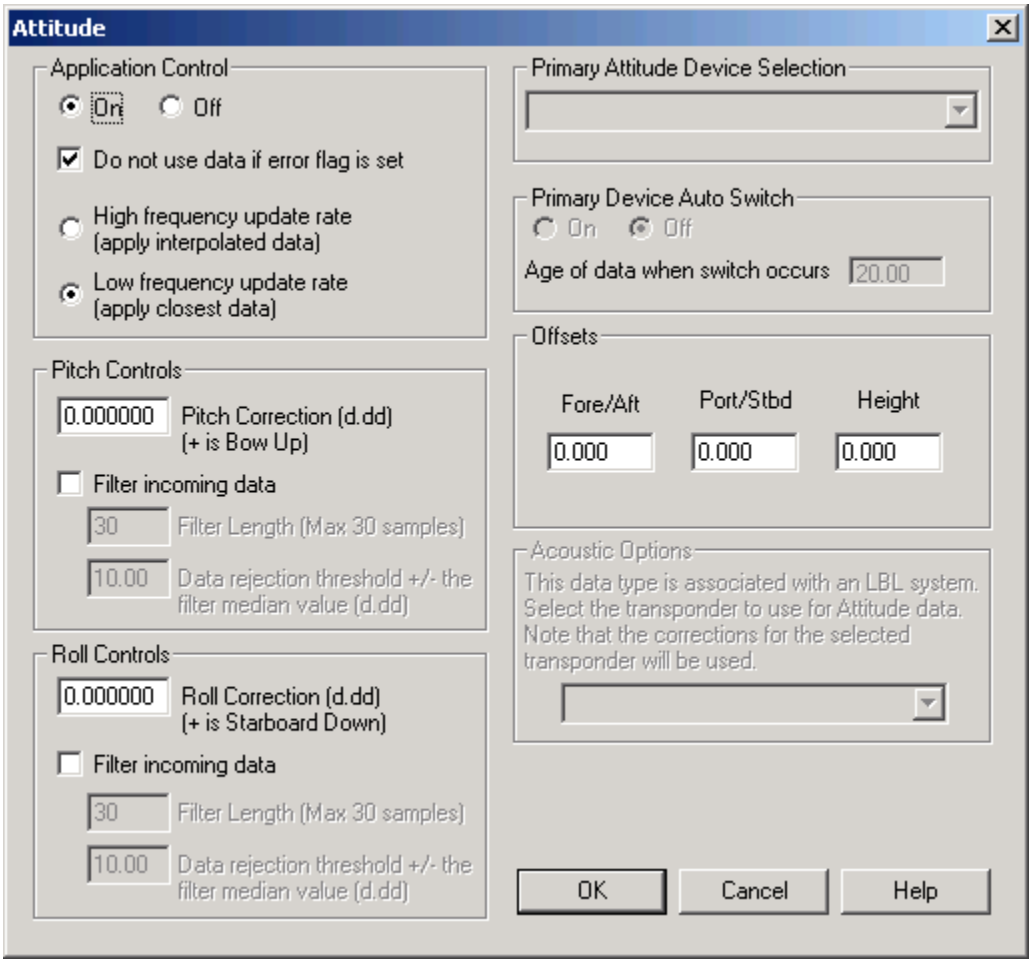
This option is not available in the WinFrog Remote package.

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, CMR2 ROV, 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.



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.

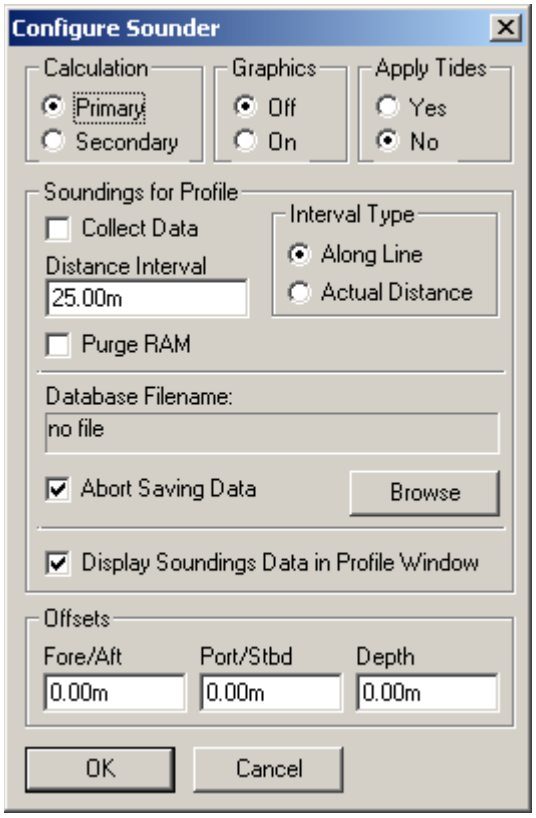
Auto Switch Feature Usage
To use this feature first turn the sensor on as described in the Attitude section above. Next, select the attitude device that you wish to be primary from the drop down list box. Then turn the primary device auto switch on and enter the time out time. Then edit all the other 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, CMR2 ROV, 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 sounder device. If there is more than one Primary sounder 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 sounder will simply be monitored.

Graphics:
Select the On radio button to display a labeled square representing the location of the sounder 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 are displayed here.

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: An echo sounder is not a positioning device, and hence its horizontal offsets have no application. If the echo sounder's position is to be recorded correctly, you must create and enable a vehicle

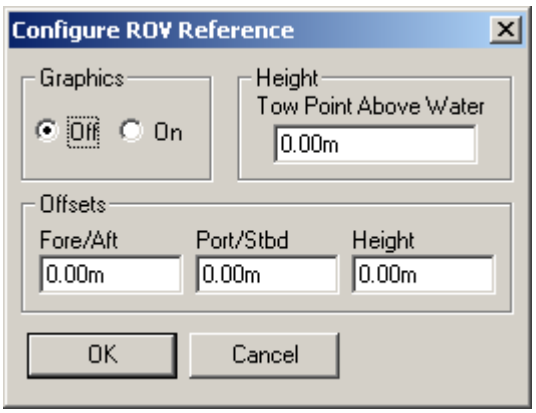
Tracking Offset for that specific location. The offsets entered here can simply be used as a means of graphically confirming that the Tracking Offset values have been entered correctly.

The Depth Offset is applied; the entered value will be added to the received sounder 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, CMR2 ROV, ROV REF VEH

This data item is added to the ship's device list to allow the ship's position to be transmitted to the ROV control system. As such, this data item is attached to the ship in WinFrog. 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:
This option is not used by this device.

Offsets:
The X,Y,Z Offsets are applied from CRP to the offset position the operator desires to transmit to the ROV control system. 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:

INPUT STRING

$ROV,r,p,h,t,dob,o,v,a,dc,s1,s2,s3,s4,e,wd

Field	Data
1	$ROV
2	r = roll
3	p = pitch
4	h = heading
5	t = trench depth
6	dob = depth of burial
7	o = cf offset
8	v = cf vertical dist
9	a = cf altitude
10	dc = cf depth of cover
11	s1 = cf signal 1
12	s2 = cf signal 2
13	s3 = cf signal 3
14	s4 = cf signal 4
15	e = cf error code
16	wd = water depth

Note: These items are decoded and displayed in the decoded data window but the items with ‘cf’ in the description are not logged to the raw file.

OUTPUT STRING

$SHIP,X,Y,Z,DCC,dMM.MMMM,dMM.MMMM,h,p,r,dMM.MMMM,dM.MMMM,KP<CR><LF>

Field	Data
1	$SHIP
2	X is USBL beacon offset X, meters
3	Y is USBL beacon offset Y, meters
4	Z is USBL beacon offset Z, meters
5	DCC is the ROV’s distance cross course, meters
6	dMM.MMMM is the ship’s latitude, d is degrees and may be one or two digits. MM.MMMM are the minutes and in this format. If in the southern hemisphere a minus sign will precede the number. e.g. -345.3456
7	dMM.MMMM is the ship’s longitude, d is degrees and may be one, two, or three digits. MM.MMMM are the minutes and in this format. If in the western hemisphere a minus sign will precede the number. e.g. -6245.3456
8	h is ship’s heading, degrees
9	p is ship’s pitch, degrees
10	r is ship’s roll, degrees

11 dMM.MMMM is the ROV's latitude, d is degrees and may be one or two digits. MM.MMMM are the minutes in this format. If in the southern hemisphere a minus sign will precede the number. e.g. -345.3456

12 dMM.MMMM is the ROV's longitude, d is degrees and may be one, two, or three digits. MM.MMMM are the minutes in this format. If in the western hemisphere a minus sign will precede the number. e.g. -6245.3456

13 KP is the ROV's KP, kilometers