WinFrog Device Group:	**Speed Log**
Device Name/Model:	**SONTEK ARGONAUT**
Device Manufacturer:	**SonTek** Suite A, 6837 Nancy Ridge Drive San Diego, CA 92121, USA Tel: (858)-546-8327 Fax:(858)-546-8150 E-mail: inquiry@sontek.com Website: http://www.sontek.com
Device Data String(s) Output to WinFrog:	ASCII data
WinFrog Data String(s) Output to Device:	N/A
WinFrog Data Item(s) and their RAW record:	Type: 403 - SPEED LOG-ARGONAUT (new) 372 - ELEVATION 413 - ATTITUDE 496 - ROVDATA 402 - SPEED LOG 408 - HEADING 410 - HEADING

DEVICE DESCRIPTION:

The SonTek Argonaut Acoustic Doppler Speed Log provides multiple data, including 3-axis through water and bottom doppler speed vectors, attitude, heading (magnetic) and pressure. It should be noted that only the bottom doppler speed vectors are used, not the through the water vectors, and then only if the status is good.

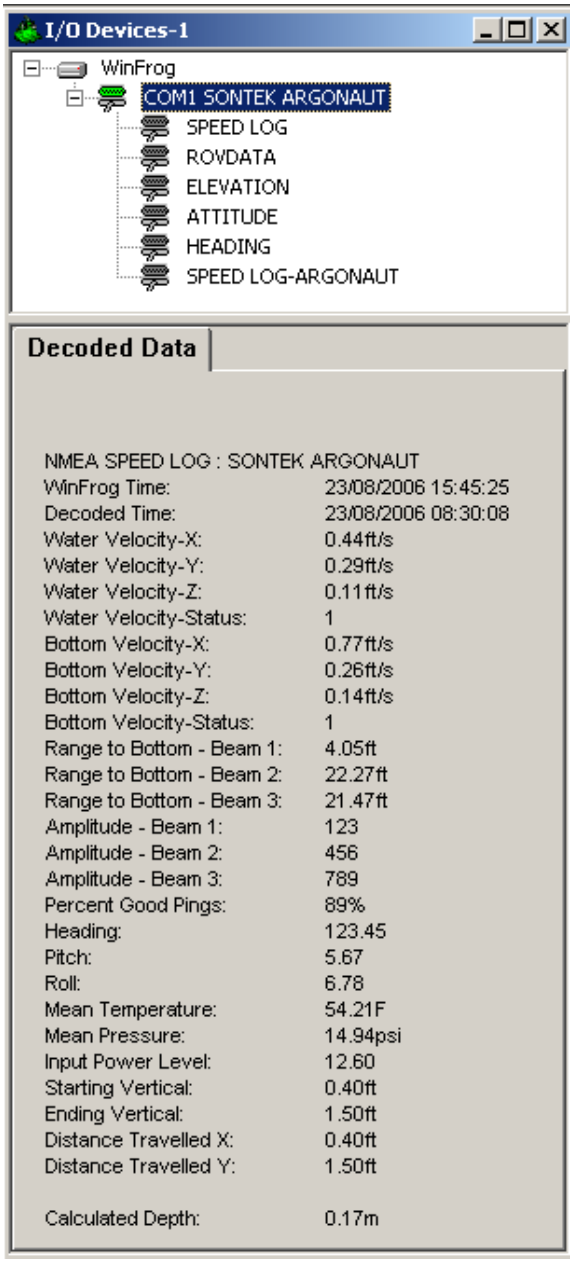
The unit can output a binary or ASCII data telegram. The device driver in WinFrog only supports the ASCII output and requires the unit be configured to output the ASCII telegram (i.e. it does not poll the unit).

All data received from the Argonaut is displayed in the original units and sign convention in the IO Device window.

Data Format Note
The manual Argonaut Acoustic Doppler Speedlog Operation Manual Firmware Version 1.6 indicates that there are 31 columns of data. Apparently later versions have 32 fields with the addition of hundredths of seconds after the second's fields and before the first Water velocity field. WinFrog can decode both of these formats; it cannot decode the Brief ASCII format available starting in 3.8. See the equipment manuals for the data formats.

NOTE:

- DSL coordinate system is right-hand with positive X forward to bow, positive Y to port and positive Z up.
- DSL attitude sign convention is positive pitch is bow up (same as WinFrog standard sign convention) and positive roll is starboard up (opposite of WinFrog standard sign convention).
- Velocity and attitude coordinate reference frame and sign convention are adjusted to Winfrog standards when passed to the respective data items (e.g. SPEED LOG and ATTITUDE). The exception is the SPEED LOG-ARGONAUT data item in which case the data is passed exactly as received.



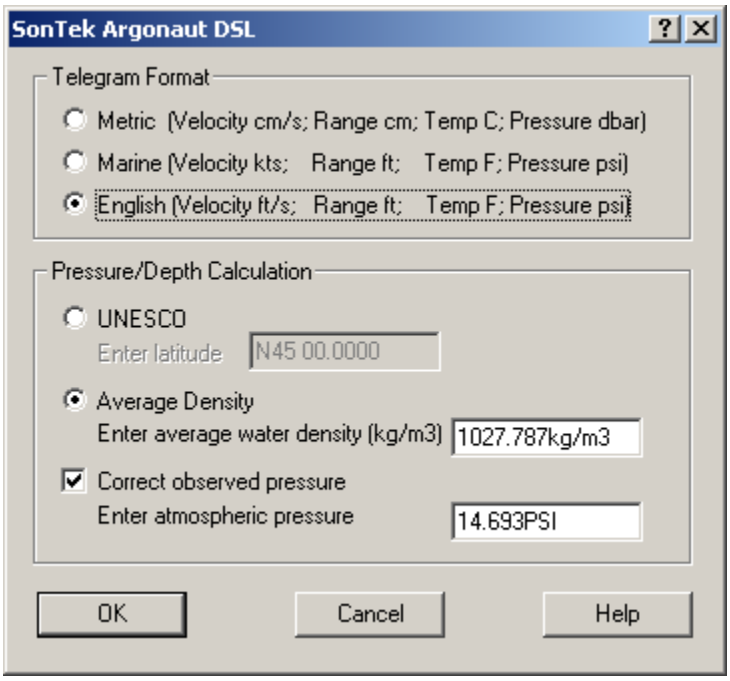
DEVICE CONFIGURATION INSTRUCTIONS:

WINFROG I/O DEVICES > EDIT I/O:

Baud Rate: Configurable, default 9600
Stop Bits: Fixed at 2
Parity: Fixed at None

WINFROG I/O DEVICES > CONFIGURE DEVICE:

The SONTEK ARGONAUT is added to WinFrog from the SPEED LOG device types. The device requires configuration as detailed below.



Telegram Format
The Argonaut can be configured to output the ASCII telegram in Metric, Marine or English formats. The selection determines the units used for the various data, as detailed in the dialog. Select the option that matches the unit's output.

Pressure/Depth Calculation
The pressure data is used to calculate a depth for use with the ELEVATION and ROVDATA data items. Select the formula to use, either the UNESCO or Average water density. If the UNESCO formula is selected, enter the average latitude for the work area. If the Average Density formula is selected, enter the average water density in kg/m^3.

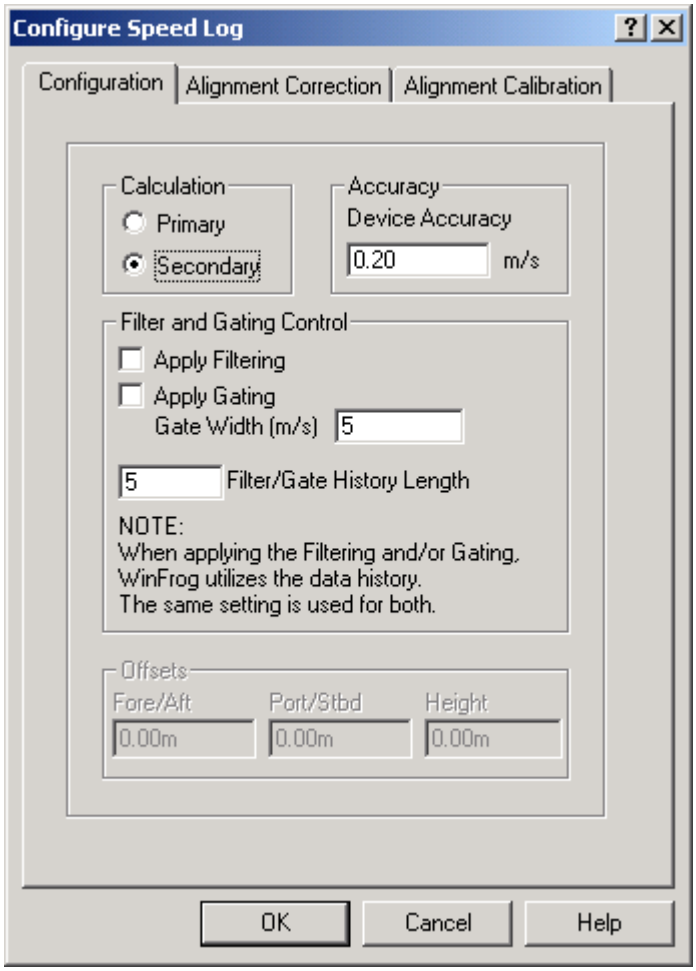
In addition, if the pressure reading is at depth and not already corrected for surface pressure, select the Correct observed pressure checkbox and enter the atmospheric pressure at the sea surface in either psi (if telegram format is Marine or English) or mbars (if the telegram format is Metric).

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

Upon adding SONTEK ARGONAUT to the vehicle, the following data items can be selected: SPEED LOG, ROVDATA, ELEVATION, ATTITUDE, HEADING and SPEED LOG-ARGONAUT. Each item must be edited once added to the vehicle, with the exception of the last one, SPEED LOG-ARGONAUT, which is only used to enable the logging of all the data received from the unit.

Data item: SPEED LOG

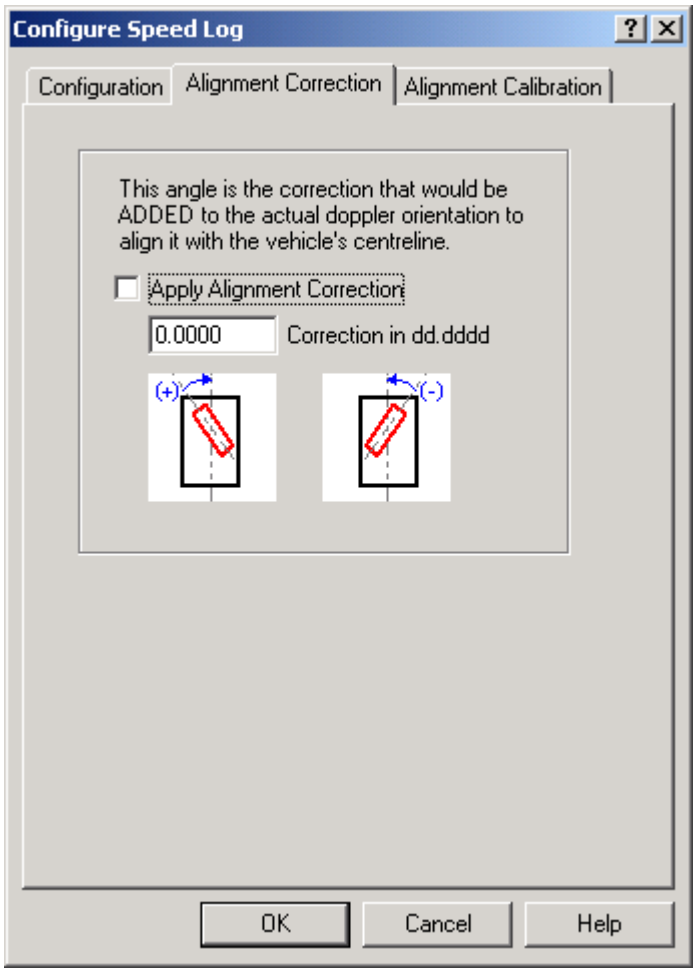
Highlight the SPEED LOG data item in the vehicle's device list and click the Edit button to open the Configure Speed Log dialog box as seen below. This dialog has three tabs, each of which requires configuration as detailed below. For more information, refer to the Special Applications chapter in the manual.



Configuration tab

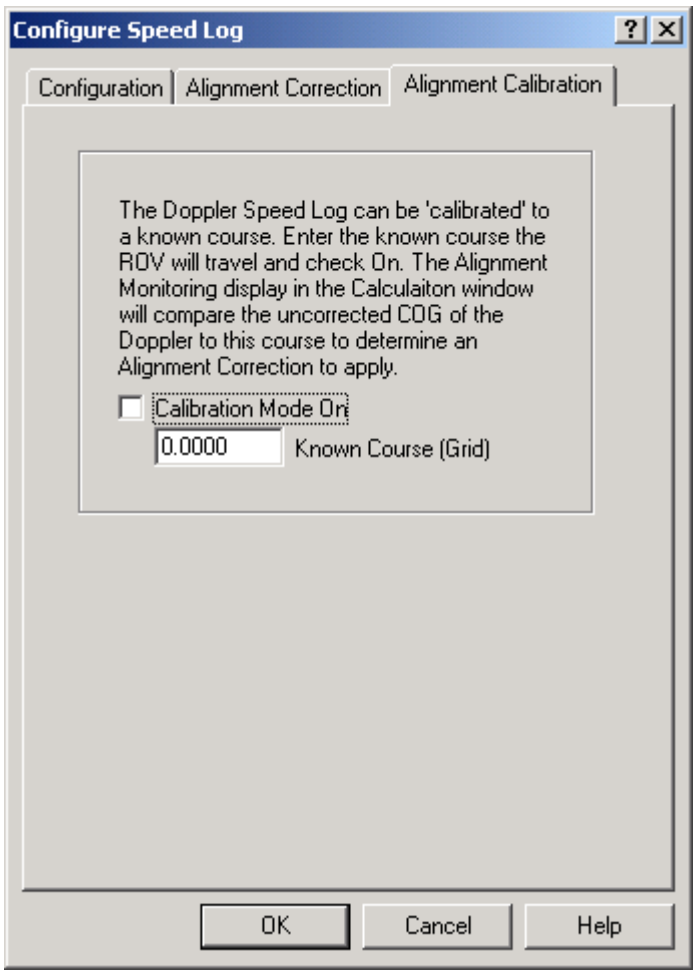
Select Primary if the data from the speed log is to be used to assist in the positioning of the vehicle. The default accuracy is recommended though it is critical that the

accuracy of other data items that are to be used with the vehicle and the Kalman Filter settings all be taken into account. The default Gate and Filter/Gate settings should provide an adequate starting point, however, the optimal settings can only be determined from observation and manual adjustments to these settings. Offsets are not used by this device.



Alignment Correction tab

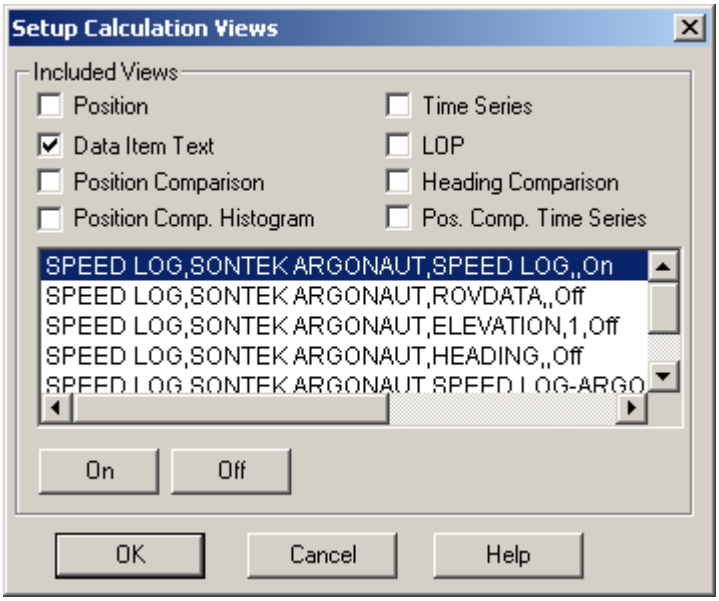
If an alignment correction has to be added to orient the speed log device with the centreline of the vehicle, select the Apply Alignment Correction checkbox and enter the correction value in decimal degrees. See the Alignment Calibration tab for details on determining the correction value to be used.



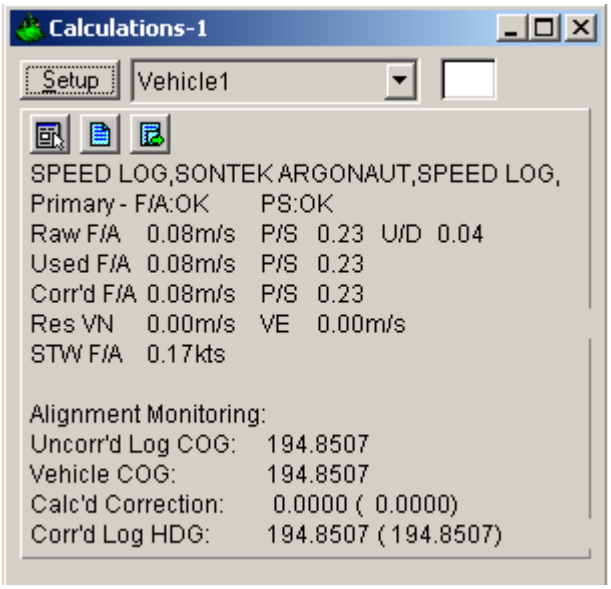
Alignment Calibration tab

The description in the Alignment Calibration is fairly self-explanatory. It is used in conjunction with a Calculations window to determine the correction value that can be entered in the Alignment Correction tab as discussed above.

To open a Calculations window, select View > Calculations from the main menu. In the Calculations window click the Setup button to open the Setup Calculation Views dialog box as seen below.



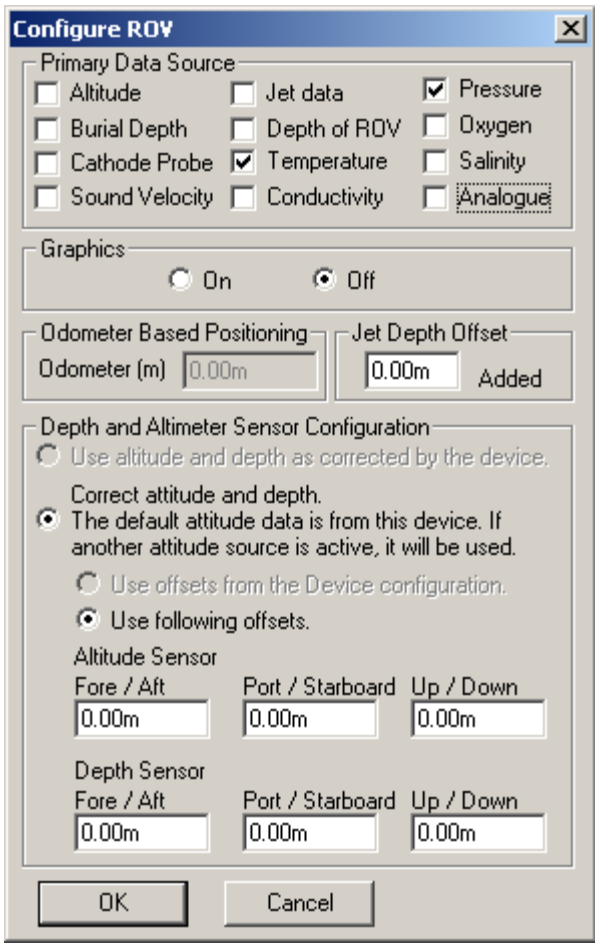
Select (check) the Data Item Text option. Next, highlight the Speed Log data item and click the On button. Exit this window with OK and the speed log data, as well as the Alignment Monitoring data can be viewed in the Calculations window as seen below.



The calculated correction (Calc'd Correction) can be viewed in this window. This correction value can be entered in the Alignment Correction tab.

Data item: ROVDATA

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



Primary Data Source
Of the options displayed, the only ones supported by the Argonaut are Depth of ROV, Temperature and Pressure. Select those that are to be passed to the respective vehicle as the primary source for that information.

Graphics
N/A

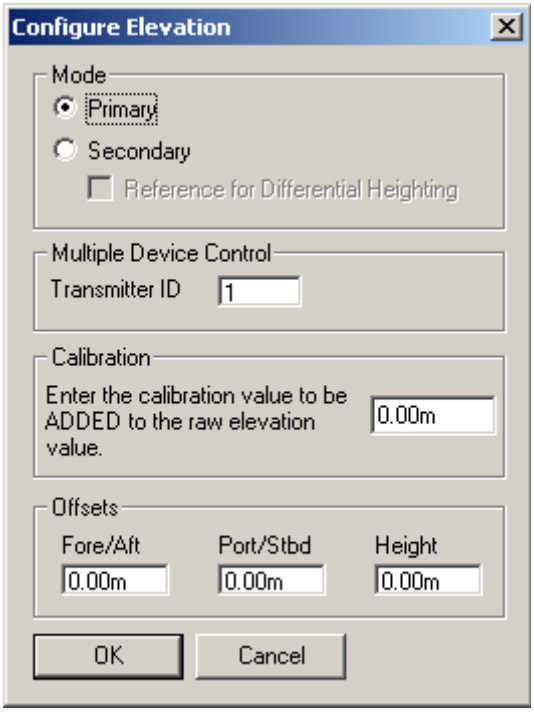
Odometer Based Positioning
N/A

Jet Based Offset
N/A

Depth and Altimeter Sensor Configuration
Enter the offsets of the pressure sensor relative to the vehicle's CRP to enable the translation of the reduced depth from the sensor to the CRP. These are corrected for attitude where the source of the attitude is the SonTek Argonaut itself directly via the attitude data made available by the device to this data item. Alternatively, if an ATTITUDE data item is associated with the vehicle and is enabled, the attitude data will be extracted from that data item.

Data item: ELEVATION

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



Mode

Set the mode to primary if this device is to determine the vehicles depth. The default is secondary. If Primary is selected, other data items that can also provide depth (e.g. ROVDATA) need to be set to secondary. The Reference for Differential Heighting is not applicable.

Multiple Device Control

N/A

Calibration

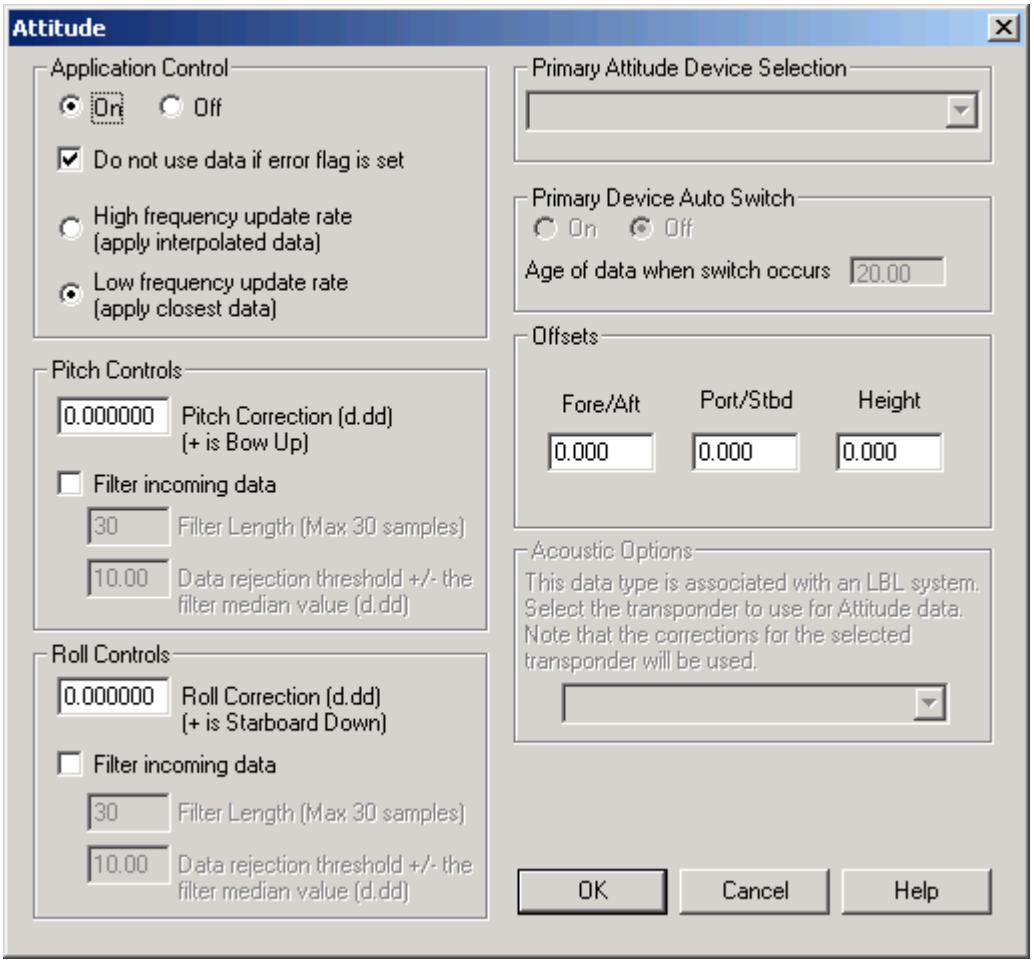
If there is a known offset in the pressure sensor and therefore in the resulting depth calculations, enter the correction to be applied.

Offsets

Enter the offsets of the pressure sensor from the CRP. If an ATTITUDE data item is associated with the vehicle and is enabled, the offsets will be corrected for attitude before being used to translating the depth to the CRP.

Data item: ATTITUDE

Highlight the ATTITUDE data item in the vehicle's device list and click the Edit button to open the Attitude dialog box as seen below. It is important to note that the output rate of this device is 1 Hz. This is very low for attitude data and the ATTITUDE data item should only be used after careful consideration of the advantages and disadvantages of using an attitude sensor with such a low update rate.



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.

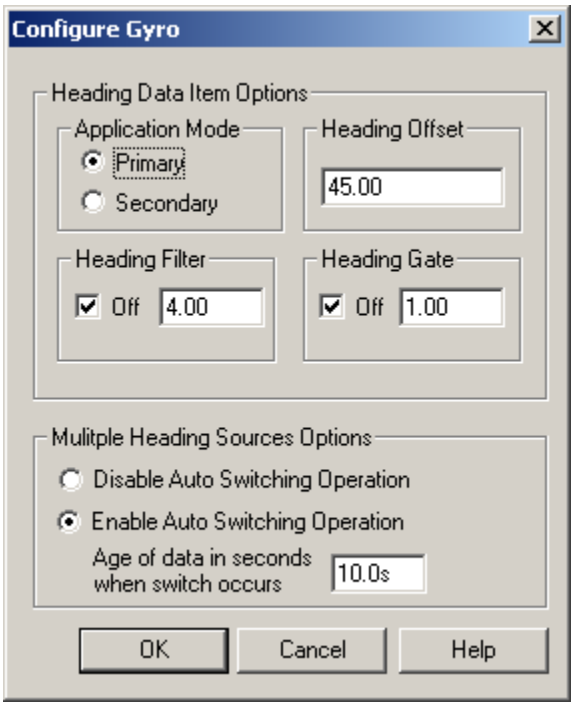
Auto Switch Feature Usage
To use this feature first turn the sensor on as described in the Attitude section above. Next, select the attitude device that you wish to be primary from the drop down list box. Then turn the primary device auto switch on and enter the time out time. Then edit all the other 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: HEADING

Highlight the HEADING data item in the vehicle's device list and click the Edit button. The Configure Gyro dialog box appears as seen below. Note that the unit is equipped with a magnetic compass and may therefore require a correction equivalent to the magnetic declination for the work area. This must be investigated and confirmed before using this data item.



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: SPEED LOG-ARGONAUT

There is no configuration for this data item. It is associated with a vehicle to enable the logging of all data received from the device to a raw data file.