WinFrog Device Group:	PLOW
Device Name/Model:	Intl Telecom Plow
Device Manufacturer:	International Telecom USA, Inc. 1850 Frankfurst Avenue Baltimore, Maryland 21226 USA Tel: (410) 354-7400 Fax: (410) 355-2423 info@intelecomgroup.com
Device Data String(s) Output to WinFrog:	User configurable space or comma delimited ASCII string with any or all of the following data items: - Bottom Depth - Trench Depth - Cable Depth - Tow Depth - Product Cable Tension - Product Cable Count - Product Cable Speed - Tow Cable Tension - Tow Cable Count - Tow Cable Speed - Plow Pitch - Plow Roll - Pump Pressure - Blade Pressure
WinFrog Data String(s) Output to Device:	None
WinFrog Data Item(s) and their RAW record:	Plow Data 490-001 Bottom Depth 411 Attitude 413 Count 492

DEVICE DESCRIPTION:
International Telecom operates several plows and have their own plow interface system with a configurable output. This device was designed to interface the International Telecom plow system with a separate WinFrog system.
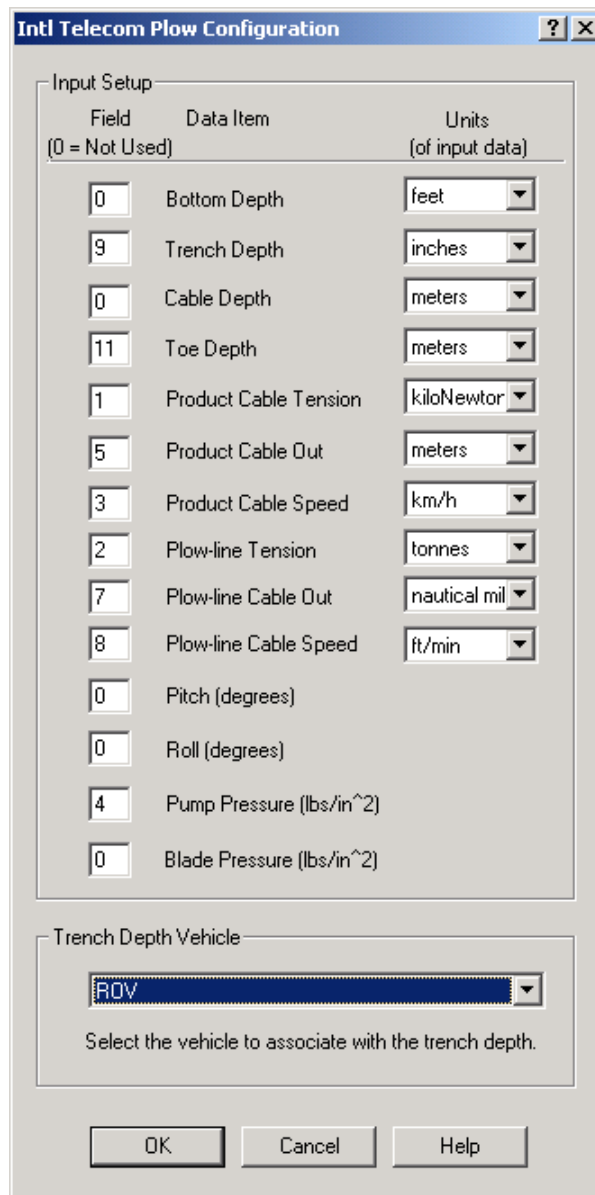
DEVICE CONFIGURATION INSTRUCTIONS

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 Intl Telecom Plow Configuration dialog box appears, as seen below.

The device configuration dialog shown above allows the device to be configured to accept the input data in a variety of units and in any order. Input can be either comma or space delimited.

The Field column indicates the position of the Data Item in the string coming into WinFrog and the Units column indicate the units of the Data Item coming into WinFrog. Note that the units of the Pitch, Roll, Pump Pressure and Blade Pressure Data Items cannot be configured. For example, the input string for the configuration shown above would be:

<Product Cable Tension(kN)>,<Plow-line Tension(t)>,<Product Cable Speed(km/h)>, <Pump Pressure(lbs/in^2)>,<Product Cable Out(m)>,<sky color(ignored by the device)>, <Plow-line Out(nm)>,<Plow-line Cable Speed(ft/min)>,<Trench Depth(inches)>, <wind speed(ignored by the device)>,<Toe Depth(m)><cr><lf>

WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:
Adding the Int'l Telecom device creates five data items: PLOW DATA, ROV REF VEH, ATTITUDE, COUNT and BOTTOMDEPTH. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: ROV, Intl Telecom PLOW, PLOWDATA

The PLOWDATA data item is added to the towed vehicle (plow) and must be edited once it is added to the vehicle's device list. Highlight the **ROV, Intl Telecom PLOW, PLOWDATA** data item in the vehicle's device list, then click the **Edit** button. The **Configure Plow** dialog box appears as seen below.

Positioning Mode Tab
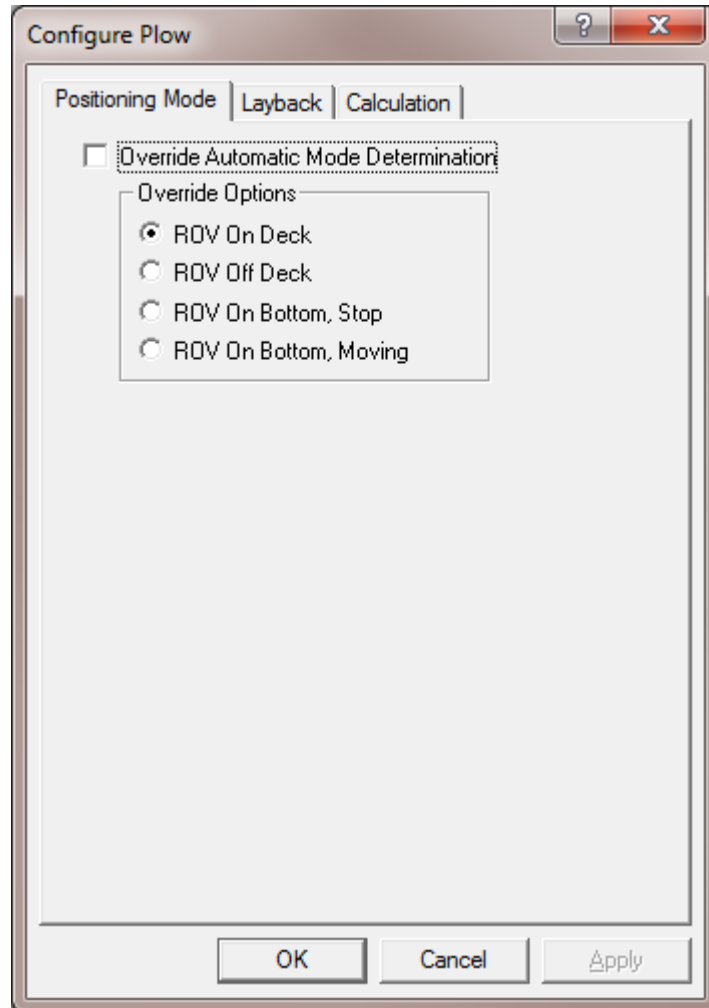
Override Automatic Mode Determination:
This check box determines whether WinFrog automatically determines the towed vehicle location and mode or whether the operator determines it.

When in automatic mode WinFrog uses the following criteria to determine the mode of the towed vehicle;

ROV On Bottom, Moving is assumed if the speed is greater than .2 knots or the Use ROV Speed setting is off and the layback is calculated at more than 1 metre.
ROV Off deck is assumed if the speed is greater than .2 and the layback is calculated at less than 1 metre and the altitude is greater than 4 metres.
ROV On deck is assumed if the speed is 0 and the layback calculated is less than the sum of the depth offset entered on the Calculations tab and the Tow point above water entered on the ROV REF VEH dialog.

ROV On Bottom, Stopped is assumed if none of the others are true.

Override Options:
ROV On deck places the towed vehicle on the tow vessel 5 metres forward of the offset point entered in the ROV REF VEH dialog.
ROV Off deck places the towed vehicle on the tow vessel at the tow point, which is the offset point entered in the ROV REF VEH dialog.
ROV On Bottom, Stop leaves the vehicle where it was when this option was selected and makes no further calculations as to its position.
ROV On Bottom, Moving calculates the towed vehicle's position using the data available and updates all displays with this data.

Layback Tab
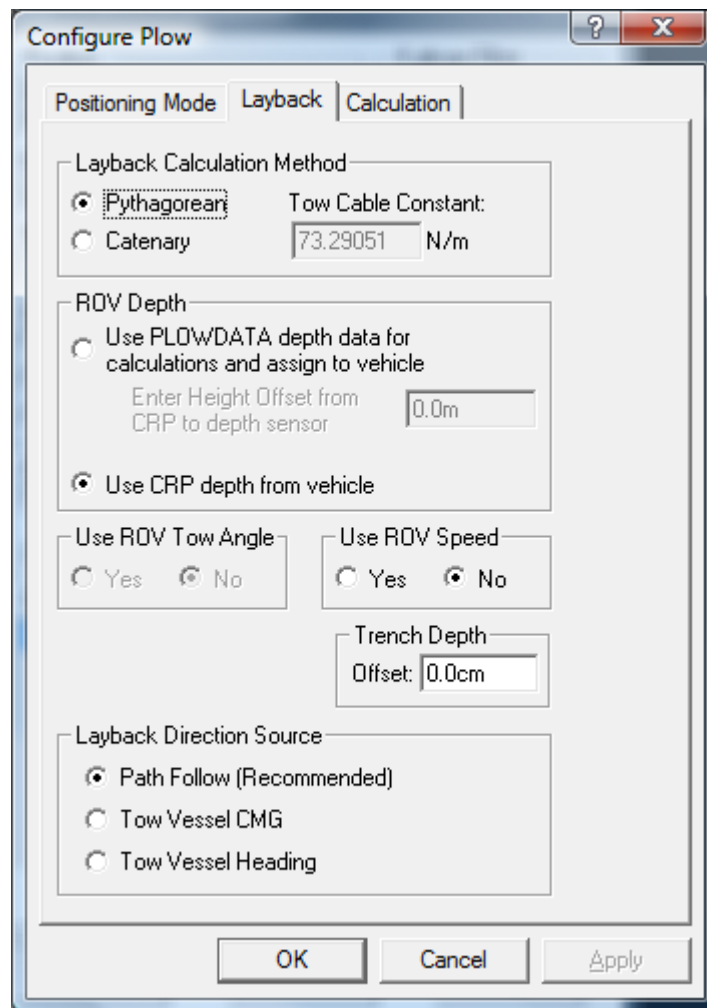
Layback Calculation Method
Pythagorean uses the depth and cable count to form a right triangle. The layback is then calculated and applied to the tow vehicle's offset position along with an azimuth based upon the previous towed vehicle's raw position. WinFrog will use this position

to calculate an azimuth but use the calculated layback for the distance between the towed vehicle and the tow vehicle.

The right triangle is formed thus: the hypotenuse is the cable count and the vertical value is the sum of the depth, Tow Point Above Water and the z offset found on the Calculations tab below.

Catenary requires the weight of the cable in newtons/metre, (1lbs/ft = 14.63nt/m). This calculation uses the cable count, depth of the towed vehicle and the tow tension to calculate the layback using a static catenary model. The angle used is the same as described above.

Use ROV Depth
Use PLOWDATA depth for calculations and assign to vehicle causes two actions:
1) The depth obtained from this device will be added to the depth offset and assigned to this vehicle. The depth offset is entered in the Calculation tab.
2) The value used to calculate the layback is the above value plus the depth offset entered on the Calculations tab plus the value *Tow Point above the Water*, entered in the ROV REF VEH configuration dialog (attached to the tow vehicle).

Use CRP depth from Vehicle causes the depth for the layback calculation to be obtained from the vehicle. Essentially, this means the depth must be obtained by another device and assigned to the vehicle by that device.

Use ROV Speed
Yes causes the speed of the device to be obtained from this device. This requires that the towed vehicle in use must have the ability to output a speed in its data string. If it does not, then select no. **No** causes the speed to be calculated from the positional information and time. It will be assigned to the vehicle.

Use ROV Tow Angle
This option only applies to the SeaplowVIII Device.

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

Layback Direction Source
Path Follow (Recommended) This is the recommended selection. It uses its own previous position and the tow vehicle location to determine the direction to the new position.

Tow Vessel CMG This selection uses the tow vehicle's course made good (plus 180 degrees) to determine the direction to the new position. As the course made good changes the towed vehicle will swing back and forth.

Tow Vessel Heading This selection uses the tow vehicle's heading (plus 180 degrees) to determine the direction to the new position. As the vessel's heading changes the towed vehicle will swing back and forth. This is usually more pronounced than the Tow Vessel CMG selection.

Calculation Tab
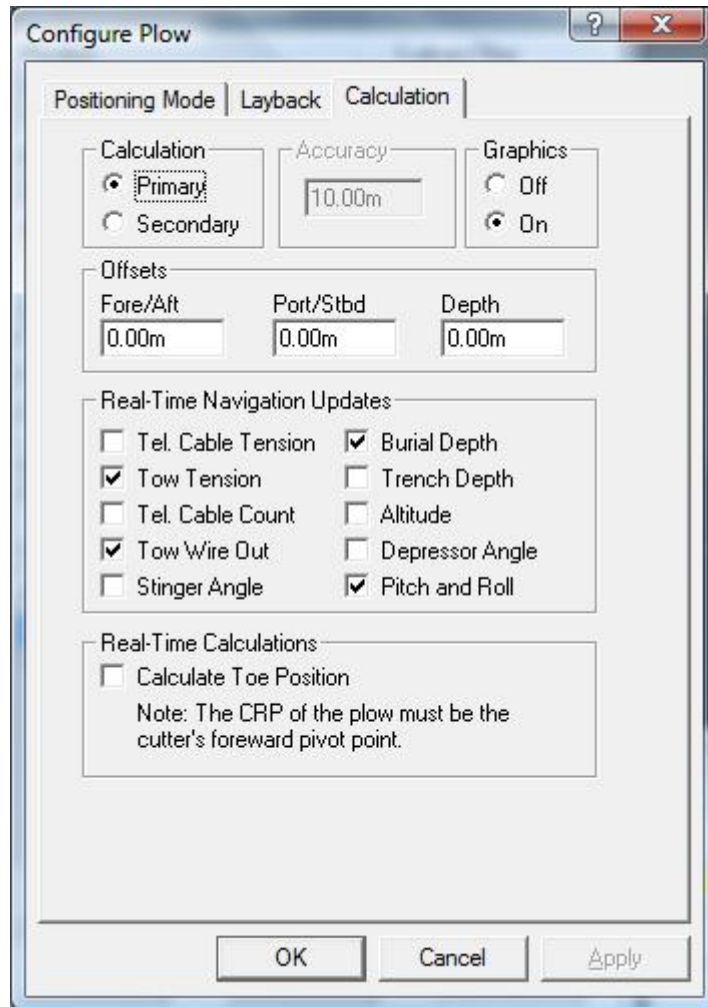
Calculation
Primary – when selected, the layback described above will be used to calculate this vehicle's position which will be assigned to it.
Secondary – when selected, this device will not determine this vehicle's position.

Accuracy
The Kalman filter uses this value as a weight factor. It should be set to a reasonable value.

Graphics
Selecting On will display a box in the Graphics and Bird's Eye windows, at the offset position below.

Offsets
The **Fore/Aft** and **Port/Stbd** offset point is the reference point for the layback distance. Essentially the lay back distance is the distance between this point and the offset point of the tow vehicle described in the **ROV, Intl Telecom PLOW, ROV REF VEH** section below. This can also be viewed as the beginning or 0 point of the tow cable. This offset point is from the towed vehicle's CRP to the tow point.

Depth is an offset from the CRP; it is applied in several different ways:
1) If **Use ROV Depth** is set to **Yes** (on the Layback tab) this value is added to the depth from this towed vehicle device and assigned to the vehicle's depth. See Use ROV Depth on the Layback tab above.
2) If the Pythagorean solution is selected this value is added to the vehicle depth and the Tow Point Above Water value to get the vertical portion of the right triangle when computing the layback.
3) If the catenary solution is selected this value is not used in the model.

Real-Time Navigation Updates
Most Plow devices have the ability to provide real-time data updates via an umbilical. The Decoded data tab in the I/O Devices window will indicate what data is updated in real-time for each device. You should only select the boxes for data output by the device, as leaving these boxes checked causes data to be assigned to the vehicle. If the device does not output a particular type of data, 0 will be assigned for each item left checked and this may cause values from other devices to be overwritten.

Real-Time Calculations
Calculate Toe Position – this option only applies to the Smart Cutter plow device.

The results of the above configurations are typically 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 box. Then click the Setup button, select **Data Item Text** and turn the data item **ROV, Intl Telecom PLOW, PLOWDATA** on by highlighting it and clicking the **ON** button as seen below.
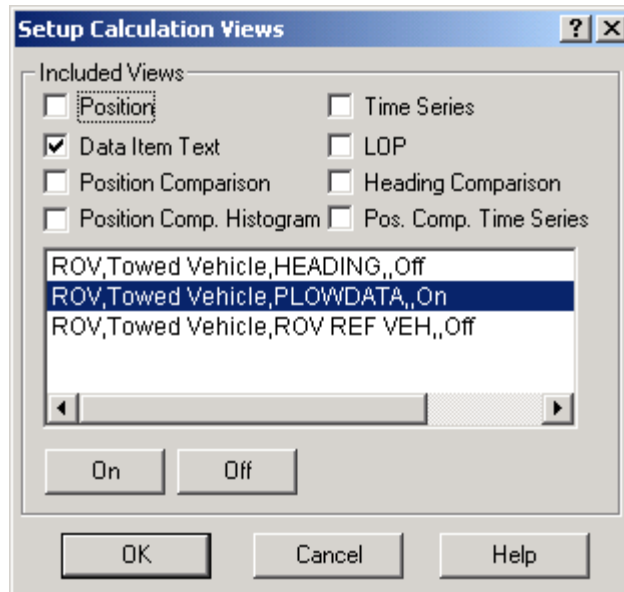
Exiting with OK will display the Calculations window as seen below.
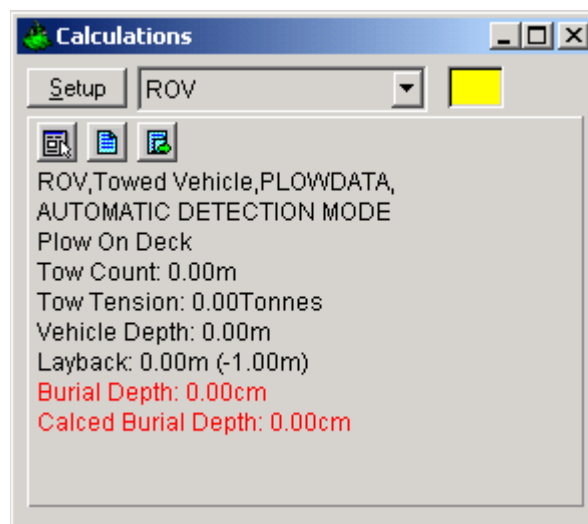
From this window you can monitor some of the input data as well as the layback calculation. This calculation window also provides a shortcut to the Configure Plow dialog box by clicking the 🔲 button.

Data item: ROV, Intl Telecom PLOW, ROV REF VEH

The ROV REF VEH data item is added to the tow vehicle (ship) and must be edited once it is added to the vehicle's device list. Highlight the **ROV, Intl Telecom PLOW, ROV REF VEH** data item in the vehicle's device list, then click the **Edit** button. The **Configure ROV Reference** dialog box appears as seen below.
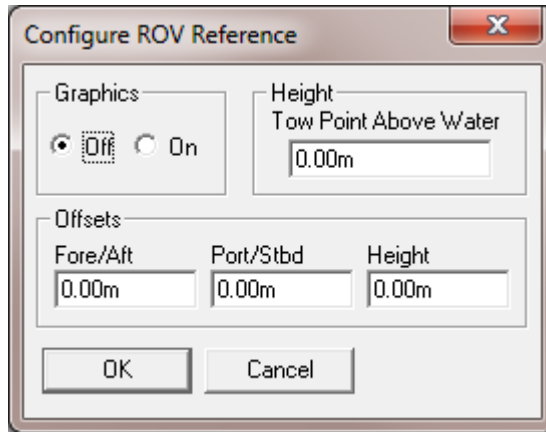
Graphics:
Selecting On will display the device name and a square at the location of the 'ROV', within the Graphics and Bird's Eye windows.

Tow Point Height:
The height of the tow point above water is added for layback calculations only if a towed vehicle model is used.

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.

Data item: ROV, Intl Telecom PLOW, ATTITUDE

The Attitude data item must also be edited once it is added to a vehicle's device list. Highlight the **Attitude** data item in the vehicle's device list, then click the **Edit** button. The **Attitude** dialog box appears 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, Intl Telecom PLOW, COUNT

This data item configuration dialog has two tabs, Reference Counters and Real-Time Navigation Updates.

Reference Counters Tab

This tab (shown below) is used in conjunction with the Calculations window to maintain up to five reference counts based on the Channel One (cable) count. These reference counts are not used for any real-time calculations and are not logged to any file; they are intended for reference purposes only.
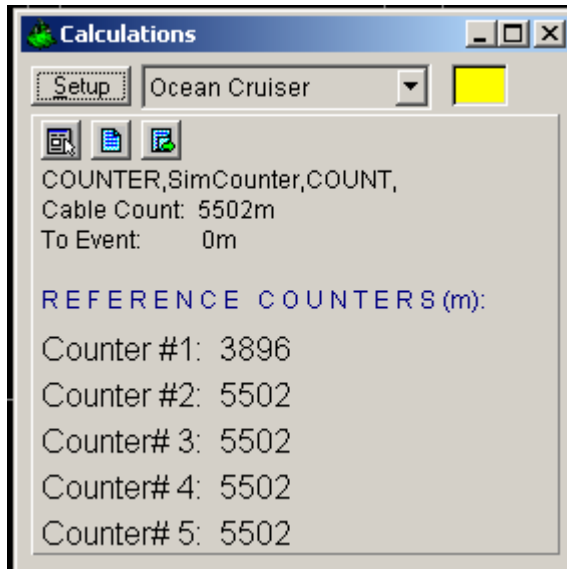

View and configure the Calculations window (shown below) by completing the following steps.

Note: To view the reference counts, the COUNT data item must be attached to the vehicle.

1. Open the Calculations window by selecting View>Calculations from the main menu.
2. In the Calculations window, select the appropriate vehicle from the dropdown list box. Then click the Setup button to open the Setup Calculation Views dialog box shown below.
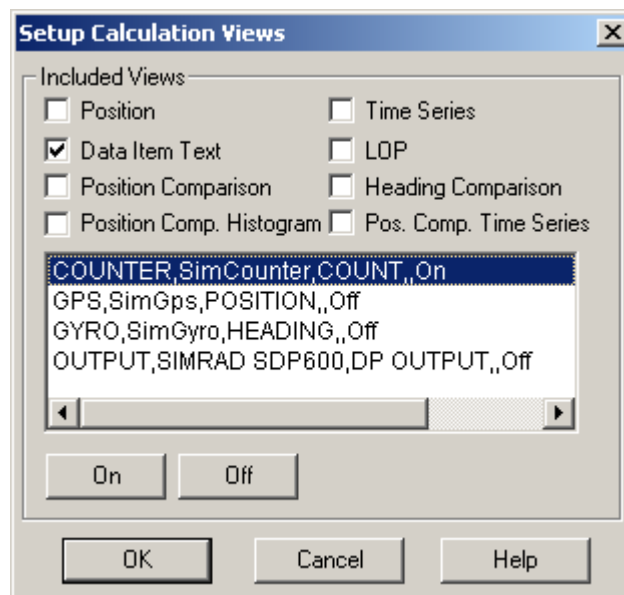
3. In the Setup Calculation Views dialog, select the Data Item Text checkbox. Then turn On the COUNT data item by selecting the COUNT data item from the list and click the On button.
4. Click OK.

Once the Calculations window has been opened and configured, the five reference counters can be modified using the Reference Counters page of the

Configure Counter dialog. (Note: the Configure Counter dialog can be directly accessed from the Calculations window by clicking the 🖳 icon.)

The Reference Counter tab allows the reference counters to be modified in a number of ways, as described below. Start by selecting the reference counter you want to modify from the dropdown list box at the top of the page.

Direction
When the *Up/Down* button is not depressed the reference count will increase if the input cable count increases and decrease if the input cable count decreases. When the *Up/Down* button is depressed the reference count will decrease if the input cable count increases and increase if the input cable count decreases.

Set Specific Cable Count
To set the reference counter to a specific cable count, enter the desired value in the edit field then click the *Set* button. When the Configure Counter dialog OK button is then clicked, the desired reference counter value will be set to the entered value. This value will then continue to increment or decrement based on the input cable count and the current settings for the reference count.

Set Counter Scale
To change the scale at which the reference count will increment or decrement relative to the input cable count, enter the desired scale factor into the scale field. Leave the *New Counter Scale from Cable Count* value at its present value to apply the scale from the current point onward. Enter in a count value into the *New Counter Scale from Cable Count* field to apply the scale from a previous count value onward. Once the desired scale factor and count value is entered click the *Set* button and then click the *OK* button.

Set Counter Offset
To set an offset from the input cable count to the reference count enter the desired value into the Set Counter Offset field, click the *Set* button and then click the *OK* button. This value will be added to the input cable count.

Counter Name
To change the reference counter name enter the desired name into the *Counter Name* field. Click the *Set* and then the *OK* button to enter the change.

Real-Time Navigation Updates Tab
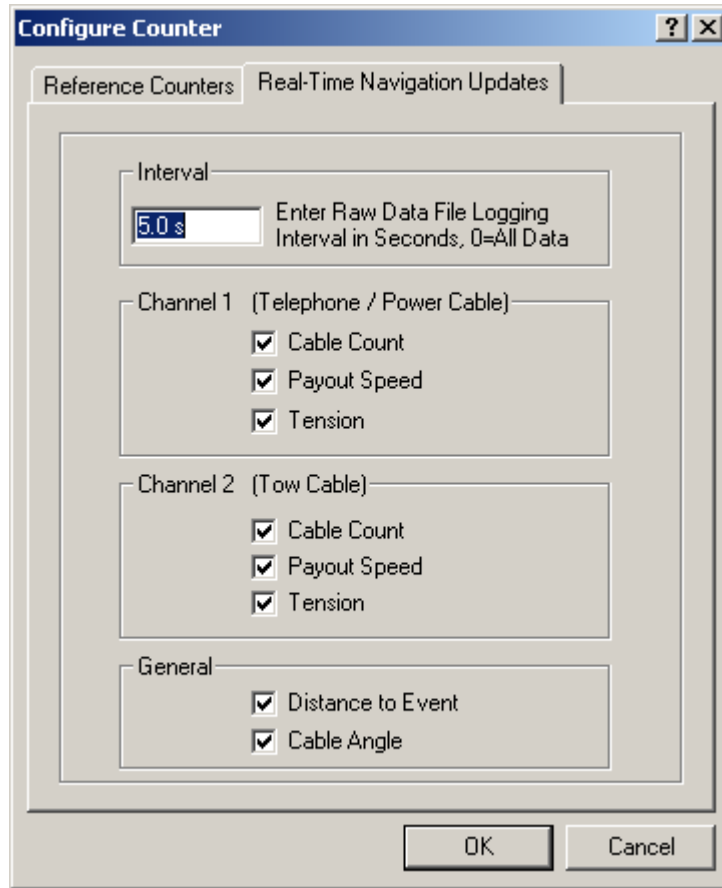
This tab enables/disables the data from this device that is to be passed on to the vehicle. Unlike the Reference Counters tab, data from the Real-Time Navigation Updates tab can be logged to the raw files if this data item is associated with a vehicle. This allows the vehicle to have more than one COUNT data item added to it, which is required if it is necessary to log data from more than one counter (raw device data is only logged if the data item is associated with a vehicle). If a checkbox is selected (checked) the data value will be passed to the vehicle. For example, if the *Cable Count* checkbox is selected in the *Channel 1* section then the cable count from the input device will be passed to the vehicles channel 1 count.

The *Interval* section sets the data logging interval used when the "With Events" Logging Control option is selected (refer to chapter 10 of the WinFrog User's Guide for more information).

Data item: ROV, Intl Telecom PLOW, BOTTOMDEPTH

Once the BOTTOMDEPTH data item has been added to the vehicle's device list, it must be edited to suit the application. In the vehicle's device list, highlight the **ROV, Intl Telecom PLOW, BOTTOMDEPTH** data item and click the **Edit** button. The standard **Configure Sounder** dialog box appears as seen below.
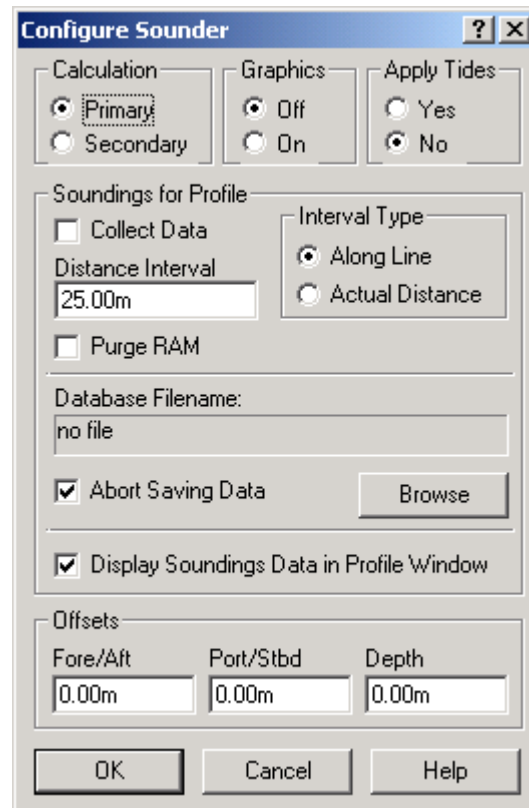
Calculation:
Set the type of calculation to Primary or Secondary using the appropriate radio button. WinFrog will only utilize (i.e. display and record) data from a Primary sounder device. If there is more than one Primary sounder attached to a vehicle's device list, WinFrog will not mean the data (as is done with positional devices), but rather alternate between the devices. Data from a Secondary status sounder will simply be monitored.

Graphics:
If the On radio button is selected, a labeled square representing the location of the sounder will be displayed 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 dialog.

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.

TELGRAM SPECIFICATION:
User configurable, comma or space delimited ASCII data string.