WinFrog Device Group:	**CABLE MACHINERY**
Device Name/Model:	**SMD System**
Device Manufacturer:	**Soil Machine Dynamics** Wincomblee Road NE63QS, Newcastle upon Tyne UK Tel: + 44 191 234 2222 Fax: + 44 191 234 0444 Email: **wendyw@smd-uk.com**
Device Data String(s) **Output to WinFrog:**	
WinFrog Data String(s) **Output to Device:**	
WinFrog Data Item(s) and their RAW record:	COUNT 492 PLOWDATA 490 DATA OUTPUT 450 DP OUTPUT 450 ATTITUDE 413

DEVICE DESCRIPTION:

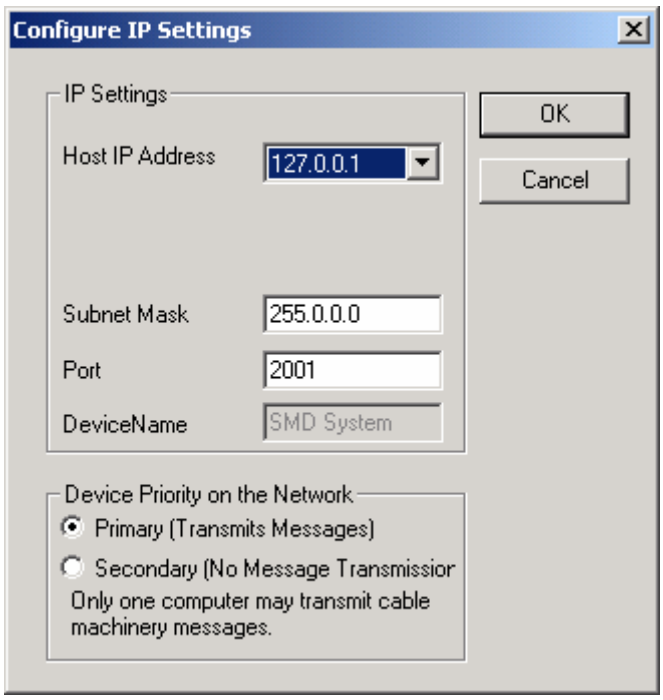
It is a network device enabling communication between the SMD System and WinFrog. It reads data to WinFrog for cable modeling, data collection and output. It accepts cable count and plow data and outputs positional information.

To display the various messages in the I/O device window, highlight the SMD System device in the I/O Devices window then right click in the Decoded Data tab area and select the desired message.

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Network Device



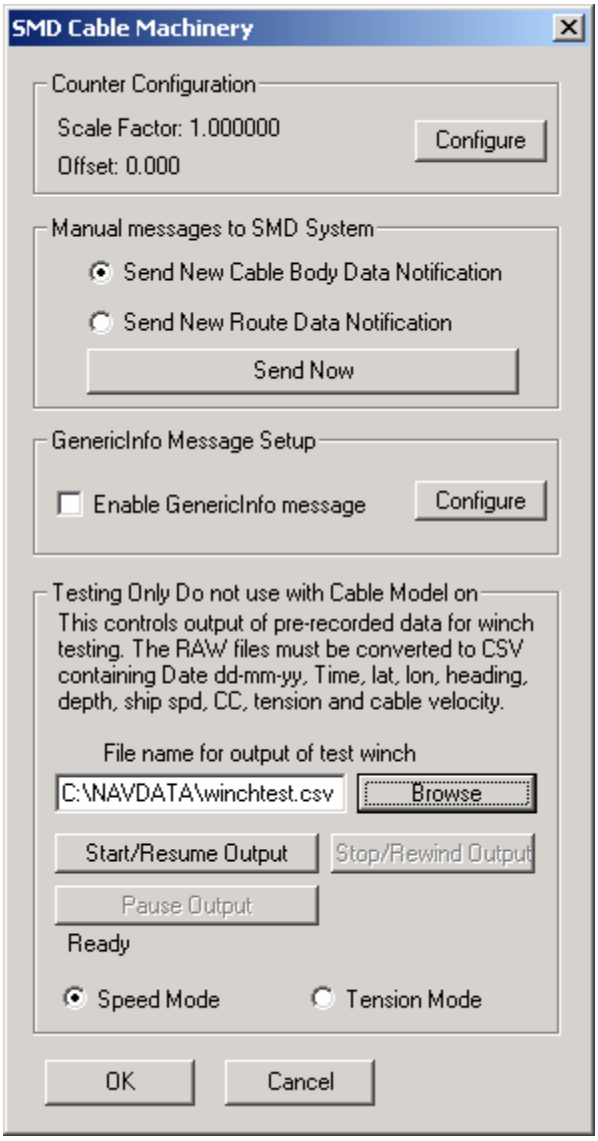
The Host IP Address option is available for situations where there is more than one network card, and therefore more than one IP address, installed in the WinFrog computer. If this situation exists, then select the IP address for the network card that is on the same network as the other computers that are to be interfaced with the WinFrog computer. If there is only one network card installed on the WinFrog computer then this option is not used. In the Port field enter the port number required by the SMD System.

The Device Priority on the Network option should be set to Primary on the computer that is being used as the Primary WinFrog system. Designating a system as Secondary will simply allow monitoring and data collection.

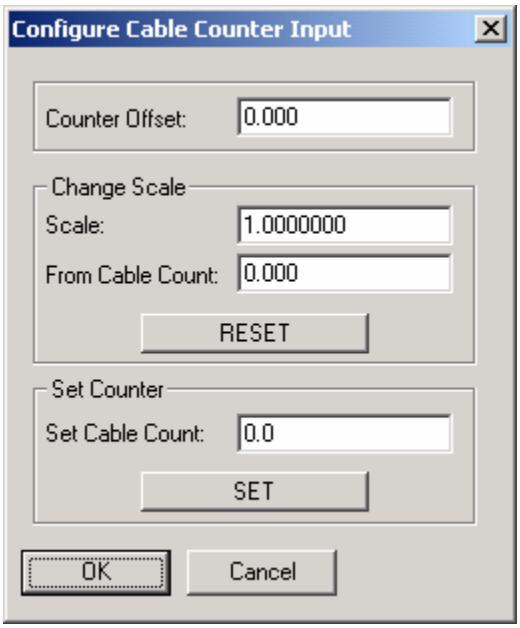
It is important to note that only one computer should be set to Primary as only one WinFrog system at a time can transmit cable machinery messages at a time.

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 SMD Cable Machinery dialog box appears, as seen below.



In the Counter Configuration section, click the Configure button to open the Configure Cable Counter Input dialog box as seen below.



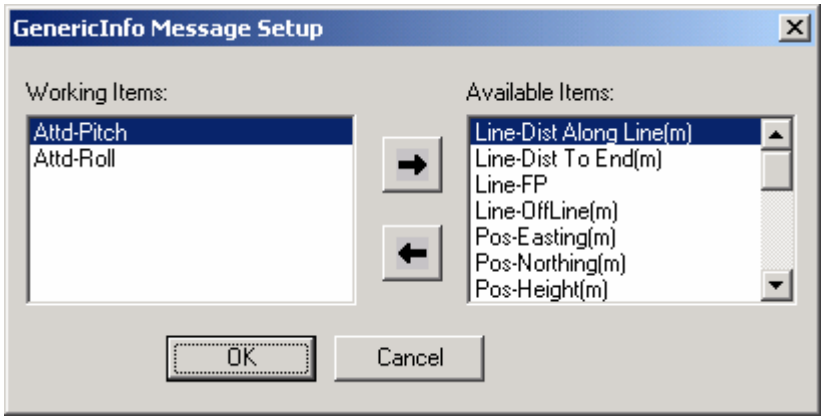
Enter a Counter Offset value to provide the counter with the desired starting cable count.

In the Change Scale section, a scale factor can be entered to compensate for any mis-calibration of the counter and/or to convert the incoming units to the desired units. You also have the option to apply the scale factor from a specified Cable Count forward. The Reset button must be used before any changes to the Scale Factor or From Cable Count options will take effect.

In the Set Counter section you can set the Cable Count to the desired value. The Set button must be used before the new Cable Count will be enabled.

The Manual messages to SMD System section of the SMD Cable Machinery dialog allows you to send update messages to the SMD System. If changes have been made to cable body information (in the CRDD database) or modifications have been made to the survey line, select the respective option and click the Send Now button to transmit the updated information to the SMD System.

In the Generic Message Setup section you can configure a data string to output to the SMD System. Click the Configure button to open the Generic Info Message Setup dialog box as seen below.



Add or delete the Available Items to the Working Items list, in the desired order, by using the left/right arrow buttons. A maximum of 10 items can be included in the message. The message will be output to the SMD System approximately once per second.

The options in the Testing Only do not use with Cable Model On section are used to test the interface between WinFrog and the SMD System. The format for the .CSV file to be used for this test is given in the dialog box (dd-mm-yy,time,lat,long,heading,depth,ship spd,cable count,cable tension,cable velocity). As stated in the dialog, these options should not be used when the Cable Model is on.

Similarly, the Speed Mode and Tension Mode options are only used for testing purposes and should not be used when the Cable Model is on.

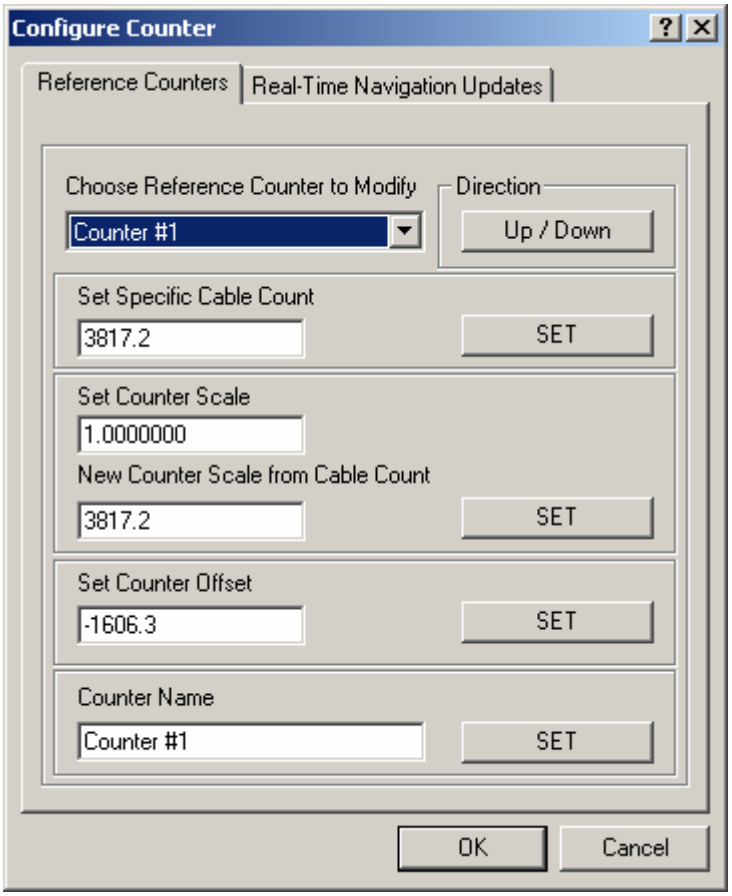
WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the SMD Cable Machinery device creates five data items: COUNT, PLOWDATA, DATA OUTPUT, DP OUTPUT and ATTITUDE. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: CABLE MACHINERY, SMD System, COUNT

Highlight the CABLE MACHINERY, SMD System, COUNT data item in the vehicle's device list and click the Edit button to open the Configure Counter dialog box as seen below.

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



Reference Counters tab

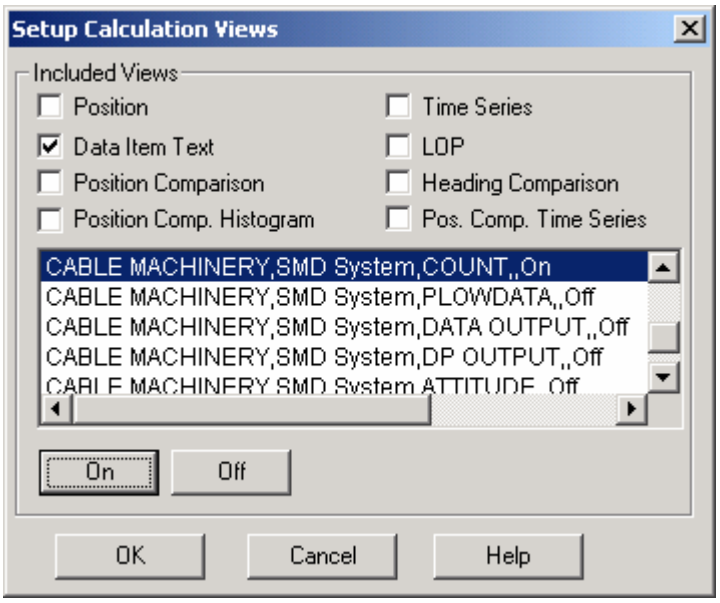
This tab is used in conjunction with the Calculations window to maintain up to five reference counts based on the Channel One (cable) count. These reference counts are not used for any real-time calculations and are not logged to any file; they are intended for reference purposes only.

One common use for the Reference Counters tab is to have a 'count down' between cable body deployment. This is accomplished by entering the cable spans between cable bodies in the 'Set Specific Cable Count' field(s), selecting the 'Direction' as 'Down' and exiting with OK when the first cable body is launched.

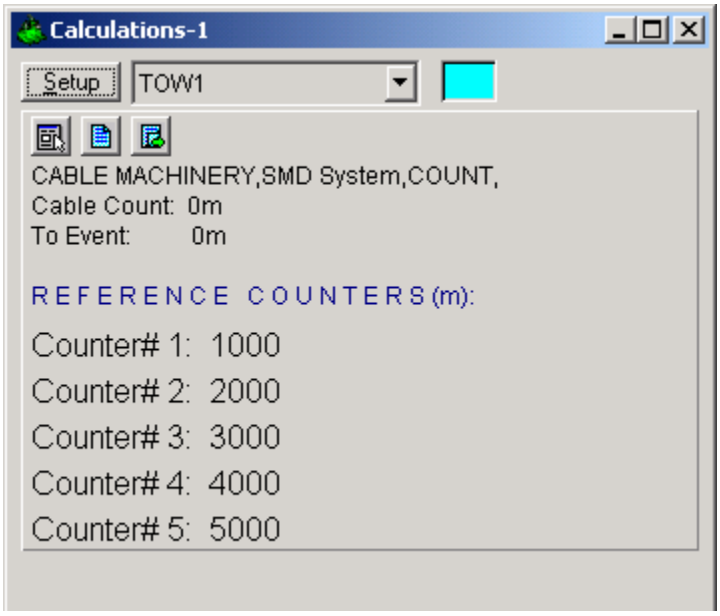
View and configure the Calculations window (shown below) by completing the following steps.

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

1. From the WinFrog View menu select the Calculations item to open the Calculations window.
2. In the Calculations window click the Setup button to open the Setup Calculation Views dialog shown below.



3. In the Setup Calculation Views dialog select the Data Item Text check box. Then to turn On the COUNT data item, select the COUNT data item from the list and click the On button.
4. Click OK and a Calculations window, with the reference counter information displays as seen below.



Once the Calculations window has been opened and configured, the five reference counters can be modified using the Reference Counters tab of the Configure Counter dialog. (Note: the Configure Counter dialog can be directly accessed from the Calculations window by clicking the  icon in the Calculations window.)

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 drop down 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 the click the *OK* button.

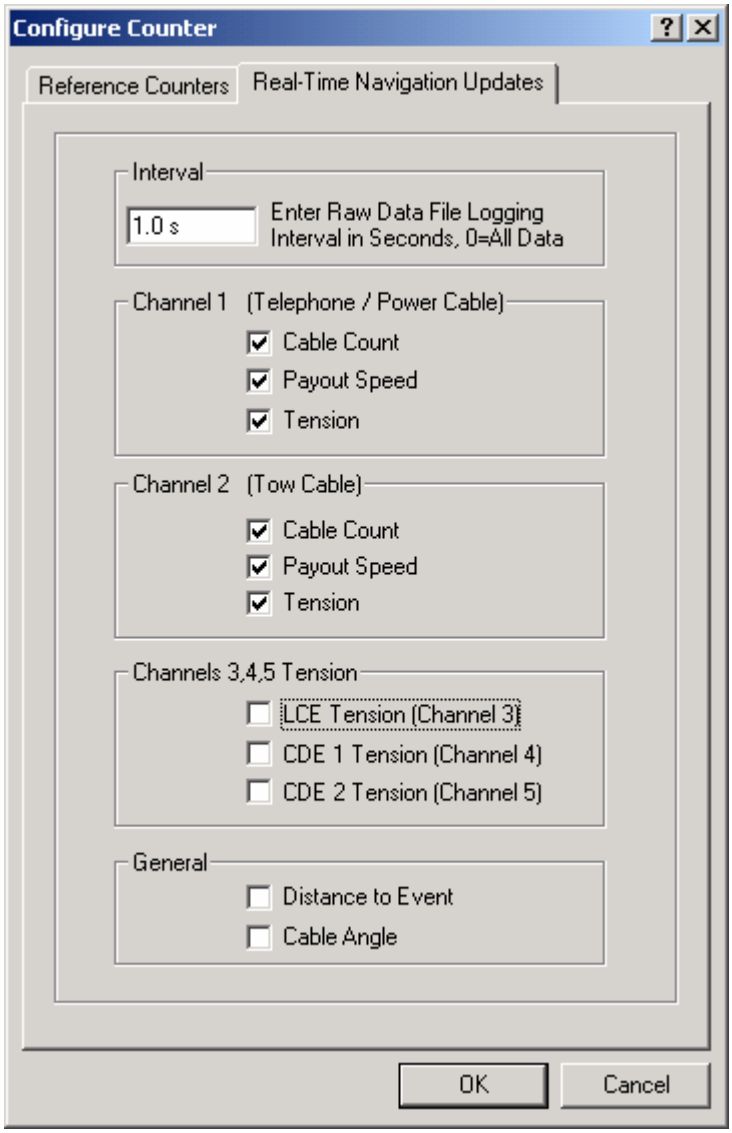
Set Counter Offset

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 the 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 certain data from this device to be passed 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 without one conflicting with the other. One COUNTER device may provide the telephone cable count while the other provides the tow count. If a checkbox is selected 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.

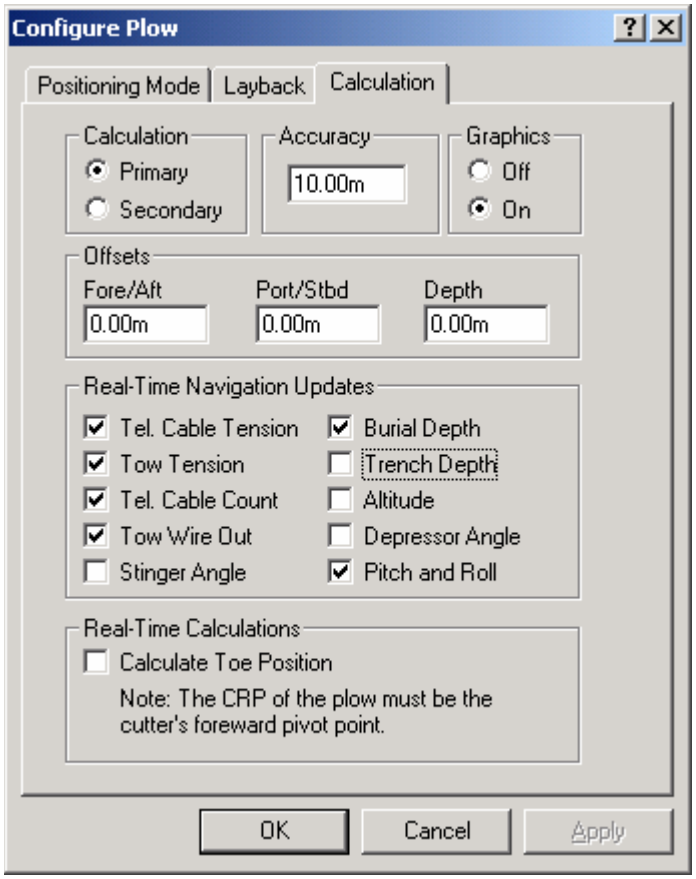
It is important to note that if the data string from the counter device does not contain certain data types (count, tension or speed), these options should not be selected from this page. Selecting an option for which there is no data in the string causes

WinFrog to assign a zero in the selected field and it may result in valid data from other sources being overwritten with zeroes.

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: CABLE MACHINERY, SMD System, PLOWDATA

This data item would typically be attached to the Plow vehicle in WinFrog. Highlight this data item in the vehicle's device list and click the Edit button to open the Configure Plow dialog box as seen below.



As can be seen above, the Configure Plow window consists of three tabs. However since this driver only reads certain data, neither the Positioning Mode nor Layback tabs are used. However the Calculation tab must be configured for use.

Positioning Mode tab

Not used for this device.

Layback tab

Not used for this device.

Calculation tab

As mentioned above, this device is not used for positioning the plough. The only function of this data item is to read the relevant data. Therefore, the only options that require configuration are the options available in the Real-Time Navigation Updates section of this tab.

Calculation

Primary/Secondary – These options are used for plough positioning and are not used by this device. This data item must be added to the vehicle's device list to read, apply and record the relevant data, but this is independent of the Primary/Secondary setting.

Accuracy

Not used for this device.

Graphics

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

Offsets

Not used for this device.

Real-Time Navigation Updates

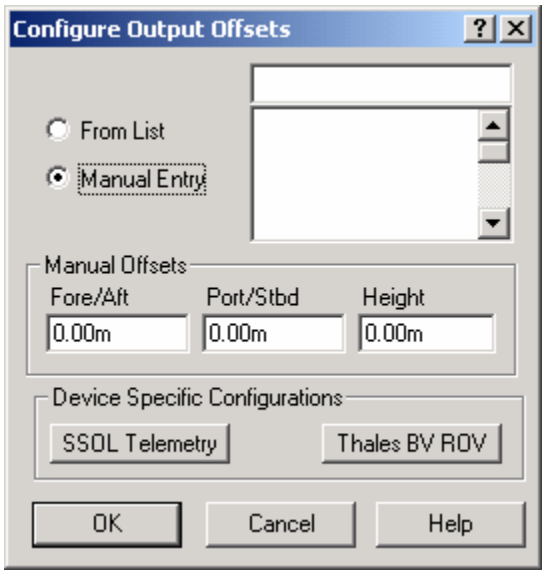
Most Plow devices have the ability to provide real-time data updates via an umbilical. The SMD System reads this data and then outputs relevant plough related data to WinFrog. The Decoded data tab in the I/O Devices window will indicate what data is updated in real-time for each device. You should only select the checkboxes for data output by this device, as leaving the other checkboxes selected 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 selected and this may cause values from other devices to be overwritten.

Real-Time Calculations

Not used for this device.

Data item: CABLE MACHINERY, SMD System, DATA OUTPUT

The DATA OUTPUT data item can be added to multiple vehicles (e.g. primary and secondary positioning vehicles) in order to output their positions. When the DATA OUTPUT data item is edited from the Configure Vehicle Devices dialog box, the Configure Output Offsets dialog box appears. The content of the dialog box is based on the offsets attached to the vehicle in question.



Configure Output Offsets:

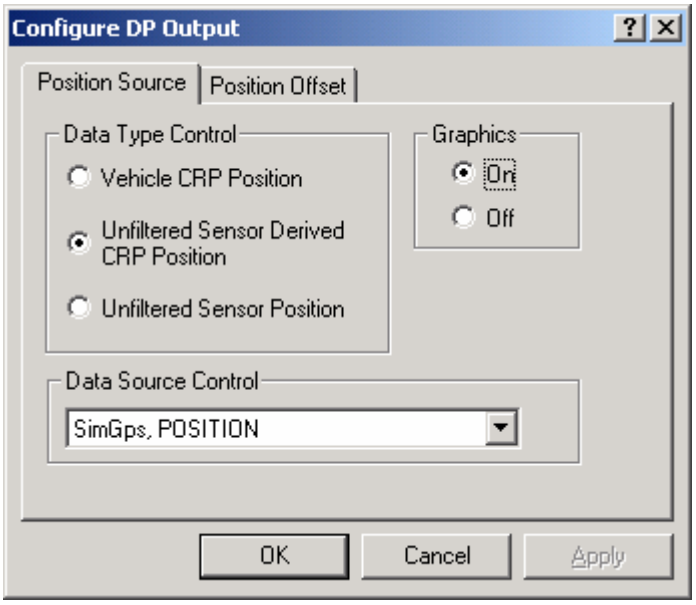
Normally, the position that is to be output will be the position of the CRP of vehicle. However, if another position is required, the offset to be applied to the output position for the DATA OUTPUT data item can either be taken from the list of vessel offsets or a manual offset entry can be input. Select the appropriate radio button (From List or Manual Entry). The offset can now be highlighted from the list, or if Manual Entry is selected, the offset values can be input. The position data output will now be referenced to the offset location chosen.

Device Specific Configurations:

The SSOL Telemetry and Thales BV ROV buttons are not used for this device.

Data item: CABLE MACHINERY, SMD System, DP OUTPUT

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



Position Source tab

Data Type Control:

In Data Type Control, there are three options to choose from: Vehicle CRP Position, Unfiltered Sensor Derived CRP Position, and Unfiltered Sensor Position.

Choose the **Vehicle CRP Position** for filtered position updates (Kalman, velocity, etc. as applied to the vehicle) referenced to the vehicles' Common Reference Point (CRP). The offset input under the Position Offset tab is added to the CRP position.

The **Unfiltered Sensor Derived CRP Position** is the same as the above only unfiltered data is output. With this option, filtering can be performed within the DP unit. This is often the preferred option as most DP units have more rigorous filtering routines that require an unfiltered data input.

The **Unfiltered Sensor Position** outputs unfiltered positions from the positioning sensors' location. The offset input under the Position Offset tab is added to the sensors raw position.

Data Source Control:

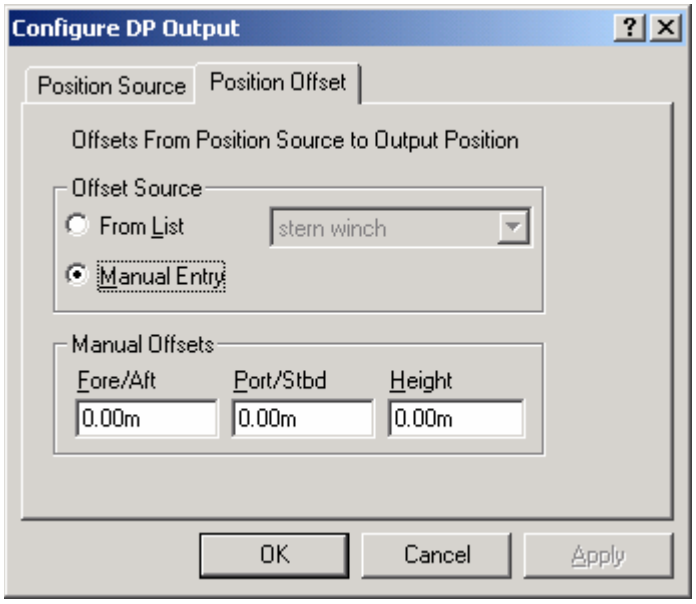
The data source depends on the Data Type Control that was selected. If the *Vehicle CRP Position* is chosen, the Data Source Control will automatically be set to VEHICLE, CRP POSITION, and the primary positioning sensor data will be used. If either the *Unfiltered Sensor Derived CRP Position* or the *Unfiltered Sensor Position* is chosen in the Data Type Control, then the positioning sensor can be chosen from the dropdown list box under Data Source Control. Here a secondary positioning sensor can be chosen. It is important to note that the *Unfiltered Sensor Derived CRP Position* is based on the chosen sensor, however, the data is related to the CRP. Note that the SimGps, POSITION is used in this window as an example only.

Graphics:

Select the On radio button to display a small square with the name of the device at the output coordinates on the Graphics window.

Position Offset tab

As shown in the dialog box below, the *Offsets From Position Source to Output Position* can also be configured here. This means that any offset input here will be applied to the position output from the Position Source tab options listed above.



Offset Source:

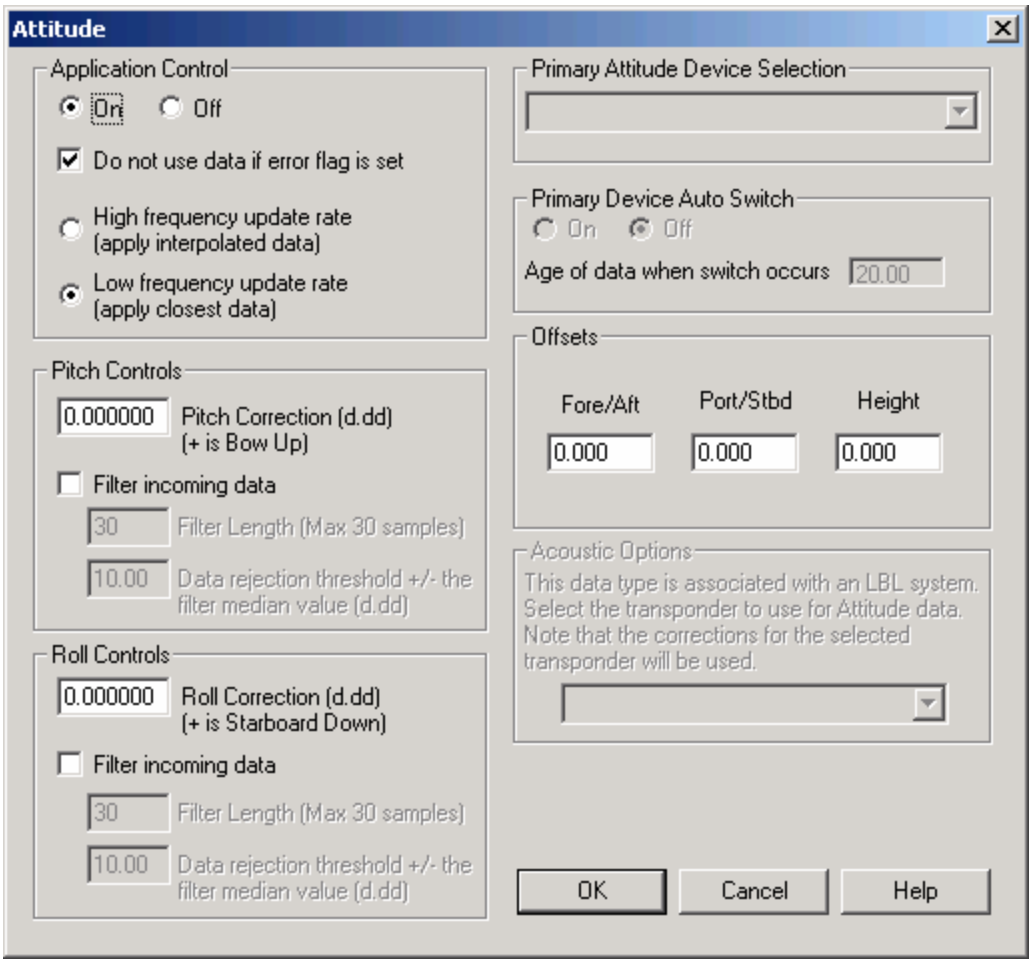
The Offset Source can be chosen from the list of offsets for the vehicle, or the Manual Entry can be used.

Manual Offsets:

If Manual Entry is chosen under the Offset Source, the offsets must be input here. Offsets are input similar to all offsets in WinFrog – i.e. measured from the CRP to the offset location.

Data item: CABLE MACHINERY, SMD System, 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.



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.