WinFrog Device Group:	**Cable Machinery (Network, UDP)**
Device Name/Model:	**DW System**
Device Manufacturer:	Multiple devices on a LAN network: Winch (ODIM), Plow (Engineering Business Ltd), MakaiLay
Device Data String(s) Output to WinFrog:	ODIM: Telephone cable data 0x30 Tow cable data 0x35 MakaiLay: Cable management 0x32 Route or ship track 0x3C (replaced 0x37) Cable Configuration 0x38 Cable Events 0x39 Initial cable count and scale 0x3A (ignored) DP set speed and set tensions 0x3B EBL: Plow record 0x34 ALL: Controlled/emergency stop 0x31
WinFrog Data String(s) Output to Device:	Ship Position 0x33 Plough Position 0x36
WinFrog Data Item(s) and their RAW record:	CABLE INFO 0x30 480 CABLE MANINFO 0x32 482 DATA OUTPUT 450 CABLE TOWINFO 0x35 485 PLOW POS 0x36 486 CABLE CONFIG 0x38 488 DP SETVALUES 0x3B 489 PLOWDATA 490 HEADING 410
Other stored data	CRITICAL STOP 0x31 WORKING *.LOG file REPEATER DETECTION in 0x30 and 0x34 WORKING *.LOG file ROUTE POSITION LIST WORKING *.PTS file CABLE EVENTS 0x39 WORKING *.LOG file

DEVICE DESCRIPTION:

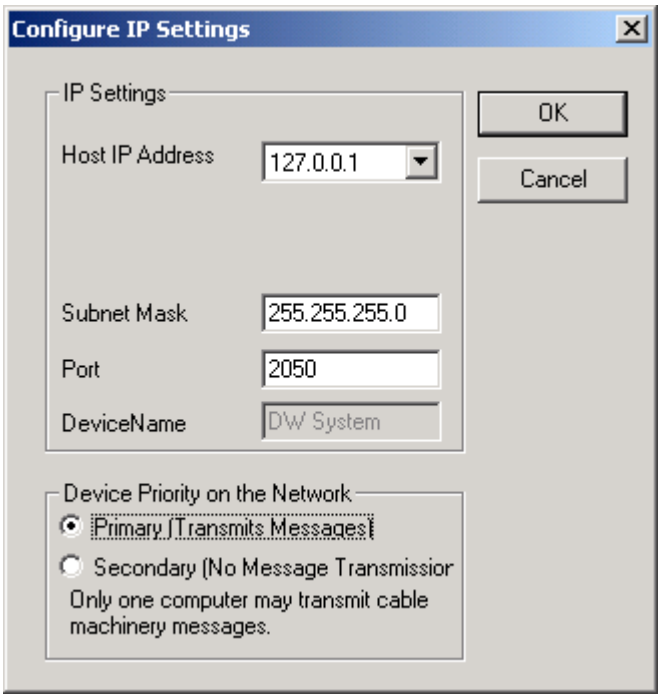
This device is for telephone cable laying. Specifically for the Dockwise boats C/S Knight and C/S Baron used along with MakaiLay. It is a network device enabling communication between the winches, plow, MakaiLay and WinFrog. Consequently, this one device takes the place of a plow device, counter for the telephone cable and tow cable. It outputs position data to MakaiLay for cable modeling and slack control. In addition to plow and cable data, it accepts cable configuration, cable management, event and DP set data from MakaiLay. See the document "Racal-Odim Cabel Machinery Interface" document v1.20 16Jun01 for details on the communications.

To display the various messages in the I/O Device window, select the DW System in the main window then right click in the Decoded Data tab area and select the desired message.

Also refer to the section at the end of this document for important information on accepting and storing MakaiLay events in WinFrog.

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:



Select the IP address of this computer from the dropdown list box. If there is more than one ether net card in this computer, select the one used for communications with MakaiLay, plow and winches.

The port needs to be 2050 and the sub-net mask needs to be 255.255.255.0 for the network as described in the **Racal-Odim Cabel Machinery Interface** document. Each computer's IP address must be set according to this document.

The initial setting for Primary or Secondary WinFrog is also set on this dialog. If this device on this computer is set to Primary then this WinFrog will transmit messages (e.g. ship or plow position), as well as record data. If Secondary is selected this WinFrog will not transmit messages but will still record data. It is important to note that only one computer can be set to Primary, i.e. only one computer can transmit these messages on the network at any one time.

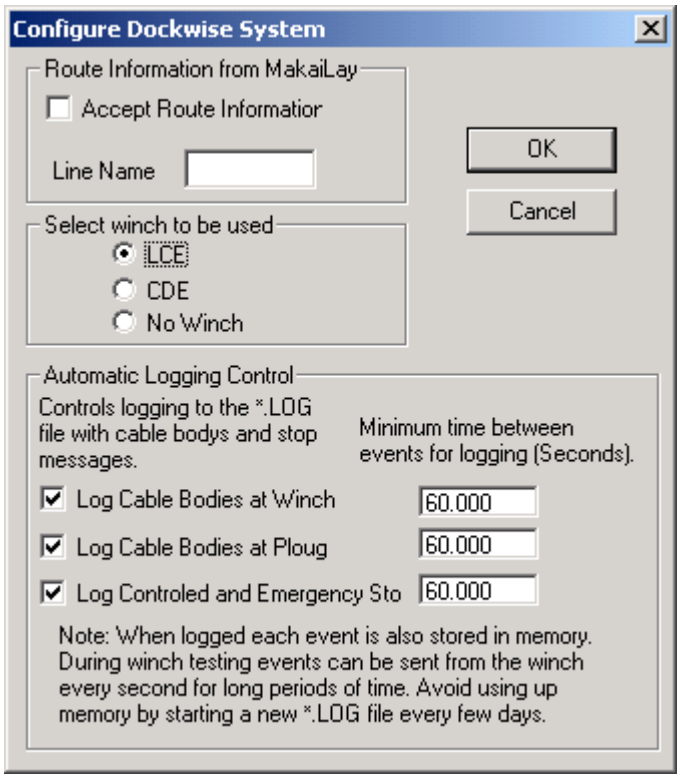
Once initially set up, use the System Control tools found on the main toolbar to switch between Primary and Secondary. The System Control tools are the Take Control 

button and the Give Control 

button. To change which computer is to transmit the positional data, since only one can be designated as Primary at a time, click the Give control button on the Primary system in order for it to relinquish control. Then on the Secondary system, click the Take Control button and the latter system will begin transmitting positional data on the network. It is important to note that a computer cannot take control unless the other computer has given it. The current state of each computer is indicated in the area between the Take Control and Give Control buttons.

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 Dockwise System dialog box appears as seen below.



MakaiLay can output route information under operator control. To load the data into WinFrog, select the **Accept Route Information** checkbox. A unique line name must also be entered. WinFrog will not add these points (A/Cs) to an existing line nor will it overwrite an existing line. WinFrog will enter this as a new line in the current working line file. If there is no current line file, the data will be ignored. WinFrog will also add the route points to the waypoint file.

Since the message from the winches could possibly indicate that both winches are ready, WinFrog cannot determine which is to be used. You must select which winch is to be used from the available options.

WinFrog can automatically log several events:

Cable bodies at the winch or plow and

Controlled and emergency stop messages.

When a cable body enters the winch, it sets a value in the mode integer of the 0x30 message. This setting remains until MakaiLay acknowledges it. However, it may remain there for several seconds before MakaiLay acknowledges its presence. In order to reduce the number of occurrences of records for the same cable body in the *.log file, a minimum time between events may be entered. Entering a value here

blocks another event being placed into the *.log file until the entered amount of time has elapsed.

Note: During winch testing the repeater present may remain set for long periods (days). Each occurrence of a cable body uses up 14+k bytes of RAM. After a few days the computer may run out of virtual memory. Therefore the checkboxes should remain unselected unless actually laying cable.

Note: It is possible to have two cable bodies close together, e.g. a splice box near a repeater, so in these cases the time interval needs to be set less than the expected difference in times of arrival of the bodies at the sensor.

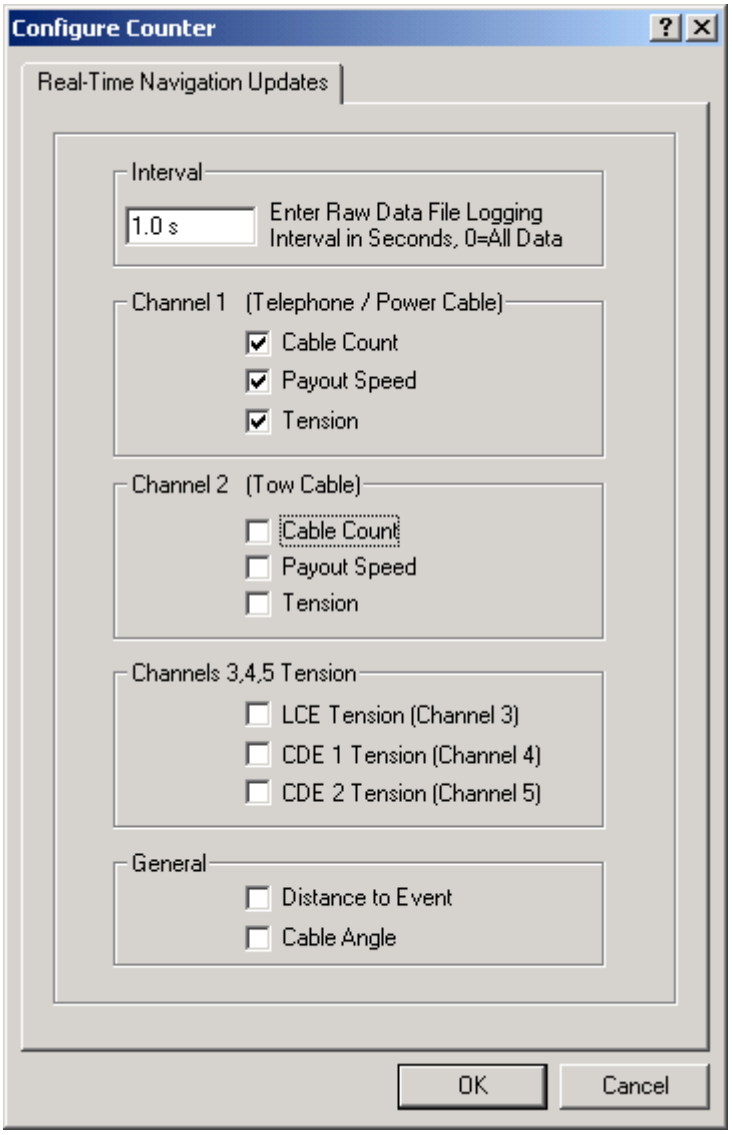
WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the DW System device creates 10 data items: CABLE INFO 0x30, CABLE MANINFO 0x32, DATA OUTPUT, CABLE TOWINFO 0x35, PLOW POS 0x36, CABLE CONFIG 0x38, DP SETVALUES 0x3B, PLOWDATA, HEADING and ROV REF VEH. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: CABLE MACHINERY, DW System, CABLE INFO 0x30

This record comes from the winch controllers. It contains telephone cable count, tension and speed. The 480 record will be recorded to the raw files if raw record storage is enabled.

Add this data item to the cable ship vehicle's device list. Highlight this data item and click the Edit button to open the Configure Counter dialog box as seen below.



Although the interfacing document indicates that the data transmission rate is 1hz, the winch controller may output this message at a higher rate. Enter the minimum time interval to log data.

If you select the checkboxes in the “Channel 1” section, the corresponding value from this message will become the prime or accepted value, which will be displayed and stored. Since this message does not contain Tow Cable, Tension or General information, the remaining checkboxes have no effect and should not be selected.

Data item: CABLE MACHINERY, DW System, CABLE MANINFO 0x32

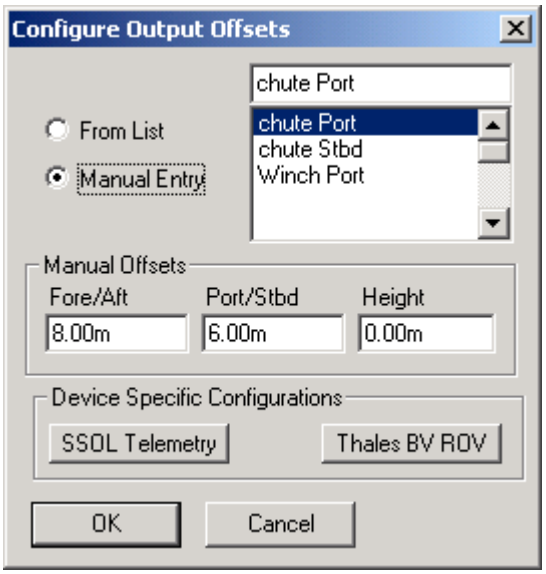
This record comes from MakaiLay. It contains data for the winch system. Additionally, WinFrog logs this data in the 482 record. It is also used to pass control between MakaiLay and the winch system. This data item is for logging these values.

Although there are no Edit options for this data item, it must be added to the cable ship's device list in order to enable data recording to the 482 record.

Data item: CABLE MACHINERY, DW System, DATA OUTPUT

This data item causes the Ship Position 0x33 message to be broadcast over the network. The 450 record will be recorded to the raw files if raw record storage is enabled.

Highlight this data item and click the Edit button to open the Configure Output Offsets dialog box as seen below.



You can select a point on the vessel whose coordinates will be output. To indicate this point to recipients of the message, a mode number and three characters are used. These are placed in the message to be transmitted. If all three offsets are zero, the coordinates of the point output in the Ship Info 0x33 telegram will be for the CRP regardless of whether Manual Entry or From List is selected. A mode number of 2 will be set. The three characters will be CRP.

Manual Entry:
If any of the offsets have an entry other than zero, the coordinates that are output will be for the offsets entered. The mode number will be 4 in the 0x33 telegram and the three characters will contain the description UNK for unknown.

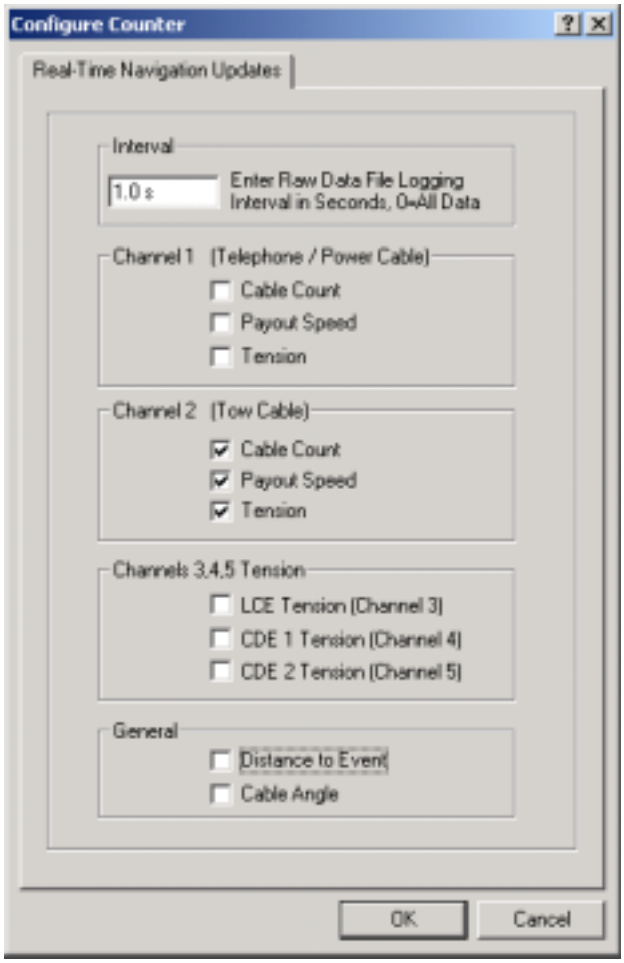
From List:
The coordinates that are output will be for the point selected. If the name of the point selected contains the word “chute”, in upper or lower case, the mode number in the 0x33 telegram will be 1 and the three characters will be the first three characters in the name. If the name of the point selected does not contain the word “chute” the mode number will be 4 and the first three letters of the name will be placed in telegram 0x33.

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

Data item: CABLE MACHINERY, DW System, CABLE TOWINFO 0x35

This record comes from the winch controllers. It contains plow tow cable count, tension and speed. The 485 record will be recorded to the raw files if raw record storage is enabled.

Add this data item to the cable ship vehicle’s device list. Highlight this data item and click the Edit button to open the Configure Counter dialog box as seen below.



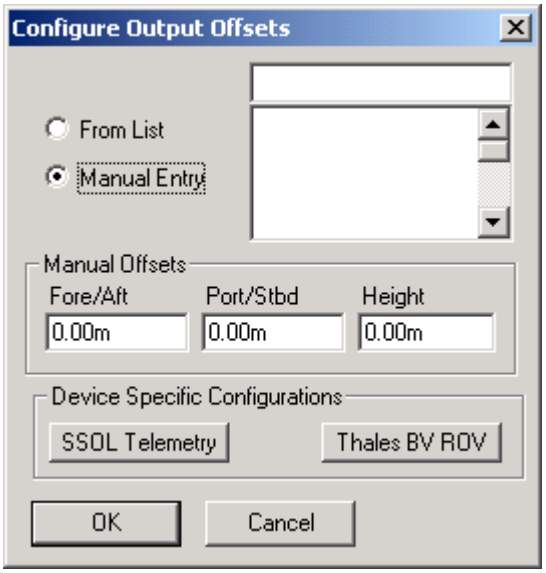
Although the interfacing document indicates that the data transmission rate is 1hz, the winch controller may output this data at a higher rate. Enter the minimum time interval to log data.

If you select the checkboxes in the “Channel 2” section, the corresponding value from this message will become the prime or accepted value, which will be displayed and stored. Since this message does not contain Telephone/Power Cable count, Tension or General information, the remaining checkboxes have no effect and should not be selected.

Data item: CABLE MACHINERY, DW System, PLOW POS 0x36

This data item causes the Plow Position 0x36 message to be broadcast over the network. The 486 record will be recorded in the raw files if raw record storage is enabled.

Add this data item to the plow vehicle’s device list. Highlight this data item and click the Edit button to open the Configure Output Offsets dialog box as seen below.



You can select a point on the plow whose coordinates will be output. If all three offsets are zero, the coordinates of the point output in the PLOW POS 0x36 telegram will be for the CRP regardless of whether Manual Entry or From List is selected. The coordinates of the point selected will be placed in the 0x36 message and transmitted over the network. There are no characters transmitted describing the location as in the DATA OUTPUT data item described above.

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

Data item: CABLE MACHINERY, DW System, CABLE CONFIG 0x38

This record comes from MakaiLay. It contains data about the telephone cable configuration. Additionally WinFrog logs this data in the 488 record in the raw files. This data item is for logging these values.

Although there are no Edit options for this data item it must be added to the cable ship's device list in order to enable data recording to the 488 record.

Data item: CABLE MACHINERY, DW System, DP SETVALUES 0x3B

This record comes from MakaiLay. It contains data that was sent to the DP via the serial port. WinFrog logs this data in the 489 record in the raw files. This data item is for logging these values.

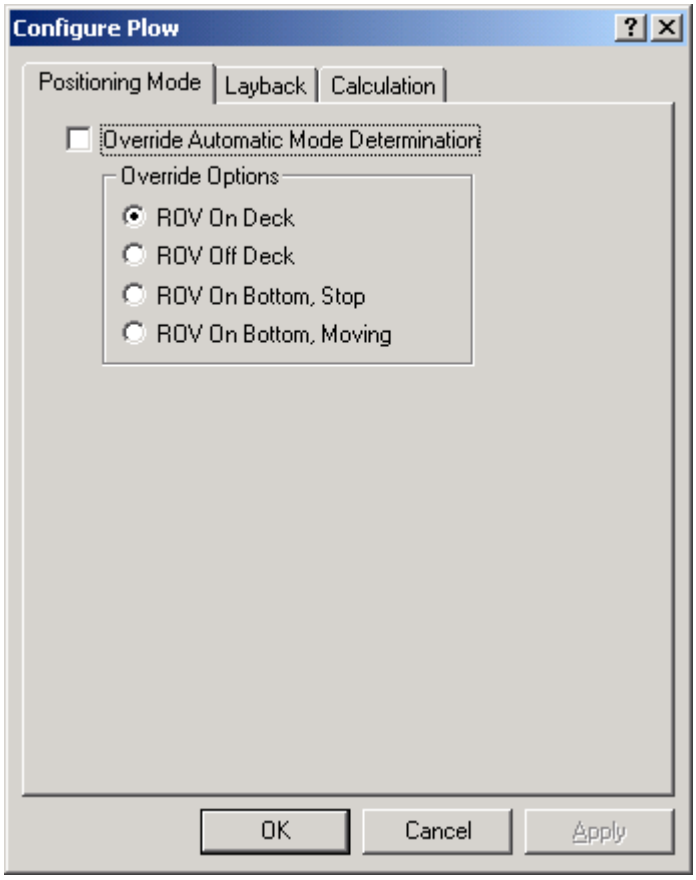
Although there are no Edit options for this data item, it must be added to the cable ship's device list in order to enable data recording to the 489 record.

Data item: CABLE MACHINERY, DW System, PLOWDATA

This record comes from the winch controllers. It contains plow tow cable count, tension and speed. WinFrog logs this data in the 490 record in the raw files if raw record storage is enabled.

This data item is also used to provide a reference point on the plow for positioning the plow relative to the ship. It is typically added 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.



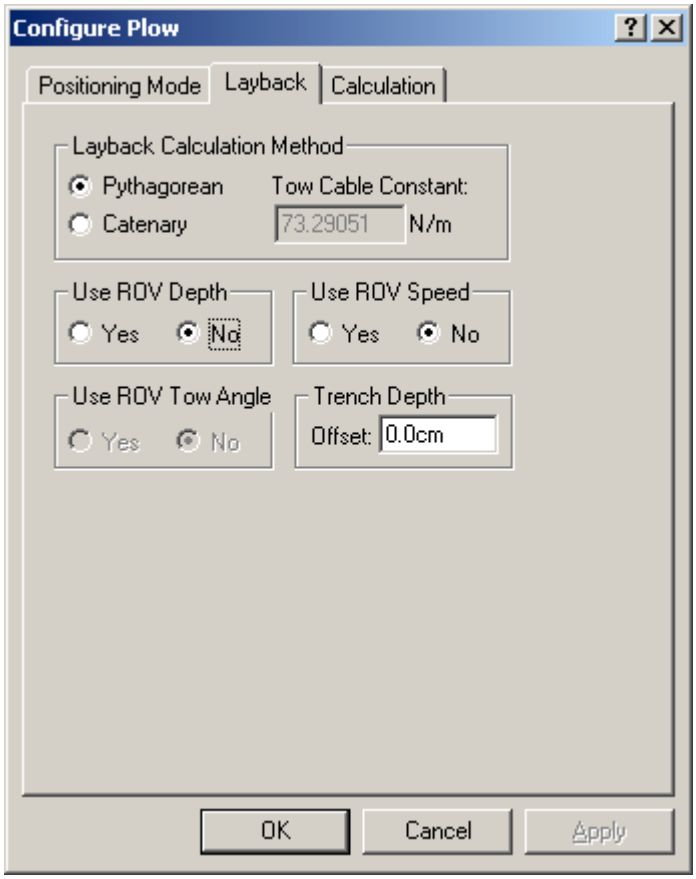
Positioning Mode tab

Override Automatic Mode Determination:
This checkbox 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 meter.
ROV Off deck is assumed if the speed is greater than .2 and the layback is calculated at less than 1 meter and the altitude is greater than 4 meters.
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 meters 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 as follows: 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.

Catenary requires the weight of the cable in newtons/meter, (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 azimuth used is the same as described above.

Use ROV Depth
Yes causes two actions:

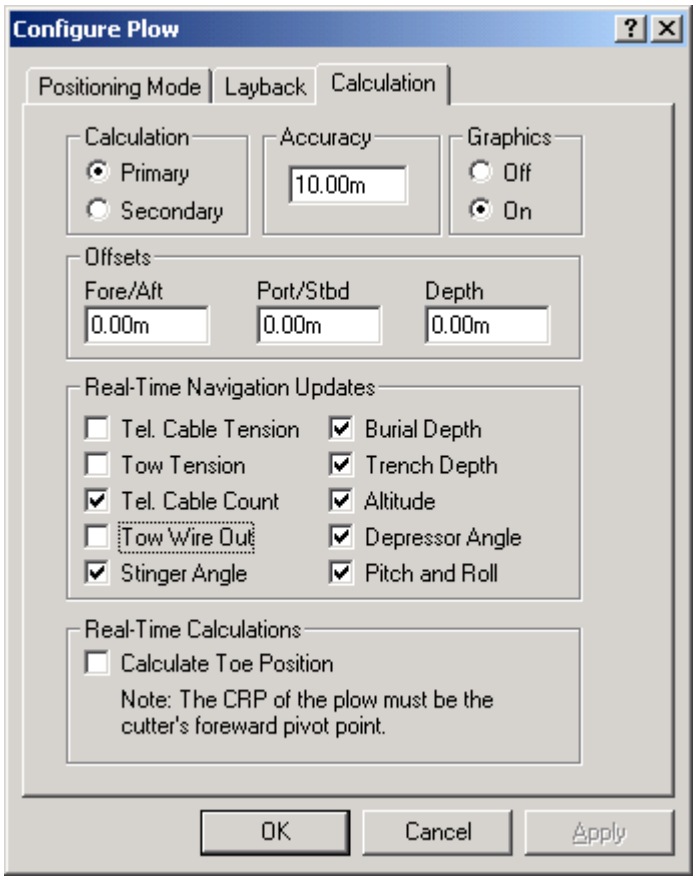
1) The depth obtained from this device will be added to the depth offset and assigned to this vehicle. The depth offset is entered in the Calculation tab. The depth obtained from this device is either the manually entered value (if applicable) or the depth from one of the data items from the selected device.
2) The depth obtained from this device is used to determine the layback. No offset is applied except which may be applied at the source device.

No causes the depth for the layback calculation to be obtained from the vehicle. Essentially, this means the depth must be assigned by another device. This overrides the selection of a device or manual entry of depth.

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 Seaplow VIII Device.

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.
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

Select the On radio button to display a square 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 **CABLE MACHINERY, DW System, 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.

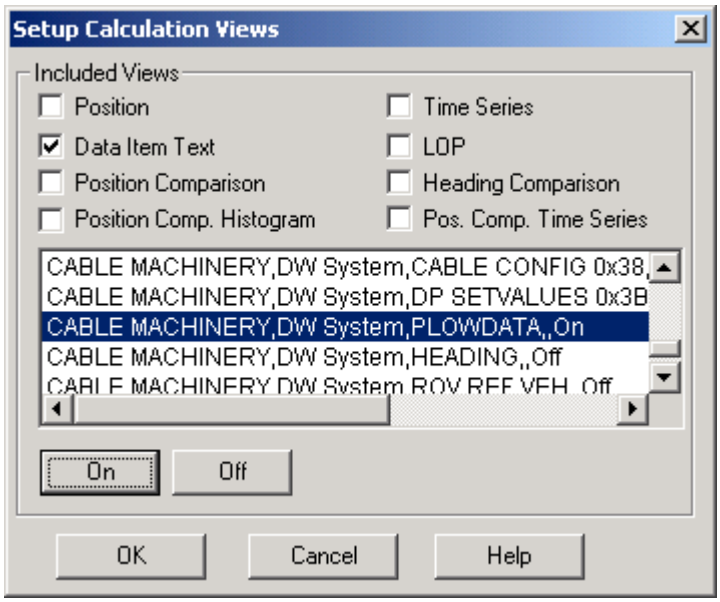
Depth is an offset from the CRP. It is applied in several different ways:

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.

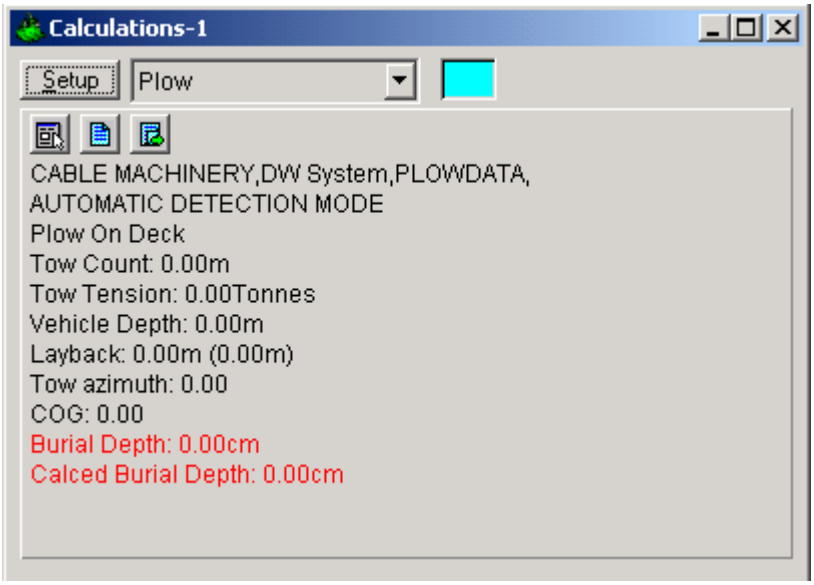
Real-Time Navigation Updates
Most Plow devices have the ability to provide real-time data updates via an umbilical. The Decoded data tab in the I/O Devices window will indicate what data is updated in real-time for each device. This data item has all the parameters except telephone cable tension. Consequently, this checkbox should remain unselected. The others may be selected. The tow wire count and tension come from the PLOW TOWINFO 0x35 message.

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 and click the Setup button. Select **Data Item Text** and turn the data item **CABLE MACHINERY, DW System, PLOWDATA** on by highlighting it and clicking the **ON** button as seen below.



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

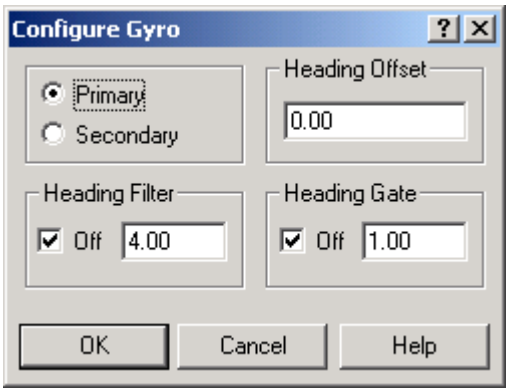


From this window, you can monitor some of the input data as well as the layback calculation. This Calculation window also provides a shortcut to the Configure Plow dialog box by clicking the  button.

Data item: CABLE MACHINERY, DW System, HEADING

If the Heading data from the sensor on the Plow is deemed reliable enough to orient the vehicle, then this data item is added 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 Gyro dialog box as seen below.



Calculation (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 with heading information. However, unlike the Position data items, WinFrog does not calculate a

weighted mean solution for multiple Heading data items. If more than one Heading data item is set to primary, the vessels heading, in WinFrog, will jump back and forth between the two. Devices set to Secondary are simply monitored, and are not used in the vehicle's calculations.

In the case of Primary device failure, WinFrog will not automatically use the Secondary device(s). You must manually change a Secondary device to Primary status in order for it to be used in the vehicle's calculations.

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.

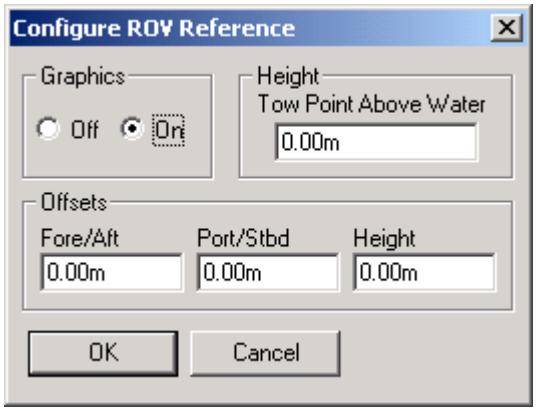
Heading Filter/Heading Gate:
The Heading Filter is used to "smooth" heading values used by the vehicle. The value entered in the Heading Filter indicates the number of headings that will be used to predict the next heading value. The larger the value entered, the "heavier" the filter will be – i.e. the 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.

Data item: CABLE MACHINERY, DW System, ROV REF VEH

This data item is attached to the vehicle in WinFrog that has a real-time positioning source (DGPS, etc.), typically the ship. This vehicle with its known position serves as the reference point for determining the Plow's position. It is only necessary to add this data item to the ship's device list if positioning of the plow is required using this device. Using this data item does not generate a raw record.

Highlight this data item 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.

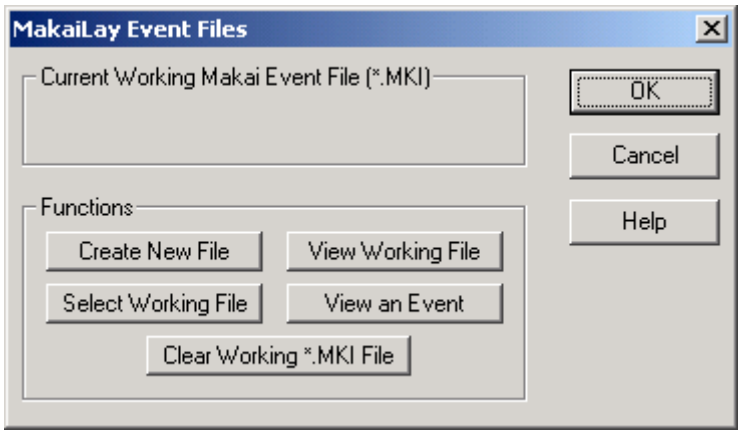
Tow Point Height:
The height of the tow point above water is added for layback calculations only if a towed vehicle model is used.

Offsets:
The X,Y,Z Offsets are applied from the CRP to the tow point (usually the winch) on the ship. These values are set similar to values that would be applied to any device offset within WinFrog. Note that the Height Offset is not used for operations involving plow vehicles.

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

Accepting and storing MakaiLay events

The MakaiLay operator may download a selection of events as recorded during the cable laying. This may be done periodically, say every six or twelve hours. These events are not automatically recorded – the WinFrog operator must set up a working *.MKI file. This is done by selecting the menu item File>Edit Working Files>Makai Cable Event which provides the following dialog.



Use this dialog to first create a MKI file, then to select it as the working MKI file. View Working File provides a drop down list of the events in the file, one of which may be selected to view. View an Event allows you to select any MKI file and then view an event in that file.

If a file is not set up, events from MakaiLay will not be stored. Ribbit can read these MKI files.