

WinFrog Device Group:	ROV
Device Name/Model:	NSW SeaREX
Device Manufacturer:	Innovatum International Ltd. Units 11/12, Woodside Business Park Thetford Road, Ingham Bury St Edmunds Suffolk IP31 1NR, United Kingdom Phone: +44 (0)1284 729123 Fax: +44 (0)1284 729133 email: info@innovatum.co.uk Web site: www.innovatum.co.uk
Device Data String(s) Output to WinFrog:	\$PINVSTP telegram. See Configuration Details for complete information.
WinFrog Data String(s) Output to Device:	Nil
WinFrog .raw Data Record Type(s):	Type 503

DEVICE DESCRIPTION:

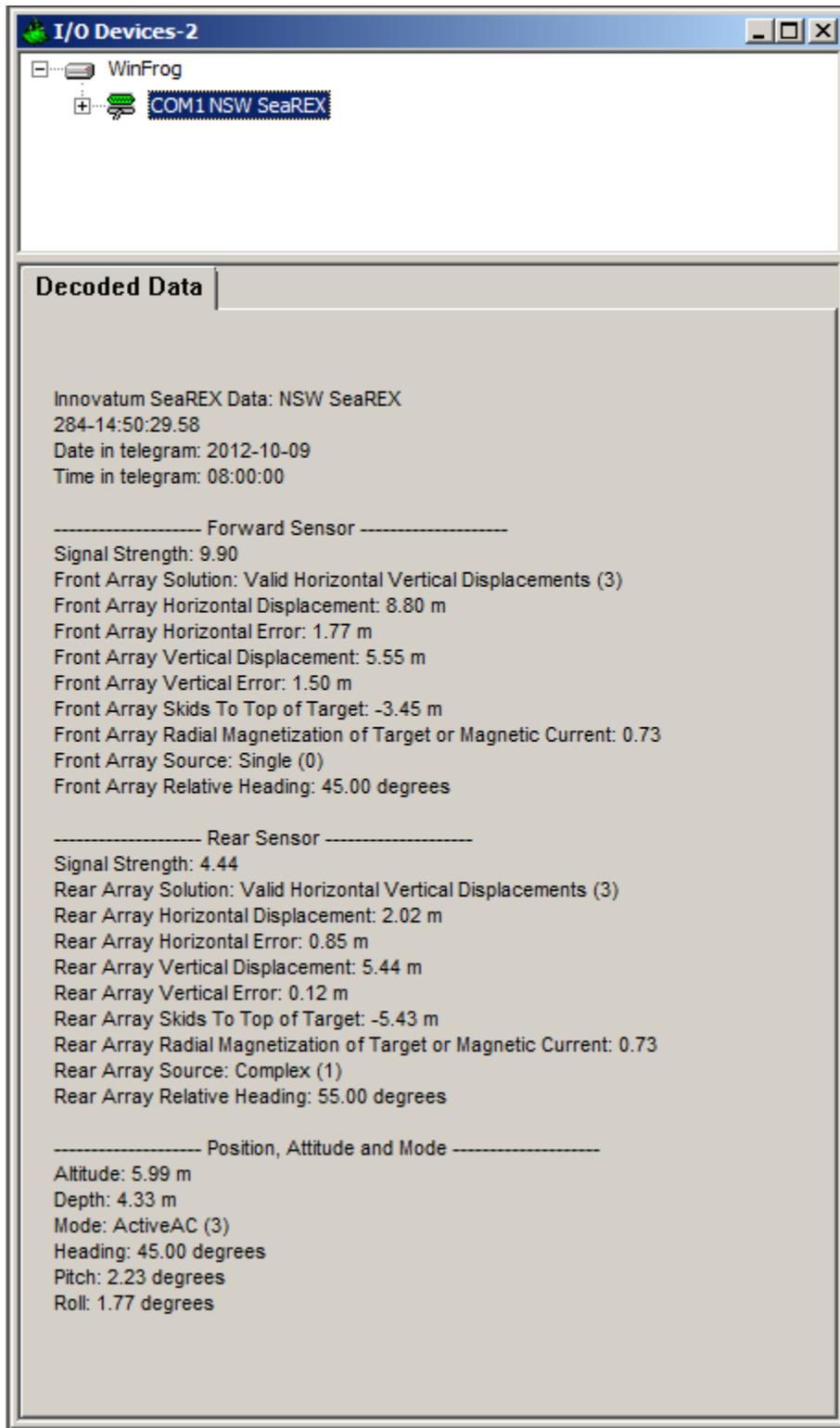
This device driver supports the \$PINVSTP proprietary telegram coming from a dual sensor Innovatum system. This Innovatum configuration was originally on NSW's SeaREX trencher but the device driver will work for any system as long as the telegram is the same.

DEVICE CONFIGURATION INSTRUCTIONS (suggested):

Baud Rate: 9600
Data Bits: 8
Stop Bits: 1
Parity : None

WINFROG I/O DEVICES > CONFIG OPTIONS:

The NSW SeaREX device is added to WinFrog from the ROV device category. Adding an NSW SeaREX device to WinFrog creates an INNODATA data item, as seen in I/O Devices window below.



Refer to the CONFIGURATION DETAILS section for more information on the data string from this device.

No configuration of the device is required at the I/O Device window level.

WINFROG VEHICLE TEXT WINDOW > CONFIGURE VEHICLE DEVICES > DEVICE > EDIT OPTIONS:

Adding the NSW SeaREX device creates three data items: INNODATA, ATTITUDE, and HEADING. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: ROV, NSW SeaREX, INNODATA

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

Configure Innovatum

Burial Depth Assignment

Prime Secondary

Prime Source

Forward Sensor Rear Sensor

Altitude Assignment

Prime Secondary

Burial Depth Correction

Correct Burial Depth for Pitch and Roll

Use Innovatum Pitch and Roll

Use Vehicle Pitch and Roll

Offsets

Offsets from Innovatum Sensor to Altitude Sensor if following WinFrog ROV convention for Pitch and Roll: Stern down (+) pitch
Starboard down (+) roll

If using ROV with opposite convention, reverse the sign (+/-) for the offset. Coordinates are based on a Right-Handed coordinate system for ROV.

Front Innovatum Array

Fore/Aft	Port/Stbd	Height
0.00m	0.00m	0.00m

Rear Innovatum Array

Fore/Aft	Port/Stbd	Height
0.00m	0.00m	0.00m

OK Cancel

Burial Depth Assignment:

Select the **Primary** radio button to enable the display of Burial Depth data in the Vehicle Text window. If **Secondary** is selected, this Burial Depth data will only be available in the raw data record or for display in a calculation window. In the **Prime**

Source group-box, select either the **Forward Sensor** or the **Rear Sensor** to designate which sensor's data is displayed in the vehicle text window..

Burial Depth Correction:

The raw Burial Depth data observations can be corrected for sensor pitch and roll. You can use the devices pitch and roll or the vehicles, should it have different source of pitch and roll. Both raw and corrected burial depths will be recorded in the type 503 raw data record (if raw data recording is enabled).

The correction is as follows: the offsets are rotated by the pitch and roll then the resulting rotated height offset is added to the observed depth below skids less the altitude.

[Front /Rear Innovatum Array] Offsets:

These fields allow you to enter Fore/Aft, Port/Stbd and Height offsets to correctly reference the Innovatum sensors to the vehicle's Altitude Sensor. This corrects burial depth data to reference the seabed as opposed to simply the depth below the sensor.

Enter X, Y, Z offsets as measured from the Innovatum Sensor to the Altitude Sensor for both the Front and Rear Arrays. Note the sign conventions used for offset entries, as detailed in the Configure Innovatum dialog box.

Data item: ROV,NSW SeaREX, ATTITUDE

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

The screenshot shows the 'Attitude' dialog box with the following settings:

- Application Control:** On, Off. Do not use data if error flag is set. High frequency update rate (apply interpolated data). Low frequency update rate (apply closest data).
- Pitch Controls:** Pitch Correction (d.dd) (+ is Bow Up): 0.000000. Filter incoming data. Filter Length (Max 30 samples): 30. Data rejection threshold +/- the filter median value (d.dd): 10.00.
- Roll Controls:** Roll Correction (d.dd) (+ is Starboard Down): 0.000000. Filter incoming data. Filter Length (Max 30 samples): 30. Data rejection threshold +/- the filter median value (d.dd): 10.00.
- Primary Attitude Device Selection:** (Empty dropdown)
- Primary Device Auto Switch:** On, Off. Age of data when switch occurs: 20.00.
- Offsets:** Fore/Aft: 0.000, Port/Stbd: 0.000, Height: 0.000.
- Acoustic Options:** (Empty dropdown). Text: This data type is associated with an LBL system. Select the transponder to use for Attitude data. Note that the corrections for the selected transponder will be used.

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

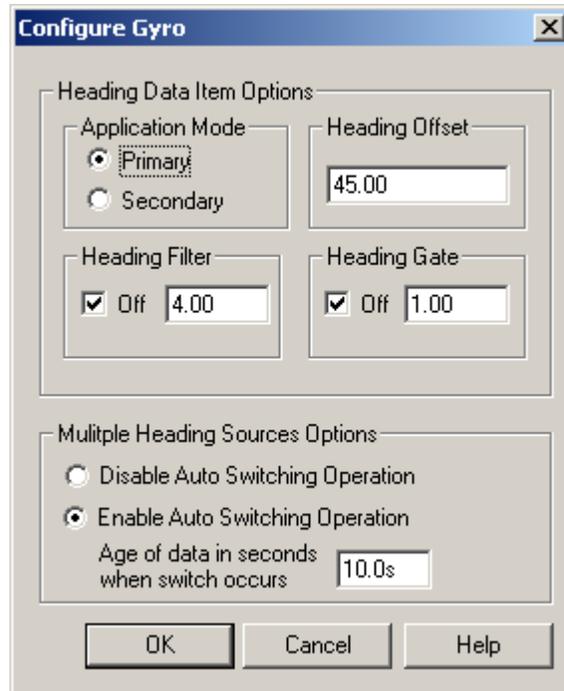
These are not applicable in this case.

Acoustic Options

This applies to long base line acoustic transponders that have inclinometers. See chapter 17 for more information.

Data item: ROV,NSW SeaREX, HEADING

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



Heading Data Item Options:

Application Mode(Primary/Secondary):

Set the type of calculation to Primary or Secondary by selecting the appropriate radio button. Devices set to Primary are used to provide the vehicle heading information. Devices set to Secondary are simply monitored, and are not used in the vehicle's calculations.

Note that WinFrog supports automatic switching from a designated Primary to a Secondary in the event that data from the Primary fails (see Multiple Heading Sources Options).

Heading Offset:

A correction value (as determined from a gyro calibration) can be input in the Heading Offset box. This value is added to the heading value from the device to provide a corrected heading for the vehicle. Note that positive or negative values can be entered.

Heading Filter/Heading Gate:

The Heading Filter is used to “smooth” heading values used by the vehicle. The value entered in the Heading Filter indicates the number of headings that will be used to predict the next heading value. The larger the value entered, the “heavier” the filter will be – i.e. the slower the vehicle's heading will respond to changes.

The Heading Gate defines a tolerance value to limit the use of anomalies in gyro readings. If the next observed gyro value received falls outside the specified range of predicted values (i.e. plus or minus the entered value), the value will not be used.

Multiple Heading Sources Options:

WinFrog supports automatic switching from a designated Primary source to an alternate Secondary source in the event that the Primary fails. The first Secondary source to receive data after the Primary has failed becomes the alternate Primary providing the heading for the vehicle. When the designated Primary is detected as active again, the alternate Primary source reverts to Secondary and the designated Primary provides the heading data to the vehicle.

If an alternate Secondary fails and there are additional Secondary sources, it in turn is detected by the first of the remaining operational Secondary sources to receive data after the failure, at which time this Secondary becomes the alternate Primary.

Note that this option is only available if more than one HEADING source is associated with the respective vehicle. Changes made to the Auto Switching options for any one of the HEADING data items are automatically assigned to the others upon exiting this dialog with OK. If the Auto Switching option is enabled and the respective HEADING source has been set to Primary, all others are automatically set to Secondary. The exception to this is when configuring a WinFrog Controlled Remote (WinFrog with a Remote module) from a Controller. In this case, changes made to one HEADING source are not automatically made to other HEADING sources. The operator must explicitly make them for each HEADING source.

This option is not available in the WinFrog Remote package.

Disable/Enable Auto Switching Operation:

Select the mode you wish to operate WinFrog.

Age of data in seconds when switch occurs:

Enter the age of data that is permitted before the source is considered to have failed.

CONFIGURATION DETAILS:

Listed below is the character string output from this device. See appendix B file format for the format of the 503 record. For more detailed description see Innovatum's document [\\$PINVSTP Description.pdf](#).

Character String:

Field	Description
1	Header \$PINVSTP
2	Date
3	Time
4	Front Array Signal Strength
5	Front Array Solution
6	Front Array Horizontal Displacement
7	Front Array Horizontal Error
8	Front Array Vertical Displacement
9	Front Array Vertical Error
10	Front Array Skids To Top
11	Front Array Radial Magnetization or Current Flowing
12	Front Array Source
13	Front Array Relative Heading
14	Rear Array Signal Strength
15	Rear Array Solution
16	Rear Array Horizontal Displacement
17	Rear Array Horizontal Error
18	Rear Array Vertical Displacement
19	Rear Array Vertical Error
20	Rear Array Skids To Top
21	Rear Array Radial Magnetization or Current Flowing
22	Rear Array Source
23	Rear Array Relative Heading
24	Altitude
25	Depth
26	Mode
27	Heading
28	Pitch
29	Roll