

WinFrog Device Group:	USBL
Device Name/Model:	ATS
Device Manufacturer:	<p>Nautronix Ltd (Head Office) 108 Marine Tce, Fremantle, Western Australia, 6160 Phone: +61 8 9430 5900 Fax: +61 8 9430 5901 info@nautronix.com.au</p> <p>Nautronix Inc. (San Diego) 12131 Community Road Poway, California 92064 Phone: +1 858 679 5500 Fax: +1 858 679 5501 info@nautronix.com</p>
Device Data String(s) Output to WinFrog:	ATS (ASCII) format: Code (1-8), time, X, Y, D (Z), Error Flag. See Configuration Details ("Code\tAge\tX\tY\tZ\tErr\t ")
WinFrog Data String(s) Output to Device:	Heading ("\$HEHDT,%05.1f,T\r\n") Heading function used to input ship's heading (external source) through serial port.
WinFrog .raw Data Record Type(s):	Type 309 (USBL)

DEVICE DESCRIPTION:

The Nautronix Acoustic Tracking System (ATS) USBL system was first released in 1988. The ATS II has since been released and is 'fully compatible with all ATS subsurface hardware'. The ATSII system, complete with console, hydrophone and a variety of beacons is shown below.



DEVICE CONFIGURATION INSTRUCTIONS (ATS):

Baud Rate: Configurable between 300 and 9600
Data Bits: Configurable
Stop Bits: Configurable
Parity: Configurable ODD or EVEN
Note that WinFrog uses NO PARITY

Suggested: 9600-8-N-1

Bi-directional RS-232 serial communication data can be output from either of the two serial ports on the unit. Only serial port 1 can be used to accept external navigation data into the system. The unit can accept Northing (m), Easting (m), and Heading (degrees), however WinFrog is only capable of sending Heading data to the ATS.

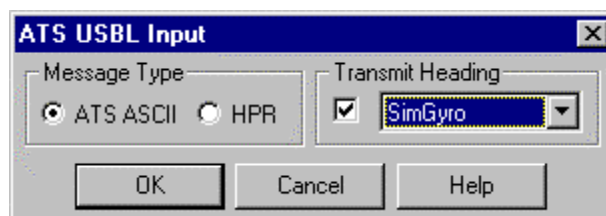
The ATS can be configured to output several different data formats: ATS (ASCII, binary, responder), HPR and Honeywell RS900. For the ATS device either the ASCII or HPR formats should be selected for use with WinFrog. The binary format is not compatible with WinFrog.

Note: Only the ATS (ASCII) format will be covered in this document. Refer to documentation on the Simrad 300P for the HPR format.

WINFROG I/O DEVICES > CONFIG OPTIONS:

The ATS is added to WinFrog from the USBL device category. Adding an ATS device to WinFrog creates Hydrophone and Beacon data items.

The ATS device must be configured at the generic I/O Device window level. Highlight the ATS device, then right-click and select Configure Device. The ATS USBL Input dialog box appears as seen below:



ATS USBL Input:

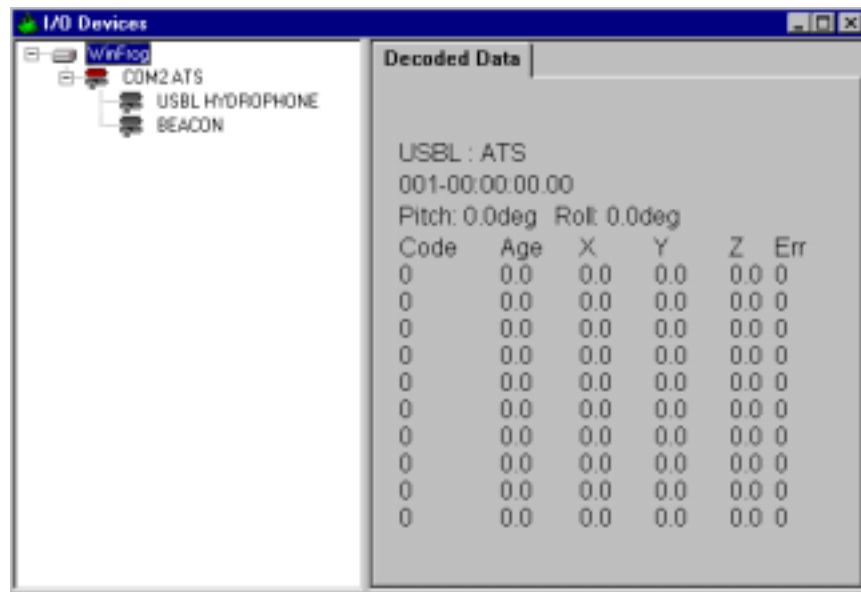
This dialog box allows you to specify whether to use the ATS ASCII or HPR input (ATSII) data format. Select the option to match the data output format configured in the ATS software.

This dialog box also allows you to enable the output of heading data from WinFrog to the ATS. This heading data must come from a real time heading device added to WinFrog. Use the dropdown field to select the appropriate heading device. The

adding of heading data to the ATS will result in the data being received from the ATS referring to North (dN/dE) as opposed to relative to the hydrophone head (i.e. dX/dY).

As can be viewed in the *I/O Devices* window below, the following data is displayed for the ATS:

- Time
- Pitch
- Roll
- Code (of Beacon)
- Age
- X
- Y
- Z
- Error Code



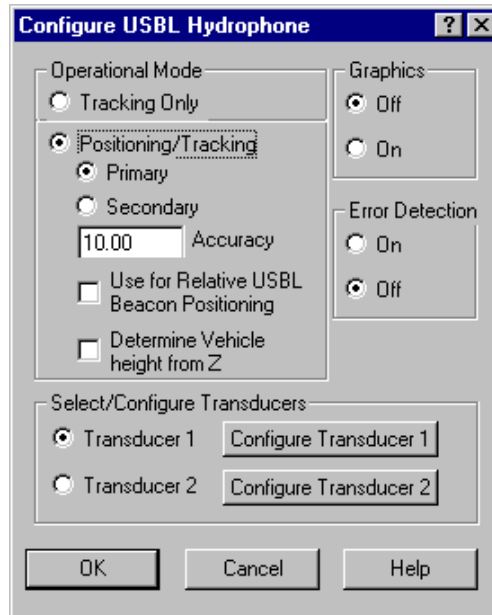
WINFROG VEHICLE TEXT WINDOW > CONFIGURE VEHICLE DEVICES > DEVICE > EDIT OPTIONS:

As mentioned above, adding the ATS device to WinFrog creates two separate data items: the USBL, ATS, USBL HYDROPHONE and the USBL, ATS, BEACON. For remote vehicle tracking, the USBL ATS Hydrophone data item must be added to the device list of the vehicle to which the hydrophone has been physically attached (i.e. the main ship). The Beacon data item must be added to the vehicle to which the beacon has been physically attached (i.e. the ROV or towed vehicle).

USBL systems can also be used for positioning of the main vessel. In this type of operation the USBL Beacon must be physically attached to some fixed point on the seabed or subsurface structure. In this type of operation the Hydrophone position (i.e. vehicle position) is derived from measurements made to the fixed beacon. For this type of positioning, you must define a working Xponder File (*.XPT) in WinFrog, and enter the fixed position of the Beacon into that file. The Hydrophone must be added to the ship's device list and configured for positioning as opposed to tracking mode. See chapter 5 of the WinFrog User's Guide for more information on setting up *.XPT files.

Configuration of the USBL Hydrophone

Once the ATS Hydrophone has been added to the appropriate vehicle's device list it must be edited to suit the application. In the vehicle's Devices list, highlight the USBL, ATS, USBL HYDROPHONE then click the Edit button. The Configure USBL Hydrophone dialog box appears as seen below.



Operational Mode:

As mentioned above, USBL systems can be used for tracking of remote vehicles or for positioning of the main vehicle to which the hydrophone is attached. Select **Tracking Only** if relative tracking of a structure/vessel is desired.

Select **Positioning/Tracking** and **Primary** if you want to position the Master Vessel relative to a stationary (fixed) beacon. The beacon must be located on the stationary (fixed) object, as defined in a working XPONDER (.XPT) file.

Select the **Secondary** radio button if this is not the primary positioning source (i.e. if this is a comparison position), or if you are setting up for a USBL Calibration. Note as well that if you are setting up for a USBL Calibration, the Hydrophone should also be specified as a Secondary positioning device. See chapter 20 of the WinFrog User's Guide for more information on USBL Calibrations.

If **Positioning/Tracking** is selected, you can also specify **Use for Relative USBL Beacon Positioning**. This feature controls the use of the USBL positioning of the hydrophone from a fixed beacon for application to relative USBL Beacon positioning. In this mode, the difference between the hydrophone position as determined directly from observation to fixed beacon is compared to the hydrophone position determined from other positioning sources (e.g. DGPS). This difference is then applied to the position determined for any tracked beacon. The concept is that any inherent errors due to local conditions, both environmental and mechanical, are cancelled out. This is independent of the Primary/Secondary setting.

Determine Vehicle height from Z

Select this checkbox if the USBL system is to be used to determine the height of the vehicle. This is independent of the Primary/Secondary setting.

Graphics:

Select On to have WinFrog display the device name and a square at the location of the hydrophone within the Graphics and Bird's Eye windows.

Error Detection:

Select On to have WinFrog include error detection codes in the Raw Files. This option is mainly for post project QC analysis. If WinFrog detects a significant error code, the data will not be utilized in the vessel's calculations.

Select/Configure Transducers Window:

Some USBL systems can be configured with two hydrophones. Before configuring a transducer ensure that it is the correct one, and that the values entered refer to that device. Click Configure Transducer 1 or Configure Transducer 2 as required.

The Configure USBL Transducer dialog box appears as seen below.

Calibration Corrections		
Range Scale Factor		Head Rotation Correction
1.00000		000.0
Pitch Correction		Roll Correction
0.00		0.00

NOTE: Corrections sign conventions are
Roll=(+)Stbd down; Pitch=(+)Stern down

Offsets from the point the data is related to, to the transducer. These values will be subtracted from the USBL output data to get data related to the transducer.		
Fore/Aft	Port/Stbd	Z (down +)
0.0m	0.0m	0.0m

WinFrog Offsets, from CRP to Transducer		
Fore/Aft	Port/Stbd	Depth (down +)
-100	8	12

OK Cancel Help

Calibration Corrections:

WinFrog allows you to enter Range Scale, Heading, Pitch and Roll correction values to correct raw USBL measurements. Note that the Heading, Pitch and Roll values are entered in degrees and decimal degrees. These values can be determined by using WinFrog's USBL calibration utility. See chapter 20 of the WinFrog User's Guide for detailed information on calibration of USBL systems.

USBL System Internal Offsets:

This section of the Configure USBL Transducer dialog window is for the entry of X,Y and Z offsets that will be applied to the raw observations received from the ATS console.

The upper fields are used to remove any offsets that have been entered into the ATS console. This may come into use specifically when USBL systems are used for vessel positioning, where the ship's DP system needs positional information to relate to the vessel's center of gravity as opposed to just at the USBL hydrophone. WinFrog however requires all XYZ offsets to relate to the USBL hydrophone. These upper fields then are used to enter the same offsets as are entered in the ATS Console, nullifying the offsets in the ATS. As these values are subtracted from the received data, ensure that values are entered using the same sign as internal ATS offsets.

The lower fields, **Winfrog Offsets, from CRP to Transducer**, are similar to all other positional device offsets entered in Winfrog. These offsets must be entered to relate the hydrophone's position to the vessel's Common Reference Point (CRP). All offsets are entered with signage referring to the distance *from* the CRP *to* the hydrophone.

Configuration of the USBL Beacon.

As mentioned above, for subsurface vehicle positioning, the USBL beacon must be added to the appropriate vehicle's device list. Once added to the device list, it must be edited to suit the application. Editing the USBL, ATS, Beacon device brings up the Configure USBL Beacon dialog box, as seen below.



Calculation

Set Calculation to **Primary** if the beacon is to be used for positioning the vehicle to which it is attached. Multiple beacons can be added to the same vehicle's device list, each configured as Primary. WinFrog will calculate a weighted mean position using the Accuracy value entered.

Accuracy

This value is used by WinFrog to weight the use of different positioning devices in solving a single vehicle's position. The lower the accuracy value entered, the more accurate it is deemed to be, and hence the more weight that will be applied to it in comparison to the other devices.

Error Detection:

Setting Error Detection to 'On' instructs WinFrog to identify error codes received in the USBL data string and disable the use of bad data. USBL systems include various error codes in the data string when the beacon is not within the optimum "cone of operation" or other operational parameters have been exceeded.

Deskewing Options

Deskew Beacon Timestamp

This option is for future development.

Deskew Hydrophone Position

When positioning the beacon, WinFrog uses the last calculated position for the associated USBL Hydrophone to determine the tracked beacon's position. Depending on the vehicle's Kalman filter and Dead Reckoning settings, the position of the hydrophone may be up to 1 second old. It is recommended that this deskewing option be enabled to remove positional inaccuracies associated with this latency.

Code:

Enter a value matching the code of the beacon attached to the vehicle.

ROV Depth from USBL:

If **Yes** is selected, the ROV's depth will be set to the calculated USBL beacon depth.

LBL Calibration:

Select the **Use for Calibration** checkbox if the beacon is to be used in an LBL Calibration.

Graphics:

Select Graphics to **On** to have WinFrog plot a square and label to represent the beacon location in the Graphics and Bird's Eye displays.

Offsets:

This portion of the dialog box is used to enter Offsets that relate the beacon's location to the vehicle's Common Reference Point (CRP).

These values are set similar to values that would be applied to any device offset within Winfrog, with values entered as measured from the CRP to the device. A heading device must also be added to the vehicle's device list to ensure the correct application of the offsets.

CONFIGURATION DETAILS:

Nautronix manufacturers various models of the ATS USBL system including the following:

- ATS-SO2
- ATS-SO4
- ATS-SO8
- ATS-LRO8
- ATSI (most recent model)

The ATS has a menu driven console where device parameters such as communication data, input/output formats, filter data etc. can be configured.

Following is an example of the ATS (ASCII) data output data string:

```
01 Jul 87 12:35: B:1 X:560.7 Y:789.7 D:89 P5.6 R:2.3 E:0000000<LF><CR>
```

Where:

B: Beacon 1,2,3,4,5,6,7, or 8

X: X Coordinate position in meters

Y: Y Coordinate position in meters

D: Depth in meters

P: Ship's pitch in degrees

R: Ship's roll in degrees

E: Error Checking (this character may or may not be present)

H: Ship's heading in degrees (this is sent to the unit).

ATS Software Settings:

Configuration of the ATS is as follows:

1. Press in sequence
 - SETUP
 - INSTALLATION
 - COMMS PORT 1
2. Enter the system password.
3. Press in sequence
 - SETUP
 - BAUD RATE
4. Select a baud rate of 9600 by pressing BAUD UP or BAUD DOWN.
5. Press in sequence.
 - SET
 - DATA BITS
 - PARITY
 - NO PARITY
 - STOP BITS
 - 1 STOP BIT
6. Press BACK one time.
7. Press in sequence
 - FORMAT
 - DATA OUT
 - ATS
 - ASCII
8. Press BACK two times.
9. Press in sequence
 - FILTER
 - RAW
 - TIMEOUT
 - 0
10. Press ENTER.
11. Press BACK three times.

Navigation Input to ATS:

The NAV function is used to select the position input from an external Navigation system. WinFrog does not support this functionality.