WinFrog Device Group:	OUTPUT
Device Name/Model:	AUV OUTPUT
Device Manufacturer:	
Device Data String(s) Output to WinFrog:	None
WinFrog Data String(s) Output to Device:	$PUSBA,hhmmss.sss,ddmm.mmmm,a,dddmm.mmmm,a,c.c,c.c,c.c,,r.r,t.tt,s.s,a.a,ddmm.mmm,a,dddmm.mmmm,a*hh<CR><LF> See below for field description.
WinFrog Data Item(s) and their RAW record:	DATA OUTPUT 451 This record contains the above telegram minus the checksum but prefixed with 451,device name and transmission time.

DEVICE DESCRIPTION:

Outputs the described data on a serial port. Intended for transmission to an AUV of the AUV's position and other data. The driver requires selection of a USBL device and beacon number. Several options described below allow the operator to control the data rate.

Requirements: both the ship and tracked vehicle must have valid positions (i.e. Not in alarm).

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:
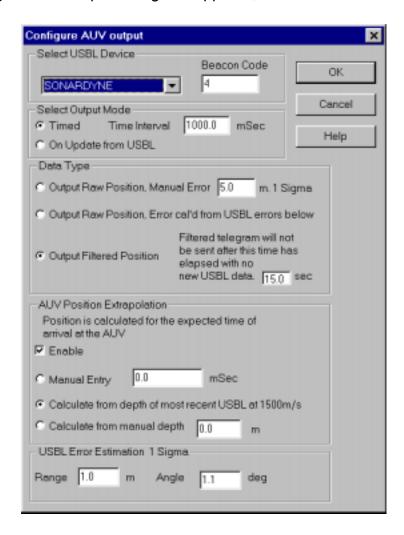
Serial
(These are selectable)
Baud Rate: 9600
Bits Per Character: 8
Stop Bits: 1
Parity: None

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 AUV output dialog box appears, as seen below.

Select USBL Device
The drop down list will display all the USBL devices currently available for use within WinFrog. Select the device tracking the AUV and select the beacon that is on the AUV.

Select Output Mode
Select the interval you wish to have the telegram transmitted at; either on time at the specified interval or upon receipt of a new USBL telegram. Note: If the latter is selected the telegram will not be transmitted until the new position has been calculated.

Data Type
This group allows the operator to select either raw or Kalman filtered data. Raw data means that the USBL data is applied to the reference vehicle position to obtain the AUV

position and no filtering of the AUV is done. The reference vehicle position is first calculated for the USBL epoch.

The first selection "Output Raw Position, manual error" uses the raw position described above but the variance will be derives from the one sigma value entered in the edit box. The value will be squared and placed in the telegram for both the latitude and longitude variance. The covariance will be 0.

The second selection "Output Raw Position, Error cal'd from USBL error below" also uses the raw position as described above however the variance placed in the telegram will be derived from the values entered in the group box "USBL Error Estimation 1 Sigma" below. Covariance Law is used to propagate the values entered below to the AUV coordinates assuming no error in the reference vehicle position (i.e. relative error).

The third selection "Output Filtered Position" places the coordinates and their variance-covariance from the Kalman filter in the telegram. The variance-covariance is affected by the operator entered Accuracy entered on the BEACON data item for the AUV. **NOTE: The Kalman filter option must be enabled for the AUV vehicle for this option to function properly.**

AUV Position Extrapolation

These options are only available if the filtered position has been selected above.

If the Kalman filtered position has been selected for output and this is enabled then a predicted position can be transmitted in the telegram. This predicted position is for then epoch when the AUV is expected to receive this data. Accounts for the acoustic travel time from the reference vehicle to the AUV. Note the age of the data does not include this acoustic travel time.

The acoustic travel time is added to the time of transmission then the position of the AUV is predicted for this time and this position is placed in the telegram.

The acoustic travel time may be entered by the operator or may be determined from the AUV depth or a manually entered depth. If either depth option is used the time is calculated using 1500m/sec.

USBL Error Estimation 1 Sigma

These values are included in the telegram.

Additionally if the "Data Type" option "Output Raw Position, Error cal'd from USBL error below" is selected then the two values are propagated through to the AUV coordinates yielding the variance and covariance of the AUV's coordinates. These values will used in the telegram.

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

Adding the AUV OUTPUT device creates two data items ROV REF VEH and DATA OUTPUT. The ROV REF VEH data item needs to be added to the reference vehicle and the DATA OUTPUT data item needs to be added to the AUV vehicle.

Neither data item requires a configuration. The reference point used is the CRP.

TELGRAM SPECIFICATION:

$PUSBA,hhmmss.sss,ddmm.mmmm,a,dddmm.mmmm,a,c.c,c.c,c.c,,r.r,t.tt,s.s,a.a,ddm
m.mmm,a,dddmm.mmmm,a*hh<CR><LF>
Where:
- hhmmss.sss= time of transmission or predicted
                   time of arrival at AUV
- ddmm.mmmm   = WGS 84 Latitude of the AUV
- a   = N or S
- dddmm.mmmm   = WGS 84 Longitude of the AUV
- a   = E or W
- c.c   = Variance AUV Latitude (M^2)
- c.c   = Variance AUV Longitude (M^2)
- c.c   = Covariance Latitude, Longitude
- Currently unpopulated field.
- r.r   =Standard deviation of USBL range
- t.tt   =Standard deviation of USBL angle
- s.s   =Slant range (M) CRP to CRP
- a.a   =Age of data (seconds) Last USBL
                   update to transmission time
- ddmm.mmmm   = WGS 84 Latitude of the ship
- a   = N or S
- dddmm.mmmm   = WGS84 Longitude of the ship
- a   = E or W
-*hh   = Check sum