WinFrog Device Group:	USBL
Device Name/Model:	GOLF Laser
Device Manufacturer:	**Measurement Devices Ltd. (MDL)** Silverburn Crescent, Bridge of Don Industrial Estate, Aberdeen AB23 8EW, Scotland, UK Tel:+44 (0)1224 246700 Fax:+44 (0)1224 824987 sales@mdl.co.uk
Device Data String(s) Output to WinFrog:	:rrrrbbbb:rrrrbbbb (i.e. the range/bearing is sent twice) Range is in meters, Bearing is in 10ths of degrees.
WinFrog Data String(s) Output to Device:	N/A
WinFrog .raw Data Record Type(s):	Type 309

DEVICE DESCRIPTION:
The MDL Gyro Oriented Laser Rangefinder (GOLF) II System is a self-contained range/bearing system employing laser, gyro and telemetry techniques. The systems' range accuracy is within 5 meters from 200 meters to a maximum of 8995 meters. Bearing accuracy is maintained to within 0.1 degree. In situations where no reference azimuth is available, an electronic gyrocompass can be interfaced to the system.

The use of the GOLF Laser is restricted in some work areas as the Laser Beam can cause damage to a person's vision.

DEVICE CONFIGURATION INSTRUCTIONS:
Baud Rate: Configurable
Data Bits: Configurable
Stop Bits: Configurable
Parity: Configurable

RS-232 data can be obtained via the GOLF Control Unit.

WINFROG I/O DEVICES > CONFIG OPTIONS:
The GOLF Laser is added to WinFrog from the USBL device types. The Hydrophone and Beacon sub-devices are added along with the Golf Laser. The device cannot be configured from the I/O Devices Window.

WINFROG VEHICLE TEXT WINDOW > CONFIGURE VEHICLE DEVICES > DEVICE > EDIT OPTIONS:
As mentioned above, adding the GOLF Laser device to WinFrog creates two separate data items: the USBL,GOLF Laser,USBL HYDROPHONE and the USBL,GOLF Laser,BEACON. For remote vehicle tracking, the 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.

1. Configuration of the USBL Hydrophone.
Once the GOLF Laser 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,GOLF Laser,USBL HYDROPHONE then click the Edit button. The Configure USBL Hydrophone dialog box appears as seen below.
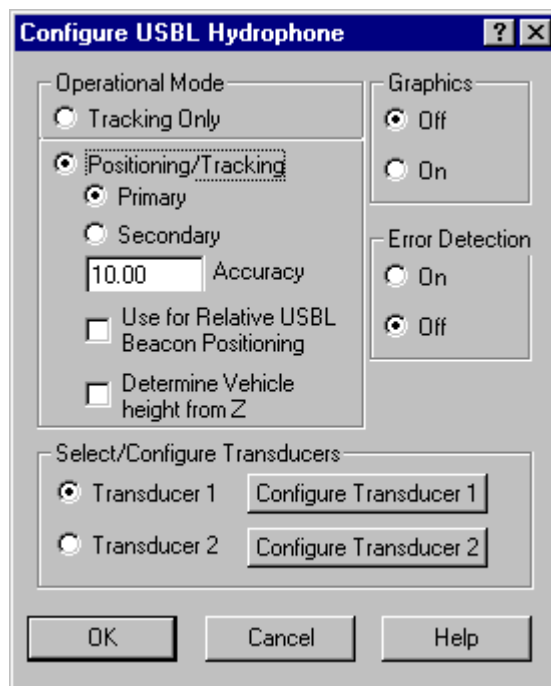
> **Operational Mode:**
> As mentioned above, USBL systems can be used for tracking of remote vehicles or for positioning of the main vehicle to which the hydrophone is attached. Select **Tracking Only** if relative tracking of a structure/vessel is desired.

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. See chapter 5 of the WinFrog User's Guide for more details on defining working XPONDER (.XPT) files. 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. See chapter 20 of the WinFrog User's Guide for more details 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:
Setting the Graphics to On will display the device name and a square at the location of the total station, within the Graphics windows.

Error Detection:
By enabling this option, error detection codes are included in the Raw Files. This option is mainly for post project QC analysis and future development.

Select/Configure Transducers:
Two GOLF Lasers can be configured for use. By going into the Configure Transducer 1 (or 2) in the Configure USBL Hydrophone dialog box, you can set the calibration parameters and offsets for either of the two transducers.
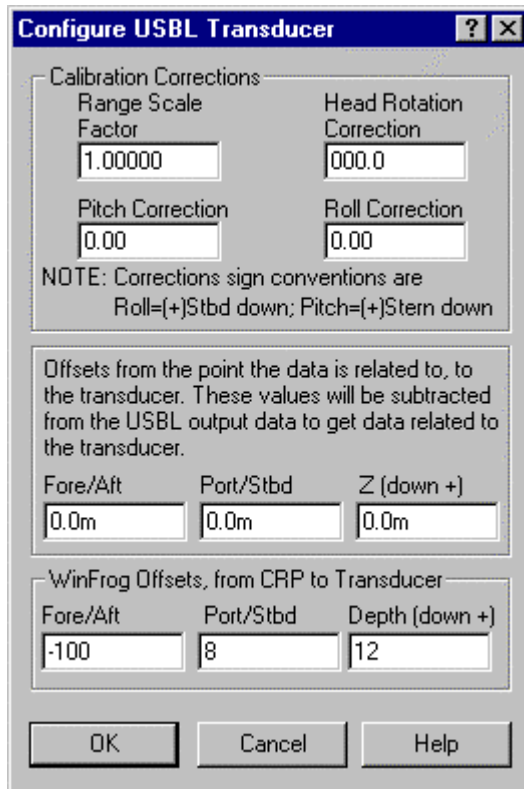
Calibration Corrections:
These values do not apply for GOLF Laser operation. Set values as displayed
above.

Offsets:
In the top window the offsets from the point the data is related to, to the transducer,
are set to zero for GOLF Laser operation. The Winfrog Offsets, from CRP to
Transducer are set to similar values as would be applied to any device offset in
Winfrog. In the example above, the instrument is located 100 (m) aft, 8 (m) starboard
and 12 (m) above the CRP.

2. 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,GOLF Laser,Beacon device brings up
the Configure USBL Beacon dialog box, as seen below.
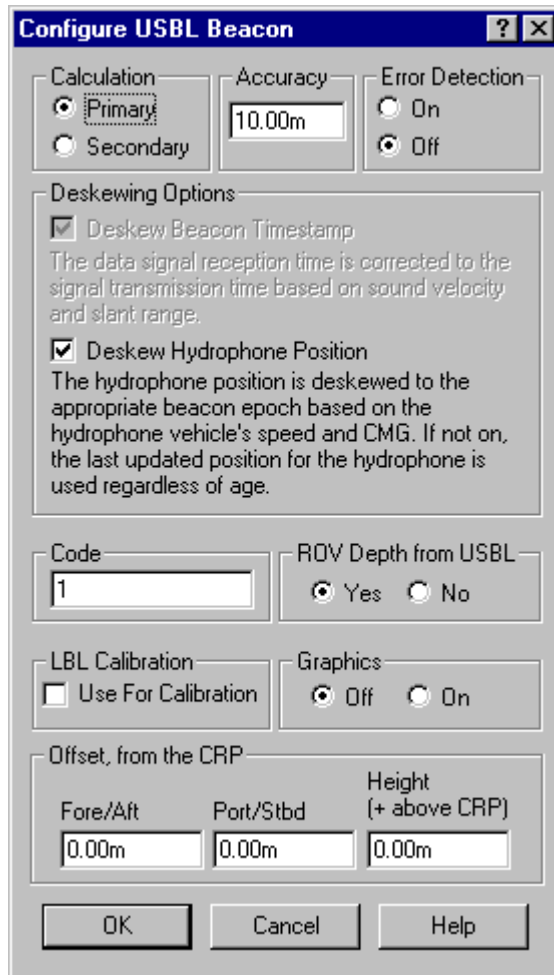
Calculation

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.

Code:
Set code to 1.

ROV Depth from USBL:
By setting this to Yes, the target height will be calculated.

LBL Calibration:
No calibration within Winfrog is required for operation of the GOLF Laser.

Graphics:
By setting the Graphics to on, a square and label will be displayed for the target location.

Offsets:
The Offsets are applied from CRP (of the structure/vessel) to the target Location. These values are set similar to values that would be applied to any device offset within Winfrog.

CONFIGURATION DETAILS:
A GOLF Laser Unit was not available for this documentation.

The GOLF Laser is set up similar to a total station and is usually mounted on a Tripod 5/8" (coarse bolt) with and accompanying power supply. No reflector is required on the target, which is the advantage over total station positioning.

Ranging can be gated in the instrument using the minimum and maximum range settings in the unit.

Output to Winfrog is only initiated when the Fix Button is hit on the instrument, therefore this system requires an operator.