



Autonomous Vehicle Systems

AHLS

Acoustic Homing and Localization System

Overview

Omnitech's AHLS (pron. 'alice') is a directional acoustic array, processing module and acoustic modem (optional) combined in single navigation sensor. The system is mounted inside an AUV nose cone and provides a long range acoustic bearing (LRAB) to a 'homing' beacon.

LRAB is available in two models: **DAHLS**, for larger Deep-water AUVs and '**CAHLS**' a Compact model for smaller, shallower depth Ivers2 family of AUVs (or similar).

In addition to providing a bearing to a homing beacon, both models of LRAB feature a user defined set of communication messages or command states that can be embedded in the homing beacon to the AUV. These command states are sent, from the AHLS to the AUV control computer with the LRAB bearing and can be used to signal changes to the mission, emergency surface commands, etc.

Features

The DAHLS can provide updates and corrections to absolute, geo-referenced vehicle position. As the AUV approaches the beacon, or after reaching deployment depth, the DAHLS can, optionally, use a deployed field of acoustic modems as an 'underwater positioning system' to acquire accurate absolute vehicle position while at depth, without the need for an accurate synchronized time reference. This Short Range Localization system (SRL) can be used, to correct vehicle position when the vehicle does not have a bottom lock, and to correct navigation system error in long deployments. SRL has been tested to accuracies better than 5 meters of absolute vehicle position or within the error of the surface buoy GPS measurements.



LRAB – compact version

- *Power Consumption, < 225 mW (serial coms, no Ethernet)*
- *Communication via Ethernet (TCP, UDP) or Serial (RS232/485)*
- *Homing Range > 75km, 192 dB source*
- *(optional) Position Correction < 5 m (absolute)*
- *Depth rating, 250m or 3000m*



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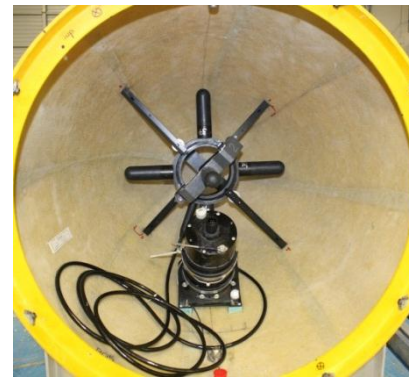
History

AHLS was designed to assist Canada's Arctic Explorer AUVs for National Resources Canada's Project CORNERSTONE. The AUVs are used to gather hydrographic quality bathymetric data of the seabed under the ice in Canada's Arctic Ocean. For these missions, the AUVs were deployed through holes cut on floating ice sheets. The AUV conducted 500 - 1000km missions, under the ice, and returned to the mission end point. However, during the course of the mission the ice sheet can drift by tens of kilometers. The LRAB homing beacon is placed in the water at the new end point and LRAB, on board the vehicle, provides the AUV with a bearing to the source. LRAB has provided bearings at distances greater than 75 km from the beacon in recent deployments.

Building on the success of the Project Cornerstone's AHLS, Omnitech designed a smaller, more compact, version of AHLS for use with smaller, more common, AUVs. The CAHLS is designed to fit inside vehicles with a hull diameter of 147mm (5.8 in) or less, such as the Ivers2 family of AUVs, and has a depth rating of 250 m.



Arctic Explorer AUV, under the ice in Canadian Arctic. Breaking world records using Omnitech's LRAB homing system.



DALHS mounted in the nose cone of Arctic Explorer AUV 1

Model Parameters

Specification	Model	
	DAHLS (Deep-water)	CAHLS (Compact)
Depth Rating	3000m	250m
Homing Distance	> 75 km with 192 dB source	> 10 km with 186 dB source
Size	445 cm (17.5 in)	14.7 cm (5.8 in)
Acoustic Homing Frequency	selectable, 1000 – 1400 Hz	selectable 1100 – 2000 Hz
Ancillary Functions	six (6) command messages / states embedded in homing signal	
Absolute Positioning	Available via underwater modem field	NA



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