Total Acoustic Positioning Systems

# Long and Ultrashort Baseline Acoustic Position Reference System

Sonardyne

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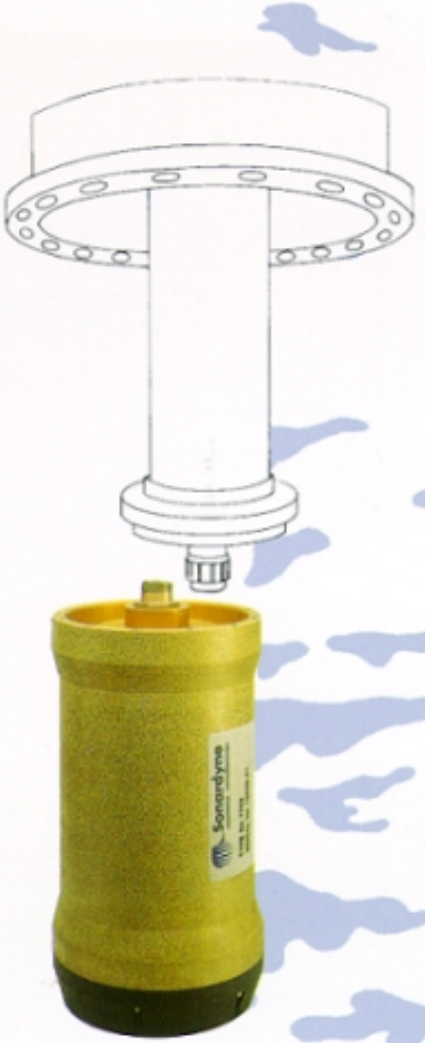
# Long and Ultra Short Baseline Acoustic Reference System




### Sonardyne's LUSBL – The Integrated Positioning Solution

Sonardyne's Long and Ultra-Short Baseline (LUSBL) system is an integrated hydro acoustic system for high accuracy, subsea navigation and positioning applications. The system is readily configurable to support a range of applications including;

- A Position reference sensor for dynamically positioned vessels.
- Survey grade USBL for deep water (3,000 meter) ROV/Towfish tracking
- Accurate positioning of underwater structures.
- Riser angle monitoring and hole positioning for drilling operations.

### Key benefits of ownership

The key design benefit of Sonardyne LUSBL is that it minimises the cost of ownership. From initial purchase and commissioning, through to routine maintenance and upgrades, substantial savings over comparable systems can be made. There is no need for an expensive tracking head and the system is easily installed using existing gate valves, ship's cabling and deployment mechanisms.
The performance, technology and flexibility of Sonardyne LUSBL system is derived from the seamless integration of Sonardyne's advanced Ultra-Short Baseline (USBL) and Long Baseline (LBL) systems.

### What is Ultrashort and Long Baseline positioning?

An Ultra-Short Baseline position reference system in it's simplest form uses a single seabed transponder and vessel based transceiver and processor. The vessel mounted transceiver positions the transponder with a 'range and bearing' position fix with respect to the vessel. Operators can position a transponder attached to a mobile target without the delay of calibrating a seafloor array of transponders. The overall accuracy of a USBL system depends on the water depth and ship's sensors.

A Long Baseline technique requires an array of transponders, typically four or more, to be deployed on the seabed and calibrated. Vessels and targets equipped with acoustic devices can then be positioned and tracked using 'range-range' observations within the array. Long baseline provides very high positioning accuracy independent of the water depth and ship's sensors.

### Combined Benefits

By combining LBL with USBL, Sonardyne's Long and Ultra-Short Baseline system offers the advantages of both techniques in one compact, high performance package. The strong geometry from the transponders in the LBL array coupled with accurate range and bearing data received by the vessel based USBL transceiver gives precise, reliable and stable positioning. By collecting excess range and bearing data not only is there considerable improvement in accuracy, the system can also provide fix quality information in addition to position information on all targets.

## Key Features of the Sonardyne LUSBL system

- Multi range fixes allowing very stable positioning with quality control.
- Significantly enhances the performance of DP systems, especially in deep water.
- Accuracy does not degrade with depth.
- Full dual redundancy option available.
- Rapidly calibrates LBL transponder arrays.
- Compatible with existing COMPATT transponder inventories.
- Riser angle monitoring option available.
- Interfaces to (D)GPS for very accurate absolute positioning and system calibration
- Easy installation using existing gate valves and ship's cabling or an "over the side" pole.
- Interfaces to all currently available VRUs, Gyros, and DP sensors.
- Built in spectral analysis capability to see what the in water noise levels are.

## System Description

At the core of the LUSBL system is Sonardyne's highly evolved USBL system incorporating a through-hull Transceiver and Navigation Processor. The unique design of the Transceiver head with multiple transmit/receive elements provides near hemispherical coverage, allows position error calculation on even single ranges and eliminates the need for a tracking head. By analysing the local noise spectra and optimising frequency allocations, Sonardyne's USBL system gives outstanding performance in noisy shallow or deep environments.

The system is controlled by the Navigation Processor which commands the transmission of acoustic signals from the Transceiver to the transponders and decodes the data received back. The unit also processes signals from VRUs, north seeking Gyro Compass' and (D)GPS receivers.

The operator interface consists of a high resolution color monitor with integrated keypad. This allows the system to be set-up, job specific parameters to be entered and live positioning tasks monitored. Operator intervention, can if required, optimise the calibration accuracy of the system which includes an extensive transponder command capability emulating Sonardyne's PAN Long BaseLine surface controller

## System Performance

Repeatability is typically 0.5% of slant range although, after completing a comprehensive calibration with a high resolution VRU and gyro the standard error can be as little as 0.2% of slant range. Ultimately, this factor is dependent on transponder array size, water depth, frequency and environmental factors such as vessel noise. With good calibration, a quiet vessel and good array geometry the LUSBL system will provide a position fix within a circle of radius 3 to 5 meters for 96% of the time in 3,000m of water.

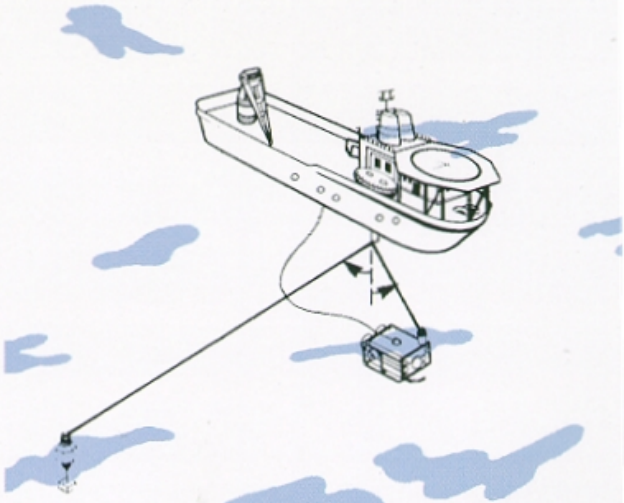
## Dual Redundancy

In the dual-redundant configuration, two complete sets of LUSBL equipment (Navigation Processor, Monitor/Keypad and Transceiver) are operated in tandem. The two-sub systems are cross-linked in such a way that, in the event of a failure of any major element, navigation and positioning tasks will continue without the need for operator intervention.

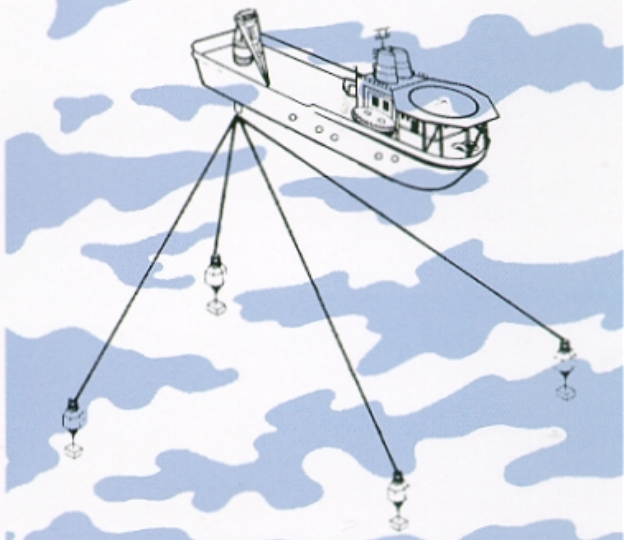
As one sub-system acts as the 'master' and performs all normal system functions the second sub-system, the 'slave', continually monitors the status of the 'master' and if it detects a problem, will assume control and become the new 'master'. From an operators point of view, operation of the dual-redundant version is essentially identical to that of the standard version.

## The Right Tool

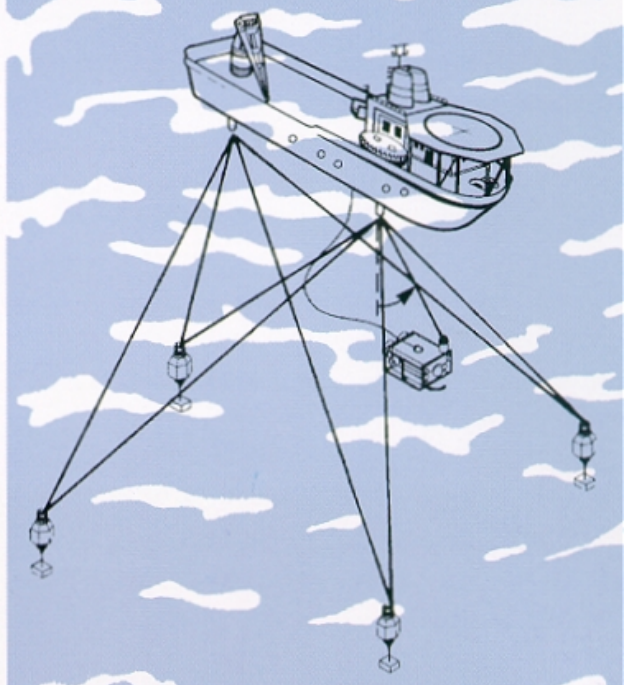
Sonardyne's LUSBL system is a very flexible positioning tool for many demanding offshore applications.



*USBL: Standard Ultra Short Baseline*

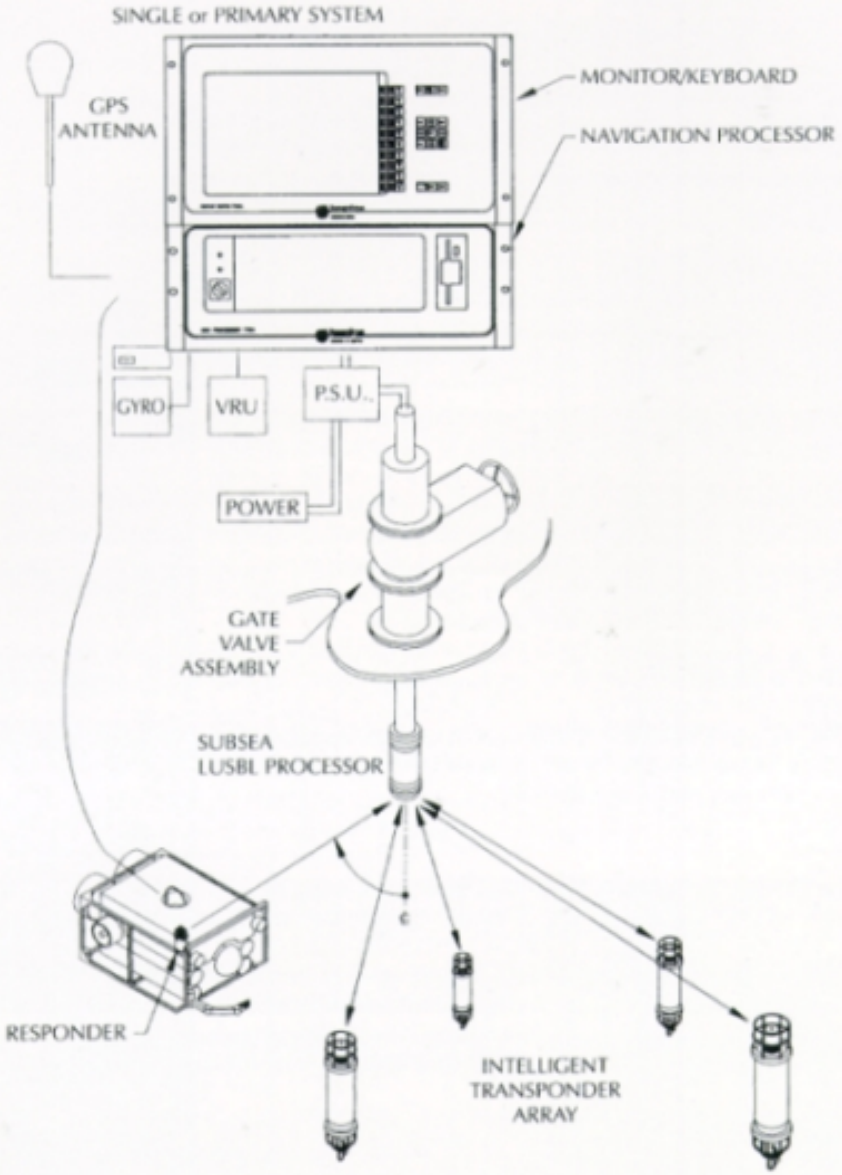


*LBL: Standard Long Baseline*



***LUSBL: Integrated Long and Ultra Short Baseline***

# LUSBL System Diagram

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