## SeaTrac Technology

The SeaTrac X100 series of Micro-USBL tracking and data modems are suite of complimentary products built around a robust broadband spread spectrum signalling scheme. These multi-purpose acoustic transponder beacons are capable of simultaneously tracking asset positions and undertaking bi-directional data exchange, making them ideal for use in a wide range of applications including...

- Remote monitoring and control of sensors and equipment (up to 14 beacons).
- Re-location and retrieval of sub-sea assets.
- ROV positioning and navigation tasks.
- AUV navigation, telemetry, mission adjustments and real-time position monitoring.
- Diver buddy and surface-vessel/dive-bell tracking and re-location.
- Remote and local depth, water temperature, attitude and heading reference (AHRS) information.
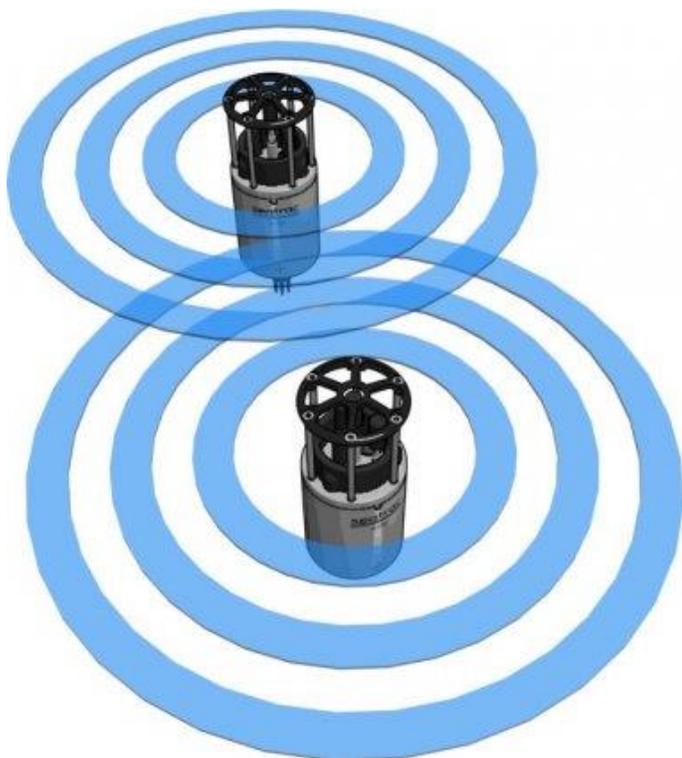
Data Modems

In a modem application, either X110 or X150 beacons are mounted at either end of the required data link and addressable packets of data are exchanged between the Acoustic Communication Stacks using protocols that ensure integrity of data, buffering and (optionally) reattempting transmission in event of packet loss. Each beacon is configured by the user with a unique identification-code that allows up to 15 beacons to exchange acoustic data messages or broadcast to all other beacons in the network.

Messages are exchanged by a request/response process and when complete the sending beacon is able to obtain a range measurement to the remotely interrogated beacon. Additionally, the X150 USBL beacon allows the interrogating end of the link to obtain a relative position 'fix' of the remote modem during data exchange. Integrated beacon sensors such as depth, temperature, pitch, roll, yaw and supply voltage, may also be remotely queried by the interrogating modem.

USBL & iUSBL Positioning

As well as the features offered by the X110 data modem and transponder beacon, the X150 beacon includes an Ultra-Short Baseline (USBL) receiver array capable of calculating the azimuth and elevation of incoming data messages. All positions are computed within the X150 beacon, so no additional PC hardware is required.

The X150's small size makes and no additional hardware requirement make it idea for OEM's who want to integrate an iUSBL (inverted) system into AUV's for applications such as automated docking or target tracking.
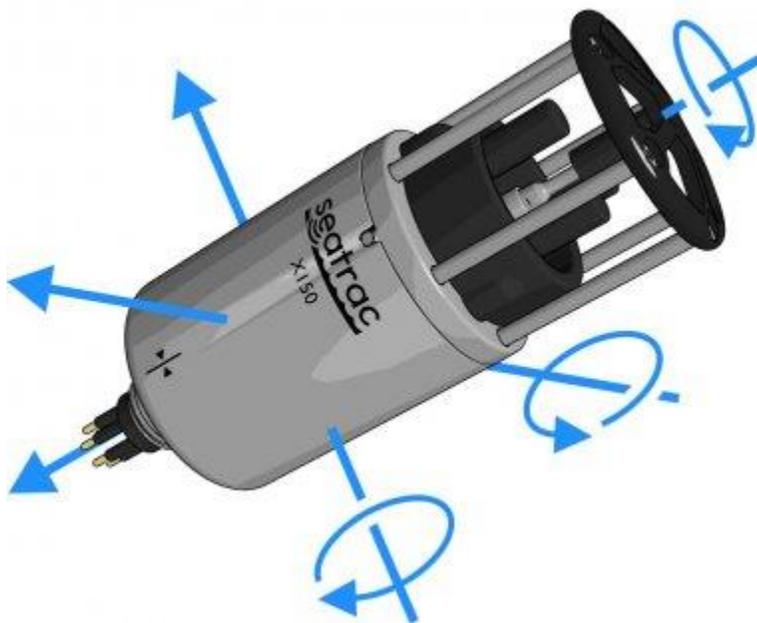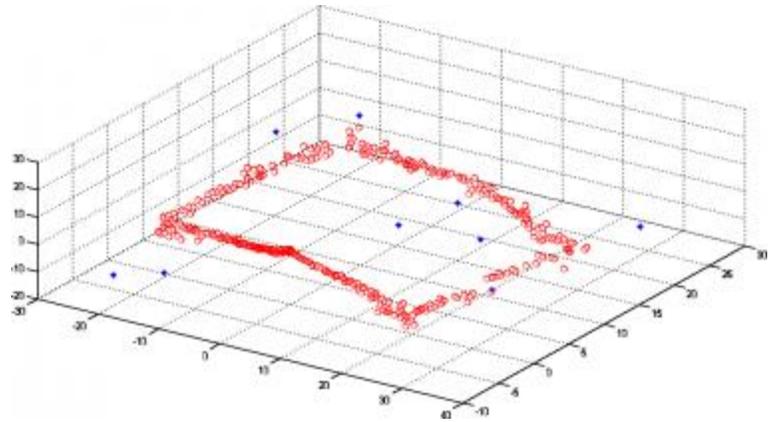
AHRS

Each beacon is fitted with a 9 Degrees-of-Freedom (9-DOF) Attitude and Heading Reference System, processing data from the onboard MEMS gyroscope, accelerometer and magnetometer to compute pitch, roll and yaw information that is made available to external applications via the communications port.

The X150 series beacons make use of this information to convert the remote beacons range and computed azimuth and elevation angles into relative real-world coordinates.

Environmental Sensors

Each beacon is fitted with an environmental pressure and temperature sensor that allow the depth of each beacon to be calculated and monitored. When used as part of a tracking system, the remote beacon's depth information can be transmitted and used as part of the position solution, improving vertical accuracy. Additionally, the pressure and temperature information can be used to automatically update the local velocity-of-sound value at each beacon, ensuring ranging calculations have the least possible error.