



Photo: Oceanering

Ranger 2 is a survey grade Ultra-Short BaseLine (USBL) acoustic positioning system designed for deep water, long range tracking of underwater targets and position referencing for dynamically positioned (DP) vessels. The system calculates the position of a subsea target, for example an ROV, by measuring the range and bearing from a vessel-mounted transceiver to an acoustic transponder fitted to the target. Multiple subsea targets over a wide area and range of water depths can be simultaneously and precisely positioned.

### 6G<sup>®</sup> Technology

Ranger 2 builds on the simplicity and reliability of Sonardyne's original Ranger system but adds support for the latest 6G<sup>®</sup> (Sixth Generation) acoustic instruments and Wideband 2 signal architecture. 6G<sup>®</sup> systems offer precise acoustic ranging, fast data telemetry and hardware that is easier to set up and operate even in the most challenging subsea operating environments. These features improve the efficiency of survey operations, reduce vessel delays and generate cost savings for owners.

### Ranger 2 and Ranger 2 Pro

Two versions of Ranger 2 USBL are available; Standard and Pro. In Standard configuration, Ranger 2 allows multiple subsea targets to be simultaneously tracked from a surface vessel at ranges of 6,000 metres and beyond. It is compatible with all makes of DP system and can achieve one second position updates in any water depth.

Pro configuration adds support for LUSBL positioning. The technique utilises a network of seabed transponders to provide the highest levels of accuracy and acoustic range redundancy and is widely installed on DP Class 2 and 3 vessels where maintaining a reliable vessel position is a critical operational requirement. Ranger 2 Pro also supports SPRINT INS, geodesy and configurable displays.

### Ranger 2 at a glance



- Simultaneously tracks multiple subsea targets; ROVs, towfish, AUVs
- Compatible with all DP systems
- Operating range beyond 6,000 metres
- 0.1% system accuracy when optimised
- Up to 1 second position updates
- Automated setup reduces delays
- Easy to use software
- Compatible with Sonardyne's SPRINT acoustically aided inertial navigation system

# RANGER 2 USBL

## DP REFERENCE AND SUBSEA TARGET TRACKING

### Optimised Ranger 2

The positioning accuracy obtainable from Ranger 2 can be improved by interfacing the system directly into Lodestar, Sonardyne's premium quality Attitude and Heading Reference System (AHRS). This configuration is referred to as Optimised Ranger 2.

In an Optimised Ranger 2 system, the Lodestar is co-located with the vessel's 6G<sup>®</sup> acoustic transceiver. The main advantage is that they are directly connected, enabling raw USBL range and bearing data to be simultaneously processed with the Lodestar's attitude data. This integration achieves a tightly compensated solution that enables a system accuracy of 0.1% of slant range to be achieved. An Optimised Ranger 2 is therefore able to meet the positioning specifications of subsea projects that previously may have required the use of alternative acoustic positioning techniques.

### Inverted Tracking

Ranger 2 supports Inverted USBL (iUSBL) tracking of towfish over long laybacks. Rather than mounting the USBL transceiver on the vessel in the traditional manner, with iUSBL the transceiver is installed on the towed body itself. This method eliminates the need for repeated system calibration, whilst the accuracy and repeatability of the acoustics is improved as the transceiver is located in a low noise, dynamically stable environment.

### System Configuration

#### Bridge / Instrument Room Hardware

Onboard, the Navigation Sensor Hub (NSH) is the interface between the in-water acoustic instruments, sensors and the Navigation Computer which runs the Ranger 2 software application. In addition to accurately time-stamping incoming data from external devices such as gyro, VRU and GPS, the NSH also provides power and communications for the vessel's acoustic transceiver.

The Ranger 2 software application is easy and intuitive to use, requiring only basic operator training to become familiar with it. It includes an extensive array of tools to allow the user to assess the performance of the system, including real-time acoustic quality indicators, noise analysis and signal travel time displays.

Acoustic positioning operations can be remotely monitored on a vessel network using a serial connection from Ranger 2 to Sonardyne's ViewPoint software application. ViewPoint supports .dwg format backgrounds, on-screen guidance, measurement tools, configurable vehicle outline shapes and offsets, waypoints and geodesy.

#### Acoustic Transceiver

HPT is a high performance, vessel-mounted acoustic transceiver that enables transponders being tracked with Ranger 2 to be precisely positioned. A number of different array designs are available from full hemispherical coverage to directional designs for ultra deep water and high noise operating environments. To allow tracking of long layback targets at shallow angles, a tilt adaptor enables the transceiver to keep the target being tracked within the ideal operating envelope of its array.

HPT transceivers can also be used as modems for autonomous monitoring transponder setup and data retrieval as well as supporting Long Baseline operations when using a Sonardyne Fusion system.

#### Transceiver Deployment

The deployment method of the HPT transceiver is critical to Ranger 2's positioning performance. It should ideally be rigidly mounted to the vessel well below the keel, away from any weather or vessel induced aeration.

Sonardyne's hydraulic through-hull deployment systems are extremely rigid and ideal for permanent vessel installation, whether new-build or retro-fit. For short-term projects on vessels-of-opportunity, a high quality over-the-side deployment system is available

### Lodestar AHRS + HPT

The combination of Sonardyne's Lodestar AHRS for vessel motion compensation, interfaced to a HPT positioning and telemetry transceiver, all installed on a through-hull deployment machine, deliver the most precise USBL available.



### DP Reference

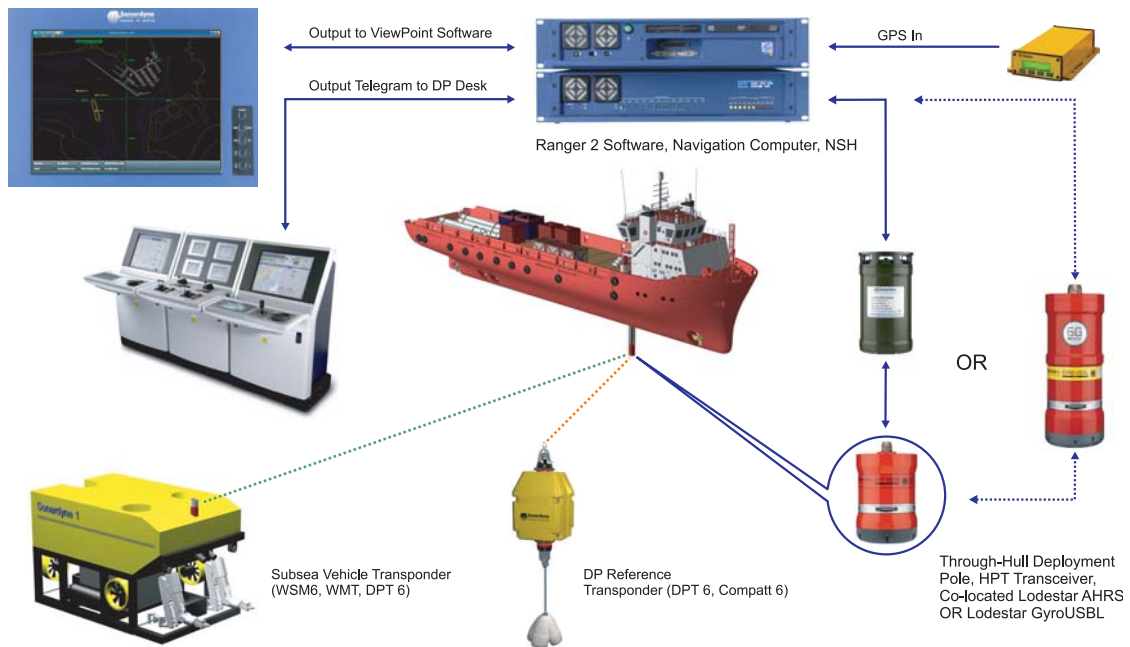
Ranger 2 installed in a DP desk. The system supports all industry standard DP telegrams, providing accurate and repeatable position referencing.



### Software

Ranger 2's software interface is intuitive and easy to learn, ensuring users quickly gain confidence. New features include Discovery mode.





that is practical to transport and install on a vessel whilst it is alongside.

**Vessel Reference Sensors**

All USBL systems need to remove the effects of vessel motion upon the transceiver. To do this they are interfaced to heading, pitch and roll motion sensors of a quality appropriate to the accuracy required for the operation and water depth. Ranger 2 supports a wide range of these sensor types including Sonardyne’s own Lodestar AHRS unit which, for optimum system performance, should be mounted close to the vessel’s HPT transceiver.

**Lodestar GyroUSBL**

GyroUSBL combines a HPT transceiver and Lodestar AHRS in the same housing. With the AHRS in fixed mechanical alignment to the HPT’s acoustic array, the requirement for a total system calibration to determine the alignment of the ship’s motion sensors to the transceiver is, in many situations, eliminated. This allows Ranger 2 to be quickly installed on vessels of opportunity saving operational time and money.

**6G® Subsea Transponders**

Ranger 2 supports previous generation Sonardyne transponders, for example WSM 5, and many transponders from other manufacturers. However the maximum benefits of the system can only be realised when using exclusively 6G® transponders.

WMT and WSM 6 are small, lightweight transponders generally used for tracking mobile targets such as ROVs. They feature a responder trigger for fast position updates and are depth rated up to 4,000 metres.

DPT 6 is designed for DP reference and large target tracking. The unit is fitted with a highly reliable acoustic release mechanism to enable it to be deployed on the seabed in a floatation collar and later recovered to the surface without ROV intervention.

Compatt 6 is Sonardyne’s most advanced USBL and LBL transponder. Its integrated communications and navigation technology allows it to be used as a position reference transponder for DP, a multi-purpose modem and autonomous data logger.



**GyroUSBL**

Setting up a USBL system often requires many hours of transceiver calibration checks before a vessel can go to work. GyroUSBL is pre-calibrated enabling operations to be survey-ready in less than 60 minutes. (Below) WSM 6, WMT, DPT and Compatt 6 transponders.



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## Ranger 2 Performance Summary

Operating Range	>6,000 metres	
System Accuracy	Typical	0.2% of Slant Range
	Optimised	0.1% of Slant Range
	Depending on the installation quality, system accuracy can vary greatly. Where every effort is made to ensure the rigidity of the deployment pole, an appropriate transceiver has been selected and the vessel's AHRS is high quality, standard Sonardyne USBL systems have been proven to achieve 0.1% of slant range error. In 1,000 metres, this is equal to 1 metre.	
Number of Targets Tracked	1 surface, multiple simultaneous subsea	
Position Update Rate	1 second, independent of water depth	
Output Telegrams	Supports all industry standard survey and DP telegrams	

## Ranger 2 Equipment List Key: ● = Required ○ = Optional



- Software  
Ranger 2  
(Std or Pro)
- Software  
ViewPoint  
Navigation
- Type 8026  
Navigation  
Computer
- Type 8098  
Navigation  
Sensor Hub
- Type 8142  
HPT USBL  
Transceiver



- Type 8084  
Lodestar AHRS  
Subsea
- Type 8084  
Lodestar  
GyroUSBL
- Type 7950  
Deployment  
Machine
- Type 8097  
Over-The-Side  
Deployment Pole
- Type 8370/71  
WSM 6  
Transponder



- Type 8190  
Wideband Mini  
Transponder
- Type 8300  
Compatt 6  
Transponder
- Type 8301  
DPT 6  
Transponder
- Type 8315  
iWand Hand-  
held Test Device
- Type 8070/71  
WSM 5  
Transponder



○ System  
SPRINT INS

## Other Acoustic and Inertial Systems from Sonardyne

- SPRINT
- DP-INS
- Fusion 6G<sup>®</sup> LBL
- Marksman LUSBL

## Ranger 2 Key Technology



**Wideband 2<sup>®</sup>**

Sonardyne Wideband<sup>®</sup> 2 is an ultra-wide bandwidth signal architecture exclusively developed for 6G<sup>®</sup> hardware. Delivering seamless acoustic navigation and telemetry of subsea data, the technology offers a host of benefits; fast and robust transmission of data, precise ranging, wide area coverage, mitigation from multipath signals and greater immunity to noise from vessels and other acoustic systems.



### Multiple Target Numbers

Sonardyne Ranger 2 Pro systems can track multiple subsea targets simultaneously. With the 'ping stacking' software feature enabled, one second position updates can be achieved independent of water depth.



### Accuracy

Sonardyne Wideband systems offer high accuracy. However, the absolute accuracy of the system is dependent upon the vessel's motion sensors, GPS, transponder source levels, environmental noise, water depth and how well a ship's transceiver has been deployed and calibrated.



### Range

Sonardyne's USBL tracking systems have a proven operational range in excess of 6,000 metres, enough for the longest tracking operations.



### Acoustically Aided INS

Ranger 2 is compatible with Sonardyne's SPRINT (Subsea Precision Reference Inertial Navigation Technology) acoustically aided inertial navigation system for subsea vehicles. SPRINT improves position accuracy, precision and integrity in any water depth.