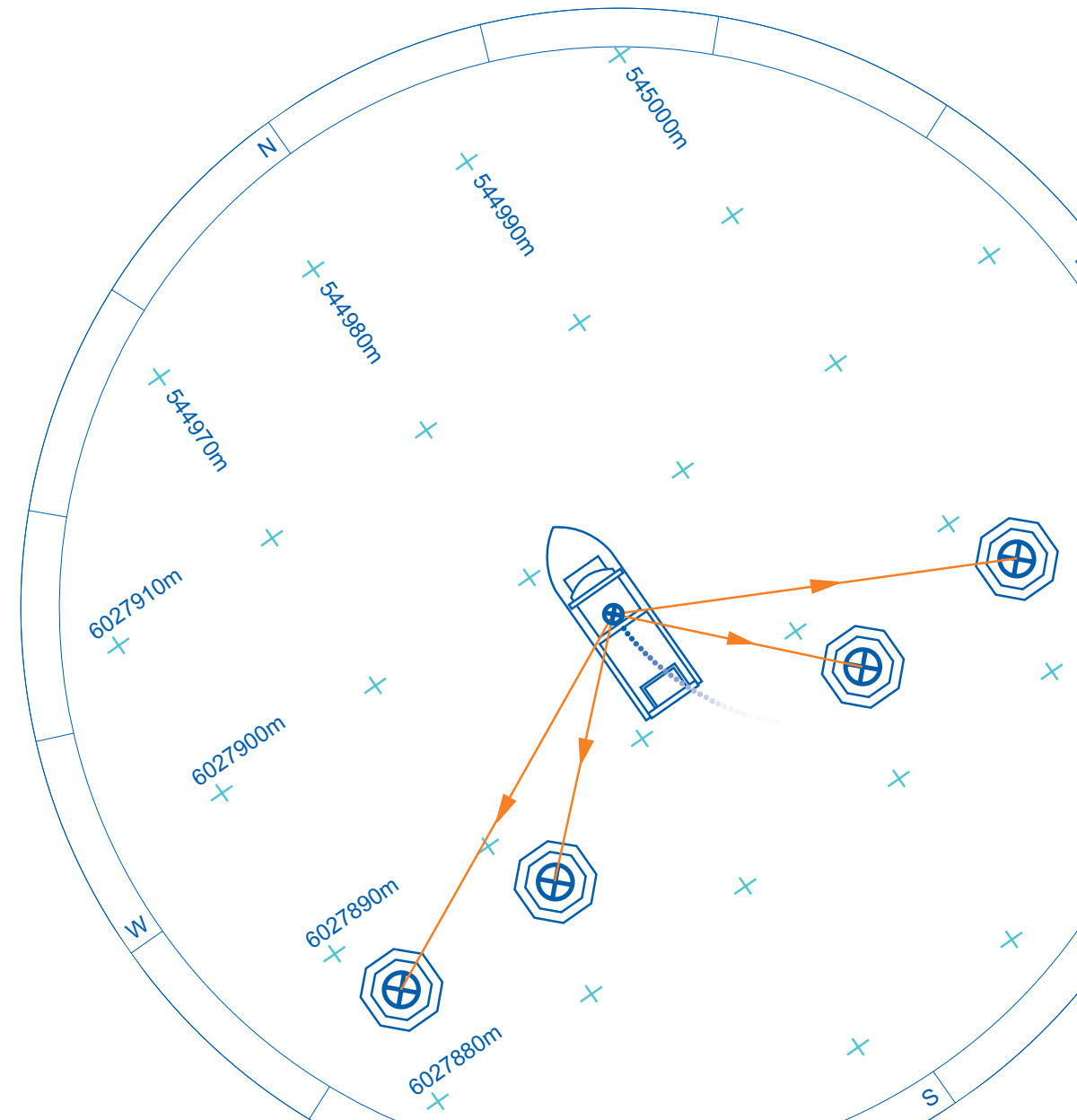




Ranger USBL

Acoustic DP Reference
and Target Tracking
System



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Ranger USBL DP and Target Tracking

Dynamic Positioning

(Below and Middle) Ranger USBL can be interfaced to all industry standard DP systems, providing stable and repeatable acoustic position reference



ROV and AUV Tracking

High accuracy tracking of ROVs and AUVs is just one application for Ranger USBL



Introduction

Ranger is a new Ultra Short Baseline (USBL) positioning system from Sonardyne that offers a fit for purpose solution for Dynamic Positioning (DP) tasks and simple survey operations. The system provides an operating range of 2,000 metres and offers a cost effective upgrade path to Sonardyne's deep water Fusion product range.

To simplify operations a new software package has been developed. Its origins are rooted in Sonardyne's 30 years of acoustic navigation systems development, Ranger has an excellent pedigree on which to build.

Simple to learn, set up and operate Ranger will allow those new to USBL and old hands alike, to achieve immediate success and get to work without delay or additional stress that is often associated with new systems.

Incorporating Sonardyne's Wideband™ technology Ranger operates with a Navigation Computer and Controller as well as a Type 8021 Transceiver. For simplicity of set up and operation, the transponders available for operation with the basic system are Wideband Sub- Minis (WSM) and Dynamic Positioning Transponders (DPT).

Sonardyne's legacy tone transponders, in addition to HPR 300 and Hipap® frequencies are supported by the addition of a software 'add-in' – the Legacy Pack.

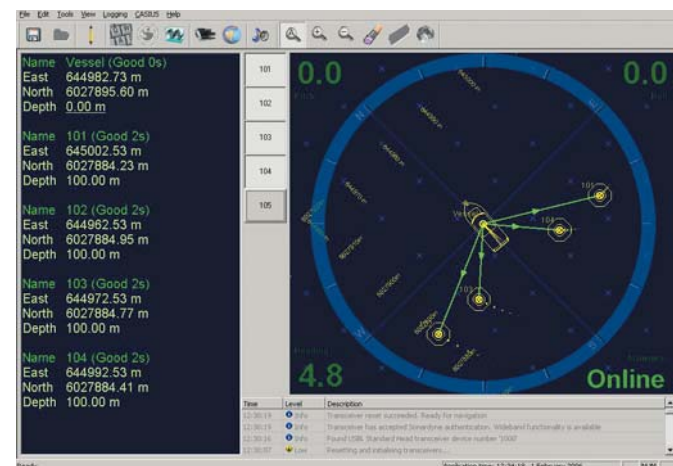
Alongside the Legacy Pack is the Advanced Pack. This module increases the number of tracked targets from 4 to 10 and allows multiple replies to be stacked in the water column allowing fast update rates, independent of slant range, a method known as 'ping stacking'.

A Ranger Marine Riser Angle Monitoring System (MRAMS) option is also available. It operates with the newly developed DPTi, a DP Transponder with an integral inclinometer. The MRAMS operates with either a pair of DPTis or with one DPTi and a remote inclinometer package.

Ranger USBL System Overview

Ranger Software

Ranger software is simple to learn, set up and operate and rewards the user with immediate success



Data Fusion Engine

The heart of a Ranger USBL system; an integrated PC and Navigation controller running Ranger software



Transceiver Deployment

Sonardyne can provide a wide range of solutions for transceiver deployment



Ranger USBL Transceivers

(Below and Right) Ranger systems are supplied with a Type 8021 transceiver although existing Scout USBL users can opt to use the system as a type 8024 transceiver



System Overview

A Ranger USBL system is comprised of four main components; a rack-mounted or portable Data Fusion Engine, control software, acoustic transceiver and seabed or vehicle-mounted transponder/responders.

Data Fusion Engine

The Data Fusion Engine is the heart of the system and is an integrated PC and acoustic processor platform running Ranger software.

The unit is designed to meet the complete on-board hardware requirements of any acoustic operation thereby eliminating the need to install and set-up separate systems to meet different acoustic positioning scenarios. As the user's requirements grow, this 'one-box' solution can be upgraded from a Ranger system through to a deep water Fusion USBL system and ultimately, a Fusion LBL system able to undertake complex subsea construction survey tasks.

The Navigation Controller Unit (NCU) is the interface between the

acoustic instruments, sensors and the Navigation Computer. In addition to accurately time stamping incoming data from external devices such as GPS, VRU and Gyro, the NCU also provides power and communications for ship-borne acoustic transceivers.

The Navigation Computer is a powerful, purpose-built PC that is used in conjunction with the Navigation Controller Unit. Features include front-mounted USB ports for when access to the rear of the unit is restricted by rack mounting and dedicated monitor power supply.

Ranger USBL Software

Ranger USBL software allows the user to simultaneously track four subsea targets as standard and up to ten with the advanced software pack whilst it's output can be configured to support any industry standard DP telegram.

The software has been designed to be very easy and intuitive to operate with only basic user training required.

During setup, the system automatically identifies the type of transceiver connected to the system and configures it accordingly. Multiple attitude, heading and position instruments can be added in a simple I/O ports page which provides feedback on the operation of all inputs and outputs. Instruments are shown in Green if working and Red if not.

Once the system is configured, tracking of transponders can be turned 'On' and 'Off' with a single click. In the event of a power failure, the only action the user needs to take to get the system tracking again is to restore power. The application will start the Navigation Computer and automatically restart tracking the transponder it was tracking before power was lost.

A key design principle of the User Interface is that an operator can assess the operation of the system at a glance from across the bridge. For example, positions are displayed in either; Green for a good position

with update rate, Yellow for a good range but bad USBL signal therefore no position computed, Red for no reply to the interrogation and finally, Grey to indicate no information has been received for more than twice the update rate.

For advanced tracking of up to ten targets with the maximum position update rate, Ranger applications incorporate Sonardyne's unique 'ping stacking technology' originally developed for ultra deep water drilling operations. The technique allows the system to transmit acoustic interrogations to transponders before the last reply was received. Through ping stacking, Ranger software is able to maintain position update rates of better than one second in any water depth.

Ranger software also includes an extensive array of tools to allow the user to optimise the performance from the system. These include utilities to measure acoustic noise, a signal analyser to filter out a specific transponder's signal and a comms viewer to monitor any NCU or

Navigation serial port. To correctly calibrate gyro and VRU offsets and therefore improve positioning accuracy, Sonardyne's CASIUS calibration tool is also included.

Ranger USBL Transceivers

The Type 8021 USBL transceiver is an all purpose MF frequency transceiver proven for general survey and DP operations where tracking could be at shallow angles or straight up and down, for example, ROV positioning.

To optimise tracking of targets at shallow angles, such as long range towfish tracking, a tilt adaptor can be used with Type 8021 transceiver. The advantage of this is that the target being positioned remains within the optimal operating envelope of the transceiver thereby maintaining positioning performance.

Type 8024 USBL transceivers are also compatible with Ranger USBL. The unit is a HF frequency transceiver originally designed for use with Sonardyne's shallow water USBL system, Scout. Now the same

transceiver can be used with Ranger topside equipment, therefore providing existing Scout users with a cost effective upgrade path to a deep water USBL system.

The 8029 transceiver is compact, lightweight and can be deployed on a rigid, over-the-side pole or through a standard 150mm (6") gate valve if one is available. To simplify set-up, an integrated motion sensor automatically compensates for the dynamic motion of the vessel. For higher accuracy work, external accuracy work external reference sensors can be used.

Transceiver Deployment Machines

The performance of any USBL system is greatly affected by the mounting of the transceiver. Sonardyne has extensive experience in both 'through hull' and 'over the side' deployment and can assist you with the selection of the right solution for you. Full details are contained within our dedicated USBL Transceiver Deployment Machine brochure.

Ranger USBL Transponder Options

Wideband Sub-Mini (WSM)

(Below and Right) The WSM is Sonardyne's new sub-mini transponder and incorporates the latest Wideband acoustic signalling technology



Wideband Sub Mini (WSM)

The Wideband Sub-Mini (WSM) is a new compact, rugged transponder/responder designed primarily to position ROVs, towfish and other small mobile targets. Available as a 1,000 metre rated omni-directional unit or 3,000 metre rated directional unit, WSMs have the option of a depth sensor for improved positioning accuracy.

In addition, WSMs support intelligent charging of its long-life NiMH battery, Windows-based setup software, Sonardyne Wideband signals, tone frequencies and all HPR 300/HiPAP® channels. For applications requiring an acoustic release function, for example releasing a clump weight on a seabed instrument package, WSMs can be connected to an external mechanical release mechanism or conventional burn-wire release via their charging socket.

Dynamic Positioning Transponder (DPT)

The Dynamic Positioning Transponder (DPT) is a full sized

Dynamic Positioning Transponder (DPT)

(Below) The DPT is a full size transponder designed for DP reference and large target tracking



Back Deck Testing

(Below and Left) Both the Pocket Test Terminal and Deck Test Unit (DTU) are available for testing DPTs



transponder designed specifically for seabed deployment or large target tracking. Available in 3,000 metre rated omni-directional or directional transducers, DPTs are equipped with a simple On/Off switch, rugged spring assisted release mechanism, depth sensors and advanced power and gain controls if required. Deeper rated and short housing units are also available. Battery options are Alkaline and Lithium.

DPTs support Sonardyne Wideband™ signals, tone frequencies and all HPR 300/HiPAP® channels. DPT also supports Sonardyne command and control options.

Back Deck Test Units

WSMs and DPT are supplied with PC utility software that allows users to setup and program the transponders prior to deployment. For DPTs, a dedicated Deck Test Unit (DTU) or Pocket Test Terminal device is also available.

Supplied in a rugged portable case, the DTU is used initially to

program the channel of the transponder, acoustically test the transponder in air and then load the acoustic release mechanism.

Pocket Test Terminal is a new truly portable test tool. Running on a dedicated iPAQ PDA platform, the Pocket Test Terminal software offers all the main features of the PC-based DPT Test Terminal software but from a small, portable, splash proof device. It is therefore ideal for taking on to the back deck to set-up and test DPTs prior to deployment.

Both the DTU and Pocket Test Terminal can be also used with Sonardyne Compact 5 transponders.

Transponder Floatation Collars

Sonardyne supply a range of subsurface floatation collars that are compatible DPT and WSM transponders.

Manufactured from high performance materials, bright colours ensure good recovery visibility.

Ranger USBL System Specifications

System Performance

General

Operating Range	2,000 Metres
Acoustic Coverage	±90° below transceiver
Accuracy	0.27% 1 Drms Slant Range (63% of fixes with 2.7 metre radius in 1,000 metres water depth) or 0.20% 1 Sigma Slant Range (39.4% of fixes within 2 metre radius in 1,000 metres water depth) (Note: The absolute accuracy of the system is dependent upon the quality of attitude and heading sensors, beacon source level, vessel noise, water depth, the mechanical rigidity of the transceiver deployment machine and proper calibration of the total system using CASIUS)
Tracking	Supports tracking of one surface vessel and up to 10 subsea targets

Transceiver

Type Numbers	8021	8024
Operating Frequency	MF (18-36kHz)	HF (935-55kHz)
Range Accuracy	Better than 0.2 metres	??
Positioning Repeatability	Better than 0.1% of slant range 1 Drms	??
Deployment Method	Through-hull or Over-the-Side	Through-hull or Over-the-Side
Dimensions (LxDia)	410mm (16.14") x 225mm (8.86")	500mm (19.7") x 145mm (5.7")
Weight in Air	28kg	10kg
Weight in Water	13.5kg	2.2kg

Ranger USBL Transponders

Type	Wideband™ Sub-Mini (WSM)	Dynamic Positioning Transponder (DPT)
Description	A small size transponder with some limited downlink capability and optional release outputs	A full size transponder designed for seabed deployment and large target tracking
Depth Rating	1,000 Metres (Omni-Directional Transducer) 3,000 Metres (Directional Transducer)	3,000 Metres (Omni or Directional Transducer)
Positioning	USBL compatible • Sonardyne Wideband™ and Tone • HRP400	USBL compatible • Sonardyne Wideband™ and Tone • HRP400
Telemetry	Configurable command downlink • Enable/Disable • Release 1,2 etc Equipment status uplink via serial port to node	High-speed up and downlink (1,500bit/s – 10,000bit/s) Via serial
Sensors	None	Tilt
Optional Sensors	Depth	Depth Temperature
Release Options	External Sonardyne release mechanism output via connector Burn-wire release output	Integrated mechanical release mechanism External release output via connector
External On/off Switch	Yes	Yes
Battery Life (Listening, Disabled)	60 days Ni-MH rechargeable	833 days Alkaline 1390 days Lithium
Dimension (LxDia)	Omni = 399mm x 69mm Directional = 407mm x 89mm	1035mm x 135mm

Navigation Controller Unit (NCU)

See separate datasheet for full specifications

Navigation Computer

See separate datasheet for full specifications

Head Office

Sonardyne International Limited
Blackbushe Business Park
Yateley, Hampshire
GU46 6GD United Kingdom

T. +44 (0) 1252 872288
F. +44 (0) 1252 876100
E. sales@sonardyne.com
www.sonardyne.com

Agent ID: