



Coastal Systems Product Guide

Underwater Positioning, Navigation and Relocation Systems



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Trusted Solutions

Position, Track, Relocate

Subsea Positioning

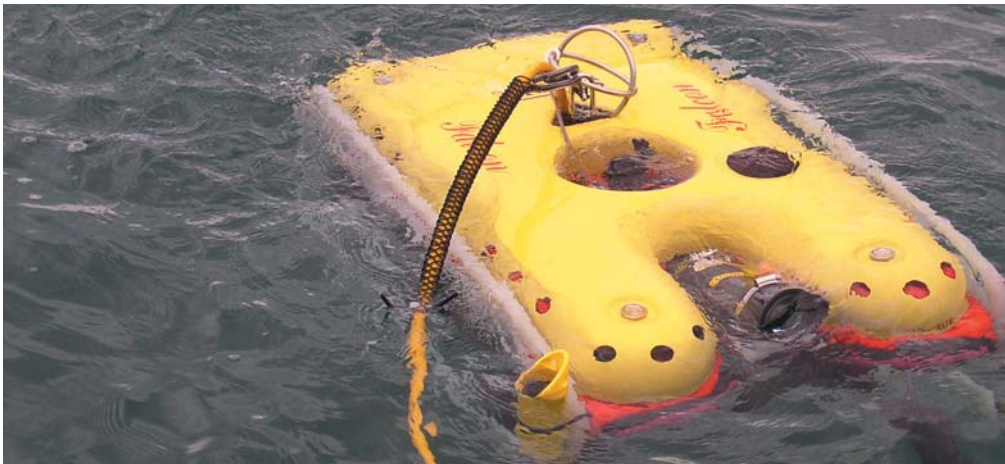
Sonardyne's Coastal products are widely used to position ROVs, divers and AUVs. The systems provide high accuracy and can be installed on both small and large vehicles

Towfish Tracking

Accurate and reliable towfish tracking, just one of the applications for Scout USBL (Page 02)

Diver Navigation

Save time and cost with precise navigation and guidance for divers



Introduction

For over 30 years Sonardyne have been pioneers in the use of underwater sound for navigation, positioning and communications. In the world's most challenging subsea environments our solutions deliver accuracy and reliability giving you the confidence to operate successfully at any water depth.

Since the introduction of our first diver-based product in 1974, we have been committed to developing reliable, easy to use and high performance acoustic systems for Remotely Operated Vehicles (ROVs) and divers.

Applications for the Coastal product range are found within the oceanographic, search and salvage, survey and marine archaeology industries where requirements vary from tracking towfish and navigating divers through to conducting harbour inspections with ROVs and relocating targets of special interest.

Sonardyne acoustic release transponders, for example, are an important component in the inventory of many scientific organisations. The units are relied upon for the recovery of valuable data monitoring equipment that in many cases have been deployed for several years.

As all of the products within the Coastal product range share the same frequency band, users can benefit from mixing-and-matching components to suit their particular applications. For example, an LRT can be used as a simple release transponder or as part of a Prospector positioning system depending on what topside equipment is being used.

Sonardyne's manufacturing facility is in the UK with regional companies strategically located around the world providing sales, product support and equipment servicing. This is backed by a world-wide, 24hr helpline that provides emergency telephone assistance for all our products.

Scout USBL

Subsea Positioning System

ROV and Towfish Installation

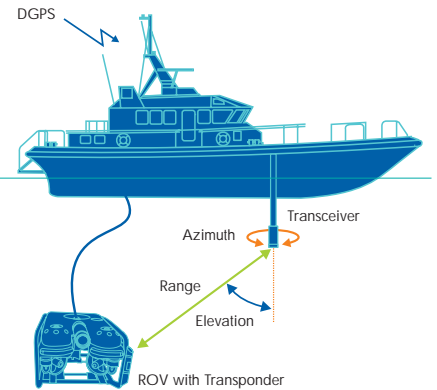
Coastal transponders are compact and rugged and can be installed directly onto ROVs or small towfish attached to the umbilical

Lightweight Release Transponder

The LRT is a versatile acoustic release transponder with a Safe Working Load (SWL) of 125kg

USBL Positioning

The Scout USBL system calculates the position of a target by measuring the range and bearing of a transponder from the vessel



Introduction

Scout USBL is a complete vessel based subsea positioning system for divers, ROVs and towfish.

Scout calculates the position of a subsea target by measuring the range and bearing from a vessel mounted transceiver to a small acoustic transponder fitted to the target; a technique known as Ultra-Short BaseLine (USBL) positioning. USBL positioning is widely used by the offshore and oceanographic industries as it offers high accuracy performance combined with ease of operation.

One of the main advantages of the technique is that no other in-water acoustic equipment has to be deployed before underwater operations can commence. Only the targets being tracked need to be equipped with a transponder. With Scout, a support boat can arrive on location and begin tracking straight away. This has particular benefits for search and salvage applications when search times are critical.

Key Features

- Easy to install and use
- Affordable and high accuracy
- All sensors, software and hardware provided
- 1,000 metre design slant range
- Upgrade path to deep water USBL systems

Scout, Scout Plus and Scout Pro

Three versions of Scout are available: Scout, Scout Plus and Scout Pro.

Scout and Scout Plus are entry level systems designed for general target tracking applications at ranges up to 500 metres. Scout can track one surface vessel and four subsea targets whilst Scout Plus can track six targets and incorporates a responder mode for fast position updates of ROVs and towfish. With both systems, all sensors and hardware are provided whilst the software is simple to learn and intuitive to use. These features make Scout and Scout Plus the ideal

solution for users with little or no prior experience of acoustic systems.

Scout Pro is designed to support complex construction survey applications through its fully featured software. It provides greater accuracy, tracking for up to 10 subsea targets and a 1,000 metre design slant range.

The advanced topside control hardware supplied with Scout Pro systems enables experienced users to operate using Sonardyne's latest Wideband signalling technology and its associated benefits that include greater immunity to noise and a ten fold improvement in measurement repeatability.

This same topside unit can also be used with Sonardyne Ranger USBL, Fusion USBL and Fusion Long Baseline (LBL) equipment therefore providing a cost effective and versatile upgrade solution for full ocean depth subsea operations.

Scout USBL System Overview

Scout Software Display
Scout's 'Simple' UI software is easy and intuitive to use and requires minimal user training

Scout Transceiver
Scout transceivers are small, easy to deploy and incorporate an internal heading, pitch and roll sensor

Surface Interface Unit
The SIU provides power and communications to the transceiver
Surface Command Unit
The SCU is a self contained PC, display and interface unit for operating Scout and Scout Plus from any type of vessel

Transceiver Deployment
For temporary vessel installations, a dedicated lightweight deployment pole is available from Sonardyne



System Overview
A Scout USBL system is comprised of four main components: control software, vessel based interface unit, acoustic transceiver and transponders.

Software
Scout and Scout Plus software is easy to use and intuitive to operate. It is designed to appeal to users who wish to arrive on location and begin tracking a target immediately.

Scout Pro software shares a common look and feel with Sonardyne's Fusion and Ranger systems and offers users a complete range of survey tools. These include: chart backdrops, industry standard output telegrams and configurable sensor displays.

Interface Unit
As standard, Scout and Scout Plus systems are supplied with a rack-mountable Surface Interface Unit (SIU) that supplies power and communications to the transceiver and is connected to the user's own computer via a serial or USB link.

For complete portability, the optional Surface Command Unit (SCU) enables Scout and Scout Plus to be operated from almost any size of boat. It comprises a PC, high brightness TFT display, sensor interface and rechargeable battery incorporated in an splashproof case.

Scout Pro systems are supplied with a Navigation Controller Unit (NCU). In addition to accurately time stamping incoming data from external devices such as GPS, Gyro and VRU's, the NCU also provides power and communications for the vessel's USBL transceiver.

Transceiver
The Scout transceiver provides a hemispherical pattern of acoustic coverage enabling tracking of targets from far below through to near surface. For this reason, it is suitable for a wide variety of tasks such as towfish tracking.

The compact design of the transceiver makes it easy to install on a simple over-the-side mount or through a gate valve. Sonardyne

can supply an easy-to-assemble pole, complete with fittings and advice on installation, if required. Options include a water block protection device and tilted transducer array.

To simplify set-up, an integrated motion sensor automatically compensates for the dynamic motion of the vessel. For higher accuracy applications, external reference sensors can be used with Scout Plus and Scout Pro.

Transponders
Scout USBL is compatible with the Sonardyne's family of low cost HF frequency transponders. Scout Plus and Scout Pro both offer additional compability with the advanced Wideband Sub-Mini (WSM) transponder.

All transponders have been designed for applications where size and weight are important operational factors, such as installation on the back of a diver or ROV. For more information on transponders, turn to Pages 14 and 15.

Scout USBL

System Specifications

System Performance

General

Design slant Range	500 metres (Scout, Scout Plus) 1,000 metres (Scout Pro)
Acoustic Coverage	±90° below transceiver
Accuracy	±2.75% of Slant Range (With internal Heading and Attitude sensor) ±0.5% of Slant Range (With external VRU and Gyro)
Tracking	Supports tracking of one surface vessel and multiple subsea targets

Transceiver

Type Number	8024
Operating Frequency	Sonardyne HF (35-55kHz)
Sensors	Heading and Attitude
Options	Tilted Array
Deployment Method	Through-hull or Over-the-Side
Mechanical Construction	Aluminium Bronze, Powder Coated
Dimensions – Without Guard (LxDia)	489mm (19.25") x 160mm (6.3")
Weight in Air	18.9kg
Weight in Water	8.9kg

Surface Command Unit (SCU)

Type Number	8039
Processor	Pentium M
Operating System	Windows XP Professional
RAM	512Mb
Hard Disk	40Gb
Ports (Front Panel)	4 x Serial Ports, 1 x USB 2.0
External Inputs	Transceiver, Responder Trigger, GPS Antenna (Optional)
Battery	Internal Li-Ion (UN Transport Approved)
Typical Battery Life	1-2 hours
Power Supply	12-16V DC
Display Panel	12.1" TFT, 1024 x 768
IP Rating	IP65
Dimensions (LxWxH)	444.5mm (17.5") x 305mm (12") x 178mm (7")
Weight	10kg

Surface Interface Unit (SIU)

Type Number	8038
Ports	4 x Serial Ports, 1 x USB 2.0
External Inputs	Transceiver, Power, Responder Trigger
Power Supply	110 / 230V AC
Dimensions (LxWxH)	432mm (17") x 305mm (12") x 51mm (2")
Weight	3kg

Navigation Controller Unit (NCU)

See separate datasheet for full specifications

Radian AHRS

Attitude and Heading Reference System

Radian subsea housing
 Supplied within a 300 or 3,000 metre rated underwater pressure housing and accepting a wide range of input

voltages, Radian can be mounted anywhere on vessels, ROVs, AUVs and other vehicles or structures



Introduction

Radian is a miniature marine Attitude and Heading Reference System (AHRS) using a triad of modern high quality solid state MEMS inertial and earth magnetic field sensors.

Key Features

- Surface or subsea versions available
- Low power consumption
- High update rate of 100Hz
- Industry standard serial outputs
- Low latency
- Suitable for highly dynamic conditions as gyro compensated
- Magnetic field calibration system provided

Applications for Radian include: inshore hydrographic survey, compensation of bathymetry systems and dead reckoning for AUVs. The embedded processor allows the real-time output of high accuracy gyro compensated magnetic heading, pitch, roll and related information at high output rates to provide the user with an optimum orientation solution.

To correct any local disturbances to the magnetic field caused by a vessel's engines for example, a full magnetic field calibration can be carried out with the easy to use software supplied. A correction table is then stored within the device.

The relative weighting between the magnetic heading sensor data and gyro data can be adjusted to enable absolute or relative heading output, dependent on the magnetic environment that it is installed in. The filter response can be adjusted to suit different vehicle dynamics.

Radian supports RS232 or RS485 communications with a range or proprietary or marine industry standard serial outputs. With the software supplied users can view the heading, pitch and roll data in real-time on a PC or configure serial outputs to other systems.

Radian is compatible with Sonardyne's family of Scout USBL tracking systems.

AvTrak 2

AUV Navigation and Communication System

Position, Track, Communicate
 Sonardyne has extensively modelled the performance of AvTrak 2 to achieve an optimum design. This capability is

available to customers to assist in arriving at the best possible configuration for their AUV



Introduction

AvTrak 2 is a second generation acoustic navigation and communications instrument designed to form part of an integrated AUV navigation system. It combines the functions of transponder, transceiver and telemetry link in one low power device that has been designed to meet the requirements of a variety of mission scenarios and vehicle types.

Key Features

- Incorporates Sonardyne's latest Wideband technology
- Compatible with Fusion USBL for surface vessel combined telemetry and positioning
- Supports AUV-to-AUV ranging and telemetry
- Two telemetry modes: Robust and High Data Rate Link
- Designed for Doppler immunity
- Emergency relocation mode

The unit can operate in Wideband or conventional tone mode and with a variety of systems and transponders. It is also fully compatible with Sonardyne's family of Fusion Long BaseLine (LBL) and Ultra-Short BaseLine (USBL) navigation systems.

AvTrak 2 has a comprehensive, yet easy to use command language that allows the AUV to undertake simultaneous LBL ranging, USBL tracking via a surface vessel and robust and high speed telemetry both for AUV-to-vessel and AUV-to-AUV communications.

This capability provides the AUV designer with good quality absolute position reference data to constrain the drift in the vehicle's inertial navigation system.

AvTrak 2 is available in a variety of configurations including: 3,000, 5,000 and 7,000 metre depth ratings, screened chassis option for mounting within the main AUV pressure vessel, omni or directional transducers for shallow or deep operations and a remote transducer for easy installation.

An internal watchdog option monitors AUV communications activity and can switch the unit into transponder mode for emergency relocation. This is supported by an internal back-up battery and digital I/O for emergency ballast jettison.

Sonardyne has extensively modelled the performance of AvTrak 2 to achieve an optimum design. This capability is available to customers in addition to advice on transducer installation and its impact on system performance.

Radian AHRS and AvTrak 2 Specifications

Radian AHRS

Type Numbers	8041-000-01	8041-000-02
Depth Rating	300 metres	3,000 metres
Dimensions (LxWxH)	160mm x 92mm x 78mm	160mm x 92mm x 78mm
Weight in Air / Water	0.64kg / 0.05kg	1.21kg / 0.61kg

Performance

Dynamic Range	All angles 3D
Angular Resolution	0.05°
Pitch Accuracy	<0.5°
Roll Accuracy	<0.5°
Heading Accuracy	<1° statically, <2° in real marine environment
Raw sensor performance	See separate datasheet for full specifications

Interfacing

Proprietary Outputs	3D orientations (Quaternions, Euler Angles, Rotation Matrix), 3D acceleration, 3D rate of turn, 3D earth-magnetic field (Normalized), Device temperature
Industry Standard	\$HCHDM, \$HCHDG, TSS2, \$PHTRO, \$PRDID, EM1000
Max update rate	512Hz (Sensors only), 100Hz (Orientation data)
Communications Interface	RS232 or RS485 (Specify at time of ordering)
Operating Voltage	18 to 50 VDC
Power Consumption	450mWatts

AvTrak 2

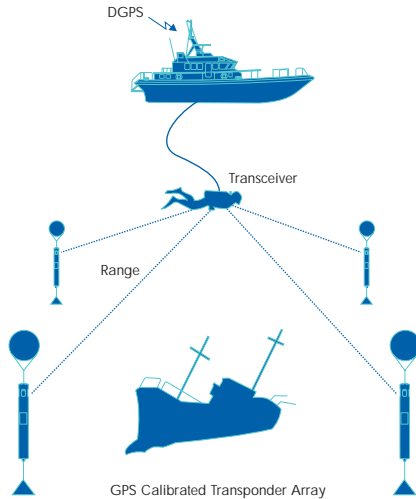
Type Number	8065	
Frequency Band	MF (19-36kHz)	
Source Level – Omni / Directional	188dB / 193dB re 1µPa @ 1 metre	
Range Measurement – Wideband	1cm / 3cm	
Repeatability / Accuracy – Tone	10cm / 30cm	
Telemetry		
Robust Wideband SMS Text Messaging (Transmit and Receive)	1,500 baud	
HDRL (High Data Rate Link) to USBL (Transmit only)	Up to 15,000 baud	
Transponder Ranging Compatibility (* = Wideband & Tone operation)	Wideband Sub-Mini*, Compatt 5*, SSM, Compatt 4, HiPAP series	
Pinger Detection (Wideband only), Max No of Pingers	4	
Digital Input / Output	4 plus event sync	
Communications Interface	RS232, RS485	
Dimensions and Weight in Air / Water	3,000 metre Omni	499mm x 93mm 5.1kg / 2.2kg
	5,000 metre Directional	518mm x 93mm 7kg / 3.6kg
	7,000 metre Directional	518mm x 93mm 7kg / 3.6kg
Voltage	24-50 Volts	
Power	Listening (Transponder mode)	25mW
	Quiescent	<2W (<1W option)
	Peak (During transmission)	<50W
Emergency Internal Battery Pack	Listening	30 days
	Continuous interrogation	Approx 2 days
Remote Transducer and Board Set Versions	See separate datasheet for full specifications	

Prospector

Wide Area, Absolute Positioning

Wide Area Positioning

Prospector uses a GPS calibrated transponder array to provide high accuracy absolute positioning over a wide area



Prospector Transponders

A Prospector system uses four Coastal or LRT transponders to provide wide area seabed positioning

ROV Installation

An ROV equipped with a Prospector transceiver and remote transducer

Diver Navigation

A diver takes a position fix using his Prospector remote transducer



Introduction

Prospector uses a GPS calibrated network of low cost transponders to provide high accuracy absolute positioning over a wide area.

Prospector can track one surface and one underwater mobile object, such as an ROV, diver, towfish or Autonomous Underwater Vehicle (AUV). This is combined with the minimum of vessel mounted hardware and easy to use software.

Key Features

- Low cost system
- Quick to deploy
- Easy to calibrate
- Highly accurate

Some of the many tasks that Prospector can be used for include: underwater inspection, debris searches, mapping, inshore construction work, ordnance clearance, marine salvage assessment, marine biology surveys and marine archaeology.

This simplified acoustic system is extremely easy to use and yet brings the inshore diver and ROV operator the same advanced Sonardyne technology used to save time and money in most of the world's offshore oilfield developments.

Four acoustic transponders are deployed on the seabed with surface or sub-surface floats to form an underwater navigation network with each transponder being deployed at one corner of a square. The positions of these four transponders are then calibrated by sailing the vessel briefly around the square, typically in under 20 minutes.

Once calibrated, the transponder array may be used to position a diver or ROV. Since both the boat's position and the diver's or ROV's position are known, referenced to DGPS data, Prospector can track both objects simultaneously to a high degree of accuracy, in water depths from less than five metres to 500 metres.

During tracking operations the positions of both the boat and the diver or ROV are shown on a chart display. The chart also shows the position of the four transponders, any waypoints, position fixes or survey lines and can also show a background chart. All of the tracking information such as measurements and positions are recorded for replay.

Prospector System Overview

Remote Transducer

The remote transducer transmits and receives acoustic signals. It is typically held by a diver or floats free above him

Prospector Transceiver

This is fitted to the diver's backpack or ROV. Cables connect it to the surface and remote transducer



System Overview

The components of a Prospector system are an acoustic transceiver, Surface Interface Unit (SIU), four transponders and Windows-based software. All the equipment is supplied in a rugged case for ease of transport and storage. A computer and Global Positioning System (GPS) receiver are also required.

Transceiver

The transceiver is the electronics module that is fitted to the diver or ROV. A connector on one end of the unit provides power and communication to the SIU while the other connector is used to attach the acoustic transducer. The transducer is the part that actually transmits and receives the acoustic signals. The transceiver's transducer sends an acoustic interrogation signal to a transponder through the water and receives an acoustic reply signal back from the transponder. By measuring the time between sending the interrogation and receiving the reply the transponder's distance can be determined.

Surface Interface Unit

The SIU provides power and a communications link between the transceiver and the computer running the Prospector software. The SIU connects to the transceiver through a long cable fitted with a waterproof connector and then to a computer using a USB link. Four additional serial ports are included that can be used to connect to external instruments.

Transponders

Prospector is compatible with either Coastal or LRT transponders (see Pages 14 and 15). These can be deployed in a maximum water depth of 500 metres and either mounted in fixed seabed stands or supplied with release hooks for easy recovery on the surface.

Computer and Software

The computer running the Prospector software connects to the SIU using a serial communications cable. The software on the computer talks to the transceiver via the SIU sending

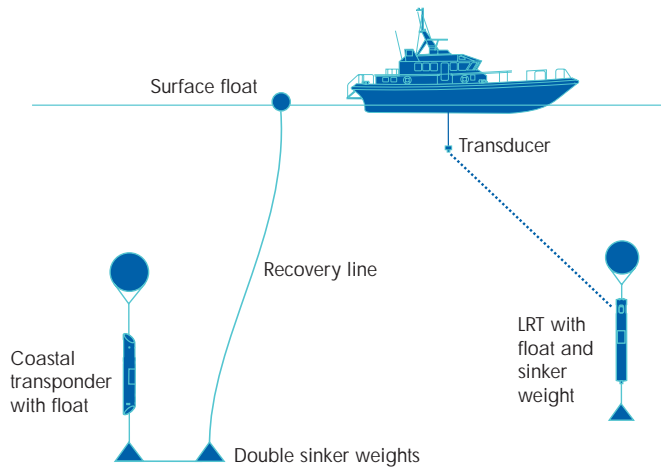
it commands to make it measure acoustic ranges to transponders. The software also takes the range measurements made by the transceiver and calculates the position of the transceiver from them. The boat, the transponders and a chart of the working area can be displayed on the computer's monitor.

Global Positioning System (GPS) Receiver

Positions from a Global Positioning System (GPS) receiver are used when determining or calibrating the positions of the transponders just after they have been deployed. The GPS receiver fitted to the boat provides position measurements in real-world co-ordinates. The GPS receiver connects to the SIU via a serial port.

Prospector System Specifications

Transponder Deployment
 Typical seabed deployment methods for Coastal and LRT transponders



Transponder Frame
 Preparing to deploy an LRT in a seabed transponder frame



Prospector Installation
 A diver prepares to enter the water equipped with a Prospector transceiver



System Performance

General

Transponder Array Size	500 metres x 500 metres (Maximum)
Accuracy	300mm absolute, 100mm relative (The accuracy of positions obtained by the system is dependant on the accuracy of the initial array calibration, itself dependant on the quality of the surface positioning instruments)
Tracking	Supports tracking of one surface vessel and one umbilical connected subsea target

Transceiver

Type Number	7832-000-05
Depth Rating	500 metres
Operating Frequency	Sonardyne HF (35-55kHz)
Transducer Type	Remote Omni-Directional (Cable connected to transceiver)
Transmit Source Level	190dB re 1µPa at 1 metre
Power	12-24V DC (From SIU or SCU)
Communications	RS485
Mechanical Construction	Anodised Aluminium Alloy and Plastics
Dimensions (LxDia)	272mm (10.7") x 72mm 2.85"
Weight in Air	Transceiver 2.1kg, Remote transducer 0.5kg
Weight in Water	Transceiver 1.3kg, Remote transducer floats

Surface Command Unit (SCU)

Refer to Page 04 for specification

Surface Interface Unit (SIU)

Refer to Page 04 for specification

Homer-Pro

Diver Based Target Relocation

Homer-Pro Display

The Homer-Pro display provides range and direction information so that a diver can swim directly towards the target



Target Selection

Selecting the address of a transponder to home into

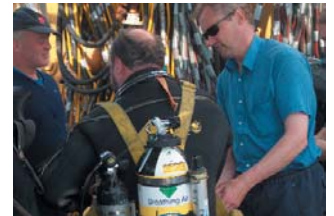


Target Relocation

A diver pointing a Homer-Pro towards the target he wants to relocate

Diver with Transponder

Homer-Pro can be used to relocate any target equipped with a transponder, even other divers



Introduction

Homer-Pro enables divers to quickly and easily relocate targets in low and zero visibility from over 750 metres distance. By using small acoustic transponders to mark points of special interest, for example, tools, wrecks and pipelines, a diver can swim directly to a location, thereby reducing wasted dive time.

Key Features

- Small and lightweight
- Easy to use
- Fast, simple target relocation of points of interest: pipes, tools
- Saves time and money on diving operations
- Compatible with Association of Offshore Diving Contractors (AODC) transponders

Homer-Pro comprises of a diver held relocation device and low cost transponders which are deployed at the target locations. Each transponder has its own unique 'address' code, enabling a number of targets in a small area to be marked and relocated unambiguously.

When the diver wishes to relocate an object fitted with a transponder, he switches on his handheld unit and selects the address of the transponder he wishes to relocate. The diver's unit then sends out an interrogation signal to the transponder selected. If the transponder is within acoustic range of the diver's unit it will automatically reply. From the reply the diver's unit calculates the distance in metres and direction to the transponder. The range and direction information is displayed to the diver enabling him to be guided directly towards the object.

A diver changes the address of the transponder he wishes to home to by using a single push button switch. To save time in switching between targets, the diver's unit can be pre-programmed with only the addresses of the transponders that are likely to be encountered during the dive. The diver's unit contains a Ni-Cad battery which must be charged before diving.

Designed for commercial and amateur divers, Homer-Pro can also be used as a cost effective survey tool for accurately measuring distances of up to 750 metres.

ROV-Homer

Low Cost ROV Guidance

ROV Range and Direction Unit
The ROV-Homer range and direction unit allows ROV pilots to fly directly towards targets equipped with a transponder

ROV Installation
ROV-Homer installed on an ROV during the recovery of a Black Box flight recorder
Deep Marker Transponder
For ultra deep applications, a 12,000 metre rated titanium marker transponder is available



Introduction

ROV-Homer is a miniature range and direction guidance system for small or large ROVs. Based on proven acoustic principles, it is specifically designed for fast, efficient relocation of underwater targets such as: aircraft black boxes, lost diving bells, divers and seabed equipment.

It enables points of interest to be marked with an acoustic transponder so that an ROV pilot can be guided straight back to the target even in zero visibility. The system helps reduce search time and therefore operating costs.

Key Features

- Low cost ROV guidance system
- Saves time and operating costs
- Allows operation in zero visibility
- Depth ratings to 12,000 metres
- Critical point marking: tools, valve heads, pipelines
- Emergency relocation: diving bells, flight recorders, ROVs...

The system consists of an ROV mounted range and direction unit, PC control software and transponders which are attached to the targets that need to be relocated.

Once the pilot has selected the target he wishes to home into, the ROV unit begins interrogating the designated transponder to determine its range and direction. This information is communicated back to the surface, via the ROV's umbilical, and is displayed on the user's PC. The software indicates the range to the target and in which direction to turn in order to fly the ROV directly towards the selected transponder.

The ROV mounted unit is accurately aligned with the ROV's heading sensor and is connected to spare cores on the ROV's umbilical or through the ROV's communications multiplexer.

The electronics inside the unit incorporate power regulation, an RS232 interface and a micro-processor, all of which are galvanically isolated from the ROV's electrical system. A 12 to 24V DC power supply is connected via the same connector. On smaller ROVs which do not have communications multiplexers, and therefore cannot support RS232, an RS485 interface can be provided.

The standard depth rating of the ROV unit is 4,000 metres. This allows the system to be used with either the 500 metre range of transponders or the deeper rated Type 7835 transponder which is also depth rated to 4,000 metres. For ultra deep water applications a 12,000 metre titanium version of the system is available.

Homer-Pro and ROV-Homer Specifications

Homer Pro

Type Number	7797
Depth Rating	500 metres
Operating Frequency	HF (35-55 kHz)
Interrogation Interval	1 second
Range Resolution	0.1 metre
Display Type	4 digit, 7 segment LED with brightness control
Update Interval	1 second
Power	Ni-Cad rechargeable
Battery Life	Approx 4 hours
Directional Indication	+/-5° – Indicates Left or Right when outside sector
Mechanical Construction	Anodised Aluminium Alloy and Plastics
Dimensions (LxDia)	226mm (8.9") X 70mm (2.75")
Weight in Air	1.5kg
Weight in Water	0.6kg

ROV-Homer

Type Number	7832-000-01	7832-000-03
Depth Rating	4,000 metres	12,000 metres
Operating Frequency	HF (35–55kHz)	HF (35–55kHz)
Transmit Source Level	90dB re 1µPa @1metre	90dB re 1µPa @1metre
Directional Indication (10° Wide Receive)	Left, Right or Ahead	Left, Right or Ahead
Range Resolution	0.1 metre	0.1 metre
Maximum Operating Range	750 metres (Dependent on conditions)	750 metres (Dependent on conditions)
Power Supply	12V – 24V DC	12V – 24V DC
Quiescent Life	Continuous when powered from ROV	Continuous when powered from ROV
Position Update Interval	1.5 seconds	1.5 seconds
Mechanical Construction	Anodised Aluminium Alloys and Plastics	Titanium grade 5
Diameter (LxDia)	272mm (10.7") x 72mm (2.85")	370mm (14.57") x 100mm (3.94")
Weight in Air	2.1kg	8.0kg
Weight in Water	1.3kg	5.8kg

Transponders

Coastal, LRT, LAT and WSM

Coastal Transponder

The Coastal transponder is a low cost and versatile transponder suitable for a wide range of shallow water subsea applications



Coastal Transponder

The Coastal transponder has been designed for very low cost applications where size and weight are important operational factors. It's the ideal choice for attaching to towfish, underwater structures, diving bells and instrumentation packages so that they can be tracked or relocated using any of the Coastal tracking and relocation product range.

Key Features

- Versatile, low cost transponder
- Depth rated to 500 metres
- Compact and rugged design
- Alkaline battery packs give up to 18 months listening life
- Compatible with AODC emergency channels

Lightweight Release Transponder (LRT)

The LRT is a combined positioning and acoustic release transponder depth rated to 500 metres



Lightweight Release Transponder (LRT)

The LRT is similar to a Coastal transponder but incorporates an acoustic release mechanism for added flexibility. This allows the transponder to be deployed on the seabed with a sinker weight to hold it down and a buoy to keep it upright.

By sending a command from the surface, the transponder releases the sinker weight and floats to the surface for recovery.

Key Features

- 125kg Safe Working Load
- Depth rated to 500 metres
- Up to 4 years listening life with lithium battery pack
- Thousands of secure identities
- Reliable, screw-off release
- Optional 75 metre rope canister

LRT with optional Rope Canister

The LRT Rope Canister is packed with 75 metres of high strength rope to allow seabed items to be pulled up



Screw-off Release

The LRT features a highly reliable screw-off release mechanism

Deck Unit

Testing an LRT on the back deck prior to deployment



The unique design of the screw-off mechanism ensures a positive release action that overcomes any biological growth.

Unlike similar low cost release transponders, the LRT has both receive and transmit functions, enabling accurate slant ranges to be measured, release actuation to be confirmed and position to be determined.

LRT Rope Canister

An optional attachment for the LRT is a rope canister that allows items left on the seabed, for example, tools, cables and salvage, to be quickly and easily hauled up.

It works by mooring one end of the rope to the item on the seabed and the other end to the LRT via the attached canister of rope. As the transponder ascends to the surface, high strength rope is deployed from the canister. This line can then be used to pull up the item directly or retrieve heavier tag lines.

Remote Actuation

Activating the inflation of a buoyancy bag is just one use for a Lightweight Actuation Transponder

Lightweight Actuation Transponder (LAT)

LATs provide wireless control of subsea devices. Its signal output can be configured to suit customer electronics

Wideband Sub-Mini (WSM)

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



Lightweight Actuation Transponder (LAT)

The Lightweight Actuation Transponder (LAT) provides a simple yet reliable way of controlling subsea electrical equipment wirelessly. Applications for the LAT include activating the inflation of buoyancy bags and opening or closing valves. The output from an LAT can be configured to provide multi-width and multi-pulse electrical outputs to suit a wide range of requirements. The LAT can also be interrogated from the surface to determine its position on the seabed and provide confirmation of electrical activation.

Key Features

- Commands and controls subsea devices
- Configurable signal output
- Robust underwater connector
- Depth rated to 500 metres
- Long battery life

Transponder Deck Unit

Coastal, LRT and LAT transponders are commanded using a small deck unit and dunking transducer. The unit is used initially to program the acoustic identity of the transponder, test it and load the release prior to deployment. Once deployed, it can be used to measure ranges to the transponder to relocate it and in the case of an LRT, send release commands. The deck unit can also be controlled via RS232 enabling raw range data to be logged to PC.

Deep Marker Transponder

The Deep Marker Transponder is a deep rated version of the Coastal transponder. The unit has been primarily designed for use with Sonardyne's ROV-Homer guidance system (see Page 12) and enables underwater targets such as structures and seabed equipment to be marked and later relocated.

Deep Marker Transponders are available in 4,000 metre and 12,000 metre depth ratings.

Wideband Sub Mini

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 set-up software, Sonardyne Wideband signals, tone frequencies and all HPR 300/400 and HiPAP® channels.

Key Features

- Depth rated up to 3,000 metres
- Transponder or Responder operating modes
- Channel selection via serial data port to PC
- On / Off switch

Transponders Specifications

Coastal Transponder

Type Number	7815
Depth Rating	500 metres
Operating Frequency	Sonardyne HF (35-55kHz)
Transmit Source Level	184-187dB
Receive Sensitivity	105-115dB re 1µPa @ 1 metre
Number of Unique Addresses	3609 (Field programmable)
Switch On	Continuously operating (No On/Off switch)
Battery Life	Alkaline: 18 months
Mechanical Construction	Plastic and Anodised Aluminium Alloy
Dimensions (LxDia)	442mm (17.4") x 63mm (2.48")
Weight in Air / Water	1.1kg / 0.75kg
Deck Unit	Type 7967-000-02 (Includes transducer and 10 metres of cable)

Deep Marker Transponder

Type Number	7835	Type 7835
Depth Rating	4,000 metres	12,000 metres
Operating Frequency	HF (35-55kHz)	HF (35-55kHz)
Transmit Source Level	>183dB re 1µPa @ 1 metre	>183dB re 1µPa @ 1 metre
Receive Sensitivity	<100dB re 1µPa	<100dB re 1µPa
Number of Unique Addresses	3609 (Field programmable)	3609 (Field programmable)
Switch On	Continuously operating	Continuously operating
Battery Life	Alkaline: 2 years Lithium: 3 years	Alkaline: 2 years Lithium: 3 years
Mechanical Construction	Anodised Aluminium Alloy and Stainless Steel	Titanium Grade 5
Dimensions (LxDia)	353mm (13.9") x 64mm (2.5")	376mm (14.45") x 80mm (3.15")
Weight in Air / Water	1.9kg / 1.2kg	5.5kg / 3.8kg

Wideband Sub-Mini (WSM)

Type Number	Type 8071	Type 8070
Depth Rating	1,000 metres	3,000 metres
Transducer Beamshape	Omni-Directional	Directional
Transmit Source Level:		
External Power:	190dB dB re 1µPa @ 1 metre	202dB dB re 1µPa @ 1 metre
Battery – High Power:	188dB dB re 1µPa @ 1 metre	199dB dB re 1µPa @ 1 metre
Battery – Low Power:	185dB dB re 1µPa @ 1 metre	196dB dB re 1µPa @ 1 metre
Receive Sensitivity:		
High Gain	<100dB dB re 1µPa	<100dB dB re 1µPa
Low Gain	<110dB dB re 1µPa	<110dB dB re 1µPa
Operating Channels	All Sonardyne Wideband/Tone HPR 300 and 400 Channels	All Sonardyne Wideband/Tone HPR 300 and 400 Channels
Power Supply	Long-Life NiMH battery or external 24V via ROV's umbilical	Long-Life NiMH battery or external 24V via ROV's umbilical
Depth Sensor	Yes (Optional)	Yes (Optional)
Maximum Update Period	750ms	750ms
Mating Connector	Subconn MCIL5F	Subconn MCIL5F
Mechanical Construction	Aluminium Alloy, Anodised	Aluminium Alloy, Anodised
Dimensions (LxDia)	401mm (15.8") x 75mm (2.95")	408mm (16.1") x 87mm (3.42")
Weight in Air / Water	2.7kg / 1.4kg	5.0kg / 2.6kg

Lightweight Release Transponder (LRT)

Type Number	7986
Depth Rating	500 metres
Operating Frequency	Sonardyne HF (35-55kHz)
Transmit Source Level	185dB re 1µPa @ 1 metre
Receive Sensitivity	<110dB re 1µPa
Number of Unique Addresses	3609 (Field programmable)
Switch On	Continuously operating (No On/Off switch)
Battery Life	Alkaline: 18 months Lithium: 34 months Long Life Lithium: 52 months
Safe Working Load (at 4:1 ratio)	125kg
Release Load	125kg
Breaking Load	500kg
Proof Load	250kg (Note: A Proof Test Certificate can be provided upon request)
Mechanical Construction	Plastic, Stainless Steel and Anodised Aluminium Alloy
Dimensions (LxDia)	490mm (19.3") x 63mm (2.48")
Weight in Air / Water	1.75kg / 0.4kg
Options	75 metre or 100 metre Rope Canister (Longer lengths available upon request)
Deck Unit	Type 7967-000-02 (Includes transducer and 10 metres of cable)

Lightweight Actuation Transponder (LAT)

Type Number	8044
Depth Rating	500 metres
Operating Frequency	Sonardyne HF (35-50kHz)
Transmit Source Level	185dB re 1µPa @ 1 metre
Receive Sensitivity	<110dB re 1µPa
Number of Unique Addresses	3609 (Field programmable)
Switch On	Continuously operating (No On/Off switch)
Battery Life	Alkaline: 18 months Lithium: 34 months Long Life Lithium: 52 months
Max Actuation Current	120mA increasing with shorter pulse widths (Higher currents available)
Actuation Pulse Voltage	10-15V DC
Actuation Pulse Width	2 seconds typical (Other options available upon request)
Actuation Pulses per Command	1 typical (Other options available upon request)
Total Number of Actuations	100,000 (2 seconds @ 1mA)
Connector Type	8 way Sub con MCBH8FAL/2-0 Bulkhead Female
Mechanical Construction	Plastic, Stainless Steel and Anodised Aluminium Alloy
Dimensions (LxDia)	490mm (19.3") x 63mm (2.48")
Weight in Air / Water	1.75kg / 0.4kg
Deck Unit	Type 7967-000-02 (Includes transducer and 10 metres of cable)



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