POS MV™ marine vessels

DATASHEET

POS MV - Providing the Marine Industry with robust, reliable, and repeatable position and orientation solutions

The new POS MV - a tightly-coupled system utilizing advanced Inertially-Aided Real-Time Kinematic (IARTK) technology designed to increase your operational capability and reduce downtime.

Tightly integrated inertial navigation – Continuous positioning data can be generated while surveying in areas where GPS reception is compromised by multipath effect and signal loss, such as close to offshore structures, or in ports, harbors, near-shore coastal waters and rivers. Raw GPS data from as few as one satellite can now be processed directly within the POS MV reducing position drift and RTK re-acquisition time.

The POS MV Advantage

The Major Benefits

- Faster, more robust heading aiding from GPS Azimuth Measurement Subsystem (GAMS) when compared to V3
- Proprietary Inertially Aided RTK providing almost instantaneous reacquisition of RTK following a GPS outage
- Superior low elevation tracking performance using lighter, smaller Trimble Zephyr ™ geodetic antenna technology
- Faster initial system calibration
- Maintains heading accuracy longer when in a high multipath environment
- Increased component reliability
- Automatic identification and error estimation for lever arm distances and angles

The Latest Technology

POS MV uses the latest Trimble BD950 receivers with the following attributes:

- Extremely fast response time
- Latency of less than 20 milliseconds (at 20 times per second)
- Very low noise L1 and L2 carrier phase measurements
- Uses the Maxwell 4 Custom Survey GPS chip for enhanced tracking capability

Straightforward Installation and Operation

- All components mounted and installed using a straightforward, one-time-only, systematic procedure.

Faster, More Reliable Networking Potential

- An improved Ethernet raw data logging capability for streamlined data acquisition of all motion variables with microsecond-accurate time stamping

Upgradeability*

- Convenient upgrade program for PCS and antennas, to allow for maximum interoperability when moving from L1 only to a full L1/L2 RTK unit

The Most Accurate Position and Orientation Solution

POS MV maintains positioning accuracy under the most demanding conditions regardless of vessel dynamics. With its high data update rate, the system delivers a full six degree-of-freedom position and orientation solution to provide the following:

- Position (latitude, longitude and elevation)
- Velocity (north, east and vertical)
- Attitude (roll, pitch and true heading)
- Heave (real-time, delayed)
- Acceleration Vectors
- Angular Rate Vectors

** For detailed upgrade information please call your Applanix Marine office*

POS MV now has a 2 Year Warranty

SYSTEM COMPONENTS

POS Computer System (PCS) – A rugged, compact computer system contains the core POS processor and IMU interface electronics, plus two GPS receivers and an optional removable PC-card disk drive. The PCS provides system timing, position and velocity aiding, together with GPS raw observables for use with GAMS.

POS Inertial Measurement Unit – The system's primary sensor allows for the continuous output of position and orientation data.

Primary GPS Receiver Antenna – A dual frequency antenna for use with GAMS.

Secondary GPS Receiver Antenna – A dual frequency antenna for use with GAMS.

APPLANIX
A TRIMBLE COMPANY

POS MV™ marine vessels

SPECIFICATIONS

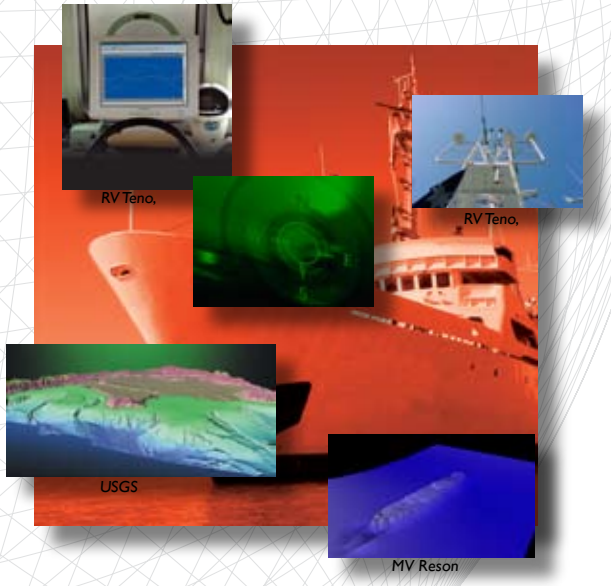
Accuracy

POS MV 320 Main Specifications (with Differential Corrections)

Roll, Pitch accuracy:	0.02° (1 sigma with GPS or DGPS)
	0.01° (1 sigma with RTK)
Heave Accuracy:	5 cm or 5% (whichever is greater) for periods of 20 seconds or less
Heading Accuracy:	0.02° (1 sigma) with 2 m antenna baseline, 0.01 (1 sigma) with 4 m baseline
Position Accuracy:	0.5 - 2 m (1 sigma) depending on quality of differential corrections
	0.02 - 0.10 m (RTK) with input from auxiliary RTK or optional internal RTK receiver
Velocity Accuracy:	0.03 m/s horizontal

POS MV 320 during GPS Outages

Roll, Pitch accuracy:	0.02° (1 sigma)
Heave accuracy:	5 cm or 5% (whichever is greater) for wave periods of 18s or less
Heading accuracy:	Drift less than 1° per hour (negligible for outages < 60s)
Position accuracy degradation:	2.5 m (1 sigma) for 30 s outages <6 m (1 sigma) for 60 s outages



Images courtesy from clockwise RV Teno, MV Reson and the USGS,

Physical Characteristics

Size

IMU:	204 mm X 204 mm X 168 mm	7.95 in X 7.95 in X 6.55 in
PCS:	432 mm X 89 mm X 356 mm	17.00 in X3.50 in X 14.05 in
	2.0U 19 in rack mount	
GPS Antenna (x2):	187 mm X 53 mm	7.4 in X 2.1 in

Weight

IMU:	3.5 kg	7.7 lb (international)
Processor:	5 kg	11.0 lb (international)
GPS Antenna:	<0.5 kg	<1.1 lb (international)

Power

Processor:	110/230 Vac, 50/60 Hz, auto-switching 80 Watt
IMU:	Power provided by PCS
GPS Antennas:	Power provided by PCS

Environmental

Temperature Range (Operating)

IMU:	-40 °C to +60 °C	-40 °F to +140 °F
Processor:	0 °C to +55 °C	+32 °F to +131 °F
GPS Antenna:	-40 °C to +70 °C	-40 °F to +158 °F

Temperature Range (storage)

IMU:	-40 °C to +60 °C	-40 °F to +140 °F
Processor:	-25 °C to +85 °C	-13 °F to +185 °F
GPS Antenna:	-50 °C to +70 °C	-58 °F to +158 °F

Humidity

IMU:	10 - 80% RH, Ingress Protection of 65
Processor:	10 - 80% RH, non-condensing
GPS Antenna:	0 - 100% RH

Shock & Vibration (IMU)

Operating:	90 g, 6 ms terminal saw tooth
Non-Operating:	220 g, 5 ms half-sine

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QINSy

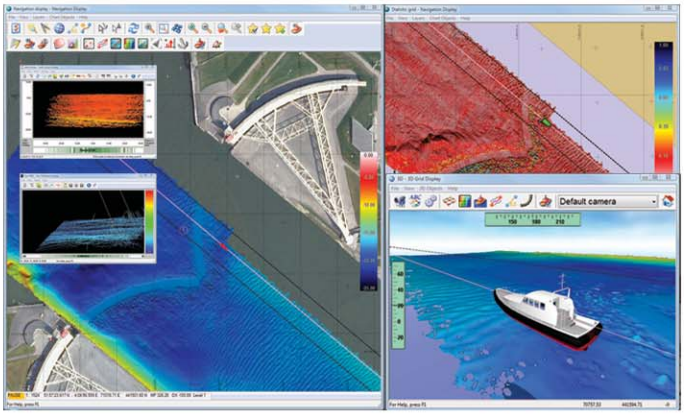
Total hydrographic solution

In a world where everything seems to get faster and bigger, software needs to be even better. The ideal software package needs to be as flexible as the people who use it, and most importantly it must be easy to operate. QINSy provides a total hydrographic solution to serve the small as a well as the large survey companies.
Its modular design and inherent flexibility makes QINSy perfect for a wide variety of applications.

- Inland Surveys
- Hydrographic & Oceanographic Surveys
- Laser Scanning for Land & Maritime applications
- Complete offshore construction and survey applications
- Barge, Tug and Fleet Management
- Dredging Monitoring & Navigation
- Electronic Navigation Chart production

Since its launch in 1996, QINSy has become the standard in marine surveying, bathymetric chart and ENC production.

For this purpose QINSy makes use of a “project template” database which contains all survey configuration parameters relevant to the project. QINSy supports most of the world’s datums and projections, multiple units and geoidal models used world-wide. The project template also contains vessel shapes, administrative information, as well as vessel offsets and I/O parameters.
Using real-time depth measurements, sound velocity profiles, tide levels, RTK heights etc. QINSy calculates the final foot print positions on-the-fly and visualizes these on various displays.



Typical QINSy displays

Real-time DTM production is the dream of every surveyor. In QINSy all computations are performed in 3D. Together with accurate RTK heights or real-time tide gauges, all depth observations are immediately available in absolute survey coordinates. This unique technique is called ‘on-the-fly DTM production’.

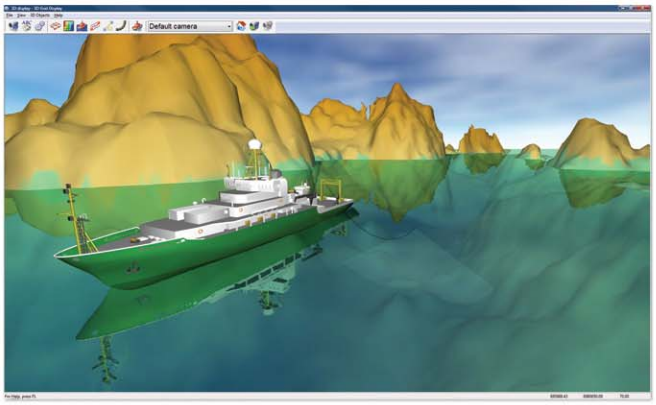
Accurate timing is imperative in the survey industry. QINSy uses a sophisticated timing routine based on the PPS option from the GNSS receiver. All incoming and outgoing data is accurately stamped with a UTC time label. Internally QINSy uses ‘observation ring buffers’ so that data values can be ‘placed’ for the exact moment of an event or ping. This combination gives QINSy a proven accuracy of 1 msec.

QPS

www.qps.nl
www.qps-us.com

Online Data Acquisition

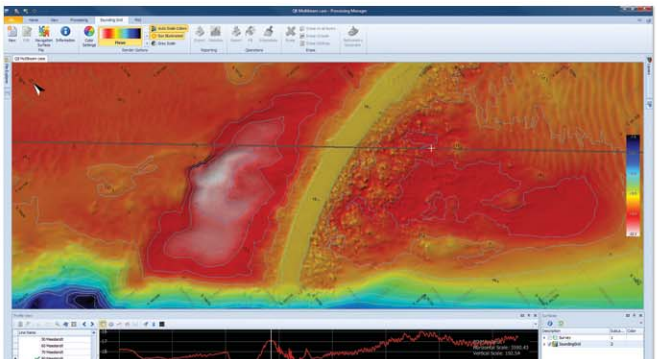
- Real-time calculation of footprint positions and on-the-fly DTM production.
- Accurate Timing: Combination of ring buffers and PPS gives QINSy a proven accuracy of 1 msec.
- Storage of Raw sensor data enables total replay of performed survey in the office with different settings.
- Total Propagated Uncertainty (error budget) calculation in real-time which can be used for on-line data clipping.
- Multi-layer sounding grid used for on-line visualization of on the fly DTM, SSS draping, layer differences etc.
- Support for Anchor handling & Tug management.
- Advanced Dredging functionality.
- Multiple ROV positioning & monitoring.
- Side Scan Sonar support for targeting and mosaicking.
- Great flexibility in sensor support which ensures interfacing of almost all sensors.
- Survey planning tool enables you to prepare your project in the office.
- Visualization of project using powerful 2D and 3D visualization techniques together with flexible user defined information displays.
- Ocean Bottom Cable & 2D seismic support.



3D View

Post Processing

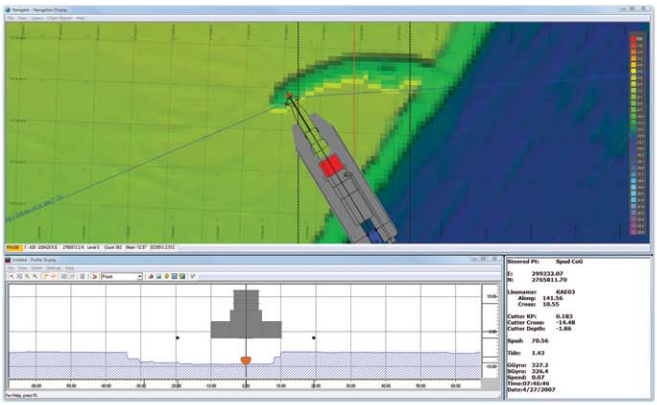
- Powerful Data Processing & Validation techniques
- Export to all popular formats and more.
- Sound velocity manager which enables time & spatial processing of SVP casts.
- Plotting of engineering charts with bathymetric data, cross and long profiles.
- Different volume calculation methods.
- S-57 ENC production, both file based and spatial database solutions, incl. notice to mariners, updates.
- S-57 ENC distribution.



Processing Manager

Qloud

- Fast area based data cleaning tool.
- Ideal for processing of large multibeam data sets.
- Reliable automatic cleaning methods.
- Manual data clipping.
- Easy to search for problems in the bathymetric data using statistical information.
- Combination of sounding grid and DTM points.
- CUBE support.
- 3D spot sounding generation.
- TIN reduction.



Advanced Dredging functionality

Sonardyne
SOUND IN DEPTH

Coastal Systems Product Guide

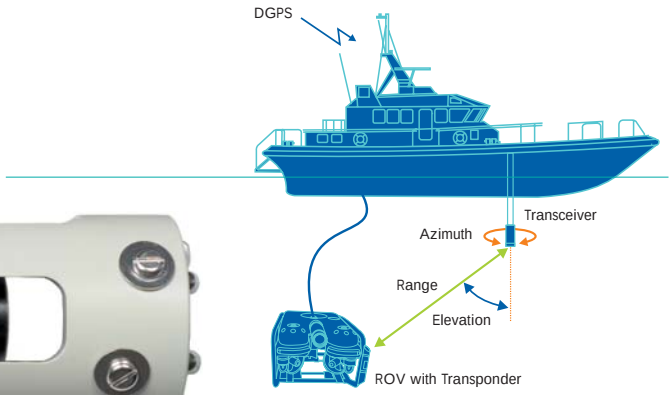
Underwater Positioning, Navigation and Relocation Systems

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 contruction 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

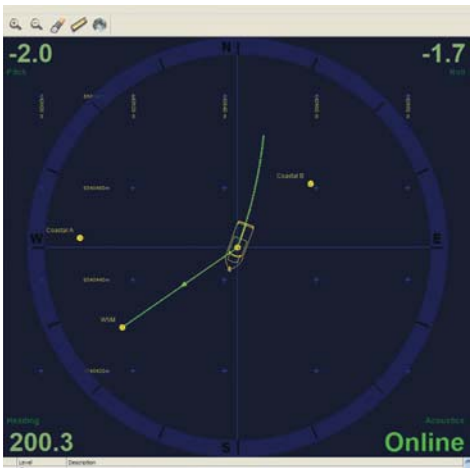
Scout Software Display
Scout's 'Simple' UI software is easy and intuitive to use and requires minimal user training

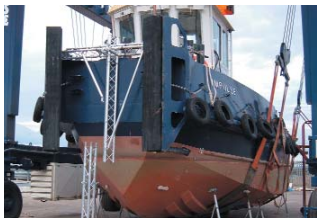
Scout Transceiver
Scout transceivers are small, easy to deploy and incorprate an internal heading, ptich and roll sensor

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

Transponders
Coastal, LRT, LAT and WSM

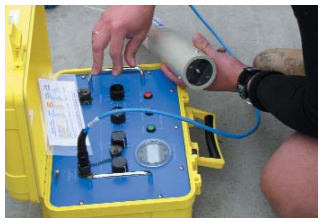
Coastal Transponder
The Coastal transponder is a low cost and versatile transponder suitable for a wide range of shallow water subsea applications

Lightweight Release Transponder (LRT)
The LRT is a combined positioning and acoustic release transponder depth rated to 500 metres

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



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 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

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: Battery – High Power: Battery – Low Power	 190dB dB re 1µPa @ 1 metre 188dB dB re 1µPa @ 1 metre 185dB dB re 1µPa @ 1 metre	 202dB dB re 1µPa @ 1 metre 199dB dB re 1µPa @ 1 metre 196dB dB re 1µPa @ 1 metre
Receive Sensitivity: High Gain Low Gain	 <100dB dB re 1µPa <110dB dB re 1µPa	 <100dB 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

Instrumented Sheave System

with

SD41 Display

20 Inch Sheave System
P/N: SYS-IS-20IN

12 Inch Sheave System
P/N: SYS-IS-842832-01

3PS, Inc. (512) 610-5200
1300 Arrow Point Drive
Cedar Park, TX 78613

email: Sales@3PSInc.com
DOC-OM-SD41-0167

Specifications

General

One 4-20 mA Sensor Input (for Tension Monitoring only)

One Payout Sensor Input

Payout Sensor may be Discrete Proximity Switches or Quadrature Sensor or Most Encoders

Status Indicated for Alarms

Four Form-C Relay Outputs for High (warning) and High-High (critical) External Alarm Monitoring

Calibration and Programming Interface on Rear Cover

Load Cell Calibration via Simulating Tension Loads or Through Applying Known Loads

Environmental

Operation Temperature: -40 to +85°C

Storage Temperature: -40 to +85°C

Reflective Style LCD Displays for Operation in Direct Sun Locations

Adjustable LCD Backlight for Night Time Operation (Red Color)

Electrical

10.5 – 28.0 VDC Power Input, Approximately 200 mA (120 VAC Version Available)

Transient Voltage Protection

Reverse Polarity Protection

RFI Filtered

Mechanical

Outside Bezel Dimensions: 5.75” (146 mm) High, 7.63” (194 mm) Wide, 0.44” (11 mm) Deep

Panel Cutout Opening: 5.12” (130 mm) High, 7.01” (178 mm) Wide

¼” (6.4 mm) Thick Polycarbonate Lens

May be Panel Mounted, Enclosure or Bracket Mounted (NEMA4X)

High Resolution Multibeam Systems for:

Hydrography

Offshore

Dredging

Defense

Research

SONIC 2024

Multibeam Echo Sounder

Features:

- 60kHz Wideband Signal Processing
- Focused 0.5° Beam Width
- Selectable Frequencies 200-400kHz
- Selectable Swath Sector 10° to 160°
- System Range to 500m
- Embedded Processor/Controller
- Equiangular or Equidistant Beams
- Roll Stabilization
- Rotate Swath Sector

Applications:

- Hydrographic Survey
- Offshore Site Survey
- Pre & Post Dredge Survey
- Defense & Security
- Marine Research

System Description:

The Sonic 2024 is the world's first proven wideband high resolution shallow water multibeam echo sounder. With proven results and unmatched performance, the Sonic 2024 produces reliable and remarkably clean data with maximum user flexibility through all range settings to 500m.

The unprecedented 60 kHz signal bandwidth offers twice the resolution of any other commercial sonar in both data accuracy and image. With over 20 selectable operating frequencies to chose from 200 to 400 kHz, the user has unparalleled flexibility in trading off resolution and range and controlling interference from other active acoustic systems.

In addition to selectable operating frequencies, the Sonic 2024 provides variable swath coverage selections from 10° to 160° as well as ability to rotate the swath sector. Both the frequency and swath coverage may be selected 'on-the-fly', in real-time during survey operations.

The Sonar consists of the three major components: a compact and lightweight projector, a receiver and a small dry-side Sonar Interface Module (SIM). Third party auxiliary sensors are connected to the SIM. Sonar data is tagged with GPS time.

The sonar operation is controlled from a graphical user interface on a PC or laptop which is typically equipped with navigation, data collection and storage applications software.

The operator sets the sonar parameters in the sonar control window, while depth, imagery and other sensor data are captured and displayed by the applications software.

Commands are transmitted through an Ethernet interface to the Sonar Interface Module. The Sonar Interface Module supplies power to the sonar heads, synchronizes multiple heads, time tags sensor data, and relays data to the applications workstation and commands to the sonar head. The receiver head decodes the sonar commands, triggers the transmit pulse, receives, amplifies, beamforms, bottom detects, packages and transmits the data through the Sonar Interface Module via Ethernet to the control PC.

The compact size, low weight, low power consumption of 50W and elimination of separate topside processors make Sonic 2024 *very well suited* for small survey vessel or ROV/AUV operations.

R2Sonic LLC
1503-A Cook Pl.
Santa Barbara
California,
USA 93117

T: 805 967 9192
F: 805 967 8611

www.r2sonic.com

Sonic 2024 Multi Beam Echo Sounder

Systems Specification:

Frequency	200kHz-400kHz
Beamwidth, across track	0.5°
Beamwidth, along track	1.0°
Number of beams	256
Swath sector	Up to 160°
Max Range	500m
Pulse Length	10µs-500µs
Pulse Type	Shaped CW
Ping Rate	Up to 60 Hz
Depth rating	100m
Operating Temperature	0°C to 50°C
Storage Temperature	-30°C to 55°C

Electrical Interface

Mains	90-260 VAC, 45-65Hz
Power consumption	<50W
Uplink/Downlink:	10/100/1000Base-T Ethernet
Data interface	10/100/1000Base-T Ethernet
Sync In, Sync out	TTL
GPS	1PPS, RS-232
Auxiliary Sensors	RS-232
Deck cable length	15m

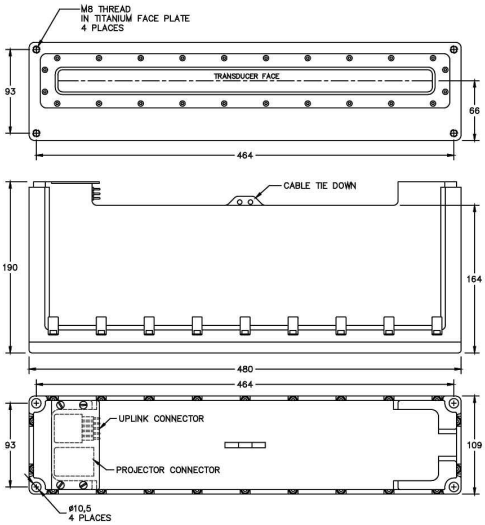
Mechanical:

Receiver Dim (LWD)	480 x 109 x 190 mm
Receiver Mass	12 kg
Projector Dim (LWD)	273 x 108 x 86 mm
Projector Mass	6 kg
Sonar Interface Module Dim (LWH)	280 x 170 x 60 mm
Sonar Interface Module Mass	2.4 kg

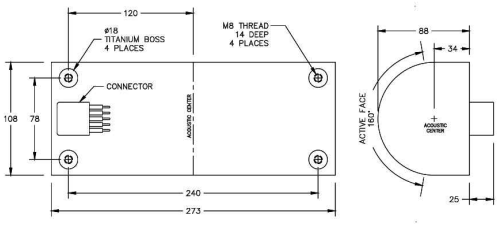
Sonar Options:

Snippets Imagery Output
Switchable Forward Looking Sonar Output
Mounting Frame & Hardware
Over-the-side Pole Mount
Sound Velocity Probe & Profiler
Extended Sonar Deck Cable, 25m or 50m
3000m Depth Immersion Depth

Sonar Interface Module



Sonic 2024 Receiver



Sonic 2022 Projector

High Resolution Multibeam Systems for:

Hydrography

Offshore

Dredging

Defense

Research

R2Sonic LLC
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California,
USA 93117

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MIDAS SVP Sound Velocity Profiler

The MIDAS SVP is the most accurate Sound Velocity Profiler in the world. As well as using Valeport's digital time of flight sound velocity sensor, it now comes as standard with a 0.01% pressure sensor. Every detail from the sensor accuracy through the titanium construction to the large memory and choice of communications methods has been considered - we truly believe it to be the ultimate SVP.

Sensors

The MIDAS SVP is fitted with Valeport's digital time of flight sound velocity sensor, a high accuracy temperature compensated piezo-resistive pressure transducer, and a fast response PRT temperature sensor.

Sound Velocity

Range:	1375 – 1900m/s
Resolution:	0.001m/s
Accuracy:	±0.02m/s

Temperature

Range:	-5°C to +35°C
Resolution:	0.005°C
Accuracy:	±0.01°C

Pressure

Range:	10, 50, 100, 300 or 600bar
Resolution:	0.001% range
Accuracy:	±0.01% range

Data Acquisition

The MIDAS SVP uses the concept of distributed processing, where each sensor has its own microprocessor controlling sampling and calibration of readings. Each of these is then controlled by a central processor, which issues global commands and handles all the data. This means that all data is sampled at precisely the same instant, giving superior quality profile data.

Sampling Modes

Continuous:	Regular output from all sensors at 1, 2, 4 or 8Hz.
Burst:	Regular sampling pattern, where instrument takes a number of readings, then sleeps for a defined time.
Trip/Profile:	Data is output as a chosen parameter changes by a set value, usually Pressure for profiling.
Conditional:	Instrument sleeps until a selected parameter reaches a set value.
Delay:	Instrument sleeps until predefined start time

Communications

The instrument will operate autonomously, with setup and data extraction performed by direct communications with PC before and after deployment. It also operates in real time, with a choice of communication protocols for a variety of cable lengths, all fitted as standard and selected by pin choice on the output connector:

Standard

RS232	Up to 200m cable, direct to serial port via USB adaptor
RS485	Up to 1000m cable, addressable half duplex comms

Options

FSK	2 wire power & comms up to 6000m cable (cable dependant)
Baud Rate:	2400 - 115200 (FSK fixed at 19200, USB 460800)
Protocol:	8 data bits, 1 stop bit, No parity, No flow control

Memory

The MIDAS SVP is fitted with 16Mb solid state non-volatile FLASH memory. Total capacity depends on sampling mode; continuous & burst modes have a single time stamp at the start of the file, trip mode (profiling) stores a time stamp with each reading. A single line of SVP data uses 8 bytes, and a time stamp uses 7 bytes.

Continuous:	>2,000,000 data points
Profile:	>1,000,000 data points (>100 profiles to 6000m).

Electrical

Internal:	8 x C cells, 1.5v alkaline or 3.6v lithium
External:	9 - 30vDC
Power:	0.6W (sampling), <1mW (sleeping)
Battery Life:	<100 hours operation (alkaline) <250 hours operation (lithium)
Connector:	Subconn Titanium MCBH10F

Physical

Materials:	Titanium housing, polyurethane & carbon composite sensor components, stainless steel (316) deployment cage
Depth Rating:	6000m (may be limited by pressure sensor)
Instrument Size:	88mmØ x 665mm long
Cage Size:	750 x 140 x 120mm
Weight (in cage):	11.5kg (in air), 8.5kg (in water)
Shipping:	100 x 18 x 49cm, 24kg

Software

System is supplied with DataLog Express Windows based PC software, for instrument setup, data extraction and display. DataLog Express is license free.

Ordering

0650003-XX	MIDAS SVP Profiler, supplied with deployment cage, Subconn switch plug, 3m communications lead, USB adaptor, DataLog Express software, manual, tool kit and transit case.
Note:	XX denotes transducer range. Select from 10, 50, 100, 300 and 600bar.
0400002	16 Mbyte memory upgrade (max 64 Mbyte)
0400EA5	FSK modem adaptor
TB0400FSK	Probe board set required for FSK operation

Datasheet Reference: MIDAS SVP version 2C, June 2013

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ECHOTRAC™ CVM

MOBILE HYDROGRAPHIC SYSTEM

- Portable carry-on case style supports a dual frequency echo sounder with optional DGPS receiver, notebook PC and bundled data acquisition software.
- Features include Ethernet LAN interface, frequency agile configurable transceivers, standard serial interfaces for data acquisition systems, motion sensors and DGPS receivers.

TELEDYNE
ODOM HYDROGRAPHIC
A Teledyne Technologies Company

ECHOTRAC™ CVM

The rugged and weatherproof Echotrac CVM outperforms other echo sounders in its class, offering the utmost in portability without sacrificing Teledyne Odom performance standards.

With a choice of dual or single frequency operation, optional built-in DGPS and notebook PC bundled with your choice of data acquisition software, the CVM has everything you need in an echo sounder – even when portability isn't an issue.

GENERAL SPECIFICATIONS

Frequency
- High band: 100 kHz – 340 kHz
- Low band: 24 kHz – 50 kHz

Output Power
- High: 200 kHz – 350 W RMS max
- Low: 24 kHz – 420 W RMS max

Input Power
- 24 V DC (nominal) 15 watts
- 110 or 220 V AC

Resolution
- 0.01 m/0.1 ft

Accuracy
- 0.01 m/0.10 ft +/- 0.1% of depth @ 200 kHz
- 0.10 m/0.30 ft +/- 0.1% of depth @ 33 kHz

Depth Range
- 0.2 – 200 m/0.5 – 600 ft. @ 200 kHz
- 0.5 – 600 m/1.5 – 1968 ft. @ 200 kHz

Phasing
- Automatic scale change, 10%, 20%, 30% overlap or manual

Sound Velocity
- 1370 – 1700 m/s
- Resolution 1 m/s

Transducer Draft Setting
- 0 – 15 m (0 – 50 ft)

Depth Display
- On control PC

Clock
- Internal battery backed time, elapsed time and date clock

Annotation
- Internal – date, time, GPS position
- External – from RS232 or Ethernet

Interfaces
- 2 x RS232
- Inputs from external computer, motion sensor
- Outputs to external computer
- Ethernet interface
- Heave –TSS and sounder sentence

Blanking
- 0 to full scale

Software
- E-Chart display, control, and logging software

Help
- The function of each parameter and its minimum and maximum values can be displayed.

Environmental Operating Conditions
- 0° – 50° C, 5 – 90% relative humidity, non-condensing

Dimensions
- 55 cm W x 41.5 cm D x 21.5 cm H

Weight
- 14 kg (31 lbs)

Options
- Single or dual frequency operation
- Side scan transducer – single or dual channel side looking 200 kHz or 340 kHz for search and reconnaissance
- Built-in DGPS
- Ruggedized notebook PC bundled with data aquisition software

TELEDYNE
ODOM HYDROGRAPHIC
A Teledyne Technologies Company

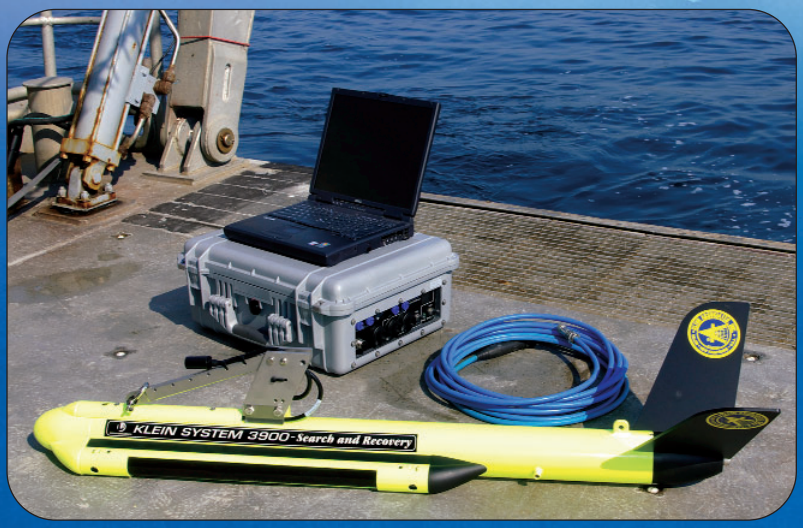
▶ See our entire product line at: **odomhydrographic.com**

1450 Seaboard Avenue ▶ Baton Rouge, Louisiana 70810-6261 USA ▶ (225) 769-3051 ▶ (225) 766-5122 FAX

Klein Associates, Inc.

SYSTEM 3900

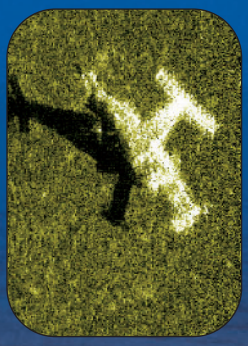
Dual-Frequency Side Scan Sonar for Search and Recovery



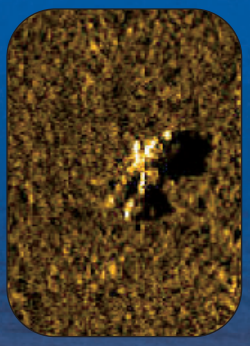
The System 3900 is an extremely high-resolution digital sonar for use in Search and Recovery missions which require a portable side scan system. The model is a selectable dual-frequency system with 445 kHz, which offers excellent range and resolution, and 900 kHz, which offers higher resolution of identified tar gets. The system is competitively priced and configured to be operated by one man from a small boat in shallow water. The standard system configuration comes complete with a splash-proof Transceiver Processing Unit (TPU), custom-configured laptop and 50m of lightweight tow cable. The Model 3900 Towfish electronics are housed in a stainless steel body with a phosphorescent finish.

KEY FEATURES

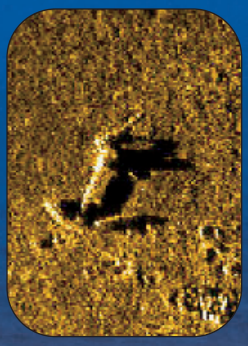
- Very high resolution and long range images
- Lightweight, one-man portable — ideal for small open boat operations
- Special software features for target analysis
- Complete turnkey system ready for field use
- Cost-effective
- Selectable dual-frequency operation (445 kHz and 900 kHz)
- Phosphorescent finish
- Laptop and wireless LAN compatible



Plane



Drowning Victim



Anchor

THE DIFFERENCE IS IN THE IMAGE

L3

C³ISR > GOVERNMENT SERVICES > AM&M > ELECTRONIC SYSTEMS

Klein Associates, Inc.

SYSTEM 3900

Dual-Frequency Side Scan Sonar for Search and Recovery

SonarPro® SOFTWARE

Custom-developed software by users and for users of Klein side-scan sonar systems operating on Windows XP®. Field-proven for many years. SonarPro® is a modular package combining ease of use with advanced sonar features.

- Basic Modules: Main Program, Data Display, Target Management, Navigation, Data Recording & Playback, and Sensor Display
- Multiple Display Windows: Permits multiple windows to view different features as well as targets in real time or in playback modes. Multi-windows for sonar channels, navigation, sensors, status monitors, targets, etc.
- Navigation: Permits underlay of electronic charts
- Survey Design: Quick & easy survey setup with ability to change parameters, set tolerances, monitor actual coverage and store settings
- Target Management: Independent windows permitting mensuration, logging, comparisons, filing, classification, positioning, time & survey target layers, and feature enhancements. Locates target in navigation window.
- Sensor Window: Displays all sensors in several formats (includes some alarms) and responder set up to suit many frequencies and ping rates
- Networking: Permits multiple, real-time processing workstations via a LAN including "master and slave configurations
- Wizards": To help operator set up various manual and default parameters
- Data Comparisons Real Time: Target and route comparisons to historical data

SPECIFICATIONS

Towfish	
Frequencies	445 kHz, 900 kHz
Beam width	Horizontal: 0.21° @ 900 kHz, 0.21° @ 445 kHz; Vertical: 40°
Range scales	11 settings: 10 to 200 meters
Maximum range	150 meters @ 445 kHz; 50 meters @ 900 kHz
Depth rating	200 meters standard
Construction	Stainless steel / fluorescent powder coat
Size	122 cm long, 8.9 cm diameter
Weight	29 kg in air
Standard sensors	Roll, pitch, heading
Options	Pressure sensor
Splash-proof Transceiver Processor Unit (TPU)	
Operating system	VxWorks® with custom application
Outputs	100BaseTx, Ethernet LAN, optional wireless LAN
Navigation input	NMEA 0183
Power	120 watts @ 120/240 VAC, 50/60 Hz (includes towfish)
Interfacing	Interfaces to all major sonar data processors
Splash-proof	To IP 65 with waterproof connectors
Klein Sonar Workstation	
Basic operating system	Windows XP®
Sonar software	SonarPro®
Data format	SDF or XTF or both, selectable
Hardware	Laptop
Options	Optional ruggedized laptop
Tow Cables	Lightweight 50m cable; optional armored steel cables

Klein Associates, Inc.

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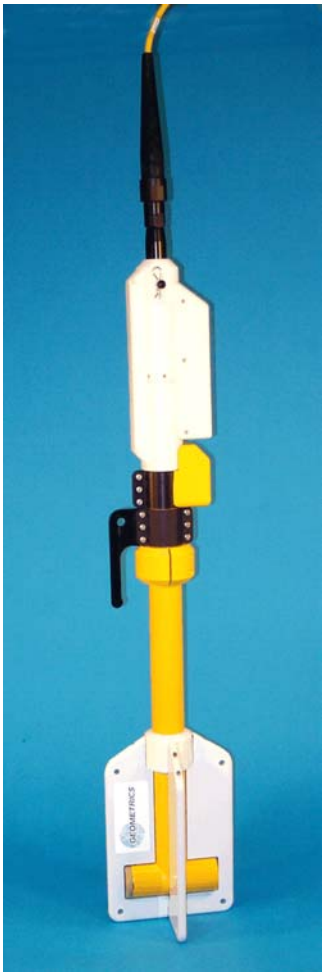
Klein Associates, Inc.

L-3. Headquartered in New York City, L-3 Communications employs over 66,000 people worldwide and is a prime contractor in aircraft modernization and maintenance, C³ISR (Command, Control, Communications, Intelligence, Surveillance and Reconnaissance) systems and government services. L-3 is also a leading provider of high technology products, subsystems and systems.

G-882 MARINE MAGNETOMETER

- ***CESIUM VAPOR HIGH PERFORMANCE – Highest detection range and probability of detecting all sized ferrous targets***
- ***NEW STREAMLINED DESIGN FOR TOW SAFETY – Low probability of fouling in lines or rocks***
- ***NEW QUICK CONVERSION FROM NOSE TOW TO CG TOW – Simply remove a stainless steel locking pin, move tow point and reinsert. New easy carry handle built in!***
- ***NEW INTERNAL CM-221 COUNTER MODULE – Provides Flash Ram for storage of default parameters set by user***
- ***NEW ECHOSOUNDER / ALTIMETER OPTION***
- ***NEW DEPTH RATING – 4,000 psi !***
- ***HIGHEST SENSITIVITY IN THE INDUSTRY – 0.004 nT/Hz RMS with the internal CM-221 Mini-Counter***
- ***EASY PORTABILITY & HANDLING – no winch required- single man operation, 44 lbs with 200 ft cable (without weights or depressor wing)***
- ***COMBINE TWO SYSTEMS FOR INCREASED COVERAGE – Internal CM-221 Mini-Counter provides multi-sensor data concatenation allowing side by side coverage which maximizes detection of small targets and reduces noise***



G-882 with Weight Collar Depth Option

Very high resolution Cesium Vapor performance is now available has been incorporated into a low cost, small size system for professional surveys in shallow or deep water. High sensitivity and sample rates of total field measurements are maintained for all applications. The well proven Cesium sensor is combined with a unique new CM-221 Larmor counter and ruggedly packaged for small or large boat operation. Use your computer and standard printer with our MagLog Lite™ software to log, display and print GPS position and magnetic field data. Model G–882 is the lowest priced - highest performance fully operational marine mag system ever offered.

The G-882 is flexible for operation in small boat, shallow water surveys as well as deep tow applications (4,000 psi rating, telemetry over steel coax available to 10Km). Being small and lightweight (44 lbs net, no weights) it is easily deployed and operated by one man. But add several no-foul weight collars and the system can quickly weigh in at more than 100 lbs. Power may be supplied from a 24 to 30 VDC battery supply or the included 110/220 VAC power supply. The tow cable uses high strength Kevlar and it's length is standard at 200 ft (61 m) with optional cable up to 500m (no telemetry). The shipboard end of the tow cable is attached to a junction box or on-board cable for quick and simple hookup to power and output of data into any IBM PC computer. A rugged fiber-wound fiberglass housing provides selectable orientation of the sensor and therefore maintains operations throughout the world with only small limitations as to direction of survey in equatorial regions.

The G-882 Cesium magnetometer provides the same operating sensitivity and sample rates as the larger deep tow model G-880. MagLogLite™ Logging Software is offered with each magnetometer and allows recording and display of data and position with Automatic Anomaly Detection! Additional options include: MagMap2000 plotting and contouring software and post acquisition processing software MagPick™ (free from our website.)

The G-882 system is particularly well suited for the detection and mapping of all sizes of ferrous objects. This includes anchors, chains, cables, pipelines, ballast stone and other scattered shipwreck debris, munitions of all sizes, aircraft, engines and any other object with magnetic expression. Objects as small as a 5 inch screwdriver are readily detected provided that the sensor is close to the seafloor and within practical detection range.(Refer to table at right).

The design of this special marine unit is directed toward the largest number of user needs. It is not intended to meet all marine requirements such as deep tow through long cables or monitoring fish altitude. Rugged design with highest performance at lowest cost are the goals.

Typical Detection Range For Common Objects

Ship 1000 tons	0.5 to 1 nT at 800 ft (244 m)
Anchor 20 tons	0.8 to 1.25 nT at 400 ft (120 m)
Automobile	1 to 2 nT at 100 ft (30 m)
Light Aircraft	0.5 to 2 nT at 40 ft (12 m)
Pipeline (12 inch)	1 to 2 nT at 200 ft (60 m)
Pipeline (6 inch)	1 to 2 nT at 100 ft (30 m)
100 KG of iron	1 to 2 nT at 50 ft (15 m)
100 lbs of iron	0.5 to 1 nT at 30 ft (9 m)
10 lbs of iron	0.5 to 1 nT at 20 ft (6 m)
1 lb of iron	0.5 to 1 nT at 10 ft (3 m)
Screwdriver 5 inch	0.5 to 2 nT at 12 ft (4 m)
1000 lb bomb	1 to 5 nT at 100 ft (30 m)
500 lb bomb	0.5 to 5 nT at 50 ft (16 m)
Grenade	0.5 to 2 nT at 10 ft (3 m)
20 mm shell	0.5 to 2 nT at 5 ft (1.8 m)

MODEL G-882 CESIUM MARINE MAGNETOMETER SYSTEM SPECIFICATIONS

OPERATING PRINCIPLE:	Self-oscillating split-beam Cesium Vapor (non-radioactive)
OPERATING RANGE:	20,000 to 100,000 nT
OPERATING ZONES:	The earth's field vector should be at an angle greater than 6° from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching.
CM-221 COUNTER SENSITIVITY:	<0.004 nT/ √Hz rms. Typically 0.02 nT P-P at a 0.1 second sample rate or 0.002 nT at 1 second sample rate. Up to 10 samples per second
HEADING ERROR:	±1 nT (over entire 360° spin and tumble)
ABSOLUTE ACCURACY:	<3 nT throughout range
OUTPUT:	RS-232 at 9600 Baud
MECHANICAL:	
Sensor Fish:	Body 2.75 in. (7 cm) dia., 4.5 ft (1.37 m) long with fin assembly (11 in. cross width), 40 lbs. (18 kg) Includes Sensor and Electronics and 1 main weight. Additional collar weights are 14lbs (6.4kg) each, total of 5 capable
Tow Cable:	Kevlar Reinforced multiconductor tow cable. Breaking strength 3,600 lbs, 0.48 in OD, 200 ft maximum. Weighs 17 lbs (7.7 kg) with terminations.
OPERATING TEMPERATURE:	-30°F to +122°F (-35°C to +50°C)
STORAGE TEMPERATURE:	-48°F to +158°F (-45°C to +70°C)
ALTITUDE:	Up to 30,000 ft (9,000 m)
WATER TIGHT:	O-Ring sealed for up to 9000 ft (2750 m) depth operation
POWER:	24 to 32 VDC, 0.75 amp at turn-on and 0.5 amp thereafter
ACCESSORIES:	
Standard:	CM-201 View Utility Software operation manual and ship case
Optional:	Telemetry to 10Km coax, gradiometer (longitudinal or transverse)
MagLog Lite™ Software:	Logs, displays and prints Mag and GPS data at 10 Hz sample rate. Automatic anomaly detection and single sheet Windows printer support

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE ***4/03***

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GEOMETRICS Europe Manor Farm Cottage, Galley Lane, Great Brickhill, Bucks,
England MK179AB ● 44-1525-261874 ● Fax 44-1525-261867

GEOMETRICS China Laurel Industrial Co. Inc. - Beijing Office, Room 2509-2511, Full Link Plaza #18
Chaoyangmenwai Dajie, Chaoyang District, Beijing, China 100020
10-6588-1126 (1127..1130), 10-6588-1132 ● Fax 010-6588-1162

GEOMETRICS

Chirp III

SUB BOTTOM PROFILER

High-Resolution Chirp Sub-Bottom Profiler System

Benthos is a pioneer in Chirp technology and was the first to bring a commercial Chirp sub-bottom profiling system to the market. Teledyne Benthos continues that advancement with the Chirp III sub-bottom profiling system.

Portable and affordable, the Chirp III is a low cost system ideally suited for many applications. Its versatile system configuration has been designed to operate with various styles of tow vehicles and hull mounted arrays.

TTV-170 Series

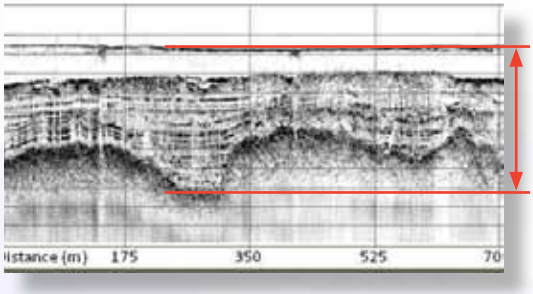
TTV-290 Series

System configurations include:

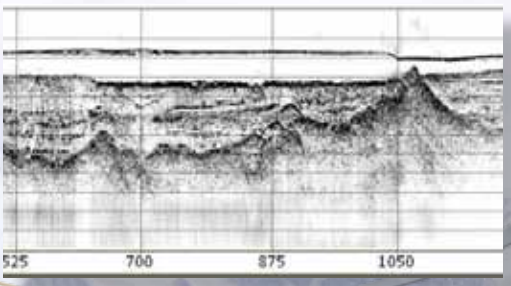
- TTV-170 Series
- TTV-290 Series
- AUV configuration
- Hull mount configuration

Applications

- Offshore hazard surveys
- Pipeline and small object surveys
- Bridge piling scour and environmental surveys
- Mining and dredging
- Wind farm site survey (See data at right)



40 m penetration



INNOVATIVE UNDERSEA SYSTEMS TECHNOLOGY

TELEDYNE BENTHOS

A Teledyne Technologies Company

System Specifications

Main Processor:	PC based sonar work station
Signal Resolution:	16 bit
Data Storage:	Stores raw data in SEG-Y format
Operator Software:	Windows™ environment
Display:	High-resolution display
Ping Rate:	15 pings/second maximum
Pulse Length:	User selectable from 5 msec. to 60 msec. Pulse waveforms stored in memory
Output Power:	4 KW each channel max
Transducers:	AT-471, Chirp bands 2 to 7 kHz AT-12D7, Chirp bands 10 to 20 kHz
Beam Angle:	TTV-170 .....100° Conical TTV-290 (2x2) Array.....45° Hull Mount (4x4) Array.....25°
Cable:	Kevlar electrical umbilical cable
Operating Depth:	TTV-170: Shallow water/small vehicle (200m) TTV-290: (200m)
Navigation/Annotation:	NMEA 0183 interface, event/fix marks, external interrupt
Hard Copy Recorder:	Grey scale graphic recorder (optional)
Operator Controls:	HW gain (dual channel) 0-42dB/channel; two stage TVG; bottom tracking (dual channel); smoothing; horizontal/vertical zoom; display gain control; repetition rate control; custom FM waveform design
Operator Displays:	Bathymetry display; reflectivity and hardness display; signal to noise ratio display; voltage display; custom color palette selection; color rotation; navigation map display
Tow Vehicle Dimensions & Weight:	TTV 170: 18 in O.D. x 24 in long; weight in air–98 lbs., weight in water–80 lbs TTV 290: 18 in O.D. x 64 in long; weight in air–300 lbs., weight in water–170 lbs

Chirp III Hardware Features

- Simultaneous dual frequency operation allows for a choice of Chirp FM sweeps from 2 kHz to 20 kHz
- Flexible Chirp III acquisition/processing work station allows for versatile configurations including shallow and deep water vehicles, diverse hull mount arrays, and AUV's
- Ethernet output
- High power output -- up to 4KW each
- Integrated pressure sensor (optional)

Digital Acquisition Computer with Monitor

Chirp III Software Features

- Windows operating system
- User defined ping rate
- Automatic bottom tracking
- Interactive horizon picking
- Switch on the fly Chirp/CW pulse
- Simultaneous dual channel Chirp

Chirp III Transceiver (DSP-6651/DSP-6652)

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Day Grab

Features:

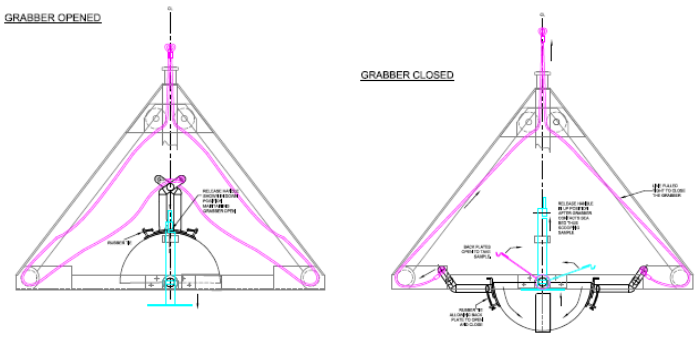
- Depth capability <250 m
- Stainless steel, for reduced contamination
- Variable weight around 150 – 300 kg
- 0.1m2 Sample Area
- Sample volume 15 litres

The modified ($0.1m^2$) Day grab has been constructed entirely of stainless steel and is routinely utilised for projects where the water depths are less than 250m. Low-slung pad feet when in contact with the seabed trigger the instrument. On retrieval (once triggered) the weight of the instrument is transferred along the warp wires, closing the jaws of the grab. The recovered samples are fully enclosed to reduce disturbance and can obtain up to 15 litres of well-preserved sample in most silts and sandy substrates.

The modified grab is also constructed to carry additional weights (providing better penetration) and an extended bucket lip to reduce sediment washout during retrieval.

On recovery, the sample can be processed directly through the large access doors or by emptying the contents into a plastic tray.

Further package includes dry-core galvanised cables, grab stand, sieving trays (0.5 m to 1mm), Gardline AutoSiever, biological sieves, chemicals, safety equipment and clothing.



Shallow Water Video / Camera System

Features:

- Depth capability 250 m
- Operational over 350 m umbilical cable
- Set-up weight ~ 260 kg
- Real time video footage
- Video imagery and still photographs

Gardline's standard digital stills camera systems are built within titanium alloy housing that is mounted within a stainless steel frame.

Still photographs are capture remotely, via an umbilical using a surface control unit. Images are stored on the cameras in internal memory card.

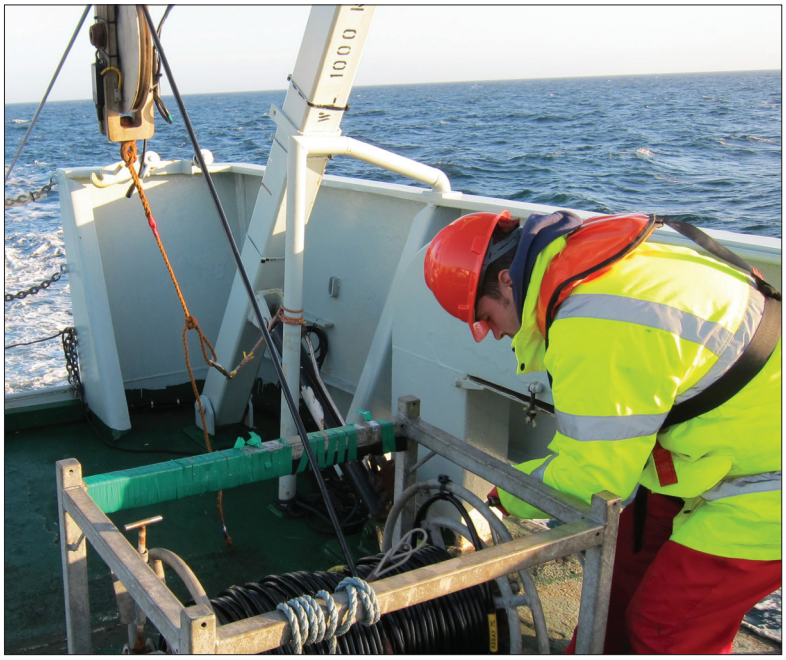
Equipment Specifications	
Manufacturer	Konsberg/Simrad.
Model	OE14-208 or OE14-408
Lens	f 7.2 – 28.8 (35mm format equivalent to 38-140mm) and automatic or manual focus control (50mm to infinity)
Pixels	5.0 M or 10.0 M
Video Resolution	320 x 240p
Video Overlay	Oceantools VO1
Field of View	47.8 (deg H) by 36.2 (deg V)
Trigger	Remote from deck
Height Control	USBL Beacon and Video footage
Lighting	1 strobe, 1 LED/Halogen lamp and integrated flash.

Live footage is overlaid with time, position and site details and recorded directly onto DVD and VHS.

This unique system is ideal for any study that requires real-time high resolution photographic equipment and can be used for a variety of environmental studies and ground truthing surveys.

Optional extras include the integration of a High Definition camera and / or higher resolution camera and green line laser scale bar.

Passive Acoustic Monitoring System



The PAMS comprises of a towed streamer section containing hydrophones with built in pre-amplifiers and a depth sensor, a tow cable, deck cable and a data processing system.

Data Processing System

The data processing system described here, comprises of the following sub systems:

a) High frequency data acquisition for cetacean clicks up to 175 kHz (Max sample rate 500 kHz)
b) Medium frequency data acquisition for cetacean click and whistles up to 48 kHz (Max sample rate 96 kHz)
c) Magrec amplifier and conditioning box (Magrec HP/27st) – VPL and GEL systems only
d) Power supply to the towed array
e) Depth data acquisition
f) Computer based sound acquisition, display and analysis software
g) Remote workstation – Seiche 511 system only

Computer based analysis and display systems

The outputs from the signal processing units are digitised (by National Instruments DAQ card for high frequency data and TC Konnect 24D for medium frequency sound acquisition) and passed to a PC Java based analysis program, enabling the detection of cetacean vocalisations.

The latest version of PAMGUARD software is utilised as a graphical display for sound acquisition, visualisation and finally detection of marine mammal vocalisations over the frequency range 100Hz to 175kHz.

The events can be displayed in real-time or frequency domains (or both). GELs proprietary data model comprises of a click detection module, a whistle detection and moan detection module, a porpoise-specific detector, navigational data logging module and audio recording capabilities.

The system will give an indication of range and bearing of the detected vocalisations (the bearing information has a left / right ambiguity).

General	
Manufacturer	Gardline Environmental Ltd
Model	MK4
Towed streamer section	
Length	N/A integrated into tow cable
Section diameter	16mm over cable, 26mm over mouldings
Number of Hydrophones	6
Hydrophone type	Custom built by Gardline Environmental Limited 3 low frequency, 3 broadband
Receive sensitivity (dB re 1 V/µPa)	-204
Hydrophone separation	Hydrophone 1 and 2 1.2m Hydrophone 2 and 3 1.2m Hydrophone 3 and 4 1.2m Hydrophone 4 and 5 3.15m Hydrophone 5 and 6 6.75m
Preamplifiers	3 low / medium frequency, 3 broadband
Preamplifier type	Sensor Technology SA-02
Depth sensor manufacturer	SensorTechnics
Tow cable	
Length	250 m
Diameter	16 mm
Termination	37 pin CEEP Connectors
Deck cable	
Length	100 m
Diameter	14 mm
Termination	37 pin CEEP Connectors

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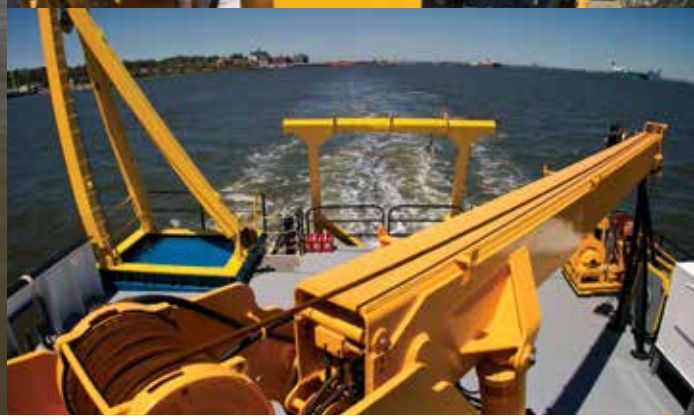
R/V Shearwater

Multi-role Survey Vessel

R/V Shearwater – Multi-role Survey Vessel



R/V Shearwater combines superior stability and maneuverability with state-of-the art research facilities to provide a flexible, multipurpose platform for marine surveying. The vessel fills the gap between small coastal and large offshore survey platforms providing a cost effective solution for many applications. In addition, the Shearwater allows for a single vessel to complete different tasks, such as geophysical, environmental, and geotechnical surveys, thereby affording our clients the opportunity to save both time and money.

The Shearwater is designed to be flexible enabling it to provide efficient and effective configurations for the completion of its missions. The 110' x 39' aluminium trimaran boasts a hydraulic azimuth drive propulsion system which is fuel efficient while providing superior positioning and line-keeping performance (handling is further enhanced by a 100 HP Bow Thruster). In most instances, this allows the vessel to hold station without resorting to anchoring. The Shearwater also features a large back deck, two equipment moon-pools, a crane, hydraulic stern A-frame, fixed starboard A-frame, dedicated equipment winches, laboratory and office space with onboard data processing capabilities, and accommodation for up to 20 people on a 24-hour basis.

A professional crew, with extensive experience in offshore survey and construction operations, allows clients to take advantage of the full list of impressive capabilities the Shearwater can bring to a project.

R/V SHEARWATER HAS BEEN DESIGNED TO SUPPORT THE FOLLOWING KEY AREAS:

- Offshore Structure Surveys (Wind, Oil & Gas, Hydrokinetic)
- Cable and Pipeline Route Surveys
- Marine Aggregate and Mineral Surveys
- Environmental Surveys
- Oceanographic Instrument Deployment and Recovery
- Port and Breakwater Development Surveys
- ROV, AUV and Diver Support
- Offshore Construction Support and Monitoring Surveys

Vessel Details

Name:	Shearwater
Type:	Multi-Role Survey
Year of Build:	1981
Reconfigured, Refit and Repowered:	2011

Dimensions

Length:	110'
Beam:	39'
Draft:	9'
GRT:	198
NRT:	175

Aft Deck: 1175 sq. ft with separate stern rescue deck

Accommodation

Berths:	20 including crew
Survey Lab:	127 sq ft
Processing Office:	72 sq ft

Propulsion and Machinery

Main Engines:	2 x 526 HP John Deere Model 6125AFM
Propulsion:	2 x Hydraulically driven "Z" Drives (raise/lower/tilt with 360 degree steering)
Bow Thruster:	Thrustmaster 100 HP
Generators:	2 x John Deere Model 6081AFM/Marathon (Magna Plus) 135 Kw

Capacities

Desalination System:	Up to 900 gallons/day
Fresh Water Storage:	5000 gallons
Fuel Storage:	13800 gallons
Septic:	Zero discharge with 2000 gallon holding tank
Endurance:	21 days

Fuel Consumption

Survey 24hrs:	300 gallons/day
Steaming:	500-600 gallons/day
Standby at Sea:	70-100 gallons/day

Navigation

Radar:	Furuno 1944C/NT Furuno 1935
Charting System:	Garmin 5208 GPS with Chart Plot
Auto Pilot:	COMNAV
Echosounders:	Furuno FCV 620 – color in each hull
AIS:	Furuno FA 150
Navtex:	Furuno NX700
Survey GPS, Heading and IMU:	Applanix POS MV
Acoustic Positioning:	Moon Pool mounted USBL

Communication

VHF:	2 x Icom IC-M504
SSB:	SEA 245 HF/SSB
SART:	Sevenstar Electronics S.701
Satellite (Phone/Data):	Intellian v80G VSAT

Equipment Handling

Equipment Moon Pools:	Port and Starboard 3 foot diameter moon pools
Hydraulic Stern A-Frame:	2 Ton Capacity Can operate as two separate davits
Fixed Starboard A-Frame:	5 Ton Capacity
Crane:	14 Ton Maximum Capacity 5 Ton w/ single part line 2 Ton at 40' Extension.
Geotechnical Winch:	5 Ton Capacity
Survey Equipment Winch:	2500m (11mm diam.) Capacity

Survey Capabilities

Hydrography and Geophysics

Multibeam and Single Beam Echosounders
Side Scan Sonars
Subbottom Profilers
Boomers
Sparkers
Mini Air Gun
Multi-Channel Streamers
Magnetometers and Gradiometers

Benthic and Oceanographic

CTD and SVPs
Water Sampling Systems
Turbidity Monitoring Systems
Benthic Grabs
Box Corers
Drop Down Cameras

Geotechnical

10 to 30' Pneumatic and Electric Vibracores
Mini-CPTs
Piston Corers
Drop Corers
Grab Samplers

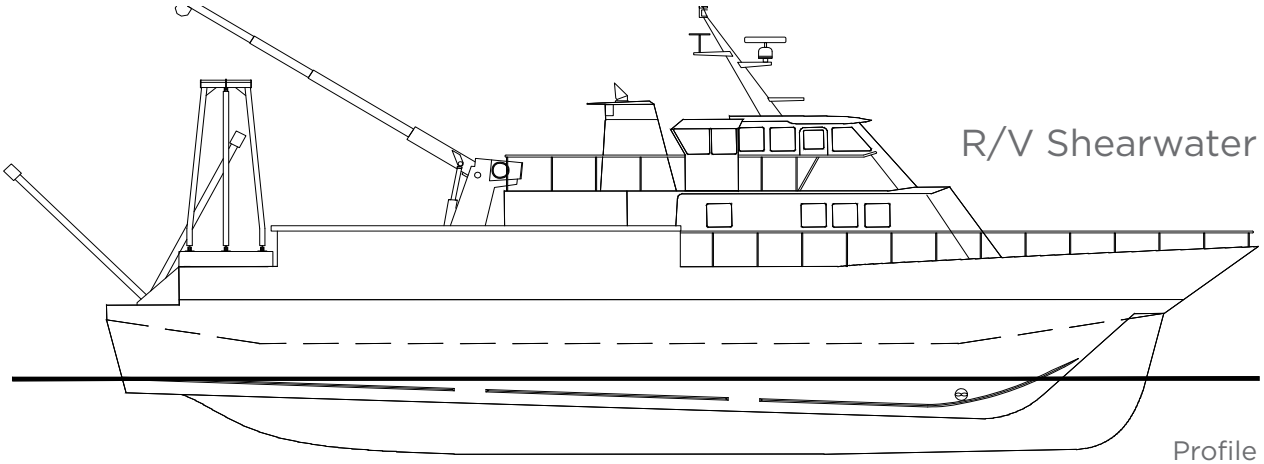
Other

Deployment and Retrieval of Inspection Class ROVs and Compact AUVs

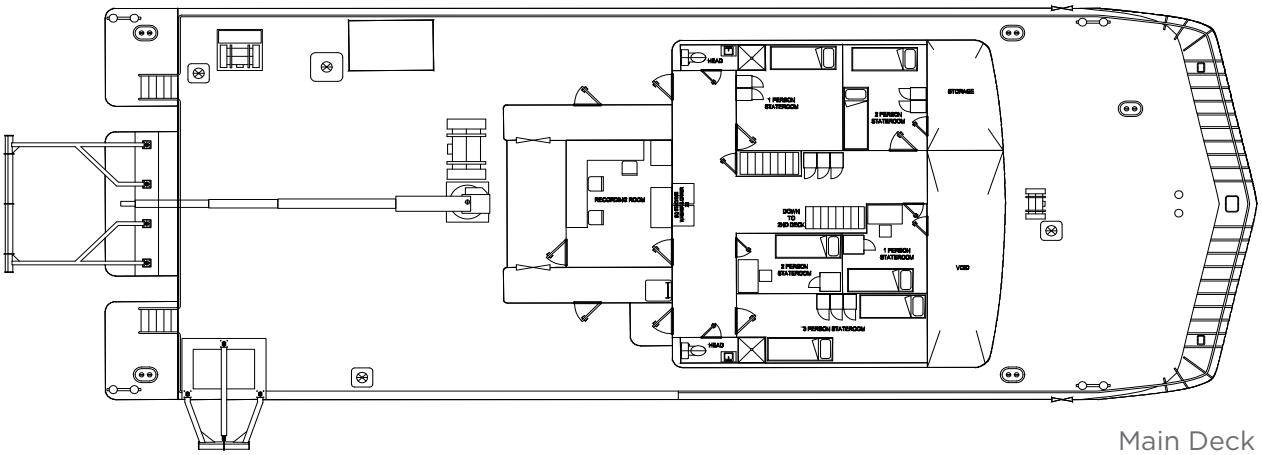
Dive Platform Capable

Permanently Installed Networked Server

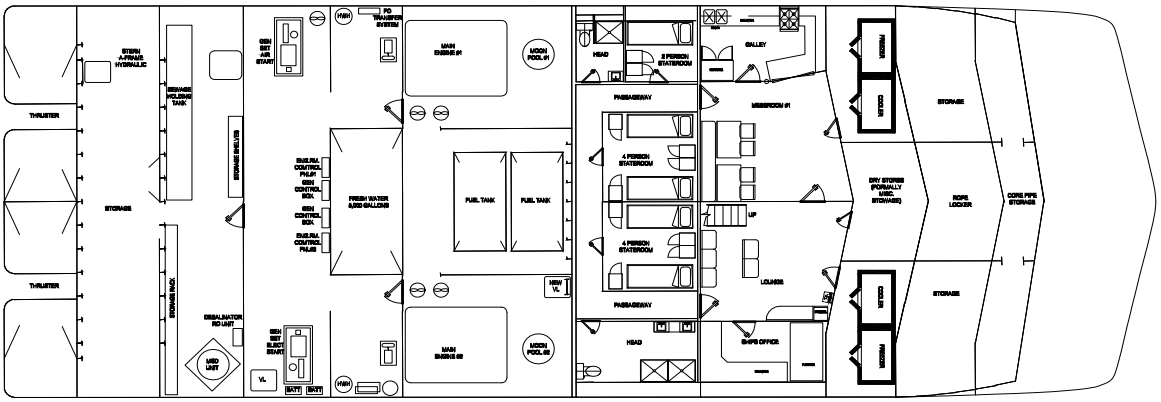
R/V Shearwater



Profile



Main Deck



Below Main Deck

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