



Starfix-StarPack



StarPack is Fugro's answer to increasing market demand for precise, redundant GNSS positioning solutions, including extensive QC and accurate timing, from a single, easy to use platform.

StarPack Unit

A StarPack unit consists of a survey grade GNSS receiver and powerful processor, running Linux multi-tasking operating system. The receiver is capable of tracking all current (GPS, GLONASS) and future (Galileo) systems. A StarPack can be extended with a second receiver (in the same unit) to provide accurate, GNSS derived heading.

The combination of receiver and processor provides for robust multiple simultaneous precise position calculations and extensive QC. For maximum system reliability the internal software is embedded on flash memory configured on the processor. Control and configuration of the system is via the front panel, a web interface or a serial port.

Four serial ports and LAN interface to read multiple correction sources (in addition to the integrated receiver) and to provide multiple outputs to the user are available on the system rear panel.



StarPack Unit



StarPack Web Interface

Documentation

This section describes the various user, installation and technical references for the equipment. The Starpack User Manual contains the specifications and user details.

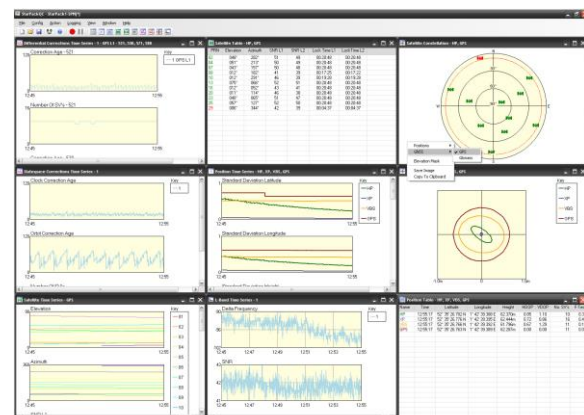
Input Data Formats

Data inputs to the Starpack from a PC are considered advanced CODEC features, and are not supported at this time.

The StarPack can handle two formats: RTCM or "Fugro". Fugro format is the format from the Starfix network, also called SuperCompressed in Starfix.IOWIN.

Output Data Formats

This section describes the various data formats the equipment OUTPUTS to other equipment. These outputs are typically interfaced to Starfix.NG which decodes and consumes the data.



StarPack-QC running in real-time

Starfix-StarPack



Technical Specifications

Type Accuracy

Starfix.XHP Position	0.1m 2DRMS
Starfix.G2 Position	0.1m 2DRMS
Starfix.Plus Position	0.08m 2DRMS
GNSS Position	2.0m 2DRMS
Velocity	0.05m/s RMS

NMEA messages

\$GPGGA	Fugro Proprietary HP Monitor formats
\$GPGSA	\$PFGRPVT
\$GPVTG	\$PFGRHPQ
\$PASHR	



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Starfix Navigation Suite



Fugro has developed a state of the art realtime navigation and data logging package. This replaces the successful DOS based PCNav suite and the Lynx based System 2000, running on single PCs, which have been used extensively throughout the world

Starfix Navigation Suite

The new system is also PC based, but uses Microsoft Windows 95 and NT for its operating system, developed for 32-bit operation. The package is modular and can have a number of applications running simultaneously over a LAN or WAN.

The Starfix Navigation Suite comprises the following components:

- **Nav** - Realtime navigation, display, and data entry using GIS database engine.
- **Seis** - Integrated navigation package interchangeable with Nav, specifically designed for hydrographic and seismic applications.
- **OBS** - Ocean Bottom Seismic module and processing system to work in conjunction with Starfix.Nav.

The following data management software tools and hardware are used with each of these packages:

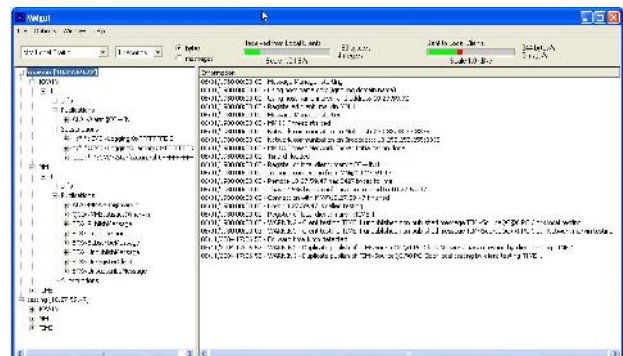
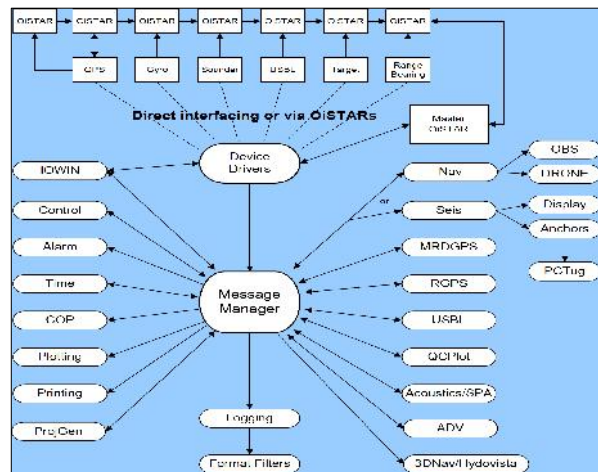
- **Message Manager** – Data distribution system.
- **Control** - Toolbar that launches and closes all the applications.
- **IOWIN** – Interfacing application to load device drivers.
- **OiSTAR** fieldbus – Interfacing modules for connecting asynchronous serial devices.
- **Time** - Synchronisation of time over a LAN or WAN using external time inputs.
- **Alarm** - Processing and display of Alarms and Warnings.
- **Logging** - Control of logging, playback and filters to UKOOA and other formats.
- **Print** - Spooling of printouts from the various applications.
- **Plot** - Realtime positioning output to a plotter.

The following modules can be utilised either on the same computer as the main package or on another computer linked by local or wide area network:

- **MRDGPS** - Multi Reference Differential GPS positioning system.
- **QCPlot** - QC display and printing system for Time Series Plots, Statistics, and Histograms.
- **Anchors** - Control of tugs and remote vessels.
- **3DNav/Hydrovista** – Display module for 3D views and CAD calculations.
- **COP** - Configurable Output Module for user defined displays, printouts, and logging.
- **RGPS** - Relative GPS module used for tailbuoy or remote vessel tracking.
- **USBL** - Ultra Short Baseline calibration and positioning.



Starfix Navigation Display Console



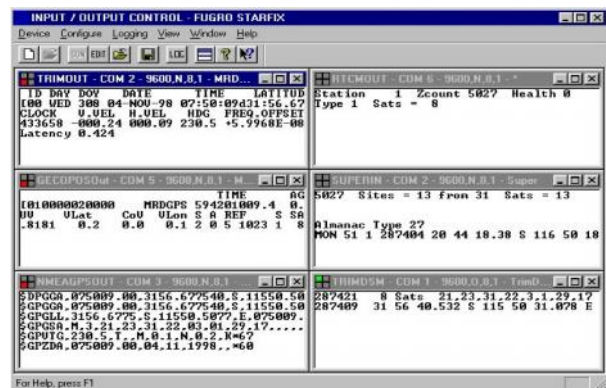
Message Manager (MM) messages

Starfix Navigation Suite

- **SPA** - Structural Positioning Application used for positioning of jackets, templates, pipelines, and ROVs.
- **Acoustics** - Calibration and positioning using Sonardyne LBL and LUSBL acoustics.
- **ADV** - Data processing of altitude and depth data from Chance's DW-ADV system.

Starfix.MM

The Message Manager (MM) is the heart of the system. Applications and device drivers publish their data messages to the MM, which in turn passes the data to any application that has subscribed to the data message. Each machine on a LAN will run its own MM which passes data between machines making it available for any application running on that machine.



INPUT/OUTPUT (IOWIN) Control Module

Starfix.CONTROL

The Control program is the launching pad for the Starfix Navigation Suite. Its functions include:

- Starts all applications as per previous use.
- Stays as Toolbar for launching any of the installed applications and for switching between running applications.
- Closes all applications.
- Day / Night text colour control.

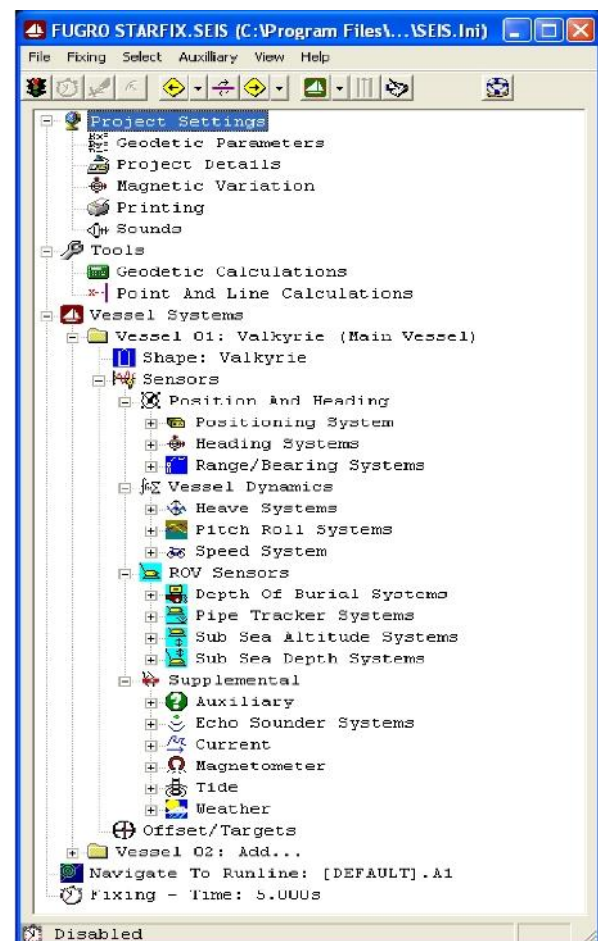
The Control program is used to open and close all programs within the Starfix Navigation Suite and to simplify the startup procedure for each computer on a network.

Starfix.IOWIN

The Starfix.IOWIN application is the controller for input and output of data, either via RS232, ethernet, or hardware devices, with the user assigning device drivers to these. Individual drivers are created for each device that is interfaced which includes GPS receivers, gyros, echo sounders, USBL systems, target systems, and range bearing systems.

Starfix.TIME

Timing is critical for synchronization of all input data. This is achieved by the Time application using time input devices, such as GPS receivers as a time source. Multiple sources can be used and each will be given a priority according to its validity. For example, a 1 PPS input from a GPS receiver will be given the highest priority when compared to a time received in a NMEA position input that has some latency. Automatic switching between sources is available should one system fail. Smoothing is applied to minimise any jitter in poor quality sources or should one system be replaced by another.



SEIS Control Module

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Accurate motion measurement in all sea conditions.

Descriptions

The DMS range of motion sensors is designed specifically for the motion measurement needs of the marine industry. Whether it is achieving IHO standard survey from any size of vessel, or providing safety critical monitoring of offshore platforms, large vessels, helicopter landing decks, cranes and positioning systems, the DMS provides accurate motion measurement in all sea conditions.

Incorporating an enhanced external velocity and heading aiding algorithm for improved accuracy during dynamic manoeuvres, the solid state angular rate sensors offer reliability in the highest performing vertical reference unit ever produced by TSS.

The DMSView software programme is an intuitive Windows™- based programme enabling installation, set-up and integrity checking, and monitoring of the sensor. The user can select from a series of frequently used data protocols or configure a bespoke output from a selection of variables.

The DMS is rated to 3000m as standard with 6000m available on request. The sensor can be supplied in various configurations for integration with towed vehicles and other bespoke applications. As with all TSS systems, the DMS is certified to meet all current and anticipated European legislation for electromagnetic compatibility and electronic emissions.



DMS-05 system

Features

- Dynamic roll and pitch accuracy to $- 0.05^\circ$
- Depth rated to 3000m (optional 6000m)
- Survey to Class 1 IHO standard
- High dynamic accuracy during vessel turns

Benefits

- Intuitive control software with user-configurable outputs
- Real-time digital and analogue outputs
- Compact and lightweight

TSS DMS-05



Dynamic accuracy	Heave	Roll & Pitch			
	All (except DMS-RP25)	DMS-05	DMS-10	DMS-25	DMS-RP25
	5cm or 5% whichever is greater (period 0 to 20s)	0.05°	0.10°	0.25°	0.25°
Maximum range	±10m	±60°			
Bandwidth	0.05 to >30 Hz	0 to 30Hz			
Data output rate	Digital: up to 200 Hz; Analogue: up to 500 Hz (with an external repeater)				
Available output parameters	Adjustable data packet output rate down to 1 Hz Heave; roll; pitch; remote heave; angular rate X, Y, Z – acceleration X, Y, Z (body frame); angular rate east north, up – acceleration east, north, up (geographical frame); IMU temperature; surge; sway; sensor status; external speed; external heading; UTC time				
Dimensions	99mm (d) x 172mm (h) (excluding connector and mounting plate)				
Weight	3000m <2.3 Kg; (6000m <4.0 Kg)				
Power supply	15-30 Vdc				
Temperature range	0°C to 55°C operating; -20°C to +70°C storage				
Power requirement	10-36V, <6.5W				
Velocity input packet formats	NMEA 0183 (required VTG & GLL or GGA); TSIP; (DMS-05, -10, -25 models only) Doppler Speed Log				
Heading input packet formats	NMEA 0183; SGB; Robertson; Sperry LR40/60				
Depth rating	3000m (optional 6000m)				
Shock (survival)	30g peak 40ms half-sine				
Vibration (operating)	30mm/s or 0.2mm, 7-300 Hz				
Available output formats	DMSView for Windows™ offers standard TSS and other manufacturers' data strings in addition to a user-configurable menu				
Software interface	Digital: RS232 or RS422 (software selectable) Analogue: via an optional remote interface for power, communications and aiding				
MTBF (computed)	50,000 hours				
Warranty	12 months international warranty including parts and labour <i>Due to continuous development, specifications may vary from those listed above.</i>				

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TSS Meridian Gyrocompass



The new Meridian Surveyor boasts a wide range of interfaces to enable use on any marine vessel. The unit utilises a DTG gyro element which will provide exceptional performance with accuracy unmatched by even the latest fibre optic designs

High Performance Service Compatibility

- The world's smallest digital marine gyrocompass
- The high specification has been derived from the Type approval test results completed in 1999.
- Meridian Surveyor provides reliable, maintenance free operation with a mean time before failure (MTBF) in excess of 30,000hrs. Calibration is likely to be the only required expenditure during this period unlike the large element replacement costs associated with most gyrocompasses. The remarkably stable heading can be maintained for turn rates in excess of 200° per second making the system ideal for use on fast survey craft and in river/harbour environments.
- The new Meridian Surveyor gyrocompass will be supported by one of the largest gyro service and support organisations in the world that services many of advanced military & commercial operators globally



IMO, Wheelmark & HSC certified

- Innovative chassis design incorporating state-of- the- art digital electronics for improved reliability
- Maintenance free DTG element
- World's smallest & lightest marine gyro
- Dynamic heading accuracy of 0.2°
- Static heading accuracy of 0.05°
- <40 minutes initial settling time
- Start up power requirement of 1.8A
- Large range of analogue & digital output options
- Gyro element design ensures low cost of ownership
- MTBF of 30,000hrs
- High turn rate of 200° per second
- User friendly digital set-up and self-test





TSS Meridian Gyrocompass

Technical Specifications

Dynamic accuracy

0.2o secant latitude

Static accuracy

0.05o RMS secant latitude

Settle point

0.1o secant latitude

Display type

360° Compass Card and VFD Display

Settling time

<40 minutes, to within 0.7°

Speed Input

Automatic – via RS232 or RS422, NMEA 0183 from Log or pulse/contact closure at 100,200 or 400 per NM from Log or manual

Latitude Compensation

80oN to 80oS

Speed Compensation

0 - 90 knots

Operating Temperature

-15oC + 55oC

Storage Temperature

-25oC to + 80oC

Input Voltage

24VDC (18 - 36VDC)

Start-up current

1.8A at Switch on

Dimensions

344mm (H) x 267 mm (W) x 440mm (D)

Weight

15.5kg

Accessories Included

Operators Handbook, Spare Fuse Power Cable, Connector Kit

Options

Transit Case, Stepper Amplifier Steering Repeater, 110/220V Power Supply Unit

Outputs Format

"S" type Step by Step (5V TTL) 6 steps/1o Synchro
1 x 26V, 400Hz, 360 o (1:1ratio)

Serial Data

5 x RS 422, 5 x RS 232, 5 x 20mA loop

Analogue

R.O.T. ± 20 o/sec. (± 10 mA) 1 x 5V TTL system ready
1 x 5V TTL power fail / gyro fail

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Sonardyne- Ranger 2 acoustic positioning system



Long range subsea target tracking and reference.

Descriptions

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

6G®Technology

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

Ranger Product Family

Ranger 2 is available in two versions. In standard configuration, Ranger 2 allows up to 10 subsea targets to be simultaneously tracked from a surface vessel. Operating ranges of greater than 6,000 metres are achievable and the system supports a wide range of industry standard survey and DP output telegrams. One second position updates are achievable in any water depth.

Ranger 2 Pro is designed for complex operations where any number of subsea targets can be tracked. Multiple transceivers and attitude compensation sensors can be simultaneously interfaced into Ranger 2 Pro allowing for highly redundant, bespoke installations. Ranger 2 Pro also supports subsea INS integration, external triggers for acoustic synchronisation and user configurable displays.



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

Sonardyne- Ranger 2 acoustic positioning system

Optimised Ranger 2

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

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

Inverted Tracking

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

System Configuration:

Bridge / Instrument Room Hardware

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

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

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

Acoustic Transceiver

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

for autonomous monitoring transponder setup and data retrieval as well as supporting Long BaseLine operations when using a Sonardyne Fusion system.



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



Software: Ranger 2's software interface is intuitive and easy to learn, ensuring users quickly gain confidence.



Transponder Options: Ranger 2 compatible transponders are available in a range of sizes, depth ratings, battery configurations and acoustic output power to suit deployment on subsea vehicles or on the seabed. (Above) Preparing a DPT transponder. (Below) New 6G® transponders.

Sonardyne- Ranger 2 acoustic positioning system

Transceiver Deployment

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

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

Vessel Reference Sensors

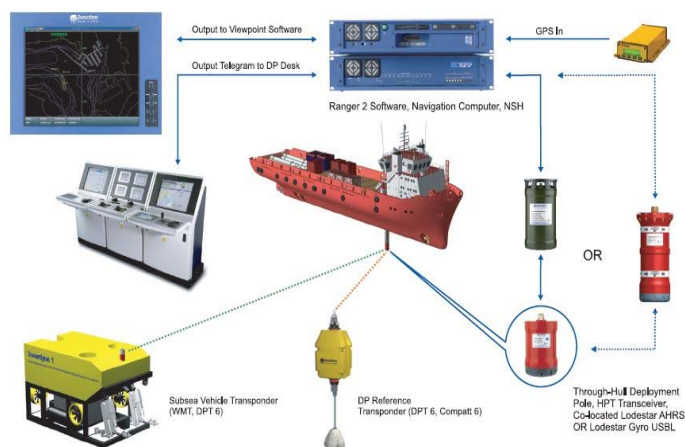
All USBL systems need to remove the effects of vessel motion upon the transceiver. To do this they are interfaced to heading, pitch and roll motion sensors of a quality appropriate to the accuracy required for the operation and water depth. Ranger 2 supports a wide range of these sensor types including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

Lodestar GyroUSBL

Sonardyne's GyroUSBL instrument combines a HPT transceiver and Lodestar AHRS in the same housing. With the AHRS in fixed mechanical alignment to the HPT's acoustic array, the requirement for a total system calibration to determine the alignment of the ship's motion sensors to the transceiver is, in many situations, eliminated. This saves operational time and vessel costs.

6G® Subsea Transponders

Ranger 2 supports previous generation Sonardyne transponders, for example WSM, and many transponders from other manufacturers. However the maximum benefits of the system can only be realised when using exclusively 6G® transponders. WMT is a small, lightweight unit generally used for tracking mobile targets such as ROVs. It features a responder trigger for fast position updates and is depth rated up to 3,000 metres. DPT 6 is designed for DP reference and large target tracking. The unit is fitted with a highly reliable acoustic release mechanism to enable it to be deployed on the seabed in a floatation collar and later recovered to the surface without ROV intervention. Compatt 6 is Sonardyne's most advanced USBL and LBL transponder. Its integrated communications and navigation technology allows it to be used as a position reference transponder for DP, a multi-purpose modem and autonomous data logger.



Sonardyne Ranger 2 system configuration.

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Echotrac MKIII Model DF3200



Dual Visualization, flexible and compact echosounder

Model DF3200 main features

Like to keep your options open? Then Teledyne Odom's Echotrac MKIII is the echo sounder for you!

It's the only sounder on the market offering you the choice of either a high-resolution thermal paper recorder or a full-sized high bright color LCD chart in interchangeable module format.

When it comes from Teledyne Odom, you know it's durable, easy to use and backed by the best customer service in the industry.

Both high and low channels feature frequency agility, enabling the operator to precisely match the transceiver to almost any existing transducer.

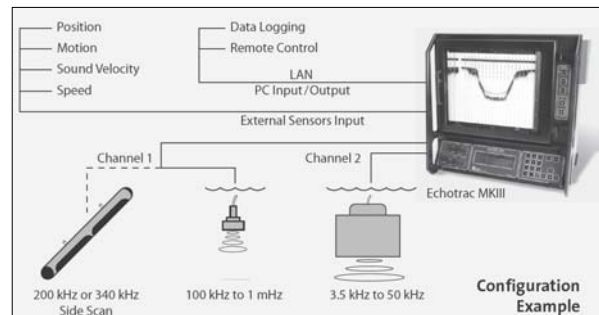
This matching ability minimizes near-surface noise caused by transducer ringing while increasing echo return strength.

The MKIII is capable of both shallow and deep-water operations, and it features unsurpassed interfacing flexibility with four serial ports and high speed Ethernet capability for maximum efficiency. With all of these features in such a compact and portable package, it's easy to see why the Echotrac MKIII is such a respected echo sounder.

- Interchangeable paper chart or color LCD
- Frequency agile (both channels)
- Internal data storage and playback with color LCD
- Four serial ports and Ethernet interface
- Optional built-in DGPS
- AC/DC power input



Model DF3200



Configuration example



Echotrac MKIII Model DF3200

Technical Specifications

Frequency

High band	100 kHz – 1 MHz
Low band	3.5 kHz – 50 kHz

Output Power

High	100 kHz – 1 kW RMS max 200 kHz – 900 W RMS max, 750 kHz – 300 W RMS max
Low	3.5 kHz – 2 kW RMS max, 50 kHz – 2 kW RMS max

Input Power

110 or 220 V AC / 24 V DC 120 watts start/ 50 watts run

Resolution

0.01m / 0.10 ft.

Accuracy

0.01m / 0.10 ft. +/- 0.1% of depth @ 200 kHz
0.10m / 0.30 ft. +/- 0.1% of depth @ 33 kHz
0.18m / 0.60 ft. +/- 0.1% of depth @ 12 kHz
(corrected for sound velocity)

Depth Range

0.2 – 200 m / 1.0 – 600 ft. @ 200 kHz
0.5 – 1500 m / 1.5 – 4500 ft. @ 33 kHz
1.0 – 4000 m / 3.0 – 20,000 ft. @ 12 kHz

Phasing

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

Printer

High resolution 8 dot/mm (203 dpi), 16 gray shades
216mm (8.5 in) wide thermal paper or film
External ON/OFF switch
Paper advance control

LCD Display (optional)

15 in TFT screen
High-Bright (500 NIT)
Internal data storage DSO on 40 GB hard disk
Data transfer via Ethernet interface or USB flash drive
Windows XP Embedded

Paper Speed

1 cm/min. (0.5 in/min.) to 22 cm/min. (8.5 in/min.), Auto = one dot row advance for each Ping

Help

Automatic logging and printing

Sound velocity

1370 – 1700 m/s
Resolution 1 m/s

Transducer Draft Setting

0 – 15 m (0 – 50 ft.)

Depth Display

On control PC and LCD display

Clock

Internal battery backed time, elapsed time and date clock

Annotation

Internal – date, time, optional GPS position from built-in Rx
External – up to 80 ASCII characters from RS232 Serial or Ethernet port

Interfaces

4 X RS232 or 3 X RS232 and 1 X RS422
Inputs from external computer, motion sensor
Outputs to external computer, remote display
Outputs with LCD chart – video out
Ethernet interface
Heave – TSS1 or sounder sentence

Blanking

0 to full scale

Installation

Desktop, optional rack mount or bulkhead mount

Environmental Operating Temperature

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

Dimensions

450 mm (17.7 in) H x 450 mm (17.7 in) W x 300 mm (12.8 in) D

Weight

16 kg (35 lbs.)

Options

Remote Display
Side Scan Transducer 200 kHz or 340 kHz
Built-in DGPS

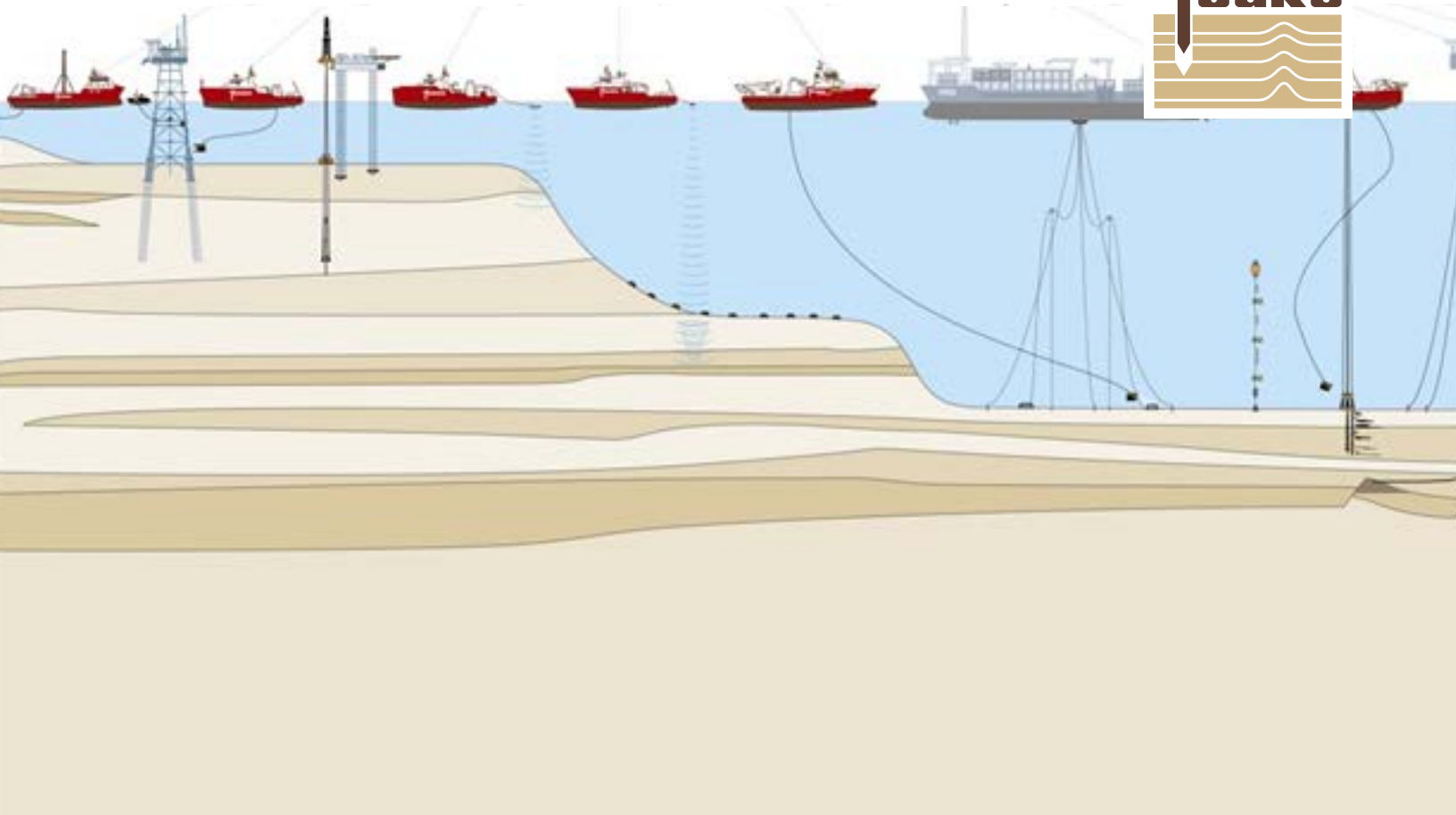
Features

Selectable Receiver bandwidth for shallow/ deep water echo sounding
Silas compatible output for sediment analysis

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FUGRO

COMBINE SIDE SCAN SONAR & SUB-BOTTOM PROFILING SYSTEM

Since its release in 1996 the SeaBat 8101 has gained a formidable reputation for performance, reliability and robustness. The new SeaBat 7101 multibeam echosounder brings to the forefront the advanced technology utilised across the range of SeaBat 7000 series multibeam systems. This combination of the well-proven 8101 sonar head and new 7000 series signal processing and data handling provides the ultimate in performance through an easy upgrade path.

A bathymetric sonar operating at 240kHz fitted with either a stick (St) or Extended Range (ER) projector, the 7101 measures up to 511 discrete soundings equally spaced across the wide 150° swath. This sounding density combined with realtime roll stabilisation, high accuracy and robust bottom detect provides maximum performance and efficiency in all acoustic environments. Optional, unique 210° coverage option for extremely shallow water or vertical structure surveys.

The SeaBat 7101 transducer is depth rated to 100m and is suitable for installation on ROVs and surface vessels where the high ping rate provides very high efficiency by meeting international survey standards even at high vessel speeds.

The SeaBat 7101 is available as a Composite variant which includes all sensors and software required to conduct a full hydrographic survey, or as a 7101-Flow variant with an Both variants are available with a standard or extended range projector in titanium.

FEATURES

SWATH

150° swath coverage providing up to 7.5 x water depth swath coverage. Optional 210° swath.

FREQUENCY

240kHz operating frequency provides seamless coverage from 0.5m to 500m max depth (Using ER).

HIGH SPEED

High ping rate allows high speed operations without comprising data density.

IHO

Compliant with IHO SP44 Ed 5 over entire depth range.

DATA

Bathymetry, sidescan, snippets & water column data available over gigabit ethernet.

ROLL STABILISATION

Realtime roll stabilisation maximizes usable swath width.

WATER COLUMN

Up to 511 beams in selectable modes optimises operations for any survey type.



SYSTEM SPECIFICATIONS

Side Scan Sonar

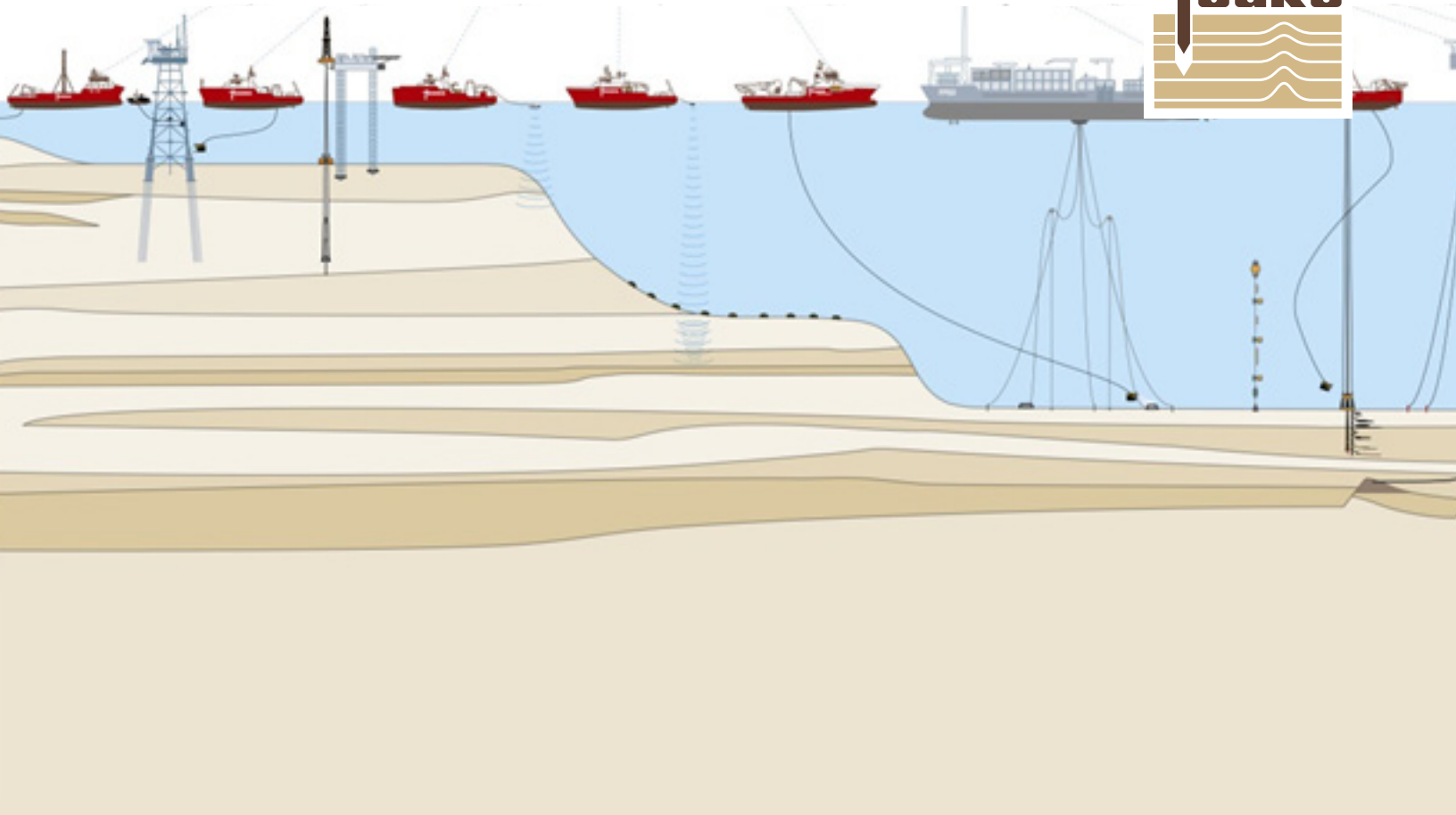
Frequency (dual simultaneous CHIRP)	1000/400 kHz	300/600kHz
Operating	100 kHz: 500 meters/side 400 kHz: 150 meters/	300 kHz: 230 meters /side 600 kHz: 120 meters/side
Beam width (2-way) & Along track resolution	100 kHz: 1.08 deg or 1.90 m @ 100 m 400 KHz: 0.56 deg or 0.96 m @ 100 m	300 kHz: 0.6 deg or 1.0 m @ 100 m 600 kHz: 0.26 deg 0.45 m @ 100 m
Across track resolution	100 kHz: 6.3 cm 400 kHz: 1.8 cm	300 kHz: 2.8 cm 600 kHz: 1.4 cm

Sub-Bottom Profiler	2000-CSS	2000-DSS	2000-TVD
Frequency Band	500 Hz - 12 kHz	2 -16 kHz	1- 10 kHz
Resolution	8 - 20 cm	6 - 10 cm	9 - 25 cm
Penetration in coarse sand	20 m	6 m	20 m
Penetration in clay	200 m	80 m	200 m
Towfish	2000-CSS	2000-DSS	2000-TVD
Length	160 cm (63")	145 cm (57")	226 cm (89")
Width	124 cm (49")	74 cm (30")	81 cm (32")
Height	47 cm (18.5")	84 cm (33")	55 cm (22")
Weight in Air	232 kg (510 lbs.)	145 kg (320 lbs.)	250 kg (550 lbs.)
Maximum Water Depth	300 m	2000 m	3000 m

Topside Processor

Hardware	Standard 19" rack
Operating System	Windows 7
Display	Dual 22" high resolution flat panek monitors
Archive	DVD-R/W and /or LAN connection
File Format	Native JSF or XTF for side scan, SEG-Y for sub-bottom
Output	Ethernet
Power Input	90 to 132 VAC and 180 to 260 VAC, Auto voltage detect and switching, 47-63 Hz





FUGRO MULTIBEAM ECHOSOUNDER

Since its release in 1996 the SeaBat 8101 has gained a formidable reputation for performance, reliability and robustness. The new SeaBat 7101 multibeam echosounder brings to the forefront the advanced technology utilised across the range of SeaBat 7000 series multibeam systems. This combination of the well-proven 8101 sonar head and new 7000 series signal processing and data handling provides the ultimate in performance through an easy upgrade path.

A bathymetric sonar operating at 240kHz fitted with either a stick (St) or Extended Range (ER) projector, the 7101 measures up to 511 discrete soundings equally spaced across the wide 150° swath. This sounding density combined with realtime roll stabilisation, high accuracy and robust bottom detect provides maximum performance and efficiency in all acoustic environments. Optional, unique 210° coverage option for extremely shallow water or vertical structure surveys.

The SeaBat 7101 transducer is depth rated to 100m and is suitable for installation on ROVs and surface vessels where the high ping rate provides very high efficiency by meeting international survey standards even at high vessel speeds.

The SeaBat 7101 is available as a Composite variant which includes all sensors and software required to conduct a full hydrographic survey, or as a 7101-Flow variant with an Both variants are available with a standard or extended range projector in titanium.

FEATURES

SWATH

150° swath coverage providing up to 7.5 x water depth swath coverage. Optional 210° swath.

FREQUENCY

240kHz operating frequency provides seamless coverage from 0.5m to 500m max depth (Using ER)

HIGH SPEED

High ping rate allows high speed operations without comprising data density

IHO

Compliant with IHO SP44 Ed 5 over entire depth range

DATA

Bathymetry, sidescan, snippets & water column data available over gigabit ethernet

ROLL STABILISATION

Realtime roll stabilisation maximizes usable swath width

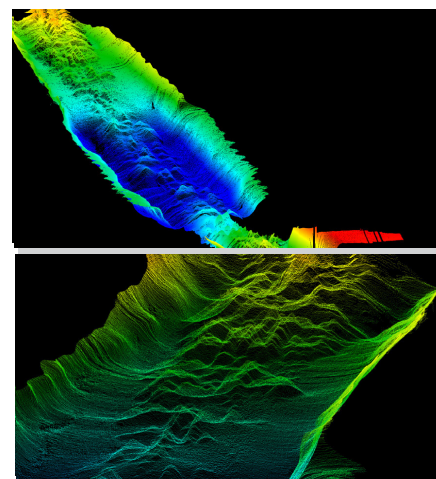
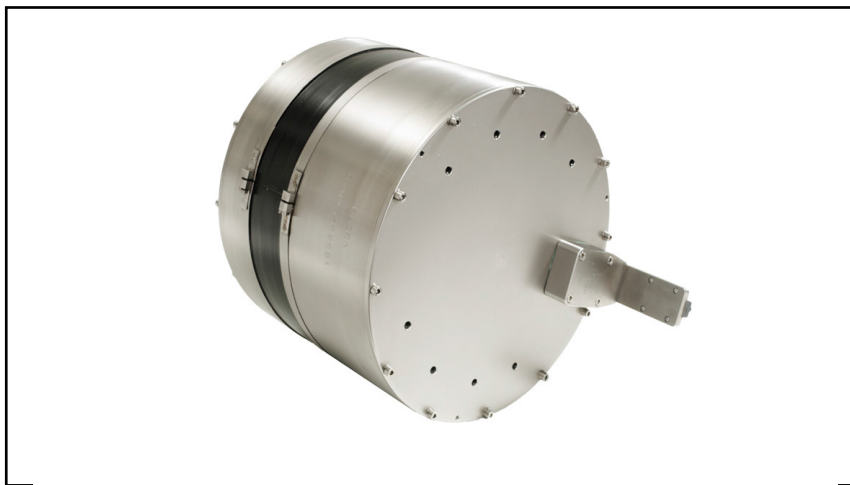
WATER COLUMN

Up to 511 beams in selectable modes optimises operations for any survey type



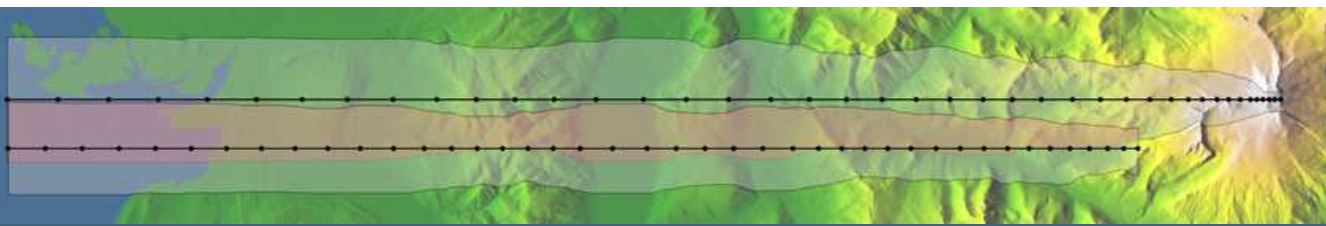
SYSTEM SPECIFICATIONS

Fraquency	240khz
Along-track transmit beamwidth	1.5°
Across-track receive beamwidth	1.8°
Max ping rate	40Hz
Pulse length	21µsec to 225 µsec
Number of beams	Up to 511 beams in selectable mode
Max swath angle	150° (210° optional)
Typical depth	0.5m to 300m (St), 0.5m to 475m (ER)
Max depth	350m (St), 500m (ER)
Depth resolution	12,5 mm
Data interface	Bathmetry, sidescan & snippets. 7K data format. Gigabit Ethernet
Power requirement	110/220 VAC, 50/60 Hz, 500W max
Head to processor cable length	25m
Depth rating	100m
Seabat 7101 composite	7101-Composite is a full hydrographic survey system based on the 7101 and the Applanix Wavemaster. All required sensors including sound velocity and software is provided.
Seabat 7101 flow	7101-Flow is a specialised version of the 7101 specifically for surveys in sheltered reas such as dams, rivers, lakes, harbours where the effects of motion are limited. The systems consists of a standard 7101 with a motion sensor incorporated inside the sonar head enclosure. The 7101-Flow is available with integrated PDS2000 software, sound velocity and position/heading sensors.





SEABAT 7160 Multibeam Echosounder System



The SeaBat 7160 brings the latest multibeam technology to the deepwater market.

Descriptions

The SeaBat 7160 provides an unbeatable combination of range, resolution, portability and powerful features.

The SeaBat 7160 transducer array is comprised of linear receive and transmit arrays mounted together on a support base. The T-shaped array geometry provides the basis for a compact, high-resolution sonar which is easily installed for portable or hull mounts - a first for a high-resolution system in this frequency range. The system features a pitch-stabilized transmitter and an active roll compensated receiver.

Performance enhancements over the SeaBat 8160 include the addition of 512 high density equi-distant beams, variable swath coverage, beam uncertainty measurement, water column data and many other efficiency enhancing features.



SeaBat 7160 Multibeam Echosounder System

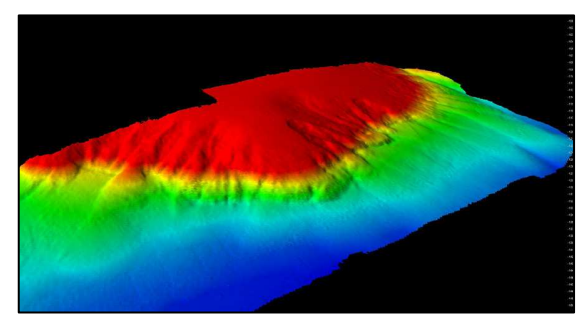
FEATURES

FREQUENCY	44kHz (nominal)
SWATH	Swath coverage greater than 4 x water depth greater than 4 x water depth
DEPTH	Operational depths 10m to 3000m
BEAMS	512 Equi-Distant 150 Equi-Angle
FLEXIBLE INSTALLATION	Hull-mount or portable

- FEATURES
- Water column data
 - Variable and steerable swath
 - Pitch & Roll stabilization
 - Tracker Autopilot
 - Adaptive & Manual Gates
 - Integrated PDS2000 (optional)



SeaBat 7160



SeaBat 7160 - Processed Data

SEABAT 7160 Multibeam Echosounder System



Technical Specifications

Frequency	44kHz (nominal)
Range resolution	12cm
Swath coverage	Greater than 4x water depth
Typical depth	3m to 3000m
Max depth	3000m
Number of beams	512 Equi-Distant / 150 Equi-Angle
Along-track beamwidth	1.5°
Across-track beamwidth	2.0° at nadir (nominal)
Pitch stabilization	±10°
Max update rate	50 Hz
Transducer depth rating	60m
System supply:	115V/230V 50/60 Hz,500W
System control	Trackball or from Ethernet
Data output	1GB Ethernet
Data uplink	High-speed digital coax
Temperature: operating, storage	Operating: -5° to +40°C, storage: -30° to +55°C
Transducer array dimension	1477mm x 1100mm x 100mm
Dimension transceiver array	265mm x 483mm x 469mm
Weight hydrophone	34kg (air) / 14.6kg (water) including 15m cable
Weight transmitter	42kg (air) / 17.5kg (water) including 15m cable

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VALEPORT Midas SVX2

VALEPORT Midas SVX2 Sound Velocity Probe

Description

The MIDAS SVX2 is the latest version of Valeport's unique instrument. Recognizing the conflict faced by users requiring the superior Sound Velocity data from SVP but still needing the Salinity and Density data from CTD. The MIDAS SVX2 combines both technologies to give the best of both worlds. Now fitted with a 0.01% pressure sensor as standard, the SVX2 also uses synchronized sampling to ensure perfect profiles, and since the digital time of flight SV sensor is the most accurate in the world, it's also possible to compare the true sound velocity data with that generated by commonly used equations.

Sensors

The MIDAS SVX2 is fitted with Valeport's digital time of flight sound velocity sensor, high stability conductivity 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

Conductivity

Range	0 to 80 mS/cm
Resolution	0.003 mS/cm
Accuracy	±0.01mS/cm

Temperature

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

Pressure

Range	300 or 600 Bar
Resolution	0.001% range
Accuracy	±0.01% range



Valeport MIDAS SVX2

VALEPORT Midas SVX2



Data Acquisition

The MIDAS SVX2 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

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

Electrical

<i>Internal:</i>	8 x C cells, 1.5v alkaline or 3.5v lithium.
<i>External</i>	9 – 30vDC.
<i>Power</i>	0.7W (sampling), <1mW (sleeping).
<i>Battery life</i>	<100 hours operation (alkaline) <250 hours operation (lithium).
<i>Connector</i>	Subconn Titanium MCBH1DF

Software

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

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:

<i>RS232</i>	Up to 200m cable, direct to serial port via USB adaptor.
<i>RS485</i>	Up to 1000m cable, addressable half duplex communication.

Options

<i>FSK</i>	2 wire power & communications up to 6000m cable (cable dependent).
<i>Baud Rate</i>	2400 - 115200 (FSK fixed at 19200, USB 460800).
<i>Protocol</i>	8 data bits, 1 stop bit. No parity. No flow control

Memory

The MIDAS SVX2 is fitted with 16Mb solid state non-volatile FLASH memories. 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 10 bytes, and a time stamp uses 7 bytes.

Continuous: >1,600,000 data points

Profile: > 980,000 data points (>80 profiles to 6000m)

Physical

<i>Materials:</i>	Titanium housing, polycarbonate & composite sensor components, stainless steel (316) cage.
<i>Depth Rating</i>	6000m (may be limited by pressure sensor).
<i>Instrument Size</i>	88mmØ x 665mm long
<i>Cage Size</i>	750 x 140 x 120mm
<i>Weight (in cage)</i>	11.5kg (in air), 8.5kg (in water)
<i>Shipping</i>	95 x 17 x 49cm, 24kg.

VALEPORT Midas SVX2



Ordering

<i>0650003:</i>	MIDAS SVX2 Profiler, supplied with deployment cage, Subcon switch plug, 3m communications lead, USB adaptor, DataLog Express software, manual, tool kit and transit case.
<i>0400002</i>	16Mb memory upgrade (max 64Mb)
<i>0400EA5</i> <i>TB0400FSK</i>	FSK modem adaptor Probe board set required for FSK operation
<i>0400EA9</i>	RS485 communications adaptor
<i>0400EA6</i>	Advanced Y lead for RS485 operation.

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CARIS HIPS & CARIS SIPS



BATHYMETRIC AND SONAR DATA PROCESSING AND PRODUCTION.

Descriptions

Hydrography. Cable and Pipeline Routing. Minecountermeasures. Side Scan search and recovery. Geophysical Exploration. Management of Fisheries. No matter what the application, the reliability and usability of your cleaned bathymetric and side scan sonar survey data is critical. Based on its reputation for rigorous and proven algorithms, CARIS HIPS, for processing large bathymetric datasets, and CARIS SIPS, for processing side scan sonar imagery and multibeam backscatter data, have been selected number one among marine and hydrographic specialists for over 10 years.

Purpose- built processing

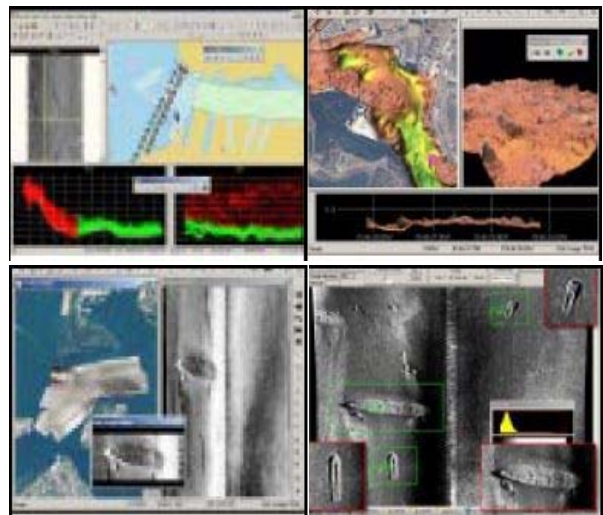
Area and line based cleaning, 3D visualization, integrated sensor cleaning tools. These are but a few of the features that clearly suggest one thing: CARIS HIPS and CARIS SIPS are purpose-built processing and production systems.

Information you can use

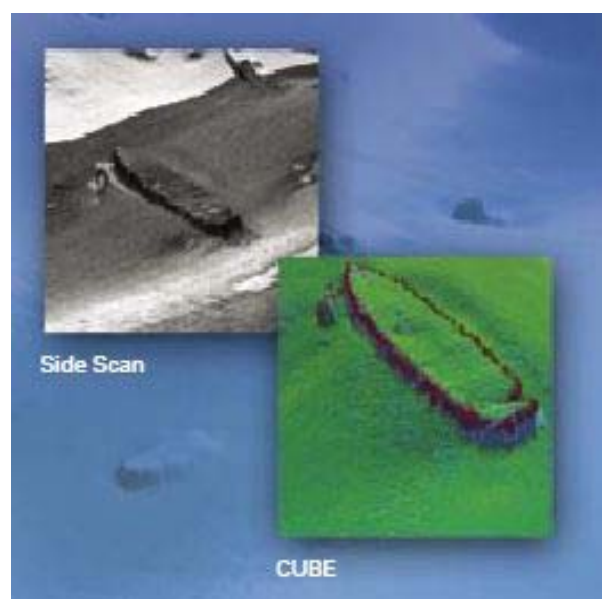
Tiling, contours, depth areas, shoal-biased sounding selection and an interactive dynamic profile are among the multitude of outputs that can be generated from your clean bathymetry and sonar data. Bottom line, CARIS software turns your survey data into information you can use.

Engineered to work together

CARIS software systems are engineered to work together. CARIS HIPS and CARIS SIPS are standalone systems but are also capable of operating in unison offering the functionality and format support allowing you to take your clean data further.



Caris HIPS & SIPS System Configuration



Highly evolved sonar data production tools add stability and reliability to any workflow.



CARIS HIPS & CARIS SIPS

Built to grow on

Open an S-57 ENC file and display the data with other data types such as BSB, HCRF, and GeoTIFF as well as vector CARIS map data. Regardless of your current workflow, CARIS HIPS and CARIS SIPS are built to grow on. CARIS HIPS and CARIS SIPS are backed by training from subject matter experts, assistance in data production flowline implementation, and by knowledgeable and responsive support personnel. Review the suite of CARIS HIPS and CARIS SIPS products described on the reverse side and contact CARIS today about a solution that is right for you.

Technical specifications

HIPS Singlebeam

SUPPORTED FORMATS	Hypack, Winfrog Generic ASCII Data
DATA CLEANING	Interactive singlebeam depth cleaning Automatic singlebeam spike filters
DATA PROCESSING	Apply tides / zoning Apply SV corrections

HIPS Multibeam Lite

SUPPORTED FORMATS	HIPS Singlebeam, PLUS Atlas, Furuno, GSF LADS, Seabeam/ Elac, SeaFalcon, Simrad, UNB, XTF
DATA CLEANING	HIPS Singlebeam, PLUS Interactive swath cleaning Automatic swath filters Refraction repair Integrated side scan display
DATA PROCESSING	Apply tides / zoning Apply SV corrections

HIPS Multibeam Professional	
SUPPORTED FORMATS	same as HIPS Multibeam Lite
DATA CLEANING	HIPS Singlebeam, PLUS
	3D subset area cleaning
	Statistical surface cleaning

DATA PROCESSING	HIPS Singlebeam, PLUS
	Weighted gridding

SIPS Lite	
SUPPORTED FORMATS	Cmax, Coda, EdgeTech, GSF, MarineSonics, Qmips, Segy, XTF
	Generic ASCII Data cleaning
DATA CLEANING	Side Scan viewing and cleaning
	Digitize towfish altitude
DATA PROCESSING	Re-compute towfish navigation
	Slant range correction
	Mosaic

SIPS Professiona	
SUPPORTED FORMATS	same as SIPS Lite
DATA CLEANING	same as SIPS Lite
DATA PROCESSING	SIPS Lite, PLUS
	Generate side scan contacts database

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