

WHEN IT'S ALL ABOUT GETTING THE RIGHT SIGNAL



HYDROGRAPHIC POSITIONING  
SYSTEM



E-SEA SAT 2020 & 2002

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A WAVE OF USEFUL PRODUCTS

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E-Sea Sat mobile station



E-Sea Sat Reference Station

## E-SEA SAT FEATURES

- Robust design
- Portable
- All in one unit
- Upgradeable
- Waterproof
- Extremely accurate
- Multi-user system
- AIS/EMS capability
- Tidal data transfer
- Low power consumption

## POSITIONING FOR HYDROGRAPHY, DREDGING & OFF-SHORE CONSTRUCTION.

The E-Sea Sat DGPS is not just another GPS. It is the most unique positioning system introduced to the market to date (2002). Let us take a look at the many opportunities provided with this new technology.

Some thoughts of typical positioning applications:

- Hydrographic surveys
- Dredging operations
- Marine construction work
- Oil rig positioning
- Cable and pipe laying
- Advanced ship's trials
- High accuracy where no differential correction is available

## SYSTEM COMPONENTS

The standard E-Sea Sat DGPS consists of one reference station and one mobile station connected via a Telemetry Link. The system is also supplied with a software program, which can be installed in your own PC - or as an extra feature - in a PalmTop computer, which is very handy particularly when setting up the reference station.

It should be noted that the E-Sea Sat mobile station can also be delivered as a portable, battery operated unit without cables.

The E-Sea Sat is very small with a minimum of power consumption. Therefore, all components are integrated into the compact, waterproof antenna unit. Only one data/power cable must be connected to the unit, and there is no limit on the length of this data/power cable. Therefore, performance is always optimal. The antenna unit is designed for adding a choke ring for more difficult ship installations where multipath signals could cause disturbance.

## PRINCIPLES OF OPERATION

The E-Sea Sat offers everything from single user solutions to large integrated networks.

The E-Sea Sat can also work as an Automatic Identification System (AIS). The E-Sea Sat AIS feature is not compatible with U-AIS.

Up to twenty ships can participate in a UHF/VHF network, where information such as meteorological and oceanographic data, such as tide, can be shared with other users. This information is distributed through the differential station - and this feature is unique for the E-Sea Sat system. It is made possible by using the same UHF/VHF radio channel with the TDMA (Time Division Multiple Access) protocol, and by sending this data as an add-on to the differential correction. All users have an individual identification code allowing them to monitor all ships within the network. This could be a practical feature where dredgers, barges, tugs and survey vessels have to coordinate their operations. Monitoring of the network is even possible from shore.

## PERFORMANCE

The E-Sea Sat system covers all corners of the opportunities within the GPS environment. Apart from high position accuracy, the E-Sea Sat in dual receiver configuration also provides heading accuracy better than a gyro.

Three versions of the E-Sea Sat are available, from standard GPS all the way up to sophisticated RTK solutions. Price and performance go hand in hand. RTK is the most accurate and the most expensive. All three versions are based on the same hardware unit. Only the software is different. This means that the basic E-Sea Sat 2020 can be upgraded to an E-Sea Sat 2002, or to an E-Sea Sat 2002-R.

The E-Sea Sat 2020 system offers accuracy in the differential range of  $\pm 20$  cm.

The E-Sea Sat 2002 system offers an accuracy better than 2 cm thanks to the RTK principle. This is the most accurate system available, and it is what we need for the high demanding multibeam surveys.

The E-Sea Sat 2002-R RGPS (Relative GPS) based system also offers an absolute accuracy better than  $\pm 50$  cm. Furthermore, it is capable of providing a relative accuracy between the RGPS units better than 2 cm.

The E-Sea Sat reference station may be left out if less accurate positioning is acceptable. However, it still provides submetre accuracy.

Typical accuracy figures of the three systems are:

E-Sea Sat	2020 DGPS	2002 RTK	2002-R RGPS/RTK
Speed accuracy	$\pm 5$ cm/sec	$\pm 1$ cm/sec	$\pm 1$ cm/sec
Heading accuracy*	$\pm 0.3$ deg	$\pm 0.1$ deg	$\pm 0.1$ deg
Position accuracy	$\pm 20$ cm	$< 2$ cm	$\pm 50$ cm
Relative accuracy			$< 2$ cm

\*) In dual receiver configuration.

The E-Sea Sat Telemetry Link operates from 0.5W to 6W transmission power offering coverage between 10 and 25 nautical miles. For ranges over 30 nautical miles a 12W booster is available.

Optionally, extra hardware can be added to the E-Sea Sat. It can be equipped to provide accurate heading. The mobile stations can also be upgraded to receive GLONASS as well as the upcoming WAAS/EGNOS. Accurate heave, pitch and roll information will soon be added as another option.

## SUMMARY

As mentioned in the beginning: "The E-Sea Sat is the most unique positioning system introduced to the market to date". Compact. Easy to use. And highly performing.

Note that MARIMATECH also offers system software for survey, dredging, navigation, special positioning as well as environmental monitoring. We also provide integration assistance for several survey packages on the market.



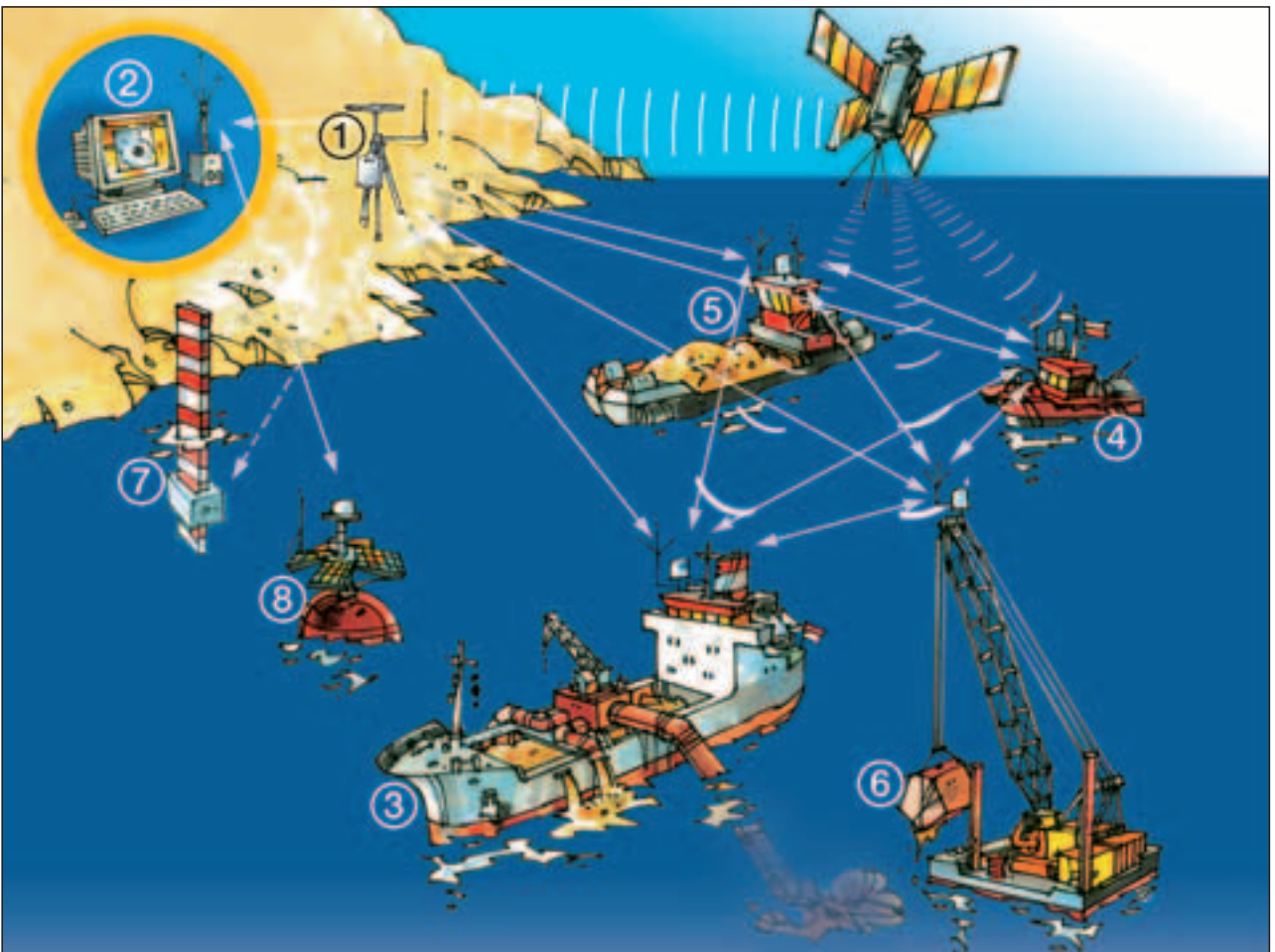
Dual GPS antenna



Palmtop PC for initialising



Ruggedised laptop with software



## APPLICATION EXAMPLE

- 1 Reference station.
- 2 Monitor station to follow and log the overall operation. Can be located anywhere within the range of the UHF/VHF network.
- 3 Positioning of the dredger.
- 4 Positioning of the survey launch.
- 5 Positioning of the barge.
- 6 Positioning of a crane.
- 7 Tidal information is connected to the reference station, which transmits water level data to all ships on the same UHF/VHF channel.
- 8 Wave height and wave direction buoy based on RTK from MARIMATECH can be part of the network information system.

A WAVE OF USEFUL PRODUCTS

# SPECIFICATION AND PERFORMANCE DATA

## Mobile Station

<b>2020:</b>	20 channel DGPS L <sub>1</sub>
Accuracy:	Typically ± 20 cm (95%)
Update rate:	0.5 Hz, 1 Hz opt. 10/20Hz
Azimuth:	Typically < 0.3 deg. (option dual receiver)
<b>2002:</b>	20 ch. RTK L <sub>1</sub> + L <sub>2</sub> (or L <sub>1</sub> + Glonass)
Accuracy:	Typically < 2 cm (95%)
Update rate:	0.5 Hz, 1 Hz, opt. 10/20 Hz
Azimuth:	Typically < 0.1 deg. (option dual receiver)
<b>2002-R:</b>	20 channel RGPS-RTK L <sub>1</sub> + L <sub>2</sub> (or L <sub>1</sub> + Glonass)
Accuracy:	Relative, typically < 2 cm (95%) Absolute, typically < 1 metre (95%)
Azimuth:	Typically < 0.1 deg. (option)
Antenna:	L <sub>1</sub> or L <sub>1</sub> + L <sub>2</sub> , chokering optional
Receiver:	Multi-path reduction, low noise observable.

## E-Sea Sat General data

Built-in UHF transceiver:	(VHF optional)
Selectable channels:	256 (± 3 MHz from centre freq.)
Antenna:	3 dB UHF, omnidirectional
Channel spacing:	12.5 kHz
Frequency band:	430-470 MHz (other frequencies available, please ask)
Modulation:	GMSK 9600 bits/sec
Transmission power*:	0.5 W (Range 10-15 Nm) opt. 6 W (Range 20-25 Nm)

\*only of interest if the mobile station is used in AIS mode

Comport 1 to 4: RS-232 Fully independant

Position output format to include AIS & EMS data:

MARIMATECH protocol

Position lock-on: Typically < 1 min, max 5 min.

FIELD FACE software supplied with the system:

- Extensive set of remote commands
- User defined datum and projections
- PALMTOP PC support

Power requirements: 110/265VAC or 10 to 36VDC  
3 W (reception mode)  
4 W (AIS mode) @ 0.5W Tx  
30 W (AIS mode) @ 6W Tx

Azimuth version: Additional 4 W

Operating temperature: ambient: -10°C + 65°C  
storage: -40°C + 70°C

Humidity: 100% fully sealed, IP67

Cable to rover: 10 metres as standard  
opt. 20/30/50 metres

Dimensions: Ø<sub>TOP</sub> = 165 mm, Ø<sub>BOTTOM</sub> = 80 mm  
H = 270 mm

Weight: 5.4 kg. complete unit

Antenna UHF: 560 mm long

## Reference Station

2020 (differential station):	20 ch. DGPS L <sub>1</sub>
2002 (kinematic station):	20 ch. RTK L <sub>1</sub> + L <sub>2</sub> (or L <sub>1</sub> + GLONASS)
Update rate:	0.5 Hz, 1 Hz opt. 10 Hz
Antenna:	L <sub>1</sub> or L <sub>1</sub> + L <sub>2</sub> (or L <sub>1</sub> + GLONASS)chokering standard
Receiver:	Multipath reduction, low noise observable
Built-in UHF transceiver:	(VHF optional)
Selectable channels:	256 (± 3 MHz from centre frequency)
Antenna:	3 dB UHF, omnidirectional marine type. (directional antennas optional)
Channel spacing:	12.5 kHz or 25 kHz
Frequency band:	430-470 MHz (other frequencies available, please ask)
Modulation:	GMSK 9600 bits/sec
Transmission power:	6 W (Range 20-25 Nm) 12 W booster option
Comport 1 to 4:	RS-232 Fully independant
Correction output:	RTCM / CMR / JPS
Correction input AIS/EMS mode:	MARIMATECH protocol

FIELD FACE software supplied with the system:

- Extensive set of remote commands
- User defined datum and projections
- Auto referencing
- Monitoring mode
- PALMTOP PC support (to start up and control the station)

Power requirements: 110/265 VAC or 10 to 36 VDC, 30 W

Operating temperature: ambient: - 10°C, + 65°C

storage: - 40°C, + 70°C

Humidity: 100% fully sealed IP67

Cable to station: 10 metres as standard

optional length, maximum 100 metres

Dimensions: Ø<sub>TOP</sub> = 185 mm (w/ chokering = 375 mm)

Ø<sub>BOTTOM</sub> = 90 mm

H = 300 mm (w/ chokering = 550 mm)

Weight: 5.2 kg. tripod model

7.3 kg, with chokering

For fixed installation mounting hardware

add 4.8 kg all stainless steel 316

Antenna UHF: 220 mm long, tripod model

Antenna UHF: 550 mm long, fixed model

## RF Booster TB-1

UHF booster that can be connected to any E-Sea Fix unit.

Frequency band:	430 to 470 MHz
Transmission power:	12 W
Antenna:	Optional
Power:	10-36 VDC, 20 W peak
Ambient temperature:	-10°C, + 60°C
Storage temperature:	-40°C, + 70°C
Humidity:	100% fully scaled IP67
Dimensions H x W x D:	200 x 125 x 100 mm
Weight:	3.2 kg

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A W A V E O F U S E F U L P R O D U C T S

