

SONARMITE v4.0 MTX 'sweep' version - PORTABLE BLUETOOTH ECHO SOUNDER



Introduction

The SonarMite Echo Sounder was the result of nearly two years research and development to further extend the boundaries of shallow water hydrographic surveying equipment. The introduction by Ohmex of the SonarMite, the worlds first truly portable echo sounder system, has been a hard act to follow and it remains the portable instrument of choice in many survey companies around the world. The release of the SonarMite MTX/BTX instrument marks the next stage introducing a series of equipment designed around the WinSTRUMENT concept using the latest portable computers integrated with new measurement technologies.

Throughout the Hydrographic world the term 'Black Box' has become a euphemism for a device that has a minimal user interface and normally requires connection to a PC to be of any use ! In most cases these boxes are a cut down version of a more conventional instrument without all the features of the full system. The SonarMite extends this idea of a rugged design and minimalist interface to produce a 'Blue Box' system where the user interface is provided by integrated software running on a portable computer connected via a Bluetooth link. The use of wireless technology enables the instrument to be waterproof and used in a hostile environment while the more sensitive computer features can be located in a more user friendly environment up to 50m away from the instrument.

The SonarMite MTX/BTX instrument uses the same 'Smart' integrated transducer technology used in previous systems, in addition to highly reliable bottom tracking algorithms using DSP techniques the system also outputs a quality value associated with every depth measurement made. The popular SonarW7 software has been updated to the latest Windows versions. Software for the 'front end' of the SonarMite is available to run on a wide range of devices from Pocket PCs through to the full range of desktop systems running the Windows operating system

Typical use of the Equipment

The SonarMite Portable Echo Sounder has been designed to provide a portable instrument that provides the facilities of a 'professional' sounder at the cost and performance of a 'fish finder' device. It is important to recognize what the differences are between these two types of echo sounder. The 'fish finder' or leisure craft devices are primarily concerned with two functions, finding fish in the water column below the boat by sensing returns from their swim bladders and providing a bottom tracking/smoothing algorithm to detect minimum water depth below the boats hull.

Survey sounders are designed to provide a large number of pings with as little processing of the raw data as possible to define the bottom in as fine detail as possible. Of major concern in a survey sounder is a narrow beam width to prevent averaging of the returned signal.



235KHz and 200/30KHz Transducers

The SonarMite uses Active Transducers, these are digital as opposed to analogue components and use internal microprocessors to synthesize transmitted frequencies and to interpret the return signals. The devices incorporate state of the art DSP and filtering techniques to reduce noise and improve depth tracking. These devices are supplied encapsulated in resin and have no serviceable parts. The connecting cable to the transducer carries only low DC voltage and digital I/O, none of the EMC problems associated with conventional analogue devices apply. To improve weatherproofing and to avoid connection problems the SonarMite has two connectors that provide all the I/O required by the device. One of the connectors also includes a return pin to enable the system to switch on by cable connection rather than using a switch. Cables to the device can be connected simultaneously (e.g. Transducer on port 1 and Serial Data Cable on Port 2).

Equipment Supplied

The SonarMite MTX is supplied as standard with the following list of equipment ...

- **SonarMite MTX main processor unit c/w Bluetooth Antenna**
- 'Smart' P66 depth transducer c/w 5m cable and embedded processor
- Serial data lead
- IP68 rugged plastic Transit case
- SonarW7 post process/import/export software
- External battery connector leads



The following is a short list of accessories for the SonarMite ...

- SonarMite Windows Mobile PDA software
- SonarMite W7 software for Tablet/Portable PC
- USB serial lead
- Aluminium shoe to connect transducer to detail pole
- 'Smart' 200/30KHz depth transducer c/w 5m cable and embedded processor
- 2 x 'Smart' P66 depth transducer c/w 5m cable and embedded processor

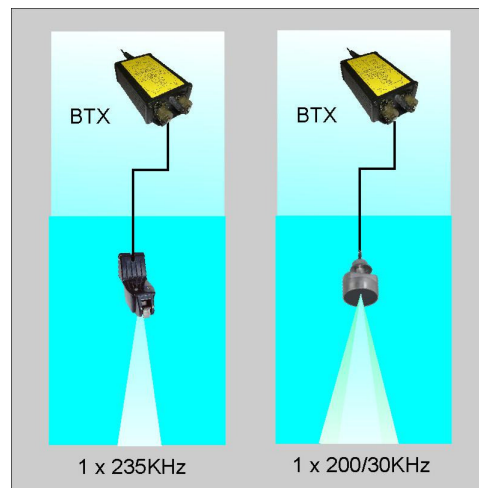
The SonarMite MTX is a compact, portable, low power

The SonarMite MTX is a compact, portable, low power system for use in shallow water hydrographic surveys, its small size and low power requirements make the system easy to deploy and transport to remote or inaccessible sites. The SonarMite MTX is a development from the basic SonarMite single beam echo sounder providing a wider range of single beam solutions for surveyors working in shallow water hydrographic surveying. The

SonarMite MTX can be configured in several ways ...

- 1 x 235KHz single beam transducer used in BTX mode
- 1 x 200/30 dual beam transducer used in MTX mode
- 3 x 235KHz transducers spaced at 2 x depth in sweep mode
- 1 x 200KHz center with 2 x 235KHz port/starboard transducers
- 1 x 200/30KHz mixed frequency center with 2 x 235KHz side transducers

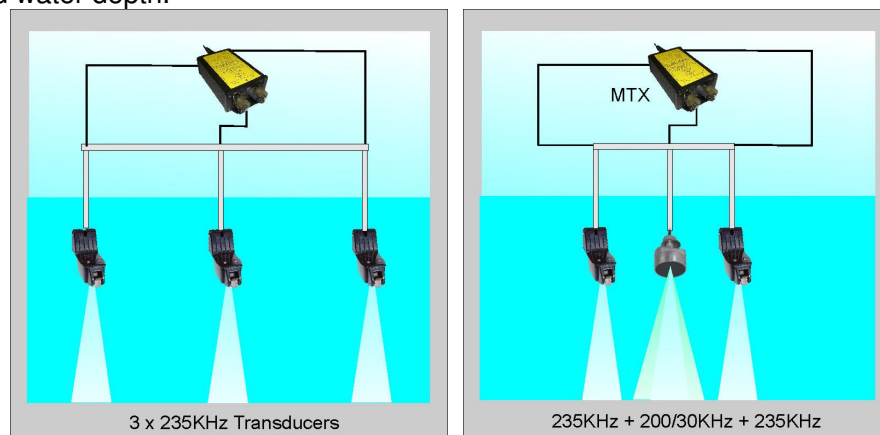
All models make use of a range of interchangeable smart transducers. In its simplest form the SonarMite SPX and BTX are 235KHz single beam systems in the same format as the previous SonarMite BT system. This single channel system can interchange its transducer for a dual frequency unit operating simultaneously at 200KHz and 30KHz. As with the previous SonarMite versions every measured depth is accompanied by a QA value which can be used for post analysis of the survey data.



BTX Single Beam SF and DF solution

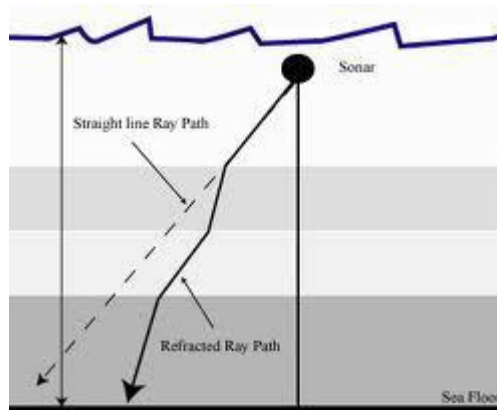
The MTX multiple transducer 'sweep' configuration provides an intermediate stage between swathe and a single beam systems. These configurations consist of an array of single beam echo sounders located around the vessel, normally as a boom frame mounted over the stern but could also be around the vessel at various offset positions from the positioning antenna, for convenience the transducers are referred to as the 'Port', 'Centre' and 'Starboard' locations. The multiple channel device can be configured in two basic formats, a 3 x 235 KHz or a 235+200+235KHz array, the mixed frequency array giving the option to use the transducers in closer proximity without the problem of crosstalk between transducers operating at the same frequency.

A typical acoustic sweep system consists of a linear array of evenly spaced transducers mounted vertically around the vessel. These systems are used in critical shallow water areas (harbours, channels, etc.). The coverage of the bottom is 100%, depending on transducer spacing and water depth.



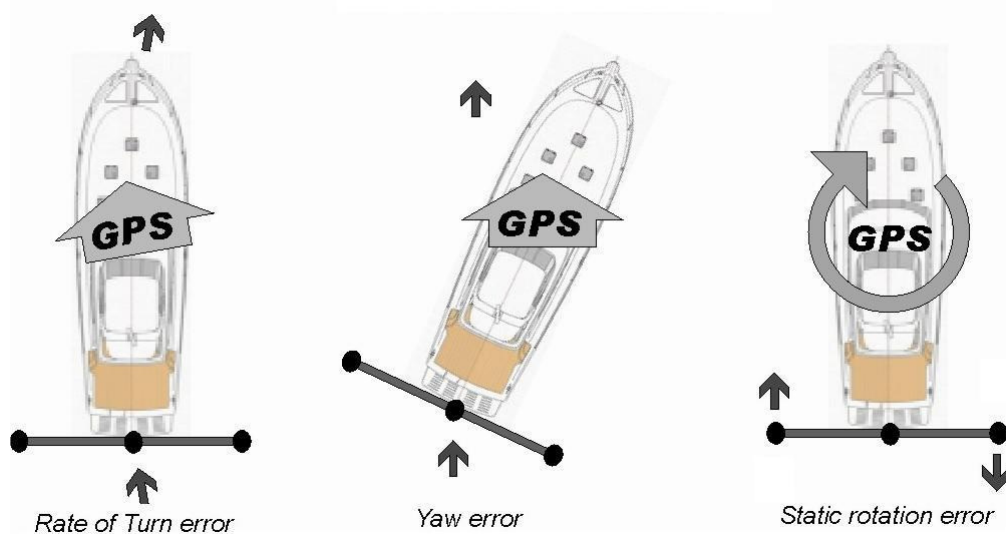
MTX transducer array configurations

These systems are very accurate for IHO Special Order and Order 1 surveys where 100% coverage and high accuracy are required. By using multiple transducers the problems associated with swathe systems such as stray side shots caused by incorrect motion adjustment or water refraction errors are greatly reduced or eliminated. The speed of sound in water is approximately 1500 meters/second, however, this speed can vary with changes in temperature, salinity and pressure. These variations can drastically change the path that sound travels through water, as changes in sound speed between layers of water cause the trajectory of sound waves to bend by refraction. With a multiple transducer system all measurements are made vertically through the water column avoiding refraction errors caused by non homogenous or stratified water layers of different densities/temperatures. With a single beam sounder the forward and reverse sonar paths pass through the same vertical column so any velocity error is an 'average' over the entire path not a complex reflected and refracted flight route.



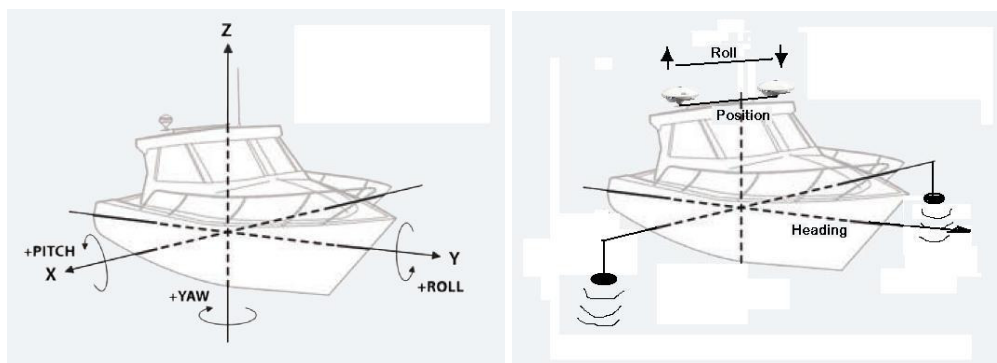
Swath side shot refraction errors

As with a swath system true heading is important for the accuracy of the system, the dynamic GPS heading message is sufficient for systems that do not change direction rapidly, rotate on a static location or travel in a rotated position. For more accurate systems a dual antenna GPS that provides both position and heading from the true bearing between the antennas is required.



Heading errors using 'NMEA' HDG message

The effects of pitch and roll do not so greatly affect a sweep system as they do a wide beam swath system. If a dual GPS antenna system is used then the roll of the mounting boom can also be calculated from the difference in height of the two antennas if they are mounted along the same axis as that of the boom.



Dual GPS Antenna Heading/Roll adjustment