



TURNS

Transportable Underwater Range for Naval Signatures

Overview

Omnitech Electronics collaborated with Defence Research and Development Canada (DRDC) - Atlantic, to design and manufacture the TURNS system to fulfill the Canadian Navy's requirement for a magnetic signature measurement range that can be easily deployed when on assignments anywhere in the world.

The TURNS system is a digital magnetic sensor array based on Rapidly Deployable Systems (RDS) technology. The TURNS array consists of twelve (12) evenly spaced digital 3-axis magnetometers and four (4) wideband digital hydrophones distributed along a 75m underwater cable. Each magnetic sensor contains a 3-axis MEMS based accelerometer to allow correction of magnetic field measurements based on sensor orientation, and an accurate pressure sensor to allow array depth measurements.

The array is small and lightweight allowing easy deployment from a small boat (ie. RHIB). After deployment, the array position is localized using acoustic positioning techniques measured through the arrays' hydrophone elements. The ship being ranged passes over the array and data from the underwater sensors is transmitted through a surface tether cable to a rugged operator's console onboard the small deployment craft. The data from the array is then geo-referenced to ship's position – obtained from a shipboard GPS tracking system - and the ship's magnetic signature is produced.

System Components

In addition to the underwater sensor array, the TURNS system is comprised of the following: an underwater 'Array Receiver', 500m surface tether cable and spooler, a 'Dry End Interface', a rugged operator computer, and an onboard ship position measurement system.



TURNS Dry-end Interface Unit (top-mid), Underwater Array Receiver Unit (top-right), 80 m Sensor Array with twelve (12) Magnetometers, four (4) hydrophones

The Array Receiver collects digital data from the array sensors and sends this data via 500m long tether cable to the Dry End Interface at the surface or located on shore. The Array Receiver generates the timing signals for the array so that

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Signature Measurement Systems

sensor measurements are precisely referenced to a GPS disciplined clock in the Dry End Interface. The Dry End Interface converts the time-stamped array data to TEMPEST approved Ethernet-over-fiber for connection to the operator console. Power for the entire system is provided through an external 24VDC battery source that is conditioned at the Dry End Interface and sent to the underwater Array Receiver through the tether cable.

A GPS based Portable Ship Position Measurement System is used to accurately measure the ship's position relative to the sensor array during the ranging.

Experience

Omnitech designs and builds multi-sensor digital arrays for defense and research customers around the globe. Low power operation and simple cabling requirements make possible systems of minimal weight and size allowing deployment from most vessels of opportunity.

Omnitech can custom manufacture arrays with many combinations of acoustic, magnetic and electric field sensors, and provide processing hardware and software for standalone operation, or integration into customer solutions.



Magnetometer sensor - shown installed on the array cable with protective shell open

- *3-axis Magnetic, Acoustic, Pressure, and 3-axis Acceleration, electric-field (optional)*
- *Battery powered or direct AC operation.*
- *Calibrated to provide orientation-corrected, geo-referenced magnetic measurements.*
- *Constructed of non-magnetic materials*
- *Physical Characteristics*
 - *Temperature range: - 20 to 60°C*
 - *Depth: up to 150 m*
 - *Component weights (in air)*
 - Array (as configured): 96 kg,*
 - Dry End Interface Receiver: 7.0 kg*
 - Array Receiver (with cage): 7.5 kg*
 - 500 m tether cable (on spool): 100 kg*
- *Custom configurations available. Contact Omnitech for more information.*



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