



DSIMS

Diver Signature Integrated Measurement System

Overview

Omnitech's Diver Signature Integrated Measurement System was developed in partnership with Defense Research and Development Canada. DSIMS measures the acoustic, magnetic, electric and pressure signatures of Navy Divers, for training and prior to deployment for mine clearing operations.

Sensors are mounted in a Manta Mine shaped underwater housing and detect acoustic, magnetic, electric field and pressure signals. The analog signals are conditioned (amplified, filtered and buffered) by circuitry in the Sensor Interface Unit and sent to the Underwater Data Acquisition Unit (DAU) located five meters away.

Digitized DSIMS data from the DAU is sent via Ethernet-over-VHDSL (or optional fiber link), to a ruggedized operator console at the surface or on shore.

Sensors

The Sensor Interface Unit connects to the Underwater Data Acquisition Unit using the Analog Signal Cable and is secured to the base plate of the Mine Shape. The SIU contains up to two tri-axis magnetometers, one electric field sensor (2 or 3 axis options), one hydrophone, a high precision pressure



DSIMS Sensor Unit (pressure case removed)



DSIMS Sensor Unit, Manta Mine Shape (left), Enclosed Sensors (top right)

sensor and a high output LED indicator. Ancillary sensors measure mine shape orientation, temperature and water depth. Additional options are available for video recording, seismic, ambient and artificial light sensors.

- *Acoustic, magnetic, electric potential and pressure signature measurement*
- *Specialized software and mine algorithms*
- *Real-time data displays and optical feedback to divers without affecting signature measurement*
- *copper or fiber Ethernet link to surface of shore*

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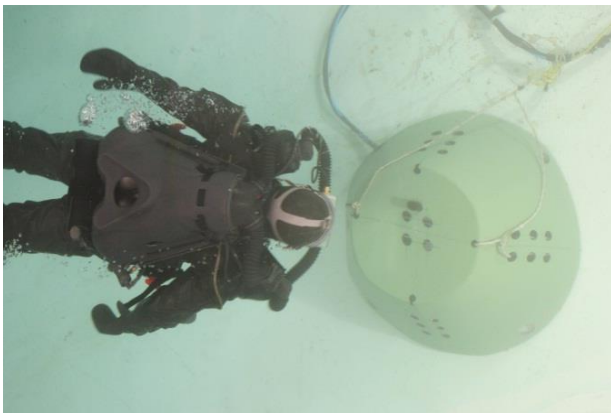
Diver Signature Systems

Software

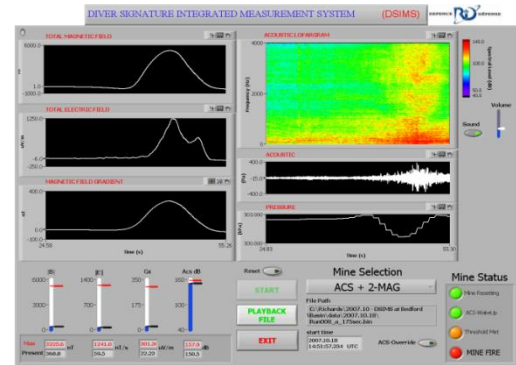
Specialized DSIMS software acquires, analyzes and displays diver signatures in real-time. If enabled, the selected mine algorithms can signal detection levels to the diver through a set of high power, underwater LED indicators *without affecting any diver signatures*. Visual and audible alerts provide feedback to console operators. The interface allows creation, editing and selection of mine algorithms from menu options or custom software add-ons. Sensor data is recorded for future analysis or playback in unprocessed, full bandwidth files. Data in the displays is corrected for platform orientation.

Maturity

DSIMS was developed as a joint effort between Defense Research and Development Canada (DRDC Atlantic) and Omnitech Electronics. The effort began in 2003. Three versions of DSIMS have been designed and built. User feedback has been a major factor in the refinement of the design, with the key objectives being a small, easily portable, highly reliable and accurate measurement system for diver signatures.



Diver Training at DRDC Test tank



Operator Software Dialog

Customization

Omnitech can customize a DSIMS with many sensor configurations, types and construction according to customer specifications. Systems can be configured for short term easy deployment or long term permanent installations. All software source code and data interface specifications are provided to customers with support and customization assistance. Contact Omnitech for more information.



Dry End Interface Unit



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Performance and Specifications

Sensor Parameter	Specification	Options	Units	Comments
Acoustic				
Model	omni-directional			piezo ceramic, cylindrical, sealed
Bandwidth	5 – 20k	1 – 100k	Hz	
Sensitivity	-195 ± 1		dBV re 1µPa	
Gain	40, 60	20,40,60,80	dB	software selectable
Max Signal Level	175	200	dB re 1µPa	at minimum gain
Self Noise (Min. Level)	30		dB re 1µPa/√Hz	at 1kHz
Dynamic Range	130	150	dB	gain + ADC range
Digitization	24	16	bits	
Magnetic				
Model	MAG-03 Series			Bartington Instruments
Quantity	1	2		3-axis (use of 2 magnetometers allows gradient measurements)
Bandwidth	DC – 500	DC – 900	Hz	
Measurement Range	± 100		µT	
Self Noise	6		pT /√Hz @ 1Hz	
Dynamic Range	109	112	dB	
Digitization	24		bits	
Electric Field				
Quantity	X,Y pairs	X,Y,Z pairs		
Electrodes	Ag-Ag-Cl			
Bandwidth	0.002 - 500		Hz	
Electrical Noise	4 (5)		nV/√Hz @ 1Hz	bracketed value is nV/m equivalent noise
Measurement Range	±3, 10, 30, 100		mV	full-scale output, 4 gain settings
Digitization	24		bits	



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Diver Signature Systems

Sensor Parameter	Specification	Options	Units	Comments
Pressure				
Model	Integrated			
Measurement Range	0-700		kPa	selectable depth conversion by programmable factor
Accuracy	± 5		kPa	
Resolution	0.01		kPa	
Sample Rate	1	up to 2000	Sp/sec	increased sample rate for signature measurement
Orientation / Temperature				
Model			deg	provides orientation of mine shape on seafloor
Heading	0 - 360		deg	
Accuracy	± 1		deg	
Resolution	0.1		deg	
Pitch / Roll	± 30		deg	
Accuracy	± 1		deg	
Resolution	0.1		deg C	
Temperature	-5 to 50		deg C	
Accuracy	0.5		deg C	
Resolution	0.1		Sp/sec	
Acceleration		± 2	G	optional 3-axis raw acceleration
Resolution		± 1	mg	

*Customizations are available upon request. Please contact Omnitech for information regarding the modification of any sensor specification or the integration of additional sensors.

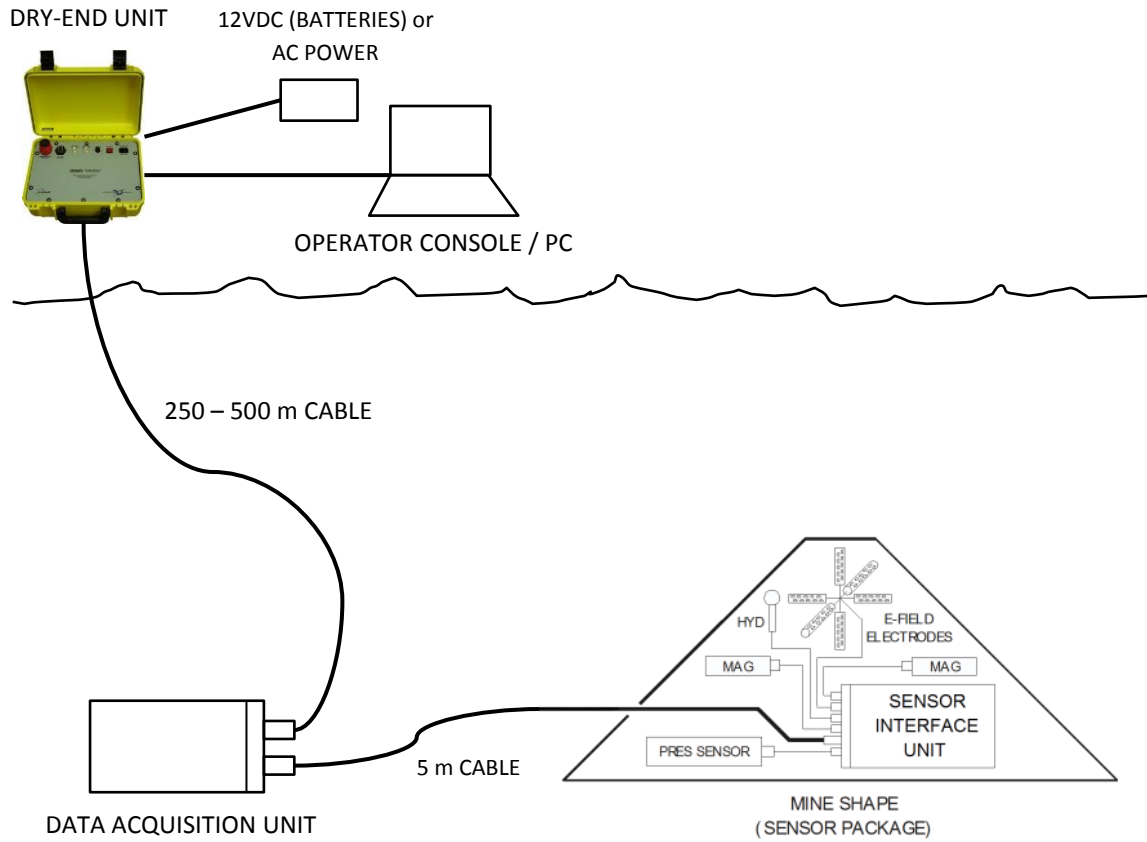


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System Diagram



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