NPOL

Naval Physical & Oceanographic Laboratory

ALTAS-X

Advanced Light
Towed Array Sonar

Depths do not matter,
Submarines do !

ALTAS-X is a variable depth surface-ship sonar system for detection, localisation & classification of silent submarines in active and passive modes. As an advanced underwater sensor system, it provides early warning of torpedo attack, thereby strengthening the Anti Submarine Warfare (ASW) capabilities of advanced warships. ALTAS-X has the distinct advantage of having a long array to exploit the low frequency spectrum of the radiated noise, low losses of propagation, capability to operate at different depths to make best use of the prevailing hydrological conditions and minimal effect of self-noise of the platform.

Features

- Active cum passive towed array sonar capable of detection, localisation and classification of submarines and torpedoes
- Low frequency variable depth sonar
- capable of operations in shallow and deep oceans
- Advanced adaptive beam forming techniques for detection and tracking of silent submarines
- Operator selectable transmit waveforms, pulse lengths, bandwidths & range scales
- Adaptive noise cancellation & own Doppler nullification techniques
- Advanced signal processing techniques for broadband and narrowband functions
- Real time data recording for online/offline processing
- Automatic depth-keeping bottom-avoidance functions

ATDS-X

Advanced Torpedo Defence System

ATDS-X is a complete package involving sensors and decoys for defence against vintage as well as modern torpedoes. It is a fully integrated system having both torpedo detection and countermeasure capabilities. The system can receive inputs from both Hull Mounted Sonar (HMS) and Towed Array Sonar (TAS) for panoramic detection and tracking of torpedoes. There is an intercept sensor to characterize the active homing signature of the torpedo.

Acoustic decoying is effected using two types of decoys – Towed Decoy and Expendable Decoys. The complete wet end including the towed array sonar and towed decoy is launched and retrieved using a hydraulically operated winch system. The data from the sonar is processed in the Fire Control System (FCS) to localize the torpedo and obtain critical information on range, speed etc. The FCS also calculates the escape parameters like own ship bearing and speed for evading the torpedo.

Features

- Automatic detection and alert of acoustic homing torpedoes (passive & active)
- Acoustic decoying of the torpedo
- Classification of torpedo along with localisation and target motion parameters
- Advanced adaptive beam forming techniques for torpedo detection and tracking
- Intelligent soft kill decoy systems with multi mode operational capability
- User-friendly system with excellent built-in Fault Detection & Fault Localisation
- Appended with Left-Right ambiguity
- resolving module in the towed array sonar
- Real-time data recording & online / offline processing
- Unique 'Auto Torpedo Recognition' algorithms
- Escape solutions on the most appropriate manoeuvre & countermeasure actions
- Custom configurability for ASW & non-ASW platforms

Futuristic Human Machine Interface

CHITR-M1

Underwater Acoustic Imaging System
Towed Array sonar

Even the submerged
Shall be imaged !

CHITR-M1 is a wideband high-frequency imaging sonar which gives excellent image quality and good object detection ranges. It's a compact system designed for dual use purposes.

Military applications include Autonomous Underwater Vehicle (AUV) navigation, marine mine detection, ship hull inspection and harbour security. In the civilian sector, CHITR-M1 can be used for underwater structural monitoring, search and salvage.

Compact and low power design of CHITR–M1 enables fitment to light weight class AUVs and Remotely Operated Vehicles (ROVs). CHITR-M1 utilises Ethernet connectivity to establish data and control communication with host computers, using a single data and power cable which can be extended up to 70 meters.

Features

- Wide 90 degree field of view
- High resolution imaging
- Reverberation suppression
- Low power consumption
- Wide-band processing
- Near-field processing
- User-friendly system with excellent built-in FDFL
- Real-time data recording
- Can be installed on seagiong vessels - manned & unmanned
- Multiple power input options

DISHANI

Directional Sonobuoy

Sensing directions of enemy.
by floating passively on surface

DISHANI is Directional Sonobuoy (DS) is an expendable air-deployed ASW sensor system in a compact, self-contained package. It comprises of acoustic sensors, electronics, mechanical assemblies and parachute. Directional Sonobuoy can be launched from an aircraft (fixed/ rotary wing). It is mainly used for Anti-Submarine Warfare (ASW) operations to determine targets of interest to take appropriate counter measures.

DS consists of three Acoustic sensors like Surface Omni (SO), Deep Omni (DO) and Directional Sensor. A directional sonobuoy system consists of a wet end comprising of the sonobuoy and an onboard system comprising of RF transceiver capable of receiving the sensor data, signal processing subsystem & HMI unit for displaying the resultant information. The sonobuoy consists of sub-systems like floatation assembly unit with RF antenna,

Surface floating electronics unit, CO2 canister assembly, seawater activated battery, main telemetry cable reel. The Sonobuoy is assembled into a specially made storage cum launch cover suitable for launching them from P8I and MH-60R.

Features

- Sonobuoys are launched from a height of 7500 m from a Fixed wing aircraft and 3000 m from a Rotary wing aircraft.
- It is launched after certain pre-set functions done like selecting the Channel No, Acoustic Sensor, AGC, Depth of operation, and Operating Life.
- The Indigenous DIFAR Sonobuoys are equipped with state of the art GPS sensors to determine and monitor the positions of sonobuoys launched.
- The DIFAR Acoustic Sensor is used to clearly find out the submarine
- The On-board system consists of state-of-the-art Integrated VHF-UHF receiver and transmitter units suitable for platform installations.
- 32 Sonobuoys shall be monitored from the on-board systems.
- The HMI software is developed to monitor multiple target's details simultaneously.
- Sonobuoys are launched by Pneumatic means from the platforms used by user.

HMS-X2

HMS-X2 is an advanced and compact sonar system designed for Anti-Submarine Warfare (ASW) ships. It is an integrated active cum passive sonar system, specifically targeted for installation on small to medium platforms

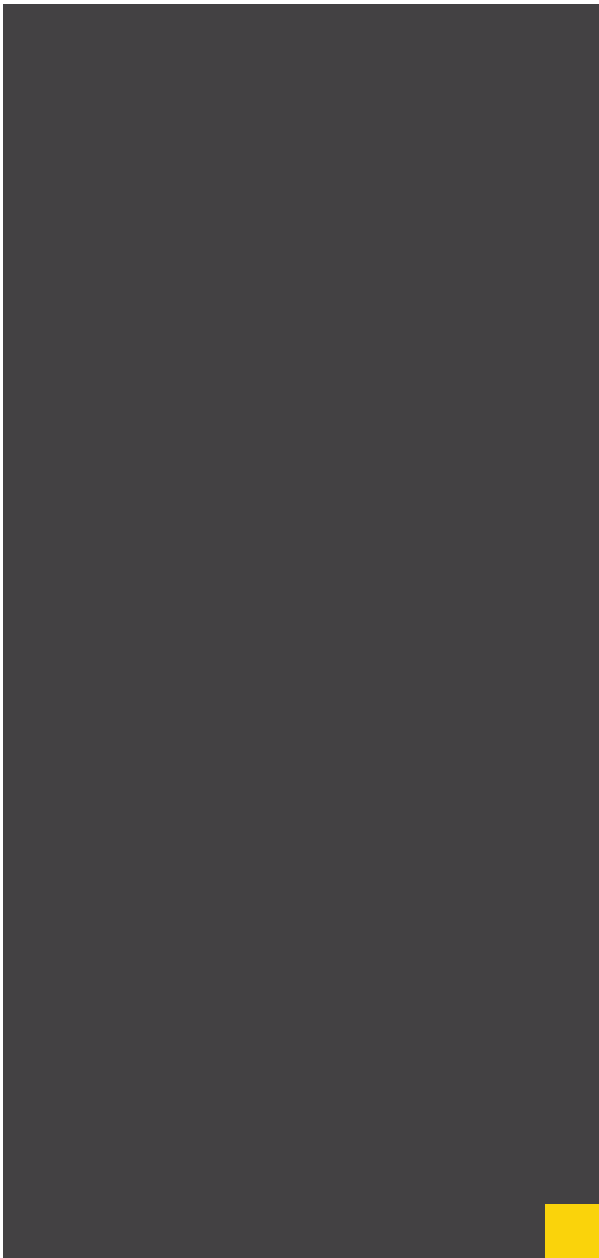
such as ASW corvettes & patrol vessels. It employs advanced adaptive signal & information processing techniques for detection, tracking & classification of targets. The hardware architecture is based on state-of-the-art open-architecture processor technologies that will enable smooth upgrade of the system capabilities. A compact transducer array, modular front-end signal conditioning hardware & high-efficiency switched-mode power amplifiers make up the rest of the system.

Compact Hull Mounted Sonar System

Integrated ship sonar system.
intensifying command over high seas

Features

- Simultaneous active and passive operation
- Choice of cylindrical transducer arrays
- Auto target designation
- Audio in both active / passive modes
- Self-noise cancellation
- Beam stabilisation for environmental adaptability
- Automatic LRU-level Fault Detection & Fault Localisation
- Integrated sonar performance prediction
- Built-in simulator and sensor data recorder
- Panoramic active detection in dual frequencies
- Waveforms – conventional and combo
- Selectable pulse lengths
- Selectable range scales
- Adaptive signal processing techniques
- Passive panoramic broadband surveillance
- Conventional and adaptive beam forming
- Automatic tracking of multiple passive targets
- Spectral Analysis of the tracked targets
- Display formats with different integration time constants



LFDS-X

Low Frequency
Dunking Sonar

Hovering above the sea.
hunting deep submarines

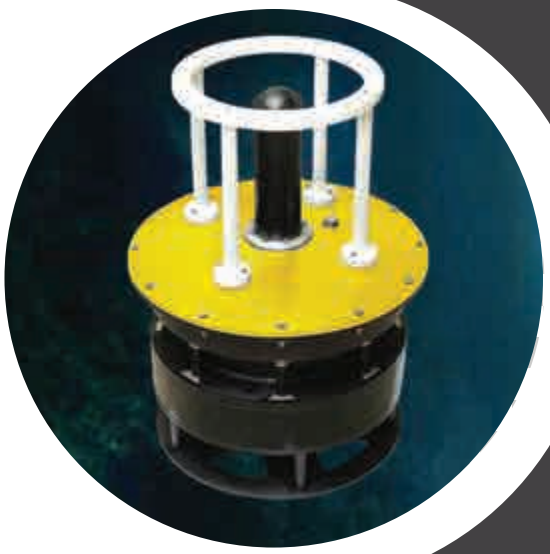
LFDS-X is an airborne sonar system which can be deployed from rotary wing platforms, for effectively acting as force multiplier for naval ships. It provides the advantages of lower frequency combined with higher source level for range advantage in littoral Anti-Submarine Warfare (ASW). It enables the deployment of sensors to deeper depths for detection of deep dived submarines, thereby substantially enhancing performance. LFDS-X is an integrated system using indigenous technology capable of simultaneously processing inputs from sonobuoys and operating the dunking sonar for establishing exact range and bearing of targets with active low frequency transmission. The system uses the latest technologies and employs well-proven algorithms, which enable the insonification of relatively long ranges with the required resolutions, to adequately meet present day ASW requirements.

Features

- Sonar and sonics modes of operation
- Long range detection of subsurface targets
- Both active and passive sonar modes
- Light in weight for fitment on light & multi-role helicopters
- User-friendly Human Machine Interface
- Foldable array for higher acoustic aperture
- Capabilities for target localization and classification
- Low frequency for extended ranges
- Electromechanical actuator for stave folding mechanism
- Low frequency projector array of Flex-tensional Transducers
- Dual stave configuration for receiving hydrophones array
- Onboard electronics using state-of-the-art COTS-like technology
- Scalable system architecture
- Echo-sounding for bottom proximity

PDDS-X

Portable Diver
Detection Sonar



Detecting intruders. deterring threats

PDDS-X is a portable sonar system capable of detecting potential underwater threats like divers and diver delivery vehicles in shallow waters. The system alerts the operator to confirm the type of threat so that effective countermeasures can be initiated in time. The system can be deployed either outboard a ship or at any location in a harbour, typically beside a wall, pier or at the sea bottom. The system consists of two parts, an underwater unit and a shore unit, interconnected by water blocked cable carrying data and power supply lines.

The underwater unit is a sonar head consisting of transducer arrays, transmitter and front-end receiver electronics hardware. The shore unit consists of the processing and display units, data recorder and power supply. As an auto-alert system, PDDS-X performs detection, tracking and classification of divers or diver-like targets automatically and alerts the operator accordingly. The target information provided by the system include (i) target position (range and bearing) (ii) target dynamics (speed and course).

Features

- Fully automated solution for underwater security
- Detects and classifies underwater intruders like divers with very low target strength
- Automatic alarm on detection of threat
- Capable of detecting multiple targets around 360° in the azimuthal plane
- Vertical coverage of up to 20° in elevation
- Useful for protection of waterside assets & installations with 24x7 surveillance
- Very narrow beams for fine resolution in bearing of small targets
- High probability of detection
- Low probability of false alarm
- Very low maintenance requirements
- Enables rapid deployment and movement between sites
- High frequency sonar with extended detection range
- Portable system with compact packaging
- Deployable light-weight wet-end unit
- Flexible deployment schemes for fixed-site applications / onboard vessels

SMS-X

Submarine
Sonar Suite

Underwater eyes and ears..
underlining tactical supremacy..

SMS-X is an integrated suite of sonar systems for installation onboard submarine. It is essentially a compendium of multiple sensors for passive detection,

which collates different characteristics of the same target and provides target data through information fusion. The constituent sonars in the suite include passive sonar, active sonar, intercept sonar, obstacle avoidance sonar and underwater telephony. The suite incorporates advanced signal processing techniques and state-of-the-art hardware platforms. The system provides advanced classification features, contact motion analysis and automatic torpedo detection capabilities. The target presentations to the user are garnished with a gallery of user-friendly and tactically useful information. The suite is provided with end-to-end redundancy for passive sonar systems. It is developed on modular design approach with state-of-the-art technologies and standard interfaces. SMS-X is scalable to suit submarine platforms with varying levels of displacement capacity.

Features

- All-round superior performance with simultaneous
- panoramic surveillance coverage
- Capable of detecting, localizing and tracking multiple surface and subsurface targets
- Quick and reliable signal and information processing
- Selectable pulse lengths, power levels and range scales
- Choice of transmission waveforms
- Display format presentation under different integration time constants
- Audio in both active and passive sonar modes
- Spectral information processing capabilities
- Compact packaging of electronics in hermetically sealed units / cooled enclosures
- Modular design facilitating installation on different classes of submarines
- In-built facility to record the audio and video data
- In-built test facility for online health monitoring & self-noise measurements
- Comprehensive simulator for operator training

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