



Naval Suite for Submarines

ARIES-S LPI Navigation Radar

The ARIES-S system represents a complete radar surveillance and navigation solution for the next generation of submarines. Its low transmission power makes it virtually undetectable by today's tactical ESM systems, so that it can "see without being seen".

The Aries-S radar is High Resolution Radar able to detect and track low radar cross section surface targets, in several sea clutter environments. The radar uses continuous waveforms and large bandwidth, allowing long detection ranges with minimum peak transmission power, low probability of intercept (LPI) performances and high robustness against external interference.

ARIES-S has been designed to be installed in a non-hull penetrating mast and the transmitter/receiver unit has been reduced in size to fit inside the pedestal. Inboard units have been designed for lightness, compactness, robustness and easy maintenance. Those units can be installed inboard with total flexibility. The system supports multi-Console architecture and can be easily integrated with the Combat Management System.

TSUB Satellite Communication System X and Ku Band

The TSUB submarine terminal developed by Indra is an outstanding member of the Indra's family of military naval SATCOM terminals. The submarine terminal will provide secure long-range communications between the submarine and the command center ground station. The TSUB terminal is designed to fulfill the most demanding requirements and to withstand the extreme environmental conditions.

The terminal architecture has been developed in order to facilitate the maintenance tasks. With the most advanced and largely tested stabilized antenna, the TSUB allows the user to maintain reliable and trustful communications in up to sea state 3.

PEGASO RESM CESM Family

PEGASO RESM CESM system's family is a scalable and modular Electronic Warfare System that represents the integrated radar and communications bands solution for the next generation of submarines. It incorporates the advantages of True Wideband (6th Generation) Digital Reception as well as highly integrated hardware, and constitutes a unique instrument to successfully face the new electromagnetic warfare scenarios.

PEGASO family goes from a baseline configuration (2-18 GHz) with standard DF accuracy measurement (PEGASO RESM BASIC), up to complete configuration (1.6 MHz – 40 GHz) with a complete RESM, CESM, ELINT and COMINT functionality.

The RESM most relevant operational capabilities include: Outstanding warning capability of pulsed and continuous wave signals based on wide-band digital receivers; extremely high probability of detection, accurate identification and tracking of targets and advanced deinterleaving and library matching algorithms for accurate identification.

The CESM functionality includes detection, classification, short time signals processing, monitoring, technical analysis, tracking, and analysis of communication band emissions within the HF, VHF and UHF frequency bands with direction finding within the 120 MHz to 1 GHz.

Optionally can be included: ELINT and COMINT subsystems providing intelligence gathering capabilities. Performing ELINT or COMINT processing during mission time or recording data for subsequent further analysis. These options provide the PEGASO system with the capability to extract parameters from collected signals, as well as storage capability and training capability for the operators.

TXP-25S Identification System

TXP-25S system provides the submarine self-identification capability to operate with the following modes:

- Modes SIF: 1, 2, 3/A, C.
- Mode 4.
- Mode S level 2 Basic Surveillance.
- Mode S level 2.

Advanced Simulators

Indra simulators for submarines allowing optimal submarine operation: crews can receive the best training to get know the vessel performance and emergencies that could occur in the real environment. All navigation conditions, malfunctions as well as emergency situations can be simulated to prepare crew for giving the best immediate response.

Not only for training the crew, but simulators are prepared also to review usual and emergency operation procedures before Sea Trials.



PERCOSUB Multisensor Optronic Mast

The PERCOSUB is one of the most advanced Optronic periscope systems providing detection, surveillance and tracking capabilities to the submarine combining all the capabilities of the most modern optronic masts and attack periscopes into one compact system that is extremely easy to adapt to virtually any submarine.

The modern architecture of PERCOSUB makes it equally suitable for upgrades of existing submarines with penetrating periscopes or for new submarines making an extremely effective optronic periscope for modern non-penetrating masts.

In fact PERCOSUB can be used to replace a conventional optical attack periscope significantly improving the ship's capabilities for intelligence and increasing its survivability or can be supplied as a complete solution including if required the tube (if penetrating retrofit solution) or the mast and hoisting system for new submarines.

In summary PERCOSUB main advantages are:

- **Non intrusive** - no modification to the hull, easy installation in port. Full optronic periscope capability at a fraction of the cost of a new periscope.
- **Increased safety** - non-penetrating optics, only electrical feedthroughs, additional pressure barriers / bulk heads.
- **Fully integrated with combat system** - semi automatic designation of targets, track fusion with other sensors.
- **Growth potential** - easy to upgrade changing head.
- **Low lifecycle cost** - easy repair & replacement of sensors with submarine afloat.

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