



Future Technologies and Developments In Sonar Systems For Conventional Submarines

Cmde A Jai Singh (Retd), ATLAS ELEKTRONIK India
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... a sound decision

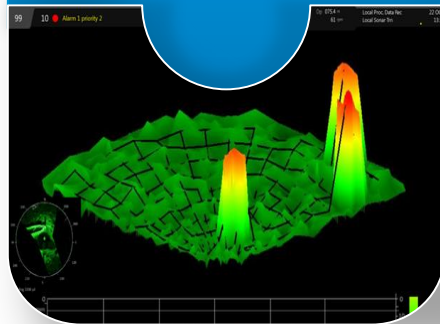
 **ATLAS ELEKTRONIK**
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To Set the Context

Challenges to Overcome

Environment

- complex acoustic conditions
- biological noise
- high shipping densities



Operations

- networked operations
- high endurance
- less energy consumption



Human Factor

- reduced crew strength
- varying training levels



ISUS100 for Submarines

Superior System Performance for Complex Conditions

Large Acoustic Aperture

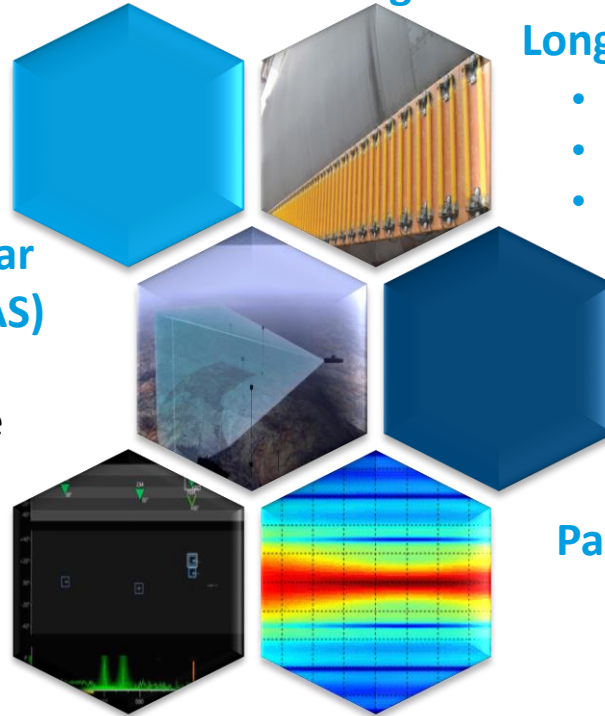


Long-Range Sonar Sensors

- Expanded Flank Array
- Flank Array
- Towed Array with Winch and Shape Estimator

(FLAS)

- Mine Avoidance Mode
- Forward Looking Mode
- Safety Surfacing



Passive Ranging Sonars

- Advanced Ranging Sonar (as an option to EFAS)

Medium Frequency Surveillance Sonar

- Extended Conformal / Cylindrical Array
- Vertical Beamforming

Multiple Additional Benefits

Expanded Flank Array Sonar

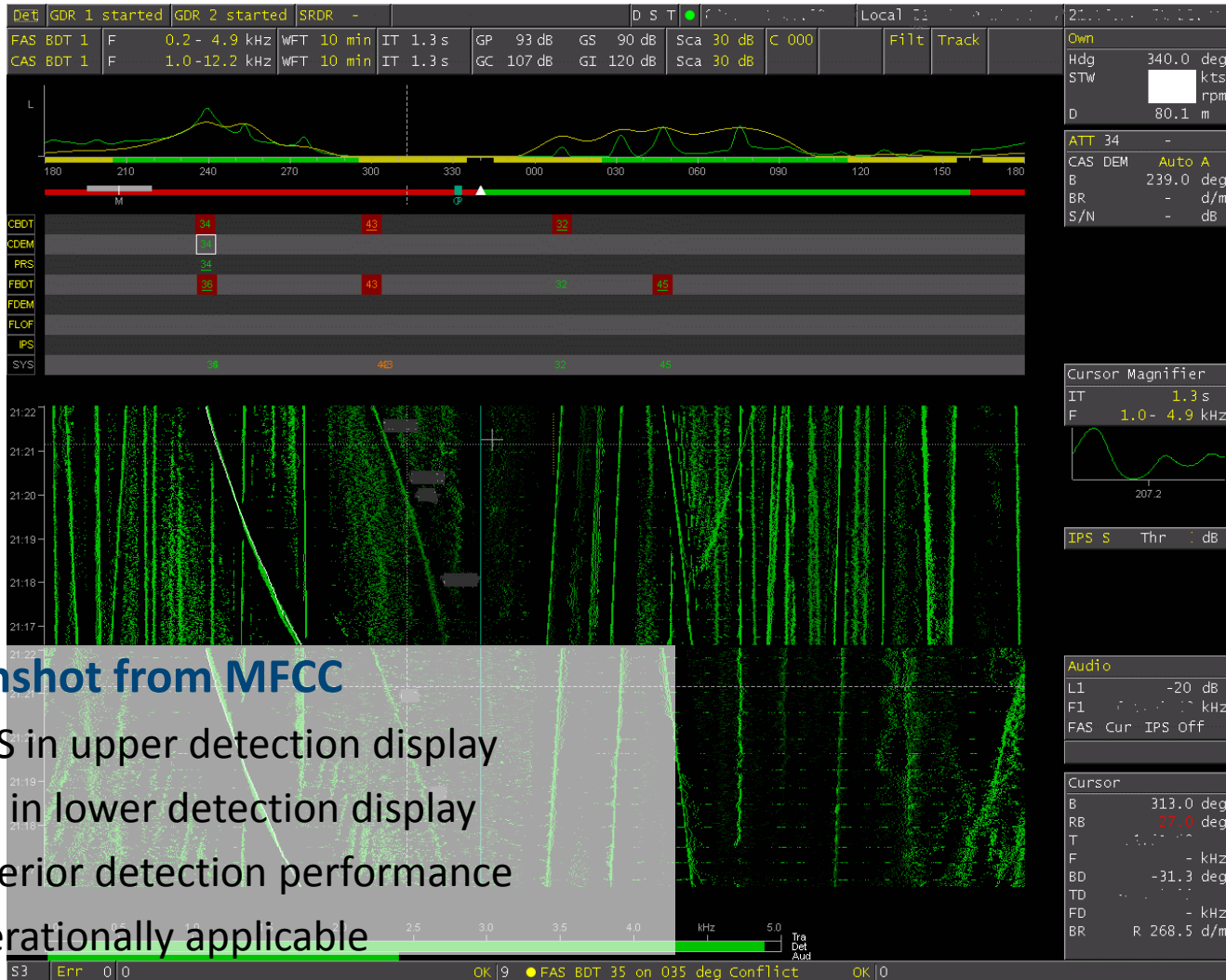
Features of the Expanded Flank Array Sonar (EFAS)

- Extension of the frequency range up to 4.8 kHz
- Improved directivity index due to higher frequency
- Improved target separation performance due to higher frequency
- Suppression of own noise by use of damping and shielding materials
- Effective flow noise damping by a hydro dynamically optimised sonar dome



Multiple Additional Benefits

EFAS Sea Trial Results- on 212A class submarine



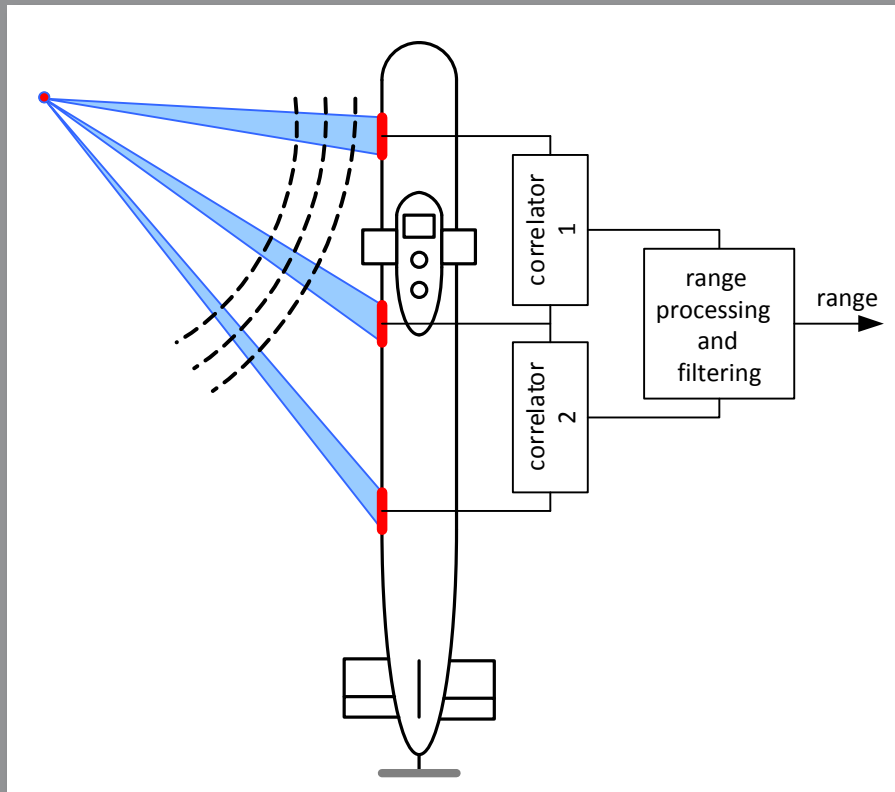
Screenshot from MFCC

- EFAS in upper detection display
- CAS in lower detection display
- Superior detection performance
- Operationally applicable

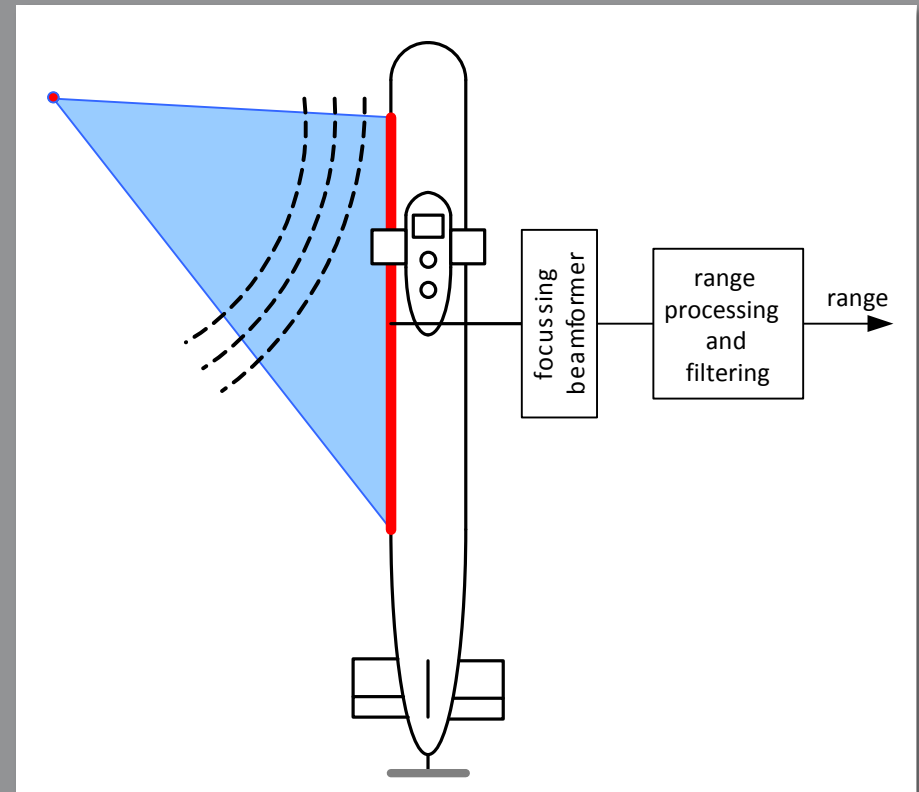
Multiple Additional Benefits

Passive Ranging Principles – PRS vs. ARS

PRS
(Passive Ranging Array)



ARS
(EFAS)



Enter The Airspace With A Towed Array

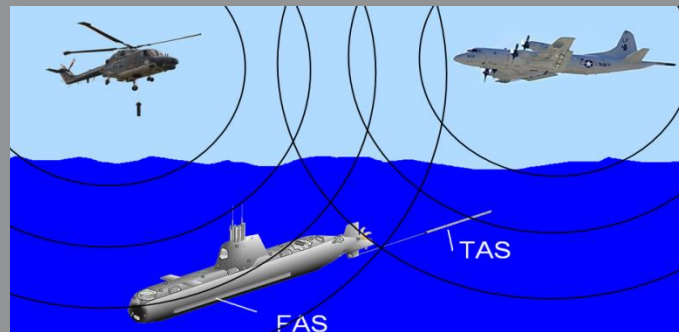
Passive Aircraft Detection

Future Functions

- Detect threats (helicopters / fixed wing aircraft)
- Generate target parameters (missile engagement)

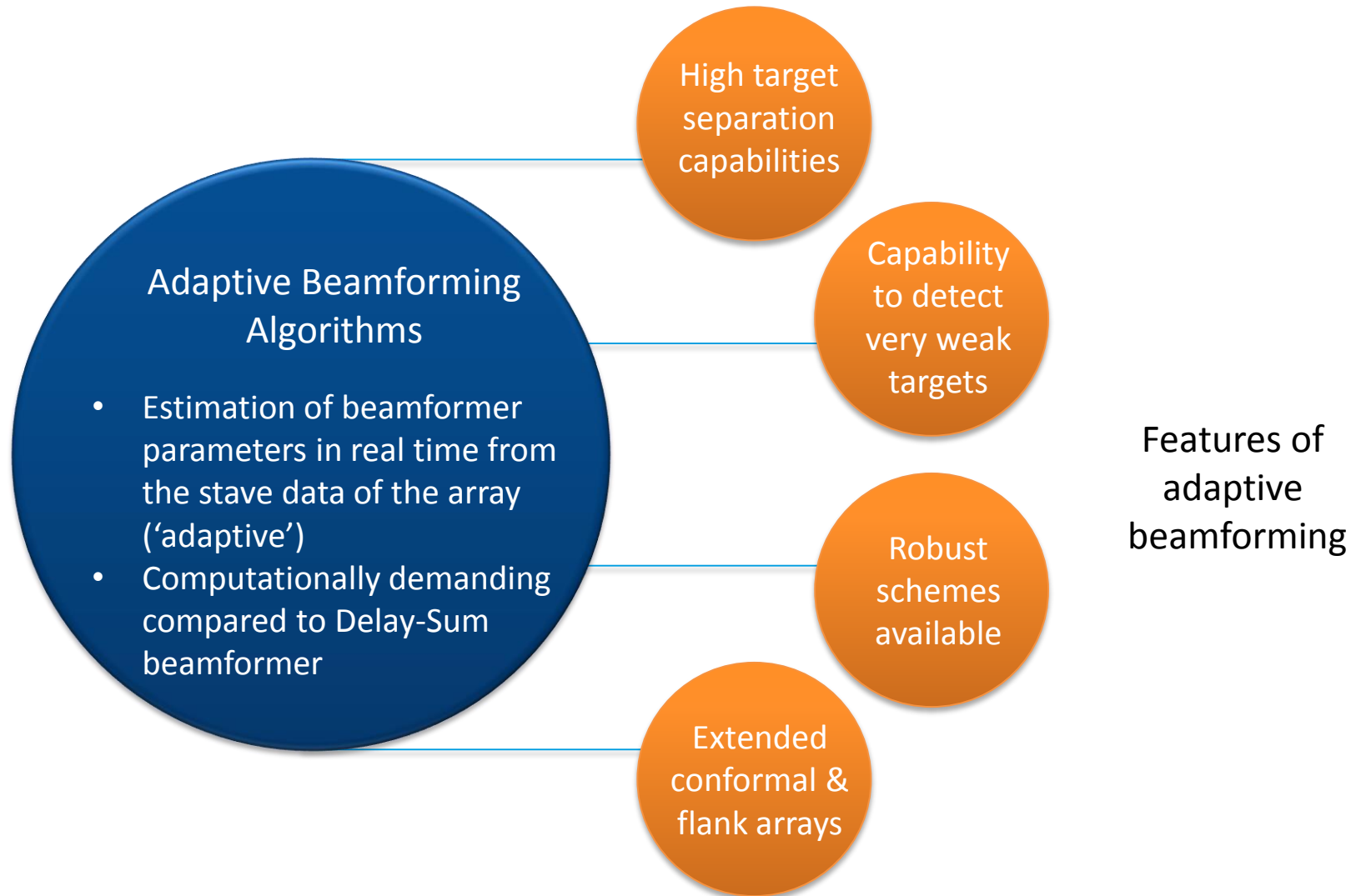
Complete and full automatic passive aircraft detection:

- Narrow band processing for required frequencies
- Detection of targets with Multi-Hypotheses-Tracker
- Classification of aircraft / no aircraft
- Estimation of the target position
- Classification of aircraft type by fundamental frequency



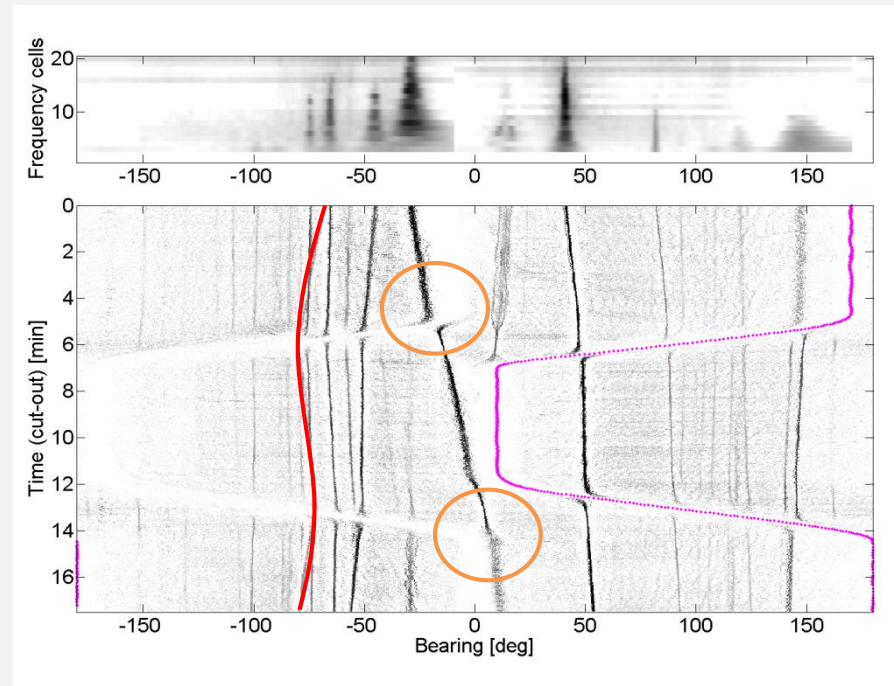
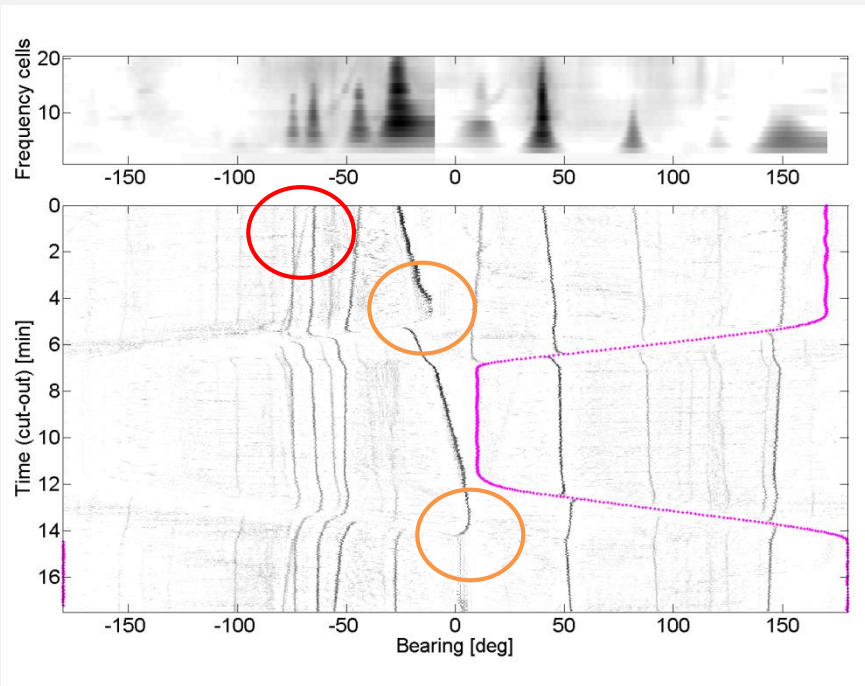
Discover the Undiscovered

Improving Passive Sonar Detection Performance



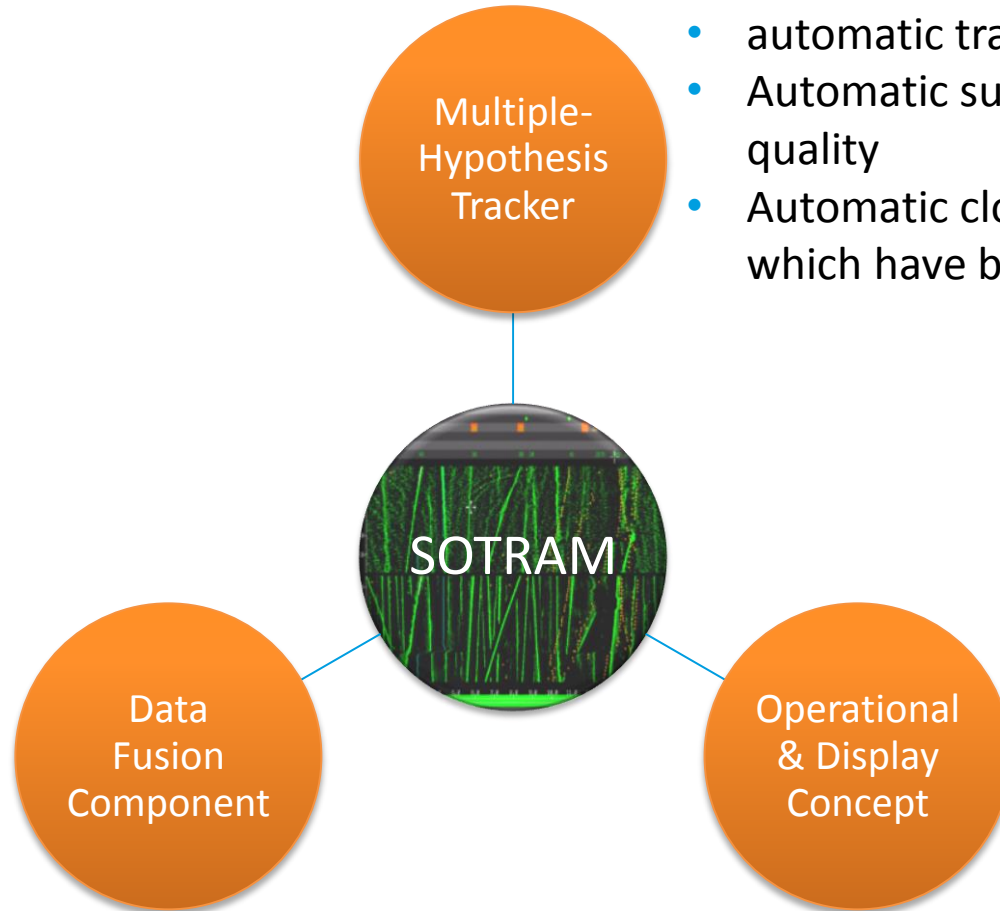
Discover the Undiscovered

Comparison DSBF vs. ABF: Sea Data EFAS - DSBF BDT 1



Minimum Effort – Maximum Output

Sonar Track Manager (SOTRAM)



- automatic track setup
- Automatic surveillance of track quality
- Automatic closing of tracks which have become unsafe

- „One Target, one Track“
- Change of track history possible

- Less displays
- Simplified operation

Someone is switching on the light– be the first and open your eyes.

Bistatic Sonar

Future Functions

- Evaluation of received target echoes within bi- & multistatic anti submarine warfare scenarios
- Operation in cooperative & non cooperative environments
- Displays range and bearing of contacts in PPI plot

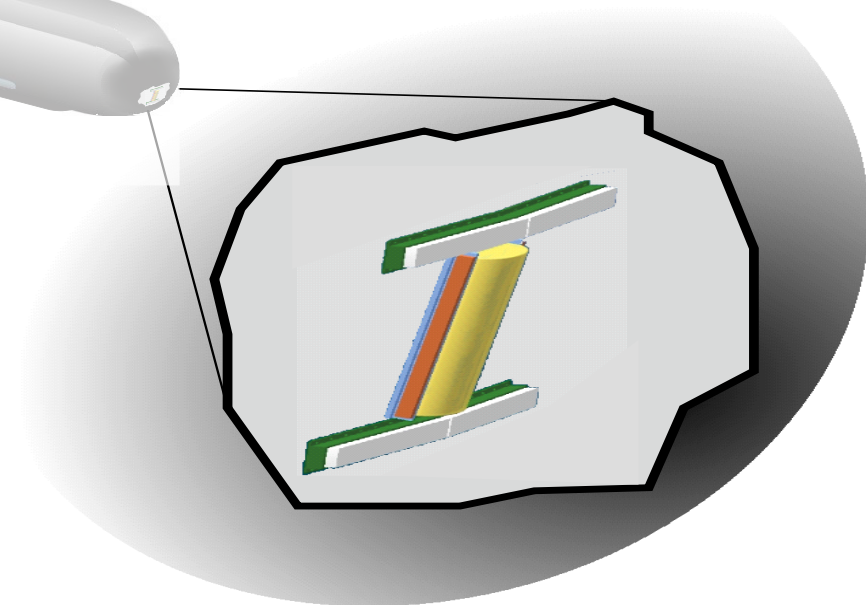


Safety First!

Multipurpose Forward Looking Active Sonar Setup

Transmission Concept

- Application of single frequency / high bandwidth concept
- Centre frequency of 50 kHz represents optimum balance between
 - Detection ranges against small targets (mines)
 - Detection ranges against large targets (submarines)
- Forward looking performance
- Low probability of intercept
- Basis for MOAS and FLS functions
- Safety Surfacing



Safety First!

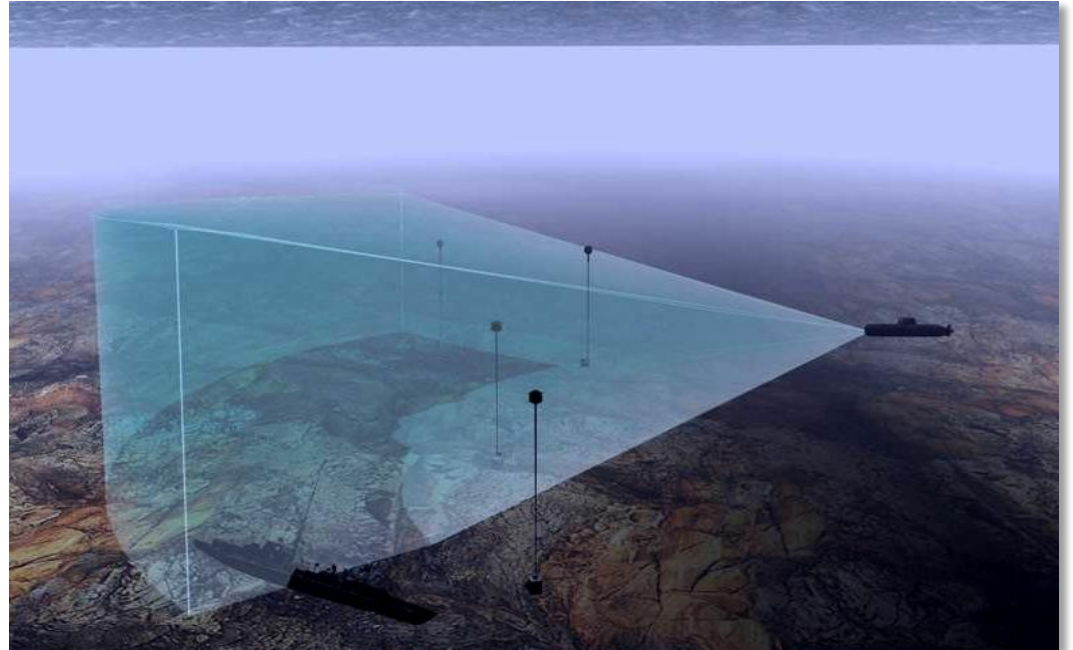
Mine & Obstacle Avoidance Sonar (MOAS)

Applicable for detection of

- floating mines
- moored mines
- obstacles
- small submarines

Additional Features

- Depth classification
- Automatic tracking
- Automatic alarm
- Automatic collision avoidance course proposals
- Horizontal detection sector: 120°
- Vertical detection sector: 60°

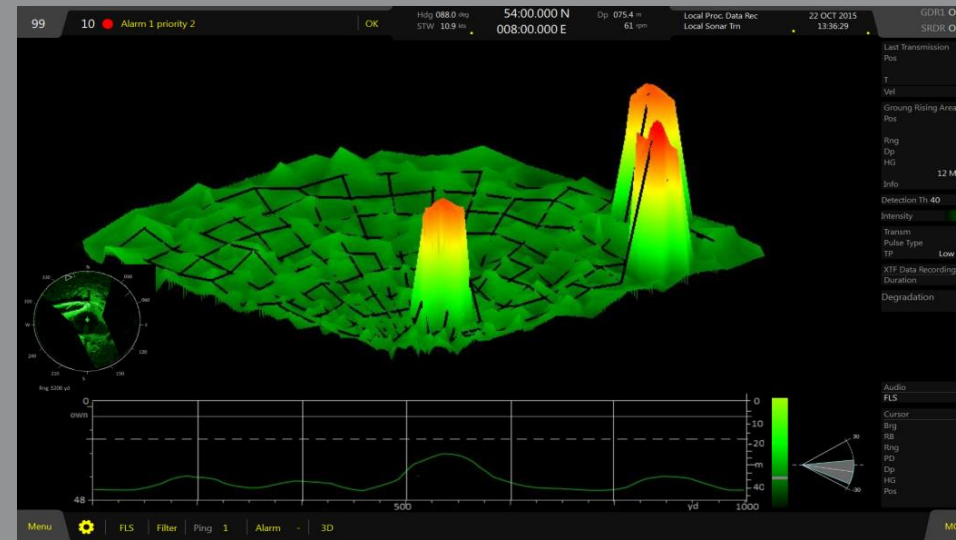
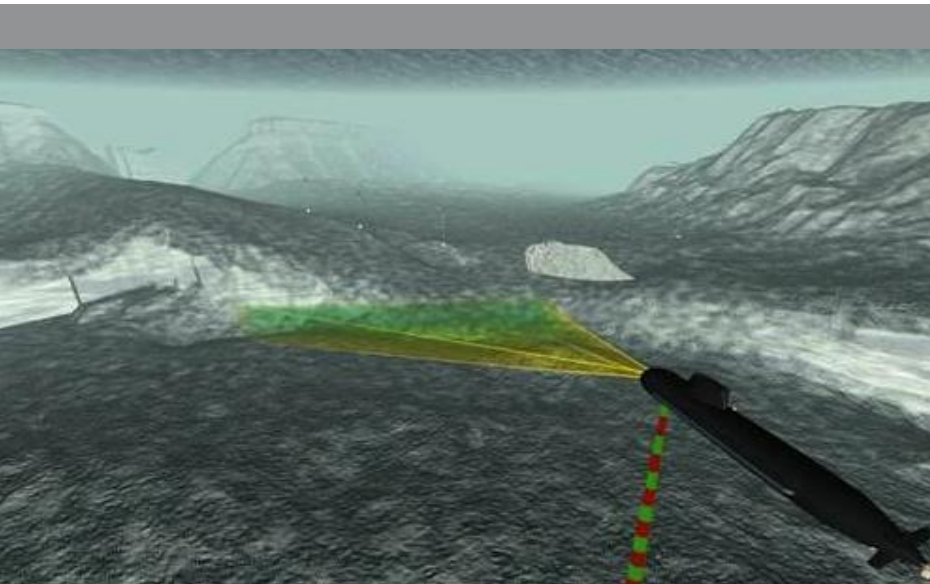


Safety First!

Forward Looking Sonar (FLS)

Features

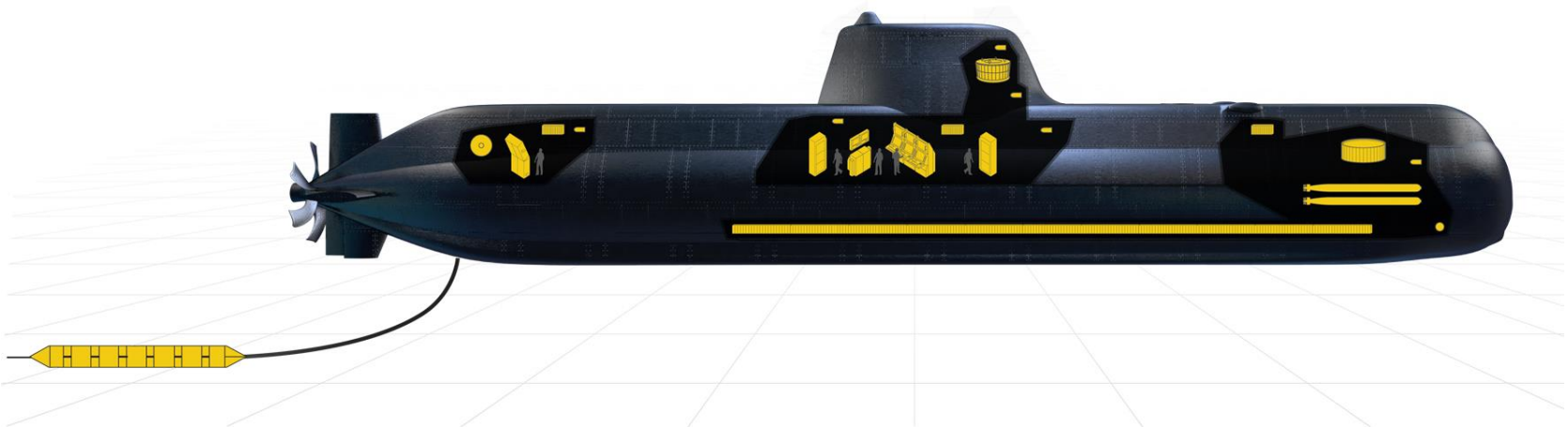
- generates visual representation of sea bottom profile in forward direction
- applicable as a navigation and safe surfacing aid
- Horizontal detection sector: 120°
- Vertical detection sector: 60°



ISUS100 - A Considerable Step Forward in Evolution

The system solution for conventional submarines

- Improved sonar sensor performance for complex submarine missions
- Sea proven as well as innovative technology
- Minimum operator workload and maximum performance
- Optimum balance between computational power and energy consumption / low physical space occupancy
- Technology and service support can be provided to IN through our subsidiary ATLAS India



ISUS100

A Considerable Step Forward in Evolution



Contact

ATLAS ELEKTRONIK GmbH

Sebaldsbruecker Heerstrasse 235

28309 Bremen | Germany

Phone: +49 421 457-02

Telefax: +49 421 457-3699

www.atlas-elektronik.com

