



Integrated Shipborne Protection

Classification: Three days Unclassified

Instructor: Dr. Arthur Self

This detailed technical seminar reviews the concepts and issues surrounding ship survivability in today's naval environments, including the asymmetric threat.

Emphasis is on showing practical performance requirements and issues and includes demonstration of state-of-the-art simulation software of latest missile/CM concepts. Following a detailed review of ship roles and their principal characteristics [incl. radar, IR and EW perspectives], the course moves on to examining EMEs [littoral, blue water] leading to EW requirements definition.

Ship sensor and weapon fits lead to typical protection measures involving a gamut of technologies. Lessons learned from recent naval conflicts [Falklands, Gulf war, Stark, Cole, etc] are reviewed. A wide ranging Technology assessment is included together with predicted impacts on future ship designs and sensor/weapon fits, including the concept of Force level/Network Centric operations. An extensive database of ship data, sensor/weapon fits is included for subsequent in-depth reading.

OUTLINE

1. ROLE OF EW IN NAVAL WARFARE AND THE IMPACT ON SHIP DESIGN

Naval Operational Roles

The Asymmetric Threat

Survey of Hull Sizes and Fitments

Sensor/Weapons vs Platform Size/Role

Influence on Ship Design Characteristics

Radar Cross Section and Detectabilities

Naval Stealth Platforms:- La Fayette; Visby; Sea Shadow; RN Type 23; SAAR 5; Sea Wraith

2. ELECTROMAGNETIC ENVIRONMENT (EME) IMPACTS

EMEs from Blue Water through to Littoral Scenarios

The Asymmetric Threat

Developing Anti-Ship Missile Threats and Effects on Ship ESM and ECM Systems

EME impacts on ESM and ECM systems, and Weapon/Platform Response Times

EW Lessons Learned from Recent Naval Engagements (Falklands, Gulf, USS Stark, USS Cole)

3. ESTABLISHING EW REQUIREMENTS

EW Roles for Naval Platforms including:- Self Protection; Area Defence; Surveillance; Over The Horizon Targeting; ASW; Amphibious Operations; Search and Rescue
ESM/ECM Requirements (Communications Systems; Radar Systems; Infrared Systems)
Typical EW Specifications
ECM and Layered Defence

4. PLATFORM AND EQUIPMENT ANALYSIS

Ship Platform Survey
Detailed Sensor and Weapons Fits, Performance Characteristics and Relative Advantages
Detailed Hardkill Weapons Review
Radar Ranges and ESM Detectability
EMI and EMC Installation Issues

5. ELECTRONIC COUNTERMEASURES (ECM)

Onboard ECM Performance Characteristics
Offboard ECM Performance Characteristics
Layered Defence Concept
Offboard Decoys (Distraction and Seduction)
Extensive Review of Onboard/Offboard EW products, including SIREN, NULKA, RPVs, Chaff, etc
Detailed ECM effectiveness [J/S, etc]
Combined Onboard/Offboard ECM

6. CRITICAL ISSUES IN SHIPBORNE PROTECTION

Implications of Threats and Environments on Battlespace
Individual Sensor/Weapon up to Force level [Network Centric]
Response Time issues and the Need for Integrated EW
Multi-Function Radar (MFR) Requirements
Sensor/Weapon Integration Attributes
Area Protection Issues

7. REVIEW OF INTEGRATED SHIP EW DEFENCE PROGRAMMES

Integrated EW Systems – SLQ-32, APECS
Integrated Ship Defense Programs – AEGIS, NATO Anti-Air Warfare System (NAAWS), Family of Anti-Missile Systems (FAMS), Rapid Anti-Ship Missile Defense System (RAIDS), Advanced Integrated EW System (AIEWS)
MFR Development – APAR, MESAR, ARABEL, EMPAR, SAMPSON

8. INTEGRATED SENSOR/WEAPON CONCEPTS

Impacts on Command and Control (CC) Architectures/Technologies

Review of C&C Systems
Data Fusion and TEWA, NEWCP
Issues and Solutions for Sensor/Weapon Integration and Coordination
New Platform-Level and Force-Level Coordination Developments –
Ship Self Defense System (SSDS), Cooperative Engagement Capability (CEC)
New Ship Procurement Programs: Type 45, TFC, F-124, F100

9. IN-DEPTH TECHNOLOGY REVIEW

Technology Areas –

- Antenna/Receivers
- Fibre Optics
- GaAs
- Transmitters
- Processing/Software
- COTS
- GUI
- Superconductivity

Sensor Advances

- Radar – (MFR and ANTI-Stealth)
- ESM - (MMW, LPI, HADF/PESM, Situational Awareness, SEI/HULTEC)
- EO/IR

Weapon Advances

- Hardkill and Softkill
- Onboard/Offboard Concepts
- DD21/DDX/LCS/HORIZON/Trimaran
- Directed Energy Warfare [Laser, HPM, Electric guns]

EW Databases

10. SUMMARY & CONCLUSIONS

Who Should Attend?

Military and industry professionals who need to understand today's scenarios and all of the issues involved in making naval ships survivable. This is an invaluable seminar for EW practitioners and system designers. It gives the total picture on ship survivability as well as the latest technology advances and R&D programs.

Materials

Seminar notes including copies of visual aids and application notes are provided.

Instructor

Dr. Arthur Self has over 25 years of experience in Electronic Warfare, including eleven years at a UK Ministry of Defense research establishment leading the development of a range of EW systems for UK forces before joining a Canadian EW company. He has led a broad range of EW activities which include extensive R&D into new receiver, processing and frequency extension technologies, including the development of novel, next-generation naval ESM and ECM products.