Electronic Warfare Training Courses
For the Modern Warfighter
Capability Overview

MASS is the UK’s leading provider of independent Electronic Warfare Operational Support (EWOS) training, products and services across the air, land and maritime domains.

Our expertise spans the entire field of EW support, ranging from operationally focused training, design and installation of operational support centres and EW training schools through to countermeasures development, data management, and the provision of EW Consultants.

Our proven capability is founded on many years of dedicated support to the UK Defence EW Centre where we have supplied world leading expertise in countermeasures development and sophisticated EW data management. Our next generation EW data management system, THURBON™, has been selected to replace the current UK Defence EW Database.

Primary Business Areas

- **EW Training**
- **EW Training Schools**
- **EW Centre Design and Development**
- **EW Data Management Systems**
- **Countermeasures Development**

**EW Training.** MASS has considerable experience of training foreign and domestic armed forces in all aspects of air, land and maritime EW. Providing a unique mix of operational and technical instruction, founded on UK military and scientific experience, we offer a tiered approach to developing EW capability.

Our approach to training uses a combination of traditional classroom instruction underpinned by the use of sophisticated modelling and simulation tools. This blended solution enables students to develop their skills more quickly, expediting the route to operational effectiveness.

We are the route to operational independence in EW for our customers.

We offer a flexible approach to specific course design. All of our courses are adaptable, and can be tailored to specific customer requirements. Courses can either be delivered at our state-of-the-art UK training facilities in Lincoln, or at an agreed customer location.

Our unique Electronic Warfare Mission Support Tool (EWMST) incorporates planning applications for Electronic Support.

Trusted to provide advice and support to the UK Ministry of Defence.
Measures (ESM), Counter Remote Controlled Improvised Explosive Device Electronic Warfare (CREW), EW asset management and jamming mission planning.

In addition it provides a dynamic Path Profile Analysis (PPA) tool to aid in the planning, positioning and management of traditional communications platforms whilst adding Situational Awareness (SA) by highlighting likely enemy positions. EWMST is utilised as a briefing tool in our EW training courses.

**EW Training Schools.** Using a proven model based on our UK EW training facilities we are able to design and install complete networked training schools, equipped with sophisticated simulation tools that are configured to meet customers’ specific requirements.

**EW Centre Design and Development.** Using our wide-ranging expertise of EW Centre operations we can design and install scalable EW Centres tailored to specific customer requirements. Using in-country experts we can provide a totally integrated support solution able to develop with your specific needs and EW capabilities.

**EW Data Management Systems.** Our next generation EW Data Management System (EWDMS), THURBON™, provides users with the capability to store and manage complex platform, sensor and weapon system data. This facilitates an enhanced capability to conduct Electronic Order of Battle (EOB) analysis; EW planning and automated intercepts analysis.

**Countermeasures Development.** Outside of Government departments, we are unique in our ability to offer a design and development service for platform protection countermeasures & tactics, advanced engagement models and effectiveness evaluation using tests and trials. Customers can be provided with technical assistance from Domain Knowledge Experts (DKE) with military and scientific backgrounds, or the relevant training support to provide self-sufficiency.
**Introduction to Electronic Warfare (EW)**

<table>
<thead>
<tr>
<th>Electronic Warfare Support Measures (ESM)</th>
<th>Overview</th>
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</thead>
<tbody>
<tr>
<td>ESM refers to the provision of Intelligence, SA, threat warnings and Indicators and Warnings (I&amp;W). ESM is also referred to as Electronic Support or more recently Electronic Surveillance (ES) in the widely used ‘effects-based’ terminology.</td>
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<thead>
<tr>
<th>Electronic Countermeasures (ECM)</th>
<th>Overview</th>
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<tbody>
<tr>
<td>ECM refers to jamming, deceiving, disrupting and denying an adversary’s electronic equipment. ECM is more commonly referred to as Electronic Attack (EA).</td>
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<table>
<thead>
<tr>
<th>Electronic Protection Measures (EPM)</th>
<th>Overview</th>
</tr>
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<tbody>
<tr>
<td>EPM refers to Electronic Protection (EP), or more recently Electronic Defence (ED), ensures the effective use of the EMS by Friendly Forces. Activities in this area include emission control (EMCON) for radars, communications systems and CREW. EPM may also be referred to as Electronic Counter Countermeasures (ECCM).</td>
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</table>
MASS Electronic Warfare Training Courses

Courses

Electronic Warfare Foundation

Acoustic Analysis and Anti-Submarine Warfare Fundamentals
Air and Maritime Platform Protection (Level 1)
Air and Maritime Platform Protection (Level 2)
Airmanship for Sensor Operators
Anti-Submarine Warfare (Level 1)
Anti-Submarine Warfare (Level 2)
Anti-Submarine Warfare (Level 3)
Anti-Submarine Warfare Familiarisation for Principal Warfare Officers
Comms Electronic Support Measures (ESM) Level 1
Comms ESM Level 2
Comms Intelligence (COMINT) Analysis
Countermeasures Design
Countermeasures Development and Platform Protection
Electronic Intelligence (ELINT) Analysis
Electronic Warfare Data Management
Electronic Warfare Operational Support
Electronic Warfare Staff
Geospatial Intelligence
Information Operations
Radar ESM / Radar Fundamentals (Level 1)
Radar ESM / Radar Techniques (Level 2)
Radar Signal Processing
Robust Comms
Robust EOIR
Robust Radar
Threat Vulnerability Analysis and Countermeasures Development - Introduction
Weapon System Exploitation

Specialist Tactical Data Link (TDL) Courses
# Electronic Warfare Foundation

The course will provide personnel with an introduction to EW and Signals Intelligence (SIGINT).

## Course Content

The EW Foundation course modules will include the following areas:

- Components of EW and SIGINT
- The Electromagnetic Spectrum (EMS)
- Wave theory and propagation
- Comms Electronic Support Measures (CESM) fundamentals
- Radar Electronic Support Measures (RESM) fundamentals
- Intelligence feeds and sources
- Operational use of EW in air, land and maritime domains
- Battlespace Spectrum Management (BSM)
- The role of the EW Coordination Cell (EWCC)
- Electro-Optic and Infra-Red (EO&IR) overview
- Intelligence Surveillance Target Acquisition and Reconnaissance (ISTAR)
- Platform / Force protection

## Course Duration

10 days

## Entry Criteria

No prior knowledge of EW is required prior to attendance.
Acoustic Analysis and Anti-Submarine Warfare Fundamentals

The course will provide personnel with 12 weeks of training in modern principles of sonar, focusing primarily on passive sonar in an operational environment. Upon completion, personnel will understand the fundamentals of the sonar and acoustic sphere of operations.

Course Content

The Acoustic Analysis and Anti-Submarine Warfare (ASW) Fundamentals course modules will include the following areas:

- Interpreting and exploiting the underwater environment
- Pre-mission threat assessments and awareness of evolving technologies
  - Prediction of target detection ranges
- Sensor deployment
- Detection and tracking of contacts using passive and active sonar
- Detection and tracking of contacts using non-acoustic methods
- Calculation of target speed using Demodulated Noise (DEMON) / Low Frequency Analysis and Recording (LOFAR) signatures and Doppler
- Signature recognition
- Contact classification using LOFAR and DEMON tools
- Identification and classification of secondary contacts
- Lost contact procedures
- Effects of active sonar on marine life

Course Duration

60 days

Entry Criteria

No previous ASW experience required but previous EW experience would be beneficial prior to attendance.
**Air and Maritime Platform Protection (Level 1)**

The course will provide personnel with an awareness of the primary factors involved in the vulnerability and protection of air and maritime platforms.

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Course Duration</th>
<th>Entry Criteria</th>
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</thead>
<tbody>
<tr>
<td>The Air and Maritime Platform Protection Level 1 course modules will include the following areas:</td>
<td>5 days</td>
<td>Completion of the EW Foundation Course would be beneficial prior to attendance.</td>
</tr>
<tr>
<td>• Threat systems</td>
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<tr>
<td>• Platform vulnerability including:</td>
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<tr>
<td>- Radar Cross Section (RCS)</td>
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<tr>
<td>- Infra-Red (IR) Signature</td>
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<tr>
<td>• Stealth technology overview</td>
<td></td>
<td></td>
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<tr>
<td>• Threat avoidance</td>
<td></td>
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<tr>
<td>• Threat detection</td>
<td></td>
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<tr>
<td>• Countering the threat through:</td>
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<tr>
<td>- Jamming (including noise and deception techniques)</td>
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<tr>
<td>- Expendables and decoys (including chaff and flare)</td>
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<tr>
<td>- Defensive tactics</td>
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<tr>
<td>• Introduction to Suppression of Enemy Air Defence (SEAD)</td>
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</table>
Air and Maritime Platform Protection (Level 2)

The course builds on the Air and Maritime Platform Protection Level 1 course, equipping personnel with enhanced knowledge of the vulnerabilities and protection of air and maritime platforms.

Course Content

The Air and Maritime Platform Protection Level 2 course modules will include the following areas:

- Advanced threat systems including:
  - Radar-Guided Surface to Air Missiles (SAM)
  - Electro-Optic / Infra-Red (EOIR) guided SAMs
    - Short Range Air Defence System (SHORADS)
    - Man Portable Air Defence Systems (MANPADS)
- In depth platform vulnerability including:
  - Radar Cross Section (RCS)
  - Infra-Red (IR) signature
- Low Observables / Stealth technologies
- Threat avoidance utilising:
  - Intelligence
  - Tactics, Techniques and Procedures (TTP)
- Threat detection equipment
- Countering the threat through:
  - Advanced jamming techniques
  - Expendables and decoys (including chaff, flare and Towed Radar Decoy (TRD))
- Suppression of Enemy Air Defence (SEAD)

Course Duration

5 days

Entry Criteria

Completion of the EW Foundation and the Platform Protection Level 1 courses would be beneficial prior to attendance.
### Airmanship for Sensor Operators

The course is for air, land and maritime personnel training to become airborne sensor operators. The Airmanship for Sensor Operators course will provide students with a sound grounding in the factors affecting safety and situational awareness whilst in and around aircraft.

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<tr>
<th>Course Content</th>
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<th>Entry Criteria</th>
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<tr>
<td>The Airmanship for Sensor Operators course modules will include the following areas:</td>
<td>5 days</td>
<td>No previous knowledge of Airmanship is required for attendance.</td>
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<tr>
<td>• Theory of flight</td>
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<td>• Airfield arrival and departure procedures</td>
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<tr>
<td>• Classifications of airspace (airways, Visual Flight Rules (VFR) airspace, Instrument Flight Rules (IFR) airspace)</td>
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<tr>
<td>• Navigational concepts</td>
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<td>• Aircraft instrumentation</td>
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<td></td>
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<tr>
<td>• Air traffic radio procedures</td>
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<td>• Maps and charts</td>
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<td>• In-flight awareness (fuel monitoring, the need for air safety, diversion airfields, intercom)</td>
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<td>• Meteorological conditions (air pressure, pressure regions, temperature, clouds, weather fronts, wind shear, icing)</td>
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<tr>
<td>• Aero-medical topics (effects of g, hypoxia, disorientation)</td>
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<tr>
<td>• Flight safety</td>
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</tbody>
</table>
The course will provide personnel with theoretical knowledge of underwater sensors and Anti-Submarine Warfare (ASW), basic oceanography, how sound travels in water and some of the factors that impact on their sensors. A theoretical awareness of active and passive sonar systems is underpinned by instructor led practical exercises.

Course Content

The ASW Level 1 course modules will include the following areas:

- Knowledge of acoustic operations
  - Sound in water
  - Sound sources
- Knowledge of oceanography
  - Ocean variables
- Introduction to active and passive systems
  - Active sonar advantages & disadvantages
  - Passive sonar advantages & disadvantages
  - Introduction into operational employment of both active and passive
- Awareness of the effects of the environment
  - Wind / rain / fronts and eddies / topography
- Introduction into tactical thinking
- Basic signature reduction
  - Compartment noise rounds overview

Course Duration

5 days

Entry Criteria

No previous ASW experience required for attendance.
Antisubmarine Warfare (Level 2)

The course will build on knowledge gained during the Anti-Submarine Warfare (ASW) Level 1 course. Personnel will be introduced to departmental organisation for watch keeping, training and records collection.

Course Content

The ASW Level 2 course modules will include the following areas:

- Intermediate underwater acoustics
- Acoustics - ray paths and sound transmission modes
- Oceanography – ocean variables:
  - Ocean fronts and their effect on sound propagation
  - Eddies / vertical ocean currents
- Effects of the environment:
  - Ocean bottom composition & topography
  - Continental slope and rise / deep ocean basin
- Operational considerations / detection and classification - passive sonar:
  - Narrowband / Low Frequency Analysis and Recording (LOFAR) theory
  - Cavitation / main propulsion machinery / propulsion noise
- Demodulated Noise (DEMON) / LOFAR and aural analysis practical exercises
- Operational considerations / detection and classification – active sonar:
  - Mono-static / bi-static / multi-static / parametric sonar
  - Doppler theory
  - Pulse types
  - Anechoic cladding
  - Marine life and active sonar

Course Duration

5 days

Entry Criteria

Completion of ASW Level 1 training or 18 months experience of sonar operations would be beneficial prior to attendance.
Anti-Submarine Warfare (Level 3)

The course builds on Anti-Submarine Warfare (ASW) Level 2 and will provide personnel with extensive knowledge of underwater sensors and ASW. Personnel will be capable of applying this knowledge to brief command and formulate sonar search plans. On completion of the course, attendees will be fully prepared to fulfil their role as departmental supervisors.

Course Content

The ASW Level 3 course modules will include the following areas:

• Operational considerations:
  - ASW shipboard organisation
  - Mission planning
  - Acoustics
• Effects of the environment / mission planning
  - Environmental forecasting
• ASW tactics / countermeasures
  - Submarine search and evasion techniques
• Submarine propulsion
• Advanced passive sonar
• Self noise
  - Signature reduction

Course Duration

5 days

Entry Criteria

Completion of ASW Level 2 training or equivalent experience of sonar operations would be beneficial prior to attendance.
## Anti-Submarine Warfare Familiarisation for Principal Warfare Officers

The course will provide the Principal Warfare Officer (PWO) with sufficient understanding of Anti-Submarine Warfare (ASW) to provide tactical advice to their Commanding Officer, to write an Operational Tasking Signal directing the ASW effort and perform the duties of the Head of the ASW Department.

<table>
<thead>
<tr>
<th>Course Content</th>
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<tbody>
<tr>
<td>The ASW Familiarisation for PWO course modules will include the following areas:</td>
<td>10 days</td>
<td>PWOs qualifying or undergoing refresher training.</td>
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<tr>
<td>• ASW Command and Control (C2)</td>
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<tr>
<td>• ASW tactics / countermeasures</td>
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<tr>
<td>• Submarine search and evasion techniques</td>
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<tr>
<td>• Operational considerations</td>
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<tr>
<td>• Submarine propulsion</td>
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<td>• Environmental effects</td>
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<tr>
<td>• Personnel / training</td>
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<tr>
<td>• ASW shipboard organisation</td>
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<tr>
<td>• Signature reduction / self noise</td>
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<tr>
<td>• Threat / principles of Mine Countermeasures (MCM)</td>
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<tr>
<td>• ASW mission planning and execution</td>
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</table>
Comms Electronic Support Measures (Level 1)

The course will provide personnel with training and knowledge of Comms Electronic Support Measures (ESM) theory in order to prepare for Comms ESM operator roles.

Course Content

The Comms ESM Level 1 course modules will include the following areas:

- Comms networks
- Comms targeting
- Roles and responsibilities of the CESM operator and EW Supervisor
- Basic code breaking
- Network and traffic (1st line) analysis
- Global System for Mobile (GSM) Comms overview
- Satellite Communications (SATCOM) overview
- Radio Controlled Improvised Explosive Device (RCIED) overview
- Counter RCIED Electronic Warfare (CREW) principles
- Introduction to EW planning
- Introduction to complex signals

Course Duration

10 days

Entry Criteria

Completion of the EW Foundation Course would be beneficial prior to attendance.
# Comms Electronic Support Measures (Level 2)

The course will provide personnel with an in-depth knowledge of Comms Electronic Support Measures (ESM). Upon successful completion, personnel will be able to demonstrate their knowledge of complex signals and data exploitation concepts, with an emphasis on modern Comms systems and emerging capabilities.

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<tr>
<th>Course Content</th>
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<th>Entry Criteria</th>
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<tbody>
<tr>
<td>The Comms ESM Level 2 course modules will include the following areas:</td>
<td>15 days</td>
<td>Completion of the Comms ESM Level 1 course or at least 1 year operational Comms ESM experience would be beneficial prior to attendance.</td>
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<tr>
<td>• Propagation, antennas and complex wave forms</td>
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<td>• Initial Intercept Plan (IIP)</td>
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<td>• Production of appropriate level intelligence reports</td>
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<tr>
<td>• Prioritise target tasks for search / intercept plans</td>
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<tr>
<td>• Analogue and Digital comms including:</td>
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<tr>
<td>- Direct Sequence Spread Spectrum (DSSS)</td>
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<tr>
<td>- Terrestrial Trunk Radio (TETRA)</td>
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<tr>
<td>- Voice Over Internet Protocol (VoIP)</td>
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<tr>
<td>- Global System for Mobile (GSM) Comms infrastructure and associated architecture</td>
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<tr>
<td>- High Power Cordless Phones (HPCP)</td>
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<td>- WiMax / OSI 7 layer</td>
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<tr>
<td>- Synchronous and asynchronous techniques</td>
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<tr>
<td>• Comms ESM support to Electronic Attack (EA)</td>
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<td>• Comms ESM support to Electronic Protection (EP)</td>
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</table>
Comms Intelligence Analysis

Course Content

The COMINT analyst course modules will include the following areas:

• Roles and responsibilities of the COMINT analyst
• Analytical processes and problem solving
• Comms networks and Orders of Battle (ORBAT)
• Intelligence Cycle and EW Estimate
• Intelligence Preparation of the Battlespace (IPB) / Environment (IPE)
• EW Triage / information prioritisation
• Cryptanalysis techniques
• EW operators log creation and interpretation
• Extraction of information from:
  - Operators logs and comments
  - Direction Finding (DF) results
  - Code words / Cover terms
• Database manipulation and processing
• All source Intelligence feeds

• Intelligence fusion including Intelligence Surveillance
  Target Acquisition and Reconnaissance (ISTAR) sources
• Intelligence briefing

Course Duration

10 days

Entry Criteria

Although not a prerequisite, it would be beneficial for personnel to have completed the EW Foundation course and/or fulfilled the role of a COMINT operator prior to attendance.
Countermeasures Design

The Countermeasures (CM) Design course builds on the Weapon System Exploitation course and will provide personnel with in-depth knowledge and skills for exploiting and understanding CM techniques, allowing the construction of candidate CM tactics.

Theory lessons are consolidated by exercises and case studies through the use of CM techniques built into defensive tactics.

Course Content

The CM Designer course modules will include the following areas:

- Design of CM techniques and their incorporation into a defensive tactic
- Principles of CM techniques
- Design and application of:
  - Chaff programs
  - Flare programs
  - Electronic CM (ECM) techniques
  - Defensive manoeuvres
  - Decoy techniques
  - CM tactics

Course Duration

5 days

Entry Criteria

Personnel should have completed the Weapon System Exploitation course or Introduction to Threat Vulnerability and Countermeasures Development course prior to attendance.
Countermeasures Development and Platform Protection

The Countermeasures (CM) Development and Platform Protection course utilises modelling software and builds on the CM Design course. The course will provide personnel with the knowledge to determine the susceptibility of a platform, establish the vulnerabilities of threat weapon systems and use this information to develop CM to maximise platform survivability.

Theory lessons are consolidated by exercises and case studies through the use of engagement modelling software.

Course Content

The CM Development and Platform Protection course modules will include the following areas:

- EW threat analysis to identify vulnerabilities such as:
  - Radio Frequency (RF) systems
  - Electro-Optic (EO) systems
  - Infra-Red (IR) systems
- Threat receiver techniques influencing jamming selection
- Influence of low observable technologies on the CM process
- Threat detection and selection of the appropriate tactics and CM development process
- Processes and procedures used in developing CM
- Engagement simulations using modelling software

Course Duration

10 days

Entry Criteria

Personnel should have completed the Countermeasures Design course or equivalent prior to attending this course.
Electronic Intelligence Analysis

The course will provide knowledge and understanding of Electronic Intelligence (ELINT) analysis enabling personnel to perform the duties of an ELINT analyst. Upon successful completion of this course using a combination of lectures, practical exercises and scenarios, attendees will be fully conversant with the role and responsibilities of the ELINT analyst.

Course Content

The ELINT analysis course modules will include the following areas:

• Electromagnetic (EM) wave propagation
• Radar theory from an ELINT perspective
• Radar parametrics to include:
  - Pulsed radar waveforms
  - Complex RF agile systems
  - Interpulse and Intrapulse modulation types
• ELINT support to EW operations
• ELINT principles to include:
  - Tasking
  - Collection
  - Analysis
  - Reporting

Course Duration

5 days

Entry Criteria

In order to maximise the effectiveness of this training, attendees should have a basic knowledge of radar theory as a prerequisite.
**Electronic Warfare Data Management Systems**

The course will provide personnel with theoretical and practical experience of Electronic Warfare (EW) Data Management Systems (EWDMS). The requirement for effective data management to support EW will be covered along with the necessary structures and features of a modern EWDMS. Access to advanced EWDMS application software will be provided to support practical exercises.

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<tr>
<th>Course Content</th>
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<th>Entry Criteria</th>
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<tbody>
<tr>
<td>The EW Data Management Systems course modules will include the following areas:</td>
<td>5 days</td>
<td>No pre-requisite knowledge is required prior to attending this course.</td>
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<tr>
<td>- Database formats</td>
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<tr>
<td>- Principles of EW Relational Database Management Systems (RDBMS)</td>
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<tr>
<td>- Sub-divisions of an EW database</td>
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<tr>
<td>- The principles of:</td>
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<td>- EW Intelligence capture</td>
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<tr>
<td>- Using a database to analyse data</td>
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<td>- Database support to EW equipment</td>
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<td>- Electronic Orders of Battle (EOB) production</td>
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Electronic Warfare Operational Support

The course will provide personnel with knowledge and understanding of how a typical Electronic Warfare Operational Support (EWOS) Centre provides the requisite EW support to operational Frontline formations. The purpose and capabilities of an EWOS centre are covered along with the development processes used to provide EW mission data and guidance.

Course Content

The EWOS course modules will include the following areas:

- Purpose of an EWOS centre
- Responsibilities and functions of the various departments within an EWOS centre
- Skill sets required within an EWOS centre
- Use of information technology within an EWOS centre
- Intelligence feeds required by an EWOS centre
- Use of the EWOS product (mission data including countermeasures, EW training and guidance)

Course Duration

5 days

Entry Criteria

No pre-requisite knowledge is required but completion of the EW Foundation course would be beneficial prior to attendance.
Electronic Warfare Staff

The course will provide personnel with in-depth knowledge of Electronic Warfare Staff responsibilities and an overview of EW support to the Joint Force Commander (JFC). Attendees will gain an appreciation of offensive EW effects and techniques, enabling a more successful contribution to EW Staff planning at the Joint Force Headquarters (JFHQ) level.

Course Content

The EW Staff course modules will include the following areas:

- EW doctrine and principles
- Intelligence gathering techniques and associated outputs
- Principles of:
  - Intelligence Surveillance Target Acquisition and Reconnaissance (ISTAR)
  - Command & Control Warfare (C2W)
  - Information Operations (IO)
  - Electronic Attack (EA)
  - Battlespace Spectrum Management (BSM)
- EW Coordination Cell (EWCC)
- All-Source Intelligence Cell (ASIC)
- EW Planning and deployments to include:
  - Intelligence cycle
  - EW estimate
  - Asset management
  - Command and Control (C2) of offensive EW
- Coordination with operations, intelligence staff
- EW Mutual Support (EWMS):
  - Multi-national cooperation
  - De-confliction
- EW support to the Find Fix Finish Exploit Analyse and Disseminate (F3EAD) cycle
- EW Intelligence briefings

Course Duration

5 days (theory and practical exercises) or
10 days (theory and practical exercises with additional EW war-gaming scenarios)

Entry Criteria

No prerequisite knowledge is required in order to participate in this course, although a basic understanding of EW would be beneficial.
Geospatial Intelligence

The course will provide personnel with an overview and working knowledge of Geospatial Intelligence (GEOINT) via the use of Imagery, Imagery Intelligence (IMINT) and geospatial information.

Course Contents

The Geospatial Intelligence course modules will include the following areas:

- Imagery interpretation principles, techniques and procedures
- Collation, analysis and evaluation of imagery
- Use of geospatial information including:
  - Maps
  - Charts
  - Grid systems
  - On-line mapping tools
- Mosaic construction
- Imagery manipulation
- Dissemination of IMINT
- Production of imagery for inclusion in target packs
- Analysis of:
  - Terrain
  - Structures and installations
  - Urban conurbations
- Battle Damage Assessment (BDA)

Course Duration

5 days

Entry Criteria

No previous Geospatial Intelligence knowledge is required to participate in this course.
The course will provide personnel with knowledge of Information Operations (IO) in the ever evolving sphere of Command & Control Warfare (C²W).

**Course Content**

The Information Operations course modules will include the following areas:

- Computer Network Operations (CNO)
- Psychological Operations (PsyOps) / Media Operations
- Physical destruction (to include Directed Energy Weapons (DEW))
- Military presence, posture and profile
- Information Security (IS) / Operational Security (OPSEC)
- Military deception
- Electronic Warfare (EW) in support of IO
- Battlespace Spectrum Management (BSM)
- Civil-Military Cooperation (CIMIC)
- Important legal considerations

**Course Duration**

5 Days

**Entry Criteria**

No previous IO experience required.
## Radar Electronic Support Measures / Radar Fundamentals (Level 1)

The course will provide personnel with training and knowledge of Radar Electronic Support Measures (ESM) / Radar Fundamentals theory in order to prepare for Radar ESM operator roles.

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Course Duration</th>
<th>Entry Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Radar ESM /Radar Fundamentals Level 1 course modules will include the following areas:</td>
<td>10 days</td>
<td>Completion of the EW Foundation Course would be beneficial prior to attendance.</td>
</tr>
<tr>
<td>• Radar ESM in the modern battlespace</td>
<td></td>
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<tr>
<td>• Radar fundamentals and principles</td>
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<tr>
<td>• Radar parameters</td>
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<tr>
<td>• Radar weapon systems</td>
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<tr>
<td>• Introduction to Electronic Order of Battle (EOB)</td>
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<tr>
<td>• EW Databases</td>
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<td></td>
</tr>
<tr>
<td>• Roles and responsibilities of the Radar ESM operator and EW Supervisor</td>
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<td></td>
</tr>
<tr>
<td>• Introduction to ELINT</td>
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</tr>
</tbody>
</table>
Radar Electronic Support Measures / Radar Techniques (Level 2)

The course will provide personnel with an in-depth knowledge of Radar Electronic Support Measures (ESM) / Radar Techniques focussing on analysis, reporting and planning techniques. Upon successful completion, personnel will be able to demonstrate their knowledge of advanced radar techniques and specialist radar applications.

Course Content

The Radar ESM / Radar Techniques Level 2 course modules will include the following areas:

- Radar theory:
  - The radar range equation
  - Power range relationships
  - Radar detection range
  - Radar Cross Section (RCS)
- Atmospheric attenuation, surface reflection, diffraction and refraction
- Antenna characteristics and properties
- Radar waveforms and modulations
- ESM / RWR equipment and weapon systems
- Jamming types and methodology

Course Duration

15 days

Entry Criteria

Successful completion of Radar ESM / Radar Fundamentals Level 1 training would be beneficial prior to attendance.
Radar Signal Processing

The course will provide an in-depth understanding of Radar Signal Processing and receiver design considerations, equipping personnel with the knowledge and skills to understand and exploit radar signal processing chains.

Theory lessons are consolidated by exercises and case studies using modelling and simulations.

Course Content

The Radar Signal Processing course modules will include the following areas:

• Generic Signal processing architectures
• Design considerations and mechanisms used with different signal processing chains including:
  - Surveillance radar processing
  - Doppler processing
  - Ground Moving Target Indicator (GMTI) processing
  - Synthetic Aperture Radar (SAR) processing

Course Duration

5 days

Entry Criteria

Personnel should have completed the EW Foundation course or equivalent prior to attendance.
# Robust Comms

The course is designed to enable personnel to study communications systems and their robustness to intentional interference or Electronic Countermeasures (ECM).

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Course Duration</th>
<th>Entry Criteria</th>
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</thead>
<tbody>
<tr>
<td>The Robust Comms course modules will include the following areas:</td>
<td>20 days</td>
<td>Personnel should have experience of advanced comms engineering.</td>
</tr>
<tr>
<td>• Antenna directivity</td>
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<tr>
<td>• Electronic Attack (EA) / Electronic Defence (ED)</td>
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<tr>
<td>• Intercept and location</td>
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<tr>
<td>• Introduction to Long Range Wi-Fi(WiMax)</td>
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<tr>
<td>• Quadrature Amplitude Modulation (QAM)</td>
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<tr>
<td>• Open Systems Interconnection 7 Layer Model (OSI 7 Layer)</td>
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<tr>
<td>• Propagation theory</td>
<td></td>
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<tr>
<td>• Receiver theory</td>
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<tr>
<td>• Role of the Intercept Officer</td>
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<tr>
<td>• Synchronous and asynchronous</td>
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<tr>
<td>• Thuraya, Iridium, Very-Small-Aperture-Terminal (VSAT), Inmarsat</td>
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<tr>
<td>• Unintentional RF / RF Measurement and Signature Intelligence (MASINT)</td>
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</tr>
</tbody>
</table>
# Robust Electro-Optical / Infra-Red Systems

The course is designed to enable personnel to study Electro-Optics / Infra-Red (EOIR) Systems and their robustness to intentional interference or Electronic Countermeasures (ECM).

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Course Duration</th>
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</thead>
<tbody>
<tr>
<td>The EOIR Systems course modules will include the following areas:</td>
<td>10 days</td>
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<tr>
<td>• Introduction to EOIR systems</td>
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<tr>
<td>• Blackbody radiation, reflection and transmission of radiation</td>
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<tr>
<td>- Types of transduction</td>
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<tr>
<td>• Typical calculations relating to EOIR spectral regions</td>
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<tr>
<td>• Optical engineering</td>
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<tr>
<td>• Concepts of active and passive EOIR systems</td>
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<tr>
<td>• Tracking control of EOIR systems</td>
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<tr>
<td>• Determining a robust EOIR system</td>
<td></td>
</tr>
</tbody>
</table>

## Entry Criteria
Personnel should have experience of advanced EOIR engineering.
Robust Radar

The course is designed to enable personnel to study radar systems and their robustness to intentional interference or Electronic Countermeasures (ECM).

Course Content

The Robust Radar course modules will include the following areas:

• Roles of radar systems and ECM in an operational context
• Detection and tracking performance of a radar system in the presence of noise and clutter
• Calculation of antenna characteristics
• Principles of various radar signal processing techniques
• Configurations and forms of ECM and prediction of effects
• Evaluation of Electronic Protection Measures (EPM)

Course Duration

20 days

Entry Criteria

Personnel should have experience of advanced radar engineering.
The course will provide air and maritime personnel, involved in platform protection, with an introduction to threat vulnerability analysis and the subsequent development of effective Countermeasures (CM).

**Course Content**

- EW Threat Vulnerability Analysis and Countermeasures Development (TVACD) - Introduction course modules will include the following areas:
  - EW Threat Vulnerability Analysis (TVA) of:
    - Radio Frequency (RF) systems
    - Electro-Optics (EO) systems
    - Infra-Red (IR) systems
  - Receiver techniques influencing selection of jamming techniques
  - Engagement modelling
    - Assessment of generic CM effectiveness
    - Optimisation of CM versus the threat
    - CM robustness development

**Course Duration**

5 days

**Entry Criteria**

Personnel should have completed the Air and Maritime Platform Protection Level 1 course prior to attendance.
Weapon System Exploitation

The Weapon System Exploitation course builds on the Radar Signal Processing course and will provide personnel with the knowledge required to build candidate weapon system models from Electronic Intelligence (ELINT) data for subsequent exploitation and Countermeasures (CM) development.

Course Content

The Weapon System Exploitation course modules will include the following areas:

- Radar and sensor principles, capabilities and applications
- Missile design and performance
- ELINT analysis techniques for exploitation
- Weapon system modelling and simulation
- Receivers and jamming techniques
- Threat detection, tactics and CM development
- EW Operational Support (EWOS) processes
- EW data management systems

Course Duration

10 days

Entry Criteria

Personnel should have completed the Radar Signal Processing course or equivalent prior to attendance.
Network Enabled Capability (NEC), or Network Centric Warfare (NCW), provides enhanced military effect through the better use of information systems and tactical Data Links are one of the major enablers. All NATO nations and many others, utilise TDLs to exchange information and to provide command and control instructions. Depending on the TDL in use, the type of information exchanged varies, but may include: Surveillance, Command and Control, EW and various types of management information.

In association with SyntheSys Systems Engineers, we are now able to offer TDL training as part of our existing portfolio. These courses may be taken as part of an EW training course, or as an independent subject. The training courses are designed as a staged education, providing the capability to take a student, with little or no TDL experience, from zero knowledge through to expert level. The 3 levels are referred to as Basic, Foundation and Advanced.

TDL courses currently available (with standard duration):

**Basic**

- Communications Principles (1 Day)
- Introduction to TDL (1 Day)

**Foundation**

- Joint Range Extension Application Protocol (1 Day)
- Introduction to Link 11 (1 Day)
- Introduction to Link 22 (2 Days)
All of the courses are presented by highly qualified instructors who have extensive experience in the subject matter. For further information please contact ew@mass.co.uk or telephone +44 (0) 1480 222600

Introduction to VMF (2 ½ Days)
Introduction to JTIDS/MIDS Link 16 (2 ½ Days)

Advanced

Combat Net Radio Protocols-MIL-STD-188-220 (2 Days)

JTIDS/MIDS Network Design and Management (4 Days)

Most courses are supported by simulators, software demonstrators and/or use of specific tools (e.g. TACTX, DLTS, TNDS etc). TDL Courses are accompanied by a manual specific to that subject. Delegates also receive copies of the slides in both hand-out format and on CD. All courses are accredited to ISO 9001. Computer Based Trainer (CBT) is available for Introduction to JTIDS/MIDS Link 16.

TDL Related Courses (All 1 Day)

Frequency Clearance Agreements
Configuration Management
Principles of TDL Testing
TDL Acquisition
SIMPLE (STANAG 5602)
Information Exchange Principles
## Glossary

Glossary of terms and acronyms used in this brochure.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Expanded Term</th>
<th>Abbreviation</th>
<th>Expanded Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASIC</td>
<td>All-Source Intelligence Cell</td>
<td>EOIR</td>
<td>Electro-Optic / Infra-Red</td>
</tr>
<tr>
<td>ASW</td>
<td>Anti-Submarine Warfare</td>
<td>EOB</td>
<td>Electronic Order of Battle</td>
</tr>
<tr>
<td>BDA</td>
<td>Battle Damage Assessment</td>
<td>EP</td>
<td>Electronic Protection</td>
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<tr>
<td>BSM</td>
<td>Battlespace Spectrum Management</td>
<td>EPM</td>
<td>Electronic Protection Measures</td>
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<tr>
<td>C²</td>
<td>Command and Control</td>
<td>ES</td>
<td>Electronic Warfare Support / Electronic Surveillance</td>
</tr>
<tr>
<td>C³W</td>
<td>Command and Control Warfare</td>
<td>ESM</td>
<td>Electronic Warfare Support</td>
</tr>
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<td>CESM</td>
<td>Communications Electronic Support Measures</td>
<td>EW</td>
<td>Electronic Warfare</td>
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<td>CIMIC</td>
<td>Civil-Military Cooperation</td>
<td>EWCC</td>
<td>Electronic Warfare</td>
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<td>CM</td>
<td>Countermeasures</td>
<td>EWOS</td>
<td>Electronic Warfare</td>
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<td>CNO</td>
<td>Computer Network Operations</td>
<td>F³EAD</td>
<td>Find Fix Finish Exploit</td>
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<td>COMINT</td>
<td>Communications Intelligence</td>
<td>FP</td>
<td>Force Protection</td>
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<td>COMSEC</td>
<td>Communications Security</td>
<td>GEOINT</td>
<td>Geospatial Intelligence</td>
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<td>CREW</td>
<td>Counter Remote Controlled Improvised Explosive Device</td>
<td>GMTI</td>
<td>Ground Moving Target Indicator</td>
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<tr>
<td>DE</td>
<td>Directed Energy</td>
<td>GSM</td>
<td>Global System for Mobile Comms</td>
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<td>DEMON</td>
<td>Demodulated Noise</td>
<td>HPCP</td>
<td>High Power Cordless Phones</td>
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<tr>
<td>DEW</td>
<td>Directed Energy Weapons</td>
<td>IFR</td>
<td>Instrument Flight Rules</td>
</tr>
<tr>
<td>DF</td>
<td>Direction Finding</td>
<td>IIP</td>
<td>Initial Intercept Plan</td>
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<tr>
<td>DSSS</td>
<td>Direct Sequence Spread</td>
<td>IMINT</td>
<td>Imagery Intelligence</td>
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<tr>
<td>EA</td>
<td>Electronic Attack</td>
<td>IO</td>
<td>Information Operations</td>
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<tr>
<td>ECCM</td>
<td>Electronic Counter</td>
<td>IPB</td>
<td>Intelligence Preparation of the Battlespace</td>
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<tr>
<td>ECM</td>
<td>Electronic Countermeasures</td>
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<td>ED</td>
<td>Electronic Defence</td>
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<tr>
<td>ELINT</td>
<td>Electronic Intelligence</td>
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<tr>
<td>EM</td>
<td>Electromagnetic</td>
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<tr>
<td>EMCON</td>
<td>Emission Control</td>
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<td>EMS</td>
<td>Electromagnetic Spectrum</td>
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<tr>
<td>EMSEC</td>
<td>Emission Security</td>
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<tr>
<td>EO</td>
<td>Electro-Optic</td>
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</tbody>
</table>

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<table>
<thead>
<tr>
<th>Abbreviation</th>
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<th>Expanded Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPE</td>
<td>Intelligence Preparation of the Environment</td>
<td>SHORADS</td>
<td>Short Range Air Defence System</td>
</tr>
<tr>
<td>IR</td>
<td>Infra-Red</td>
<td>SIGINT</td>
<td>Signals Intelligence</td>
</tr>
<tr>
<td>IS</td>
<td>Information Security</td>
<td>TETRA</td>
<td>Terrestrial Trunk Radio</td>
</tr>
<tr>
<td>ISTAR</td>
<td>Intelligence Surveillance</td>
<td>TRD</td>
<td>Towed Radar Decoy</td>
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<td></td>
<td>Target Acquisition and Recording</td>
<td>TTP</td>
<td>Tactics, Techniques and Procedures</td>
</tr>
<tr>
<td>JFC</td>
<td>Joint Force Commander</td>
<td>TVA</td>
<td>Threat Vulnerability Analysis</td>
</tr>
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<td>JFHQ</td>
<td>Joint Force Headquarters</td>
<td>TVACD</td>
<td>Threat Vulnerability Analysis and Countermeasures</td>
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<td>LOFAR</td>
<td>Low Frequency Analysis and Recording</td>
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<td>Development</td>
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<td>Man Portable Air Defence System</td>
<td>VFR</td>
<td>Visual Flight Rules</td>
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<td>Operational Security</td>
<td>VoIP</td>
<td>Voice over Internet Protocol</td>
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<td>ORBAT</td>
<td>Order of Battle</td>
<td>WiMax</td>
<td>Long Range Wi-Fi</td>
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<td>OSI 7 Layer</td>
<td>Open Systems Interconnection 7 Layer Model</td>
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<td>PsyOps</td>
<td>Psychological Operations</td>
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<td>PWO</td>
<td>Principal Warfare Officer</td>
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<td>RCIED</td>
<td>Remote Controlled Improvised Explosive Device</td>
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<td>RCS</td>
<td>Radar Cross Section</td>
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<td>RDBMS</td>
<td>Relational Database</td>
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<td>RESM</td>
<td>Radar Electronic Support Measures</td>
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<td>RF</td>
<td>Radio Frequency</td>
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<td>RWR</td>
<td>Radar Warning Receiver</td>
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<tr>
<td>SA</td>
<td>Situational Awareness</td>
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<td>SAM</td>
<td>Surface to Air Missile</td>
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<td>SAR</td>
<td>Synthetic Aperture Radar</td>
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<td>SATCOM</td>
<td>Satellite Comms</td>
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<td>SEAD</td>
<td>Suppression of Enemy Air Defences</td>
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