Software-first, Ultra low SWAP-C RESM innovation for the future force

ESROE
Identifying the Spectrum

Agile, pervasive RESM – deployable at the tactical edge for deep, cross-domain threat intelligence.

Radar Electronic Support Measures (RESM) is a vital defense capability which has, until now, been reserved for major military platforms due to high SWAP, costs and operating requirements. ESROE's breakthroughs in RESM technology change this. Deployable anywhere, whether as a standalone miniature sensor system or a networked array across battlefields and coastlines, ESROE's ultra low SWAP-C solutions deliver agile, pervasive, radar detection, identification and geolocation. A spinout from the UK's Defence Science & Technology Laboratory, and at the forefront of RESM innovation, ESROE'S deep domain and software-first development expertise is now transforming the access to and use of this unique capability across battlespaces.

The world's smallest RESM system

ESROE's MicroESM provides comparable capabilities to traditional RESM systems but with significantly reduced SWAP requirements, making it a low-cost game-changer in the area of battlefield situational awareness. The key to these radical reductions in SWAP for an RESM capability lies in ESROE's processing software which is highly efficient at identifying radar pulses, making it compatible with small, low-power computing platforms that drastically reduce the overall requirements of the RESM system.

Continuous identification of known & unknown radars

The most accurate radar classification algorithms on the market today, ESROE's processing software is uniquely able to interpret very uncertain information; intelligently reporting both known and unknown radar emitters to continuously improve it's situational awareness. To make the most of this advantage, ESROE's software can also be embedded in the Electronic Surveillance suites used in a range of military platforms, from armoured vehicles and UAVs, to large multi-role warships and surveillance aircraft.

Scalable, networked deployment

The fully-automated RESM solution redesign means the capability can be scaled from individual special forces, to unmanned vehicles, and larger high value platforms - completely changing the way that RESM contributes to the safety of armed forces in hostile environments. Very small, with a low unit cost, MicroESM can be deployed in high volume too, making the solution highly versatile and resilient, as the units can be networked into an intelligent, self-healing array along coastlines, borders and battlefields.

Person-portable, ESROE's MicroESM is easily deployed on manned and unmanned systems to gain greater situational awareness of the ELINT environment and achieve a tactical edge on the electronic battlefield.

Information Superiority - across land, air and sea

MicroESM acts as a force multiplier, across domains, to improve situational awareness of the total ELINT environment. Extending threat warning and covert surveillance capabilities to a wide range of vehicles, system operators can penetrate deep into enemy defences, getting closer than ever previously possible to identify signals of interest and measure the characteristics of radars, out of range to legacy intelligence gathering systems.

At a glance:

- Passive receiver system mitigates detection
- Ultra low SWAP-C supports wide range of missions and use cases
- Modular design enables integration with small manned and unmanned platforms
- Fully automated, providing continuous intelligent surveillance
- Quick and easy to set up and operate
- Minimal system training and no requirement for electronic warfare background
- Integrates with existing signal libraries and records unknown detected radars

Land

Land-based Micro ESM

Augment ground based radar systems with multiple passive MicroESM sensors to build a more complete picture of the enemy's electronic order of battle. The more sensors deployed, the more resilient the system. ESROE sensors can be deployed to an individual or team, or networked across a battlefield, along a border, or a coastline, to extend surveillance capabilities way beyond what is currently possible with legacy solutions.

- Build a picture of enemy's order of battle
- Detect and locate hostile artillery and attack helicopters
- Protect ground forces by alerting to enemy units nearby
- Mount on lightly armoured or unarmoured vehicles to gather additional intelligence
- Operations can utilise the Soldier-as-a-Platform solution for EW capability

Air

Air-based MicroESM

MicroESM directly addresses the range challenge in electronic surveillance by being compact enough for installation on UAVs and drones, overcoming the sensor/target radar elevation limitations faced by land or sea platforms. Once airborne, MicroESM sensors can be seamlessly networked with other air, land, or maritime sensors, extending coverage and delivering accurate emitter geolocation and advanced EWOS capabilities through coordinated multi-sensor operation.

- UAV ESM payload can be used to provide location of a radar signal
- Low cost alternative to a traditional radar warning receiver (RWR) on transport aircraft
- Potential RWR for aggressor training aircraft
- Use 'collection mode' on covert surveillance missions, to avoid transmission to the ground.

Advanced performance with operational advantages

Sea

Sea-based MicroESM

Achieve reliable non-cooperative target identification across wide search areas to improve threat warnings. Detect and identify ships that have gone dark, or deploy RESM on covert surveillance vessels to gather operational intelligence from the hardest to reach locations. MicroESM enables EW to become pervasive across oceans and along coastlines.

- Extend RESM to insertion craft and patrol boats and minesweepers
- Detect and identify bomber aircraft or other warships
- Perform covert pre-mission surveillance of beachheads by adding sensors to USVs
- Use on UUVs to provide extra, low cost protection to surfacing vessels by detecting anti-submarine aircraft and fishing boats.

Flexible COTS packages

From a single person-portable sensor operated locally or remotely, to a coastal surveillance solution or a multi-sensor array, ESROE's autonomous, next-gen RESM solutions are available in a variety of commercial off the shelf (COTS) packages to meet user requirements. Each modular configuration shares a core set of technical benefits and attributes.

Technical Benefits

Reducing the typical £1M investment in a minimum 50 Kg ESM sensor system, to <2 Kg solution starting at under £200K, MicroESM is transforming access to and the use of RESM in contested environments.

The all aluminium sensor design lends itself well to a transformatively wide range of military use cases, whilst the modularity of the system also means it is possible to integrate small sensor heads into more traditional platforms.

ESROE also offers standalone software applications which can be embedded in Electronic Surveillance suites, used in a range of military platforms.

Technical Attributes

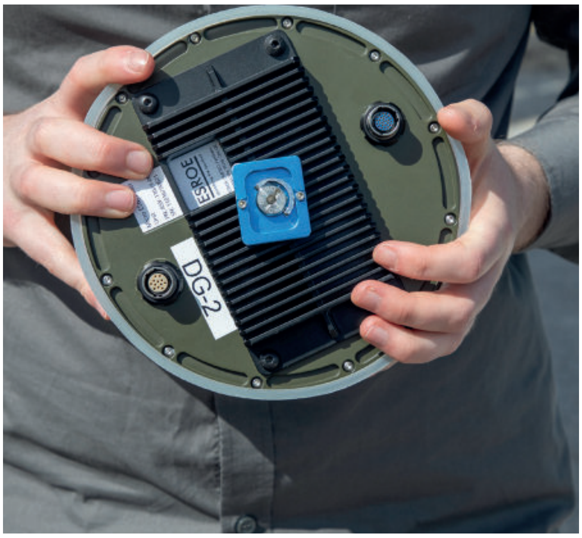
ESROE's MicroESM solutions are available in a variety of configurations to meet user requirements, but each model shares a core set of technical attributes:

- Frequency coverage: 2 GHz to 18 GHz
- Weight: < 2 Kg
- Operating voltage: 10-18v DC
- Power consumption: < 20 Watt
- Power source: BB2590 or LIPS 14 batteries
- Coverage: 360 degrees
- Operating range: Line of sight

Mission-ready MicroESM solutions

Delivering identification, bearing and geolocation of radar emitters with performance approaching that of legacy systems, but at a fraction of the cost and logistical burden, ESROE's RESM solutions support real-time information superiority across all domains.

Single sensor:
Virtually undetectable ELINT capabilities



Tactical deployment of a single, very low SWAP RESM sensor provides virtually undetectable, real-time Electronic Intelligence (ELINT) capabilities at the tactical edge for advanced threat protection.

ESROE's single sensor deployment equips:

- Ground troops with early warning of when they could be discovered/targeted by ground surveillance radars or radar guided attack.
- Light Electronic Warfare Troops (LEWTs) with the option to perform reconnaissance missions further forward than traditional ELINT systems.
- Covert operations with ESM that can be deployed at speed and automatically operated in transit, with no restrictions on manoeuvrability.
- Operations with ESM data that can be used alongside AIS and other sensor data.

As well as providing real-time awareness of radar threats in the environment, data captured by the sensor is recorded for analysis at a later date.

Remote single sensor:
Fully automatic RESM data capture

Deployed as a semi-permanent automatic solution, remote single sensors can be left in situ by frontline personnel, and operated remotely. ESROE's remote solution utilises a wireless TCP/IP socket to transfer track data back to a computer device running the MicroESM UI and control software.

A remote single sensor deployment enables real time ESM data to be collected on the frontline and shared with:

- ESM specialists in secure locations, to inform the forces command, enable better decision making, and shape a more informed electronic order of battle (EOB).
- Command, to provide situational awareness and ESM data amongst systems and units in operation.
- Libraries, to enhance ELINT and increase effectiveness of other systems.

Deployable anywhere...

Whether embedded in general purpose capabilities, reducing the need for dedicated RESM units, or deployed at scale to provide a resilient sensor network, ESROE solutions are inherently survivable and flexible enough for modern multi-domain operations.

Integrated sensor:
Deployable across manned and unmanned platforms

Deployable where larger ESM systems cannot go, ESROE's MicroESM solution can be integrated as a payload on current operational platforms, including unmanned systems.

Used standalone on a platform, or part of a sensor suite, integrated sensors deliver two key functions - awareness and reconnaissance - by providing:

- ESM data collection capability on unmanned systems such as UAVs, carrying out reconnaissance missions in denied regions.
- Manned vehicles with early warning of threats by identifying signatures of radar guided systems.
- A low power Radar Warning Receiver (RWR) for armoured vehicles, giving vehicle crews early threat warnings and more time to deploy countermeasures.
- Detection and identification capability for UAVs seeking radars of interest and counterbattery radars.
- Intelligence when designating targets for strike.

Multi-sensor:
Scalable and resilient geolocation of threat targets

With as few as two networked sensors out in the field, ESROE's multi-sensor deployment delivers threat geolocation capability. The ESM data captured by integrated and/or remote sensors - which can be placed across a range of platforms - are streamed back to the multi-sensor hub, allowing triangulation of bearing lines to provide an accurate indication of range.

Very small, with a low cost per unit, the networked sensors can be deployed in high volume, making the multi-sensor solution highly versatile and resilient:

- Enhancing ELINT data with geolocation of radar targets.
- Providing a low cost battlefield, border and coastline surveillance capability.
- Improving force protection around forward operating bases.
- Supporting the detection of unknown emitters, giving trained ESM operators the parameters and bearings needed to analyse tracks.

ESROE is completely changing the way that Radar ESM contributes to the safety of armed forces in hostile environments with radically deployable, software-first solutions for the future force.

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