SAAB

9LV Combat Management System

Integrated Counter Unmanned Aircraft Systems Capability

Saab's 9LV Combat Management System (CMS) combines complex sensors and effectors with enhanced situational awareness to deliver an advanced counter uncrewed aircraft system (CUAS).

The rapidly evolving use of uncrewed aircraft systems (UAS) for airborne intelligence, surveillance and reconnaissance (ISR), in addition to strike, targeting and indirect fire missions, is posing new challenges for military force protection and defensive counter air operations all over the world.

Building on a world class combat system, the Saab 9LV CMS integrates sensors, effectors and UAS classification to deliver an enhanced CUAS capability.

The system is a versatile and scalable solution, that supports varying levels of installation, mobility and integration to deliver advanced CUAS solutions for any situation - both military and civil applications.

A combination of advanced 9LV CMS CUAS features

Advanced sensor integration to mitigate UAS detection difficulty due to low observability and high manoeuvrability.

Enhanced situational awareness displayed in accordance with MIL-STD-2525, via a common recognised air picture, with fused sensor detection with tracks, in addition to increased UAS information.

Advanced UAS classification, supporting a hierarchy of UAV sub-classification based on size, propulsion and autonomy.

Novel Threat Identification leveraging positive UAS identification as well as non-cooperative kinematic threat intent assessment.

Versatile and scalable platform and system integration.

Effective airspace management to facilitate the planning and efficient execution of CUAS operations, simultaneously ensuring safeguards for friendly forces.

UAS class specific effector integration to achieve both traditional and novel UAS neutralisation.

Layered defence and escalatory response to ensure the successful targeting and engagement of a UAS or swarm of UAS.

Effective implementation of restrictive and permissive Rules of Engagement to minimise the likelihood of collateral damamge and meet the challenge of the evolving threat.

Sensor integration

The Saab 9LV CUAS CMS enables the integration of a range of advanced sensors, capable of UAS localisation, classification and recognition. These sensors include radio frequency (RF) protocol detection, micro doppler radar, passive radar and commercial remote identification systems and electro optic (EO)/infrared (IR) sensors to support enhanced detection capabilities.

The ability to integrate a range of sensors is critical to enable detection of UAS in an environment where it is extraordinarily difficult to detect low observability (acoustic, EO/IR and RF) and high manoeuvrability targets; compounded by the limitations of traditional integrated air missile defence (IAMD) sensors.

Advanced UAS Classification

UAS classification and threat identification is critical in airspace where malignant and non-malignant UAS operations may be undertaken using commercial or hardened military UAS.

Saab's classification support function enables a hierarchy of UAV sub-classification based on size, propulsion and autonomy and utilises a Multiple Attribute Decision Making method to combine:

- Simple or complex rules,
- Organic sensor classifications including image recognition, signature analysis and protocol detection
- Kinematic Model Based Classification, and
- Movement pattern analysis.

Novel Threat Identification

The threat identification function utilises positive UAS identification (IFF, ADS-B, Remote ID) with associated trust metrics. It employs non-cooperative kinematic threat intent assessment and incorporates both anomaly detection and spatio-temporal movement pattern analysis. With additional UAS specific rules, traditional IAMD identification criteria can also be supplemented.

Effective Airspace Management

The 9LV CUAS CMS airspace management facilitates the planning and efficient execution of CUAS operations, simultaneously ensuring safeguards for friendly forces. This is achieved by;

- Definition of zones including; identification, defence/ protection, engagement, safety and asset protection
- Local, Area, Zone and Joint Counter Air Coordination Methods,
- Application of Weapon Control Status, and
- Emerging UAS Traffic Management regulations.

The 9LV CUAS CMS airspace management function also supports integration of friendly UAS by enabling the definition of segregated airspace, including Restricted Operations Zones (ROZs) to support launch and recovery, air routes/corridors (e.g. AIRCOR, TR), and facilitates transit to and from a UAS mission area and mission specific ACM (e.g. UA, RECCE).

Effector Integration

CUAS operations require a range of effector and interdiction systems depending on the class of UAS in order to accommodate NATO Class I, II and III UAS.

The 9LV CUAS CMS supports the integration of a range of new effectors to enable this capability, including;

- RF protocol takeover systems that can fend off or force a landing,
- High Energy Laser Systems (1-10kW) to dazzle, disrupt or destroy the UAV,
- RF jammers that target the specific frequencies and protocols used for communication between the ground control system and UAV,
- Global navigation satellite system denial systems,
- Interceptor, physical capture, and fouling drones, and
- Small to medium calibre guns with a high rate of fire and air-burst ammunition.

Layered Defence & Escalatory Response

Targeting and engagement of a UAS or swarm of UAS is successfully achieved as part of a layered defence system. The advanced engagement planning and effector control functions of the 9LV CUAS CMS provide the ability to layer effectors and allow the means to progressively escalate a response. This is achieved by:

- Operator definition of UAS specific weapon channels/ kill chains to ensure proportionality of response.
- UAS specific non-destructive warnings and fending actions to dazzle or disrupt UAS operations.
- Applied weapons restrictions by warfare domain and threat type/class per engagement zone.
- Cross warfare domain coordination and prioritisation of effectors and fire control resources to maintain conventional warfare operations.
- Local area defence and high value asset protection modes.
- Pre-planned responses across threat types and classes using Kill Cards that define an escalatory response sequence, as an input to the engagement planning function.
- Manual, partial (Human In the Loop) or fully automated (Human On the Loop) engagements; and
- HMI to enact Fire Control Orders.

Rules of Engagement

The 9LV CUAS CMS enables effective implementation of restrictive and permissive Rules of Engagement by providing enhanced threat distinction and ensuring that the CUAS response is proportional, to minimise the likelihood of collateral damage.

The enhanced capabilities of the 9LV CUAS CMS coupled with new sensor and effector configurations enables existing Doctrine, Tactics, Techniques and Procedures (TTP) to adapt in meeting the challenge of this rapidly evolving threat.

Learn more about Saab's Integrated Counter Unmanned Aircraft Systems Capability