TRML-4D

Multi-functional surveillance and target acquisition sensor system

Step into the next dimension
TRML-4D is HENSOLDT's latest member of the C band (NATO G band) TRS-4D® radar family and is designed to be used as a remote-controlled mobile unit for effective ground-based air defence. The TRML-4D uses the state-of-the-art AESA (Active Electronically Scanned Array) technology, based on GaN (gallium nitride) solid state transmitters. With multiple, digitally formed beams and innovative electronic scanning, the TRS-4D® radar systems ensure full 3D surveillance over 360 degrees quickly and with unprecedented performance. The AESA-inherent graceful degradation and the use of reliable components guarantee a long service life and high operational availability.

Fast
Thanks to its electronic look forward / back scanning capability, the TRML-4D provides weapon systems with more time for reaction:

- Scanning a dedicated sector twice per mechanical rotation ("cued search" function) depending on recon information
- Initiating a track within a single scan (look back functionality) for threatening targets
- Automatically classifying specific targets as high priority threats and allocating additional radar illumination ("cued track" functionality)

Due to the higher track update rate resulting from this, the TRML-4D creates reliable tracks more quickly and with a minimum number of scans and, in this way, increases the time available to weapon systems for reaction, also in the case of manoeuvring and pop-up targets.

Accurate
The precise calibration of all antenna parts in combination with the given antenna aperture in C band yields highly accurate tracks, even for the smallest of flying threats, in both symmetric and asymmetric conditions, to ensure exact and fast weapon assignment and increased hit probability. The TOC (Tactical Operation Centre) uses these tracks to directly cue the effectors with the help of the radar's high priority tracking function, which means that no fire control system is required and response time is reduced significantly.

Resilient
Allocating radar resources to different scan types allows high-volume search and high-priority tracking to be combined in a sophisticated way. This combination of measurements ensures reliable tracking performance and target classification, especially for manoeuvring threats. Advanced, automatically triggered ECCM (Electronic Counter-Counter-Measures) and the tracker's high saturation level guarantee the system's performance even when jamming or interfering signals are present. The radar has sufficient capacity to uphold all functions simultaneously so as to ensure mission success even in stress situations involving a high density of targets.

Sustainable
Its modular architecture and its ability to be defined by software allow the radar system to be customised and its capability to be enhanced incrementally so that it is up to date throughout its life and fit for future challenges at any time.

Reliable
Completed with HENSOLDT Sensors' well-established SSR (Secondary Surveillance Radar) interrogator MSSR 2000 I®, TRML-4D provides the inevitable and reliable track identification to avoid friendly fire. The MSSR 2000 I® is capable to deal with interrogation modes up to Mk XIIA/S, including Mode S and Mode 5.

HENSOLDT
Detect and Protect.

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Applications

Remote-controlled air surveillance and fire control sensor system for short and medium range weapon systems

Robust and highly reliable system allowing to be relocated frequently and to be used for long-term deployment

Key Features

Accurate track-while-scan function combined with high-precision 3D tracking of dedicated targets

Multiple Beam on Receive
- Supports the creation of reliable air pictures with enhanced elevation estimation
- Enables parallel processing of data from the whole elevation range

AESA functionality for
- Increasing the probability of detection and enabling faster track initiation
- Supporting the creation of reliable air pictures, also for manoeuvring and pop-up targets
- Tracking one's own weapons ("Skin Track") and providing kill indication
- Tracking targets also in the cone of silence ("Overflight Tracking")
- Increasing the time available to weapon systems for reaction

Integrated IFF system with MkXII-A/S capability (incl. Mode S and Mode 5)

Additional features
- Software-based PSR (Primary Surveillance Radar) modes allow the radar modes to be adapted to each mission in advance
- Emission control for dedicated sectors
- Jammer detection, tracking and suppression
- Cued search in a dedicated sector with enhanced performance
- Target classification by PSR-based and IFF-based target identification
- Integrated continuous BIT (Build-In Test) functionality with fault localisation down to LRU (Line Replaceable Unit) level

Key Performance

Instrumented parameters	Range: 250 km Height: 30 km Radar cross section: 0.01 m^2 (RCS)
Minimum range	< 100 m
Elevation coverage	Surveillance: -2° … 70° with electronic tilt down to -10° Tracking: up to 90°
3D tracking capability	> 1,500 targets
Confirmed track range	Fighter aircraft: > 120 km Supersonic missile: > 60 km
Track accuracy	Azimuth: < 0.2° Elevation: < 0.3° Range: < 15 m

Environmental Conditions

Storage and transportation from -40 to +71 °C

Operation from -40 to +49 °C, plus solar radiation

Operation up to 3000 meters above sea level (MASL)

Can be operated at slopes with an inclination of up to 5°

Mobility

Transportable on cross-country trucks, e.g. MAN SX45, equipped with 20 ft ISO container fittings

Roll-on / roll-off capability for transport by rail, ship and A400M / C-130 Hercules

Set-up and de-camp within 10 minutes

Active INS (Inertial Navigation System) when driving to ensure rapid positioning and north alignment at the place of operation

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