

**AULOS<sup>®</sup>**

ELECTRONICS DIVISION

# PASSIVE COVERT RADAR



 **LEONARDO**

AULOS® is the passive radar system designed to provide detection and tracking capability for defence and homeland security applications. The system works by processing reflections from illumination sources such as commercial broadcast and communications signals. AULOS® is an eco-friendly system since it doesn't produce electromagnetic pollution.

Passive radar systems are unique because they do not have their own transmitters but exploit the electronic waves already produced by existing sources e.g. FM radio signals, telecommunication equipment. Passive radar systems are often referred as Passive Covert Radar (PCR) and as a covert radar the system is ideal for military applications.

A passive radar is not detectable by Anti Radiation Missile (ARM) and not easily disturbed by jammers. Since it exploits low frequencies, it can be successfully used to detect and track small targets flying at low altitude in urban areas and even in difficult orographic conditions.

## THE SOLUTION

The company has developed AULOS, a new passive radar that exploits the electromagnetic emission from transmitters such as FM radio stations, TV broadcasters, broadband communications signals for covert surveillance and tracking of stealth and low flying air targets. It simultaneously detects and tracks different targets with small radar cross-section by determining their position and altitude.



The system may be used for several applications, primarily for surveillance in many different missions. It can monitor the airspace around airports, ports and any element of critical national infrastructures. AULOS can also monitor commercial and military traffic up to a distance of several hundred kilometers.

AULOS can be considered an “environmental friendly” system. Since it does not increase electromagnetic pollution, it can be safely installed in urban areas. In addition, it does not compete with other systems for the assignment of parts of the electromagnetic spectrum, nowadays a valuable and in demand resource.

The system is available in both fixed and deployable configurations. The latter provides several operational advantages as it can move in different geographic areas, exploiting emissions from different bands and thereby solving problems of small target detection in mountain areas.

## THE SYSTEM

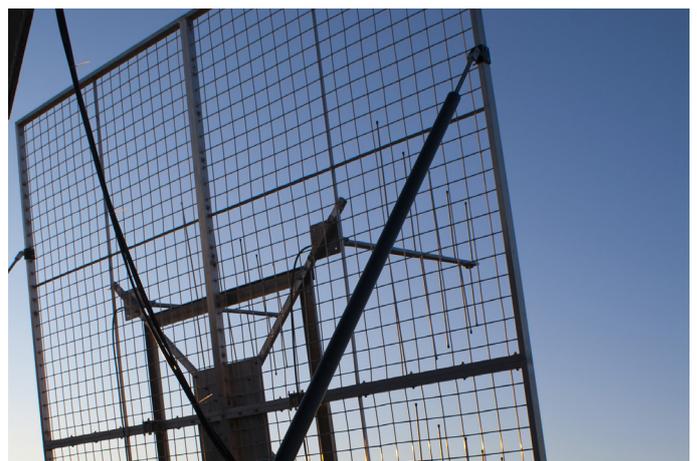
AULOS is a technologically advanced system, developed on the basis of a “software defined radar” approach.

This involves signal sampling directly at the carrier frequency using COTS devices for signal reception and digital processing MultiCore and GPU technologies powered personal computer. AULOS can be integrated in existing surveillance networks or with other sensors as a way of updating and enhancing overall performances.

## FIXED CONFIGURATION

The fixed AULOS radar is available in two versions. The first version, 2D, uses high-gain directional antennas (Log-Periodic Antenna LPDA), necessary to achieve long range coverage and provides 90° angular coverage. It uses a single FM radio station and interferometric techniques for the estimation of the azimuth.

The second version, 3D, consists of five channels coherent receivers connected to an array of four LPDAs for surveillance and two LPDAs for the reference signal. It guarantees the same angular coverage of the 2D version but in addition it provides an estimate of the target altitude.



## DEPLOYABLE CONFIGURATION

In its deployable configuration, the radar has two receiving systems connected to two Uniform Circular Arrays (UCA), each with eight dipole elements, one array operating in the FM band and the other one in the DVB-T band. Each receiving system contains eight coherent receiving channels connected to the array dipoles. The RF signal from each dipole is filtered, amplified and then digitised.

The system uses Digital Beam Forming (DBF) and multistatic techniques, exploiting one or more broadcasting stations at the same time. This implies that it is necessary to generate several beams with suitable weight sets, at least three beams for each station (two surveillance patterns and one reference pattern).

The signal processor performs co-channel interference cancellation, generates the range doppler maps, applies CFAR detection and sends plots to the tracker.



Together with the two receivers, the system also includes a Human Machine Interface to represent the tracks from FM and DVB-T digital signals and their processing results.

## KEY FEATURES

As a result of many years in research and development activities, the AULOS passive radar excels for the following features:

- › Low Cost - AULOS is easy to operate and maintain
- › Rapid Intervention - easy to deploy configurations for differing theatres of operation
- › Flexibility - thanks to the availability of different embodiments, it is suitable for several scenarios and geographic conditions
- › Sustainability - since it doesn't transmit electromagnetic energy, it is safe for people and doesn't contribute to electromagnetic pollution.



## TECHNICAL DESCRIPTION

### TECHNICAL FEATURES - FIXED 3D

- › Antenna group                      Array of four LPDAs for surveillance and two LPDAs for reference
- › Azimuth coverage                90°
- › Doppler accuracy                 $\geq 1$  m/s
- › Updating                             $\geq 1$ sec.
- › 5 contemporaneous Receiving Channels
- › 4 Receiving Beams synthesised via Digital Beam Forming Network
- › Track fusion of other passive or active sensors data

### TECHNICAL FEATURES - DEPLOYABLE

- › Motor-home size (l w h)        8.mt x 2.2 mt x 3.6 mt
- › Antenna group size (l w)        6.8 mt x 6.8 mt
- › Antenna mast height            12 mt
- › Up to 8 FM stations concurrently processed
- › Bistatic instrumental range      360km
- › Azimuth coverage                360°
- › Updating rate                       $\geq 1$ sec.
- › 64 contemporaneous Receiving Channels
- › 24 Receiving Beams synthesised via Digital Beam Forming Network

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