SELEX
Sistemi Integrati
A Finmeccanica Company

Predictable results
for unpredictable threats


# LYRA RADAR FAMILY

**The Lyra radar family is conceived to address a number applications as an integral part of major system for:**

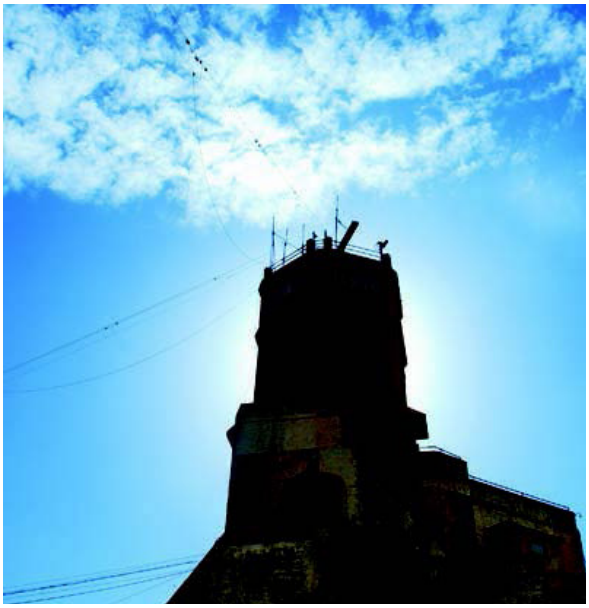
- homeland protection
- field applications as a man portable radar
- vessel traffic service.

Independently from system architecture, HW and SW components and the associated industrial processes are conceived in a modular and synergetic way, already envisaging the evolution to other possible applications such as a Maritime Surveillance and a Surface Movement for airport applications.

The Lyra radar family is composed of the following members:

- LYRA 10 series for Homeland Protection available for fixed installations on a tower, on a vehicle and Man Portable (High mobility version)
- LYRA 50 series for VTS applications and Coastal Surveillance
- LYRA 80 series for Maritime Surveillance applications.

The LYRA family incorporates the best of the COTS hardware technology and proprietary state of art processing algorithms.



## RADAR LYRA 10 SERIES

**Homeland Protection/High Mobility applications**

Lyra 10 High Mobility wheeled version

LYRA 10 is a system completely designed and developed by SELEX Sistemi Integrati for Homeland Protection and Man Portable applications, available in different configurations.

LYRA 10 can detect people, vehicles, boats and low altitude flying helicopter. It is a radar providing outstanding range and azimuth data.
In addition, it automatically performs target classification.

LYRA 10 has the following capabilities:

- automatic sector surveillance
- automatic audio/video alarm for detection
- automatic target tracking
- automatic classification of a selected target.

Moreover, it incorporates the following characteristic:

- very low electromagnetic emission
- short re-deployment and maintenance time
- ease of operation
- remote control and command control data link facilities
- power supply through batteries or mains.

When the system is powered up, it automatically goes in stand-by mode. In stand-by mode all system functions are active, but there is no antenna scanning and no radar emissions.
The following functions are also available:

- north alignment capability
- system set-up capability: during set-up it is possible to adapt the default system settings or the settings used in the previous session
- BIT capability: the system contains Built-in Test to automatically detect system failures.

In Surveillance mode the system detects moving targets; the main functions are:

- sector surveillance capability: the system has the ability for sector surveillance. It is possible to set one sector between +/- 5° and +/-180°
- the sector setting can be performed locally or at remote site console unit
- antenna speed selection capability; between two antenna speeds selectable by the operator
- target detection performance.

For moving targets with radial velocities up to 90 km/h (unambiguous) with accuracy of 0.8 km/h, the power budget conforms with the free space detection ranges below (with a probability of detection of 90%, probability of false alarms of 10-6, antenna scan speed of 6°/s). The reduction of the detection range due to rain attenuation is less than 10% at a rainfall rate of 2 mm/h, and 25% at a rainfall rate of 4 mm/hr.

The system is capable of providing automatic target classification.
Automatic classification is based on the range Doppler analysis of target backscatter.
The classification result is indicated by a symbol on the display at the measured position.

## SYSTEM SPECIFICATIONS

**Main Performances**

| | |
|---|---|
| Frequency | X band |
| Instrumented Range | 50 m - 30 km |
| Tilt: | +-20° on the vertical plane |
| Coverage | Azimuth Sector Scanning or full rotation |
| Resolution Range: | 9 (nominal) |
| Azimuth Resolution: | 2.8 degres (nominal) |

**Technical characteristics**

| | |
|---|---|
| Antenna type | Slotted Wave Guide |
| Antenna gain | 31 dB |
| Azimuth beam width | 2.8 degrees |
| Scan Rate | 6deg/s - 12deg/s - 15deg/s |
| Transmitter | solid state |
| Receiver | Double conversion stage with digital down conversion and pulse compression |
| IF Band | 22 MHz |
| Transmitted Power | |
| Peak Value | 10 W |
| Data/Control Interface | Ethernet |
| Operational Availability | > 99% |
| Dimension | 70 cm x 40 cm x 25 cm |
| Weight | 25 kg |

## ENVIRONMENTAL CHARACTERISTICS

| | |
|---|---|
| Altitude of operation | 0-4500 m |
| Temperature Ranges (operation) | -30°C to +50°C |
| Temperature Ranges (storage) | -40°C to +60°C |
| Solar Radiation | 1120 W/m$^2$ |

LYRA 10 Radar System is CE marked.

## LYRA 50 SERIES

**VTS applications**

Lyra 50 Vessel Traffic Surveillance

LYRA 50 is the most recent system completely designed and developed by SELEX Sistemi Integrati for Vessel Traffic Service and Coastal Surveillance applications.

LYRA 50 has the following capabilities:

- detection of steady or moving vessels and boats
- high spatial resolution which provides rejection of unwanted background echoes and ensures the required system sensitivity.

It uses fully solid state technology and very powerful digital processing boards using proprietary state of art algorithms which allow the following improvements with respect to existing radars:

- low in trasmission peak power
- low voltage supply
- high compactness
- high reliability
- capability of frequency diversity transmission on multiple frequencies.

LYRA 50 is a coherent radar and can control and track the frequency and phase characteristics of the transmitted waveform. Wideband Frequency Modulation is used to minimise the electromagnetic compatibility impact and is effective in reducing interference from other radiating systems.

Frequency diversity is performed by using a Digital Frequency Synthesizer to generate waveforms. Pulse compression is performed digitally; this technique allows accurate characterisation of the compressed pulse.

The joint use of frequency modulation and pulse compression allows the use of low peak power long pulses. A proprietary side lobe suppression algorithm is used to reduce the pulse compression range side lobe; its time stability at different environmental conditions is also obtained by means of state of art calibration algorithms.

Finally frequency diversity improves the sensor coverage by reducing the fluctuation of the target echo and decreasing the range and time correlation of the clutter returns. The performance improvement is obtained by integrating multiple different frequency pulses.

## SYSTEM SPECIFICATIONS

**Main Performances**

| | |
|---|---|
| Frequency | X band |
| Instrumented Range | 50 m – 48 km |
| Coverage | Full azimuth coverage with user defined transmission sectors |
| Range Resolution: | 9 (nominal) |
| Azimuth Resolution: | 0.4 degrees (nominal) |
| Antenna type | Slotted Wave Guide |
| Antenna Tilt | -10 to +5 deg (option) |
| Antenna gain | ≥38 dB |
| Azimuth beam width | 0.4 degrees |
| Elevation beam width | 12 degrees |
| Scan Rate | 10/20 rpm |
| Transmitter | Solid state with graceful degradation |
| Receiver | Double conversion stage with digital down conversion and pulse compression |
| IF Band | 22 MHz |
| Processing | MTD, CFAR |
| Transmitted Power | |
| average value | 3.5 W |
| Data/Control Interface | Ethernet |
| Operational Availability | > 99% |
| Oil Spill Detection | Optional |
| Sea State Parameters | Optional |
| Redundant Configuration | Optional |

## ENVIRONMENTAL CHARACTERISTICS

| | |
|---|---|
| Altitude of operation | 0-4500 m |
| Temperature Ranges (operation) | -25°C to +50°C |
| Temperature Ranges (storage) | -40°C to +70°C |
| Solar Radiation | 1120W/m2 |

LYRA 50 Radar System is CE marked.

## LYRA 80 SERIES

**Coastal Surveillance applications**

LYRA 80 is the High End version of the system for Vessel Traffic Service and Coastal Surveillance applications.

LYRA 80L has the following capabilities:

- Longer Range than the standard VTS version by using a more powerful transmitter and a higher gain antenna
- detection of steady or moving boats
- high spatial resolution which provides rejection of unwanted background echoes and ensures the required system sensitivity.

It uses fully solid state technology and very powerful digital processing boards using proprietary state of art algorithms which guarantee the following improvements with respect to existing radars:

- low in transmission peak power
- low voltage supply
- high compactness
- high reliability
- capability of frequency diversity transmission on multiple frequencies.

## SYSTEM SPECIFICATIONS

**Main Performances**

| | |
|---|---|
| Typical Detection Range | 48 NMi |
| Coverage | Full azimuth coverage or sectorial transmission capability |

**Technical characteristics**

| | |
|---|---|
| Technology | Pulsed coherent Doppler radar with digital pulse compression |
| Antenna type | Reflector |
| Antenna gain | 40-44 dB |
| Tx | Solid state |
| Rx | Double Conversion |
| Azimuth integration | MTD, frequency diversity or non coherent |
| Range integration | Coherent |
| Frequency | X band |
| IF Band | 22 MHz |
| CFAR | Yes |
| Maps | Fixed and adaptive range azimuth clutter maps |
| STAGGER | Frequency agility |
| Transmitted Power | Average value 5-20 W |
| Digital conversion | 12 bit / 100 Msps |
| Data/Control Interface | Ethernet, WiFi |
| Operational Availability | > 99% |

## ENVIRONMENTAL CHARACTERISTICS

| | |
|---|---|
| Altitude of operation | 0-4500 m |
| Temperature Ranges (operation) | -25°C to +50°C |
| Temperature Ranges (storage) | -40°C to +60°C |

Lyra 10 High Mobility tracked version

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