

SKYSURV^{MSSR} BY INTELSCAN



SKYSURV Monopulse Secondary Surveillance Radar (MSSR) — Mode S The SKYSURV MSSR is a fully integrated, state-of-the-art system that meets ICAO Annex 10, civil ATC and Air Defence operations requirements. It is a highly accurate, modular, flexible system that can be installed as standalone equipment or integrated with a new or existing Primary Surveillance Radar (PSR).

Available in basic dual-channel or single-channel configurations, this 256NM radar easily upgrades to Mode S functionality by inserting modules into the interrogator and activating the corresponding software. A design, highly dependable commercial components and robust software result in minimal maintenance and maximum system reliability.

MSSR Modular System

SKYSURV MSSR's innovative design easily adapts to meet your requirements, including the use of the MSSR's individual subsystems to upgrade existing older SSR systems.

Major Subsystems

- Antenna Subsystem
- Dual Interrogator-Receiver Subsystem
- Control & Maintenance Monitoring Subsystem

The SKYSURV MSSR can easily be built up from basic configurations to enhanced by incorporating processing modules and software upgrading functionality:

- Basic configuration - secondary surveillance radar operating in standardized 1,2,3/A, B, C, D modes of interrogation (SIF modes)
- Mode S UF11 all-call interrogation or intermodes 3/A/S and C/S
- Mode S surveillance system - elementary Mode-S interrogation capabilities, mode-S roll-call messages
- Mode S Level 2 and 5 - enhanced Mode S surveillance system with static scenario

Large Vertical Aperture (LVA) Antenna Subsystem

The LVA Antenna Subsystem is composed of an antenna pedestal, drive, changeover unit, frame and the LVA itself. The drive turns with an antenna and support frame. The antenna drive is fitted with dual asynchronous motors, gearbox, and two- or three-channel rotary joint and dual azimuth encoders.



The LVA antenna operates in 1030 MHz (interrogation) and 1090 MHz (reception) frequencies. It is composed of a set of vertical column radiator dipoles fed by the horizontal feeder (created by a set of strip power dividers). To meet individual requirements, this product includes three types of LVA antennae with differing antenna gain, mechanical dimensions and a number of radiator columns.

The LVA antennae available for your specific coverage requirements are:

- **LVA-20** 2-channel MSSR antenna (20-column radiators)
- **LVA-21** 3-channel MSSR antenna (21-column radiators)
- **LVA-35** 3-channel MSSR antenna (35-column radiators)

Each LVA antenna has a main SUM (SIGMA) beam. DIF (DELTA) and BACK beams integrate to provide a Side Lobe Suppression (SLS) beam.

The LVA-21 and LVA-35 antennae have a separate DIF beam which, together with the SUM beam, provides monopulse measurement of target azimuth. These antennae also have Omni (OMEGA) and BACK beams. Through the integration of an OMEGA and BACK beam, an SLS beam is created.

SKYSURV MONOPULSE SECONDARY SURVEILLANCE RADAR (MSSR)

Dual Interrogator-Receiver Subsystem MSSR

The Interrogator-Receiver Subsystem is the basic component of the SKYSURV MSSR. It contains all the necessary circuits to generate the interrogation, receive replies, identify targets, determine target bearing using monopulse techniques and process individual interrogation modes. The system's design minimizes the connection with other subsystems to decrease dependency.

This approach enhances system modularity and maintainability. The cross-linked, dual-redundant subsystems include built-in test equipment (BITE) and internal diagnostics. The BITE detects system malfunctions in real-time with fault isolation down to the lowest replaceable module.

Functional Parts: Dual Interrogator-Receiver Subsystem:

- Two-channel transmitter
- Three-channel receiver
- Extractor
- Post-processor

Both channels of the transmitter have identical configurations with linear solid-state amplifiers and high selectivity filters. The interrogation generator creates interrogation modes, which are interlaced into interrogation samples programmed for different azimuth sectors. The Dual Surveillance Processors receive the target data from the Extractors and perform scan-to-scan tracking to create aircraft tracks (or plots) with individual numbers. These are now ready for transmission to the ATM system.

System Parameters

Control and Monitoring Subsystem (CMS)

The CMS monitors the serviceability status, performance, set-up and control of the total MSSR system.

Test signals are inserted with output amplitude-detected video signals to continually test system performance.

The CMS communicates with the BITE system to collect and analyse performance data for all subsystems. The CMS runs diagnostics software for fault analysis and generates status reports for the ATM system.

A local maintenance display unit is used for all system control and maintenance functions. It displays analogue and secondary radar signals, digital data and other supplementary information. Basic functions of the radar can be controlled directly from the MDU (or from a remote technical workstation) using a keyboard and/or trackball.

Frequency band	LVA-20 LVA-21	1030 - 1090 MHz >20 dBi
Antenna gain	LVA-35	>24 dBi >27 dBi
ICAO modes		Mode S Level 2/5, 1, 2, 3/A, C, 3/A/S, C/S
Transmitter power - peak		1.6kW – 3.2kW
Power supply		3 x 230/400 V±10 %
Antenna scan rates		4.5 to 15 RPM
Operating temperature range (outdoor parts of the equipment)		-40 °C to +65 °C
Operating temperature range (indoor parts of the equipment)		-10 °C to +50 °C
Range		from 0.5 to 256NM
Antenna revolution		from 4.5 to 15 RPM
Antenna beam width at 3 dB level		2.2° 70 dB min
Dynamic range		100 feet
Altitude resolution (mode C)		25 feet
Altitude resolution v all-call mode		±27 m. rms
C/S		min. 750
Range accuracy		±0.1°
Total targets output per scan		ASTERIX cat 34,48
Azimuth accuracy [°] Output data format System availability		99.99%

System Capability for Real Targets

Plots per scan	1200 minimum
Tracking capability (S MODE processor and RDP)	up to 1000 targets at a time
Capability of the system to maintain the tracks through the 'cone of silence'	up to 12 targets simultaneously
Interrogator/receiver sidelobes suppression	ISLS, IISLS, RSLS

The radar's control and diagnostic system communicates with the operator via a user-friendly graphic user interface (GUI). All information is displayed in windows with standard system features. The maintenance display unit is an autonomous module that is connected to the system via a LAN network.

About Intelcan Technosystems

Intelcan is the leading Canadian communications, navigation, surveillance and air traffic management (CNS/ATM) system and airport infrastructure solution provider. Integrating Intelcan's own products or utilizing products from a diverse supplier network, Intelcan has delivered complete turnkey solutions both cost-effective and flexible, to fulfill civil and military clients' requirements in over 60 countries, worldwide.



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