Condor Mk3 Mode S MSSR

Monopulse secondary surveillance radar

Collins Aerospace
An RTX Business

Condor Mk3 MSSR

The Collins Condor Mk3 monopulse secondary surveillance radar (MSSR) uses the very latest state-of-the-art technology to provide cutting-edge systems to air traffic operators around the world. The Condor Mk3 delivers the highest performance, without compromise, at a very competitive and affordable price.

Enhanced

Built on the excellent pedigree of the Condor Mk2, the Mk3 introduces enhanced features, such as a higher duty cycle transmitter, gallium nitride (GaN) technology, automatic adaptive power control and built-in ADS-B.

Low cost of ownership

Highly reliable and simple to maintain, the Condor Mk3 has a low cost of ownership. Extensive parameter control allows easy system reconfiguration for the user, and the flexible architecture ensures future proofing for the next 15+ years.

Reduced size

The Condor Mk3 size has been greatly reduced (50%) from previous models to combine two channels into a single 19-inch rack, resulting not only in a lower cost but a clear decrease in the system space requirement.

More environmentally friendly

The Condor Mk3 is far more economical to operate with a 35% reduction in power consumption and 25% reduction in heat generation, decreasing the annual operating costs for both site power and HVAC requirements, as well as power-range look-up attenuation.

More savings

The new Condor Mk3 was designed to implement the latest available processing technologies, allowing Collins to greatly decrease the number of internal line-replaceable units (LRUs) in the system. This system simplification benefits the operator, making it easier to maintain, while reducing any spares holding requirement. This results in a reduction in cost of ownership for the product life cycle.

Reliability

With a mean time between critical failure (MTBCF) of 401,557 hours (or more than 45 years), the Condor Mk3 has an inherent system availability of 99.9999%.

All Condor Mk3 LRUs are accessed from the front. Should a failure occur, the mean time to repair (MTTR) is less than 30 minutes. Built-in diagnostics, accessed on site or remotely, can detect 98%of all hardware faults.

Using field-proven components configured in a redundant and fault-tolerant architecture, the Condor Mk3 delivers 24-hour continuity over a 15+ year life cycle.

Features:

- Minimal maintenance design
- Modes 1,2,3/A, C and S
- Implements the latest processing technologies
- Considerably fewer LRUs for improved reliability and reduced footprint
- Adaptive false target processing suppresses false targets without degrading system performance
- Surveillance coordination functionality permitting Mode S interrogator clustering
- Product lifetime support commitment
- Four Ethernet and synchronous interfaces
- Integrated GPS and network time protocol (NTP)

ADS-B

The ADS-B processing in the Condor Mk3 uses the patented Collins algorithms, proven to provide excellent decoding abilities in all RF environments.

ADS-B messages support the following features:

- Track initiation (selectable option)
- Track support (if the target is not updated by a normal surveillance interrogation)
- Reflection suppression
- ADS-B data output on ASTERIX Cat 21/25

Mode S

Comm-B information provided by aircraft as downlinked aircraft parameters (DAP) are encoded in to ASTERIX data fields.

Surveillance data messages are output for the end user or as an input to the Mode S processing for track acquisition and maintenance.

Data alignment error is calculated by comparing ADS-B and MSSR track position, enabling users to continuously check the accuracy of the radar or, for use during commissioning, as an initial alignment tool.

BIT

Comprehensive built-in-test (BIT) facilitates fault finding. Each interrogator channel contains full control and monitoring capability. Local and remote control and monitoring system terminals (CMS), combine functionality with performance analysis.

Physical ports

4 x 1 Gb Ethernet ports allow full network redundancy and seamless network operations (up to 32 logical channels configurable per port).

Control and monitoring

Embedded CMS functionality allow full monitoring and control via an integrated and user-friendly GUI.

Processing

The Condor Mk3 retains the proven MSSR and Mode S reply processing algorithms, using both amplitude and monopulse data, to provide high levels of performance in congested RF environments. Spare capacity and processing power are incorporated to allow for even greater capacity or other future enhancements.

The Condor Mk3 features adaptive false target processing. Unlike other systems that apply reflection processing after target data output, the Collins approach uses internal information, such as pulse reply amplitude, to assist false target rejection. This enables false target suppression without degradation of system performance, even in severe multipath and reflection environments.

Target data output reports are formatted in ASTERIX Cat 34 and 48 formats, supporting elementary and enhanced surveillance data content.

Features:

- Terminal approach and en-route secondary radar
- Comprehensive BIT
- CMS terminal(s) for control and performance monitoring
- Adaptive false target processing for determining possible reflections
- High reliability with an inherent system availability of a dual channel being 99.9999%
- All LRU's accessible from the front of the interrogator for easy maintenance

Mk3 performance specifications

Fully compliant to ICAO amendment 90 and Eurocontrol specifications	
Instrumented range – MSSR	0.1 to 256 nautical miles
Instrumented range – ADS-B	>90 nautical miles
Pulse repetition frequency (PRF) range	50 to 250 Hz (typical 80 – 155 Hz for MSSR/Mode S)
Staggered PRF	256 pseudo random up to 20% in 0.5% steps
Mode interlace patterns	Single, double or triple, and scan
Fully solid state transmitter	
Transmitter peak duty cycle	Max 65% over 2.4 mS
Transmitter continuous duty cycle	6.6%
Transmitter power attenuation	15 dB range in 1 dB ± 0.5 dB steps
Improved interrogator side lobe suppression (IISLS) operation	
Fully configurable sensitivity time control (STC) profile	
Target capacity	1,400 (360°), 350 (90°), 100 (11.25°) and 32 (2.4°) 1,000 (ADS-B)
Overall Mode S probability of code detection	>99%
Overall Mode A probability of code detection	>98%
Overall Mode C probability of code detection	>97%
Overall false target report rate	<0.1%
ADS-B probability of update	99%
Output formats	ASTERIX Cat 01/02 ASTERIX Cat 17 (SCF) ASTERIX Cat 18 (DLF) ASTERIX Cat 21/25/247 (ADS-B) ASTERIX Cat 34/48 (Mode S) ASTERIX Cat 240 (video) ASTERIX Cat 253 (CMS)
Inherent availability (dual-channel system)	> 99.9999%
System is fully configurable by software	No hardware links or jumpers
Antenna pattern measurement capability	
Built-in ADS-B	
Integrated GPS and NTP	

Industry-leading reliability and low cost of ownership

The Condor Mk3 leverages the very latest technologies to offer a combination of high performance and high probability of detection, even in severe multipath and reflection environments.

Evolutionary

The Condor Mk3 features an evolved system and software, backed by proven track record of reliability.

Technical refresh

Service life extension plans using Condor Mk3 technology are available. The small footprint usually allows installation while the legacy radar remains operational, resulting in minimal downtime prior to switchover. This is an attractively priced upgrade solution to extend the life of your radar.

Turnkey solutions

Whether you require a standalone MSSR system or a full turnkey co-mounted system with a new tower and shelter, Collins can deliver the ideal radar solution for your requirements.

Pedigree

With more than 60 years experience in the air traffic and radar business, Collins has installed more than 800 systems globally, helping to bring order to the skies around the world.

Learn more at
collinsaerospace.com.

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