International Civil Aviation Organization

MIDANPIRG Communication, Navigation and Surveillance Sub-Group (CNS SG/15)

(Doha, Qatar, 11 – 14 May 2026)

Agenda Item 4: Surveillance issues

EXTENDING PERIODIC FLIGHT INSPECTION INTERVALS FOR GROUND-BASED NAVIGATION AIDS

(Presented by Saudi Arabia)

SUMMARY

This paper presents a proposal to extend the periodicity of flight inspection (FI) intervals for ground-based navigation aids (NAVAIDs). The proposal is supported by continuous monitoring capabilities, system reliability data, and the deployment of modernized Ground based NAVAID technologies used for the provision of navigation services. The paper outlines the safety considerations and eligibility criteria for extending flight inspection intervals based on demonstrated system performance rather than following fixed periodicity. It emphasizes that any extension must be supported by robust and reliable monitoring arrangements, formal safety risk assessments, regulatory oversight, and clearly defined reversion mechanisms to standard inspection intervals when required.

Action by the meeting is at paragraph 4.

REFERENCES

- ICAO Annex 10 Vol I — Radio Navigation Aids
- ICAO Doc 8071, Volume I — Manual on Testing of Radio Navigation Aids
- ICAO Doc 9859 — Safety Management Manual (SMM)

1. INTRODUCTION

1.1 Flight inspection is an essential activity to verify the accuracy, integrity, and operational suitability of ground-based navigation aids. Saudi Arabia is applying fixed semi-annual for ILS CAT I and annual flight inspection cycles for DVOR/DME facilities, irrespective of actual system performance or demonstrated reliability.

1.2 ICAO Annex 10 and associated guidance material, i.e. ICAO Doc 8071, Volume I - Testing of Ground-based Radio Navigation Systems, establish minimum requirements for the inspection and monitoring of radio navigation aids while allowing States flexibility in determining flight inspection periodicity, provided that the required level of safety is continuously achieved.

1.3 The periodic flight inspection of ground-based NAVAIDs remains a critical component of navigation service provision. However, advancements in system design, monitoring technologies, and preventive maintenance practices can enable a performance-based approach supported by:

A- System reliability and observed and recorded long-term stability

B- Correlation between flight inspections and ground-checks results

C- Ground monitoring and alarm capabilities

D- Preventive and Corrective Maintenance History

E- Failures and outages history

F- MTBO/MTBF observance and level of compliance with the manufacturer recommendations

G- Environmental and operational conditions

H- Formal safety risk assessments

1.4 The extension of flight inspection intervals must not reduce safety; rather, it should enhance safety by focusing flight inspection activities on systems presenting higher operational risk. This approach should be supported by:

1) Demonstrated long-term stability of NAVAID performance

2) High availability, integrity, and reliability of ground monitoring systems

3) Availability of historical trend data correlating between ground and flight inspection results

2. DISCUSSION

2.1 The traditional application of fixed semi-annual for ILS CAT I and annual flight inspection cycles for DVOR/DME does not fully reflect the performance capabilities of modern NAVAID systems. Contemporary navigation systems incorporate advanced design features, automated monitoring, and robust preventive maintenance practices that provide high confidence in continuous operational integrity.

2.2 A performance-based approach allows flight inspection periodicity to be extended by based on proven and demonstrated system performance rather than elapsed time period alone. This

approach considers system reliability, monitoring capability, maintenance history, environmental conditions, and the results of formal safety assessments.

2.3 Navigation aids demonstrate long-term proven stability through consecutive satisfactory flight inspection results, supported by reliable ground monitoring and alarm systems, and present a lower operational risk. Crucially, the extension of flight inspection intervals is entirely dependent on the continuous, uninterrupted operation of Remote Control and Status Monitoring (RCSM). If RCSM capabilities fail or degrade, the inspection interval must immediately revert to the standard schedule. Continuous monitoring of ground navigational aids allows early detection of performance degradation, ensuring that corrective actions can be taken in a timely manner without reliance solely on periodic flight inspections.

2.4 Historical trend analysis of ground monitoring data, and checks with previous flight inspection results, provides objective evidence of navigational aid system performance and integrity. This data-driven approach strengthens safety assurance and supports informed decision-making regarding the extension of flight inspection intervals.

2.5 The extension of flight inspection intervals must be supported by a formal safety risk assessment conducted in accordance with the ICAO Safety Management Manual, GACA regulation and the ANSP (SANS) Safety Management System.

2.6 The implementation of the flight inspection intervals should be subject of regulatory approval and oversight of the system performance.

2.7 Based on technical evaluations and monitoring, SANS has determined that the applicable navigation aids demonstrate sufficient stability to safely support extended flight inspection intervals. Analysis of historical performance data confirmed that there is no additional operational risk or adversely impacted on flyability using the ground based navigational aids. All failures and observed anomalies were classified under the SANS Safety Risk Classification Scheme as No Immediate Effect on Safety.

2.8 To ensure a controlled and safety-driven transition, the implementation of extended periodic flight inspection intervals will be conducted using a **phased approach**. The phasing should be designed to account for airport operational capacity, navigation aid system age, operational criticality, and historical performance. The following three phases are proposed.

Phase 1: Low-Risk / Low-Complexity Airports. This phase will apply to navigation aids serving airports with:

A- Low traffic density.

B- New modern navigation aid systems with advanced Monitoring capabilities.

C- Stable environmental conditions no change to surrounding landscape

D- Consistent historical data of satisfactory flight inspection results and good correlation between these results and ground checks

Phase 2: Medium-Risk / Medium-Capacity Airports. This phase will include navigation aids at airports characterized by:

A- Medium traffic density.

B- Mixed operational use, including limited precision approach operations.

C- Systems with moderate service life but proven reliability & integrity.

Phase 3: High-Capacity / Safety-Critical Airports: This will apply to navigation aids serving:

A- High-capacity and international airports.

B- ILS CAT I Precision approach operations only

C- Older systems with demonstrated long-term stability, reliability, and strong maintenance history

D- Complex operational or environmental conditions WITH NO major change to surrounding landscape

2.9 Progression between phases will depend on satisfactory safety performance, continuous monitoring results, and periodic review under SANS Safety Management System. Any indication of performance degradation, monitoring failure, or increased operational risk will trigger immediate reversion to standard flight inspection intervals.

2.10 Proposed Flight Inspection Intervals:

Navigation System	Current Interval	Proposed Interval	Safety Justification
ILS (LOC/GP)	6 months	9 months	Digital ILS with continuous monitoring (Note: Applies primarily to CAT I; CAT II/III facilities remain subject to stricter Annex 10 tolerances, flight inspection intervals)
DVOR	12 months	15 months	Stable signal, low drift, robust remote monitoring
DME	12 months	15 months	High reliability, automated alarms and robust remote monitoring

3. CONCLUSION

3.1 A performance-based approach to flight inspection periodicity for ground-based navigation aids is technically feasible and can be safety driven. The availability of continuous ground monitoring, comprehensive safety management processes, and demonstrated system performance provides a strong foundation for extending flight inspection intervals for ILS CAT I and DVOR/DME without compromising operational safety.

3.2 The proposal is supported by strong evidence, including long-term system stability, reliable monitoring and alarm capabilities, accurate and reliable maintenance history, and comprehensive safety risk assessments conducted in accordance with ICAO Doc 9859, GACA regulations, and the SANS Safety Management System. Historical data and analysis confirm that recorded anomalies did not introduce additional operational risk and remained within an acceptable safety tolerance level.

3.3 The phased implementation approach ensures a controlled, risk-based transition by progressively applying extended flight inspection intervals according to airport complexity, operational criticality, and system performance and stability. This approach allows for continuous oversight,

performance validation, and immediate reversion to standard inspection intervals should system performance deteriorate.

3.4 By optimizing the allocation of flight inspection activities, the proposed approach maintains overall safety, operational efficiency, and sustainability of navigation service provision while maintaining continued regulatory compliance.

3.5 Accordingly, the proposed extension of flight inspection intervals for selected NAVAIDs serving airports and airspace in the kingdom represents a safe, evidence-based, and forward-looking initiative that strengthens safety assurance while adapting to the capabilities of modern navigation infrastructure.

4. ACTION BY THE MEETING

4.1 The meeting is invited to:

a) Note the information presented regarding the proposed approach to extend flight inspection intervals for ground-based navigation aids;
b) Note that modern NAVAID systems supported by continuous monitoring and safety risk assessment may safely justify extension of flight inspection intervals in accordance with ICAO guidance;
c) Note the usage of performance-based methodology and phased implementation approach developed by Saudi Arabia, recognizing that final regulatory approval remains a state responsibility; and
d) Invite States and share their experience, best practices, and lessons learned related to the flight inspection intervals and the monitoring strategies.
e) encourage the exchange of information on regulatory frameworks, safety assessments, and monitoring arrangements to support harmonized and safe implementation of extended flight inspection intervals within the MID Region.
f) Request the CNS SG to consider developing a MID Region guidance material on implementing performance-based flight inspection intervals

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