



ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

**EIGHTH MEETING OF THE STEERING COMMITTEE OF THE REGIONAL  
AVIATION SAFETY GROUP FOR AFRICA-INDIAN OCEAN (RASC/8)**

**From 29 to 30 August 2022**

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**Agenda Item 4: Potential Significant Safety Concerns (SSCs) related to instrument flight procedures and proposed mitigation measures**

*(Presented by the Secretariat)*

<b>SUMMARY</b>
<p>This paper outlines potential ANS- related SSCs, with respect to instrument flight procedures, including calibration of navigational aids and validation and verification of Instrument Flight Procedures and Design. The paper also highlights mitigation measures to address the potential SSCs.</p>
<p><b>REFERENCE(S):</b></p> <ul style="list-style-type: none"><li>- Annex 6 - <i>Operation of Aircraft</i></li><li>- Annex 10 - <i>Aeronautical Telecommunications, Volume I – Radio Navigation Aids</i></li><li>- Annex 11 - <i>Air Traffic Services</i></li><li>- Doc 8071 - <i>Manual on Testing of Radio Navigation Aids</i></li><li>- Doc 8168 - <i>Procedures for Air Navigation Services: Aircraft Operations</i></li><li>- Doc 9906 - <i>Quality Assurance Manual for Flight Procedure Design</i></li><li>- USOAP CMA 2020 Protocol Questions - ANS (7.234, 7.247, 7.393)</li></ul>
<p><b>Related ICAO Strategic Objective(s):</b></p> <p><b>A</b> – <i>Safety</i>,</p> <p><b>B</b> – <i>Air Navigation Capacity and Efficiency</i>,</p>






**1. INTRODUCTION:**

1.1 In accordance with the provisions of Annex 10 to the Convention on International Civil Aviation (Chicago Convention, 1944) and the Guidance Material contained in Doc 8071- Manual on Testing of Radio Navigation Aids, States shall ensure that each radio navigation aid and each visual aid operated for the provision of Air Navigation Services is calibrated/tested/inspected

periodically.

1.2 The radio navigation aids and visual aids, to be calibrated include the following:

*Ground-based radio navigation aids*

- VHF Omnidirectional Range (VOR);
- Distance Measurement Equipment (DME)
- Non-Directional Beacon (NDB)
- Instrument Landing System (ILS)
- VHF Marker Beacons

*Visual aids*

- Precision Approach Path Indicator (PAPI)
- Visual Approach Slope Indicator Systems (VASIS).

1.3 Furthermore, instrument flight procedures (IFPs) based on conventional ground-based navigational aids have always demanded a high level of quality control. The implementation of area navigation and associated airborne database navigation systems, however, means that even small errors in data can lead to catastrophic results. This significant change in data quality requirements (accuracy, resolution, and integrity) has led to the need for a systemic quality assurance process (often part of a State Safety Management System). The Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168) Volume II, Part 1, Section 2, Chapter 4, Quality Assurance requires that a State take measures to “control” the quality of the processes associated with the construction of instrument flight procedures.

1.4 Accordingly, the Quality Assurance Manual for Flight Procedure Design (Doc 9906) referred to in Doc 8168 (PANS-OPS) addresses issues related to Flight Procedure Design Quality Assurance System (Volume I); Flight Procedure Designer Training (Volume 2); Flight Procedure Design Software Validation (Volume 3); Flight Procedure Design Construction (Volume 4); Validation of Instrument Flight Procedures (Volume 5); and Flight Validation Pilot Training and Evaluation (Volume 6).

## **2. DISCUSSION**

2.1 Calibration is used to authenticate navigational aids signals and bring them to specifications in tandem with ICAO SARPs. Therefore, it’s a requirement that ground-based navigation systems and visual aids used by airplanes be calibrated. In accordance with Annex 10 (Aeronautical telecommunications), Volume I, Chapter 2, paragraph 2.7.1, the State shall require that periodic ground/flight tests for radio navigation aids of all types be done in accordance to the relevant provisions of Chapter 3 of the same Annex.

2.2 States and Air Navigation Service Providers (ANSPs) must ensure that flight inspection of commissioned ground navigational aids be completed within the period of 14 calendar days prior to the due date of flight inspection. Identification of non-calibrated commissioned ground navigational aids is considered as significant safety concern (SSCs) under the framework of the ICAO Universal Safety Oversight Audit Programme (USOAP).

2.3 Where a flight inspection cannot be conducted within the 14 days grace period due to unforeseen circumstances, e.g. technical and/or operational issues, the ANSPs shall submit a proposal to the regulatory Authority requesting approval for an extension of the Flight Inspection period. Periodic flight inspections for navigational aids may be extended by the regulatory Authority as follows:

- a) For Instrument Landing Systems (ILS), a period of extension up to 3 months;
- b) For Very High Frequency Omnidirectional Range (VOR), as homing facility function, a period of extension up to 3 months;
- c) For Distance Measuring Equipment (DME) as homing facility function, a period of extension up to 3 months;
- d) For Very High Frequency Omnidirectional Range (VOR) as en-route facility function, a period of extension up to 6 months;
- e) For Distance Measuring Equipment (DME) as en-route facility function, a period of extension up to 6 months;
- f) For Non-Directional Beacon(NDB) as locator, a period of extension up to 3 months;
- g) For Non-Directional Beacon (NDB) as homing/check point, period of extension up to 6 months.
- h) For Precision Approach Path Indicator (PAPI), a period of extension up to 3 months.
- i) For Visual Approach Slope Indicator System (VASIS), a period of extension up to 6 months.

2.4 During the extension of Flight Inspection Period, the ANSP shall conduct periodic Ground Checks, submit the Ground Check results of related facilities to the Authority as reference to review and evaluate the performance of facility during the proposed extension period, continue to conduct the maintenance activities in accordance with the maintenance plan for the facility, as well as recording of the test results; and monitor the readings of critical parameters to indicate that the equipment consistently meets performance requirements; and issue a NOTAM stating that the status of facility as operational but ground checked only and awaiting flight Check. When issuing the NOTAM, the ANSP shall indicate the validity period of the NOTAM according to the approval issued by the Authority.

***Potential triggers of SSC under the USOAP: Calibration of NAVAIDS***

2.4.1 State's failure to ensure that requirements for flight inspection are established and periodic flight inspections are provided for radio navigation aids, including failure to:

- a) establish a mechanism to ensure effective implementation,
- b) establish flight inspection regulations and procedures, and
- c) maintain flight inspection reports.

***Potential triggers of SSC under the USOAP: validation of Instrument Flight Procedures and Design***

2.5 State's failure to ensure that instrument flight procedures (IFPs) are reviewed periodically (including validation) to ensure that they continue to comply with changing criteria and meet user requirements, including failure to:

- a) establish mechanism to ensure effective implementation.
- b) maintain documentation regarding periodic reviews done and ensure their ongoing validity in terms of minimum obstacle clearances; and
- c) adhere to a maximum interval for review of five years.

2.6 State's failure to ensure that all IFPs comply with measures that control the quality of the process (including obstacles check), including failure to:

- a) establish mechanism to ensure effective implementation.
- b) maintain reports and results of flight validations (including assurance that adequate obstacle clearance has been provided).
- c) implement a mechanism to ensure that IFP packages also include a list of relevant obstacles and identification and description of controlling obstacles

**3. ACTION BY THE MEETING:**

3.1. The meeting is invited to:

1. Take note of the above information;
2. Request the RASG-AFI to urge States/Organizations to take proactive actions and preventative measures ensuring that:
  - a) flight calibration of radio navigation aids and visual aids are carried out in accordance with the State calibration plan;
  - b) adequate training is provided to flight procedure practitioners to maintain their competency;
  - c) instrument flight procedures (IFPs) are validated periodically and continue to comply with established operational minima, including minimum obstacle clearance; and
  - d) implement quality assurance of flight procedure design processes.

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