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WORKING PAPER

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FOURTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 26 August to 6 September 2024

Agenda Item 3: Air Navigation System Performance Improvement

3.1: Proposals to improve the efficiency of air navigation services contributing to LTAG

FLIGHT PROCEDURES DESIGN STANDARDS

(Presented by South Africa)

EXECUTIVE SUMMARY

This working paper highlights the need to have a dedicated ICAO Annex document for Flight procedures. The ICAO standards governing the flight procedures are contained in various ICAO documents, without clear reference to such documents. The design of flight procedures is a critical element of ensuring a safe and efficient operation of flight from gate to gate. The design, verification and validation of flight procedures is complex and takes time, but it remains the only critical element for safe operation of flight without a dedicated ICAO Annex.

Action Required is contained in paragraph 3.2 of this working paper

1. INTRODUCTION

1.1 The first edition of *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168) was approved on 26 June 1961 for applicability on 1 October 1961.

1.2 PANS-OPS addresses procedures approved by the Council for world-wide application with primary Standards and Recommended Practices (SARPs) contained in both Annex 6 – *Aircraft Operations* as well as Annex 11 – *Air Traffic Services*.

1.3 Doc 8168 has had several amendments made to it since its initial applicability in 1961, expanding from one document into multiple volumes addressing specific areas of procedure design.

1.4 Doc 8168 is the main reference for the Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) and consists of three volumes as follows:

- a) Volume I — *Flight Procedures*
- b) Volume II — *Construction of Visual and Instrument Flight Procedures*
- c) Volume III — *Aircraft Operating Procedures*

1.5 The other supporting ICAO documents are:

— *Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual* (Doc 9905), second Edition 2016;

— *The Quality Assurance Manual for Flight Procedure Design* (Doc 9906), Vol 1 - *Quality Assurance Manual for Flight Procedure Design*, Vol 2 - *Flight Procedure Designer Training*, Vol 3 - *Flight Procedure Design Software Validation*, Vol 5 - *Validation of Instrument Flight Procedures* and Vol 6 - *Flight Validation Pilot Training and Evaluation*, etc.

2. DISCUSSION

2.1 According to Doc 8168, the division of the PANS-OPS into the two volumes was accomplished in 1979 because of an extensive amendment to the obstacle clearance criteria and the construction of approach-to-land procedures. Prior to 1979, all PANS-OPS material was contained in a single document. PANS-OPS, Volume III, applicable in 2018, was created from Part III of Volume I with the intention to separate the provisions related to aircraft operating procedures from the requirements for flying the procedures designed in accordance with the criteria provided in Volume II.

2.2 As highlighted in section 1(Introduction) above, PANS-OPS documents have had several amendments made to it since its initial applicability in 1961.

2.3 ICAO, in its effort to continuously improve the quality of flight procedure design and associated functions has introduced several documents dealing with pertinent air traffic management (ATM) matters for a safe flight operation.

2.4 There are standards governing flight procedures in various ICAO documents which require additional cross referencing of requirements including context of definitions used. Furthermore, this brings about confusions in certain instances in relation to the regulatory requirements to be applied. For example, Annex 11 – *Air Traffic Services* pertains to the establishment of airspace, units, and services necessary to promote a safe, orderly and expeditious flow of air traffic. Furthermore, Annex 11 outlines the requirements for designation of the portions of the airspace and controlled aerodromes where air traffic services will be provided including the establishment and identification of ATS routes and significant points. The primary requirements for establishment of ATS routes are contained in Annex 11 whilst reference to the guidance for the establishment of such routes is contained in *Air Traffic Services Planning Manual* (Doc 9426).

2.5 Annex 11 contains multiple references to Doc 9426 in relation to airspace, including establishment of ATS Routes and significant points. Annex 11 furthermore also contains references to ICAO Doc 8168 as applicable. When reviewing Doc 8168 (Vol I, II, and III), not one reference to ICAO Doc 9426 can be found which creates misalignment of guidance for States to incorporate into their national regulatory framework.

2.6 Annex 11, Appendix 2 defines the requirements for the establishment of significant points with a detailed explanation on the establishment of significant points used for reporting purposes. The establishment of significant points in alignment with Annex 11, Appendix 2 is not considered when applying the design criteria as contained in Doc 8168.

2.7 Doc 8168, Vol I, section 3 contains the requirements for en-route procedures and states that “En-route obstacle clearance procedures were added to Volume I in 1996 as a result of the tenth meeting of the Obstacle Clearance Panel (OCP). The procedures were amended in 2004 to include simplified en-route criteria”. Doc 8168, Vol I, Section 3, Chapter 1 states that “Procedures developed utilizing en-route

criteria assume normal aircraft operations. Any requirements to satisfy Annex 6 aeroplane performance operating limitations must be considered separately by the operator.”

2.8 It is necessary for ICAO to consolidate the various requirements and introduce a dedicated ICAO Annex that will be dealing with Flight Procedure Design and consolidate all the other existing documents into the implementation vehicle for the standards. This has proven to be a good, structured approach that ICAO follows, similar to *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) process where you have Annex 11, supported by Doc 4444, and others.

2.9 A similar process was followed in 2013, when ICAO and Member States transformed safety management into *Annex 19 – Safety Management*.

2.10 The benefit of drawing together all the standards material from various ICAO documents into a single Annex is to focus States’ attention on the importance of integrating their flight procedure design activities and enhances the regulatory compliance with the flight procedures provisions.

3. CONCLUSION

3.1 The unbundling of the standards from all the related flight procedure design documents and create an Annex will make the development of national regulations much easier. During the Universal Safety Oversight Audit Program (USOAP), ICAO have raised concerns with flight procedure design regulatory compliance

3.2 The Conference is invited to:

- a) note the content of the paper; and
- b) request ICAO to refer the matter regarding the creation of a dedicated Annex for design, verification, and validation of flight Procedures to an appropriate Panel for consideration.

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