



International
Civil Aviation
Organization

Organisation
de l'aviation civile
internationale

Organización
de Aviación Civil
Internacional

Международная
организация
гражданской
авиации

منظمة الطيران
المدني الدولي

国际民用
航空组织

Tel.: +1 514-954-8219 ext. 6011

Ref.: AN 11/1.1.35-21/50

17 August 2021

Subject: Proposed amendments to Annex 6, Part I and PANS-OPS, Volumes I and III, related to the use of RNAV on conventional routes and procedures and flight data analysis programmes (FDAP) arising from the seventh meeting of the Flight Operations Panel (FLTOPSP/7)

Action required: Comments to reach Montréal by 17 November 2021

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission (ANC), at the sixth meeting of its 217th Session virtually held on 8 June 2021, considered a preliminary review of proposed amendments to Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes*, and the *Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168)*, Volumes I — *Flight Procedures* and Volume III — *Aircraft Operating Procedures* related to the use of area navigation (RNAV) on conventional routes and procedures arising from the seventh meeting of the Flight Operations Panel (FLTOPSP/7). The Commission authorized the transmission of these proposals to Contracting States and appropriate international organizations for comments.

2. The background of the aforementioned amendment proposals is explained in Attachment A. The proposals for amendment to Annex 6, Part I and PANS-OPS, Volumes I and III are contained in Attachments B to D, respectively. A rationale box providing more information has been included immediately following each proposal.

3. In examining the proposed amendment, you should not feel obliged to comment on editorial aspects as such matters will be addressed by the ANC during its final review of the draft amendment.

4. May I request that any comments you wish to make on the amendment proposals be dispatched to reach me not later than 17 November 2021. To facilitate the processing of replies with substantive comments, I invite you to submit an electronic version in Word format to icaohq@icao.int. The ANC has asked me to specifically indicate that comments received after the due date may not be considered by the Commission and the Council. In this connection, should you anticipate a delay in the receipt of your reply, please let me know in advance of the due date.

5. In addition, the proposed amendments to Annex 6, Part I and PANS-OPS, Volumes I and III are envisaged for applicability on 3 November 2022. Any comments you may have thereon would be appreciated.

6. The subsequent work of the ANC and the Council would be greatly facilitated by specific statements on the acceptability or otherwise of the proposals.

7. Please note that for the review of your comments by the ANC and the Council, replies are normally classified as “agreement with or without comments”, “disagreement with or without comments” or “no indication of position”. If in your reply the expressions “no objections” or “no comments” are used, they will be taken to mean “agreement without comment” and “no indication of position”, respectively. In order to facilitate proper classification of your response, a form has been included in Attachment E which may be completed and returned together with your comments, if any, on the proposals in Attachments B to D.

Accept, Sir/Madam, the assurances of my highest consideration.

Juan Carlos Salazar
Secretary General

Enclosures:

- A — Background information
- B — Proposed amendment to Annex 6, Part I
- C — Proposed amendment to PANS-OPS, Volume I
- D — Proposed amendment to PANS-OPS, Volume III
- E — Response form

BACKGROUND INFORMATION

1.1 Flight data analysis programmes

1.1.1 The proposal to amend the lower threshold maximum certificated take-off mass (MCTOM) value for flight data analysis programmes (FDAP) originated in the Pan-America Regional Aviation Safety Group (RASG-PA) 29th Steering Committee Meeting (Mexico, 20 to 30 November 2017).

1.1.2 This proposal was subsequently reviewed and amended in order to ensure the additional costs of implementing an FDAP was justified by the potential safety benefits of such a programme. The FDAP is intended to support the operators safety management system (SMS); therefore, to determine the likely impact and establish a lower threshold for FDAP, a review was conducted on hull loss and fatal accident data since the introduction of the operator SMS requirements (1 January 2009). Following this review, a suitable threshold was established which extended far enough to account for the majority of significant accidents in the period reviewed, while also acknowledging the likely maturity of an operator's SMS. In deciding not to further reduce the MCTOM threshold for the FDAP, it was concluded that, in general, SMS maturity was related to the size and complexity of the operator's fleet; the smaller aircraft tended to be operated by smaller operators with a less robust SMS that likely would not see any benefit from the enforced introduction of the FDAP. A similar consideration regarding the use of aeroplanes for corporate operations (business jets) resulted in a minimum seating capacity requirements being introduced, again to exclude those operators unlikely to have a sufficiently robust SMS to benefit from the FDAP.

1.2 Use of RNAV on conventional routes and procedures

1.2.1 Modern aircraft are typically equipped with flight management systems incorporating area navigation (RNAV) capability (flight management system (FMS)/RNAV systems) which may be used for navigation at all times, even while the aircraft is operating on routes or procedures defined by conventional radio navigation aids. Use of the FMS/RNAV system is particularly beneficial when, for example, the underlying radio navigation aid is unserviceable, or in some cases where the route or procedure is predicated on a navigational aid for which no receiver is fitted on the aircraft (typically this would affect procedures using non-directional radio beacons (NDBs)).

1.2.2 The FMS/RNAV system can be used in many cases to allow for continued operation on conventional routes and procedures, increasing safety and efficiency in situations where a conventionally equipped aircraft would otherwise require vectoring.

1.2.3 To ensure operational safety, the use of such systems for this purpose must be overseen by the State and appropriate authorization must be given to the operator. This will ensure that adequate procedures and training are in place for pilots to safely conduct this type of operation and prepare them for potential failures of the on-board system.

1.2.4 Initial discussions of the scope of this work considered all phases of flight. However, the proposal presented excludes the final approach segment of an instrument approach procedure, as there are additional considerations that have not been adequately addressed: specifically, the use of linear rather than angular obstacle clearance areas for the RNAV versus the conventional radio aid procedure design. Additionally, the proposal presents best practices from States currently authorizing the use of FMS/RNAV systems on conventional routes and procedures. Typically, these do not permit use on the final approach segment.

1.2.5 Included in the proposal, however, is the use of the FMS/RNAV system in situations where the aircraft is not fitted with a receiver for the conventional radio navigation aid required. It is becoming increasingly common for new aircraft to be delivered with no automatic direction finder (ADF) for use with NDBs and in this specific case, it is proposed to allow for the use of the on-board system in lieu of the ADF. No such equivalent provision is considered for either VHF omnidirectional radio range (VOR) or distance measuring equipment (DME) which are likely to be required equipment for the foreseeable future.

1.2.6 Considering the minimum requirements for an operator to conduct these operations, the use of a required navigation performance RNP 1 authorization is intended to incorporate many of the built-in features of the performance-based navigation (PBN) specification (such as display of next waypoint) without the need to explicitly define these in the provisions. Use of RNP 1 in preference to RNAV 1 is intentional as RNP 1 requires global navigation satellite system (GNSS) as a navigation sensor, whereas RNAV 1 can be authorized without GNSS and relies solely on conventional radio navigation aids.

**PROPOSED AMENDMENT TO
INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES**

**OPERATION OF AIRCRAFT
ANNEX 6**

**PART I
INTERNATIONAL COMMERCIAL AIR TRANSPORT —
AEROPLANES**

**NOTES ON THE EDITORIAL PRESENTATION OF THE PROPOSED
AMENDMENT**

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~Text to be deleted is shown with a line through it.~~ text to be deleted
2. **New text to be inserted is highlighted with grey shading.** new text to be inserted
3. ~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading. new text to replace existing text

**PROPOSED AMENDMENT TO
INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES**

ANNEX 6 — OPERATION OF AIRCRAFT

**PART I—INTERNATIONAL COMMERCIAL AIR TRANSPORT —
AEROPLANES**

...

CHAPTER 3. GENERAL

...

3.3 SAFETY MANAGEMENT

Note.— Annex 19 includes safety management provisions for air operators. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859).

3.3.1 Recommendation.— *The operator of an aeroplane of a certificated take-off mass in excess of ~~20 000~~ 15 000 kg should establish and maintain a flight data analysis programme as part of its safety management system.*

3.3.2 All aeroplanes of a certificated take-off mass in excess of 15 000 kg with a passenger seating capacity greater than 30, with a certificate of airworthiness first issued on or after 1 January 2026, shall be equipped with a means to support a flight data analysis programme.

3.3.3 With effect from 1 January 2026, the operator of an aeroplane equipped as described in 3.3.2 shall establish and maintain a flight data analysis programme as part of its safety management system.

3.3.24 The operator of an aeroplane of a maximum certificated take-off mass in excess of 27 000 kg shall establish and maintain a flight data analysis programme as part of its safety management system.

<i>Origin:</i> FLTOPSP/7	<i>Rationale:</i> Following a review of aircraft maximum certified take-off mass, passenger numbers and accident data obtained from the Flight Safety Foundation’s Aviation Safety Network database, it is apparent that a value of 15 000 kg would include the majority of the aircraft identified in the range between 5 700 kg (the definition of large aeroplanes) and 27 000 kg (the current lower threshold for the Flight Data Analysis Programme (FDAP). Additionally, a value of 15 000 kg would include larger aircraft such as the ATR-24 and Dash-8 (100-300). Accident data since the introduction of the operator safety management system (SMS) requirements (1 January 2009) showed a significant number of hull loss and fatal accidents for these aircraft types, and it was agreed that there would be significant benefit in including them in the category of aircraft covered by a requirement for FDAP.
---------------------------------	---

ATTACHMENT C to State letter AN 11/1.1.35-21/50

**PROPOSED AMENDMENT TO
PROCEDURES FOR AIR NAVIGATION SERVICES —
AIRCRAFT OPERATIONS
VOLUME I — FLIGHT PROCEDURES
(PANS-OPS, DOC 8168)**

**NOTES ON THE EDITORIAL PRESENTATION OF THE PROPOSED
AMENDMENT**

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~Text to be deleted is shown with a line through it.~~ text to be deleted
2. **New text to be inserted is highlighted with grey shading.** new text to be inserted
3. ~~Text to be deleted is shown with a line through it~~ followed **by the replacement text which is highlighted with grey shading.** new text to replace existing text

PROPOSED AMENDMENT TO

***PROCEDURES FOR AIR NAVIGATION SERVICES —
AIRCRAFT OPERATIONS, VOLUME I — FLIGHT PROCEDURES***

(PANS-OPS, Volume I, Doc 8168)

INITIAL PROPOSAL 1

Part II

FLIGHT PROCEDURE REQUIREMENTS

SECTION 1

GENERAL REQUIREMENTS

Chapter 1

GENERAL REQUIREMENTS

...

**1.4 USE OF FLIGHT MANAGEMENT SYSTEM (FMS)/
AREA NAVIGATION (RNAV) EQUIPMENT SYSTEM IN CONVENTIONAL PROCEDURES**

1.4.1 Where an FMS/RNAV equipment system is available, it may be used to fly conventional procedures provided:

- a) the such procedures is are monitored using the basic display normally associated with that those procedures; and
- b) the tolerances for flight using raw data on the basic display are complied with.

1.4.2 Notwithstanding 1.4.1, an operator may fly conventional procedures using the FMS/RNAV system for primary navigation without monitoring the raw data of the radio navigation aids designated by the conventional procedure, provided that the operational criteria defined in PANS-OPS, Volume III, Section 11 – *RNAV substitution* are complied with.

1.4.2-3 Lead radials are for use by non-RNAV-equipped aircraft and are not intended to restrict the use of turn anticipation by the FMS.

...

Origin: FLTOPSP/7	<i>Rationale</i> Current provisions require the monitoring of conventional radio aids in all cases where an FMS/RNAV system is used for navigation. This is updated to allow for the use of an RNAV system without monitoring the primary navigation aid in the event that the conditions outlined in PANS-OPS, Volume III are met. This ensures that the use of RNAV systems will be correctly managed and, in other cases where the provisions of Volume III cannot be complied with, monitoring the conventional radio aids will still be required.
---------------------------------	---

ATTACHMENT D to State letter AN 11/1.1.35-21/50

**PROPOSED AMENDMENT TO
PROCEDURES FOR AIR NAVIGATION SERVICES —
AIRCRAFT OPERATIONS
VOLUME III — AIRCRAFT OPERATING PROCEDURES
(PANS-OPS, DOC 8168)**

**NOTES ON THE EDITORIAL PRESENTATION OF THE PROPOSED
AMENDMENT**

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~Text to be deleted is shown with a line through it.~~ text to be deleted
2. **New text to be inserted is highlighted with grey shading.** new text to be inserted
3. ~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading. new text to replace existing text

**PROPOSED AMENDMENT TO
PROCEDURES FOR AIR NAVIGATION SERVICES —
AIRCRAFT OPERATIONS, VOLUME III — AIRCRAFT OPERATING
PROCEDURES**

(PANS-OPS, Volume III, Doc 8168)

INITIAL PROPOSAL 1

Chapter 1

Definitions

...

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Origin: FLTOPSP/7	<i>Rationale</i> Inclusion of the reference to NOTAM in 11.2.6 requires that the definition be included here. The provided definition is consistent with Annex 15 and PANS ABC.
-----------------------------	--

Editorial Note 1.— Section 10 is reserved for *Aircraft Tracking* (not yet published)

Editorial Note 2.— Insert new Section 11 as per below.

Section 11 – RNAV substitution

INITIAL PROPOSAL 2

11.1 General

11.1.1 RNAV substitution is the ability to use the FMS/RNAV system instead of conventional radio navigation aids, without monitoring the raw data of the conventional navigation aids.

11.1.2 RNAV substitution can have significant operational benefits, derived from the following:

- a) failure of the conventional navigation aids does not automatically impose an operational limitation;
- b) flight crew workload is reduced in part due to not having to interpret both conventional radio navigation aids and FMS navigational displays;

- c) flight crew are able to employ common procedures across a range of instrument approach operations; and
- d) the ability to use the full functionality of modern navigation displays is maintained thereby improving situational awareness.

11.1.3 RNAV substitution depends on a coding of the conventional procedure into the navigation database whereas it has not been originally designed with that intention. As a consequence, there are limitations associated with RNAV substitution and required operating procedures, in order to maintain the same level of safety.

Origin: FLTOPSP/7	<i>Rationale</i> The general section aims to provide context for the provisions, explaining why an operator might request authorization for the use of FMS/RNAV system on conventional routes and procedures. It is important for the State to understand the benefit derived when determining whether to issue such an authorization.
---------------------------------	--

INITIAL PROPOSAL 3

11.2 Scope and limitations

Note.— This section defines the limitations (scope) of RNAV substitution and the operational criteria an operator has to comply with in order for it to be implemented.

11.2.1 RNAV substitution may be used in all phases of flight except to provide lateral guidance in the final approach segment of an instrument approach procedure.

11.2.2 Applications of RNAV substitution are used to:

- a) determine aircraft position relative to or distance from:
 - 1) a very high frequency omnidirectional radio range (VOR);
 - 2) marker;
 - 3) DME fix; or
 - 4) a named fix defined by a VOR radial or non-directional beacon (NDB) bearing and DME distance;
- b) navigate to or from a VOR, or NDB, except as lateral guidance in the final approach segment of an instrument approach procedure;
- c) hold over a VOR, NDB, or DME fix;
- d) fly an arc based upon DME;

- e) fly an overlay of a conventional departure, arrival, approach or route except as lateral guidance in the final approach segment of an instrument approach procedure; and
- f) fly a procedure where the chart contains a note requiring a particular type of conventional navaid, e.g. “ADF required”.

11.2.3 RNAV substitution for ADF, in accordance with 11.2.2, may be used where the aircraft equipment is not installed or inoperative and/or ground-based equipment is inoperative.

11.2.4 RNAV substitution for VOR, in accordance with 11.2.2, may be used where the aircraft equipment and/or ground-based equipment are inoperative.

11.2.5 RNAV substitution for DME, in accordance with 11.2.2 may be used where the aircraft and/or ground-based equipment are inoperative.

11.2.6 RNAV substitution shall not be applied to any route or procedure where RNAV substitution has been indicated as “not authorized” by an aeronautical information publication (AIP) entry or NOTAM.

Note.— Additional information regarding the validation of procedures and the use of radio navigation aids is provided in the Quality Assurance Manual for Flight Procedure Design (Doc 9906), Volume 5 - Validation of Instrument Flight Procedures; and the Performance-based Navigation (PBN) Manual (Doc 9613).

<p>Origin:</p> <p>FLTOPSP/7</p>	<p><i>Rationale</i></p> <p>Use of RNAV substitution is clearly defined and limited here. In particular, the provisions restrict the use of RNAV substitution to flight phases other than final approach. This restriction has been included for the reasons described below.</p> <p>VOR, NDB and Localizer/DME (LOC/DME) or instrument landing system (ILS) approaches are designed and protected from obstacles based on criteria considering the angular nature of the radio navigation aids, which is more accurate closer to the radio aid (and by default nearer the ground). As a result, it would be more difficult to demonstrate, considering the GNSS performance from Annex 10 — <i>Aeronautical Telecommunications</i>, that the positioning of the aircraft based on GNSS is equivalent or better than the positioning based on conventional radio aid in the final approach segment of an instrument approach procedure.</p> <p>Additionally, ICAO has encouraged States, through resolutions A36-23 and A37-11, to develop PBN and in particular RNP approach on all instrument runways. Inclusion of RNAV substitution for the final approach segment of instrument approach procedures based on VOR/NDB/LOC would result in an inconsistent message to States who have not yet implemented PBN approaches.</p> <p>Further, in the operational documentation developed by aircraft manufacturers, the final approach segment is typically excluded from the scope of RNAV substitution.</p> <p>With regard to the different scope of applications for VOR and ADF, large commercial air transport aircraft have been produced without ADF as a basic option for several years, and States are encouraged as part of the PBN implementation plan to move</p>
--	---

away from NDBs. Therefore, RNAV substitution is particularly valuable for aircraft not fitted with an ADF.

For DME and VOR, RNAV substitution should not encourage operators to uninstall VOR or DME, which remain as standard equipment.

In accordance with discussions on the consequences of GNSS total loss (due to solar activity for instance), some States develop/keep a network of minimal conventional radio-navigation aids as backup solution. Among different options, back-up solutions are proposed based on DME for aircraft capable for RNAV 1 with DME/DME and VOR for general aviation. In this context, it would not be consistent to propose provisions allowing operations with no DME and no VOR installed.

INITIAL PROPOSAL 4

11.3 Operational criteria

11.3.1 RNAV substitution shall be restricted to operators authorized for RNP 1 operations.

11.3.2 The RNAV/flight management system (FMS) installation in the aircraft shall be certified for RNP 1 operations.

11.3.3 The operator shall establish and document:

- a) a policy for the use of RNAV substitution. Depending on its operational constraint(s), the operator may decide to limit the RNAV substitution to particular cases, mainly to cope with inoperative or unreliable conventional navigation aids;
- b) standard operating procedures to be used by the flight crew when utilizing the RNAV/FMS system for substitution, complying with any procedures and/or limitations developed by the aircraft manufacturer in its documentation (Aircraft Flight Manual (AFM), Quick Reference Handbook (QRH), etc.); and
- c) training for the use of RNAV substitutions. The training programme shall, at a minimum, contain the limitations and operational criteria as detailed in this chapter. Such training shall be extended to support staff such as flight operations officers/flight dispatch personnel, as required.

11.3.4 The operator shall ensure that the minimum equipment list (MEL) is updated to include operating limitations associated with the FMS, RNAV and any system (e.g. the GNSS system) that supports that equipment.

11.3.5 The operator shall verify that conventional navigational aids intended to be substituted are coded in the FMS/RNAV database, so they can be used as a waypoint.

11.3.6 The operator shall verify that the conventional procedure intended to be flown is coded in the FMS/RNAV navigation database. Depending on the complexity of the conventional procedure (e.g. several

conventional navigation aids involved in the path definition with several turning points), a flyability check may be considered.

<p>Origin:</p> <p>FLTOPSP/7</p>	<p><i>Rationale</i></p> <p>In defining the minimum authorized PBN capability of the operator, RNP 1 was determined as the most appropriate option.</p> <p>The navigation specification of RNP 1 includes a requirement for information to be displayed in the primary field of view, and also includes requirements for functionality such as:</p> <ul style="list-style-type: none"> a) capability for the “direct to”; b) display of distance and bearing to the active waypoint; c) display of ground speed or time to the active waypoint; d) display of the identification of the active (TO) waypoint; and e) support for path/terminator types : IF CF TF DF VA VM VI CA FA FM. <p>By specifying RNP 1, the additional requirements noted above are all included in the operator requirements for conducting RNAV substitution. Reference to an existing PBN navigation specification further emphasises the need for consistency and indicates that this is not a means to avoid proper authorization for the conduct of PBN operations.</p>
--	---

INITIAL PROPOSAL 5

11.4 Operating procedures

11.4.1 The pilot-in-command is responsible for:

- a) applying pre-flight procedures associated with GNSS use (e.g. receiver autonomous integrity monitoring (RAIM) check if applicable);
- b) checking that the navigation database is current;
- c) ensuring that any procedures and waypoints used are retrieved from the navigation database;
- d) verifying waypoint sequence, reasonableness of track angles, and distances of any overlay procedure used, in particular where the use of RNAV substitution is used to replace offset DME associated with an ILS;
- e) ensuring that FMS/RNAV and the GNSS systems are operational; and
- f) complying with any limitation on RNAV substitution in the AFM and manufacturer’s documentation.

11.5 Pilot knowledge and training

The pilot shall be aware of the limitations of RNAV substitution and familiar with the operator's policy and operating procedures.

<i>Origin:</i>	<i>Rationale</i>
FLTOPSP/7	<p>Requirements for the pilot to check that the procedure is extracted in full from a current navigational database ensure that the operation will proceed as intended. Additional checks on the GNSS system and receiver autonomous integrity monitoring (RAIM) prediction (where applicable) will also help to ensure that the operation can be conducted on arrival.</p> <p>Pilot knowledge and training is essential to ensure that any limitations and operator policy and procedure are adhered to.</p>

ATTACHMENT E to State letter AN 11/1.1.35-21/50

**RESPONSE FORM TO BE COMPLETED AND RETURNED TO ICAO TOGETHER
WITH ANY COMMENTS YOU MAY HAVE ON THE PROPOSED AMENDMENTS**

To: The Secretary General
International Civil Aviation Organization
999 Robert-Bourassa Boulevard
Montréal, Quebec
Canada, H3C 5H7

(State) _____

Please make a checkmark (✓) against one option for each amendment. If you choose options “agreement with comments” or “disagreement with comments”, **please provide your comments on separate sheets.**

	<i>Agreement without comments</i>	<i>Agreement with comments*</i>	<i>Disagreement without comments</i>	<i>Disagreement with comments</i>	<i>No position</i>
Amendment to Annex 6, Part I (Attachment B refers)					
Amendment to PANS-OPS, Volume I (Attachment C refers)					
Amendment to PANS-OPS, Volume III (Attachment D refers)					

*“Agreement with comments” indicates that your State or organization agrees with the intent and overall thrust of the amendment proposal; the comments themselves may include, as necessary, your reservations concerning certain parts of the proposal and/or offer an alternative proposal in this regard.

Signature: _____ Date: _____

— END —