
IFP PROVISION AND SAFETY
OVERSIGHT WORKSHOP
(Amman, Jordan, 7–9 December 2025)

ICAO SARPs & PANS for IFP Design and global developments

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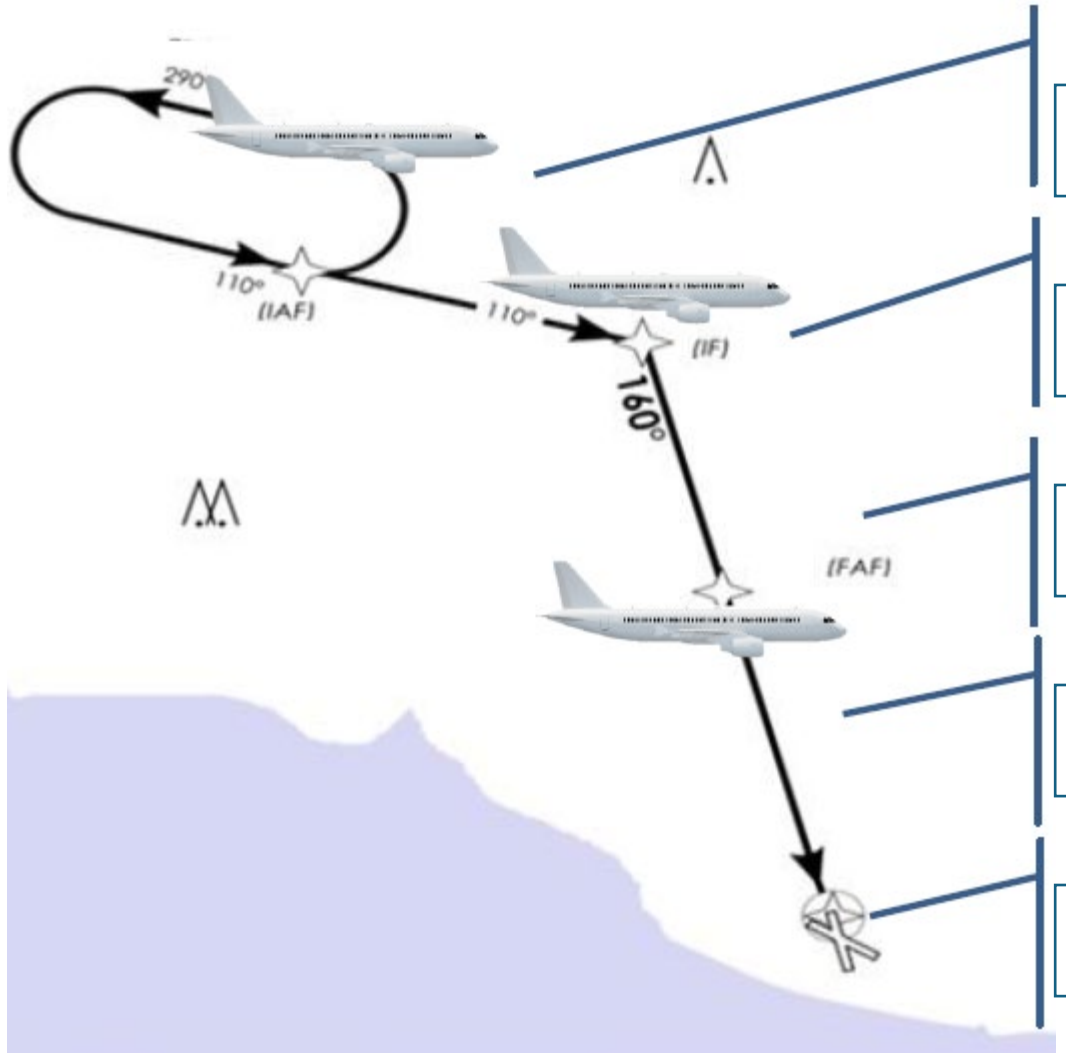
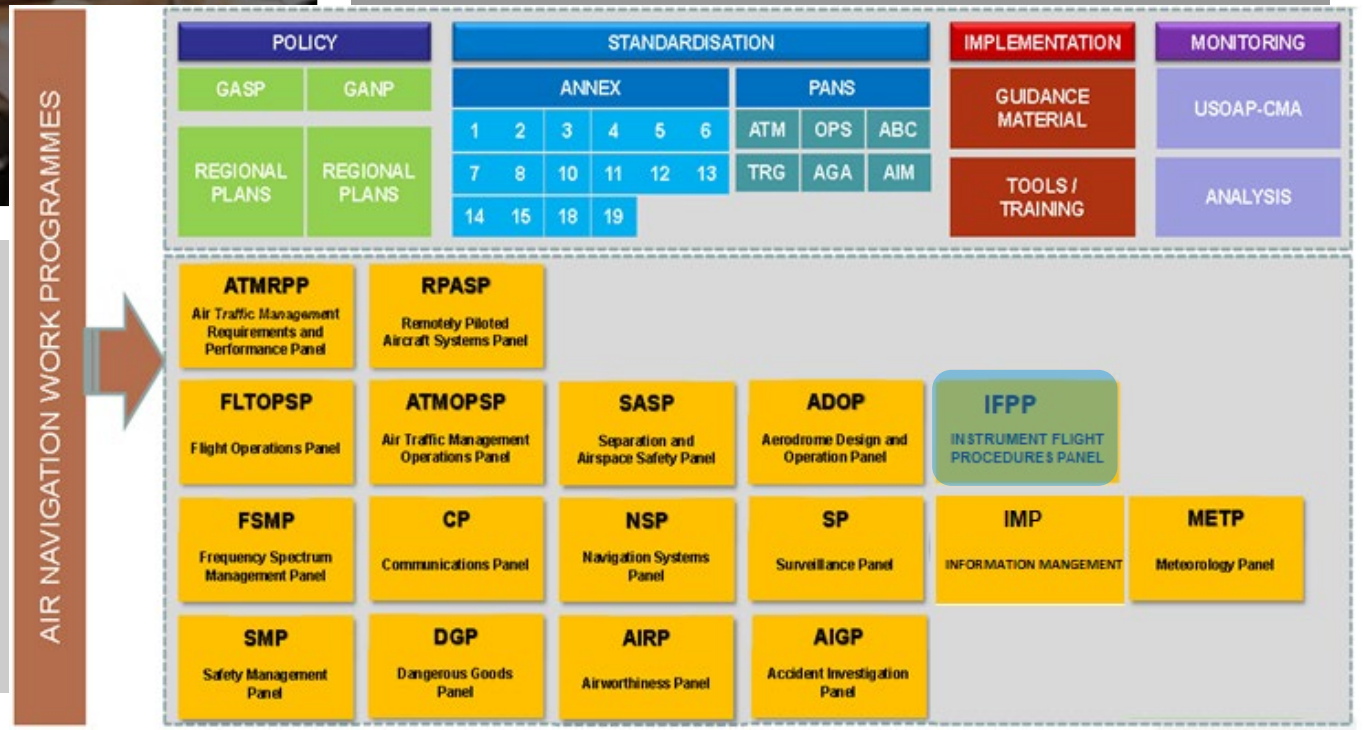
ICAO



- ANC and IFPP
- ICAO GANP
- ICAO SARPs & PANS for IFP
- ICAO Guidance
- Global Developments

The Air Navigation Commission (ANC) considers and recommends Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS) for adoption or approval by the ICAO Council.

The ANC works through established panels of experts in various disciplines who are assigned specific tasks from the overall work programme. It also takes advantage of the expertise within States and international organizations to develop its technical proposals.



INSTRUMENT FLIGHT PROCEDURES PANEL

- Develop and maintain flight procedures SARPs and guidance material (e.g., PANS-OPS, Docs 8697, 9905 and 9906)
- Improved airport/heliport accessibility in all weather conditions
- Efficient transitions to/from en-route airspace.
- New design criteria to address changes
- IFP oversight requirements
- Charting requirements
- Consequential amendments to Annexes and ICAO Documents because of these changes

THE IFPP WORKING GROUP ACTIVITIES-OLD

WG 1a

- PBN
- New Criteria

WG 1b

- Maintenance of existing criteria

WG 1c

- Helicopter operation and criteria

WG 2

- Integration

WG 3

- Collision Risk Model

WG 4

Quality Assurance

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THE IFPP WORKING GROUP ACTIVITIES-Proposed

FCWG- Fixed wing criteria

- Development and Maintenance of Fixed-wing criteria

HCWG-Helicopter Criteria

- Development and maintenance of helicopter criteria

IWG-Integration

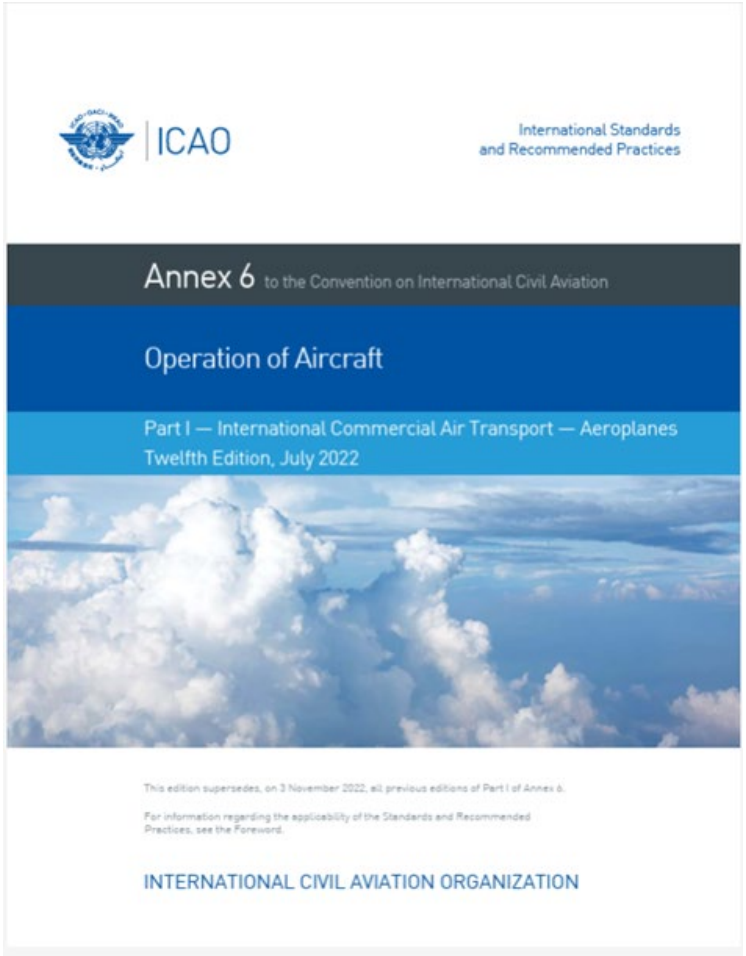
- Database, Charting, Avionics

CRMWG-Collision Risk Model WG

- CRM and OAS

QAWG-Quality Assurance WG

- IFP Quality Assurance provision


ICAO
International Standards and Recommended Practices
Annex 6 to the Convention on International Civil Aviation
Operation of Aircraft
Part I — International Commercial Air Transport — Aeroplanes
Twelfth Edition, July 2022
This edition supersedes, on 3 November 2022, all previous editions of Part I of Annex 6.
For information regarding the applicability of the Standards and Recommended Practices, see the Foreword.
INTERNATIONAL CIVIL AVIATION ORGANIZATION


ICAO
International Standards and Recommended Practices
Annex 6 to the Convention on International Civil Aviation
Operation of Aircraft
Part II — International General Aviation — Aeroplanes
Eleventh Edition, July 2022
This edition supersedes, on 3 November 2022, all previous editions of Part II of Annex 6.
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INTERNATIONAL CIVIL AVIATION ORGANIZATION


ICAO
International Standards and Recommended Practices
Annex 6 to the Convention on International Civil Aviation
Operation of Aircraft
Part III — International Operations — Helicopters
Eleventh Edition, July 2022
This edition supersedes, on 3 November 2022, all previous editions of Part III of Annex 6.
For information regarding the applicability of the Standards and Recommended Practices, see the Foreword.
INTERNATIONAL CIVIL AVIATION ORGANIZATION

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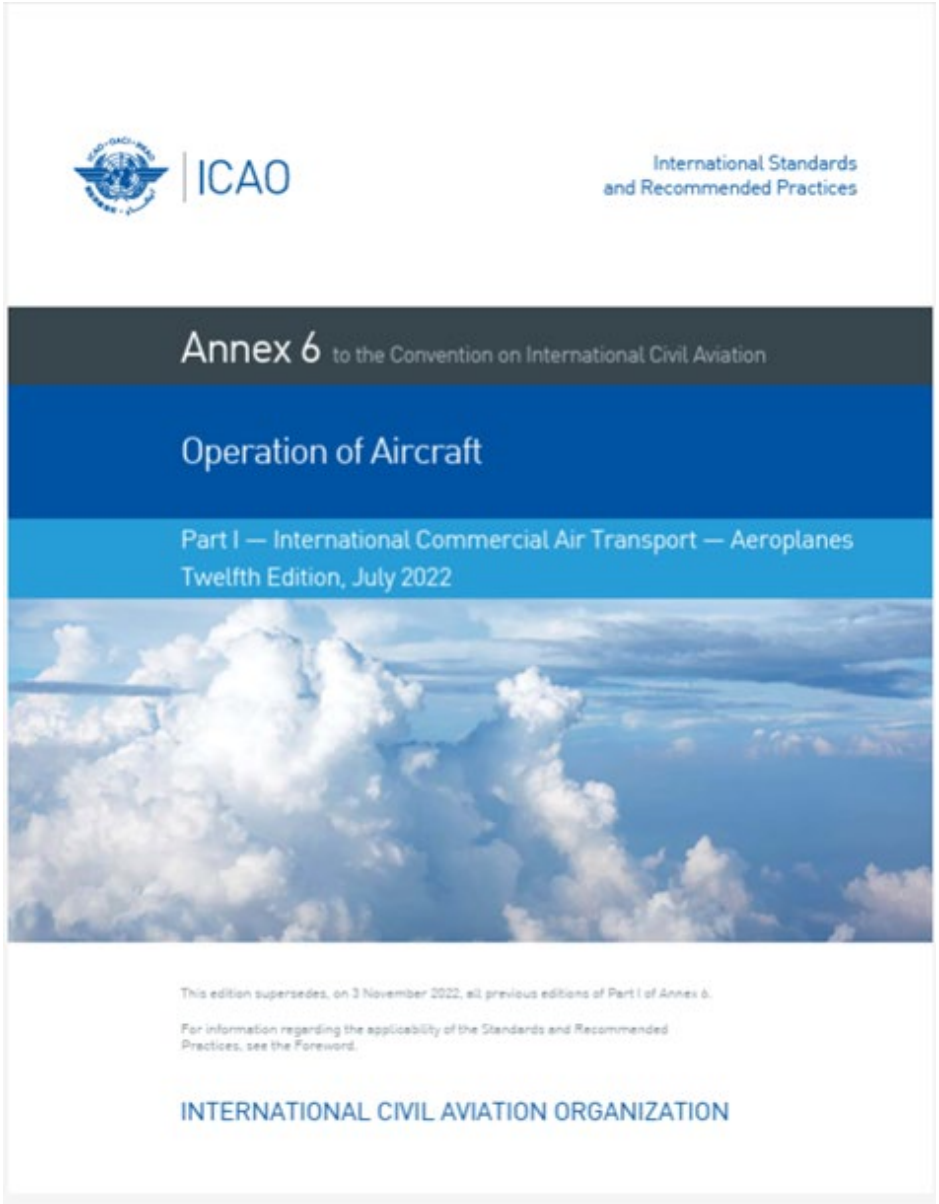
Annex 6 Vol -I

- 4.4.8 Instrument flight procedures
- 4.4.8.1 One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by the State in which the aerodrome is located to serve each instrument runway or aerodrome utilized for instrument flight operations.
- 4.4.8.2 All Aeroplan operated in accordance with instrument flight rules shall comply with the instrument flight procedures approved by the State in which the aerodrome is located.



Annex 6 Vol –II

- 2.2.4.9 Instrument approach procedures

- 2.2.4.9.1 One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by the State in which the aerodrome is located to serve each instrument runway or aerodrome utilized for instrument flight operations.

- 2.2.4.9.2 Aeroplane operated in accordance with the instrument flight rules shall comply with the instrument approach procedures approved by the State in which the aerodrome is located.

Annex 6 Vol -III

- 2.17 INSTRUMENT FLIGHT PROCEDURES

- 2.17.1 One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State, to serve each final approach and take-off area or heliport utilized for instrument flight operations.
- 2.17.2 All helicopters operated in accordance with IFR shall comply with the instrument approach procedures approved by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

- Annex 6 Vol -III
- 2.4.7 Instrument flight procedures

- 2.4.7.1 One or more instrument approach procedures to serve each final approach and take-off area or heliport utilized for instrument flight operations shall be approved and promulgated by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

- 2.4.7.2 All helicopters operated in accordance with IFR shall comply with the instrument approach procedures approved by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.


ICAO
Doc 8168
PROCEDURES FOR AIR NAVIGATION SERVICES
Aircraft Operations
Volume I – Flight Procedures
Sixth Edition, 2018
This edition incorporates all amendments approved by the Council prior to 29 August 2018 and supersedes on 8 November 2018, all previous editions of Doc 8168, Volume I.
INTERNATIONAL CIVIL AVIATION ORGANIZATION


ICAO
Doc 8168
PROCEDURES FOR AIR NAVIGATION SERVICES
Aircraft Operations
Volume II – Construction of Visual and Instrument Flight Procedures
Seventh Edition, 2020
This edition incorporates all amendments approved by the Council prior to 19 May 2020 and supersedes on 5 November 2020, all previous editions of Doc 8168, Volume II.
INTERNATIONAL CIVIL AVIATION ORGANIZATION


ICAO
Doc 8168
PROCEDURES FOR AIR NAVIGATION SERVICES
Aircraft Operations
Volume III – Aircraft Operating Procedures
First Edition, 2018
This first edition of Doc 8168, Volume III, was approved by the President of the Council on behalf of the Council on 28 August 2018 and becomes applicable on 8 November 2018.
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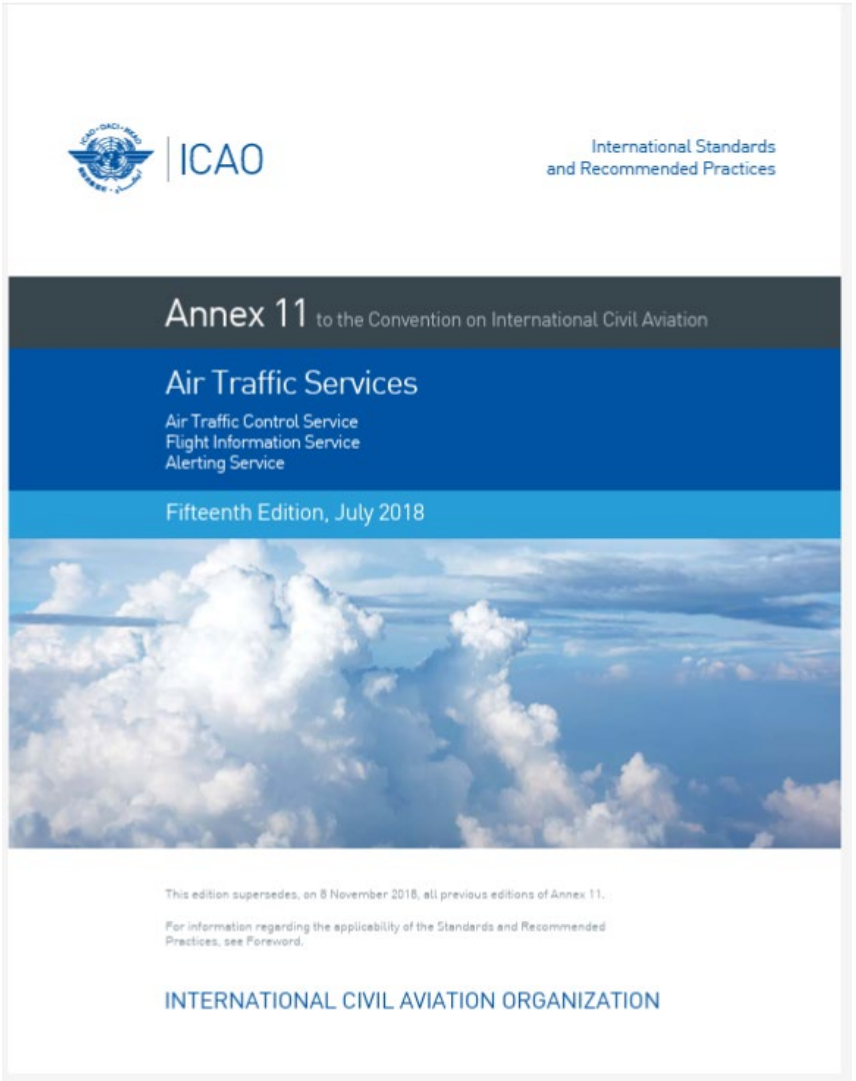
ICAO
International Standards
and Recommended Practices
Annex 11 to the Convention on International Civil Aviation
Air Traffic Services
Air Traffic Control Service
Flight Information Service
Alerting Service
Fifteenth Edition, July 2018
This edition supersedes, on 8 November 2018, all previous editions of Annex 11.
For information regarding the applicability of the Standards and Recommended Practices, see Foreword.
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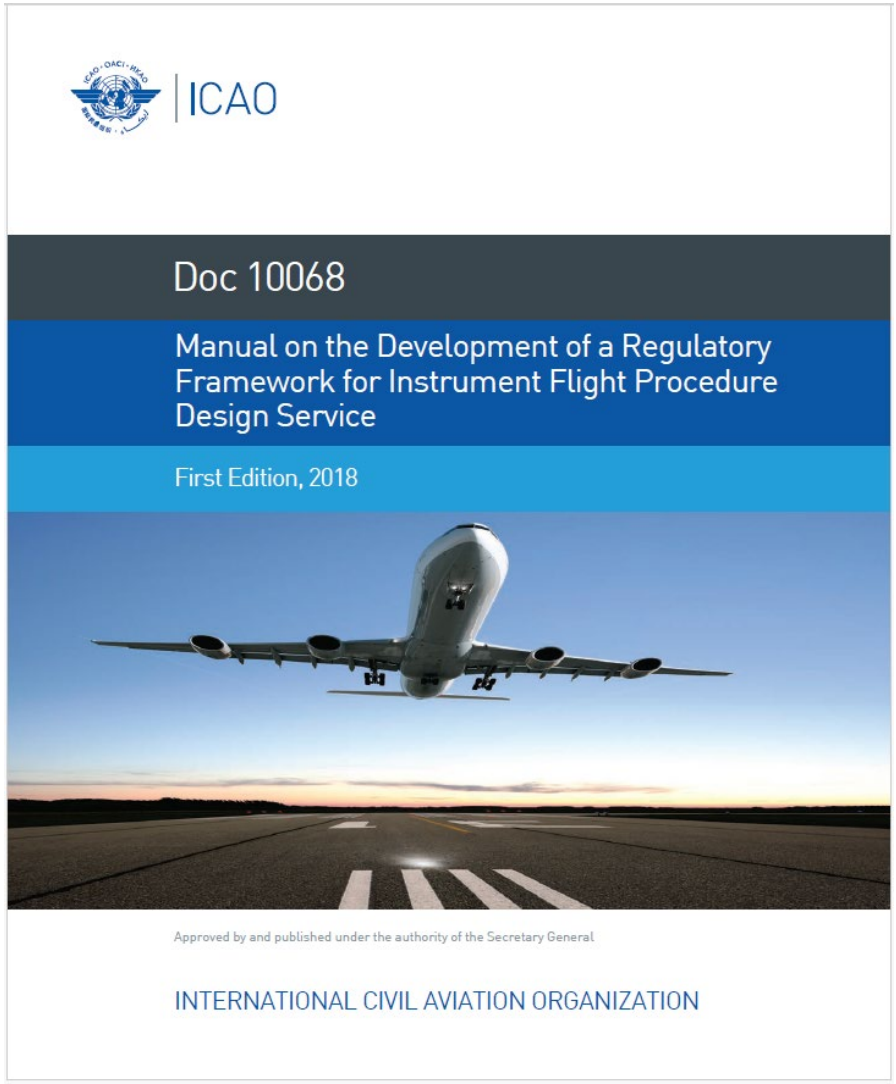
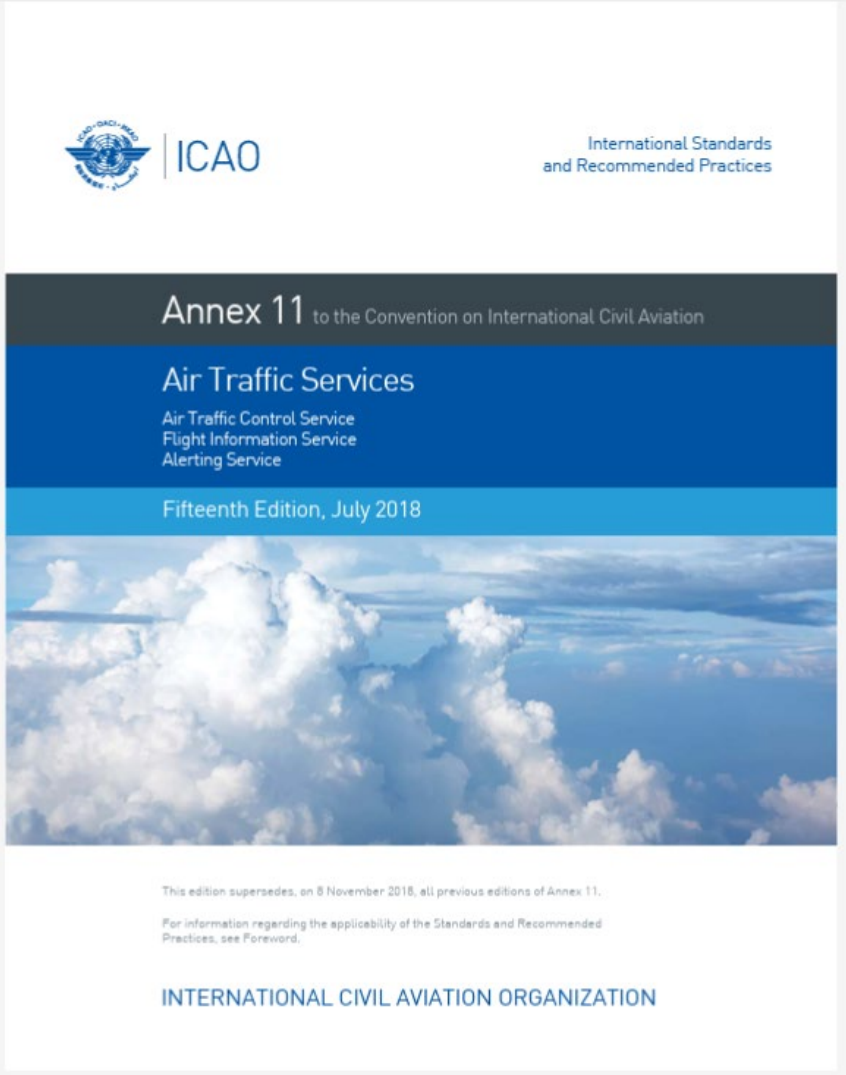

ICAO
Doc 10068
Manual on the Development of a Regulatory Framework for Instrument Flight Procedure Design Service
First Edition, 2018
Approved by and published under the authority of the Secretary General
INTERNATIONAL CIVIL AVIATION ORGANIZATION



ANNEX 11: 2.34 Instrument flight procedure design service States shall ensure that an instrument flight procedure design service is in place in accordance with Appendix 7.

APPENDIX 7. STATE RESPONSIBILITIES CONCERNING AN INSTRUMENT FLIGHT PROCEDURE DESIGN SERVICE

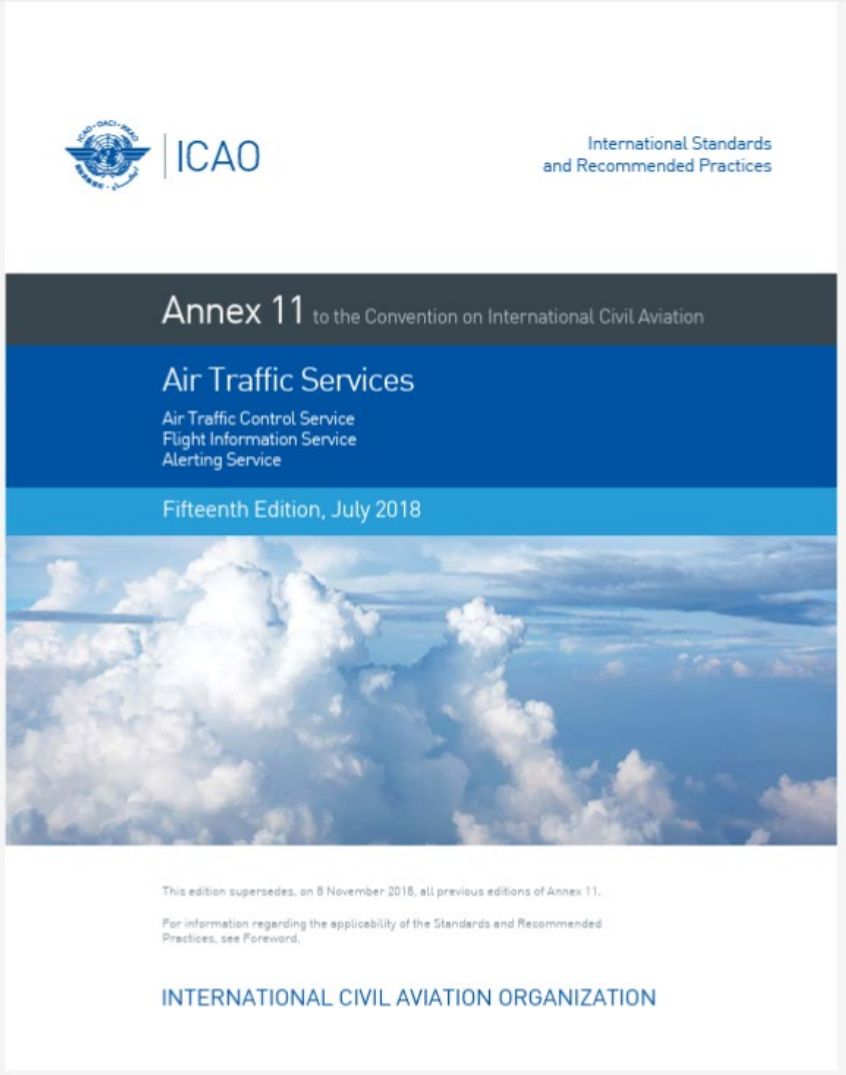
1. A State shall:

a) provide an instrument flight procedure design service; and/or

b) agree with one or more Contracting State(s) to provide a joint service; and/or

c) delegate the provision of the service to external agency(ies).

2. **In all cases in paragraph 1 above, the State concerned shall approve and remain responsible for all instrument flight procedures for aerodromes and airspace under the authority of the State**.



3. Instrument flight procedures shall be designed in accordance with State-approved design criteria.

4. Each State shall ensure that an instrument flight procedure design service provider intending to design an instrument flight procedure for aerodromes or airspace under the authority of that State meets the requirements established by that State's regulatory framework.

Note.— Guidance material for regulatory framework for the oversight of instrument flight procedure design service is contained in the Manual on the Development of a Regulatory Framework for Instrument Flight Procedure Design Service (Doc 10068).

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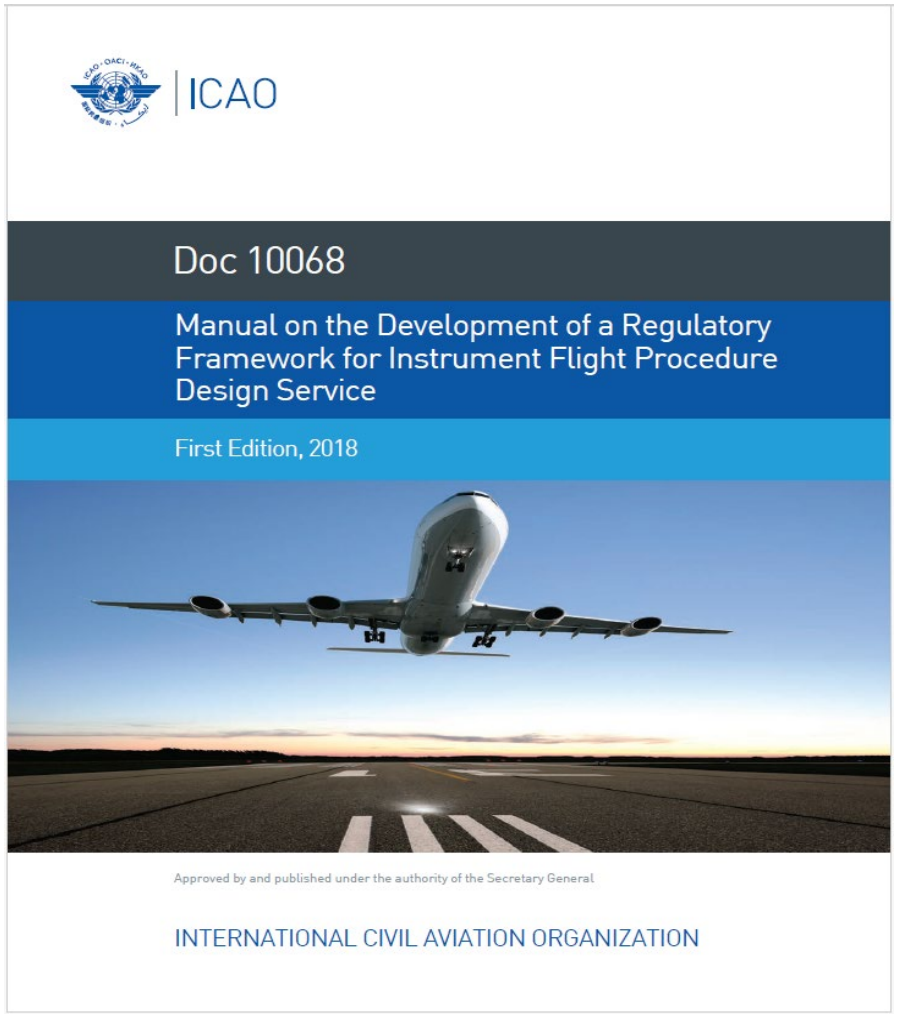


ICAO Doc 10068 - Manual on the Development of a Regulatory Framework for Instrument Flight Procedure Design Service:-
State obligations and responsibilities

- State (“Regulator” or “Flight Procedure Inspectorate”) must assume safety oversight responsibilities for an IFPDS to ensure the safety and quality of instrument flight procedures for aerodromes and airspace under their authority.
- Oversight can be conducted through:

a) the certification of a service provider(s) and their personnel;
b) ensuring that a service provider has developed an operations manual and related procedures that meet the regulatory framework established by the State;
c) ensuring that a service provider complies with the operations manual and related procedures they have established

- States must ensure that continuous maintenance and a periodic review are conducted.

The Quality Assurance Manual for Flight Procedure Design (Doc 9906)

The Quality Assurance Manual for Flight Procedure Design (Doc 9906) consists of six volumes:

Volume 1 — Flight Procedure Design Quality Management System;

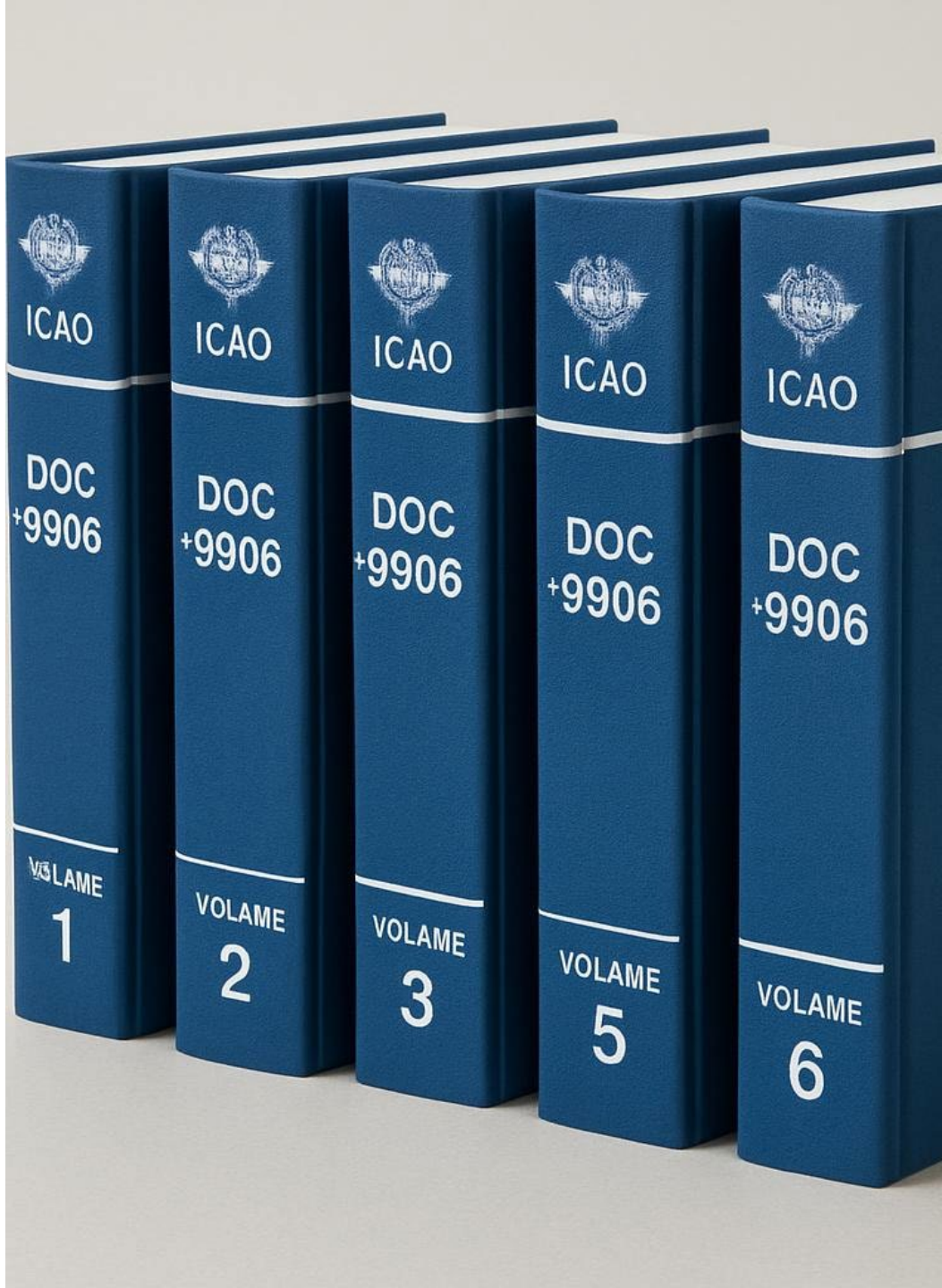
Volume 2 — Flight Procedure Designer Training (Development of a Flight Procedure Designer Training Programme);

Volume 3 — Flight Procedure Design Software Validation;

Volume 4 — Flight Procedure Design Guidance (forthcoming);

Volume 5 — Validation of Instrument Flight Procedures; and

Volume 6 — Flight Validation Pilot Training and Evaluation (Development of a Flight Validation Pilot Training Programme).



Importance of Quality in IFPs

IFPs are integral to safe and efficient flight operations.

Quality cannot be left to chance; it must be systematically assured.

States' Safety Management Systems must include oversight of IFP processes.

IFP Process

Covers all activities from initiation to publication of the procedure.

Includes maintenance, safety assessment, Sim validation, and flight validation.

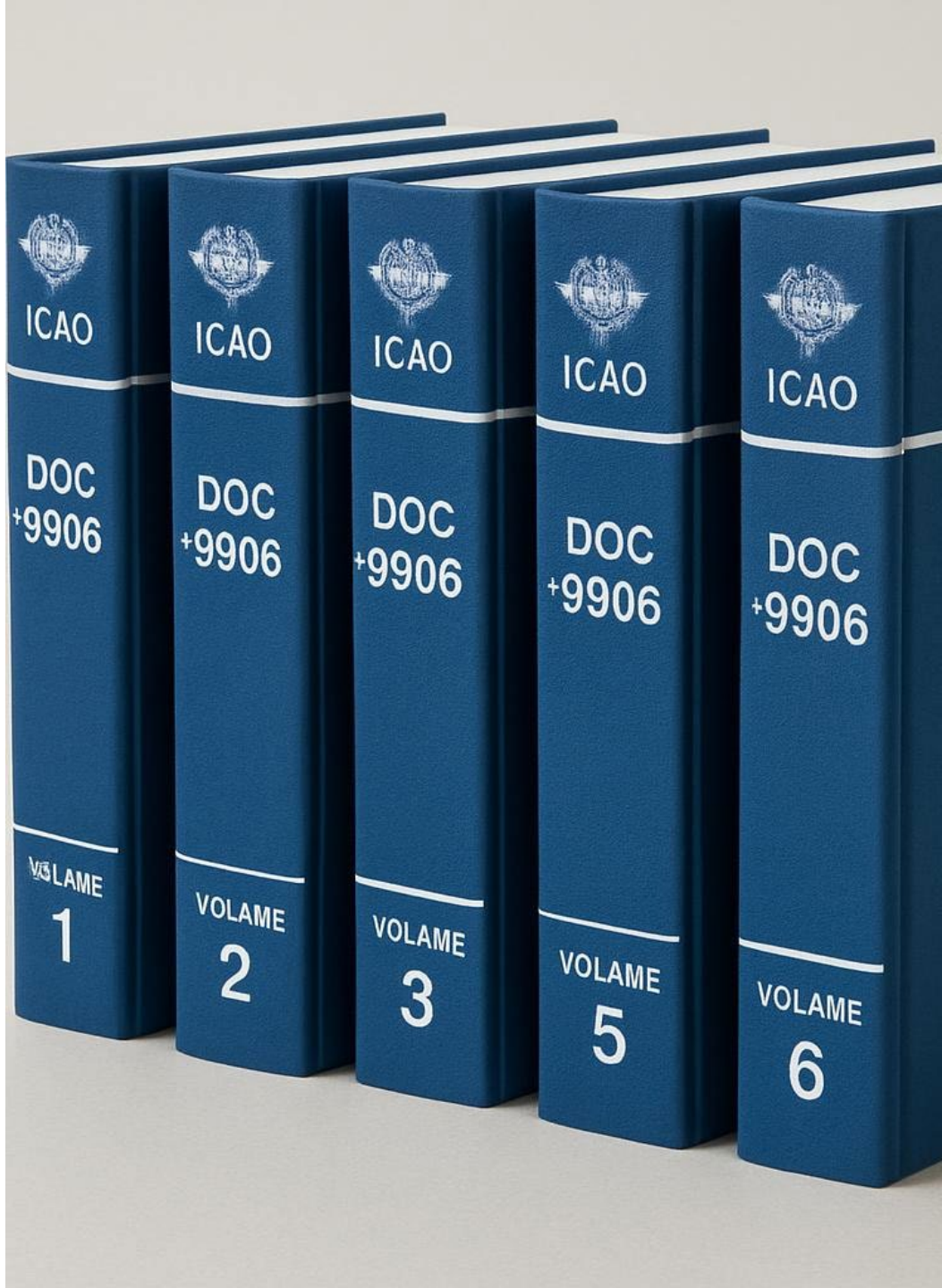
The process continues after publication—user feedback is essential for improvements.

State Responsibilities

States are ultimately responsible for all procedures published in their territory.

Implementation may be performed by the State or delegated to third parties (ANSPs, private entities, other States).

Delegation of service is allowed; delegation of responsibility is not.



Quality Requirements

PANS-OPS (Doc 8168) requires States to control the quality of the procedure design process.

Quality measures must ensure safety through review, verification, coordination, and validation.

Early correction mechanisms must be built into the process.

Procedure Design Service Provider Obligations

Must establish a quality system covering the entire IFP process.

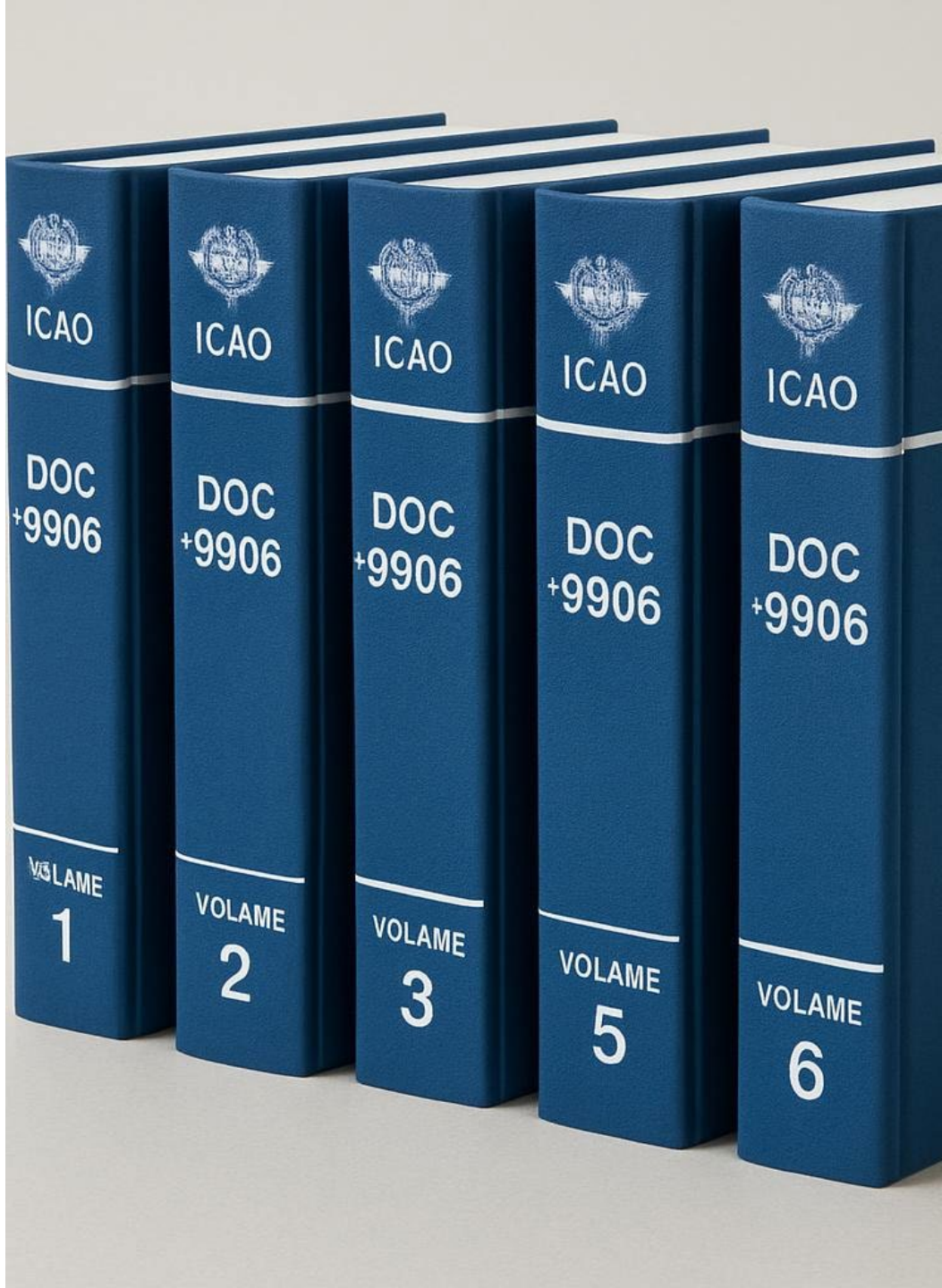
System includes overall quality assurance and focused QA for the design phase.

Must align with the State’s regulatory framework.

Purpose of the Manual

Provides guidance to Member States on establishing systems that ensure flight procedure quality.

It Presents one possible method for implementing quality assurance throughout the IFP process.



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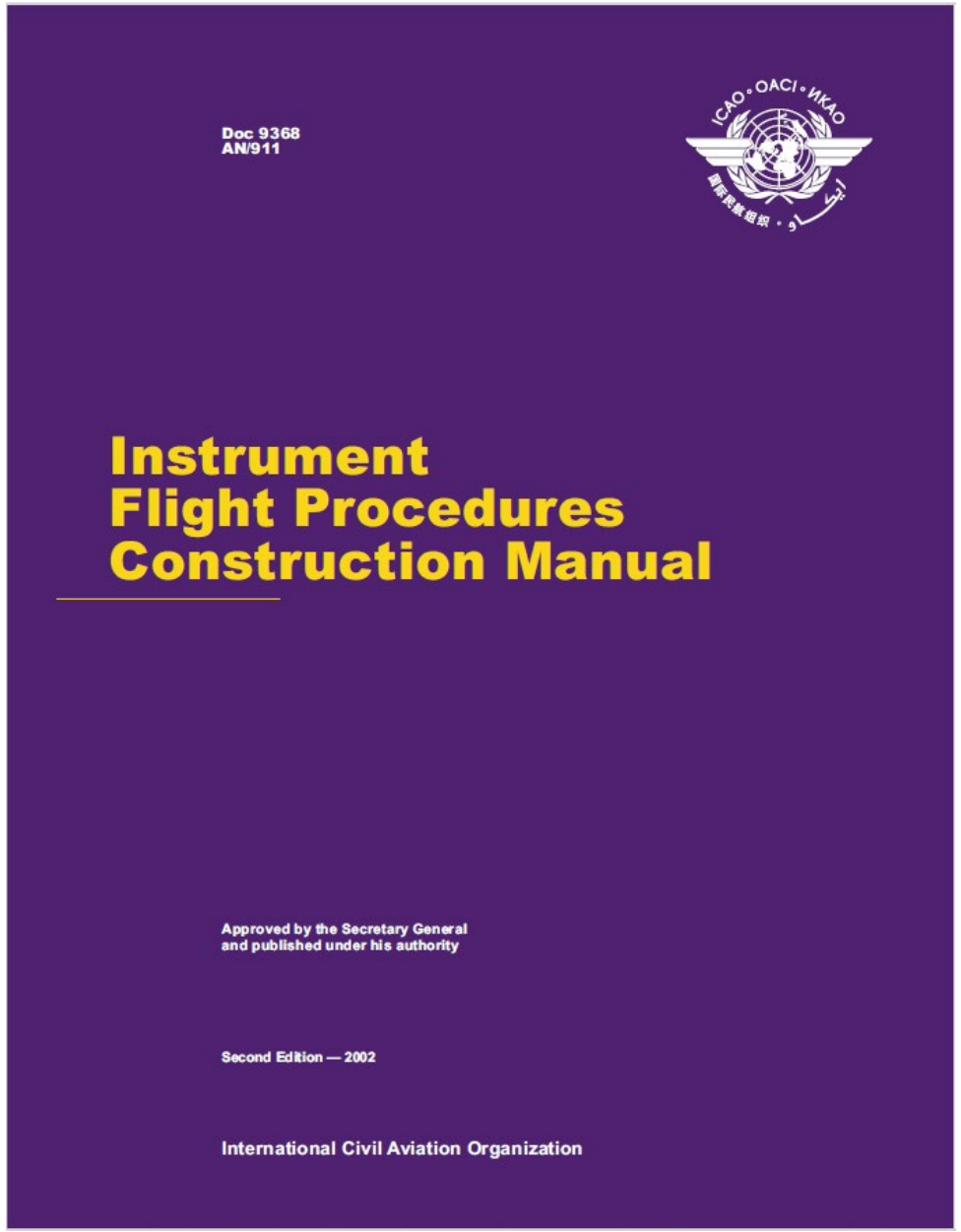


The purpose of this manual 9368:-

To assist in the implementation of the procedures

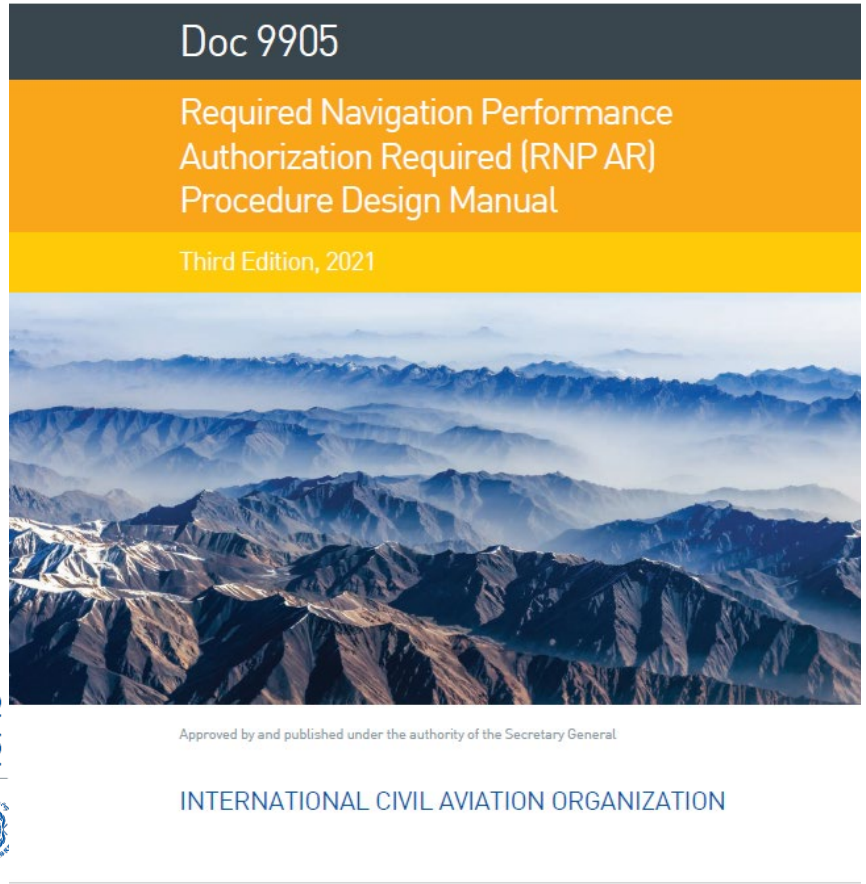
Breaking down each procedure into a series of simple, easily understood steps using examples

Three main principles apply to the design of all instrument approach procedures:

- they should be safe;
- they should be simple;
- they should be economical of both time and airspace

It is recommended that both the plan view and the vertical profile of all procedures be accurately plotted on appropriate maps and graph paper. This forms a control that can reveal any significant error in calculation or obstacle location.

It is recommended that worksheets used to record calculations be preserved for future work. Worksheets will speed up the design process, reduce errors and facilitate standardization, review and training.



Evolution and Purpose of RNP & RNP AR

ICAO introduced **Required Navigation Performance (RNP)** to enable faster adaptation to evolving GNSS, aircraft systems, and airspace needs.

Early **PANS-OPS RNP criteria** were conservative due to limited demand and familiarity with new concepts.

Growing operational challenges—especially in **obstacle-rich or terrain-constrained airports**—revealed gaps in ICAO criteria.

To promote standardization, ICAO formed the Required Navigation Performance and Special Operational Requirements Study Group (**RNPSORSG)**, leading to the **Performance-Based Navigation (PBN) Manual (Doc 9613)**.

PBN defines two approach navigation specifications:

- **RNP APCH** – general RNP operations, no special authorization.
- **RNP AR APCH** – advanced capability for challenging environments; requires **aircraft, crew, and operational authorization**.

RNP AR enables increased accuracy, integrity, and advanced functionality, supporting operations not feasible with standard RNAV.

Provides improved safety, optimized paths, and reduced CFIT risk through high-quality managed VNAV.

This manual guides States in **designing and implementing RNP AR approaches**; departure criteria will follow when developed.

Global developments (real PBN, ...etc.

- Real PBN…
- MLS, Offset MLS, PAR, MLS Azimuth-only and DF will be removed
- Revision of PBN Holding Design Criteria
- The use of augmented GNSS with geometric vertical guidance in RNP AR approach
- Evolution of PinS criteria
- Alignment of Instrument Flight Procedure Design criteria with the New OLS Concept
- New edition of Doc 9906 Vol-1, Vol-5 and Vol-3 expected to be published very soon.

In PBN, different navigation sensors require different design criteria. when a NavSpec allows multiple sensors, the designer often design the same procedure several times. This seems to contradict the “performance-based” idea, because if an aircraft meets the required performance, one design should be enough.

NSE vs. TSE

In RNAV specifications, the requirement applies only to the Navigation System Error (NSE).
In RNP specifications, the requirement applies to the Total System Error (TSE), which includes the NSE, the system’s computation error, and—most importantly—the Flight Technical Error (FTE), which is usually the largest contributor.

Observed Issues in Current PBN Protection Criteria

Designers must create multiple versions of a procedure for different navigation sensors.

Some protection widths do not match the expected performance

Overall problem:
More accurate sensors sometimes require **larger protection**, and RNP with performance monitoring (TSE) may require **more protection** than RNAV with a lesser requirement (NSE). This contradicts the performance-based concept.

Proposed Way Forward

Move toward **fully performance-based** protection criteria.

Protect the required **performance**, not the individual **sensors**.

This approach is already used successfully in **US TERPS**, with no negative safety outcomes.

Current Protection Concept and Issues

Today's protection = **1.5 × XTT + Buffer Value (BV).**

The **BV** was added because early PBN data showed **non-Gaussian behavior**, but no reliable distribution data existed.
So, a "generic" buffer was added to protect the unknown tails.

BV is based on assumptions about:

- Blunder angle
- Pilot reaction time
- Recovery bank angle

These assumptions led to BV being **speed-dependent**, but:

- No distinction is made between aircraft categories
- No variation with altitude
- Only fixed-wing vs helicopters is considered

Consequences:

BV is **overly conservative** and reduces efficiency of PBN implementation.

As navigation requirements become more stringent, **BV dominates the protection width**, making the design less performance-based.

RNP vs RNAV Consideration

- Dataset reflects **RNAV 1** (NSE only).
- RNP uses **TSE** (includes FTE) with **monitoring and alerting**, so actual performance is expected to be **equal or better**.
- Not yet statistically proven due to limited data, but likely.

Other Considerations

- Protections must not become **larger** or **too small**.
- Avoid weakening **RNP AR**, which uses **2 × RNP** with *primary-only* protection.
- Using 2 × RNP for all RNP APCH without adjustment could unintentionally expand primary areas—**not desirable**.

Proposed New Protection Concept

For nav requirements ≥ 1 NM:
Protection = 2 × XTT

For nav requirements < 1 NM:
Protection = 2.5 × XTT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Thank You!

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