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Performance-based Navigation (PBN) Route Laboratory Workshop

Nairobi, 22 – 26 May 2023

changes to the ICAO Doc. 9613

(Doc. 9613, 5th edition (Advanced – Unedited 2023))

Contents

History of the PBN Manual

1999

Doc. 9613 – 2nd Edition

Manual on Required Navigation Performance (RNP)

2008

Doc. 9613 – 3rd Edition

Performance-base Navigation (PBN) Manual

2013

Doc. 9613 – PBN Manual, 4th Edition

Introduction of RNP 2, A-RNP and RF functionality

2023

Doc. 9613 – PBN Manual, 5th Edition

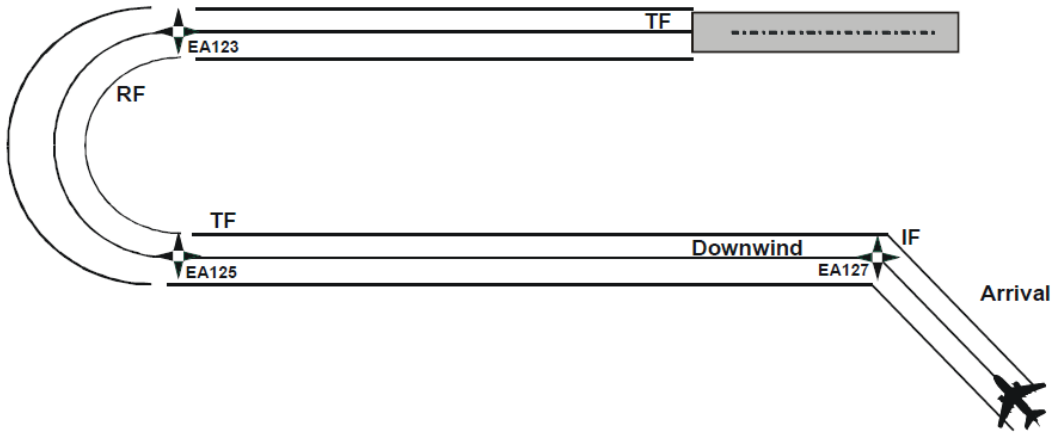
Performance-base Navigation (PBN) Manual

Driving factors for the changes in 5th Edition

- PBN represents a shift from sensor-based navigation to performance-based navigation through the use of navigation specifications (Navspecs).
- Navspecs:
  - Navigation sensors and equipment to be used o meet the performance requirements;
  - Provide implementation guidance in order to facilitate global harmonization;
  - Changes are driven by operational requirements.

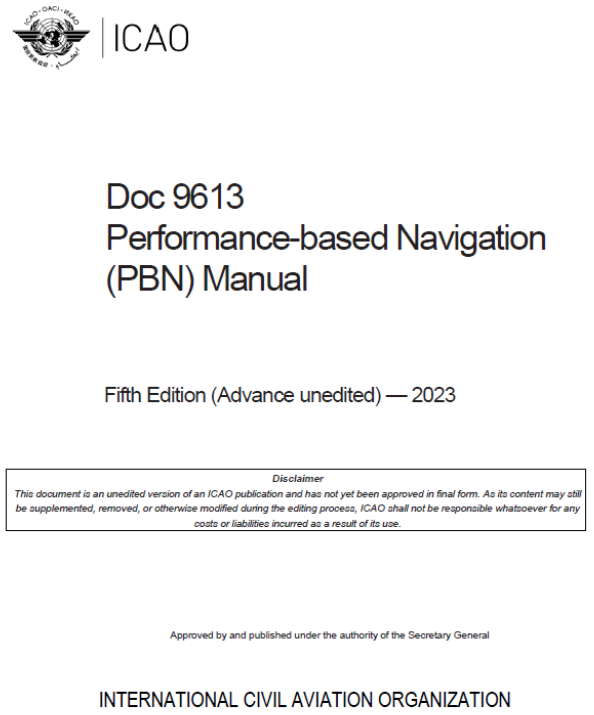
Driving factors of the changes in 5th Edition

- Simplify and provide more clarification;
- Reflect new requirements:
  - ☞Use of RF legs;
  - ☞RNP AR departure,
- Provide additional or revised guidance.



Main changes proposed in the 5th Edition

- Deep revision of the Manual:
  - ☞Organization and content.
- Addition or addition or new requirements.
- Revision of the PBN terminology.



ICAO

Doc 9613
Performance-based Navigation
(PBN) Manual

Fifth Edition (Advance unedited) — 2023

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Organization of the Manual

Organization

- What is remaining?
  - ☞Two (02) volumes):
    - Volume I - Concept and implementation guidance:
      - Attachments A & B to volume I.
    - Volume II – Implementing RNP and RNAV Operations:
      - Parts A, B & C.

Organization of the Manual

Organization

- Is new?
  - In Volume I:
    - Deletion of Parts A and B;
    - Chapter 1 (introduction to implementation guidance) of volume I, Part B:
      - Became Chapter 4 of volume I.
    - Chapters 2 and 3 deleted and cross-referenced to Doc. 9992 (PBN Airspace Design Manual).

Organization

- Is new?
  - ☞In Volume II:
    - Attachment A - Baro-VNAV replaced by "Vertical navigation in the final approach segment;
    - Att. B ➔ RNP APCH and RNP AR APCH operations in non-standard operations;
    - Att. D - Magnetic variation
    - Att. E – Document references for navigation specifications.

Organization of the Manual

4th Edition	5th Edition
Volume I – Concept and implementation guidance	Volume I – Concept and implementation guidance
Part A - The Performance-Based Navigation (PBN) Concept	
• Chap. 1 - Description of PBN	Chap. 1 - Description of PBN
• Chap. 2 – Airspace concepts	Chap. 2 – Airspace concepts
• Chap. 3 – Stakeholder uses of PBN	Chap. 3 – Stakeholder uses of the PBN
	Chap. 4 - Introduction to PBN implementation
Part B – Implementation guidance	
Chap. 1 - Introduction to Implementation processes	~~Chap. 1 - Introduction to Implementation processes~~
Chap. 2 - Process 1: Identifying an ICAO Navigation Specification for Implementation	~~Chap. 2 - Process 1: Identifying an ICAO Navigation Specification for Implementation~~
Chap. 3 - Process 2: Validation and Implementation Planning	~~Chap. 3 - Process 2: Validation and Implementation Planning~~
Att. A — RNAV and RNP Systems,	Attachment A - RNAV and RNP Systems (directed at air traffic controllers and airspace planners).
Att. B — Data Processes	Attachment B - Data Processes (anyone involved in the data chain)
Att. C — Operational Approval	~~Att. C — Operational Approval~~

Organization of the Manual

4th Edition	5th Edition
Volume II - Implementing RNAV and RNP Operations	**Volume II - Implementing RNAV and RNP Operations**
Part A - General	Part A - General
Part B - Implementing RNAV operations	Part B - Implementing RNAV operations
Part C - Implementing RNP operations	Part C - Implementing RNP operations
App. 1 to Part C - Radius to fix (RF) path terminator	App. 1 to Part C - Radius to fix (RF) path terminator
App. 2 to Part C - Fixed Radius Transition	App. 2 to Part C - Fixed Radius Transition
App. 3 to Part C - Time Of Arrival Control (TOAC)	App. 3 to Part C - Time Of Arrival Control (TOAC)
Att. A to Vol. II – Baro-VNAV	**Att. A to vol. II - Vertical navigation in the final approach segment**
Att. B to Vol. II - Sample Airspace concepts based on navspecs	Att. B to vol. II - RNP APCH and RNP AR APCH operations in non-standard temperature conditions
	Att. C to vol. II - Sample Airspace concepts based on navspecs
	Att. D to vol. II - Magnetic variation
	Att. E to vol. II - Document references for navigation specifications

Additional or revised guidance

- Clarification between RNAV and RNP (Navspec and RNP value);
- Changes to Advanced-RNP (A-RNP):
  - ☞RNAV 5, 2 and 1 seems excluded;
  - ☞Final approach segment no longer part of A-RNP;
  - ☞RNP scalability requirements replaced by RNP value of 0.3 out of the final approach segment;
  - ☞Additional guidance on its implementation.
- Addition of RNP AR departure procedures (RNP AR DP);
- Updates and additions to systems and equipment performance, functionality and capability (incl. speed transition, magvar, parallel offset, etc.).

Additional or revised guidance

Table II-C-4-1. Navpecs addressed by A-RNP in the 4th Edition

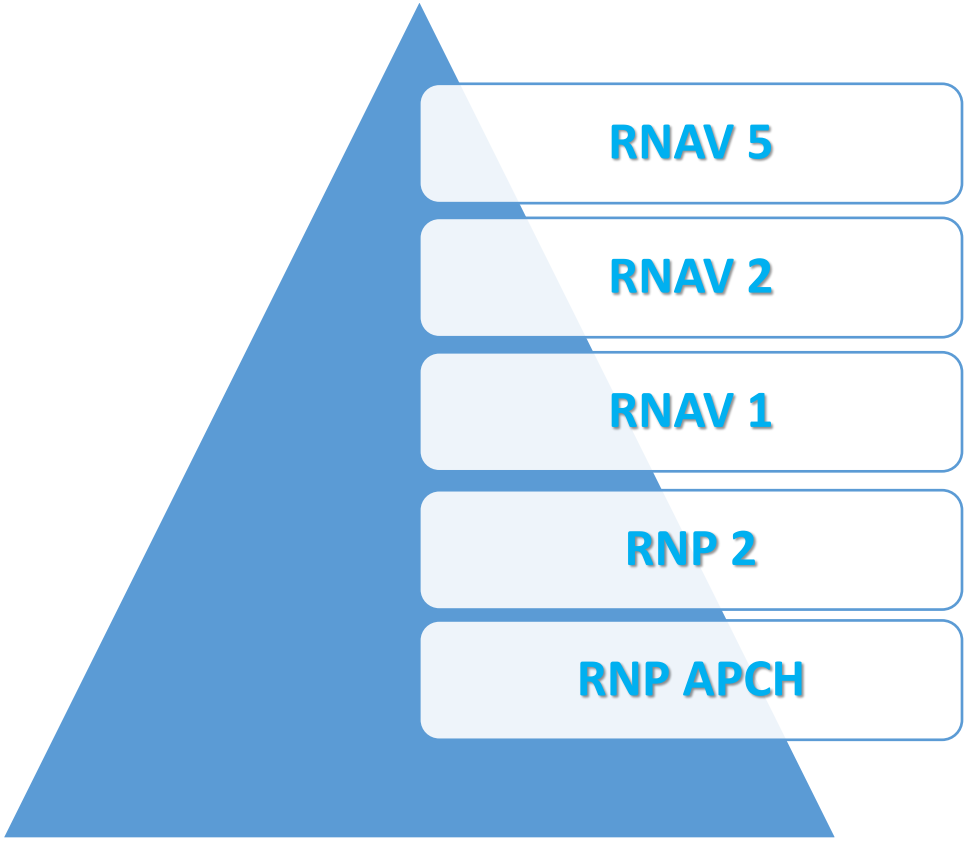

Table II-C-4-1. Navpecs addressed by A-RNP in the 5th Edition

RNP value (NM)	Application
2	En-route oceanic/Remote and continental
1	En-route continental
0.3	Arrival, Initial, Intermediate & Departure
1	Missed approach

Additional or revised guidance

- Refinement of the use of RF leg;
- Addition of GBAS and dual frequency multiple constellation;
- Awareness on the development of GNSS reversion capability;
- Removal of references to minimum navigation performance Standards (MNPS);
- Review of applicable path terminators and their sequencing;
- Additional guidance on temperature correction (Att. B to Volume II);
- Restriction of RNP 0.3 to helicopters only;
- Guidance on ATC status monitoring for GNSS;
- Clarification on the definition and use of holding capabilities.

PBN Terminology

- RNP 1 refers to the navigation specification (Volume II, Part C, Chapter 3)
- RNP 0.3 refers to the navigation specification (Volume II, Part C, Chapter 7)

- RNP 1.0 is an RNP value (lateral navigation accuracy) expressed in NM
- RNP 0.30 is an RNP value (lateral navigation accuracy) expressed in NM

- RNP AR APCH or RNP AR DP require a ***specific approval***, whereas most other PBN operations require an ***approval.***

Questions:

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