



CHAPTER 38

PERFORMANCE-BASED NAVIGATION (PBN) - OPERATIONAL APPROVAL PROCES

1.0 PURPOSE

The key to successful PBN implementation is knowledge and experience. In many States, operators and regulators lack both. Our country is not excluded, however, with the aid of our handbook and ICAO documents, we will navigate our way through. Inspectors and operators can benefit by acquainting themselves of the contents of the NCAA Procedure Manual "Performance Based Navigation Operational Approval".

2.0 Reference Regulations

Nig. CARs 8.8.1.36, NCAA Procedure Manual 'Performance Based Navigation Operational Approval'

ICAO Doc. 9613 (Performance-Based Navigation Manual) and ICAO Doc. 9997 (Performance-Based Navigation Operational Approval Manual).

3.0 INTRODUCTION

Conventional navigation is dependent upon ground-based radio navigation aids. It has been the mainstay of aviation for as long as any of us have been in aviation.

Performance-based navigation (PBN) detailed in ICAO Doc 9613 is based upon area navigation principles. The PBN concept is intended to better define the use of area navigation systems and is expected to replace many of the existing conventional navigation routes within the next few years.

The fundamentals of PBN operations are relatively straightforward, and operational approval need not be a complicated process for either applicant or regulator. However, the transition to new technology, new navigation and new operational concepts and the dependence on data-driven operations require careful management.

An Application Form is provided to guide the Operator. Sections 1 and 2 shall be completed, while section 3 provides a submission matrix. Relevant documents shall be attached with the application.

Job Aids are available for the guidance of the Operators and for the use of Inspectors to assess the application for each Navigation Specification.



4.0 RNAV and RNP

The PBN concept is mainly about transitioning from conventional navigation to performance-based navigation. Area navigation is abbreviated RNAV which comes with different Navigation Specifications. Area navigation that includes the performance monitoring and alerting requirements is designated as RNP, Required Navigation Performance. These specifications are preceded by a number indicating the accuracy requirements.

5.0 NAVIGATION SPECIFICATIONS

Navigation specification	Flight Phase							
	En-route oceanic/ remote	En-route continental	Arrival	Approach				Departure
				Initial	Intermediate	Final	Missed	
RNAV 10	10							
RNAV 5 ^a		5	5					
RNAV 2		2	2					2
RNAV 1		1	1	1	1		1 ^b	1
RNP 4	4							
RNP 2	2	2						
Advanced RNP ^c	2 ^d	2 or 1	1	1	1	0.3	1 ^b	1
RNP 1			1 ^e	1	1		1 ^b	1 ^e
RNP 0.3 ^f		0.3	0.3	0.3	0.3	—	0.3 ^b	0.3
RNP APCH				1	1	0.3 ^g	1 ^b or 0.3 ^h	
RNP AR APCH				1-0.1	1-0.1	0.3-0.1	1-0.1 ⁱ	

6.0 APPROVAL PROCESS

The approval process should consist of the following phases:

6.1 Step 1 – Pre-Application Phase

The operator initiates the approval process by reviewing the requirements; establishing that the aircraft, the operating procedures, the maintenance procedures and the training meet the requirements; and developing a written proposal to the regulator. If the proposed application is complex, the operator may need to obtain advice and assistance from OEMs or other design organisations, training establishments, data providers etc.

6.2 Step 2 – Formal Application Phase

The operator submits a formal, written application for approval to the CAA, which appoints a project manager either for the specific approval or generally for PBN approvals.

6.3 Step 3 – Document Evaluation Phase

The CAA project manager evaluates the formal, written application for approval to determine if all the requirements are being met. If the proposed application is complex, the project manager may need to obtain advice and assistance from headquarters, regional agencies or experts in other States.



6.4 Step 4 – Demonstration and Inspection Phase

During a formal inspection by the project manager (assisted as necessary by a CAA team), the operator demonstrates how the requirements are being met.

6.5 Step 5 – Approval Phase

Following a successful formal inspection by the CAA, approval is given via:

- a) an Operations Specification (OpSpec), associated with the Air Operator's Certificate (AOC); or
- c) a Letter of Authorisation (LOA) for General Aviation Operators.

7.0 CERTIFICATION AND OPERATIONAL APPROVAL

7.1 OVERVIEW

The PBN concept requires that the aircraft meets certain airworthiness certification standards, including the necessary navigation system performance and functionality, to be eligible for a particular application and that the operator has operational approval from an appropriate regulatory body before the system can be used. A PBN navigation specification operational approval is an approval that authorizes an operator to carry out defined PBN operations with specific aircraft in designated airspace. The operations approval for an operator may be issued when the operator has demonstrated to the regulatory authority of the State of Registry/State of the Operator that the specific aircraft are in compliance with the relevant airworthiness standard and that the continued airworthiness and flight operations requirements are satisfied.

- The Airworthiness element ensures that the aircraft meets the aircraft eligibility and safety requirements for the functions and performance defined in the navigation specifications and the installation meets the relevant airworthiness standards.
- The continued airworthiness element of the operational approval is not directly addressed in the PBN Manual since it is inherent in the aircraft airworthiness approval through the airworthiness requirements, but the operator is expected to be able to demonstrate that the navigation system will be maintained compliant with the type design.
- The flight operations element considers the operator's infrastructure for conducting PBN operations and flight crew operating procedures, training and competency demonstrations. This element also considers the operator's MEL, operations manual, checklists, instrument flight procedure approval processes, navigation database validation procedures, dispatch procedures, etc

7.2 OPERATIONAL APPROVAL

Operational approval is usually the responsibility of the regulatory authority of the state of Operator for commercial operations and state of Registry for general aviation operations.

The operational approval assessment must take account of the following:

- a) aircraft eligibility and airworthiness compliance;
- b) operating procedures for the navigation system used;
- c) control of operating procedures (documented in the operations manual);
- d) flight crew initial training and competency requirements and continued competency requirements;



- e) dispatch training requirements; and
- f) control of navigation database procedures. Where a navigation database is required, operators need to have documented procedures for the management of such database.

7.3 AIRCRAFT ELIGIBILITY

An aircraft is eligible for a particular PBN application provided there is a clear statement in:

- a) the TC; or
- b) the STC; or
- c) the associated documentation - AFM or equivalent document; or
- d) a compliance statement from the manufacturer, which has been approved by the State of Design and accepted by the State of Registry or the State of the Operator, if different.

The operator must have a configuration list detailing the pertinent hardware and software components and equipment used for the PBN operation.

7.4 OPERATING PROCEDURES

Standard operating procedures (SOPs) must be developed to cover both normal and non-normal (contingency) procedures for the systems used in the PBN operation. The SOPs must address:

- a) pre-flight planning requirements including the MEL and, where appropriate, RNP/RAIM prediction;
- b) actions to be taken prior to commencing the PBN operation;
- c) actions to be taken during the PBN operation; and
- d) actions to be taken in the event of a contingency, including the reporting to the operator and to the CAA of significant incidents such as:
 - 1. navigation errors not associated with transitions from an initial navigation mode to a radio navigation mode;
 - 2. unexpected deviations in lateral or vertical flight path attributed to incorrect navigation data;
 - 3. significant misleading information without failure warning;
 - 4. total loss or multiple failures of the PBN navigation equipment; or
 - 5. problems with ground navigation facilities leading to significant navigation errors.

General Aviation pilots must ensure that they have suitable procedures/checklists covering all these areas.



7.5 CONTROL OF OPERATING PROCEDURES

The SOPs must be adequately documented in the operations manual for commercial air operators of large or turbojet aircraft. For general aviation operators where operations manual is not required, the PBN operating procedures must still be documented.

7.6 FLIGHT CREW AND DISPATCH TRAINING AND COMPETENCY

A flight crew training programme and, if applicable, a dispatch training programme must cover all the tasks associated with the PBN operation as well as provide sufficient background to ensure a comprehensive understanding of all aspects of the operation.

7.7 CONTROL OF NAVIGATION DATABASE PROCEDURES

Navigation database are required for all PBN navigation specifications except RNAV 10 and RNAV 5. The procedures for maintaining currency, checking for errors to the navigation database supplier must be documented in the operations and maintenance manual.

8.0 CERTIFICATION STANDARDS

NAVIGATION SPECIFICATION	EASA	FAA
RNAV 10	AMC 20-12	Order 8400.12()
RNAV 5	AMC 20-4	AC 90-96()
RNAV 1 & RNAV 2	TGL 10	AC 90-100()
RNP 4	No document	Order 8400.33
RNP 1	No document	AC 90-105
RNP APCH (LNAV)	AMC 20-27	AC 90-105
RNP APCH (LNAV/VNAV)	AMC 20-27	AC 90-105
RNP APCH (LPV)	AMC 20-28	AC 90-107
RNP AR APCH	AMC 20-26	AC 90-105

Use this table as guidance for required documents supplied by the Operator as attachments with the application.