



APPLICATION & PROCESS: PERFORMANCE BASED NAVIGATION

SECTION 1 POLICY AND GENERAL INFORMATION

1.1 PURPOSE

The purpose of this advisory circular (AC) is to provide guidance to aircraft operators regarding the—

- 1) International standards for Performance Based Navigation (PBN); and
- 2) Requirement to have CAAP approval for operations involving performance based navigation.

Emphasis should be on maintaining and ensuring total system performance, accuracy, availability, reliability and integrity for the intended operations.

1.2 STATUS OF THIS AC

This is Revision 1 of this AC.

1.3 BACKGROUND

The continuing growth of aviation increase demands on airspace capacity therefore emphasizing the need for optimum utilization of available airspace. Improved operational efficiency derived from the application of area navigation techniques has resulted in the development of navigation applications in various regions worldwide and for all phases of flight. Requirements for navigation applications on specific routes or within a specific airspace must be defined in a clear and concise manner. This is to ensure that the flight crew and the air traffic controllers (ATCOs) are aware of the on-board RNAV or RNP system capabilities in order to determine whether the performance of the RNAV or RNP system is appropriate for the specific airspace requirements. RNAV and RNP systems evolved in a manner similar to conventional ground-based routes and procedures. A specific RNAV or RNP system was identified and its performance was evaluated through a combination of analysis and flight testing. For domestic operations, the initial systems used VOR and DME for estimating their position; for oceanic operations, INS were employed. These “new” systems were developed, evaluated and certified. Airspace and obstacle clearance criteria were developed based on the performance of available equipment; and specifications for requirements were based on available capabilities. In some cases, it was necessary to identify the individual models of equipment that could be operated within the airspace concerned. Such prescriptive requirements resulted in delays to the introduction of new RNAV and RNP system capabilities and higher costs for maintaining appropriate certification. To avoid such prescriptive specifications of requirements, this manual introduces an alternative method for defining equipage requirements by specifying the performance requirements. This is termed Performance-based Navigation (PBN).

- Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.
- Where a regulation contains the words “prescribed by the Authority”, the AC may be considered to “prescribe” a viable method of compliance, but status of that “prescription” is always “guidance” (never regulation).

1.3.1 CONCEPT

- A. The PBN concept specifies aircraft RNAV system performance requirements in terms of accuracy, integrity, availability, continuity and functionality needed for the proposed operations in the context of a particular Airspace Concept.
- B. The PBN concept represents a shift from sensor-based to performance-based navigation.

1.3.2 NAVIGATION SPECIFICATIONS

Performance requirements are identified in navigation specifications, which also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements.

These navigational specifications are defined in ICAO Doc 96132, Volume II

1.3.3 FLEXIBILITY

- A. Under PBN, generic navigation requirements are defined based on the operational requirements.
- B. Technologies can evolve over time without requiring the operation itself to be revisited, as long as the requisite performance is provided by the RNAV system.

Operators are able to evaluate the available technologies and navigation services options and choose the most logical solution.

1.3.4 ADVANTAGES TO STATES & OPERATORS

PBN offers a number of advantages over the sensor-specific method of developing airspace and obstacle clearance criteria—

- 1) Reduces need to maintain sensor-specific routes and procedures, and their associated costs.
- 2) Avoids need for development of sensor-specific operations with each new evolution of navigation systems, which would be cost-prohibitive.
- 3) Allows more efficient use of airspace (route placement, fuel efficiency, noise abatement).
- 4) Clarifies the way in which RNAV systems are used.
- 5) Facilitates the operational approval process for operators by providing a limited set of navigation specifications intended for global use.

1.3.5 STATE OF THE OPERATOR FOCUS

In this advisory circular, the guidance is approached from the point of view of the State of the Operator, who is internationally obligated to approve performance based navigation operations for its operators and to ensure—

- 1) The aircraft and navigation equipment conform to the navigation specifications;
- 2) The operator has established procedures, controls and process measures to ensure that their personnel should be able to comply in all aspects to the navigations specifications; and
- 3) That pilot and other personnel are trained and competent to comply with the applicable navigation specifications.

1.4 APPLICABILITY

The requirement for CAAP approval before conducting PBN operations applies to operators of Philippine-registered aircraft involved in general aviation, aerial work and commercial air transport.

1.5 RELATED REGULATIONS

- PCAR Part 7 includes requirements for instruments and equipment for performance based navigation

- PCAR Part 8 includes the requirements for performance based navigation.
- PCAR Part 9 includes the requirements for CAAP approval of AOC performance based navigation.

1.6 RELATED PUBLICATIONS

These ICAO publications are source documents for this advisory circular—

- 1) Civil Aviation Authority of the Philippines (CAAP)
 - AC 09-001, AOC Certification

A copy may be obtained from CAAP Flight Standards Inspectorate Service and CAAP website caap.gov.ph.
- 2) International Civil Aviation Organization (ICAO)
 - Doc 9613-AN/937 – Performance Based Navigation Manual (PBN)
 - Doc 9997-AN/498 – Performance-Based Navigation Operational Approval Manual
 - Annex 6, Part 1, International Commercial Air Transport – Aeroplanes
 - Annex 6, Part 3, International Operations – Helicopters

Copies may be obtained from Document Sales Unit, ICAO, 999 University Street, Montreal, Quebec, Canada H3C 5H7.

1.7 DEFINITIONS & ACRONYMS

1.7.1 DEFINITIONS

The following definitions apply to this advisory circular—

- 1) **Aircraft-Based Augmentation System (ABAS).** An augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information available on board the aircraft.
 - The most common form of ABAS is receiver autonomous integrity monitoring (RAIM).
- 2) **Airspace Concept.** An Airspace Concept provides the outline and intended framework of operations within an airspace.
 - Airspace Concepts are developed to satisfy explicit strategic objectives such as improved safety, increased air traffic capacity and mitigation of environmental impact etc.
 - Airspace Concepts can include details of the practical organization of the airspace and its users based on particular CNS/ATM assumptions. E.g. ATS route structure, separation minima, route spacing and obstacle clearance.
- 3) **Approach procedure with vertical guidance (APV).** An instrument procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.
- 4) **Area navigation (RNAV).** A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained navigation aids, or a combination of these.
 - Area navigation includes Performance Based Navigation as well as other RNAV operations that do not meet the definition of Performance Based Navigation.
- 5) **Area navigation route.** An ATS route established for the use of aircraft capable of employing area navigation.

- 6) **Cyclic Redundancy Check (CRC).** A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.
- 7) **Navigation Function.** The detailed capability of the navigation system (such as the execution of leg transitions, parallel offset capabilities, holding patterns, navigation data bases) required to meet the Airspace Concept.
- 8) **Navigation Specification.** A set of aircraft and air crew requirements needed to support Performance based navigation operations within a defined airspace.
- 9) **Performance Based Navigation.** Performance Based Navigation specifies system performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.
- 10) **Receiver Autonomous Integrity Monitoring (RAIM):** A form of ABAS whereby a GNSS receiver processor determines the integrity of the GNSS navigation signals using only GPS signals or GPS signals augmented with altitude (baro aiding).
- 11) **RNAV Operations.** Aircraft operations using area navigation for RNAV applications.
- 12) **RNAV System:** A navigation system which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.
 - A RNAV system may be included as part of a Flight Management System (FMS).
- 13) **RNP Route.** An ATS Route established for the use of aircraft adhering to a prescribed RNP Specification.
- 14) **RNP System.** An area navigation system which supports on-board performance monitoring and alerting.
- 15) **RNP Operations.** Aircraft operations using a RNP System for RNP applications.
- 16) **Satellite based augmentation system (SBAS).** A wide coverage augmentation system in which the user receives augmentation from a satellite-based transmitter.
- 17) **Standard instrument arrival (STAR).** A designated instrument flight rule (IFR) arrival route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.
- 18) **Standard instrument departure (SID).** A designated instrument flight rule (IFR) departure route linking the aerodrome or a specified runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the en-route phase of a flight commences.

1.7.2 ACRONYMS & ABBREVIATIONS

The following acronyms apply to this advisory circular—

- 1) AC – Advisory Circular
- 2) AOC – Air Operator Certificate
- 3) ABAS –Aircraft-based Augmentation System
- 4) APV – Approach Procedure with Vertical Guidance
- 5) ATS – Air Traffic Services
- 6) CRC – Cyclic Redundancy Check
- 7) DME – Distance Measuring Equipment

- 8) DTED – Digital Terrain Elevation Data
- 9) EASA – European Aviation Safety Agency
- 10) ECAC – European Civil Aviation Conference
- 11) EUROCAE – European Organization for Civil Aviation Equipment
- 12) EUROCONTROL – European Organisation for the Safety of Air Navigation
- 13) FAA – Federal Aviation Administration
- 14) FTE – Flight Technical Error
- 15) FMS – Flight Management System
- 16) FRT – Fixed Radius Transition
- 17) GBAS – Ground-based Augmentation System
- 18) PCAR – Philippine Civil Aviation Regulation
- 19) GNSS – Global Navigation Satellite System
- 20) GPS – Global Positioning System
- 21) INS – Inertial Navigation System
- 22) IRS – Inertial Reference System
- 23) IRU – Inertial Reference Unit
- 24) JAA – Joint Aviation Authorities
- 25) LNAV – Lateral Navigation
- 26) MEL – Minimum Equipment List
- 27) MNPS – Minimum Navigation Performance Specification
- 28) NSE – Navigation System Error
- 29) OEM – Original Equipment Manufacturer
- 30) PBN – Performance Based Navigation
- 31) RAIM – Receiver Autonomous Integrity Monitoring
- 32) RF – Radius to Fix
- 33) RNAV – Area Navigation
- 34) RNP – Required Navigation Performance
- 35) RTCA – Radio Technical Commission on Aeronautics
- 36) SBAS – Satellite-based Augmentation System
- 37) SID – Standard Instrument Departure
- 38) STAR – Standard Terminal Arrival
- 39) TLS – Target Level of Safety
- 40) TSE – Total System Error
- 41) VNAV Vertical Navigation
- 42) VOR – Very High Frequency Omni-directional Radio Range

SECTION 2 PERFORMANCE BASED NAVIGATION CONCEPTS

Performance based navigation is a relatively new concept that was incorporated into the ICAO Standards and Recommended Practices of Annex 6. The development of this concept resulted in the revision of the definitions of RNAV and RNP to accommodate a more flexible approach to international navigation.

2.1 GENERAL

2.1.1 COMMON FEATURES

Both RNAV and RNP specifications include requirements for certain navigation functionalities. At the basic level, these functional requirements may include—

- 1) Continuous indication of aircraft position relative to track to be displayed to the pilot flying on a navigation display situated in his primary field of view
- 2) Display of distance and bearing to the active (To) waypoint
- 3) Display of ground speed or time to the active (To) waypoint
- 4) Navigation data storage function.
- 5) Appropriate failure indication of the RNAV system, including the sensors.

More sophisticated navigation specifications include the requirement for navigation data bases and the capability to execute data base procedures.

2.1.2 PRIMARY DIFFERENCES BETWEEN RNAV & RNP

A. The primary difference between these two designations is—

- RNP specifications include a requirement for on-board performance monitoring and alerting.
- RNAV specifications do not include a requirement for on-board performance monitoring and alerting.

B. This difference and other differences are outlined in the following table—

	RNAV Specification	RNP Specifications	
		RNP X Specification not requiring RF or FRT	RNP X specification requiring RF, FRT
NSE (Monitoring and Alerting)	NSE only observed by pilot cross checks; No alerting on position error	Alerting on position accuracy and integrity	
FTE (Monitoring)	Managed by on-board system or crew procedure.	Managed by on-board system or crew procedure.	
PDE (Monitoring)	Generally negligible the desired path is not defined on fly-by, fly-over, and conditional turns.		Generally negligible; path defined on RF and FRT
NET EFFECT ON TSE	TSE distribution not bounded. In addition, the wide variation in turn performance results in need	TSE distribution bounded but extra protection of route needed on turns;	TSE distribution bounded; no extra protection of the route needed on turns if turns defined by RF or FRT.

2.1.3 ON-BOARD MONITORING

- A. On-board performance monitoring and alerting is the main element which determines if the navigation system complies with the necessary safety level associated to a RNP application.
- This performance relates to both lateral and longitudinal navigation performance.
- B. On-board performance monitoring and alerting allows the flight crew to detect that the navigation system is not achieving, or cannot guarantee the required integrity, the navigation performance required for the operation.

2.2 PBN DESIGNATIONS

The designations for both RNP and RNAV are expressed as suffixes—

- A RNP specification is designated as RNP X (e.g. RNP 4).
- A RNAV specification is designated as RNAV X (e.g. RNAV 1).
- If two navigation specifications share the same value for X, they may be distinguished by use of a prefix. E.g. Advanced-RNP 1 and Basic- RNP 1.
- RNP approach navigation specifications are designated using RNP as a prefix and an abbreviated textual suffix e.g. RNP APCH or RNP AR APCH.

For both RNP and RNAV designations, the expression 'X' (where stated) refers to the lateral navigation accuracy in nautical miles that is expected to be achieved.

- Approach navigation specifications cover all segments of the instrument approach.
- There are no RNAV approach specifications.

2.2.1 ICAO TERMINOLOGY VS CERTAIN STATES

- A. The following table clarifies some differences of terminology between the ICAO nav designations and existing RNAV practices—

ICAO	Europe	United States
RNAV 1	P-RNAV	US RNAV Type B
RNAV 2		
RNAV 5	B-RNAV	US RNAV Type A

- B. The United States and member States of the European Civil Aviation Conference (ECAC) currently use regional RNAV specifications with designators that differ from the ICAO applications.

US and European RNAV applications are expected to migrate towards the ICAO nav specifications.

- C. The US applications and European applications will continue to be used only within these States.

2.2.2 RNAV 10 = RNP 10

- A. The designation RNP 10 has been used for years to define long range oceanic navigation requirements.
- B. Because the designator RNP 10 appears in numerous published documents and charts, RNP 10 will be retained in its current designation form.

Under the PBN concepts, RNP 10 actually conforms to the RNAV 10 navigation specification.

2.3 ICAO NAVIGATION SPECIFICATIONS

2.3.1 LIST OF NAVIGATION SPECIFICATIONS

The following navigation specifications will require approval by the CAAP before entry into airspace defined for the navigation performance requirements—

- 1) RNAV 10 (RNP 10)
- 2) RNAV 5

- 3) RNAV 1 and RNAV 2
- 4) RNP 4
- 5) RNP 2
- 6) RNP 1
- 7) Advanced RNP
- 8) RNP APCH
- 9) RNP 0.3
- 10) RNP AR APCH

- The official ICAO navigation specifications for these designations are located in Doc 9613, Volume II.
- Operators are expected to ensure that their proposed operation will conform to the applicable nav specification(s) prior to submission of the application to the CAAP.

2.3.2 SEPARATE APPROVAL FOR EACH NAVIGATION SPECIFICATION

- A. The CAAP will review and approve each navigation specification authorized for the specific aircraft and operator.
- B. Navigation accuracy is the underlying basis for the navigation specifications, but operators should be aware that navigation accuracy is only one of the many performance requirements included in a navigation specification.

- C. Because specific performance and functionality requirements are defined for each navigation specification, an aircraft approved for a RNP specification is not automatically approved for all RNAV specifications.

The designations for navigation specifications are a "short-hand" title for all the performance and functionality requirements.

- Similarly, an aircraft approved for a RNP or RNAV specification having stringent accuracy requirement (e.g. RNP 0.3 specification) is not automatically approved for a navigation specification having a less stringent accuracy requirement (e.g. RNP 4).

- D. It may seem logical, for example, that an aircraft approved for RNP-1 be automatically approved for RNP-4; however, this is not the case.

Aircraft approved to the more stringent accuracy requirements may not necessarily meet a navigation specification having a less stringent accuracy.

- These nav specifications differ regarding performance and functionality.

2.3.3 SEPARATE CERTIFICATION & DEMONSTRATION

- A. The following navigation specifications may be evaluated during an operator's initial certification—

- 1) RNAV 5
- 2) RNAV 2
- 3) RNAV 1
- 4) Basic RNP 1
- 5) RNP APCH

- If the operator desires that these evaluation be conducted during initial certification, an application with appropriate documentation must be submitted.
- These evaluations will only be initiated based on the operator's application.

- B. The approval of all other navigation specifications will require a separate, focused evaluation and demonstration of capability.

2.4 SEPARATE NAT-MNPS EVALUATION

- A. The NAT-MNPS specification has been intentionally been excluded from the PBN navigation

specifications by ICAO because the regulatory requirement pre-dates the PBN concept and is formalized in separate ICAO documents and in States' regulations and technical guidance.

- B. Aircraft operating in the North Atlantic MNPS airspace are required to meet a Minimum Navigation Performance Specification (MNPS).



Prior to NAT-MNPS operations, the operator must complete the certification process specified in AC 08-009.

2.5 AIRSPACE CONCEPTS BY AREA OF OPERATION

2.5.1 OVERVIEW OF NAV SPECIFICATIONS TO AIRSPACE

The following table shows the application of navigation specifications to phase of flight—

Navigation specification	Flight Phase							
	En-route Oceanic/Remote	En-route Continental	Arrival	Approach				DEP
				Initial	Intermediate	Final	Missed ¹	
RNAV 10	10							
RNAV 5 ²		5	5					
RNAV 2		2	2					2
RNAV 1		1	1	1	1		1	1
RNP 4	4							
RNP 2	2	2						
RNP 1 ³			1	1	1		1	1
Advanced RNP (A-RNP) ⁴	2 ⁵	2 or 1	1	1	1	0.3	1	1
RNP APCH ⁶				1	1	0.3 ⁷	1	
RNP AR APCH				1-0.1	1-0.1	0.3-0.1	1-0.1	
RNP 0.3 ⁸		0.3	0.3	0.3	0.3		0.3	0.3

Notes:

1. Only applies once 50 m (40 m, Cat H) obstacle clearance has been achieved after the start of climb.
2. RNAV 5 is an en-route navigation specification which may be used for the initial part of a STAR outside 30 NM and above MSA.
3. The RNP 1 specification is limited to use on STARs, SIDs, the initial and intermediate segments of IAPs and the missed approach after the initial climb phase. Beyond 30 NM from the ARP, the accuracy value for alerting becomes 2 NM.
4. A-RNP also permits a range of scalable RNP lateral navigation accuracies.
5. Optional – requires higher continuity.
6. There are two sections to the RNP APCH specification: Section 2 is enabled by GNSS and baro-VNAV, Section 2 is enabled by SBAS.
7. RNP 0.3 is applicable to RNP APCH Section 2. Different angular performance requirements are applicable to RNP APCH Part B only.
8. The RNP 0.3 specification is primarily intended for helicopters operations.

2.5.2 OCEANIC & REMOTE CONTINENTAL

- A. Oceanic and Remote continental Airspace Concepts are currently served by three navigation applications, RNP 10, RNP 4, and RNP 2.

2.5.3 CONTINENTAL EN ROUTE

- A. Continental En Route Airspace Concepts are currently supported by RNAV applications.

- RNAV 5 (B-RNAV in Europe and the Middle East) is available for Continental Airspace subjected to availability of appropriate ground NAVAID infrastructures.
- In the United States, an RNAV 2 application (currently termed RNAV Type A) supports an En Route continental Airspace Concept.
- "RNP 2 is applicable for continental airspace based on GNSS and is intended to support geographical areas with little or no ground NAVAID infrastructure.

At present, these Continental RNAV applications support Airspace Concepts which include radar surveillance and direct controller pilot communication (voice).

2.5.4 TERMINAL AIRSPACE: ARRIVAL & DEPARTURE

- A. Existing Terminal Airspace Concepts, which include arrival and departure, are supported by RNAV and RNP applications.
- B. RNAV 1 and RNAV 2 and RNP 1 are developed to support terminal airspace applications including arrival and departure.

2.5.5 APPROACH

- A. Approach concepts cover all segments of the instrument approach, including—

- 1) Initial;
- 2) Intermediate;
- 3) Final; and
- 4) Missed approach.

- B. Under the PBN concept, the final approach segments call for RNP specifications requiring a navigation accuracy between 0.3 NM and 0.1 NM or lower.

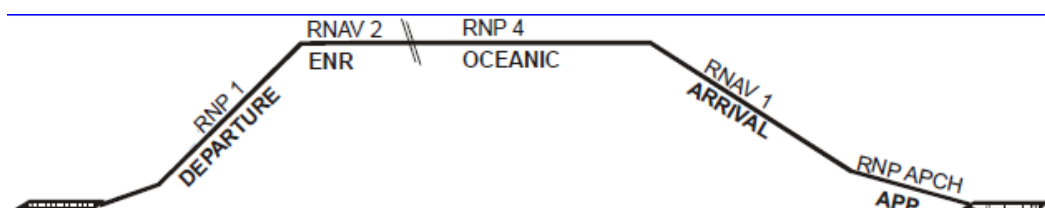
Presently, ICAO has provided navigation specifications for RNP APCH and RNP AR APCH.

- C. Three general applications of RNP are characteristic of this phase of flight—

- 1) New procedures to runways never served by an instrument procedure;
- 2) Procedures either replacing or serving as backup to existing instrument procedures based on different technologies; and
- 3) Those developed to enhance airport access in demanding environments.

2.5.6 APPLICATION OF NAV SPECIFICATION TO FLIGHT PHASE

- A. The following graphic demonstrates how an operator may apply more than one navigation specification during a single flight—



- B. An operator should make similar evaluations of all proposed operations to determine the minimum navigation specifications that should be requested from the CAAP during certification.

SECTION 3 OPERATIONAL APPROVAL PROCESS

3.1 GENERAL INTERNATIONAL REQUIREMENTS

3.1.1 COMPLETE CERTIFICATION REQUIREMENTS

To obtain a PBN approval, the following requirements should be satisfied:—

- 1) Satisfactorily complete the process for granting of the proper authorizations;
- 2) Obtain CAAP-approval document for the specific aircraft or fleet.

3.1.2 EVALUATION REQUIRED

CAAP shall take into account the—

- 1) Type(s) of enroute and approach operations proposed;
- 2) Suitability of the aircraft, instruments and equipment for those operations;
- 3) Procedures for conformance with navigation specifications; and
- 4) Qualification of operator personnel for such operations

3.1.3 CRITERIA FOR GRANTING THE APPROVAL

CAAP shall be satisfied that the—

- 1) The aircraft, instruments and equipment were designed and airworthiness-tested for the PBN operations proposed by the operator;
- 2) Operator has instituted appropriate procedures and training in respect to maintenance programmes and practices necessary to ensure the continued airworthiness of the aircraft, instruments and equipment involved in the proposed PBN operations.
- 3) Operator has instituted adequate and appropriate operational procedures to ensure the safe accomplishment of the PBN operations;
- 4) Operator has ensured that all flight crew and flight dispatcher participants in the proposed PBN operations are trained and qualified; and
- 5) The operator has demonstrated that its personnel can conduct the PBN operations(s) consistently and safely.

- The criteria specified in this paragraph will be applied after certification to all inspections involving PBN operations.
- Consistent satisfactory performance is absolutely necessary for continued PBN approval.

3.2 GENERAL PHILIPPINE REQUIREMENTS

3.2.1 CERTIFICATION PROCESS

- A. While all certification proceeds through the same 5-phase process, whether is a single document or a completely new airline, the lines between the phases blur in a simple certification.
- B. Granting of PBN is a simple process. The applicant will provide the required formal application as prescribed by CAAP. (PBN Approval Application Form 580A can be downloaded at CAAP website *caap.gov.ph*.)
- C. The certification team will then accomplish the document conformance to the requirements of ICAO Doc 9613 PBN Manual.

- D. Document conformance is considered complete when all submitted documents have been—
- 1) Evaluated;
 - 2) Found to be acceptable for use in aviation; and
 - 3) Issued a formal instrument of approval or acceptance.
- E. Equipment compliance should be documented by the operator and submitted for review by the operations inspector. A review of these documents is sufficient to satisfy the approval requirements. Inspection and demonstration will be conducted upon the discretion CAAP. No authorizations for non-standard equipment (that without existing certification for a particular operation) should be granted.

3.2.2 FINAL CERTIFICATION ACTIONS

- A. This is the period of time that CAAP completes the necessary documentation to formalize the approval of the applicant for PBN approvals in specific aircraft type(s) and, if necessary, in specific airspace.
- B. That approval will be in the form of—
- 1) For general aviation operators; an LOA valid for a period of 12 months; and
 - 2) For AOC holders, a revision to the—
 - (a) Master (formal) operations specifications; and
 - (b) Aircraft Display operations specification (for each type of aircraft).

SECTION 4 CONTENTS OF FORMAL APPLICATION PACKAGE

4.1 GENERAL REQUIREMENTS

The following documents will be considered individually—

- 1) The completed PBN application form. (CAAP Form 580A downloaded from CAAP website caap.gov.ph)
- 2) The completed PBN Conformance Checklist. (CAAP Form 580B downloaded from CAAP website caap.gov.ph)
- 3) Relevant sections of Operations Manual (or revisions) that demonstrate capabilities to conduct appropriate PBN operations.
- 4) Relevant sections of Operations Manual -D (or revisions) that include training programs appropriate to desired PBN navigation specification(s)
- 5) Relevant sections of Maintenance Control Manual (or revisions) that include general maintenance procedures related to aircraft PBN airworthiness and current status.

4.2 FOR AIRCRAFT TYPE

The following documents must be submitted for each aircraft type—

- 1) Description of aircraft Type Certificate data;
- 2) Operations Manual - B (or revisions) that include PBN procedures and limitations appropriate the desired navigation specification(s);
- 3) Proposed Minimum Equipment List (MEL) revisions for PBN, if applicable; and
- 4) Current Master Minimum Equipment List (MMEL);

4.3 FOR INDIVIDUAL AIRCRAFT

The following documents must be submitted for each individual aircraft—

- 1) Completed copy of aircraft PBN conformity checklist;

See Appendix C for copy of Aircraft PBN Conformity Checklist.

- 2) AFM (or approved AFM supplement) demonstrating that aircraft is eligible for the desired PBN navigation specification(s);
- 3) If applicable, modification documents demonstrating that the aircraft is eligible for the desired PBN nav specs.

4.4 FOR NAVIGATION EQUIPMENT

The following documents related to the specific PBN equipment required should be submitted with the application—

- 1) Maintenance Program with appropriate provisions for desired PBN navigation specification(s);
- 2) Database integrity procedures (may be in maintenance control manual); and
- 3) Database supplier subscription and approval.

4.5 AVAILABLE FOR CONSULTATION

The following documents (for each type of aircraft and equipment necessary for the PBN operations) must be available at the applicant's facilities for consultation—

- 1) Maintenance manuals;
- 2) Standard practices manuals; and
- 3) Illustrated parts catalogues.

- CAAP inspectors shall have unobstructed ability to refer to these documents.
- If this criteria is not met, copies of these manuals will be required to be submitted to the CAAP offices as a part of the application.

SECTION 5 AIRWORTHINESS CONSIDERATIONS

5.1 AIRWORTHINESS DEMONSTRATIONS

- A. Aircraft eligibility shall be demonstrated in accordance with requirements in ICAO Doc 9613 and ICAO Doc 9997.
- B. This demonstration is based upon the airworthiness criteria in place at that time.
- C. The operating rules will continuously apply over time and may change after airworthiness demonstrations are conducted, or may be updated consistent with safety experience, additional operational credit or constraints may apply to operators or aircraft as necessary for safe operations.
- D. The criteria related primarily to the airworthiness demonstration of systems or equipment is assumed through the proper validation of the data provided by the State of Design (or Manufacture) airworthiness demonstration.

Unless otherwise accepted by the CAAP, each aircraft should meet relevant criteria specified by the applicable aircraft manufacturer or avionics manufacturer for associated systems and equipment, such as

- Valid Type Certificate
- Appropriate STC records
- Compliance, assessment of status of any engineering orders, Ads, service bulletins or other compliance requirements.

5.2 CONTINUING AIRWORTHINESS/MAINTENANCE

5.2.1 MAINTENANCE PROGRAM

- A. Unless otherwise approved by CAAP, each operator should have an approved maintenance program.
- B. The approved maintenance program should include any necessary provisions to address the PBN navigation specification(s) in accordance with the operator's intended PBN operations -
 - 1) Operator's Minimum Equipment List (MEL) is updated in accordance with the appropriate requirements for authorized PBN navigation specifications.
 - 2) Operator and contract maintenance personnel authorized to provide maintenance on PBN

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equipment should receive initial and continuing training as necessary to support authorized PBN operations.

- 3) Unless otherwise approved by CAAP, each operator should have an approved maintenance program, which may be an existing approved maintenance program.

5.2.2 MAINTENANCE PROGRAM PROVISIONS

A. The maintenance program should be compatible with an operator's organization and ability to implement and supervise the program.

B. Maintenance personnel should be familiar with—

- 1) The operator's approved program;
- 2) Their individual responsibilities in accomplishing that program; and
- 3) The availability of any resources within or outside of the maintenance organization that maybe necessary to assure program effectiveness.

- Examples include getting applicable information related to the manufacturer's recommended maintenance program and getting information referenced in this AC (such as service bulletin information).

C. Provision for PBN operations may be addressed as a specific program or may be integrated with the general maintenance program.

D. Regardless whether the maintenance program is integrated or is designated as a specific program for PBN, the maintenance program should at least address the following—

- 1) Maintenance procedures necessary to ensure continued airworthiness relative to PBN operations;
- 2) A procedure to revise and update the maintenance program;
- 3) A method to identify, record or designate personnel currently assigned responsibility in managing the program, performing the program, maintaining the program, or performing quality assurance for the program;
- 4) This includes identification of any service provider or sub-contractor organizations, or where applicable, their personnel;
- 5) Verification should be made of the PBN equipment, systems and configuration status for each aircraft brought into the maintenance or PBN program.
- 6) Identification of modifications, additions, and changes which were made to qualify aircraft systems for the intended operation or minima, if other than as specified in the AFM, TC or STC.
- 7) Identification of additional maintenance requirements and log entries necessary to change PBN equipment status;
- 8) Any discrepancy reporting procedures that may be unique to the PBN program.

Unless otherwise accepted by the CAAP, each aircraft should meet relevant criteria specified by the applicable aircraft manufacturer or avionics manufacturer for associated systems and equipment.

- If applicable, such procedures should be compatibly described in maintenance documents and operations documents;

- 9) Procedures which identify, monitor and report PBN system and component discrepancies for the purpose of quality control and analysis;
- 10) Procedures which define, monitor and report chronic and repetitive discrepancies;
- 11) Procedures which ensure aircraft remain out of PBN status until successful corrective action has been verified for chronic and repetitive discrepancies;
- 12) Procedures which ensure the aircraft system status is placarded properly and clearly documented in the aircraft log book, in coordination with maintenance control, engineering, flight operations, and dispatch, or equivalent;
- 13) Procedures to ensure the downgrade of an aircraft PBN capability status, if applicable, when

maintenance has been performed by persons other than those trained, qualified, or authorized to use or approve procedures related to PBN operations;

- 14) Procedures for periodic maintenance of systems ground check, and systems flight check, as applicable;

- For example, following a heavy maintenance, suitable checks may need to be performed prior to maintenance release.

- 15) Provision should be made for periodic operational sampling of suitable performance.

- A recording procedure for both satisfactory and unsatisfactory results should be included.
- Fleet sampling is not generally acceptable in lieu of specific aircraft assessment.
- At least one satisfactory low visibility system operational use, or a satisfactory systems ground check, should be accomplished within 30 days, for an aircraft to remain in the desired PBN status.

At least one satisfactory operation under each approved specific nav spec should have been accomplished within a specified period approved for that operator, unless a satisfactory systems ground check has been accomplished.

5.3 INITIAL & CONTINUING MAINTENANCE TRAINING

- A. Operator and contract maintenance personnel should receive initial and continuing training as necessary for an effective program, including—

- 1) Mechanics;
- 2) Maintenance controllers;
- 3) Avionics technicians;
- 4) Personnel performing maintenance inspection or quality assurance; and
- 5) Other engineering personnel if applicable.

- B. The training curriculum should include specific aircraft systems and operator policies and procedures applicable to PBN operations.

5.3.1 CONTINUING TRAINING

- A. Continuing training should be accomplished—

- 1) At least annually; and
- 2) When a person has not been involved in the maintenance of the specified aircraft or systems for an extended period of more than 6 months.

The CAAP recommends that the operator provide a special certification of maintenance personnel for PBN duties.

- B. The training should at least include, as applicable—

- 1) An initial and recurrent training program for appropriate operator and contract personnel;
- 2) Personnel considered to be included are maintenance personnel, quality and reliability groups, maintenance control, and incoming inspection and stores, or equivalent organizations.
- 3) Training should include both classroom and at least some “hands-on” aircraft training for those personnel who are assigned aircraft maintenance duties. Otherwise, training may be performed—
 - In a classroom
 - By computer based training
 - In simulators in an airplane or in any other effective combination of the above
 - Consistent with the approved program, and considered acceptable to CAAP.

- 4) Subject areas for training should include—
- Operational concepts
 - Aircraft types and systems affected
 - Aircraft variants and differences where applicable
 - Procedures to be used;
 - Manual or technical reference availability and use
 - Processes, tools or test equipment to be used
 - Quality control
 - Methods for testing and maintenance release
 - Sign-offs required
 - Proper Minimum Equipment List (MEL) application
 - General information about where to get technical assistance as necessary,
 - Necessary coordination with other parts of the operator's organization (e.g., flight operations, dispatch), and
 - Any other maintenance program requirements unique to the operator or the aircraft types or variants flown (e.g., human factors considerations, problem reporting)
- 5) Procedures for the use of outside vendors or vendor's parts that ensures compatibility to program requirements and for establishing measures to control and account for parts overall quality assurance.
- 6) Procedures to ensure tracking and control of components that are "swapped" between systems for trouble shooting when systems discrepancies cannot be duplicated.
- These procedures should provide for total system testing and/or removal of aircraft from PBN status.
- 7) Procedures to assess track and control the accomplishment of changes to components or systems pertinent to low visibility operations.
- For example, ADs, service bulletins, engineering orders, PCAR requirements.
- 8) Procedures to record and report PBN operation(s) that are discontinued/ interrupted because of system(s) malfunction
- 9) Procedures to install, evaluate, control, and test system and component software changes, updates, or periodic updates
- 10) Procedures related to the MEL remarks section use which identify PBN related systems and components, specifying limitations, upgrading and downgrading
- 11) Procedures for identifying PBN related components and systems as "RII" items, to provide quality assurance whether performed in-house or by contract vendors.

5.4 TEST EQUIPMENT/CALIBRATION STANDARDS

- A. Test equipment may require periodic re-evaluation to ensure it has the required accuracy and reliability to return systems and components to service following maintenance.
- B. A listing of primary and secondary standards used to maintain test equipment which relate to PBN operations should be maintained.
- It is the operator's responsibility to ensure these standards are adhered to by contract maintenance organizations.
 - Traceability to a national standard or the manufacturer's calibration standards should be maintained.

5.5 MAINTENANCE RELEASE PROCEDURES

- A. Procedures should be included to upgrade or downgrade systems status concerning PBN operations capability.
- B. The appropriate level of testing should be
- The method for controlling operational status of the aircraft should ensure that flight crews, maintenance and inspection departments, dispatch and other administrative personnel as necessary are appropriately aware of aircraft and system

specified for each component or system.

- C. The manufacturer's recommended maintenance program or maintenance instructions should be considered when determining the role built-in-test-equipment (BITE) should play for return to service (RTS) procedures or for use as a method for PBN status upgrade or downgrade.
- D. Contract facilities or personnel should follow the operator's CAAP-approved maintenance program to approve an aircraft for maintenance release.



The operator is responsible for ensuring that contract organizations and personnel are appropriately training, qualified and authorized.

5.6 PERIODIC AIRCRAFT SYSTEM EVALUATIONS

- A. The operator should provide a method to continuously assess or periodically evaluate aircraft system performance to ensure satisfactory operation for those systems applicable to PBN operations.
- An acceptable method for assuring satisfactory performance of a low visibility flight guidance system (e.g., autoland or HUD) is to periodically use the system and note satisfactory performance.
- B. Periodic flight guidance system/autopilot system checks should be conducted in accordance with—
- Procedures recommended by the airframe or avionics manufacturer; or
 - An alternate procedure approved by the CAAP.
- C. For periodic assessment, a record should be established to show—
- When and where the flight guidance/autopilot system was satisfactorily used, and
 - If performance was not satisfactory, to describe any remedial action taken.

Use of the flight guidance/automatic landing system by the flight crews should be encouraged to assist in maintaining its availability and reliability.

A record of that check such as a logbook entry or computer ACARS record showing satisfactory performance within the previous –

- 6 months for RNP 10 or
- 30 days for RNP AR APRCH.

5.7 CONFIGURATION CONTROL/SYSTEM MODIFICATIONS

- A. The operator should ensure that any modification to systems and components approved for low visibility operations are not adversely affected when incorporating software changes, service bulletins, hardware additions or modifications.
- B. Any changes to system components should be consistent with the aircraft manufacturers, avionics manufacturer's, industry or CAAP accepted criteria or processes.

5.8 RECORDS

- A. The operator should keep suitable records (e.g., both the operator's own records and access to records of any applicable contract maintenance organization).
- B. Contract maintenance organizations should have appropriate records and instructions for coordination of records with the operator.

These records ensure that both the operator and CAAP can determine the appropriate airworthiness configuration and status of each aircraft intended for PBN operation.

5.9 AIRWORTHINESS APPROVAL PROCESS

- A. The Airworthiness approval process assures that each item of the RNAV equipment installed is

of a kind and design appropriate to its intended function and that the installation functions properly under foreseeable operating conditions.

- B. Additionally, the airworthiness approval process identifies any installation limitations that need to be considered for operational approval.
- Such limitations and other information relevant to the approval of the RNAV system installation are documented in the AFM or AFM Supplement as applicable.
- C. Information may also be repeated and expanded upon in other documents such as Pilot Operating Handbooks (POHs) or Flight Crew Operating Manuals (FCOMs).

5.10 APPROVAL OF RNAV SYSTEMS FOR RNAV-X OPERATION

- A. The RNAV system installed should be compliant with a set of basic performance requirements described in the “navigation specification” which defines accuracy, integrity and continuity criteria.
- B. The RNAV system installed should be compliant with a set of specific functional requirements described in the navigation specification.
- C. For a multi-sensor RNAV system, an assessment should be conducted to establish which sensors are compliant with the performance requirement described in the navigation specification.
- D. The RNAV system installed should have a navigation data base and should support each specific path terminator as required by the navigation specification.
- For certain RNAV navigation applications, a navigation database may be optional.
- E. The navigation specification generally indicates if a single or a dual installation is necessary to fulfill availability and/or continuity requirements.
- The Airspace Concept and Navaid infrastructure are key elements to decide if single or dual installation is necessary.

5.11 APPROVAL OF RNP SYSTEMS FOR RNP-X OPERATION

- A. The RNP system installed should be compliant with a set of basic RNP performance requirement described in the navigation specification.
- The RNP system should include as on board performance monitoring and alerting function.
- B. The RNP system installed should be compliant with a set of specific functional requirement described in the navigation specification.
- C. For a multi-sensor RNP system, an assessment should be conducted to establish sensors which are compliant with the RNP performance requirement described in the RNP specification.
- D. The RNP system installed should have a navigation data base and should support path terminator as required by the navigation specification.

SECTION 6 OPERATIONAL APPROVALS

- A. The aircraft must be equipped with an RNAV system enabling the flight crew to navigate in accordance with operational criteria defined in the navigation specification.
- B. The authority must be satisfied that operational programmes are adequate.

- C. Training program and operations manuals should be evaluated.

6.1 GENERAL RNAV APPROVAL PROCESS

- A. The operational approval process assumes first that the corresponding installation/airworthiness approval has been granted.
- B. During operation, the crew should respect AFM and AFM supplements limitations.
- C. Normal procedures are provided in the navigation specification and detailed necessary crew action to be conducted during pre-flight planning, prior to commencing the procedure and during the procedure.
- D. Abnormal procedures are provided in the navigation specification.
- These procedures should detail crew action in case of on-board RNAV system failure and in case of system inability to maintain the prescribed performance of the on board monitoring and alerting function.
- E. The operator should have in place a system for investigation events of affecting the safety of operations to determine its origin (coded procedure, accuracy problem, etc)
- F. Minimum equipment list (MEL) should identify the minimum equipment necessary to satisfy the navigation application.

6.2 FLIGHT CREW TRAINING

Each pilot must receive appropriate training, briefing and guidance material in order to safely conduct the operation.

6.3 NAVIGATION DATABASE MANAGEMENT

Any specific requirement regarding the navigation data base should be provided in the navigation specification particularly if the navigation data base integrity should demonstrate compliance with DO 200A/EUROCAE ED 76 (data quality assurance process).

The demonstration required by this paragraph may be documented with a Letter of Acceptance (LOA) or other equivalent means acceptable to the CAAP.

SECTION 7 OPERATIONAL PROCEDURES

7.1 OPERATIONAL PROCEDURES

- A. The operator should include appropriate operational procedures for authorized PBN Suitable operational operations in the operator's operation manual and training manual.
- B. Operational procedures should be in accordance with ICAO Doc 9613 and manufacturers' recommendations.

Suitable operational procedures must be used by the operator and be used by flight crews prior to conducting PBN operations.


7.1.1 FLIGHT CREW PROCEDURES

- A. Flight crew procedures should complement the technical contents of the navigation specification.
- B. Flight crew procedures are usually embodied in the company operating manual.

- C. These procedures could include, for example, that the flight crew notify ATC of contingencies (equipment failures, weather conditions) that affect the aircraft's ability to maintain navigation accuracy.
- D. These procedures would also require the flight crew to state their intentions, coordinate a plan of action and obtain a revised ATC clearance in such instances.
- E. Depending on the defined airspace, contingency procedures have been established to permit the flight crew to follow such established procedures in the event that it is not possible to notify ATC of their difficulties.

7.1.2 APPLICATION OF AFM PROVISIONS

- A. The operator's procedures for PBN operations should be consistent with any AFM provisions specified in the normal or non-normal procedures sections during airworthiness demonstrations.
 - Adjustments of procedures consistent with operator requirements are permitted when approved by the POI.
- B. Operators should assure that no adjustments to procedures are made which invalidate the applicability of the original airworthiness demonstration.
- C. Where navigation performance for a specific RNP can only be achieved by specific system modes (e.g., coupled flight director or autopilot), the specific modes and associated RNP levels should be applied consistent with the AFM.

	<p>If not available in the AFM or Flight Crew Operating Manual (FCOM), RNP operations may be approved on a case by case basis, consistent with "fleet qualification" for RNP criteria.</p>
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- D. Where operations are based on RNP, suitable flight manual provisions for RNP capability and uses should be provided.

7.1.3 CREW COORDINATION

- A. Appropriate procedures for crew coordination should be established so that each flight crew member can carry out their assigned responsibilities.
- B. Briefings prior to the applicable takeoff or approach should be specified to assure appropriate and necessary crew communications.
- C. Responsibilities and assignment of tasks should be clearly understood by crew members.

7.1.4 MONITORING

- A. Operators should establish appropriate monitoring procedures for each type of PBN operation.
- B. Procedures should assure that adequate crew attention can be devoted to—
 - Control of aircraft flight path
 - Displacements from intended path
 - Mode annunciations

APPENDIX A

RNAV 10 JOB AID

APPLICATION TO CONDUCT RNAV 10 (RNP 10)

1. Introduction

This Job Aid was developed to provide States, operators, and inspectors with guidance on the process to be followed in order to obtain an RNAV 10 (RNP 10) approval. It should be used as an aid for the approval process but frequent reference to the ICAO PBN Manual (DOC9613) and [State] PBN Operational Approval Handbook will be required. Volume II, Part B, Chapter 1 contains detailed guidance on the implementation of RNAV 10 (Designated and Authorized as RNP 10).

2. Purpose of the Job Aid

- 2.1 To give operators and inspectors information on the main RNAV 10 reference documents.
- 2.2 To provide tables showing the contents of the application, the associated reference paragraphs, the place in the application of the operator where RNAV 10 elements are mentioned and columns for inspector comments and follow-up on the status of various elements of RNAV 10.

3. Actions Recommended for the Inspector and Operator

- 3.1 At the pre-application meeting with the operator, the inspector reviews the “basic events of the RNAV 10 approval process” described in Section 1 of this Job Aid, in order to provide an overview of the approval process events.
- 3.2 The inspector reviews this Job Aid with the operator in order to establish the form and content of the RNAV 10 approval application.
- 3.3 The operator uses this Job Aid as a guide to collect the documents of the RNAV 10 application.
- 3.4 The operator inserts in the Job Aid references showing in what part of its documents are the RNAV 10 elements located.
- 3.5 The operator submits the Job Aid and the application to the inspector (with the required documents).
- 3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.
- 3.7 The inspector informs the operator as soon as possible when a corrective action by the operator is required.
- 3.8 The operator provides the inspector with the revised material when so requested.
- 3.9 The [STATE CAA] provides the operator with the operational specification (air operators) or a letter of authorization (others), as applicable, when the tasks and documents have been completed.

SECTION 1**INFORMATION ON THE IDENTIFICATION OF AIRCRAFT AND OPERATORS**

NAME OF THE OPERATOR: _____ is applying for RNAV 10 (RNP 10) Operations Approval.

Aircraft manufacturer, model, and series	Aircraft Registration (required only if installed equipment varies between model and series)	List relevant make and model of related navigation equipment

DATE OF PRE-APPLICATION MEETING

DATE ON WHICH THE APPLICATION WAS RECEIVED

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN RNAV 10 (RNP 10) OPERATIONS

SECTION 2

OPERATOR APPLICATION (ITEMS AND DOCUMENTS)

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
1	<p>Airworthiness documents showing aircraft eligibility for RNAV 10 (RNP 10).</p> <p>AFM, AFM revision, AFM supplement, or Type certificate data sheet (TCDS) showing that the LRNS is eligible for RNAV 10 (RNP 10).</p>		
2	<p>Aircraft modified to meet RNAV 10 (RNP 10) standards.</p> <p>Documentation on aircraft inspection and/or modification, if applicable.</p>		
3	<p>Maintenance program</p> <ul style="list-style-type: none"> • For aircraft with established LRNS maintenance practices, the list of references of the document or program. • For newly installed LRNS provide LRNS maintenance practices for review. 		
4	<p>Minimum Equipment List (MEL) if applicable showing provisions for LRNS</p>		
5	<p>Training programme for flight crews, flight dispatchers, and maintenance personnel as applicable.</p>		
6	<p>Operating policies and procedures including relevant section of Operations Manuals and checklists attached to the application, applicable to RNAV 10</p>		
7	<p>Navigation database (if carried)</p> <p>Details of the navigation data validation programme.</p>		

SECTION 3

GUIDE FOR DETERMINING RNAV 10 (RNP 10) AIRCRAFT ELIGIBILITY

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part B 1	Location in the Documents of the operator	Comments
1	Eligibility Method 1 – Eligibility of aircraft through RNP certification. (RNP compliance documented in the AFM).	1.3.3.1.2		
2	Eligibility Method 2 - Eligibility of aircraft through previous certification of the navigation system.	1.3.3.1.3		
3	Eligibility Method 3 - Eligibility of aircraft through data collection.	1.3.3.1.4		
4	Aircraft Equipment			
	Dual Long Range Navigation Systems	1.3.4		
	Dual GNSS	1.3.4.2.1		
	GNSS approved as primary means of navigation (AC 20-138 or equivalent)	1.3.4.2.1.1		
	Multi-sensor systems into which the GNSS is integrated (AC 20-130 or equivalent).	1.3.4.2.1.2		
	Complies with regulations/advisory information for use of GNSS for primary oceanic/remote performance	1.3.4.2.1.3		
	Approved FDE prediction programme	1.3.4.2.1.4		
	Dual INS or IRS	1.3.4.2.2.1		
	INSs or IRUs approved according to 14 CFR, Part 121, Appendix G (time limit 6.2 hours).	1.3.4.2.2		
	INSs or IRUs approved for MNPS operations in the North Atlantic or RNAV	1.3.4.2.2		

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part B 1	Location in the Documents of the operator	Comments
	operation in Australia (time limit 6.2 hours).			
	Application for extended time limit	1.3.4.2.3		
	Operator route evaluation conducted	1.3.9.6		
	Single IRS or IRU and Single GNSS	1.3.4.2.4		
	INS/IRU approved to 14 CFR Part 121 Appendix G or equivalent	1.3.4.2.4		
	GNSS authorized for oceanic/remote (TSO C129a with FTE, TSO C145a/146a, or equivalent)	1.3.2.4		
	Approved FDE prediction programme	1.3.4.2.4		

SECTION 4

PROCEDURES FOR RNAV 10 (RNP 10) OPERATIONS

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 1	Location in the Documents of the operator	Comments
1	Flight planning			
	Verify that aircraft has been approved for RNAV 10 (RNP 10) operations.	1.3.5		
	Verify that two LRNS are operational.	1.3.6.1		
	Verify that the RNAV 10 (RNP 10) time limit has been taken into account (aircraft equipped with only INS/IRU).	1.3.5.1 (a)		
	Verify requirements for GNSS, such as FDE, if applicable to the operation.	1.3.5.1 (b)		
	Insert the letter "R" in Box 10 of the ICAO flight plan	1.3.7		
	If required, take into account any operational restriction related to RNAV 10 (RNP 10) approval for a specific navigation system.	1.3.5.1 (c)		
2	Pre-flight procedures			
	Review of maintenance logs and forms for LRNS status	1.3.5.2 (a)		
	Review the emergency procedures for operations in RNAV 10 (RNP 10) airspace or routes.	1.3.5.2 (c)		
3	En-route procedures			
	Before oceanic point of entry verify at least two LRNS capable of navigating in RNAV 10 (RNP 10). If not consider using an alternate route or initiating a deviation.	1.3.9.1		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 1	Location in the Documents of the operator	Comments
	Before entering oceanic airspace, check aircraft position as accurately as possible using external navigation aids.	1.3.9.2		
	Cross-check procedures in order to identify navigation errors in advance and prevent the aircraft from inadvertently deviating from the routes authorised by the ATC.	1.3.9.3		
	Notify the ATC of any degradation or failure of the navigation equipment below the navigation performance requirements, or of any deviation required for a contingency procedure.	1.3.9.4		
	Operator procedures for use of a lateral deviation indicator, an FD or an AP in lateral navigation mode (LNAV) for RNP 10 operations.	1.3.9.5		
	Operator procedures for limiting FTE to +/- ½ navigation accuracy	1.3.9.5		
	Operator procedures for manual updating of position (if approved)	1.3.9.9		

APPENDIX B

RNAV 5 JOB AID

APPLICATION TO CONDUCT RNAV 5

1. Introduction

This Job Aid was developed to provide operators, and inspectors with guidance on the process to be followed in order to obtain an RNAV 5 approval. It should be used as an aid for the approval process but frequent reference to the ICAO PBN Manual (DOC9613) and [State] PBN Operational Approval Handbook will be required. Volume II, Part B, Chapter 2 contains detailed guidance on the implementation of RNAV 5.

2. Purpose of the Job Aid

- 2.1 To give operators and inspectors information on the main RNAV 5 reference documents.
- 2.2 To provide tables showing the contents of the application, the associated reference paragraphs, the place in the application of the operator where RNAV 5 elements are mentioned and columns for inspector comments and follow-up on the status of various elements of RNAV 5.

3. Actions Recommended for the Inspector and Operator

- 3.1 At the pre-application meeting with the operator, the inspector reviews the “basic events of the RNAV 5 approval process” described in Section 1 of this Job Aid, in order to provide an overview of the approval process events.
- 3.2 The inspector reviews this Job Aid with the operator in order to establish the form and content of the RNAV 5 approval application.
- 3.3 The operator uses this Job Aid as a guide to collect the documents of the RNAV 5 application.
- 3.4 The operator inserts in the Job Aid references showing in what part of its documents are the RNAV 5 elements located.
- 3.5 The operator submits the Job Aid and the application to the inspector (with the required documents).
- 3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.
- 3.7 The inspector informs the operator as soon as possible when a corrective action by the operator is required.
- 3.8 The operator provides the inspector with the revised material when so requested.
- 3.9 The [STATE CAA] provides the operator with the operational specification (air operators) or a letter of authorization (others), as applicable, when the tasks and documents have been completed.

SECTION 1

INFORMATION ON THE IDENTIFICATION OF AIRCRAFT AND OPERATORS

NAME OF THE OPERATOR: _____ is applying for RNAV 5 Operations Approval.

Aircraft manufacturer, model, and series	Aircraft Registration (required only if installed equipment varies between model and series)	List relevant make and model of related navigation equipment

DATE OF PRE-APPLICATION MEETING

DATE ON WHICH THE APPLICATION WAS RECEIVED

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN RNAV 5 OPERATIONS

SECTION 2

OPERATOR APPLICATION (ITEMS AND DOCUMENTS)

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
1	<p>Airworthiness documents to determine aircraft eligibility</p> <p>Airworthiness documents that establish the aircraft and the navigation system have been approved for RNAV 5 operations.</p>		
2	<p>RNAV 5 system requirements</p> <p>Documents that show the aircraft equipment</p> <p>One (1) RNAV system comprising of:</p> <ul style="list-style-type: none"> • one or a combination of the following navigation sensors: VOR/DME, DME/DME, INS or IRS, and GNSS; • an Area Navigation (RNAV) computer; • a Control Display Unit (CDU); and • a navigation display(s) or instrument(s) e. g., Navigation Display (ND), Heading Situation Indicator (HSI) or Course Deviation Indicator (CDI). 		
3	<p>Maintenance program</p> <p>1. For Aircraft with established RNAV or GPS stand-alone maintenance practices provide document references.</p> <p>2. For newly installed RNAV or GPS stand-alone provide maintenance practices for review.</p>		
4	<p>Minimum equipment list (MEL) if applicable</p> <p>showing provisions for RNAV 5 systems.</p>		
5	<p>Training</p> <p>Training program for flight crews, flight dispatchers, and maintenance personnel as applicable</p>		
6	<p>Operational policies and procedures</p> <p>Operations manual and checklists or sections to be attached to the application, corresponding to</p>		

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
	RNAV 5 operating procedures and policies.		
7	Navigation database (if carried) Details of the navigation data validation programme.		

SECTION 3

GUIDE FOR DETERMINING RNAV 5 AIRCRAFT ELIGIBILITY

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part B 2	Location in the Documents of the operator	Comments
1	Aircraft eligibility			
	Aircraft approved for B-RNAV	2.3.2.6		
	Aircraft with an approved statement of compliance	2.3.2.4		
	Aircraft with statement by the manufacturer	2.3.2.4		
2	Aircraft and System requirements – one of the following			
	VOR/DME or DME/DME system	2.3.3.2.2 2.3.3.2.3		
	INS or IRS	2.3.3.2.1		
	GNSS a) TSO C129 with pseudo range step detection and health word checking; or b) TSO C129 (a) or TSO C145 () or TSO C146() or equivalent	2.3.3.2.4		
3	Availability of conventional navigation equipment as a back-up in the event of loss of GNSS, if required by the State.	2.3.3.2.4.3		
4	RNAV 5 system functional requirements	2.3.3.3		

SECTION 4

PROCEDURES FOR RNAV 5 OPERATIONS

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 2	Location in the Documents of the operator	Comments
1	Flight planning			
	Verify aircraft is approved for RNAV operation.	2.3.4.1		
	File appropriate flight plan suffixes for RNAV 5	2.3.4.2.1		
	Verify that GNSS or ground-based navigation aids required for RNAV 5 operations are available for the route and period of operations, including any contingencies	2.3.4.2.2		
	Verify that database is current and appropriate for the route (if carried)	2.3.4.2.3		
	Confirm availability of GNSS (if carried). Revise flight planning if a continuous loss of integrity of more than 5 minutes is predicted	2.3.4.3		
2	General operating procedures			
	Operator procedures to ensure flight crew do not request, or file a flight plan for RNAV 5 routes unless they meet all the criteria in the relevant State documents.	2.3.4.4.1		
	Operator procedures to ensure any manufacturer requirements, to meet the RNAV 5 performance requirements	2.3.4.4.2		
	For RNAV 5 routes – procedures for the use of a lateral deviation indicator, a FD or an AP in the lateral navigation mode.	2.3.4.4.7		
	Operator procedures for setting lateral deviation scale (where applicable)	2.3.4.4.7		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 2	Location in the Documents of the operator	Comments
	Operator procedures for limiting FTE to +/- ½ navigation accuracy	2.3.4.4.8		
	Operator procedures for rejoining route following ATC course assignment	2.3.4.4.9		
3	Contingency Procedures			
	Notification of ATC when RNAV performance ceases to meet the requirements for RNAV 5	2.3.4.5.1		
	Operator procedures for use of GNSS; a) Loss of integrity monitoring function b) Integrity alert	2.3.4.5.3 a) 2.3.4.5.3 b)		

APPENDIX C

RNAV 1 AND RNAV 2

APPLICATION TO CONDUCT RNAV 1 AND RNAV 2 OPERATIONS

1. Introduction

This Job Aid was developed to provide air operators, and inspectors with guidance on the process to be followed in order to obtain an RNAV 1 and RNAV 2 approval. It should be used as an aid for the approval process but frequent reference to the ICAO PBN Manual (DOC9613) and [State] PBN Operational Approval Handbook will be required. Volume II, Part B, Chapter 3 contains detailed guidance on the implementation of RNAV 1 and RNAV 2.

2. Purpose of the Job Aid

- 2.1 To give operators and inspectors information on the main RNAV 1 and RNAV 2 reference documents.
- 2.2 To provide tables showing the contents of the application, the associated reference paragraphs, the place in the application of the operator where RNAV 1 and RNAV 2 elements are mentioned and columns for inspector comments and follow-up on the status of various elements of RNAV 1 and RNAV 2.

3. Actions Recommended for the Inspector and Operator

- 3.1 At the pre-application meeting with the operator, the inspector reviews the “basic events of the RNAV 1 and RNAV 2 approval process” described in Section 1 of this Job Aid, in order to provide an overview of the approval process events.
- 3.2 The inspector reviews this Job Aid with the operator in order to establish the form and content of the RNAV 1 and RNAV 2 approval application.
- 3.3 The operator uses this Job Aid as a guide to collect the documents of the RNAV 1 and RNAV 2 application.
- 3.4 The operator inserts in the Job Aid references showing in what part of its documents are the RNAV 1 and RNAV 2 elements located.
- 3.5 The operator submits the Job Aid and the application to the inspector (with the required documents).
- 3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.
- 3.7 The inspector informs the operator as soon as possible when a corrective action by the operator is required.
- 3.8 The operator provides the inspector with the revised material when so requested.
- 3.9 The [STATE CAA] provides the operator with the operational specifications (air operators) or a letter of authorization (others), as applicable, when the tasks and documents have been completed.

SECTION 1

INFORMATION ON AIRCRAFT AND OPERATOR IDENTIFICATION

NAME OF THE OPERATOR: _____ is applying for RNAV 1 and RNAV 2 Operations Approval.

Aircraft manufacturer, model, and series	Aircraft Registration (required only if installed equipment varies between model and series)	List relevant make and model of related navigation equipment

DATE OF PRE-APPLICATION MEETING

DATE ON WHICH THE APPLICATION WAS RECEIVED

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN RNAV 1 AND RNAV 2

OPERATIONS _____

SECTION 2

OPERATOR APPLICATION (ITEMS AND DOCUMENTS)

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
1	<p>Airworthiness documents showing aircraft eligibility for RNAV 1 and RNAV 2. AFM, AFM revision, AFM supplement, or Type certificate data sheet (TCDS) showing that the RNAV navigation system is eligible for RNAV 1 and RNAV 2 or RNP 1 or above. or Manufacturer statement.- Aircraft with a manufacturer statement documenting compliance with RNAV 1 and RNAV 2, or P-RNAV (TGL-10) or FAA AC 90-100() or equivalent. <i>Note: Approvals in accordance with P-RNAV only or FAA AC 90-100() only require additional documentation to meet RNAV 1 and RNAV 2 requirements</i></p>		
2	<p>Aircraft modified to meet RNAV 1 and RNAV 2 standards. Documentation on aircraft inspection and/or modification, if applicable. Maintenance records documenting the installation or modification of aircraft systems</p>		
3	<p>Maintenance programme</p> <ul style="list-style-type: none"> • For aircraft with established maintenance procedures for RNAV 1 and RNAV 2 systems, the list of references of the document or programme. • For recently installed RNAV 1 and RNAV 2 systems, the maintenance procedures for review. 		
4	<p>Minimum equipment list (MEL) if applicable showing provisions for RNAV 1 and RNAV 2.</p>		

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
5	Training Training programme for flight crews, flight dispatchers, and maintenance personnel as applicable.		
6	Operating policies and procedures including relevant section of Operations Manuals and checklists attached to the application, applicable to RNAV 1 and RNAV 2		
7	Navigation database Details of the navigation data validation programme.		

SECTION 3

GUIDE FOR DETERMINING RNAV 1 AND RNAV 2 AIRCRAFT ELIGIBILITY

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part B 3	Location in the Documents of the operator	Comments
1	System eligibility for RNAV 1 and RNAV 2 operations Aircraft with a statement of compliance with at least one of the following:	3.3.2.6		
	a) Aircraft approved under TGL-10 and AC 90-100A	3.3.2.7.2 (b)		
	b) Aircraft approved under TGL-10 (P-RNAV) and additional requirements in Table II-B-3-1	3.3.2.7.3 (b)		
	c) Aircraft that comply with AC 90-100A and additional requirements in Table II-B-3-2	3.3.2.7.4 (b)		
	d) Aircraft with a statement by the manufacturer demonstrating compliance with RNAV 1 and RNAV 2 requirements.			
2	Aircraft and system requirements (as applicable)			
	a) FMS with TSO-C129() GNSS	3.3.3.2.1.1 (a)		
	b) FMS with TSO-C145() GNSS	3.3.3.2.1.1 (b)		
	c) Stand-alone TSO C129 () Class A1 GNSS	3.3.3.2.1.1 (c)		
	d) Stand-alone TSO C146 () GNSS	3.3.3.2.1.1 (d)		
	e) DME/DME RNAV equipment	3.3.3.2.2		
	DME/DME/IRU RNAV equipment	3.3.3.2.3		
3	Functional requirements	3.3.3.3		

SECTION 4

PROCEDURES FOR RNAV 1 AND RNAV 2 OPERATIONS

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 3	Location in the Documents of the operator	Comments
1	Pre-flight planning			
	File appropriate flight plan suffix	3.3.4.1.1		
	Ensure on-board navigation data current and appropriate for the region of intended operation	3.3.4.1.2		
	Use all the information available, to confirm the availability of the required navigation infrastructure for the projected routes, including any non-RNAV contingency, for the intended operation.	3.3.4.1.3		
	Check GNSS integrity prediction (for GNSS equipped aircraft)	3.3.4.1.3 3.3.4.1.4		
	For navigation relying on DME, check NOTAMs to verify the condition of critical DMEs. Assess capability to navigate (potentially to an alternate destination) in case of failure of critical DME while airborne	3.3.4.1.5		
2	General operating procedures			
	Operator procedures to ensure flight crew do not request, or file a flight plan for RNAV 1 and RNAV 2 routes unless they meet all the criteria in the relevant State documents.	3.3.4.2.2		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 3	Location in the Documents of the operator	Comments
	Operator procedures to ensure any manufacturer requirements, to meet the performance requirements of this section are met	3.3.4.2.1		
	At system initialization, pilots must: a) confirm the validity of the navigation database; b) verify the current position of the aircraft; c) verify the proper entry of the assigned ATC route once the initial clearance is received, and of any subsequent route changes; and d) ensure that the WPT sequence displayed on the navigation system coincides with the route shown in the appropriate charts and with the assigned route.	3.3.4.2.3		
	Operator procedures to ensure SID/STARs are retrieved from the on-board navigation database using the procedure name are consistent with the charted procedure and only modified as outlined in the PBN Manual.	3.3.4.2.4		
	RNAV 1 or RNAV 2 routes to be obtained from the database and only modified as per approved procedures	3.3.4.2.5		
	Operator procedures for verifying navigation system text display.	3.3.4.2.6		
	Operator procedures for confirming reasonableness of navigation.	3.3.4.2.7		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 3	Location in the Documents of the operator	Comments
	For RNAV 2 Routes - recommended procedures for the use of a lateral deviation indicator, flight director or autopilot in lateral navigation mode	3.3.4.2.8		
	For RNAV 1 routes - requirements for the use of a lateral deviation indicator, a FD or an AP in the lateral navigation mode.	3.3.4.2.9		
	Operator procedures for setting lateral deviation scale (where applicable)	3.3.4.2.10		
	Operator procedures for limiting FTE to +/- ½ navigation accuracy	3.3.4.2.11		
	Operator procedures for rejoining route following ATC course assignment	3.3.4.2.12		
	Operator procedures for setting bank angle limitations.	3.3.4.2.13		
3	Specific RNAV SID requirements			
	Operator procedures for determining system availability and pre-departure setup	3.3.4.3.1		
	Operator procedures/requirements for equipment use to ensure meeting RNAV 1 performance.	3.3.4.3.3		
	For DME/DME/IRU aircraft. - requirements for position confirmation.	3.3.4.3.5		
	For aircraft utilizing GNSS requirements for acquiring signal and flight plan loading to ensure the appropriate navigation system monitoring and sensitivity	3.3.4.3.6		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part B 3	Location in the Documents of the operator	Comments
4	Specific RNAV STAR requirements			
	Operator procedures for loading/checking route	3.3.4.4.1		
	Operator procedures related to restriction on waypoint creation	3.3.4.4.2		
	Operator procedures for contingency procedures to revert to a conventional arrival route	3.3.4.4.3		
	Operator procedures for accepting radar headings or “direct to” tracking	3.3.4.4.4		
	Operator procedures for verifying system operation and selection of procedures	3.3.4.4.5		
	Operator procedures for observing published altitude and speed constraints	3.3.4.4.6		
5	Contingency procedures			
	Operators contingency procedures for loss of navigation capability	3.3.4.5.1		

APPENDIX D

RNP 4 JOB AID

APPLICATION TO CONDUCT RNP 4

1. Introduction

This Job Aid was developed to provide operators, and inspectors with guidance on the process to be followed in order to obtain an RNP 4 approval. It should be used as an aid for the approval process but frequent reference to the ICAO PBN Manual (DOC9613) and [State] PBN Operational Approval Handbook will be required. Volume II, Part C, Chapter 1 contains detailed guidance on the implementation of RNP 4.

2. Purpose of the Job Aid

- 2.1 To give operators and inspectors information on the main RNP 4 reference documents.
- 2.2 To provide tables showing the contents of the application, the associated reference paragraphs, the place in the application of the operator where RNP 4 elements are mentioned and columns for inspector comments and follow-up on the status of various elements of RNP 4.

3. Actions Recommended for the Inspector and Operator

- 3.1 At the pre-application meeting with the operator, the inspector reviews the “basic events of the RNP 4 approval process” described in Section 1 of this Job Aid, in order to provide an overview of the approval process events.
- 3.2 The inspector reviews this Job Aid with the operator in order to establish the form and content of the RNP 4 approval application.
- 3.3 The operator uses this Job Aid as a guide to collect the documents of the RNP 4 application.
- 3.4 The operator inserts in the Job Aid references showing in what part of its documents are the RNP 4 elements located.
- 3.5 The operator submits the Job Aid and the application to the inspector (with the required documents).
- 3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.
- 3.7 The inspector informs the operator as soon as possible when a corrective action by the operator is required.
- 3.8 The operator provides the inspector with the revised material when so requested.
- 3.9 The [STATE CAA] provides the operator with the operational specification (air operators) or a letter of authorization (others) as applicable, when the tasks and documents have been completed.

SECTION 1

INFORMATION ON THE IDENTIFICATION OF AIRCRAFT AND OPERATORS

NAME OF THE OPERATOR: _____ is applying for RNP 4 Operations Approval.

Aircraft manufacturer, model, and series	Aircraft Registration (required only if installed equipment varies between model and series)	List relevant make and model of related navigation equipment

DATE OF PRE-APPLICATION MEETING

DATE ON WHICH THE APPLICATION WAS RECEIVED

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN RNP 4 OPERATIONS

SECTION 2

OPERATOR APPLICATION (ITEMS AND DOCUMENTS)

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
1	Aircraft airworthiness documents showing RNP 4 compliance per ICAO PBN Manual, e.g., AFM, AFM Revision, AFM Supplement or Type Certificate Data Sheet (TCDS) showing that aircraft LRNS are RNP 4 eligible.		
2	Aircraft Modified To Meet RNP 4 Standards Documentation of aircraft inspection and/or modification. <u>If applicable</u> , maintenance records documenting installation or modification of aircraft/LRNS.		
3	Maintenance Program: For aircraft with established LRNS maintenance practices, provide list of document or program references. For newly installed LRNS, provide LRNS maintenance practices for review.		
4	Minimum Equipment List (MEL) if applicable showing provisions for LRNS		
5	Training programme for flight crews, and flight dispatchers, and maintenance personnel as applicable.		
6	Operating policies and procedures including relevant section of Operations Manuals and checklists attached to the application, applicable to RNP 4		
7	Navigation database Details of the navigation data validation programme.		

SECTION 3

GUIDE FOR DETERMINING RNP 4 AIRCRAFT ELIGIBILITY

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part C 1	Location in the Documents of the operator	Comments
1	Eligibility Group 1 – RNP Certification (RNP compliance documented in Airplane Flight Manual (AFM))	1.3.2.3.2 (a)		
2	Eligibility Group 2 – Prior Navigation System Certification	1.3.2.3.2 (b)		
	Aircraft fitted with GNSS only: a) Approved long-range navigation systems for oceanic and remote airspace (with FDE) b) Approved dispatch FDE availability programme	1.3.2.3.2 (b)(i)		
	Multi-sensor Systems Integrating GNSS with integrity provided by RAIM	1.3.2.3.2 (b)(ii)		
	Multi-sensor Systems Integrating GNSS with integrity provided by AAIM	1.3.2.3.2 (b)(iii)		
3	Eligibility Group 3 – New Technology	1.3.2.3.2 (c)		
4	Requirement for at least dual Long Range Navigation System equipage including GNSS	1.3.3		
5	Functional Requirements	1.3.3.6 1.3.3.7		

SECTION 4

PROCEDURES FOR RNP 4 OPERATIONS

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 1	Location in the Documents of the operator	Comments
1	Pre-flight Planning			
	Verify aircraft long-range navigation systems (LRNS) required meeting minimum Navigation Specification (RNP) specified for the route or area is operational.	1.3.4.1.2		
	Annotate ICAO Flight Plan block 10 (Equipment) with "R" and "Z" and annotate Item 18 with "NAV/RNP4". Note: CPDLC and ADS-C will also be required when separation standard is 30 NM lateral and/or longitudinal.	1.3.4.1.1		
	Review applicable contingency procedures	1.3.4.1.2 (c)		
	Ensure navigation capability available including availability of FDE s applicable	1.3.4.2		
2	Pre-flight Procedures			
	Review of maintenance logs and forms for LRNS status	1.3.4.1.2 (a)		
	Confirm Navigation Database currency	1.3.4.1.1 (Note)		
3	En route Procedures			
	Before oceanic entry point, verify two LRNS meeting the minimum RNP specified are operating. If not, notify ATC and operate in accordance with policy applicable to the airspace.	1.3.4.3.1		
	Before entering oceanic airspace, perform navigation accuracy check and	1.3.4.3.2		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 1	Location in the Documents of the operator	Comments
	position update (if necessary) using accepted method.			
	Follow in-flight operating drills to prevent inadvertent deviation from cleared routes.	1.3.4.3.3		
	Use flight director or autopilot in lateral deviation mode	1.3.4.3.4		
	Advise ATC of loss of long-range navigation capability and operate in accordance with policy applicable to the airspace.	1.3.4.3.3		

APPENDIX E

RNP 1 JOB AID

APPLICATION TO CONDUCT RNP 1

1. Introduction

This Job Aid was developed to provide operators, and inspectors with guidance on the process to be followed in order to obtain a RNP 1 approval. It should be used as an aid for the approval process but frequent reference to the ICAO PBN Manual (DOC 9613) and [State] PBN Operational Approval Handbook will be required. Volume II, Part C, Chapter 3 contains detailed guidance on the implementation of Basic-RNP 1.

2. Purpose of the Job Aid

- 2.1 To give operators and inspectors information on the main Basic-RNP1 reference documents.
- 2.2 To provide tables showing the contents of the application, the associated reference paragraphs, the place in the application of the operator where RNP 1 elements are mentioned and columns for inspector comments and follow-up on the status of various elements of - RNP 1.

3. Actions Recommended for the Inspector and Operator

- 3.1 At the pre-application meeting with the operator, the inspector reviews the “events of the - RNP 1 approval process” described in Section 1 of this Job Aid, in order to provide an overview of the approval process events.
- 3.2 The inspector reviews this Job Aid with the operator in order to establish the form and content of the -RNP 1 approval application.
- 3.3 The operator uses this Job Aid as a guide to collect the documents of the -RNP 1 application.
- 3.4 The operator inserts in the Job Aid references showing in what part of its documents are the - RNP 1 elements located.
- 3.5 The operator submits the Job Aid and the application to the inspector (with the required documents).
- 3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.
- 3.7 The inspector informs the operator as soon as possible when a corrective action by the operator is required.
- 3.8 The operator provides the inspector with the revised material when so requested.
- 3.9 The [State CAA] provides the operator with the operational specifications (air operator) or a letter of authorization (other), as applicable, when the tasks and documents have been completed.

SECTION 1
INFORMATION ON AIRCRAFT AND OPERATOR IDENTIFICATION

NAME OF THE OPERATOR: _____ is applying for -RNP 1
Operations Approval.

Aircraft manufacturer, model, and series	Aircraft Registration (required only if installed equipment varies between model and series)	List relevant make and model of related navigation equipment

DATE OF PRE-APPLICATION MEETING

DATE ON WHICH THE APPLICATION WAS RECEIVED

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN -RNP 1 OPERATIONS

SECTION 2

OPERATOR APPLICATION (ITEMS AND DOCUMENTS)

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
1	<p>Airworthiness documents showing aircraft eligibility for -RNP 1.</p> <p>AFM, AFM revision, AFM supplement, or Type certificate data sheet (TCDS) showing that the RNP navigation system is eligible for -RNP 1 or less.</p> <p>or</p> <p>Manufacturer statement - Aircraft with a manufacturer statement documenting compliance with the performance and functional requirements of the ICAO PBN Manual.</p>		
2	<p>Aircraft modified to meet - RNP 1 standards.</p> <p>Documentation on aircraft inspection and/or modification, if applicable.</p> <p>Maintenance records documenting the installation or modification of aircraft systems</p>		

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
3	<p>Maintenance programme</p> <ul style="list-style-type: none"> • For aircraft with established maintenance procedures for -RNP 1 systems, the list of references of the document or programme. • For recently installed -RNP 1 systems, the maintenance procedures for their review. 		
4	<p>Minimum equipment list (MEL) if applicable showing provisions for -RNP 1 systems.</p>		
5	<p>Operating policies and procedures including relevant section of Operations Manuals and checklists attached to the application, applicable to RNP 1</p>		
6	<p>Training Training programme for flight crews, flight dispatchers, and maintenance personnel as applicable.</p>		
7	<p>Navigation database Details of the navigation data validation programme.</p>		

SECTION 3

GUIDE FOR DETERMINING -RNP 1 AIRCRAFT ELIGIBILITY

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part C 3	Location in the Documents of the operator	Comments
1	Aircraft and system requirements – one of the following:			
	Aircraft with E/TSO-C129a GNSS sensor (Class B or C) installed in an FMS	3.3.3 a)		
	Aircraft with E/TSO-C145 () GNSS sensor installed in an FMS	3.3.3 a)		
	Aircraft with E/TSO-C129a Class A1 system or E/TSO-C146 () stand-alone GNSS system	3.3.3 b)		
	Aircraft with RNP capability certified or approved with equivalent standards.	3.3.3 c)		
	Positioning data from other types of navigation sensors can be integrated with GNSS data provided they do not cause position errors that exceed the total system error (TSE)). Otherwise, means must be provided to deselect or cancel the other types of navigation sensors.	3.3.3.2		
2	Aircraft and System eligibility for -RNP 1 operations			
	Aircraft with an approved statement of compliance	3.3.2.4		
	Aircraft with a statement by the manufacturer	3.3.2.4		
	Modified aircraft	3.3.2.4		
3	Functional requirements <i>Note: Aircraft with RNAV 1 and RNAV 2 approval or equivalent (e.g. P-RNAV and FAA AC 90-100) based on GNSS</i>	3.3.3		

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part C 3	Location in the Documents of the operator	Comments
	<i>capability meet the functional requirements of this AC for -RNP 1 operations.</i>			

SECTION 4

PROCEDURES FOR -RNP 1 OPERATIONS

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 3	Location in the Documents of the operator	Comments
1	Pre-flight planning			
	File appropriate flight plan suffix	3.3.4.1.1		
	Ensure on-board navigation data current and appropriate for the region of intended operation	3.3.4.1.2		
	Use all the information available, to confirm the availability of the required navigation infrastructure for the projected routes, including any non-RNAV contingency, for the intended operation.	3.3.4.1.3		
	Check GNSS integrity prediction	3.3.4.2		
2	General operating procedures			
	Operator procedures comply with any instruction or procedure identified by the manufacturer, as necessary, to meet the performance requirements of this section.	3.3.4.3.1		
	Operator procedures to ensure flight crew do not request, or file a flight plan for RNP 1 routes unless they meet all the criteria in the relevant State documents.	3.3.4.3.2		

	<p>At system initialization, pilots must:</p> <p>a) confirm the validity of the navigation database;</p> <p>b) verify the current position of the aircraft;</p> <p>c) verify the proper entry of the assigned ATC route once the initial clearance is received, and of any subsequent route changes; and</p> <p>d) ensure that the WPT sequence displayed on the navigation system coincides with the route shown in the appropriate charts and with the assigned route.</p>	3.3.4.3.3		
	<p>Operator procedures to ensure a RNP 1 SID/STARs is retrieved from the on-board navigation database using the procedure name, is consistent with the charted procedure and only modified as outlined in the PBN Manual .</p>	3.3.4.3.4		
	<p>Operator procedures for verifying navigation system text display.</p>	3.3.4.3.5		
	<p>Operator procedures for confirming reasonableness of navigation.</p>	3.3.4.3.6		
	<p>For -RNP 1 routes procedures requiring the use of a lateral deviation indicator, flight director or autopilot in lateral navigation mode</p>	3.3.4.3.7		
	<p>Operator procedures for limiting FTE to +/- ½ navigation accuracy</p>	3.3.4.3.8		
	<p>Operator procedures for rejoining route following ATC course assignment</p>	3.3.4.3.9		
	<p>Operator procedures for setting bank angle limitations.</p>	3.3.4.3.10		

3	Aircraft with RNP selection capability			
	Pilots of aircraft capable of selecting RNP input must select RNP 1 or lower for -RNP 1 SIDs, STARs or procedures.	3.3.4.4		
4	-RNP 1 SID specific requirements			
	Operator procedures for determining system availability and pre-departure setup	3.3.4.5.1		
	Operator procedures/requirement for equipment use to ensure meeting RNP 1 performance	3.3.4.5.3		
	GNSS requirements for acquiring signal and flight plan loading to ensure the appropriate navigation system monitoring and sensitivity	3.3.4.5.4		
	Procedures for setting lateral deviation display scale for aircraft using a lateral deviation display (e.g., a navigation map display), and use of FD or autopilot	3.3.4.5.5		
5	-RNP 1 STAR specific requirements			
	Operator procedures for loading/checking route	3.3.4.6.1		
	Operator procedures related to restriction on waypoint creation.	3.3.4.6.2		
	Operator procedures for contingency procedures to revert to a conventional arrival route (where required).	3.3.4.6.3		
	Operator procedures for accepting radar headings or "direct to" tracking	3.3.4.6.4		
	Operator procedures for verifying system operation and selection of procedures	3.3.4.6.5		

	Operator procedures for observing published altitude and speed constraints.	3.3.4.6.6		
	For aircraft using stand-alone GNSS systems, operator procedures/requirements for equipment setup/flight planning to ensure RNP 1 lateral deviation display scale sensitivity	3.3.4.6.7		
6	Contingency procedures			
	Operator contingency procedures for loss of navigation capability	3.3.4.7.1		

APPENDIX F

RNP APCH JOB AID

APPLICATION TO CONDUCT RNP APCH (LNAV) OPERATIONS

1. Introduction

This Job Aid was developed to provide operators, and inspectors with guidance on the process to be followed in order to obtain an RNP APCH approval for approaches flown to an LNAV minima. It should be used as an aid for the approval process but frequent reference to the ICAO PBN Manual (DOC 9613) and [State] PBN Operational Approval Handbook will be required. Volume II, Part C, Chapter 5 contains detailed guidance on the implementation of RNP APCH.

2. Purpose of the Job Aid

- 2.1 To give operators and inspectors information on the main RNP APCH reference documents.
- 2.2 To provide tables showing the contents of the application, the associated reference paragraphs, the place in the application of the operator where RNP APCH elements are mentioned and columns for inspector comments and follow-up on the status of various elements of RNP APCH.

3. Actions Recommended for the Inspector and Operator

- 3.1 At the pre-application meeting with the operator, the inspector reviews the “basic events of the RNP APCH approval process” described in Section 1 of this Job Aid, in order to provide an overview of the approval process events.
- 3.2 The inspector reviews this Job Aid with the operator in order to establish the form and content of the RNP APCH approval application.
- 3.3 The operator uses this Job Aid as a guide to collect the documents of the RNP APCH application.
- 3.4 The operator inserts in the Job Aid references showing in what part of its documents are the RNP APCH elements located.
- 3.5 The operator submits the Job Aid and the application to the inspector (with the required documents).
- 3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.
- 3.7 The inspector informs the operator as soon as possible when a corrective action by the operator is required.
- 3.8 The operator provides the inspector with the revised material when so requested.
- 3.9 The CAA provides the operator with the operational specifications (air operators) or a letter of authorization (others), as applicable, when the tasks and documents have been completed.

SECTION 1

INFORMATION ON THE IDENTIFICATION OF AIRCRAFT AND OPERATORS

NAME OF THE OPERATOR: _____ is applying for
RNP APCH Operations Approval.

Aircraft manufacturer, model, and series	Aircraft Registration (required only if installed equipment varies between model and series)	List relevant make and model of related navigation equipment

DATE OF PRE-APPLICATION MEETING

DATE ON WHICH THE APPLICATION WAS RECEIVED

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN RNP APCH OPERATIONS

SECTION 2

OPERATOR APPLICATION (ITEMS AND DOCUMENTS)

Item	Title of document	Indication of inclusion by the operator	Comments by the Inspector
1	<p>Airworthiness documents showing aircraft eligibility for RNP APCH.</p> <p>AFM, AFM revision, AFM supplement, or Type certificate data sheet (TCDS) showing that the RNP navigation system is eligible for RNP APCH.</p> <p>or;</p> <p>Manufacturer statement. - Aircraft with a manufacturer statement documenting compliance</p>		
2	<p>Aircraft modified to meet RNP APCH standards.</p> <p>Documentation on aircraft inspection and/or modification, if applicable.</p> <p>Maintenance records documenting the installation or modification of aircraft systems</p>		
3	<p>Maintenance programme</p> <ul style="list-style-type: none"> • For aircraft with established maintenance procedures for RNP APCH systems, the list of references of the document or programme. • For recently installed RNP APCH systems, the maintenance procedures for their review. 		
4	<p>Minimum equipment list (MEL) if applicable</p> <p>showing provisions for RNP APCH systems.</p>		
5	<p>Training</p> <p>Training programme for flight crews, flight dispatchers, and maintenance personnel as applicable.</p>		
6	<p>Operating policies and procedures</p> <p>Operations manual (OM) and checklists or sections to be attached to the application, corresponding to RNP APCH operating procedures and policies.</p>		
7	<p>Navigation database</p> <p>Details of the navigation data validation programme.</p>		

SECTION 3

GUIDE FOR DETERMINING RNP APCH AIRCRAFT ELIGIBILITY

Item	Topics	Reference paragraphs ICAO Doc 9613 Vol II Part C 5	Location in the Documents of the operator	Comments
1	Aircraft and system requirements			
	Aircraft approved to conduct RNAV (GNSS) approaches.			
	Aircraft that have a statement of compliance in their flight manual (AFM), AFM supplement, pilot operations handbook (POH), or in the avionics operating manual.	5.3.2.4		
	RNP installation based on GNSS standalone system	5.3.3.1, Note 3		
	RNP installation is based on GNSS sensor equipment used in a multi-sensor system	5.3.3.1, Note 3		
	Positioning data from other types of navigation sensors can be integrated with GNSS data provided they do not cause position errors that exceed the total system error (TSE). Otherwise, means must be provided to deselect or cancel the other types of navigation sensors.	5.3.3.2		
	Functional requirements	5.3.3.3		

SECTION 4

PROCEDURES FOR RNP APCH OPERATIONS

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 5	Location in the Documents of the operator	Comments
1	Pre-flight planning			
	File appropriate flight plan suffix	5.3.4.1.1		
	<p>Ensure that the approaches which may be used for the intended flight (including alternate aerodromes):</p> <ul style="list-style-type: none"> a) are selected from a valid navigation data base (current AIRAC cycle); b) have been verified through an appropriate (navigation database integrity process); and c) have not been prohibited by any NOTAM issued by the CAA or by the air navigation service providers or by an operational instruction of the company 	5.3.4.1.2 a)		
	Ensure that there are sufficient means available to fly and land at the destination or alternate aerodrome in case of loss of RNP APCH capability.	5.3.4.1.2 b)		
	Take account of any NOTAM issued by the CAA or by the ANSP, or by an operational instruction of the company that might adversely affect aircraft system operation or the availability or suitability of the procedures at the destination aerodrome or at any alternate aerodromes.	5.3.4.1.2 c)		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 5	Location in the Documents of the operator	Comments
	For missed approach procedures based on conventional NAVAIDs (VOR, NDB), verify that the appropriate airborne equipment required to fly such procedures is installed and operational in the aircraft.	5.3.4.1.2 d)		
	Use all the information available, to confirm the availability of the required navigation infrastructure for the projected routes, including any non-RNAV contingency, for the intended operation.	5.3.4.1.3		
	Check GNSS integrity prediction	5.3.4.1.3		
2	Prior to commencing the procedure			
	In addition to normal procedures, prior to commencing the approach (before the initial approach fix (IAF)), the flight crew must verify the correct procedure has been loaded, by comparing said procedure with the approach charts. This check must include: a) the WPT sequence; b) the integrity of the tracks and distances of the approach legs, the accuracy of the inbound course and the length of the final approach segment.	5.3.4.3.1		
	For multi-sensor systems, verify during the approach that a GNSS sensor is used for position computation.	5.3.4.3.3		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 5	Location in the Documents of the operator	Comments
	For a RNP system with aircraft-based augmentation system (ABAS) requiring barometric aiding, set the current aerodrome barometric altimeter	5.3.4.3.4		
	Check GNSS availability	5.3.4.3.5		
	Operator procedures for rejoining route following ATC course assignment	5.3.4.3.6		
	Operator procedures to prohibit revision of lateral definition of the flight path between the FAF and the missed approach point (MAPt).	5.3.4.3.7		
3	During the procedure			
	Establish aircraft on course prior to FAF	5.3.4.4.1		
	Check appropriate approach mode active prior to FAF.	5.3.4.4.2		
	Select appropriate displays so that the following information can be monitored by the flight crew: a) the RNP computed desired track (DTK); and b) the aircraft position relative to the path cross track deviation (XTK) for FTE monitoring.	5.3.4.4.3		
	Discontinue approach: a) if the navigation display is announcing a failure (flagged invalid); or b) in case of loss of the integrity alerting function; or c) if the integrity alerting function is annunciated not available before passing the FAF; or d) if the FTE is excessive.	5.3.4.4.4		

Item	Operating Procedures	Reference paragraphs ICAO Doc 9613 Vol II Part C 5	Location in the Documents of the operator	Comments
	Missed approach must be flown in accordance with the published procedure. Use of the RNP system during the missed approach provided: a) the RNP system is operational (e.g., there is no loss of function, no NSE alert, no failure indication, etc.). b) the whole procedure (including the missed approach) is loaded from the navigation data base.	5.3.4.4.5		
	Operator procedures for limiting FTE to +/- ½ navigation accuracy	5.3.4.4.6		
	Operator procedures for limiting vertical deviations within + 100/-50 ft when Baro-VNAV is used for vertical path guidance during the final approach segment	5.3.4.4.7		
	Operator procedures for the conduct of a missed approach if the lateral or vertical deviations are excessive	5.3.4.4.8		
4	Contingency procedures			
	Notify ATC of any loss of the RNP APCH capability, together with the proposed course of action.	5.3.4.6.1		
	Operator contingency procedures in order to react safely following the loss of the RNP APCH capability during the approach.	5.3.4.6.1		