EASA
European Union Aviation Safety Agency

PBN Operational Approvals Workshop

Mr. Javier Cabrera Espinós

Bangkok, 3rd to 5th of February, 2020

Your safety is our mission.

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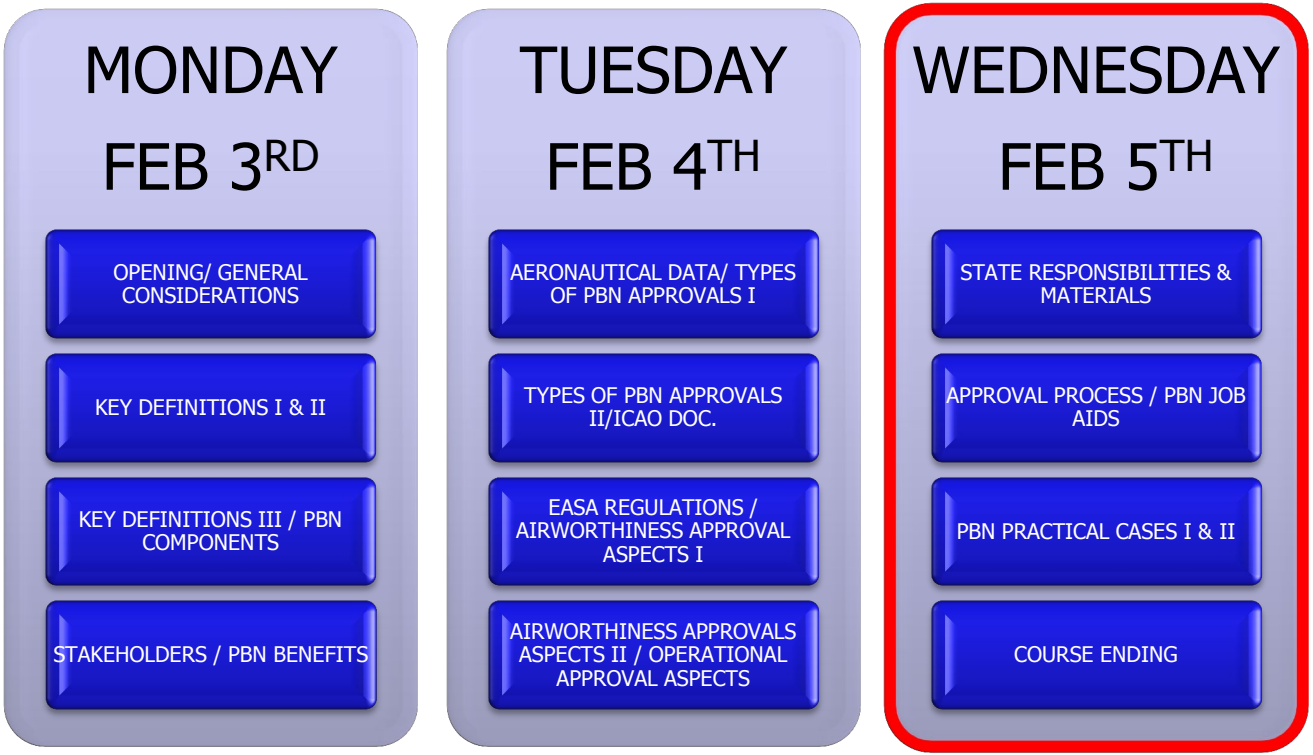
EU-South East Asia Aviation Partnership Project (EU-SEA APP)
This project is funded by the European Union and implemented by the European Union Aviation Safety Agency - EASA

Agenda


MONDAY
FEB 3RD
OPENING/ GENERAL CONSIDERATIONS
KEY DEFINITIONS I & II
KEY DEFINITIONS III / PBN COMPONENTS
STAKEHOLDERS / PBN BENEFITS
TUESDAY
FEB 4TH
AERONAUTICAL DATA/ TYPES OF PBN APPROVALS I
TYPES OF PBN APPROVALS II/ICAO DOC.
EASA REGULATIONS / AIRWORTHINESS APPROVAL ASPECTS I
AIRWORTHINESS APPROVALS ASPECTS II / OPERATIONAL APPROVAL ASPECTS
WEDNESDAY
FEB 5TH
STATE RESPONSIBILITIES & MATERIALS
APPROVAL PROCESS / PBN JOB AIDS
PBN PRACTICAL CASES I & II
COURSE ENDING

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State Regulatory Responsibilities

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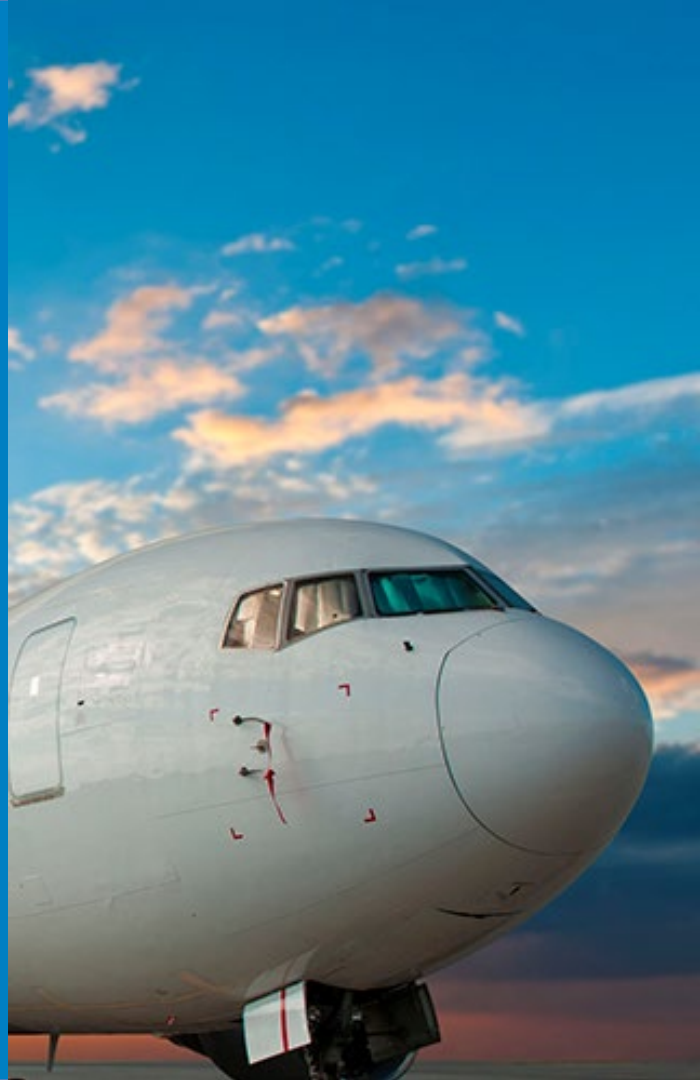

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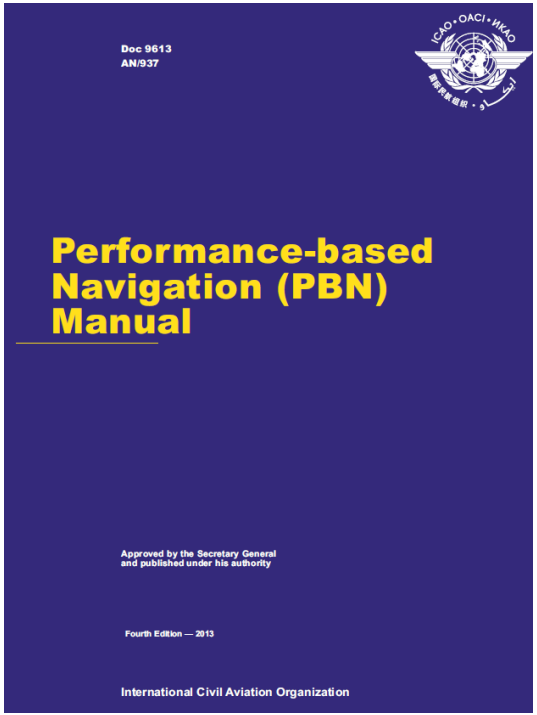
State Regulatory Responsibilities

2. State Regulatory Responsibilities



Attachment C

OPERATIONAL APPROVAL

State Regulatory Responsibilities

- State Regulatory Responsibilities
  - Individual States must develop national regulatory material which addresses the PBN applications relevant to their airspace or
  - relevant to operations conducted in another State by the operators and aircraft registered in that State.
  - In line with current practice, small or less capable States may elect to adopt or even adapt the national regulatory material of the major certification States as an acceptable means of compliance

State Regulatory Responsibilities

→ States and Regulatory Agencies involved

a) State of Design/Manufacture

b) State of Registry

c) State of the Operator

State Regulatory Responsibilities

a) State of Design/Manufacture:

- → The organisation which has designed the aircraft applies for a TC from the State of Design.
- → The State of Design also approves the MMEL, the mandatory maintenance tasks and intervals, and the AFM and its amendments, which determine the PBN capabilities and limitations of the aircraft.
- → A State of Design, which may be different from the State which issued the original TC, may issue a design change approval for an aircraft as a STC.

State Regulatory Responsibilities

b) State of Registry:

- → The State of Registry is the State in which the aircraft is registered.
- → The State of Registry is responsible for the airworthiness of the aircraft. It approves the aircraft maintenance programme, in accordance with its regulations, and issues the certificate of airworthiness.
- → It also approves aircraft repairs and modifications (as stand-alone modifications or as STCs).
- → The State of Registry approves the MEL for GA aircraft and the conduct of specified PBN operations.

State Regulatory Responsibilities

c) State of the Operator:

→ The State of the Operator (which may be different from the State of Registry for commercial air transport operators) accepts the aircraft maintenance programme and approves the MEL, the flight crew training programmes and the conduct of specified PBN operations, in accordance with its regulations.

State Regulatory Responsibilities

- Approval of technical data:
  - States should not reapprove technical data approved by another State; reapproving already approved technical data effectively transfers the regulatory responsibility for that data to the State reapproving the data with respect to aircraft registered under its jurisdiction.
  - Where a State wishes to use technical data approved by another State, the State should review the data and determine that it is acceptable for use in the State and formally accept it;
  - In this way, the regulatory responsibility remains with the State that originally approved the data.

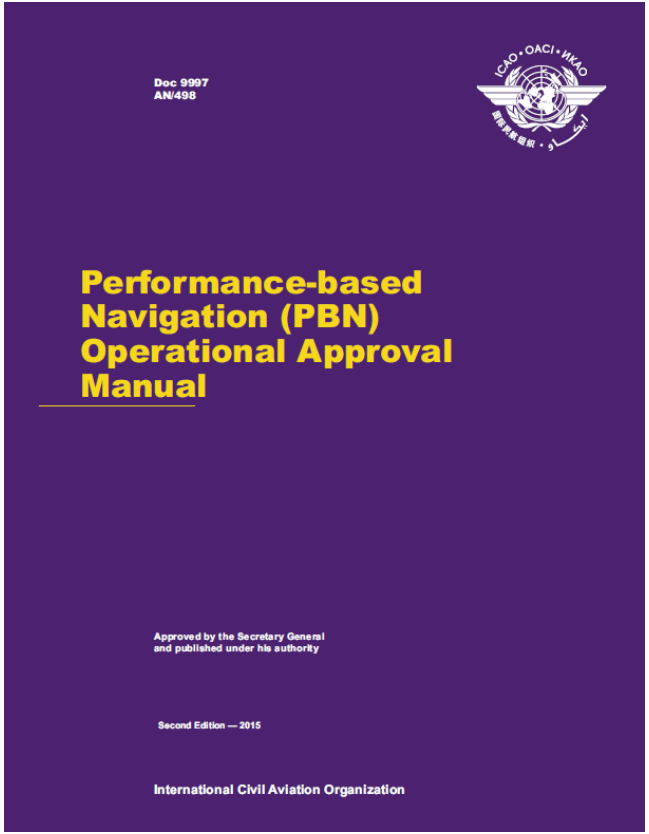
State Regulatory Responsibilities

- PBN environment:
  - When establishing a PBN operational approval environment, States should also consider the other operational approvals relevant to CNS/ATM.
  - Currently there are up to about 20 operational approvals that may be needed by each aircraft.
  - Establishing approval procedures that are efficient and minimize overhead for both operators and regulators are important considerations.

State Regulatory Responsibilities

Chapter 2

Certification and Operational Approval



State Regulatory Responsibilities

- Regulatory Material:
  - Individual States must develop national regulatory material which addresses the PBN applications relevant to their airspace or relevant to operations conducted in another State by the operators and aircraft registered in their State.
  - Responsibility for all or part of this activity may be delegated to regional safety oversight organizations.
  - In line with current practice, small or less capable States may elect to adopt or even adapt, as an acceptable means of compliance, the national regulatory material of certification States that have a relevant developed regulatory framework.

State Regulatory Responsibilities

Operational Approval Responsibilities

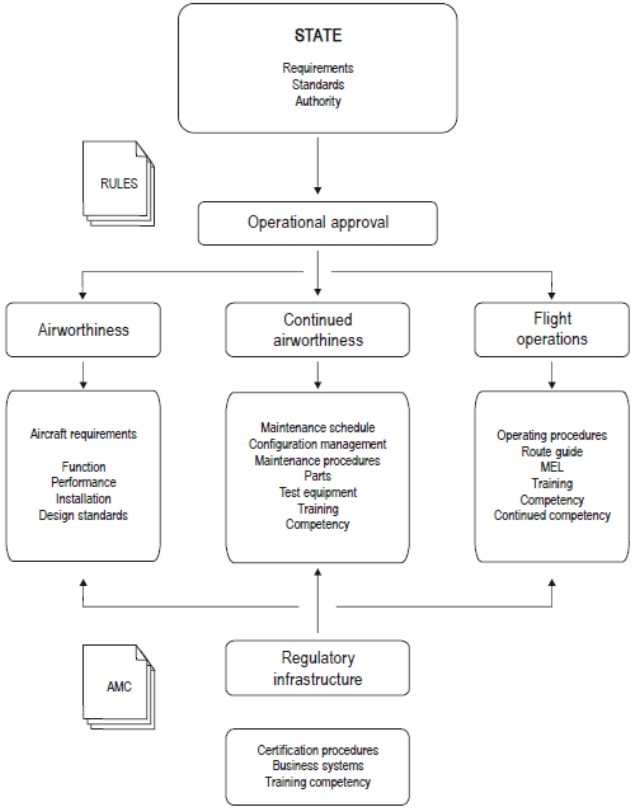


Figure 2-1. Overview of operational approval responsibilities

State Regulatory Responsibilities

- State Responsibilities:
  - Operational approval is usually the responsibility of the regulatory authority of the State of the Operator for commercial air transport operations and the State of Registry for general aviation operations.

State Regulatory Responsibilities

- State Responsibilities:
  - General aviation operators may not be required to follow the same authorization model as commercial operators although a State may determine that a letter of authorization (LOA) is also necessary for general aviation (GA).
  - Alternatively, a State may determine that a GA aircraft may operate on a PBN route/procedure provided that the operator has ensured that the aircraft has suitably approved equipment (is eligible), the navigation database is valid, the pilot is suitably qualified and current with respect to the equipment, and adequate procedures (and checklists) are in place.
  - Another consideration may be the ability of certain operators to document home State approval(s) for international operations. As such, issuance of a formal, specific approval may also be appropriate if only as an option to facilitate recognition by foreign States.

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State Regulatory Material

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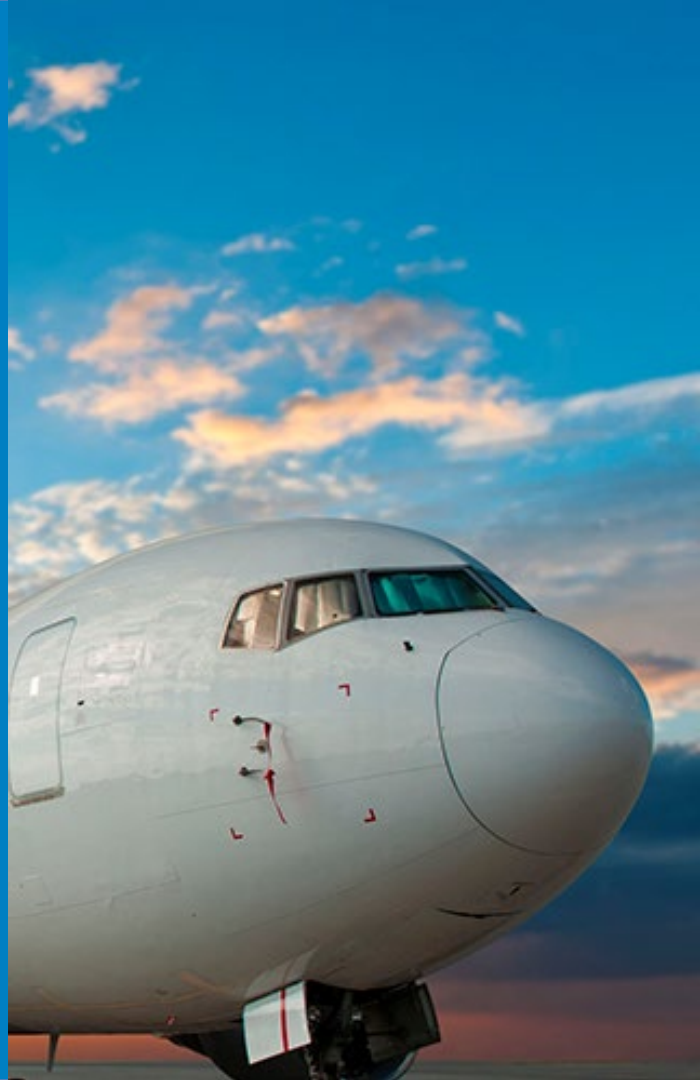

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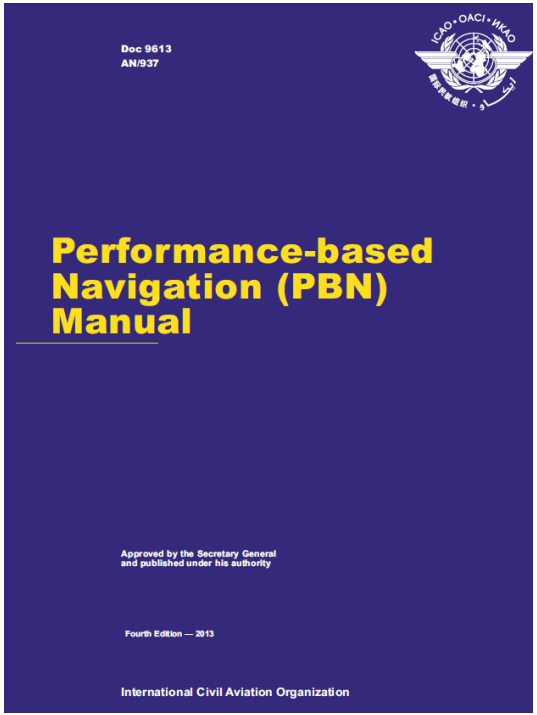
State Regulatory Material

4. Documentation of Operational Approval



Attachment C

OPERATIONAL APPROVAL

State Regulatory Material

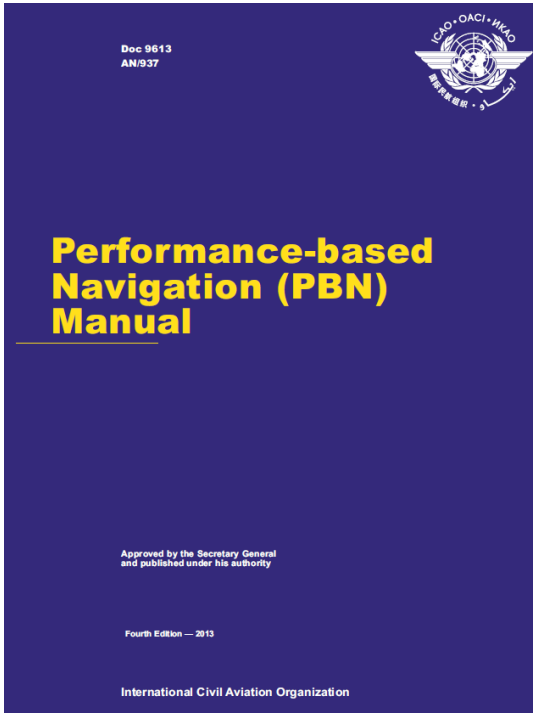
- Operational Approval:
  - Operational approval may be documented as an endorsement of the AOC through:
    a) an Operations specification, associated with the AOC; or
    b) an amendment to the OM; or
    c) an LOA.

State Regulatory Material

- Operational Approval:
  - During the validity of the operational approval, the CAA should consider any anomaly reports received from the operator or other interested party.
  - Repeated navigation error occurrences attributed to a specific piece of navigation equipment may result in restrictions on use or cancelation of the approval for use of that equipment.
  - Information that indicates the potential for repeated errors may require modification of an operator's training programme. Information that attributes multiple errors to a particular pilot or crew may necessitate remedial training and checking or a review of the operational approval.

State Regulatory Material

5. State Regulatory Material



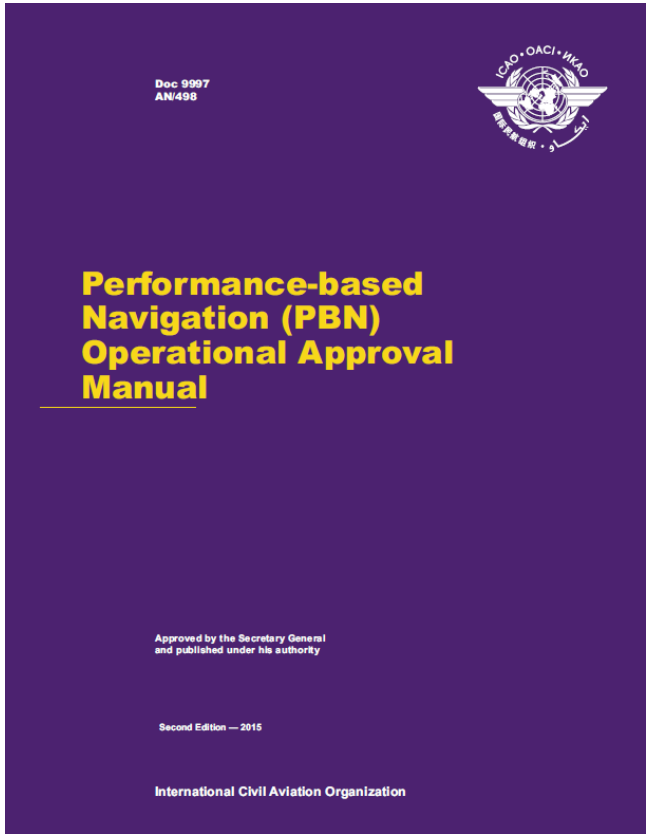
Attachment C

OPERATIONAL APPROVAL

State Regulatory Material

- Operational Approval:
  - Individual States must develop national regulatory material which addresses the PBN applications relevant to their airspace or relevant to operations conducted in another State by the State's operators or by aircraft registered in that State.
  - The regulations may be categorized by operation, flight phase, area of operation and/or navigation specification.
  - Approvals for commercial operations should require specific authorisation.

State Regulatory Material



Chapter 4. Navigation specification job aids ..

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Approval Process

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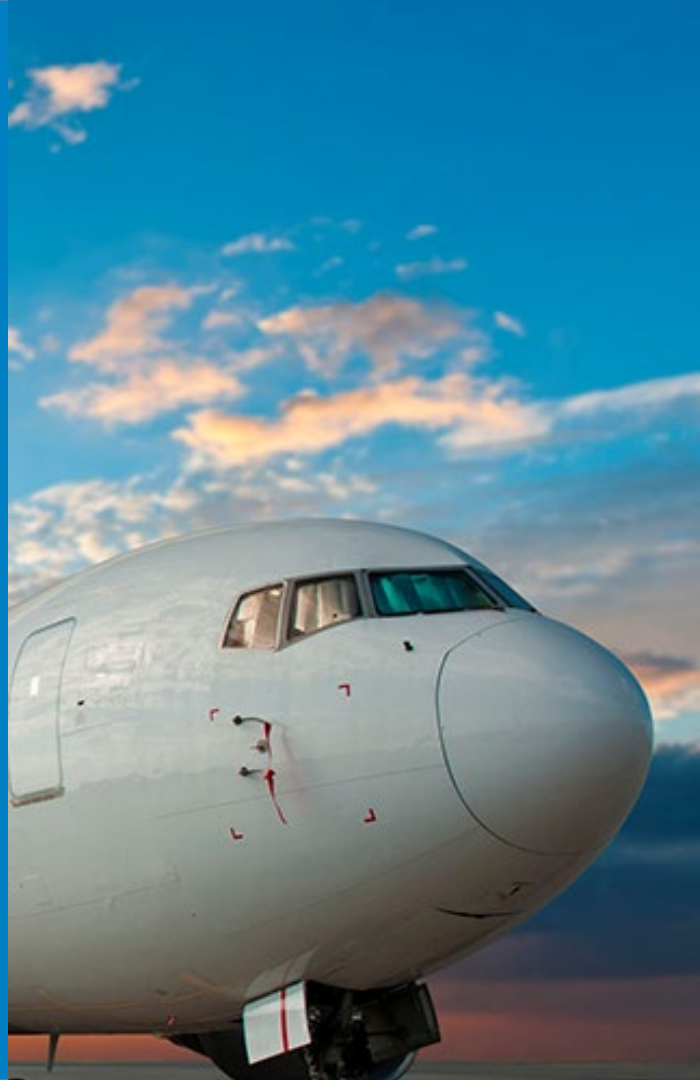

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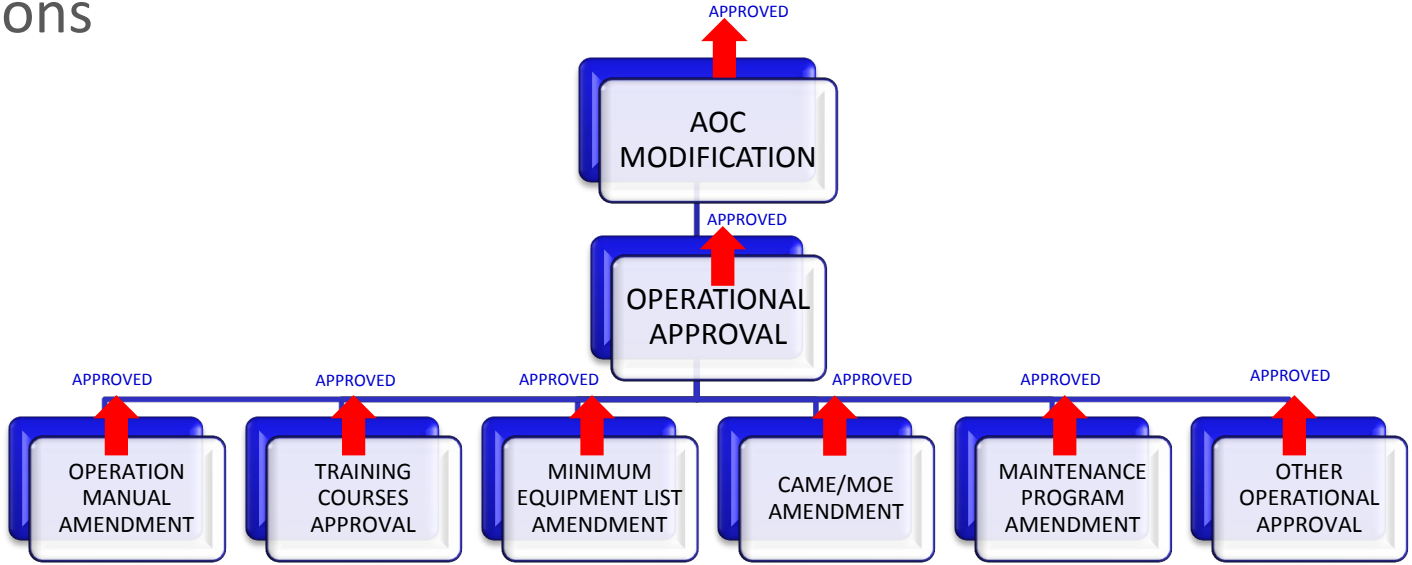
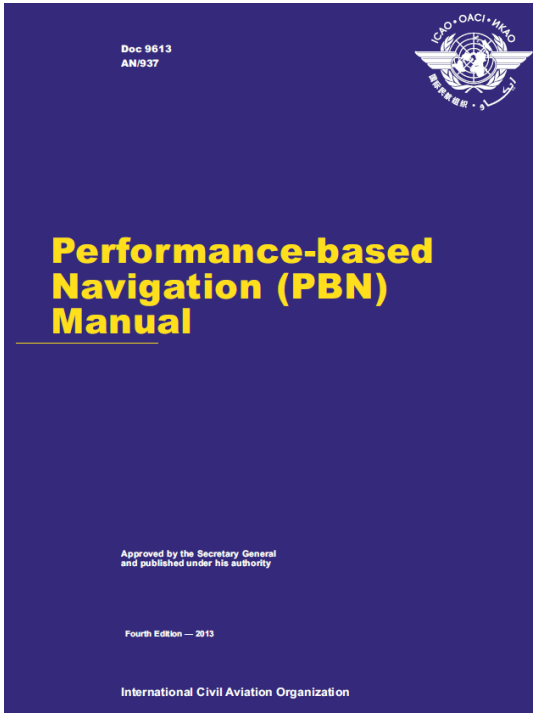
Approval Process

Conclusions



State Regulatory Material

6. Approval Process



Attachment C

OPERATIONAL APPROVAL

Approval Process

- General terms:
  - Since each operation may differ significantly in complexity and scope, the project manager and the operational approval team need considerable latitude in taking decisions and making recommendations during the approval process.

Approval Process

- General terms:
  - The ultimate recommendation by the project manager and decision by the CAA regarding operational approval should be based on the determination of whether or not the applicant:

    a) meets the requirements established by the State in its air navigation regulations;

    b) is adequately equipped; and

    c) is capable of conducting the proposed operation in a safe and efficient manner

Approval Process

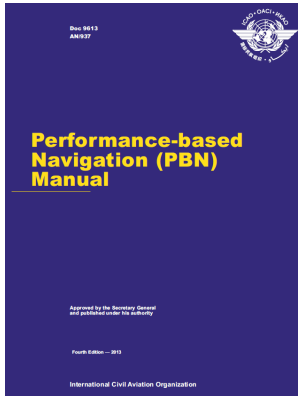
- General terms:
  - The complexity of the approval process is based on the inspector's assessment of the applicant's proposed operation. For simple approvals, some steps can be condensed or eliminated.

Approval Process

- General terms:
  - Some applicants may lack a basic understanding of what is required for approval.
  - Other applicants may propose a complex operation, but may be well prepared and knowledgeable.
  - Because of the variety in proposed operations and differences in an applicant's knowledge, the process must be thorough enough and flexible enough to apply to all possibilities.

Approval Process

Phases of the approval process



- Step 1 — Pre-application phase
- Step 2 — Formal application phase
- Step 3 — Document evaluation phase
- Step 4 — Demonstration and inspection phase
- Step 5 — Approval phase

Approval Process

- Step 1 — Pre-application phase
  - The operator initiates the approval process by reviewing the requirements; establishing that the aircraft, the operating procedures, the maintenance procedures and the training meet the requirements; and developing a written proposal to the regulator.
  - A number of regulators have published “job aids” to assist the operator in gathering the necessary evidence to support the approval application.

Approval Process

- Step 1 — Pre-application phase
  - At this stage a pre-application meeting with the regulator can also be very beneficial. If the proposed application is complex, the operator may need to obtain advice and assistance from OEMs or other design organizations, training establishments, data providers, etc.

Approval Process

- Step 2 — Formal application phase
  - The operator submits a formal, written application for approval to the CAA, which appoints a project manager either for the specific approval or generally for PBN approvals.

Approval Process

- Step 3 — Document evaluation phase
  - The CAA project manager evaluates the formal, written application for approval to determine whether all the requirements are being met.
  - If the proposed application is complex, the project manager may need to obtain advice and assistance from other organizations such as regional agencies or experts in other States.

Approval Process

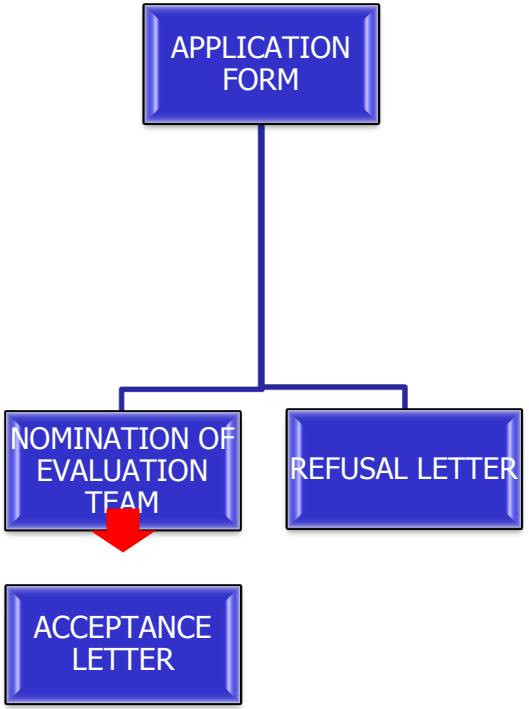
- Step 4 — Demonstration and inspection phase
  - During a formal inspection by the project manager (assisted as necessary by a CAA team), the operator demonstrates how the requirements are being met.

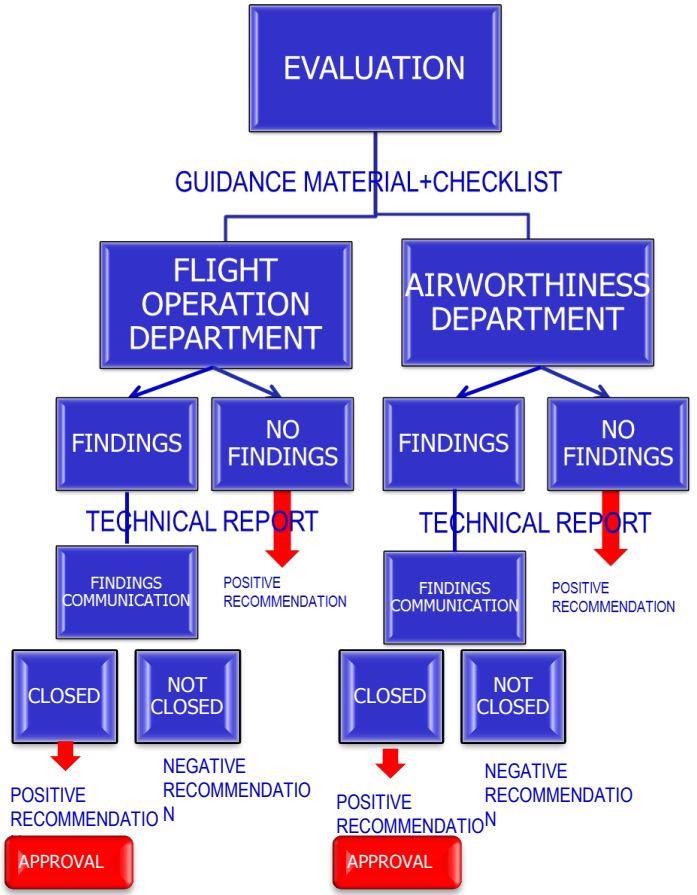
Approval Process

- Step 5 — Approval phase
  - Following a successful formal inspection by the CAA, approval is given via:
    a) an Operations specification, associated with the AOC; or
    b) an amendment to the OM; or
    c) an LOA.
  - Some PBN applications may not require formal approval for GA operations — this will be determined by the State of Registry.

Approval Process

Administrative Procedure





Approval Process

- → Specific Approval
  - → Most PBN specifications are treated as a normal mode of navigation
  - → The requirement for specific (operational) approvals was removed for most PBN specifications and replaced by improved pilot training, testing and checking rules and performance-based and proportionate operating rules
    - → A specific approval remains only for complex PBN specifications and operations which cannot (yet) be trained sufficiently during initial pilot training: RNP AR APCH and RNP 0.3 (helicopter operations)

Approval Process

SPA.PBN.100 PBN operations

a) An approval is required for each of the following PBN specifications:

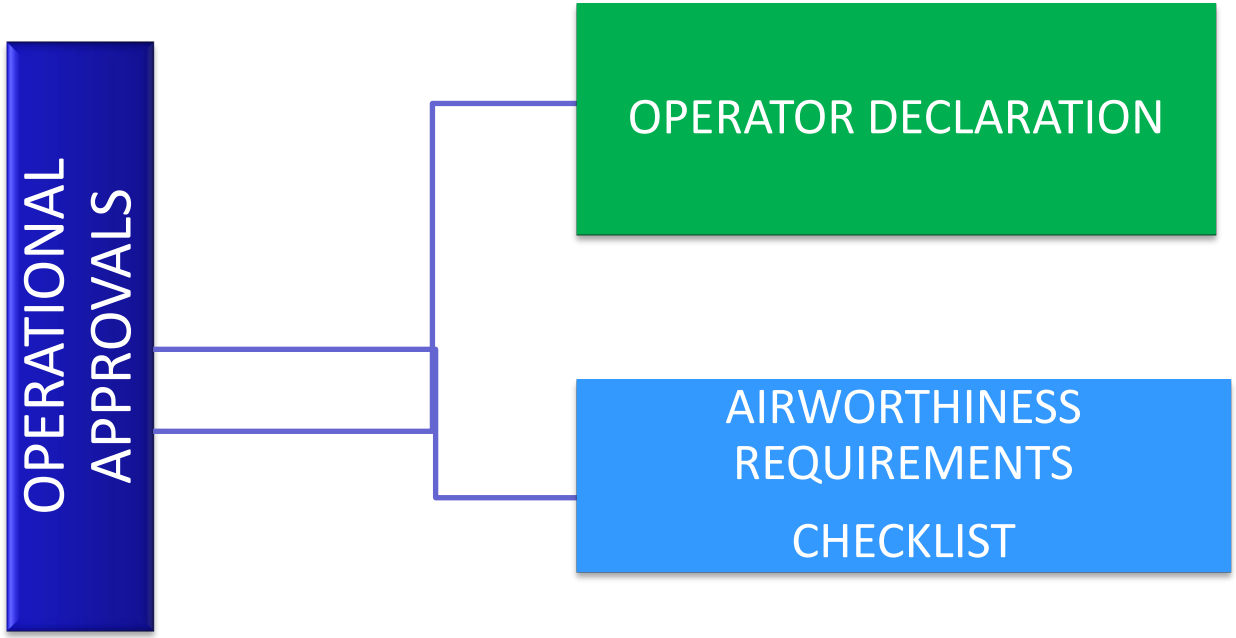
(1) RNP AR APCH; and

(2) RNP 0.3 for helicopter operation.

(b) An approval for RNP AR APCH operations shall allow operations on public instrument approach procedures which meet the applicable ICAO procedure design criteria.

(c) A procedure-specific approval for RNP AR APCH or RNP 0.3 shall be required for private instrument approach procedures or any public instrument approach procedure that does not meet the applicable ICAO procedure design criteria, or where required by the Aeronautical Information Publication (AIP) or the competent authority.

Approval Process



Approval Process

Operator Declaration

	STATEMENT OF COMPLIANCE REQUIREMENTS OF EQUIPMENT. AIRCRAFT	

Operator	Model	Serial Number	Registration

ANNEX E: PBN OPERATIONS

Below is the referenced aircraft, and as specified by the manufacturer, the equipment directly involved in the PBN operation indicated (navigation systems LNAV, navigation systems VNAV, inertial systems, GNSS sensors, sensors of conventional navigation, sensors of air data, navigation sensors, altimetry, autopilot system, director of flight displays EHSI (, CDI, MCDUs etc...) to comply with the applicable requirements. Several different PBN operations (e.g. RNAV5/RNAV1/RNP APCH) must be attached if you notify as many attachments as operations.

TYPES OF OPERATIONS PBN NOTIFIED	
☐ RNAV 10	☐ RNP 4
☐ RNAV 5	☐ BASIC-RNP 1
☐ RNAV 2	☐ RNP APCH (LNAV, LNAV&VNAV)
☐ RNAV 1	☐ RNP APCH (LPV)

(Márquese la opción que proceda de las anteriores)

TYPE OF EQUIPMENT	BRAND/TYPE/VARIANT/C50	P/N	S/N	ITEM MMEL associated(2)

Note 1: If the equipment has been associated with a specific operating software, or directly is an avionics modular or similar functionality, the technical data of the same must be provided. In case of existence of teams duplicated in the aircraft (for example two FMS different or similar) a row other than the following table should be used for each one of them. All declared equipment shall be approved with documentation officer of the manufacturer or the operator showing the existence of the same being so necessary to the contribution of the p/n and s/n for the multiple justification thereof.

(2) 2 Note: In the case of FMS powered by various navigation sensor must be indicated also the MMEL items related to them, both in those cases in which information provided by them is directly used to navigate as when it is used to update the position of inertial systems.

Hereby I declare that the referenced aircraft complies with all requirements of equipment operation PBN above indicated pursuant to the part CAT Subpart IDE of the Regulation (EU) No. 965/2012 and ICAO Doc. 9613 PBN

Responsible for maintenance of airworthiness the Camo of the operator	The responsible operations flight of the AOC
(Place/date/signature)	(Place/date/signature)

Approval Process

Operator Declaration

Hereby I declare that the referenced aircraft meets all the requirements of equipment for PBN RNP AR APCH operation as set out in annex V (part SPA) of the Regulation (EU) No. 965/2012 as well as AMC 20-26 and ICAO Doc. 9613 PBN

Responsible for maintenance of airworthiness the Camo of the operator	The responsible operations flight of the AOC
(Place/date/signature)	(Place/date/signature)

Approval Process

Airworthiness Requirements Checklist

PBN RNAV 1 APPLICATION

B. DATA THE APPLICATION-SPECIFIC

Here are some tables which includ
of an operational approval PBN RN
not and if not satisfied you must in
document or documents of the or
requirement requested, specifying

1. THE PROPOSED AIRCRAF

Manufacturer

2. SPECIFIC AIRWORTHINES

In relation to the Declaration of
annex of the format of Declarat
AOC-100 To) that the operator
airworthiness must be filled, th
Additionally in the reference co
we gather information that ena
chapter and section in each cas

NO.	Reference	
2.1	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (5) and (d) SPA. PBN.105 (a) TGL-10 IAA (E.5), (5.1.2) CAT. IDE. A.345 (d) NCC. IDE. A.250	The operat embarked annex of t requireme
2.2	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (5) and (d) SPA. PBN.105 (a) (6.1) IAA TGL-10	Demonstr operations
2.3	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (5) and (d) SPA. PBN.105 (a) TGL-10 IAA (E.2), annex B	Demonstr requireme
2.4	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (5) and (d) SPA. PBN.105 (a) TGL-10 IAA (E.3)	Demonstration of the requirements of continuity of function for the RNAV 1 operations.

PBN RNAV 2 APPLICAT

B. DATA THE APPLICATION-SPECIFIC

Here are some tables which includes the requirements of airworthine
of an operational approval PBN RNAV2. Shall be ticked in the column
not and if not satisfied you must indicate the reason. Additionally in t
document or documents of the organization where we gather inform
requirement requested, specifying clearly the chapter and section in

In all reference materials RNAV1 and RNAV2 operations are treated j
identical approval process. The main difference is that the RNAV2 spe
while RNAV1 is designed to be used in terminal area. RNAV2 operatio
allows a longer use of the IRU, thereby reducing DME infrastructure
onboard GNSS system.

In the Doc.9613 of ICAO, volume II, part B, Chapter 3 "Implementing
specifications for navigation, indicating the criteria for systems, functi
that should be fulfilled. Obtaining the RNAV 2 approval is conditioned
make the necessary changes, through this application to introduce th

1. THE PROPOSED AIRCRAFT IDENTIFICATION

Manufacturer	Model

The aircraft for which approval is sought has already RNAV 1 specific approva

2. SPECIFIC AIRWORTHINESS REQUIREMENTS

Aircraft with approval RNAV1 will be directly eligible in terms of airwo
requirements of airworthiness RNAV2. The limitations that arise for t
and applicable for operation with RNAV2.

PBN RNAV 5 APPLICATION

B. DATA THE APPLICATION-SPECIFIC

Here are some tables which includes the requirements of airworthiness and operational requirements for op
in compliance column must be marked as the requirement is met and otherwise shall indicate the reason. Ad
reference column must be specified document or documents of the organization where we gather informati
compliance with the requirement requested, specifying clearly the chapter and section in each case.

1. THE PROPOSED AIRCRAFT IDENTIFICATION

Manufacturer	Model	Serial numb

2. SPECIFIC AIRWORTHINESS REQUIREMENTS

In relation to the Declaration of the onboard equipment this should be done as specified in the relevant anne
Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 To) that the ope
to this application. To meet the other requirements of airworthiness must be filled, the following paragraph
supporting documentation. Additionally in the reference column must be specified document or documents
where we gather information that enables compliance with the requirement requested, specifying clearly th
in each case.

NO.	REFERENCE	DESCRIPTION	COMPLIANCE (YES, NO, N/A
2.1	AMC1 SPA. Gen.105 (a) GM1 SPA. PBN.100 SPA. PBN.105 (a) SPA. PBN.105 (c) (1) CAT. IDE. A.345 (d) AMC 20-4 3, 4.4.4.2.1; 4.4.2.3, Appendix 1	The operator has attached the Declaration of equipment embarked for RNAV 5 operations as specified in the relevant annex of the format of Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 (A).	
2.2	AMC1 SPA. Gen.105 (a) GM1 SPA. PBN.100 SPA. PBN.105 (a) AMC 20-4 4.1.1	Demonstration of the accuracy requirements for RNAV 5 operations.	
2.3	AMC1 SPA. Gen.105 (a) GM1 SPA. PBN.100 SPA. PBN.105 (a) AMC 20-4 4.1.2	Demonstration of the requirements of integrity and continuity of the function for the RNAV 5 operations.	
2.4	AMC1 SPA. Gen.105 (a) GM1 SPA. PBN.100 SPA. PBN.105 (a) AMC 20-4 4.2.1	Statement of the functions required for RNAV 5 operations.	
2.5	AMC1 SPA. Gen.105 (a) GM1 SPA. PBN.100 SPA. PBN.105 (a) 4.2.2 20-4 AMC	Statement of the functions recommended for RNAV 5 operations.	
2.6	AMC1 SPA. Gen.105 (a) GM1 SPA. PBN.100 SPA. PBN.105 (a)	Explicit statement of compliance in the AFM/POH with material reference to RNAV 5 operations guide.	

PBN RNAV 10 (RNP 10) APPLICATION

B. DATA THE APPLICATION-SPECIFIC

Here are some tables which includes the requirements of airworthiness and operational requirements for the issuance of an operational approval PBN 10 RNAV (RNP 10). Shall be ticked in the column of compliance if the requirement is fulfilled or not and if not satisfied you must indicate the reason. Additionally in the reference column must be specified document or documents of the organization where we gather information that enables compliance with the requirement requested, specifying clearly the chapter and section in each case.

1. THE PROPOSED AIRCRAFT IDENTIFICATION

Manufacturer	Model	Serial number	Registration

2. SPECIFIC AIRWORTHINESS REQUIREMENTS

In relation to the Declaration of the onboard equipment this should be done as specified in the relevant annex of the format of Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 To) that the operator shall be attached to this application. To meet the other requirements of airworthiness must be filled, the following paragraph enclosing the required supporting documentation. Additionally in the reference column must be specified document or documents of the organization where we gather information that enables compliance with the requirement requested, specifying clearly the chapter and section in each case.

NO.	REFERENCE	DESCRIPTION	COMPLIANCE (YES, NO, N/A)	DOCUMENTARY REFERENCE
2.1	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (1) and (d) SPA. PBN.105 (a) CAT. IDE. A.345 (d) NCC. IDE. A.250 AMC 20-12 4.1; 4.2	Definition of onboard navigation and communications equipment and the certification statement of the equipment for operations RNAV10 (RNP10).		
2.2	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (1) and (d) SPA. PBN.105 (a) ICAO Doc. 9613 vol. II, part B, Chapter 1.3.4.1	Demonstration of the accuracy requirements for operations 10 RNAV (RNP 10).		
2.3	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (1) and (d) SPA. PBN.105 (a) ICAO Doc. 9613 vol. II, part B, Chapter 1.3.4.1	Demonstration of the requirements of integrity for operations 10 RNAV (RNP 10) when using equipment GNSS.		
2.4	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (1) and (d) SPA. PBN.105 (a) ICAO Doc. 9613 vol. II, part B, Chapter 1.3.4.1	Demonstration of continuity of the requirements of continuity of operations 10 RNAV (RNP 10) function.		

PBN RNP 4 APPLICATION

The application-specific data

Here are some tables which includes the requirements of airworthiness and operational requirements for the issuance of a PBN RNP-4 operational approval. Shall be ticked in the column of compliance if the requirement is fulfilled or not and if not satisfied you must indicate the reason. Additionally in the reference column must be specified document or documents of the organization where we gather information that enables compliance with the requirement requested, specifying clearly the chapter and section in each case.

1. THE PROPOSED AIRCRAFT IDENTIFICATION

Manufacturer	Model	Serial number	Registration

2. SPECIFIC AIRWORTHINESS REQUIREMENTS

In relation to the Declaration of the onboard equipment this should be done as specified in the relevant annex of the format of Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 To) that the operator shall be attached to this application. To meet the other requirements of airworthiness must be filled, the following paragraph enclosing the required supporting documentation. Additionally in the reference column must be specified document or documents of the organization where we gather information that enables compliance with the requirement requested, specifying clearly the chapter and section in each case.

NO.	Reference	DESCRIPTION	COMPLIANCE (YES, NO, N/A)	DOCUMENTARY REFERENCE
2.1	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (2) and (d) SPA. PBN.105 (a) CAT. IDE. A.345 (d) NCC. IDE. A.250 ICAO Doc. 9613 vol. II, part C, Chapter 1.3.2.2.1, 1.3.2.3.1, 1.3.3	The operator has attached the Declaration of equipment embarked for RNP-4 operations as specified in the relevant annex of the format of Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 (A).		
2.2	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (2) and (d) SPA. PBN.105 (a) ICAO Doc 9613 Vol. II, part C, Chapter 1.3.3.5	Demonstration of the accuracy requirements for RNP-4 operations.		
2.3	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (2) and (d) SPA. PBN.105 (a) ICAO Doc. 9613 vol. II, part C, Chapter 1.3.3.5	Demonstration of the requirements of integrity for operations RNP 4 when using equipment GNSS.		
2.4	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (2) and (d) SPA. PBN.105 (a) ICAO Doc 9613 Vol. II, part C, Chapter 1.3.3.5	Demonstration of continuity for RNP-4 operations requirements.		

Approval Process

CE 965/2012

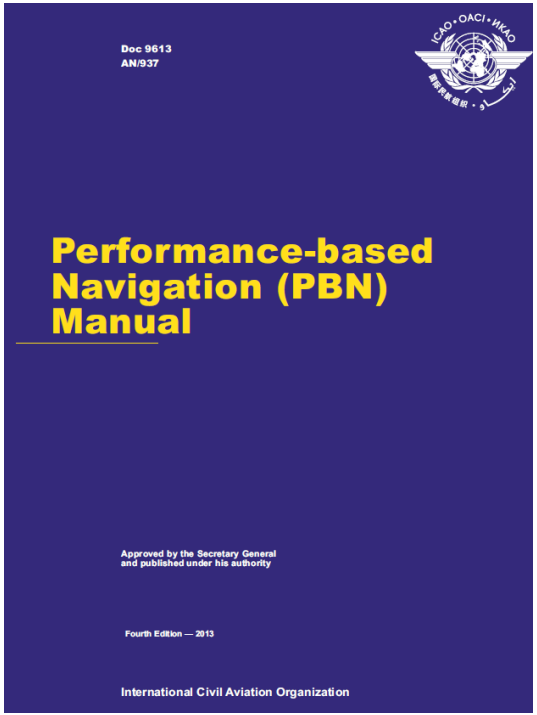
Table 1: Overview of PBN specifications

	FLIGHT PHASE							
	En-route		Arrival	Approach				Departure
	Oceanic	Continental		Initial	Intermediate	Final	Missed	
RNAV 10	10							
RNAV 5		5	5					
RNAV 2		2	2					2
RNAV 1		1	1	1	1		1	1
RNP 4	4							
RNP 2	2	2						
RNP 1			1	1	1		1	1
A-RNP	2	2 or 1	1–0.3	1–0.3	1–0.3	0.3	1–0.3	1–0.3
RNP APCH (LNAV)				1	1	0.3	1	
RNP APCH (LNAV/VNAV)				1	1	0.3	1	
RNP APCH (LP)				1	1		1	
RNP APCH (LPV)				1	1		1	
RNP AR APCH				1–0.1	1–0.1	0.3-0.1	1–0.1	
RNP 0.3 (H)		0.3	0.3	0.3	0.3		0.3	0.3

Numbers specify the accuracy level no specific approval required specific approval required

State Regulatory Material

7. Foreign Operations



Attachment C

OPERATIONAL APPROVAL

Approval Process

- Mutual recognition
  - A State undertakes, in accordance with Article 12 to the Convention, to ensure that every aircraft flying over or manoeuvring within its territory shall comply with the rules and regulations relating to the flight and manoeuvre of aircraft there in force.
  - Article 33 to the Convention provides that certificates of airworthiness and certificates of competency and licences issued, or rendered valid, by the State in which an aircraft is registered, shall be recognized by other States, provided that the requirements under which such certificates or licences were issued or rendered valid are equal to or above the minimum standards which may be established by ICAO.

Approval Process

- Mutual recognition
  - This requirement for recognition is now extended by Annex 6, Part I and Part III, Section II, such that Contracting States shall recognize as valid an AOC issued by another Contracting State, provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in Annex 6, Part I and Part III.

Approval Process

- Mutual recognition
  - States should establish procedures to facilitate the application by foreign operators for approval to operate into their territory.
  - States should be careful in their requirements for applications, to request only details relevant to the evaluation of the safety of the operations under consideration and their future surveillance.
  - When evaluating an application by an operator from another State to operate within its territory a State will examine both the safety oversight capabilities and record of the State of the Operator and, if different, the State of Registry, as well as the operational procedures and practices of the operator.

Approval Process

- Mutual recognition
  - This is necessary in order for the State, in the terms of Article 33 to the Convention, to have confidence in the validity of the certificates and licences associated with the operator, its personnel and aircraft, in the operational capabilities of the operator and in the level of certification and oversight applied to the activities of the operator by the State of the Operator.

Approval Process

- Mutual recognition
  - The operator will need to make applications to each State into or over which it is intended to operate.
  - The operator will also need to keep its own CAA, as the authority of the State of the Operator, informed of all applications to operate in other States.

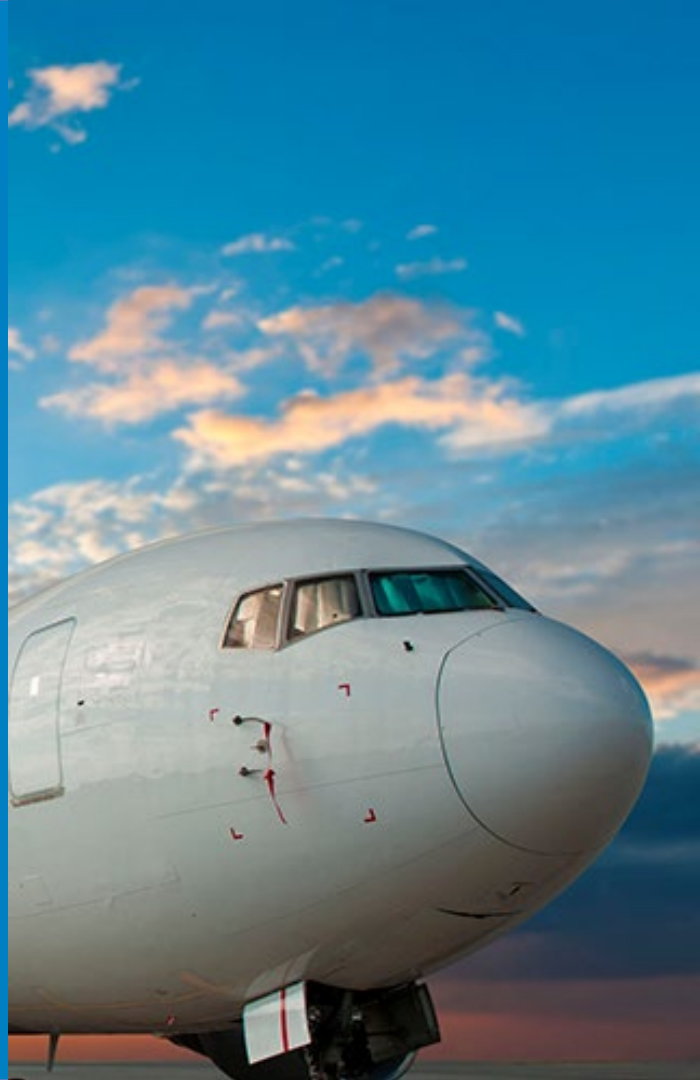
Approval Process

- Mutual recognition
  - Applications should be made direct to the CAAs of the States into which it is intended to operate.
  - In some cases it will be possible to download information and instructions for making an application and the necessary forms from a website maintained by the CAA in question.

EASA
European Union Aviation Safety Agency

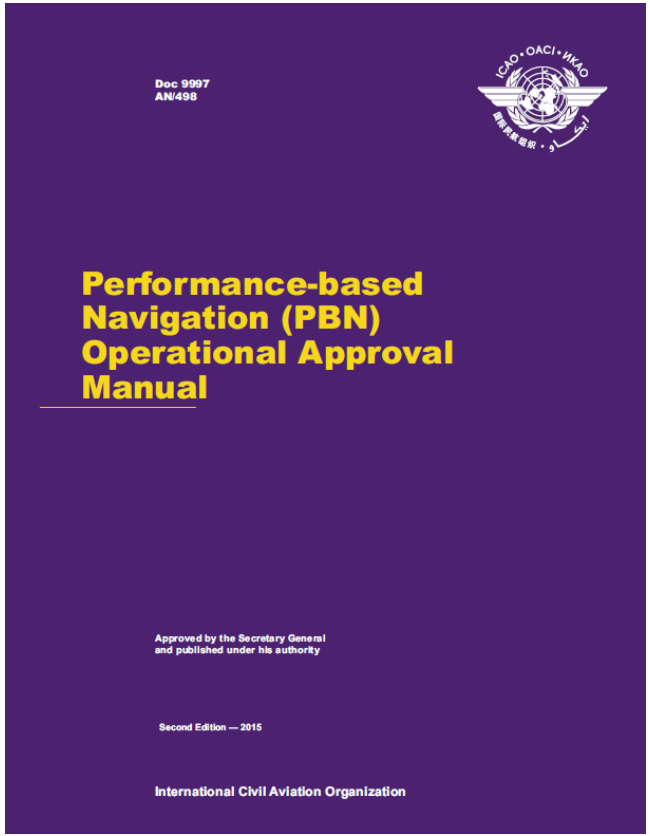
PBN Job Aids and Checklists

PBN Operational Approvals Workshop



An Agency of the European Union

PBN Job Aids and Checklists



Chapter 4. Navigation specification job aids ..

PBN Job Aids and Checklists

- Navigation Specification Job Aids
  - In order to facilitate a standardized approach to the process of applying for PBN approval, a structured form, known as a “job aid”, has been developed.

PBN Job Aids and Checklists

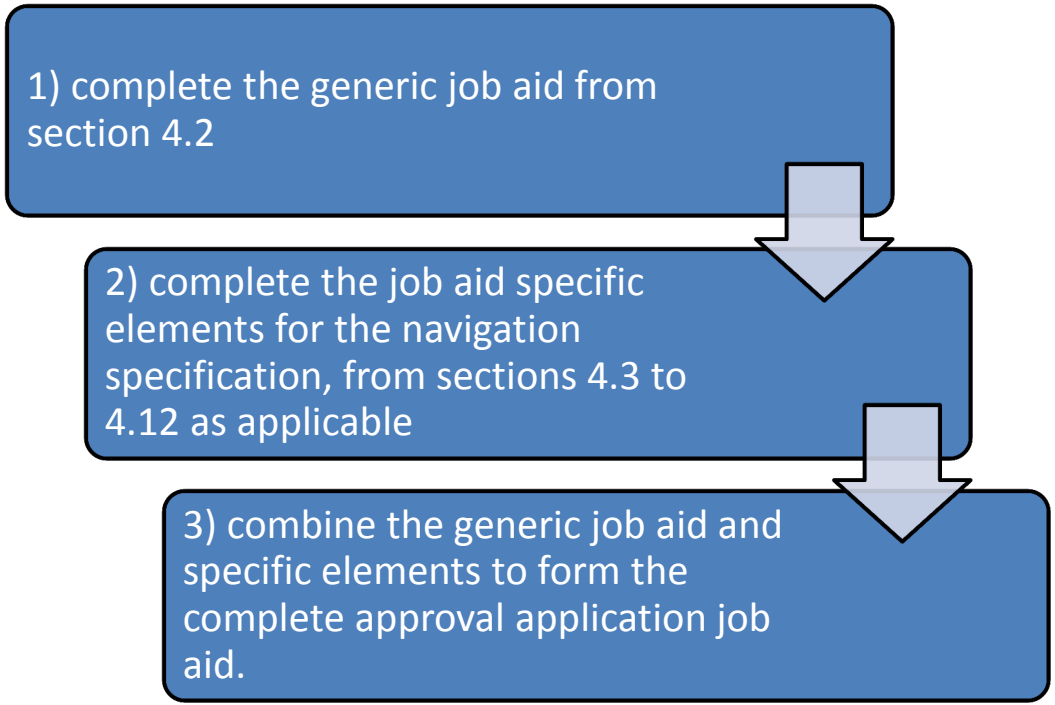
- Navigation Specification Job Aids
  - In the absence of national pro forma, the job aid can be used by the operator to detail the application for approval and to demonstrate that the specific requirements with respect to aircraft eligibility, operating procedures, training and database management have been met.

PBN Job Aids and Checklists

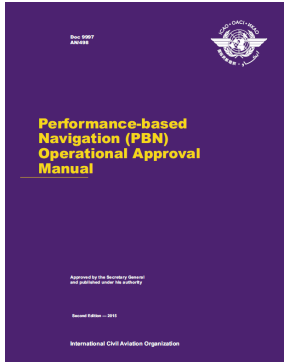
- Navigation Specification Job Aids
  - Much of the application process is common to all navigation specifications but each specification has specific elements that must be addressed.

PBN Job Aids and Checklists

The following describes the process to complete an application for approval for a PBN navigation specification:



PBN Job Aids and Checklists



4.2 GENERIC JOB AID

APPLICATION TO CONDUCT *(INSERT NAVIGATION SPECIFICATION)* **OPERATIONS**

1. **Purpose of the job aid**

   a) To provide information on the relevant reference documents.

   b) To provide a record of the operator application, the inspector comments and the operator follow-up action for each relevant paragraph in the reference document(s).

2. **Actions recommended for the inspector and operator**

   a) At the pre-application meeting, the operator and the inspector review the approval process events and establish the form and content of the approval application.

   b) The operator records references to material in company documents for each relevant paragraph in the job aid.

   c) The operator submits to the inspector the completed job aid with the application.

   d) The inspector records his/her findings for each relevant paragraph in the job aid indicating compliance or necessary corrective action.

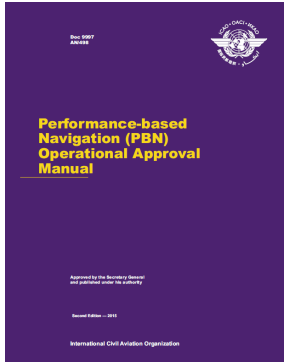
   e) The inspector informs the operator as soon as possible when a corrective action is required.

   f) The operator provides the inspector with the revised material when so requested.

   g) The CAA provides the operator with the operations specifications (Ops Specs) or a letter of authorization (LOA), as applicable, when the tasks and documents have been completed.

Part	*Topic*	*Page*
1	General information	
2	Aircraft and operator identification	
3	Operator application	
4	Contents of the operator application	
5	Basic pilot procedures	
6	Contingency procedures	

PBN Job Aids and Checklists

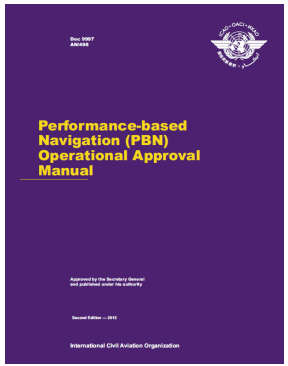


PART 1. GENERAL INFORMATION

BASIC EVENTS OF THE APPROVAL PROCESS

	Action by Operator	*Action by Inspector*
1	Establish the need for the authorization.	
2	Review the AFM, AFM supplement, TC data sheet, other appropriate documents (e.g. STCs, SBs, SLs) to determine aircraft eligibility. If necessary contact the aircraft and/or avionics OEM to confirm eligibility[1].	
3	Schedule a pre-application meeting with the inspector.	
4		During the pre-application meeting establish: • form and contents of the application; • documents required to support the application; • target date for the application submission; • requirement for flight validation.
5	Submit the application at least XX days prior to start-up of the planned operations.	
6		Review submission.
7	Ensure that amendments to manuals, programmes and other relevant documents are complete; provide training to flight crews, flight dispatchers and maintenance personnel; if required, conduct a validation flight.	If required, participate in the validation flight.
8		Once the requirements have been met, issue operational approval.

PBN Job Aids and Checklists



PART 2. IDENTIFICATION OF AIRCRAFT AND OPERATORS

Name of Operator: _____

Aircraft manufacturer, model and series	*Registration number*	*Serial number*	*Long-range navigation system manufacturer, model and number*	*PBN specification*

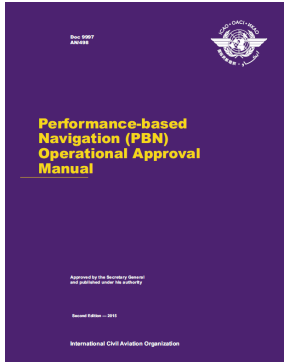
Date of pre-application meeting: _____

Date when application received by CAA: _____

Date when operator intends to begin *(insert navigation specification)* operations: _____

Is the CAA notification date appropriate? Yes ☐ No ☐

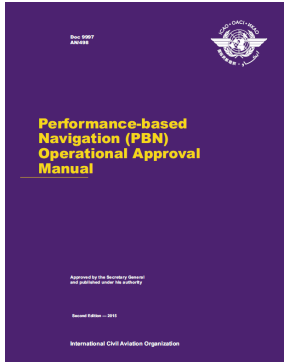
PBN Job Aids and Checklists



PART 3. OPERATOR APPLICATION

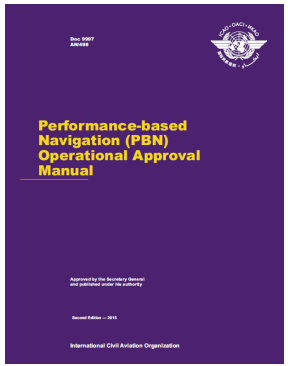
Annex	*Title*	*Inclusion by Operator*	*Comments by Inspector*
A	**Request for authorization**		
B	**Aircraft eligibility — airworthiness** AFM, AFM revision, AFM supplement, TCDS showing that the aircraft RNAV systems are eligible.		
C	**Aircraft eligibility — modifications (if applicable)** Maintenance records documenting installation or modification of aircraft systems to achieve eligibility.		
D	**Maintenance** For aircraft with established LRNS maintenance practices, references to the maintenance document/ programme. For recently installed LRNSs, details of the full maintenance practices.		
E	**Minimum equipment list** Showing provisions for LRNS.		
F	**Training** xxx91/GA operators or equivalent: • course completion records. xxx121/xxx135/CAT operators or equivalent: • training programmes for flight crew, flight dispatchers and maintenance personnel.		

PBN Job Aids and Checklists



Annex	*Title*	*Inclusion by Operator*	*Comments by Inspector*
G	**Operating policies and procedures** xxx91/GA operators or equivalent: • extracts from the operations manual corresponding to the application. xxx121/xxx135/CAT operators or equivalent: • operations manual and checklists.		
H	**Validation flight plan** As required.		

PBN Job Aids and Checklists



Contents of the application to be submitted by the operator

— compliance documentation for the aircraft/navigation systems;
— operating procedures and policies;
— sections of the maintenance manual related to LRNS (if not previously reviewed).

Note.— Documents may be grouped in a single binder or may be submitted as individual documents.

PART 4. CONTENTS OF THE OPERATOR APPLICATION

#	Topic	Specific ICAO reference	Specific State guidance reference	Operator compliance description	Inspector disposition/ comments	Follow-up by inspector (optional)
		(Doc 9613, Volume II, ...)	(AC/AMC/CA, etc.)	(Document reference/ method)	(Accepted/ not accepted)	(Status and date)

Note.— A detailed table is provided for each navigation specification.

PART 5. OPERATING PROCEDURES

#	Topic	Specific ICAO reference	Specific State guidance reference	Operator compliance description	Inspector disposition/ comments	Follow-up by inspector (optional)
		(Doc 9613, Volume II, ...)	(AC/AMC/CA, etc.)	(Document reference/ method)	(Accepted/ not accepted)	(Status and date)

Note.— A detailed table is provided for each navigation specification.

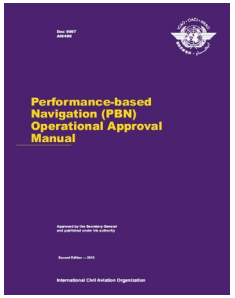
PART 6. CONTINGENCY PROCEDURES

#	Topic	*Specific ICAO reference*	*Specific State guidance reference*	*Operator compliance description*	*Inspector disposition/ comments*	*Follow-up by inspector (optional)*
		(Doc 4444, Chapters 5 and 15)	*(AC/AMC/CA, etc.)*	*(Document reference/ method)*	*(Accepted/ not accepted)*	*(Status and date)*

PBN Job Aids and Checklists

RNAV 5

PBN Job Aids and Checklists



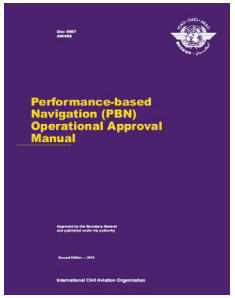
4.4.1 General

4.4.1.1 RNAV 5 supports continental en-route operations using a range of different positioning sensors. Prior to the introduction of PBN, basic RNAV (B-RNAV) was introduced in Europe and the Middle East. The RNAV 5 requirements are based upon B-RNAV, and any B-RNAV approval meets the requirements of RNAV 5 without further examination.

4.4.1.2 RNAV 5 is intended for en-route navigation where not all the airspace users are equipped with GNSS and where there is adequate coverage of ground-based radio navigation aids permitting DME/DME or VOR/DME area navigation operations.

4.4.1.3 An RNAV 5 route is dependent upon an analysis of the supporting NAVAID infrastructure. This analysis is the responsibility of the air navigation service provider.

PBN Job Aids and Checklists



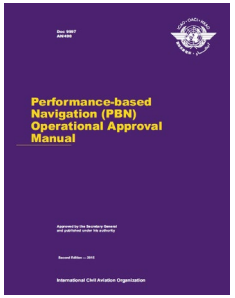
4.4.2 System requirements

The aircraft requirements are detailed in the PBN manual (Doc 9613), Volume II, Part B, Chapter 2, 2.3.3.

4.4.3 Operating procedures

The operating procedures are addressed in the PBN manual (Doc 9613), Volume II, Part B, Chapter 2, 2.3.4. Normal area navigation operating procedures will usually meet the requirements of RNAV 5.

PBN Job Aids and Checklists

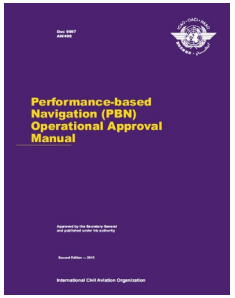


4.4.4 Pilot knowledge and training

4.4.4.1 The pilot knowledge and training requirements are detailed in the PBN manual (Doc 9613), Volume II, Part B, Chapter 2, 2.3.5. Flight crews should possess the necessary skills to conduct RNAV 5 operations with minimal additional training.

4.4.4.2 Where additional training is required, this can normally be achieved by bulletin, computer-based training or classroom briefing. Flight training is not normally required.

PBN Job Aids and Checklists



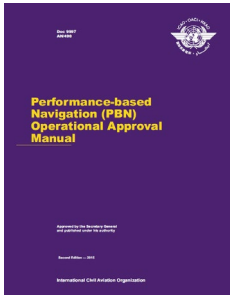
4.4.5 Operational approval

4.4.5.1 The operational approval process for RNAV 5 is generally straightforward, given that most aircraft are equipped with area navigation systems which exceed the minimum requirements for RNAV 5.

4.4.5.2 In most cases the AFM will document RNAV 5 capability; failing that, many OEMs have issued statements of compliance and only occasionally will it be necessary to conduct an evaluation of aircraft capability.

4.4.5.3 With the exception of an amendment to the operations manual, a State may decide that there is no further requirement for any additional documentation of RNAV 5 approval.

PBN Job Aids and Checklists

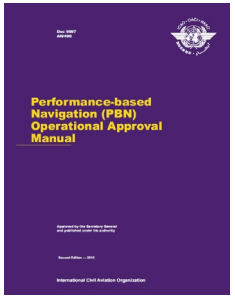


4.4.6 Job aid specific elements

PART 4. CONTENTS OF THE OPERATOR APPLICATION

#	Topic	Specific ICAO reference (Doc 9613, Volume II, Part B, Chapter 2)	Specific State guidance reference (AC/AMC/CA, etc.)	Operator compliance description (Document reference/ method)	Inspector disposition/ comments (Accepted/ not accepted)	Follow-up by inspector (optional) (Status and date)
1	**Authorization request** Statement of intent to obtain authorization.					
2	**Aircraft/navigation system eligibility** Documents that establish eligibility.	2.3.2.1 2.3.2.2.1				
3	**Training** Details of courses completed (xxx91 operators). Details of training programmes (xxx121 and xxx135 operators).	2.3.2.2.2 2.3.5				
4	**Operating policies and procedures** Extracts from the operations manual or other documentation (xxx91 operators). Operations manual and checklists (xxx121 and xxx135 operators).	2.3.2.2.3				
5	**Maintenance practices** Document references for navigation database maintenance practices.	2.3.2.2.5 2.3.6				
6	**MEL update**	2.3.2.2.4				

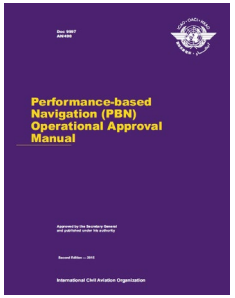
PBN Job Aids and Checklists



PART 5. OPERATING PROCEDURES

#	Topic	Specific ICAO reference (Doc 9613, Volume II, Part B, Chapter 2)	Specific State guidance reference (AC/AMC/CA, etc.)	Operator compliance description (Document reference/ method)	Inspector disposition/ comments (Accepted/not accepted)	Follow-up by inspector (optional) (Status and date)
1	**Flight planning**					
1a	Verify that the aircraft is approved for RNAV 5 operations.	2.3.4.2.1				
1b	Verify RAIM availability (GNSS only).	2.3.4.3				
1c	Verify the availability of NAVAIDS (non-GNSS).	2.3.4.2.4				
1d	Verify that the navigation database (if carried) is current and appropriate for the region.	2.3.4.2.3				
1e	Verify the FPL: "R" should appear in field 10 and PBN/B1–B5 (as appropriate) in field 18.	2.3.4.2.1				
1f	Verify the operational restrictions as appropriate.	2.3.4.4.3				
1g	Verify the flight-planned route including diversions.	2.3.4.4.1				
2	**General operating procedures**					
2a	Advise ATC if unable to comply.	2.3.4.4.1				
2b	Confirm that the navigation database is up to date (if appropriate).	2.3.4.4.4				
2c	Cross-check the chart with the RNAV system display.	2.3.4.4.5				
2d	Cross-check with conventional NAVAIDS to monitor for navigational reasonableness.	2.3.4.4.6				
2e	Follow route centre lines within 2.5 NM.	2.3.4.4.8				

PBN Job Aids and Checklists



PART 6. CONTINGENCY PROCEDURES

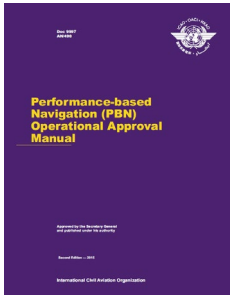
#	Topic	*Specific ICAO reference*	*Specific State guidance reference*	*Operator compliance description*	*Inspector disposition/ comments*	*Follow-up by inspector (optional)*
		*(Doc 9613, Volume II, Part B, Chapter 2)**	*(AC/AMC/CA, etc.)*	*(Document reference/ method)*	*(Accepted/ not accepted)*	*(Status and date)*
1	**Contingencies**					
1a	Advise ATC if unable to meet the requirements for RNAV 5.	2.3.4.5.1				
1b	Air-ground communications failure.	2.3.4.5.2 (Doc 4444, Chapter 15, 15.3)				
1c	GNSS RAIM alert or loss of RAIM.	2.3.4.5.3				

*All references are to the PBN manual (Doc 9613), Volume II, Part B, Chapter 2, unless otherwise indicated.

PBN Job Aids and Checklists

RNAV 10

PBN Job Aids and Checklists



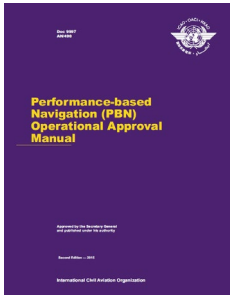
4.3.1 General

4.3.1.1 RNAV 10 supports a 50 NM lateral and 50 NM longitudinal distance-based separation minima in oceanic or remote area airspace. Prior to the development of the PBN concept, RNAV 10 operations were authorized as RNP 10 operations. An RNAV 10 operational approval does not change any requirement nor does it affect operators that have already obtained an RNP 10 approval.

4.3.1.2 RNP 10 was developed and implemented at a time when the delineation between RNAV and RNP had not been clearly defined. Because the requirements for RNP 10 did not include a requirement for on-board performance monitoring and alerting, RNP 10 is more correctly described as an RNAV operation and hence is included in the PBN manual as RNAV 10.

4.3.1.3 Recognizing that airspace, routes, airworthiness and operational approvals have been designated as RNP 10, further declaration of airspace, routes, and aircraft and operator approvals may continue to use the term RNP 10, while the application in the PBN manual will be known as RNAV 10.

PBN Job Aids and Checklists



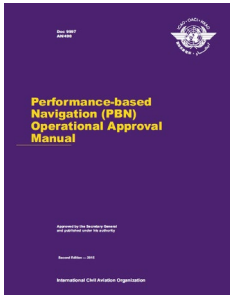
4.3.2 System requirements

4.3.2.1 RNAV 10 is intended for use in oceanic and remote areas, and the navigation specification is based on the use of long range navigation systems (LRNSs). The aircraft requirements are detailed in the PBN manual (Doc 9613), Volume II, Part B, Chapter 1, 1.3.4.

4.3.3 Operating procedures

The operating procedures are addressed in the PBN manual (Doc 9613), Volume II, Part B, Chapter 1, 1.3.5. The standard operating procedures adopted by operators flying on oceanic and remote routes should normally be generally consistent with RNAV 10 operations, although some additional provisions may need to be included. A review of the operator's procedure documentation against the requirements of the PBN manual and the (State) regulatory requirements should be sufficient to ensure compliance.

PBN Job Aids and Checklists

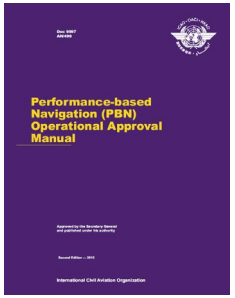


4.3.4 Pilot knowledge and training

4.3.4.1 Pilot knowledge and training requirements are detailed in the PBN manual (Doc 9613), Volume II, Part B, Chapter 1, 1.3.10. Flight crews should possess the necessary skills to conduct RNAV 10 operations with minimal additional training.

4.3.4.2 Where additional training is required, this can normally be achieved by bulletin, computer-based training or classroom briefing. Flight training is not normally required.

PBN Job Aids and Checklists

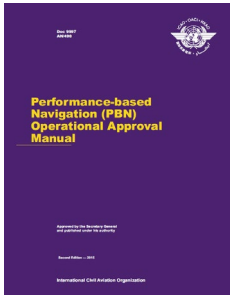


PART 3. OPERATOR APPLICATION

Add following rows:

Annex	*Title*	*Inclusion by Operator*	*Comments by Inspector*
J	**Aircraft group** A statement by the operator of the method used to determine eligibility of the aircraft/LRNS combination.		
K	**RNP 10 time limit and area of operations (if applicable)** For aircraft equipped with INS/IRU only, details of time limit and area of operations/routes for which the aircraft is eligible.		
L	**Performance record** Evidence of previous problems, incidents or path-keeping errors, together with corrective action applied.		
M	**Withdrawal of approval** The need for follow-up action on navigation error reports, with the possibility of removal of approval.		

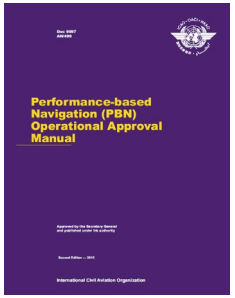
PBN Job Aids and Checklists



PART 4. CONTENTS OF THE OPERATOR APPLICATION

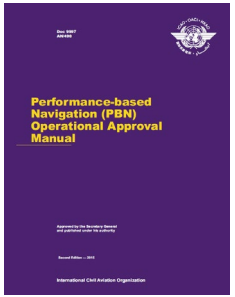
#	Topic	Specific ICAO reference (Doc 9613, Volume II, Part B, Chapter 1)	Specific State guidance reference (AC/AMC/CA, etc.)	Operator compliance description (Document reference/ method)	Inspector disposition/ comments (Accepted/ not accepted)	Follow-up by inspector (optional) (Status and date)
1	**Authorization request** Statement of intent to obtain authorization.	1.3.3.2				
2a	**Aircraft/navigation system eligibility** Documents that establish eligibility. For RNP 10, the eligibility method(s) used and a list of the airframes included in each method.	1.3.3.1 1.3.3.2.1				
2b	**Dual LRNS** At least 2 LRNSs with displays and functions suitable for oceanic operations.	1.3.4				
3	**Time limit for aircraft equipped with INS/IRU and no GNSS**	1.3.4.2.2 1.3.9.6				
4	**Area of operation for aircraft equipped with INS/IRU and no GNSS**	1.3.9.6				
5	**Training** Details of courses completed (xxx91 operators). Details of training programmes (xxx121 and xxx135 operators).	1.3.3.2.2.2 1.3.10				
6	**Operating policies and procedures** Extracts from the operations manual or other documentation (xxx91 operators). Operations manual and checklists (xxx121 and xxx135 operators).	1.3.3.2.2.3 1.3.5				

PBN Job Aids and Checklists



#	Topic	Specific ICAO reference (Doc 9613, Volume II, Part B, Chapter 1)	Specific State guidance reference (AC/AMC/CA, etc.)	Operator compliance description (Document reference/ method)	Inspector disposition/ comments (Accepted/ not accepted)	Follow-up by inspector (optional) (Status and date)
7	**Maintenance practices** Document references for established LRNS maintenance practices. Complete copy of appropriate maintenance practices for new LRNS installations.	1.3.3.2.2.5				
8	**MEL update** Applicable only to operations requiring a MEL.	1.3.3.2.2.4				
9	**Past performance** Record of operating history, including problems, incidents, track-keeping errors and corrective actions.	1.3.3.2.2.6				
10	**Withdrawal of RNP 10 authority**	1.3.12				
11	**Validation flight plan** If required.					

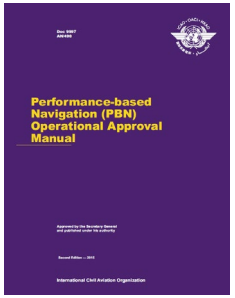
PBN Job Aids and Checklists



PART 5. OPERATING PROCEDURES

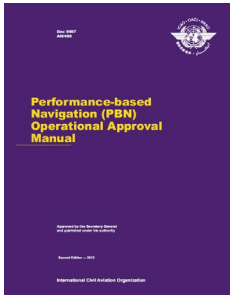
#	Topic	*Specific ICAO reference* (Doc 9613, Volume II, Part B, Chapter 1)	*Specific State guidance reference* (AC/AMC/CA, etc.)	*Operator compliance description* (Document reference/ method)	*Inspector disposition/ comments* (Accepted/ not accepted)	*Follow-up by inspector (optional)* (Status and date)
1	**Flight planning**					
1a	Verify that the aircraft is approved for RNP 10 operations.	1.3.7				
1b	Verify that two LRNSs are operational.	1.3.6				
1c	Verify that the RNP 10 time limit has been taken into account (INS/IRU only).	1.3.5.2				
1d	Verify that FDE is available (GNSS only).	1.3.5.2 1.3.8				
1e	Verify the FPL: "R" should appear in field 10 and PBN/A1 in field 18.	1.3.7				
1f	Verify operational restrictions as appropriate.	1.3.5.2				
1g	Verify the flight-planned route including diversions.	1.3.7				
2	**Preflight**					
2a	Verify equipment conditions: • review flight technical records; • confirm that maintenance actions are complete.	1.3.5.3				
2b	Check the condition of navigation antennas and surrounding fuselage skin.	1.3.5.3				
2c	Review the emergency procedures for RNP 10 operations.	1.3.5.3				
3	**En route**					
3a	Verify that both LRNSs are RNP 10 capable at the oceanic point of entry.	1.3.9.1				

PBN Job Aids and Checklists



#	Topic	Specific ICAO reference (Doc 9613, Volume II, Part B, Chapter 1)	Specific State guidance reference (AC/AMC/CA, etc.)	Operator compliance description (Document reference/ method)	Inspector disposition/ comments (Accepted/ not accepted)	Follow-up by inspector (optional) (Status and date)
3b	Prior to the oceanic point of entry, the aircraft position must be independently checked and updated if necessary.	1.3.9.2				
3c	Other mandatory navigation cross-checks.	1.3.9.3				
3d	ATC to be notified if unable to comply with RNP 10 requirements or of any deviation required for contingency procedures.	1.3.9.4				
3e	Follow route centre line within 5 NM.	1.3.9.5				
4	**Update LRNS position**	1.3.9.7				

PBN Job Aids and Checklists



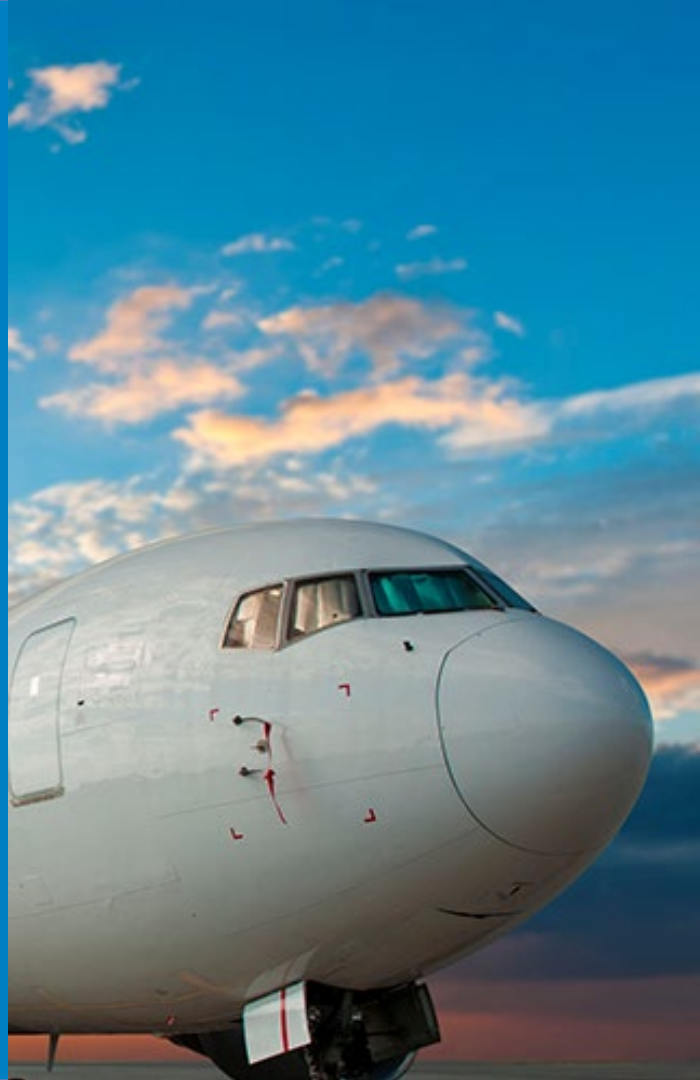
PART 6. CONTINGENCY PROCEDURES

#	Topic	*Specific ICAO reference*	*Specific State guidance reference*	*Operator compliance description*	*Inspector disposition/ comments*	*Follow-up by inspector (optional)*
		(Doc 4444, Chapters 5 and 15)	*(AC/AMC/CA, etc.)*	*(Document reference/ method)*	*(Accepted/ not accepted)*	*(Status and date)*
1	**Contingencies**	15.2.1 and 15.2.2				
1a	Inability to comply with ATC clearance due to meteorological conditions, aircraft performance or pressurization failure.	15.2.1.1				
1b	Weather deviation.	15.2.3				
1c	Air-ground communications failure.	5.4.2.6.3.2 15.3				

EASA
European Union Aviation Safety Agency

PBN Practical Cases I

PBN Operational Approvals Workshop



An Agency of the European Union

PBN Practical Cases I

RNP AR APCH

RNP 0.3 (H)

PBN.RNP AR APCH APPLICATION

APPLICATION DATA

Here are some tables which includes the requirements of airworthiness and operational requirements for the issuance of an operational approval PBN RNP AR APCH. Column of compliance shall be ticked indicating whether the requirement is fulfilled or not and if not satisfied, the reason must be indicat[illegible] t or documents of the organization with information that enables compliance with the requirements, specifying clearly the chapter and section in each case.

1. AIRCRAFT IDENTIFICATION

Manufacturer	Model	Serial number	Registration

Airports requested	Type of approach

[illegible] AR APCH initial approval for a new aircraft.	☐ Yes ☐ No ☐ In process
Apply for approval of new maneuvers of RNP AR APCH approximation based on GM1 SPA. PBN.100 (c) (8) for aircraft that already have approval RNP AR APCH.	☐ Yes ☐ No ☐ In process

2.- SPECIFIC AIRWORTHINESS REQUIREMENTS

In relation to the Declaration of the onboard equipment this should be done as specified in the relevant [illegible] x of the format of Declaration of compliance with the requirements of equipment for aircraft that the [illegible] attached to this application. To meet the other requirements of airworthiness, the following [illegible] the required supporting documentation must be filled. Additionally, in the reference co[illegible] or documents of the organization with information that enables compliance wi[illegible] ested, specifying clearly the chapter and section in each case.

NO.	REFERENCE	DESCRIPTION	COMPLIANCE (YES, NO, N/A)	REFERENCE
2.1	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 5 6, 8.3, 8.4, 8.5, 8.6, 8.7 NCC. IDE. A.250	The operator has attached the Declaratio[illegible] equipment shipped to AR RNP APCH opera[illegible] as specified in the relevant annex of the fo[illegible] of Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 (A).		
2.2	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 6.1	Demonstration of the accuracy requirements for RNP AR APCH operations.		
2.3	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 6.2	Demonstration of integrity for AR RNP APCH operations requirements.		

PBN.RNP AR APCH APPLICATION

NO.	REFERENCE	DESCRIPTION	COMPLIANCE (YES, NO, N/A)	REFERENCE
2.4	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 6.3	Demonstration of the requirements of continuity of the function for AR RNP APCH operations.		
2.5	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 7.1	Demonstration of the [illegible] d for RNP AR APCH operations.		
2.6	SPA. GEN.[illegible]	[illegible] functions recommended [illegible] RNP [illegible] operations.		
2.7	[illegible].105 [illegible].100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 8.1, 9, Appendix 4	Explicit statement of compliance in the AFM/POH with AR RNP APCH operations Guidebook material.		
2.7	SPA. PBN.105 (c) (6) CAT. IDE. A.355 NCC. IDE. A.250 AMC 20-26 8.2	Electronic navigation data management		

APPLICATION

EASA

PBN Practical Cases I

“Complex” PBN Approval

SPA.PBN.105 PBN operational approval

Regulation (EU) 2016/1199

To obtain a PBN specific approval from the competent authority, the operator shall provide evidence that:

(a) the relevant airworthiness approval, suitable for the intended PBN operation, is stated in the AFM or other document that has been approved by the certifying authority as part of an airworthiness assessment or is based on such approval;

(b) a training programme for the flight crew members and relevant personnel involved in the flight preparation has been established;

(c) a safety assessment has been carried out;

(d) operating procedures have been established specifying:

(1) the equipment to be carried, including its operating limitations and appropriate entries in the minimum equipment list (MEL);

(2) flight crew composition, qualification and experience;

(3) normal, abnormal and contingency procedures; and

(4) electronic navigation data management;

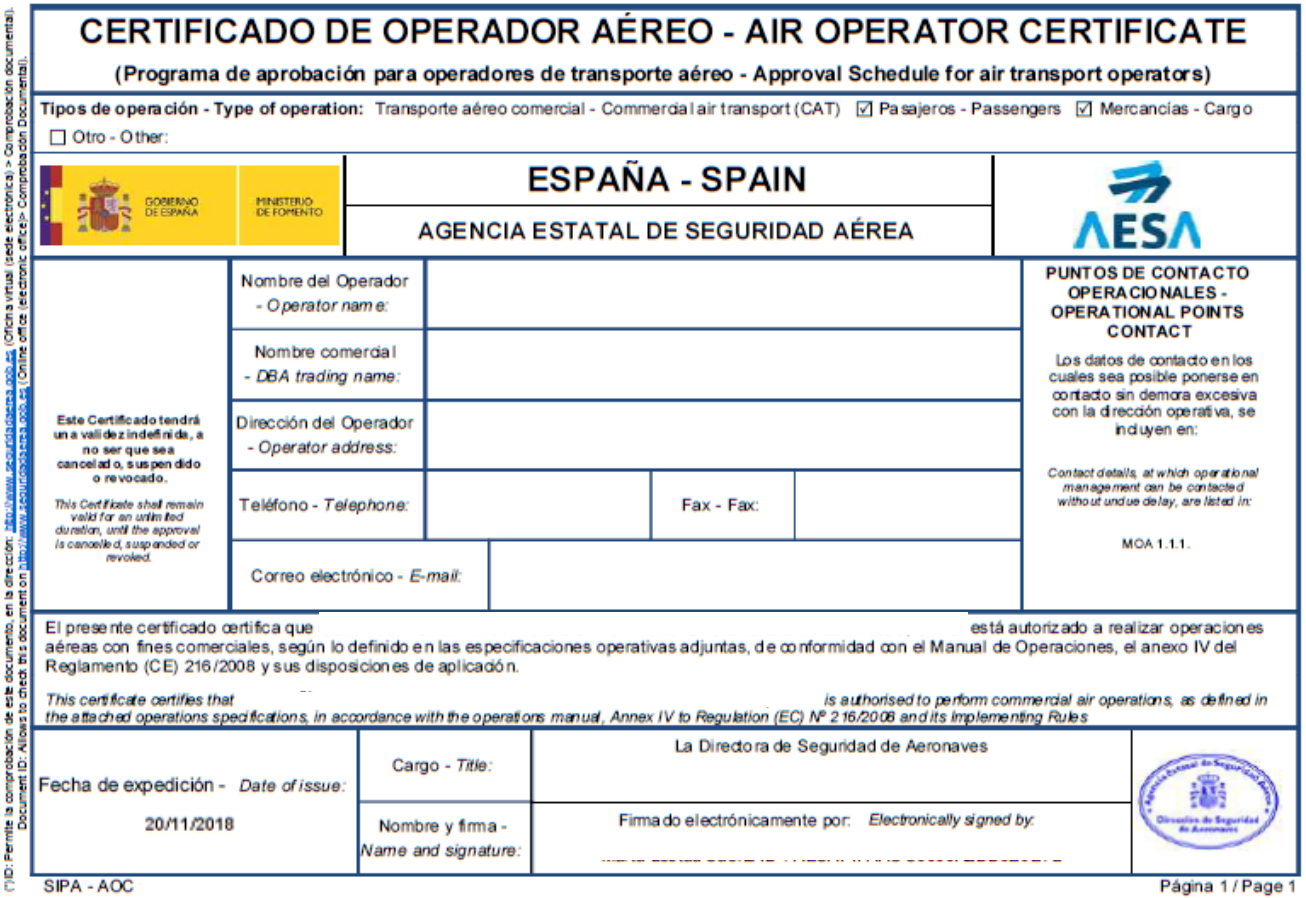
(e) a list of reportable events has been specified; and

(f) a management RNP monitoring programme has been established for RNP AR APCH operations, if applicable.

RNP AR APCH

RNP 0.3 (H)

PBN Practical Cases I



CERTIFICADO DE OPERADOR AÉREO - AIR OPERATOR CERTIFICATE

(Programa de aprobación para operadores de transporte aéreo - Approval Schedule for air transport operators)

Tipos de operación - Type of operation: Transporte aéreo comercial - Commercial air transport (CAT) ☑ Pasajeros - Passengers ☑ Mercancías - Cargo

☐ Otro - Other:

GOBIERNO DE ESPAÑA — MINISTERIO DE FOMENTO

ESPAÑA - SPAIN

AGENCIA ESTATAL DE SEGURIDAD AÉREA

AESA

Este Certificado tendrá una validez indefinida, a no ser que sea cancelado, suspendido o revocado.

This Certificate shall remain valid for an unlimited duration, until the approval is cancelled, suspended or revoked.

Nombre del Operador - *Operator name:*	
Nombre comercial - *DBA trading name:*	
Dirección del Operador - *Operator address:*	
Teléfono - *Telephone:*	Fax - Fax:
Correo electrónico - *E-mail:*	

PUNTOS DE CONTACTO OPERACIONALES - OPERATIONAL POINTS CONTACT

Los datos de contacto en los cuales sea posible ponerse en contacto sin demora excesiva con la dirección operativa, se incluyen en:

Contact details, at which operational management can be contacted without undue delay, are listed in:

MOA 1.1.1.

El presente certificado certifica que está autorizado a realizar operaciones aéreas con fines comerciales, según lo definido en las especificaciones operativas adjuntas, de conformidad con el Manual de Operaciones, el anexo IV del Reglamento (CE) 216/2008 y sus disposiciones de aplicación.

This certificate certifies that is authorised to perform commercial air operations, as defined in the attached operations specifications, in accordance with the operations manual, Annex IV to Regulation (EC) Nº 216/2008 and its implementing Rules

Fecha de expedición - *Date of issue:* 20/11/2018	Cargo - *Title:*	La Directora de Seguridad de Aeronaves
	Nombre y firma - *Name and signature:*	Firmado electrónicamente por: *Electronically signed by:*

Agencia Estatal de Seguridad Aérea — Dirección de Seguridad de Aeronaves

SIPA - AOC

Página 1 / Page 1

(*) ID: Permite la comprobación de este documento, en la dirección: https://www.sedeaesa.gob.es (Oficina virtual (sede electrónica) > comprobación documental). Document ID: Allows to check this document on https://www.sedeaesa.gob.es (Online office (electronic office)> Comprobación Documental).

EASA

PBN Practical Cases I

ESPECIFICACIONES DE OPERACIONES - *OPERATIONS SPECIFICATIONS*

(Sujetas a las condiciones aprobadas en el Manual de Operaciones) *(Subject to the approved conditions in the Operations Manual)*

Datos de contacto de la autoridad expedidora - *Issuing authority contact details*

AESA | Tel: +34 91 396 80 00 | Fax: +34 91 396 80 00 | esa@fomento.es

AOC nº: ES.AOC.117 | COMPAÑIA OPERADORA DE CORTO Y MEDIO RADIO IBERIA EXPRESS, S.A.U. | Firma *Signature*: | Fecha *Date*: (*)

Especificaciones de operaciones nº - *Operations specifications*: ES.AOC.117 -313

Véase última página para Observaciones adicionales. *See last page for Additional remarks.*

Modelo de la aeronave - *Aircraft Model*: AIRBUS A320-211

Matrícula - *Registration Marks*:

El operador tiene aprobado un procedimiento para gestión interna de las matrículas operadas bajo este AOC.
The operator has an approved procedure for internal management of aircraft registration marks, operated under this AOC.

Tipos de operación - *Type of operation*: Transporte aéreo comercial - *Commercial air transport (CAT)*

☑ Pasajeros - Passengers ☑ Mercancías - Cargo ☐ Otros - Other:

Zona de operaciones - *Area of operation*: (*) C3 C4 C5 C7 C10

(*) Véase última página para códigos de Zona de Operación. *See last page for Are*

Limitaciones Especiales - *Special Limitations*:

APROBACIONES ESPECÍFICAS *SPECIFIC APPROVALS*			SI *YES*	NO	ESPE *SPE*	
Mercancías Peligrosas. *Dangerous goods.*			☑	☐		
Operaciones con baja visibilidad *Low visibility operations*						
Aproximación y aterrizaje. *Approach and landing.*			☑	☐	CAT I (DH 200 ft) CAT II (DH 100 ft) CAT IIIA (DH 50 ft) (RVR 200 m)	
Despegue. *Take-off.*			☐	☑		
RVSM.	N/A	☐	☑	☐		
ETOPS.	N/A	☐	☐	☑		
Especificación de navegación complejas para operaciones PBN. *Complex navigation specifications for PBN operations.*			☐	☑		
Especificación mínima de performance de navegación. *Minimum navigation performance specification.*			☐	☑		
Operaciones con helicópteros con la ayuda de sistemas de visión nocturna de imágenes. *Helicopter operations with the aid of night vision imaging systems.*			☐	☑		
Operaciones de vuelo de helicópteros con grúas de rescate. *Helicopter hoist operations.*			☐	☑		
Operaciones de servicio médico de emergencias con helicópteros. *Helicopter emergency medical service operations.*			☐	☑		
Cartera Electrónica de Vuelo (EFB) *Electronic Flight Bag (EFB)*			☑	☐	EFB Portátil. Portable EFB	
Instrucción de tripulación de cabina. *Cabin crew training.*			☑	☐		
Expedición del atestados CC. *Issue of CC attestation.*			☐	☑		
Mantenimiento de la Aeronavegabilidad. *Continuing airworthiness.*			☑	☐	ES.MG.167	
Otros *Other*						

(*) Firmado electrónicamente en la fecha indicada en la página 1. *(Electronically signed on date shown in page 1).*

(*ID: Permite la comprobación de este documento, en la dirección: https://www.sedeaplicaciones.aesa.es (Oficina virtual sede electrónica) > Comprobación documental). Documento ID: Allows to check this document on https://www.sedeaplicaciones.aesa.es (Online office (electronic office)> Comprobación Documental).

Especificación de navegación complejas para operaciones PBN.
Complex navigation specifications for PBN operations.

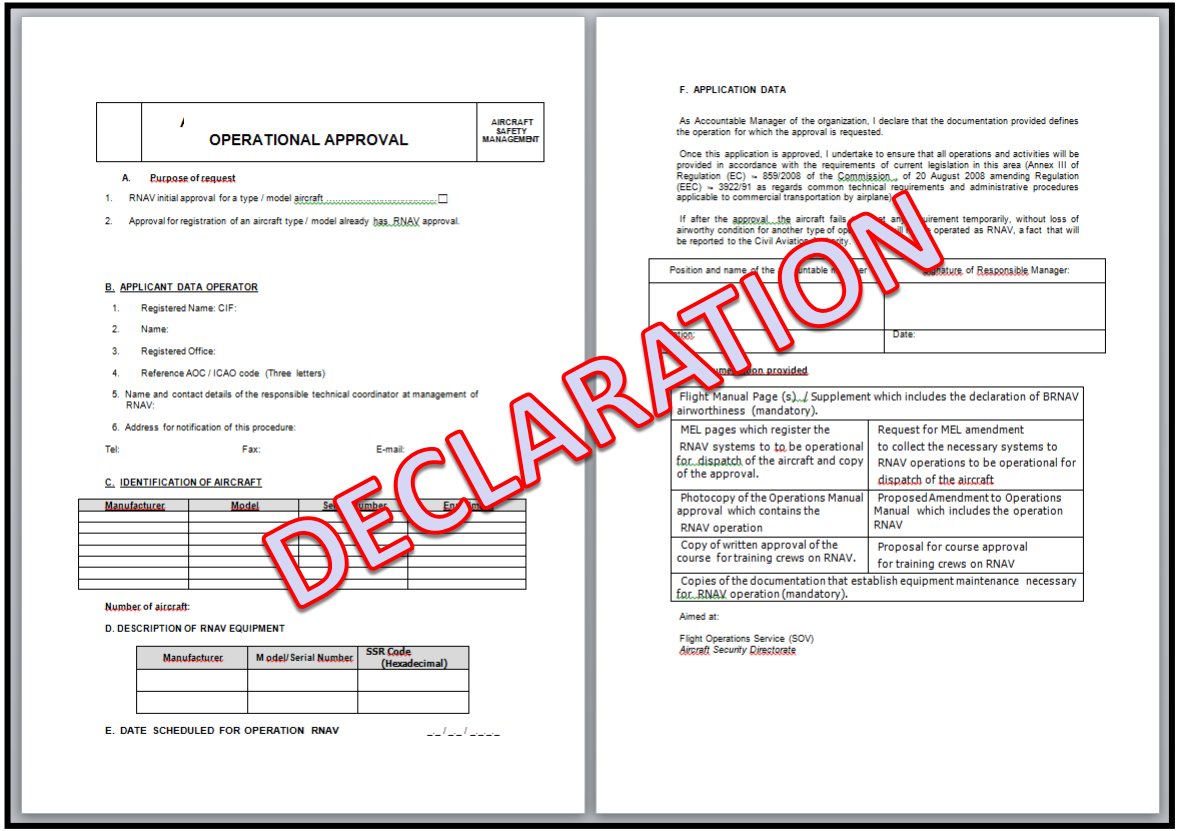
☐ ☑

RNP AR APCH

RNP 0.3 (H)

PBN Practical Cases I

RNAV 10
RNAV 5
RNAV 2
RNAV 1
RNP 4
RNP 2
RNP 1
A-RNP
RNP APCH (LNAV)
RNP APCH (LNAV/VNAV)
RNP APCH (LP)
RNP APCH (LPV)



OPERATIONAL APPROVAL

AIRCRAFT SAFETY MANAGEMENT

A. Purpose of request

1. RNAV initial approval for a type / model aircraft ☐
2. Approval for registration of an aircraft type / model already has RNAV approval.

B. APPLICANT DATA OPERATOR

1. Registered Name: CIF:
2. Name:
3. Registered Office:
4. Reference AOC / ICAO code (Three letters)
5. Name and contact details of the responsible technical coordinator at management of RNAV:
6. Address for notification of this procedure:

Tel: Fax: E-mail:

C. IDENTIFICATION OF AIRCRAFT

Manufacturer	Model	Serial Number	Engine

Number of aircraft:

D. DESCRIPTION OF RNAV EQUIPMENT

Manufacturer	Model/Serial Number	SSR Code (Hexadecimal)

E. DATE SCHEDULED FOR OPERATION RNAV __/__/____

F. APPLICATION DATA

As Accountable Manager of the organization, I declare that the documentation provided defines the operation for which the approval is requested.

Once this application is approved, I undertake to ensure that all operations and activities will be provided in accordance with the requirements of current legislation in this area (Annex III of Regulation (EC) ¬ 859/2008 of the Commission , of 20 August 2008 amending Regulation (EEC) ¬ 3922/91 as regards common technical requirements and administrative procedures applicable to commercial transportation by airplane).

If after the approval the aircraft fails to meet any requirement temporarily, without loss of airworthy condition for another type of operation, it will be operated as RNAV, a fact that will be reported to the Civil Aviation Authority

Position and name of the [illegible]	Signature of Responsible Manager:
	Date:

Information provided

Flight Manual Page (s) ../ Supplement which includes the declaration of BRNAV airworthiness (mandatory).
MEL pages which register the RNAV systems to to be operational for dispatch of the aircraft and copy of the approval. / Request for MEL amendment to collect the necessary systems to RNAV operations to be operational for dispatch of the aircraft
Photocopy of the Operations Manual approval which contains the RNAV operation / Proposed Amendment to Operations Manual which includes the operation RNAV
Copy of written approval of the course for training crews on RNAV. / Proposal for course approval for training crews on RNAV
Copies of the documentation that establish equipment maintenance necessary for RNAV operation (mandatory).

Aimed at:

Flight Operations Service (SOV)
Aircraft Security Directorate

DECLARATION

PBN Practical Cases I

“Non-complex” PBN Approval

AMC1 CAT.OP.MPA.126 Performance-based navigation

ED Decision 2016/015/R

PBN OPERATIONS

For operations where a navigation specification for performance-based navigation (PBN) has been prescribed and no specific approval is required in accordance with SPA.PBN.100, the operator should:

(a) establish operating procedures specifying:

(1) normal, abnormal and contingency procedures;

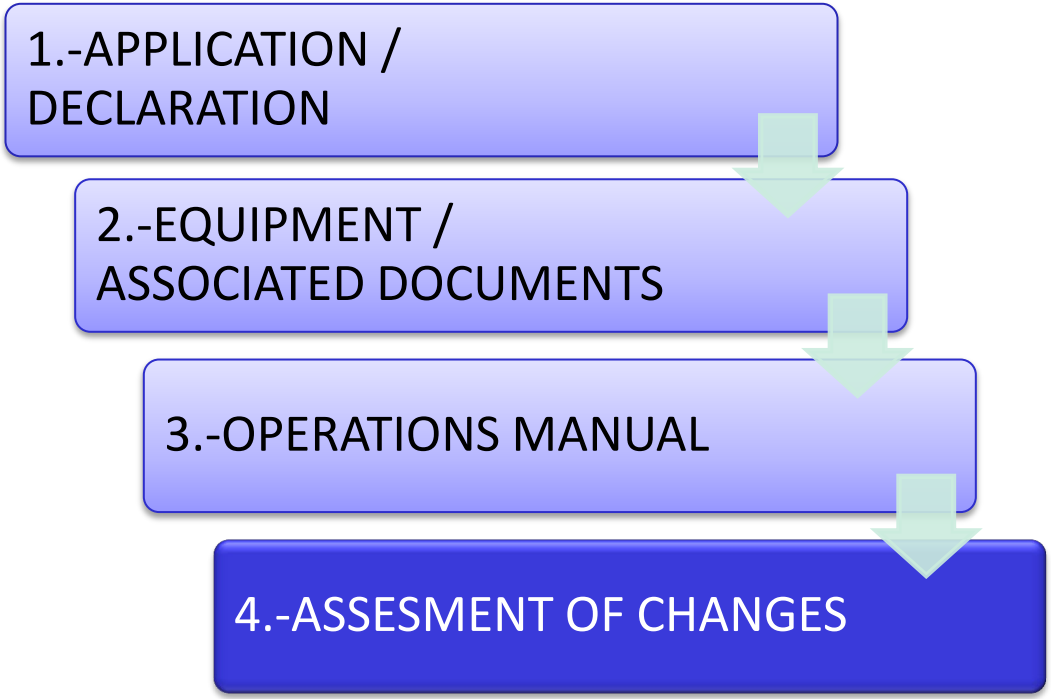
(2) electronic navigation database management; and

(3) relevant entries in the minimum equipment list (MEL);

(b) specify the flight crew qualification and proficiency constraints and ensure that the training programme for relevant personnel is consistent with the intended operation; and

(c) ensure continued airworthiness of the area navigation system.

PBN Practical Cases I



PBN Practical Cases I

SECTION 2 – MANAGEMENT

ORO.GEN.200 Management system

Regulation (EU) No 965/2012

(a) The operator shall establish, implement and maintain a management system that includes:

(1) clearly defined lines of responsibility and accountability throughout the operator, including a direct safety accountability of the accountable manager;

(2) a description of the overall philosophies and principles of the operator with regard to safety, referred to as the safety policy;

(3) the identification of aviation safety hazards entailed by the activities of the operator, their evaluation and the management of associated risks, including taking actions to mitigate the risk and verify their effectiveness;

(4) maintaining personnel trained and competent to perform their tasks;

(5) documentation of all management system key processes, including a process for making personnel aware of their responsibilities and the procedure for amending this documentation;

(6) a function to monitor compliance of the operator with the relevant requirements. Compliance monitoring shall include a feedback system of findings to the accountable manager to ensure effective implementation of corrective actions as necessary; and

(7) any additional requirements that are prescribed in the relevant Subparts of this Annex or other applicable Annexes.

(b) The management system shall correspond to the size of the operator and the nature and complexity of its activities, taking into account the hazards and associated risks inherent in these activities.

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

1. CHANGE MANAGEMENT AND IMPLEMENTATION PLAN

The purpose of this document is to present the steps that Thomas Cook will follow Airlines Balearics (TCAB), to carry out the necessary changes to implement the use in its Data Link Communications operation, hereinafter CPDLC for its acronym in English.

1.1 Description of the change and reason

The objective of the change is to comply with COMMISSION REGULATION (EC) No 29/2009 of 16 January 2009, as well as its subsequent amendments and modifications, laying down requirements regarding data link services for the single European sky.

The result of said Regulation and those derived from it, is that the use of CPDLC will be mandatory in a large part of European airspace, whereby the TCAB aircraft, as of February 5, 2020. It is therefore essential for the Organization proceed to the implementation of CPDLC in its normal operation.

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

2. EVALUATION AND DESCRIPTION OF THE NEW REQUIREMENTS TO BE FULFILLED

Reference rules:

- Regulation (EC) No. 29/2009
- Regulation (EC) No. 310/2015
- Regulation (EC) No. 2019/1070
- FAA AC 90/117
- ICAO GOLD Doc Manual and circular 10037, together with the material mentioned in the circular.
- ICAO Annex 10, Volume III, Part 1, Chapter 3
- ICAO Doc. 4444: PANS-ATM, Chapter 14 and Annex 5

To operate with CPDLC TCAB aircraft must have specific equipment, they must be develop procedures that describe this operation, and a training that ensures that the crews make proper use of said system. Likewise, manuals and processes should be updated to accommodate this particularity of the operation, which includes, among others, modifications to the flight plan or review the MEL.

This document describes the management of change to implement these developments.

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

2.2. CAMO

The department that manages the continued airworthiness of our aircraft must carry carry out the procedures for the installation and activation of the aircraft systems that allow the use of the CPDLC. At the time of defining this Change Management Plan, CAMO has already finalized All processes to modify aircraft to allow CPDLC. Specifically, the option of Airbus FANS B + in the entire fleet, through the corresponding *Service Bulletin* .

CAMO has completed a new F-DSO-AOC-100 format updated for each aircraft. This document has already been delivered to AESA on 11/29/2019 along with the revision of the Corresponding MEL. It is worth mentioning at this point that the normative point CAT.IDE.A.195 Data link recording affected by the use of the CPDLC does not apply to any aircraft in the fleet of TCAB, due to the date of issuance of the first airworthiness certificate.

Finally, CAMO will be incorporated into debriefing of the functional tests prior to commissioning. system service

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

2.3. Flight operations

The Operations department is the leader of the proposed change. It is responsible for verifying that all the general requirements established in section 2.1 are met.

In addition, the requirements in FAA AC 90/117, ICAO Doc GOLD 10037 and material mentioned in said circular.

Flight Operations will modify the Operations Manual to describe the operation of this system. The main changes are in OM-A, since OM-B simply refers to the FCOM. It has also been verified that the FCOM, AFM and other manufacturer manuals of the aircraft have been updated after the installation of the CPDLC. At the time of developing this guide, Airbus manuals (FCOM mainly) are already updated and in force with referring to CPDLC.

It has been verified that OM-C is also updated with the implementation of the CPDLC. In Specifically, this affects the LIDO eRoute Manual. In its version 4.3.1 LIDO already has prepared the changes that affect CPDLC and it is confirmed that they will make new updates with the entry in force of the mandate of Reg. 29/2009.

The operational engineering department is responsible for modifying the MEL to include the system CPDLC This modification of MEL (Rev. 7) has already been submitted to AESA on 11/29/2019.

The flight operations department will lead the functional tests of the CPDLC system in all aircraft in the fleet, prior to the final implementation of the system in the normal TCAB operation.

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

2.5 Crew Training

The training related to the operation Communications by Data Link requested comes described in FAA AC 90/117. The content of the aforementioned circular has been taken into account to modify Part D of the Operations Manual, including a specific familiarization course for this type of CPDLC operation. This course has been prepared through the e-platform CPat learning that TCAB already uses for other trainings. The course includes a verification with a question bank, in order to ensure that the student has made a good use of the same.

The flight crew conversion course is modified to include the CPDLC system as part of the aircraft systems that are studied and reviewed in that course. Also, in the Annual recurring course for pilots includes a mention of the CPDLC, according to will verify its correct use by the crews during the online verification.

This department is also responsible for modifying certain forms affected by the Introduction of the CPDLC:

- Initial pilot assessment questionnaire - to include a question about previous experience in use of CPDLC
- Line Check form to include CPDLC in the general evaluation of the use of communications during normal operation

The training department has also verified how the use of CPDLC affects training sessions in simulator. It has been consulted with the training providers that

Finally the training department will be in charge of making a selection of pilots of the company with sufficient previous experience in CPDLC (possibly in airplanes and type of operation similar to those of TCAB) to be proposed for functional tests to perform.

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT
REQUEST COMMUNICATIONS BY DATA LINK
(CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

2.6. Safety Management System

The SMS is responsible for preparing the change management document for the implementation of the CPDLC system. Also this department acts as coordinator between the different departments of the company, and will facilitate and support the various managers departmental to carry out the corresponding risk analysis.

PBN Practical Cases I

3. RISK ANALYSIS OF CHANGE

TCAB Risk and Defence Evaluation Matrix

EVENT RISK

If the event had escalated into an accident, what would have been the most credible outcome?

PROACTIVE

What would be the most credible outcome?

Severity	People	Property	Operations	Environment	Media	Reputation	N
Negligible	No health effect/ Injury	No damage	No damage / Little consequence	No impact	No attention	No impact	1
Minor	Minor health effect/ Injury/ First Aid	No evident damage	No evident damage / minor operational influence / use of emergency procedures	No impact	No attention	No impact	2
Major	Major health effect/ Injury	Local damage/ Technical delay	Longer operational disruptions/ Financial loss/ significant reduction in safety margins / NAA restrictions due to non compliance	Some impact	Local attention	Local impact / Pax refuse to fly	3
Hazardous	Disability/ Severe injuries	Major damage	Major operational disruptions/ Missed trips	Major impact	National attention	National impact/ Airline reputation compromised	4
Catastrophic	Multiple fatalities / Loss of life	Loss of aircraft /Equipment destroyed	Removal of certificate of airline/ aircraft	Extreme impact	International attention	International impact/ Airline group reputation compromised	5

What was the effectiveness of the remaining defences between this event and the most credible accident scenario?

Effective	Mostly	Partially	Min Effective	Ineffective
numerous effective defences prevented the outcome	few defences failed, a considerable safety margin exists	some defences still in place with remaining defences only partially effective	single defence prevented the outcome	pure luck or exceptional skill prevented the outcome

Probability				
Almost inconceivable that the event will occur	very unlikely to occur (not known to have occurred)	Unlikely to occur, but possible (has occured rarely)	likely to occur sometimes (has occured infrequently)	Likely to occur many times (has occured frequently)
<10E-9	10E-7 - 10E-9	10E-5 - 10E-7	10E-3 - 10E-5	1- 10E-3
Extremly - Improbable	Improbable	Remote	Occasional	Frequent
1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20
5	10	15	20	25

Risk Level Definitions % >> Low 1-6 | Medium 6-12 | High 15-25

Exposure To Risk +/- 3 (used by Safety Department only)

PBN Practical Cases I

Crew Training

(Risk Probability Level) * (Risk Severity Level) = (Risk Level)

WHO	DANGER	RISKS	RISK LEVEL	MITIGATION MEASURES	NEW RISK LEVEL
Training manager	Training programme not covering the needs of CPDLC operation	Negative training Incorrect System Operation	4x1 = 4	• Checked the changes and found compliant with FAA AC 90/117 • Contingency Procedures established in OM and FCOM (revert to VHF communication)	2x1=2

PBN Practical Cases I

Crew Training

(Risk Probability Level) * (Risk Severity Level) = (Risk Level)

WHO	DANGER	RISKS	RISK LEVEL	MITIGATION MEASURES	NEW RISK LEVEL
Training manager	Crews don't know how the system works	Misuse of CPDLC systems Confusion in cabin that may affect the safe operation of the aircraft	4x1 = 4	• Familiarization course mandatory for all pilots, even those with previous experience in the use of CPDLC • Include the course of CPDLC in the course of conversion for new pilots	2x1=2

PBN Practical Cases I

Flight Operations

(Risk Probability Level) * (Risk Severity Level) = (Risk Level)

WHO	DANGER	RISKS	RISK LEVEL	MITIGATION MEASURES	NEW RISK LEVEL
Director of Flight Op.	Unmodified MEL to include the CPDLC operation	MEL not particularised Different Procedures Restrictions on Operation. Aircraft with less dispatch chances,	2x4 = 8	MEL reviewed by TCAB and by AESA, who approves it.	1x4=4

PBN Practical Cases I

Maintenance

(Risk Probability Level) * (Risk Severity Level) = (Risk Level)

WHO	DANGER	RISKS	RISK LEVEL	MITIGATION MEASURES	NEW RISK LEVEL
CAMO	Different variants for CPDLC system configuration	Confusion and misuse of the system	4x1 = 4	The entire fleet has installed the same FANS B + version	1x4=4

PBN Practical Cases I

4. ACTIONS TO BE CARRIED OUT AND MAIN RESPONSIBLE ASSIGNED

4.1. ROV - Responsible . (DFO)

- Prepare and coordinate the modification of the OM and its approval by AESA. Includes changes to OM-A and OM-D (prepared by the RET), and its publication where appropriate. - Tasks assigned to staff support D and
- Modify the MEL to include references to Data Link Communications (CPDLC) requested, and manage their approval (rev. 7). - Task assigned to _ _ _ Operations Engineering savior
- Verify that FCOM and other manufacturer's manuals are up to date (completed)
- Verify that OM-C and LIDO, including its reference manual, are updated (completed)
- Manage with Eurocontrol the inclusion in the White-List of TCAB aircraft - task assigned to _ : of Operations Engineering
- Lead and coordinate functional tests on all airplanes with all other departments before implementing the use of CPDLC in the operation - Task in coordination with the Head of Fleet
- Manage the inclusion of the J1 code in the ATC Flight Plan before starting the operation with CPDLC - task assigned to _ of Operations Engineering

PBN Practical Cases I

4. ACTIONS TO BE CARRIED OUT AND MAIN RESPONSIBLE ASSIGNED

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

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Fecha	13-12-2019 REV 2.0		

4.2. CAMO - . (RM)

- Manage the introduction and activation of aircraft systems that allow CPDLC communication. (completed)
- Update F-DSO-100 (completed)
- Cooperate and solve problems, if any, in functional tests.

PBN Practical Cases I

4. ACTIONS TO BE CARRIED OUT AND MAIN RESPONSIBLE ASSIGNED

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
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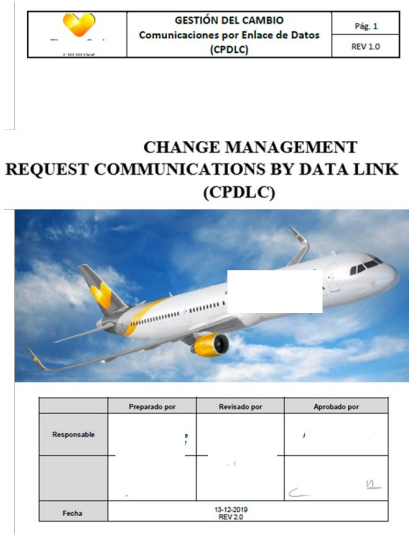
Fecha	13-12-2019 REV 2.0		

4.4. Crew Training - Responsible (RET)

- Develop the CPDLC familiarization course in CPat (completed)
- Modify the OM-D to include the CPDLC familiarization course and update the courses of conversion and refreshment for flight crew (complete, under review by AESA)
- Ensure that crew training is carried out according to what remains approved in Part D of the MO, before the operations of Data Link Communications (CPDLC) requested.
- Perform the appropriate verifications to ensure that the means used for the training in are suitable for such function and where appropriate, adopt mitigating measures timely so that they do not adversely affect the training performed by the crews.
- Develop a list of pilots with previous experience in CPDLC to carry out the tests functional before the implementation of the CPDLC in the TCAB operation.

PBN Practical Cases I



	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
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Fecha	13-12-2019 REV 2.0		

4.5. Head of Security and Compliance Control - (RS / RCC)

- Prepare the change management document (this document) in coordination with the rest of the personnel responsible for the company. Track that is met the content of that document, especially with the change tracking section which is detailed below.

PBN Practical Cases I

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT REQUEST COMMUNICATIONS BY DATA LINK (CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

5. ACTIONS TO BE TAKEN TO CARRY OUT THE FOLLOW-UP OF CHANGE

The SMS will monitor the reports, especially Air Safety Reports (ASR) related to the CPDLC system operation. The Operations Department will be notified immediately Flight and Crew Training if a trend is detected that the Implementation of this system is causing problems in the operation.

Fleet Management and Training will monitor online verifications during the 4 months following the implementation of the CPDLC operation, in order to check for evidence of Problems in the operation of this system.

PBN Practical Cases I

AMC1 SPA.PBN.105(c) PBN operational approval

ED Decision 2016/020/R

FLIGHT OPERATIONAL SAFETY ASSESSMENT (FOSA)

(a) For each RNP AR APCH procedure, the operator should conduct a flight operational safety assessment (FOSA) proportionate to the complexity of the procedure.

(b) The FOSA should be based on:

(1) restrictions and recommendations published in AIPs;

(2) the flyability check;

(3) an assessment of the operational environment;

(4) the demonstrated navigation performance of the aircraft; and

(5) the operational aircraft performance.

(c) The operator may take credit from key elements from the safety assessment carried out by the ANSP or the aerodrome operator.

PBN Practical Cases I

FOSA provides a systematic process for checking that risks are adequately mitigated across the range of hazards

Example Aircraft Failure Hazard

Failures	Likelihood	Consequences	Extra Mitigations	Risk Acceptability?
Undetected erroneous A/C position calculation in one FMS	SSA evaluated probability as Remote (between 10-5 and 10-7 per approach)	Contained within 0.4NM. Implies $RNP_{non\ norm}$ = 0.2NM Demonstrated and documented in accordance with AMC 20-26	TAWS Class A Contingency procedures	Specific procedure significantly less onerous than one used in airworthiness approval for AMC 20-26. Risk acceptable.

PBN Practical Cases I

PBN.RNP AR APCH APPLICATION

APPLICATION DATA

Here are some tables which includes the requirements of airworthiness and operational requirements for the issuance of an operational approval PBN RNP AR APCH. Column of compliance shall be ticked indicating whether the requirement is fulfilled or not and if not satisfied, the reason must be indicated. Additionally the reference column must specify document or documents of the organization with information that enables compliance with the requirements, specifying clearly the chapter and section in each case.

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1. AIRCRAFT IDENTIFICATION

Manufacturer	Model	Serial number	Registration

Airports requested	Type of approach

RNP AR APCH initial approval for a new aircraft.	☐ Yes ☐ No ☐ In process
Apply for approval of new maneuvers of RNP AR APCH approximation based on GM1 SPA. PBN.100 (c) (8) for aircraft that already have approval RNP AR APCH.	☐ Yes ☐ No ☐ In process

2.- SPECIFIC AIRWORTHINESS REQUIREMENTS

In relation to the Declaration of the onboard equipment this should be done as specified in the relevant annex of the format of Declaration of compliance with the requirements of equipment for aircraft that the operator shall be attached to this application. To meet the other requirements of airworthiness, the following paragraph enclosing the required supporting documentation must be filled. Additionally, in the reference column must be specified document or documents of the organization with information that enables compliance with the requirement requested, specifying clearly the chapter and section in each case.

NO.	*REFERENCE*	*DESCRIPTION*	*COMPLIANCE (YES, NO, N/A)*	*REFERENCE*
2.1	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 5 6, 8.3, 8.4, 8.5, 8.6, 8.7 NCC. IDE. A.250	The operator has attached the Declaration of equipment shipped to AR RNP APCH operations as specified in the relevant annex of the format of Declaration of compliance with the requirements of equipment for aircraft (F-DSO-AOC-100 (A).		
2.2	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 6.1	Demonstration of the accuracy requirements for RNP AR APCH operations.		
2.3	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 6.2	Demonstration of integrity for AR RNP APCH operations requirements.		

PBN.RNP AR APCH APPLICATION

NO.	*REFERENCE*	*DESCRIPTION*	*COMPLIANCE (YES, NO, N/A)*	*REFERENCE*
2.4	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 6.3	Demonstration of the requirements of continuity of the function for AR RNP APCH operations.		
2.5	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 7.1	Demonstration of the functions required for RNP AR APCH operations.		
2.6	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 7.1	Demonstration of the functions recommended for AR RNP APCH operations.		
2.7	SPA. GEN.105 SPA. PBN.100 GM1 SPA. PBN.100 (c) (8) and (d) SPA. PBN.105 (a) AMC 20-26 8.1, 9, Appendix 4	Explicit statement of compliance in the AFM/POH with AR RNP APCH operations Guidebook material.		
2.7	SPA. PBN.105 (c) (6) CAT. IDE. A.355 NCC. IDE. A.250 AMC 20-26 8.2	Electronic navigation data management		

PBN Practical Cases I

Airworthiness

AMC1 CAT.OP.MPA.126 Performance-based navigation

ED Decision 2016/015/R

PBN OPERATIONS

For operations where a navigation specification for performance-based navigation (PBN) has been prescribed and no specific approval is required in accordance with SPA.PBN.100, the operator should:

(a) establish operating procedures specifying:

(1) normal, abnormal and contingency procedures;

(2) electronic navigation database management; and

(3) relevant entries in the minimum equipment list (MEL);

(b) specify the flight crew qualification and proficiency constraints and ensure that the training programme for relevant personnel is consistent with the intended operation; and

(c) ensure continued airworthiness of the area navigation system

PBN Practical Cases I

RNAV 5 (B RNAV)

→ AFM Applicability for the Particular Aircraft

Statement of Approval / Certification for Operations in RNAV Space

B-RNAV Airworthiness and maintenance requirements				
Reference	**No.**	**Requirement**	**Observance**	**Reference Document**
ICAO Doc 9613-AN/937 TGL Nº2	1	The Aircraft Flight Manual (AFM) contains a RNAV statement which indicates the criteria used to grant airworthiness certification, together with any limitations in RNAV system. The AFM procedures may also provide normal and abnormal RNAV system procedures.	☐ YES ☐ NO	

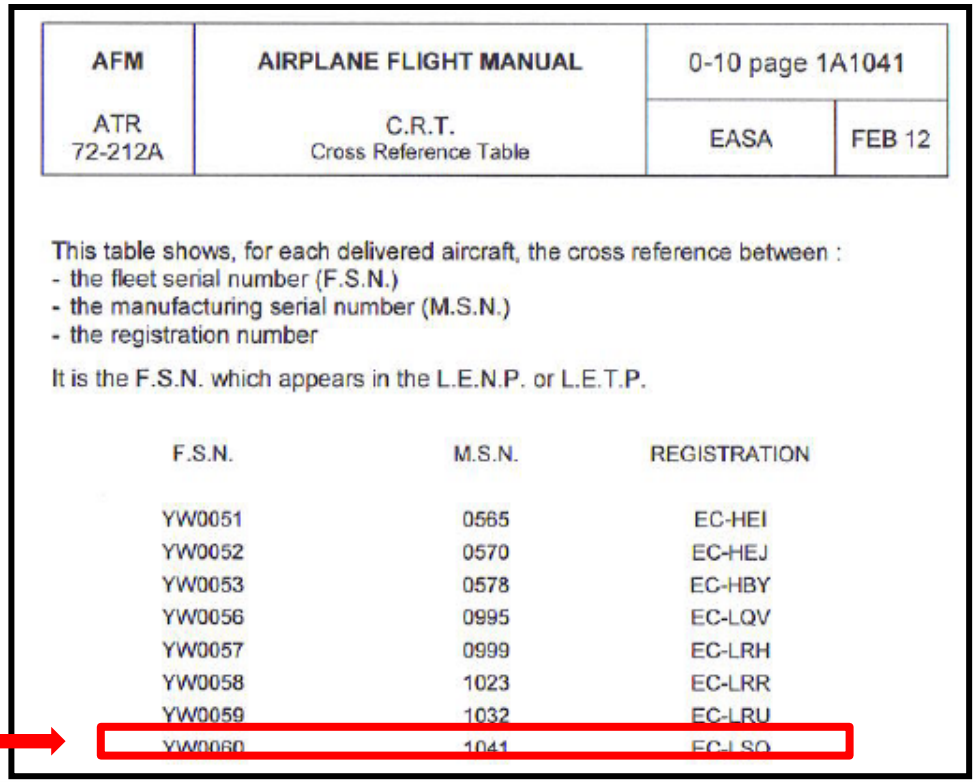
PBN Practical Cases I

RNAV 5 (B RNAV)

→ ATR72-212A

PBN Practical Cases I

RNAV 5 (B RNAV)



AFM	AIRPLANE FLIGHT MANUAL	0-10 page 1A1041	
ATR 72-212A	C.R.T. Cross Reference Table	EASA	FEB 12

This table shows, for each delivered aircraft, the cross reference between :
- the fleet serial number (F.S.N.)
- the manufacturing serial number (M.S.N.)
- the registration number

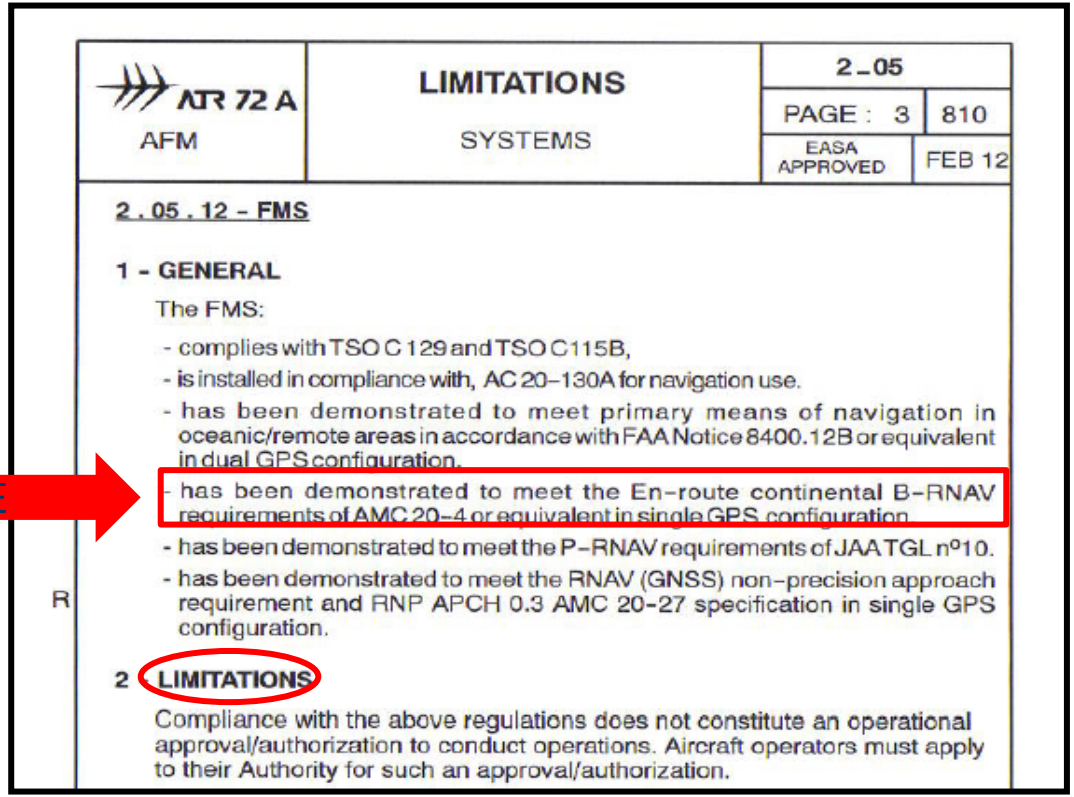
It is the F.S.N. which appears in the L.E.N.P. or L.E.T.P.

F.S.N.	M.S.N.	REGISTRATION
YW0051	0565	EC-HEI
YW0052	0570	EC-HEJ
YW0053	0578	EC-HBY
YW0056	0995	EC-LQV
YW0057	0999	EC-LRH
YW0058	1023	EC-LRR
YW0059	1032	EC-LRU
YW0060	1041	EC-LSO

PBN Practical Cases I

RNAV 5 (B RNAV)

AMC 20-4 COMPLIANCE



ATR 72 A
AFM

LIMITATIONS
SYSTEMS

2_05
PAGE : 3 810
EASA APPROVED FEB 12

2 . 05 . 12 - FMS

1 - GENERAL

The FMS:

- complies with TSO C 129 and TSO C115B,
- is installed in compliance with, AC 20–130A for navigation use.
- has been demonstrated to meet primary means of navigation in oceanic/remote areas in accordance with FAA Notice 8400.12B or equivalent in dual GPS configuration.
- has been demonstrated to meet the En–route continental B–RNAV requirements of AMC 20–4 or equivalent in single GPS configuration.
- has been demonstrated to meet the P–RNAV requirements of JAA TGL n°10.
- has been demonstrated to meet the RNAV (GNSS) non–precision approach requirement and RNP APCH 0.3 AMC 20–27 specification in single GPS configuration.

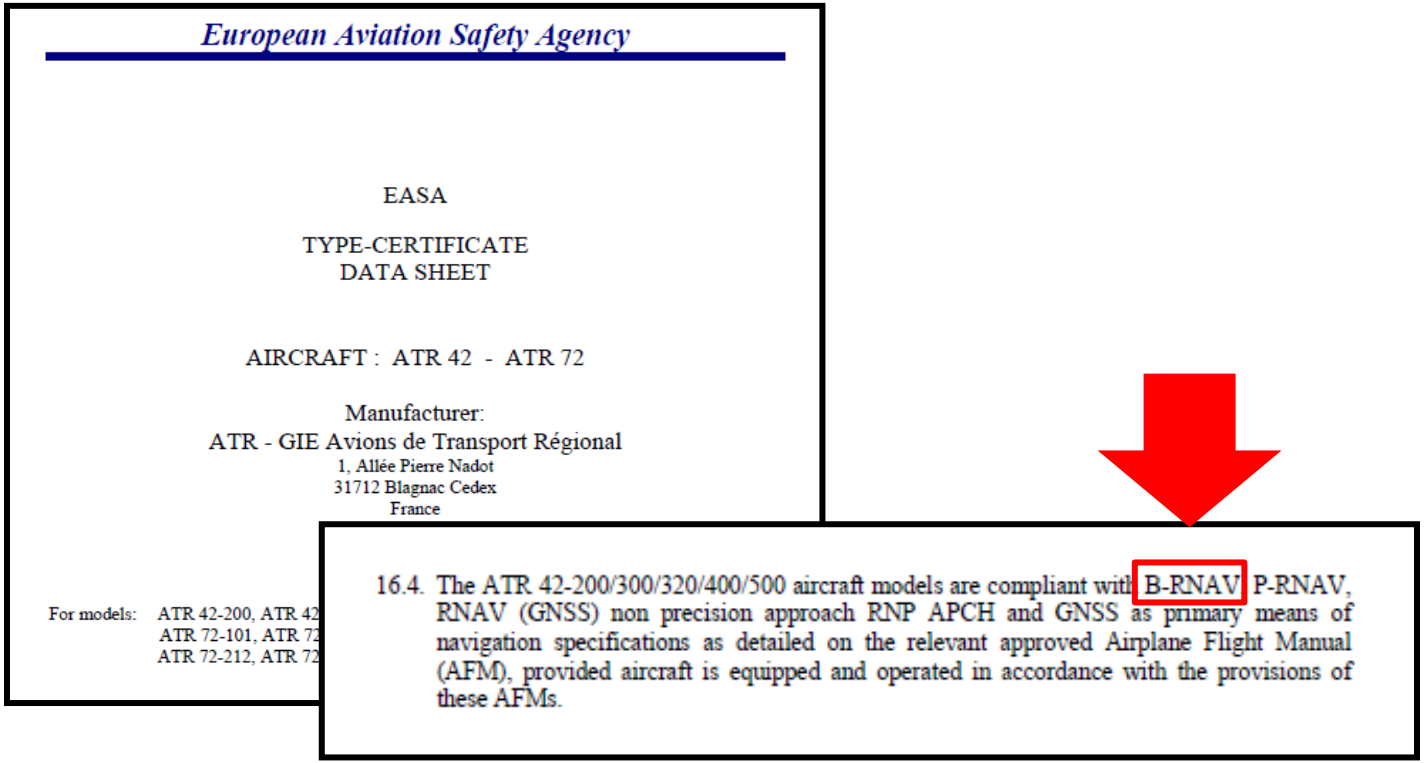
R

2 LIMITATIONS

Compliance with the above regulations does not constitute an operational approval/authorization to conduct operations. Aircraft operators must apply to their Authority for such an approval/authorization.

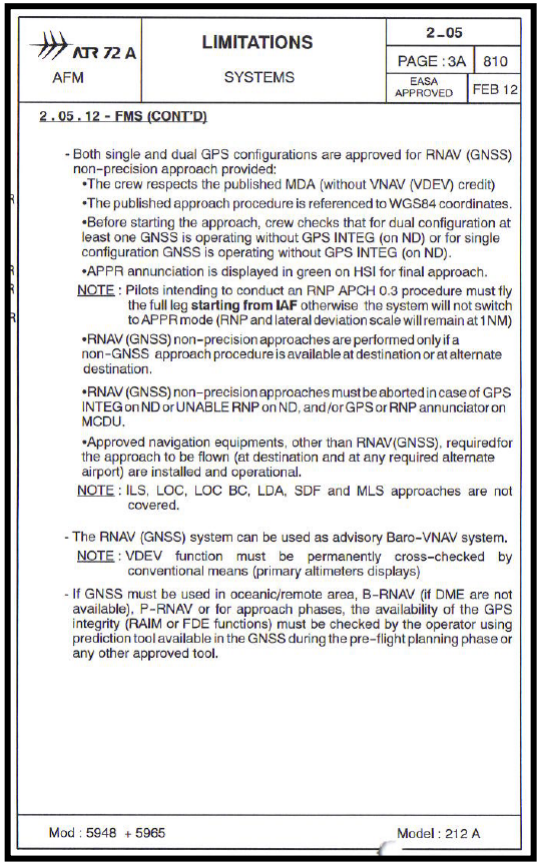
PBN Practical Cases I

RNAV 5 (B RNAV)



PBN Practical Cases I

RNAV 5 (B RNAV)



ATR 72 A AFM | LIMITATIONS SYSTEMS | 2-05 PAGE : 3A 810 EASA APPROVED FEB 12

2.05.12 - FMS (CONT'D)

- Both single and dual GPS configurations are approved for RNAV (GNSS) non-precision approach provided:
  - •The crew respects the published MDA (without VNAV (VDEV) credit)
  - •The published approach procedure is referenced to WGS84 coordinates.
  - •Before starting the approach, crew checks that for dual configuration at least one GNSS is operating without GPS INTEG (on ND) or for single configuration GNSS is operating without GPS INTEG (on ND).
  - •APPR annunciation is displayed in green on HSI for final approach.

  NOTE : Pilots intending to conduct an RNP APCH 0.3 procedure must fly the full leg **starting from IAF** otherwise the system will not switch to APPR mode (RNP and lateral deviation scale will remain at 1NM)

  - •RNAV (GNSS) non-precision approaches are performed only if a non-GNSS approach procedure is available at destination or at alternate destination.
  - •RNAV (GNSS) non-precision approaches must be aborted in case of GPS INTEG on ND or UNABLE **RNP** on ND, and/or GPS or **RNP** annunciator on MCDU.
  - •Approved navigation equipments, other than RNAV(GNSS), required for the approach to be flown (at destination and at any required alternate airport) are installed and operational.

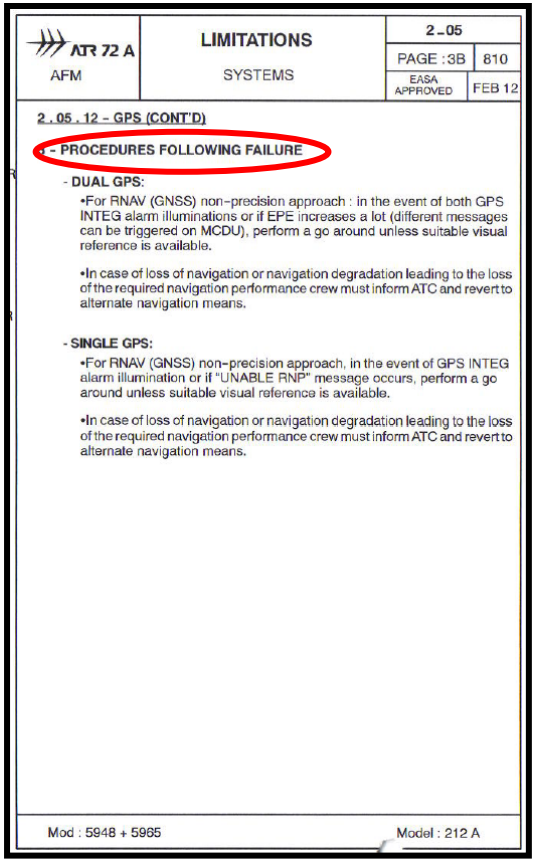
  NOTE : ILS, LOC, LOC BC, LDA, SDF and MLS approaches are not covered.

- The RNAV (GNSS) system can be used as advisory Baro-VNAV system.

  NOTE : VDEV function must be permanently cross-checked by conventional means (primary altimeters displays)

- If GNSS must be used in oceanic/remote area, B-RNAV (if DME are not available), P-RNAV or for approach phases, the availability of the GPS integrity (RAIM or FDE functions) must be checked by the operator using prediction tool available in the GNSS during the pre-flight planning phase or any other approved tool.

Mod : 5948 + 5965 Model : 212 A



ATR 72 A AFM | LIMITATIONS SYSTEMS | 2-05 PAGE : 3B 810 EASA APPROVED FEB 12

2.05.12 - GPS (CONT'D)

- PROCEDURES FOLLOWING FAILURE

- DUAL GPS:
  - •For RNAV (GNSS) non-precision approach : in the event of both GPS INTEG alarm illuminations or if EPE increases a lot (different messages can be triggered on MCDU), perform a go around unless suitable visual reference is available.
  - •In case of loss of navigation or navigation degradation leading to the loss of the required navigation performance crew must inform ATC and revert to alternate navigation means.

- SINGLE GPS:
  - •For RNAV (GNSS) non-precision approach, in the event of GPS INTEG alarm illumination or if "UNABLE RNP" message occurs, perform a go around unless suitable visual reference is available.
  - •In case of loss of navigation or navigation degradation leading to the loss of the required navigation performance crew must inform ATC and revert to alternate navigation means.

Mod : 5948 + 5965 Model : 212 A

PBN Practical Cases I

RNAV 5 (B RNAV)

→ Other supporting information-WEB "FAA":

http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs470/media/AC90-100compliance.xls

1	Manufacturer	System	Part Number	Software Version	Approval using GPS	Approval using DME/DME/IRU	Database Integrity	Eligible to fly RNAV "Q" or "Tango" route	Eligible to fly RNAV SID/STAR/ ODP
2	Accepted 8 February 2010								
3	All systems must have an appropriate navigation database and a procedure to inhibit NOTAM'd DME facilities (on test or unreliable)								
4	Embraer ERJ-135/145 and Legacy (8 Feb 2010)	Honeywell FMS NZ2000	7018879-03014 MOD B	5.2B	Yes	Yes (for those a/c equipped with IRS)	Yes, Honeywell has a type 2 LOA	Yes	Yes
5		Honeywell FMS NZ2000	7018879-03014 MOD C	5.2C	Yes	Yes (for those a/c equipped with IRS)	Yes, Honeywell has a type 2 LOA	Yes	Yes
6		Honeywell FMS NZ2000	7018879-03014 MOD C	5.2C	Yes	Yes(for those a/c equipped with IRS)	Yes, Honeywell has a type 2 LOA	Yes	Yes
7		Honeywell FMS NZ2000	7018879-03014 MOD D	5.2D	Yes	Yes (for those a/c equipped with IRS)	Yes, Honeywell has a type 2 LOA	Yes	Yes

DIRECTIONS | Airbus | Boeing | CMC Electronics | Dassault | Embraer | Gulfstream | Garmin

Listo 100%

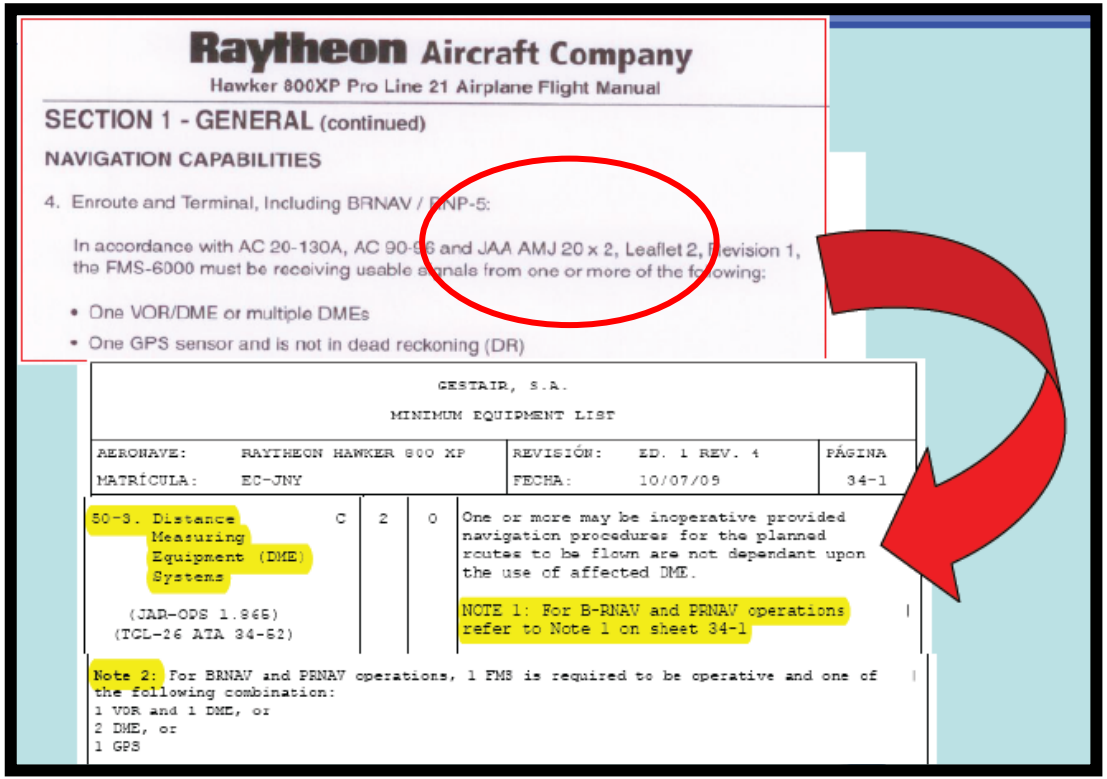
PBN Practical Cases I

RNAV 5 (B RNAV)

→ Hawker 800 XP

PBN Practical Cases I

RNAV 5 (B RNAV)



Raytheon Aircraft Company

Hawker 800XP Pro Line 21 Airplane Flight Manual

SECTION 1 - GENERAL (continued)

NAVIGATION CAPABILITIES

4. Enroute and Terminal, Including BRNAV / RNP-5:

In accordance with AC 20-130A, AC 90-96 and JAA AMJ 20 x 2, Leaflet 2, Revision 1, the FMS-6000 must be receiving usable signals from one or more of the following:

- One VOR/DME or multiple DMEs
- One GPS sensor and is not in dead reckoning (DR)

GESTAIR, S.A.

MINIMUM EQUIPMENT LIST

AERONAVE:	RAYTHEON HAWKER 800 XP	REVISIÓN:	ED. 1 REV. 4	PÁGINA
MATRÍCULA:	EC-JNY	FECHA:	10/07/09	34-1

50-3. Distance Measuring Equipment (DME) Systems (JAR-OPS 1.965) (TCL-26 ATA 34-52)	C	2	0	One or more may be inoperative provided navigation procedures for the planned routes to be flown are not dependant upon the use of affected DME. NOTE 1: For B-RNAV and PRNAV operations refer to Note 1 on sheet 34-1

Note 2: For BRNAV and PRNAV operations, 1 FMS is required to be operative and one of the following combination:
1 VOR and 1 DME, or
2 DME, or
1 GPS

PBN Practical Cases I

RNAV 5 (B RNAV)

→ Letter of Acceptance (LOA) check

B-RNAV Airworthiness and maintenance requirements				
Reference	**No.**	**Requirement**	**Observance**	**Reference Document**
ICAO Doc 9613-AN/937 TGL Nº2	2	Verify that the submitted list of equipment corresponds with the real hardware installed in the aircraft. (see NOTE 1*)	YES ☐ NO ☐	

NOTE 1:

- The equipment required to perform operations in air space designated B-RNAV operate by automatic determination of the aircraft's position from one, or a combination, of the following sensors or systems aboard together with means to establish and follow a desired path: VOR/DME; DME/DME, INS* or IRS, LORAN C*,

PBN Practical Cases I

RNAV 5 (B RNAV)

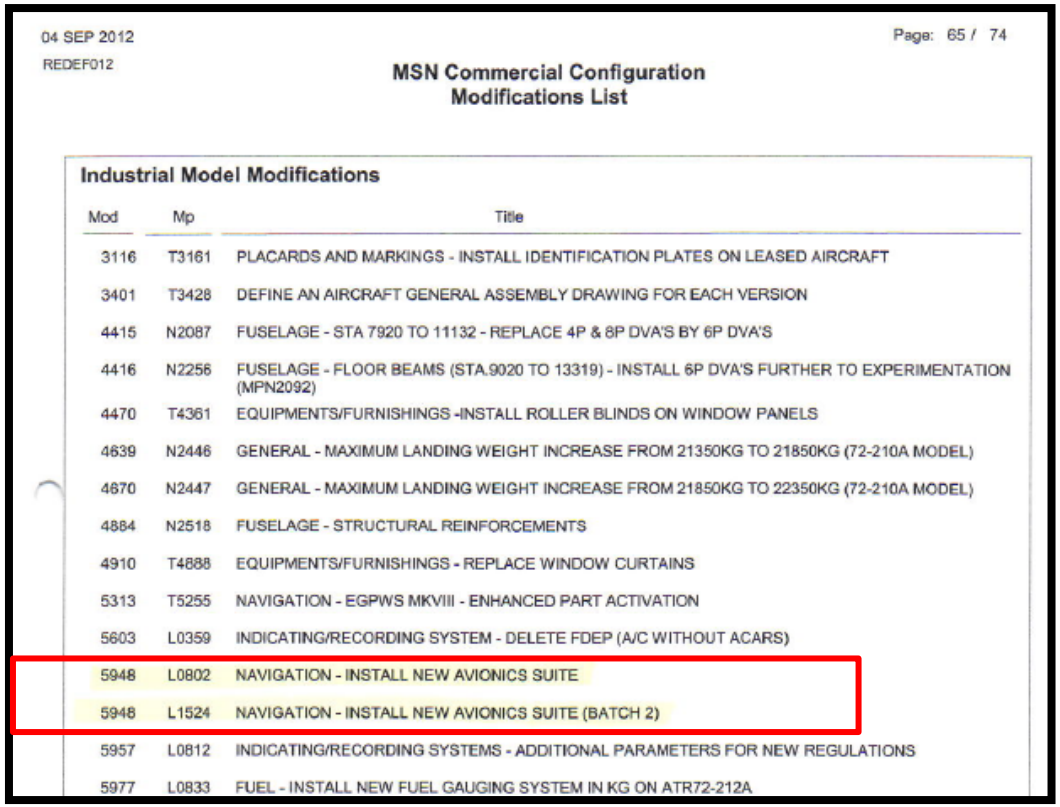
PBN Practical Cases I

RNAV 5 (B RNAV)

→ ATR72-212A

PBN Practical Cases I

RNAV 5 (B RNAV)



04 SEP 2012
REDEF012

Page: 65 / 74

MSN Commercial Configuration Modifications List

Industrial Model Modifications

Mod	Mp	Title
3116	T3161	PLACARDS AND MARKINGS - INSTALL IDENTIFICATION PLATES ON LEASED AIRCRAFT
3401	T3428	DEFINE AN AIRCRAFT GENERAL ASSEMBLY DRAWING FOR EACH VERSION
4415	N2087	FUSELAGE - STA 7920 TO 11132 - REPLACE 4P & 8P DVA'S BY 6P DVA'S
4416	N2256	FUSELAGE - FLOOR BEAMS (STA.9020 TO 13319) - INSTALL 6P DVA'S FURTHER TO EXPERIMENTATION (MPN2092)
4470	T4361	EQUIPMENTS/FURNISHINGS -INSTALL ROLLER BLINDS ON WINDOW PANELS
4639	N2446	GENERAL - MAXIMUM LANDING WEIGHT INCREASE FROM 21350KG TO 21850KG (72-210A MODEL)
4670	N2447	GENERAL - MAXIMUM LANDING WEIGHT INCREASE FROM 21850KG TO 22350KG (72-210A MODEL)
4884	N2518	FUSELAGE - STRUCTURAL REINFORCEMENTS
4910	T4888	EQUIPMENTS/FURNISHINGS - REPLACE WINDOW CURTAINS
5313	T5255	NAVIGATION - EGPWS MKVIII - ENHANCED PART ACTIVATION
5603	L0359	INDICATING/RECORDING SYSTEM - DELETE FDEP (A/C WITHOUT ACARS)
5948	L0802	NAVIGATION - INSTALL NEW AVIONICS SUITE
5948	L1524	NAVIGATION - INSTALL NEW AVIONICS SUITE (BATCH 2)
5957	L0812	INDICATING/RECORDING SYSTEMS - ADDITIONAL PARAMETERS FOR NEW REGULATIONS
5977	L0833	FUEL - INSTALL NEW FUEL GAUGING SYSTEM IN KG ON ATR72-212A

PBN Practical Cases I

RNAV 5 (B RNAV)

ATR

Aircraft Inspection Report — Aircraft 72-212A — Chapter 3 — Page : 30/ 44

Equipment — ATA : 34 — MSN : 1041 — Date : 18 Sep 2012

Zone	Functional Item Number	Description	Code	Vendor	Part Number	CMS	BFE	Serial Number Remarks
120	60FP2	AHRU REMOVABLE MEMORY	F6151	SAGEM DEFENSE SECURIT	420-01867-210	6881801800		7454
214	150FL	POWER SUPPLY DECOUPLIN	F0214	ECE EQUIPEMENT	530AL01CN	6825001500		19675
213	155SN1	GPS RECEIVER	F9111	THALES AVIONICS SA	C17149AA01	6814330700		368
213	155SN2							34
210	200FN	INTEGRATED ELEC.STAND-	F9111	THALES AVIONICS SA	C16786VA02	6814335300		C16786003269
213	5020SH1	ATC RACK AND STRAP ASS	1WYD3	ACSS-AN L3 COMMUNICAT	7517455-903	6815701300		MTE00399
213	5020SH2							MTE00464
213	1FP2							10481
213	1RS1	VOR/ILS/MKR.RECEIVER	4V792	ROCKWELL COLLINS INC	822-1465-001	6811010800		471LK
213	1RS2							446CR
111	1RT	GLIDE SLOPE ANTENNA	85226	DORNE AND MARGOLIN IN	DMN25-2	6820600500		6846
213	1SA1	RADIO-ALTIMETER TRANSC	F0057	THALES COMMUNICATIONS	9599-607-19993	6891101000		19993-02019
213	1SD1	DME TRANSCEIVER	4V792	ROCKWELL COLLINS INC	822-1466-001	6811011000		4BJBV
213	1SD2							4BJCH
213	1SG	T2CAS COMPUTER	1WYD3	ACSS-AN L3 COMMUNICAT	9000000-10309	6815701600		2200212

PBN Practical Cases I

RNAV 5 (B RNAV)

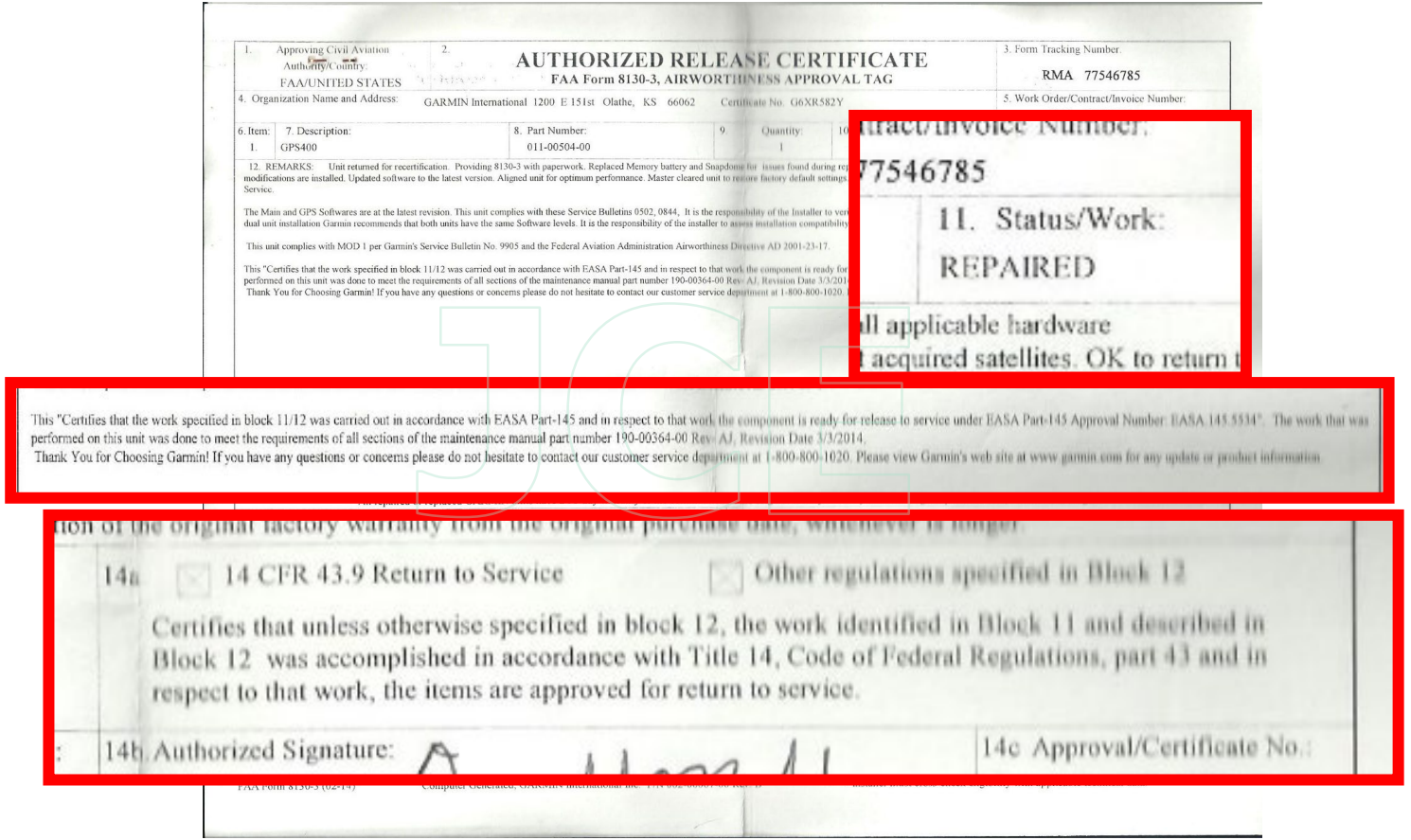
				Bat Expiry :01jul2018			
256	10MW	CMS BASIC FAP	FAPB0	VISION SYSTEMS REB	046-10108-990	6877911400	01254766202
210 210	10WK1 10WK2	MCDU	B1224	BARCO N.V. BARCOVIEW	K9321050A031	6807340200	1890264407 1890269239
211	110VM	ICP 110VM	A4582	SIRIO PANEL SPA	727-1062-01	6863459200	S11143039
211	111VM	ICP 111VM	A4582	SIRIO PANEL SPA	727-1063-01	6863459300	S12441062

Descripción	P/N	S/N
MCDU (Multi-function Control Display Unit)	K9321050A031	1890264407
		1890269239
VOR/ILS/MKR RECEIVER	822-1465-001	47ILK
		44GCR
DME TRANSCEIVER	822-1466-001	4BJBV
		4BJCH
GPS RECEIVER	C17149AA01	368
		34

PBN Practical Cases I

RNAV 5 (B RNAV)

PBN Practical Cases I



1. Approving Civil Aviation Authority/Country: FAA/UNITED STATES

AUTHORIZED RELEASE CERTIFICATE
FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG

3. Form Tracking Number: RMA 77546785

4. Organization Name and Address: GARMIN International 1200 E 151st Olathe, KS 66062 Certificate No. G6XR582Y

5. Work Order/Contract/Invoice Number:

6. Item:	7. Description:	8. Part Number:	9. Quantity:	10
1.	GPS400	011-00504-00	1	

12. REMARKS: Unit returned for recertification. Providing 8130-3 with paperwork. Replaced Memory battery and Snapdome for issues found during re… modifications are installed. Updated software to the latest version. Aligned unit for optimum performance. Master cleared unit to restore factory default settings. Service.

The Main and GPS Softwares are at the latest revision. This unit complies with these Service Bulletins 0502, 0844, It is the responsibility of the Installer to ver… dual unit installation Garmin recommends that both units have the same Software levels. It is the responsibility of the installer to assess installation compatibility…

This unit complies with MOD 1 per Garmin's Service Bulletin No. 9905 and the Federal Aviation Administration Airworthiness Directive AD 2001-23-17.

This "Certifies that the work specified in block 11/12 was carried out in accordance with EASA Part-145 and in respect to that work the component is ready for… performed on this unit was done to meet the requirements of all sections of the maintenance manual part number 190-00364-00 Rev AJ, Revision Date 3/3/201… Thank You for Choosing Garmin! If you have any questions or concerns please do not hesitate to contact our customer service department at 1-800-800-1020. …

…ract/Invoice Number:
…7546785
11. Status/Work:
REPAIRED
…ll applicable hardware
…l acquired satellites. OK to return t…

This "Certifies that the work specified in block 11/12 was carried out in accordance with EASA Part-145 and in respect to that work the component is ready for release to service under EASA Part-145 Approval Number: EASA.145.5534". The work that was performed on this unit was done to meet the requirements of all sections of the maintenance manual part number 190-00364-00 Rev AJ, Revision Date 3/3/2014.
Thank You for Choosing Garmin! If you have any questions or concerns please do not hesitate to contact our customer service department at 1-800-800-1020. Please view Garmin's web site at www.garmin.com for any update or product information.

…ion of the original factory warranty from the original purchase date, whichever is longer.

14a ☒ 14 CFR 43.9 Return to Service ☒ Other regulations specified in Block 12

Certifies that unless otherwise specified in block 12, the work identified in Block 11 and described in Block 12 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

14b. Authorized Signature:

14c Approval/Certificate No.:

FAA Form 8130-3 (02-14) Computer Generated, GARMIN International Inc. …

PBN Practical Cases I

Navigation Databases
Letters of Acceptance

- Integrity (LOA or equivalent)
  - The European Aviation Safety Agency (EASA) is responsible for the accreditation of navigation data base suppliers in Europe. A Supplier will be issued, by EASA, with a Letter of Acceptance (LOA) when the supplier has demonstrated compliance with a number of defined conditions.
  - The FAA will issue a LOA to suppliers in the United States and
  - For Canadian suppliers, the function is managed by Transport Canada and is known as an Acknowledgement Letter (AL).
  - It has been agreed in principle there will be mutual recognition of accreditations.

There are two types of LOA to ensure that data is compatible with its intended use.

PBN Practical Cases I

Navigation Databases
Letters of Acceptance

- Type 1 LOA.
  - Letter of Acceptance is granted where a navigation database supplier complies with ED-76/DO-200A with no identified compatibility with an aircraft system
  - A Type 1 LOA Supplier may not release navigation databases directly to end users
- Type 2 LOA
  - A Type 2 LOA confirms that the processes for producing navigation data comply with these Conditions and also the requirements for installing them in specific avionics equipment are fulfilled.
  - A Type 2 LOA Supplier may release navigation databases directly to end users. The Canadian AL is equivalent to a Type 2 LOA.

PBN Practical Cases I

Navigation Databases
Letters of Acceptance

→ Type 1 LOA vs. Type 2 LOA

→ **What is the difference**?

PBN Practical Cases I

Navigation Databases
Letters of Acceptance

- Type 1 acceptance letters are based on generic data requirements agreed between the data supplier and the customer and are for data suppliers **that are data service providers.**
- Type 2 acceptance letters are based on requirements that **ensure compatibility with particular systems** or equipment and are for data suppliers that are avionics manufacturers/application integrators.

Type 2 acceptance letters are intended to facilitate the operational approval process or approved maintenance program, and eliminate the operator's need to re-evaluate compatibility if the data supplier has already assured compatibility.

PBN Practical Cases I

RNAV

Navigation Databases - Letters of Acceptance

- EASA, Letters of Acceptance (LOA1)
  - EAG
  - Lufthansa Flight Nav
  - Jeppesen (Germany)
- FAA, Letters of Acceptance (LOA2) & Canadian Acknowledgement Letter
  - Jeppesen Sanderson (United States of America)
  - Honeywell Aerospace
  - Smiths Aerospace
  - CMC (Canada).
  - UNIVERSAL AVIONICS SYS.
  - GARMIN INTERNATIONAL

PBN Practical Cases I

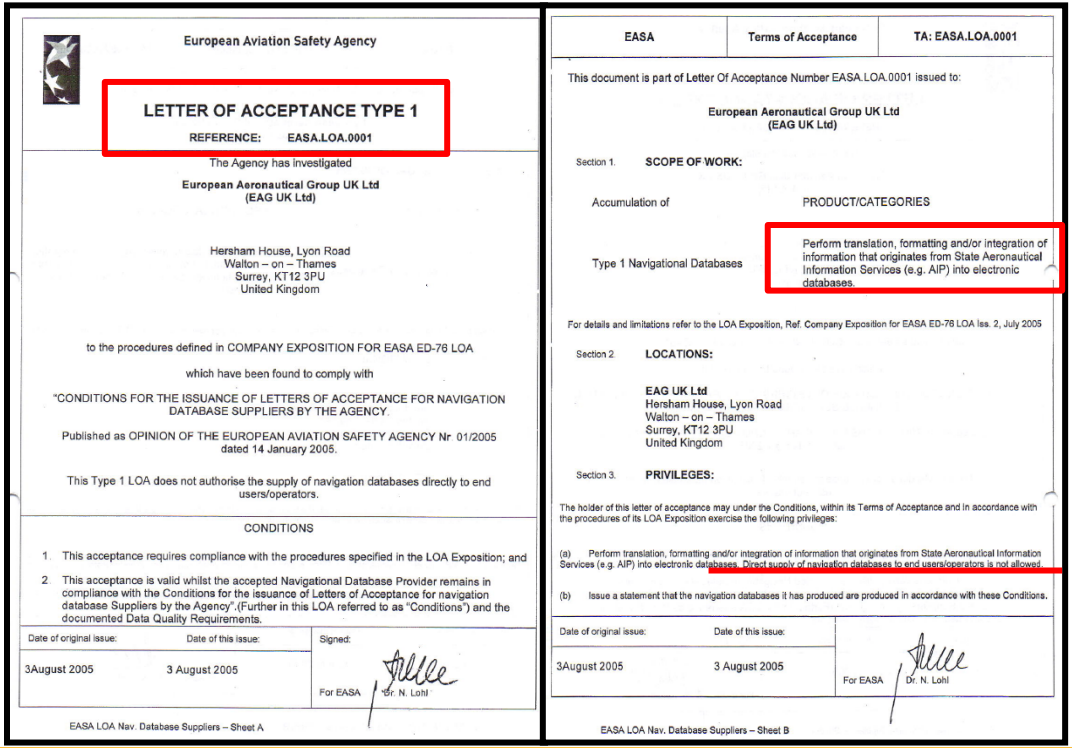
RNAV 5 (B RNAV)

Navigation Databases - Letters of Acceptance

→ ATR72-212A

PBN Practical Cases I

Navigation Databases - Letters of Acceptance



European Aviation Safety Agency

LETTER OF ACCEPTANCE TYPE 1

REFERENCE: EASA.LOA.0001

The Agency has investigated

European Aeronautical Group UK Ltd
(EAG UK Ltd)

Hersham House, Lyon Road
Walton – on – Thames
Surrey, KT12 3PU
United Kingdom

to the procedures defined in COMPANY EXPOSITION FOR EASA ED-76 LOA

which have been found to comply with

"CONDITIONS FOR THE ISSUANCE OF LETTERS OF ACCEPTANCE FOR NAVIGATION DATABASE SUPPLIERS BY THE AGENCY.

Published as OPINION OF THE EUROPEAN AVIATION SAFETY AGENCY Nr 01/2005 dated 14 January 2005.

This Type 1 LOA does not authorise the supply of navigation databases directly to end users/operators.

CONDITIONS

1. This acceptance requires compliance with the procedures specified in the LOA Exposition; and
2. This acceptance is valid whilst the accepted Navigational Database Provider remains in compliance with the Conditions for the issuance of Letters of Acceptance for navigation database Suppliers by the Agency".(Further in this LOA referred to as "Conditions") and the documented Data Quality Requirements.

Date of original issue:	Date of this issue:	Signed:
3August 2005	3 August 2005	For EASA Dr. N. Lohl

EASA LOA Nav. Database Suppliers – Sheet A

EASA	Terms of Acceptance	TA: EASA.LOA.0001

This document is part of Letter Of Acceptance Number EASA.LOA.0001 issued to:

European Aeronautical Group UK Ltd
(EAG UK Ltd)

Section 1. **SCOPE OF WORK:**

Accumulation of	PRODUCT/CATEGORIES
Type 1 Navigational Databases	Perform translation, formatting and/or integration of information that originates from State Aeronautical Information Services (e.g. AIP) into electronic databases.

For details and limitations refer to the LOA Exposition, Ref. Company Exposition for EASA ED-76 LOA Iss. 2, July 2005

Section 2. **LOCATIONS:**

EAG UK Ltd
Hersham House, Lyon Road
Walton – on – Thames
Surrey, KT12 3PU
United Kingdom

Section 3. **PRIVILEGES:**

The holder of this letter of acceptance may under the Conditions, within its Terms of Acceptance and in accordance with the procedures of its LOA Exposition exercise the following privileges:

(a) Perform translation, formatting and/or integration of information that originates from State Aeronautical Information Services (e.g. AIP) into electronic databases. Direct supply of navigation databases to end users/operators is not allowed.

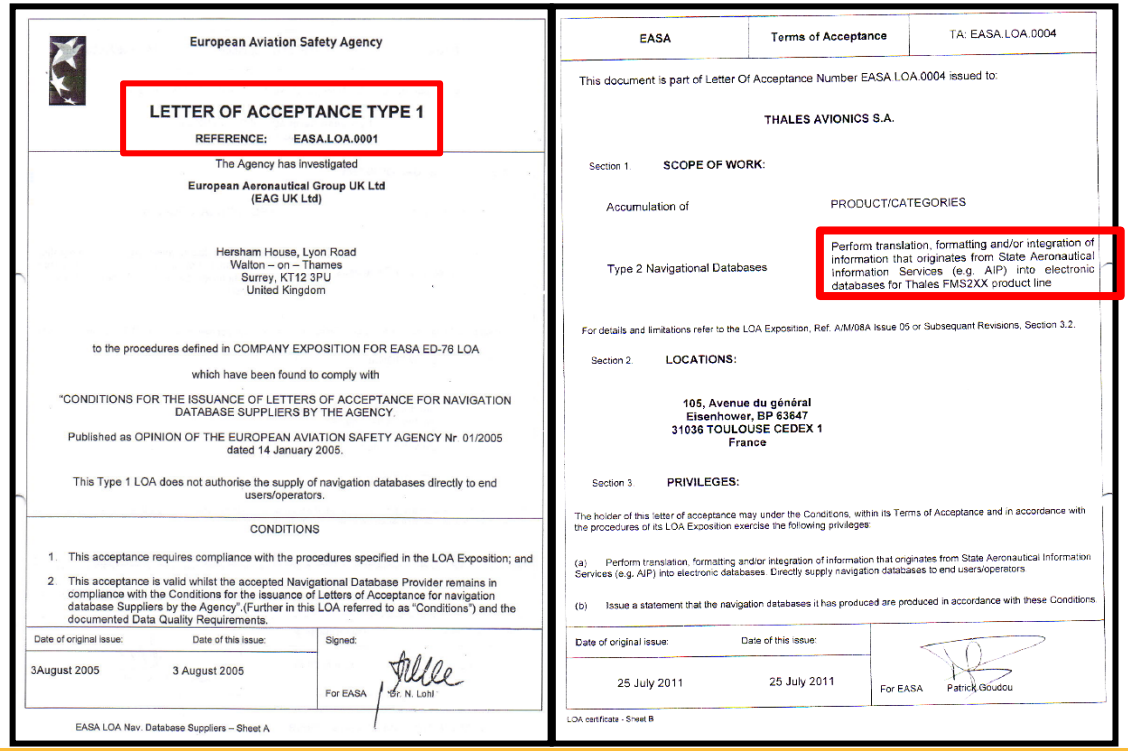
(b) Issue a statement that the navigation databases it has produced are produced in accordance with these Conditions.

Date of original issue:	Date of this issue:	
3August 2005	3 August 2005	For EASA Dr. N. Lohl

EASA LOA Nav. Database Suppliers – Sheet B

PBN Practical Cases I

Navigation Databases - Letters of Acceptance



European Aviation Safety Agency

LETTER OF ACCEPTANCE TYPE 1

REFERENCE: EASA.LOA.0001

The Agency has investigated

European Aeronautical Group UK Ltd
(EAG UK Ltd)

Hersham House, Lyon Road
Walton – on – Thames
Surrey, KT12 3PU
United Kingdom

to the procedures defined in COMPANY EXPOSITION FOR EASA ED-76 LOA

which have been found to comply with

"CONDITIONS FOR THE ISSUANCE OF LETTERS OF ACCEPTANCE FOR NAVIGATION DATABASE SUPPLIERS BY THE AGENCY.

Published as OPINION OF THE EUROPEAN AVIATION SAFETY AGENCY Nr 01/2005 dated 14 January 2005.

This Type 1 LOA does not authorise the supply of navigation databases directly to end users/operators.

CONDITIONS

1. This acceptance requires compliance with the procedures specified in the LOA Exposition; and
2. This acceptance is valid whilst the accepted Navigational Database Provider remains in compliance with the Conditions for the issuance of Letters of Acceptance for navigation database Suppliers by the Agency".(Further in this LOA referred to as "Conditions") and the documented Data Quality Requirements.

Date of original issue:	Date of this issue:	Signed:
3August 2005	3 August 2005	For EASA Dr. N. Lohl

EASA LOA Nav. Database Suppliers – Sheet A

EASA	Terms of Acceptance	TA: EASA.LOA.0004

This document is part of Letter Of Acceptance Number EASA.LOA.0004 issued to:

THALES AVIONICS S.A.

Section 1. **SCOPE OF WORK:**

Accumulation of	PRODUCT/CATEGORIES
Type 2 Navigational Databases	Perform translation, formatting and/or integration of information that originates from State Aeronautical Information Services (e.g. AIP) into electronic databases for Thales FMS2XX product line

For details and limitations refer to the LOA Exposition, Ref. A/M/08A Issue 05 or Subsequent Revisions, Section 3.2.

Section 2. **LOCATIONS:**

105, Avenue du général
Eisenhower, BP 63647
31036 TOULOUSE CEDEX 1
France

Section 3. **PRIVILEGES:**

The holder of this letter of acceptance may under the Conditions, within its Terms of Acceptance and in accordance with the procedures of its LOA Exposition exercise the following privileges:

(a) Perform translation, formatting and/or integration of information that originates from State Aeronautical Information Services (e.g. AIP) into electronic databases. Directly supply navigation databases to end users/operators

(b) Issue a statement that the navigation databases it has produced are produced in accordance with these Conditions.

Date of original issue:	Date of this issue:	
25 July 2011	25 July 2011	For EASA Patrick Goudou

LOA certificate - Sheet B

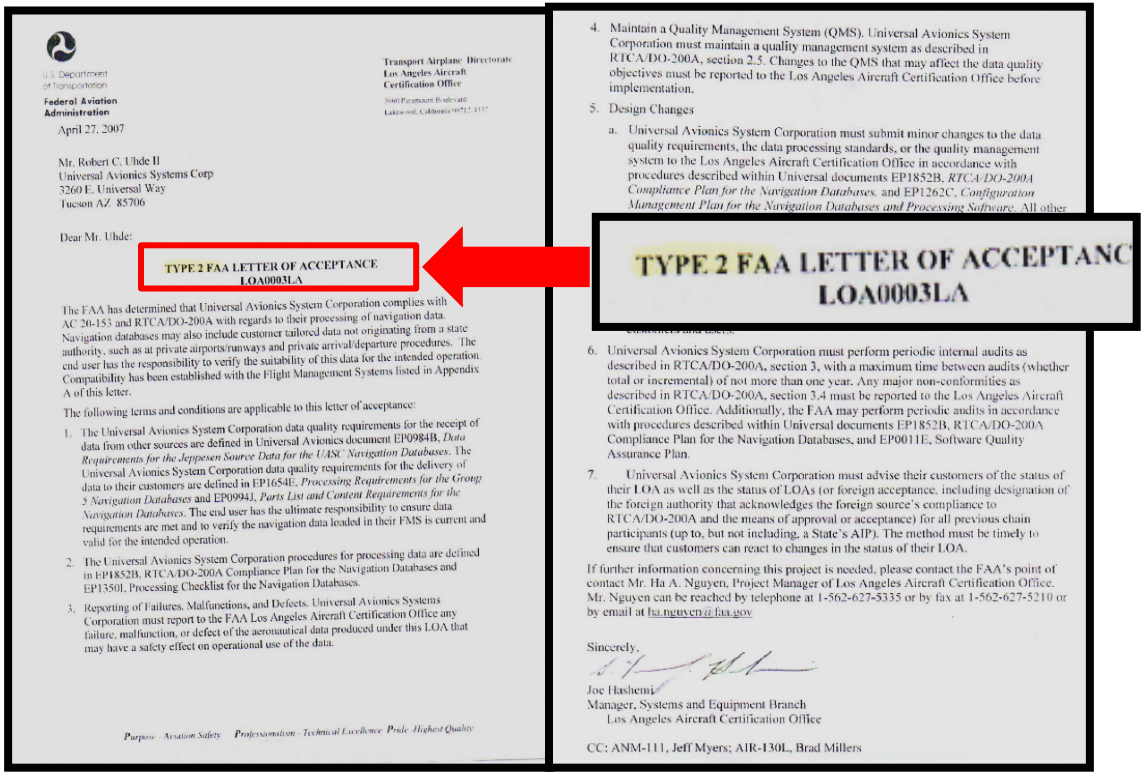
PBN Practical Cases I

Navigation Databases - Letters of Acceptance

→ Cessna 525

PBN Practical Cases I

Navigation Databases - Letters of Acceptance



U.S. Department of Transportation
Federal Aviation Administration

Transport Airplane Directorate
Los Angeles Aircraft Certification Office
3960 Paramount Boulevard
Lakewood, California 90712-4137

April 27, 2007

Mr. Robert C. Uhde II
Universal Avionics Systems Corp
3260 E. Universal Way
Tucson AZ 85706

Dear Mr. Uhde:

TYPE 2 FAA LETTER OF ACCEPTANCE
LOA0003LA

The FAA has determined that Universal Avionics System Corporation complies with AC 20-153 and RTCA/DO-200A with regards to their processing of navigation data. Navigation databases may also include customer tailored data not originating from a state authority, such as at private airports/runways and private arrival/departure procedures. The end user has the responsibility to verify the suitability of this data for the intended operation. Compatibility has been established with the Flight Management Systems listed in Appendix A of this letter.

The following terms and conditions are applicable to this letter of acceptance:

1. The Universal Avionics System Corporation data quality requirements for the receipt of data from other sources are defined in Universal Avionics document EP0984B, *Data Requirements for the Jeppesen Source Data for the UASC Navigation Databases*. The Universal Avionics System Corporation data quality requirements for the delivery of data to their customers are defined in EP1654E, *Processing Requirements for the Group 5 Navigation Databases* and EP0994J, *Parts List and Content Requirements for the Navigation Databases*. The end user has the ultimate responsibility to ensure data requirements are met and to verify the navigation data loaded in their FMS is current and valid for the intended operation.
2. The Universal Avionics System Corporation procedures for processing data are defined in EP1852B, RTCA/DO-200A Compliance Plan for the Navigation Databases and EP1350I, Processing Checklist for the Navigation Databases.
3. Reporting of Failures, Malfunctions, and Defects. Universal Avionics Systems Corporation must report to the FAA Los Angeles Aircraft Certification Office any failure, malfunction, or defect of the aeronautical data produced under this LOA that may have a safety effect on operational use of the data.

Purpose - Aviation Safety - Professionalism - Technical Excellence Pride -Highest Quality

4. Maintain a Quality Management System (QMS). Universal Avionics System Corporation must maintain a quality management system as described in RTCA/DO-200A, section 2.5. Changes to the QMS that may affect the data quality objectives must be reported to the Los Angeles Aircraft Certification Office before implementation.
5. Design Changes
   a. Universal Avionics System Corporation must submit minor changes to the data quality requirements, the data processing standards, or the quality management system to the Los Angeles Aircraft Certification Office in accordance with procedures described within Universal documents EP1852B, *RTCA/DO-200A Compliance Plan for the Navigation Databases*, and EP1262C, *Configuration Management Plan for the Navigation Databases and Processing Software*. All other

TYPE 2 FAA LETTER OF ACCEPTANC
LOA0003LA

6. Universal Avionics System Corporation must perform periodic internal audits as described in RTCA/DO-200A, section 3, with a maximum time between audits (whether total or incremental) of not more than one year. Any major non-conformities as described in RTCA/DO-200A, section 3.4 must be reported to the Los Angeles Aircraft Certification Office. Additionally, the FAA may perform periodic audits in accordance with procedures described within Universal documents EP1852B, RTCA/DO-200A Compliance Plan for the Navigation Databases, and EP0011E, Software Quality Assurance Plan.
7. Universal Avionics System Corporation must advise their customers of the status of their LOA as well as the status of LOAs (or foreign acceptance, including designation of the foreign authority that acknowledges the foreign source's compliance to RTCA/DO-200A and the means of approval or acceptance) for all previous chain participants (up to, but not including, a State's AIP). The method must be timely to ensure that customers can react to changes in the status of their LOA.

If further information concerning this project is needed, please contact the FAA's point of contact Mr. Ha A. Nguyen, Project Manager of Los Angeles Aircraft Certification Office. Mr. Nguyen can be reached by telephone at 1-562-627-5335 or by fax at 1-562-627-5210 or by email at ha.nguyen@faa.gov

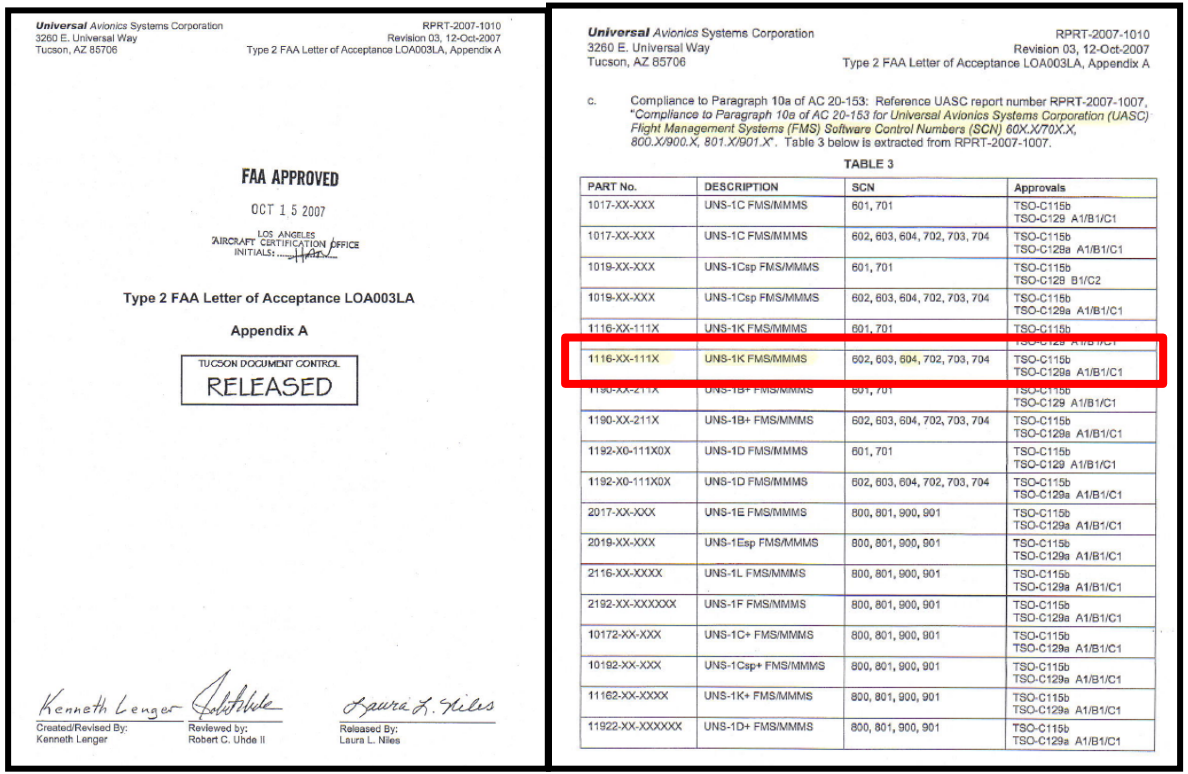
Sincerely,

Joe Hashemi
Manager, Systems and Equipment Branch
Los Angeles Aircraft Certification Office

CC: ANM-111, Jeff Myers; AIR-130L, Brad Millers

PBN Practical Cases I

Navigation Databases - Letters of Acceptance



Universal Avionics Systems Corporation
3260 E. Universal Way
Tucson, AZ 85706

RPRT-2007-1010
Revision 03, 12-Oct-2007
Type 2 FAA Letter of Acceptance LOA003LA, Appendix A

FAA APPROVED

OCT 1 5 2007

LOS ANGELES
AIRCRAFT CERTIFICATION OFFICE
INITIALS: ....

Type 2 FAA Letter of Acceptance LOA003LA

Appendix A

TUCSON DOCUMENT CONTROL
RELEASED

Kenneth Lenger — Created/Revised By: Kenneth Lenger

Reviewed by: Robert C. Uhde II

Laura L. Niles — Released By: Laura L. Niles

Universal Avionics Systems Corporation
3260 E. Universal Way
Tucson, AZ 85706

RPRT-2007-1010
Revision 03, 12-Oct-2007
Type 2 FAA Letter of Acceptance LOA003LA, Appendix A

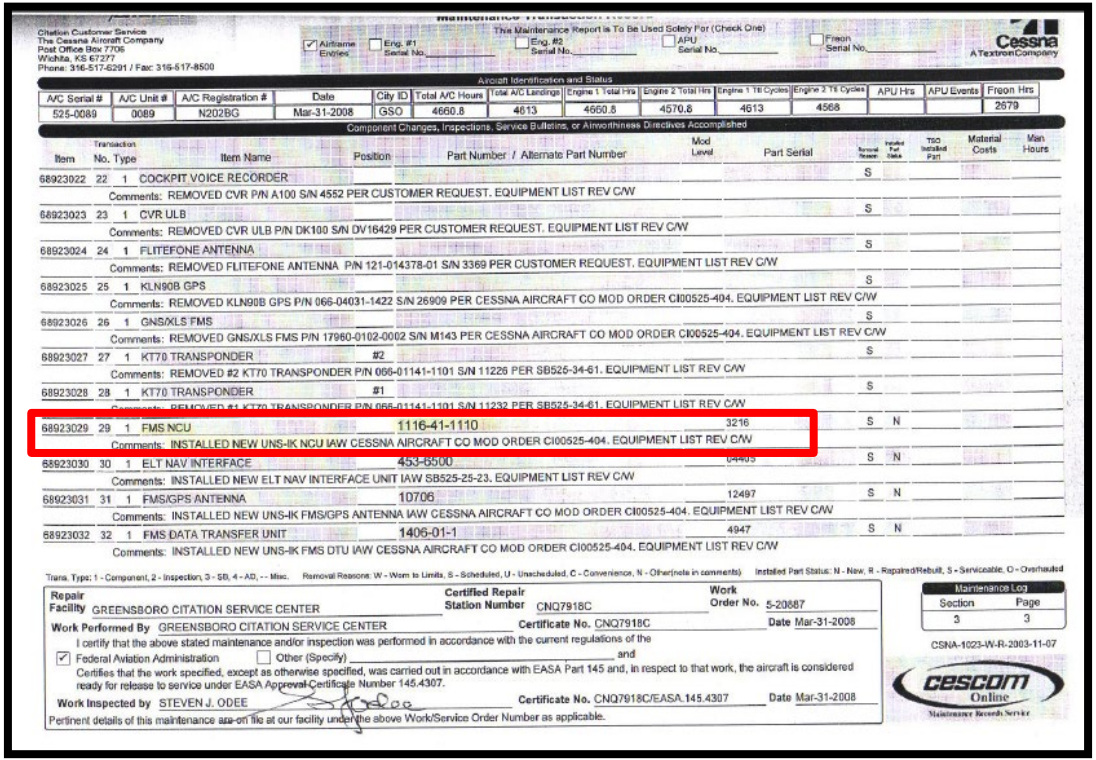
c. Compliance to Paragraph 10a of AC 20-153: Reference UASC report number RPRT-2007-1007, "*Compliance to Paragraph 10a of AC 20-153 for Universal Avionics Systems Corporation (UASC) Flight Management Systems (FMS) Software Control Numbers (SCN) 60X.X/70X.X, 800.X/900.X, 801.X/901.X*". Table 3 below is extracted from RPRT-2007-1007.

TABLE 3

PART No.	DESCRIPTION	SCN	Approvals
1017-XX-XXX	UNS-1C FMS/MMMS	601, 701	TSO-C115b TSO-C129 A1/B1/C1
1017-XX-XXX	UNS-1C FMS/MMMS	602, 603, 604, 702, 703, 704	TSO-C115b TSO-C129a A1/B1/C1
1019-XX-XXX	UNS-1Csp FMS/MMMS	601, 701	TSO-C115b TSO-C129 B1/C2
1019-XX-XXX	UNS-1Csp FMS/MMMS	602, 603, 604, 702, 703, 704	TSO-C115b TSO-C129a A1/B1/C1
1116-XX-111X	UNS-1K FMS/MMMS	601, 701	TSO-C115b TSO-C129 A1/B1/C1
1116-XX-111X	UNS-1K FMS/MMMS	602, 603, 604, 702, 703, 704	TSO-C115b TSO-C129a A1/B1/C1
1190-XX-211X	UNS-1B+ FMS/MMMS	601, 701	TSO-C115b TSO-C129 A1/B1/C1
1190-XX-211X	UNS-1B+ FMS/MMMS	602, 603, 604, 702, 703, 704	TSO-C115b TSO-C129a A1/B1/C1
1192-X0-111X0X	UNS-1D FMS/MMMS	601, 701	TSO-C115b TSO-C129 A1/B1/C1
1192-X0-111X0X	UNS-1D FMS/MMMS	602, 603, 604, 702, 703, 704	TSO-C115b TSO-C129a A1/B1/C1
2017-XX-XXX	UNS-1E FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
2019-XX-XXX	UNS-1Esp FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
2116-XX-XXXX	UNS-1L FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
2192-XX-XXXXXX	UNS-1F FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
10172-XX-XXX	UNS-1C+ FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
10192-XX-XXX	UNS-1Csp+ FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
11162-XX-XXXX	UNS-1K+ FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1
11922-XX-XXXXXX	UNS-1D+ FMS/MMMS	800, 801, 900, 901	TSO-C115b TSO-C129a A1/B1/C1

PBN Practical Cases I

Navigation Databases - Letters of Acceptance



Citation Customer Service
The Cessna Aircraft Company
Post Office Box 7706
Wichita, KS 67277
Phone: 316-517-6291 / Fax: 316-517-8500

This Maintenance Report is To Be Used Solely For (Check One)
☑ Airframe Entries ☐ Eng. #1 Serial No. ☐ Eng. #2 Serial No. ☐ APU Serial No. ☐ Freon Serial No.

Cessna — A Textron Company

Aircraft Identification and Status

A/C Serial #	A/C Unit #	A/C Registration #	Date	City ID	Total A/C Hours	Total A/C Landings	Engine 1 Total Hrs	Engine 2 Total Hrs	Engine 1 TR Cycles	Engine 2 TR Cycles	APU Hrs	APU Events	Freon Hrs
525-0089	0089	N202BG	Mar-31-2008	GSO	4660.8	4613	4660.8	4570.8	4613	4568			2679

Component Changes, Inspections, Service Bulletins, or Airworthiness Directives Accomplished

Item	Transaction No.	Type	Item Name	Position	Part Number / Alternate Part Number	Mod Level	Part Serial	Removal Reason	Installed Part Status	TSO Installed Part	Material Costs	Man Hours
68923022	22	1	COCKPIT VOICE RECORDER					S				
			Comments: REMOVED CVR P/N A100 S/N 4552 PER CUSTOMER REQUEST. EQUIPMENT LIST REV C/W									
68923023	23	1	CVR ULB					S				
			Comments: REMOVED CVR ULB P/N DK100 S/N DV16429 PER CUSTOMER REQUEST. EQUIPMENT LIST REV C/W									
68923024	24	1	FLITEFONE ANTENNA					S				
			Comments: REMOVED FLITEFONE ANTENNA P/N 121-014378-01 S/N 3369 PER CUSTOMER REQUEST. EQUIPMENT LIST REV C/W									
68923025	25	1	KLN90B GPS					S				
			Comments: REMOVED KLN90B GPS P/N 066-04031-1422 S/N 26909 PER CESSNA AIRCRAFT CO MOD ORDER CI00525-404. EQUIPMENT LIST REV C/W									
68923026	26	1	GNS/XLS FMS					S				
			Comments: REMOVED GNS/XLS FMS P/N 17960-0102-0002 S/N M143 PER CESSNA AIRCRAFT CO MOD ORDER CI00525-404. EQUIPMENT LIST REV C/W									
68923027	27	1	KT70 TRANSPONDER	#2				S				
			Comments: REMOVED #2 KT70 TRANSPONDER P/N 066-01141-1101 S/N 11226 PER SB525-34-61. EQUIPMENT LIST REV C/W									
68923028	28	1	KT70 TRANSPONDER	#1				S				
			Comments: REMOVED #1 KT70 TRANSPONDER P/N 066-01141-1101 S/N 11232 PER SB525-34-61. EQUIPMENT LIST REV C/W									
68923029	29	1	FMS NCU		1116-41-1110		3216	S	N			
			Comments: INSTALLED NEW UNS-IK NCU IAW CESSNA AIRCRAFT CO MOD ORDER CI00525-404. EQUIPMENT LIST REV C/W									
68923030	30	1	ELT NAV INTERFACE		453-6500		04405	S	N			
			Comments: INSTALLED NEW ELT NAV INTERFACE UNIT IAW SB525-25-23. EQUIPMENT LIST REV C/W									
68923031	31	1	FMS/GPS ANTENNA		10706		12497	S	N			
			Comments: INSTALLED NEW UNS-IK FMS/GPS ANTENNA IAW CESSNA AIRCRAFT CO MOD ORDER CI00525-404. EQUIPMENT LIST REV C/W									
68923032	32	1	FMS DATA TRANSFER UNIT		1406-01-1		4947	S	N			
			Comments: INSTALLED NEW UNS-IK FMS DTU IAW CESSNA AIRCRAFT CO MOD ORDER CI00525-404. EQUIPMENT LIST REV C/W									

Trans. Type: 1 - Component, 2 - Inspection, 3 - SB, 4 - AD, -- Misc. Removal Reasons: W - Worn to Limits, S - Scheduled, U - Unscheduled, C - Convenience, N - Other(note in comments) Installed Part Status: N - New, R - Repaired/Rebuilt, S - Serviceable, O - Overhauled

Repair Facility GREENSBORO CITATION SERVICE CENTER
Certified Repair Station Number CNQ7918C
Work Order No. 5-20887

Work Performed By GREENSBORO CITATION SERVICE CENTER
Certificate No. CNQ7918C **Date** Mar-31-2008

I certify that the above stated maintenance and/or inspection was performed in accordance with the current regulations of the
☑ Federal Aviation Administration ☐ Other (Specify) _____ and
Certifies that the work specified, except as otherwise specified, was carried out in accordance with EASA Part 145 and, in respect to that work, the aircraft is considered ready for release to service under EASA Approval Certificate Number 145.4307.

Work Inspected by STEVEN J. ODEE
Certificate No. CNQ7918C/EASA.145.4307 **Date** Mar-31-2008

Pertinent details of this maintenance are on file at our facility under the above Work/Service Order Number as applicable.

Maintenance Log

Section	Page
3	3

CSNA-1023-W-R-2003-11-07

cescom Online — Maintenance Records Service

PBN Practical Cases I

RNAV 5 (B RNAV)

B-RNAV Airworthiness and maintenance requirements				
Reference	**No.**	**Requirement**	**Observance**	**Reference Document**
ICAO Doc 9613-AN/937 TGL Nº2	3	Verify the maintenance actions to be performed on the components of the BRNAV system. If necessary, verify specific training on BRNAV tasks for maintenance staff.	☐ YES ☐ NO	

PBN Practical Cases I

RNAV 5 (B RNAV)

→ Aircraft Specific Maintenance Requirements

- → Maintenance requirements that are specific to individual aircraft are detailed in the Aircraft-Specific chapters of the Maintenance Manuals
- → Note that while there are standard RNAV maintenance procedures for each aircraft, even for the same manufacturer and model, some aircraft may have been certified RNAV compliant in different ways—i.e., by SB compliance, or different STCs on the same series of aircraft.
- → It is important that the technicians working on the aircraft pay attention to differences in the Aircraft-Specific chapter for a given aircraft.

PBN Practical Cases I

RNAV 5 (B RNAV)

→ Factory RNAV Compliant Aircraft

- → Most of these aircraft will have the RNAV related items as part of the factory inspection list and will not require any special consideration other than following the inspection list in a timely and compliant manner.

→ Other Aircraft

- → Aircraft that are RNAV-compliant either by compliance with a SB or STC usually need to modify the inspection program to ensure that the RNAV items, usually items incorporated in the Instructions for Continuous Airworthiness (ICAs), are followed and performed in a timely and compliant manner.

PBN Practical Cases I

RNAV 5 (B RNAV)

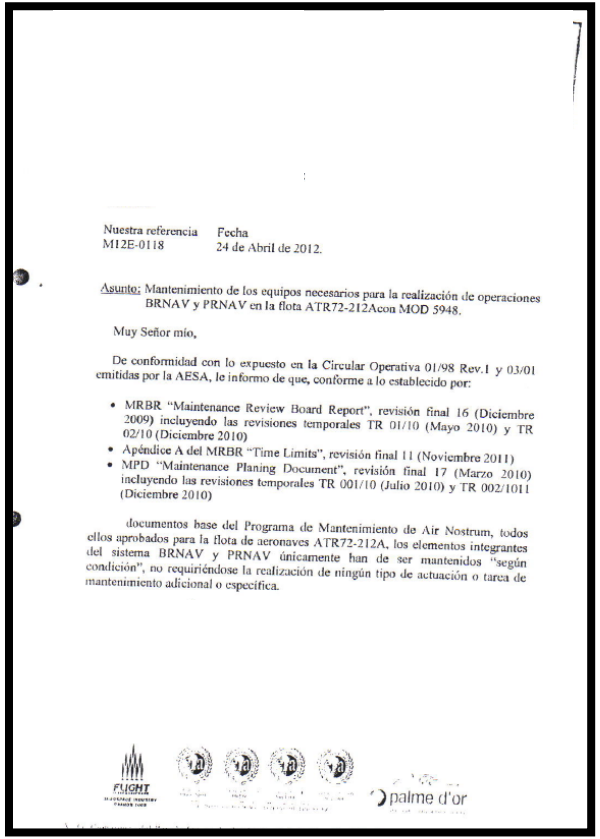
→ ATR72-212A

PBN Practical Cases I

RNAV 5 (B RNAV)

MAINTENANCE program

- USUAL: statement signed by the Airworthiness manager
- EQUIPMENT : no scheduled maintenance ("ON CONDITION")
- EQUIPMENT WITH PERIODIC MAINTENANCE .. (“e.g. OPERATIONAL TEST")
- TASK to be included.: "NAV DATA UPDATE" (28 DAYS)



Nuestra referencia
M12E-0118

Fecha
24 de Abril de 2012.

Asunto: Mantenimiento de los equipos necesarios para la realización de operaciones BRNAV y PRNAV en la flota ATR72-212Acon MOD 5948.

Muy Señor mío,

De conformidad con lo expuesto en la Circular Operativa 01/98 Rev.1 y 03/01 emitidas por la AESA, le informo de que, conforme a lo establecido por:

- MRBR “Maintenance Review Board Report”, revisión final 16 (Diciembre 2009) incluyendo las revisiones temporales TR 01/10 (Mayo 2010) y TR 02/10 (Diciembre 2010)
- Apéndice A del MRBR “Time Limits”, revisión final 11 (Noviembre 2011)
- MPD “Maintenance Planing Document”, revisión final 17 (Marzo 2010) incluyendo las revisiones temporales TR 001/10 (Julio 2010) y TR 002/1011 (Diciembre 2010)

documentos base del Programa de Mantenimiento de Air Nostrum, todos ellos aprobados para la flota de aeronaves ATR72-212A, los elementos integrantes del sistema BRNAV y PRNAV únicamente han de ser mantenidos “según condición”, no requiriéndose la realización de ningún tipo de actuación o tarea de mantenimiento adicional o específica.

FLIGHT

palme d'or

Example accepted by the spanish CAA. Complimentary translation will be delivered during the course

PBN Practical Cases I

RNAV 5 (B RNAV)

B-RNAV Airworthiness and maintenance requirements				
Reference	**No.**	**Requirement**	**Observance**	**Reference Document**
JAR MMEL-MEL	4	The Minimum Equipment List (MEL) in effect for this airplane contemplates this type of operation	☐ YES ☐ NO	

PBN Practical Cases I

RNAV 5 (B RNAV)

→ MEL STATUS

- → The MEL has to be carefully reviewed for any open discrepancies and it is determined that none of the open items will make the aircraft ineligible for RNAV flights. If a technician is in doubt about the applicability of any given MEL item and its impact on RNAV operations they shall consult with the Director of Maintenance for guidance.
- → Special attention must be paid to any deferred items in the:
  - →a. ATA 22 – Auto Flight,
  - →b. ATA 23 – Communications, and
  - →c. ATA 34 – Navigation areas.

PBN Practical Cases I

RNAV 5 (B RNAV)

→ Minimum Equipment List (MEL)

- → Should identify the minimum equipment necessary to operate RNAV which must be operational for dispatch of the aircraft
- → Depends on the "avionics architecture" for every type of aircraft - DOC. REFERENCE: MMEL, AFM / S, STC, FCOM and TGL-26

PBN Practical Cases I

RNAV 5 (B RNAV)

→ MEL Status

→ A deferred discrepancy may be MEL legal for most flights, but would not allow the aircraft into a RNAV airspace!

An example might be a VOR equipment that could be inoperative for non- RNAV operations but must be functional for flights into RNAV airspace.

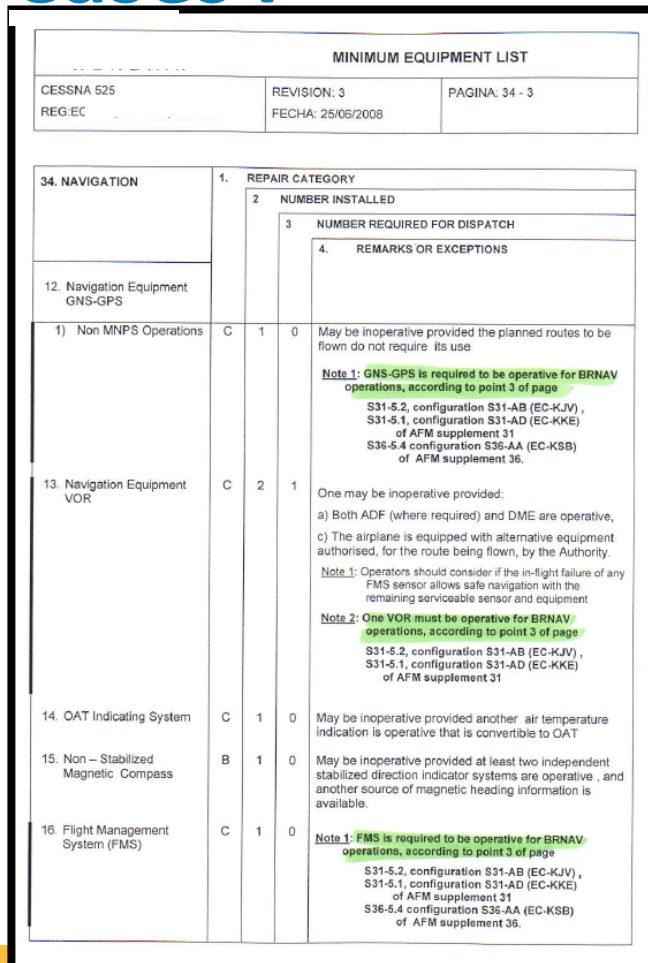
PBN Practical Cases I

RNAV 5 (B RNAV)

→ Cessna 525

PBN Practical Cases I

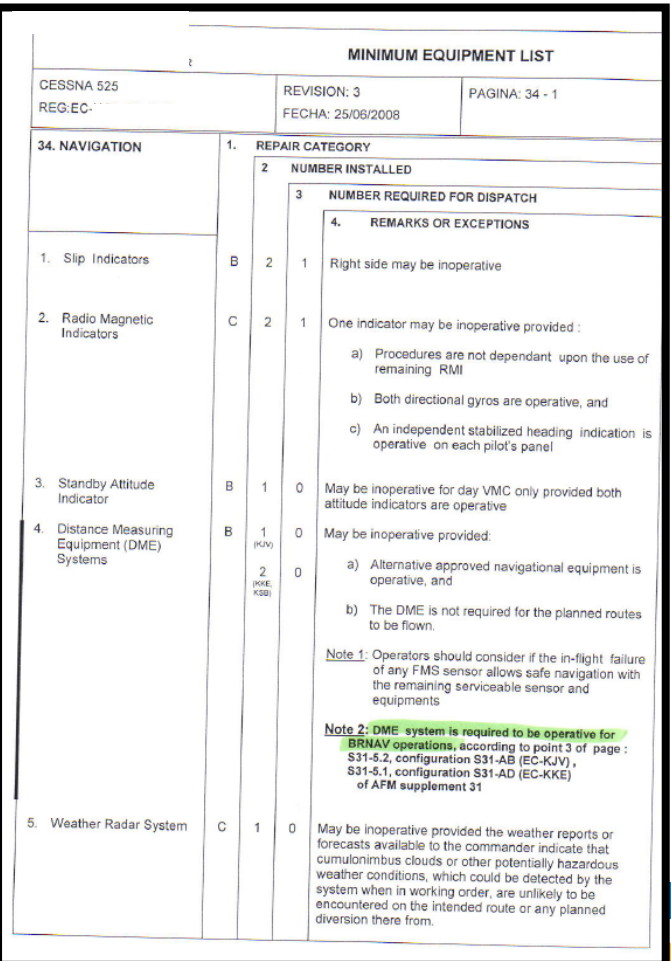
RNAV 5 (B RNAV)



MINIMUM EQUIPMENT LIST

CESSNA 525 REG:EC	REVISION: 3 FECHA: 25/06/2008	PAGINA: 34 - 3

34. NAVIGATION	1. REPAIR CATEGORY	2 NUMBER INSTALLED	3 NUMBER REQUIRED FOR DISPATCH	4. REMARKS OR EXCEPTIONS
12. Navigation Equipment GNS-GPS				
1) Non MNPS Operations	C	1	0	May be inoperative provided the planned routes to be flown do not require its use Note 1: GNS-GPS is required to be operative for BRNAV operations, according to point 3 of page S31-5.2, configuration S31-AB (EC-KJV), S31-5.1, configuration S31-AD (EC-KKE) of AFM supplement 31 S36-5.4 configuration S36-AA (EC-KSB) of AFM supplement 36.
13. Navigation Equipment VOR	C	2	1	One may be inoperative provided: a) Both ADF (where required) and DME are operative, c) The airplane is equipped with alternative equipment authorised, for the route being flown, by the Authority. Note 1: Operators should consider if the in-flight failure of any FMS sensor allows safe navigation with the remaining serviceable sensor and equipment Note 2: One VOR must be operative for BRNAV operations, according to point 3 of page S31-5.2, configuration S31-AB (EC-KJV), S31-5.1, configuration S31-AD (EC-KKE) of AFM supplement 31
14. OAT Indicating System	C	1	0	May be inoperative provided another air temperature indication is operative that is convertible to OAT
15. Non – Stabilized Magnetic Compass	B	1	0	May be inoperative provided at least two independent stabilized direction indicator systems are operative, and another source of magnetic heading information is available.
16. Flight Management System (FMS)	C	1	0	Note 1: FMS is required to be operative for BRNAV operations, according to point 3 of page S31-5.2, configuration S31-AB (EC-KJV), S31-5.1, configuration S31-AD (EC-KKE) of AFM supplement 31 S36-5.4 configuration S36-AA (EC-KSB) of AFM supplement 36.



MINIMUM EQUIPMENT LIST

CESSNA 525 REG:EC-	REVISION: 3 FECHA: 25/06/2008	PAGINA: 34 - 1

34. NAVIGATION	1. REPAIR CATEGORY	2 NUMBER INSTALLED	3 NUMBER REQUIRED FOR DISPATCH	4. REMARKS OR EXCEPTIONS
1. Slip Indicators	B	2	1	Right side may be inoperative
2. Radio Magnetic Indicators	C	2	1	One indicator may be inoperative provided : a) Procedures are not dependant upon the use of remaining RMI b) Both directional gyros are operative, and c) An independent stabilized heading indication is operative on each pilot's panel
3. Standby Attitude Indicator	B	1	0	May be inoperative for day VMC only provided both attitude indicators are operative
4. Distance Measuring Equipment (DME) Systems	B	1 (KJV) 2 (KKE, KSB)	0 0	May be inoperative provided: a) Alternative approved navigational equipment is operative, and b) The DME is not required for the planned routes to be flown. Note 1: Operators should consider if the in-flight failure of any FMS sensor allows safe navigation with the remaining serviceable sensor and equipments Note 2: DME system is required to be operative for BRNAV operations, according to point 3 of page : S31-5.2, configuration S31-AB (EC-KJV), S31-5.1, configuration S31-AD (EC-KKE) of AFM supplement 31
5. Weather Radar System	C	1	0	May be inoperative provided the weather reports or forecasts available to the commander indicate that cumulonimbus clouds or other potentially hazardous weather conditions, which could be detected by the system when in working order, are unlikely to be encountered on the intended route or any planned diversion there from.

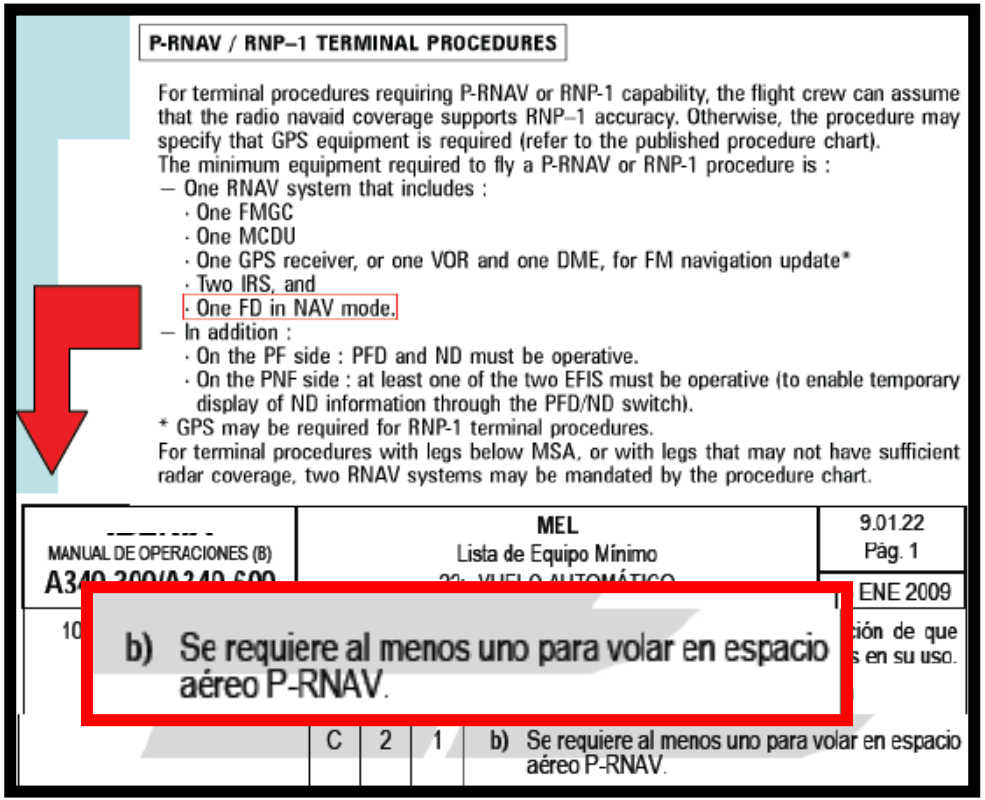
PBN Practical Cases I

RNAV 5 (B RNAV)

→ Airbus A-340-300/600

PBN Practical Cases I

RNAV 5 (B RNAV)



P-RNAV / RNP–1 TERMINAL PROCEDURES

For terminal procedures requiring P-RNAV or RNP-1 capability, the flight crew can assume that the radio navaid coverage supports RNP–1 accuracy. Otherwise, the procedure may specify that GPS equipment is required (refer to the published procedure chart).
The minimum equipment required to fly a P-RNAV or RNP-1 procedure is :

– One RNAV system that includes :
  · One FMGC
  · One MCDU
  · One GPS receiver, or one VOR and one DME, for FM navigation update*
  · Two IRS, and
  · One FD in NAV mode.
– In addition :
  · On the PF side : PFD and ND must be operative.
  · On the PNF side : at least one of the two EFIS must be operative (to enable temporary display of ND information through the PFD/ND switch).

* GPS may be required for RNP-1 terminal procedures.
For terminal procedures with legs below MSA, or with legs that may not have sufficient radar coverage, two RNAV systems may be mandated by the procedure chart.

MANUAL DE OPERACIONES (B) — MEL — Lista de Equipo Mínimo — 9.01.22 Pág. 1 — ENE 2009

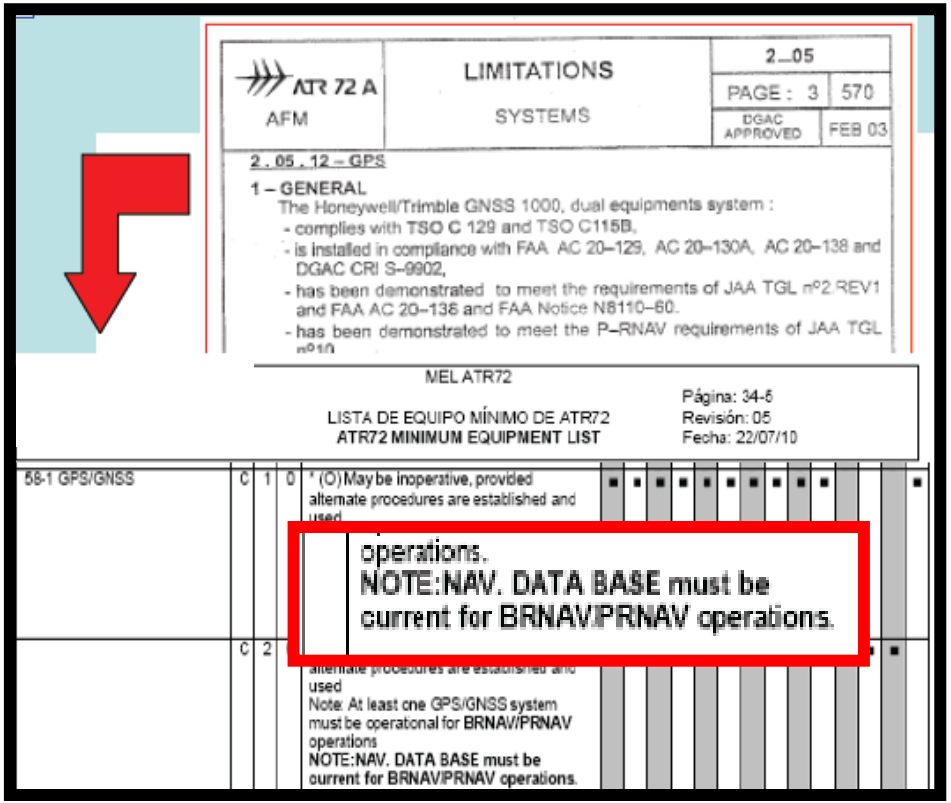
b) Se requiere al menos uno para volar en espacio aéreo P-RNAV.

	C	2	1	b) Se requiere al menos uno para volar en espacio aéreo P-RNAV.

Example accepted by the spanish CAA. Complimentary translation will be delivered during the course

PBN Practical Cases I

RNAV 5 (B RNAV)



ATR 72 A
AFM

LIMITATIONS
SYSTEMS

2_05
PAGE : 3 570
DGAC APPROVED FEB 03

2 . 05 . 12 – GPS

1 – GENERAL
The Honeywell/Trimble GNSS 1000, dual equipments system :
- complies with TSO C 129 and TSO C115B,
- is installed in compliance with FAA AC 20–129, AC 20–130A, AC 20–138 and DGAC CRI S–9902,
- has been demonstrated to meet the requirements of JAA TGL nº2 REV1 and FAA AC 20–138 and FAA Notice N8110–60.
- has been demonstrated to meet the P–RNAV requirements of JAA TGL nº10

MEL ATR72

LISTA DE EQUIPO MÍNIMO DE ATR72
ATR72 MINIMUM EQUIPMENT LIST

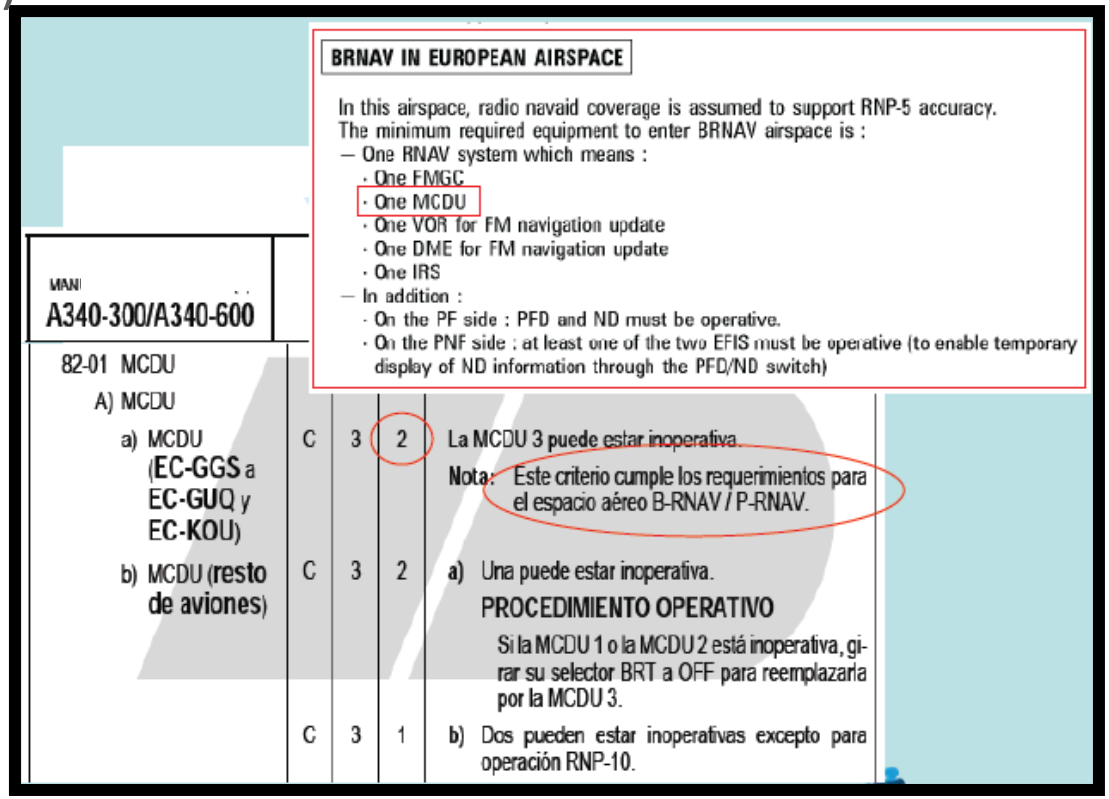
Página: 34-6
Revisión: 05
Fecha: 22/07/10

58-1 GPS/GNSS	C	1	0	* (O) May be inoperative, provided alternate procedures are established and used	
	C	2		alternate procedures are established and used Note: At least one GPS/GNSS system must be operational for BRNAV/PRNAV operations NOTE:NAV. DATA BASE must be current for BRNAV/PRNAV operations.	

operations.
NOTE:NAV. DATA BASE must be current for BRNAV/PRNAV operations.

PBN Practical Cases I

RNAV 5 (B RNAV)



BRNAV IN EUROPEAN AIRSPACE

In this airspace, radio navaid coverage is assumed to support RNP-5 accuracy.
The minimum required equipment to enter BRNAV airspace is :

— One RNAV system which means :
- One FMGC
- One MCDU
- One VOR for FM navigation update
- One DME for FM navigation update
- One IRS

— In addition :
- On the PF side : PFD and ND must be operative.
- On the PNF side : at least one of the two EFIS must be operative (to enable temporary display of ND information through the PFD/ND switch)

MANI
A340-300/A340-600

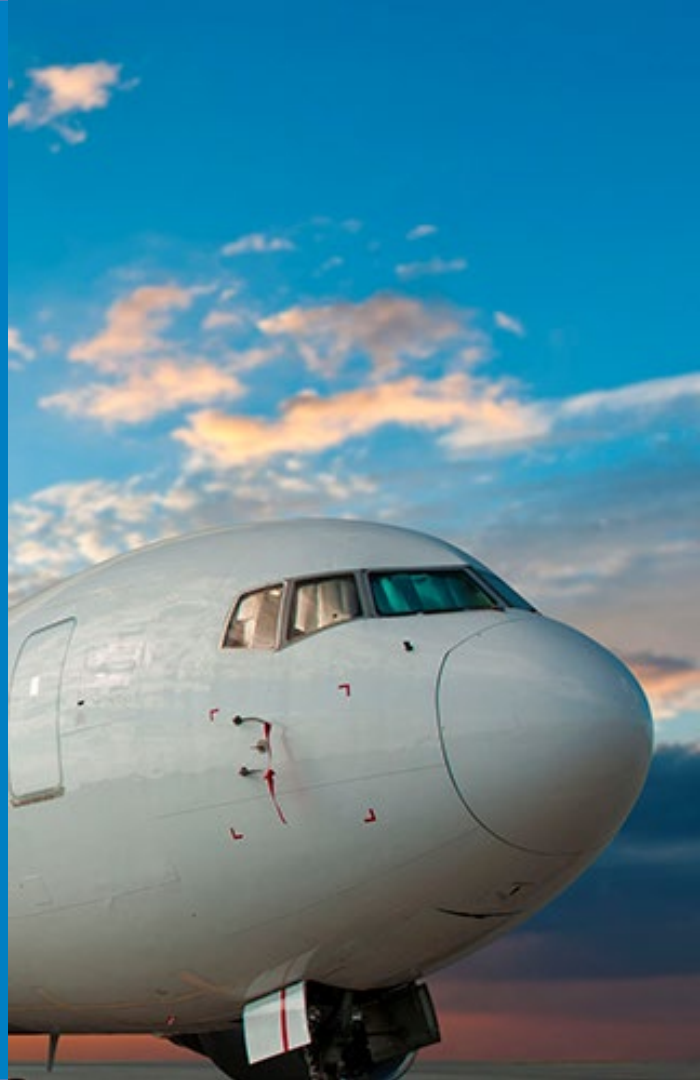
82-01 MCDU				
A) MCDU				
a) MCDU (**EC-GGS** a **EC-GUQ** y **EC-KOU**)	C	3	2	La MCDU 3 puede estar inoperativa. **Nota:** Este criterio cumple los requerimientos para el espacio aéreo B-RNAV / P-RNAV.
b) MCDU (**resto de aviones**)	C	3	2	a) Una puede estar inoperativa. **PROCEDIMIENTO OPERATIVO** Si la MCDU 1 o la MCDU 2 está inoperativa, girar su selector BRT a OFF para reemplazarla por la MCDU 3.
	C	3	1	b) Dos pueden estar inoperativas excepto para operación RNP-10.

Example accepted by the spanish CAA. Complimentary translation will be delivered during the course

EASA
European Union Aviation Safety Agency

PBN Practical Cases II

PBN Operational Approvals Workshop



An Agency of the European Union

PBN Practical Cases II

Operations

AMC1 CAT.OP.MPA.126 Performance-based navigation

ED Decision 2016/015/R

PBN OPERATIONS

For operations where a navigation specification for performance-based navigation (PBN) has been prescribed and no specific approval is required in accordance with SPA.PBN.100, the operator should:

(a) establish operating procedures specifying:

(1) normal, abnormal and contingency procedures;

(2) electronic navigation database management; and

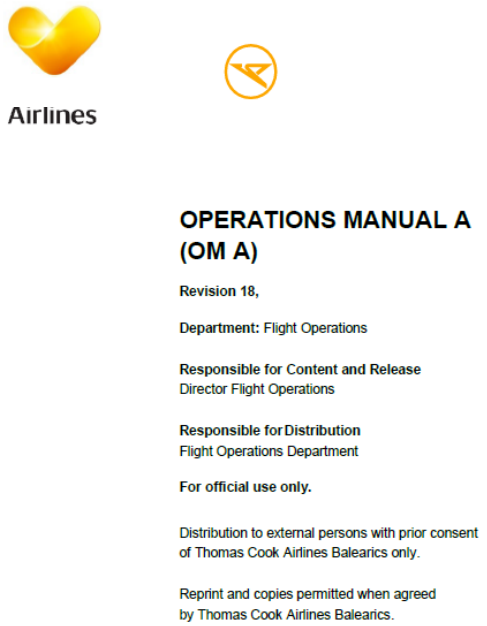
(3) relevant entries in the minimum equipment list (MEL);

(b) specify the flight crew qualification and proficiency constraints and ensure that the training programme for relevant personnel is consistent with the intended operation; and

(c) ensure continued airworthiness of the area navigation system.

PBN Practical Cases II

- Part A: Includes general information describing the basic aspects of the organization and its structure including policies, instructions and operating procedures.
- Part B: Includes information related to aircraft operating matters such as service and maintenance, and normal, abnormal and emergency procedures taking into account the differences between aircrafts.
- Part C: Commercial air transport operations, comprising route/role/area and aerodrome/operating site instructions and information.
- Part D: Includes information about the training such as the instructions of the staff and their evaluation.



PBN Practical Cases II

Table 1–Operational Manual impacted parts chapter and sections.

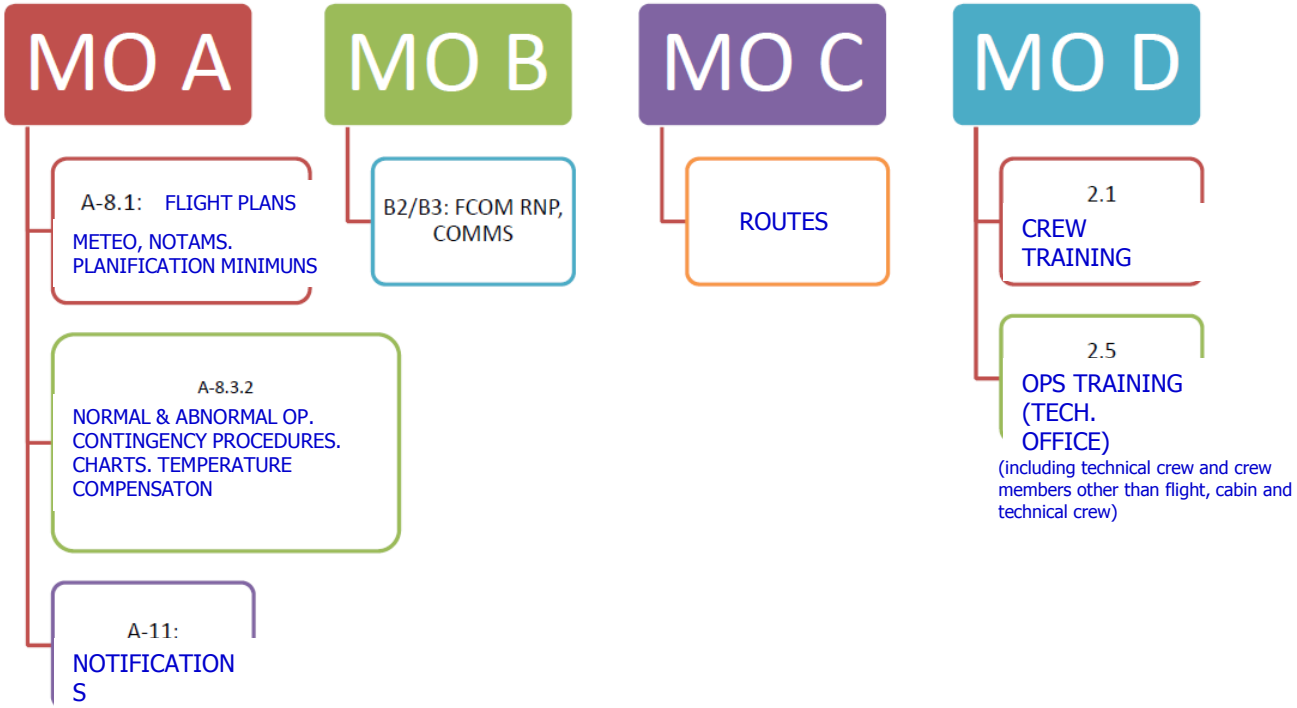
Chapter		Section	Subsection	Amendments
Part A. General/Basic				
OM-A	**0.** Administration and control of OM	**0.1** Introduction	**(d)** Explanations and definitions of terms	New RNP definitions and abbreviations
		0.2 System of amendment and revision		Revision update
	1. Organisation and responsibilities	**1.3** Responsibilities and Duties		Potential new functions/responsible (See Appendix A): - NAV data handling, quality and control - Routes, flight plans, NOTAM check and occurrence reporting
	2. Operational control and supervision	**2.2** System and responsibility for promulgation of additional operational instructions and information		NOTAMs, AIPs and AICs related information
		2.3 Operational control		- RNP APCH related information distribution process for safe operation. - Aerodrome categorisation
	3 Management system	Quality System – duties and responsibilities		NAV data handling, quality and control processes
	5 Qualification requirements	**5.1** A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties.		Crew Authorisation required/validation (See Section 6).
	8. Operating Procedures	**8.1** Flight preparation instructions.	**8.1.2** Criteria and responsibilities for determining the adequacy of aerodromes to be used	- RNP procedure operational evaluation - Use of NOTAM/RAIM to select destination / alternate aerodrome
			8.1.3 Methods and responsibilities for establishing aerodrome operating minima.	Calculations for RNP APCH operations (e.g. RVR and DA(H))
			8.1.5 Presentation/application of aerodrome operating minima	APCH charts presentation, i.e. RNAV (GNSS)
			8.1.9 ATS flight plan	Explanation on ATS flight plans submission (state RNP APCH capability[9]).
			8.1.10 Operational flight plan	Procedures for elaboration and submission of operational flight plans for RNP APCH.

PBN Practical Cases II

	Chapter	Section	Subsection	Amendments
OM-A	**8.** Operating Procedures	**8.3** Flight Procedures	**8.3.2** Navigation Procedures. A description of all navigation procedures, relevant to the type(s) and area(s) of operation. Special consideration given to: a. standard navigational procedures; and b. RNP and Minimum Navigation Performance Specification c. in-flight re-planning; d. procedures in the event of system degradation;	Update (see Appendix A): - RNAV/RNP concepts including NOTAM; - Crew qualification - Database (Type 2 LoA) - Normal and abnormal procedures - Radiotelephony, RTF phraseology - Navigation accuracy assessment at dispatch, for destination and alternates;
		8.6 Use of the minimum equipment and configuration deviation list(s).		MEL handling (if changes are necessary).
	11. Handling and reporting occurrences	Procedures for handling, notifying and reporting accidents, incidents and occurrences.		Include procedures for RNP issues reporting (See Section 8.6)
B. Aircraft Operating Matters – Type Related				
OM-B	**1.** Limitations	Description of the certified limitations and the applicable operational limitations: Certification status - EASA (S)TC, Types of approved operations (RNP APCH) and Navigation System limitations		Update STC/TC certification and approved operations
	2. Normal procedures			See Appendix A
	3. Abnormal and/or emergency procedures			See Appendix A
	9. Minimum Equipment List (MEL)			Include MMEL dispatch conditions for RNP APCH.
	12. Aircraft Systems			Update on RNP APCH navigation capability
Part C. Route/Role/Area and Aerodrome/Operating Site Instructions				
OM-C	**1** Instructions and information relating to communications, navigation and aerodromes/operating sites including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome/operating site planned to be used, including the following			- Operating minima - Navigation aids and Communications - Charts description
Part D. Training				
OM-D	**1** Description of scope: Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight.			Setup training program (modules): purpose, scope, requirements, conditions, instructors, etc. (See Section 6 and Appendix B).
	2 Training syllabi and checking programmes	**2.1** for flight crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.FC;		Ground and FSTD/Airplane practical training and checking.
		2.5 for operations personnel other than crew members (e.g. dispatcher, handling personnel etc.)		RNP APCH training for supervisors and other than crew personnel
	3 Procedures	**3.1** Procedures for training and checking.		Include RNP APCH procedures and simulator/training devices selection criteria

PBN Practical Cases II

Operations Manual Affected Parts



PBN Practical Cases II

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

The OM should contain at least the following information, where applicable, as relevant for the area and type of operation:

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AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

A GENERAL/BASIC

8 OPERATING PROCEDURES

8.3.2 Navigation Procedures. A description of all navigation procedures, relevant to the type(s) and area(s) of operation. Special consideration should be given to:

(a) standard navigational procedures, including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aircraft; and

(b) required navigation performance (RNP), minimum navigation performance specification (MNPS) and polar navigation and navigation in other designated areas;

(c) in-flight re-planning;

(d) procedures in the event of system degradation; and

(e) reduced vertical separation minima (RVSM), for aeroplanes.

PBN Practical Cases II

PARTE A
PART A

RNAV 1

OPERATIONS MANUAL A (OM A)

Revision 18,

Department: Flight Operations

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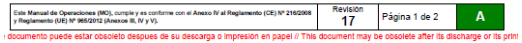


PBN Practical Cases II

GOLD.GEN. 200 (a) (3) (e) AMC1 ORO.GEN.200 (a) (3) (e) AMC 20-26 1, 2, 3, 5, 10.7, Appendices 3 and 5

The operator has implemented the actions derived from the change management process as established in section A 3 of the MO to adequately manage the risk associated with this new RNAV1 operation

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT
REQUEST COMMUNICATIONS BY DATA LINK
(CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

PBN Practical Cases II

GOLD.GEN. 200 (a) (3) (e) AMC1 ORO.GEN.200 (a) (3) (e) AMC 20-26 1, 2, 3, 5, 10.7, Appendices 3 and 5

The operator has implemented the actions derived from the change management process as established in section A 3 of the MO to adequately manage the risk associated with this new RNAV1 operation

PBN Practical Cases II

GOLD.GEN. 200 (a) (3) (e) AMC1 ORO.GEN.200 (a) (3) (e) AMC 20-26 1, 2, 3, 5, 10.7, Appendices 3 and 5

The operator has implemented the actions derived from the change management process as established in section A 3 of the MO to adequately manage the risk associated with this new RNAV1 operation

	GESTIÓN DEL CAMBIO Comunicaciones por Enlace de Datos (CPDLC)	Pág. 1 REV 1.0

CHANGE MANAGEMENT
REQUEST COMMUNICATIONS BY DATA LINK
(CPDLC)

	Preparado por	Revisado por	Aprobado por
Responsable			
Fecha	13-12-2019 REV 2.0		

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (2) AMC 20-26 10.3, Appendix 2	The training requirements and previous experience in RNAV1 operations for personnel have been introduced in Operations Manual section A.5 .

FLIGHT OPERATIONS	**Qualification Requirements /** ***Requisitos de Cualificación*** Licence and Qualification / *Licencia y Cualificación*	**OM A / *OM A*** Chap. 5 **Page / *Pág.*** 15 **Rev / *Rev.*** 18

5.1.5.1 Qualification to Operate in Airspaces with Special Authorization/approvals / *Cualificación para Operar en Espacios Aéreos con Autorizaciones/aprobaciones Especiales*

Prior to operating in airspaces where special authorization/operational approvals (e.g. MNPS, RVSM, PBN) are required the Flight Crew must be qualified in accordance with **OM D** Section 2.2. and familiar by study of applicable procedures laid down in the OM B, OM C and, if available, by computer based training.

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

5 QUALIFICATION REQUIREMENTS

5.1 A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration should be given to the aircraft type, kind of operation and composition of the crew.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (2) AMC 20-26 10.3, Appendix 2	The training requirements and previous experience in RNAV1 operations for personnel have been introduced in Operations Manual section A.5 .

A-5 CUALIFICACIONES REQUERIDAS/QUALIFICATIONS REQUIRED

A-5.2 TRIPULACIÓN DE VUELO (FC) / FLIGHT CREW (FC)

A-5.2.h.7 ***PBN (RNAV1, RNAV5 and RNAV10, RNP4 y RNP APCH)***

This training course will be completed during the conversion and checking course (ECV) and these skills will be maintained during recurrent training and checking (EVP).

Refer for A320 to:

OM-D 2.1.10 (ECV) and OM-D 2.1.15 (EVP)

Refer for the A330 to:

OM-D 2.1.11 (ECV) and OM-D 2.1.16 (EVP)

Regardless of ECV and EVP there is a specific programme PNB (RNAV1, RNAV5, RNAV10, RNP4 y APCH) is developed in the OM-D 2.1.55.

***Note:** RNAV10 doesn't apply to A320 fleet.*

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

5 QUALIFICATION REQUIREMENTS

5.1 A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration should be given to the aircraft type, kind of operation and composition of the crew.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (3) AMC 20-26 Appendix 3, 3	In the Operations Manual section A.8.3.2 (b) the corresponding general operational procedures of the RNAV1 operation have been developed .

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

8.3 Flight Procedures:

8.3.2 Navigation Procedures. A description of all navigation procedures, relevant to the type(s) and area(s) of operation. Special consideration should be given to:
(a) standard navigational procedures, including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aircraft; and
(b) required navigation performance (RNP), minimum navigation performance specification (MNPS) and polar navigation and navigation in other designated areas;
(c) in-flight re-planning;
(d) procedures in the event of system degradation; and
(e) reduced vertical separation minima (RVSM), for aeroplanes.

PBN Practical Cases II

A-8.3.2.b.3 *RNVA1 Operations*

Precision RNAV1 procedures apply to operations such as departures, arrivals and approaches to the intermediate approach fix (IF).

During operations on routes or in designated authorized RNAV1 areas, the accuracy of the onboard RNAV1 system must be equal to or greater than +/-1 NM for 95% of the flight time (accuracy).

The active flight plan should be checked by comparing the charts, SID and other relevant documents with the map display (if applicable) and the MCDU unit. This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed restriction and, when possible, which waypoints are fly-by and which are fly-over.

Creation of new waypoints by manual entries by the FC in the RNAV1 system is not permitted.

The FC may modify the path in the terminal area only inserting waypoints that are in the MCDU database or radar headings or "direct", for which the flight crew must be able to react quickly.

*When in doubt regarding initialization or system integrity, the departure must be determined by means of conventional navigation.*In fact, if the determination of the position is exclusively given aircraft will lose capacity RNAV1. *The transition to should be made when the aircraft has entered DME there has been sufficient time to enter the necessar*

a) Navigation Areas

Terminal Area (SID or STAR) and Approach up to IF.

b) Equipment required

The minimum equipment required for RNAV1 procedures is:

An RNAV system that includes:

- *One FMGC.*
- *One MCDU.*
- *A GPS receiver, or one VOR and one DME for the FM update navigation data (GPS terminals may be required for RNP-1).*
- *Two IRS, and*
- *One FD in NAV mode.*

Also

- *On the PF side: The PFD and ND must be operating.*
- *On the PNF side: At least one of the two EFIS must be operating in order to select ND in the operating EFIS with the PFD/ND selector.*
- *The certified capacity and approved modes of operation are of the FMGS are given in the AFM.*

c) Normal procedures

Approaches to IF RNAV1 without GPS PRIMARY are executable only if the coverage of radio aids covers the RNP value and the precision required is shown as "HIGH " on MCDU for the specified RNP.

The normal procedures of flight crew regarding RNAV1 approaches are based on those described in the FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350).

d) Abnormal and contingency procedures

When items of information regarding the position are contradictory, the *bility of the navigation aid used should be checked by another* *pendent source. Aids to navigation and approach should not be* *d if they cannot be positively identified, or when any information or* *ication (NOTAM) indicates that a system can be unreliable or* *uitable for operations en route or approach.*

tingency procedures for FC regarding RNAV1 approaches are *ed on those described in FCOM PRO-SPO-51 (A320 and A330) or* *M PRO-SPO-PBN (A350)*

If the published procedures require GPS, before the departure procedure or approach to the IF, check on the PROG page that GPS PRIMARY function is available:

- *If GPS PRIMARY is not available before starting the procedure, ATC should be required another procedure that does not require GPS, and*
- *If GPS PRIMARY is lost while we are performing the procedure, notify ATC and follow their instructions.*

If published procedures require NO GPS:

- *If GPS PRIMARY is not available the RAW DATA position must be checked with a radio aid. Also on the PROG page, in the REQUIRED field RNP-1 must be entered and ACCURACY set on HIGH.*
- *If while we are performing the procedure any of the following messages appear on the ECAM, MCDU and ND:*
  - *NAV ACCUR DOWNGRAD*
  - *POS DIFF FMS1/FMS2*
  - *CHECK IRS 1 (2) (3) / FM POSITION*
  - *NAV FM/GPS POS DISAGREE*

ATC must be informed of our loss of capacity and their instructions must be followed.

e. Communications with ATC

The FC shall inform ATC of any problem with the RNAV1 system that results in loss of required navigation capability in addition to proposed remedial measures.

In case of communication failure, the FC should continue the RNAV1 procedure according to the procedure published on the breakdown in communication.

The ATC flight plan contains the letter "R", Table 10, which indicates that the aircraft is authorized for RNAV.

f. Incident Reporting

The Commander shall report any abnormalities and report incidents to the RS through the corresponding ASR. (Refer to OM-A 11.1.b.10 (ASR)).

g. Specific Training

The specific program is developed in OM-D 2.1.55 and was first offered in the ECV and periodically in the EVP.

PBN Practical Cases II

8.3.4.10.5 Performance Based Navigation (PBN) / *Navegación Basada en la Perfomance (PBN)* [55]

For TCAB operation refer to FCOM:

The following procedures, accompanied by the rest of procedures within this OM, SOPs and the referred documentation by the aircraft manufacturer, include all the contents established in the AMCs for CAT.OP.MPA.126 and CAT.OP.MPA.175, where applicable to our operations.

- Preflight: PRO-NOR-SOP-02 (RAIM check)
- Cockpit Preparation: PRO-NOR-SOP-06 (FM database validity, for Outdated Navigation Database refer to MEL)
- Take-Off: PRO-NOR-SOP-12 (FMS position update)
- Cruise: PRO-NOR-SOP-15 (for checking NAV accuracy RNAV-5)
- Descent: PRO-NC Approach and NAV ac
- Approach: PRO-NOR- NAV accuracy).
- PRO-SPO-51 for the

RNP – Required Navigational Performance

Requires a navigation system that not only satisfies the Area Navigation accuracy requirements but also has on-board performance monitoring and alerting.

The following Navigation Specifications are approved for Company operations, subject to aircraft technical status and crew qualification:

RNAV 10: Primarily oceanic and remote areas where availability of navigation aids is limited and radar surveillance is not available. RNAV 10 can support 50 NM track spacing. For historical reasons RNAV 10 airspace is also called RNP 10 airspace. For an aircraft to operate in RNAV 10 airspace it needs to be fitted with a minimum of two independent long range navigation systems (LRNSs).

RNAV 5: Previously referred to as B RNAV (no specific approval required).

RNP 4: Primarily used in higher ATC density oceanic/remote areas supporting 30 NM track spacing. To meet this more accurate navigation requirement, two independent LRNS are required for which GNSS sensors are mandatory. If GNSS is used as a stand-alone LRNS, an integrity check is foreseen (fault detection and exclusion). Additional aircraft requirements include two long range communication systems (LRCSs) in order to operate in RNP4 designated airspace.

Note: TCAB will perform operations RNAV 1, RNAV 5, RNAV 10 and RNP APCH.

The PBN concept specifies that aircraft RNAV and RNP system performance requirements be defined in terms of the accuracy, integrity, continuity and functionality, which are needed for the proposed operations in the context of a particular airspace segment. It is a shift from sensor-based to performance-based navigation. Performance requirements are identified in navigation specifications (see fig below[56]); these specifications also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements.

RNAV 1 (P-RNAV): Currently a European specification that requires a navigational accuracy of 1 NM but does not have the monitoring and alerting requirements of RNP 1 but operationally may be considered the same.

RNP APCH: Approaches to this specification will have the following characteristics – minimum RNP in initial approach of 1 NM, minimum RNP during final approach of 0.3, minimum RNP during missed approach of 1 NM. RNP APCH are Non-precision Approaches supported by GNSS and APV which are themselves divided in two types of APV approaches: APV Baro and APV SBAS.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (4) AMC 20-26 Appendix 3.3 n) i)	In the Operations Manual section A.8.3.2 (d) the corresponding operational procedures have been developed in the case of a system degradation in RNAV1 operations .

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

8.3 Flight Procedures:

8.3.2 Navigation Procedures. A description of all navigation procedures, relevant to the type(s) and area(s) of operation. Special consideration should be given to:
(a) standard navigational procedures, including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aircraft; and
(b) required navigation performance (RNP), minimum navigation performance specification (MNPS) and polar navigation and navigation in other designated areas;
(c) in-flight re-planning;
(d) procedures in the event of system degradation; and
(e) reduced vertical separation minima (RVSM), for aeroplanes.

PBN Practical Cases II

a) Navigation Areas

Terminal Area (SID or STAR) and Approach up to IF.

b) Equipment required

The minimum equipment required for RNAV1 procedures is:

An RNAV system that includes:

- One FMGC.
- One MCDU.
- A GPS receiver, or one VOR and one DME for the FM update navigation data (GPS terminals may be required for RNP-1).
- Two IRS, and
- One FD in NAV mode.

Also

- On the PF side: The PFD and ND must be operating.
- On the PNF side: At least one of the two EFIS must be operating in order to select ND in the operating EFIS with the PFD/ND selector.
- The certified capacity and approved modes of operation are of the FMGS are given in the AFM.

c) Normal procedures

Approaches to IF RNAV1 without GPS PRIMARY are executable only if the coverage of radio aids covers the RNP value and the precision required is shown as "HIGH " on MCDU for the specified RNP.

The normal procedures of flight crew regarding RNAV1 approaches are based on those described in the FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350).

d) Abnormal and contingency procedures

When items of information regarding the position are contradictory, the reliability of the navigation aid used should be checked by another independent source. Aids to navigation and approach should not be used if they cannot be positively identified, or when any information or notification (NOTAM) indicates that a system can be unreliable or unsuitable for operations en route or approach.

Contingency procedures for FC regarding RNAV1 approaches are based on those described in FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350)

If the published procedures require GPS, before the departure procedure or approach to the IF, check on the PROG page that GPS PRIMARY function is available:

- If GPS PRIMARY is not available before starting the procedure, ATC should be required another procedure that does not require GPS, and
- If GPS PRIMARY is lost while we are performing the procedure, notify ATC and follow their instructions.

If published procedures require NO GPS:

- If GPS PRIMARY is not available the RAW DATA position must be checked with a radio aid. Also on the PROG page, in the REQUIRED field RNP-1 must be entered and ACCURACY set on HIGH.
- If while we are performing the procedure any of the following messages appear on the ECAM, MCDU and ND:
  - NAV ACCUR DOWNGRAD
  - POS DIFF FMS1/FMS2
  - CHECK IRS 1 (2) (3) / FM POSITION
  - NAV FM/GPS POS DISAGREE

ATC must be informed of our loss of capacity and their instructions must be followed.

e. Communications with ATC

The FC shall inform ATC of any problem with the RNAV1 system that results in loss of required navigation capability in addition to proposed remedial measures.

In case of communication failure, the FC should continue the RNAV1 procedure according to the procedure published on the breakdown in communication.

The ATC flight plan contains the letter "R", Table 10, which indicates that the aircraft is authorized for RNAV.

f. Incident Reporting

The Commander shall report any abnormalities and report incidents to the RS through the corresponding ASR. (Refer to OM-A 11.1.b.10 (ASR)).

g. Specific Training

The specific program is developed in OM-D 2.1.55 and was first offered in the ECV and periodically in the EVP.

PBN Practical Cases II

8.3.10.14.3 Contingency Procedures /

Where the contingency to revert to a conventional arrival procedure is required, the Flight Crew should make the necessary preparation. The following conditions should be considered:

a. Failure of the navigation system components including those affecting flight technical error (e.g. failures of the flight director or autopilot).

b. Multiple system failures.

c. Failure of the navigation sensors.

d. Coasting on inertial sensors beyond a specified time limit.

e. RAIM (or equivalent) alert or loss of integrity function.

In the event of loss of PBN capability, the Flight Crew should invoke contingency procedures and navigate using an alternative means of navigation which may include the use of an inertial system. The alternative means need not be a PBN system.

Flight crew should ensure sufficient means are available to navigate and land at the destination or at an **Alternate Aerodrome** in the case of loss of RNP APCH capability.

In the event of failure of one RNAV system during a procedure where two systems are necessary, the Flight Crew should abort the procedure if the failure occurs before FAF but may continue the approach if the failure occurs after FAF.

The Flight Crew should notify ATC of any problem with PBN navigation capability.

In the event of communications failure, the Flight Crew should continue with procedures in accordance with published lost communication procedures.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (5) AMC 20-26 10.7	The corresponding procedures for the treatment of events in RNAV1 operations have been developed in Operations Manual section A.11 .

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

11 HANDLING, NOTIFYING AND REPORTING ACCIDENTS, INCIDENTS AND OCCURRENCES AND USING THE CVR RECORDING

(b) illustrations of forms to be used for reporting all types of accident, incident and occurrence (or copies of the forms themselves), instructions on how they are to be completed, the addresses to which they should be sent and the time allowed for this to be done;

PBN Practical Cases II

11.1.e.1 Air traffic incidents or events

*Whenever an aircraft has been in danger during the flight for the reasons indicated below, once the flight has ended, the Commander shall use the **EVELOP** internal reporting system (OM-A 3) to report the incident to the ROV and the RS.*

a) a near collision with any other flying object;

b) faulty air traffic or FC procedures,

c) ATC or FC failure to comply with air traffic procedures,

d) failure of air traffic service facilities.

Additionally, in the case of incidents or events relating to operational approvals, such as RVSM, MNPS, ETOPS, etc., the Commander may also report using the ASR form, by filling in the fields specific to each operational approval.

PBN Practical Cases II

7. Reportable Events Of PBN Operations (AMC2 *PBN (AMC2 ORO.GEN.160)*

(a) A reportable event should be an event that adversely affects the safety of the operation and may be caused by actions or events external to the functioning of the aircraft navigation system.

(b) Technical defects and the exceedance of technical limitations, including:

(1) significant navigation errors attributed to incorrect data or a database coding error;

(2) unexpected deviations in lateral/vertical flight path not caused by flight crew input or erroneous operation of equipment;

(3) significant misleading information without a failure warning;

(4) total loss or multiple navigation equipment failure; and

(5) loss of integrity, e.g. RAIM function, whereas integrity was predicted to be available during preflight planning,

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (3) (4) AMC2 ORO.MLR.100	In the Operations Manual section B.1.1.c all the operational limitations associated with the RNAV1 maneuver have been described

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

B AIRCRAFT OPERATING MATTERS — TYPE RELATED

1 LIMITATIONS

1.1 A description of the certified limitations and the applicable operational limitations should include the following:

(a) certification status (e.g. EASA (supplemental) type certificate, environmental certification, etc.);

(b) passenger seating configuration for each aircraft type, including a pictorial presentation;

(c) types of operation that are approved (e.g. VFR/IFR, CAT II/III, RNP, flights in known icing conditions, etc.);

PBN Practical Cases II

B-1 LIMITACIONES / LIMITATIONS

B-1.1 LIMITACIONES CERTIFICADAS Y LIMITACIONES OPERACIONALES APLICABLES / CERTIFIED LIMITATIONS & APPLICABLE OPERATIONAL LIMITATIONS

B-1.1.c.2 **PBN Operations**

Following are detailed the operations for which only requires a notification of operation to the authority and the reference to the chapters of the AFM/FCOM which describes the associated limitations:

a. ***RNAV5**: AFM LIM-22-FMS, FCOM PRO-SPO-51 and MO-A 8.3.2.*
b. ***RNAV1**: AFM LIM-22-FMS, FCOM PRO-SPO-51 and MO-A 8.3.2*
c. **RNP APCH**: AFM LIM-22-FMS, FCOM PRO-SPO-51 and MO-A 8.3.2.

PBN Practical Cases II

1 LIMITATIONS / *LIMITACIOI*

1.1 General / *General*

Refer to FCOM LIM Limitations.

The operational limitations required by the regulations will be presented in this chapter as they are contained in the AFM as well as other limitations recommended by Airbus but not included in the AFM.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (3) AMC 20-26 Appendix 3	In the Operations Manual section B.2 the normal procedures associated with the RNAV1 operation have been developed

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

2 NORMAL PROCEDURES

The normal procedures and duties assigned to the crew, the appropriate checklists, the system for their use and a statement covering the necessary coordination procedures between flight and cabin/other crew members. The normal procedures and duties should include the following:

(a) pre-flight,

(b) pre-departure,

(c) altimeter setting and checking,

(d) taxi, take-off and climb,

(e) noise abatement,

(f) cruise and descent,

(g) approach, landing preparation and briefing,

(h) VFR approach,

(i) IFR approach,

(j) visual approach and circling,

(k) missed approach,

(l) normal landing,

(m) post-landing,

(n) for aeroplanes, operations on wet and contaminated runways.

PBN Practical Cases II

A-8.3.2.b.3 *RNVA1 Operations*

Precision RNAV1 procedures apply to operations such as departures, arrivals and approaches to the intermediate approach fix (IF).

During operations on routes or in designated authorized RNAV1 areas, the accuracy of the onboard RNAV1 system must be equal to or greater than +/-1 NM for 95% of the flight time (accuracy).

The active flight plan should be checked by comparing the charts, SID and other relevant documents with the map display (if applicable) and the MCDU unit. This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed restriction and, when possible, which waypoints are fly-by and which are fly-over.

Creation of new waypoints by manual entries by the FC in the RNAV1 system is not permitted.

The FC may modify the path in the terminal area only inserting waypoints that are in the MCDU database or radar headings or "direct", for which the flight crew must be able to react quickly.

When in doubt regarding initialization or syste
must be determined by means of conventiona
determination of the position is exclusively
aircraft will lose capacity RNAV1. *The transitio*
should be made when the aircraft has entered
there has been sufficient time to enter the nece

a) Navigation Areas

Terminal Area (SID or STAR) and Approach up to IF.

b) Equipment required

The minimum equipment required for RNAV1 procedures is:

An RNAV system that includes:

- *One FMGC.*
- *One MCDU.*
- *A GPS receiver, or one VOR and one DME for the FM update navigation data (GPS terminals may be required for RNP-1).*
- *Two IRS, and*
- *One FD in NAV mode.*

Also

- *On the PF side: The PFD and ND must be operating.*
- *On the PNF side: At least one of the two EFIS must be operating in order to select ND in the operating EFIS with the PFD/ND selector.*
- *The certified capacity and approved modes of operation are of the FMGS are given in the AFM.*

c) Normal procedures

Approaches to IF RNAV1 without GPS PRIMARY are executable only if the coverage of radio aids covers the RNP value and the precision required is shown as "HIGH " on MCDU for the specified RNP.

The normal procedures of flight crew regarding RNAV1 approaches are based on those described in the FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350).

d) Abnormal and contingency procedures

When items of information regarding the position are contradictory, the reliability of the navigation aid used should be checked by another independent source. Aids to navigation and approach should not be used if they cannot be positively identified, or when any information or notification (NOTAM) indicates that a system can be unreliable or unsuitable for operations en route or approach.

Contingency procedures for FC regarding RNAV1 approaches are based on those described in FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350)

If the published procedures require GPS, before the departure procedure or approach to the IF, check on the PROG page that GPS PRIMARY function is available:

- *If GPS PRIMARY is not available before starting the procedure, ATC should be required another procedure that does not require GPS, and*
- *If GPS PRIMARY is lost while we are performing the procedure, notify ATC and follow their instructions.*

If published procedures require NO GPS:

- *If GPS PRIMARY is not available the RAW DATA position must be checked with a radio aid. Also on the PROG page, in the REQUIRED field RNP-1 must be entered and ACCURACY set on HIGH.*
- *If while we are performing the procedure any of the following messages appear on the ECAM, MCDU and ND:*
  - *NAV ACCUR DOWNGRAD*
  - *POS DIFF FMS1/FMS2*
  - *CHECK IRS 1 (2) (3) / FM POSITION*
  - *NAV FM/GPS POS DISAGREE*

ATC must be informed of our loss of capacity and their instructions must be followed.

e. Communications with ATC

The FC shall inform ATC of any problem with the RNAV1 system that results in loss of required navigation capability in addition to proposed remedial measures.

In case of communication failure, the FC should continue the RNAV1 procedure according to the procedure published on the breakdown in communication.

The ATC flight plan contains the letter "R", Table 10, which indicates that the aircraft is authorized for RNAV.

f. Incident Reporting

The Commander shall report any abnormalities and report incidents to the RS through the corresponding ASR. (Refer to OM-A 11.1.b.10 (ASR)).

g. Specific Training

The specific program is developed in OM-D 2.1.55 and was first offered in the ECV and periodically in the EVP.

PBN Practical Cases II

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (4) AMC 20-26 Appendix 3	In the Operations Manual section B.3 the abnormal and emergency procedures associated with the RNAV1 operation have been developed

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

3 ABNORMAL AND/OR EMERGENCY PROCEDURES

The abnormal and/or emergency procedures and duties assigned to the crew, the appropriate checklists, the system for their use and a statement covering the necessary coordination procedures between flight and cabin/other crew members. The abnormal and/or emergency procedures and duties should include the following:

(a) crew incapacitation,
(b) fire and smoke drills,
(c) for aeroplanes, un-pressurised and partially pressurised flight,
(d) for aeroplanes, exceeding structural limits such as overweight landing,
(e) lightning strikes,
(f) distress communications and alerting ATC to emergencies,
(g) engine/burner failure,
(h) system failures,
(i) guidance for diversion in case of serious technical failure,
(j) ground proximity warning, including for helicopters audio voice alerting device (AVAD) warning,
(k) ACAS/TCAS warning for aeroplanes/audio voice alerting device (AVAD) warning for helicopters,
(l) windshear,
(m) emergency landing/ditching,
(n) for aeroplanes, departure contingency procedures.

PBN Practical Cases II

A-8.3.2.b.3 *RNVA1 Operations*

Precision RNAV1 procedures apply to operations such as departures, arrivals and approaches to the intermediate approach fix (IF).

During operations on routes or in designated authorized RNAV1 areas, the accuracy of the onboard RNAV1 system must be equal to or greater than +/-1 NM for 95% of the flight time (accuracy).

The active flight plan should be checked by comparing the charts, SID and other relevant documents with the map display (if applicable) and the MCDU unit. This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed restriction and, when possible, which waypoints are fly-by and which are fly-over.

Creation of new waypoints by manual entries by the FC in the RNAV1 system is not permitted.

The FC may modify the path in the terminal area only inserting waypoints that are in the MCDU database or radar headings or "direct", for which the flight crew must be able to react quickly.

When in doubt regarding initialization or syste must be determined by means of conventiona determination of the position is exclusively aircraft will lose capacity RNAV1. The transitio should be made when the aircraft has entered there has been sufficient time to enter the nece

a) Navigation Areas

Terminal Area (SID or STAR) and Approach up to IF.

b) Equipment required

The minimum equipment required for RNAV1 procedures is:

An RNAV system that includes:

- *One FMGC.*
- *One MCDU.*
- *A GPS receiver, or one VOR and one DME for the FM update navigation data (GPS terminals may be required for RNP-1).*
- *Two IRS, and*
- *One FD in NAV mode.*

Also

- *On the PF side: The PFD and ND must be operating.*
- *On the PNF side: At least one of the two EFIS must be operating in order to select ND in the operating EFIS with the PFD/ND selector.*
- *The certified capacity and approved modes of operation are of the FMGS are given in the AFM.*

c) Normal procedures

Approaches to IF RNAV1 without GPS PRIMARY are executable only if the coverage of radio aids covers the RNP value and the precision required is shown as "HIGH " on MCDU for the specified RNP.

The normal procedures of flight crew regarding RNAV1 approaches are based on those described in the FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350).

d) Abnormal and contingency procedures

When items of information regarding the position are contradictory, the reliability of the navigation aid used should be checked by another independent source. Aids to navigation and approach should not be used if they cannot be positively identified, or when any information or notification (NOTAM) indicates that a system can be unreliable or unsuitable for operations en route or approach.

Contingency procedures for FC regarding RNAV1 approaches are based on those described in FCOM PRO-SPO-51 (A320 and A330) or FCOM PRO-SPO-PBN (A350)

If the published procedures require GPS, before the departure procedure or approach to the IF, check on the PROG page that GPS PRIMARY function is available:

- *If GPS PRIMARY is not available before starting the procedure, ATC should be required another procedure that does not require GPS, and*
- *If GPS PRIMARY is lost while we are performing the procedure, notify ATC and follow their instructions.*

If published procedures require NO GPS:

- *If GPS PRIMARY is not available the RAW DATA position must be checked with a radio aid. Also on the PROG page, in the REQUIRED field RNP-1 must be entered and ACCURACY set on HIGH.*
- *If while we are performing the procedure any of the following messages appear on the ECAM, MCDU and ND:*
  - *NAV ACCUR DOWNGRAD*
  - *POS DIFF FMS1/FMS2*
  - *CHECK IRS 1 (2) (3) / FM POSITION*
  - *NAV FM/GPS POS DISAGREE*

ATC must be informed of our loss of capacity and their instructions must be followed.

e. *Communications with ATC*

The FC shall inform ATC of any problem with the RNAV1 system that results in loss of required navigation capability in addition to proposed remedial measures.

In case of communication failure, the FC should continue the RNAV1 procedure according to the procedure published on the breakdown in communication.

The ATC flight plan contains the letter "R", Table 10, which indicates that the aircraft is authorized for RNAV.

f. *Incident Reporting*

The Commander shall report any abnormalities and report incidents to the RS through the corresponding ASR. (Refer to OM-A 11.1.b.10 (ASR)).

g. *Specific Training*

The specific program is developed in OM-D 2.1.55 and was first offered in the ECV and periodically in the EVP.

PBN Practical Cases II

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (c) (3) AMC 20-26 5, 6, 7, 9 and 10	The full description of the equipment involved in the RNAV1 operation for the type / variant requested has been developed in the Operations Manual section B.12 .

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

12 AIRCRAFT SYSTEMS
A description of the aircraft systems, related controls and indications and operating instructions. Consideration should be given to use the ATA number system when allocating chapters and numbers.

PBN Practical Cases II

12 AIRPLANE SYSTEMS

For FC, refer to FCOM A320 DSC for a complete description of the aeroplane systems, related controls and indications and operating instructions. . For CC, refer to Manual de TCPs (MTCP), chapter 9.

PBN Practical Cases II

12 AIRCRAFT SYSTEMS / *SIST*

12.1 GENERAL / *GENERAL*

For aircrafts systems refer to the corresponding ATA chapter in the FCOM.

ATA.20. AIRCRAFT GENERAL

ATA.21. AIR CONDITIONING/ PRESSURIZATION/ VENTILATION

ATA.22 AUTOFLIGHT

ATA.22.10. Autoflight general.

ATA.22.20. Autoflight, flight management.

ATA.22.30. Autoflight, flight guidance.

ATA.22.40. Autoflight, flight augmentation.

ATA.22.45. Autoflight, AOC functions.

ATA.22.46. Autoflight, print interface.

ATA.23. COMMUNICATIONS.

ATA.24. ELECTRICAL

ATA.25. EQUIPMENT

ATA.26. FIRE PROTECTION

ATA.27. FLIGHT CONTROLS

ATA.29. HYDRAULIC

ATA.30. ICE AND RAIN PROTECTION

ATA.31. INDICATING/RECORDING SYSTEMS

ATA.32. LANDING GEAR

ATA.33. LIGHTS

ATA.34. NAVIGATION

ATA.34.1. NAV navigation.

ATA.34.2. SURV surveillance.

ATA.35. OXYGEN

ATA.36. PNEUMATIC

ATA.38. WATER / WASTE

ATA.45. MAINTENANCE SYSTEM

ATA.46. INFORMATION SYSTEM

ATA.49. APU

ATA.52. DOORS

ATA.56. COCKPIT WINDOWS

ATA.70. ENGINES

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (b) AMC 20-26 10.3, Appendix 2	In the Operations Manual section D. 2.1 the training program related to the F RNAV1 peration for flight crews has been developed.

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

D TRAINING

2 Content: Training syllabi and checking programmes should include the following:
2.1 for flight crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.FC;
2.2 for cabin crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-CC) of Commission Regulation (EU) 1178/2011 and ORO.CC;
2.3 for technical crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.TC;
2.4 for operations personnel concerned, including crew members:
(a) all relevant items prescribed in SPA.DG Subpart G of Annex IV (SPA.DG); and
(b) all relevant items prescribed in Annex IV (Part-CAT) and ORO.SEC; and
2.5 for operations personnel other than crew members (e.g. dispatcher, handling personnel, etc.), all other relevant items prescribed in Annex IV (Part-CAT) and in this Annex pertaining to their duties.

PBN Practical Cases II

D-2 PROGRAMAS ENTRENAMIENTO TRIPULACIONES

D-2.1 PROGRAMAS DE ENTRENAMIENTO FLIGHT CREW

CONTENIDO DEL PROGRAMA	TEÓRICO

1.3 Módulo A.3

Entrenamientos específicos de tipos de operaciones, aprobaciones y sistemas

En este módulo se instruye a los FC en los procedimientos operacionales incluidos en el MO relacionados con los tipos de operaciones, aprobaciones y sistemas siguientes:

1. **PBN**
   - Referirse a **MO-D 2.1.55** para el curso específico
2. **MNPS**
   - Referirse a **MO-D 2.1.65** para el curso específico
3. **RVSM**
   - Referirse a **MO-D 2.1.50** para el curso específico
4. **FANS**
   - Referirse a **MO-D 2.1.75** para el curso específico
5. **Mercancías Peligrosas**
   - Referirse a **MO-D 2.1.40** para el curso específico
6. **Operaciones de Baja Visibilidad** (LVO)
   - Referirse a MO-D 2.1.60 para el curso específico
7. **TCAS**
   - Referirse a **MO-D 2.1.54** para el curso específico
8. **GPWS**
   - Referirse a **MO-D 2.1.53** para el curso específico

A320				
MÓDULO	**Conversión al Operador**	**Cambio de Flota A330 a A320**	**Duración Conversión al Operador**	**Duración Cambio de Flota**
1. PBN	X		4 hrs. 30 min.	
2. MNPS	X		2 horas	
3. RVSM	X		2 horas	
4. FANS	X		2 horas	
5. Mercancías Peligrosas	X		4 horas	
6. LVO	X	X	4 horas // 2 horas*	2 horas
7. TCAS	X		45 minutos	
8. GPWS	X		45 minutos	
		Total Horas	20 horas // 18 horas*	2 horas

Example accepted by the spanish CAA. Complimentary translation will be delivered during the course

PBN Practical Cases II

2.2.13 Performance Based Navigation Procedures: / *Procedimientos de RNAV Basados en las Actuacione*

Refer to OM D Appendix 1A for TCAB Operator Conversion Course

These are routine operations, trained during initial Type Rating Training or Operator Conversion Course.

This is checked during proficiency checks.

Refer to Part A for definitions and requirements.

RNP and RNP-AR Approach:

The syllabus for RNP APCH ground training will include the following elements:

– General RNAV Concepts

- Theory of RNAV including differences between types of RNAV operations
- Limitations of RNAV
- Limitations of BARO-BNAV
- Charting and database issues including:
  - Waypoint naming concepts
  - Vertical path angle
  - Fly-by and fly-over waypoints
- Use of RNAV equipment including:
  - Verification and sensor management
- Contingency procedures

When applicable, credit may be given to initial PBN courses which integrate the concepts specified above.

Simulator Training:

The ground syllabus mentioned above must be complemented with practical training on an approved FSTD. The initial training in the simulator must include 2 RNP Approaches (one flown as PF and another as PM) per each type of RNP APCH for which the pilot will be granted PBN privileges. Normally this will mean 4 approaches flown (2 LNAV + 2 LNAV/VNAV).

The approaches completed in the simulator will serve both as training and checking. The TRI/SFI will decide if any additional practical training is recommended before allowing the pilot to fly RNP Approaches in real operations, and will notify the Training Manager when appropriate.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (b) AMC 20-26 10.3, Appendix 2	In the Operations Manual section D.2.5, the training program related to the RNAV1 operation has been developed for personnel directly involved in the supervision of the RNAV1 operation .

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

D TRAINING

2 Content: Training syllabi and checking programmes should include the following:
2.1 for flight crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.FC;
2.2 for cabin crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-CC) of Commission Regulation (EU) 1178/2011 and ORO.CC;
2.3 for technical crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.TC;
2.4 for operations personnel concerned, including crew members:
(a) all relevant items prescribed in SPA.DG Subpart G of Annex IV (SPA.DG); and
(b) all relevant items prescribed in Annex IV (Part-CAT) and ORO.SEC; and
2.5 for operations personnel other than crew members (e.g. dispatcher, handling personnel, etc.), all other relevant items prescribed in Annex IV (Part-CAT) and in this Annex pertaining to their duties.

PBN Practical Cases II

D-2.5	PERSONAL DE OPERACIONES DISTINTO DE LOS MIEMBROS DE LA TRIPULACIÓN
2.5.10	ENTRENAMIENTO PERSONAL DE OPERACIONES (OCC/CCC – OT)
2.5.18	ENTRENAMIENTO – CUALIFICACIÓN EN RUTA/ÁREA Y AERÓDROMO (CRA)
2.5.35	ENTRENAMIENTO AVSEC
2.5.38	ENTRENAMIENTO – MERCANCÍAS PELIGROSAS (EMP) CAT-6
2.5.39	ENTRENAMIENTO – MERCANCÍAS PELIGROSAS (EMP) CAT-8
2.5.40	ENTRENAMIENTO – MERCANCÍAS PELIGROSAS (EMP) CAT-9
2.5.41	ENTRENAMIENTO – MERCANCIAS PELIGROSAS (EMP) CAT-10
2.5.70	ENTRENAMIENTO - ETOPS
2.5.80	ENTRENAMIENTO - Personal de Tierra (EPT)
2.5.82	ENTRENAMIENTO DE SEGURIDAD OPERACIONAL
2.5.85	ENTRENAMIENTO – FTL y Gestión de la Fatiga

Example accepted by the spanish CAA. Complimentary translation will be delivered during the course

PBN Practical Cases II

2.5 OTHER PERSONNEL TRAININ
VERIFICACIÓN DE OTRO PERS

Integration of a new member of an organizational unit will largely be effected by on the job training, and should be conducted in accordance with the SQM which recommends, among administrative matters:

- To name, for a period of 2 weeks, a tutor to answer the trainee's questions and help solve problems.
- To inform the trainee of the targets of the Company in general and of the organizational unit in particular.
- To introduce the trainee to relevant working tools (rules, regulations, organization of the Company, directives ...)
- To introduce the trainee to flight operational interdependencies.
- To check whether the electronic data processing and other knowledge of the trainee suffice, or whether additional training is required.

The head of the organizational unit to conduct,

after a period of 4 weeks, a debriefing with the trainee.

PBN Practical Cases II

SPA.GEN.105 AMC1 SPA.GEN.105 (a) SPA.PBN.100 GM1 SPA.PBN.100 (c) (8) and (d) SPA.PBN.105 (b) AMC 20-26 10.3, Appendix 2	The procedures for choosing simulators and training devices for RNAV1 operations have been developed in the Operations Manual section D.3.1 .

AMC3 ORO.MLR.100 Operations manual – general

ED Decision 2019/019/R19/R

D TRAINING

2 Content: Training syllabi and checking programmes should include the following:
2.1 for flight crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.FC;
2.2 for cabin crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-CC) of Commission Regulation (EU) 1178/2011 and ORO.CC;
2.3 for technical crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.TC;
2.4 for operations personnel concerned, including crew members:
(a) all relevant items prescribed in SPA.DG Subpart G of Annex IV (SPA.DG); and
(b) all relevant items prescribed in Annex IV (Part-CAT) and ORO.SEC; and
2.5 for operations personnel other than crew members (e.g. dispatcher, handling personnel, etc.), all other relevant items prescribed in Annex IV (Part-CAT) and in this Annex pertaining to their duties.

PBN Practical Cases II

CONTENIDO DEL PROGRAMA	EN SIMULADOR

2.0 Entrenamiento y verificaciones en simulador de vuelo.

Esta fase conlleva la siguiente actividad:

a. En el entrenamiento y verificación en FSTD comprende 4 sesiones de simulador de 4 horas cada una de ellas. En todas ellas el FC actuará tanto como PF como PM.

b. Todas las sesiones de simulador serán precedidas por 1 hr. 30 min. de briefing (incluye el Briefing de Diferencias avión-simulador -BDAS) y 30 min. de debriefing.

c. En el entrenamiento en simulador de un curso de conversión se completarán los siguientes escenarios incluidos en la OSD A320 FC de Airbus en su Apéndice 3:

- Vuelo Manual, en ley Normal, Alternativa y Directa a baja altitud
- Vuelo Manual, en ley Normal y Alternativa a alta altitud
- Pérdida a baja altitud
- Pérdida a alta altitud

d. Para el entrenamiento y verificación en simulador Evelop utiliza los FSTD que a continuación se indican y de los que se dispone de información más detallada y actualizada en el documento "Guía FSTD". El procedimiento monitorización de estos FSTD se describe en MO-D 3.1.I

e. Durante todas las sesiones de entrenamiento se utilizará el sistema EFB de acuerdo a lo descrito en MO-D 2.1.81. Así mismo, se verificará durante la sesión de "Train+OPC" de acuerdo a MO-D 2.1.81.

FSTD	Nivel	Ubicación	Operador FSTD	Identificador del FSTD	S/N	Aprobado para UPRT (ver MO-D 2.1.56)	Aprobado para PBN (ver MO-D 2.1.55)
A-320 B	DG	Madrid	CAE Centre Copenhagen A/S	DK-196	T3406	Si	Si
A-320 C	D	Madrid	CAE Centre Copenhagen A/S	DK-186A	2NU2-300	Si	Si
A-320 E	D	Barcelona	CAE Centre Copenhagen A/S	DK-189A	2UMR/105040-1522	Si	Si
A-320 F	D	Barcelona	CAE Centre Copenhagen A/S	DK-121A	111412-1528	Si	Si
A-320 G	D	Madrid	CAE Centre Copenhagen A/S	DK-135A	11/10	Si	Si
A-320	D	Madrid	GTA, Global Training Aviation	ES-1A-032	01	Si	Si
A-320	D	Londres	CAE Centre Copenhagen A/S	DK-170A	T3117/113633	Si	Si

f. A continuación se detallan las sesiones de simulador que se realizarán. En el documento "**Syllabus para FSTD**" se desarrollan en profundidad cada una de las sesiones de simulador a realizar así como cada uno de los syllabus a seguir.

Example accepted by the spanish CAA. Complimentary translation will be delivered during the course

Sesión de Entrenamiento en Simulador de Vuelo (TRAIN I). Duración: 4 hrs

Maniobra	Referencia M.O. Parte D	Emergencias ATA's	Duración
Entrenamiento Aproximaciones RNP Approach (PBN)	MO-D 2.1.55 - PBN	---	1 hr. 30 min. (45 min. por FC)

PBN Practical Cases II

3.1.6.4.2 Simulator and Training Devices
dispositivos de entrenamiento

The FSTD used for the flight crew training and checking of the operator conversion course, recurrent training and checking, upgrade to captain and pilot qualification to operate in either pilot's seat shall be a representative flight simulation devices of the A320. The NPH Training Manager shall verify that the following training can be conducted in the selected FSTD:

- RVSM
- PBN
- CAT II/III, LVTO &
- TCAS 7.1
- GPWS/EGPWS
- Windshear Warnin
- WX-Radar
- UPRT

Differences between the FSTD and the aircraft will be reflected in the Simulator Differences Document (F-TCAB-TNG-FC-029), which is available to flight crew members, instructors, examiners and line supervisors Refer to OM-D 3.1.6.4.5 Simulator Differences Document.

TCAB has requested to each simulator operator that any changes on the FSTD shall be communicated to the NPH Training Manager. TCAB will be responsible for ensuring that any changes in a FSTD not affect the validity of defined training syllabus.

PBN Practical Cases II

A-8 PROCEDIMIENTOS OPERATIVOS/OPERATING PROCEDURES

A-8.3 PROCEDIMIENTOS DE VUELO / FLIGHT PROCEDURES

A-8.3.2.b ***PBN (RNAV5, RNAV1, RNAV10, RNP APPROACH, RNP 4), MNPS and polar navigation and navigation in other designated areas***

A-8.3.2.b.1 PBN

Regulation:

- *CAT.OP.MPA.126 y AMC's (1-7) y GM1*
- *GM1 SPA.PBN.100*
- *AMC1/2 CAT.OP.MPA.175*
- *ICAO 9613*
- *AMC 20-27 EASA*

The minimum equipment list (MEL) lists the equipment required for RNAV/RNP operations.

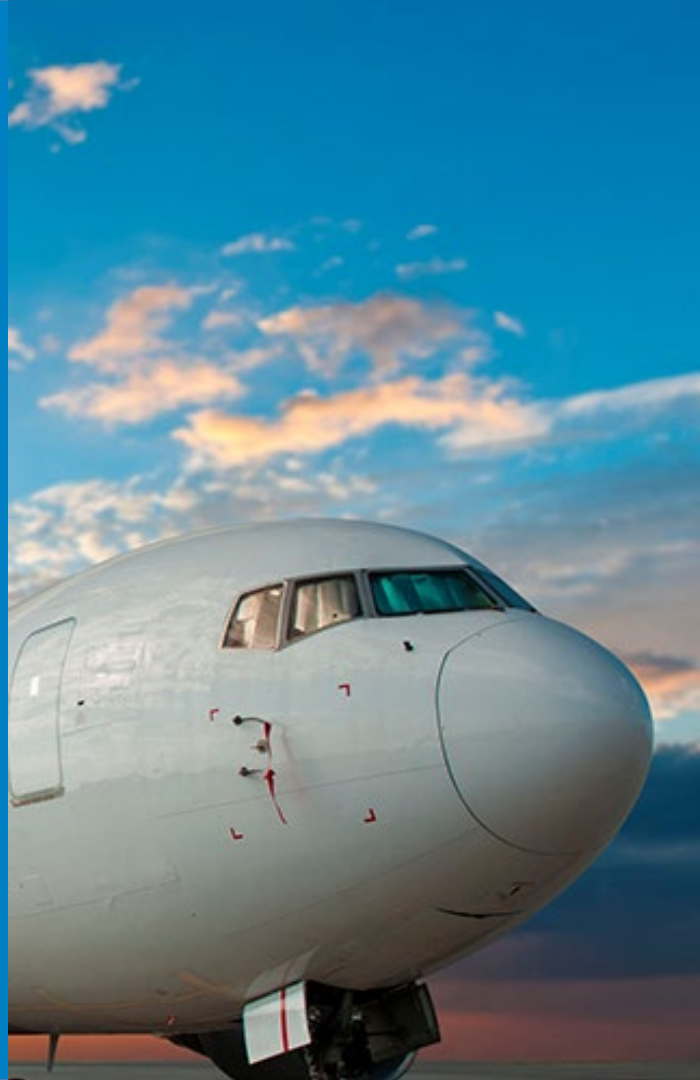
The FOD is responsible for ensuring that aircraft operating in areas, segments of airspace or on routes with specific navigation performance requirements are certified according to requirements and, where appropriate, that EASA has granted the corresponding approval of operations.

The FOD is responsible for ensuring that the OM contains all contingency procedures specified by the AESA responsible for the airspace concerned for all aircraft operating in the indicated areas.

EASA
European Union Aviation Safety Agency

Course Summary

PBN Operational Approvals Workshop



An Agency of the European Union

Course Summary

CE 965/2012

Table 1: Overview of PBN specifications

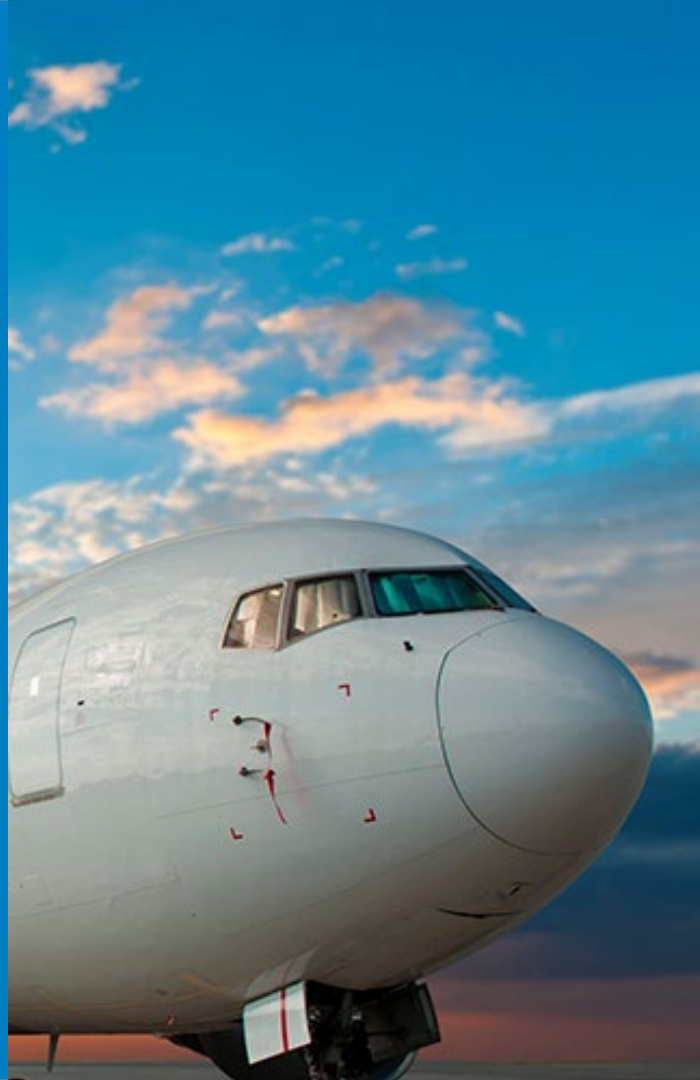
	FLIGHT PHASE							
	En-route		Arrival	Approach				Departure
	Oceanic	Continental		Initial	Intermediate	Final	Missed	
RNAV 10	10							
RNAV 5		5	5					
RNAV 2		2	2					2
RNAV 1		1	1	1	1		1	1
RNP 4	4							
RNP 2	2	2						
RNP 1			1	1	1		1	1
A-RNP	2	2 or 1	1–0.3	1–0.3	1–0.3	0.3	1–0.3	1–0.3
RNP APCH (LNAV)				1	1	0.3	1	
RNP APCH (LNAV/VNAV)				1	1	0.3	1	
RNP APCH (LP)				1	1		1	
RNP APCH (LPV)				1	1		1	
RNP AR APCH				1–0.1	1–0.1	0.3-0.1	1–0.1	
RNP 0.3 (H)		0.3	0.3	0.3	0.3		0.3	0.3

Numbers specify the accuracy level — no specific approval required — specific approval required

EASA
European Union Aviation Safety Agency

Course Closing and Certificates

PBN Operational Approvals Workshop



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Course Closing and Certificates

References

- Websites
  - Federal Aviation Administration (FAA), United States: www.faa.gov (see Regulations & Policies)
  - Civil Aviation Safety Authority (CASA), Australia: www.casa.gov.au/rules/1998casr/index.htm
  - International Civil Aviation Organization (ICAO): www.icao.int/pbn
- Federal Aviation Administration (FAA) PUBLICATIONS, United States:
  - Federal Aviation Administration (FAA), United States:
  - FAA Order 8400.12A (as amended), Required Navigation Performance 10 (RNP 10) Operational
  - Approval
  - Code of Federal Regulations (CFR), Part 121, Subpart G, Manual Requirements
  - Advisory Circular (AC) 20-130A, Airworthiness Approval of Navigation or Flight Management Systems
  - Integrating Multiple Navigation Sensors
  - AC 20-138A, Airworthiness Approval of Global Navigation Satellite System (GNSS) Equipment

Course Closing and Certificates

References

- European Aviation Safety Agency (EASA)
  - Airborne Communications, Navigation and Surveillance CS-ACNS Issue 2 (26 April 2019)
  - AMC 20-4 Airworthiness Approval of Navigation Systems for RNAV 5 Operations
  - AMC 20-12 Airworthiness Approval of Navigation Systems for RNAV 10 Operations
  - AMC 20-26 Airworthiness Approval for RNP Authorisation Required (RNP AR) Operations
  - AMC 20-27 Airworthiness Approval for RNP APPROACH (RNP APCH) Operations Including
  - APV BARO-VNAV Operations
  - AMC 20-28 Airworthiness Approval related to Area Navigation for Global Navigation Satellite System (GNSS) approach operation to Localiser Performance with Vertical guidance minima using Satellite-based Augmentation System (SBAS)
  - CS-23 Certification Specifications for Normal, Utility, Aerobatic and Commuter Category Aeroplanes
  - CS-25 Certification Specifications for Large Aeroplanes
  - CS-25.1529 Instructions for Continued Airworthiness
  - CS-27 Certification Specifications for Small Rotorcraft
  - CS-29 Certification Specifications for Large Rotorcraft
  - EASA Part-21 Subpart G Production Organisation Approval
  - ETSO-C129a Airborne Supplemental Navigation Equipment Using Global Positioning System
  - ETSO-C145 Airborne Navigation Sensors Using the Global Positioning System (GPS)
  - Augmented by the Wide Area Augmentation System (WAAS)
  - ETSO-C146 Stand-Alone Airborne Navigation Equipment Using the Global Positioning System
  - (GPS) Augmented by the Wide Area Augmentation System (WAAS)
  - AIR OPS (Regulation (EU) No 965/2012)

Course Closing and Certificates

References

- European Organization for Civil Aviation Equipment (EUROCAE)
  - ED-76 Standards for Processing Aeronautical Data
- ICAO Documents
  - Convention on International Civil Aviation (Doc 7300)
  - **Annexes to the Convention on International Civil Aviation**
  - Annex 6 — Operation of Aircraft
  - Part I — International Commercial Air Transport — Aeroplanes
  - **Procedures for Air Navigation Services**
  - ATM — Air Traffic Management (PANS-ATM, Doc 4444)
  - Regional Supplementary Procedures (Doc 7030)
  - **Manuals**
  - Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335)
  - Performance-based Navigation (PBN) Manual (Doc 9613) and (Doc 9997)
  - Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual (Doc 9905)

EASA
European Union Aviation Safety Agency

End slide

PBN Operational Approvals Workshop

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