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IMPLEMENTATION OF RNAV 5 ROUTES IN UPPER AIRSPACE CENTRAL AMERICA FIR

1. PURPOSE

1.1 This Aeronautical Information Circular (AIC) has the purpose to inform on the implementation of routes and RNAV 5 operations in the upper airspace of the Flight Information Region (FIR) of Central America, as of November 17, 2011, encouraging the participation of those involved, mainly:

a) Aircraft operators;
b) Air traffic providers; and
c) Dependencies involved in air traffic management.

1.2 The publication of this AIC does not impede the performance of other activities to disseminate information such as the development of supplements or amendments to the AIP, or the issuance of specific regulations related to the implementation of RNAV 5.

2. INTRODUCTION

2.1 Demand for airspace capacity is a function of the growth of civil aviation, making it necessary the optimal use of available airspace. The techniques of area navigation (RNAV) have allowed the development of navigation applications all phases of flight.

2.2 Applications requirements for en-routes navigation or specific airspace should be defined as clearly as possible in order to ensure the pilots and air traffic controllers (ATC) are aware of RNAV system capabilities on-board the aircraft, enabling them to determine that the systems performance on-board is appropriate for airspace requirements.

2.3 The RNAV systems have evolved in the same way as routes and conventional land-based procedures. Therefore, a specific RNAV system was identified and its performance evaluated through analysis and inspection in flight; though, airspace and range obstacle clearance criteria operated according to the performance of the equipment available, even identifying specific computer models for being used in a particular airspace.

2.4 Consequently, a few prescriptive requirements were established, which in turn delayed new capabilities of RNAV system operation that generated higher costs for maintenance and certification specifications. In this context, ICAO developed the concept of navigation-based on performance

(PBN) concept to avoid such prescriptive specifications in order to set the requirements of aircraft equipment primarily, specifying the requirements of performance.

2.5 The PBN concept specifies performance requirements of RNAV system in terms of accuracy, integrity, availability, continuity and functionality necessary for the proposed operations within a particular airspace. Overall, the PBN concept represents a navigation based on systems of land towards performance-based navigation system of the aircraft.

3 STANDARDS RNAV 5

3.1 In January 1998 the European Aviation Safety Agency (EASA) published a document acceptable methods of compliance with 20-4 (20-4 AMC) which replaced the temporary guidance material No. 2 (TGL No. 2) issued by the JAA. This AMC contains acceptable means of compliance on airworthiness approval and operational criteria for the use of navigation systems in European airspace designated for operations basic area navigation (RNAV Basic or B-RNAV).

3.2 Likewise, the Federal Aviation Administration (FAA) of the United States, replaced the AC 90-96 March 1998 by AC 90-96A issued in January 2005. This new document provides support materials regarding airworthiness and operational approval for operators of aircraft registered in the U.S., operating in European airspace designated for basic air (B-RNAV) navigation and navigation accuracy (P-RNAV) area.

3.3 Both current documents, AMC 20-4 and AC 90-96A, prescribe similar functional and operational requirements.

3.4 The terminology for B-RNAV requirements, adopted by the International Civil Aviation Organization (ICAO), in the performance-based navigation (PBN) manual, is known as RNAV 5.

3.5 The basis of specifications developed by EASA and FAA, are founded on RNAV computer capabilities embedded in the early 70's.

3.6 The RNAV 5 specification has been developed by ICAO to be used in en-route operations within navigation aids coverage based on ground or satellite, or within limits of capacity from autonomous subsidies, or a combination of both.

3.7 RNAV 5 specification does not require an alert to the pilot in case of excessive navigation errors nor it requires two RNAV systems; therefore, any potential loss of RNAV capability requires that the aircraft be fitted with a source of alternative navigation.

3.8 The level of performance selected for RNAV 5 operations, allows that a wide range of RNAV systems were approved for such operations; including inertial systems (INS) with a limit of two hours after its last update position alignment performed on land, when a function to update automatic radio aircraft position is not available.

3.9 While RNAV 5 specification does not require a control and alert function of flight performance, it is certainly required that the equipment on board meet accuracy of lateral navigation of + / - 5NM or higher, 95% of the total flight time.

3.10 The ICAO Handbook (Doc 9613) performance-based navigation (PBN) sets a variety of specifications about navigation that can be globally applied. If we consider the characteristics of air traffic in the CAR Region, the use of RNAV 5 for en-route operations, is the most appropriate, taking into account that the requirements for approval will allow most aircraft equipped with RNAV systems be able to meet those approval requirements.

3.11 Following previous consideration, RNAV 5 aims to optimize the use of aircraft RNAV capability, without significant changes in equipment on board most aircraft.

4 BENEFITS OF RNAV 5

4.1 RNAV 5 operations provide potential advantages and benefits over conventional land-based operations. The benefits of using RNAV 5 reach aspects such as safety, ATC and air traffic-flow management ATFM, economic and environmental considerations, among others.

4.2 Airspace capacity can be increased; not only en-route, but also in terminal areas, by implementing more direct routes that are not connected by NAVAIDS which must be over flown, or setting up parallel paths to cope with the demand of traffic. Consequently, to get a more efficient use of airspace, it's suggested to create a more flexibly structured network of ATS routes; setting up short and direct along with parallel paths or dual ones. Also, it is recommended to design paths for aircrafts over flying terminal of high density of traffic, as well as alternative routes for contingency to meet the needs of the user community.

4.3 A potential reduction in monitoring traffic required by ATC, to ensure that aircraft maintain course or assigned levels/altitudes, also reduction of RTF communications between controller/pilot and increase of available time for the resolution of conflicts, which lead to reduce both the controller and the pilot workload.

4.4 From an economic point of view, when more direct and short routes are established, it reduces the fuel consumption, costs effective; thus, operators can leverage this reduction to increase the payload. On the other hand, the implementation of RNAV 5 leads to more efficient management of the number of land based NAVAIDS and a better planning of infrastructure. Hence by RNAV 5 equipment it is possible to maintain a better course, allowing reductions in the fuel consumption and pollution; which is a positive impact on the environment.

5 RELATED DOCUMENTS

- Annex 6 - Operation of Aircraft, ICAO, Parts I and II
- Doc 9613 - Performance Based Navigation Manual (PBN) of ICAO
- Doc 7030 - Regional Supplementary Procedures, ICAO
- Doc 7300 - Convention on International Civil Aviation

6 ADOPTION AIRWORTHINESS AND OPERATIONAL

6.1 A commercial air transport operator must comply with two types of approvals before receiving an RNAV 5 authorization or use RNAV routes in Central America FIR airspace:

a) Airworthiness approval which will lie with the State registration (see article 31 to Chicago Convention (ICAO) and paragraph 5.2.3 and 8.1.1 Part I, Annex 6); and

b) Operational approval by the State of the operator (see paragraph 4.2.1 and Deputy F of Annex 6, part I).

6.2 For general aviation operators, the state registration (see paragraph 2.5.2.2 of Annex 6, Part II) should be authorized to conduct operations, once it determines that the aircraft meets all applicable requirements of this document for RNAV 5.

6.3 The achievement of the requirements for airworthiness by themselves, do not constitute an operational approval.

6.4 Aeronautical Information Circulars issued by the States for RNAV 5 operations that provide acceptable methods of compliance (AMC) on the aircraft and operator approval for RNAV 5.

6.5 As a complement for previous advising circular has elaborated an aid of work to provide orientation and guides the States, operators, and inspectors with respect to the process that operators must follow to obtain RNAV 5 authorization.

7 PROCEDURES

7.1 Except as described in paragraph 7.3, only aircraft with authorization for RNAV 5 operations (approval operations and airworthiness) may submit flight plans to fly ATS routes designated RNAV 5 within the Central America FIR, as specified in the AIP.

7.2 Designated routes according to this publication as RNAV 5, for operations in the airspace of the Central American FIR is detailed below:

RNAV ROUTE 5	STARTING POINT CONSIDERED	FINAL POINT CONSIDERED	UPPER LIMIT / LOWER LIMIT	
UL200	ALSAL	VOR / DME IOL	UNL/FL200	
UL203	ALSAL	COOS	UNL/FL200	
UL308	ANREX	GEDIX	UNL/FL200	
Ul318	ALSAL	RADIM	UNL/FL200	
UL423	ISEB	VOR / DME TAP	UNL/FL200	
UL471	NAGEL	PABEL	UNL ▼ FL250	UNL ▲ FL260
UL655	ASOKU	EGODI	UNL/FL290	
UM419	ASOKU	ANSON	UNL/FL290	
UM659	LESIR	PARRI	UNL/FL200	
UM782	DELVI	TAKUS	UNL/FL290	
UM787	PILKO	TELAX	UNL/FL290	
UM796	PADURA	VOR / DME IOL	UNL/FL200	
UZ30	SETRI	SEDRA	UNL/FL195	
UZ403	FIORA	SELEK	UNL/FL210	

7.3 State aircraft, aircraft in SAR missions, humanitarian mission aircraft, and first flight delivery aircraft or maintenance flight are exempt of authorization for RNAV 5 operations. Conditions regarding the presentation of flight plans apply in accordance with 7.8.5.

7.4 Aircraft operating in ATS routes designated as RNAV 5, will be equipped with RNAV equipment on board (like minimum) which satisfies en-route precision of lateral and longitudinal navigation of +/- 5 NM 95% of the total flight time.

7.5 Before starting operations on RNAV 5 routes, shall be verify the correct functioning of the RNAV system on board. This verification must include:

a) Forms, and records shall be reviewed to ensure that maintenance actions are taken to correct defects in the equipment; and

b) The validity of data base (AIRAC cycle current), will be verified, if it is installed.

c) Authorized flight plans will be verified by comparing charts or other applicable sources with the textual display of the navigation system display of the aircraft, if applicable. The exclusion of specific navigation aids must be confirmed, if applicable.

7.6 During an operation in RNAV 5 routes, verify the correct functioning of the RNAV system of the aircraft. This verification must include a confirmation about:

a) Equipment required for RNAV 5 operation has not been degraded during the flight;

b) Path corresponds to the authorization.

c) The precision of the aircraft navigation is suitable for RNAV 5 operations, ensuring through cross verifications;

d) Other AIDS for navigation must be selected, in such a way that allows a cross check or immediate reversal in the event of loss of ability to RNAV.

7.7 If ATC assigns a direction, to an aircraft off the route, the pilot must not change the flight plan in the RNAV system until it receives authorization to return to the path, or ATC confirms a new authorization. While the aircraft is not in the designated RNAV path, specified accuracy requirement does not apply.

7.8 Flight Planning

7.8.1 In box 10 (equipment) of the flight plan, the letter R will be inserted to indicate that the aircraft conforms to the RNAV 5 specification prescribed route and that the operator has obtained an authorization from the Civil Aviation Authority; and it can comply the conditions for such authorization. Also, in the box 10 the letter Z will be inserted, meaning that the type of RNAV computer on-board will be detailed in box 18.

7.8.2 In section (box) 18 of the flight plan, will be inserted NAVI followed by the code or codes of specifying navigation which corresponds, according to the following table:

CODE	NAVIGATION SPECIFICATION		
B1	5 RNAV	-	All sensors allowed
B2	RNAV 5	-	GNSS
B3	RNAV 5	-	DME / DME
B4	RNAV 5	-	VOR / DME
B5	RNAV 5	-	INS or IRS
B6	RNAV 5	-	LORAN C

7.8.3 All aircraft that do not have authorization for RNAV 5 shall insert STS/NONRNAV5 in box18 of their flight plans, as appropriate to the flight plan route.

7.8.4 When a failure or degradation is produced on board an aircraft with RNAV 5 authorization, (refer to paragraph 6) which renders them to comply with the prescribed requirements for functionality and accuracy before departure, the operator shall not include the letter R in box 10 of the flight plan. As these flights cannot use RNAV route, this should be reflected in section 18 of the flight plan by inserting STS/NONRNAV5, as appropriate to the route of current flight plan. So then, on a flight for which a flight plan has been submitted, will be presented an appropriate new flight plan and the old one will be canceled. For a flight based on an RPL operation, this will be cancelled and an appropriate new flight plan will be presented.

7.8.5 State aircraft, aircraft in SAR missions, humanitarian mission aircraft, and maintenance flight aircraft or first flight delivery without RNAV approval, might present flight plans for RNAV route operations.

These aircraft must complete box 18 including after STS / reasons for special treatment, for example: STATE, HUM, SAR, etc.

7.8.6 All the operators who register repetitive flight plans (RPL) shall include, in the Q box of the RPL, all information regarding to equipment and capacity of navigation in accordance with the box 10 of the flight plan. This includes indicators and designators which describe the level of the PBN granted authorization issued to the operator.

7.9 Contingency procedures

7.9.1 The procedures regarding degradation or failure in the RNAV system during flight, when the aircraft is on ATS designated RNAV 5 route;

a) It is authorized to fly the aircraft on the ATS routes defined by a VOR/DME; or

b) If these routes were not available, it shall be permitted to fly the aircraft with conventional navigation AIDS, i.e., VOR/DME; or

c) When the above mentioned procedures are not available, the ATC unit shall provide to the aircraft, when possible, radar vectors until that aircraft can resume its own navigation.

7.9.2 ATC actions of an aircraft that fails to comply with the RNAV requirements due to a failure or degradation on the RNAV system depend on the nature of the reported failure and the overall situation of the transit. In Many situations, the aircraft can continue operations in accordance with the current ATC authorization. When this cannot be done, pilot may request a revised authorization, as specified in 7.8.1 to return to the VOR/DME navigation.

8 ADDITIONAL INFORMATION

Additional information can be obtained through the following sites:
http://www.mexico.icao.int/ATM.html # PBN
http://www.mexico.icao.int/ATM/ConceptodeEspacioAereoPBN.pdf
http://www2.icao.int/en/pbn/Pages/default.aspx