

APPENDIX F-2

RNP AR APCH JOB AID

OPERATOR APPLICATION TO CONDUCT RNP AR APCH OPERATIONS

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1. Introduction

This Job Aid was developed by the Latin American Regional Safety Oversight Cooperation System (SRVSOP) to provide States, operators, and inspectors with guidance on the process to be followed by an applicant in order to obtain an RNP AR APCH approval.

2. Purpose of the Job Aid

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

3. Recommended inspector and operator actions

Some recommendations for use of the Job Aid follow:

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

4. **Structure of the Job Aid**

Parts	Topics	Page
Part 1	General information	3
Part 2	Information on aircraft and operator identification	5
Part 3	Application (RNP AR APCH Job Aids and documents)	7
Part 4	Contents of the application for RNP AR APCH	11
Part 5	Guide to determine the eligibility of RNP AR APCH aircraft	15
Part 6	Basic pilot procedures for RNP AR APCH operations	21

Main Sources of Documents, Information, and Contacts

Advisory Circular CA 91-009 - Approval of aircraft and operators for RNP approach procedures with authorisation required (RNP AR APCH) operations, is available on the ICAO/SAM Regional Office web page (www.lima.icao.int) through the SRVSOP link.

5. **Main Reference Documents**

Reference documents	Titles
Annex 6	Operation of aircraft
ICAO Doc 9613	Performance-based navigation (PBN) manual
FAA AC 90-101	Approval guidance for RNP procedures with SAAAR
EASA AMC 20-26	Airworthiness approval and operational criteria for RNP authorization required (RNP AR) operations
FAA AC 20-130A	Airworthiness approval of navigation or flight management systems integrating multiple navigation sensors
FAA AC 20-138A	Airworthiness approval of Global navigation satellite system (GNSS) equipment
TSO-C115b	Airborne area navigation equipment using multi-sensor inputs
TSO-C129a	Airborne supplemental navigation equipment using the global positioning system (GPS)
TSO-C145a	Airborne navigation sensors using the global positioning system (GPS) augmented by the wide area augmentation system (WAAS)
TSO-C146a	Stand-Alone airborne navigation equipment using the global positioning system (GPS) augmented by the wide area augmentation system (WAAS)

PART 1: GENERAL INFORMATION**Basic events of the RNP AR APCH Approval Process**

	Action by the operator	Action by the CAA
1	Establish the need to obtain approval for RNP AR APCH operations.	
2	Review the AFM, AFM supplement or Type Certificate Data Sheet (TCDS), or other appropriate documents (e.g., service bulletins (SB), service letters (SL), etc.) to determine the eligibility of the aircraft for RNP AR APCH operations. The operator contacts the aircraft or avionics manufacturer, if necessary, to confirm RNP AR APCH aircraft eligibility or better.	
3	Contact the CAA to schedule a pre-application meeting to discuss the operational approval requirements.	
4		During the pre-application meeting, establish: <ul style="list-style-type: none"> • the form and contents of the application; • the documents that support RNP AR APCH approval • the date in which the application will be submitted for evaluation • if necessary, conduct a validation flight observed by the CAA
5	Send the application at least 60 days before start-up of RNP AR APCH operations.	
6		Review the request of the operator
7	Once the amendments to manuals, programmes, and documents have been approved or accepted, provide training to flight crews, flight dispatchers, and maintenance personnel, and conduct a validation flight, if required by the CAA.	Only if required, participate in the validation flight.
8		Once the operational and airworthiness requirements have been met, issue the operational approval in the form of OpSpecs for LAR 121 or 135 or equivalent operators, or an LOA for LAR 91 or equivalent operators, as appropriate.

Notes related to the approval process**1. Responsible authority**

- a. **Commercial air transport (LAR 121 and/or 135 or equivalent regulations).**- The **State of registry** determines that the aircraft meets the airworthiness requirements. The **State of the operator** issues the RNP AR APCH approval (e.g., OpSpecs).
- b. **General Aviation (LAR 91 or equivalent).**- The **State of Registry** determines that the aircraft meets airworthiness requirements and issues the operational approval (e.g., an L regulation).

2. The CAA does not need to issue an LOA or equivalent document for each individual area of operation in the case of LAR 91 operators.

3. LAR 121 and/or 135 operators with RNP AR APCH approval must list this approval in the OpSpecs.

4. Related sections of the Latin American Aeronautical Regulations (LAR) or equivalent regulations

- a. LAR 91 Sections 91.1015 and 91.1640 or equivalents
- b. LAR 121 Section 121.995 (b) or equivalent
- c. LAR 135 Section 135.565 (c) or equivalent

5. Related ICAO documents

- a. Annex 6 to the Convention on International Civil Aviation – Operation of aircraft
- b. Annex 10 to the Convention on International Civil Aviation – Aeronautical telecommunications
- c. Annex 15 to the Convention on International Civil Aviation – Aeronautical information services
- d. ICAO Doc 9613 – Performance-based navigation (PBN) manual
- e. ICAO Doc 9905 - Required navigation performance authorization required (RNP AR) procedure design manual (final draft)
- f. ICAO Doc 4444 – Procedures for air navigation services – Air traffic management

PART 2: INFORMATION ON THE IDENTIFICATION OF AIRCRAFT AND OPERATORS**NAME OF THE OPERATOR:** _____

Aircraft manufacturer, model, and series	Registration numbers	Serial numbers	RNP AR APCH system Number, manufacturer, and model	RNP specification

DATE OF PRE-APPLICATION MEETING _____

DATE ON WHICH THE APPLICATION WAS RECEIVED _____

DATE ON WHICH THE OPERATOR INTENDS TO BEGIN RNP AR APCH OPERATIONS _____

IS THE CAA NOTIFICATION DATE APPROPRIATE? YES _____ NO _____

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PART 3 – OPERATOR APPLICATION (ANNEXES AND DOCUMENTS)

Annex	Title of annex/document	Indication of inclusion by the operator	Comments by the Inspector
A	Application for RNP AR APCH approval		
B	<p>Airworthiness documents showing aircraft eligibility for RNP AR APCH.</p> <p>AFM, AFM revision, AFM supplement, or Type certificate data sheet (TCDS) showing that the RNP navigation system is eligible for RNP AR APCH.</p> <p>Documentation produced by the manufacturer.- Aircraft that have documentation by the manufacturer documenting compliance with SRVSOP CA 91-009 criteria or equivalent documents, meet the performance and functional requirements of said document.</p>		
C	<p>Aircraft modified to meet RNP AR APCH standards. Documentation on aircraft inspection and/or modification, if applicable. Maintenance records documenting the installation or modification of aircraft systems (e.g., FAA Form 337 – major repairs and alterations).</p>		
D	<p>Maintenance programme</p> <ul style="list-style-type: none"> For aircraft with established maintenance procedures for RNP AR APCH systems, the list of references of the document or programme. For recently installed RNP AR APCH systems, the maintenance procedures for their review. 		
E	<p>Minimum equipment list (MEL) (only for operators conducting operations based on a MEL):</p> <p>MEL showing provisions for RNP AR APCH systems.</p>		
F	<p>Training</p> <p>1. LAR 91 operators or equivalent: Training methods: Training at</p>		

Annex	Title of annex/document	Indication of inclusion by the operator	Comments by the Inspector
	<p>home, LAR 142 training centres, or other training courses, course completion records.</p> <p>2. LAR 121 and/or 135 operators or equivalents: Training programmes (training curricula) for flight crews, flight dispatchers, and maintenance personnel.</p>		
G	<p>Operating policies and procedures</p> <p>1. LAR 91 operators or equivalents: Operations manual (OM) or sections to be attached to the application, corresponding to RNP AR APCH operating procedures and policies.</p> <p>2. LAR 121 and/or 135 operators or equivalents: Operations manual and checklists.</p>		
H	<p>Navigation database</p> <p>Details of the navigation data validation programme</p>		
I	<p>Withdrawal of RNP AR APCH approval</p> <p>Indication of the need to follow up on navigation error reports submitted and the possibility of withdrawal of RNP AR APCH approval.</p>		
J	<p>Validation flight plan</p> <p>Plan showing that the operator is capable of conducting the requested operations.</p>		
K	<p>RNP AR APCH approach monitoring programme</p> <p>Programme to collect data on the RNP AR APCH procedures to be conducted</p>		

CONTENTS OF THE APPLICATION TO BE SUBMITTED BY THE OPERATOR

- _____ **DOCUMENTATION SHOWING RNP AR APCH COMPLIANCE OF THE AIRCRAFT/NAVIGATION SYSTEMS**
- _____ **OPERATING PROCEDURES AND POLICIES**
- _____ **SECTIONS OF THE MAINTENANCE MANUAL RELATED TO THE RNP AR APCH SYSTEM (if not previously reviewed)**

Note 1: Documents may be grouped in a single folder or may be sent as individual documents.

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PART 4: CONTENTS OF THE OPERATOR APPLICATION FOR RNP AR APCH OPERATIONS

#	Contents of the RNP AR APCH application by the operator	Reference paragraphs CA 91-009	In what Annexes/Documents of the operator can the application contents be located	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
1	Letter of application of the operator Letter of application to request RNP AR APCH approval.	Appendix 7, Paragraph b) 1)	Annex A		
2	Type of aircraft and description of aircraft equipment A configuration list which detail the relevant components and the equipment to be used in the operation. The list shall include each manufacturer, model and version of the equipment and software of the installed FMS.	Appendix 7, Paragraph b) 3)			
3	Aircraft qualification documentation Documentation showing that the equipment of the proposed aircraft meets the requirements of Appendix 2 to CA 91-009 or equivalent documents (e.g., FAA AC 90-101 Appendix 2). This documentation shall contain any requirements in terms of hardware, software, procedures, and limitations.	Appendix 7, Paragraph b) 2)	Annex B Annex C		
4	Training programmes a) LAR 121 or 135 operators or equivalents: Training programmes: Operators will develop an initial and periodic training programme for flight crews, flight dispatchers, if applicable and maintenance personnel. b) LAR 91 operators or equivalent: Training methods: The following methods are acceptable for these operators: Training at home, LAR 142 training centres, or other training courses.	Appendix 7, Paragraph b) 6)	Annex F		

#	Contents of the RNP AR APCH application by the operator	Reference paragraphs CA 91-009	In what Annexes/Documents of the operator can the application contents be located	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
5	Operations manual (OM) and checklists a) LAR 121 and/or 135 operators or equivalents: Operations manual and checklists. b) LAR 91 operators or equivalents: Operations manual or section of the operator application documenting RNP AR APCH policies and procedures.	Appendix 7, Paragraph b) 10)			
6	Maintenance procedures <ul style="list-style-type: none"> For aircraft with established maintenance practices for RNP AR APCH navigation systems, the operator will provide document references. For newly installed RNP AR APCH systems, the operator will provide maintenance practices for review. 	Appendix 7, Paragraph b) 11)	Annex D		
7	Minimum equipment list (MEL) The operator will revise the MEL in order to incorporate the aspects necessary to conduct RNP AR APCH operations.	Appendix 7, Paragraph b) 13)	Annex E		
8	Navigation data validation programme The operator will provide details of the navigation data validation programme.	Appendix 7, Paragraph b) 5)	Annex F		
9	RNP AR APCH monitoring programme The operator will establish a monitoring programme that will collect data on the performed RNP AR APCH procedures. Each operation must be recorded, and unsatisfactory	Appendix 7, Paragraph b) 12)	Annex H		

#	Contents of the RNP AR APCH application by the operator	Reference paragraphs CA 91-009	In what Annexes/Documents of the operator can the application contents be located	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
	attempts must include the factors that prevented successful completion of an operation.				
10	<p>Validation test plan</p> <p>The operator will develop a validation test plan to show that it is capable of conducting the proposed operation. The plan will include, at least, the following:</p> <ul style="list-style-type: none"> a) a statement that the validation plan has been designed to show the capability of the aircraft to carry out RNP AR APCH procedures; b) the operating and dispatch procedures of the operator; and c) MEL procedures. <p><i>Note 1.- The validation plan shall benefit from the ground training devices, flight simulators and aircraft demonstrations. If the validation is conducted on an aircraft, it must be done during the day and under VMC.</i></p> <p><i>Note 2.- Validations may be required for each manufacturer, model and version of the software in the installed FMS.</i></p>	Appendix 7, Paragraph b) 14)	Annex I		
11	<p>Flight operational safety assessment (FOSA)</p> <p>The operator will establish a methodology for the analysis and quantitative and qualitative assessment of navigation systems, aircraft systems, operational procedures, hazards, failure mitigation, normal conditions, abnormal conditions, and operational environment related to safety.</p>	Appendix 7, Paragraph b) 16)			

PART 5 – GUIDE FOR DETERMINING RNP AR APCH AIRCRAFT ELIGIBILITY

#	Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
1	Aircraft eligibility	Paragraph 9.2	Annex B		
	a) For new aircraft.- the aircraft qualification documentation can be approved by the CAA as part of an aircraft certification project, and will be reflected in the AFM and related documents.	Paragraph 9.2 a)			
	b) For aircraft in use.- Documentation produced by the manufacturer.	Paragraph 9.2 b)	Annex B		
	c) Aircraft modified to meet RNP AR APCH standards.- Aircraft inspection and/or modification documentation, if applicable. Maintenance records documenting the installation or modification of aircraft systems (e.g., FAA Form 337 – major repairs and alterations).	Paragraph 9.3	Annex B		
2	Aircraft qualification	Appendix 2			
	a) Previously certified aircraft.- Operators of previously certified aircraft can document compliance with CA 91-009 (RNP AR APCH) or equivalent documents, without a new airworthiness project (e.g., without making a change in the AFM) and will notify the CAA of any new performance not covered by the original airworthiness approval.	Appendix 2 Paragraph 1. c)			
	b) The AFM or other aircraft qualification evidence shall indicate the normal and	Appendix 2			

#	Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
	abnormal flight crew procedures, failure alerting responses, and any other limitation, including information related to the operating modes required for flying an RNP AR APCH procedure.	Paragraph 1. d)			
	c) In addition to the specific RNP AR APCH guide presented in CA 91-009 or equivalent documents (e.g., EASA AMC 20-26 or FAA AC 90-101), the aircraft must comply with AC 20-129 and either AC 20-130 () or AC 20-138 ().	Appendix 2 Paragraph 1. e)			
3	Navigation sensors.- On the horizontal plane, the RNP equipment will use data input from the following types of position sensors, but with the GNSS as primary positioning basis: a) Global navigation satellite system (GNSS). b) Inertial navigation system (INS) or inertial reference system (IRS), with automatic position updating from suitable radio-based navigation equipment. c) Distance-measuring equipment (DME) that provides measurements from two or more ground stations (DME/DME)	Paragraph 6.1 b)			
	Global positioning system (GPS) a) The sensor must meet the FAA AC 20-138 () criteria. For systems that comply with this AC, the following sensor precisions can be used for analysing total system precision	Appendix 2 Paragraph 3. a) 1)			

#	Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
	without any additional justification: 1) precision of the GPS sensor better than 36 m (95%); and 2) precision of the augmented GPS sensor (with GBAS or SBAS) better than 2 m (95%).				
	Inertial reference system (IRS). - An IRS must meet the criteria of Appendix G LAR 121 or Appendix G Part 121 of United States 14 CFR or equivalents. Aircraft manufacturers and applicants can demonstrate improved inertial performance according to the methods described in Appendix 1 or 2 of FAA Order 8400.12A. <i>Note.- Integrated GPS/INS position solutions reduce the degradation ratio following a position update loss. For coupled GPS/IRUs, Appendix R to document RTCA/DO-229C provides additional guidance.</i>	Appendix 2 Paragraph 3. a) 2)			
	Distance measuring equipment (DME). - Initiation of all RNP AR APCH procedures is based on GNSS updating. Except where the use of DME in a procedure is specifically designated as “not authorized”, DME/DME updating can be used as a reversal mode during the approach and missed approach when the system complies with the navigation precision. The manufacturer and the operator shall identify any DME infrastructure or procedure limitation preventing an aircraft type from meeting this requirement	Appendix 2 Paragraph 3. a) 3)			

#	Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
	<p>VHF omnidirectional radio range (VOR).- For initial RNP AR APCH implementation, the RNP system may not use VOR updating. The manufacturer and the operator shall identify any constraints on the VOR infrastructure or the procedure for a given aircraft to comply with this requirement.</p> <p><i>Note.- This requirement does not prohibit the capability of the VOR equipment, provided there is a direct means to inhibit its update. A procedure that allows the flight crew to inhibit VOR updating or to execute a missed approach if the system reverts to VOR updating may meet this requirement.</i></p>	Appendix 2 Paragraph 3. a) 4)			
	<p>Multi-sensor systems.- For multi-sensor systems, there must be automatic reversal to an alternate RNAV sensor if the primary RNAV sensor fails. Automatic reversal from a multi-sensor system to another multi-sensor system is not required.</p>	Appendix 2 Paragraph 3. a) 5)			
	<p>Altimetry system error.- 99.7% of the altimetry system error for each aircraft (assuming the temperature and adiabatic lapse rate of standard atmosphere) must be smaller than, or equal to, the following, with the aircraft in approach configuration:</p> $ASE = -8.8 \cdot 10^{-8} \cdot H^2 + 6.5 \cdot 10^{-3} \cdot H + 50$ <p>where H is the aircraft true altitude.</p>	Appendix 2 Paragraph 3. a) 6)			
	<p>Temperature compensation systems.- Systems that provide temperature-based correction for the VNAV barometric guide must comply with Appendix H.2 to document</p>	Appendix 2 Paragraph 3. a) 7)			

#	Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the inspector	Follow-up by the inspector: Item status and date
	RTCA/DO-236. This applies to the final approach segment. Compliance with this requirement must be documented to allow the operator to conduct RNP AR APCH approaches when the real temperature is above or below the design limit of the published procedure. Appendix H.2 also provides guidance on the operational aspects related to temperature compensation systems, such as the interception of compensated paths from non-compensated procedure altitudes.				
4	Performance and functional requirements of RNP AR APCH systems	Appendix 2	Annex B		
5	Navigation database Details of the navigation data validation programme.	Appendix 3	Annex B		

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PART 6 - BASIC PILOT PROCEDURES FOR RNP AR APCH OPERATIONS

Topics		Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
Operating procedures		Appendix 4	Annex G		
1	Pre-flight considerations	Appendix 4 Paragraph 2			
	Minimum equipment list (MEL). - The operator MEL must be developed or revised to indicate equipment requirements for instrument RNP AR APCH procedures. Guidance on these equipment requirements is available in the documents of the aircraft manufacturer. The required equipment may depend on the intended navigation precision and whether the missed approach requires an RNP value of less than 1.0. For example, GNSS and AP are normally required for a low navigation precision. Normally, dual equipment is required for approaches when using a line of minima of less than RNP 0.3 and/or when the missed approach has an RNP value of less than 1.0. An operable enhanced ground proximity warning system (EGPWS/TAWS) is required for all RNP AR APCH procedures. It is advisable that the EGPWS/TAWS use local pressure- and temperature-compensated altitudes (e.g., a corrected GNSS and barometric altitude) and that it includes data on significant obstacles and terrain. The flight crew must be aware of the equipment requirement.	Appendix 4 Paragraph 2 a)			
	Autopilot (AP) and flight director (FD). - For procedures with a navigation precision of less than RNP 0.3 or with RF legs, the use of AP and FD driven by the aircraft RNP system is required in all cases. Therefore, the AP and FD must operate with a suitable precision to track the lateral and vertical paths required by a specific RNP AR APCH procedure. When the dispatch or release of a flight is predicated on flying an RNP AR APCH approach that requires the use of AP at the destination and/or alternate aerodrome, the flight dispatcher or pilot in command must make sure that the AP is installed and operational.	Appendix 4 Paragraph 2 b)			
	Assessment of an RNP AR APCH dispatch or release. - The operator must have a predictive performance capability to forecast	Appendix 4 Paragraph 2			

Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
<p>whether the specific RNP will be available at the location and time of a desired RNP AR APCH operation. This capability can be provided through a ground service and does not need to reside in the aircraft avionic equipment. The operator must establish procedures requiring the use of this capability as a dispatch or release tool and as a flight-tracking tool in case of reported failures. RNP assessment must consider the specific combination of aircraft capabilities (sensors and integration).</p> <p>a) Assessment of RNP AR APCH with GNSS updating.- The predictive capability must take into account known and predicted temporary suspension of GNSS satellite service or other negative effects on navigation system sensors. The prediction program shall not use a masking angle of less than 5°, as operational experience indicates that satellite signals at low elevations are not reliable. The prediction must use the current GPS constellation with an algorithm identical to that used in the on-board equipment. For RNP AR APCH procedures in high terrain, the operator must use a masking angle appropriate to the terrain.</p> <p>b) From the initiation of the approach, RNP AR APCH procedures require GNSS updating.</p>	c)			
<p>NAVAID exclusion.- The operator must establish procedures to exclude air navigation facilities in accordance with published NOTAMs (e.g., DMEs, VORs, and localizers). Rationality checks of the internal avionic equipment may not be appropriate for RNP AR APCH operations.</p>	Appendix 4 Paragraph 2 d)			
<p>Validity of the navigation database.- Upon initiating the system, the pilots of aircraft equipped with certified RNP systems must confirm that the navigation database is valid. The databases are expected to be current for the duration of the flight. If the AIRAC cycle changes during the flight, the operators and pilots must establish procedures to ensure the precision of navigation data, including the suitability of navigation facilities used for defining routes and flight procedures. Traditionally, this has been accomplished by verifying electronic data against paper documents. One acceptable means is to compare</p>	Appendix 4 Paragraph 2 e)			

Topics		Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
	aeronautical charts (new and old) to verify navigation fixes prior to flight dispatch or release. If an amended chart has been published for the procedure, the navigation database must not be used to conduct the operation				
2	In-flight considerations	Appendix 4 Paragraph 3			
	Flight plan modification.- Pilots are not authorized to fly a published RNP AR APCH procedure unless it can be retrieved by its name from the navigation database and conforms to the published procedure. The lateral path must not be modified, except that the pilot may accept a clearance to fly direct to a fix located prior the FAF in the approach procedure, and that does not immediately precede an RF leg. The only other acceptable modification to the loaded procedure is to change speed and/or altitude waypoint constraints on the initial, intermediate, or missed approach segments (for example, corrections applied due to cold temperature or to comply with an ATC clearance/instruction).	Appendix 4 Paragraph 3. a)			
	Required equipment list.- The flight crew must have a list of the equipment required to conduct RNP AR APCH procedures or alternate methods for addressing, during the flight, equipment failures that hinder the execution of an RNP AR APCH procedure (e.g., the quick reference handbook - QRH)	Appendix 4 Paragraph 3. b)			
	RNP AR APCH management.- Flight crew operating procedures must ensure that the navigation system uses the appropriate navigation precision during the approach. If the approach chart shows several minima associated to different navigation precision values, the flight crew must confirm that the desired navigation precision has been entered in the RNP system. If the RNP system does not extract and set the navigation precision from the on-board database for each leg of the procedure, then the flight crew operating procedures must ensure that the lowest navigation precision required to complete the approach or missed approach has been selected before starting the approach.	Appendix 4 Paragraph 3. c)			

Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
<p>GNSS updating.- From the beginning of the approach, all instrument RNP AR APCH procedures require GNSS updating of the navigation position solution. The flight crew must verify that GNSS updating is available before starting the RNP AR APCH procedure. If at any time during the approach GNSS updating is lost and the navigation system does not have the performance to continue the approach, the flight crew must abandon the RNP AR APCH procedure, unless the pilot has in sight the visual references required to continue such approach.</p>	Appendix 4 Paragraph 3 d)			
<p>Radio updating.- The initiation of any RNP AR APCH procedure is based on GNSS updating. Except where specifically designated in a procedure as not authorized, DME/DME updating can be used as a reversal mode during the approach or missed approach when the system complies with the navigation precision. VOR updating is not authorized at this time. Consequently, the flight crew must follow operator procedures to inhibit specific facilities (see paragraph 2.d) of this appendix).</p>	Appendix 4 Paragraph 3 e)			
<p>Approach procedure confirmation.- The flight crew must confirm that the correct procedure has been selected. This procedure includes the confirmation of waypoint sequence, the rationality of track angles and distances, and any other parameter that can be modified by the pilot, such as altitude and speed constraints. A procedure must not be used if validity of the navigation database is in doubt. A navigation system text display or a navigation map display can be used.</p>	Appendix 4 Paragraph 3 f)			
<p>Track deviation monitoring.- Pilots must use a lateral deviation indicator, an FD and/or an AP in lateral navigation mode during RNP AR APCH procedures. Pilots of aircraft with lateral deviation indicators must ensure that indicator scaling (full-scale deflection) is suitable for the navigation precision associated with the various segments of the RNP AR APCH procedure.</p>	Appendix 4 Paragraph 3 g)			

Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
<p>All pilots are expected to maintain route centre lines, as depicted by on-board lateral deviation indicators and/or in the flight guidance, during all RNP operations, unless authorized to deviate by the ATC or under emergency conditions.</p> <p>For normal operations, the cross-track error/deviation (the difference between the path estimated by the RNP system and the aircraft position relative to the path) shall be limited to $\pm \frac{1}{2}$ the navigation precision associated with the procedure segment.</p> <p>Small lateral deviations from this requirement (e.g., overshooting or undershooting the limit) during or immediately after a turn are allowed, up to a maximum of 1 times (1xRNP) the navigation precision of the procedure segment.</p> <p>The vertical deviation must be within 75 ft during the final approach segment. Lateral deviations shall be monitored above and below the glide path (GP). While being above the glide path provides a margin over the obstacles during the final approach, it can result in the pilot deciding to do a go-around closer to the runway, which reduces obstacle clearance during the missed approach.</p> <p>Pilots must execute a missed approach if lateral deviation exceeds 1xRNP or if vertical deviation exceeds 75 ft, unless the pilot has in sight the visual references required to continue the approach.</p> <p>a) Some aircraft navigation displays do not incorporate lateral and vertical deviations scaled for each RNP AR APCH operation in the primary field of view of the pilot. When using a moving map, a low-resolution vertical deviation indicator (VDI), or a numeric deviation display, flight crew training and procedures must ensure the effectiveness of these displays. Normally, this implies a demonstration of the procedure with a number of trained crews and the inclusion of this monitoring procedure in the recurrent training program for RNP AR APCH.</p> <p>b) For aircraft using a CDI for lateral path tracking, the AFM or the aircraft qualification guidance shall indicate which navigation precision (RNP value) and operations the aircraft supports and the effects of the operation on CDI scale. The flight crew must know the CDI full-scale deflection (FSD) value. The avionics system can automatically adjust the CDI scale (depending on</p>				

Topics		Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
	the flight phase) or the flight crew can manually adjust such scale. If the flight crew manually selects the CDI scale, the operator must have procedures in place and provide training to ensure that the CDI scale selection is appropriate for the intended RNP AR APCH operation. The deviation limit must be readily visible, considering CDI scale (e.g., full-scale deflection).				
	<p>System cross-check.- For RNP AR APCH procedures with a navigation precision of less than 0.3, the flight crew must monitor the lateral and vertical guidance provided by the RNP navigation system to ensure that this guidance is consistent with other available data and displays provided by an independent means.</p> <p>Note.- <i>This cross-check may not be necessary if lateral and vertical guidance systems have been developed taking into account a hazardous (severe or major) failure condition due to false information (see Appendix 2, paragraph 3.e) and if normal system performance supports airspace containment (see Appendix 2, paragraph 2.d).</i></p>	Appendix 4 Paragraph 3 h)			
	<p>Procedures with RF legs.- An RNP AR APCH procedure may require aircraft to have the capability of executing an RF leg to avoid terrain and obstacles. Since not all aircraft have this capability, flight crews must know if they can or cannot carry out these procedures. When an RF leg is flown, it is essential for the flight crew to follow the flight path in order to maintain the intended track.</p> <p>a) If a go-around is initiated during or immediately after an RF leg, the flight crew must be aware of the importance of maintaining the published path as closely as possible. The operator must develop and establish operating procedures for aircraft that do not remain in LNAV when initiating a go-around, in order to ensure that the intended track of the RNP AR APCH procedure is maintained.</p> <p>b) Pilots must not exceed the maximum speeds shown in Table 4-1 of Appendix 4 to SRVSOP CA 91-009 during the RF leg. For example, a Category C A320 must reduce its speed to 160 KIAS at the final approach fix (FAF) or can fly as fast as 185 KIAS if it uses Category D minima. A missed approach before the decision altitude (DA) may require a segment speed for that</p>	Appendix 4 Paragraph 3 i)			

Topics		Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
	segment to be maintained.				
	<p>Temperature compensation.- In aircraft that have temperature compensation capability according to paragraph 3.a)7) of Appendix 2 to SRVSOP CA 91-009, flight crews can do without temperature limits for RNP AR APCH procedures if the operator provides the flight crews with training on the use of this capability. Temperature compensation through the aircraft system is applicable to VNAV guidance and is no substitute for the low-temperature compensation to be applied by the flight crew at minimum altitudes or at the decision altitude. Flight crews must be familiar with temperature compensation effects when intercepting the compensated path described in document EUROCAE ED-75B/RTCA DO-236B Appendix H.</p>	Appendix 4 Paragraph 3 j)			
	<p>Altimeter setting.- Due to reduced obstacle clearance inherent to instrument RNP AR APCH procedures, the flight crew must verify that the current local altimeter is set prior to the FAF but not prior to the IAF. The execution of an instrument RNP AR APCH procedure requires that the current altimeter be set for the aerodrome of intended landing. Remote altimeter settings are not allowed.</p>	Appendix 4 Paragraph 3 k)			
	<p>Altimeter cross-check.- Prior to the FAF, but not before the IAF, the flight crew must carry out a cross-check of both pilot altimeters to make sure they agree within ± 100 ft. If the cross-check fails, the crew must not continue with the approach. If the avionics system provides an automatic altitude comparison warning system for pilot altimeters, flight crew procedures shall indicate the action to be taken in the event of an altimeter comparator warning while executing an RNP AR APCH.</p> <p><i>Note.- This operational cross-check is not required if the aircraft system automatically compares altitudes to within 100 ft (see paragraph 3. d)15) of Appendix 2).</i></p>	Appendix 4 Paragraph 3 l)			
	<p>VNAV altitude transitions.- The aircraft VNAV barometric system provides fly-by vertical guidance to ensure a smooth transition when intercepting the glide path prior to the FAF. Small vertical shifts, which may occur in a vertical constraint (e.g., in the FAF), are considered operationally acceptable and desirable since they allow for</p>	Appendix 4 Paragraph 3 m)			

Topics	Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
the capture of a new or the next vertical segment. This temporary deviation below the published minima is acceptable as long as the deviation is limited to no more than 100 ft and is the result of a normal VNAV capture. This applies to both “leveling” and “altitude capture” segments that follow a climb or descent or vertical climb or beginning of a segment with descent, or when climb and descent paths with different slopes come together.				
Non-standard climb gradient. - When the operator intends to use a DA associated with a missed approach non-standard climb gradient, it must ensure that the aircraft will be able to comply with the climb gradient published for the expected weight (mass) of the aircraft, atmospheric conditions, and operating procedures before conducting the operation. When the operator has performance personnel available to determine whether its aircraft can meet the published climb gradients, such personnel must provide information to pilots about the climb gradients that they must comply with.	Appendix 4 Paragraph 3 n)			
Engine-out procedures. - Aircraft may demonstrate an acceptable flight technical error (FTE) with one engine inoperative when conducting RNP AR APCH procedures. Otherwise, flight crews are expected to take appropriate action in case of an engine failure during an approach, so no specific aircraft qualification is required in this case. The aircraft qualification must identify any performance limitation in case of engine failure to support the definition of the appropriate flight crew procedures. Operators must pay special attention to published procedures with non-standard climb gradients.	Appendix 4 Paragraph 3 o)			
Missed approach or go-around a) Missed approach procedure requiring RNP 1.0. - Where possible, the missed approach will require RNP 1.0. The missed approach of these procedures is similar to the missed approach of an RNP APCH operation. b) Missed approach procedures requiring RNP of less than 1.0. - When necessary, RNP values of less than 1.0 will be used in the missed approach. For an operator to be approved to	Appendix 4 Paragraph 3 p)			

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<p>execute these approaches, the equipage and procedures must meet the criteria established in paragraph 6 of Appendix 2 (Requirements for missed approaches with an RNP of less than 1.0).</p> <p>c) In many aircraft, a change may occur in lateral navigation when TOGA is activated during a missed approach or go-around. Also, in many aircraft, TOGA activation disconnects the AP and FD from LNAV guidance, and the FD reverts to track-hold derived from the inertial system. LNAV guidance to the AP and FD shall be re-engaged as quickly as possible.</p> <p>d) Flight crew procedures and training programs must address the impact on navigation capability and flight guidance if the pilot initiates a go-around during a turn. In the event an early missed approach is initiated, the flight crew must follow the approach and missed approach tracks unless otherwise cleared by the ATC. The flight crew shall also be aware that RF legs are designated based on the maximum true speed at normal altitudes, and initiating an early missed approach will reduce the maneuverability margin, and will potentially make it impractical to hold the turn at missed approach speeds.</p> <p>e) Upon loss of GNSS updating, the RNP guidance may begin to navigate on IRU, if installed on the aircraft, but the aircraft will begin to drift, degrading the navigation position solution. Therefore, when RNP AR APCH missed approach operations are based on IRU autonomous navigation, the inertial guidance can only provide RNP guidance for a specific amount of time.</p>				
<p>Contingency procedures</p> <p>a) Failure while en route.- The aircraft RNP capability is dependent upon operational equipment and GNSS satellites. Before initiating the approach, the flight crew must be capable of assessing the impact of equipment failure on the RNP AR APCH procedure and take the appropriate corrective action. As stated in paragraph 2.c) of this appendix, the flight crew must also be capable of assessing the impact of changes in GNSS</p>	<p>Appendix 4 Paragraph 3 q)</p>			

Topics		Reference paragraphs CA 91-009	Location in the Annexes of the operator	Comments and/or recommendations by the CAA	Follow-up by the Inspector: Item status and date
	constellation and take appropriate corrective action. b) Failure on approach. - The operator contingency procedures must cover at least the following conditions: 1) RNP system components failures, including those affecting lateral and vertical deviation performance (e.g., failures of GPS sensors, AP or FD). 2) Loss of navigation signal-in-space (loss or degradation of external signal).				

SRVSOP contacts:

Marcelo Ureña Logroño: SRVSOP safety oversight specialist/aircraft operations
 e-mail: murena@lima.icao.int

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