

**Application for RNP AR APCH Operational Approval**

**Job Aid for application to conduct Required Navigation Performance Authorisation Required (RNP AR) Operations**

**1. Purpose of this Job Aid**

1.1 This Job Aid is developed to provide guidance to the operator seeking grant of CAAS Operational Approval to engage in RNP AR APCH operations.

1.2 This Job Aid is to be used as an *aide memoire* for the approval process. The applicant must make frequent reference to CAAS AC 98-2-8() and ICAO PBN Manual, Doc 9613, Volume II, Part C, Chapter 6.

**2. Actions Recommended for the Authority inspector and the applicant**

2.1 At the pre-application phase meeting, the CAAS inspector should review the “basic events of the RNP AR APCH approval process” described in Section 2 of this Job Aid, in order to provide an overview of the approval process.

3.2 The review of this Job Aid is to establish the form and contents of the RNP AR APCH approval application.

3.3 The applicant uses this Job Aid as a guide to compile the documentation required for the RNP AR APCH application.

3.4 The applicant inserts in the Job Aid references showing in what part of its documents are the RNP AR APCH elements located.

3.5 The applicant submits the Job Aid and the application to the CAAS inspector (with the required documents).

3.6 The inspector indicates in the Job Aid whether an item is in compliance or needs corrective action.

3.7 The inspector informs the applicant as soon as possible when a corrective action by the applicant is required.

3.8 The applicant provides the inspector with the revised material when so requested.

3.9 When completed, CAAS will notify the applicant officially of the grant of Operational Approval and the conditions and limitations related to the privileges of the approval. The letter will also advise the successful applicant the terms and conditions that could lead to revocation or withdrawal of the privileges by CAAS.

3.10 Upon receipt of the official notification, the successful applicant shall apply to CAAS for variation to the AOC Operational Specification before exercising the privileges of the approval.

**Section 1 – Information on Aircraft and Operator Identity**

**Operator…..………………………….…AOC No……………..……………………..Rep’s Name……………………………………………..Position………………….……………………**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| # | Aircraft manufacturer, Type and series | Serial number | Registration | No. of INS / IRS / IRU manufacturer and model | No. of GNSS make and model | No. of FMS / FMGC manufacturer and model | No and make of DMEs. TSO reference |
| 1 |  |  |  |  |  |  |  |
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| 12 |  |  |  |  |  |  |  |

Date of first Pre-Application meeting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date on which application was received \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date on which the applicant intends to commence RNP AR APCH operations \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section 2 – Operator Application (Items and Documents)**

| **Title of document** | **CAAS Guidance** | **ICAO Reference** | **Operator substantiation** | **CAAS Comments** | **CAAS Follow-up** |
| --- | --- | --- | --- | --- | --- |
| AC 98-2--8() | Doc 9613 Vol II Part C | Doc. Ref. | Accept or  not accept | Accepted & Date |
| **Request for Ops Approval of RNP AR APCH**  Statement of intent with reasons for the authorization |  |  |  |  |  |
| **Airworthiness - aircraft eligibility**  AFM, AFM revision, AFM supplement, or TCDS showing RNP navigation system is eligible for RNP AR APCH or manufacturer statement of compliance  *Note: The operator should indicate the lowest RNP capability for which approval is requested and provide relevant supporting documentation*. | 4.5 | 6.3.2.5 |  |  |  |
| **Aircraft modified to meet RNP AR APCH standards.**  Maintenance records documenting the installation ormodification of aircraft systems | 4.5 | 6.3.2.5 |  |  |  |
| **Maintenance programme**  • 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. | 4.6.5 | 6.3.2.6.5 |  |  |  |
| **Minimum equipment list (MEL) as applicable** showing provisions for RNP AR APCH systems. | 4.6.4 | 6.3.2.6.4 |  |  |  |
| **Training**  Training programme (inclusive of recurrent) for flight crews, flight dispatchers, and maintenance personnel as applicable. | 4.6.3 | 6.3.2.6.2 |  |  |  |
| **Operating policies and procedures**  Operations manual (OM) and checklists or sections to be attached to the application, corresponding to RNP AR APCH operating procedures and policies. | 4.6.2 | 6.3.2.6.3 |  |  |  |
| **Navigation database**  Details of the navigation data validation programme. | D.1 | 6.3.6 |  |  |  |

**Section 3 – Guidance for determining RNP AR APCH aircraft eligibility**

| **Topics** | **CAAS Guidance** | **ICAO Reference** | **Compliance description** | **CAAS comments** | **CAAS Follow-up** |
| --- | --- | --- | --- | --- | --- |
| AC 98-2--8() | Doc 9613  Vol II Part C | Document reference | Accepted / not accepted | Acceptance & Date |
| **Aircraft eligibility** Aircraft eligibility must be determined through demonstration of compliance against relevant airworthiness criteria…. | 4.5 | 6.3.2.5 |  |  |  |
| **Operational approval** | 4.6 | 6.3.2.6 |  |  |  |
| ***Description if aircraft equipment.*** Operator must have a configuration list and MEL for RNP AR APCH | 4.5 | 6.3.2.6.1 |  |  |  |
| ***Training documentation.*** | 4.6.3 | 6.3.2.6.2 |  |  |  |
| Commercial operators must have a training programme addressing the operational practices, procedures and training items related to RNP AR APCH operations (e.g. initial, upgrade or recurrent training for pilots, dispatchers or maintenance personnel). | 4.6.3.1 | 6.3.2.6.2.1 |  |  |  |
| Private operators must be familiar with the practices and procedures identified in 10.5, “Pilot/dispatch/operator knowledge and training”. | 4.6.2.2 | 6.3.2.6.2.2 |  |  |  |
| ***Operations Manuals and checklists*** | 4.6.2 | 6.3.2.6.3 |  |  |  |
| OMs and checklists for commercial operators must address information/guidance on the SOP detailed in 4.6.2. The appropriate manuals should contain navigation operating instructions and contingency procedures, where specified. …. | 4.6.2.1 | 6.3.2.6.3.1 |  |  |  |
| Private operators should operate using the practices and procedures identified in 10.5, “Pilot/dispatch/operator knowledge and training”. | 4.6.2.2 | 6.3.2.6.3.2 |  |  |  |
| ***MEL considerations*** Any MEL revisions necessary to address provisions for RNP AR APCH operations must be approved. Operators must adjust the MEL, or equivalent, and specify the required dispatch conditions. | 4.6.4 | 6.3.2.6.4 |  |  |  |
| **Continuing airworthiness** Operator must submit the continuing airworthiness instructions applicable to the aircraft’s configuration and the aircraft’s qualification for this navigation specification. Additionally, there is a requirement for operators to submit their maintenance programme, including a reliability programme for monitoring the equipment. | 4.6.5 | 6.3.2.6.5 |  |  |  |
| ***Approval submittal*** | 5 | 6.3.2.7 |  |  |  |
| To obtain approval in accordance with National operating rules | 5.1 | 6.3.2.7.1 |  |  |  |
| Completion of FOSA | 5.2 | 6.3.2.7.2 |  |  |  |
| Documentation of Operational Approval | 5.3 | 6.3.2.7.3 |  |  |  |
| Operating RNP AR APCH in other States | 5.4 | 6.3.2.7.4 |  |  |  |
| Approved proc include additional requirements & equipment config | 5.5 | 6.3.2.7.5 |  |  |  |
| **Aircraft requirements** | 4.5 | 6.3.3 |  |  |  |
| To qualify for RNP AR APCH the aircraft must comply with FAA AC 20-129 and either FAA AC 20-130 or AC 20-138 or equivalent. | A.1 | 6.3.3.1 |  |  |  |
| **On-board performance monitoring and alerting** | A.2 | 6.3.3.2 |  |  |  |
| Uniqueness of RNP AR APCH | A.2 | 6.3.3.2.1 |  |  |  |
| **Path definition.** Aircraft performance…. | A.2.1 | 6.3.3.2.2 |  |  |  |
| **Lateral accuracy.** All aircraft operating on RNP AR APCH procedures must have a cross-track navigation error no greater than the applicable accuracy value (0.1 NM to 0.3 NM) for 95 per cent of the flight time. This includes positioning error, FTE, PDE and display error…… | A.2.2 | 6.3.3.2.3 |  |  |  |
| **Vertical accuracy.** The vertical system error includes altimetry error, the effect of along-track error, system computation error, data resolution error, and FTE. The 99.7 per cent of system error in the vertical direction must be less than the following (in feet)……….. | A.2.3 | 6.3.3.2.4 |  |  |  |
| **System monitoring.** A critical component of RNP is the ability of the aircraft navigation system to monitor its achieved navigation performance, and to identify, for the pilot, whether the operational requirement is or is not being met during an operation (e.g. “Unable RNP”, “Nav Accur Downgrade”)….. | A.2.4 | 6.3.3.2.5 |  |  |  |
| **GNSS updating.** A crew alert is required when GNSS updating is lost unless the navigation system provides an alert when the selected RNP no longer meets the requirements for continued navigation. | A.2.5 | 6.3.3.2.6 |  |  |  |
| **Airspace containment.** RNP and baro-VNAV aircraft. This chapter provides a detailed acceptable means of compliance for aircraft that use an RNP system based primarily on GNSS, and a VNAV system based on barometric altimetry……. | A.2.6 | 6.3.3.2.7 |  |  |  |
| **Criteria for specific navigation services** | A.3 | 6.3.3.3 |  |  |  |
| Section on unique RNP AR APCH nav sensor issues | A.3 | 6.3.3.3.1 |  |  |  |
| **ABAS** and other GNSS augmentations based on GPS | A.3.1 | 6.3.3.3.2 |  |  |  |
| **IRS.** An IRS must satisfy the criteria of US 14 CFR part 121, Appendix G, or equivalent. While Appendix G defines the requirement for a 2 NM per hour drift rate (95 per cent) for flights up to 10 hours, this rate may not apply to an RNP system after loss of position updating. Systems that have demonstrated compliance with Part 121, Appendix G, can be assumed to have an initial drift rate of 8 NM/hour for the first 30 minutes (95 per cent) without further substantiation. Aircraft manufacturers and applicants can demonstrate improved inertial performance in accordance with the methods described in Appendix 1 or 2 of FAA Order 8400.12A…… | A.3.2 | 6.3.3.3.3 |  |  |  |
| **DME.** GNSS-updating is the basis for initiating all RNP AR APCH procedures. When authorized by the State, the aircraft may use DME/DME-updating as a reversionary navigation mode during an approach or during the missed approach when the navigation system continues to comply with the required navigation accuracy. The aircraft manufacturer should identify any requirements for the DME infrastructure or any necessary operational procedures and limitations when conducting a procedure through use of DME/DME updating of the aircraft's position. | A.3.3 | 6.3.3.3.4 |  |  |  |
| **VHF omnidirectional range (VOR) station.** The aircraft's RNP system may not use VOR-updating when conducting RNP AR APCH procedure. The aircraft manufacturer should identify any pilot procedures or techniques for an aircraft to comply with this requirement…… | A.3.4 | 6.3.3.3.5 |  |  |  |
| **For multi-sensor systems,** there must be automatic reversion to an alternate area navigation sensor if the primary area navigation sensor fails. Automatic reversion from one multi-sensor system to another multi-sensor system is not required. | A.3.5 | 6.3.3.3.6 |  |  |  |
| The 99.7 per cent aircraft ASE for each aircraft (assuming the temperature and lapse rates of the International Standard Atmosphere) must be less than or equal to the following with the aircraft in the approach configuration:  ASE = - 8.8 . 10-8 . H2 + 6.5 . 10-3 . H + 50(ft)  Where H is the true altitude of the aircraft. | A.3.6 | 6.3.3.3.7 |  |  |  |
| **Temperature compensation systems**. Systems that provide temperature-based corrections to the barometric VNAV guidance must comply with RTCA/DO-236B, Appendix H.2. This applies to the FAS………. | A.3.7 | 6.3.3.3.8 |  |  |  |
| **Functional requirements** Additional guidance and information concerning many of the required functions are provided in EUROCAE ED-75A/ RTCA DO-236B. | A.4 | 6.3.3.4 |  |  |  |
| **General requirements** | A.4.1 | 6.3.3.4.1 |  |  |  |
| Path definition and flight planning | A.4.1.1 | 6.3.3.4.1.1 |  |  |  |
| **Maintaining track and leg transitions**. The aircraft must have the capability to execute leg transitions and maintain tracks consistent with i) a geodesic line between two fixes; ii) a direct path to a fix; iii) a specified track to a fix, defined by a course; and iv) a specified track to an altitude……. | A.4.1.1.1 | 6.3.3.4.1.1  (a) |  |  |  |
| **Fly-by and fly-over fixes**. The aircraft must have the capability to execute fly-by and fly-over fixes. For fly-by turns, the navigation system must limit the path definition within the theoretical transition area defined in EUROCAE ED-75B/ RTCA DO-236B and under the wind conditions identified in Doc 9905. The fly-over turn is not compatible with RNP flight tracks and will only be used when there is no requirement for repeatable paths. | A.4.1.1.2 | 6.3.3.4.1.1  (b) |  |  |  |
| **Waypoint resolution error.** The navigation database……waypoint resolution error must be less than or equal to 60 ft, including both the data storage resolution and the RNP system computational resolution used internally for construction of flight plan waypoints. The navigation database must contain vertical angles (flight path angles) stored to a resolution of hundredths of a degree, with computational resolution such that the system-defined path is within 1.5 m (5 ft) of the published path. | A.4.1.1.3 | 6.3.3.4.1.1  (c) |  |  |  |
| **Capability for a “direct-to” function.** The navigation system must have a “direct-to” function that the pilot can activate at any time…... | A.4.1.1.4 | 6.3.3.4.1.1  (d) |  |  |  |
| **Capability to define a vertical path.** The navigation system must be capable of defining a vertical path by a flight path angle to a fix. The system must also be capable of specifying a vertical path between altitude constraints at two fixes in the flight plan. Fix altitude constraints must be defined as one of the following: i) an “AT” or “ABOVE” altitude constraint; ii) an “AT” or “BELOW” altitude constraint ; iii) an “AT” altitude constraint (e.g. 5200); or iv) a “WINDOW” constraint……... | A.4.1.1.5 | 6.3.3.4.1.1  (e) |  |  |  |
| Altitudes and/or speeds associated with published terminal procedures must be extracted from the navigation database. | A.4.1.1.6 | 6.3.3.4.1.1  (f) |  |  |  |
| The system must be able to construct a path to provide guidance from the current position to a vertically constrained fix. | A.4.1.1.7 | 6.3.3.4.1.1  (g) |  |  |  |
| **Capability to load procedures from the navigation database**. The navigation system must have the capability to load the entire procedure(s) to be flown into the RNP system from the on-board navigation database. This includes the approach (including vertical angle), the missed approach and the approach transitions for the selected airport and runway. | A.4.1.1.8 | 6.3.3.4.1.1  (h) |  |  |  |
| **Means to retrieve and display navigation data.** The navigation system must provide the ability for the pilot to verify the procedure to be flown through review of the data stored in the on-board navigation database. This includes the ability to review the data for individual waypoints and for NAVAIDs. | A.4.1.1.9 | 6.3.3.4.1.1  (i) |  |  |  |
| **Magnetic variation.** For paths defined by a course (CF and FA path terminators), the navigation system must use the magnetic variation value for the procedure in the navigation database. | A.4.1.1.10 | 6.3.3.4.1.1  (j) |  |  |  |
| **Changes in navigation accuracy.** RNP changes to lower navigation accuracy must be completed by the fix defining the leg with the lower navigation accuracy, considering the alerting latency of the navigation system. Any operational procedures necessary to accomplish this must be identified. | A.4.1.1.11 | 6.3.3.4.1.1  (k) |  |  |  |
| **Automatic leg sequencing.** The navigation system must provide the capability to automatically sequence to the next leg and display the sequencing to the pilot in a readily visible manner. | A.4.1.1.12 | 6.3.3.4.1.1  (l) |  |  |  |
| A display of the altitude restrictions associated with flight plan fixes must be available to the pilot. If there is a specified navigation database procedure with a flight path angle associated with any flight plan leg, the equipment must display the flight path angle for that leg. | A.4.1.1.13 | 6.3.3.4.1.1  (m) |  |  |  |
| **Demonstration of path steering performance.** The demonstration of path steering performance must be completed…….. | A.4.1.1.14 | 6.3.3.4.1.2 |  |  |  |
| **Displays** | A.4.1.3 | 6.3.3.4.1.3 |  |  |  |
| **Continuous display of deviation**. The navigation system must provide the capability to continuously display to the pilot flying, on the primary flight instruments for navigation of the aircraft, the aircraft position relative to the RNP defined path (both lateral and vertical deviation). The display must allow the pilot to readily distinguish if the cross-track deviation exceeds the navigation accuracy (or a smaller value) or if the vertical deviation exceeds 22 m (75 ft) (or a smaller value). | A.4.1.3.1 | 6.3.3.4.1.3  (a) |  |  |  |
| **Identification of the active (To) waypoint.** The navigation system must provide a display identifying the active waypoint either in the pilot’s primary optimum field of view, or on a readily accessible and visible display to the pilot. | A.4.1.3.2 | 6.3.3.4.1.3  (b) |  |  |  |
| **Display of distance and bearing.** The navigation system must provide a display of distance and bearing to the active (To) waypoint in the pilot’s primary optimum field of view. Where not viable, a readily accessible page on a control display unit, readily visible to the pilot, may display the data. | A.4.1.3.3 | 6.3.3.4.1.3  (c) |  |  |  |
| **Display of ground speed and time to the active (To) waypoint**. The navigation system must provide the display of ground speed and time to the active (To) waypoint in the pilot’s primary optimum field of view. Where not viable, a readily accessible page on a control display unit, readily visible to the pilot, may display the data. | A.4.1.3.4 | 6.3.3.4.1.3  (d) |  |  |  |
| **Display of “To” the active fix**. The navigation system must provide a To display in the pilot’s primary optimum field of view. | A.4.1.3.5 | 6.3.3.4.1.3  (e) |  |  |  |
| **Desired track display.** The navigation system must have the capability to continuously display to the pilot flying the desired aircraft track. This display must be on the primary flight instruments for navigation of the aircraft. | A.4.1.3.6 | 6.3.3.4.1.3  (f) |  |  |  |
| **Display of aircraft track.** The navigation system must provide a display of the actual aircraft track (or track angle error) either in the pilot’s primary optimum field of view, or on a readily accessible and visible display to the pilot. | A.4.1.3.7 | 6.3.3.4.1.3  (g) |  |  |  |
| **Failure annunciation.** The aircraft must provide a means to annunciate failures of any aircraft component of the RNP system, including navigation sensors. The annunciation must be visible to the pilot and located in the primary optimum field of view. | A.4.1.3.8 | 6.3.3.4.1.3  (h) |  |  |  |
| **Slaved course selector.** The navigation system must provide a course selector automatically slaved to the RNP computed path. | A.4.1.3.9 | 6.3.3.4.1.3  (i) |  |  |  |
| **RNP path display.** The navigation system must provide a readily visible means for the pilot monitoring to verify the aircraft’s RNP-defined path and the aircraft’s position relative to the defined path. | A.4.1.3.10 | 6.3.3.4.1.3  (j) |  |  |  |
| **Display of distance to go.** The navigation system must provide the ability to display distance to go to any waypoint selected by the pilot. | A.4.1.3.11 | 6.3.3.4.1.3(k) |  |  |  |
| **Display of distance between flight plan waypoints**. The navigation system must provide the ability to display the distance between flight plan waypoints. | A.4.1.3.12 | 6.3.3.4.1.3(l) |  |  |  |
| **Display of deviation**. The navigation system must provide a numeric display of the vertical deviation. Vertical deviation must have a resolution of 3 m (10 ft) or less, for RNP AR APCH operations. Lateral deviation resolution must be:  i) 0.1 NM or less for RNP operations not less 0.3nm; or  ii) 0.01 NM or less for RNP operations below 0.3. | A.4.1.3.13 | 6.3.3.4.1.3(m) |  |  |  |
| **Display of barometric altitude**. The aircraft must display barometric altitude….. | A.4.1.3.14 | 6.3.3.4.1.3  (n) |  |  |  |
| **Display of active sensors.** The aircraft must either display the current navigation sensor(s) in use or indicate sensor loss/degradation in navigation system performance. It is recommended that this display be provided in the primary optimum field of view. | A.4.1.3.15 | 6.3.3.4.1.3  (o) |  |  |  |
| **Design assurance** | A.4.1.4 | 6.3.3.4.1.4 |  |  |  |
| The system design assurance must be….major failure | A.4.1.4.1 | 6.3.3.4.1.4.1 |  |  |  |
| **Navigation Database.** The aircraft navigation system must use an on-board navigation database which can receive updates……. | A.4.1.5 | 6.3.3.4.1.5 |  |  |  |
| The aircraft must have the capacity to execute leg transactions and maintain tracks consistent with an RF leg between two fixes. | A.4.1.6 | 6.3.3.4.1.6 |  |  |  |
| **Requirements for RNP AR approaches with RF legs** | A.4.2 | 6.3.3.4.2 |  |  |  |
| The navigation system must have the capability to execute leg transitions and maintain tracks consistent with an RF leg between two fixes. | A.4.2.1 | 6.3.3.4.2.1 |  |  |  |
| The aircraft must have an electronic map display of the selected procedure | A.4.2.2 | 6.3.3.4.2.2 |  |  |  |
| The FMC, the flight director system and autopilot must be capable of commanding a bank angle up to 25 degrees above 121 m (400 ft) AGL and up to 8 degrees below 121 m (400 ft) AGL. | A.4.2.3 | 6.3.3.4.2.3 |  |  |  |
| Upon initiating a go-around or missed approach (through activation of TOGA or other means), the flight guidance mode should remain in LNAV to enable continuous track guidance during an RF leg. | A.4.2.4 | 6.3.3.4.2.4 |  |  |  |
| When evaluating an FTE on RF legs, the effect of rolling into and out of the turn should be considered. The procedure is designed to provide a 5-degree maneuverability margin, to enable the aircraft to get back on the desired track after a slight overshoot at the start of the turn. | A.4.2.5 | 6.3.3.4.2.5 |  |  |  |
| **Requirements for RNP AR Approaches to less than RNP 0.3** | A.4.3 | 6.3.3.4.3 |  |  |  |
| **No single point of failure**. No single point of failure can cause the loss of guidance compliant with the navigation accuracy associated with the approach. Typically, the aircraft must have at least the following equipment: dual GNSS sensors, dual FMS, dual air data systems, dual autopilots, and a single IRU……. | A.4.3.1 | 6.3.3.4.3.1 |  |  |  |
| **Design assurance.** The system design assurance must be consistent with at least a major failure condition for the loss of lateral or vertical guidance on an RNP AR APCH where RNP less than 0.3 is required to avoid obstacles or terrain while executing the procedure. | A.4.3.2 | 6.3.3.4.3.2 |  |  |  |
| **Go-around guidance.** Upon initiating a go-around or missed approach (through activation of TOGA or other means), the flight guidance mode should remain in lateral navigation to enable continuous track guidance during an RF leg. If the aircraft does not provide this capability, the following requirements apply:  i) If the aircraft supports RF legs, the lateral path after initiating a go-around (TOGA), (given a minimum 50-second straight segment between the RF end point and the DA), must be within 1 degree of the track defined by the straight segment through the DA point. The prior turn can be of arbitrary angular extent and radius as small as 1 NM, with speeds commensurate with the approach environment and the radius of the turn.  ii) The pilot must be able to couple the autopilot or flight director to the RNP system (engage lateral navigation) by 121 m (400 ft) AGL. | A.4.3.3 | 6.3.3.3.4.3 |  |  |  |
| **Loss of GNSS**. After initiating a go-around or missed approach following loss of GNSS, the aircraft must automatically revert to another means of navigation that complies with the navigation accuracy. | A.4.3.4 | 6.3.3.4.3.4 |  |  |  |
| **Requirements for approaches with missed approach less than RNP 1.0** | A.4.4 | 6.3.3.4.4 |  |  |  |
| **Single point of failure.** No single point of failure can cause the loss of guidance compliant with the navigation accuracy associated with a missed approach procedure. Typically, the aircraft must have at least the following equipment: dual GNSS sensors, dual FMS, dual air data systems, dual autopilots, and a single IRU. | A.4.4.1 | 6.3.3.4.4.1 |  |  |  |
| **Design assurance.** The system design assurance must be consistent with at least a major failure condition for the loss of lateral or vertical guidance on an RNP AR APCH where RNP less than 1.0 is required to avoid obstacles or terrain while executing a missed approach……. | A.4.4.2 | 6.3.3.4.4.2 |  |  |  |
| Go-around guidance. Upon initiating a go-around or missed approach (through activation of TOGA or other means), the flight guidance mode should remain in lateral navigation to enable continuous track guidance during an RF leg. If the aircraft does not provide this capability, the following requirements apply:  i) If the aircraft supports RF legs, the lateral path after initiating a go-around (TOGA) (given a minimum 50-second straight segment between the RF end point and the DA) must be within 1 degree of the track defined by the straight segment through the DA point. The prior turn can be of arbitrary angular extent and the radius as small as 1 NM, with speeds commensurate with the approach environment and the radius of the turn.  ii) The pilot must be able to couple the autopilot or flight director to the RNP system (engage lateral navigation) by 121 m (400 ft) AGL. | A.4.4.3 | 6.3.3.4.4.3 |  |  |  |
| **Loss of GNSS**. After initiating a go-around or missed approach following loss of GNSS, the aircraft must automatically revert to another means of navigation that complies with the navigation accuracy | A.4.4.4 | 6.3.3.4.4.4 |  |  |  |

**Section 4 – Procedures for RNP AR APCH operations**

| # | **Topics** | **CAAS Guidance** | **ICAO Reference** | **Compliance description** | **CAAS comments** | **CAAS Follow-up** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Operating Procedures** | AC 98-2--8() | Doc 9613  Vol II Part C | Document reference | Accepted / not accepted | Acceptance & Date |
|  | **Operating Procedures** | 4.6.2 | 6.3.4 |  |  |  |
|  | **Pre-flight considerations** | B.1 | 6.3.4.1 |  |  |  |
|  | **Minimum equipment list (MEL).** The operator’s MEL developed/revised to address the equipment requirements for RNP AR APCH instrument approaches. | B.1.1 | 6.3.4.1.1 |  |  |  |
|  | **Autopilot and flight director**. RNP AR APCH procedures with a lateral navigation accuracy of less than RNP 0.3 or with RF legs require the use of an autopilot or flight director driven by the RNP system in all cases. Thus, the autopilot/flight director must be operable and able to track the lateral and vertical paths defined by the procedure. When the dispatch of a flight is predicated on flying an RNP AR APCH procedure requiring the autopilot at the destination and/or alternate, the dispatcher must determine that the autopilot is operational. | B.1.2 | 6.3.4.1.2 |  |  |  |
|  | **Dispatch RNP availability prediction.** The operator must have a predictive performance capability which can forecast whether or not the specified RNP will be available at the time and location of a desired RNP AR APCH procedure….. | B.1.3 | 6.3.4.1.3 |  |  |  |
|  | **Navaid exclusion**. Operator procedures to exclude navaid facilities in accordance with NOTAMs (e.g. DMEs, VORs, localizers). | B.1.4 | 6.3.4.1.4 |  |  |  |
|  | **Navigation database currency**. Operator procedures to confirm that the navigation database is current. | B.1.5 | 6.3.4.1.5 |  |  |  |
| **2** | **In-flight considerations** | B.2 | 6.3.4.2 |  |  |  |
|  | **Modification of the flight plan.** Operator procedures for loading and modification of published RNP AR APCH procedures. | B.2.1 | 6.3.4.2.1 |  |  |  |
|  | **Required list of equipment**. The pilot must have a required list of equipment for conducting RNP AR APCHs or alternate methods to address in-flight equipment failures prohibiting RNP AR APCHs (e.g. a quick reference handbook). | B.2.2 | 6.3.4.2.2 |  |  |  |
|  | **RNP management**. Pilot operating procedures must ensure the navigation system uses the appropriate navigation accuracy throughout the approach……. | B.2.3 | 6.3.4.2.3 |  |  |  |
|  | **GNSS updating**. Procedures for pilot to verify GNSS updating is available prior to commencement of approach…… | B.2.4 | 6.3.4.2.4 |  |  |  |
|  | **Radio updating**. RNP AR APCH is predicated upon GNSS updating. Except where specially designated “Not authorised” on a procedure, DME/DME updating as a reversionary mode during the approach or missed approach…... Pilot must comply with operator’s procedures for inhibiting specific facilities. | B.2.5 | 6.3.4.2.5 |  |  |  |
|  | **Approach procedure confirmation**. The pilot must confirm that the correct procedure has been selected….. | B.2.6 | 6.3.4.2.6 |  |  |  |
|  | **Track deviation monitoring**. Operator procedures to limit cross-track deviation to not more than +/- ½ navigation accuracy….. | B.2.7 | 6.3.4.2.7 |  |  |  |
|  | **Vertical Deviation**. Operator procedures to limit vertical deviation in the final approach segment to +/- 22m (75ft)….. | B.2.8 | 6.3.4.2.8 |  |  |  |
|  | **Lateral / Vertical deviation exceedance.** Pilots must execute a missed approach if the lateral deviation exceeds 1 × RNP or the vertical deviation exceeds –22 m (–75 ft), unless the pilot has in sight the visual references required to continue the approach……Demonstrate pilot procedure. | B.2.9 | 6.3.4.2.9 |  |  |  |
|  | **System cross-check.** For approaches with a navigation accuracy less than RNP 0.3, the pilot must monitor the lateral and vertical guidance provided by the navigation system by ensuring it is consistent with other available data and displays that are provided by an independent means | B.2.10 | 6.3.4.2.10 |  |  |  |
|  | **Procedures with RF legs**. Operator procedures to ensure pilots are familiar with requirements for conducting approaches with RF legs. | B.2.11 | 6.3.4.2.11 |  |  |  |
|  | **Temperature compensation.** For aircraft with temperature compensation capabilities, approved operating procedures may allow pilots to disregard the temperature limits on RNP AR APCH procedures if the operator provides pilot training on the use of the temperature compensation function. Temperature compensation by the system is applicable to the baro-VNAV guidance and is not a substitute for the pilot compensating for the cold temperature effects on minimum altitudes or the DA. Pilots should be familiar with the effects of the temperature compensation on intercepting the compensated path described in EUROCAE ED-75B/ RTCA DO-236B Appendix H……. | B.2.12 | 6.3.4.2.12 |  |  |  |
|  | **Altimeter setting**. Flight crew procedures to verify that the current airport local altimeter is set prior to the final approach fix (FAF). Use of remote altimeter setting not permitted. | B.2.13 | 6.3.4.2.13 |  |  |  |
|  | **Altimeter cross-check**. The pilots must complete an altimetry cross-check ensuring both pilots’ altimeters agree within 30 m (±100 ft) prior to the FAF but no earlier than the IAF. | B.2.14 | 6.3.4.2.14 |  |  |  |
|  | **VNAV altitude transitions.** The aircraft barometric VNAV system provides fly-by vertical guidance, and may result in a path that starts to intercept the vertical path of the procedure prior to the FAF. The small vertical displacement which may occur at a vertical constraint (e.g. the FAF is considered operationally acceptable, providing a smooth transition to the next flight path vertical segment. This momentary deviation below the published minimum procedure altitude is acceptable provided the deviation is limited to no more than 30 m (100 ft) and is a result of a normal VNAV capture. This applies to both “level off” or “altitude acquire” segments following a climb or descent, or vertical climb or descent segment initiation, or joining of climb or descent paths with different gradients. | B.2.15 | 6.3.4.2.15 |  |  |  |
|  | **Non-standard climb gradient**. When an approach procedure specifies a non-standard climb gradient, the operator must ensure the aircraft is capable of complying with the published climb gradient at the aircraft landing weight under ambient atmospheric conditions. | B.2.16 | 6.3.4.2.16 |  |  |  |
|  | **Go-around or missed approach.** Where possible, the missed approach will require a navigation accuracy of RNP 1.0. The missed approach portion of these procedures is similar to a missed approach of an RNP APCH approach. Where necessary, navigation accuracy less than RNP 1.0 will be used in the missed approach. Approval to conduct these approaches, equipage and procedures must meet criteria in A.4.4 “Requirements for approaches with missed approach less than RNP 1.0.” | B.2.17 | 6.3.4.2.17 |  |  |  |
|  | **TOGA activation during the initiation of a go-around or missed approach.** Aircraft to have TOGA to NAV fitted or have approved operating procedures to ensure that in a go-around LNAV guidance is engaged such that the aircraft remains within the required cross-track deviation limits…… | B.2.18 | 6.3.4.2.18 |  |  |  |
|  | **Pilot procedures when initiating a go-around while the aircraft is in a turn.** Pilot procedures and training to address the impact on navigation capability and flight guidance if the pilot initiates a go-around while the aircraft is in an RF turn… | B.2.19 | 6.3.4.2.19 |  |  |  |
|  | **Contingency procedures — failure while en route. …**The pilot must The pilot must be able to assess the impact of equipment failure on the anticipated RNP AR APCH procedure and take appropriate action. As described in B.1.3, “Dispatch RNP availability prediction”, the pilot also must be able to assess the impact of changes in the GNSS constellation and take appropriate action. | B.2.20 | 6.3.4.2.20 |  |  |  |
|  | **Contingency procedures — failure on approach.** Operator’s contingency procedures to address failure conditions on approach……. | B.2.21 | 6.3.4.2.21 |  |  |  |
|  | **Pilot / dispatch / operator knowledge and training** | **4.6.3** | **6.3.5** |  |  |  |
|  | The operator must provide training for key personnel … RNP AR APCH procedures. A thorough understanding of the operational procedures and best practices is critical…..This programme must provide sufficient detail on the aircraft’s navigation and flight control systems to enable the pilots to identify failures affecting the aircraft’s RNP capability and the appropriate abnormal/emergency procedures. Training must include both knowledge and skill assessments of the crew members’ and dispatchers’ duties. | C.1 | 5.3.5.1 |  |  |  |
|  | To ensure compliance with paragraph C.2, the operator shall verify that the flight simulator is CAAS qualified, meets Aircraft requirements in paragraph 4.5 and CAAS Functionality and Qualification for RNP AR APCH checklist. | C.2.2 | Nil |  |  |  |
|  | **Operator responsibilities** | C.2 | 6.3.5.2 |  |  |  |
|  | Each operator is responsible for training….include different types …and include in Training manuals……. | C.2.1 | 6.3.5.2(a) |  |  |  |
|  | Training and Checking module…..method of training…training device to accurately replicate operator’s equipment….. | C.2.2 | 6.3.5.2(b) |  |  |  |
|  | Operator initial, transition, upgrade, recurrent or stand-alone training and qualification programme. Operator programme to ensure operations knowledge and skills, | C.2.3 | 6.3.5.2(c) |  |  |  |
|  | RNP AR APCH training may integrate with other training programme | C.2.4 | 6.3.5.2(d**)** |  |  |  |
|  | Operator claim of training credit must be approved and differences addressed | C.2.5 | 6.3.5.2(e) |  |  |  |
|  | Flight dispatcher training all aspects: navigation equip, regulatory and procedural, OM, LOA, MEL, GPS RAIM prediction etc. | C.2.6 | 6.3.5.2(f) |  |  |  |
|  | **Ground training segments content** | **C.3** | **6.3.5.3** |  |  |  |
|  | Scope of approved RNP AR APCH programme | C.3.1 | 6.3.5.3.1 |  |  |  |
|  | General concept and knowledge of RNP AR APCH theory, system operations, classifications and limitations | C.3.1 | 6.3.5.3.2  (a) to (k) |  |  |  |
|  | ATC communications and coordination for use of RNP AR APCH….flight plan and ATC procedures……. | C.3.2 | 6.3.5.3.3 |  |  |  |
|  | RNP AR APCH equipment components, controls, displays, and alerts….. | C.3.3 | 6.3.5.3.4 |  |  |  |
|  | The AFM or other aircraft eligibility evidence must address normal and abnormal flight crew operating procedures…… | C.3.4 | 6.3.5.3.5 |  |  |  |
|  | MEL operating provisions…… | C.3.5 | 6.3.5.3.6 |  |  |  |
|  | **Flight training segments — contents** | **C.4** | **6.3.5.4** |  |  |  |
|  | Training programmes must cover the proper execution of RNP AR APCH procedures in concert with the OEM’s documentation……. Such training may also use approved flight training devices or simulators. This training must address the following specific elements—i) to xix) | C.4 | 6.3.5.4.1  (a) to (s) |  |  |  |
|  | **Evaluation module** | **C.5** | **6.3.5.5** |  |  |  |
|  | Initial evaluation of RNP AR APCH operations knowledge and procedures……An acceptable means for this initial assessment includes one of the following: i) to iii) | C.5.1 | 6.3.5.5.1  (a) to (c) |  |  |  |
|  | Evaluation content. Specific elements that must be addressed in this evaluation module are: i) to xi) | C.5.2 | 6.3.5.5.2  (a) to (k) |  |  |  |
|  | **Recurrent training** | **C.6** | **6.3.5.6** |  |  |  |
|  | Recommend RNP training with AR as operator’s programme | C.6.1 | 6.3.5.6.1 |  |  |  |
|  | Minimum RNP AR APCH :1 landing, 1 missed approach for each pilot recurrent. | C.6.2 | 6.3.5.6.2 |  |  |  |
|  | **Navigation Database** | **4.6.6** | **6.3.6** |  |  |  |
|  | Navigation database updates..every 28 days, and navigation data…are critical to the integrity of every RNP AR APCH procedure. Given the reduced obstacle clearance associated with these procedures, validation of navigation data warrants special consideration. This section provides guidance for the operator’s procedures for validating the navigation data associated with RNP AR APCH procedures. | D.1 | 6.3.6.1 |  |  |  |
|  | **Data Process** | D.2 | 6.3.6.2 |  |  |  |
|  | The operator must identify the responsible manager for the data updating process within their procedures. | D.2.1 | 6.3.6.2.1 |  |  |  |
|  | The operator must document a process for accepting, verifying and loading navigation data into the aircraft. | D.2.2 | 6.3.6.2.2 |  |  |  |
|  | The operator must place their documented data process under configuration control. | D.2.3 | 6.3.6.2.3 |  |  |  |
|  | **Initial data validation**. The operator must validate every RNP AR APCH procedure before flying the procedure in instrument meteorological conditions (IMC) to ensure compatibility with their aircraft and to ensure the resulting path matches the published procedure..…….. | D.2.4 | 6.3.6.2.4 |  |  |  |
|  | **Data updates**. The operator has a process for comparing each data update to validated procedure data. | D.2.5 | 6.3.6.2.5 |  |  |  |
|  | **Data suppliers**. The operator obtains data from a supplier holding a Letter of Acceptance (LOA) for processing navigation data. | D.2.6 | 6.3.6.2.6 |  |  |  |
|  | **Aircraft modifications.** If an aircraft system required for RNP AR APCH operations is modified (e.g. software change), the operator is responsible for validating of RNP AR APCH procedures using the navigation database and the modified system…….. | D.2.7 | 6.3.6.2.7 |  |  |  |
|  | **Oversight of operators** | **6** | **6.3.7** |  |  |  |
|  | Authority action on anomaly reports and remedial action. Repeated navigation error occurrences attributed to a specific piece of navigation equipment may result in the cancellation of the approval for use of that equipment. | 6.1 | 6.3.7.1 |  |  |  |
|  | Information that indicates the potential for repeated errors may require modification of an operator’s training programme…….remedial training or licence review. | 6.2 | 6.3.7.2 |  |  |  |
|  | Operators must have an RNP monitoring programme to ensure continued compliance ……. periodically review these data to identify potential safety concerns, as well as maintain summaries of these data | 6.3 | 6.3.7.3  (a) to (d) |  |  |  |
|  | **Flight Operational Safety Assessment (FOSA)** | **5.2** | **6.4** |  |  |  |
|  | Applicant develops own FOSA along given guidelines. | Appendix E |  |  |  |  |

**Warning: Notice is given that the operator shall accept full responsibility for all information given in this application form. Any attempt to provide distorted or false information will result in rejection of the application and, if already granted, the withdrawal of the Operational Approval under paragraph 60 of the ANO. Additionally, for the offence, the operator may render himself to prosecution under paragraph 61 of the ANO.**

**I have read the above Warning and declare that the information given is true and accurate.**

**Signature / Name of person representing the operator: ­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Signature / Name of A/FO Officer accepting this form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| Revision History | | | |
| Version | Date | Paragraph(s) | Details |
| 1.0 | 30 September 2015 | Title & various paragraphs | editorial |
| 2.0 | 24 April 2019 | Various paragraphs | Alignment with revised AC |

**REFERENCES**

Regulatory: (1) ANR-98 (2) CAAS AC 98-2-8()

Compliance: (1) ICAO DOC 9613 Volume II Part C (2) FAA AC 90-101A (3) EASA AMC 20-26 (4) CASA AC 91U-LL-6(0) (5) SRVSOP AC 91-009 Rev1