Flight Technologies and Procedures Division

C384, Required Navigation Performance Procedures with Authorization Required (RNP AR)

RNP AR
Compliance Guide

Version: 10.19

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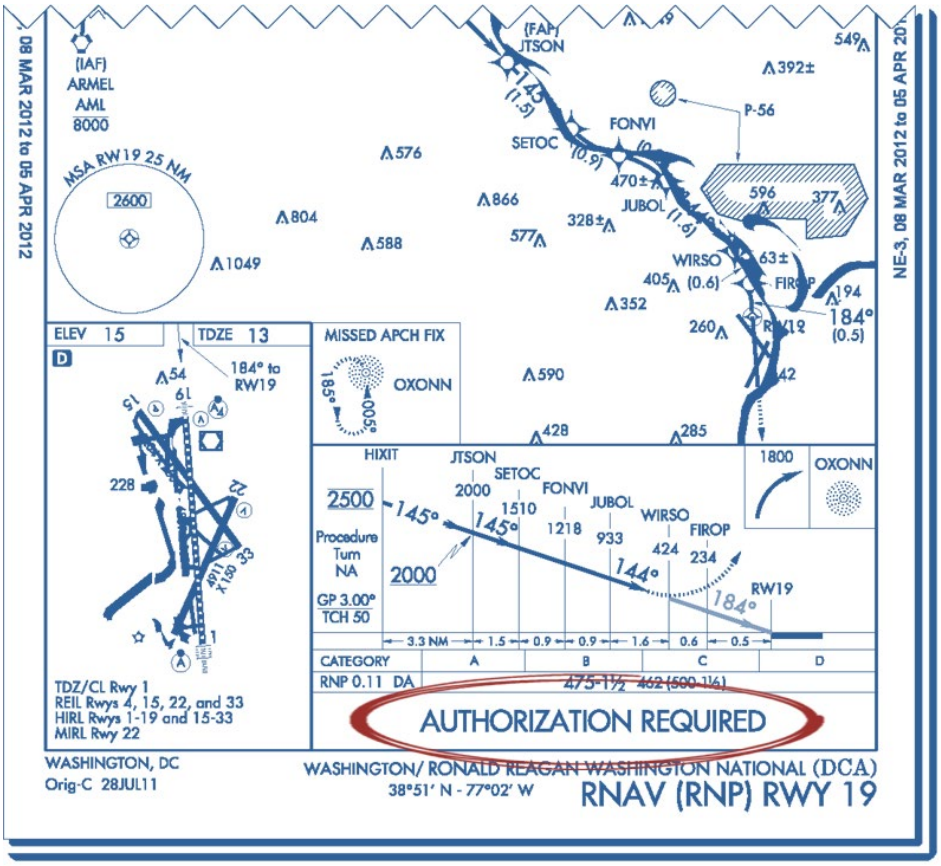
Changes

Version	Date	Description of Change



Federal Aviation Administration
Flight Technologies and Procedures Division
470 L'Enfant Plaza, Suite 4102
Washington, DC 20024
Phone: (202) 267-8795

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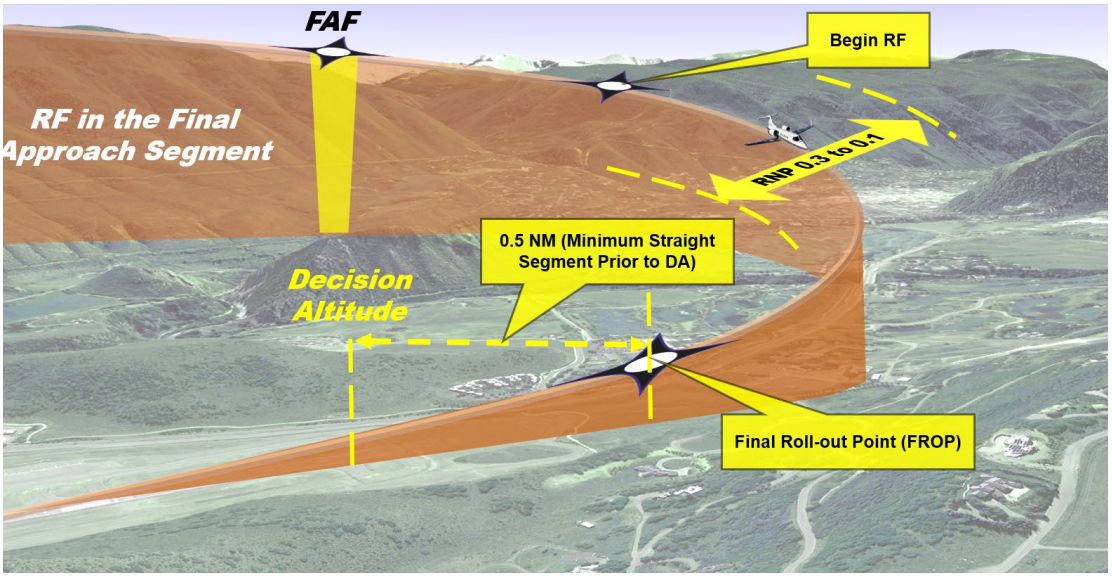
Section 1



Section 1: Introduction

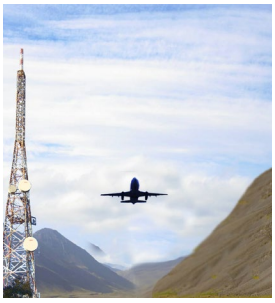
This compliance guide was developed by the Federal Aviation Administration (FAA) Flight Technologies and Procedures Division to provide operators with an organized method for submitting required content. It is an optional tool that expedites the application process as it condenses into one location the information required for Required Navigation Performance Authorization Required (RNP AR) operations. Operators adhering to this guidance by supplying the requested documentation will significantly reduce the application processing time. This guide includes the interim authorization period at RNP 0.3 with a continuation of the authorization process to minima less than RNP 0.3.

This document uses the term Principal Inspector (PI) which may be a Principal Operations Inspector (POI), Principal Avionics Inspector (PAI) or Principal Maintenance Inspector (PMI). The term "operator" to refer to the operator, certificate holder, program manager, and operator/company.

The overarching guidance for RNP AR approval is provided in Advisory Circulars (AC) 90-101( ), *Approval Guidance for RNP Procedures with AR*, and AC 20-138( ), *Airworthiness Approval of Positioning and Navigation Systems*. AC 90-101( ) and AC 20-138( ) should be considered the "source documents" for RNP AR approvals. If you have any questions regarding an item in this guide, please refer to the AC guidance for clarification or call the Flight Technologies and Procedures Division at **(202) 267-8795**.

This document provides guidances for:

1. **New applications**;
2. **Current C384 Operators Adding Identically Equipped Aircraft Types;**
3. **Current C384 operators Adding a New, Eligible Aircraft Types;**
4. **Current C384 operators adding any aircraft hardware or software modification.**
5. **Continued Application Process for RNP AR APCH Minima less than RNP 0.3 and Missed Approach Minima less than RNP 1.0.**



We appreciate any feedback to improve this compliance guide.
Contact The Flight Technologies and Procedures Division
for Comment
(202) 267-8795

Instructions

Operators must schedule a pre-application meeting or teleconference with Flight Standards and the Aircraft Certification Service. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation (i.e. attachments) will greatly reduce the application process time. The compliance guide and attachments should be submitted in a PDF format (See Naming Convention). For the attachments, please include only the applicable page or paragraph to show compliance. Attaching irrelevant documentation other than the requested page/paragraph to show compliance only delays the application process.

The main body of the guide is devoted to the initial RNP AR APCH requirements. Appendix A provides follow-on requirements for conducting RNP AR APCH operations with RNP values of less than 0.3.

For all applications, include the fill-in-the-blank portions of this guide (pages 4, 5, and 6) and include your letter of request. With each attachment, include the corresponding reference number provided in the tables. For each excerpt, include the document title, page number and paragraph number as applicable. If an item is not applicable, provide a brief explanation as to why it does not apply. You may use this guide for the following options:

1. New applications

Operators seeking a new C384 authorization may choose to apply for RNP AR APCH only and an interim authorization of conducting RNP AR APCH to RNP 0.3 or if eligible, less than RNP 0.3.

2. Current C384 operators adding identically equipped aircraft

This is for operators adding identically equipped aircraft as previously approved for RNP AR operations. Include your AFM or change order (signed off per serial number) for each new aircraft.

3. Current C384 operators desiring adding a new, eligible aircraft type design to their existing RNP AR authorization.

This is for operators adding RNP AR eligible aircraft but require FAA approval for RNP AR operations. Complete Section 2, Aircraft Eligibility, and those items requested by your PI.

4. Current C384 operators adding any aircraft hardware or software modification.

The operator and the PI must confirm whether or not there is a STATEMENT OF NO IMPACT. Follow the instructions within the application portion on page 5.

5. Current RNP AR operators seeking RNP APCH minima less than RNP 0.3

Operators approved for RNP AR operations to 0.3 seeking less than 0.3 may continue their application by submitting Appendix A. See AC 90-101( ), Chapter 4, RNP AR APCH Interim Authorization paragraph and subparagraphs.

To see the items required for each application type see the Summary Table on page 8.

6. Acrobat Option. If you have the latest version of Acrobat, we would prefer that you attach files to the compliance guide using the Acrobat attachment feature. Send your compliance guide with all the attachments in one

folder. When using this method, use the naming convention for the folder name and the compliance guide. The attachments may be in MS Word or converted to a PDF.

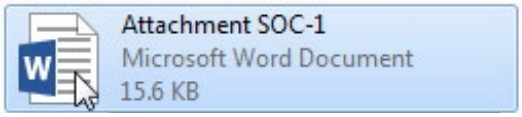
To add attachments:

a. Click the Paper Clip icon in the left margin

b. To Add Files click the and browse for the file attachment on your computer.

c. Click on file to attach it to the compliance guide.

d. Check to see the file is listed as an attachment.

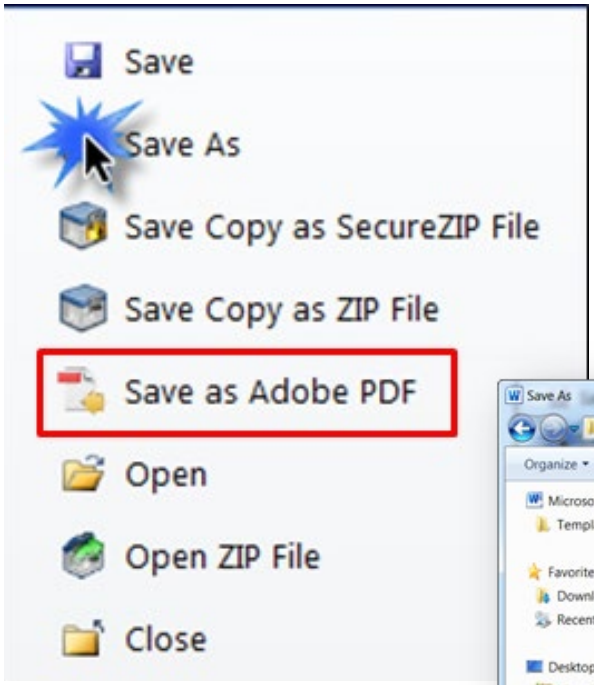
e. 

ıows compliance.

Naming Convention

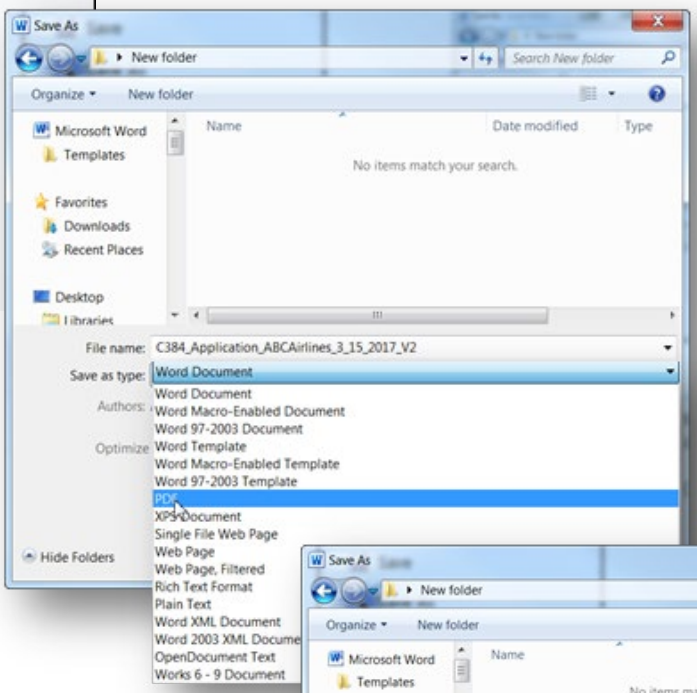
Use the following file naming convention when submitting this document and folder (if using Acrobat option).
C384_Application_Company/Name_Date(XX_XX_XXXX)_Version_Number_(VX)
Example: C384_Application_ABCAirlines_02_29_2018_V2

Note: Version numbers are used in order for the PI to distinguished between a re-submittal of an application and the original which should be labeled beginning with (Version 1 (V1) followed by V2 etc.).



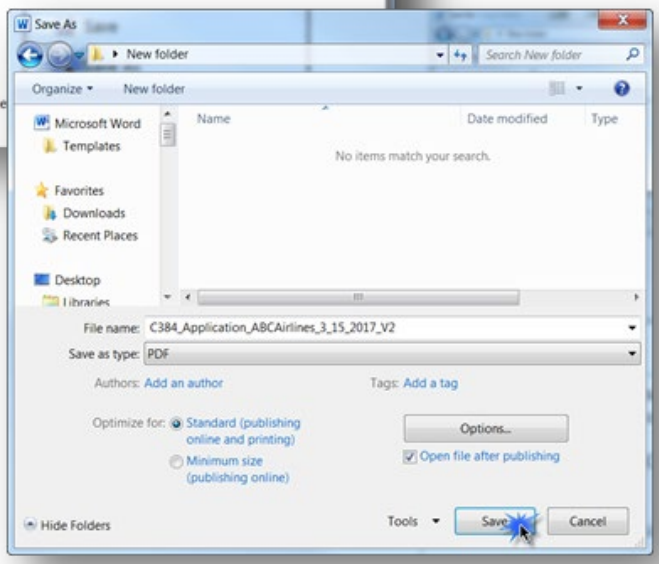
Step 1:

For your MS Word Attachments, select "Save As" under File Menu or select "Save as Adobe PDF" and skip Step 2.



Step 2:

Select "PDF" under "Save as type"



Step 3: Saving file with naming convention.

Use the following naming convention with underlines "_" as shown:

C384_Application_Your_Company_Name_Date_Version

Example:

C384_Application_ABCAirlines_02_29_2016_V2

Application Information

Application Type

My Letter of Request is Attached

New Application (No prior C384 authorization).

New Application

Current C384 Application and Adding Additional Fleet Aircraft

Current C384 Operator adding identically equipped aircraft type

Current C384 operators adding a new, eligible aircraft type

Current C384 operator applying for an aircraft hardware or software modification

Reset the above application options *(Use only if you need to reset options above)*

Check Box if you intend to continue the application for an RNP AR APCH below RNP 0.3 and/or a missed approach below RNP 1. During the interim authorization period, operators can conduct RNP AR APCHs using the RNP 0.3 line of minima on those approaches where the missed approach procedure is RNP 1.0 for a period of 90 days and until the operator has accumulated 100 successful RNP AR approaches in each aircraft type. See AC 90-101A for details on the RNP AR APCH Interim Authorization in chapter 4.

Contact Information

Company/Operator Name:

14 CFR Part: Select Operator 4 Letter/Number Designator:

Address: Suite:

City: State: Select Zip Code:

Contact Information

Contact Name:

Contact Phone:

Contact Email:

Aircraft Information

Aircraft/Fleet:

- Make:
- Model:
- Series:

Navigation Systems:

Navigation (NAV):

NAV Make: NAV Model: NAV Series:

NAV Software: Version:

Lowest RNP with flight director: Lowest RNP with Autopilot:

RF Leg Capable: Yes: No:

Registration Number(s) ("N number"): Serial Number(s):

Aircraft Modification

Are you applying for an aircraft modification?	Yes	No	*(If No, continue to next section)*
If yes, do you have a Statement of No Impact?	Yes	No	*(See Instructions Below)*
This is a modification of:	Software	Hardware	

Instructions: If you have a Statement of No Impact, then send the statement as an attachment along with the completed contact and aircraft portion of this guide section to your PI. If you do not have a Statement of No Impact, DO NOT MAKE ANY MODIFICATIONS TO YOUR AIRCRAFT and contact the FAA Aircraft Certification Service (AIR), Phone: 202-267-1575.

Sample Authorization Table

Check or fill-in any missing information below.

Aircraft:

Make:
Model:
Series:

Navigation System:

Make:
Model:
Series:

Software:

FMS Software:
Version Number:

Lowest RNP	Additional Aircraft Capabilities (Select all that apply)	Limitations
With Flight Director: _____RNP With Autopilot:_____RNP	Missed approach less than RNP 1.0	RNP AR APCH limited to RNP 0.3 No Missed APCH < RNP 1.0 Add any other limitations or state "None"

FAA Principal Inspector Information

Federal Aviation Administration (FAA) Principal Inspector (PI)

Principal Inspector (PI) First Name:

Principal Inspector (PI) Last Name:

PI Email Address:

PI Phone:

Completed Kickoff Meeting with PI : Yes: No: Date of Kickoff Meeting:_____

Comments to PI:

Summary Table

Use the summary table below to determine the sections that must be completed by an "X" and or note for your particular application listed in the black column headings.

Sections and Appendices	New Application RNP 0.3	RNP < 0.3 (Continuation after Interim Period)	Adding Identically Equipped Aircraft	Adding New Aircraft for RNP AR Approval	Aircraft Modification*
Section 1	X	X	X	X	X
Section 2 (With SOC), or	X Only SOC portion of Section 2, or	Prerequisite	N/A	X Only SOC portion of Section 2, or	N/A
Section 2 (No SOC)	X Complete all of Section 2	Prerequisite	N/A	X Complete all of Section 2	N/A
Section 3	X	Prerequisite	N/A	X	N/A
Section 4	X	Prerequisite	N/A	X	N/A
Section 5	X	Prerequisite	N/A	N/A	N/A
Section 6	X	Prerequisite	N/A	N/A	N/A
Section 7	If PI Requested	If PI Requested	If PI Requested	If PI Requested	If PI Requested
Appendix A	N/A or Continue Application (Next Column)	X	N/A	N/A	N/A

*Send the "Contact" and "Aircraft" fill-in-the-blank portion along with the Statement of No Impact to your PI

Section 2

Section 2: Aircraft Eligibility

Your application should include a Statement of Compliance (SOC) from the entity holding the type design approval for the aircraft and its installed RNP system stating that your aircraft is RNP AR qualified as per the guidance in AC 20-138( ). Otherwise, respond to each aircraft system requirement as referenced by designators ASE, ASC, ASD, ASP and ASI. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation will greatly reduce the application process time. For each item, include only the applicable page(s) or paragraph to show compliance unless otherwise requested by your PI. For this section (Section 2) refer to AC 20-138D (Appendix 2 is primarily for RNP AR) for more detailed airworthiness guidance. If an item does not apply to your operation, provide an explanation as to why it does not apply. For each attachment, provide the necessary page(s)/paragraph(s) to establish compliance.

Statement of Compliance (SOC) Attachments:

Check Box	Reference Number	SOC Attachments
	SOC-1	Provide the statement from the entity holding the type design approval for the aircraft and its installed RNP system that your aircraft is RNP AR qualified as per the guidance in AC 20-138( ). The statement of compliance should indicate the aircraft navigation systems meet the RNP AR requirements and must include: 1. The aircraft systems and navigation sensor(s) necessary to meet the RNP AR aircraft eligibility requirements for RNP AR procedures; 2. The lowest RNP value the aircraft is eligible to use and the type of flight guidance necessary to achieve that minimum RNP value (e.g., autopilot (AP), flight director (FD), heads up display (HUD) or manual flight); 3. The eligibility to perform RNP AR procedures employing radius to fix (RF) turns; and 4. The navigation database meets the specifications in AC 20-138( ). *(Ref. TBD)*

STOP

The remainder of the aircraft systems section does not need to be addressed if you have provided an SOC from the entity holding the type design approval for the aircraft and its installed RNP system. If you have a documented SOC with attachment SOC-1, proceed to Section 3.

If you are submitting SOC-1, skip this page and go to Section 3

Equipage Attachments:

Check Box	Reference Number	Equipage Attachments
	ASE-1	Provide documentation to verify your aircraft is equipped to display barometric altitude from two independent altimeter sources, one in each pilots' primary optimum field of view (FOV), to support an operational cross check of altitude sources. *(Ref. AC 20-138D, Chg2, p. A2-14)*
	ASE-2	Provide documentation to verify your aircraft has a means to annunciate failures of any component of the RNP system, including the navigation sensors. The annunciation must be visible to the pilot and located in the primary optimum FOV. *(Ref. AC 20-138D, Chg2, p. A2-13)*
	ASE-3	Provide documentation to verify your navigation system provides a course selector automatically slaved to the RNP computed path. *(Ref. AC 20-138D, Chg2, p. A2-14)*
	ASE-4	If your aircraft requires two pilots, provide documentation to verify your navigation system provides a readily visible means for the pilot monitoring to verify the aircraft's RNAV-defined path and the aircraft's position relative to the desired path. *(Ref. AC 20-138D, Chg2, p. A2-14)*
	ASE-5	Provide documentation to verify your aircraft navigation system uses GNSS-updating as the basis for initiating all RNP AR APCH procedures. *(Ref. AC 20-138D, Chg2, p. A2-6)*
	ASE-6	Provide documentation to verify your aircraft's GPS/SBAS sensor is within the GPS/SBAS service volume and in an integrity mode that outputs a GPS/SBAS-generated Vertical Protection Level (VPL). *(Ref. AC 20-138D, Chg2, p. A2-6)*
	ASE-7	Provide documentation to verify your aircraft has no single point of failure that could cause the loss of guidance or loss of lateral guidance display with the RNP value associated with the approach or missed approach procedure. Typically, your aircraft must have at least the following equipment: dual GNSS sensors, dual FMSs, dual ADSs, dual autopilots, and a single IRU. *(Ref. AC 20-138D, Chg2, p. A2-18)*
	ASE-8	Provide documentation to verify your aircraft is equipped with a Class A Terrain Avoidance and Warning System (TAWS). *(Ref. AC 20-138D, Chg2, A2-4)*
	ASE-9	Provide documentation to verify your aircraft's TAWS position solution is sourced directly from a GNSS sensor or a tightly-coupled GNSS/inertial system without any reference to, or interchange with, the RNP equipment's (e.g., FMS) position solution output. *(Ref. AC 20-138D, Chg2, p. A2-5)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Equipage Attachments
	ASE-10	Provide documentation to verify your aircraft's Terrain Awareness and Warning System (TAWS) contains current operating software and the most current terrain and obstacle database offered by the TAWS manufacturer. *(Ref. AC 20-138D, Chg2, p. A2-4)*
	ASE-11	Provide documentation to verify your procedures to keep both the TAWS operating software and the TAWS onboard terrain and obstacle database current. *(Ref. AC 20-138D, Chg2, p. A2-4)*
	ASE-12	Provide documentation to verify that your aircraft's RNP system does not use VOR-updating during public RNP AR instrument approach procedures (IAP). *(Ref. AC 20-138D, Chg2, p. A2-7)*
	ASE-13	If your aircraft has an approved temperature compensation system, provide documentation to verify that it provides corrections to the barometric vertical navigation (baro-VNAV) guidance and is in compliance with RTCA/DO-283B, Appendix H. *(Ref. AC AC 20-138D, Chg2, p. A2-7)*
	ASE-14	Provide documentation to verify your aircraft's INS/IRU, if applicable, satisfies the criteria of Title 14 of the Code of Federal Regulations (14 CFR) part 121 appendix G while in inertial mode. *(Ref. AC 20-138D, Chg2, p. 49)*

Capability Attachments:

Check Box	Reference Number	Capability Attachments
	ASC-1	Provide documentation your aircraft display(s) allows the pilot to readily distinguish if the cross-track deviation exceeds the RNP value (or a smaller value) or if the vertical deviation exceeds 75 feet (or a smaller value). *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASC-2	Provide documentation to verify your aircraft has an appropriately-scaled, non-numeric deviation display (i.e., lateral deviation indicator (LDI) and vertical deviation indicator (VDI)) in the pilot's primary optimum FOV. *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASC-3	If your aircraft has a scalable course deviation indicator (CDI), provide documentation of how the scale is derived and the alerting and annunciation limits match the scaling values. *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASC-4	Provide documentation your aircraft's flight guidance mode remains in lateral navigation (LNAV) upon initiating a go-around or missed approach (through activation of takeoff/go-around (TOGA) or other means). If the flight guidance does not remain in LNAV upon initiation of a go-around or missed approach, then provide the manufacturer and/or your defined flight crew contingency procedures for maintaining compliance with the desired track and re-engaging LNAV as soon as possible in FAS-3. *(Ref. AC 20-138D, Chg2, p. A2-17)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Capability Attachments
	ASC-5	Provide documentation of your aircraft's capability of automatic reversion to an alternate RNAV sensor if the primary RNAV sensor fails. *(Ref. AC 20-138D, Chg2, p. A2-7)*
	ASC-6	Provide documentation of your aircraft's capability to execute leg transitions and maintain tracks consistent with the following paths: • A geodesic line between two fixes (TF); • A direct path to a fix (DF); • A specified Track to Fix (CF), defined by a course; and • A specified track to an altitude (FA). *(Ref. AC 20-138D, Chg2, Chg2, p. A2-7 and p. A2-8)*
	ASC-7	Provide documentation to verify your aircraft's capability to execute flyby and flyover turns. For flyby turns, the navigation system must limit the path definition within the theoretical transition area defined in RTCA/DO-236( ) under the wind conditions identified in Table 11 of AC 20-138D, Chg2. *(Ref. AC 20-138D, Chg2, p. A2-8)*
	ASC-8	Provide documentation to verify your aircraft navigation system has a "Direct-To" function the flight crew can activate at any time. This function must be available to any fix. *(Ref. AC 20-138D, Chg2, p. A2-10)*
	ASC-9	Provide documentation to verify your aircraft navigation system is capable of generating a geodesic path to the designated "To" fix, without "S-turning" and without undue delay. *(Ref. AC 20-138D, Chg2, p. A2-10)*
	ASC-10	Provide documentation to verify your aircraft navigation system is capable of defining a vertical path by a flight path angle to a fix and is also capable of specifying a vertical path between altitude constraints at two fixes in the flight plan. The navigation system must define fixed altitude constraints as one of the following: • An "AT or ABOVE" altitude constraint (e.g., 2400A may be appropriate for situations where bounding the vertical path (VPATH) is not a requirement); • An "AT or BELOW" altitude constraint (e.g., 4800B may be appropriate for situations where bounding the VPATH is not a requirement); • An "AT" altitude constraint (e.g., 5200); or • A "WINDOW" constraint (e.g., 2400A3400B). *(Ref. AC 20-138D, Chg2, p. A2-10 and p. A2-11)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Capability Attachments
	ASC-11	Provide documentation to verify your aircraft navigation system is able to construct a path to provide guidance from current position to a vertically constrained fix. *(Ref. AC 20-138D, Chg2, p. A2-11)*
	ASC-12	Provide documentation to verify your aircraft navigation system is capable of completing RNP value changes by the first fix defining the leg with the lower value or you have documented pilot procedures to manually set to the lowest RNP value prior to commencing the approach (See OFP-3). *(Ref. AC 20-138D, Chg2, p. A2-11)*
	ASC-13	Provide documentation to verify your aircraft navigation system provides the capability to automatically sequence to the next leg and display the sequencing to the flight crew in a readily visible manner. *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASC-14	Provide documentation to verify your aircraft navigation system displays altitude restrictions associated with flight plan fixes and the flight path angle (FPA) associated with any flight plan leg of an RNP AR procedure. *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASC-15	Provide documentation to verify your aircraft navigation system provides 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 pilot must be able to readily distinguish if the cross-track deviation exceeds the RNP value (or a smaller value) or if the vertical deviation exceeds 75 feet (or a smaller value). *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASC-16	Provide the documentation to verify your aircraft navigation system displays the active waypoint either in the pilot's primary optimum FOV, or on a readily accessible and visible display to the flight crew. *(Ref. AC 20-138D, Chg2, p. A2-13)*
	ASC-17	Provide documentation to verify your aircraft navigation system displays distance and bearing to the active (To) waypoint in the pilot's primary optimum FOV. *(Ref. AC 20-138D, Chg2, p. A2-13)*
	ASC-18	Provide documentation to verify your aircraft navigation system displays groundspeed and time to the active (To) waypoint in the pilot's primary optimum FOV. *(Ref. AC 20-138D, Chg2, p. A2-13)*
	ASC-19	Provide documentation to verify your aircraft navigation system provides a TO/FROM display in the pilot's primary optimum FOV. *(Ref. AC 20-138D, Chg2, p. A2-13)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Capability Attachments
	ASC-20	Provide documentation to verify your aircraft navigation system has the capability to continuously display to the pilot flying the aircraft the RNP desired track. This display must be on the primary flight instruments for aircraft navigation. *(Ref. AC 20-138D, Chg2, p. A2-13)*
	ASC-21	Provide documentation to verify your aircraft navigation system displays the actual aircraft track (or track angle error) either in the pilot's primary optimum FOV, or on a readily accessible and visible display to the flight crew. *(Ref. AC 20-138D, Chg2, p. A2-13)*
	ASC-22	Provide documentation to verify your aircraft has the ability to display distance to go to any waypoint selected by the flight crew. *(Ref. AC 20-138D, Chg2, p. A2-14)*
	ASC-23	Provide documentation to verify your aircraft navigation system displays the distance between flight plan waypoints. *(Ref. AC 20-138D, Chg2, p. A2-14)*
	ASC-24	Provide documentation to verify your aircraft navigation system numerically displays vertical deviation with a resolution of 10 feet or less, and the lateral deviation with a resolution of 0.01 NM or less. *(Ref. AC 20-138D, Chg2, p. A2-14)*
	ASC-25	Provide documentation to verify your aircraft navigation system displays the current navigation sensor(s) in use. The aircraft should provide this display in the primary optimum FOV. For in-service aircraft that do not display the current navigation sensor in use, see AC 20-138( ) for an alternate means of compliance. *(Ref. AC 20-138D, Chg2, p. A2-15)*
	ASC-26	Provide documentation to verify your aircraft's navigation system is capable of RF legs. *(Ref. TBD)*
	ASC-27	Provide documentation to verify your aircraft's navigation system has the capability to execute leg transitions and maintain tracks consistent with an RF leg between two fixes. *(Ref. AC 20-138D, Chg2, p. A3-3)*
	ASC-28	Provide documentation to verify your aircraft's flight management computer (FMC), the FD system, and autopilot are capable of commanding a bank angle up to 30 degrees above 400 feet above ground level (AGL) and up to 8 degrees below 400 feet AGL. *(Ref. AC 20-138D, Chg2, p. A3-4)*
	ASC-29	Provide documentation to verify your aircraft has an electronic map display of the selected procedure. The map display should be capable of depicting the curved, RF leg segments without discontinuities on both active and inactive leg segments if a moving map display is included with or interfaced to the positioning and navigation equipment. *(Ref. AC 20-138D, Chg2, p. A3-4)*
	ASC-30	Provide documentation that the OEM has demonstrated continued RNP AR approach performance when GNSS is lost (for example, through inertial navigation) and continue to monitor/annunciate loss of RNP capability (i.e., annunciating "Unable RNP"). *(Ref. AC 20-138D, Chg2, p. A2-15)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Capability Attachments
	ASC-31	Provide documentation to verify your navigation system is: • Consistent with at least a major failure condition for the display of misleading lateral or vertical guidance on an RNP AR approach. • Consistent with at least a major failure condition for the loss of lateral guidance and a minor failure condition for loss of vertical guidance on an RNP AR approach. *(Ref. AC 20-138D, Chg2, p. A2-15)*

Performance Attachments:

Check Box	Reference Number	Performance Attachments
	ASP-1	Provide documentation to verify your aircraft's vertical system error includes altimetry system error (ASE) (assuming the temperature and lapse rates of the International Standard Atmosphere (ISA)), the effect of along-track error (ATE), system computation error, data resolution error, and flight technical error (FTE). The 99.7 percent of system error in the vertical direction must be less than the following (in feet): $\sqrt{((6076.115)(1.225)\mathbf{RNP}\cdot \tan\theta)^2 + (60\tan\theta)^2 + 75^2 + \left(\left(-8.8\cdot 10^{-8}\right)(\mathbf{h}+\Delta\mathbf{h})^2 + \left(6.5\cdot 10^{-3}\right)(\mathbf{h}+\Delta\mathbf{h}) + 50\right)^2}$ where θ is the vertical navigation (VNAV) path angle, h is the height of the local altimetry reporting station and Δh is the height of the aircraft above the reporting station. *(Ref. AC 20-138D, Chg2, p. A2-3)*
	ASP-2	Provide documentation to verify that 99.7 percent of your aircraft ASE (assuming the temperature and lapse rates of the ISA) is less than or equal to the following with the aircraft in the approach configuration: **ASE** = $-8.8 \times 10^{-8} \times H^2 + 6.5 \times 10^{-3} \times H + 50$ (ft) where H is the true altitude of the aircraft. *(Ref. AC 20-138D, Chg2, p. A2-7)*
	ASP-3	Provide documentation to verify that your RNP system lateral TSE remains within ±1 NM for at least 95 percent of the total flight time and the along-track error within ±1 NM for at least 95 percent of the total flight time during operations on the initial, intermediate and missed approach segments of a RNP APCH procedure. *(Ref. AC 20-138D, Chg2, p. 57)*
	ASP-4	Provide documentation to verify your aircraft's navigation system provides lateral guidance so aircraft remain within the lateral boundaries of the defined RNP AR procedure at one times the RNP value in use (1×RNP, 95%). *(Ref. AC 20-138D, Chg2, p. A2-3)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Performance Attachments
	ASP-5	Provide documentation to verify the probability of your aircraft's Total System Error (TSE) remains within the procedure design obstacle clearance volume of greater than 95 percent (both laterally and vertically) in the event of a latent GNSS satellite failure and marginal GNSS satellite geometry (e.g., horizontal protection level (HPL) equal to the horizontal alert limit (HAL) or vertical protection level (VPL) equal to the vertical alert limit (VAL)). *(Ref. AC 20-138D, Chg2, p. A2-5)*
	ASP-6	Provide documentation to verify your aircraft provides an alert when a glide path deviation reaches or exceeds 75 feet; or when a lateral deviation reaches or exceeds a distance equivalent to one times the RNP value in use (i.e., 1×RNP). *(Ref. AC 20-138D, Chg2, p. A2-2)*
	ASP-7	Provide documentation to verify your aircraft provides a deviation alert within 10 seconds of reaching a lateral or vertical deviation limit consistent with the RNP AR procedure design assumptions. *(Ref. AC 20-138D, Chg2, p. A2-2)*
	ASP-8	Provide documentation to verify your aircraft's ability to maintain FTE (95 percent of the flying time) during straight and curved path segments. *(Ref. AC 20-138D, Chg2, p. A2-12)*
	ASP-9	Provide documentation to verify your aircraft's GNSS sensor accuracy is better than 36 meters (95 percent), and augmented GNSS (Ground Based Augmentation Systems (GBAS) or SBAS) sensor accuracy is better than 2 meters (95 percent). *(Ref. AC 20-138D, Chg2, p. A2-5)*
	ASP-10	Provide documentation to verify the probability of your aircraft exiting the lateral and vertical extent of the obstacle clearance volume does not exceed 10^{-7} per approach, including the missed approach. *(Ref. AC 20-138D, Chg2, p. A2-3)*
	ASP-11	Provide documentation to verify your aircraft performance has a conditional probability of exiting the final approach obstacle clearance volume is less than 0.001 (one in a thousand). *(Ref. AC 20-138D, Chg2, p. A2-15)*
	ASP-12	Provide documentation to verify your aircraft performance has a conditional probability of exiting the missed approach obstacle clearance volume is less than 0.01 (one in a hundred). *(Ref. AC 20-138D, Chg2, p. A2-15)*

If you are submitting SOC-1, skip this page and go to Section 3

Installation Attachments:

Check Box	Reference Number	Installation Attachments
	ASI-1	Provide detailed rationale in the RNP certification plan (or project specific certification plan) for the use of RNP. This rationale should include a detailed explanation as to how the assigned levels support the system safety assessment, as well as a detailed explanation of the system architecture, including any means used to mitigate hazards and failure conditions resulting from the use of RNP. Additionally, include a detailed explanation of the interfaces between the FD, the autopilot and other sensors, and avionics hardware/software required, as it relates to the computed commands used for RNP. *(Ref. AC 20-138D, Chg2, p. A2-23)*
	ASI-2	Describe how existing open software problem reports are resolved within the aircraft or other equipment that could directly or indirectly affect the RNP approval. Open software problems or changes that could affect RNP operations should be addressed. *(Ref. AC 20-138D, Chg2, p. A2-24)*
	ASI-3	Identify any failure modes potentially affecting RNP capability. Verify annunciation of RNP failure modes exists. This verification should be compatible during manual flight and with the aircraft's Flight Guidance System (FGS) to ensure unambiguous flight crew action(s). Verify that following failure modes, any pilot selected entries are retained or their cancellations annunciated (e.g., manual entry of RNP type, blackballed navaid, etc.). Typical failure modes include loss of electrical power, loss of signal reception, and RNP equipment failure (including degradation of navigation performance resulting in a loss of RNP containment integrity). The aircraft manufacturer should also verify that a visual alert within the flight crew's primary FOV occurs with a loss of navigation capability and/or loss of RNP containment integrity. An aural alert should accompany the visual alert. *(Ref. AC 20-138D, Chg2, p. A2-24)*
	ASI-4	From the flight manual or referenced capabilities document, provide a statement indicating the aircraft meets the requirements for RNP and has demonstrated the established minimum RNP capabilities. This documentation should include: the phase of flight (e.g., oceanic, enroute, terminal area, approach), mode of flight (e.g., manual, FD on or off, and/or autopilot on or off, and applicable lateral and vertical modes), minimum demonstrated RNP value, and sensor limitations, if any (e.g., GPS required). The phase of flight description should indicate what procedure design criteria the navigation performance is designed to support, as applicable. *(Ref. AC 20-138D, Chg2, p. A2-24)*
	ASI-5	From the flight manual or referenced capabilities document, list any conditions or constraints on path steering performance (e.g., autopilot engaged, FD or manual control with CDI or map display, including lateral and vertical modes and/or CDI/map scaling requirements). *(Ref. AC 20-138D, Chg2, p. A2-24-25)*

If you are submitting SOC-1, skip this page and go to Section 3

Check Box	Reference Number	Installation Attachments
	ASI-6	From the flight manual or referenced capabilities document, provide the criteria used for the demonstration of the RNP system, acceptable normal and non-normal procedures, the demonstrated configurations, type of facilities used, and any constraints or limitations necessary for safe operation. *(Ref. AC 20-138D, Chg2, p. A2-25)*
	ASI-7	Define all the assumptions on systems external to the aircraft (e.g., signal in space performance, coverage, and survey accuracy). This includes GNSS-based limitations in the AFM(S)/RFM(S) for RNP AR APCH availability predictions at the destination, or checking NOTAMs. These predictions are consistent with the equipment performance described in AC 20-138( ), chapter 5. ✈ A pre-departure RAIM prediction (fault detection or fault detection and exclusion (FDE) as appropriate) is acceptable for GPS-based RNP AR operations that are limited to RNP AR 0.3 accuracy. ✈ GPS/SBAS provides improved availability and enhanced accuracy during RNP AR operations. An RNP AR operation that is limited to RNP 0.3 accuracy based on GPS/SBAS only needs to confirm via NOTAM that there is no GPS/SBAS outage. ✈ A pre-departure FDE RAIM prediction is acceptable for RNP AR operations limited to RNP 0.3 accuracy when outside of the GPS/SBAS coverage area or during a GPS/SBAS outage. ✈ A pre-departure RNP prediction must be conducted prior to dispatch for accuracy values below RNP 0.3 (i.e., RNP < 0.3). If no RNP prediction capability is available (either external to the aircraft or within the navigation system), then the operator must not plan to use RNP < 0.3. Instead, the operator must plan to use RNP 0.3 if that line of minima exists for the procedure. **Note:** The guidance on RNP prediction only applies to RNP AR operations conducted in the U.S. national airspace system. This does not apply to RNP AR operations in other ICAO States. When operating in another State's airspace, operators must follow the RNP AR operational requirements for that State. *(Ref. AC 20-138D, Chg2, p. A2-25)*

Section 3

Section 3: RNP AR Operations

Respond to each operational requirement and include the corresponding reference number for each response. For each attachment, provide the necessary page(s)/paragraph(s) to establish compliance. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation will greatly reduce the application process time. For each item, include only the applicable page or paragraph to show compliance. For this section (Section 3) refer to AC 90-101A for more detailed operational guidance. If an item does not apply to your operation, provide an explanation as to why it does not apply. All AC 90-101 references in this section are TBD until AC 90-101B is published.

Operational Preflight Attachments

Check Box	Reference Number	Operational Preflight Attachments
	ORP-1	Provide documentation that addresses pilot flying/pilot monitoring procedures for executing RNP AR operations from your operations manuals and/or checklists. *(Ref. TBD)*
	ORP-2	Provide documentation from your aircraft's minimum equipment list (MEL) addressing the equipment requirements for RNP AR operations. *(Ref. TBD)*
	ORP-3	Provide documentation of your operational procedure regarding a destination/alternate with preflight flight planning procedures regarding an operational autopilot (AP) or flight director (FD) for use at the destination and alternate. *(Ref. TBD)*
	ORP-4	Provide operational documentation that your dispatcher and/or pilot preflight duties include the following: 1. The aircraft is eligible and equipped for the desired RNP AR procedure; and 3. The pilot is trained and current for the desired RNP AR operation. *(Ref. TBD)*
	ORP-5	Provide documentation of your operational procedures to conduct an RNP availability prediction to ensure the required RNP value is available at the time of the intended RNP AR operation. This capability can be a ground service and need not be resident in the aircraft's avionics equipment. *(Ref. TBD)*

Check Box	Reference Number	Operational Preflight Attachments
	ORP-6	Provide documentation to verify your operational procedures to conduct an RNP availability prediction during preflight forecasting the published RNP value is available at the time of the intended RNP AR operation. Include procedures using a flight-following tool in the event of reported failures. *(Ref. TBD)*
	ORP-7	If your aircraft is equipped with SBAS sensors, provide documentation to verify your operational procedures to confirm WAAS availability during flight. If your operations are outside of the U.S., include procedures of confirming with a State ANSP or procedures to conduct an RNP availability prediction if this relief is not available.*(Ref. TBD)*
	ORP-8	Provide documentation to verify your operational procedures confirm the navigation database (NDB) is current during the system initialization. NDBs are expected to be current for the duration of the flight. *(Ref. TBD)*
	ORP-9	Provide documentation to verify your pilots know the CDI scaling and where the lateral deviation reaches the operational FTE limit. *(Ref. TBD)*
	ORP-10	If your aircraft displays do not incorporate lateral and vertical deviation displays scaled for the RNP AR operation, provide documentation to verify the proper use of a moving map, low-resolution VDI, or numeric display of deviation to control FTE. *(Ref. TBD)*
	ORP-11	If your aircraft has a multi-sensor navigation system, provide documentation that addresses any contingencies and considerations resulting from reversion to an alternate positioning solution. *(Ref. TBD)*

Operational Flight Attachments

Check Box	Reference Number	Operational Flight Attachments
	OFP-1	Provide operational pilot procedures for not accepting or requesting a clearance to proceed direct to the initial fix of an RF leg or to intercept the RF leg. *(Ref. TBD)*
	OFP-2	Provide operational pilot procedures to verify your aircraft's RNP system uses the appropriate RNP value throughout an RNP AR procedure. If the aircraft's RNP system includes automated scalability, include pilot operating procedures to ensure the pilot selects automated scalability prior to beginning an RNP AR procedure. If your aircraft does not provide leg segment by leg segment scalability, provide pilot operating procedures to ensure the lowest RNP value is set prior to beginning an RNP AR procedure. *(Ref. TBD)*

Prior to the Final Approach Attachments

Check Box	Reference Number	Operational Prior to Final Attachments
	PFR-1	Provide operational pilot procedures conducting GNSS updating prior to commencing an RNP AR procedure.*(Ref. TBD)*
	PFR-2	Provide operational pilot procedures specifying RNP AR procedures must be loaded by name from the aircraft's onboard NDB. *(Ref. TBD)*
	PFR-3	Provide operational pilot procedures confirming the selection of the correct procedure. This procedure should include confirming the waypoint sequence, the reasonableness of track angles and distances, and any other unique characteristics (i.e. altitude and/or speed constraints). *(Ref. TBD)*
	PFR-4	If the RNP AR APCH chart provides multiple lines of minima associated with different RNP values, provide your operational pilot procedures setting the desired minimum RNP value in the RNP system prior to beginning the approach. *(Ref. TBD)*
	PFR-5	Provide operational pilot procedures for using the current local altimeter at the intended destination airport prior to beginning an RNP AR APCH. Pilots must not use remote altimeter settings.*(Ref. TBD)*

Final Approach and Missed Approach Attachments

Check Box	Reference Number	Operational Final and Missed Approach Attachments
	FAS-1	Provide operational pilot procedures for monitoring the vertical deviation during an RNP AR APCH procedure to ensure vertical deviations not exceed 75 feet above or below the desired vertical path. Include documentation that addresses pilots maintaining the procedure centerline at all times by referencing the CDI and/or use of coupled flight guidance during all RNP AR operations. *(Ref. TBD)*
	FAS-2	Provide operational pilot guidance for use of a CDI, FD, and/or autopilot in lateral navigation (LNAV) mode during RNP AR procedures to maintain path centerline.*(Ref. TBD)*

Check Box	Reference Number	Operational Final and Missed Approach Attachments
	FAS-3	For navigation systems that provide continuous LNAV after initiating a go-around, provide your operational pilot procedures for following the RNP system's LNAV guidance to maintain the path centerline. If the RNP system does not maintain LNAV upon initiating a go-around, provide your operational pilot procedures to manually maintain the published path as closely as possible through any means necessary (e.g. monitoring the aircraft's present position on the map display relative to the plan view of the flight plan's desired path) and re-engage LNAV as soon as possible.*(Ref. TBD)*
	FAS-4	Provide operational pilot procedures that address the possible negative outcomes of activating TOGA during a go-around. Pilots must be aware that LNAV guidance may be lost when TOGA is selected. NAV mode may revert to heading or track-hold guidance and if established on an RF turn it is possible that the FD may discontinue the turn or even reverse the direction of the RF leg. For these systems, provide your procedures for the pilot flying to manually maintain the turn and re-engage LNAV as quickly as possible to restore LNAV guidance to the RNP AR procedural path. *(Ref. TBD)*
	FAS-5	Provide an operational pilot procedure to ensure that the maximum airspeeds shown in AC 90-101(): Maximum Airspeeds Throughout the Radius to a Fix Leg Segment, throughout the RF leg Segment. *(Ref. TBD)*
	FAS-6	Provide operational pilot procedures for executing a missed approach prior to decision altitude (DA). This documentation should include maintaining the segment speed to the DA and then observing any speed contraint specified for the missed approach segment (MAS).*(Ref. TBD)*
	FAS-7	Provide operational pilot procedure of the use of automated or manual temperature compensation when applicable for an RNP AR procedure. Include procedures to coordinate with ATC prior to applying any temperature compensation *(Ref. TBD)*
	FAS-8	If applicable, provide operational pilot procedures for an altimeter crosscheck ensuring both pilots' primary barometric altimeters agree within ±100 feet of one another at a known waypoint. This check must occur no later than the FAF and should be conducted at a fix where the procedure attitude can be compared to both pilot altimeters. *(Ref. TBD)*
	FAS-9	Provide pilot operational procedures that address non-standard climb gradients during the missed approach procedure. The operator is responsible to ensure the aircraft will be able to comply with the published climb gradient for the planned aircraft loading, atmospheric conditions, and operating procedures. *(Ref. TBD)*

Check Box	Reference Number	Operational Final and Missed Approach Attachments
	FAS-10	Provide operational procedures that mandate your pilots execute a go-around and/or missed approach (as applicable) if the lateral deviation exceeds 1xRNP or the vertical deviation exceeds 75 feet (75 FT), unless the pilot flying acquires the appropriate visual requirements to continue and proceed below DA(H) (e.g. Part 91 §91.175, §91.176, Part 121, §121.651, and Part 135, §135.225). *(Ref. TBD)*
	FAS-11	Provide pilot contingency procedures to address a failure of the required equipment after beginning an RNP AR procedure. Operators may employ these procedures consistent with the existing best practices they employ for other instrument operations. As a minimum, your contingency procedures must address the following conditions to be eligible to conduct an RNP AR procedure: 1. Failure of RNP system components, including those affecting lateral and vertical path tracking performance (e.g. autopilot failure); and 2. Loss of the GNSS signal-in-space due to jamming or interference; *(Ref. TBD)*

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Section 4

Section 4: Navigation Database (NDB)

Respond to each navigation database validation requirement and include the corresponding reference number for each response. For each attachment, provide the necessary page(s)/paragraph(s) to establish compliance. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation will greatly reduce the application process time. For each item, include only the applicable page or paragraph to show compliance. For this section (Section 4) refer to AC 90-101A and AC 20-138( ) for more detailed operational guidance. If an item does not apply to your operation, provide an explanation as to why it does not apply.

NDB Validation Attachments

Check Box	Reference Number	Navigation Database Validation Attachments
	DBR-1	Provide documentation of your RNP AR validation procedures. Proper data validation includes an accuracy check by comparing the RNP AR procedure in the navigation database with the government source data. *(Ref. AC 20-138D, Chg2, p. A2-21)*
	DBR-2	Provide a list of any non-part 97 U.S. RNP AR procedures you intend to fly and the method of validation (i.e. actual aircraft in visual meteorological conditions; a flight simulation training device (FSTD) approved for RNP AR; or an appropriately configured desktop/laptop computer). *(Ref. AC 20-138D, Chg2, p. A2-22)*
	DBR-3	Provide the name of the individual responsible for managing the overall onboard NDB process. *(Ref, AC 20-138D, Chg2, p. A2-21)* Name of NDB Manager:
	DBR-4	Provide documentation that your aircraft operator's data supplier (e.g., FMS manufacturer) has at least a Type 2 LOA. *(Ref. AC 20-138D, Chg2, p. A2-23)*
	DBR-5	If your operation has contracted with an outside entity to perform navigation database validation services, describe the extent and nature of those services. *(Ref. AC 20-138D, Chg2, p. A2-21)*
	DBR-6	Provide documentation of your processes and procedures for accepting, verifying, and loading navigation data into the aircraft. Include a statement of how you maintain these processes and procedures under configuration control (e.g., formal control of revisions and updates to the process). The operator may not contract out this responsibility to a third party. *(Ref. AC 20-138D, Chg2, p. A2-21)*

STOP

The remainder of this section does not need to be addressed if SOC-1 also has a statement that your aircraft's NDB meets the specification described in AC 20-138( ). If you have a documented your NDB with attachment SOC-1, proceed to Section 5.

Check Box	Reference Number	Navigation Database Validation Attachments
	DBR-7	Provide documentation to verify your aircraft navigation system can: • Receive updates in accordance with the Aeronautical Information Regulation and Control (AIRAC) cycle; and • Allow retrieval and loading of RNP AR procedures into the RNP system. *(Ref. AC 20-138D, Chg2, p. A2-16)*
	DBR-8	Provide documentation to verify your aircraft's NDB provides sufficient data resolution to ensure the navigation system achieves the required RNP accuracy. Waypoint resolution error must be less than or equal to 60 feet, including both the data storage resolution and the RNP system computational resolution used internally for construction of flight plan waypoints. *(Ref. AC 20-138D, Chg2, p. A2-10)*
	DBR-9	Provide documentation to verify your aircraft's NDB contain vertical angles (Flight Path Angles (FPA)) stored to a resolution of hundredths of a degree, with computational resolution such that the system-defined path is within 5 feet of the published path. *(Ref. AC 20-138D, Chg2, p. A2-10)*
	DBR-10	Provide documentation to verify your aircraft has a means to display to the flight crew the validity period for the onboard NDB. *(Ref. AC 20-138D, Chg2, p. A2-16)*
	DBR-11	Provide documentation to verify your aircraft navigation system uses the magnetic variation value for the procedures in the NDB for paths defined by a course (CF and FA path terminators). *(Ref. AC 20-138D, Chg2, p. A2-11)*
	DBR-12	Provide documentation to verify your aircraft navigation system extracts altitudes and/or speeds defined in published terminal procedures from the onboard NDB. *(Ref. AC AC 20-138D, Chg2, p. A2-11)*
	DBR-13	Provide documentation to verify your aircraft navigation system has the capability to load the entire flight procedure into the RNP system from the onboard NDB. This includes the approach (including vertical angle), the missed approach, and the approach transitions for the selected airport and runway. *(Ref. AC AC 20-138D, Chg2, p. A2-11)*
	DBR-14	Provide documentation to verify your aircraft navigation system has the means for the flight crew to confirm the flight procedure to be flown through review of the data stored in the onboard NDB. This includes the ability to review the data for individual waypoints and for NAVAIDs. *(Ref. AC 20-138D, Chg2, p. A2-11)*
	DBR-15	Provide documentation to verify your aircraft's navigation system does not permit the flight crew to modify the stored data in the onboard navigation database. *(Ref. AC 20-138D, Chg2, p. A2-16)*

If you are submitting SOC-1, skip this page and go to Section 5

Check Box	Reference Number	Navigation Database Validation Attachments
	DBR-16	Provide documentation to verify your aircraft's RNP system can execute a procedure as published whenever the flight crew selects and loads a procedure from the onboard NDB. *(Ref. AC 20-138D, Chg2, p. A2-16)*

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Section 5: Training RNP AR

This section is primarily for providing RNP AR APCH pilot training. For each attachment, provide the necessary page(s)/paragraph(s) to establish compliance. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation will greatly reduce the application process time. For each item, include only the applicable page or paragraph to show compliance. For this section (Section 5) refer to AC 90-101A for more detailed operational guidance.

Parts 91K, 121, 125, and 135 operators must have a training program addressing the operational practices, procedures and training items related to RNP AR operations (e.g., initial, upgrade, or recurrent training for flight crew, operational control personnel, and maintenance personnel). Part 91 operators must be knowledgeable with the procedures and operations associated with the use of RNP AR systems.

Note : A separate training program is not required if RNP AR training is integrated in the current training program. However, you must identify the training elements from AC 90-101A within your existing training program.

If an item does not apply to your operation, provide an explanation as to why it does not apply.

All AC 90-101 references are TBD until AC 90-101B is published.

Training Attachments

Check Box	Reference Number	Training Requirements Attachments
	TNG-1	Provide your RNP AR training documentation available for personnel involved with RNP AR operations (i.e. pilots, dispatchers and maintenance personnel). This material must cover pertinent aspects of your RNP AR operations including the applicable Federal Aviation Administration (FAA) authorizations (i.e., Operations Specifications (OpSpec), Management Specifications (MSpec), or Letter of Authorizations (LOA)). *(Ref. TBD)*
	TNG-2	Provide documentation of your initial RNP AR APCH training and qualifications during initial, transition, upgrade, recurrent, differences, or stand-alone. Your qualification standards must assess each pilot's ability to properly understand and use RNP AR APCH procedures. *(Ref. TBD)*

Trainings Requirements Continued

Check Box	Reference Number	Training Requirements Attachments
	TNG-3	Provide documentation of your dispatcher training program if applicable for RNP AR operations. Document your training covers all pertinent aspects of your RNP AR operations including: ✈ Understanding of regulatory requirements and dispatch procedures pertinent to the different types of RNP AR procedures performed, as well as the applicable FAA authorization (i.e. OpSpecs, MSpecs, or LOA); ✈ The ability to determine Global Navigation Satellite System (GNSS) availability for RNP AR procedures at the time of intended operation through use of an approved RNP prediction program or confirmation of WAAS availability in lieu of a prediction (when the aircraft includes an RNP system using SBAS (WAAS)); and ✈ Understanding the following aircraft performance capabilities: • The effects of MEL failures on RNP AR procedure flight planning; • The aircraft OEM's minimum operating list of aircraft equipment essential to flight planning for an RNP AR procedure; and • Navigation signal availability on RNP AR capabilities. *(Ref. TBD)*
	TNG-4	Provide documentation of your initial pilot ground training that addresses the knowledge areas listed in AC 90-101A. For recurrent RNP AR APCH training, the curriculum need only address new, revised, or emphasized items. *(Ref. TBD)*

Trainings Requirements Continued

Check Box	Reference Number	Training Requirements Attachments
	TNG-5	Provide documentation of your pilot training program to include: ✈ Contingency procedures for a loss of RNP capability during an RNP AR procedure. Training should emphasize the operator's documented contingency procedures (if available) and the need for the pilot to take action to maintain separation from terrain and obstacles; ✈ The use of navigation sensors including the assessment of sensor failures and any known loss of external navigation aids (i.e. loss of GNSS due to jamming or interference); and ✈ Ability to recognize, evaluate, and take appropriate action in response to any system or instrument failures affecting the aircraft's RNP performance prior to and during an RNP AR procedure. This training should follow the aircraft OEM's minimum equipment required for an RNP AR operation. Examples of failures that could degrade the RNP capability of the aircraft include: • Autopilot failure, • Autothrottle/Autothrust failure, • GNSS signal-in-space (SIS) loss, • Right/left/dual FMC failure or RESET, and/or • TAWS alerts or warnings. *(Ref. TBD)*
	TNG-6	Provide pilot training documentation that your RNP AR flight training contains the subject areas listed in AC 90-101A. *(Ref. TBD)*
	TNG-7	Provide documentation that your initial pilot training program requires each pilot completes at **least four RNP AR APCH procedures**: two as pilot flying and two as pilot monitoring. These four RNP AR APCHs must employ the unique AR characteristics of your approved procedures (i.e., RF legs, RNP missed). Two approaches must be flown to the decision altitude (DA) and two approaches must result in an RNP Missed Approach Procedure (MAP). Two of the above approaches will include interrupted approaches resulting in one approach with vectors to resume the approach and one approach resulting in a hold at an initial approach fix (IAF) or transition fix. *(Ref. TBD)*

Trainings Requirements Continued

Check Box	Reference Number	Training Requirements Attachments
	TNG-8	Provide training documentation of your procedures for evaluating pilot knowledge of RNP AR APCH procedures. As a minimum, this must include a thorough evaluation of pilot procedures and specific aircraft performance requirements for RNP AR APCH operations. This initial assessment of pilot knowledge can be accomplished by one of the following: ✈ An authorized instructor/evaluator or check-airman using an approved simulator or training device; ✈ An authorized instructor/evaluator or check-airman during line operations, training flights, proficiency checks, practical tests events, operating experience, route checks, and/or line checks; or ✈ LOFT/LOE programs using an approved simulator that incorporates RNP operations that employ the unique RNP AR APCH characteristics (i.e. RF legs, RNP missed approach) of your approved procedures. *(Ref. TBD)*
	TNG-9	Provide documentation that your evaluation content includes the subject areas listed in AC 90-101A. *(Ref. TBD)*
	TNG-10	Provide documentation of your recurrent pilot training program in which each pilot must complete at **least two RNP AR APCH procedures**: one as pilot flying and one as pilot monitoring. These two RNP AR approaches must employ the unique AR characteristics of your approved procedures (i.e., RF legs, RNP missed). One of the approaches must be flown to the DA and one approach must result in an RNP MAP. One of the above approaches will include either an interrupted approach resulting in vectors to resume the approach or a hold at an IAF or transition fix. *(Ref. TBD)*

Section 6

Section 6: Monitoring Program

Respond to each monitoring program requirement item and include the corresponding reference number for each response. For each attachment, provide the necessary page(s)/paragraph(s) to establish compliance. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation will greatly reduce the application process time. For each item, include only the applicable page or paragraph to show compliance. For this section (Section 6) refer to AC 90-101A for more detailed operational guidance in chapter 8. If an item does not apply to your operation, provide an explanation as to why it does not apply.

Operators must record and report all information pertaining to unsuccessful RNP AR procedures. During the interim authorization period, the monitoring program should gather information from every attempted RNP AR procedure. The program should establish internal processes that provide for regular reviews of departure and approach data by appropriate officials.

Note: After completion of the RNP AR interim period, operators need not record data for successful RNP AR procedures.

Monitoring Program

Check Box	Reference Number	Monitoring Program Attachments
	MON-1	Provide documentation of your implementation of an ongoing RNP AR monitoring program to ensure continued compliance with the guidance in AC 90-101 and processes to identify any negative trends in executing RNP AR procedures. *(Ref. TBD)*

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Section 7: Additional Information

Additional PI Requested Documentation.

This section is optional and reserved for any additional information that may be requested by your Principal Inspector (PI). For each attachment, provide the necessary page(s)/paragraph(s) to establish compliance. Include the corresponding reference number with the attachment.

Check Box	Reference Number	Additional PI Requested Documentation
	POI-1	If requested, attach additional documentation requested by your PI.

Document Review

Check each document below to indicate you are familiar with each. Copy the table below and include it with your application with each document checked. Brackets "( )" indicate most current edition.

Check Box	Reference Number	Document List
	DOC-1	AC 90-101( ), Approval Guidance for RNP Procedures with AR
	DOC-2	AC 20-138 ( ) Airworthiness Approval of Positioning and Navigation Systems.

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Appendix A

Appendix A: RNP AR Qualification Requirements for Less than RNP 0.3

When interim authorization to conduct RNP AR procedures is awarded, the operator may conduct approaches using RNP 0.3 for a period of 90 days and until 100 procedures have been completed. Approach procedures with no RNP 0.3 line of minima must be conducted in VMC. Operators approved for RNP AR approach operations to RNP 0.3 wishing to conduct RNP AR APCH operations using RNP less than 0.3 must complete this section. The use of highlights, outlines, tables and/or hyperlinks for your supporting documentation will greatly reduce the application process time. For each item, include only the applicable page or paragraph to show compliance.

Aircraft Systems Attachments RNP Less Than 0.3

STOP Appendix A does not need to be addressed if you have a Statement of Compliance for conducting RNP AR APCH with a specific RNP value less than 0.3 for RNP AR APCH and missed approach RNP value less than 1.0 that was submitted with Section 2 of this application (SOC-1).

Check Box	Reference Number	Aircraft Systems Attachments for RNP <0.3 Attachments
	ARL-1	Provide documentation to verify your aircraft is capable of using lines of minima associated with RNP less than 0.3, and the required equipment configuration to achieve this capability (e.g., dual autopilots may achieve a smaller RNP capability than dual FDs). *(Ref. AC 20-138D, Chg2, p. A2-17)*
	ARL-2	Provide documentation to verify your aircraft automatically reverts to another means of navigation that complies with the RNP value after initiating a go-around or missed approach following loss of GNSS. *(Ref. AC 20-138D, Chg2, p. A2-18)*

If you are submitting SOC-1 with RNP<0.3, skip this page

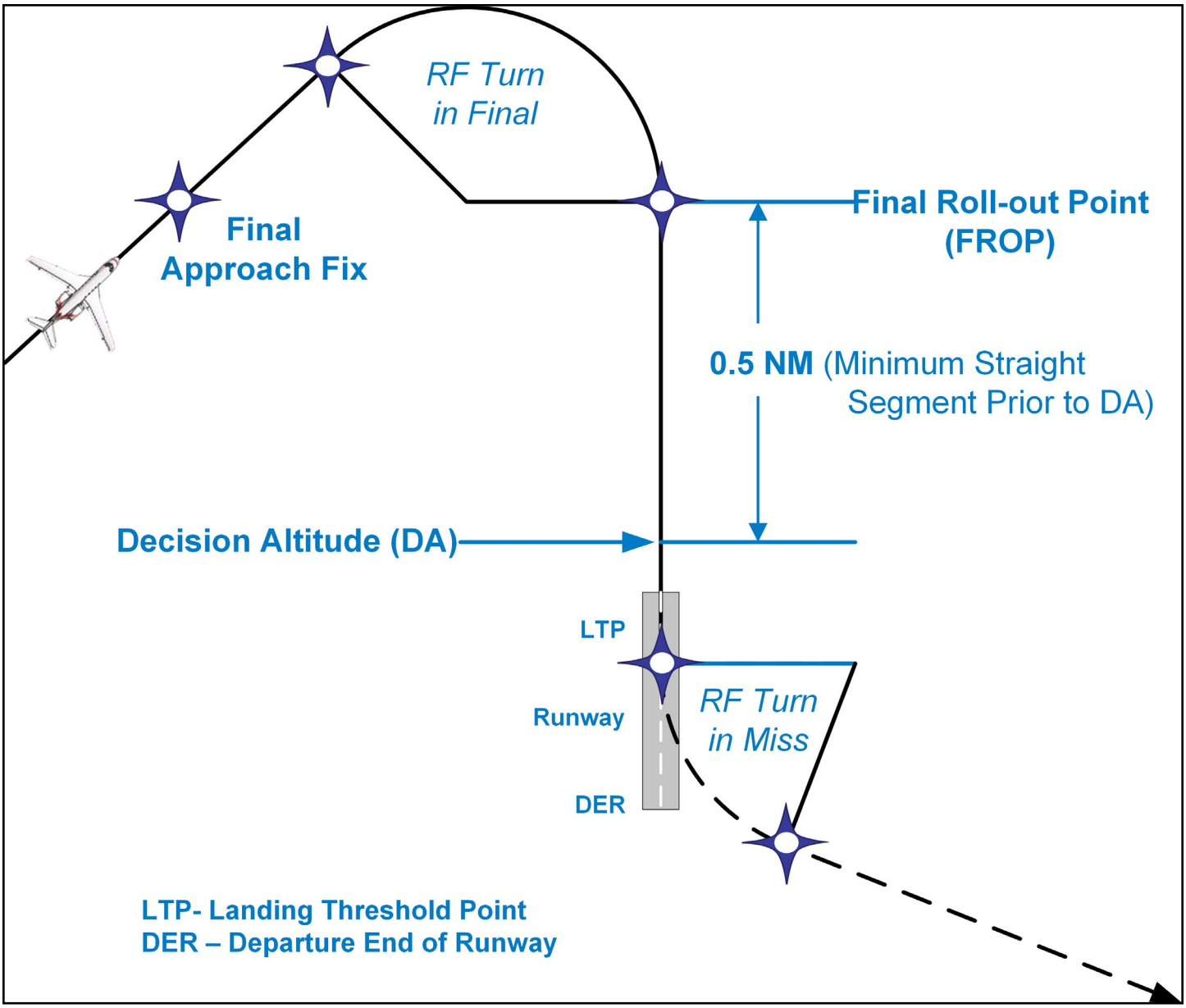
Check Box	Reference Number	Aircraft Systems Attachments for RNP <0.3 Attachments
	ARL-3	Provide documentation to verify that there is no single point of failure that can cause the loss of guidance compliant with the RNP value associated with the approach. Document that your aircraft is equipped with at least: ✈ Dual GNSS sensors, ✈ Dual flight management systems (FMS), ✈ Dual air data systems (ADS), ✈ Dual autopilots, and ✈ A single IRU. *(Ref. AC 20-138D, Chg2, p. A2-17)*
	ARL-4	Provide documentation to verify your navigation system is consistent with at least a hazardous (severe-major) failure condition for the display of misleading lateral or vertical guidance on an RNP AR approach where the procedure requires RNP less than 0.3 while executing an approach. *(Ref. AC 20-138D, Chg2, p. A2-17)*
	ARL-5	Provide documentation to verify your navigation system is consistent with at least a hazardous (severe-major) failure condition for the loss of lateral guidance and a minor failure condition for the loss of vertical guidance on an RNP AR approach where the procedure requires RNP less than 0.3 while executing an approach. *(Ref. AC 20-138D, Chg2, p. A2-17)* **Note:** Directly meeting this requirement can substitute for the general requirement for dual equipment in ARL-3.

If you are submitting SOC-1 with RNP<0.3, skip this page

Aircraft Systems Attachments RNP AR Missed Approach

Check Box	Reference Number	Aircraft Attachments for RNP <0.3 Attachments
	ARM-1	Provide documentation to verify your aircraft can achieve less than RNP 1.0 when executing a missed approach procedure segment. *(Ref. AC 20-138D, Chg2, p. A2-18)*
	ARM-2	Provide documentation to verify aircraft does not have a single-point-of-failure that can cause the loss of guidance or loss of lateral guidance display with the RNP value associated with a missed approach procedure. Typically, the aircraft must have at least the following equipment: dual GNSS sensors, dual FMSs, dual air data systems, dual autopilots, and a single IRU. *(Ref. AC 20-138D, Chg2, p. A2-18)*
	ARM-3	Provide documentation to verify your navigation system is consistent with at least a major failure condition for the loss of lateral guidance compliant with the RNP value on an RNP AR missed approach segment that requires RNP less than 1.0. *(Ref. AC 20-138D, Chg2, p. A2-18)*
	ARM-4	Provide documentation to verify your navigation display system is consistent with at least a hazardous (severe-major) failure condition for the loss of display of lateral guidance compliant with the RNP value on an RNP AR missed approach segment that requires RNP less than 1.0. *(Ref. AC 20-138D, Chg2, p. A2-18)*
	ARM-5	Provide documentation to verify that upon initiating a go-around or missed approach (through activation of TOGA or other means), the flight guidance mode remains in LNAV to enable continuous track guidance, particularly during an RF leg. If the aircraft does not provide this capability, provide documentation for the following: 1. For RF legs, the lateral path guidance after initiating a go-around (given a minimum 0.5 NM straight segment between the RF end point and the DA) must be within 1 degree (1°) of the track defined by the straight segment through the DA point (see Figure A-1). 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. 2. The flight crew must be able to couple the autopilot or FD to the RNP system (engage LNAV) by 400 feet AGL. *(Ref. AC 20-138D, Chg2, p. A2-19)*
	ARM-6	Provide documentation to verify your aircraft can automatically revert to another means of navigation that complies with the RNP value after initiating a go-around or missed approach following loss of GNSS. *(Ref. AC 20-138D, Chg2, p. A2-19)*

Figure A-1: Straight Final Approach Segment after RF



Appendix C

Appendix C: Definitions and Acronyms

Definitions

A

ARINC 424. ARINC 424 is an international standard file format for aircraft navigation data maintained by Airlines Electronic Engineering Committee and published by Aeronautical Radio, Inc.

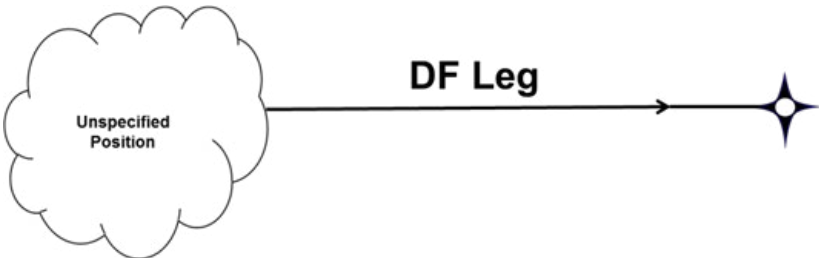
Area Navigation (RNAV). A method of navigation, which permits aircraft operation on any desired flightpath within the coverage of ground- or space-based Navigational Aids (NAVAID), within the limits of the capability of self-contained aids, or a combination of these.

C

Course to a Fix (CF). Course to a Fix Leg defines a specified course to a specific database fix.

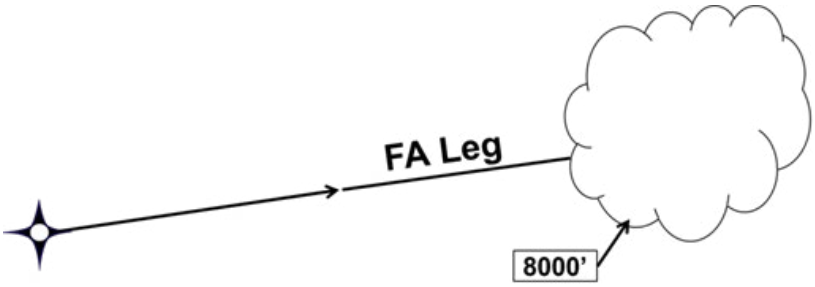
D

Direct to a Fix (DF). Direct to a Fix Leg defines an unspecified track starting from an undefined position to a specified fix.



F

Fix to an Altitude (FA). Fix to an Altitude defines a specified track over ground from a database fix to a specified altitude at an unspecified position



Flight Management System (FMS). An integrated system, consisting of airborne sensor, receiver, and computer with both navigation and aircraft performance databases, which provides performance and RNAV guidance to a display and automatic flight control system (AFCS).

G

Global Positioning System (GPS). GPS is a U.S. satellite-based radio navigation system that provides a positioning service anywhere in the world. The definition of the service provided by GPS for civil use is in the GPS Standard Positioning System (SPS) Signal Specification. GPS is the U.S. core Global Navigation Satellite System (GNSS) satellite constellation providing space-based positioning, velocity, and time. GPS is composed of space, control, and user elements.

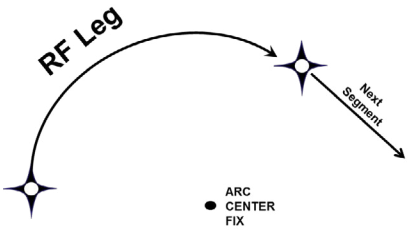
Global Navigation Satellite System (GNSS). GNSS is a generic term for a worldwide position, velocity, and time determination system, which includes one or more satellite constellations, aircraft receivers, and system integrity monitoring. GNSS includes Global Positioning Service (GPS-U.S.), Global Orbiting Navigation Satellite System (GLONASS-RUS), Galileo (European Union-EU), and any other satellite system approved for civil use. GNSS can be augmented as necessary to support the Required Navigation Performance (RNP) for the actual phase of operation with Satellite-based Augmentation Systems (SBAS) such as wide area augmentation system (WAAS-US), European Geostationary Overlay Service (EGNOS-EU), or Ground Based Augmentation System (GBAS).

P

Primary Optimum Field of View (FOV). For the purpose of this AC, the primary optimum FOV is within 15 degrees of the pilot's primary line of sight.

R

Radius to Fix (RF) Leg. An RF leg is defined as a constant radius circular path, around a defined turn center, that starts and terminates at a fix. An RF leg may be published as part of a procedure.



Receiver Autonomous Integrity Monitoring (RAIM). An algorithm that verifies the integrity of the position output using GPS measurements or GPS measurements and barometric aiding.

Required Navigation Performance (RNP). RNP is a statement of the 95 percent navigation accuracy performance that meets a specified value for a particular phase of flight or flight segment and incorporates associated onboard performance-monitoring and alerting features to notify the pilot when the RNP for a particular phase

or segment of a flight is not being met.

Required Navigation Performance Operations. Refers to the navigation specifications of RNP AR instrument approach procedures (RNP AR APCH).

Required Navigation Performance Approach with Authorization Required (RNP AR APCH). RNP AR instrument approach procedure (RNP AR APCH) based on Performance Based Navigation (PBN).

Required Navigation Performance (RNP) System. An RNAV system which supports onboard performance monitoring and alerting.

Required Navigation Performance (RNP) Value. The RNP value designates the lateral performance requirement in NM increments associated with a procedure. Examples of RNP values are RNP 0.3 and RNP 0.15.

T

Track to a Fix (TF). Track to a Fix defines a great circle track over ground between two known database fixes.

Acronyms

Acronym	Meaning
ADS	Air Data System
AFM	Airplane Flight Manual
AIRAC	Aeronautical Information Regulation and Control
AP	Autopilot
ASE	Altimetry System Error
ATE	Along-Track Error
CDI	Course Deviation Indicator
CF	Course to Fix
CHDO	Certificate-Holding District Office
FA	Fix to an Altitude
FAF	Final Approach Fix
FGS	Flight Guidance System
FMS	Flight Management System
FOM	Flight Operations Manual
FOV	Field of View
FPA	Flight Path Angle
FSDO	Flight Standards District Office
GNSS	Global Navigation Satellite System
HUD	Heads Up Display
IRU	Inertial Reference Unit
ISA	International Standard Atmosphere
LDI	Lateral Deviation Indicator
LNAV	Lateral Navigation
MAS	Missed Approach Segment
NAVAIDS	Navigational Aid
NDB	Navigation Database
OEI	One Engine Inoperative
PI	Principal Inspector
POH	Pilot's Operating Handbook
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP AR	Required Navigation Performance Authorization Required
RNP AR APCH	Required Navigation Performance Authorization Required Approach
SIS	Signal in Space
TAWS	Terrain Awareness and Warning System
VPATH	Vertical Path
VPL	Vertical Protection Level