

GENERAL

The aircraft navigation system, required by regulation to fly within a Required Navigation Performance (RNP) airspace, shall comply with RNAV functionality criteria and with navigation position accuracy and integrity criteria.

When referring to RNP-X, the value of X is the navigation accuracy expressed in NM, which has to be met with a probability of 95 %.

A RNP value can be associated to an airspace, a route, a SID, a STAR, a RNAV approach or a RNAV missed approach procedure.

Depending of the RNP value and the airspace environment (ground radio navaid), different navigation equipment may be necessary.

An operational approval from the airline's national authorities may be necessary.

NAVIGATION SYSTEM CAPABILITY (for reference only)

European BRNAV (RNP-5) capability is shown in compliance with certification requirements of JAA AMJ 20-X2.

RNP-10 capability in oceanic or remote areas is shown in compliance with paragraph 12.b.(1) of FAA Notice 8400.12A or with paragraph 12.a., if GPS is installed and is operative.

Navigation system with GPS PRIMARY function (if GPS installed) meets certification requirements of FAA AC 20-130A and TSO C 129A in class C1 (for navigation system with multiple sensor inputs including GPS).

RNP CAPABILITY

In order to match a given RNP value, the FMS estimated position accuracy (also called Estimated Position Error) must be better than the RNP value. This is obviously dependent on the FMS navigation-updating mode (GPS, DME/DME, VORDME, or IRS).

On the MCDU PROG page, the required and the estimated position accuracy are displayed, and determine the HIGH/LOW accuracy indication (refer to FCOM 1.22.20).

The required accuracy can either be a default value, which is either a function of the phase of flight or a navigation database procedure value, or a value manually entered by the crew.

When flying in an RNP environment, the crew can insert the appropriate RNP value in the REQUIRED ACCUR field of the PROG page.

- When HIGH is displayed, the RNP requirement is estimated fulfilled.
- When LOW is displayed, the RNP requirement is estimated not fulfilled. In that case :
 - The crew crosschecks navigation with raw data, if available.
 - If the crosscheck is negative, or if raw data is unavailable, the crew informs the ATC.

When leaving the RNP environment, the crew will clear the manually-entered required accuracy.

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Without GPS PRIMARY function

RNP accuracy criteria are met provided the radio navaid coverage supports it for :

- RNP-1 en route and in terminal area provided a required accuracy of 1.2 NM(1) is manually entered in MCDU.
- RNP-0.3 in approach provided a required accuracy of 0.36NM(1) is manually entered in MCDU.

Note : (1) Radial equivalent to the specified Cross Track/Along Track (XTK/ATK) accuracy.

With GPS PRIMARY function

RNP requirements are met, provided GPS PRIMARY is available, for :

- RNP-1 en route
- RNP-0.5 in terminal area provided AP or FD in NAV mode is used
- RNP-0.3 in approach provided AP or FD in NAV mode is used

BRNAV IN EUROPEAN AIRSPACE

In this airspace the radio navaid coverage is assumed to support RNP-5 accuracy.

The minimum required equipment to enter BRNAV airspace is :

- One RNAV system which means :
 - One FMGC
 - One MCDU
 - One VOR for FM navigation update
 - One DME for FM navigation update
 - One IRS
- Flight Plan Data on 2 ND

PROCEDURES

Except when GPS PRIMARY is available, crosscheck periodically the FM position with navaid raw data.

The manual selection of a required accuracy on MCDU is optional.

● If manual entry of a required is desired, use the radial equivalent to 5NM XTK/ATK accuracy that is 6.1NM.

When leaving the RNP-5 airspace, or when entering terminal area, revert to the default required accuracy or enter appropriate value on MCDU.

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Check navigation accuracy with navaid raw data or GPS MONITOR page (if GPS installed), if one of the following MCDU or ECAM messages is displayed :

- NAV ACCUR DOWNGRAD
- FMS1/FMS2 POS DIFF
- CHECK IRS 1(2)(3)/FM POSITION
- ECAM : FM/GPS POS DISAGREE (if GPS installed)
- ECAM : FM/IR POS DISAGREE

● **If accuracy check confirms that RNP-5 capability is lost or if both FMGC are failed : inform ATC and revert to conventional navigation.**

● **If accuracy check confirms that only one FMGC position is incorrect, resume navigation with the other FMGC.**

In IRS ONLY navigation, the BRNAV capability is kept during 2 hours independently of the estimated accuracy displayed on MCDU.

RNP-10 IN OCEANIC OR REMOTE AREAS

In this kind of airspace the aircraft is expected to fly for a long period of time outside radio navaid coverage.

For aircraft without GPS the flight time outside radio navaid coverage is limited. According to FAA Notice 8400.12A this limitation is :

- 6.2 hours since IRS ground alignment, or
- 5.7 hours since last FM radio update.

There is no limitation for aircraft fitted with GPS.

Minimum required equipment to enter a RNP-10 airspace is :

- 2 long range navigation systems, which means :
 - 2 FMGC (or 1 FMGC + 1 BACK UP NAV)
 - 2 MCDU
 - 1 GPS if required by flight time outside radio navaid coverage
 - 2 IRS

Refer also to Regional Supplementary Procedures of ICAO Doc 7030 for specific requirements in a particular airspace.

PROCEDURES

The manual selection of a required accuracy on MCDU is optional.

● **If manual entry of a required accuracy is desired, use the radial equivalent to 10NM XTK/ATK accuracy that is 12.2NM.**

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● When leaving the RNP-10 airspace, revert to the default required accuracy or enter appropriate value.

Check navigation with POSITION MONITOR page, IRS MONITOR pages and GPS MONITOR page (if GPS installed), if one of the following MCDU or ECAM messages is displayed :

- FMS1/FMS2 POS DIFF
- CHECK IRS 1(2)(3)/FM POSITION
- ECAM : FM/GPS POS DISAGREE (if GPS installed)
- ECAM : FM/IR POS DISAGREE

● Use AP with the navigation system checked correct

● If unable to determine which system is correct, inform ATC and look for navaid raw data confirmation as soon as possible

In IRS ONLY navigation, the RNP-10 capability is kept during 5.7 hours, according to FAA Notice 8400.12A, independently of the estimated accuracy displayed on MCDU.