

# ICAO PBN Workshop Tanzania

## How to build a MEL for PBN operations



# How to incorporate the RNP limitation in the MEL?

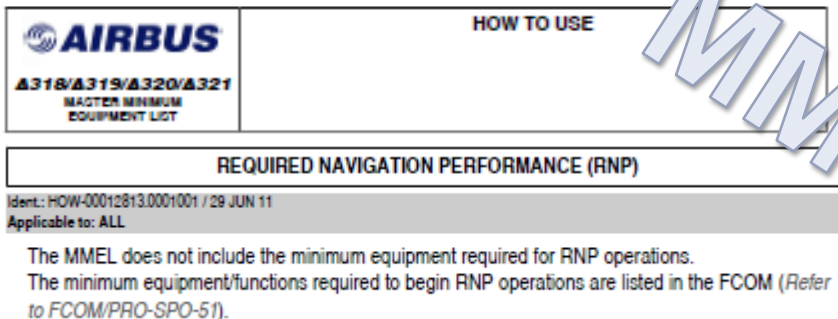
Exercise: Incorporate RNP 4 operation in your MEL

## How to incorporate the RNP limitation in the MEL?

- Is RNP operation already covered in the MMEL?
- Where find the list of required RNP equipment ?
- Which limitation need to be covered in the MEL?
- How to cover the RNP in the MEL?

## How to incorporate the RNP limitation in the MEL?

- Is RNP operation already covered in the MMEL?



**AIRBUS**  
A318/A319/A320/A321  
MASTER MINIMUM  
EQUIPMENT LIST

HOW TO USE

**REQUIRED NAVIGATION PERFORMANCE (RNP)**

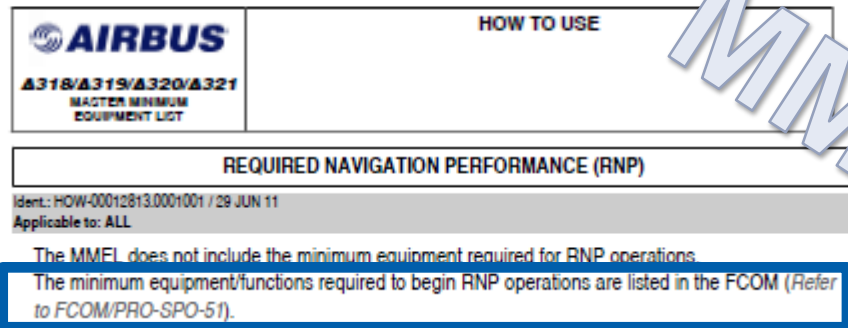
Ident.: HOW-00012813.0001001 / 29 JUN 11  
Applicable to: ALL

The MMEL does not include the minimum equipment required for RNP operations.  
The minimum equipment/functions required to begin RNP operations are listed in the FCOM (Refer to FCOM/PRO-SPO-51).

MMEL clearly mentions that the RNP is not covered in the MMEL.

## How to incorporate the RNP limitation in the MEL?

- Where find the list of required RNP equipment ?



**AIRBUS**  
A318/A319/A320/A321  
MASTER MINIMUM  
EQUIPMENT LIST

HOW TO USE

REQUIRED NAVIGATION PERFORMANCE (RNP)

Ident: HOW-00012813.0001001 / 29 JUN 11  
Applicable to: ALL

The MMEL does not include the minimum equipment required for RNP operations.  
The minimum equipment/functions required to begin RNP operations are listed in the FCOM (Refer to FCOM/PRO-SPO-5).

MMEL clearly mentions that the minimum equipment/functions required for RNP operations are covered in the FCOM.

# How to incorporate the RNP limitation in the MEL?

## RNP 4 compliance

### Regulation



FAA Order 8400.33

AC90-105A (new issue planned)

No regulation



### Aircraft compliance covered in the AFM

**AIRBUS**  
A319  
AIRPLANE FLIGHT MANUAL

LIMITATIONS  
AUTO FLIGHT SYSTEM  
FLIGHT MANAGEMENT SYSTEM

AFM

#### AIRWORTHINESS STANDARDS COMPLIANCE

Ident.: LIM-20-FM0-20009968.001000 / 05 DEC 13 EASA APPROVED  
 Config.: (A319 or A320 or A321) and (3-1966 or 3-1997) and (25305 or 28111 or 28485 or 28999 or 29382 or 30241 or 30651 or 3063611)

The FMGS has been demonstrated to comply with applicable airworthiness requirements, including FAA AC 20-130A, for a navigation system integrating multiple navigation sensors, when operating with aircraft position based on:

- IRS position and GPS update, or
- IRS position and radio navaid update, or
- IRS position only.

The FMGS also complies with the airworthiness part of:

- EASA AMC 20-4 (or JAA TGL 2 Rev 1) for Basic RNAV
- EASA AMC 20-27 for RNP APPROACH (RNP APCH) Operations with or without APV BARO-VNAV Operations

- Note:**
1. RNP APCH without APV BARO-VNAV operation corresponds to RNAV(GNSS) approach with LNAV Minimum.
  2. RNP APCH with APV BARO-VNAV operation corresponds to RNAV(GNSS) approach with LNAV/VNAV Minimum.

- JAA TGL 10 for Precision RNAV (compliance with paragraph 8.2 has not been demonstrated)
- FAA Advisory Circular 90-100A for terminal and en route RNAV operations
- FAA Order 8400.33 for RNP 4 in oceanic and remote areas
- FAA Order 8400.12A for RNP 10 in oceanic and remote areas.

RNAV-10 oceanic/remote area operations are approved:

- With GPS PRIMARY
- Without GPS PRIMARY (GPS deselected or inoperative), provided time limitations in IRS only navigation, acceptable to the operational authorities, are established.

**Note:** Compliance with the applicable airworthiness requirements does not constitute an operational approval. Such authorization must be obtained by the operator from the appropriate authorities.

# How to incorporate the RNP limitation in the MEL?

## RNP 4 compliance

### Regulation



FAA Order 8400.33



AC90-105A (new issue planned)

No regulation

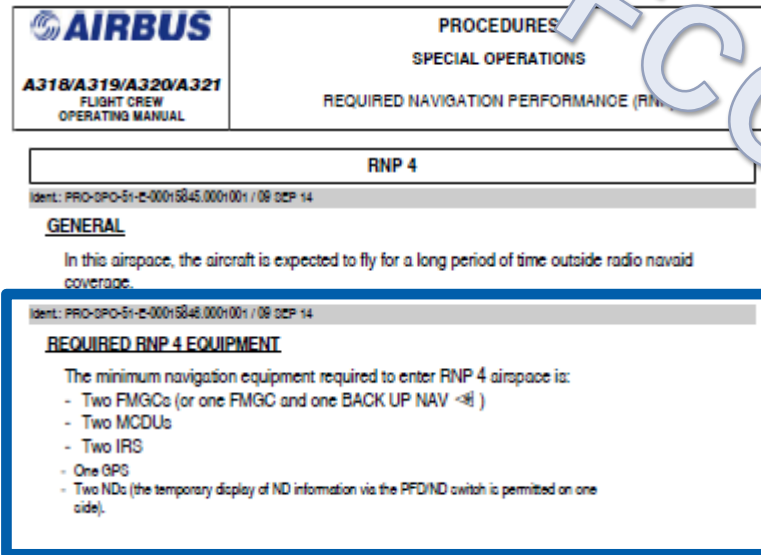
### Aircraft system required covered in the FCOM

FCOM

<p><b>A318/A319/A320/A321</b> FLIGHT CREW OPERATING MANUAL</p>	<p>PROCEDURES SPECIAL OPERATIONS REQUIRED NAVIGATION PERFORMANCE (RNP)</p>
<p><b>RNP 4</b></p>	
<p>Ident: PRO-SPO-51-E-00015845.0001001 / 09 SEP 14</p>	
<p><b>GENERAL</b></p> <p>In this airspace, the aircraft is expected to fly for a long period of time outside radio navaid coverage.</p>	
<p>Ident: PRO-SPO-51-E-00015845.0001001 / 09 SEP 14</p> <p><b>REQUIRED RNP 4 EQUIPMENT</b></p> <p>The minimum navigation equipment required to enter RNP 4 airspace is:</p> <ul style="list-style-type: none"> <li>- Two FMGCs (or one FMGC and one BACK UP NAV -&gt;EJ )</li> <li>- Two MCDUs</li> <li>- Two IRS</li> <li>- One GPS</li> <li>- Two NDs (the temporary display of ND information via the PFD/ND switch is permitted on one side).</li> </ul>	

# How to incorporate the RNP limitation in the MEL?

- Which limitation need to be covered in the MEL?



**AIRBUS**  
**A318/A319/A320/A321**  
FLIGHT CREW  
OPERATING MANUAL

PROCEDURES  
SPECIAL OPERATIONS  
REQUIRED NAVIGATION PERFORMANCE (RNP)

**RNP 4**

Ident: PRO-OPD-51-E-00016845.0001001 / 08 SEP 14

**GENERAL**

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

Ident: PRO-OPD-51-E-00016848.0001001 / 08 SEP 14


**REQUIRED RNP 4 EQUIPMENT**

The minimum navigation equipment required to enter RNP 4 airspace is:

- Two FMGCs (or one FMGC and one BACK UP NAV <img alt="arrow icon"/>)
- Two MCDUs
- Two IRS
- One GPS
- Two NDs (the temporary display of ND information via the PFD/ND switch is permitted on one side).



# How to incorporate the RNP limitation in the MEL?

 <b>A318/A319/A320/A321</b> FLIGHT CREW OPERATING MANUAL	<b>PROCEDURES</b> <b>SPECIAL OPERATION</b>
	<b>REQUIRED NAVIGATION PERFORMANCE (RNP)</b>

## RNP 4

Ident: PRO-OPD-51-E-00016846.0001001 / 09 SEP 14

### GENERAL

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

Ident: PRO-OPD-51-E-00016846.0001001 / 09 SEP 14

### REQUIRED RNP 4 EQUIPMENT

The minimum navigation equipment required to enter RNP 4 airspace is:

- Two FMGCs (or one FMGC and one BACK UP NAV (B) )
- Two MCDUs

- Two IRS

- One GPS

- Two NDs (the temporary display of ND information via the PFD/ND switch is permitted on one side).

34-50-09	Global Positioning System (GPS)
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Ident: M-34-50-00006710.0001001 / 22 MAR 10

Applicable to: MSN 0029-0309, 0311-5948

### 34-50-09A

Repair interval	Nbr installed	Nbr required	Placard
-	-	-	-

*As required by regulations*

Let's focus on GPS

# How to incorporate the RNP limitation in the MEL?

For RNP 4 one GPS is required:

34-50-09	Global Positioning System (GPS) -R
Ident.: MF-34-50-00002r10.0001001 / 27 MAY 14	
Applicable for: ALL	

## 34-50-09A One GPS Inoperative

Repair Interval	Nbr Installed	Nbr required	Placard
D	2	1	Yes

- (o) One may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS.

## 34-50-09B Two GPS Inoperative

Repair Interval	Nbr Installed	Nbr required	Placard
D	2	0	Yes

### RNAV-RNP

- (o) Both may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS.


MEL

No impact since the minimum required is '1'

Restriction for RNP 4 need to be added

# How to incorporate the RNP limitation in the MEL?

- How to cover the RNP in the MEL?

 <b>A318/A319/A320/A321</b> MINIMUM EQUIPMENT LIST	<b>MEL ITEMS</b> <b>34 - NAVIGATION</b> 34-50 - ATC and Radio/GPS Navigation Systems
	<b>34-50-09</b> Global Positioning System (GPS)

34-50-09

Global Positioning System (GPS)

Ident.: MF-34-50-0000210.0001001 / 27 MAY 14

Applicable to: ALL

### 34-50-09A One GPS Inoperative

Repair Interval	Nbr Installed	Nbr required	Placard
D	2	1	Yes


- (a) One may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS.

### 34-50-09B Two GPS Inoperative

Repair Interval	Nbr Installed	Nbr required	Placard
D	2	0	Yes

**RNAV-RNP**

- (b) Both may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS.

 <b>A318/A319/A320/A321</b> MINIMUM EQUIPMENT LIST	<b>MEL OPERATIONAL PROCEDURES</b> <b>34 - NAVIGATION</b> 34-50 - ATC and Radio/GPS Navigation Systems
	<b>Two GPS Inoperative</b>

Ident.: MD-34-50-0000002.0000004 / 27 MAY 14

Applicable to: ALL 318, ALL 319, 320, 321

### FLIGHT PREPARATION/LIMITATIONS

RNP-4 operation is not allowed.


Check that navigation, approach and landing procedures do not require two GPS.  
All limitations and procedures with "GPS PRIMARY LOST" are applied.

It is proposed to clearly mention the restriction in the associated operational procedure.

It is proposed to add an attention getter such as "RNP" or "RNAV-RNP"

# How to incorporate the RNP limitation in the MEL?

- How to cover the RNP in the MEL?

 <b>A318/A319/A320/A321</b> MINIMUM EQUIPMENT LIST	<b>MEL ITEMS</b> <b>34 - NAVIGATION</b> 34-50 - ATC and Radio/GPS Navigation systems

34-50-09	Global Positioning System (GPS)
Ident.: MF-34-50-00002r10.0001001 / 27 MAY 14	
Applicable to: ALL	

### 34-50-09A One GPS Inoperative

Repair Interval	Nbr Installed	Nbr required	Placard
D	2	1	Yes

- (a) One may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS.

### 34-50-09B Two GPS Inoperative

Repair Interval	Nbr Installed	Nbr required	Placard
D	2	0	Yes

#### RNAV-RNP

- (a) Both may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS.

<b>34-50-09B Two GPS Inoperative</b>			
Repair Interval	Nbr Installed	Nbr required	Placard
D	2	0	Yes
<b>RNAV-RNP</b>			
(a) Both may be inoperative provided that navigation, approach and landing procedure are not based on the use of two GPS and RNP 4 operation is not conducted.			
(a) Refer to OpsProc 34-50-09B 90000002 "Not found"			
<b>RNAV-RNP</b>			

Instead of cover the restriction in the operational procedure, it could be clearly mentioned in the dispatch condition “**RNP 4 operation is not conducted**”.

It is proposed to add an attention getter such as “RNP” or “RNAV-RNP”

## How to incorporate the RNP limitation in the MEL?

- How to cover the RNP in the MEL?

**34-50-09B Two GPS Inoperative**

Repair Interval	Nbr Installed	Nbr required
D	2	0

**RNAV-RNP**

(o) Both may be inoperative provided that navigation, approach and landing procedure are based on the use of two GPS and RNP 4 operation is not conducted.

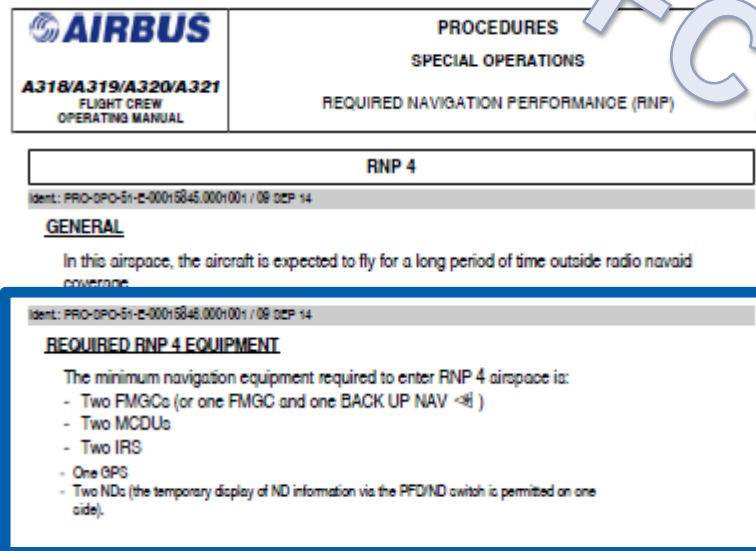
(o) Refer to OpsProc 34-50-09B 90000002 "Not found"

**RNAV-RNP**

You can add in the dispatch condition “**RNP/RNAV operation may be affected**” and clearly mentioned the restriction in the associated operational procedure.

# How to incorporate the RNP limitation in the MEL?

- Which limitation need to be covered in the MEL?



**AIRBUS**  
**A318/A319/A320/A321**  
FLIGHT CREW  
OPERATING MANUAL

**PROCEDURES**  
**SPECIAL OPERATIONS**  
**REQUIRED NAVIGATION PERFORMANCE (RNP)**

**RNP 4**

Ident: PRO-OPD-51-E-00015845.0001001 / 09 SEP 14

**GENERAL**

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


Ident: PRO-OPD-51-E-00015845.0001001 / 09 SEP 14

**REQUIRED RNP 4 EQUIPMENT**

The minimum navigation equipment required to enter RNP 4 airspace is:

- Two FMGCs (or one FMGC and one BACK UP NAV <R> )
- Two MCDUs
- Two IRS
- One GPS
- Two NDs (the temporary display of ND information via the PFD/ND switch is permitted on one side).

# How to incorporate the RNP limitation in the MEL?

 <b>A318/A319/A320/A321</b> FLIGHT CREW OPERATING MANUAL	<b>PROCEDURES</b> <b>SPECIAL OPERATIONS</b> <b>REQUIRED NAVIGATION PERFORMANCE (RNP)</b>
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## RNP 4

Ident: PRO-SPO-51-E-00016845.0001001 / 09 SEP 14

### GENERAL

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

Ident: PRO-SPO-51-E-00016846.0001001 / 09 SEP 14

### REQUIRED RNP 4 EQUIPMENT

The minimum navigation equipment required to enter RNP 4 airspace is:

- Two FMGCs (or one FMGC and one BACK UP NAV (B) )
- Two IRS
- Two NDc (the temporary display of ND information via the PFD/ND switch is permitted on one side).

Let's focus on IRS

# How to incorporate the RNP limitation in the MEL?

For RNP 4 two IRs are required:

34-10-04	IR 1			
Ident: M-34-10-00008547.0004001 / 27 JUN 11 Applicable to: MSN 0354, 0361-0362, 0405, 0758, 1009, 1237				
34-10-04A For aircraft fitted with HONEYWELL ADIRU P/Ns mixed in accordance with MOD 33585 / SB A320-34-1297				
Repair interval	Nbr installed	Nbr required	Placard	
-	1	1	No	

Continued on the following page

34-10-05	IR 2			
Ident: M-34-10-00008548.0005001 / 27 JUN 11 Applicable to: MSN 0354, 0361-0362, 0405, 0758, 1009, 1237				
34-10-05A For aircraft fitted with HONEYWELL ADIRU P/Ns mixed in accordance with MOD 33585 / SB A320-34-1297				
Repair interval	Nbr installed	Nbr required	Placard	
-	1	1	No	

Must be operative.

34-10-05B For aircraft fitted with the same HONEYWELL ADIRU P/Ns with the IR 2 totally inoperative

Repair interval	Nbr installed	Nbr required	Placard
C	1	0	Yes

- (o) May be inoperative provided that:
- 1) The IR 2 mode selector is set to OFF, and
  - 2) The IR 1, the IR 3, the ADR 1 and the ADR 3 are operative, and
  - 3) The task is not performed in Climb Phase.

Reference(s)

34-10-06	IR 3 (for aircraft fitted with Honeywell 10 MCU ADIRU)			
Ident: M-34-10-00008552.0001001 / 27 JUN 11 Applicable to: ALL				
34-10-06A IR 3 mode selector set to OFF				
Repair interval	Nbr installed	Nbr required	Placard	
C	1	0	Yes	

(o) May be inoperative provided that:

- 1) The IR 3 mode selector is set to OFF, and
- 2) The IR 1, the IR 2, the ADR 1, and the ADR 2 are operative.

Continued on the following page

34-10-06B IR 3 operated in ATT mode

Repair interval	Nbr installed	Nbr required	Placard
C	1	0	Yes

(o) The NAV mode may be inoperative provided that:

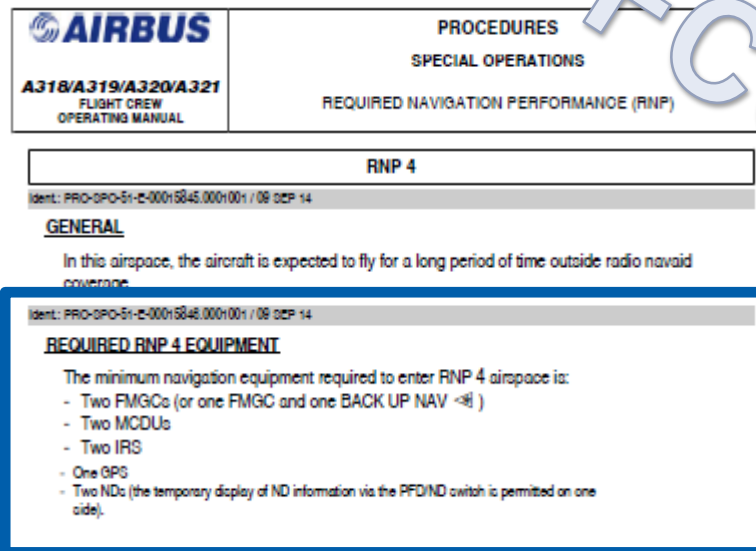
- 1) The IR 3 is operated in ATT mode, and
- 2) The IR 1 and the IR 2 are operative.

As per MMEL, the dispatch is allowed with at least 2 IRs, so **NO IMPACT**.



# How to incorporate the RNP limitation in the MEL?

- Which limitation need to be covered in the MEL?



**AIRBUS**  
**A318/A319/A320/A321**  
FLIGHT CREW  
OPERATING MANUAL

**PROCEDURES**  
**SPECIAL OPERATIONS**  
**REQUIRED NAVIGATION PERFORMANCE (RNP)**

**RNP 4**

Ident: PRO-OPD-51-E-00015845.0001001 / 09 SEP 14

**GENERAL**

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

Ident: PRO-OPD-51-E-00015845.0001001 / 09 SEP 14


**REQUIRED RNP 4 EQUIPMENT**

The minimum navigation equipment required to enter RNP 4 airspace is:

- Two FMGCs (or one FMGC and one BACK UP NAV <R> )
- Two MCDUs
- Two IRS
- One GPS
- Two NDs (the temporary display of ND information via the PFD/ND switch is permitted on one side).

# How to incorporate the RNP limitation in the MEL?

## What to incorporate in the MEL?

 <b>A318/A319/A320/A321</b> FLIGHT CREW OPERATING MANUAL	<b>PROCEDURES</b> <b>SPECIAL OPERATIONS</b> <b>REQUIRED NAVIGATION PERFORMANCE (RNP)</b>
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### RNP 4

Ident: PRO-SPO-51-E-00016846.0001001 / 09 SEP 14

#### GENERAL

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

Ident: PRO-SPO-51-E-00016846.0001001 / 09 SEP 14


#### REQUIRED RNP 4 EQUIPMENT

The minimum navigation equipment required to enter RNP 4 airspace is:

- Two FMGCs (or one FMGC and one BACK UP NAV -> )
- Two MCDUs
- Two IRS
- Two NDs (the temporary display of ND information via the PFD/ND switch is permitted on one side).

Let's focus on NDs

# How to incorporate the RNP limitation in the MEL?

 <b>A318/A319/A320/A321</b> FLIGHT CREW OPERATING MANUAL	<b>PROCEDURES</b> SPECIAL OPERATIONS REQUIRED NAVIGATION PERFORMANCE (RNP)
	<b>RNP APCH / RNAV(GNSS)</b>

Ident.: PRO-OPD-51-D-00015839.0001001 / 09 SEP 14


## GENERAL

RNP APCH operations correspond to RNAV(GNSS) or RNAV(GPS) operations.  
 For these operations, the GPS is required to support the RNP value of 0.3 nm.

Ident.: PRO-OPD-51-D-00015840.0001001 / 09 SEP 14

## REQUIRED RNP APCH EQUIPMENT

- The minimum equipment required to perform RNP APCH operations is:
- One FMS
  - One GPS
  - One MCDU
  - One FD
  - One PFD
  
  - One ND on the PF side
  - Two FCU channels

 <b>A319</b> AIRPLANE FLIGHT MANUAL	<b>LIMITATIONS</b> AUTO FLIGHT SYSTEMS FLIGHT MANAGEMENT SYSTEM
	<b>AIRWORTHINESS STANDARDS COMPLIANCE</b>

Ident.: TDU / LIM-22-FMS-00015234.0001001 / 22 JAN 14

Series: (3A and ((31898 or 31897 or 32401 or 32402 or 32475 or 32929) and (25205 or 28111 or 28485 or 28999 or 28382 or 30241 or 30631 or 30635)))


Impacted DU: NONE

Belongs to TR388 Issue 1

**EASA APPROVED**

- The FMGS complies with the airworthiness part of the FAA AC 90-105 including RF leg capability for:
- RNP APPROACH (RNP APCH) Operations with or without APV BARO-VNAV Operations,
  - RNP1 operations in Terminal area.

# How to incorporate the RNP limitation in the MEL?

 <b>A318/A319/A320/A321</b> FLIGHT CREW OPERATING MANUAL	<b>PROCEDURES</b> SPECIAL OPERATIONS REQUIRED NAVIGATION PERFORMANCE (RNP)
	<b>RNP APCH / RNAV(GNSS)</b>

Ident.: PRO-OPD-51-D-00015839.0001001 / 09 SEP 14

## GENERAL

RNP APCH operations correspond to RNAV(GNSS) or RNAV(GPS) operations.  
 For these operations, the GPS is required to support the RNP value of 0.3 nm.

Ident.: PRO-OPD-51-D-00015840.0001001 / 09 SEP 14

## REQUIRED RNP APCH EQUIPMENT

The minimum equipment required to perform RNP APCH operations is:

- One FMS
- One GPS
- One MCDU
- One FD
- One PFD
- One ND on the PF side
- Two FCU channels



## Advisory Circular

**Subject:** Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System

**Date:** 1/23/2009      **AC No:** 90-105

**Initiated by:** AFS-400      **Change:**

### 8. Operational Considerations.

c. **Prior to Commencing the RNP Procedure.** In addition to normal operating procedures, prior to commencing the procedure the flightcrew should accomplish the following:

(1) The flightcrew must confirm that the correct procedure has been selected. This process includes confirmation of the waypoint sequence, reasonableness of track angles, distances, and any other parameters that can be altered by the pilot, such as altitude or speed constraints. **A procedure must not be used if validity of the navigation database is in doubt.** A navigation system textual display or navigation map display must be used.

## How to incorporate the RNP limitation in the MEL?

RNP operations have to be covered in the MEL

- At each associated MEL item
- At associated MEL item (second level)
- In the preamble
- Local Authorities regulations
- Specific Pilots requirement