

RNP APPROACHES

Foreword



A330 & A340

Background for RNP APCH (RNAV GPS/GNSS APPROACH)

- EASA (European Aviation Safety Agency) has issued an AMC 20-27 (Acceptable Means of Compliance) in 23 December 2009. This AMC establish criteria for airworthiness and operational approval of RNP APCH procedures using RNP APCH systems based on GNSS (Global Navigation Satellite System - GPS to you) with or without vertical guidance based on Baro VNAV. It is the intention of STOOF to seek approval to fly RNP APCH procedures on the Airbus. We will also benefit from getting more used to the same FMGS modes we use to fly conventional non-ILS approaches - FINAL APP.
- IAC/IAL will bear the terminology of RNP APCH(GNSS), RNP APCH(GPS), RNAV (GNSS) or RNAV (GPS), we will call it RNP APCH in this text.
- Special approaches with curved final segment or an RNP < 0,3 like ESSA mentioned above will be known as RNP **AR** APCH meaning ***Authorization Required***. This is a further step requiring further training and is not in the scope for Airbus at the moment.

Requirements

- In order to qualify for the approval to use RNP APCH all SAS Airbus pilots will be trained during the A340 type-rating and conversion course. The recurrent training (OPC) and AST will also include RNP APCH to ensure proficiency.
- In order to use RNP APCH we must fulfill the requirements described in AMC 20-27.
- This will be documented in:
 - SAS OM-A
 - SAS A330/340 FCOM
 - SAS A330/340 OM-B
 - QRH A330 and A340
- In this text we will discuss these requirements further.

RNP APCH approach fundamentals

- (from EU OPS and AMC 20-27)
- GNSS is the primary navigation system to support RNP APCH procedures. At least one GNSS sensor must be included in a multi-sensor system.
- Obstacle clearance is based on criteria in PANS-OPS. Missed approach procedures may include conventional NAV AIDS segments (VOR, NDB, DME)
- Approach charts will identify the RNP APCH as RNP APCH (GNSS) or RNP APCH (GPS) or RNAV(GNSS) or RNAV(GPS)
- The Instrument Approach Procedure may, or may not include a vertical flight path defined by a vertical path angle. If the procedure design includes a vertical path a minimum temperature will be promulgated on the chart.

Accuracy requirements

- Lateral Total System Error (TSE) must be better than ± 1 NM for 95% of the time for initial and intermediate segments and for the RNP APCH missed approach.
- Lateral TSE must be better than ± 0.3 NM for 95% of the time for the final approach segment.
- TSE is dependent on the Navigation System Error (NSE), Path definition Error and Flight Technical Error (FTE).
- Vertical Total System Error (VTSE) must be less than 199 ft for 99,7% of the time for the final segment.

Continuity of Function

- The probability of loss of all navigation information is remote.
- Airworthiness criteria for the RNP APCH system are met by our Airbus fleet when operating in **GPS PRIMARY** (ref LIM 22 10)

Pre-flight Planning

- The IAC/IAL should clearly identify the RNP APCH operations as RNP APCH (GNSS), RNAV (GPS) or RNAV (GNSS).
- The approach procedure must be selected from a valid navigational data base. Procedure should be checked against a graphical presentation to ensure correct loading and reasonableness of the procedure content
- The vertical path should be checked on the MCDU.
- Suitable contingency procedures should be available in case of loss of RNP APCH airborne capability.

Prior to commencing Procedure

- In addition to normal procedures prior to commencing approach the crew must verify the correctness of the procedure by checking at least:
- The waypoint sequence and status of waypoints – fly-over or fly-by
- Tracks and distances of the approach legs and accuracy of inbound course and mileage of final segment
- Manual entry of coordinates in terminal area is not permitted
- Direct-to may be accepted to IF if track change < 45 degrees
- Direct-to FAF is not acceptable
- Revisions between FAF and MAPt is not permitted

During Approach

- Must be established on final track at FAF before starting descent
- The Desired Track and the Cross Track deviation must be monitored
-
- Procedure must be discontinued if
- RNP APCH failure is annunciated
- If RAIM alert is triggered (GPS Primary Lost)
- If FTE excessive

SAS OM-A REQUIREMENTS

- The above-mentioned requirements of EU OPS and AMC 20-27 are described in OM-A 8.3.2.3
- The approach procedure is described and following additional checks required:
 - The sequence of waypoints
 - Reasonableness of tracks and distances.
 - The vertical angle of final approach segment
 - Altitude constraints at FAF
 - Airfield temperature above required limit as stated on the IAC/IAL, or ISA-15°C, if no temperature stated
 - Restrictions on use of Direct-to function
 - Ban on revisions from FAF and inside
 - AP and/or FD must be used to DA
 - Both NDs in NAV Map mode during approach

SAS OM-A REQUIREMENTS

- In practice if check of MCDU selected approach is positive - including:
 - Altitude at FAF correct acc. IAC/IAL
 - Approach angle correct acc. IAC/IAL
 - Final APCH course correct acc. IAC/IAL
 - MAPt coincides with RW THR then FINAL NAV FMGS mode can be used for RNP APCH.
 - If MAPt before THR use NAV/FPA
 - If Final APCH course differs $>2^{\circ}$ do not use the procedure
 - The OM-A distinguishes between RNP APCH and RNP AR APCH.

Standard Flight Crew coordination

- When flying in FINAL APP the approach is an auto-coupled approach according OM-A 8.4.2 and PF is looking out at DH + 100

MCDU designators

- The Final Approach Fix (FAF), usually indicated by a star symbol on the approach profile view can be identified on the MCDU with the letter “F”, followed by route type identifier and runway identifier if it is unnamed or by its specific name E.g: FR05, DEVOD, SH429.
- Do not confuse FAF with Final Approach Course Fix (FACF), a fix immediately prior to the Final Approach Fix, with an assigned altitude, usually between one to four miles before the FAF and generally in line with the final approach course. This waypoint is a technically required waypoint used by navigation database suppliers to construct a flyable approach procedure for the FMGS.
- For RNP APCH approaches the requirements are that the Missed Approach Point (MAPt) should be located at the runway threshold. Usually it is designated as e.g. RW05.
- For un-named fixes the letters “MA” are used.

Terrain clearance and go-around criteria

- In addition to normal requirements the OM-A 8.4.5-3.3 states:
- Descent in IMC from the initial/intermediate approach altitude shall not be commenced before:
- On RNP Approach track and within a $\frac{1}{2}$ RNP for the active leg (RNP=0,3 NM for RNP APCH GNSS)
-
- OM-A 8.4,5-5.1 requires a go-around if
- Estimated Position Uncertainty (EPU) exceeds RNP inside FAF during RNP APCH approach.
- The END

RNP APPROACHES

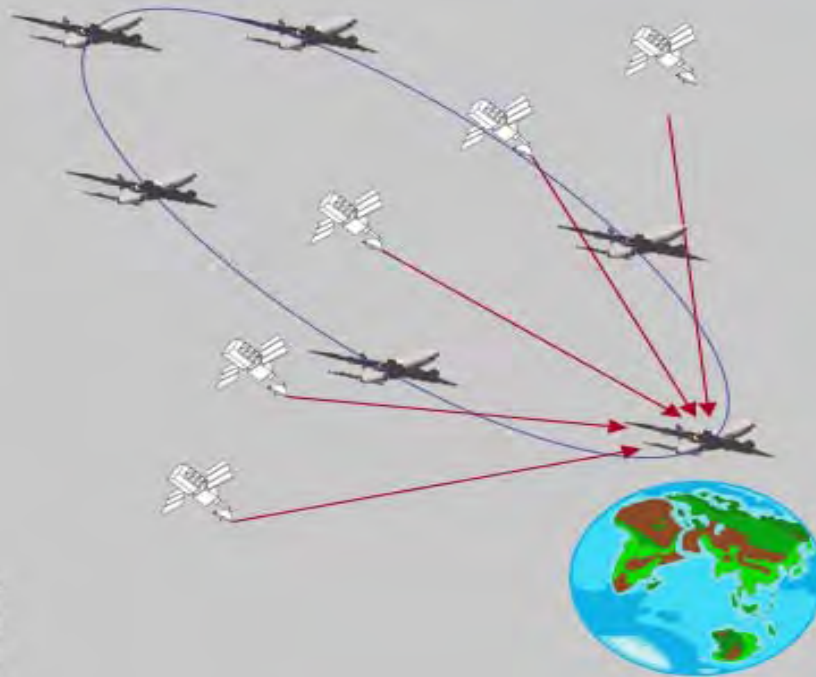


A330 & A340

RNP

GENERAL

GNSS/GPS



Signals from one satellite can be used to determine the distance to the satellite

Signals from 2 satellites will provide possible positions on a circular path

Signals from 3 satellites will determine a 2D lat/long position

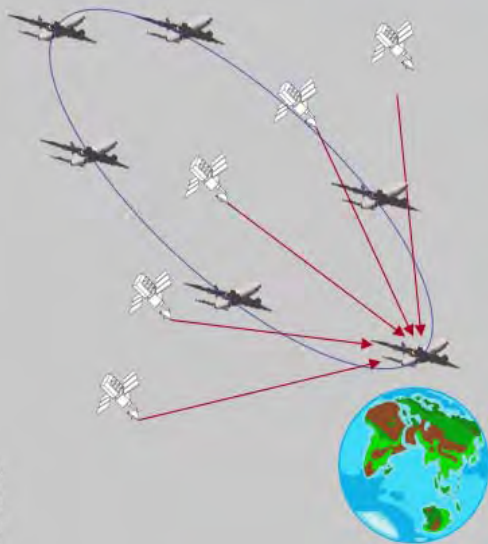
If you have 4 signals you can determine your 3D position without ambiguity

If you receive signals from 5 satellites a built in program monitors the radio signals and determines the integrity of the GPS navigation signals. This is called Receiver Autonomous Integrity Monitoring – **RAIM**

RNP

GENERAL

GNSS/GPS



Signals from one satellite can be used to determine the distance to the satellite

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8/19/2008

5

PREDICTIVE GPS						
DEST	PRIMARY					ETA
HESH						1002
-15	-10	-5	ETA+5	+10	+15	
Y	Y	Y	Y	Y	Y	
WPT	PRIMARY					ETA
CVO						0930
-15	-10	-5	ETA+5	+10	+15	
N	N	Y	Y	N	N	
DESELECTED SATELLITE						

RAIM - Receiver Autonomous Integrity Monitoring:
RAIM availability prediction on
PREDICTIVE GPS page on MCDU

RNP

GENERAL

RNAV and RNP systems are fundamentally similar.

The key difference between them is the requirement for onboard performance monitoring and alerting.

A navigation specification that includes a requirement for onboard navigation performance monitoring and alerting is referred to as an RNP specification.

One not having such a requirement is referred to as an RNAV specification.

RNAV = Does NOT require an onboard navigation performance monitoring and alerting system.

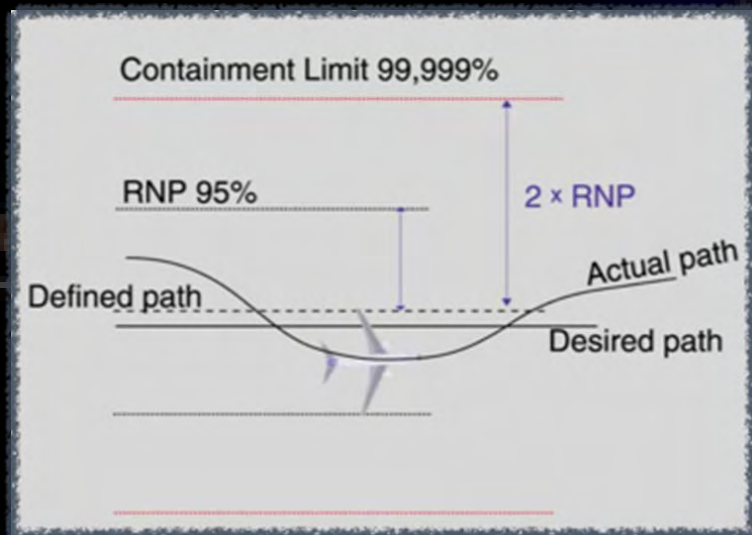
(RNAV = Area Navigation)

RNP = Must have an onboard navigation performance monitoring and alerting system.

(RNP = Required Navigation Performance)

RNP

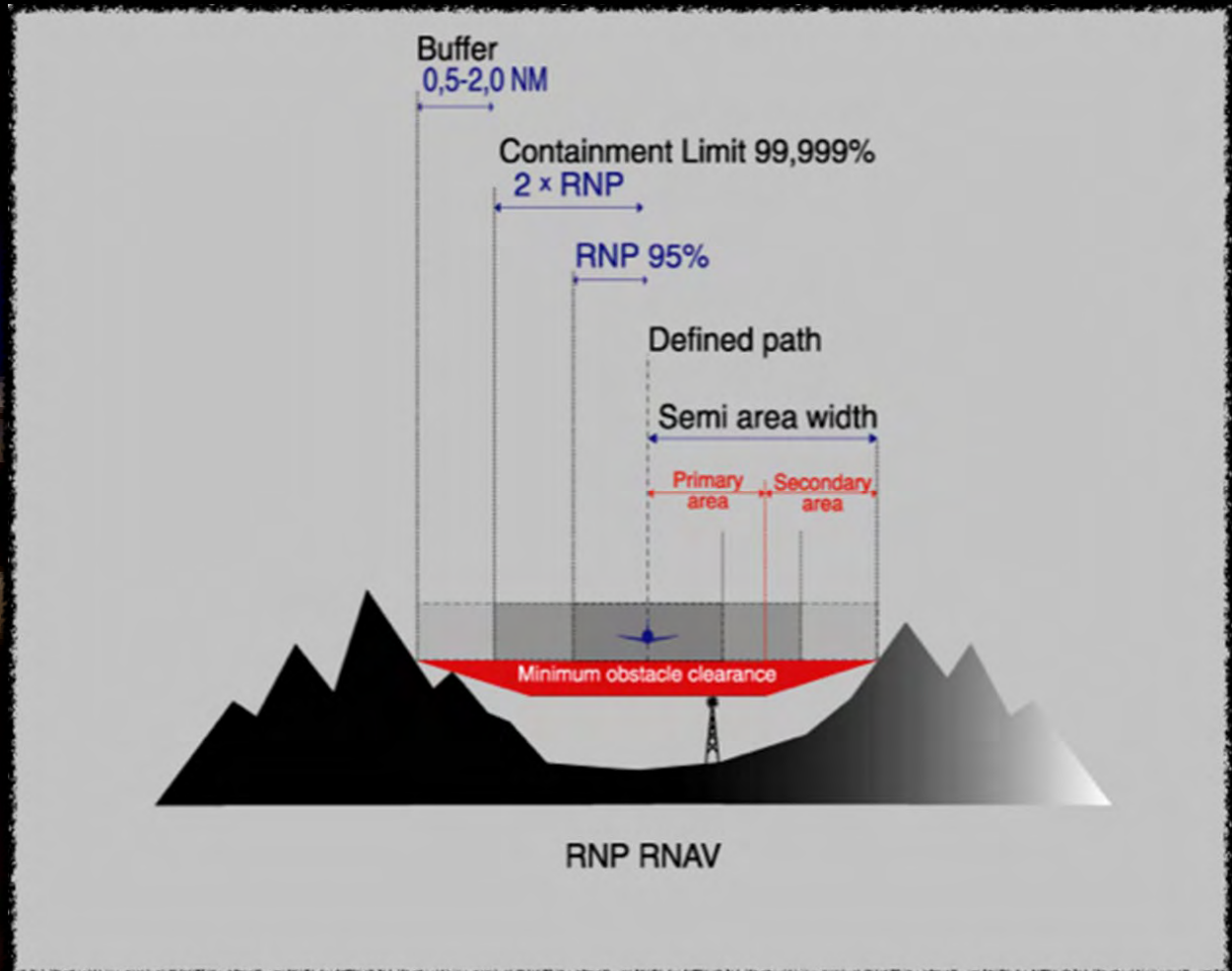
GENERAL



RNP RNAV

Minimum Aviation System Performance Standard

MASPS defined by working groups from U.S. Radio Technical Commission for Aeronautics (RTCA) and the European Organisation for Civil Aviation Equipment (EUROCAE)



RNP

GENERAL

ERROR DEFINITIONS

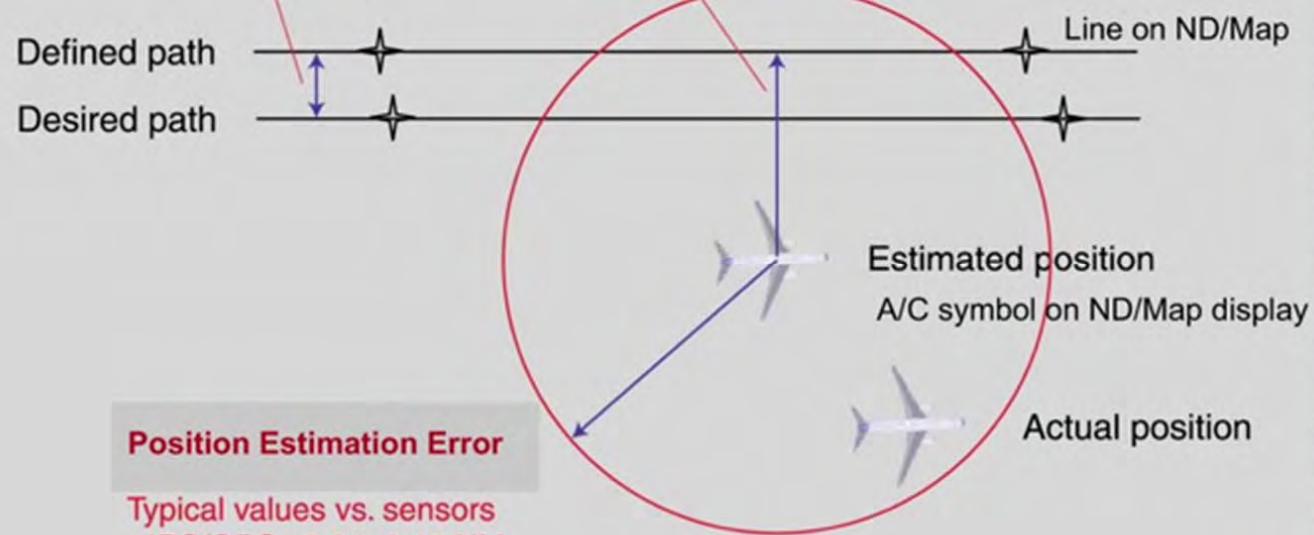
Path definition error

- Navigation data
- Procedure design
- System performance

Flight technical error

Assumed FTE values

- Flight director: 0.25 NM
- Autopilot: 0.125 NM



Position Estimation Error

Typical values vs. sensors

- IRS/GPS: 0.04–0.15 NM
- IRS/DME/DME: 0.2–0.48 NM
- IRS/VOR/DME: 0.5–1.65 NM

Total System Error

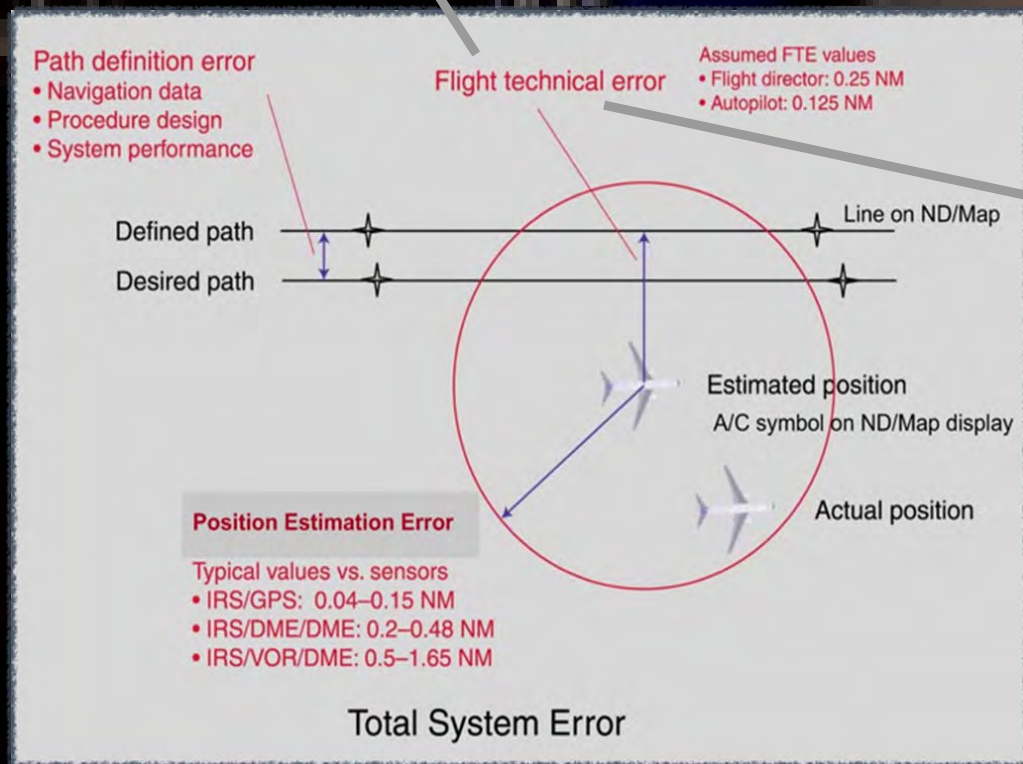
RNP

GENERAL

ERROR DEFINITIONS

FTE Flight Technical Error

The deviation of aircraft position, as reported by the navigation sensors, from the desired flight path.



RNP

GENERAL

ERROR DEFINITIONS

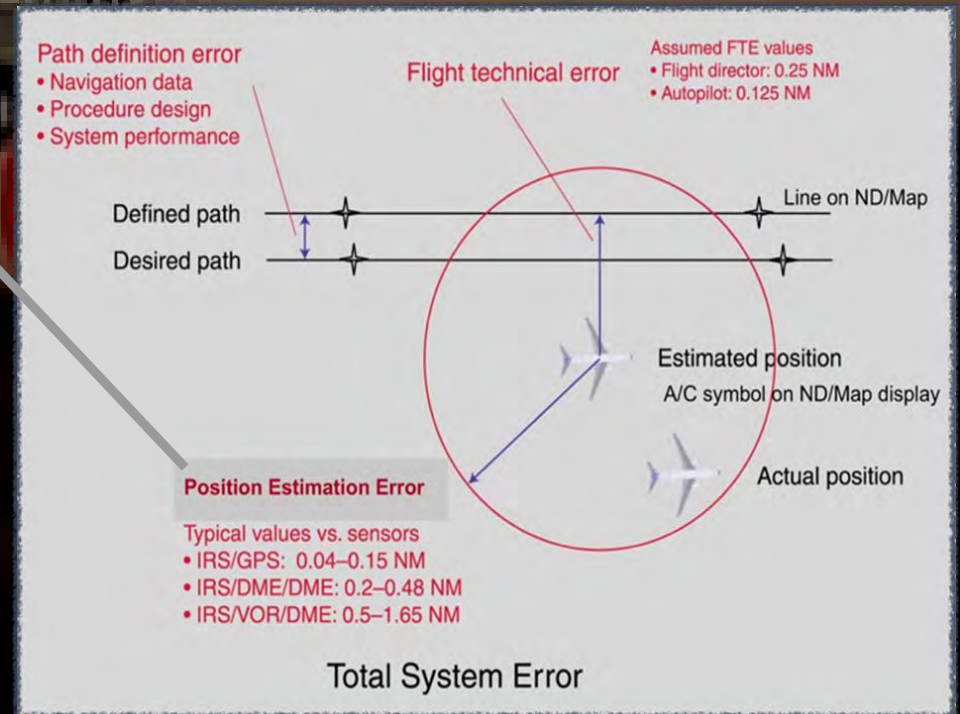
RNP vs EPU can be seen on MCDU PROG page.



190 / 3.8 TO EDDM23
PREDICTIVE
<GPS GPS PRIMARY
REQUIRED ACCUR ESTIMATED
0.30NM HIGH 0.05NM

The RNP
(Required Navigation
Performance)
is displayed in the
REQUIRED field of the
PROG page.

The EPU
(Estimated Position
Uncertainty)
is displayed in the
ESTIMATED field of the
PROG page.



RNP

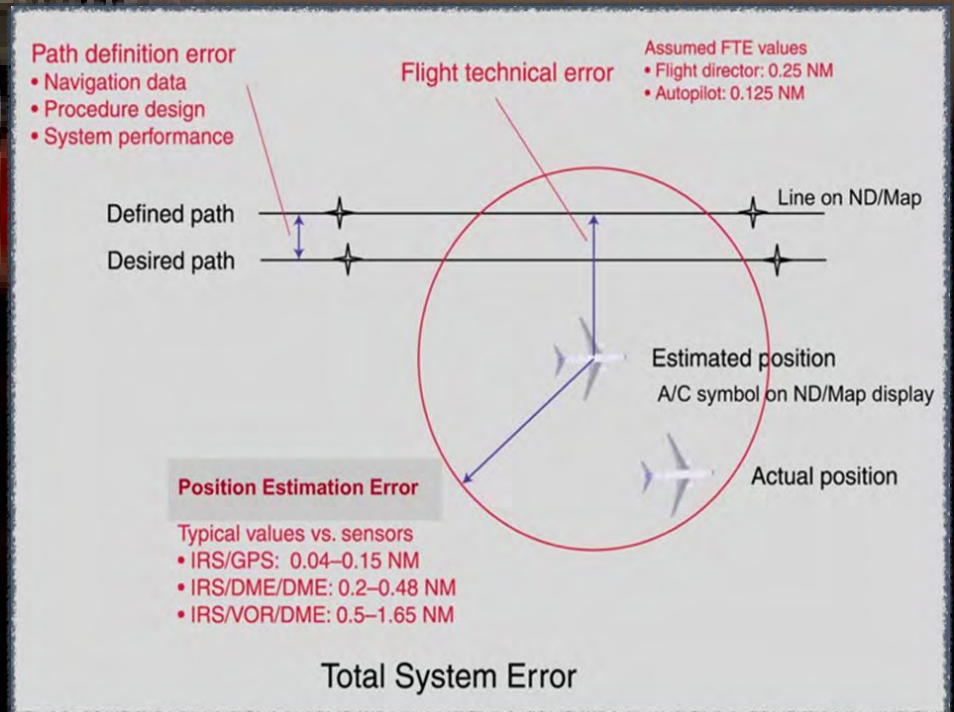
GENERAL

ERROR DEFINITIONS

190 73.8 TO EDDM23
PREDICTIVE
<GPS GPS PRIMARY
REQUIRED ACCUR ESTIMATED
0.30NM HIGH 0.05NM

The FMS displays the EPU to the flight crew and compares it with the RNP:

- If the EPU does not exceed the RNP, accuracy is HIGH.
- If the EPU exceeds the RNP, accuracy is LOW.



TYPES OF RNP APPROACHES

RNAV (GNSS) RWY 04L (50-10 | 21 DEC 11) Finland - EFHK / HELSINKI

Helsinki APP	119.1	119.5	124.325	119.1	129.85	118.6	118.85	121.8	135.075
	119.7	119.7		119.7					

RNAV FAT 040° THR Elev 133 AD Elev 179 TL ATC TA 5000

RNAV (GPS) Z RWY 22L (50-15 | 22 AUG 12) USA (NJ) - KEWR / EWR Liberty INTL NEWARK

New York APP	128.55	090°-240°	132.8	241°-269°	118.3	121.8	115.7		
	127.6	270°-330°	132.7	331°-089°	134.05	126.15	134.825	South	

RNAV WAAS CH70324 22A FAT 219° TDZ Elev 10 AD Elev 18 TL ATC TA 18000

RNAV (RNP) Y RWY 22L (50-14 | 02 MAY 12) USA (NJ) - KEWR / EWR Liberty INTL NEWARK

New York APP	128.55	090°-240°	132.8	241°-269°	118.3	121.8	115.7		
	127.6	270°-330°	132.7	331°-089°	134.05	126.15	134.825	South	

RNAV FAT 219° TDZ Elev 10 AD Elev 18 TL ATC TA 18000

WE

WE WILL FLY

OBS!!!
IS NOT APPROVED A330/340

WE DON'T FLY

RNP APCH
IAL/IAC chart title RNAV (GNSS or GPS)
A general authority approval is stated in the AOC.

RNP AR APCH
IAL/IAC chart title RNAV (RNP)
AR = authorisation required
This type of approach requires a specific authority approval for each individual approach.

TYPES OF RNP APPROACHES

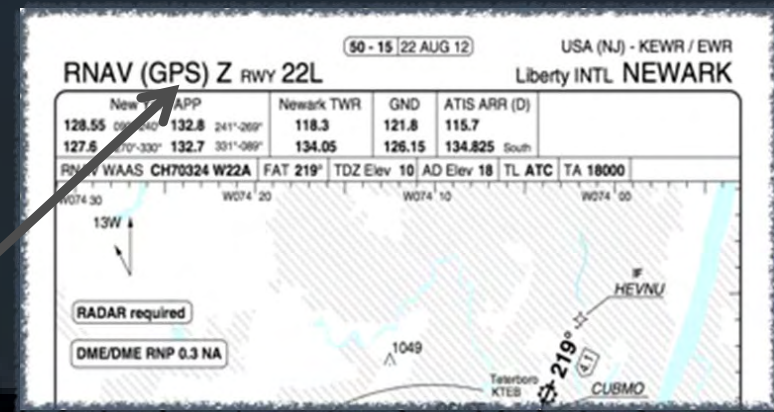
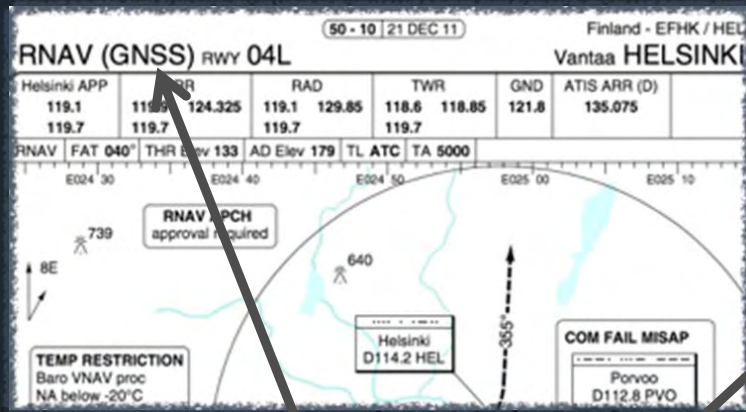


RNP APCH
 IAL/IAC chart title RNAV (GNSS or GPS)
 also chart title GPS and RNAV (RNP 0.3)

A general authority approval is stated in the AOC.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

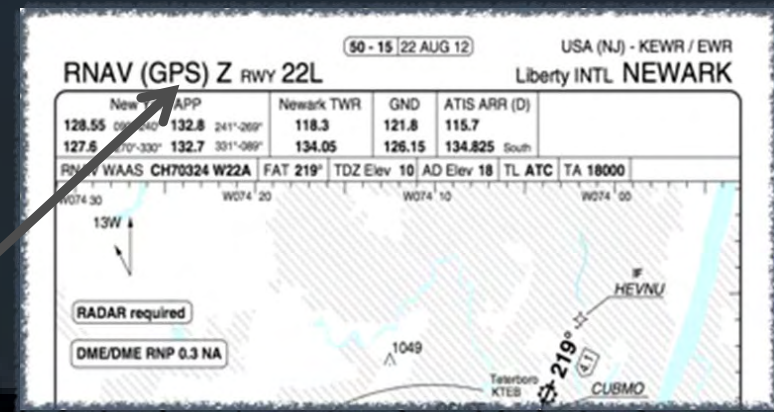
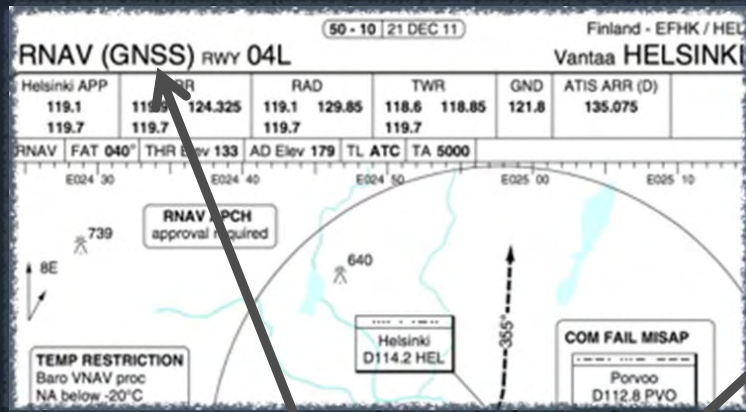


- Chart title is RNAV(GNSS or GPS or RNP 0.3) or GPS



RNP APCH

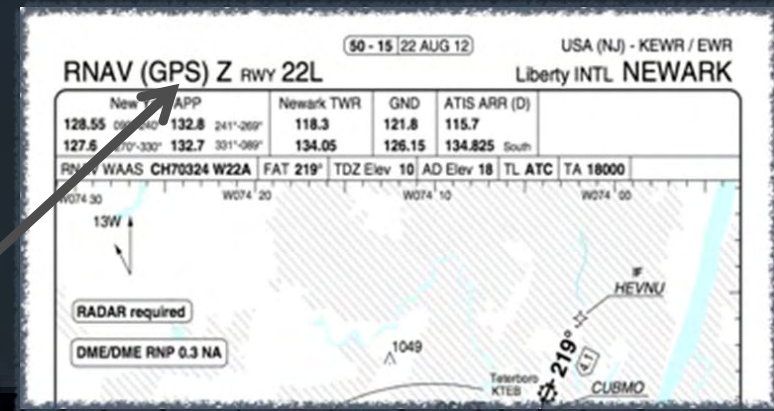
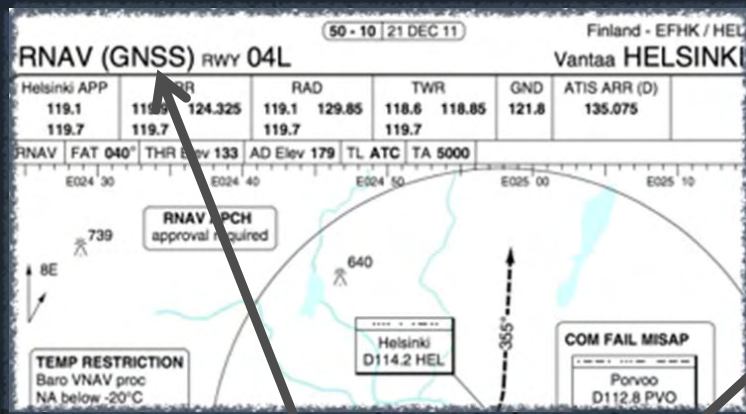
IAL/IAC chart title RNAV (GNSS or GPS)



- Chart title is RNAV(GNSS or GPS or RNP 0.3) or GPS)
- RNP for this approach is always 0.3 for the final approach, FAF - MAPt.

RNP APCH

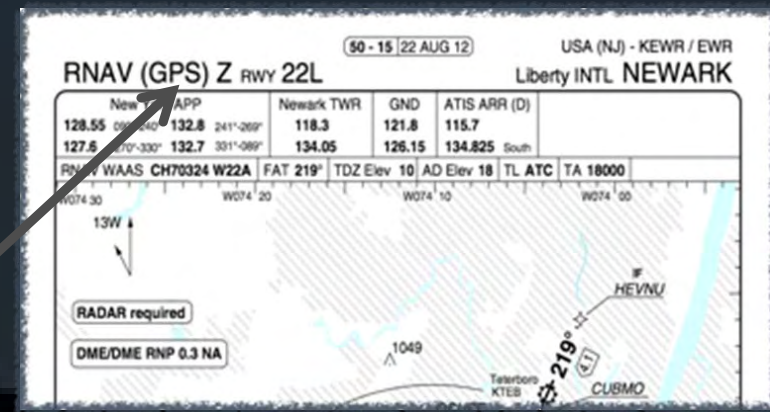
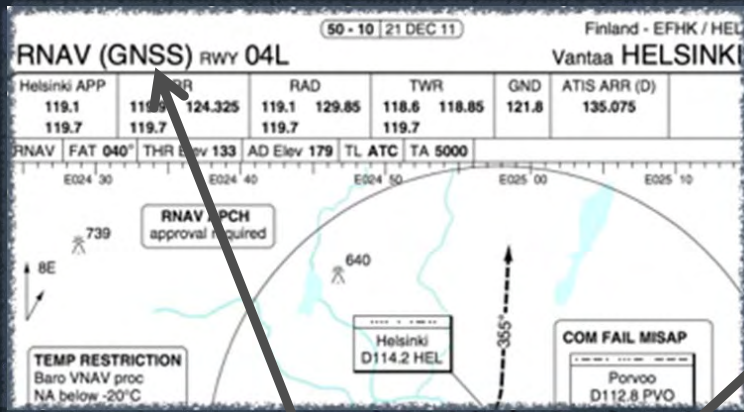
IAL/IAC chart title RNAV (GNSS or GPS)



- Chart title is RNAV(GNSS or GPS or RNP 0.3) or GPS)
- RNP for this approach is always 0.3 for the final approach.
- Can be flown in FINAL APP if certain conditions fulfilled. (will be explained soon)

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

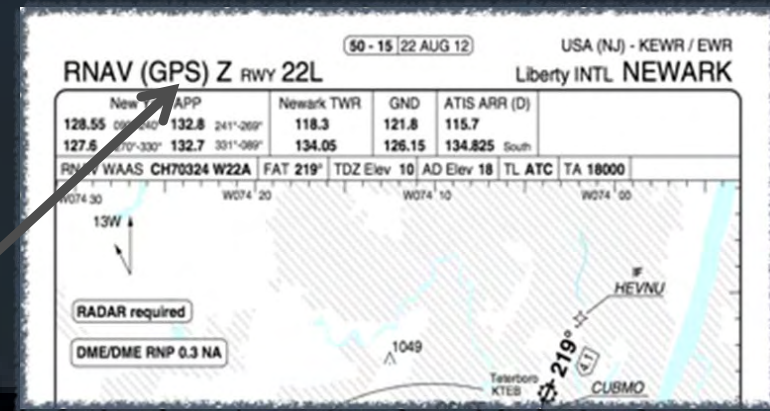
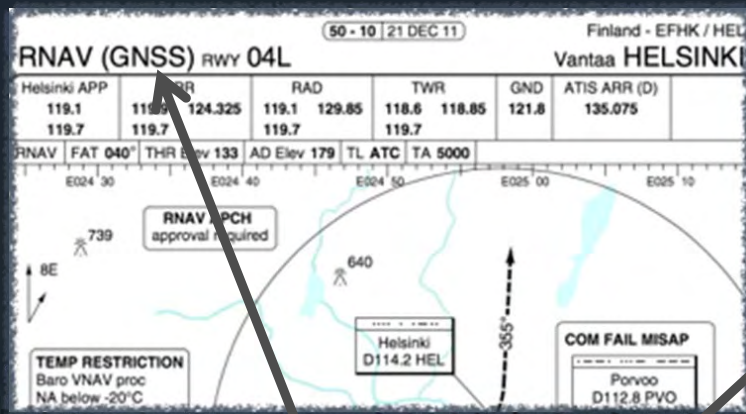


- Chart title is RNAV(GNSS or GPS or RNP 0.3) or GPS)
- RNP for this approach is always 0.3 for the final approach.
- Can be flown in FINAL APP if certain conditions fulfilled.
- Can be flown as APV (= approach **with** vertical guidance) then the LNAV/VNAV minima used.

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)



- Chart title is RNAV(GNSS or GPS or RNP 0.3) or GPS)
- RNP for this approach is always 0.3 for the final approach.
- Can be flown in FINAL APP if certain conditions fulfilled.
- Can be flown as APV (= approach **with** vertical guidance) LNAV/VNAV minima used.
- or
- NPA (non precision approach) **without** vertical guidance then the LNAV minima used.

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

APV approach with vertical guidance

- LNAV/VNAV minima.

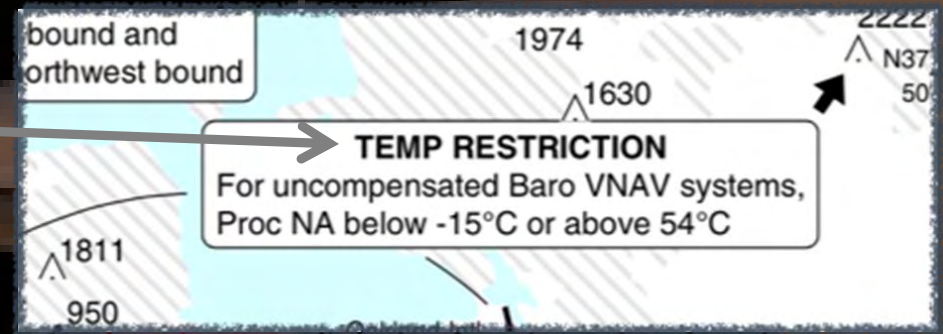
RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

APV approach with vertical guidance

- LNAV/VNAV minima.
- Lateral and vertical guidance, managed by the FMGES in FINAL APP mode. Airport OAT must be above published minimum airport OAT, stated in IAC/IAL. Temperature correction is NOT allowed, except for minima.



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

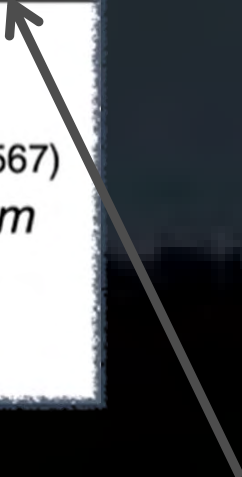
APV approach with vertical guidance

- LNAV/VNAV minima.
- Lateral and vertical guidance, managed by the FMGES in FINAL APP mode. Airport OAT must be above published minimum airport OAT, stated in IAC/IAL. Temperature correction is NOT allowed, except for minima.
- Can be flown in NAV-FPA (or NAV-V/S) if temp is below the published minimum airport OAT and adjustments to the vertical profile due to temperature is done in accordance with OM- A 8.3.3. 2.1. Approach is then made only to LNAV minima.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm



APV approach with vertical guidance

- LNAV/VNAV minima.
- Lateral and vertical guidance, managed by the FM in FINAL APP mode. Airport OAT must be above published minimum airport OAT, stated in IAC/IAL. Temperature correction is NOT allowed, except for minima.
- Can be flown in NAV-FPA (or NAV-V/S) if temp is below the published minimum airport OAT and adjustments to the vertical profile due to temperature is done in accordance with OM- A 8.3.3. 2.1. Approach is then made only to LNAV minima.

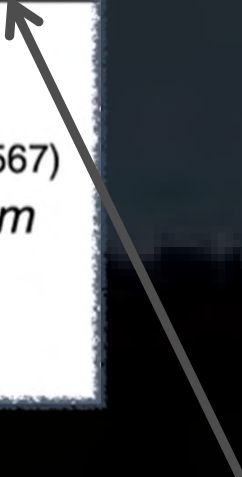
NPA non precision approach

- LNAV minima only.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm



APV approach with vertical guidance

- LNAV/VNAV minima.
- Lateral and vertical guidance, managed by the FM in FINAL APP mode. Airport OAT must be above published minimum airport OAT, stated in IAC/IAL. Temperature correction is NOT allowed, except for minima.
- Can be flown in NAV-FPA (or NAV-V/S) if temp is below the published minimum airport OAT and adjustments to the vertical profile due to temperature is done in accordance with OM- A 8.3.3. 2.1. Approach is then made only to LNAV minima.

NPA non precision approach

- LNAV minima only.
- Lateral guidance, managed by the FMGES.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

TCH 60		
THR	3.0°	LDA 3233x60
10R	ALT	10608x200ft
10.8	3500	P 3° (75)
9	2930	●
8	2610	○
7	2300	●
6	1980	
5	1660	

LS

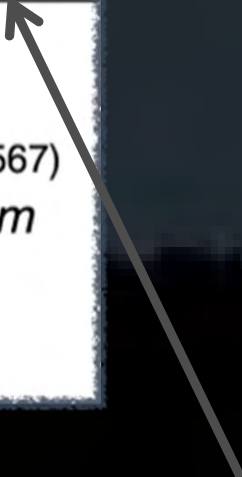
NPA non precision approach

- LNAV minima only.
- Lateral guidance, managed by the FM.
- Can be flown in FINAL APP if temp is >ISA-15°, if vertical flight path is checked versus profile on IAL. NO adjustments to the vertical profile due to temperature is allowed.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm



APV approach with vertical guidance

- LNAV/VNAV minima.
- Lateral and vertical guidance, managed by the FM in FINAL APP mode. Airport OAT must be above published minimum airport OAT, stated in IAL/IAC. Temperature correction is NOT allowed, except for minima.
- Can be flown in NAV-FPA (or NAV-V/S) if temp is below the published minimum airport OAT and adjustments to the vertical profile due to temperature is done in accordance with OM- A 8.3.3. 2.1. Approach is then made only to LNAV minima.

NPA non precision approach

- LNAV minima only.
- Lateral guidance, managed by the FM.
- Can be flown in FINAL APP if temp is > ISA -15°. NO adjustments to the vertical profile due to temperature is allowed.
- Must be flown in NAV-FPA (or NAV-V/S) if temp is < ISA -15°. Adjustments to the vertical profile due to temperature must be done in accordance with OM- A 8.3.3. 2.1..

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

REQUIRED EQUIPMENT FOR RNP APPROACH
IS FOUND IN QRH OPS.06

SAS A330/A340 QUICK REFERENCE HAND BOOK		OPERATIONAL DATA	OPS.06 15 DEC 11
REQUIRED EQUIPMENT FOR RNP APPROACH			
RNP VALUE INSIDE FAF →			
EQUIPMENT ↓		RNP ≥ 0.3	RNP < 0.3 N/A
AP/FD		1 AP AND/OR 2 FD ENGAGED	
ENGINES RUNNING		SEE QRH OPS	
MCDU		2	
FMGC		2	
ND DUs		2	
GPS		2	
ADR/IR		2/2	
EGPWS		1	
FMA		1	
FCU		1	
FLIGHT WARNING COMPUTER		1	

(SAS)

Note:


- Flight crews are not expected to check the equipment list before approach. When an ECAM or local caution occurs, the crew should use the list to confirm the RNP approach capability.
- On ground, the equipment list determines which RNP approach capability the aircraft will be able to perform the next approach.

Note

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

When briefing the approach use RNP BRIEFING GUIDE in QRH OPS.07


 A330/A340 QUICK REFERENCE HAND BOOK		OPERATIONAL DATA	
		OPS.07	
		15 DEC 11	
RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +/- 1°	
Vertical Path Angle			
MAPt at RWY THR			
GPS Mode	GPS 1 AND 2 in NAV		
FMGS NAV MODE	GPS PRIMARY		
DURING THE APPROACH	Flying Reference	FPV with FPD (recommended)	Before FAF
	FMGS Mode	FINAL APP	When cl. APCH
	Monitoring	Lateral deviation	<= 1/2 RNP (0.15 NM FAF-MAPt)
		Vertical deviation	+/- 75ft
	Task Sharing	FINAL APP with AP	PF looks out
FINAL APP without AP		PNF looks out	
FAILURES	One Engine Inoperative	AP permitted	FINAL APP
	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
	FAF → DA	Go-Around if:	Any warning/caution or aural alert (including TRIPLE CLIC)
	<DA	Go-Around if:	Visual cues unsatisfactory for landing
MISC	Direct To	Intermediate Fix (IF)	OK if track change < 45°
		Final Approach Fix (FAF)	Not Acceptable
	Radar Vector	Outside FAF	Acceptable as long as final track intercepted prior to FAF

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Start here.

 A330/A340 <small>QUICK REFERENCE HAND BOOK</small>		OPERATIONAL DATA	
		OPS.07	
		15 DEC 11	
RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +- 1°	
Vertical Path Angle			
MAPt at RWY THR			
GPS Mode	GPS 1 AND 2 in NAV		
FMGS NAV MODE	GPS PRIMARY		
DURING THE APPROACH	Flying Reference	FPV with FPD (recommended)	Before FAF
	FMGS Mode	FINAL APP	When cl. APCH
	Monitoring	Lateral deviation	<= 1/2 RNP (0.15 NM FAF-MAPt)
		Vertical deviation	+/- 75ft
	Task Sharing	FINAL APP with AP	PF looks out
FINAL APP without AP		PNF looks out	
FAILURES	One Engine Inoperative	AP permitted	FINAL APP
	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
	FAF → DA	Go-Around if:	Any warning/caution or aural alert (including TRIPLE CLIC)
	<DA	Go-Around if:	Visual cues unsatisfactory for landing
MISC	Direct To	Intermediate Fix (IF)	OK if track change < 45°
		Final Approach Fix (FAF)	Not Acceptable
	Radar Vector	Outside FAF	Acceptable as long as final track intercepted prior to FAF

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Start with Qualifications

RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +/- 1°	
		Vertical Path Angle	
		MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV		
FMGS NAV MODE	GPS PRIMARY		

RNAV GNSS or GPS BRIEFING GUIDE

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Start with Qualifications:

A/C capabilities.

A/C equipment.

Qualifications	A/C capabilities	FCOM LIM
	A/C equipment	QRH OPS
	IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
	FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN

A/C capabilities.

Check in FCOM is only needed if MEL or inflight failure.

A/C equipment.

Check in QRH OPS.06 is only needed if MEL or inflight failure.

RNAV GNSS or GPS BRIEFING GUIDE

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Start with Qualifications:

A/C capabilities.

A/C equipment.

IAL/IAC designation

Qualifications	A/C capabilities	FCOM LIM
	A/C equipment	QRH OPS
	IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
	FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN

IAL/IAC designator.

Check IAL/AIC chart to be a

RNAV (GNSS or GPS or RNP 0.3) or GPS approach.

WED 20 SEP 12		50 - 11 22 AUG 12		USA (CA) - KSFO / SFO	
RNAV (GPS) Y RWY 10R			INTL SAN FRANCISCO		
Norcal APP		San Francisco TWR	GND	ATIS (D)	
135.65 South	133.95 134.5	120.5	121.8	135.45	118.85
128.325	128.575		128.65 EMERG	115.8	113.7
RNAV	FAT 101°	TDZ Elev 9	AD Elev 13	TL ATC	TA 18000

RNAV GNSS or GPS BRIEFING GUIDE

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Start with Qualifications:

A/C capabilities.

A/C equipment.

IAL/IAC designation.

FMGS procedure in current NAV database.

Qualifications	A/C capabilities	FCOM LIM
	A/C equipment	QRH OPS
	IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
	FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN



FMGS procedure i NAV data base.

Must be inserted without alternations

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with Additional checks before IAF

RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +/- 1°	
		Vertical Path Angle	
		MAPt at RWY THR	
		GPS Mode	GPS 1 AND 2 in NAV
		FMGS NAV MODE	GPS PRIMARY

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

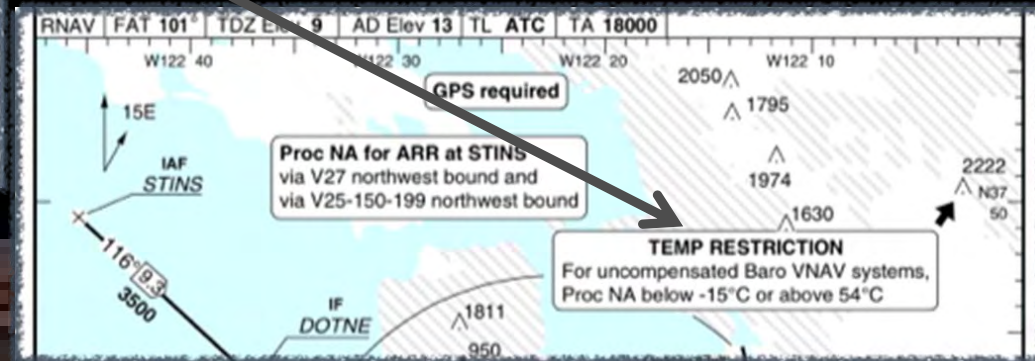
Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with Additional checks before IAF:

- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.

Additional checks
before IAF

Aérodrome OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	
Final track +- 1°	
Vertical Path Angle	MCDU versus IAC/IAL
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)


Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with Additional checks before IAF:

- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima

Additional checks
before IAF

Aérodrom OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	MCDU versus IAC/IAL
Final track +- 1°	
Vertical Path Angle	
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY

TCH 49		0	1	2	3	4	5
ACFT	LPV	LNAV/VNAV		LNAV	Circling 		
STATE	C	270 (257) 2400ft	420 (407) 5000ft	580 (567) 1¼sm	640 (626) 1¼sm		
	D				720 (700) 2½sm		

RNP APCH

IAC/IAL chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with Additional checks before IAF:

- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima (if no LNAV/VNAV minima published use LNAV minima box)

Additional checks
before IAF

Aérodrom OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	MCDU versus IAC/IAL
Final track +- 1°	
Vertical Path Angle	
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY

6	15	14	13	12	11
	LNAV	Circling			
	1200 (1193) <i>3sm</i>	1210 <i>3sm</i>			

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with Additional checks before IAF:

- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima (if no LNAV/VNAV minima published use LNAV or RNP 0.3 minima box)
- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.

Additional checks before IAF

Airport OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	MCDU versus IAC/IAL
Final track +- 1°	
Vertical Path Angle	
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY

		TCH 49					
		0	1	2	3	4	5
ACFT		LPV	LNAV/VNAV	LNAV	Circling		⊙
STATE	C	270 (257) 2400ft	420 (407) 5000ft	580 (567) 1¼sm	640 (626) 1¼sm		
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RNP APCH

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Continue with Additional checks before IAF:

- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima (if no LNAV/VNAV minima published use LNAV or RNP 0.3 minima box)
- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.

Additional checks before IAF

Aero/rome OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	
Final track +- 1°	MCDU versus IAC/IAL
Vertical Path Angle	
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY



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IAL/IAC chart title RNAV (GNSS or GPS)

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- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima (if no LNAV/VNAV minima published use LNAV or RNP 0.3 minima box)
- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.
- FAF altitude

Additional checks before IAF

Aero/rome OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	
Final track +- 1°	
Vertical Path Angle	MCDU versus IAC/IAL
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

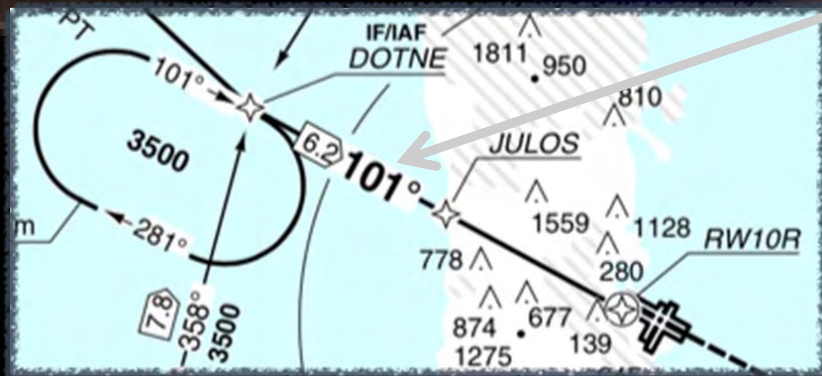
Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with Additional checks before IAF:

- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima (if no LNAV/VNAV minima published use LNAV or RNP 0.3 minima box)
- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.
- FAF altitude
- Final track $\pm 1^\circ$

Additional checks before IAF

Aero OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF altitude	
Final track $\pm 1^\circ$	MCDU versus IAC/IAL
Vertical Path Angle	
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
EMGS NAV MODE	GPS PRIMARY



RNP APCH

IAC/IAL chart title RNAV (GNSS or GPS)

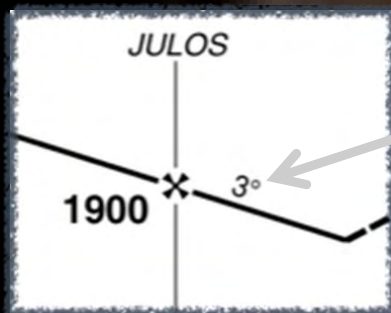
Let's use the RNP BRIEFING GUIDE in QRH OPS.07

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- Airport OAT is above published minimum airport OAT on the IAC/IAL plate.
- IAC/IAL minima (if no LNAV/VNAV minima published use LNAV or RNP 0.3 minima box)
- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.
- FAF altitude.
- Final track +/- 1°.
- Vertical Path Angle.

Additional checks before IAF

Airport OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTR
FAF Altitude	
Final track +/- 1°	
Vertical Path Angle	MCDU versus IAC/IAL
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY



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- If no min OAT on IAC/IAL Use ISA-15° as lowest temp
- FAF altitude.
- Final track +- 1°.
- Vertical Path Angle.
- MAPt at RWY THR.



Airport OAT	Above IAC/IAL minimum
IAC/IAL Minima	LNAV/VNAV minima box
If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
Waypoint sequence	ND Plan Mode + CSTD
FAF Altitude	
Final track +- 1°	MCDU versus IAC/IAL
Vertical Path Angle	
MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV
FMGS NAV MODE	GPS PRIMARY

Additional checks before IAF



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Continue with Additional checks before IAF:

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- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.
- FAF altitude.
- Final track +- 1°.
- Vertical Path Angle.
- MAPt at RWY THR.
- GPS Mode.

Additional checks before IAF	Airport OAT	Above IAC/IAL minimum
	IAC/IAL Minima	LNAV/VNAV minima box
	If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
	Waypoint sequence	ND Plan Mode + CSTR
	FAF Altitude	
	Final track +- 1°	
	Vertical Path Angle	MCDU versus IAC/IAL
	MAPt at RWY THR	
	GPS Mode	GPS 1 AND 2 in NAV
	FMGS NAV MODE	GPS PRIMARY

GPS MONITOR			
GPS POSITION			
35°04.3N/027°14.7E			
TTRK	UTC	GS	
137.0	08:38:41	519	
MERIT	GPS ALT	MODE/SAT	
10M	36270	NAV/12	
GPS POSITION			
35°04.4N/027°14.7E			
TTRK	UTC	GS	
137.0	08:38:40	519	
MERIT	GPS ALT	MODE/SAT	
10M	36270	NAV/12	

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

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Continue with Additional checks before IAF:

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- If no min OAT on IAC/IAL Use ISA-15° as lowest temp and use only LNAVminima box.
- FAF altitude.
- Final track +- 1°.
- Vertical Path Angle.
- MAPt at RWY THR.
- GPS Mode.
- FMGS NAV MODE.

Additional checks before IAF	Airport OAT	Above IAC/IAL minimum
	IAC/IAL Minima	LNAV/VNAV minima box
	If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
	Waypoint sequence	ND Plan Mode + CSTR
	FAF Altitude	
	Final track +- 1°	
	Vertical Path Angle	MCDU versus IAC/IAL
	MAPt at RWY THR	
	GPS Mode	GPS 1 AND 2 in NAV
	FMGS NAV MODE	GPS PRIMARY

150 73.8 10 EDDH23
PREDICTIVE
<GPS GPS PRIMARY
REQUIRED ACCUR ESTIMATED
0.30NM HIGH 0.05NM

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with DURING THE APPROACH

RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +/- 1°	
		Vertical Path Angle	
		MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV		
FMGS NAV MODE	GPS PRIMARY		
DURING THE APPROACH	Flying Reference	FPV with FPD (recommended)	Before FAF
	FMGS Mode	FINAL APP	When cl. APCH
	Monitoring	Lateral deviation	<= 1/2 RNP (0.15 NM FAF-MAPt)
		Vertical deviation	+/- 75ft
	Task Sharing	FINAL APP with AP	PF looks out
FINAL APP without AP		PNF looks out	
FAILURES	One Engine Inoperative	AP permitted	FINAL APP
	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
	FAF → DA	Go-Around if:	Any warning/caution or aural alert (including TRIPLE CLIC)
	<DA	Go-Around if:	Visual cues unsatisfactory for landing
MISC	Direct To	Intermediate Fix (IF)	OK if track change < 45°
		Final Approach Fix (FAF)	Not Acceptable
	Radar Vector	Outside FAF	Acceptable as long as final track intercepted prior to FAF

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with DURING THE APPROACH check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.

Flying Reference	FPV with FPD (recommended)	Before FAF
FMGS Mode	FINAL APP	When cl. APCH
Monitoring	Lateral deviation	$\leq 1/2$ RNP (0.15 NM FAF-MAPt)
	Vertical deviation	± 75 ft
Task Sharing	FINAL APP with AP	PF looks out
	FINAL APP without AP	PNF looks out



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with DURING THE APPROACH check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be APP NAV and FINAL armed when cleared approach and APPR pushed.

Flying Reference	FPV with FPD (recommended)	Before FAF
FMGS Mode	FINAL APP	When cl. APCH
Monitoring	Lateral deviation	$\leq 1/2$ RNP (0.15 NM FAF-MAPt)
	Vertical deviation	+ 75ft
Task Sharing	FINAL APP with AP	PF looks out
	FINAL APP without AP	PNF looks out



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with **DURING THE APPROACH** check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be **APP NAV** and **FINAL** armed when cleared approach and APPR pushed.
can also be **APP NAV** armed and **FINAL** armed.

Flying Reference	FPV with FPD (recommended)	Before FAF
FMGS Mode	FINAL APP	When cl. APCH
Monitoring	Lateral deviation	$\leq 1/2$ RNP (0.15 NM FAF-MAPt)
	Vertical deviation	+ 75ft
Task Sharing	FINAL APP with AP	PF looks out
	FINAL APP without AP	PNF looks out



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with **DURING THE APPROACH** check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be armed FINAL and APP NAV, when cleared approach and APPR pushed. can also be APP NAV and FINAL depending of distance to extended centerline.

ADDITIONAL CHECK not in BRIEFING GUIDE recommended:

- Check that descend arrow is **BLUE**
if arrow is not **blue** check:
 - (1) the approach phase is activated.
 - (2) FPL correctly sequenced.(make a new extended centerline from FAF and re-arm the approach by pressing APPR button.



RNP APCH

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Continue with **DURING THE APPROACH** check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be armed FINAL and APP NAV, when cleared approach and APPR pushed. can also be APP NAV and FINAL depending of distance to extended centerline.
- Lateral deviation $\leq 1/2$ RNP (= max 0.15 NM FAF-MAPt if normal RNP is 0.3).

Flying Reference	FPV with FPD (recommended)	Before FAF
FMGS Mode	FINAL APP	When cl. APCH
Monitoring	Lateral deviation	$\leq 1/2$ RNP (0.15 NM FAF-MAPt)
	Vertical deviation	± 75 ft
Task Sharing	FINAL APP with AP	PF looks out
	FINAL APP without AP	PNF looks out



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

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Continue with DURING THE APPROACH check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be armed FINAL and APP NAV, when cleared approach and APPR pushed. can also be APP NAV and FINAL depending of distance to extended centerline.
- Lateral deviation $\leq 1/2$ RNP (= max 0.15 NM FAF-MAPt if normal RNP is 0.3).
- Vertical deviation ± 75 ft.

Flying Reference	FPV with FPD (recommended)	Before FAF
FMGS Mode	FINAL APP	When cl. APCH
Monitoring	Lateral deviation	$\leq 1/2$ RNP (0.15 NM FAF-MAPt)
	Vertical deviation	± 75 ft
Task Sharing	FINAL APP with AP	PF looks out
	FINAL APP without AP	PNF looks out

```

APP BASIS
GRZ  OPT  RNC MAX
-----
<REPORT  VDEV=  OPT
UPDATE AT
< [ ]
BRG /DIST  - TO [ ]
PREDICTIVE
<GPS  GPS PRIMARY
REQUIRED ACCUR ESTIMATED
0.50NM  HIGH  0.03NM
    
```



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with DURING THE APPROACH check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be armed FINAL and APP NAV, when cleared approach and APPR pushed.
can also be APP NAV and FINAL depending of distance to extended centerline.
- Lateral deviation $\leq 1/2$ RNP (= max 0.15 NM FAF-MAPt if normal RNP is 0.3).
- Vertical deviation ± 75 ft.



The vertical deviation scale and index appear when in approach phase and the FINAL mode is armed/engaged or a non precision approach has been entered.

They are displayed until MDA has been reached. They give the vertical deviation with respect to the trajectory defined by the FMGEC.

Each index scale graduation represents 100 ft. The range is ± 200 ft.

Note: If LS pb-sw is pressed, glide deviation has priority over vertical deviation information.

Make sure LS is not selected.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

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Continue with **DURING THE APPROACH** check:

- Recommended flying reference is FPV (BIRD) with FPD (mustach), selected before FAF.
- FMGS mode to be armed FINAL and APP NAV, when cleared approach and APPR pushed. can also be APP NAV and FINAL depending of distance to extended centerline.
- Lateral deviation $\leq 1/2$ RNP (= max 0.15 NM FAF-MAPt if normal RNP is 0.3).
- Vertical deviation ± 75 ft.
- Normal Task Sharing in **FINAL APP** is
 - PF looks out if AP on.
 - PNF looks out if AP off.



Flying Reference	FPV with FPD (recommended)	Before FAF
FMGS Mode	FINAL APP	When cl. APCH
Monitoring	Lateral deviation	$\leq 1/2$ RNP (0.15 NM FAF-MAPt)
	Vertical deviation	± 75 ft
Task Sharing	FINAL APP with AP	PF looks out
	FINAL APP without AP	PNF looks out

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Latest at minima:

- Autopilot - OFF
- FD - OFF
- Check/Set inbound CRS on FCU



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Latest at minima:

- Autopilot - OFF
- FD - OFF
- Check/Set inbound CRS on FCU

Caution

When FINAL APP modes are engaged, the AP/FD will disengage:

1 At the MDA/MDH minus 50 ft (if entered) or at 400 ft AGL (if no MDA/MDH is entered), or

2 At the Missed Approach Point (MAP),

depending on which one comes first. The FDs will revert to basic modes (HDG-V/S or TRK/FPA).



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with FAILURES

RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +/- 1°	
Vertical Path Angle			
MAPt at RWY THR			
GPS Mode	GPS 1 AND 2 in NAV		
FMGS NAV MODE	GPS PRIMARY		
DURING THE APPROACH	Flying Reference	FPV with FPD (recommended)	Before FAF
	FMGS Mode	FINAL APP	When cl. APCH
	Monitoring	Lateral deviation	<= 1/2 RNP (0.15 NM FAF-MAPt)
		Vertical deviation	+/- 75ft
	Task Sharing	FINAL APP with AP	PF looks out
FINAL APP without AP		PNF looks out	
FAILURES	One Engine Inoperative	AP permitted	FINAL APP
	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
	FAF → DA	Go-Around if:	Any warning/caution or aural alert (including TRIPLE CLIC)
	<DA	Go-Around if:	Visual cues unsatisfactory for landing
MISC	Direct To	Intermediate Fix (IF)	OK if track change < 45°
		Final Approach Fix (FAF)	Not Acceptable
	Radar Vector	Outside FAF	Acceptable as long as final track intercepted prior to FAF

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with FAILURES

	One Engine Inoperative	AP permitted	FINAL APP
FAILURES	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
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Continue with FAILURES

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	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
	FAF → DA	Go-Around if:	Any warning/caution or aural alert (including TRIPLE CLIC)
	<DA	Go-Around if:	Visual cues unsatisfactory for landing

Discontinue the approach also if:

- If the GPS PRIMARY LOST indication appears on the ND during the approach.
- If the FMS1/FMS2 POS DIFF message is triggered.

RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Continue with FAILURES

FAILURES	One Engine Inoperative	AP permitted	FINAL APP
	Before FAF	ECAM completed before 1000ft	Consult QRH OPS for RNP APCH capab.
	FAF → DA	Go-Around if:	Any warning/caution or aural alert (including TRIPLE CLIC)
	<DA	Go-Around if:	Visual cues unsatisfactory for landing



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Finish with MISC

RNP BRIEFING GUIDE			
PRIOR TO FLYING PROCEDURES	Qualifications	A/C capabilities	FCOM LIM
		A/C equipment	QRH OPS
		IAC/IAL designation	RNAV (GNSS/GPS/RNP 0.3) or GPS
		FMGS procedure in current NAV database	Inserted with no alteration in FMGS primary F-PLN
	Additional checks before IAF	Aerodrome OAT	Above IAC/IAL minimum
		IAC/IAL Minima	LNAV/VNAV minima box
		If no min OAT on IAC/IAL	Use ISA-15 as lowest and LNAV minima box
		Waypoint sequence	ND Plan Mode + CSTR
		FAF Altitude	MCDU versus IAC/IAL
		Final track +/- 1°	
		Vertical Path Angle	
		MAPt at RWY THR	
GPS Mode	GPS 1 AND 2 in NAV		
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DURING THE APPROACH	Flying Reference	FPV with FPD (recommended)	Before FAF
	FMGS Mode	FINAL APP	When cl. APCH
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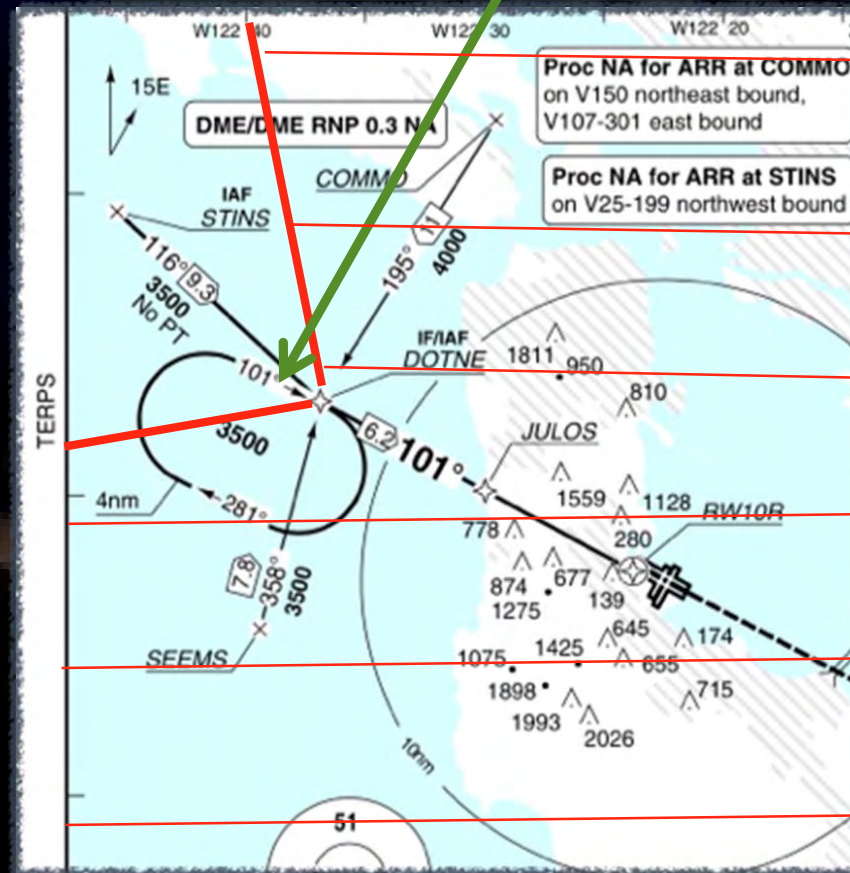
RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's use the RNP BRIEFING GUIDE in QRH OPS.07

Finish with MISC

MISC	Direct To	Intermediate Fix (IF)	OK if track change < 45°
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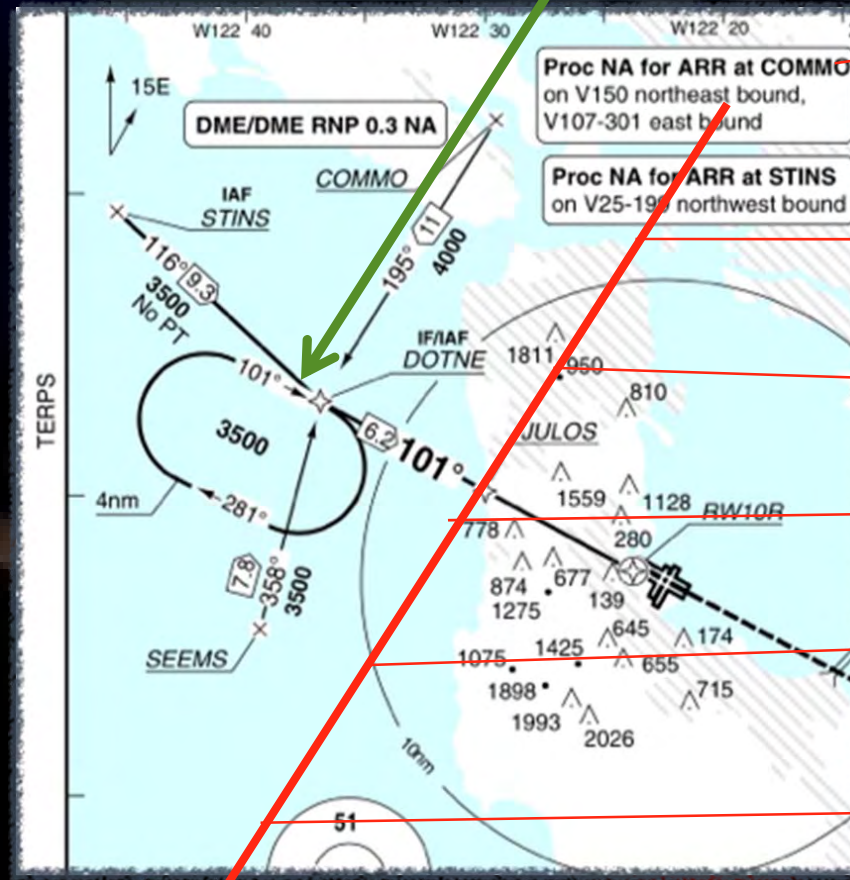
RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

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Finish with MISC

MISC	Direct To	Intermediate Fix (IF)	OK if track change < 45°
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RNP APCH

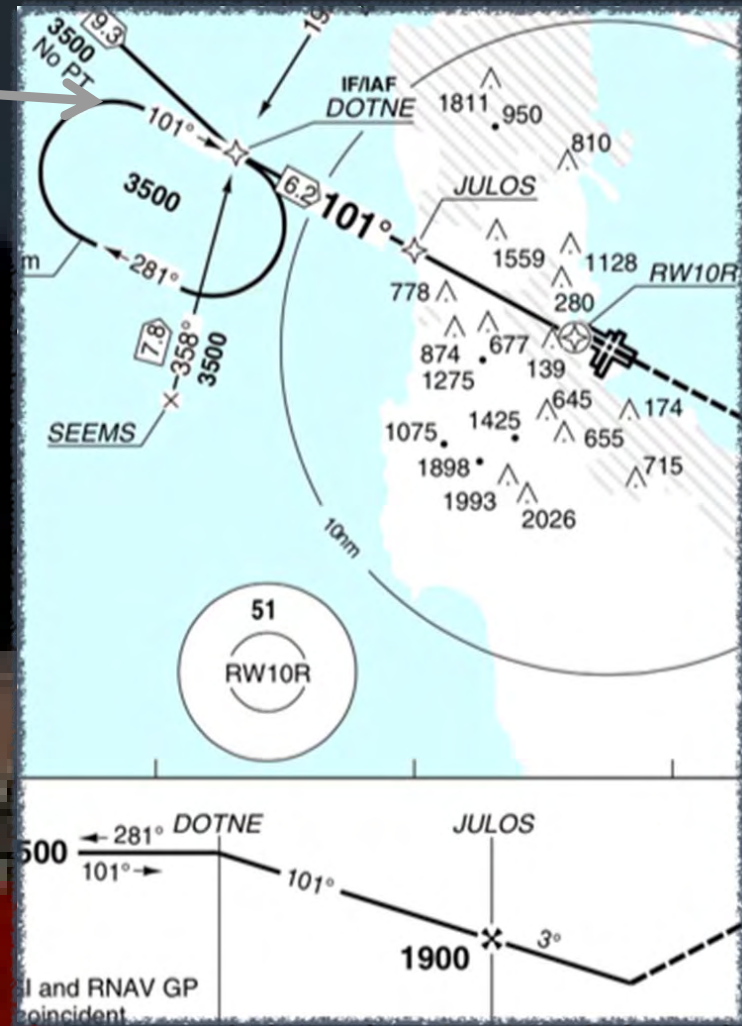
IAL/IAC chart title RNAV (GNSS or GPS)

Let's take a look at callouts in during RNP approach

"FINAL TRACK COMING"

normally by PF when

Aircraft is coming within 1 NM from RNAV approach track.



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's take a look at callouts in during RNP approach

"FINAL TRACK COMING"

normally by PF when

Aircraft is coming within 1 NM from RNAV approach track.

"APP NAV"

normally by PF when

A/P or F/D is engaged in APP NAV



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's take a look at callouts in during RNP approach

"FINAL TRACK COMING"

normally by PF when
Aircraft is coming within 1 NM from RNAV approach track.

"APP NAV"

normally by PF when
A/P or F/D is engaged in APP NAV

"FAF COMING"

normally by PF when
Aircraft is coming within 1 NM from RNAV FAF.



RNP APCH

IAL/IAC chart title RNAV (GNSS or GPS)

Let's take a look at callouts in during RNP approach

"FINAL TRACK COMING"

normally by PF when
Aircraft is coming within 1 NM from RNAV approach track.

"APP NAV"

normally by PF when
A/P or F/D is engaged in APP NAV

"FAF COMING"

normally by PF when
Aircraft is coming within 1 NM from RNAV FAF.

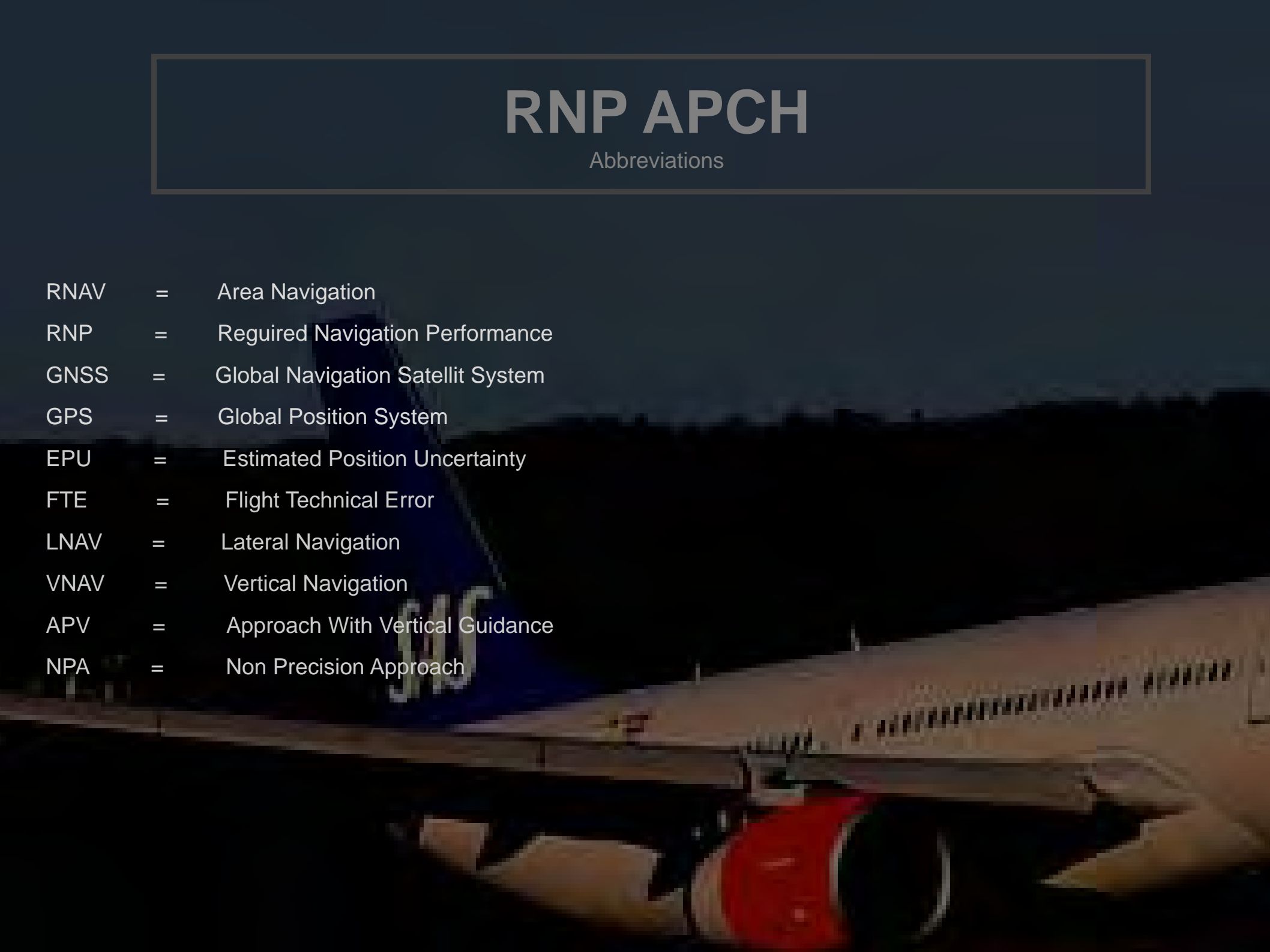
"FINAL APP"

normally by PF when
A/P or F/D is descending in **FINAL APP**



RNP APCH

Abbreviations



RNAV	=	Area Navigation
RNP	=	Required Navigation Performance
GNSS	=	Global Navigation Satellit System
GPS	=	Global Position System
EPU	=	Estimated Position Uncertainty
FTE	=	Flight Technical Error
LNAV	=	Lateral Navigation
VNAV	=	Vertical Navigation
APV	=	Approach With Vertical Guidance
NPA	=	Non Precision Approach

RNP APCH

References

OM- A:

- OM-A 0.3 page 9 AOC
- OM-A 8.3.2 3. RNAV

FCOM:

- PRO-NOR-SOP-19 P 1-11/12
- PRO-NOR-SRP-01-70 P 22-29/34

QRH:

- OPS 0.7 RNP BRIEFING GUIDE

RNP APCH

Questions

Q1.

What type of chart titles RNP approaches may we fly ?



RNP APCH

Questions

Q1.

What type of chart titles RNP approaches may we fly ?

A1. (ref QRH OPS.07, OM-A 0.3 page 9 and OM-A 8.3.2 3.2.)

We may fly approaches with chart titles:

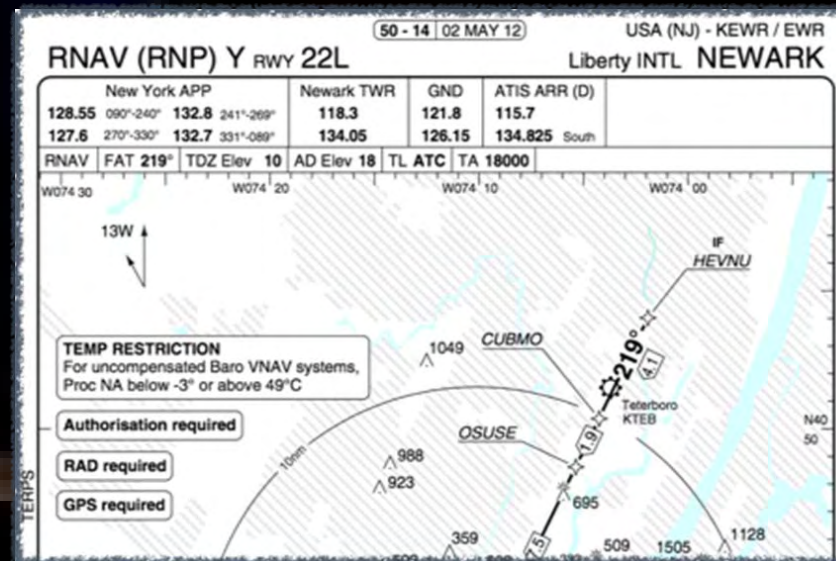
- RNAV (GNSS)
- RNAV (GPS)
- GPS (will be substituted by "RNAV (GPS)" as IAL plates are renewed by FAA)
- RNAV (RNP 0.3)

RNP APCH

Questions

Q2.

May we fly RNP approach with IAL chart title "RNP AR"?



RNP APCH

Questions

Q2.

May we fly RNP approach with IAL chart title "RNP AR"?

A1. (ref QRH OPS.07, OM-A 0.3 page 9 and OM-A 8.3.2 3.2.)

No.

AR means Authorization Required and a special approval from the authorities is required. We do NOT have approval for RNP AR approaches.



RNP APCH

Questions

Q3.

What temperature criteria must be fulfilled to fly a RNP approach in **FINAL APP** down to LNAV/VNAV minima?

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

RNP APCH

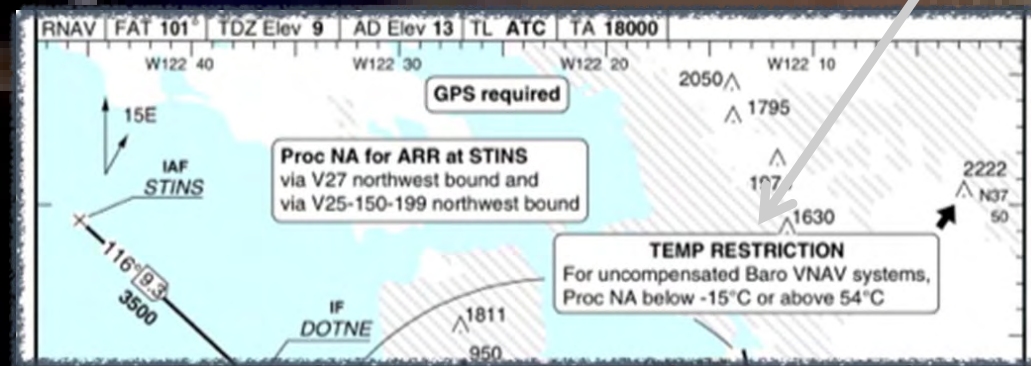
Questions

Q3.

What temperature criteria must be fulfilled to fly a RNP approach in FINAL APP down to LNAV/VNAV minima?

A3. (ref QRH OPS.07 and OM-A 8.3.2 3.5.)

Airport OAT must be above published minimum airport OAT, stated in IAC/IAL. Temperature correction is NOT allowed, except for minima



RNP APCH

Questions

Q4.

a) What temperature criteria must be fulfilled to fly a RNP approach in **FINAL APP** down to LNAV minima?

b) Anything else that differs from a LNAV/VNAV minima?

LNAV/VNAV	LNAV
420 (407) 5000ft	580 (567) 1¼sm

RNP APCH

Questions

Q4.

- a) What temperature criteria must be fulfilled to fly a RNP approach in FINAL APP down to LNAV minima?
- b) Anything else that differs from a LNAV/VNAV minima?

A4. (ref QRH OPS.07 and OM-A 8.3.2 3.5.)

- Airport OAT must be above or equal to ISA – 15 degrees. If OAT is colder than this limit RNP approach can **NOT** be flown in **FINAL APP**.

It must be flown in NAV-FPA (or NAV-V/S) if temp is $< \text{ISA} - 15^\circ$. Adjustments to the vertical profile due to temperature must be done in accordance with respective OM- B.

- b) Yes, flying a RNP approach in **FINAL APP** to a LNAV minima only shall be handled as an "overlay approach". This means pilots have to check correct A/C vertical profile versus IAL chart.

RNP APCH

Questions

Q5.

Where can you see that your lateral navigation (FTE = Flight Technical Error) is within the $\frac{1}{2}$ RNP limit as stated in QRH OPS 0.7?



RNP APCH

Questions

Q5.

Where can you see that your lateral navigation (FTE = Flight Technical Error) is within the $\frac{1}{2}$ RNP limit as stated in QRH OPS 0.7?

A4. (ref FCOM DSC-31-45 P 13-14/26.)

Check your cross track error on your ND to be 0.15 (means 0.1 on our A/C as second decimal is not presented yet, 0.2 will be to high) or less, since RNP is 0.3 from FAF.



RNP APCH

Questions

Q6.

- a) What is the minimum height for use of autopilot for a straight-in LNAV/VNAV approach?
- b) If not manually disconnected when will the autopilot disengage?



RNP APCH

Questions

Q6.

- a) What is the minimum height for use of autopilot for a straight-in LNAV/VNAV approach?
- b) If not manually disconnected when will the autopilot disengage?

A4. (ref FCOM LIM 22-22-10 P 1/4 and FCOM PRO-NOR-SRP-01-70 P29/34.)

- Applicable DA
- When **FINAL APP** modes are engaged the autopilot/FD will disengage :
 - At the MDA/MDH minus 50 ft if entered in FMGES or at 400 ft AGL if NOT entered.
 - At the Missed Approach Point (MAP), depending on which comes first.

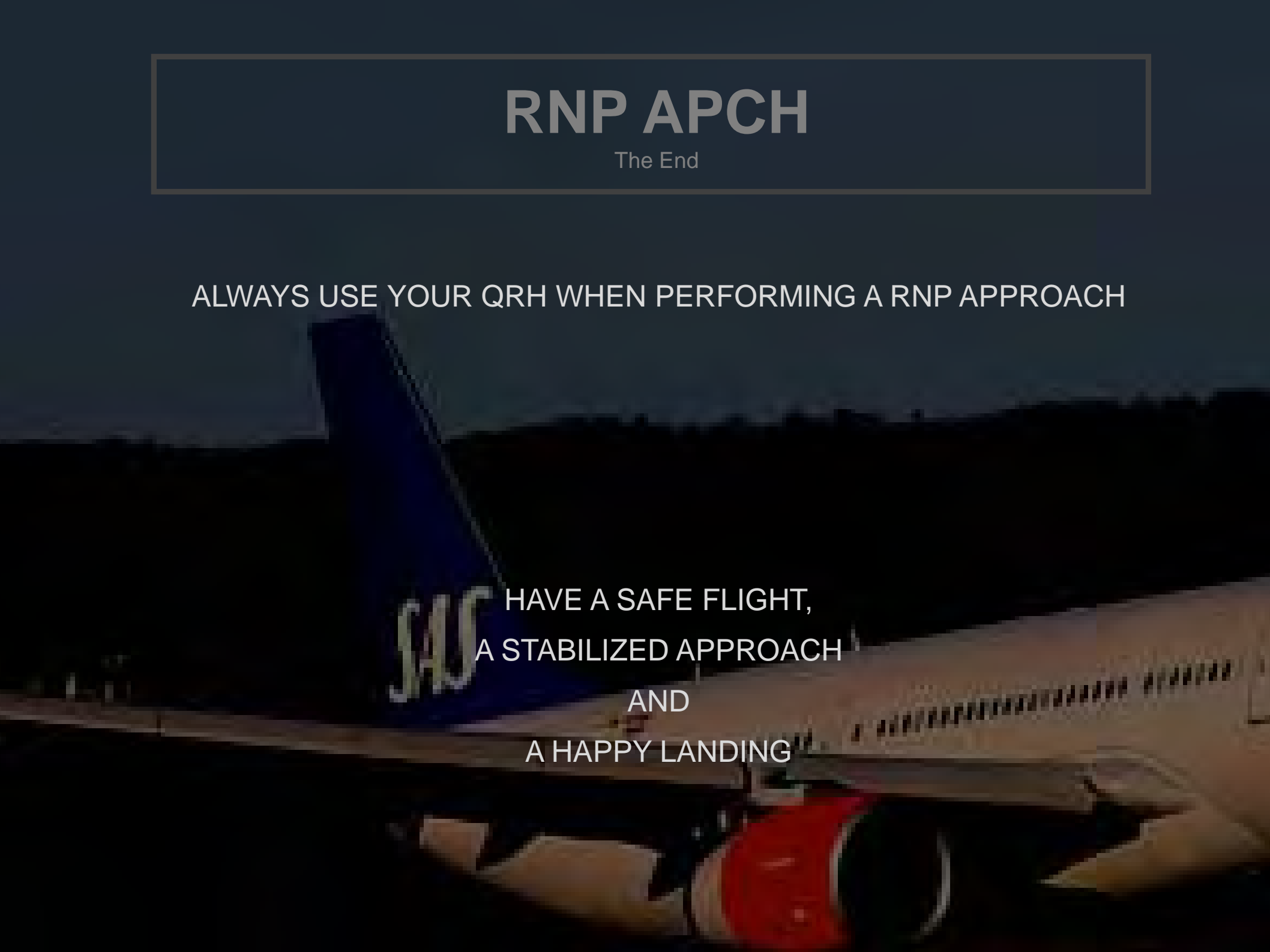
The FDs will revert to basic modes (HDG-V/S or TRK/FPA).

RNP APCH

The End

ALWAYS USE YOUR QRH WHEN PERFORMING A RNP APPROACH

HAVE A SAFE FLIGHT,
A STABILIZED APPROACH
AND
A HAPPY LANDING

A photograph of an airplane tail section, specifically the vertical stabilizer, with the letters 'SAS' written on it in a stylized font. The background is dark, suggesting a night or low-light environment. The text is overlaid on the image.