

Attachment 5

to Operational Factors / Human Performance Group Factual Report

DCA011IA047

RNAV APPROACH REFERENCE CARD

RNAV (RNP) / RNAV (GPS) Approach Reference Card

Equipment Requirements

- B737-700
- 2 PFD/ND displays*
- 2 FMC/CDUs
- 2 GPS receivers
- EGPWS
- Current NAV database
- 2 flight directors*
- 2 autopilots* (RNP approaches only)
- 2 radio altimeters
- 2 ADIRU/IRS in NAV mode*
- 1 operative TO/GA switch
- LNAV and VNAV capability
- U10.7 (or later) software

*A single failure of an autopilot, flight director, ADIRU, IRS, or PFD/ND display should cause the Crew to consider a go-around/missed approach if that is the safest course of action.

Programming / Briefing

- Ensure the reported temperature is within charted maximum and minimum temperature limits.
- Verify the RAF provides RNP availability during the time frame expected to initiate and complete the approach.
- Program the FMC:
 - Set Lateral RNP on LEGS page (RNP approaches only)
- Set minimums:
 - MINS selector—BARO
 - DA—charted DA
 - DDA—charted MDA + 50 feet
- (PF) Brief/(PM) verify in the FMC:
 - Waypoint sequence
 - Waypoint names
 - Altitude/speed restrictions
 - GP angle
- Review approach contingencies and missed approach procedures.

- Do not modify any waypoint unless necessary to comply with an ATC clearance and the following criteria are met:
- The modified waypoint is prior to the FAF.
 - The aircraft is under radar surveillance or will remain above the MSA or Terminal Arrival Area (TAA) floor until established on the approach.
 - A course intercept is not to an RF leg, a fix beginning an RF leg, or the segment preceding the RF leg.

The following exceptions are allowed:

- Charted altitude and speed restrictions must be entered.
- If being radar vectored, bypassed waypoints must be deleted to ensure proper waypoint sequencing.
- The course centerline may be extended from the vectored-to waypoint, provided the waypoint does not begin an RF leg.
- If the IAF has an “at or above” altitude restriction, it may be changed to an “at” altitude restriction using the same altitude.
- The modified waypoint is prior to the FAF.

Procedure Review

- Prior to the IAF, set current destination altimeter.
- Monitor CDU (One CDU—LEGS page; Other CDU—appropriate page for situational awareness).
- Map display to 10 nm prior to the final approach segment.
- At least one Pilot must monitor terrain (TERR).
- RF legs must be flown at or below the speed displayed in LARGE font on the LEGS page.
- For final approach segments with RF legs, use Category D minima if V_{TARGET} is greater than 140 KIAS.
- Do not exceed 165 KIAS on the final approach segment.

Cleared for the Approach

- Select/verify LNAV.

Prior to the FAF, Established on a segment of the approach

- Select/verify VNAV, and verify VNAV PATH annunciated on the FMA.
- Call, “**LNAV and VNAV PATH.**”
- Set MCP altitude to ZERO.
 - LNAV engaged
 - On a published segment of the approach
 - Prior to the GP intercept
 - Cleared for the approach
 - VNAV engaged; VNAV PATH verified

Maximum Deviation

- Lateral—1 x RNP or ANP bar amber indication.
- Vertical—Inside the FAF, pointer cannot be maintained between the ANP bar limits.

RNAV (RNP) / RNAV (GPS) Approach Contingency Review

Failures of Required Aircraft Equipment

Dual Failure

- Discontinue RNAV operations.
 - Refer to the *QRH*, as required.
- If established on approach and a visual approach cannot be accomplished:
 - Execute a go-around.
 - Refer to the *QRH*, as required.

Single Failure Prior to FAF

- Refer to the *QRH* to restore failed system.
 - If system restored.....Continue approach
 - If unable to restore system.....Execute a go-around

Single Failure Inside the FAF with Runway Not in Sight

- Execute go-around unless a safer course of action can be taken.
- Refer to the *QRH*, as required.

Loss of LNAV Capability

- Discontinue procedures that require LNAV and VNAV.
- Monitor/maintain lateral path until conventional navigation or ATC vectors are available.

Loss of VNAV Capability

- Discontinue procedures that require VNAV.

Loss of LNAV and/or VNAV on Both PFDs

Inside the FAF, if a visual approach cannot be accomplished:

- Execute a go-around/missed approach.
- Monitor/maintain lateral path using NAV display, NPS, and the RNP progress page.
- Monitor terrain display.

Deviation Callouts

**RNAV (RNP) / RNAV (GPS)
Missed Approach Procedures**

Parameter	Limit	Callout
NAV Performance Scales—Lateral	XTK ERROR exceeds 1/2 RNP (NPS 1/2 scale deflection), or NPS pointer in the ANP bar.	“Crosstrack.”
	ANP bar amber indication, or NPS pointer cannot be maintained at less than 1 x RNP (NPS full scale deflection).	“Go-Around.”
NAV Performance Scales—Vertical	NPS pointer cannot be maintained between the ANP bar limits.	“Go-Around.”
FMC Alert Message	UNABLE REQD NAV PERF-RNP	“Go-Around.”
	FMC DISAGREE	
	VERIFY POSITION or VERIFY POS: XXX-XXX	

MCP altitude.....After gear retraction, set missed approach altitude

LNAV engaged.....Verify at 400 feet AGL

Monitor.....LEGS page

Notes:

- If executed prior to the beginning of the missed approach procedure, follow the approach lateral path until the missed approach procedure begins.
- RF legs must be flown at or below the speed displayed in LARGE font on the LEGS page.