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NATIONAL TRANSPORTATION SAFETY BOARD

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Attachment 23 – Non-Precision Approach Procedures
(12 Pages)

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

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Attachment 23 – Non-Precision Approach Procedures

OPERATIONAL FACTORS

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1.0 Non-Precision Approaches - General

04.06.01 NON-PRECISION APPROACHES

04.06.01.01 GENERAL

Use of the FMS along with the AFDS and ATS to fly non-precision approaches is the normal (and preferred) method.

Jeppesen publishes multiple approaches of the same type to the same runway. Carefully compare the database procedure to Jeppesen chart. If differences exist, the chart is controlling. Approaches retrieved from the NAV database do not contain fixes between the Final Approach Fix (FAF) and the runway threshold or Missed Approach Point (MAP) as applicable. GPS and RNAV (GPS) approaches may not be flown if the proper procedure, excluding the missing stepdown fixes, cannot be retrieved from the NAV database. Approach procedures that require navigation to or reference a NDB may be flown in accordance with TERMINAL AREA RNAV OPERATIONS limitations. **NDB and LOC BC approaches are not authorized on UPS A300 aircraft**.

04.06.01.02 GPS AND RNAV (GPS) APPROACHES

The A300 may conduct approaches titled "GPS" or "RNAV (GPS)." This includes approaches titled "VOR or GPS" and "VOR/DME or GPS." **Approaches titled RNAV (RNP) are not authorized**. GPS and RNAV (GPS) approaches may be conducted in Vertical Speed or Profile mode.

The approach clearance received from the controller will depend upon the title of the approach procedure. Approaches titled "GPS" will receive clearance for a GPS approach. Approaches titled "VOR or GPS" or "VOR/DME or GPS" must receive a clearance for a GPS approach to be flown using GPS procedures. Approaches titled "RNAV (GPS)" will receive a clearance for an RNAV approach.

FMC DATABASE RETRIEVAL

GPS and RNAV (GPS) approaches are primarily identified in the NAV database by the identifier "GPS." They may also be identified in the NAV database as "RNV." Carefully compare the database procedure to the Jeppesen chart.

Approaches titled as a conventional NAVAID or GPS approach (i.e., "VOR or GPS RWY 4") are not coded in the database as GPS or RNV. These approaches must be loaded from the database using their conventional NAVAID identifier (i.e., VOR 04), but may be flown as GPS approaches after comparing the approach chart to the database procedure for accuracy.

Approaches retrieved from the database do not contain fixes between the Final Approach Fix (FAF) and the runway threshold. Stepdown fixes in the final approach segment of RNAV (GPS) approaches may be identified using Along Track Distance (ATD). ATD is the distance to the next waypoint on a properly sequenced FMC flightplan. Approaches may contain a runway threshold waypoint that is coded RW## (e.g., RW35L).

GPS AND RNAV (GPS) APPROACH MINIMA

RNAV (GPS) approach procedures may contain several sets of approach minima. The LNAV approach minima box contains conventional MDA and visibility minima and is used when conducting a Profile approach to a D-DA or a Vertical Speed approach. The LNAV/VNAV approach minima box contains VNAV Baro DA minima and may be used when conducting a Profile approach to a DA. LPV minima is never used.

[1] Source: UPS A300 AOM.

2.0 Profile Approaches

04.06.01.05 PROFILE APPROACHES

GENERAL

The use of FMC Final Approach mode allows non-precision approaches to be flown using VNAV path guidance to a Decision Altitude (DA) or Derived Decision Altitude (D-DA) in lieu of an MDA.

Approach Requirements

Profile mode may be used to fly the following approaches:

- ILS (GS out)
- LOC and LOC/DME
- VOR and VOR/DME
- GPS and RNAV (GPS)

The following requirements must be met to fly Profile approaches:

- Autopilot or flight director required.
- Autothrottles required if available.
- Approach must be reviewed for cold temperature or remote altimeter setting restrictions. Profile Final Approach mode is prohibited at -15°C or below.

  Profile approaches may not be conducted when the surface OAT is below the minimum temperature limitation or above the maximum temperature published on the approach chart.

CAUTION: **DO NOT APPLY COLD TEMPERATURE ALTITUDE CORRECTIONS WHEN CONDUCTING A PROFILE APPROACH.**

- Approach must be loaded from the current NAV database.
- GPS PRIMARY and GPS PREDICTIVE must be verified for GPS and RNAV (GPS) approaches.
- Verify ECAM FM/GPS POSITION DISAGREE message is not displayed.
- Verify PROG page RNP value (CLR any crew entered RNP).
- Raw data must be monitored on LOC, ILS (GS out) and VOR approaches. (VOR raw data must be displayed by the PM on the ND in ARC or ROSE mode.)
- VNAV path (VPA) must be depicted on the Jeppesen chart.
- The vertical profile must clear all step down fixes in the final approach segment.
- The FMC and Jeppesen chart VPA must agree within 1/10. Enter DA/D-DA into APPROACH page MDA field (LSK 5R) and verify VPA.

- AFDS roll mode:
  - NAV for VOR, GPS and RNAV (GPS) approaches
  - LOC for localizer and ILS (GS out) approaches
- AFDS pitch mode:
  - Profile
- If an adjustment to V_{APP} is necessary, the modification must be made on the FMC APPROACH page. Enter desired V_{APP}, LSK (4L), do not use the wind correction prompt.
- Final Approach mode must be activated prior to arming Profile. LSK 5R of the APPROACH page. FINAL "x.x" prompt will only appear when ALT, V/S or LVL CH modes are engaged.

USE OF DECISION ALTITUDE OR DERIVED DECISION ALTITUDE

All profile approaches are conducted to a Barometric Decision Altitude (DA) or a Derived Decision Altitude (D-DA), as applicable. If a Barometric DA or D-DA cannot be utilized, the approach must be flown to the applicable MDA in Vertical Speed mode.

A Barometric DA may be utilized on the following approaches:

- RNAV (GPS) approaches with published LNAV/VNAV minima.
- ILS (GS out) - Provided the vertical profile clears all stepdown fixes in the final approach segment. The VNAV Ball Note does not appear on ILS approach charts, however, these approaches may be flown to a DA equivalent to the GS out MDA. These provisions also apply to LOC approaches when titled ILS or LOC RWY XXX or ILS or LOC DME Rwy XXX.
- All approaches with a VNAV Ball Note. The Ball Note states: "Only authorized operators may use VNAV DA in lieu of MDA."

NOTE: The use of a Barometric Decision Altitude (DA) is restricted to US airspace only.

If the approach does not support the use of a DA, the approach is flown to a D-DA.

Derived Decision Altitude

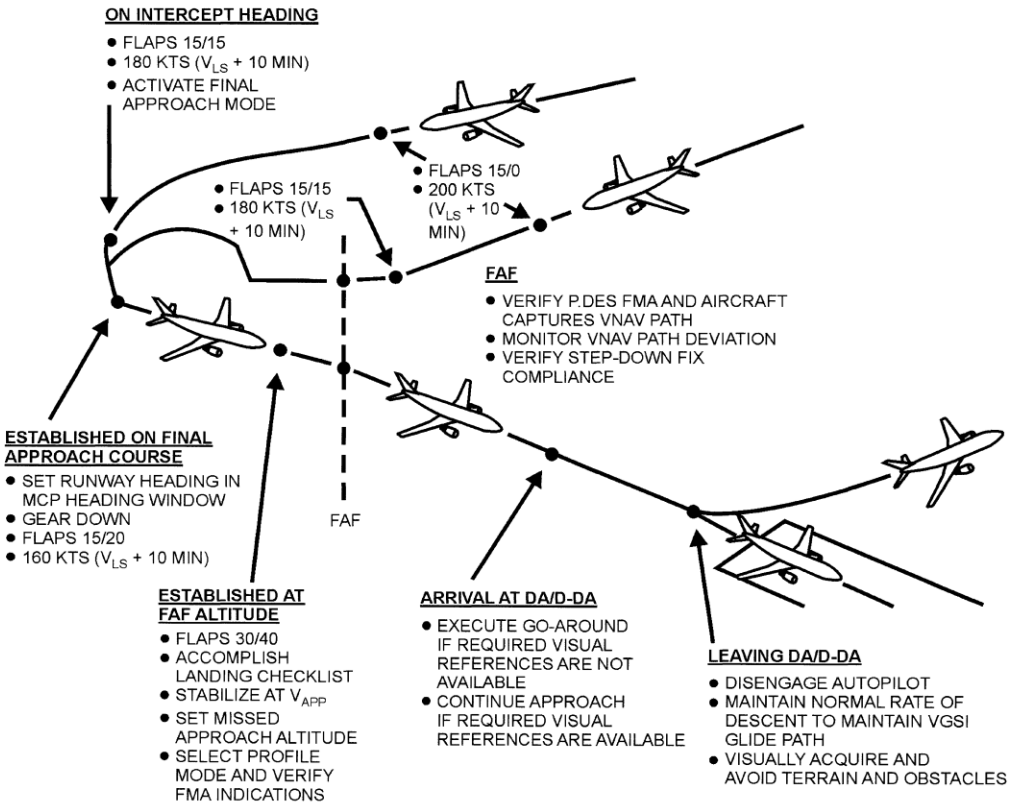
Approaches that do not support Profile approaches to a DA may be flown to a D-DA. D-DAs are calculated by adding 50 feet to the applicable MDA.

PROFILE APPROACH SUMMARY TABLE

TYPE OF APPROACH	APPROACH CHART TITLE	RETRIEVE FROM DATABASE AS	RAW DATA	AFDS ROLL MODE	VNI
RNAV (GPS)	RNAV (GPS) RWY XXX RNAV (GPS) "__" RWY XXX	GPS XXX or RNV XXX	NO	NAV	NAV
RNAV (RNP)	RNAV (RNP) RWY XXX	**NOT AUTHORIZED**			
GPS	GPS RWY XXX	GPS XXX	NO	NAV	NAV
GPS OVERLAY	VOR or GPS RWY XXX VOR DME or GPS RWY XXX	VOR XXX	NO	NAV	NAV
VOR	VOR RWY XXX VOR DME RWY XXX	VOR XXX	YES (PM ARC/ROSE)	NAV	PF-NAV PM-VOR
LOC	LOC RWY XXX LOC DME RWY XXX ILS or LOC RWY XXX ILS or LOC DME RWY XXX	LOC XXX or ILS XXX	YES(PFD)	LOC	ILS
ILS (GS OUT)	ILS RWY XXX ILS DME RWY XXX	ILS XXX	YES(PFD)	LOC	ILS

04.06.01.06 PROFILE NON-PRECISION APPROACH

This profile provides a standard method of flying a non-precision approach and may be modified to suit operational requirements.



- It is recommended to descend to FAF crossing altitude prior to intercepting the VNAV path. Intercepting the VNAV path outside the FAF does not guarantee step down fix compliance. FINAL APPROACH mode does not respect the MCP Altitude Select Window.
- Crossing the FAF verify the FMA indicates P.SPD and P.DES, and the aircraft begins descent on the VNAV path. If approach contains a level segment, P.DES may not engage until reaching the VNAV path inside the FAF.
- If conducting an ILS G/S OUT or a LOC approach, and the VNAV path crosses the FAF below the FAF minimum altitude, at the FAF select V/S - 1000, then arm PROFILE mode.
- Monitor deviation from VNAV path. (Max + 100/-50 feet). One dot on the vertical deviation indicator (VDI) equals 100 feet. Compare PF and PM VDI indications to identify gross errors.
- Verify step-down fix compliance.
- Arrival at DA/D-DA with the runway environment insight, select FPV or V/S for guidance in the visual segment. AFDS and ATS will mode revert and the autopilot will disengage at 50 feet below DA/D-DA. AFDS modes will revert to the HDG and V/S existing at the time of reversion. The ATS mode will revert to existing speed. **Ensure the correct approach speed is maintained**.

- Execute a missed approach for the following:
  - FM/GPS POS DISAGREE message displayed.
  - GPS PRIMARY LOST (GPS or RNAV (GPS) approach).
  - Maximum lateral deviation exceeded:

Localizer	1 dot
VOR	1 dot (5 degrees)
GPS or RNAV (GPS)	.2 nm

  - Maximum vertical deviation exceeded - (+100/-50 feet) 1 dot equals 100 feet.
  - Stabilized approach criteria is not met.
  - PROFILE mode disengages prior to DA/D-DA without the runway environment in sight.
  - Arrival at DA/D-DA without the required visual references. **Do not turn until reaching the published missed approach point**.

3.0 Vertical Speed Approaches

04.06.01.07 VERTICAL SPEED APPROACHES

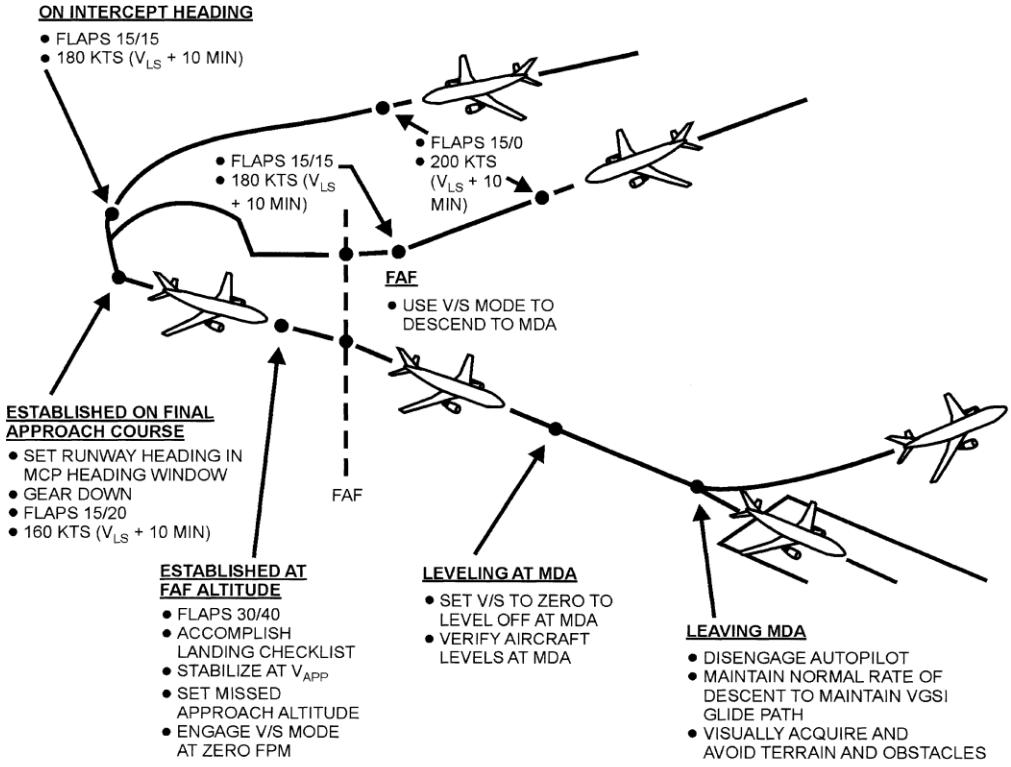
Non-precision approaches must be conducted using AFDS Vertical Speed pitch mode if PROFILE mode is not available. All Vertical Speed approaches must be flown to conventional MDA minima. It is recommended that the vertical speed used during descent to MDA is computed using information available on the approach chart to approximate a continuous descent and prevent EGPWS activation.

04.06.01.08 APPROACH REQUIREMENTS

- Autopilot or flight director required.
- Autothrottles required if available.
- GPS and RNAV (GPS) approaches - GPS PRIMARY and GPS PREDICTIVE must be verified. Verify ECAM FM/GPS DISAGREE message is not displayed.
- Verify PROG page RNP (CLR any crew entered RNP).
- AFDS roll mode:
  - NAV for VOR, GPS and RNAV (GPS) approaches.
  - LOC for Localizer, LDA (without GS) and ILS (GS out) approaches.
- Raw data must be monitored on LOC, LDA, ILS (GS out) and VOR approaches. VOR raw data must be displayed by the PM on the ND in ARC or ROSE mode.

04.06.01.09 VERTICAL SPEED NON-PRECISION APPROACH PROFILE

This profile provides a standard method of flying a non-precision approach and may be modified to suit operational requirements.



WARNING: **IF MCP ALTITUDE IS CHANGED WHILE FMA DISPLAYS ALT*, THE AFDS PITCH MODE WILL REVERT TO V/S.**

- Aircraft should be fully configured and at V_{APP} speed prior to FAF to ensure stabilized approach criteria are met.
- Use V/S mode to descend to MDA. Do not exceed 1500 fpm inside the FAF to 1000 feet HAT. Do not exceed 1000 fpm below 1000 feet HAT. V/S selected should allow a continuous descent to MDA.
- Verify step-down fix compliance.
- Select V/S to zero approximately 20% of the vertical speed above MDA if not at VDP. Verify aircraft levels at MDA.
- Arrival at VDP with the runway environment in sight, select FPV or V/S for guidance in the visual segment.
- Disengage the autopilot no later than 50 feet below MDA.
- Execute a missed approach for the following:
  - GPS PRIMARY LOST or FM/GPS POS DISAGREE message displayed (GPS or RNAV (GPS) approaches).
  - Maximum lateral deviation exceeded:

Localizer	1 dot
VOR	1 dot (5 degrees)
GPS or RNAV (GPS)	.2 nm

  - Stabilized approach criteria is not met.
  - Arrival at VDP without the required visual references.
  - **Do not turn until reaching the published missed approach point**.

- Required crew callouts:
  - 1000 feet above touchdown:
    PM - **"One thousand feet, instruments chrosschecked/no flags."**
    PF - **"MDA ____."**
  - 500 feet above touchdown:
    PM - Calls out altitude, existing speed and sink rate. (e.g.,**"500 feet, on speed, sink 7."**)
  - 100 feet above MDA:
    PM - **"Approaching minimums."**
  - At MDA:
    PM - **"Minimums."**
    PF - **"Landing/Continuing,"** or **"Go-Around Thrust, Flaps."**

4.0 Required Crew Callouts – Pilot Training Guide Reference

02.04.06 REQUIRED CREW CALL OUTS

02.04.06.01 OVERVIEW

NON-PRECISION APPROACH STANDARD CALLOUTS

PF	PM
Confirm localizer movement.	During ILS (GS out), LOC, LDA approach: When localizer indicator moves from fully deflected position, call "Localizer Alive."
Confirm aircraft is within Stabilized Criteria and respond, "DA (D-DA) _____" or "MDA _____." If PM announces other than "Stable", announce and conduct the appropriate response (e.g., "Go-Around Thrust, Flaps").	At 1000 feet HAT, check that the appropriate altitude is set in the altitude alerter and that the aircraft is within Stabilized Criteria and call "1000 Feet, Altitude Set, Stable." If stabilized criteria are not met, announce what the condition is (e.g., "1000 Feet, Altitude Set, Sink 1500").
Acknowledge.	At 500 feet HAT: Call altitude, existing speed (referenced to target speed) and sink rate; for example, "500 feet/plus5/sink 7."
	At 100 feet above DA (D-DA) or MDA: "Approaching Minimums."
Respond "Landing," "Continuing" or "Go-Around Thrust, Flaps ___" as appropriate.	At DA (D-DA), MDA or missed approach point: Call "Minimums" or "Missed Approach Point".
	If Visual Descent Point (VDP) is applicable, call "Visual Descent Point" or "VDP."
	Call out 100, 50, 40, 30, 20, 10 feet reference to the radio altimeter if the automated callouts are inoperative.
NOTE: After FAF and prior to 1000 feet HAT, call any sink rate in excess of 1500 FPM. Below 1000 feet HAT, call any deviations from stabilized approach criteria. At any time during the approach, the PM calls any visual cues associated with the runway environment; for example, "Runway, Strobes, Approach Lights," etc.	

02.04.07 MISSED APPROACH REQUIREMENTS

02.04.07.01 OVERVIEW

Execute a missed approach if any of the following occur:

Execute a missed approach for the following:

- Lateral deviation exceeds: