



Flight Operations Briefing Notes Descent Management Descent and Approach Profile Management

I Introduction

Inadequate management of descent-and-approach profile and/or incorrect management of aircraft energy level may lead to:

- Loss of vertical situational awareness; and/or,
- Rushed and unstabilized approaches.

Either situation increases the risk of approach-and-landing accidents, including those involving CFIT.

II Statistical Data

Approximately 70 % of rushed and unstable approaches involve an inadequate management of the descent-and-approach profile and/or an incorrect management of energy level; this includes:

- Aircraft higher or lower than the desired vertical flight path; and/or,
- Aircraft faster or slower than the desired airspeed.

III Best Practices and Guidelines

To prevent delay in initiating the descent and to ensure an optimum management of descent-and-approach profile, descent preparation and approach briefings should be initiated when pertinent data have been received (e.g ATIS, ...), and completed before the top-of-descent (typically 10 minutes before).

Descent Preparation

Insert a realistic FMS flight plan built up from the arrival expected to be flown. If, for example, a standard terminal arrival route (STAR) is inserted in the FMS flight plan but is not expected to be flown, because of anticipated radar vectors, the STAR should be revised (i.e. The track-distance, altitude restrictions and/or speed restrictions) according to pilot's expectations so as to allow the FMS adjustment of the top-of-descent point; and,

Wind forecast should be entered (as available) on the appropriate FMS page, at waypoints close to the top-of-descent point and along the descent profile in order to get a realistic top-of-descent.

Descent and Approach Briefing

The missed approach should be considered as being part of the approach. It may be part of the FMS flight plan, and it should be reviewed against the applicable approach chart.

Descent Initiation

If descent initiation is delayed by ATC, reduce speed as appropriate to minimize the impact on the descent profile (i.e. to be in a better position to recapture the nominal descent profile).

Navigation Accuracy Check

If FMS navigation accuracy does not meet the applicable criteria for terminal area navigation or approach, no descent should be made below the MEA or below the sector MSA without prior confirmation of the aircraft position, using nav aids raw-data. Then, the descent will be continued using raw-data as aircraft position reference (e.g. nav aids, DME, ...).

Descent Profile Monitoring

Descent profile should be monitored, using all available instrument and chart references:

- FMS vertical-deviation indication, as applicable;
- Nav aids and instruments raw-data; and,
- Charted descent-and-approach profile.

Wind conditions and wind changes should be monitored closely to anticipate any reduction in head wind component or increase in tail wind component, and to adjust the flight path profile in a timely manner.

The descent profile may be monitored and adjusted based on a typical 3000 ft per 10 nm descent gradient (corrected for the prevailing head wind component or tail wind

component), while complying with the required altitude and/or speed restrictions (i.e., ensuring adequate deceleration management).

The flight path vector, as available, can be used to monitor the descent profile by checking that the remaining track-distance to touchdown (in nm) is approximately equal to the FL divided by the flight-path-angle (FPA, in degrees):

$$\text{Distance-to-go (nm)} = \text{FL} / \text{FPA (degrees)}$$

Note:

In the above rule of thumb, the FL should be understood as the FL difference (Δ FL) between the current aircraft FL and the airfield FL.

Below 10 000 ft, flying at 250 kt IAS, the following rules of thumb may be used to confirm the descent profile and ensure a smooth transition between the various phases of the approach:

- 9000 ft above airport elevation at 30 nm from touchdown; and,
- 3000 ft above airport elevation at 15 nm from touchdown (to account for deceleration and slats/flaps extension).

Descent Profile Adjustment/Recovery

If flight path is significantly above the desired descent profile (e.g. because of an ATC constraint or a higher-than-anticipated tail wind), to recover the desired flight path:

- Revert, if necessary, from FMS vertical navigation to a selected vertical mode, with an appropriate speed target;
- Maintain a high airspeed as long as practical and possible (e.g., in accordance with ATC speed constraint);
- Extend speed brakes (as allowed by SOPs depending on airspeed and configuration, keeping preferably one hand on the speed brakes handle until speed brakes are retracted);
- Extend landing gear, if the use of speed brakes is not sufficient;
- Notify ATC, for timely coordination, that the aircraft is unable to recover the desired flight path, as soon as it is ascertained;
- As a last resort, perform a 360-degree descending turn (as practical and cleared by ATC).

Maintain close reference to instruments throughout the turn to monitor and control the rate of descent, bank angle and position, to prevent:

- Loss of control;
- CFIT; or,

- Overshoot of the localizer and/or of the extended runway centerline.

Refer to the Flight Operations Briefing Note **Aircraft Energy Management during Approach** for additional information.

Concept of Next Target and Decision Gates

Throughout the entire flight a **next target** should be defined, in order to **stay ahead of the aircraft** at all times.

The **next target** should be any required combination of one or more of the following elements:

- A position;
- An altitude;
- A configuration;
- A speed;
- A vertical speed (as applicable); and,
- A power setting (e.g. thrust is stabilized, usually above idle, to maintain the target approach speed along the desired final approach path).

If it is anticipated that one or more element(s) of the next target will not be met, the required corrective action(s) should be taken without delay.

During the approach and landing, the successive **next targets** should constitute **gates** that should be met for the approach to be continued.

The Final Approach Fix (FAF), the Outer Marker (OM) or an equivalent fix (as applicable) constitute an **assessment gate** to confirm the readiness to proceed further.

The minimum **stabilization height** should constitute a particular gate (i.e. **decision gate**) along the final approach.

If the aircraft is not stabilized on the approach path in landing configuration, at the minimum stabilization height, **a go-around must be initiated unless the crew estimates that only small corrections are necessary to rectify minor deviations from stabilized conditions** due, amongst others, to external perturbations.

The Flight Operations Briefing Note **Flying Stabilized Approaches** describes:

- All the **elements of a stabilized approach**; and,
- The **flight parameter exceedance callouts** performed by the PNF if one flight parameter exceeds the criteria defined for one of the elements of a stabilized approach.

IV Adverse Factors and Typical Errors

The following factors and working errors often are observed during transition and line training:

- Late, therefore rushed descent, approach preparation and briefing, resulting in the omission of important items;
- Failure to cross-check FMS data entries;
- Failure to account for track-distance differences between expected routing and actual routing (i.e., STAR versus radar vectors);
- Distraction leading to or resulting from a **two-heads-down** situation;
- Failure to resolve ambiguities, doubts or disagreements;
- Failure to effectively monitor the descent progress using all available instrument references (e.g., failure to monitor wind conditions and/or wind changes); and/or,
- Use of inappropriate technique to recover the descent profile.

V Summary of Key Points

The following key points should be emphasized during transition training and line training as well as during line checks and line audits:

- Timeliness of descent and approach preparation;
- Strict adherence to SOPs for FMS setup;
- Cross-check of all data entries by both crewmembers;
- Use of PFD, ND and FMS CDU to support and illustrate the descent, approach and go-around briefings;
- Confirmation of FMS navigation accuracy, before deciding the use of automation (i.e., use of FMS modes or selected modes) and of associated monitoring cues (e.g. ND Rose NAV or Rose VOR, needles, VDEV, ...) for the descent and approach;
- Review of terrain information and other approach hazards; and,
- Guidelines for descent planning, monitoring and adjustment.

VI Associated Flight Operations Briefing Notes

The following Flight Operations Briefing Notes may be referred to for a complete overview of the procedures, operational recommendations and techniques involved in the conduct of the descent and approach:

- **Conducting Effective Briefings**
- **Aircraft Energy Management during Approach**
- **Flying Stabilized Approaches**
- **Being Prepared for Go-around**

VII Regulatory References

- ICAO – Procedures for Air navigation Services – Aircraft Operations (PANS-OPS, Doc 8168), Volume I – Flight procedures

VIII Airbus References

- Flight Crew Operating Manuals (FCOM) – Standard Operating Procedures – Descent – Descent Monitoring & Descent Adjustment
- A320 Family and A330/A340 Family Flight Crew Training Manuals (FCTM) – Normal Operations – Descent – Guidance and Monitoring

This Flight Operations Briefing Note (FOBN) has been adapted from the corresponding ALAR Briefing Note developed by Airbus in the frame of the Approach-and-Landing Accident Reduction (ALAR) international task force led by the Flight Safety Foundation.

This FOBN is part of a set of Flight Operations Briefing Notes that provide an overview of the applicable standards, flying techniques and best practices, operational and human factors, suggested company prevention strategies and personal lines-of-defense related to major threats and hazards to flight operations safety.

This FOBN is intended to enhance the reader's flight safety awareness but it shall not supersede the applicable regulations and the Airbus or airline's operational documentation; should any deviation appear between this FOBN and the Airbus or airline's AFM / (M)MEL / FCOM / QRH / FCTM, the latter shall prevail at all times.

In the interest of aviation safety, this FOBN may be reproduced in whole or in part - in all media - or translated; any use of this FOBN shall not modify its contents or alter an excerpt from its original context. Any commercial use is strictly excluded. All uses shall credit Airbus and the Flight Safety Foundation.

Airbus shall have no liability or responsibility for the use of this FOBN, the correctness of the duplication, adaptation or translation and for the updating and revision of any duplicated version.

Airbus Customer Services

Flight Operations Support and Services

1 Rond Point Maurice Bellonte - 31707 BLAGNAC CEDEX France

FOBN Reference : FLT OPS – DESC – SEQ02– REV03 – OCT. 2006