Proposed Temporary Deviation on FMS Wrong Altitude Predictions in Descent

Applicable to A400M

Introductory note:

The hereby presented Temporary Deviation has been classified as important and as such shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

Statement of issue

This Temporary Deviation is specific to A400M Flight Management System (FMS) and applicable in the scope of the EASA Civil Type Certification.

As per A400M's FMS TC design, the altitude constraints of the descent phase are not taken into account for the computation of the FMS Theoretical Vertical Profile.

As a consequence, the altitude predictions displayed on the Active FPLN (Flight Plan) page of the MFD (Multi Functional Display) can be misleading in descent since they are computed by the FMS according to this Theoretical Vertical Profile.

EASA CS 25.1301(a) requires that:

> *"Each item of installed equipment must -*
> *(a) Be of a kind and design appropriate to its intended function".*

EASA CS 25.1309(a)(1) requires that:

> *"(a) The aeroplane equipment and systems must be designed and installed so that:*
> > *(1) Those required by type certification or by operating rules, or whose improper functioning would reduce safety, perform as intended under the aeroplane operating and environmental conditions"*

EASA consider that compliance with CS 25.1301(a) is not demonstrated for the function which presents altitude predictions displayed on the FMS FPLN page in descent phase of flight. As a result of this, the objectives of paragraph 25.1309(a)(1) are also not demonstrated for this function.

Due to this identified non-compliance, Airbus has requested EASA a Temporary Deviation to allow the A400M aircraft being certified.

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The applicant agrees to improve the A400M design after initial EASA A400M certification to restore compliance with the requirements identified under the statement of issue and this design improvement to be implemented before first aircraft entry into service.

Airbus SAS request EASA to grant meanwhile a Temporary Deviation with regards compliance with CS25.1301(a) and CS25.1309(a)(1) supporting such request on the following mitigations introduced or already available for the particular scenario described on the statement of issue:

1) As stated in the AFM, FMS predictions are for advisory purpose only and altitude clearances must remain a crew responsibility,

2) Due to this advisory use requisite, and as per Airbus' FMS SSA approved by EASA, repercussions of erroneous FMS predictions are MAJOR at worst.

3) A specific AFM limitation has been added to request the crew to select the "EFOB & T.WIND" display option on the Active FPLN page instead of "SPD & ALT" before the beginning of the Descent phase in order to avoid displaying the erroneous altitude predictions.

4) Guidance cues displayed on NTD (Navigation and Tactical Display) provide to the crew the required information to manage the descent. Furthermore, it is considered that crew is more likely to use data on the NTD rather than on MFD (which requires more crew actions). In particular, the ALT ERROR functionality displays in the NTD the altitude difference between the altitude constraint for a given waypoint and the anticipated aircraft altitude when crossing this waypoint, according to the currently engaged vertical guidance selected mode.

As EASA conclusion, a Temporary Deviation for the A400M can be granted by EASA associated to the following condition:

This EASA Temporary Deviation will be valid since initial A400M certification until 31st December 2012 or until first A400M aircraft entry into service, whichever will occur first.