

Deviation Request ETSO-C146c#8 for an ETSO approval for CS-ETSO applicable to Stand Alone Airborne Navigation Equipment Using the Global Positioning System Augmented by the Satellite Based Augmentation System (ETSO-C146c)

Consultation Paper

1 Introductory Note

The hereby presented deviation requests shall be subject to public consultation, in accordance with EASA Management Board Decision No 7-2004 as amended by EASA Management Board [Decision No 12-2007](#) products certification procedure dated 11th 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.”

2 ETSO-C146c#8 Stand Alone Airborne Navigation Equipment Using the Global Positioning System Augmented by the Satellite Based Augmentation System

2.1 Summary of Deviation

Deviate from RTCA/DO-229D 2.2.3.3.1 and provide the deviations relative to the first approach leg instead of the FAF.

2.2 Original Requirement

DO-229D, 2.2.3.3.1, Approach Path Definition:

“If the pilot has selected a VTF approach, deviations shall be provided relative to the inbound course to the FAWP. Full-scale deflection shall be angular or linear as shown in Figure 2-12. The active waypoint shall initially be the FAWP. The equipment should also account for short turns onto the final approach where the FAWP may not be crossed.”

2.3 Industry

The MPS only addresses cases where the approach path is a straight path from the End of Approach (EOA) point through the FAWP, continuing in a straight line outwards to the point commencing the approach segment. For these cases the Universal FMS is totally compliant.

The MPS doesn't discuss approach segments with a Final Approach Course Fix (FACF), nor approaches with course changes within the approach segment. When the procedure dictates a course change at the FAF, the FMS exceeds the MPS requirements by providing deviations relative to the charted course from the FACF to the FAWP.

Background:

Approach procedures utilizing a Final Approach Course Fix (FACF), especially with a change in course from the FACF-to-FAWP leg to the FAWP-to-EOA leg create a special case. Providing deviations relative to the final inbound course in such cases will create a hazardous condition resulting in presenting course guidance to the pilot that totally violates the charted procedure. The FMS recognizes the presence of an FACF as a component of the approach segment. When the segment is a straight line the FMS fully complies with the MPS. When the procedure dictates a course change at the FAF, the FMS exceeds the MPS requirements by providing deviations relative to the charted course from the FACF to the FAWP.

In summary, FMSs provide the capability for pilots to manually activate the FMS approach mode. This function is analogous to the VTF in the MPS. The final inbound course is used to compute deviations where the procedure defines a straight path from the FACF to the FAF or the procedure does not use a FACF.

Where the procedure creates a bent path at the FAF, the FMS will provide correct guidance to the FACF-to-FAF path when the approach is manually activated outside the FAF, which surpasses the MPS requirements

VTF Procedures:

- (1) The pilot presses a line select key labeled "ACT APPR" on the NAV page. This action replaces a dedicated VTF key as called for in the MPS.
- (2) All waypoints outside the FAWP, or the FACF (if present) are sequenced.
- (3) A CF leg is created to the FACF or FAWP.
- (4) When prompted, the pilot presses the "INTERCEPT" line select key.
- (5) FMS Heading Mode (FHDG) is activated and a heading to intercept the CF leg (3) or a published approach leg is set by the flight crew.
- (6) The leg is intercepted and the FMS flies the remainder of the published approach.

FAA Acceptance: This deviation was accepted by the FAA LAACO and AIR-130 during a telecom on 16-Sep-2013.

2.4 Equivalent Level of Safety

Since the published procedure is safe, and the FMS intercepts and flies the remainder of the published procedure, the safety requirement is satisfied.

2.5 Comments on earlier versions of this deviation

On an earlier version of this deviation request THALES AVIONICS SAS commented as follows:

The proposed Equivalent Level of Safety seems to rely on FACF coded on the FAF extended lateral path.

But several published approach procedures show that FACF could be not coded right on the FAF extended lateral path.

In this case, executing a VTF command with such procedures, requests a specific FMS behavior that should be commented in the response.

Furthermore, guiding to the FACF is not equivalent to guiding to the FAF for these procedures. That may lead to unexpected lateral trajectory with impacts on ATC standpoint.

The statement of the applicant was as follows:

The applicant the industry comments provided by Thales on this topic. After reviewing the comments provided on deviation ETSO-C146c#8 , the applicant performed considerable research into the navigation database requirements, MPS requirements, and the performance of the applicants FMS. This research led the applicant to reword the deviation as indicated in above. Following is a brief summary of the currently worded deviation.

As stated above (ref to DO-229D), the MPS only addresses cases where the approach path is a straight path from the End of Approach (EOA) point through the FAWP, continuing in a straight line outwards to the point commencing the approach segment. For these cases the FMS is totally compliant.

The MPS doesn't discuss approach segments with a Final Approach Course Fix (FACF), nor approaches with course changes within the approach segment. When the procedure dictates a course change at the FAF, the FMS exceeds the MPS requirements by providing deviations relative to the charted course from the FACF to the FAWP.

Equivalent Level of Safety: Since the published procedure is safe, and the FMS intercepts and flies the remainder of the published procedure, the safety requirement is satisfied.

2.6 EASA position

The deviation in the new formulation is accepted.