

**Deviation F-42 to CS 25.1301, 25.1309 and 25.1322 regarding “Speed Brakes Extended”  
caution message during steep approach landings (SAL)**

**Applicable to Gulfstream G280**

**Introductory note:**

The following Deviation 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 the Issue:**

As per G280 certified type design, during normal operation, when the speed brakes are extended with the throttle above idle, the amber caution message “Speed Brakes Extended” will inform the flight crew of an abnormal and potentially unsafe configuration, requiring crew action (such as the speed brakes retraction or the thrust reduction).

A major change supporting the steep approach landing capability on the G280 is currently under certification. This change requires no airplane structural or system architecture modification beside specific operational procedures where the speed brakes are extended by crew action during steep approach landings (SAL) while the thrust is above idle. This configuration triggers the caution message “Speed Brakes Extended” but the crew is directed to ignore it, without any specific action, during the whole approach.

The Caution alert is a nuisance alert during SAL and is systematically triggered. This design is therefore not compliant with CS 25.1322 (d)(1). Directing the crews to ignore a Caution alert is not in line with the CS 25.1322 requirement: it reduces the flight crew's confidence in the alerting system, and affects their reaction in case of a real alert.

The “Speed Brakes Extended” caution message, as it appears currently in the G280 EICAS configuration, provides the crew with notification that the speed brakes are extended with the thrust lever not in idle position. This caution CAS message was created for the G280 to achieve a Gulfstream Large Cabin cockpit “look and feel”, strictly to achieve a certain level of commonality between the Gulfstream models and not out of necessity.

Notwithstanding this point, receipt of this caution message either during a SAL or in any other phase of flight merely, as the CS requirement states, makes the flight crew aware of the configuration and indicates the possible need for future corrective action. There may in fact be no need for any corrective action in the phase of flight and the pilot's intentions. The message is only provided for awareness.

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The applicant is requesting a time limited deviation of 4 years from now, as a modification of the caution message logic is, at the moment, difficult to realize. The design change to remove the "Speed Brakes Extended" caution CAS message requires a change to the Integrated Modular Avionics (IMA) software. The development and certification cycle for IMA software is both lengthy and costly. The applicant is currently working with Rockwell Collins, the IMA supplier, to finalizing the scope of the next planned revision of the IMA software. From the experience during the original aircraft certification which included avionics software version 3.2.1, as well as the subsequent TC MOD incorporating Avionics software version 3.6 a three to four years period is required which includes; software development, impact analysis, safety analysis, software testing, aircraft testing, certification (and validations) and ultimately fleet retrofit.

Any EU aircraft which have purchased the SAL AFMS will be upgraded within one year of the software fix certification or within four years from approval of the time limited deviation, whichever occurs first.

Nevertheless the fix will be available to the entire fleet, regardless of whether an operator has opted for the SAL package, via recommended Service Bulletin.

This deviation is supported by the following elements ;

1. The applicant demonstrate that the risk has been analysed, quantified and all reasonable actions have been taken to mitigate the risk, and
2. There should be a plan, acceptable for the Agency, to remove the non-compliance in a reasonable timeframe.

#### 1- Analysis of the risk

The applicant shall identify all effects of the nuisance caution message during steep approach landings. The applicant, in their position, need to include full details of the consequences to the flight crew causing the nuisance caution message and the level of exposure in terms of aircraft delivered to EU operators, flight hours etc. before the re-design is embodied. The applicant also need to detail any mitigation that reduces the exposure to the risk identified as pilot training, AFMS, etc. prior to steep approach operation. The applicant must demonstrate that the risks due to the nuisance caution message on the G280 aircraft in its current configuration will not exceed those currently known and accepted for existing transport category aircraft. If mitigations are available to support this demonstration, then these should be included in the safety assessment.

The applicant offers below the following justification and substantiation for granting this time limited deviation and how the current type design provides an acceptable level of safety for the interim period of this deviation:

The caution CAS message was created for the G280 to achieve a Gulfstream Large Cabin cockpit "look and feel", i.e. strictly to achieve a certain level of commonality between the Gulfstream models and not out of necessity. However, the existing message does not pose an increased operational risk detrimental to safety, based on the following:

- In the normal operations – the caution message makes the flight crew aware of the configuration and indicates the **possible** need for future corrective action.
- In the SAL operations – there are several arguments as described in the applicant position from 09 September, 2016:

- A SAL dedicated AFM Supplement (AFMS) has been prepared for EASA approval. The AFMS provides very clear guidance regarding the expected receipt of this CAS message when configuring the aircraft for SAL.
- Prior to approval for SAL, per requirements to be established in the EASA OSD-FCD, each flight crew member must complete SAL training, the content of which will cover the AFMS and this CAS message.
- The AFMS required flight crew briefing before each SAL will, among other items, review the AFMS procedure and the expected CAS message.
- Per the SAL AFMS, following stabilizing on final descent inside the final approach fix, the receipt of any subsequent Master Caution / Warning requires the SAL be aborted
- During extensive SAL certification flight tests the stability of the CAS message was demonstrated repeatedly. To further ensure the message stability during the descent along the glide slope, all SALs shall be conducted with Auto Pilot and Auto Throttles engaged per the requirements of the AFMS.
- Given the clear AFMS guidance, flight crew training and crew briefing mentioned above, it is very improbable that the flight crew would be “misled” by the CAS message during the short time between placing the aircraft in the SAL configuration and landing.
- There are currently only three (3) G280 aircraft under EU registration. Using the G150 as a benchmark, of the 9 EU registered G150 aircraft in service only two purchased the SAL option. From data obtained from London City Airport (LCY), over the past two years G150 EU registered aircraft have landed at LCY 1.5 time per year on average per aircraft.

## 2- Compliance restoration

The applicant shall provide a plan for the design, certification and embodiment of the changes acceptable by EASA. This plan must describe any modifications required, a development and certification programme including agreed timescales, which are compatible with the requested period of the deviation. The plan shall cover both production and in-service aircraft (retrofit)

The "Speed Brakes Extended" caution message, which appears when the speed brakes are extended with the thrust lever not in idle position, will be changed to a status message since it was not required as an alert in any phase of flight.

- In normal approaches – there are several functions that provide the flight crew warnings before reaching the stall speed:
  - Auto throttle, which is most commonly used, advances to provide enough thrust to overcome speed brakes drag, up to a point when Speed brakes retract automatically (see below).
  - During manual throttle operation, if airspeed is not maintained or monitored with speed brakes extended, there are three more safe guards:

- Underspeed indication (Caution CAS message) appears when the aircraft speed is below Vref.
  - Pitch limit indicator appears on PFD (and HUD if installed) prior to stick shaker.
  - Stall warning
  - Stick Pusher
- If there is a need to Go Around, the speed brakes are retracted automatically when either of the thrust levers is advanced to CLB or when TOGA is selected.

The use of caution message "Speed brakes extended" is not necessary for the stall protection and the features above provide safe margin from stall, it is used as a status indicator of the speed brakes position.

- In Steep Approach – the speed brakes extended are mandatory.

The applicant believes that the above arguments favor a time limited deviation to CS 25.1301, 25.1309 and CS 25.1322 until the deletion of the Amber CAS message "Speed brakes extended" in the next avionic software version.