

**SUBJECT** : Degraded flight instrument external probe heating system

**REQUIREMENTS incl. Amdt.** : CS 25.1326(b)(2) at Amdt. 21

**ASSOCIATED IM/MoC<sup>1</sup>** : Yes ☐ / No ☒

**ADVISORY MATERIAL** : AMC 25.1326

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<sup>1</sup> Associated Interpretative Material and/or Means of Compliance may be published for awareness only and they are not subject to public consultation.

**INTRODUCTORY NOTE:**

The following Equivalent Safety Finding (ESF) has been classified as important and as such is subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) 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."*

**ABBREVIATIONS:**

ADS	Air Data System
ADSP	Air Data System Probes
AFM	Aeroplane Flight Manual
AOA	Angle Of Attack
CAS	Crew Alerting System
CMR	Certification Maintenance Requirements
DFCS	Digital Flight Control System
ICA	Instruction for Continued Airworthiness
IRS	Inertial Reference System
SFD	Secondary Flight Display
TAT	Total Air Temperature

**IDENTIFICATION OF ISSUE:**

The Dassault Aviation Falcon 6X is equipped with Air Data System Probes (ADSP), Total Air Temperature (TAT) probes and Angle Of Attack (AOA) vanes. Those probes are equipped with heating systems that require compliance with CS 25.1326(b)(2) at Amdt 21 "Flight instrument external probes heating systems alert".



**ESF-F25.1326-01****Equivalent Safety Finding****ADS degraded flight instrument external probe heating system****1. APPLICABILITY**

This ESF is applicable to CS-25 Large Aeroplanes.

**1.1 AFFECTED CS**

CS 25.1326(b)(2) at Amdt 21. Flight instrument external probes heating systems alert

**2. COMPENSATING FACTORS**

Dassault Aviation Falcon 6X ADSP and TAT probe heating system, although not literally compliant with CS 25.1326(b)(2) for certain failure modes leading to degraded anti-icing performance, may be installed and safely operated within the aircraft flight envelope provided that the below compensating factors are complied with.

**a. For ADSP**

1. The failure of one ADSP heater having an effect on operational capability or safety shall be detected, based on the following logics
  - If the degraded heating leads to small bias below the DFCS monitoring threshold, there is no effect on operational capability or safety and the aircraft will pursue the flight safely and so as per AMC 25.1326, there is no need to provide alert to the crew.
  - If the degraded heating leads to bias higher than the DFCS monitoring threshold (erroneous data), the DFCS monitoring system allows to detect the erroneous ADS data and trigger a root cause for dispatch purpose and possibly a caution CAS message "ADS x: FAIL".
2. The DFCS shall embed sufficient monitoring capabilities that enable 2 ADS erroneous data not to have higher than hazardous consequences and may trigger a caution CAS message "ADS x+y: FAIL" (e.g., subsequent failures) or a warning CAS message "ADS: ALL UNRELIABLE" (e.g., simultaneous failures).
3. In case of 3 or more ADS erroneous data there shall be sufficient monitoring capabilities that may trigger a warning CAS message "ADS: ALL UNRELIABLE".
4. the Instructions for Continued Airworthiness (ICA) shall include:
  - maintenance tasks checking the probe heating system following the generic ADS fault messages triggered to avoid latent failures remaining in the system.
  - a scheduled maintenance task (through a Certification Maintenance Requirement (CMR)) aimed at checking the ADSP heater in order to detect potential latent failures modes degrading the anti-icing/de-icing capability. The CMR interval shall adequately compensate the duration of operation with the latent failure(s).

**Notes:** With those CAS messages, pilots would be aware of a failure of the ADS but would not be informed of the origin of the failure.

The AFM procedures associated to CAS message “ADS x(+y): FAIL” and “ADS x(+y): PROBE HEAT FAIL” require the same pilot actions: reversion to the valid ADS/IRS source or disregard of ADS driven parameters in SFD, as applicable.

The AFM procedure associated to CAS “ADS: ALL UNRELIABLE” does not require different pilot action whether it is an ADS failure or an ADSP heater failure that drives this CAS message.

**b. For TAT Probes**

1. The failure of one TAT heater – leading to 2 erroneous temperature data - having an effect on operational capability or safety shall be detected. The crew is aware of erroneous TAT thanks to the caution CAS message “ADS: TAT MISCOMPARE”.
2. In case of 3 or more erroneous temperature data, there shall be sufficient monitoring capabilities that may trigger a caution CAS message “ADS: TAT MISCOMPARE” leading the crew to leave icing conditions which is considered as major.
3. the Instructions for Continued Airworthiness (ICA) shall include:
  - maintenance tasks checking the probe heating system following the generic TAT fault messages triggered to avoid latent failures remaining in the system
  - a scheduled maintenance task (through a Certification Maintenance Requirement (CMR)) aimed at checking the TAT heater in order to detect potential latent failures modes degrading the anti-icing/de-icing capability. The CMR interval shall adequately compensate the duration of operation with the latent failure(s).

**Note:** In case of triggering of the CAS message “ADS: TAT MISCOMPARE”, the procedure differs from “ADS x+y: TAT HEAT FAIL” and the pilot is required to avoid or leave the icing conditions and increase speed and landing distance.