



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: Information: Equivalent Level of Safety Finding for the Alenia Aeronautica Model C-27J
FAA Project Number TC0371IB-T

Date: June 9, 2010

Reg Ref: 14 CFR 25.1549

From: Manager, Propulsion/Mechanical Systems Branch,
ANM-112
Transport Standards Staff

Reply to
Attn of: Michael Collins
ANM-112

To: Manager, International Branch, ANM-116

ELOS
Memo #: TC0371IB-T-P-2

Background

Title 14 Code of Federal Regulations Section 25.1549 requires, for each Powerplant and Auxiliary Power Unit (APU) instrument as appropriate to the type of instrument –

- (a) Each maximum and, if applicable, minimum safe operating limit must be marked with a red radial or a red line;
- (b) Each normal operating range must be marked with a green arc or green line, not extending beyond the maximum and minimum safe limits;
- (c) Each takeoff and precautionary range must be marked with a yellow arc or a yellow line; and
- (d) Each engine auxiliary power unit or propeller speed range that is restricted because of excessive vibration stresses must be marked with red arcs or red lines.

The Alenia C27J APU's Revolutions Per Minute (RPM) and Exhaust Gas Temperature (EGT) have digital readouts which are part of the overhead APU control panel located in the flight deck. The readouts consist of a three digit, fixed colors numeric display.

Applicable regulation(s)
§ 25.1549

Regulation(s) requiring an ELOS
§ 25.1549

Description of compensating design features or alternative standards that allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

1. RPM

The following Advisory, Caution, And Warning System (ACAWS) messages are displayed according with the relevant RPM status:

- APU OVERSPEED illuminates whenever APU RPM > 105%
- APU UNDERSPEED illuminates whenever APU RPM < 97%

The APU is automatically commanded to shut down by the Full Authority Digital Engine Control (FADEC) when the RPM reaches 105% or drops down to 95%.

All these messages are yellow since no immediate crew action is required

2. EGT

The following ACAWS message is displayed according to the relevant EGT status:

- APU EGT OVERTEMPERATURE (yellow)

This message is accompanied by the following FADEC logic:

ON GROUND

- The FADEC automatically shuts down the APU on ground if the EGT ≥ 927 °C during start, or if EGT ≥ 718 °C for 3 seconds or EGT ≥ 788 °C for 0.5 seconds.

IN FLIGHT

- In case the EGT exceeds the same limits as above only the ACAWS message “APU EGT OVERTEMPERATURE” is displayed and no automatic shutdown is performed.
- APU shutdown is at the pilot’s discretion, depending upon if a greater emergency exists which could require APU to be operated.

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

The design features mentioned above assure a safety level equal to the requirements of § 25.1549. The ACAWS messages listed above also come with an aural warning for the pilots, which is not required by § 25.1549. This will assure prompt awareness by the flight crew, if the APU is being operated in an unsafe manner or condition.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned equivalent level of safety finding as documented in Issue Paper P-2. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport Airplane Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section. [e.g., Equivalent Safety Findings have been made for the following regulation(s):

§ 25.1549 requirements applicable to engine torque indications (documented in TAD ELOS Memo TC0371IB-T-P-2)]



JUNE 9, 2010

Manager, Propulsion/Mechanical Systems Branch, ANM-112
Transport Standards Staff

Date

ELOS Originated by: Standards Staff, Propulsion Branch	Project Engineer: Michael Collins	Routing Symbol: ANM-112
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