Federal Aviation Administration

Memorandum

Date:	October 24, 2011
To:	Manager, Atlanta Aircraft Certification Office, ACE-115A
From:	Manager, Transport Airplane Directorate, ANM-100
Prepared by:	Darby Mirocha, ACE-118A
Subject:	Information: Equivalent Level of Safety Finding for the Oil Fire Detection System on the Gulfstream Model GVI Series Aircraft (FAA Project TC8700AT-T)
Memo No.:	TC8700AT-T- P-8
Reg. Ref.:	§§ 21.21(b)(1) and 25.1203(d)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Gulfstream Model GVI airplane.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.1203(d) states that "there must be means to allow the crew to check, in flight, the functioning of each fire or overheat detector circuit". The oil fire detection function of the BR700-725A1-12 engine control system installed on the Gulfstream GVI model aircraft, does not allow the crew to check its functioning during flight. Although the fire zone compartment detector portion of the fire/overheat system can be fully tested in flight, and complies with § 25.1203(d), the inability to initiate a test of the oil fire detection circuit in flight does not satisfy the testing provisions of this rule.

Applicable regulation(s)

§§ 21.21(b)(1) and 25.1203(d)

Regulation(s) requiring an ELOS

§ 25.1203(d)

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

The oil fire detection system on the Rolls-Royce Deutschland BR700-725A1-12 engines installed on the GVI model aircraft ensures that the engine does not overheat in case of an oil fire in the rear bearing chamber.

The oil fire sensor comprises two co-located thermocouples, providing an independent temperature measurement to each channel of the electronic engine controller (EEC). The measurements are used to provide a warning of excessive low pressure (LP) turbine cooling air temperature to the flight crew, which could result from a rear bearing oil fire. The EEC transmits the oil fire warning indication to generate a warning message in the cockpit (with an associated procedure), if overheating is detected by both thermocouples.

The condition of the oil fire detection system is continuously monitored by the EEC from power-up. Any system fault generates a corresponding maintenance message. The flight deck effect will depend on the detected fault and associated dispatch condition. In normal operation, if faults affecting only one channel are detected, then a cockpit message associated with a time limited dispatch condition will be triggered, and if faults affecting both channels are detected, then a cockpit message associated with a Do Not Dispatch condition will be generated.

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

The operating condition of the oil fire detection scheme is continuously monitored by the EEC from power-up. If an overheat condition is detected by the thermocouples, the EEC sends a discrete signal to the flightdeck avionics to generate a red crew advisory system (CAS) warning message in the cockpit, with an associated procedure. Likewise, if any system fault occurs, depending on the fault type and number of affected channels, a maintenance message and the appropriate CAS message will be generated.

Based on these full time detection and system fault monitoring capabilities and features, the need to provide a means to allow the flight crew to be able to directly check the oil fire system's functioning in flight is no longer necessary as the intent of the regulation will be met.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned ELOS finding in project Issue Paper P-8. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The TAD 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. An example of an appropriate statement is provided below.

Equivalent Safety Findings have been made for the following regulation(s):

§ 25.1203(d), “Fire-detector System” (documented in TAD ELOS Memo TC8700AT-T-P-8).

Original Signed by
Victor Wicklund for

Manager, Transport Airplane Directorate, Aircraft Certification Service	October 28, 2011 Date

ELOS Originated by ACO:	Darby Mirocha, ACE-118A	