



Federal Aviation Administration

Memorandum

Date: March 22, 2013

To: Thomas Boudreau, Manager, Engine Certification Office, ANE-140

From: Robert Ganley, Acting Manager, Engine and Propeller Directorate, ANE-100

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Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for General Electric Aviation's project on CT7-2E1 Engines, FAA Project #AT3011EN-E

ELOS Memo Number: AT3011EN-E-P-4

Regulatory Reference: 14 CFR §§ 21.21 (b)(1), 21.101 (b)(1), 33.28 and 33.91

This memorandum informs the Engine Certification Office of an evaluation made by the Engine and Propeller Directorate on the establishment of an equivalent level of safety finding for the CT7-2E1 engine.

Background

The CT7-2E1 engine model is a derivative engine based on the certified models in the CT7 family, which were certified between 1977 and 2010. Compliance to 14 CFR §§33.28 and 33.91 will be shown by an ELOS for several components because the history and documentation back to the original certification/qualification testing cannot be found.

Applicable Regulations

14 CFR §§ 21.21 (b)(1), 21.101 (b)(1), 33.28 and 33.91

Regulations requiring an ELOS finding

14 CFR §§ 33.28 and 33.91

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

FAA identified the following compensating factors that were addressed by GE in their showing of compliance:

1. The CT7-2E1 ELOS components operating conditions, including temperatures, pressures and vibratory forces, must be no more severe than those of the legacy CT7 engine models.
2. The CT7-2E1 ELOS components and features must have been flown 29 million hours on CT7/T700 engine models without events that would adversely affect compliance with 33.28 and 33.91 requirements.
3. The operating conditions and environmental exposure of the legacy components of CT7 engine models must satisfy the requirements of 33.28 and 33.91.

In addition, GE must identify criteria (for example, operating environment, metrics) for the reliability and safety of the legacy design in order to finalize the following compensating factor:

4. The reliability and safety of the legacy design as applicable to 33.28 and 33.91 must be directly applicable to the CT7-2E1 application,

GE provided data that complied with the compensating factors listed above. Certification testing will be done to verify the changed portions of the 4 components which are being modified.

Explanation of how designs provide an ELOS

Over the 35 years since original certification of the CT7 engine, millions of hours of successful component flying time have been accumulated in combined commercial and military operation. The components have demonstrated reliable field history which meets the intent of certification bench testing and which exceeds any bench or test cell endurance testing. The designs are being substantiated against the flying history and, in some cases, supported by non-conformed military testing. Four of the five subject previously-certified components will be undergoing a minor design change. However, the changes in design are minor and the hardware is similar but not identical. For the changed portions of the 4 components with changes, specific component tests and analyses will be performed per 14 CFR Part 33, § 33.91 substantiation compliance matrix described in Preliminary Type Certification Board Meeting (PTCBM) and Project Specific Certification Plan (PSCP).

GE has researched the comparable environmental conditions, the nature of the designs and the 14 CFR changes that have occurred over the years (1974 to date). When all these issues are comprehensively examined the basis for an ELOS seems appropriate as meeting the level of safety intended by the regulation.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned equivalent level of safety in Project Issue Paper P-4, dated September 17, 2012. This memorandum provides standardized documentation for the ELOS that is non-proprietary and can be made available to the public. The Accountable Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of the ELOS. This ELOS Memorandum number must be listed in the

type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) or in the Limitations and Conditions section of the STC. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulations:

14 CFR §§ 33.28 Electrical and electronic engine control systems and 33.91 Engine component tests (documented in ELOS Memo AT3011EN-E-P-4)

Manager, Accountable Directorate
Aircraft Certification Service

Date

ELOS Originated by ACO: ECO	ACO Manager Thomas Boudreau	Routing Symbol ANE-140
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