

SUBJECT : Equivalent safety finding for Lack of Functional Indication of ATTCS Operation

REQUIREMENTS incl. Amdt. : CS 25.117, 25.119(a), 25.121(d), 25.904, 25.1309, CS 25 Appendix I amdt. 15

ASSOCIATED IM/MoC : Yes / No

ADVISORY MATERIAL : /

INTRODUCTORY NOTE:

The Equivalent Level of Safety (ELOS) finding Memo TXTAV-014180-P-37 has been issued by the FAA for the Textron Aviation project 700 (FAA TCDS T00015WI) for Amendment 25-115 of Title 14, Code of Federal Regulations (14 CFR) 25.904 and part 25, appendix I, §§ 125.5(b)(3) and 125.6(a). The corresponding CS 25.904 and, appendix I, §§ 125.6(c) and 125.7(a). has the equivalent wording. The ELOS Memo is considered by EASA an acceptable Equivalent Safety Finding (ESF) to the corresponding requirements CS 25.904 and, appendix I, §§ 125.6(c) and 125.7(a). This ESF has been classified as important; as such it shall be 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."

Note: this consultation is for the EASA ESF and not for the FAA ELOS Memo. Comments and the corresponding resolution will affect the EASA ESF only.

IDENTIFICATION OF ISSUE:

See "background" in ELOS Memo "TXTAV-014180-P-037" attached.

Considering the above, the following Equivalent Safety Finding is proposed:

**Equivalent Safety Finding “ESF-E25.904-01” to CS 25.904 and, appendix I, §§ I25.6(c) and I25.7(a).
Amdt 15 for Lack of Functional Indication of ATTCS Operation**

1. APPLICABILITY

Textron Aviation Inc. Model 700.

1.1 Affected CS

CS 25.904 and, appendix I, §§ I25.6(c) and I25.7(a). Amdt 15

1.2 Pre-Conditions for Application of the Deviation

None

2. Intent of the CS, compensating Factors

See section “**Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)**” and “**Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation**” in the ELOS Memo “TXTAV-014180-P-37” attached.

3. Attachments

Faa ELOS Memo "TXTAV-014180-P-37".



Federal Aviation Administration

Memorandum

Date: January 8, 2018

To: Manager, Wichita ACO Branch, AIR-7K0

From: Manager, Transport Standards Branch, AIR-670

Prepared by: Jeffrey Englert, AIR-7K2

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Lack of Functional Indication of ATTCS Operation on a Textron Aviation Inc. Model 700 airplane, FAA Project # TXTAV-014180

ELOS Memo #: TXTAV-014180-P-37

Regulatory Ref: 14 CFR 25. 25.904 and part 25, appendix I, §§ I25.5(b)(3) and I25.6(a)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Standards Branch (TSB) on the establishment of an equivalent level of safety (ELOS) finding for the Textron Aviation Inc. (Textron) Model 700 airplane.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.904 and part 25, appendix I, §§ I25.5(b)(3) and I25.6(a) require the Automatic Takeoff Thrust Control System (ATTCS) to provide notification to the flightcrew, prior to takeoff that the ATTCS is in a condition to operate. Section 25.904 states, "Each applicant seeking approval for installation of an engine power control system that automatically resets the power or thrust on the operating engine(s) when any engine fails during the takeoff must comply with the requirements of Appendix I of this part." Section I25.5(b)(3) states: "(b) The ATTCS must be designed to: (3) Provide a means to verify to the flightcrew before takeoff that the ATTCS is in a condition to operate; ...". Section I25.6(a) states: "In addition to the requirements of Sec. 25.1305: (a) A means must be provided to indicate when the ATTCS is in the armed or ready condition; ...". The applicant's system does not indicate ATTCS functional status, unless the system is turned off or has failed.

Applicable regulations

14 CFR 25.904 and part 25, appendix I, §§ I25.5(b)(3) and I25.6(a)

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Regulation(s) requiring an ELOS finding

14 CFR 25.904 and part 25, appendix I, §§ I25.5(b)(3) and I25.6(a)

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

The compensating factors that provide an ELOS for the regulations not complied with are as follows:

- The normal airplane flight manual (AFM) operating procedure will leave ATTCS armed at all times.
- The full authority digital engine control (FADEC) integrates ATTCS functionality with no separate circuitry required to enable it.
- When the ATTCS function is manually selected off, the “Power Reserve Auto” switch is illuminated “OFF”, an amber crew alerting system (CAS) message “AUTO PWR RSV OFF” is displayed, and an aural alert is sounded. The Master Caution alert is illuminated, which the crew is then required to reset via the separate Master Caution reset switch.
- Likewise, in the event of any failure of the “Power Reserve Auto” switch or wiring that would also command the ATTCS off, an amber CAS message “AUTO PWR RSV OFF” is displayed, an aural alert is sounded. The Master Caution alert is illuminated, which the crew is then required to reset via the separate Master Caution reset switch. However, the Power Reserve Auto switch is not illuminated.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The compensating factors raise the level of safety to that required by § 25.904 and part 25, appendix I, §§ I25.5(b)(3) and I25.6(a). On the Model 700, the FADEC integration of ATTCS ensures that it is armed and ready at all times, unless turned off by the flightcrew or degraded. The AFM procedures are written such that the flightcrew no longer has to verify that the system is operational, armed or ready and only is provided an indication when the system is in a non-normal condition. AFM crew procedures direct the flightcrew how to address non-normal conditions. The flightcrew is trained to follow these AFM procedures for ATTCS usage.

In combination with the design features above, the ATTCS will be shown to meet the applicable safety requirements without an armed indication. Per § 25.904, a safety analysis will show that the probability of failure of the ATTCS will meet the requirements of an improbable event per appendix I25.3(a)(1), so that maximum approved takeoff thrust is available when needed during the critical time interval. Also per § 25.904, the failure of ATTCS will be shown to be an extremely improbable event, not to cause a significant reduction in thrust per appendix I25.3(a)(2). A combination failure of ATTCS with an engine failure will also be shown to be an extremely improbable event per appendix I25.3(b) requirements of § 25.904 via a safety analysis.

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ATTCS will, therefore, be available when required. Finally, the ATTCS annunciation of failures will also meet the safety requirements of §§ 25.1309(b) and 25.1309(c).

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper P-37, titled Lack of Functional Indication of ATTCS Operation. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TSB has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

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

14 CFR 25.904, Automatic takeoff thrust control system (ATTCS),

14 CFR part 25 appendix I, § I25.5(b)(3), Installation of an Automatic Takeoff Thrust Control System (ATTCS) Powerplant Controls, and

14 CFR part 25 appendix I, § I25.6(a), Installation of an Automatic Takeoff Thrust Control System (ATTCS) Powerplant Instruments.

(documented in TSB ELOS Memorandum TXTAV-014180-P-37)

CHRISTOPHER R PARKERDigitally signed by CHRISTOPHER R PARKER
Date: 2018.01.08 07:03:35 -08'00'Transport Standards Branch
Policy & Innovation Division
Aircraft Certification Service

Date

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