Federal Aviation Administration

Memorandum

Date: January 25, 2013

To: Scott A. Horn, Acting Manager, Rotorcraft Certification Office, ASW-170

THRU: Larry M. Kelly, Manager, Rotorcraft Standards Staff, ASW-110

From: Kim Smith, Manager, Rotorcraft Directorate, ASW-100

Prepared by: George Harrum, Aircraft Safety Engineer, ASW-170

Subject: INFORMATION: Equivalent Level of Safety (ELOS) finding for Bell Helicopter Textron, Inc.'s Supplemental Type Certificate for the Engine & Glass Cockpit Upgrade on Bell 412EP, ODA STC Project No. ST0025RC-RD

ELOS Memorandum Number ST0025RC-RD/S-2

Regulatory Ref: 14 CFR §§ 29.1333(a) and (b), and 14 CFR §§ 29 Appendix B VIII. (b)(5)(i) and (ii)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Accountable Directorate on the establishment of an ELOS finding for the Bell Helicopter Textron, Inc. (BHTI) Model 412EP Engine and Glass Cockpit Upgrade project.

Background

BHTI has applied to the FAA for an ELOS finding for a similar design on the Model 429 to address the pilot instrument display as regards to 14 Code of Federal Regulations (CFR) §§ 29.1333(a) and (b), and 14 CFR Part 29 Appendix B, VIII.(b)(5)(i) and (ii).

14 CFR 29.1333(a) and 14 CFR Part 29 Appendix B, VIII.(b)(5)(i), requires for systems that operate the required flight instruments at each pilot's station, only the required flight instruments for the first pilot may be connected to that system. 14 CFR 29.1333(b) and 14 CFR Part 29 Appendix B, VIII.(b)(5)(ii), requires additional instruments, systems or equipment may not be connected to an operating system for a second pilot unless provisions are made to ensure the continued normal functioning of the required instruments in the event of any malfunction of the additional instruments, systems or equipment which is not shown to be extremely improbable. The requirements of 14 CFR Appendix B VIII.(b)(5)(i) and (ii) were intended to apply when electromechanical flight instruments were required when Instrument Flight Rule (IFR) approval of design and installation was being sought in Part 29 rotorcraft.

Due to the increased complexity of instrumentation that was available and being used, it was considered appropriate to amend the provisions of this requirement to consider the extreme range of operational environments to which rotorcraft were being exposed. The intent of 14 CFR 29.1333(a) and 14 CFR Part 29 Appendix B, VIII.(b)(5)(i) is to prevent degrading of the first pilot's instrument system, or the only pilot's instrument system in a single-pilot-approved (SPIFR) rotorcraft, by not permitting peripheral systems to be connected to it. 14 CFR 29.1333(b) and 14 CFR Part 29 Appendix B, VIII.(b)(5)(ii) additionally requires that equipment must not be connected to operating systems for the second pilot's required instruments, unless it is extremely improbable that failure of such additional equipment would affect that operating system.

Applicable regulation(s)

14 CFR §§ 29.1333(a) and (b), and 14 CFR §§ 29 Appendix B, VIII.(b)(5)(i) and (ii)

Regulation(s) requiring an ELOS finding

14 CFR §§ 29.1333(a) and (b), and 14 CFR §§ 29 Appendix B, VIII.(b)(5)(i) and (ii)

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)

1. The pilot's display, although connected to both Attitude and Heading Reference System (AHRS) units and both Air Data Computer (ADC) units uses separately buffered data busses so that failure of the cross-side pilot (co-pilot) system does not affect the on-side pilot's system. The opposite system connections follow the same scheme.

2. The AHRS and the ADC provide a third set of separately buffered data busses to support other peripheral equipment, kits or customizing so that these connections will not interfere with those signals supporting primary flight displays at either pilot's station.

3. This architecture provides the equivalent to the required separation stated in the rule and at the same time ensures the redundancy needed for integrating the systems providing combined indication functions.

4. A System Safety Assessment has been performed for the proposed architecture such that the probability of loss of display or display of misleading attitude, airspeed, or altitude information is extremely improbable.

Explanation of how design features or alternative Methods of Compliance (MoC) provide an ELOS to the level of safety intended by the regulation

14 CFR part 29.1333(a) and (b), and 14 CFR part 29 Appendix B, VIII.(b)(5)(i) and (ii), requires (i) isolation of the pilot's flight instruments from other systems, and (ii) additional instruments, systems or equipment may not be connected to an operating system for a second pilot unless

provisions are made to ensure the continued normal functioning of the required instruments in the event of any malfunction of the additional instruments. The Rotorcraft Standards Staff has determined that the system architecture, as designed and installed, in lieu of literal compliance with the requirements of 14 CFR part 29.1333(a) and (b), and 14 CFR part 29 Appendix B, VIII.(b)(5)(i) and (ii), shows an ELOS to the rule through electrical isolation, circuit protection, and redundancy.

FAA approval and documentation of the ELOS finding:

The FAA has approved the aforementioned ELOS finding in project issue paper S-2. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Accountable Directorate has assigned a unique ELOS memorandum number (ST0025RC-RD/S-2) to facilitate archiving and retrieval of this ELOS. This ELOS memorandum number must be listed in the Limitations and Conditions section of the STC. An example of an appropriate statement is provided below.

ELOS findings have been made for the following regulation(s):

14 CFR §§ 29.1333(a) and (b), and 14 CFR §§ 29 Appendix B, VIII.(b)(5)(i) and (ii) Electronically Integrated Flight Instrument Systems (documented in ELOS Memorandum ST0025RC-RD/S-2)

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1/25/2013
Date

ELOS Originated by ACO: Rotorcraft Certification Office	ACO Acting Manager Scott A. Horn	Routing Symbol ASW-170