Federal Aviation Administration

Memorandum

Date: September 27, 2012

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

THRU: Larry Kelly, Manager, Standards Staff, ASW-110

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

Prepared by: Andy Gardos, Flight Test Analyst, 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 Memo No. ST0025RC-RD/F-2

Regulatory Ref: 14 CFR §§ 29.1545(b)(2)

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

Background

BHTI intends to modify the 412EP Helicopter by Supplemental Type Certificate (STC) to include the PT6T-9 Engine, and a Glass Cockpit using the *Bell BasiX-Pro*® integrated avionics system from the Bell Model 429. The new modern glass cockpit, which uses elements common to the Bell 429, provides the display capability required by installation of the new engine.

The Model 412EP Engine and Glass Cockpit Upgrade has a V_{NE} (power-off) that is less than V_{NE} (power on), but the V_{NE} (power-off) is not depicted with a red, crosshatched radial line, as required by 14 CFR 29.1545(b)(2).

The Bell 412EP Engine and Glass Cockpit Upgrade displays airspeed on an electronic display unit, which offers several advantages to improve the presentation and readability of the instrument. The V_{NE} is automatically calculated as a function of density altitude, which is therefore displayed to the pilot, without need for reference to a V_{NE} placard. Further, the electronic display can automatically sense engine failures and can reconfigure the V_{NE} display accordingly.

While such features of electronic displays are considered advantages over traditional mechanical indicators, the requirements of 14 CFR 29.1545(b)(2) is prescriptive. If not met, compliance must be shown as documented through a finding of an Equivalent Level of Safety (ELOS).

BHTI applied to the FAA and was granted an ELOS for a similar design on the Model 429 to address the airspeed indicator and requirements of 14 CFR 27.1545(b)(2).

Applicable regulation(s)

14 CFR §§ 29.1545(b)(2)

Regulation(s) requiring an ELOS finding

14 CFR §§ 29.1545(b)(2)

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)

The use of the Air Data Computers (ADCs) to compute V_{NE} based on aircraft and environmental conditions provides the pilot with more accurate data than a statically defined V_{NE} marking. These compensating factors include:

- V_{NE} is automatically calculated as a function of density altitude (by the Aircraft Data Interface Unit (ADIU) using data received from the ADCs, engine control units and sensors available directly to the unit) without the need for reference to a V_{NE} placard.
- The electronic display automatically senses engine failures (using the same logic in the ADIU used to control the presentation of the Power Situation Indicator (PSI) Engine Indicating and Crew Alerting System (ICAS) and can reconfigure the V_{NE} display accordingly.
- The proposed solid red radial line clearly indicates the relevant V_{NE} to the pilot for the appropriately sensed condition.

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

The FAA agrees with the compensating factors for this design and recognizes the value and benefit of displaying the red V_{NE} radial at the appropriate position on the indicator. This provides visual and aural alerting, as opposed to relying on a placard and flight manual limitation which has been the traditional methodology. The FAA finds that the use of ADCs to calculate and present a power-off V_{NE} to the pilot as a red radial with red shading for airspeeds greater than V_{NE} value meets the intent of 14 CFR 29.1545(b)(2).

FAA approval and documentation of the ELOS finding:

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper F-2. This memorandum provides standardized documentation of the ELOS finding that is

nonproprietary and can be made available to the public. The Accountable Directorate has assigned a unique ELOS Memorandum number (ST0025RC-RD/F-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.

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

14 CFR §§ 29.1545(b)(2) Airspeed indicator (documented in ELOS Memo ST0025RC-RD/F-2)

signed: Lane T. Gant
for Kimberly K. Smith _____ _____11/8/2012_____
Manager, Accountable Directorate, Date
Aircraft Certification Service

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