



[4910-13]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 29**

[Docket No.FAA-2017-1128; Notice No. 29-045-SC]

**Special Conditions: Bell Helicopter Textron, Inc. (BHTI), Model 525 Helicopters; Control Margin Awareness**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the BHTI Model 525 helicopter. This helicopter will have a novel or unusual design feature associated with the fly-by-wire flight control system (FBW FCS) in the area of pilot awareness of the control margins remaining while maneuvering the helicopter. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** These special conditions are effective **[INSERT 30 DAYS AFTER DATE OF PUBLICATION IN FEDERAL REGISTER]**.

**FOR FURTHER INFORMATION CONTACT:** George Harrum, Aerospace Engineer, FAA, Rotorcraft Standards Branch, Policy and Innovation Division, 10101 Hillwood Pkwy, Fort Worth, TX 76177; telephone (817) 222-4087; email [George.Harrum@faa.gov](mailto:George.Harrum@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On December 15, 2011, BHTI applied for a type certificate for a new transport category helicopter designated as the Model 525. The Model 525 is a medium twin-engine rotorcraft. The design maximum takeoff weight is 20,500 pounds, with a maximum capacity of 19 passengers and a crew of 2.

The BHTI Model 525 helicopter will be equipped with a four-axis full authority digital FBW FCS that provides for aircraft control through pilot input and coupled flight director modes. The current 14 CFR part 29 regulations do not contain adequate standards for FBW FCS with respect to control margin awareness. The airworthiness standards for controllability and maneuverability of the rotorcraft are contained in § 29.143. These controllability requirements are compatible with most FBW systems, while most of the maneuverability requirements are not affected by FBW systems, except for the control margins. One of the purposes of the rule is to ensure that control margins (at the rotor and the anti-torque system level) are sufficient in the defined flight envelope to avoid loss of control (that is, the rotorcraft has adequate control power for the pilot to exit potentially hazardous flight conditions). Implicit in this purpose is that the pilot is provided with sufficient awareness of proximity to control limits. Because § 29.143 was written to address hydro-mechanical flight control systems, through which pilot awareness of control margins is provided by cyclic and pedal position relative to cockpit control stops, the rule is inadequate for certification of a FBW FCS, where there is no mechanical link between the inceptor and the receptor. Without a constant correlation between cockpit control and main or tail rotor actuator positions, the FCS may not provide tactile control margin feedback to the pilot through cockpit control position relative to the control position physical stop or limit, for all

flight conditions. The special conditions will require the minimum safety standard to ensure awareness of proximity to control limits at the main rotor and tail rotor is provided to pilots of the Bell Model 525 helicopter.

### **Type Certification Basis**

Under the provisions of 14 CFR 21.17, BHTI must show that the Model 525 helicopter meets the applicable provisions of part 29, as amended by Amendment 29-1 through 29-55 thereto. The BHTI Model 525 certification basis date is December 31, 2013, the effective date of application to the FAA.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 29) do not contain adequate or appropriate safety standards for the BHTI Model 525 because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the BHTI Model 525 helicopter must comply with the noise certification requirements of 14 CFR part 36, and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the "Noise Control Act of 1972."

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

## **Novel or Unusual Design Features**

The BHTI Model 525 helicopter incorporates the following novel or unusual design features: a four-axis full authority digital FBW FCS. Pilot control inputs, through the mechanically linked cockpit controls (cyclic, collective, directional pedals), are transmitted electrically to each of the three Flight Control Computers (FCCs). The pilot control input signals are then processed and transmitted to the hydraulic flight control actuators which affect control of the main and tail rotors.

## **Discussion**

These special conditions require the minimum safety standard to ensure awareness of proximity to control limits at the main rotor and tail rotor is provided to pilots of the Bell Model 525 helicopter. The system design must provide the pilot with sufficient awareness of proximity to control limits, traditionally achieved through conventional flight controls by the pilot's inherent awareness of cyclic stick and pedal position relative to control stops.

## **Discussion of Comments**

Notice of proposed special conditions No. 29-045-SC for the BHTI Model 525 helicopter was published in the Federal Register on June 6, 2018 (83 FR 26225). No comments were received, and the special conditions are adopted as proposed.

## **Applicability**

As discussed above, these special conditions are applicable to the BHTI Model 525 helicopter. Should BHTI apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

## **Conclusion**

This action affects only certain novel or unusual design features on one model of rotorcraft. It is not a rule of general applicability.

## **List of Subjects in 14 CFR Part 29**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Bell Helicopter Textron, Inc., Model 525 helicopters:

### Control Margin Awareness.

In addition to the existing § 29.143 requirements, the following special condition applies: The system design must ensure that the flight crew is made suitably aware whenever the means of primary flight control approaches the limits of control authority. For the context of this special condition, the term “suitable” indicates an appropriate balance between nuisance and necessary operation.

Issued in Ft Worth, Texas on October 3, 2018.

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[FR Doc. 2018-22265 Filed: 10/11/2018 8:45 am; Publication Date: 10/12/2018]