



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 27

[Docket No. FAA-2020-1102; Notice No. 27-052-SC]

Special Conditions: Garmin International, Inc., Bell Textron Canada Limited Model 505 Helicopter, Visual Flight Rules Autopilot and Stability Augmentation System

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Bell Textron Canada Limited (BTCL) Model 505 helicopter. This helicopter as modified by Garmin International, Inc. (Garmin), will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for helicopters. This design feature is associated with the installation of an autopilot and stability augmentation system (AP/SAS). 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: Send comments on or before [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Send comments identified by Docket No. FAA-2020-1102 using any of the following methods:

- *Federal eRegulations Portal:* Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.

- *Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.*
- *Fax: Fax comments to Docket Operations at 202-493-2251.*

Privacy: Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the *Federal Register* published on April 11, 2000 (65 FR 19477-19478).

Confidential Business Information: CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to these special conditions contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to these special conditions, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of these special conditions. Submissions containing CBI should be sent to Andy Shaw, Continued Operational Safety Section, AIR-682, Rotorcraft Standards Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 10101 Hillwood Pkwy, Fort Worth, TX 76177; telephone (817) 222-5384. Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Andy Shaw, Continued Operational Safety Section, AIR-682, Rotorcraft Standards Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 10101 Hillwood Pkwy, Fort Worth, TX 76177; telephone (817) 222-5384; email Andy.Shaw@faa.gov.

SUPPLEMENTARY INFORMATION:

Reason for No Prior Notice and Comment Before Adoption

The FAA has determined, in accordance with 5 U.S.C. 553(b)(3)(B) and 553(d)(3), that notice and opportunity for prior public comment hereon are unnecessary because substantially identical special conditions have been previously subject to the public comment process in several prior instances such that the FAA is satisfied that new comments are unlikely. For the same reason, the FAA finds that good cause exists for adopting these special conditions upon issuance. The FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment.

Special Conditions Number	Company and Helicopter Model
No. 27-048-SC ¹	Bell Helicopter Textron Canada Limited Bell Model 505 helicopter
No. 27-046-SC ²	Robinson Helicopter Company Model R66 helicopter
No. 27-043-SC ³	Airbus Helicopters Model AS350B2 and AS350B3 helicopters

Comments Invited

¹ 84 FR 64233, November 21, 2019

² 84 FR 30050, June 26, 2019

³ 82 FR 57685, December 07, 2017

The FAA invites interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

The FAA will consider all comments received by the closing date for comments. The FAA may change these special conditions based on the comments received.

Background

On December 18, 2019, Garmin applied for a supplemental type certificate (STC) to install an AP/SAS in the BTCL Model 505 helicopter. The BTCL Model 505 helicopter is a 14 CFR part 27 normal category, single turbine engine, conventional helicopter designed for civil operation. This helicopter model can carry up to four passengers with one pilot and has a maximum gross weight (MGW) of up to 4,475 pounds, depending on the model configuration. The major design features include a two-blade main rotor, an anti-torque tail rotor system, skid landing gear, and a visual flight rule (VFR) basic avionics configuration. Garmin proposes to modify this model helicopter by installing an AP/SAS.

The AP/SAS provides attitude stabilization in two or three axes (pitch and roll with optional yaw) and higher-level AP functions such as altitude hold, heading command, and navigation tracking. However, the possible failure conditions for this system, and their effect on the continued safe flight and landing of the helicopter, are more severe than those envisioned by the present rules.

The effect on safety is not adequately covered under 14 CFR 27.1309 for the application of new technology and the new application of standard technology. Specifically, the present provisions of § 27.1309(c) do not adequately address the safety requirements for systems whose failures could result in catastrophic or hazardous/severe-major failure conditions or complex systems whose failures could result in major failure conditions in VFR rotorcraft. The current regulations are inadequate because when § 27.1309(c) was promulgated, it was not envisioned that this type of VFR rotorcraft would use systems that are complex or whose failure could result

in "catastrophic" or "hazardous/severe-major" effects on the rotorcraft. This inadequacy is particularly true with the application of new technology, a new application of standard technology, or other applications not envisioned by the rule that affect safety.

Type Certification Basis

Under 14 CFR 21.101, Garmin must show that the BTCL Model 505 helicopter, as changed, continues to meet the applicable regulations listed in Type Certificate Number R00008RD or the applicable regulation in effect on the date of application for the change. The regulations listed in the type certificate are commonly referred to as the "original type certification basis." The regulations listed in Type Certificate Number R00008RD are as follows:

For approved MGW configuration of 1670 kg (3680 lb.) internal loading and 2030 kg (4475 lbs.) external loading:

14 CFR part 27, dated October 2, 1964, amendment 27-1 through 27-47

14 CFR part 36 Amendment 36-1 through 36-30

Equivalent Level of Safety Findings issued against:

- (a) FAA Cover Issue Paper CIP-01
- (b) 14 CFR part 27.307(b)(5) Proof of Structure Landing Gear Drop Test
- (c) 14 CFR part 27.723 Landing Gear Shock Absorption Tests
- (d) 14 CFR part 27.725 Landing Gear Limit Drop Test
- (e) 14 CFR part 27.727 Landing Gear Reserve Energy Absorption Drop Test
- (f) 14 CFR part 27.995(d) Fuel Shut-off Valve
- (g) 14 CFR part 27.1545(b)(2) Airspeed Indicator

The Administrator has determined that the applicable airworthiness regulations (e.g., 14 CFR part 27) do not contain adequate or appropriate safety standards for the BTCL Model 505 helicopter type certificate number R00008RD because of a novel or unusual design feature. Therefore, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should Garmin apply for an STC to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the BTCL Model 505 helicopter must comply with the noise certification requirements of 14 CFR part 36.

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 § 21.101.

Novel or Unusual Design Features

The BTCL Model 505 helicopter will incorporate the following novel or unusual design features: an AP/SAS. An AP system is a system used to control an aircraft trajectory without constant input from the pilot. This system allows the pilot to focus on other aspects of the operation, such as weather and other flight associated systems. SAS is another type of automatic flight control system; however, instead of maintaining the aircraft on a predetermined attitude or flight path, the SAS will reduce pilot workload by dampening the rotorcraft's buffeting regardless of the attitude or flight path.

Discussion

The BTCL Model 505 helicopter's type certification basis as modified by Garmin does not contain adequate airworthiness standards for the AP/SAS. The FAA requires these special conditions to comply with airworthiness standards. The FAA requires that Garmin provide the FAA with a systems safety assessment (SSA) for the final AP/SAS installation configuration to adequately address the safety objectives established by a functional hazard assessment (FHA). This assessment will ensure that all failure conditions and their effects are adequately addressed for the installed AP/SAS. The SSA process is part of the overall safety assessment process discussed in FAA Advisory Circular 27-1B, *Certification of Normal Category Rotorcraft*, and Society of Automotive Engineers document Aerospace Recommended Practice 4761, *Guidelines*

and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment.

These special conditions require that the AP/SAS installed on the BTCL Model 505 helicopter meet the requirements to adequately address the failure effects identified by the FHA, and subsequently verified by the SSA, within the defined design integrity requirements.

Failure conditions are classified according to the severity of their effects on the rotorcraft. Radio Technical Commission for Aeronautics, Inc. (RTCA) Document DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*, provides software design assurance levels most commonly used for the major, hazardous/severe-major, and catastrophic failure condition categories. The AP/SAS equipment must be qualified for the expected installation environment. The test procedures prescribed in RTCA Document DO-160G, *Environmental Conditions and Test Procedures for Airborne Equipment*, are recognized by the FAA as acceptable methodologies for finding compliance with the environmental requirements. Equivalent environment test standards may also be acceptable.

The environmental qualification provides data to show that the AP/SAS can perform its intended function under the expected operating condition. Some considerations for environmental concerns are installation locations and the resulting exposure to environmental conditions for the AP/SAS equipment, including considerations for other equipment that may be environmentally affected by the AP/SAS equipment installation. The level of environmental qualification must be related to the severity of the considered failure conditions and effects on the rotorcraft.

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.

Applicability

As discussed above, these special conditions are applicable to the BTCL Model 505 helicopter. Should Garmin apply at a later date for a STC to modify any other model included on Type Certificate Number R00008RD to incorporate the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only a certain novel or unusual design feature on the BTCL Model 505 helicopter. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of this feature on the helicopter.

List of Subjects in 14 CFR Part 27

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

Authority Citation

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(f), 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 supplemental type certification basis for Bell Textron Canada Limited (BTCL) Model 505 helicopters, as modified by Garmin International, Inc.

Instead of the requirements of 14 CFR § 27.1309(b) and (c), the following must be met for certification of the autopilot and stability augmentation system installed on BTCL Model 505 helicopters:

(a) The equipment and systems must be designed and installed so that any equipment and systems do not adversely affect the safety of the rotorcraft or its occupants.

(b) The rotorcraft systems and associated components considered separately and in relation to other systems must be designed and installed so that:

(1) The occurrence of any catastrophic failure condition is extremely improbable;

(2) The occurrence of any hazardous failure condition is extremely remote; and

(3) The occurrence of any major failure condition is remote.

(c) Information concerning an unsafe system operating condition must be provided in a timely manner to the crew to enable them to take appropriate corrective action. An appropriate alert must be provided if immediate pilot awareness and immediate or subsequent corrective action is required. Systems and controls, including indications and annunciations, must be designed to minimize crew errors that could create additional hazards.

Issued in Fort Worth, Texas on November 19, 2020.

Jorge Castillo,
Manager, Rotorcraft Standards Branch,
Policy and Innovation Division,
Aircraft Certification Service

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