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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–2012–0968; Special Conditions No. 25–467–SC]

Special Conditions: Bombardier, Model CL–600–2B16 Airplane (CL–601–3A, CL–601–3R, and CL–604 Variants); Enhanced Flight Vision System

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Bombardier Model CL–600–2B16 airplanes, including variants CL–601–3A, CL–601–3R and CL–604. This airplane, as modified by Atlantic Aero, Inc., will have a novel or unusual design feature associated with an advanced, enhanced flight vision system (EFVS). The EFVS consists of a head-up display (HUD) system modified to display forward-looking infrared (FLIR) imagery. 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: The effective date of these special conditions is September 6, 2012. We must receive your comments by October 29, 2012.

ADDRESSES: Send comments identified by docket number FAA–2012–0968 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 8 a.m. and 5 p.m., Monday through Friday, except federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: 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), as well as at *http://DocketsInfo.dot.gov/.*

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 the 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: Dale Dunford, FAA, Transport Standards Staff, ANM–111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057–3356; telephone 425–227–2239; facsimile 425–227–1320; email: *dale.dunford@faa.gov.*

SUPPLEMENTARY INFORMATION: The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions are impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected aircraft. In addition, the substance of these special conditions has been subject to the public comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon issuance.

Comments Invited

We invite 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.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On October 7, 2011, Atlantic Aero, Inc., applied for a supplemental type certificate (STC) for the installation and operation of a HUD and an EFVS in the Bombardier Model CL–600–2B16 (CL–601–3A, CL–601–3R, and CL–604 variants). The original type certificate for the CL–600–2B16 is A21EA, dated April 30, 1987, and is now at revision 31, dated May 25, 2011.

The Model CL–600–2B16 is a 22-passenger, transport category airplane that operates with a crew of two. It is powered by two General Electric engines and has a maximum takeoff weight of 43,100 pounds for the CL–601–3A and 3R variants and 47,600 pounds for the CL–604 variant.

The electronic infrared image displayed between the pilot and the forward windshield represents a novel or unusual design feature in the context of Title 14, Code of Federal Regulations (14 CFR) 25.773. Section 25.773 was not written in anticipation of such technology. The electronic image has the potential to enhance the pilot's awareness of the terrain, hazards, and airport features. At the same time, the image may partially obscure the pilot's direct outside compartment view. Therefore, the FAA needs adequate safety standards to evaluate the EFVS to determine that the imagery provides the intended visual enhancements without undue interference with the pilot's outside compartment view. The FAA's intent is that the pilot will be able to use a combination of the information seen in the image and the natural view of the outside scene, as seen through the image, as safely and effectively as a pilot compartment view without an enhanced

vision system (EVS) image, and that it is compliant with § 25.773.

Although the FAA has determined that the existing regulations are not adequate for certification of EFVSs, it believes that EFVSs could be certified through application of appropriate safety criteria. Therefore, the FAA has determined that special conditions should be issued for certification of EFVSs to provide a level of safety equivalent to that provided by the standard in § 25.773.

Note: The term ''enhanced vision system'' (EVS) in this document refers to a system comprised of a head-up display (HUD), imaging sensor(s), and avionics interfaces that display the sensor imagery on the HUD, and overlay that imagery with alpha-numeric and symbolic flight information. However, the term has also been commonly used in reference to systems that display the sensor imagery, with or without other flight information, on a head-down display. For clarity, the FAA created the term ''enhanced flight vision system'' (EFVS) to refer to certain EVS systems that meet the requirements of the new operational rules—in particular, the requirement for a HUD and specified flight information—and which can be used to determine ''enhanced flight visibility.'' An EFVS can be considered a subset of a system otherwise labeled EVS.

On January 9, 2004, the FAA published revisions to operational rules in 14 CFR parts 1, 91, 121, 125, and 135 to allow aircraft to operate below certain altitudes during a straight-in instrument approach while using an EFVS to meet visibility requirements.

Prior to this rule change, the FAA issued Special Conditions No. 25–180–SC, which applied to an EVS installed on Gulfstream Model G–V airplanes. Those special conditions addressed the requirements for the pilot compartment view and limited the scope of the intended functions permissible under the operational rules at the time. The intended function of the EVS imagery was to aid the pilot during the approach and allow the pilot to detect and identify the visual references for the intended runway down to 100 feet above the touchdown zone. However, the EVS imagery alone was not to be used as a means to satisfy visibility requirements below 100 feet.

The recent operational rule change expands the permissible application of certain EVSs that are certified to meet the new EFVS standards. The new rule allows the use of an EFVS for operation below the minimum descent altitude or decision height to meet new visibility requirements of § 91.175(l). The purpose of these special conditions is not only to address the issue of the ''pilot compartment view,'' as was done by Special Conditions No. 25–180–SC, but also to define the scope of intended function consistent with § 91.175(l) and (m).

Type Certification Basis

Under the provisions of § 21.101, Atlantic Aero, Inc., must show that the Bombardier Model CL–600–2B16 (CL–601–3A, CL–601–3R, and CL–604 variants), as changed, continues to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. A21EA or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the ''original type certification basis.'' The regulations incorporated by reference are listed in Type Certificate Data Sheet No. A21EA, Revision 31, dated May 25, 2011, which covers all variants of the Bombardier CL–600–2B16 airplanes. In addition, the certification basis includes certain special conditions and exemptions that are not relevant to these special conditions.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Bombardier Model CL–600–2B16 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 applicant apply for a supplemental type certificate to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model.

In addition to the applicable airworthiness regulations and special conditions, the Model CL–600–2B16 must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and 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 Bombardier Model CL–600–2B16 will incorporate the following novel or unusual design feature: An EFVS that projects a video image derived from a FLIR camera through the HUD. The EFVS image is projected in the center of the ''pilot compartment view,'' which is governed by § 25.773. The image is displayed with HUD symbology and overlays the forward outside view. Therefore, § 25.773 does not contain appropriate safety standards for the EFVS display.

Operationally, during an instrument approach, the EFVS image is intended to enhance the pilot's ability to detect and identify ''visual references for the intended runway'' [see § 91.175(l)(3)] to continue the approach below decision height or minimum descent altitude. Depending on atmospheric conditions and the strength of infrared energy emitted and/or reflected from the scene, the pilot can see these visual references in the image better than they can be seen through the window without EFVS.

Scene contrast detected by infrared sensors can be much different from that detected by natural pilot vision. On a dark night, thermal differences of objects which are not detectable by the unaided eye are easily detected by many imaging infrared systems. On the other hand, contrasting colors in visual wavelengths may be distinguished by the unaided eye but not by an imaging infrared system. Where thermal contrast in the scene is sufficiently detectable, the pilot can recognize shapes and patterns of certain visual references in the infrared image. However, depending on conditions, those shapes and patterns in the infrared image can appear significantly different than they would with normal vision. Considering these factors, the EFVS image needs to be evaluated to determine that it can be accurately interpreted by the pilot.

The EFVS image may improve the pilot's ability to detect and identify items of interest. However, the EFVS needs to be evaluated to determine that the imagery allows the pilot to perform the normal flightcrew duties and adequately see outside the window through the image, consistent with the safety intent of § 25.773(a)(2).

Compared to a HUD displaying the EFVS image and symbology, a HUD that only displays stroke-written symbols is easier to see through. Stroke symbology illuminates a small fraction of the total display area of the HUD, leaving much of that area free of reflected light that could interfere with the pilot's view out the window through the display. However, unlike stroke symbology, the video image illuminates most of the total display area of the HUD (approximately 30 degrees horizontally and 25 degrees vertically), which is a significant fraction of the pilot compartment view. The pilot cannot see around the larger illuminated portions of the video image, but must see the outside scene through it.

Unlike the pilot's external view, the EFVS image is a monochrome, two-dimensional display. Many, but not all, of the depth cues found in the natural view are also found in the image. The quality of the EFVS image and the level of EFVS infrared-sensor performance could depend significantly on conditions of the atmospheric and external light sources. The pilot needs adequate control of sensor gain and image brightness, which can significantly affect image quality and transparency (i.e., the ability to see the outside view through the image). Certain system characteristics could create distracting and confusing display artifacts. Finally, because this is a sensor-based system intended to provide a conformal perspective corresponding with the outside scene, the system must be able to ensure accurate alignment. Therefore, safety standards are needed for each of the following factors:

- An acceptable degree of image transparency;
- Image alignment;
- Lack of significant distortion; and
- The potential for pilot confusion or misleading information.

Section 25.773, ''Pilot compartment view,'' specifies that ''Each pilot compartment must be free of glare and reflection that could interfere with the normal duties of the minimum flight crew * * *.'' In issuing § 25.773, the FAA did not anticipate the development of the EFVS and does not consider that § 25.773 adequately addresses the specific issues related to such a system. Therefore, the FAA has determined that special conditions are needed to address the specific issues particular to the installation and use of an EFVS.

Discussion

The EFVS is intended to present an enhanced view during the landing approach. This enhanced view would help the pilot see and recognize external visual references, as required by § 91.175(l), and to visually monitor the integrity of the approach, as described in FAA Order 6750.24D, ''Instrument Landing System and Ancillary Electronic Component Configuration and Performance Requirements,'' dated March 1, 2000.

Based on this approved functionality, users would seek to obtain operational approval to conduct approaches, including approaches to Type I runways, in visibility conditions much lower than those for conventional Category I.

The purpose of these special conditions is to ensure that the EFVS to be installed can perform the following functions:

- Present an enhanced view that aids the pilot during the approach.
- Provide enhanced flight visibility to the pilot that is no less than the visibility prescribed in the standard instrument approach procedure.
- Display an image that the pilot can use to detect and identify the ''visual references for the intended runway'' required by § 91.175(l)(3) to continue the approach with vertical guidance to 100 feet height above the touchdown-zone elevation.

Depending on the atmospheric conditions and the particular visual references that happen to be distinctly visible and detectable in the EFVS image, these functions would support its use by the pilot to visually monitor the integrity of the approach path.

Compliance with these special conditions does not affect the applicability of any of the requirements of the operating regulations (i.e., 14 CFR parts 91, 121, and 135). Furthermore, use of the EFVS does not change the approach minima prescribed in the standard instrument approach procedure being used; published minima still apply.

The FAA certification of this EFVS is limited as follows:

1. The infrared-based EFVS image will not be certified as a means to satisfy the requirements for descent below 100 feet height above touchdown.

2. The EFVS may be used as a supplemental device to enhance the pilot's situational awareness during any phase of flight or operation in which its safe use has been established.

An EFVS image may provide an enhanced image of the scene that may compensate for any reduction in the clear outside view of the visual field framed by the HUD combiner. The pilot must be able to use this combination of information seen in the image and the natural view of the outside scene, as seen through the image, as safely and effectively as the pilot would use a pilot compartment view without an EVS image that is compliant with § 25.773. This is the fundamental objective of the special conditions.

The FAA will also apply additional certification criteria, not as special conditions, for compliance with related regulatory requirements, such as §§ 25.1301 and 25.1309. These additional criteria address certain image characteristics, installation, demonstration, and system safety. Image-characteristics criteria include the following:

- Resolution
- Luminance
- Luminance uniformity
- Low-level luminance
- Contrast variation
- Display quality
- Display dynamics (e.g., jitter, flicker, update rate, and lag)
- Brightness controls

Installation criteria address visibility and access to EFVS controls and integration of EFVS in the cockpit.

The EFVS demonstration criteria address the flight and environmental conditions that need to be covered.

The FAA also intends to apply certification criteria relevant to high-intensity radiated fields (HIRF) and lightning protection.

Applicability

As discussed above, these special conditions are applicable to the Bombardier Model CL–600–2B16 (CL–601–3A, CL–601–3R, and CL–604 variants). Should Atlantic Aero, Inc., apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. A21EA to incorporate 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 series of airplanes. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of these features on the airplane.

The substance of these special conditions has been subjected to the notice and comment period in several prior instances and has been derived without substantive change from those previously issued. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, because a delay would significantly affect the certification of the airplane, which is imminent, the FAA has determined that prior public notice and comment are unnecessary and impracticable, and 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 described above.

List of Subjects in 14 CFR Part 25

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 Bombardier Model CL–600–2B16 (CL–601–3A, CL–601–3R, and CL–604 variants) airplanes modified by Atlantic Aero, Inc.

1. Enhanced flight vision system (EFVS) imagery on the head-up display (HUD) must not degrade the safety of flight or interfere with the effective use of outside visual references for required pilot tasks during any phase of flight in which it is to be used.

2. To avoid unacceptable interference with the safe and effective use of the pilot compartment view, the EFVS device must meet the following requirements:

a. The EFVS design must minimize unacceptable display characteristics or artifacts (e.g., noise, ''burlap'' overlay, running water droplets) that obscure the desired image of the scene, impair the pilot's ability to detect and identify visual references, mask flight hazards, distract the pilot, or otherwise degrade task performance or safety.

b. Automatic control of EFVS display brightness must be sufficiently effective, in dynamically changing background (ambient) lighting conditions, to prevent full or partial blooming of the display that would distract the pilot, impair the pilot's ability to detect and identify visual references, mask flight hazards, or otherwise degrade task performance or safety. If automatic control for image brightness is not provided, it must be shown that a single manual setting is satisfactory for the range of lighting conditions encountered during a time-critical, high-workload phase of flight (e.g., low visibility instrument approach).

c. A readily accessible control must be provided that permits the pilot to immediately deactivate and reactivate display of the EFVS image on demand without removing the pilot's hands from the primary flight controls (yoke or equivalent) or thrust control.

d. The EFVS image on the HUD must not impair the pilot's use of guidance information, or degrade the presentation and pilot awareness of essential flight information displayed on the HUD, such as alerts, airspeed, attitude, altitude and direction, approach guidance, windshear guidance, traffic alert and collision avoidance system (TCAS) resolution advisories, or unusual attitude recovery cues.

e. The EFVS image and the HUD symbols, which are spatially referenced to the pitch scale, outside view and image, must be scaled and aligned (i.e., conformal) to the external scene. In addition, the EFVS image and the HUD symbols, when considered singly or in combination, must not be misleading, cause pilot confusion, or increase workload. Airplane attitudes or crosswind conditions may cause certain symbols (e.g., the zero-pitch line or flight path vector) to reach field-of-view limits such that they cannot be positioned conformably with the image and external scene. In such cases, these symbols may be displayed but with an altered appearance, which makes the pilot aware that they are no longer displayed conformably (for example, ''ghosting'').

f. A HUD system used to display EFVS images must, if previously certified, continue to meet all of the requirements of the original approval.

3. The safety and performance of the pilot tasks associated with the use of the pilot compartment view must not be degraded by the display of the EFVS image. Pilot tasks that must not be degraded by the EFVS image include:

a. Detection, accurate identification, and maneuvering, as necessary, to avoid traffic, terrain, obstacles, and other hazards of flight.

b. Accurate identification and utilization of visual references required for every task relevant to the phase of flight.

Use of EFVS for instrument approach operations must be in accordance with the provisions of § 91.175(l) and (m) and § 121.651 where applicable. Appropriate limitations must be stated in the operating limitations section of the airplane flight manual to prohibit the use of the EFVS for functions that have not been found to be acceptable.

Issued in Renton, Washington, on September 6, 2012.

Ali Bahrami

Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. 2012–22468 Filed 9–12–12; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2012–0896; Directorate Identifier 2010–SW–070–AD; Amendment 39–17173; AD 2012–17–10]

RIN 2120–AA64

Airworthiness Directives; Various Restricted Category Helicopters

AGENCY: Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION: Final rule; request for comments.

SUMMARY: We are adopting a new airworthiness directive (AD) for various restricted category Model HH–1K, TH–1F, TH–1L, UH–1A, UH–1B, UH–1E, UH–1F, UH–1H, UH–1L, and UH–1P helicopters with certain main rotor (M/R) blade assemblies installed, to require inspecting the grip plates, doublers, and upper and lower surfaces of the M/R blades in the area between blade stations 24.5 and 40 for an edge void, corrosion, or a crack. This AD is prompted by several reports of fatigue cracks on M/R blades installed on Bell Helicopter Textron, Inc. (Bell) Model 212 helicopters. These same part-numbered M/R blades may also be installed on certain FAA-approved modified restricted category helicopters. These actions are intended to detect an edge void, corrosion, or a crack on an M/R blade, which could lead to loss of the M/R blade and subsequent loss of control of the helicopter.

DATES: This AD becomes effective September 28, 2012.

We must receive comments on this AD by November 13, 2012.

ADDRESSES: You may send comments by any of the following methods:

- *Federal eRulemaking Docket:* Go to *http://www.regulations.gov*. Follow the online instructions for sending your comments electronically.
- *Fax:* 202–493–2251.
- *Mail:* Send comments to the U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE., Washington, DC 20590–0001.
- *Hand Delivery:* Deliver to the ''Mail'' address between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Examining the AD Docket: You may examine the AD docket on the Internet at *http://www.regulations.gov* or in person at the Docket Operations Office