

# Proposed Rules

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This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No. NM303; Notice No. 25-05-02-SC]

#### Special Conditions: Bombardier Aerospace Models BD-700-1A10 and BD-700-1A11 Global Express Airplanes; Enhanced Flight Visibility System (EFVS)

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

**ACTION:** Notice of proposed special conditions.

**SUMMARY:** This notice proposes special conditions for the Bombardier Aerospace Models BD-700-1A10 and BD-700-1A11 Global Express airplanes. These airplanes, as modified by Bombardier Aerospace Corporation, will have an Enhanced Flight Visibility System (EFVS). The EFVS is a novel or unusual design feature which consists of a head up display (HUD) system modified to display forward-looking infrared (FLIR) imagery. The regulations applicable to pilot compartment view do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that provided by the existing airworthiness standards.

**DATES:** Comments must be received on or before April 19, 2005.

**ADDRESSES:** Comments on this proposal may be mailed in duplicate to: Federal Aviation Administration, Transport Airplane Directorate, Attention: Rules Docket (ANM-113), Docket No. NM303, 1601 Lind Avenue SW., Renton, Washington 98055-4056; or delivered in duplicate to the Transport Airplane Directorate at that address. All comments must be marked: Docket No. NM303. Comments may be inspected in the Rules Docket weekdays, except

Federal holidays, between 7:30 a.m. and 4 p.m.

**FOR FURTHER INFORMATION CONTACT:** Dale Dunford, FAA, Transport Standards Staff, ANM-111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98055-4056; telephone (425) 227-2239; fax (425) 227-1320; e-mail: [dale.dunford@faa.gov](mailto:dale.dunford@faa.gov).

#### SUPPLEMENTARY INFORMATION:

##### Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting 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 ask that you send us two copies of written comments.

We will file in the docket all comments we receive as well as a report summarizing each substantive public contact with FAA personnel concerning these proposed special conditions. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this notice between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late, if it is possible to do so without incurring expense or delay. We may change the proposed special conditions in light of the comments we receive.

If you want the FAA to acknowledge receipt of your comments on this proposal, include with your comments a pre-addressed, stamped postcard on which the docket number appears. We will stamp the date on the postcard and mail it back to you.

##### Background

On February 26, 2003, Bombardier Aerospace, applied for an amendment to the type certificate to modify Bombardier Model BD-700-1A10 and BD-700-1A11 Global Express airplanes. The Model BD-700-1A10 is a transport category airplane certified to carry a maximum of 19 passengers and a minimum of 2 crew members. The

Model BD-700-1A11 is a smaller version of the BD-700-1A10. The modification involves the installation of an Enhanced Flight Vision System (EFVS). This system consists of a Thales HUD system, modified to display FLIR imagery, and a FLIR camera.

The electronic infrared image displayed between the pilot and the forward windshield represents a novel or unusual design feature in the context of 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 the combination of information seen in the image and the natural view of the outside seen through the image as safely and effectively as a § 25.773-compliant pilot compartment view without an EVS image.

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 EFVS to provide a level of safety equivalent to that provided by the standard in § 25.773.

**Note:** The term "enhanced vision system (EVS)" has been commonly used to refer to a system comprised of a head up display, imaging sensor(s), and avionics interfaces that displayed the sensor imagery on the HUD and overlaid it with alpha-numeric and symbolic flight information. However, the term has also been commonly used in reference to systems which displayed the sensor imagery, with or without other flight information, on a head down display. To avoid confusion, the FAA created the term "enhanced flight visibility 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 can be used to determine "enhanced flight visibility." EFVSs can be considered a subset of systems otherwise labeled EVSs.

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 25-180-SC, which approved the use of an EVS on Gulfstream Model G-V airplanes. These 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 will allow the use of EFVSs for operation below the Minimum Descent Altitude (MDA) or Decision Height (DH) to meet new visibility requirements of § 91.175(l). The purpose of this special condition is not only to address the issue of the "pilot compartment view" as was done by 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 14 CFR 21.101, Bombardier Aerospace must show that the Bombardier Aerospace Model BD-700-1A10 and BD-700-1A11 Global Express airplanes, as modified, comply with the regulations in the U.S. type certification basis established for those airplanes. The U.S. type certificate basis for the airplanes is established in accordance with 14 CFR 21.21, 14 CFR 21.17, and the type certification application date. The U.S. type certification basis for these model airplanes is listed in Type Certificate Data Sheet No. T00003NY.

If the Administrator finds that the applicable airworthiness regulations (*i.e.*, part 25, as amended) do not contain adequate or appropriate safety standards for the Bombardier Global Express airplanes modified by Bombardier Aerospace because of a novel or unusual design feature, special conditions are prescribed under the provisions of 14 CFR 21.16.

Special conditions, as appropriate, are issued in accordance with 14 CFR 11.19 after public notice, as required by 14

CFR 11.38, and become part of the type certification basis in accordance with 14 CFR 21.101(b)(2).

Special conditions are initially applicable to the model for which they are issued. Should Bombardier Aerospace apply at a later date 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, these special conditions would also apply to the other model under the provisions of 14 CFR 21.101(a)(1).

#### Novel or Unusual Design Features

The EFVS is a novel or unusual design feature, because it 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 he or she can see them 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 naked eye will be easily detected by many imaging infrared systems. On the other hand, contrasting colors in visual wavelengths may be distinguished by the naked 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 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 duties of the flight crew 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 displays only 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 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 that is intended to provide a conformal perspective corresponding with the outside scene, the system must be able to ensure accurate alignment.

Hence, there need to be safety standards 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 EFVSs and does not consider § 25.773 to be adequate to address 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 function by presenting an enhanced view during the approach. This enhanced view would help the pilot to 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 functionality, users would seek to obtain operational approval to conduct approaches—including approaches to Type I runways—when the Runway Visual Range is as low as 1,200 feet.

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 would aid 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:

- The infrared-based EFVS image will not be certified as a means to satisfy the requirements for descent below 100 feet height above touchdown (HAT).
- 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 seen through the image as safely and effectively as the pilot would use a § 25.773—compliant pilot compartment view without an EVS image. 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 14 CFR 25.1301 and 14 CFR 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), and
- 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 Bombardier Aerospace Models BD-700-1A10 and BD-700-1A11 Global Express airplanes. Should Bombardier Aerospace apply at a later date 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, these special conditions would apply to that model as well under the provisions of § 21.101(a)(1).

## Conclusion

This action affects only certain novel or unusual design features on the Bombardier Aerospace Models BD-700-1A10 and BD-700-1A11 Global Express airplane, as modified by Bombardier Aerospace. 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.

## 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 Proposed Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the FAA proposes the following special conditions as part of the amended type certification basis for Bombardier Aerospace Models BD-700-1A10 and BD-700-1A11 Global Express airplanes, modified by Bombardier Aerospace:

1. The EFVS imagery on the 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. 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.

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, 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. There may be airplane attitudes or cross-wind conditions which 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 conformally 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 conformally (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. These tasks include the following:

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.

4. Compliance with these special conditions will enable the EFVS to be used during instrument approaches in accordance with 14 CFR 91.175(l) such that it may be found acceptable for the following intended functions:

a. Presenting an image that would aid the pilot during a straight-in instrument approach.

b. Enabling the pilot to determine that the “enhanced flight visibility,” as required by § 91.175(l)(2) for descent and operation below minimum descent altitude/decision height (MDA)/(DH).

c. Enabling the pilot to use the EFVS imagery to detect and identify the “visual references for the intended runway,” required by 14 CFR 91.175(l)(3), to continue the approach with vertical guidance to 100 feet height above touchdown zone elevation.

5. Use of EFVS for instrument approach operations must be in accordance with the provisions of 14 CFR 91.175(l) and (m). 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 March 23, 2005.

**Ali Bahrami,**

*Manager, Transport Airplane Directorate, Aircraft Certification Service.*

[FR Doc. 05–6310 Filed 3–29–05; 8:45 am]

**BILLING CODE 4910–13–P**

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA–2005–20730; Directorate Identifier 2004–NM–68–AD]

RIN 2120–AA64

#### **Airworthiness Directives; Bombardier Model DHC–8–101, –102, –103, –106, –201, –202, –301, –311, and –315 Airplanes**

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

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** The FAA proposes to supersede an existing airworthiness directive (AD) that applies to all Bombardier Model DHC–8–101, –102, –103, –106, –201, –202, –301, –311, and –315 airplanes. The existing AD currently requires installation of a placard on the instrument panel of the cockpit to advise the flightcrew that positioning of the power levers below the flight idle stop during flight is prohibited. Additionally, the existing AD requires eventual installation of an FAA-approved system that would prevent such positioning of the power levers during flight. Installation of that system terminates the requirement for installation of a placard. This proposed AD would require operators who have incorporated a certain Bombardier service bulletin to perform repetitive operational checks of the beta lockout system and to revise the Airworthiness Limitations document. This proposed AD is prompted by in-service issues reported by operators who incorporated Bombardier Service Bulletin 8–76–24 as an alternative method of compliance to the existing AD. We are proposing this AD to prevent the inadvertent activation of ground beta mode during flight, which could lead to engine overspeed, engine damage or failure, and consequent reduced controllability of the airplane.

**DATES:** We must receive comments on this proposed AD by April 29, 2005.

**ADDRESSES:** Use one of the following addresses to submit comments on this proposed AD.

• *DOT Docket Web Site:* Go to <http://dms.dot.gov> and follow the instructions for sending your comments electronically.

• *Government-wide Rulemaking Web Site:* Go to <http://www.regulations.gov> and follow the instructions for sending your comments electronically.

• *Mail:* Docket Management Facility; U.S. Department of Transportation, 400 Seventh Street SW., Nassif Building, room PL–401, Washington, DC 20590.

• *Fax:* (202) 493–2251.

• *Hand Delivery:* Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For service information identified in this proposed AD, contact Bombardier, Inc., Bombardier Regional Aircraft Division, 123 Garratt Boulevard, Downsview, Ontario M3K 1Y5, Canada.

You can examine the contents of this AD docket on the Internet at <http://dms.dot.gov>, or at the Docket Management Facility, U.S. Department of Transportation, 400 Seventh Street SW., room PL–401, on the plaza level of the Nassif Building, Washington, DC. This docket number is FAA–2005–20730; the directorate identifier for this docket is 2004–NM–68–AD.

**FOR FURTHER INFORMATION CONTACT:** Richard Fiesel, Aerospace Engineer, Airframe and Propulsion Branch, ANE–171, Federal Aviation Administration, New York Aircraft Certification Office, 1600 Stewart Avenue, Suite 410, Westbury, New York 11590; telephone (516) 228–7304; fax (516) 794–5531.

#### Comments Invited

We invite you to submit any relevant written data, views, or arguments regarding this proposed AD. Send your comments to an address listed under **ADDRESSES**. Include “Docket No. FAA–2005–20730; Directorate Identifier 2004–NM–68–AD” at the beginning of your comments. We specifically invite comments on the overall regulatory, economic, environmental, and energy aspects of the proposed AD. We will consider all comments received by the closing date and may amend the proposed AD in light of those comments.

We will post all comments we receive, without change, to <http://dms.dot.gov>, including any personal information you provide. We will also post a report summarizing each substantive verbal contact with FAA personnel concerning this proposed AD. Using the search function of our docket Web site, anyone can find and read the comments in any of our dockets, including the name of the individual