Rules and Regulations

Federal Register
Vol. 75, No. 127
Friday, July 2, 2010

This section of the FEDERAL REGISTER contains regulatory documents having general applicability and legal effect, most of which are keyed to and codified in the Code of Federal Regulations, which is published under 50 titles pursuant to 44 U.S.C. 1510.

The Code of Federal Regulations is sold by the Superintendent of Documents. Prices of new books are listed in the first FEDERAL REGISTER issue of each week.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM429; Special Conditions No. 25–407–SC]

Special Conditions: Boeing 757–200 With 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 Boeing Model 757–200 series airplanes. These airplanes, as modified by the Federal Express Corporation, will have an advanced, 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 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 June 11, 2010. We must receive your comments by July 22, 2010.

ADDRESSES: You must mail two copies of your comments to: Federal Aviation Administration, Transport Airplane Directorate, Attn: Rules Docket (ANM–113), Docket No. NM429, 1601 Lind Avenue, SW., Renton, Washington 98057–3356. You may deliver two copies to the Transport Airplane Directorate at the above address. You must mark your comments: Docket No. NM429. You can inspect comments 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.*

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 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 special conditions. You can inspect the docket 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 preamble 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 these special conditions based on the comments we receive.

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

Background

On June 23, 2009, the Federal Express Corporation applied for a supplemental type certificate for the installation and operation of a HUD and an EFVS on Boeing Model 757–200. The original type certificate for the 757–200 airplanes is A2NM, revision 27, dated July 16, 2009.

The Boeing Model 757–200 is a transport-category, cargo-carrying airplane that operates with a crew of two and that carries no passengers. The model 757–200 airplane has a wing span of 125 feet, a length of 155 feet, a maximum takeoff gross weight of 255,000 pounds, is powered by two Pratt and Whitney PW2037, PW2040, PW2043, or Rolls-Royce RB211 turbofan engines, and has a maximum range of 3,900 nautical miles.

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 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 seen through the image, as safely and effectively as a pilot compartment view without an EVS image, that 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 EFVS 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, 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 displayed the sensor imagery, with or without other flight information, on a head-down display. For clarity, 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 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 will allow 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 14 CFR 21.101, the Federal Express Corporation must show that the Boeing Model 757–200 airplanes, as modified, comply with the regulations in the U.S. type-certification basis established for those airplanes. The U.S. type-certification basis for the airplanes is established in accordance with § 21.21 and 21.17, and the type certification application date. The U.S. type-certification basis for these airplane models is listed in Type Certificate Data Sheet No. A2NM, revision 27, dated July 16, 2009, which covers all variants of the 757 airplanes.

In addition, the certification basis includes certain special conditions and exemptions that are not relevant to these special conditions. Also, if the regulations incorporated by reference do not provide adequate standards with respect to the change, the applicant must comply with certain regulations in effect on the date of application for the change.

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 Boeing Model 757–200 airplanes, modified by Federal Express, because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions, as defined in § 11.19, are issued in accordance with § 11.38 and become part of the type-certification basis in accordance with § 21.101.

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.

Novel or Unusual Design Features

The Boeing Model 757–200 airplanes will incorporate an EFVS, which is a novel or unusual design feature. 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 are 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 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 flight-crew 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 14 CFR 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.

3. 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 pilot compartment view without an EFVS 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), 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 Boeing Model 757–200 airplanes. Should the Federal Express Corporation apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. A2NM 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 Boeing 757–200 airplanes. It is not a rule of general applicability and it 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 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 Boeing Model 757–200 airplanes modified by the Federal Express Corporation.

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. 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.

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 cross-wind 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 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. If the HUD has not been previously approved, it must be found to meet the basic HUD certification criteria documented in the HUD issue paper.

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 which 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.

4. The EFVS must be shown to be compliant with these requirements, under the provisions of §§ 91.175(l) and 121.651, with the following intended functions:

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

b. Enable the pilot to determine that the "enhanced flight visibility," as required by § 91.175(l)(2) and referenced in § 121.651, is adequate for descent and operation below minimum descent altitude/decision height.

c. Enabling the pilot to use the EFVS imagery 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 touchdown-zone elevation.

5. 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 June 11, 2010.

Jeffrey Duven,

Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. 2010–16166 Filed 7–1–10; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2010–0132; Directorate Identifier 2009–NM–096–AD; Amendment 39–16355; AD 2010–14–10]

RIN 2120–AA64

Airworthiness Directives; The Boeing Company Model 747–100, –200B, and –200F Series Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is superseding an existing airworthiness directive (AD), which applies to certain Model 747–100, 747–200B, and –200F series airplanes. That AD currently requires inspections to detect cracking in the upper row of fasteners holes of the skin lap joints in the fuselage lower lobe, and repair if necessary. This new AD reduces the maximum interval of the post-modification inspections. This AD results from reports of fatigue cracking on modified airplanes. We are issuing this AD to detect and correct fatigue cracking in the longitudinal lap joints of the fuselage lower lobe, which could lead to the rapid decompression of the airplane and the inability of the structure to carry fail-safe loads.

DATES: This AD is effective August 6, 2010.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in the AD as of August 6, 2010.

ADDRESSES: For service information identified in this AD, contact Boeing Commercial Airplanes, Attention: Data & Services Management, P.O. Box 3707, MC 2H–65, Seattle, Washington 98124–2207; telephone 206–544–5000, extension 1; fax 206–766–5680; e-mail *me.boecom@boeing.com;* Internet *https://www.myboeingfleet.com.*

Examining the AD Docket

You may examine the AD docket on the Internet at *http://www.regulations.gov;* or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (telephone 800–647–5527) is the Document Management Facility, U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Ivan Li, Aerospace Engineer, Airframe Branch, ANM–120S, FAA, Seattle Aircraft Certification Office, 1601 Lind Avenue, SW., Renton, Washington 98057–3356; telephone (425) 917–6437; fax (425) 917–6590.

SUPPLEMENTARY INFORMATION:

Discussion

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an AD that supersedes AD 94–17–01, Amendment 39–8996 (59 FR 41653, August 15, 1994). The existing AD applies to certain Model 747 airplanes. That NPRM was published in the **Federal Register** on February 25, 2010 (75 FR 8554). That NPRM proposed to continue to require inspections for cracking in the upper row of fasteners holes of the skin lap joints in the fuselage lower lobe, and repair, if necessary. The NPRM proposed to reduce the maximum interval of the post-modification inspections.

Comments

We gave the public the opportunity to participate in developing this AD. We considered the comments received from the sole commenter.

Request To Clarify Term in Paragraph (i)(2) of the NPRM

Boeing requests that we add a note below paragraph (i)(2) of the NPRM to clarify the term "remove" to mean "to