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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2018-1016; Notice No. 25-19-06-SC]

Special Conditions: The Boeing Company Model 777-9 Airplane; Electronic Flight-Control System and Control-Surface-Position Awareness

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for The Boeing Company (Boeing) Model 777-9 airplane. This airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is an electronic flight-control system requiring control-surface-position awareness. The applicable airworthiness regulations 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 established by the existing airworthiness standards.

DATES: Send comments on or before **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Send comments identified by Docket No. FAA-2018-1016 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: 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).

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: Joe Jacobsen, Airplane & Flight Crew Interface Section, AIR-671, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, Washington 98198; telephone: 206-231-3158; e-mail: joe.jacobsen@faa.gov.

SUPPLEMENTARY INFORMATION:

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 December 6, 2013, Boeing applied for an amendment to Type Certificate No. T00001SE to include the new 777-9 airplane. This airplane, which is a derivative of the Boeing Model 777 airplane currently approved under Type Certificate No. T00001SE, is a twin-engine, transport-category airplane with seating for 495 passengers and a maximum takeoff weight of 775,000 pounds.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Boeing must show that the Model 777-9 airplane meets the applicable provisions of the regulations listed in Type Certificate No. T00001SE, or the applicable regulations in

effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

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 Boeing Model 777-9 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified 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 Boeing Model 777-9 airplane 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 Boeing Model 777-9 airplane will incorporate the following novel or unusual design feature:

An electronic flight-control system requiring control-surface-position awareness.

Discussion

With a response-command type of flight-control system and no direct coupling from the cockpit controller to control surface, such as on the Boeing Model 777 and 787 airplanes, the pilot is not aware of the actual surface-deflection position during flight maneuvers. This feature of this design is novel and unusual when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. These special conditions are intended to contain the additional safety standard.

Some unusual flight conditions, arising from atmospheric conditions, or airplane or engine failures, or both, may result in full or nearly full control-surface deflection. Unless the flightcrew is made aware of excessive deflection or impending control-surface deflection limiting, piloted or the automated flight-control system control of the airplane could be inadvertently continued in a way that would cause loss of control, or other unsafe handling or performance situations.

The special conditions require that suitable annunciation be provided to the flightcrew when a flight condition exists in which nearly full control-surface deflection occurs. Suitability of such an annunciation must take into account that some pilot-demanded maneuvers, such as a rapid roll, are necessarily associated with intended full or nearly full control-surface deflection. Simple alerting systems, which would function in both intended and unexpected control-limiting situations, must be properly balanced between providing needed crew awareness and avoiding nuisance warnings.

The special conditions are derived initially from standardized requirements the Aviation Rulemaking Advisory Committee (ARAC) developed, a committee comprising representatives of the FAA, Europe's Joint Aviation Authorities (now replaced by the

European Aviation Safety Agency), and industry representatives. In the case of some of these requirements, a draft notice of proposed rulemaking has been prepared but no final rule has yet been issued.

The proposed 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 proposed special conditions are applicable to the Boeing Model 777-9 airplane. Should Boeing apply at a later date for a change to the type certificate to include another model incorporating 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 one model of airplane. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

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 Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for Boeing Model 777-9 airplanes.

In addition to compliance with §§ 25.143, 25.671, and 25.672, the following proposed special conditions apply.

1. The system design must ensure that the flightcrew is made suitably aware whenever the primary control means nears the limit of control authority. This indication should direct the pilot to take appropriate action to avoid the unsafe condition in accordance with appropriate airplane flight manual (AFM) instructions. Depending on the application, suitable annunciations may include flight-deck control position, annunciator light, or surface position indicators. Furthermore, this requirement applies at limits of control authority, not necessarily at limits of any individual surface travel.
2. Suitability of such a display or alerting must take into account that some pilot-demanded maneuvers are necessarily associated with intended full performance, which may require full surface deflection. Therefore, simple alerting systems, which would function in both intended or unexpected control-limiting situations, must be properly balanced between needed flightcrew awareness and nuisance factors. A monitoring system, which might compare airplane motion, surface deflection, and pilot demand, could be useful for eliminating nuisance alerting.

Issued in Des Moines, Washington, on May 1, 2019.

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