Airworthiness Directive

Federal Register Information

Header Information
DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39 [62 FR 34623 NO. 124 06/27/97]

Docket No. 97-NM-28-AD; Amendment 39-10060; AD **97-14-03**

RIN 2120-AA64

Airworthiness Directives; Boeing Model 737-100, -200, -300, -400, and -500 Series Airplanes
PDF Copy (If Available):

Preamble Information
AGENCY: Federal Aviation Administration, DOT

ACTION: Final rule

SUMMARY: This amendment adopts a new airworthiness directive (AD), applicable to all Boeing Model 737-100, -200, -300, -400, and -500 series airplanes, that requires installation of a newly designed rudder-limiting device and yaw damper system. This amendment is prompted by a report indicating that a full rudder input, either commanded or uncommanded, could result in a rapid roll upset; and by reports of malfunctions of the yaw damper system. The actions specified by this AD are intended to prevent excessive rudder authority and consequent reduced controllability of the airplane; and malfunctions of the yaw damper system, which could result in sudden uncommanded yawing of the airplane and consequent injury to passengers and crewmembers.

EFFECTIVE DATE: August 1, 1997

ADDRESSES: Information concerning this amendment may be obtained from or examined at the Federal Aviation Administration (FAA), Transport Airplane Directorate, Rules Docket, 1601 Lind Avenue, SW., Renton, Washington.

FOR FURTHER INFORMATION CONTACT: T. Tin Truong, Aerospace Engineer, Systems

and Equipment Branch, ANM-130S, FAA, Transport Airplane Directorate, Seattle Aircraft Certification Office, 1601 Lind Avenue, SW., Renton, Washington 98055-4056; telephone (425) 227-2552; fax (425) 227-1181.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an airworthiness directive (AD) that is applicable to all Boeing Model 737-100, -200, -300, -400, and -500 series airplanes was published in the Federal Register on March 14, 1997 (62 FR 12121). That action proposed to require installation of a newly designed rudder-limiting device and yaw damper system.

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comments received.

Support for the Proposal

Three commenters support the proposed AD.

Request to Revise Discussion Section of Proposal

One commenter requests that the second paragraph of the Discussion section that appeared in the preamble to the proposed rule be revised to remove any reference to wear of any bearing in the yaw damper coupler as the cause of the identified unsafe condition. The commenter states that its evaluations of the rate gyroscope from uncommanded yaw incidents do not support the conclusion that rudder kicks can be caused by wear of rotor bearings in the yaw damper coupler; therefore this commenter does not support replacement of the existing yaw damper couplers. The commenter also suggests that the word "gimbal" (in reference to the bearings) should be referenced in the proposal in lieu of "rotor."

The FAA concurs partially. The FAA is aware of a number of incidents of failure of the rate gyroscope of the yaw damper coupler as a result of wear of the rotor bearing. Such wear causes increased vibration within the yaw damper coupler, which can lead to brinnels (i.e., dents) in the gimbal bearings. This situation can cause faults in the gyroscope at certain input rates, which could result in the identified unsafe condition. Therefore, while wear of the rotor bearing alone does not cause rudder kicks, it does contribute to the unsafe condition.

The FAA agrees that the word "gimbal" could be referenced in place of "rotor." However, the Discussion section of a proposal does not reappear in a final rule. Therefore, the FAA finds that no change to this final rule is necessary.

Request to Extend the Comment Period of the Proposal

Several commenters request an extension of the public comment period for the proposed AD. These commenters state that such an extension will enable operators to better understand the issues surrounding the proposed actions and to review material that Boeing will present. The FAA does not concur. The FAA is unaware of material from Boeing and, therefore, is unable to extend the public comment period based on this request. Further, the FAA finds that to delay issuance of this final rule would be inappropriate, since the FAA has determined that an unsafe condition exists and the actions required by this AD are necessary to ensure continued safety.

Request to Delay Issuance of Final Rule

One commenter requests that the FAA delay issuance of the final rule until Boeing can release the service bulletins containing procedures for installation of a newly designed yaw damper system and rudder-limiting device. The commenter states that neither Boeing nor its suppliers have completed engineering the proposed design changes; therefore, the commenter is unable to provide meaningful or technically relevant comments regarding the actions specified in the proposed AD.

In light of the critical nature of the addressed unsafe condition, the FAA does not consider that delaying this action until after the release of Boeing's planned service bulletins is warranted. Furthermore, the FAA disagrees with the commenter's assertion that it is unable to submit meaningful comments on this AD until Boeing's design changes are completed. On the contrary, the proposed AD provided extensive information on the nature of the unsafe condition, the proposed corrective actions, and the proposed compliance times for those actions. The only information not provided (because it was not available) was reference to a specific service document providing details on specific methods for accomplishing the proposed actions.

The FAA considers that this proposed AD has complied fully with the requirements of the Administrative Procedure Act to provide the public with a reasonable opportunity to comment by including in the proposal "either the terms or substance of the proposed rule or a description of the subjects and issues involved."

Requests to Reduce Compliance Time for Modification

One commenter requests a revision to the proposed compliance time of 3 years for accomplishment of the requirements of this proposed AD. The commenter requests that the requirements proposed by the AD be accomplished by December 31, 1997. The commenter states that the National Transportation Safety Board (NTSB) and FAA have known about the problems associated with the rudder power control unit (PCU) since 1986 or earlier. The

commenter asserts that further delays will only increase the possibility of another catastrophic accident.

The FAA does not concur with the commenter's request to reduce the compliance time. In response to the comment that the FAA has known about the problems associated with the main rudder PCU since 1986 or earlier, the FAA finds this statement to be incorrect. The FAA learned of the design deficiencies in the main rudder PCU servo valve and control rod bolts in the last quarter of 1996, and has specifically addressed concerns associated with the main rudder PCU in a notice of proposed rulemaking that was issued on March 7, 1997 (reference Docket No. 97-NM-29-AD).

In the case of this AD, the FAA finds that a compliance time of less than 3 years would significantly increase the possibility of new design or manufacturing errors. Further, the FAA points out that once Boeing has developed the design changes for the rudder-limiting device and yaw damper system, time will be necessary to test the new design changes to ensure those changes meet certification requirements for FAA approval.

Further, in developing an appropriate compliance time for the required modifications, the FAA considered not only the degree of urgency associated with addressing the unsafe condition, but the availability of required parts and the practical aspect of accomplishing the replacements within an interval of time that parallels normal scheduled maintenance for the majority of affected operators. In consideration of all of these factors, the FAA has determined that 3 years represents an appropriate interval of time allowable wherein the modifications can be accomplished during scheduled maintenance intervals for the majority of affected operators, and an acceptable level of safety can be maintained.

Requests to Eliminate Rudder Authority at Altitudes Above 1,500 Feet

Three commenters note that paragraph (a)(1) of the proposed AD requires installation of the newly designed rudder-limiting device that reduces the rudder authority at altitudes above 1,500 feet above ground level (AGL).

One of these commenters requests that the rudder limiting device be changed from an altitude-based device to one based on airplane speed and the asymmetrical thrust of the engines. This commenter states that excessive rudder authority should be restricted at any altitude and speed. This commenter also states that a malfunction on the rudder system could occur at altitudes above 1,500 feet above ground level (AGL) when the rudder limiting device is activated. Such a failure could be transparent to the flightcrew until the airplane descends below 1,500 feet AGL, at which point the rudder-limiting device will no longer be in effect.

The second commenter also requests that airspeed (or dynamic pressure) be the triggering point for activation of the rudder limiter. This commenter contends that an active rudder-limiting device is necessary to reduce the rudder authority. The commenter points out that such a reduction should occur in any situation in which a full rudder deflection (i.e., hardover) can result in a rolling movement due to a sideslip that exceeds the maximum rolling moment available by control wheel inputs. The commenter states that this scenario can exist both above and below 1,500 feet AGL. The commenter also states that an airspeed driven rudder limiter would be consistent with past practices and industry standards.

The third commenter also requests that the proposal be revised to require rudder limiting "at flight conditions where full rudder authority is not required." The commenter states that the requirements of paragraph (a)(1) of the proposal (i.e., at altitudes above 1,500 feet AGL) are too restrictive. The commenter asserts that it will be possible to reduce this altitude.

The FAA finds that clarification is necessary. The FAA finds that, as paragraph (a)(1) is currently worded, operators could only install a newly designed rudder-limiting device that reduces that rudder authority at altitudes above 1,500 feet AGL. However, the FAA finds the various designs may reduce rudder authority; thus, basing the rudder-limiting device on an altitude is too restrictive. Therefore, the FAA has determined that revising paragraph (a)(1) of the final rule to replace the phrase "at altitudes above 1,500 feet above ground level (AGL)" with the phrase "at flight conditions where full rudder authority is not required" will allow operators to submit various designs that reduce rudder authority to the FAA for approval. The FAA has revised paragraph (a)(1) of the final rule accordingly.

Request that Proposed Modifications Terminate Another AD

One commenter requests that the requirements of the proposed AD constitute terminating action for the requirements of Notice of Proposed Rulemaking (NPRM) Docket No. 96-NM-151-AD that address the yaw damper coupler/rate gyroscope.

The FAA finds that clarification is necessary. The FAA points out that the NPRM referenced by the commenter proposed to require actions associated with the yaw damper engage solenoid valve and the yaw damper coupler/rate gyroscope. Additionally, since receipt of the comment, the FAA has issued the final rule for that NPRM [reference AD 97-09-15, amendment 39-10011 (62 FR 24325, May 5, 1997)]. That AD addresses only actions associated with the yaw damper engage solenoid valve.

In the preamble of AD 97-09-15, the FAA indicated that it is considering issuance of a separate rulemaking action to address actions relative to the yaw damper coupler/rate gyroscope. The FAA is considering whether accomplishing the actions required by this final rule would

constitute terminating action for the requirements of that separate proposed AD.

Request that Parts Be Available for Concurrent Accomplishment of Modifications

One commenter requests that parts for both modification of the yaw damper system (required by this proposed AD) and modification of the rudder PCU (proposed by NPRM Docket No. 97-NM-29-AD) be made available at the same time. The commenter states that such parts availability will allow accomplishment of both modifications at the same time, which would minimize the down time of the airplane.

The FAA has no way of ensuring that parts can be made available at a specific time so that these modifications can be accomplished concurrently. The FAA acknowledges that accomplishment of both modifications at the same time would minimize down time of the airplane. The FAA points out that the compliance time for this AD is 3 years, and the proposed compliance time for NPRM Docket No. 97-NM-29-AD is 2 years. Based on parts availability, it is an operator's prerogative to special schedule its fleet of airplanes to accomplish both modifications concurrently, provided that the required actions are accomplished within the specified compliance times. The FAA finds that no change to this final rule is necessary.

Request to Add a New Requirement for ON/OFF Switches

One commenter requests that the shut off valves of the rudder hydraulic supply be installed and controlled by ON/OFF switches in the control cabin. The commenter states that such switches are installed on Boeing Model 727 series airplanes. The FAA does not concur with the commenter's request. The FAA does not consider it appropriate to include various provisions in an AD applicable to a single operator's unique use of an affected airplane. However, paragraph (b) of this AD contains a provision for requesting approval of an alternative method of compliance to address these types of unique circumstances.

Request to Add a New Requirement to Revise Operating Procedures

One commenter requests that the FAA require a revision to operating procedures of Boeing Model 737 series airplanes that would give pilots a reliable margin of safety until operators could accomplish the proposed installation of the newly designed rudder limiter. The commenter points out that, for certain weight and approach flap combinations of the airplane, the approach speeds that Boeing recommended are at or very near the "cross over point" (a speed below which the lateral controls become inadequate to counter a fully deflected rudder). The commenter contends that increasing the recommended approach speed by an additional 10 knots will increase the controllability of the airplane and will provide the flightcrew with additional time to take appropriate action in the event of a rudder hardover.

The FAA does not concur with the commenter's request. On December 23, 1996, the FAA issued AD 96-26-07, amendment 39-9871 (62 FR 15, January 2, 1997), which is applicable to all Boeing Model 737 series airplanes. That AD requires revising the FAA-approved Airplane Flight Manual to include procedures that will enable the flightcrew to take appropriate action to maintain control of the airplane during an uncommanded yaw or roll condition, and to correct a jammed or restricted flight control condition. The FAA has determined that the requirements of AD 96-26-07 adequately address the controllability issue raised by the commenter.

Conclusion

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes previously described. The FAA has determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Cost Impact

There are approximately 2,900 Boeing Model 737 series airplanes of the affected design in the worldwide fleet. The FAA estimates that 1,350 airplanes of U.S. registry will be affected by this AD.

The FAA estimates that it will take approximately 87 work hours per airplane to accomplish the required installation of a newly designed rudder-limiting device, at an average labor rate of $60 per work hour. Required parts will be supplied by the manufacturer at no cost to operators. Based on these figures, the cost impact of the required AD on U.S. operators is estimated to be $7,047,000, or $5,220 per airplane.

The FAA also estimates that it will take approximately 20 work hours per airplane to accomplish the required installation of a newly designed yaw damper system, at an average labor rate of $60 per work hour. Required parts will be supplied by the manufacturer at no cost to operators. Based on these figures, the cost impact of the required AD on U.S. operators is estimated to be $1,620,000, or $1,200 per airplane.

The cost impact figures discussed above are based on assumptions that no operator has yet accomplished any of the requirements of this AD action, and that no operator would accomplish those actions in the future if this AD were not adopted.

Regulatory Impact

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

For the reasons discussed above, I certify that this action (1) is not a "significant regulatory action" under Executive Order 12866; (2) is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. A final evaluation has been prepared for this action and it is contained in the Rules Docket. A copy of it may be obtained from the Rules Docket at the location provided under the caption "ADDRESSES."

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (14 CFR part 39) as follows:

PART 39 - AIRWORTHINESS DIRECTIVES
1. The authority citation for part 39 continues to read as follows: Authority: 49 U.S.C. 106(g), 40113, 44701. § 39.13 - [Amended]
2. Section 39.13 is amended by adding the following new airworthiness directive:

Regulatory Information

97-14-03 BOEING: Amendment 39-10060. Docket 97-NM-28-AD.

Applicability: All Model 737-100, -200, -300, -400, and -500 series airplanes, certificated in any category.

NOTE 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been otherwise modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request

approval for an alternative method of compliance in accordance with paragraph (b) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless accomplished previously.

To prevent excessive rudder authority and consequent reduced controllability of the airplane; and malfunctions of the yaw damper system, which could result in sudden uncommanded yawing of the airplane and consequent injury to passengers and crewmembers; accomplish the following:

(a) Within 3 years after the effective date of this AD, accomplish paragraphs (a)(1) and (a)(2) of this AD in accordance with a method approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA, Transport Airplane Directorate.

(1) Install a newly designed rudder-limiting device that reduces the rudder authority at flight conditions where full rudder authority is not required.

(2) Install a newly designed yaw damper system that improves the reliability and fault monitoring capability.

(b) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Seattle ACO. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Seattle ACO.
NOTE 2: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Seattle ACO.

(c) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(d) This amendment becomes effective on August 1, 1997.

Footer Information

Comments

Updated RGL applicability to match AD applicability; CAR C-11-185