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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2012-0186; Directorate Identifier 2011-NM-268-AD; Amendment 39-17278; AD 2012-24-08]

RIN 2120-AA64

Airworthiness Directives; The Boeing Company Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for certain The Boeing Company Model 737-600, -700, -700C, -800, -900, and -900ER series airplanes. This AD was prompted by reports of flight crew failure to activate air data probe heat. This AD requires modifying the anti-icing system for the angle of attack sensor, the total air temperature, and the pitot probes. We are issuing this AD to prevent ice from forming on air data system sensors and consequent loss of or misleading airspeed indication on all airspeed indicating systems, which could lead to loss of control of the airplane.

DATES: This AD is effective January 14, 2013.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in the AD as of January 14, 2013.

ADDRESSES: For service information identified in this AD, contact Boeing Commercial Airplanes, Attention: Data & Services Management, P.O. Box 3707, MC 2H-65, Seattle, WA 98124-2207; telephone 206-544-5000, extension 1; fax 206-766-5680; Internet <https://www.myboeingfleet.com>. You may review copies of the referenced service information at the FAA, Transport Airplane Directorate, 1601 Lind Avenue SW., Renton, WA. For information on the availability of this material at the FAA, call 425-227-1221.

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 (phone: 800-647-5527) is 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: Frank Carreras, Aerospace Engineer, Systems and Equipment Branch, ANM-130S, FAA, Seattle Aircraft Certification Office (ACO), 1601 Lind Avenue SW., Renton, WA 98057-3356; phone: 425-917-6442; fax: 425-917-6590; email: frank.carreras@faa.gov.

SUPPLEMENTARY INFORMATION:

Discussion

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an AD that would apply to the specified products. That NPRM published in the Federal Register on February 28, 2012 (77 FR 11789). That NPRM proposed to require modifying the anti-icing system for the angle of attack sensor, the total air temperature, and the pitot probes.

Actions Since Issuance of NPRM (77 FR 11789, February 28, 2012)

Since we issued the NPRM (77 FR 11789, February 28, 2012), we reviewed Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012. (The NPRM referred to Boeing Alert Service Bulletin 737-30A1063, dated November 16, 2011.) Among other things, Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012, updates certain information, including part numbers, various accomplishment steps, certain modules, maintenance manuals, and kit information.

Comments

We gave the public the opportunity to participate in developing this AD. The following presents the comments received on the proposal (77 FR 11789, February 28, 2012) and the FAA's response to each comment. Aviation Partners Boeing stated that installation of winglets per STC ST00830SE does not affect the NPRM and stated it would provide supporting data to the FAA upon request.

Request To Revise Compliance Time

Seven commenters requested that we revise the 24-month compliance time, as proposed in the NPRM (77 FR 11789, February 28, 2012).

Korean Air Lines (KAL), Air Pacific Limited (APC), Delta Air Lines, Inc. (DAL), American Airlines (AAL), United Airlines (UAL), and Southwest Airlines (SWA) requested we extend the compliance time. UAL and AAL requested we take into account the time needed to obtain modification kits and to modify the panels. SWA and AAL stated that the compliance time will result in unscheduled maintenance outside of a heavy maintenance cycle. SWA stated unscheduled maintenance visits could last up to four days outside of a heavy maintenance cycle. APC noted it would not be able to accomplish the actions during this year's C-checks, which are at 2-year intervals.

Turkish Airlines (THY) stated that the proposed 24-month compliance time may not be enough for fleet-wide retrofit since the P5-9 panel modification restricts the rate of aircraft modification. KAL requested that the compliance time be extended to 30 or more months. DAL requested that the compliance time be extended to 36 months due to several factors. DAL cited the rate at which operators can complete the modification, expected late kit release based on revisions in service information linked to the service bulletin validation process, and "flawed" service information. DAL also compared the modification specified in this NPRM (77 FR 11789, February 28, 2012) with a

similar modification that installs warning lights to the P1-3 and P3-1 panels, and stated that this similar modification has a 36-month compliance time.

We disagree with these requests to extend the compliance time. In developing an appropriate compliance time for these actions, we considered the urgency associated with the subject unsafe condition, the practical aspect of accomplishing the required modification and the normal scheduled maintenance times for most affected operators. In consideration of these items, as well as parts availability, we have determined that the 24-month compliance time for the modification is the longest duration allowable that will ensure an acceptable level of safety. According to the provisions of paragraph (i) of this AD, however, we may approve requests to adjust the compliance time if the requests include data substantiating that the new compliance time would provide an acceptable level of safety. We have not changed the final rule regarding this issue.

Request To Include an Alerting System

Air Line Pilots Association International (ALPA) requested that we revise the NPRM (77 FR 11789, February 28, 2012) by including an alerting system as part of the proposed requirements. ALPA stated that any automatic system design must include a crew alerting system to provide the flight crew with an aural and visual indication if the heating system does not automatically activate or is not functioning properly. ALPA further states that human factors principles should be integrated into a warning system design to ensure that factors such as pilot field of view and nuisance warnings due to normal ground operations (e.g., single engine taxi) are fully evaluated. ALPA stated that Boeing Model 747-400 airplanes have an automatic system and this system provides crews with an engine indicating and crew alerting system (EICAS) message if any item in the air data probe suite is not being heated, either due to heating element failure or if the system fails to activate upon engine start. ALPA reasoned that a similar alerting system should be included in the proposed system for Model 737 airplanes.

We agree that if the heating system does not automatically activate or is not functioning properly, the flight crew should receive an alert. We also agree that human factors principles should be considered in an alert system design. These principles are consistent with FAA regulations, policy, and guidance.

However, we disagree with revising this AD to include changes to the flight crew alerting for pitot heat malfunctions on Model 737 airplanes because that model incorporates "CAPT PITOT" and "F/O PITOT" caution lights on the P5-9 overhead panel for the captain's and first officer's probe heat. Both caution lights are tied to a Master Caution light in each pilot's primary field of view and an "Anti-ice" caution light that alerts the pilots to check the overhead panel for the specific condition causing the Master Caution and "Anti-ice" lights to illuminate. The captain's and/or first officer's PITOT light will illuminate whenever a loss of electrical current flow is sensed through the respective pitot probe heater. The practical effect of the change to automatic probe heat activation is that when the probe heat switch is in AUTO, the respective PITOT light should be out when either engine is running. Therefore, if the switch is in AUTO and the corresponding PITOT light remains on with either engine running, a malfunction of the automatic activation system is indicated.

Flight crew procedures for both normal and non-normal operation of the pitot heat system are unaffected by this change. We have determined that the existing flight crew alerting for pitot heat malfunctions provides adequate flight crew alerting for pitot heat malfunctions on Model 737 airplanes, whether the system is manually or automatically activated. Furthermore, since probe heat is activated with the probe heat switch in AUTO when either engine is running, single engine taxi should not generate nuisance warnings; a PITOT light during single engine taxi would indicate a malfunction of the automatic activation system. No change to the final rule is necessary in this regard.

Request To Revise Precipitating Event Language

Boeing requested we revise the sentence in the Summary section of the NPRM (77 FR 11789, February 28, 2012) that describes the precipitating event, i.e., "reports of flight crew failure to activate air data probe heat." Boeing suggested that the phrase "as required by the FAA approved operating procedures" be added to the end of the sentence in question. Boeing reasoned that the suggested text would make it clear that existing Boeing Model 737NG operating procedures are FAA-approved and that the flight crew failed to perform a required action.

We disagree with the commenter's request to revise the language that describes the precipitating event. Regardless of whether the flight crew adhered to prescribed operating procedures, we consider that failure to activate the air data probe heat on the part of the flight crew represents an unacceptable risk to the affected airplanes, as evidenced by the current lack of an automatic probe heat activation system in combination with the demonstrated accident and incident history on the type associated with failure to activate probe heat. In addition, the purpose of this AD is to identify and correct an unsafe condition in the type design of the affected airplanes. We find that the precipitating event statement is accurate as originally worded in the NPRM (77 FR 11789, February 28, 2012). We have not made any change to the final rule in this regard.

Request To Revise Unsafe Condition Statement

Boeing requested we revise the unsafe condition statement in the Summary section, Discussion section, and paragraph (e) of the NPRM (77 FR 11789, February 28, 2012). Boeing stated that the text "* * * which could lead to loss of control of the airplane" should read, "* * * which would not provide the necessary air data instrumentation to safely fly the airplane." Boeing stated that loss of, or erroneous, airspeed indications do not necessarily lead to loss of control because other indications can be used to safely fly the airplane. Boeing noted that multiple in-service events have occurred without loss of control when the flight crew followed the procedures that mitigate loss of air data.

We disagree with the commenter's request to revise the unsafe condition statement. Although some in-service events might have occurred without loss of control, loss of, or misleading airspeed indication on all airspeed indicating systems can, in fact, lead to an unsafe condition of loss of airplane control. FAA Advisory Circular (AC) 25-11A, "Electronic Flight Deck Displays," dated June 21, 2007 ([http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/7d6139991c94e7d9862573080063f84d/\\$FILE/AC%2025-11A.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/7d6139991c94e7d9862573080063f84d/$FILE/AC%2025-11A.pdf)), typically classifies loss of all airspeed displays (including the standby display) as a "catastrophic" failure condition. "Catastrophic" is defined in FAA AC 25.1309-1A, "System Design and Analysis," dated June 21, 1988 ([http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/50bfe03b65af9ea3862569d100733174/\\$FILE/AC25.1309-1A.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/50bfe03b65af9ea3862569d100733174/$FILE/AC25.1309-1A.pdf)) as a failure condition which would prevent continued safe flight and landing. FAA AC 25-11A also classifies display of misleading airspeed information on one primary display combined with a standby failure (i.e., loss of airspeed or incorrect airspeed) as a "catastrophic" failure condition. As specified in National Transportation Safety Board (NTSB) Safety Recommendation A-07-56, dated September 13, 2007 (http://www.nts.gov/doclib/reclatters/2007/a07_55_56.pdf), in at least one in-service event on a Boeing Model 737 airplane, it was determined that this condition ultimately resulted in a loss of airplane control with fatal injuries.

In addition, we agree with Boeing's identification of the effects of unreliable air data, as given in the Background section of Boeing Alert Service Bulletin 737-30A1063, dated November 16, 2011; and Revision 1, dated July 10, 2012. For these reasons, we find that the unsafe condition statement is accurate as originally worded in the NPRM (77 FR 11789, February 28, 2012). We have not made any change to the final rule in this regard.

Request To Revise Discussion Section of the NPRM (77 FR 11789, February 28, 2012)

Boeing requested we revise certain text in the Discussion section of the NPRM (77 FR 11789, February 28, 2012):

- To indicate existing compliance of pitot heat alerting with section 25.1326 of the Federal Aviation Regulations (14 CFR 25.1326);
- To indicate failure of the flight crew to respond properly to the amber caution-level indication of a lack of probe heat; and
- To state that the indication is in clear view of a flight crew member. Boeing stated the changes are needed for the following reasons:
- To correctly state that the system provides indication of a lack of probe heat activation, as required by section 25.1326 of the Federal Aviation Regulations (14 CFR 25.1326), rather than a positive indication of heat activation, as stated by the FAA (and which would not be compliant);
- To make it clear that the existing indication is compliant;
- To correct the "blameless" tone of the passive voice used in the first sentence of the Discussion section by making it clear that it is only the flight crew that can fail to activate the probe heat, which is one of the advantages of a manual system; and
- To make it explicit that the unsafe condition is not only a result of flight crew failure to activate the probe heat, but also a result of the flight crew ignoring the caution-level indication that is in plain view.

Since the Discussion section of the NPRM (77 FR 11789, February 28, 2012) is not restated in the final rule, we cannot change that section. However, we find that clarification is necessary.

According to section 39.5 of the Federal Aviation Regulations (14 CFR 39.5), we issue ADs when we find that an unsafe condition exists in the product, and that the unsafe condition is likely to exist or develop in other products of the same type design. We made such a finding with respect to the pitot heat system of the affected airplanes in this AD action. Therefore, it is our responsibility to correct the unsafe condition independent of whether the design was considered compliant to applicable airworthiness standards; an AD is the appropriate vehicle for doing so.

Additionally, we do not make findings for the incidents identified in safety recommendations issued by the National Transportation Safety Board (NTSB). We do not have any information that supports the argument that the flight crews involved in the incidents identified in the NTSB safety recommendation deliberately disregarded a properly functioning pitot heat alert that they had observed. Many possible scenarios associated with pitot heat alerting could contribute to the failure of the flight crew to activate the probe heat; including a malfunction of probe heat alerting resulting in failure to provide an indication of lack of activation, the flight crew not observing or properly identifying the alert due to various factors (even though certain elements of the alerting system are within the pilots' primary field of view), or the flight crew not understanding the meaning of the alert or the proper procedures for responding to it.

We have not made any changes to the final rule in this regard.

Request To Revise Cost Estimate

AAL, DAL, and SWA requested that we revise the cost estimate of the NPRM (77 FR 11789, February 28, 2012). AAL stated the NPRM and service information underestimate the labor cost by greater than 50 percent. AAL stated that additional out-of-service days and lost opportunity cost should be included in the Cost of Compliance section of the NPRM. DAL stated there is a significant investment in excess of \$250,000 in "seed" modules that are necessary to minimize the risk of not accomplishing the proposed changes. DAL concluded that this cost is not represented in the Costs of Compliance of the NPRM. SWA stated the expected labor cost is underestimated by 32 work-hours due to removal and reinstallation of lavatory A and galley 1.

We partially agree with the commenters' request to revise the cost estimate. We do not agree to change the AD to accommodate the investment in "seed" modules, since this appears to be an operator-specific cost associated with individual maintenance scheduling. Also, we disagree that the cost estimate is underestimated by greater than 50 percent. However, we revised the Costs of Compliance section of this AD as follows. We revised the parts cost to match the information presented in Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012. In addition, we included 30 additional work-hours for removing and reinstalling lavatory and galley monuments that might be necessary to do the modification. This information was coordinated with Boeing.

Request To Reference Revised Service Information

Several commenters noted that Boeing Alert Service Bulletin 737-30A1063, dated November 16, 2011, is inadequate. That service information is cited in the NPRM (77 FR 11789, February 28, 2012) as the appropriate source of service information for accomplishing the required actions. The commenters requested that the service information be revised to incorporate certain clarifications. One airline, DAL, specifically requested that the final rule not be released until the service information has been validated.

We agree. As explained previously, Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012, has been issued. This service information has been validated by means of use of an aircraft in maintenance, and is referenced in this final rule as the appropriate source of service information. In addition, we added a new paragraph (h) to this AD (and re-designated subsequent paragraphs) to provide credit for certain actions performed before the effective date of this AD using Boeing Alert Service Bulletin 737-30A1063, dated November 16, 2011.

DAL also requested we specify "revisions to BAE Systems Service Bulletin 233A3201-30-02" as approved service information, and provide contact information for BAE. (The commenter did not specify a revision level or date for the BAE service information.) DAL stated that its review of the BAE Systems service information (which provides instructions on how to modify the P5-9 window/pitot heat module to the required ON and AUTO pitot heat switch configuration) identified discrepancies in the Accomplishment Instructions.

DAL provided examples of the identified discrepancies, including connector identifications and the number of printed wire assemblies on the P5-9 modules. DAL stated it has contacted Boeing and BAE Systems to seek resolution of these discrepancies.

DAL added that BAE concurred that its service information will require revision. DAL indicated that additional revision of the Boeing service information might be required in light of any BAE Systems service information revision. DAL noted that the service information, as currently published, would necessitate that operators request approval of alternative methods of compliance (AMOC) for resolutions to the identified discrepancies in order to comply with the final rule.

We find that clarification is necessary. The intent of this AD is to require installation of a P5-9 module with AUTO and ON pitot heat switch functionality that supports automatic pitot heat activation. As discussed previously, we reviewed Boeing Alert Service Bulletin 737-30A1063, dated November 16, 2011; and Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012; and determined that this service information provides sufficient instructions to adequately correct the unsafe condition. Operators may use either the original issue or Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012, to comply with the AD requirements. However, this AD does not require accomplishment of the BAE service information. No change to the final rule is necessary in this regard.

Conclusion

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously. We have determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM (77 FR 11789, February 28, 2012) for correcting the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM (77 FR 11789, February 28, 2012).

We also determined that these changes will not increase the economic burden on any operator or increase the scope of the AD.

Costs of Compliance

We estimate that this AD affects 1,025 airplanes of U.S. registry.

We estimate the following costs to comply with this AD:

Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Modification, including removing and reinstalling galleys and lav-	90 to 109 work-hours × \$85 per hour = \$7,650 to \$9,265.	\$6,674 to \$8,051	Up to \$17,316	Up to \$17,748,900.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect 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.

For the reasons discussed above, I certify that this AD:

- (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),
- (3) Will not affect intrastate aviation in Alaska, and
- (4) 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.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 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. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):



2012-24-08 The Boeing Company: Amendment 39-17278; Docket No. FAA-2012-0186; Directorate Identifier 2011-NM-268-AD.

(a) Effective Date

This AD is effective January 14, 2013.

(b) Affected ADs

None.

(c) Applicability

This AD applies to The Boeing Company Model 737-600, -700, -700C, -800, -900, and -900ER series airplanes; certificated in any category; as identified in Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012.

(d) Subject

Joint Aircraft System Component (JASC)/Air Transport Association (ATA) of America Code 3030, Pitot/Static Anti-Ice System.

(e) Unsafe Condition

This AD was prompted by reports of flight crew failure to activate air data probe heat. We are issuing this AD to prevent ice from forming on air data system sensors and consequent loss of or misleading airspeed indication on all airspeed indicating systems, which could lead to loss of control of the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Modification

Within 24 months after the effective date of this AD: Modify the anti-icing system for the angle of attack sensor, the total air temperature, and the pitot probes, in accordance with the Accomplishment Instructions of Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012.

(h) Credit for Previous Actions

This paragraph provides credit for actions required by paragraph (g) of this AD, if those actions were performed before the effective date of this AD using Boeing Alert Service Bulletin 737-30A1063, dated November 16, 2011, which is not incorporated by reference in this AD.

(i) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Seattle Aircraft Certification Office (ACO), FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the ACO, send it to the attention of the person identified in the Related Information section of this AD. Information may be emailed to: 9-ANM-Seattle-ACO-AMOC-Requests@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(j) Related Information

For more information about this AD, contact Frank Carreras, Aerospace Engineer, Systems and Equipment Branch, ANM-130S, FAA, Seattle Aircraft Certification Office (ACO), 1601 Lind Avenue SW., Renton, WA 98057-3356; phone: 425-917-6442; fax: 425-917-6590; email: frank.carreras@faa.gov.

(k) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Boeing Alert Service Bulletin 737-30A1063, Revision 1, dated July 10, 2012.

(ii) Reserved.

(3) For service information identified in this AD, contact Boeing Commercial Airplanes, Attention: Data & Services Management, P.O. Box 3707, MC 2H-65, Seattle, WA 98124-2207; telephone 206-544-5000, extension 1; fax 206-766-5680; Internet <https://www.myboeingfleet.com>.

(4) You may view this service information at FAA, Transport Airplane Directorate, 1601 Lind Avenue SW., Renton, WA. For information on the availability of this material at the FAA, call 425-227-1221.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued in Renton, Washington, on November 23, 2012.

Ali Bahrami,
Manager, Transport Airplane Directorate,
Aircraft Certification Service.