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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2015-1273; Directorate Identifier 2014-NM-194-AD; Amendment 39-18530; AD 2016-11-03]**

**RIN 2120-AA64**

#### **Airworthiness Directives; The Boeing Company Airplanes**

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

**ACTION:** Final rule.

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**SUMMARY:** We are adopting a new airworthiness directive (AD) for certain The Boeing Company Model 777 airplanes. This AD was prompted by reports of unreliable performance of the fuel scavenge system. This AD requires changing the main fuel tank water scavenge system, center fuel tank fuel scavenge system, and certain electrical panels; doing related investigative actions; doing corrective actions if necessary; and, for certain airplanes, changing the fuel scavenge system to give redundant control of the center override/jettison fuel pumps and main jettison fuel pumps. We are issuing this AD to prevent fuel exhaustion and subsequent power loss of all engines due to loss of capability to scavenge fuel in the center fuel tank.

**DATES:** This AD is effective July 6, 2016.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of July 6, 2016.

**ADDRESSES:** For Boeing service information identified in this final rule, 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>.

For GE Aviation service information identified in this final rule, contact GE Aviation Fleet Support, 1 Neumann Way, Cincinnati, OH 45215; telephone 513-552-3272; email: [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com); Internet <http://www.geaviation.com>.

You may view this 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. It is also available on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2015-1273.

## **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2015-1273; 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 Docket 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:** Sue Lucier, Aerospace Engineer, Propulsion Branch, ANM-140S, FAA, Seattle Aircraft Certification Office (ACO), 1601 Lind Avenue SW., Renton, WA 98057-3356; phone: 425-917-6438; fax: 425-917-6590; email: [suzanne.lucier@faa.gov](mailto:suzanne.lucier@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain The Boeing Company Model 777 airplanes. The NPRM published in the Federal Register on May 14, 2015 (80 FR 27601) ("the NPRM"). The NPRM was prompted by reports of unreliable performance of the fuel scavenge system. The NPRM proposed to require changing the main fuel tank water scavenge system, center fuel tank fuel scavenge system, and certain electrical panels; related investigative actions; and doing corrective actions if necessary; and, for certain airplanes, changing the fuel scavenge system to give redundant control of the center override/jettison fuel pumps and main jettison fuel pumps. We are issuing this AD to prevent fuel exhaustion and subsequent power loss of all engines due to loss of capability to scavenge fuel in the center fuel tank.

### **Comments**

We gave the public the opportunity to participate in developing this AD. The following presents the comments received on the NPRM and the FAA's response to each comment.

### **Request To Withdraw the NPRM**

Lufthansa Cargo AG stated that the unsafe condition addressed in the NPRM is not a safety concern and that mandating Boeing Special Attention Service Bulletin 777-28-0078, dated September 4, 2014, is not justified. Lufthansa Cargo AG stated that the main fuel tanks must be fully loaded with fuel when a mission flight requires fuel in the center tank. Lufthansa Cargo AG explained that if the fuel scavenge system fails to scavenge the remaining fuel in the center tank, the fuel in the main tanks is still available, and therefore there is no safety concern.

We infer that the commenter requests we withdraw the NPRM. We do not agree with the commenter's request. The failure of fuel scavenging means that up to 2,700 pounds of fuel that is required by mission planning would not be available if needed. The actions required by this AD are necessary in order to prevent fuel exhaustion and subsequent power loss of all engines due to loss of capability to scavenge fuel in the center fuel tank. We have not changed this AD in this regard.

### **Requests To Remove Modification Requirement**

Boeing, Aerologic GmbH, and British Airways (BAC) requested that we remove the modification required by paragraph (g) of the proposed AD, but instead mandate installation of

airplane information management system (AIMS) 2 software V14 or later to address the unsafe condition. Aerologic GmbH and BAC stated that the unsafe condition can be mitigated by incorporation of AIMS 2 software V14 or later, which provides an engine indicating and crew alerting system (EICAS) advisory message to alert the flightcrew of the status of the scavenge system and the possibility of unusable trapped fuel. Boeing stated that the trapped fuel quantity is well below reserve fuel requirements and that the flightcrew can take appropriate actions to avoid a fuel exhaustion condition.

We do not agree with the commenters' request. We worked with Boeing extensively on this issue in order to define a reliable automated solution, appropriate to address the severity of this safety issue. While Boeing may disagree, we have determined that relying solely on AIMS 2 software V14 or later is not sufficient to address the identified unsafe condition under all flight conditions. The approach in Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, yields a higher confidence of fully mitigating the safety issue since a robust automated software solution (i.e., installing electrical load management system 2 (ELMS 2) software) removes the potential for human error to undermine the safety mitigation. We have not changed this AD in this regard.

### **Request To Delay AD Issuance**

Boeing requested that we delay issuance of the final rule until the modified scavenge system is certified on Model 777 airplanes equipped with an auxiliary fuel tank. Boeing stated that this will allow this final rule to require the accomplishment of Boeing Service Bulletin 777-28-0078 on all applicable airplanes and avoid the need for multiple ADs on the same subject.

We infer the commenter is requesting that we delay issuance of the final rule until a revision of Boeing Service Bulletin 777-28-0078 is available for reference in the final rule. We do not agree with the commenter's request. We do not have a definitive date when the modified scavenge system will be certified on Model 777 airplanes equipped with an auxiliary fuel tank and the related service bulletin revision will be available. To delay this action would be inappropriate, since we have determined that an unsafe condition exists. We have also determined that it is not warranted to delay this final rule in order to avoid issuance of multiple ADs on the same subject. We have not changed this AD in this regard.

### **Requests To Incorporate New Service Information and Provide Credit**

Boeing, All Nippon Airways (ANA), Delta Airlines (DAL), Emirates Airline, FedEx Express, and United Airlines (UAL) requested that we revise the NPRM to incorporate Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015. Boeing requested that we provide credit for prior actions done using Boeing Special Attention Service Bulletin 777-28-0078, dated September 4, 2014.

We agree with the commenters' requests. Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, provides revised instructions and top-kits to accomplish the modification. No new work is required by this revision. We have revised paragraphs (c), (g), (h)(1), (h)(2), and (i) of this AD to refer to Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015. We have added new paragraph (j)(2) of this AD to provide credit for actions required by paragraph (g) of this AD, if those actions were performed before the effective date of this final rule using Boeing Special Attention Service Bulletin 777-28-0078, dated September 4, 2014. We have redesignated paragraph (j) of the proposed AD as paragraph (j)(1) in this AD.

## **Request To Revise Compliance Time**

Boeing requested that we remove the wording "prior to" in paragraph (h)(2) of the proposed AD, which would require actions to be done concurrently with the actions specified in paragraph (g) of the proposed AD.

We agree with the commenter's request. Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, specifies concurrent, not prior, accomplishment of the service information specified in paragraph (h) of this AD. We have revised paragraph (h) of this AD accordingly, which does not expand the requirements of this AD.

## **Requests To Incorporate Boeing Information Notice (IN) for New Service Bulletin, for Part Substitution, and for Error Resolution**

ANA, DAL, Emirates Airline, FedEx, and UAL requested that we include in the NPRM the information specified in Boeing IN 777-28-0078 IN 02. FedEx also requested that we include in the NPRM the information specified in Boeing IN 777-28-0078 IN 03. ANA and Emirates Airline requested that a new Boeing Service Bulletin (Revision 2 of Boeing Service Bulletin 777-28-0078) be mandated if possible.

The commenters stated that Boeing IN 777-28-0078 IN 02 clarifies the instructions in Boeing Special Attention Service Bulletin 777-28-0078, and also indicates that Boeing Special Attention Service Bulletin 777-28-0078 will be revised to incorporate those clarifications.

ANA requested that a cable assembly with a different lock wire length (part number BACC13AT3K()) be allowed for use in place of part number BACCI3AT3KI2 for the actions specified in paragraph (g) of the proposed AD. ANA also identified an error in Boeing Special Attention Service Bulletin 777-28-0078, dated September 4, 2014, regarding the position of the connector D11007P.

We do not agree with the commenters' requests. We have determined that Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, is adequate to correct the identified unsafe condition, and the errors will not affect compliance with this AD. The information notices (IN) are issued to provide clarity and are not required to accomplish the required actions. We are working with Boeing to include the IN information and part number substitution and other corrections in Revision 2 of Boeing Service Bulletin 777-28-0078. Under the provisions of paragraph (k) of this AD, once Revision 2 of Boeing Service Bulletin 777-28-0078 is issued, we will consider requests to approve it as an alternative method of compliance (AMOC) with this AD. In addition, AMOCs for part number substitutions can also be requested through the provisions of paragraph (k) of this AD. We have not changed this AD in this regard.

## **Request To Address an Integer Overflow Error**

An anonymous commenter stated that Model 777 airplanes have an integer overflow error when being operated over a certain number of days. The commenter stated that we should require the computer to be reset before any of the overflow errors happen during flight.

We do not agree with the commenter's request. This issue does not appear related to the identified unsafe condition that is the subject of this final rule. However, we will investigate this situation to make sure that the issue stated by the commenter does not exist or is addressed in a proper manner. We have not changed this final rule in this regard.

## **Conclusion**

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

- Are consistent with the intent that was proposed in the NPRM for correcting the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

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

**Related Service Information Under 1 CFR Part 51**

Boeing has issued the following service information.

- Boeing Service Bulletin 777-28A0047, Revision 5, dated September 20, 2010. This service information describes procedures for installing new P301 and P302 panels, changing the wiring, and performing bonding resistance measurements.
- Boeing Service Bulletin 777-28A0047, Revision 6, dated July 11, 2013. This service information describes procedures for installing new P301 and P302 panels, changing the wiring, and performing bonding resistance measurements.
- Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015. This service information describes procedures for doing mechanical changes to the main fuel tank water scavenge system and center fuel tank fuel scavenge system; doing wiring changes between the P105, P110 and P301 panels, and between the P200, P205, P210 and P302 panels; doing wiring changes in the P105 panel; installing new electrical load management system 2 (ELMS2) software; and doing functional testing.

GE Aviation has issued the following service information.

- GE Aviation Service Bulletin 5000ELM-28-075, Revision 1, dated August 5, 2014. This service information describes procedures for doing wiring changes in the P110 panel.
- GE Aviation Service Bulletin 6000ELM-28-076, Revision 1, dated August 5, 2014. This service information describes procedures for doing wiring changes in the P210 panel.

This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in the ADDRESSES section.

**Costs of Compliance**

We estimate that this AD affects 55 airplanes of U.S. registry.

We estimate the following costs to comply with this AD:

**Estimated Costs**

<b>Action</b>	<b>Labor cost</b>	<b>Parts cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
Fuel system modification	200 work-hours × \$85 per hour = \$17,000	\$68,535	\$85,535	\$4,704,425
P110 and P210 panel modification	2 work-hours × \$85 per hour = \$170	0	170	9,350

We have received no definitive data that will enable us to provide cost estimates for the on-condition actions specified in this AD.

According to the manufacturer, some of the costs of this AD may be covered under warranty, thereby reducing the cost impact on affected individuals. We do not control warranty coverage for affected individuals. As a result, we have included all costs in our cost estimate.

## **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):



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**2016-11-03 The Boeing Company:** Amendment 39-18530; Docket No. FAA-2015-1273; Directorate Identifier 2014-NM-194-AD.

**(a) Effective Date**

This AD is effective July 6, 2016.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to The Boeing Company Model 777-200, -200LR, -300, -300ER, and -777F series airplanes, certificated in any category, as identified in Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015.

**(d) Subject**

Air Transport Association (ATA) of America Code 28, Fuel.

**(e) Unsafe Condition**

This AD was prompted by reports of unreliable performance of the fuel scavenge system. We are issuing this AD to prevent fuel exhaustion and subsequent power loss of all engines due to loss of capability to scavenge fuel in the center fuel tank.

**(f) Compliance**

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

**(g) Fuel Scavenge System Changes, Wiring Changes, and Software Changes**

For airplanes identified in Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, except for Group 10 airplanes on which the actions specified in Boeing Service Bulletin 777-28-0060; or Work Package 2 of the Accomplishment Instructions of Boeing Service Bulletin 777-28-0062, have not been accomplished: Within 60 months after the effective date of this AD, do the applicable actions specified in paragraphs (g)(1) through (g)(6) of this AD; and do all applicable related investigative and corrective actions; in accordance with the Accomplishment Instructions of Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015. Do all applicable related investigative and corrective actions before further flight.

(1) Do applicable mechanical changes to the main fuel tank water scavenge system and center fuel tank fuel scavenge system.

(2) Install relays and related equipment on the P301 and P302 panels in the main equipment center.

(3) Do applicable wiring changes between the P105, P110, and P301 panels, and between the P200, P205, P210, and P302 panels.

(4) Do wiring changes in the P105 panel.

(5) Install new electrical load management system 2 (ELMS2) software.

(6) Do a functional test consisting of operational tests, a leak test, system tests, and a fuel scavenge system functional test. If any of the tests fail, before further flight accomplish corrective actions and repeat the test and applicable corrective actions until the test is passed.

#### **(h) Concurrent Actions**

(1) For Groups 13 through 16 airplanes, as identified in Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, concurrently with accomplishing the actions required by paragraph (g) of this AD, install a new P301 panel on the left side of the airplane, install a new P302 panel on the right side of the airplane, and change the wiring; or perform bonding resistance measurements and rework the airplane installations; as applicable; in accordance with the Accomplishment Instructions of Boeing Service Bulletin 777-28A0047, Revision 5, dated September 20, 2010; or Boeing Service Bulletin 777-28A0047, Revision 6, dated July 11, 2013.

(2) For airplanes identified in Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, except for Group 10 airplanes on which the actions described in Boeing Service Bulletin 777-28-0060; or Work Package 2 of the Accomplishment Instructions of Boeing Service Bulletin 777-28-0062, have not been accomplished: Concurrently with accomplishing the requirements of paragraph (g) of this AD, do wiring changes in the P110 and P210 panels, in accordance with the applicable Accomplishment Instructions of GE Aviation Service bulletin 5000ELM-28-075, Revision 1, dated August 5, 2014; and GE Aviation Service Bulletin 6000ELM-28-076, Revision 1, dated August 5, 2014.

#### **(i) Parts Installation Prohibition**

For Group 10 airplanes, as identified in Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015, after completion of the actions required by paragraph (g) of this AD, no person may install an auxiliary fuel tank on any Group 10 airplane.

#### **(j) Credit for Previous Actions**

(1) This paragraph provides credit for actions required by paragraph (h)(1) of this AD, if those actions were performed before May 26, 2011 (the effective date of AD 2011-09-05, Amendment 39-16667 (77 FR 22305, April 21, 2011)), using a service bulletin identified in paragraph (j)(1)(i) or (j)(1)(ii) of this AD, which are not incorporated by reference in this AD.

(i) Boeing Service Bulletin 777-28A0047, Revision 3, dated June 11, 2009.

(ii) Boeing Service Bulletin 777-28A0047, Revision 4, dated May 20, 2010.

(2) 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 Special Attention Service Bulletin 777-28-0078, dated September 4, 2014, which is not incorporated by reference in this AD.

#### **(k) 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 paragraph (l)(1) 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.

(3) An AMOC that provides an acceptable level of safety may be used for any repair, modification, or alteration required by this AD if it is approved by the Boeing Commercial Airplanes Organization Designation Authorization (ODA) that has been authorized by the Manager, Seattle ACO, to make those findings. To be approved, the repair method, modification deviation, or alteration deviation must meet the certification basis of the airplane and the approval must specifically refer to this AD.

(4) For service information that contains steps that are labeled as Required for Compliance (RC), the provisions of paragraphs (k)(4)(i) and (k)(4)(ii) of this AD apply.

(i) The steps labeled as RC, including substeps under an RC step and any figures identified in an RC step, must be done to comply with the AD. An AMOC is required for any deviations to RC steps, including substeps and identified figures.

(ii) Steps not labeled as RC may be deviated from using accepted methods in accordance with the operator's maintenance or inspection program without obtaining approval of an AMOC, provided the RC steps, including substeps and identified figures, can still be done as specified, and the airplane can be put back in an airworthy condition.

### **(l) Related Information**

(1) For more information about this AD, contact Sue Lucier, Aerospace Engineer, Propulsion Branch, ANM-140S, FAA, Seattle ACO, 1601 Lind Avenue SW., Renton, WA 98057-3356; phone: 425-917-6438; fax: 425-917-6590; email: [suzanne.lucier@faa.gov](mailto:suzanne.lucier@faa.gov).

(2) Boeing service information identified in this AD that is not incorporated by reference is available at the addresses specified in paragraphs (m)(3) and (m)(5) of this AD.

### **(m) 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 Service Bulletin 777-28A0047, Revision 5, dated September 20, 2010.

(ii) Boeing Service Bulletin 777-28A0047, Revision 6, dated July 11, 2013.

(iii) Boeing Special Attention Service Bulletin 777-28-0078, Revision 1, dated April 27, 2015.

(iv) GE Aviation Service Bulletin 5000ELM-28-075, Revision 1, dated August 5, 2014.

(v) GE Aviation Service Bulletin 6000ELM-28-076, Revision 1, dated August 5, 2014.

(3) For Boeing 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) For GE Aviation service information identified in this AD, contact GE Aviation Fleet Support, 1 Neumann Way, Cincinnati, OH 45215; telephone 513-552-3272; email: [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com); Internet <http://www.geaviation.com>.

(5) You may view this 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.

(6) 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 May 18, 2016.  
Dionne Palermo,  
Acting Manager, Transport Airplane Directorate,  
Aircraft Certification Service.