

## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

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

**[Docket No. FAA-2013-0333; Directorate Identifier 2013-NM-080-AD; Amendment 39-17436; AD 2013-08-12]**

**RIN 2120-AA64**

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

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

**ACTION:** Final rule; request for comments.

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**SUMMARY:** We are superseding an existing airworthiness directive (AD) for The Boeing Company Model 787-8 airplanes. That AD currently requires modification of the battery system, or other actions. This AD requires installing main and auxiliary power unit (APU) battery enclosures and environmental control system (ECS) ducts; and replacing the main battery, APU battery, and their respective battery chargers. This AD also requires revising the maintenance program to include an airworthiness limitation. This AD also revises the applicability by removing airplanes on which these changes have been incorporated in production prior to delivery. This AD was prompted by recent incidents involving lithium ion battery failures that resulted in release of flammable electrolytes, heat damage, and smoke on two Model 787-8 airplanes. We are issuing this AD to minimize the occurrence of battery cell failures and propagation of such failures to other cells and to contain any flammable electrolytes, heat, and smoke released during a battery thermal event in order to prevent damage to critical systems and structures and the potential for fire in the electronics equipment bays.

**DATES:** This AD is effective April 26, 2013.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in the AD as of April 26, 2013.

We must receive any comments on this AD by June 10, 2013.

**ADDRESSES:** You may send comments by any of the following methods:

- Federal eRulemaking Portal: Go to <http://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: 202-493-2251.
- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

- Hand Delivery: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

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, Washington. 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 street address for the Docket Office (phone: 800-647-5527) is in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

**FOR FURTHER INFORMATION CONTACT:** Robert Duffer, Manager, Systems and Equipment Branch, FAA, ANM-130S, Seattle Aircraft Certification Office, 1601 Lind Avenue SW., Renton, Washington 98057-3356; phone: (425) 917-6493; fax: (425) 917-6590; email: [robert.duffer@faa.gov](mailto:robert.duffer@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

On February 1, 2013, we issued AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013), for all The Boeing Company Model 787-8 airplanes. That AD requires modification of the battery system, or other actions. That AD resulted from recent incidents involving lithium ion battery failures that resulted in release of flammable electrolytes, heat damage, and smoke on two Model 787-8 airplanes. We issued that AD to prevent damage to critical systems and structures and the potential for fire in the electrical compartment.

### **Actions Since AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013), Was Issued**

Since we issued AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013), the National Transportation Safety Board (NTSB) released an Interim Factual Report, NTSB Case Number DCA13IA037, on March 7, 2013, presenting its initial findings concerning a battery failure on a Model 787-8 airplane operated by Japan Airlines. That report can be found at: [http://www.nts.gov/investigations/2013/boeing\\_787/interim\\_report\\_B787\\_3-7-13.pdf](http://www.nts.gov/investigations/2013/boeing_787/interim_report_B787_3-7-13.pdf).

That report documents thermal and mechanical damage to the battery and the battery control units, and a lack of containment of the battery electrolytes, heat, and smoke from the battery case. The cause(s) of this battery failure incident has not yet been determined by the NTSB. Likewise, the cause(s) of the battery failure incident on a Model 787-8 airplane operated by All Nippon Airways has not yet been determined by the Japan Transport Safety Board (JTSB), which is the accident investigative authority for Japan.

The FAA has reviewed the NTSB's interim factual report, as well as information provided by the JTSB, Boeing, All Nippon Airways, and Japan Airlines. The main and APU batteries are identical, but perform different functions on the airplane. The main battery installed on Model 787-8 airplanes is used to provide power while the engines are off during ground maintenance operations (e.g., power-up, refueling, braking, and navigation lights during towing) and backup electrical power while airborne. The APU battery is required to start and operate the APU. The APU may be used on the

ground, or in flight to generate backup electrical power. Each of the two engines drives two variable frequency starter generators (VFSGs) for a total of four VFSGs providing power to the airplane. Therefore, while in flight, the two generators driven by the APU provide the 5th and 6th layer of power generation for the airplane.

On March 12, 2013, the FAA approved a Boeing plan to mitigate the unsafe condition identified by AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013). The plan resulted from a detailed review by Boeing and the FAA that considered all potential causal factors of the two recent battery incidents. The plan provides three layers of protection to improve the reliability of the battery and to prevent any hazardous effects on the airplane from a battery failure. Those layers are (1) measures to minimize the probability of a single battery cell failure, (2) measures to minimize the probability of any single battery cell failure from propagating to other cells in the battery, and (3) measures to preclude hazardous airplane-level safety effects of any battery failure that might occur. Details of these measures, which are mandated by this AD, are as follows:

- **Minimize the Probability of a Single Battery Cell Failure**—Each main and APU battery consists of a set of individual cells within a battery case. Each battery cell will be encapsulated to isolate the cell electrically. Locking nuts with specific torque values will be used on every cell terminal to prevent overheating of the terminal due to a loose electrical connection. Drainage within the battery case will be improved to remove any condensation within the battery. The battery monitoring and charging unit will be changed to reduce the operational voltage range to lessen electrical stress on the battery cell, and to enhance over-discharge protection. Boeing has also made mandatory changes to the battery manufacturing and acceptance testing processes to improve the overall quality of the battery.
- **Minimize the Probability of Multiple Cell Failure Propagation**—Additional insulation will be provided between each battery cell and between each cell and the battery case to thermally and electrically isolate the individual battery cells. High temperature sleeving will also be added to the battery internal wiring harness to protect against short circuits. In addition, cell venting will be added to the battery case to allow any cell gasses, including electrolytes, to escape into the battery enclosure to minimize heat build-up within the battery case.
- **Preclude Hazardous Airplane-Level Safety Effects of a Battery Failure That Might Occur**—As stated previously, each main and APU battery consists of a set of individual cells within a battery case. The case containing the cells will be secured within a stainless steel, sealed enclosure. This enclosure will be connected to a titanium ECS duct that vents to the outside of the airplane. Should a battery failure occur, and generate significant heat, pressure, and gasses, a metallic frangible disc (also referred to as a vent burst disc) at the interface of the enclosure and vent duct will open and allow the heat, pressure, and gasses to safely vent overboard through the ECS duct. This will prevent the introduction of any heat, pressure, or gasses in the electronics equipment bays or any occupied area of the airplane.

## **Relevant Service Information**

We reviewed Boeing Alert Service Bulletin B787-81205-SB500003-00, Issue 001, dated April 19, 2013; and Section D, "Airworthiness Limitations—Life Limits," of the Boeing 787 Airworthiness Limitations (AWLs) Document D011Z009-03-01, dated April 2013. For information on the procedures and compliance times, see this service information at <http://www.regulations.gov> by searching for Docket No. FAA-2013-0333.

## **FAA's Determination**

We are issuing this AD because we evaluated all the relevant information and determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

## **AD Requirements**

This AD requires accomplishing the actions specified in the service information identified previously.

### **Change to Applicability of AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013)**

This AD applies to The Boeing Company Model 787-8 airplanes, as identified in Boeing Alert Service Bulletin B787-81205-SB500003-00, Issue 001, dated April 19, 2013, instead of "all" airplanes, as specified in AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013). The actions required by this AD address the identified unsafe condition for in-service airplanes. For all future delivered airplanes, the replacement batteries, their respective chargers, and enclosure and duct installations will be incorporated at the factory prior to delivery.

### **FAA's Justification and Determination of the Effective Date**

AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013), effectively grounded the Model 787-8 fleet and prevented delivery of new Model 787-8 airplanes because there was no design solution available. While necessary in the short term to address the unsafe condition, this caused a significant economic burden on domestic and international operators of Boeing Model 787-8 airplanes. The purpose of this AD is to allow the aircraft to return to service as soon as possible by mandating a modification that will address the unsafe condition. Therefore, we find that notice and opportunity for prior public comment are impracticable and would defeat the Agency's regulatory objective, and that good cause exists for making this amendment effective in less than 30 days.

### **Comments Invited**

This AD is a final rule that involves requirements affecting flight safety, and we did not provide you with notice and an opportunity to provide your comments before it becomes effective. However, we invite you to send any written data, views, or arguments about this AD. Send your comments to an address listed under the ADDRESSES section. Include the docket number FAA-2013-0333 and Directorate Identifier 2013-NM-080-AD at the beginning of your comments. We specifically invite comments on the overall regulatory, economic, environmental, and energy aspects of this AD. We will consider all comments received by the closing date and may amend this AD because of those comments.

We will post all comments we receive, without change, to <http://www.regulations.gov>, including any personal information you provide. We will also post a report summarizing each substantive verbal contact we receive about this AD.

### **Costs of Compliance**

We estimate that this AD affects 6 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
Installation and replacement	112 work-hours × \$85 per hour = \$9,520	\$455,158	\$464,678	\$2,788,068
Revise maintenance program	1 work-hour × \$85 per hour = \$85	None	85	510

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 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. The FAA amends § 39.13 by removing airworthiness directive (AD) 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013), and adding the following new AD:



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**2013-08-12 The Boeing Company:** Amendment 39-17436; Docket No. FAA-2013-0333; Directorate Identifier 2013-NM-080-AD.

**(a) Effective Date**

This AD is effective April 26, 2013.

**(b) Affected ADs**

This AD supersedes AD 2013-02-51, Amendment 39-17366 (78 FR 12231, February 22, 2013).

**(c) Applicability**

This AD applies to The Boeing Company Model 787-8 airplanes, certificated in any category; as identified in Boeing Alert Service Bulletin B787-81205-SB500003-00, Issue 001, dated April 19, 2013.

**(d) Subject**

Joint Aircraft System Component (JASC)/Air Transport Association (ATA) of America Code 24, Electrical Power.

**(e) Unsafe Condition**

This AD was prompted by recent incidents involving lithium ion battery failures that resulted in release of flammable electrolytes, heat damage, and smoke on two Model 787-8 airplanes. We are issuing this AD to minimize the occurrence of battery cell failures and propagation of such failures to other cells and to contain any flammable electrolytes, heat, and smoke released during a battery thermal event in order to prevent damage to critical systems and structures and the potential for fire in the electronics equipment bays.

**(f) Compliance**

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

**(g) Installation/Replacement**

Before further flight: Install main battery and auxiliary power unit (APU) battery enclosures and environmental control system (ECS) ducts; and replace the main battery, APU battery, and their respective battery chargers; in accordance with the Accomplishment Instructions of Boeing Alert Service Bulletin B787-81205-SB500003-00, Issue 001, dated April 19, 2013.

## **(h) Maintenance Program Revision**

Before further flight: Revise the maintenance program to incorporate Item No. 1b. in Section D, "Airworthiness Limitations—Life Limits," of the Boeing 787 Airworthiness Limitations (AWLs) Document D011Z009-03-01, dated April 2013. This new item is the Systems Life-Limited Parts requirement for replacement of the main and APU battery enclosure vent burst discs.

## **(i) No Alternative Actions and Intervals**

After accomplishing the revision required by paragraph (h) of this AD, no changes may be made to Item No. 1b. in Section D, "Airworthiness Limitations—Life Limits," of the Boeing Model 787 Airworthiness Limitations (AWLs) Document D011Z009-03-01, dated April 2013, unless approved as an alternative method of compliance (AMOC) in accordance with the procedures specified in paragraph (j) of this AD.

## **(j) 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.

(3) An AMOC that provides an acceptable level of safety may be used for any repair 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. For a repair method to be approved, the repair must meet the certification basis of the airplane, and the approval must specifically refer to this AD.

## **(k) Related Information**

For more information about this AD, contact Robert Duffer, Manager, Systems and Equipment Branch, ANM-130S, Seattle Aircraft Certification Office, FAA, 1601 Lind Avenue SW., Renton, Washington 98057-3356; phone: (425) 917-6493; fax: (425) 917-6590; email: robert.duffer@faa.gov.

## **(l) 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 B787-81205-SB500003-00, Issue 001, dated April 19, 2013.

(ii) Boeing 787 Airworthiness Limitations (AWLs) Document D011Z009-03-01, dated April 2013.

(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; phone: 206-544-5000, extension 1; fax: 206-766-5680; Internet: <https://www.myboeingfleet.com>.



(4) 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.

(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 April 22, 2013.

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