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## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA-2018-1066; Product Identifier 2018-NM-176-AD; Amendment 39-19540; AD 2019-01-01]

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 adopting a new airworthiness directive (AD) for The Boeing Company Model 787-8 airplanes powered by Rolls-Royce plc (RR) Trent 1000-A (including -A/01 and -A/01A), Trent 1000-AE (including -AE/01A), Trent 1000-C (including -C/01 and -C/01A), Trent 1000-CE (including -CE/01A), Trent 1000-D (including -D/01 and -D/01A), Trent 1000-E (including -E/01 and -E/01A), Trent 1000-G (including -G/01 and -G/01A), and Trent 1000-H (including -H/01 and H/01A) turbofan engines. This AD requires revising the airplane flight manual (AFM) to limit extended operations (ETOPS). This AD was prompted by a report from the engine manufacturer indicating that after an engine failure, prolonged operation at high thrust settings on the remaining engine during an ETOPS diversion may result in failure of the remaining engine before the diversion can be safely completed. We are issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective February 4, 2019.

We must receive comments on this AD by March 4, 2019.

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, 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: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

## 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-2018-1066; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the regulatory evaluation, any comments received, and other information. The street address for Docket Operations (phone: 800-647-5527) is in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

**FOR FURTHER INFORMATION CONTACT:** Rebel Nichols, Aerospace Engineer, Propulsion Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3556; email: Rebel.Nichols@faa.gov.

## SUPPLEMENTARY INFORMATION:

### Discussion

We issued AD 2018-09-05, Amendment 39-19261 (83 FR 18208, April 26, 2018) (“AD 2018-09-05”), to address an unsafe condition identified on Boeing Model 787-8 and 787-9 airplanes powered by RR Trent 1000 Package C engines. The Package C engines are RR Trent 1000-A2, Trent 1000-AE2, Trent 1000-C2, Trent 1000-CE2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, and Trent 1000-L2 turbofan engines. AD 2018-09-05 was prompted by a report from the engine manufacturer that intermediate pressure compressor (IPC) stage 2 blades have a resonant frequency that is excited by the airflow conditions existing in the engine during operation at high thrust settings under certain temperature and altitude conditions.

We determined that the resultant blade vibration can result in cumulative fatigue damage that can cause blade failure and consequent engine in-flight shutdown. In the event of a single engine in-flight shutdown during the cruise phase of flight, thrust on the remaining engine is normally increased to maximum continuous thrust (MCT). During a diversion following a single engine shutdown under an ETOPS flight, the remaining engine may operate at MCT for a prolonged period, during which the IPC stage 2 blades would be exposed to the resonant frequency condition. Therefore, an ETOPS diversion will put the remaining engine at an operating condition that would significantly increase the likelihood of failure of the remaining engine. In addition, if the remaining engine already had cracked IPC stage 2 blades, the likelihood of the remaining engine failing before a diversion can be safely completed will further increase.

The issue associated with IPC blade vibration due to a resonant frequency as described above was determined to exist on Boeing Model 787-8 airplanes powered by RR Trent 1000 Package B engines. The Package B engines are RR Trent 1000-A (including -A/01 and -A/01A), Trent 1000-AE (including -AE/01A), Trent 1000-C (including -C/01 and -C/01A), Trent 1000-CE (including -CE/01A), Trent 1000-D (including -D/01 and -D/01A), Trent 1000-E (including -E/01 and -E/01A), Trent 1000-G (including -G/01 and -G/01A), and Trent 1000-H (including -H/01 and H/01A) turbofan engines. The engine manufacturer assessed available data and determined that the IPC blade vibration due to a resonant frequency for the Package B engines is less severe than that for the Package C engines, but it is still an unsafe condition that must be addressed by AD action on Boeing Model 787-8 airplanes powered by the RR Trent 1000 Package B engines during an ETOPS diversion.

The Package B engines have been certified for installation on Boeing Model 787-8 airplanes. Furthermore, Boeing Model 787-8 airplanes have been certified for intermixed engine installation, where a Package B engine is installed with a Package C or a Trent 1000-TEN engine, for certain thrust ratings. The RR Trent 1000-TEN engines have a numeral “3” at the end of the model number (e.g., Trent 1000-AE3). When a 787-8 airplane has an intermix engine configuration where a Package B engine is installed with a non-Package B engine, ETOPS limitations associated with the non-

Package B engine also apply. In this case, the airplane must be operated in a manner that satisfies all applicable ETOPS limitations.

### **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 revising the AFM to limit ETOPS.

### **Interim Action**

This AD is interim action. The manufacturer is currently developing a modification that will address the unsafe condition identified in this AD. Once this modification is developed, approved, and available, we might consider additional rulemaking.

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

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies waiving notice and comment prior to adoption of this rule because after an engine failure, prolonged operation at high thrust settings on the remaining engine during an ETOPS diversion may result in failure of the remaining engine before the diversion can be safely completed; unrecoverable thrust loss on both engines could lead to a forced landing. Additionally, there are currently no domestic operators of this product. We find good cause that notice and opportunity for prior public comment are impracticable and unnecessary. In addition, for the reasons stated above, we find 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 was not preceded by notice and an opportunity for public comment. However, we invite you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under the ADDRESSES section. Include the docket number FAA-2018-1066 and Product Identifier 2018-NM-176-AD at the beginning of your comments. We specifically invite comments on the overall regulatory, economic, environmental, and energy aspects of this final rule. We will consider all comments received by the closing date and may amend this final rule 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 final rule.

### **Costs of Compliance**

Currently, there are no affected U.S.-registered airplanes. If an affected airplane is imported and placed on the U.S. Register in the future, we provide the following cost estimates to comply with this AD:

### Estimated Costs

Action	Labor cost	Parts cost	Cost per product
AFM revisions	1 work-hour × \$85 per hour = \$85	\$0	\$85

### 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.

This AD is issued in accordance with authority delegated by the Executive Director, Aircraft Certification Service, as authorized by FAA Order 8000.51C. In accordance with that order, issuance of ADs is normally a function of the Compliance and Airworthiness Division, but during this transition period, the Executive Director has delegated the authority to issue ADs applicable to transport category airplanes and associated appliances to the Director of the System Oversight Division.

### 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):



**2019-01-01 The Boeing Company:** Amendment 39-19540; Docket No. FAA-2018-1066; Product Identifier 2018-NM-176-AD.

**(a) Effective Date**

This AD is effective February 4, 2019.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to The Boeing Company Model 787-8 airplanes, certificated in any category, powered by Rolls-Royce plc (RR) Trent 1000-A (including -A/01 and -A/01A), Trent 1000-AE (including -AE/01A), Trent 1000-C (including -C/01 and -C/01A), Trent 1000-CE (including -CE/01A), Trent 1000-D (including -D/01 and -D/01A), Trent 1000-E (including -E/01 and -E/01A), Trent 1000-G (including -G/01 and -G/01A), and Trent 1000-H (including -H/01 and H/01A) turbofan engines.

**(d) Subject**

Air Transport Association (ATA) of America Code 71, Power plant.

**(e) Unsafe Condition**

This AD was prompted by a report from the engine manufacturer indicating that after an engine failure, prolonged operation at high thrust settings on the remaining engine during an extended-operation (ETOPS) diversion may result in failure of the remaining engine before the diversion can be safely completed. We are issuing this AD to address unrecoverable thrust loss on both engines, which could lead to a forced landing.

**(f) Compliance**

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

**(g) Revision of Limitations Chapter in Airplane Flight Manual (AFM)**

Within 7 days after the effective date of this AD, revise the Certificate Limitations chapter of the applicable Boeing AFM Engine Appendix by incorporating the information in figure 1 to paragraph (g) of this AD. This may be accomplished by inserting a copy of this AD into the AFM. When information identical to that in figure 1 to paragraph (g) of this AD has been included in the Certificate Limitations chapter of the general revisions of the AFM, the general revisions may be inserted into the AFM, and the copy of this AD may be removed from the AFM.

Note 1 to paragraph (g) of this AD: The Boeing AFM for the aircraft affected by this AD is required to be furnished with the aircraft, per 14 CFR 25.1581. Further, operators of the aircraft affected by this AD must operate in accordance with the limitations specified in the AFM, per 14 CFR 91.9.

**Figure 1 to paragraph (g) of this AD – AFM Certificate Limitations**

<p><b>Engine Appendix - Certificate Limitations</b></p> <p><b>ETOPS</b></p> <p>For 787-8 airplanes equipped with at least one Rolls Royce Trent 1000-A (including -A/01 and -A/01A), Trent 1000-AE (including -AE/01A), Trent 1000-C (including -C/01 and -C/01A), Trent 1000-CE (including -CE/01A), Trent 1000-D (including -D/01 and -D/01A), Trent 1000-E (including -E/01 and -E/01A), Trent 1000-G (including -G/01 and -G/01A), and Trent 1000-H (including -H/01 and -H/01A) engine that has greater than 1,000 total accumulated engine cycles on the intermediate pressure compressor (IPC) Rotor 1 or Rotor 2 blades</p> <ul style="list-style-type: none"><li>• since new or</li><li>• since the replacement of blades in accordance with the instructions of Part B or C in Rolls Royce Non Modification Service Bulletin Trent 1000 72-AK132 Original Issue or later authority-approved revision.</li></ul> <p>The following limitations apply:</p> <ul style="list-style-type: none"><li>• Planned maximum diversion time for single engine driftdown must not exceed 180 minutes, except that a planned maximum diversion time up to 207 minutes is allowed only under the provision of Title 14 Code of Federal Regulations, part 121, Appendix P, Section I, paragraph (h).</li></ul>	<p><b>(Required by AD 2019-01-01)</b></p>
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**(h) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, Seattle ACO Branch, 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 certification office, send it to the attention of the person identified in paragraph (i) 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 Branch, 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.

**(i) Related Information**

For more information about this AD, contact Rebel Nichols, Aerospace Engineer, Propulsion Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3556; email: Rebel.Nichols@faa.gov.

**(j) Material Incorporated by Reference**

None.

Issued in Des Moines, Washington, on January 11, 2019.  
Jeffrey E. Duven,  
Director, System Oversight Division,  
Aircraft Certification Service.