



[4910-13-P]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2010-0748; Directorate Identifier 2010-NE-13-AD; Amendment 39-17082; AD 2012-12-03]**

**RIN 2120-AA64**

**Airworthiness Directives; Rolls-Royce plc Turbofan Engines**

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

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

**SUMMARY:** We are superseding an existing airworthiness directive (AD) for all Rolls-Royce plc (RR) models RB211-Trent 970-84, 970B-84, 972-84, 972B-84, 977-84, 977B-84, and 980-84 turbofan engines. That AD currently requires inspecting the intermediate-pressure (IP) shaft rigid coupling splines for wear resulting in rearward movement of the IP turbine. This AD requires the same inspections, and new inspections based on possible changes in wear rate. This AD was prompted by RR identifying wear beyond engine manual limits on the abutment faces of the splines. RR also determined that an additional IP shaft rigid coupling configuration requires inspection. We are issuing this AD to detect wear on the abutment faces of the splines, which could result in loss of disc integrity, an uncontained failure of the engine, and damage to the airplane.

**DATES:** This AD is effective [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in the AD as of [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

We must receive any comments on this AD by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**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 Rolls-Royce plc, P.O. Box 31, Derby, DE24 8BJ, United Kingdom; phone: 011 44 1332 242424; fax: 011 44 1332 249936; e-mail: [http://www.rolls-royce.com/contact/civil\\_team.jsp](http://www.rolls-royce.com/contact/civil_team.jsp); or Web: <https://www.aeromanager.com>. You may review copies of the referenced service information at the FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

### **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:** Alan Strom, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: alan.strom@faa.gov; phone: 781-238-7143; fax: 781-238-7199.

**SUPPLEMENTARY INFORMATION:**

**Discussion**

On July 26, 2010, we issued AD 2010-16-07, Amendment 39-16384 (75 FR 49368, August 13, 2010), for RR model RB211-Trent 970-84, 970B-84, 972-84, 972B-84, 977-84, 977B-84, and 980-84 turbofan engines. That AD requires inspecting the IP shaft rigid coupling splines for wear resulting in rearward movement of the IP turbine. That AD resulted from RR identifying wear beyond engine manual limits on the abutment faces of the splines on the Trent 900 IP shaft rigid coupling on several engines during engine disassembly. We issued that AD to detect wear on the abutment faces of the splines, which could result in loss of disc integrity, an uncontained failure of the engine, and damage to the airplane.

**Actions Since AD was Issued**

Since we issued AD 2010-16-07 (75 FR 49368, August 13, 2010), RR determined that engines that are moved from one position to another on the same airplane or to a different airplane, may exhibit a change in the rate of IP shaft rigid coupling spline wear. RR also determined that an additional IP shaft rigid coupling configuration requires inspection, because it also exhibits wear.

**Relevant Service Information**

We reviewed RR RB211 Trent 900 Series Propulsion Systems Alert Non-Modification Service Bulletin (NMSB) No. RB.211-72-AG329, Revision 4, dated March

23, 2012. That Alert NMSB describes procedures for inspecting and replacing the IP shaft rigid coupling.

We also reviewed RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG871, dated March 23, 2012. That Alert NMSB describes procedures for inspecting the IP shaft rigid coupling on engines that have incorporated RR RB211 Trent 900 Series Propulsion Systems Service Bulletin (SB) No. RB.211-72-G585, Original Issue, or any revision. Service Bulletin No. RB.211-72-G585 is the SB that introduces the additional configuration that this AD adds.

#### **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 described previously.

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

No domestic operators use this product. Therefore, we find that notice and opportunity for prior public comment are unnecessary 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-2010-0748 and directorate identifier 2010-NE-13-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 will affect no engines installed on airplanes of U.S. registry. We also estimate that it would take about 4 work-hours per engine to perform one borescope inspection required by the AD. The average labor rate is \$85 per work-hour. Based on these figures, we estimate the cost of the AD on U.S. operators to be \$0.

### **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) 2010-16-07, Amendment 39-16384 and adding the following new AD:

2012-12-03 **Rolls-Royce plc**: Amendment 39-17082; Docket No. FAA-2010-0748; Directorate Identifier 2010-NE-13-AD.

**(a) Effective Date**

This AD is effective [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**(b) Affected ADs**

This AD supersedes AD 2010-16-07, Amendment 39-16384 (75 FR 49368, August 13, 2010).

**(c) Applicability**

This AD applies to Rolls-Royce plc (RR) models RB211-Trent 970-84, 970B-84, 972-84, 972B-84, 977-84, 977B-84, and 980-84 turbofan engines.

**(d) Unsafe Condition**

This AD was prompted by RR identifying wear beyond engine manual limits on the abutment faces of the splines on the Trent 900 intermediate pressure (IP) shaft rigid coupling on several engines during engine disassembly. RR also determined that engines that are moved from one position to another on the same airplane or to a different airplane, may exhibit a change in the rate of IP shaft rigid coupling spline wear. RR also determined that an additional IP shaft rigid coupling configuration requires inspection. We are issuing this AD to detect wear on the abutment faces of the splines, which could result in loss of disc integrity, an uncontained failure of the engine, and damage to the airplane.

**(e) Compliance**

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

**(f) Engines that Have Not Incorporated RR RB211 Trent 900 Series Propulsion Systems Service Bulletin (SB) No. RB.211-72-G585, Original Issue, or Any Revision**

**(1) On-wing Borescope Inspections**

(i) Initially borescope-inspect the IP shaft rigid coupling splines. Use paragraphs 3.A.(2)(a) through 3.A.(2)(k) of RR RB211 Trent 900 Series Propulsion Systems Alert Non-Modification Service Bulletin (NMSB) No. RB.211-72-AG329, Revision 4, dated March 23, 2012, to do the inspection. Inspect per the following:

(A) If the IP shaft rigid coupling has 250 or fewer flight cycles-since-new (FCSN) on the effective date of this AD, inspect before accumulating 400 FCSN; or

(B) If the IP shaft rigid coupling has more than 250 FCSN on the effective date of this AD, inspect within 150 additional flight cycles.

(ii) Repetitively borescope-inspect the IP shaft rigid coupling splines. Use paragraphs 3.A.(2)(a) through 3.A.(2)(l) of RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG329, Revision 4, dated March 23, 2012, to determine the re-inspection interval and to do the inspections.

(iii) If during the initial or any repetitive inspection, the average spline crest length measured dimension is less than 0.5 millimeters (mm), remove the engine from service before further flight.

## **(2) In-shop Inspections**

(i) At every shop visit after the effective date of this AD, where the IP shaft rigid coupling is exposed, visually inspect and magnetic particle inspect (MPI) the IP shaft rigid coupling splines.

(ii) At every shop visit after the effective date of this AD, where the IP shaft rigid coupling is not exposed:

(A) Inspect the IP shaft as specified in paragraph (f)(1) of this AD and determine the next inspection interval using Figure 10 of RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG329, Revision 4, dated March 23, 2012; and

(B) Reject any IP shaft with an average spline crest length measured dimension less than 1.0 mm.

## **(3) After Any Shop Inspection**

After any shop inspection, where the IP shaft rigid coupling is exposed, perform a borescope inspection per paragraph (f)(1) of this AD within 400 cycles after the in-shop visual inspection and MPI.

#### **(4) Engine Installation**

(i) Before installing an engine in a new position on the same airplane, or before installing an engine on a different airplane in any position:

(A) Inspect the IP shaft rigid coupling splines as specified in paragraphs (f)(1) or (f)(2) of this AD as applicable and determine the next inspection interval using Figure 10 of RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG329, Revision 4, dated March 23, 2012; and

(B) Do not install an engine that has an IP shaft with an average spline crest length measured dimension of less than 0.5 mm.

(ii) Before installing an engine in the same position on the airplane it was removed from:

(A) Inspect the IP shaft rigid coupling splines using paragraph (f)(1) or (f)(2) of this AD as applicable and determine the next inspection interval; and

(B) Do not install an engine that has an IP shaft with an average spline crest length measured dimension of less than 0.5 mm.

#### **(g) Engines that Have Incorporated RR RB211 Trent 900 Series Propulsion Systems SB No. RB.211-72-G585, Original Issue, or Any Revision**

##### **(1) On-wing Borescope Inspections**

(i) Initially borescope-inspect the IP shaft rigid coupling splines before accumulating 400 FCSN or 400 cycles since the last inspection per paragraph (g)(2)(i) of this AD. Use paragraph 3.A.(2) of RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG871, dated March 23, 2012, to do the inspection.

(ii) Repetitively borescope-inspect the IP shaft rigid coupling splines. Use paragraphs 3.A.(2)(e), 3.A.(2)(f), and 3.A.(3) of RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG871, dated March 23, 2012, to determine the re-inspection interval and to do the inspections.

## **(2) In-shop Inspections**

(i) At every shop visit after the effective date of this AD, where the IP shaft rigid coupling is exposed, visually inspect and MPI the IP shaft rigid coupling splines.

(ii) At every shop visit after the effective date of this AD, where the IP shaft rigid coupling is not exposed, borescope-inspect using paragraphs 3.A.(2)(a) through 3.A.(2)(f) of RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG871, dated March 23, 2012.

(A) If at the time of initial inspection, the average value of length “B” is equal to, or less than, 6.00 mm, repeat the borescope inspection using paragraph (g)(1) or (g)(2) of this AD within 400 flight cycles.

(B) If at the time of initial inspection the average value of length “B” is greater than 6.00 mm, MPI the IP turbine shaft, and visually inspect and MPI the intermediate turbine shaft and IP rigid coupling.

## **(3) After Any Shop Inspection**

After any shop inspection, where the rigid shaft coupling is exposed, perform a borescope inspection per paragraph (g)(1) of this AD within 400 cycles after the in-shop visual inspection and MPI.

## **(h) Definition**

For the purpose of this AD, a shop visit is the induction of an engine into the shop for maintenance involving the separation of pairs of major mating engine flanges, except that the separation of engine flanges solely for the purposes of transportation without subsequent engine maintenance does not constitute an engine shop visit.

## **(i) Credit for Previous Actions for Engines That Have Not Incorporated RR RB211 Trent 900 Series Propulsion Systems SB No. RB.211-72-G585**

If you performed inspections and corrective actions that are required by paragraph (f) of this AD using RR RB211 Trent 900 Series Propulsion Systems Alert NMSB No. RB.211-72-AG329, Original Issue, dated November 26, 2009; Revision 1, dated January

13, 2010; Revision 2, dated July 7, 2010; or Revision 3, dated November 25, 2010, before the effective date of this AD, you have met the requirements of paragraph (f) of this AD.

**(j) Alternative Methods of Compliance (AMOCs)**

The Manager, Engine Certification Office, may approve AMOCs for this AD. Use the procedures found in 14 CFR 39.19 to make your request.

**(k) Related Information**

(1) For more information about this AD, contact Alan Strom, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: 781-238-7143; fax: 781-238-7199; e-mail: alan.strom@faa.gov.

(2) Refer to European Aviation Safety Agency AD 2012-0057, dated April 3, 2012, and AD 2012-0057 (corrected), dated April 20, 2012, for related information.

(3) RB211-Trent 900 Engine Manual, tasks 72-33-21-200-804 and 72-00-00-200-808, pertain to the visual inspections and MPIs required by this AD.

**(l) Material Incorporated by Reference**

(1) You must use the following service information to do the actions required by this AD, unless the AD specifies otherwise. The Director of the Federal Register approved the incorporation by reference (IBR) under 5 U.S.C. 552(a) and 1 CFR part 51 of the following service information:

(i) Rolls-Royce plc RB211 Trent 900 Series Propulsion Systems Alert Non-Modification Service Bulletin No. RB.211-72-AG329, Revision 4, dated March 23, 2012.

(ii) Rolls-Royce plc RB211 Trent 900 Series Propulsion Systems Alert Non-Modification Service Bulletin No. RB.211-72-AG871, dated March 23, 2012.

(2) For service information identified in this AD, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE248BJ, phone: 011-44-

1332-242424; fax: 011-44-1332-245418, or e-mail: [http://www.rolls-royce.com/contact/civil\\_team.jsp](http://www.rolls-royce.com/contact/civil_team.jsp).

(3) You may review copies at the FAA, New England Region, 12 New England Executive Park, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

(4) You may also review copies of the 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 Burlington, Massachusetts, on June 5, 2012.

Peter A. White,  
Manager, Engine & Propeller Directorate,  
Aircraft Certification Service.

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