



## Airworthiness Directive

**AD No.:** 2014-0152R1

**Issued:** 02 March 2018

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) 216/2008 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.

This AD is issued in accordance with Regulation (EU) 748/2012, Part 21.A.3B. In accordance with Regulation (EU) 1321/2014 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [Regulation (EU) 1321/2014 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [Regulation (EC) 216/2008, Article 14(4) exemption].

### Design Approval Holder's Name:

ROLLS-ROYCE plc

### Type/Model designation(s):

RB211 Trent 500, 800 and 900 engines

**Effective Date:** Revision 1: 09 March 2018  
Original issue: 04 July 2014

**TCDS Number(s):** EASA.E.012, EASA.E.047 and EASA.E.060

**Foreign AD:** Not applicable

**Revision:** This AD revises EASA AD 2014-0152 dated 20 June 2014 (including its Correction dated 25 June 2014), which superseded EASA AD 2013-0002 dated 04 January 2013.

## ATA 72 – Engine – Intermediate Pressure Compressor Rotor Shaft and Balance Weights – Inspection / Modification

### Manufacturer(s):

Rolls-Royce plc (RR)

### Applicability:

RB211 Trent 553-61, 553A2-61, 556-61, 556A2-61, 556B-61, 556B2-61, 560-61 and 560A2-61 engines, all serial numbers. These engines are known to be installed on, but not limited to, Airbus A340-500 and A340-600 series aeroplanes.

RB211 Trent 875-17, 877-17, 884-17, 884B-17, 892-17, 892B-17 and 895-17 engines, all serial numbers. These engines are known to be installed on, but not limited to, Boeing 777 series aeroplanes.

RB211 Trent 970-84, 970B-84, 972-84, 972B-84, 977-84, 977B-84 and 980-84 engines, all serial numbers. These engines are known to be installed on, but not limited to, Airbus A380 series aeroplanes.



**Definitions:**

For the purpose of this AD, the following definitions apply:

**The applicable NMSB:** RR Trent 500 Alert Non-Modification Service Bulletin (NMSB) RB.211-72-AH058 original issue dated 13 December 2012, Trent 800 NMSB RB.211-72-AG264 Revision 5 dated 21 March 2011, or Trent 900 NMSB RB.211-72-AH059 original issue dated 11 December 2012, as applicable. Although the applicable NMSB has an 'A' (Alert) in the number, an earlier or later revision may not have that 'A', which does not effectively alter the publication references in this AD.

**The applicable mod/SB:** RR Trent 800 modification (mod) 72-G401 and Service Bulletin (SB) RB.211-72-AG401 Revision 2 dated 05 July 2011; Trent 500 mod 72-H555 and SB RB.211-72-AH555 original issue dated 18 October 2013; or RR Trent 900 mod 72-H561 and SB RB.211-72-AH561 original issue dated 21 October 2013, as applicable.

**Groups:** Group 1 engines are those that do not have the applicable mod/SB embodied. Group 2 engines are those that have the applicable mod/SB embodied.

**Qualified shop visit:** A shop visit in which the intermediate pressure (IP) compressor module is scheduled for a module check and repair, module overhaul, or engine refurbishment; or where the engine is disassembled sufficiently to expose the rear face of the IP compressor module.

**Reason:**

Cracks were found on the rear balance land feature of the IP compressor rotor shaft of two in-service Trent 800 engines and on one in-service Trent 700 engine. The cracking had initiated from fretting marks caused by balance weights, but the key factors behind the crack propagation are not fully understood. Stress analysis of the damage condition has shown that it presents a possible threat to the rotor integrity.

This condition, if not detected and corrected, could lead to IP compressor rotor shaft failure and consequent non-contained high energy debris, possibly resulting in damage to the aeroplane.

EASA initially issued AD 2007-0052, applicable to Trent 500, 700 and 800 engines, to address this unsafe condition with visual inspections of the balance land. Subsequently, RR improved the inspection methods for the Trent 700 and 800 engines and developed a mod for those engines (72-G401 for Trent 800 and 72-G402 for Trent 700), accomplishment of which terminates the need for on-wing inspections. After that AD was issued, EASA issued AD 2010-0266, retaining most requirements of EASA AD 2007-0052, which was superseded, to incorporate these changes to require, for the Trent 700 and 800 engines, repetitive on-wing borescope and in-shop eddy current (EC) inspections of the IP compressor rotor shaft for discrepancies and, depending on findings, corrective actions. For the Trent 500 engines, EASA AD 2010-0266 (later revised) required repetitive in-shop visual inspections, in accordance with the instructions of RR Alert NMSB RB.211-72-AF260 at Revision 4 or, alternatively, in-shop EC inspections in accordance with RR NMSB RB.211-72-G448 Revision 1, to detect discrepancies in the IP compressor rotor shaft and, depending on findings, corrective actions.



After EASA AD 2010-0266R1 was issued, efforts to develop an on-wing EC inspection, intended to increase the effectiveness of the programme for Trent 700 and 800 engines, failed. Consequently, EASA issued AD 2011-0221 (later revised), superseding EASA AD 2010-0266R1 and partially retaining its requirements, to require the new balance weight installation for Trent 700 and 800 engines.

After EASA AD 2011-0221R1 was issued, it was reported that during a shop visit, cracking was found in a Trent 500 IP compressor rotor shaft rear balance land. Further engineering evaluation concluded that the mechanism leading to this occurrence could also occur in Trent 900 engines. Consequently, EASA issued AD 2013-0002, retaining the requirements of EASA AD 2011-0221R1, which was superseded, expanding the Applicability to include Trent 900 engines, and adding repetitive on-wing inspections for Trent 500 and 900 engines.

After EASA AD 2013-0002 was issued, it was found that for post-mod 72-G401 Trent 800 engines and post-mod 72-G402 Trent 700 engines, which were excluded from the Applicability of that AD, the in-shop inspections must remain required. The mod constitutes terminating action only for the repetitive on-wing inspections. In addition, RR developed mod 72-H555 (for Trent 500) and mod 72-H561 (for Trent 900), introducing the new balance weight design, which cancels the required on-wing inspections for those engines. Consequently, EASA issued AD 2014-0152 (later corrected), retaining the requirements of EASA AD 2013-0002, which was superseded, to require modification of the affected engines. That AD also clarified that modification does not constitute terminating action for the repetitive in-shop inspections.

Since EASA AD 2014-0152 was issued, RR revised the NMSB for the Trent 700 on-wing inspections and EASA issued AD 2018-0049, taking over all Trent 700 engine requirements from AD 2014-0152. In addition, it was agreed that the modification requirements could be relaxed.

This AD is revised to remove the Trent 700 engines from the Applicability and extend the compliance time for modification by removing the 90 months limit. This AD also introduces some editorial changes, updating to the latest AD writing standards, without affecting the requirements.

#### **Required Action(s) and Compliance Time(s):**

Required as indicated, unless accomplished previously:

#### **Trent 800 Engines:**

##### **On-Wing Inspections:**

- (1) For Group 1 engines: Within 475 flight cycles (FC) after 20 January 2011 [the effective date of EASA AD 2010-0266R1] and, thereafter, at intervals not to exceed 475 FC, accomplish an on-wing visual borescope inspection of the IP compressor rotor shaft rear balance land in accordance with the instructions of the applicable NMSB.

Table 1 – DELETED

Table 2 – Integrated with paragraph (1)



**In-Shop Inspections:**

- (2) For Group 1 and Group 2 engines: During each qualified shop visit after the effective date of this AD, accomplish an EC inspection of the IP compressor rotor shaft for discrepancies in accordance with the instructions of RR NMSB RB.211-72-AG085 Revision 2.

**Alternative Actions:**

- (3) An EC inspection accomplished in shop in accordance with paragraph (2) of this AD is acceptable in lieu of an on-wing visual borescope inspection as required by paragraph (1) of this AD.

If an engine is insufficiently disassembled to expose the rear face of the IP compressor module, an in-shop visual borescope inspection of that engine in accordance with the instructions of the applicable NMSB is acceptable in lieu of an on-wing inspection as required by paragraph (1) of this AD for that engine.

**Corrective Action(s):**

- (4) If, during any inspection as required by paragraph (1) or (2) of this AD, or as specified in paragraph (3) of this AD, discrepancies (as detailed in the applicable NMSB, or in NMSB RB.211-72-AG085, as applicable) are detected, within the time period specified in the NMSB, or before release to service of the engine, as applicable, accomplish the applicable corrective action(s), depending on findings, as detailed in the applicable NMSB, or in NMSB RB.211-72-AG085, as applicable, or replace the affected parts with serviceable parts.

**Modification:**

- (5) For Group 1 engines: During the next qualified shop visit after 28 November 2011 [the effective date of EASA AD 2011-0221], modify the engine (introduction of new balance weight design) in accordance with the instructions of the applicable modification SB.

**Terminating Action:**

- (6) Modification of an engine as required by paragraph (5) of this AD constitutes terminating action for the repetitive on-wing inspections as required by paragraph (1) of this AD for that engine.

**Credit:**

- (7) Inspection(s), corrective action(s) and modification (introduction of new balance weight design) of an engine, accomplished before the effective date of this AD in accordance with the instructions of RR NMSB RB.211-72-AG264, or RR SB RB.211-72-AG401, at any previous revision, are considered acceptable to comply with the requirements of paragraphs (1), (4) and (5) of this AD for that engine.

**Trent 500 Engines:****On-Wing Inspections:**

- (8) For Group 1 engines: Within 340 FC after 18 January 2013 [the effective date of EASA AD 2013-0002] and, thereafter, at intervals not to exceed 340 FC, accomplish an on-wing visual borescope inspection of the IP compressor rotor shaft rear balance land in accordance with the instructions of the applicable NMSB.



**In-Shop Inspections:**

- (9) For Group 1 and Group 2 engines: During each qualified shop visit after 04 July 2014 [the effective date of the original issue of this AD], accomplish an EC inspection of the IP compressor rotor shaft for discrepancies in accordance with the instructions of RR NMSB RB.211-72-G448 Revision 3.

**Alternative Actions:**

- (10) An EC inspection accomplished in shop in accordance with paragraph (9) of this AD is acceptable in lieu of an on-wing visual borescope inspection as required by paragraph (8) of this AD.

If an engine is insufficiently disassembled to expose the rear face of the IP compressor module, an in-shop visual borescope inspection of that engine in accordance with the instructions of RR NMSB RB.211-72-G448 Revision 3 is acceptable in lieu of an on-wing inspection as required by paragraph (8) of this AD for that engine.

**Corrective Action(s):**

- (11) If, during any inspection as required by paragraph (8) or (9) of this AD, or as specified in paragraph (10) of this AD, discrepancies (as detailed in NMSB RB.211-72-G448, or in the applicable NMSB, as applicable) are detected, within the time period specified in the NMSB, or before release to service of the engine, as applicable, accomplish the applicable corrective action(s), depending on findings (as detailed in NMSB RB.211-72-G448, or in the applicable NMSB, as applicable), or replace the affected parts with serviceable parts.

**Modification:**

- (12) For Group 1 engines: During the next qualified shop visit after 04 July 2014 [the effective date of the original issue of this AD], modify the engine (introduction of new balance weight design) in accordance with the instructions of the applicable modification SB.

**Terminating Action:**

- (13) Modification of an engine as required by paragraph (12) of this AD constitutes terminating action for the repetitive on-wing inspections as required by paragraph (8) of this AD for that engine.

**Trent 900 Engines:****On-Wing Inspections:**

- (14) For Group 1 engines: Within 280 FC after 18 January 2013 [the effective date of EASA AD 2013-0002] and, thereafter, at intervals not to exceed 280 FC, accomplish an on-wing visual borescope inspection of the IP compressor rotor shaft rear balance land in accordance with the instructions of the applicable NMSB.

**In-Shop Inspections:**

- (15) For Group 1 and Group 2 engines: During each qualified shop visit after 04 July 2014 [the effective date of the original issue of this AD], accomplish an EC inspection of the IP compressor rotor shaft for discrepancies in accordance with the instructions of RR NMSB RB.211-72-G448 Revision 3.



**Alternative Actions:**

- (16) An EC inspection accomplished in shop in accordance with paragraph (15) of this AD is acceptable in lieu of an on-wing visual borescope inspection as required by paragraph (14) of this AD.

If an engine is insufficiently disassembled to expose the rear face of the IP compressor module, an in-shop visual borescope inspection of that engine in accordance with the instructions of RR NMSB RB.211-72-G448 Revision 3 is acceptable in lieu of an on-wing inspection as required by paragraph (14) of this AD for that engine.

**Corrective Action(s):**

- (17) If, during any inspection as required by paragraph (14) or (15) of this AD, or as specified in paragraph (16) of this AD, discrepancies (as detailed in NMSB RB.211-72-G448, or in the applicable NMSB, as applicable) are detected, within the time period specified in the NMSB, or before release to service of the engine, as applicable, accomplish the applicable corrective action(s), depending on findings (as detailed in NMSB RB.211-72-G448, or in the applicable NMSB, as applicable), or replace the affected parts with serviceable parts.

**Modification:**

- (18) For Group 1 engines: During the next qualified shop visit after 04 July 2014 [the effective date of the original issue of this AD], modify the engine (introduction of new balance weight design) in accordance with the instructions of the applicable modification SB.

**Terminating Action:**

- (19) Modification of an engine as required by paragraph (18) of this AD constitutes terminating action for the repetitive on-wing inspections as required by paragraph (14) of this AD for that engine.

**Ref. Publications:**

RR NMSB RB.211-72-AG085 Revision 2 dated 07 July 2011.

RR NMSB RB.211-72-AG264 Revision 5 dated 21 March 2011.

RR NMSB RB.211-72-G448 Revision 3 dated 07 July 2011, or Revision 4 dated 21 August 2014.

RR SB RB.211-72-AG401 Revision 2 dated 05 July 2011, or Revision 3 dated 28 January 2014.

RR NMSB RB.211-72-AH058 original issued dated 13 December 2012, or Revision 1 dated 07 July 2014.

RR NMSB RB.211-72-AH059 original issue dated 11 December 2012, or Revision 1 dated 07 July 2014.

RR SB RB.211-72-AH555 original issue dated 18 October 2013, or Revision 1 dated 13 December 2013.

RR SB RB.211-72-AH561 original issue dated 21 October 2013, or Revision 1 dated 27 June 2014.



The use of later approved revisions of the above-mentioned documents is acceptable for compliance with the requirements of this AD.

**Remarks:**

1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.
2. The original issue of this AD was posted on 23 January 2014 as PAD 14-019 for consultation until 20 February 2014. The Comment Response Document can be found in the [EASA Safety Publications Tool](#), in the compressed (zipped) file attached to the record for this AD.
3. Enquiries regarding this AD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: [ADs@easa.europa.eu](mailto:ADs@easa.europa.eu).
4. For any question concerning the technical content of the requirements in this AD, please contact your designated Rolls-Royce representative, or download the publication from your Rolls-Royce Care account at <https://customers.rolls-royce.com>.

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