


<b>EASA</b>	<b>AIRWORTHINESS DIRECTIVE</b>
	<p><b>PAD No.: 14-019</b></p> <p><b>Date: 23 January 2014</b></p> <p>Note: This Proposed Airworthiness Directive (PAD) is issued by EASA, acting in accordance with Regulation (EC) No 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.</p>
<p>In accordance with the EASA Continuing Airworthiness Procedures, the Executive Director is proposing the issuance of an EASA Airworthiness Directive (AD), applicable to the aeronautical product(s) identified below.  All interested persons may send their comments, referencing the PAD Number above, to the e-mail address specified in the 'Remarks' section, prior to the consultation closing date indicated.</p>	
<p><b>Type Approval Holder's Name :</b>  ROLLS-ROYCE PLC</p>	<p><b>Type/Model designation(s) :</b>  RB211 Trent 500, 700, 800 and 900 engines</p>
<p>TCDS Numbers: EASA.E.012, EASA.E.042, EASA.E.060 and United Kingdom No. 1051</p>	
<p>Foreign AD : Not applicable</p>	
<p>Supersedure: This AD supersedes EASA AD 2013-0002 dated 04 January 2013.</p>	
<b>ATA 72</b>	<b>Engine – Intermediate Pressure Compressor Rotor Shaft and Balance Weights – Inspection / Modification</b>
Manufacturer(s):	Rolls-Royce plc
Applicability:	<p>Models 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.</p> <p>Models RB211 Trent 768-60, 772-60, 772B-60 and 772C-60 engines, all serial numbers. These engines are known to be installed on, but not limited to, Airbus A330 series aeroplanes.</p> <p>Models 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.</p> <p>Models 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.</p>
Reason:	<p>Cracks have been found on the rear balance land feature of the Intermediate Pressure (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.</p> <p>Stress analysis of the damage condition has shown that it presents a possible</p>

	<p>threat to the rotor integrity.</p> <p>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.</p> <p>EASA initially issued AD 2007-0052 to address this unsafe condition with visual inspections of the balance land. Subsequently, Rolls-Royce improved the inspection methods for the Trent 700 and 800 engines and developed a modification for those engines, accomplishment of which terminates the need for on-wing inspections. EASA AD 2010-0266 incorporated these changes and superseded EASA AD 2007-0052 requiring, for the Trent 700 and 800 engines, repetitive on-wing borescope and in-shop Eddy Current inspections of the IP Compressor rotor shaft for discrepancies and, depending on findings, corrective actions.</p> <p>For the Trent 500 engines, EASA AD 2010-0266 (later revised) required repetitive in-shop visual inspections, in accordance with Rolls-Royce Alert Non-Modification Service Bulletin (NMSB) RB.211-72-AF260 at Revision 4 or, alternatively, in-shop Eddy Current inspections in accordance with Rolls-Royce NMSB RB.211-72-G448 Revision 1, to detect discrepancies in the IP Compressor rotor shaft and, depending on findings, corrective actions.</p> <p>Since EASA AD 2010-0266R1 was issued, efforts to develop an on-wing eddy-current 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, partially retaining its requirements, to require introduction of new balance weight design for Trent 700 and 800 engines. For Trent 500 engines, the requirements are not changed technically relative to EASA AD 2010-0266R1.</p> <p>Since EASA AD 2011-0221R1 was issued, it was reported that during a recent inspection at shop visit, cracking was detected in a Trent 500 IP Compressor rotor shaft rear balance land. Further engineering evaluation carried out by Rolls-Royce concluded that the mechanism which led to this occurrence may be also present in Trent 900 engines.</p> <p>Consequently, EASA issued AD 2013-0002, retaining the requirements of EASA AD 2011-0221R1, which is superseded, expanding the Applicability to include all Trent 900 engines, and adding repetitive on-wing inspections for Trent 500 and Trent 900 engines to the requirements.</p> <p>Since 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. Those modifications constitute terminating action only for the repetitive on-wing inspections.</p> <p>In addition, RR have developed modifications for Trent 500 (mod 72-H555) and Trent 900 (mod 72-H561), introducing the new balance weight design, which cancels the required on-wing inspections for those engines.</p> <p>For the reasons described above, this AD retains the requirements of EASA AD 2013-0002, which is superseded, and requires modification of the affected engines. This AD also clarifies that modification does not constitute terminating action for the repetitive in-shop inspections.</p>
Effective Date:	[TBD: 14 days after Final AD issue date]
Required Action(s) and Compliance Time(s):	<p>Required as indicated, unless already accomplished:</p> <p>Note: Where in this AD, reference is made to an RR Mod, SB or NMSB with an 'A' (Alert) in the number, it should be recognised that an earlier or later revision may not have that 'A'. This kind of change does not effectively alter the publication references for the purpose of this AD.</p>

**Trent 700 and Trent 800 engines:**

- (1) Within the compliance times specified in Table 1 or Table 2 of this AD, as applicable to engine type, accomplish on-wing inspections of the IP Compressor rotor shaft for discrepancies in accordance with the instructions of the associated NMSB. On-wing inspections are not required for engines that have had mod 72-G401 (Trent 800) or mod 72-G402 (Trent 700) incorporated in production.

Table 1 – Trent 700 engine inspections

Compliance time	NMSB Instructions
Within 625 flight cycles (FC) after 20 January 2011 [the effective date of AD 2010-0266R1] and thereafter at intervals not to exceed 625 FC	RB.211-72-AG270 Revision 4

Table 2 – Trent 800 engine inspections

Compliance time	NMSB Instructions
Within 475 FC after 20 January 2011 [the effective date of AD 2010-0266R1] and thereafter at intervals not to exceed 475 FC	RB.211-72-AG264 Revision 5

- (2) During each shop visit after the effective date of this AD in which the engine is sufficiently disassembled to expose the IP Compressor module rear face, inspect the IP Compressor rotor shaft and balance weights for discrepancies in accordance with the instructions of NMSB RB.211-72-AG085 Revision 2.
- (3) An inspection performed in shop in accordance with paragraph (2) of this AD is acceptable in lieu of an on-wing visual inspection as required by paragraph (1) of this AD.
- (4) If, during any inspection as required by paragraph (1) or (2) of this AD, discrepancies (as detailed in NMSB RB.211-72-AG264, NMSB RB.211-72-AG270, or 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 NMSB RB.211-72-AG264, NMSB RB.211-72-AG270, or NMSB RB.211-72-AG085, as applicable, or replace the affected parts with serviceable parts.
- (5) At the next shop visit in which the IPC 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 IPC compressor module, or within 90 months, whichever occurs first 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 RR SB RB.211-72-AG401 Revision 2 (for RB211 Trent 800) or SB RB.211-72-AG402 Revision 2 (for RB211 Trent 700), as applicable.
- (6) Modification of an engine as required by paragraph (5) of this AD constitutes terminating action for the repetitive on-wing inspections required by paragraph (1) of this AD for that engine.
- (7) Inspections and modification of an engine (introduction of new balance weight design) accomplished before the effective date of this AD, in accordance with all referenced SBs and NMSBs at any previous

revisions, are considered acceptable to comply with the requirements of paragraphs (1), (4) and (5) of this AD for that engine.

**Trent 500 engines:**

- (8) 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 NMSB RB.211-72-AH058. On-wing inspections are not required for engines that have had mod 72-H555 incorporated in production.
- (9) During each shop visit after the effective date of this AD, in which the engine is sufficiently disassembled to expose the IP Compressor module rear face, accomplish an Eddy Current inspection of the IP Compressor rotor shaft and visual inspection of the balance weights in accordance with the instructions of NMSB RB.211-72-G448 Revision 3.
- (10) An inspection performed in shop in accordance with paragraph (9) of this AD is acceptable to comply with an on-wing visual inspection required by paragraph (8) of this AD.
- (11) If, during any inspection as required by paragraph (8) or (9) of this AD, as applicable, discrepancies (as detailed in NMSB RB.211-72-G448 or NMSB RB.211-72-AH058, 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 NMSB RB.211-72-AH058, as applicable) or replace the affected parts with serviceable parts.
- (12) At the next shop visit in which the IPC 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 IPC compressor module, or within 90 months, whichever occurs first after the effective date of this AD, modify the engine (introduction of new balance weight design) in accordance with the instructions of RR SB RB.211-72-AH555.
- (13) Modification of an engine as required by paragraph (12) of this AD constitutes terminating action for the repetitive on-wing inspections required by paragraph (8) of this AD for that engine.

**Trent 900 engines:**

- (14) 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 NMSB RB.211-72-AH059. On-wing inspections are not required for engines that have had mod 72-H561 incorporated in production.
- (15) During each shop visit after the effective date of this AD, accomplish an Eddy Current inspection of the IP Compressor rotor shaft if the rear of the IPC module is exposed, and a borescope inspection of the balance land when it is not exposed, in accordance with the instructions of NMSB RB211-72-G448 Revision 3.
- (16) An inspection performed in shop in accordance with paragraph (15) of this AD is acceptable to comply with an on-wing visual inspection required by paragraph (14) of this AD.
- (17) If, during any inspection as required by paragraph (15) or (16) of this AD, discrepancies (as detailed in NMSB RB.211-72-G448 or in NMSB

	<p>RB.211-72-AH059, 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 NMSB RB.211-72-AH059, as applicable, or replace the affected parts with serviceable parts.</p> <p>(18) At the next shop visit in which the IPC 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 IPC compressor module, or within 90 months, whichever occurs first after the effective date of this AD, modify the engine (introduction of new balance weight design) in accordance with the instructions of RR SB RB.211-72-AH561.</p> <p>(19) Modification of an engine as required by paragraph (18) of this AD constitutes terminating action for the repetitive on-wing inspections required by paragraph (14) of this AD for that engine.</p>
Ref. Publications:	<p>Rolls-Royce NMSB RB.211-72-AG085 Revision 2 dated 7 July 2011.</p> <p>Rolls-Royce NMSB RB.211-72-AG264 Revision 5 dated 21 March 2011.</p> <p>Rolls-Royce NMSB RB.211-72-AG270 Revision 4 dated 21 March 2011.</p> <p>Rolls-Royce NMSB RB.211-72-G448 Revision 3 dated 7 July 2011.</p> <p>Rolls-Royce SB RB.211-72-AG401 Revision 2 dated 5 July 2011.</p> <p>Rolls-Royce SB RB.211-72-AG402 Revision 2 dated 7 July 2011.</p> <p>Rolls-Royce NMSB RB.211-71-AH058 dated 7 November 2012.</p> <p>Rolls-Royce NMSB RB.211-72-AH059 dated 11 December 2012.</p> <p>Rolls-Royce SB RB.211-72-AH555 original dated 18 October 2013, or Revision 1 dated 13 December 2013.</p> <p>Rolls-Royce SB RB.211-72-AH561 dated 21 October 2013.</p> <p>The use of later approved revisions of these documents is acceptable for compliance with the requirements of this AD.</p>
Remarks :	<ol style="list-style-type: none"> <li>1. This Proposed AD will be closed for consultation on 20 February 2014.</li> <li>2. Enquiries regarding this PAD should be referred to the Safety Information Section, Executive Directorate, EASA. E-mail <a href="mailto:ADs@easa.europa.eu">ADs@easa.europa.eu</a>.</li> <li>3. For any question concerning the technical content of the requirements in this PAD, please contact your designated Rolls-Royce representative or download the publication from your Aeromanager account at <a href="http://www.aeromanager.com">www.aeromanager.com</a>.</li> </ol> <p>If you do not have a designated representative or Aeromanager account, please contact Corporate Communications at Rolls-Royce plc., P.O. Box 31, Derby, DE24 8BJ, United Kingdom, telephone: +44 (0) 1332 242424, or send an e-mail through <a href="http://www.rolls-royce.com/contact/civil_team.jsp">http://www.rolls-royce.com/contact/civil_team.jsp</a> identifying the correspondence as being related to Airworthiness Directives.</p>