EASA	AIRWORTHINESS DIRECTIVE
	AD No.: 2013-0002 **Date: 04 January 2013** Note: This Airworthiness Directive (AD) 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.

This AD is issued in accordance with EU 748/2012, Part 21.A.3B. In accordance with EC 2042/2003 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 [EC 2042/2003 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [EC 216/2008, Article 14(4) exemption].

Type Approval Holder's Name :	**Type/Model designation(s) :**
ROLLS-ROYCE PLC	RB211 Trent 500, 700, 800 and 900 engines

TCDS Numbers:	EASA.E.012, EASA.E.042, EASA.E.060 and United Kingdom No. 1051
Foreign AD :	Not applicable
Supersedure:	This AD supersedes EASA AD 2011-0221R1 dated 25 November 2011.

ATA 72	**Engine – Intermediate Pressure Compressor Rotor Shaft and Balance Weights – Inspection / Modification**
Manufacturer(s):	Rolls-Royce plc
Applicability:	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. Models RB211 Trent 768-60, 772-60, 772B-60 and 772C-60 engines, all serial numbers, except those having Modification (mod.) 72-G402 embodied. These engines are known to be installed on, but not limited to, Airbus A330 series aeroplanes. Models RB211 Trent 875-17, 877-17, 884-17, 884B-17, 892-17, 892B-17 and 895-17 engines, all serial numbers, except those having mod. 72-G401 embodied. These engines are known to be installed on, but not limited to, Boeing 777 series aeroplanes. 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.
Reason:	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 frettage 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 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. 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. 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. 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. For the reasons described above, this AD retains the requirements of EASA AD 2011-0221R1, which is superseded, expands the Applicability to include all Trent 900 engines, and adds repetitive on-wing inspections for Trent 500 and Trent 900 engines to the requirements.
Effective Date:	18 January 2013
Required Action(s) and Compliance Time(s):	Required as indicated, unless already accomplished: **Trent 700 and Trent 800 engines:** (1) Within the time period indicated in Table 1 or Table 2 of this AD, as applicable to engine type, accomplish inspections (on-wing or in-shop) of the IP Compressor rotor shaft for discrepancies in accordance with the instructions of the associated NMSB:

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, or RB.211-72-AG085 Revision 2.

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, or RB.211-72-AG085 Revision 2.

(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) 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.

(4) At the next shop visit in which any level of inspection or strip is scheduled to be carried out on the IPC 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 SB RB.211-72-G401 Revision 2 (for RB211 Trent 800) or SB RB.211-72-G402 Revision 2 (for RB211 Trent 700), as applicable.

(5) Modification of an engine as required by paragraph (4) of this AD constitutes terminating action for the repetitive inspections required by paragraph (1) of this AD for that engine.

(6) 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), (2), (3) and (4) of this AD for that engine.

Trent 500 engines:

(7) 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-AF260 Revision 5.

(8) As an alternative to each inspection as required by paragraph (7) of this AD, an Eddy Current inspection of the IP Compressor rotor shaft and visual inspection of the balance weights can be accomplished in accordance with the instructions of NMSB RB.211-72-G448 Revision 3.

(9) Within 340 FC after the effective date of this AD 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.

(10) If, during any inspection as required by paragraph (7), (8) or (9) of this AD, discrepancies (as detailed in NMSB RB211-72-AF260, or NMSB

	RB.211-72-G448, or NMSB RB.211-72-AH058, as applicable) are detected, before release to service of the engine, accomplish the applicable corrective action(s), depending on findings as detailed in NMSB RB.211-72-AF260, or in NMSB RB.211-72-G448, or in NMSB RB.211-72-AH058, as applicable) or replace the affected parts with serviceable parts. **Trent 900 engines:** (11) 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-G269. (12) As an alternative to each inspection as required by paragraph (11) of this AD, an Eddy Current inspection of the IP Compressor rotor shaft and visual inspection of the balance weights can be accomplished in accordance with the instructions of NMSB RB211-72-G448 Revision 3. (13) Within 280 FC after the effective date of this AD 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. (14) If, during any inspection as required by paragraph (11), (12), or (13) of this AD, discrepancies (as detailed in NMSB RB.211-72-G269, or in NMSB RB.211-72-G448, or in NMSB RB.211-72-AH059, as applicable) are detected, before release to service of the engine, accomplish the appropriate corrective action(s), depending on findings as detailed in NMSB RB.211-72-G269 or in NMSB RB.211-72-G448, or NMSB RB.211-72-AH059, as applicable, or replace the affected parts with serviceable parts. **Trent 500 and 900 engines – No terminating action:** (15) Corrective action on an engine, as required by paragraph (10) or paragraph (14) of this AD, as applicable, does not constitute terminating action for the repetitive inspections required by this AD for that engine.
Ref. Publications:	Rolls-Royce NMSB RB.211-72-AF260 Revision 5 dated 7 July 2011. Rolls-Royce NMSB RB.211-72-AG085 Revision 2 dated 7 July 2011. Rolls-Royce NMSB RB.211-72-AG264 Revision 5 dated 21 March 2011. Rolls-Royce NMSB RB.211-72-AG270 Revision 4 dated 21 March 2011. Rolls-Royce NMSB RB.211-72-G448 Revision 3 dated 7 July 2011. Rolls-Royce SB RB.211-72-G401 Revision 2 dated 5 July 2011. Rolls-Royce SB RB.211-72-G402 Revision 2 dated 7 July 2011. Rolls-Royce NMSB RB.211-71-AH058 dated 7 November 2012. Rolls-Royce NMSB RB.211-72-AH059 dated 11 December 2012. Rolls-Royce NMSB RB.211-72-G269 dated 10 August 2009. The use of later approved revisions of these 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. Based on the required actions and the compliance time, EASA have

	decided to issue a Final AD with Request for Comments, postponing the public consultation process until after publication. 3. Enquiries regarding this AD should be referred to the Safety Information Section, Executive Directorate, EASA. E-mail 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 Aeromanager account at www.aeromanager.com. 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 http://www.rolls-royce.com/contact/civil_team.jsp identifying the correspondence as being related to Airworthiness Directives.