



# Notification of a Proposal to issue an Airworthiness Directive

**PAD No.: 18-062**

**Issued: 27 April 2018**

Note: This Proposed Airworthiness Directive (PAD) 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.

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 date indicated.

**Design Approval Holder's Name:**

ROLLS-ROYCE plc

**Type/Model designation(s):**

RB211 Trent 900 Engines

**Effective Date:** [TBD - standard: 14 days after Final AD issue date]

**TCDS Number(s):** EASA.E.012

**Foreign AD:** Not applicable

**Supersedure:** This AD supersedes AD 2016-0194 issued 30 September 2016.

## ATA 72 – Engine – Low Pressure Turbine Disc Seal Fins and Interstage Seals – Inspection / Replacement / Modification

**Manufacturer(s):**

Rolls-Royce plc (RR)

**Applicability:**

RB211 Trent 970-84, 970B-84, 972-84, 972B-84, 972E-84, 977-84, 977B-84 and 980-84 engines, all serial numbers, except those that have embodied RR modification (mod) 72-AJ592 in production.

These engines are known to be installed on, but not limited to, Airbus A380 aeroplanes.

**Definitions:**

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

**The NMSB:** RR Alert Non-Modification Service Bulletin (NMSB) RB.211-72-AH054 Revision 3.

**The SB:** RR Alert Service Bulletin (SB) RB.211-72-AJ592. Where, in this AD, reference is made to a 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.



**Qualified shop visit:** M52 LPT Module rework level of Module Check and Repair, Refurbishment, or Overhaul; or Engine Check and Repair, or Refurbishment.

**Reason:**

Following a revenue service flight, a Trent 900 engine experienced increased low pressure vibration. Upon post-flight inspection of the engine, debris was found in the exhaust tail pipe and the engine was removed. The results of a subsequent strip inspection revealed that the stage 2 low pressure turbine (LPT) disc had suffered material loss from a portion of the rear disc seal fin area of the disc, with impact damage to downstream LPT stages. All debris was contained within the engine casings. Preliminary findings showed that the rear disc seal fins had rubbed into the stage 3 interstage seal (ISS) honeycomb seal, which overheated and cracked, finally resulting in releasing a portion of the seal fin area of the disc.

This condition, if not detected and corrected, could lead to LPT stage 2 disc cracks, possibly resulting in an uncontained engine failure and subsequent damage to the aeroplane.

To address this potential unsafe condition, RR published NMSB RB.211-72-AH054 to provide inspection instructions and EASA issued AD 2012-0220 (later revised) to require on-wing inspections of LPT disc seal fins and interstage seals, each time it is determined that the Engine Health Monitoring (EHM) vibratory levels have been exceeded in flight, and in-shop inspections of the LPT disc seal fins and interstage seals, to detect cracks or damage and, depending on findings, the accomplishment of applicable corrections action(s).

After EASA AD 2012-0220R2 was issued, another Trent 900 engine experienced increased LP vibration during climb. The pilot commanded an engine shutdown, performed an air turnback, and landed without further incident. The subsequent strip inspection of the engine revealed separation between the stage 1 and 2, and between the stage 2 and 3 LPT discs, as well as missing LPT blades and vanes. A review of all the potential causes of an ISS rub identified that some could be linked to activities which take place during an overhaul shop visit. To protect against all actions during the shop visit which could lead to an undesired heavy ISS rub, RR published NMSB RB.211-72-AH054 Revision 2 to introduce an inspection, to be done after each pass-off test. RR also introduced additional criteria for inspection of the stage 2, 3 and 4 LPT disc seal fins and interstage seals, and removed the requirement to inspect stage 5 LPT disc seal fins and interstage seal. Consequently, EASA issued AD 2016-0194, which partially retained the requirements of EASA AD 2012-0220R2, which was superseded, introduced the requirement to inspect the LPT disc seal fins and interstage seals following pass-off test, and changed certain inspection requirements.

Since that AD was issued, RR developed mod 72-AJ592 and published the SB accordingly, to provide modification instructions. This mod introduces LPT stage 2, 3 and 4 nozzle guide vane rear support and seal ring assemblies, featuring increased cold build clearances. In addition, RR issued the NMSB to exclude post-mod 72-AJ592 engines from the inspections, but included pre-mod 72-AJ592 RB211 Trent 972E-84 engines. The inspections of these engines were, until now, managed through the relevant Airworthiness Limitations Section (ALS) of that engine Model. RR will revise the ALS accordingly, removing those instructions for the model 972E-84 engines.

For the reasons described above, this AD retains the requirements of EASA AD 2016-0194, which is superseded, excludes post-mod 72-AJ592 engines from the Applicability, adds RB211 Trent 972E-84



engines to the Applicability and requires introduction of the modification in-service, which constitutes terminating action for the repetitive inspections required by this AD.

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

Required as indicated, unless accomplished previously:

#### Inspections:

- (1) From 05 November 2012 [the effective date of EASA AD 2012-0220 at original issue], accomplish the following actions:
  - (1.1) Within 10 engine flight cycles (EFC) following receipt of an Engine Health Monitoring (EHM) notification for N1 vibration levels exceeding the alert limits during flight (see Note 1 of this AD), perform trouble shooting to determine vibration indication fault or high vibration, in accordance with the Airbus A380 Trouble Shooting Manual (TSM) Task 77-00-00-810-803-A, paragraph 2 - Fault Confirmation.

If it cannot be confirmed that the vibration increase has been caused by an indication fault, and if acceptable vibration levels have not been restored through applicable corrective actions (see Note 2 of this AD), inspect the LPT disc seal fins and interstage seals in accordance with the instructions of section 3.B of the NMSB.

Note 1: RR Operational Service Desk (OSD) automatically receives, monitors and analyses EHM data, and will send a notification containing the wording as shown in Figure 1 of this AD. The RR OSD will close out the alert when confirmation is received from the operator that the actions required in paragraph (1.1) of this AD have been carried out by the operator.

Figure 1 – Alert Notification

This alert is the subject of an EASA AD, and inspection of the LPT interstage seals may be required.

Note 2: Vibration levels caused by LP compressor unbalance following maintenance may be restored through corrective actions defined in the Airbus A380 AMM.

- (1.2) For operators who are not using the RR EHM service, within 200 EFC after 14 October 2016 [the effective date of EASA AD 2016-0194] and, thereafter, at intervals not to exceed 200 EFC, inspect the LPT disc seal fins and interstage seals in accordance with the instructions of section 3.B of the NMSB.

#### In-Shop Post-Pass-off Test Inspection:

- (2) From 14 October 2016 [the effective date of EASA AD 2016-0194], each time a pass-off test is performed on the engine after induction into a Repair and Overhaul Shop, following that test, inspect the LPT disc seal fins and interstage seals in accordance with the instructions of section 3.C of the NMSB. These inspections are not required when the engine is inducted into a Repair or Overhaul Shop where, due to the level of work performed, a pass-off test is not necessary.



**Corrective Action(s):**

- (3) If, during any inspection as required by paragraph (1.1) or (1.2) of this AD, as applicable, any crack or material loss from the disc seal fin is found, before next flight, remove the engine from the aeroplane and, before release to service of the engine, replace the affected parts with serviceable parts.
- (4) If, during any in-shop inspection as required by paragraph (2) of this AD, any crack or material loss from the disc seal fin is found, before release to service of the engine, replace the affected parts with serviceable parts.

**Credit:**

- (5) Inspections and corrective actions on an engine, accomplished before the effective date of this AD in accordance with the instructions of Rolls-Royce Technical Variance (TV) TV125060, or TV125658, or the NMSB at original issue, or Revision 1, or Revision 2, as applicable, are acceptable to comply with the initial requirements of paragraphs (1), (2), (3) and (4) of this AD for that engine.
- (6) Inspections and corrective actions on a Model RB211 Trent 972E-84 engine, accomplished before the effective date of this AD in accordance with the instructions of the applicable ALS, are acceptable to comply with the initial requirements of paragraphs (1), (2), (3) and (4) of this AD for that engine.

**Modification:**

- (7) During any qualified shop visit after the effective date of this AD, but not later than 30 September 2025, modify the engine in accordance with the instructions of the SB.

**Terminating Action:**

- (8) Corrective actions on an engine, as required by paragraph (3) or (4) of this AD, as applicable, do not constitute terminating action for the repetitive inspections as required by paragraphs (1) and (2) of this AD for that engine.
- (9) Modification of an engine as required by paragraph (7) of this AD constitutes terminating action for the repetitive inspection requirements of this AD for that engine.

**Ref. Publications:**

Airbus A380 AMM and TSM.

Rolls-Royce Trent 900 Generic EMP, currently at issue 29, dated 09 February 2018.

Rolls-Royce Alert NMSB RB.211-72-AH054 dated 14 September 2012, or Revision 1 dated 05 November 2012, or Revision 2 dated 24 August 2016, or Revision 3 dated 01 February 2018.

Rolls-Royce TV125060 issue 1, dated 27 July 2012, or issue 2 dated 30 January 2013.

Rolls-Royce TV125658 issue 2, dated 14 August 2012.

Rolls-Royce Alert SB RB.211-72-AJ592 dated 04 September 2017.



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

**Remarks:**

1. This Proposed AD will be closed for consultation on 25 May 2018.
2. Enquiries regarding this PAD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: [ADs@easa.europa.eu](mailto:ADs@easa.europa.eu).
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 Rolls Royce Care account at <https://customers.rolls-royce.com>.

If you do not have a designated representative or Rolls Royce Care 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 email through [http://www.rolls-royce.com/contact/civil\\_team.jsp](http://www.rolls-royce.com/contact/civil_team.jsp) identifying the correspondence as being related to **Airworthiness Directives**.

