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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2013-0740; Directorate Identifier 2013-NE-24-AD; Amendment 39-18905; AD 2017-11-06]**

**RIN 2120-AA64**

#### **Airworthiness Directives; Pratt & Whitney Turbofan Engines**

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

**ACTION:** Final rule.

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**SUMMARY:** We are superseding Airworthiness Directive (AD) 2014-05-32 for all Pratt & Whitney (PW) PW2037, PW2037D, PW2037M, PW2040, PW2040D, PW2043, PW2143, PW2643, and F117-PW-100 turbofan engines. AD 2014-05-32 required one-time eddy current inspection (ECI) of affected engines with certain diffuser and high-pressure turbine (HPT) cases installed. AD 2014-05-32 also required a fluorescent-penetrant inspection (FPI) of the diffuser case rear flange and the HPT case front flange. This AD requires additional repetitive, on-wing ECI inspections. This AD was prompted by the manufacturer determining through analysis that the inspections required by AD 2014-05-32 are not adequate to maintain safety for certain diffuser cases. We are issuing this AD to correct the unsafe condition on these products.

**DATES:** This AD is effective July 18, 2017.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of July 18, 2017.

**ADDRESSES:** For service information identified in this final rule, contact Pratt & Whitney, 400 Main St., East Hartford, CT 06118; phone: 860-565-0140; fax: 860-565-5442; email: HELP24@pw.utc.com. You may view this service information at the FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125. It is also available on the internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2013-0740.

#### **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2013-0740; 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 address for the Docket Office (phone: 800-647-5527) is Document Management Facility, U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Brian Kierstead, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7772; fax: 781-238-7199; email: brian.kierstead@faa.gov.

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to supersede AD 2014-05-32, Amendment 39-17804 (79 FR 17856, March 31, 2014), (“AD 2014-05-32”). AD 2014-05-32 applied to all PW PW2037, PW2037D, PW2037M, PW2040, PW2040D, PW2043, PW2143, PW2643, and F117-PW-100 turbofan engines. The NPRM published in the Federal Register on December 22, 2016 (81 FR 93855) (“the NPRM”). The NPRM was prompted by the manufacturer determining through analysis that the inspections required by AD 2014-05-32 were not adequate to maintain safety for diffuser cases that incorporate a wrought M-flange. Also, repaired wrought flanges cannot be distinguished from other wrought flanges or from non-repaired flanges on diffuser cases installed on the affected engines. The NPRM, therefore, proposed to add additional repetitive, on-wing ECIs. We are issuing this AD to prevent failure of the diffuser-to-HPT case flange, which could lead to uncontained engine failure and damage to the airplane.

### **Comments**

We gave the public the opportunity to participate in developing this AD. The following presents the comments received on the NPRM and the FAA's response to each comment.

### **Request for New AD Instead of Supersedure AD**

PW, Delta Airlines (Delta), FedEx Express (FedEx), and United Airlines (United) requested that the NPRM to supersede AD 2014-05-32 be withdrawn and the requirements of the NPRM be included in a new AD that does not supersede AD 2014-05-32. Delta indicated that the NPRM applies only to a sub-population of diffuser cases. Delta recommended that further field data be captured to validate PW's analysis prior to issuance of the final rule AD. PW, Delta, and United added that the repetitive ECIs introduced by this AD are different from those mandated by AD 2014-05-32.

We disagree. AD 2014-05-32 and this AD address the same safety issue, which is cracking and rupture of the diffuser case M-flange. Therefore, AD 2014-05-32 and this AD have the same applicability. Differences in compliance time reflect different levels of risk associated with different sub-populations of diffuser cases. We therefore find it appropriate that this AD replaces AD 2014-05-32. We are, however, revising the Previous Credit section of this AD to allow credit for ECIs of the diffuser case M-flange performed using either PW Service Bulletin (SB) No. PW2000 72-763, Revision No. 1, dated August 30, 2013; and PW Alert Service Bulletin (ASB) No. PW2000 A72-765, Revision No. 1, dated July 13, 2016.

## **Request To Exclude F117 Engines From Applicability**

PW requested that the F117-PW-100 turbofan engine be excluded from the applicability of this AD. PW indicated that the F117 engine meets all safety requirements and does not warrant a service bulletin or an AD. PW asked that if this AD does not remove the F117 engine from applicability, then this AD should clarify that the repetitive ECIs in paragraphs (f)(3) and (4) of this AD do not apply to the F117 engine. Further, this AD should reference PW SB F117 72-410, Revision 1, dated December 17, 2013.

We partially agree. We agree that the original build F117-PW-100 engines used only cast material M-flanges and, therefore, are not susceptible to the safety issue responsible for this AD. We note, however, that an F117 diffuser case flange can be repaired using the wrought material making these flanges susceptible to the unsafe condition represented by this AD. We, therefore, find it necessary to include the F117-PW-100 engine in the applicability of this AD.

We disagree with removing the F117 engine from the recurring ECIs in paragraphs (f)(3) and (4) of this AD since these inspections apply to all applicable engines.

We disagree with referencing PW SB F117 72-410, Revision 1, dated December 17, 2013, as this is not an equivalent instruction for the repetitive inspections of this AD. We did not change this AD.

## **Request To Revise Criteria for Recurrent ECI Inspection**

PW, Delta, FedEx, and UPS requested that the re-inspection required by paragraph (f)(4)(ii) of this AD be changed to occur “within 2,500 cycles since last ECI or last piece-part FPI inspection, whichever occurs last” instead of “within 2,500 cycles since last ECI or last piece-part FPI inspection, whichever occurs first” as proposed. The commenters indicated that using the criteria “whichever occurs first” would not allow the repetitive inspection interval to be reset following an ECI inspection. PW also commented that the repetitive inspections required by paragraph (f)(4)(ii) of this AD should reference PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016.

We partially agree. We agree that changing the criteria in paragraph (f)(4)(ii) of this AD to “whichever occurs last” maintains an acceptable level of safety and changed this paragraph accordingly. Paragraph (f)(4) of this AD references direct compliance in accordance with PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016. There is no need to repeat that instruction in paragraph (f)(4)(ii).

## **Request To Revise Initial Inspection Threshold**

Delta and United requested that the initial inspection intervals be increased. Delta also requested that the initial inspection threshold of 5,500 cycles since new or since M-flange replacement, as specified in paragraph (f)(4)(i)(A) of this AD, be extended to 6,500 cycles since new. United asked that the initial inspection threshold in this paragraph (f)(4)(i)(C) be aligned with the service information, which provides an inspection interval of 1,500 cycles for engines with more than 2,500 cycles since last engine shop visit.

We partially agree. We agree that closer alignment of the initial inspection threshold with PW ASB No. PW2000 A72-765, Revision No. 1, dated July 13, 2016, maintains an acceptable level of safety. We therefore increased the initial inspection threshold in paragraph (f)(4)(i)(C) of this AD from 500 cycles to 1,000 cycles from the effective date of this AD. We do not, however, have data to support increasing the interval from 5,500 to 6,500 cycles since new. Therefore, we did not change paragraph (f)(4)(i)(A) of this AD.

## **Request To Clarify References to Diffuser Cases**

PW and Delta requested that we revise sections in the preamble of the NPRM, particularly the “Summary” and the “Actions Since AD 2014-05-32 Was Issued” sections, to clarify that the “subpopulation identified by the manufacturer” refers to diffuser cases manufactured or repaired using wrought flanges. Also, PW and Delta want to clarify that repaired flanges cannot be distinguished from non-repaired since they share the same part number.

We partially agree. The summary of an AD is not intended to provide the level of detail requested by the commenters, but we added a reference to clarify that we are referring to a certain population of diffuser cases. The “Actions Since AD 2014-05-32 Was Issued” section does not exist in a final rule AD, but we clarified in the Discussion sections of this AD that we are referring to diffuser cases that incorporate a wrought M-flange. We also added a statement in the Discussion to note that repaired flanges cannot be distinguished from non-repaired flanges.

## **Request To Update Service Information References**

PW, Delta, United, and FedEx requested that we revise references in the compliance section of this AD from PW ASB No. PW2000 A72-765, Revision No. 1, dated July 13, 2016, to PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016. PW and Delta also requested that we allow compliance to later revisions of this ASB. PW and Delta indicated that they expect an additional revision to this ASB prior to issuance of this final rule. Delta further asked that publication of this final rule AD be delayed until the latest version of this ASB is published.

We partially agree. We agree to update the references to PW ASB No. PW2000 A72-765 to Revision 2, dated August 12, 2016, in the compliance section of this AD. We do not agree to delay publication of this final rule AD or to revise the references to service information to allow compliance to revisions that have not been published. We cannot require compliance to service information that does not exist.

## **Request To Clarify References to Diffuser Cases M-flange**

PW, Delta, FedEx, and United requested that we clarify that the inspections required by paragraphs (f)(3) and (4) of this AD are for cracks from the diffuser case M-flange bolthole towards the case body. The commenters note that flange bolthole cracks away from the case body do not contribute to the unsafe condition.

We agree. We changed this AD by revising paragraphs (f)(4)(iii) and (iv) to refer to “bolthole ID crack” as defined by ASB No. PW2000 A72-765.

## **Request To Revise SUMMARY**

PW requested that we clarify in the SUMMARY that FPI is performed at “piece part opportunity.”

We disagree. The compliance section of this AD specifies that the FPI is performed at piece-part opportunity. The SUMMARY is not intended to provide that level of detail. We did not change this AD.

## **Request To Revise Definition**

Delta requested that the Definition of “piece-part opportunity” in paragraph (g) of this AD be revised to exclude diffuser cases that will not be returned to service. Delta noted that diffuser cases that will be scrapped should not be required to be inspected.

We disagree. This AD is only applicable to parts that are installed. Parts that will be scrapped do not need to be inspected. We did not change this AD.

## **Request To Revise Previous Credit Section**

PW and Delta requested that the reference to the HPT case M-flange be removed from the Credit for Previous Actions section of this AD. PW commented that only the diffuser case M-flange should be referenced.

PW also requested that in the Credit for Previous Actions section we refer to PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016, instead of Revision No. 1 of this SB. PW and Delta asked that we correct the date of PW SB No. PW2000 72-763, Revision No. 1, from August 13, 2013, to August 30, 2013.

We partially agree. We disagree with removing the reference to the HPT case M-flange. In order to have complied with this AD, the operator must have performed an ECI of the diffuser and HPT case M-flange as specified in this AD. As noted in our previous comment response, we agreed to update the reference to PW ASB No. PW2000 A72-765 to Revision No. 2 in the compliance section of this AD. We do not need to refer to Revision No. 2 in the Credit for Previous Actions section. The purpose of the Credit for Previous Actions section is to allow credit for actions that use earlier versions of service information required by this AD. We agree to correct the date for PW SB No. PW2000 72-763, Revision No. 1, to August 30, 2013.

## **Request Update to Contact Information**

PW requested that we update the manufacturer's contact information in this AD to Pratt & Whitney, 400 Main St., East Hartford, CT 06118; phone: 860-565-0140 ; fax: 860-565-5442; email: HELP24@pw.utc.com.

We agree. We updated the manufacturer's contact information in the ADDRESSES and Material Incorporated by Reference sections of this AD.

## **Request To Revise Costs of Compliance Estimate**

PW commented that that this AD affects 638 engines installed on U.S. airplanes. FedEx commented that the cost of the repetitive ECI proposed in this AD is \$618,800.

We disagree. When AD 2014-05-32 was issued, there were only 638 affected engines in the U.S. Registry. However, a more recent inquiry for this AD located 910 engines listed in the U.S. Registry. We disagree with FedEx that the cost for a repetitive ECI is \$618,800 because FedEx assumes all engines will be subject to the repetitive ECI. We estimate that the additional inspections affect only 339 of the 910 engines. We did not change this AD.

## **Conclusion**

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this AD with the changes described previously and minor editorial changes. We have determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM for correcting the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

We also determined that these changes will not increase the economic burden on any operator or increase the scope of this AD.

## **Related Service Information Under 1 CFR Part 51**

We reviewed PW SB No. PW2000 72-763, Revision No. 1, dated August 30, 2013; and PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016. This service information

describes procedures for a one-time ECI inspection of the engine diffuser case and the HPT case, and repetitive on-wing ECIs of the engine diffuser case assembly, respectively. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in the ADDRESSES section.

**Costs of Compliance**

We estimate that this AD affects 910 engines installed on airplanes of U.S. registry.  
 We estimate the following costs to comply with this AD:

**Estimated Costs**

<b>Action</b>	<b>Labor cost</b>	<b>Parts cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
On-wing/module ECI Inspection	8 work-hours × \$85 per hour = \$680	\$0	\$680	\$230,520 per inspection cycle.
FPI Inspection	3 work-hours × \$85 per hour = \$255	20	\$275 per inspection cycle	\$250,250 per inspection cycle.

**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**

We have determined that 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 to the extent that it justifies making a regulatory distinction, 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 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) 2014-05-32, Amendment 39-17804 (79 FR 17856, March 31, 2014), and adding the following new AD:



**2017-11-06 Pratt & Whitney:** Amendment 39-18905; Docket No. FAA-2013-0740; Directorate Identifier 2013-NE-24-AD.

**(a) Effective Date**

This AD is effective July 18, 2017.

**(b) Affected ADs**

This AD replaces AD 2014-05-32, Amendment 39-17804 (79 FR 17856, March 31, 2014).

**(c) Applicability**

This AD applies to all Pratt & Whitney (PW) PW2037, PW2037D, PW2037M, PW2040, PW2040D, PW2043, PW2143, PW2643, and F117-PW-100 turbofan engines.

**(d) Subject**

Joint Aircraft System Component (JASC) Code 72, Turbine/Turboprop Engine.

**(e) Unsafe Condition**

This AD was prompted by a rupture of the diffuser-to-high-pressure turbine (HPT) case flange. We are issuing this AD to prevent failure of the diffuser-to-HPT case flange, which could lead to uncontained engine failure and damage to the airplane.

**(f) Compliance**

Unless already done, comply with this AD within the compliance times specified.

(1) For diffuser case, part number (P/N) 1B7461, serial numbers (S/Ns) DGGUAK1306 and DGGUAK1308, and HPT case, P/N 1B2440, S/N DKLBCS1032:

(i) Within 100 flight cycles or 30 days after May 5, 2014, whichever is later, eddy current inspect the diffuser case and the HPT case M-flange. Use PW Service Bulletin (SB) No. PW2000 72-763, Revision No. 1, dated August 30, 2013, to do the inspection.

(ii) Reserved.

(2) For all diffuser and HPT cases, at the next piece-part opportunity and every piece-part opportunity thereafter, perform a high sensitivity fluorescent-penetrant inspection (FPI) of the entire diffuser case rear flange (M-flange) and boltholes, and the entire HPT case forward flange (M-flange) and boltholes.

(3) For diffuser cases that have not incorporated PW SB PW2000-72-364 or have incorporated either PW SB PW2000-72-700 or PW2000 Series Engine Manual, Repair-28, Task 72-41-01-300-028 (M-flange replacement), perform initial and repetitive eddy current inspections (ECIs) of the M-flange of the diffuser case in accordance with paragraph (f)(4) of this AD.

(4) Use, as applicable, either the Accomplishment Instructions, "For Engines Installed on the Aircraft," paragraphs 3.(I) through 3.(J), or the Accomplishment Instructions, "For Engines Removed



from the Aircraft,” paragraphs 3.(D) through 3.(E), of PW Alert Service Bulletin (ASB) No. PW2000 A72-765, Revision No. 2, dated August 12, 2016 to do the ECI as follows:

- (i) Perform an initial inspection within the following period, whichever occurs later:
  - (A) Within 5,500 cycles since new or since M-flange replacement, or
  - (B) Within 2,500 cycles since last piece-part FPI inspection, or
  - (C) Within 1,000 cycles from the effective date of this AD.
- (ii) If no crack indications are found, re-inspect within 2,500 cycles since last ECI or last piece-part FPI inspection, whichever occurs later.
- (iii) If bolthole ID crack indications are found, measure the length and determine the re-inspect interval in accordance with:
  - (A) Paragraphs 5.(C) through 5.(D) of PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016 “For Engines Installed on the Aircraft”; or
  - (B) Paragraphs 4.(C) through 4.(D) of PW ASB No. PW2000 A72-765, Revision No. 2, dated August 12, 2016, “For Engines Removed from the Aircraft.”
- (iv) Remove from service diffuser cases with bolthole ID cracks exceeding 0.170 inches.

**(g) Definition**

For the purpose of this AD, piece-part opportunity is defined as when the part is completely disassembled.

**(h) Credit for Previous Actions**

(1) You may take credit for the diffuser case and HPT case inspections required by paragraphs (f)(1) and (3) of this AD if you performed:

- (i) An ECI of the diffuser case and the HPT case M-flange using the Accomplishment Instructions of PW SB No. PW2000 72-763, Revision No. 1, dated August 30, 2013, or an earlier version; or
- (ii) a high sensitivity FPI of the diffuser case and the HPT case at a piece-part opportunity after January 1, 2010.

(2) You may take credit for only the diffuser case inspections required by paragraphs (f)(1) and (3) of this AD if you performed an ECI of the M-flange using the Accomplishment Instructions of PW SB No. PW2000 A72-765, Revision No. 1, dated July 13, 2016, or an earlier version.

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

The Manager, Engine Certification Office, FAA, may approve AMOCs for this AD. Use the procedures found in 14 CFR 39.19 to make your request. You may email your request to: ANE-AD-AMOC@faa.gov.

**(j) Related Information**

For more information about this AD, contact Brian Kierstead, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7772; fax: 781-238-7199; email: brian.kierstead@faa.gov.

**(k) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Pratt & Whitney (PW) Service Bulletin No. PW2000 72-763, Revision No. 1, dated August 30, 2013.

(ii) PW Alert Service Bulletin No. PW2000 A72-765, Revision No. 2, dated August 12, 2016.

(3) For PW service information identified in this AD, contact Pratt & Whitney, 400 Main St., East Hartford, CT 06118; phone: 860-565-0140; fax: 860-565-5442; email: HELP24@pw.utc.com.

(4) You may view this service information at the FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

(5) You may view this service information 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 May 17, 2017.

Robert J. Ganley,  
Acting Manager, Engine & Propeller Directorate,  
Aircraft Certification Service.