DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration

14 CFR Part 39

[Docket No. 2000-NE-25-AD; Amendment 39-12448; AD 2001-20-02]
RIN 2120-AA64

Airworthiness Directives; Pratt & Whitney PW4000 Series Turbofan Engines

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment adopts a new airworthiness directive (AD), that is applicable to Pratt & Whitney (PW) PW4000 series turbofan engines with 2nd stage high pressure turbine (HPT) air seal assembly part number (P/N) 50L976 or P/N 50L960 installed. This amendment requires operators to recalculate 2nd stage HPT air seal assembly cycles-in-service, based on flight hour-to-cycle ratio usage. This amendment also requires upon recalculation, initial and repetitive on-wing borescope inspections of 2nd stage HPT air seal assemblies for cracks based on the newly calculated service life. This amendment also requires the removal from service of any cracked seal assemblies, and the removal of seal assemblies at or before newly calculated service life limits. This amendment is prompted by reports that thirteen 2nd stage HPT air seal assemblies have been found cracked in the rim area. Although these thirteen air seals were operating in the hottest configuration design, which is no longer in service, the current design 2nd stage HPT air seal assemblies are still operating in a temperature environment that is hotter than anticipated. The actions specified by this AD are intended to prevent 2nd stage HPT air seal assembly fracture that could result in an uncontained engine failure.

DATES: Effective date November 5, 2001. The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of November 5, 2001.

ADDRESSES: The service information referenced in this AD may be obtained from Pratt & Whitney, 400 Main Street, East Hartford, CT 06108. This information may be examined at the Federal Aviation Administration (FAA), New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

FOR FURTHER INFORMATION CONTACT: Tara Goodman, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington MA 01803-5299; telephone: (781) 238-7130, fax: (781) 238-7199.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an AD that is applicable to PW PW4000 series turbofan engines with 2nd stage HPT air seal assembly P/N 50L976 or P/N 50L960 installed was published in the Federal Register on December 27, 2000 (65 FR 81780). That action proposed to require operators to recalculate 2nd stage HPT air seal assembly cycles-in-service, based on flight hour-to-cycle ratio usage. That action also proposed to require upon recalculation, initial and repetitive on-wing borescope inspections of 2nd stage HPT air seal assemblies for cracks based on the newly calculated service life, in accordance with PW ASB No. PW4G-112-A72-233, dated August 25, 2000. Finally,

that action proposed to require removal from service of any cracked seal assemblies, and the removal of seal assemblies at or before newly calculated service life limits.

Comments

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comments received.

Reference to Service Bulletin Revisions

One commenter requests that the AD reference Revision 1 of PW ASB PW4G-112-A72-233, dated January 18, 2001. That revision clarifies the procedures for mixed operation of ``long mission'' and ``short mission'' operation, and does not change the inspection requirements. The FAA agrees that Revision 1 of the ASB provides necessary clarification. However, since the publication of the NPRM, the manufacturer published several revisions to ASB PW4G-112-A72-233. The original issue of the ASB required a one-time borescope inspection for engines converted by SB PW4G-112-75-30 at the time of conversion. Revision 1, dated January 16, 2001, clarified mixed mission instructions and in-shop inspections. Revision 2, dated March 27, 2001, added a statement that if the conversion occurred before the requirement for the one-time inspection, the one-time inspection is performed within 250 cycles of the issue date of Revision 2. Revision 3, dated August 3, 2001, removes all reference to a one-time inspection. These revisions do not change the inspection requirements referenced by the AD. Therefore, the SB reference has been changed in the AD to PW ASB PW4G-112-A72-233, Revision 3. However, inspections done in accordance with the original SB or any of the revisions are considered to be in compliance with the AD.

Mixed Cycle Operator's Instructions

Two commenters request confirmation that for the Mixed-Cycle Operator's Instructions of the SB referenced by the NPRM, the hour-to-
cycle ratio does not need to be calculated prior to August 25, 2000, the original publication date of the ASB. The commenters request confirmation that the monthly hour-to-cycle ratio monitoring is required only after the initial hour-to-cycle ratio is calculated.

The FAA agrees that there appears to be some ambiguity regarding when calculations for hour-to-cycle ratio must be performed in order to determine the initial inspection threshold. The ASB states that the determination of the total number of hours and cycles a 2nd stage air seal has accumulated is done ``up to this point.'' This means the calculation of the total number of cycles on the seals must be done in accordance with the SB for every month that the seal has been in service. Because the AD incorporates the instructions of the ASB by reference, the AD requires the calculation of equivalent cycles by the equation in paragraph 1. A. of the Mixed Cycle Operator's Instructions of the ASB on all the cycles that the seal has accumulated in service on the date that the calculation is performed. Paragraph (a) of the AD specifies that the initial inspection threshold must be determined within 30 days of the effective date of the AD. The wording of the AD does not need to be changed because the compliance is ``required as indicated, unless accomplished previously.'' If an operator made the determination of the initial inspection threshold utilizing the August 25, 2000 date, prior to the publication of this AD, this would be in compliance with the AD. The FAA agrees that the monthly hour-to-cycle ratio monitoring is required only after the initial hour-to-cycle ratio is calculated.

Air Seal Inspection in the Shop

One commenter requests clarification as to whether the ASB requirement for air seal inspection in the shop is included in the AD. The in-shop inspection requirements are not included in the AD. The NPRM references the ``On-Wing'' inspection procedures of the ASB because the FAA determined by evaluation of risk assessment data that, at a minimum, the on-wing inspections are required to address the unsafe condition.

Applicable Engine Models

One commenter notes that Pratt & Whitney SB PW4G-112-A72-233, referenced in the NPRM, does not list PW4074D, and PW4090-3 as applicable engine models. However, the Boeing master change for B777 allows installation of these engine models. The commenter believes this AD and the SB should reflect the PW4074D and the PW4090-3 as applicable engine models. The FAA agrees. The Appliciability now reflects the PW4000 112 inch diameter series engine models: PW4074, PW4077, PW4077D, PW4084, PW4084D, PW4090, PW4090-3, PW4074D, PW4090D, PW4098.

AD Requirements for Converted Engines

One commenter requests clarification of the AD requirements for engines that have been converted from Population 3 to Population 4 or from 90K-A to 90K-B prior to the initial inspection threshold. The AD does not require the one-time post-conversion inspection for engines that were converted per SB PW4G-112-75-30 or Special Instruction 134F-98 to population 4 or population 90K-B prior to the installed air seal accruing 1,500 cycles for ``long mission'' operators or 3,300 cycles for ``short mission'' operators.

Alternative Inspection Procedure

One commenter notes that the On-Wing inspection procedure described in the Accomplishment Instructions of PW ASB PW4G-112-A72-233 allows operators to follow Boeing AMM Chapter/Section 72-52-00 as an alternative. The commenter believes the AD should also allow operators to use the procedure in the Boeing AMM Chapter/Section 72-52-00. The FAA does not agree. The FAA has not reviewed and approved the Boeing AMM Chapter/Section 72-52-00 that is cross-referenced in the ASB. Therefore, the Boeing AMM is not incorporated by reference in this AD.

250 Flight Cycle Inspection Frequency

One commenter requests that the exception provided by PW ASB PW4G-112-A72-233 that allows operators to inspect every 250 cycles rather than track hour-to-cycle ratio be permitted in the AD. The commenter asks if the monthly hour-to-cycle ratio should be calculated from the first day to the last day of each month, or twelve nearly equally spaced increments in a given year. The FAA agrees. The 250 flight cycle inspection frequency, and a cycle limit of 8,000 cycles is a more conservative approach. The FAA agrees that this option should be allowed in the AD. In addition, the FAA agrees that twelve nearly equally spaced increments in a given year satisfies the intent of the term ``monthly.''

Complicated Control Mechanism

One commenter expresses concern that the control mechanism established in the ASB and AD is too complicated for an operator to manage. The commenter believes that this kind of complication can cause human error, which can result in non-compliance to the ASB. The FAA disagrees that this AD establishes a control mechanism that is too complicated for an operator to manage and is prone to human error. While human error can be introduced into any process, this is unlikely to occur when diligence in process management is afforded to issues that are subject to regulatory action.

Clarification of Discussion Statements Requested

One commenter requests a clarification of statements made in the Discussion section of the NPRM. The first sentence in the Discussion states, ``This proposal is prompted by reports that thirteen 2nd stage HPT air seal assemblies have been cracked in the rim area." The commenter requests that for clarification the following be added: ``These thirteen air seals were operating in the hottest configuration design, which is no longer in service." The subsequent sentence would then say: ``However, the current design 2nd stage HPT air seal assemblies are still operating in a temperature environment that is hotter than the manufacturer anticipated." The FAA agrees and this clarification has been added to the summary section of this amendment.

Replacement Cost Inaccuracy

One commenter notes an inaccuracy in the replacement cost used in the Economic Analysis. The cost of a new 2nd stage HPT air seal noted in the ASB is $213,990, whereas the cost stated in the NPRM is $235,950. The FAA agrees. Utilizing the $213,990 figure would decrease the overall estimated cost impact from $10,659,312 to $8,551,152, a reduction of $2,108,160.

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes described previously. The FAA has determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Economic Analysis

There are approximately 233 Pratt & Whitney (PW) PW4000 series turbofan engines with 2nd stage high pressure turbine (HPT) air seal assembly part number (P/N) 50L976 or P/N 50L960 installed in the worldwide fleet. The FAA estimates that 96 engines installed on airplanes of U.S. registry will be affected by this AD. The FAA also estimates that it would take approximately 2.3 work hours per engine to accomplish the proposed on-wing borescope inspection, and that the average labor rate is $60 per work hour. The FAA estimates that approximately 47% of the certified life of the affected parts will be lost. Required parts would cost $213,990 per engine. Based on these figures, the total cost impact of the proposed AD on U.S. operators is estimated to be $8,551,152.

Regulatory Impact

This final rule does not have federalism implications, as defined in Executive Order 13132, because it would 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. Accordingly, the FAA has not consulted with state authorities prior to publication of this final rule.

For the reasons discussed above, I certify that this action (1) is not a ``significant regulatory action" under Executive Order 12866; (2) is not a ``significant rule" under the DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) if promulgated, 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. A final evaluation has been prepared for this action and it is contained in the Rules Docket. A copy of it may be obtained by contacting the Rules Docket at the location provided under the caption **ADDRESSES**.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (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.

Sec. 39.13 [Amended]

2. Section 39.13 is amended adding a new airworthiness directive to read as follows:

AIRWORTHINESS DIRECTIVE

Aircraft Certification Service
Washington, DC

U.S. Department
of Transportation
**Federal Aviation
Administration**

We post ADs on the internet at "av-info.faa.gov"

2001-20-02 Pratt & Whitney: Amendment 39-12448. Docket 2000-NE-25-AD.

Applicability

This airworthiness directive (AD) is applicable to Pratt & Whitney (PW): PW4074, PW4077, PW4077D, PW4084, PW4084D, PW4090, PW4090-3, PW4074D, PW4090D, and PW4098 turbofan engines with 2nd stage high pressure turbine (HPT) air seal assembly part number (P/N) 50L976 or P/N 50L960 installed. These engines are installed on but not limited to Boeing 777 series airplanes.

Note 1: This AD applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (d) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance

Compliance with this AD is required as indicated, unless already done.

To prevent 2nd stage HPT air seal assembly failure that could result in uncontained engine failure, accomplish the following:

Calculation of Service Limits

(a) Within 30 days of the effective date of this AD, and then each calendar month thereafter, determine the hour-to-cycle ratio of 2nd stage HPT air seal assemblies based on the hours and cycles accumulated in the previous month in accordance with Paragraph 1 of the Accomplishment Instructions for air seal management of PW Alert Service Bulletin (ASB) No. PW4G-112-A72-233, Revision 3, dated August 3, 2001.The original ASB or any of the revisions may also be used and are considered to be in compliance with the AD.

Borescope Inspections

(b) For 2nd stage HPT air seal assemblies, determine the initial inspection time and repetitive inspection interval in cycles, in accordance with Paragraph 2 of the Accomplishment Instructions for air seal management of PW ASB No. PW4G-112-A72-233; Revision 3, dated August 3, 2001. Perform borescope inspections of the 2nd stage HPT air seal assembly for cracks, and remove HPT air seal assemblies from service if cracked, in accordance with the On-Wing Procedure section of

Accomplishment Instructions of PW ASB No. PW4G-112-A72-233, Revision 3, dated August 3, 2001. Inspections done in accordance with the original ASB or any of the revisions are considered to be in compliance with the AD.

New Cycle Limits

(c) Determine new cycle limits for 2nd stage HPT air seal assemblies in accordance with Paragraph 3 of the Accomplishment Instructions for air seal management of PW ASB No. PW4G-112-A72-233; Revision 3, dated August 3, 2001, and remove from service 2nd stage HPT air seal assemblies prior to exceeding those limits. Determinations made using the original ASB or any of the revisions are considered to be in compliance with the AD.

Alternative Methods of Compliance

(d) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Engine Certification Office (ECO). Operators must submit their request through an appropriate Federal Aviation Administration (FAA) Principal Maintenance Inspector, who may add comments and then send it to the Manager, ECO.

Note 2: Information concerning the existence of approved alternative methods of compliance with this airworthiness directive, if any, may be obtained from the ECO.

Special Flight Permits

(e) Special flight permits may be issued in accordance with Secs. 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

Documents That Have Been Incorporated by Reference

(f) The inspections must be done in accordance Pratt & Whitney ASB PW4G-112A72-233, Revision 3, dated August 3, 2001. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from Pratt & Whitney, 400 Main Street, East Hartford, CT 06108. Copies may be inspected at the FAA, New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

Effective Date of This AD

(g) This amendment becomes effective on November 5, 2001.

Issued in Burlington, Massachusetts, on September 21, 2001.
Jay J. Pardee,
Manager, Engine and Propeller Directorate, Aircraft Certification Service.
[FR Doc. 01-24273 Filed 9-28-01; 8:45 am]
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