

[4910-13-U]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39 [65 FR 37473 6/15/2000]

[Docket No. 98-ANE-66-AD; Amendment 39-11780; AD 2000-12-02]

RIN 2120-AA64

Airworthiness Directives; Pratt & Whitney PW4000 Series Turbofan Engines

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment supersedes an existing airworthiness directive (AD), applicable to certain Pratt & Whitney PW4000 Series Turbofan Engines, that currently requires revisions to the Time Limits Section of the manufacturer's Engine Manuals (EM's) to include required enhanced inspection of selected critical life-limited parts at each piece-part exposure. This action adds additional critical life-limited parts for enhanced inspection. This amendment is prompted by additional focused inspection procedures for other critical life-limited rotating engine parts that have been developed by the manufacturer. The actions specified by this AD are intended to prevent critical life-limited rotating engine part failure, which could result in an uncontained engine failure and damage to the airplane.

DATE: Effective September 13, 2000.

ADDRESSES: The rulemaking docket may be examined at the Federal Aviation Administration (FAA), New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA.

FOR FURTHER INFORMATION CONTACT: Peter White, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803-5299; telephone (781) 238-7128, fax (781) 238-7199.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) by superseding (AD) 99-08-15, Amendment 39-11121 (64 FR 17947), that is applicable to certain Pratt & Whitney series turbofan engine was published in the **Federal Register** on October 7, 1999. The original AD required enhanced inspection of selected critical life-limited rotating components in the fan rotor at each piece-part exposure. This amendment will require additional enhanced inspections of selected critical life-limited rotating components in the HPT rotor at each piece-part exposure.

### New Procedures and Parts

Since the issuance of that AD, additional focused inspection procedures for other critical life-limited rotating engine parts have been developed. The new parts are the:

- High Pressure Turbine (HPT) 1<sup>st</sup> stage airseal--on certain models
- HPT 2<sup>nd</sup> stage airseal—on certain models
- HPT 1<sup>st</sup> stage (front) hub
- HPT 2<sup>nd</sup> stage (rear) hub

This AD will require an air carrier's approved continuous airworthiness maintenance program to incorporate these inspection procedures, and will revise the Time Limits Section of the manufacturer's Engine Manual.

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

### **Length of comment and inspection periods**

Two comments express concerns regarding the length of the comment period, and the length of the initial compliance time allowed to incorporate the manufacturer's instructions into an applicant's maintenance plan. One comment asks that the final rule not be issued and the comment period extended until after the manufacturer publishes the new inspection procedures in the manufacturer's manuals.

Another comment asks that the initial compliance time be extended from 30 to 90 days to better accommodate the manufacturer's planned manual change schedule.

The FAA does not agree. The FAA believes that the nature and scope of the added inspections will not be significantly different from existing inspections. In addition, the effective date of this AD has been extended to 90 days after publication to allow time for the specific procedures to be published. The extra time until the AD becomes effective should also allow the manufacturer to issue a manual revision. Operators may submit comments to the docket file on the specific procedures, once they are published, and the FAA will consider extending the effective date further or additional rulemaking, as necessary. The FAA does not believe, however, that this final rule need be delayed pending the publication of the inspection procedures, or the initial compliance time extended to accommodate the manufacturer's manual revision cycle.

### **More than one engine model covered by AD**

One comment notes that engine models covered by two different Type Certificates are affected by this AD, and feels that a separate AD should be issued to cover the engine models covered by each Type Certificate. Another comment notes that, to avoid confusion, the tables in proposed paragraph (a) should be divided by engine model. The comment points out that as presently constructed the AD requires information related to different engine models to be incorporated into all manuals. That could cause confusion as information unrelated to a particular engine model would appear in that model's manuals.

The FAA does not agree that products covered by different type certificates must be addressed with separate AD's. The FAA often includes products covered by different type designs in a single AD. When the same unsafe condition exists or is likely to develop on products covered by different type designs, a single AD covering all the affected products works more efficiently than duplicating the same corrective action into multiple AD's. The single AD should place no undue burden on operators, and may actually simplify administrative responsibilities by

reducing the number of AD's required to be tracked. This AD applies to engines covered by three Type Certificates.

The FAA does agree, however, that the tables in paragraph (a) should be separated by engine model. Paragraph (a) will be changed to include a provision that only the table that applies to a particular engine model should be incorporated into that engine model's manual. This will eliminate the potential confusion in having information not applicable to that engine in its manual.

### **HPC parts included in the proposed rule**

Two comments question the need for this AD noting that the lower risk associated with HPC disk failures make the inclusion of HPC parts in the enhanced inspection program unnecessary.

The FAA partially agrees. The failure of an HPC disk with a full webbed bore configuration such as the PW4000 poses a hazard to the aircraft due to the energy associated with these large, heavy, rapidly spinning components. While the risk factors for HPC failures are somewhat lower than those associated with HPT and fan failures, the FAA feels this could be due to several factors, which will need to be evaluated. Until further studies have been completed, the FAA will eliminate the HPC parts from the enhanced inspection program for these engine models. The FAA will continue to review and evaluate the data and will take appropriate action when this review is completed.

### **Part numbers used to identify parts to be inspected**

One comment notes that the use of specific part numbers (P/N's) to identify the parts needing enhanced inspection raises concerns. The comment notes that the use of part numbers places additional undue burden on operators who must keep track of the manual changes to ensure consistency with P/N's, and creates a need for downstream revisions to the AD as additional part number disks are introduced into service.

The FAA concurs. During the process of preparing this rule, the FAA considered utilizing the term "ALL" rather than specific part numbers, but not all part numbers associated with a specific part need enhanced inspection. For example, HPT airseals from various engine models may or may not need enhanced inspection, depending on the configuration of the part. Only those parts that are likely to hazard the aircraft by their failure are included in the enhanced inspection program. Therefore, the "ALL" terminology could not be used consistently across engine models. However, in response to another comment the FAA is changing the structure of this AD to separate the tables by engine model. With that change each table may use the term "ALL" and eliminate the need for specific P/N's.

### **Discussion section changed from original NPRM**

One comment notes that the preamble published with this Notice of Proposed Rulemaking (NPRM) did not include the same guidelines concerning required enhanced inspections as the preamble for the NPRM published for the current AD. The comment asks that the FAA add those guidelines to the final rule.

The FAA does not agree. The inspection program established by the current AD has not been changed. The NPRM proposed to add additional parts to the list of parts that must be inspected, but does not change how air carriers must manage the inspection program. Future AD's may be

issued to introduce additional intervention strategies in order to further reduce uncontained engine failures. These may include AD's to add new parts to the list of parts to be inspected. The inspection program established by the current AD will remain unchanged unless specifically changed in a future proposal.

### **Manual references should include revision level and issue date**

Two comments note that the proposed rule does not reference a specific revision level or issue date of the Clean, Inspect and Repair (CIR) manual. The comments express concern that without a specific manual revision referenced operators will not know if the FAA expects compliance with future revisions to the manual, which may be issued without notice and public comment. For that reason, the comments suggest that the manual references in paragraph (a) include a revision level and issue date.

The FAA disagrees. Unlike the typical incorporation by reference, this AD does not require inspections to be accomplished "in accordance with" a specific service document or manual. This AD requires changes to the Airworthiness Limitations Section (ALS) of the Instructions for Continued Airworthiness (ICA), and to air carrier operator's maintenance plans, in order to include mandatory inspections. Once included in the ALS, the enhanced inspections become operational limits that must be followed. The manufacturer will update the sections of their manuals to incorporate the inspections, and those changes, as well as any future changes, will be coordinated with the FAA. It is not the intent of this AD, however, to mandate the use of any specific manual revision, but only to require the accomplishment of an enhanced inspection. If the FAA should find it necessary to mandate compliance with a specific future revision of the manual, then the FAA will undertake a new rulemaking action and provide notice and an opportunity for comment.

### **Other corrections**

One comment notes that the table in proposed paragraph (a) lists CIR manual 51A357 as the manual to use when inspecting HPT first stage hub, P/N 50L761, while that part is only found in CIR manual 51A750. The FAA agrees, and will make that correction in the final rule.

One comment points out that detail HPT 1<sup>st</sup> stage disk P/N 51L901 is referenced in the manufacturer's parts catalog, but is not referenced in the corresponding CIR. The FAA agrees. However, the corresponding assembly P/N is called out in the CIR. The "ALL" reference now utilized in the AD eliminates any issues arising from the Detail versus Assembly P/N reference issue. In addition, the FAA has added the definition of "piece-part opportunity" to (a) (2) to clarify that the disks must be inspected when torn down to either the piece part or part assembly P/N level where the inspection can still be accomplished.

One comment notes that paragraph (e) of the proposed rule contains the phrase "of this chapter" following a reference to §121.369 (c) of the Federal Aviation Regulations [14 CFR 121.369 (c)]. The comment asks that this phrase be deleted in the interest of clarity. The FAA agrees, and will make that correction in the final rule.

### **Engines Affected by the Ruling**

One commenter notes the PW4098, PW4090D and PW4090-3 models are not affected by the AD, and questions why they are excluded from the rule. The FAA partially agrees. The PW4098 and PW4090D fan hardware were included in the NPRM, and an explanation for this

inclusion is provided in the NPRM. Coincident with the inclusion of this hardware, these two models were included in the Applicability statement. The PW4090-3 engine model was certified at a later date, and was not included in the NPRM. The final rule will be modified to include the PW4090-3 engine model in the Applicability section for completeness, as were the PW4098 and PW4090D.

## **Economic Analysis**

No comments were received on the economic analysis contained in the proposed rules. The FAA has determined that the annual cost of complying with this AD does not create a significant economic impact on small entities.

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.

## **Regulatory Impact**

This final rule does not have federalism implications, as defined in Executive Order (EO) No. 13132, because it does 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 DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) 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 from the Rules Docket at the location provided under the caption "ADDRESSES."

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, 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.

### **§39.13 [Amended]**

2. Section 39.13 is amended by removing Amendment 39-11121 (64 FR 17947, April 13, 1999), and by adding a new airworthiness directive, to read as follows:

SUPERSEDED

# AIRWORTHINESS DIRECTIVE

Aircraft Certification Service  
Washington, DC



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

***AD's are posted on the internet at <http://av-info.faa.gov>***

The following Airworthiness Directive issued by the Federal Aviation Administration in accordance with the provisions of Title 14 of the Code of Federal Regulations (14 CFR) part 39, applies to an aircraft model of which our records indicate you may be the registered owner. Airworthiness Directives affect aviation safety and are regulations which require immediate attention. You are cautioned that no person may operate an aircraft to which an Airworthiness Directive applies, except in accordance with the requirements of the Airworthiness Directive (reference 14 CFR part 39, subpart 39.3).

**2000-12-02 Pratt & Whitney:** Amendment 39-11780. Docket No. 98-ANE-66-AD. Supersedes AD 99-08-15, Amendment 39-11121.

**Applicability:** Pratt & Whitney (PW) Model PW4050, PW4052, PW4056, PW4060, PW4060A, PW4060C, PW4062, PW4152, PW4156, PW4156A, PW4158, PW4160, PW4460, PW4462, PW4168, PW4168A, PW4164, PW4074, PW4074D, PW4077, PW4077D, PW4084, PW4084D, PW4090, PW4090D, PW4090-3 and PW4098 turbofan engines, installed on but not limited to Airbus A300, A310, and A330 series, Boeing 747, 767, and 777 series, and McDonnell Douglas MD-11 series airplanes.

**Note 1:** This airworthiness directive (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 (c) 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:** Required as indicated, unless accomplished previously.

To prevent critical life-limited rotating engine part failure, which could result in an uncontained engine failure and damage to the airplane, accomplish the following:

## Inspections

(a) Within the next 30 days after the effective date of this AD, revise the Time Limits Section of the manufacturer's Engine Manual (EM), Part Numbers (P/Ns) 50A605, 50A443, 51A342, 50A822, 51A751, or 51A345, as applicable, for PW Model PW4050, PW4052, PW4056,

PW4060, PW4060A, PW4060C, PW4062, PW4152, PW4156, PW4156A, PW4158, PW4160, PW4460, PW4462, PW4168, PW4168A, PW4164, PW4074, PW4074D, PW4077, PW4077D, PW4084, PW4084D, PW4090, PW4090D, PW4090-3 and PW4098 turbofan engines, and for air carrier operations revise the approved mandatory inspections section of the continuous airworthiness maintenance program, to read as follows:

## "MANDATORY INSPECTIONS

(1) Perform inspections of the following parts at each piece-part opportunity in accordance with the instructions provided in the applicable PW4000 series Engine Cleaning, Inspection, and Repair (CIR) Manuals:

**For Engine Manual 50A605 only, insert the following table:**

| Nomenclature                                   | Part Number | CIR Manual Section | CIR Manual Inspection | CIR Manual |
|------------------------------------------------|-------------|--------------------|-----------------------|------------|
| Hub, Front Compressor                          | ALL         | 72-31-07           | Insp/Check-02         | 51A357     |
| Hub, Turbine Front<br>(Stage 1)                | ALL         | 72-52-05           | Insp/Check-02         | 51A357     |
| Hub, Turbine<br>Intermediate Rear<br>(Stage 2) | ALL         | 72-52-06           | Insp/Check-02         | 51A357     |

**For Engine Manual 50A443 only, insert the following table:**

| Nomenclature                                   | Part Number | CIR Manual Section | CIR Manual Inspection | CIR Manual |
|------------------------------------------------|-------------|--------------------|-----------------------|------------|
| Hub, Front Compressor                          | ALL         | 72-31-07           | Insp/Check-02         | 51A357     |
| Hub, Turbine Front<br>(Stage 1)                | ALL         | 72-52-05           | Insp/Check-02         | 51A357     |
| Hub, Turbine<br>Intermediate Rear<br>(Stage 2) | ALL         | 72-52-06           | Insp/Check-02         | 51A357     |

**For Engine Manual 50A822 only, insert the following table:**

| Nomenclature                                   | Part Number | CIR Manual Section | CIR Manual Inspection | CIR Manual |
|------------------------------------------------|-------------|--------------------|-----------------------|------------|
| Hub, Front Compressor                          | ALL         | 72-31-07           | Insp/Check-02         | 51A357     |
| Hub, Turbine Front<br>(Stage 1)                | ALL         | 72-52-05           | Insp/Check-02         | 51A357     |
| Hub, Turbine<br>Intermediate Rear<br>(Stage 2) | ALL         | 72-52-06           | Insp/Check-02         | 51A357     |



**For Engine Manual 51A342 only, insert the following table:**

| Nomenclature                                        | Part Number | CIR Manual Section | CIR Manual Inspection | CIR Manual |
|-----------------------------------------------------|-------------|--------------------|-----------------------|------------|
| Hub, LPC Assembly                                   | ALL         | 72-31-07           | Insp/Check-02         | 51A357     |
| Hub, Turbine Front Assembly (1 <sup>st</sup> Stage) | ALL         | 72-52-05           | Insp/Check-02         | 51A357     |
| Hub, Turbine Rear (Stage 2)                         | ALL         | 72-52-06           | Insp/Check-02         | 51A357     |

**For Engine Manual 51A345 only, insert the following table:**

| Nomenclature                                        | Part Number | CIR Manual Section | CIR Manual Inspection | CIR Manual |
|-----------------------------------------------------|-------------|--------------------|-----------------------|------------|
| Hub, LPC Assembly                                   | ALL         | 72-31-07           | Insp/Check-02         | 51A750     |
| Seal - Air, HPT, 1 <sup>st</sup> Stage              | ALL         | 72-52-19           | Insp/Check-02         | 51A750     |
| Hub, Turbine Front Assembly (1 <sup>st</sup> Stage) | ALL         | 72-52-05           | Insp/Check-02         | 51A750     |
| Seal – Air, HPT 2 <sup>nd</sup> Stage Assembly      | ALL         | 72-52-22           | Insp/Check-02         | 51A750     |
| Hub, Turbine Rear Assembly (2 <sup>nd</sup> Stage)  | ALL         | 72-52-06           | Insp/Check-02         | 51A750     |

**For Engine Manual 51A751 only, insert the following table:**

| Nomenclature                                        | Part Number | CIR Manual Section | CIR Manual Inspection | CIR Manual |
|-----------------------------------------------------|-------------|--------------------|-----------------------|------------|
| Hub, LPC Assembly                                   | ALL         | 72-31-07           | Insp/Check-02         | 51A750     |
| Seal - Air, HPT, 1 <sup>st</sup> Stage              | ALL         | 72-52-19           | Insp/Check-02         | 51A750     |
| Hub, Turbine Front Assembly (1 <sup>st</sup> Stage) | ALL         | 72-52-05           | Insp/Check-02         | 51A750     |
| Seal – Air, HPT, 2 <sup>nd</sup> Stage Assembly     | ALL         | 72-52-22           | Insp/Check-02         | 51A750     |
| Hub, Turbine Rear Assembly (2 <sup>nd</sup> Stage)  | ALL         | 72-52-06           | Insp/Check-02         | 51A750     |

(2) For the purpose of these mandatory inspections, piece-part opportunity means:

(i) The part is considered completely disassembled when accomplished in accordance with the disassembly instructions in the manufacturer's engine manuals to either the part detail or part assembly level part numbers for the parts listed in the Tables above; and

(ii) The part has accumulated more than 100 cycles in service since the last piece-part opportunity inspection, provided that the part was not damaged or related to the cause for its removal from the engine."

(b) Except as provided in paragraph (c) of this AD, and notwithstanding contrary provisions in section 43.16 of the Federal Aviation Regulations (14 CFR 43.16), these mandatory inspections shall be performed only in accordance with the Time Limits Section of the manufacturer's EM's.

### **Alternative Method of Compliance**

(c) 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 Engine Certification Office (ECO). Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector (PMI), who may add comments and then send it to the 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.

### **Ferry Flights**

(d) Special flight permits may be issued in accordance with sections 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.

### **Continuous Airworthiness Maintenance Program**

(e) FAA-certificated air carriers that have an approved continuous airworthiness maintenance program in accordance with the record keeping requirement of § 121.369 (c) of the Federal Aviation Regulations [14 CFR 121.369 (c)] must maintain records of the mandatory inspections that result from revising the Time Limits Section of the EM's and the air carrier's continuous airworthiness program. Alternately, certificated air carriers may establish an approved system of record retention that provides a method for preservation and retrieval of the maintenance records that include the inspections resulting from this AD, and include the policy and procedures for implementing this alternate method in the air carrier's maintenance manual required by § 121.369 (c) of the Federal Aviation Regulations [14 CFR 121.369 (c)]; however, the alternate system must be accepted by the appropriate PMI and require the maintenance records be maintained either indefinitely or until the work is repeated. Records of the piece-part inspections are not required under § 121.380 (a) (2) (vi) of the Federal Aviation Regulations [14 CFR 121.380 (a) (2) (vi)]. All other operators must maintain the records of mandatory inspections required by the applicable regulations governing their operations.

**Note 3:** The requirements of this AD have been met when the engine manual changes are made and air carriers have modified their continuous airworthiness maintenance plans to reflect the requirements in the EM's.

(f) This amendment becomes effective on September 13, 2000.

FOR FURTHER INFORMATION CONTACT: Peter White, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803-5299; telephone (781) 238-7128, fax (781) 238-7199.

Issued in Burlington, Massachusetts, on June 5, 2000. Diane S. Romanosky, Acting Manager, Engine and Propeller Directorate, Aircraft Certification Service.