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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

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

**[Docket No. FAA-2005-23500; Directorate Identifier 2005-NE-46-AD; Amendment 39-15223; AD 2007-21-05]**

**RIN 2120-AA64**

#### **Airworthiness Directives; International Aero Engines (IAE) V2500 Series Turbofan Engines**

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

**ACTION:** Final rule.

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**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for International Aero Engines (IAE) V2500 series turbofan engines. This AD requires repetitive monitoring of N2 vibration on all IAE V2500 series engines to identify engines that might have a cracked high pressure turbine (HPT) stage 2 air seal. This AD results from a report that HPT stage 2 air seals have developed cracks. We are issuing this AD to prevent uncontained failure of the HPT stage 2 air seal.

**DATES:** This AD becomes effective November 15, 2007. The Director of the Federal Register approved the incorporation by reference of certain publications listed in the regulations as of November 15, 2007.

**ADDRESSES:** You can get the service information identified in this AD from International Aero Engines AG, 400 Main Street, East Hartford, CT 06108; telephone: (860) 565-5515; fax: (860) 565-5510.

The Docket Operations office is located at U.S. Department of Transportation, Docket Operations, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE., Washington, DC 20590-0001.

**FOR FURTHER INFORMATION CONTACT:** James Rosa, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; telephone (781) 238-7152; fax (781) 238-7199.

**SUPPLEMENTARY INFORMATION:** The FAA proposed to amend 14 CFR part 39 with a proposed AD. The proposed AD applies to IAE V2500 series turbofan engines. We published the proposed AD in the Federal Register on June 2, 2006 (71 FR 31978). That action proposed to require

repetitive monitoring of N2 vibration on all IAE V2500 series engines to identify engines that might have a cracked HPT stage 2 air seal and to replace the seal as required.

### **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov>; or in person at the Docket Operations office 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 street address for the Docket Operations office (telephone (800) 647-5527) is provided in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

We provided the public the opportunity to participate in the development of this AD. We have considered the comments received.

### **Comments**

### **Parts To Be Monitored and Replaced**

The Modification and Replacement Parts Association states that the proposed AD does not list the part number(s) of seals requiring monitoring and replacement. We agree. To date, the following part numbers have failed: 2A3179, 2A3185, and 2A3425. However, all old design HPT stage 2 seals are subject to failure and should be vibration monitored and removed as required. We included a complete list of HPT stage 2 air seal part numbers in paragraph (c) of this AD.

### **Trend Slope**

The Air Transport Association and Delta Airlines state that we should better define the methodology for monitoring and determining trend slope. We disagree. Although these requirements are complex, they can be completed by trained personnel. We did not change the AD.

### **Tracking Compliance**

Delta Airlines states that we should provide guidance for tracking compliance with this AD, as current instructions are inadequate. We disagree. Operators should establish a system for showing compliance to this AD if they do not already have such a system. We did not change the AD.

### **Terminating Action**

Delta Airlines also states that we should include terminating action for the AD so they can estimate costs. We disagree. Terminating action is not currently available for the model V2500-A1 engine. Further, we discuss costs in the Costs of Compliance section of the AD. We did not change the AD.

### **Vibration Trend Monitoring**

Japan Airlines International states that vibration trend monitoring is not appropriate for an AD. The airline states that, because of the complex and subjective nature of vibration trend monitoring, accurate measurements are not possible. Therefore, trend monitoring is appropriate as a supplemental, nonmandatory activity only. We disagree. Vibration trend monitoring is successful in detecting cracked HPT seals. Although results are somewhat subjective, the system is the most practical way to prevent an unsafe condition due to cracked HPT seals. We did not change the AD.

Japan Airlines International also states that industry needs a ground system to monitor vibration trends. We agree that a system to hold collected data and calculate trends as they occur is needed, however, defining requirements for that system is beyond the scope of this AD.

United Airlines states that we should permit vibration data averaging and smoothing. They state that not allowing averaging will increase the chances of false alerts. We disagree. Experience indicates that averaging or smoothing might mask evidence of a badly cracked seal before a piece becomes liberated. We did not change the AD.

### **Clarify Service Bulletin Instructions**

Japan Airlines International states that we should clarify International Aero Engines service bulletin (SB) instructions regarding how gaps allowed by the Mandatory Minimum Equipment List (MMEL) effect data. MMEL allows a 10-day down time for the vibration trend monitoring system. We disagree. IAE service instructions allow a down time of 50 cycles, approximately 10 days for most operators. If operators require more time, they may request an AMOC. We did not change the AD.

### **Manufacturer's Suggestions**

IAE suggests the following:

- Include the latest SB revisions in the final rule. We agree and incorporated by reference the accomplishment instructions of the latest IAE SB revisions in the final rule. Operators who have followed earlier SBs will receive credit for doing so.
- Correct the Discussion section regarding an incorrectly identified model from V2528-D to V2528-D5. We agree that the Discussion section should have specified the correct models, however, that discussion remained accurate for the engines subject to the AD. We did not change the AD because the Preamble of the NPRM is not included in the final rule.
- Include the Airbus A321 in the Applicability section. We agree. We have added the airplane model to the Applicability section.
- Reword the Compliance section to maintain consistent safety requirements. We agree, and included paragraphs (h)(4) and (j)(4) in the AD. These paragraphs now indicate that if a through crack is found in the front fillet radius of the HPT stage 2 air seal, the following must also be removed: For model V2500-A1/A5/D5 engines, remove the HPT stage 1 disk and HPT rear air seals; and for model V2500-A1 engines, also remove the HPT stage 2 disk.
- List only SB V2500-ENG-72-502, Revision 1, dated March 15, 2006, under Removal of HPT Stage 2 Air Seals at Opportunity. We agree, and removed IAE SB V2500-ENG-72-0500 and IAE SB V2500-ENG-72-0501, which refer to vibration monitoring, from this section.

### **Conclusion**

We have carefully reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously. We have determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

### **Costs of Compliance**

We estimate that this AD will affect 1,022 engines installed on airplanes of U.S. registry. We also estimate that it would take about 2 work-hours per engine to perform the actions, and that the average labor rate is \$80 per work-hour. Required parts would cost about \$97,040 per engine. Based on these figures, we estimate the total cost of the AD to U.S. operators to be \$99,338,400.

## **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); 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.

We prepared a summary of the costs to comply with this AD and placed it in the AD Docket. You may get a copy of this summary at the address listed under ADDRESSES.

## **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 Federal Aviation Administration 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 adding the following new airworthiness directive:



**2007-21-05 International Aero Engines:** Amendment 39-15223. Docket No. FAA-2005-23500; Directorate Identifier 2005-NE-46-AD.

### **Effective Date**

(a) This airworthiness directive (AD) becomes effective November 15, 2007.

### **Affected ADs**

(b) None.

### **Applicability**

(c) This AD applies to International Aero Engines (IAE) model V2500-A1, V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5, V2525-D5, and V2528-D5 turbofan engines with high pressure turbine (HPT) stage 2 air seals, part numbers (P/Ns) 2A0487, 2A1159, 2A1160, 2A3108, 2A3179, 2A3185, 2A3425, and 2A3596, installed. These engines are installed on, but not limited to, Airbus A319, A320, A321, and Boeing MD-90 airplanes.

### **Unsafe Condition**

(d) This AD results from a report that HPT stage 2 air seals have developed cracks. We are issuing this AD to prevent uncontained failure of the HPT stage 2 air seal.

### **Compliance**

(e) You are responsible for having the actions required by this AD performed within the compliance times specified unless the actions have already been done.

### **Monitoring N2 Vibration on All IAE Model V2500-A1 and V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 Engines**

(f) For IAE model V2530-A5 and V2533-A5 engines operated at 30,000 or 33,000 pounds of thrust, or for model V2522-A5, V2524-A5, V2527-A5, V2527E-A5, and V2527M-A5 engines that have ever operated in the 30,000 or 33,000 pound thrust range, begin monitoring for N2 vibration trend if the HPT stage 2 air seal reaches 4,000 cycles-since-new (CSN) or more.

(g) For IAE model V2500-A1 and V2522-A5, V2524-A5, V2527-A5, V2527E-A5, and V2527M-A5 engines operated below 30,000 pounds of thrust, begin monitoring for N2 vibration trend if the HPT stage 2 air seal reaches 6,000 CSN.

(h) Monitor N2 vibration trend of each engine for every 100 to 150 cycles of engine operation as follows:

(1) Use the Accomplishment Instructions of IAE Service Bulletin (SB) V2500-ENG-72-0500, Revision 1, dated July 14, 2006, to gather and monitor steady-state cruise N2 vibration data.

(2) For a trend that has a slope of 0.001 units per cycle or greater and less than 0.003 units per cycle, remove the seal 250 cycles from the point at which the slope begins to increase and do not reinstall it in any V2500 engine.

(3) For a trend that has a slope of 0.003 units per cycle or greater, remove the seal in 10 cycles and do not reinstall it in any V2500 engine.

(4) If a through crack is found in the front fillet radius of the HPT stage 2 air seal, remove the following:

(i) For the A1 model engine, remove the HPT stage 1 and 2 disks and HPT stage 1 rear air seals (64 per engine) and do not reinstall them in any V2500 engine.

(ii) For all A5 engine models, remove the HPT stage 1 disk and the HPT stage 1 rear air seals (64 per engine) and do not reinstall them in any V2500 engine.

(5) Use Section 3, Accomplishment Instructions, of IAE SB V2500-ENG-72-0502, Revision 1, dated March 15, 2006, for removal procedures.

### **Monitoring N2 Vibration on All IAE Model V2525-D5 and V2528-D5 Engines**

(i) For all IAE model V2500-D5 series engines, begin monitoring for N2 vibration trend if the HPT stage 2 air seal reaches 6,000 CSN or more.

(j) Monitor N2 vibration trend of each engine for every 100 to 150 cycles of engine operation as follows:

(1) Use Section 3, Accomplishment Instructions, of IAE SB V2500-ENG-72-0501, Revision 1, dated July 14, 2006, to gather and monitor the steady-state cruise N2 vibration data.

(2) If an increasing trend that has a slope of 0.0007 units per cycle or greater, and less than 0.002 units per cycle is observed, remove the HPT stage 2 air seal within 250 cycles from the point at which the slope begins to increase and do not reinstall it in any V2500 engine.

(3) If an increasing trend that has a slope of 0.002 units per cycle or greater is observed, remove the HPT stage 2 air seal within 10 cycles and do not reinstall it in any V2500 engine.

(4) If a through crack is found in the front fillet radius of the HPT stage 2 air seal of D5 model engines, remove the HPT stage 1 disk and HPT rear air seals (64 per engine) and do not reinstall them in any V2500 engine.

(5) Use Section 3, Accomplishment Instructions, of IAE SB V2500-ENG-72-0502, dated March 15, 2006, for removal procedures.

### **Removal of HPT Stage 2 Air Seals at Opportunity**

(k) For all engines, when the HPT stage 2 air seal reaches 2,000 CSN, remove the HPT stage 2 air seal at the next separation of the HPT stage 1 and 2 rotors and do not reinstall it in any V2500 engine.

### **Definition**

(l) For the purposes of this AD, "At Opportunity" is defined as when the engine is disassembled, the HPT stage 2 seal is exposed, and the HPT stage 1 and 2 rotors are separated after 2,000 CSN.

(m) The Accomplishment Instructions of IAE SB V2500-ENG-72-0502, Revision 1, dated March 15, 2006, provide information on removing the HPT stage 2 air seal.

## **Alternative Methods of Compliance**

(n) The Manager, Engine Certification Office, has the authority to approve alternative methods of compliance for this AD if requested using the procedures found in 14 CFR 39.19.

## **Related Information**

(o) Contact James Rosa, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: james.rosa@faa.gov, telephone (781) 238-7152; fax (781) 238-7199, for more information about this AD.

## **Material Incorporated by Reference**

(p) You must use the Accomplishment Instructions (Section 3.) of International Aero Engines (IAE) Service Bulletin (SB) V2500-ENG-72-0500, Revision 1, dated July 14, 2006; IAE SB V2500-ENG-72-0501, Revision 1, dated July 14, 2006; or IAE SB V2500-ENG-72-0502, Revision 1, dated March 15, 2006, to perform the actions required by this AD. The Director of the Federal Register approved the incorporation by reference of these service bulletins in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Contact International Aero Engines AG, 400 Main Street, East Hartford, CT 06108; telephone: (860) 565-5515; fax: (860) 565-5510 for a copy of this service information. You may review copies at the FAA, New England Region, 12 New England Executive Park, Burlington, MA; or 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 October 2, 2007.

Peter A. White,

Acting Manager, Engine and Propeller Directorate, Aircraft Certification Service.

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