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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

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

**[Docket No. FAA-2016-9450; Product Identifier 2016-NE-25-AD; Amendment 39-19317; AD 2018-13-05]**

**RIN 2120-AA64**

### **Airworthiness Directives; Honeywell International Inc. Turboprop and Turboshaft Engines**

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

**ACTION:** Final rule.

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**SUMMARY:** We are adopting a new airworthiness directive (AD) for certain Honeywell International Inc. (Honeywell) TPE331 turboprop and TSE331 turboshaft engines. This AD was prompted by recent reports of failures of the direct drive fuel control gears and bearings in the hydraulic torque sensor gear assembly, part number (P/N) 3101726-3. This AD requires initial and repetitive engine oil filter sampling and analysis of the affected engines and inspections of certain hydraulic torque sensor gear assemblies. We are issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective July 26, 2018.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of July 26, 2018.

**ADDRESSES:** For service information identified in this final rule, contact Honeywell International Inc., 111 S 34th Street, Phoenix, AZ 85034-2802; phone: 800-601-3099; internet: <https://myaerospace.honeywell.com/wps/portal>. You may view this service information at the FAA, Engine and Propeller Standards Branch, Policy and Innovation Division, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7759. It is also available on the internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2016-9450.

#### **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-2016-9450; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the

regulatory evaluation, any comments received, and other information. The address for the Docket Operations (phone: 800-647-5527) is Docket Operations, 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:** Joseph Costa, Aerospace Engineer, Los Angeles ACO Branch, FAA, 3960 Paramount Blvd., Lakewood, CA 90712-4137; phone: 562-627-5246; fax: 562-627-5210; email: joseph.costa@faa.gov.

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Honeywell International Inc. TPE331 turboprop and TSE331 turboshaft engines. The NPRM published in the Federal Register on September 13, 2017 (82 FR 42957). The NPRM was prompted by recent reports of failures of the direct drive fuel control gears and bearings in the hydraulic torque sensor gear assembly, P/N 3101726-3. The NPRM proposed to require initial and repetitive engine oil filter sampling and analysis of the affected engines. The NPRM also proposed to require inspection of the hydraulic torque sensor gear assemblies that do not meet oil filter inspection requirements and improved component overhaul procedures that would remove from service, by attrition, certain P/N hydraulic torque sensor gear assemblies. We are issuing this AD to address the unsafe condition on these products.

### **Comments**

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

#### **Request To Revise Compliance Time for Resampling**

The National Agricultural Aviation Association (NAAA) commented that additional compliance time may be required for oil filter analysis resampling beyond the 25 hours time-in-service proposed by the NPRM. The NAAA noted that the engine may re-enter service after oil sampling. Therefore, the 25 hours time-in-service may be exceeded prior to the operators receiving notification from the laboratory that performed the oil filter analysis.

We agree that the proposed compliance time may have resulted in operators exceeding the 25 hours time-in-service before receiving the results of the oil filter analysis. We, therefore, revised the requirement time for resampling in this AD to 25 hours time in service after receiving notification from the accredited laboratory performing the oil filter analysis. We determined that allowing this additional time in service will improve the quality of the sample. We also clarified that if an inspection or resample is required, then the inspection must occur within 5 days after receiving notification from the laboratory that performed the oil filter analysis.

#### **Request To Revise Compliance Time for Initial Sample**

Honeywell requested that we increase the compliance time for obtaining an oil filter sample from 150 to 200 hours. Honeywell commented that Honeywell Service Bulletin (SB) TPE331-72-0180 indicates a 200-hours compliance time for TPE331-10 operators with at least 800 operating hours per year. Honeywell noted that this compliance time coincides with scheduled maintenance intervals for operators.

We disagree. We are attempting to detect impending torque sensor failures using set response times and reduced oil filter sampling and analysis intervals. We find, therefore, that the 150-hour compliance time meets the safety objectives of this AD. Further, we did not receive any comments from part 121 or part 135 operators indicating a concern with the inspection interval of 150 hours. We did not change this AD.

### **Request To Revise Number of Resampling Tests**

NAAA and Copperstate Turbine Engine Company commented that a single resampling allowance that may lead to a gearbox inspection is too stringent. They indicated that oil filter resampling experience has shown that multiple resampling tests may be necessary. NAAA commented that the source of the contamination may not always be the material caused by the torque sensor failure. In this situation, NAAA indicated that another resampling, without the inspection, may be warranted. NAAA commented that the sample analysis should guide maintenance personnel in the proper direction without having to tear down an engine unnecessarily.

We partially agree. We agree that some wear elements, such as silver and aluminum, found during the initial oil filter analysis could permit more than one resampling before a required gearbox inspection. We also agree because these elements or alloys may not cause accelerated wear and possible failure of the torque sensor assembly. We disagree with changing the AD because the commenters have not produced evidence that the presence of certain elements may not contribute to the failure of the torque sensor. We will consider AMOC requests to allow additional oil filter resamples before requiring a gearbox inspection provided we receive acceptable technical justification. We did not change this AD.

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

Honeywell requested that we revise our reference to the service bulletin to refer to the latest revision.

We agree. We updated the reference in the Other Related Service Information paragraph in this AD to Revision 38 of Honeywell SB TPE331-72-0180.

### **Request To Clarify Differences Paragraph**

Honeywell requested that we clarify the “Differences Between This Proposed AD and the Service Information” section in the NPRM.

We disagree. The referenced paragraph does not exist in the final rule and the compliance requirements were clearly defined in the NPRM. 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 final rule 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 final rule.

## Related Service Information Under 1 CFR Part 51

We reviewed Honeywell Service Information Letter (SIL) P331-97, Revision 11, dated July 23, 2008. The SIL describes procedures for conducting the spectrometric oil and filter analysis program to sample and analyze metal particles in the engine lubricating system. 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.

## Other Related Service Information

We reviewed the improved procedures and limitations in the Honeywell Torque Sensor Gear Assembly Overhaul Manual with Illustrated Parts List, 72-00-17, Revision 10, dated October 31, 2013, for the TPE331 and TSE331 torque sensor gear assemblies. We also reviewed Honeywell's TPE331 Line Maintenance Training Manual which provides guidance for obtaining oil filter samples. In addition, we reviewed Honeywell SBs TPE331-72-0402, Revision 6, dated November 26, 1997; TPE331-72-0403, Revision 5, dated January 20, 1989; TPE331-72-0404, Revision 8, dated September 13, 2016; TPE331-72-0823, Revision 3, dated September 13, 1996; TSE331-72-5003, Revision 3, dated January 20, 1989; and TPE331-72-0180, Revision 38, dated August 15, 2017. The SBs address the inspection intervals for the oil and filter analysis for the affected TPE331 and TSE331 engines.

## Costs of Compliance

We estimate that this AD affects 3,831 engines installed on airplanes of U.S. registry. We estimate the following costs to comply with this AD:

We estimate that 3,831 engines will require a records review to determine if they have an affected hydraulic torque sensor gear assembly installed.

### Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Records review	1 work-hour × \$85 per hour = \$85	\$0	\$85	\$325,635

We estimate that 2,542 engines operating under Parts 121 or 135 and 544 engines operating under Part 91 will be required to perform oil filter sampling and analysis.

### Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Oil filter sampling and analysis: Part 91 operators	4 work-hours × \$85 per hour = \$340	\$844	\$1,184	\$644,096 per year.
Oil filter sampling and analysis: Part 121 and 135 operators	1 work-hour × \$85 per hour = \$85	211	296	\$752,432 per year.

We estimate that 242 engines will require that the hydraulic torque sensor gear assembly be overhauled during the first year of inspection.

### Estimated Overhaul Costs

Action	Labor cost	Parts cost	Cost per product
Replace or overhaul hydraulic torque sensor gear assembly	10 work-hours × \$85 per hour = \$850	\$10,000	\$10,850

We estimate that 217 engines will require hydraulic torque sensor gear assembly inspection after an unacceptable oil filter analysis during the first year of inspection.

### On-Condition Costs

Action	Labor cost	Parts cost	Cost per product
Inspect and reassemble hydraulic torque sensor gear assembly	5 work-hours × \$85 per hour = \$425	\$3,000	\$3,425

### Paperwork Reduction Act

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB control number. The control number for the collection of information required by this AD is 2120-0056. The paperwork cost associated with this AD has been detailed in the Costs of Compliance section of this document and includes time for reviewing instructions, as well as completing and reviewing the collection of information. Therefore, all reporting associated with this AD is mandatory. Comments concerning the accuracy of this burden and suggestions for reducing the burden should be directed to the FAA at 800 Independence Ave. SW, Washington, DC 20591. ATTN: Information Collection Clearance Officer, AES-200.

### 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.

This AD is issued in accordance with authority delegated by the Executive Director, Aircraft Certification Service, as authorized by FAA Order 8000.51C. In accordance with that order, issuance of ADs is normally a function of the Compliance and Airworthiness Division, but during this transition period, the Executive Director has delegated the authority to issue ADs applicable to engines, propellers, and associated appliances to the Manager, Engine and Propeller Standards Branch, Policy and Innovation Division.

## **Regulatory Findings**

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, 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 adding the following new airworthiness directive (AD):



**2018-13-05 Honeywell International Inc. (Type Certificate previously held by AlliedSignal, Garrett Engine Division; Garrett Turbine Engine Company; and AiResearch Manufacturing Company of Arizona):** Amendment 39-19317; Docket No. FAA-2016-9450; Product Identifier 2016-NE-25-AD.

**(a) Effective Date**

This AD is effective July 26, 2018.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to Honeywell International Inc. (Honeywell) TPE331-1, -2, -2UA, -3U, -3UW, -5, -5B, -6, -6A, -8, -10, -10AV, -10N, -10P, -10R, -10T, -10U, -10UA, -10UF, -10UR model turboprop and TSE331-3U turboshaft engines with hydraulic torque sensor gear assemblies, part numbers (P/Ns) 3101726-1, -2, or -3, installed.

**(d) Subject**

Joint Aircraft System Component (JASC) Code 7210, Turbine Engine Reduction Gear.

**(e) Unsafe Condition**

This AD was prompted by recent reports of failures of the direct drive fuel control gears and bearings in the hydraulic torque sensor gear assembly, P/N 3101726-3. We are issuing this AD to prevent failure of the hydraulic torque sensor gear assembly. The unsafe condition, if not addressed, could result in failure of the hydraulic torque sensor gear assembly, in-flight shutdown, and reduced control of the airplane.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Oil Filter Sampling and Analysis**

(1) Obtain an initial engine oil filter sample of the affected engines within 150 hours time in service after the effective date of this AD. You can find guidance for obtaining oil filter samples in Honeywell's engine training manuals; for example, see the TPE331 Line Maintenance Training Manual.

(2) Submit the engine oil filter sample within 3 days of sampling to an ISO/IEC 17025-accredited laboratory capable of performing analysis using ASTM D5185, Standard Test Method for

Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES). You can find a list of Honeywell-authorized laboratories capable of performing this analysis in paragraph 1.D.(10) of Honeywell Service Information Letter (SIL) P331-97, Revision 11, dated July 23, 2008.

(3) Perform an oil filter analysis for wear metals and evaluate filter contents using paragraphs 1.D.(4) and (5) of Honeywell SIL P331-97, Revision 11, dated July 23, 2008. Guidelines for interpreting analysis results can be found in paragraph (8) of Honeywell SIL P331-97.

(4) For those engines where the oil filter analysis indicates the need for an inspection or resample, as specified in Figures 1, 2 or 3 of the Honeywell SIL P331-97, Revision 11, dated July 23, 2008, accomplish the following:

(i) If Figures 1, 2, or 3 indicate an inspection is required, within 5 days after receiving notification from the laboratory that performed the analysis, inspect the torque sensor gear assembly using paragraph (g)(4)(iii) of this AD.

(ii) If Figures 1, 2, or 3 indicate a resample is required, perform a repeat oil filter sample and analysis, within 25 hours time in service after receiving notification from the laboratory that performs the analysis to evaluate for wear metals in accordance with paragraphs (g)(1), (2) and (3) of this AD.

(A) If the resample indicates a second resample or inspection is required, within 5 days after receiving notification from the laboratory that performed the analysis, inspect the hydraulic torque sensor gear assembly using paragraph (g)(4)(iii) of this AD.

(B) Reserved.

(iii) Inspect the hydraulic torque sensor gear assembly using the following steps:

(A) Remove bearings, P/Ns 358893-1, 3103035-1, 3103585-1 or 70100168-1, from the assembled spur gear and fuel control drive gearshaft and inspect or replace. Guidance for performing the inspection can be found in Section 70-00-00, Standard Practices of the applicable TPE331 engine maintenance manual. For example, see paragraph 5., "Bearing Inspection," on pages 11-12 of Honeywell Maintenance Manual 70-00-00, TPE331-10 (Report No. 72-00-27), dated February 29, 2000.

(B) Visually inspect the gearshaft teeth for scoring, pitting, chipping, metal deposits or corner breakage. Visual defects on gear teeth are acceptable if defects cannot be felt using a 0.031 inch diameter stylus. No corner breakage is allowed.

(5) Thereafter, repeat the steps identified in paragraphs (g)(1) through (4) of this AD every additional 150 hours time in service after last oil filter sampling.

(6) For any hydraulic torque sensor gear assembly that fails the inspection required by paragraph (g) of this AD, remove the affected hydraulic torque sensor gear assembly and, before further flight, replace with a part eligible for installation.

#### **(h) Hydraulic Torque Sensor Gear Assembly Overhaul**

After the effective date of this AD, do not use the Honeywell Torque Sensor Gear Assembly Overhaul Manual with Illustrated Parts List, 72-00-17, Revision No. 9, dated, July 20, 1992, or earlier versions, to overhaul TPE331 or TSE331 hydraulic torque sensor gear assemblies, P/Ns 3101726-1, -2, or -3.

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

(1) The Manager, Los Angeles ACO Branch, FAA has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (j) of this AD.



(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

**(j) Related Information**

For more information about this AD, contact Joseph Costa, Aerospace Engineer, Los Angeles ACO Branch, FAA, 3960 Paramount Blvd., Lakewood, CA 90712-4137; phone: 562-627-5246; fax: 562-627-5210; email: joseph.costa@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) Honeywell Service Information Letter P331-97, Revision 11, dated July 23, 2008.

(ii) Reserved.

(3) For Honeywell service information identified in this AD, contact Honeywell International Inc., 111 S 34th Street, Phoenix, AZ 85034-2802; phone: 800-601-3099; internet: <https://myaerospace.honeywell.com/wps/portal>.

(4) You may view this service information at FAA, Engine and Propeller Standards Branch, Policy and Innovation Division, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7759.

(5) You may view this service information that is incorporated by reference 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 June 14, 2018.

Robert J. Ganley,  
Manager, Engine and Propeller Standards Branch,  
Aircraft Certification Service.