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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

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

**[Docket No. FAA-2016-9418; Product Identifier 2016-NE-23-AD; Amendment 39-19167; AD 2018-02-14]**

**RIN 2120-AA64**

**Airworthiness Directives; Honeywell International Inc. Turboprop and Turboshift 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 reports that combustion chamber case assemblies have cracked and ruptured. This AD requires inspection of the affected combustion chamber case assembly, replacement of those assemblies found cracked, and removal of affected assemblies on certain TPE331 and TSE331 engines. We are issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective February 28, 2018.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of February 28, 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, 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-2016-9418.

#### **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-2016-9418; 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 Docket Operations (phone: 800-647-5527) is Document 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 TPE331 turboprop and TSE331 turboshaft engines. The NPRM published in the Federal Register on April 19, 2017 (82 FR 18402). The NPRM was prompted by reports of three accidents involving combustion chamber case assembly ruptures. Investigations have shown numerous cracked and ruptured combustion chamber case assemblies resulting from high stresses in the as-designed weld joints and contributing factors due to repair weld quality, poor maintenance and inspection practices, and cycles-in-service. The NPRM proposed to require inspection, replacement of the affected combustion chamber case assemblies, and removal of affected assemblies on certain TPE331 turboprop and TSE331 turboshaft engines. 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 Internet Address**

Honeywell requested that its internet address be revised.

We agree. We revised the internet address as requested by Honeywell.

#### **Request To Revise Service Information**

Honeywell requested that we revise the service bulletins in this AD to reference the latest revisions.

We agree. We revised the references in this AD to Honeywell Service Bulletins (SBs) TPE331-72-2218; TPE331-72-2235; and TPE331-72-2244 from Revision 1 to Revision 2. However, we did not update the references to the SB that is incorporated by reference since this SB is already at the latest revision.

#### **Request To Revise Discussion of Proposed AD Requirements**

Honeywell requested that we reference the TSE331 turboshaft engine in the "Proposed AD Requirements" section of this final rule.

We partially agree. We agree that we inadvertently omitted mention of the TSE331 turboshaft engines from the "Proposed AD Requirements" section in the NPRM. We disagree with making a change to this final rule because the "Proposed AD Requirements" section does not exist in this final rule AD. We did not change this AD.

## **Request To Revise Discussion of Removal and Replacement Times**

Honeywell requested changes to the Differences Between This Proposed AD and the Service Information section contained within the NPRM, recommending revision of the removal and replacement statement. Honeywell's referenced service bulletins in the NPRM recommend a revised compliance calendar deadline for certain redesigned combustion chamber case assemblies. Honeywell indicated the compliance deadline is March 31, 2021, for all redesigned combustion chamber case assemblies.

We partially agree. We agree it would be appropriate to reference this calendar deadline in this discussion within the NPRM. We do not agree to revise this final rule because this discussion does not exist in this final rule. Further explanation in this final rule is not necessary. We did not change this final rule.

## **Request To Revise Number of Affected Engines**

Honeywell indicated its records show 11,280 engines have been shipped with suspect combustion chamber case assemblies. Honeywell, therefore, requested we revise the number of engines accordingly within the Costs of Compliance section in this final rule.

We disagree. We estimate costs based on the number of affected engines in the U.S. Registry. We estimate 50% of the engines Honeywell shipped are in the U.S. Registry. We did not change this final rule.

## **Request To Revise Applicability To Include TPE331-12B Engine**

Honeywell requested we revise the applicability of this AD to include the TPE331-12B engine. Honeywell commented this engine was used in military operations but now is operated commercially and has experienced similar cracks in its combustion chamber case assembly.

We partially agree. The combustion chamber case assemblies installed on these engines are subject to the same cracking as those installed on the other affected TPE331 engines. However, in the interest of safety, we will proceed to publish this final rule without adding the TPE331-12B engine model. We will consider further rulemaking action to incorporate the TPE331-12B engines.

## **Request To Revise Compliance Time**

Honeywell, Council 331 (a TPE331 operators and maintenance group), and an individual operator requested a change to repetitive compliance time for the visual inspection of the combustion chamber case assembly and suggested a specified calendar date. The commenters noted compliance at 50 and 400 hours would not align with the fuel nozzle inspection interval and requested clarification.

We partially agree. We interpret Honeywell's comment on the 50-hour initial compliance interval as a request to clarify the intent of the 50-hour interval rather than as a request to change this AD. We used the 50-hour compliance interval and not a calendar date because a grace period is necessary to give operators time to comply with this AD.

We agree the repetitive combustion chamber case assembly inspections should be aligned with the fuel nozzle inspections not to exceed 450 hours. We revised this AD to indicate repetitive visual inspection of the combustion chamber case assembly be performed before accumulating 450 hours since last fuel nozzle inspection.

## **Request To Note Ruptures of Additional Combustion Chamber Case Assemblies**

Honeywell requested this final rule note that combustion chamber case assembly ruptures occurred on parts other than those part numbers (P/Ns) mentioned in paragraph (g) of this AD. Honeywell indicated ruptures have occurred on other P/N combustor chamber case assemblies.

We agree. Combustion chamber case assembly ruptures have occurred with other configurations other than those P/Ns mentioned in paragraph (g) of this AD. We agree the public should be aware of combustion chamber case assembly cracks that may propagate to failure or rupture if not properly inspected and maintained. We reviewed other combustion chamber case assembly configurations and determined the risk of rupture for P/N 3101668-x ("x" denotes all dash numbers) is lower than those configurations identified in paragraph (g)(2) of this AD. We have adequately addressed more frequent inspections and removal from service of high risk and cracked combustion chamber case assemblies. We did not change this AD.

## **Request To Remove All Combustion Chamber Case Assemblies From Service**

Honeywell requested that we revise the Compliance section of this AD to require removal from service, at the next removal from the engine, all combustion chamber case assemblies other than the P/Ns listed in paragraph (g)(2) of this AD. In addition, Honeywell has performed a Continued Airworthiness Assessment, in accordance with Advisory Circular 39-8 and determined replacement of the combustion chamber case assemblies with redesigned assemblies is the only corrective action that would return the product to the level of safety intended by the original basis of certification.

We disagree. This AD requires corrective actions that reduce the probability of combustion chamber case rupture. We identified in paragraph (g)(2) of this AD certain combustion chamber case assemblies with high stresses in the specified weld joint that showed higher incidents of cracking and rupture, a short crack propagation life, and poor crack detectability compared to other combustion chamber case assemblies. These combustion chamber case assemblies require replacement within the AD's specified compliance time. We did not change this AD.

## **Request To Clarify Identity of Supplemental Type Certificate (STC) Holder**

Honeywell requested we clarify that Honeywell is not the holder of the STC referenced in this AD.

We agree. Indication of ownership of the subject STC may assist owners to identify the engine modification. We changed this AD by identifying National Flight Services Inc. as the holder of the STC SE383CH.

## **Request To Clarify Engines That Have Been Modified With Increased P3 Pressures**

Honeywell requested we clarify paragraph (g) of this AD to describe how operators would determine that their engines have been modified with increased P3 pressures not under STC SE383CH.

We agree that operators may be unable to determine that their engines have been modified with increased P3 case pressures. Therefore, we will limit the applicability of paragraph (g) of this AD to the referenced STC. We revised paragraph (g) of this AD by removing the phrase "modified with increased P3 pressures, including, but not limited to . . ." from this paragraph."

## **Request To Limit Weld Repairs**

Honeywell requested we revise the compliance section of this AD to disallow any weld repairs on any combustion chamber case assemblies that are affected by this AD.

We partially agree. We agree a weld repair is a sensitive process that may affect the fatigue life of the combustion chamber case assembly. We agree not to allow use of any weld repair procedures dated before the effective date of this AD. We will assess repair procedures of certain combustion chamber case assemblies with lower stresses on a case-by-case basis. We did not change this AD.

#### **Request To Prohibit Installation of Weld-Repaired Combustion Chamber Case Assemblies**

Honeywell requested the compliance section be revised to prohibit installation of any applicable combustion chamber case assembly which has been weld repaired.

We do not agree. In paragraphs (g)(2), (h) and (i) of this AD, we identified the combustion chamber case configurations with the highest risk of rupture. Prohibiting installation of all welded combustion chamber case assemblies is unnecessary because they do not all create the same unsafe condition. We did not change this AD.

#### **Request To Add Further Information on Combustion Chamber Assembly Failures**

Perimeter Aviation LP (Perimeter) requested we add information to this AD regarding the number of failures of combustion chamber assemblies with or without the one-piece bleed pad. Perimeter requested further information on how these failures relate to the P/N 3101668-12 combustion chamber assembly.

We agree. We note that five of the six combustion chamber case assemblies that ruptured were assemblies without the one-piece bleed pad. P/N 3101668-x has the one-piece bleed pad with P3 boss, which demonstrated significantly reduced cracking between the P3 and bleed boss; therefore, this combustion chamber case assembly is not affected by this AD. No further changes are needed. We did not change this AD.

#### **Request To Add More Frequent Inspections**

Hancock Enterprises, Inc. and Council 331 requested we require more frequent visual inspections and/or fluorescent penetrant inspections during the combustion chamber case assembly's removal. They recommended allowing the assembly be re-installed and replaced with an updated part at the next overhaul or continuous airworthiness maintenance. Council 331 cited the non-destructive testing experience of these combustion chamber case assemblies.

We disagree. We do not believe more frequent inspections would maintain an adequate level of safety. Allowing the most difficult-to-inspect and highest risk combustion chamber case assemblies back into service would allow excessive risk. Although we agree more frequent visual inspections would improve the probability of detecting cracks, thereby reducing the risk of a rupture, the FAA believes the probability of crack detection for a visual inspection of an installed combustion chamber case assembly is generally low and will not maintain an acceptable level of safety. We did not change this AD.

#### **Request To Add Terminating Action**

Council 331 requested that compliance with one of the service bulletins listed in "Other Related Service Information" provide terminating action for the proposed AD. Terminating action in the AD will provide added incentive to operators in removing from service suspect parts with a documented history of failure. Council 331 commented that, as drafted, the new redesign combustion chamber case assembly does not eliminate the AD's compliance requirements. There have been no known failures of the new redesign combustion chamber case assembly.

We partially agree. We agree lower stress and improved reliability should eliminate the need for repetitive visual inspection. We also agree to limiting the AD's applicability to only the suspect configurations should provide adequate safety. We therefore changed the Applicability section of this

AD to refer only to engines “with combustion chamber case assemblies, part numbers (P/Ns) 869728-x, 893973-x, 3101668-x, and 3102613-x, where “x” denotes any dash number, installed.”

We do not agree it is necessary to specify terminating action in this AD. This AD only applies to the specified engine models with the specific P/N combustor chamber case assemblies installed. Therefore, a terminating action for new combustor chamber assemblies is unnecessary. We did not change this AD.

### **Revision to Engine Operating Time Limit**

After further review, we revised the engine operating time limit in paragraph (g)(2) of this AD to “not to exceed 3,700 hours time-in-service since last hot section inspection.” This is equivalent to removal of the combustion chamber case assemblies at their next removal from the engine, which was specified in the NPRM.

### **Revision to Installation Prohibition**

After further review, we revised the Installation Prohibition, paragraph (i) of this AD, to limit this prohibition against installation of affected combustion chamber case assemblies in certain engine models. This clarification makes this prohibition consistent with paragraph (g)(2) of 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:

- [Agr]re 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 SB TPE331-72-2178, Revision 0, dated May 3, 2011. Honeywell SB TPE331-72-2178 describe procedures for inspection and removal of the affected combustion chamber case assemblies installed on all affected engines except for the TPE331-12B engine. 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**

Honeywell has also issued SBs TPE331-72-2228, Revision 0, dated June 12, 2014; TPE331-72-2230, Revision 0, dated June 19, 2014; TPE331-72-2218, Revision 2, dated February 18, 2017; TPE331-72-2244, Revision 2, dated March 20 2017; TPE331-72-2235, Revision 2, dated February 18, 2017; TPE331-72-2281, Revision 0, dated July 22, 2016; TPE331-72-2294, Revision 0, dated December 22, 2016; and TSE331-72-2245, Revision 0, dated November 11, 2016. These SBs provide guidance on replacement of the affected combustion chamber case assemblies.

### **Costs of Compliance**

We estimate that this AD affects 5,644 engines installed on airplanes of U.S. registry. We estimate the following costs to comply with this AD:



### Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
On-wing inspection	1 work-hour $\times$ \$85 per hour = \$85	\$0	\$85 per inspection	\$479,740 per inspection cycle.

We estimate the following costs to do any necessary replacements that would be required based on the results of the proposed inspection. We estimate that 158 engines will need this replacement during the first year of inspection.

### On-Condition Costs

Action	Labor cost	Parts cost	Cost per product
Replacement of the combustion chamber assembly	1 work-hour $\times$ \$85 per hour = \$85	\$15,000	\$15,085

### 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):

**SUPERSEDED**





FAA  
Aviation Safety

## AIRWORTHINESS DIRECTIVE

[www.faa.gov/aircraft/safety/alerts/](http://www.faa.gov/aircraft/safety/alerts/)  
[www.gpoaccess.gov/fr/advanced.html](http://www.gpoaccess.gov/fr/advanced.html)

**2018-02-14 Honeywell International Inc.** (Type Certificate previously held by AlliedSignal Inc., Garrett Engine Division; Garrett Turbine Engine Company; and AiResearch Manufacturing Company of Arizona): Amendment 39-19167; Docket No. FAA-2016-9418; Product Identifier 2016-NE-23-AD.

### (a) Effective Date

This AD is effective February 28, 2018.

### (b) Affected ADs

None.

### (c) Applicability

This AD applies to Honeywell International Inc. (Honeywell) TPE331-1, -2, -2UA, -3U, -3UW, -5, -5A, -5AB, -5B, -6, -6A, -8, -10, -10AV, -10GP, -10GT, -10N, -10P, -10R, -10T, -10U, -10UA, -10UF, -10UG, -10UGR, -10UR, and -11U, -12JR, -12UA, -12UAR, -12UHR, -25AA, -25AB, -25DA, -25DB, -25FA, -43A, -43BL, -47A, -55B, and -61A model turboprop engines, and TSE331-3U model turboshaft engines with combustion chamber case assemblies, part numbers (P/Ns) 869728-x, 893973-x, 3101668-x, and 3102613-x, where “x” denotes any dash number, installed.

### (d) Subject

Joint Aircraft System Component (JASC) Code 7240, Turbine Engine Combustion Section.

### (e) Unsafe Condition

This AD was prompted by reports that combustion chamber case assemblies have cracked and ruptured. We are issuing this AD to prevent failure of the combustion chamber case assembly. The unsafe condition, if not addressed, could result in failure of the combustion chamber, in-flight shutdown, and reduced control of the airplane.

### (f) Compliance

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

### (g) Required Actions

(1) For all affected engines:

(i) Inspect all accessible areas of the combustion chamber case assembly, focusing on the weld joints, before accumulating 450 hours in service since last fuel nozzle inspection or within 50 hours in service after the effective date of this AD, whichever occurs later.

(ii) Do the inspection in accordance with the Accomplishment Instructions, paragraphs 3.B.(1) through 3.B.(2), in Honeywell Service Bulletin TPE331-72-2178, Revision 0, dated May 3, 2011.

(iii) Thereafter, repeat this inspection during scheduled fuel nozzle inspections at intervals not to exceed 450 hours.

(2) For TPE331-3U, -3UW, -5, -5A, -5AB, -5B, -6, and -6A engines with combustion chamber case assemblies, P/Ns 869728-1, 869728-3, or 893973-5, installed, and without the one-piece bleed pad with P3 boss; and for TPE331-1, -2, and -2UA engines modified by National Flight Services, Inc., supplemental type certificate (STC) SE383CH, remove the combustion chamber case assembly from service at the next removal of the combustion chamber case from the engine, not to exceed 3,700 hours time-in-service since last hot section inspection.

(3) As of the effective date of this AD, do not weld repair the applicable combustion chamber case assemblies using procedures dated before the effective date of this AD.

#### **(h) Definition**

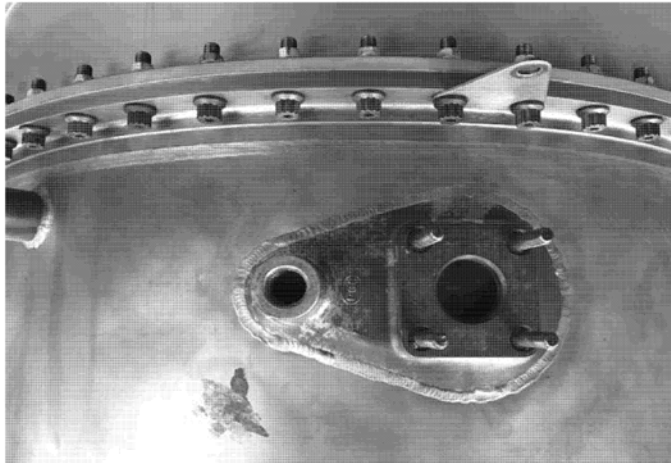
TPE331 model engines modified by STC SE383CH may be defined as the “Super 1” and “Super 2” for the compressor modification of the TPE331-1 and the TPE331-2, -2U, and -2UA engines, respectively. Figures 1 and 2 to paragraph (h) of this AD illustrate the appearance of combustion chamber case assembly, P/N 893973-5, without and with, respectively, the one-piece bleed pad with the P3 boss.

**Figure 1 to Paragraph (h) of this AD. Combustion Chamber Case Assembly**

**Without the One-Piece Bleed Pad with P3 Boss**



**Figure 2 to Paragraph (h) of this AD. Combustion Chamber Case Assembly with  
One-Piece Bleed Pad with P3 Boss**



**(i) Installation Prohibition**

After the effective date of this AD, do not install a combustion chamber case assembly, P/N 869728-1, 869728-3, or 893973-5, in TPE331-3U, -3UW, -5, -5A, -5AB, -5B, -6, and -6A engines or in TPE331-1, -2, and -2UA engines modified by National Flight Services, Inc., STC SE383CH, unless the combustion chamber case assembly has a one-piece bleed pad with P3 boss.

**(j) 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 (k) 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.

**(k) 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.

**(l) 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 Bulletin TPE331-72-2178, Revision 0, dated May 3, 2011.

(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 the FAA, Engine and Propeller Standards Branch, 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 January 17, 2018.

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

SUPERSEDED