

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2006-23704; Directorate Identifier 2006-NE-02-AD; Amendment 39-14674; AD 2006-14-03]

RIN 2120-AA64

Airworthiness Directives; Honeywell International Inc. TPE331 Series Turboprop, and TSE331-3U Model Turboshift Engines

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

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain Honeywell International Inc. TPE331 series turboprop, and TSE331-3U model turboshift engines. This AD requires implementing a new flight cycle counting method for first, second, and third-stage turbine rotors used in aircraft that make multiple takeoffs and landings without an engine shutdown, and removing turbine rotors from service that have reached or exceeded their cycle life limits. This new flight cycle counting method requires determining total equivalent cycles accrued. This AD results from several reports of uncontained turbine rotor separation on engines used in special-use operations. We are issuing this AD to prevent uncontained failure of the turbine rotor due to low-cycle-fatigue (LCF), and damage to the aircraft.

DATES: This AD becomes effective August 9, 2006. The Director of the Federal Register approved the incorporation by reference of certain publications listed in the regulations as of August 9, 2006.

ADDRESSES: You can get the service information identified in this AD from Honeywell Engines, Systems & Services, Technical Data Distribution, M/S 2101-201, P.O. Box 52170, Phoenix, AZ 85072-2170; telephone: (602) 365-2493 (General Aviation); (602) 365-5535 (Commercial); fax: (602) 365-5577 (General Aviation and Commercial).

You may examine the AD docket on the Internet at <http://dms.dot.gov> or in Room PL-401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC.

FOR FURTHER INFORMATION CONTACT: Joseph Costa, Aerospace Engineer, Los Angeles Aircraft Certification Office, FAA, Transport Airplane Directorate, 3960 Paramount Blvd., Lakewood, CA 90712-4137; telephone (562) 627-5246; fax (562) 627-5210.

SUPPLEMENTARY INFORMATION: The FAA proposed to amend 14 CFR part 39 with a proposed AD. The proposed AD applies to certain Honeywell International Inc. TPE331 series turboprop, and TSE331-3U model turboshaft engines. We published the proposed AD in the Federal Register on February 23, 2006 (71 FR 9281). That action proposed to require implementing a new flight cycle counting method for first, second, and third-stage turbine rotors used in aircraft that make multiple takeoffs and landings without an engine shutdown, and removing turbine rotors from service that have reached or exceeded their cycle life limits. This new flight cycle counting method requires determining total equivalent cycles accrued.

Examining the AD Docket

You may examine the docket that contains the AD, any comments received, and any final disposition in person at the Docket Management Facility Docket Office between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The Docket Office (telephone (800) 647-5227) is located on the plaza level of the Department of Transportation Nassif Building at the street address stated in ADDRESSES. Comments will be available in the AD docket shortly after the DMS receives them.

Comments

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

Suggestion To Delete Phrase "To Ground Idle"

One commenter suggests that in the Discussion paragraph of the proposed AD, we delete the phrase "to ground idle". Doing this would reconcile the Discussion paragraph with the Definition paragraph (i) in the compliance section, because touch-and-go maneuvers require the logging of partial cycles. A touch-and-go maneuver is a landing and takeoff without shutdown.

We partially agree. The damage fraction for a minor cycle identified in the Honeywell Alert Service Bulletins is based on landings to normal ground-idle engine speed reductions without an engine shutdown. Any engine operation, such as a touch-and-go maneuver with an engine speed reduction to ground idle during touch-down, counts as a minor cycle. Engine speed reductions to ground idle during landing are an important factor in determining the counting of a minor cycle and, therefore, must be included in the definition. The AD does not repeat the proposed AD Discussion paragraph. We agree that the wording in our NPRM could be clearer. Therefore, we changed Definition paragraph (i), to include major and minor cycles, and paragraph (o), to state that a minor cycle, which occurs within a major cycle, is an additional landing with an engine speed reduction to ground idle with no engine shutdown, followed by a takeoff.

Request To Change Compliance Section Paragraph (f)(1)(ii)

One commenter requests that we change compliance section paragraph (f)(1)(ii) from "If you are unable to determine equivalent cycles for prior special-use operations, you must use a onetime takeoff-to-engine shutdown ratio of six to estimate prior special-use equivalent cycles for each turbine rotor" to "For turbine rotors known to have prior special use operation, if you are unable to determine equivalent cycles for prior special-use operations, you must use a onetime takeoff-to-engine shutdown ratio of six to estimate prior special-use equivalent cycles for each turbine rotor." The commenter feels that this would clarify the phrase "unable to determine" because as-written it could be construed to mean that a rotor had special use operation, but exact minor-to-major cycle count cannot be determined.

We partially agree. We agree with the commenter's application of the phrase "unable to determine" but we do not agree that paragraph (f)(1)(ii) should be changed. That paragraph must be read in context with paragraph (f), which clearly states "For turbine rotors installed before the effective date of this AD, and currently or previously used in special-use operations:" However, we did clarify paragraph (f)(1)(ii) to add the reason why the operator or owner would be unable to determine equivalent cycles.

Request To Change the Phrase "Used Turbine Rotors" in Compliance Paragraph (f)

One commenter requests that we change the phrase "used turbine rotors" in compliance paragraph (f) to "turbine rotors" as these rotors may have had zero cycles-since-new at installation. We agree. The compliance action is the same for new or used turbine rotors installed before the effective date of the AD. We made that change in the AD.

Request To Add a Step to Compliance Paragraphs (f) and (g)

One commenter requests that we add a step to compliance paragraphs (f) and (g) to include the new counting method, which is also referenced in paragraph (h)(1) of the compliance section. The commenter states that this counting method should be used after determining equivalent cycles, whether the turbine rotor is new or used.

We partially agree. We agree that operators and maintenance personnel use the new counting method of counting major and minor cycles when accrued for new and used turbine rotors after the initial assessment from the Table 1 turbine removal schedules in the Honeywell ASBs. This schedule requires retiring the turbine rotors within a specified number of equivalent cycles, which infers that the owner or operator use the new counting method with minor and major cycles. We changed compliance section paragraph (f)(1)(ii) to read "If you are unable to determine equivalent cycles for prior special-use operations due to the absence of actual data regarding the number of takeoffs and landings per major cycle, you must use a onetime ratio of six takeoffs and landings per major cycle to estimate prior special-use equivalent cycles for each turbine rotor". Also, for clarification, we changed compliance section paragraph (h)(1) to read "Use the new counting method by counting and recording minor and major cycles when accrued, and determine equivalent cycles by the method described in paragraph (f)(1)(i) and (f)(1)(iii) of this AD".

In preparing the response to this commenter, we decided that proposed paragraphs (h) and (h)(2) could be clearer. Therefore, we changed compliance section paragraph (h) to read "For all new (zero cycles) turbine rotors installed on or after the effective date of this AD used in special-use operations:" and paragraph (h)(2) to read "Using the ratio of six takeoffs and landings per major cycle for unknown cycle history, as referenced in paragraph (f)(1)(ii) of this AD, is not permitted".

Comment That Previous Method of Counting Cycles Is Acceptable

One commenter states that the previous method of counting cycles is acceptable and that major and minor counting is unnecessary. The commenter cites their "lower than red-line" engine operation temperatures are an additional safety margin (excluding temperatures during startups and shutdowns).

We do not agree. The new counting method is necessary to preclude fatigue damage of turbine rotors and is appropriate for most operations when considering engine operation temperatures and rotor speeds. We did not change the AD based on this comment.

Suggestion That AD Action Does Not Target the Problem

Two commenters suggest that the AD action does not target the problem of why most turbine rotors fail. The commenters state that the proposed AD should be withdrawn.

We do not agree. The AD addresses our safety concern that use of the TPE331 engine beyond its original certified intended assumption of one cycle for each flight threatens safe operations. We understand that the AD does not address all causes for turbine rotor failure. We are investigating other turbine rotor features that may cause failures, and we may consider future AD action. We did not change the AD.

Ten Percent Estimate Seems Low

One commenter states that the proposed AD estimate of ten percent of affected engines are used on MU-2B airplanes, seems low, and that the special-use industry such as skydiving, agriculture, and some cargo, is a large industry.

We do not agree. Ten percent of the affected engines being used on MU-2B airplanes, is our best estimate based on FAA experience with special-use operators and the MU-2 fleet size.

Root of the Problem Seems To Be in Manufacturing

One commenter states that the root of the problem seems to be in manufacturing. The commenter asks if Honeywell International Inc. will provide a turbine rotor that can withstand low-cycle-fatigue.

We do not agree. We investigated the production and manufacturing of the affected turbine rotors and found no anomalies. Therefore, we concluded that the existing turbine rotors were manufactured to type design. However, we may consider future AD action if we find such action necessary.

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 200 TPE331 series turboprop, and TSE331-3U model turboshaft engines installed on airplanes and helicopters of U.S. registry. We also estimate that it will take about two work-hours per engine to perform the total equivalent cycles determination and recording. We also estimate that to replace a turbine rotor will take 40 work-hours per engine when done at an unscheduled maintenance interval. We also estimate that 38 rotors will be replaced at unscheduled maintenance intervals. We estimate the average labor rate to be \$65 per work-hour. Required parts will cost about \$20,000 per engine. The costs associated with this AD are dependent on the engine mission cycle. Operators accruing many minor and major cycles might replace first and second stage turbine rotors every two years. For the purpose of this AD, we estimate the costs for an eight-year period with moderate usage to be 10 minor cycles each flight and 200 flights each year, and the effective use of the first and second turbine rotors to be equivalent to 2,600 cycles. Based on these figures, we estimate the total cost to U.S. operators to be \$9,350,630.

The Agency is committed to updating the aviation community of expected costs associated with the MU-2B series airplane safety evaluation conducted in 2005. As a result of that commitment, the accumulating expected costs of all ADs related to the MU-2B series airplane safety evaluation may

be found at the following Web site: http://www.faa.gov/aircraft/air_cert/design_approvals/small_airplanes/cos/mu2_foia_reading_library/

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:

AIRWORTHINESS DIRECTIVE

www.faa.gov/aircraft/safety/alerts/
www.gpoaccess.gov/fr/advanced.html

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



2006-14-03 Honeywell International Inc. (formerly AlliedSignal Inc., Garrett Engine Division; Garrett Turbine Engine Company; and AiResearch Manufacturing Company of Arizona):
Amendment 39-14674. Docket No. FAA-2006-23704; Directorate Identifier 2006-NE-02-AD.

Effective Date

(a) This airworthiness directive (AD) becomes effective August 9, 2006.

Affected ADs

(b) None.

Applicability

(c) This AD applies to Honeywell International Inc. TPE331-1, -1U, -1UA, -2, -2UA, -3U, -3UW, -3W, -5, -5A, -5AB, -5B, -5U, -6, -6A, -6U, -8, -8A, -9, -9U, -10, -10A, -10AV, -10B, -10G, -10GP, -10GR, -10GT, -10J, -10N, -10P, -10R, -10T, -10U, -10UA, -10UF, -10UG, -10UGR, -10UJ, -10UK, -10UR, -11U, -11UA, -12, -12B, -12JR, -12UA, -12UAR, -12UER, and -12UHR series turboprop and TSE331-3U model turboshaft engines. These engines are installed on, but not limited to, the following aircraft:

Manufacturer	Airplane model
Aero Planes, LLC (formerly McKinnon Enterprises)	G-21G.
Allied AG Cat Productions (formerly Schweizer)	G-164 series.
Ayres	S-2R series.
British Aerospace Ltd (formerly Jetstream)	3201 series, and HP.137 Jetstream MK.1.
Cessna Aircraft Company	441 Conquest.
Construcciones Aeronauticas, s.a. (CASA)	C-212 series.
DeHavilland	DH104 series 7AXC (Dove).
Dornier	228 series.
Fairchild	SA226 AND SA227 series (Swearingen Merlin and Metro series).
Grumman American	G-164 series.
Mitsubishi	MU-2B series (MU-2 series).
Pilatus	PC-6 series (Fairchild Porter and Peacemaker).
Polskie Zaklady Lotnicze Spolka (formerly Wytwornia Sprzetu Komunikacyjnego).	PZL M18, PZL M18A, PZL M18B.
Prop-Jets, Inc.	400.
Raytheon Aircraft (formerly Beech)	C45G, TC-45G, C-45H, TC-45H, TC-45J, G18S, E18S-9700, D18S, D18C, H18, RC-45J, JRB-6, UC-45J, 3N, 3NM, 3TM, B100, C90, and E90.

Manufacturer	Airplane model
Shorts Brothers and Harland, Ltd.	SC7 (Skyvan) series.
Thrush (Rockwell Commander)	S-2R.
Twin Commander (Jetprop Commander)	680 and 690 series.
Manufacturer	Helicopter Model
Sikorsky	S-55 series (Helitec Corp. S55T).

Unsafe Condition

(d) This AD results from several reports of uncontained turbine rotor separation on engines used in special-use operations. We are issuing this AD to prevent uncontained failure of the turbine rotor due to low-cycle-fatigue (LCF), and damage to the aircraft.

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.

Turbine Rotors Installed Before the Effective Date of This AD

(f) For turbine rotors installed before the effective date of this AD, and currently or previously used in special-use operations:

(1) Within 100 major cycles-in-service after the effective date of this AD, or upon removal of the turbine rotor(s) from the engine, whichever occurs first, do the following:

(i) Determine the total equivalent cycles accrued for turbine rotors. Use paragraph 2.A. of the Accomplishment Instructions of the applicable Honeywell Alert Service Bulletin (ASB) for your model engines listed in the following Table A, to make the determination.

TABLE A.—HONEYWELL ASBS FOR DETERMINING TOTAL EQUIVALENT CYCLES

For engines	Use ASB No.	Turbine rotor removal schedule
(A) TPE331-1 through -6 series and TSE331-3U model.	TPE331-A72-2111, dated November 12, 2002	Use ASB Table 1.
(B) TPE331-8 through -9 series	TPE331-A72-2123, dated February 8, 2006	Use ASB table 1.
(C) TPE331-10 through-11 series	TPE331-A72-2130, dated September 27, 2005	Use ASB Table 1.
(D) TPE331-12 series	TPE331-A72-2131, dated September 27, 2005	Use ASB Table 1.

(ii) If you are unable to determine equivalent cycles for prior special-use operations due to the absence of actual data regarding the number of takeoffs and landings per major cycle, you must use a onetime ratio of six takeoffs and landings per major cycle to estimate prior special-use equivalent cycles for each turbine rotor.

(iii) For each turbine rotor affected on the Life Limited Part Log Card, record the total equivalent cycles accrued, as determined in paragraphs (f)(1)(i) and (f)(1)(ii) of this AD, by complying with the recording requirements for your model engine listed in the following Table B:

TABLE B.—SERVICE BULLETINS (SBS) FOR RECORDING TOTAL EQUIVALENT CYCLES

For engines	Record using
(A) TPE331–1 through –6 series and TSE331–3U model	Honeywell SB No. TPE/TSE331–72–0019, Revision 22, dated May 16, 2001.
(B) TPE331–8 through –9 series	AlliedSignal SB No. TPE331–72–0117, Revision 11, dated November 13, 1997.
(C) TPE331–10 through –11 series	Honeywell SB No. TPE331–72–0180, Revision 31, dated November 7, 2003.
(D) TPE331–12 series	Honeywell SB No. TPE331–72–0476, Revision 27, dated September 17, 2003.

(2) Remove from service turbine rotors affected by paragraph (f) of this AD using the applicable Turbine Rotor Removal Schedule in Table A of this AD, or, within nine months after the effective date of this AD, whichever occurs later.

Used Turbine Rotors Installed On or After the Effective Date of this AD

(g) For used turbine rotors installed on or after the effective date of this AD, and currently or previously used in special-use operations:

(1) Before further flight, determine and record total equivalent cycles using paragraphs (f)(1)(i) through (f)(1)(iii) of this AD.

(2) Remove from service, turbine rotors affected by paragraph (g) of this AD using the applicable Turbine Rotor Removal Schedule in Table A of this AD.

New (Zero Cycles) Turbine Rotors Installed On or After the Effective Date of This AD

(h) For all new (zero cycles) turbine rotors installed on or after the effective date of this AD used in special-use operations:

(1) Use the new counting method by counting and recording minor and major cycles when accrued, and determine equivalent cycles by the method described in paragraphs (f)(1)(i) and (f)(1)(iii) of this AD.

(2) Using the ratio of six takeoffs and landings per major cycle for unknown cycle history, as referenced in paragraph (f)(1)(ii) of this AD, is not permitted.

Definitions

(i) An engine used in special-use operations is defined as an engine that accrues major and minor cycles and is installed in an aircraft that makes multiple takeoffs and landings without engine shutdown.

(j) Total equivalent cycles, is that combination of major and minor cycles as specified in the Honeywell ASBs listed in Table A of this AD.

(k) Total equivalent cycle life limits listed in the ASBs, are the cycle life limits specified in the SBs listed in Table B of this AD.

(l) The "recording of total equivalent cycles on the Life Limited Part Log Card" is that same procedure specified for "accumulated cycles" or "total cycles" in the SBs listed in Table B of this AD.

(m) "Turbine rotors" include first, second, and third stage seal plates, air seals, rotor disks, wheels, and assemblies, and are parts that have part numbers specified in the ASBs listed in Table A of this AD.

(n) A major cycle is an engine start, takeoff, landing, and shutdown.

(o) A minor cycle, which occurs within a major cycle, is an additional landing with an engine speed reduction to ground idle with no engine shutdown followed by a takeoff.

(p) A "used turbine rotor" is a turbine rotor whose cycles-since-new are more than zero.

Alternative Methods of Compliance

(q) The Manager, Los Angeles Aircraft 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.

Material Incorporated by Reference

(r) You must use the service information specified in Table C of this AD to perform the actions required by this AD. The Director of the Federal Register approved the incorporation by reference of the documents listed in Table C of this AD in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Contact Honeywell Engines, Systems & Services, Technical Data Distribution, M/S 2101-201, P.O. Box 52170, Phoenix, AZ 85072-2170; telephone: (602) 365-2493 (General Aviation); (602) 365-5535 (Commercial); fax: (602) 365-5577 (General Aviation and Commercial) for a copy of this service information. You may review copies at the FAA, New England Region, Office of the Regional Counsel, 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>.

TABLE C.—INCORPORATION BY REFERENCE

Service Bulletin (SB)	Page	Revision	Date
Honeywell SB No. TPE/TSE331-72-0019 Total Pages: 16	1	22	May 16, 2001.
	2-11	21	March 3, 2000.
	12	22	May 16, 2001.
	13-16	21	March 3, 2000.
AlliedSignal SB No. TPE331-72-0117 Total Pages: 10	1	11	November 13, 1997.
	2	9	May 24, 1995.
	3-10	11	November 13, 1997.
Honeywell SB No. TPE331-72-0180 Total Pages: 54	1	31	November 7, 2003.
	2-3	29	August 23, 2002.
	4-5	31	November 7, 2003.
	6-7	29	August 23, 2002.
	8-13	31	November 7, 2003.
	14	27	February 23, 2001.
	15-17	31	November 7, 2003.
	18	27	February 23, 2001.
	19	31	November 7, 2003.

Service Bulletin (SB)	Page	Revision	Date
Honeywell SB No. TPE331-72-0180 (<i>continued</i>)	20	29	August 23, 2002.
Total Pages: 54	21	31	November 7, 2003.
	22-24	29	August 23, 2002.
	25	31	November 7, 2003.
	26	29	August 23, 2002.
	27-54	31	November 7, 2003.
Honeywell SB No. TPE331-72-0476	1-2	27	September 17, 2003.
Total pages: 46	3	25	May 24, 2002.
	4	27	September 17, 2003.
	5	25	May 24, 2002.
	6	27	September 17, 2003.
	7-14	25	May 24, 2002.
	15	26	July 26, 2002.
	16-22	25	May 24, 2002.
	23-27	27	September 17, 2003.
	28-32	25	May 24, 2002.
	33	26	July 26, 2002.
	34	25	May 24, 2002.
	35	27	September 17, 2003.
	36	25	May 24, 2002.
	37-41	27	September 17, 2003.
	42	25	May 24, 2002.
	43	27	September 17, 2003.
	44	25	May 24, 2002.
	45	27	September 17, 2003.
	46	25	May 24, 2002.
Alert Service Bulletin (ASB)	Page	Revision	Date
Honeywell ASB No. TPE331-A72-2111	ALL	Original	November 12, 2002.
Total Pages: 12			
Honeywell ASB No. TPE331-A72-2123	ALL	Original	February 8, 2006.
Total Pages: 12			
Honeywell ASB No. TPE331-A72-2130	ALL	Original	September 27, 2005.
Total Pages: 16			
Honeywell ASB No. TPE331-A72-2131	ALL	Original	September 27, 2005.
Total Pages: 14			

Issued in Burlington, Massachusetts, on June 26, 2006.

Francis A. Favara,

Manager, Engine and Propeller Directorate, Aircraft Certification Service.

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