



**[4910-13-P]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2015-4007; Product Identifier 2015-SW-064-AD; Amendment 39-19351; AD 2018-16-11]**

**RIN 2120-AA64**

**Airworthiness Directives; Various Model 234 and Model CH-47D Helicopters**

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

**ACTION:** Final rule.

**SUMMARY:** We are adopting a new airworthiness directive (AD) for various Model 234 and Model CH-47D helicopters. This AD requires inspections of the pitch housing and revising the pitch housing retirement life. This AD was prompted by reports of cracking in the pitch housing lugs. The actions of this AD are intended to detect and prevent an unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain documents listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For service information identified in this final rule, contact Boeing Helicopters, The Boeing Company, 1 S. Stewart Avenue, Ridley Park, PA 19078, telephone 610-591-2121, and Columbia Helicopters, Inc. (Columbia), 14452 Arndt Road

NE, Aurora OR 97002, telephone (503) 678-1222, fax (503) 678-5841, or at <http://www.colheli.com>. You may review a copy of the referenced service information at the FAA, Office of the Regional Counsel, Southwest Region, 10101 Hillwood Pkwy, Room 6N-321, Fort Worth, TX 76177.

### **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-2015-4007; 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, any incorporated-by-reference service information, the Special Airworthiness Information Bulletin (SAIB), the economic evaluation, any comments received, and other information. The street address for the Docket Operations Office (phone: 800-647-5527) is U.S. Department of Transportation, Docket Operations Office, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

**FOR FURTHER INFORMATION, CONTACT:** Chris Bonar, Aerospace Engineer, Airframe Section, Seattle ACO Branch, FAA, 2200 S 216<sup>th</sup> Street, Des Moines, WA 98198; telephone (206) 231-3521; email [Christopher.Bonar@faa.gov](mailto:Christopher.Bonar@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Discussion**

On March 14, 2017, at 82 FR 13567, the Federal Register published our notice of proposed rulemaking (NPRM), which proposed to amend 14 CFR part 39 by adding an AD that would apply to Model 234 and Model CH-47D helicopters with a pitch housing part number (P/N) 145R2075-11, 145R2075-12, 145R2075-13, 145R2075-14,

145R2075-15, 145R2075-16, 234R2075-1, or 234R2075-2 installed. The type certificate (TC) holder for Model 234 helicopters is Columbia (TC previously held by Boeing Defense & Space Group), and the TC holders for Model CH-47D helicopters currently include Columbia, Billings Flying Service, Inc., and Tandem Rotor, LLC. We did not limit the proposed AD to these TC holders because we expect additional TC holders of helicopters that are subject to this same unsafe condition.

The NPRM was prompted by reports of cracking in the pitch housing lugs, located on the lead side of the lower vertical pin lug. The reports initially prompted the FAA to issue SAIB SW-11-03, dated October 22, 2010, which recommends that all owners and operators of Columbia Model 234 helicopters perform repetitive ultrasonic inspections of the lugs. At that time, there were no civil Model CH-47D helicopters in service. On March 20, 2015, we received a report of lateral vibration on a Model 234 helicopter caused by a crack in an aft pitch housing upper lug. The crack was determined to be caused by fatigue and attributed to underestimated load conditions in the original life limit calculations. This cracking differed from the cracking described in the SAIB.

To correct this unsafe condition, we proposed to require repetitive eddy current and ultrasonic inspections of the pitch housing. Boeing, the original manufacturer of both model helicopters, developed service information for the SAIB ultrasonic inspections, which we proposed to require in the NPRM. Due to the rapid growth rate, an effective eddy current inspection must detect an inward-growing crack of no more than 0.10 inch. The NPRM proposed to require, for Columbia helicopters, the eddy current inspection method specified in Columbia's service information. Because the other TC holders have not developed service instructions, we proposed to require the eddy current inspection

procedures for all other helicopters be submitted to the Seattle or Denver Aircraft Certification Offices for approval.

We also proposed to require removing the pitch housing from service when it accumulates a total of 8,200 hours time-in-service (TIS). Forward pitch housings on Model CH-47D helicopters had no life limit and the aft pitch housing already had a life limit of 8,200 hours TIS. For Model 234 helicopters, the forward pitch housing had a life limit of 12,547 hours TIS and the aft pitch housing had a life limit of 19,077 hours TIS. The NPRM proposed to establish or reduce these life limits to 8,200 hours TIS for both forward and aft pitch housings, regardless of the model helicopter.

The actions specified by the NPRM were intended to detect and prevent a crack in a pitch housing lug. This condition could result in loss of a rotor blade and consequent loss of helicopter control.

Since the NPRM was issued, the FAA's Aircraft Certification Service has changed its organization structure. The new structure replaces product directorates with functional divisions. We have revised some of the office titles and nomenclature throughout this final rule to reflect the new organizational changes. Additional information about the new structure can be found in the Notice published on July 25, 2017 (82 FR 34564).

### **Ex Parte Contact**

On October 25, 2017, after the comment period closed, we had a teleconference with Columbia about Columbia's service information identified in the NPRM.

Columbia's comment during this teleconference is addressed below. A summary of this discussion can be found in the rulemaking docket at <http://www.regulations.gov> in Docket No. FAA-2015-4007.

## **Comments**

We gave the public an opportunity to participate in developing this AD. The following presents the comments we received and the FAA's response to each comment.

## **Request**

One commenter supported the actions required by this AD.

Another commenter requested that we provide more information regarding our determination to include all Model CH-47D and Model 234 helicopters in this AD, including the number of hours on the failed Japanese military CH-47 pitch housing. This commenter suggested the failures may be unique to the Model 234 helicopter or may result from factors, such as high speed operations, a corrosive Japanese operating environment, or inaccurate fatigue equations.

We agree to provide additional information regarding our determination. The Japanese military CH-47 pitch housing failure referenced in SAIB SW-11-03 failed due to fatigue cracking initiated by fretting. The event occurred in 2006, and we do not have access to the number of hours on the failed pitch housing. The reported pitch housing lug cracks occurred on both the Model 234 and the Model CH-47D. These models use identical rotor head design and components, including the same part-numbered pitch housings. Therefore, we determined that the life limits for the pitch housings on both models should be the same.

We found no indication that the lug failure resulted from the Japanese operating environment. Investigation of the cracking did not show evidence of damage originating at corrosion sites. The Japanese operating environment is not unique as these aircraft operate worldwide in a variety of conditions. We also found no indications that the

failures were due to inaccuracies in the Boeing Model 234 cycle count equations. Our investigation concluded that the original fatigue life evaluation excluded certain loading conditions and resulted in a life limit that was too high.

Tandem Rotor requested the AD not impose a life limit on the forward pitch housing or, alternatively, impose a life limit consistent with the life limit of the MH-47E/G forward pitch housing of 24,975 hours TIS. As part of this request, Tandem Rotor asks us to reconsider the service lives established by Boeing.

We disagree. We reviewed newer analyses than those considered by Boeing, including fatigue loading that was not part of the original design data. These newer analyses show a life limit is required on both the forward and aft pitch housings. This is consistent with SAIB SW-11-03, which included the forward pitch housing despite cracks having only been found in service on the aft pitch housing. The newer analyses do not support the 24,975-hour life limit requested by Tandem Rotor. These helicopters are used in a wide variety of operations. The life limits required by this AD assume more severe usage than the average operator in order to fully cover the range of different operators and usages. Individual operators may request an alternative method of compliance if sufficient data is submitted to substantiate a different life limit because their usage is not as damaging to a particular part.

Tandem Rotor also requested that the repetitive ultrasonic inspection interval be increased from 200 hours to 250 hours TIS to align the inspection with an existing recurring 500-hour eddy current inspection, thus reducing travel costs and simplifying maintenance planning for the technician.

We disagree. We have determined that the 200-hour interval for the inspection represents an appropriate time in which the required actions can be performed in a timely manner within the affected fleet, while still maintaining an adequate level of safety. A 250-hour interval did not yield a sufficient safety margin when considering all usage spectrums in the current fleet.

Columbia requested that we change the AD to make the eddy current inspection requirement the same for all helicopters. In support of its request, Columbia states that its service bulletin is proprietary and should not be incorporated by reference (and thus made publicly available) as an inspection method in the AD.

We agree. The inspection methods in the Columbia service information is specific to Columbia helicopters. Because Columbia is the only operator of its U.S. fleet, we determined there are no other operators that need this information to perform the eddy current inspections. We have changed the AD accordingly.

#### **FAA's Determination**

We have reviewed the relevant information, considered the comments received, and determined that an unsafe condition exists and is likely to exist or develop on other products of these same type designs and that air safety and the public interest require adopting the AD with the change previously described. This change will not increase the economic burden on any operator or increase the scope of the AD.

#### **Related Service Information Under 1 CFR part 51**

We reviewed Boeing Service Bulletin 145R2075-62-0001, Revision 1, dated September 27, 2011, which specifies updated life limits for the forward and aft pitch housings and revised overhaul and ultrasonic inspection procedures for various military

Model CH-47 and Model 234 helicopters.

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 also reviewed Columbia Helicopters, Inc. Alert Service Bulletin No. 234-62-A0012, Revision 2, dated March 1, 2016, and Alert Service Bulletin No. 47D-62-A0002, Revision 0, dated March 1, 2016. This service information specifies performing repetitive eddy current inspections, visual inspections, and ultrasonic inspections and for reducing the life limit of the pitch housing assemblies.

### **Differences Between This AD and the Service Information**

The service information provides different life limits for the forward and aft pitch housings, while this AD requires a life limit of 8,200 hours TIS for all pitch housings. The service information requires either an ultrasonic inspection or a dye penetrant inspection as part of the overhaul procedures. The service information specifies different compliance times for the inspections than what this AD requires.

### **Costs of Compliance**

We estimate that this AD affects 15 helicopters of U.S. Registry and that labor costs average \$85 per work-hour. Based on these estimates, we expect the following costs:

- An eddy current inspection requires 4 work-hours for a total cost of \$340 per helicopter and \$5,100 for the U.S. fleet, per inspection cycle.
- An ultrasonic inspection requires 4 work-hours for a total cost of \$340 per

helicopter and \$5,100 for the U.S. fleet, per inspection cycle.

- Replacing a pitch housing requires 8 work-hours and parts cost \$13,000, for a total cost of \$13,680 per helicopter.

### **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**

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 to the extent that it justifies making a regulatory distinction; 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.

We prepared an economic evaluation of the estimated costs to comply with this AD and placed it in the AD docket.

#### **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):

2018-16-11 **Various Model 234 and Model CH-47D Helicopters:** Amendment 39-19351; Docket No. FAA-2015-4007; Product Identifier 2015-SW-064-AD.

#### **(a) Applicability**

This AD applies to Model 234 and Model CH-47D helicopters, regardless of type

certificate holder, with a pitch housing assembly (pitch housing) part number (P/N) 145R2075-11, 145R2075-12, 145R2075-13, 145R2075-14, 145R2075-15, 145R2075-16, 234R2075-1, or 234R2075-2 installed, certificated in any category.

**(b) Unsafe Condition**

This AD defines the unsafe condition as a crack in a pitch housing lug. This condition could result in loss of a rotor blade and consequent loss of helicopter control.

**(c) Effective Date**

This AD becomes effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**(d) Compliance**

You are responsible for performing each action required by this AD within the specified compliance time unless it has already been accomplished prior to that time.

**(e) Required Actions**

(1) Before further flight, remove from service any pitch housing P/N 145R2075-11, 145R2075-12, 145R2075-13, 145R2075-14, 145R2075-15, 145R2075-16, 234R2075-1, and 234R2075-2 that has accumulated 8,200 hours total time-in-service (TIS).

(2) Before the pitch housing accumulates 200 hours TIS after the effective date of this AD and thereafter at intervals not to exceed 200 hours TIS, ultrasonic inspect the pitch housing for a crack in accordance with Attachment 1, paragraphs F and H through K, of Boeing Service Bulletin 145R2075-62-0001, Revision 1, dated September 27, 2011. If there is a crack, replace the pitch housing before further flight.

(3) Within 400 hours TIS after the effective date of this AD or before the pitch

housing has accumulated 4,000 hours total TIS, whichever occurs later, and thereafter at intervals not to exceed 500 hours TIS, eddy current inspect the pitch housing for a crack. If there is a crack, replace the pitch housing before further flight. The eddy current inspection must be accomplished using a method approved by the Manager, Seattle ACO Branch, or by the Manager, Denver ACO Branch. For a repair method to be approved as required by this AD, the manager's approval letter must specifically refer to this AD.

**(f) Alternative Methods of Compliance (AMOCs)**

(1) For operators of helicopters with type certificates issued by the Denver Aircraft Certificate Office or ACO Branch, the manager of the Denver ACO Branch, FAA, may approve AMOCs for this AD. Send your proposal to: Greg Johnson, Senior Aerospace Engineer, Denver ACO Branch, Compliance and Airworthiness Division, FAA, 26805 East 68th Avenue, Denver, CO 80249; phone: 303-342-1083; fax: 303-342-1088; e-mail: Gregory.Johnson@faa.gov.

(2) All other AMOC requests should be sent to the Manager, Seattle ACO Branch, FAA. Send your proposal to: Chris Bonar, Aerospace Engineer, Airframe Section, Seattle ACO Branch, FAA, 2200 S 216<sup>th</sup> Street, Des Moines, WA 98198; telephone (206) 231-3521; email 9-ANM-Seattle-ACO-AMOC-Requests@faa.gov.

(3) For operations conducted under a 14 CFR part 119 operating certificate or under 14 CFR part 91, subpart K, we suggest that you notify your principal inspector, or lacking a principal inspector, the manager of the local flight standards district office or certificate holding district office before operating any aircraft complying with this AD through an AMOC.

**(g) Additional Information**

Special Airworthiness Information Bulletin SW-11-03, dated October 22, 2010 (SAIB); Columbia Helicopters, Inc., Alert Service Bulletin No. 234-62-A0012, Revision 2, dated March 1, 2016; and Columbia Helicopters, Inc., Alert Service Bulletin No. 47D-62-A0002, Revision 0, dated March 1, 2016, which are not incorporated by reference, contain additional information about the subject of this AD. You may view the SAIB on the internet at <http://www.regulations.gov> in the AD Docket. For Columbia service information identified in this final rule, contact Columbia Helicopters, Inc., 14452 Arndt Road NE, Aurora OR 97002, telephone (503) 678 1222, fax (503) 678-5841, or at <http://www.colheli.com>. You may view a copy of the referenced service information at the FAA, Office of the Regional Counsel, Southwest Region, 10101 Hillwood Pkwy, Room 6N-321, Fort Worth, TX 76177.

**(h) Subject**

Joint Aircraft Service Component (JASC) Code: 6220, Main Rotor Head.

**(i) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference 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) Boeing Service Bulletin 145R2075-62-0001, Revision 1, dated September 27, 2011.

(ii) Reserved.

(3) For Boeing Helicopters service information identified in this AD, contact Boeing Helicopters, The Boeing Company, 1 S. Stewart Avenue, Ridley Park, PA 19078, telephone 610-591-2121.

(4) You may view this service information at FAA, Office of the Regional Counsel, Southwest Region, 10101 Hillwood Pkwy, Room 6N-321, Fort Worth, TX 76177. For information on the availability of this material at the FAA, call (817) 222-5110.

(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 Fort Worth, Texas, on July 27, 2018.

Scott A. Horn,

Deputy Director for Regulatory Operations,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

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