



## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA-2018-1046; Product Identifier 2018-CE-049-AD; Amendment 39-21371; AD 2020-26-16]

RIN 2120-AA64

#### Airworthiness Directives; Piper Aircraft, Inc. Airplanes

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

**ACTION:** Final rule.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for certain Piper Aircraft, Inc. (Piper) Models PA-28-151, PA-28-161, PA-28-181, PA-28-235, PA-28R-180, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T, PA-32-260, PA-32-300, PA-32R-300, PA-32RT-300, and PA-32RT-300T airplanes. This AD was prompted by a report of a wing separation caused by fatigue cracking in a visually inaccessible area of the lower main wing spar cap. This AD requires calculating the factored service hours for each main wing spar to determine when an inspection is required, inspecting the lower main wing spar bolt holes for cracks, and replacing any cracked main wing spar. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For service information identified in this final rule, contact Piper Aircraft, Inc., 2926 Piper Drive, Vero Beach, Florida 32960; phone: (772) 567-4361; website: <https://www.piper.com>. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 901 Locust, Kansas City, Missouri 64106. For information on the availability of this material at the FAA, call (816)

329-4148. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2018-1046.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2018-1046; 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, any comments received, and other information. The address for Docket Operations is 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:** Dan McCully, Aviation Safety Engineer, Atlanta ACO Branch, FAA, 1701 Columbia Avenue, College Park, Georgia 30337; phone: (404) 474-5548; fax: (404) 474-5605; email: [william.mccully@faa.gov](mailto:william.mccully@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Background**

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Piper Models PA-28-140, PA-28-150, PA-28-151, PA-28-160, PA-28-161, PA-28-180, PA-28-181, PA-28-235, PA-28R-180, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T, PA-32-260, and PA-32-300 airplanes. The NPRM published in the *Federal Register* on December 21, 2018 (83 FR 65592). The NPRM was prompted by a fatal accident involving wing separation on a Piper Model PA-28R-201 airplane. An investigation revealed a fatigue crack in a visually inaccessible area of the lower main wing spar cap. The NPRM included other model airplanes with similar wing spar structures as the Model PA-28R-201. Based on airplane usage history, the FAA determined that only those airplanes with higher risk for fatigue cracks (airplanes with a significant history of operation in flight training or other high-load environments) should be subject to the inspection requirements proposed in the NPRM.

Because airplanes used in training and other high-load environments are typically operated for hire and have inspection programs that require 100-hour inspections, the

FAA determined the number of 100-hour inspections an airplane has undergone would be the best indicator of the airplane's usage history. Accordingly, the FAA developed a factored service hours formula based on the number of 100-hour inspections completed on the airplane.

In the NPRM, the FAA proposed to require a review of the airplane maintenance records to determine the number of 100-hour inspections and the application of the factored service hours formula to identify when an airplane meets the criteria for the proposed eddy current inspection of the lower main wing spar bolt holes. The FAA also proposed to require inspecting the lower main wing spar bolt holes for cracks once a main wing spar exceeds the specified factored service hours and replacing any main wing spar when a crack is indicated. The maintenance records review to determine the factored service hours proposed in the NPRM would only apply when an airplane has either accumulated 5,000 or more hours time-in-service (TIS); has had either main wing spar replaced with a serviceable (more than zero hours TIS) main wing spar; or has missing and/or incomplete maintenance records.

The FAA issued a supplemental notice of proposed rulemaking (SNPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Piper Models PA-28-151, PA-28-181, PA-28-235, PA-28R-180, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T, PA-32-260, PA-32-300, PA-32R-300, PA-32RT-300, and PA-32RT-300T airplanes. The SNPRM published in the *Federal Register* on June 3, 2020 (85 FR 34121). The SNPRM was prompted by comments received on the NPRM and further analysis by the FAA. The FAA determined that some additional airplane models are likely affected by the unsafe condition and should be included in the applicability, while other models that are not affected should be removed from the applicability. Consequently, in the SNPRM, the FAA proposed to revise the applicability and the estimated cost associated with the proposed AD actions. The SNPRM also clarified the language in the applicability and some of the proposed actions. In addition, the SNPRM no longer allowed replacement of the wing spar with a used part. The FAA determined replacement of the wing spar with a part of unknown operational history would not ensure an acceptable level of safety. After the NPRM was published,

Piper issued a service bulletin that contains procedures for the eddy current inspection. The SNPRM proposed to require using the eddy current inspection contained in that service bulletin instead of the inspection procedure in the appendix to the NPRM.

The FAA developed a flow chart that may assist operators in complying with this AD. The flow chart may be found at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2018-1046.

The FAA is issuing this AD to address the unsafe condition on these products.

### **Discussion of Final AD**

#### **Comments**

The FAA received comments on the SNPRM from 42 commenters. The majority of the commenters were individuals. The remaining commenters included Piper, governmental agencies such as the National Transportation Safety Board (NTSB) and the Civil Aviation Safety Authority of Australia (CASA), and organizations such as the Aircraft Owners and Pilots Association (AOPA), the General Aviation and Manufacturer's Association (GAMA), the Experimental Aircraft Association (EAA), and the Piper Flying Association. The following presents the comments received on the SNPRM and the FAA's response to each comment.

## **A. Supportive Comments**

The NTSB and two individual commenters supported the AD without any recommended changes. Three other individual commenters supported the AD but requested changes discussed below.

## **B. Requests for Additional Information**

CASA requested information on whether a bolt hole eddy current inspection would have detected the crack in the 1993 accident airplane.

The FAA agrees to provide the requested information. Because it was located slightly beyond the detectable range of a bolt hole eddy current inspection, the crack in the 1993 accident airplane would not have been detected by an eddy current inspection of the bolt holes. Although the airplane had previously undergone dye penetrant inspection of the bolt holes, the crack would not have been detectable under that method either due to its location beyond the bolt hole perimeter and beneath the web doubler.<sup>1</sup> The 1993 accident disclosed evidence of a fatigue crack initiation in a wing spar similar to that of the 2018 accident aircraft, N106ER (the accident that prompted this AD). In addition to having high hours TIS, the fatigue crack was very near the inspection location addressed by this AD. As such, the FAA included the 1993 accident in the risk analysis process for this AD.

CASA and an individual commenter requested information comparing the failures in the 1987 and 1993 accidents with the failure of N106ER (the accident that prompted this AD). CASA specifically asked whether these wing spars failed at the same outer bolt hole location.

The FAA agrees to provide additional information. Both airplanes in question (N8191V, the 1987 accident; and N2093A, the 1993 accident) experienced wing separations at the outboard bolt holes of the lower spar cap. The NTSB Metallurgist's Factual Report in the 1987 accident, Materials Laboratory Report No. 87-89, dated August 17, 1987, found that fatigue had initiated at two locations on the lower surface of

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<sup>1</sup> The supporting materials for NTSB accident NYC93FA140 are available in the NTSB Docket at <https://dms.ntsb.gov/pubdms/search/hitlist.cfm?docketID=4323&CFID=1643539&CFTOKEN=74133c21c3ef3d72-C9941D08-5056-942C-92883A7C17DB9FF3>.

the left wing spar cap near the forward most outboard, spar to carry through, bolt hole. The report further found the fatigue had propagated completely through the forward flange and partially into the aft flange and spar web.<sup>2</sup> The Metallurgist's Factual Report in the 1993 accident, Report No. 93-34, dated December 15, 1993, found that the lower cap was fractured through the most outboard pair of bolts connecting the spar and carry-through.<sup>3</sup> The FAA notes that the NTSB Final Report for the 1993 accident states the investigation could not determine whether an uncracked wing would have failed.<sup>4</sup>

CASA and an individual commenter requested information on the inspection method used to detect cracks on aircraft N104ER. CASA asked whether the inspection method described in Piper Service Bulletin No. 1345, dated March 27, 2020 (Piper SB No. 1345), was used. The individual commenter asked whether bolt hole eddy current is the most suitable method if it was used on N104ER and did not reveal the cracks that caused the wing failure.

The FAA agrees to provide the requested information. Aircraft N104ER was used in the investigation of the 2018 accident due to the similarities in structure and operational use to the accident aircraft. The initial high frequency eddy current inspection of N104ER was conducted by a local FAA-approved repair station contracted by the owner. The FAA could not determine why the inspection conducted by the FAA-approved repair station did not detect cracks because this inspection did not involve the investigative team. Also, the inspection occurred prior to the development of the inspection procedures required by this AD. The investigative team conducted a second high frequency eddy current inspection, in the development of the inspection procedures required by the AD, with the wings removed, which detected a crack. The team

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<sup>2</sup> Report No. 87-89 is available in the NTSB Docket for NTSB accident FTW87FA088 at <https://dms.nts.gov/pubdms/search/document.cfm?docID=475398&docketID=62694&mkey=96975>.

<sup>3</sup> Report No. 93-34 is available in the NTSB Docket for NTSB accident NYC93FA140 at <https://dms.nts.gov/pubdms/search/document.cfm?docID=487590&docketID=4323&mkey=38586>.

<sup>4</sup> The NTSB Aviation Accident Final Report for NTSB accident NYC93FA140 is available on the NTSB's website at <https://app.nts.gov/pdfgenerator/ReportGeneratorFile.ashx?EventID=20001211X13212&AKey=1&RTyp e=Final&IType=FA>.

conducted an additional high frequency eddy current inspection after reinstalling the wings to validate the inspection process, which confirmed the presence of a crack.<sup>5</sup>

Another commenter requested information on the methodology used by the FAA for identifying specific wing loads, the applied stress locations, and their influence on fatigue life, and the rationale for selecting those aircraft within 95 percent of the baseline load case for the applicability.

The FAA agrees to provide the requested information. The methodology used by the FAA for identifying specific wing loads for gust, maneuvering, and landing loads comes from 14 CFR Part 23 (Amdt 63) Subpart C-Structure and Advisory Circular 23-13A Fatigue, Fail-Safe, and Damage Tolerance Evaluation of Metallic Structure for Normal, Utility, Acrobatic, and Commuter Category Airplanes.

A subsequent analysis calculated damage factors using variables for each of the various PA-28/32 models. The variables include maximum design weight ( $W_{max}$ ), maximum design cruising speed ( $V_{cmax}$ ), spar cross section properties, and spanwise center of pressure location for each loading category mentioned above. The results for each model/load category are divided by the PA-28R-201 (accident aircraft model) results. Any model with a damage factor ratio greater than 0.94 is included in the effectivity of this AD.

The 0.94 factor cutoff was arrived at by observing a natural break in the resulting damage factor numbers and the Palmgren–Miner linear damage hypothesis or Miner’s Rule. This theory shows that a linear decrease in stress (damage factor in this case) results in an exponential increase in fatigue life. The FAA believes this level of risk is appropriate for the purpose of this one-time inspection. The applied stress location is at the lower spar cap attachment to the fuselage carry through channel, outboard row of fasteners. This is the location of the fatigue failure on the accident airplane.

### **C. Comments Regarding the FAA’s Justification of the Unsafe Condition**

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<sup>5</sup> The supporting materials for NTSB accident ERA18FA120 are available in the NTSB Docket at <https://dms.nts.gov/pubdms/search/hitlist.cfm?docketID=62694&CFID=95094&CFTOKEN=b616b3892cb482f1-5B544A63-5056-942C-92C71C2E6BFF1D97>.

Piper and GAMA requested the AD be withdrawn because the completed NTSB investigation invalidates the FAA's basis for issuing an AD. These commenters asserted that, based on the NTSB's findings, the operator's failure to follow existing maintenance requirements was responsible for the accident involving N106ER.

The FAA disagrees that the NTSB's investigation invalidates the FAA's basis for issuing this AD. The spar surface is not visually accessible during routine inspections required by existing maintenance requirements, because the lower spar cap is obscured by the installation of the web doubler on the upper surface and the wing skin on the lower surface. Therefore, a well-developed crack may only be visually detected after the spar crack progresses into the doubler. The claim that an operator may fail to detect a crack that had progressed to an extent that caused cracking in the overlying web doubler only serves to reinforce the need for detecting fatigue cracks in the spar before they reach a critical nature.

#### **D. Comments Regarding Applicability**

Piper, AOPA, EAA, and several individual commenters requested the FAA revise the applicability of the AD because it is still too broad and includes models not representative of the accident airplane.

EAA requested the FAA ensure that only the appropriate aircraft, in general, are subject to the AD. Piper and AOPA asserted that the AD should not include Models PA-28-151, PA-28-181, PA-32R-300, and PA-32RT-300T airplanes. In support, Piper stated that the PA-28-151, PA-28-181, and PA-32R-300 models have "stress per g" measurements that do not meet the 95 percent threshold established by the FAA for comparison to the accident airplane. CASA and eight individual commenters questioned why the proposed AD applies to the Model PA-28-151 when that model is structurally similar to the Model PA-28-161, which the FAA proposed to remove from the applicability in the SNPRM. Two individual commenters requested the AD apply to the Model PA-28-161, because of the longer wing structure. Piper and three individual commenters stated the PA-32R-300 and certain PA-32-300 models do not share the same wing construction and installation details as the accident airplane model.

The FAA disagrees with removing Models PA-28-151, PA-28-181, and PA-32R-300 from the applicability of the AD. The FAA used the following load cases, provided by Piper, for comparison to the accident airplane: gust damage factor, maneuver damage factor, and landing damage factor. The included models each had one or more load cases that exceed 94 percent of the baseline Model PA-28R-201. Several models had individual load cases exceeding 100 percent of the baseline value.

The FAA partially agrees with the comments regarding the similarity between the Model PA-28-151 and the Model PA-28-161. In determining pertinent load cases, the FAA used factors such as maximum gross takeoff weight and maximum cruise speed in combination with structural considerations. In the SNPRM, the FAA proposed to remove Model PA-28-161 from the applicability based on initial load calculations based on a maximum gross takeoff weight of 2,240 lbs. Additional analysis indicated that the maximum gross takeoff weight is not uniform among all Model PA-28-161 variants, and that some variants are certificated to a maximum gross takeoff weight that brings the gust damage factor load case to above 94 percent of the baseline. Accordingly, this AD applies to the Model PA-28-161.

The FAA disagrees with removing the Model PA-32R-300 and certain Model PA-32-300 airplanes from the applicability based on wing construction.

Although the FAA acknowledges the differing wing structures among some models, that structure was taken into consideration during loads analysis in terms of inertia calculations for the each cross section.

## **E. Comments Regarding the Compliance Time**

An individual commenter expressed concern that the FAA's factored service hours did not align with the compliance time in Piper SB No. 1345. The commenter stated that Piper's compliance time of 5,000 hours TIS is simpler and a more conservative approach to safety.

The FAA partially agrees. While using hours TIS is a simpler approach, it would create the possibility of requiring an unnecessary inspection long before any fatigue crack might be expected to form. The FAA established 5,000 factored service hours as a method of delaying or eliminating inspection requirements for many personal use, lower risk airplanes. This AD will require an inspection within 100 hours TIS after reaching 5,000 factored service hours.

Another commenter requested the FAA determine the compliance time based on an estimate of the number of airplanes that will need to be inspected and the number of qualified eddy current inspectors, to allow sufficient time for all airplanes in the fleet to be inspected. The commenter stated it is unacceptable for airplanes to be grounded for a significant amount of time because of an insufficient number of eddy current inspectors or equipment.

The FAA disagrees that a change to the compliance time is necessary. The FAA anticipates that less than 50 percent of applicable airplanes will have accumulated the 5,000 TIS necessary for the logbook review. The FAA also anticipates that the majority of those airplanes will not need an inspection after the logbook review. Calculating the number of qualified and available eddy current inspectors would be too speculative, as it is largely based on current demand.

One commenter requested that the FAA convert the AD into an emergency AD so that data from the inspections can be collected as soon as possible.

Considering the number of known failures, the severity of the outcome, and number of cracks detected during the investigation, the FAA determined that an emergency AD was not necessary. The FAA did not change this AD based on these comments.

## **F. Comments Regarding the Requirements Proposed in the SNPRM**

## **Request to Allow Replacement of the Spar with a Used Spar**

The Piper Flying Association and four individual commenters requested the FAA change the proposed requirement to install a new (zero hours TIS) spar if cracks were detected. These commenters stated that any spar that has passed the eddy current inspection is an airworthy spar and should be allowed as a replacement spar. Two of the commenters noted that the unavailability of new spars would effectively ground aircraft that fail the eddy current inspection.

The FAA agrees and has revised this AD to allow the installation of a used (more than zero hours TIS) wing spar that has passed the eddy current inspection.

An individual commenter requested the FAA compel Piper to restore availability of replacement parts.

The FAA disagrees. As a federal agency, the FAA is responsible for all directives, policies, and mandates issued under its authority. The FAA does not have the authority to require a manufacturer to produce new parts.

## **Requests for Information About the Service Bulletin**

An individual commenter asked how operators can record compliance with the AD when the required service bulletin does not apply to all of the models in the AD. Another individual commenter asked why the AD only incorporates part of the instructions in Piper SB No. 1345.

The FAA's regulations specify that when there is a conflict between an AD and a service document incorporated by reference in the AD, operators must follow the requirements of the AD. See 14 CFR 39.27. Since this AD differs from Piper SB No. 1345, as described in the Differences Between this AD and the Service Information section, the AD only requires the inspection method portion of Piper SB No. 1345.

## **Requests for Different Inspection Methods**

An individual commenter suggested guided wave technology as a better, less intrusive, and less expensive inspection method. Another individual commenter suggested using dye penetrant inspection without bolt removal as a less aggressive method for early detection, even if it meant more frequent inspections.

The FAA disagrees. The FAA, Piper, and the NTSB considered several inspection options. Guided wave is not a preferred method for this AD due to accessibility issues and the need to detect longitudinal, as opposed to circumferential, cracks. To be detectable using a dye penetrant or fluorescent penetrant method, a crack that initiated at a wing spar attach bolt hole would have had to propagate through the web doubler and beyond the perimeter of the washer(s). A crack of that size would have already dangerously compromised the strength of the spar cap.

The FAA did not change this AD based on these comments.

### **Requests for Different Repair Options**

An individual commenter observed that if one wing indicates fatigue cracks, then replacing both wings may be warranted, since the opposite wing would have experienced the same usage history.

The FAA partially agrees. Fatigue cracking in one wing would warrant an increased level of concern for the opposite wing. However, the FAA determined that replacement of both wings is not required when only one wing has failed the inspection. Certain factors that can accelerate the initiation of a fatigue crack on one wing may not be present on the opposite wing (for example, prior damage from operations or maintenance).

Another individual commenter requested the FAA consider a cold working process (split sleeve cold expansion) on the bolt holes to minimize future fatigue cracking.

The FAA partially agrees. Piper provided the FAA with cold working data in support of a proposed repair and fatigue mitigation process for the wing spars. Cold working has been considered and may be investigated further should the inspection reports received as a result of this AD indicate that such action is required.

One individual commenter suggested using different washers, adjusting the bolt torque to the lowest value of the acceptable range, and installing a doubler plate to alleviate stress concentrations.

The FAA disagrees. Load transfer into the spar cap does not rely on a washer to help evenly transfer the load. A larger washer would not lower the stress concentration as

the critical geometry is the fastener diameter and the edge distance associated with the diameter, not the washer size. Staying within the torque values for the bolt will not alleviate the loading in the bolt enough to decrease the stress concentration and could lead to further issues such as the bolt being under torqued, which would worsen the fatigue life. A doubler repair has been considered and may be investigated further should the inspection reports received as a result of this AD indicate that such action is required.

An additional individual commenter asked if changing the outer holes to the next smaller size would result in a more favorable stress distribution.

The FAA disagrees. While a smaller hole may decrease the load in the fastener, the gain is offset by the increase in stress concentration.

The FAA has not changed the AD based on these comments.

### **Request for Safe Life**

An individual commenter suggested establishing a life limit as a solution based on a comparison of any safe life analysis conducted by Piper with the known fatigue failures.

The FAA partially agrees. Fatigue safe life has been considered and may be pursued as an option should the inspection reports received as a result of this AD indicate that further action is required. Because this AD is interim in nature and intended to gather fleet condition data based on these comparisons, this AD does not contain repetitive or terminating actions.

The FAA did not make any changes to this AD based on this comment.

### **Request to Revise the Reporting Information**

Piper requested the FAA revise the inspection results form to include Piper's mailing address.

The FAA agrees and has added Piper's mailing address to the inspection results form.

### **G. Comments Previously Addressed in the SNPRM**

AOPA, EAA, and several individuals submitted comments that were substantially the same as comments the FAA received on the NPRM. These comments pertain to issues such as the FAA's decision to issue the AD as interim action, whether the FAA

should issue a special airworthiness information bulletin or airworthiness concern sheet instead of an AD, how the FAA determined the AD applicability, whether the FAA should issue this AD considering the cost and risk associated with the removal and reinstallation of the airplane wings/bolts, alternatives for instances where maintenance records were missing or incomplete, how to count 100-hour inspections, the FAA's hourly labor rate, the estimated number of hours for the eddy current inspection, and indirect costs. The FAA previously addressed each of these comments in the SNPRM.

#### **H. Out of Scope Comments**

The FAA also received and reviewed a few comments that stated the commenter's viewpoint without a suggestion specific to the AD or otherwise did not make a request the FAA can act on. These comments are outside the scope of this AD.

#### **Other Changes to the Final AD**

The FAA removed two serial-numbered airplanes from the applicability that were included in the SNPRM because those airplanes were previously inspected using the current procedures and witnessed by the FAA. The FAA determined those airplanes are not subject to the unsafe condition addressed by this AD. The FAA also added language to clarify the procedures for when a wing is not installed on the airplane and clarified some of the language in the examples and figures.

#### **Conclusion**

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes and the changes described previously, this AD is adopted as proposed in the SNPRM. None of the changes will increase the economic burden on any operator.

#### **Related Service Information under 1 CFR Part 51**

The FAA reviewed Piper Service Bulletin No. 1345, dated March 27, 2020 (Piper SB No. 1345). This service bulletin specifies procedures for doing an eddy current inspection and instructions to report the results of the inspection to Piper and to replace the wing, wing spar, or spar section as necessary. 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**

The FAA reviewed Piper Service Bulletin No. 886, dated June 8, 1988; and Piper Service Bulletin SB 978A, dated August 6, 1999. These service bulletins contain procedures for determining initial and repetitive inspection times based on the aircraft's usage and visually inspecting the wing lower spar caps and the upper wing skin adjacent to the fuselage and forward of each main spar for cracks. The FAA also reviewed Piper Service Letter No. 997, dated May 14, 1987, which contains procedures for replacing airplane wings.

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

Piper SB No. 1345 specifies doing the eddy current inspection upon reaching 5,000 hours TIS; however, this AD requires using the factored service hours to identify the airplanes at the highest risk of developing fatigue cracks. Piper SB No. 1345 also specifies using its feedback form to report the eddy current inspection results, but this AD requires the use of a different form attached as appendix 1.

### **Interim Action**

The FAA considers this AD to be an interim action. The inspection reports will provide the FAA additional data for determining the number of cracks present in the fleet. After analyzing the data, the FAA may take further rulemaking action.

### **Costs of Compliance**

The FAA estimates that this AD affects 5,440 airplanes of U.S. registry. There are 10,881 airplanes of U.S. registry with a model and serial number shown in table 1 to paragraph (c) of this AD. Based on a sample survey, the FAA estimates that 50 percent of those U.S.-registered airplanes will have reached the qualifying 5,000 hours TIS necessary to do the required logbook review.

The FAA estimates the following costs to comply with this AD:

### Estimated costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Review airplane maintenance records and calculate factored service hours	3 work-hours X \$85 per hour = \$255	Not applicable	\$255	\$1,387,200

The FAA estimates the following costs to do the eddy current inspection. Because some airplanes are only used non-commercially and will not accumulate the specified factored service hours in the life of the airplane, the FAA has no way of determining the number of airplanes that might need this inspection:

### On-condition costs

Action	Labor cost	Parts cost	Cost per product
Gain access to the left-hand (LH) and right-hand (RH) inspection areas	2 work-hours X \$85 per hour = \$170	\$20	\$190
Do eddy current inspections of the LH and RH lower main wing spar	1 work-hour contracted service x \$600 = \$600	N/A	\$600
Restore aircraft	2 work-hours X \$85 per hour = \$170	N/A	\$170
Report inspection results to the FAA and Piper Aircraft, Inc.	1 work-hour X \$85 per hour = \$85	N/A	\$85

The FAA estimates the following costs to do any necessary replacements that would be required based on the results of the inspection. The agency has no way of determining the number of aircraft that might need this replacement:

### On-condition replacement costs

Action	Labor cost	Parts cost	Cost per product
Replace main wing spar	80 work-hours X \$85 per hour = \$6,800 per wing spar	\$5,540	\$12,340 per wing spar

### 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 a 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 currently valid OMB Control Number. The OMB Control Number for this information collection is 2120-0056. Public reporting for this collection of information is estimated to take approximately 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. All responses to this collection of information are mandatory. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, Federal Aviation Administration, 10101 Hillwood Parkway, Fort Worth, TX 76177-1524.

### **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.

The FAA is 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) Will not affect intrastate aviation in Alaska to the extent that it justifies making a regulatory distinction, 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.

### **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

### **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:

**2020-26-16 Piper Aircraft, Inc.:** Amendment 39-21371; Docket No. FAA-2018-1046; Product Identifier 2018-CE-049-AD.

### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

### **(b) Affected ADs**

None.

### **(c) Applicability**

This AD applies to Piper Aircraft, Inc. (Piper) airplanes, certificated in any category, with a model and serial number shown in table 1 to paragraph (c) of this AD, and that meet at least one of the criteria in paragraphs (c)(1), (2), or (3) of this AD.

Note 1 to the introductory text of paragraph (c): An owner/operator with at least a private pilot certificate may do the aircraft maintenance records review to determine the applicability as specified in paragraph (c) of this AD.

(1) Has accumulated 5,000 or more hours time-in-service (TIS); or

(2) Has had either main wing spar replaced with a serviceable (more than zero hours TIS) main wing spar; or

(3) Has missing and/or incomplete maintenance records.

Table 1 to paragraph (c)

<b>Model</b>	<b>Serial Numbers</b>
PA-28-151	All serial numbers
PA-28-161	All serial numbers except 2842006
PA-28-181	All serial numbers
PA-28-235	All serial numbers
PA-28R-180	All serial numbers
PA-28R-200	All serial numbers except 28R-7235151
PA-28R-201	All serial numbers except 2844029, 2844030, 2844081, 2844125, 2844136, 2844147 through 2844151, 28R-7737078, 28R-7737142, 28R-7837108, 28R-7837125, and 28R-7837257
PA-28R-201T	All serial numbers
PA-28RT-201	All serial numbers
PA-28RT-201T	All serial numbers
PA-32-260	All serial numbers
PA-32-300	All serial numbers
PA-32R-300	All serial numbers
PA-32RT-300	All serial numbers except 32R-7985004
PA-32RT-300T	All serial numbers

**(d) Subject**

Joint Aircraft System Component (JASC) Code 5711, Wing Spar.

**(e) Unsafe Condition**

This AD was prompted by a report of a wing separation caused by fatigue cracking in a visually inaccessible area of the main wing lower spar cap. The FAA is issuing this AD to detect and correct fatigue cracks in the lower main wing spar cap bolt

holes. The unsafe condition, if not addressed, could result in the wing separating from the fuselage in flight.

**(f) Compliance**

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

**(g) Definitions**

(1) “TIS” has the same meaning as the definition of “time in service” in 14 CFR 1.1.

(2) For purposes of this AD, “factored service hours” refers to the calculated quantity of hours using the formula in paragraph (h)(2) of this AD, which accounts for the usage history of the airplane.

**(h) Review Airplane Maintenance Records and Calculate Factored Service Hours for Each Main Wing Spar**

(1) Within 30 days after the effective date of this AD, review the airplane maintenance records and determine the number of 100-hour inspections completed on the airplane since new and any record of wing spar replacement(s).

(i) For purposes of this review, count any inspection conducted to comply with the 100-hour requirement of 14 CFR 91.409(b) pertaining to carrying persons for hire, such as in-flight training environments, even if the inspection was entered in the maintenance records as an “annual” inspection or as an “annual/100-hour” inspection. If the purpose of an inspection was to comply with § 91.409(b), then it must be counted. To determine the purpose of an inspection, note the repeating intervals between inspections, i.e., less than 10 months between, and typically 90-110 flight hours. An inspection entered as a “100-hour” inspection but done solely for the purpose of meeting the requirement to complete an annual inspection, or those otherwise not required by §91.409(b), need not be counted. For operators utilizing a progressive inspection program, count the completion of each § 91.409(b) 100-hour interval as one inspection.

(ii) If a main wing spar has been replaced with a new (zero hours TIS) main wing spar, count the number of 100-hour inspections from the time of installation of the new main wing spar.

(iii) If a main wing spar has been replaced with a serviceable main wing spar (more than zero hours TIS) or the airplane maintenance records are missing or incomplete, the wing history cannot be determined. Perform the eddy current inspection as specified in paragraph (i) of this AD.

(iv) The actions required by paragraph (h)(1) of this AD may be performed by the owner/operator (pilot) holding at least a private pilot certificate and must be entered into the aircraft records showing compliance with this AD in accordance with 14 CFR 43.9(a)(1) through (4), and 14 CFR 91.417(a)(2)(v). The record must be maintained as required by 14 CFR 91.417, 121.380, or 135.439.

(2) Before further flight after completing the action in paragraph (h)(1) of this AD, calculate the *factored service hours* for each main wing spar using the formula in figure 1 to paragraph (h)(2) of this AD. Thereafter, after each annual inspection and 100-hour inspection, recalculate/update the *factored service hours* for each main wing spar until the main wing spar has accumulated 5,000 or more *factored service hours*.

N is the number of 100-hour inspections; and T is the total hours TIS of the airplane.

$$(N \times 100) + \frac{[T - (N \times 100)]}{17} = \text{Factored Service Hours}$$

Figure 1 to paragraph (h)(2)

(3) An example of determining factored service hours for an airplane with no 100-hour inspections is as follows: The airplane maintenance records show that the airplane has a total of 12,100 hours TIS, and only annual inspections have been done. None of the annual inspections were done for purposes of compliance with § 91.409(b). Both main wing spars are original factory installed. In this case, N = 0 and T = 12,100. Use those values in the formula as shown in figure 2 to paragraph (h)(3) of this AD. In

the example in figure 2 to paragraph (h)(3) of this AD), the eddy current inspection would not be required because the factored service hours are less than 5,000 hours.

If the number of 100-hour inspections is 0 and the total hours TIS of the airplane is 12,100 hours, then your formula would be:

$$(0 \times 100) + \frac{[12,100 - (0 \times 100)]}{17} = 711 \text{ Factored Service Hours}$$

Figure 2 to paragraph (h)(3)

(4) An example of determining factored service hours for an airplane with both 100-hour and annual inspections is as follows: The airplane was originally flown for personal use, then for training for a period of time, then returned to personal use. The airplane maintenance records show that the airplane has a total of 10,600 hours TIS, and fifty-five 100-hour inspections for purposes of compliance with § 91.409(b) have been done. Both main wing spars are original factory installed. In this case, N = 55 and T = 10,600. Use those values in the formula shown in figure 3 to paragraph (h)(4) of this AD. First, calculate commercial use time by multiplying (N x 100). Next, subtract that time from the total time, and divide that quantity by 17. Add the two quantities to determine total factored service hours. In the example in figure 3 to paragraph (h)(4) of this AD), the eddy current inspection would be required because the factored service hours are more than 5,000 hours.

If the number of 100-hour inspections is 55 and the total hours TIS of the airplane is 10,600 hours, then your formula would be:

$$(55 \times 100) + \frac{[10,600 - (55 \times 100)]}{17} =$$

$$(5,500) + \frac{[10,600 - (5,500)]}{17} =$$

$$(5,500) + 300 = 5,800 \text{ Factored Service Hours}$$

Figure 3 to paragraph (h)(4)

**(i) Eddy Current Inspect**

Within the compliance time specified in either paragraph (i)(1) or (2) of this AD, as applicable, eddy current inspect the inner surface of the two lower outboard bolt holes on the lower main wing spar cap for cracks. If the wing is installed, use steps 1 through 3 or, if the wing is not installed, use step 3 in the Instructions of Piper Aircraft, Inc. Service Bulletin No. 1345, dated March 27, 2020 (Piper SB No. 1345). Although Piper SB No. 1345 specifies NAS 410 Level II or Level III certification to perform the inspection, this AD allows Level II or Level III qualification standards for inspection personnel using any inspector criteria approved by the FAA.

Note 2 to the introductory text of paragraph (i): Advisory Circular 65-31B contains FAA-approved Level II and Level III qualification standards criteria for inspection personnel doing nondestructive test (NDT) inspections.

(1) Within 100 hours TIS after complying with paragraph (h) of this AD or within 100 hours TIS after a main wing spar accumulates 5,000 factored service hours, whichever occurs later; or

(2) For airplanes with an unknown number of factored service hours on a main wing spar, within the next 100 hours TIS after the effective date of this AD or within 60 days after the effective date of this AD, whichever occurs later.

**(j) Replace the Main Wing Spar**

If a crack is found during an inspection required by paragraph (i) of this AD, before further flight, replace the main wing spar with a new (zero hours TIS) main wing spar or with a serviceable (more than zero hours TIS) main wing spar that has passed the eddy current inspection required by paragraph (i) of this AD.

**(k) Install New Bolts**

Before further flight after completing the actions required by paragraph (i) or (j) of this AD, install new bolts by following step 6 of Piper Aircraft, Inc. Service Bulletin No. 1345, dated March 27, 2020.

**(l) Report Inspection Results**

Within 30 days after completing an inspection required by paragraph (i) of this AD, using Appendix 1, "Inspection Results Form," of this AD, report the inspection results to the FAA at the Atlanta ACO Branch and to Piper Aircraft. Submit the report to the FAA and Piper using the contact information found on the form in appendix 1 of this AD.

**(m) Special Flight Permit**

A special flight permit may only be issued to operate the airplane to a location where the inspection requirement of paragraph (i) of this AD can be performed. This AD prohibits a special flight permit if the inspection reveals a crack in a main wing spar.

**(n) Paperwork Reduction Act Burden Statement**

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a 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 currently valid OMB Control Number. The OMB Control Number for this information collection is 2120-0056. Public reporting for this collection of information is estimated to be approximately 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing and reviewing the collection of information. All responses to this collection of information are mandatory. Send comments regarding this burden estimate or any other aspect of this collection of information, including

suggestions for reducing this burden to: Information Collection Clearance Officer, Federal Aviation Administration, 10101 Hillwood Parkway, Fort Worth, TX 76177-1524.

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

(1) The Manager, Atlanta 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 (p) 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.

**(p) Related Information**

For more information about this AD, contact Dan McCully, Aviation Safety Engineer, Atlanta ACO Branch, FAA, 1701 Columbia Avenue, College Park, Georgia 30337; phone: (404) 474-5548; fax: (404) 474-5605; email: [william.mccully@faa.gov](mailto:william.mccully@faa.gov).

**(q) 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) Piper Service Bulletin No. 1345, dated March 27, 2020.

(ii) [Reserved]

(3) For Piper Aircraft, Inc. service information identified in this AD, contact Piper Aircraft, Inc., 2926 Piper Drive, Vero Beach, Florida 32960; phone: (772) 567-4361; website: <https://www.piper.com>.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 901 Locust, Kansas City, Missouri 64106. For information on the availability of this material at the FAA, call (816) 329-4148.

(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, email: [fedreg.legal@nara.gov](mailto:fedreg.legal@nara.gov), or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

**Appendix 1 to AD 2020-26-16**

**Inspection Results Form**

Email completed form to:  
**9-ASO-ATLCOS-Reporting@faa.gov**  
and  
**customer.service@piper.com**

Or mail to: Federal Aviation Administration  
Atlanta ACO Branch, AIR-7A1  
1701 Columbia Avenue  
College Park, GA 30337  
and  
Piper Certification Office  
2926 Piper Drive  
Vero Beach, FL 32960

SUBJECT line: Docket No. FAA-2018-1046

*Include photos if applicable*

Aircraft Model No.: <b>PA-</b>	Serial Number:
Aircraft Total Hours Time-In-Service (TIS):	Registration Number:
Factored Service Hours Left-Hand (LH) Wing:	Right-Hand (RH) Wing:
(If both wings are factory installed original, these numbers should be the same)	
<b>Inspection Results</b>	
LH Wing Spar Fwd Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>	RH Wing Spar Fwd Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>
LH Wing Spar Aft Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>	RH Wing Spar Aft Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>
<b>Inspector Comments (observed damage, condition of hole, etc)</b>	

**Inspector Information**

Name (print): \_\_\_\_\_ Signature: \_\_\_\_\_

Certificate No.: \_\_\_\_\_ Date: \_\_\_\_\_

Issued on December 30, 2020.

Gaetano A. Sciortino, Deputy Director for Strategic Initiatives,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

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