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President & CEO

January 15, 2019

U.S. Department of Transportation
Docket Operations, M-30, West Building Ground Floor, Room W12-140
1200 New Jersey Avenue SE
Washington, DC 20590

Subject: Piper Aircraft, Inc. Comments to the "Interim" Notice of Proposed Rulemaking AD, Docket No. FAA-2018-1046; Product Identifier 2018-CE-049-AD

Introduction

For more than 80 years, Piper Aircraft, Inc.'s highest priority has always been the operational safety of our products and the people that fly in them. Throughout its history, Piper has enjoyed one of the safest records in the General Aviation community, has one of the best Air Safety Investigation teams in the industry, and has consistently worked closely with the FAA and NTSB in determining the root cause of accidents and incidents involving our aircraft; even when that root cause involves an issue with the aircraft itself. Unfortunately, in the investigation of the accident which gives rise to this "Interim" NPRM AD, the FAA has chosen to depart from this long history and instead invoke "ex-parte" rules while initiating a blanket order where the owners of more than 40,000 aircraft bear the burden of removing wing fasteners on perfectly safe aircraft in order to determine whether a fatigue crack found in the accident aircraft (and also found in one other aircraft operated by the same entity) might be present elsewhere. This is all being done before the conclusion of the NTSB investigation designed to determine the cause of the accident. With this in mind, Piper Aircraft, Inc. urges the FAA to remove the veil of ex-parte communication in order that we might again work together along with the NTSB, to complete the open investigation, determine a probable cause, and initiate appropriate safety actions (involving Piper and/or the owner of the accident aircraft).

Piper Aircraft, Inc. is responding to the "Interim" NPRM AD with a clear focus on the following aspects listed in the broader proposal:

- The FAA's overall regulatory approach
- Technical deficiencies identified
- Errors in the economic aspects of the proposal
- General NPRM related comments

A review of the docket information has revealed several key issues which will necessitate further evaluation and detailed consideration by the FAA. It is urged that the FAA convert the proposed actin to a much more targeted Special Airworthiness Information Bulletin (SAIB) for the purpose of this information gathering process. The top concerns are as follows:

1. It is inappropriate to utilize an Airworthiness Directive as an investigational tool in order to determine if a yet unknown "unsafe condition" exists. A much more targeted SAIB would be more appropriate for this activity since a blanket AD would likely interfere with the ongoing investigation by the NTSB.

2. The "Interim" NPRM AD inspection action as proposed will unnecessarily increase the likelihood of creating a safety hazard due to unintentional discrete wing spar or spar/fuselage fastener hole damage for the over 40,000 aircraft. This hazard does not currently exist for these products.
3. The selection of an overly broad cross-section of aircraft models spanning all model years for both the PA-28 and PA-32 aircraft as contained in the "Interim" NPRM AD is improper because it is overly comprehensive and unsubstantiated. Many aircraft models that have been included in the FAA's proposed "unsafe condition" determination have reduced loads, different design requirement considerations and various structural layouts that improve and/or reduce the loading spectrum. This subjects an unnecessary number of aircraft to these invasive inspections.
4. The "Interim" NPRM AD proposes to utilize an inspection criteria related to a factored service life (5,000 hours) that is overly conservative and not supported by industry standard detailed rational engineering analysis for each of the referenced PA-28 and PA-32 models listed in the publication. Calculation of the factored life does not clearly capture aircraft that do not perform 100 hour inspections but are engaged or have been engaged in the type of activities being investigated.
5. The FAA's estimation of the financial impact on all operators of the "Interim" NPRM AD proposal vastly understates the cost to the operators, owners and maintenance personnel in several respects which includes the complete omission of the costs related to the NAS 410 Level II/III Technician which is required to perform each such inspection.

Discussion

As a Type Certificate holder, Piper Aircraft, Inc. holds safety as its highest priority and as always has endeavored to diligently work with the Federal Aviation Administration to assist where possible with the development of the requirements related to any airworthiness action. Unfortunately, due to the initiation of ex-parte rules following the first FAA Corrective Action Review Board (CARB), this has been curtailed and has made any substantive two way communication impossible.

Piper Aircraft, Inc. wishes to further clarify that the publication of agency contacts and content at no time constituted Piper's agreement as to any of the items shown in the "Interim" NPRM AD as this was an independent action taken by the FAA. Historical documentation, laborious, detailed and highly conservative engineering calculations that (at the direction of the FAA) far exceed the defined certification basis of the aircraft (CAR3) were provided to the FAA. This activity utilized analytical requirements contained within FAA Advisory Circular AC 23-13A, "Fatigue, Fail-Safe, and Damage Tolerance Evaluation of Metallic Structure for Normal, Utility, Acrobatic, and Commuter Category Airplanes," which per each of the models Type Certificate Data Sheets (TCDS 2A13 and A3SO) do not apply to these aircraft as noted under the FAA approved certification basis for the type designs. Other relevant information related to the Embry Riddle Aeronautical University (ERAU) accident aircraft as well as it's second aircraft which also showed a crack in a similar location was requested and provided. (Note that these two (2) aircraft, at this single operator, are the only abnormalities found during the course of the entire ongoing NTSB probable cause accident investigation which has already included the examination of multiple other aircraft).

Issue #1: Utilization of a blanket Airworthiness Directive as an investigative tool to determine whether or not a yet unknown "unsafe condition" exists is improper

History has shown that it is inappropriate to utilize a blanket Airworthiness Directive as an investigation tool in order to determine whether or not a yet unknown "unsafe condition" exists. It is more appropriate for this information gathering exercise to be performed under a more limited and

targeted SAIB since the present proposed action could likely interfere or mislead the ongoing probable cause investigation by the NTSB.

In 1987, the FAA issued AD 87-08-08 to address an accident involving a pipeline patrol aircraft model PA-28-181 SN 8090115 which suffered an inflight wing separation on March 30, 1987. **This action was summarily rescinded by the FAA on May 22, 1988 after inspecting approximately 560 aircraft, finding no evidence of cracks or additional damage, but also discovering that the inspection process mandated by this AD created an "unsafe condition" of its own by causing damage to the very wings being examined.** The data from this rescinded AD was based on the following:

> *"The FAA has carefully reviewed all of the available information including a credible fracture mechanics analysis"*

A further supporting statement in the rescinded AD is as follows:

> *"...it is concluded that the cracks found were isolated occurrences and those failures are not likely to exist or develop in other PA-28 series or PA-32 series airplanes..."*

In order to avoid repeating the mistakes of the past, caution should be exercised until the NTSB probable cause has been issued or, alternatively, the FAA should work toward issuing a much more limited SAIB to perform additional inspections.

Issue #2: Increase the likelihood of creating a safety hazard

The tasks required in order to perform the fastener removal for the inspection pose additional unnecessary risks which may create a feature (notch, gouge, thread mark, etc.) that is likely to cause a safety or airworthiness hazard. The hazard is tied to the removal of the outboard lower wing to fuselage spar attachment bolts. The directed activity is not a part of regular maintenance activities and requires the mechanic to maneuver in the confined area around the wing spar in order to gain access to both sides of the proposed inspection bolts and associated holes as shown below in the figure taken from the NPRM AD's text:

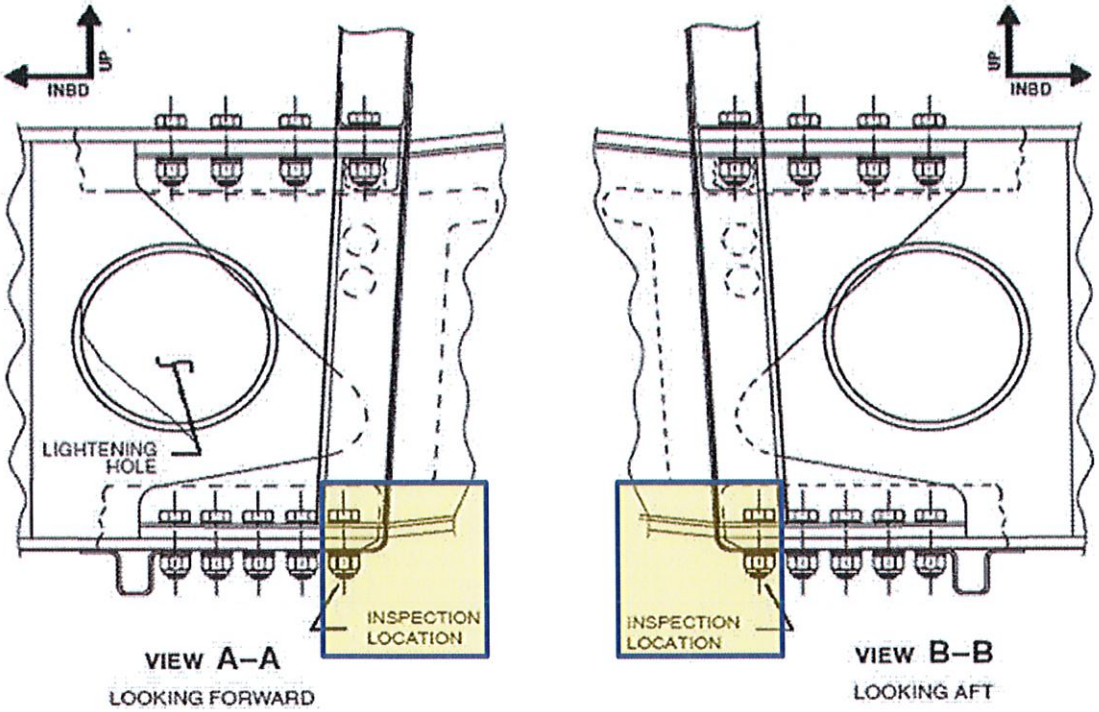

Figure 1: Location Inspection Area

Unnecessarily removing the wings or wing attachment fasteners on this large quantity of aircraft causes a high potential for unintended damage which will then lead to a new safety concern for the FAA, Piper and our common constituents; the tens of thousands of owner operators flying these proven aircraft designs. As this damage would create a continued operational safety issue, it is imperative that the model series be reduced by limiting the scope of inspections to a smaller more relevant representative group. Additionally, the action may potentially render the wing spar or its fuselage attachments un-airworthy or at a minimum require a repair with an associated FAA approved AMOC as the FAA references in the text of the "Interim" NPRM AD proposal with no alternative solution or standard repair method provided other than wing disassembly and spar replacement.

Piper Aircraft, Inc. customer service has already received reports of spar fastener holes that were damaged during the removal of the bolts. One such report stated that these bolts were removed in order to perform voluntary inspections of the fastener holes and consequently sustained thread marks and other damage which then needed to be repaired.

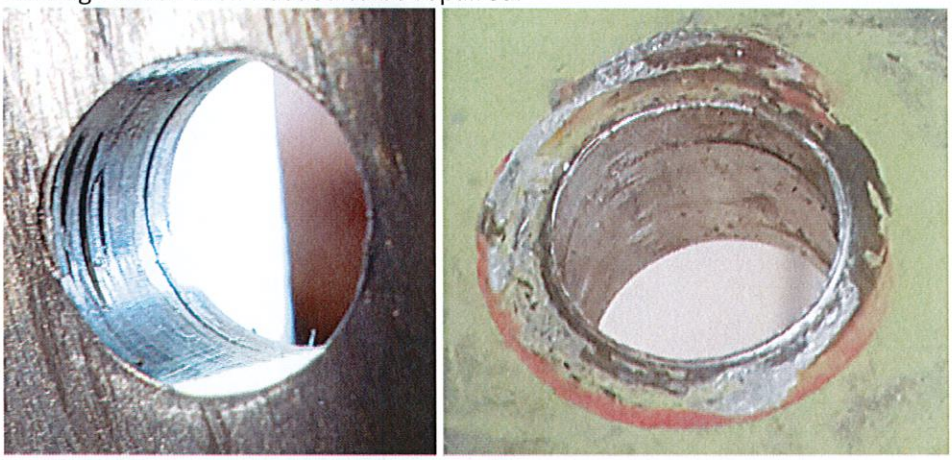

Figure 2: Example of Inspection Damaged Spar Bolt Holes

Issue #3: The selection of an overly broad cross-section of aircraft models

During the course of the joint Piper/NTSB initial preliminary investigation (with partial FAA participation) a single (1) PA-28-161 aircraft and twenty one (21) PA-28R-201 aircraft were inspected along with 2 additional wings with no cracks found in any of the bolt holes for a total of 46 wing attachments successfully inspected.

The following is a summary of the aircraft inspected/serial numbers/times/approximate number of cycles (if available):

- PA-28R aircraft
  - S/N 2844029, 9,111.9 hours, ~39,000 cycles
  - S/N 2844030, 8,486.9 hours, ~36,000 cycles
  - S/N 2844136, TTAF 3,923.9
  - S/N 2844125, TTAF 2,777.5
  - S/N 2844081, TTAF 5,964, ~15,808 cycles
  - S/N 2844147, TTAF 2,829, ~10,930 cycles
  - S/N 2844148, TTAF 2,905, ~11,008 cycles
  - S/N 2844149, TTAF 2,779, ~10,646 cycles
  - S/N 2844150, TTAF 2,887, ~11,165 cycles
  - S/N 2844151, TTAF 2,856, ~11,193 cycles
  - S/N 28R-7837125, TTAF 8,884.0, ~35,536 cycles
  - S/N 28R-7837257, TTAF 9,237.4, ~28,455 cycles

  - S/N 28R-7737142, TTAF 8,819.0, ~29,180 cycles
  - S/N 28R-7737078, TTAF 10,148.6, ~28,875 cycles
  - S/N 28R-7837108, TTAF 9,421.2, ~33,228 cycles
  - 6 additional aircraft (1977 to 1978), TTAF 7,150 to 9,230 (serial numbers not provided)
- PA-28-161 aircraft
  - S/N 2841035, TTAF 21,916.5

Piper Aircraft, Inc. disagrees with the FAA on the proposed model selection based on the company's completion of a detailed engineering analysis supported by type design data and certification testing results. Despite the FAA's failure to allow the NTSB's investigation to reach its conclusion, it directed Piper to initiate a proposed Service Bulletin. The FAA then rejected several proposed service publication drafts produced by Piper Aircraft, Inc. which would have inspected the area of interest in detail on a more representative and limited group of aircraft similar to the ERAU accident aircraft while adding the benefit of providing an acceptable terminating action.

Based on the data and analysis review by Piper the FAA would be well advised to limit its data gathering inspection activity. Through the SAIB process it would be prudent to examine a representative sample of only the following aircraft and serial number ranges:

- PA-28R-180, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T
  - All serial numbers for each model listed
- PA-28-235
  - All serial numbers
- PA-32-260 and PA-32-300 airplanes
  - 32-40000 through 32-7840202

The design loads and fatigue spectrum exclude the other aircraft listed in the "Interim" NPRM AD because each of the models in the associated families has been evaluated by Piper using the FAA approved type design data which shows lower fatigue and static stress values at the spar bolt hole location due to various design factors and thus does not warrant invasive and potentially damaging inspections on such a large group of aircraft.

Issue #4: The inspection criteria

Piper Aircraft, Inc. has utilized its type design data along with test data from previous certification activities on PA-28 aircraft as it relates to the proposed group of products and performed analysis utilizing the FAA's position statements related to this "Interim" NPRM AD action. The utilization of the FAA's AC 23-13A material that is not a part of the aircraft certification basis provides an extraordinarily conservative approach that attempts to capture an accident aircraft (thereby erroneously identifying it as a test article) and looks to find a yet undermined probable cause issue that has not been finalized by the NTSB as they have not currently completed their investigation.

The 5,000 hour factored life is a byproduct of performing 100 hour inspections on aircraft which the FAA believes to be the only indicator of the severity of usage. Utilizing the data that is held by Piper Aircraft, Inc. and the very conservative FAA directed methodology, an inspection interval for each of the models listed in the "Interim" NPRM AD has been calculated. Utilizing Piper proprietary data and FAA approved data, the inspection times are significantly higher than published in the proposed action for many of the models. This conservative methodology, if applied as published, would indicate the likelihood of the proposed failure occurring since the initial rescinded AD87-08-08 was issued and would have predicted 10 or more wing spar failures on just PA-28R series aircraft alone. As history has dictated, this has not been the case.

The factored hour calculation also contains additional flaws as many fleet operators utilize a progressive inspection process, as approved by their various FAA managing offices, which does not result in 100 hour maintenance inspections being logged. Therefore, there would be no record of 100

hour inspections listed in the aircraft maintenance records and a high time aircraft would not qualify for this proposed costly and burdensome information gathering inspection process.

Issue #5: The financial impact

The current cost of compliance section contains the following statement by the FAA in the "Interim" NPRM AD text which assumes all PA-28's and some PA-32's:

"We estimate that this proposed AD affects 19,696 airplanes of U.S. registry."

Piper has produced 37,709 PA-28 series and 3,588 PA-32-260/300 series aircraft that are engaged in many various types of operations worldwide. This "Interim" NPRM AD would affect approximately 41,297 aircraft as opposed to the 19,696 aircraft indicated by the FAA. When a Final Rule AD publishes, most international countries accept or adopt the rule as their own airworthiness action per bilateral or other agreements. This has caused the FAA's estimation of affected products to be misleadingly low compared to the actual number of fielded aircraft that could be affected. In order to capture the true cost of implementation of this interim FAA directed data gathering exercise, all referenced aircraft (international or domestic) should be considered when estimating the total cost of this activity.

Piper estimates the FAA's stated costs to comply with this proposed activity is understated in four significant ways. The first evaluation is based on the detailed research necessary to perform the logbook inspections. It is reasonable and necessary to expand and allow for 3 hours of logbook review as opposed to only 2 hours as proposed in the NPRM. Many of the aircraft affected by the "Interim" NPRM AD's proposed serial number ranges have been in safe, reliable service for over 58 years spanning multiple owners and / or multiple hand written log books and thus would require additional time to review the historical maintenance documents or attempt to locate any missing documentation. A computation of the adjusted costs is as follows:

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 × $85 per hour = $255	Not applicable	$255	$10,530,735 (41,297 aircraft)

Table 1: Piper Estimated Records Review Costs

Secondly the FAA has also erroneously placed a labor cost of $85 per hour on the portion of the inspection that includes the directed NDI checks. Piper Aircraft, Inc. agrees that the labor will be approximately $85 per hour for the disassembly & reassembly pursuant to Part 43 maintenance as well as any of the preparations for the NDI inspection. However, additional cost and time needs to be added to the charges based on the average cost for an NAS 410 Level II/III Technician of approximately $150 per hour while onsite during the execution of the inspections. The FAA must also include in the proposed inspection costs all representative transportation costs to a remote location which will vary based on aircraft positioning, number of aircraft to be inspected at that location, and any other costs associated with consumable items. The inspection cost has been adjusted by Piper as shown in Table 2.

Third, the FAA states in the NPRM proposal that because some airplanes are only used non-commercially and will not accumulate the specified factored service hours in the life of the airplane that it has no way of determining the number of airplanes that might need this inspection. Piper Aircraft, Inc. estimates that any aircraft manufactured prior to 2009 should be considered in the overall cost as

many have had 100 hour inspections, been in service with flight schools for periods of their usage or have unknown usage. The average flight school or unknown usage should be estimated as approximately 500 hours per year for the purpose of the "Interim" NPRM AD. By applying this to the scope of the requirements it serves to reduce the scope of the inspection by only approximately 441 aircraft from the total population figure since all aircraft over 10 years of age would be potentially subject to the inspections for a total of 40,856 units.

Piper Aircraft, Inc. has reviewed and provides a full accurate estimate of the costs to do the eddy current inspection on the modified scope of aircraft serial numbers as shown in Table 2:

Action	Labor cost	Parts cost	Cost per product	Total Cost
Gain access to the lower main wing spar, remove and replace the attach nuts and bolts	1.5 work-hours × $85 per hour = $127.50 per wing spar = $255.00 per AC	$20	$275.00 per Aircraft	
NDI Level II or III inspection of the bolt holes not including travel costs to the remote facility	1.0 work-hours × $150 per hour = $150.00 per wing spar = $300.00 per AC	N/A	$300.00 per AC	
Report inspection results to the FAA and record inspection results in airframe logbook	1.0 work-hour × $85 = $85.00	N/A	$85.00	{40,856 A/C} $26,964,960

Table 2: Piper Estimation of Inspection Costs

The total Cost for records review, preparation of the subject area, NDT inspection and reporting of results is as follows:

$10.53M + $26.96M = $37.49M

Finally, Piper Aircraft Inc. seriously questions whether any cracks will be found in the inspected structures, however, because rework cost data was printed in the "Interim" NPRM AD we are compelled to also correct the FAA's representation of the total rework cost's shown for reference in the proposal. The accurate representation of the rework costs is shown in Table 3 and Piper proposes using a more realistic assessment to complete any required replacements. The FAA's part costs have been estimated above list price for new spar parts but far lower than customary for hours and labor based on finding an unsatisfactory condition discovered during the inspection. Piper's full replacement wing list price is $35,827.40. Piper's main spar inboard section list price is $4,854.40. Alternatively, wings could be purchased from an air salvage company then reworked/inspected to be shown airworthy condition (with additional unknown cost for an 8130-3 tag) for approximately $2,000 to $6,000 (a very limited quantity of these wings will be available and total price varies however due to the unknown service history which will immediately require the bolt hole inspections mandated by this proposed "Interim" NPRM AD). The associated cost of rework is estimated in Table 3:

Action (2 options)	Labor cost	Parts cost	Cost per product
Remove wing from aircraft	8 work-hours x $85 per hour = $680.00 per wing	N/A	
Remove main wing spar from root to first outboard splice	32 work-hours × $85 per hour = $2,720 per wing spar	N/A	
Install new main wing spar from root to first outboard splice	32 work-hours × $85 per hour = $2,720 per wing spar	$4,854.40	
Reinstall wing on the aircraft	8 work-hours x $85 per hour = $680.00 per wing	N/A	$11,654 per wing reworked
Remove wing from aircraft	8 work-hours x $85 per hour = $680.00 per wing	N/A	
NDI Level II or III inspection of the bolt holes not including travel costs to the remote facility if necessary	1.0 work-hours × $150 per hour = $150.00 per wing spar = $300.00 per AC	$6000 used wing	$7,510 per used airworthy wing
Install airworthy wing on the aircraft	8 work-hours x $85 per hour = $680.00 per wing	$35,827 new wing	$37,187 per new wing

Table 3: Rework Cost for Replacement of Components

General Issues and Comments

Piper Aircraft, Inc. disagrees with the FAA's position that the reporting of crack indications and any inspection data should be made to the FAA only. Piper Aircraft, Inc. as the TC holder and undisputed technical expert on all affected aircraft should be consulted and immediately notified of any pertinent field reports and associated data. This would allow review, analysis and additional inspections to be performed. There may be additional inspections necessary to ensure that all steps in the proposed procedure were followed and that a crack is truly present in the structure.

In addition it should be noted that this proposed "Interim" NPRM AD completely disregards a relevant inspection requirement contained in the appropriate maintenance manual sections for each model of aircraft. This requirement is necessary prior to bolt removal for the inspection to identify evidence of previous damage from such events as "hard landings". Removal of the bolts prior to proper evaluation of the torque stripe, fastener general condition and looseness would destroy evidence of prior unreported damage. An example inspection from Piper PA-28R-201 Maintenance Manual Part Number 761-639 requires an inspection of the wing after a hard or overweight landing as follows in Figure 3:

PIPER CHEROKEE ARROW III SERVICE MANUAL

C. Severe Turbulence, Hard or Overweight Landing (continued)

Item	Inspection	Inspection Interval
☐ Wings.	Wing attach bolts for slippage, damage and overstress. Upper and lower wing skins for wrinkles, cracks, popped or loose rivets.	Each occurrence, before further flight.

Figure3: Example Maintenance Manual Inspection

Failure to make such inspections and follow the basic requirements of the maintenance manual prior to the performance of the "Interim" NPRM AD inspections could cause the results to be erroneous and drive conclusions that may not be warranted.

Piper Aircraft, Inc. has reviewed the FAA's document filing as a part of this response and disagrees that this proposed activity will have no effect on intrastate commerce in Alaska. This NPRM AD affects PA-32-260 and PA-32-300 aircraft which are widely utilized by many Part 135 companies involved in Alaska's transportation system and serve the communities that rely on aviation as their only mode of transportation. This should be corrected in the filing documents as there are a total of 189 registered PA-28/PA-32 aircraft contained within the serial number ranges in the "Interim" NPRM AD and operating in the state of Alaska.

Conclusion and Recommendations

Piper Aircraft Inc. contends that, similar to the original AD 87-08-08 which was ultimately rescinded by the FAA, the inspections proposed by this "Interim" NPRM AD will again show that no cracks will be found in the subject areas based on analysis and test data and potentially introduce an "unsafe condition". As such, this NPRM AD activity is not warranted due to the misuse of the regulatory approach, deficiencies of the proposals technical merit, excessive economic impact factors and overly broad expanse of aircraft currently proposed. Piper Aircraft Inc. recommends the following: The FAA should remove the ex-parte rule and resume normal communication in order to collaborate on a combined solution while working with the NTSB and Piper Aircraft, Inc. to determine the probable

- The FAA should reconsider the "Interim" NPRM AD activity as proposed and reclassify the action to a more targeted SAIB level for this information gathering purpose
- The FAA should also align the models and serial numbers in its proposal based on analysis related to the accident aircraft
- The FAA should adjust its cost and aircraft population estimates in the "Interim" NPRM to accurately reflect the hours necessary to complete the work, the labor required for the specialized technicians market based pricing and actual aircraft volumes

Any party wishing to comment directly to Piper Aircraft, Inc. can do so via a dedicated email address for this action at: ***nprm@piper.com***. Pertinent comments and suggestions will be utilized throughout this NPRM process.

Respectfully Submitted,

Simon Caldecott
President and Chief Executive Officer