August 3, 2017

James Delisio
Federal Aviation Administration
Program Manager, Continued Operational Safety
New York Aircraft Certification Office (ACO-170)
1600 Stewart Ave
Westbury, NY 11590

RE: Lycoming Service Bulletin No. 632A

Dear Mr. Delisio,

On July 23, 2017, Lycoming published a Mandatory Service Bulletin No. 632A to identify connecting rods with non-conforming small end bushings. As a result of that publication, as representatives of affected owner groups, we have heard from a number of our members with questions, comments, and concerns.

A corresponding Airworthiness Concern Sheet (ACS) was not, and has not, been transmitted on this issue. An ACS is intended as a means for the FAA to coordinate airworthiness concerns with engine/operators through the Aircraft Owners and Pilots Association (AOPA) and helps in developing a common understanding of the risk and notably quantify the number of failures or incidents that have occurred.

Soon after the service bulletin's publication, we asked the agency if an ACS was forthcoming – a process explored and agreed to at the FAA/Industry Engine Summit. We were disappointed to hear that, due to time restraints, the FAA was unable to go through the standard ACS process but was willing and able to arrange a telecon with stakeholders to discuss.

Yesterday, August 2nd, we were informed that if we were to have that discussion it would have to be that afternoon and a time was quickly established for the undersigned owner's groups, the FAA, and Lycoming to discuss the issue, ask and answer questions, and hopefully come to a common understanding of the risk and means to best manage it.

In the short time before the call, we attempted to outline our specific questions, concerns, and recommendations to both Lycoming and the Agency and have attached them to this letter. We firmly believe that the alternative protocol outlined in our recommendation could serve as an alternative method of compliance (if warranted) and effectively mitigate the risk, if not more so, when compared to SB 632A. Additionally, our recommended method would be accomplished at a fraction of the cost and have a lower risk of maintenance-induced failures. We were, however, disappointed that on the call, neither the FAA or Lycoming were willing to share any data or numbers of failures – a critical and essential element needed to better understand and quantify risk.

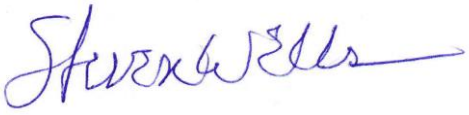
If and when the Agency initiates a Corrective Action Review Board (CARB), we respectfully ask for it to consider the questions, concerns, and, most importantly, our recommended alternative means of compliance. If, after the CARB review and risk assessment, the risk rises above the line to warrant an Airworthiness Directive, given the short compliance time, we respectfully request that a global AMOC be approved simultaneously upon the issuance of the AD. The service bulletin's time of compliance within the next 10 hours of engine operation will simply not afford the time needed to request and approve an AMOC after the issuance of an AD.

Thank you for the opportunity to submit comments and any consideration given to them during the CARB review. Collectively, we stand ready and willing to continued discussions and ways to work together to best mitigate the issue. We share the belief that a strong and trusting relationship between the FAA, manufacturers, and operators will result in a marked improvement in safety.

Sincerely,

David Oord
Aircraft Owners & Pilots Association

Paul New
Cessna Pilots Association
Tennessee Aircraft Services, Inc.



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Questions, Concerns, and Recommendation

Lycoming SB 632A – Identification of Connecting Rods with Non-Conforming Small End Bushings

QUESTIONS

- How many Lycoming-built/rebuilt engines will be affected?
- What is Lycoming's and/or FAA's estimate of how many field-overhauled/repaired engines will be affected? How was this estimate arrived at?
- How many displaced small-end bushings have been reported to date? Over what period of time?
- How many connecting rod failures have been reported to date that were due to bushing displacement? Over what period of time?
- What is the correlation between reported bushing displacement and engine TIS since new/rebuilt/overhauled?
- What is the correlation between connecting rod failure due to bushing displacement and engine TIS since new/rebuilt/overhauled?
- What is the lowest-TIS engine for which bushing displacement has been reported? What is the highest-TIS engine?
- What is the lowest-TIS engine for which connecting rod failure due to bushing displacement has been reported? What is the highest-TIS engine?
- What efforts has Lycoming made to narrow the scope of non-conforming bushings to specific lots or manufacture dates? Is there any way to narrow the scope from the current two full years of bushing production?
- What is the availability of the ST-531 Connecting Rod Bushing Press-Out Verification Tool? What is the cost of this tool? How quickly will Lycoming be able to supply the many thousands of such tools that will be required to equip all the maintenance shops and independent A&Ps who will be called upon to perform SB632A?
- Lycoming states that the ST-531 tool "tests the bushings at a much greater force than they would experience during normal engine operation." Lycoming further states that "approximately 20% of the bushings in the affected population" are expected to flunk the press-out test. These statements imply that the percentage of bushings that would suffer displacement during normal engine operation is far less than 20%. What is Lycoming's estimate of what percentage of bushings in affected engines would suffer displacement in normal engine operation?

CONCERNS

- Although we need the above-requested data to evaluate the severity of risk associated with the issue of non-conforming small end bushings, we are inclined to agree with Lycoming that this issue probably does rise to the level of being an unsafe condition warranting an Airworthiness Directive by the FAA.
- At the same time, we believe that the corrective action proposed by Lycoming in SB632A is so invasive and inherently risky that the corrective action is very likely to create a greater safety risk than the problem that it is intended to mitigate. In other words, we are convinced that the SB632A cure is worse than the disease.
    - Removal/reinstallation of all cylinders of an engine "on the wing" by typical line mechanics has a long, well-documented history of causing catastrophic maintenance-induced engine failures. Mechanics in the field typically do not use torque plates (nor have them) and do not take precautions to prevent main bearing displacement while most of the through-bolts that clamp the main bearing saddles together are simultaneously relieved of torque. Mechanics in the field often fail to provide adequate preload on through-bolts and hold-down studs because they fail to lubricate the fasteners properly prior to torqueing and because they sometimes reuse nuts with worn cadmium plating and sometimes worn or damaged threads. All of these things can lead to fastener failure and cylinder separation.
    - Consequently, we hate to see all cylinders removed simultaneously from an engine by anyone but a qualified engine specialist in a certified engine repair station.
    - Removal/reinstallation of connecting rods "on the wing" by typical line mechanics is a positively terrifying proposition. Rod bolts are the most highly stressed components of the engine, and achieving proper preload on rod bolts is absolutely essential to prevent catastrophic failure. Arguably the majority of line mechanics who will be performing SB632A will never have previously installed connecting rod "stretch bolts." (Unfortunately, the provision of 14 CFR 65.81(a) that says a mechanic may not supervise or approve work "unless he has satisfactorily performed the work concerned at an earlier date" is rarely observed in the real world of piston GA maintenance.)
    - Doing this properly is difficult with the engine installed in the airplane, and really should be done with the engine on an engine stand with unencumbered access, and performed by an experienced engine technician. Unfortunately, that is not what will happen if SB632A is mandated by AD.
    - Consequently, we are convinced that the risk of thrown connecting rods caused by improper removal/reinstallation under "battlefield conditions" would be greater than the risk of thrown connecting rods caused by bushing migration. The cure here would almost certainly be worse than the disease.
    - If Lycoming's estimate is correct that 20% of the connecting rod bushings will fail the press-out test, that means that the overwhelming majority of affected engine will need to have at least one connecting rod removed in the field by typical line mechanics who are marginally qualified to perform this task. This is truly a terrifying prospect.
- We feel strongly that the FAA should ask Lycoming to propose a far less invasive and risky corrective action before it issues an Airworthiness Directive. We are convinced that a minimally invasive approach will detect bushing displacement well before rod failure can occur.

- The small end bushing of the connecting rod cannot displace more than about 1/16" before coming in contact with the piston. A displacement of 1/16" is not nearly sufficient to cause rod failure.
- Once the small end bushing has displaced far enough to come in contact with the piston, further displacement cannot occur unless the exposed portion of the bushing breaks off and falls into the engine sump.
- Once this portion of the busing breaks off, the bushing can continue to be displaced further until it contacts the piston once more and another exposed portion breaks off. This process must repeat several times until the displacement progresses far enough to result in rod failure.
- We wholeheartedly agree with Lycoming's concern "that mechanics may not identify bushing deterioration during oil filter checks at the recommended oil change intervals." Indeed, the portions of bushings that break off are typically too large to pass through the engine's suction screen and reach the oil filter.
- However, we are convinced that an alternative minimally-invasive protocol would be sufficient to detect bushing displacement long before it progresses to the point that rod failure could occur.

RECOMMENDATION

- We propose that the FAA, if warranted, approve an alternate protocol for detecting small end bushing displacement along the following lines:
  - At an appropriate interval (each 25 hours?), remove and inspect the suction screen for evidence of bushing material.
  - At an appropriate interval (each 25 hours?), drain the engine oil hot through a piece of fine window screen or cheesecloth and inspect for evidence of bushing material.
  - At an appropriate interval (each 25 hours?), after the engine oil has been completely drained, remove both oil drain plugs and inspect the bottom of the oil sump using a borescope for evidence of bushing material.
  - If (and only if) any of the three above inspections reveal evidence of bushing material, perform the cylinder removal and press-out tests described in SB 632A.
- We believe that this recommended alternative will drastically reduce the risk of maintenance-induced failure while providing effective mitigation of the risk created by non-conforming small end bushings.