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

SAFO

Safety Alert for Operators

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Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.

Subject: Powder Coating of Aircraft Wing Struts

Purpose: This SAFO provide safety information to the public of potential problems associated with coating or modifying wing struts.

Background: A recent investigation of a repair station's specifications for the application of powder coating revealed an airworthiness concern with a Piper airplane equipped with sealed wing struts. The airplane was in compliance with Airworthiness Directive (AD) 99-01-05, specifically the installation of sealed wing struts that terminates the 24-month repetitive inspection requirement.

Discussion: The powder coat application process requires heating the wing lift struts to 450 degrees Fahrenheit. At this temperature, a sealed wing lift strut would expand (swell up). To vent the heat and gas buildup of this process, a hole is drilled at the fork socket located at the bottom of the strut. This vent hole in the wing strut ultimately means that the struts are no longer sealed. Although drilling this hole is not specifically prohibited by AD 99-01-05 and installation of the lift strut assembly part number keeps the airplane within AD compliance, the intent of the AD was for the affected airplanes to be either 1) repetitively inspected every 24 months, or 2) equipped with sealed strut assemblies and those assemblies to remain sealed.

AD 99-01-05 requires these strut assemblies to be repetitively inspected if the seal is broken in any manner to include the drilling of a vent hole. The Federal Aviation Administration (FAA) is considering a revision to the AD to clarify this requirement and possibly add a requirement to determine if the struts are still sealed with appropriate follow-on action.

To further complicate the issue, the location of the vent hole in the socket of the fork boss does not make it apparent that the lift strut has been opened or modified. Thus, the part number of the sealed wing strut assembly shows compliance with the terminating action of AD 99-01-05. The drilling of a vent hole for the powder coating process brings into question the need for repetitive inspections. In addition, the vent hole creates a high stress concentration area, which affects the fatigue characteristics of the lift struts and degrades the structural performance of the strut. The high heat introduced by the powder coat process also causes the corrosion inhibitor inside the strut to boil, vaporize, and/or alter its protective properties. If unchecked and undetected, these conditions could lead to corrosion of the lift struts, which could result in a safety of flight issue such as wing separation.

Though our discussion above focuses on Piper aircraft, sealed wing lift struts are also used on other airplanes such as Maule and Taylorcraft. The same safety concerns exist for any aircraft where "sealed" wing struts were replaced in a similar fashion with "vented" powder coated struts", unless such a change was thoroughly substantiated by proper engineering data. In many cases, it may not be possible to substantiate such a change without also mandating a requirement to inspect the wing lift struts and wing lift strut forks for cracks or corrosion, and replace any strut or fork found cracked or corroded.

Recommended Action: Aircraft owners, operators, and maintenance personnel should:

- Initially inspect airplanes with sealed lift struts at the next annual inspection to determine if the struts have drill holes or other modifications that may have broken the seal.
- Annotate in the aircraft record if wing lift struts are no longer sealed.
- Identify externally if wing lift struts are no longer sealed so that maintenance personnel can readily ascertain this.
- Incorporate an FAA-approved procedure for reapplying the corrosion inhibitor and resealing the lift struts.

Contact: Questions or comments concerning this SAFO can be directed to the following:

- Piper Aircraft (All Models) , G. "Kieth" Noles, Atlanta ACO 404-474-5551
- Maule Aircraft (All Models). Cindy Lorenzen, Atlanta ACO, 404-474-5524
- Taylorcraft Aircraft (All Models) and Aircraft Parts and Development Corp (Models A-9, A-9A, and A-9B), Andy McAnaul, ASW-150, 210-308-3365
- Kansas City Aircraft Evaluation Group (AEG), Mike Alquist, 816-329-3239