



U.S. Department of Transportation

Federal Aviation Administration

Airworthiness Concern Sheet

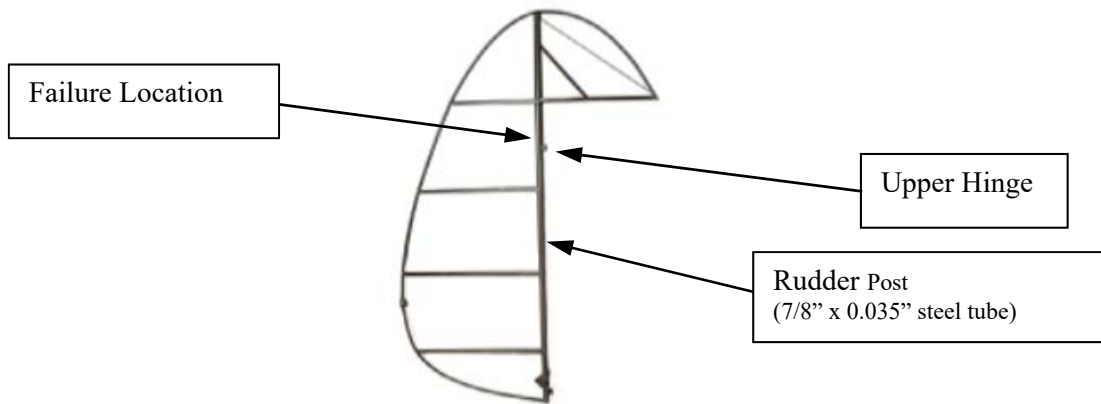
Date: 09/04/2020

Reply to: Name: David Swartz Title: Senior Engineer Office: Anchorage Aircraft Certification Office Department: Street Address: 222 W 7 th Ave City, State, ZIP: Anchorage Alaska, 99513 Telephone: 907-271-2671 Email: Dave.swartz@faa.gov	Make: Piper/FS2003 Corp Model / Series: J-5A, J-5B, J-5C, J-5D, AE-1, HE-1, PA-12, PA-12S, PA-14, PA-16, PA-18, L-21, PA-20, and PA-22 Serial Numbers: All Reason for Airworthiness Concern: In flight failure of rudder just above the upper hinge.
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Federal Aviation Administration (FAA) Description of Airworthiness Concern

Request for Information:

Recently an accident occurred where the rudder on a PA-12 failed in flight. The airplane was a seaplane equipped with a 160 hp Lycoming O-320 engine. The original tail surfaces had been replaced with PA-18 tail surfaces in accordance with a Supplemental Type Certificate (STC). The broken upper part of the rudder post broke just above the top hinge and the upper part of the rudder folded over the tail brace wires in such a way that rudder control was severely limited and as to effectively create an additional horizontal tail, driving the tail down and the nose up. It was possible for the senior flight instructor to control the airplane in pitch, but required a lot of the available elevator deflection to do so. By dropping the water rudders, some directional control was established and the airplane was able to return to base and land, but with difficulty.



At this time, it is not clear whether the rudder was an original Piper part, or one of the several PMA replacement parts available from aftermarket manufacturers. The accident airplane was equipped with an LED beacon on top of the rudder. The rudder had been overhauled about 6 years prior to this accident and some minor corrosion had been blended out from the exterior surface of the rudder post and the rudder had been powder coated. The inside of the rudder post was blackened, indicating the corrosion prevention oil that was applied there during original manufacture had burned off during the powder coating process. The inside of the tube exhibited some very minor corrosion pitting but was otherwise unremarkable other than evidence that corrosion prevention oil was burned off during the powder coating operation. This rudder has been submitted to the NTSB laboratory for further evaluation.

In August of 1984, a very similar accident occurred on another PA-12 in Juneau, NTSB Accident number SEA84LA220, where the rudder failed at the same location. In 2001, NTSB Accident number LAX01LA130, PA-18 suffered a rudder failure at the lower hinge.

FS2003, the current type certificate holder for the PA-12 airplane, is aware of two rudder failures of the front rudder post, above top hinge, on PA-12 airplanes. One was caused by a cable strike. The other was caused by previous damage not being detected after the airplane went over on its back while operating on skis in deep snow.

Two additional instances have also come to light, that did not result in an accident, both on PA-12s equipped and higher horsepower than stock engines, one with a 180 HP Lycoming O-360 and one with a 150 HP Lycoming O-320. Both of these also had some kind of strobe or

beacon on top of the rudder as well. Neither of these two airplanes was equipped with floats at the time of failure.

Interviews with some repair facilities that specialize in Cub airplanes indicates that a significant number of additional events may have occurred in the fleet of the long history of PA-18 and PA-12 airplanes.

At some point in the production of these series rudders, a change was made in the manufacture of these rudders to make the subject rudder post tube out of 4130 Condition N tubing as opposed to 1025 mild steel. We believe that rudders manufactured after about June 1974 will have been made out of 4130. The NTSB will be analyzing the failed rudders they have to see if they were 1025 or 4130.

According to FS2003 Corp., the original rudder part number is P/N 40622-(X) but the dash number varies with lighting options. This rudder was also used on the Piper (and formerly-Piper) models J-5A, J-5B, J-5C, J-5D, AE-1, HE-1, PA-12, PA-12S, PA-14, PA-18, L-21, PA-20, and PA-22. Rudder P/N 15726-(X) rudder was used on Piper PA-18 S/N 18-7509123 and up. At this point, we believe that these rudders had posts originally manufactured out of 4130 steel. At this time, it is not clear which part number was involved in this accident.

We would appreciate input on the following question regarding the most appropriate actions to take:

- 1. What other occurrences have been observed of rudders failing?**
- 2. What information can you provide about possible causes for the failures?**
- 3. What solutions might be available and effective?**
- 4. What reports of vibrations have people observed in the rudder and is there any correlation with the presence or absence of a strobe or beacon on the top of the rudder?**



This Airworthiness Concern Sheet (ACS) is intended as a means for FAA Aviation Safety Engineers to coordinate airworthiness concerns with aircraft owners/operators through associations and type clubs. At this time, the FAA has not made a determination on what type of corrective action (if any) should be taken. The resolution of this airworthiness concern could involve Airworthiness Directive (AD) action or a Special Airworthiness Information Bulletin (SAIB), or the FAA could determine that no action is needed at this time. The FAA's final determination will depend in part on the information received in response to this ACS.

The FAA endorses dissemination of this technical information to all manufacturers and requests association and type club comments.

Attachments:	Transmittal:	Response Requested By:
<input type="checkbox"/> Service Difficulty Report <input type="checkbox"/> Accident/Incident Data System <input type="checkbox"/> Service Letter / Bulletin <input type="checkbox"/> Special Airworthiness Information Bulletin <input type="checkbox"/> Federal Aviation Administration or National Transportation Safety Board Safety Recommendation <input type="checkbox"/> Airworthiness Directive <input type="checkbox"/> Alternate Means of Compliance <input type="checkbox"/> Risk Analysis	<input checked="" type="checkbox"/> Federal Aviation Administration <input checked="" type="checkbox"/> Airplane Owners and Pilots Association <input checked="" type="checkbox"/> Experimental Aircraft Association <input checked="" type="checkbox"/> Type Club <input checked="" type="checkbox"/> Type Certificate Holder <input checked="" type="checkbox"/> Other: See List.	<input type="checkbox"/> Emergency (10 days) <input type="checkbox"/> Alert (30 days) <input checked="" type="checkbox"/> Information (90 days)