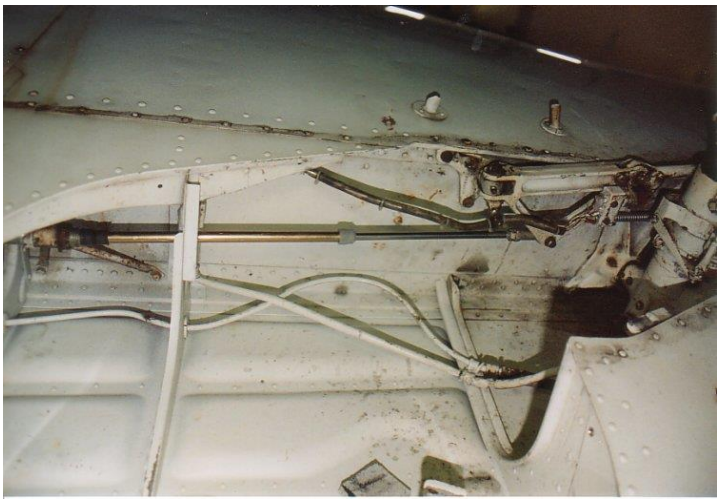
Comanche Landing Gear Maintenance session at Ellenville NY

Dwight Coombe, host for the May 16, 2015 NE fly-in at Resnick Airport, lead an in-depth discussion on issues related to the Comanche landing gear system. The topics ranged from possible causes for circuit breaker overloading, improper installation of bolts resulting in interference with gear movement, improper installation of wishbone linkages, and the emergency gear release spring missing or disconnected. Those in attendance provided accounts of problems with these items and the resulting actions taken.

Landing gear circuit breaker overload:

Most overloads occur when raising the gear, particularly in the last few inches of travel when the loads are higher. One cause could be excessive crud accumulated on the gear conduit telescoping tubes. Peter Morse had a gear collapse on landing due to this problem. Another could be failure or more likely miss adjustment of the up-limit switch, located in the floor just aft the nose wheel well. Discussion resulted in a few pilots sharing that their gear breaker has opened when raising gear on very cold days but that helping the gear up with the lever prevented the problem. Otherwise they found from ground testing that everything was normal



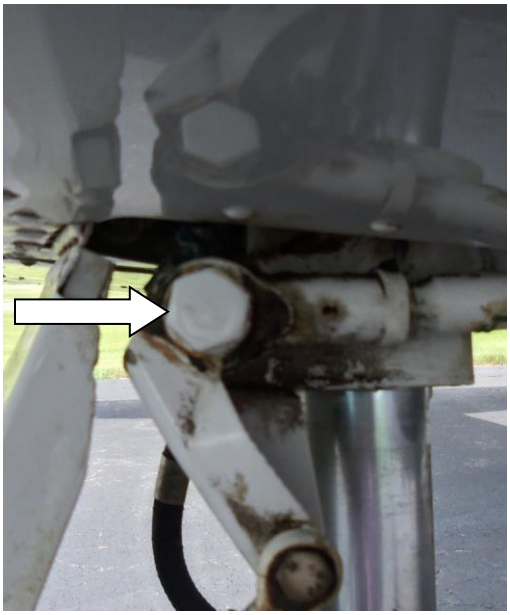
gear conduit in wheel well

A third cause could be interference with the gear movement due to improperly installed hardware, failure of the oleo strut to fully extend, or crud (mud or ice) on the wheel or in the wells. Many of these problems can be detected by following the gear level through its travel with your hand. If the motion slows down that indicates an increased load. If there is a shuddering felt in the lever this could indicate a worn worm gear. Unfortunately trouble free gear actuation while on jacks does not preclude problems in the air. Forces on the gear components in flight create quite different results than no airflow while testing on jacks.

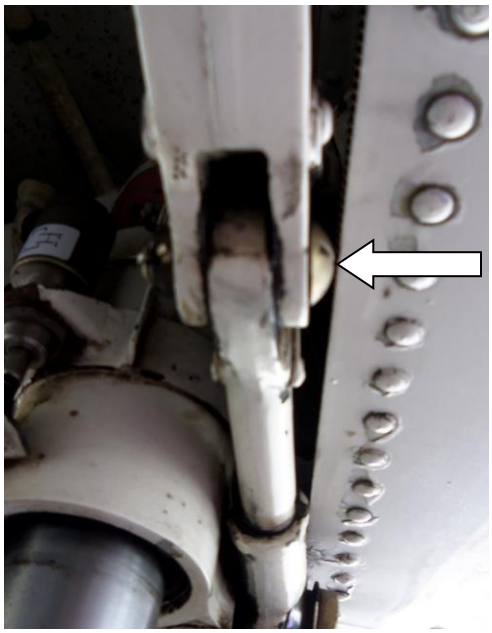
conduit jammed by crud

Improper installation of bolts:

There are a couple of bolt fasteners that, if installed improperly, can result in contact with the wing underside and/or wheel well. This can result in damage to the sheet metal structure and prevent further movement of the gear (see arrows). Refer to the Piper Service Manual for proper assembly. Gear actuation while on jacks should reveal any problems.

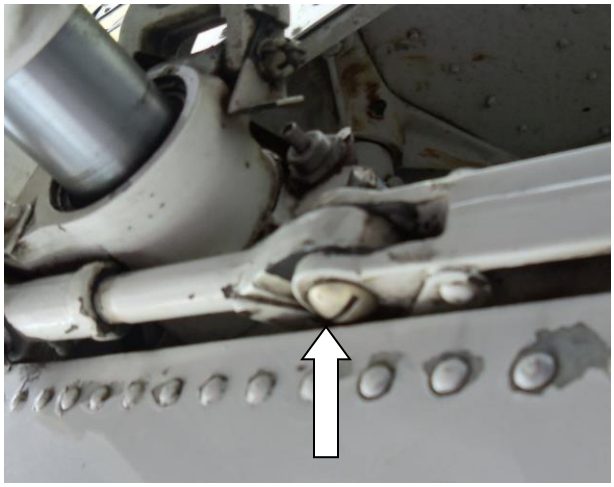


flat head bolt



round head bolt clearance

flat head bolt clearance

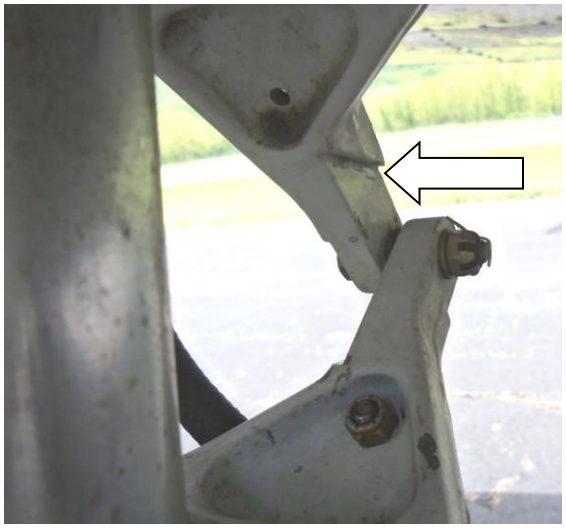


round head bolt

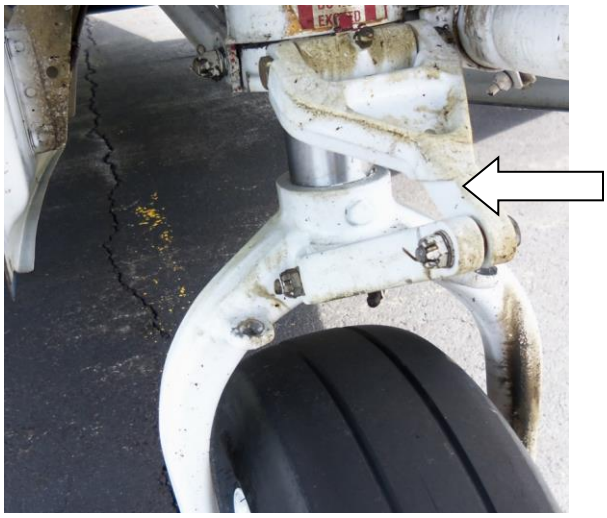
Threads and nuts should be aft in these installations.

Installation of wishbone linkages:

The wishbone linkages on each gear leg provide directional control while allowing the gear to flex up or down. Each wishbone arm has an area milled in the side (see arrows) which, when properly lined up, allow the assembly to compress further without binding. This allows full deflection to the gear oleo struts. Should the assembly bind up the resulting stress can shear the bolt positioned at the knee joint. Without this linkage the oleo strut is free to rotate. If broken, the nose gear will shimmy without connection, but should tend to track in the direction of aircraft motion. If this link bolt breaks at the main gear it will likely rotate 90 deg to the direction of travel with the tire dragging sideways on the surface. Bernie Stumpf had this occur when landing at Westerly RI, closing down the runway for nearly an hour. Without care, each wishbone arm, as well as the entire assembly, can be installed backwards. When properly installed the milled areas should face each other and the flat notch surface should be relatively horizontal to the ground. Zach Grant commented that, at one time nearly 18% of the Comanche fleet had improperly installed wishbones, many as factory original.

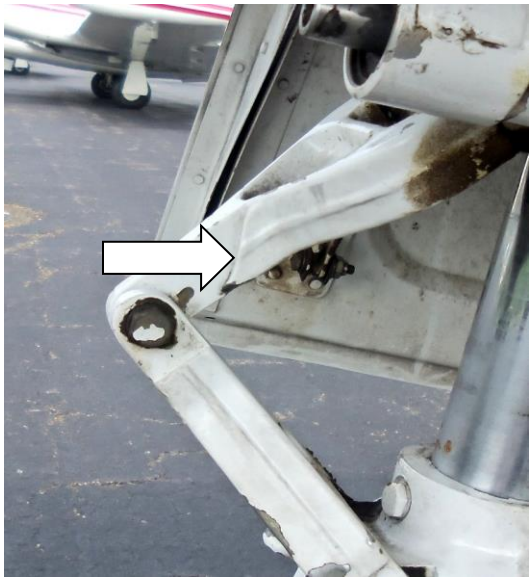


good main link



good nose link

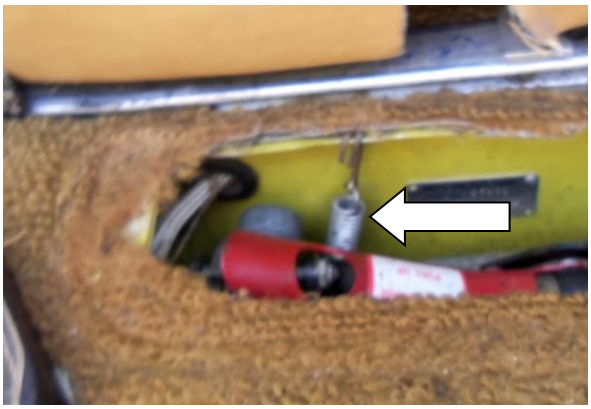
good nose assembly



reversed nose assembly, binding spot

Emergency gear release spring:

A spring under the floorboard (arrow) supports the gear motor assembly when the red handle is pulled to activate the emergency gear release. If the spring is not in place the assembly will drop and possibly jam, preventing further movement of the gear conduits. To continue to lower the gear someone will have to manually support the assembly, which could result in pinched fingers. When swinging the gear at each annual inspection, pay attention to the role of the spring in maintaining proper alignment of the worm gear assembly.



gear release support spring

Conclusion:

We hope that this presentation provides you with new insight to the safe operation of the Comanche landing gear system. While we still continue to have accidents due to the common GA problems – fuel mismanagement, weather issues, and pilot errors – our unique landing gear system sets us apart from other aircraft. With proper care and attention, and recurrent practice, the Comanche system should continue to perform flawlessly for many landings to come.