Comanche Gear Conduit Replacement (Feb 2007)

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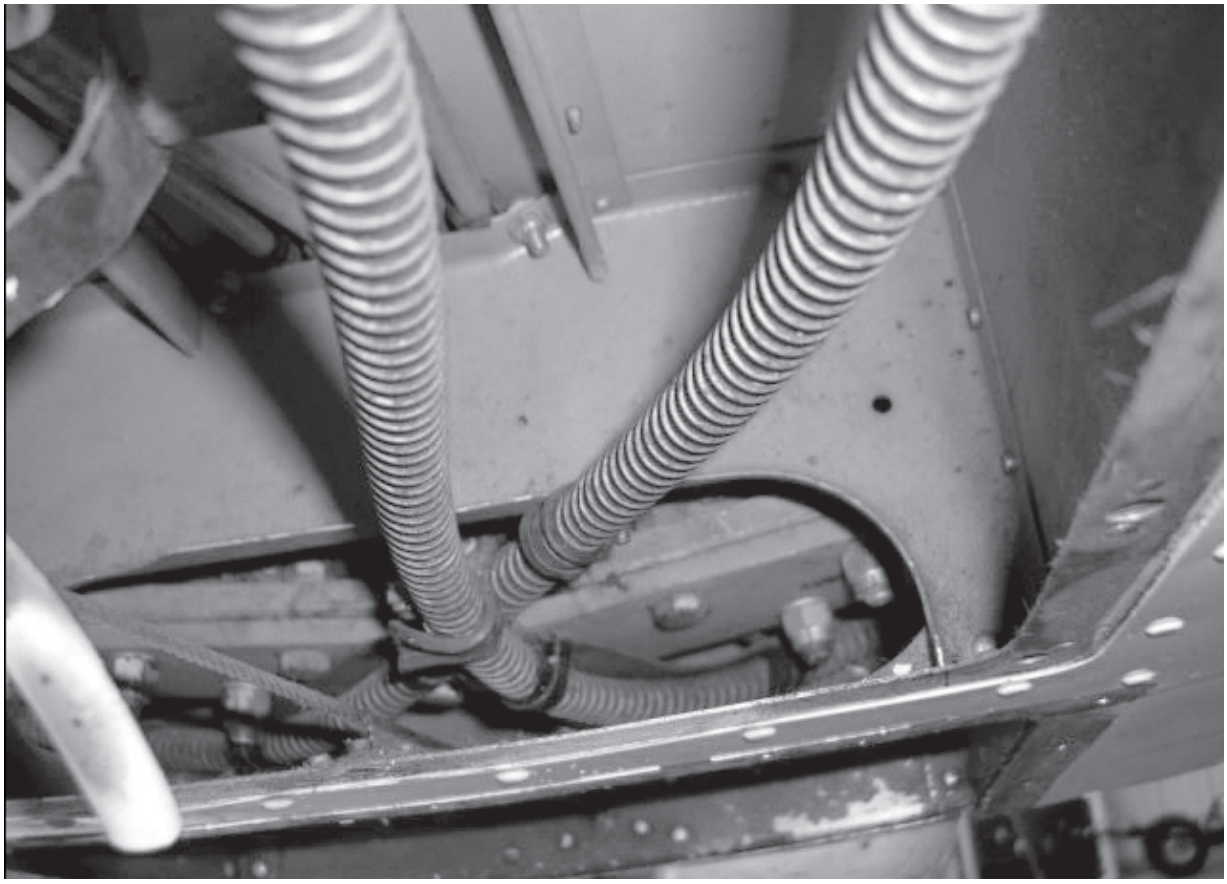
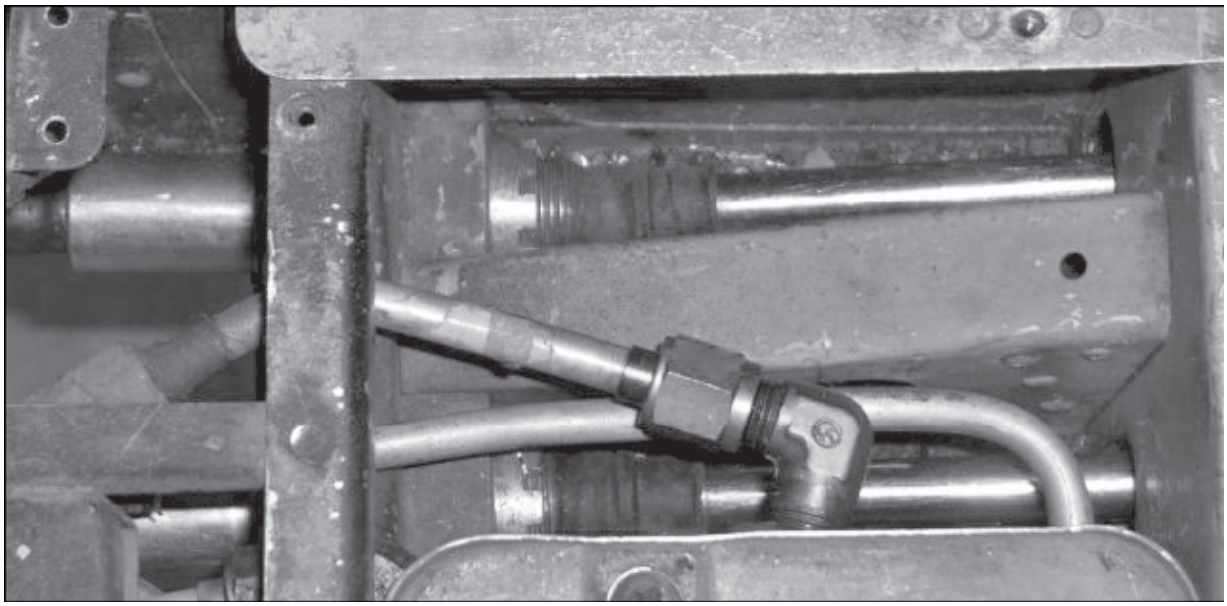
During my 1961 250's (96P) annual in December 2005, my IA was doing a gear retraction test and reported that my gear would pop the circuit breaker when it was 99 percent up into the wells. This had happened to me while in flight a couple of times during the past year and was cause for concern.

Since my gear motor and transmission were newly rebuilt and the gear circuit breaker, solenoids and wiring, etc. were all basically new (courtesy of Comanche Gear), my IA and I suspected the gear conduits. We did the normal manual emergency extension test (on jacks), and while the gear extended normally, it was impossible to raise the gear up by hand beyond 50 percent. So much for using that nice torque wrench adapter I had just fabricated. I must emphasize that the gear could not be raised by hand, even after disengaging the rod ends from the down lock. I could only imagine the strain put on the motor and transmission during the retraction cycle.



Looking aft at the old conduit routing, the left conduit goes under the right one.



The new conduits routed through the under-seat bulkhead.

The solution was clear – order new gear conduits from Webco. The PMA parts received from Webco worked perfectly out of the box. I tested the new cables by hand before installing them, and they moved back and forth through the conduit without resistance. Webco supplied a multi-page set of instructions (mostly pictures) which described how to install the new conduits. Additionally, I ordered new rod ends for both the transmission side and the gear down lock sides.

Note: The instructions were written by Webco mechanics that have done the change a thousand times and to me the directions were a little confusing. However, after starting the change-out, the instructions became perfectly clear.

I must emphasize I am not an A&P, but I was able to do virtually all the work myself and with the help of Dave Blankenbaker, another Comanche owner (Thanks Dave). During the process, all work was properly supervised and inspected by my IA. The procedure is fairly straight forward requiring skinned knuckles and about 25 hours of labor.

I was initially worried that when I removed the 40-year-old castle nuts that secure the conduits, they would be ruined. This was a concern because new hardware is NOT supplied with the new conduits, and the old nuts must be reused. I used a set of standard slip joint pliers (not a special tool) to remove the nuts. Surprisingly, the nuts were either alarmingly loose or only finger tight.

There is one critical aspect that requires the help of another person. When the conduits are bent and routed through both left and right wing roots, the end must be passed through the open conduit support. One person must be above in the cockpit to bend the conduit and the other on the floor to guide the end of the cable through the support.

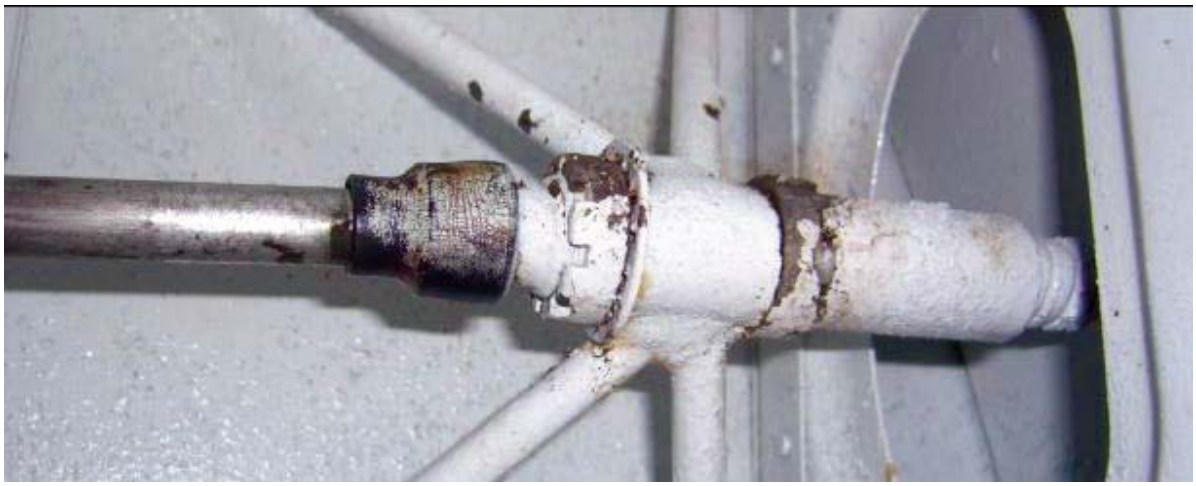
After the old conduits were on the hanger floor, Dave removed the old gear cable from one conduit. It appeared that the old cable was not worn out. However, it appeared that just time and dirt had gummed up the interior to the point that it was nearly impossible for the cable to slide within the conduit.

I snapped a bunch of digital pictures of how the original conduits were routed and how they were set up within the motor transmission bay. So I had plenty of reminders of how it should go together. The new conduits have a larger diameter and required new mounting clamps and hardware. It is best to have them on hand before you start your project.

I encourage any Comanche owner who has a moderate mechanical aptitude to take the time to do the job, or assist your maintenance personnel in replacing the gear conduits. Perhaps this will help stem the tide of Comanche gear collapses and gear-up accidents.

An additional comment – after the conduits are installed, the service manual offers an alternate method of safety wiring the castle nuts adjacent to the bulkhead where the conduit ends pass through to the gear transmission (Fig. 6-14 of the Service Manual). The factory installed these nuts without safety wire. My IA suggested that the threads be “staked” (punched), or to use Locktite to keep the castle nuts from moving. I used Locktite to fasten these nuts and so far they remain tight. I used the method described in the Service Manual to safety wire the outboard nuts.

A top-view look at the new conduits installed and routed.



The left side of the old conduit.

The new conduit support collar.

Recommendations:

1. Place your order for the conduits NOW from Webco. Don't wait until you need them. If Webco is out, you could wait months for a new supply to be fabricated.
2. Purchase and install new down lock springs at the same time you do the conduits (Piper part #83302-40 – confirm with your parts manual). This is the perfect (and easiest) time to do this, and I would guess your logbooks have no mention of this ever being done.
3. Have new hardware on hand before you start the project.
4. Take pictures and study the Webco drawings carefully as you disassemble and re-install the new conduits.
5. With the aircraft on jacks, this is an ideal time to do a "shake test" on the gear to help determine the overall condition of the bushings and parts.
6. Do not over bend the new conduits beyond the limits stated in the Webco instructions.
7. Remember this is 1950's technology, but the gear is easily serviced if the service manual is followed.
8. Carefully follow your service manual to set up the gear after the conduits are installed.

If you have the old gear conduits you are living on borrowed time.
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