

310Q GEAR MISHAP

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I have I have owned my 310Q for more than 13 years. I use it regularly for business travel. About a month before my gear incident, I was taking off for a \$200 hamburger flight. After raising the gear, the tower pointed out that the left gear did not retract. I lowered the gear and returned to the airport for an uneventful landing.

Upon inspection of the left gear mechanism at my hangar, the torque tube had a spiral fracture which seemed to begin at a weld and extended almost halfway down the tube. I consulted with my mechanic of more than 20 years, and we decided that since the floor was going to have to come up to access the gearbox, we should just take the plane down for annual inspection a month early. I ordered the torque tube, and the mechanic replaced it and spent quite a bit of time readjusting the gear using the "Rig It Right video" and the service manual as references.



My gear incident occurred after we replaced this MLG torque tube and completely re-rigged the landing gear.

On June 26, 2011, I had a very close call on my check out flight after the annual inspection. Usually, I drag my mechanic along, but it was a beautiful Sunday morning and I wanted to get in the air. So, I didn't wake him up. After the usual careful preflight inspection (making sure all the inspection panels are on, etc.), I took to the air. After lingering for a few minutes over the airport, I flew out to

the north for a complete systems check. Upon returning to the airport I entered the pattern and dropped the gear. The right main gear light did not illuminate.

I cycled the gear once and had the same indication. I let the tower know about the problem and asked for a flyby so that he could confirm the right gear was down. Tower confirmed that it looked down. Since my mechanic had just replaced the left torque tube and a complete re-rigging (or so I thought), I was fairly confident that it was a microswitch adjustment on the right side, and was not that concerned. But, just in case, I decided to touch down on the left gear first.

It was a calm day, and I floated down the runway a little before setting it down gently. When I touched down on the left gear, the plane started to veer to the left off the runway and I seemed to be leaning left. After processing things for a second, I realized that the left gear was collapsing. I leveled the plane, pulled up and then leveled it out. With the stall horn protesting, I applied full power and escaped the clutches of gravity.

I pulled up the gear, notified tower of the problem, and headed out to the north to sort things out. I grabbed the checklist and followed the manual gear procedure. Once I felt that the gear was completely down, I noticed that there was now no safe gear indication on either main!

I flew out to the north about 35 miles while the tower alerted the Detroit Fire Department and prepared for my return. (We have an apparatus on the field, but the Fire Department must come from a nearby station to man it.) I began my return thinking about my options.

I told the tower that I didn't think it was going to turn out well and I would likely make a mess of the runway. I debated out loud on the tower frequency whether I should just pull up the gear and belly it in. I was wondering about control if one or both of the main gear collapsed and the nose gear remained extended. What would happen? I pondered whether

I should belly it on the grass or the runway. Ultimately, I decided to leave the gear down (the checklist says once it is down, leave it there) and ride it out.

During this time, I also documented on the tower frequency the measures I had taken, what I was seeing in the gear indications, how much fuel I had on board, and described what had happened on the first landing. I asked the tower to call my mechanic, who lives about 10 minutes away, and notify him of the problem and to see if he had any suggestions.

When I returned to the airport, I did one more flyby. A few pilots also assisted the tower by taking a look as I flew overhead. One pilot thought that it looked like the right main may not be fully down. With all of the emergency equipment in place, I decided to land. I prepared for an emergency landing.

On final, I opened the door (wow, does that make a difference in how it flies) full flaps, and prepared to shut off the fuel on short final. I prepared to shut down electrical as soon as I touched down. I landed firmly on both mains with the stall horn blaring at the threshold of the runway. To my surprise, the gear held! I exclaimed into the radio, "Holy *&%\$ Batman" and rolled out a short distance.

The right engine died before I could restore fuel to it and I taxied on the left engine to where the fire trucks and EMS



Upon landing, we surveyed the damage. Here is the broken end on the MLG outboard drive tube.

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crew and my mechanic were waiting.

I exited the plane and got a bear hug from my mechanic who was obviously relieved that this ended so well. A television news camera was in my face almost immediately. My mechanic then pointed out that the overcenter pieces on the left landing gear were missing! The attachment tab had broken off of the upper main gear trunion. The parts were gone and the microswitch was hanging by the wires.



Broken ear on main landing gear upper trunion at lock link pivot bolt point.

More startling, the left propeller had touched the runway during my first landing! It appears that all three blades touched only once because the degree of damage was so different in severity. The blades were all saved by the propeller shop. The only other evidence of the close call came on the tail. It appears that the tie down hook may have touched (without damage to the associated bulkheads) and there is a one 18" long x 8" wide area of paint rubbed off the bottom of the left outer plastic piece on the elevator. This plastic is not heavily gouged nor is it broken. I suspect this piece may have rubbed in the grass when I pulled up the plane abruptly.

I can only speculate that the prolonged time in the air after the emergency manual extension locked the gear into place sufficiently that it held on landing. Needless to say, a lot of parts needed to be replaced, the most expensive being the upper main gear trunion. Removing this part proved to be a real chore for the mechanic. The forward main gear pivot pin was extremely difficult (almost

impossible) to remove. He required a special tool (which was made for him) to get it out.

After pondering this problem with my mechanic and Tony Saxton, I believe there are two possible modes of failure for the parts:

- The torque tube may have failed because of a binding (partially frozen) main gear pivot pin. Once a new torque tube was installed, then the weaker links in the gear system failed.
- The mechanic may have improperly adjusted the gear and caused excessive stress on the parts which failed.

Now that it has been reassembled and the process of rigging the gear has begun, I think my mechanic believes this may have been a problem of his creation. The clue was on the right landing gear indicator light. Recall that the right landing gear light was not lit when I dropped the gear for the first time. It seems that the left side had stopped it just short of completing its full travel. Although locked, it was not making contact with the switch on the gear.

Thus, it would seem to me that the left gear actuator was stressed and adjusted too far, which wouldn't allow the right gear to completely extend. Thus, the connection on the upper main gear trunion failed. Perhaps the binding main gear pivot bolts contributed to this.

Even if rigged properly, things need to be able to move. Proper lubrication is critical. Frozen pivot bolts, which can be seen in one of the pictures, might have been the problem. This situation is much more of a concern as aircraft continue to be used less due to curtailed flying.

Tony's Comment: Having not been directly involved in the process, I can't say for sure what happened, but it's quite possible that though the gear was rigged properly, the components were not disassembled, cleaned and lubed adequately. I've seen instances before where a correctly rigged gear system has problems because a lack of lubrication.

"Even if rigged properly, things need to be able to move. Proper lubrication is critical."

Editor's Note: Every owner of a Twin Cessna with electro-mechanical gear should own a copy of *Rig It Right*. See our web store to order a copy.

