NOSE GEAR COLLAPSE!

by TTCF Staff

I absolutely hate to get a phone call from my airport FBO. It's always bad news:

"Your hanger door's stuck and we can't get your airplane out."

"Did you leave your brakes on by any chance when you came in earlier?"

"The city has cancelled all airport passes and you can't get out to your airplane until you renew it."

But the worst call came a few years ago: "We've had an incident with the nose wheel of your airplane. Can you come out right away?" I did and here is what I saw:

The FBO was pushing my airplane into the maintenance for a routine oil change and the tug driver said that the nose wheel "just folded up". As you can see from the picture, it collapsed right as he was trying to get the main wheels over the hanger door hump. Cowboy tug operator, plain and simple - right? Not this time.

My shop put the nose on a trolley and got the airplane in the hanger and got it on jacks. When they looked up in the nose wheel well, they found the nose gear actuator (my 421 has hydraulic gear) was bent 90 degrees.

That was odd, they said. Somehow the nose gear was not "over-center" when the gear collapsed. If it had been, the gear arms and attach fittings would be damaged as well. The tug driver was right when he said it just folded back. When I heard this, I knew where the trail was headed.

About two weeks earlier, I was on a charter flight and landed at a coastal airport about an hour away. Upon deplaning the passengers and walking towards the FBO, I noticed a small puddle of red fluid under the nose wheel bay. After I got the passengers on their way, I returned to the airplane and confirmed it - the nose gear actuator had sprung a pretty good leak. No more flying that day. I arranged alternative transportation for my passengers and put the airplane in the local shop. They ordered an actuator for overnight delivery and had it installed by earlier afternoon the next day. Great service, I thought, and off I went. I flew another 10 uneventful hours in the intervening couple of weeks.

I told my shop the story and they told me their theory. The gear would not have collapsed like it did had it been over-center. Most likely, it had not been adjusted properly when installed. It hadn't collapsed before because the actuator has an internal locking mechanism. It was strong enough to keep the gear from collapsing during normal operations (for two weeks anyway) but not strong enough to take the pressure from the tug. They were pretty certain about this. The pieces fell in place even more when I recalled that the actual mechanic who installed the actuator seemed rushed and angry. It didn't concern me at the time, because I watched his supervisor inspect the gear and swing it multiple times before signing it off.

I called the shop that installed the actuator and told them what happened and what my shop was saying. The had one of their mechanics on the scene in a matter of hours. He didn't say a word: just looked at the airplane and took a lot of pictures. When I called the manager the next day, he denied any responsibility and said it was the tug driver's fault - even though my FBO had 2 wing walkers on my airplane who claimed no excessive pressure or movement took place. This was confirmed by several other witnesses in the hanger.

It was obvious that battle lines were being drawn. I knew this was going to be expensive for somebody and I didn't want it to be me. Since I'm Part 135, I called the FAA. They came out and

inspected the airplane and the shop told them their theory. Long story short, the FAA's only concern was making sure the paperwork was in order and that my airplane would be repaired properly before it flew again. When I tried to make them get more deeply involved by pointing out that the shop that installed the actuator made an error that should be investigated for safety reasons, they backed off. They didn't want any part of what looked like might evolve into a legal battle.

Here's why the stakes were high and the burden of proof was on me: my insurance policy had a $10,000 deductible for damage due to a gear related incident. Insurance for piston Part 135 operations was hard to get at the time, and this was a clause I had been forced to accept. It didn't bother me at the time; "I'll just be extra careful about lowering the gear before landing," I thought. But now the clause had come home to haunt me.

The total bill for repair was $18,000 and change. The actuator had to be replaced, of course, but so did the radome and nose gear doors. Each part of the nose gear mechanism had to be examined for cracks and other damage. The insurance company happily covered everything above the $10,000 deductible.

I began to research my options and assemble my case. I am friends with a noted aviation author and expert witness. He reviewed my situation at no charge and here was his response:

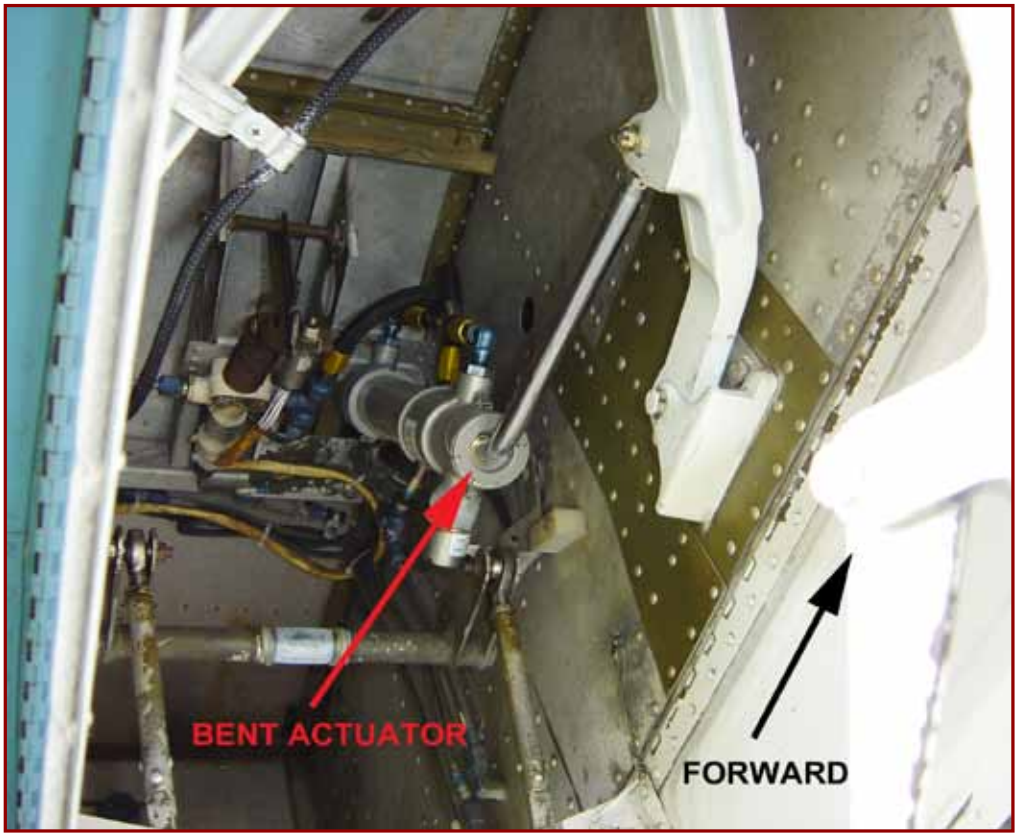
"I have reviewed the details of the nose gear collapse of Bob Thomason's Cessna 421C, including digital photographs of the failed nose landing gear (NLG) trunion and drag brace. It is my understanding that the NLG collapsed while the aircraft was being pushed by a Lektro electric tug. It is my further understanding that not long before the NLG collapsed, the NLG hydraulic actuator was replaced.

In my opinion, there are only four ways that the 421C nose gear can collapse in this fashion:

1. *One of the NLG trunion pivot lugs fractures from fatigue and/or overstress.*
2. *The NLG drag brace fails from fatigue and/or overstress.*
3. *The NLG actuator internal downlocks fail.*
4. *The NLG actuator rod-end is misadjusted, causing the NLG actuator not to lock the drag brace fully over-center with the necessary pre-load.*

The first three of these possibilities can easily be eliminated as possible causes in this case:

1. *Failure of a NLG trunion pivot lug would cause the NLG to fail sideways, not backwards as occurred in this case. Furthermore, the photos indicate that both NLG trunion pivot lugs remained intact.*
2. *Failure of the NLG drag brace did not occur in this case, as the photos show it to be intact as well.*
3. *Failure of the NLG actuator internal downlocks did not occur in this case, because the photos show the actuator pushrod bent from overstress, and*



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this could not have happened unless the downlocks held.

Consequently, in my professional opinion that the only plausible cause of the NLG collapse of Bob Thomason's Cessna 421C is that the mechanic who replaced the NLG actuator failed to adjust the NLG actuator rod-end properly to ensure that the extended actuator holds the NLG drag brace fully over-center with the necessary pre-load.

The 421C service manual specifically documents a procedure for adjusting the rod end after installation of a NLG actuator in order to ensure the required pre-load on the NLG drag brace. Maintenance of U.S. registered and certificated aircraft is governed by 14 CFR Part 43. Specifically, 14 CFR Section 43.13(a) states: "Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance shall use the methods, techniques, and practices prescribed in the current manufacturer's maintenance manual or Instructions for Continued Airworthiness prepared by its manufacturer, or other methods, techniques, and practices acceptable to the Administrator." With respect to installation of a Cessna 421C NLG actuator (including adjustment of its rod-end), I am unaware of any alternate procedure to the one documented in the Cessna 421C service manual that is considered acceptable to the Administrator."

Case opened and closed, right? I quickly learned that in the legal world, things are not so simple. I contacted a friend, one of the top criminal attorneys in my city. He had a less expensive attorney in his firm who might be able to help me. His estimated fee? $12,000. I was beginning to sense the hole I was in. I looked into small claims court but in NC it applies to amounts of $5,000 or less and has other restrictions that made pursuing my case impractical. My strategy was reduced to sending threatening letters and as my attorney stated, "in my experience, people never respond to letters....". His theory proved correct. The offending shop, and their attorney, would not budge. They knew the dilemma I was in. I swallowed hard and repressed the urge to fight on principal. I took my loss and moved on.

The repair to the nose was relatively quick and I was off flying soon enough. The sting of the financial loss faded as I climbed through towering cumulus on my way to some now-forgotten destination. I was flying again. And for those of us who love it so, any price we have to pay to fly is worth it.

A Comment from Tony Saxton, TTCF Director of Tech Support:

"Bob's story reinforces my conviction that twin Cessna aircraft, and particularly their landing gear, need to be maintained and rigged PER THE BOOK! This applies when replacing parts as well as during the periodic inspections that the Cessna Maintenance Manual calls for. Short cuts and ommissions can have expensive consequences."