ANATOMY OF A 210 NOSE WHEEL COLLAPSE ON LANDING

by Eric Woodman

Here's my experience, in the hope it will provide guidance for others regarding a simple open-view inspection during preflight to avoid this experience as well as some hindsight on how to avoid the mess that occurs if faced with the same experience.

Discovering the Issue

Approaching to land at Truckee, CA, in my 1979 T210N, the green gear down-lock indicator light did not illuminate. More attempts to cycle the gear up and then down did not solve the problem. I believe the gear pump turned off at the end of each down and up cycle. Using the manual gear pump, I found maximum pressure in the lines made it impossible to pump the extended handle. The pilot's-side main gear appeared to be in position to be locked. Looking at the passenger-side mirror showed the right main gear also in position to be locked. The mirror view seemed the same for the nose wheel.

Decisions, Decisions

Ever think about how you might get guidance for a mechanical issue without creating an immediate emergency?

Look up and use the POH/AFM emergency checklist; it is a good starting point. The after-manual-extension procedure states to land slow and soft, followed by minimum braking. That's about it for that source.

How about getting advice from someone outside the plane while you use up the many gallons of fuel that can provide extra time and remove any feeling of urgency? Calling your trusty CFI who really knows the plane and is likely to provide more detailed suggestions on the landing process? Calling or texting "911 ASAP" by cell phone? If that doesn't work, do you ask the tower or other controller to call for you and patch the call through or relay the conversation? I wish I had thought of all that! It might have helped, but who knows.

I made the decision to land using the 7,000' runway at Truckee instead of the 2,500' runway at my home base.

The landing went well. I throttled to idle before touchdown. All wheels touched down, I kept the weight on the nose, and used minimal breaking for a short distance. Success so far. Some more minimal braking continued. Success at first. But at about 40 knots airspeed, that sinking feeling surprised me when the nose gear collapsed, and all blades of the propeller struck the pavement as the plane skidded to a stop in minimal distance.

Why Didn't the Nose Gear Lock?

The nose was lifted with the use of a crane and webbing. Attempts to swing the nose gear into locked position failed. Crawling under the plane behind the nose wheel, I discovered a down-lock pin had migrated out of its hole far enough to block the collar at the end of the actuator rod so the rod couldn't pull the nose wheel back far enough for the down-lock hooks to engage the pins.

See the lower pin in the attached photo. The upper pin has a 1/4" gap for passage. The lower pin was not loose and could only be moved back by hammering a wedge between it and the rod. Once the pin was forced away from the actuator rod, the nose wheel could be moved by hand into the locked position and the plane was towed off the runway.

CPA tech support specialist Garth Bartlett responded to my support ticket: "The problem you have with the down-lock pins migrating out of place is very common on aircraft that don't have regular inspections of the pins for looseness as recommended by Cessna SEB 95-20. This SEB was introduced in 1995 and recommends the pins be inspected for looseness every 200 hours or 12 months (whichever occurs first) and repeated at each gear retraction inspection (while on jacks) not to exceed 200 hours of operation after the initial inspection.

While Cessna never said so, the general consensus about the cause of the pins' becoming loose is the use of powered towing devices such as tractors, tugs, etc. These machines put a jerking motion on the pins, which leads to looseness.

The pins are retained in the nose actuator housing by two roll pins, one for each downlock pin. These retaining pins are very small diameter, very weak and break easily, leading to the looseness of the pin, which allows it to start migrating.

SEB 95-20 introduces a service kit SK210-155. This allows the down-lock pins to be replaced with larger diameter down-lock pins and larger diameter roll pins.

I would suggest that in the future, your mechanic should carefully check the down-lock pins for looseness every annual, even if you modify the down-lock actuator with the service kit."

Wrong! This is an owner preflight inspection item!

Look up SEB 95-20. It provides lots of insight. [see also our 2002 article reprint on the Nose Gear Spring Guide and Acutator Pin Inspection in this issue on pages 28 & 29 -Ed.]

A Few Seconds During the Pre-flight

Yes!

My two cents: Inspect for the gap between the pins and the nose gear actuator rod as part of every pre-flight. Request your mechanic to do the same during all his inspections, as well.

A look at my logbooks dating back to 1996 disclosed nothing related to this SEB, the inspections it requires, nor the recommended kit being installed.

Hindsight on the Landing Process

In hindsight, there was more that could have been done beyond following the book emergency procedure.

Given a long 7,000' runway, there was no reason to have braked. Progressively pulling the controls back using aerodynamic braking would have possibly allowed coasting to a stop with no braking needed.

Better yet, when the mains touched down, pulling mixture and the prop controls full back would have stopped the motor quickly during rollout. In my plane, the three-blade prop stops at the 12-20-40 position, which would have protected against a prop strike and the requirement for a motor removal, teardown and inspection, plus repairs and purchase of a new prop.

If all had gone well and the nose wheel hadn't collapsed, the plane could have been left on the runway without turning, providing time to place a support and a jack at the firewall to jack the nose wheel up, and troubleshoot.

Conclusion

I hope my experience and hindsight can help others avoid a similar occurrence.

About The Author And Airplane

In my "day job" I was an attorney from 1970 until retirement in 2015.

I started flying in 1973, just before the Arab oil embargo, and got my primary license six months later. In 1977, I received an instrument rating. This was followed years later with training by my older son, a CFII/MEI, for a commercial rating and later by a multi-engine rating I have never used. In May of this year, my other son and I used Jones Brothers in Florida to obtain our single engine seaplane ratings.

My family has deep roots in aviation. My late wife's career started as a Pan Am flight attendant in 1968. She transitioned to United Airlines in 1986 and continued for a 40-year career until medical retirement in 2008. Her career and love of travel provided our two sons and me insight into people and cultures all over the world. As a result, my younger son Gavin is a 737 First Officer with United and has an aircraft sales brokerage company, Aerocor, based in Los Angeles. My older son Garrett followed and is a 777 First Officer, also with United, working with Gavin in aircraft sales and management.

I've owned two T210s. The first was an interest purchased in 1977 in a

1969 T210J, N2287R, where I later purchased the other owner's share. I hope N2287R continues doing well under the care of later owners and I would certainly like to receive confirmation from her current owner. The second is my current 1979 T210N, N4137C, purchased in 1996 without logbooks at a bankruptcy sale.

N4137C has been highly modified over the years. Some of the main modifications: I personally did the entire interior in 1998. It has been stripped and repainted twice, the last time in 2010. Precise Flight speed brakes were installed, as well as a TKS de-ice protection system. The six-point motor mount was installed along with Kneisley exhaust. It has a Riley intercooler installed by the original owner. The propeller was changed to the Ram STC Hartzell Q-tip before the TKS was installed. We found a spot high on the firewall on the co-pilot's side to mount a remote oil filter. I hope to upgrade to a more current Hartzell Scimitar propeller as part of the current repairs unless the original 337 approval for the TKS

slinger ring requires a new approval that can't be solved by hiring a capable DER. The radios were initially upgraded, and the entire instrument panel later upgraded again to its current configuration, all by Executive Autopilots in Sacramento, CA.

It's had its share of woes. Superior Millenium cylinders were subject to the AD requiring mandatory replacement, once they were removed, short of 1,800 hours. The new Superior cylinders, included in the latest Western Skyways reman-to-new-limits completed in April 2022, were subject to the latest AD grounding the plane on March 19, 2023, for removal of defective intake valves. It remains to be seen whether Superior will reimburse the full cost, instead of arbitrarily limiting reimbursement to the reduced hours Cessna claims should be needed to remove the motor, disassemble it on a stand, and reverse the process for an unmodified aircraft/motor. The good news is the AD for inspection of the wing carry-through section has been done and it passed.

I have installed two GNS 480s, Sirius XM weather, active traffic, ADBS-B in, with a Garmin 210 broadcast to my iPad running Garmin Pilot showing secondary weather and traffic, Century 2000 autopilot with altitude pre-select, and a G5 as standby AI with the vacuum system removed. I'm still dreaming of a Garmin GFC 500 and two G650s.

Cessna's Centurion has been the ideal aircraft meeting all of my needs. It's fast enough and stable in instrument conditions and can carry a lot of people and/or baggage, even with full fuel. I typically cruise lean of peak at 15-15.6 GPH at 10,000-12,000 MSL, getting true airspeeds ranging from the high 160s to 175 knots depending on conditions.

Having just turned 80, I hope to have at least a decade of continued flight through use of annual flight reviews and IPCs. My next adventure is training with my 14-year-old grandson for sailplane ratings. My hope has been that insurance will continue to be available with aggressive recurrent training and addition of ratings. Time will tell.

TECH NOTE

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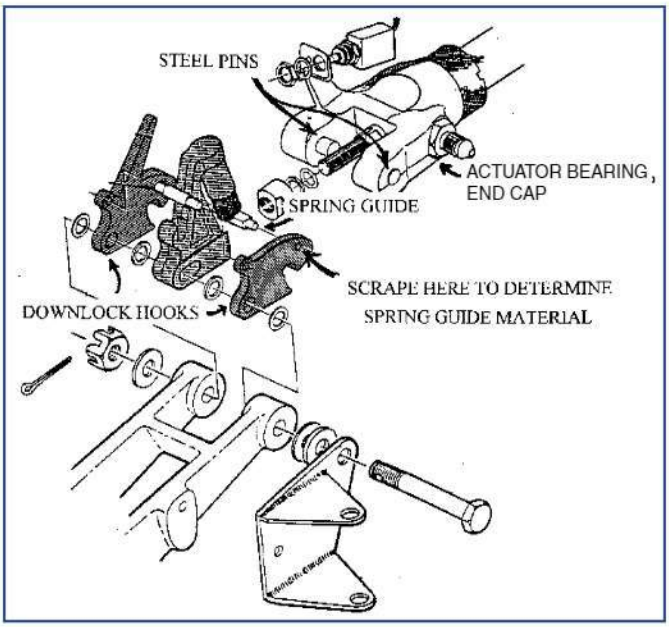
Nose Gear Spring Guide & Actuator Pin Inspection

Used on 172RG, R/TR182, 210, 303, and 337 Series Landing Gear

Two downlock hooks capture two steel pins that are pressed and pinned in the nose gear actuator end cap to lock the nose gear in the down position. Pressure to hold these two hooks in position when the gear is locked down is transferred from a spring through a "T" shaped part called a spring guide to the two hooks.

The spring guide was originally made out of a white plastic. The all-plastic spring guide tends to fail at ends of the "T" that project through the holes in the downlock hooks. The ends would bend, or in some cases break off leaving little or no down force on one or both of the downlock hooks. This can cause intermittent or no gear down indication or failure of the nose gear to lock down and nose gear collapse.

All previous part numbers for the spring guide are now superseded to part number 9882024-1. This improved spring guide has a steel pin molded into the crossbar of the plastic guide. The ends of the steel pin project through the holes in the hooks. Attempting to scrape the end of the spring guide where it projects through the hooks can check for the presence of the improved steel-pinned spring guide. If a knife blade will cut the end of the guide then it is the old style and must be replaced. If the blade won't cut the pin, the new guide has already been installed.



The announcement of the improved spring guide was covered in SE 84-3 for the 172RG, R/TR182, and 210 aircraft and MEB 84-1 for the 337 series aircraft. The installation of the spring guide may be in a log entry with reference to the appropriate bulletin.

The downlock hook mechanism for the nose gear is a critical item and should be inspected and cleaned at every gear inspection. The hooks and crossbar must rotate freely with no binding. As stated in the Service Manual, "The hooks have a dry film lubricate applied and should last the life of the parts." This dry film should be reapplied whenever the mechanism is disassembled or as needed. The 1978-83 P210 service manual states in the landing gear section that the hooks may be field lubricated by spraying with Lubri Bond A, Lubri Bond 220, or Perma Silk. These are available by contacting one of the many distributors of EM Products. EM products can be reached at 800/428-7802. One distributor in California, K.R. Anderson 800/538-8712, will sell individual cans of Lubri Bond A, Lubri Bond 220, and Perma-Silk. There is a distributor in the Miami, Florida area. Contact U.S. Airmotive at 305/885-4991.

There have been problems with the nose gear actuator bearing end pins that the downlock hooks engage. Service Bulletin SEB95-20 for the single engine aircraft and MEB95-14 for the 303 and 337 series aircraft advises owners to have the pins inspected for looseness. The pins are a press fit in the actuator bearing end and retained with a roll pin. The bearing end pins break at the retaining groove that the roll pin engages. This allows the pin to back out and prevents the downlock hooks from engaging properly.

These pins should be looked at whenever the aircraft is on jacks. This inspection can easily be done with a small pair of needle nose vise grip pliers. The pliers should have the serrated teeth ground off so the pliers do not gall the pins. With the pliers clamped to one of the pins, look for any movement in the pin while attempting to rotate the pin with the pliers. The pin is a press fit, so there should be no

movement in any direction. Check the other pin in the same manner. If any looseness is detected, the actuator bearing will have to be inspected to see if the hole size for the pin is still within limits. The maximum size for the downlock pin bore is 0.3760 inches. If the holes are out of tolerance, the bearing end will have to be replaced. If the bearing end is serviceable, the kit described in SEB95-20, SK210-155 for the single engine aircraft or MEB95-14 for the 303, SK303-47 and 337, SK337-70 aircraft can be installed. The new pins contained in the kit are retained by a roll pin that passes through the center of the pin so new holes must be drilled in the actuator bearing end. A drill guide is provided in the kit.

In the June 1998 issue of Advisory Circular No.43-16, Aviation Maintenance Alerts, there is a Safety Recommendation 97.149 which in part states. "A review by the responsible FAA Aircraft Certification Office revealed the actuator bearing end and downlock pin designs meet the current criteria for expected loads, and the observed failure mode of the pin is inconsistent with design loads applied to an assembly in serviceable condition. Investigation determined that the probable cause is improper ground handling during towing and continued use of the actuator after damage has incurred. Cessna has issued Recommended Service Bulletin (SEB) 95-20 which details inspection procedures and provides a more robust downlock pin which is less susceptible to failure caused by exceeding the landing, towing, or taxi loads." The way I understand this statement is that with the improved pin and retaining system it will take more abuse from mishandling the aircraft before the pins break.

The condition of the downlock pins is impossible to inspect on a preflight walk around inspection. The hooks hide the inboard portions of the pins, and this is the area of concern. The recommendation CPA makes is to have the inspection called for in SEB95-20 or MEB95-14 done whenever the airplane is jacked, and be sure it is entered in the aircraft's maintenance records. This gives a known good starting point and may give you some leverage if a failure occurs after a tug or tractor has towed the aircraft. The nose gear down switch is made by contact with the right hook so anytime the gear system fails to indicate a green light gear down position, be sure to have the actuator pins inspected and noted in the logbook no matter what the actual problem turns out to be.