

# Grandpa's Rocker or The Ins and Outs of Articulating Seats



By Dennis Wolter  
*Air Mod*

Almost every Cessna we bring into Air Mod for renovation that has an articulating pilot or co-pilot seat comes with a request to do something about the wobbly looseness in the seat. One customer actually said that if his pilot seat became any looser he was going to put it on his front porch and rock away into his golden years! Cessna began installing these desirable articulating seats in the early sixties. That means that an original owner could easily be the grandparent of many of the current group of pilots flying these 40- to 50-year-old machines. We Cessna owners are not alone in dealing with aging seats. The Air Force intends to continue flying its early-fifties B52s for another 30 years. And I have a friend who is waiting for a call from NASA requesting delivery of space shuttle parts to the Smithsonian in his fleet of 1940s DC3s. Who would have thought?

Of the seven airplanes currently being renovated in Air Mod's hangar, the oldest was built in 1957 and the newest in 1980. With one exception, all appear to have been maintained to an above-average standard. That said, one component that seems to have slipped through the cracks over the years is the articulating seat. The complexity of articulating crew seats make it the one thing in the cabin that I think needs the most attention.

Before examining the wear points and repair processes for these seats, I feel it is important to say that these are unquestionably the best designed, best built, best functioning and most durable piston single engine aircraft seats in the GA fleet. So why have so many of these seats fallen into disrepair? With all the effort it takes to keep up with engine condition, landing gear maintenance, aging airframe issues, and AD notes, seats just get taken for granted or overlooked. Unless the owner/customer calls out a particular seat problem, maintenance technicians tend to ignore these seats, allowing them to slowly degrade into a rocking and tracking mess, just like Grandpa's rocker.

The good news is the excellent build quality of these seats and the availability of new parts, making them very repairable and maintainable. Most of what it takes to take care of them can be legally done by an aircraft owner under the provisions of preventative maintenance, FAR part 43.3, paragraph G, appendix A. So let's get started.

The number one enemy? Accumulated dirt and lack of lubrication. Without question, the majority of seats we prepare for renovation are almost totally lacking any lubrication and are covered with years of built-up dirt and dry lubricant residue. Some mineral spirits, an old toothbrush, and compressed air will do the trick. Clean anything that moves. Fully actuate the height and reclining cranks and thoroughly clean and flush the jack screws as you go. Remove the seat rollers, and clean the rollers, bushings and mounting screws. Once clean, inspect each component carefully. Any worn, cracked or loose components should be evaluated by your maintenance technician. Not many people seem to realize that the seats we sit in are primary structure. They can be a major factor in survivability in the event of an off-airport landing or serious accident (imagine if a seat back or seat latch lets go at the most critical moment of the flight).

While the seat tracking rollers are removed, install new side thrust washers (available from McFarlane Aviation). The originals from



*New McFarlane tefton thrust washers and seat rollers*

Cessna were made using the same plastic as your lovely window frames and often are totally shot by the time you inspect or upgrade your seats. The side thrust washers are there to reduce side travel and wiggle as the seat sits and tracks on the rails. These washers also prevent metal-to-metal contact between the seat feet and the seat rails, and help to insure proper alignment of the seat latch pins and the seat track holes.

With the seat cleaned and reassembled, lubricate the various moving parts as follows. We use spray silicon to lubricate the tracking rollers. It doesn't leave an oily, dirt-holding residue that would eventually end up in your carpet. Lubricate the jack screws with DC-4 silicon grease; your maintenance tech will have some. Very little is required and your index finger is the applicator of choice. Finally, using a light oil such as the old standby 3:1 or LPS2, lubricate anything that moves, especially the large height-adjustment pivot tubes that pass through the cast aluminum frame pieces. Don't forget the seat rollers and reclining mechanism on the non-articulating seat. And remember, your aft seats have reclining components that will need some attention too. Thankfully, the aft seat lubrication can be easily done without removing the seat from the airplane. We all know the bench seats on some Cessnas can be difficult to remove and reinstall.

Seat maintenance issues, especially loose articulating seats, should be left to your maintenance technician, as they often involve somewhat complex disassembly and assembly procedures. Here's an outline of some common wiggle-generating wear points and fixes.



*Loose roll pins halfway out of the seat back reclining bellcrank*

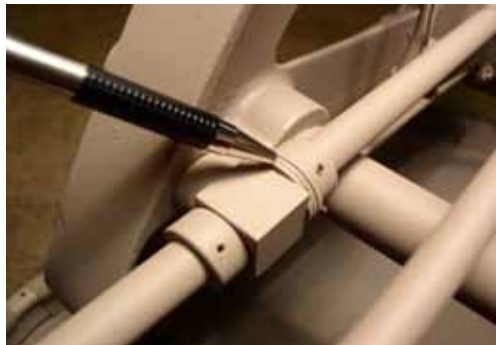
**LOOSE ROLL PINS:** To save weight and space, articulating seats are held together with

lots of roll pins. Any slippage of these pins must be corrected. The most common place to find loose roll pins will be the pins that secure the seat reclining bell crank to its supporting shaft. These small pins will often work their way halfway out of their holes, causing all of the torsional load (and there is lots of it at this point in the mechanism) to be concentrated on only half of the cam attachment. Inspect the cam for cracks or oversizing of the holes. A crack means a new cam is in order. Due to close tolerances at this cam, oversized holes cannot be reamed to accommodate the next larger diameter roll pin. Again, a new cam is required. If the pins and holes are in good condition in a crack-free cam, reset the roll pin so it is fully supporting both sides of the cam at the shaft, and use .032" safety wire to prevent future slippage.



*New roll pins installed and safety wired in the seat back reclining cam*

**JACK SCREW WEAR:** The crank operated jack screws, for both height and reclining adjustment, can become worn, resulting in longitudinal play that will allow the seat to rock fore and aft. This looseness can be eliminated by adding additional shim washers to the existing stack of washers adjacent to the chrome crank. You can usually find the needed sized shims from local machine shop supply companies. In a pinch, I will dimension a washer using a belt sander.



*Seat back reclining bellcrank jack screw shims*

**WORN CLEVIS:** The clevis and/or the clevis pin that connects the jack screw to its respective component often becomes worn. Due to strength requirements, no up-sizing of hardware is possible here, necessitating the installation of new parts.

**WORN SEAT ROLLERS & FEET:** Cessna used durlon or aluminum to fabricate their seat rollers. Wear and appreciable wobble in these rollers requires replacement, and don't forget to replace the previously mentioned thrust washers. Cessna recently released service bulletins SEB 11-4 and MEB 11-2, that more fully address long-standing issues surrounding seat track AD 2011-10-09. Of particular note is a new focus on the condition of the seat feet. Two major issues are addressed by this service bulletin, one being the deformation of the foot caused by undue stress, and the second being wear of the points of the foot itself. Follow the dimensional criteria of this service bulletin; both your safety and the amount of wiggle reduction will benefit. Don't forget your seat rails. Even if the holes are good, plenty of rails are worn on the bottom side of the top flange. All this wear adds up.



*Carefully inspect the seat feet per Cessna service bulletin SEB 11-4 and NEB11-2*

**WORN HEIGHT ADJUSTMENT SHAFT PIVOT POINTS:** I saved the best for last. The least common but most difficult issue to correct is wear in the holes for or in the large diameter pivot tubes. Due to lack of lubrication, considerable wear can develop where these steel shafts pass through the cast aluminum seat frame. Correction of this problem requires in-depth disassembly of the seat. Outside and inside micrometers will identify worn parts. If the shafts are worn, new components will do the job. If the seat frame holes are worn, custom made bushings are in

order. This level of repair will require a field approval since the seat frame is primary structure. In this case, I would either live with it or look for a used seat in better condition.



*Seat height pivot points; definitely oil these at every annual inspection*

Over the years, we've seen a number of articulating seats that present frozen-in-place height adjustment tubes, likely due to lack of use or insufficient lubrication. To correct this, we mix a concoction of 50% ACF50 or CorrosionX and 50% lacquer thinner. A couple of times a day we brush on a generous amount of this penetrating mixture on both sides of the height adjusting tube where it passes through the cast aluminum seat frame. Continue this process for several days. Use a heat gun (no open flames please) to heat the seat frame until it is hot to the touch and then actuate the height adjustment crank in both directions in an attempt to create some movement in the two shafts. Sometimes we will also use a large crescent wrench to break the frozen shafts loose. Repeated applications of penetrant, heat and cranking will eventually do the job (remember, if you lubricate your seats once a year this problem can be avoided). Once we break the height adjustment pivots loose, we remove the handle of the jack screw and then use a nut driver with a slot cut in it to run the seat up and down until the seat height adjustments function smoothly.

While you're inspecting your seats and rails, don't ignore the possibility of a crack in the seat frame, usually found in the seat back. With the seat on the rails, aggressively pull the top of the seat aft. If you can see any flexing in the seat back, remove the upholstery and look for a crack. We've found a few in recent years.



*Drill motor trick to loosen tight seat height adjustment pivot shafts*

One final note. I can say without hesitation that most of the Cessnas we get in our shop for an interior are missing some of their seat

stops. You should have four seat stops per tracking seat. Think about it. Most airplanes sit tail-low. When you slide your seat aft to get out of the airplane you often slam the seat into the stops. If there is only one stop installed, the seat comes to an abrupt stop on one side only. The inertia of your body and seat weight causes a strong asymmetrical load on the seat base that eventually leads to loosening of roll pins and other components. If you have an earlier Cessna that may not have left the factory with four seat stops per tracking seat, have your maintenance technician drill the rail and install the additional stops.

Welcome to the new golden years of aviation. With proper care of our wonderful airplanes, these can be the best years of all. As we often say at Air Mod, if doctors could do for our bodies what we can do for our airplanes, we could be young and beautiful forever. Until next time, fly safe!

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