

CHECK YOUR AIR RUDDER!

(Except where noted otherwise, photos and article courtesy of an "Active Seabee Owner")

Editor's Note: An active Seabee owner found a potentially disastrous situation and submitted this article. Please check your rudder for excessive play at the lower hinge point where the rudder cable horn attaches to the rudder. The fix is nothing less than annoying and requires that the rudder be taken apart and the two ribs holding the rudder stop must be re-riveted in place. **THERE SHOULD BE NO MOVEMENT BETWEEN THE RUDDER AND THE RUDDER STOP BRACKET!**

Thank you to the Seabee Club member for his excellent article and bringing this critical safety item to our attention. (You know who you are!)

As a side note, another club member shed light on the reason this happens, as the author eluded to in this article...NO RUDDER GUST LOCKS! His recommendations are at the end of this article. Thank you all for your input! (SM-for the Seabee Club)

Discovery

"The rudder horn is riveted with six rivets to two nose ribs, which are in turn riveted to the rudder spar and the skin. On my aircraft, all 6 rivets loosened up, which allowed the rudder to move FURTHER THAN THE STOPS, with slight pressure applied at the stop.

I have no way of knowing if this is the original rudder, but my aircraft has only 450 hours or so total time. I can only surmise that this particular rudder went through a long period of windy conditions without benefit of rudder gust locks, which banged it back and forth for quite a while causing the rivets to loosen up. [This is a video of the rudder still attached, doing what it did...\(click\)](#)



We discovered this while checking the flight controls at the annual. When pushing the rudder by hand to full travel as if on pre-flight, we noticed about 1/8" movement after the rudder was against the stop. There was no way to check anything further, so the rudder had to come off.

[Here's a video of the horn assembly re-attached to the fin post \(after we got it out\), so you can see what was happening inside the rudder...\(click\)](#)

If you check yours and find movement, the rudder horn must be disassembled and re-riveted to the nose ribs. Here's how we did mine...

Remove the air rudder as follows:

1. Disconnect the wire to the light.
2. Remove the two screws that go through the horn.
3. Remove the top screw at the hinge.
4. Remove the middle screw last and slide the rudder straight back.
5. Bag the hardware and put it where you won't lose it! Replace if necessary.

Drill baby, drill

Drill out the rivets attaching the horn to the nose ribs (left photo below). If your rudder has a seam like mine, you'll also need to drill out enough rivets along the seam and the spar to allow you to gently peel back the skin to get at the horn assembly. Once inside, block it open with a short 2 x 4 chunk (right photo below). You'll need to drill out the four rivets per rib attaching the nose ribs to the spar in order to remove the horn assembly.



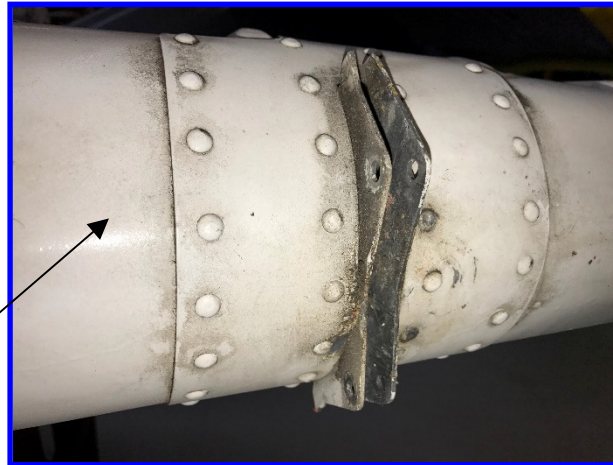
These are the nose-rib-to-skin rivets removed



These are the leading edge rivets removed

If your rudder does not have a seam, (as in the white spare rudder below) you'll have to do some exploring. I assume you'll have an easier time of it with fewer rivets to drill out to get the horn assembly out of the rudder to repair, as you won't have to split the rudder like I did.

No leading edge seam



(Editors note: Some Seabee rudders are one piece, which didn't have a leading edge seam. Others were a two and three-piece rudders which have the seam on the front edge. The one-piece rudders must be completely taken apart to replace the rudder horn rivets.)

Preparation

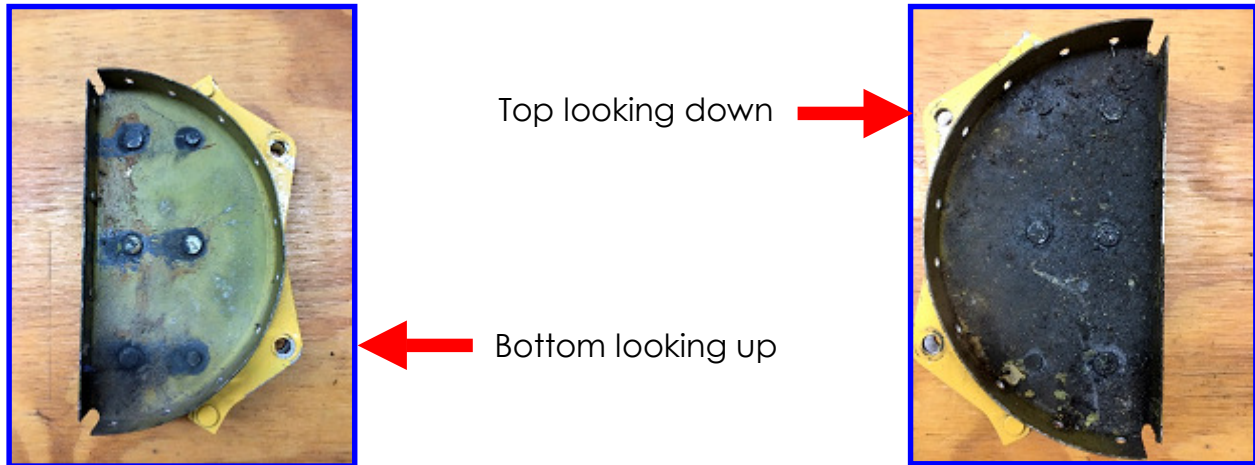
The assembly was pretty dirty from years of catching engine oil and grease thrown back by the prop. Looking up from the bottom shows the smoking rivets; the top is coated in gunk.



From bottom looking up



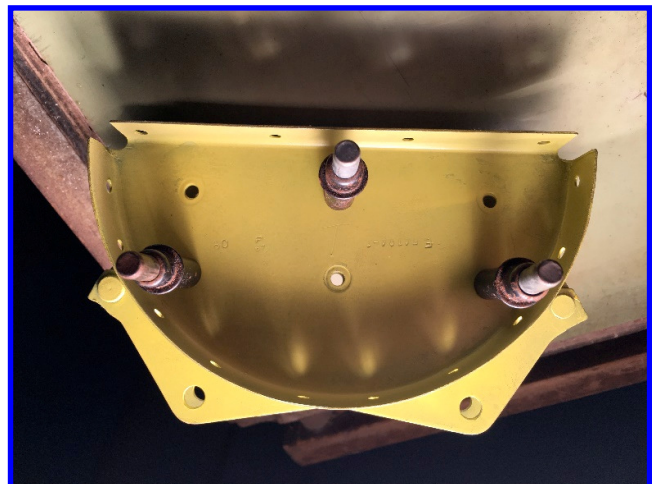
From top looking down



This is the horn with one nose rib removed. It is sandwiched between two.

Reassembly

After cleaning the assembly, we drilled out the existing loose rivets and replaced them with six 5-2 rivets. (The holes were slightly elongated.) The assembly was riveted back together and fitted to the spars. Then the seams were re-riveted. Once the rudder was closed back up, it's off to the paint shop.



All in all, it took about ten hours (minus paint) to repair.

I don't believe that the rudder could have come clean off the horn without a lot more warning, but loose flight controls are never a good thing! I'd be interested to hear if anyone else discovers the same thing!

Fly safe..."

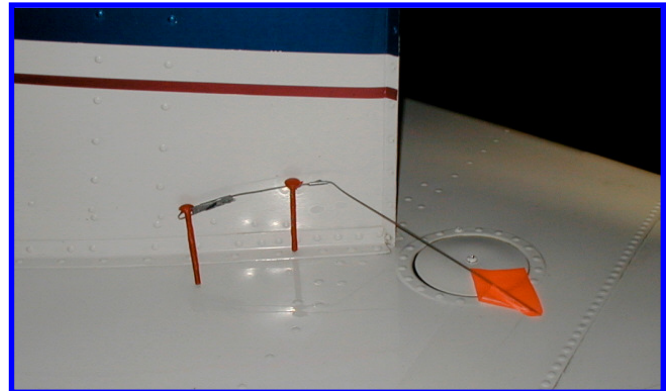
Prevention

The following is a reprint of a "Tips and Tricks" recommendation by member Bruce Hinds. Bottom line: you need air rudder gust locks!

Bruce writes:

"My aircraft at one time had the rudder stops broken out because the airplane was parked in a strong tail wind where the rudder would bang back and forth against the stops. The mechanics had cut a hole into the rudder skin to do the repair and the finish has never been the same. Another bee this past year on our field was in the shop for an extensive repair for the same thing, except it was the former and plate on the vertical stabilizer the hinge mounts to that was damaged. The rudder and vertical and stab had to be removed. That was a very costly repair. Locking tail wheel airplanes don't have anything resisting rudder movement like the springs on the steerable tail wheels. Perhaps you remember my rudder lock (see below). It's been a few years, but I used someone else's idea of putting two "pins" on a wire and flag so they go in the middle rudder hinge. I coated the carriage bolts in rubber made for tool handles and drilled the carriage bolts for a sprinkler marking wire flag. It's worked great all these years.

But..."



First Rudder Gust Lock

"When I showed this to everyone, I received a story about how a problem that could arise should you forget to remove it! "Not a problem" you say? Well on land you can't taxi without noticing it, that's correct and I use this if I'm leaving the Bee tied down for long periods. But as the story goes, and I can see this happening, when parked on a ramp or beach, 9 times out of 10, especially on soft beaches you get the airplane in position to go down hill when you park it. So, what if you forget, and power straight into the water! Try to get that sucker out now! Even if the water is warm, you're not going to be able to swim back to get it out. It's just too far above the water. So, how are your sailing skills without a rudder? I've been looking for alternatives because even as well as this has worked, it would be difficult to get it in and out at a dock. And another flaw with my arrangement is when the wind is blowing from behind and the airplane is parked, you can still get some rudder banging unless you have someone hold the pedals while you pull the pins.... Yes it's not perfect and the other situations haven't been much of a problem. Recently in reading the old newsletters I noticed a "U" shaped bracket they mounted to the battery box with a piece on each end that would attach to small bolts threaded into the inboard ends of the rudder pedals on the copilot's side. Great idea, but I didn't want to put the bracket under my carpet job and I didn't want to pull the pedals out to drill and tap in the bolts. Can't we make this easier? Yes!



New Generation Rudder Lock

In its former life this rudder gust lock (above) was a wardrobe box hanger bar (available from a U-Haul store). Now shortened and painted bright orange with web straps that wrap around the back of the pedals, pop riveted on the ends and snaps in the middle. It's lined with pipe insulation and fits the shape of the rudder pedals perfectly. You can't miss it! Well almost, but even if you do and you find yourself 'underway' on the bounding mane, you can reach down and pop the snaps, you're home free. The only drawback on this is there will be just a little rudder movement, but it can't move much and won't damage your stops."

Thanks to the "Active Seabee Club member" and Bruce Hinds for bringing this important safety item to light. The life you save may be your own!

S.M. for the Seabee Club