



# Shimmy Damping

A shimmy on landing isn't always about the wheels or brakes, as Capt. Machum recently found out.

**A**s I've mentioned in previous columns, my landings in my Piper PA-28-236 Dakota have been a work in progress since September 2012, when I first started flying the machine. Carrying excessive speed was initially a problem, due to my fear of falling out of the sky, as I had become accustomed to jets with approach speeds higher than the Dakota's cruise speed!

Eventually I got the approach speed back into an acceptable range. My landings became smoother, and more controllable on the rollout, as the airplane was not still at flying speed when the wheels were rolling down the runway.

## My shimmy problem

Stopping, unfortunately, became more of a challenge over time due to an increasingly annoying shimmy from our nosewheel. It was a peculiar phenomenon, in that it only occurred when applying brakes, but not always. Much head-scratching and research ensued. Why only with the brakes on, and why only some of the time?

Prior to my purchasing half of the airplane, my partner Paul had spent a lot of time chasing down this shimmy, and as a result, a new Parker shimmy damper was installed.

When I first started flying the airplane, the shimmy was not present, but it started to appear again—at first occasionally, then as time wore on, more often than not. It was odd though, in that sometimes it wouldn't happen at all—and that shall remain a mystery.

When it did happen, it was always the same. Applying back pressure to remove pressure from the nosewheel never helped, neither did pushing forward to add more pressure. We had to be careful with that

test, as a wheelbarrow scenario wouldn't be good, either.

## Attempted fixes

Consequently, the main wheel tires were replaced, balanced, and rotated. Wheel bearings were checked. Brake rotors were checked for warpage or corroded brake housings, and the pucks were replaced, as were the pads. The nosewheel tire was also run through the previous gauntlet, including a "road force" balance, and tire pressures were heavily

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experimented with. (*Road force balancing measures the force variation and runout of the whole wheel and tire assembly. The road force tire balancer uses a load roller to simulate the force of the road, or in this case, the runway. —Ed.*) We even rebuilt our damper with a kit, yet alas, the shimmy remained.

The only way to get the shimmy to stop was to release brake pressure and then attempt again and again until a safe speed was found where the shimmy subsided.

We examined the events more closely after all this work, and we noted that the shimmy only started when brakes were applied, and the pulsing always started in the right pedal. It didn't matter whether the braking was applied from the right

seat or left; it was at least consistent in that sense. Also, it didn't occur right away on landing, it only occurred at mid rollout speeds. Weird.

Then, one day, I decided to try a few more tricks. I tried applying brakes with use of the handbrake, not the toe brakes. It still shook. Then I tried applying only one brake and doing my best to not go in the rhubarb. Thankfully the runways at home base are 200 feet wide, and despite my stupid, ill-conceived test, I managed to stay pretty well on centerline. I did discover in that crazy process that when only the left brake was applied, there was no shimmy.

More head scratching ensued. Then, we did some more reading.

## Bungee rods? Bungee rods!

By process of elimination, we had pretty much ruled out the brakes, the wheels, and the scissors. We had also rebuilt the damper, and on the bench it seemed to do its thing, albeit we recognized that we weren't applying the sorts of pressures it would endure when in service. Then, I shifted my focus to the mysterious bungee rods.

These rods must have some sort of superpowers as the manuals say little about them, and I've yet to see a diagram that exposes their internal workings. Basically, they are sort of like the closer on your screen door, or maybe a shock absorber, in that they are not fixed in length, but can extend or compress based on circumstances.

Perhaps there are bungees inside that do this compressing and expanding. This is probably what leads to the sort of disconnected feeling you get through the pedals when you steer a Piper. You know stuff is happening, but

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it's hardly the sense of "on rails" steering like you get in a go-cart.

Another clue: the service manual states that when the bungee rods are installed, that they must not be "under load." That means you don't stretch or compress them to get the bolt through the horn assembly, but rather adjust its length with the rod end so that it drops into place. Of course, the nosewheel and rudder pedals must be aligned to the straight-ahead position to ensure the airplane will track correctly. See the manual for a detailed description.

Well, lo and behold, when the bungee rods were disconnected, one was under load and popped to its natural neutral when released. It was adjusted and reinstalled, and every other moving part including bushings and bolts were replaced and the damper was torn apart and rebuilt while immersed in fluid, to ensure no bubbles were present.

A test flight was conducted and "tada!"—shimmy no more! Another landing was conducted, with more aggressive braking. No shake! A few more for good measure and a couple with crosswinds, all good! Sweet success.

Needless to say, we were elated. The shimmy had gotten to the point where it frustrated us so much, we wanted to sell the airplane. And in the end, we did sell it, but that's another story for another day. But when we did sell, we sold an airplane with the most thoroughly tested and serviced nosewheel, steering, and brakes in the entire Dakota fleet! I'm happy to report that I've flown with the new owner a few times and the shimmy has departed to points unknown.

Now, the hunt is on for a new ride. What will it be? I'm open to suggestions.

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