DRILLING THE TAIL SPRING

DUPLICATING THE FRONT HOLE

If you are replacing an existing tail spring, you will need to match-drill the forward hole for the spring. The WD-409 weldment is inside the plane, typically with very limited access to get to this area, so it's unlikely that you will be able to match drill the spring on the airplane.

It is possible to duplicate the holes, but understand this: modern Van's kits ship with these holes predrilled, but that was not always the case. Unless you built the airplane yourself, assume that this hole was drilled by hand... it cannot be counted on to be drilled straight, plumb, or through the center of the spring.

- Remove the existing tail spring from the airplane. These often become seized in place with time, so expect to have to get a little aggressive with it. There should be only one AN4 bolt holding it in, and usually there is a small access hole on the bottom of the fuselage for a socket or pin punch. Use penetrating oil if necessary and apply appropriate torsional force on the spring if it requires persuading.

- Take the old and new springs to someone who is competent with machinist's tools (if that person is you, that's great). Remind that person that this hole was likely drilled by hand, then ask them to duplicate the hole into the second spring (usually this is doable with some simple fixturing on a manual mill).

- Install the new spring into the fuselage of the aircraft and install a new AN4 bolt to hold the spring in place.

GENERAL DRILLING NOTES

These springs are heat treated, but they are not so hard as to be unworkable. The key to successfully drilling tough spring or 4130 steel is to use a **sharp,** slow-turning bit, and be very careful not to work-harden the material. A little cutting oil won't hurt, keep pressure on the drill, and make sure that the drill is continuing to cut! **A bit that spins without cutting will almost immediately harden the steel and then you've got a problem**. If this happens, immediately either resharpen the bit (a Drill Doctor is recommended, if you've got access to one) or use a new bit. You must cut through the hardened steel immediately so it doesn't get worse. Keep these tips in mind and you'll have no problems!

DRILLING THE AFT HOLES

- With the new spring installed, level the plane across the cockpit longerons.

- Put the new tailwheel socket in place and mark for the two AN3-13A bolts that will retain it. They are installed horizontally. These should be about ½" apart. Put one at ½" and 1" from the back end of the spring. Don't over-analyze the measurement; just make sure to hit the spring! Make a punch mark where the holes will be and double check the placement.

- Remove the mounting socket and use a drill press and V-block to drill two 1/8" holes through ONE side of the mounting socket (i.e. not the spring). Do NOT drill all the way through. You should now have two holes pre-drilled in the mounting socket. Reinstall the mounting socket. Using a torpedo level, make sure the socket is plumb. Use Vise-Grip pliers to clamp the front edge of the socket to the spring.

- Pause and recheck everything. You should have two 1/8" pre-drilled holes. You should verify that those holes hit the spring inside the socket. Your socket should be plumb and firmly clamped. Step back about ten feet behind the plane and eyeball that the socket is plumb.

- Now, take a deep breath, and using a sharp - preferably brand new – drill bit, begin drilling the 1/8" hole horizontally through the spring. Have your helper watch the drill so you don't vary from horizontal. Some will use a drilling jig here, but it's not necessary if you're careful. After the drill breaks through the other side, put an old 1/8" drill bit in the hole so nothing moves.

- Check the plumb one more time.

- Drill the other hole the same way.

- You should now have two 1/8" perfectly level holes perfectly placed in a perfectly plumb tailwheel socket.

- Now, drill the holes to the proper size for AN3 bolts. A #13 drill bit is 0.1850" diameter. An AN3 bolt is about 0.1860" diameter. A 3/16" drill bit is 0.1875" diameter. We suggest using brand new #13 bits for this job, and start with a few extra bits on hand just in case. 3/16" is simply too big and you'll have a sloppy fit, which will only get worse.

- Drill one hole completely through and see if the bolt will go through it. Hopefully it will be very snug. Snug is good. If it simply won't go in, then grab your drill and run the #13 bit through again. We want a tight fit here. It's likely that a little error during the drilling will have caused the undersized hole to come out about the right size.

- Once you have both holes drilled, put the nuts and washers on, and refer to our other documents for instructions to put the rest of the tailwheel assembly together.