

# Power Steering Control Valve Rebuild

If you are driving an older Corvette, and by that I mean a C2 or C3, it will eventually get to a point where the Power Steering Control Valve (PSCV) will leak and require attention. In 2002, I had to repair a leaky PSCV on my 1978, followed by assembly and then balancing using only the procedure outlined in the 1979 Corvette Shop Manual to rebuild it. Earlier Corvette years included rebuild procedures in a Chassis Overhaul Manual.

I am not fortunate enough to have a photographic memory so I like photos and text to accompany me to the work bench. Hitch's PSCV rebuilt post documents the steps for parts assembly. Using this guide with the Willcox video offers do-it-yourselfers a rather comprehensive guide for rebuilding a PSCV.

Saginaw supplied GM and therefore Corvette with power steering systems. The Power Steering Control Valve (PSCV) referred to in this rebuild guide was used from 1963 through 1982 and perhaps early into the C4 years. A change came in 1976 to the part number but the physical change is not fully understood. Valve housings had an o-ring groove machined into the housing face that permitted an o-ring to sit inside the groove.<sup>1</sup> A valve housing with a smooth surface also was discovered but its source and use is not known. Figure 1 compares the two housings. In 1976, the part became GM #7825636, and in 2010 was still available from GM for \$635.00.

While there exists many options to repair a leaky PSCV that range from replacement to rebuild, this guide is based on a posting by Hitch in 2007 on the C2 Corvette forum to rebuild it. Hitch's post reflects the o-ring vintage housing and therefore this write-up is tailored for the 1963-86 PSCV. If you have the smooth housing surface...you may have an o-ring left over while if you are rebuilding a C2-C3 PSCV, make sure you order the correct rebuild kit with the o-ring. We also reference a recent video on the same topic by Willcox that compliments this study guide. Other than a few edits and including the photos alongside the text, the write-up reflects the original C2 forum post.

<sup>1</sup> See NCRS Tech Board link in References for full discussion of the o-ring groove vs smooth surface to the PSCV housing



**Figure 1: Valve housing smooth vs. o-ring groove**



**Figure 2: The Power Steering Control Valve**



**Figure 3: PSCV adjusting nut (dust cap removed)**

## *The Hitch Guide to Rebuilding a PSCV*

Well it seems that my vette had decided to start leaking. I looked under the car and it wasn't where I thought the leak would be coming from. I found that the PSCV leaked from the ball stud dust boot. So this could only mean one thing. The vee seal in the PSCV had torn. I started by looking at getting a replacement but it seems that the only ones available are the crappo overseas crap. I looked into the vendor that John Hinkley recommended but that was still over \$100 for a control valve. I called Corvette Stainless Steel Brakes and they had the rebuild kit for \$21 and Tom (CSSB) was nice enough to give me a quick tutorial on rebuilding the PSCV.

I have read all of the horror stories of PSCV leaking after they've been replaced, rebuilt or even the new ones. So I thought what the heck it's only \$21 plus shipping. I've rebuilt about everything else on the car why not this.

The hardest part was separating the ball stud from the pitman arm. I have read that using a pickle fork is not a good idea on the PSCV. However I have tried my tie rod puller and there is not enough room so I had to use the pickle fork. If anyone has a picture of said ball stud separator that will fit in the confines of a midyear frame it would be greatly appreciated. The only way that you can effectively get to the ball stud to separate it with the pickle fork is to do as follows. Remove the four nuts that secure the power steering ram and let it hang down. You will need to have the car up on jackstands to get under the car. Turn the wheels to the right so that the pitman arm is pretty much at the center of the car. Then place the pickle fork perpendicular to the control valve and hammer away. It is necessary to be perpendicular as this is the only way that the pickle fork is not binding on the housing bolts (Figure 2).

Once you have the ball stud separated from the pitman arm now you can remove the four hoses from the PSCV. Remove the bolt that secures the PSCV to the drag link. This will allow you to unscrew the PSCV. As you unscrew the PSCV count the amount of revolutions (number of turns) it requires to remove it. This is important as you need to match this count when you put it back on. If you missed counting the turns, you will have the opportunity to balance the system later. Mine was 16 turns.

With the PSCV off and on your work bench, secure it in the vise and remove the dust cover (Figure 3). There



**Figure 4: Valve shaft (rod), shaft washer & sleeve key**



**Figure 5: Rod removed with ball and adjustment nut**



**Figure 6: Housing, o-ring groove & ball seat spring**

is an adjustment nut under the dust cap that controls the PSCV (Figure 3). As you remove the adjustment nut, it is important that you count the revolutions or number of turns. Mine was 10 turns.

Keeping track of adjustment nut turns is important because once you get the system all back together, the adjustment nut controls the centering of the system.

Remove the two bolts that hold the two housing halves together. I took lots of pictures as the Chassis Overhaul Manual has a good picture but not good enough to see the items as you would like. I can see why so many do-it-yourselfers have problems with the PSCV rebuild.

I cleaned up all of the parts in my handy dandy plastic tub with some BrakeKleen as I don't have a fancy parts washer yet. The rebuild kit that I received had all of the seals that I needed but one looked a little smaller and the original was not damaged so I reused it.

I did not take pictures as I rebuilt the ball stud side but I have the disassembly pics and reference those here. The Willcox video provides a detailed overview of the entire assembly process.

When you separate the ball stud housing from the valve housing you will see the sleeve key with a washer on top (figure 4). Unscrew the ball stud adjustment nut from the rod (Figure 5).



**Figure 6: Ball stud side up with part stack assembly**



**Figure 7: Spring retainer (top) and annulus seal**



**Figure 8: Add spring to stack**

Once you remove the sleeve key and the ball adjustment nut, there is a spring under it that you want the point end towards the ball seat cup (Figure 6). The two ball seats surround the the ball stud that exits the housing.

### **Assembly of PSCV**

The way to do this is to stack the parts on the ball stud side of the unit and lower the hydraulic side down on it. Well in theory that may work but I found a better way. This is how it should look if you try to stack them (Figure 6)



**Figure 9: Valve reaction spool (piston) slides over valve shaft and inside the valve spring**



**Figure 10: Spring thrust washer (keeper) inserts into valve spool and secures valve spring assembly**

Now to get to the point I think the Chassis Overhaul Manual is a little lacking. The order to rebuild the hydraulic side starts with Figure 7. It shows the spring retainer and seal (underneath) and washer. Remember the seal lip goes up - towards the hydraulic side.

Add the spring (Figure 8); Then the valve reaction spool (Figure 9). Next install the keeper or lock ring in the slot of the valve reaction spool (Figure 10).

The hydraulic portion or valve housing has the



**Figure 11: Valve spool & valve adjustment spring**

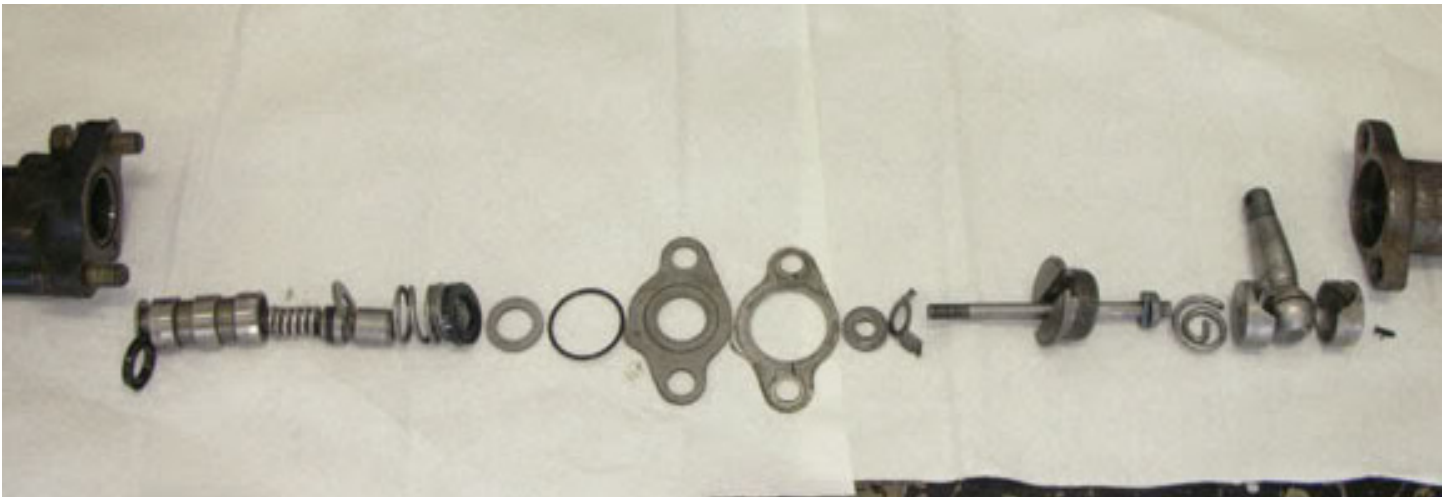


**Figure 12: Valve housing with seal and o-ring**

valve reaction spool and an adjustment spring that floats inside the valve spool (Figure 11). Use a little bit of grease to hold the spring inside. This assembly loads into the valve housing (top half).

With the ball stud stacked in the vise and the spool valve inserted in the valve housing (hydraulic end) you could lower it onto the ball stud housing. Unfortunately I could not get the seal to pass into the valve housing. So, I turned the valve housing over and loaded the stack into it. You will have to apply some pressure to the seal to compress the spring in the spool. All the while working to ensure the seal remains in the bore.

Place the rubber dust boot and thin metal plate over the ball stud while holding it down. With your thumbs holding the metal plate lower it onto the ball stud side. Slide your



**Figure 13: Complete PSCV parts layout from valve housing (hydraulic end) to ball stud housing**

thumbs out and you have now just joined the two sides. For reference, Figure 13 illustrates the parts in the order of their assembly similar to the layout found in the Chassis Overhaul Manual and Shop Manuals.

Once you have the PSCV reinstalled you are ready to start the car right? Not yet. Refill the power steering reservoir and remember to remove the belt and rotate the pump backwards to prime it. I also move the steering wheel back and forth to get air out of the system, then run the pump backwards by hand again. Okay, now we've got the reservoir filled and you are ready to start the car.

Reminder, the car should still be up in the air before proceeding. The manual says to disconnect the ram so the pump doesn't burn the belts and hurt something. I would rather the ram jam the wheels verses the chance of it over extending and then I have to deal with that. Make sure you set the adjustment nut to 10 turns (or # of turns you counted) which will get you close. Make SURE THAT YOU KEEP YOUR HANDS OUT OF THE STEERING WHEEL WHEN YOU START THE CAR. If the PSCV is not centered it will rotate the wheel violently. At first you only want to run the car for about 10 seconds to get some of the air out.

If the steering wheel spun by itself adjust the nut. Turn it once to see if when you start the car back up if the wheel will stay centered. Adjust the nut until it does.

I doubt that I got it all but the Chassis Overhaul Manual didn't do it for me and I could not find a good write up here in the archives. Hope this helps someone save some money on a rebuilt control valve. Dave

### **Final Touches**

If you wish to complete your PSCV rebuild project with finishes that approximate those of the Saginaw plant, read on. The entire unit was painted as a single assembly and included the housing halves, bolts and nuts that secured the two halves and the rubber dust boot and clamp that wrapped the ball stud. The assembly was painted semi-gloss black while the ball stud was a black phosphate plated finish.

### **References**

[NCRS Tech Board discussion related to valve housing o-ring groove.](#)

[Power Steering Control Valve Leak & Rebuild](#), C2 Corvette Forum:

[Power Steering Control Valve Rebuild Video](#): 1963-82, Willcox Corvette

**Note: This guide was developed, formatted and published by Tom Russo while technical contributions were provided by Hitch (C2 Corvette Forum). Direct comments to hunt4cleanair@earthlink.net.**



**Figure 14: Completed rebuilt PSCV assembly**