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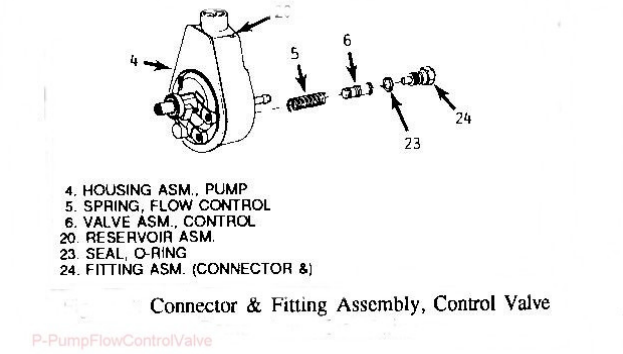
**HOW DO I DETERMINE IF I HAVE SUFFICIENT PRESSURE AND FLOW FROM MY POWER STEERING PUMP?**

There are a couple of fairly easy steering tests that you can conduct in order to determine if you have a power steering pump that is putting out sufficient pressure and flow.

**Test for sufficient pump pressure**

Your system needs maximum pump pressure when you are stopped; on a cool concrete or asphalt surface; engine running; foot on service brakes, and making a full lock "static" steering wheel turns full lock to full lock. If you can rotate the steering wheel all the way with full power assist to both corners, you have sufficient pump pressure. If steering effort suddenly rises to near manual effort before reaching full lock, you probably need the pump to generate more pressure. (When you run out of assist or are at full lock, do not hold the steering wheel in that position for more than 5 seconds. High fluid temperatures are being created that can damage internal pump components.)

At all other times when you are steering your car, pump pressure requirements are far lower than a "static" steer in a parking lot. (At highway speeds and even during city driving, your system will not require more that a couple hundred psi of hydraulic pressure from your power steering pump in order to complete your turns.)




The maximum pressure that your pump can develop is controlled by a pressure relief screw on the backside of the flow control valve assembly #6 that is inside the pump.

To increase the maximum pressure setting on all GM (except 1963-82 Corvette) power steering systems, proceed as follows:

Remove the power steering pressure hose from the back of the pump. You will note that the hose nut screws into discharge connector fitting #24. That fitting has a one inch hex head and can be unscrewed from the back of the pump once the hose is removed. Just behind the fitting (and sliding in a bore that is inside the pump) is the flow control valve assembly #6. It has a spring #5 behind it which is pushing the plunger back toward you.

Remove the flow control valve assembly and you will find a small hex head screw with a fine mesh screen on the end that was furthest inside the pump. You should see some shims under the head of the screw. You might try unscrewing it and removing one shim. One shim should raise the pump relief pressure by 100 to 200 psi. Hold the plunger in a vise that has "soft jaws" or hold it between two pieces of wood when you remove the screw. The outside diameter of the plunger must not be damaged or scored.

I wouldn't recommend going much higher than removing the one shim since you do not want to increase the pressure setting by too much.

When you remove the small hex head screw you will find a ball, a guide pin, and a spring inside the plunger in that order. Make sure you reinstall them the same as you found them.

Note that sometime later in production, you might find the flow control valve assembly with the small hex head screw held in place by epoxy glue (no shims). You could rotate the hex fitting about a quarter turn and see if that is sufficient to increase system pressure relief. (I do not have information on how or what type of epoxy to use on the hex fitting. You will need to lock the hex in place.)

One last note: The power steering hoses that are used on C2/C3 (1963-1982) Corvettes are designed for 1100 psi maximum pressure. This is also the maximum pressure setting in a Corvette power steering pump. Increasing the maximum pressure on a C2/C3 Corvette pump with a stock valve and adapter/linkage booster system will most likely result in fluid leaks from hose fittings and/or the control valve attached to the linkage.

**Test for sufficient pump flow**

The test for sufficient pump flow is conducted in a manner that would simulate trying to make an evasive maneuver (such as trying to avoid something that suddenly appears in front of your car.) You need to find a fairly large, vacant, parking lot. Drive along at about 20 miles an hour; suddenly whip the steering wheel to the right or left as if avoiding something in the roadway. If you have full assist throughout the steering wheel motion, you have sufficient flow. If the steering abruptly becomes much heavier during the rapid movement of the steering wheel, you probably do not have sufficient flow.

You will need to change to a discharge fitting with a larger throat diameter in order to increase pump flow. I suggest that you try and obtain a discharge fitting from another GM vehicle. (Large suburbans and other large pickup trucks will probably have fittings with too much flow.) Also GM power steering pumps manufactured for vehicles built before 1980 will have discharge fittings with male or female threads and 45 degree connector faces. Pumps manufactured vehicles (1980 and later) will have discharge fittings with a female M16x1.5 metric port and an internal configuration for a pressure hose assembly with a metric male nut and o-ring.

The production discharge fitting has very close tolerance dimensions controlling the flow output. It isn't quite as simple as just drilling out the throat of the fitting. If you take a fitting out of a pump and look closely at it, behind the hex is an o-ring. (Please refer to drawing at the end of this paper.) Just behind the o-ring (at the bottom of the next groove) you will see a very small hole. That hole is called the P-hole and it communicates pressure back inside the pump; actuates the flow control valve; and results in regulating the maximum discharge flow.

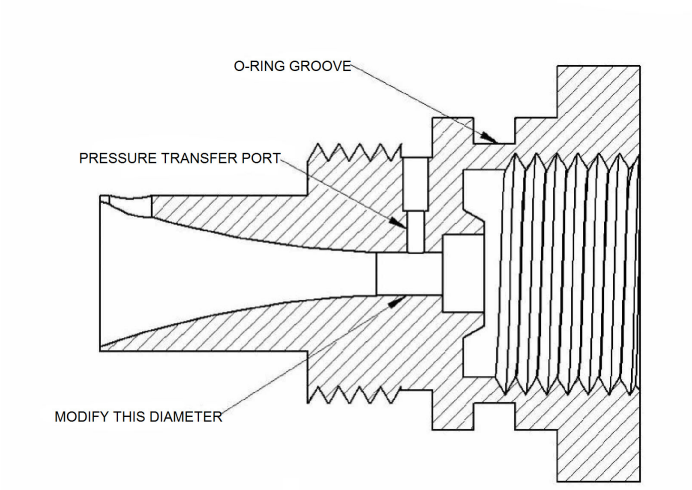
Here is why some people may complain about jerky pressure spikes when they have drilled out the fitting. The have disrupted the P-hole communication and their pump is no longer putting out consistent flow.

By going in and disturbing the diameters and surface finishes, as well as leaving burrs and sharp edges, you really don't know what you might end up with. But if you want to try, here is a guideline.

Opening up the throat of the discharge fitting by 0.016 inch on the diameter will give you approximately 1/2 more gallon per minute. Opening up the hole by twice that amount (0.031 inch on the diameter) will increase flow by about one more gallon per minute at full flow.

0.1144 inch diameter = 2.0 gpm
0.130 inch diameter = 2.5 gpm
0.145 inch diameter = 3 gpm

Again, you really don't want more pump flow than you actually need. High flows result in higher system backpressure and higher fluid operating temperatures. This can shorten the useful life of many of the rubber hoses, seals, and o-rings throughout the power steering system.




SAGINAW POWER STEERING PUMP DISCHARGE FITTING

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JIML82@aol.com