

## **POWER STEERING SYSTEM DEAIRATION – ALL GM SYSTEMS**

You may already have read the GM bulletin on removing trapped air from a power steering system. This paper is written to complement the GM procedure and add just a bit more detail on the subject. By the way, I really don't think that "deairation" is a real word. But it was created as part of our engineering culture at Saginaw Steering Gear Division to describe the elimination of the trapped air when major power steering components are replaced.

Some people think that the power steering pump must be spinning (with the engine running) in order to circulate power steering fluid and drive the air out of a freshly repaired or assembled system. This is really not the case and actually can cause a real lengthening of the time required to "get the air out."

When the engine is started the power steering pump begins to spin and any air that is trapped in the system begins circulating throughout the pump, gear, and hoses along with the power steering fluid. As large bubbles of air pass into the pumping area of the power steering pump the air and fluid get whipped to a froth as they engage the spinning rotor and vanes. The results will be a milky colored mixture of entrained air and oil that is now being pumped through the system. The air/oil mixture takes up more room (and expands far more as the fluid heats up) than pure fluid. Many times people will find that suddenly the pump reservoir begins to overflow. Unlike pure power steering fluid, foam is compressible (because of the many, tiny, air bubbles.) This can also cause lots of steering noise and erratic power assist until the air eventually works its way out of the system.

Once the fluid is filled with entrained air, it will now take quite a while for the very small air bubbles to come out of suspension from the fluid and make their way as larger air bubbles into the pump reservoir. You will note that the pump reservoir is typically the highest point in the hydraulic system. Left on its own, air will eventually rise into it and escape to atmosphere. However, this fluid action may actually take a several days.

There are two generally accepted methods of eliminating air from a power steering system. One is to pull a vacuum directly on the reservoir and then start the engine. A vacuum at that point will literally suck the very small air bubbles right out of suspension as the circulating fluid passes through the reservoir. This procedure requires a special "stopper" to fit the fill neck of the reservoir. The stopper will have a hose connection and is connected to a means of drawing a vacuum. This procedure works very well but requires special tools.

Please note that this procedure can sometimes fail because there can be a seepage of air in the pump driveshaft area because of the high system vacuum. The pump will then continue to create froth as the newly entering air passes through it.

The other method is to eliminate the majority of the air BEFORE starting the engine. First jack both front wheels off the ground. (Make sure that your jacks have clearance when the road wheels are turned to full lock.) With the front wheels in the air and the engine off you can rotate the steering wheel back and forth (full lock to full lock) quite easily. As you perform this lock to lock procedure, the piston inside the assist cylinder (Corvette) or the rack piston (all GM power steering gears) will act as a pump. Rotating the steering wheel will gently move the fluid along with any large air bubbles through the circuit until the air can rise directly into the pump reservoir - and out. It is a good idea to hold the steering wheel at full lock for about 5 seconds each time before turning in the opposite direction. This allows the air to rise into the pump reservoir with each steering cycle. You will need to repeat this lock to lock procedure a couple dozen times.

You will note that the fluid level in the pump reservoir will drop as air bubbles rise up through the reservoir fluid. Check the fluid level in the pump reservoir and refill to the COLD mark on the capstick a couple times during the procedure.

This procedure will get MOST of the air out. Check the fluid level one last time then drop the car back down and start the engine. Try a few more lock to locks but now be sure NOT to hold the steering at full lock for more than just a few seconds. Recheck the fluid level and fill if required. Go for a 10 mile drive. You are done!

One last tip, I recommend that you use genuine GM power steering fluid that is available from GM dealerships. I don't recommend using the stuff that is labeled, "Meets everyone's specifications." The only fluid that has been tested in tens of thousands of Saginaw laboratory tests and millions of vehicle test miles is the GM fluid. Also the GM fluid is pretty good at dispersing the air out of fluid suspension.

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