

Hydraulic Power Steering Servicing (Belt driven or electric pumps)

Most car owners are too young to remember life before power steering. Now power steering is standard. Let's look at how it works. The heart of any power steering system is its pump. The pump pressurizes the power steering fluid that assists steering. Most pumps are driven by a belt that is run by the engine and a few are electrically powered. A high-pressure hose passes fluid from the pump to the steering gear. A low pressure hose returns the fluid back to the pump.

The fluid cleans, cools and lubricates the power steering system. The fluid will break down as the years and kilometers pass as it collects unwanted moisture and dirt. Customers are to be made aware that the power steering fluid needs to be replaced from time to time. Many car makers specify power steering service intervals. Unfortunately, however, sometimes this important service is left off the car maintenance schedule.

Ideally, the power steering should be serviced every 30 to 40,000 kms or if the car is in extreme conditions, more often.

Hydraulic Power Steering oil is one of the most neglected fluids in cars today. This oil requires changing like any other fluid as it has a "use-by" date.

Generally there is no way of knowing how old the fluid is. Even if you ask the customer, there is a good chance they do not know and because a power steer oil change may not appear on a regular service schedule there is no record of when it was done, if ever.



In all cases, irrespective of the type of Power Steering oil used, remove the reservoir cap and take a sample.

Note: On some late model cars, removing the reservoir cap when the system is hot, releases pressure and can cause the system to go into negative pressure when it cools. This can induce cavitation in the pump creating a pulsing or shuddering at low/parking speeds, which is felt through the steering wheel. Therefore the recommendation is, "wait until the car has cooled down" prior to removing the power steering reservoir cap.

If the oil is "off colour", smells burnt or feels gritty, it's time for an oil change.

Here are some essential warning signs of trouble with your power steering:

- Harder to turn the wheel.
- Erratic power assist.
- Loud whining when the steering is activated.
- Oil Leaking, or frequently adding oil.
- Squealing belts.
- Vibration (could be caused by cavitation, because the wrong oil has been used).

There are two ways to change the power steering oil. One is to remove the low pressure return line and let the oil drain from the system and the other way is to use a tool like the Wynn's Power steering oil flushing machine.

The advantage of using a machine of this nature is that there is minimal requirement to disconnect any high or low pressure lines, which means no mess. This procedure will exchange 95% of the oil in the system.

In a power steering system that has not been serviced for an extended period of time, remove the reservoir and clean it to remove any accumulated dirt and grime from the bottom.



Power Steering Oil/Fluid

Not all hydraulic power steering systems use the same oil. Some use synthetic and others use mineral based fluids. It is very important NOT to mix the oils. The outcome of mixing fluids will be a shortened life for the pump, damage to the internals of the rack and the big possibility of operational noise with hydraulic fluid cavitation, which induces vibration. On average, there are about six (6) different types power steering fluids, depending on the brand that is being used. Note with regards to Honda, if the wrong fluid is used, it will burn out both the pump and the steering gear, both items can be very expensive to replace.

If there is any doubt, regarding the type of fluid that is to be used, contact the O.E. dealership and ask advice.

In Line Filters

In some situations, it is an advantage to fit an inline Power Steering Oil Filter. This is only to be fitted to the LOW PRESSURE RETURN LINE. If it is fitted to the high pressure line it will not handle the pressure generated by the pump and EXPLODE. Note: High pressure lines that transfer the oil from the pump to the steering device must NEVER be cut as over 950lbs/sq" (6550kPa) can be generated by the pump.



Oil Coolers

The Power Steering Oil Cooler removes destructive heat generated within a power steering system, especially in vehicles with large tyres such as, performance vehicles, off-road vehicles and vehicles used for towing or carrying heavy loads. Installation of a Power Steering Oil Cooler will prolong the life of the system's pump, hoses and seals. The cooler assembly is fitted into the return line of the system.



Items that are recommended to be checked during a Power Steering Service

While car is on the ground check:

- Power steering fluid, colour and smell
- Any oil leaks
- Power steer drive belt or Front End Accessory Drive (FEAD) belt for condition and tension
- Coupling from shaft to Rack or Box
- High pressure hose
- Low pressure return hose
- All clamps and fittings
- **With engine running**, listen for pump noise whilst turning steering wheel back and forth, from 10:00 O'clock to 2:00 O'clock
- Also while doing the previous procedure, check for "free - play" in the steering gear.

While car is up on the hoist check:

- Oil leaks
- For the best result, remove one end of the concertina boot each side and check for any power steering oil. There should be nil. If there is, it is an indication that the internal hydraulic seals are allowing by-pass
- Any movement in the rack ends and tie rod ends
- Look at the toe adjusting threads, are they even? If not, turn the steering wheel from lock to lock and count the turns. Halve the count and place the steering gear in its central position, if the wheels are not straight, it may mean that a wheel alignment has been performed without the steering gear being placed in its central position. The car may require a Wheel Alignment.

Customer Complaints:

- Steering, light/heavy: this can be due to “out of trim” torsion bar in the Pinion, Valve & Sleeve assembly.
- Car always pulls one way: also could be damage to the torsion bar in the Pinion, Valve & Sleeve assembly
- Hard to turn in one direction: this may be caused by impact damage to the internals

Do you know how many service type organisations there are in your area that carry out Power Steering Servicing?

A power steering service is another opportunity to enhance your work shop, to give greater value to your customers.

Question: It's like everything else to do with the car, what's the cheapest insurance?

Answer: Servicing on a regular basis

When you weigh up the cost of a steering rack or a pump replacement, against the serving cost of them around every 30,000 kilometers, servicing is generally going to be substantially cheaper for the customer.

Bleeding the system

We have all experienced it, a cavitation type vibration at low speeds in the power steering, the following is one procedure you can try to get rid of it.

Some late model cars with hydraulic power steering run a sealed power steering system that pressurises as the temperature increases similar to a cooling system. Removing the reservoir cap when the system is hot releases pressure and consequently causes the system to go into negative pressure when it cools which can induce cavitation in the pump creating a pulsing or shuddering at low/parking speeds which is felt through the steering wheel. Moving the wheels from lock to lock with the engine off may also cause a similar cavitation leading to shudder. Because of the sealed cap on the system it can take up to a week of normal driving to allow the system to “normalize” and eliminate the shudder. Most cases of this shudder are temporary and can be relieved by following the correct bleed procedure. Persistent cases might be caused by other defects, such as a restriction in the high pressure hose or no restriction in the return hose eg. Commodore.

The correct procedure for bleeding the system to remove the air bubbles created by the cavitation is as follows. The engine should be COLD for this procedure.

****NOTE** Ensure keys are removed from the Ignition before commencing this procedure.**

Step 1) - Release the tension from the front end accessory drive belt (FEAD Belt) and slip the belt off the side of the pump pulley. Tension is released by rotating the automatic tensioner arm clockwise using a 3/8 drive ratchet or similar in the square recess in the alloy arm. (Refer to arrow on belt schematic for location of recess)

Remove the reservoir cap.

Step 2) - Turn the pump pulley by hand to bring the air bubbles to the surface of the fluid. Continue until no air bubbles are visible rising in the fluid. This should only take a couple of minutes.

Step 3) - Refit the FEAD belt over the pump pulley by rotating the automatic tensioner clockwise and then release for automatic re-tension. Refit the reservoir cap.

Step 4) - * NOTE* Do not use any throttle during this step. Start and then immediately stop the engine. Wait for 40 seconds. Repeat this procedure two more times making sure you wait 40 seconds before each start/stop of the engine.

Step 5) - Wait for two minutes after completing step 4 and then start the engine and cycle the steering from lock to lock approximately 20 times. Move the vehicle forward slightly after each 4 lock cycles to minimize tyre scuffing.

This procedure should eliminate the shudder but if it persists, there might be a requirement to fit a revised power steering hose that "MAY" cure the persistent cases of steering shudder.

Speed sensitive rack problems

Speed sensitive power steering - resetting the body control module (BCM) for Commodore / Calais / Statesman. Speed sensitive power steering provides the driver with maximum assistance at low speeds and gradually reduces the assistance as the vehicle speed increases. When a steering rack is replaced or the wiring loom disconnected, you will need to reset the BCM to restore the steering back to normal operating conditions.

Follow this simple procedure to reset the BCM:

1. Switch off the ignition.
2. Remove fuse for approx. 3 seconds. (Located in engine compartment relay housing).
3. Refit the fuse, the BCM should click.
4. The vehicle indicators or interior lighting will flash to indicate resetting has been successful.

Please Note: Speed sensing steering racks contain a plastic damper, which over time deteriorates and crumbles, spreading contaminants throughout the hydraulic system. When replacing a speed sensitive rack, it is recommended to flush all lines and inspect the old modulating valve for evidence of plastic contamination. This will identify if both power steering rack and pump are contaminated and require replacement. Failure to do so may effect the total hydraulic system within a short period of time.



Old and New Damper



Contaminated Housing

BCM FUSE IDENTIFICATION

VP Calais & Statesman Fuse F21

VR to VS Calais & Statesman Fuse F23

VT to VX Calais & Statesman Fuse F31

Note: When either of the Power Steering units are replaced you should always inspect the rack modulating valve and the pump flow control valve as it is common for broken pieces of the upper pinion damper to become lodged in either or both of these components which may cause the system to malfunction. The symptoms are intermittent, partial or total loss of power assistance.

Warning

Do not turn the steering wheel without the motor running as this can dislodge inner rack seals causing fluid to leak into the boots.

Power Steering Hoses

Not all worn hoses can be detected from an outward inspection, as they deteriorate from the inside out. Steel braided hoses can create groaning noises and vibrations at lock. OE manufacturers use nylon braided rubber hoses to absorb the pulses in the fluid that cause vibration. Most OE hoses also have an internally fitted vibration damper to prevent pulsation. Unless the vehicle is a late model or has low kilometres travelled, all hoses should be replaced.

Hoses fitted to vehicles up to the early 80's used brass or aluminium olives in the connecting fittings to seal the joint, and thereafter using Teflon seal or nitrile 'o'ring seal.

Steering Wheel Jerks When Turning

- Low fluid level - fill as required.
- Loose belt at pump - tighten.
- Engine idle too slow - adjust idle speed / check idle up switch if applicable.
- Air in system - check all sealing connections between pump and reservoir.
- Low pump pressure - pressure check / replace pump.
- Steering linkage hitting obstruction - correct clearance.

Occasional Increase In Effort When Quickly Turning The Steering Wheel

- Low fluid level - fill as required.
- Pump drive belt loose or glazed - adjust or replace.
- Internal leakage in steering system - check pump pressure / replace pump or steering rack.

Excessive Steering Wheel Return Or Loose Steering

- Worn or damaged steering linkage or wheel bearings - replace as necessary.
- Worn or damaged rack bar or pinion - replace steering gear.
- Loose steering gear mounting - tighten bolts to specs.

- Improper high point adjustment of steering gear - check and adjust to specs.
- Steering column coupling loose - tighten to specs.
- Air mixed with fluid - check all sealing connections between pump and reservoir

Heavy Steering

- Excessive internal leakage - pressure check and replace steering gear / pump.
- Loose pump belt - tighten.
- Low fluid level in reservoir - check for leaks, fill as required.
- Sticking flow control valve - replace pump.
- Tyres under inflated - inflate to specified pressure.
- Steering linkage binding from lack of lubrication - lubricate.
- Steering column binding - replace worn parts and align.
- Steering gear adjusted too tight - adjust to specs.
- Body control module not operating - reset BCM refer to speed sensitive power steering in fitting tips.
- Obstructed modulating valve or broken wiring loom - clean or replace valve assembly.