1991 - 1994 Corvette: Service Bulletin: Reduced Power Steering Assist at Low Ambient Temperatures

Subject: Reduced Pwr Steeringat Low Ambient Temperatures (New Power Steering Fluid)
Model and Year: 1994 AND PRIOR PASSENGER CARS AND LIGHT DUTY TRUCKS
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BULLETIN BEING REVISED TO ADD MODEL YEARS 1993-94, ADDED LIGHT TRUCKS AND REVISED "IMPORTANT" STATEMENT FOUND LISTED BELOW STEP 3. UNDER SUB-TITLE 'BLEEDING THE POWER STEERING SYSTEM'. PREVIOUS DIVISIONAL PUBLICATION NUMBERS WERE:

BUICK: 91-3-8 CADILLAC: T-91-83 CANADA: 91-3-117 CHEVROLET: 91-208-3B OLDSMOBILE: 91-3-117 PONTIAC: 91-3-12

APPLICATIONS :

APPROPRIATE FOR ALL PASSENGER VEHICLES, BUT PARTICULARLY BENEFICIAL IN 1980 AND LATER FWD MODELS EQUIPPED WITH POWER RACK AND PINION STEERING.

CONDITION:

COMMENTS OF REDUCED POWER STEERING ASSIST AT LOW AMBIENT TEMPERATURES (APPROXIMATELY 10 DEGREES FAHRENHEIT AND LOWER) MAY BE NOTED BY SOME VEHICLE OPERATORS WHEN TURNING THE STEERING WHEEL IN BOTH THE RIGHT AND LEFT DIRECTION DURING WARM-UP AFTER COLD START. ALL VEHICLES WITH POWER STEERING EXHIBIT THIS CONDITION TO VARYING DEGREES, BUT CONDITION MAY BE MORE NOTICEABLE WITH POWER RACK AND PINION STEERING SYSTEMS

THAT TYPICALLY HAVE LONGER HOSES AND COOLER LINES.

NOTE: THIS CONDITION, WHICH IS RELATED TO POWER STEERING FLUID VISCOSITY, SHOULD NOT, HOWEVER, BE CONFUSED WITH CONDITIONS HAVING SIMILIAR SYMPTOMS SUCH AS THAT DESCRIBED DIVISIONAL SPECIAL POLICY NUMBERS LISTED BELOW:

BUICK: 88-POL-4 CADILLAC: 88-P-1 CHEVROLET: 88-417-3B OLDSMOBILE: 88-T-139 PONTIAC: 88-SM-10

CAUSE:

IN COLD WEATHER, POWER STEERING FLUID THICKENS IN THE SAME MANNER AS ANY OTHER PETROLEUM-BASED OIL OR FLUID. UPON COLD STARTING, THE FLUID RESISTS MOVEMENT THROUGH THE SYSTEM AND THE DRIVER SENSES REDUCED POWER ASSIST (SOMETIMES REFERRED TO AS "STIFF STEER"). AS THE VEHICLE OPERATES AND FLUID CIRCULATES THROUGH THE POWER STEERING SYSTEM, THE FLUID WARMS AND THINS TO ITS NORMAL OPERATING VISCOSITY.

CORRECTION:

SAGINAW DIVISION HAS DEVELOPED A NEW LOW TEMPERATURE CLIMATE SERVICE FLUID FOR USE IN COLD CLIMATES. COMPARED WITH CONVENTIONAL POWER STEERING FLUID, THIS NEW FLUID FLOWS BETTER AT LOW TEMPERATURES AND RESISTS THE THICKENING WHICH CONTRIBUTES TO REDUCED POWER ASSIST UPON START UP.

RACK AND PINION STEERING SYSTEMS

REDUCED POWER ASSIST UPON COLD WEATHER STARTING MAY BE MORE NOTICEABLE IN POWER RACK AND PINION STEERING SYSTEMS THAT MAY CONTAIN SIX OR MORE FEET OF PRESSURE AND RETURN HOSE ALONG WITH LONG COOLER LINES. SUCH LONG SYSTEMS CONTAIN GREATER VOLUMES OF FLUID AND VEHICLES SO EQUIPPED TEND TO HAVE LONGER PERIODS OF REDUCED POWER ASSIST. THE NEW FLUID PERFORMS PARTICULARLY WELL WITH CURRENT DESIGNED RACK AND PINION STEERING SYSTEMS AND SPECIAL REMANUFACTURED RACK AND PINION STEERING ASSEMBLIES.

PARTS INFORMATION:

LOW TEMPERATURE CLIMATE SERVICE FLUID IS AVAILABLE FROM GMSPO. ORDER AS:

CONTAINER SIZE	PART NUMBER
16 OUNCE	12345866
32 OUNCE	12345867

PARTS ARE CURRENTLY AVAILABLE FROM GMSPO.

SERVICE PROCEDURE:

THE POWER STEERING FLUID REPLACEMENT PROCEDURE IS A TWO-STAGE PROCESS: FIRST, FLUSHING THE OLD FLUID FROM THE SYSTEM WITH NEW FLUID; AND SECOND, BLEEDING THE SYSTEM TO REMOVE ANY TRAPPED AIR. THE FOLLOWING TWO SEQUENCES OUTLINE THE STEPS IN EACH PROCEDURE.

FLUSHING THE POWER STEERING SYSTEM

1. RAISE THE FRONT END OF THE VEHICLE OFF THE GROUND UNTIL THE WHEELS ARE FREE TO TURN.

2. REMOVE THE FLUID RETURN LINE AT THE PUMP RESERVOIR INLET CONNECTOR.

3. PLUG THE INLET CONNECTOR PORT ON THE PUMP RESERVOIR.

4. POSITION THE FLUID RETURN LINE TOWARD A LARGE CONTAINER IN ORDER TO CATCH THE DRAINING FLUID.

5. WHILE A SECOND PERSON FILLS THE RESERVOIR WITH NEW LOW TEMPERATURE CLIMATE SERVICE FLUID, START AND RUN THE ENGINE AT IDLE.

6. TURN THE STEERING WHEEL FROM STOP TO STOP.

NOTICE: DO NOT HOLD THE WHEEL AGAINST STOPS WHILE FLUSHING THE SYSTEM. HOLDING STEERING WHEEL AGAINST WHEEL STOPS WILL CAUSE HIGH SYSTEM PRESSURE, OVERHEATING, AND DAMAGE TO THE PUMP AND/OR GEAR.

7. CONTINUE DRAINING UNTIL ALL OF THE OLD FLUID IS CLEARED FROM THE POWER STEERING SYSTEM. ADDITION OF APPROXIMATELY 1 QUART OF NEW FLUID WILL BE REQUIRED TO FLUSH SYSTEM.

8. UNPLUG PUMP RESERVOIR INLET AND RECONNECT RETURN LINE.

9. TURN ENGINE OFF, AND FILL RESERVOIR TO THE "FULL COLD" MARK.

10. CONTINUE WITH FOLLOWING PROCEDURE "BLEEDING THE POWER STEERING SYSTEM".

BLEEDING THE POWER STEERING SYSTEM

AFTER REPLACING THE FLUID OR SERVICING THE POWER STEERING HYDRAULIC SYSTEM, YOU MUST BLEED AIR FROM THE SYSTEM. AIR IN THE SYSTEM PREVENTS AN ACCURATE FLUID LEVEL READING, CAUSES PUMP CAVITATION NOISE AND OVER TIME COULD DAMAGE THE PUMP. TO BLEED THE POWER STEERING SYSTEM PROCEED AS FOLLOWS:

1. BEGIN WITH THE ENGINE OFF, FRONT WHEELS OFF THE GROUND, AND WHEELS TURNED ALL THE WAY TO THE LEFT.

2. ADD LOW TEMPERATURE CLIMATE SERVICE FLUID TO THE "FULL COLD" MARK ON THE FLUID LEVEL INDICATOR.

3. BLEED THE SYSTEM BY TURNING THE WHEELS FROM SIDE TO SIDE WITHOUT HITTING STOPS.

IMPORTANT: THIS MAY REQUIRE TURNING THE WHEELS FROM SIDE TO SIDE TWENTY TIMES. ON SYSTEMS WITH LONG RETURN LINES OR FLUID COOLERS, TURNING STEERING WHEEL LOCK-TO-LOCK FORTY TIMES MAY BE REQUIRED. KEEP THE FLUID LEVEL AT THE "FULL COLD" MARK. FLUID WITH AIR IN IT HAS A LIGHT TAN APPEARANCE.

THIS AIR MUST BE ELIMINATED FROM THE FLUID BEFORE NORMAL STEERING ACTION CAN BE OBTAINED.

4. START THE ENGINE. WITH THE ENGINE IDLING, RECHECK THE FLUID LEVEL. IF NECESSARY, ADD FLUID TO BRING THE LEVEL TO THE "FULL COLD" MARK.

5. RETURN THE WHEELS TO THE CENTER POSITION. LOWER FRONT WHEELS TO THE GROUND. CONTINUE RUNNING THE ENGINE FOR TWO OR THREE MINUTES.

6. TEST THE VEHICLE TO BE SURE THE STEERING FUNCTIONS NORMALLY AND IS FREE FROM NOISE.

IMPORTANT: INSPECT FOR FLUID LEAKAGE AT CONNECTION POINTS ALONG THE POWER STEERING SYSTEM.

7. RECHECK THE FLUID LEVEL AS DESCRIBED IN STEPS 3 AND 4 EXCEPT THAT THE FLUID LEVEL SHOULD NOW BE UP TO THE "FULL HOT" MARK AFTER THE SYSTEM HAS STABILIZED AT ITS NORMAL OPERATING TEMPERATURE.

Bleeding Air from Power Steering Systems

Before bleeding: Inspect steering system. Check, and correct as needed:

Hoses must not touch any other part of vehicle.

- Steering system noise could be caused by hose touching frame, body, or engine.

All hose connections must be tight.

- Loose connections might not leak but could allow air into system.

When to bleed:
After any component replacement
After disconnecting fluid line
In case of steering system noise

Why bleed?
To prevent pump damage
To ensure proper system operation
To stop steering system noise

Power Steering Fluid
Use only clean, new power steering fluid. Fluid must be:

Conventional Climate:
GM #1052884 – 16 ounce
#1050017 – 32 ounce

Cold Climate:
GM #12345866 – 16 ounce
#12345867 – 32 ounce

How to bleed:

1. 

Switch ignition off.

2. 
Raise front wheels off ground.

3. 
Turn steering wheel full left.

4. 
Fill fluid reservoir to "FULL COLD" level. Leave cap off.

5. 
With assistant checking fluid level and condition, turn steering wheel lock-to-lock at least 20 times. Engine remains off.
   - On systems with long return lines or fluid coolers, turn steering wheel lock-to-lock at least 40 times.
   - Trapped air may cause fluid to overflow. Thoroughly clean any spilled fluid to allow for leak check.
   - Keep fluid level at "FULL COLD."

6. 
While turning wheel, check fluid constantly.
   - No bubbles are allowed.
   - For any sign of bubbles, recheck connections. Repeat step 5.

7. 

Start engine. With engine idling, maintain fluid level. Reinstall cap.

8. 
Return wheels to center. Lower front wheels to ground.

9. 

Keep engine running for two minutes.

10. 
Turn steering wheel in both directions.

Verify:
- ☑ Smooth power assist
- ☑ Noiseless operation
- ☑ Proper fluid level
- ☑ No system leaks
- ☑ Proper fluid condition
  - No bubbles, no foam, no discoloration

11. If all proper conditions apply, procedure is complete.

12. If any problem remains, see "Special Conditions."

Special Conditions:

Fluid

- Foam or bubbles in fluid
  Fluid must be completely free of bubbles. In step 5, be alert to periodic bubbles that could indicate a loose connection or leaky O-ring seal in either the return hose or pressure hose.
- Discolored fluid
  (milky, opaque, or light tan color)

Switch ignition off. Wait two minutes. Recheck hose connections. Repeat steps 7-10. If condition still exists, replace and check a possible cause:
- ☑ Return hose clamps
- ☑ Return hose O-ring
- ☑ Pressure hose O-rings
- ☑ Gear cylinder line O-rings

Fill system and repeat bleed procedure for each possible cause. Repeat steps 7-10 to verify whether noise has been eliminated.

Noise

- Pump whine or groan

With engine running, recheck hoses for possible contact with frame body or engine. If no contact is found, follow either method below to cool down fluid and repressurize system.

Method 1: Normal Cool Down
Switch engine off.
Wait for system to cool.
Install reservoir cap.

Method 2: Partial Fluid Replacement
Switch engine off.
Use a suction device to remove fluid from reservoir.
Refill with cool, clean fluid.
Install reservoir cap.

After either method of cooling, start engine and allow engine to come up to operating temperature. If noise persists, remove and replace power steering pump. Repeat bleed procedure following pump replacement.

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