Power Assisted Steering – Diagnosis

MODEL 1995-97 MY Sedan Range

VIN 720001-812255

Remove and destroy Bulletin 10-07, dated 11/96.
Replace with this Bulletin.
Revisions are marked with a bar and in **bold text**.

ISSUE:

This Technical Bulletin will provide a Diagnostic Procedure to aid in the investigation of power assisted steering (PAS) related problems, and must be used in conjunction with the PAS Rack and Pinion Evaluation Form, W-29.

ACTION:

When diagnosing PAS related problems, the following procedure is recommended:

1. Enter the Customer's comments in the appropriate section of the Evaluation Form.
2. Inspect the steering assembly and enter the observations in the appropriate section of the Evaluation Form.
3. Consult the PAS Diagnosis Chart.
4. Determine the cause of the fault.
5. Rectify any fault found.
6. Test to confirm the elimination of the fault.
7. Record the idle and maximum pump pressures on the completed W-29 form and submit the form.

NOTE: Failure to submit the W-29 form may delay warranty reimbursement.

PAS DIAGNOSIS CHART

Reported Condition	Possible Causes	Remedy
Very light when driving - stationary maneuver good	Transducer not open, (no fluid flow) Transducer not open, SCM fault Transducer not open, speedometer signal error Rack reaction limitation valve - open / incorrect setting Low pressure pipe restricted Reservoir filter restricted Tire pressures too high	Check for debris Replace SCM Replace speedometer transmitter Replace rack Replace pipe Replace reservoir/filter Reset tire pressures
Heavy during stationary maneuver	Transducer not closed Transducer not closed - ground short Transducer not closed - no feed voltage Transducer not closed - cable fault SCM faulty Delivery pressure or flow too low Internal rack leakage Tire pressures too low	Check for debris Replace transducer Check & repair Replace cable Replace SCM Replace pump Replace rack Reset tire pressures
Heavy during rapid maneuver	Engine idle speed too slow Pump drive loose (6 cyl) Pump drive belt slack (V12) Air in system Fluid loss at pump shaft seal Delivery pressure/flow too low	Reset idle speed Replace coupling & pump Check/replace & tension belt Stop air leak, refill & bleed Replace pump Replace pump
Heavy turning to one side	Faulty rotary valve/seal	Replace rack
Heavy turning to both sides	Low fluid level Pump drive loose (6 cyl) Pump drive belt slack (V12) Air in system Fluid loss at pump shaft seal Delivery pressure/flow too low Filter blocked restricting flow Check valves blocked Rack damper too tight Lower column setting Upper column too tight	Rectify fluid leak & refill Replace coupling & pump Check/replace & tension belt Stop air leak, refill & bleed Replace pump Replace pump Replace reservoir Replace rack Replace rack Reset lower column Replace upper column
Very heavy when driving - stationary maneuver good	Transducer open early Transducer open early, SCM faulty Transducer open early, speedometer signal error Rack reaction limitation valve - closed / incorrect setting	Replace transducer Replace SCM Replace speedometer transmitter Replace rack
Varies from heavy to light at constant speed	Incorrect speedometer signal Transducer cable/connection faulty or grounded	Replace speedometer transmitter Check & replace
Unequal load - center to left or right	Leaking rack check valve Rotary valve blockage Lower column setting	Replace rack Replace rack Reset lower column
Load at steering wheel varies from light to heavy 2 times per revolution	Lower column setting	Reset lower column

PAS DIAGNOSIS CHART

Reported Condition	Possible Causes	Remedy
Load at steering wheel varies from light to heavy many times per revolution	Rack damper too tight	Replace rack
Load at steering wheel very light at center	Low fluid level Tire pressures too high Air in system Seized steering joint Rack damper too tight Steering geometry Lower column over extended	Rectify fluid leak & refill Set to specified pressure Stop air leak, refill & bleed Replace steering joint Replace rack Check & rectify Reset lower column
Knocking/vibration at steering wheel	Low fluid level Air in system Fluid loss at pump shaft seal Rack damper loose Pinion bearing faulty Rack or column fixings loose Rack mounting bracket loose Rack mounting bush loose Free play in column assembly	Rectify fluid leak & refill Stop air leak, refill & bleed Replace pump Replace rack Replace rack Retighten to specification Replace rack Replace rack Check & rectify
Free play at steering wheel	Rack damper loose Pinion bearing loose Worn intermediate shaft joint Worn suspension joint Loose lower u-joint pinch bolt	Replace rack Replace rack Replace joint Replace joint Inspect & tighten to specification
Noise during rack movement	Low fluid level Air in system Water contamination Cavitation due to restricted feed hose	Rectify fluid leak & refill Stop air leak, refill & bleed Replace cooler, flush system at least 2 times & check for damage to transmission Reposition or replace hose
Continuous noise	Low fluid level Pump drive loose (6 cyl) Pump drive belt slack (V12) Pump drive pulley loose Pump mounting loose Hose/pipe in contact with body Hose restricted/twisted	Rectify fluid leak & refill Replace coupling & pump Check/replace & tension belt Inspect & tighten to specification Inspect & tighten to specification Reposition or replace hose/pipe Reposition or replace hose
Low system pressure	Filter blocked restricting flow Pump worn High pressure hose restricted/ twisted	Replace reservoir & filter Replace pump Reposition or replace hose
Leakage	Leakage at hose to rack connection Leakage at 'O' rings Leakage from transfer pipes Leakage from rack body Leakage from boots	Tighten to specification/replace hose Replace 'O' rings Tighten to specification/replace pipes Replace rack Replace rack

LEAK DETECTION PROCEDURE

Raise the vehicle on a suitable hoist to provide access to the steering rack.

> **NOTE:** If a fluid leak is suspected the steering rack assembly, reservoir and pump must be thoroughly cleaned of all dirt, grease and fluid, using a suitable degreasing agent, and then thoroughly dried, before testing for leaks.

After cleaning, check the whole PAS system for any outward sign of physical damage or misalignment.

Start the engine and turn the steering steadily from lock to lock observing all the connections and joints for signs of a fluid leak.

> **WARNING:** Eye protection, i.e. goggles or visor, must be worn when looking for suspected leaks.
> **Do not** attempt to repair any suspected leak while the engine is running.

PRESSURE MEASUREMENT PROCEDURE

Measure the maximum system pressure, (which is governed by the pressure relief valve), by connecting a pressure tester **(J25323-D)** with suitable adapters **(J28579)**, in series into the fluid circuit of the PAS system. **When using gauge J25323-D, the tool must be connected so the fluid flow enters the gauge end of the tester through the thicker high pressure hose.**

1. **Thread the dog leg adapter pipe into the high pressure fitting of the steering rack. This requires arranging the fittings on the hoses so that the female quick connect is on the thicker high pressure hose on the tester.**
2. **Connect the other tester hose to the PAS hose previously disconnected from the steering rack.**
3. **Run the engine at idle speed, and check that the pressure at idle is 100-150 psi (6.9-10.3 bar).**
4. **Hold the steering wheel at full lock and read the maximum pressure recorded on the gauge which should be 1470-1600 psi (100-110 bar). If the pressure is within specification, continue to step 6. If the pressure reading is below the minimum, continue with step 5.**
5. **Center the steering wheel and close the pressure tester valve for no more than 5 seconds. Read the maximum pump pressure with the valve closed.**

   - **If the maximum pressure recorded is within the limits, 1470-1600 psi (100-110 bar), then the RACK is faulty and not the pump. The rack may have excessive internal leakage causing a high flow rate.**
   - **If the maximum pressure recorded is below the minimum, 1470 psi (100 bar), then the PUMP is faulty and not the rack. The pump may have a pressure valve seized in the open position allowing excessive flow, or it may be worn and inefficient.**
6. **Record the idle and maximum pump pressures on the W29 form.**

WARRANTY INFORMATION:

FAULT CODE	R.O. NUMBER	DESCRIPTION	TIME ALLOWANCE
GC CB 63	57.20	PAS pressure test	shop time