

TECHNICAL BULLETIN



Power Assisted Steering – Diagnosis

57-22

MODEL 1992-96 XJS Range

DATE 12/98

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 | Rack reaction limitation valve - open / incorrect setting Low pressure pipe restricted Reservoir filter restricted Tire pressures too high | Replace rack Replace pipe Replace reservoir/filter Reset tire pressures |
| Heavy during stationary maneuver | Delivery pressure or flow too low Internal rack leakage Tire pressures too low | 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 | Rack reaction limitation valve - closed / incorrect setting | Replace rack |
| 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 or JD10-4A), 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. On all engines except XJS V12 engines, thread the dog leg adapter pipe J28579 into the high pressure fitting of the PAS pump. On XJS V12 engines, thread the curved adapter pipe from 211-011-03 (JD10-4A) into the high pressure fitting of the PAS pump.
This requires arranging the fittings on the hoses so that the male quick connect is on the thicker high pressure hose on the tester.
2. Connect the other tester hose to the PAS high pressure hose previously disconnected from the PAS pump.
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 1100-1200 psi (75.8-82.7 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, 1100-1200 psi (75.8-82.7 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, 1100 psi (75.8 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 |