

Steering System - General Information - Steering System

Diagnosis and Testing

Principles of Operation

For a detailed description of the Steering System and operation, refer to the relevant Description and Operation section of the workshop manual.

REFER to: [Power Steering](#) (211-02 Power Steering, Description and Operation) /

[Steering Linkage](#) (211-03 Steering Linkage, Description and Operation) /

Steering Column (211-04 Steering Column, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

• **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. **1.** Verify the customer concern.
 - If a road test is necessary make sure the vehicle is safe to do so.
2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
• Check the tires for correct pressure, size and tread pattern • Check for wheel rim and tire damage • Check road wheel security • Check the power steering fluid level and the hydraulic circuit for oil leaks • Check the power steering pump drive belt condition and tension • Check the power steering pump for security, wear, damage and excessive noise • Check the steering gear assembly for damage, wear and security • Check the hydraulic pipes and cooler lines for damage and correct routing • Check the steering joints for damage, excessive play, wear and security • Check the steering column and joints for damage, excessive play, wear and security	• Steering Angle Sensor Module (SASM) and circuits • Controller Area Networks (CAN) circuits

3. **3.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. **4.** If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Steering wanders	• Excessive free play in the steering system • Steering geometry incorrectly aligned	Check for excessive movement or play in the steering system with the engine running. Check for play at several different steering positions. Carry out steering geometry and alignment checks. Refer to the relevant section of the workshop manual
Steering pulls to the left or right	• Steering geometry incorrectly aligned	Carry out steering geometry and alignment checks using a four wheel alignment system. REFER to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures). Ensure that the tire direction of rotation is correct for the position on the vehicle (where directional tires are installed)
Steering feels notchy when turning from lock to lock	• Steering or suspension swivel joints seized • Steering tie rod end joints or track rod inner joints seized • Steering column or universal joints seized • Steering gear internal components misaligned, worn or damaged	Disconnect the steering gear from the suspension. Check for freedom of movement in the suspension. Disconnect the steering column from the steering gear. Check the steering column and universal joints for freedom of movement. Check the steering gear for freedom of movement. Rectify as necessary
Steering feels tight and does not self-center		

Symptom	Possible Causes	Action
Power steering hydraulics noisy operation	- Power steering fluid level low or contaminated - Incorrect specification of power steering fluid - Filter in the power steering reservoir blocked - Power steering fluid aerated - power steering hoses twisted or restricted	Check and top-up the power steering fluid level if required, using the correct specification of fluid. REFER to: Specifications (211-00 Steering System - General Information, Specifications). Check for contaminated fluid. Drain the fluid from the reservoir and visually inspect the filter for obstructions/blockage. Repair/renew as necessary. Check for air ingress into the system. Check the power steering hoses for twisting or restrictions. Rectify as necessary
Power steering pump noisy	- Power steering fluid level low or contaminated - Filter in the power steering reservoir blocked - Pump internal components worn or damaged	Check and top-up the power steering fluid level if required. REFER to: Power Steering System Filling and Bleeding (211-00 Steering System - General Information, General Procedures). Check for contaminated fluid. Drain the fluid from the reservoir and visually inspect the filter for obstructions/blockage. Repair/renew as necessary. Check for excessive pump noise. Rectify as necessary
Power steering gear noisy	- Power steering fluid level low or contaminated - Steering gear internal components worn or damaged	Check and top-up the power steering fluid level if required. Refer to the relevant section of the workshop manual. Check for contaminated fluid. Check for excessive steering gear noise. Rectify as necessary
Steering column noisy	Steering column fouling or universal joints dry	Check the steering column and universal joints. Rectify as necessary
Power steering feels heavier than normal through its operating range	Lack of power assistance	Check the power steering pump pressure. Check the steering column has no damage and rotates freely
Power steering feels too light at speed		
Power steering feels too heavy at standstill and low speed		

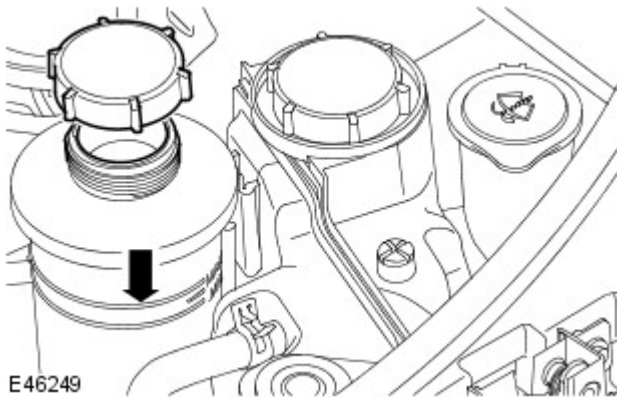
DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.

Steering System - General Information - Power Steering System Filling and Bleeding

General Procedures

1. Check the power steering fluid level.



2.  **CAUTION:** Fluid must always be present in the reservoir during bleeding.

Remove the filler cap and fill to the MAX level mark.

- Install the reservoir filler cap.

3. Start the engine and allow to run for 10 seconds, stop the engine.

- Check the power steering fluid, if aerated, wait until fluid is free from bubbles then top-up reservoir to UPPER level mark with recommended fluid.

4.  **CAUTION:** Do not hold steering on full lock for longer than 10 seconds.

Start the engine and turn steering fully lock to lock, stop the engine.

- Check and top-up power steering fluid level.

5. Start and run the engine for 2 minutes, turn the steering fully lock to lock.

- Check and top-up power steering fluid level.

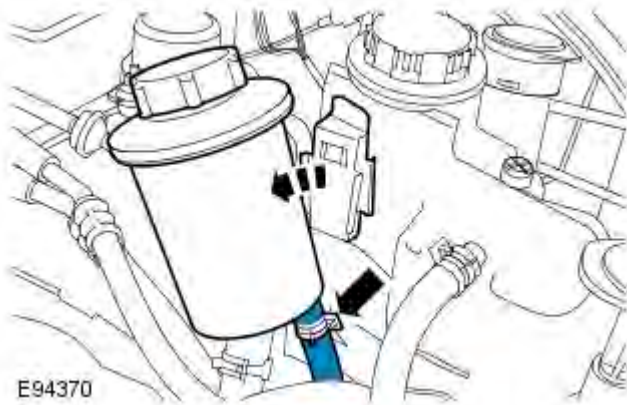
Steering System - General Information - Power Steering System Flushing

General Procedures

• NOTE: If heavy steering or contamination within the power steering system is found, it is necessary to carry out the system flush procedure as detailed below. If any components have been replaced in the power steering system the procedure below must be carried out in full.

• NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Remove the power steering fluid reservoir cap.
2. Using a suitable syringe, remove the power steering fluid from the power steering fluid reservoir.

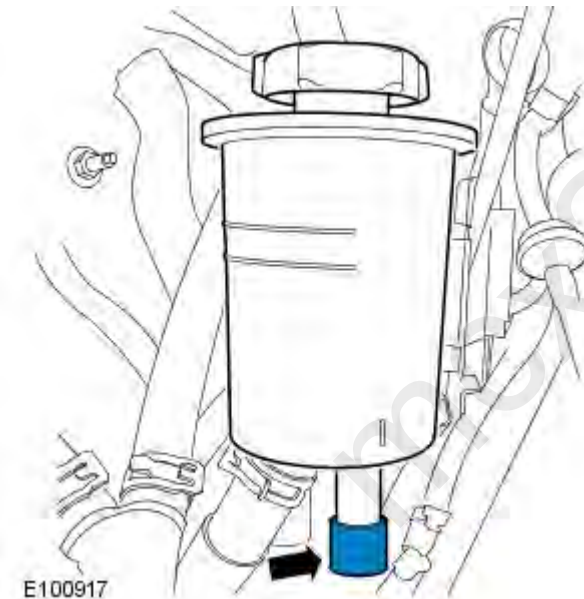


3.  CAUTION: Be prepared to collect escaping fluids.

• NOTE: Note the orientation of the clip.

Detach the power steering fluid reservoir.

- Detach but do not remove the power steering fluid reservoir.
- Release the power steering fluid return hose from the power steering fluid reservoir.
- If a quick release coupling is fitted to the power steering return hose, release the power steering fluid return hose from the coupling by removing the clip.



4.  CAUTION: Be prepared to collect escaping fluids.

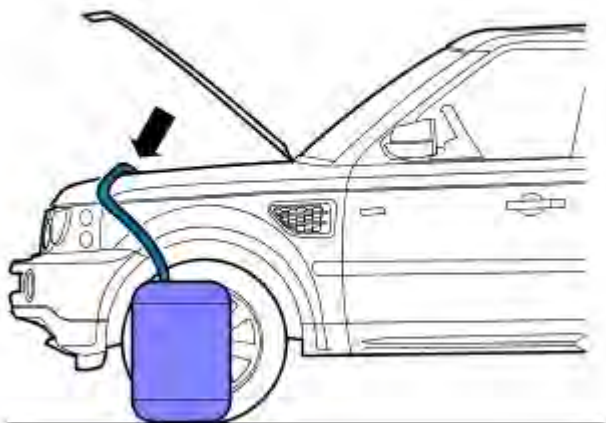
• NOTE: Make sure that all openings are sealed. Use new blanking caps.

Using a suitable blanking cap, cap the power steering reservoir return pipe.

5.  CAUTION: Be prepared to collect escaping fluids.

- NOTE: Make sure the extended pipe is not kinked or twisted and is correctly secured with hose clips.

Attach a suitable pipe to the power steering return hose to allow the fluid to drain.

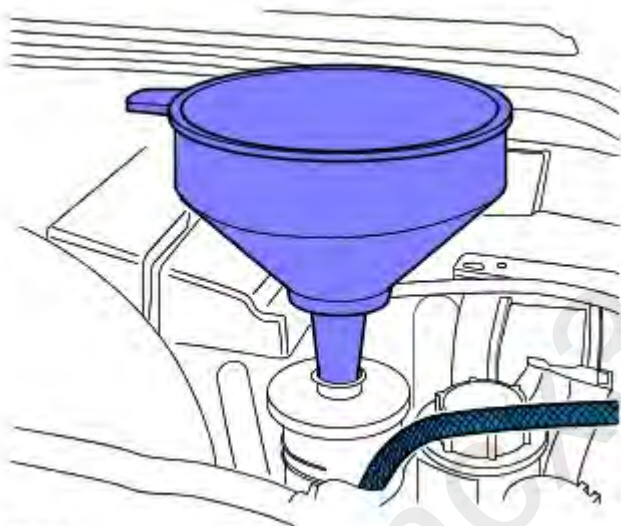


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6. NOTE: The suitable funnel should have the a capacity of 4 litres and O-ring seal

- NOTE: The suitable funnel must be tightly sealed to the power steering fluid reservoir to avoid fluid leakage.

Install a suitable funnel onto the power steering fluid reservoir.



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7.  WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle with the wheels just clear of the ground.

8. CAUTIONS:

 Steps 8 and 9 must be carried out within 2 - 3 seconds of each other. Failure to follow this instruction may result in damage to the power steering system.

 Be prepared to collect escaping fluids.

Using the suitable funnel, top up the power steering system with the specified fluid. Make sure the fluid level is maintained at two thirds full in the funnel.

9. CAUTIONS:



Be prepared to collect escaping fluids.



Do not allow the power steering fluid level in the power steering fluid reservoir to fall below the minimum power steering fluid level. Failure to follow this instruction may result in damage to the power steering system.



Make sure the engine is switched off as soon as the full 4 litres of power steering fluid has entered the power steering fluid reservoir.

Flush the power steering system.

- Start the engine
- With assistance turn the steering slowly lock to lock 3 times at approximately 1 revolution every 5 seconds.
- Continue to flush the power steering system until 4 litres of power steering fluid has been added to the power steering reservoir. This should take approximately 30 seconds.

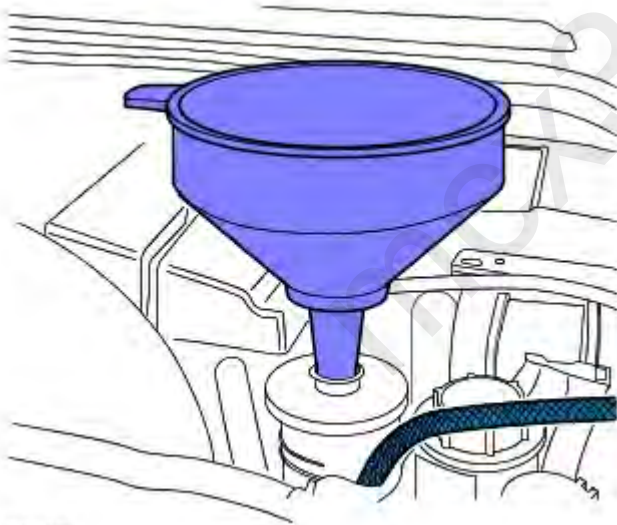


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10. CAUTION: Be prepared to collect escaping fluids.

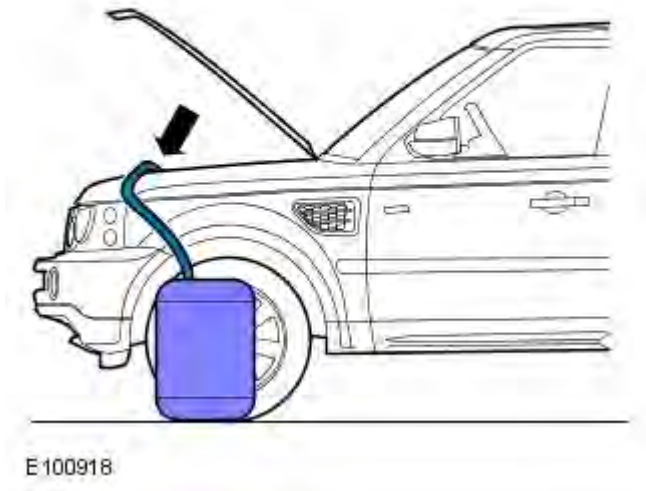
Remove the suitable funnel.



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11.  **CAUTION:** Be prepared to collect escaping fluids.

Remove the suitable pipe to the power steering return hose.



12.  **CAUTION:** Be prepared to collect escaping fluids.

- **NOTE:** Note the orientation of the clip.

If a quick release coupling is fitted to the power steering return hose, connect the power steering fluid return hose to the coupling by installing the clip.

13. Install a new power steering fluid reservoir.
For additional information, refer to: [Power Steering Fluid Reservoir - V6 4.0L Petrol/V8 5.0L Petrol/TDV6 3.0L Diesel](#) (211-02 Power Steering, Removal and Installation).