

Steering (11.00)

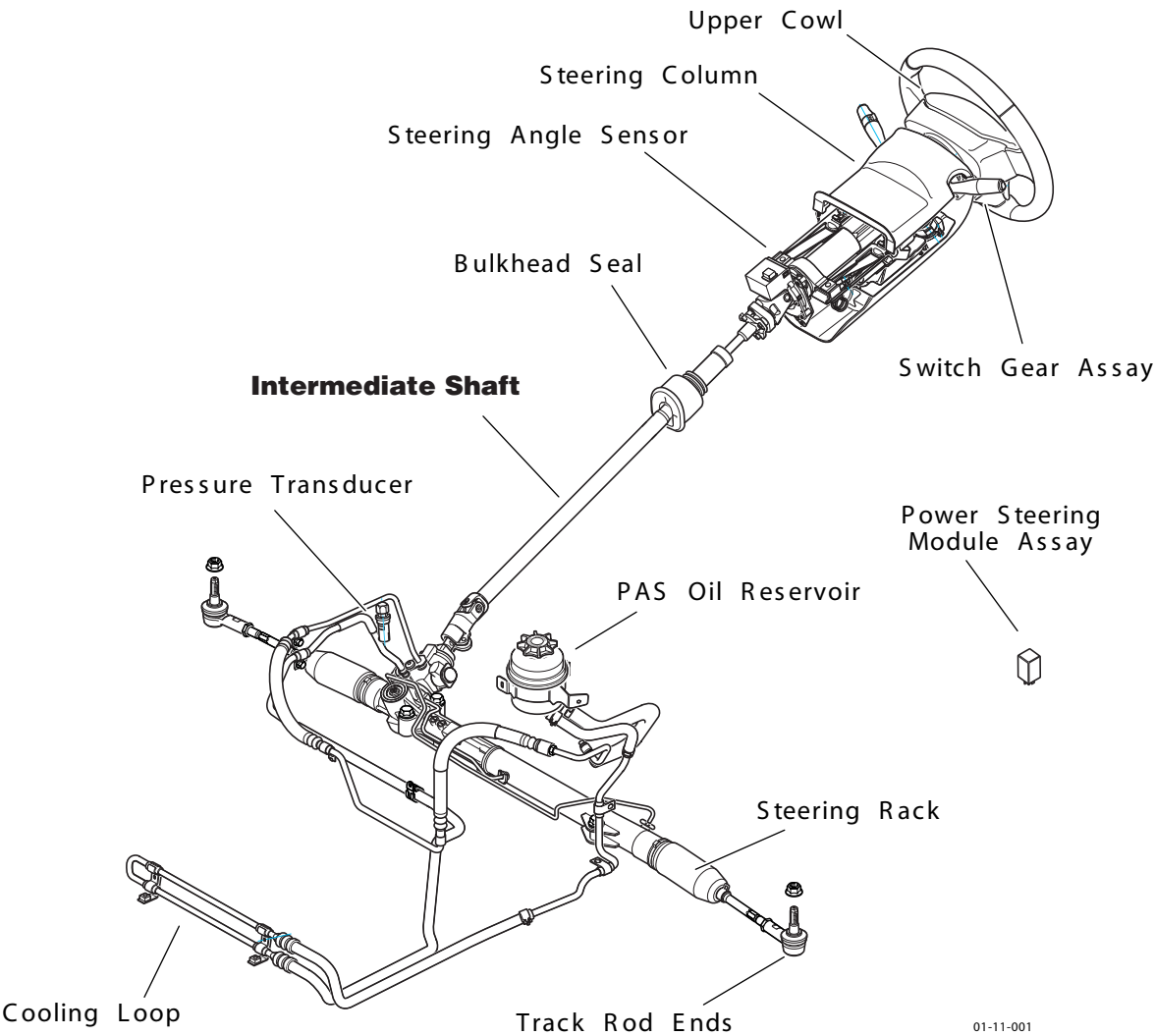
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Steering (11.00)

Steering Gear (11.01)



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Diagnostics
Symptom Chart

Symptom	Possible Cause	Action
Vehicle wanders from side to side on the road when driven straight ahead with the steering wheel held firmly.	Incorrect tyre size or pressure.	Check for correct tyre size. Adjust tyre pressures.
	Vehicle unevenly loaded or overloaded.	Adjust load.
	Loose or worn tie-rods or tie-rod ends.	New tie-rod end or steering gear.
	Steering gear bolts loose or damaged.	Tighten. New bolts.
	Loose or worn suspension ball joint(s).	New suspension ball joint assembly.
	Steering column universal joint pinch bolt loose.	Tighten pinch bolt.
	Incorrect toe adjustment.	Adjust as required.
	Loose or worn rear suspension.	Tighten if loose. New rear suspension components.
	Steering gear bushes worn or damaged.	New steering gear.

Symptom	Possible Cause	Action
Vehicle tends to pull to one side when driven on a level surface.	Incorrect tyre pressure.	Adjust tyre pressure.
	Incorrect tyre size.	New tyre as required.
	Different tyre or tread type.	
	Vehicle is unevenly or excessively loaded.	Adjust load evenly.
	Incorrect toe adjustment.	Adjust as required.
	Damaged front or rear suspension components.	New suspension components.
	Steering gear valve effort out of balance.	Shift transmission into neutral while driving at no more than 30 miles/hour (50 km/h) and turn the ignition to position I (engine 'Off'-coasting). a. If the vehicle does not pull to one side with the engine off, install a new steering gear. b. If the vehicle drifts with the engine off, 'cross switch' the front wheel assemblies. Test at low speed due to directional tyres. a. If the vehicle pulls to the opposite side, switch the wheels that were on the rear to the same side on the front. b. If the vehicle pull direction is not changed, check the front suspension components and toe adjustments.
	Check front and rear brakes for correct operation.	Adjust as required.
	Check for bent rear suspension components and for damaged coil springs in the front suspension.	New rear suspension components.
	Check the rear suspension for loose or worn suspension components.	Tighten. New components.
	Incorrect underbody alignment.	Check underbody alignment.
Feedback (whining or knocking noises in the steering gear) Condition where roughness is felt in the steering wheel by the driver when the vehicle is driven over rough surfaces.	Loose or worn tie-rods.	New steering gear.
	Steering gear bolts loose or damaged.	Tighten. New bolts.
	Loose suspension bushing, bolts or ball joints.	Tighten. New components.
	Damaged steering column.	New steering column.
Power steering pump or reservoir leaks	Overfilled system.	Correct fluid level.
	Damaged fluid cap.	New fluid cap.
	Loose or damaged hose fittings.	Tighten. New hose.
	Leakage at power steering pump.	New power steering pump.
Poor returnability of the steering	Incorrect tyre pressure.	Check and adjust tyre pressure.
	Incorrect tyre size or type.	New tyre as required.
	Steering column universal joints binding.	New steering column.
	Steering column shaft floor seal may be torn	New floor seal as required.
	Binding or damaged tie-rods.	New steering gear.
	Damaged or worn front suspension components.	New front suspension components as required.
	Incorrect toe adjustment.	Adjust as required.

Symptom	Possible Cause	Action
Excessive steering efforts required to turn corners and during parking manoeuvres	Low power steering pump fluid.	Fill as required. Check for system leaks.
	Damaged accessory drive belt tensioner.	New accessory drive belt tensioner.
	Hose or oil cooler external leak.	New hose or oil cooler as required.
	Hose or cooler line restriction.	New hose as required.
	Fluid aeration.	Bleed system.
Fluid leakage	Overfilled system.	Correct fluid level.
	Component leak.	Locate suspect component and repair as required.
Accessory drive belt squeal	Check accessory drive belt for correct tension or glazing.	New accessory drive belt.
'Chirp' noise in steering pump	Loose or worn accessory drive belt.	New accessory drive belt.
Power steering pump noisy	Low fluid level.	Top up and check for system leaks.
	Power steering pump.	Check for leaks. Repair as required.
		New power steering pump.
'Swish' noise	Fluid flow into bypass valve of the power steering pump valve housing with fluid temperature below 54°C (130°F).	Normal noise.
'Whine' noise	Aerated fluid.	Bleed system.

Specifications

Torque Figures

Description	Nm.	lb / ft.
Ball Joint (nut)	70	52
Track-Rod (lock nut)	70	52
Steering Rack to Subframe	115	85
Steering Rack Pipe Latch Plate	9-12	7-9
Intermediate Shaft Pinch Bolt	21-29	15.5-21.5

Maintenance

The specifications and adjustments for front and rear road wheel alignment are located in Suspension (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

Wheel Bearing Inspection

1. Raise, support and make the vehicle safe.
2. Ensure the road wheel rotates freely and that the brake pads are sufficiently retracted, allowing free movement of the road wheel.

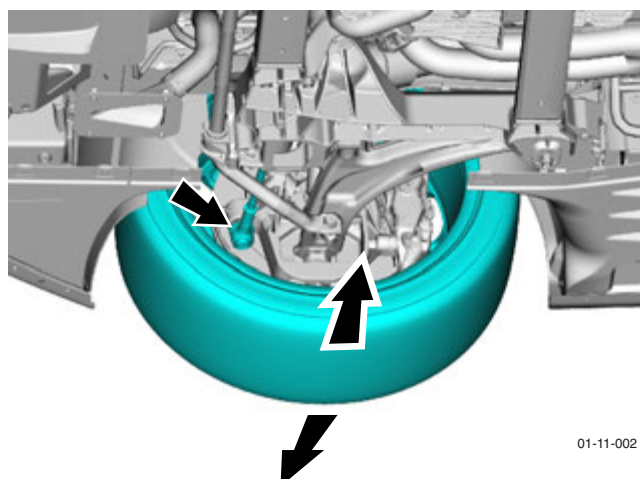
Have a colleague observe upper and lower ball joints for movement during the following check. This will ensure that the cause of any free play is correctly identified.

3. Firmly grasp the road wheel at top and bottom. Attempt to move the road wheel inward and outward while lifting the weight of the road wheel off the road wheel bearings.
4. If there is any excess movement in the wheel bearing, replace the bearing assembly.
5. Remove the safety stand and lower the vehicle.

Ball Joint Inspection

Prior to carrying out any inspection of ball joints, inspect the front wheel bearings.

1. Raise, support and make the vehicle safe.
2. Position a safety stand to support the suspension lower arm.
3. While an assistant pulls and pushes the bottom of the road wheel, check for any relative movement between the ball joint and the suspension lower arm. Any lateral movement indicates a worn or damaged lower ball joint. Install new components if required.



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- While an assistant pulls and pushes the top of the road wheel, observe the relative movement between the ball joint and the suspension upper arm. Any lateral movement indicates a worn or damaged upper ball joint. Install new components as required.
- Remove the safety stand and lower the vehicle.

Track-Rod Ends

Repair Operation Time (ROT)	
Item	Code
Track-Rod Ends Renew	TBA

Removal

- Raise, support and make the vehicle safe.
- Remove the front road wheels.
- Remove the front undertray.
- Using service tool (Refer to '204-523 (Ball Joint Splitter)', page 20-1-3), remove the track rod-end from the vertical link.

Take care not to cut / damage the track rod end boot when using the ball joint splitter.

Remove image

- Loosen the track-rod end lock nut and remove the track-rod end.

Note the number of complete turns to remove the rod end from the track rod.

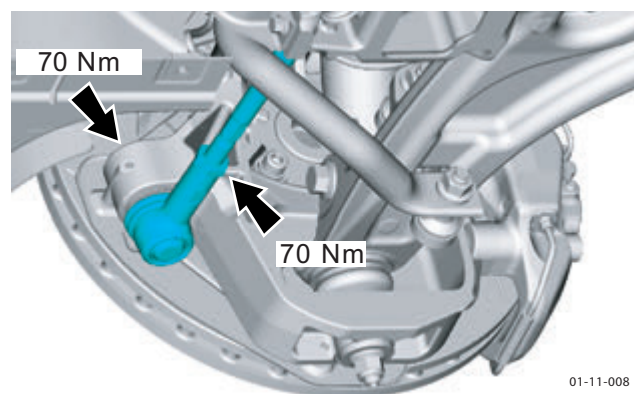
Installation

- Install the track-rod end.

Install the rod end the same number of turns it took to remove.

Install image

- Install the track-rod end to the vertical link. Torque nut to **70 Nm**.



- Install the road wheel.
- Lower the vehicle.
- Check the vehicle Toe (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
 - If the vehicle Toe is within specifications - Tighten the track-rod end lock nut(s) (**70 Nm**.)
 - If the vehicle Toe is not within specifications - Raise the vehicle and adjust the vehicle Toe

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Steering Rack

Repair Operation Time (ROT)	
Item	Code
Steering Rack Renew	RHD 11.02.DB
	LHD TBA

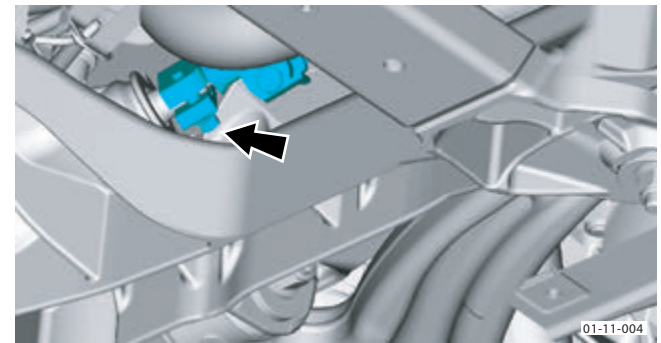
Removal

1. Disconnect the vehicle battery.

Caution

Failure to centre the steering wheel and rack during reassembly may cause damage to the restraint bag clock-spring and also may cause difficulties in attaining correct alignment of the steering wheel in the straight ahead position.

2. Secure the steering wheel in the centred position.
Remove the ignition key and engage the steering lock with the road wheel as accurately centred as possible.
3. Support the engine from above (Refer to '303-1080 (Engine Support Adaptor)', page 20-1-6).
4. Raise, support and make the vehicle safe.
5. Remove the front road wheels.
6. Remove the front undertray.
7. Disconnect the steering rack from the steering intermediate shaft (RH drive shown).



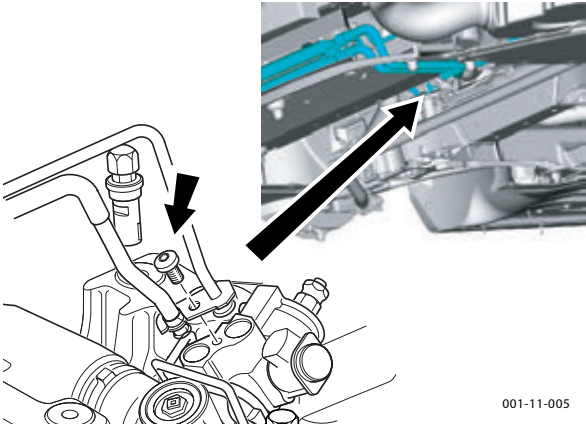
8. Disconnect the L/H and R/H rod ends from the vertical link.

9. RH Drive Only.

- 9.1 Disconnect the power steering fluid pipes.

Caution

Whenever the steering gear unions are disconnected the steering gear valve body ports should be capped to prevent ingress of foreign objects.



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- 9.2 Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).
- 9.3 Remove bolts (x3) that secure the steering rack to the subframe. Withdraw the steering rack.

10. LH Drive Only.

- 10.1 'Ty-wrap' the steering rack in position. Remove bolts (x3) that secure the steering rack to the subframe.
- 10.2 Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).
- 10.3 Disconnect the power steering fluid pipes.

Caution

Whenever the steering gear unions are disconnected the steering gear valve body ports should be capped to prevent ingress of foreign objects.

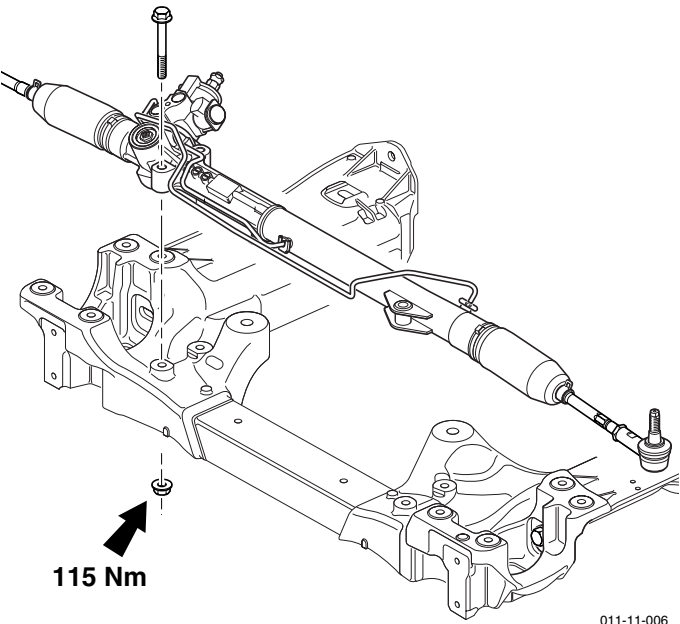
- 10.4 Remove 'Ty-wraps' and withdraw the steering rack.

Installation

Always use new washer seals.

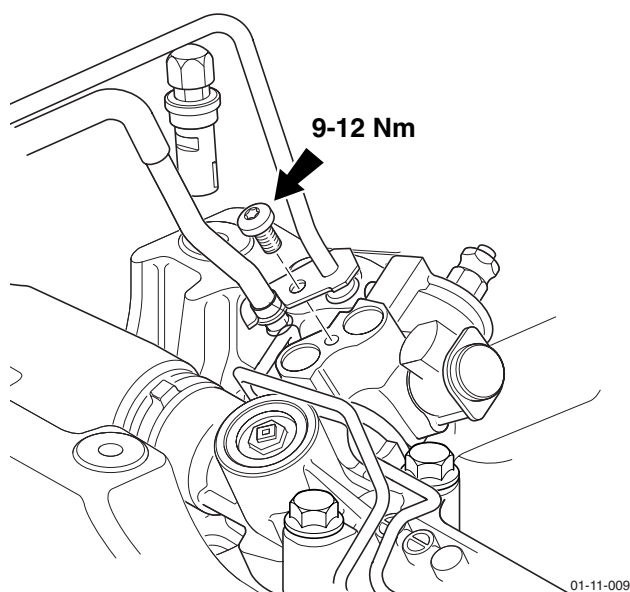
1. RH Drive Only.

- 1.1 Install the steering rack to the subframe (new nyloc bolts x3). Tighten bolts to **115 Nm**.



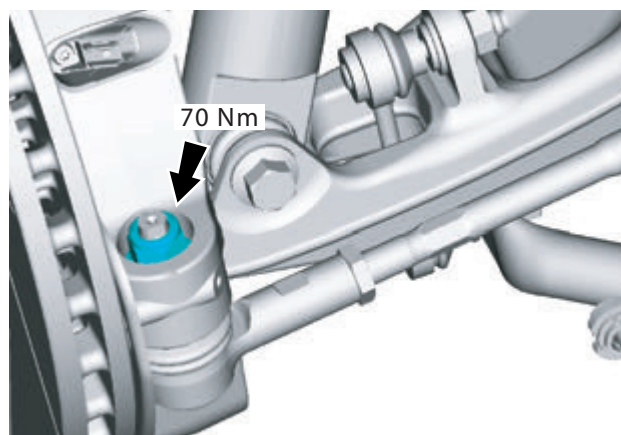
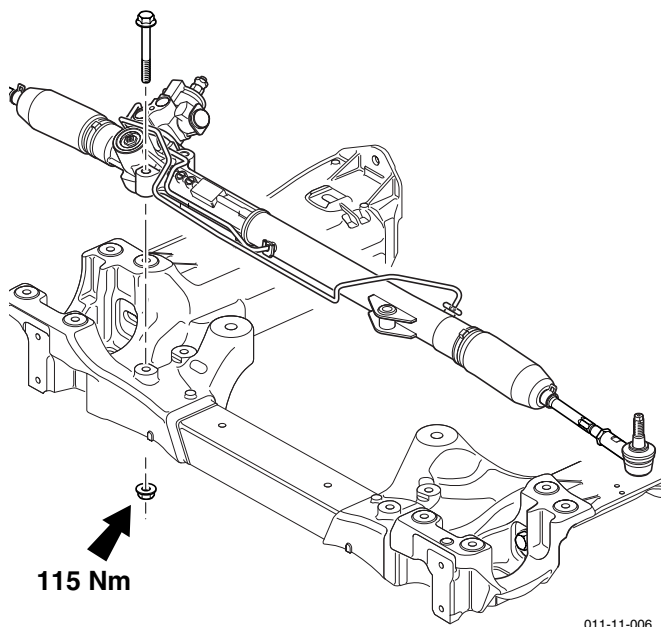
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- 1.2 Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
- 1.3 Connect the steering rack pipe work.

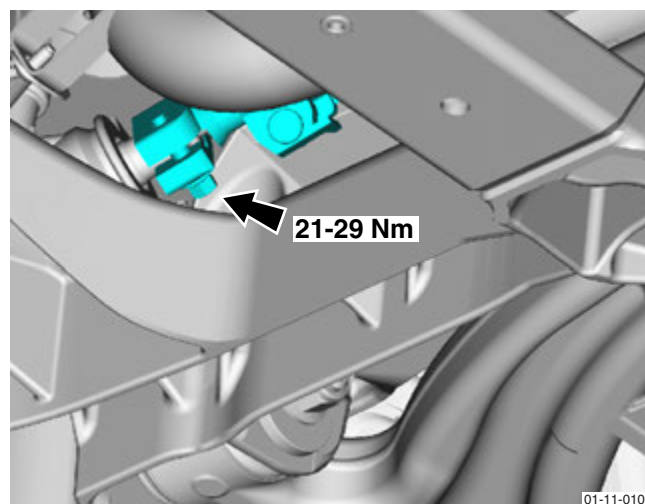


2. LH Drive Only.

- 2.1 'Ty-wrap the steering rack in position.
- 2.2 Connect the power steering fluid pipes.
- 2.3 Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
- 2.4 Install the steering rack to the subframe (new nyloc bolts x3). Tighten bolts to **115 Nm**.



4. Recheck both the steering wheel and rack are accurately centred.
5. Install the steering rack to the steering intermediate shaft.



6. Connect the vehicle battery.
7. Fill and bleed the power steering system (Refer to 'System Bleeding', page 11-2-2).

Warning

Do not drive the vehicle until the steering geometry has been set and all fixings have been secured.

8. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
9. Check and adjust front wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
10. Raise the vehicle and install the front undertray.



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Steering (11.00)

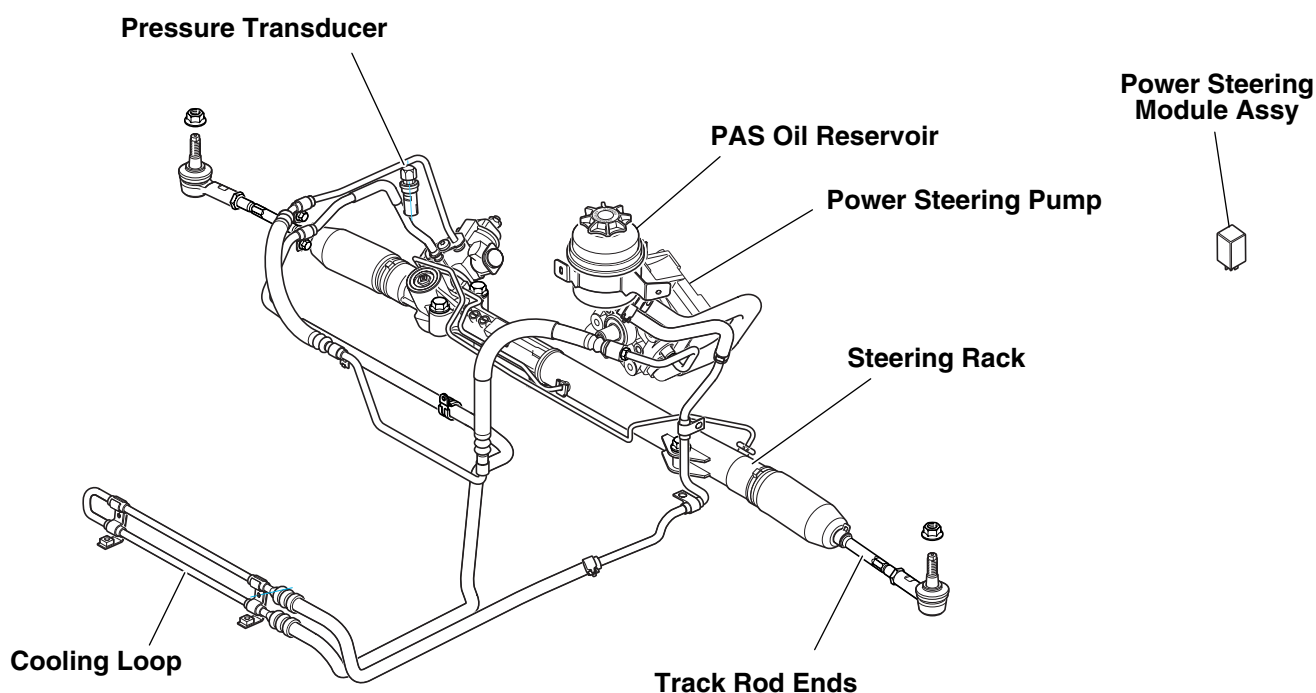
Power Steering (11.02)

The power steering system is hydraulically driven and contains a speed sensitive rack and pinion steering gear (ZF Servotronic II ®). Power assistance is generated by an engine driven vane pump, operating at a constant flow rate.

The level of assistance is controlled electronically via an ECU, which receives a vehicle speed signal from the speedometer. The signal is then converted to a controlled electric current, which is then transmitted to an electro-hydraulic transducer (attached directly to the valve housing). This allows steering efforts to remain lighter at lower speeds to aid parking manoeuvres, whilst at higher speeds, efforts are increased, providing greater directional stability.

Hoses / pipes are used to transmit hydraulic fluid throughout the system. The high-pressure line contains a pressure transducer, which sends an electronic signal to the engine management system. This ensures engine rpm is maintained when the steering system draws higher loads from the engine (i.e. during parking manoeuvres). In order to regulate system temperatures, a wire-wound cooler is incorporated into the return line.

Description



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The power steering system uses a rack and pinion type steering gear with servotronic steering assistance. The power steering pump is belt driven and the power steering oil cooler is of a wire bound tube type and is mounted in front of the radiator.

The steering assistance decreases smoothly at a calibrated rate to increase the steering efforts required as vehicle speed increases.

The steering efforts are controlled by the servotronic valve (actuator) position, which in turn is controlled electronically by the servotronic ECU housed in the instrument cluster.

Absolute cleanliness must be observed when replenishing the fluid or dismantling any part of the system. A new power steering reservoir must be installed if the steering gear, pump or fluid cooler is to be replaced. New fluid from a sealed container must be used.

Specifications

Item	Data
Pump Pressure (max)	116 +/-4 bar
Turns lock-to-lock	3
Overall steering ratio	17:1
Turning Circle (Kerb To Kerb)	11.5m
Fluids	33270 Texaco Cold Climate Power Steering Fluid 14315G
Capacity	1.3 ltr.
Toe Settings	(Refer to 'Road Wheel Alignment (04.00)', page 4-1-2)

Maintenance

System Bleeding

When filling the reservoir, make sure that the fluid is clean and not agitated prior to use. Pour the fluid slowly to minimize aeration.

1. Check that the reservoir level is well above the Min. mark. Add fluid if required and install the reservoir cap loosely to avoid fluid splashes during system bleeding.
2. Start the engine and run for several minutes. Check the returning fluid in reservoir. When the air bubbles cease to flow, top up the reservoir. Move to step 3.
3. Turn the steering hard over on one lock. Run the engine for several minutes. Check the returning fluid in reservoir. When the air bubbles cease to flow, top up the reservoir. Move to step 4.
4. Turn the steering hard over on opposite lock. Run the engine for several minutes. Check the returning fluid in the reservoir. When the air bubbles cease to flow, top up reservoir. Move to step 5.
5. Allow the engine to idle for 5 minutes with the road wheels in the straight ahead position.
6. Briefly turn the steering to one lock and then to the opposite lock. If no air sounds are heard, bleeding was successful.
If air noises are present, repeat the bleeding procedure.
7. Top-up the reservoir to the max. level and secure the reservoir cap.

Steering (11.00)

Steering Column (11.04)

Description

The steering column lock is secured to the upper casting of the steering column and consists of a locking pin. The steering column is locked and unlocked by inserting and removing the ignition key respectively.

The steering column has rake and reach functions. These allow the driver to manually set the steering column position by using the rake / reach lever, located on the underside of the steering column, regardless of the ignition switch position.

The steering intermediate shaft consists of two parts. The lower shaft is attached to both the steering gear and the upper shaft.

Specifications

Torque Figures		
Description	Nm.	lb / ft.
Steering Column to mounting	21-27	15.5-20
U/J securing bolt	20-25	15-18.5

Maintenance

Steering Column

Repair Operation Time (ROT)	
Item	Code
Steering Column (Upper) Renew	11.04.CB

Removal

1. Power the driver's seat to it's lowest and most rearward position.
2. Disconnect the vehicle battery at the negative terminal. Ensure the ignition key is removed.

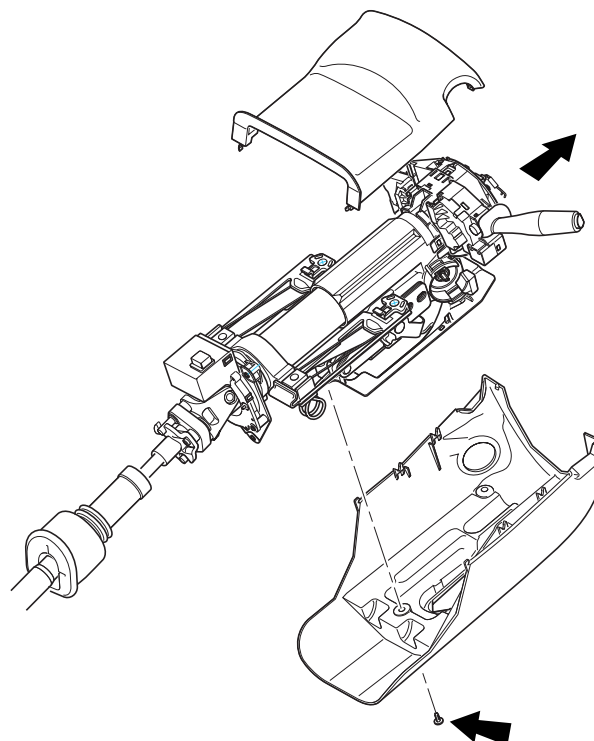
Warning

The restraint bag is equipped with a back-up power supply and may be inadvertently deployed. To avoid accidental restraint bag deployment, wait at least one minute before starting work so that any residual power is dissipated.

3. Remove the drivers side underscuttle panel.

4. Remove the steering column cowl.

To remove the rear lower screw unlatch the reach / rake lever and pull the steering column forward.



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Caution

Failure to centre steering wheel and rack may cause damage to restraint bag clock-spring and also may cause difficulties in attaining correct alignment of steering wheel in the straight ahead position.

5. Centre the steering and engage the steering column lock.
6. Pull back the bulkhead seal. Remove the pinch bolt that secures the upper column to the intermediate shaft.

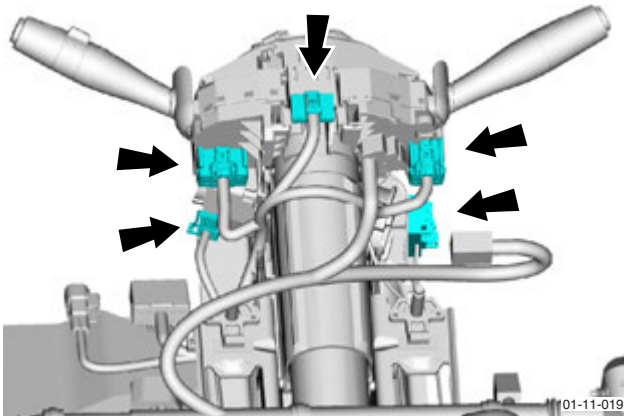
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7. Ensure that the vehicle battery is disconnected at the negative terminal and that the ignition key is removed.

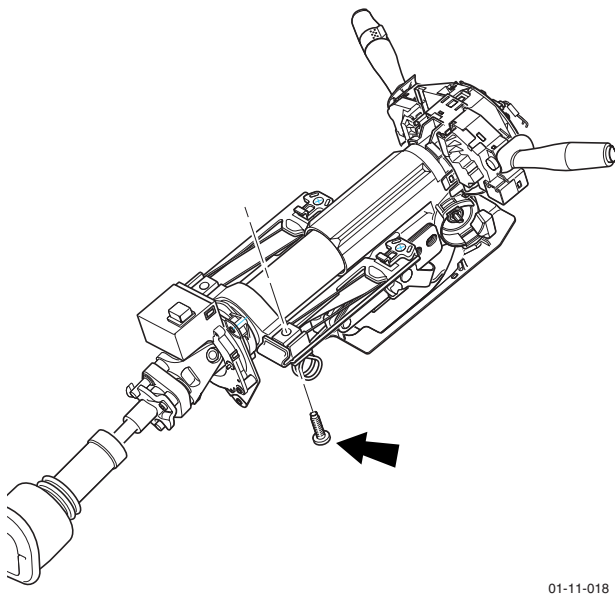
⚠ Warning ⚠

Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.

8. Disarm and remove the air bag module (Refer to 'Driver Airbag', page 1-14-4).
9. Remove the steering wheel (Refer to 'Steering Wheel', page 11-5-1).
10. Retain the clockspring rotor in position, i.e. masking tape.
- 11. Automatic Vehicles Only.**
Remove the paddle shift assembly.
12. Disconnect the wiring harness plugs (x5).



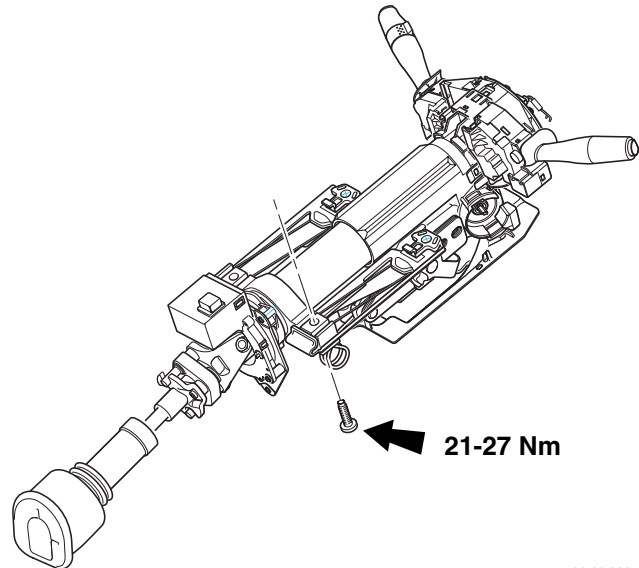
13. Remove the mounting securing bolts (x4).



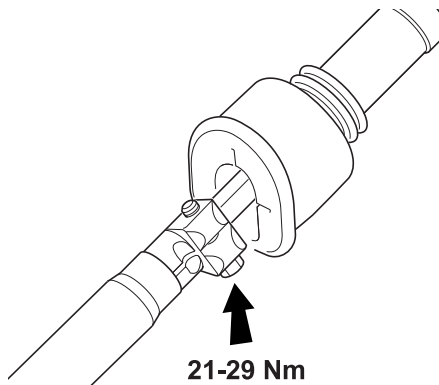
14. Withdraw the upper column from the intermediate shaft.

Installation

1. Install the upper column.
- 1.1 Connect the intermediate shaft to the upper column.
- 1.2 Locate the steering column to its mount. Install the mounting bracket bolts. Tighten bolts (x4) to **21 -27 Nm**.



2. Install the U/J securing bolt. Torque to **20-25 Nm**. Install the bulkhead seal.



3. Install the steering column switch block (Refer to 'Column Controls', page 11-4-1).
4. Connect the wiring harness plugs.
5. Remove the material holding the clockspring rotor in position.
- 6. Automatic Vehicles Only.**
Install the paddle shift assembly. Connect the wiring harness plug.
7. Install the steering wheel (Refer to 'Steering Wheel', page 11-5-1).
8. Install the air bag module (Refer to 'Driver Airbag', page 1-14-4).
9. Install the steering column cowls.
10. Install the underscuttle.
11. Connect the vehicle battery.

Steering (11.00)

Steering Column Switches (11.05)

Maintenance Column Controls

Repair Operation Time (ROT)	
Item	Code
Steering Column Controls Renew	TBA

Removal

⚠ Warning ⚠

DO NOT remove the restraint bag without first reading and fully understanding the warnings related to restraint bag removal. Follow step by step the procedure for disarming and removing the restraint bag.

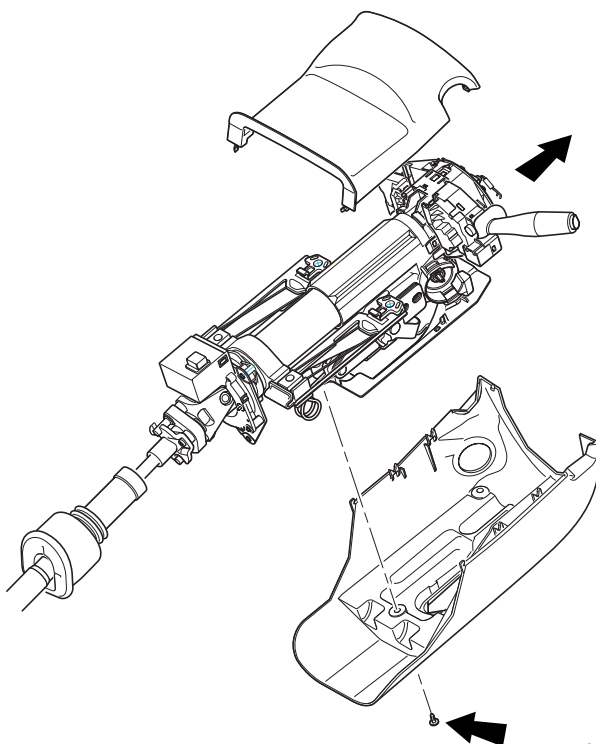
1. Disconnect the vehicle battery at the earth (-ve) terminal and ensure the ignition key is removed.

⚠ Warning ⚠

Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.

2. Remove the restraint bag module (Refer to 'Driver Airbag', page 1-14-4).
3. Remove the steering wheel (Refer to 'Steering Wheel', page 11-5-1).
4. Remove the steering column cowl.

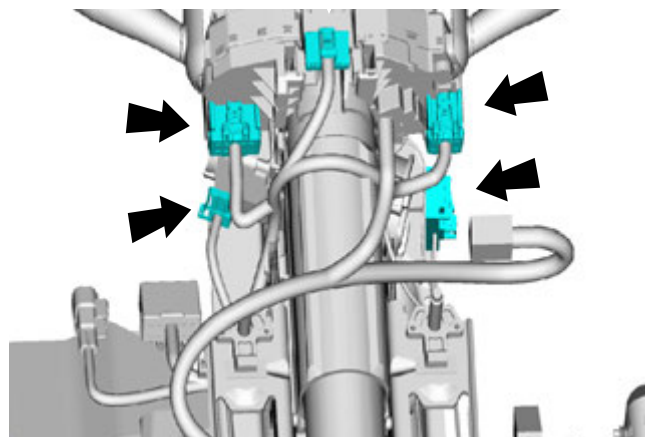
To remove the rear lower screw unlatch the reach / rake lever and pull the steering column forward.



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5. Automatic Gearbox Only.

- 5.1 Remove screws (x4) and release the paddle shift.
- 5.2 Disconnect the wiring harness plug and remove paddle shift.
6. Disconnect the column switch wiring harness plugs.



7. Unclip the column controls from the steering column and remove.

Installation

1. Install the column controls.
 - 1.1 Clip the column controls to the steering column.
 - 1.2 Connect the wiring harness plugs.

2. Automatic Gearbox Only.

Connect the wiring harness plug and install the paddle shift.

3. Install the restraint bag module (Refer to 'Driver Airbag', page 1-14-4).
4. Install the steering column cowl.

⚠ Warning ⚠

DO NOT install the restraint bag without first reading and fully understanding the warnings related to restraint bag removal. Follow the step by step procedure for refitting the restraint bag.

5. Install and re-arm the restraint bag (Refer to 'Driver Airbag', page 1-14-4).
6. Install the steering wheel (Refer to 'Steering Wheel', page 11-5-1).



ASTON MARTIN

Steering (11.00)

Steering Wheel (11.06)

Specifications

Torque Figures		
Description	Nm.	lb / ft.
Steering Wheel	40	30

Maintenance

Steering Wheel

Repair Operation Time (ROT)	
Item	Code
Steering Wheel Renew	11.06.AB

Removal

⚠ Warning ⚠

DO NOT remove the restraint bag without first reading and fully understanding the warnings related to restraint bag removal. Follow step by step the procedure for disarming and removing the restraint bag.

1. Disconnect the vehicle battery at the earth (-ve) terminal and ensure the ignition key is removed.

⚠ Warning ⚠

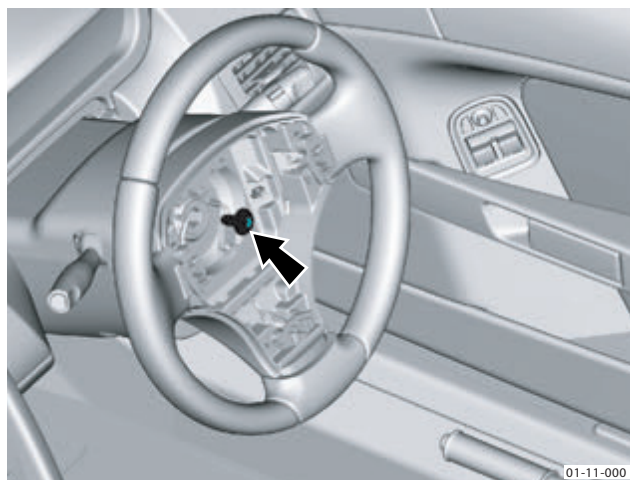
Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.

2. Remove the restraint bag module (Refer to 'Driver Airbag', page 1-14-4).
3. Place the steering in the straight ahead position.

Caution

Do not use steering lock to hold wheel whilst releasing securing nut. Steering lock may be irreparably damaged.

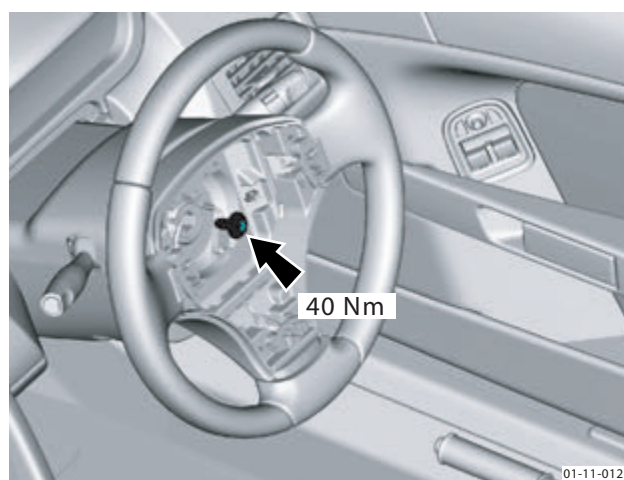
4. Undo and remove the steering wheel securing nut.



5. Place marks on the steering wheel and column to indicate the correct spline alignment. Pull the steering wheel from the steering column splines.

Installation

1. Install steering wheel.
 - 1.1 Ensure that the steering is in the straight ahead position.
 - 1.2 Align the steering wheel spokes in the straight ahead position.
 - 1.3 Align the steering wheel and column marks correctly and install the steering wheel to the steering column
 - 1.4 Check that the steering wheel rotation is accurately centred when the road wheels are in the straight ahead position.
- 1.5 Install and tighten the securing bolt. Torque bolt to **40 Nm**.



2. Install the restraint bag (Refer to 'Driver Airbag', page 1-14-4).



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