

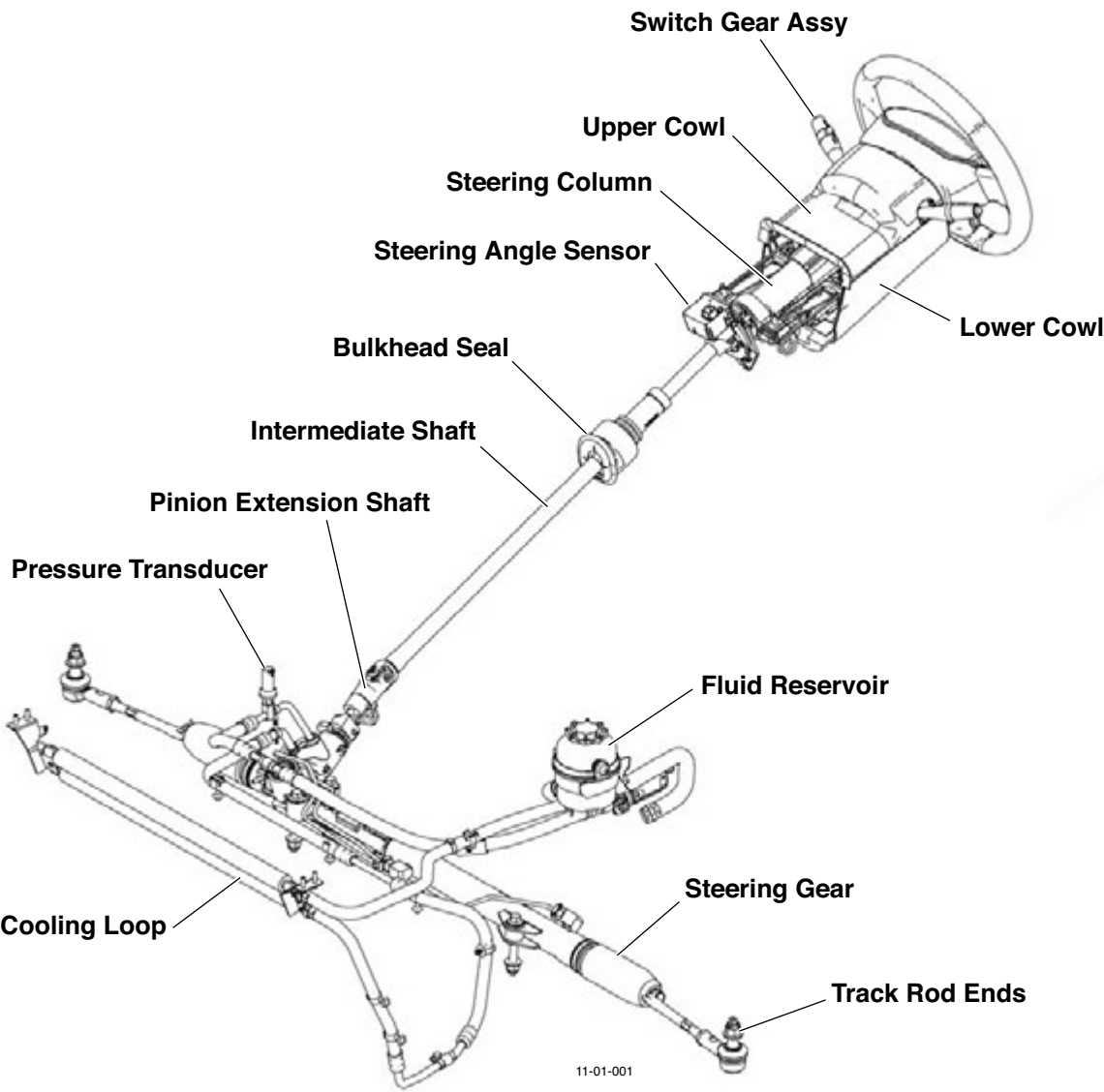
Steering (11.00)

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Steering (11.00)

Steering Gear (11.01)



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.
	Insufficient Castor.	Check front suspension geometry.

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.
Feedback (whining or knocking noises in the steering gear)	Check the rear suspension for loose or worn suspension components.	Tighten. New components.
	Incorrect underbody alignment.	Check underbody alignment.
	Loose or worn tie-rods.	New steering gear.
	Steering gear bolts loose or damaged.	Tighten. New bolts.
	Condition where roughness is felt in the steering wheel by the driver when the vehicle is driven over rough surfaces.	Tighten. New components.
Power steering pump or reservoir leaks	Damaged steering column.	New steering column.
	Loose Column bolts.	Tighten bolts.
	Overfilled system.	Correct fluid level.
	Damaged fluid cap.	New fluid cap.
Poor returnability of the steering	Loose or damaged hose fittings.	Tighten. New hose.
	Leakage at power steering pump.	New power steering pump.
	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 and fouling I-shaft.	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	Dirty fluid filter.	Clean/replace reservoir.
	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.
	Damaged pump.	Replace pump.
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 from 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 pump.
	Steering hoses fouling body structure.	Ensure hose is secured and routed correctly.
'Hiss' noise	Fluid flow through steering gear rotary valve - close to 'Full Lock'.	Normal noise.
'Whine' noise	Aerated fluid.	Bleed system.
Steering wheel vibration	Road wheels out of balance.	Check front end alignment.

Specifications

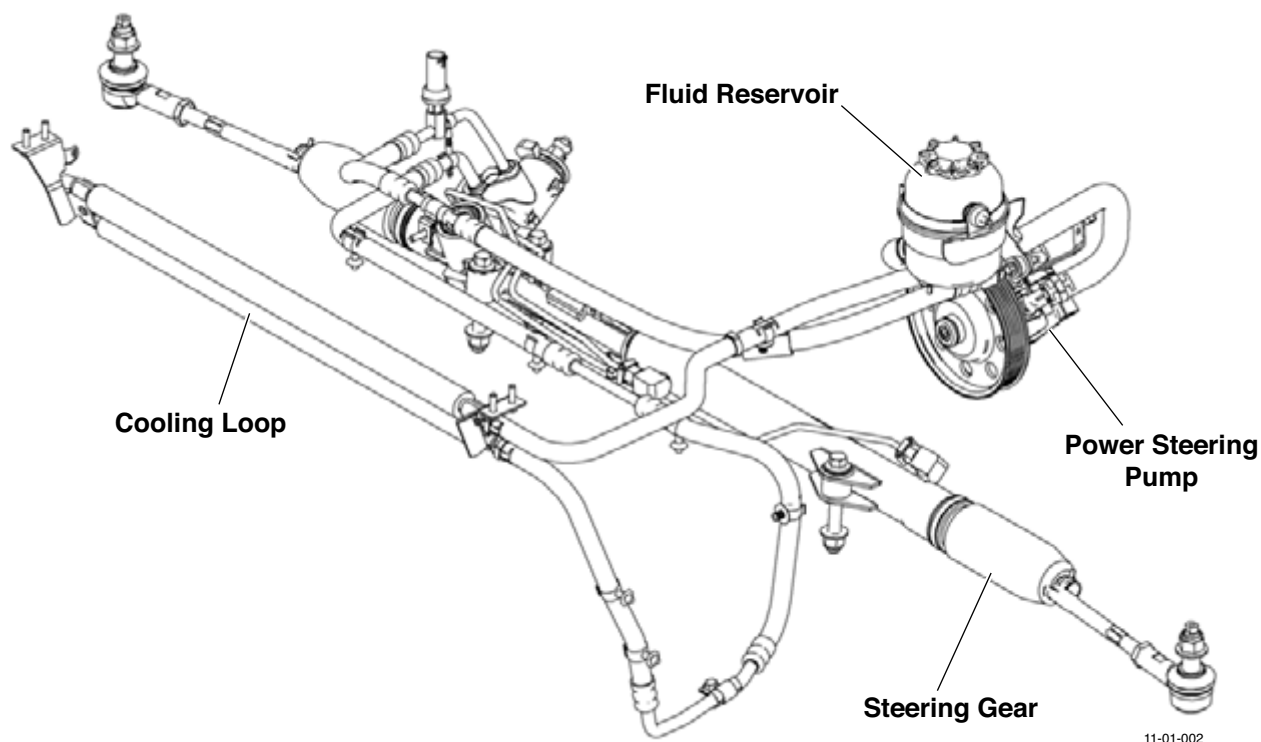
Torque Figures

Description	Nm.	lb/ft
Ball Joint (M14 nut)	70	52
Track-Rod (lock nut)	70	52
Steering Rack to Subframe (M12)	115	85
Steering Rack Pipe Attachment Plate	9-12	7-9
Intermediate Shaft Pinch Bolt	21-29	15.5-21.5

Steering (11.00)

Power Steering (11.02)

Description



The power steering system comprises of a non-speed sensitive rack and pinion steering gear together with an engine driven vane pump, operating at a constant flow rate. The level of assistance is controlled via a rotary hydraulic valve, integral to the steering gear assembly.

Hoses / pipe are used to transmit hydraulic fluid throughout the steering 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.

Specifications

Item	Data
Pump Pressure (max)	116 $\pm$ 4Bar
Turns lock-to-lock	3
Overall steering ratio	17:1
Turning Circle (Kerb To Kerb)	11.1m
Fluids	33270 Texaco Cold Climate Power Steering Fluid 14315G (to 10 MY) Pentosin CHF 11S (10MY onwards)
Toe Settings	(Refer to 'Road Wheel Alignment (04.00)', page 4-0-2)

Maintenance

Power Steering System - Bleed

Repair Operation Time (ROT)	
Item	Code
Power Steering System - Bleed	11.01.AA

Procedure

1. Do a check of the fluid level in the PAS fluid reservoir. Add fluid if necessary.
2. Start the engine and let it idle for 20 seconds.
3. Operate the steering fully to the left and then the right through three cycles.
4. Stop the engine.
5. Wait for five minutes then do a check of the fluid level in the PAS fluid reservoir again.
6. Add fluid if necessary.
7. Install the PAS fluid reservoir cap.

Power Steering Pump-Renew

Repair Operation Time (ROT)	
Item	Code
Power Steering Pump-Renew	03.05.AA

Removal

1. Remove A/C compressor (see Workshop Manual procedure 03.05.BE Compressor - Air Conditioning - Renew).
2. Coolant drain (see Workshop Manual procedure 03.03.AD Coolant - Drain & Refill).
3. Remove PAS fluid from reservoir.
4. Disconnect HP union from PAS pump pipe.
5. Remove bolt P-clip suction hose to body.
6. Remove bolt (x1) HP pump pipe to engine.
7. Remove bolts (x3) PAS pump to engine.
8. Disconnect bottom hose and move aside.
9. Unclip (x1) harness from cylinder head for access.
10. Manoeuvre pump forward and up.
11. Disconnect suction hose (cut off clip) and remove pump.
12. Remove HP union pipe from pump (mark position on pump).

Installation

1. Install HP union pipe to pump (align correctly), fit new O-ring.
2. Install pump to vehicle connect suction pipe to PAS pump, align timing marks and fit new clip.
3. Manoeuvre pump into position.
4. Install bolts (x3) PAS pump to engine (torque).
5. Install bolt (x1) HP pump pipe to engine (torque).
6. Connect bottom hose.
7. Clip (x1) harness from cylinder head for access.

8. Install bolt P-clip suction hose to body (torque).
9. Connect HP union to PAS pump pipe, replace O-ring (torque).
10. Coolant refill (see Workshop Manual procedure 03.03.AD Coolant - Drain & Refill).
11. Install A/C compressor (see Workshop Manual procedure 03.05.BE Compressor - Air Conditioning - Renew).
12. Top-up PAS fluid.
13. Start and run engine, operate steering lock to lock x2.
14. Top-up PAS fluid.

Power Assisted Steering (PAS) Rack - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Power Assisted Steering (PAS) Rack - Remove and Install	11.02.AA

Removal

1. Disconnect the battery ground cable.
2. Remove the front undertray (refer to Workshop Manual Procedure 01.02.NB - Front Undertray).
3. Remove the front wheels and tyres (refer to Workshop Manual Procedure 04.04.ED - Wheel and Tyre - Pair).
4. Remove the front right side wheel-arch liner (refer to Workshop Manual Procedure 01.02.GB - Front Right Side Wheel-Arch Liner).
5. Put a container in position under the oil tank to collect oil.
6. Remove the drain plug from the oil tank.

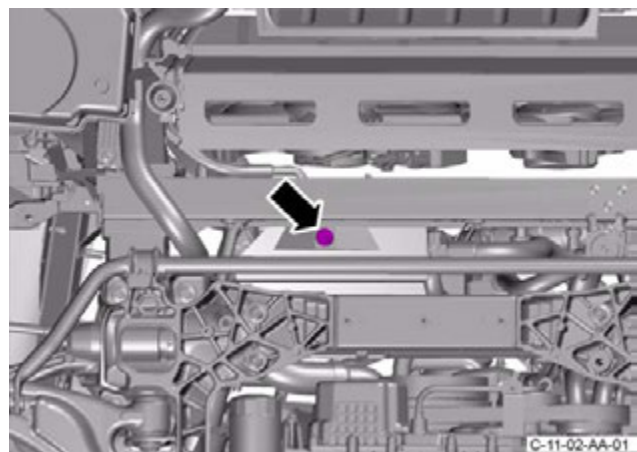


Figure 1

7. Let the oil drain into the container.
8. Install and tighten the drain plug into the oil tank (refer to Figure 1).
9. Remove the container.
10. Lower the vehicle.
11. Remove the radiator closing panel (refer to Workshop Manual Procedure 01.02.AA - Radiator Closing Panel).

12. Disconnect the two breather pipes from the air intake pipe.

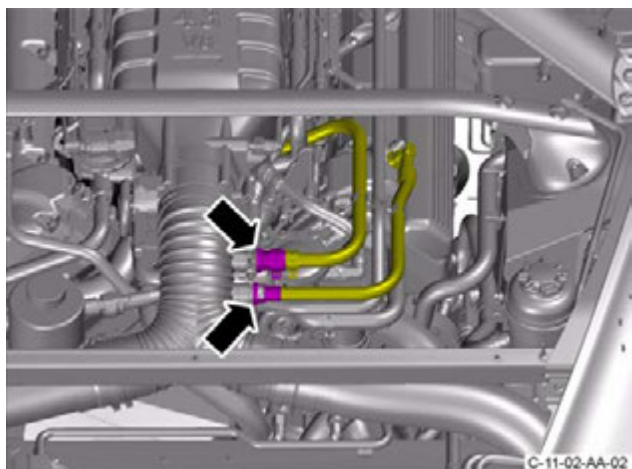


Figure 2

13. Install sealing caps into the open ports.
14. Release the clip that attaches the air intake pipe to the throttle body.

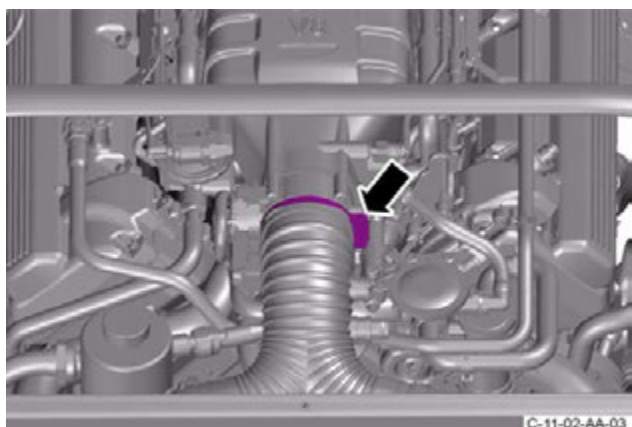


Figure 3

15. Release the clip that attaches the air intake pipe to the outlet pipe for the right side air cleaner.

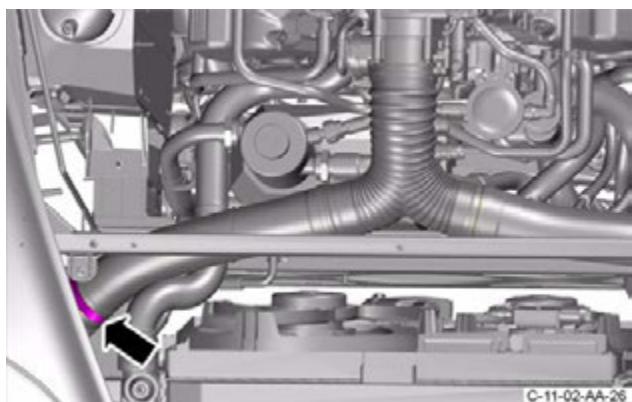


Figure 4

16. Disconnect the air intake pipe from the outlet pipe for the right side air cleaner and move it away.

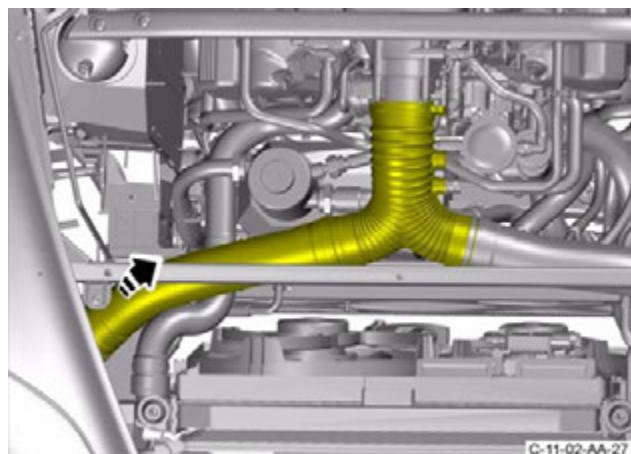


Figure 5

17. Disconnect the two oil breather pipes from the oil tank.

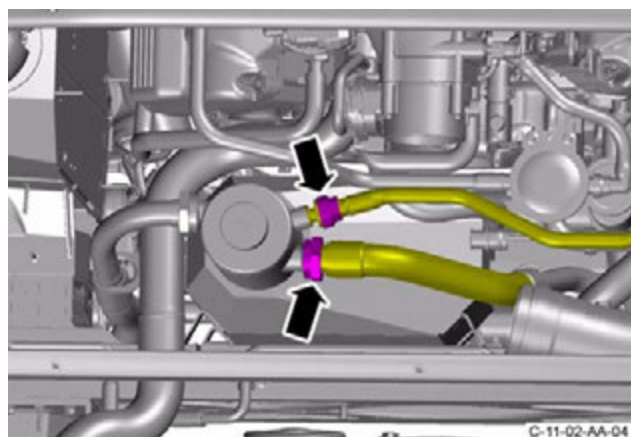


Figure 6

18. Install sealing caps into the open ports.
19. Loosen the union that attaches the top oil pipe to the oil tank and move the pipe away.

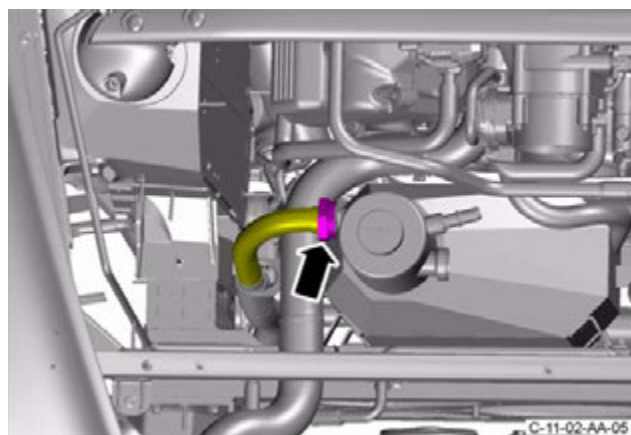


Figure 7

20. Install sealing plugs into the open ports.

21. Remove the two top screws that attach the oil tank to the body.

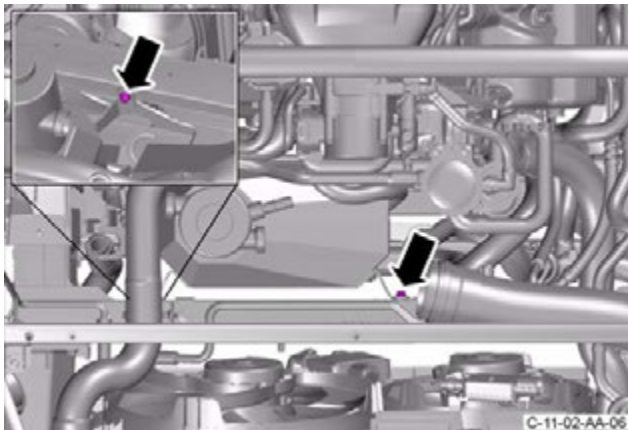


Figure 8

28. Remove the two bottom screws that attach the oil tank to the body.

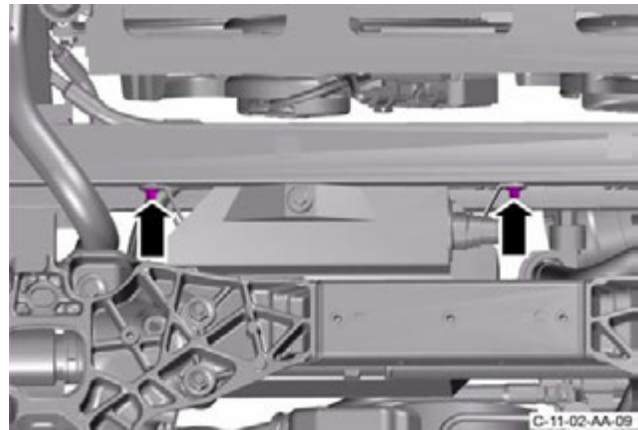


Figure 11

22. Lift the vehicle.
23. Remove the four screws that attach the anti-roll bar to the front subframe.

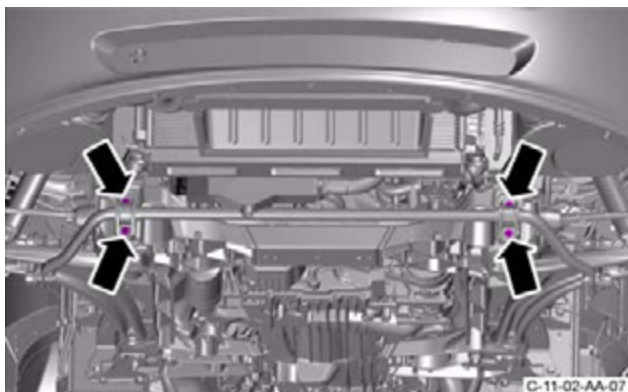


Figure 9

29. Lower the vehicle.

CAUTION

Be careful when you remove the oil tank in the step that follows. If you are not, the air conditioning switch and wiring harness can be damaged.

30. Carefully remove the oil tank.

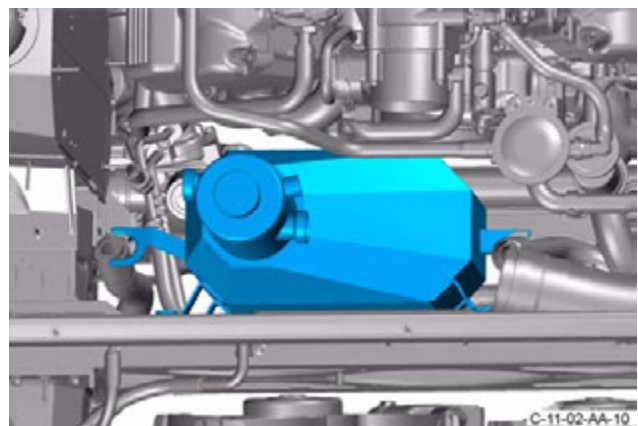


Figure 12

24. Move the anti-roll bar away and use a cable tie to hold it.
25. Loosen the union that attaches the bottom oil pipe to the oil tank and move the pipe away.

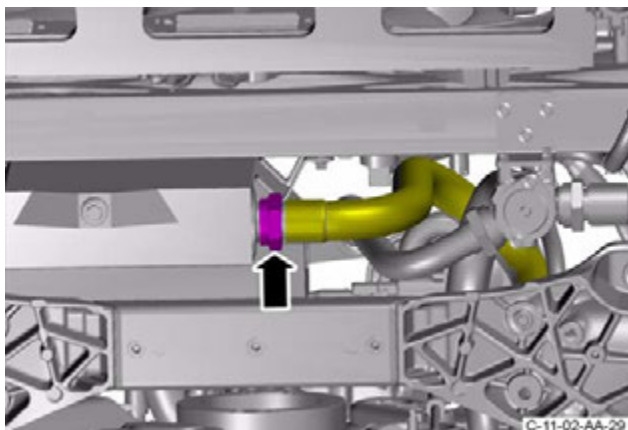


Figure 10

31. Lift the vehicle.

32. Remove the bolt that attaches the universal joint for the lower steering column to the pinion coupling.

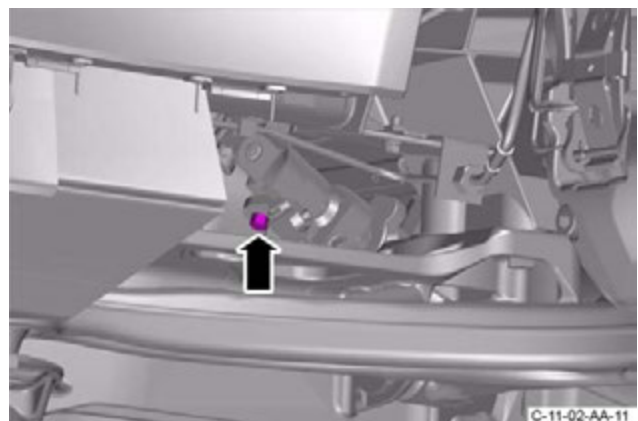


Figure 13

26. Disconnect the two lower oil pipes from the oil tank and move them away.
27. Install sealing caps in the open ports.

33. Turn the lever on the universal joint to release it from the coupling.

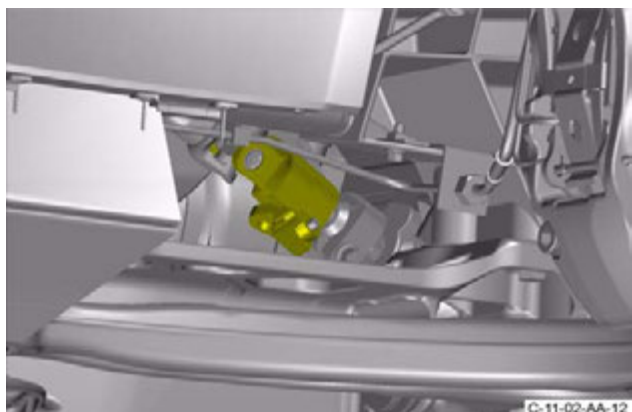


Figure 14

34. Move the steering to get access to the bolt that attaches the pinion coupling to the Power Assisted Steering (PAS) rack.
35. Remove the bolt that attaches the pinion coupling to the PAS rack.

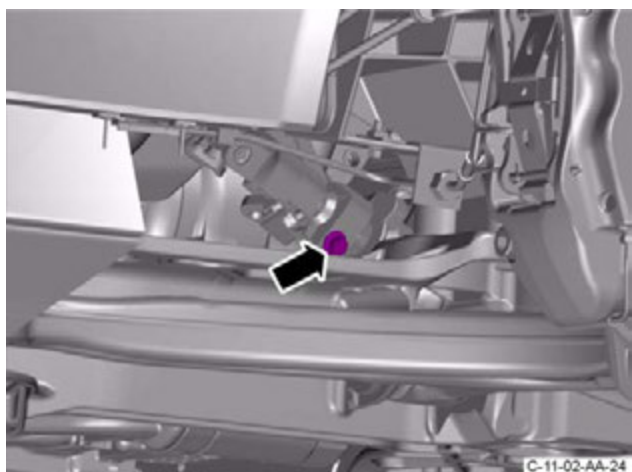


Figure 15

36. Remove the pinion coupling.
37. Remove and discard the two bolts that attach the brake caliper to the front wheel knuckle.

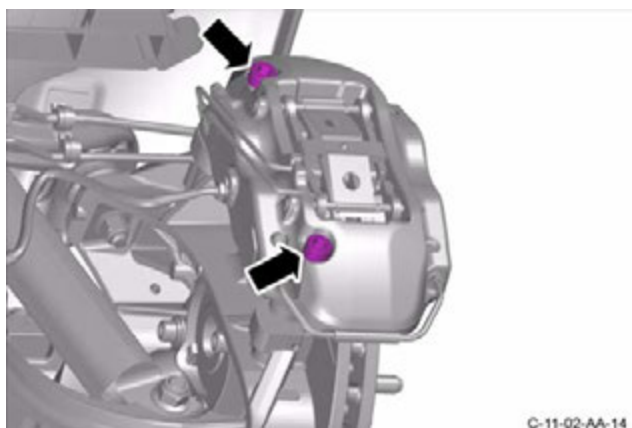


Figure 16

38. Release the brake caliper from the front wheel knuckle.

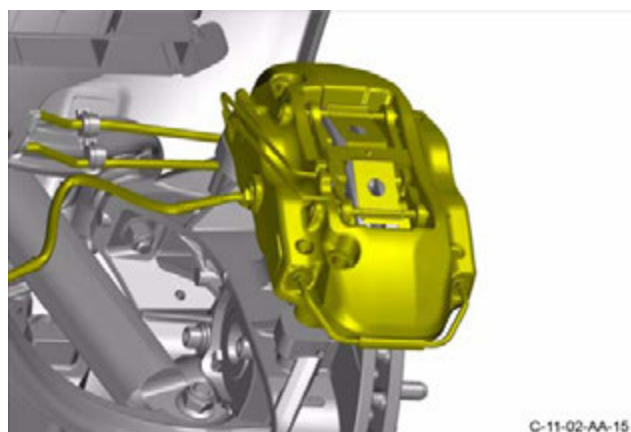


Figure 17

CAUTION

Do not let the caliper hang on the brake hose. If you do, the brake hose can be damaged

39. Use a cable tie to hold the brake caliper.
40. Make a mark to show the position of the brake disc against the wheel hub.
41. Remove the two screws that attach the brake disc to the wheel hub.

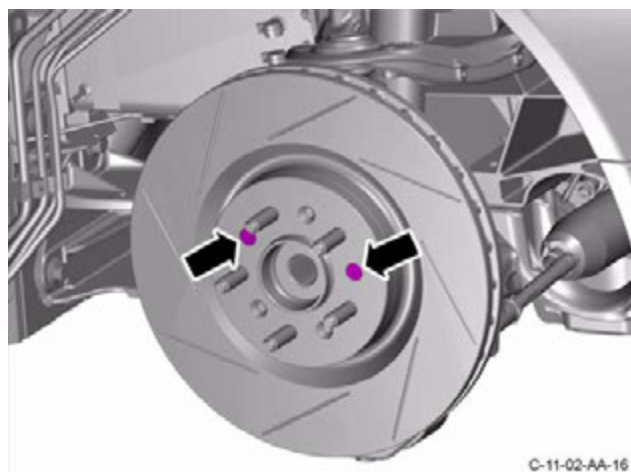


Figure 18

42. Remove the brake disc.

43. Remove the front bolt that attaches the brake backplate to the front wheel knuckle.

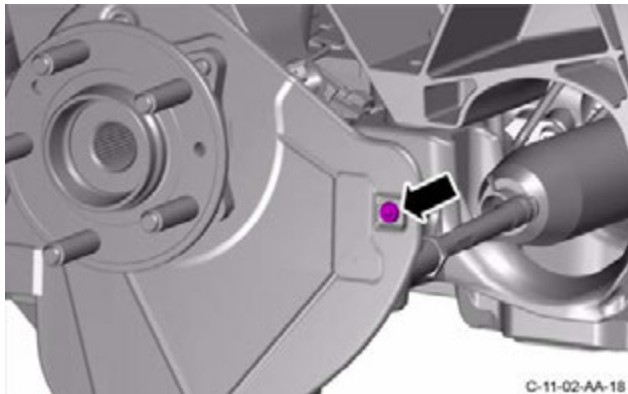


Figure 19

44. Remove and discard the nut that attaches the track rod end to the front wheel knuckle.

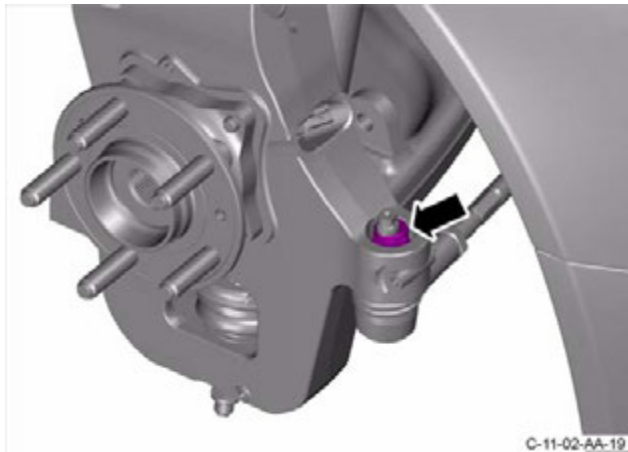


Figure 20

45. Use the special tool to release the track rod end from the vertical link.

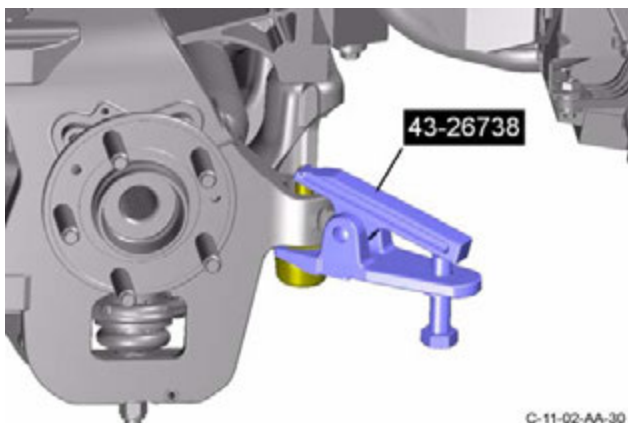


Figure 21

46. Remove the special tool from the track rod end.
47. Do steps 39 to 48 for the other side.
48. Put a container in position under the PAS rack to collect spilled oil.
49. Lower the vehicle.

50. Remove the bolt that attaches the PAS pipes to the PAS rack.

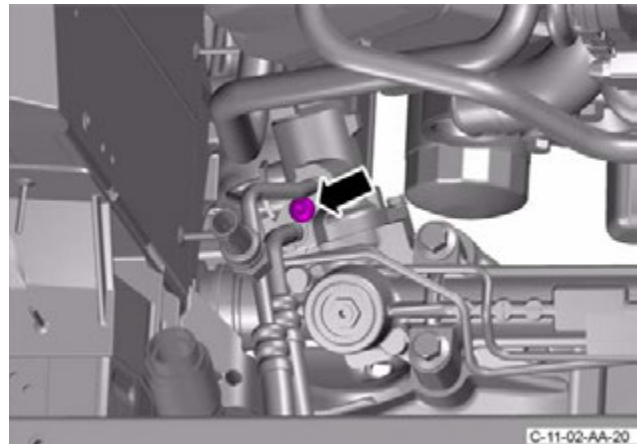


Figure 22

51. Disconnect the PAS pipes from the PAS rack.

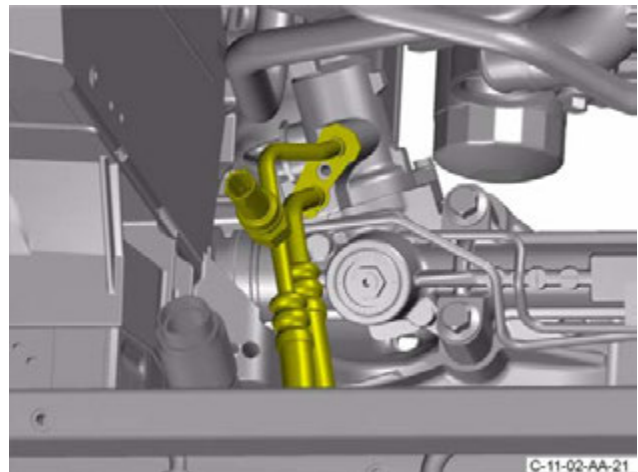


Figure 23

52. Let the oil drain into the container.
53. Lift the vehicle.
54. Remove and discard the two O-ring seals from the PAS pipes.

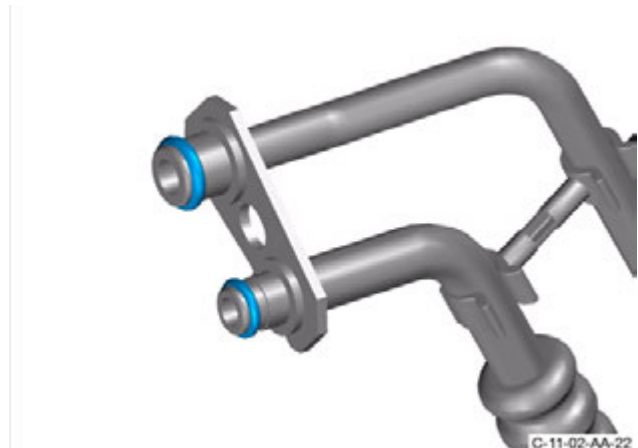


Figure 24

55. Install applicable caps to seal the open ports.
56. Make sure that the area is clean.

57. Remove the three bolts that attach the PAS rack to the front subframe.

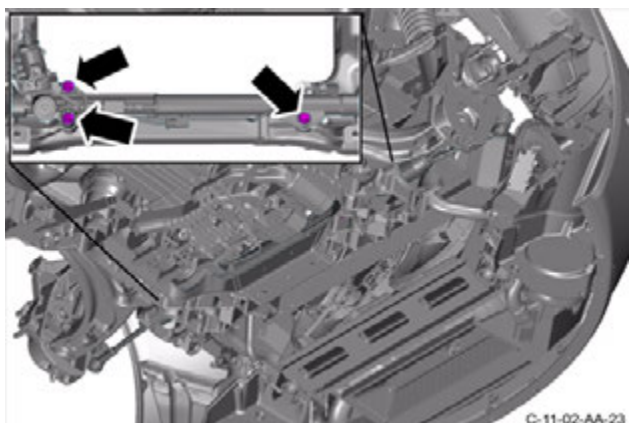


Figure 25

58. Remove the PAS rack.

Install

1. Put the PAS rack into position.

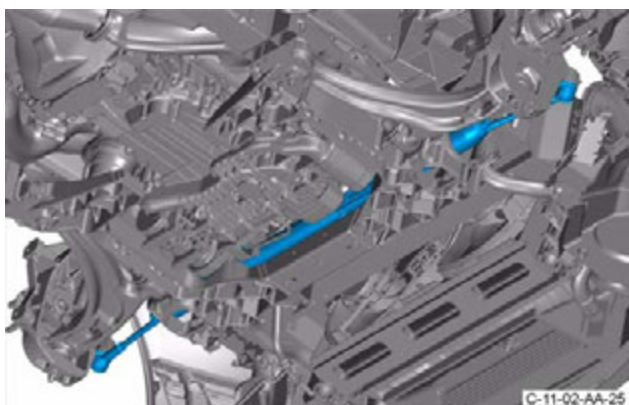


Figure 26

2. Install and tighten the three bolts that attach the PAS rack to the front subframe.

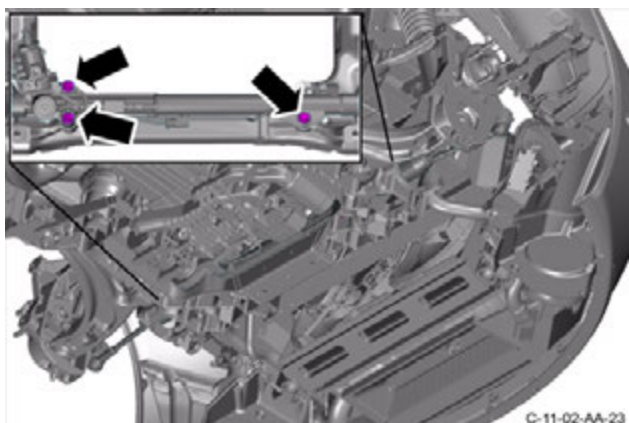


Figure 27

3. Remove and discard the caps from the PAS pipes and the PAS rack.

4. Install two new O-ring seals onto the PAS pipes.

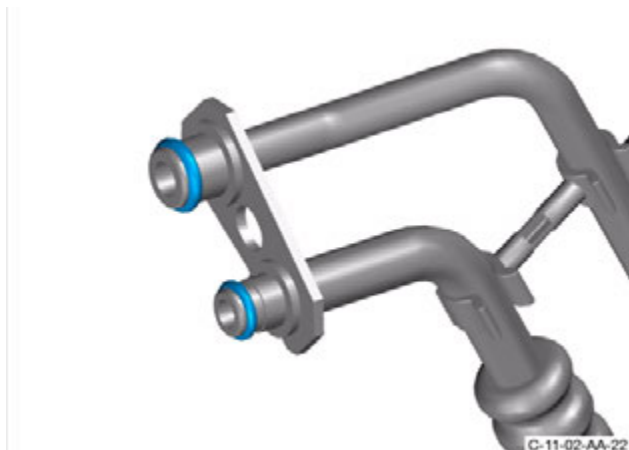


Figure 28

5. Connect the PAS pipes to the PAS rack.

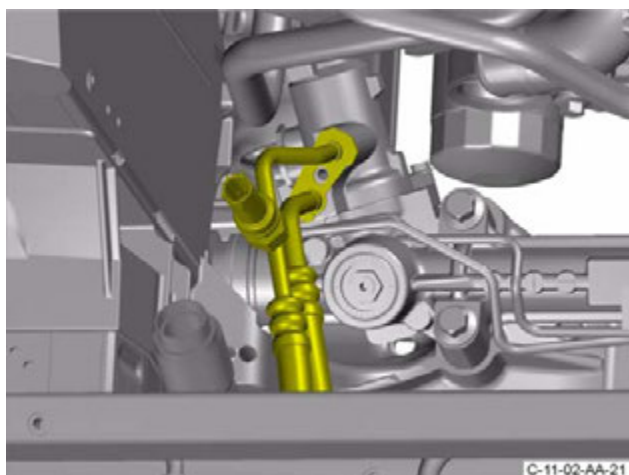


Figure 29

6. Lower the vehicle.
 7. Install and torque the screw that attaches the PAS pipes to the PAS rack.

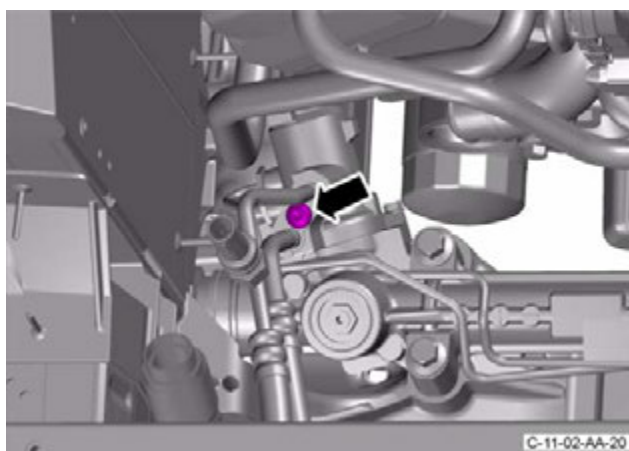


Figure 30

8. Lift the vehicle.

9. At the left side, install the track rod end onto the front wheel knuckle, and install and torque the nut.

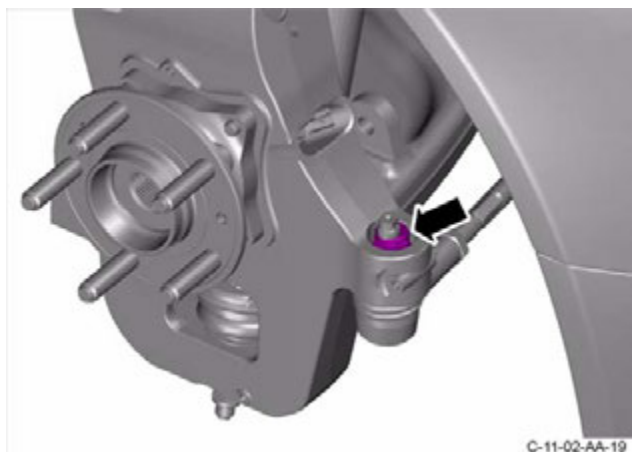


Figure 31

14. Put the brake caliper in position on the front wheel knuckle.

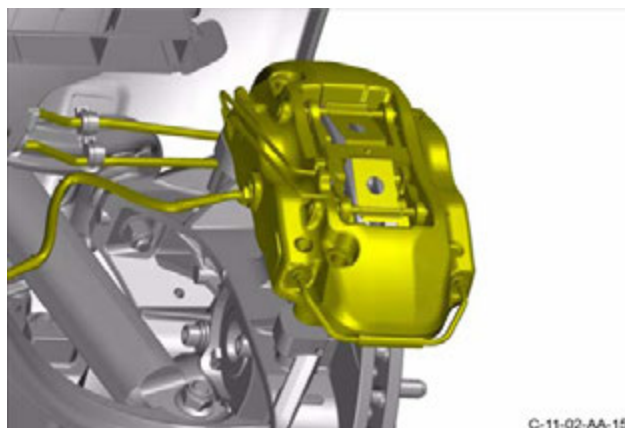


Figure 34

10. Install and tighten the front bolt that attaches the brake backplate to the front wheel knuckle.

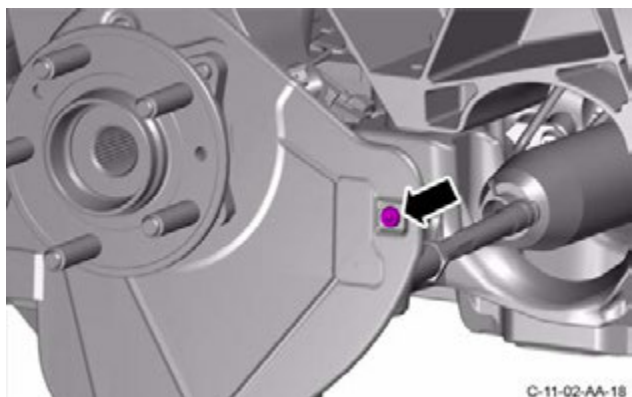


Figure 32

15. Install and tighten the two new bolts that attach the brake caliper to the front wheel knuckle.

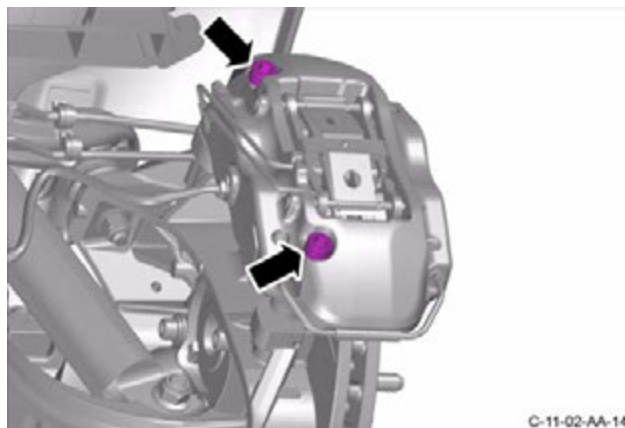


Figure 35

11. Install the brake disc.

12. Install and tighten the two screws that attach the brake disc to the wheel hub.

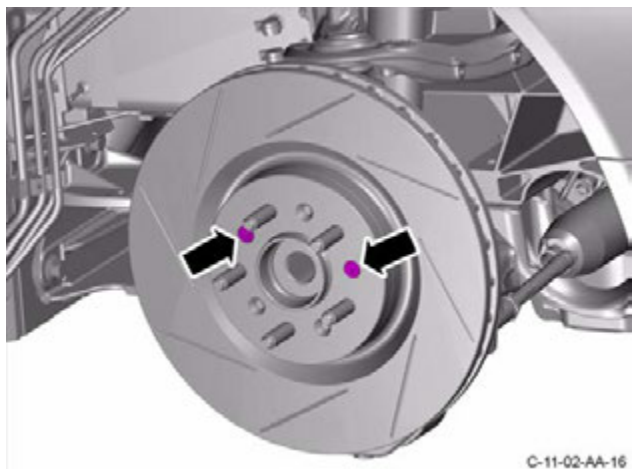


Figure 33

16. Do steps 9 to 15 for the right side.

17. Install the pinion coupling.

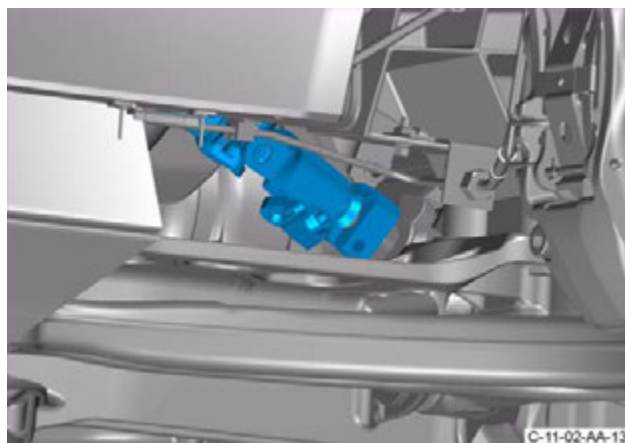


Figure 36

13. Remove and discard the cable tie to release the brake caliper.

18. Turn the steering to get access to install the bolt that attaches the pinion coupling to the PAS rack.

19. Install and torque the bolt that attaches the pinion coupling to the PAS rack.

20. Connect the bottom universal joint for the column to the coupling.

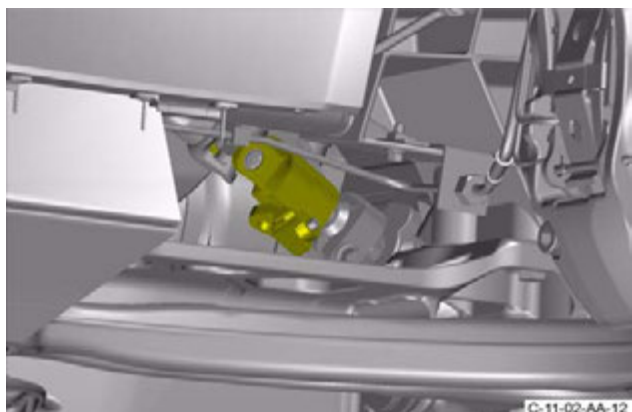


Figure 37

21. Move the lever on the universal joint to attach the joint to the coupling.
22. Install and torque the bolt that attaches the universal joint for the lower steering column to the pinion coupling.

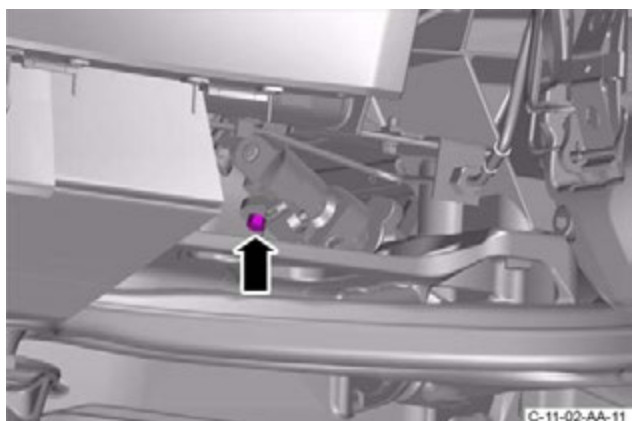


Figure 38

23. Lower the vehicle.

CAUTION

Be careful when you install the oil tank in the step that follows. If you are not, the air conditioning switch and wiring harness can be damaged.

24. Put the the oil tank in position.

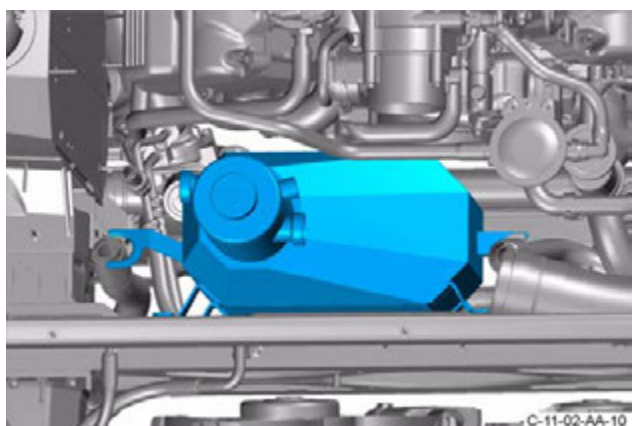


Figure 39

25. Loosely install the two top screws that attach the oil tank to the body.

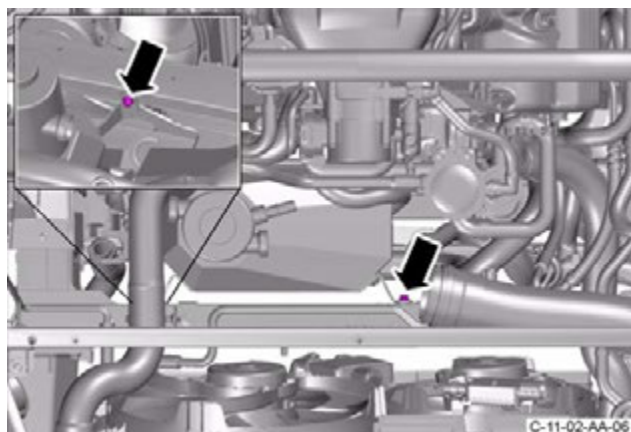


Figure 40

26. Lift the vehicle.
27. Install and tighten the two bottom screws that attach the oil tank to the body.

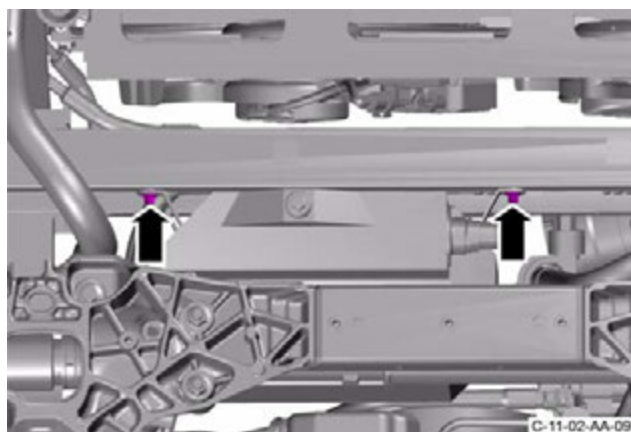


Figure 41

28. Remove and discard the sealing plugs from the oil tank and the pipes.
29. Connect the bottom oil pipe to the oil tank and tighten the union.

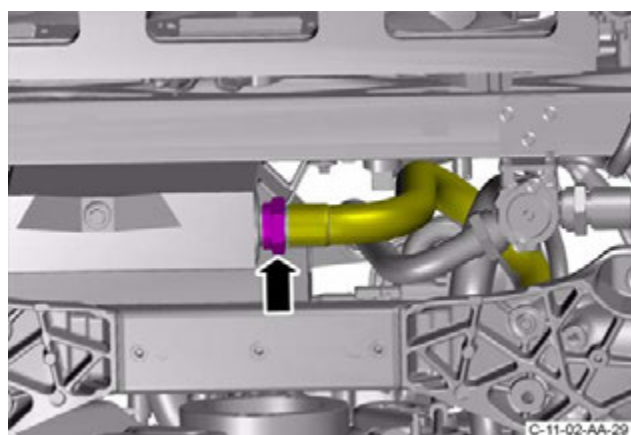


Figure 42

30. Remove and discard the cable tie to release the anti-roll bar.

31. Put the anti-roll bar into position.

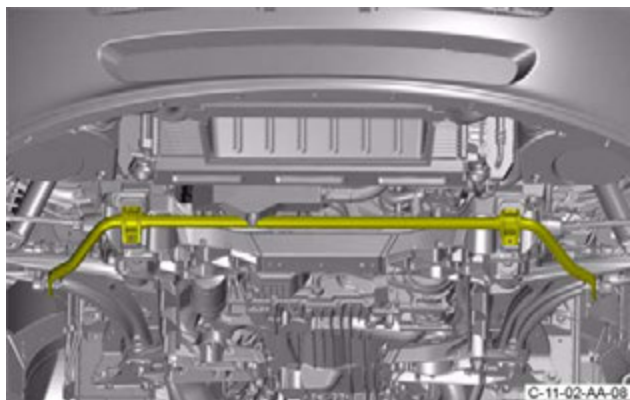


Figure 43

32. Install and torque the four screws that attach the anti-roll bar to the front subframe.

33. Lower the vehicle.

34. Tighten the two top screws that attach the oil tank to the body.

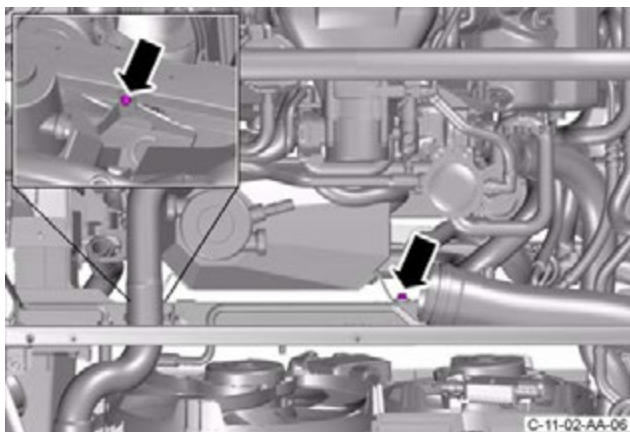


Figure 44

35. Remove and discard the sealing plugs from the upper oil pipe and the oil tank.

36. Install the top oil pipe onto the oil tank and tighten the union that attaches it to the oil tank.

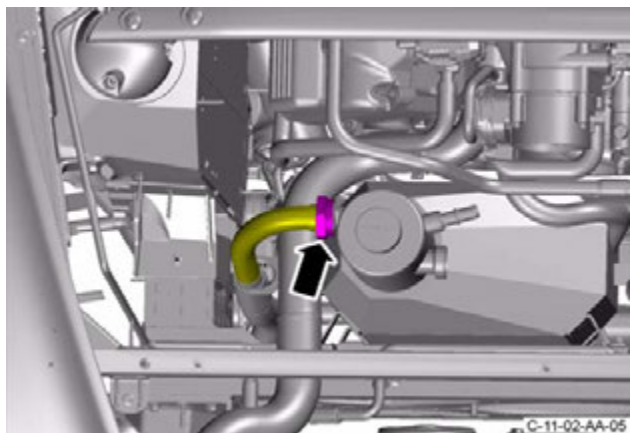


Figure 45

37. Remove and discard the caps from the oil breather pipes and the oil tank.

38. Connect the two oil breather pipes to the oil tank.

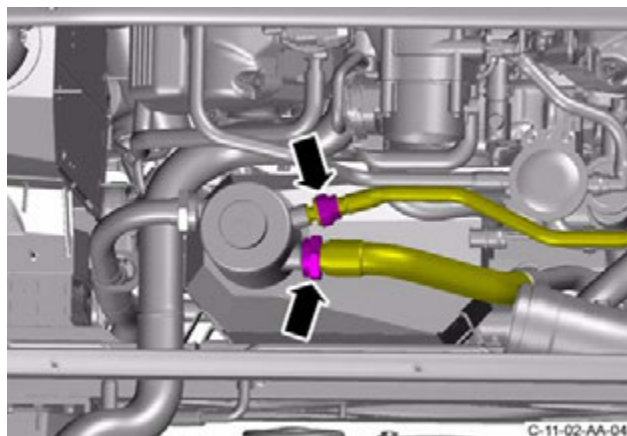


Figure 46

39. Connect the air intake pipe to the throttle body and the outlet pipe for the right side air cleaner.

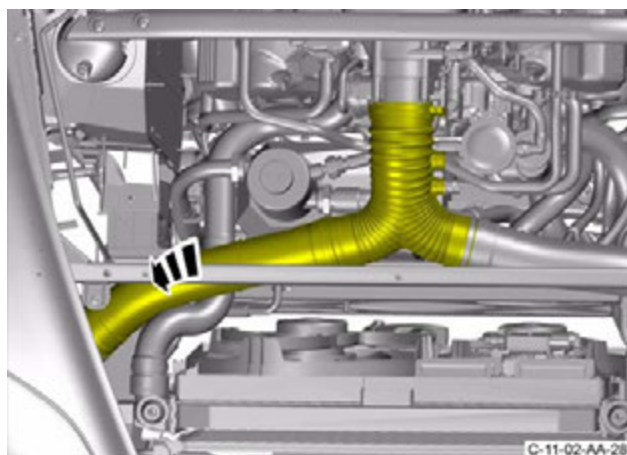


Figure 47

40. Install the clip that attaches the air intake pipe to the outlet pipe for the right side air cleaner.

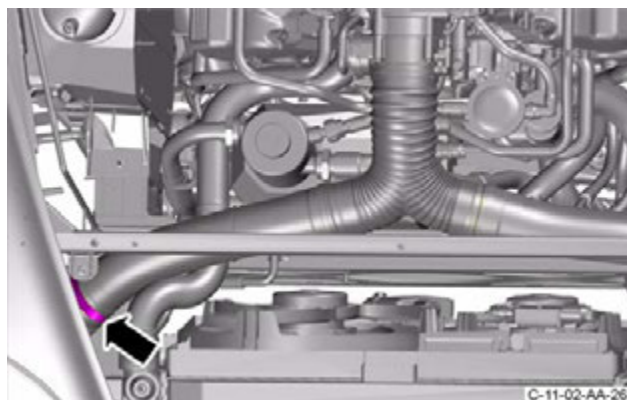


Figure 48

41. Install the clip that attaches the air intake pipe to the throttle body.

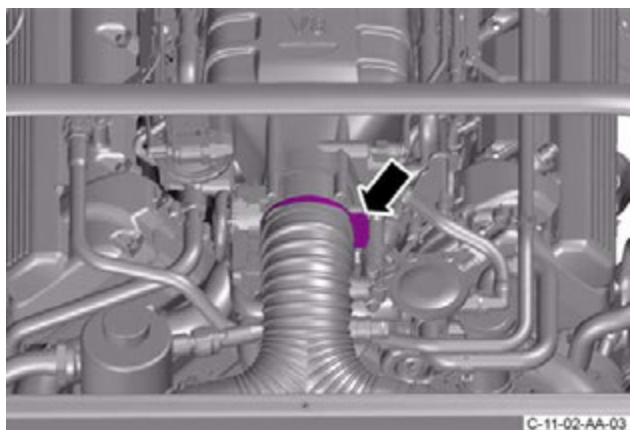


Figure 49

42. Remove and discard the sealing plugs from the two breather pipes and the air intake pipe.
43. Connect the two breather pipes to the air intake pipe.

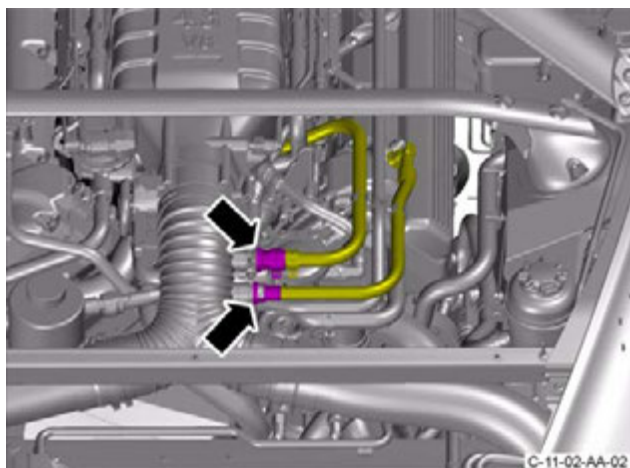


Figure 50

44. Install the radiator closing panel (refer to Workshop Manual procedure 01.02.AA - Radiator Closing Panel).
45. Fill the oil tank with the correct quantity of oil.
46. Fill the PAS fluid reservoir with the correct quantity of PAS fluid.
47. Connect the battery ground cable.
48. Bleed the PAS system.
49. Do a check of the engine oil level. Add oil if necessary.
50. Lift the vehicle.
51. Install the front right side wheel-arch liner (refer to Workshop Manual procedure 01.02.GB - Front Right Side Wheel-Arch Liner).
52. Install the front wheels and tyres (refer to Workshop Manual procedure 04.04.ED - Wheel and Tyre - Pair).
53. Do a check of the four-wheel alignment.
54. Use the applicable equipment to lift the vehicle and make it safe.
55. Install the front undertray (refer to Workshop Manual procedure 01.02.NB - Front Undertray).

RH/LH Track Rod End-Renew

Repair Operation Time (ROT)		
Item	Code	
Track Rod End	RH	11.02.AC
Track Rod End	LH	11.02.AB

Removal

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Loosen tie rod locknut.
4. Install tool (204 - 524) on front hub, install and tighten wheel nuts.

Caution

**Do Not use a hammer, to 'shock' the track rod end.
Always use the special service tool.**

5. Lower vehicle to raise suspension sufficient to install ball joint removing tool (204 - 523).
6. Remove nut, track rod end to vertical link.
7. Using (204-523 Ball Joint Splitter), release track rod end from vertical link.
8. Remove tool (204 - 524) from front hub.
9. Count number of turns and remove track rod end from tie rod.

Installation

1. Clean track rod end taper and mating face on vertical link.
2. Install track rod end on tie rod the same amount of turns.
3. Install track rod end in vertical link.
4. Install road wheel(s).
5. Lower vehicle on ramp.

WARNING
DO NOT DRIVE THE VEHICLE UNTIL THE STEERING GEOMETRY HAS BEEN SET AND ALL FIXINGS HAVE BEEN SECURED.

6. Carry out full vehicle geometry check/adjust.
7. Torque tie rod ball joint locknut(s).

Power Steering Pump to Rack Hose Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Power Steering Pump to Rack Hose Assembly-Renew	LHD	11.02.EA
Power Steering Pump to Rack Hose Assembly-Renew	RHD	11.02.EE



Removal

WARNING
AVOID EXCESSIVE SKIN CONTACT WITH MINERAL OIL. MINERAL OILS REMOVE THE NATURAL FATS FROM THE SKIN, LEADING TO DRYNESS, IRRITATION AND DERMATITIS.

1. Remove PAS fluid from reservoir (syringe).
2. Remove throttle body duct for access. (clips x3).
3. Remove top bolts (x2) from engine oil tank and loosen bottom bolts (x2) (allows tank to move to access pipe support fixings).
4. Remove bolts (x2) securing pipe to body.
5. Disconnect sensor multiplug.

Caution
Always plug pipes and hoses to prevent ingress of dirt or moisture into the system.

6. Remove hose from pump union.
7. Remove pipes from steering rack (bolt x1).
8. Remove pipe from vehicle.

Installation

1. Renew o-rings on PAS pipes and pump pipe.
2. Install hose to vehicle.
3. Install bolts brackets to body.
4. Install PAS pipes to rack (bolt x1).
5. Connect sensor multiplug.
6. Install pipe to pump union.
7. Install bolts and tighten oil tank fixings (torque).
8. Install throttle body duct. (clips x3).
9. Bleed PAS system (see Workshop Manual procedure 11.01.AA Power Assisted Steering System - Bleed).

3. Remove hose from cooler (clip x1) and support clips (x2).
4. Remove undertray (see Workshop Manual procedure 01.02.NB Undertray - Front - Renew).
5. Remove bolt, bracket to lower radiator crossmember.
6. Lower ramp.
7. Remove throttle body duct for access. (clips x3).

Caution
Always plug pipes and hoses to prevent ingress of dirt or moisture into the system.

8. Remove pipes from steering rack (bolt x1).
9. Remove hose from vehicle (support clips x2).

Installation

1. Renew the O-rings on the PAS pipes.
2. Install hose to vehicle (support clips).
3. Install PAS pipes to rack (bolt x1).
4. Install throttle body duct. (clips x3).
5. Raise ramp.
6. Install support clip bolt to radiator crossmember.
7. Install hose to cooler and support clips (x2).
8. Install undertray (see Workshop Manual procedure 01.02.NB Undertray - Front - Renew).
9. Install radiator grille (see Workshop Manual procedure 01.08.AA Grille - Radiator - Renew).
10. Top up PAS fluid.

Power Steering Rack to Cooler Hose-Renew

Repair Operation Time (ROT)		
Item	Code	
Power Steering Rack to Cooler Hose-Renew	LHD	11.02.EB
Power Steering Rack to Cooler Hose-Renew	RHD	11.02.EF

Removal

1. Remove radiator grille (see Workshop Manual procedure 01.08.AA Grille - Radiator - Renew).

WARNING
AVOID EXCESSIVE SKIN CONTACT WITH MINERAL OIL. MINERAL OILS REMOVE THE NATURAL FATS FROM THE SKIN, LEADING TO DRYNESS, IRRITATION AND DERMATITIS.

2. Remove PAS fluid from reservoir (syringe).

Caution
Always plug pipes and hoses to prevent ingress of dirt or moisture into the system.

Steering (11.00)

Steering Column (11.04)

Description

The steering column has reach and tilt functions. These let the driver manually set the position of the steering column. by using the reach / tilt lever that is on the underside of the steering column. This is independent of the ignition switch position .

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

The Electronic Steering Column Lock (ESCL) is attached to the upper casting of the steering column and has a locking pin. The steering column is electrically unlocked when the ignition key is installed and operated to position 2. The lock engages when the ignition switch is removed and the steering wheel is turned to the centre position.

Specifications

Torque Figures			
Description	Nm.	lb/ft	Nominal
Steering Column to cross car beam	21-27	15.5-19.9	24Nm
Upper column to I-shaft	27.3-32.7	20-24.1	30Nm
Vee-yoke to pinion extension shaft	15.5-18.5	11.4-21.2	17Nm
Power coupling to pinion	21.2-28.8	15.6-21.2	25Nm

Maintenance

Top Shroud for the Steering Column - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Top Shroud for the Steering Column - Remove and Install	11.04.AA

Remove

1. Release the steering column adjustment lever.
2. Move the steering wheel to the longest column position.
3. Push the adjustment lever back to lock the steering wheel.
4. Release the seven clips and remove the lower panel from the driver's side of the instrument panel.

For Pre-08MY vehicles:

5. Put the key in the ignition switch and turn it to position 1 to release the Electronic Steering Column Lock (ESCL).

For 08MY vehicles or newer:

6. Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL.

7. Turn the steering wheel to get access to the top screw in the front face of the shroud at the left side .

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

8. Remove the screw.
9. Turn the steering wheel to get access to the top screw in the front face of the shroud at the right side .

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

10. Remove the screw.
11. Remove the top shroud.

Install

1. Put the top shroud in position on the steering column.

For Pre-08MY vehicles:

2. Put the key in the ignition switch and turn it to position 1 to release the Electronic Steering Column Lock (ESCL).

For 08MY vehicles or newer:

3. Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL.
4. Turn the steering wheel to get access to the top screw hole in the front face of the shroud at the left side.
5. Install the screw.
6. Turn the steering wheel to get access to the top screw hole in the front face of the shroud at the right side.
7. Install the screw.

Bottom Shroud for the Steering Column - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Bottom Shroud for the Steering Column - Remove and Install	11.04.AB

Remove

1. Release the seven clips and remove the lower panel from the driver's side of the instrument panel.

For Pre-08MY vehicles:

2. Put the key in the ignition switch and turn it to position 1 to release the Electronic Steering Column Lock (ESCL).

For 08MY vehicles or newer:

3. Install the Emotion Control Unit (ECU) into the docking station at position 2 to release ESCL.
4. Turn the steering wheel to get access to the two screws in the front face of the shrouds at the left side (refer to Figure 1).

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.



Figure 1

5. Remove the two screws at the left side of the front face of the column shrouds.
6. Turn the steering wheel to get access to the two screws in the front face of the shrouds at the right side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

7. Remove the two screws at the right side of the front face of the column shrouds.
8. Remove the three screws that attach the bottom shroud to the steering column.
9. On pre-08MY vehicles remove the ignition key from the ignition switch.
10. Remove the bottom shroud.
11. If a new shroud is to be installed on pre-08MY vehicles, remove the ignition switch grommet.

Install

1. If necessary, install the ignition switch grommet on the bottom column shroud (shroud).
2. Put the shroud in position on the steering column.
3. Install the three screws that attach the shroud to the steering column.

For Pre-08MY vehicles:

4. Put the key in the ignition switch and turn it to position 1 to release the ESCL.

For 08MY vehicles or newer:

5. Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL.
6. Turn the steering wheel to get access to the two screws in the front face of the shrouds at the left side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

7. Install the two screws at the left side of the front face of the column shrouds.

8. Turn the steering wheel to get access to the two screws in the front face of the shrouds at the right side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

9. Install the two screws at the right side of the front face of the column shrouds.
10. Put the lower panel on the driver's side of the instrument panel and engage the seven clips.

Steering Column Gaiter-Renew

Repair Operation Time (ROT)	
Item	Code
Steering Column Gaiter-Renew	11.04.BB

Remove

1. Power driver's seat to its lowest and most rearward position.
2. Remove the top and bottom shrouds from the steering column (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
3. Centralise the steering wheel until the steering lock engages.
4. Remove the ignition key.

WARNING

LEAVE THE VEHICLE FOR TWO MINUTES AFTER YOU DISCONNECT THE BATTERY, BEFORE YOU DO WORK ON THE AIRBAG SYSTEM. IF YOU DO NOT, THE AIRBAG SYSTEM CAN OPERATE AND CAUSE INJURY.

5. Disconnect the vehicle battery.
6. Remove the steering wheel (see Workshop Manual procedure 11.06.AB Steering Wheel - Renew).
7. Attach the rotary coupling in position with masking tape.
8. Release the two clips that attach the column switch harness to the load-spread plate.
9. Pull back steering column bulkhead gaiter.
10. Remove and discard pinch bolt, upper column to intermediate shaft.
11. Remove the four Torx bolts that attach the upper column mounting.
12. Release upper column from intermediate shaft.
13. Support steering column assembly.
14. Remove gaiter from steering column.

Install

1. Install the gaiter on the steering column.
2. Put the upper steering column assembly in position and connect it to the intermediate shaft.
3. Position the upper column to the mounting, install and torque the four Torx bolts.
4. Install and torque the column pinch bolt.
5. Put the steering column gaiter in position.
6. Remove masking tape from the rotary coupler.
7. Install steering wheel (see Workshop Manual procedure 11.06.AB Steering Wheel - Renew).

8. Connect vehicle battery.
9. Install the steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
10. Put the driver's seat and the steering column in their initial positions.

Upper Steering Column Assembly-Renew

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

Remove

1. Power driver's seat to its lowest and most rearward position.
2. Remove the top and bottom shrouds from the steering column (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
3. Disconnect vehicle battery.
4. Centralise the steering wheel until the steering lock engages.
5. Remove the ignition key.

WARNING
LEAVE THE VEHICLE FOR TWO MINUTES AFTER YOU DISCONNECT THE BATTERY BEFORE YOU DO WORK ON THE AIRBAG SYSTEM. IF YOU DO NOT, THE AIRBAG SYSTEM CAN OPERATE AND CAUSE INJURY.

6. Disconnect the battery.
7. Remove the steering wheel (Refer to 'Steering Wheel-Renew', page 11-6-1).
8. Attach the rotary coupling in position with masking tape.
9. Disconnect steering column switch multiplugs (x5).
10. Remove screw securing load-spread plate to column and collect column shrouds mounting bracket.
11. Release clips (x2) from column switch harness to load-spread plate.
12. Pull back steering column bulkhead gaiter.

13. Remove and discard pinch bolt from upper column to intermediate shaft.



Figure 1

14. Remove the four Torx screws from the upper column mounting.
15. Release upper column from intermediate shaft.
16. Disconnect multiplug from steering sensor and remove steering column assembly.
17. Unclip steering column switches from column and remove switch gear.
18. Mark fitted position of rotary coupler and remove rotary coupler.
19. Remove gaiter from steering column.
20. Remove Torx screws (x3) from securing steering sensor to mounting bracket.
21. Remove sensor.
22. Remove Torx screws (x3) that secure steering sensor mounting bracket to column and remove bracket.

Install

1. Position steering sensor mounting bracket, install and tighten Torx screws (x3).
2. Install the steering sensor, install and tighten Torx screws (x3).
3. Install gaiter on steering column.
4. Install steering column switch gear and secure clips.
5. Install the rotary coupler to marked position and secure with masking tape.
6. Position upper steering column assembly and connect to intermediate shaft.
7. Connect multiplug to steering sensor.
8. Position upper column to mounting bracket, install and torque tighten Torx bolts (x4).
9. Install and torque tighten column pinch bolt.
10. Connect multiplugs (x5).
11. Position load-spread plate and secure harness clips (x2).
12. Install load-spread plate and secure with screw.

13. Remove masking tape from rotary coupler.

Caution

Align the steering wheel and the rack to the centre position during assembly. If you do not, the rotary coupling can be damaged. Also, it can be difficult to align the steering wheel in the straight-ahead position.

14. Install the steering wheel (Refer to 'Steering Wheel-Renew', page 11-6-1).
15. Install air temperature pipe to lower instrument panel and install panel.
16. Connect the vehicle battery.
17. Install the steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
18. Put the driver's seat and the steering column in their initial positions.

Top and Bottom Shrouds for the Steering Column - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Top and Bottom Shrouds for the Steering Column - Remove and Install	11.04.DB

Remove the Bottom Shroud

1. Release the seven clips and remove the lower panel from the driver's side of the instrument panel.

For Pre-08MY vehicles:

2. Put the key in the ignition switch and turn it to position 1 to release the Electronic Steering Column Lock (ESCL).

For 08MY vehicles or newer:

3. Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL.
4. Turn the steering wheel to get access to the one or two screws in the front face of the shrouds at the left side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

Figure 1

5. Remove the one or two screws at the left side of the front face of the column shrouds.
6. Turn the steering wheel to get access to the one or two screws in the front face of the shrouds at the right side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

7. Remove the one or two screws at the right side of the front face of the column shrouds.
8. Remove the three screws that attach the bottom shroud to the steering column.
9. On pre-08MY vehicles remove the ignition key from the ignition switch.
10. Remove the bottom shroud.
11. If a new shroud is to be installed on pre-08MY vehicles, remove the ignition switch grommet.

Remove the Top Shroud

1. Release the steering column adjustment lever.
2. Move the steering wheel to the longest column position.
3. Push the adjustment lever back to lock the steering wheel.
4. Remove the top shroud.

Install the Top Shroud

1. Put the top shroud in position on the steering column.

Install the Bottom Shroud

1. If necessary, install the ignition switch grommet on the bottom column shroud (shroud).
2. Put the shroud in position on the steering column.
3. Install the three screws that attach the shroud to the steering column.

For Pre-08MY vehicles:

4. Put the key in the ignition switch to release the ESCL.

For 08MY vehicles or newer:

5. Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL.
6. Turn the steering wheel to get access to the one or two screws in the front face of the shrouds at the left side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

7. Install the one or two screws at the left side of the front face of the column shrouds.
8. Turn the steering wheel to get access to the one or two screws in the front face of the shrouds at the right side.

Note: The top screw goes through the top shroud and a tab on the bottom shroud to attach it.

9. Install the one or two screws at the right side of the front face of the column shrouds.

10. Put the lower panel on the driver's side of the instrument panel and engage the seven clips.



Steering Column Lower Shaft Assembly-Renew

Repair Operation Time (ROT)	
Item	Code
Steering Column Lower Shaft Assembly-Renew	11.04.DD

Remove

1. Operate the driver's seat to its lowest and most rearward position.
2. Raise the vehicle and make it safe.
3. Remove the left side front wheel arch liner (see Workshop Manual procedure 01.02.FB Wheel Arch Liner - Front - LH - Renew).
4. Remove and discard the link bolt that attaches the lower steering column shaft to the coupling.
5. Release the shaft link for the lower steering column from the coupling.
6. Lower the vehicle.
7. Remove the top and bottom shrouds from the steering column (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
8. Disconnect the vehicle battery.
9. Turn the steering to the centre position to engage the column lock and remove the ignition key.
10. Remove the steering wheel (Refer to 'Steering Wheel-Renew', page 11-6-1).
11. Use masking tape to hold the rotary coupling in position.
12. Release the two clips that attach the column switch harness to the load-spread plate.
13. Pull back the steering column bulkhead gaiter.
14. Remove and discard the pinch bolt that attaches the upper column to the intermediate shaft.
15. Remove the four Torx bolts that attach the upper column mounting.
16. Release the upper column from lower steering column shaft.
17. Use an applicable support to hold the steering column assembly.
18. Remove the lower steering column shaft.

Installation

1. Install the lower steering column shaft.
2. Raise the vehicle and make it safe.
3. Connect the lower steering shaft to the coupling.
4. Install a new bolt but do not torque at this stage.
5. Lower the vehicle.
6. Put the upper steering column assembly in position.
7. Connect it to the intermediate shaft.
8. Put the upper column in position on its mounting.
9. Install and torque the four Torx bolts.
10. Install and torque column pinch bolt.

11. Put the steering column gaiter in position.
12. Remove the masking tape from the rotary coupler.

Caution

Align the steering wheel and the rack to the centre position during assembly. If you do not, the rotary coupling can be damaged. Also, it can be difficult to align the steering wheel in the straight-ahead position.

13. Install steering wheel (Refer to 'Steering Wheel-Renew', page 11-6-1).
14. Install the steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
15. Raise the vehicle and make it safe.
16. Torque tighten lower steering column shaft link bolt.
17. Install LH front wheel arch liner (see Workshop Manual procedure 01.02.FB Wheel Arch Liner - Front - LH - Renew).
18. Lower the vehicle.
19. Connect the vehicle battery.
20. Put the driver's seat and the steering column in their initial positions.



ASTON MARTIN

Steering (11.00)

Steering Column Switches (11.05)

Maintenance

Ignition Switch-Renew (Pre-08 MY Only)

Repair Operation Time (ROT)	
Item	Code
Ignition Switch-Renew	11.05.AB

Remove

1. Operate the driver's seat to its lowest and most rearward position.
2. Remove the steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).

WARNING
LEAVE THE VEHICLE FOR TWO MINUTES AFTER YOU DISCONNECT THE BATTERY BEFORE YOU DO WORK. IF YOU DO NOT, THE AIRBAG SYSTEM CAN OPERATE AND CAUSE INJURY

3. Disconnect the vehicle battery.
4. Turn the steering wheel to the centre position until the steering lock engages.
5. Remove the screw that attaches the load-spread plate to the column.
6. Remove the mounting bracket for the column shrouds.
7. Release the two clips that attach the column switch harness to the load-spread plate.
8. Release the steering column switch from the column (to give access).
9. Release the ignition switch from the column.
10. Disconnect the electrical connector from the ignition switch.

Install

1. Connect the electrical connector to the ignition switch.
2. Install the ignition switch onto the column.
3. Install the steering column switch.
4. Put the load-spread plate in position and attach the two harness clips.
5. Install the screw that attaches the load-spread plate.
6. Install the steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
7. Connect the vehicle battery.
8. Operate the driver's seat to its initial position.

Steering Column Stalk Assembly Switch-Renew (Pre-08 MY Only)

Repair Operation Time (ROT)	
Item	Code
Steering Column Stalk Assembly Switch-Renew	11.06.BK

Remove

1. Operate the driver's seat to its lowest and most rearward position.
2. Remove the top and bottom shrouds from the steering column (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
3. Remove the screw that attaches the load-spread plate to the steering column and remove the load-spread plate.



Figure A11-04-1668

4. Collect the mounting bracket for the column shrouds.
5. Release the two clips that attach the column switch harness to the load-spread plate.
6. Disconnect the three electrical connectors from the steering column switches.
7. Release the clips and remove steering column switches from the column.

Install

1. Install the steering column switches and make sure that the clips engage.
2. Connect the three electrical connectors to the column switches.
3. Put the load-spread plate in position and install the two harness clips.
4. Install the screw to attach the load-spread plate.
5. Install the top and bottom steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
6. Connect the vehicle battery.
7. Put the drivers seat and the steering column back to their initial positions.

Cruise Control Switch-Renew

Repair Operation Time (ROT)	
Item	Code
Cruise Control Switch-Renew	11.06.BL

Remove

WARNING
LEAVE THE VEHICLE FOR TWO MINUTES AFTER YOU DISCONNECT THE BATTERY BEFORE YOU DO WORK. IF YOU DO NOT, THE AIRBAG SYSTEM CAN OPERATE AND CAUSE INJURY.

1. Remove airbag module (Refer to 'Driver's Airbag Module - Remove and Install', page 11-6-1).
2. Remove the cruise control switch.

Install

1. Install the cruise control switch.
2. Make sure that the routing of the switch harness is correct.
3. Install the airbag module (Refer to 'Driver's Airbag Module - Remove and Install', page 11-6-1).

Indicator Switch for the Steering Column - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Indicator Switch for the Steering Column - Remove and Install	11.06.CK

Remove

1. Remove the top shroud from the steering column (Refer to 'Top Shroud for the Steering Column - Remove and Install', page 11-4-1).
2. Release the clips that attach the indicator switch to its mounting.
3. Release the indicator switch from its mounting.
4. Disconnect the electrical connector for the indicator switch.
5. Remove the indicator switch.

Install

1. Connect the electrical connector to the indicator switch.
2. Install the indicator switch in the mounting.
3. Make sure that the clips that attach the switch are correctly engaged.
4. Install the top shroud to the steering column (Refer to 'Top Shroud for the Steering Column - Remove and Install', page 11-4-1).

Airbag Rotary Coupler Assembly - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Airbag Rotary Coupler Assembly - Remove and Install	11.06.CM

Remove

For Pre-08MY vehicles:

1. Put the key in the ignition switch and turn it to position 1 to release the Electronic Steering Column Lock (ESCL).

For 08MY vehicles or newer:

2. Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL..

WARNING
LEAVE THE VEHICLE FOR TWO MINUTES AFTER YOU DISCONNECT THE BATTERY BEFORE YOU DO WORK. IF YOU DO NOT, THE AIRBAG SYSTEM CAN OPERATE AND CAUSE INJURY.

3. Disconnect the vehicle battery.
4. Turn the steering wheel to get access to one of the two M6 screws that attach the airbag module (Refer to Figure 1).



Figure 1

5. Remove the M6 screw.
6. Turn the steering wheel to get access to the second M6 screw that attaches the airbag module.
7. Remove the second M6 screw.

8. Move the airbag module to get access to the two electrical connectors (Refer to Figure 2).



Figure 2

9. Disconnect the two electrical connector for the airbag module.
 10. Remove the airbag module and keep it in an approved storage area.
 11. Turn the steering to the centre position.
 12. Disconnect the electrical connector for the steering wheel harness (Refer to Figure 3).



Figure 3

13. Remove the M10 Torx screw that attaches the steering wheel (Refer to Figure 4).



Figure 4

14. Remove the steering wheel assembly.

15. Apply tape to hold the rotary coupler in its central position (Refer to Figure 5).



Figure 5

16. Remove the top and bottom steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
 17. Remove the screw that attaches the load-spread plate to the steering column (Refer to Figure 6).



Figure 6

18. Remove the load-spread plate.
 19. Release the clips that attach the column switches to the rotary coupler.
 20. Remove the column switches from the rotary coupler.



21. Remove the electrical connector (1) from the rotary coupler (Refer to Figure 7).

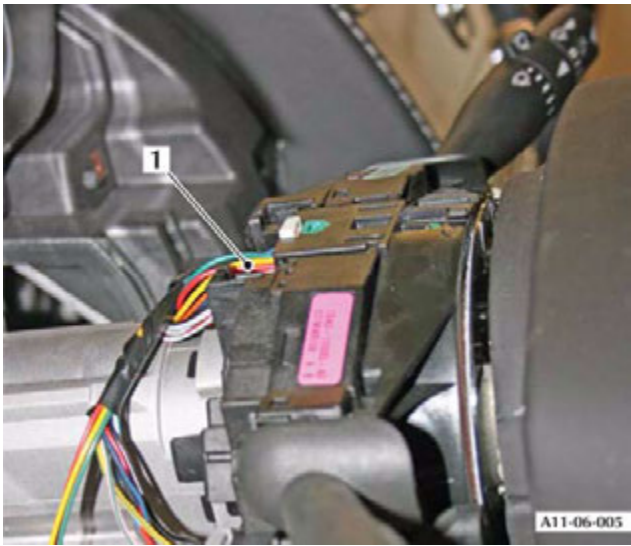


Figure 7

22. Release the two clips that attach the rotary coupler to the steering column and remove the rotary coupler.

Install

1. Put tape on the rotary coupler to hold it in its central position.
2. Push the rotary coupler onto the steering column until the two clips engage.
3. Install the electrical connector (1) for the rotary coupler.
4. Install the column switches into the rotary coupler.
5. Connect the electrical connectors for the column switches.
6. Put the load-spread plate in position on the steering column.
7. Install the screw that attaches the load-spread plate.
8. If a rotary coupler is to be installed that is not new, remove the tape used to hold it in its central position.
9. For a new rotary coupler, remove the locking key.
10. Install the top and bottom steering column shrouds (Refer to 'Top and Bottom Shrouds for the Steering Column - Remove and Install', page 11-4-4).
11. Put the electrical cables from the rotary coupler through the steering wheel.

Caution

Align the steering wheel and the rack to the centre position during assembly. If you do not, the rotary coupling can be damaged. Also, it can be difficult to align the steering wheel in the straight-ahead position.

12. Align and install the steering wheel assembly.
13. Install and torque the M10 screw that attaches the steering wheel (Refer to 'Specifications', page 11-6-1).
14. Connect the electrical connector for the steering wheel harness.
15. Connect the two electrical cables to the airbag module.
16. Put the airbag module in position.

17. Turn the steering wheel to get access to install one of the two airbag module M6 attachment screws.
18. Install the first M6 attachment screw.
19. Turn the steering wheel to get access to install the second airbag module M6 attachment screw.
20. Install the second M6 attachment screw.
21. Connect the vehicle battery.

Wiper Switch for the Steering Column - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Wiper Switch for the Steering Column - Remove and Install	11.06.EL

Remove

1. Remove the top shroud from the steering column (Refer to 'Top Shroud for the Steering Column - Remove and Install', page 11-4-1).
2. Release the clips that attach the wiper switch to its mounting.
3. Release the wiper switch from its mounting.
4. Disconnect the electrical connector for the wiper switch.
5. Remove the wiper switch.

Install

1. Connect the electrical connector to the wiper switch.
2. Install the wiper switch in the mounting.
3. Make sure that the clips that attach the switch are correctly engaged.
4. Install the top shroud to the steering column (Refer to 'Top Shroud for the Steering Column - Remove and Install', page 11-4-1).

Steering (11.00)

Steering Wheel (11.06)

Specifications

Torque Figures		
Description	Nm.	lb/ft
Steering Wheel Attachment Screw	40	29.5
Airbag Module Attachment Screws	9	6.6

Maintenance

Steering Wheel-Renew

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

Remove

1. Remove the driver's airbag module (Refer to 'Driver's Airbag Module - Remove and Install', page 11-6-1).
2. Turn the steering to the centre position.
3. Disconnect the vehicle battery.
4. Disconnect the electrical connector for the steering wheel harness.



Figure A11-06-1096

Caution

Do not use steering lock to hold the wheel when you remove the attachment screw. The steering lock can be permanently damaged.

5. Remove the M10 Torx screw that attaches the steering wheel.



Figure A11-06-1095

6. Remove the steering wheel assembly.
7. Apply tape to hold the rotary coupler in its central position.

Installation

1. Put the electrical cables from the rotary coupler through the steering wheel.

Caution

Align the steering wheel and the rack to the centre position during assembly. If you do not, the rotary coupling can be damaged. Also, it can be difficult to align the steering wheel in the straight-ahead position.

2. Align and install the steering wheel assembly.
3. Install and torque the M10 screw that attaches the steering wheel (Refer to 'Specifications', page 11-6-1).
4. Connect the electrical connector for the steering wheel harness.
5. Install the driver's airbag module (Refer to 'Driver's Airbag Module - Remove and Install', page 11-6-1).
6. Connect vehicle battery.

Driver's Airbag Module - Remove and Install

Repair Operation Time (ROT)	
Item	Code
Driver's Airbag Module remove and Install	11.06.BC

Remove

For Pre-08MY vehicles:

1. Put the key in the ignition switch and turn it to position 1 to release the Electronic Steering Column Lock (ESCL).

For 08MY vehicles or newer:

- Put the Emotion Control Unit (ECU) into the docking station at position 2 to release the ESCL..

WARNING
LEAVE THE VEHICLE FOR TWO MINUTES AFTER YOU DISCONNECT THE BATTERY BEFORE YOU DO WORK. IF YOU DO NOT, THE AIRBAG SYSTEM CAN OPERATE AND CAUSE INJURY.

- Disconnect the vehicle battery.
- Turn the steering wheel to get access to one of the two M6 screws that attach the airbag module.



Figure A11-06-1093

- Remove the M6 screw.
- Turn the steering wheel to get access to the second M6 screw that attaches the airbag module.
- Remove the second M6 screw.
- Move the airbag module to get access to the two electrical connectors.



Figure A11-06-1094

- Disconnect the two electrical connector for the airbag module.
- Remove the airbag module and keep it in an approved storage area.

Install

- Connect the two electrical cables to the airbag module.
- Put the airbag module in position.
- Turn the steering wheel to get access to install one of the two airbag module M6 attachment screws.