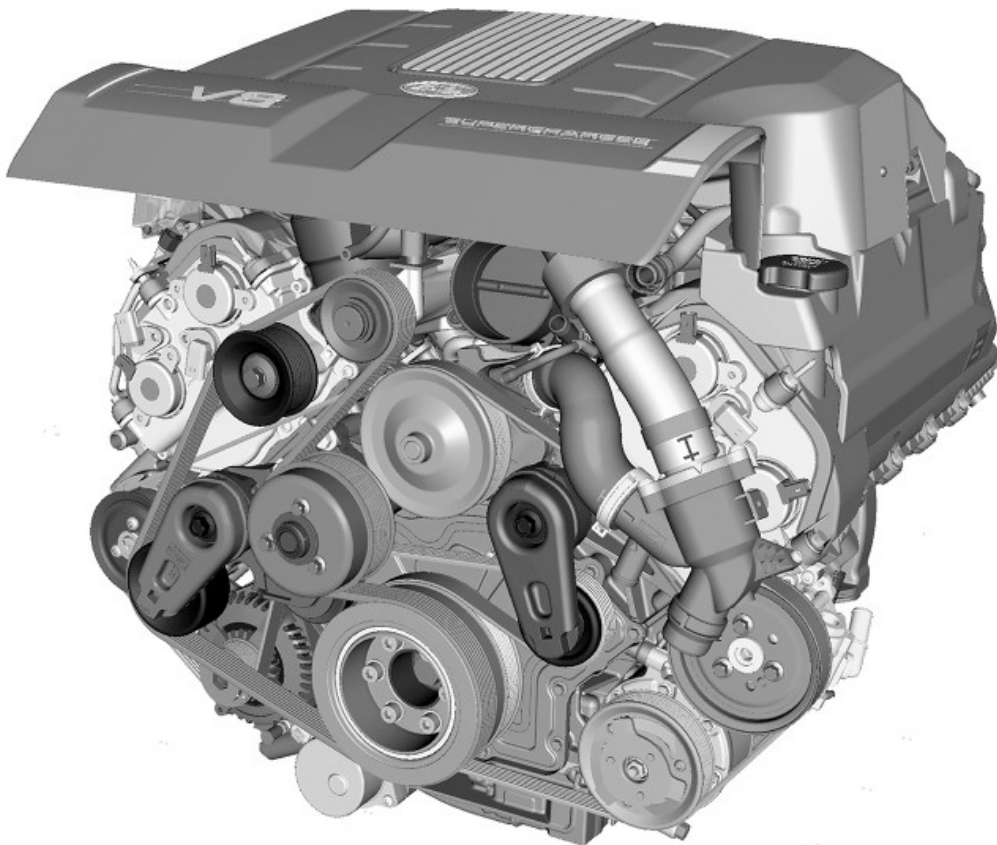


2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

DESCRIPTION AND OPERATION

EXTERNAL VIEW



E118639

INTRODUCTION

The 5.0L SC (supercharger) gasoline engine is a liquid cooled V8 unit featuring direct fuel injection, four overhead camshafts and four valves per cylinder. All four camshafts incorporate VCT (variable camshaft timing).

The main structural components of the engine are all manufactured from aluminum alloy. The engine is built around a very stiff, lightweight, enclosed V, deep skirt cylinder block. A structural windage tray is bolted to the bottom of the cylinder block to further improve the block stiffness, minimize NVH (noise, vibration and harshness) and help reduce oil foaming. To further enhance the stiffness of the lower engine structure, a heavily ribbed sump is installed. The sump also helps to reduce engine noise. A transverse hole is incorporated into the sump to accommodate the RH (right-hand) front drive halfshaft.

Engine Structure



ITEM	DESCRIPTION
1	LH (left hand) cylinder head (bank B)
2	Cylinder block
3	Windage tray
4	Sump
5	RH (right hand) cylinder head (bank A)

CYLINDER BLOCK



The cylinder block is a 90 degree configuration with cast-in iron cylinder liners and an open deck die-cast coolant jacket. The low volume coolant jacket gives good warm-up times and low piston noise levels. The longitudinal flow design of the coolant jacket, with a single cylinder head coolant transfer port in each bank, provides good rigidity and head gasket

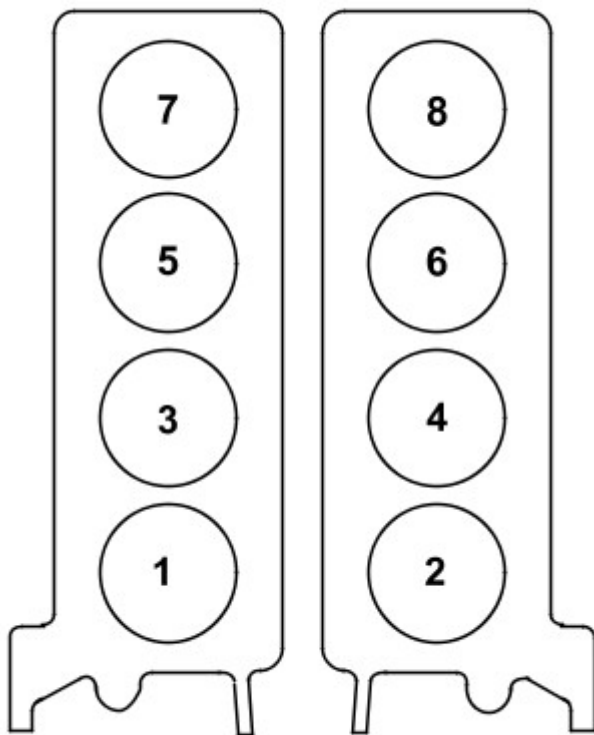
sealing.

Cylinder Numbering

ISO standard cylinder numbering

NOTE:

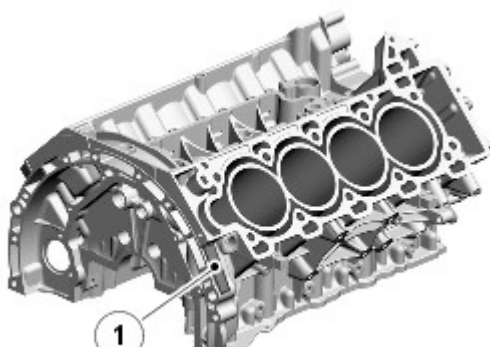
Front of engine is at No.1 cylinder.



E133972

ISO standard cylinder firing order 1,2,7,3,4,5,6,8

Engine Data Location





ITEM	DESCRIPTION
1	Engine data location

CRANKSHAFT



The crankshaft is made from spheroidal graphite cast iron, which, compared with grey cast iron, has higher mechanical strength, ductility and increased shock resistance. The undercut and rolled fillets also improve strength. Eight counter-balance weights ensure low vibration levels and the large, cross-drilled main bearing journals are designed to contribute to stiffness.

An oil groove in the upper half of each main bearing transfers the oil into the crankshaft for lubrication of the connecting rod bearings. A thrust washer is installed each side of the top half of the center main bearing.

Crankshaft Data Location



ITEM	DESCRIPTION
1	Pin journal classification and plant identification
2	Main journal classification
3	Date and time codes

The main bearings are numbered 1 to 5 starting from the front of the engine. There are five grades of main bearing available, each being color coded. Journal sizes are marked on the rear of the crankshaft.

For additional information, refer to: [Crankshaft End Play](#) (303-00 Engine System - General Information, General Procedures).

Crankshaft Installation



ITEM	DESCRIPTION
1	Coolant drain plug
2	Torque converter access plug
3	Drive plate
4	Rear cover
5	Main bearing cap
6	Identification mark
7	Front cover
8	Front pulley

The main bearing caps are made from cast iron and are cross bolted to increase rigidity. An identification mark on the bearing cap faces the front of the engine.

At the front of the crankshaft, a tuned torsional vibration damper is incorporated into the crankshaft front pulley. At the rear of the crankshaft a pressed steel drive plate, with a steel starter ring gear, is installed to transfer drive from the engine to the transmission. The reluctor ring for the CKP (crankshaft position) sensor is integrated into the perimeter of the drive plate.

The crankshaft seals are located in the front and rear covers.

PISTONS AND CONNECTING RODS



The diameter of each piston is graded and precisely matched to each cylinder bore to help reduce noise. In the vertical plane, the pistons have a slight barrel form, which helps to ensure a reliable oil film is maintained

between the piston and the cylinder bore. A solid film lubricant coating is applied to both reaction faces of the piston to reduce wear and improve fuel economy.

A three-ring piston-sealing system is used. The steel top ring is treated with a PVD (physical vapor deposition) peripheral coating. PVD is a coating technique where material can be deposited with improved properties to ensure good cylinder bore compatibility and wear resistance. A Napier center ring helps cylinder pressure and oil management, while the three-piece oil control lower ring is produced from nitrided steel.

The pistons are cooled with engine oil from four piston cooling jets installed under the valley of the cylinder block. Each piston cooling jet sprays oil onto the underside of the two adjacent pistons, one from each cylinder bank.

The connecting rods are forged from high strength steel. The cap is fracture-split from the rod to ensure precision re-assembly for bearing shell alignment. There are three grades of large end bearing available, each being color coded.

For additional information, refer to: [Connecting Rod Large End Bore](#) (303-00 Engine System - General Information, General Procedures).

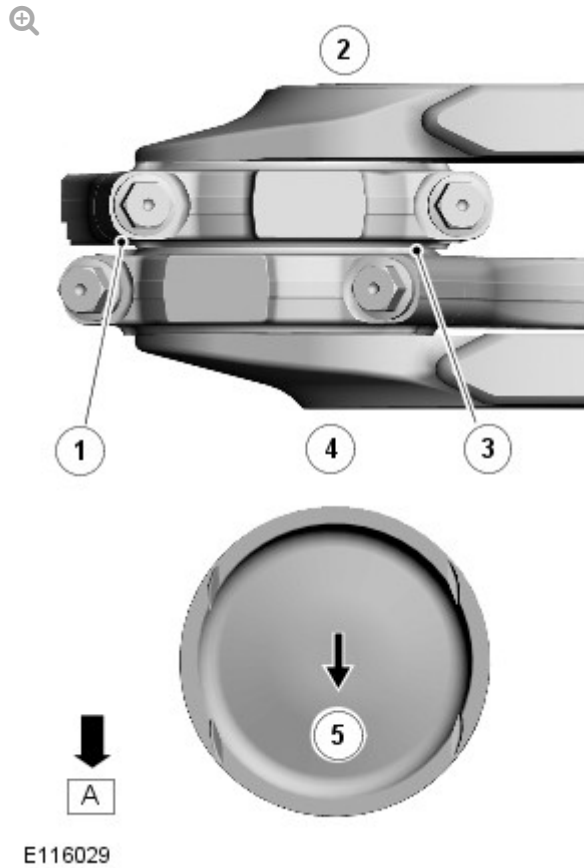
Cap Alignment with Connecting Rod



ITEM	DESCRIPTION
1	Alignment marks
2	Connecting rod
3	Cap
4	Bearings

The correct alignment of the cap with the connecting rod is indicated by marks on adjacent faces of the two components.

Connecting Rod and Piston Orientation



ITEM	DESCRIPTION
A	Front of engine
1	Alignment mark
2	LH side (bank B)
3	Alignment mark
4	RH side (bank A)
5	Piston orientation arrow

The orientation of the connecting rods and pistons on the crankshaft are given below:

- Bank A - The arrow on the piston crown must face the front of the engine and the cap and connecting rod alignment marks must face the rear of the engine.
- Bank B - The arrow on the piston crown must face the front of the engine and the cap and connecting rod alignment marks must face the front of the engine.

CYLINDER HEADS

NOTE:

RH (A bank) cylinder head shown, LH (left-hand) (B bank) cylinder head similar.



The cylinder heads are manufactured in gravity die cast aluminum alloy and are unique for each cylinder bank. Deep-seated bolts reduce distortion and secure the cylinder heads to the cylinder block.

Each cylinder is served by four valves. To help achieve the required gas-flow characteristics, these are arranged asymmetrically around the cylinder bore. Each cylinder has a centrally mounted fuel injector and spark plug.

The cylinder head gasket is of a multi-layer steel construction.

EXHAUST MANIFOLD

NOTE:

LH (B bank) installation shown, RH (A bank) installation similar.



ITEM	DESCRIPTION
1	Cylinder head
2	Gasket
3	Heat shield
4	Gasket

5	Exhaust manifold
6	Bolt (8 off)
7	Heat shield
8	Bolt (4 off)
9	Spacer (8 off)

The high SiMo (silicon molybdenum) cast iron exhaust manifolds are unique for each cylinder bank. Each exhaust manifold installation includes two metal gaskets and two heat shields. Spacers on the securing bolts allow the manifolds to expand and contract with changes of temperature while maintaining the clamping loads.

VALVE TRAIN



ITEM	DESCRIPTION
1	Inlet camshafts
2	Exhaust camshaft
3	Inverted tooth timing chain
4	Nylon chain guide
5	Auxiliary chain tensioner
6	Auxiliary drive chain
7	Oil pump drive
8	Auxiliary drive camshaft
9	Timing chain tensioner
10	Tensioner lever
11	VCT unit
12	VCT solenoids

The lightweight valve train provides good economy and noise levels and is

chain driven from the crankshaft.

Double overhead camshafts on each cylinder head operate the valves. For each cylinder head, an inverted tooth timing chain transfers drive from the crankshaft to the VCT unit on the front of each camshaft. Graded tappets enable setting of inlet and exhaust valve clearances.

Each timing chain has a hydraulic tensioner operated by engine oil pressure. The chain tensioners incorporate a ratchet mechanism, which maintains tension while the engine is stopped to eliminate start-up noise. The chains are lubricated with engine oil from jets located at the front of the engine block. Nylon chain guides control chain motion on the drive side.

VARIABLE CAMSHAFT TIMING



ITEM	DESCRIPTION
1	VCT units
2	Intake camshaft VCT solenoid
3	Camshaft position sensors
4	Exhaust camshaft VCT solenoid

The VCT system varies the timing of the intake and exhaust camshafts to deliver optimum engine power, efficiency and emissions. The timing of the intake camshafts has a range of 62 degrees of crankshaft angle. The timing of the exhaust camshafts has a range of 50 degrees of crankshaft angle.

In the base timing position:

- The intake camshafts are fully retarded.
- The exhaust camshafts are fully advanced.

VCT Operating Ranges

CAMSHAFT	VALVE OPENS	VALVE CLOSES

Intake	29 degrees BTDC (before top dead center) to 33 degrees ATDC (after top dead center)	207 to 269 degrees ATDC
Exhaust	244 to 194 degrees BTDC	6 to 56 degrees ATDC

The system consists of a VCT unit and a VCT solenoid for each camshaft. The ECM (engine control module) controls the system using PWM (pulse width modulation) signals to the VCT solenoids.

The torsional energy generated by the valve springs and the inertia of the valve train components are used to operate the system.

Variable Camshaft Timing Units

The VCT units change the position of the camshafts in relation to the timing chains.



ITEM	DESCRIPTION
1	Bolt (3 off)
2	VCT unit
3	Filter
4	Camshaft
5	Inner plate
6	Housing and sprocket
7	Rotor assembly
8	Reed plate
9	Spring and lock pin
10	Spring (3 off)
11	Tip seal (3 off)
12	Spring (2 off)
13	Tip seal (2 off)
14	Spring

15	Dowel pin
16	Bias spring
17	Snap ring
18	Reluctor ring
19	Center plate
20	Snap ring
21	Screw (6 off)
22	Spool valve
23	Outer plate

Each VCT unit is attached to the camshaft by three bolts. A rotor assembly and a reed plate are installed inside a sprocket housing, which consists of a sprocket, an outer plate and an inner plate held together by six screws.

A reluctor ring, for the CMP (camshaft position) sensor, a center plate and a bias spring are installed at the front of the VCT unit. The ends of the bias spring locate on the center plate assembly and the sprocket housing, to give a turning moment to the camshaft in the advance direction. A snap ring locates the reluctor ring on to a sleeve installed in the center of the rotor assembly. The opposite end of the sleeve locates in a bore in the front face of the camshaft, which contains a filter.

A spring and spool valve are installed in the rotor assembly sleeve and retained by a snap ring. The spring keeps the spool valve in contact with the armature of the related VCT solenoid.

Each VCT unit is supplied with engine oil from an oil gallery in the cylinder head, through the camshaft front bearing cap and a bore in the center of the camshaft.

Variable Camshaft Timing Solenoids

The VCT solenoids control the position of the spool valves in the VCT units.





E 115929

The VCT solenoids are installed in the front upper timing covers, immediately in front of their related VCT units. Each VCT solenoid is secured with two screws and sealed with an O-ring. A two pin electrical connector provides the interface with the engine harness.

Each VCT solenoid incorporates a spindle that acts on the spool valve in the related VCT unit to advance and retard the camshaft timing. The VCT solenoids operate independently and are controlled by a PWM signal from the ECM.

Variable Camshaft Timing Operation

When the engine is running, the compression and expansion of the valve springs causes momentary increases and decreases in the torque acting on the camshafts. These momentary changes of torque are sensed in the VCT units and used to change the camshaft timing.

Camshaft Torsional Energy (For a Single Valve Event)



ITEM	DESCRIPTION
A	Camshaft torque
B	Camshaft rotation (degrees)
C	Valve opening
D	Peak lift
E	Valve closing
1	1000 rev/min
2	4000 rev/min

3	7000 rev/min
4	Inertia effects from valve train rotating components
5	Force caused by valve spring
6	Bias torque from friction

Variable Camshaft Timing Unit Schematic - Base Timing

NOTE:

Intake camshaft VCT unit shown. For exhaust camshaft VCT unit, read advance for retard and retard for advance.



ITEM	DESCRIPTION
1	Advance chamber
2	Retard chamber
3	Sprocket housing
4	Rotor assembly
5	Lock pin
6	Sleeve
7	Engine oil supply from camshaft
8	Inlet check valve
9	Lock pin drain
10	Spool valve
11	Advance check valve
12	Retard check valve

At engine start-up, once the engine oil pressure in the camshaft is sufficient to open the inlet check valve, engine oil flows across the spool valve, through the advance and retard check valves and into the advance and

retard chambers. During the start cycle, the ECM signals the VCT solenoid to move the spool valve into the sleeve and connect the lock pin to inlet oil pressure. The inlet oil pressure causes the lock pin to retract from the inner plate and unlock the rotor assembly and camshaft from the sprocket housing.

There is a constant supply of oil to the VCT to ensure the unit remains filled during operation.

Variable Camshaft Timing Unit Schematic - Advance



To advance the camshaft timing, the ECM adjusts the signal to the VCT solenoid to move the spool valve so that the advance chamber oil passage is closed and the retard chamber oil passage is connected to inlet oil.

Each momentary increase of the torque acting on the camshaft generates a pressure pulse in the retard chamber. Oil moves from the retard chamber, through the spool valve and the advance check valve to the advance chamber, to equalize the pressures in the two chambers. The displacement of oil from the retard chamber causes the rotor assembly to advance in relation to the sprocket housing. Each momentary decrease of torque acting on the camshaft also generates a pressure pulse in the advance chamber, but, with the advance chamber oil passage closed, no movement of oil between the advance and retard chambers occurs and the rotor assembly cannot move in the retard direction.

Variable Camshaft Timing Unit Schematic - Null



Once the camshaft has reached the required timing position the ECM adjusts the signal to the VCT solenoid to set the spool valve in the null position. In the null position, the advance and retard chamber oil passages are both closed by the spool valve and the rotor assembly is hydraulically locked to the sprocket housing.

Variable Camshaft Timing Unit Schematic - Retard

variable Camshaft Timing Unit Schematic - Retard



To retard the camshaft timing, the ECM adjusts the signal to the VCT solenoid to move the spool valve to close the retard chamber oil passage and connect the advance chamber oil passage to the inlet oil.

Each momentary decrease of the torque acting on the camshaft causes oil to transfer from the advance chamber, through the spool valve and the retard check valve to the retard chamber, and so retard the camshaft timing.

LUBRICATION SYSTEM



ITEM	DESCRIPTION
1	Oil pump outlet tube
2	Anti-drain valve
3	Oil cooler
4	Oil filter
5	Piston cooling jet (4 off)
6	Timing chain lubrication jet (2 off)
7	Oil evacuation tube
8	Oil pump
9	Oil pick-up
10	Oil temperature and level sensor

The oil pump is attached to the underside of the windage tray. The input shaft of the oil pump is driven from the front of the crankshaft, by the auxiliary chain, at 0.87 engine speed.

The oil pump draws oil from the sump through a centrally mounted pick-up pipe. The oil is pressurized and pumped through an output tube to the

cylinder block. After passing through an anti-drain valve and a plate type oil cooler, the oil is filtered by a replaceable cartridge installed on the front of the RH cylinder head.

The output from the oil filter is distributed through oil galleries in the cylinder heads and cylinder block. All moving parts are lubricated by pressure or splash oil. Pressurized oil is also provided for the VCT system, the timing chain tensioners, the piston cooling jets and the timing chain lubrication jets.

The oil returns to the oil pan under gravity. Large drain holes through the cylinder heads and cylinder block ensure the rapid return of the oil to the sump. System replenishment is through the oil filler cap on the LH cylinder head cover.

An oil evacuation tube is installed to allow oil to be drawn from the sump. The upper end of the oil evacuation tube is located under the oil filler cap.

An oil drain plug is installed in the RH side of the sump.

Oil Pump Nominal Operating Pressures

ENGINE SPEED, REV/MIN	TEMPERATURE, °C (°F)	PRESSURE, BAR (LBF/IN ²)
Idle	20 (68)	2.0 (29.0)
1500	20 (68)	6.0 (87.0)
3000	40 (104)	6.2 (90.0)
3000	110 (230)	5.0 (72.5)
3000	130 (266)	4.0 (58.0)

OIL LEVEL MONITORING

Oil level monitoring is provided by an oil level and temperature sensor that measures the oil level in the sump. The oil level can be displayed in the message center of the instrument cluster.

Oil Level and Temperature Sensor



The oil level and temperature sensor supplies the ECM with a signal containing the level and temperature of the oil in the sump. The oil level and temperature sensor is secured to the bottom of the sump with three screws and sealed with a gasket.

The oil level and temperature sensor sends an ultrasonic pulse vertically upward and measures the time taken for the pulse to be reflected back from the top surface of the oil. This time is compared with the time taken for an ultrasonic pulse to travel a reference distance within the oil level and temperature sensor to determine the oil level. The oil level reading is combined with the oil temperature reading and transmitted in a PWM signal to the ECM.

Oil Level and Temperature Sensor Specifications

FEATURE	DETAILS
Power Source	Battery Voltage
Level Accuracy	±2 mm (±0.08 in.) at temperatures of -30 °C (-22 °F) and above; (±4 mm (±0.16 in.) at temperatures below -30 °C (-22 °F))
Temperature Accuracy	±2 °C (±3.6 °F)
Operating Level Range	116 to 147 mm (4.57 to 5.79 in.)
Operating Temperature Range	-40 to 160 °C (-40 to 320 °F)

OIL LEVEL CHECK

For additional information, refer to: [Engine Oil Draining and Filling](#) (303-01C Engine - V8 5.0L Petrol, General Procedures).

For accuracy, oil level checks should be performed with the vehicle on level ground when the oil is hot. The vehicle needs to stand for approximately 10 minutes, after the engine is switched off, to allow the oil to drain back into the sump and the oil level to stabilize. The oil level system will not give a reading until the oil level has stabilized.

To check the oil level, make sure that the ignition is on, the engine stopped and the transmission is in P (park). Access the vehicle information and

settings menu, then select **Oil Level Display** from the **Service Menu**. An **Engine Oil Level** sight glass will be displayed in the message center. The current oil level will be displayed in the sight glass. One of the following messages will also be displayed:

- If the oil level is within acceptable limits, the message **OK** is displayed.
- If the oil level is less than acceptable, a message advising how much oil to add is displayed e.g. **Add 0.5 Litre Refer to handbook for oil type**, or **Add 0.5 Quart Refer to handbook for oil type**, depending on the market.
- If the message **Overfilled Refer to handbook** is displayed, the oil level must be reduced to within acceptable limits before starting the engine again.
- If the message **Not available** is displayed, the oil level is still stabilizing. Wait 10 minutes and then recheck level.



2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

DIAGNOSIS AND TESTING

For additional information.

REFER to: [Engine - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (303-00 Engine System
- General Information, Diagnosis and Testing).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

ENGINE OIL DRAINING AND FILLING (G1226185)

GENERAL PROCEDURES

12.60.05	ENGINE OIL - DRAIN AND REFILL - INCLUDES OIL FILTER RENEW	5000 CC, AJ V8	0.8	USED WITHINS	+
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DRAINING

WARNING.

WARNING:

The spilling of hot engine oil is unavoidable during this procedure, care must be taken to prevent scalding.

CAUTION:

Correct installation of the oil filler cap can be obtained by tightening the cap until hard stop.

NOTE:

Clean the components general area prior to dismantling.

1.

CAUTION:

Make sure the engine is warm.

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

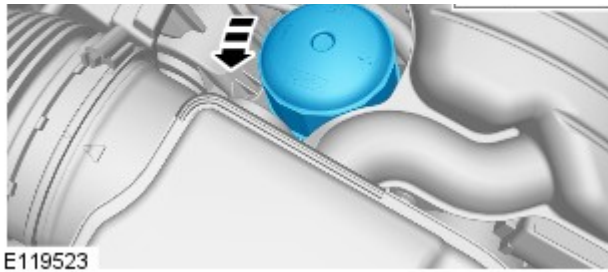
2.



3. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).

4.





- Loosen the element cover 4 complete turns to allow engine oil to drain from the filter cover.
- Make sure that the O-ring seal is exposed.

5.

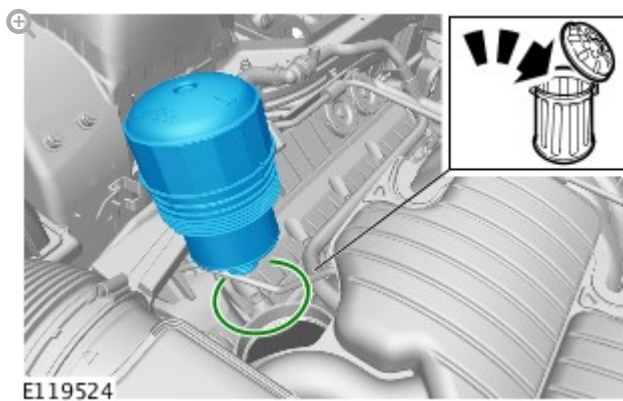
NOTE:

Allow 10 minutes for the engine oil to drain from the oil filter housing.

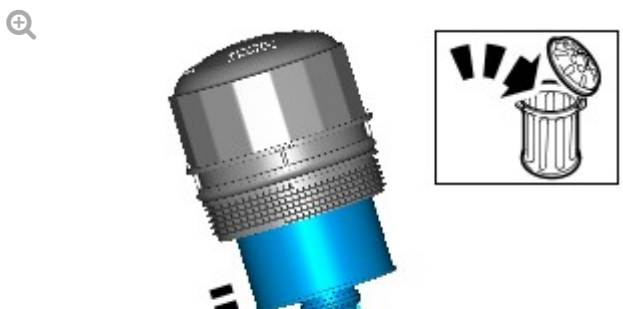
6.

NOTE:

Remove and discard the O-ring seal.



7.





E107394

Remove and discard the oil filter element.

8.

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.

9. Refer to: Engine Undershield (501-02, Removal and Installation).

10.

CAUTIONS:

- Be prepared to collect escaping oil.
- Allow at least 10 minutes for the engine oil to drain.

NOTE:

Discard the sealing washer.



FILLING

1.

CAUTION:

Make sure that the area around the component is clean and free of foreign material.

NOTE:

Install a new sealing washer.



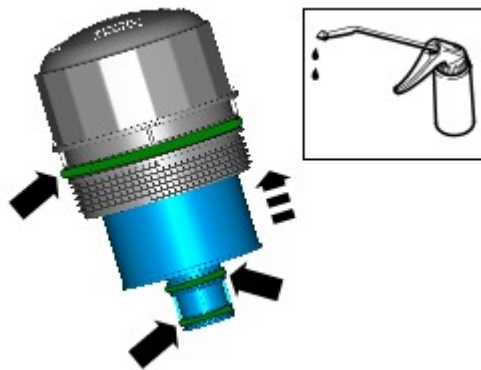
Torque: 24 Nm

2. Refer to: Engine Undershield (501-02, Removal and Installation).

3.

NOTE:

Install new O-ring seals.



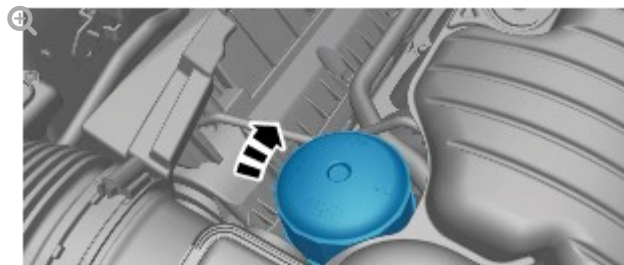
E107727

Lubricate the oil filter element O-ring seal with clean engine oil.

4.

CAUTION:

Tighten the component finger tight first.





- *Torque: 25 Nm*

5.

CAUTION:

Make sure that the vehicle is left for 5 minutes from filling with oil and that the engine oil level is reading at least minimum (by following Steps 9-16), before starting the engine.

- Fill the engine with oil - for filling values on vehicles without supercharger:
Refer to: [Specifications](#) (303-01C Engine - V8 5.0L Petrol, Specifications).
- Fill the engine with oil - for filling values on vehicles with supercharger:
Refer to: [Specifications](#) (303-01D Engine - V8 S/C 5.0L Petrol, Specifications).
- Clean any residual engine oil from the oil filler cap area.

6.



7.

CAUTION:

Make sure that the vehicle has been left for 5 minutes from

filling with oil.

Follow the Steps 9-16 before starting the engine.

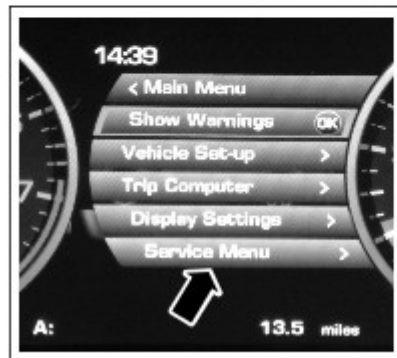
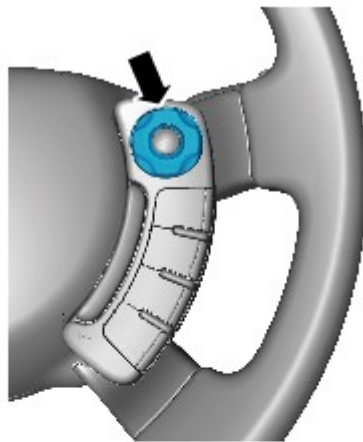
8.
 - Start the engine and allow to run for 10 minutes, stop the engine.
 - Check for leaks.

9. **CAUTIONS:**

- Make sure that the selector lever and the gearshift mechanism are in the park (P) position.
- Make sure that the hood is open.

- Turn the ignition on.

10.



E122817

- Press the right-hand directional button to access the instrument cluster menu.

11.



- Press the right-hand OK button.

12.



- Press the right-hand directional button to access the Oil Level Display.

13.



- Press the right-hand OK button and follow the instructions.

14.



- Press the cruise control cancel button twice within 2 seconds.

15.



- The message center display will revert to the normal display in the trip computer.
- Press the right-hand OK button and follow the instructions.
- Check that the oil level display shows an oil level reading.
- Only after having started and run the engine for 10 minutes (as indicated in Step 8), switch off the engine, then stabilizing for 10 minutes, take a reading from the oil level display and, if necessary top up with engine oil.

16.

NOTE:

If instructed to follow Steps 9-16 in a previous step, return to Step 8 and continue the procedure.

Turn the ignition off.

17. Allow 10 minutes for the engine oil level to stabilize if there has been additional oil top up.

18.

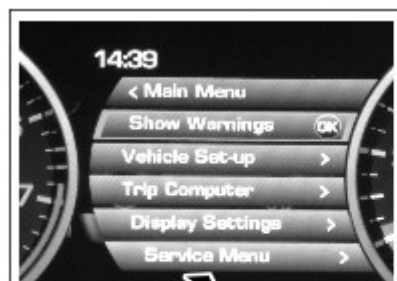
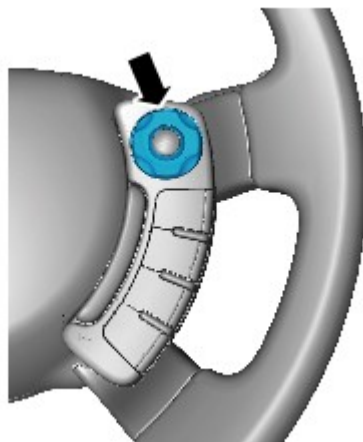
NOTE:

The following steps are to update the average oil level value.



- Turn the ignition on.
 - Press and hold the cruise control cancel button for more than 2 seconds.
19.
 - The message center display will revert to the normal display in the trip computer.
 20. Turn the ignition off.
 21. Turn the ignition on.

22.





E122817

- Press the right-hand directional button to access the instrument cluster menu.

23.



- Press the right-hand OK button.

24.



- Press the right-hand directional button to access the Oil Level Display.

25.



- Press the right-hand OK button and follow the instructions.
- Make sure that the average oil level value has now been updated.

26. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

ENGINE OIL VACUUM DRAINING AND FILLING (G1226175)

GENERAL PROCEDURES

DRAINING

WARNING:

The spilling of hot engine oil is unavoidable during this procedure, care must be taken to prevent scalding.

CAUTION:

Correct installation of the oil filler cap can be obtained by tightening the cap until hard stop.

NOTES:

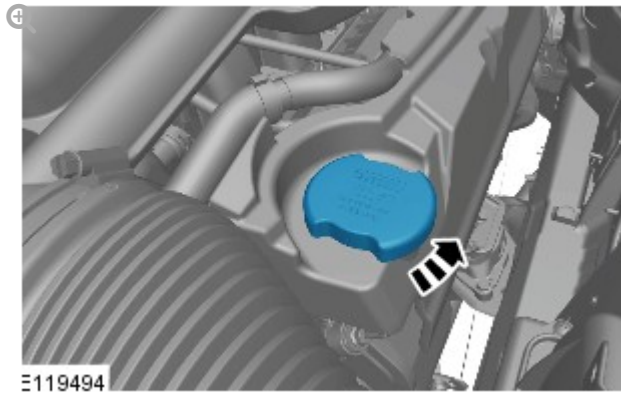
- Make sure that the vehicle is parked on level ground.
 - Clean the components general area prior to dismantling.
1.
 - Start the engine and allow to run for 10 minutes, stop the engine

engine.

2.

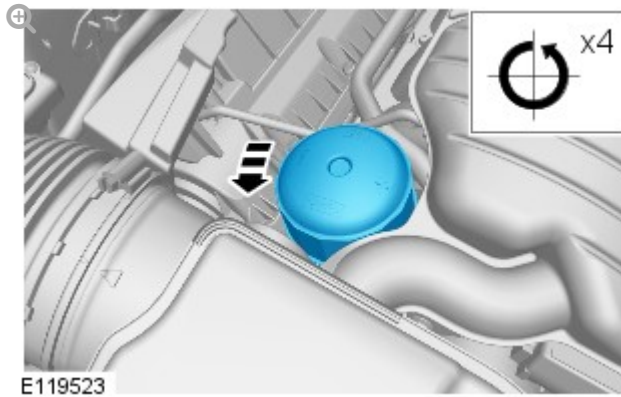
CAUTION:

Allow 10 minutes from turning the engine off before starting oil extraction.



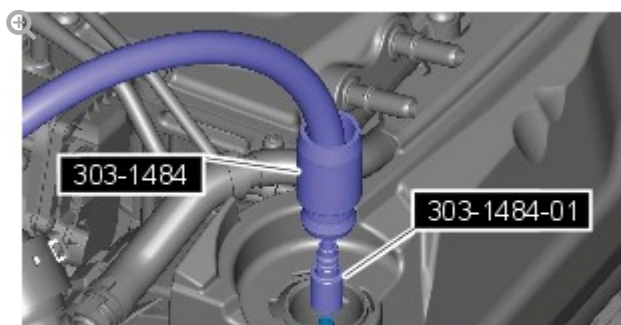
3. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).

4.



- Loosen the element cover 4 complete turns to allow engine oil to drain from the filter cover.

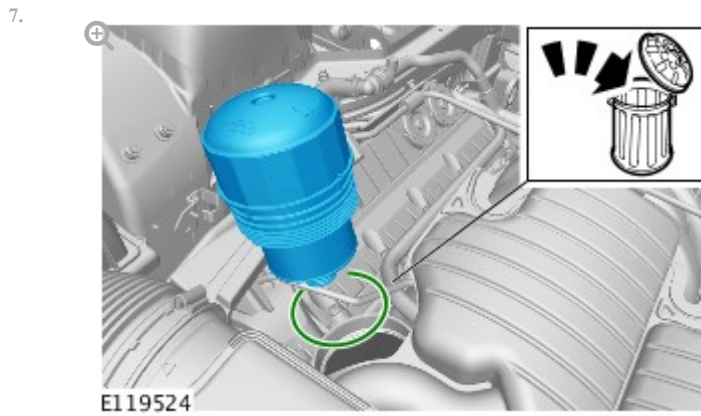
5.





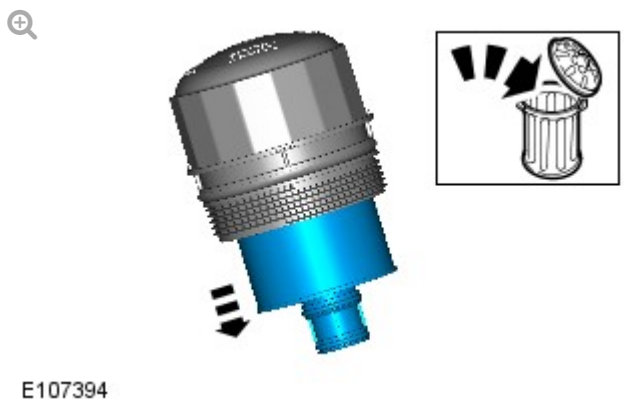
- Using the oil vacuum pump drain the oil out through the oil extraction tube.

6. ■ Remove the oil vacuum pump.



8. **NOTE:**

Discard the O-ring seals.

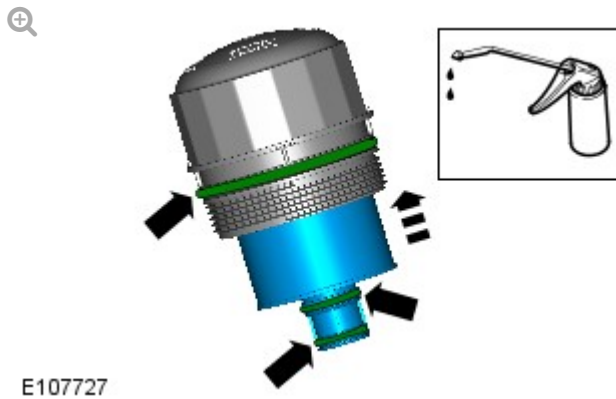


FILLING

1. **NOTE:**

Install new O-ring seals

Install new O-ring seals.



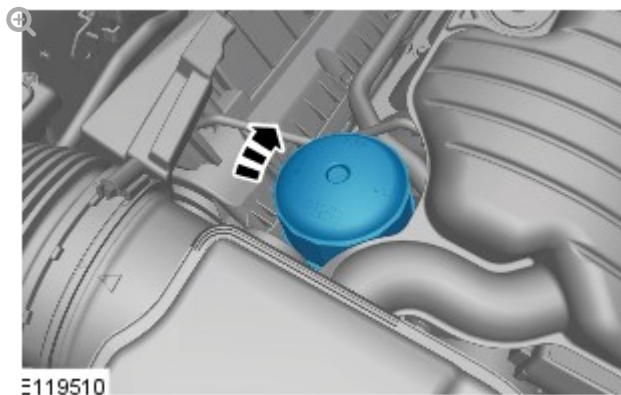
E107727

Lubricate the oil filter element O-ring seal with clean engine oil.

2.

CAUTION:

Tighten the component finger tight first.



E119510

- *Torque: 25 Nm*

3.

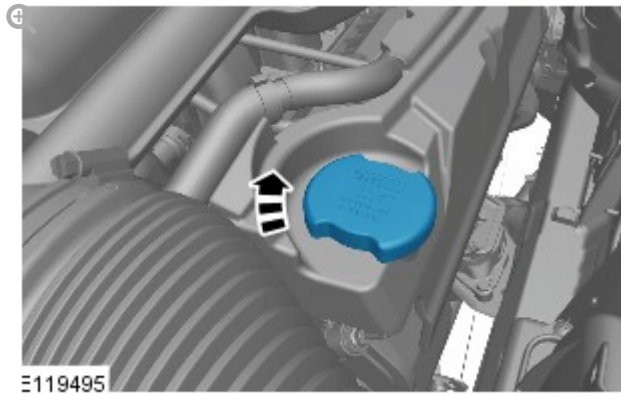
CAUTION:

Make sure that the vehicle is left for 5 minutes from filling with oil and that the engine oil level is reading at least minimum (by following Steps 7-14), before starting the engine.

- Fill the engine with oil for filling values on vehicles without

- Fill the engine with oil - for filling values on vehicles without supercharger:
Refer to: Specifications (303-01B, Specifications).
- Fill the engine with oil - for filling values on vehicles with supercharger:
Refer to: Specifications (303-01C, Specifications).
- Clean any residual engine oil from the oil filler cap area.

4.



5.

CAUTION:

Make sure that the vehicle has been left for 5 minutes from filling with oil.

Follow the Steps 7-14 before starting the engine.

- 6.
- Start the engine and allow to run for 10 minutes, stop the engine.
 - Check for leaks.

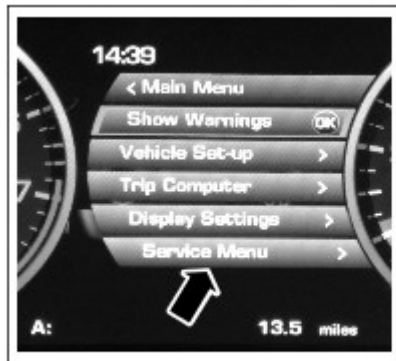
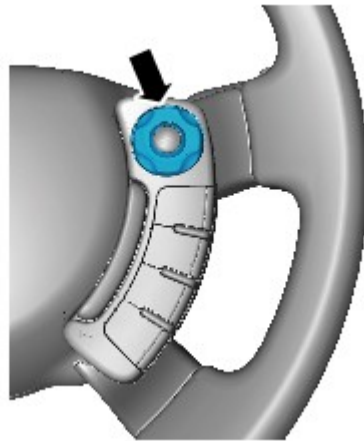
7.

CAUTIONS:

- Make sure that the selector lever and the gearshift mechanism are in the park (P) position.
- Make sure that the hood is open.

- Turn the ignition on.

8.



E122817

- Press the right-hand directional button to access the instrument cluster menu.

9.



- Press the right-hand OK button.

10.



- Press the right-hand directional button to access the Oil Level Display.

11.



- Press the right-hand OK button and follow the instructions.

12.



- Press the cruise control cancel button twice within 2 seconds.

13.



- The message center display will revert to the normal display in the trip computer.
- Press the right-hand OK button and follow the instructions.
- Check that the oil level display shows an oil level reading.
- Only after having started and run the engine for 10 minutes (as indicated in Step 6), switch off the engine, then stabilizing for 10 minutes, take a reading from the oil level display and, if necessary top up with engine oil.

14.

NOTE:

If instructed to follow Steps 7-14 in a previous step, return to Step 6 and continue the procedure.

Turn the ignition off.

15. Allow 10 minutes for the engine oil level to stabilize if there has been additional oil top up.

16.

NOTE:

The following steps are to update the average oil level value.



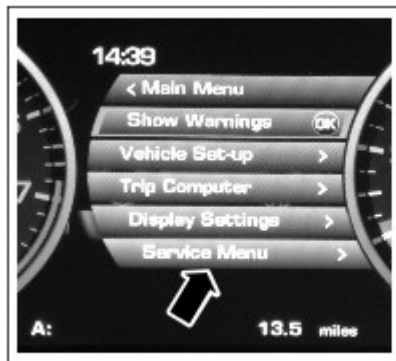
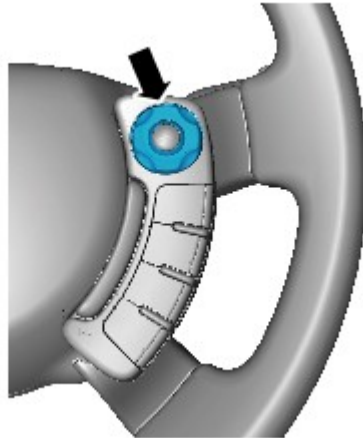
- Turn the ignition on.
- Press and hold the cruise control cancel button for more than 2 seconds.

17.
 - The message center display will revert to the normal display in the trip computer.

18. Turn the ignition off.

19. Turn the ignition on.

20.



E122817

- Press the right-hand directional button to access the instrument cluster menu.

21.



- Press the right-hand OK button.

22.



- Press the right-hand directional button to access the Oil Level Display.

23.



- Press the right-hand OK button and follow the instructions.
- Make sure that the average oil level value has now been updated.

24. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).



2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

FUEL PUMP CAMSHAFT TIMING CHECK (G1473678)

19.90.16	HIGH PRESSURE FUEL TIMING CHECK	5000 CC, AJ V8	1.2	USED WITHINS	+
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SPECIAL TOOL(S)

	303 - 144 7 Timing Tool
	JLR-303-1621 Alignment Tool, Fuel Pump Camshaft Timing

CHECK

1. Disconnect the battery ground cable.
Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

2.

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.

3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

4. Refer to: [Radiator Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

5.

CAUTION:

Be prepared to collect escaping oil.

NOTES:

- Discard the sealing washer.
- Collect the engine oil in a clean container.



6.



7.

CAUTIONS:

- Only rotate the crankshaft clockwise.
- Make sure that the crankshaft is fully locked.



Install the Special Tool(s): [303-1447](#)

8.

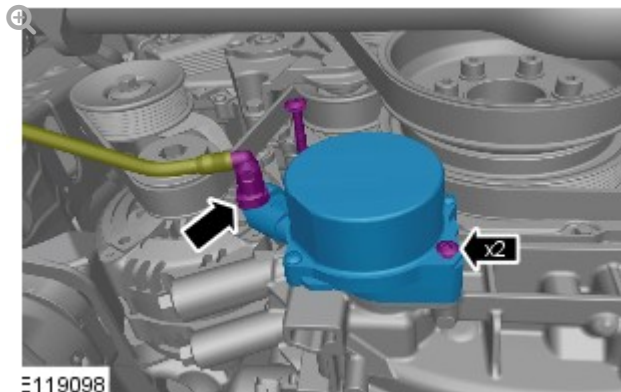


Using a suitable marker, mark the position of the crankshaft pulley as illustrated.

9.

NOTE:

Discard the seal.



10.



Remove the Special Tool(s): [303-1447](#)

11.



If required, carefully adjust the crankshaft position to allow correct installation of the special tool.

Install the Special Tool(s): [JLR-303-1621](#)

12.

CAUTION:

Do not use excessive force when adjusting the crankshaft position.

NOTE:

If the crankshaft timing tool cannot be installed, adjustment of the fuel pump camshaft timing will be required.



1. If required, carefully adjust the crankshaft position to allow correct installation of the special tool.

Install the Special Tool(s): [303-1447](#)

1. If the crankshaft timing tool cannot be installed, adjustment of the fuel pump camshaft timing will be required.

Refer to: [Fuel Pump Camshaft Timing Adjustment](#) (303-01C Engine - V8 5.0L Petrol, General Procedures).

13.

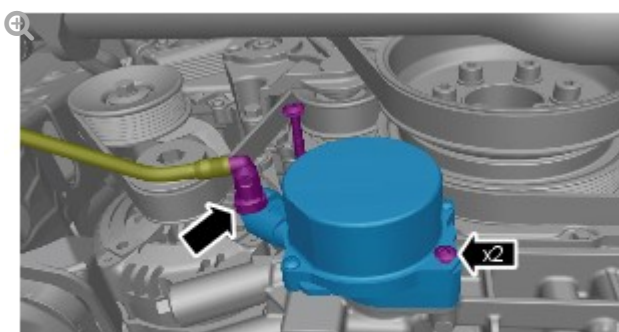


Remove the Special Tool(s): [JLR-303-1621](#)

14.

NOTE:

Install a new seal.





Torque: 12 Nm

15. 

Remove the Special Tool(s): [303-1447](#)

16. 

Torque: 10 Nm

17. **NOTE:**

Install a new sealing washer.



Torque: 24 Nm

18. Connect the battery ground cable.

Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

19. **CAUTION:**

Make sure that the vehicle is left for 5 minutes from filling with oil and that the engine oil level is reading at least minimum (by following Steps 22-29), before starting the engine.

- Fill the engine with oil - for filling values on vehicles without supercharger:

Refer to: [Specifications](#) (303-01C Engine - V8 5.0L Petrol,

Specifications).

- Fill the engine with oil - for filling values on vehicles with supercharger:
Refer to: [Specifications](#) (303-01D Engine - V8 S/C 5.0L Petrol, Specifications).
- Clean any residual engine oil from the oil filler cap area.

20.

CAUTION:

Make sure that the vehicle has been left for 5 minutes from filling with oil.

Follow the Steps 22-29 before starting the engine.

21.

- Start the engine and allow to run for 10 minutes, stop the engine.
- Check for leaks.

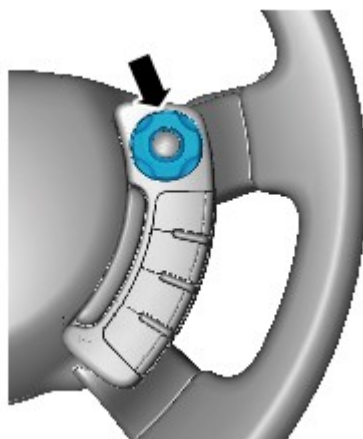
22.

CAUTIONS:

- Make sure that the selector lever and the gearshift mechanism are in the park (P) position.
- Make sure that the hood is open.

- Turn the ignition on.

23.





E122817

- Press the right-hand directional button to access the instrument cluster menu.

24.



- Press the right-hand OK button.

25.



- Press the right-hand directional button to access the Oil Level Display.

26.



- Press the right-hand OK button and follow the instructions.

27.



- Press the cruise control cancel button twice within 2 seconds.

28.



- The message center display will revert to the normal display in the trip computer.
- Press the right-hand OK button and follow the instructions.
- Check that the oil level display shows an oil level reading.

- Only after having started and run the engine for 10 minutes (as indicated in Step 21), switch off the engine, then stabilizing for 10 minutes, take a reading from the oil level display and, if necessary top up with engine oil.

29.

NOTE:

If instructed to follow Steps 22-29 in a previous step, return to Step 21 and continue the procedure.

Turn the ignition off.

30. Allow 10 minutes for the engine oil level to stabilize if there has been additional oil top up.

31.

NOTE:

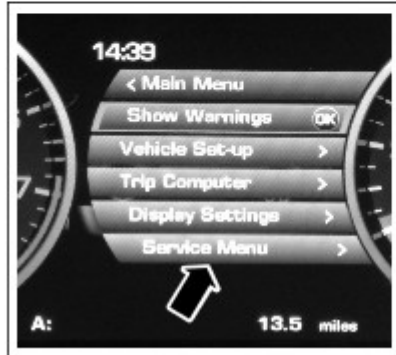
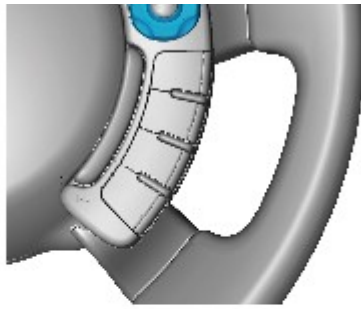
The following steps are to update the average oil level value.



- Turn the ignition on.
 - Press and hold the cruise control cancel button for more than 2 seconds.
32. ▪ The message center display will revert to the normal display in the trip computer.
33. Turn the ignition off.
34. Turn the ignition on.

35.





E122817

- Press the right-hand directional button to access the instrument cluster menu.

36.



- Press the right-hand OK button.

37.



- Press the right-hand directional button to access the Oil Level Display.

38.



- Press the right-hand OK button and follow the instructions.
- Make sure that the average oil level value has now been updated.

39. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

40. Refer to: [Radiator Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

2012.0 RANGE ROVER (LM), 303-01

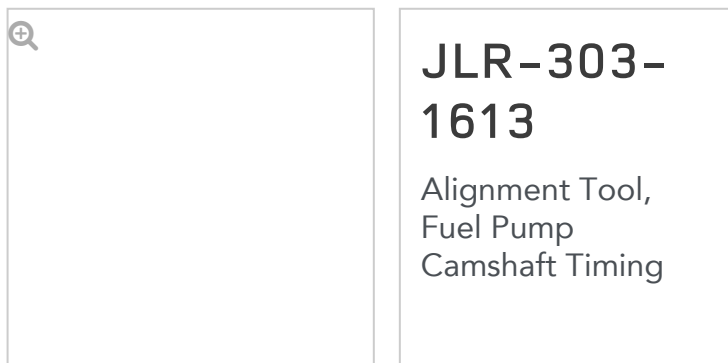
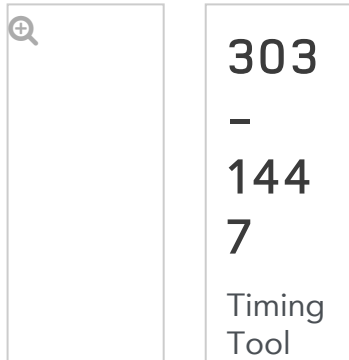
ENGINE - V8 S/C 5.0L PETROL

FUEL PUMP CAMSHAFT TIMING ADJUSTMENT (G1473679)

GENERAL PROCEDURES

19.90.17	HIGH PRESSURE FUEL TIMING CHECK AND ADJUST	5000 CC, AJ V8, SUPERCHARGED	7.2	USED WITHINS	+
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SPECIAL TOOL(S)



ADJUSTMENT

1. Disconnect the battery ground cable.
Refer to: Specifications (414-01, Specifications).

2. **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.

3. Refer to: [Fuel Pump Camshaft Timing Check](#) (303-01D Engine - V8 S/C 5.0L Petrol, General Procedures).

4. Refer to: [Lower Timing Cover](#) (303-01C Engine - V8 5.0L Petrol, Removal and Installation).
Refer to: [Lower Timing Cover](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

5. **CAUTIONS:**

- Make sure that the area around the component is clean and free of foreign material.
- Inspect the 3 timing chain oil nozzles for signs of damage, install as necessary.



6. **NOTE:**


Using a suitable tie strap, position the tensioner to one side.



Special Tool(s): [JLR-303-1613](#)

Torque: **12 Nm**

7. Refer to: [Lower Timing Cover](#) (303-01C Engine - V8 5.0L Petrol, Removal and Installation).
Refer to: [Lower Timing Cover](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

8. 

Remove the Special Tool(s): [303-1447](#)

9. 

Torque: 10 Nm

10. **NOTE:**

Install a new sealing washer.



Torque: 24 Nm

11. Connect the battery ground cable.
Refer to: Specifications (414-01, Specifications).

12. **CAUTION:**

Make sure that the vehicle is left for 5 minutes from filling with oil and that the engine oil level is reading at least minimum (by following Steps 15-22), before starting the engine.

- Fill the engine with oil - for filling values on vehicles without supercharger:
Refer to: [Specifications](#) (303-01C Engine - V8 5.0L Petrol, Specifications).
- Fill the engine with oil - for filling values on vehicles with supercharger:
Refer to: [Specifications](#) (303-01D Engine - V8 S/C 5.0L Petrol, Specifications).
- Clean any residual engine oil from the oil filler cap area.

13. **CAUTION:**

Make sure that the vehicle has been left for 5 minutes from filling with oil.

Follow the Steps 15-22 before starting the engine.

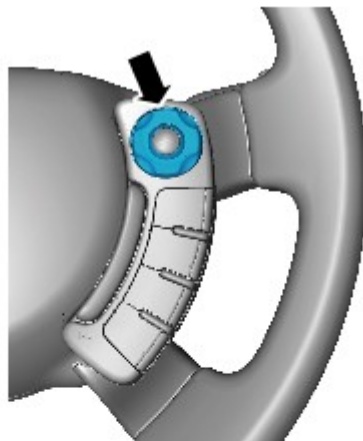
14.
 - Start the engine and allow to run for 10 minutes, stop the engine.
 - Check for leaks.

15. **CAUTIONS:**

- Make sure that the selector lever and the gearshift mechanism are in the park (P) position.
- Make sure that the hood is open.

- Turn the ignition on.

16. 



E122817

- Press the right-hand directional button to access the instrument

cluster menu.

17.



- Press the right-hand OK button.

18.



- Press the right-hand directional button to access the Oil Level Display.

19.



- Press the right-hand OK button and follow the instructions.

20.



- Press the cruise control cancel button twice within 2 seconds.

21.



- The message center display will revert to the normal display in the trip computer.
- Press the right-hand OK button and follow the instructions.
- Check that the oil level display shows an oil level reading.
- Only after having started and run the engine for 10 minutes (as indicated in Step 14), switch off the engine, then stabilizing for 10 minutes, take a reading from the oil level display and, if necessary top up with engine oil.

22.

NOTE:

If instructed to follow Steps 15-22 in a previous step, return to Step 14 and continue the procedure.



Turn the ignition off.

23. Allow 10 minutes for the engine oil level to stabilize if there has been additional oil top up.

24.

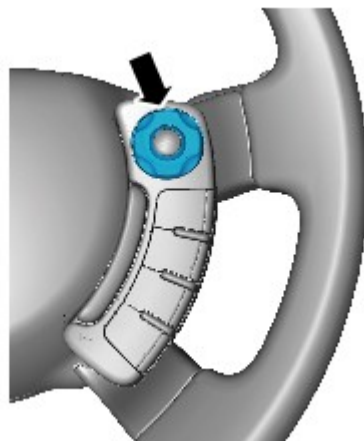
NOTE:

The following steps are to update the average oil level value.



- Turn the ignition on.
 - Press and hold the cruise control cancel button for more than 2 seconds.
25. ▪ The message center display will revert to the normal display in the trip computer.
26. Turn the ignition off.
27. Turn the ignition on.

28.





E122817

- Press the right-hand directional button to access the instrument cluster menu.

29.



- Press the right-hand OK button.

30.



- Press the right-hand directional button to access the Oil Level Display.

31.



- Press the right-hand OK button and follow the instructions.
- Make sure that the average oil level value has now been updated.

32. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

33. Refer to: [Radiator Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CAMSHAFT LH (G1224590)

REMOVAL AND INSTALLATION

12.13.21	CAMSHAFTS - LH BANK - RENEW	5000 CC, AJ V8, SUPERCHARGED	17.1	USED WITHINS	+
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REMOVAL

CAUTION:

Make sure that the orientation and code on the top of the camshaft bearing caps is noted (along with the bank - A or B), so that on installation the components are installed to their original position. Failure to follow this instruction may cause damage to the vehicle.

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2.

WARNING.

WARNING.

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Timing Drive Components (303-01, Removal and Installation).

4.

CAUTIONS:

- Rotate the camshafts until all the valves are at their minimum open point.
- Evenly and progressively, release the camshaft bearing caps.

NOTE:

Remove the camshaft bearing caps. Note: their position, orientation and markings. Each is marked with its position (number) and an orientation (arrow).



INSTALLATION

1.

CAUTIONS:

- Prior to installing the camshafts, position the crankshaft 45 degrees ATDC cylinder 1A to prevent valve/piston collision.
- Make sure that the camshafts and camshaft bearing caps are installed in their original locations.
- Evenly and progressively install and tighten the camshaft

bearing caps.

NOTE:

Lubricate the camshafts and the camshaft bearing caps with EP90 oil (or 75/90 viscosity oil will suffice) prior to installation.



Torque: 3 Nm

2.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 12 Nm

3.

CAUTION:

Only rotate the crankshaft clockwise.

Rotate the crankshaft until the camshaft lobe on the valve being checked is 180 degrees from the maximum opening position.

4.

NOTE:

If the valve clearance is incorrect, continue to the next step. If the valve clearance is correct, continue to step 8.

Using feeler gauge check the gap between the tappet and the

camshaft lobe and check against specifications table.

5.

CAUTIONS:

- Do not use a magnet to remove the tappet.
- Use the following formula to calculate the required bucket thickness. Original thickness + measured clearance - desired clearance = required bucket thickness.

Remove the tappet and measure the thickness.

6.

NOTE:

If a new tappet is installed then go back to step 1 of the install procedure.

Install a new tappet if required.

7. Using feeler gauge check the gap between the tappet and the camshaft lobe and check against specifications table.
8. Refer to: Timing Drive Components (303-01, Removal and Installation).
9. Connect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

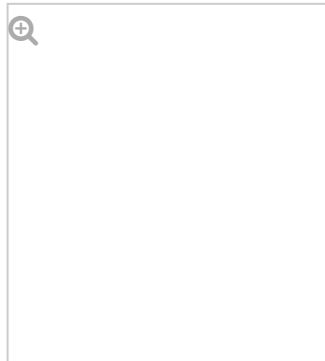
2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CRANKSHAFT PULLEY (G1271888)

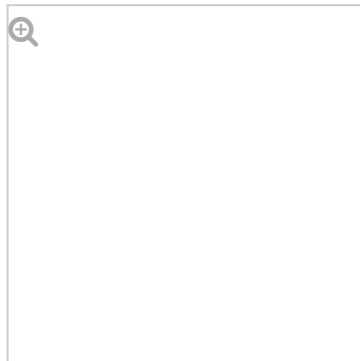
12.21.01 PULLEY -
CRANKSHAFT 5000 CC, AJ V8,
- RENEW SUPERCHARGED 4.9 USED
WITHINS +

SPECIAL TOOL(S)



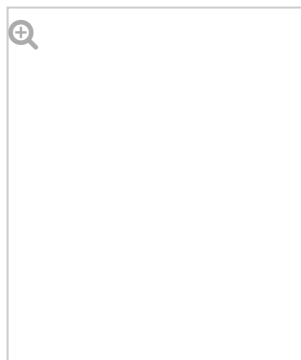
303-1437

Crankshaft
Damper
Remover/Installer



303-1438

Crankshaft Damper
Bolt
Remover/Installer



**303-
1439**

Crankshaft
Damper
Removal Plate



303-1440

303-1440

Crankshaft Damper
Removal/Installation
Stud



303-1441

Crankshaft Damper
Remover/Installer
Body



303

-

144

8

Lockin
g Tool



JLR-

303-

1304

Locking
Tool

NOTES:

- Removal steps in this procedure may contain installation details.
- Some illustrations may show the engine removed for clarity.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Remove the Radiator.

Refer to: [Radiator - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

4. Remove the Starter Motor.

Refer to: [Starter Motor](#) (303-06C Starting System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

5.



6.



- Install the special tool.
- Vehicles without Auto stop/start system.
Special Tool(s): [303-1448](#)
- Vehicles with Auto stop/start system.

Special Tool(s): [JLR-303-1304](#)

7.

CAUTION:

Before removing the crankshaft pulley bolt, note the numbers on the bolt head. If the bolt head shows 10.9, the bolt must be removed counter clockwise. If the bolt head shows 12.9, the bolt must be removed clockwise. Failure to follow this instruction may result in damage to the crankshaft.



Note the markings on the crankshaft pulley bolt.

8.



9.

NOTE:

The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will require the tool position to be the opposite direction.



- Install the special tools.
- Special Tool(s): [303-1438](#)
- Special Tool(s): [303-1437](#)

10.

NOTE:

The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will

require the tool position to be the opposite direction.



Torque: 25 Nm

11.



- Remove the special tool.
- Vehicles without Auto stop/start system.
Special Tool(s): [303-1448](#)
- Vehicles with Auto stop/start system.
Special Tool(s): [JLR-303-1304](#)

12.

NOTE:

The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will require the tool position to be the opposite direction.



Using a suitable stand, support the special tool.

13.

CAUTION:

Discard the bolt.

NOTES:

- The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will require the tool position to be the opposite direction.

- The crankshaft pulley bolt will be very tight.



Remove the crankshaft damper bolt, make sure the bolt thread direction has been noted as described in step 7.

14.



- Install the special tool.
- Vehicles without Auto stop/start system.
Special Tool(s): [303-1448](#)
- Vehicles with Auto stop/start system.
Special Tool(s): [JLR-303-1304](#)

15.



Remove the special tool.

16.

NOTE:

Discard the bolt after removal.



Remove the crankshaft damper bolt.

17.



18.



- Install the special tool

- Install the special tool.
- *Special Tool(s):* [303-1440](#)

19.



- Install the special tool.
- *Special Tool(s):* [303-1441](#)

20.



- Install the special tool.
- *Special Tool(s):* [303-1439](#)

21.



22.

CAUTION:

Discard the friction washer after removing the crankshaft pulley.

NOTE:

Make sure to clean the threads in the end of the crankshaft and that the crank nose is free of any foreign materials.



23.



24.



INSTALLATION

1.



1. Apply RTV sealant to the crankshaft pulley keyway.
1. Make sure that the RTV sealant is applied in a 2mm diameter bead.
1. Make sure that when the RTV sealant is applied that the RTV sealant is level with the top of the keyway.

2.

CAUTION:

Install a new friction washer before installing the crankshaft pulley.

NOTES:

- Make sure to clean the threads in the end of the crankshaft and that the crank nose is free of any foreign materials.
- Skip to step 11 for engines fitted with early RH thread crankshaft bolt.



3.



Install the special tool.

4.



Install the special tool.

5. 

Install the special tool.

6. **CAUTION:**

Rotate the crankshaft pulley installation tool until the pulley is fully located, do not over tighten. Failure to do this may result in damage to the components.




7. 

Remove the special tool.

8. 

- Remove the special tool.

9. 

Remove the special tool.

10. 

- **NOTE:**

The original M10 bolts can be reused.

Clean the original crankshaft pulley bolts and apply Loctite 270 to the threads before installation.

- *Torque: 65 Nm*

11.

WARNING:

Make sure that a new bolt is installed.

CAUTION:

Tighten the component finger tight first.



Install a new crankshaft damper bolt.

12.

NOTE:

The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will require the tool position to be the opposite direction.



Torque: 25 Nm

13.

NOTE:

The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will require the tool position to be the opposite direction.



Using a suitable stand, support the special tool.

14.



- Remove the special tool.
- Vehicles without Auto stop/start system.
Special Tool(s): [303-1448](#)
- Vehicles with Auto stop/start system.
Special Tool(s): [JLR-303-1304](#)

15.

NOTES:

- The use of a torque multiplier capable of 600Nm will be required.
- The illustration shows the tool positioning for LH threaded crankshaft damper bolts, RH threaded crankshaft bolts will require the tool position to be the opposite direction.



Tighten the crankshaft pulley bolt. Make sure that the socket is turned through 270 degrees not the torque wrench.

Torque:

Stage 1: **200 Nm**

Stage 2: **270°**

16.



- Install the special tool.
- Vehicles without Auto stop/start system.
Special Tool(s): [303-1448](#)

- Vehicles with Auto stop/start system.

Special Tool(s): [JLR-303-1304](#)

17.



Remove the special tool and stand.

18.

NOTE:

The original M10 bolts can be reused.



- Clean the original crankshaft pulley bolts and apply Loctite 270 to the threads before installation.
- *Torque: 65 Nm*

19.



- Remove the special tool.
- Vehicles without Auto stop/start system.
Special Tool(s): [303-1448](#)
- Vehicles with Auto stop/start system.
Special Tool(s): [JLR-303-1304](#)

20.



21.



22. Install the Sarter Motor.

Refer to: [Starter Motor](#) (303-06C Starting System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

23. Install the Radiator.

Refer to: [Radiator - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

24. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CAMSHAFT RH (G1224591)

REMOVAL AND INSTALLATION

12.13.20	CAMSHAFTS - RH BANK - RENEW	5000 CC, AJ V8, SUPERCHARGED	17.1	USED WITHINS	+
----------	-----------------------------------	---------------------------------	------	-----------------	---

REMOVAL

CAUTION:

Make sure that the orientation and code on the top of the camshaft

bearing caps is noted (along with the bank - A or B), so that on installation the components are installed to their original position. Failure to follow this instruction may cause damage to the vehicle.

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: Specifications (414-00, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Timing Drive Components (303-01, Removal and Installation).

4.

CAUTIONS:

- Rotate the camshafts until all the valves are at their minimum open point.
- Evenly and progressively, release the camshaft bearing caps.

NOTE:

Remove the camshaft bearing caps. Note: their position, orientation and markings. Each is marked with its position (number) and an orientation (arrow).



INSTALLATION

1.

CAUTIONS:

- Prior to installing the camshafts, position the crankshaft 45 degrees ATDC cylinder 1A to prevent valve/piston collision.
- Evenly and progressively install and tighten the camshaft bearing caps.
- Make sure that the camshafts and camshaft bearing caps are installed in their original locations.

NOTE:

Lubricate the camshafts and the camshaft bearing caps with EP90 oil (or 75/90 viscosity oil will suffice) prior to installation.



Torque: 3 Nm

2.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 12 Nm

3.

CAUTION:

Only rotate the crankshaft clockwise.

Rotate the crankshaft until the camshaft lobe on the valve being checked is 180 degrees from the maximum opening position.

4.

NOTE:

If the valve clearance is incorrect, continue to the next step. If the valve clearance is correct, continue to step 8.

Using feeler gauge check the gap between the tappet and the camshaft lobe and check against specifications table.

5.

CAUTIONS:

- Use the following formula to calculate the required bucket thickness. Original thickness + measured clearance - desired clearance = required bucket thickness.
- Do not use a magnet to remove the tappet.

Remove the tappet and measure the thickness.

6.

NOTE:

If a new tappet is installed then go back to step 1 of the install procedure.

Install a new tappet if required.

7.

Using feeler gauge check the gap between the tappet and the camshaft lobe and check against specifications table.

8. Refer to: Timing Drive Components (303-01, Removal and Installation).
9. Refer to: Specifications (414-00, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CRANKSHAFT FRONT SEAL

[G1224592]

REMOVAL AND INSTALLATION

12.21.14	OIL SEAL - CRANKSHAFT - FRONT - RENEW	5000 CC, AJ V8, SUPERCHARGED	4.9	USED WITHINS	+
----------	--	---------------------------------	-----	-----------------	---

SPECIAL TOOL(S)



303-1434


Remover/Installer,
Front Crankshaft
Seal

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details. Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Refer to: [Crankshaft Pulley](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

3. 

Special Tool(s): [303-1434](#)

Torque: **26 Nm**

INSTALLATION

1. **CAUTIONS:**

- Do not over tighten the crankshaft front seal. Failure to follow this instruction may result in damage to the vehicle.
- Take extra care not to damage the seal.

To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL


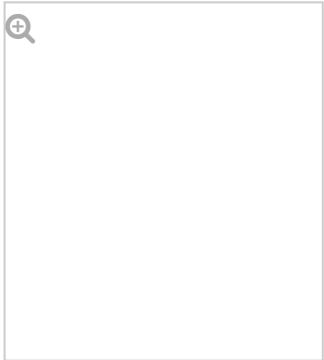
CRANKSHAFT REAR SFAI

[G1224594]

REMOVAL AND INSTALLATION

12.21.20	OIL SEAL - CRANKSHAFT - REAR - RENEW	5000 CC, AJ V8, SUPERCHARGED	9.7	USED WITHINS	+
----------	---	---------------------------------	-----	-----------------	---

SPECIAL TOOL(S)

	303-1442 Rear Crankshaft Seal Installer
	JLR-303-1622 Alignment Tool, Engine Rear Oil Seal

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Refer to: [Flexplate](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

2. 

INSTALLATION

1. **CAUTIONS:**

- Use only a plastic scraper when removing the sealing material.
- Make sure that the mating faces are clean and free of foreign material.
- Make sure that the Land Rover approved cleaning fluid (Loctite 7063) is used to clean the mating faces.



2. **CAUTION:**

Make sure that the Land Rover approved sealant, covers the mating faces of the cylinder block and the oil pan.



Apply RTV sealant (Loctite 5901G) in a 2-3mm diameter to the areas shown, and install the engine rear oil seal plate within 7 minutes.

3.

CAUTION:

Make sure that the special tool is correctly located.



Special Tool(s): [303-1442](#)

4.

NOTE:

Install the bolts finger tight.



Install the special tool.

Special Tool(s): [303-1442](#)

5.

CAUTION:

Do not fully install the component. Maintain a clearance of 8mm, between the rear oil seal plate and the cylinder block, as smearing of the sealant may occur.



Special Tool(s): [303-1442](#)

6.



Install the bolts and maintain the clearance of 8mm.

Special Tool(s): [303-1442](#)

7.



Remove the special tool.

Special Tool(s): [303-1442](#)

8.

CAUTION:

Apply pressure to the rear oil seal plate in the sequence shown, when installing the special tool.



Special Tool(s): [JLR-303-1622](#)

9.

NOTE:

Tighten the bolts in the indicated sequence.



Using the special tool, install the component.

Special Tool(s): [JLR-303-1622](#)

Torque: **11 Nm**

10.



Remove the special tool.

Special Tool(s): [JLR-303-1622](#)

11.



Torque: **11 Nm**

12. Refer to: [Flexplate](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal

and Installation).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CYLINDER HEAD LH (G1224595)

REMOVAL AND INSTALLATION

12.29.04	CYLINDER HEAD - ASSEMBLY - LEFT/ONE ONLY - RENEW	5000 CC, AJ V8, SUPERCHARGED	21.2	USED WITHINS	+
----------	--	---------------------------------	------	-----------------	---

REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.





Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

- 2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Camshaft LH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
4. Refer to: [Exhaust Manifold LH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
5. 
6. 
7. 
8. 

9.

CAUTION:

Be prepared to collect escaping coolant.



10.

CAUTION:

Be prepared to collect escaping coolant.



11.

NOTE:

Clamp the hose to minimize coolant loss.



12.



13.

CAUTION:

Discard the seals.



14.



15.



16.

CAUTIONS:

- If a new cylinder head has been installed then new tappets must be installed.
- If the cylinder head is being removed without a new component being installed, the tappets must be installed in their original positions.

NOTE:

Left-hand shown, right-hand similar.



17.

CAUTION:

Discard the 10 head bolts



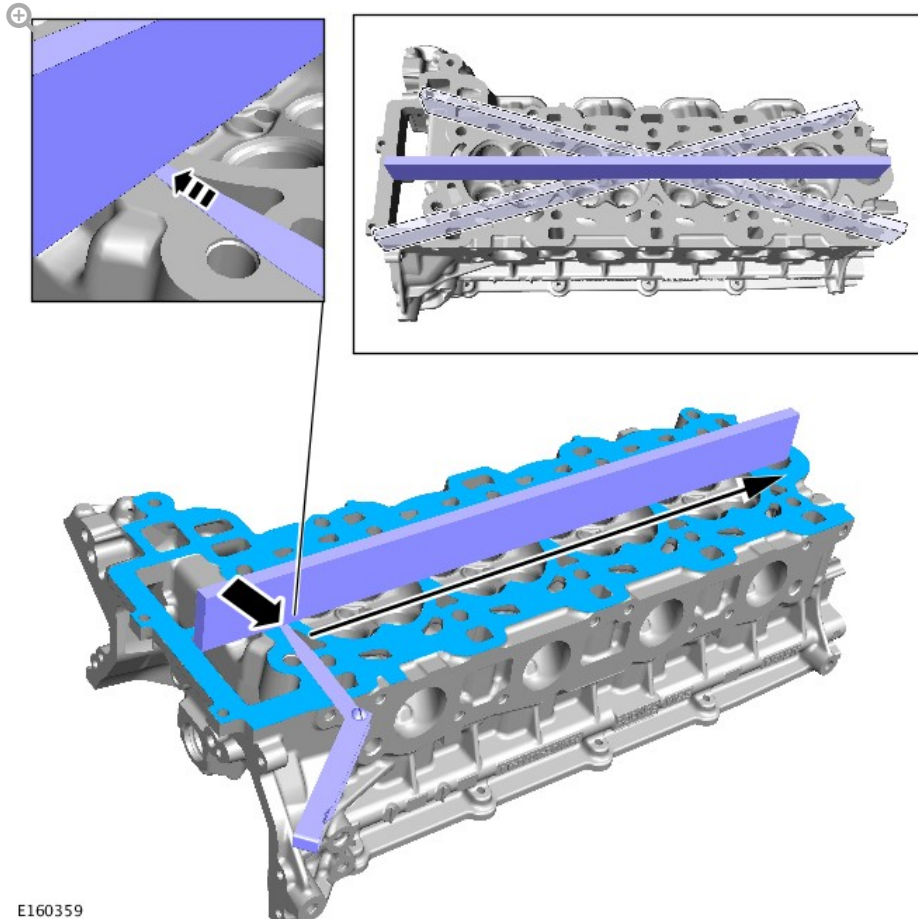
18.



1.

CAUTIONS:

- Make sure that the mating faces are clean and free of foreign material.
- An acceptable flatness of the cylinder head is 0.2mm.



1. Clean and inspect the cylinder head and cylinder block.

1. Check the cylinder head face for distortion, across the center and from corner to corner.

Refer to: [Cylinder Head Distortion](#) (303-00 Engine System - General Information, General Procedures).

2.

WARNING:

Make sure care is taken when handling the cylinder head gasket.

CAUTIONS:

- The head gasket must be installed over the cylinder block dowels.
- Make sure that the mating faces are clean and free of foreign material.

NOTE:

Install a new cylinder head gasket.



3.

CAUTION:

Make sure that new cylinder head bolts are installed.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 20 Nm

4.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 35 Nm

5.

NOTE:

Tighten the bolts in the indicated sequence.



Tighten the bolts 1 to 10, a further 90 degrees.

6.

NOTE:

Tighten the bolts in the indicated sequence.



Tighten the bolts 1 to 10, a further 120 degrees.

7.



Torque: 25 Nm

8.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 12 Nm

9.

CAUTIONS:

- If a new cylinder head has been installed then new tappets must be installed.
- If the cylinder head is being removed without a new component being installed, the tappets must be installed in their original positions.



Lubricate the valve tappets with clean engine oil.

10.



Torque: 12 Nm

11.



Torque: 10 Nm

12.



13.



Torque: 25 Nm

14.

CAUTION:

Install the new seals.



Torque: 10 Nm

15. 

16. 

Torque: 10 Nm

17. 

18. 

19. 

Torque: 20 Nm

20. 

Torque: 20 Nm

21. Refer to: [Exhaust Manifold LH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

22. Refer to: [Camshaft LH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

23. Connect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CYLINDER HEAD RH (G1224596)

REMOVAL AND INSTALLATION

12.29.05	CYLINDER HEAD - ASSEMBLY - RIGHT - RENEW	5000 CC, AJ V8, SUPERCHARGED	19.6	USED WITHINS	+
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REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Camshaft RH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
4. Refer to: [Exhaust Manifold RH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

5. 

6. **CAUTION:**

Be prepared to collect escaping coolant.




7. **CAUTION:**

Be prepared to collect escaping coolant.



8. 

9. 

10.



11.

NOTE:

Clamp the hose to minimize coolant loss.



12.



13.

CAUTION:

Discard the seals.



14.



15.

NOTE:

Remove and discard the O-ring seal.



16.

NOTE:

Discard the gasket.



17.



18.

CAUTIONS:

- If a new cylinder head has been installed then new tappets must be installed.
- If the cylinder head is being removed without a new component being installed, the tappets must be installed in their original positions.



19.

CAUTION:

Discard the 10 head bolts.



20.

NOTE:

Discard the gasket.

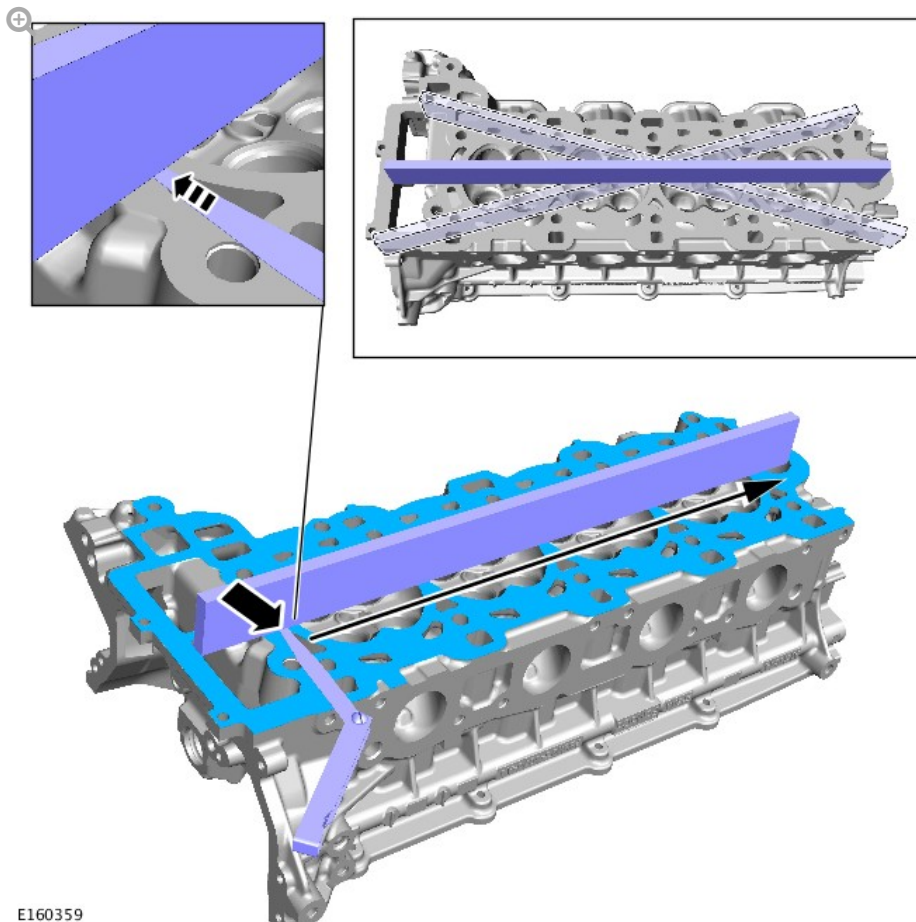


INSTALLATION

1.

CAUTIONS:

- Make sure that the mating faces are clean and free of foreign material.
- An acceptable flatness of the cylinder head is 0.2mm.



E160359

1. Clean and inspect the cylinder head and cylinder block.

1. Check the cylinder head face for distortion, across the center and from corner to corner.

Refer to: [Cylinder Head Distortion](#) (303-00 Engine System - General Information, General Procedures).

2.

WARNING:

Make sure care is taken when handling the cylinder head gasket.

NOTE:

Install a new gasket.



3.

CAUTION:

Make sure that new cylinder head bolts are installed.



Torque: 20 Nm

4.



Torque: 35 Nm

5.



Tighten the bolts 1 to 10, a further 90 degrees.

6.



Tighten the bolts 1 to 10, a further 120 degrees.

7.



Torque: 25 Nm

8.



Torque: 12 Nm

9.

CAUTIONS:

- If a new cylinder head has been installed then new tappets must be installed.
- If the cylinder head is being removed without a new component being installed, the tappets must be installed in their original positions.



Lubricate the valve tappets with clean engine oil.

10.

NOTE:

Install a new gasket.



11.

CAUTION:

A new O-ring seal is to be installed.

NOTE:

Install a new engine oil filter.



12.



Torque: 12 Nm

13.



Torque: 20 Nm

14.



Torque: 20 Nm

15.

CAUTION:

Install the new seals.



Torque: 10 Nm

16.



17.



18.



19.



20.



Torque: 10 Nm

21.



Torque: 25 Nm

22.



Torque: 25 Nm

23. Refer to: [Exhaust Manifold RH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
24. Refer to: [Camshaft RH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
25. Connect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 303-01

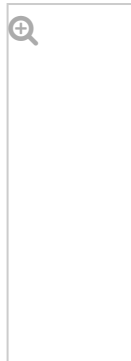
ENGINE - V8 S/C 5.0L PETROL

ENGINE MOUNT LH (G1224597)

REMOVAL AND INSTALLATION

12.45.11	MOUNTING - LH - RENEW	5000 CC, AJ V8, SUPERCHARGED	1.7	USED WITHINS	+
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SPECIAL TOOL(S)



100

-

012

Slide
Hammer



205-
735

Remover,
Halfshaft
Inner Joint



303-
1142

Viscous
Coupling
Wrench



**303-
1143**

Viscous
Coupling
Holding Tool



**308-
621-2**

Installer/Guide,
Halfshaft Oil
Seal



**308-
626**

Installer –
Halfshaft
Seal

REMOVAL



All vehicles

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2.

WARNING:

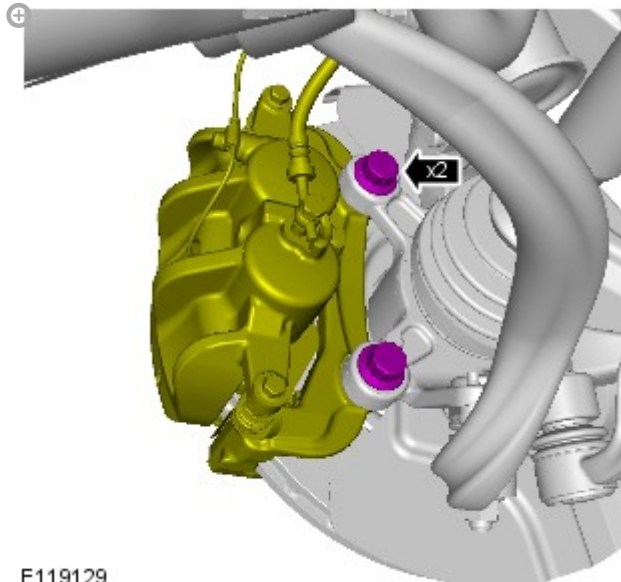
Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).

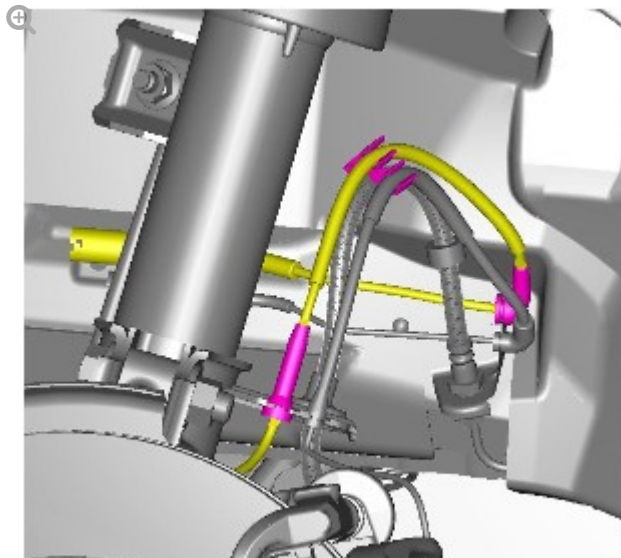
4. Refer to: Differential Draining and Filling (205-03, General Procedures).

5.



E119129

6.



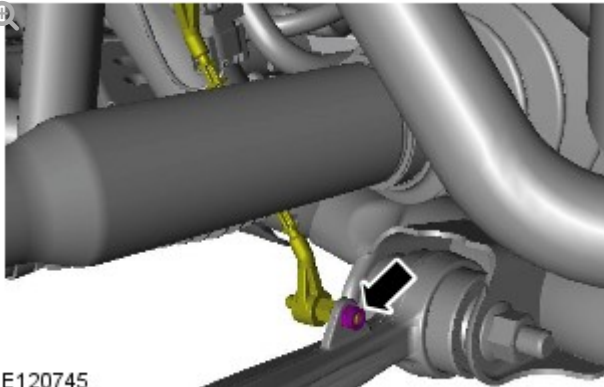
7.



8.



9.



10.



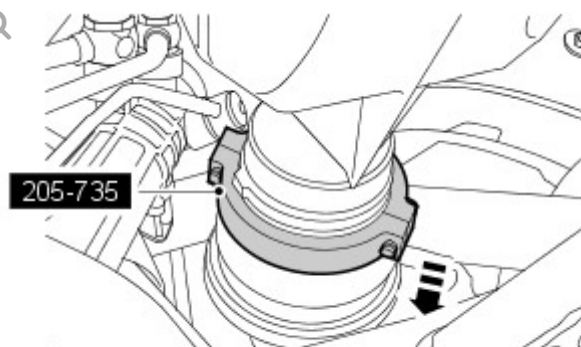
11.



12.

CAUTION:

Support the halfshaft.



- Remove and discard the retaining clip.
Special Tool(s): [205-735](#)

13.

CAUTIONS:

- Keep the halfshaft horizontal to avoid damaging the oil seal.
- Make sure no damage occurs to the halfshaft seal when installing the halfshaft.

NOTE:

With assistance remove the components.



- Install a new halfshaft oil seal.



Left-hand drive vehicles

1.



2.



All vehicles

1.



2.

CAUTION:

Always protect the cooling pack elements to prevent accidental damage.

NOTES:

- The thread is right handed.
- Some variation in the illustrations may occur, but the essential information is always correct.



Special Tool(s): [303-1142](#), [303-1143](#)

3.



4.

CAUTION:

Use a wooden block to protect the oil pan when supporting the engine.



INSTALLATION



All vehicles

1.



▪ *Torque:*

1 45 Nm

1 60°

2 56 Nm

2.



Torque: **100 Nm**

3.



Torque: **10 Nm**



Left-hand drive vehicles

1.



Torque: **24 Nm**

2.



Torque: **100 Nm**



All vehicles

1.

CAUTIONS:

- Keep the halfshaft horizontal to avoid damaging the oil seal.
- Make sure no damage occurs to the halfshaft seal when installing the halfshaft.



- Install a new halfshaft oil seal.

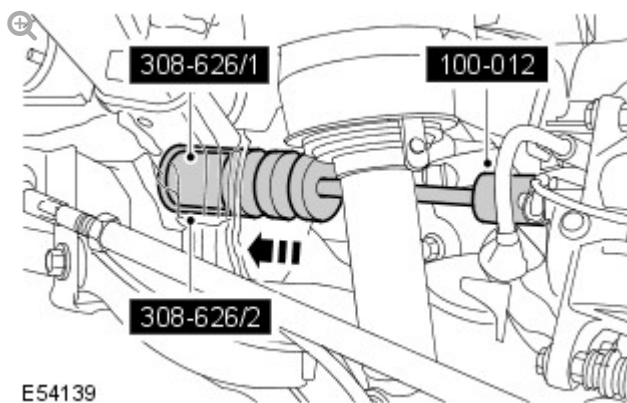
2.

CAUTION:

The seal protector must be left in place until the halfshaft has been installed.

NOTE:

LH illustration shown, RH is similar.



E54139

- Clean the component mating faces.
Special Tool(s): [100-012](#), [308-626](#), [308-621-2](#)

3.

CAUTIONS:

- Keep the halfshaft horizontal to avoid damaging the oil seal.
- Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

NOTE:

NOTE:

Do not fully engage the halfshaft until the oil seal protector has been removed.

- Install a new retaining clip.
- Open the halfshaft oil seal protector.
- Lubricate the seal with clean differential fluid.

4. 

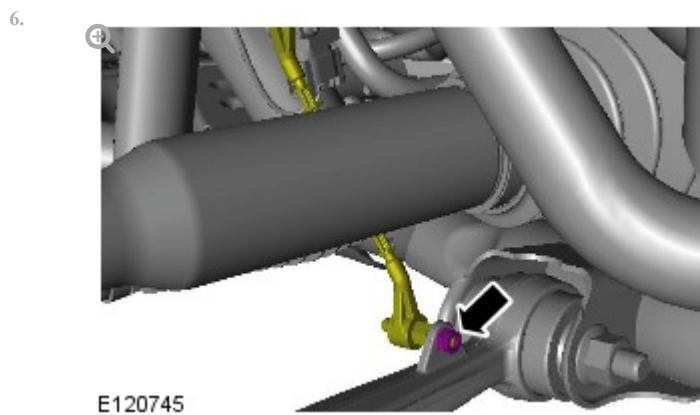
Torque:

Stage 1: **165 Nm**


Stage 2: **90°**

5. 

Torque: **250 Nm**

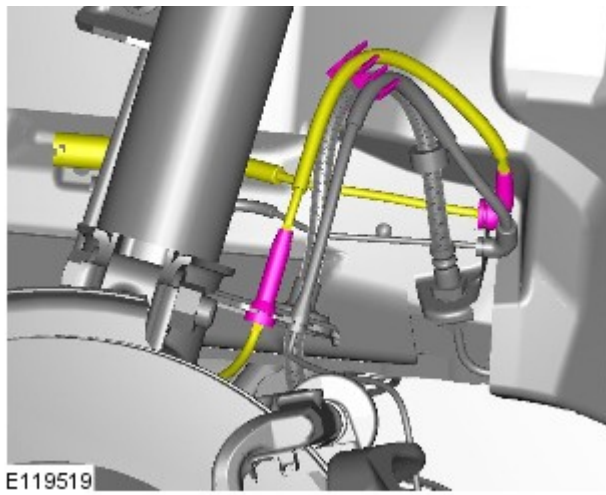


Torque: **8 Nm**

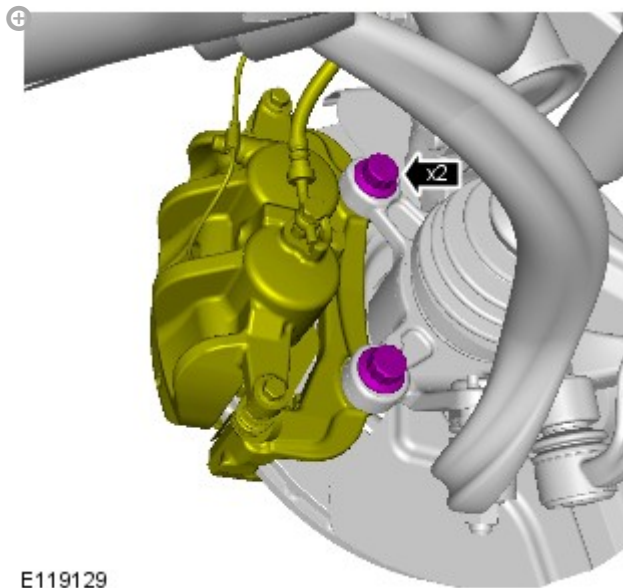
7. 

Torque: **80 Nm**





9.



Torque: 275 Nm

10. Refer to: Differential Draining and Filling (205-03, General Procedures).
11. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).
12. Connect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

ENGINE MOUNT RH (G1224598)

REMOVAL AND INSTALLATION

12.45.12	MOUNTING - RH - RENEW	5000 CC, AJ V8, SUPERCHARGED	1.7	USED WITHINS	+
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SPECIAL TOOL(S)



**303-
1142**

Viscous
Coupling
Wrench



**303-
1143**

Viscous
Coupling
Holding Tool

REMOVAL



All vehicles

1.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

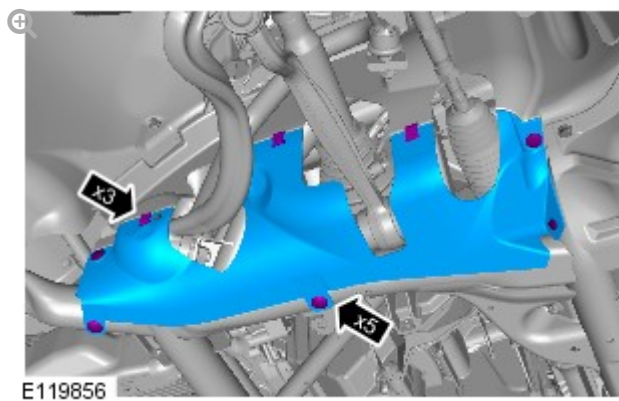
2. Refer to: Specifications (414-00, Specifications).

3. Refer to: Exhaust System (309-00, Removal and Installation).

4. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).
5. Refer to: Air Cleaner RH (303-12, Removal and Installation).
- 6.

NOTE:

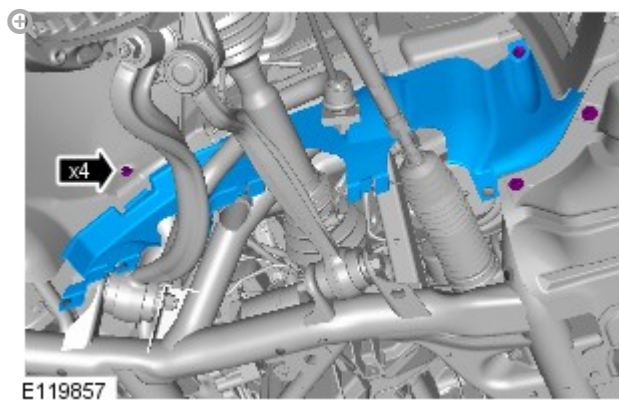
RH side only.



- 7.

NOTE:

RH side only.



Right-hand drive vehicles

1.

CAUTION:

Do not turn the steering wheel with the steering column lower shaft disconnected as damage to the clockspring and steering wheel switches may occur.



- Note the fitted position.
- Align the steering wheel to straight ahead.
- Remove and discard the Torx bolt.

2.



3.



- Remove and discard the 2 nuts and Torx bolts.



All vehicles

1.

CAUTION:

Always protect the cooling pack elements to prevent accidental damage.

NOTES:

- The thread is right handed.
- Some variation in the illustrations may occur, but the essential information is always correct.



Special Tool(s): [303-1142](#), [303-1143](#)

Torque: **65 Nm**

2.



3. Using a suitable hydraulic jack, raise and support the engine.

4.



INSTALLATION



All vehicles

1.



■ *Torque:*

1 45 Nm

1 60°

2 56 Nm

2.



3.

CAUTION:

Always protect the cooling pack elements to prevent accidental damage.

NOTES:

- The thread is right handed.
- Some variation in the illustrations may occur, but the essential information is always correct.



Special Tool(s): [303-1142](#), [303-1143](#)

Torque: 65 Nm



Right-hand drive vehicles

1.

NOTE:

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



Torque: 100 Nm

2.

NOTE:

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



3.

CAUTION:

Do not turn the steering wheel with the steering column lower shaft disconnected as damage to the clockspring and

lower shaft disconnected as damage to the clockspring and steering wheel switches may occur.

NOTE:

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

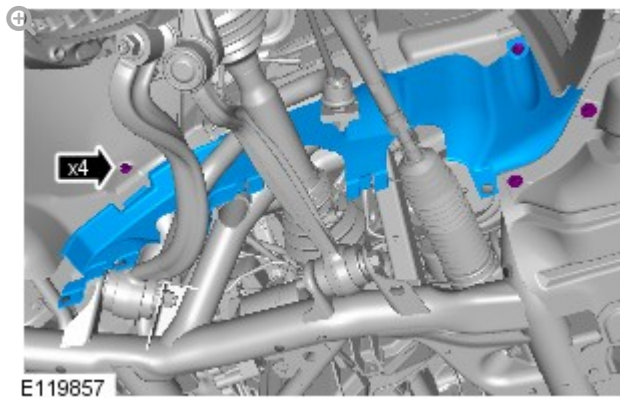


- Align the steering wheel to straight ahead.
- Return the steering column to its original position.

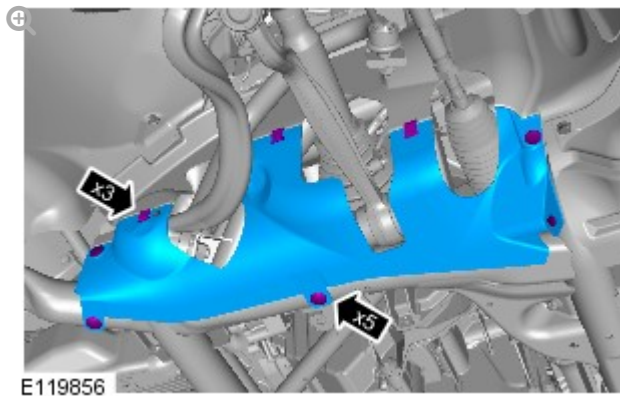


All vehicles

1.



2.



3. Refer to: Air Cleaner RH (303-12, Removal and Installation).
4. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).
5. Refer to: Exhaust System (309-00, Removal and Installation).
6. Connect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2012.0 RANGE ROVER (LM), 303-01

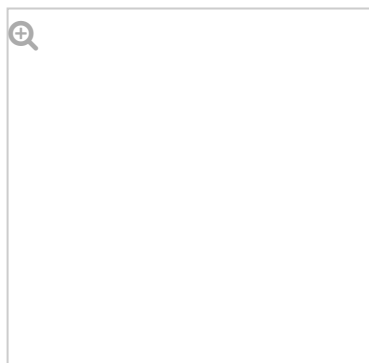
ENGINE - V8 S/C 5.0L PETROL

EXHAUST MANIFOLD LH (G1224600)

REMOVAL AND INSTALLATION

30.15.10	MANIFOLD - EXHAUST - LH/FRONT/EACH - RENEW	5000 CC, AJ V8, SUPERCHARGED	2.9	USED WITHINS	+
----------	---	---------------------------------	-----	-----------------	---

SPECIAL TOOL(S)



303-1444-01

Exhaust Manifold
Installation Guide
Pins - Threaded



303-1444-01

303-1444-02

Exhaust Manifold
Installation Guide
Pins - Unthreaded

REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2.

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.

3. Refer to: Power Steering Pump - 5.0L (211-02, Removal and Installation).
4. Refer to: Exhaust System (309-00, Removal and Installation).

5.



6.

CAUTION:

Discard the bolts.

NOTES:

- Discard the gasket.
- Make sure that the position of the spacers is noted before removal of the manifold.



7.

NOTE:

Do not disassemble further if the component is removed for access only.



8.

NOTE:

Remove and discard the gasket.



9.



10.



INSTALLATION

1.

CAUTIONS:

- Make sure that the mating faces are clean and free of foreign material.
- Make sure the anti-seize compound does not contact the catalyst monitor sensor tip.
- If accidentally dropped or knocked install a new sensor.
- Make sure the catalyst monitor sensor wiring harness is not twisted more than 180 degrees and is not in contact with either the exhaust or driveshaft.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.



Torque: 45 Nm

2.

NOTE:

Install a new gasket.



Special Tool(s): [303-1444-01](#)

3.

NOTE:

If a new cylinder head is installed use the special tools in the illustration.



Special Tool(s): [303-1444-02](#)

4.

CAUTION:

Make sure that new bolts are installed.

NOTE:

Install the spacers in the noted position.



Torque: 10 Nm

5.



Remove the special tool.

6.

CAUTION:

Make sure that new bolts are installed.

NOTE:

NOTE.

Install the spacers in the noted position.



Torque: 10 Nm

7.



Torque: 18 Nm

8.



Torque: 3 Nm

9.



Torque: 10 Nm

10.



Torque: 10 Nm

11. Refer to: Exhaust System (309-00, Removal and Installation).
12. Refer to: Power Steering Pump - 5.0L (211-02, Removal and Installation).
13. Connect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

EXHAUST MANIFOLD RH (G1224601)

REMOVAL AND INSTALLATION

	MANIFOLD				
	-				
30.15.11	EXHAUST	5000 CC, AJ V8,	1.1	USED	+
	-	SUPERCHARGED		WITHINS	
	RH/REAR				
	- RENEW				

SPECIAL TOOL(S)



303-1444-01

Exhaust Manifold
Installation Guide
Pins - Threaded



303-1444-02

Exhaust Manifold
Installation Guide
Pins - Unthreaded

REMOVAL

NOTE:

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

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Exhaust System (309-00, Removal and Installation).

4.

NOTE:

Remove and discard the gasket.



5.



6.



7.



8.

CAUTIONS:

- Discard the bolts.
- LH illustration shown, RH is similar.

NOTES:

- Discard the gasket.
- Make sure that the position of the spacers is noted before removal of the manifold.



9.

NOTE:

Do not disassemble further if the component is removed for access only.



INSTALLATION

1.



Torque: 45 Nm

2.

CAUTION:

LH illustration shown, RH is similar.

NOTE:

Install a new gasket.



Install the special tool.

Special Tool(s): [303-1444-01](#)

3.

CAUTION:

LH illustration shown, RH is similar.

NOTE:

If a new cylinder head is installed use the special tools in the illustration.



Special Tool(s): [303-1444-02](#)

4.

CAUTIONS:

- Make sure that new bolts are installed.
- LH illustration shown, RH is similar.

NOTE:

Install the spacers in the noted position.



Torque: 10 Nm

5.

CAUTION:

LH illustration shown, RH is similar.



Remove the special tool.

6.

CAUTIONS:

- Make sure that new bolts are installed.
- LH illustration shown, RH is similar.

NOTE:

Install the spacers in the noted position.



Torque: 10 Nm

7.


CAUTION:

LH illustration shown, RH is similar.



Torque: 18 Nm

8. 

9. 

Torque: 10 Nm

10. 

Torque: 10 Nm

11. **NOTE:**

Install a new gasket.



Torque: 48 Nm

12. Refer to: Exhaust System (309-00, Removal and Installation).

13. Connect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

FLEXPLATE (G1224602)

REMOVAL AND INSTALLATION

12.53.13	DRIVE PLATE - AUTOMATIC - RENEW	5000 CC, AJ V8, SUPERCHARGED	4.4	USED WITHINS	+
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REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Transmission - 5.0L (307-01, Removal).

4. **CAUTIONS:**

- Install all the bolts finger tight before final tightening.
- The bolts can only be used 3 times, mark the bolts with a center punch. If 2 punch marks are visible, discard the bolts.
- Make sure that no components fall off during removal.
- Install the bolts in the noted position.

NOTES:

- Make sure the crankshaft and flexplate mating faces are clean before installation.
- Make sure that the crankshaft is not rotated.
- Tighten the retaining bolts working diagonally.



Torque:

Stage 1: **45 Nm**

Stage 2: **90°**

INSTALLATION

1. To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

OIL COOLER (G1224603)

REMOVAL AND INSTALLATION

12.60.68	COOLER - OIL - RENEW	5000 CC, AJ V8, SUPERCHARGED	4.4	USED WITHINS	+
----------	----------------------------	---------------------------------	-----	-----------------	---

REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Engine Oil Draining and Filling (303-01, General Procedures).

4. Refer to: Supercharger (303-12, Removal and Installation).

5.



6.



7.

CAUTIONS:

- Be prepared to collect escaping oil.
- Be prepared to collect escaping coolant.



Torque: 13 Nm

8.

CAUTION:

Make sure that these components are installed to the noted removal position.

NOTE:

Install a new sealant

install a new gasket.



9.

CAUTIONS:

- Make sure that these components are installed to the noted removal position.
- Install new o-ring seals



INSTALLATION

1.

CAUTIONS:

- Install all the bolts finger tight before final tightening.
- Make sure that the area around the component is clean and free of foreign material.
- Install the new seals.

NOTE:

Tighten the bolts in the indicated sequence.



To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

OIL FILTER ELEMENT (G1224580)

REMOVAL AND INSTALLATION

12.60.02	ELEMENT - OIL FILTER - RENEW	5000 CC, AJ V8	0.2	USED WITHINS	+
----------	---------------------------------------	-------------------	-----	-----------------	---

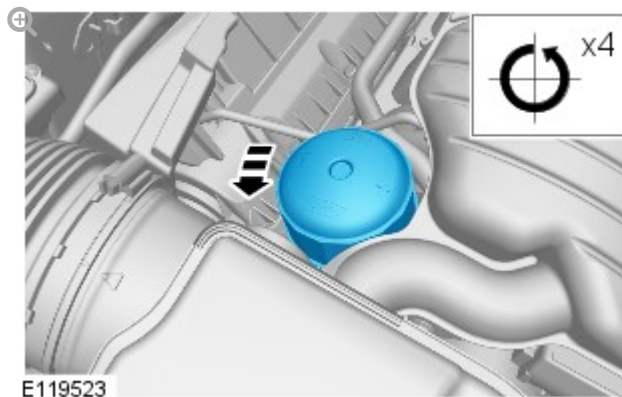
REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

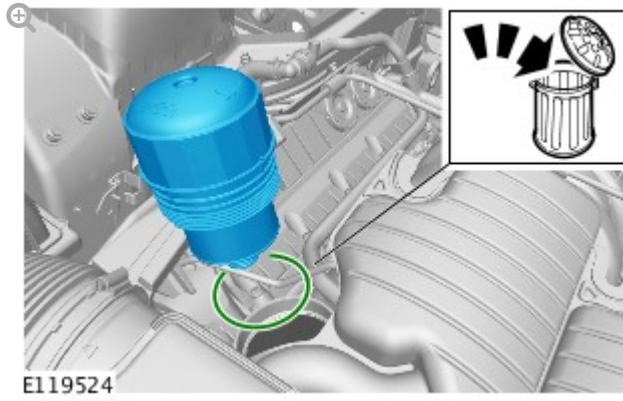
1. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).

2.

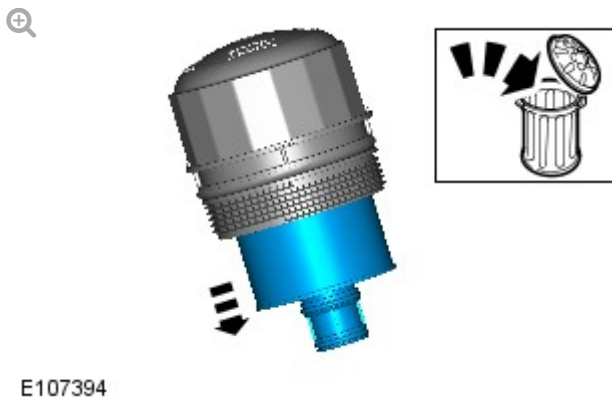


- Allow the engine oil to drain from the oil filter element housing for two minutes.

3.

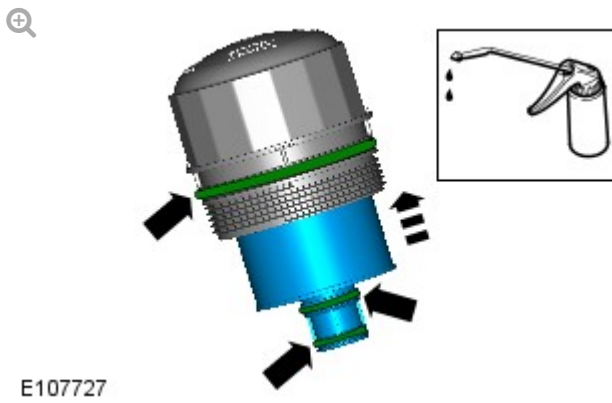


4.



INSTALLATION

1.



2.





Torque: 25 Nm

3. Check and top-up the engine oil.
4. Start and run the engine.
5. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

OIL PAN EXTENSION (G1224605)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)



303- 1433

Lower Timing
Cover
Alignment tool



303- 1442

Rear
Crankshaft
Seal Installer



303-1443

Rear Crankshaft
Cover Alignment
Tool



303- 1500

Installer,
Stretchy
Belt

REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.


1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2. **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.

3. Refer to: Crankshaft Pulley (303-01 Engine - V8 S/C 5.0L Petrol, Removal and Installation).
4. Refer to: [Engine](#) (303-01C Engine - V8 5.0L Petrol, Removal).

5. 

6. 

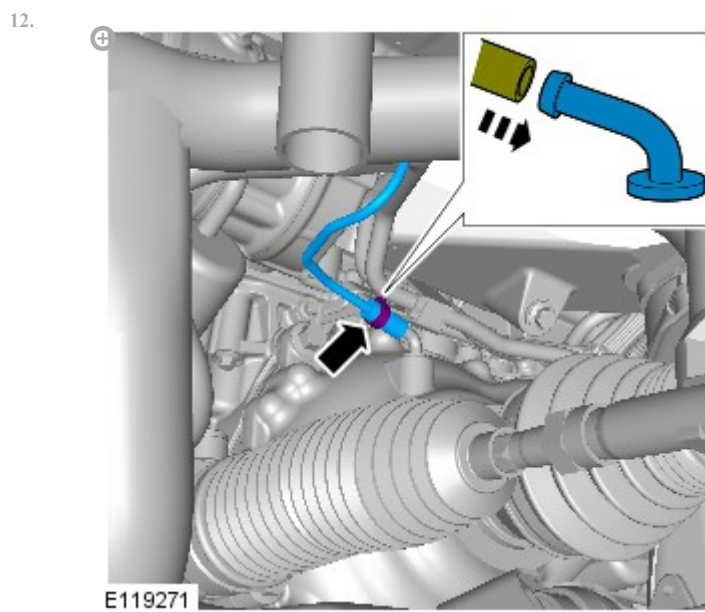
7. 

8. 

9. 

10. 

11. 



13. 

- Discard the O-ring seal.
- Remove and discard the halfshaft oil seal.

14. 

15. **CAUTIONS:**



- The bolts can only be used 3 times, mark the bolts with a center punch. If 2 punch marks are visible, discard the bolts.
- Make sure that no components fall off during removal.

NOTES:

- Make sure that the crankshaft is not rotated.
- Make sure the crankshaft and flexplate mating faces are clean before installation.



16.



17.



18.



19.



20.



21.



22.





23.



24.



25.

CAUTION:

Be prepared to collect escaping fluids.



26.

CAUTION:

Be prepared to collect escaping fluids.



27.



28.

CAUTION:

Be prepared to collect escaping fluids.



29.

CAUTION:

Be prepared to collect escaping fluids.



30.



31.

NOTE:

Discard the component.



32.



33.



34.

NOTE:

Make sure to use the aluminium lug provided on the oil pan extension to lever against.



35.

NOTE:

Do not disassemble further if the component is removed for access only.



INSTALLATION

1.



Torque: 10 Nm

2.

CAUTIONS:

- Make sure that the mating faces are clean and free of foreign material.
- Use only a plastic scraper when removing the sealing material.



- Apply RTV sealant WSE-M4G323-A6 (Loctite 5901G) to the areas shown, and tighten the bolts within 7 minutes.

3.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 25 Nm

4.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Apply RTV sealant WSE-M4G323-A6 (Loctite 5901G) to the areas shown, and tighten the bolts within 7 minutes.

5.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.

NOTE:

Install new lower timing cover.



Install the bolts, but do not tighten fully at this stage.

Special Tool(s): [303-1433](#)

6.

NOTE:

Tighten the bolts in the indicated sequence.



- *Torque:*

M8 20 Nm

M6 12 Nm

7. Remove the special tools.

8. 

Torque: 12 Nm

9. 

- *Special Tool(s):* [303-1442](#)
- *Special Tool(s):* [303-1443](#)

10. Remove the special tools.

11. **NOTE:**

Tighten the bolts in the indicated sequence.



Torque: 11 Nm

12. 

Torque: 11 Nm

13. 

- *Torque: 11 Nm*

14. **NOTE:**

The high-pressure fuel pumps are removed from the

illustration for clarity.



15.

NOTE:

Lubricate the fuel rail high-pressure fuel pump bucket with clean engine oil.



16.

CAUTION:

Tighten the Torx screws a turn at a time until the correct torque is achieved.

NOTE:

Lubricate the fuel rail high-pressure fuel pump O-ring seal with clean engine oil.



- *Torque: 11 Nm*

17.



Loosen the Torx screws half a turn each.

18.



19.

NOTE:

Lubricate the fuel rail high-pressure fuel pump bucket with clean engine oil.



20.

CAUTION:

Tighten the Torx screws a turn at a time until the correct torque is achieved.

NOTE:

Lubricate the fuel rail high-pressure fuel pump O-ring seal with clean engine oil.



- *Torque: 11 Nm*

21.



Loosen the Torx screws half a turn each.

22.



23.

CAUTION:

Care must be taken when positioning the fuel rail high-pressure fuel pump cover to one side.

NOTE:

Fuel rail high-pressure fuel pump cover shown removed for clarity.



- *Torque: 11 Nm*

24.

CAUTION:

Care must be taken when positioning the fuel rail high-pressure fuel pump cover to one side.

NOTE:

Fuel rail high-pressure fuel pump cover shown removed for clarity.



- *Torque: 11 Nm*

25.

CAUTIONS:

- Install new high-pressure fuel supply lines.
- Lubricate only the union threads with clean engine oil.

NOTES:

- Remove and discard the blanking caps.
- Install the bolt and unions fully finger tight before final tightening.



Do not fully tighten at this stage.

26.



- *Torque: 21 Nm*

27.

NOTES:

- Install the bolt and unions finger tight before final tightening.
- Remove and discard the blanking caps.



- *Torque:*
Unions **21 Nm**
M6 **11 Nm**

28.

CAUTION:

Make sure that a new component is installed.



- *Torque: 21 Nm*

29.



Torque:

Unions **21 Nm**

M6 **8 Nm**

30.



31.



Torque: 25 Nm

32.



33.

CAUTION:

Install all the bolts finger tight before final tightening.



Torque: 25 Nm

34.



35.



Torque: 12 Nm

36.





Torque:

Stage 1: **45 Nm**

Stage 2: **60°**

37.

CAUTION:

Install all the bolts finger tight before final tightening.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: **48 Nm**

38.

CAUTIONS:

- Install all the bolts finger tight before final tightening.
- The bolts can only be used 3 times, mark the bolts with a center punch. If 2 punch marks are visible, discard the bolts.
- Install the bolts in the noted position.

NOTES:

- Make sure that the crankshaft is not rotated.
- Make sure the crankshaft and flexplate mating faces are clean before installation.
- Tighten the retaining bolts working diagonally.



Torque:

Stage 1: **45 Nm**

Stage 2: **90°**

39.



Torque: **48 Nm**

40. Install a new O-ring seal to the differential case.

41.

CAUTIONS:

- Make sure the O ring seal remains in its fitted position.
- Make sure that new bolts are installed.



With assistance, align and secure the front differential case.

42.



Tighten the 100 mm length bolts.

Torque:

Stage 1: **50 Nm**

Stage 2: **90°**

43.



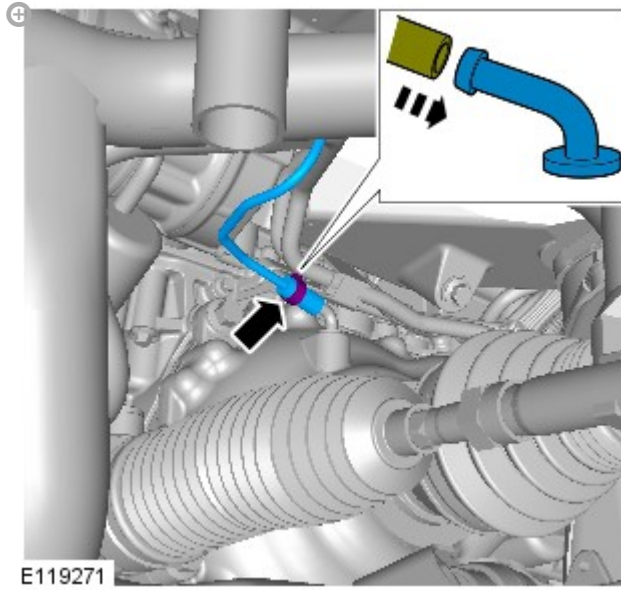
Tighten the 55 mm length bolts.

Torque:

Stage 1: **50 Nm**

Stage 2: **60°**

44.



45.



Torque: 22 Nm

46.

NOTE:

Install the bolt finger tight before final tightening.



Torque: 40 Nm

47.



Torque: 25 Nm

48.



Torque: 25 Nm

49. Refer to: Crankshaft Pulley (303-01 Engine - V8 S/C 5.0l Petrol.

Refer to: [Specifications \(414-00, Specifications\)](#),
Removal and Installation).

50.



Special Tool(s): [303-1500](#)

51.



- Install the cooling fan belt.
- Rotate the engine clockwise twice, making sure that the belt is seated on both pulleys correctly.
- Remove the special tool.

52.



Torque: **25 Nm**

53. Refer to: [Engine](#) (303-01C Engine - V8 5.0L Petrol, Installation).

54. Lower the vehicle.

55. Connect the battery ground cable.

Refer to: [Specifications \(414-00, Specifications\)](#).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

OIL PUMP (G1224606)

REMOVAL AND INSTALLATION

12.60.26	PUMP - OIL - RENEW	5000 CC, AJ V8, SUPERCHARGED	17.2	USED WITHINS	+
----------	--------------------------	---------------------------------	------	-----------------	---

REMOVAL

NOTE:

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

1. Disconnect the battery ground cable.
Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Oil Pan Extension](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

4.

NOTE:

Tsubaki timing drive only.



5.

NOTE:

INA timing drive only.



6.



7.

NOTE:

Remove and discard the O-ring seal.



8.

CAUTION:

Remove and discard the O-ring seals.



9.

NOTE:

Remove and discard the O-ring seal.



INSTALLATION

1.



Lubricate and install the new O-ring seals.

2.



Torque:

M8 25 Nm

M6 12 Nm

3.



Lubricate and install a new O-ring seal.

4.



Torque: 12 Nm

5.



Torque: 21 Nm

6.

NOTE:

Tsubaki timing drive only.



Install the lower timing chain making sure the coloured chain links align correctly with the fuel rail high-pressure fuel pumps camshaft and crankshaft sprocket markings.

7.

CAUTION:

Make sure that the tensioner spring is correctly located.

NOTE:

Tsubaki timing drive only.



Torque: 21 Nm

8.

NOTE:

INA timing drive only.



Install the lower timing chain making sure the coloured chain links align correctly with the fuel rail high-pressure fuel pumps camshaft and crankshaft sprocket markings.

9.

CAUTION:

Make sure that the tensioner spring is correctly located.

NOTE:

INA timing drive only.



Torque: 21 Nm

10. Refer to: [Oil Pan Extension](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
11. Connect the battery ground cable.
Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 303-01


ENGINE - V8 S/C 5.0L PETROL

TIMING COVER (G1224607)

REMOVAL AND INSTALLATION

12.65.01	COVER - TIMING GEARS - RENEW	5000 CC, AJ V8, SUPERCHARGED	13	USED WITHINS	+
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SPECIAL TOOL(S)



303-1433
Lower Timing
Cover
Alignment tool

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

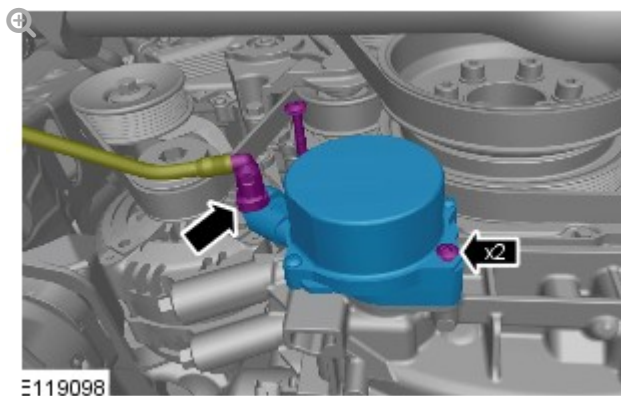
3. Refer to: [Crankshaft Pulley](#) (303-01 Engine - V8 S/C 5.0L Petrol, Removal and Installation).

4. **CAUTION:**

Be prepared to collect escaping oil.

NOTE:

Discard the seal.




5. Refer to: [Valve Cover LH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

6. Refer to: [Valve Cover RH](#) (303-01D Engine - V8 S/C 5.0L Petrol

6. Refer to: [Valve Cover Nut](#) (303 STD Engine - TDV8 3.0L Petrol, Removal and Installation).

7. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).

8. 

9. 

10. **CAUTION:**

Be prepared to collect escaping coolant.



11. 

12. 

13. 

14. 

15. 

16. 



17.



18.



19.



INSTALLATION

1.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



- Apply RTV sealant WSE-M4G323-A6 (Loctite 5901G) to the areas shown, and tighten the bolts within 7 minutes.

2.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



- Apply RTV sealant WSE-M4G323-A6 (Loctite 5901G) to the areas shown, and tighten the bolts within 7 minutes.

3.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 12 Nm

4.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: 12 Nm

5.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Apply RTV sealant WSE-M4G323-A6 (Loctite 5901G) to the areas shown, and tighten the bolts within 7 minutes.

6.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Install the bolts, but do not tighten fully at this stage.

Special Tool(s): [303-1433](#)

7.



Torque:

M6 12 Nm

M8 20 Nm

8.



Torque: 12 Nm

9.



Torque: 12 Nm

10.



Torque: 25 Nm

11.



Torque: 12 Nm

12.



Torque: 40 Nm

13.

NOTE:

Install the bolt finger tight before final tightening.



Torque: 40 Nm

14.



15.



Torque: 25 Nm

16.



Torque: 25 Nm

17.



18.



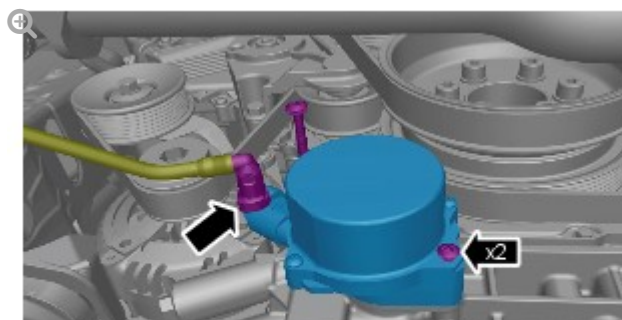
19.



20.

NOTE:

Install a new seal.





Torque: 12 Nm

21. Refer to: Crankshaft Pulley (303-01 Engine - V8 S/C 5.0L Petrol, Removal and Installation).
22. Refer to: [Valve Cover LH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
23. Refer to: [Valve Cover RH](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).
24. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).
25. Connect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
26. Check and top up the engine oil.

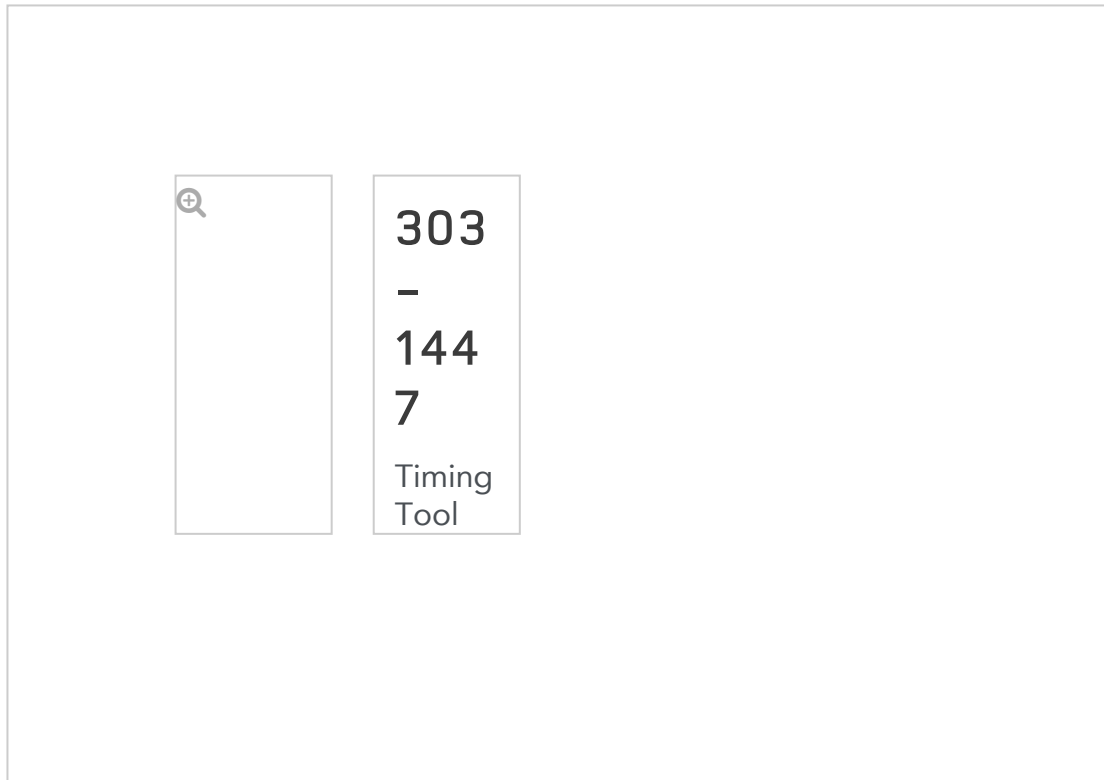
2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

TIMING CHAIN TENSIONER - ENGINE SET (G1676892)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)



REMOVAL

WARNING:

This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

CAUTIONS:

- Check all timing components for wear and install new components if required.
- Make sure that all openings are sealed. Use new blanking caps.

NOTE:

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

Information is always correct.

1. Refer to: [Petrol and Petrol-Ethanol Fuel Systems Health and Safety Precautions](#) (100-00 General Information, Description and Operation).
2. Refer to: [Fuel System Pressure Release - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (310-00 Fuel System - General Information, General Procedures).
3. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

4. **WARNING:**

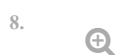
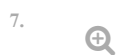
Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

5. Refer to: [Air Cleaner Outlet Pipe T-Connector](#) (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol, Removal and Installation).

6. **CAUTION:**

Be prepared to collect escaping coolant.



9.



10.

CAUTION:

Be prepared to collect escaping coolant.



11.



12.

WARNING:

Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

CAUTIONS:

- Be prepared to collect escaping fuel.
- Make sure that all openings are sealed. Use new blanking caps.



13.



14.

CAUTIONS:

- Be prepared to collect escaping fuel.
- Make sure that all openings are sealed. Use new blanking caps.



15. Refer to: [Crankshaft Pulley](#) (303-01C Engine - V8 5.0L Petrol, Removal and Installation).

16.

CAUTION:

Using a suitable tool, lock the component.



17.



18.



19. Remove the front right wheel and tire.

20. Refer to: [Fender Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

21.



22.



23.



24.



25.



26.



27.



28.

CAUTION:

Use a wooden block to protect the oil pan when supporting the engine.



Using a suitable hydraulic jack, support the engine.

29.

NOTE:

Engine shown removed for clarity.





Remove the right side engine mounting bracket.

30.

CAUTIONS:

- Be prepared to collect escaping fuel.
- Make sure that all openings are sealed. Use new blanking caps.



Remove and discard the high-pressure fuel supply lines.

31.

CAUTIONS:

- Install new high-pressure fuel supply lines.
- Do not fully install the component at this stage.
- Do not remove the blanking caps at this stage.



Install new high-pressure fuel supply lines. Loosely position the high pressure fuel pipes but do not tighten the unions at this stage.

32.

NOTE:

Engine shown removed for clarity.



Install the right side engine mounting bracket.

Torque:

Stage 1: 45 Nm

Stage 2: 60°

33.



Remove the special tool.

34.

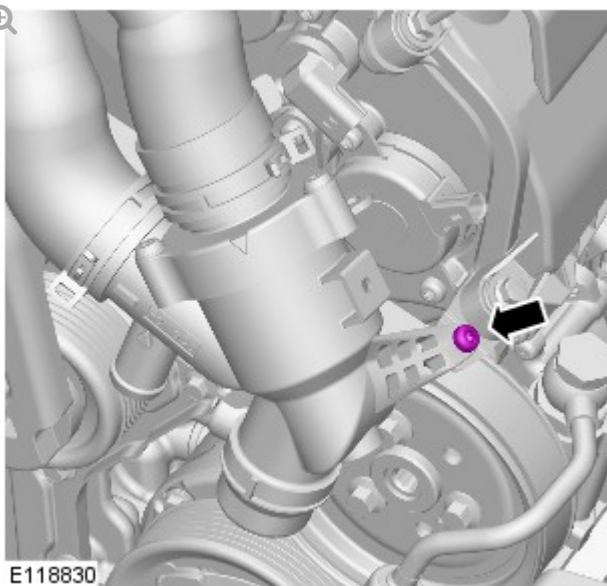


Torque: 110 Nm

35.



36.



37.

NOTE:

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



38. 

39. 

40. 

41. 

42. 

43. 

44. 

45. **CAUTION:**

Take extra care not to damage the component.

NOTE:

Make sure to use the aluminium lug provided on the timing cover to lever against.



46.

CAUTION:

Using a suitable tool, lock the component.



47.



48.



49.



50.

CAUTION:

Take extra care not to damage the component.

NOTE:

Make sure to use the aluminium lug provided on the timing cover to lever against.



51.



52.

CAUTION:

Discard the component.



53.



Remove the crankshaft position sensor.

54.

CAUTION:

Only rotate the crankshaft clockwise.



Rotate the crankshaft clockwise until the crankshaft keyway is positioned as indicated in the illustration.

55.

CAUTIONS:

- Only tighten the bolt finger-tight.
- Only rotate the crankshaft clockwise.



Make sure that the special tool is correctly located.

Special Tool(s): [303-1447](#)

56. Remove the special tool.

57.



Install the crankshaft position sensor.

Torque: 10 Nm

58.

CAUTION:

Only rotate the crankshaft clockwise.



Check that the position of the Variable Valve Timing (VVT) unit and crankshaft keyway are positioned as indicated. If the VVT units are not positioned as indicated, rotate the crankshaft clockwise until the correct crankshaft keyway and VVT unit positions are achieved.

59.

CAUTION:

Do not tension the tie strap at this stage.



Loosely install the tie strap around the timing chain guide on the non-tensioned side and the timing chain on the tensioned side, as illustrated.

60.

CAUTIONS:

- Note the orientation of the tie strap in the illustration before applying tension.
- Make sure the tension is maintained on the timing chain.



1. Carefully position the tie strap between the timing chain and

...generally prevent the tie strap between the timing chain and the timing chain guide, as shown in the illustration.

1. Apply sufficient tension to the tie strap to limit the chain movement whilst the timing chain tensioner and timing chain guide are removed.

61.



Remove the timing chain tensioner.

62.



Remove the timing chain guide bolt.

63.



Remove the timing chain guide.

64.

CAUTIONS:

- If the vehicle is fitted with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Using the illustration, identify which timing chain tensioner and guide is currently fitted to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only.

65.

CAUTION:

Make sure that a new component is installed.



Install the timing chain guide.

66.



Install the timing chain guide bolt.

Torque: 25 Nm

67.

CAUTIONS:

- If the vehicle is Installed with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Before installing the timing chain tensioners, use the illustration shown to identify which timing chain tensioner is currently fitted to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only. If a new timing chain tensioner is installed, do not deploy the tensioner pin and proceed to the next step. If the tensioner to be installed has previously been deployed, make sure the attached animation is followed to make sure the tensioner is set correctly, failure to do this may result in damage to the engine.

68.

CAUTION:



Do not release the timing chain tensioner locking pin at this stage.



Install the timing chain tensioner.

Torque: 12 Nm

69.



Apply and maintain tension on the component.

70.



Remove the timing chain tensioner retaining pin and release the timing chain guide.

71.



Remove and discard the tie strap.

72.



The piston should apply tension to the timing chain guide.

73.



The timing chain tensioner must maintain tension on the chain guide. If the piston can be pushed back so the chain guide contacts with the body of the tensioner, the tensioner is not correct. Repeat steps 67-73.

74.

CAUTION:

Only rotate the crankshaft clockwise.



Rotate the crankshaft clockwise 90 degrees until the crankshaft keyway is positioned as indicated in the illustration.

75.

CAUTION:

Only rotate the crankshaft clockwise.



Check that the position of the Variable Valve Timing (VVT) unit and crankshaft keyway are positioned as indicated. If the VVT units are not positioned as indicated, rotate the crankshaft clockwise until the correct crankshaft keyway and VVT unit positions are achieved.

76.

CAUTION:

Do not tension the tie strap at this stage.

NOTE:

Right side.



Loosely install the tie strap around the timing chain guide on the non-tensioned side and the timing chain on the tensioned side, as illustrated.

77.

CAUTIONS:

- Note the orientation of the tie strap in the illustration before applying tension.
- Make sure the tension is maintained on the timing chain.



1. Carefully manipulate the tie strap between the timing chain and the timing chain guide, to the position illustrated.
1. Apply sufficient tension to the tie strap; allowing the timing chain to remain under tension, whilst the timing chain tensioner and timing chain guide are removed.

78.



Remove the timing chain tensioner.

79.



Remove the timing chain guide bolt.

80.



Remove the timing chain guide.

81.

CAUTIONS:

- If the vehicle is fitted with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.





Using the illustration, identify which timing chain tensioner and guide is currently fitted to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only.

82.

CAUTION:

Make sure that a new component is installed.



Install the timing chain guide.

83.



Install the timing chain guide bolt.

Torque: 25 Nm

84.

CAUTIONS:

- If the vehicle is Installed with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Before installing the timing chain tensioners, use the illustration shown to identify which timing chain tensioner is currently fitted to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only. If a new timing chain

tensioner is installed, do not deploy the tensioner pin and proceed to the next step. If the tensioner to be installed has previously been deployed, make sure the attached animation is followed to make sure the tensioner is set correctly, failure to do this may result in damage to the engine.

85.

CAUTION:

Do not release the timing chain tensioner locking pin at this stage.



Before installing the timing chain tensioners, make sure the attached animation is followed to ensure the tensioner is set correctly, failure to do this may result in damage to the engine.

Torque: 12 Nm

86.



Apply and maintain tension on the component.

87.



Remove the timing chain tensioner retaining pin and release the timing chain guide.

88.



Remove and discard the tie strap.

89.

NOTE:

Left hand illustration shown, Right hand is similar.



The piston should apply tension to the timing chain guide.

90.



The timing chain tensioner must maintain tension on the chain guide. If the piston can be pushed back so the chain guide contacts with the body of the tensioner, the tensioner is not correct. Repeat steps 84-90.

91.



Remove the crankshaft pulley bolt.

INSTALLATION

1.

CAUTIONS:

- Use only a plastic scraper when removing the sealing material.
- Make sure that the mating faces are clean and free of foreign material.
- Make sure that the Land Rover approved cleaning fluid (Loctite 7063) is used to clean the mating faces.



Apply RTV sealant (Loctite 5901G) to the areas shown.

2.

CAUTION:

Make sure that a new component is installed.

NOTE:

Tighten the retaining bolts in the indicated sequence.



Tighten the lower timing cover bolts within 7 minutes.

Torque: 12 Nm

3.



Tighten the lower timing cover bolts within 7 minutes.

Torque: 12 Nm

4.

NOTE:

Lubricate the O-ring seal with clean engine oil.



Torque: 12 Nm

5.

CAUTIONS:

- Use only a plastic scraper when removing the sealing material.
- Make sure that the mating faces are clean and free of foreign material.
- Make sure that the Land Rover approved cleaning fluid (Loctite 7063) is used to clean the mating faces.



6.



Apply RTV sealant (Loctite 5901G) to the areas shown, install the component, and tighten the bolts within 7 minutes.

7.

CAUTION:

Take extra care not to damage the seal when installing the component.



8.

NOTE:

Tighten the retaining bolts in the indicated sequence.



Torque: 12 Nm

9.



Torque: 12 Nm

10.



Torque: 10 Nm

11.

CAUTION:

Using a suitable tool, lock the component.



Torque: 25 Nm

12.

CAUTIONS:

- Use only a plastic scraper when removing the sealing material.
- Make sure that the mating faces are clean and free of foreign material.
- Make sure that the Land Rover approved cleaning fluid (Loctite 7063) is used to clean the mating faces.



13.



Apply RTV sealant (Loctite 5901G) to the areas shown, install the component, and tighten the bolts within 7 minutes.

14.

CAUTION:

Take extra care not to damage the seal when installing the component.



15.

NOTE:

Tighten the retaining bolts in the indicated sequence.



13

Torque: 12 Nm

16.



Torque: 12 Nm

17.



Torque: 10 Nm

18.



Torque: 48 Nm

19.



20.



21.



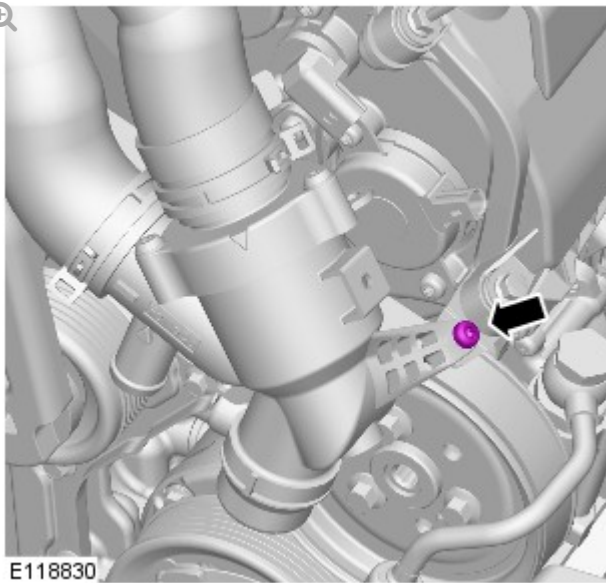
22.

NOTE:

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



23.



Torque: 10 Nm

24.



25.

CAUTIONS:

- Lubricate only the union threads with clean engine oil.
- Only tighten the bolts finger-tight at this stage.

NOTE:

Remove and discard the blanking caps.



26.



Torque:

Unions (1) **21 Nm**

M6 (2) **11 Nm**

M8 (3) **25 Nm**

27.



Torque: 48 Nm

28.



29.



Torque: 12 Nm

30.



31.



Torque: 25 Nm

32.



33. Refer to: [Fender Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

34.

WARNING:

The wheel and tire assembly will be heavy.

CAUTION:

Apply a small amount of grease to the hub and wheel mating surfaces before installation. Make sure the grease does not come into contact with the vehicles braking components and the wheel stud threads. Failure to follow these instructions may result in personal injury.

Install the RH front wheel and tire.

Torque: 140 Nm

35.



Torque: 25 Nm

36.



Torque: 48 Nm

37.

CAUTION:

Using a suitable tool, lock the component.



Torque: 25 Nm

38. Refer to: Crankshaft Pulley (303-01 Engine - V8 S/C 5.0L Petrol, Removal and Installation).

39.



Torque:

Unions **21 Nm**

M5 nut **6 Nm**

40.



41.

CAUTION:

This fuel pipe can be re-used, inspect for signs of damage.
Renew if necessary.



Torque:

Unions **21 Nm**

Bolts **12 Nm**

42.



43.



44.



45.



46.



47.



48. Refer to: [Air Cleaner Outlet Pipe T-Connector \(303-12D Intake Air](#)

Distribution and Filtering - V8 S/C 5.0L Petrol, Removal and Installation).

49. Connect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL


TIMING DRIVE COMPONENTS

[G1224608]

REMOVAL AND INSTALLATION

12.65.13	TIMING CHAIN, GEARS AND TENSIONER - RENEW	5000 CC, AJ V8, SUPERCHARGED	14.4	USED WITHINS	+
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SPECIAL TOOL(S)

	303-
---	------

1445

Timing Tool –
Camshaft
Alignment



303

-

144

7

Timing
Tool



**303-
1452**

Camshaft
Rotating
Tool



303

-

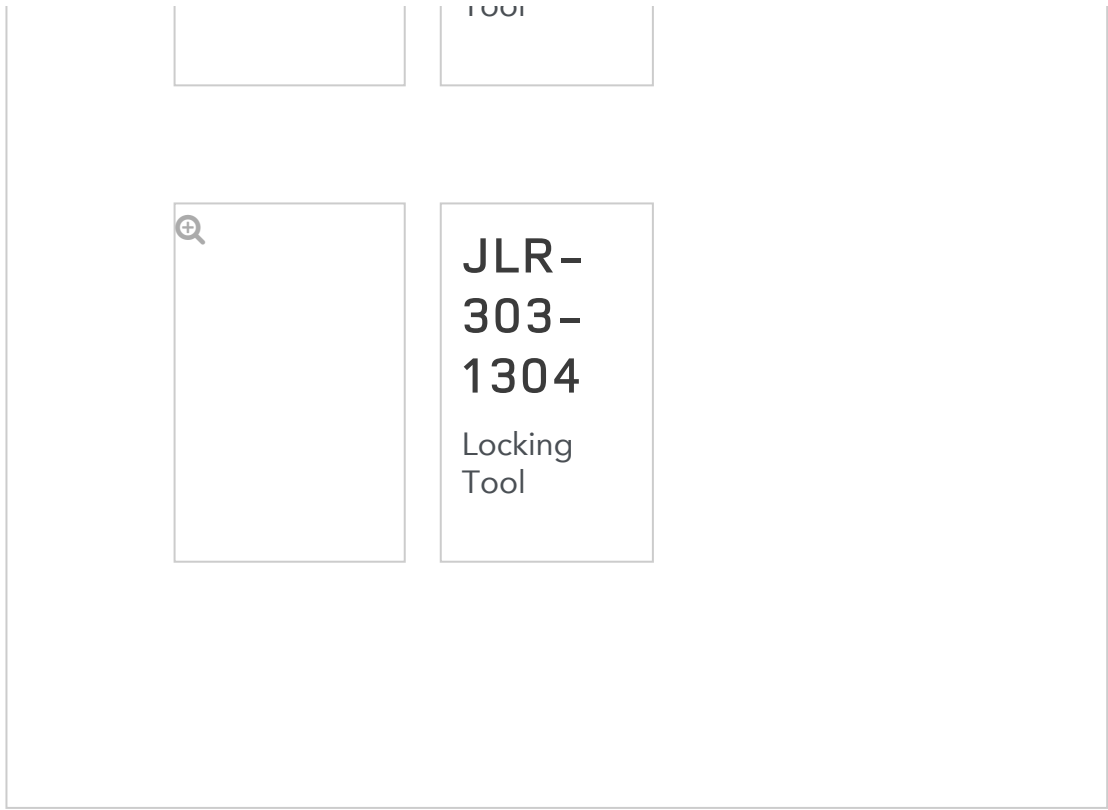
1482

Tension
er Tool



**JLR-
303-
1303**

Timing
Tool



REMOVAL

CAUTION:

Check all timing components for wear and install new components if required.

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

2.

WARNING:

Make sure to support the vehicle with safe stands.

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Timing Cover](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

4. **CAUTION:**

An M16 washer must be used to prevent damage to the crankshaft on installation.



Install the crankshaft pulley bolt.

Torque: **20 Nm**

5. 

6. **CAUTION:**

Only rotate the crankshaft clockwise.



Install the special tool.

Special Tool(s): [303-1447](#)

7. 

- Install the special tool.
- *Special Tool(s):* [JLR-303-1304](#)

8.



Remove the crankshaft pulley bolt.

9.



Remove the timing chain tensioner.

10.



11.



12.



13.

CAUTION:

If the variable valve timing (VVT) units are knocked or dropped then new VVT(s) must be installed.



Remove the timing chain and VVT units.

14.



Remove the timing chain tensioner.

15.



16.





17.



Release the oil drain tube.

18.



19.

CAUTION:

If the VVT is knocked or dropped then new VVT(s) must be installed.



Remove the timing chain with the VVT units.

20.



21.

CAUTION:

Discard the friction washer.



INSTALLATION

1.

CAUTION:

Install a new friction washer

Install a new friction washer.



2.



Torque: 12 Nm

3.



- Install the special tool to each Camshaft.
- *Special Tool(s):* [303-1452](#)
- *Torque: 10 Nm*

4.



- Carefully rotate the camshafts if the position is not as shown.

5.

CAUTIONS:

- Do not overturn the camshafts.
- Tighten the wing nuts finger tight. Failure to follow this instruction may result in damage to the components.



- *Special Tool(s):* [303-1452](#)
- Using a suitable tool, carefully rock the camshaft clockwise then anti-clockwise. Turn the special tool locking nuts until there is no movement left in camshafts. Repeat this step for both camshafts.

6.



- Remove the special tool from each Camshaft.
- *Special Tool(s):* [303-1452](#)

7.

CAUTIONS:

- Do not allow the camshaft to rotate.
- If the VVT is knocked or dropped then new VVT(s) must be installed.



- Install the timing chain with the VVT units.

8.

NOTE:

Install the bolts finger tight at this stage.



9.



- Make sure that all the timing chain alignment marks are in the positions shown.

10.

CAUTIONS:

- If the vehicle is Installed with components shown in section 1 of the illustration, these must be replaced with components shown in section (2)

components shown in section (2).

- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Using the illustration, identify which timing chain tensioner and guide is currently installed to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only.

11.



12.



Torque: 25 Nm

13.

CAUTIONS:

- If the vehicle is Installed with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Before installing the timing chain tensioners, use the illustration shown to identify which timing chain tensioner is currently fitted to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only. If a new timing chain tensioner is installed, do not deploy the tensioner pin and proceed to the next step. If the tensioner to be installed has previously been

to the next step. If the tensioner to be installed has previously been deployed, make sure the attached animation is followed to make sure the tensioner is set correctly, failure to do this may result in damage to the engine.

14.

CAUTION:

Do not release the timing chain tensioner locking pin at this stage.



Install the timing chain tensioner.

Torque: 12 Nm

15.



Apply and maintain tension on the component.

16.



Release the retaining pin.

17.



The piston should apply tension to the timing chain guide.

18.

CAUTION:

Make sure the tension is maintained.



Using considerable force, move the timing chain guide away from

the tensioner to allow the first stage ratchet mechanism to be applied.

19.



If the piston can be pushed back, the tensioner is not correct. Repeat steps 13-17.

20.



- Install the special tool to each Camshaft.
- *Special Tool(s):* [303-1452](#)
- *Torque:* **10 Nm**

21.



- **CAUTION:**

Do not overturn the camshafts.

Carefully rotate the camshafts if the position is not as shown.

22.

CAUTIONS:

- Do not overturn the camshafts.
- Tighten the wing nuts finger tight. Failure to follow this instruction may result in damage to the components.



- *Special Tool(s):* [303-1452](#)
- Using a suitable tool, carefully rock the camshaft clockwise then

anti-clockwise. Turn the special tool locking nuts until there is no movement left in camshafts. Repeat this step for both camshafts.

23.



- Remove the special tool from each Camshaft.
- *Special Tool(s):* [303-1452](#)

24.

CAUTIONS:

- Do not allow the camshafts to rotate.
- If the VVT is knocked or dropped then new VVT(s) must be installed.



- Install the timing chain with the VVT units.

25.

NOTE:

Install the bolts finger tight at this stage.



26.



- Make sure that all the timing chain alignment marks are in the positions shown.

27.

CAUTIONS:

- If the vehicle is Installed with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Using the illustration, identify which timing chain tensioner and guide is currently installed to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only.

28.



Torque: 25 Nm

29.

CAUTIONS:

- If the vehicle is Installed with components shown in section 1 of the illustration, these must be replaced with components shown in section (2).
- Do not attempt to install the components shown in section 1 of the illustration, as damage to the engine may occur.



Before installing the timing chain tensioners, use the illustration shown to identify which timing chain tensioner is currently fitted to the vehicle. Make sure the vehicle is assembled using components shown in section (2) of the illustration only. If a new timing chain tensioner is installed, do not deploy the tensioner pin and proceed to the next step. If the tensioner to be installed has previously been

deployed, make sure the attached animation is followed to make sure the tensioner is set correctly, failure to do this may result in damage to the engine.

30.

CAUTION:

Do not release the timing chain tensioner locking pin at this stage.



Before installing the timing chain tensioners, make sure the attached animation is followed to ensure the tensioner is set correctly, failure to do this may result in damage to the engine.

Torque: 12 Nm

31.



6. Release the retaining pin..

32.

NOTE:

Left hand illustration shown, Right hand is similar.



The piston should apply tension to the timing chain guide.

33.

CAUTION:

Make sure the tension is maintained.

NOTE:

NOTE:

Left hand illustration shown, Right hand is similar.



Using considerable force, move the timing chain guide away from the tensioner to allow the first stage ratchet mechanism to be applied.

34.

NOTE:

Left hand illustration shown, Right hand is similar.



If the piston can be pushed back, the tensioner is not correct. Repeat steps 27-31.

35.



- Install the special tool.
- *Special Tool(s):* [303-1482](#)

36.

CAUTIONS:

- Apply the torque to the end of the special tool.
- Make sure that the torque wrench is aligned with the special tool as illustrated in the graphic.



- Install the torque wrench to the special tool.

- *Torque: 35 Nm*

37.

CAUTION:

Make sure that the torque wrench does not move whilst tightening the VVT bolts.

NOTE:

Make sure to tighten the exhaust VVT unit bolts first.



1. *Torque: 32 Nm*

1. *Special Tool(s): 303-1482*

38.



Install the oil drain tube.

Torque: 10 Nm

39.



- Remove the special tool.
- *Special Tool(s): 303-1445*

40.



- Install the special tool.
- *Special Tool(s): 303-1482*

41.

CAUTIONS:

- Apply the torque to the end of the special tool.
- Make sure that the torque wrench is aligned with the special tool as illustrated in the graphic.



- Install the torque wrench to the special tool.
- *Torque: 35 Nm*

42.

CAUTION:

Make sure that the torque wrench does not move whilst tightening the VVT bolts.

NOTE:

Make sure to tighten the inlet VVT unit bolts first.



Torque: 32 Nm

43.



- Remove the special tool.
- *Special Tool(s): [303-1445](#)*

44.



- Remove the special tool.

- *Special Tool(s):* [JLR-303-1303](#)

45.



- Remove the special tool.
- *Special Tool(s):* [JLR-303-1304](#)

46.

CAUTION:

An M16 washer must be used to prevent damage to the crankshaft on installation.



Install the crankshaft pulley bolt.

Torque: **20 Nm**

47. Rotate the engine two complete turns clockwise.

48.

CAUTION:

Only rotate the crankshaft clockwise.



Make sure that the special tool is correctly located.

Special Tool(s): [JLR-303-1303](#)

49.

CAUTION:

If the special tool cannot be installed, the timing chain installation steps must be repeated.



Install the special tool. If the special tool cannot be installed, remove both timing chains and components and repeat the process from step 3 of the installation until the special tool 303-1445 is installed correctly.

Special Tool(s): [303-1445](#)

50.

CAUTION:

If the special tool cannot be installed, the timing chain installation steps must be repeated.



Install the special tool. If the special tool cannot be installed, remove both timing chains and components and repeat the process from step 3 of the installation until the special tool 303-1445 is installed correctly.

51.



- Remove the special tool.

52.



- Remove the special tool.

53.



- Remove the special tool.
- *Special Tool(s):* [JLR-303-1303](#)

54. Refer to: [Timing Cover](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

55. Connect the battery ground cable.

Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).



Torque: 10 Nm

2012.0 RANGE ROVER (LM), 303-01

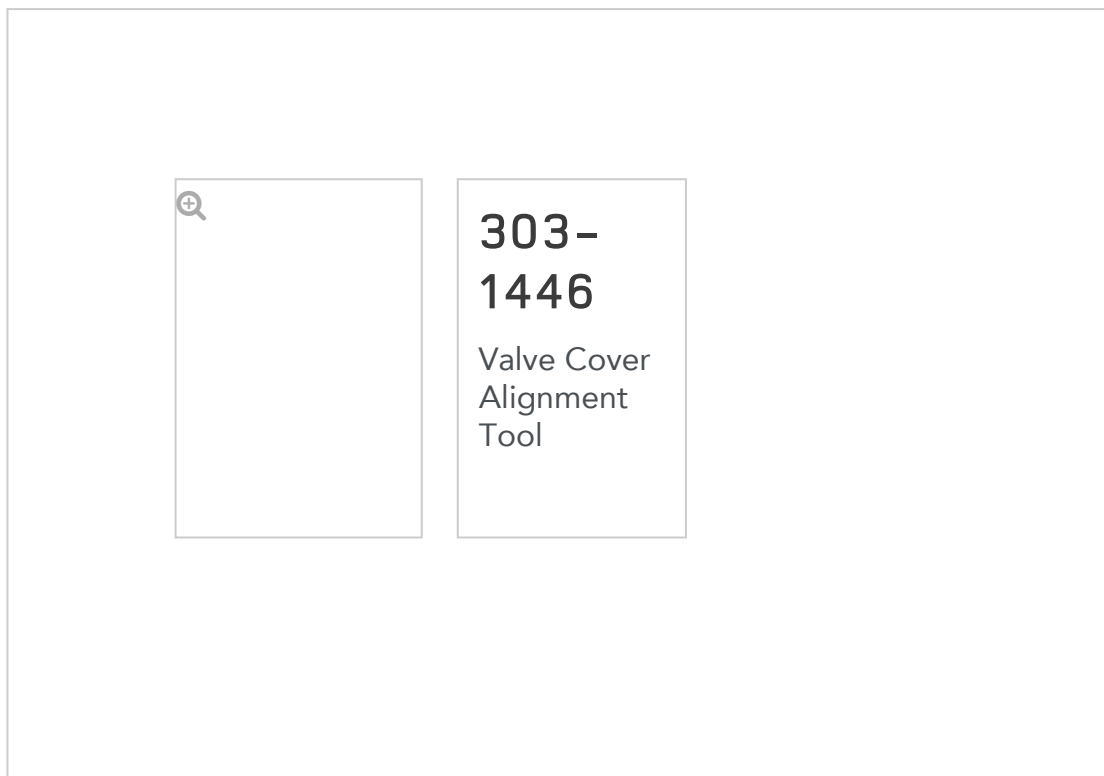
ENGINE - V8 S/C 5.0L PETROL

VALVE COVER LH (G1224609)

REMOVAL AND INSTALLATION

12.29.43	COVER - CAMSHAFT/ROCKER OR CYLINDER HEAD - EACH - RENEW	5000 CC, AJ V8, SUPERCHARGED	4.7	USED WITHINS	+
----------	--	---------------------------------	-----	-----------------	---


SPECIAL TOOL(S)



REMOVAL

NOTES:


- Some variation in the illustrations may occur, but the essential information is always correct.
- Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).
2. Refer to: Supercharger (303-12, Removal and Installation).
3. Refer to: Air Cleaner Outlet Pipe LH (303-12, Removal and Installation).
4. Refer to: Fuel Rail LH (303-04, Removal and Installation).
5. 

Torque: 10 Nm

6. 
7. 

Torque: 25 Nm

8. 

INSTALLATION

1. **CAUTIONS:**

- Use only a plastic scraper when removing the sealing material.
- Use lint free cloth.

- Make sure that the mating faces are clean and free of corrosion and foreign material.
- Installation of the valve cover and tightening must be carried out within 7 minutes of applying the sealant.

NOTE:

Apply two beads of silicone gasket sealant (Loctite 5901) as shown on the illustration. The application of the sealant must be 1.5mm diameter 12mm long. Install the valve cover immediately after applying the sealant. The cover should be fitted directly to the head without smearing the sealant or the seals.



To install, reverse the removal procedure.

2.



Special Tool(s): [303-1446](#)

3.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: **13 Nm**

2012.0 RANGE ROVER (LM), 303-01

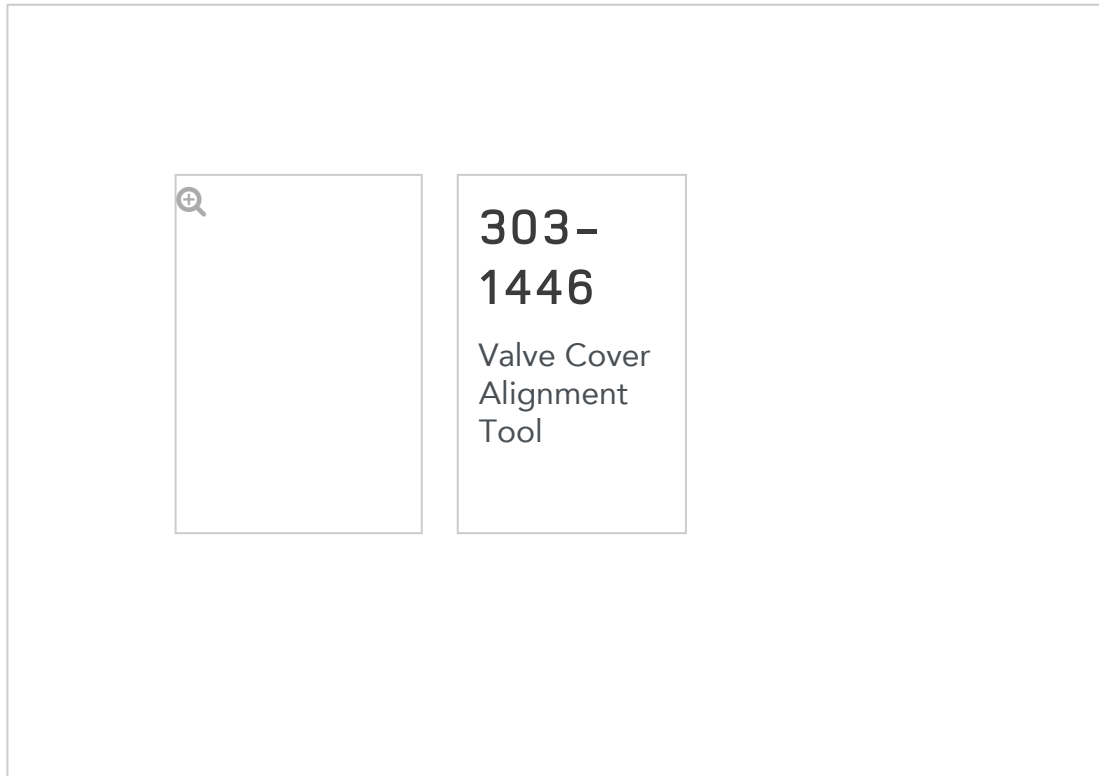
ENGINE - V8 S/C 5.0L PETROL

VALVE COVER RH (G1224610)

REMOVAL AND INSTALLATION

COVER -
CAMSHAFT/ROCKER
12.29.44 OR CYLINDER HEAD 5000 CC, AJ V8,
- RH/REAR - SUPERCHARGED 6.6 USED
RENEW WITHINS +

SPECIAL TOOL(S)




REMOVAL


NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).
2. Refer to: Supercharger (303-12, Removal and Installation).
3. Refer to: Air Cleaner Outlet Pipe RH (303-12, Removal and Installation).

4. Refer to: Fuel Rail RH (303-04, Removal and Installation).

5. 

6. 

7. 

INSTALLATION

1.

CAUTIONS:

- Use only a plastic scraper when removing the sealing material.
- Use lint free cloth.
- Make sure that the mating faces are clean and free of corrosion and foreign material.
- Installation of the valve cover and tightening must be carried out within 7 minutes of applying the sealant.

NOTE:

Apply two beads of silicone gasket sealant (Loctite 5901) as shown on the illustration. The application of the sealant must be 1.5mm diameter 12mm long. Install the valve cover immediately after applying the sealant. The cover should be fitted directly to the head without smearing the sealant or the seals.



To install, reverse the removal procedure.

2.



Special Tool(s): [303-1446](#)

3.

NOTE:

Tighten the bolts in the indicated sequence.



Torque: **13 Nm**

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

CYLINDER BLOCK OIL GALLERY PLUG (G1451564)

REMOVAL AND INSTALLATION

REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Plenum Chamber](#) (412-01A Air Distribution and Filtering, Removal and Installation).

2. **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.

3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

4. 

Torque: 12 Nm

5. 

6. **CAUTION:**

Make sure that the mating faces are clean and free of corrosion and foreign material.



Torque:

Stage 1: **40 Nm**

Stage 2: **180°**

INSTALLATION

1. To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

FUEL PUMP CAMSHAFT (G1453825)

REMOVAL AND INSTALLATION

12.65.13	TIMING CHAIN, GEARS AND TENSIONER - RENEW	5000 CC, AJ V8, SUPERCHARGED	14.4	USED WITHINS	+
----------	--	---------------------------------	------	-----------------	---

REMOVAL

NOTE:

Some illustrations may show the engine removed for clarity.

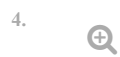
1. Disconnect the battery ground cable.
Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Oil Pan Extension](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).



7. **CAUTION:**

Take extra care when removing the component, prevent damage to the mating faces.



INSTALLATION

1. **CAUTION:**

Make sure that the mating faces are clean and free of foreign material.



2. **CAUTION:**

Take extra care not to damage the mating faces.



Torque: 12 Nm

3.



Torque: 21 Nm

4.



Torque: 12 Nm

5.



Install the lower timing chain making sure the coloured chain links align correctly with the fuel rail high-pressure fuel pumps camshaft and crankshaft sprocket markings.

6.

CAUTION:

Make sure that the tensioner spring is correctly located.



Torque: 21 Nm

7. Refer to: [Oil Pan Extension](#) (303-01D Engine - V8 S/C 5.0L Petrol, Removal and Installation).

8. Connect the battery ground cable.

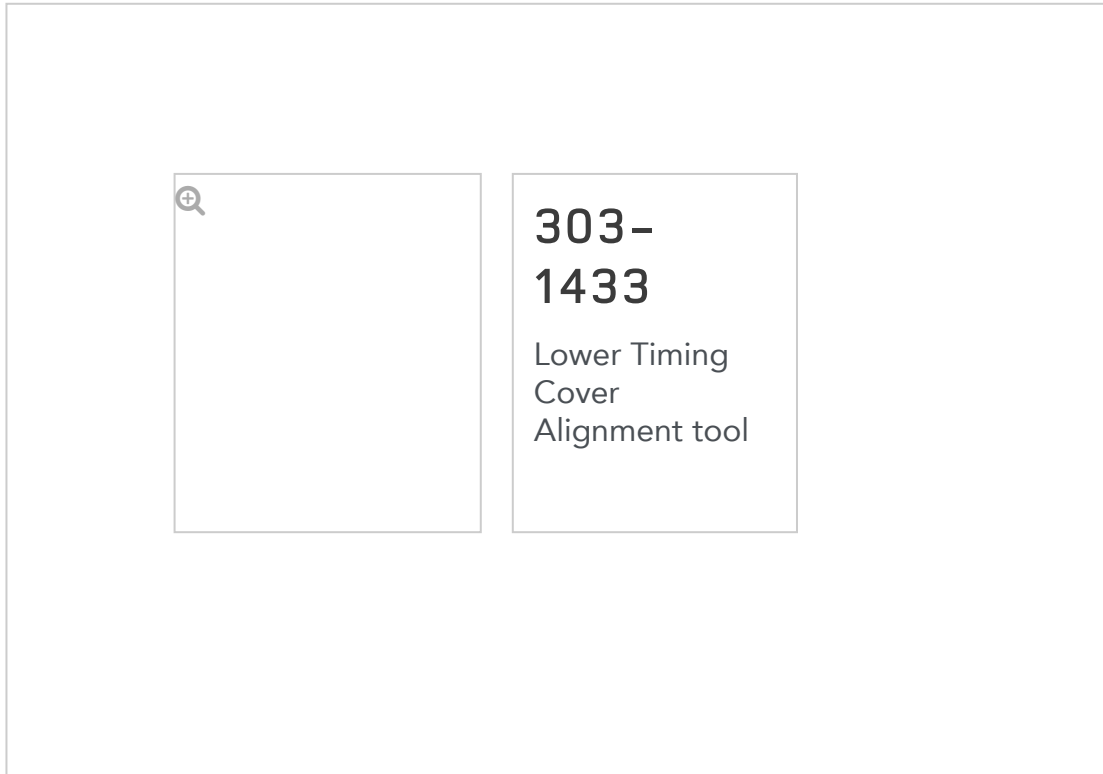
Refer to: [Specifications - Armoured](#) (414-00 Battery and Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

LOWER TIMING COVER (G1473680)

12.65.43	COVER - TIMING GEAR - LOWER - RENEW	5000 CC, AJ V8, SUPERCHARGED	6.6	USED WITHINS	+
----------	---	---------------------------------	-----	-----------------	---

SPECIAL TOOL(S)

REMOVAL

1. Disconnect the battery ground cable.
Refer to: Specifications (414-01, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Crankshaft Pulley (303-01C, Removal and Installation).
4. Refer to: [Brake Vacuum Pump - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#)

(206-07 Power Brake Actuation, Removal and Installation).


5. 

6. 

7. 

8. 

INSTALLATION

1. 

Apply RTV sealant WSE-M4G323-A6 (Loctite 5901G) to the areas shown, and tighten the bolts within 7 minutes.

2. **CAUTION:**

Make sure that the mating faces are clean and free of foreign material.



Install the bolts, but do not tighten fully at this stage.

Special Tool(s): [303-1433](#)

3. **NOTE:**

Tighten the bolts in the indicated sequence.



Torque:

M6 12 Nm

M8 20 Nm

4.



Torque: 12 Nm

5.



Torque: 40 Nm

6.



Torque: 25 Nm

7.



Torque: 25 Nm

8. Refer to: [Brake Vacuum Pump - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#)
(206-07 Power Brake Actuation, Removal and Installation).

9. Refer to: Crankshaft Pulley (303-01C, Removal and Installation).

10. Connect the battery ground cable.
Refer to: Specifications (414-01, Specifications).

11.

CAUTION:

Make sure that the vehicle is left for 5 minutes from filling with oil and that the engine oil level is reading at least

minimum (by following Steps 14-21), before starting the engine.

- Fill the engine with oil - for filling values on vehicles without supercharger:
Refer to: [Specifications](#) (303-01C Engine - V8 5.0L Petrol, Specifications).
- Fill the engine with oil - for filling values on vehicles with supercharger:
Refer to: [Specifications](#) (303-01D Engine - V8 S/C 5.0L Petrol, Specifications).
- Clean any residual engine oil from the oil filler cap area.

12.

CAUTION:

Make sure that the vehicle has been left for 5 minutes from filling with oil.

Follow the Steps 14-21 before starting the engine.

- 13.
- Start the engine and allow to run for 10 minutes, stop the engine.
 - Check for leaks.

14.

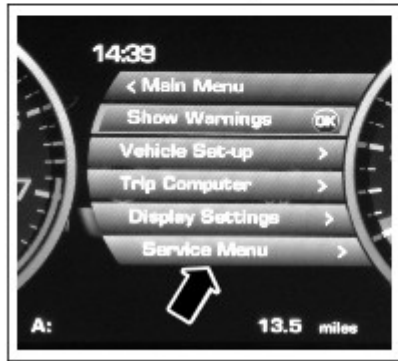
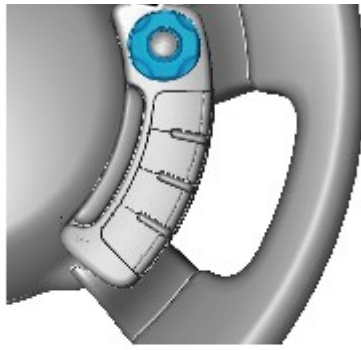
CAUTIONS:

- Make sure that the selector lever and the gearshift mechanism are in the park (P) position.
- Make sure that the hood is open.

- Turn the ignition on.

15.





E122817

- Press the right-hand directional button to access the instrument cluster menu.

16. 

- Press the right-hand OK button.

17. 

- Press the right-hand directional button to access the Oil Level Display.

18. 

- Press the right-hand OK button and follow the instructions.

19. 

- Press the cruise control cancel button twice within 2 seconds.

20.



- The message center display will revert to the normal display in the trip computer.
- Press the right-hand OK button and follow the instructions.
- Check that the oil level display shows an oil level reading.
- Only after having started and run the engine for 10 minutes (as indicated in Step 13), switch off the engine, then stabilizing for 10 minutes, take a reading from the oil level display and, if necessary top up with engine oil.

21.

NOTE:

If instructed to follow Steps 14-21 in a previous step, return to Step 13 and continue the procedure.

Turn the ignition off.

22. Allow 10 minutes for the engine oil level to stabilize if there has been additional oil top up.

23.

NOTE:

The following steps are to update the average oil level value.

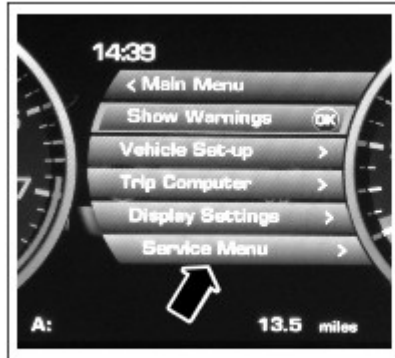
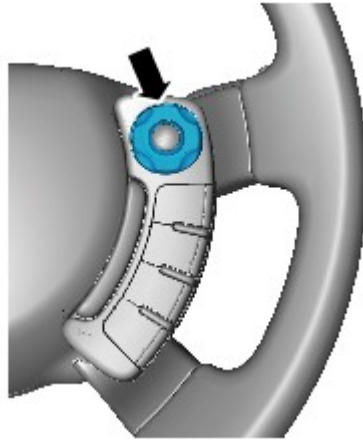


- Turn the ignition on.
 - Press and hold the cruise control cancel button for more than 2 seconds.
24. ▪ The message center display will revert to the normal display in the trip computer.

25. Turn the ignition off.

26. Turn the ignition on.

27.



E122817

- Press the right-hand directional button to access the instrument cluster menu.

28.



- Press the right-hand OK button.

29.



- Press the right-hand directional button to access the Oil Level Display.

30.



- Press the right-hand OK button and follow the instructions.
 - Make sure that the average oil level value has now been updated.
31. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).
 32. Refer to: [Radiator Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

2012.0 RANGE ROVER (LM), 303-01

ENGINE - V8 S/C 5.0L PETROL

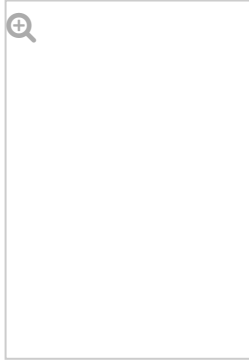
ENGINE (G1224612)

REMOVAL

12.41.01.99	ENGINE AND ANCILLARIES - REMOVE FOR ACCESS AND REFIT	5000 CC, AJ V8, SUPERCHARGED	10.4	USED WITHINS	+
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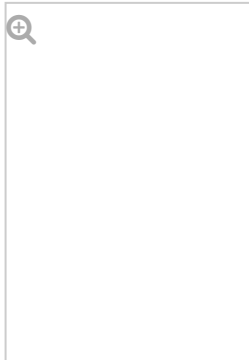
REMOVAL

SPECIAL TOOL(S)



303-1435

Engine
Lifting
Brackets
Rear



303-1436

Engine
Lifting
Bracket
Front

NOTE:

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



All vehicles

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2.


WARNING:



Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Air Conditioning \(A/C\) System Recovery, Evacuation and Charging - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (412-00 Climate Control System - General Information, General Procedures).
4. Refer to: [Transmission - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (307-01C Automatic Transmission/Transaxle - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal).
5. Refer to: [Cooling Fan - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).
6. Refer to: [Cooling System Partial Draining, Filling and Bleeding - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, General Procedures).
7. Refer to: [Front Halfshaft LH - Vehicles Without: High Performance Brakes](#) (205-04 Front Drive Halfshafts, Removal and Installation).
8. Refer to: [Front Halfshaft RH - Vehicles Without: High Performance Brakes](#) (205-04 Front Drive Halfshafts, Removal and Installation).
9. Secure the hood in the service position.

10. 

11. 

12. **WARNING:**

Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components.

Highly flammable vapors are always present and may ignite.
Failure to follow these instructions may result in personal injury.

CAUTION:

Be prepared to collect escaping fuel.



13.

CAUTION:

Be prepared to collect escaping coolant.



14.

WARNING:

Be prepared to collect escaping fluids.



15.



16.

CAUTION:

Be prepared to collect escaping coolant.



17.

CAUTION:

Be prepared to collect escaping coolant.



18.



19.

CAUTION:

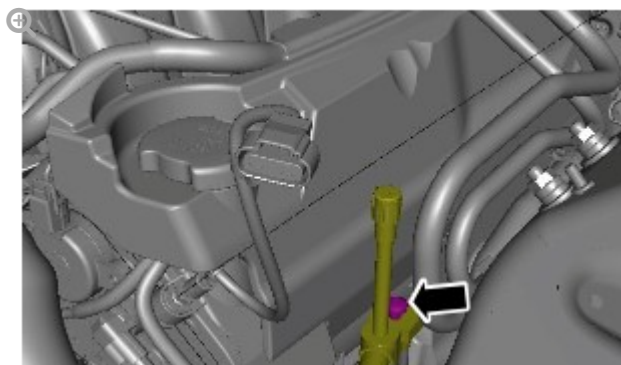
Make sure that all openings are sealed. Use new blanking caps.

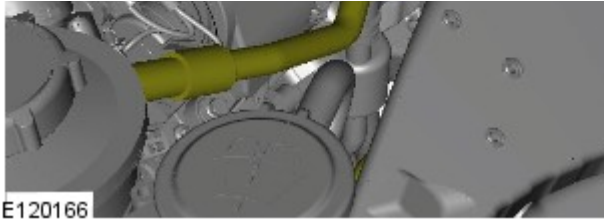


20.

CAUTION:

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





21.

NOTE:

RHD illustration shown, LHD is similar.



22.



23.



24.



25.

CAUTION:

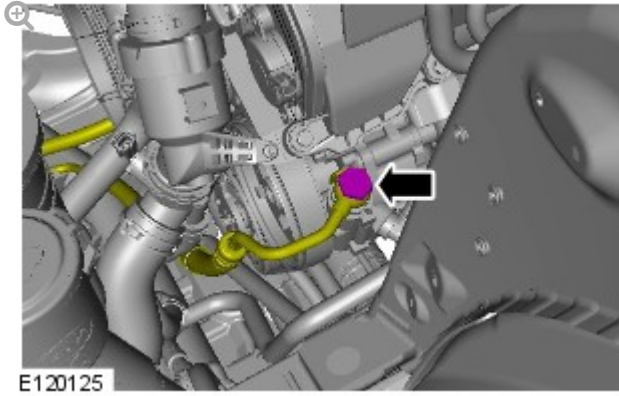
Be prepared to collect escaping fluids.



26.

CAUTION:

Install new o-ring seals



27.

CAUTION:

Be prepared to collect escaping coolant.



28.

CAUTION:

Be prepared to collect escaping coolant.



Right-hand drive vehicles

1.



2.



Left-hand drive vehicles

1.



All vehicles

1.

NOTE:

RHD illustration shown, LHD is similar.



2.

NOTE:

RHD illustration shown, LHD is similar.



3.



4.



Special Tool(s): [303-1435](#)

Torque: 25 Nm

5.



6.

NOTE:

Remove and discard the gasket.



7.

NOTE:

Remove and discard the gasket.



8.



9.



Special Tool(s): [303-1436](#)

Torque: **25 Nm**

10.



11.



12.

NOTE:

This step requires the aid of another technician.



Special Tool(s): [303-1435](#), [303-1436](#)

2012.0 RANGE ROVER (LM), 303-01

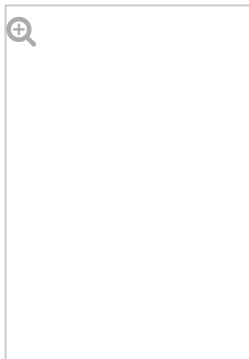
ENGINE - V8 S/C 5.0L PETROL

ENGINE (G1224613)

INSTALLATION

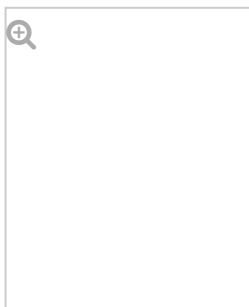
INSTALLATION

SPECIAL TOOL(S)



**303-
1435**

Engine
Lifting
Brackets
Rear



**303-
1436**

Engine
Lifting
Bracket
Front



NOTE:

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



All vehicles

1.

NOTE:

This step requires the aid of another technician.



Special Tool(s): [303-1436](#), [303-1435](#)

2.



Torque: **100 Nm**

3.



Torque: **100 Nm**

4.



Special Tool(s): [303-1436](#)



Torque: 25 Nm

6.

NOTE:

Install a new gasket.



Torque: 48 Nm

7.

NOTE:

Install a new gasket.



Torque: 48 Nm

8.



Torque: 10 Nm

9.



Special Tool(s): [303-1435](#)

10.



Torque: 10 Nm

11.

NOTE:

RHD illustration shown, LHD is similar.



Torque: 25 Nm

12.

NOTE:

RHD illustration shown, LHD is similar.



Torque: 25 Nm



Left-hand drive vehicles

1.



Torque: 10 Nm



Right-hand drive vehicles

1.



Torque: 10 Nm

2.



Torque: 10 Nm



All vehicles

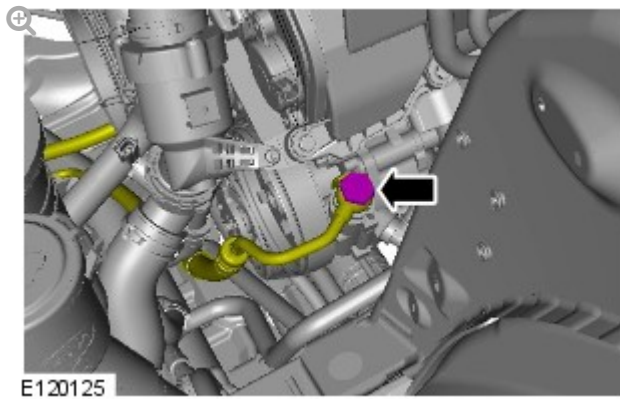
1. 

Torque: 12 Nm

2. 

3. **CAUTIONS:**


- Install new o-ring seals
- Lubricate the O-ring seals.



Torque: 25 Nm

4. 

5. 

6. 

7. 

8.

NOTE:

RHD illustration shown, LHD is similar.

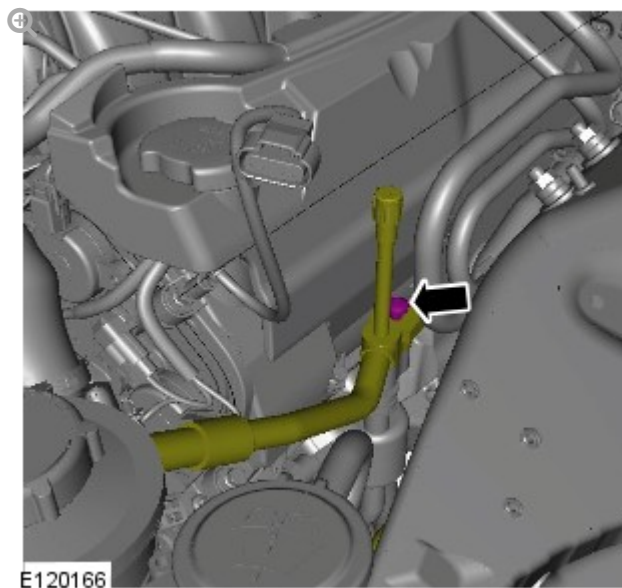


Torque: 8 Nm

9.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Torque: 25 Nm

10.

CAUTION:

Make sure that the area around the component is clean and free of foreign material.

NOTE:

Remove and discard the blanking caps.



Torque: 25 Nm

11.



12.



13.



14.



15.



16.



17.

WARNING:

Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

CAUTION:

Be prepared to collect escaping fuel.



18.



19.



20.



21. Refer to: [Front Halfshaft LH - Vehicles Without: High Performance Brakes](#) (205-04 Front Drive Halfshafts, Removal and Installation).
22. Refer to: [Front Halfshaft RH - Vehicles Without: High Performance Brakes](#) (205-04 Front Drive Halfshafts, Removal and Installation).
23. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).
24. Refer to: [Cooling Fan - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).
25. Refer to: [Transmission - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (307-01C Automatic Transmission/Transaxle - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Installation).
26. Refer to: [Air Conditioning \(A/C\) System Recovery, Evacuation and Charging - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (412-00 Climate Control System - General Information, General Procedures).
27. Lower the vehicle.

28. Connect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

29. Using the approved diagnostic equipment, clear the powertrain control module (PCM) adaptations.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L

PETROL/V8 S/C 5.0L

REPAIR

PETROL

SPECIFICATIONS

Lubricants

NOTE:

Coolant must be collected into a clean container and can be reused if not contaminated.

DESCRIPTION	SPECIFICATION
Coolant	Havoline Extended Life Coolant (XLC)
Coolant concentration	50%

Capacities

ITEM	SPECIFICATION
Vehicles with supercharger - vehicles fitted with 4 zone Air Conditioning (A/C)	20.5L (dry capacity)
Vehicles without supercharger - vehicles fitted with 4 zone Air Conditioning (A/C)	16.6L (dry capacity)
Vehicles with supercharger - vehicles fitted with 2 zone Air Conditioning (A/C)	19.8L (dry capacity)
Vehicles without supercharger - vehicles fitted with 2 zone Air Conditioning (A/C)	15.9L (dry capacity)

Torque Specifications

DESCRIPTION	NM	LB-FT	LB-IN
Coolant expansion tank retaining bolt	10	7	-
Cooling fan assembly retaining nut	65	48	-
Thermostat housing retaining bolts	10	7	-
Coolant pump retaining bolts	12	9	-

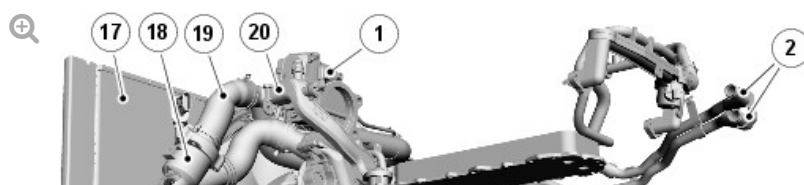
Radiator drain plug	2	-	18
Coolant bleed screw(s)	3	-	27

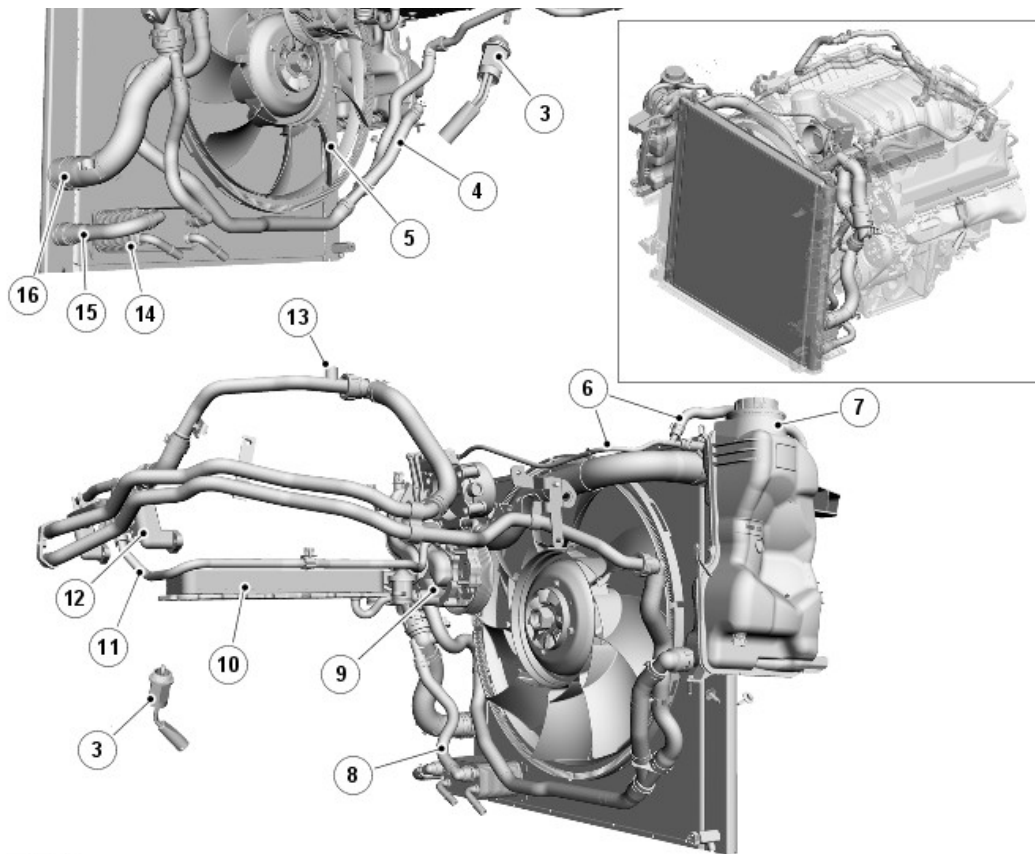
2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

DESCRIPTION AND OPERATION

COMPONENT LOCATION - NATURALLY
ASPIRATED VEHICLES



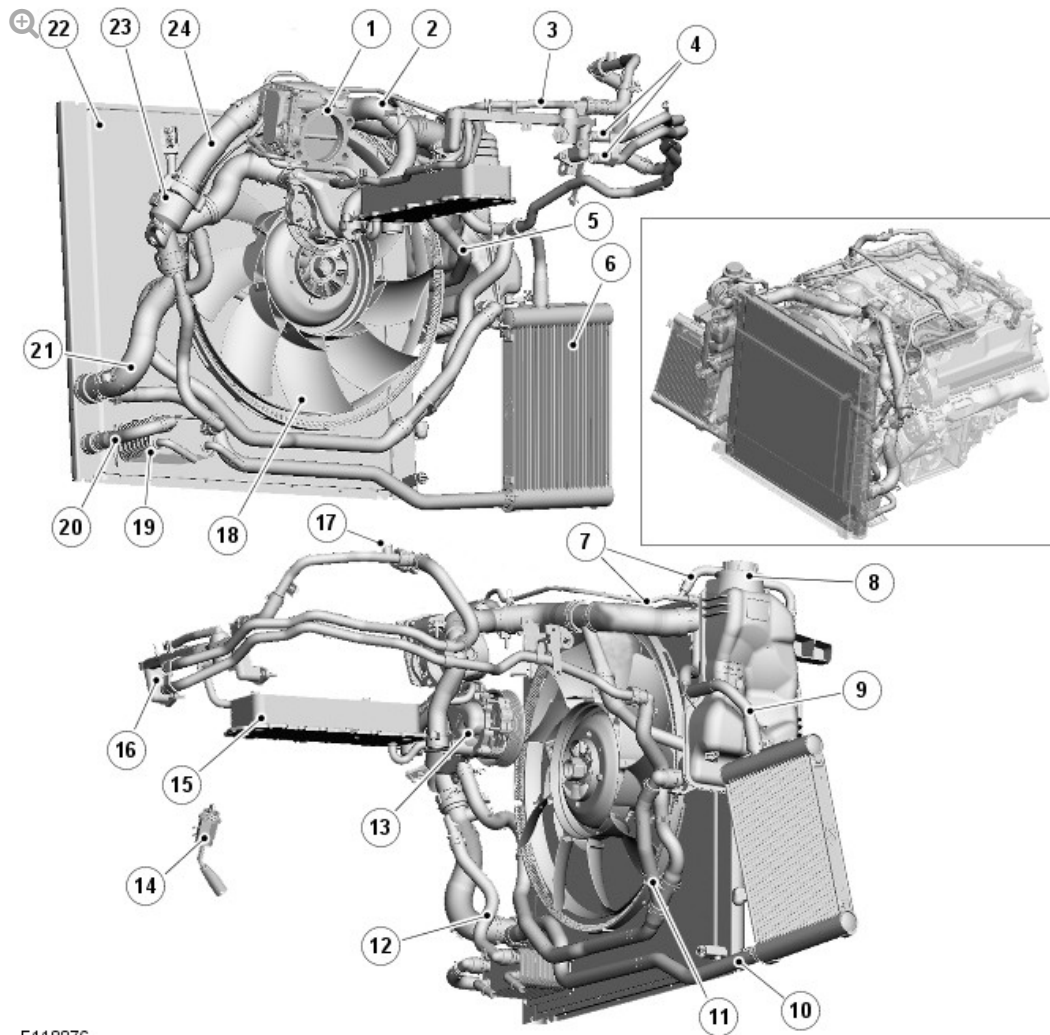


E118875

ITEM	DESCRIPTION
1	Throttle
2	Heater system supply and return hoses
3	Engine block heater (230 V version shown) or drain plug
4	Coolant supply/expansion hose
5	Cooling fan
6	Bleed hoses
7	Coolant expansion tank
8	Transmission fluid cooler return hose
9	Coolant pump
10	Engine oil cooler
11	Throttle body heater hose
12	Heater manifold
13	Bleed screw
14	Transmission fluid cooler
15	Transmission fluid cooler supply hose

16	Radiator lower hose
17	Radiator
18	Thermostat
19	Radiator upper hose
20	Outlet tube

COMPONENT LOCATION - SUPERCHARGER VEHICLES



E118876

ITEM	DESCRIPTION
1	Throttle
2	Outlet tube
3	Throttle body heater hose
4	Heater system supply and return hoses

4	Heater system supply and return hoses
5	Charge air radiator supply hose
6	Auxiliary radiator
7	Bleed hoses
8	Coolant expansion tank
9	Auxiliary radiator supply hose
10	Auxiliary radiator return hose
11	Coolant supply/expansion hose
12	Transmission fluid cooler return hose
13	Coolant pump
14	Engine block heater (230 V version shown) or drain plug
15	Engine oil cooler
16	Heater manifold
17	Bleed screw
18	Cooling fan
19	Transmission fluid cooler
20	Transmission fluid cooler supply hose
21	Radiator lower hose
22	Radiator
23	Thermostat
24	Radiator upper hose

INTRODUCTION

The engine cooling system maintains the engine within an optimum temperature range under changing ambient and engine operating conditions. The system is a pressurized expansion tank system with continuous bleeds to separate air from the coolant and prevent the formation of air locks. The engine cooling system also provides:

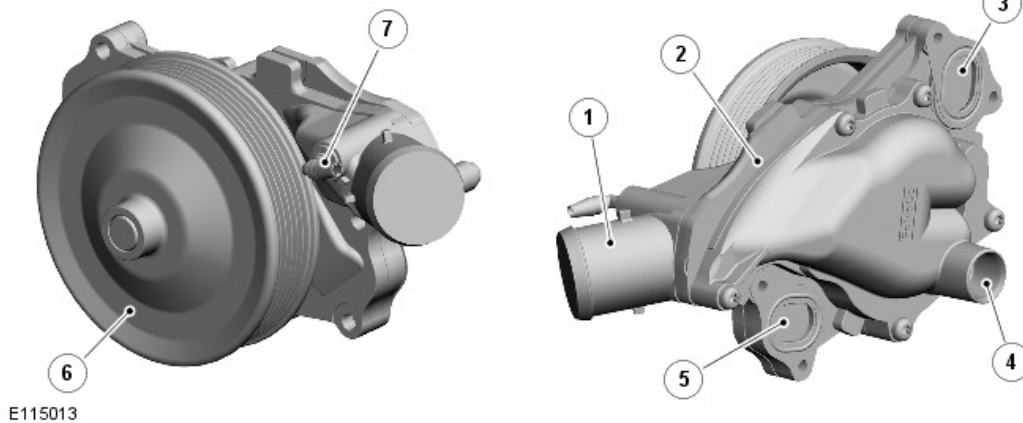
- Heating for:
 - The passenger compartment.

- The throttle body.
- Cooling for:
 - The engine oil cooler.
 - The transmission fluid cooler.

The primary components of the engine cooling system are the:

- Coolant pump.
- Thermostat.
- Radiator.
- Auxiliary radiator (SC (supercharger) vehicles only).
- Cooling fan.
- Expansion tank.
- Outlet tube and heater manifold.
- Connecting hoses and pipes.

COOLANT PUMP



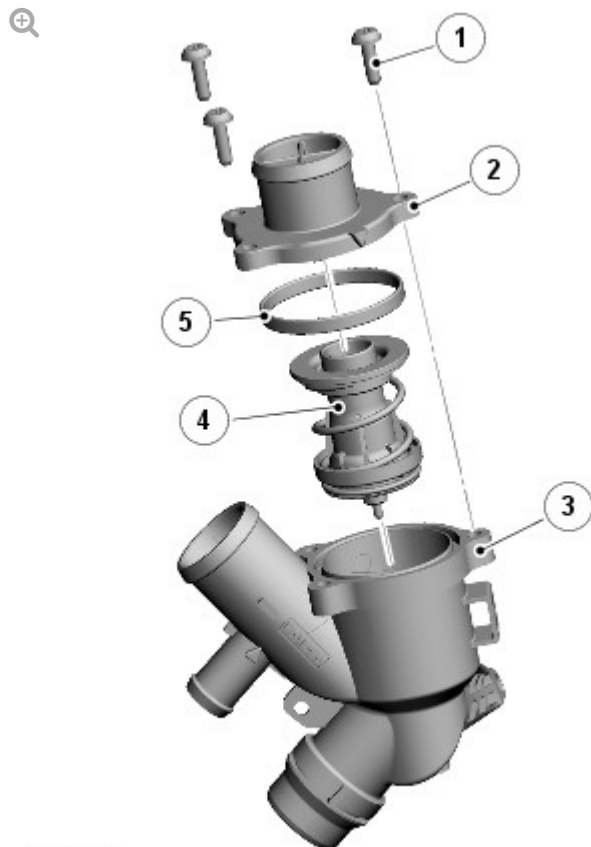
ITEM	DESCRIPTION
1	Inlet connection
2	Pump body
3	Outlet flange to RH cylinder head
4	Outlet to engine oil cooler

5	Outlet flange to LH cylinder head
6	Pulley
7	Bleed pipe connection (containing check valve)

The body of the coolant pump contains an impeller attached to a shaft supported in a bearing assembly. The impeller is driven by a pulley, pressed on to the front of the shaft, which is driven by the accessory drive belt. For additional information, refer to: Accessory Drive (303-05B, Description and Operation).

Two coolant outlet flanges attach the coolant pump to the front of the cylinder heads. A pipe connects a further coolant outlet to a pipe from the engine oil cooler. A bleed connector is installed in the front of the coolant pump, adjacent to the coolant inlet connection from the thermostat. A check valve is incorporated into the bleed connection.

THERMOSTAT



E115014

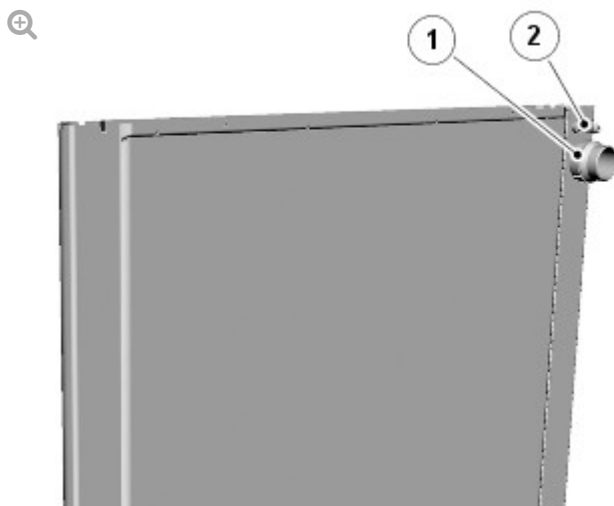
ITEM	DESCRIPTION
1	Screw (3 off)
2	Lower body
3	Upper body
4	Thermostat
5	Seal

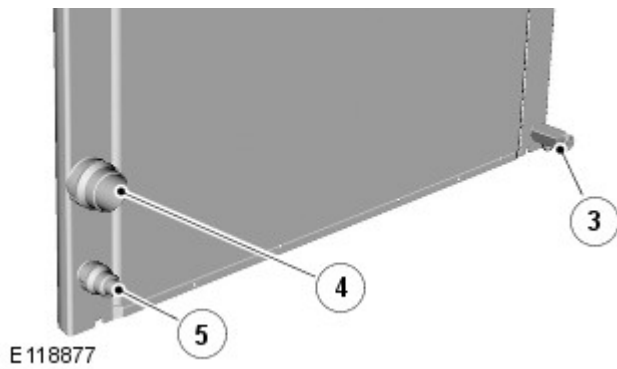
The thermostat is a multi-stage device located in the coolant pump inlet to provide fast response and control of the engine outlet temperature.

The thermostat allows rapid engine warm-up by preventing coolant flow through the radiator and by limiting coolant flow through the cylinder block when the engine is cold. During warm-up and at engine speeds above approximately 1800 rev/min, a by-pass valve opens to control the coolant flow and pressure, to protect the engine components. When the thermostat opening reaches 6 mm (0.24 in.), the by-pass flow is shut-off. When the thermostat opening exceeds 6 mm (0.24 in.), the radiator coolant flow is further controlled up to the point where the thermostat is fully open. At this point maximum radiator coolant flow is achieved to provide maximum cooling.

On both naturally aspirated and supercharger vehicles, the thermostat begins to open at 88 - 90 °C (190 - 194 °F) and is fully open at 102 °C (216 °F).

RADIATOR



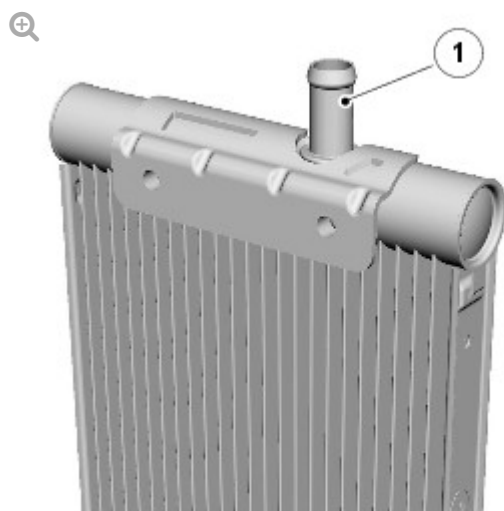


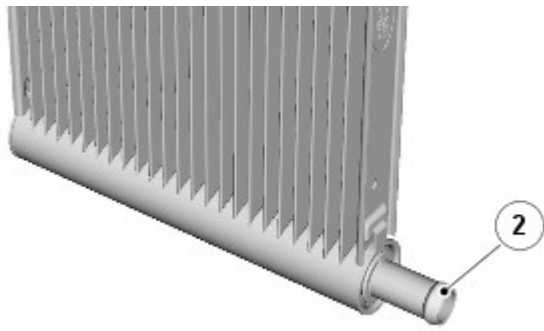
ITEM	DESCRIPTION
1	Upper hose connection
2	Bleed hose connection
3	Drain valve
4	Lower hose connection
5	Transmission fluid cooler supply hose connection

The radiator is an aluminum cross flow type installed in a plastic frame. Upper and lower mounting brackets attach the sides of the frame to the hood locking platform and the front side members respectively.

Connections are incorporated into the end tanks for the upper and lower hoses, the supply hose of the transmission fluid cooler and a bleed hose. A drain valve is installed in the bottom rear of the RH (right-hand) end tank.

AUXILIARY RADIATOR (SUPERCHARGER VEHICLES ONLY)



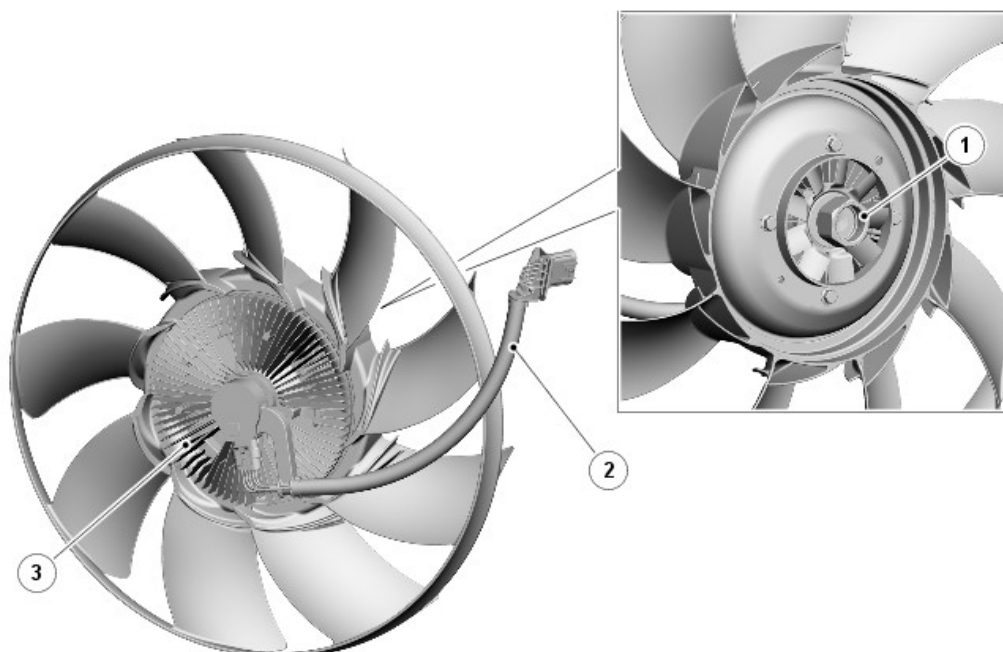


E118878

ITEM	DESCRIPTION
1	Supply hose connection
2	Return hose connection

The auxiliary radiator is connected in parallel with the (main) radiator to increase the engine cooling capacity on SC vehicles. The auxiliary radiator is installed in an air duct located between the front bumper and the RH wheel arch liner. Slots in the wheel arch liner allow the air to flow through the auxiliary cooler and into the wheel arch. The two end tanks of the auxiliary radiator incorporate connections for the supply and return hoses that connect it to the radiator upper and lower hoses.

COOLING FAN



E118879

ITEM	DESCRIPTION
1	Securing nut
2	Harness
3	Electro-viscous drive unit

For additional airflow through the radiator, particularly when the vehicle is stationary or moving slowly, there is an engine driven electro-viscous cooling fan. The cooling fan functions as a normal viscous fan, but with electronic control over the level of engagement of the viscous clutch. The ECM (engine control module) controls the level of engagement to optimize fan speed for all operating conditions.

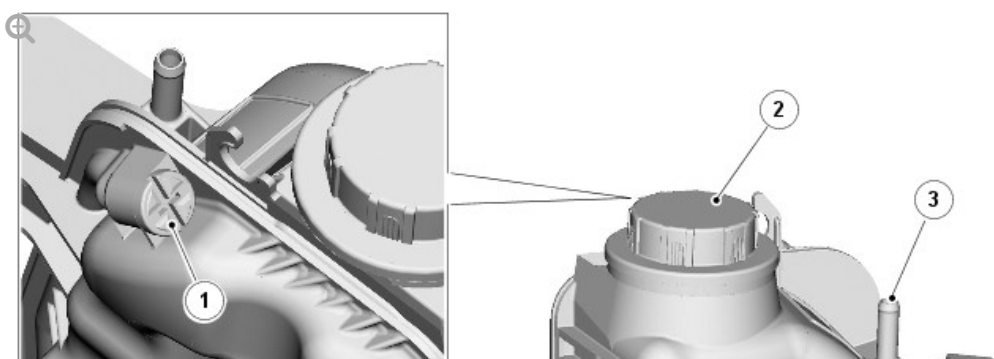
A securing nut attaches the cooling fan to a drive pulley, which is mounted on the front of the engine and driven by the accessory drive system.

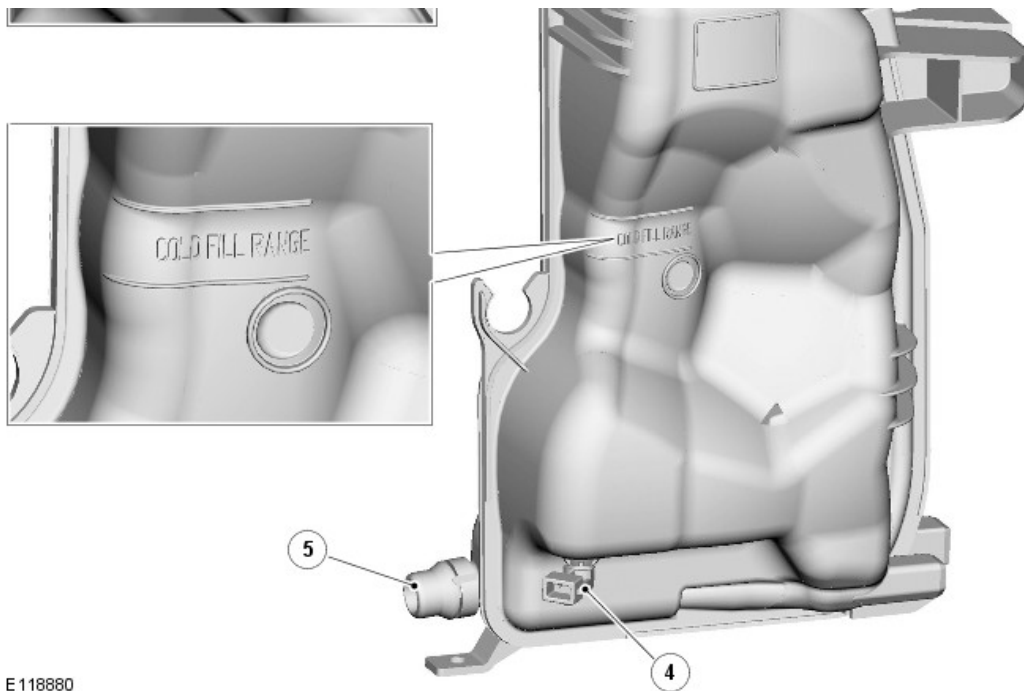
NOTE:

On naturally aspirated engines the securing nut has a LH (left-hand) thread; on SC engines the securing nut has a RH thread.

The blades of the cooling fan are located in a fan cowl attached to the rear of the radiator frame. Brushes around the circumference of the aperture in the fan cowl provide a seal with the blade shroud. An electrical connector in the top left corner of the fan cowl provides the interface between the cooling fan harness and the vehicle wiring.

EXPANSION TANK





E 118880

ITEM	DESCRIPTION
1	Bleed screw
2	Filler cap
3	Bleed hose connection
4	Level sensor
5	Coolant supply/expansion hose connection

The expansion tank is installed on the RH side of the engine compartment, immediately behind the suspension turret. A filler cap, bleed screw and level sensor are incorporated into the expansion tank. MAX and MIN level markings are molded onto the exterior of the tank.

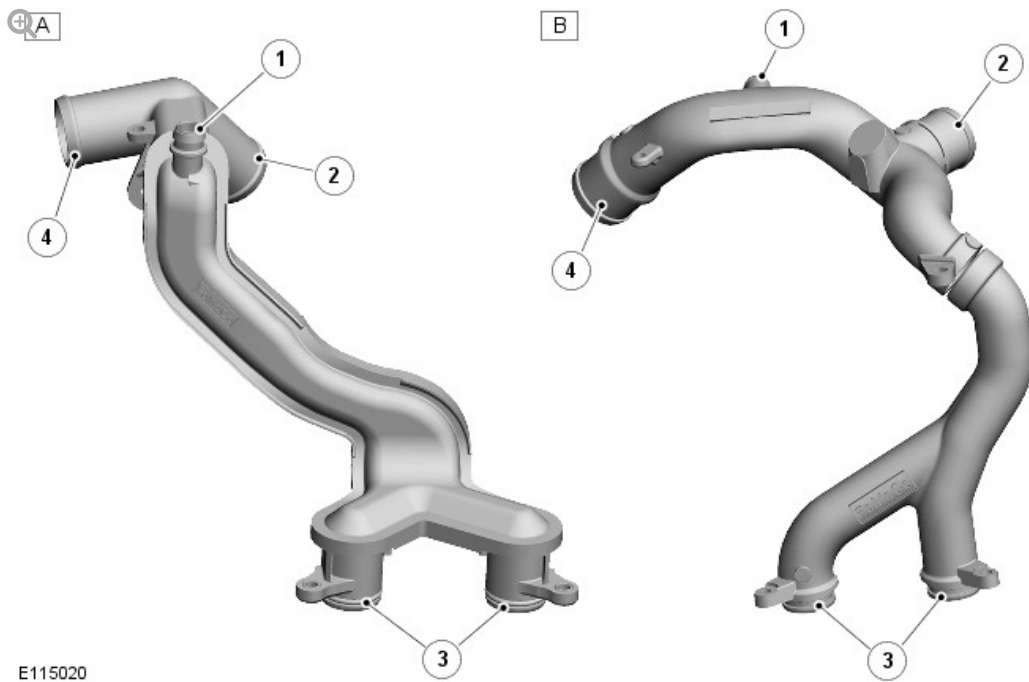
The expansion tank provides the following functions:

- Service fill.
- Coolant expansion during warm-up.
- Air separation during operation.
- System pressurization by the filler cap.

The expansion tank has an air space of approximately 1.1 liters (1.16 US quarts), above the MAX level, to allow for coolant expansion.

OUTLET TUBE AND HEATER MANIFOLD

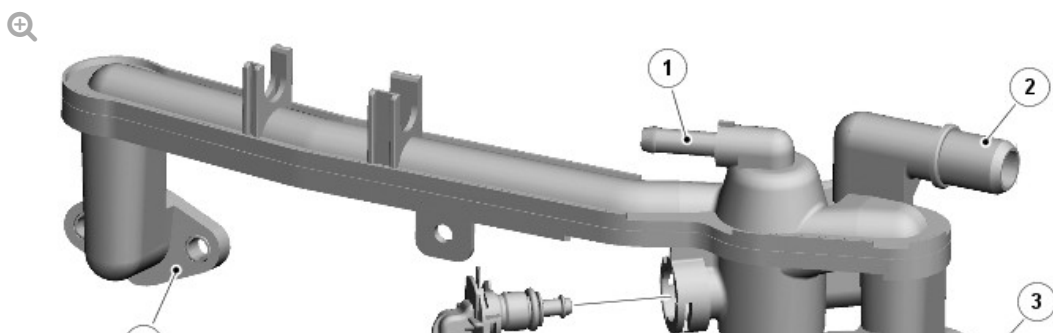
Outlet Tube



E115020

ITEM	DESCRIPTION
A	Outlet tube on naturally aspirated vehicles
B	Outlet tube on supercharger vehicles
1	Bleed spigot (fitted with blanking plug)
2	Radiator upper hose connection
3	Cylinder block connections
4	Thermostat hose connection

Heater Manifold



5



E115021

ITEM	DESCRIPTION
1	Throttle body heater hose connection
2	Heater core supply hose connection
3	RH cylinder head connection
4	Engine coolant temperature sensor
5	LH cylinder head connection

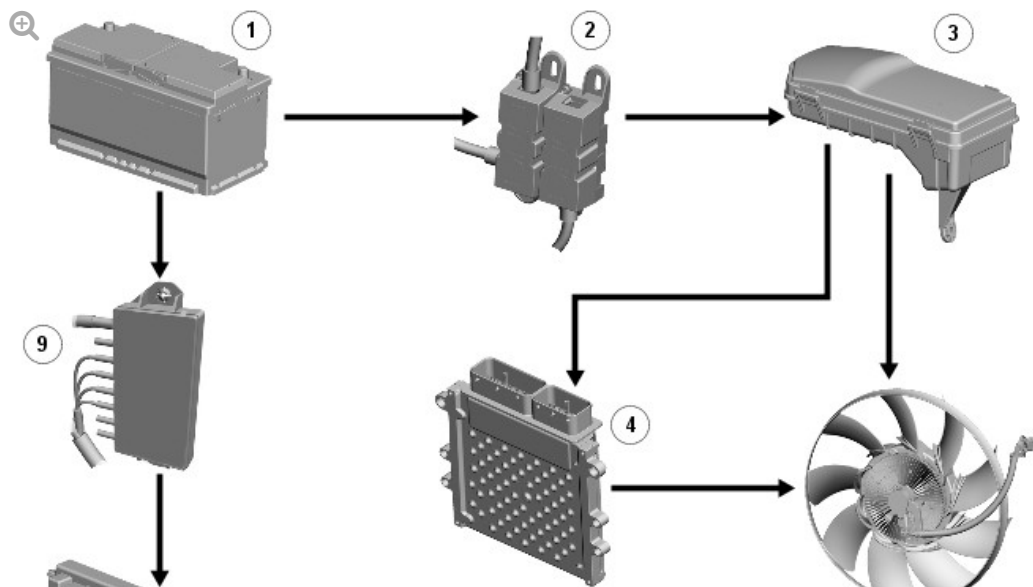
ENGINE COOLANT

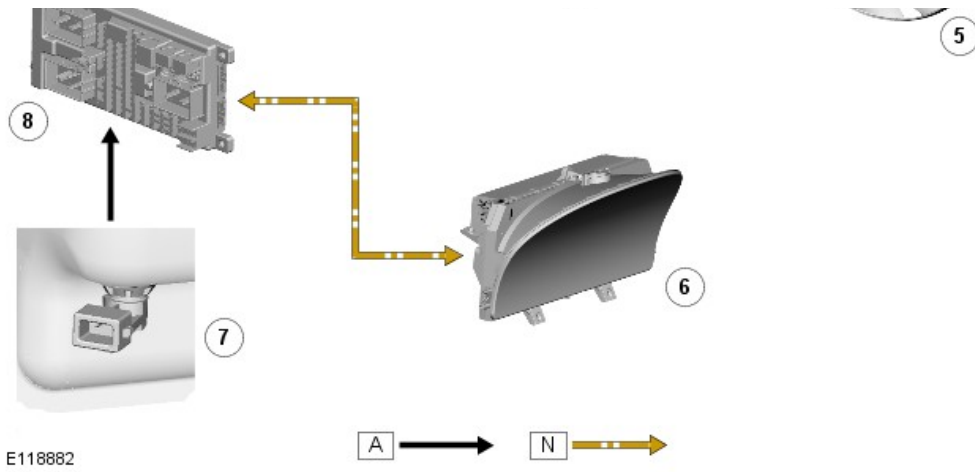
The engine coolant is formulated to last for ten years or 240,000 km (150,000 miles). The coolant is silicate free and must not be mixed with conventional engine coolant.

CONTROL DIAGRAM

NOTE:

A = Hardwired

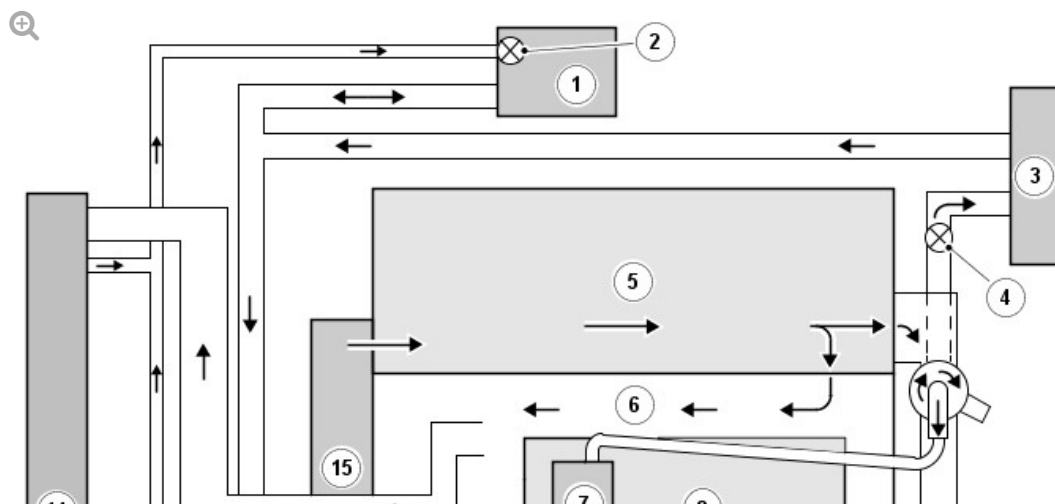


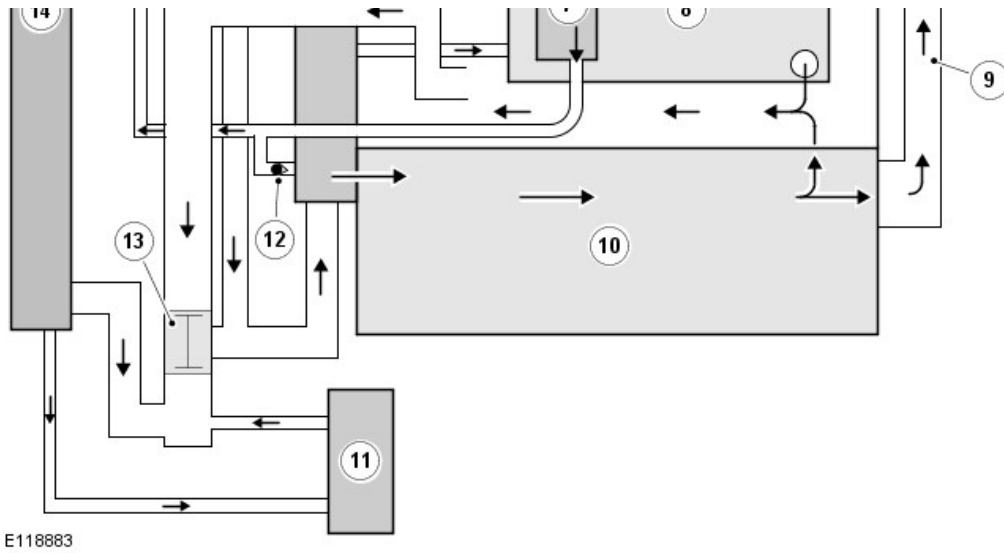


ITEM	DESCRIPTION
1	Battery
2	BJB (battery junction box) 2 (250 A megafuse)
3	EJB (engine junction box)
4	ECM (engine control module)
5	Cooling fan
6	Instrument cluster
7	Coolant level sensor
8	CJB (central junction box)
9	BJB (40 A megafuse)

OPERATION

Engine Cooling Flow Diagram - Naturally Aspirated Vehicles

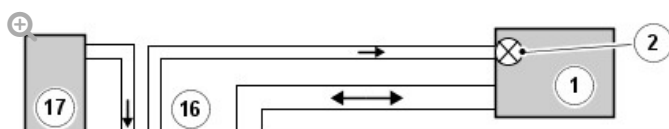


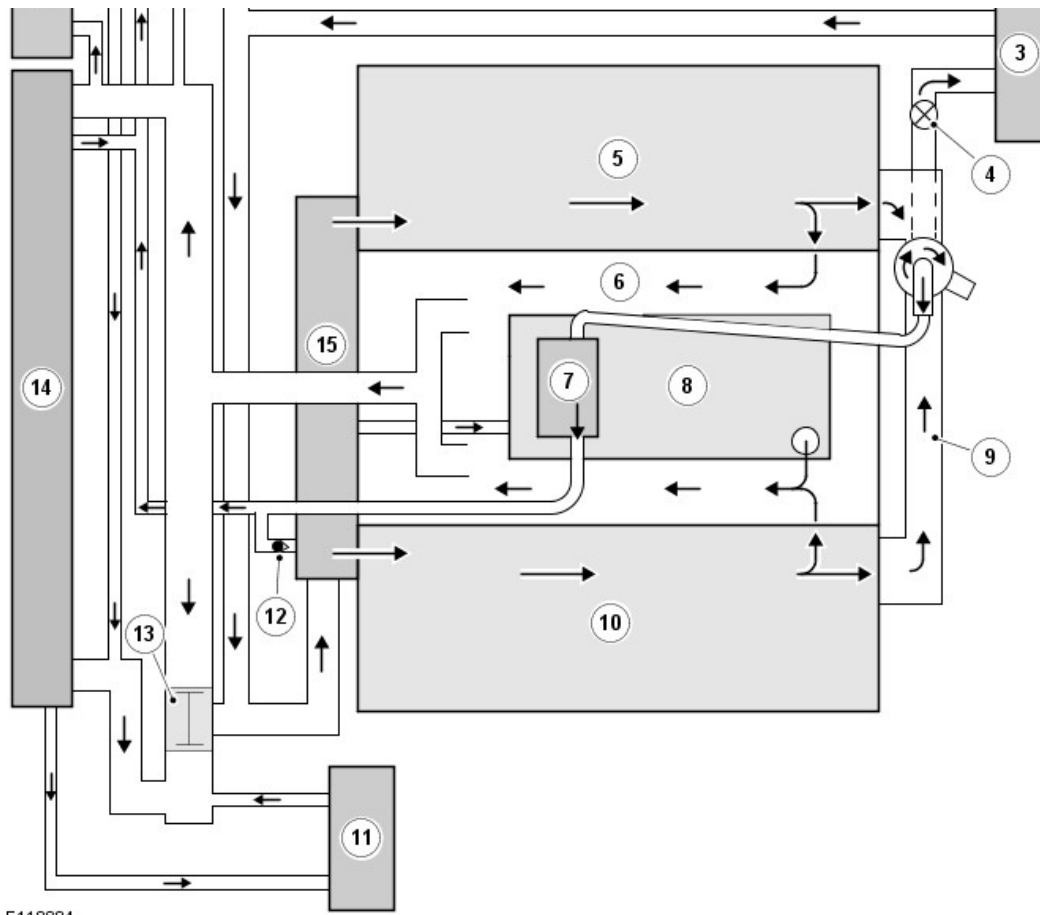


E118883

ITEM	DESCRIPTION
1	Expansion tank
2	Bleed screw
3	Heater system
4	Bleed screw
5	RH cylinder head
6	Cylinder block
7	Throttle
8	Engine oil cooler
9	Heater manifold
10	LH cylinder head
11	Transmission fluid cooler
12	Check valve
13	Thermostat
14	Radiator
15	Coolant pump

Engine Cooling Flow Diagram - Supercharger Vehicles





E118884

ITEM	DESCRIPTION
1	Expansion tank
2	Bleed screw
3	Heater system
4	Bleed screw
5	RH cylinder head
6	Cylinder block
7	Throttle
8	Engine oil cooler
9	Heater manifold
10	LH cylinder head
11	Transmission fluid cooler
12	Check valve
13	Thermostat
14	Radiator

15	Coolant pump
16	Connection with SC cooling system
17	Auxiliary radiator

When the engine is running, the coolant is circulated around the engine cooling system by the coolant pump. From the coolant pump, coolant flows through the cylinder heads and the engine oil cooler into the cylinder block and the heater manifold.

In the cylinder block, the coolant flows forwards to the outlet tube. When the coolant is cold, the thermostat is closed and the coolant flows direct from the outlet tube back to the coolant pump. Once the coolant reaches operating temperature the thermostat begins to open, to control system temperature, and coolant flows from the outlet tube to the coolant pump via the radiator and, on SC vehicles, the auxiliary radiator. When the thermostat is open, the coolant flow through the radiator(s) also generates a coolant flow through the transmission fluid cooler.

From the heater manifold the coolant flows through the electronic throttle and the heater core, in parallel circuits that are unaffected by the position of the thermostat. From the electronic throttle, the coolant merges with bleed coolant from the coolant pump and the outlet tube and flows to the expansion tank. From the heater core, the coolant flows back to the inlet of the coolant pump.

Expansion and contraction of the coolant is accommodated by an air space in the expansion tank and the compliance of the flexible hoses.

If the coolant level in the expansion tank decreases below a predetermined value, the coolant level sensor connects a ground to the CJB (central junction box), which sends a message to the instrument cluster on the medium speed CAN (controller area network) bus to display the message COOLANT LEVEL LOW in the message center.

For additional information, refer to: Instrument Cluster (413-01, Description and Operation).

To control the cooling fan, the ECM sends a PWM (pulse width modulation) signal to the cooling fan drive unit. The ECM varies the duty cycle of the

PWM signal between 0 and 100% to vary the clutch engagement and thus fan speed. The ECM determines the required fan speed from:

- Coolant, ambient air and transmission fluid temperatures
- A/C (air conditioning) system condenser cooling fan demand
- Road speed
- Terrain optimization mode.

If the electrical connections to the viscous fan are disconnected the fan will idle and the engine may overheat. If the ECM detects a cooling fan fault it stores the appropriate DTC (diagnostic trouble code) and signals the instrument cluster on the medium speed CAN bus to display the message COOLING SYSTEM FAULT MONITOR GAUGE in the message center.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

DIAGNOSIS AND TESTING

PRINCIPLE OF OPERATION

For a detailed description of the engine cooling system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Engine Cooling](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, 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. Verify the customer concern.

1. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

MECHANICAL	ELECTRICAL
<ul style="list-style-type: none"> ▪ Coolant leaks ▪ Coolant Hoses ▪ Coolant expansion tank ▪ Radiator ▪ Heater core ▪ Accessory drive belt ▪ Viscous fan 	<ul style="list-style-type: none"> ▪ Fuses ▪ Harnesses ▪ Loose or corroded connector(s) ▪ Engine Coolant Temperature (ECT) sensor

1. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

1. 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
Coolant loss	<ul style="list-style-type: none"> ▪ Hoses ▪ Hose connections ▪ Radiator ▪ Water pump ▪ Heater core ▪ Gaskets ▪ Engine castina 	Carry out a visual inspection. If there are no obvious leaks, carry out a cooling system pressure test. Rectify any leaks as necessary.

	<ul style="list-style-type: none"> cracks ▪ Engine block core plugs 	
Overheating	<ul style="list-style-type: none"> ▪ Low/Contaminated coolant ▪ Thermostat ▪ Viscous fan ▪ ECT sensor ▪ Restricted air flow over the radiator 	Check the coolant level and condition. Carry out a cooling system pressure test. Rectify any leaks as necessary. Check the thermostat and rectify as necessary. Check the viscous fan operation, make sure the viscous fan rotates freely. Check for obstructions to the air flow over the radiator. Rectify as necessary.
Engine not reaching normal temperature	<ul style="list-style-type: none"> ▪ Thermostat ▪ Viscous fan ▪ Thermostat ▪ Electric fan ▪ Fan speed module 	Check the thermostat operation. Check the viscous fan operation, make sure the viscous fan is not seized. Rectify as necessary.

DTC INDEX

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (100-00 General Information, Description and Operation).

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLING SYSTEM DRAINING AND VACUUM FILLING (G1224153)

GENERAL PROCEDURES

26.10.05	COOLANT - DRAIN, FLUSH AND VACUUM FILL	5000 CC, AJ V8	1.1	USED WITHINS	+
26.10.05	COOLANT - DRAIN, FLUSH AND VACUUM FILL	AJ V8	0.9	USED WITHINS	+
26.10.05	COOLANT - DRAIN, FLUSH AND VACUUM FILL	AJ V8, SUPERCHARGED	1.2	USED WITHINS	+

DRAINING

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).
2. Refer to: Engine Cover - 5.0L (501-05, Removal and Installation).

3.

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.

4. Refer to: Radiator Splash Shield (501-02, Removal and Installation).

5.

WARNING:

Release the cooling system pressure by slowly turning the coolant expansion tank cap a quarter of a turn. Cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow this instruction may result in personal injury.

CAUTIONS:

- Since injury such as scalding could be caused by escaping steam or coolant, make sure the vehicle cooling system is cool prior to carrying out this procedure
- Be prepared to collect escaping coolant.



6.

CAUTION:

Be prepared to collect escaping coolant.



- Position a container to collect the fluid.
- Attach a hose to the radiator drain tap. Open the tap.

7.



Torque: 2 Nm

FILLING

NOTE:

Removal steps in this procedure may contain installation details.

1. Refer to: Radiator Splash Shield (501-02, Removal and Installation).

2. Lower the vehicle.

3.

CAUTION:

Anti-freeze concentration must be maintained at 50%.

1. Install the cooling system vacuum refill adaptor to the expansion tank.

1. Install the vacuum filler gauge to the cooling system vacuum refill adaptor.

1. Install the venturi tube assembly to the vacuum filler gauge.

4.

NOTES:

- Make sure the coolant supply valve is in the closed position on the vacuum filler gauge assembly.
- The coolant vacuum fill tool needs an air pressure of 6 to 8 bar (87 to 116 psi) to operate correctly.
- Small diameter or long airlines may restrict airflow to the coolant vacuum fill tool.

Connect a regulated compressed air supply to the venturi tube assembly.

5. Position the evacuated air hose into a container.
6. Open the air supply valve.

7.

NOTE:

Make sure the coolant supply hose is positioned into a container of fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water. Make sure no air can enter the coolant supply hose.

Open the coolant supply valve for 2 seconds to prime the coolant supply hose.

8. Apply air pressure progressively until the arrow on the vacuum filler gauge reaches the green segment.
9. Disconnect the compressed air supply line.

10.

NOTE:

Close the coolant supply valve when the coolant expansion tank MAX mark is reached or coolant movement has ceased.

Open the coolant supply valve and allow the coolant to be drawn into the system.

11. Remove the vacuum filler gauge and cooling system vacuum refill adaptor assembly.

12.



13. Set the heater controls to maximum.

14.

CAUTION:

Observe the engine temperature gauge. If the engine starts to over-heat switch off immediately and allow to cool. Failure to follow this instruction may cause damage to the vehicle

Start the engine and idle until hot air is emitted at the face registers.

15. Switch the heater off.

16. Raise the engine speed to 2000 RPM for eight minutes.

17.

CAUTION:

Switch off the engine and allow the coolant temperature to go cold.

18. Visually check the engine and cooling system for signs of coolant leakage.

19.

WARNING:

When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

CAUTIONS:

- Since injury such as scalding could be caused by escaping steam or coolant, make sure the vehicle cooling system is cool prior to carrying out this procedure
- Make sure the coolant level remains above the "COLD FILL

- Make sure the coolant level remains above the "COLD FILL RANGE" lower level mark.

NOTE:

When the cooling system is warm, the coolant will be approximately 10mm above the upper level mark on the expansion tank with the cap removed.

Check and top-up the coolant if required.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLING SYSTEM PARTIAL DRAINING, FILLING AND BLEEDING - V8 S/C 5.0L PETROL (G1341838)

GENERAL PROCEDURES

DRAINING

WARNING:

Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

CAUTIONS:

- The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.
- Engine coolant will damage the paint finished surfaces. If spilt, immediately remove the coolant and clean the area with water.

NOTE:

Removal steps in this procedure may contain installation details.

1. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).

2.

WARNING:

Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.



3.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

4. Refer to: Radiator Splash Shield (501-02, Removal and Installation).

5.

WARNING:

Eye protection must be worn.

CAUTION:

Be prepared to collect escaping fluids.



- Allow the coolant to drain.
- Position a container to collect the fluid.

6.



Remove the container.

FILLING

WARNING:

Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

CAUTION:

CAUTIONS:

- The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.
- Engine coolant will damage the paint finished surfaces. If spilt, immediately remove the coolant and clean the area with water.

NOTE:

Removal steps in this procedure may contain installation details.

1.



2.



3.



4.



5.



6. Fill the coolant expansion tank until coolant appears through the bleed ports.

7.

CAUTIONS:

- Anti-freeze concentration must be maintained at 50%.

- Be prepared to collect escaping coolant.



8.

CAUTION:

Be prepared to collect escaping coolant.



9.

CAUTION:

Be prepared to collect escaping coolant.



10.

CAUTION:

Be prepared to collect escaping coolant.



11. Continue to fill the coolant until the maximum level is reached.

12. Set the heater controls to maximum.

13.

CAUTION:

Anti-freeze concentration must be maintained at 50%.

Start the engine and continue to fill the coolant until the maximum level is reached.

14. Increase the engine speed to 1500 rpm.
15. Check if the front heater is warm after 2 minutes, if warm proceed to step 17.
16. If not, turn the engine off for 10 seconds and then start the engine and return to step 13.
17. Once the front heater is warm, check if the rear heater is warm (if equipped). If no heat is felt, increase the engine speed to 3000 rpm for 30 seconds and repeat until the heater is warm and return to idle.
18. Continue filling with coolant until the level stops dropping and top up to 65mm below rim (to top rib on back of the coolant expansion tank).

19.

CAUTION:

Correct installation of the Coolant expansion tank cap can be obtained by tightening the cap until an audible click is heard.



20. Switch the heater off.
21. Raise the engine speed to 2000 RPM for eight minutes.

22.

CAUTION:

Switch off the engine and allow the coolant temperature to go cold.

Switch the engine off and allow to cool.

23. Visually check the engine and cooling system for signs of coolant leakage.

24.

WARNING:

When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

CAUTIONS:

- Since injury such as scalding could be caused by escaping steam or coolant, make sure the vehicle cooling system is cool prior to carrying out this procedure
- Make sure the coolant level remains above the "COLD FILL RANGE" lower level mark.

NOTE:

When the cooling system is warm, the coolant will be approximately 10mm above the upper level mark on the expansion tank with the cap removed.

Check and top-up the coolant if required.

25. Refer to: Radiator Splash Shield (501-02, Removal and Installation).
26. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLING SYSTEM PARTIAL DRAINING AND VACUUM FILLING (G1313553)

GENERAL PROCEDURES

26.10.09	COOLANT - PARTIAL DRAINING AND VACUUM FILL	5000 CC, AJ V8, SUPERCHARGED	0.8	USED WITHINS	+
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SPECIAL TOOL(S)



HU-919

Coolant
System
Vacuum Refill
Kit

DRAINING

WARNING:

Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

CAUTIONS:

- The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.
- Engine coolant will damage the paint finished surfaces. If spilt, immediately remove the coolant and clean the area with water.

NOTE:

Removal steps in this procedure may contain installation details.



All vehicles

1.

WARNING:

Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the

coolant expansion tank while the system is hot.



2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

-
3. For additional information, refer to: [Radiator Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).



Vehicles with 5.0L engine

1.

WARNING:

Eye protection must be worn.

CAUTION:

Be prepared to collect escaping fluids.

NOTE:

Collect the coolant in a clean container and reuse.



- Position a container to collect the fluid.

2.



- Remove the container.



Vehicles with 3.6L diesel engine

1.



Drain the coolant.

- Position a container to collect the fluid.
- Attach a hose to the radiator drain tap.
- Open the radiator drain tap.

2. Close the radiator drain tap and remove the hose.

- Remove the container.



Vehicles with 4.4L diesel engine

1.

WARNING:

Eye protection must be worn.

CAUTION:

Be prepared to collect escaping fluids.



- Position a container to collect the fluid.
-

2. 

- Remove the container.

FILLING

1. For additional information, refer to: [Radiator Splash Shield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Prepare a sufficient amount of coolant to the specified concentration.

3. **NOTES:**

- Make sure the coolant supply valve is in the closed position on the special tool.
- The special tool needs an air pressure of 6 to 8 bar (87 to 116 psi) to operate correctly.
- Small diameter or long airlines may restrict airflow to the coolant vacuum fill tool.



1. Position the hose from the special tool into a container of clean coolant.
2. Connect a regulated compressed air supply to the special tool.
3. Move the special tool to the expansion tank.

4. **NOTES:**

- Make sure the coolant supply valve is in the closed position on the special tool.

on the special tool.

- The coolant vacuum fill tool needs an air pressure of 6 to 8 bar (87 to 116 psi) to operate correctly.
- Small diameter or long airlines may restrict airflow to the coolant vacuum fill tool.



Open the air supply valve until -0.8 Bar (-12 psi) is shown on the gauge.

5.



- Close the air supply valve.
- Allow 1 minute to check the vacuum is held.

6.

NOTES:

- The coolant is to be reused.
- Close the coolant supply valve when the coolant expansion tank MAX mark is reached or coolant movement has stopped.



Open the coolant supply valve and allow the coolant to be drawn into the system.

7. Remove the special tool.

8. Connect exhaust extraction hoses to the tail pipes.

9. Start and run the engine.

-
10. Install the coolant expansion tank cap.

 11. Hold the engine speed at 2000 revolutions per minute (RPM) until warm air is expelled from the heater.

 12. Switch the engine off and allow to cool.

 13. Clean any spilt or excess coolant from the vehicle.

14.

WARNING:

Since injury such as scalding could be caused by escaping steam or coolant, allow the vehicle cooling system to cool prior to carrying out this procedure.

Check and top-up the coolant if required.

AUXILIARY RADIATOR (G1224079)

REMOVAL AND INSTALLATION

26.40.09	RADIATOR ASSEMBLY - SUPPLEMENTARY - RENEW	5000 CC, AJ V8, SUPERCHARGED	1.7	USED WITHINS	+
----------	--	---------------------------------	-----	-----------------	---

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: Coolant Expansion Tank (303-03, Removal and Installation).
3. Refer to: Fender Splash Shield (501-02, Removal and Installation).

4.

CAUTION:

Be prepared to collect escaping coolant.



5. 

Torque: 10 Nm

6. 

Torque: 10 Nm

7. **NOTE:**

Do not disassemble further if the component is removed for access only.



Torque: 10 Nm

INSTALLATION

1. To install reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLANT EXPANSION TANK - V8 S/C 5.0L PETROL (G1245617)

REMOVAL AND INSTALLATION

26.15.01	TANK - RENEW	5000 CC, AJ V8, SUPERCHARGED	1.2	USED WITHINS	+
----------	-----------------	---------------------------------	-----	-----------------	---

REMOVAL

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).
3. Refer to: [Air Cleaner Outlet Pipe RH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).
4. Refer to: [Air Cleaner RH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

5.

CAUTION:

Be prepared to collect escaping coolant.



6.

CAUTION:

Be prepared to collect escaping coolant.



7.

NOTE:

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



8.

CAUTION:

Be prepared to collect escaping coolant.



Torque: 9 Nm

INSTALLATION

1. To install reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLING FAN - V8 S/C 5.0L PETROL (G1235552)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)



**303-
1142**

Viscous
Coupling
Wrench



**303-
1143**

Viscous
Coupling
Holding Tool

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.


1. Disconnect the battery ground cable.
Refer to: Specifications (414-00, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12, Removal and Installation).
4. Refer to: Air Cleaner Outlet Pipe LH (303-12, Removal and Installation).
5. Refer to: Air Cleaner Outlet Pipe RH (303-12, Removal and Installation).

6. 

7.



8.



9.

NOTE:

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



10.



11.

CAUTION:

Always protect the cooling pack elements to prevent accidental damage.

NOTES:

- The thread is right handed.
- Some variation in the illustrations may occur, but the essential information is always correct.



Special Tool(s): [303-1142](#), [303-1143](#)

Torque: **65 Nm**

12.

NOTE:

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



13.

CAUTION:

Always protect the cooling pack elements to prevent accidental damage.

NOTE:

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



INSTALLATION

1. To install reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLING MODULE - V8 S/C 5.0L PETROL (G1224083)

REMOVAL AND INSTALLATION

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Refer to: [Air Conditioning \(A/C\) System Recovery, Evacuation and Charging - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (412-00 Climate Control System - General Information, General Procedures).

3.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

4.

NOTE:

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



5.

WARNINGS:

- Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.
- Be prepared to catch escaping fluid.

Refer to: [Cooling System Partial Draining, Filling and Bleeding - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, General Procedures).

6.



7.



8.

CAUTION:

A new O-ring seal is to be installed.



Torque: 8 Nm

9.

CAUTION:

A new O-ring seal is to be installed.



Torque: 8 Nm

10. Lower the vehicle.
11. Refer to: [Air Cleaner Outlet Pipe LH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).
12. Refer to: [Air Cleaner Outlet Pipe RH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).
13. Refer to: [Air Cleaner Outlet Pipe T-Connector](#) (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol, Removal and Installation).
14. Refer to: [Air Cleaner RH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).
15. Refer to: [Air Cleaner LH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).
16. Refer to: [Hood Latch Panel](#) (501-02 Front End Body Panels, Removal and Installation).

17. **CAUTION:**

Be prepared to collect escaping coolant.



- 18.



- 19.



20.



21.

CAUTION:

Be prepared to collect escaping coolant.



INSTALLATION

1. To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

COOLANT PUMP - V8 S/C 5.0L PETROL (G1224388)

REMOVAL AND INSTALLATION

26.50.01	PUMP - WATER -	5000 CC, AJ V8, SUPERCHARGED	1.5	USED WITHINS	+
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	RENEW				
26.50.26	AUXILIARY COOLANT PUMP - RENEW	5000 CC, AJ V8, SUPERCHARGED	0.4	USED WITHINS	+

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).
4. Refer to: [Accessory Drive Belt - V8 S/C 5.0L Petrol](#) (303-05C Accessory Drive - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

5.

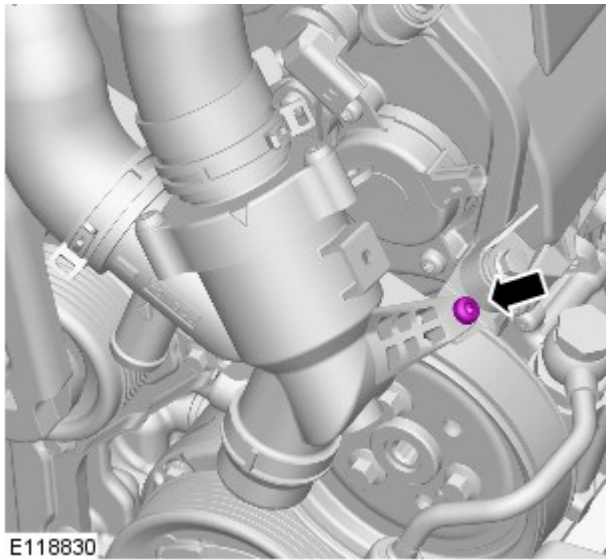


6.



7.





- *Torque: 10 Nm*

8.

NOTE:

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



9.

NOTE:

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



- *Torque: 40 Nm*

10.

WARNING:

Fluid loss is unavoidable, use absorbent cloth or a container to collect the fluid.

CAUTION:

Engine coolant will damage the paint finished surfaces. If spilt, immediately remove the coolant and clean the area with water.



- *Torque: 12 Nm*

INSTALLATION

1.

CAUTIONS:

- Make sure that the gaskets are correctly located.
- Install new o-ring seals.
- Install all the bolts finger tight before final tightening.

NOTE:

Install new gaskets.

To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

RADIATOR - V8 S/C 5.0L PETROL (G1224085)

REMOVAL AND INSTALLATION

26.40.01	RADIATOR ASSEMBLY - RENEW	5000 CC, AJ V8, SUPERCHARGED	3.4	USED WITHINS	+
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REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).
4. Refer to: [Cooling Fan - V8 S/C 5.0L Petrol](#) (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).
5. Refer to: [Hood Latch Panel](#) (501-02 Front End Body Panels, Removal and Installation).

6.

NOTE:

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



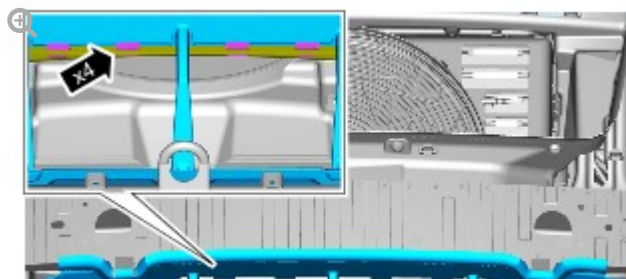
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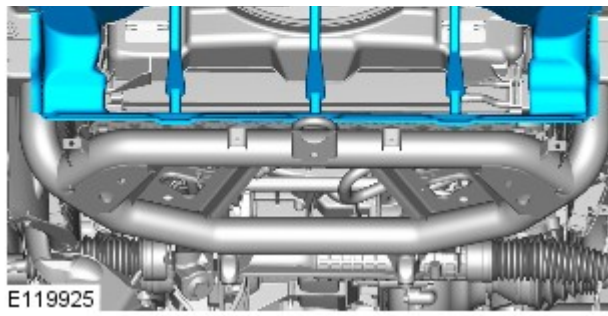


8.



9.





10. 

11. 

12. 

13. 

INSTALLATION

1. To install reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

ENGINE COOLING - V8 5.0L PETROL/V8 S/C 5.0L PETROL

THERMOSTAT HOUSING - V8 S/C 5.0L PETROL (G1224160)

REMOVAL AND INSTALLATION

26.45.10	HOUSING - THERMOSTAT - RENEW	5000 CC, AJ V8, SUPERCHARGED	1.2	USED WITHINS	+
----------	------------------------------------	---------------------------------	-----	-----------------	---

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - TDV8 4.4L Diesel, General Procedures).
4. Refer to: [Air Cleaner Outlet Pipe T-Connector](#) (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol. Removal and

Installation).

5. Refer to: [Air Cleaner Outlet Pipe LH](#) (303-12C Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

6. 

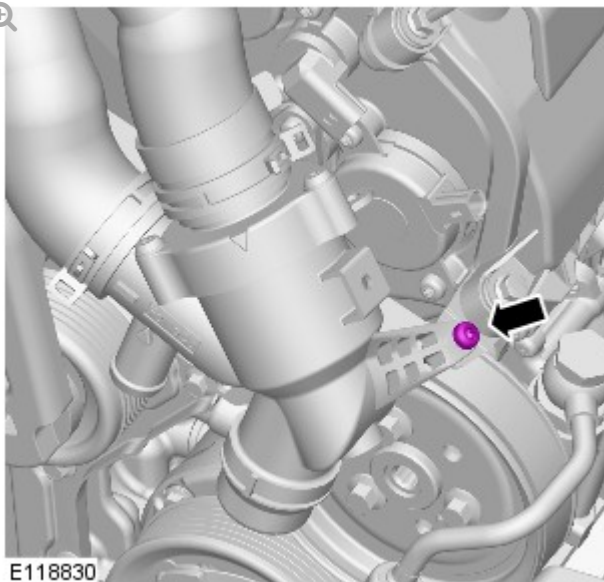
7. 

8. **NOTE:**

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



9. 



Torque: 10 Nm

10. **NOTES:**

- Some variation in the illustrations may occur, but the essential information is always correct.
- The retaining clips cannot be removed from the pipe.



INSTALLATION

1. To install, reverse the removal procedure.

2012.0 RANGE ROVER (LM), 303-03

SUPERCHARGER COOLING

SPECIFICATIONS

Torque Specifications

DESCRIPTION	NM	LB-FT
Supercharger coolant pump mounting bracket bolts	6	4

supercharger coolant pump mounting bracket bolts

U

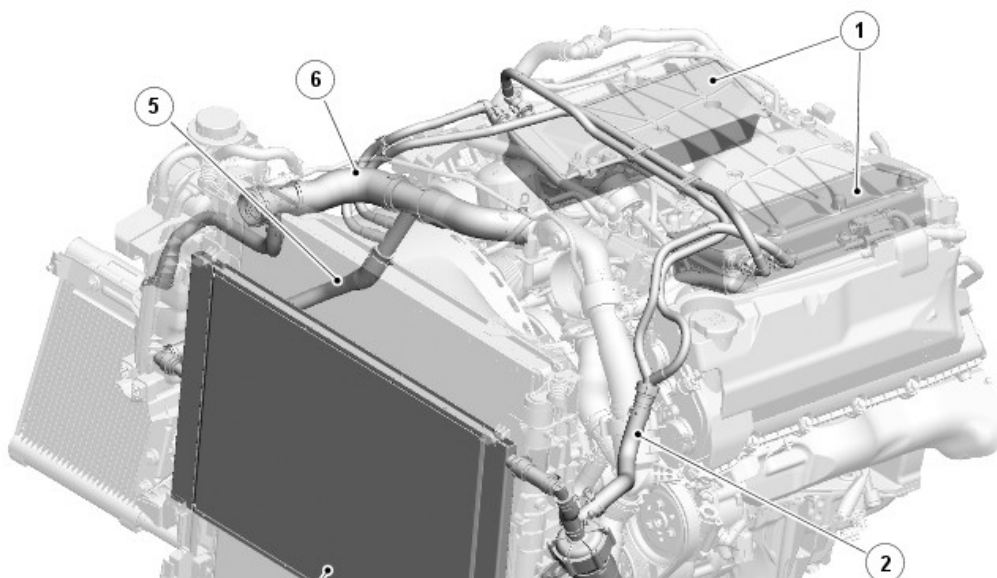
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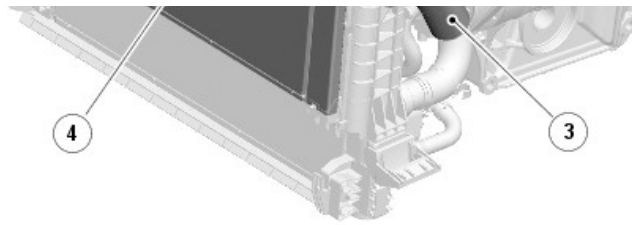
2012.0 RANGE ROVER (LM), 303-03

SUPERCHARGER COOLING

DESCRIPTION AND OPERATION

COMPONENT LOCATION





E120370

ITEM	DESCRIPTION
1	Charge air coolers
2	Supply hose to charge air coolers
3	Charge air coolant pump
4	Charge air radiator
5	Return hose from charge air coolers
6	Radiator upper hose

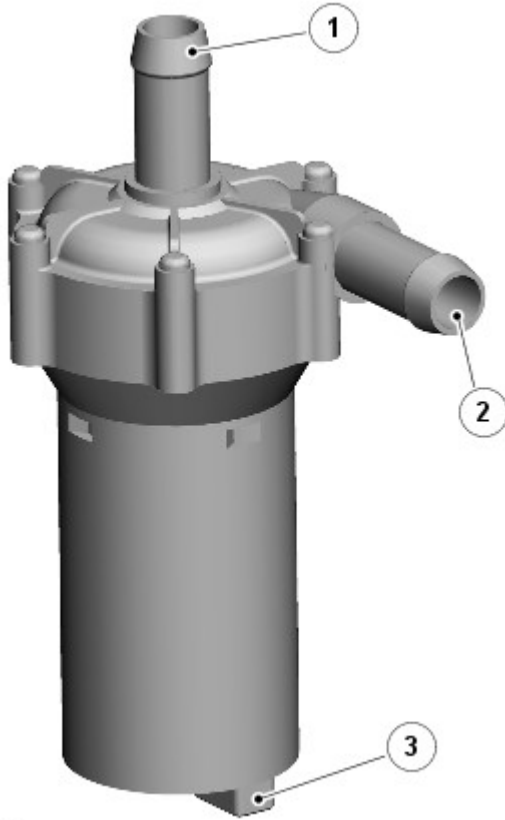
INTRODUCTION

The supercharger cooling system cools the pressurized charge air from the supercharger. The supercharger cooling system consists of:

- A charge air coolant pump.
- A charge air radiator.
- Two charge air coolers.
- Connecting hoses and pipes.

The supercharger cooling system is operationally independent of the engine cooling system, but connected to it at the radiator upper hose. The connection with the engine cooling system accommodates thermal expansion and retraction of the coolant in the supercharger cooling system, and enables filling and draining of the supercharger cooling system.

CHARGE AIR COOLANT PUMP



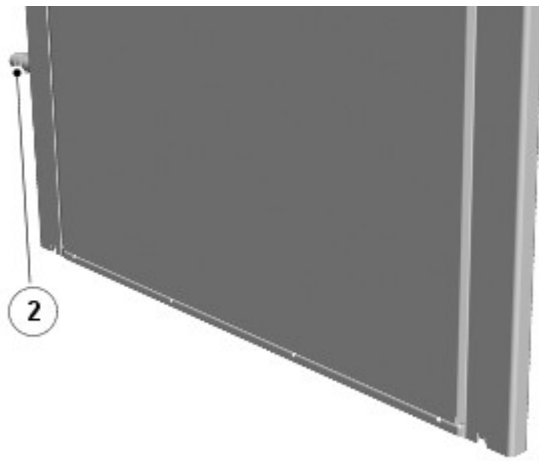
E120372

ITEM	DESCRIPTION
1	Coolant inlet connection
2	Coolant outlet connection
3	Electrical connector

The charge air coolant pump is an electric pump attached to the LH (left-hand) side of the radiator pack frame. Hoses connect the inlet of the charge air coolant pump to the charge air radiator, and the outlet to the charge air coolers. An electrical connector provides the interface between the motor of the charge air coolant pump and the vehicle wiring.

CHARGE AIR RADIATOR





E120371

ITEM	DESCRIPTION
1	Coolant outlet connection
2	Coolant inlet connection

The charge air radiator is installed in the radiator pack frame, immediately behind the condenser cooling fan.

The coolant inlet and outlet connections of the charge air radiator are installed in the RH (right-hand) and LH end tanks respectively. Hoses connect the inlet of the charge air radiator to the charge air coolers, and the outlet to the charge air coolant pump.

CHARGE AIR COOLERS

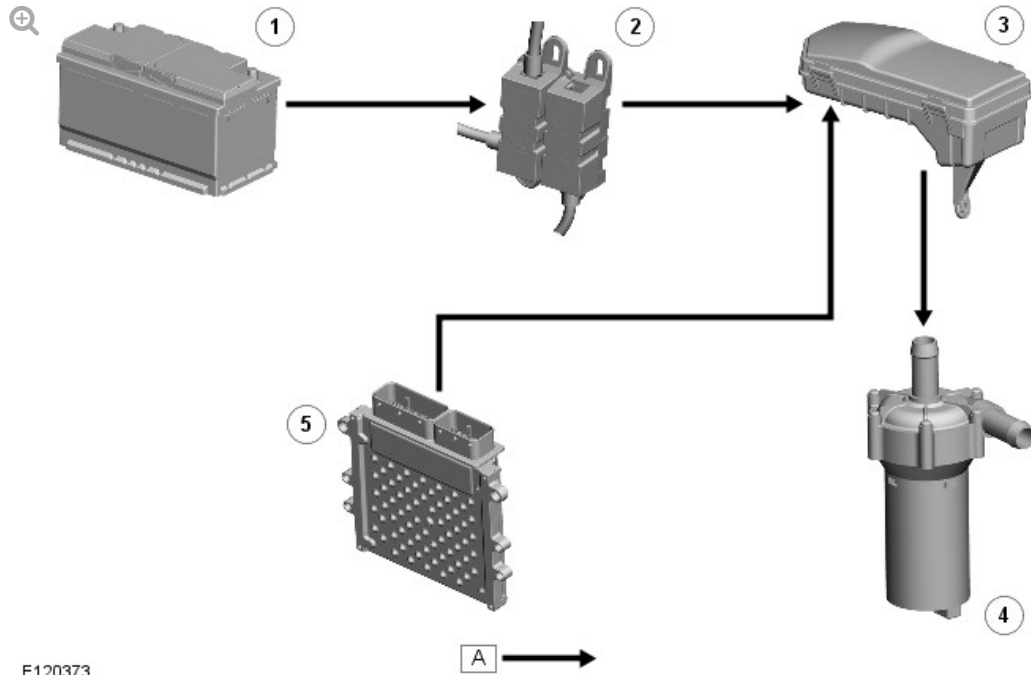
A charge air cooler is installed in each intake manifold.

For additional information, refer to: [Intake Air Distribution and Filtering](#) (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol, Description and Operation).

CONTROL DIAGRAM

NOTE:

A = Hardwired.

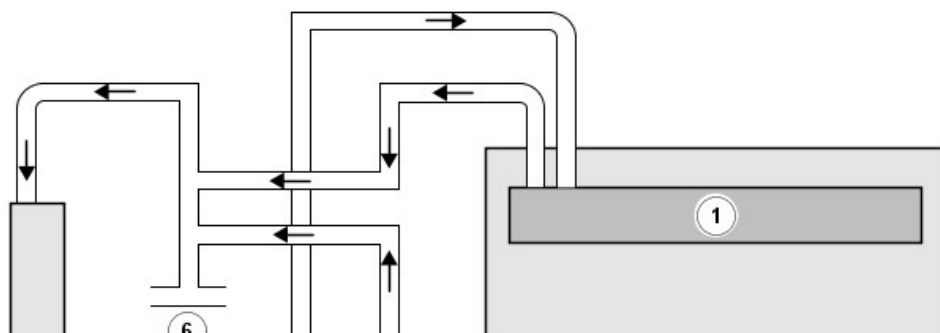


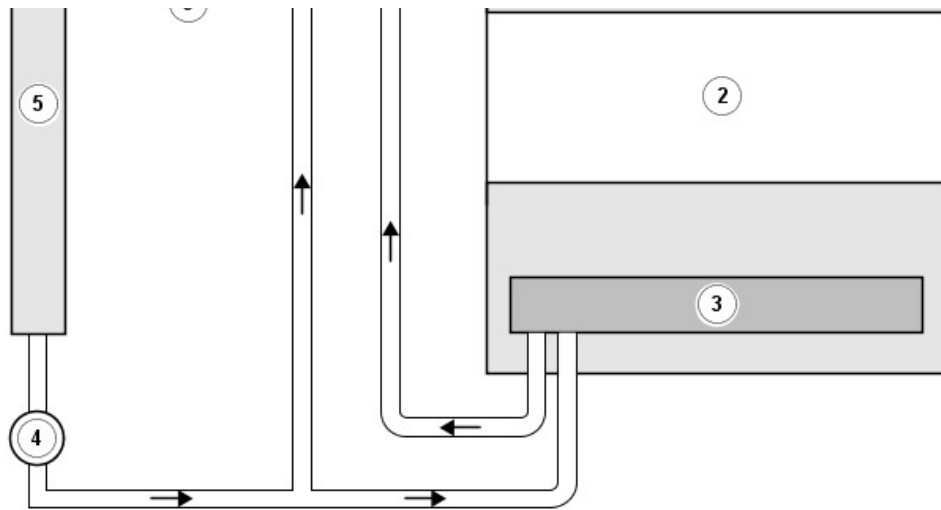
E120373

ITEM	DESCRIPTION
1	Battery
2	BJB (battery junction box) 2 (250 A megafuse)
3	EJB (engine junction box) (charge air coolant pump relay)
4	Charge air coolant pump
5	ECM (engine control module)

OPERATION

Supercharger Cooling Flow Diagram





E120374

ITEM	DESCRIPTION
1	RH charge air cooler
2	Engine
3	LH (left hand) charge air cooler
4	Charge air coolant pump
5	Charge air radiator
6	Radiator upper hose

Electrical power for the charge air coolant pump is supplied from the charge air coolant pump relay in the EJB (engine junction box). When the relay is energized, it connects power from the battery, via the BJB (battery junction box) 2 and EJB, to the charge air coolant pump. Operation of the relay is controlled by the ECM (engine control module). The charge air coolant pump relay is energized continuously while the ignition is in power mode 6.

When the charge air coolant pump is running, coolant flows from the pump outlet through the charge air coolers, the charge air radiator and back to the pump inlet.

2012.0 RANGE ROVER (LM), 303-03

SUPERCHARGER COOLING

DIAGNOSIS AND TESTING

PRINCIPLE OF OPERATION

For a detailed description of the engine cooling system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Supercharger Cooling](#) (303-03D Supercharger Cooling, 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. Verify the customer concern.
1. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

MECHANICAL	ELECTRICAL
<ul style="list-style-type: none"> ▪ Coolant leaks ▪ Coolant Hoses ▪ Coolant expansion tank ▪ Radiator ▪ Heater core ▪ Accessory drive belt ▪ Viscous fan 	<ul style="list-style-type: none"> ▪ Fuses ▪ Harnesses ▪ Loose or corroded connector(s) ▪ Engine Coolant Temperature (ECT) sensor

1. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

1. 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
Coolant loss	<ul style="list-style-type: none"> ▪ Hoses ▪ Hose connections ▪ Radiator ▪ Water pump ▪ Heater core ▪ Gaskets ▪ Engine casting cracks ▪ Engine block core plugs 	Carry out a visual inspection. If there are no obvious leaks, carry out a cooling system pressure test. Rectify any leaks as necessary.
Overheating	<ul style="list-style-type: none"> ▪ Low/Contaminated coolant ▪ Thermostat ▪ Viscous fan ▪ ECT sensor ▪ Restricted air flow 	Check the coolant level and condition. Carry out a cooling system pressure test. Rectify any leaks as necessary. Check the thermostat and rectify as necessary. Check the viscous fan operation, make sure the viscous fan rotates freely. Check for obstructions to the air flow over the radiator. Rectify as necessary.

	<ul style="list-style-type: none"> ▪ restricted air flow over the radiator 	
Engine not reaching normal temperature	<ul style="list-style-type: none"> ▪ Thermostat ▪ Viscous fan ▪ Thermostat ▪ Electric fan ▪ Fan speed module 	Check the thermostat operation. Check the viscous fan operation, make sure the viscous fan is not seized. Rectify as necessary.

DTC INDEX

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - V8 5.0L Petrol/V8 S/C 5.0L Petrol](#) (100-00 General Information, Description and Operation).

