

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

ENGINE**Engine (4.2L)****ENGINE (4.2L)****SPECIFICATIONS****SEALERS**

Item	Land Rover Part No.
Valve cover gasket	8510303
Sump pan	8510303
Oil strainer pick-up pipe bolts	STC 50553
Cylinder block core plugs	STC 50554
Timing cover seal aperture	8510303
Cylinder block coolant outlet elbow stub pipe	STC 50554
Bedplate to cylinder block	8510303

LUBRICANT - UK, EUROPE AND ROW - NOT NAS/JAPAN

Item	Specification
* Recommended lubricant	The use of 5W/30 oil to Specification WSS - M2C913-B is preferred. Where oil to this specification is not available, then 5W/30 oil meeting specifications ACEA A1/A3 or API SJ or SL may be used.

* WSS is a Ford prefix to the oil specification

LUBRICANT - NAS/JAPAN

Item	Specification
* Recommended lubricant	Use 5W/30 oil meeting Specification API SL or ILSAC GF3/GF4 and 'Certified for Gasoline Engines' by the American Petroleum Institute (API).

CAPACITY

Item	Capacity
Dry fill including filter and cooler	9.4 litres (16.5 pints) (9.9 US quarts)
Oil and filter change	7.7 litres (13.6 pints) (8.1 US quarts)
Amount of oil required to bring the level from the lower to the upper holes on the oil level indicator	1.4 litres (2.4 pints) (1.5 US quarts)

CONNECTING ROD BEARING CLEARANCES

Crank Pin Diameter	Bearing Grade Color	Part Number
From 52.982 up to and including 52.987	Yellow	2W93-6211-BCA

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From 52.988 up to and including 52.993	Green	2W93-6211-BBA
From 52.994 up to and including 53.000	Blue	2W93-6211-BAA

GENERAL SPECIFICATION

Item	Specification
Type	4.2 litre, 90 degree 'V', supercharged, petrol engine, twin overhead camshaft per cylinder head, 4 valves per cylinder
Cylinder arrangement	V8, numbers 1 and 5 cylinders at front of engine when engine is viewed from rear
Cylinder numbering	Number 1 cylinder - right hand bank; Number 5 cylinder - left hand bank
Bore - nominal	86.0 mm (3.386 in)
Stroke	90.3 mm (3.555 in)
Capacity	4196 cm ³ (256.0 in ³)
Firing order	1 - 5 - 4 - 2 - 6 - 3 - 7 - 8
Compression ratio	9.1:1
Direction of rotation	Anti-clockwise viewed from rear of engine
Maximum power:	
UK/Europe and ROW - Not NAS/Japan	291 kW (390 bhp) @ 5750 rev/min
NAS/Japan	400 bhp (298 kW) @ 5750 rev/min
Maximum torque:	
UK/Europe and ROW - Not NAS/Japan	560 Nm (413 lb-ft) @ 3500 rev/min
NAS/Japan	420 lb-ft (569 Nm) @ 3500 rev/min
Dimensions:	
Length	720 mm (28.3 in)
Width	720 mm (28.3 in)
Height	785 mm (30.9 in)
* Engine oil pressure:	
At idle	1.0 bar (100 kPa) (15.0 lb/in ²)
At 3500 rev/min	3.0 bar (300 kPa) (44.0 lb/in ²)
** Valve clearances:	
Inlet	0.18 to 0.22 mm (0.007 to 0.008 in)
Exhaust	0.23 to 0.27 mm (0.009 to 0.010 in)
Cylinder Head	
Maximum permitted warp	0.125 mm (0.005 in)

*** Note:** prior to checking the engine oil pressure, a road test of 6 miles (10 kilometres) must be carried out. Do not attempt to attain normal engine operating temperature by allowing the engine to idle

**** Note:** there are 50 different thicknesses of graded tappet available from 2.950 to 3.685 mm (0.116 to 0.145 in) rising in increments of 0.015 mm (0.005 in)

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TORQUE SPECIFICATIONS

Description	Nm	lb-ft
Exhaust manifold gasket heat shield bolt	13	10
* Exhaust manifold to cylinder head bolts	20	15
* Cylinder head bolts:		
Stage 1 - Tighten bolts 1 to 10	20	15
Stage 2 - Tighten bolts 1 to 10	35	26
Stage 3 - Tighten bolts 1 to 10	Further 90°	Further 90°
Stage 4 - Tighten bolts 1 to 10	Further 90°	Further 90°
Stage 5 - Tighten bolts 11 and 12	25	18
CMP sensor Torx screw	7	5
+ Oil filter	18	13
Oil drain plug	25	18
Primary timing chain tensioner guide bolts	12	9
Primary timing chain tensioner bolts	12	9
Secondary timing chain tensioner bolts	12	9
* Camshaft bearing cap bolts	10	7
** Intake camshaft sprocket retaining bolt	120	88
** Exhaust camshaft sprocket retaining bolt	120	88
Engine ground cable bolt	25	18
** Steering column universal joint to steering gear bolt	25	18
** Crankshaft pulley bolt	380	280
PCV valve bolts	6	4
Valve cover bolts	12	9
Oil level indicator tube nut	6	4
* Engine oil pan bolts	20	15
Oil pump to cylinder block bolts	12	9
*** Oil strainer pick-up pipe bolts - M5	6	4
Oil strainer pick-up pipe bolts - M6	12	9
Coolant pump pulley bolts	25	18
Front End Accessory Drive (FEAD) belt idler pulley bolt	25	18
* Engine front cover bolts	12	9
Generator mounting bolts	48	35
FEAD belt tensioner bolt	40	30

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Supercharger/cooling fan drive belt tensioner bolt	40	30
Cooling fan drive pulley bolts	25	18
Engine oil pressure sensor	13	10
Torque converter flexplate bolts:		
Stage 1	15	11
Stage 2	110	81
Auxiliary oil cooler thermostat bolts	10	7
Engine oil temperature sensor	20	15
Oil filter housing	20	15
Oil cooler hose adaptors	10	7
** Catalytic converter to exhaust manifold nuts	20	15
Air conditioning compressor low pressure line Allen bolt	10	7
Engine mount to front subframe bolts	56	41
Right-hand engine mount bracket to engine mount nut	100	74
Left-hand engine mount bracket to engine mount bolt	100	74
Steering gear tie rod end ball joint nut	80	59
Stabilizer bar link nut	100	74
Suspension height sensor link arm	8	6
** Lower steering column to steering gear Torx bolt	24	18
Lower suspension arm to front subframe nut/bolt:		
Stage 1	165	122
Stage 2	Further 90°	Further 90°
Lower suspension tie rod to front subframe nut/bolt:		
Stage 1	165	122
Stage 2	Further 90°	Further 90°
Cooling fan	65	48
Generator mounting bracket bolts	45	33
++ Battery positive connector to generator	10	7
Starter motor heat shield bolts	45	33
Radiator support bracket bolts	12	9
Power steering high pressure pipe to pump	65	48

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Power steering high pressure pipe to pump support bracket	11	8
Coolant expansion tank bolts	10	7
Brake vacuum pump bracket bolts	10	7
Brake vacuum pump nuts	5	4
Purge valve assembly bolt	45	33
Oil filter housing bolts	20	15
Air conditioning refrigerant line bolts	10	7
Battery compartment side wall nuts	5	4
Battery positive cable to battery compartment side wall nut	25	18
HO2S harness bracket bolt	10	7
Flexplate to torque converter bolts	45	33
** Air suspension spring to hub assembly nuts/bolts	250	184
** Brake caliper to hub assembly bolts:		
Stage 1	50	37
Stage 2	Further 60°	Further 60°
ABS sensor bolt	10	7
Crankshaft (CKP) sensor bolt	10	7

* **Bolts must be tightened in sequence**

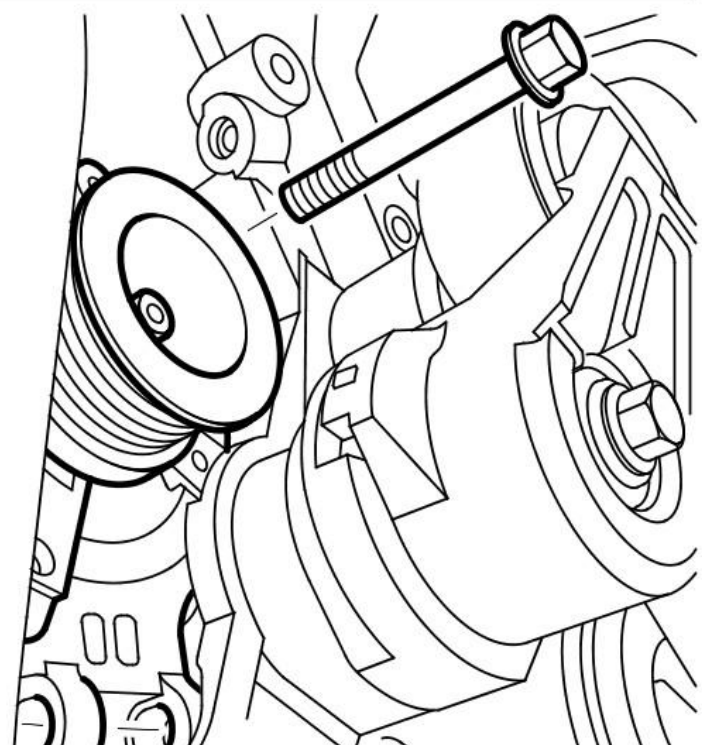
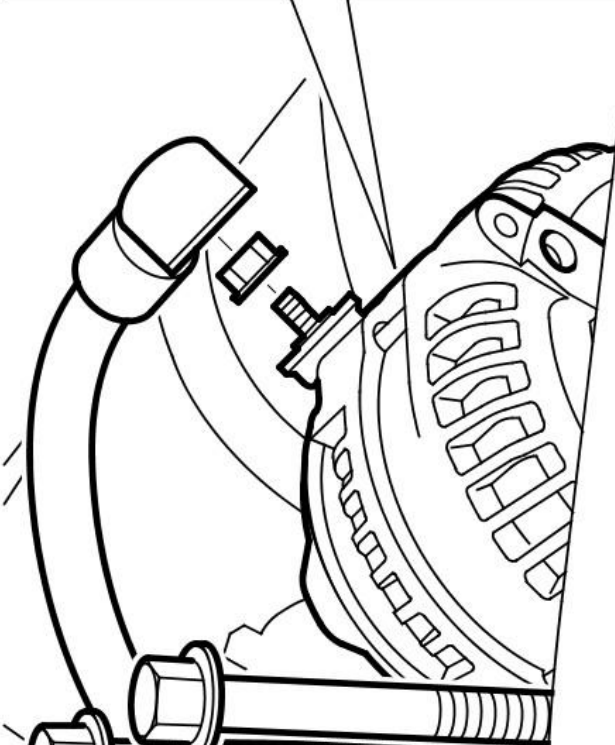
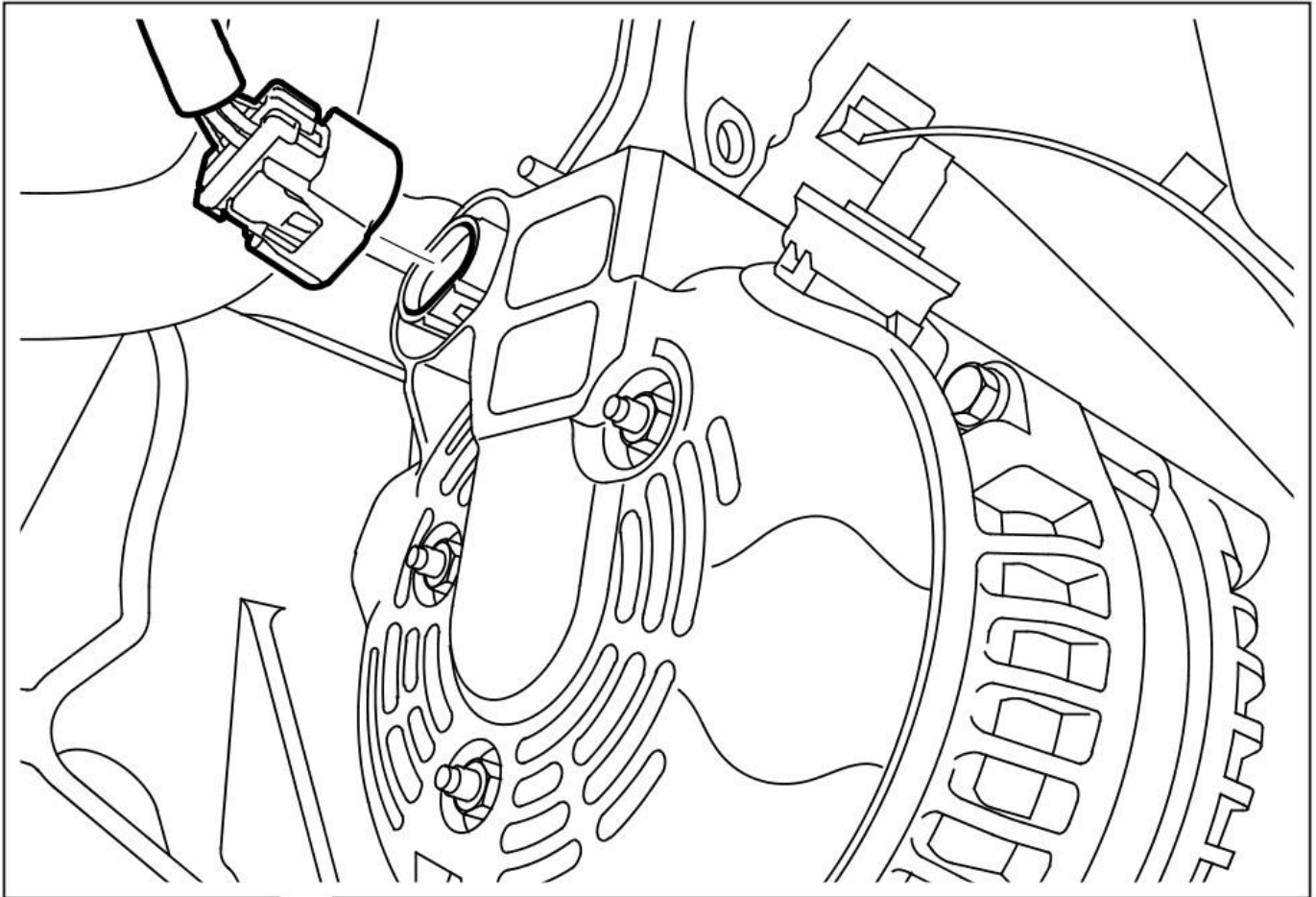
** **New nuts/bolts/Patchlok bolts must be installed**

*** **Apply sealant to threads**

+ **Apply engine oil to seal**

++ **Damage to internal components will result if this torque is exceeded**

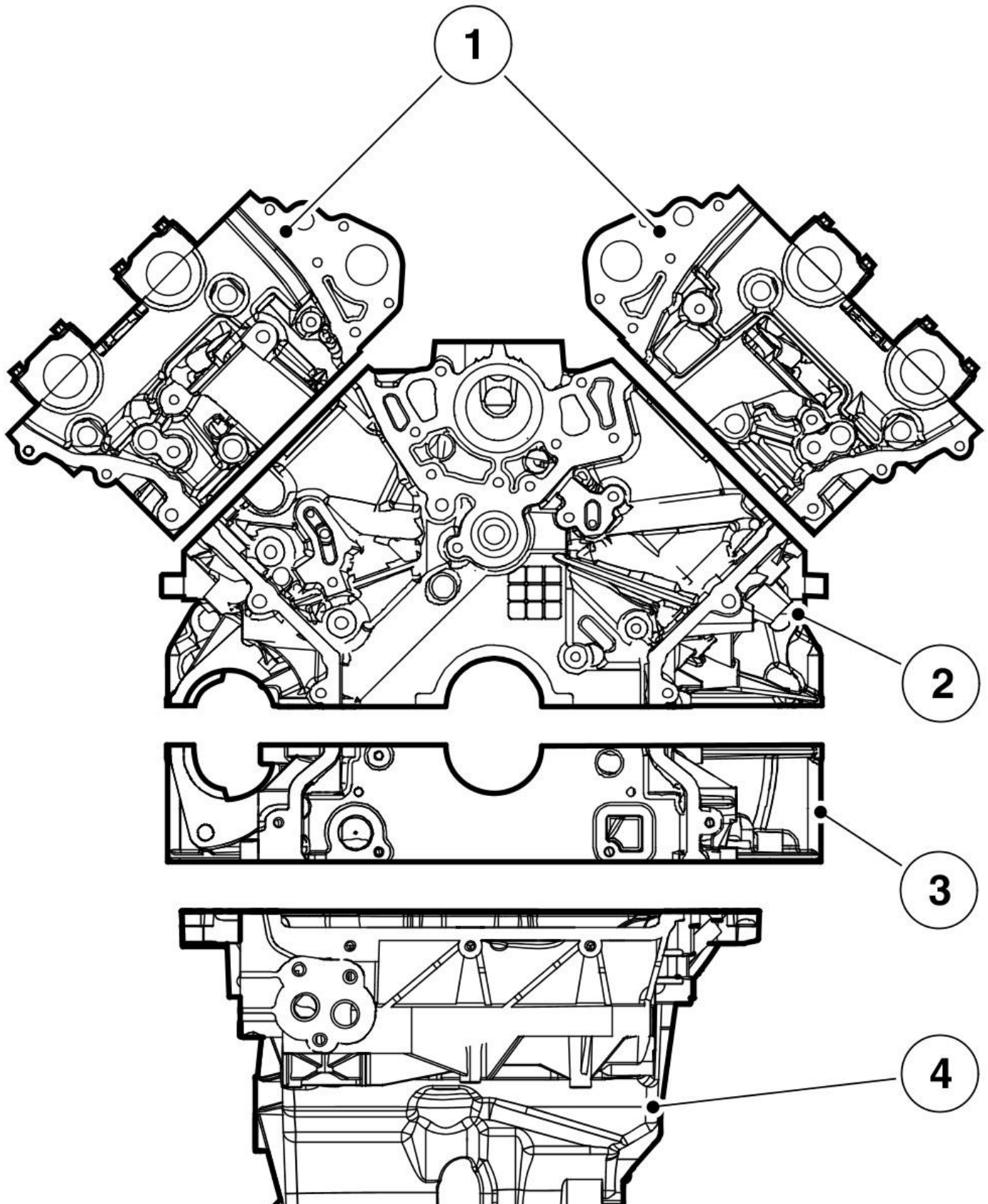
DESCRIPTION & OPERATION**ENGINE****External View**



OVERVIEW

The V8 supercharged petrol engine is a 4.2 liter, 8 cylinder, 90 degrees 'Enclosed' V unit, with 4 valves per cylinder, operated by 2 overhead camshafts per cylinder head. The engine emissions comply with ECD3 (European Commission Directive) and US Federal Tier2 Bin 8 legislative requirements and employs catalytic converters, electronic engine management control and positive crankcase ventilation to limit the emission of pollutants. The cooling system is a low volume, high velocity system. The Engine Control Module (ECM) controls the fuel injection system, the ignition system and the electric throttle.

The cylinder block is of aluminium alloy construction with cast iron liners. A cast aluminium bedplate is bolted to the bottom of the block to improve lower structure rigidity. The cylinder heads are cast aluminium with thermo-plastic camshaft covers. The single-piece oil sump is also cast aluminium. The fabricated stainless steel twin skin exhaust manifolds are unique for each cylinder bank. A moulded plastic acoustic cover is fitted over the upper engine to reduce engine-generated noise.



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Item Number	Description
1	Cylinder heads
2	Cylinder block
3	Bedplate
4	Structural sump

TECHNICAL FEATURES

The technical features include:

- An 8-cylinder 90-degree 'Enclosed V' configuration liquid cooled aluminium cylinder block with cast iron liners
- Pistons are of open-ended skirt design, with 2 compression rings and a 3-piece oil control ring
- Two aluminium cylinder heads, each incorporating 2 camshafts manufactured in chilled cast iron
- Four valves per cylinder
- Graded valve lifters (shimless)
- Belt driven supercharger
- Variable Valve Timing (VVT) (North American Specification (NAS) only, from 2007 model year)
- Top fed, 12-hole fuel injectors
- Engine front cover manufactured from aluminium, accommodating the crankshaft front oil seal
- Primary and secondary chain drive for the camshafts
- An aluminium bedplate
- A cast iron crankshaft
- Fracture-split connecting rods in sintered-forged steel
- A twin multi-vee belt, driving the front-end accessories
- Fabricated stainless steel twin skin exhaust manifolds
- An advanced engine management system incorporating electronic throttle control
- Meets with the fault handling requirements, as detailed in the European On-Board Diagnostic (EOBD) III, US Federal OBD and California OBDII legislation.

ENGINE DATA

DESCRIPTION	TYPE
Configuration	90 degree V8
Maximum power	283 kW at 5750 rpm
Maximum torque	550 Nm at 3500 rpm
Displacement	4196 liters
Stroke/bore	90.3/86 mm
Compression ratio	9.1 : 1
Firing order	1 2 7 3 4 5 6 8
Engine weight	220 kg (approx.)

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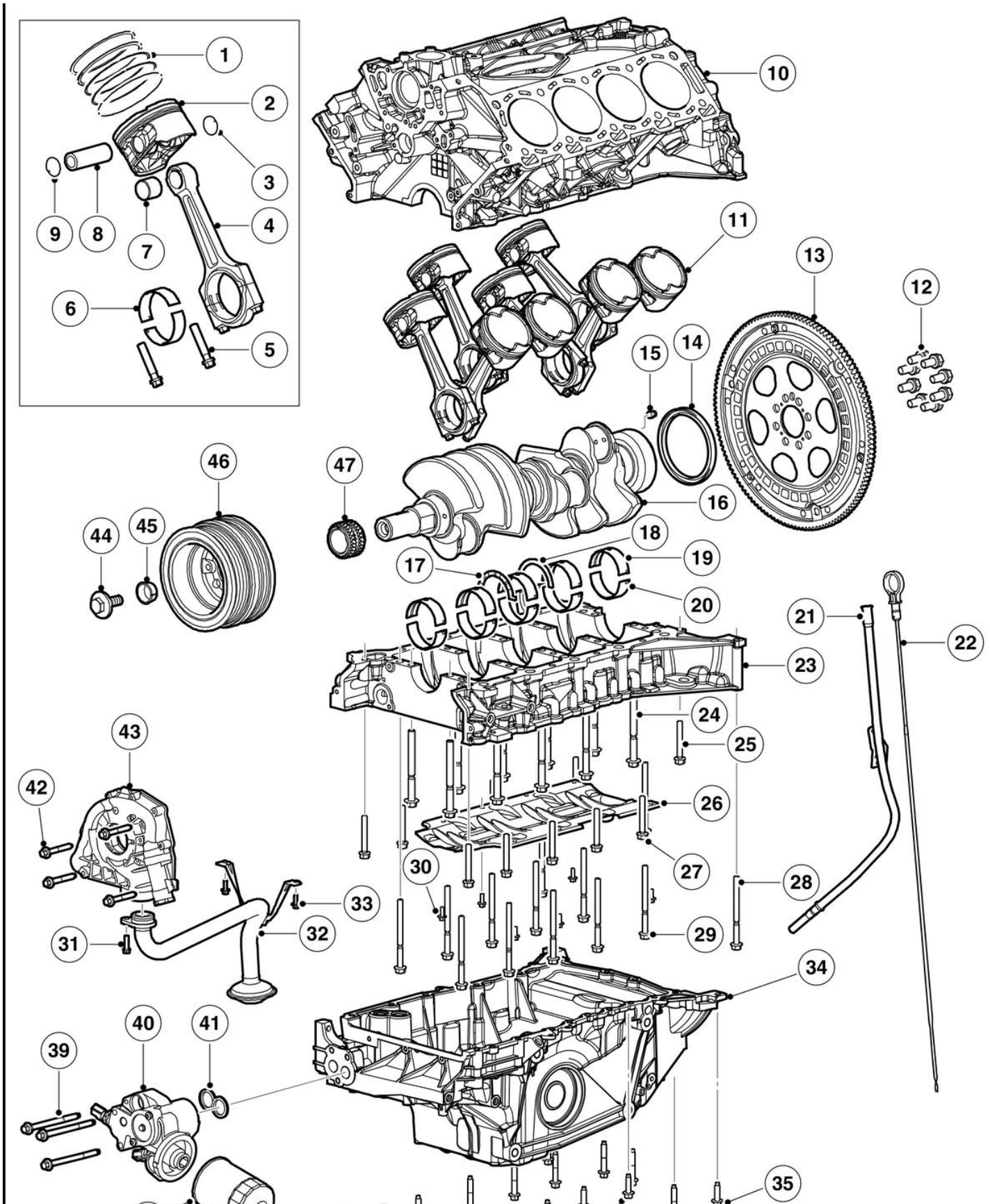
Oil volume

7.5 liters (wet)

CYLINDER BLOCK COMPONENTS

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Item Number	Description
1	Piston rings
2	Piston
3	Circlip
4	Connecting rod
5	Bolts
6	Connecting rod bearing shells
7	Bearing
8	Gudgeon pin
9	Circlip
10	Cylinder block
11	Pistons
12	Bolts
13	Flywheel
14	Seal
15	Dowel
16	Crankshaft
17	Thrust washer
18	Thrust washer
19	Bearing shells - upper
20	Bearing shells - lower
21	Oil level gage tube
22	Oil level gage
23	Bedplate
24	Bolts
25	Bolts
26	Windage tray
27	Bolts
28	Bolts
29	Bolts
30	Bolt
31	Bolt
32	Oil pick-up pipe
33	Bolts
34	Sump
35	Bolts
36	Bolts
37	Bolts
38	Oil filter
39	Bolts
40	Oil filter head assembly
41	

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	Seals
42	Bolts
43	Oil pump
44	Crankshaft bolt
45	Taper collet
46	Crankshaft pulley
47	Crankshaft sprocket

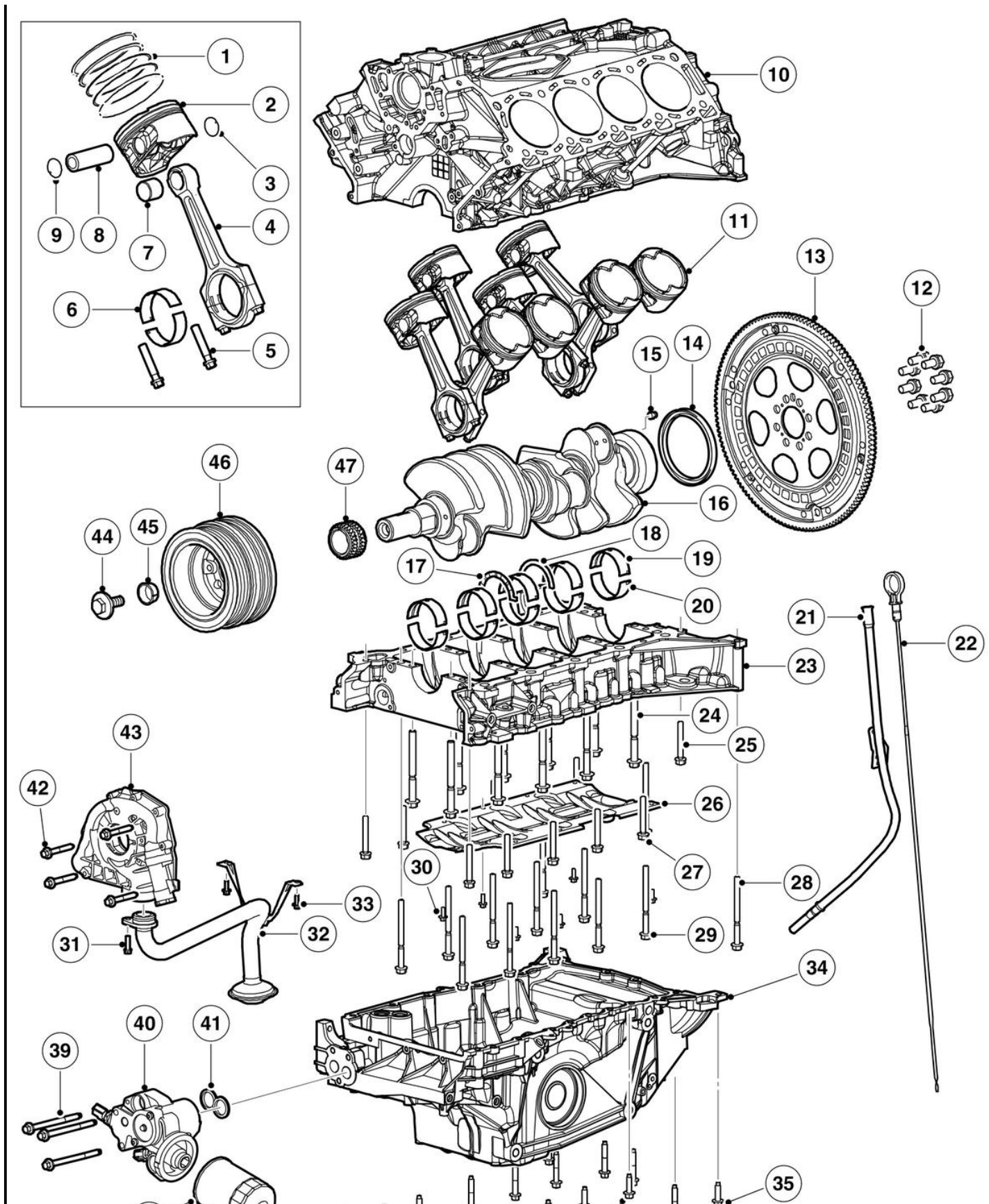
CYLINDER BLOCK

The cylinder block is an 'Enclosed V' design, which provides an inherently rigid structure with good vibration levels. A low volume coolant jacket improves warm-up times and piston noise levels; the longitudinal flow design of the jacket, with a single cylinder head coolant transfer port in each bank, improves rigidity and head gasket sealing.

Cylinder Numbering Convention

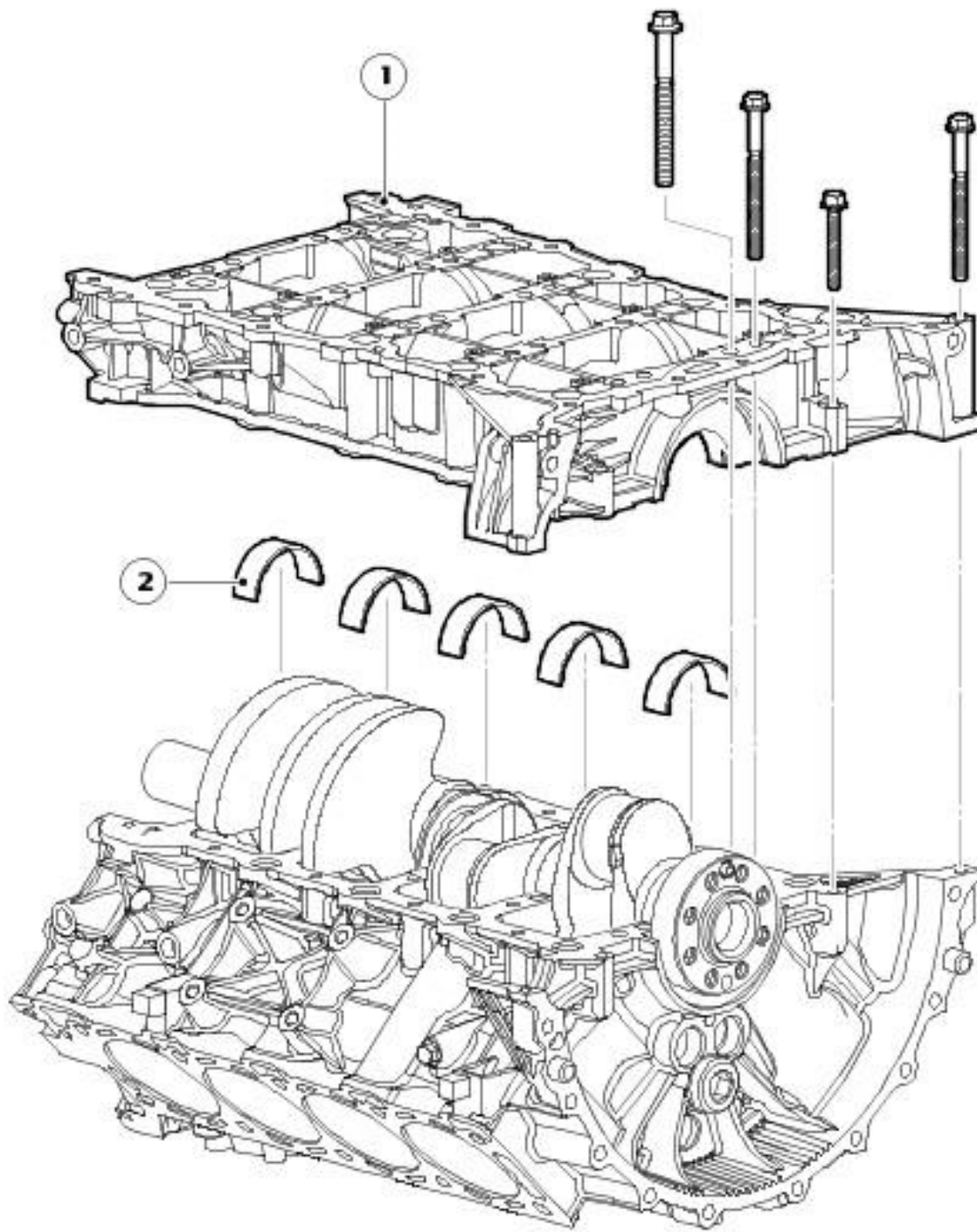
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Item Number	Description
A	Front of engine

Piston Cooling Jets



E43435

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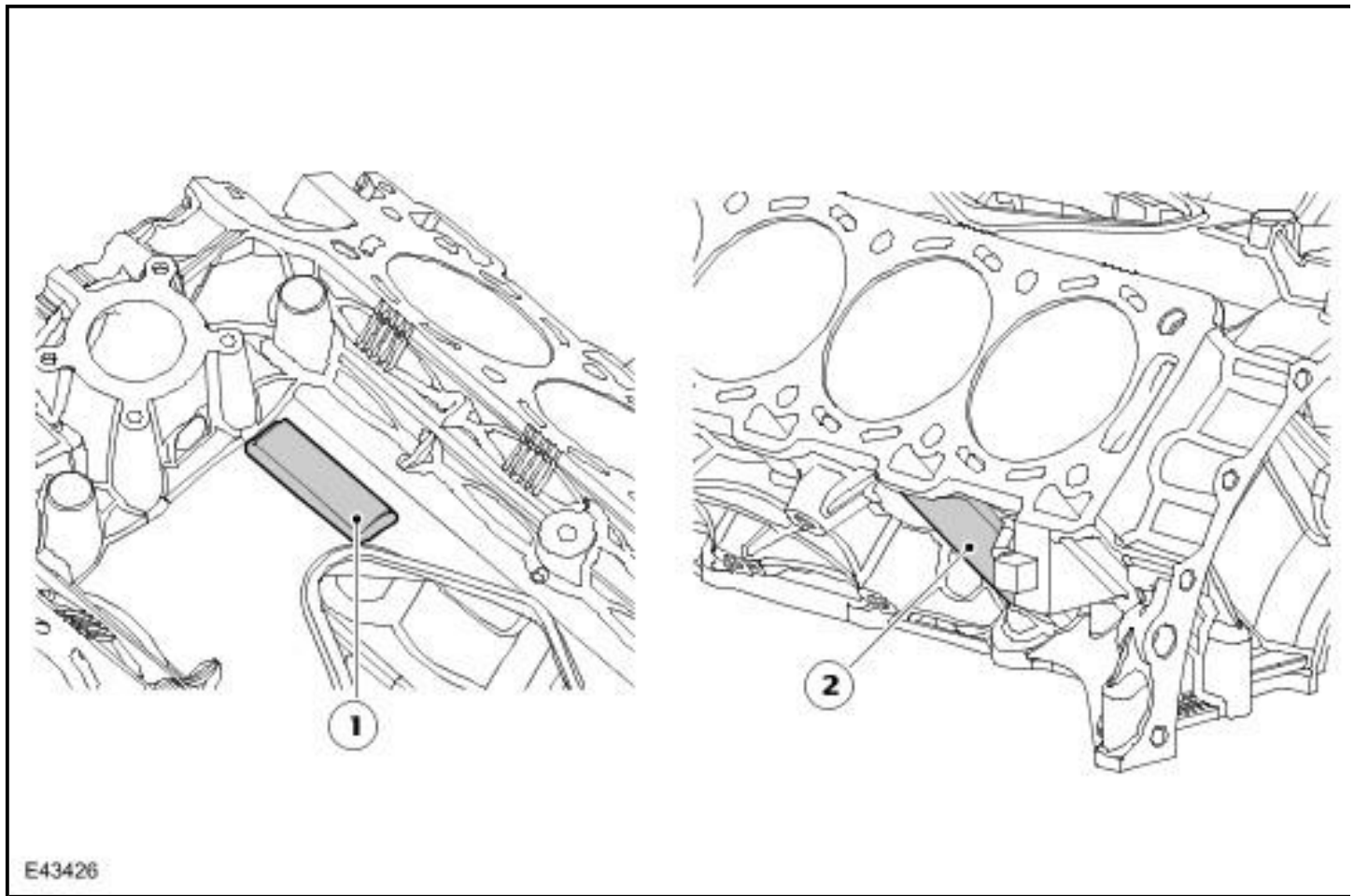
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Item Number	Description
1	Piston cooling jets
2	Bolt

Jets located in the cylinder block provide piston and gudgeon pin lubrication and cooling. These jets spray oil on the underside of the piston.

Lubrication oil is distributed through the cylinder block, via the main oil gallery and channels bored in the block, to all critical moving parts. These channels divert oil to the main and big-end bearings via holes machined into the crankshaft.

Engine Data Locations

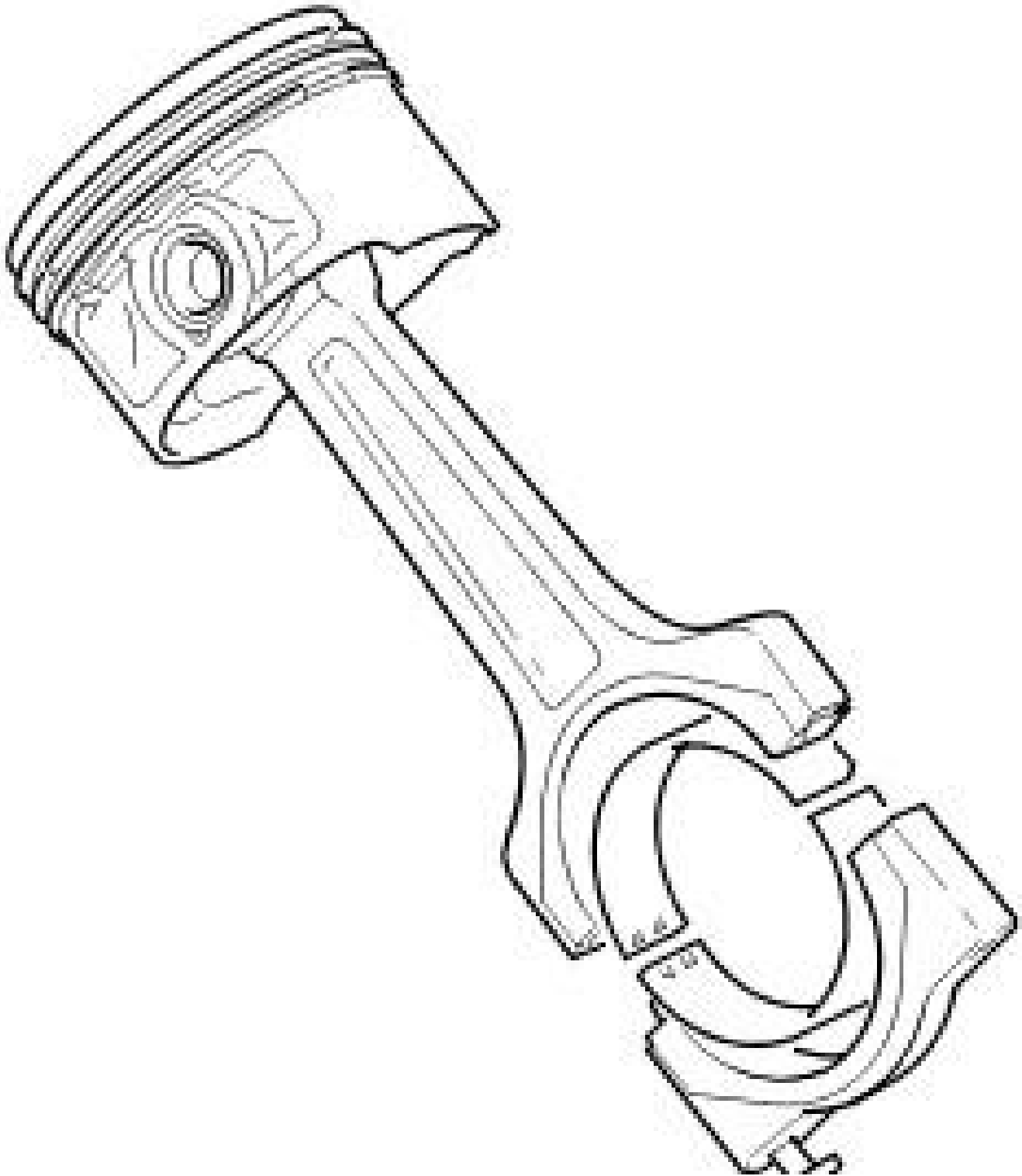


Item Number	Description
1	Engine part number
2	Engine data (main bearing diameters, cylinder bore diameters, etc), emissions code and engine number

Engine data is marked at 3 locations, 2 on the cylinder block (shown) and 1 on the engine front cover, which

consists a label displaying the engine number. Component diameters are represented by alphabetical and numerical codes; keys to the codes are in the Service Repair Procedures (SRP) Information.

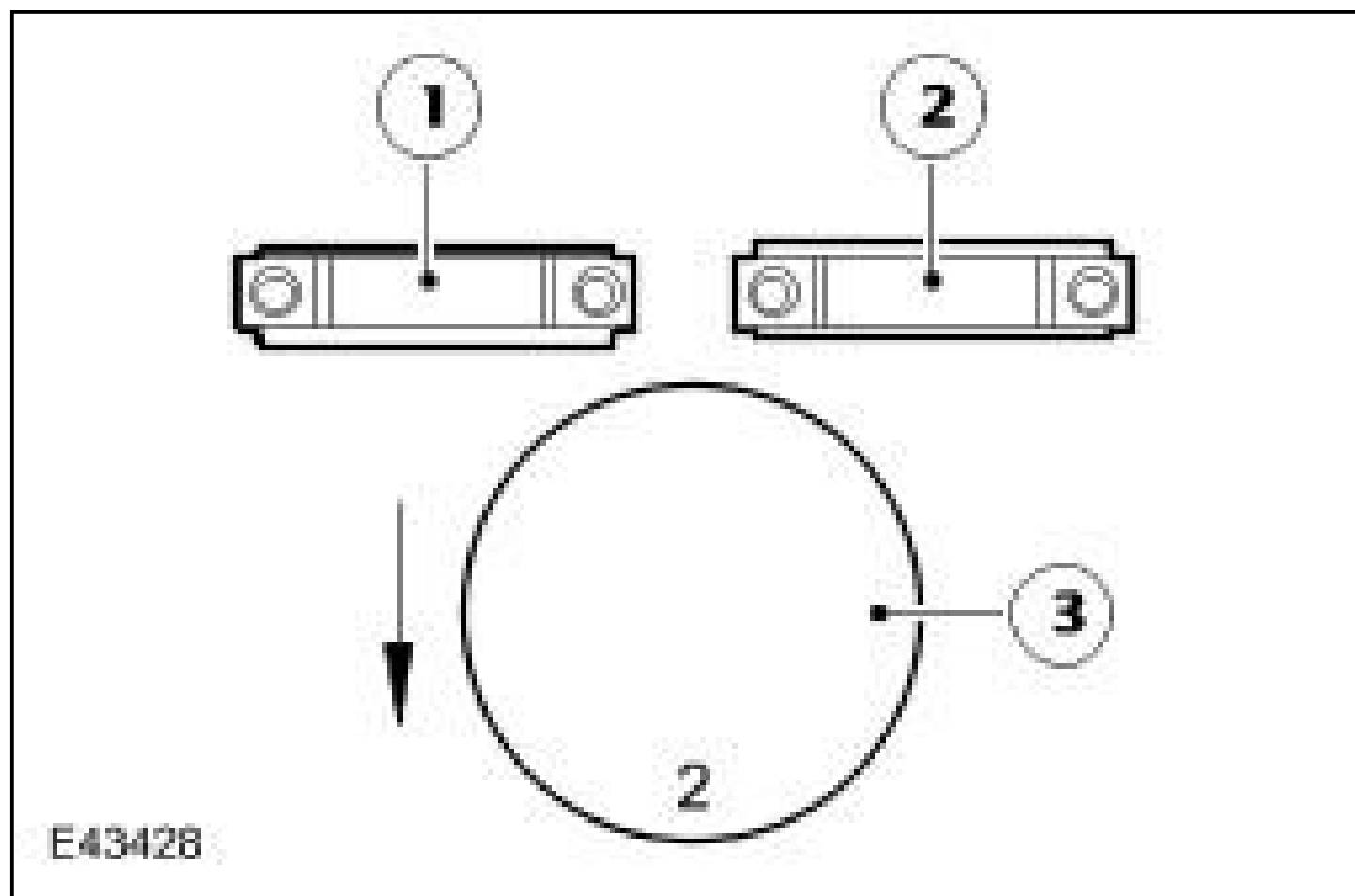
CONNECTING RODS AND PISTONS



The connecting rods are manufactured from sinter-forged steel and have fracture-split bearing caps. The bearing caps are produced by fracturing the opposing sides of the connecting rod at the bearing horizontal centre line. As well as being easier to manufacture, when reassembled the fractured surfaces interlock to form a strong seamless joint. The cylinder position is marked on adjoining sides of the joint to identify matching connecting rods and bearing caps. The connecting rod bearings are aluminium/tin split plain bearings.

The pistons are of the open-ended skirt design with a dished crown. They are also manufactured from a higher strength aluminium alloy and incorporate a thicker top land to resist the increased thermal and mechanical loads produced by supercharging. Three piston rings, 2 compression and 1 solid oil control ring, are installed on each piston. Each piston is installed on a gudgeon pin located in an bronze bushing in the connecting rod.

Connecting Rod and Piston Installation



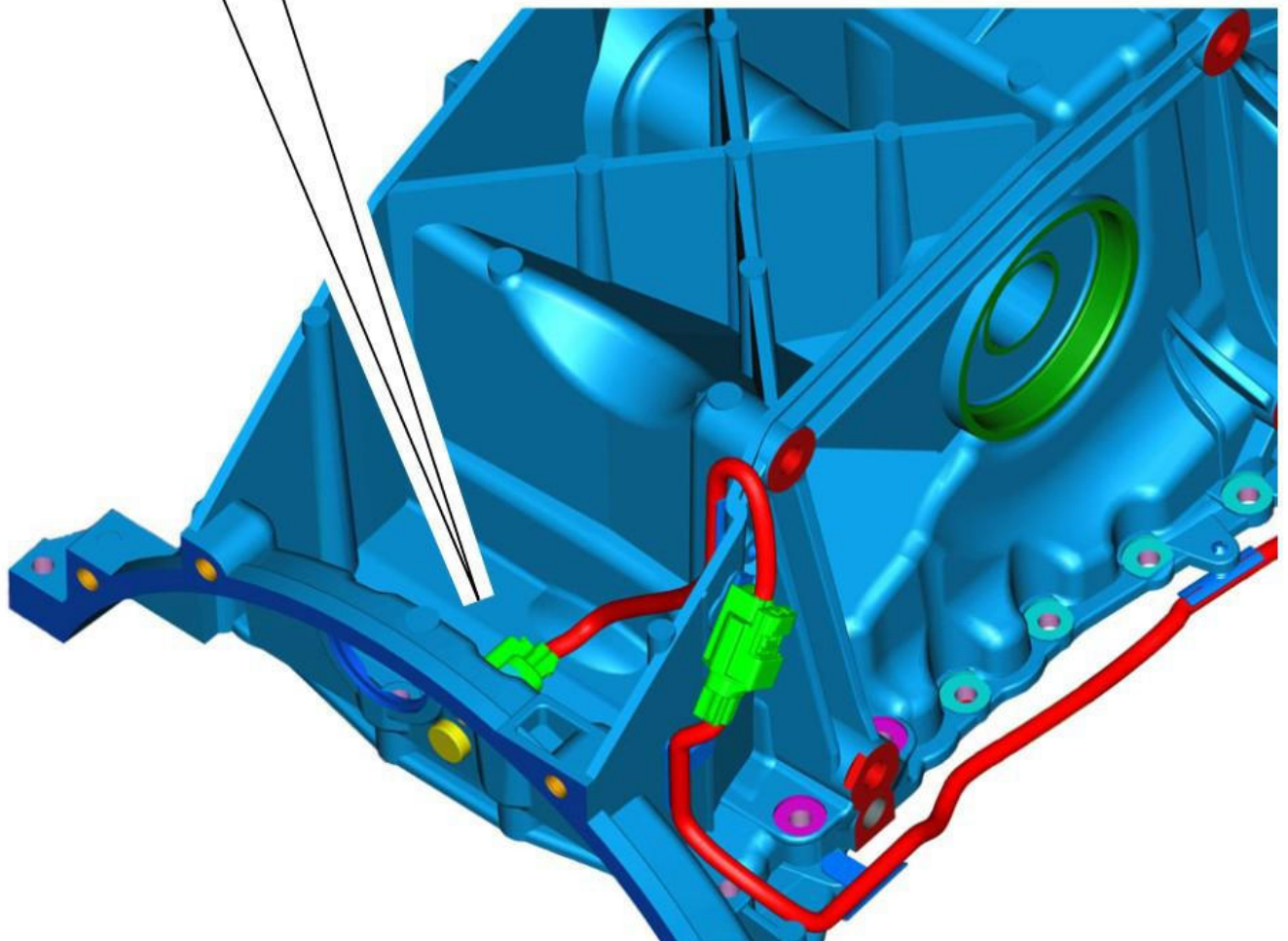
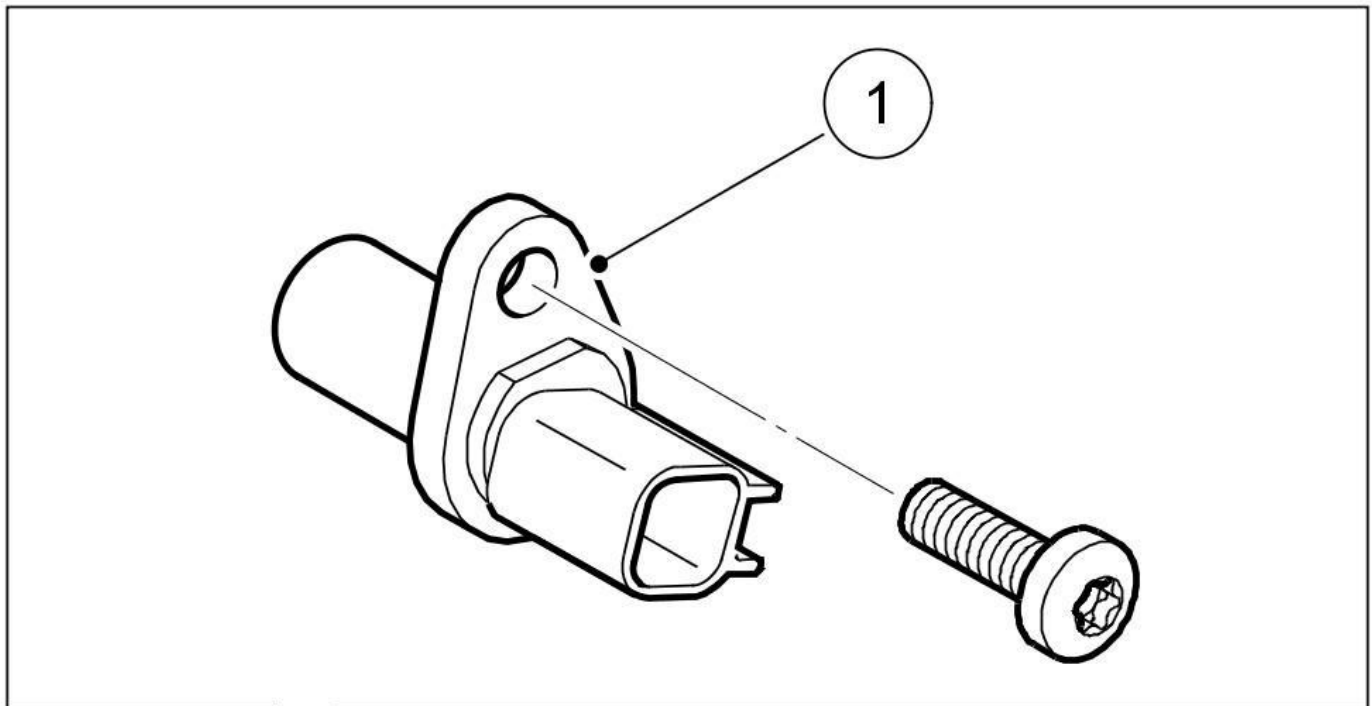
Item Number	Description
1	RH bank of cylinders
2	LH bank of cylinders
3	Piston

The piston grade number is stamped on the crown of the piston and must coincide with that for each cylinder

bore. The piston must be assembled in the correct orientation for the designated cylinder bore:

- RH bank of cylinders - piston grade number and the thick flange of the connecting rod must face the front of the engine
- LH bank of cylinders - piston grade number and the thin flange of the connecting rod must face the front of the engine

CRANKSHAFT POSITION SENSOR



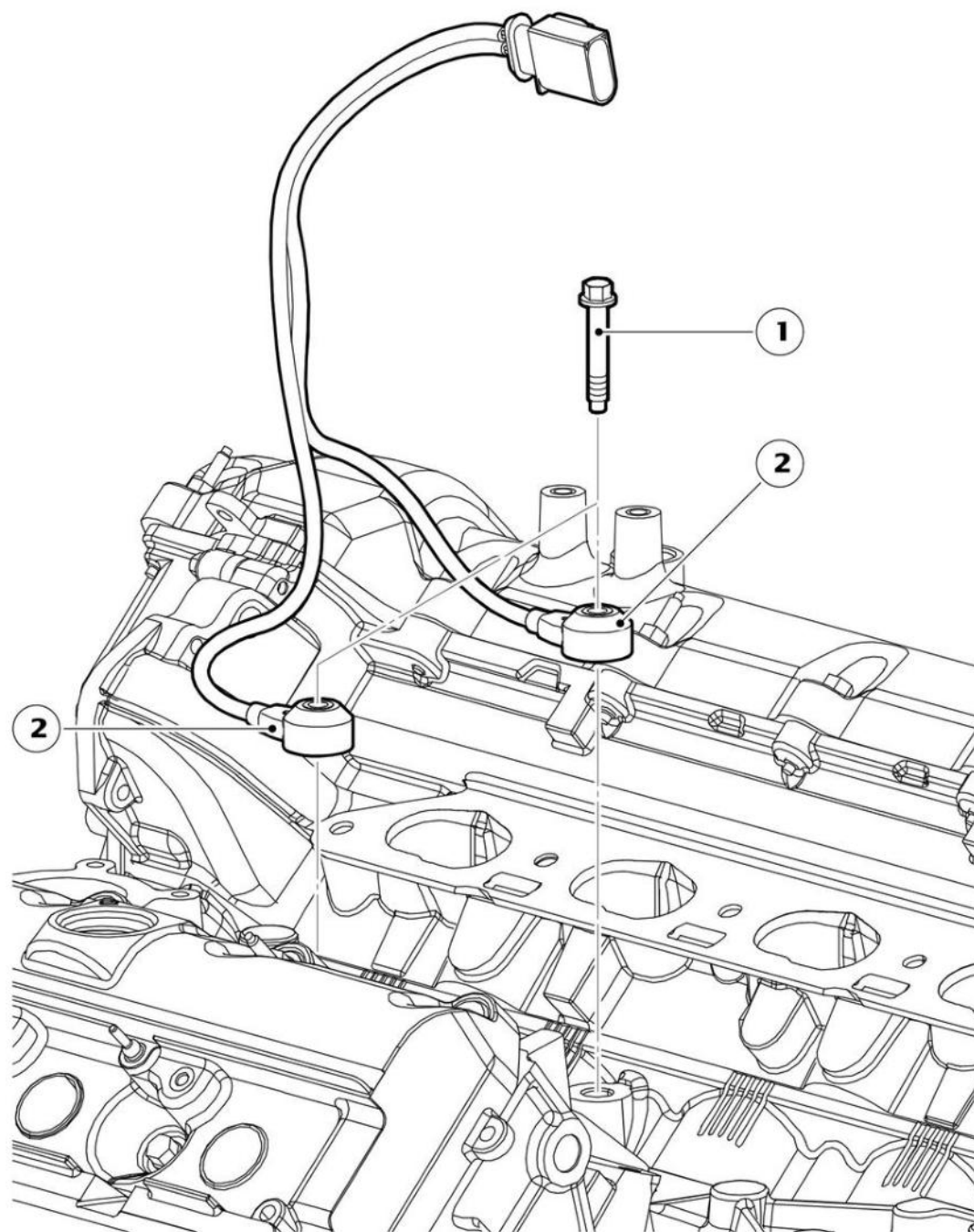
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Item Number	Description
1	Crankshaft position sensor (CKP)

The CKP sensor is installed at the rear of the sump. It is a variable reluctance sensor that provides an input of engine crankshaft speed and position. Refer to **ELECTRONIC ENGINE CONTROLS** .

KNOCK SENSORS



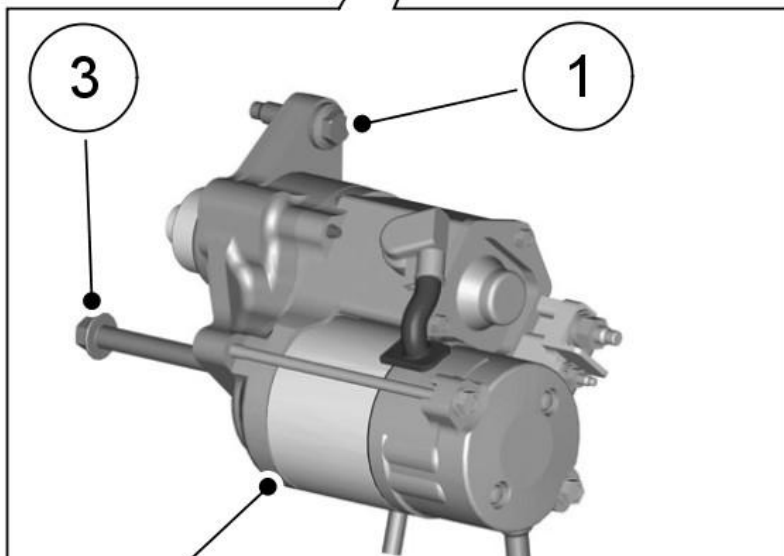
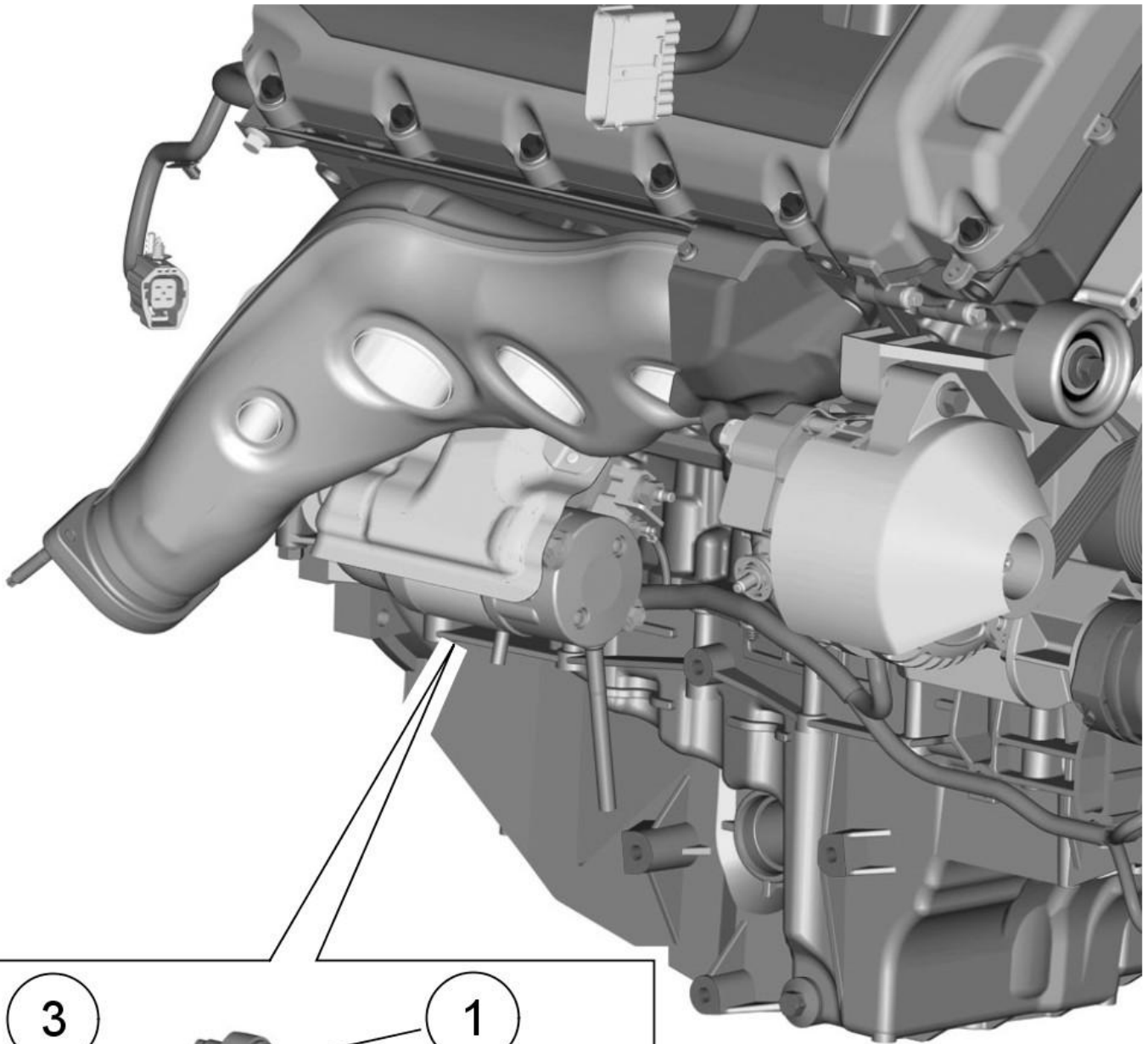
E43430

Item Number	Description
1	Bolt
2	Knock sensor

The knock sensors are installed in the cylinder block on the inboard side of each cylinder bank. They are piezo-electric sensors that provide inputs to detect and locate detonation during combustion. Refer to **ELECTRONIC**

ENGINE CONTROLS .

STARTER



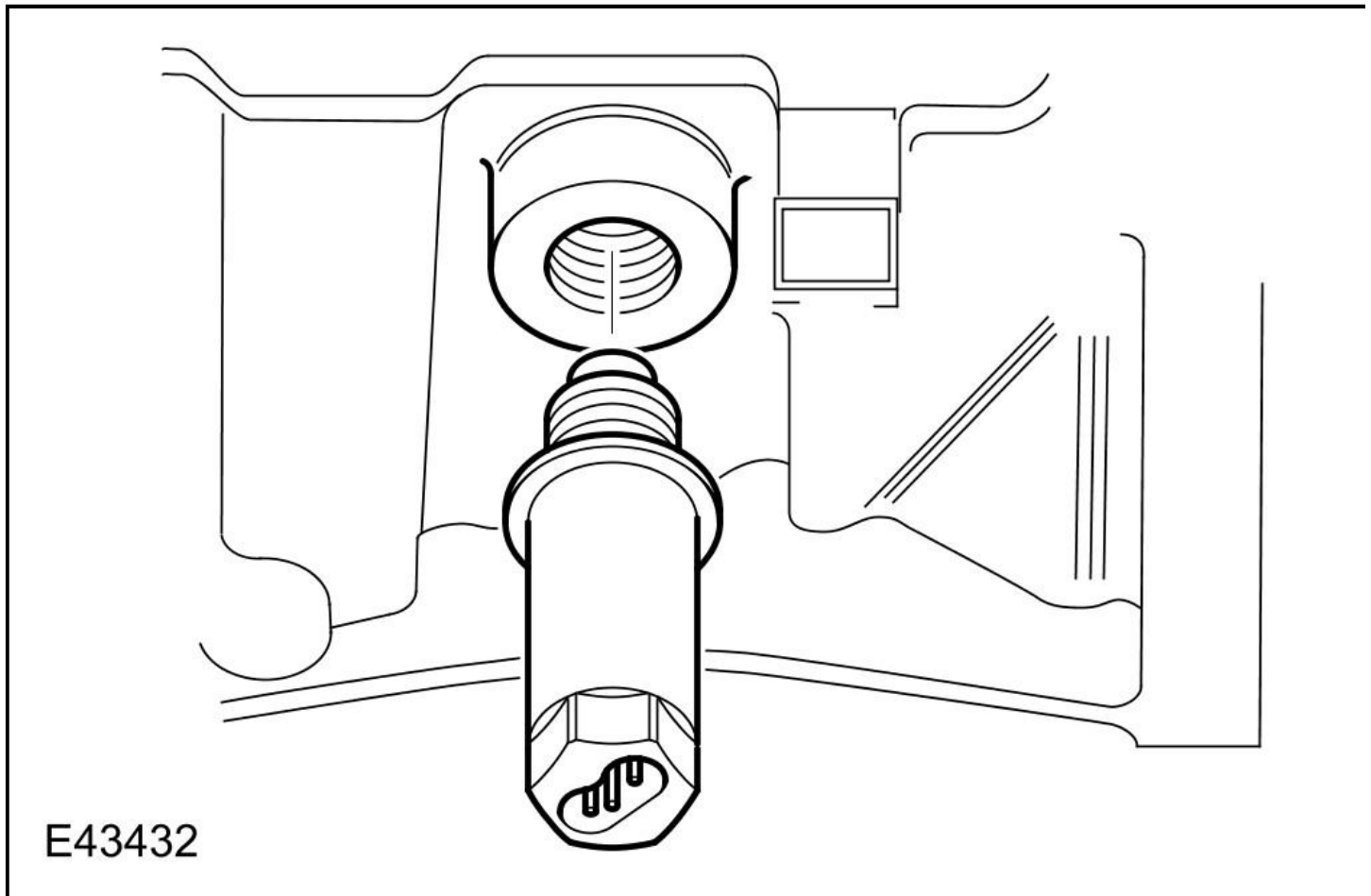
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ENGINE Engine (4.2L)

Item Number	Description
1	Bolt
2	Starter motor
3	Bolt

The engine starter motor is installed at the rear right side of the engine, at the cylinder block to bedplate split line. Refer to **STARTING SYSTEM** .

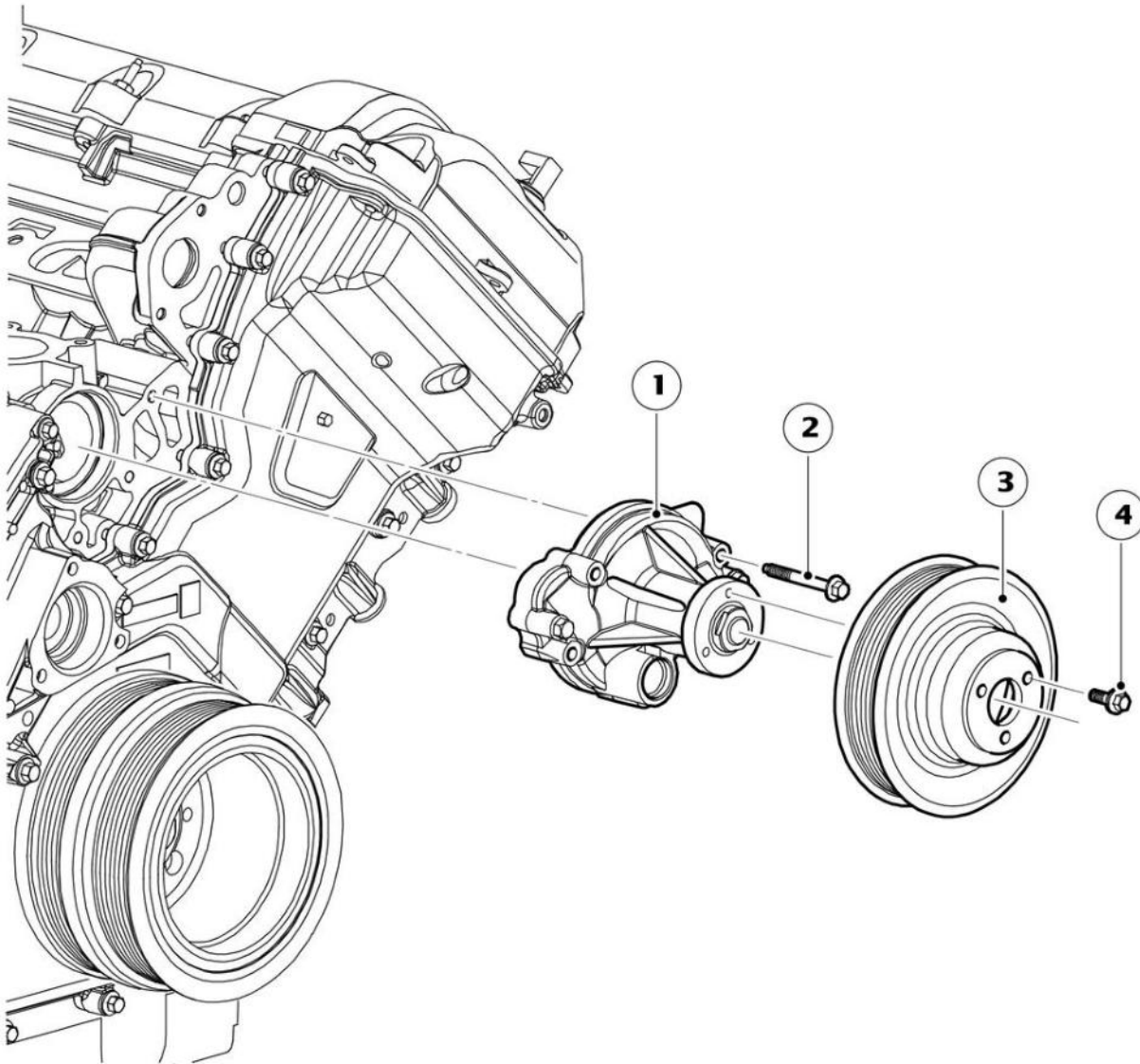
COOLANT DRAIN PLUG/HEATER



A coolant drain plug is installed on the rear left side of the cylinder block. On vehicles with the cold climate package, the cylinder block heater replaces the drain plug.

On vehicles destined for Canada, the coolant heater is installed during engine manufacture, but for Scandinavian vehicles the heater is supplied in kit form to be installed at the dealership.

COOLANT PUMP

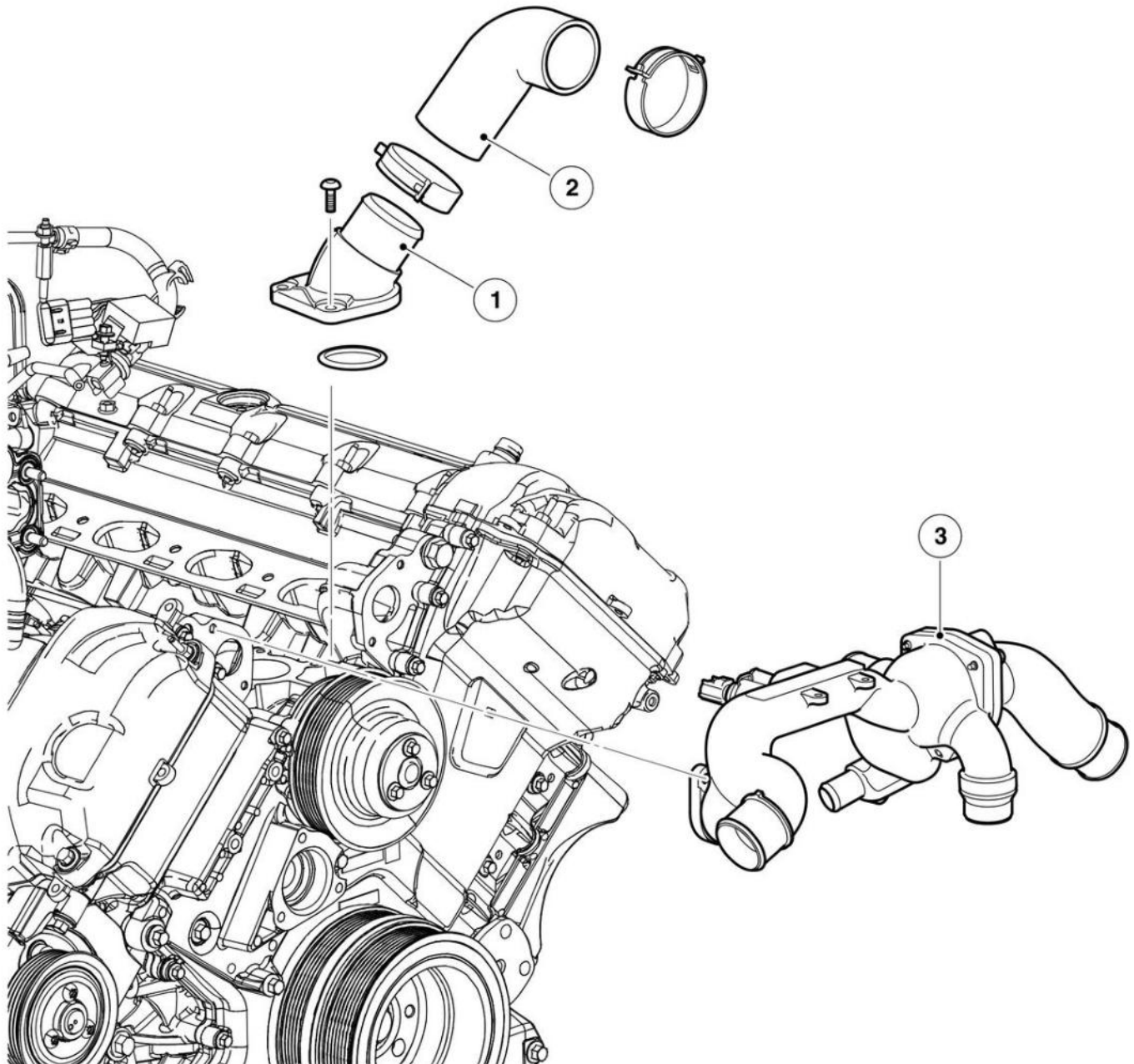


E43433

Item Number	Description
1	Coolant pump
2	Bolt
3	Pulley
4	Bolt

The coolant pump is installed between the 2 cylinder banks, on the front face of the cylinder block.

COOLANT INLET AND OUTLET ASSEMBLY



E56199

Item Number	Description
1	Coolant outlet elbow

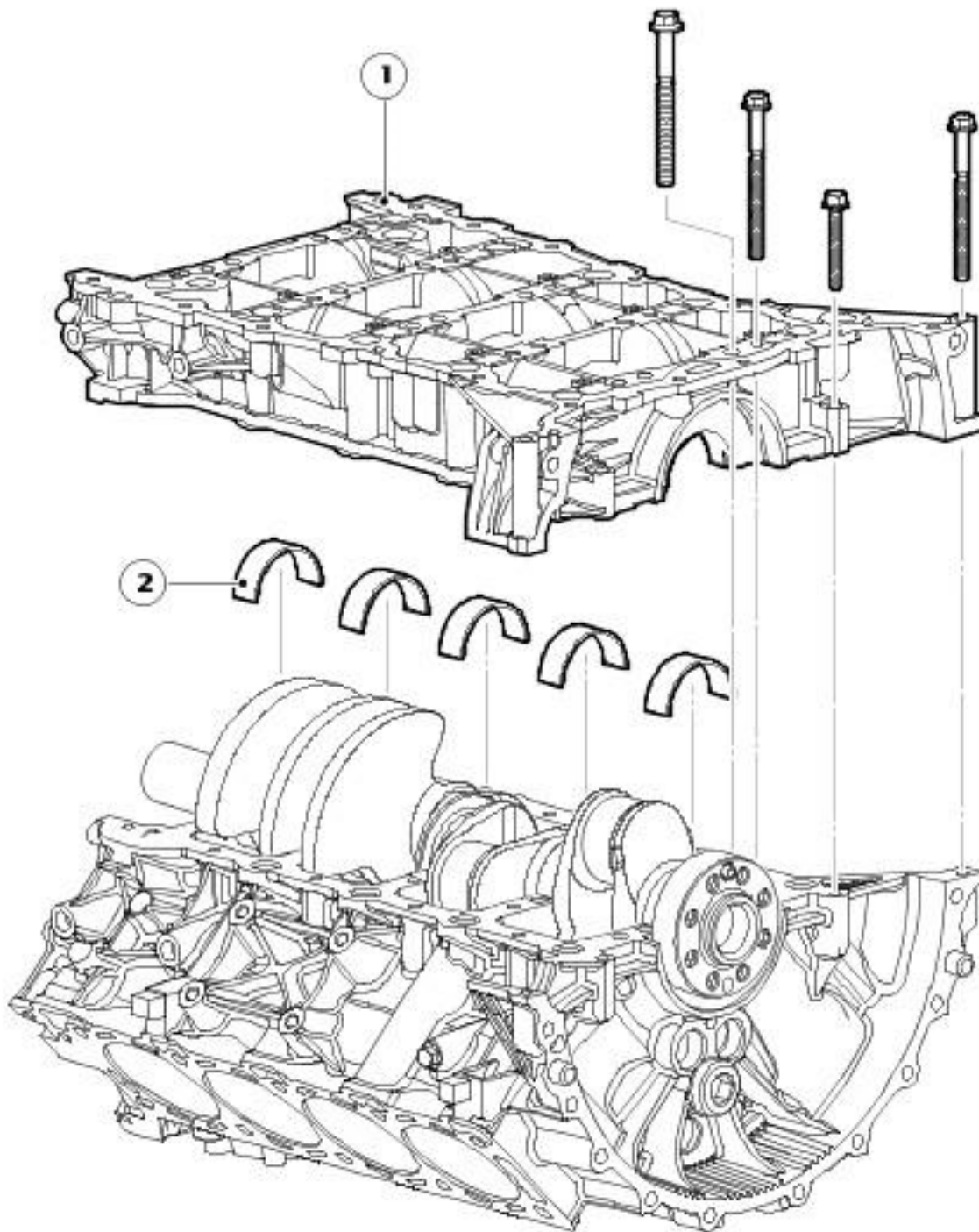
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2	Coolant hose
3	Thermostat housing

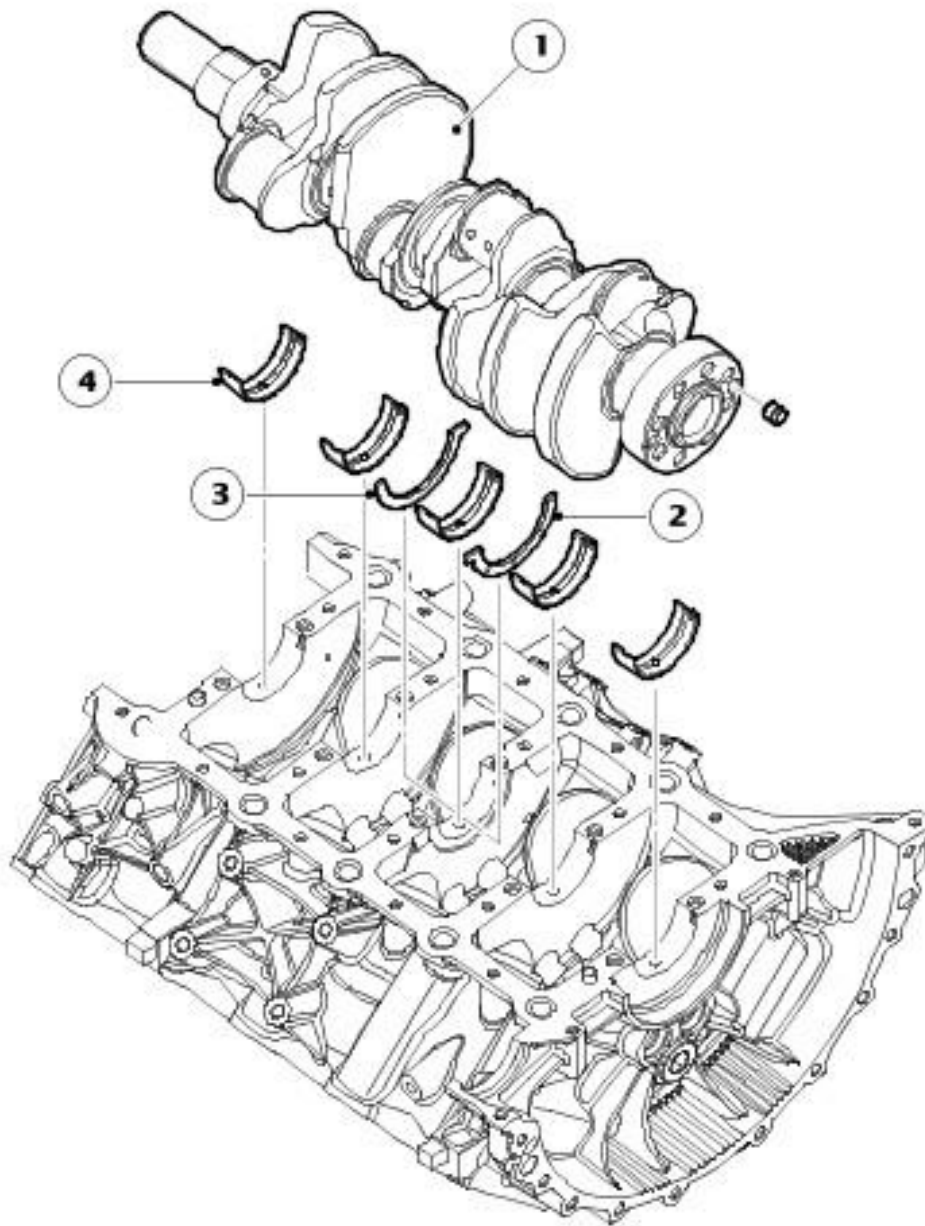
To accommodate the installation of the supercharger, the thermostat housing and coolant outlet duct are combined into an aluminium alloy coolant outlet assembly, which is installed between the 2 cylinder banks, immediately above the coolant pump. A hose connects the coolant outlet assembly to a coolant inlet housing attached to the coolant pump intake on the cylinder block. The thermostat controls the flow of coolant through the radiator.

CRANKSHAFT AND SUMP COMPONENTS



Item Number	Description
1	Bedplate
2	Main bearings - lower

CRANKSHAFT AND MAIN BEARINGS



E43436

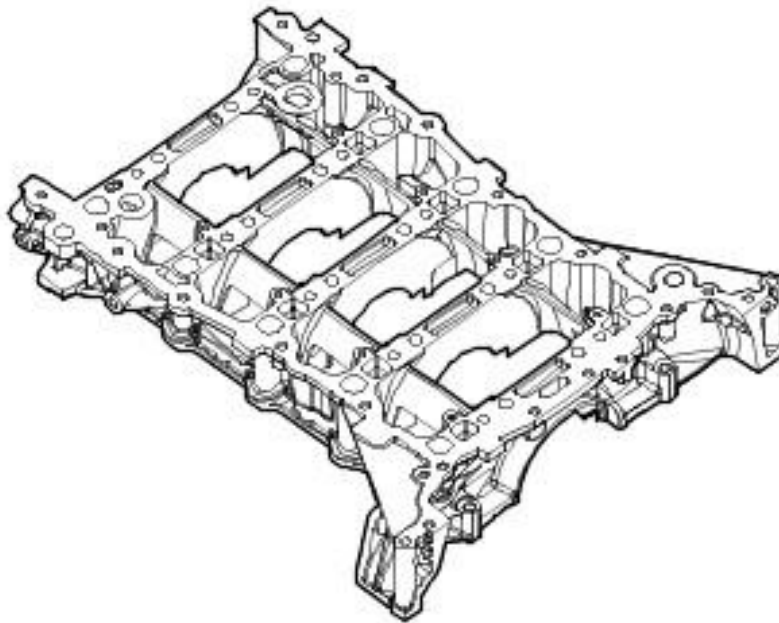
Item Number	Description
1	Crankshaft
2	Thrust washer
3	Thrust washer
4	Main bearings - upper

Six counter-balance weights ensure good vibration levels from the 4 throw, 5 bearing crankshaft. Manufactured in cast iron, the crankshaft also has undercut and rolled fillets for improved strength.

The crankshaft rear oil seal is a press fit in the bedplate to cylinder block interface.

The main bearings are aluminium/tin split plain bearings. An oil groove in the upper half of each bearing transfers the oil into the crankshaft for lubrication of the connecting rod bearings. An aluminium/tin thrust washer is installed each side of the top half of the centre main bearing.

BEDPLATE

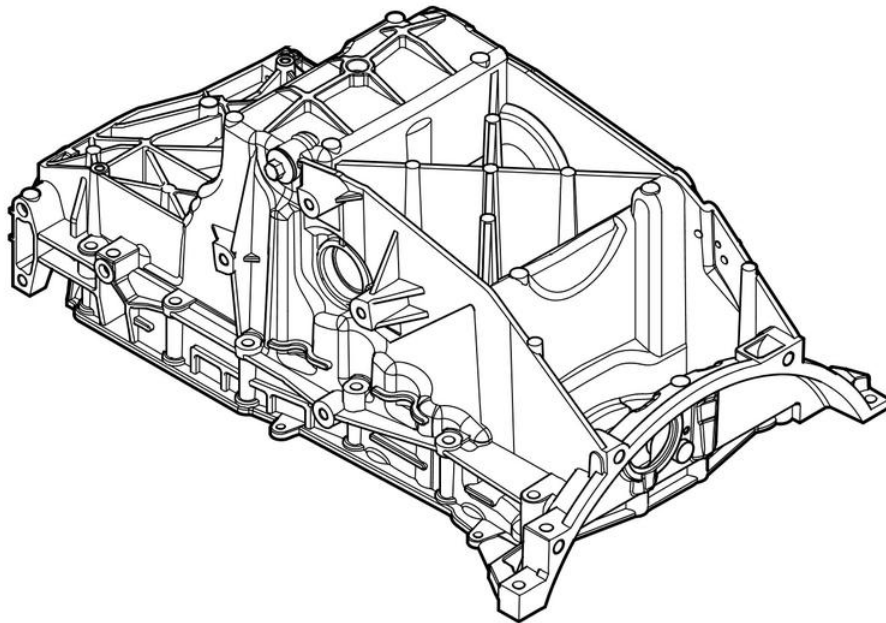


The bedplate is a structural casting bolted to the bottom of the cylinder block to retain the crankshaft. The use of a bedplate further improves rigidity. Iron inserts, cast into the main bearing supports of the bedplate, minimise main bearing clearance changes due to heat expansion.

Two hollow dowels align the bedplate with the cylinder block.

Beads of sealant seal the joint between the bedplate and the cylinder block.

SUMP

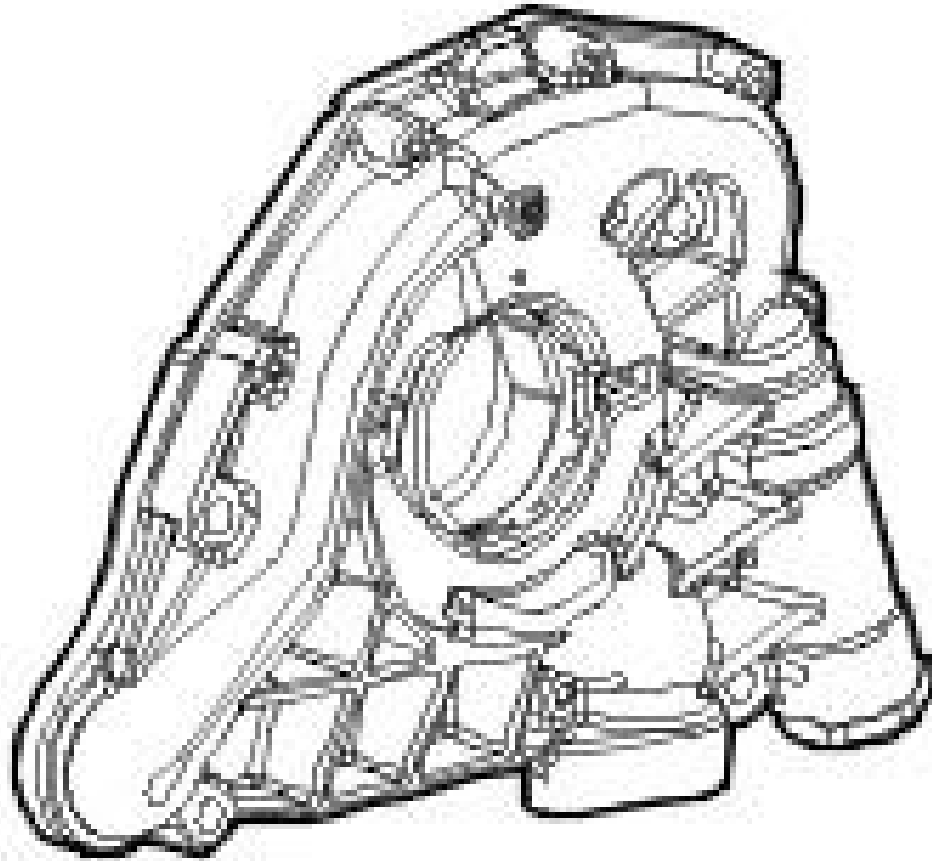


E60998

The aluminium alloy structural sump is bolted to the bedplate. A windage tray attached to the underside of the bedplate isolates the oil pan from the disturbed air produced by the rotation of the crankshaft, to prevent oil aeration and improve oil drainage. A rubber plug at the rear of the structural sump seals the port that provides access to the torque converter securing bolts. The engine oil drain plug is located at the front right corner of the oil pan.

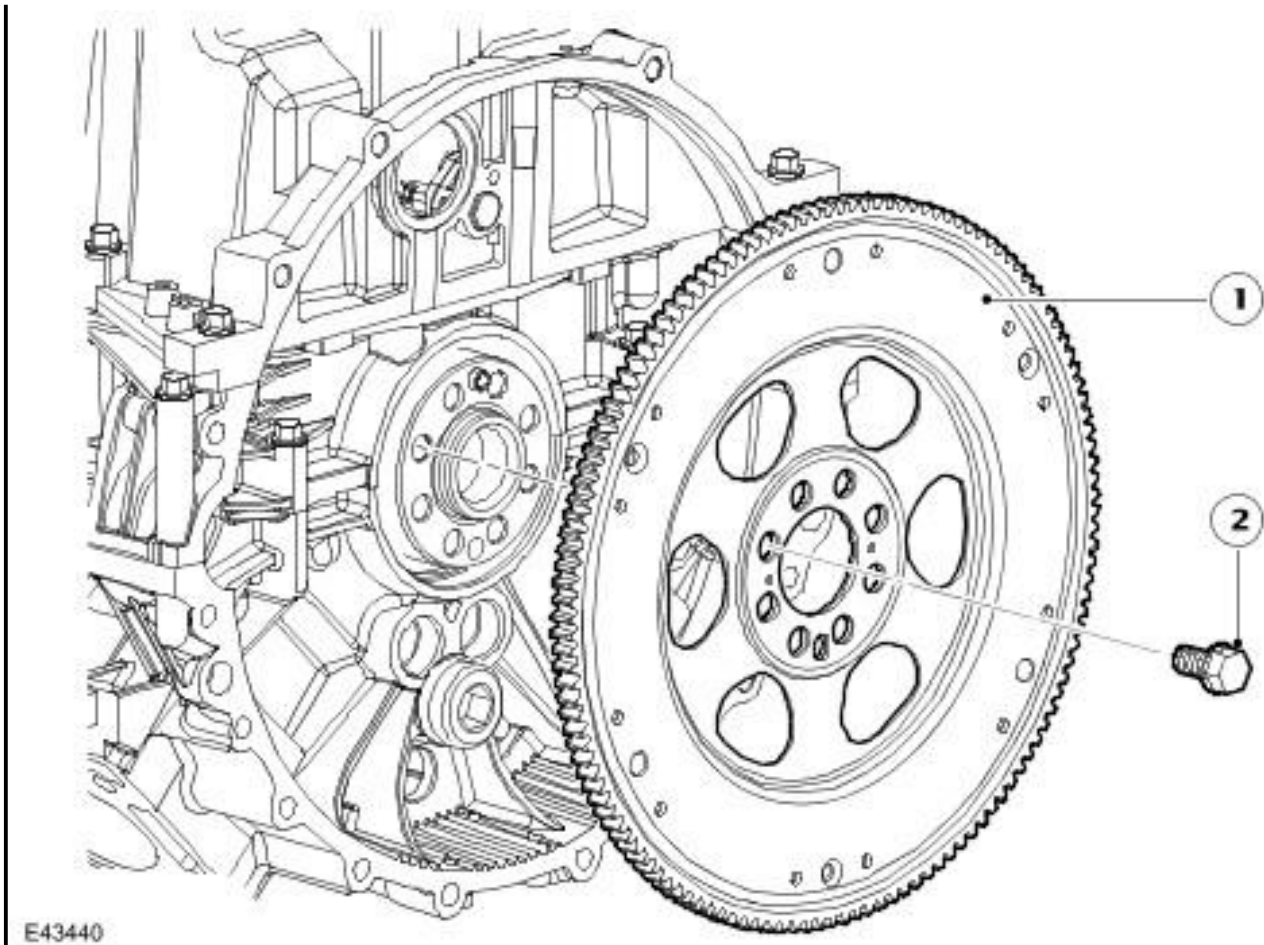
A bead of sealant seals the joint between the structural sump and the bedplate.

OIL PUMP



The oil pump is installed on the crankshaft at the front of the engine. The pump outlet port aligns with oil passages in the bedplate.

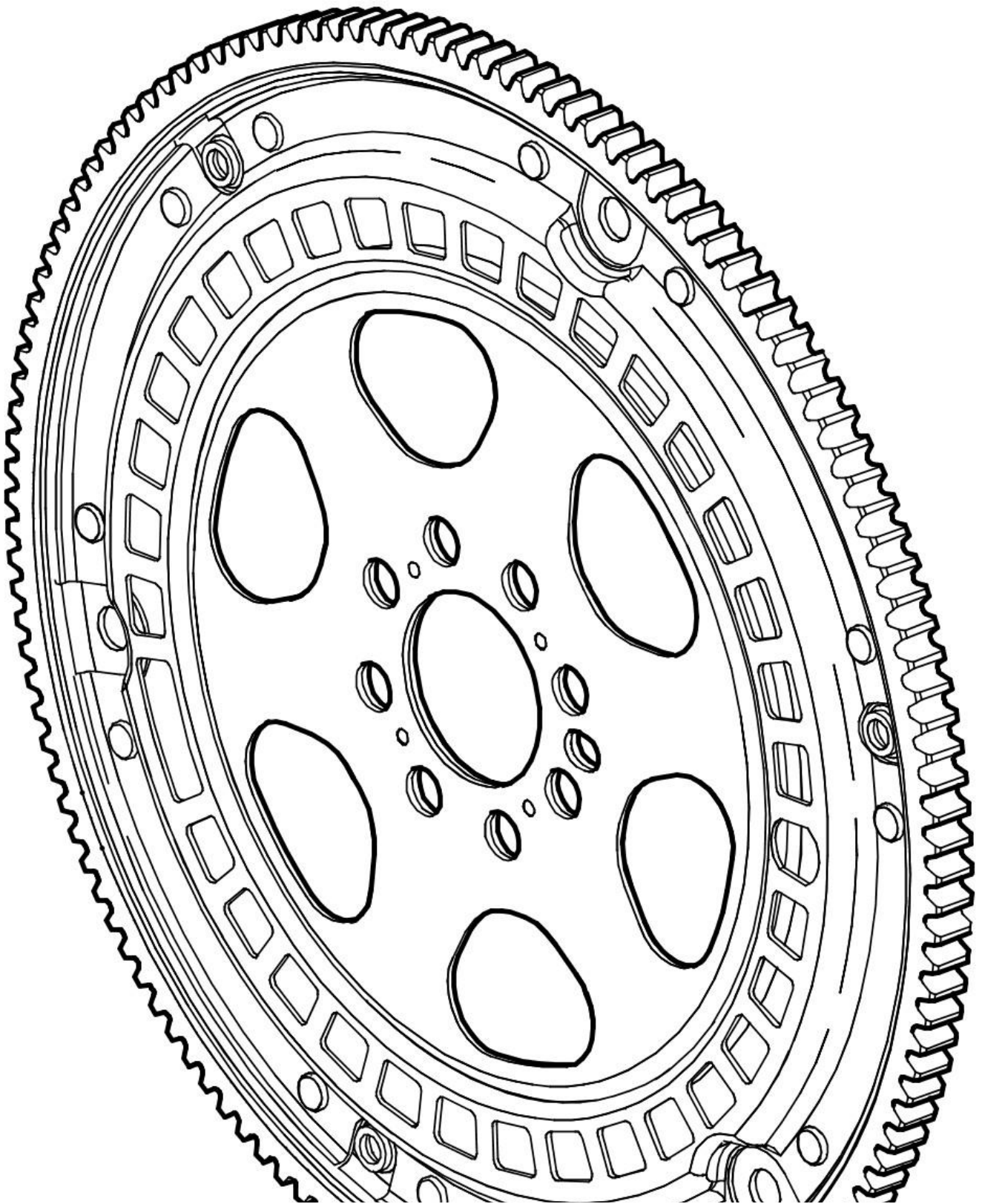
STARTER DRIVE PLATE



Item Number	Description
1	Starter drive plate
2	Bolt

The starter drive plate is attached to the rear of the crankshaft. A timing disc, for the engine speed sensor, is spot welded to the front face of the drive plate.

Timing Disc

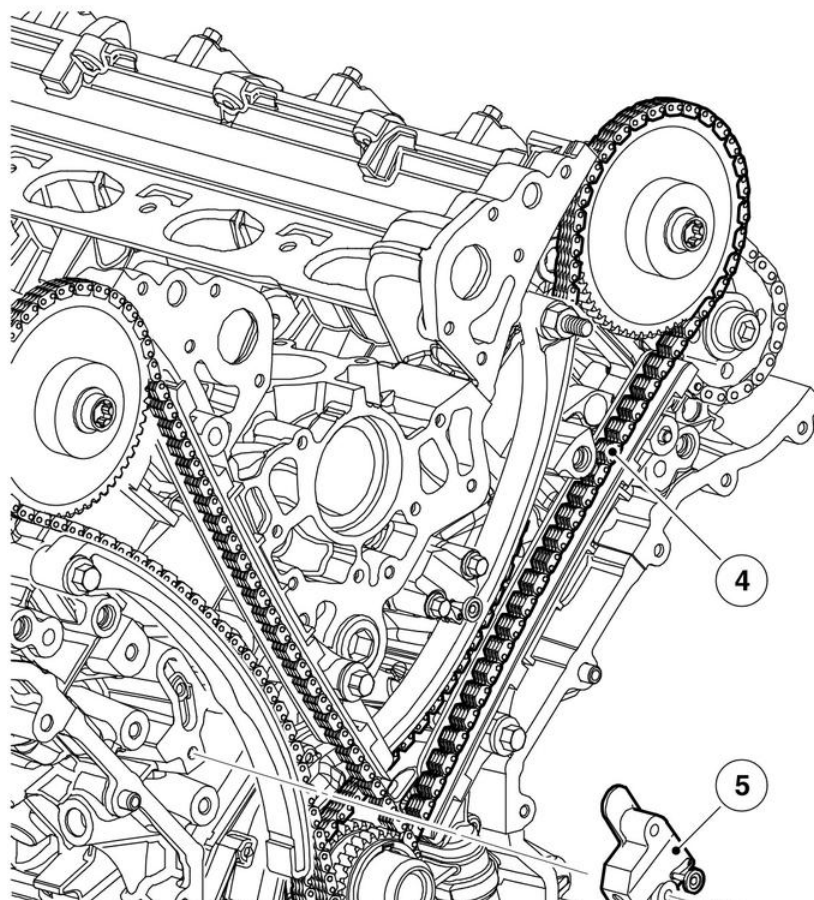
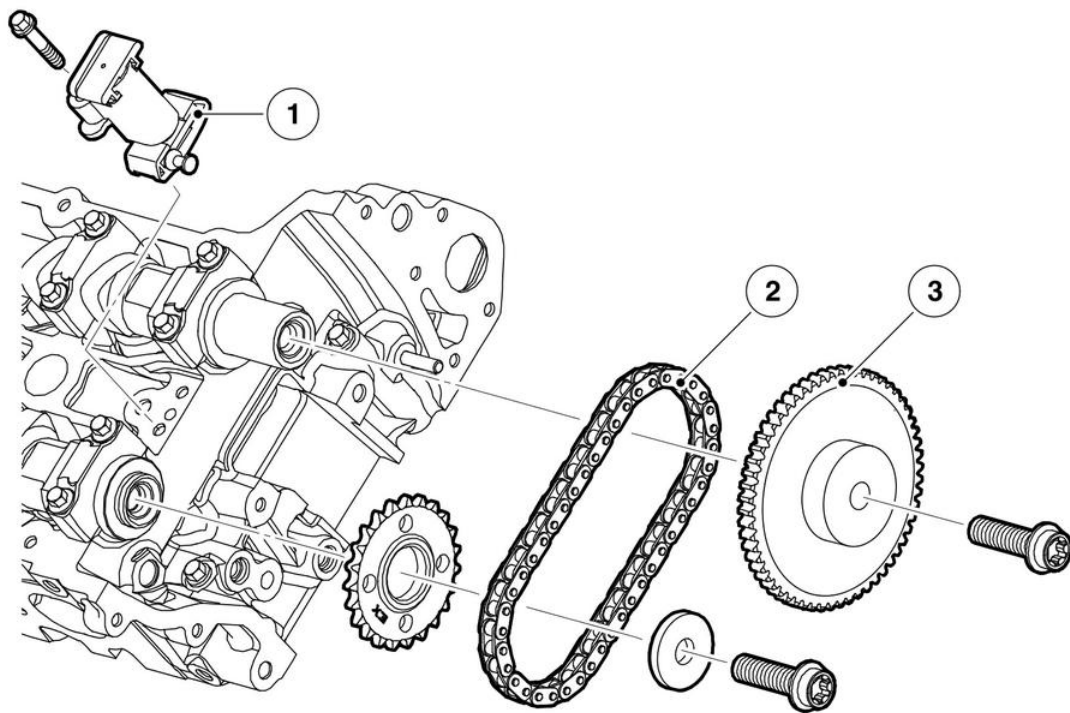


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CAMSHAFT TIMING COMPONENTS

Rest Of the World (ROW) Vehicles and NAS Vehicles upto 2007 Model Year

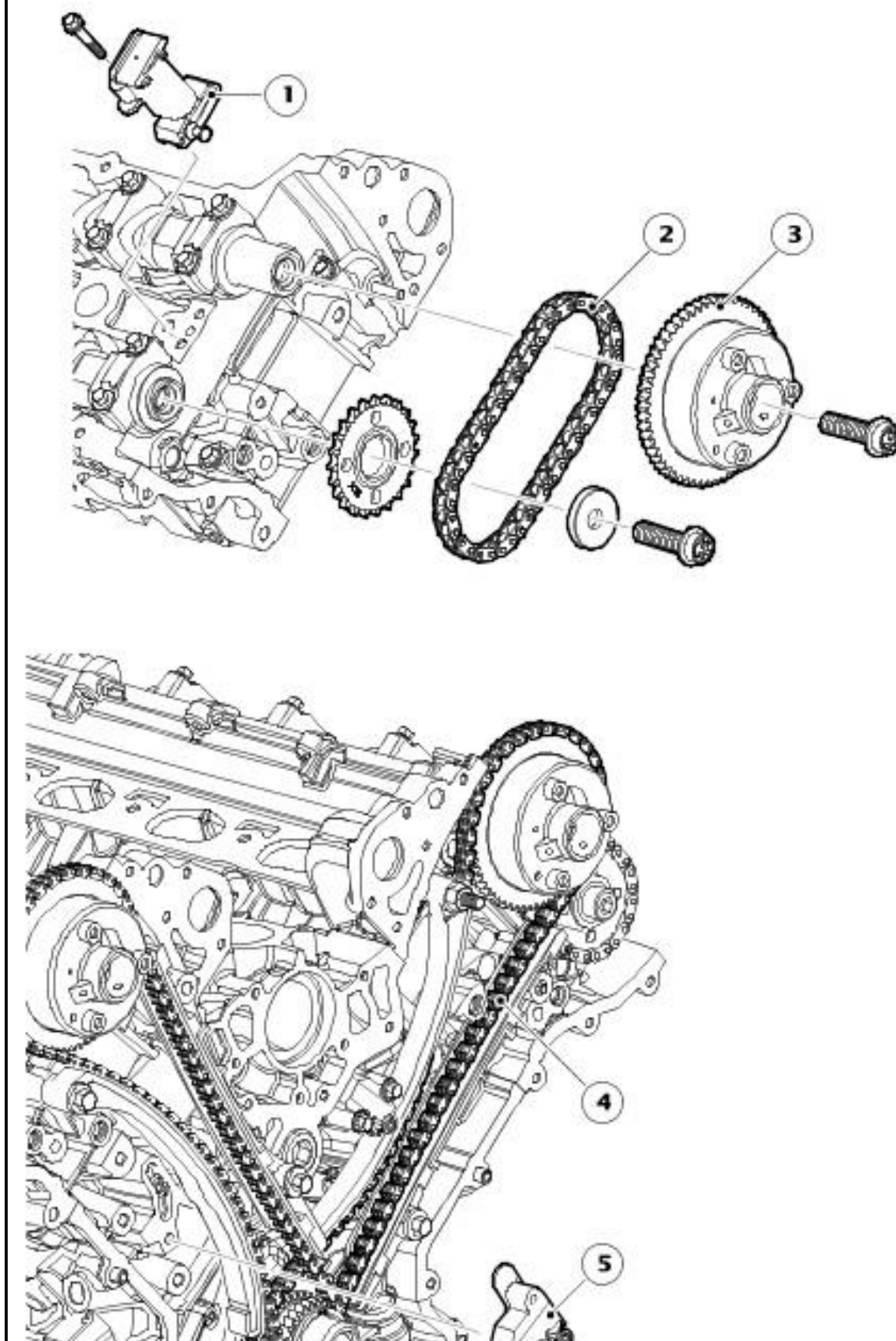


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Item Number	Description
1	Secondary chain tensioner
2	Secondary chain
3	Inlet camshaft sprocket
4	Primary chain
5	Primary chain tensioner

NAS Vehicles from 2007 Model Year



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Item Number	Description
1	Secondary chain tensioner
2	Secondary chain
3	Variable Valve Timing (VVT) unit
4	Primary chain
5	Primary chain tensioner

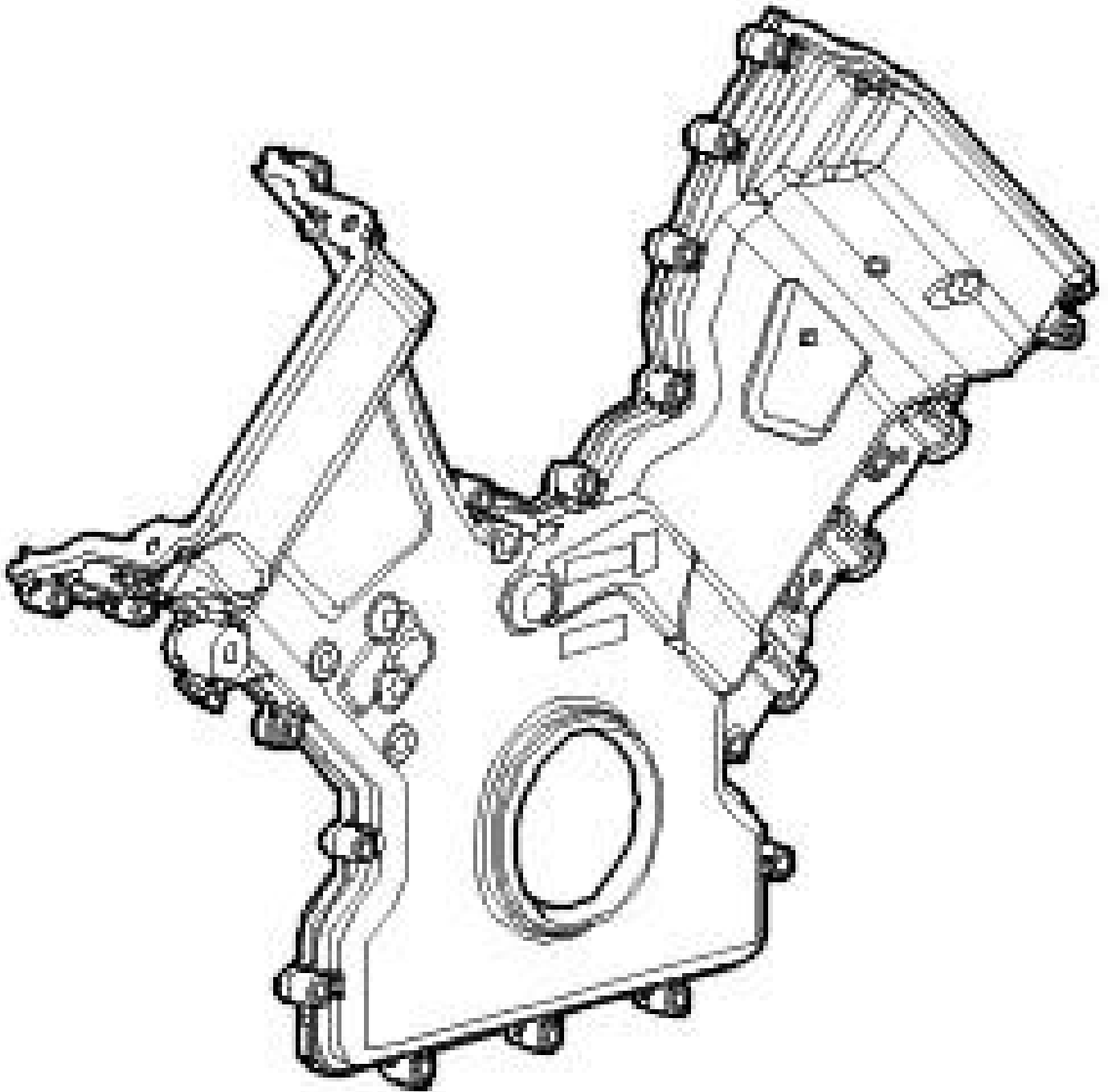
TIMING GEAR

Multiple link primary and single row secondary chains drive the camshafts of each cylinder bank. The primary chains transmit drive from 2 sprockets on the crankshaft to each intake camshaft sprocket. The secondary chains transmit drive from the intake camshaft sprockets/variable valve-timing units, to the exhaust camshafts.

A key locates the 2 drive sprockets on the crankshaft. The crankshaft's torsional vibration damper retains the sprockets in position. The intake camshaft/variable valve timing units and exhaust camshaft sprockets are non-interference, non-keyed fit on their respective camshafts; the drive being transmitted by the face-to-face friction load produced by the variable valve timing unit/sprocket-securing bolt.

Each chain has a hydraulic tensioner operated by engine oil. The primary chains are lubricated via oil squirt tubes located at the front of the engine block, near the crankshaft drive sprockets. A jet of oil from the end of each secondary chain tensioner lubricates the secondary chains. The primary chain tensioners act on pivoting flexible tensioner blades. The secondary chain tensioners act directly on the chains. Guide rails are installed on the drive side of the primary chains.

TIMING COVER

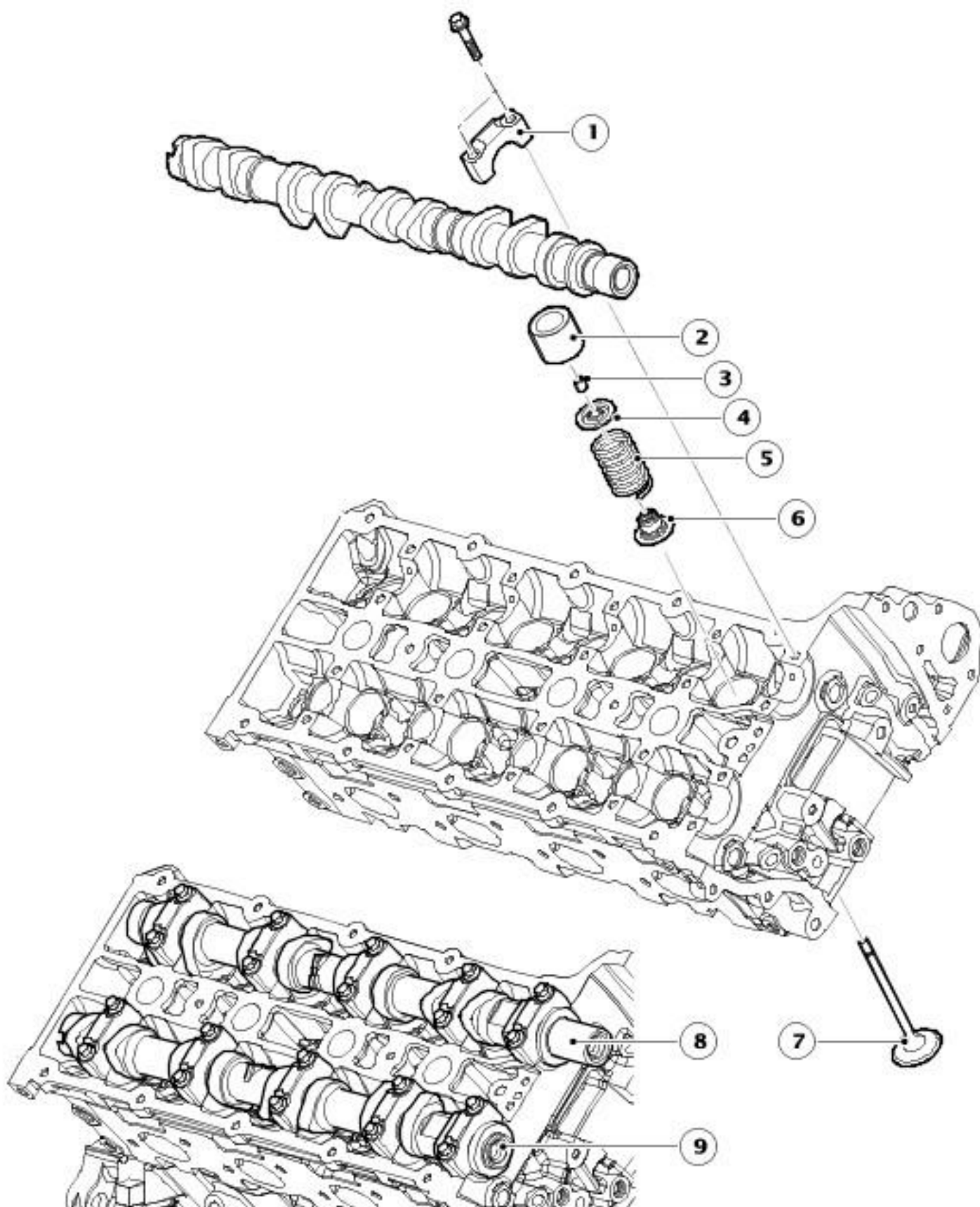


2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

The aluminium alloy timing cover accommodates the crankshaft front oil seal (a PTFE lip seal). Silicon rubber in-groove gaskets seal the joint between the timing cover and the front face of the engine.

CYLINDER HEAD COMPONENTS



2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

Item Number	Description
1	Camshaft bearing cap
2	Tappet (shimless)
3	Collet
4	Valve spring cap
5	Valve spring
6	Valve stem oil seal
7	Valve
8	Inlet camshaft
9	Exhaust camshaft

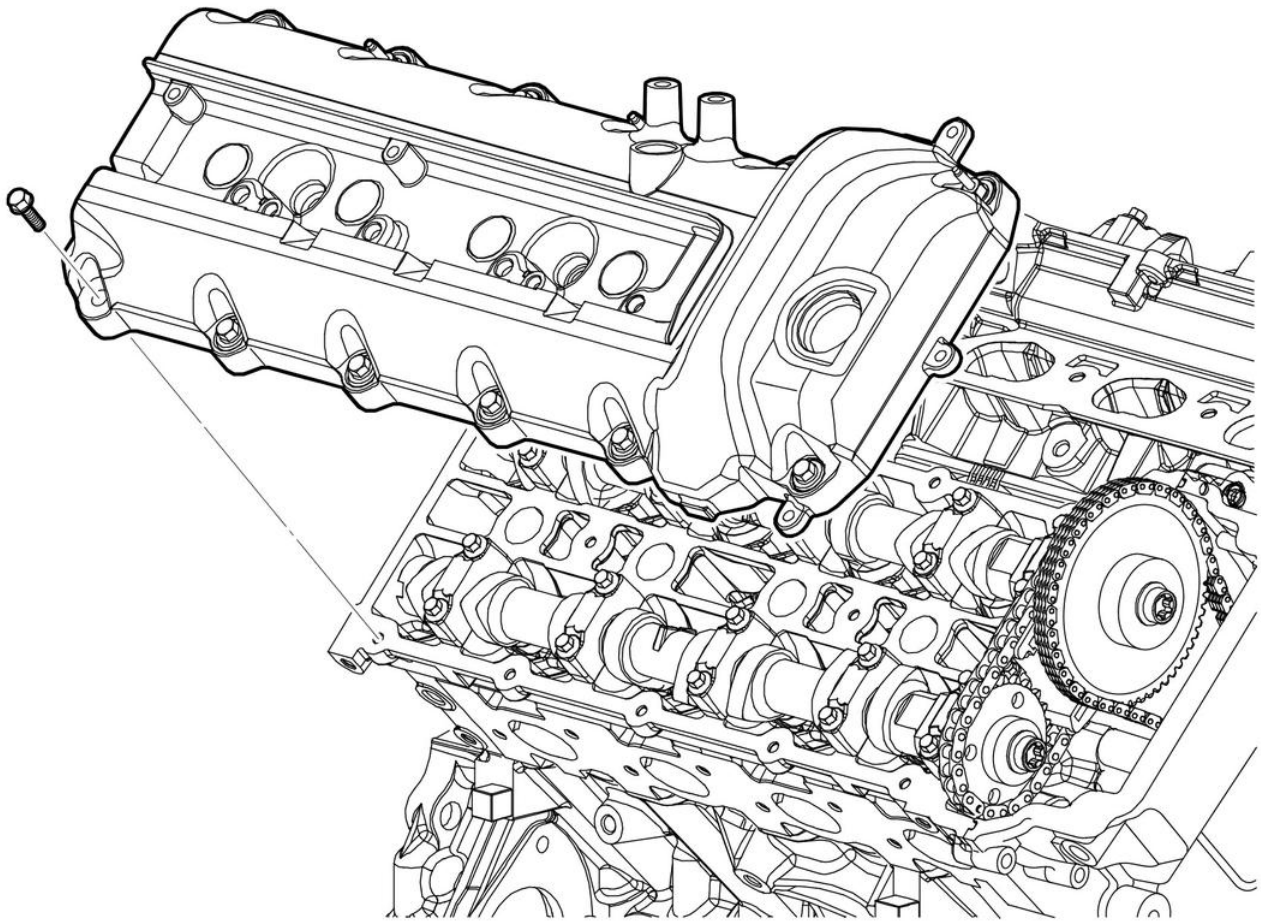
CYLINDER HEADS

The cylinder heads are unique to each cylinder bank. Deep-seated bolts, to reduce distortion, secure the cylinder heads to the cylinder block. Two hollow dowels align each cylinder head with the cylinder block.

The 14 mm spark plugs, 1 per cylinder, locate in recesses down the centre line of each cylinder head.

The engine-lifting eyes are bolted to the cylinder heads; 2 on the rear (1 per head) and 1 at the front.

CAMSHAFT COVERS



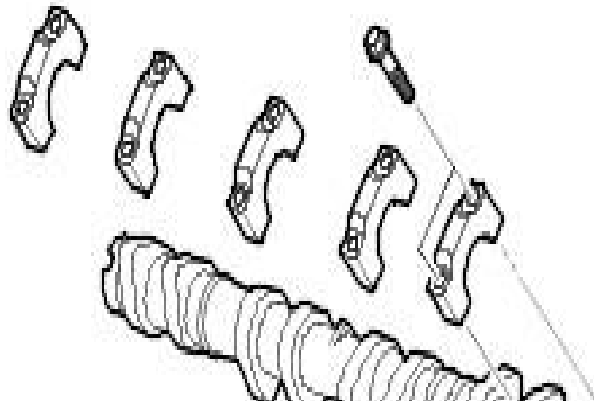
The camshaft covers are manufactured from thermo-plastic. The RH camshaft cover incorporates an outlet for the part load engine breather and the Pressure Control Valve (PCV). The LH camshaft cover incorporates an outlet for the full load engine breather and the engine oil filler cap. Identical oil separators are incorporated below the breather outlet in each cover. Refer to **ELECTRONIC ENGINE CONTROLS** .

Silicon rubber in-groove gaskets seal the joints between the camshaft covers and the cylinder heads. Together with spacers and seals on the camshaft cover fasteners, they also isolate the covers from direct contact with the cylinder heads, to reduce noise.

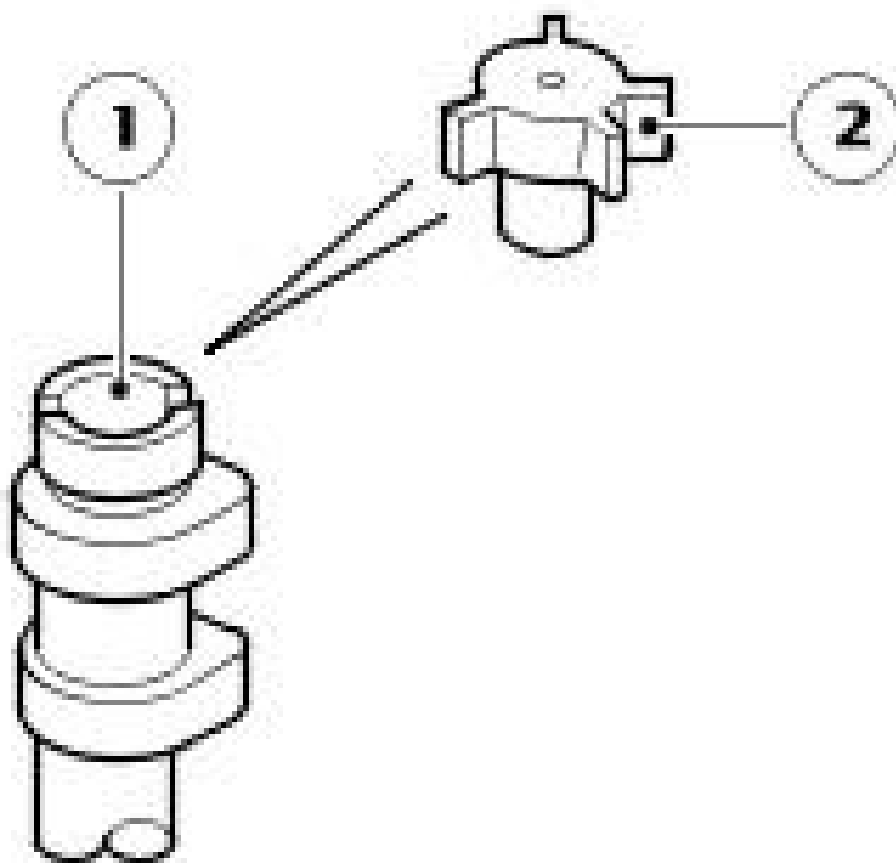
CYLINDER HEAD GASKET

The multi-layered steel cylinder head gasket has cylinder specific water flow cross-sections for uniform coolant flow.

CAMSHAFTS



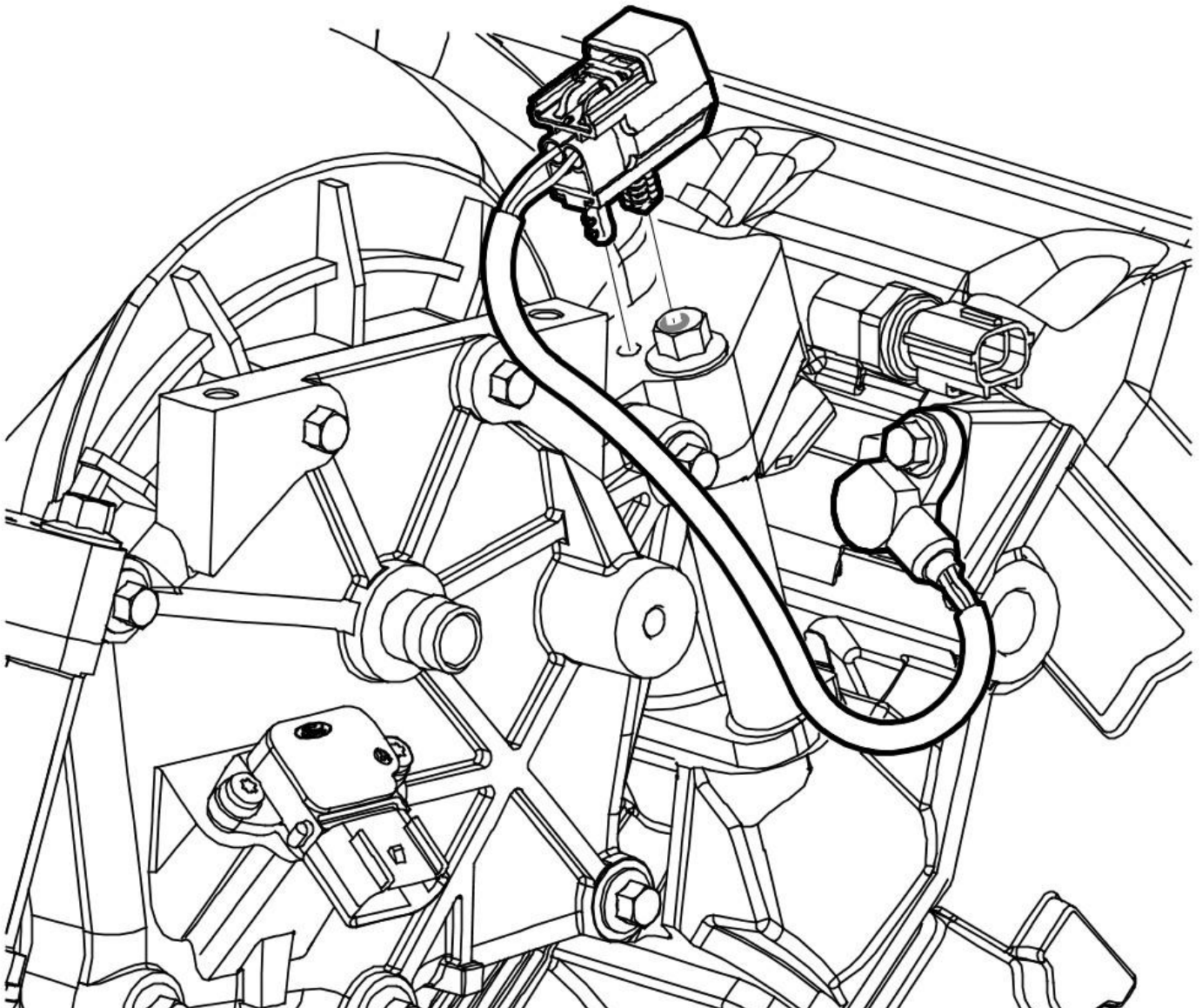
The camshafts are manufactured in chilled cast iron. Five aluminium alloy caps retain each camshaft. Location numbers, 0 to 4 for the intake camshaft and 5 to 9 for the exhaust camshaft, are marked on the outer faces of the caps.



Item Number	Description
1	Inlet camshaft
2	Sensor ring

Timing rings for each camshaft position sensor are located at the rear of both intake camshafts. A flat, machined near the front of each camshaft, enables the camshafts to be locked during the valve timing procedure.

CAMSHAFT POSITION SENSOR



The camshaft position sensors are installed in each cylinder head at the rear of the intake camshaft. It is a variable reluctance sensor that provides an input to the ECM regarding the position of the camshaft. Refer to **ELECTRONIC ENGINE CONTROLS** .

INLET AND EXHAUST VALVES

Each cylinder head incorporates dual overhead camshafts operating 4 valves per cylinder via solid shimless valve lifters.

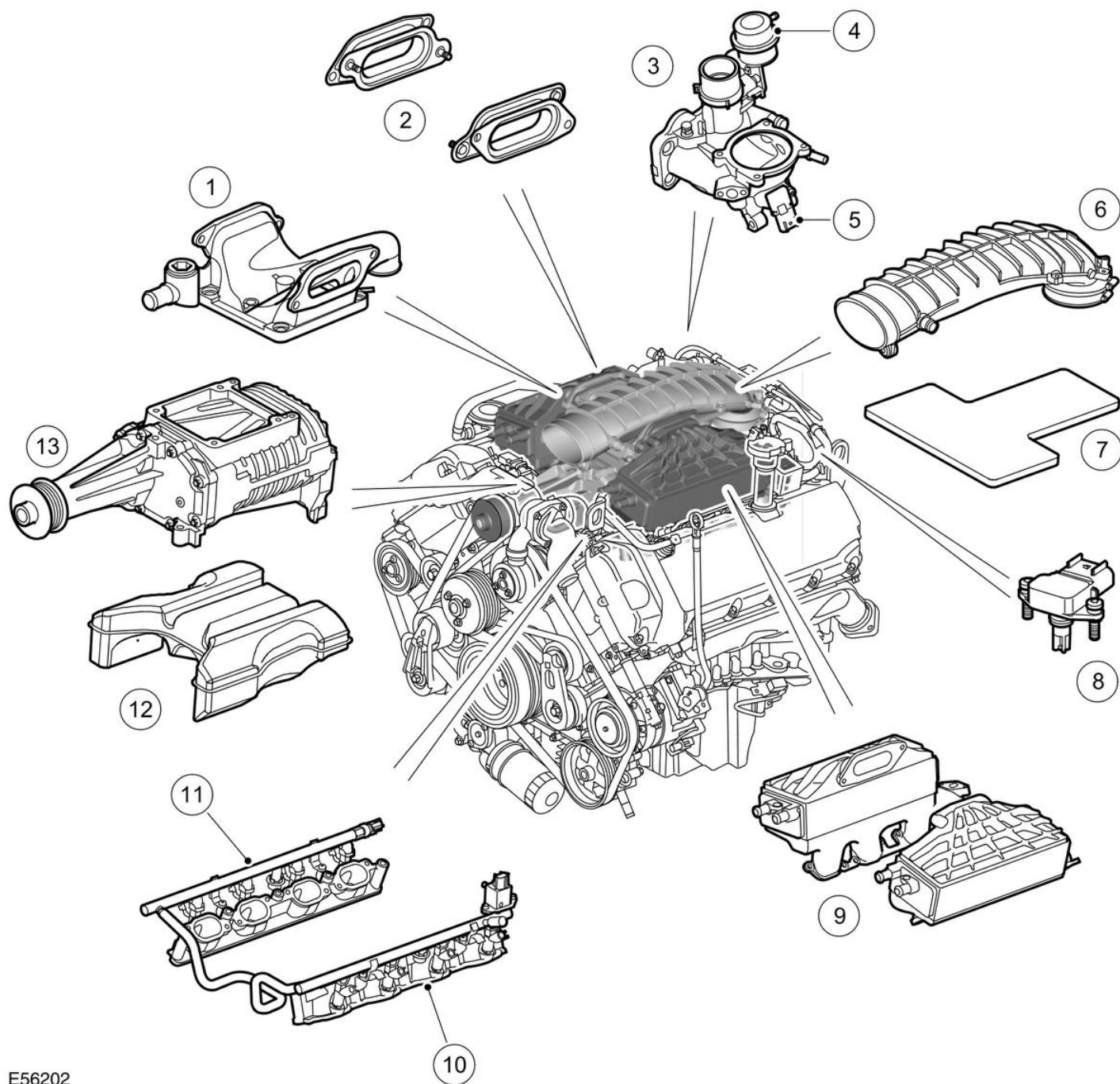
The lightweight valve gear provides good fuel economy and noise levels. Valve head diameters are 31mm (1.220 in) for the exhaust and 35mm (1.378 in) for the intake. All valves have 5mm (0.197 in) diameter stems supported in sintered metal seats and guide inserts. Collets, valve collars and spring seats locate single valve springs on both intake and exhaust valves. Valve stem seals are integrated into the spring seats.

CAUTION: Due to slight variations in length, the valves are not interchangeable between marques (Land Rover, Jaguar and Aston Martin).

SUPERCHARGER

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)



E56202

Item Number	Description
1	Outlet duct
2	Gaskets
3	Intake elbow assembly
4	Bypass valve and actuator

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

5	Manifold Absolute Pressure (MAP) sensor
6	Throttle body intake
7	Noise isolator
8	Temperature and Absolute Pressure (TMAP) sensor
9	Intercoolers
10	Intercooler adaptor
11	Fuel rail
12	Noise isolator
13	Supercharger

OVERVIEW

The supercharger is a compressor used to pump an air into the cylinders. This increases the concentration of oxygen and fuel in the charge to create a more powerful combustion inside the cylinder. This increases cylinder pressure upon ignition and creates more power.

As the supercharger compresses the air its temperature increases. This raise in air temperature reduces the potential for power gains. By installing intercoolers the air is cooled to overcome this.

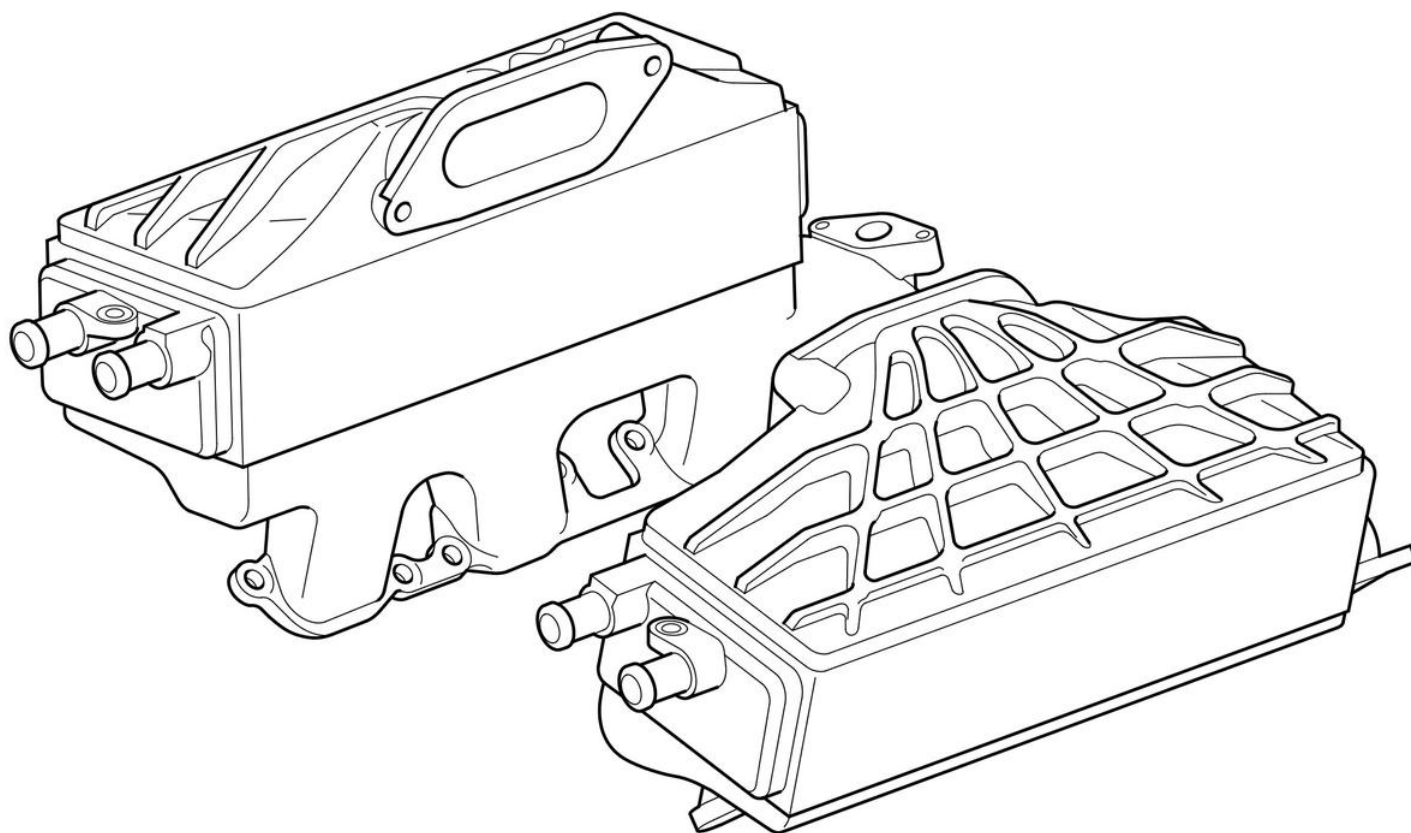
The supercharger is an Eaton M112 unit attached to the 3 mounting bosses between the 'V' of the cylinder block. Positive alignment with the drive belt is provided by a dowelled mounting bracket. An eight-ribbed belt drives the supercharger, via the crankshaft, at 2.1 engine speed. The maximum pressure increase is approximately 0.8 bar.

On the 4.2L V8 supercharged engine the intake manifold is replaced by:

- A supercharger.
- Two intercoolers.
- An outlet duct.
- A bypass valve.
- A bypass valve actuator.
- Two intercooler adapters.
- Fuel rails.

The supercharger has a sealed-for-life internal lubrication system.

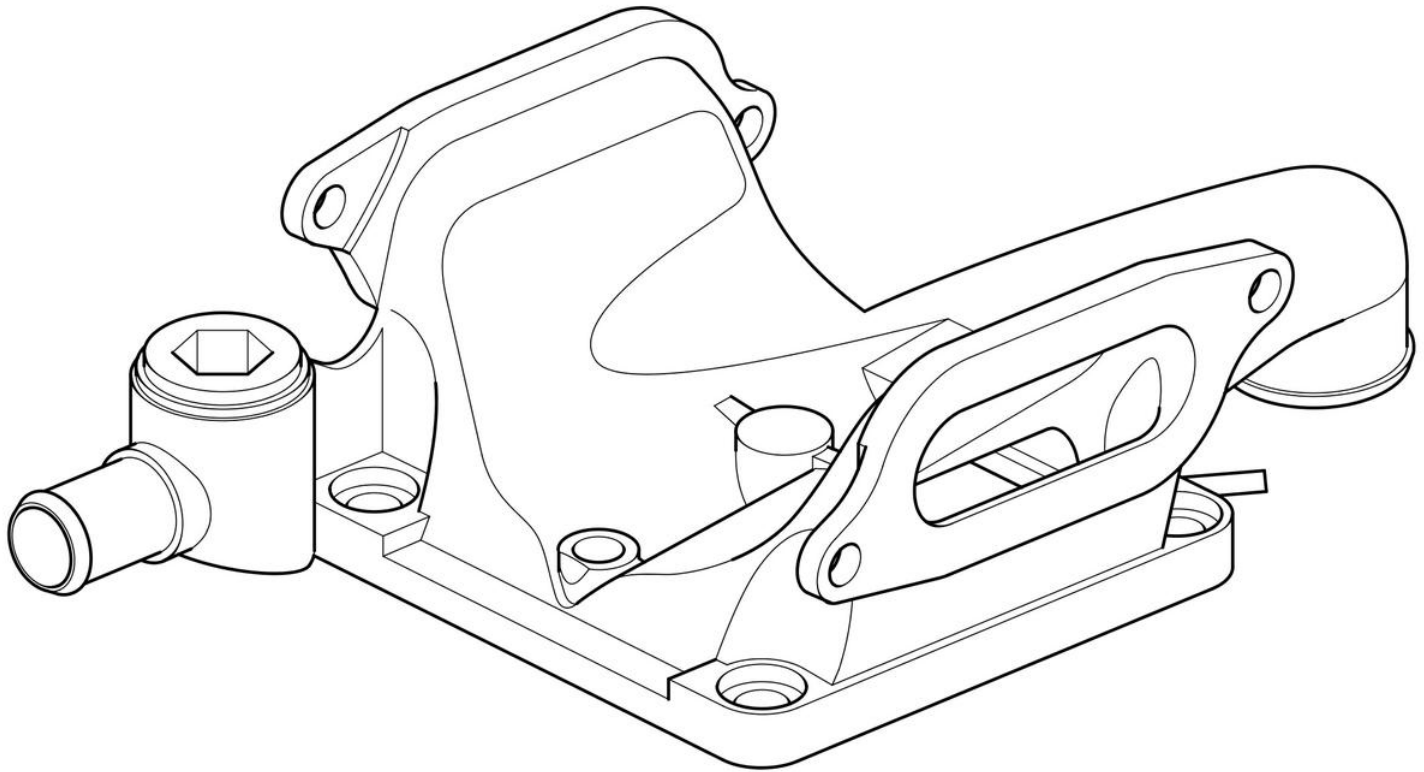
INTERCOOLER



E56203

Each of the 2 intercoolers is a fin and tube air-to-liquid heat exchanger. Two rubber ducts, secured by clamp plates, provide the interfaces between the outlet duct and the intercoolers. After passing through the heat exchanger core, the air flows into individual outlets to the cylinders. At the rear of the LH intercooler there is a mounting boss for an air intake temperature sensor.

OUTLET DUCT

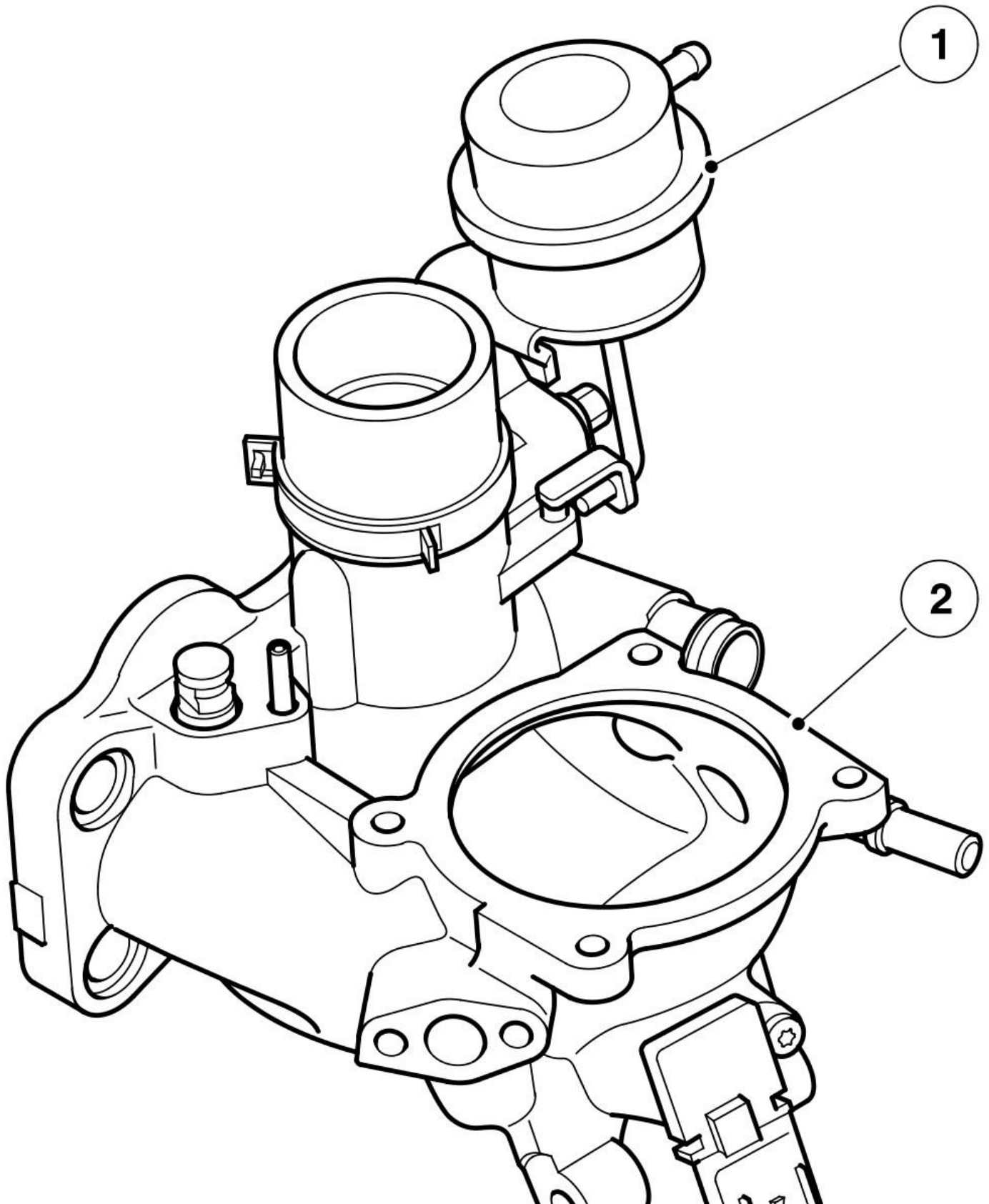


E56204

The outlet duct directs air from the supercharger into the 2 intercoolers. A filler point for the intercooler coolant system is integrated into the front and right side of the outlet duct. **This connection is not used on Land Rover vehicles.** A vacuum take-off for the fuel pressure regulator/cruise control system is located on the right side of the outlet duct. Isolating bolts, to reduce noise, secure the outlet duct to the supercharger and a rubber gasket seals the supercharger to the outlet duct interface.

BYPASS VALVE

The bypass valve attaches to an opening in the induction elbow and controls a bypass flow from the intercoolers back to the inlet side of the supercharger. At closed or partially open throttle settings (i.e. idle and most cruise conditions), the bypass valve is fully open to provide maximum bypass and optimum fuel economy. As the throttle opens, the bypass valve progressively closes to reduce the bypass flow and increase the pressure of air supplied to the engine for optimum power output.



2006 Land Rover Range Rover HSE

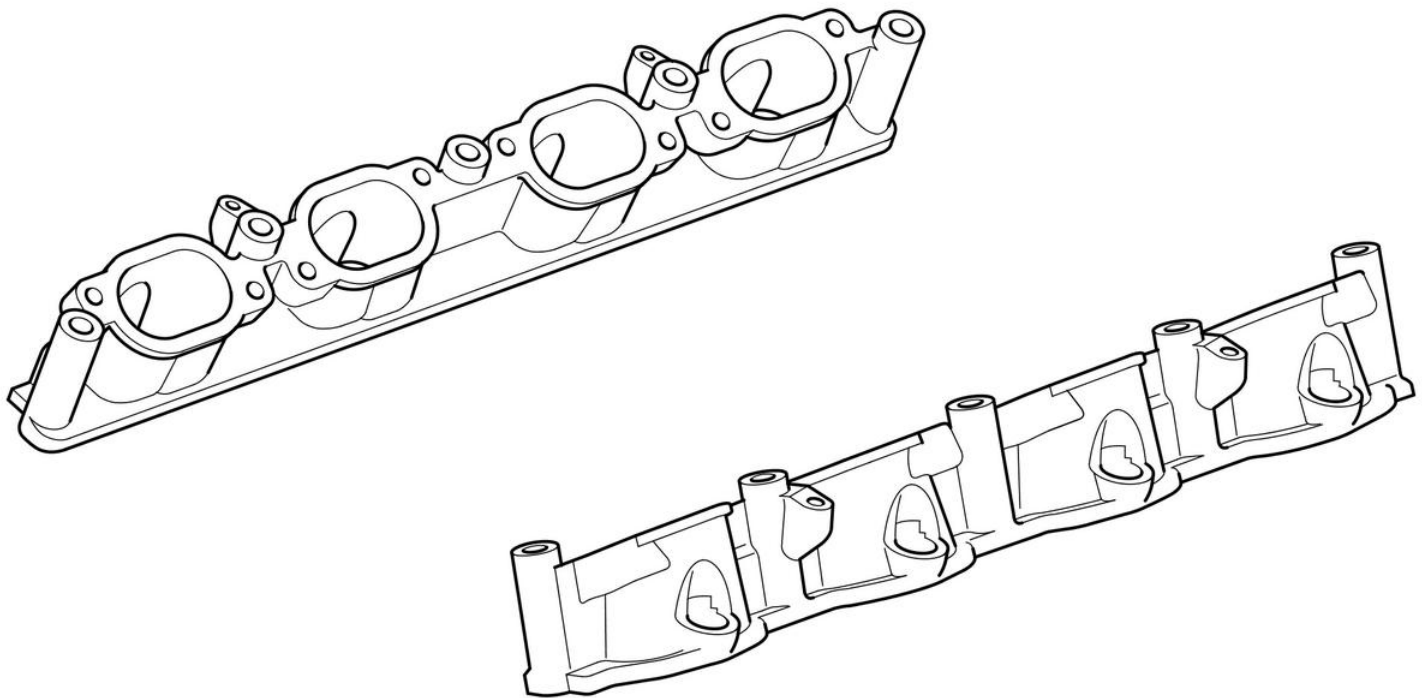
ENGINE Engine (4.2L)

Item Number	Description
1	Bypass valve actuator
2	Induction elbow
3	MAP sensor

BYPASS VALVE ACTUATOR

The bypass valve actuator is a diaphragm-operated actuator attached to the valve spindle of the bypass valve. A vacuum pipe connects the actuator to the induction elbow.

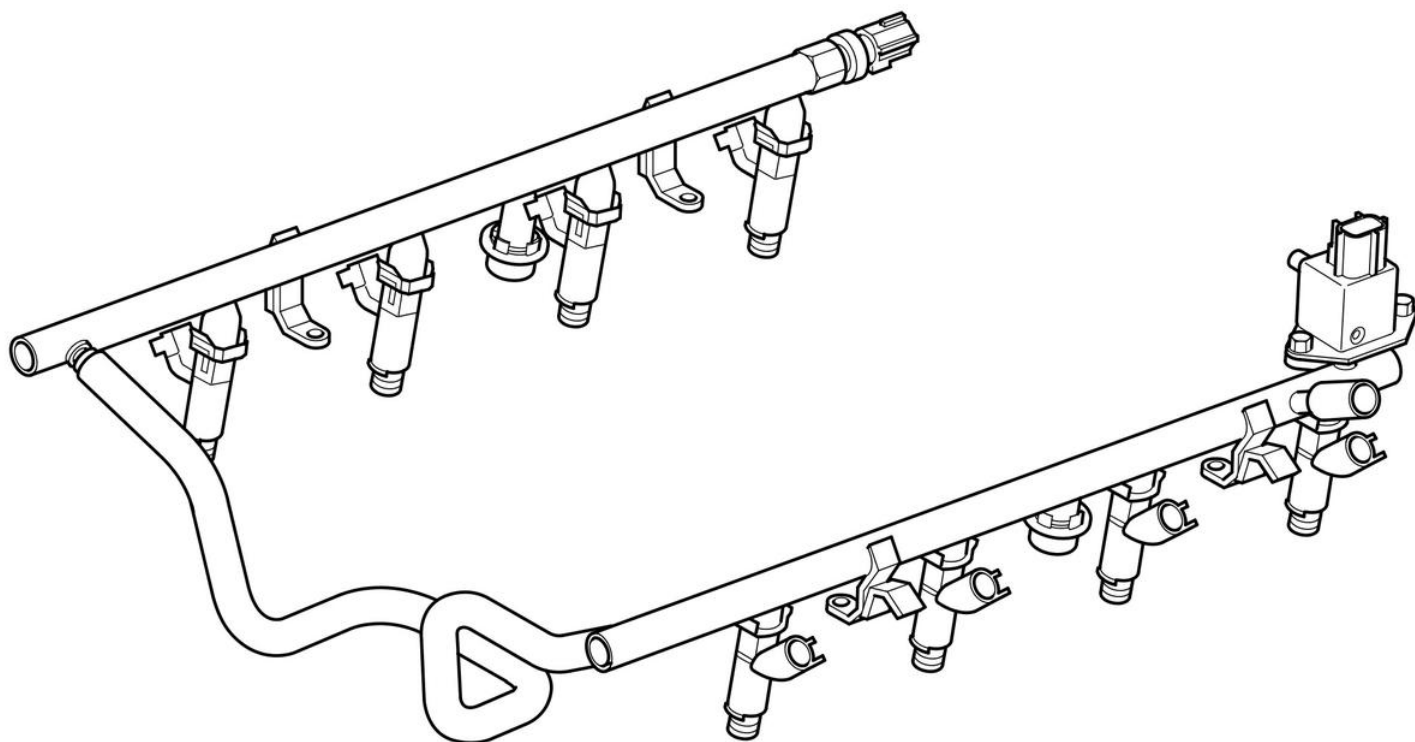
INTERCOOLER ADAPTERS



E56206

The intercooler adapters provide an interface between the intercoolers and the cylinder heads, and also locate the fuel rails and injectors. One-piece gaskets seal the joints between the intercoolers and the intercooler adapters, and between the intercooler adapters and the cylinder heads.

FUEL RAILS



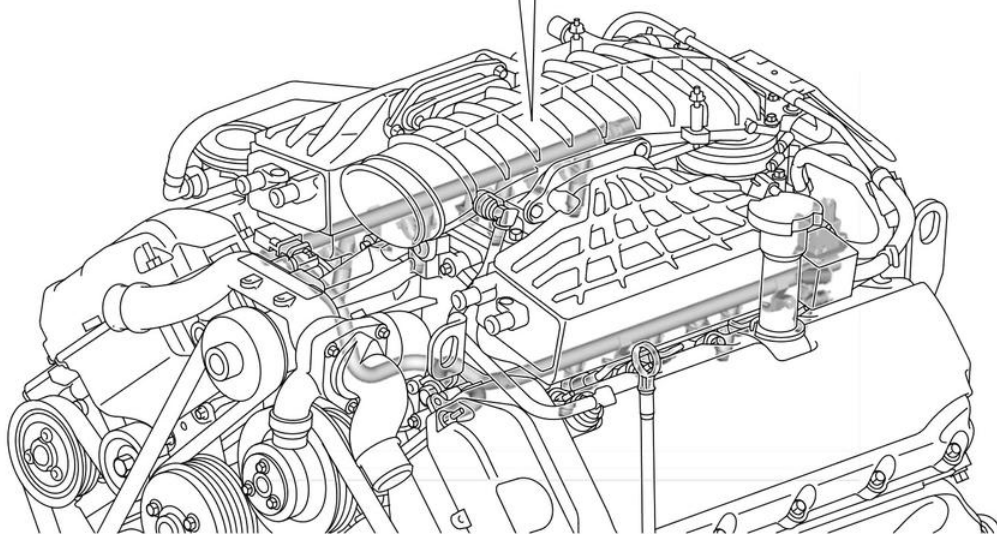
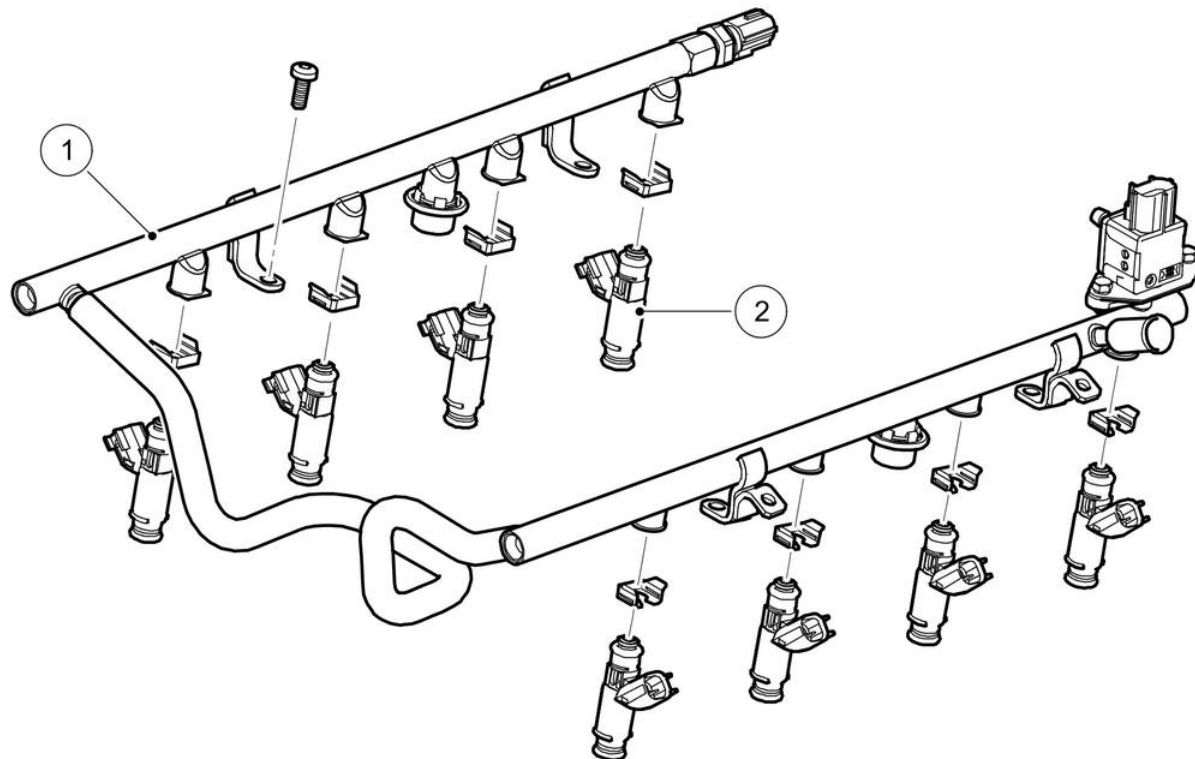
E56207

The fuel rails are installed on the intercooler adapters. A fuel crossover pipe connects the fuel rails together at the front of the engine.

FUEL INJECTORS

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)



E56228

Item Number	Description
1	Fuel rail
2	Injectors

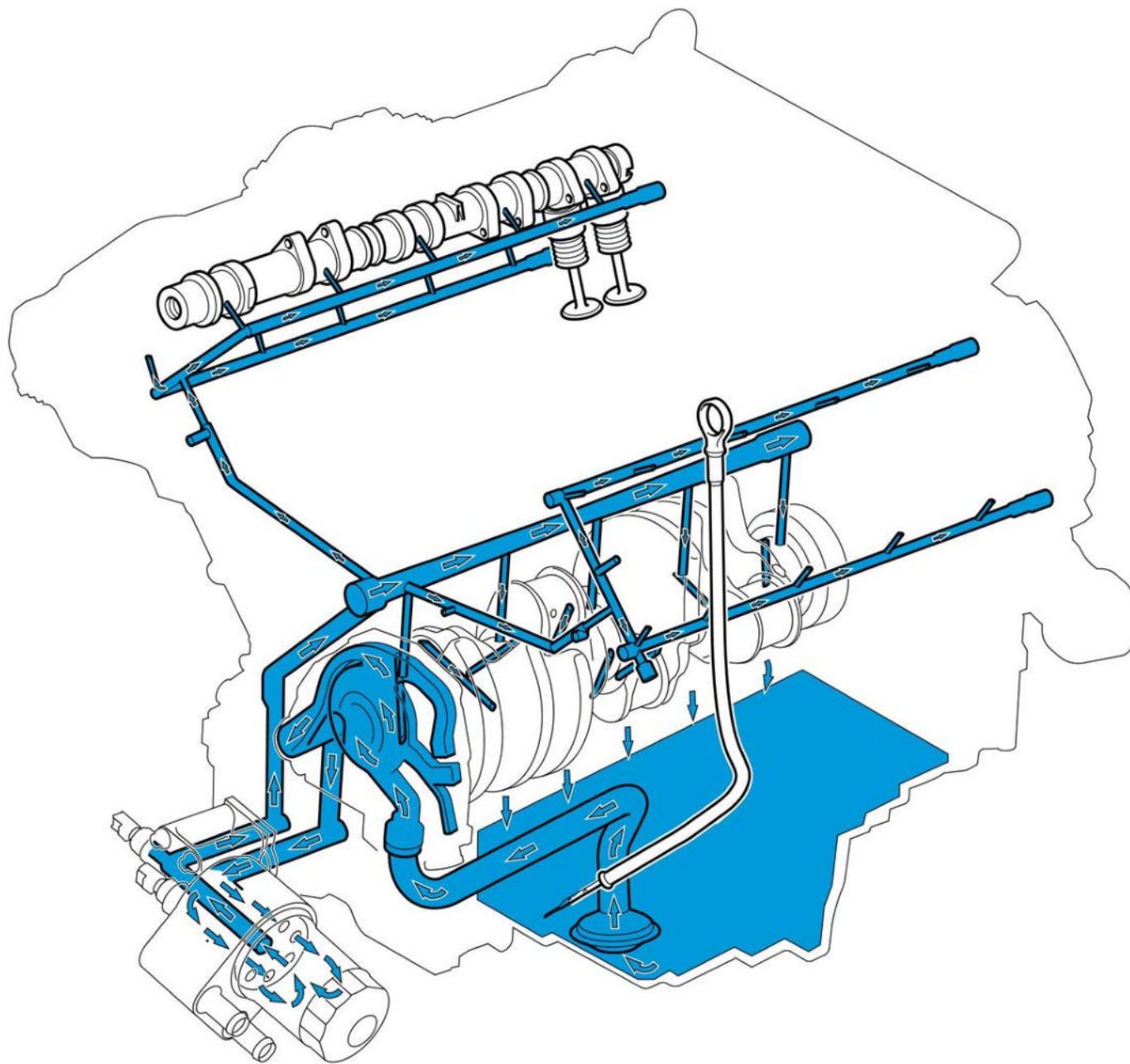
Eight, top fed, 12-hole, fuel injectors are installed in the fuel rails and are held in position by spring clips. Two O-rings are installed between the injector mounts of the fuel rails and the related recesses in the intercooler

adapters. The injectors are electromagnetic solenoid valves controlled by the ECM. The fuel jets from the injectors are directed onto the back of the intake valves. Refer to **ELECTRONIC ENGINE CONTROLS**.

VARIABLE VALVE TIMING

As from 2007 model year, NAS vehicles are fitted with VVT. Refer to **ENGINE** and Refer to **ELECTRONIC ENGINE CONTROLS**.

LUBRICATION SYSTEM



E43454

OVERVIEW

Oil is drawn from the reservoir in the oil pan and pressurised by the oil pump. The output from the oil pump is then filtered, cooled and distributed through internal oil passages.

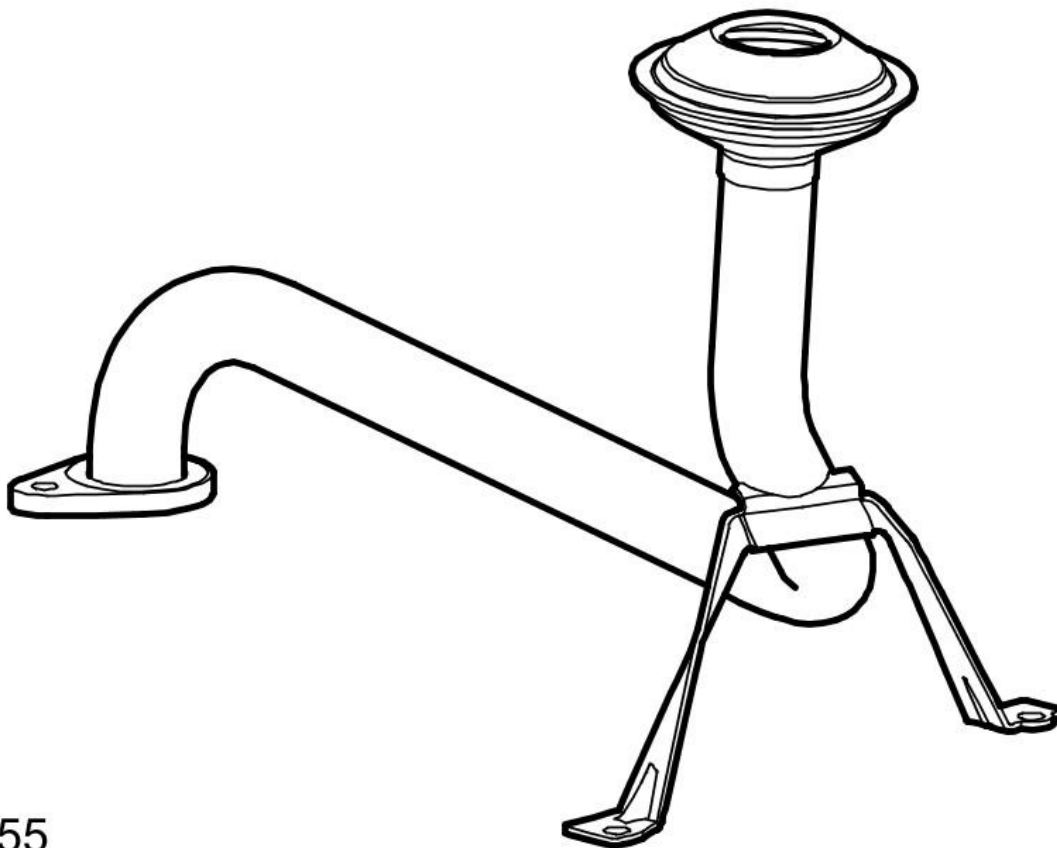
All moving parts are lubricated by pressure or splash oil. Pressurised oil is also provided for the timing gear

chain tensioners and the piston cooling jets.

The oil returns to the oil pan under gravity. Large drain holes through the cylinder heads and cylinder block ensure the quick return of the oil, reducing the volume of oil required and enabling an accurate check of the contents soon after the engine stops.

System replenishment is through the oil filler cap on the LH camshaft cover.

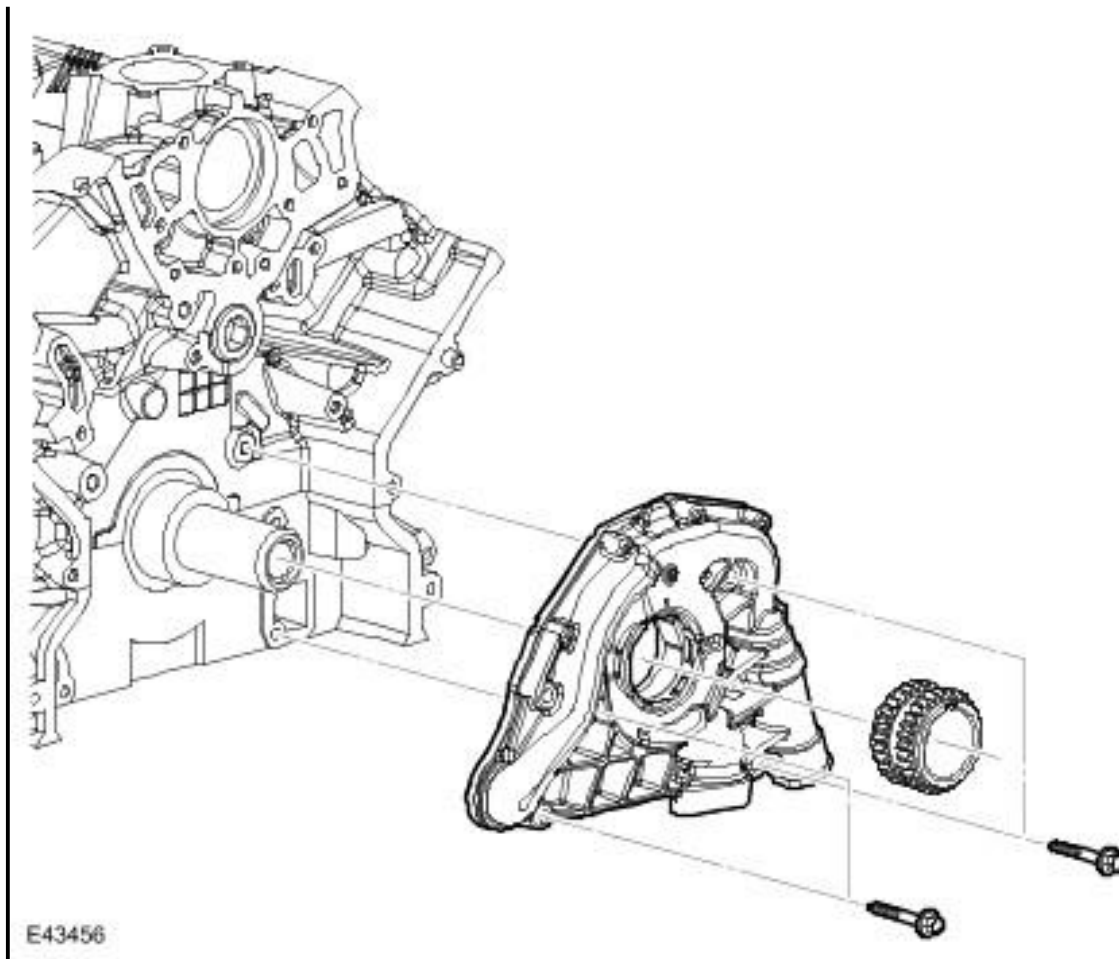
OIL PICK-UP



E43455

The fabricated steel oil pick-up is immersed in the oil reservoir to provide a supply to the oil pump during all normal vehicle attitudes. A mesh screen in the inlet prevents debris from entering the oil system.

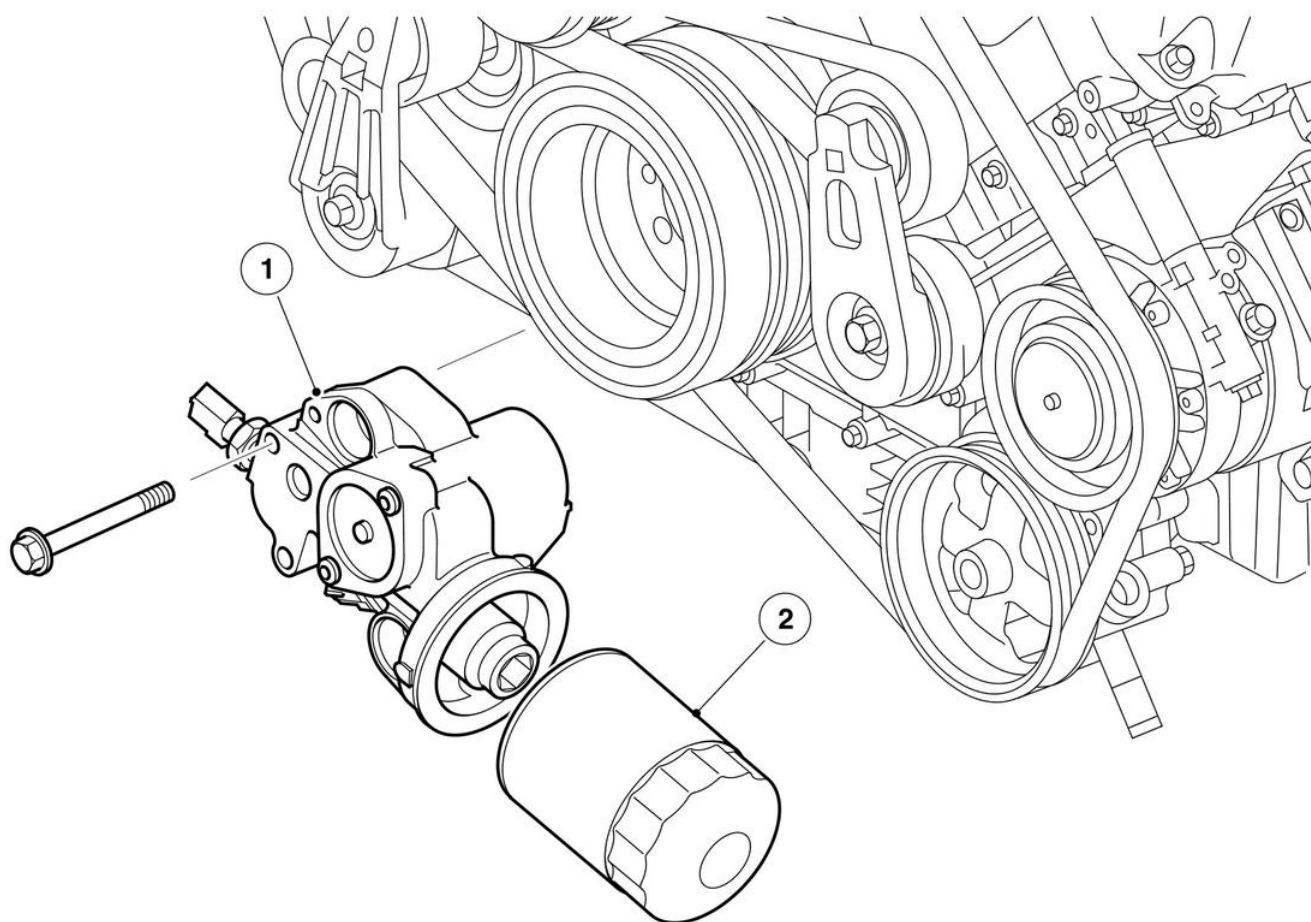
OIL PUMP



The oil pump is installed on the crankshaft at the front of the engine. The pump outlet port aligns with oil passages in the bedplate.

The pumping element is an eccentric rotor, which is directly driven by flats on the crankshaft. An integral pressure relief valve regulates pump outlet pressure at 4.5 bar (65.25 psi).

OIL FILTER ASSEMBLY



E56208

Item Number	Description
1	Oil bypass tube
2	Oil filter head assembly
3	Oil filter

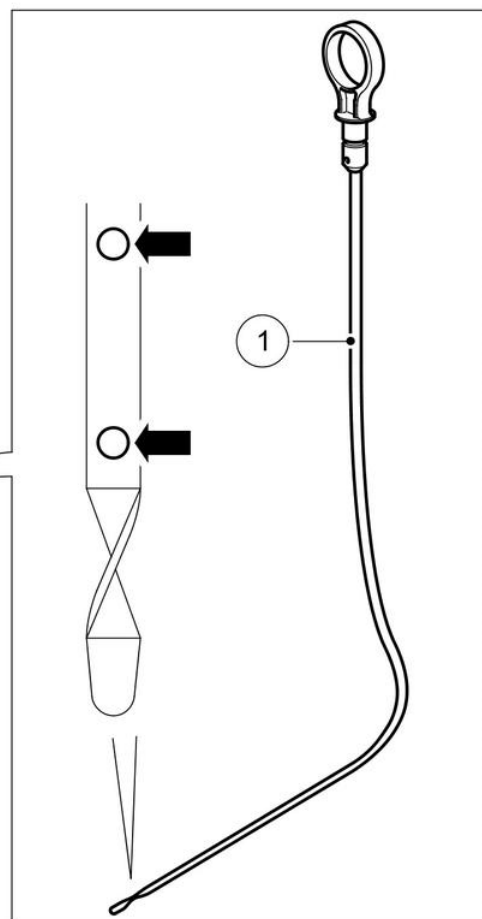
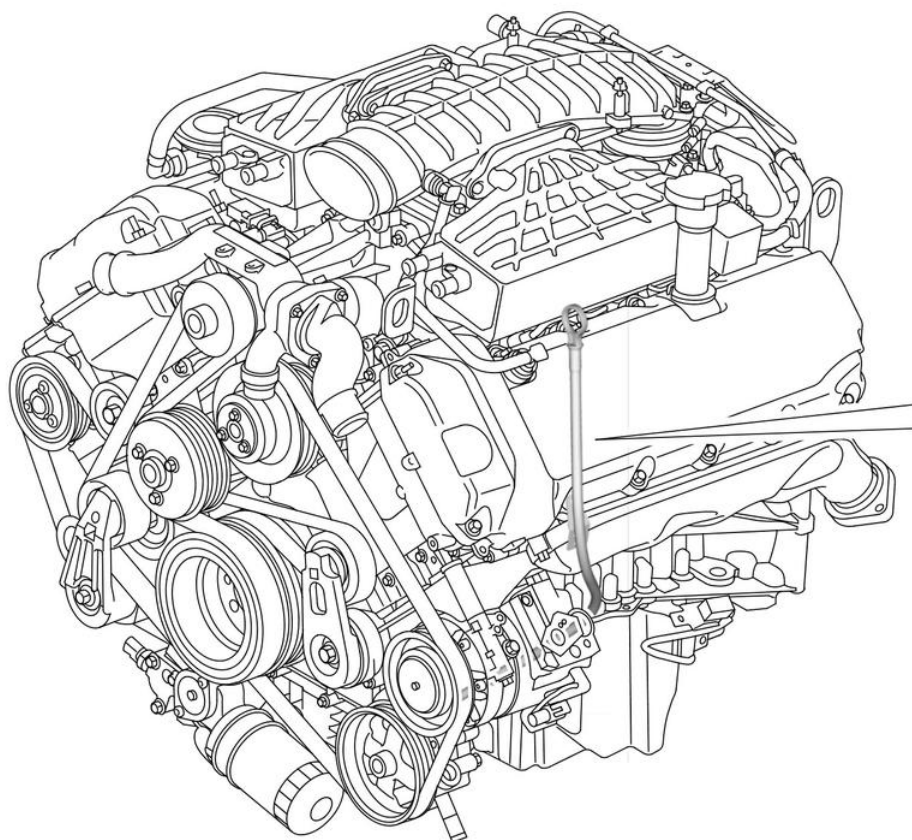
The oil filter is a replaceable cartridge installed on an adapter. An internal bypass facility permits full flow bypass if the filter is blocked.

The oil pressure switch connects a ground input to the instrument cluster when oil pressure is present. The switch operates at a pressure of 0.15 to 0.41 bar (2.2 to 5.9 psi).

OIL LEVEL GAGE

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

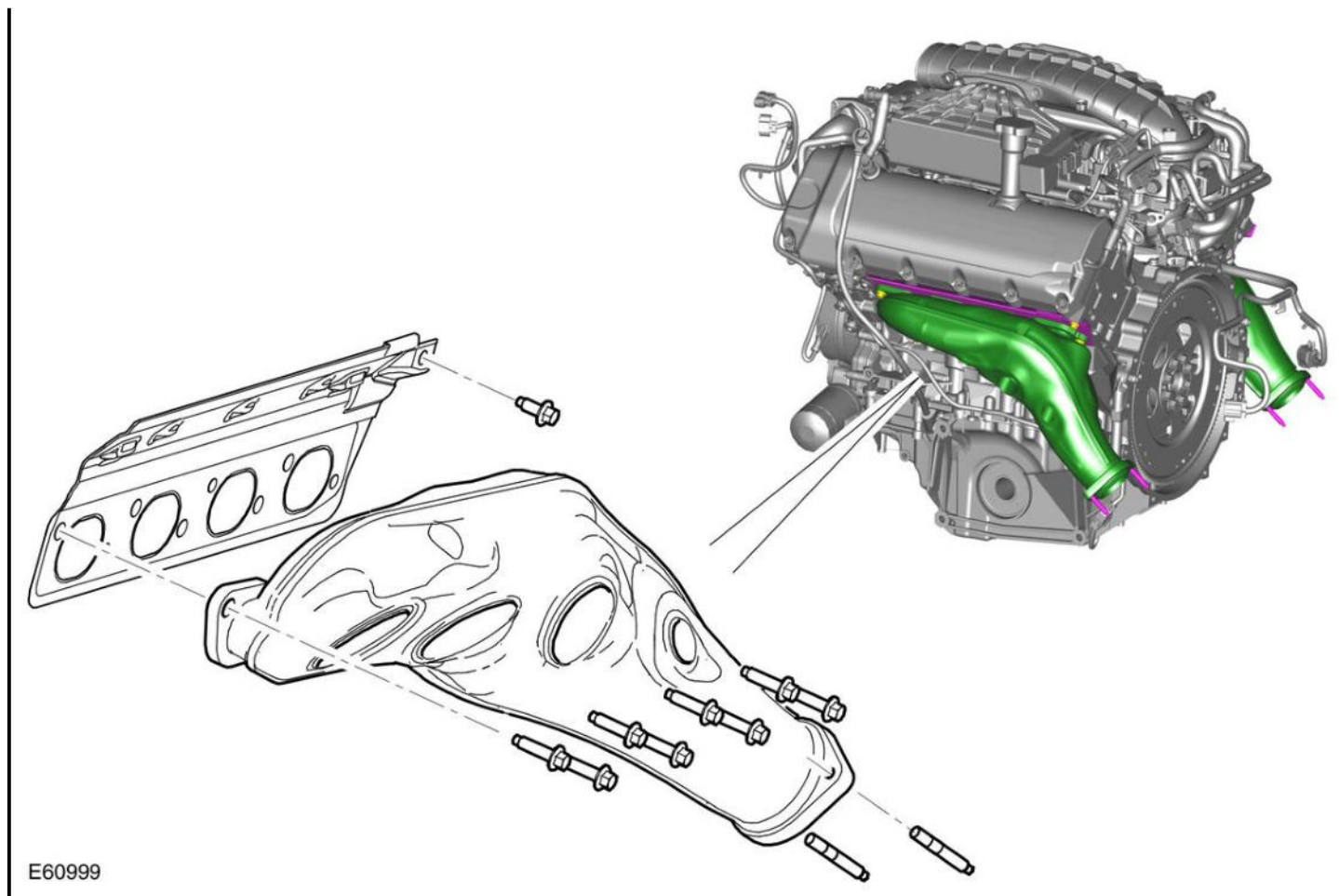


E56209

Item Number	Description
1	Oil level gage

The oil level gage locates along the left side of the oil pan, supported in a tube installed in the sump. Two holes in the end of the gage indicate the minimum and maximum oil levels. There is a difference of approximately 1.5 liters (1.58 US quart) between the 2 levels.

EXHAUST MANIFOLD



The fabricated stainless steel twin skin exhaust manifolds are unique for each cylinder bank.

Spacers on the securing bolts allow the manifolds to expand and retract with changes of temperature while maintaining the clamping loads.

Heat shields are integrated into the exhaust manifold gaskets.

GENERAL PROCEDURES

VALVE CLEARANCE CHECK

1. Disconnect the battery ground cable. Refer to SPECIFICATIONS .

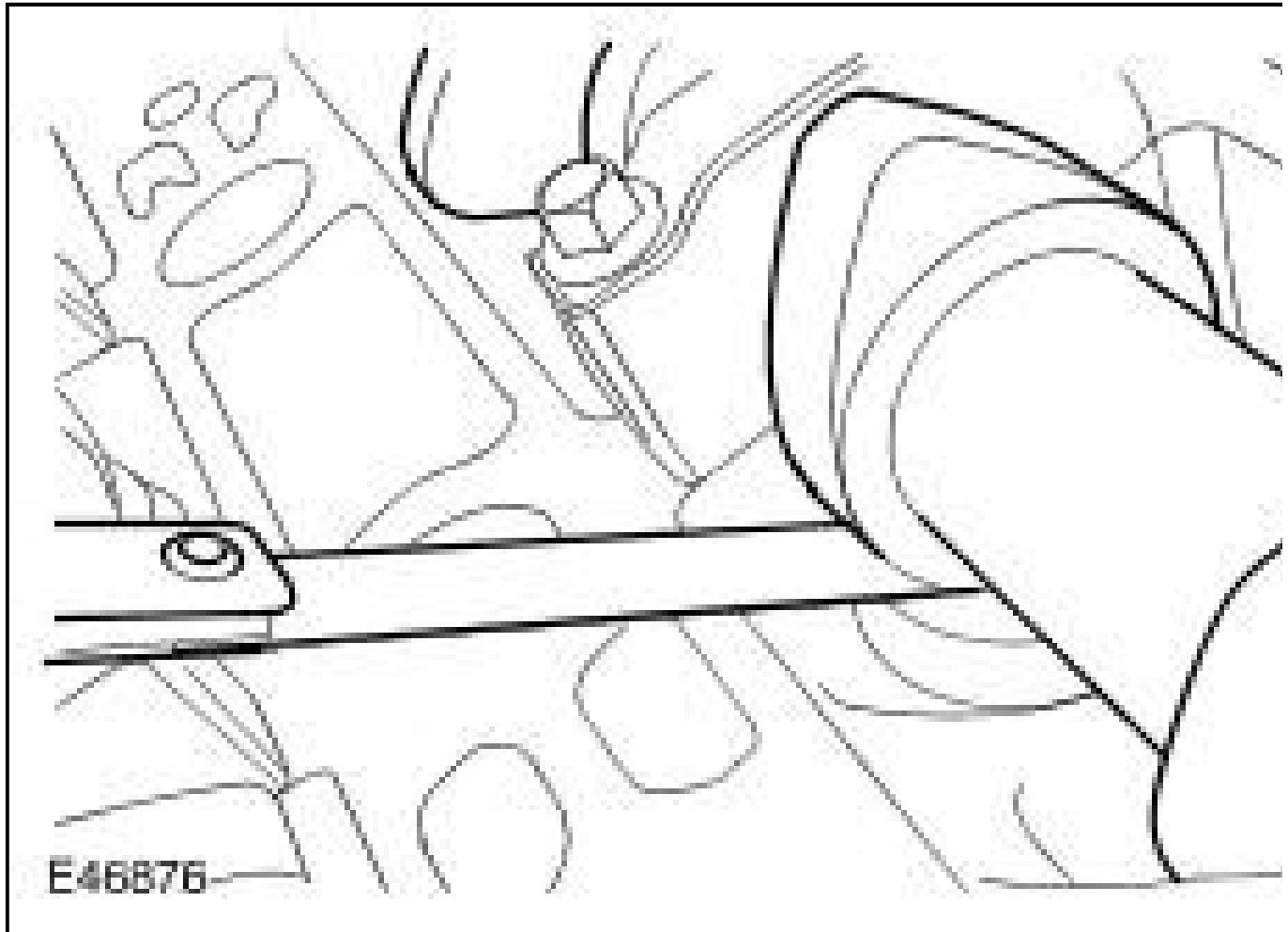
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the cooling fan. Refer to COOLING FAN .
4. Remove the LH valve cover. Refer to Valve Cover LH.

5. Remove the RH valve cover. Refer to Valve Cover RH.

CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or valve clearance will be incorrect.

6. Rotate the engine clockwise to position the camshaft lobe away from the valve tappet
7. Using the feeler gauge set, measure the clearance between the camshaft and the valve tappet.



8. Repeat the above procedure for the remaining 31 tappets.
9. Adjust the clearance as necessary.
10. For cylinder head data, refer to specifications. Refer to SPECIFICATIONS.
11. Install the RH valve cover. Refer to VALVE COVER RH.
12. Install the LH valve cover. Refer to VALVE COVER LH.
13. Install the cooling fan. Refer to COOLING FAN.
14. Connect the battery ground cable. Refer to SPECIFICATIONS.

VALVE CLEARANCE ADJUSTMENT

NOTE: The valve clearance adjustment procedure is part of the camshafts removal and installation procedure.

1. Remove the camshafts. Refer to CAMSHAFTS LH.
2. Install the camshafts. Refer to CAMSHAFTS LH.

ENGINE OIL DRAINING AND FILLING

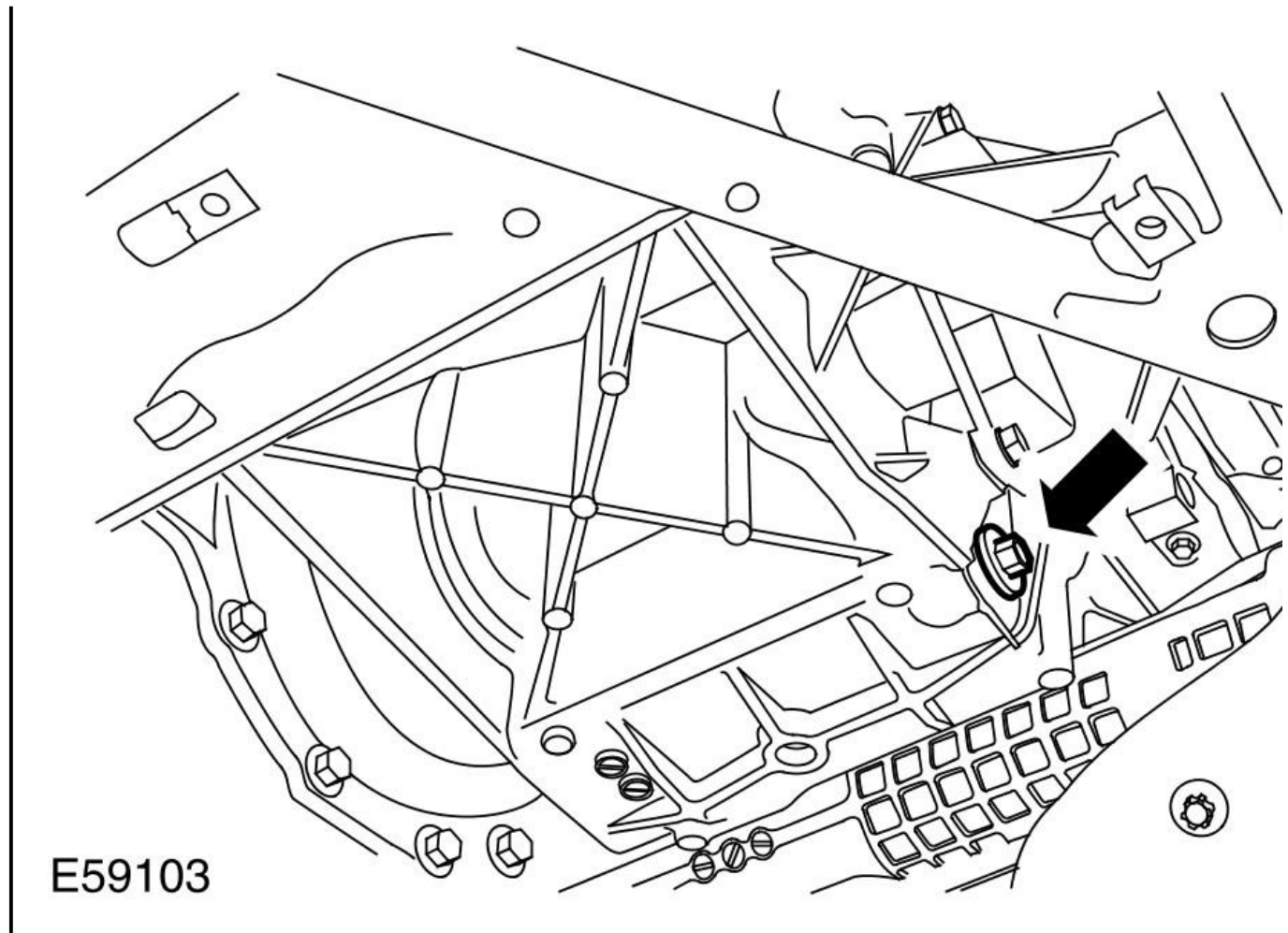
1. Disconnect the battery ground cable. Refer to Specifications .

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

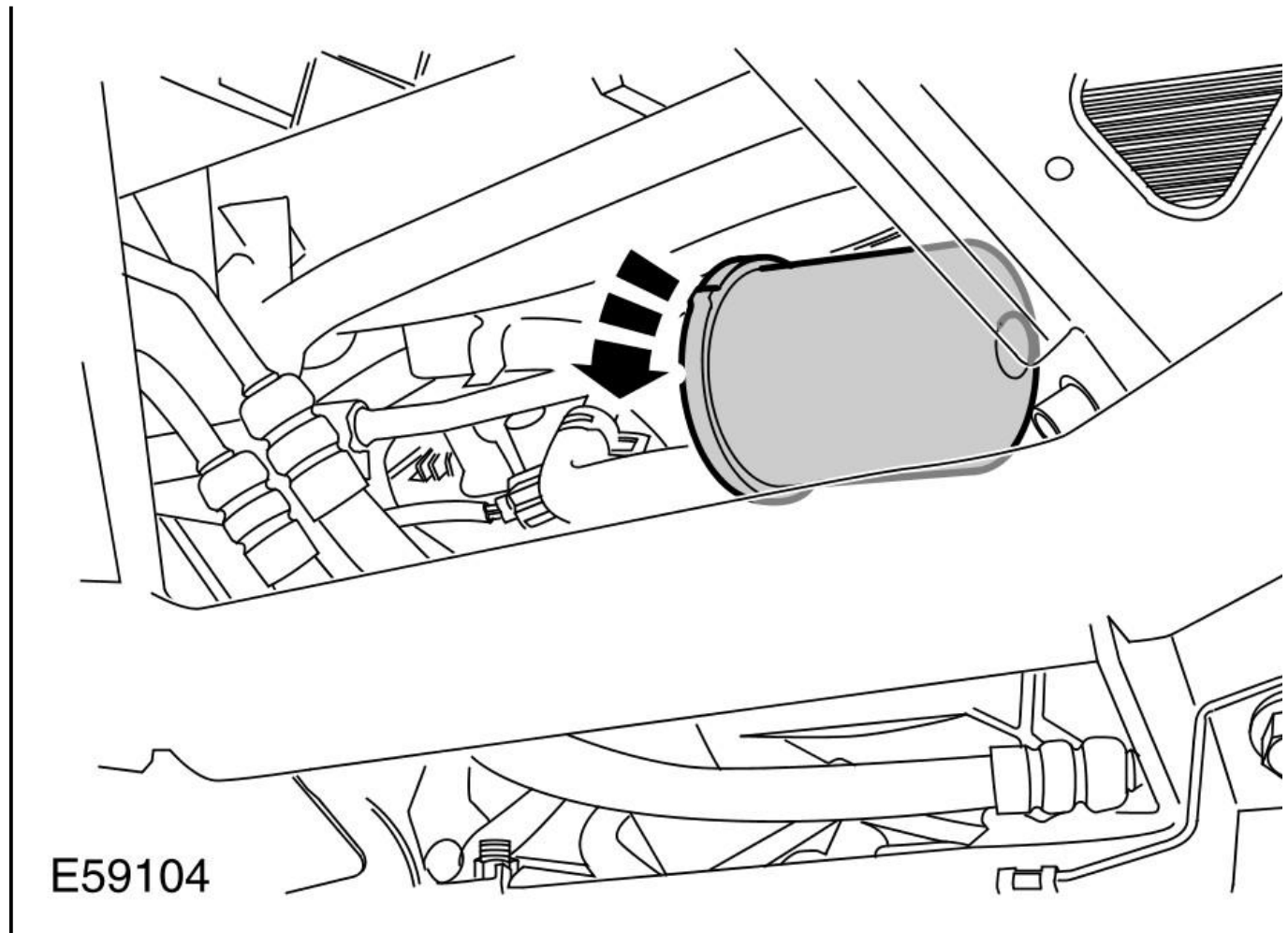
2. Raise and support the vehicle.
3. Remove the engine undershield. Refer to ENGINE UNDERSHIELD .
4. Remove the radiator splash shield. Refer to RADIATOR SPLASH SHIELD .

WARNING: Observe due care when draining engine oil as the oil can be very hot.

5. Remove the oil pan drain plug.
 - Position a container to collect the fluid.
 - Discard the oil pan drain plug seal.



6. Remove the engine oil filter.
- Position a container to collect the fluid.
 - Discard the oil filter.



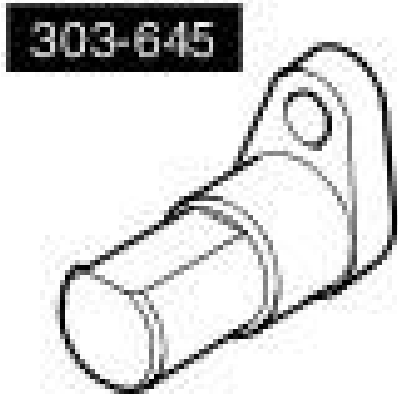
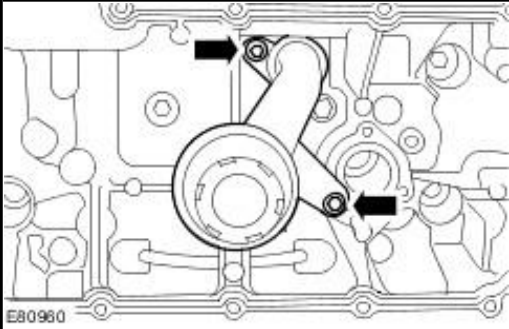
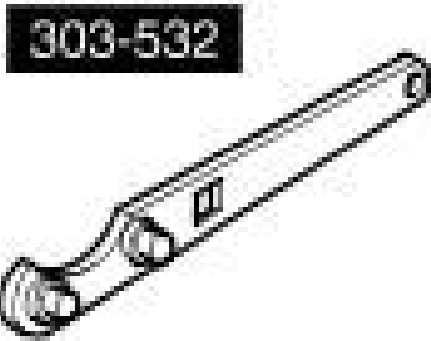
7. Install the engine oil filter.
 - Lubricate the oil filter seal with clean engine oil and tighten to 18 Nm (13 lb.ft).
8. Tighten the drain plug to 25 Nm (18 lb.ft).
 - Install a new seal.
9. Install the radiator splash shield. Refer to **RADIATOR SPLASH SHIELD** .
10. Install the engine undershield. Refer to **ENGINE UNDERSHIELD** .
11. Fill the engine with oil.
12. Connect the battery ground cable. Refer to **SPECIFICATIONS** .
13. Check and top-up the engine oil.

IN-VEHICLE PROCEDURES

CAMSHAFTS RH

SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number

 303-645 E46881	Timing Setting tool	303-645
 E80980	Camshaft setting/locking tool	303-530
 303-532 E46880	Timing chain tensioning tool	303-532

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

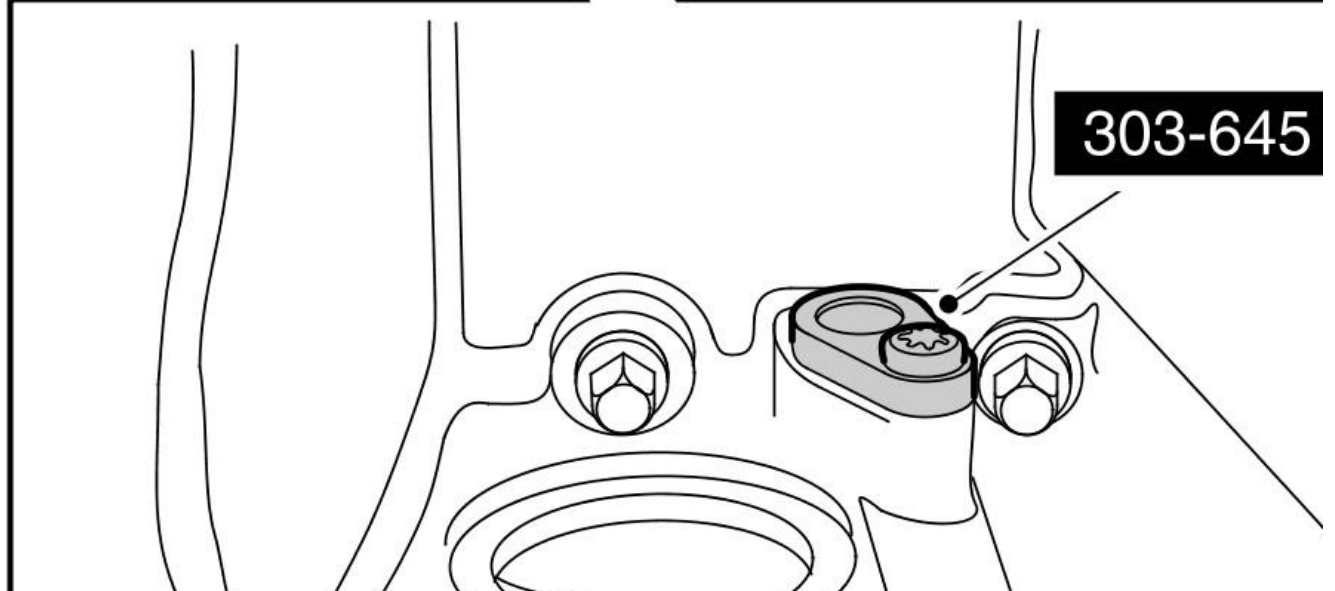
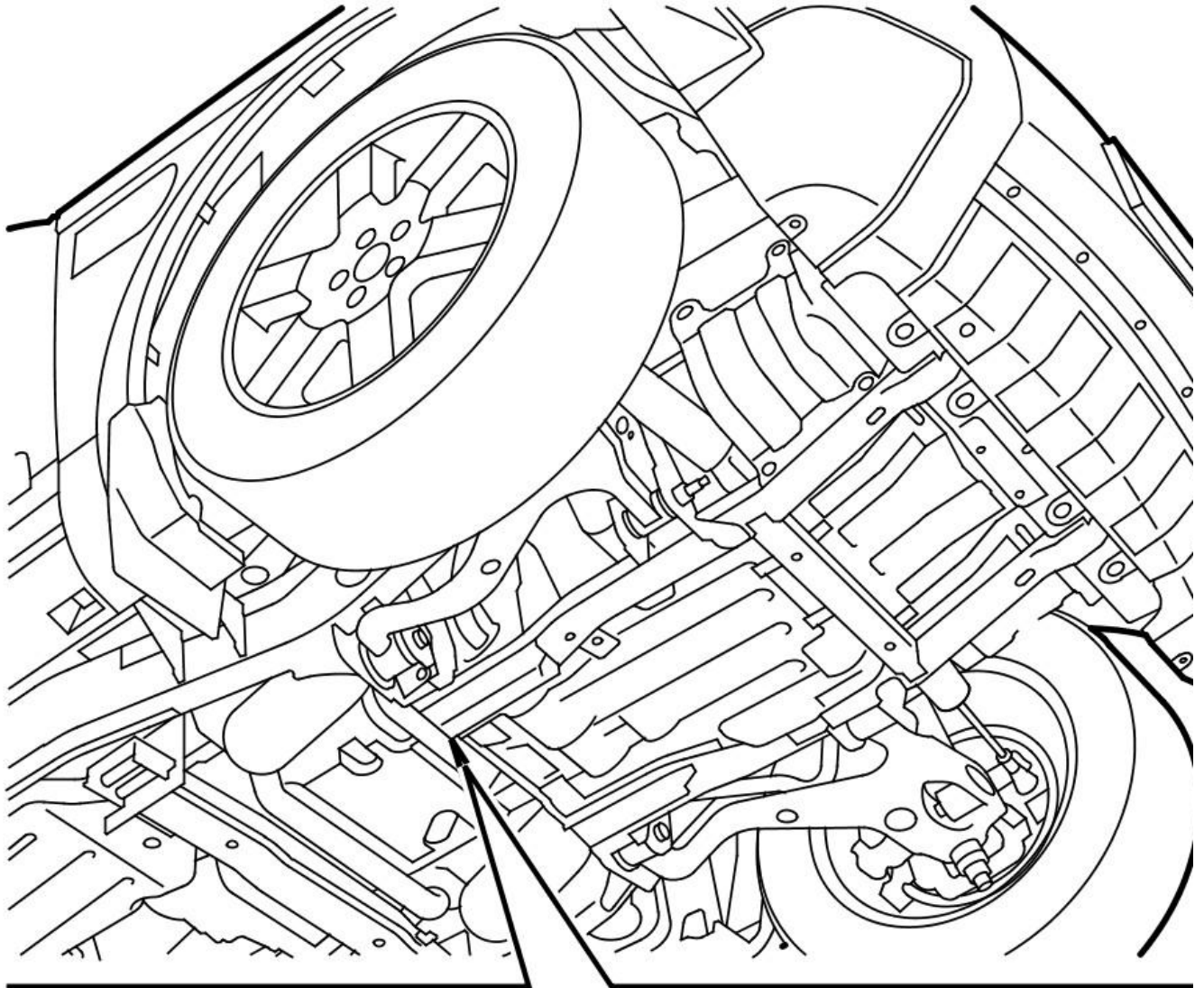
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.

3. Remove the engine front cover. Refer to **ENGINE FRONT COVER**.
4. Remove the crankshaft position (CKP) sensor. Refer to **CRANKSHAFT POSITION (CKP) SENSOR**.
5. Rotate the crankshaft until the flats on the camshafts are parallel with the cylinder head joint faces.

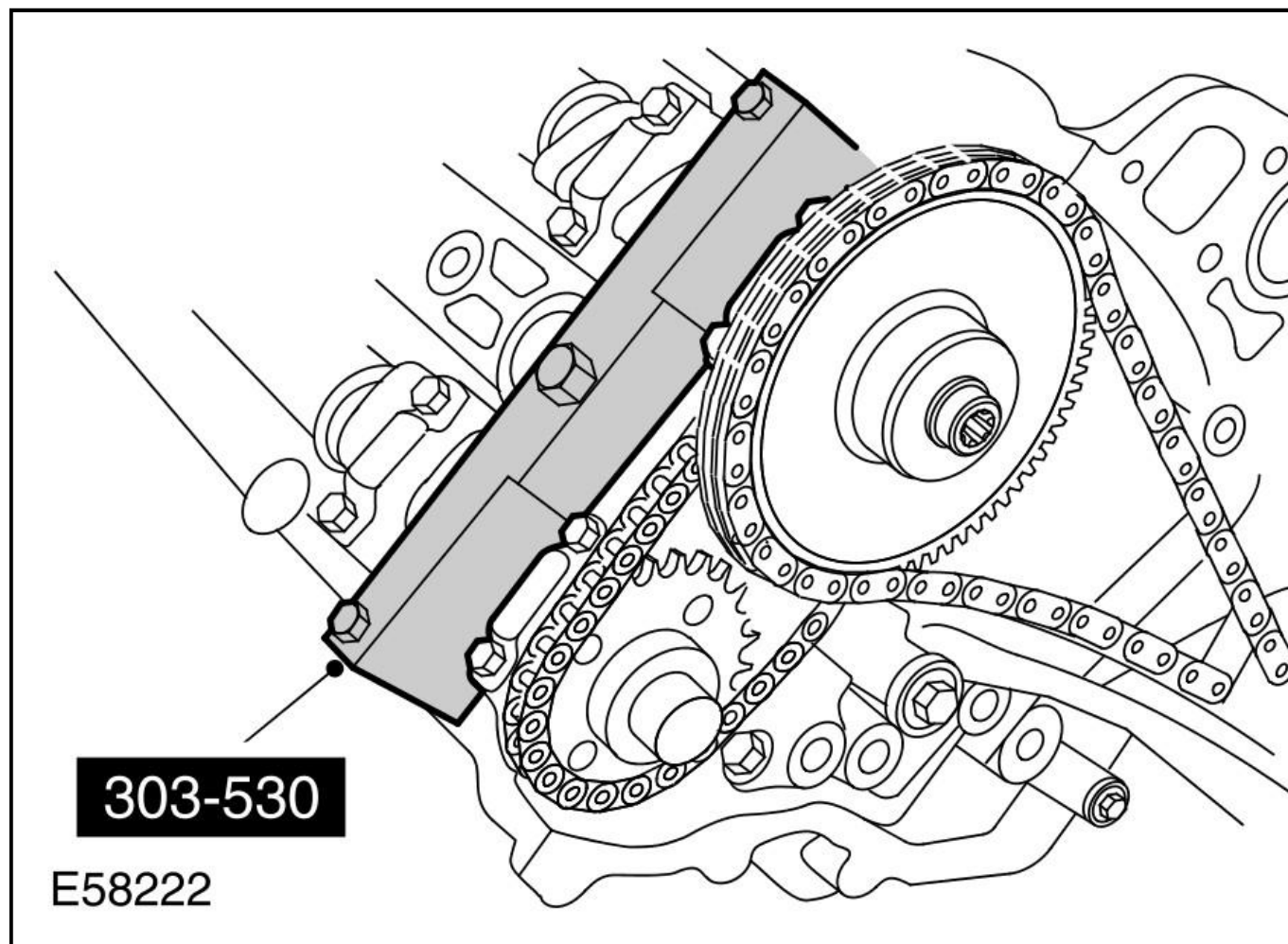
NOTE: **The engine is now in the SAFE position.**

6. Lock the crankshaft.
 - Install the special tool.
 - Install the screw.

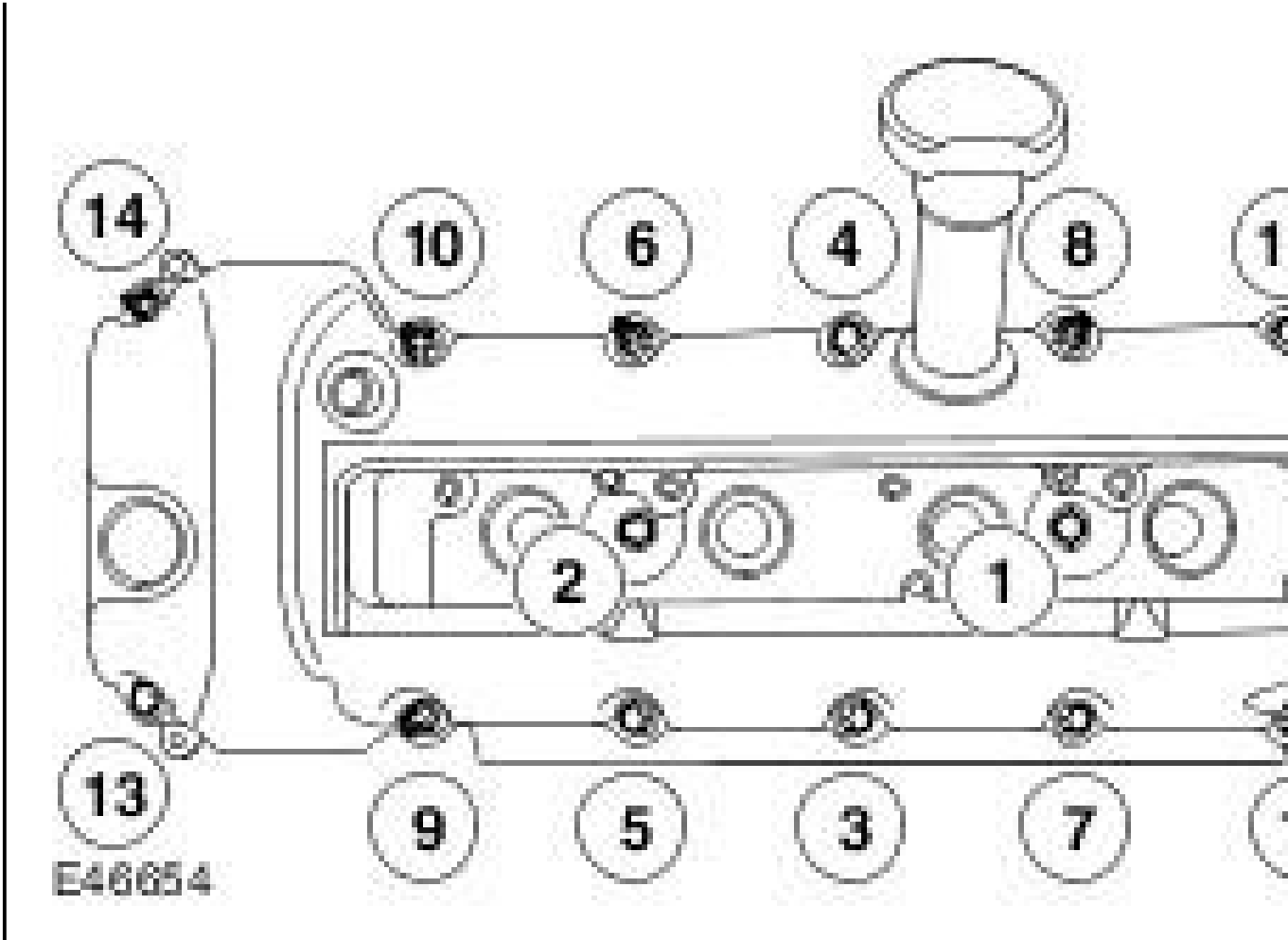


303-645

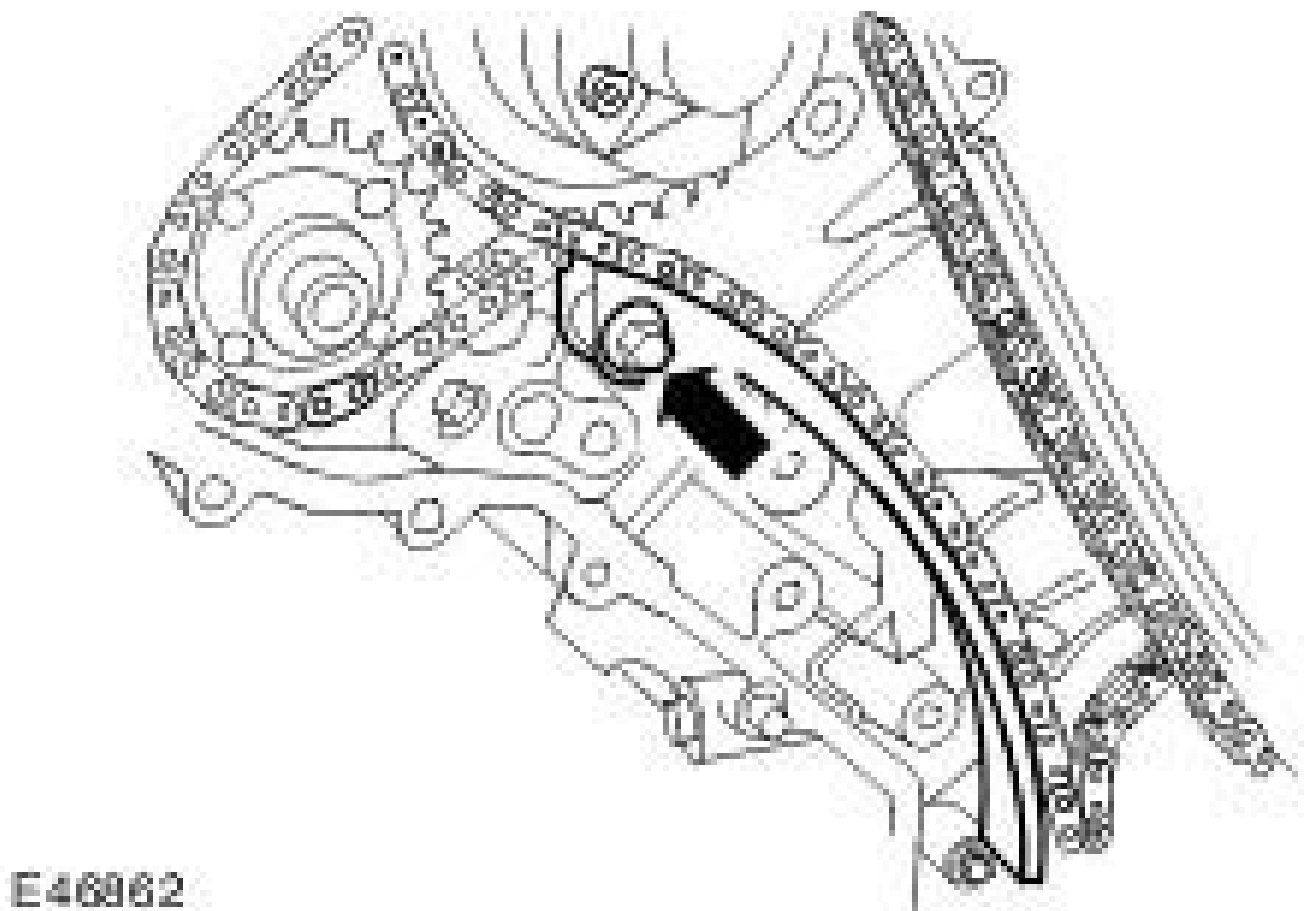
7. Install the special tool to the RH cylinder head.
 - Install the 3 bolts.



8. Remove the primary timing chain tensioner.
 - Remove the 2 bolts.

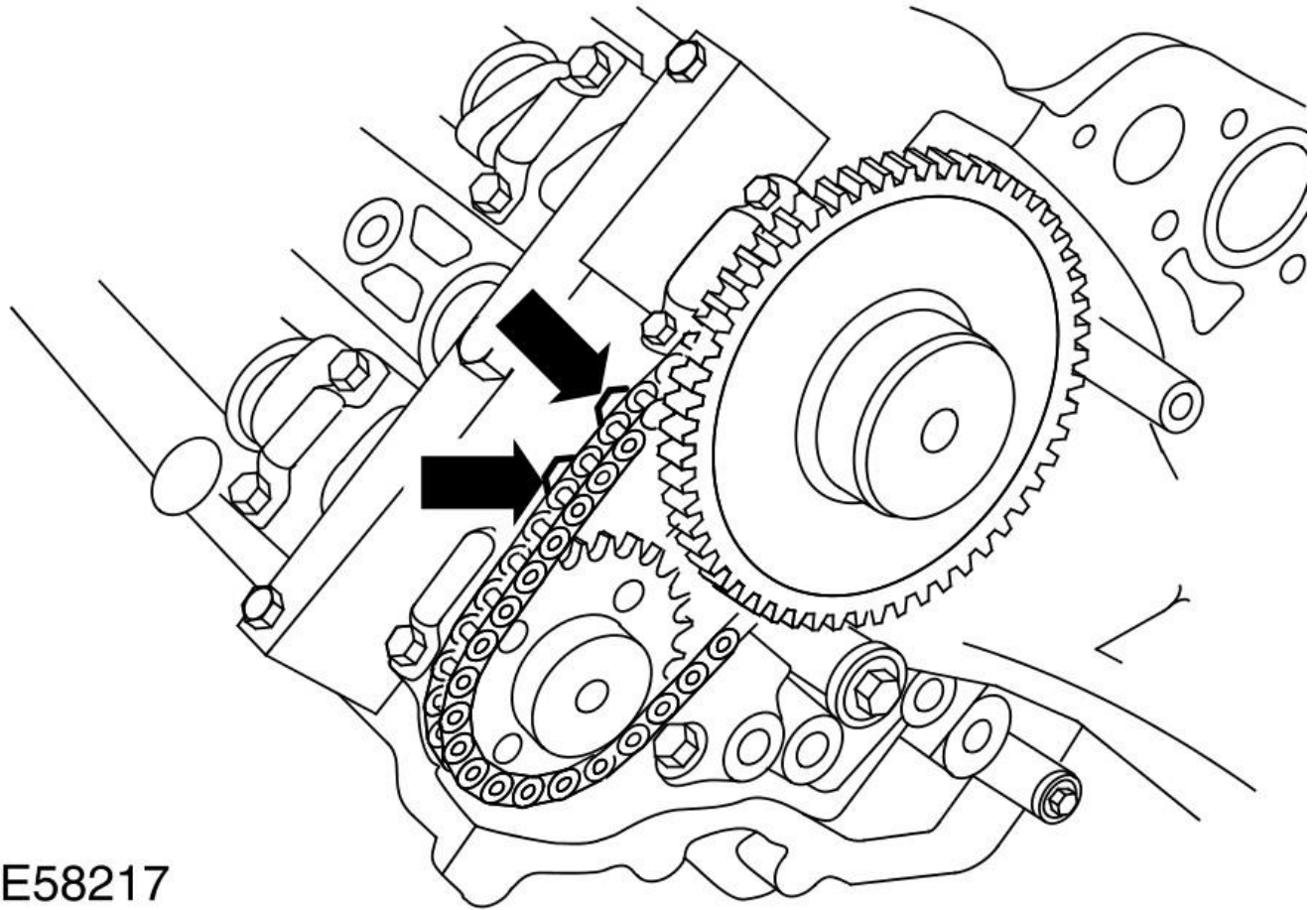


9. Remove the primary timing chain tensioner guide.
 - Remove the bolt.

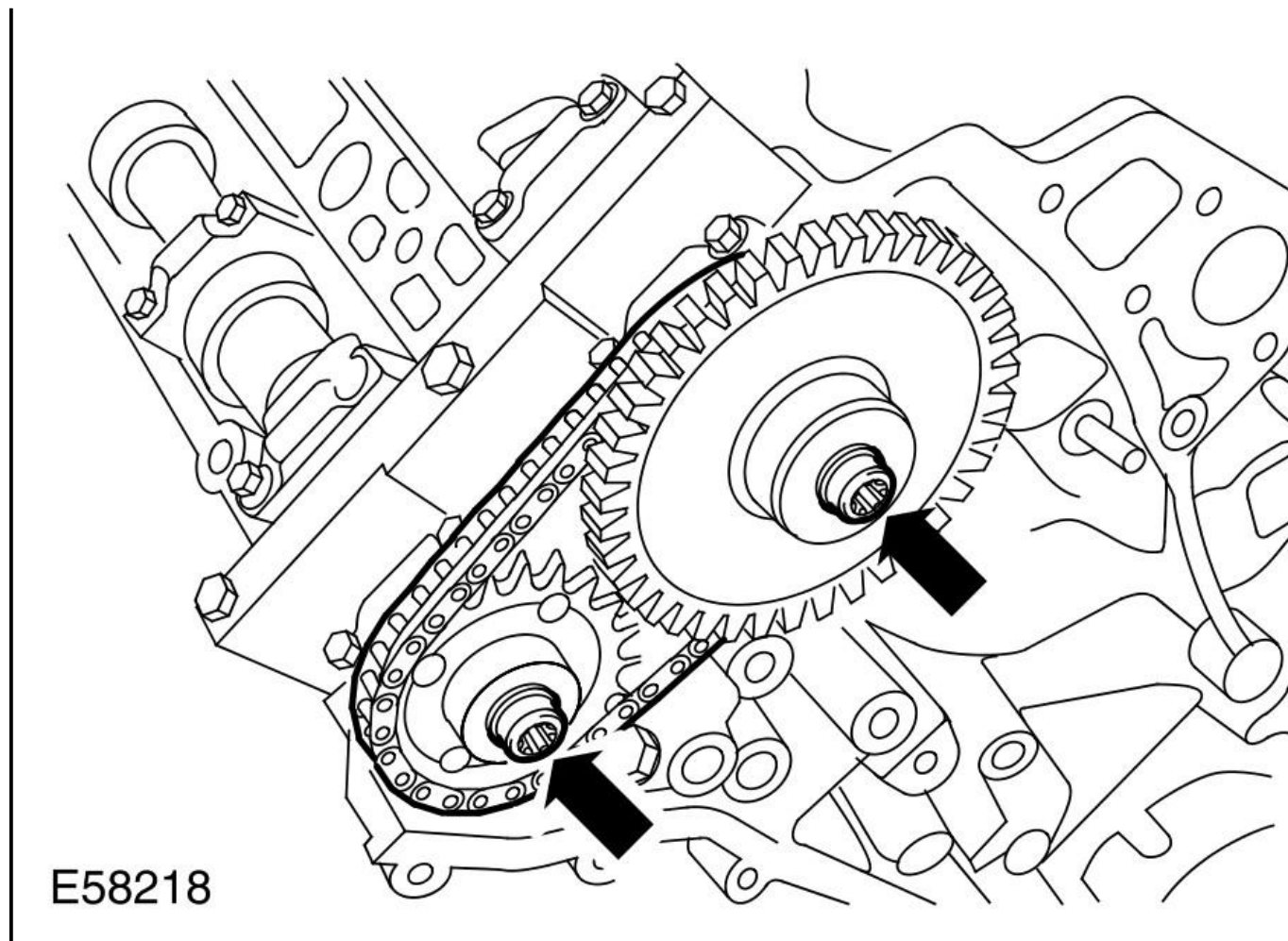


E46962

10. Remove the primary timing chain.

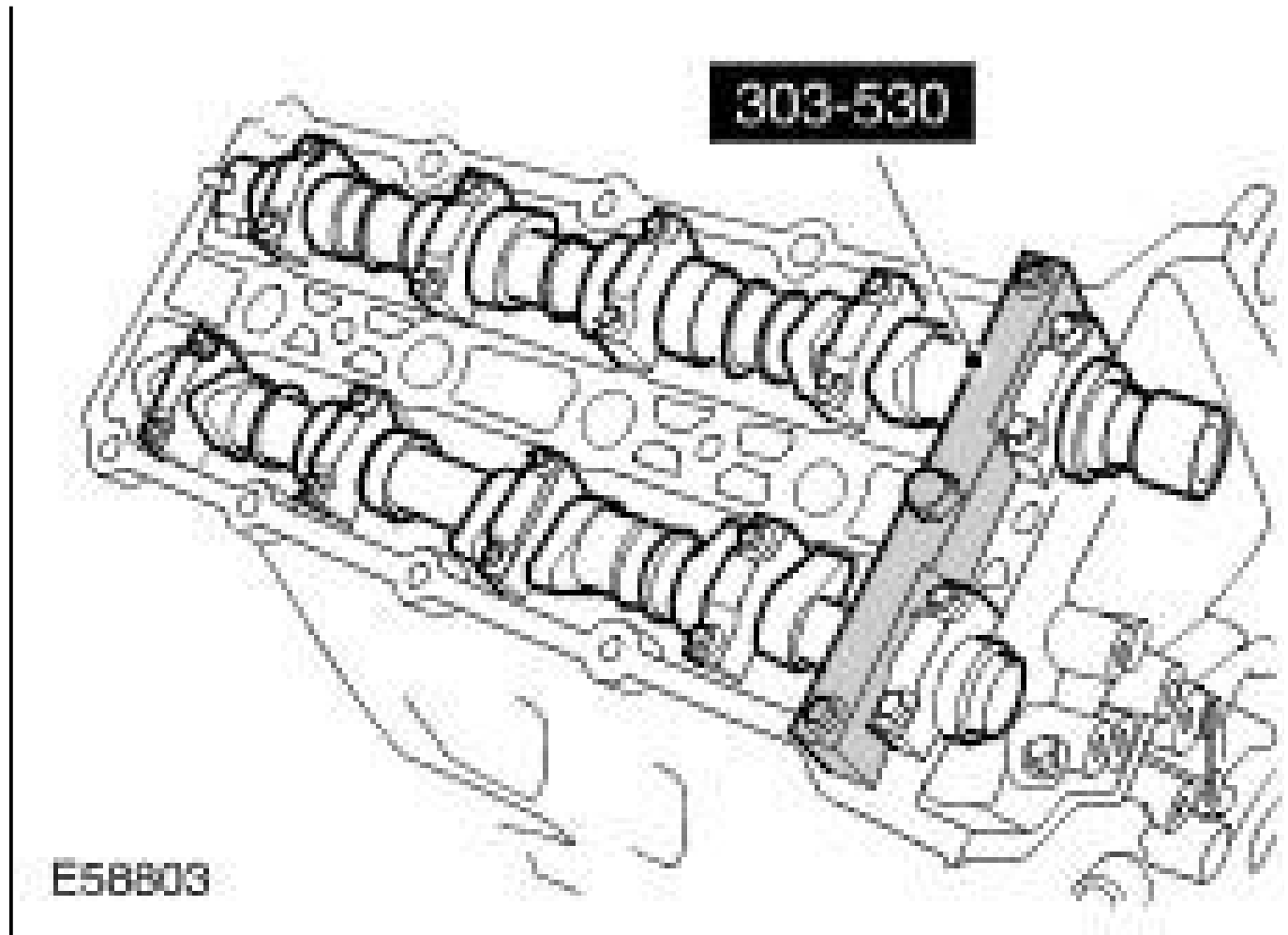


11. Remove the secondary timing chain tensioner and the secondary timing chain.
 - Remove the 2 retaining bolts.



CAUTION: Discard the bolts.

12. Remove the camshaft sprockets.
 - Remove the 2 bolts.

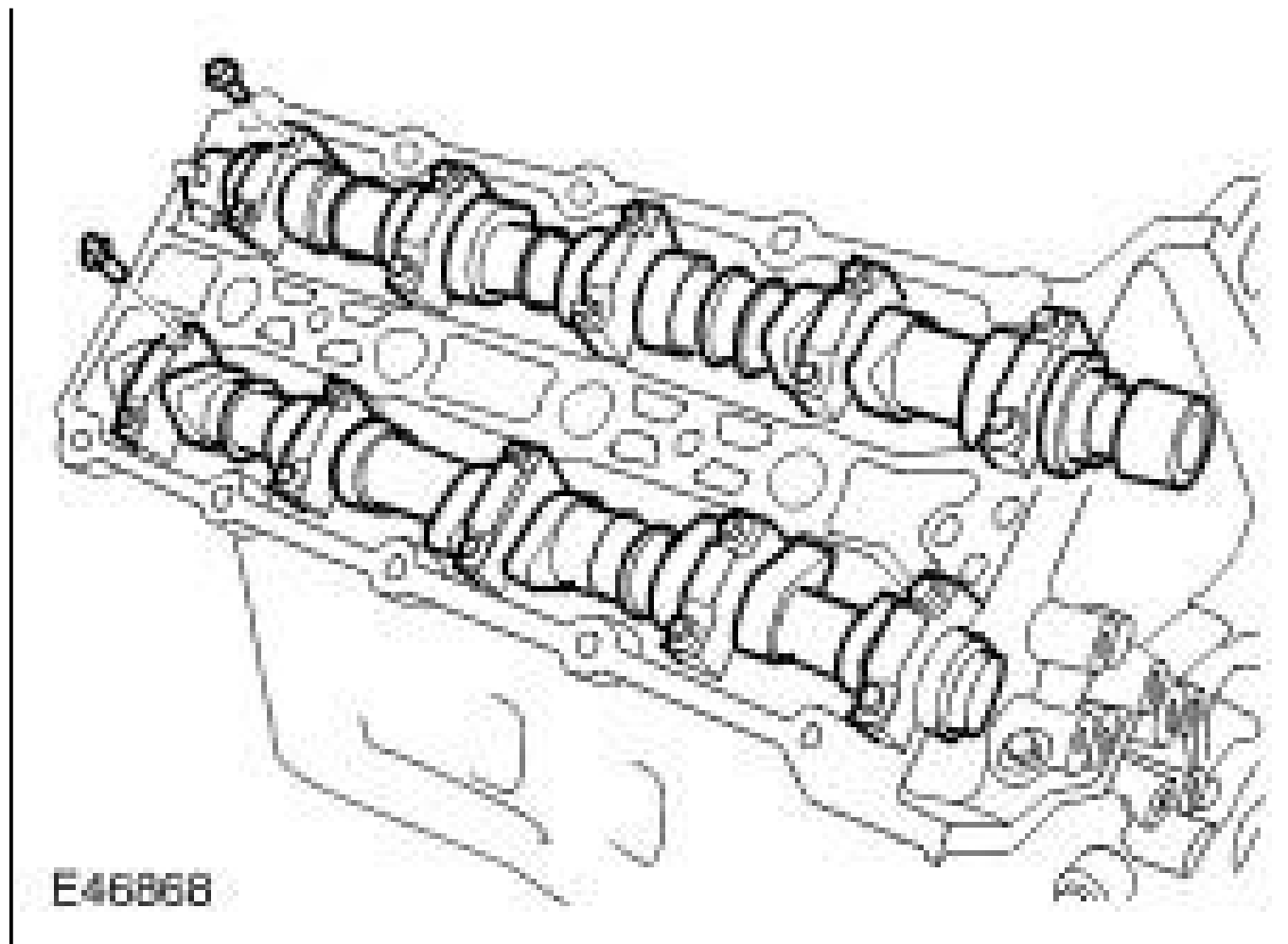


13. Remove the special tool from the RH cylinder head.
 - Remove the 3 bolts.

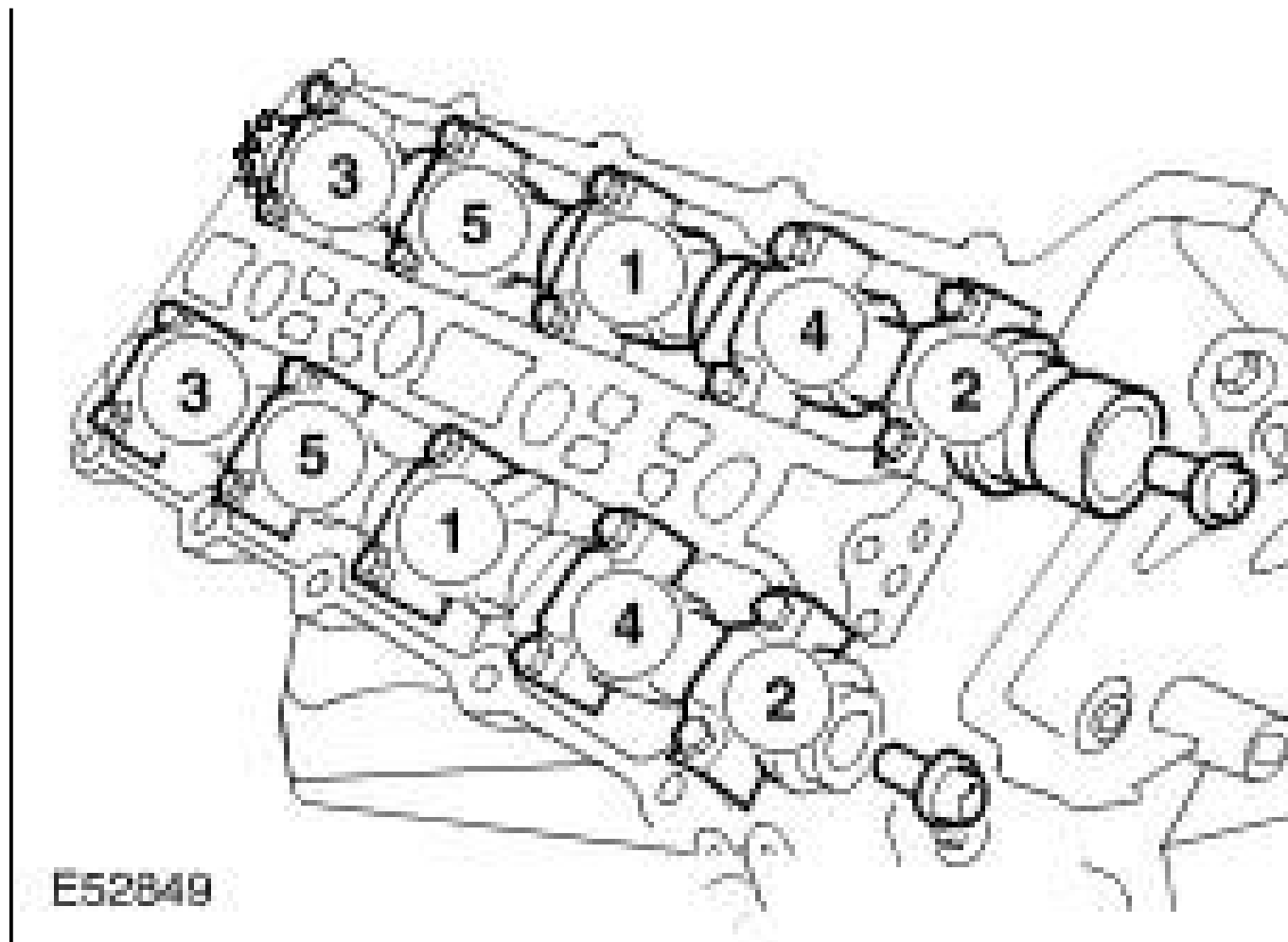
CAUTION: Evenly and progressively, release the camshaft bearing caps.

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

14. Remove the camshaft bearing caps.
 - Remove the 20 bolts.
15. Remove the camshafts.

**INSTALLATION**

1. Check and adjust the valve tappet clearances.
2. Replace the valve shims, with the smallest shim available.
 - Apply a light coat of clean engine oil to the replacement valve shims.
3. Install the camshafts.
 - Clean the component mating faces.
 - Lubricate the journals and camshaft lobes.
4. Install the camshaft bearing caps.
 - Evenly and progressively tighten the bolts in the sequence shown to 10 Nm (7 lb.ft).

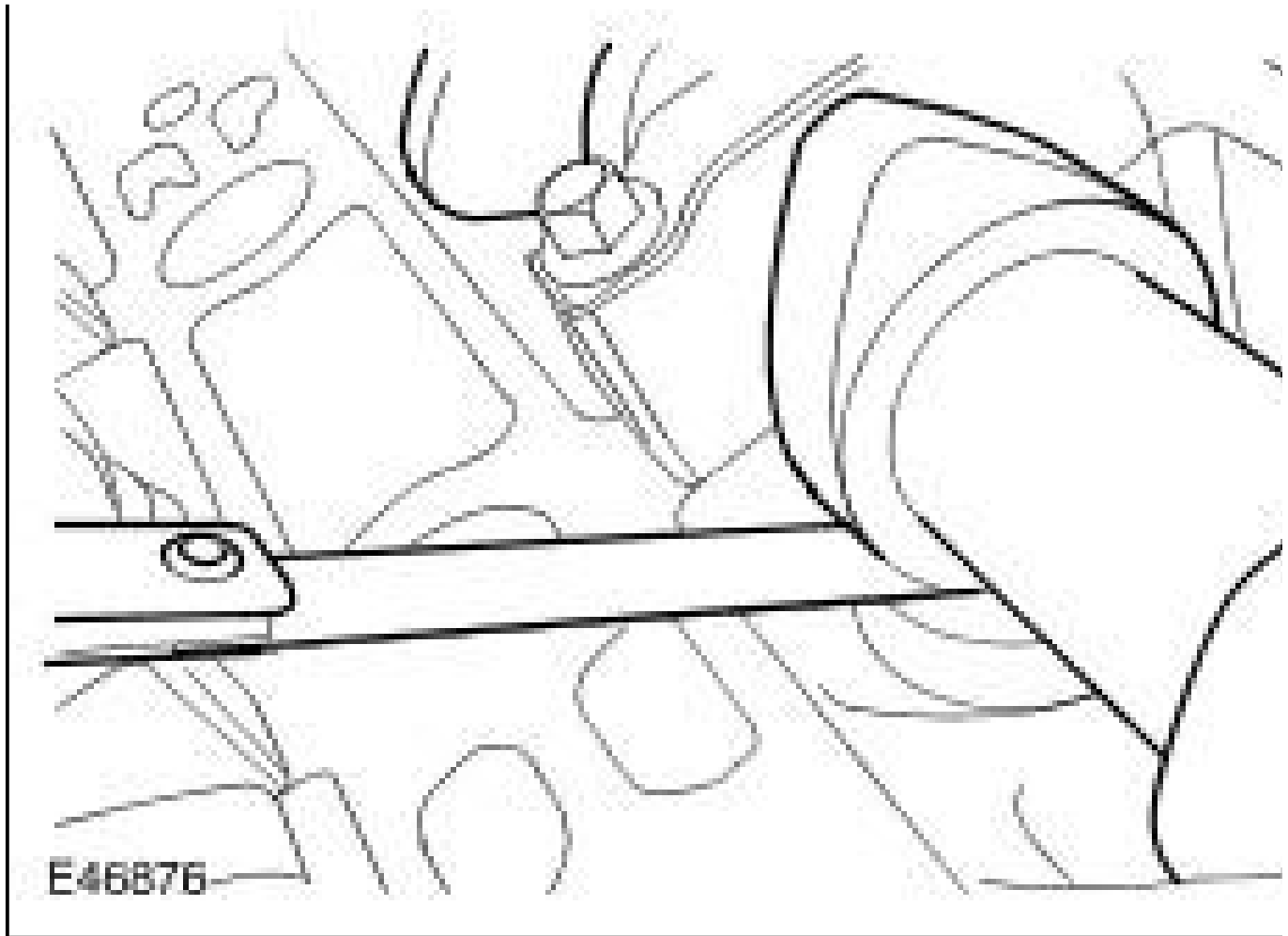


CAUTION: Make sure that new bolts are installed.

5. Install the sprocket retaining Torx bolts to the camshafts.

CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or valve clearance will be incorrect.

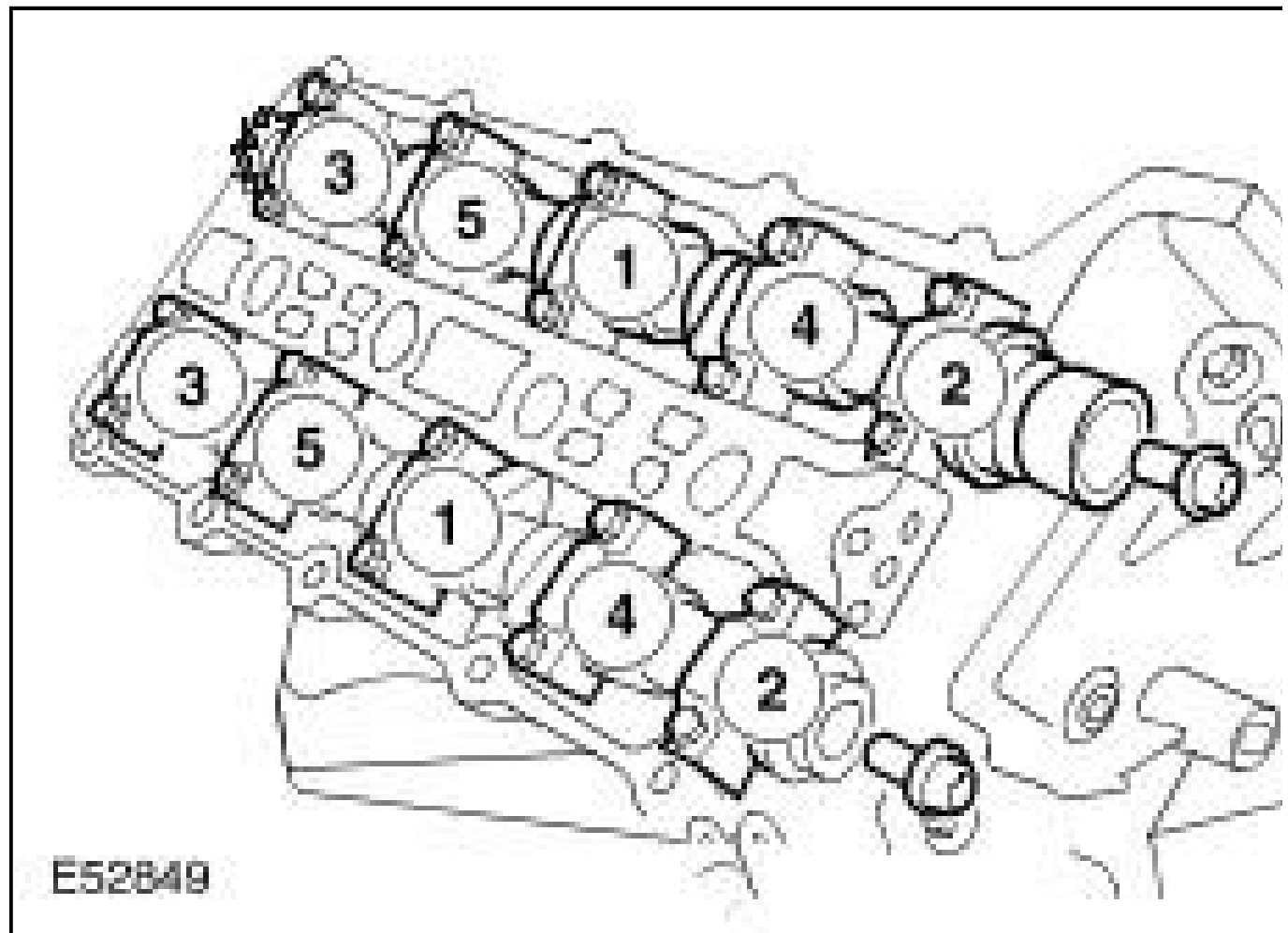
6. Measure and record the tappet clearances.
 - Rotate the camshafts using the Torx bolts.



CAUTION: Evenly and progressively, release the camshaft bearing caps.

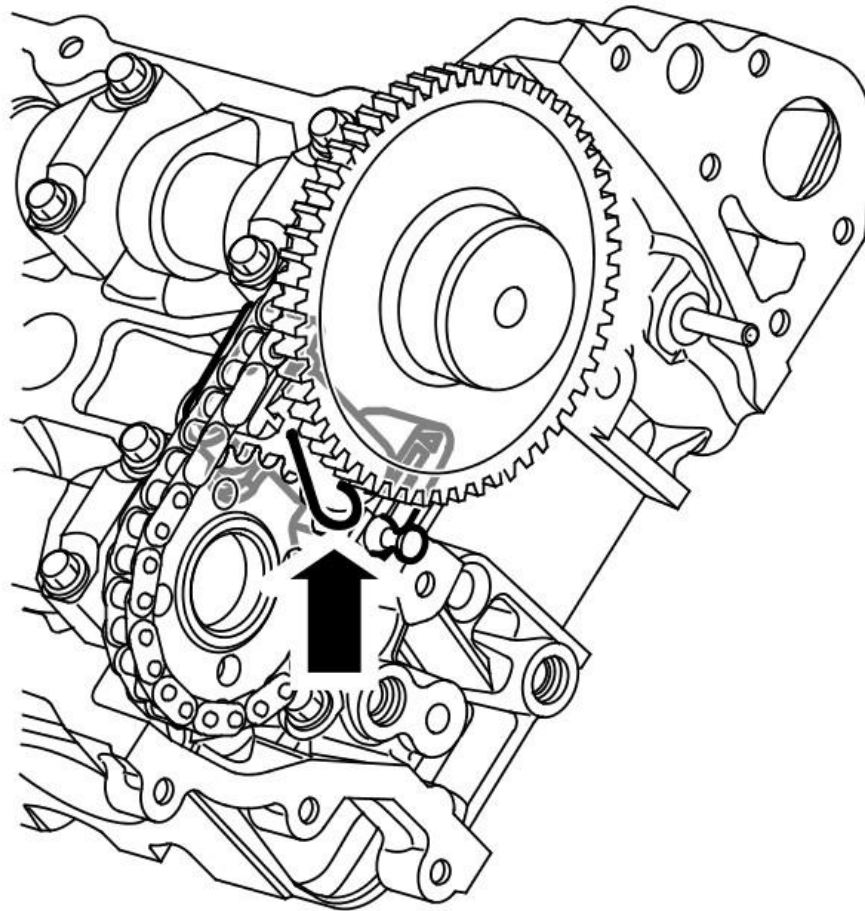
NOTE: Remove the camshaft bearing caps. Note: their position, orientation and markings. Each is marked with its position (number) and an orientation (arrow).

7. Remove the camshaft bearing caps.
 - Remove the 20 bolts.
8. Remove the camshafts.
9. Remove the valve tappets, replace with selected tappets.
10. Install the camshafts.
 - Lubricate the journals and camshaft lobes.
 - Clean the component mating faces.
11. Install the camshaft bearing caps.
 - Evenly and progressively tighten the bolts in the sequence shown to 10 Nm (7 lb.ft).



CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or valve clearance will be incorrect.

12. Check valve tappet clearances are correct.
 - Rotate the camshafts using the Torx bolts.
 - Remove the camshaft Torx bolts after the check is complete.
13. Install the special tool to the RH cylinder head.
 - Install the 3 bolts.
14. Using 1 mm diameter metal rod, retain the chain tensioner piston.



E58227

15. Install the secondary timing chain tensioner and chain to the camshaft sprockets.

NOTE: Lightly tighten the camshaft sprocket Torx bolts, the sprockets **MUST** be free to move.

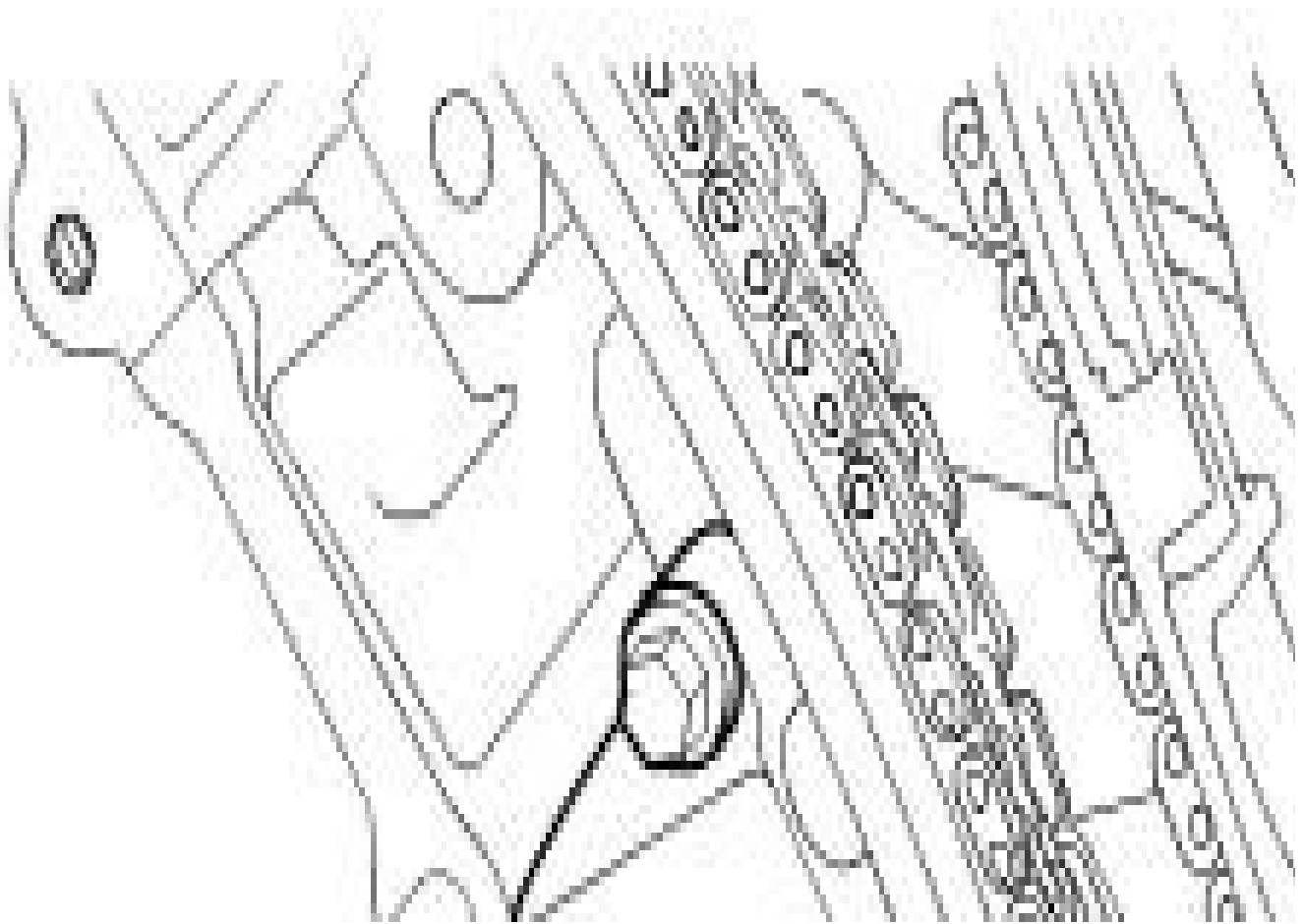
16. Install the secondary timing chain and sprockets to the camshafts.
17. Install the secondary timing chain tensioner retaining bolts.
- Tighten the bolts to 12 Nm (9 lb.ft).
18. Tension the secondary timing chain.
- Remove the retaining rod.
19. Install the primary timing chain.
- Make sure the timing chain slack is on the tensioner side of the timing chain.
20. Install the primary tensioner guide.
- Tighten the bolts to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the

ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

21. Install the primary chain tensioner.

- Using 3 mm diameter metal rod, retain the chain tensioner piston.
- Tighten the bolts to 12 Nm (9 lb.ft).
- Release the retaining rod.

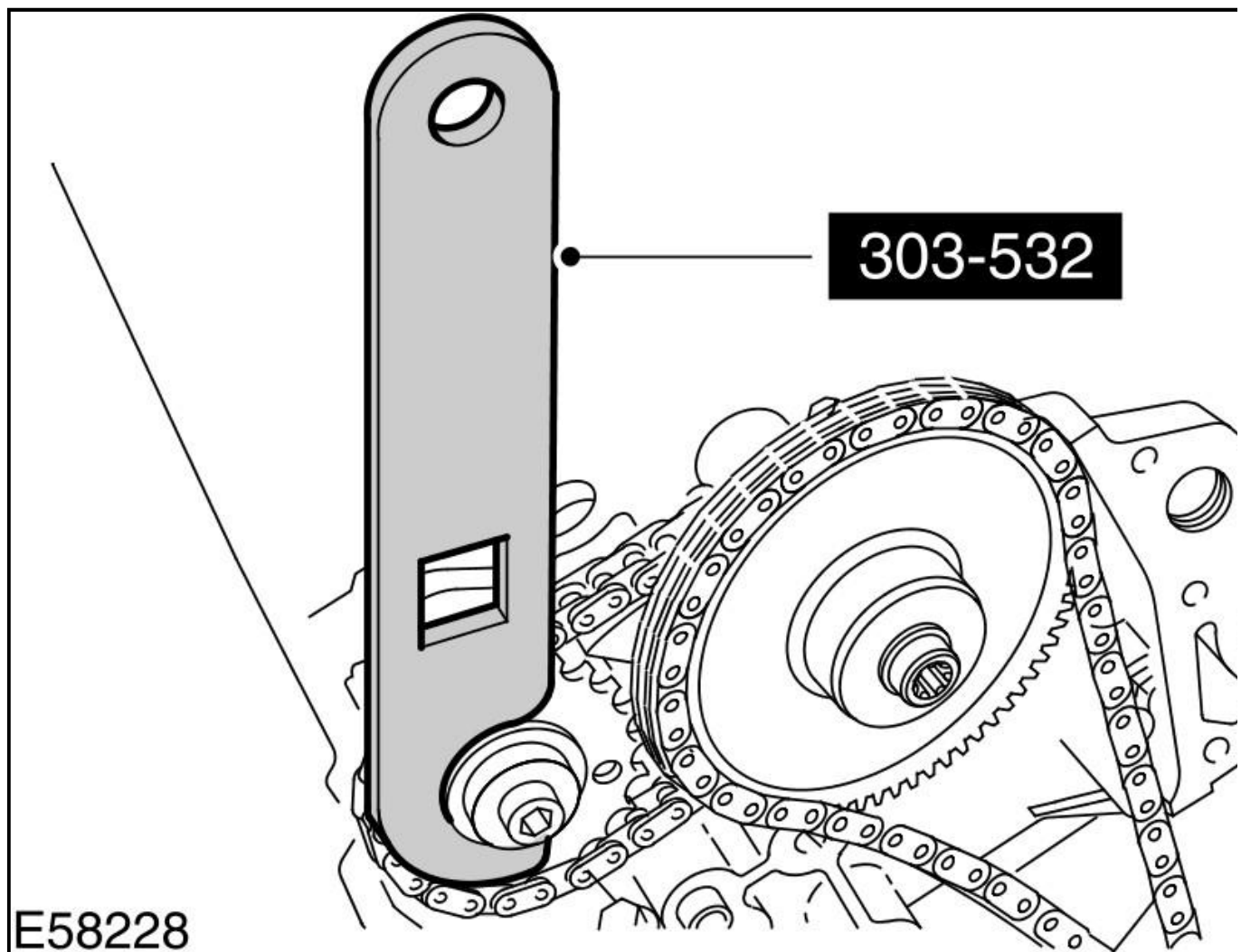


CAUTION: The intake camshaft sprocket retaining bolt **MUST** be tightened before the exhaust camshaft sprocket retaining bolt. Engine damage will occur if this procedure is not followed.

CAUTION: Using the special tool, apply force to the tool in a counter-clockwise direction, to tension the primary timing chain on its drive side.

CAUTION: Make sure that new bolts are installed.

22. Install the special tool to the exhaust camshaft sprocket.
- Tighten the intake camshaft sprocket retaining bolt to 120 Nm (88 lb.ft).
 - Tighten the exhaust camshaft retaining bolt to 120 Nm (88 lb.ft).



23. Remove the special tool from the RH cylinder head.
24. Remove the crankshaft locking tool.
- Remove the screw.
25. Install the CKP sensor. Refer to **CRANKSHAFT POSITION (CKP) SENSOR** .

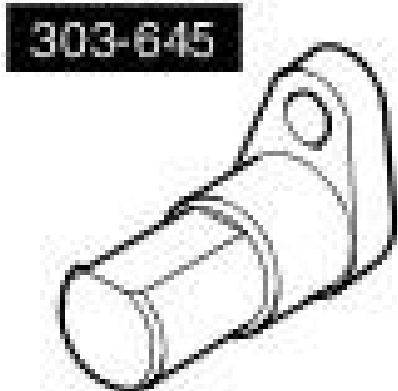
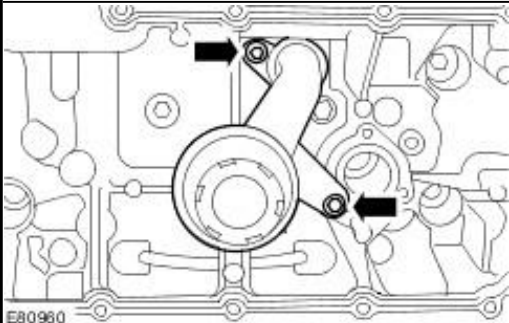
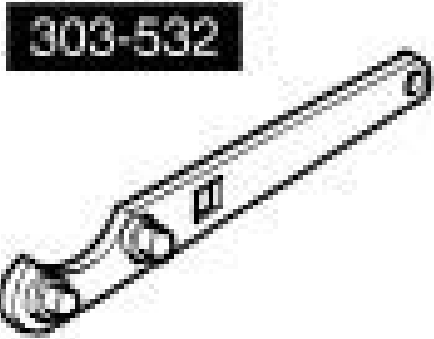
NOTE: Before installing the valve covers, check the valve clearances.

26. Install the engine front cover. Refer to **ENGINE FRONT COVER**.

27. Connect the battery ground cable. Refer to **SPECIFICATIONS**.

CAMSHAFTS LH

SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
 303-645 E46881	Timing Setting tool	303-645
 E80980	Camshaft setting/locking tool	303-530
 303-532 E46880	Timing chain tensioning tool	303-532

REMOVAL

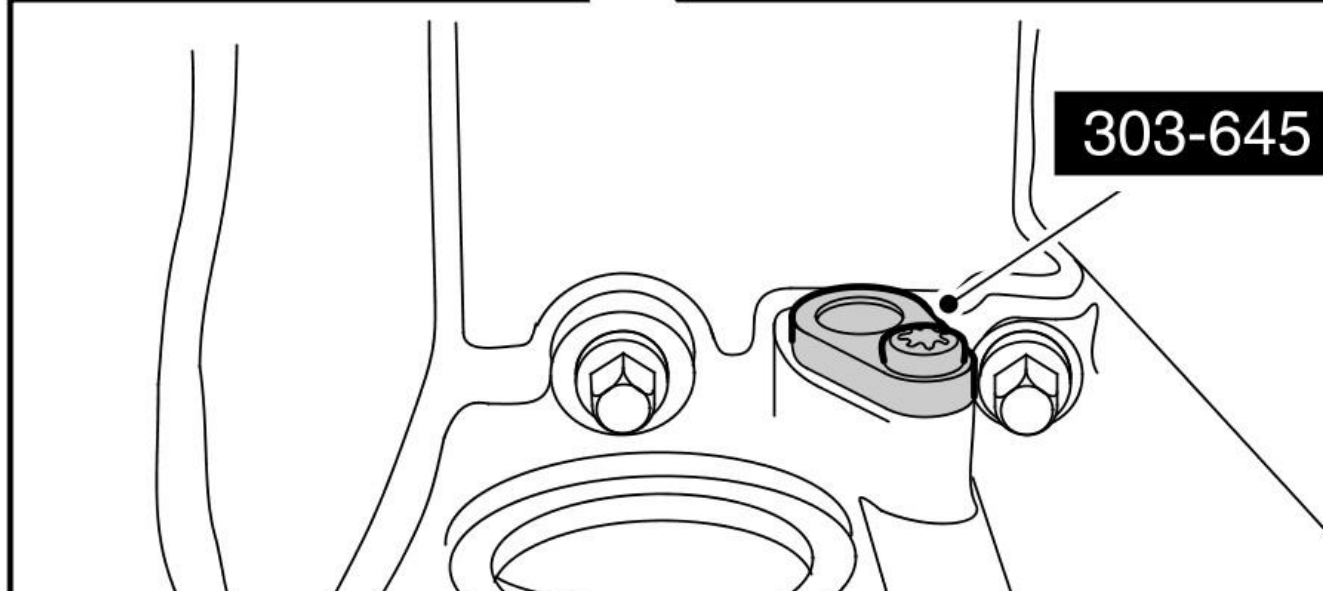
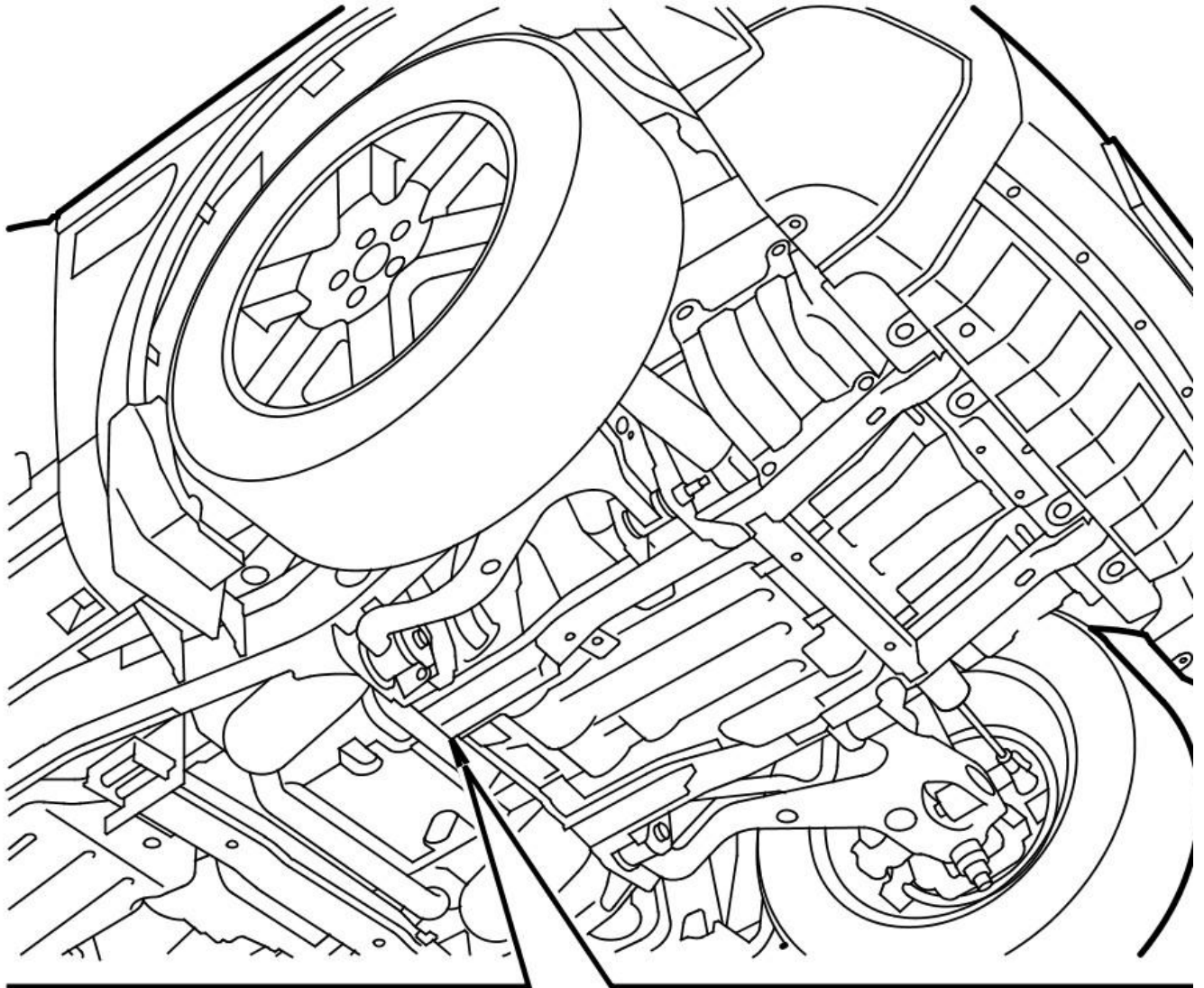
1. Disconnect the battery ground cable. Refer to SPECIFICATIONS .

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

2. Raise and support the vehicle.
3. Remove the engine front cover. Refer to ENGINE FRONT COVER.
4. Remove the crankshaft position (CKP) sensor. Refer to CRANKSHAFT POSITION (CKP) SENSOR .
5. Rotate the crankshaft until the flats on the camshafts are parallel with the cylinder head joint faces.

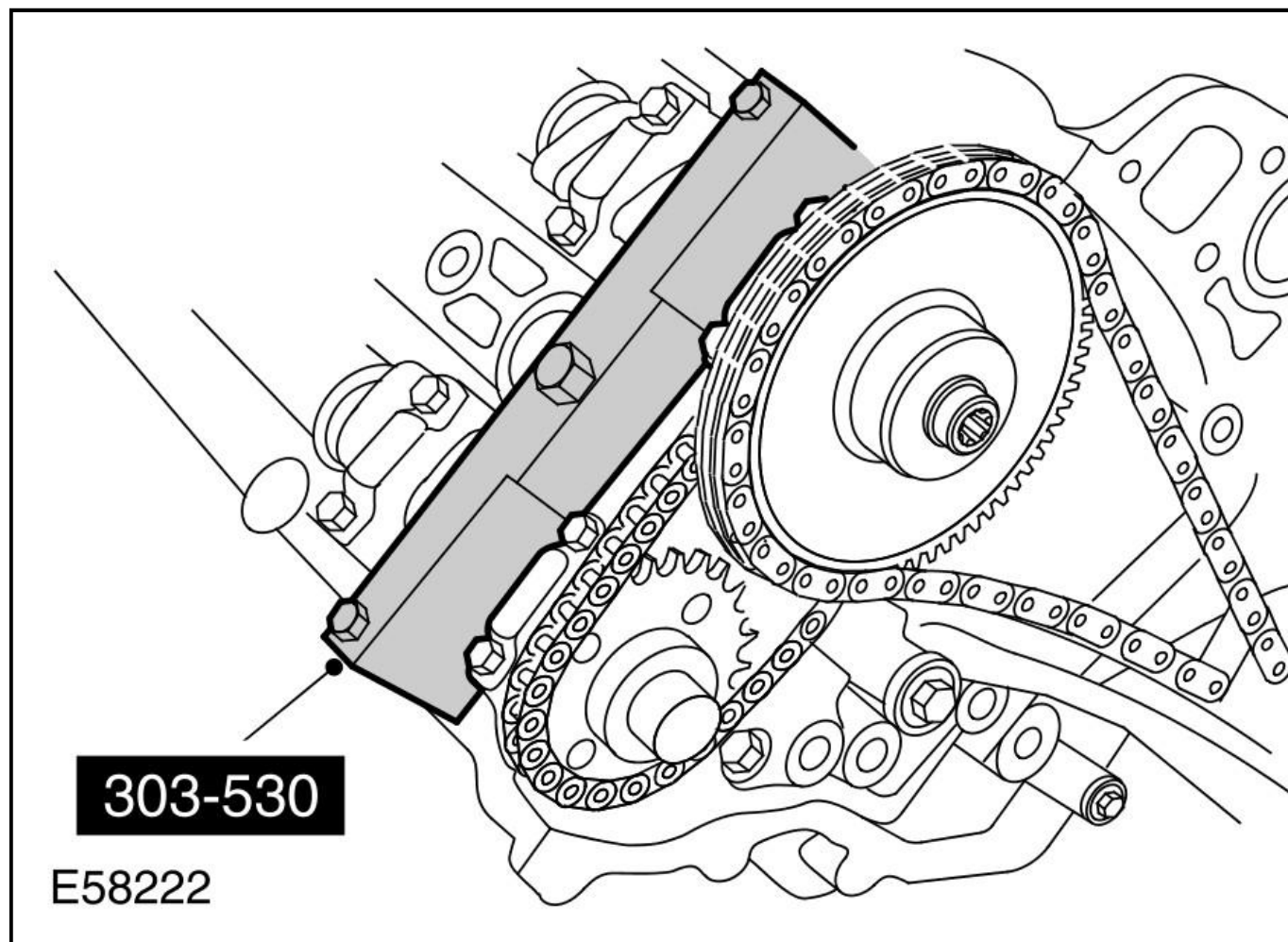
NOTE: The engine is now in the **SAFE** position.

6. Lock the crankshaft.
 - Install the special tool.
 - Install the screw.

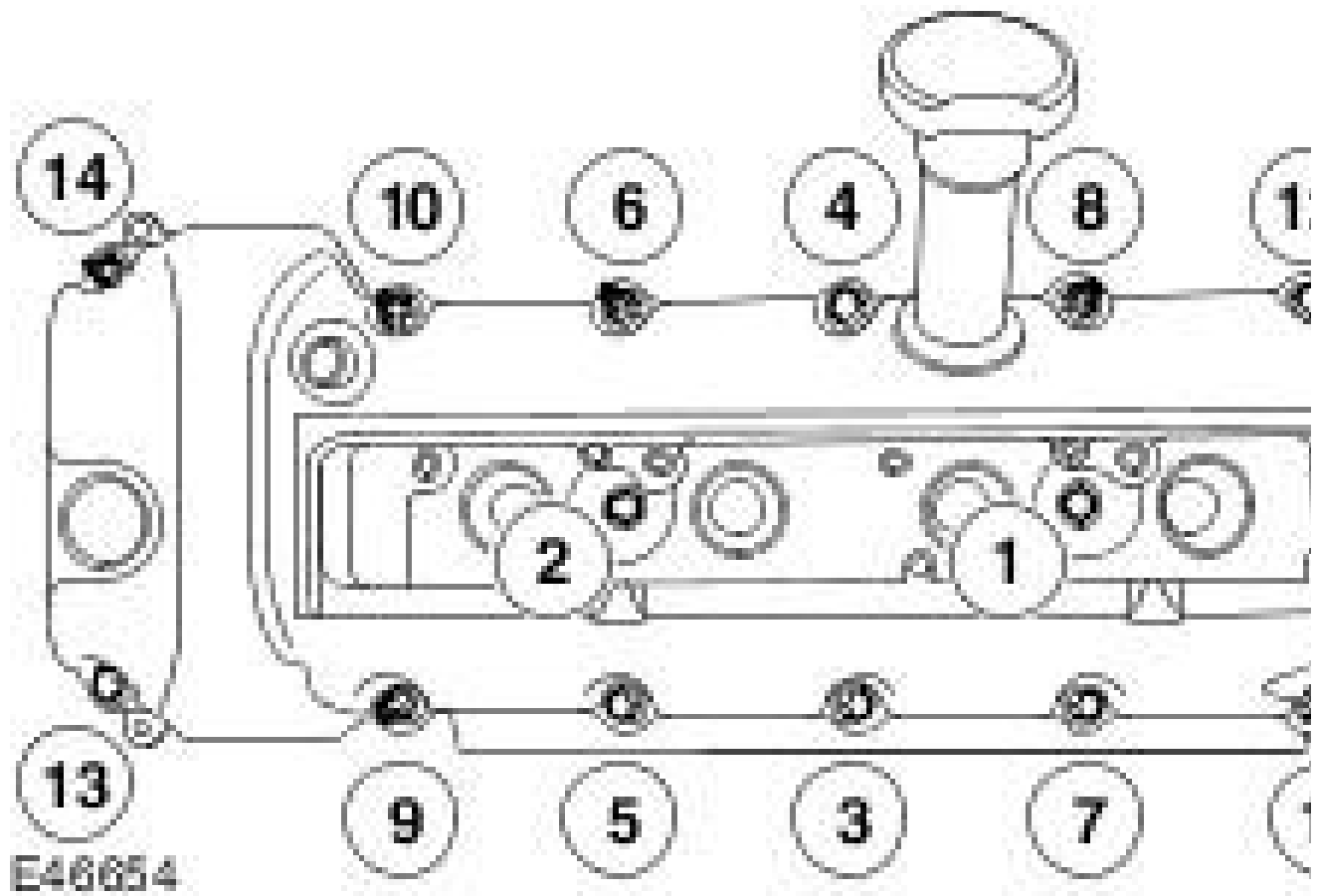


303-645

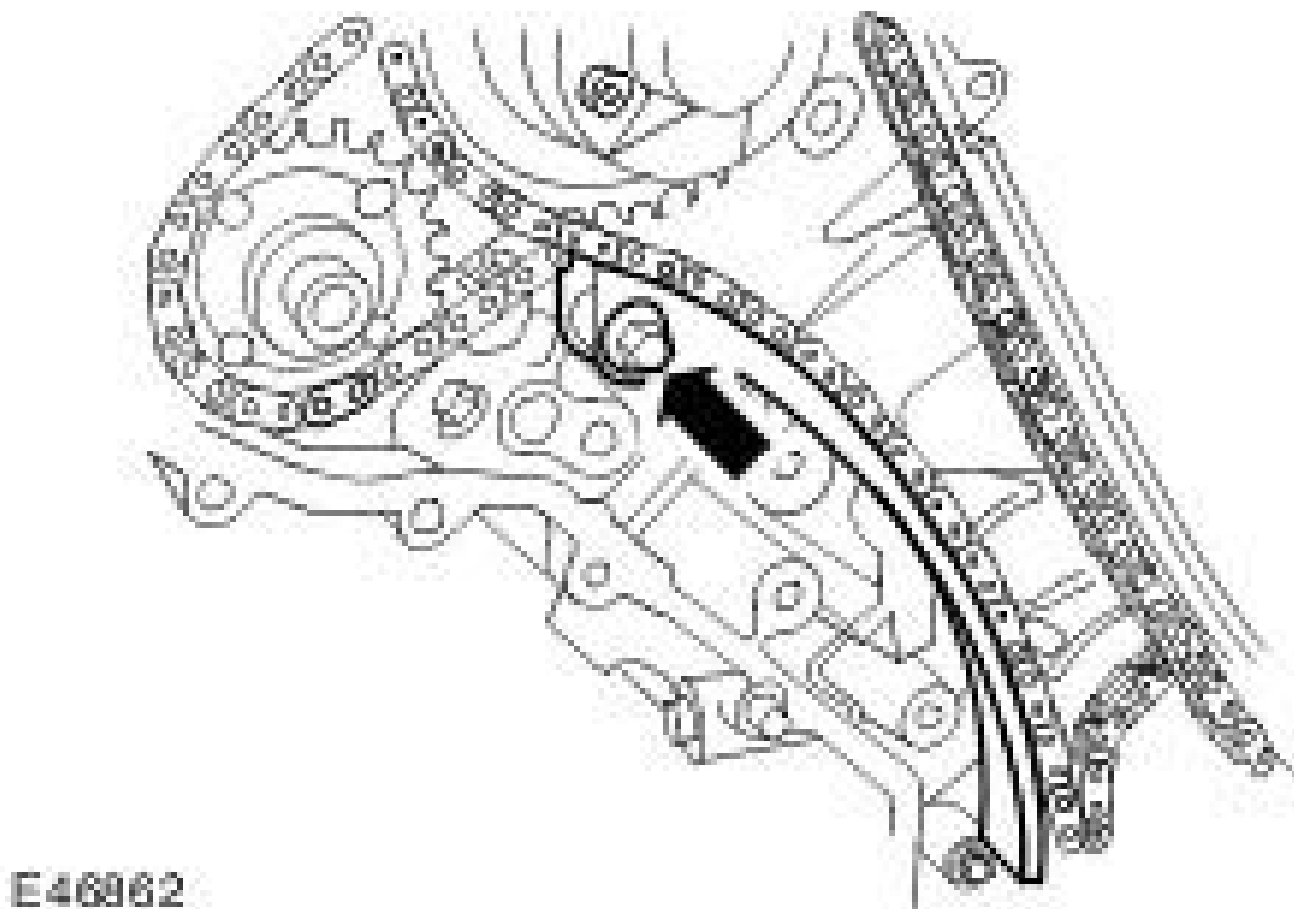
7. Install the special tool to the RH cylinder head.
 - Install the 3 bolts.



8. Remove the RH primary timing chain tensioner.
 - Remove the 2 bolts.

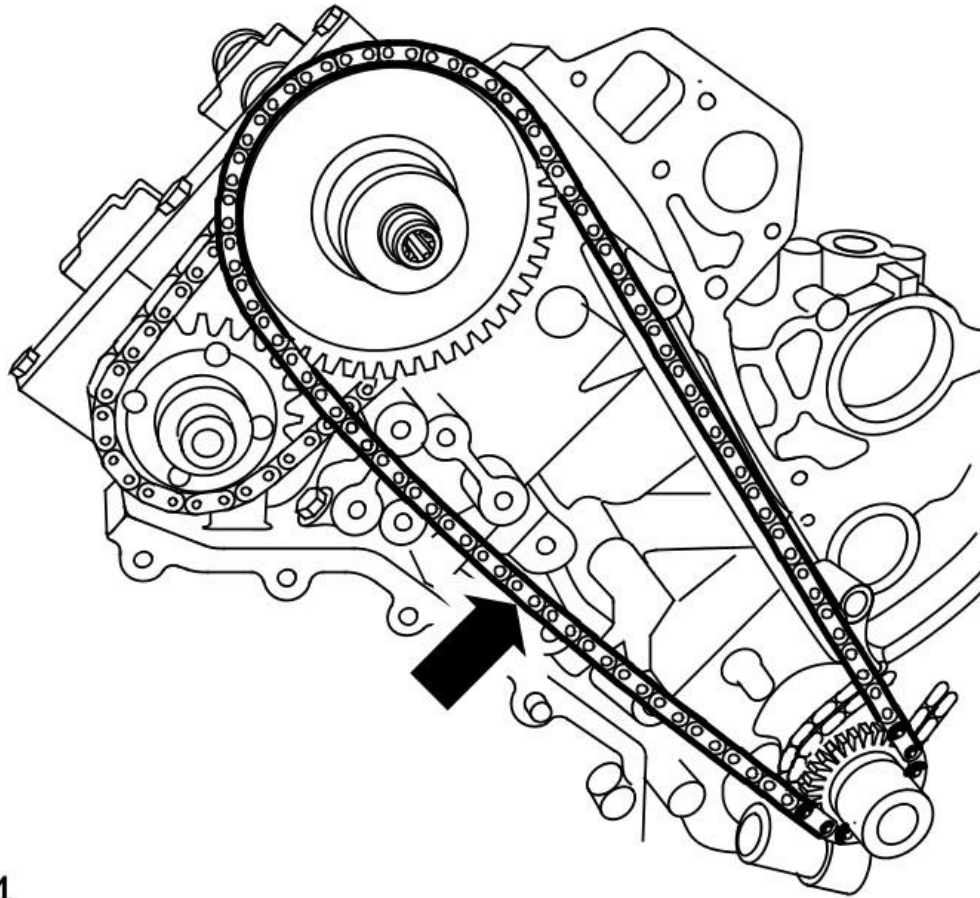


9. Remove the RH primary timing chain tensioner guide.
 - Remove the bolt.



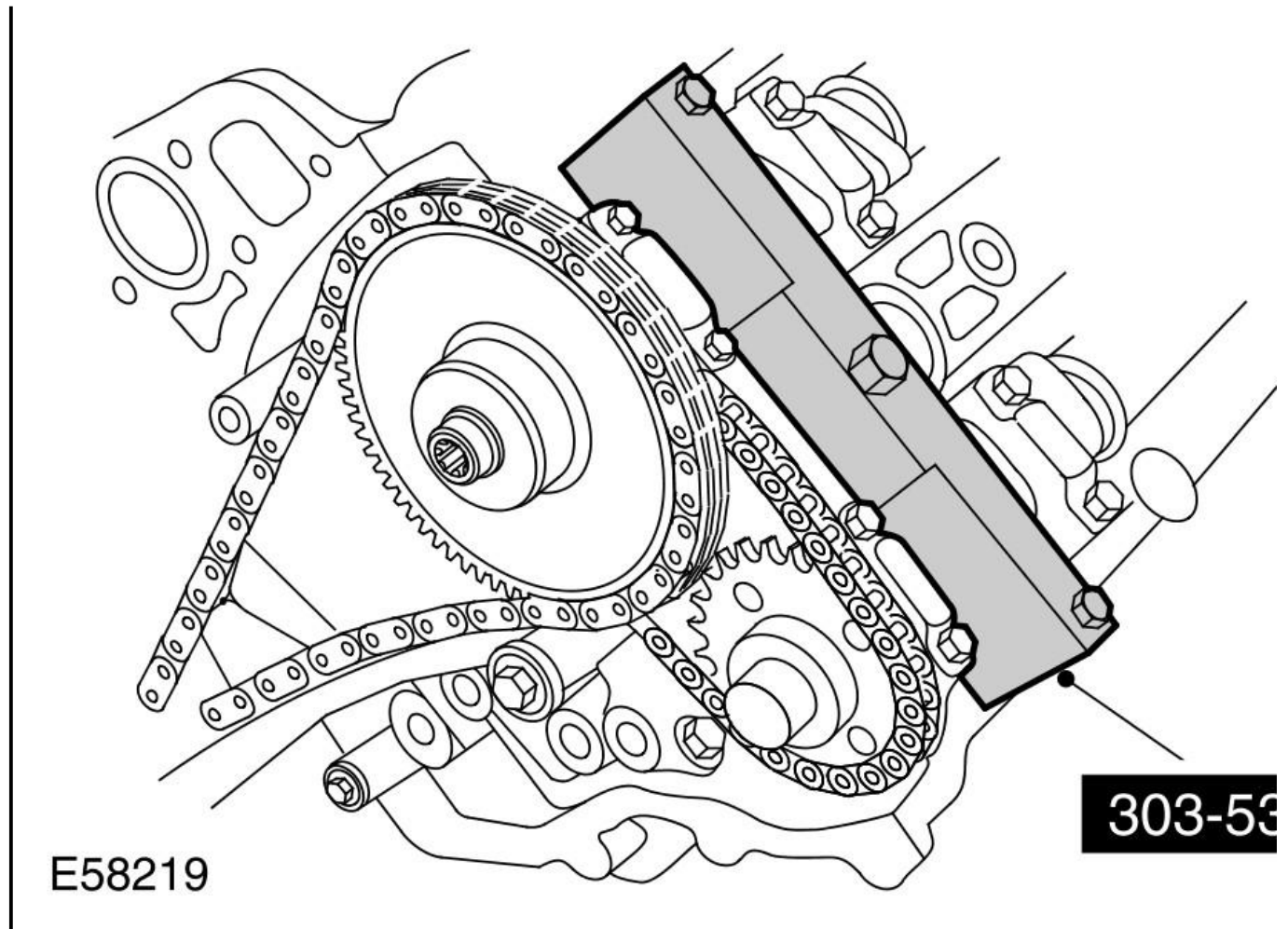
E46962

10. Remove the RH primary timing chain.

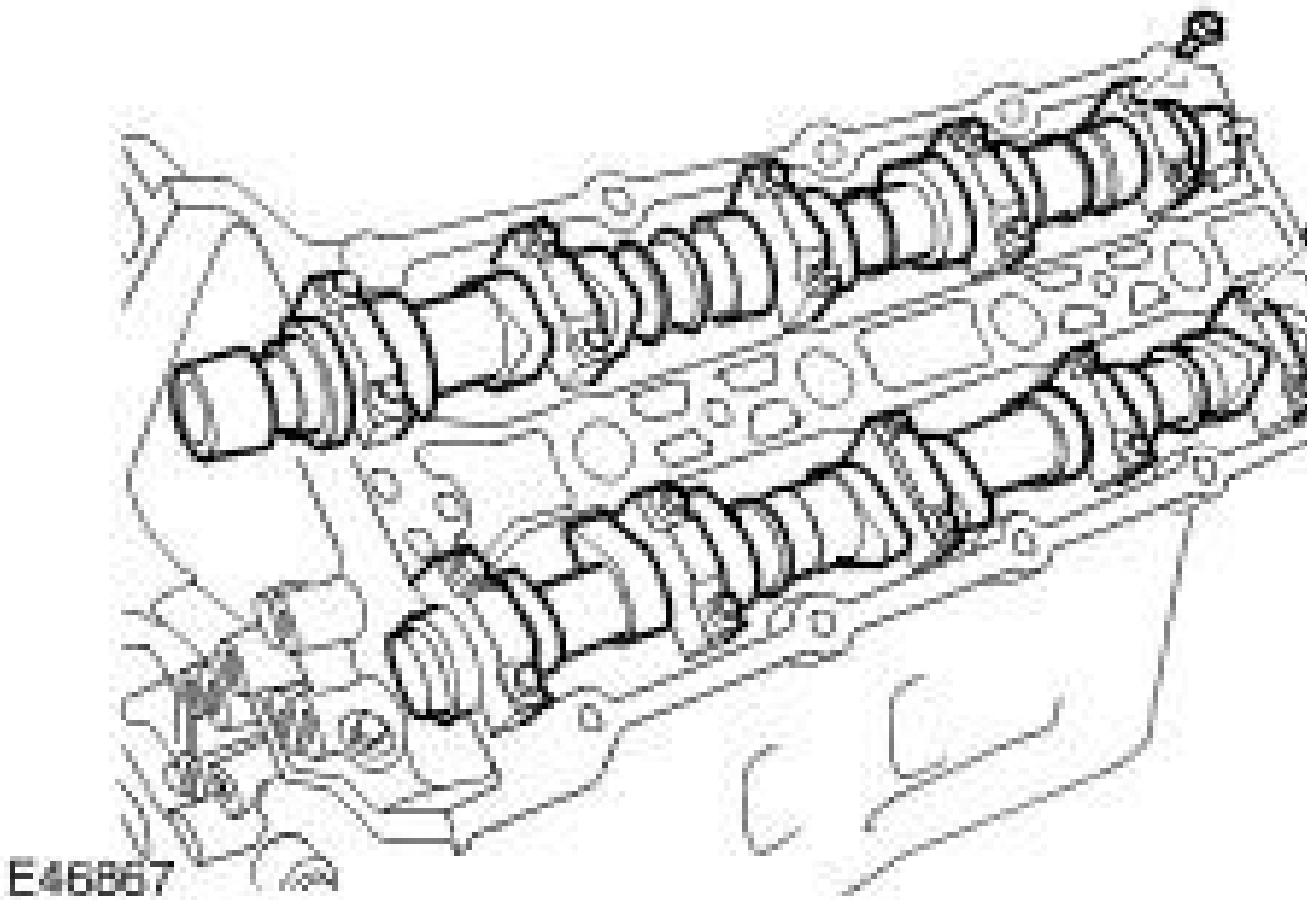


E58224

11. Install the special tool to the LH cylinder head.
 - Install the 3 bolts.

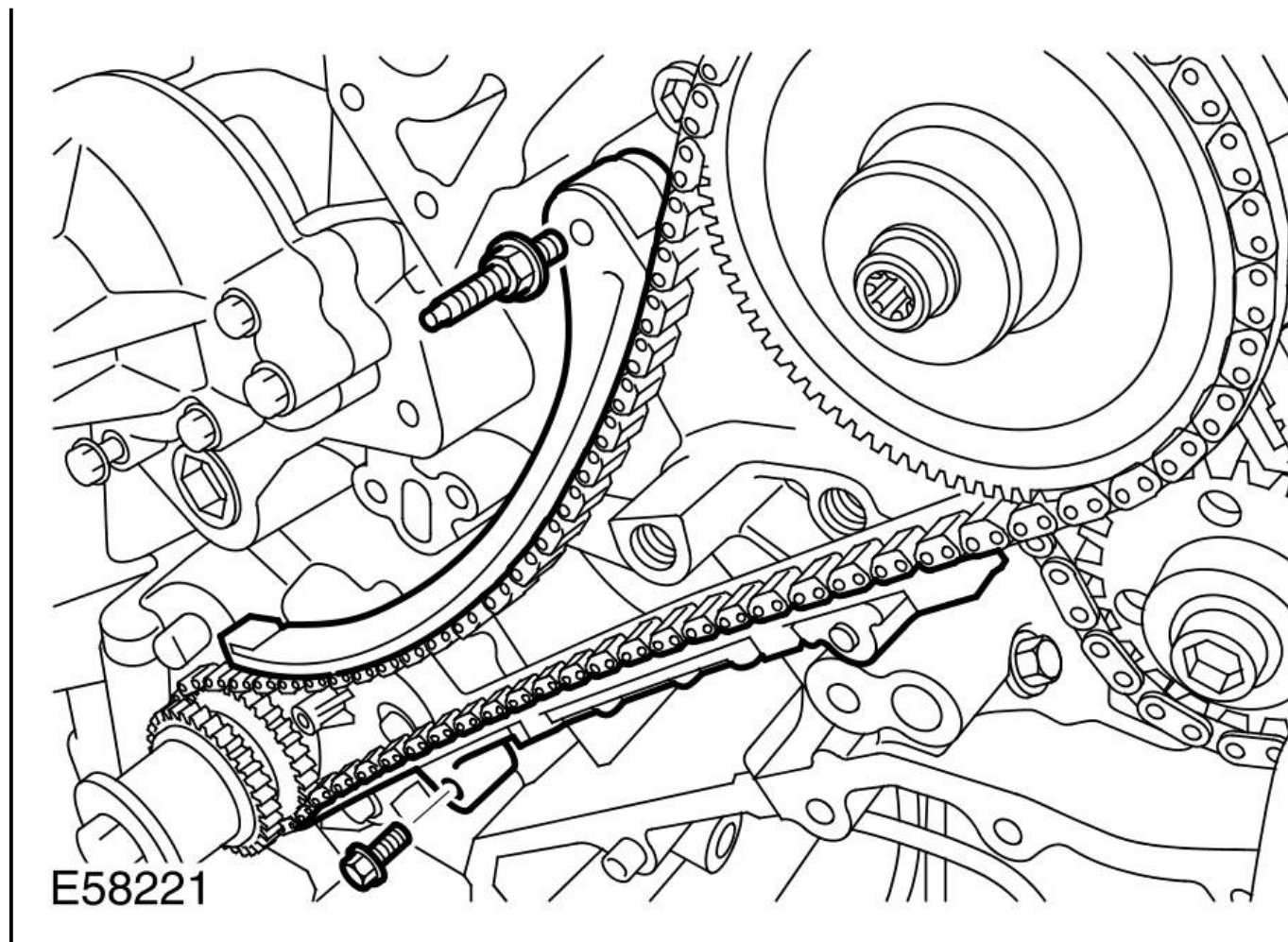


12. Remove the LH primary timing chain tensioner.
 - Remove the 2 bolts.



13. Remove the LH upper and lower primary timing chain tensioner guides.

- Remove the stud.
- Remove the bolt.

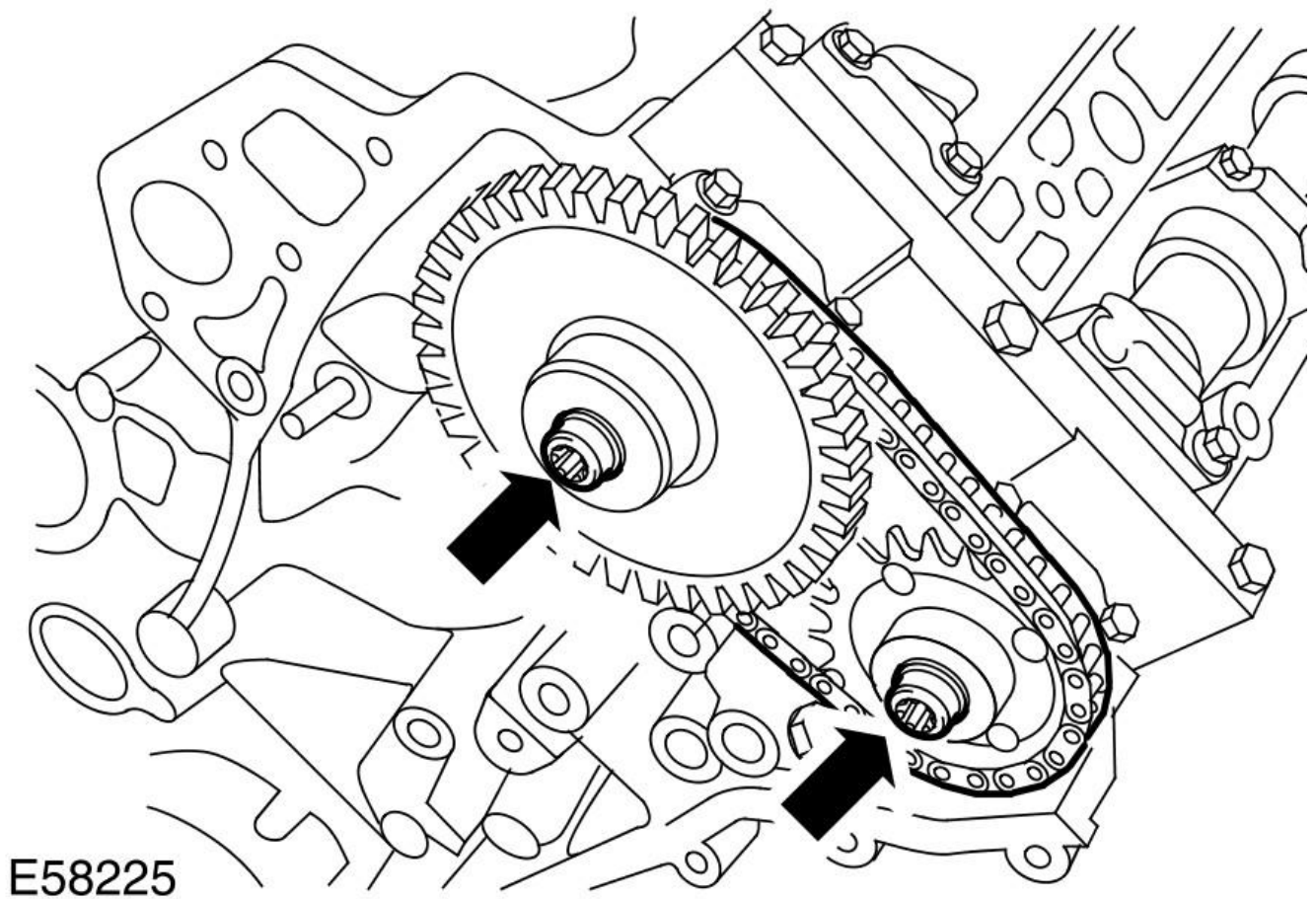


14. Remove the LH primary timing chain.

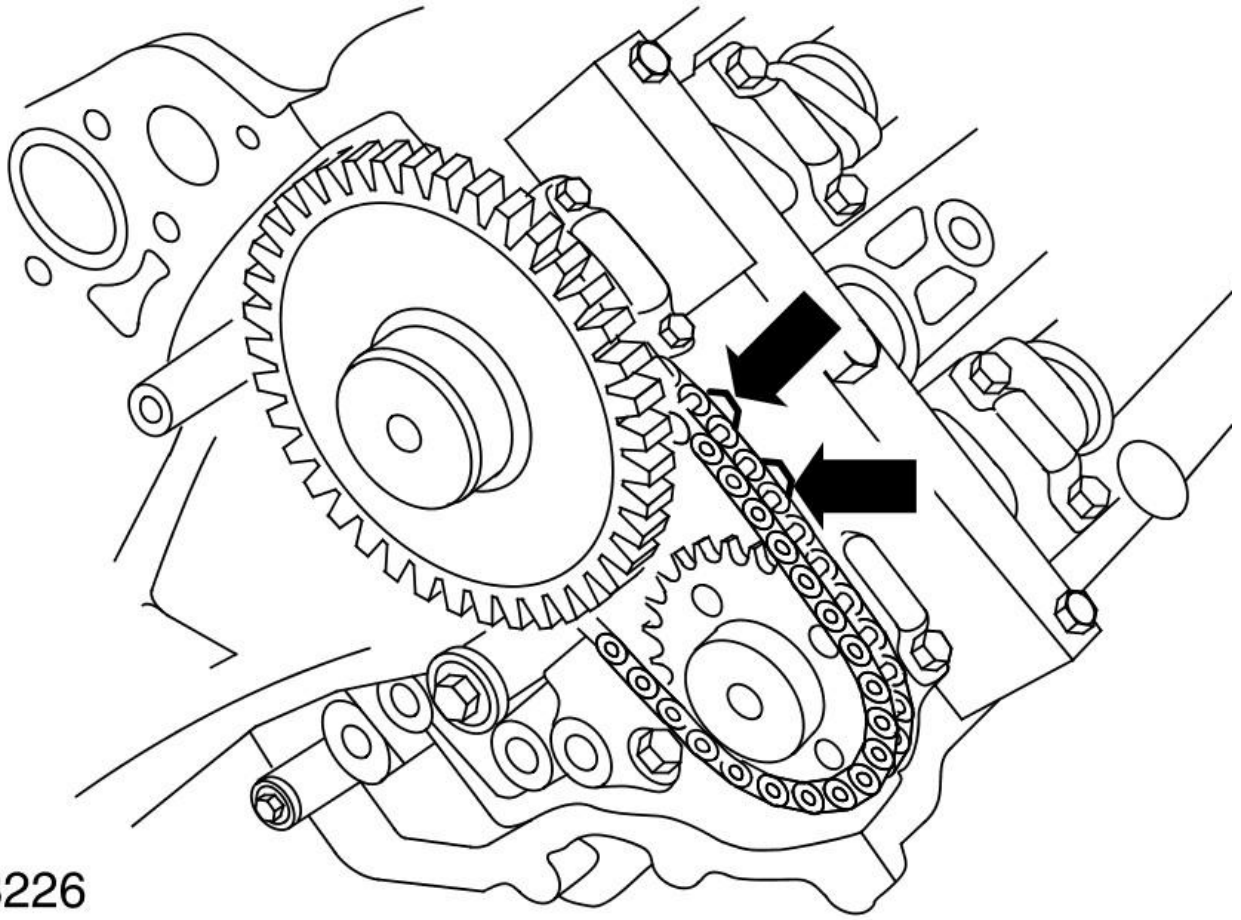
CAUTION: Discard the bolts.

15. Remove the camshaft sprockets.

- Remove the 2 bolts.

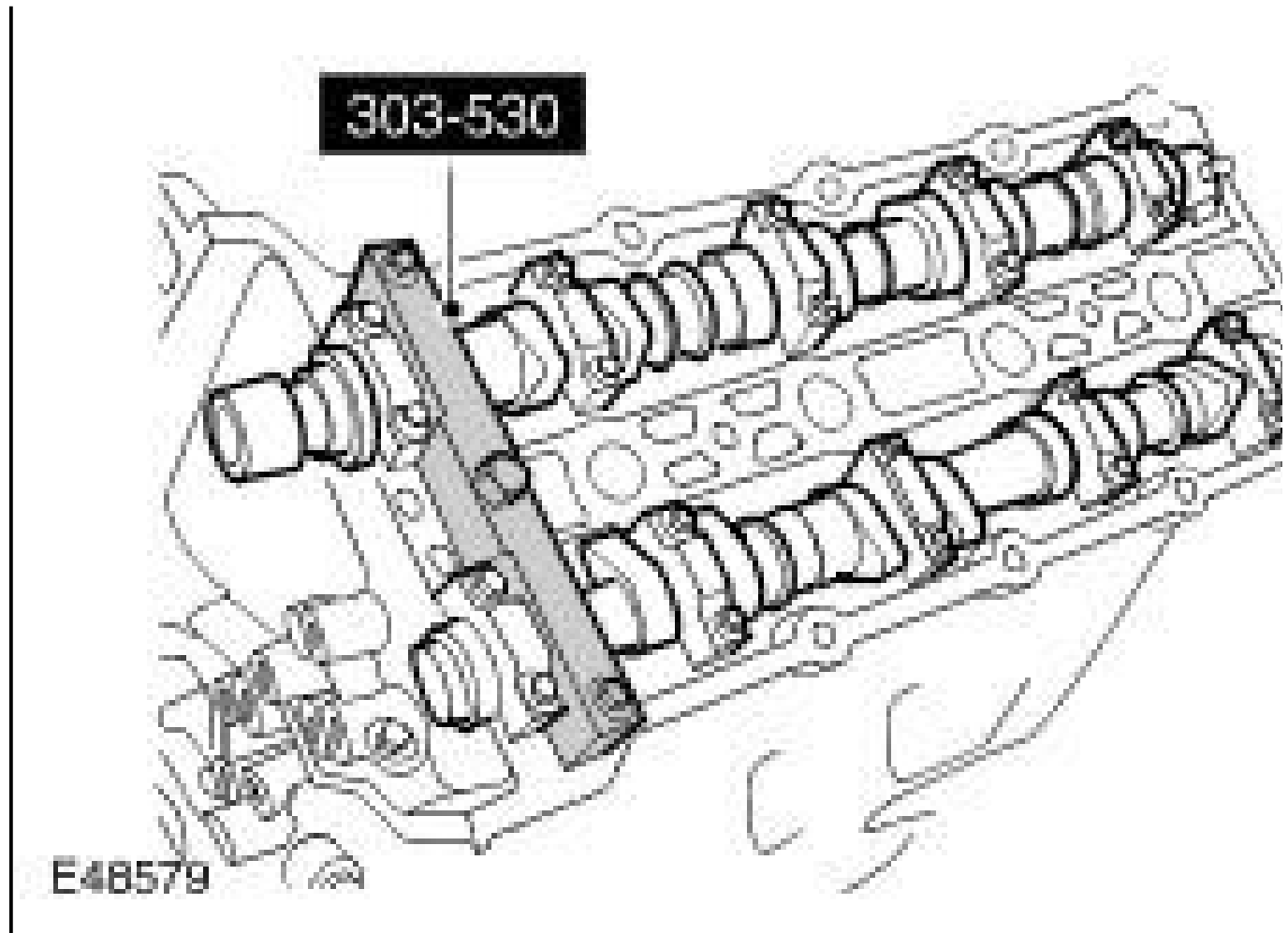


16. Remove the secondary timing chain tensioner and the secondary timing chain.
 - Remove the 2 bolts.



E58226

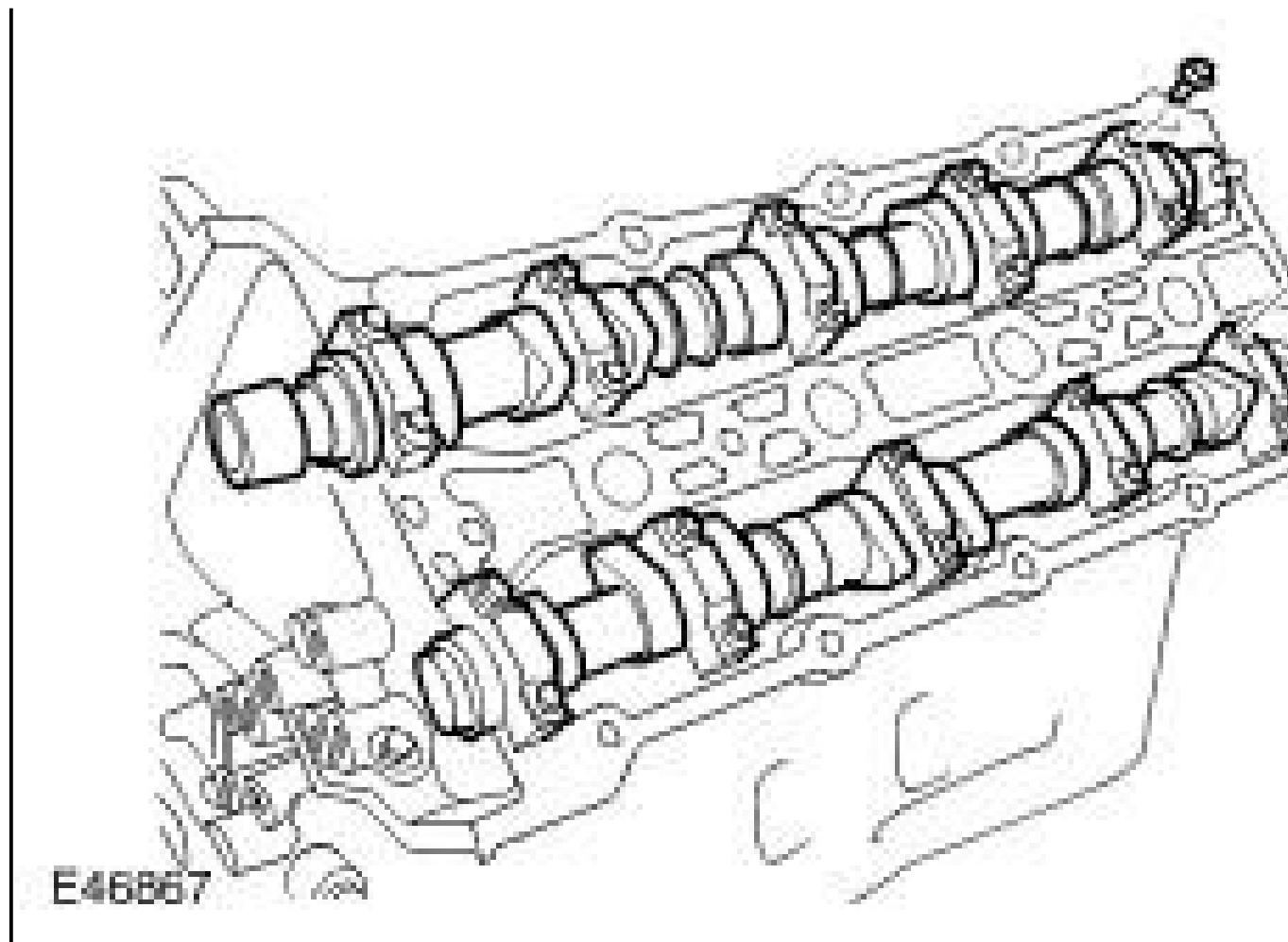
17. Remove the special tool from the LH cylinder head.
 - Remove the 3 bolts.



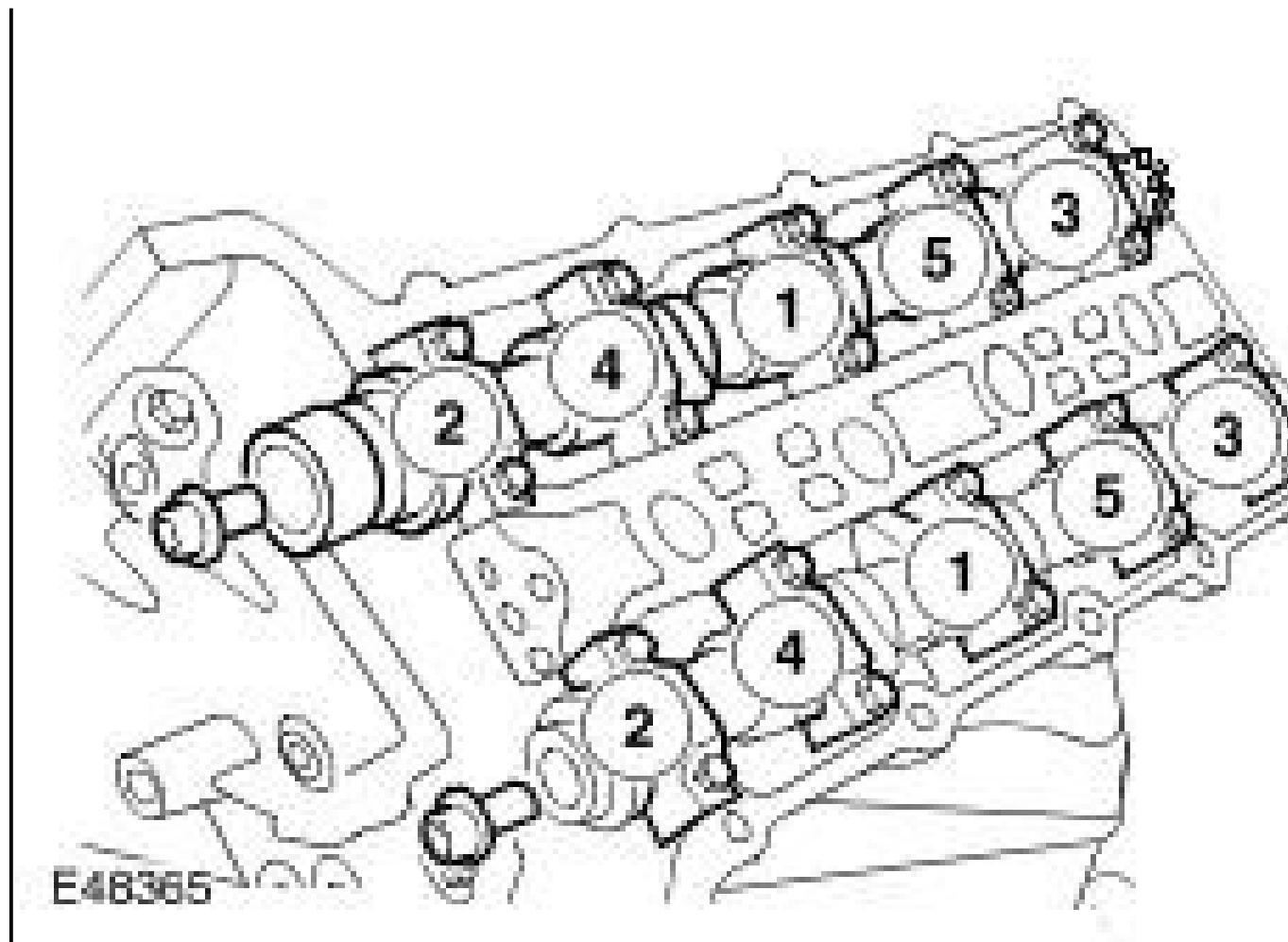
CAUTION: Evenly and progressively, release the camshaft bearing caps.

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

18. Remove the camshaft bearing caps.
 - Remove the 20 bolts.
19. Remove the camshafts.

**INSTALLATION**

1. Check and adjust the valve tappet clearances.
2. Replace the valve shims, with the smallest shim available.
 - Apply a light coat of clean engine oil to the replacement valve shims.
3. Install the camshafts.
 - Clean the component mating faces.
 - Lubricate the journals and camshaft lobes.
4. Install the camshaft bearing caps.
 - Evenly and progressively tighten the bolts in the sequence shown to 10 Nm (7 lb.ft).

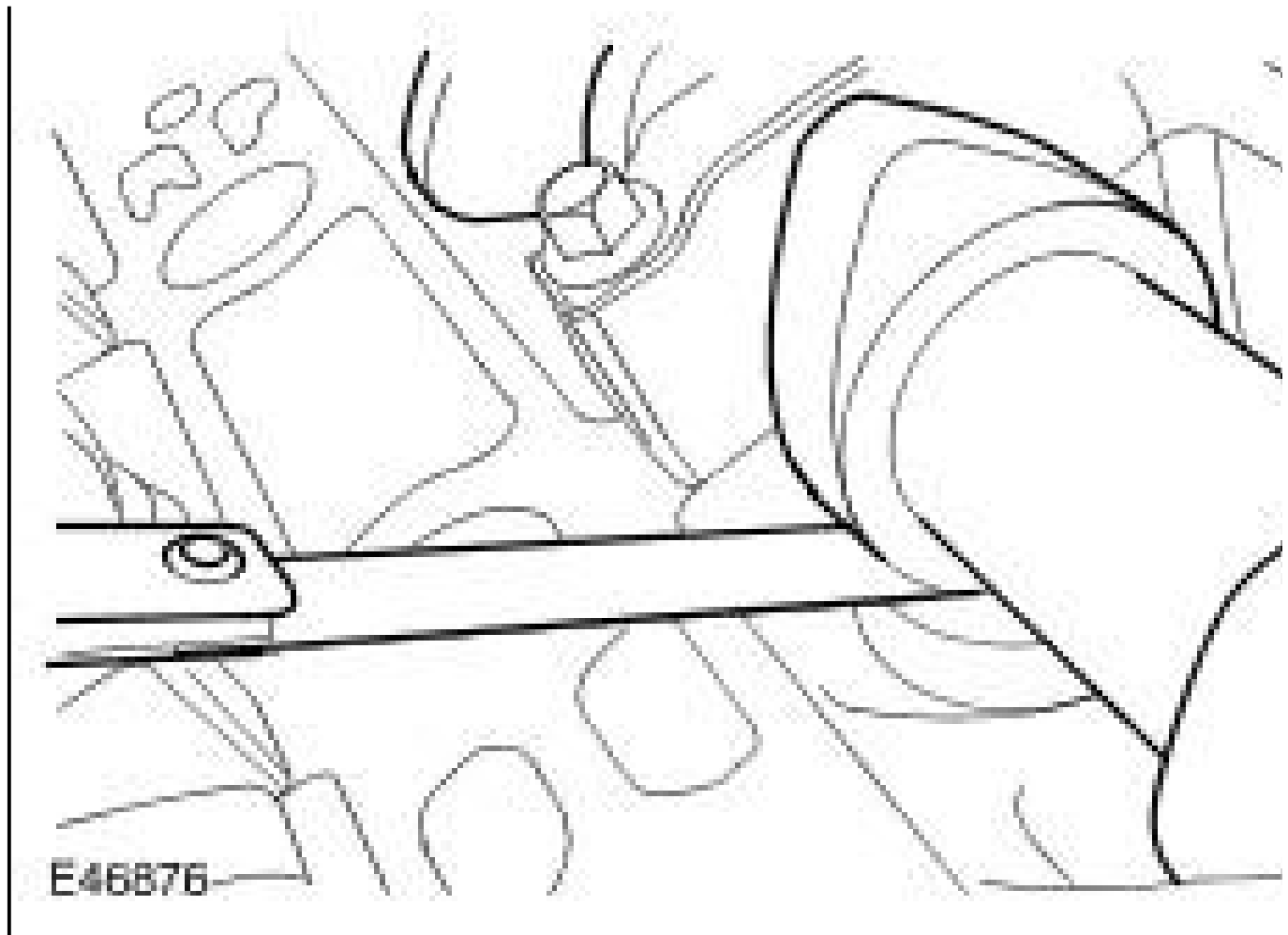


CAUTION: Make sure that new bolts are installed.

5. Install the sprocket retaining Torx bolts to the camshafts.

CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or valve clearance will be incorrect.

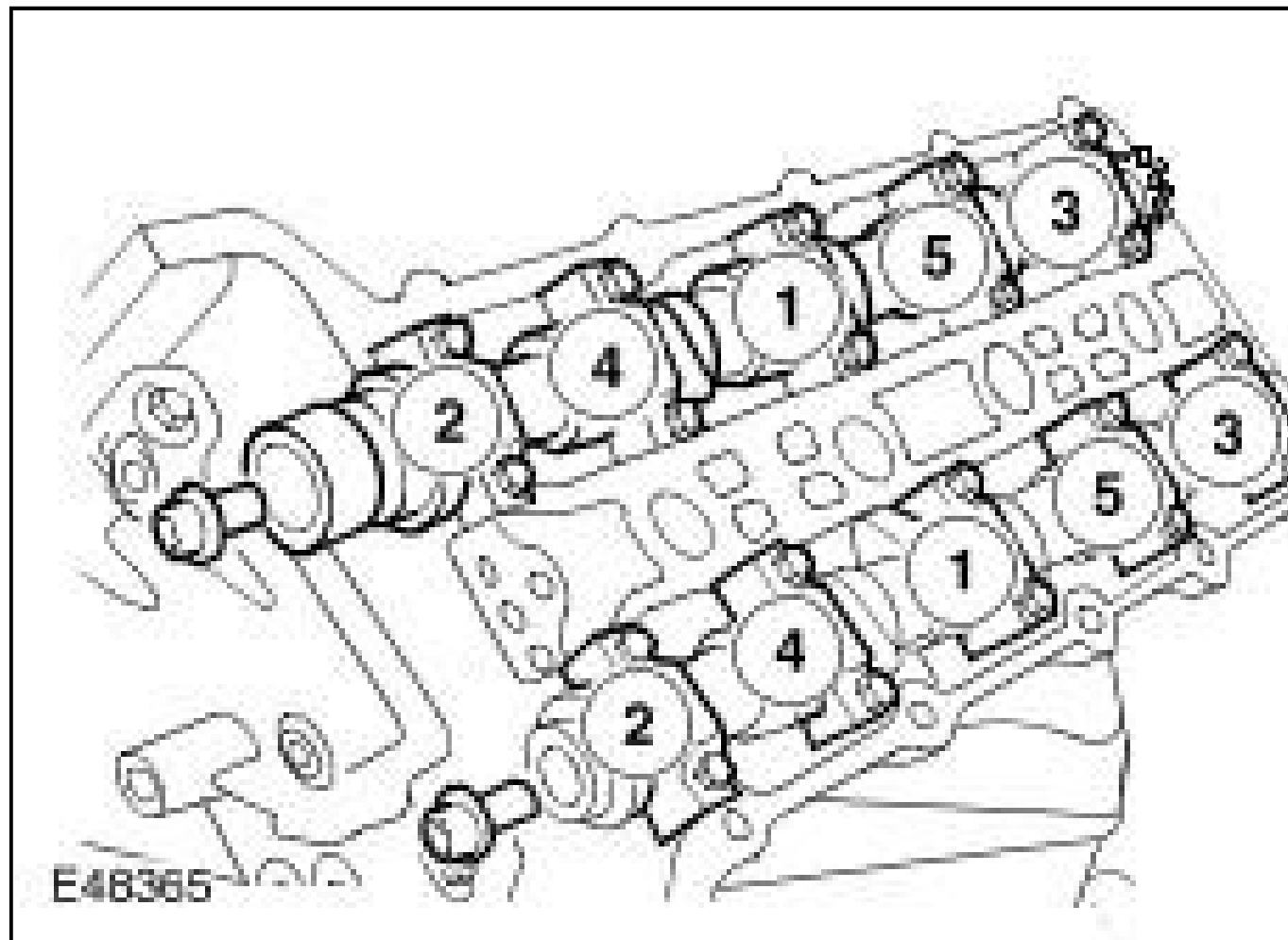
6. Measure and record the tappet clearances.
 - Rotate the camshafts using the Torx bolts.



CAUTION: Evenly and progressively, release the camshaft bearing caps.

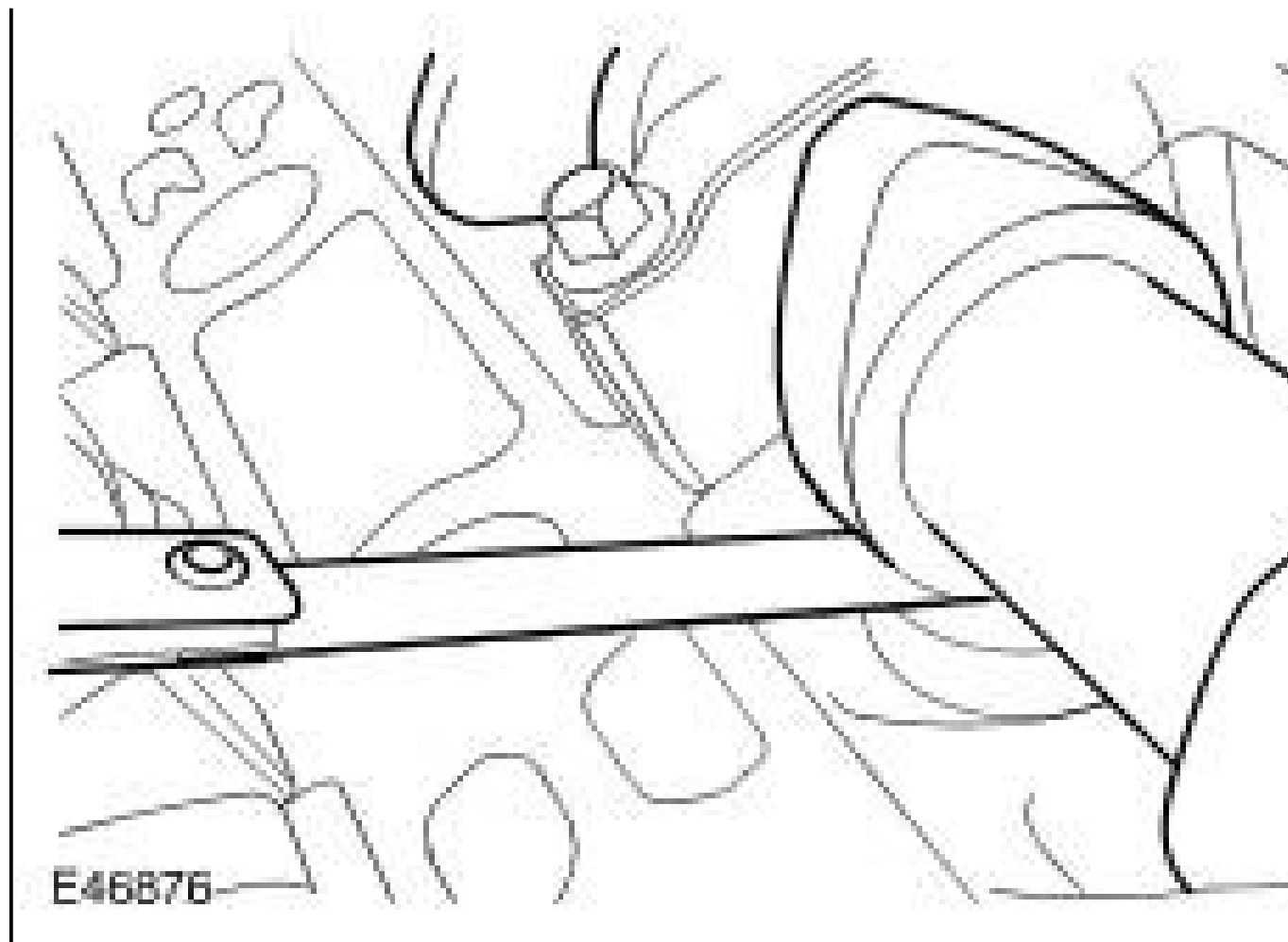
NOTE: Remove the camshaft bearing caps. Note: their position, orientation and markings. Each is marked with its position (number) and an orientation (arrow).

7. Remove the camshaft bearing caps.
 - Remove the 20 bolts.
8. Remove the camshafts.
9. Remove the valve tappets, replace with selected tappets.
10. Install the camshafts.
 - Lubricate the journals and camshaft lobes.
 - Clean the component mating faces.
11. Install the camshaft bearing caps.
 - Evenly and progressively tighten the bolts in the sequence shown to 10 Nm (7 lb.ft).

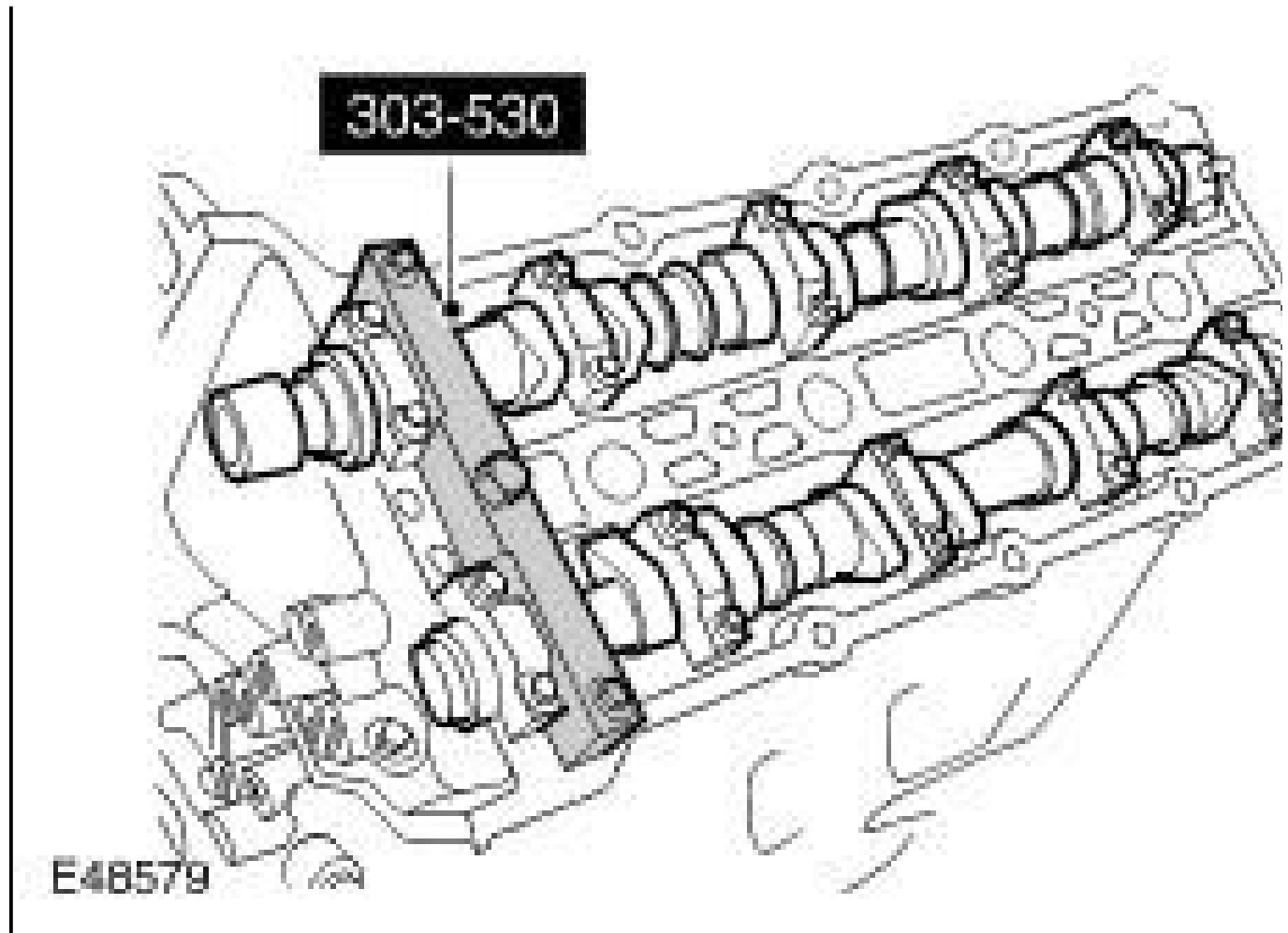


CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or valve clearance will be incorrect.

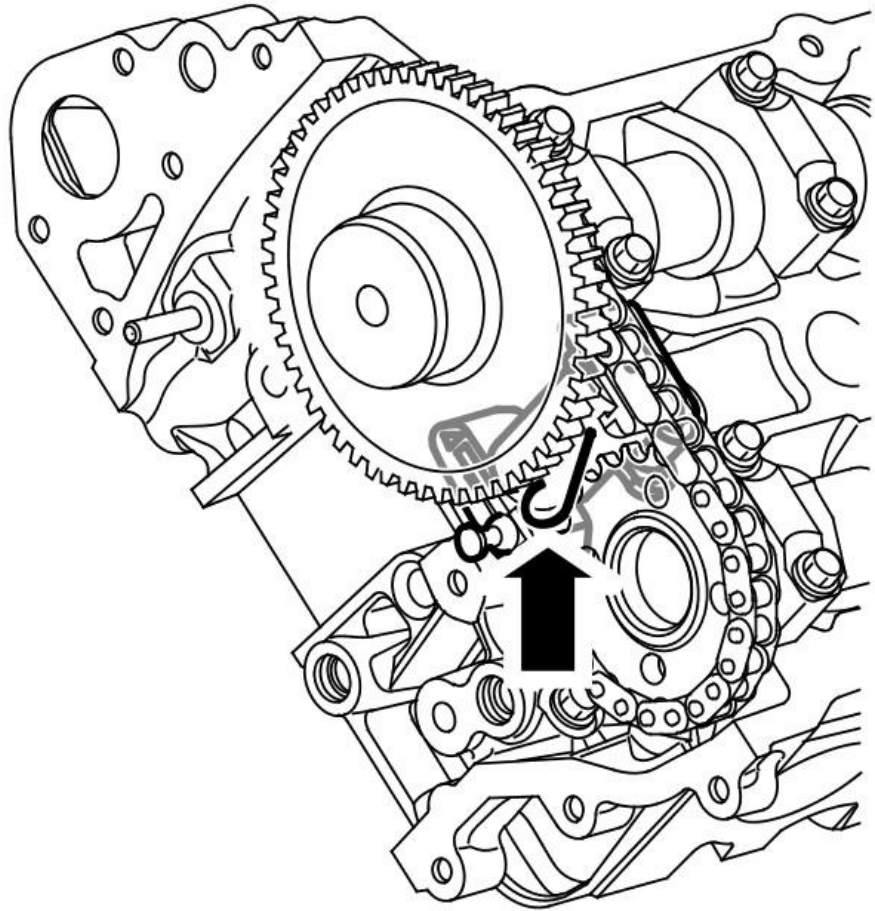
12. Check valve tappet clearances are correct.
 - Rotate the camshafts using the Torx bolts.
 - Remove the camshaft Torx bolts after the check is complete.



13. Install the special tool to the LH cylinder head.
 - Install the 3 bolts.



14. Using 1 mm diameter metal rod, retain the chain tensioner piston.



E58311

15. Install the LH secondary timing chain tensioner and chain to the camshaft sprockets.
16. Install the LH secondary timing chain tensioner retaining bolts.
 - Tighten the bolts to 12 Nm (9 lb.ft).

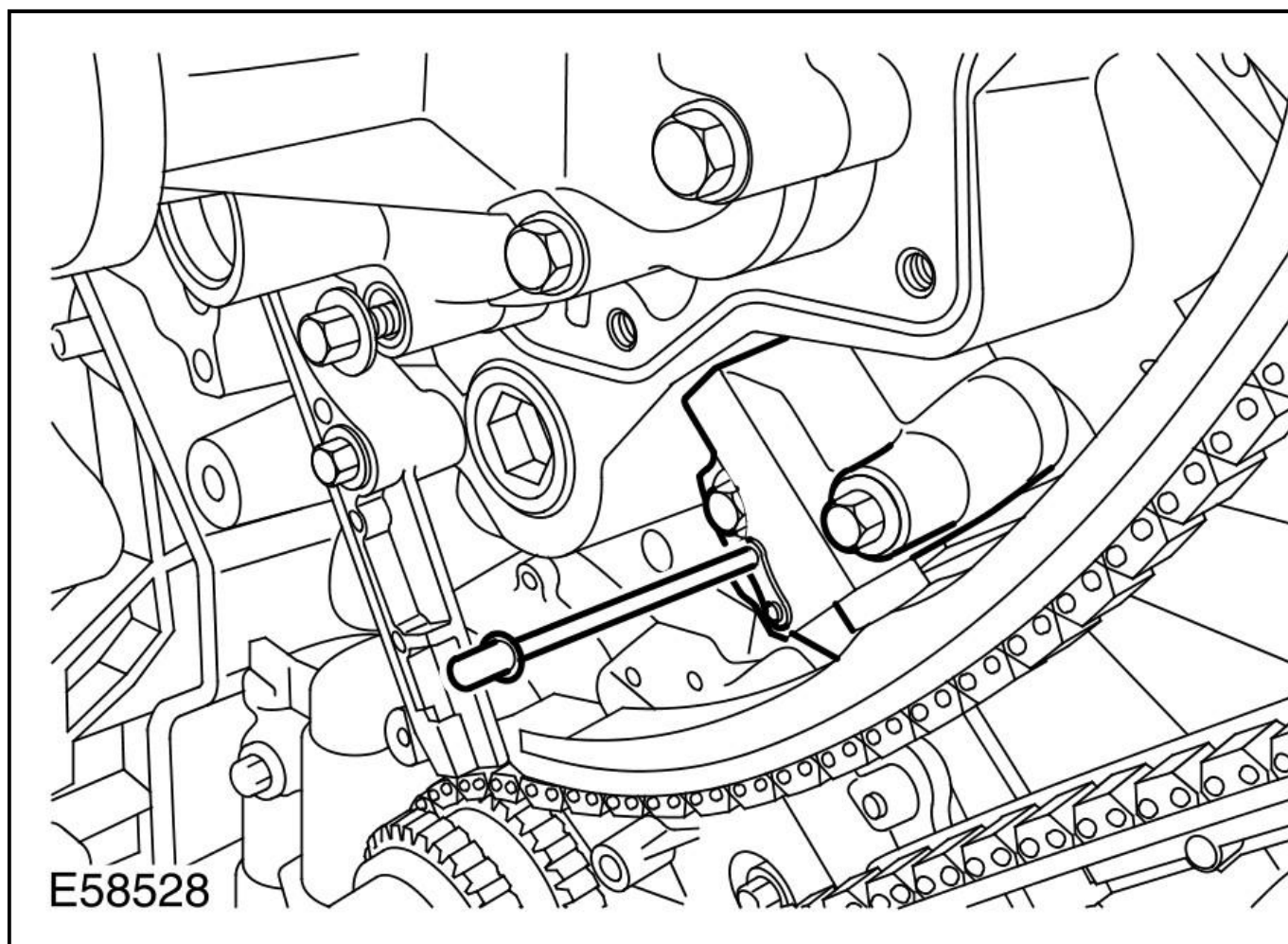
NOTE: **Lightly tighten the camshaft sprocket Torx bolts, the sprockets MUST be free to move.**

17. Install the LH secondary timing chain and sprockets to the camshafts.
 - Install the sprocket retaining Torx bolts to the camshafts.
18. Tension the secondary timing chain.
 - Remove the retaining rod.
19. Install the LH primary timing chain.
 - Make sure the timing chain slack is on the tensioner side of the timing chain.
20. Install the LH primary chain tensioner guide.
 - Tighten the stud to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

21. Install the LH primary timing chain tensioner.

- Using 3 mm diameter metal rod, retain the chain tensioner piston.
- Tighten the bolts to 12 Nm (9 lb.ft).
- Remove the retaining rod.



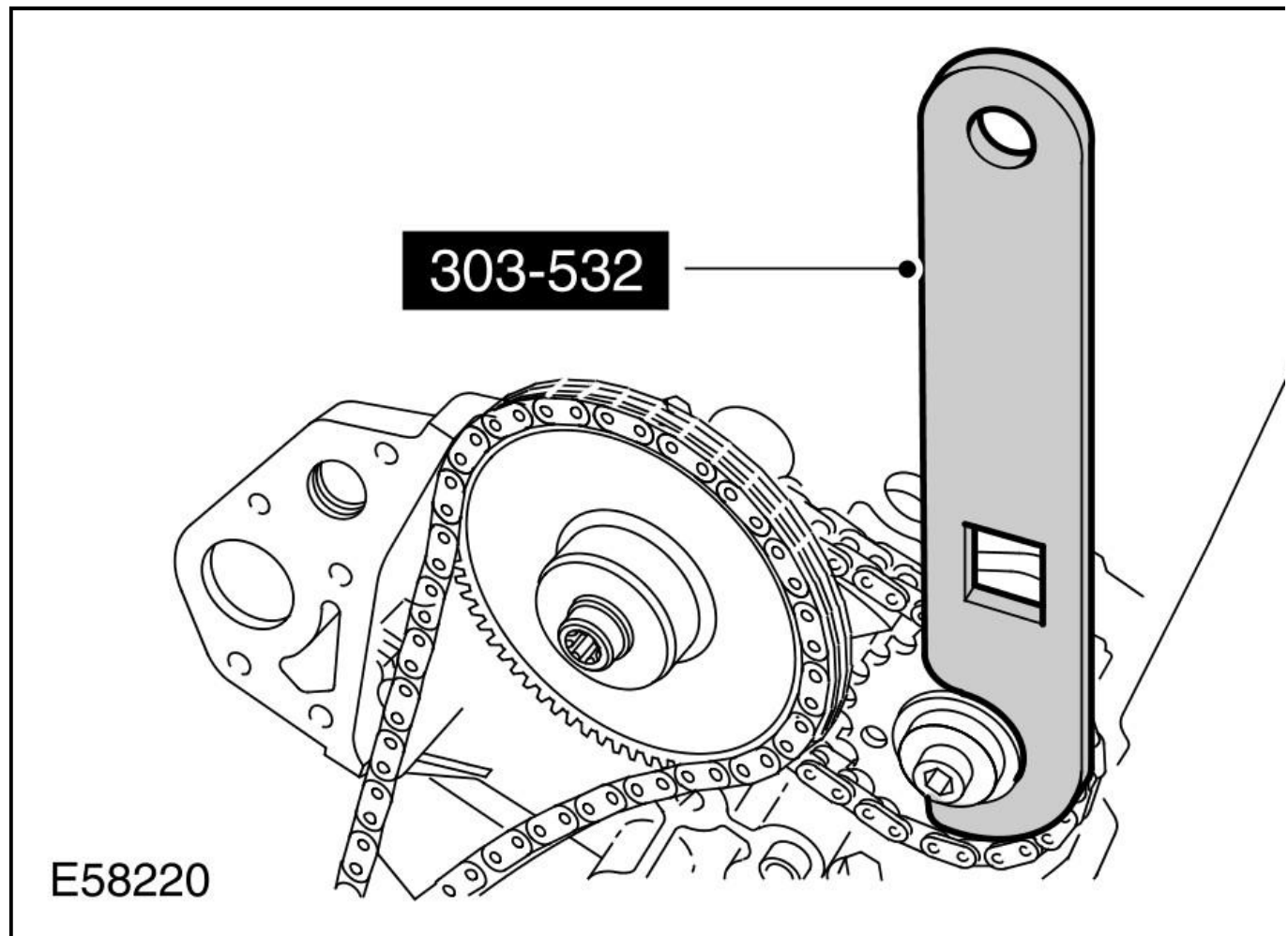
CAUTION: The intake camshaft sprocket retaining bolt **MUST** be tightened before the exhaust camshaft sprocket retaining bolt. Engine damage will occur if this procedure is not followed.

CAUTION: Using the special tool, apply force to the tool in a counter-clockwise direction, to tension the primary timing chain on its drive side.

CAUTION: Make sure that new bolts are installed.

22. Install the special tool to the exhaust camshaft sprocket.

- Tighten the intake camshaft sprocket retaining bolt to 120 Nm (88 lb.ft).
- Tighten the exhaust camshaft retaining bolt to 120 Nm (88 lb.ft).



23. Install the RH primary timing chain.

- Make sure the timing chain slack is on the tensioner side of the timing chain.

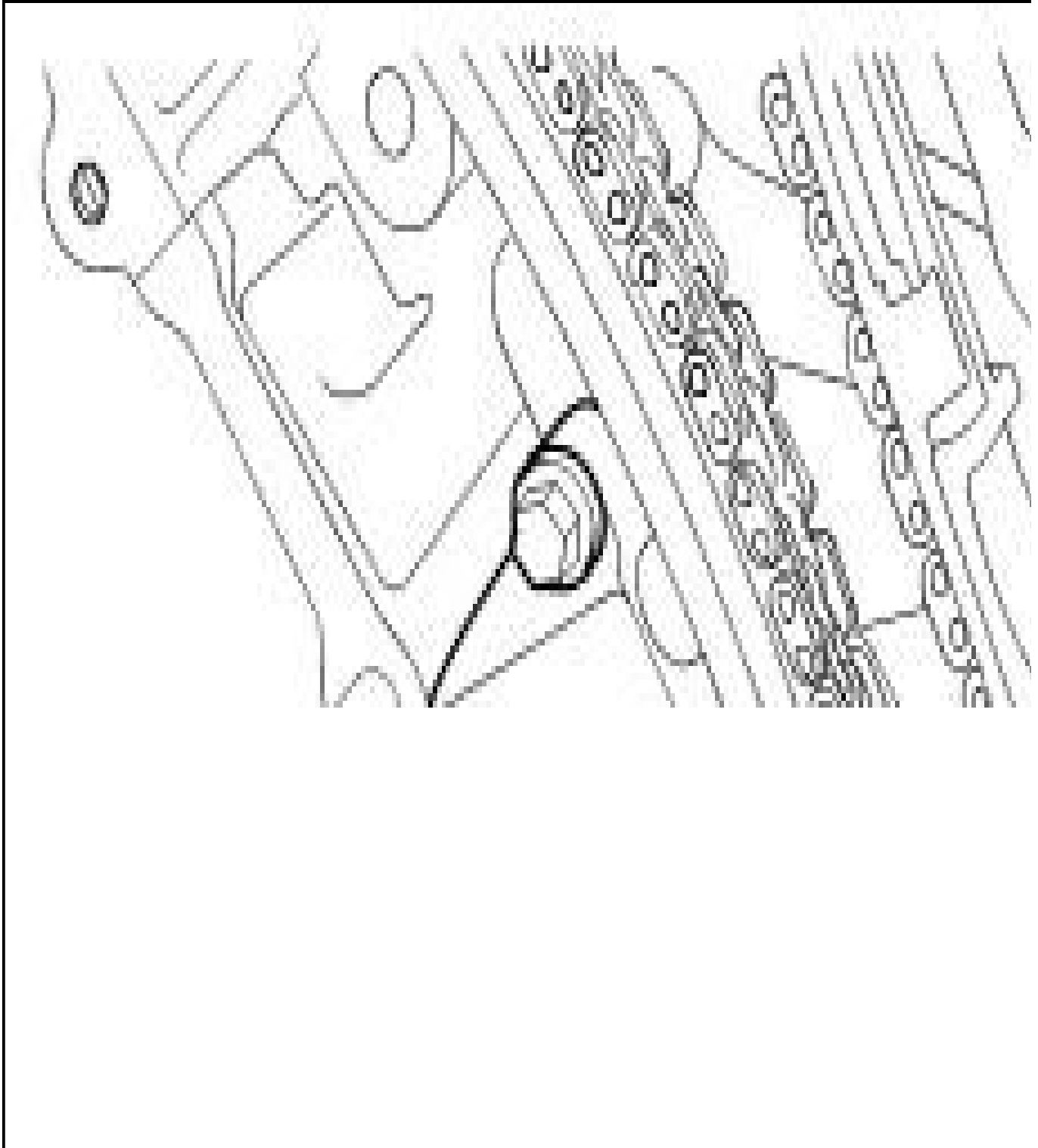
24. Install the RH primary timing chain tensioner guide.

- Tighten the bolts to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

25. Install the RH primary timing chain tensioner.

- Using 3 mm diameter metal rod, retain the chain tensioner piston.
- Tighten the bolts to 12 Nm (9 lb.ft).
- Remove the retaining rod.

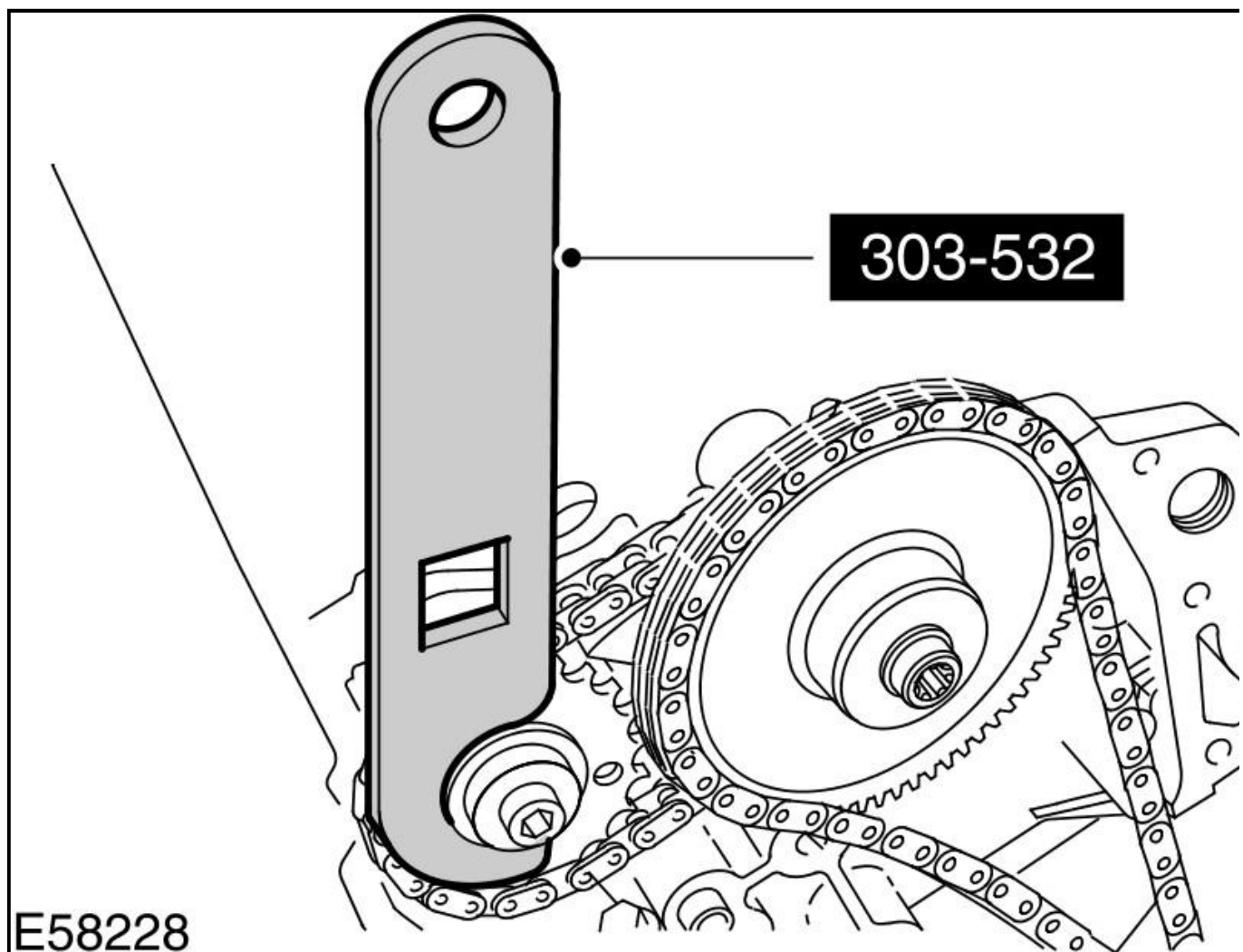


CAUTION: The intake camshaft sprocket retaining bolt **MUST** be tightened before the exhaust camshaft sprocket retaining bolt. Engine damage will occur if this procedure is not followed.

CAUTION: Using the special tool, apply force to the tool in a counter-clockwise direction, to tension the primary timing chain on its drive side.

26. Install the special tool to the exhaust camshaft sprocket.

- Tighten the intake camshaft sprocket retaining bolt to 120 Nm (88 lb.ft).
- Tighten the exhaust camshaft retaining bolt to 120 Nm (88 lb.ft).



27. Remove the special tool from the LH cylinder head.

- Remove the 3 bolts.

28. Remove the special tool from the RH cylinder head.

- Remove the 3 bolts.

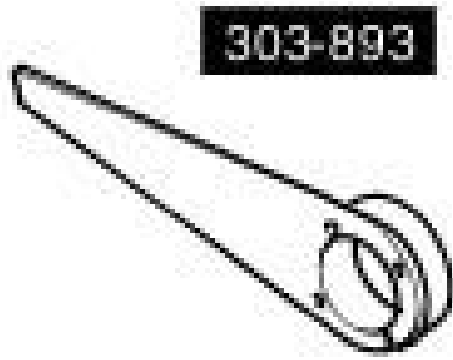
29. Remove the crankshaft locking tool.
- Remove the screw.
30. Install the CKP sensor. Refer to **CRANKSHAFT POSITION (CKP) SENSOR**.

NOTE: Before installing the valve covers, check the valve clearances.

31. Install the engine front cover. Refer to **ENGINE FRONT COVER**.
32. Connect the battery ground cable. Refer to **SPECIFICATIONS**.

CRANKSHAFT PULLEY

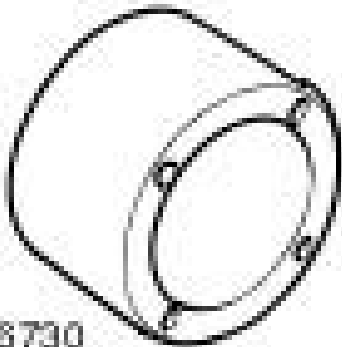
SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
 303-588 E46729	Remover, crankshaft pulley	303-588
 303-893 E46728	Holding Tool Crankshaft Pulley	303-893(LRT-12-080)
	Adapter	303-191-03

2006 Land Rover Range Rover HSE

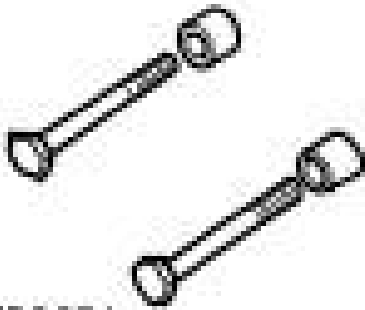
ENGINE Engine (4.2L)

303-191-03



E46730

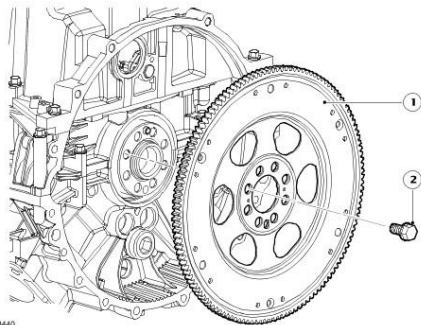
303-191-04



E59251

Bolts and spacers

303-191-04



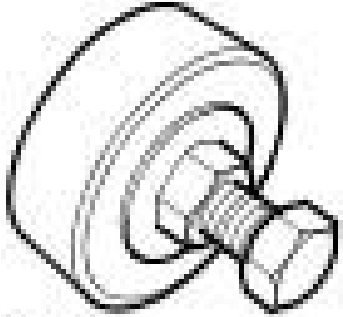
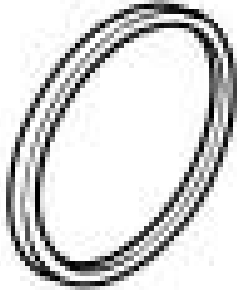
E43440

Remover, crankshaft seal

303-D121

Installer, crankshaft seal

303-1100

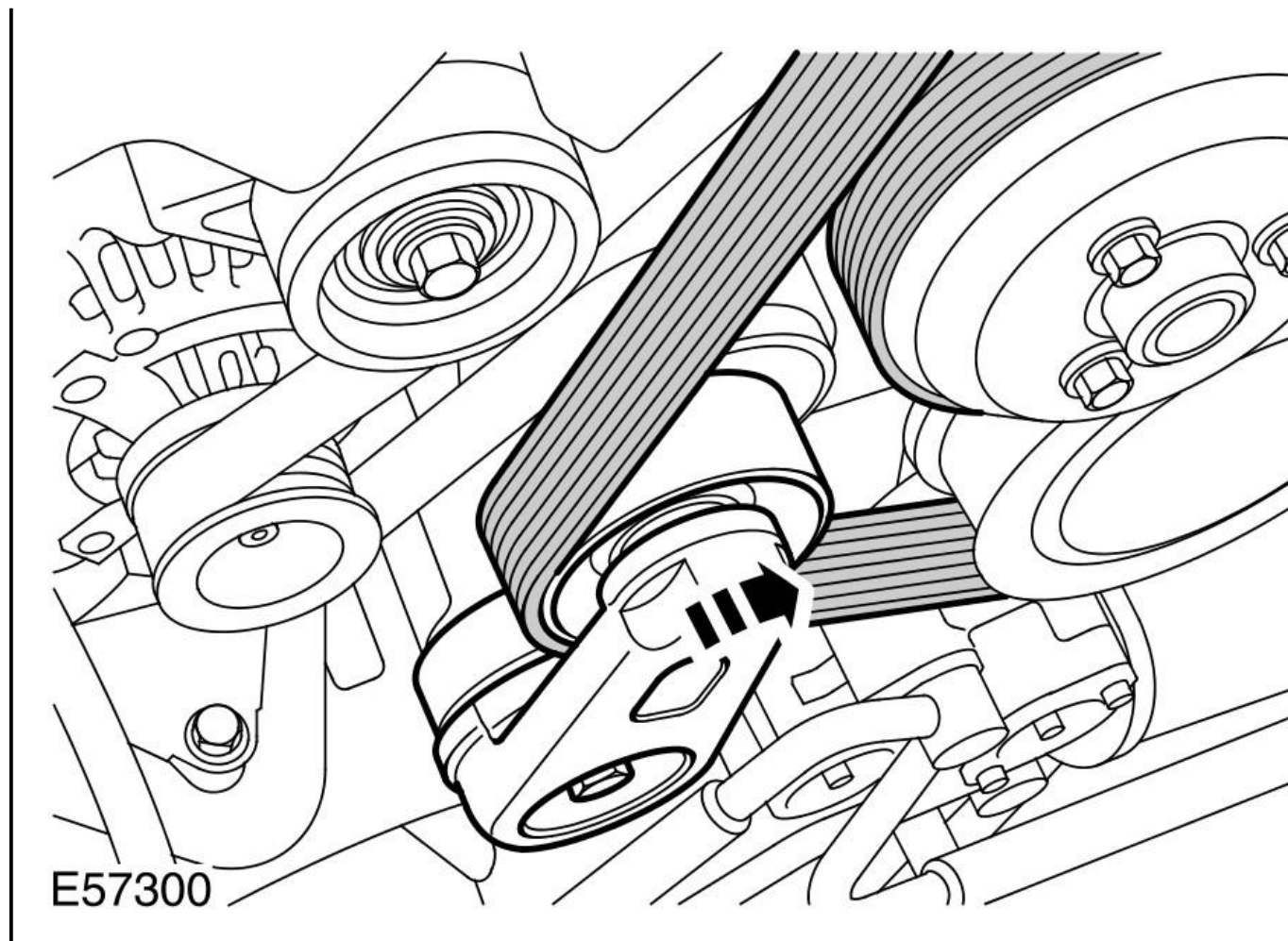
 303-1100 E46732		
 303-1100-01 E67144	Adapter - Crankshaft seal installer	303-1100-01

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

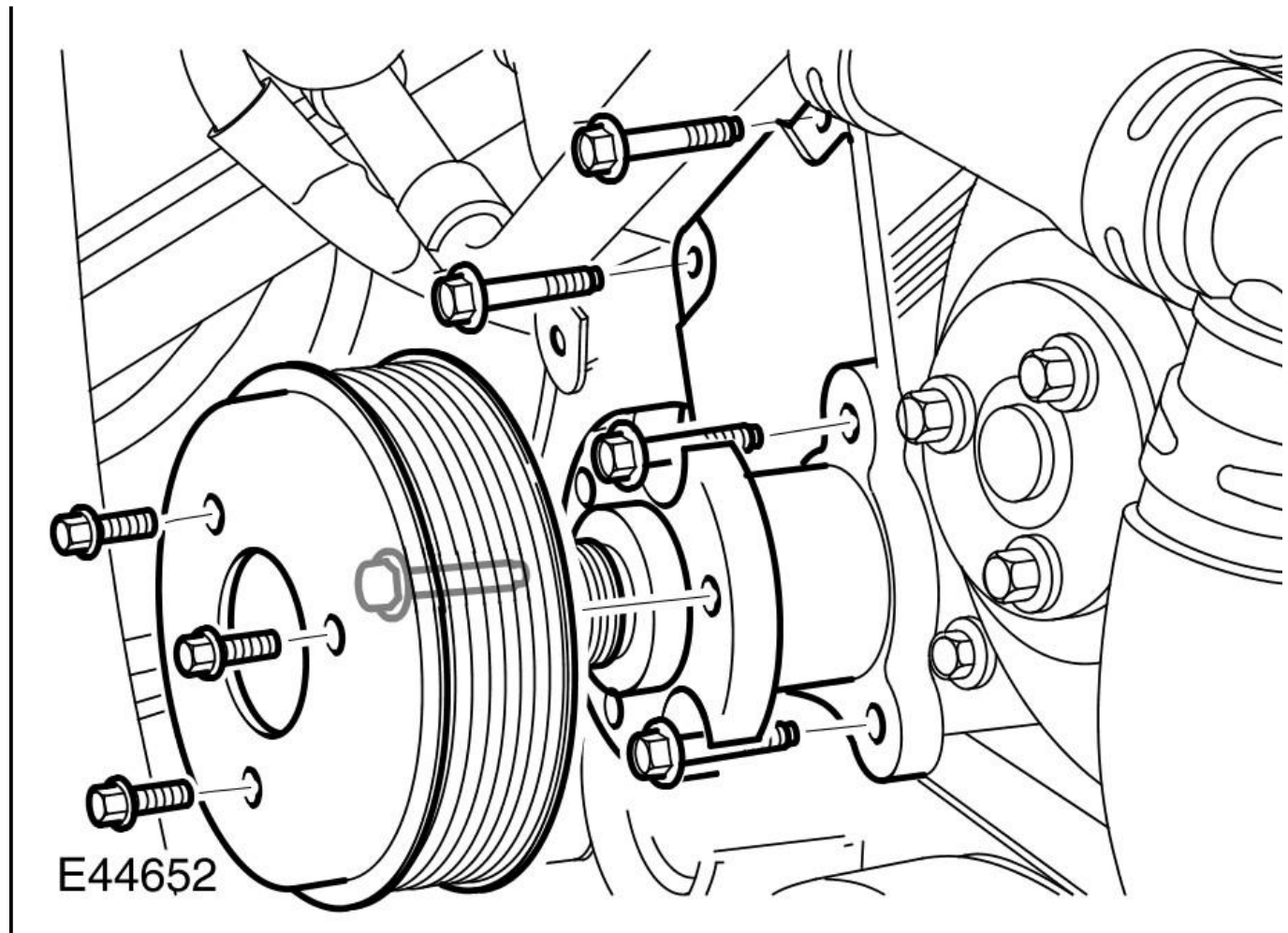
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the cooling fan. Refer to **COOLING FAN** .
4. Remove the cooling fan belt.
 - Note the fitted position.
 - Rotate the cooling fan belt tensioner clockwise.
 - Loosen the cooling fan belt tensioner bolt to aid the removal of the belt.

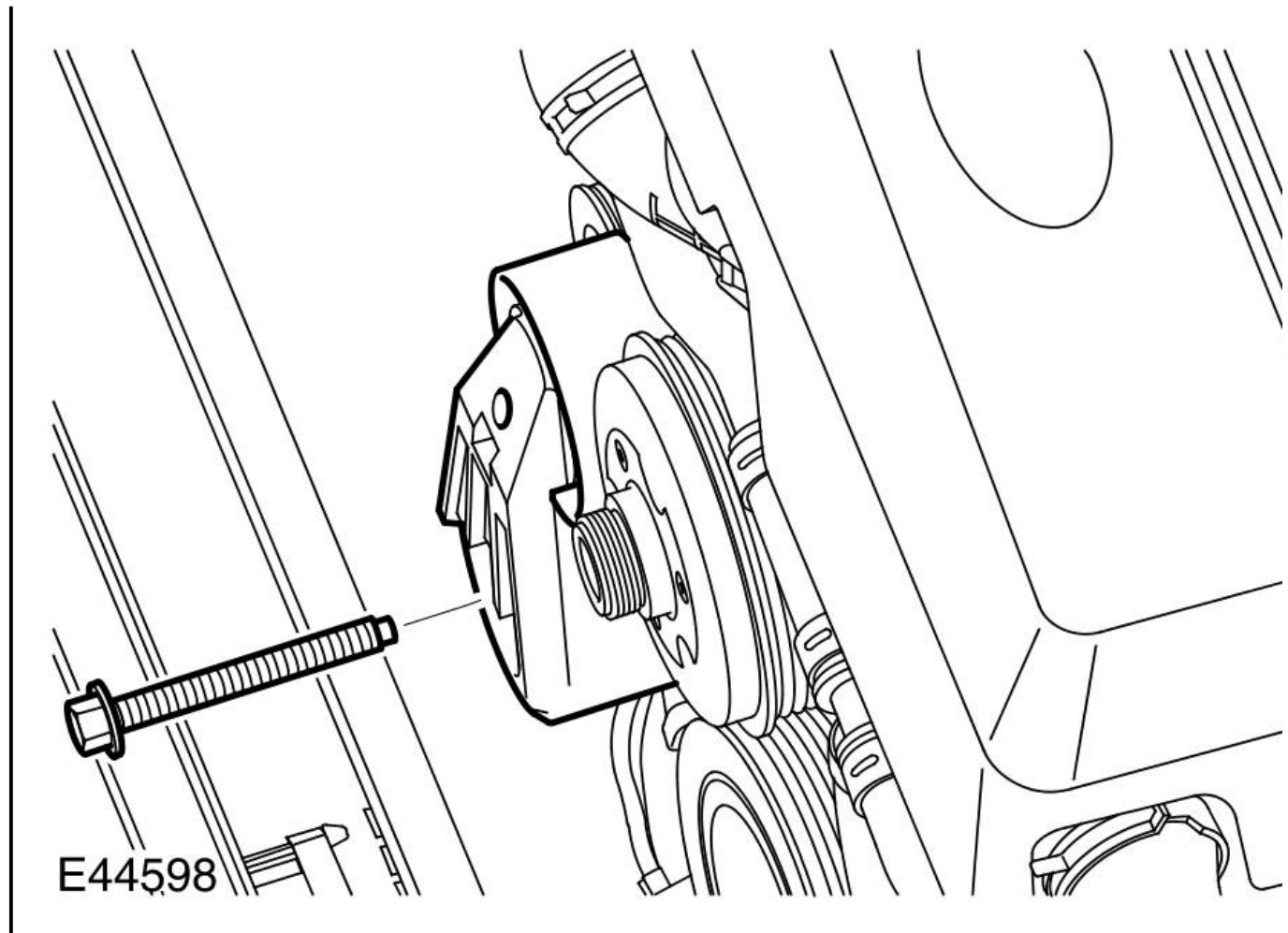


NOTE: Restrain the pulley to aid the removal of the bolts.

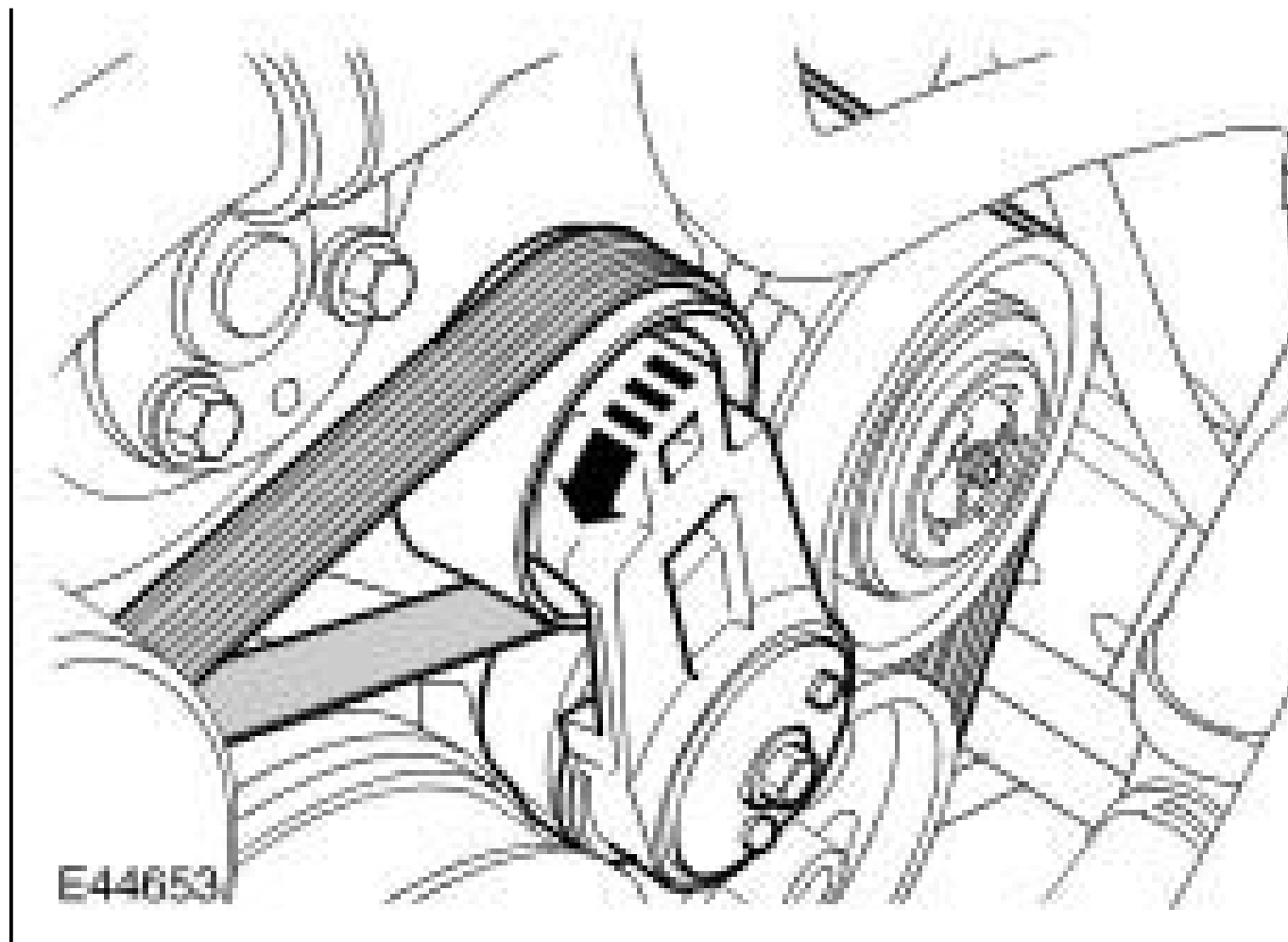
5. Remove the cooling fan pulley.
 - Remove the 3 bolts.
6. Remove the cooling fan drive hub bearing.
 - Remove the 5 bolts.



7. Remove the cooling fan belt tensioner.
 - Remove the bolt.



8. Release the accessory drive belt.
 - Rotate the accessory drive belt tensioner counter-clockwise, using a 3/8 " drive wrench.

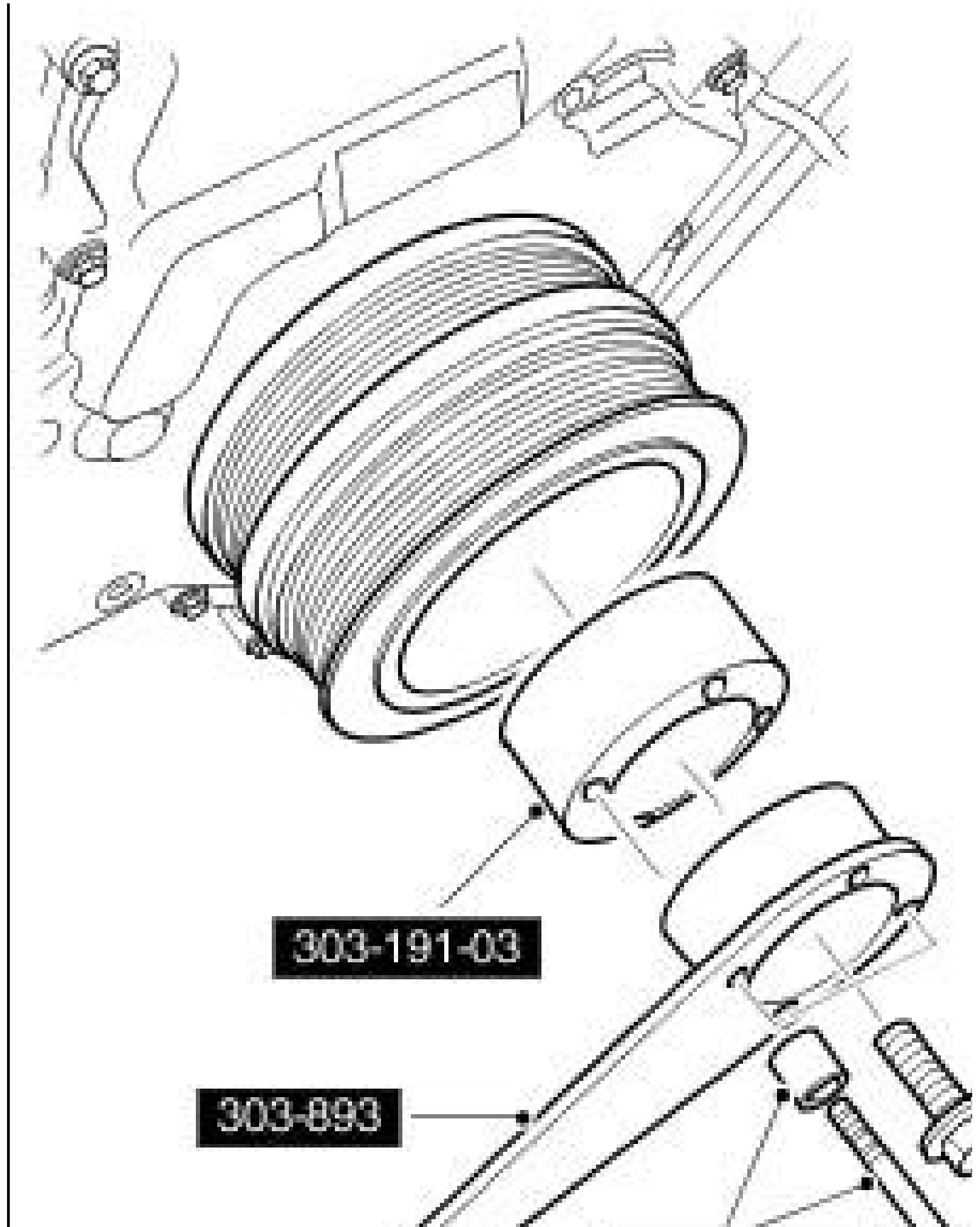


NOTE: Note the fitted position.

9. Remove the accessory drive belt.

CAUTION: Under no circumstances should the crankshaft setting peg, 303-645, be used in the following operations, to restrain the crankshaft.

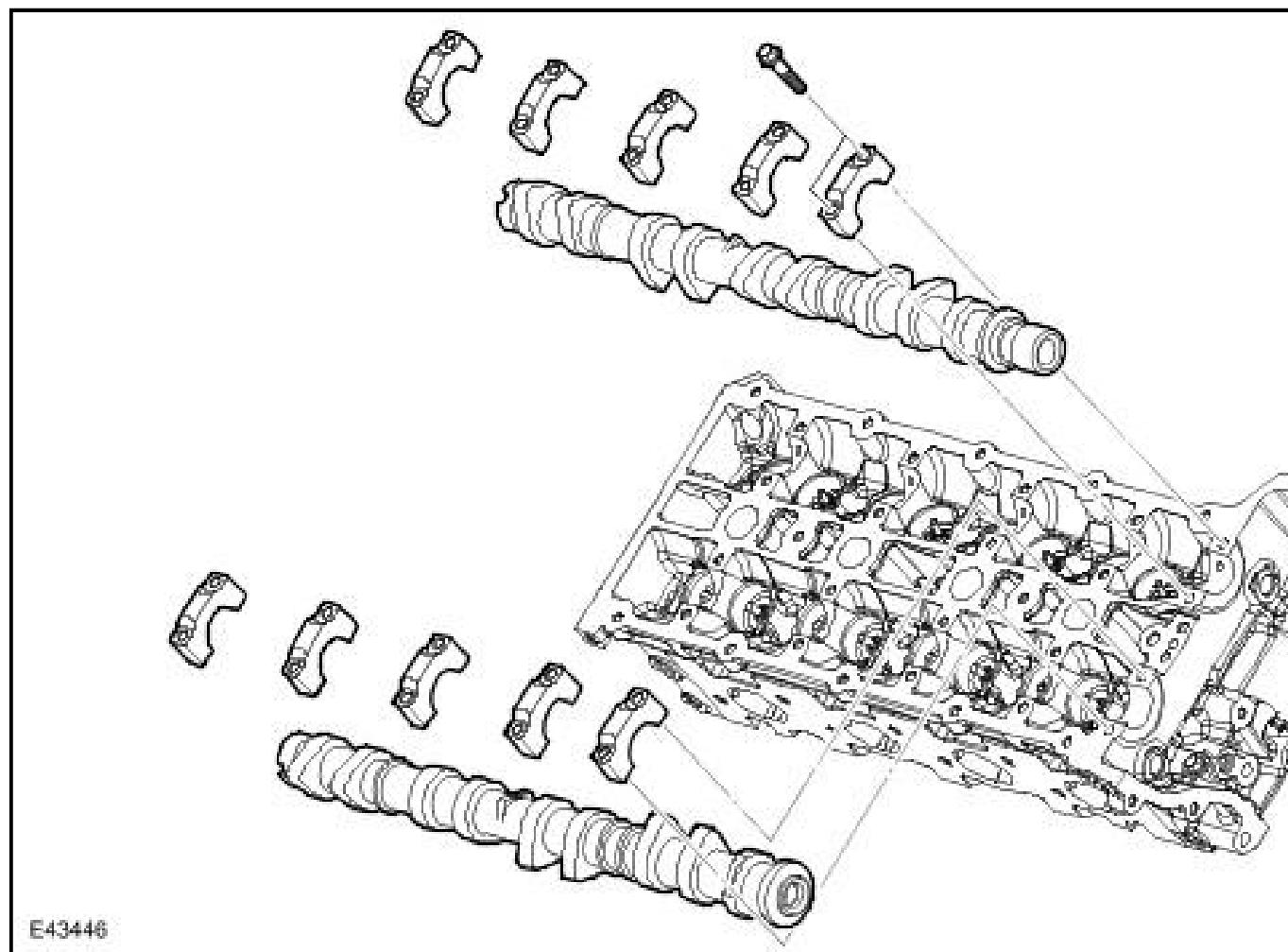
10. Using the special tools, retain the crankshaft pulley.



NOTE: The crankshaft pulley retaining bolt will be very tight.

11. Remove the crankshaft pulley retaining bolt.

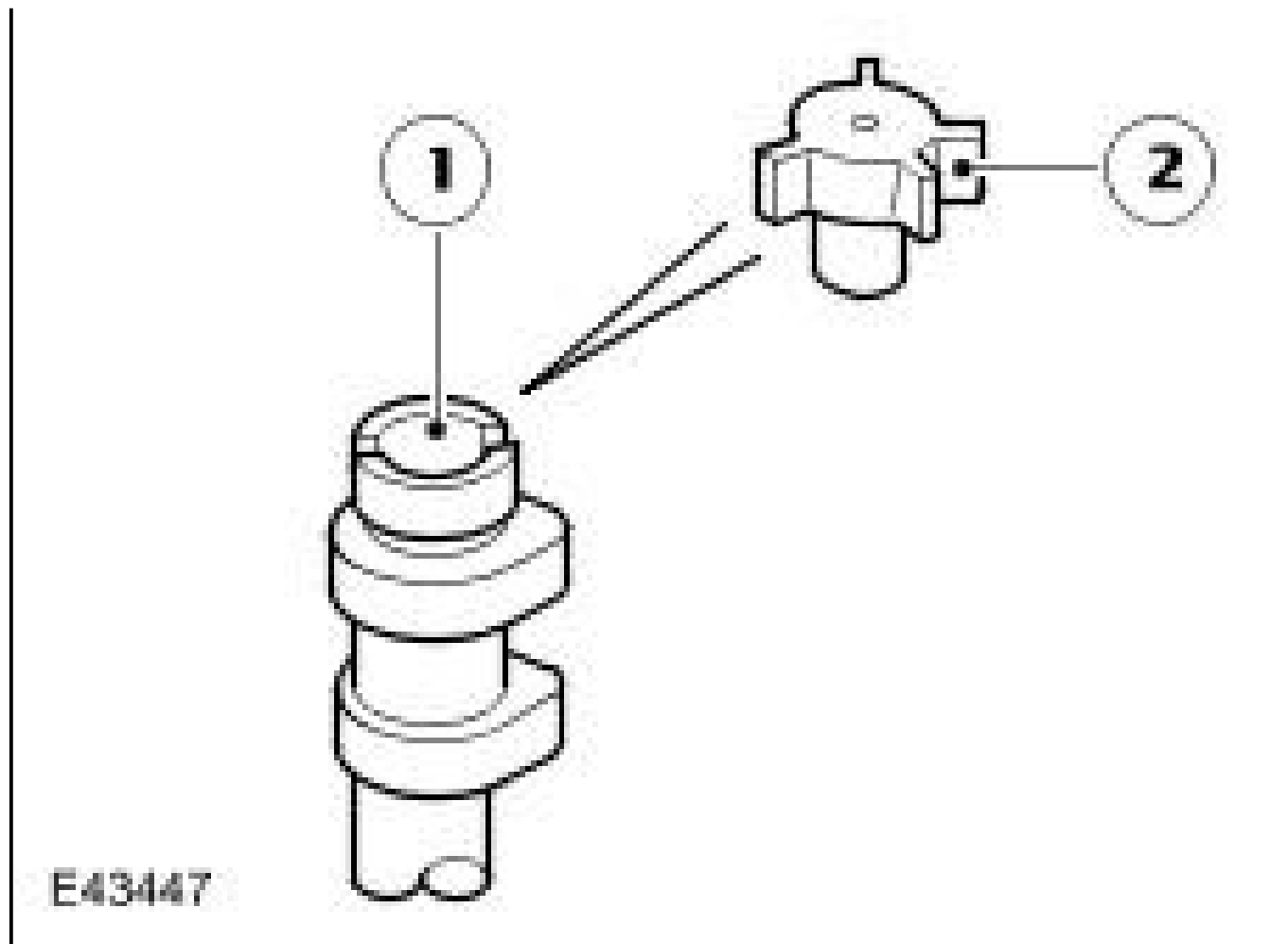
- Discard the bolt.
- Remove the special tools.



NOTE: The crankshaft pulley will be very tight.

12. Using the special tools, remove the crankshaft pulley.

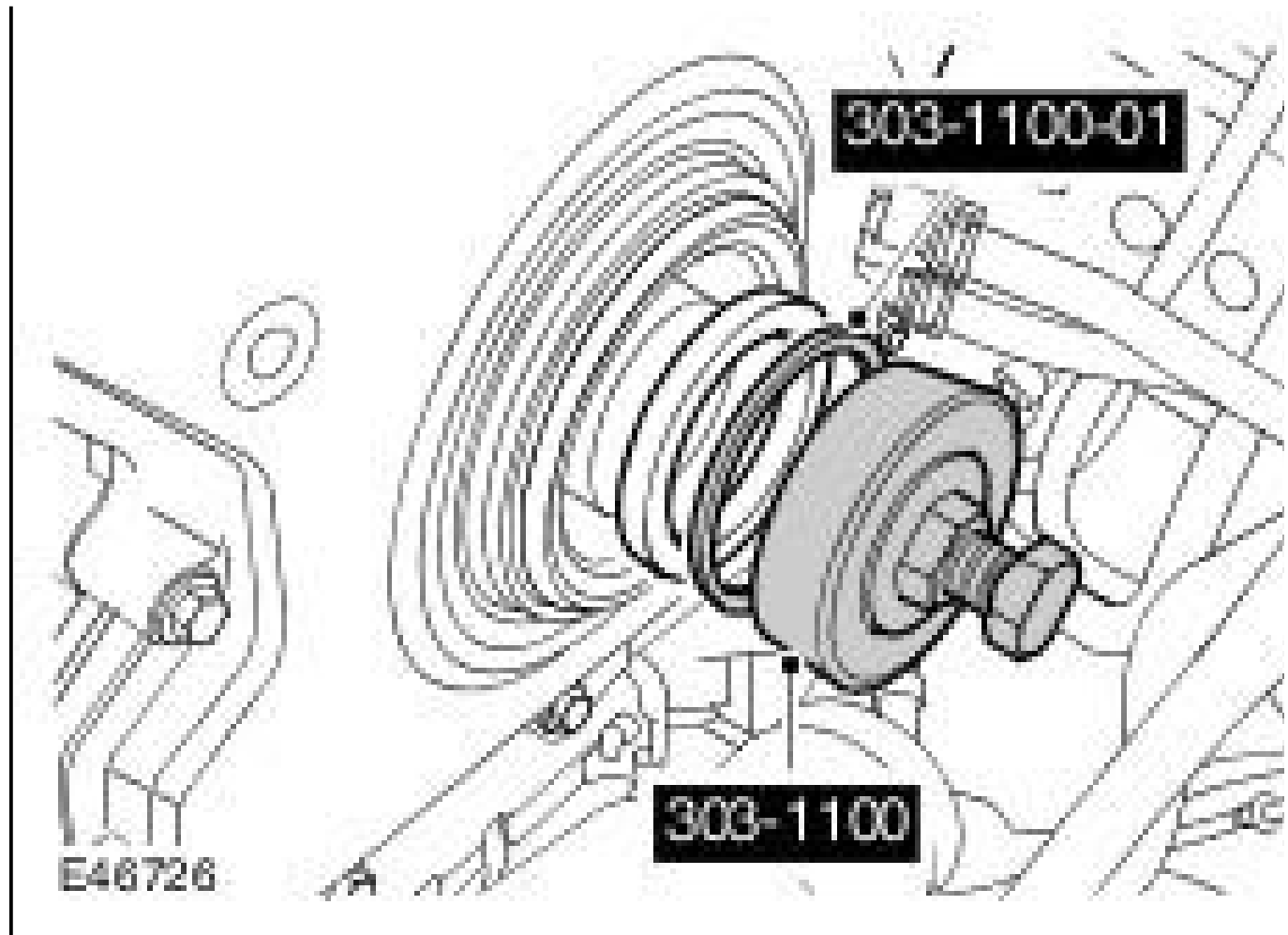
- Collect the locking ring.
- Remove the special tools.



13. Using the special tool, remove and discard the crankshaft front seal.
14. Check the crankshaft damper pulley and locking ring for damage.

INSTALLATION

1. Clean all the crankshaft pulley mating faces.
2. Using the special tools, install the crankshaft front seal.
 - Lubricate the seal with clean engine oil.
 - Use the discarded crankshaft bolt with the special tool.
 - Remove the special tools.



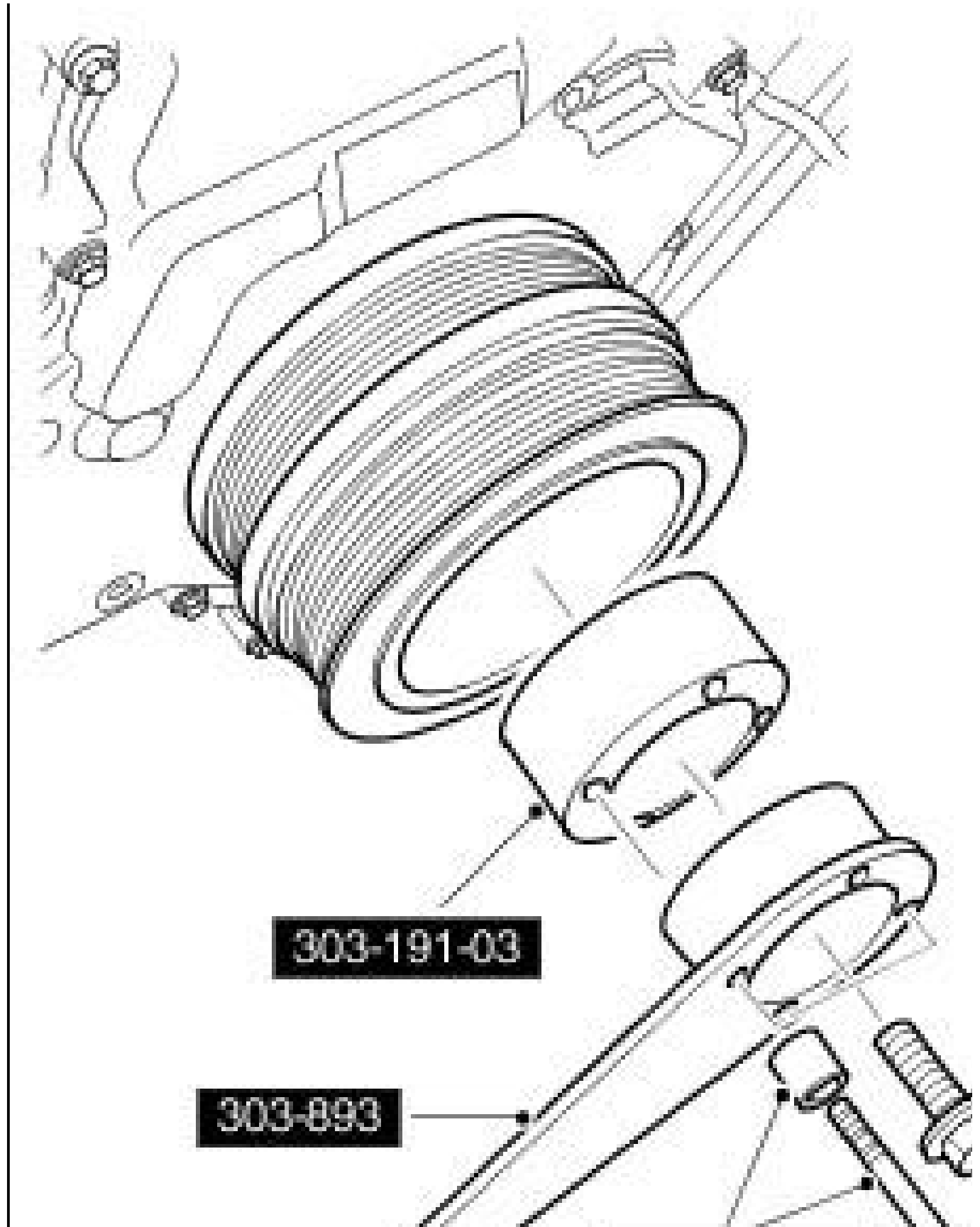
3. Install the crankshaft pulley.
 - Lubricate the seal with clean engine oil.
4. Install the crankshaft pulley locking ring.

CAUTION: The screw thread in the crankshaft pulley must be cleaned out before installing a new crankshaft pulley bolt.

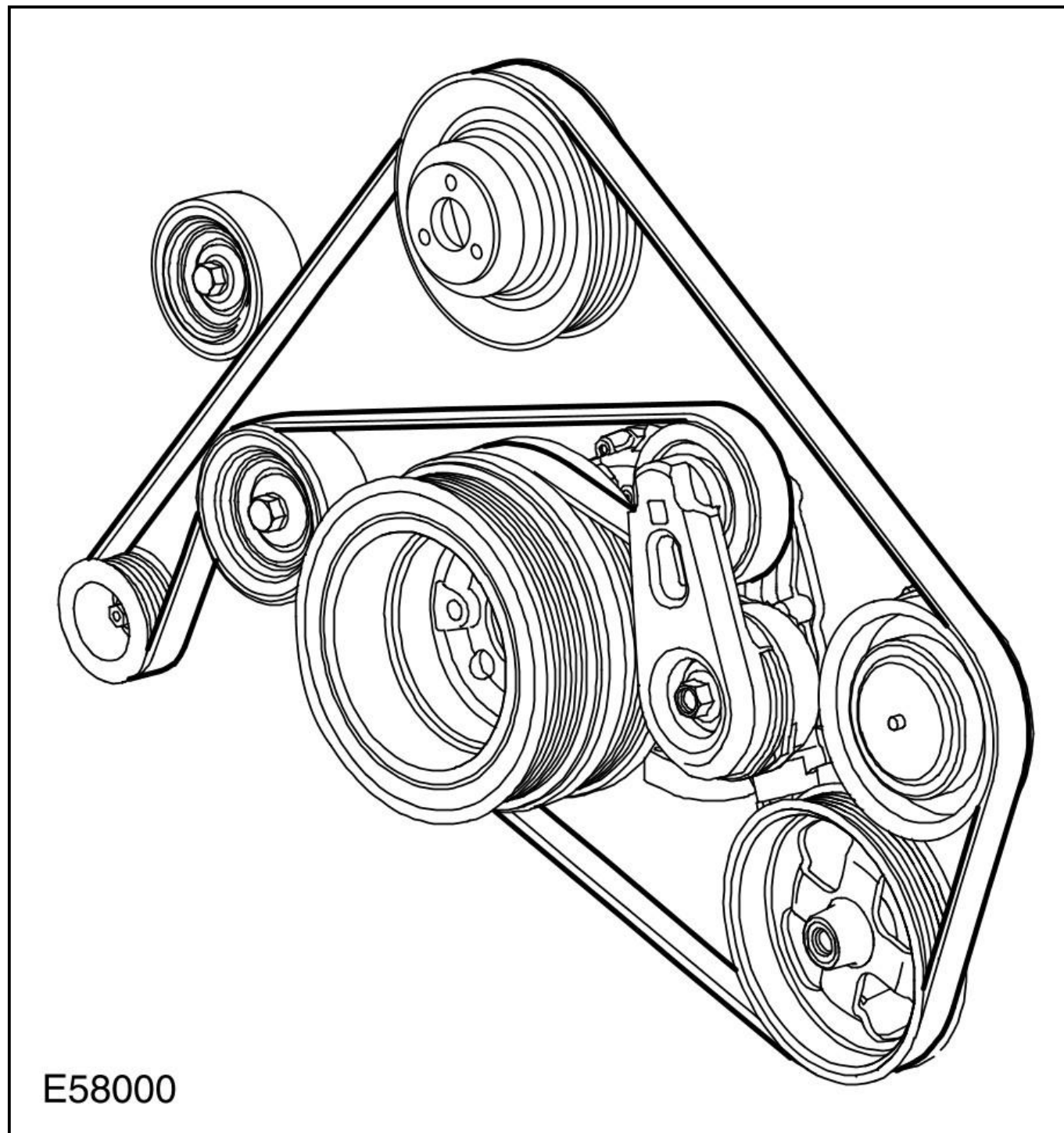
5. Install, but do not tighten, the new crankshaft pulley bolt.

CAUTION: Under no circumstances should the crankshaft setting peg, 303-645, be used in the following operations, to restrain the crankshaft.

6. Using the special tools, retain the crankshaft pulley.
 - Tighten the crankshaft pulley bolt to 380 Nm (280 lb.ft).
 - Remove the special tools.



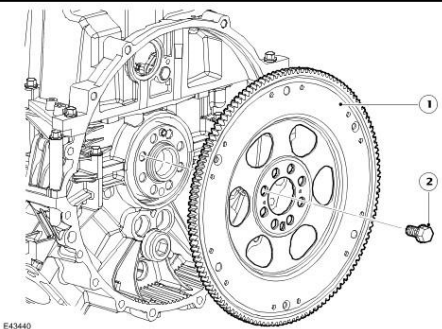
7. Install the accessory drive belt.



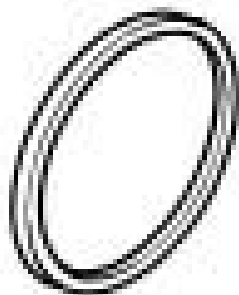
8. Install the cooling fan belt tensioner.
 - Tighten the bolt to 40 Nm (30 lb.ft).
9. Install the cooling fan drive hub bearing.

- Tighten the bolts to 10 Nm (7 lb.ft).
10. Install the cooling fan pulley.
 - Tighten the bolts evenly to 25 Nm (18 lb.ft).
 11. Install the cooling fan belt.
 - Tighten the cooling fan belt tensioner bolt to 40 Nm (30 lb.ft).
 - Rotate the cooling fan belt tensioner clockwise.
 12. Install the cooling fan. Refer to **COOLING FAN**.
 13. Connect the battery ground cable. Refer to **SPECIFICATIONS**.

CRANKSHAFT FRONT SEAL**SPECIAL TOOLS**

Tool Illustration	Tool Name	Tool Number
	Remover, crankshaft seal	303-D121
	Installer, crankshaft seal	303-1100
	Adapter - Crankshaft seal installer	303-1100-01

303-1100-01



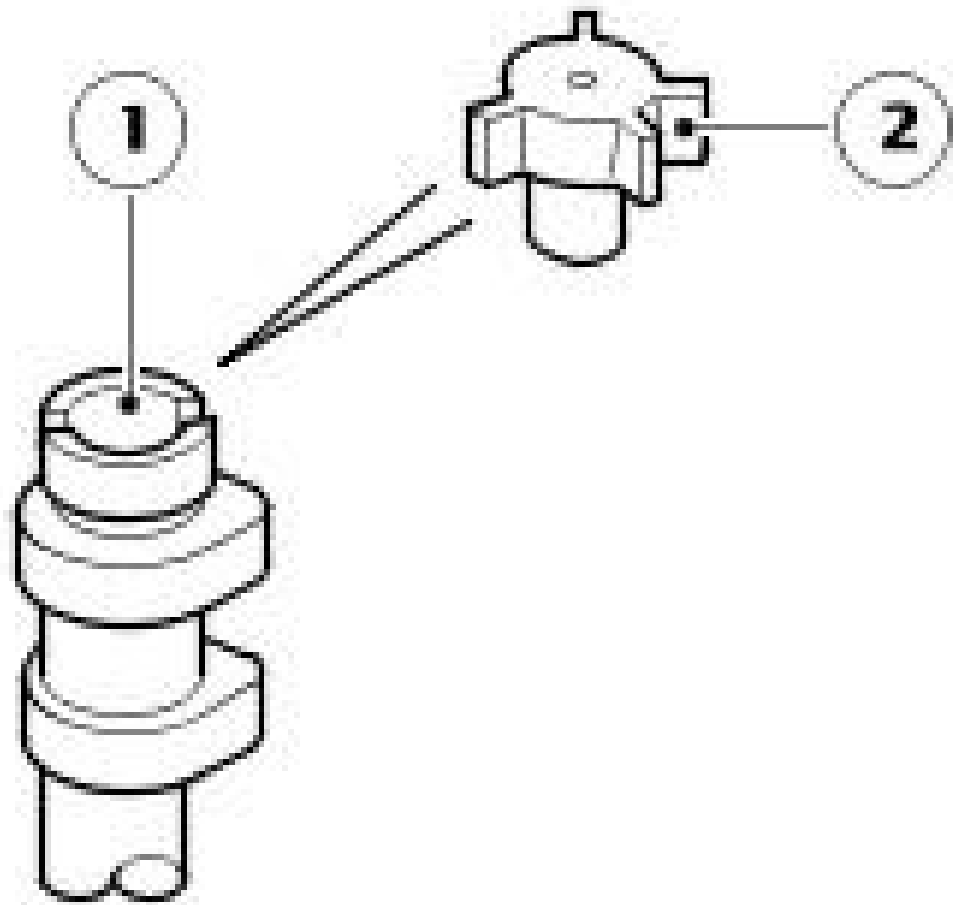
E87144

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS**.

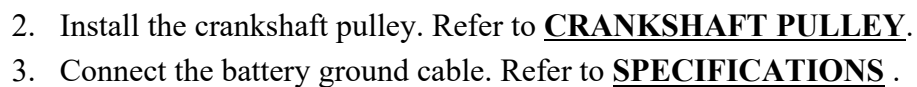
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the crankshaft pulley. Refer to **CRANKSHAFT PULLEY**.
4. Using the special tool, remove the crankshaft front seal.



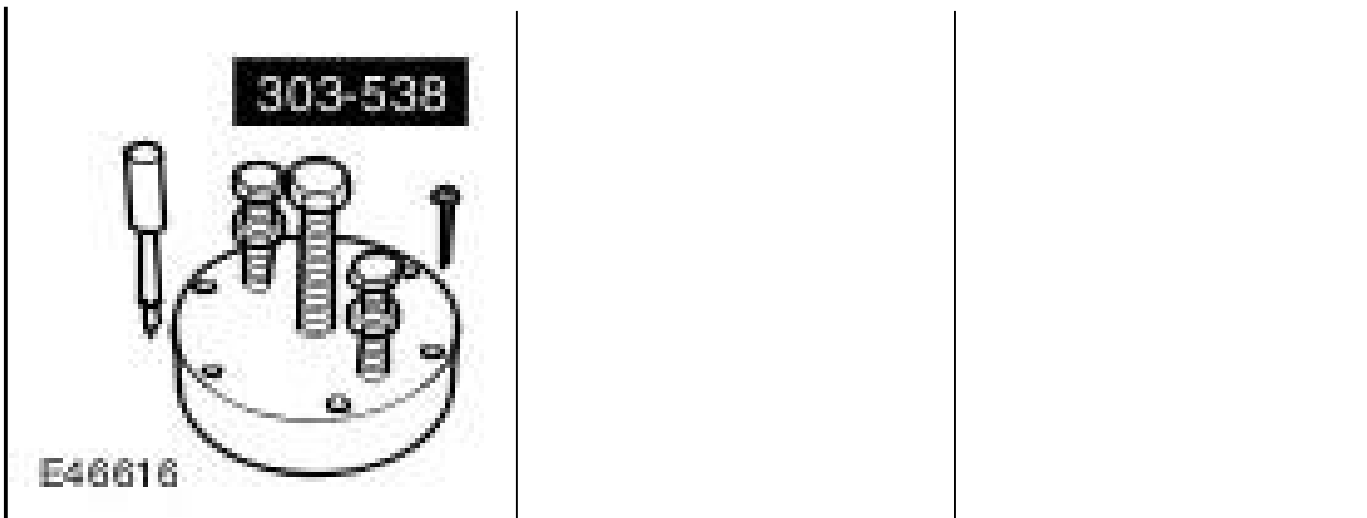
INSTALLATION

1. Using the special tools, install the crankshaft front seal.
 - Clean the component mating faces.



SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
	Crankshaft rear oil seal remover/installer	303-538

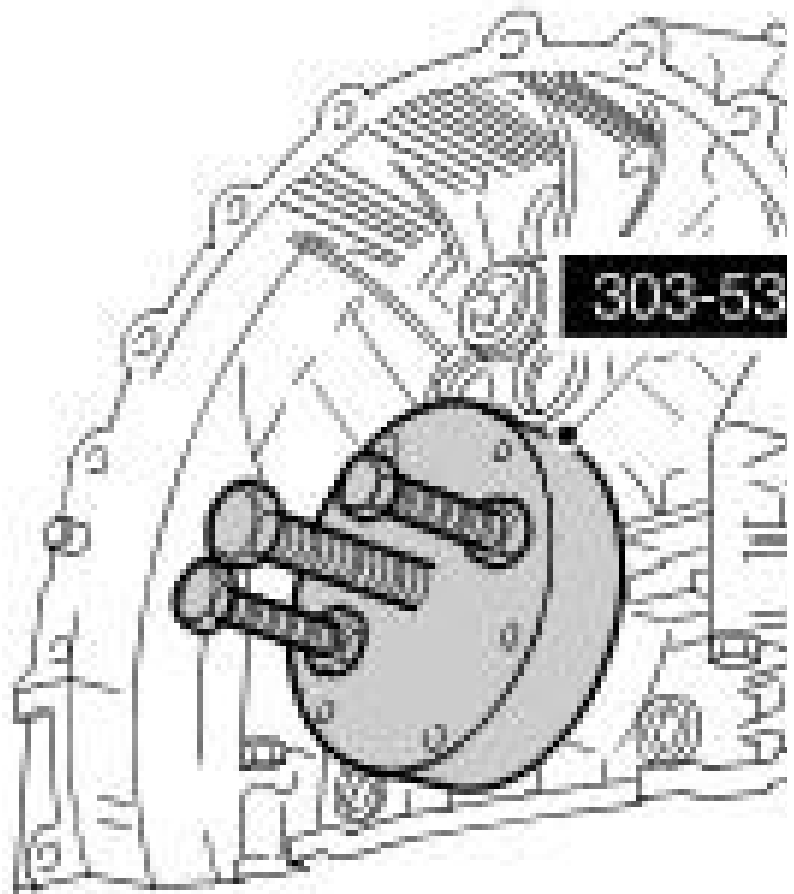
**REMOVAL**

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS**.

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

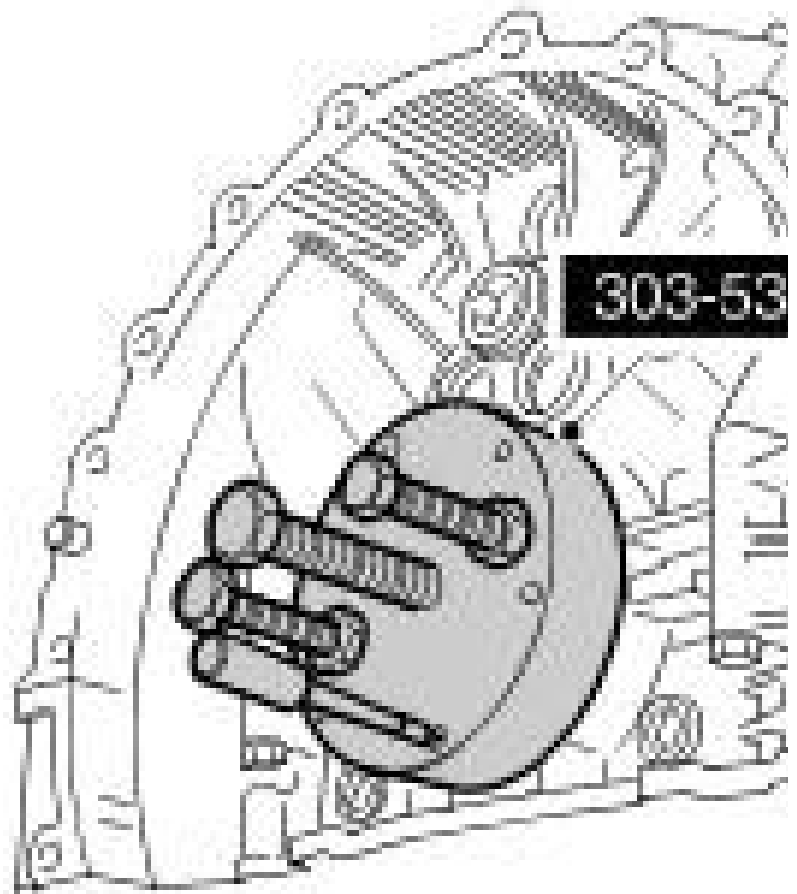
2. Raise and support the vehicle.
3. Remove the torque converter flexplate. Refer to **FLEXPLATE**.
4. Install the special tools.
 - Install the 2 bolts.
 - Tighten the 2 nuts to retain the special tool.

E46613

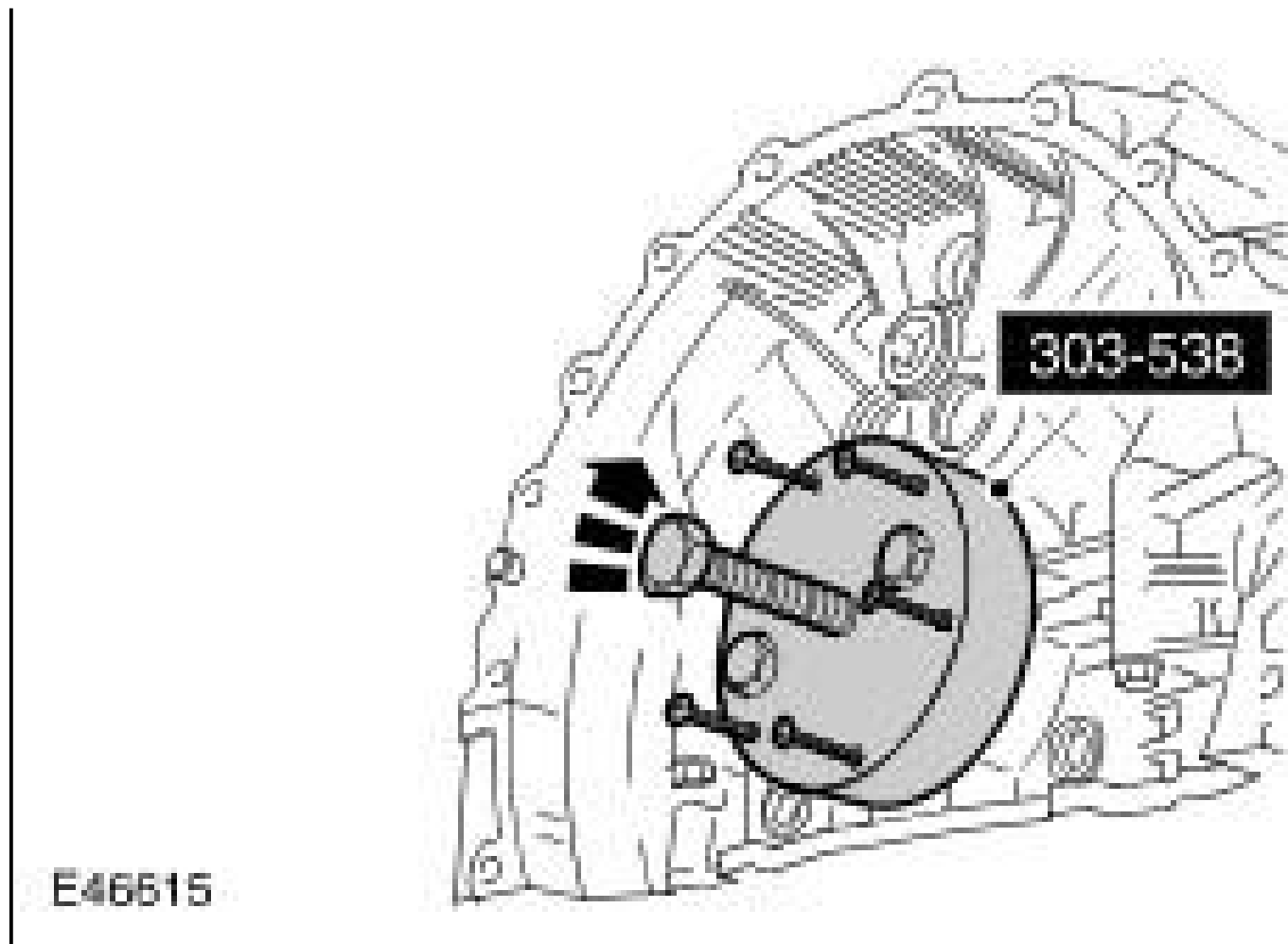


5. Using the special tool, pierce the seal to create holes for the 6 self-tapping screws.

E46614



6. Using the special tools, remove and discard the crankshaft rear oil seal.
- Install the 6 self-tapping screws.
 - Adjust the 2 nuts.
 - Tighten the center bolt.



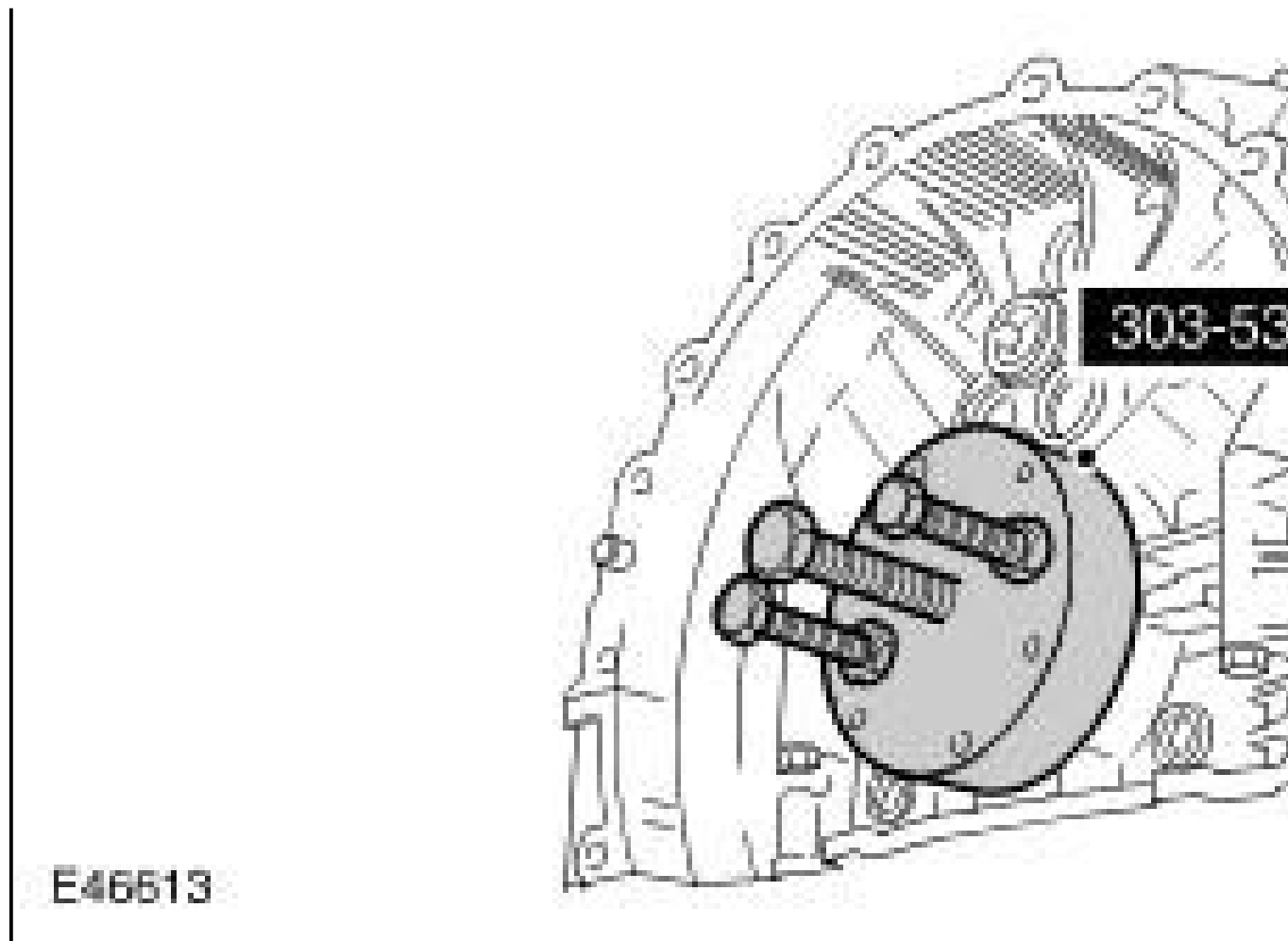
INSTALLATION

CAUTION: Do not lubricate the components.

1. Partially install the crankshaft rear oil seal.
 - Make sure the components are clean and dry.
 - Carefully remove the transit sleeve, leaving the seal on the crankshaft.

CAUTION: Make sure the seal is installed parallel

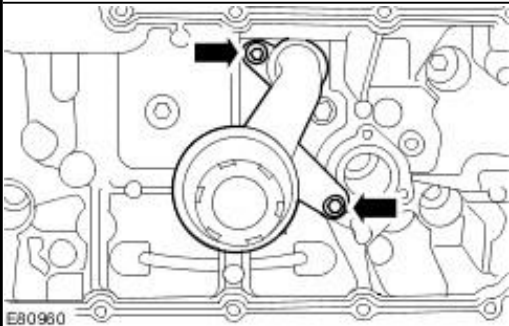
2. Using the special tool, install the crankshaft rear oil seal.
 - Tighten the special tool nuts evenly and progressively to fully install the seal.



3. Install the torque converter flexplate. Refer to **FLEXPLATE**.
4. Check and top-up the engine oil.
5. Connect the battery ground cable. Refer to **SPECIFICATIONS**.

TIMING DRIVE COMPONENTS

SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
	Camshaft setting/locking tool	303-530
	Crankshaft setting tool	303-645

303-645



E46881

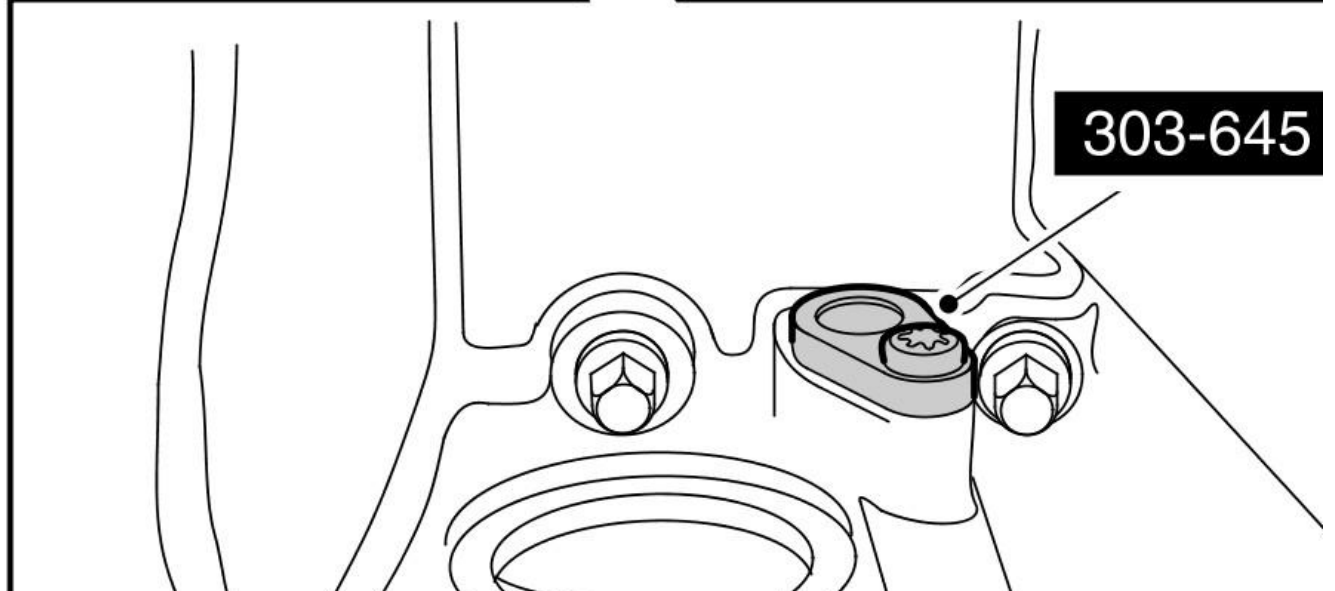
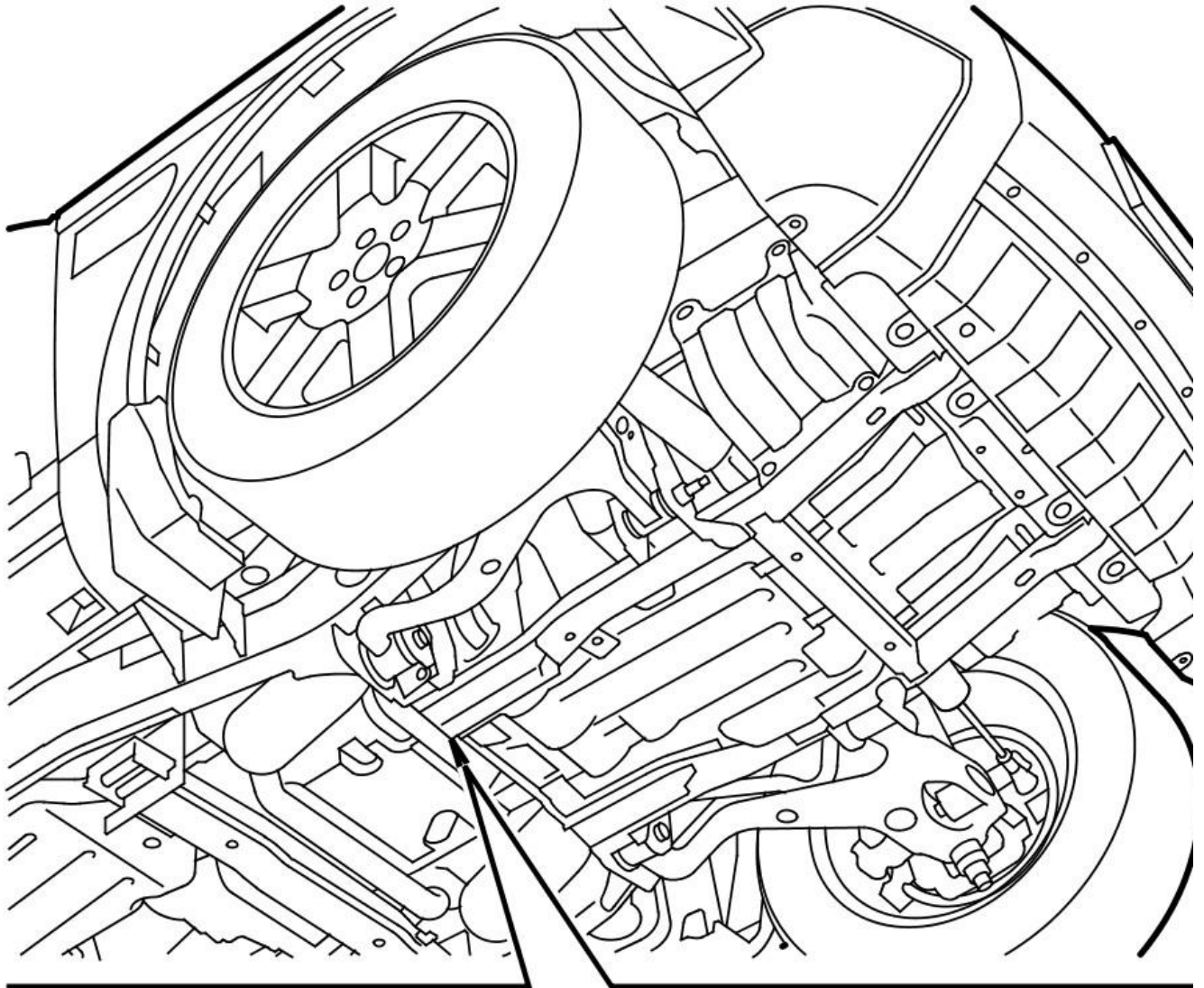
REMOVAL

NOTE: This procedure covers the removal and installation of the following components: Primary timing chain tensioners, timing chain guides, crankshaft sprocket and timing chains.

1. Disconnect the battery ground cable. Refer to SPECIFICATIONS .

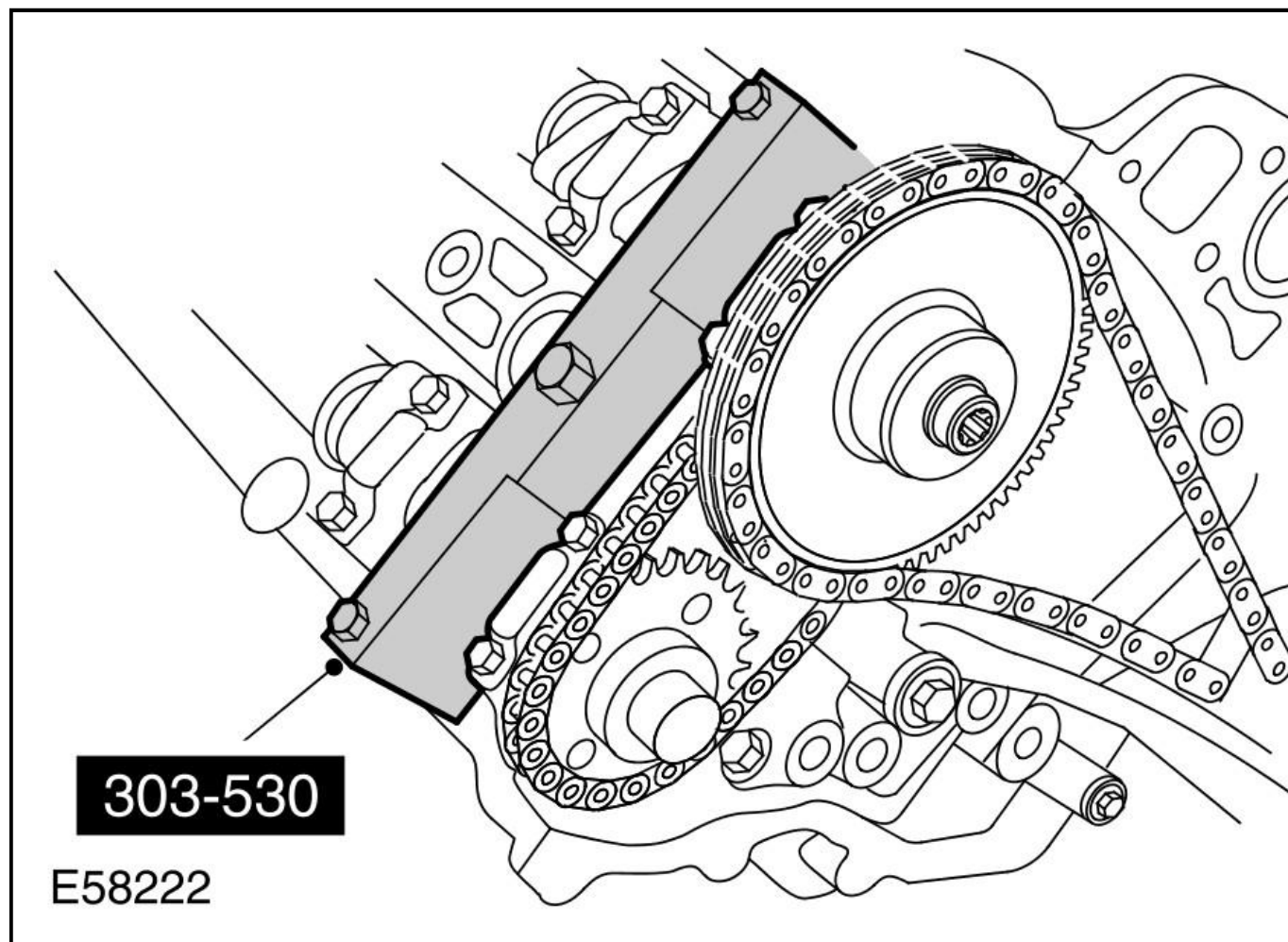
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the engine front cover. Refer to ENGINE FRONT COVER.
4. Remove the crankshaft position (CKP) sensor. Refer to CRANKSHAFT POSITION (CKP) SENSOR .
5. Install the crankshaft setting tool.
 - Install the screw.

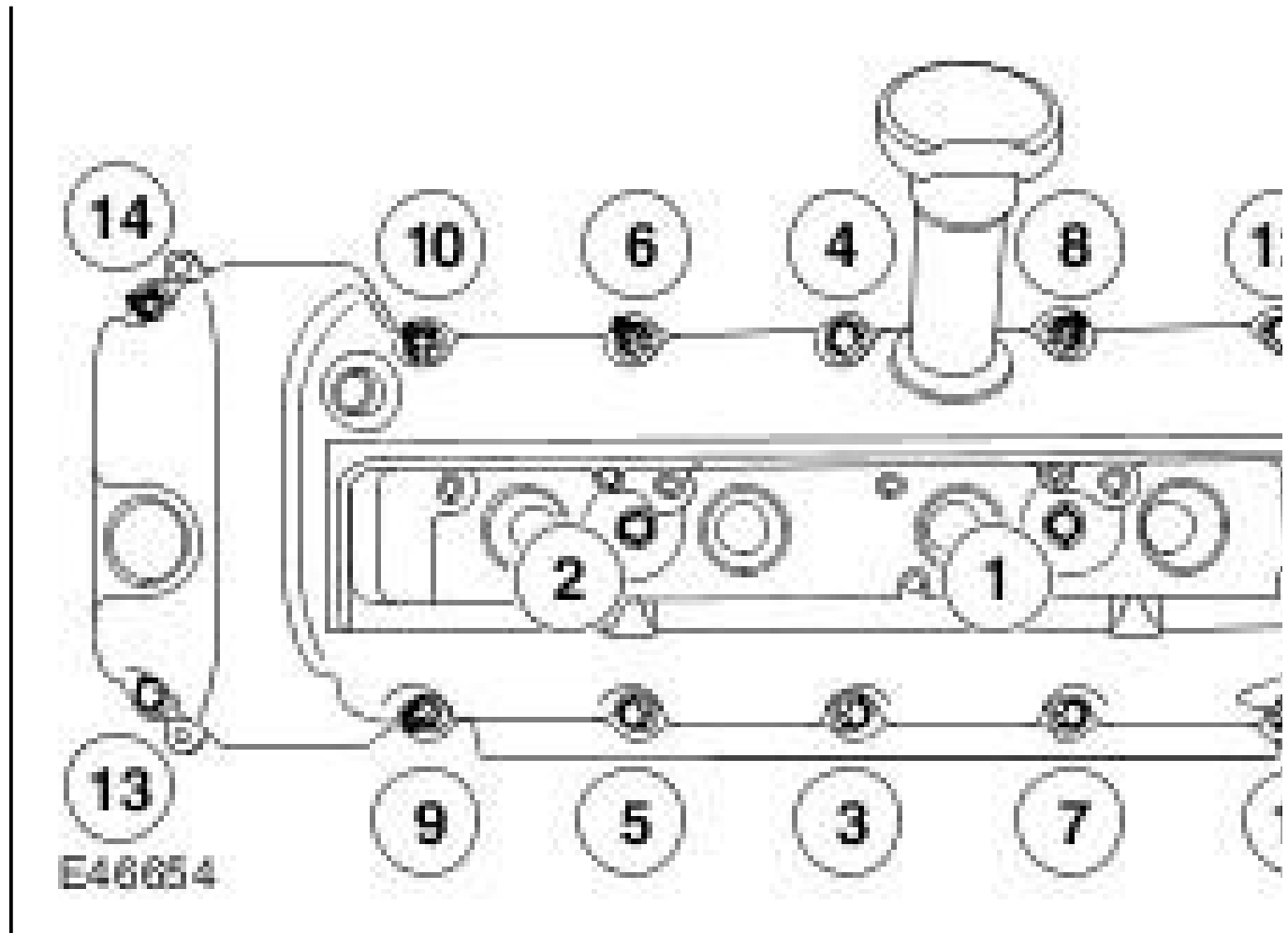


303-645

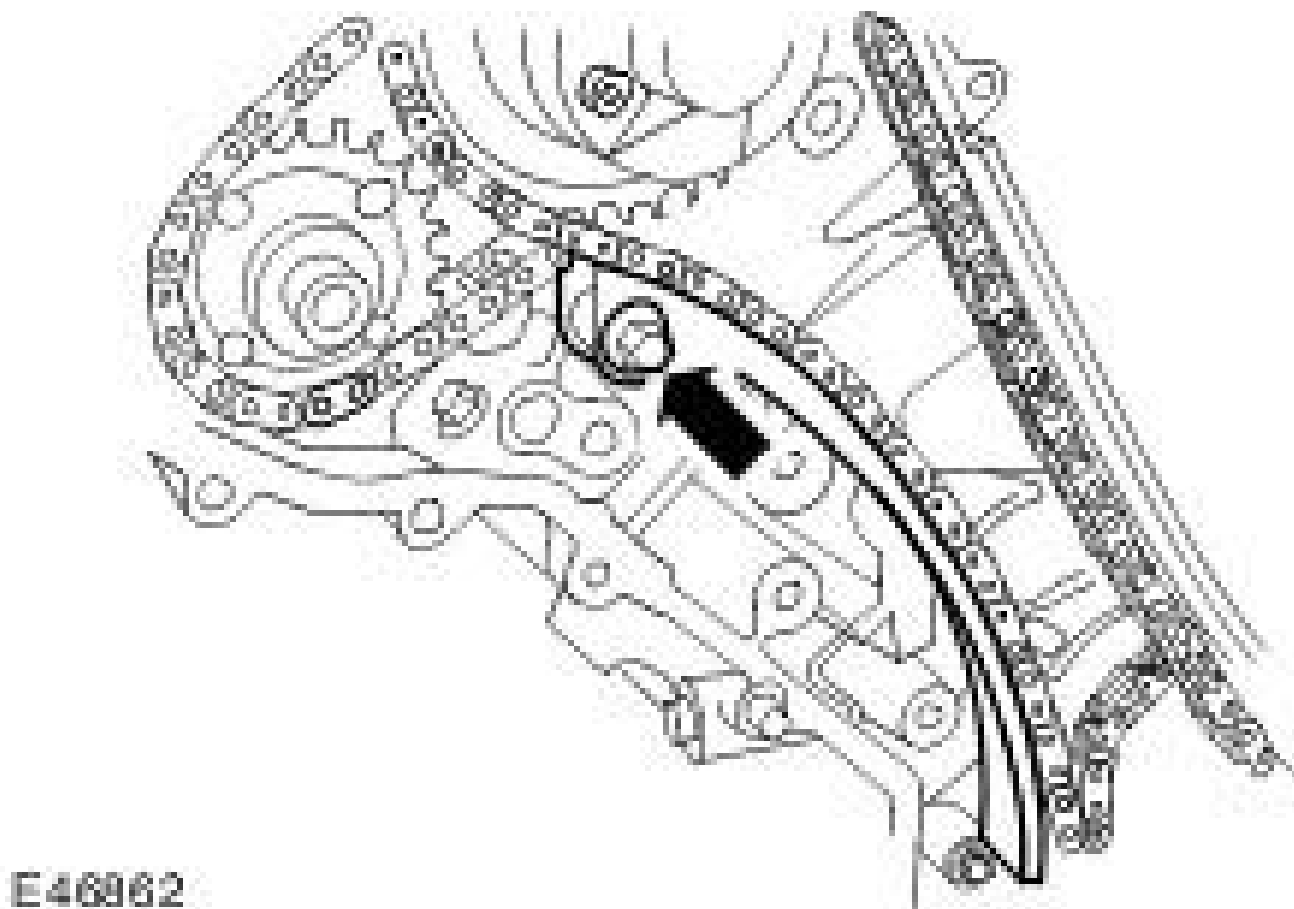
6. Install the special tool to the RH cylinder head.
 - Install the 3 bolts.



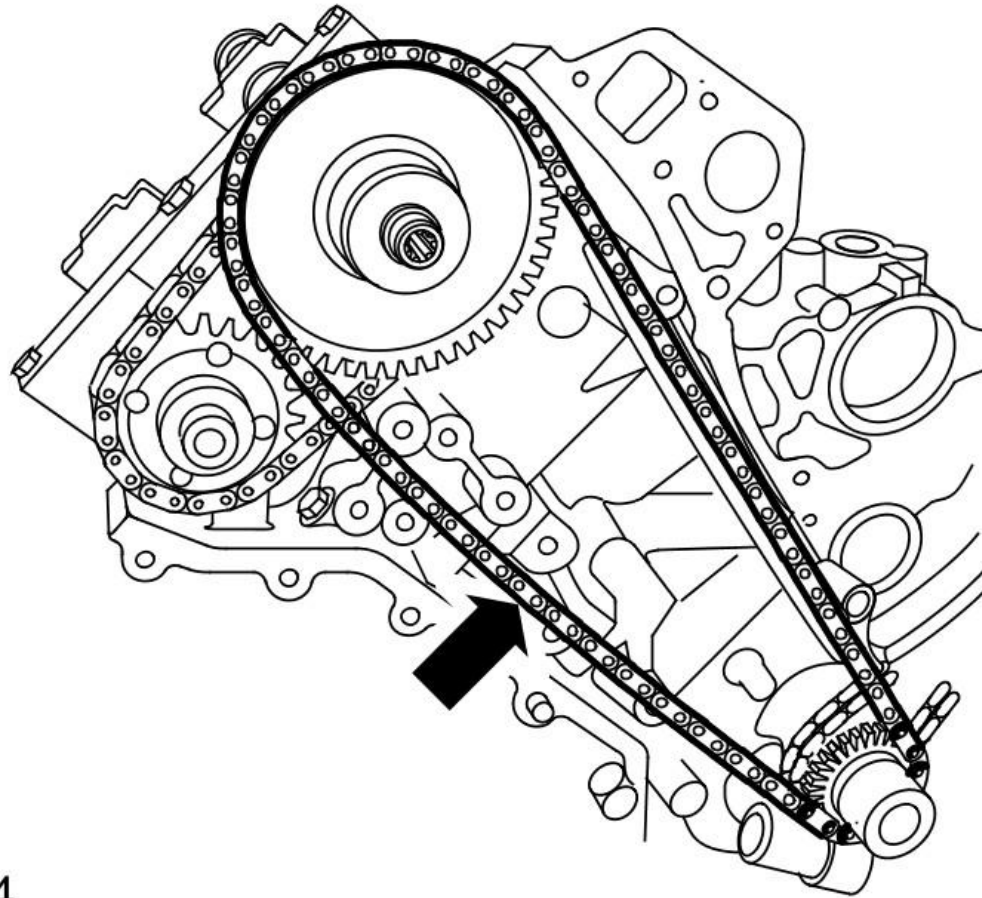
7. Remove the RH primary timing chain tensioner.
 - Remove the 2 bolts.



8. Remove the RH primary timing chain tensioner guide.
 - Remove the bolt.

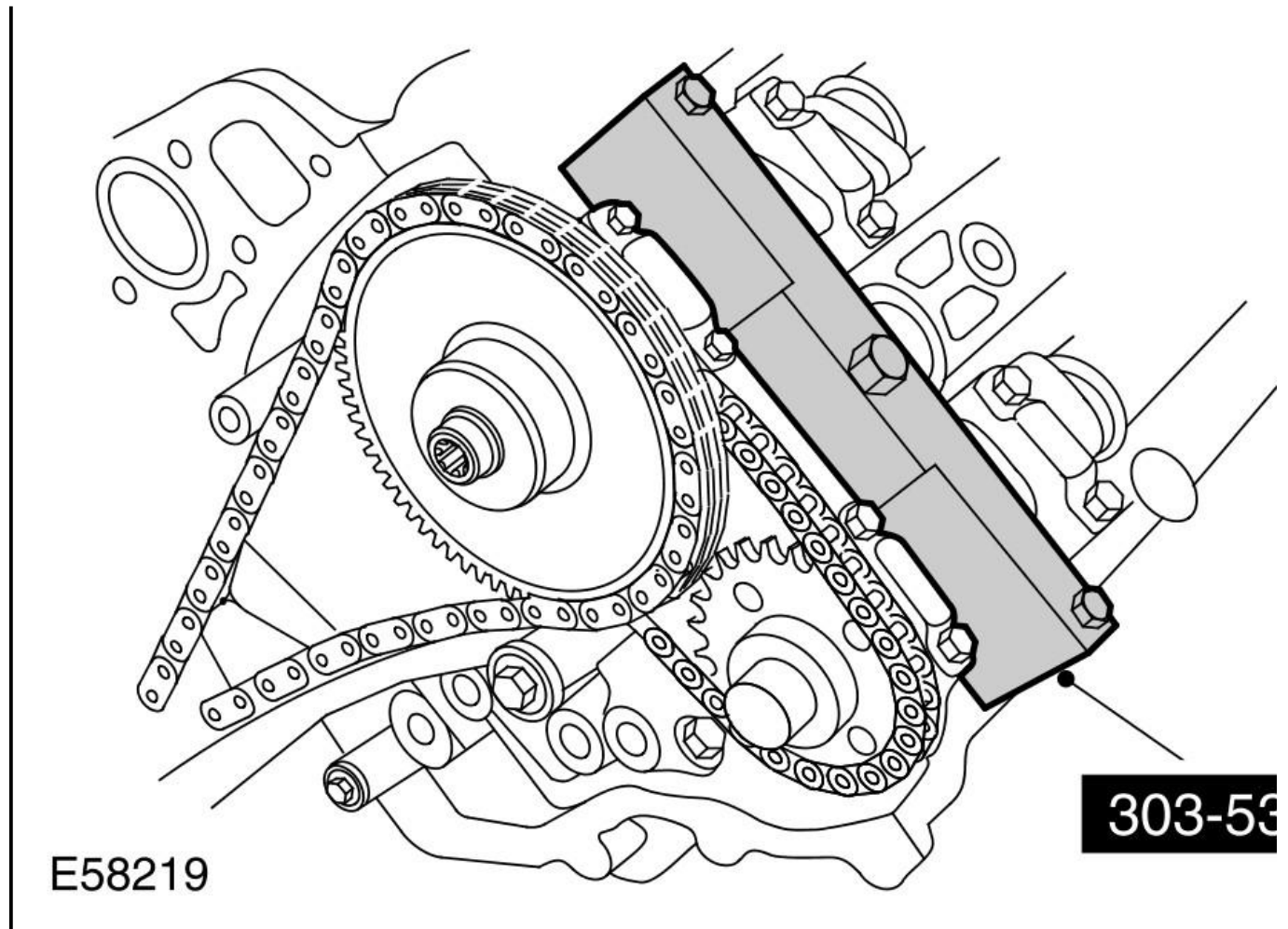


9. Remove the RH primary timing chain.

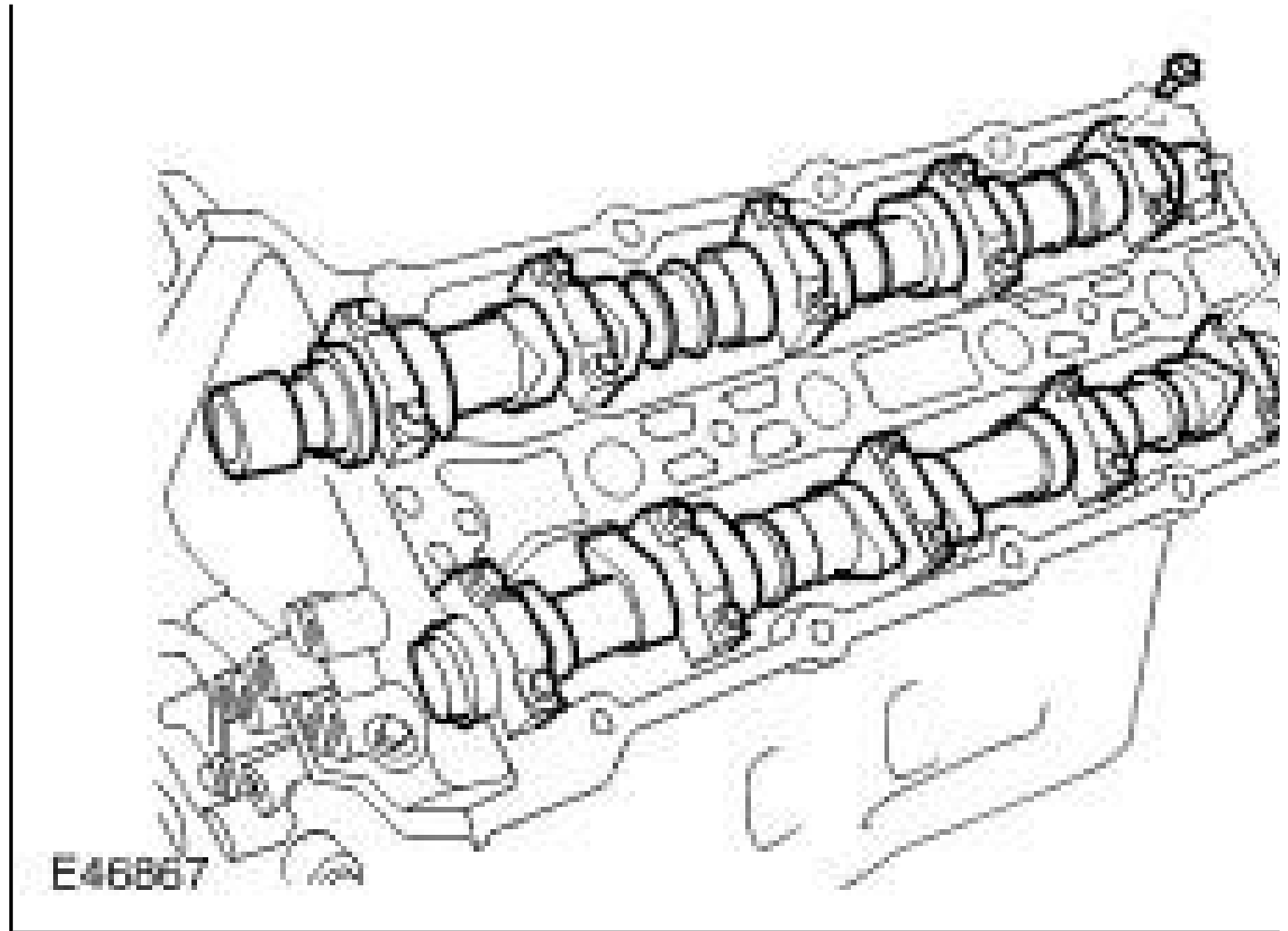


E58224

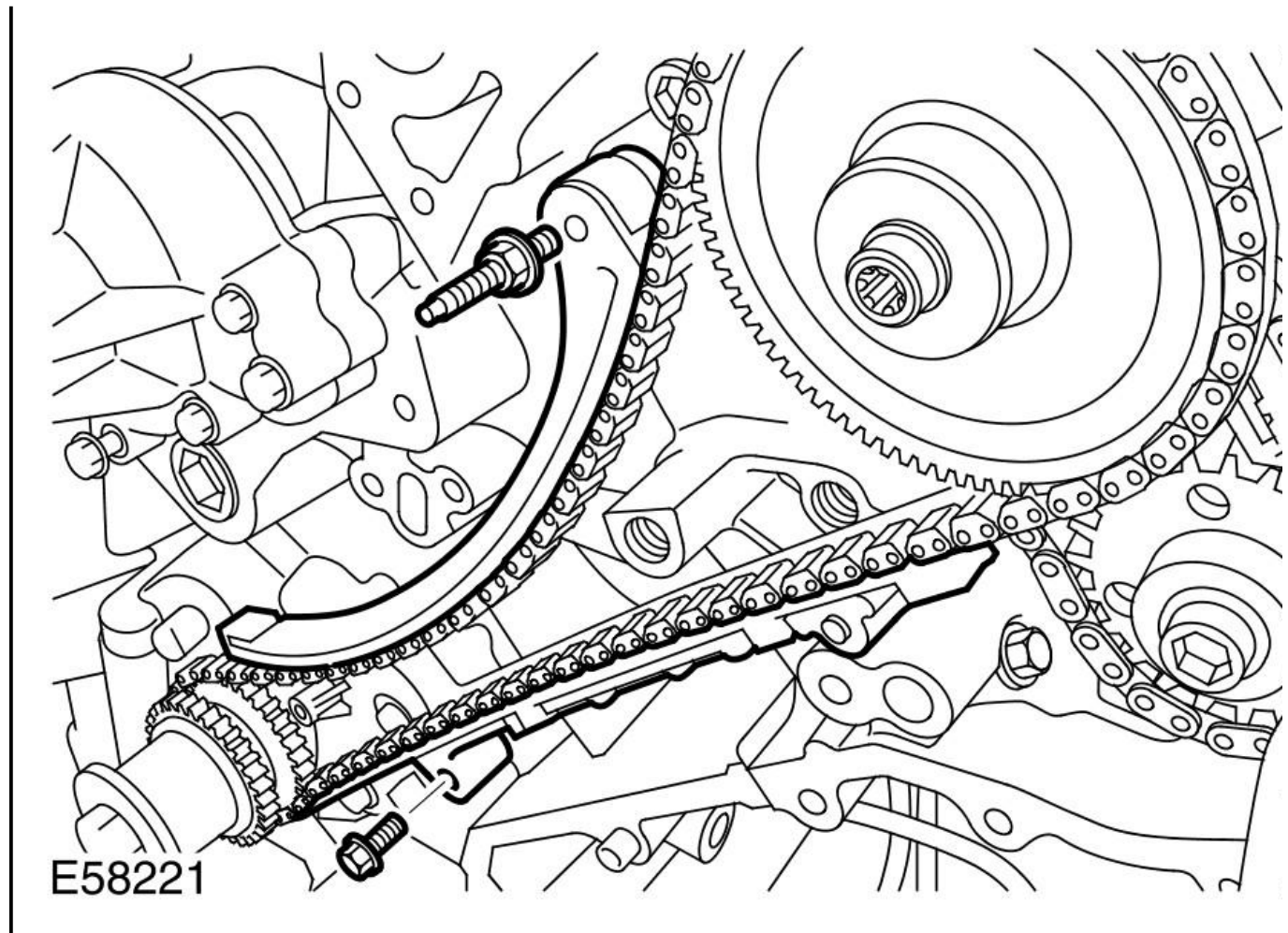
10. Install the special tool to the LH cylinder head.
 - Install the 3 bolts.



11. Remove the LH primary timing chain tensioner.
 - Remove the 2 bolts.

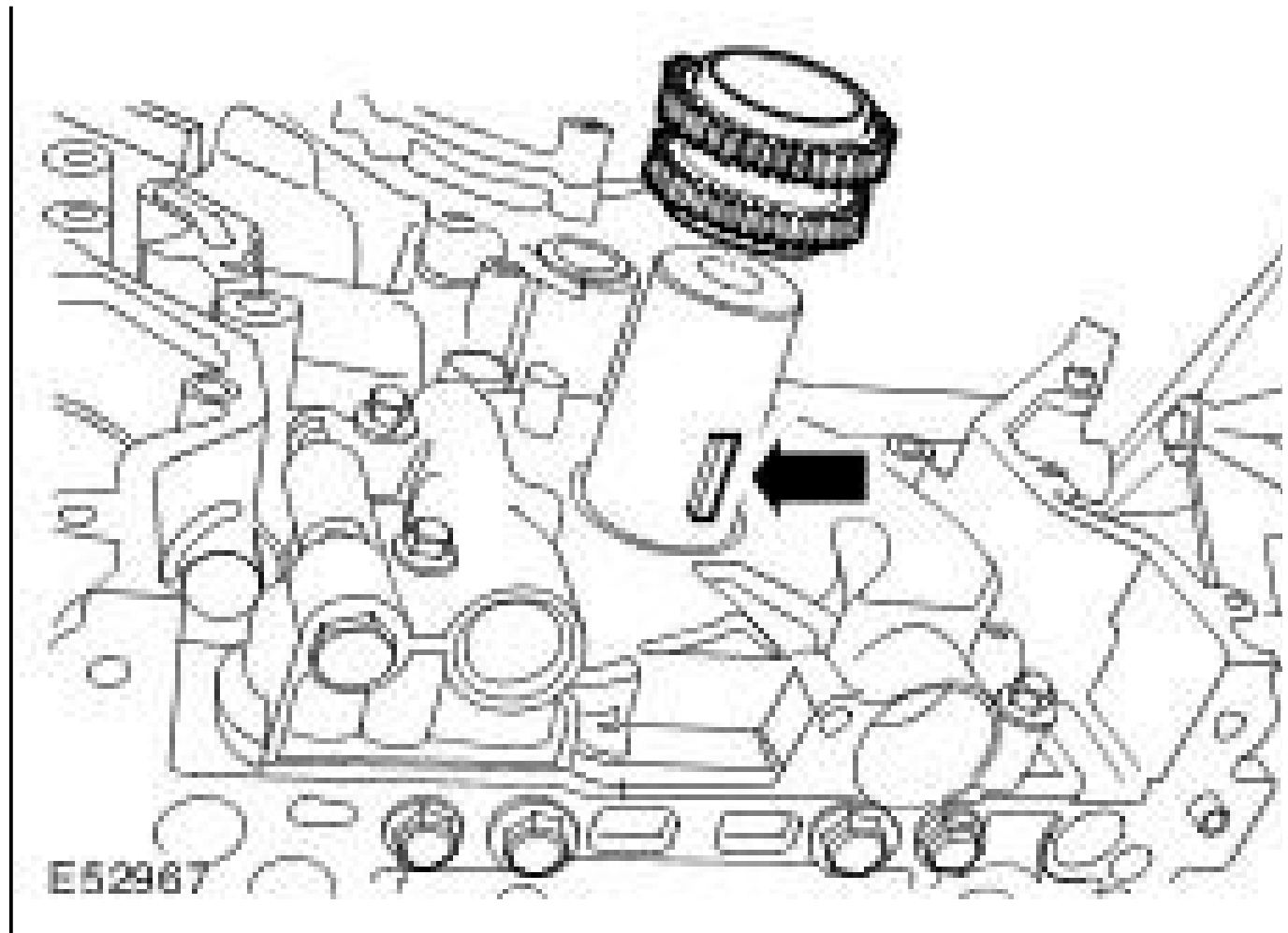


12. Remove the LH upper and lower primary timing chain tensioner guides.
 - Remove the 2 bolts.
13. Remove the LH primary timing chain.



NOTE: Note the orientation of the crankshaft sprocket.

14. Remove the crankshaft sprocket.
 - Remove the crankshaft sprocket key.

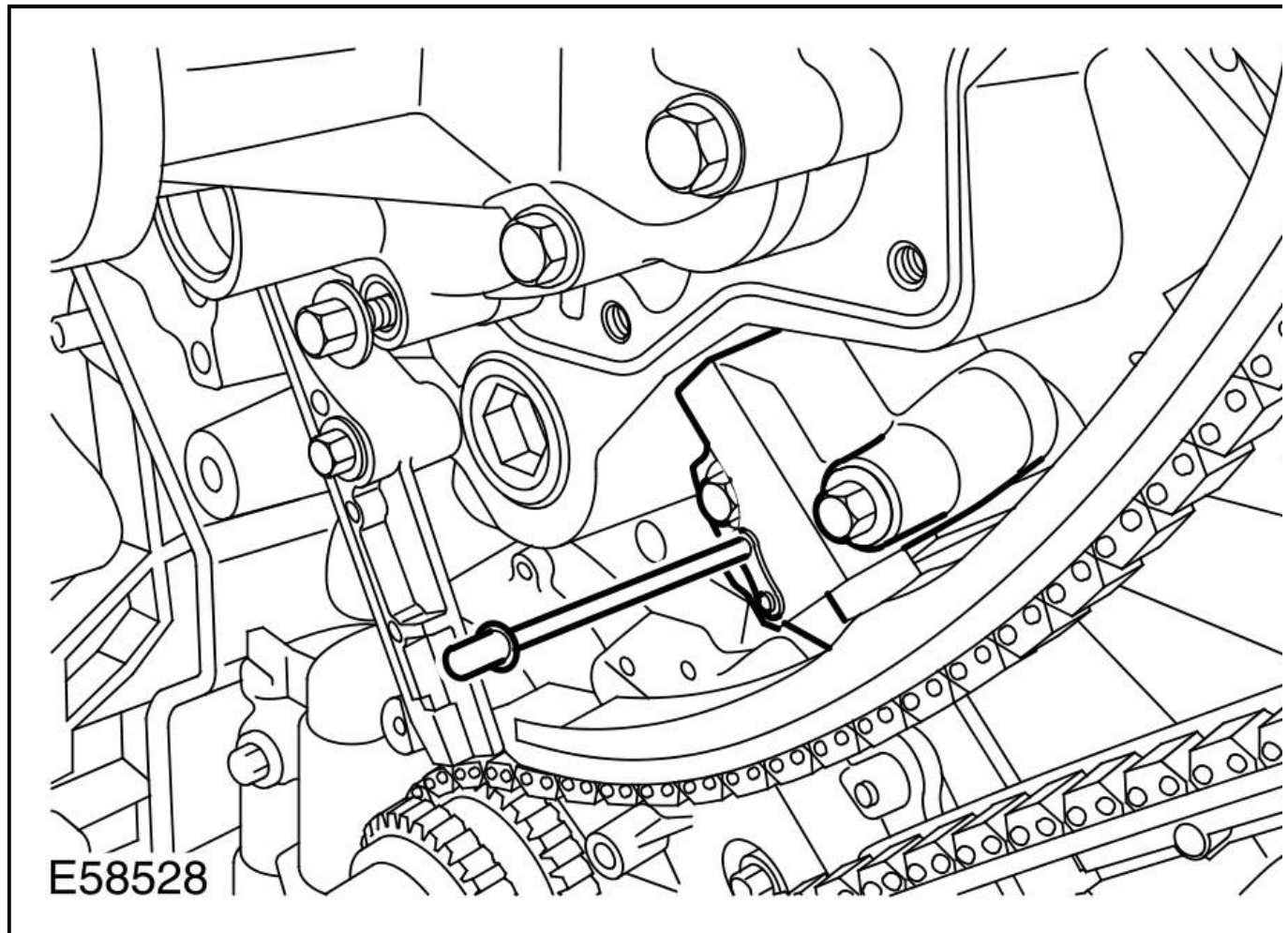


INSTALLATION

1. Install the crankshaft sprocket.
 - Install the crankshaft sprocket key.
2. Install the LH primary timing chain.
 - Make sure the timing chain slack is on the tensioner side of the timing chain.
3. Install the LH primary timing chain tensioner guides.
 - Tighten the bolts to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

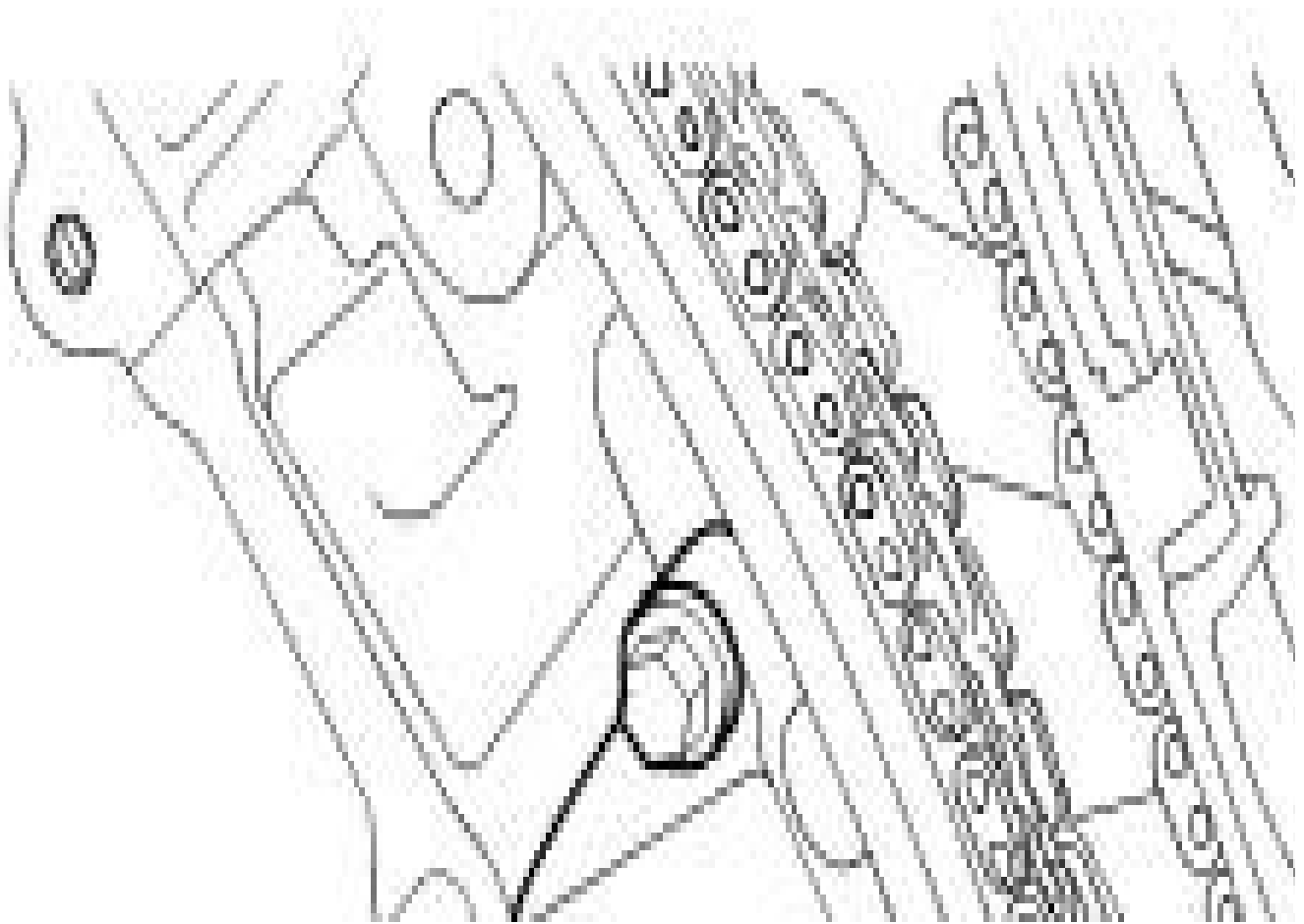
4. Install the LH primary timing chain tensioner.
 - Using 3 mm diameter metal rod, retain the chain tensioner piston.
 - Tighten the bolts to 12 Nm (9 lb.ft).
 - Remove the retaining rod.



5. Install the RH primary timing chain.
 - Make sure the timing chain slack is on the tensioner side of the timing chain.
6. Install the RH primary timing chain tensioner guide.
 - Tighten the bolts to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

7. Install the RH primary timing chain tensioner.
 - Using 3 mm diameter metal rod, retain the chain tensioner piston.
 - Tighten the bolts to 12 Nm (9 lb.ft).
 - Remove the retaining rod.



8. Remove the special tool from the RH cylinder head.
9. Remove the special tool from the LH cylinder head.
10. Remove the crankshaft setting tool.

- Remove the screw.

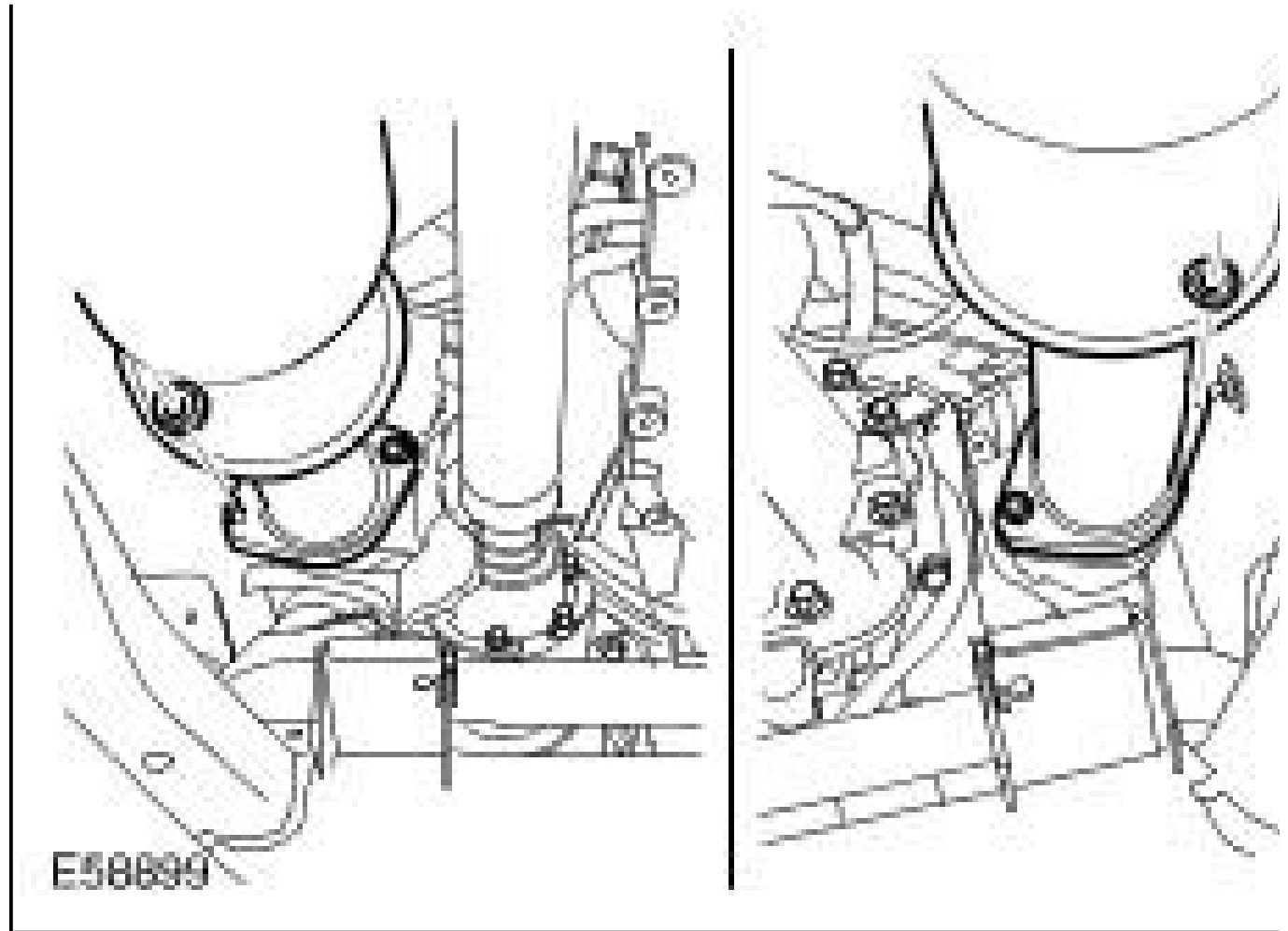
11. Install the CKP sensor. Refer to **CRANKSHAFT POSITION (CKP) SENSOR** .
12. Install the engine front cover. Refer to **ENGINE FRONT COVER**.
13. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

CYLINDER HEAD LH**REMOVAL**

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

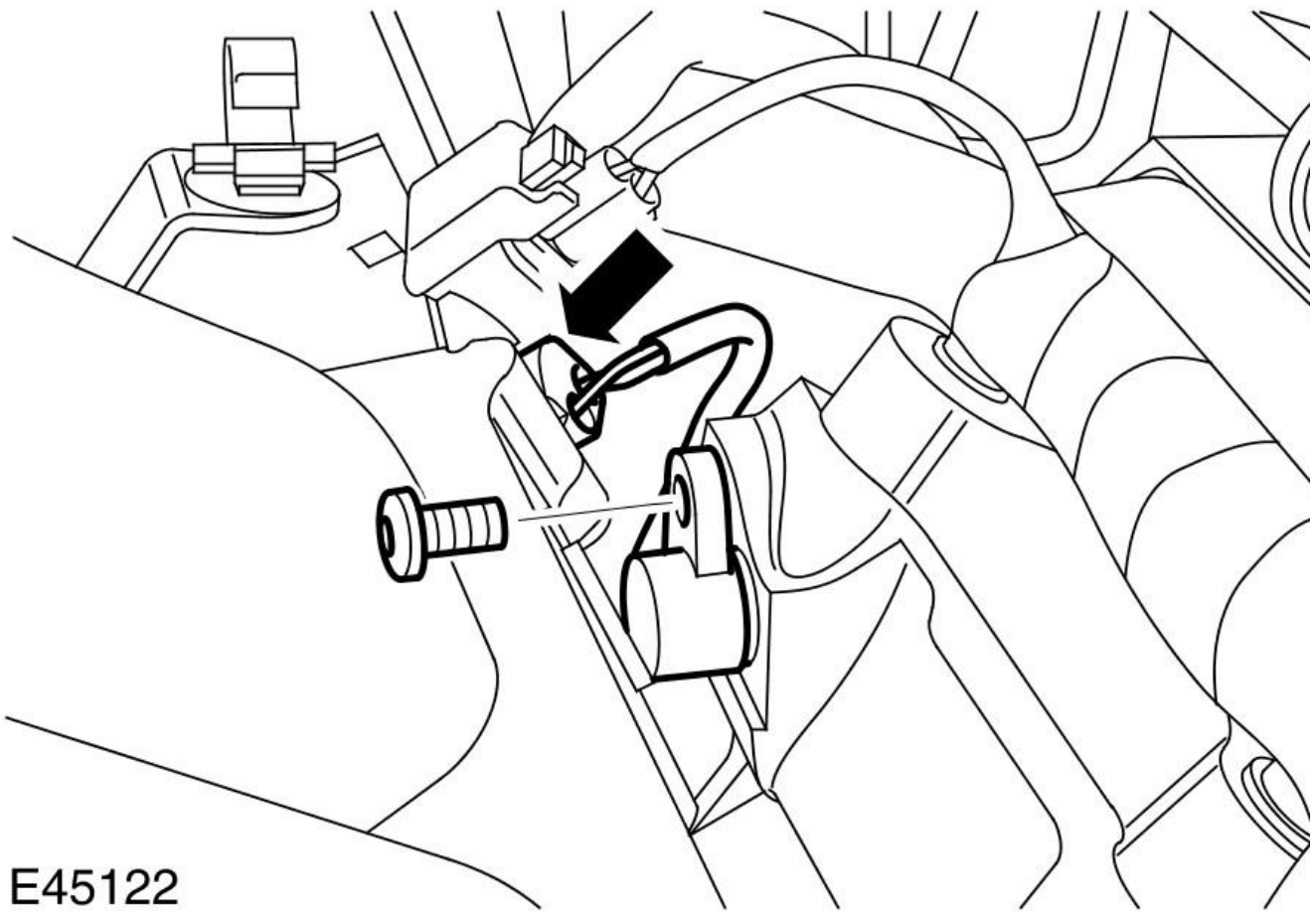
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the fuel rail. Refer to **FUEL RAIL** .
4. Remove the LH bank camshafts. Refer to **CAMSHAFTS LH**.
5. Disconnect the LH catalytic converter from the exhaust manifold.
 - Remove and discard the 2 nuts.
6. Disconnect the RH catalytic converter from the exhaust manifold.
 - Remove and discard the 2 nuts.



7. Remove the camshaft position (CMP) sensor.

- Remove the Torx screw.
- Disconnect the electrical connector.

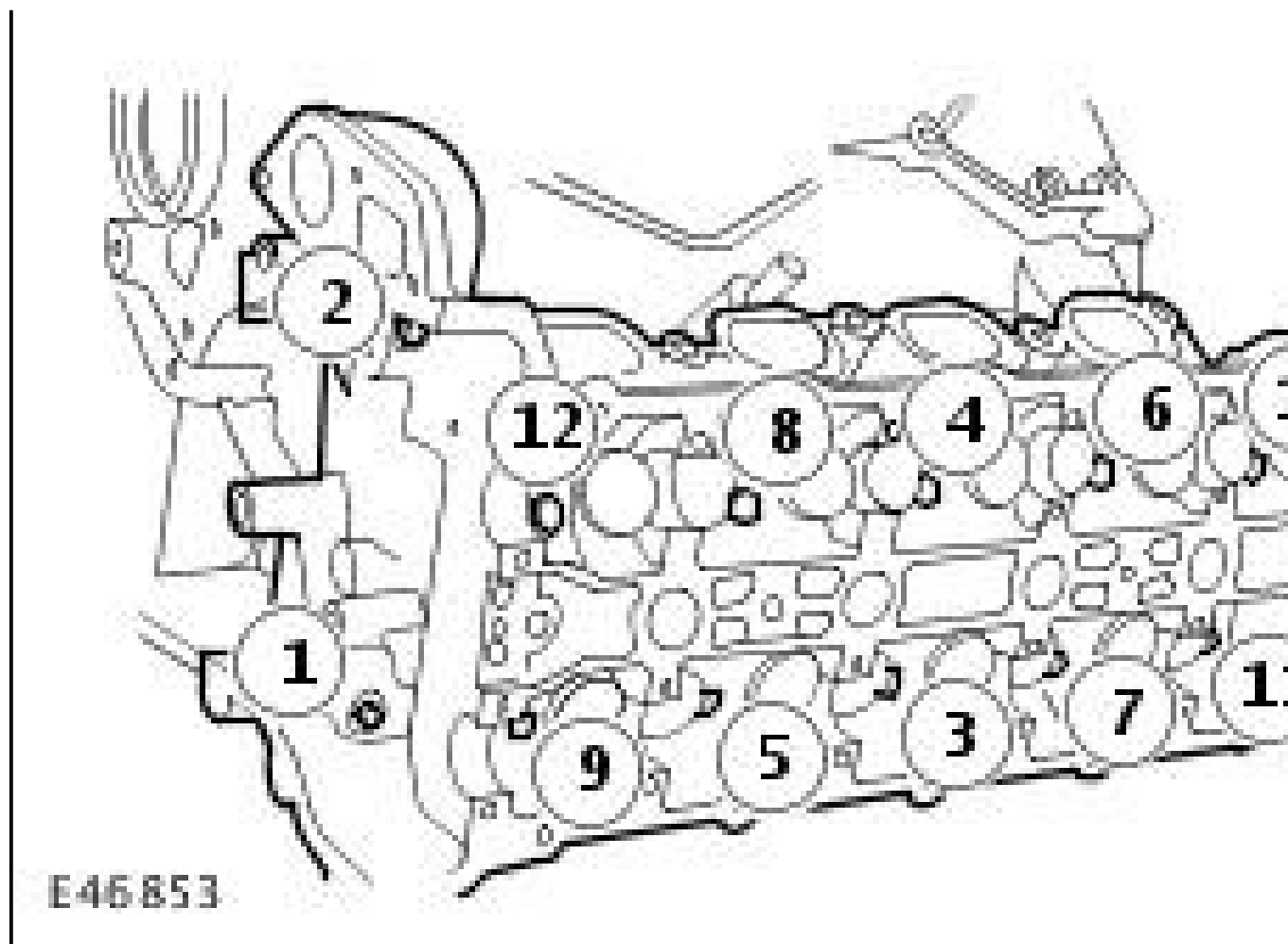


CAUTION: The bolts can only be used twice, mark the bolts with a center punch. If two punch marks are visible, discard the bolts.

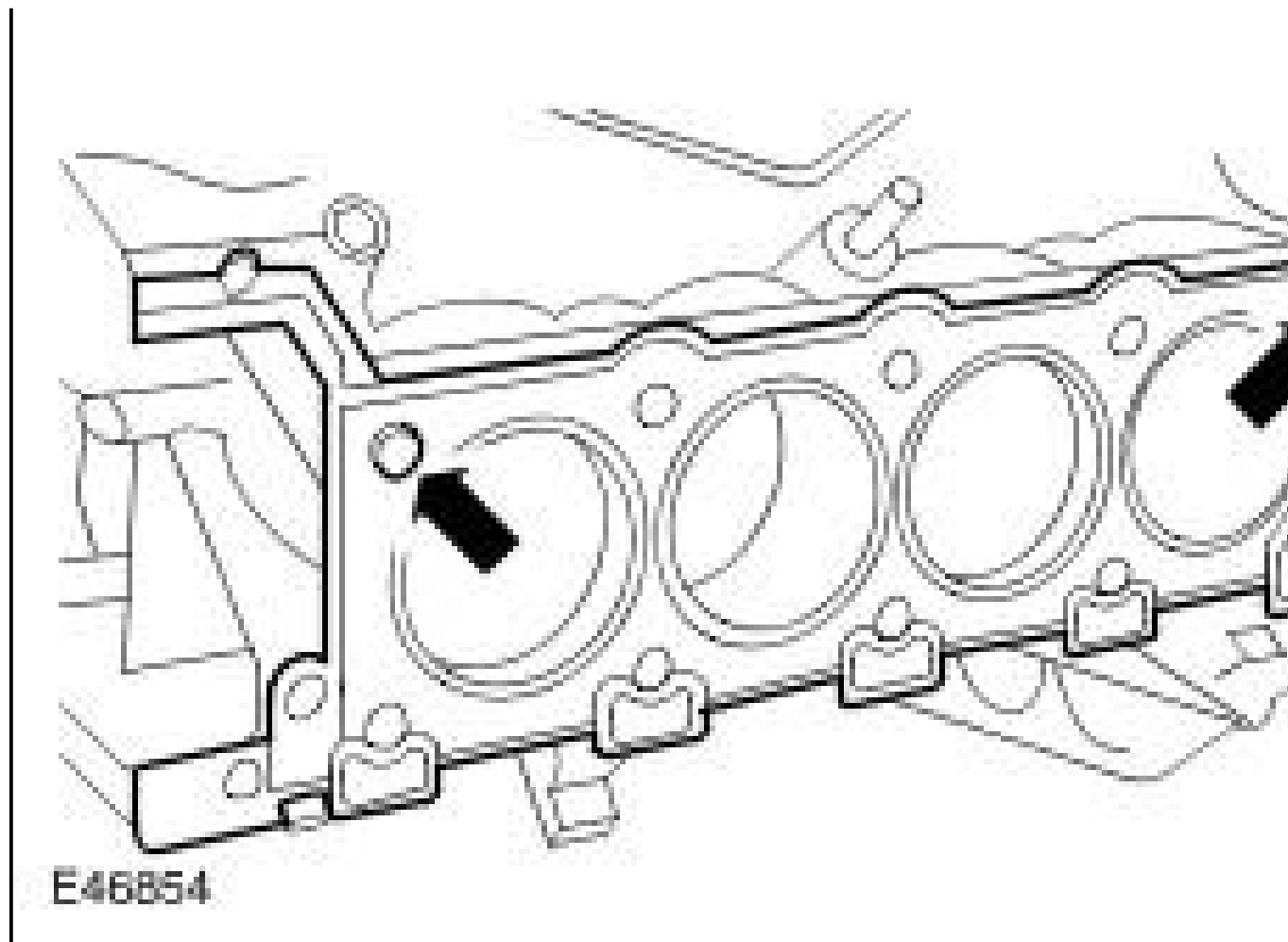
CAUTION: Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be removed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.

NOTE: Remove the bolts in the indicated sequence.

8. Remove the 12 cylinder head bolts.

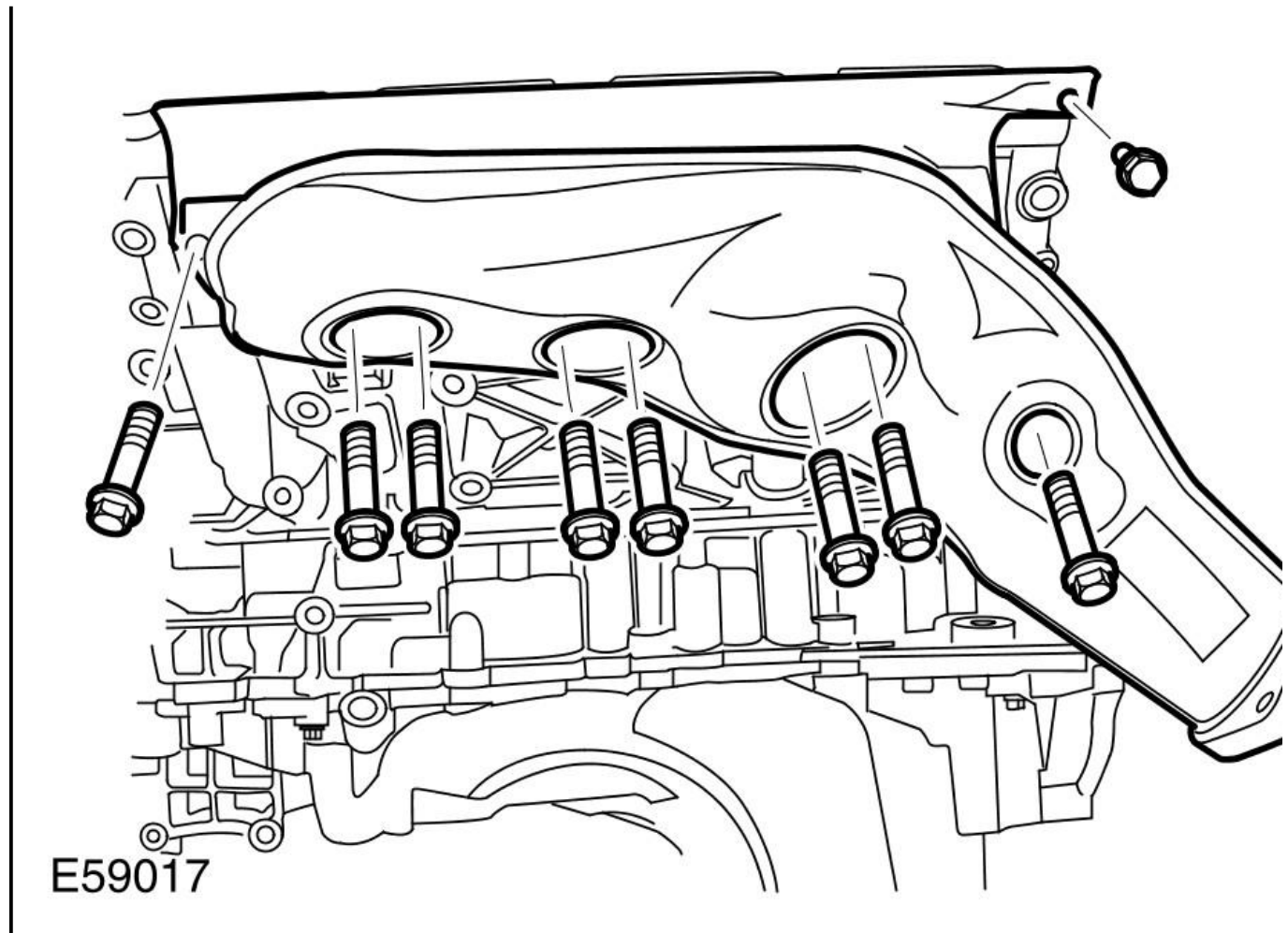


9. With assistance remove the cylinder head.
 - Clean the component mating faces.
10. Remove and discard the cylinder head gasket.
 - Clean the cylinder head locating dowels.
 - Clean and inspect the cylinder head and cylinder block.



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

11. Remove the exhaust manifold.
 - Remove and discard the 8 bolts.
 - Remove the gasket/heat shield retaining bolt.
 - Discard the gasket/heat shield.

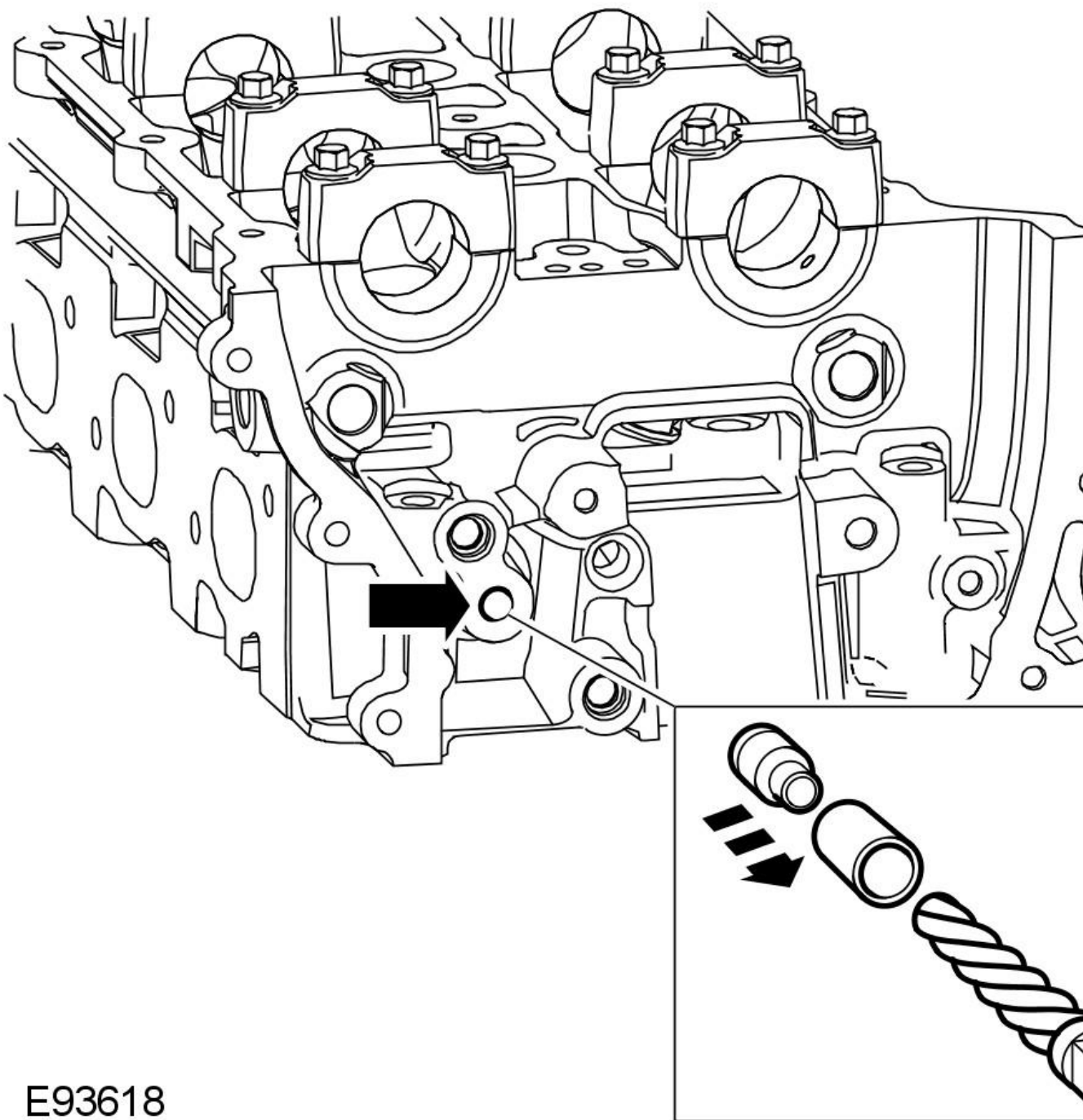
**INSTALLATION**

CAUTION: If a new cylinder head is to be installed to a vehicle with variable valve timing (VVT), the cylinder head must have the oil gallery blind rivet removed before installation.

CAUTION: Make sure that all debris and foreign material is removed from the cylinder head and cylinder head oil gallery.

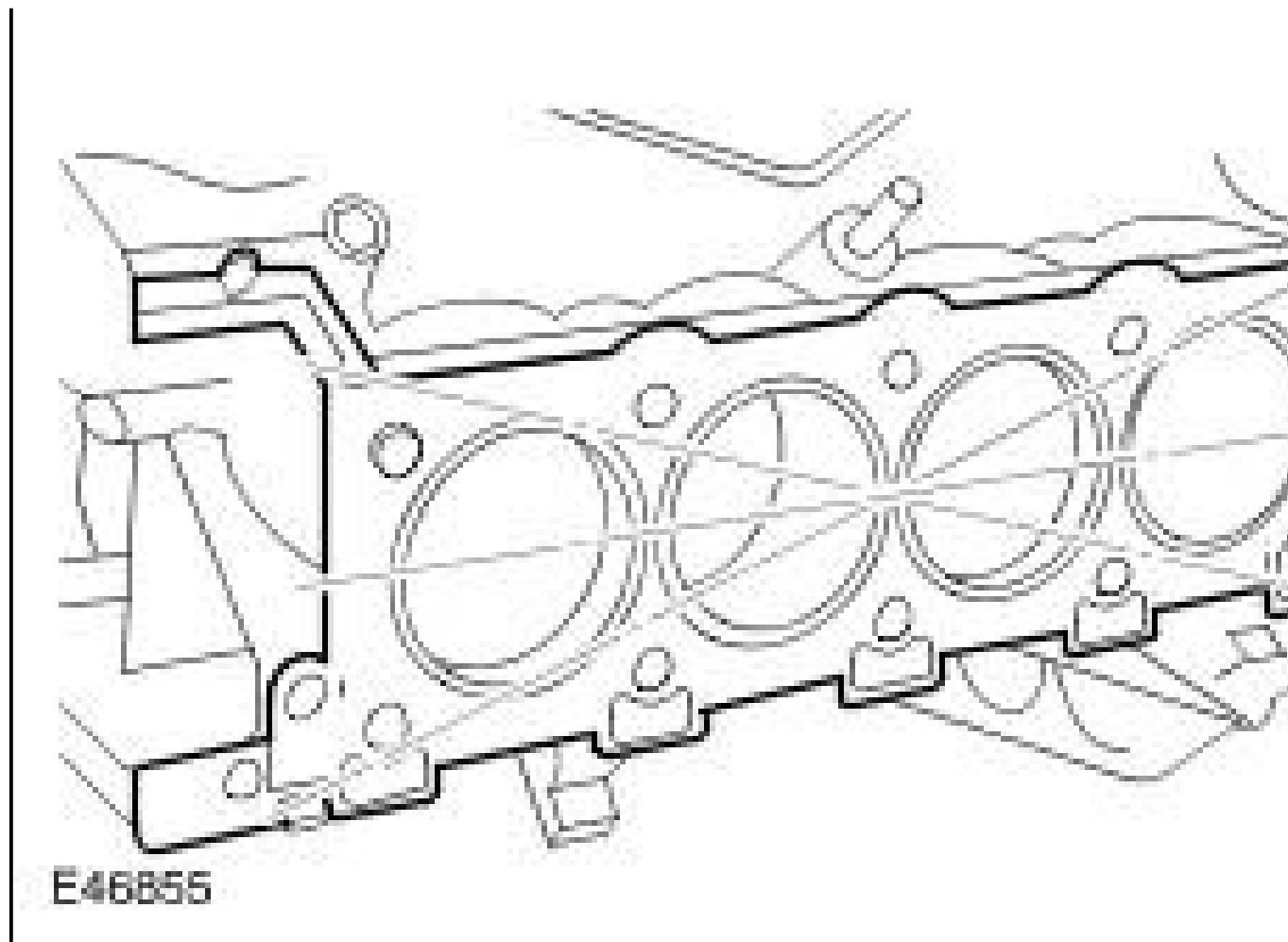
NOTE: The centre bore of the blind rivet is 6 mm (0.24 inch) diameter.

1. Vehicles fitted with VVT: remove the blind rivet from the VVT oil gallery.
 - Identify the VVT oil supply gallery and the 8 mm (0.31 inch) blind rivet.
 - Using a suitable 3 mm (0.12 inch) punch release the centre of the blind rivet until it is released from the outer part of the blind rivet.
 - Using a suitable extraction tool, remove the remaining part of the blind rivet.



E93618

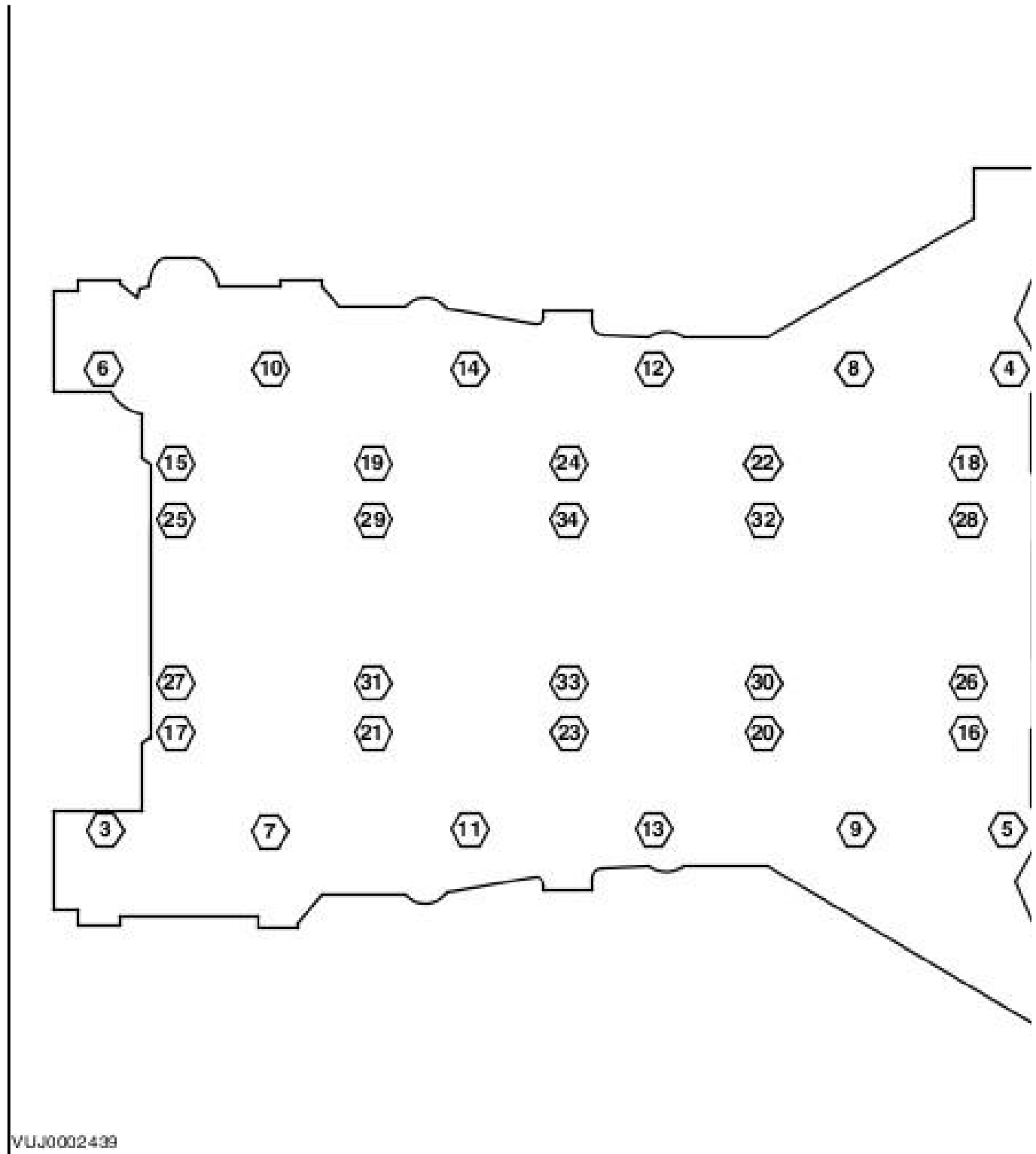
2. Clean the component mating faces.
3. Check cylinder head face for distortion, across the center and from corner to corner.



4. For cylinder head face distortion data, refer to specifications. Refer to **SPECIFICATIONS**.

NOTE: For cylinder head with distortion above the maximum allowance, the cylinder head material must be measured.

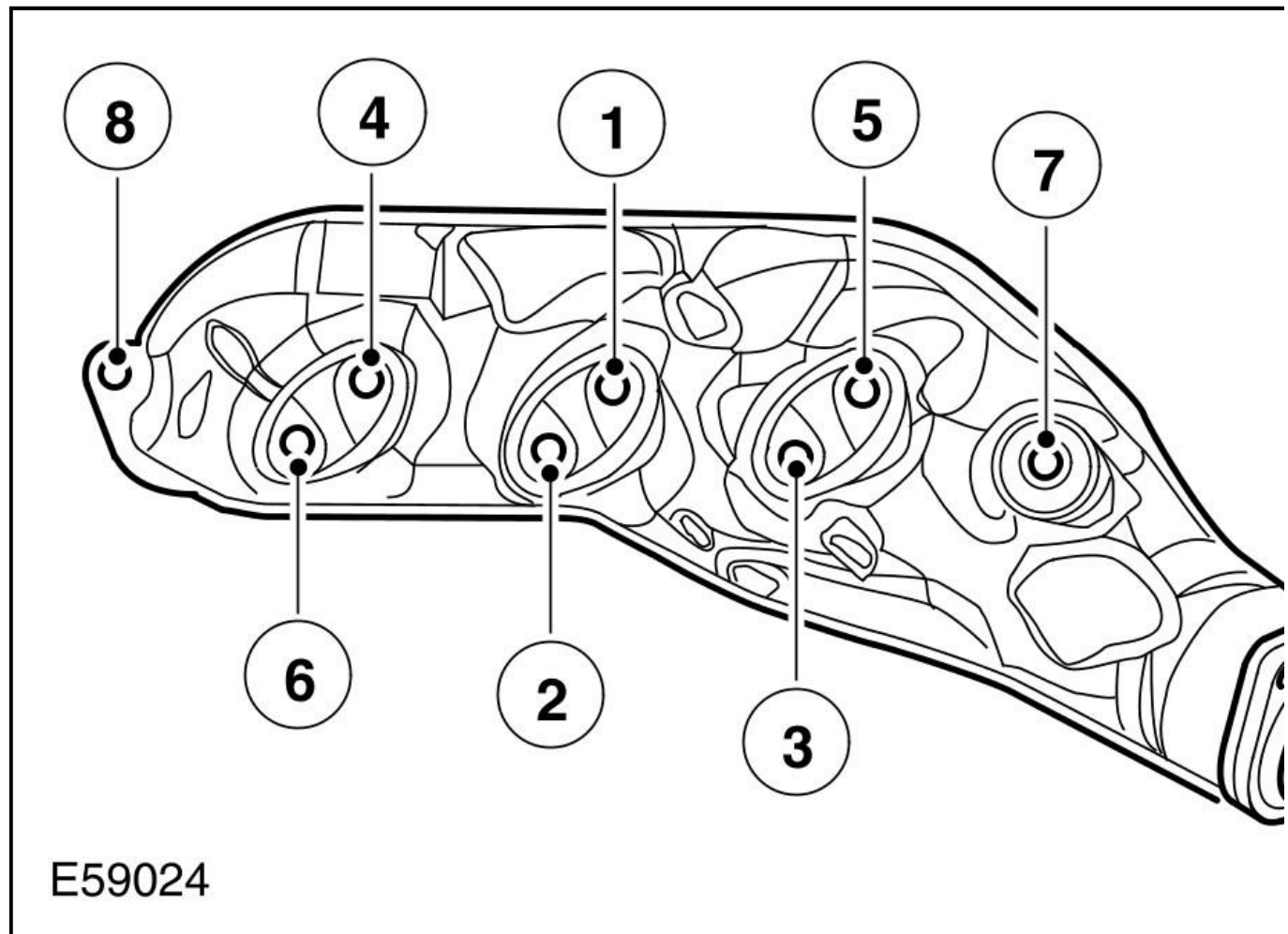
5. Measure the cylinder head material.
- Check measurement from the centre of the exhaust dowel to the cylinder head face as shown.
 - If the measurement is less than 51.88 mm the cylinder head requires replacement.



6. Install the exhaust manifold.

- Clean the component mating faces.
- Install the gasket/heat shield and tighten the bolt to 10 Nm (7 lb.ft).

- Install, and lightly tighten the bolts.
- Evenly and progressively, tighten the bolts in the sequence shown to 20 Nm (15 lb.ft).



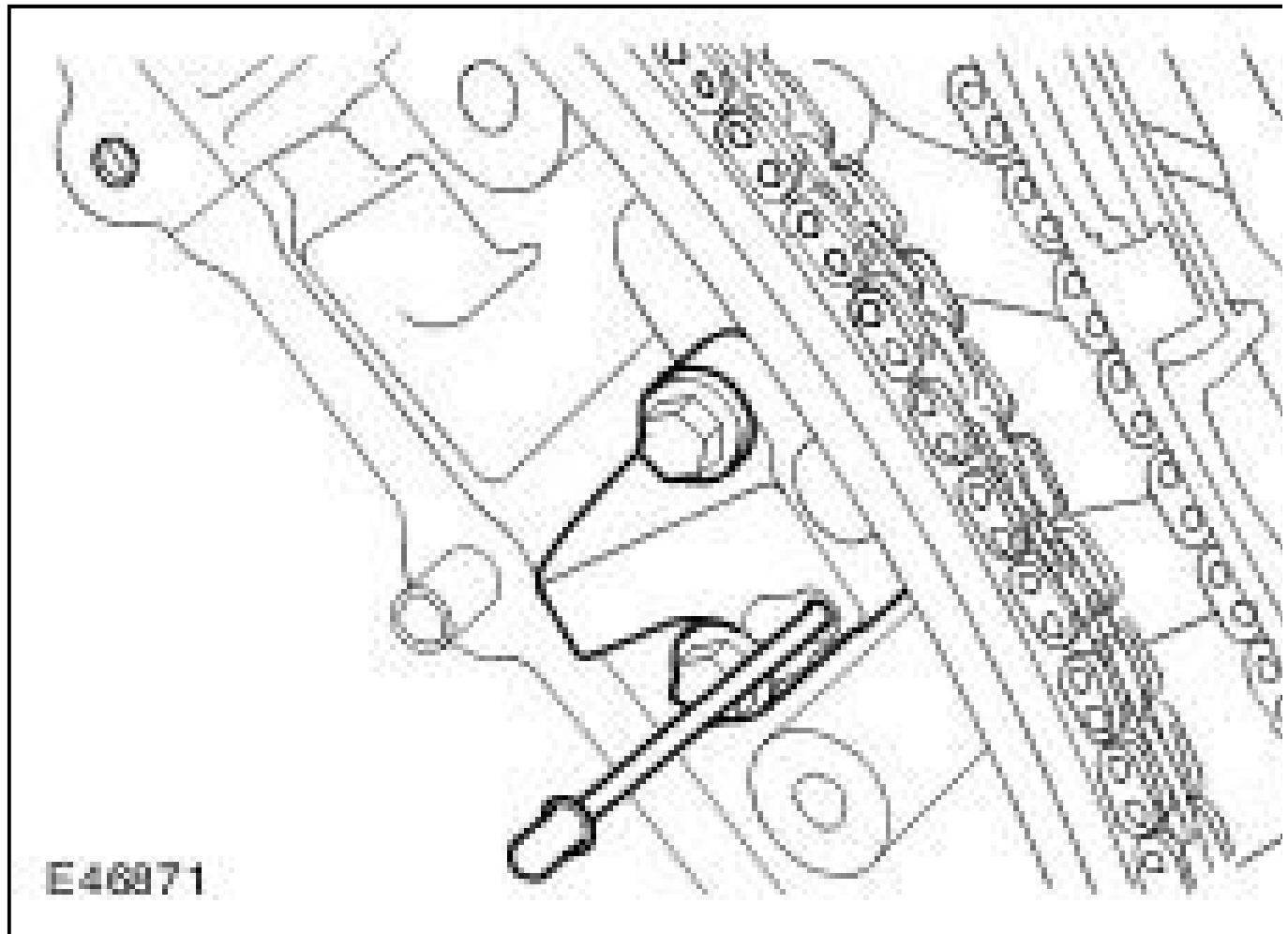
CAUTION: The head gasket must be installed over the cylinder block dowels.

7. Install a new cylinder head gasket.
8. With assistance install the cylinder head.

NOTE: Tighten the bolts 1 to 10 in the sequence shown.

9. Install the cylinder head bolts.
 - Lubricate the new cylinder head bolt threads with clean engine oil.
 - Tighten the bolts to 20 Nm (15 lb.ft).
 - Tighten the bolts to 35 Nm (26 lb.ft).
 - Tighten the bolts 1 to 10, a further 90 degrees.

- Tighten the bolts 1 to 10, a further 90 degrees.
- Tighten the M8 bolts 11 and 12, to 25 Nm (18 lb.ft).



10. Install the CMP sensor.
 - Tighten the Torx screw to 7 Nm (5 lb.ft).
 - Connect the electrical connector.
11. Position the RH catalytic converter to the exhaust manifold.
 - Clean the components.
 - Tighten the new nuts to 20 Nm (15 lb.ft).
12. Position the LH catalytic converter to the exhaust manifold.
 - Clean the components.
 - Tighten the new nuts to 20 Nm (15 lb.ft).
13. Install the LH bank camshafts. Refer to **CAMSHAFTS LH**.
14. Install the fuel rail. Refer to **FUEL RAIL**.
15. Connect the battery ground cable. Refer to **SPECIFICATIONS**.

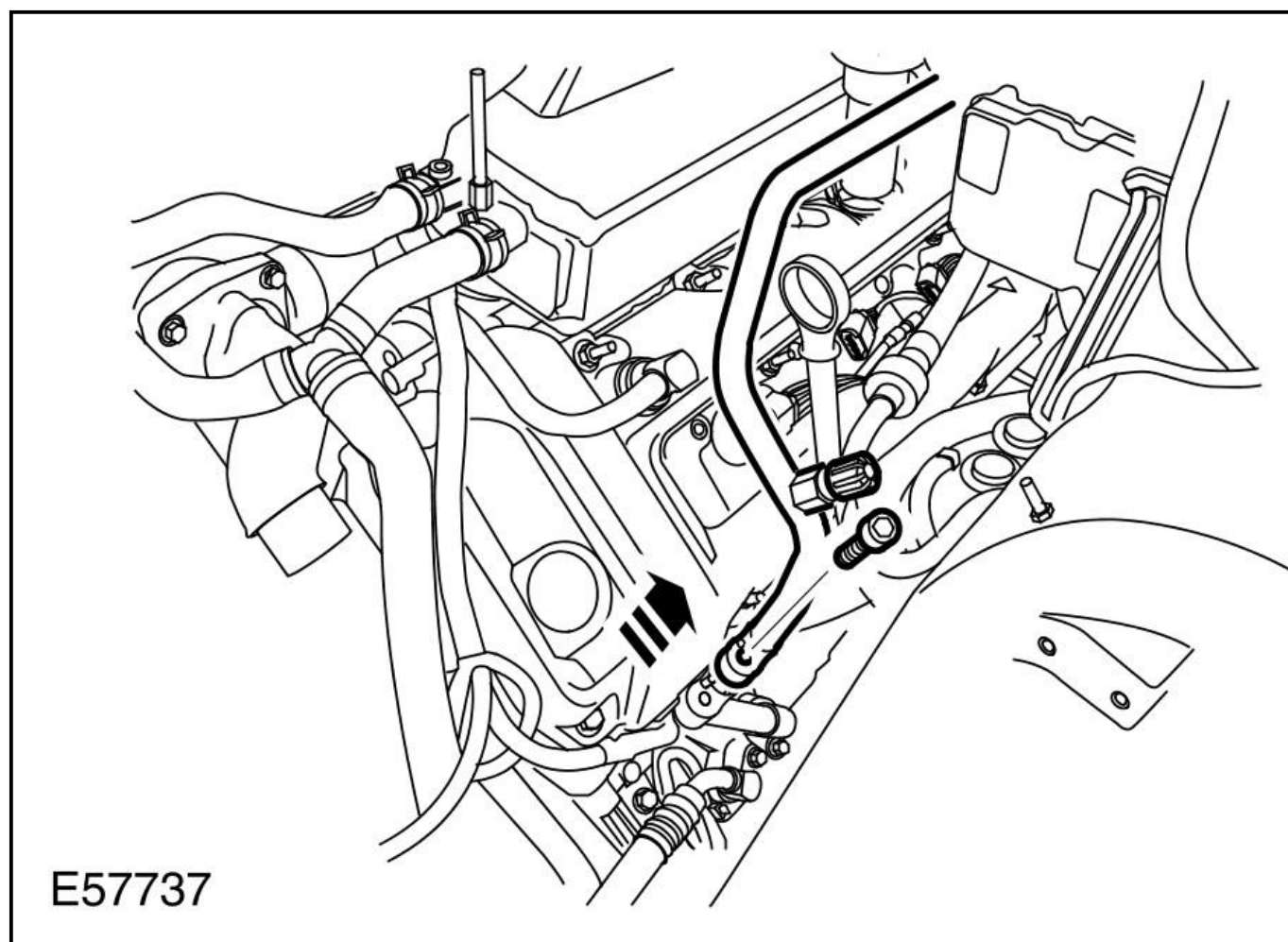
VALVE COVER LH

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .
2. Recover the A/C refrigerant. Refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING** .
3. Remove the air intake resonator. Refer to **INTAKE AIR RESONATOR** .
4. Remove the ignition coil-on-plug. Refer to **IGNITION COIL-ON-PLUG** .
5. Remove the remaining ignition coil-on-plugs.

CAUTION: Immediately cap all refrigerant lines to prevent ingress of dirt and moisture.

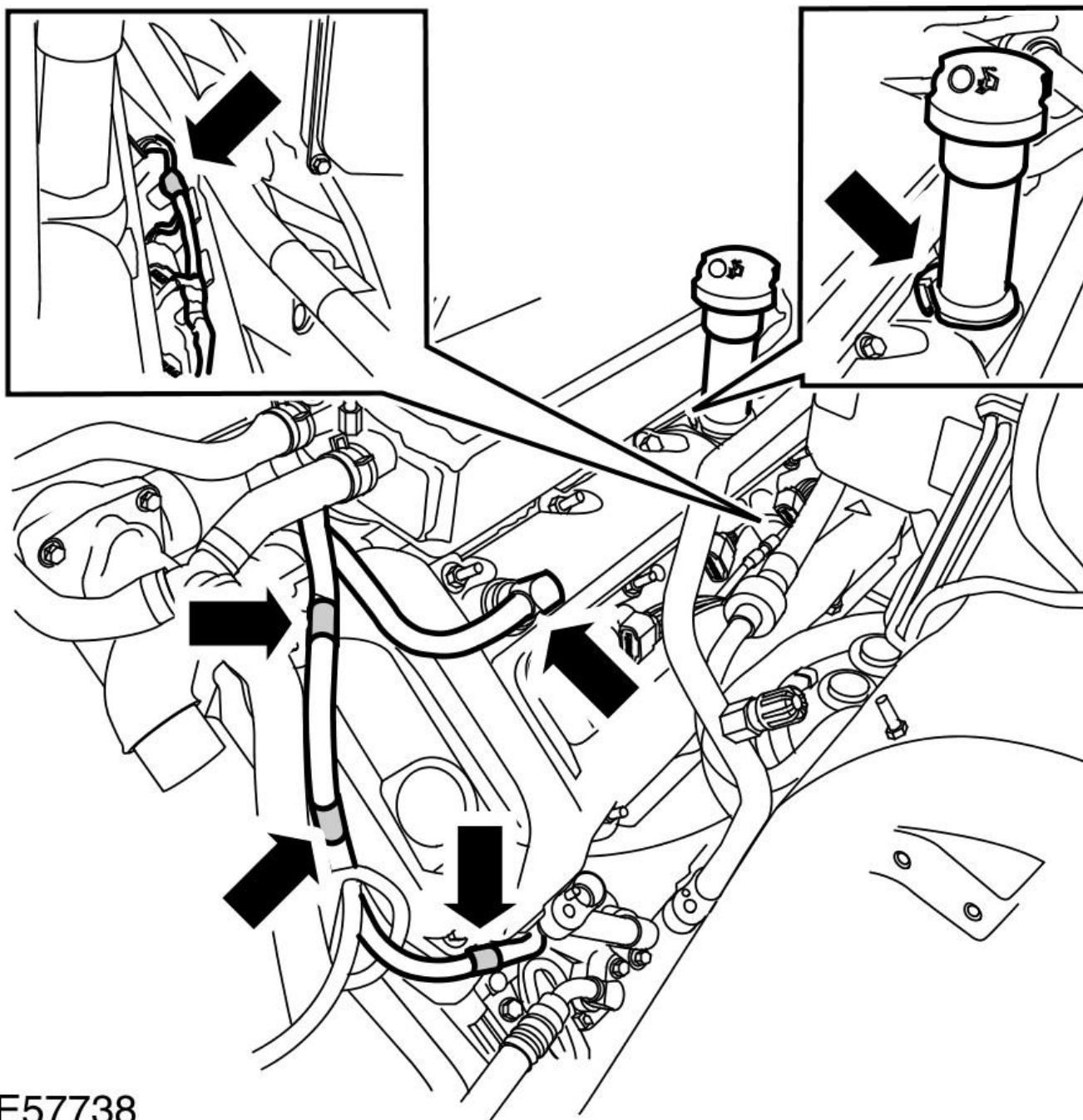
6. Disconnect the A/C compressor low pressure line.
 - Remove the Allen bolt.
 - Remove and discard the O-ring seal.



7. Remove the oil level indicator and tube. Refer to **OIL LEVEL INDICATOR AND TUBE**.
8. Disconnect the valve cover breather hose.
9. Release the engine wiring harness.
 - Release from the 4 clips.

NOTE: **Rotate the oil filler pipe counter-clockwise to remove.**

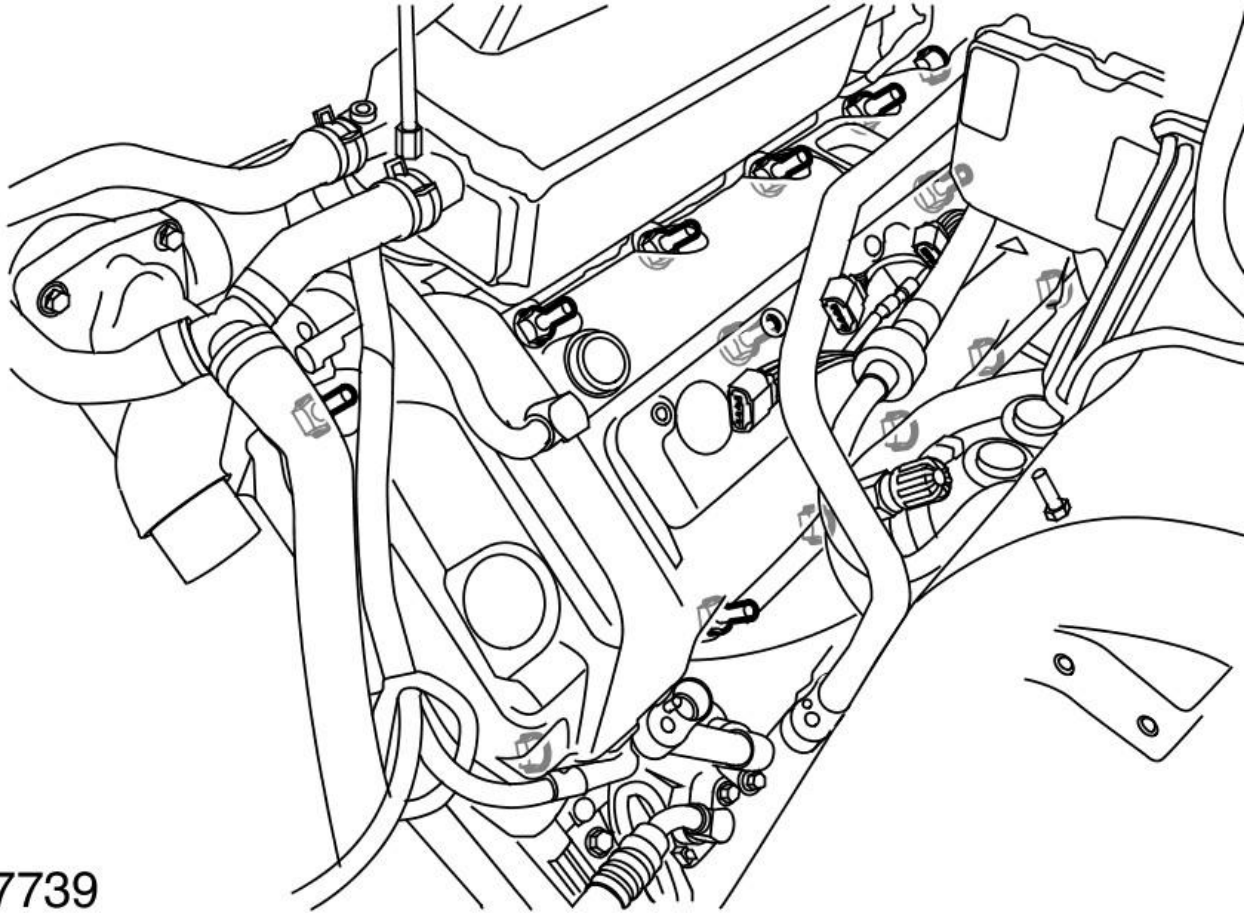
10. Remove the oil filler pipe.
 - Release the clip.



E57738

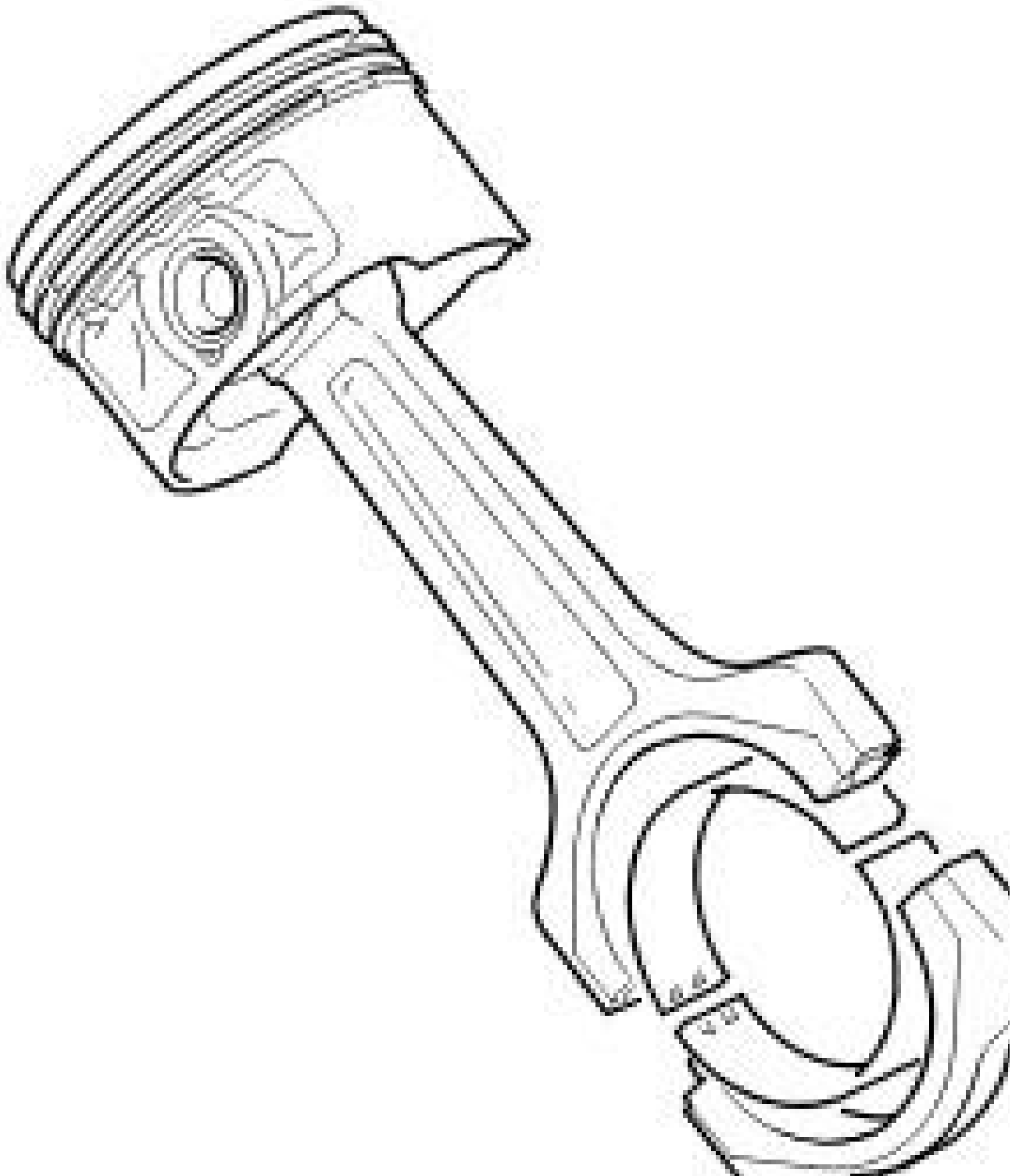
NOTE: Note the fitted position of the retaining bolts prior to removal.

11. Remove the valve cover.
 - Remove the 14 bolts.

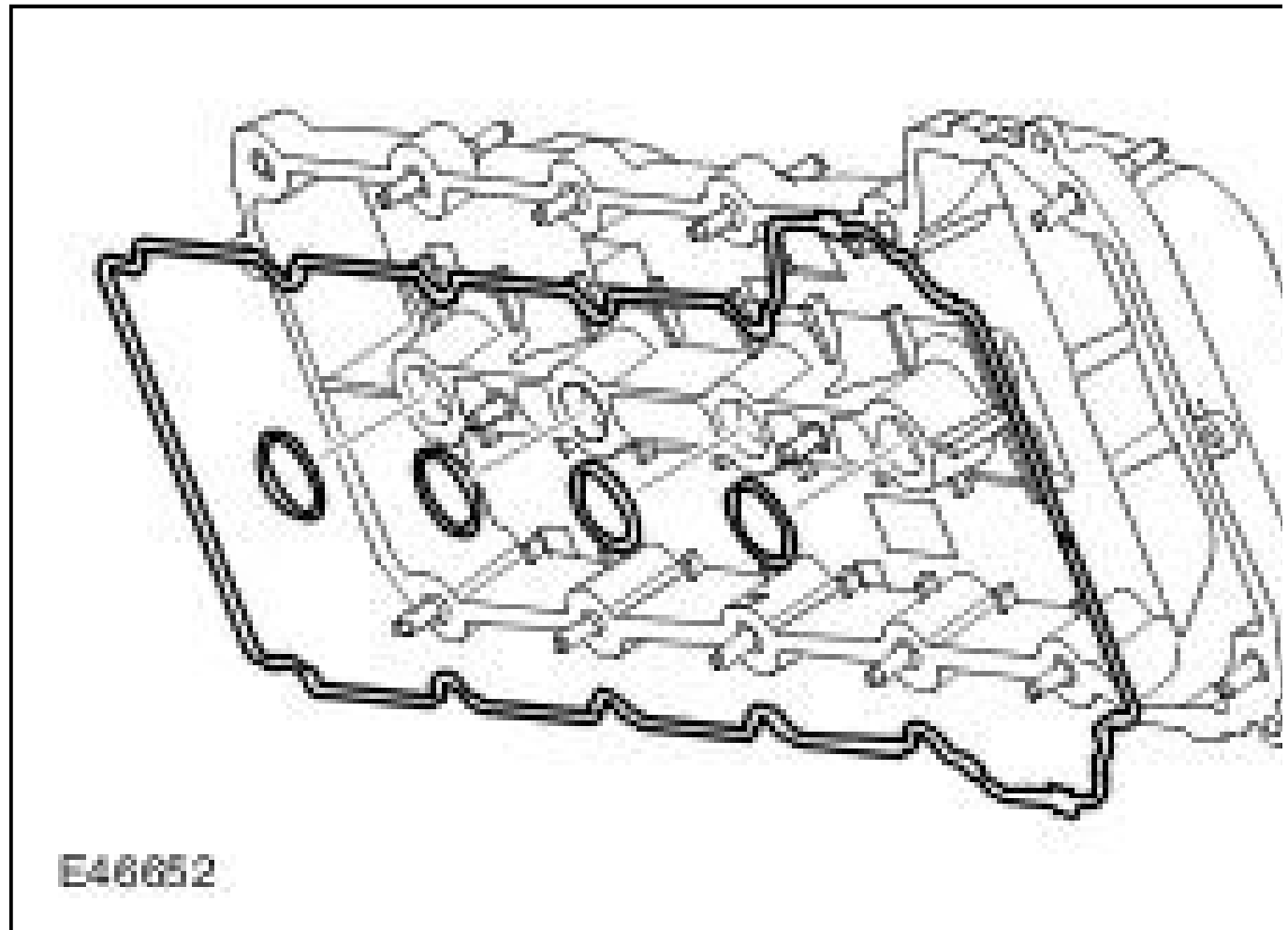


E57739

12. Remove and discard the valve cover retaining bolt O-ring seals.



13. Remove and discard the valve cover gasket.
14. Remove the valve cover plug aperture seals.

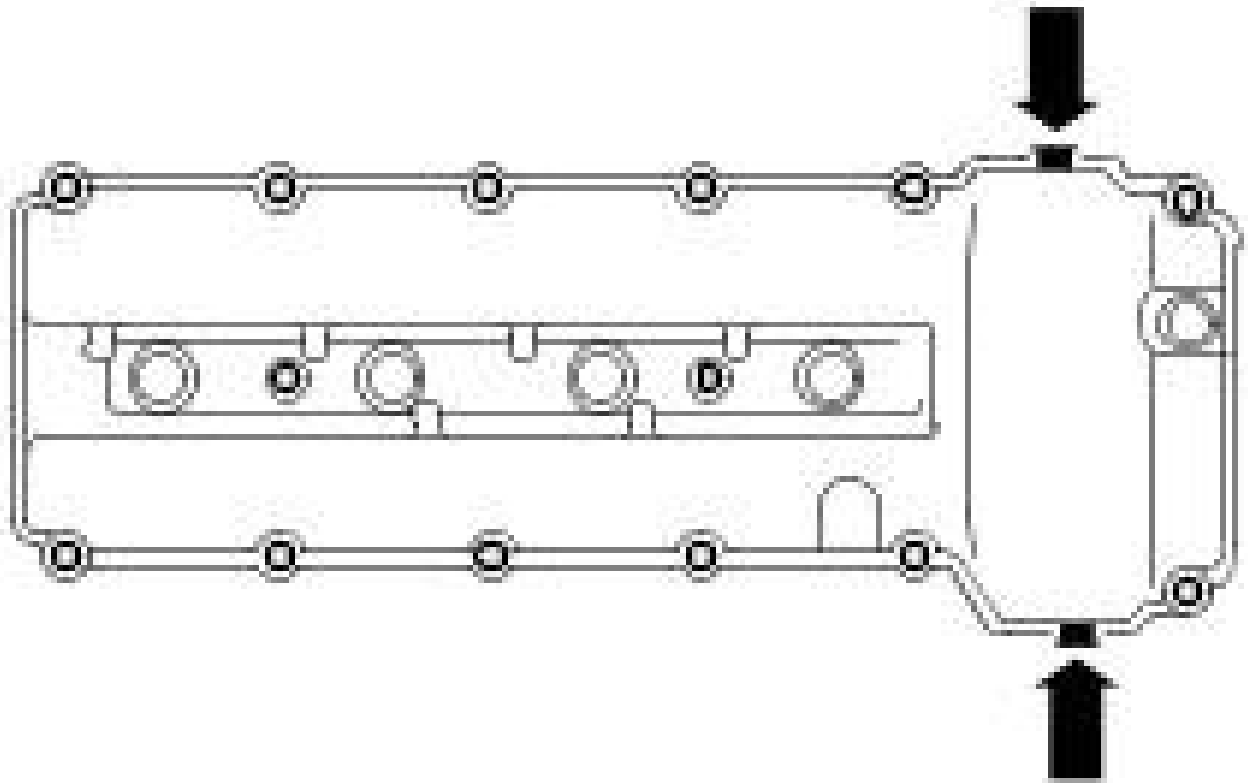


INSTALLATION

1. Install new valve cover plug aperture seals
2. Install a new valve cover gasket.
3. Install new valve cover retaining bolt O-ring seals

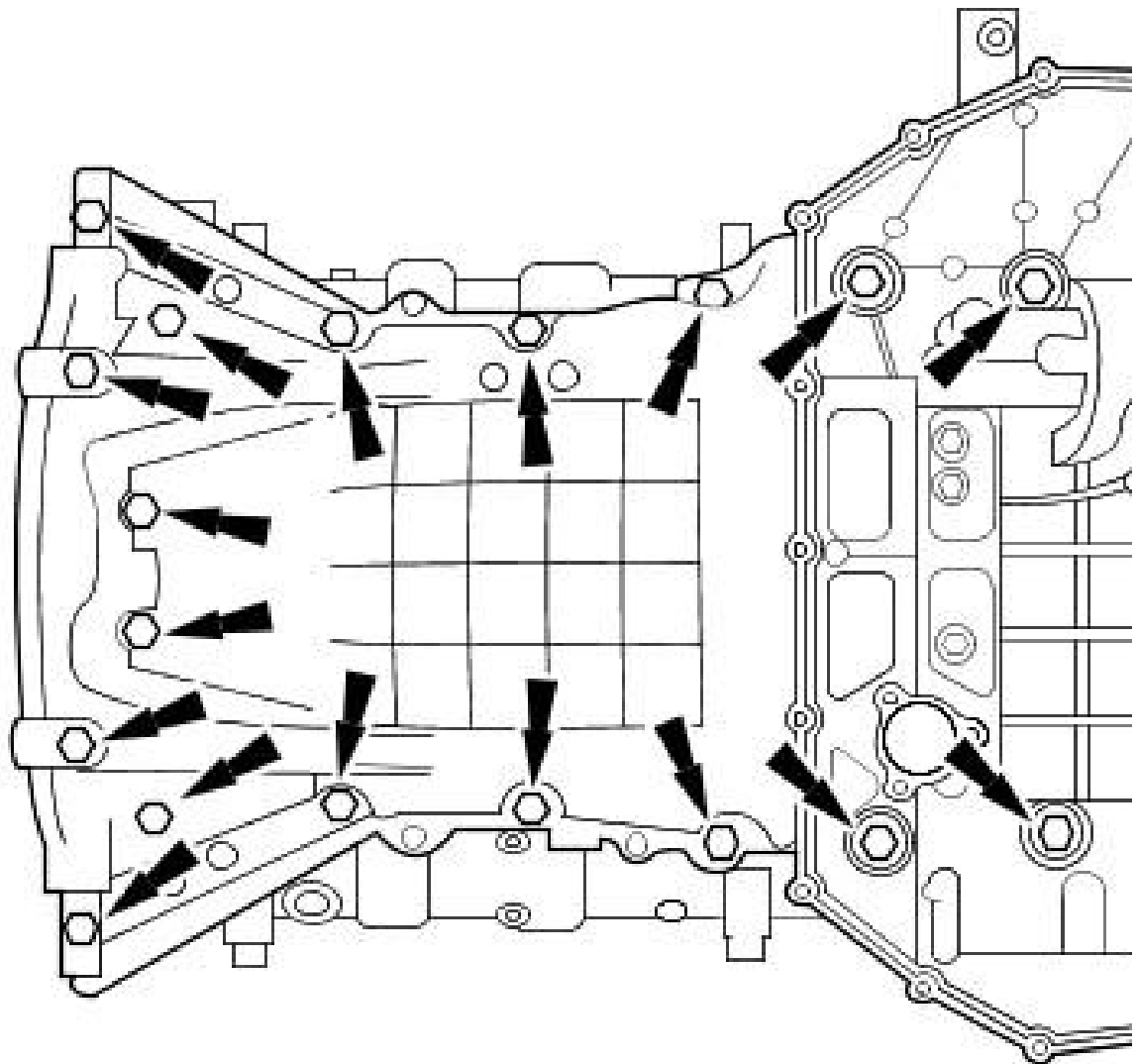
NOTE: Apply two beads of silicone gasket sealant as shown on the illustration. The application of the sealant must be 3mm diameter 12mm long. Install the valve cover immediately after applying the sealant. The cover should be fitted directly to the head without smearing the sealant or the seals.

4. Install the valve cover.
 - Clean the component mating faces.



E49922

5. Install the valve cover retaining bolts.
 - Install valve cover retaining bolts to their position previously noted.
 - Tighten the bolts to 12 Nm (9 lb.ft).
 - Complete the tightening sequence as illustrated.



VUJ0002435

6. Install the oil filler pipe.
 - Secure with the clip.
7. Attach the engine wiring harness.
8. Install the oil level indicator and tube. Refer to **OIL LEVEL INDICATOR AND TUBE**.
9. Connect the valve cover breather hose.
10. Install the ignition coil-on-plug. Refer to **IGNITION COIL-ON-PLUG**.

CAUTION: Lubricate the new seals with clean refrigerant oil.

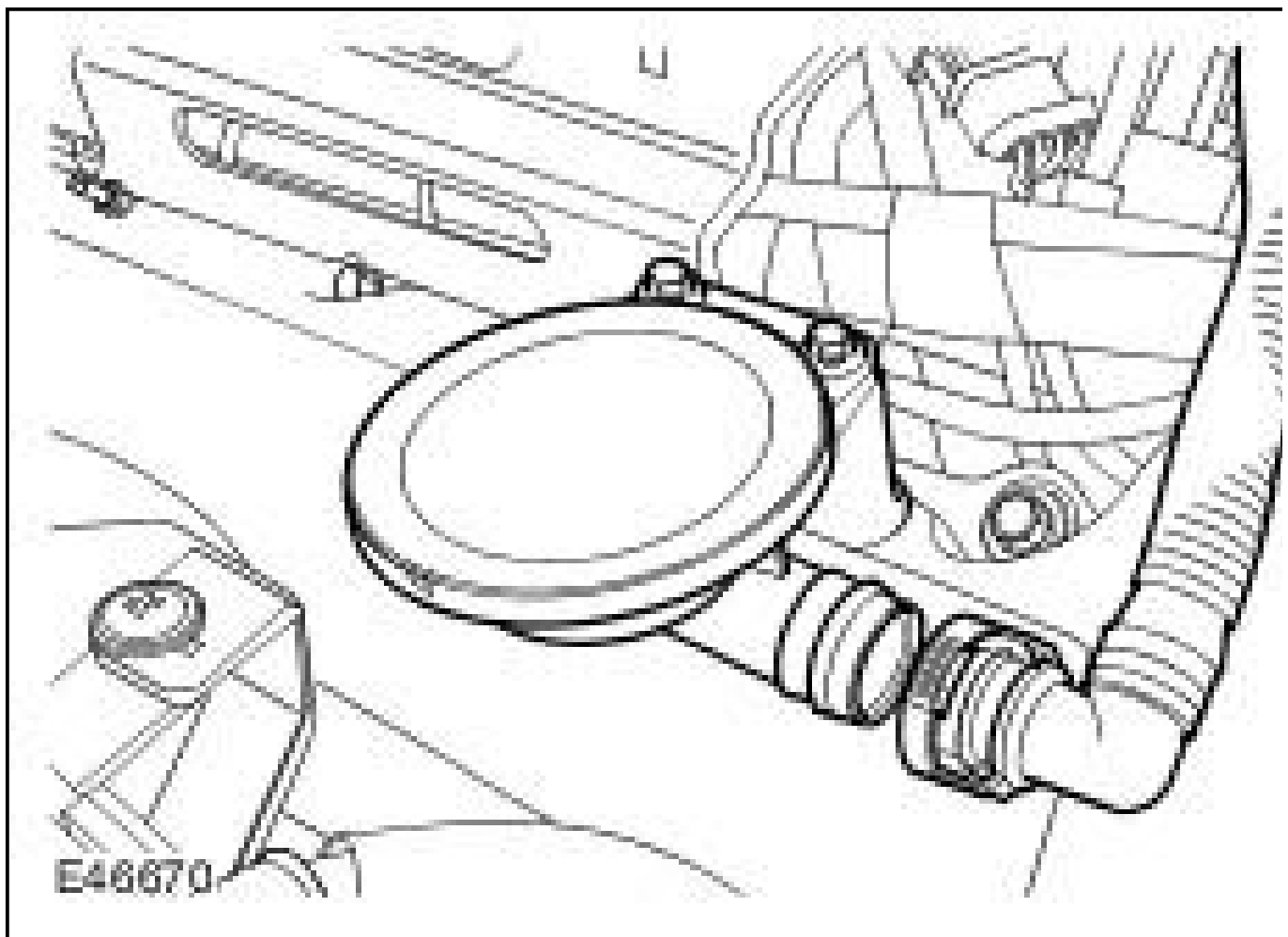
11. Connect the A/C compressor low pressure line.
 - Install a new O-ring seal.
 - Tighten the Allen bolt to 10 Nm (7 lb.ft).

12. Install the remaining coil-on-plugs.
13. Install the air intake resonator. Refer to **INTAKE AIR RESONATOR** .
14. Recharge the A/C system. Refer to **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING** .
15. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

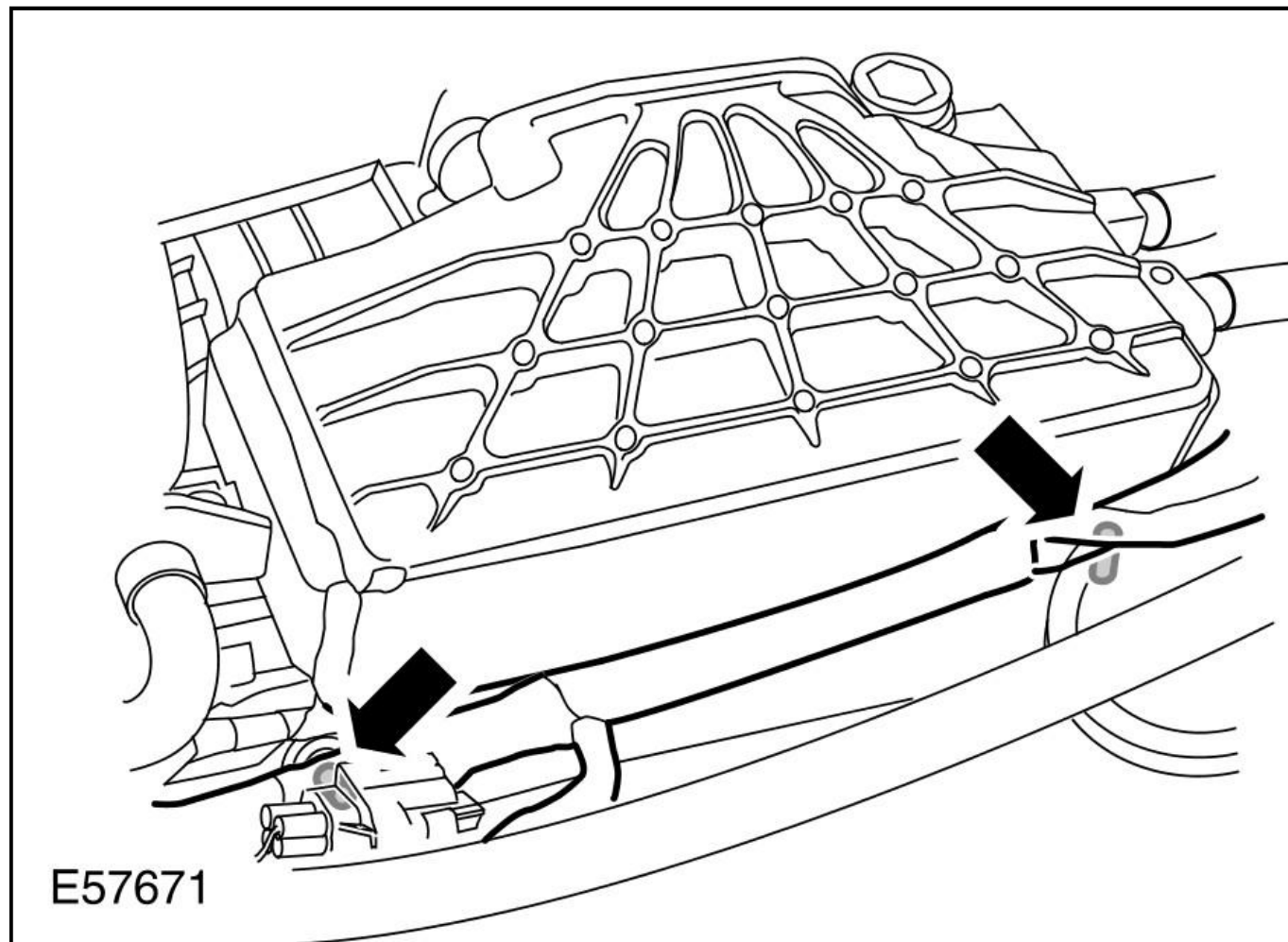
VALVE COVER RH

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .
2. Remove the air intake resonator. Refer to **INTAKE AIR RESONATOR** .
3. Remove the ignition coil-on-plug. Refer to **IGNITION COIL-ON-PLUG** .
4. Remove the remaining ignition coil-on-plugs.
5. Disconnect the positive crankcase ventilation (PCV) line.

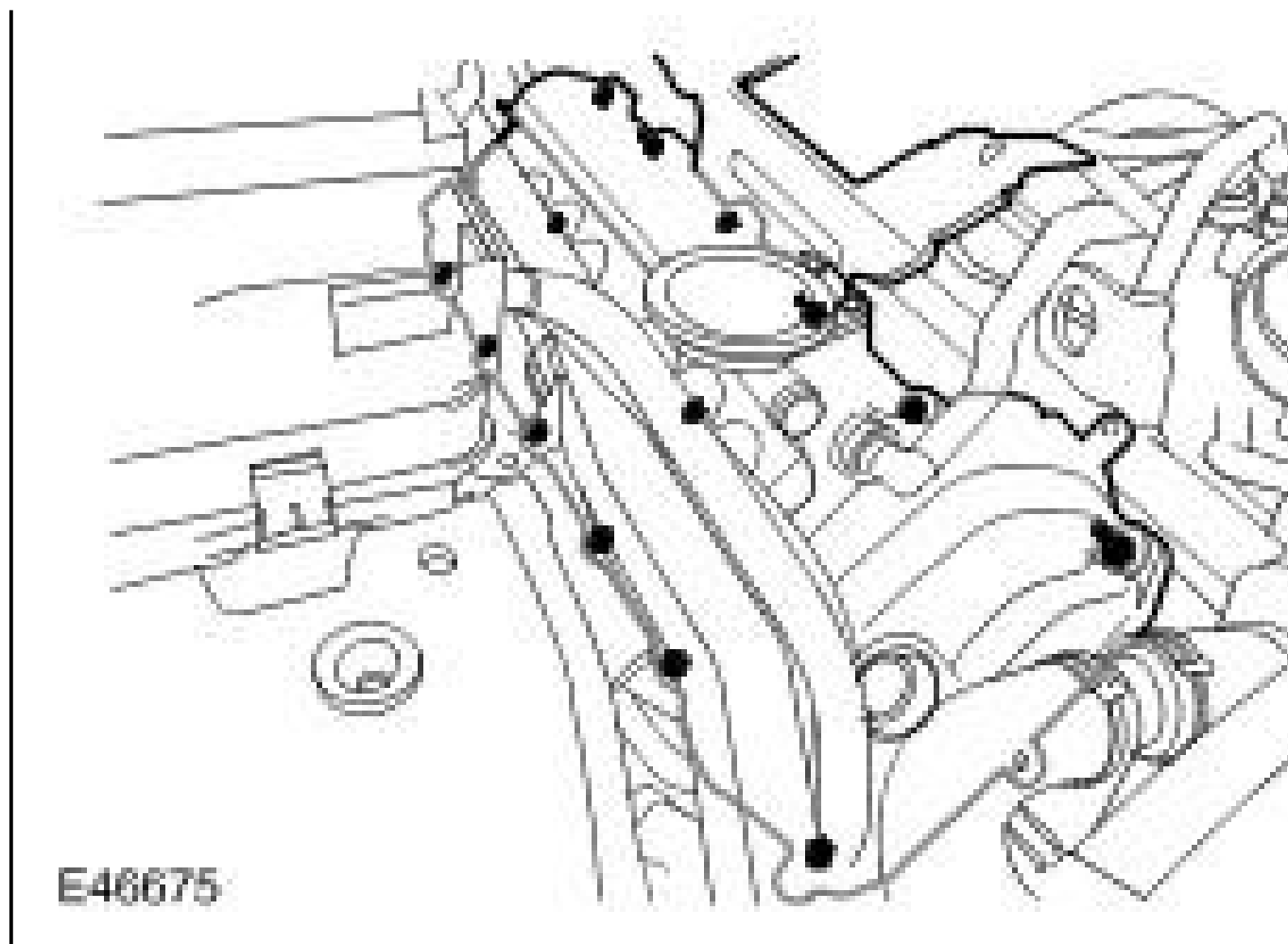


6. Release the engine wiring harness.

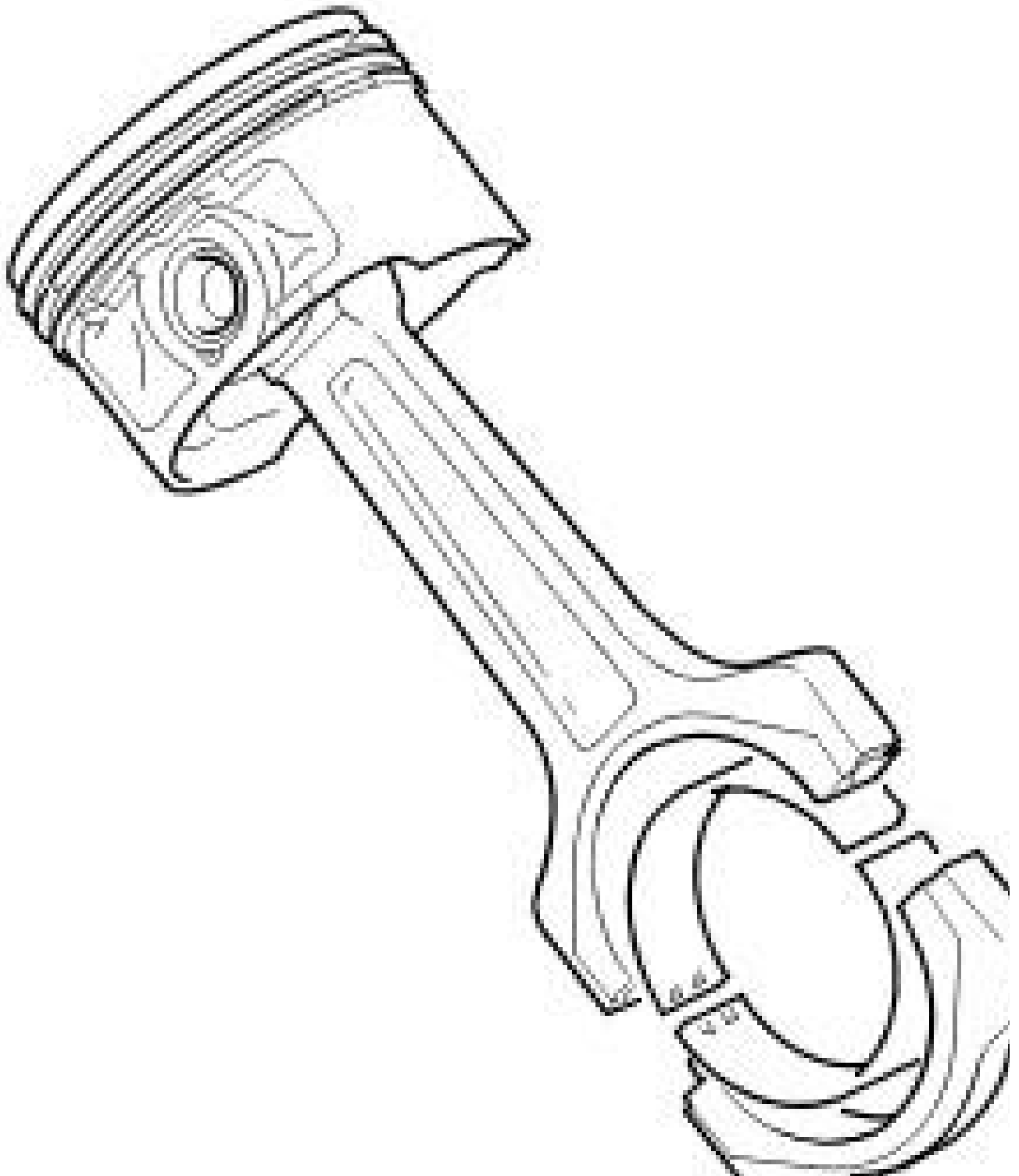


NOTE: Note the fitted position of the retaining bolts prior to removal.

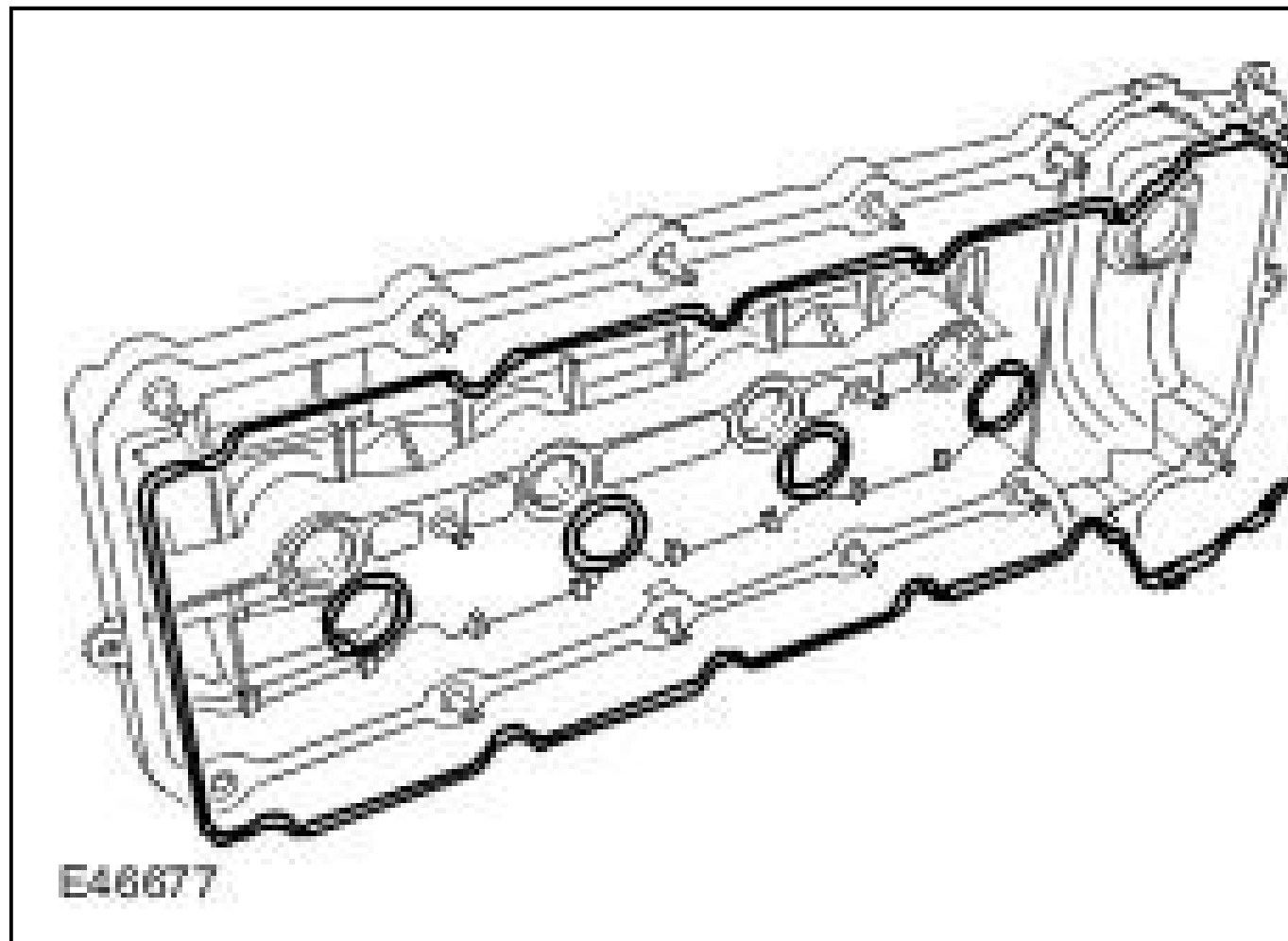
7. Remove the valve cover assembly.
 - Remove the 14 bolts.



8. Remove and discard the valve cover retaining bolt O-ring seals.

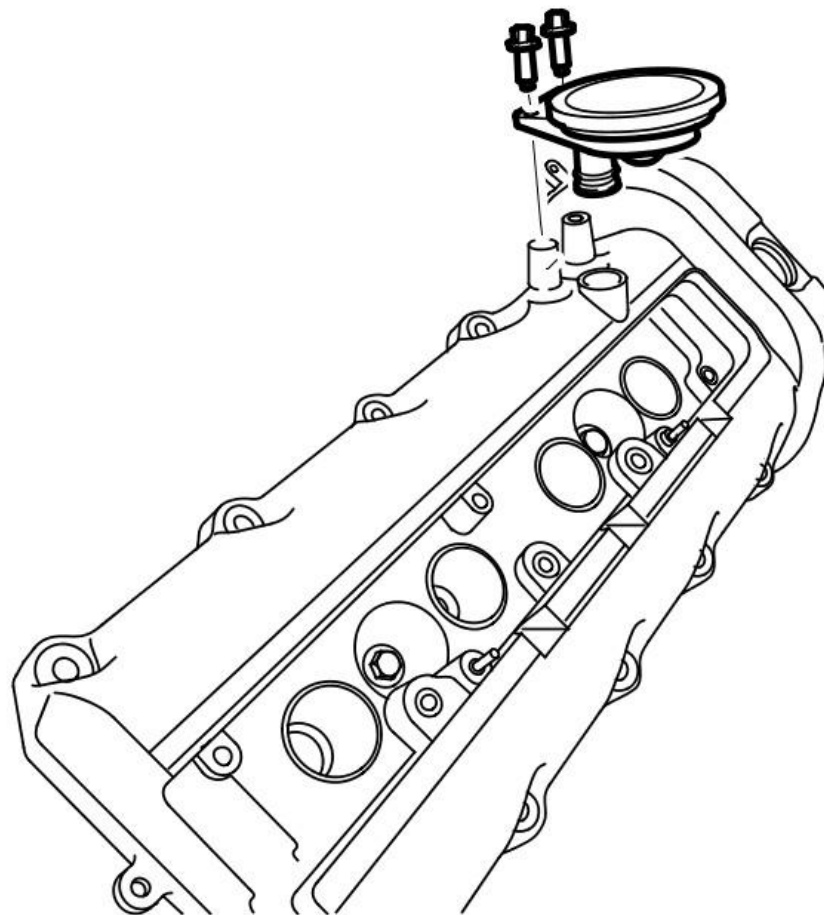


9. Remove and discard the valve cover gasket.
10. Remove the valve cover plug aperture seals.



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

11. Remove the PCV valve.
 - Remove the 2 bolts.
 - Remove and discard the 2 O-ring seals.



E46678

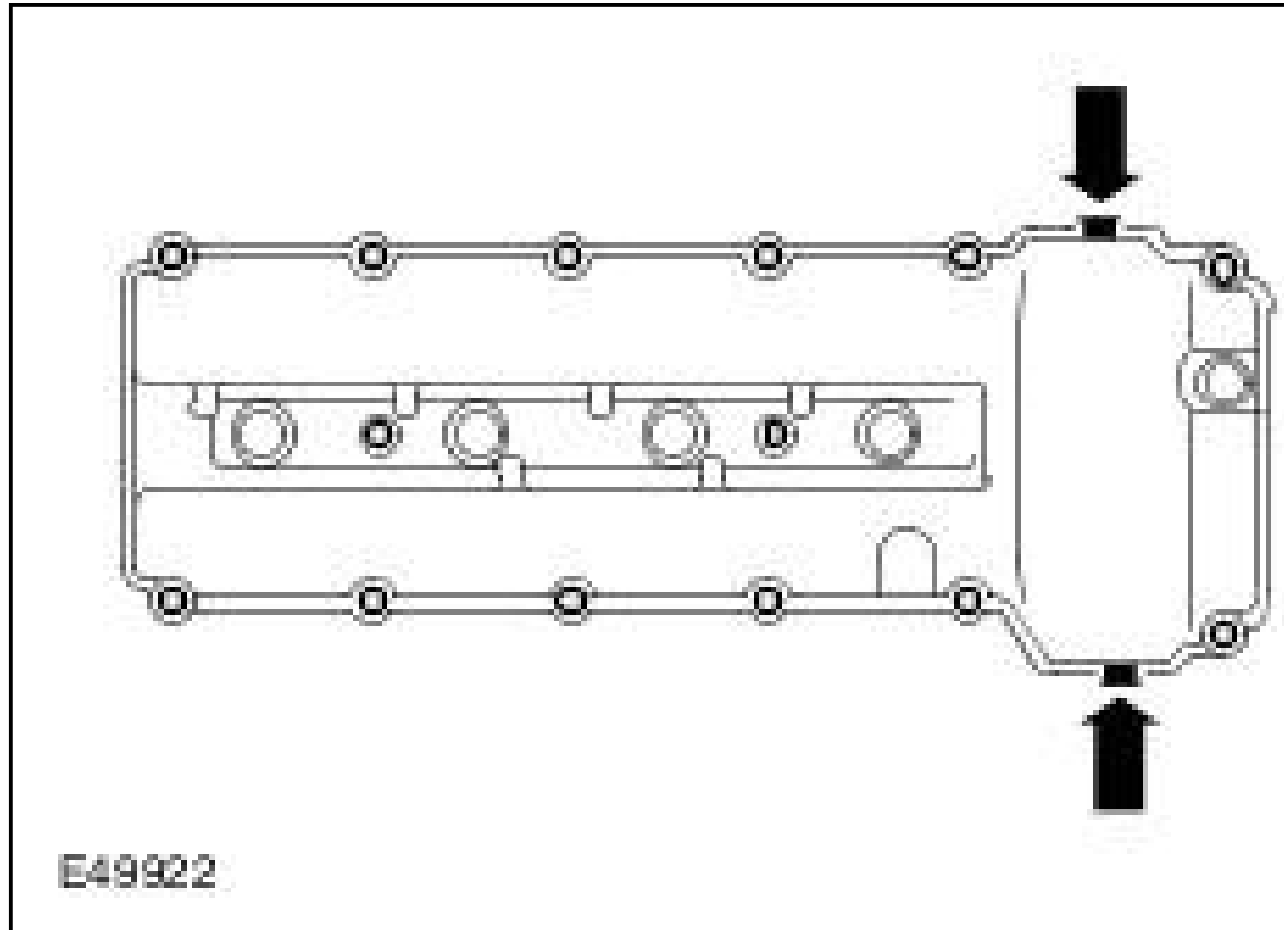
INSTALLATION

1. Install the PCV valve.
 - Clean the component mating faces.
 - Install new O-ring seals.
 - Lubricate the O-ring seals with clean engine oil.
 - Tighten the bolts to 6 Nm (4 lb.ft).
2. Install new valve cover plug aperture seals
3. Install a new valve cover gasket.
4. Install new valve cover retaining bolt O-ring seals

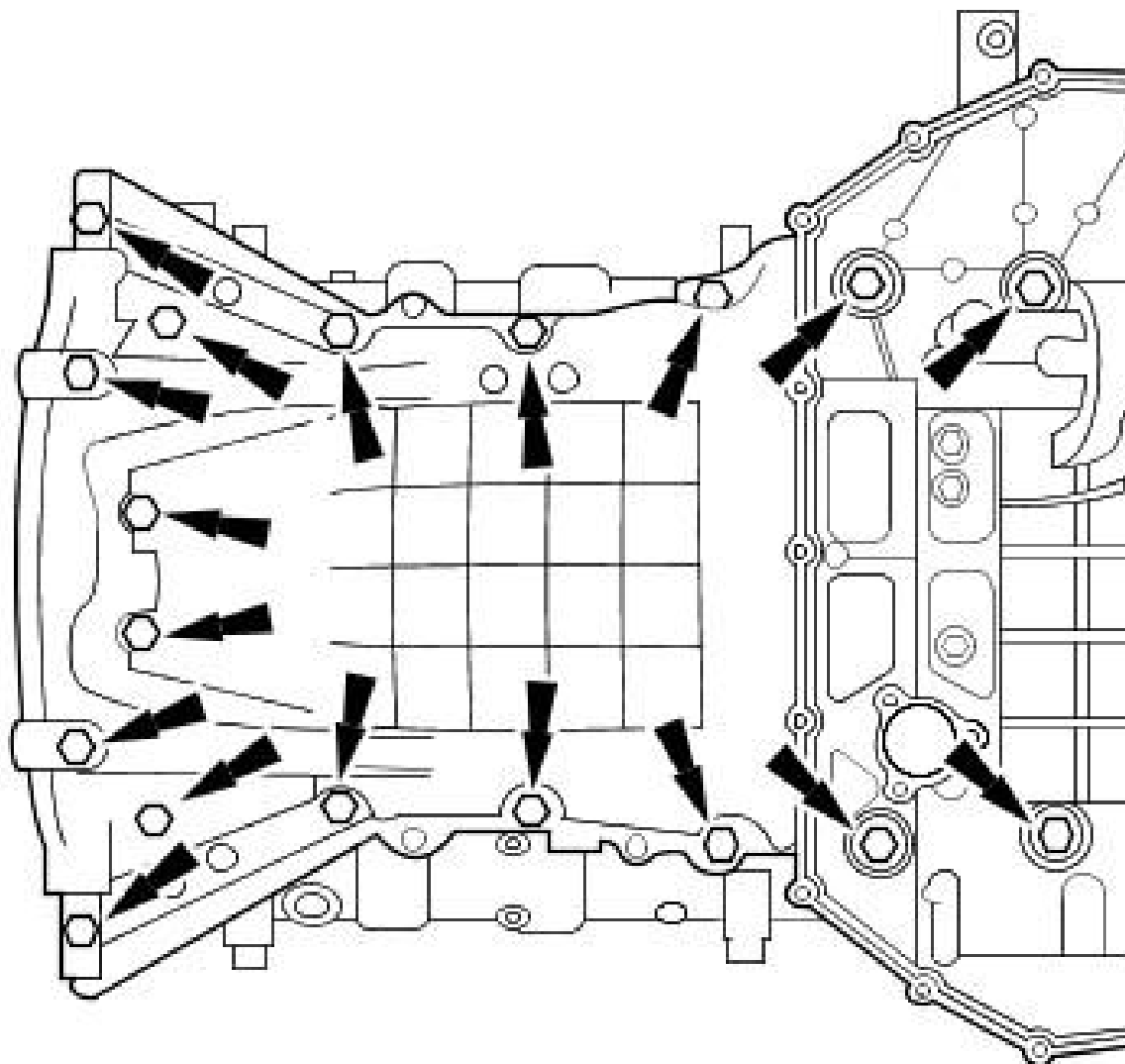
NOTE: Apply two beads of silicone gasket sealant as shown on the illustration. The application of the sealant must be 3mm diameter 12mm long. Install the valve cover immediately after applying the sealant. The cover should be fitted directly to the head without smearing the sealant or the seals.

5. Install the valve cover.

- Clean the component mating faces.



6. Install the valve cover retaining bolts.
 - Install valve cover retaining bolts to their position previously noted.
 - Tighten the bolts to 12 Nm (9 lb.ft).
 - Complete the tightening sequence as illustrated.



VUJ0002435

7. Attach the engine wiring harness.
8. Connect the PCV line.
9. Install the ignition coil-on-plug. Refer to **IGNITION COIL-ON-PLUG** .
10. Install the remaining coil-on-plugs.
11. Install the air intake resonator. Refer to **INTAKE AIR RESONATOR** .
12. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

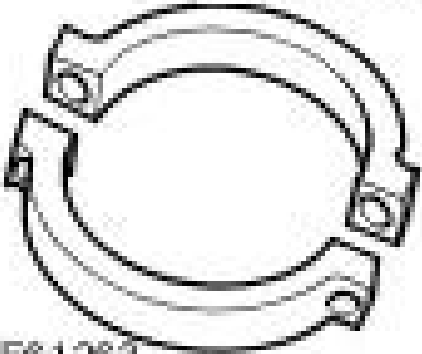
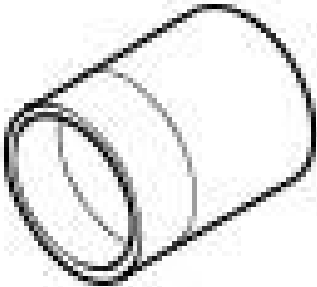
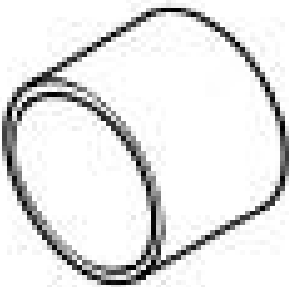
ENGINE MOUNT LH

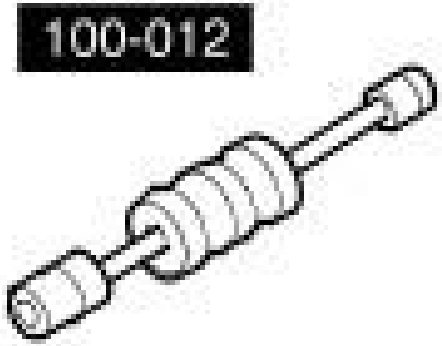
SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
	Remover halfshaft inboard joint (LRT-54-026)	205-735

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

 205-735 E61263		
 308-626/1 E54136	Installer halfshaft oil seal	308-626/1
 308-626/2 E54137	Installer/Guide halfshaft oil seal	308-626/2
	Impulse extractor (LRT-99-004)	100-012

 100-012 E54135		
 205-754A E45276	Ball joint separator (LRT-54-027)	205-754

REMOVAL**All Vehicles**

1. Disconnect the battery ground cable. Refer to SPECIFICATIONS .

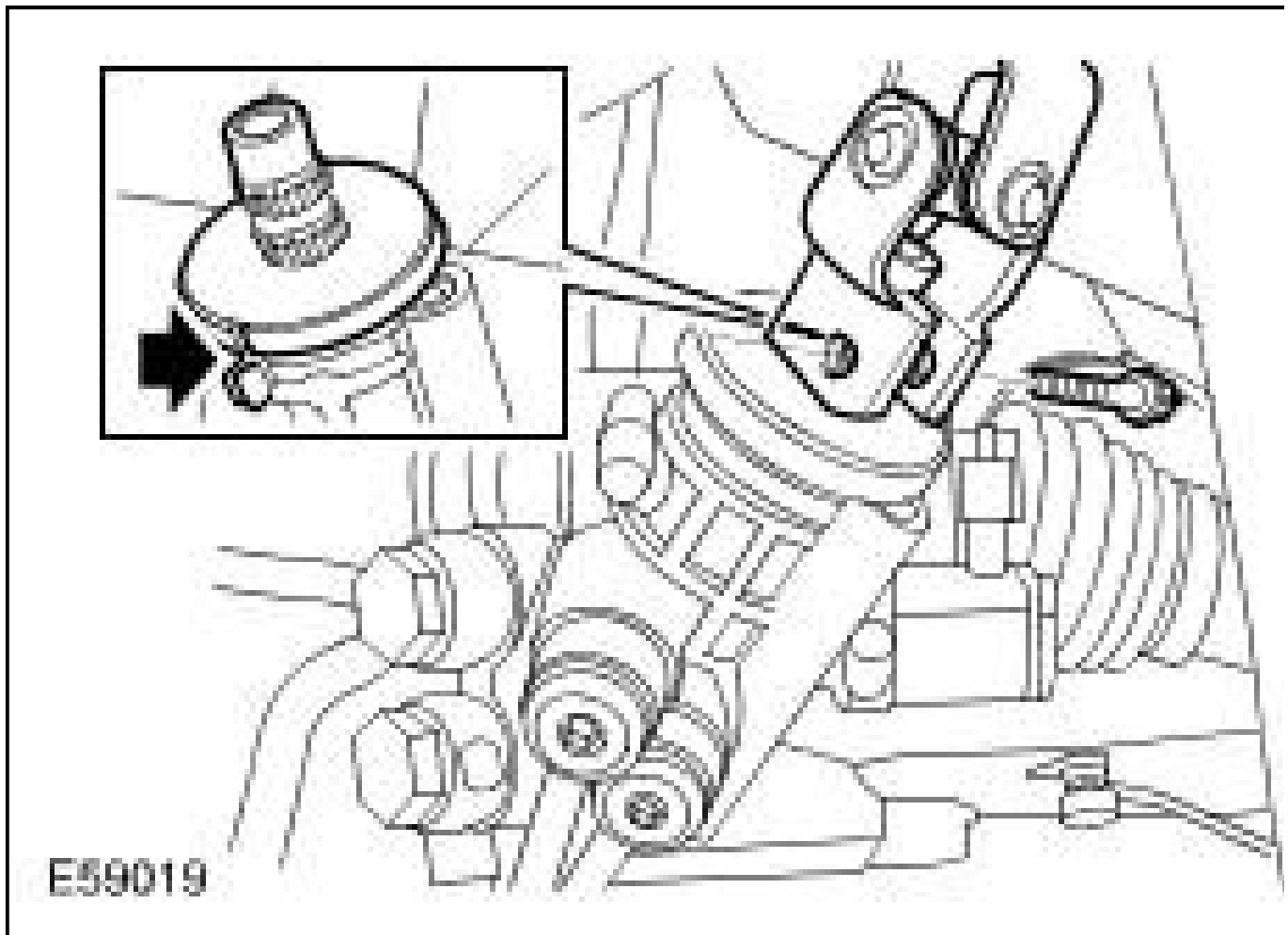
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the radiator splash shield. Refer to RADIATOR SPLASH SHIELD .
4. Remove the exhaust system. Refer to EXHAUST SYSTEM .
5. Drain the differential fluid. Refer to DIFFERENTIAL DRAINING AND FILLING .
6. Remove the front wheels and tires.

Left-Hand Drive Vehicles

CAUTION: Do not turn the steering wheel with the lower steering column disconnected as damage to the clock spring and steering wheel switches may occur.

7. Disconnect the lower steering column from the steering gear.
 - Note the fitted position.
 - Align the steering wheel to straight ahead.
 - Remove and discard the Torx bolt.



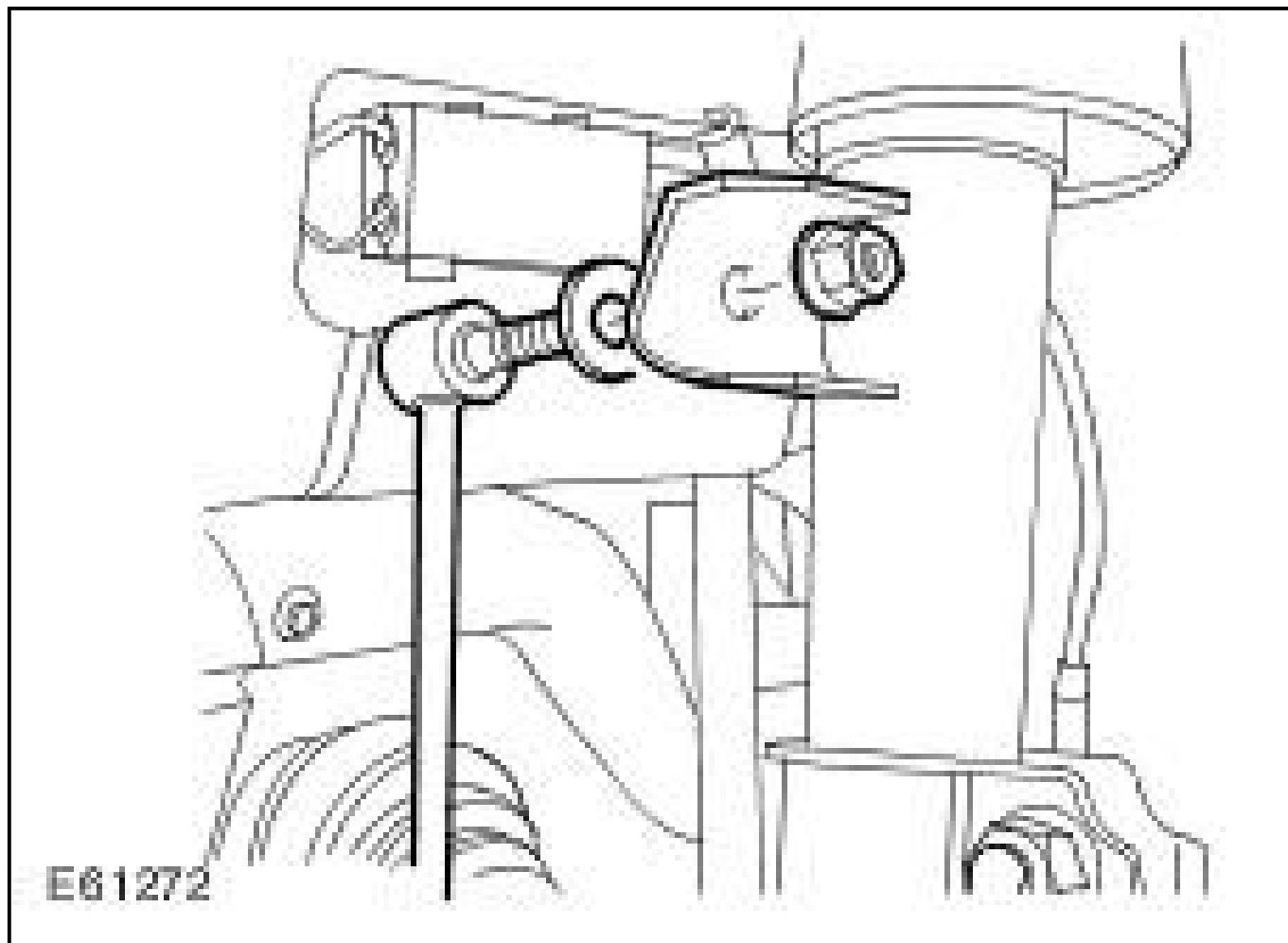
All Vehicles

NOTE: Use an additional wrench to prevent the ball joint rotating.

NOTE: Note the fitted position of the washers.

8. LH side: Disconnect the stabilizer bar link.
 - Remove the nut.

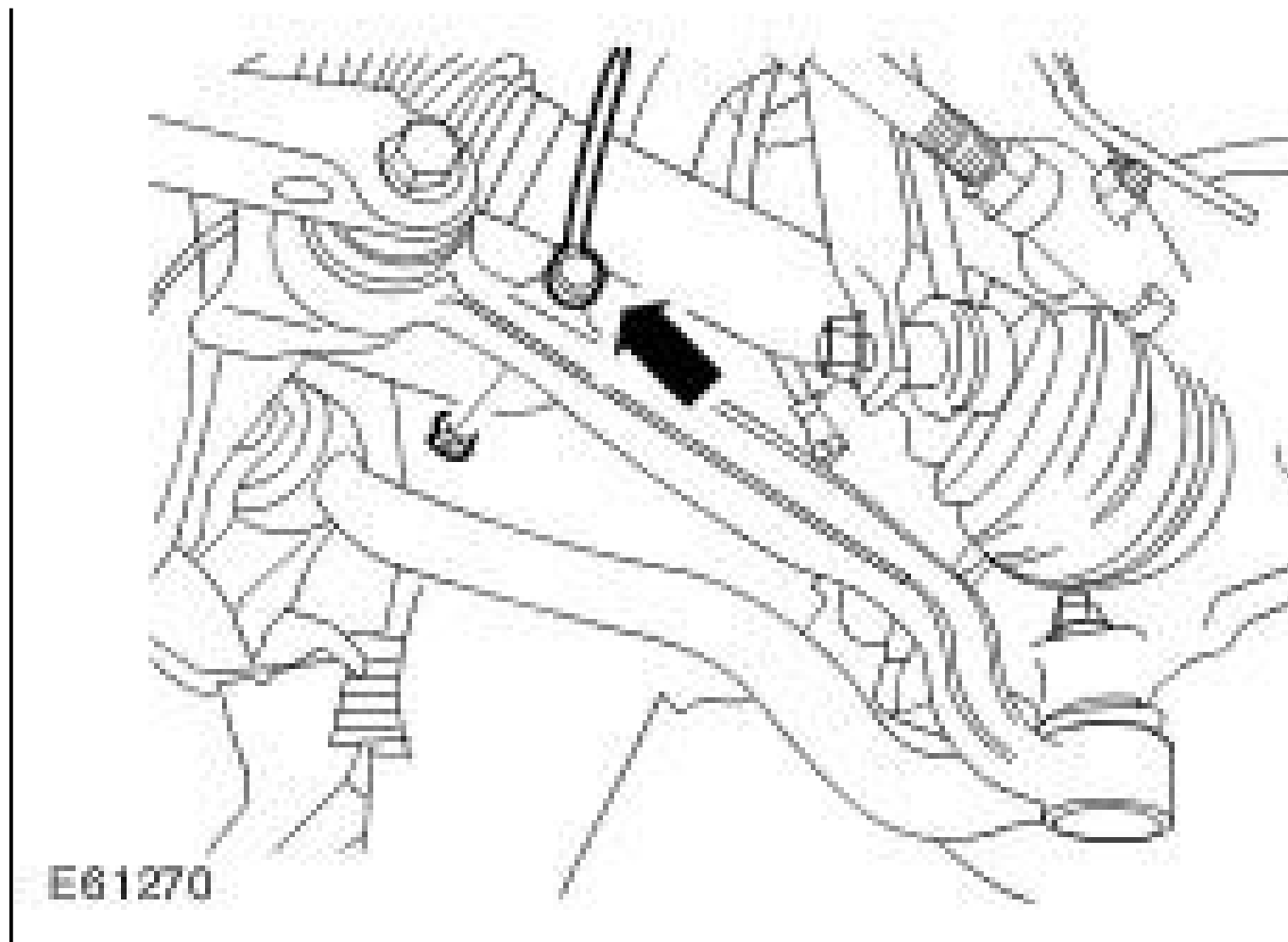
- Remove the flat washer.



NOTE: Use an additional wrench to prevent the ball joint rotating.

9. LH side: Disconnect the suspension height sensor link arm.

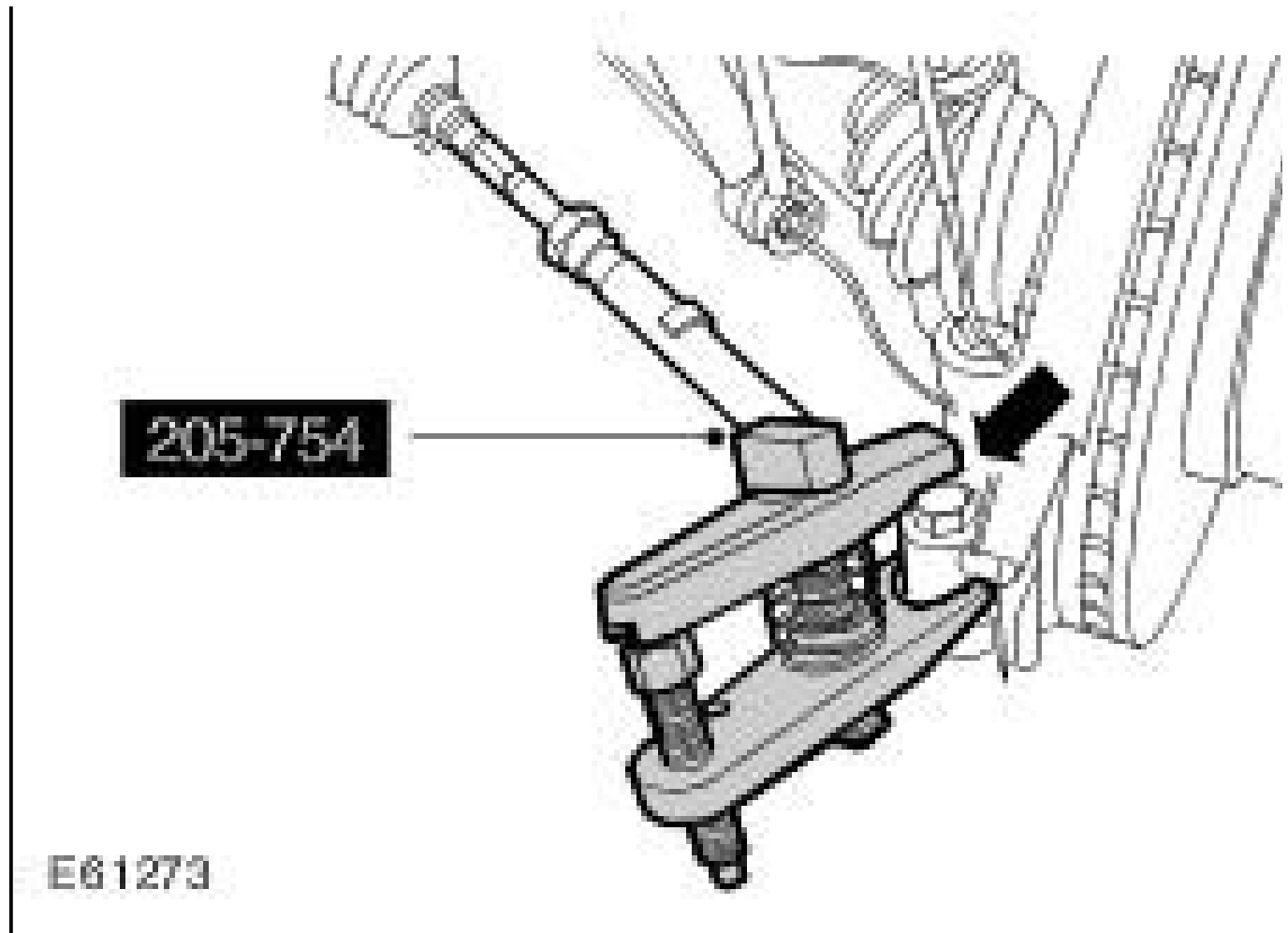
- Remove the nut.



CAUTION: Ensure the ball joint seal is not damaged. A damaged seal will lead to the premature failure of the joint.

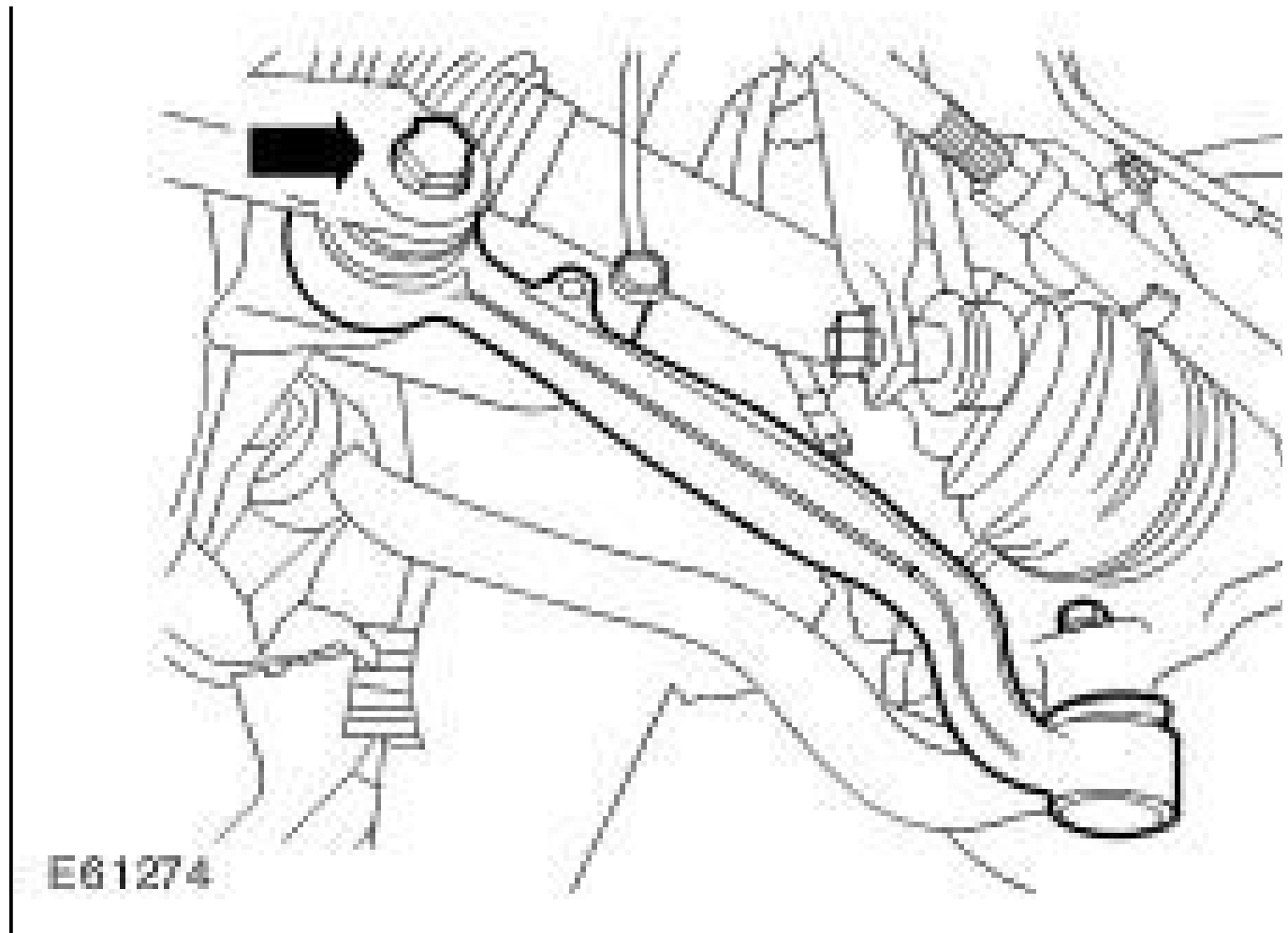
10. LH side: Disconnect the steering gear tie rod end ball joint.

- Loosen the tie-rod end ball joint retaining nut.
- Discard the nut.



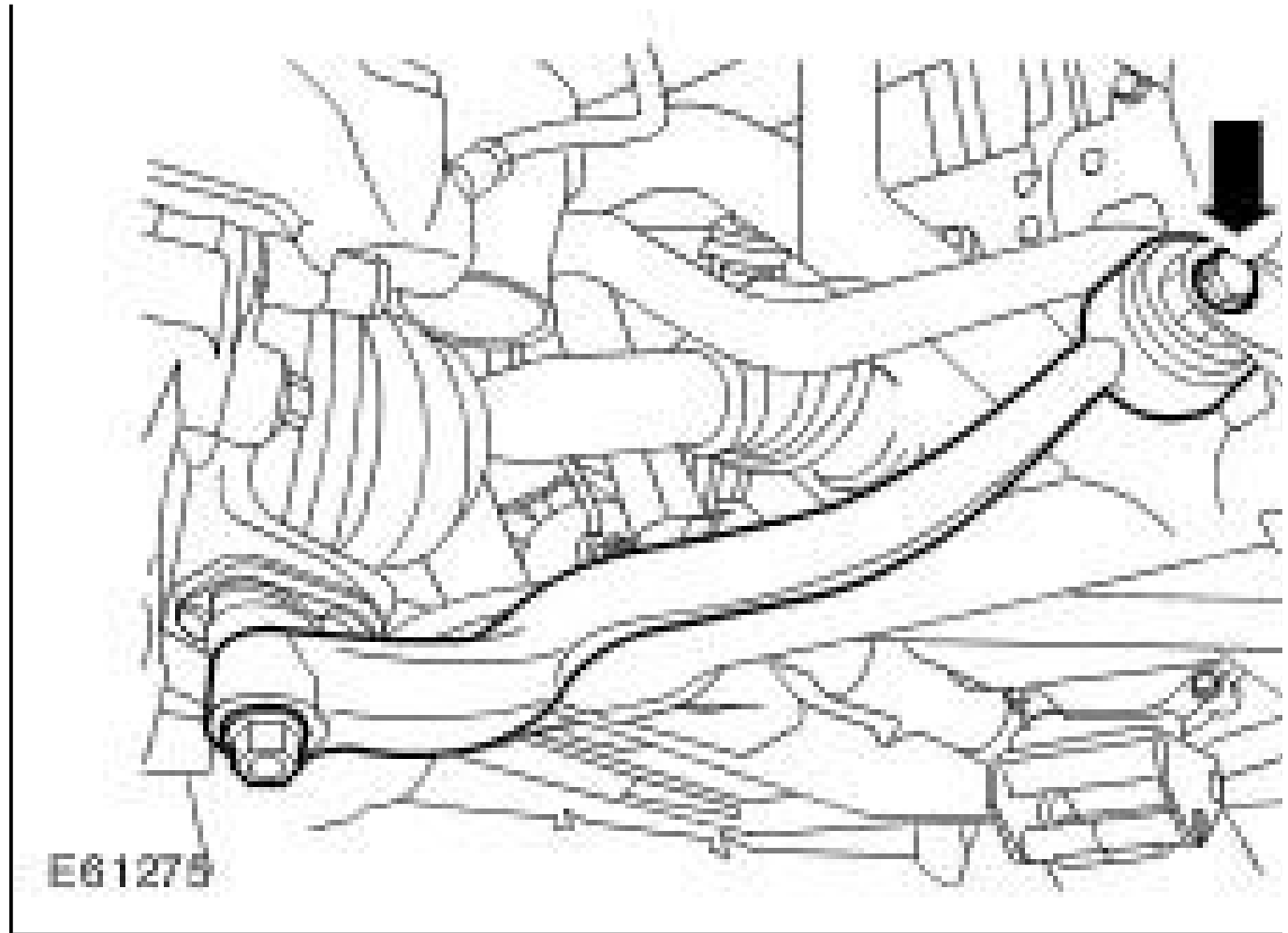
CAUTION: Support the lower arm.

11. LH side: Disconnect the lower arm.
 - Remove the bolt and discard the nut.



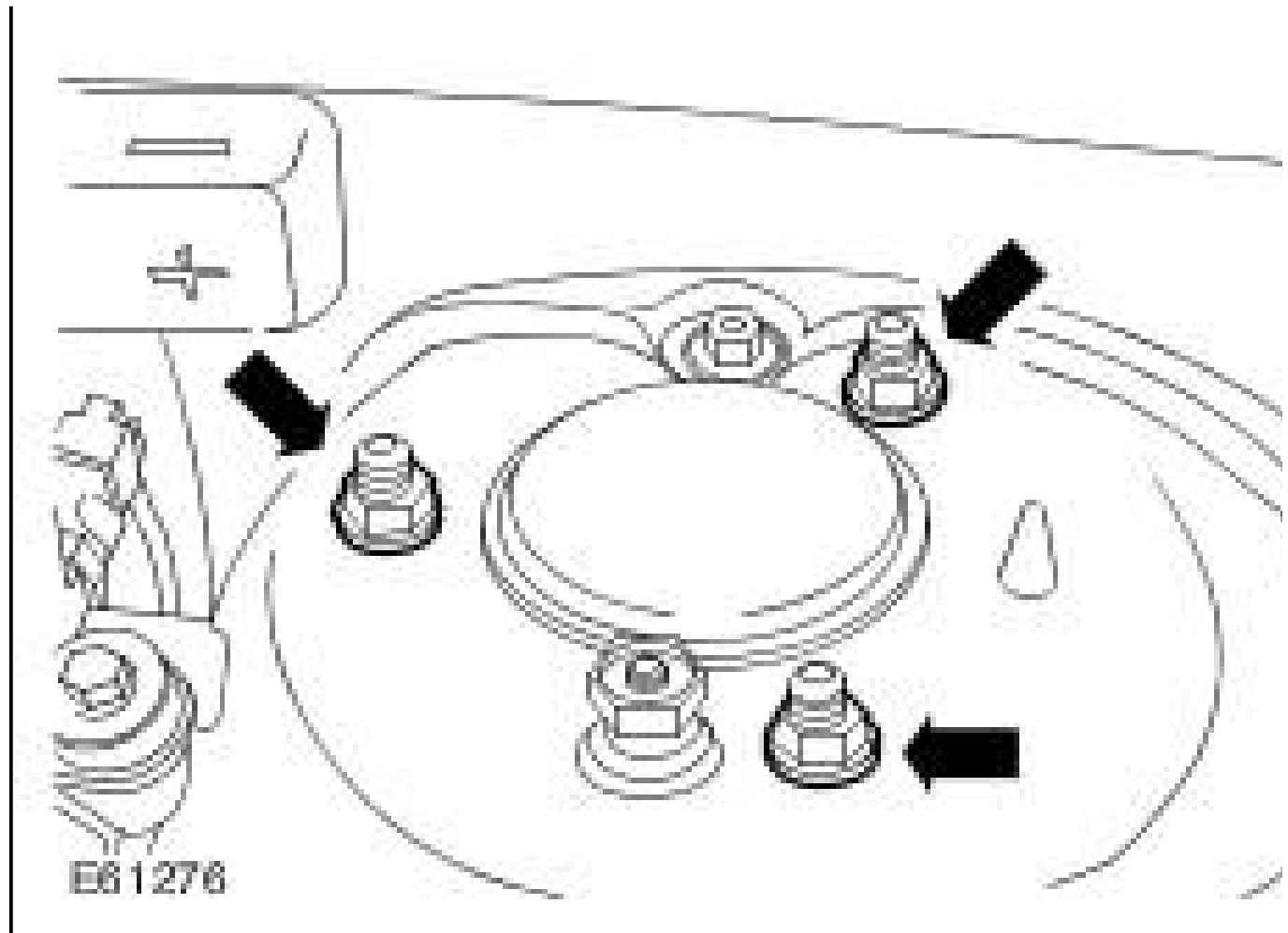
CAUTION: Support the tie rod.

12. LH side: Disconnect the tie rod.
 - Remove the bolt and discard the nut.



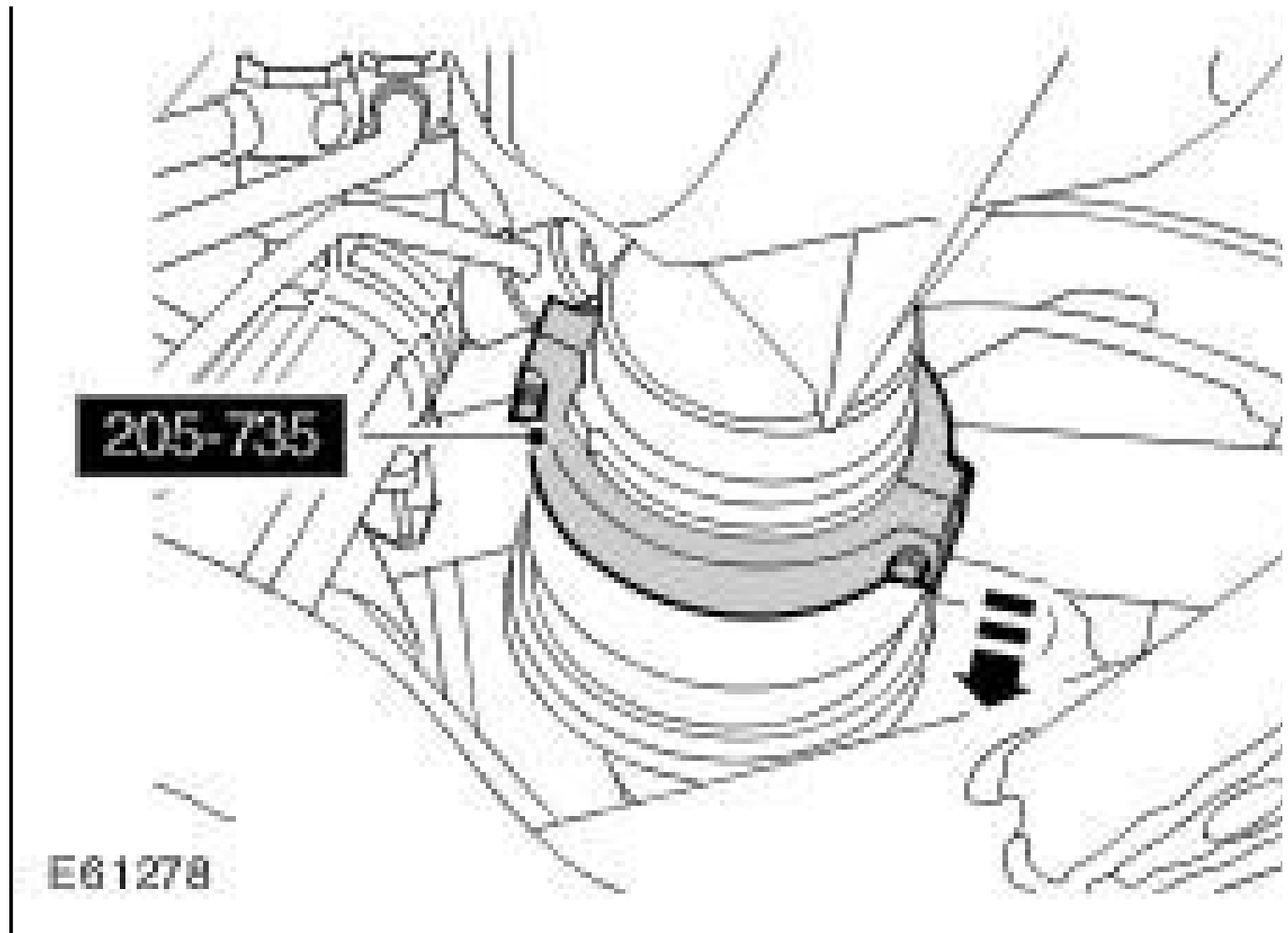
WARNING: Do not remove the nuts.

13. LH side: Release the air suspension spring.
 - Loosen the 3 nuts.



CAUTION: Support the halfshaft.

14. LH side: Using the special tool, disconnect the halfshaft from the differential.
 - Remove and discard the retaining clip.

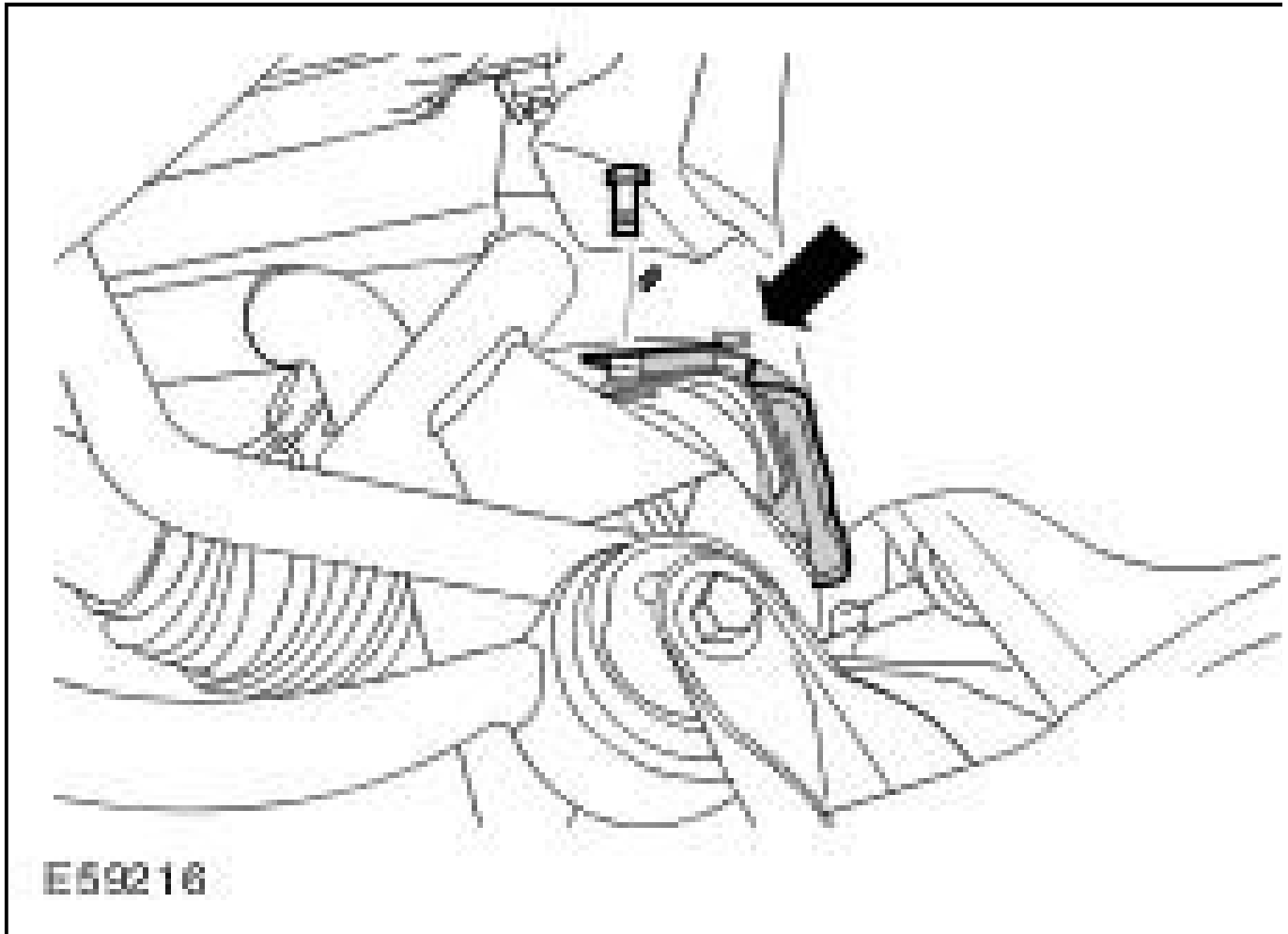


15. LH side: Remove and discard the halfshaft oil seal.
16. LH side: Remove the engine compartment heat shield.
 - Remove the 2 nuts.
 - Remove the 2 screws.



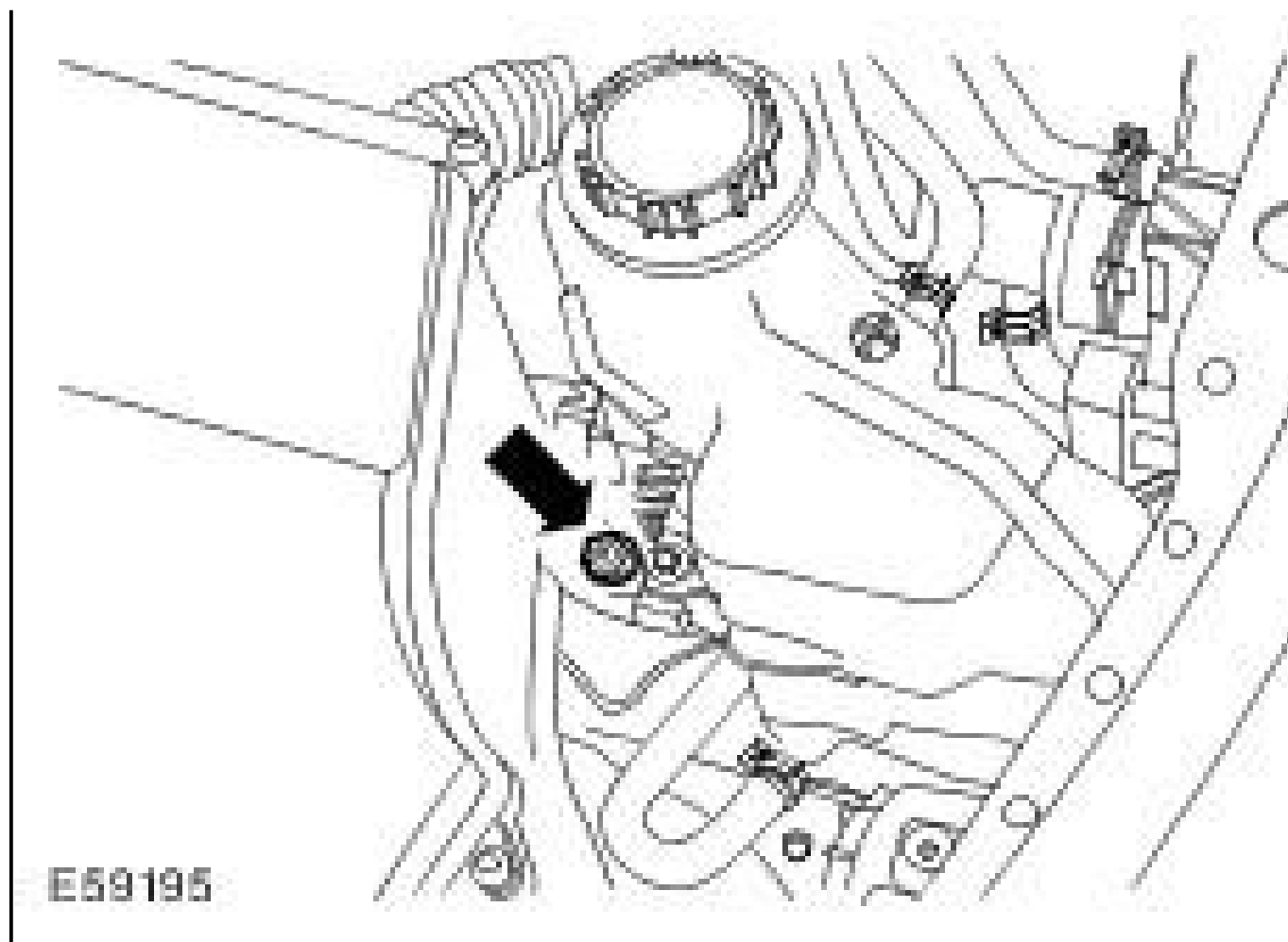
17. LH side: Remove the engine mount heat shield.

- Remove the 2 screws.

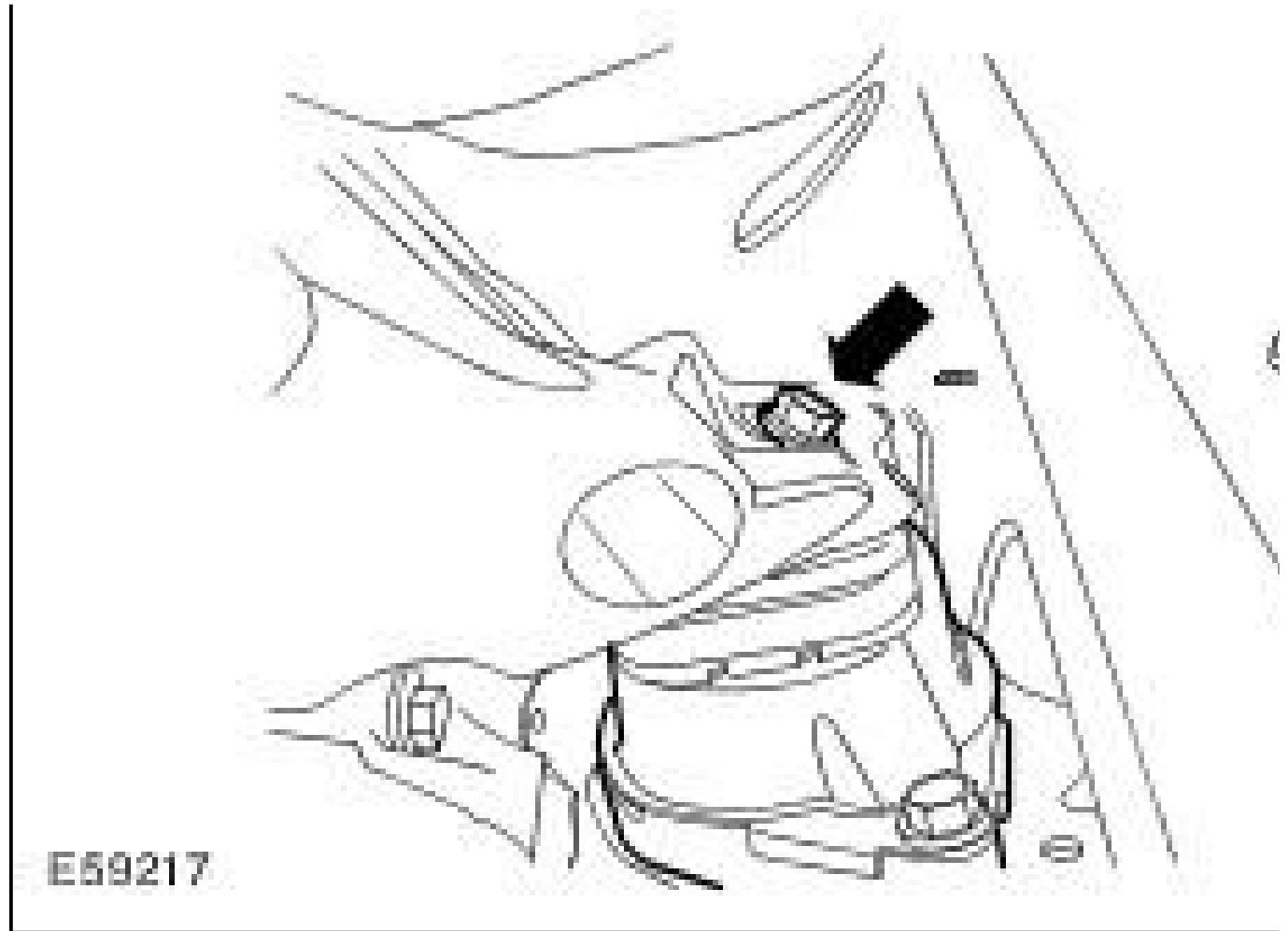


18. RH side: Release the engine mount.

- Support the engine.
- Remove the nut.



19. LH side: Release the engine mount.
- Remove the bolt.



20. LH side: Remove the engine mount.

- Using a transmission jack, raise the engine clear of the engine mount.
- Remove the 2 bolts.



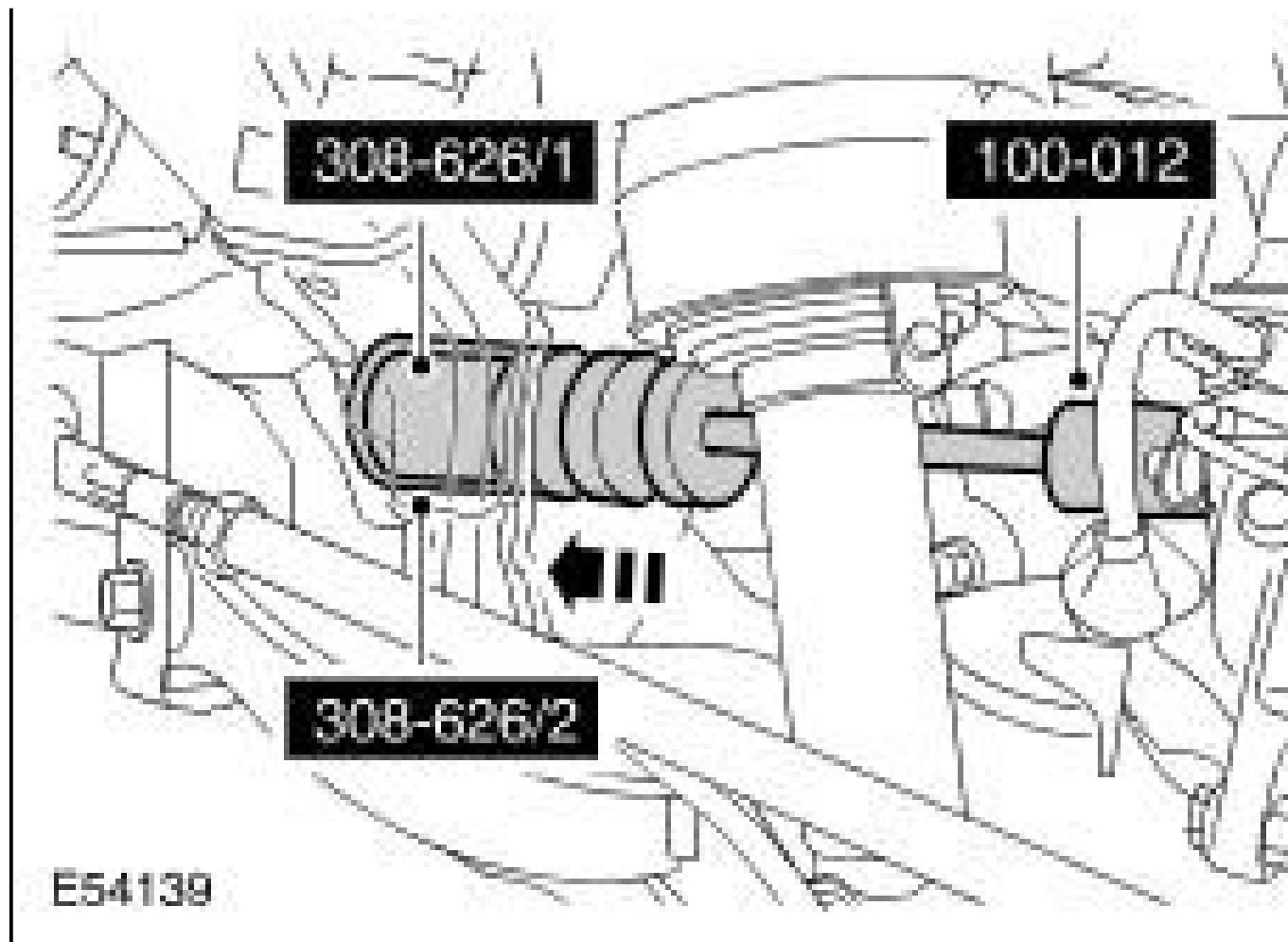
INSTALLATION**All Vehicles**

1. LH side: Install the engine mount.
 - Tighten the engine mount to subframe bolts to 56 Nm (41 lb.ft).
2. LH side: Install the engine mount heat shield.
 - Tighten the screws.
3. Lower the engine onto its mounts.
 - Tighten the bolt to 100 Nm (74 lb.ft).
 - Tighten the nut to 100 Nm (74 lb.ft).
4. LH side: Install the engine compartment heat shield.
 - Tighten the screws.
 - Tighten the nuts.

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

NOTE: LH illustration shown, RH is similar.

5. LH side: Using the special tools, install a new halfshaft oil seal.
 - Clean the component mating faces.



CAUTION: Keep the halfshaft horizontal to avoid damaging the oil seal.

CAUTION: Pull on the halfshaft to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

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

6. LH side: Fully install the halfshaft.
 - Clean the component.
 - Install a new retaining clip.
 - Open the halfshaft oil seal protector.
 - Lubricate the seal with clean differential fluid.
 - Remove and discard the halfshaft oil seal protector.

NOTE: Do not tighten the locking nut at this stage.

7. LH side: Connect the tie rod.
- Install the bolt with a new nut.

NOTE: Do not tighten the locking nut at this stage.

8. LH side: Connect the lower arm.
- Install the bolt with a new nut.

CAUTION: Ensure the ball joint seal is not damaged. A damaged seal will lead to the premature failure of the joint.

9. LH side: Connect the steering gear tie rod end ball joint.
- Clean the component mating faces.
 - Tighten the new nut to 80 Nm (59 lb.ft).

CAUTION: Make sure the hardened steel washer is fitted against the stabilizer bar link.

NOTE: Use an additional wrench to prevent the ball joint rotating.

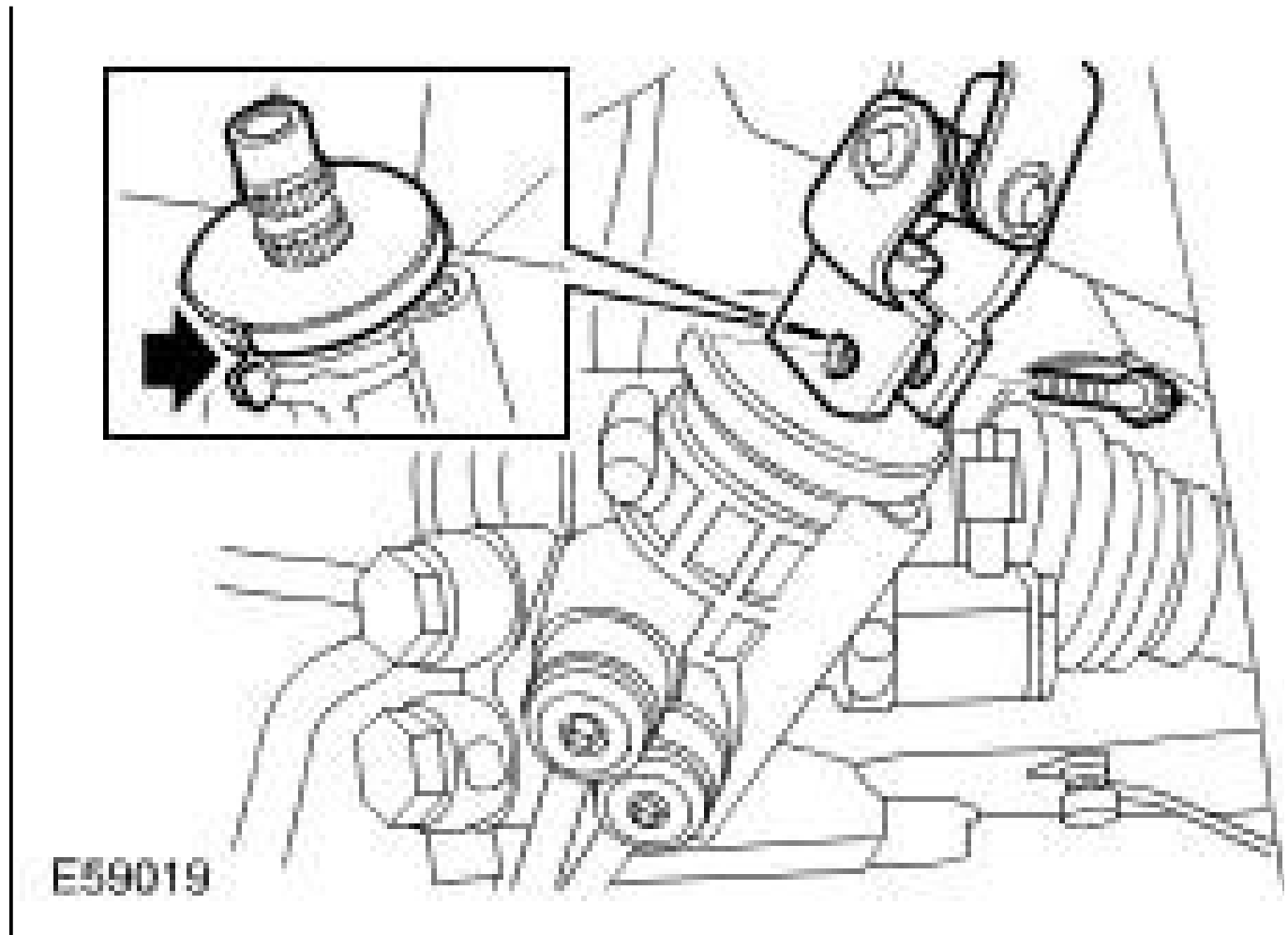
10. LH side: Connect the stabilizer bar link.
- Install the washer.
 - Tighten the nut to 100 Nm (74 lb.ft).

NOTE: Use an additional wrench to prevent the ball joint rotating.

11. LH side: Connect the suspension height sensor link arm.
- Tighten the nut to 8 Nm (6 lb.ft).

Left-Hand Drive Vehicles

12. Attach the lower steering column.
- Make sure that the steering gear tag is aligned correctly, as shown.
 - Install a new Torx bolt and tighten to 24 Nm (18 lb.ft).



13. Install the front wheels and tires.
 - Tighten the wheel nuts to 140 Nm (103 lb.ft).

CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

14. Tighten the lower arm nuts and bolts to 165 Nm (122 lb.ft) plus a further 90 degrees.

CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

15. Tighten the tie rod nuts and bolts to 165 Nm (122 lb.ft) plus a further 90 degrees.

All Vehicles

16. Install the exhaust system. Refer to **EXHAUST SYSTEM** .
17. Install the radiator splash shield. Refer to **RADIATOR SPLASH SHIELD** .

18. Connect the battery ground cable. Refer to **SPECIFICATIONS** .
19. Fill the front differential case with the correct amount of fluid. Refer to **DIFFERENTIAL DRAINING AND FILLING** .
20. Carry out a complete vehicle geometry check and adjustment.

ENGINE MOUNT RH**SPECIAL TOOLS**

Tool Illustration	Tool Name	Tool Number
	Viscous coupling spanner	303-1142
	Viscous coupling pulley retaining tool	303-1143

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

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

2. Raise and support the vehicle.

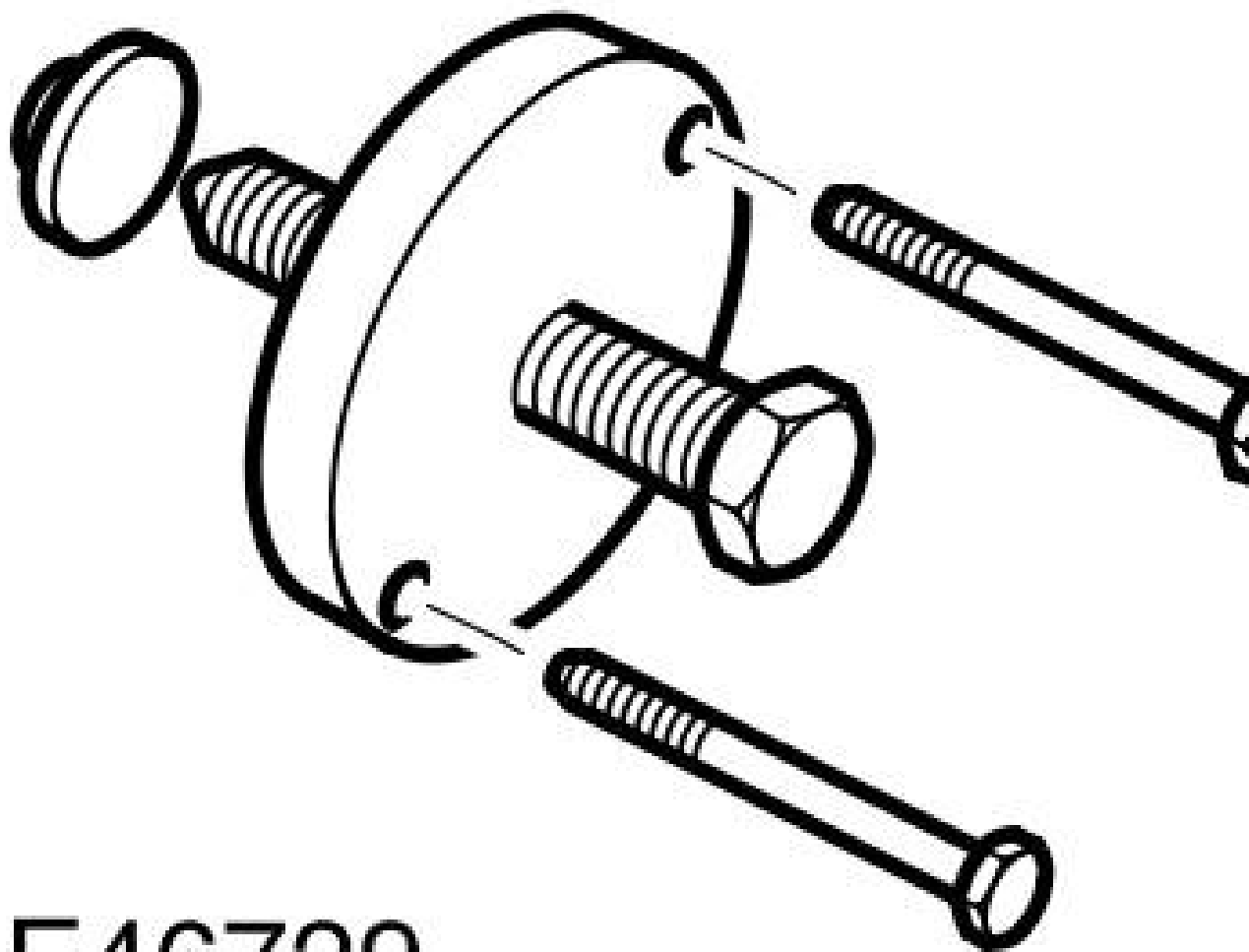
3. Remove the air intake resonator. Refer to **INTAKE AIR RESONATOR** .
4. Remove the coolant expansion tank. Refer to **COOLANT EXPANSION TANK** .

CAUTION: Always protect the cooling pack elements to prevent accidental damage.

NOTE: The thread is right handed.

5. Using the special tools, release the cooling fan.

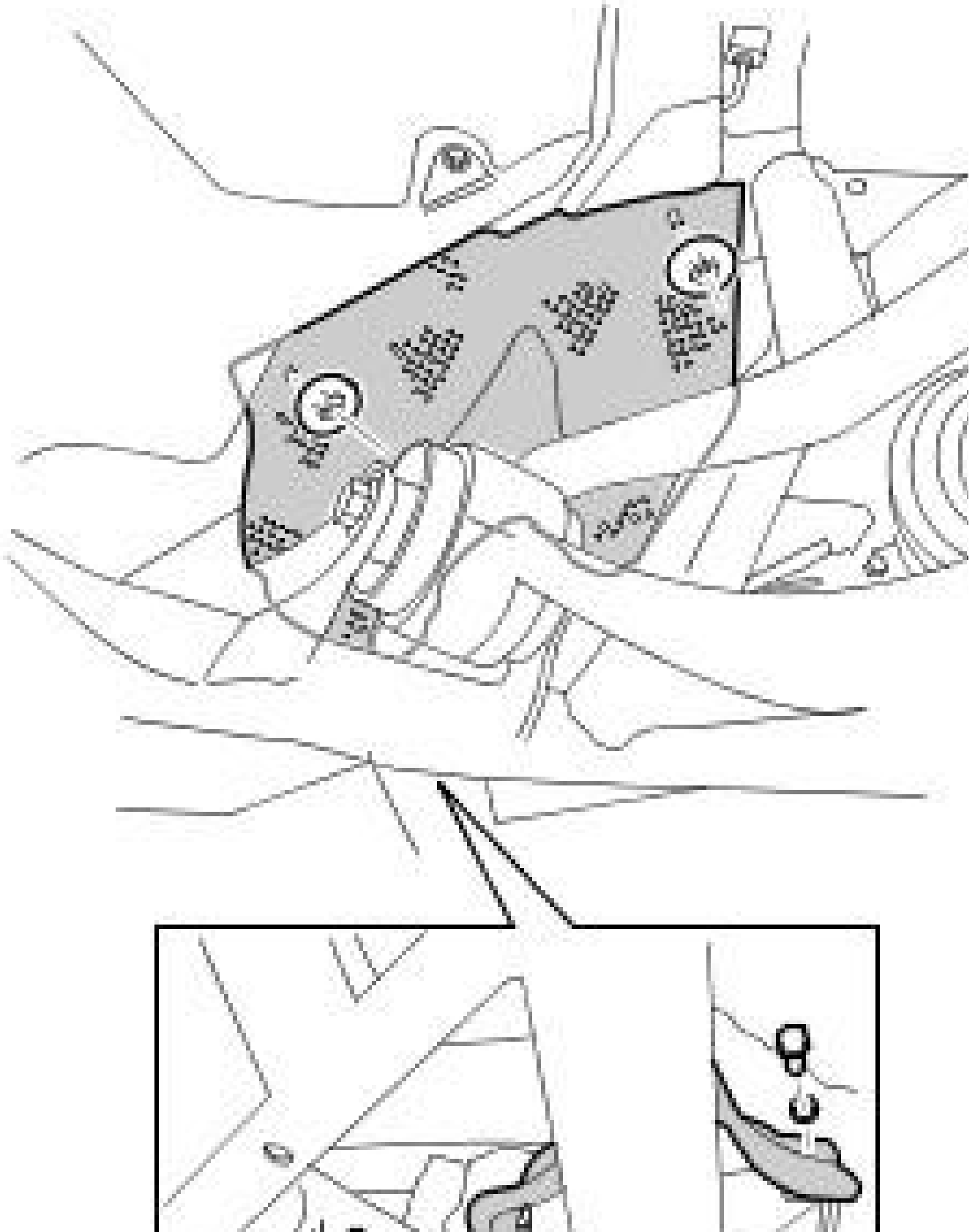
303-588



E46729

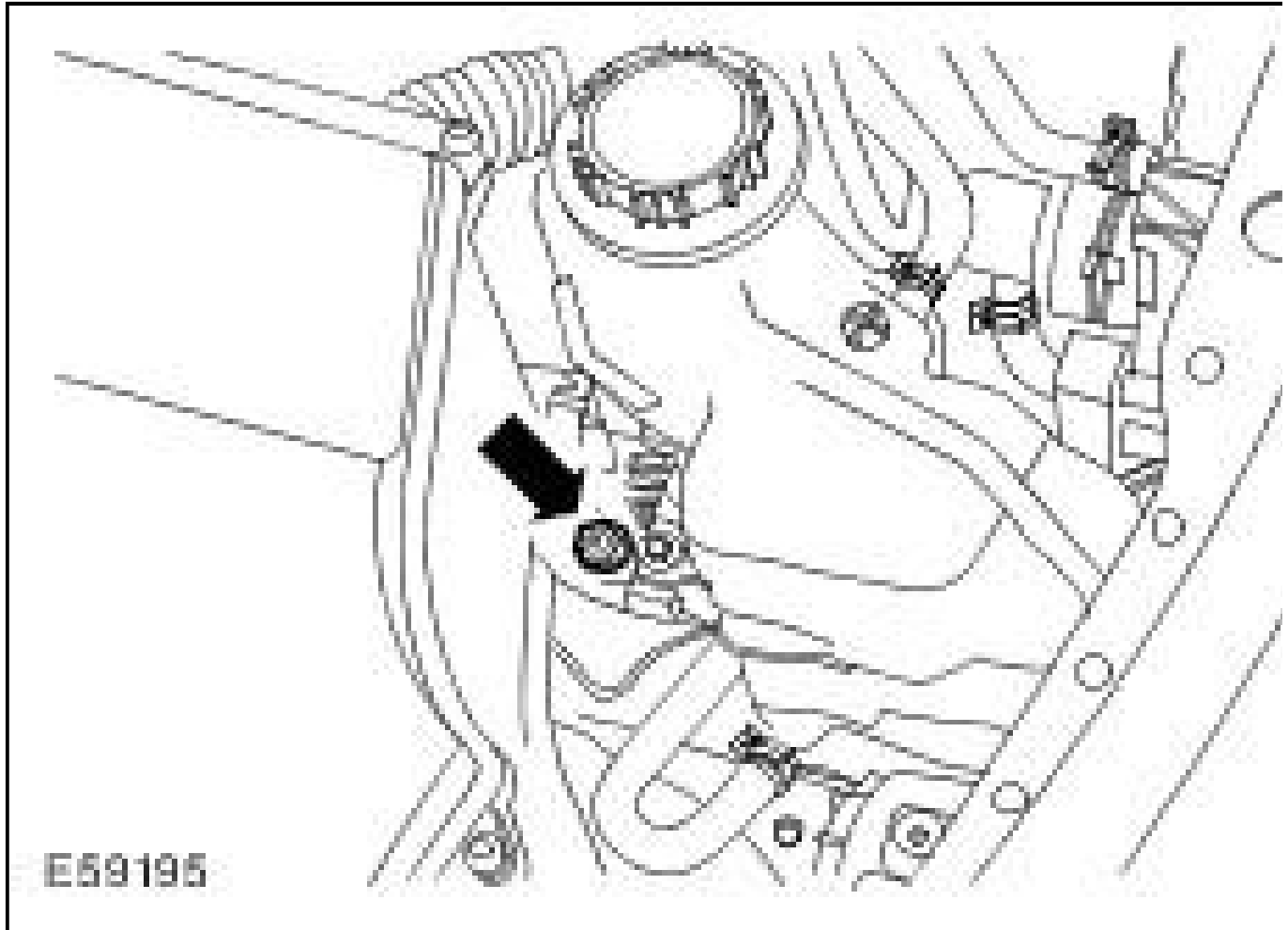
6. Remove the engine undershield. Refer to **ENGINE UNDERSHIELD** .
7. Remove the engine compartment RH heat shield.
 - Remove the 2 nuts.

- Remove the 2 screws.



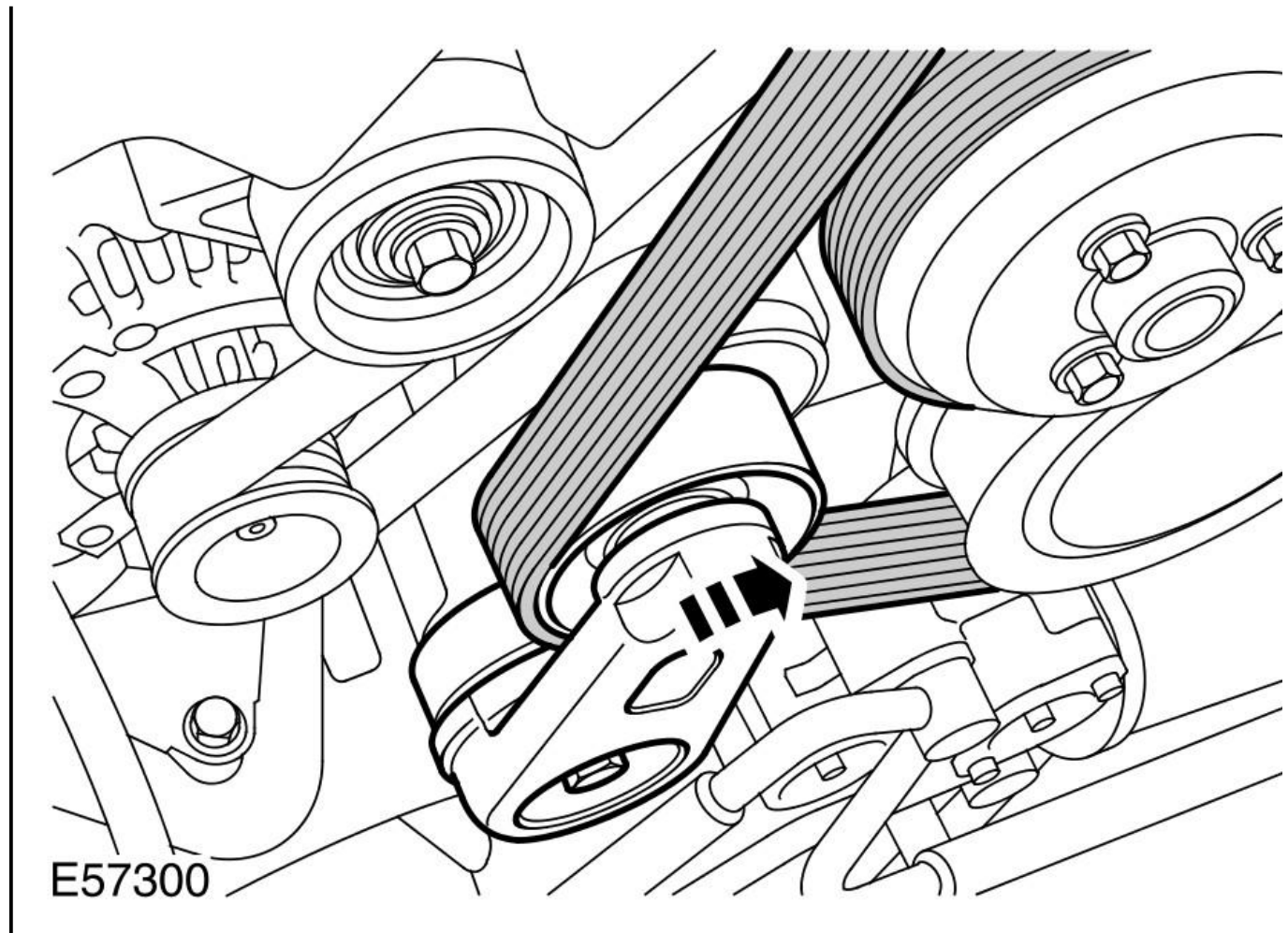
8. Release the engine mount.

- Support the engine.
- Remove the nut.



9. Remove the engine mount.

- Using a transmission jack, raise the engine clear of the engine mount.
- Remove the 2 bolts.



INSTALLATION

1. Install the engine mount.
 - Clean the component mating faces.
 - Lower the engine onto the mount.
 - Tighten the nut to 100 Nm (74 lb.ft).
 - Tighten the bolts to 56 Nm (41 lb.ft).
2. Install the engine compartment RH heat shield.
 - Tighten the screws.
 - Tighten the nuts.
3. Install the engine undershield. Refer to **ENGINE UNDERSHIELD** .
4. Install the cooling fan.
 - Tighten the cooling fan to 65 Nm (48 lb.ft).
5. Install the air intake resonator. Refer to **INTAKE AIR RESONATOR** .
6. Install the coolant expansion tank. Refer to **COOLANT EXPANSION TANK** .
7. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

FLEXPLATE**REMOVAL**

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

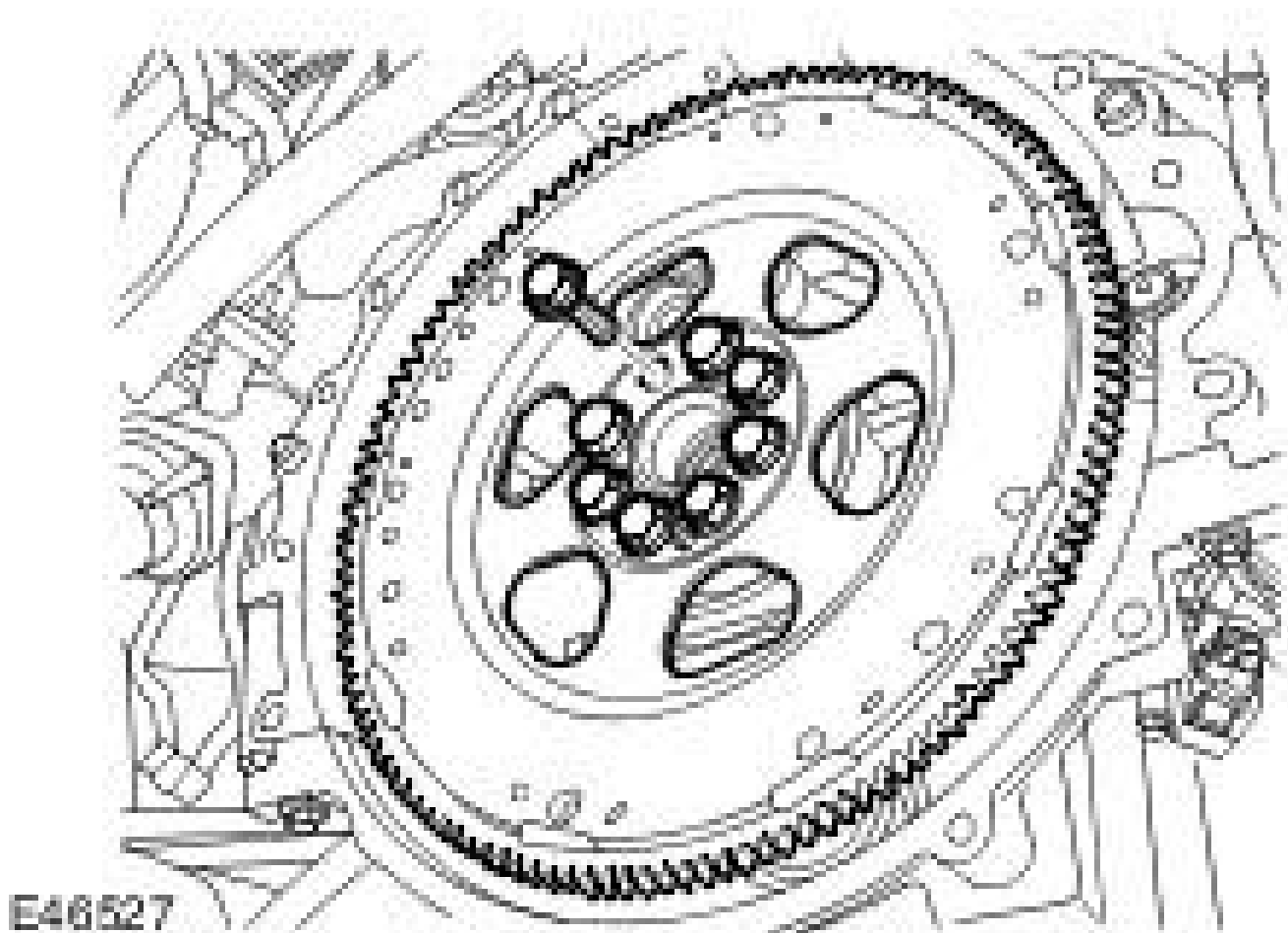
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the transmission. Refer to **TRANSMISSION** .

CAUTION: The bolts can only be used 3 times, mark the bolts with a center punch. If 2 punch marks are visible, discard the bolts.

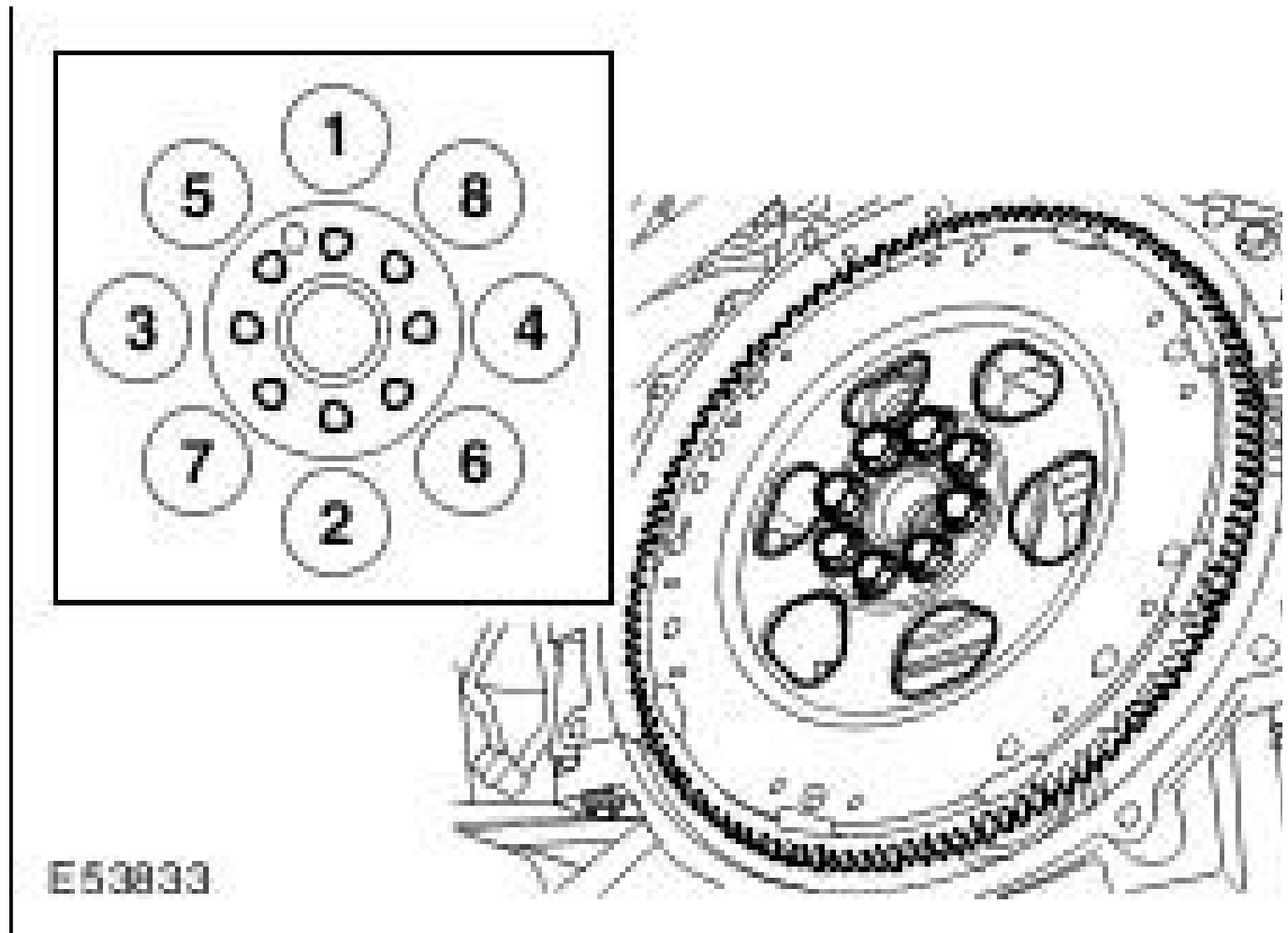
NOTE: Prevent the flexplate from rotating.

4. Remove the torque converter flexplate.
 - Remove the 8 bolts.

**INSTALLATION**

NOTE: Prevent the flexplate from rotating.

1. Install the torque converter flexplate.
 - Clean the component mating faces.
 - Tighten the bolts evenly in 2 stages to the sequence shown.
 - Tighten the bolts to 15 Nm (11 lb ft).
 - Tighten the bolts to 110 Nm (81 lb.ft).

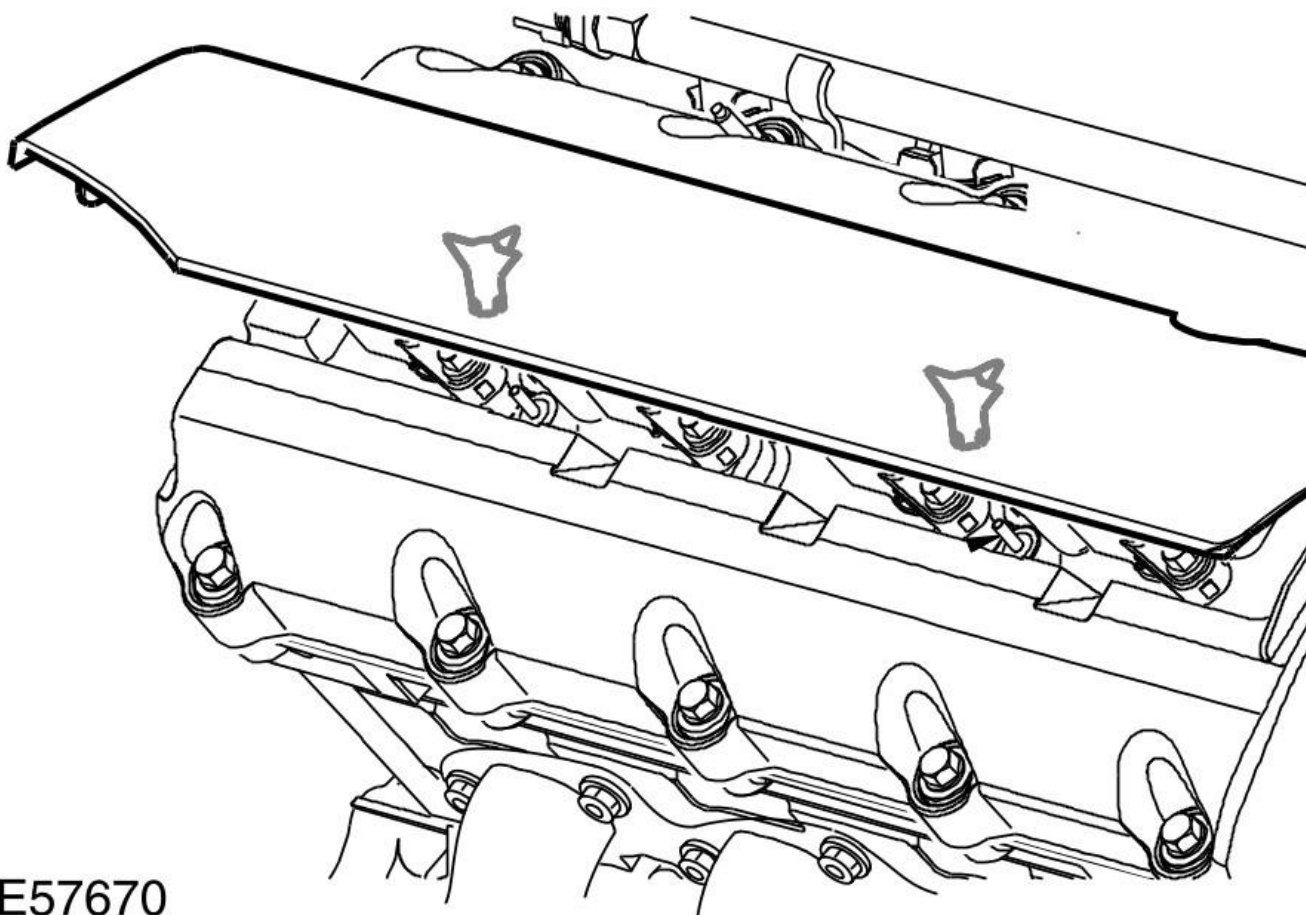


2. Install the transmission. Refer to **TRANSMISSION** .
3. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

OIL LEVEL INDICATOR AND TUBE

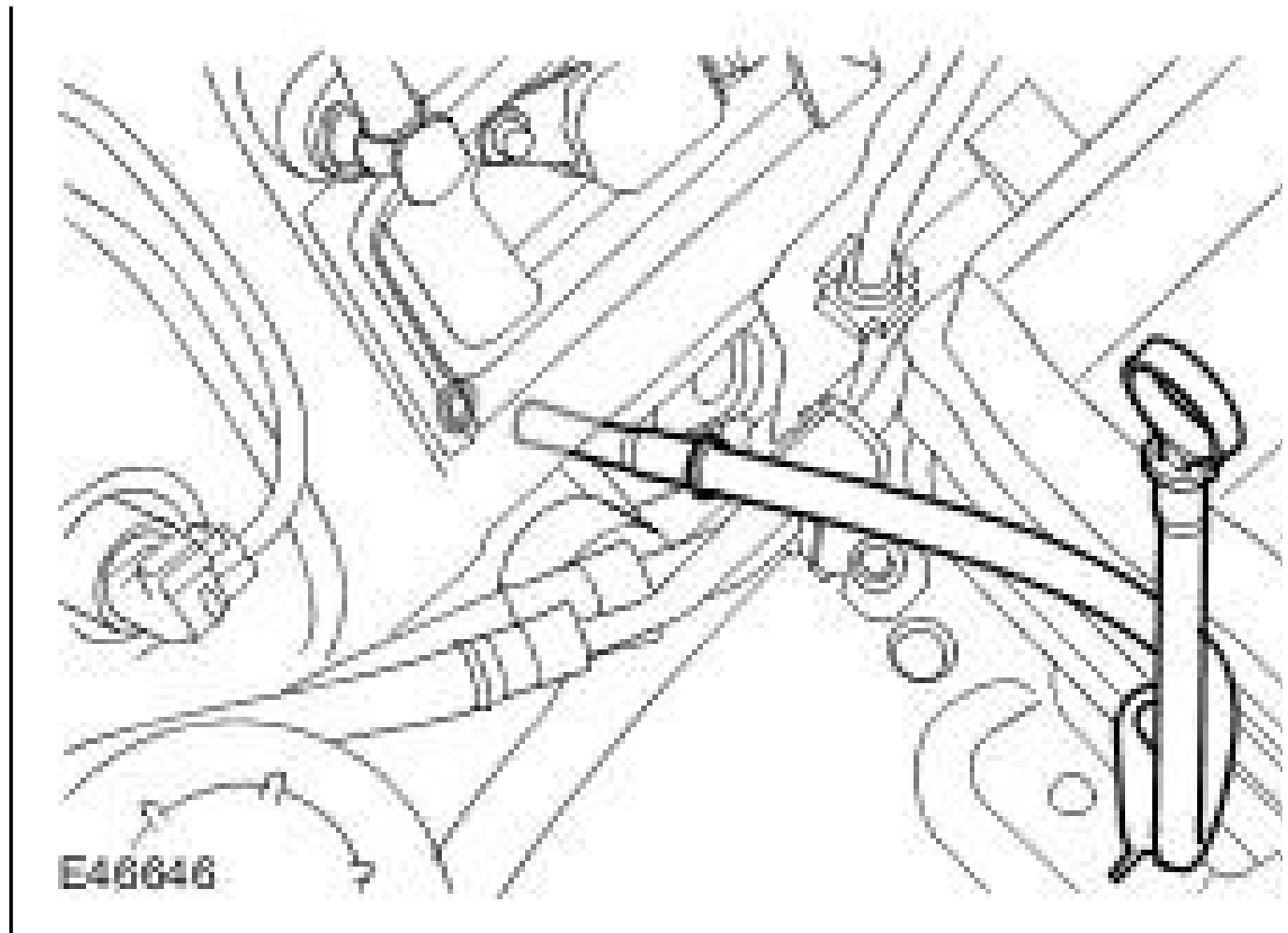
REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .
2. Remove the engine cover. Refer to **ENGINE COVER - 4.2L, VEHICLES WITH: SUPERCHARGER** .
3. Remove the air cleaner. Refer to **AIR CLEANER** .
4. Remove the LH ignition coil-on-plug cover.
 - Release the 2 clips.



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

5. Raise and support the vehicle.
6. Turn the steering on to full lock for access.
7. Remove the oil level indicator and tube.
 - Remove the nut.
 - Discard the O-ring seal.



INSTALLATION

1. With assistance, install the oil level indicator and tube.
 - Clean the components.
 - Install a new O-ring seal.
 - Lubricate the O-ring seal with clean engine oil.
 - Tighten the nut to 6 Nm (4 lb.ft).
2. Install the LH ignition coil-on-plug cover.
3. Install the air cleaner. Refer to **AIR CLEANER** .
4. Install the engine cover. Refer to **ENGINE COVER - 4.2L, VEHICLES WITH: SUPERCHARGER** .
5. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

AUXILIARY OIL COOLER THERMOSTAT

REMOVAL

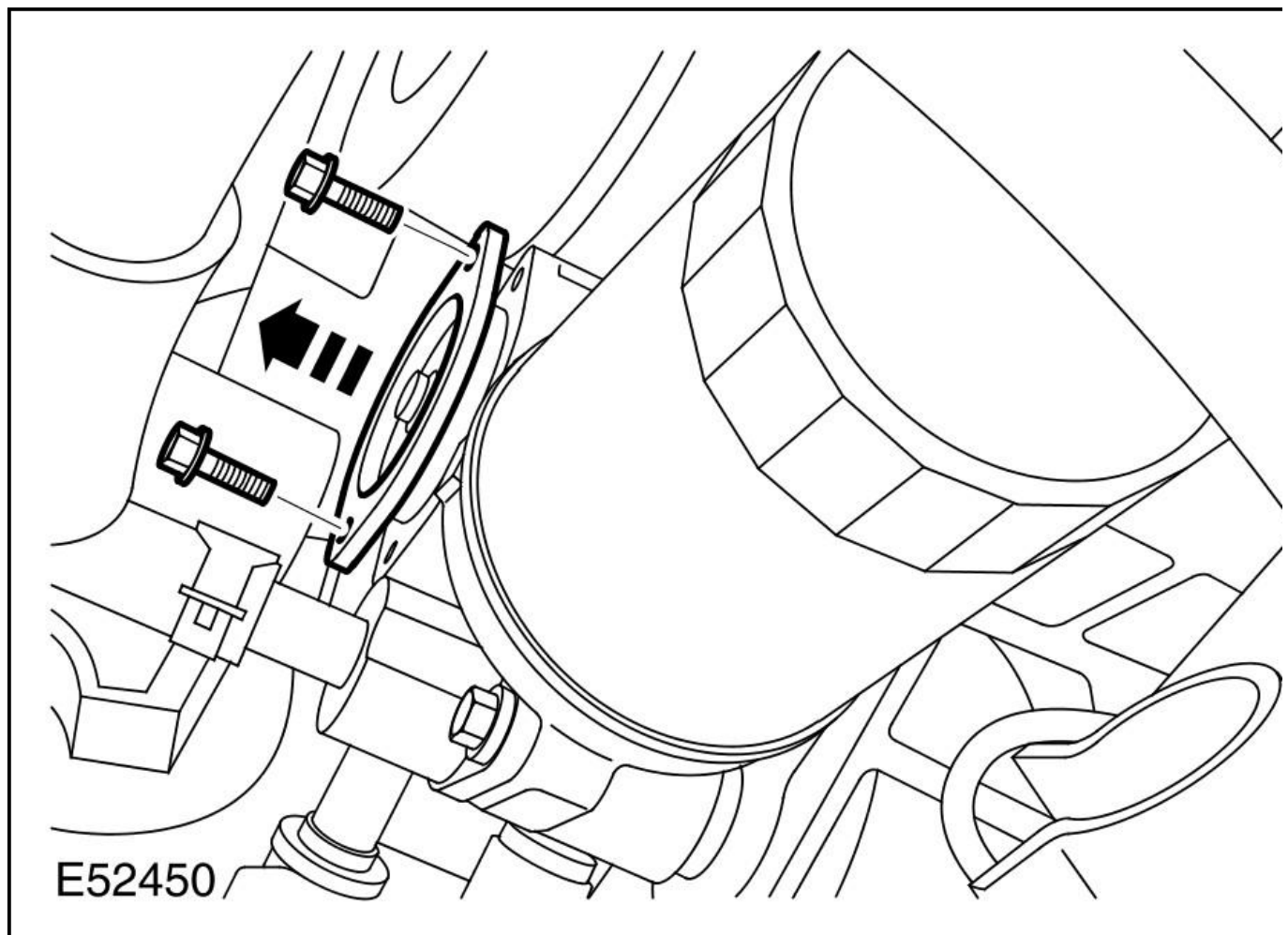
1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

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

2. Raise and support the vehicle.
3. Remove the radiator splash shield. Refer to **RADIATOR SPLASH SHIELD** .

NOTE: **Some fluid spillage is inevitable during this operation.**

4. Remove the auxiliary oil cooler thermostat.
 - Position an absorbent cloth to collect fluid spillage.
 - Remove the 2 bolts.
 - Remove and discard the O-ring seal.

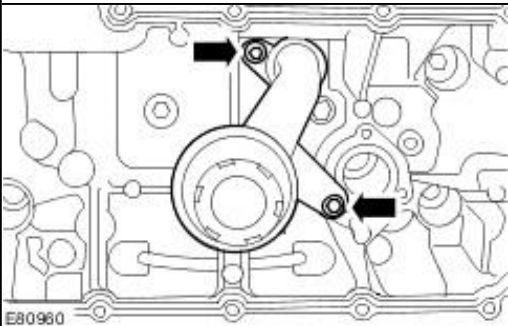


INSTALLATION

1. Install the auxiliary oil cooler thermostat.

- Clean the component mating faces.
 - Install a new O-ring seal.
 - Install the bolts and tighten to 10 Nm (7 lb.ft).
2. Install the radiator splash shield. Refer to **RADIATOR SPLASH SHIELD**.
 3. Connect the battery ground cable. Refer to **SPECIFICATIONS**.
 4. Check and top-up the engine oil.

OIL PUMP**SPECIAL TOOLS**

Tool Illustration	Tool Name	Tool Number
	Camshaft setting/locking tool	303-530
	Crankshaft locking tool	303-645

REMOVAL

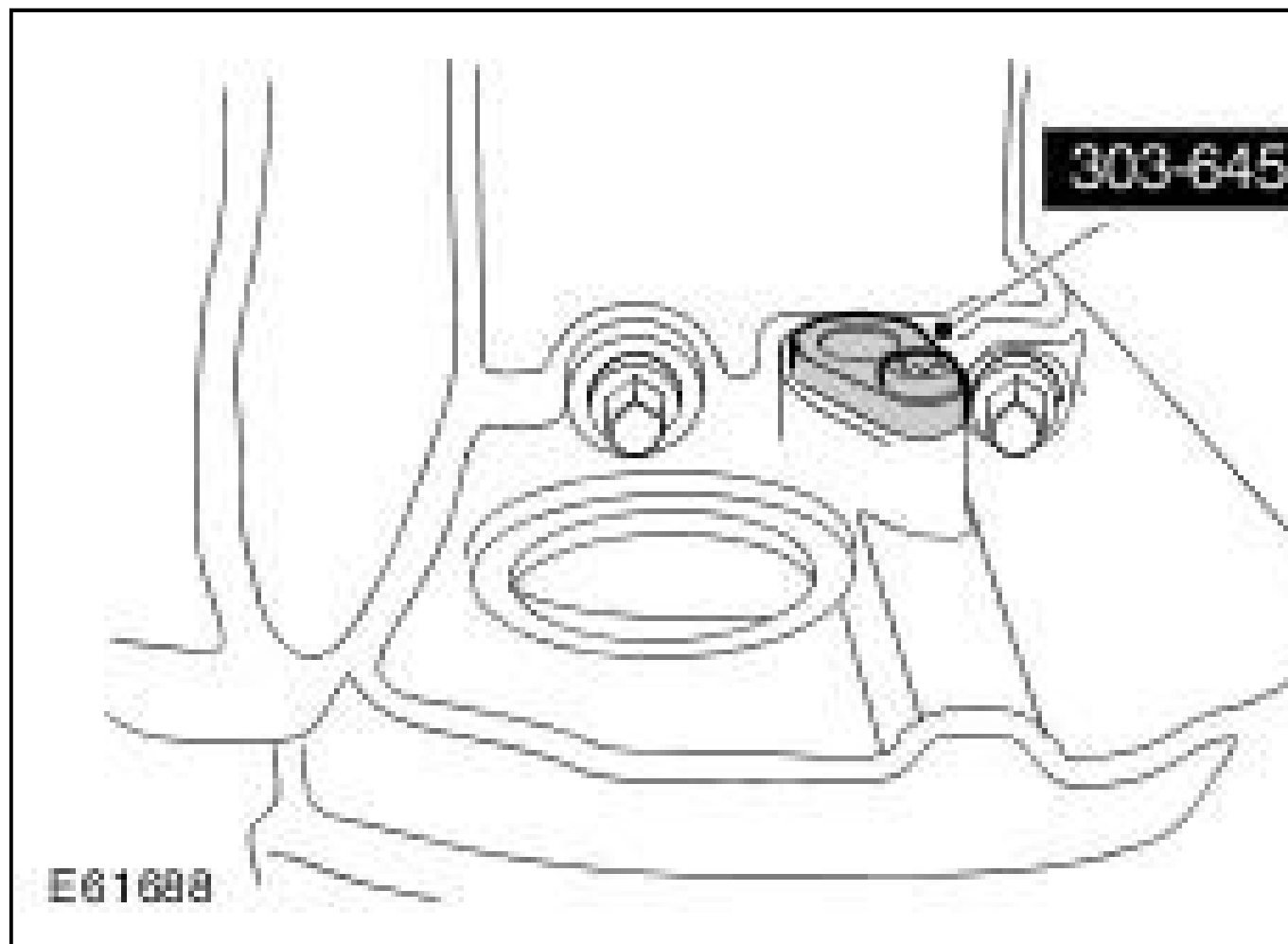
1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS**.

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

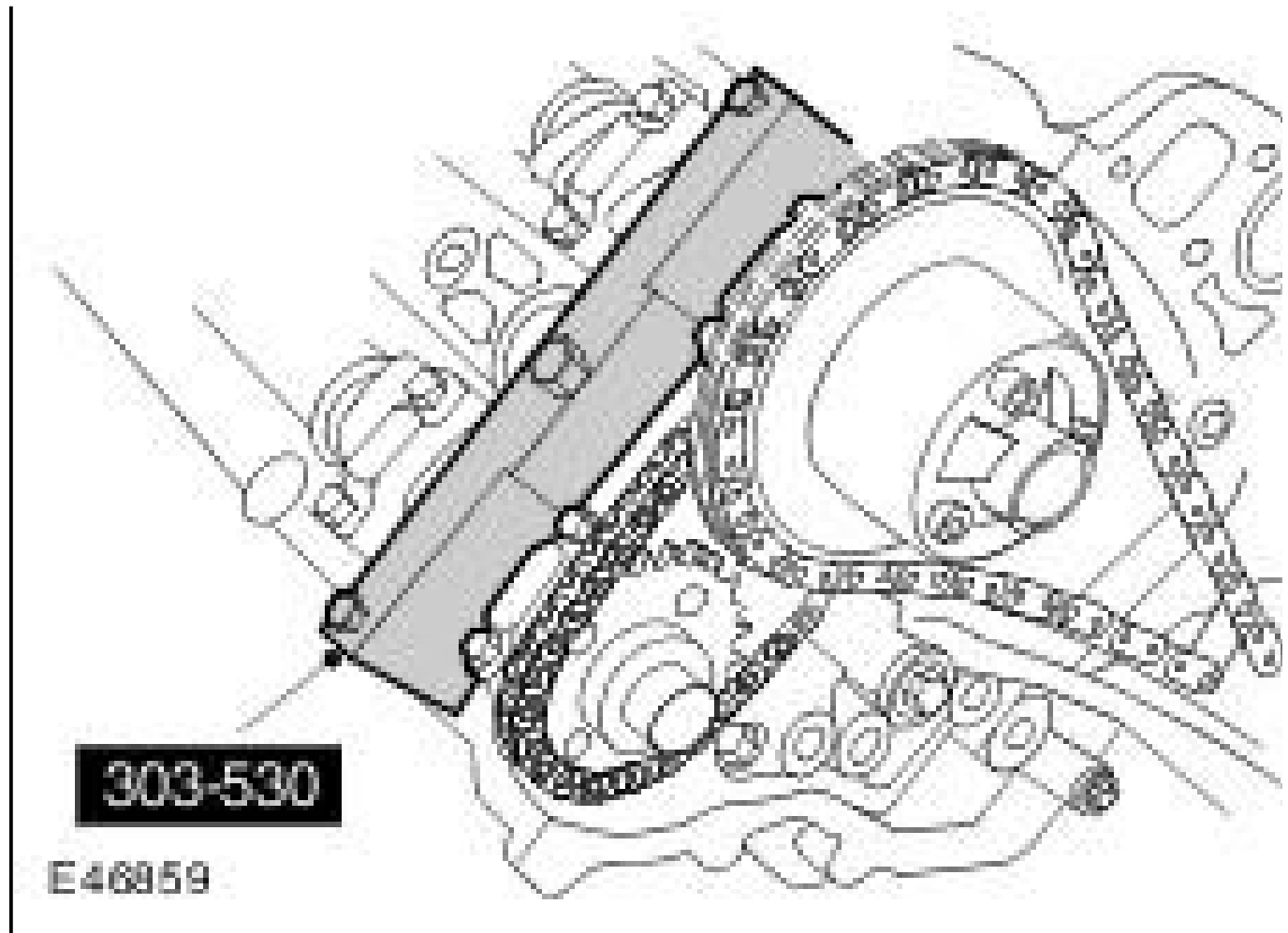
2. Raise and support the vehicle.
3. Remove the oil pan. Refer to **OIL PAN**.

NOTE: Install the special tool place of the crankshaft sensor.

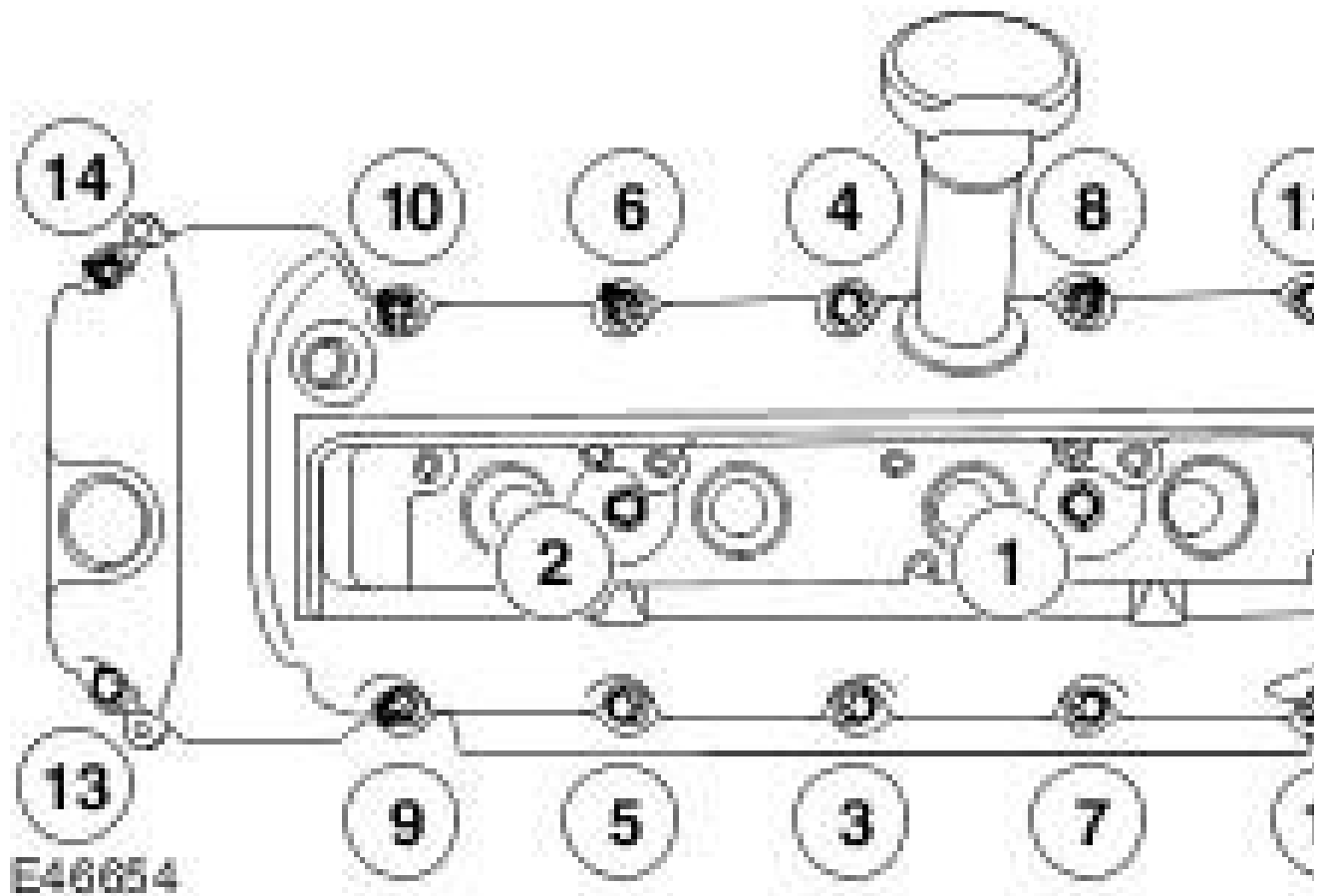
4. Lock the crankshaft.
 - Install the special tool.
 - Install the screw.



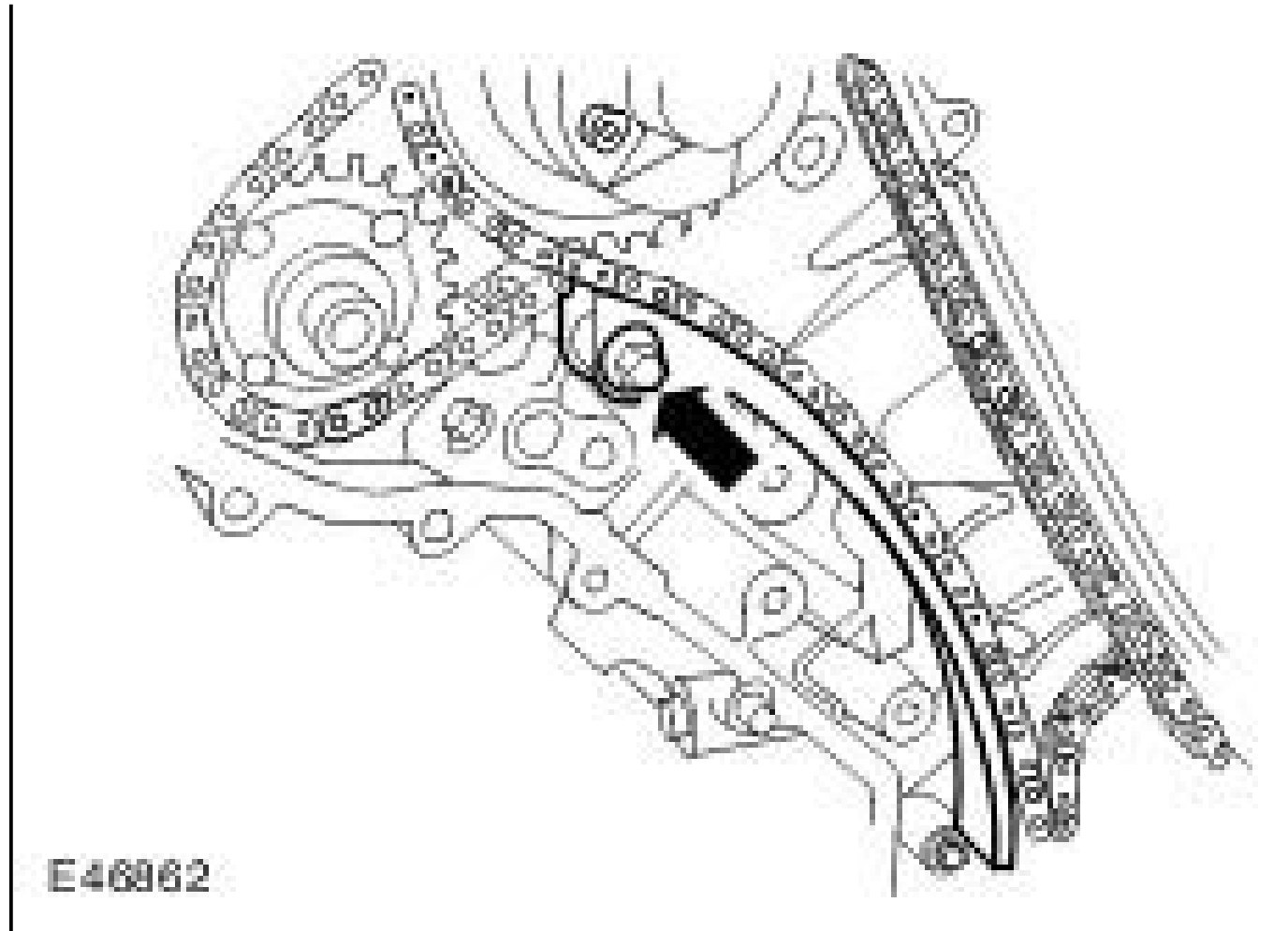
5. Install the special tool to the RH cylinder head.
 - Install the 3 bolts.



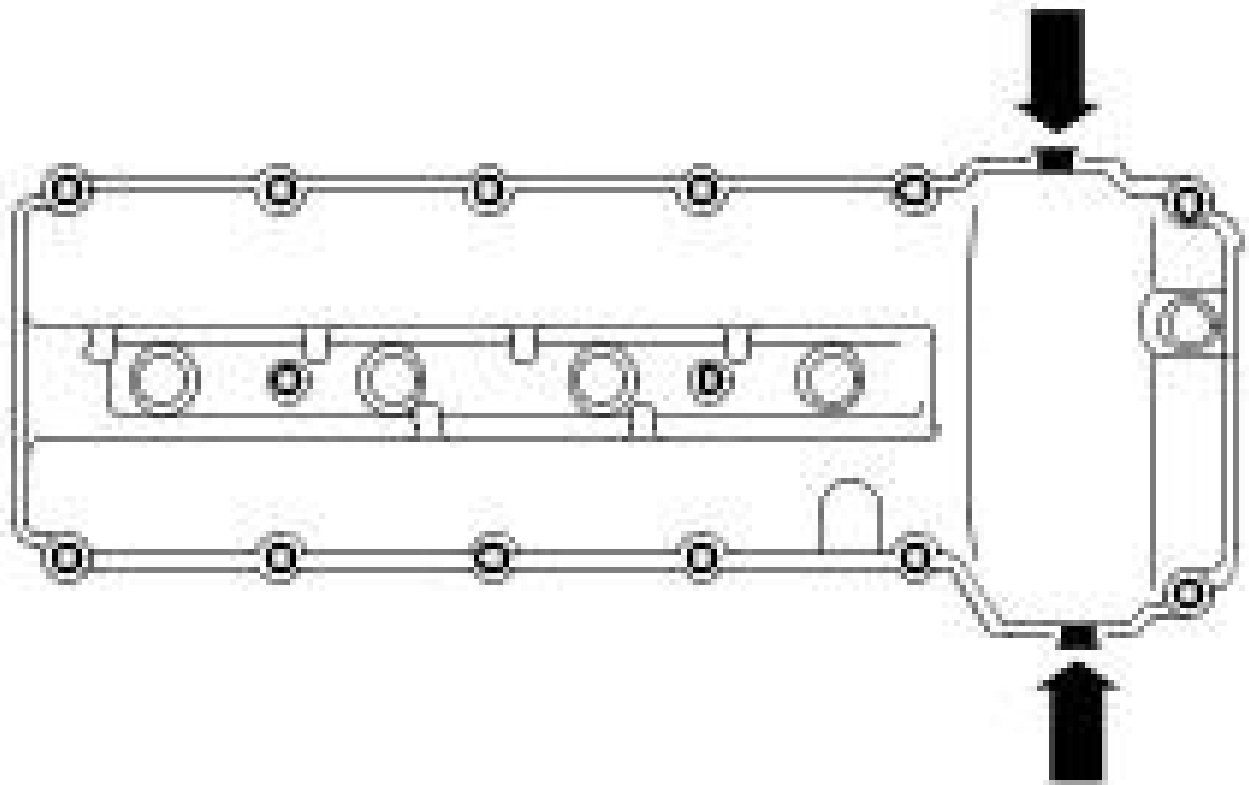
6. Remove the RH primary timing chain tensioner assembly.
 - Remove the 2 bolts.



7. Remove the RH primary timing chain tensioner guide.
 - Remove the bolt.

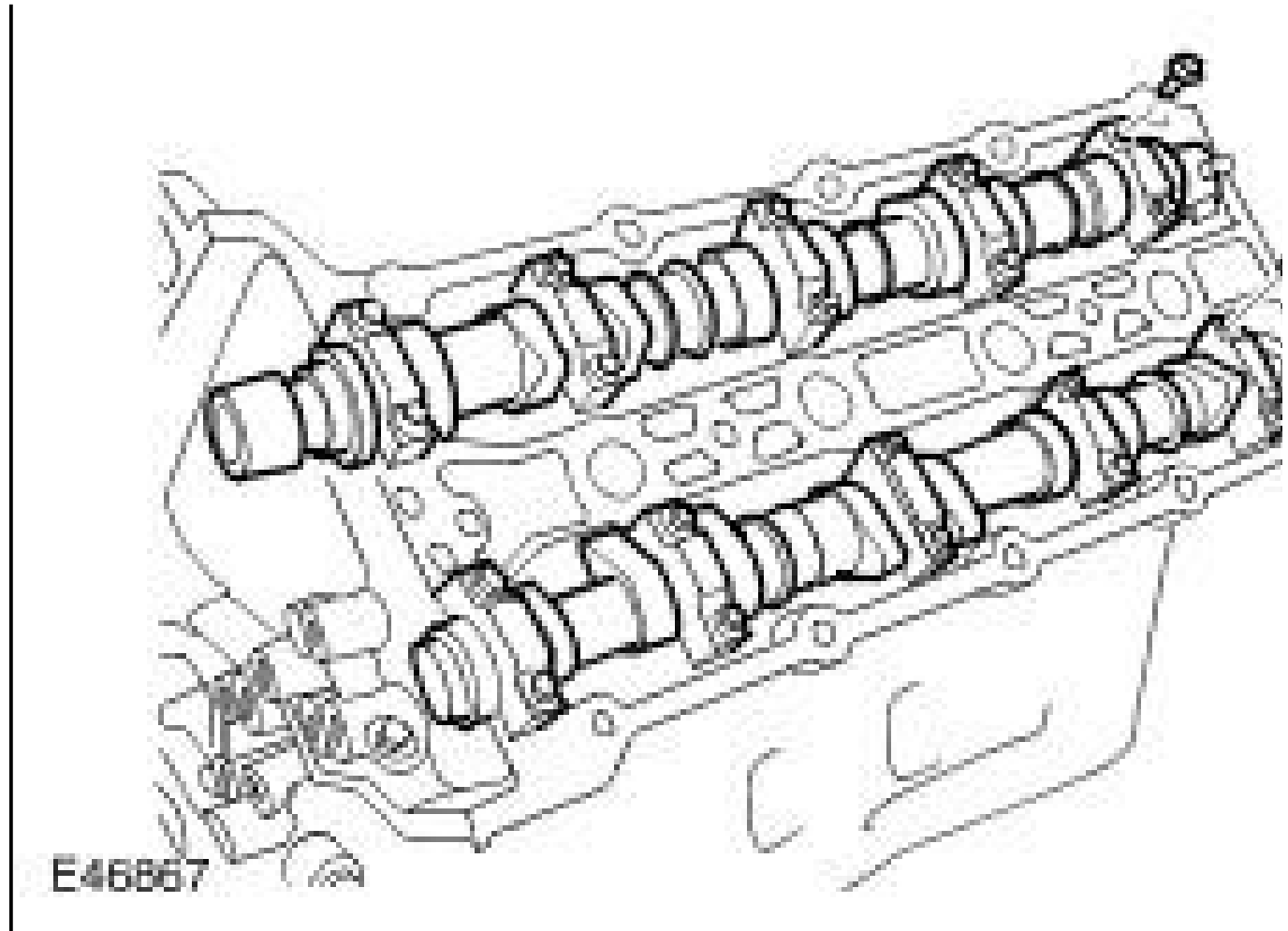


8. Remove the RH primary timing chain.
9. Install the special tool to the LH cylinder head.
 - Install the 3 bolts.

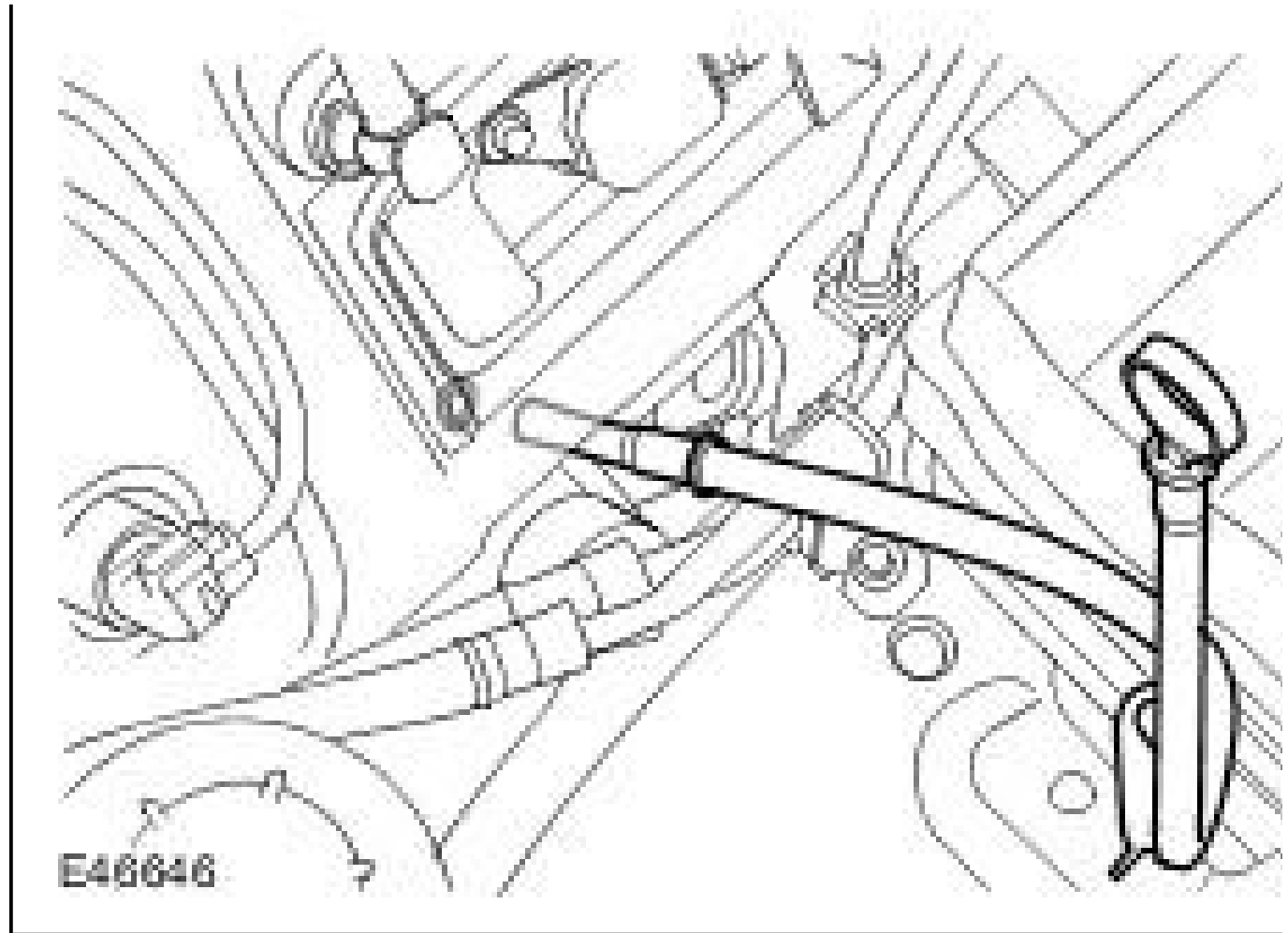


E49922

10. Remove the LH primary timing chain tensioner.
 - Remove the 2 bolts.



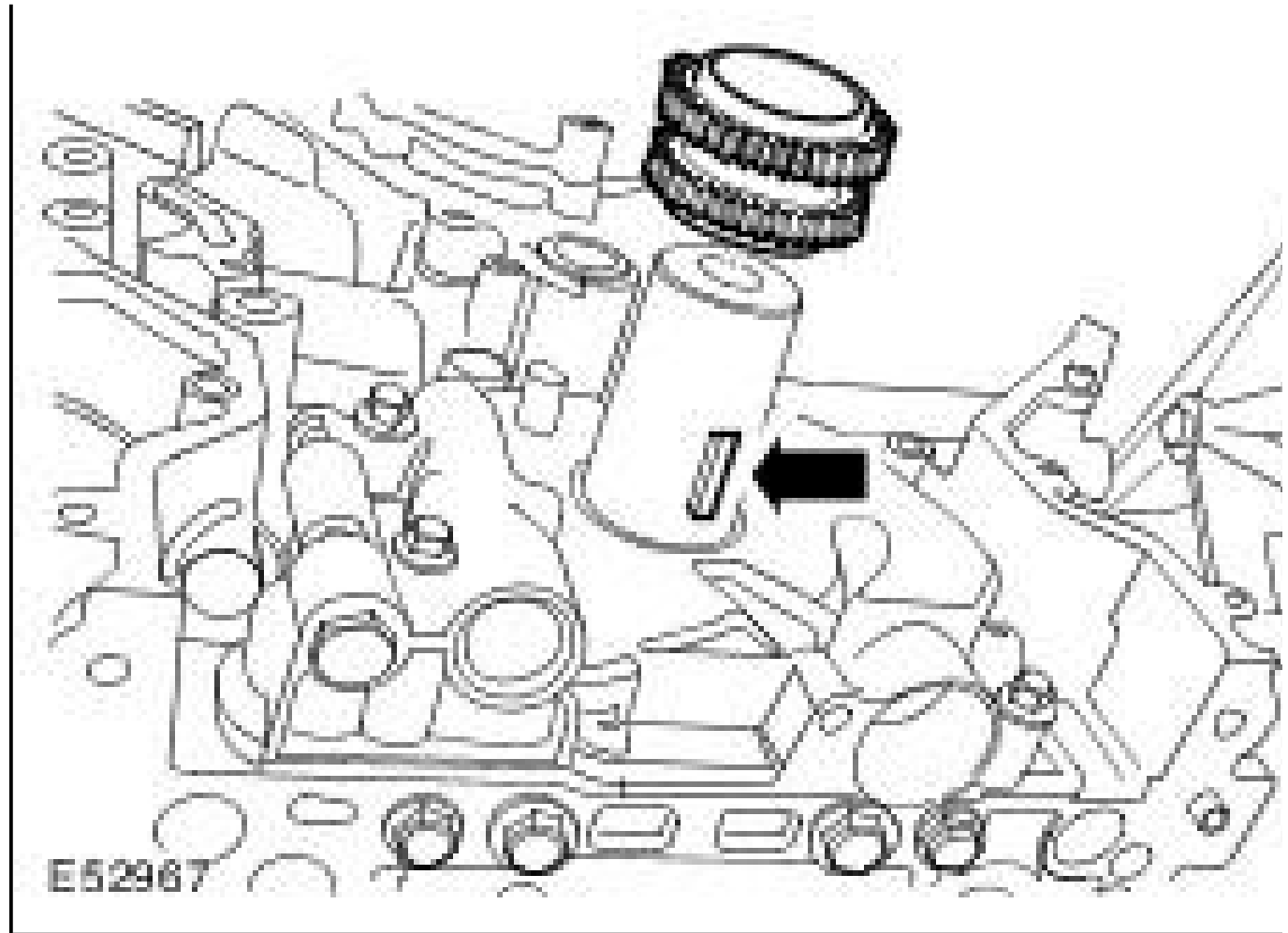
11. Remove the LH upper and lower primary timing chain tensioner guides.
 - Remove the 2 bolts.



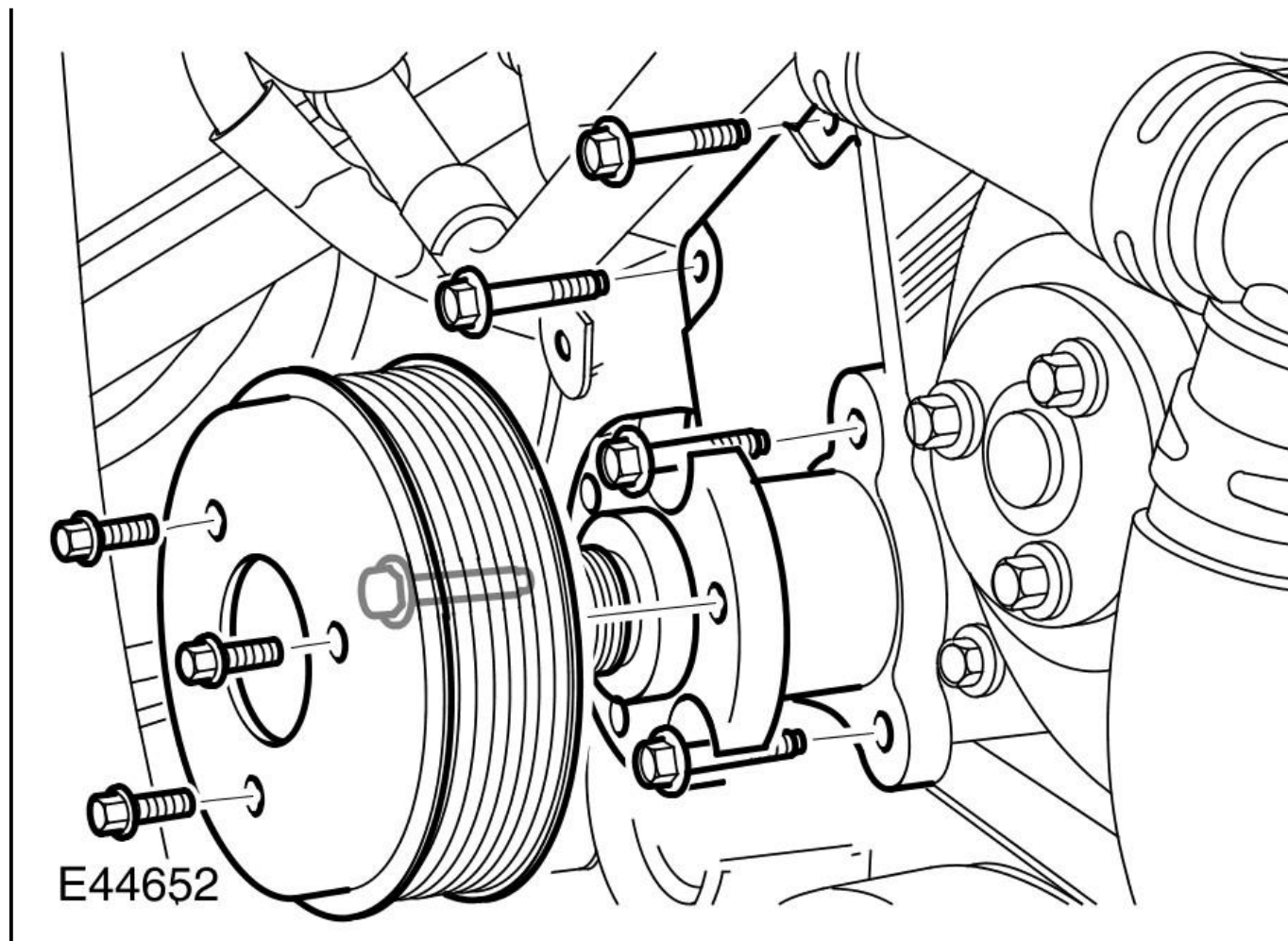
12. Remove the LH primary timing chain.

NOTE: **Note the orientation of the crankshaft sprocket.**

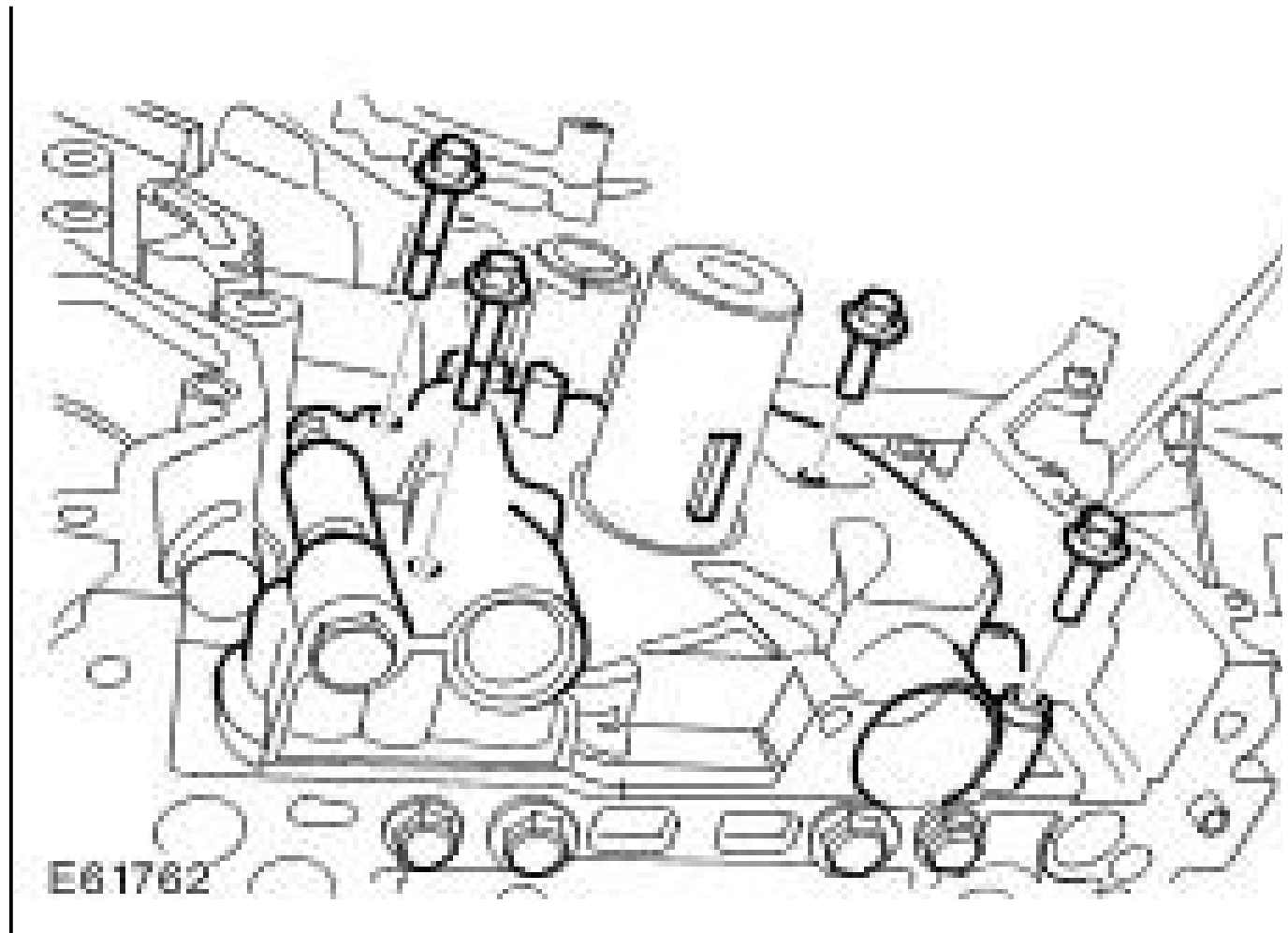
13. Remove the crankshaft sprocket.
- Remove the crankshaft sprocket key.



14. Remove the oil strainer pick-up assembly.
- Remove the 3 bolts.
 - Remove and discard the O-ring seal.



15. Remove the oil pump assembly.
 - Remove the 4 bolts.
 - Remove and discard the gasket.
 - Clean the component mating faces.



INSTALLATION

1. Install the oil pump assembly.
 - Install the new gasket.
 - Tighten the bolts to 10 Nm (7 lb.ft).
2. Install the oil strainer pick-up assembly.
 - Install the O-ring seal.
 - Tighten the M6 bolt to 10 Nm (7 lb.ft).
 - Apply sealant to the M5 bolts.
 - Tighten the M5 bolts to 6 Nm (4 lb.ft).
3. Install the crankshaft sprocket.
 - Install the crankshaft sprocket key.
4. Install the LH primary timing chain.
 - Make sure the timing chain slack is on the tensioner side of the timing chain.
5. Install the LH primary timing chain tensioner guides.
 - Tighten the bolts to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

6. Install the LH primary timing chain tensioner.
 - Using 3 mm diameter metal rod, retain the chain tensioner piston.
 - Tighten the bolts to 12 Nm (9 lb.ft).
 - Remove the retaining rod.
7. Install the RH primary timing chain.
 - Make sure the timing chain slack is on the tensioner side of the timing chain.
8. Install the RH primary timing chain tensioner guide.
 - Tighten the bolts to 12 Nm (9 lb.ft).

CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

9. Install the RH primary timing chain tensioner.
 - Using 3 mm diameter metal rod, retain the chain tensioner piston.
 - Tighten the bolts to 12 Nm (9 lb.ft).
 - Remove the retaining rod.
10. Remove the special tool from the RH cylinder head.
11. Remove the special tool from the LH cylinder head.
12. Install the oil pan. Refer to **OIL PAN**.
13. Connect the battery ground cable. Refer to **SPECIFICATIONS**.

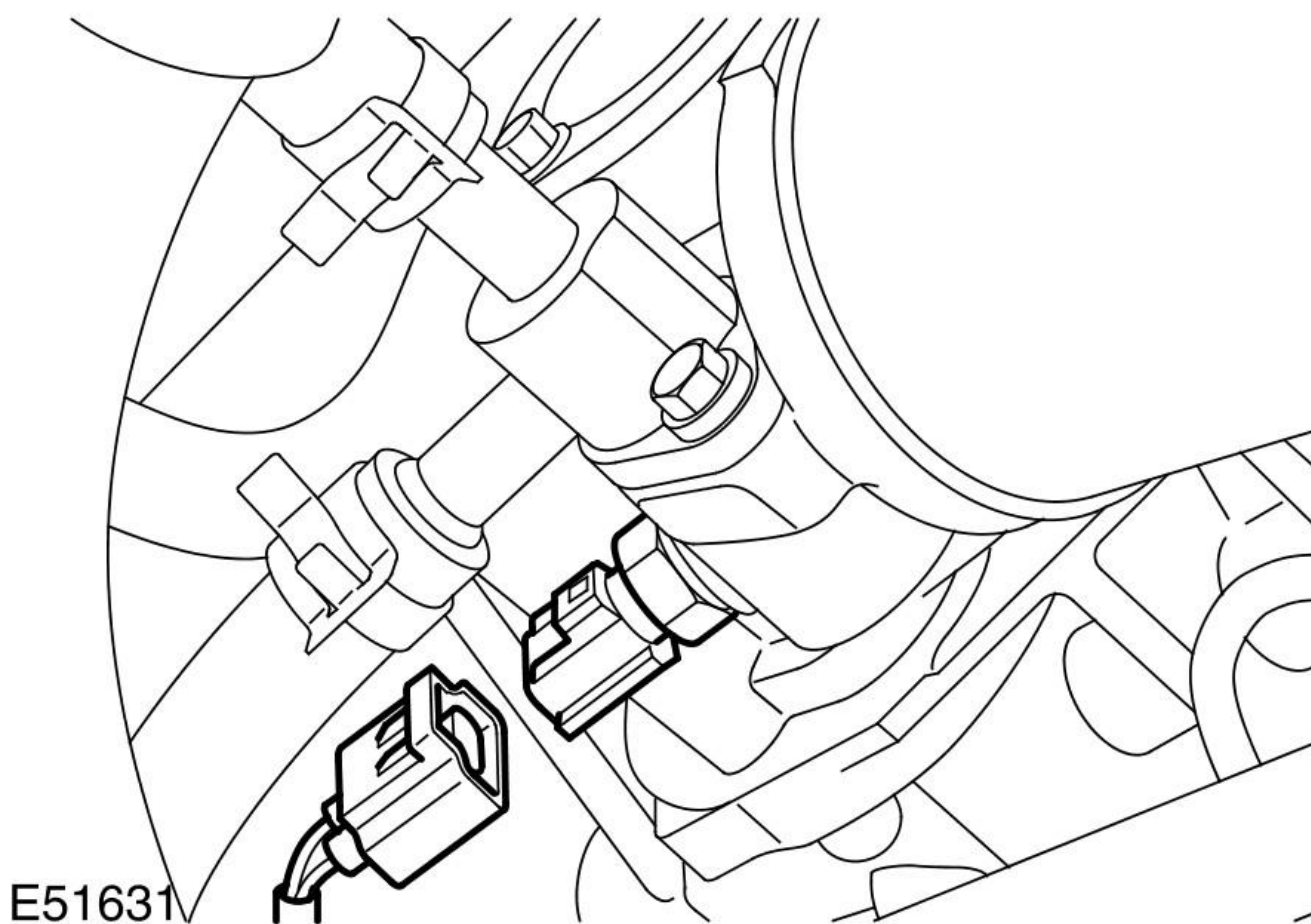
OIL FILTER HOUSING

REMOVAL

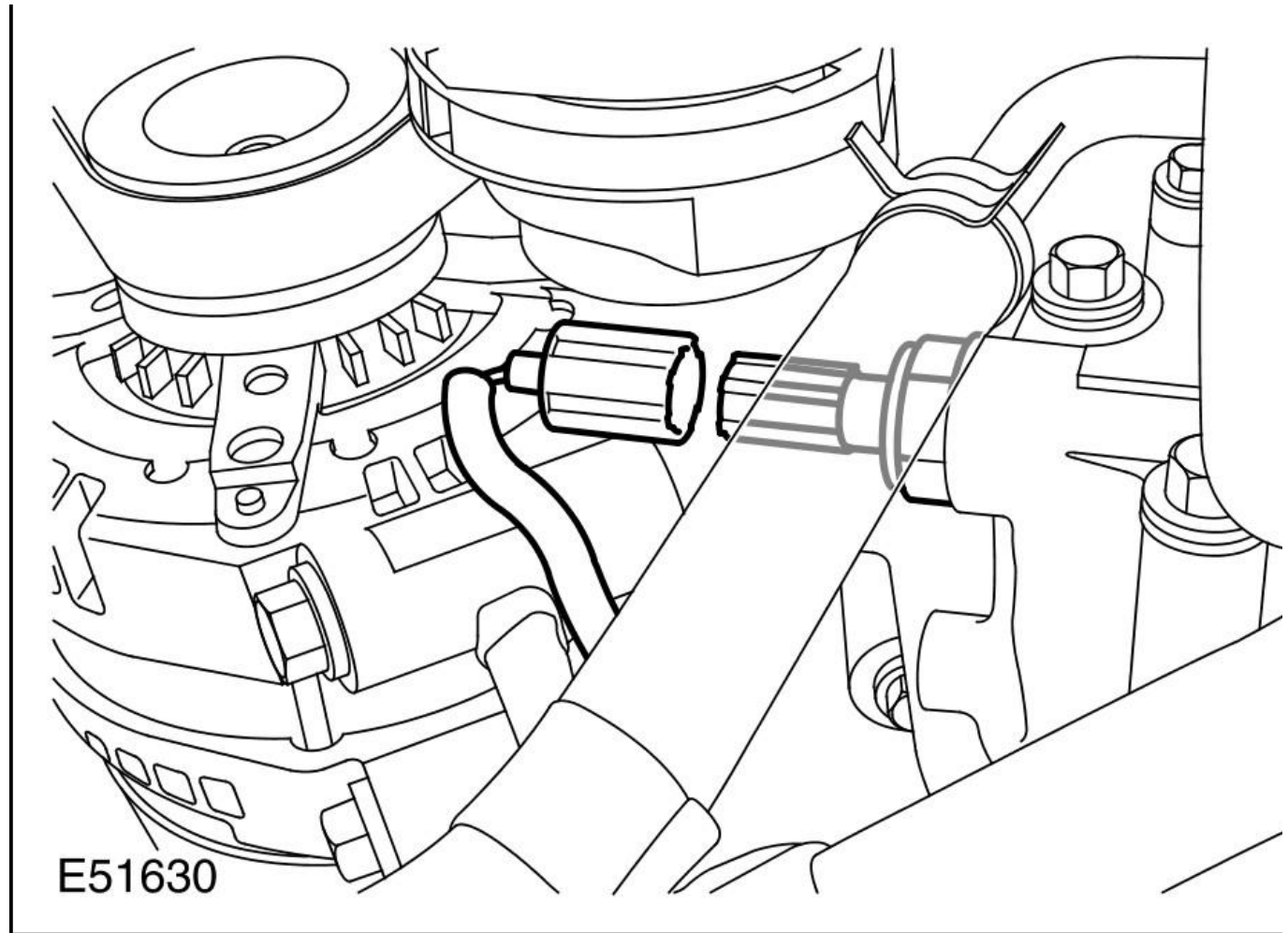
1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS**.

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

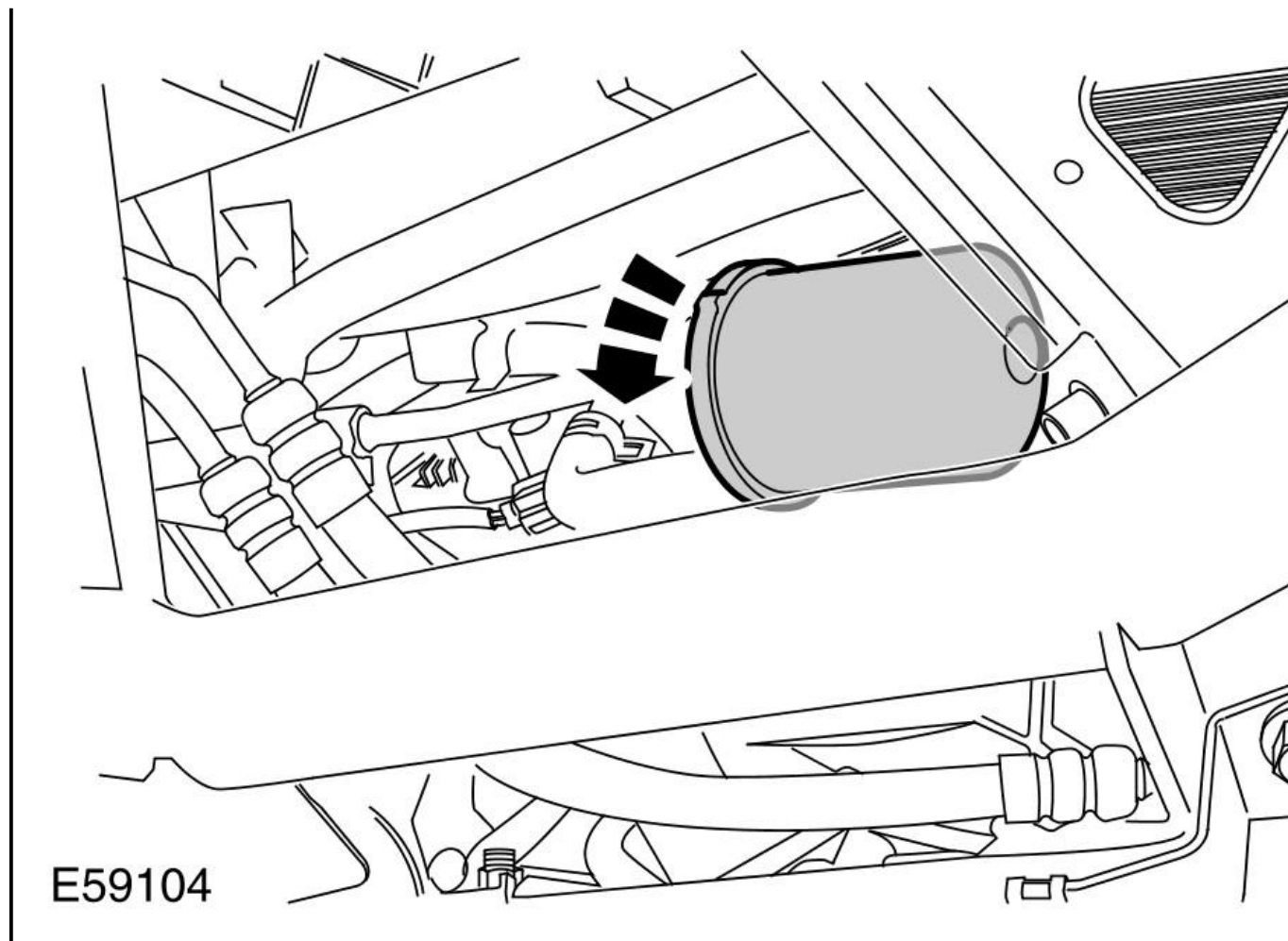
2. Raise and support the vehicle.
3. Remove the radiator splash shield. Refer to **RADIATOR SPLASH SHIELD**.
4. Disconnect the engine oil temperature sensor electrical connector.



5. Disconnect the engine oil pressure (EOP) sensor electrical connector.

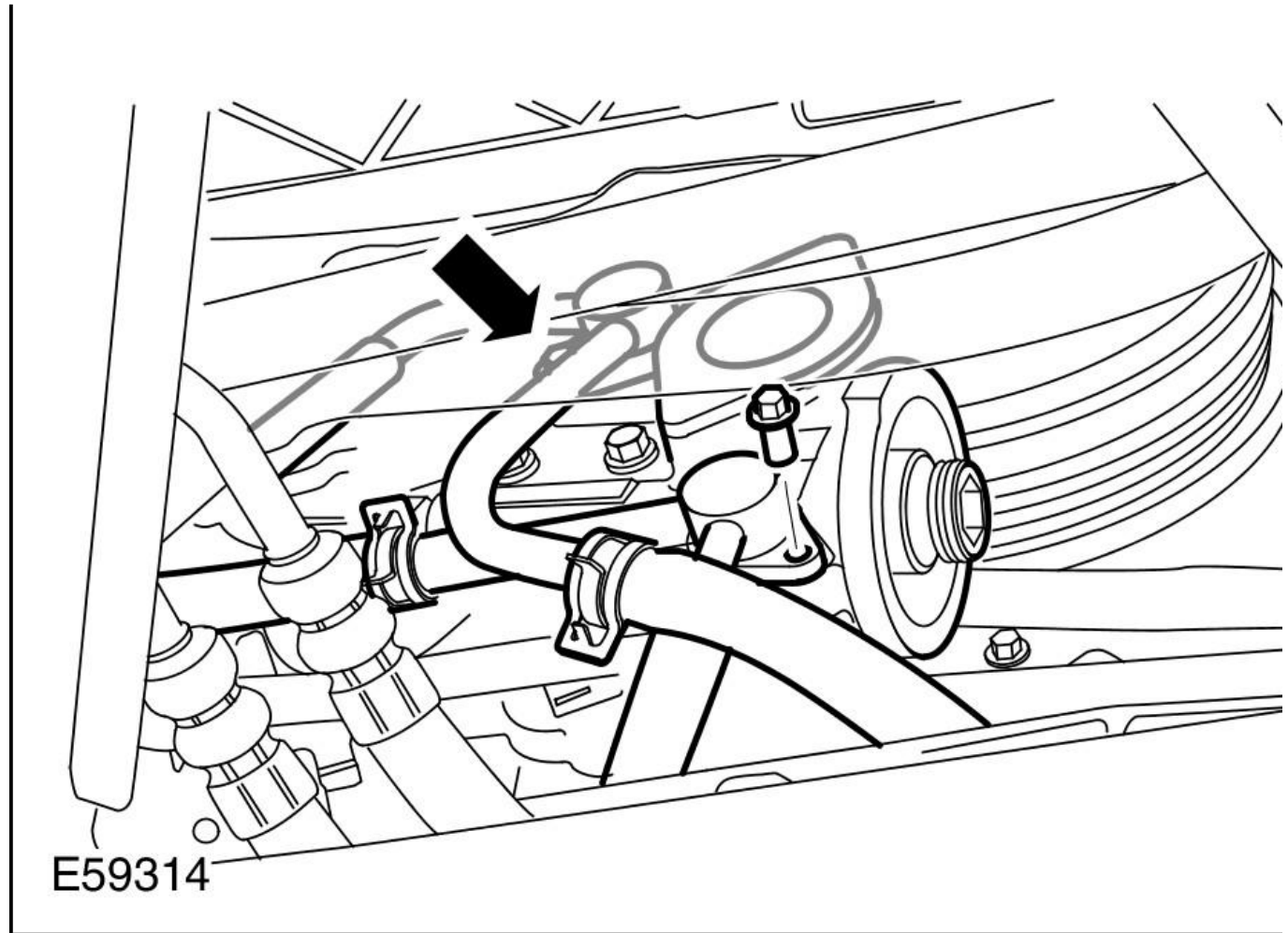


6. Remove the engine oil filter.
 - Position a container to collect the fluid spillage.

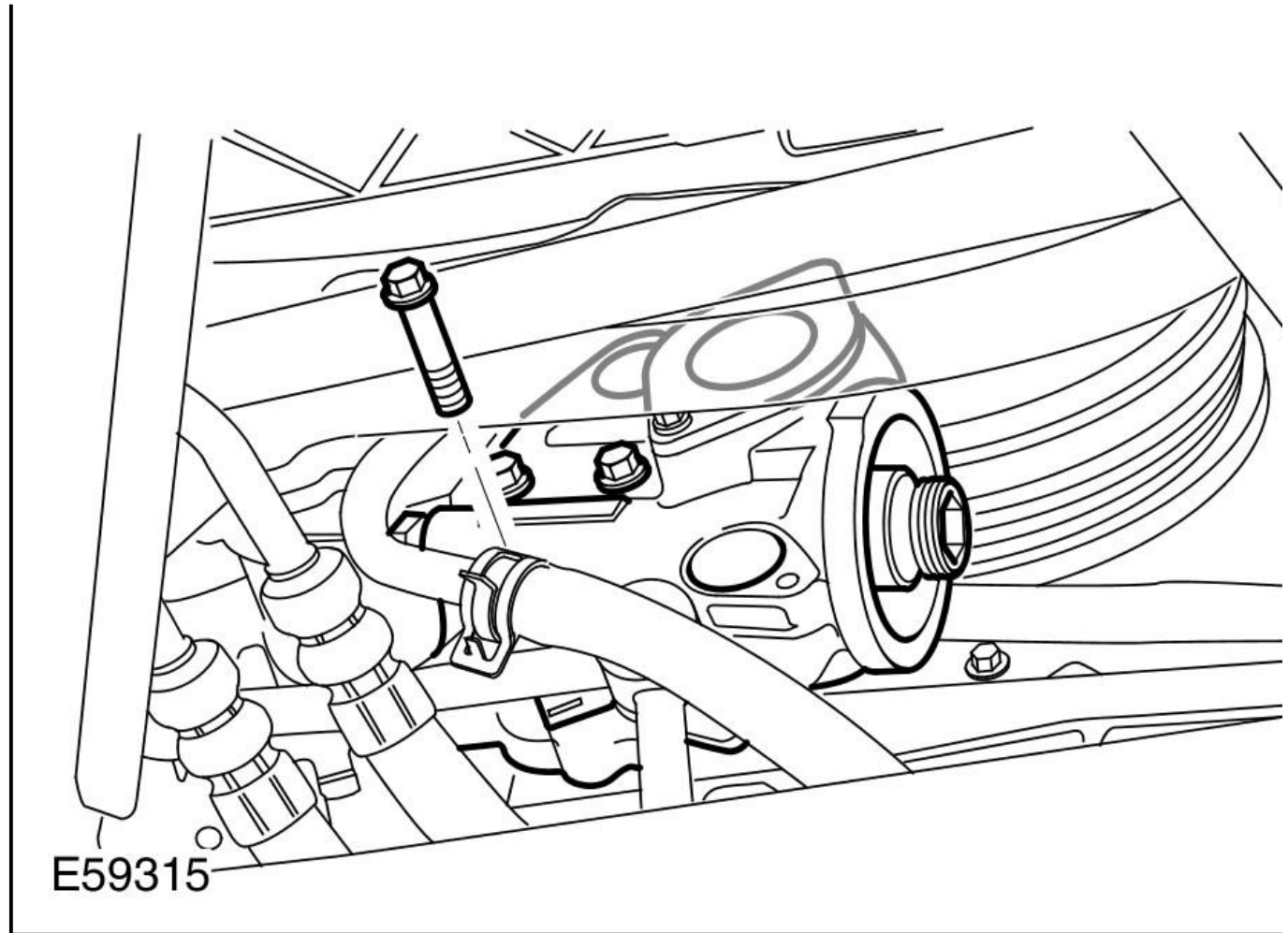


CAUTION: Before disconnecting or removing the components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

7. Disconnect the oil cooler hose adapter.
 - Remove the bolt.
 - Remove and discard the O-ring seal.
 - Repeat the above procedure for the remaining adapter.

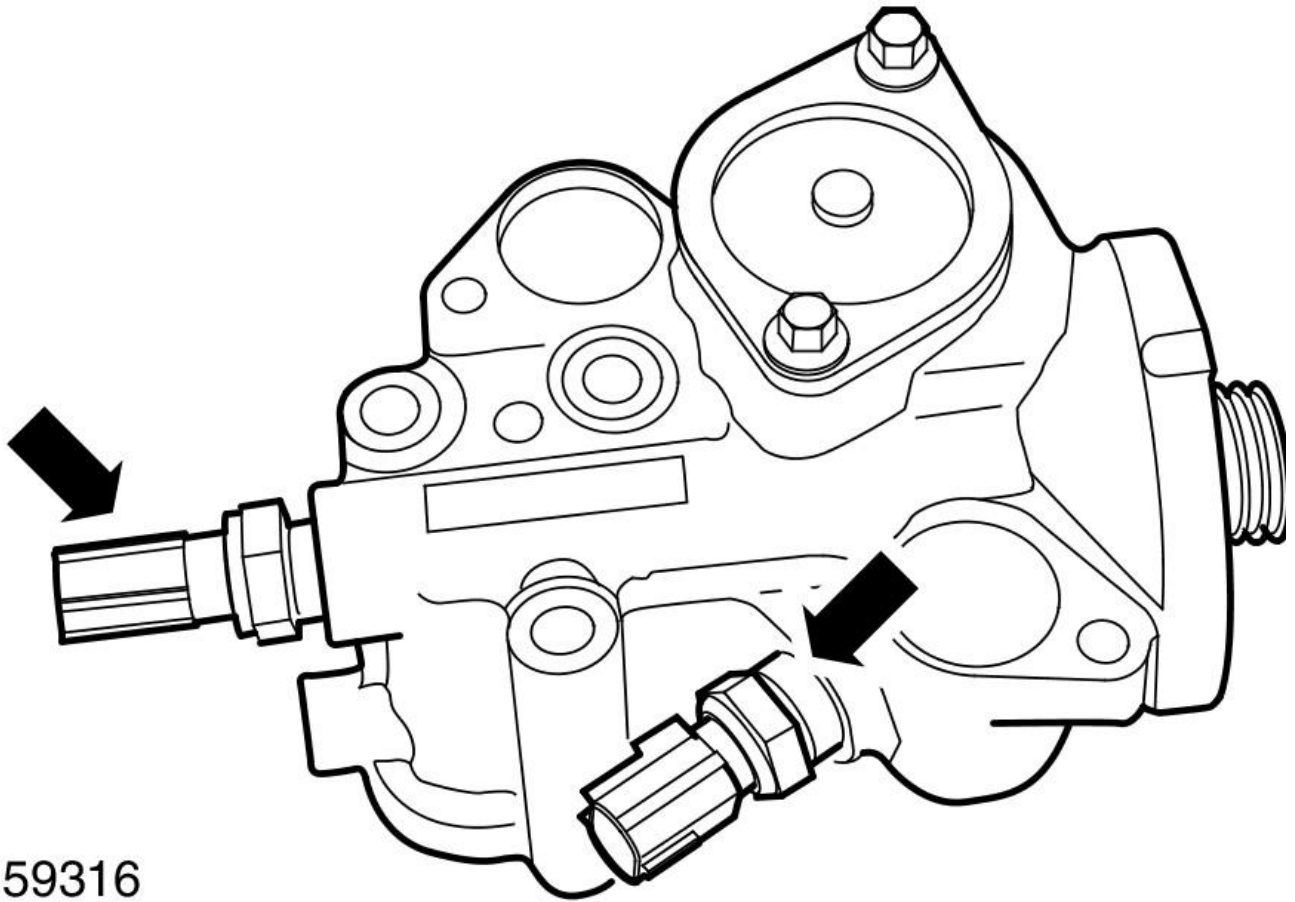


8. Remove the oil filter housing.
 - Remove the 3 bolts.
 - Remove and discard the O-ring seal.



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

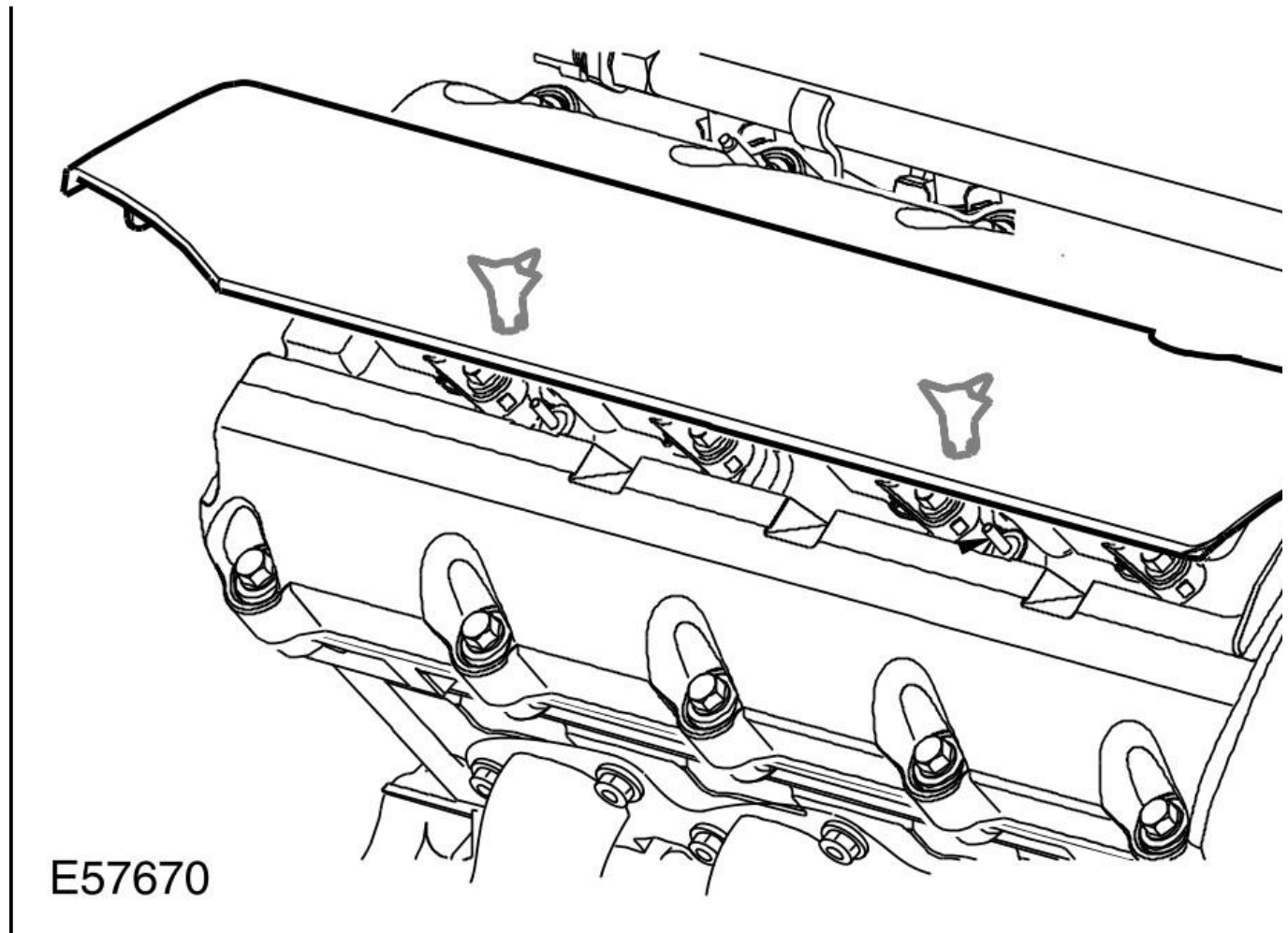
9. Remove the engine oil temperature sensor.
10. Remove the EOP sensor.



E59316

11. Remove the auxiliary oil cooler thermostat.

- Remove the 2 bolts.
- Remove and discard the O-ring seal.



INSTALLATION

1. Install the auxiliary oil cooler thermostat.
 - Clean the component mating faces.
 - Install a new O-ring seal.
 - Tighten the bolts to 10 Nm (7 lb.ft).
2. Install the EOP sensor.
 - Tighten the EOP sensor to 13 Nm (10 lb.ft).
3. Install the engine oil temperature sensor.
 - Tighten the engine oil temperature sensor to 20 Nm (15 lb.ft).
4. Install the oil filter housing.
 - Clean the component mating faces.
 - Install a new O-ring seal.
 - Tighten the bolts to 20 Nm (15 lb.ft).
5. Connect the oil cooler hose adapters.
 - Clean the component mating faces.

- Install new O-ring seals.
 - Tighten the bolts to 10 Nm (7 lb.ft).
6. Install the engine oil filter.
 - Lubricate the oil filter seal with clean engine oil and tighten to 18 Nm (13 lb.ft).
 7. Connect the EOP sensor electrical connector.
 8. Connect the engine oil temperature sensor electrical connector.
 9. Install the radiator splash shield. Refer to **RADIATOR SPLASH SHIELD** .
 10. Connect the battery ground cable. Refer to **SPECIFICATIONS** .
 11. Check and top-up the engine oil.

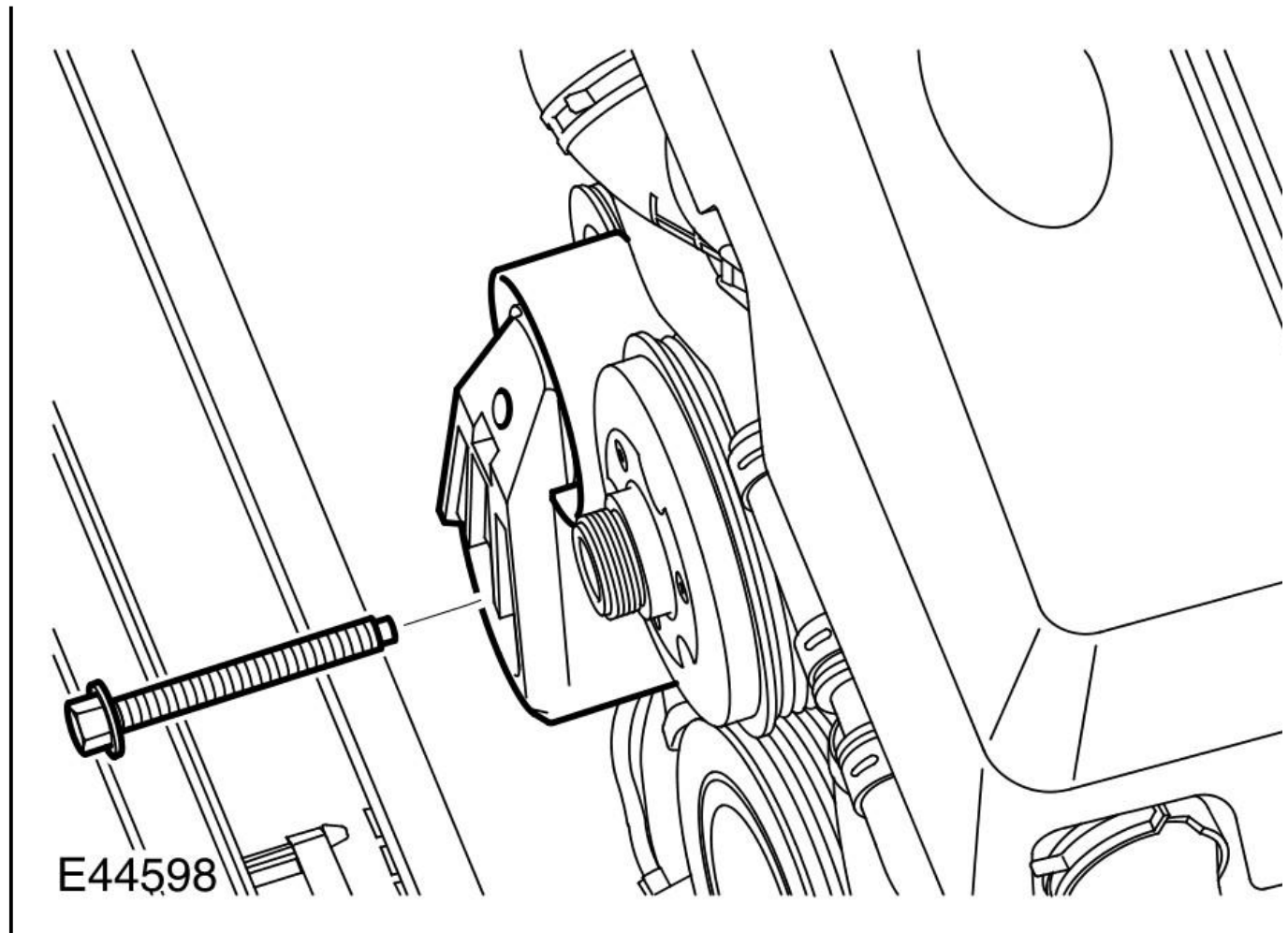
OIL PAN

REMOVAL

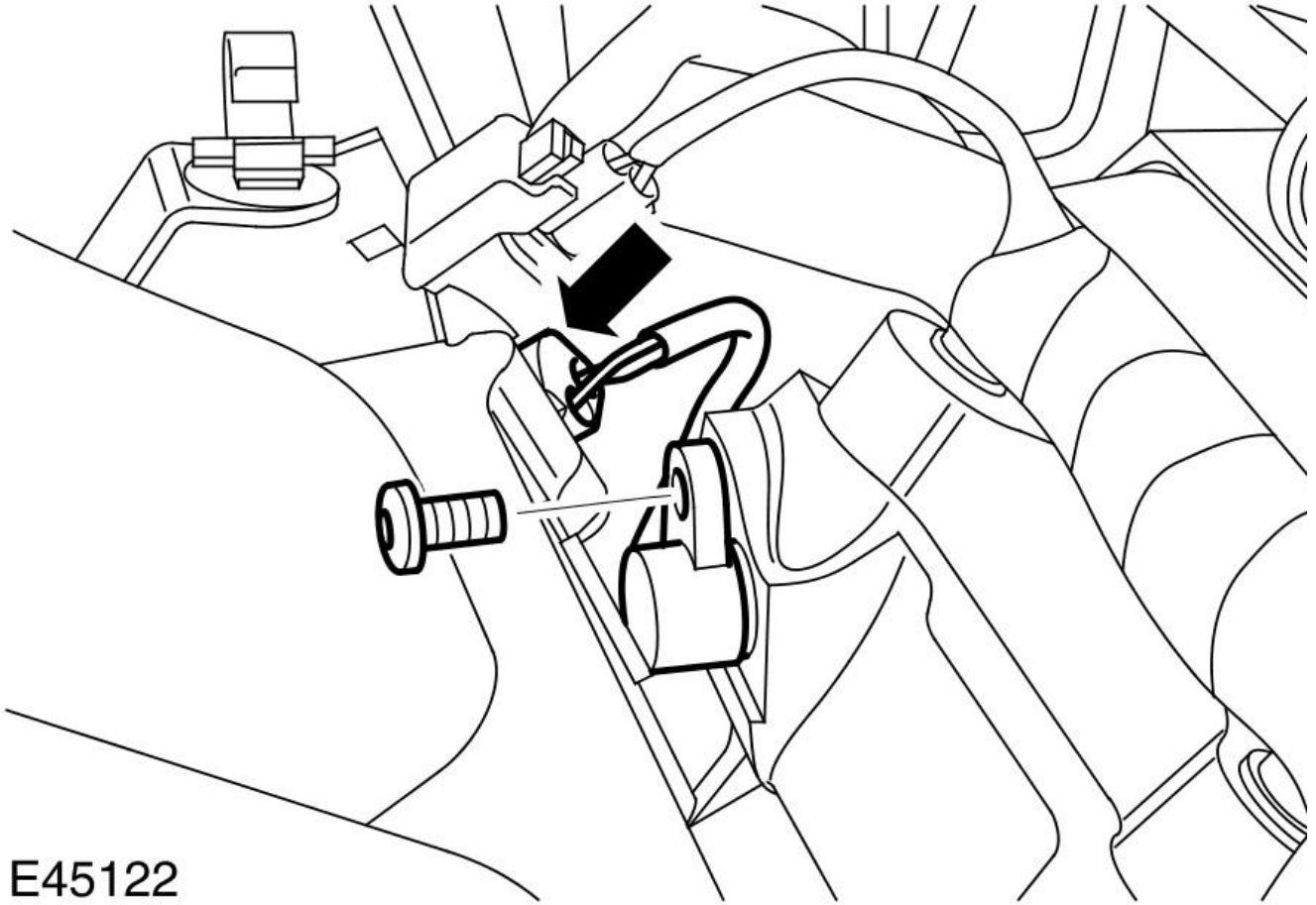
1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

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

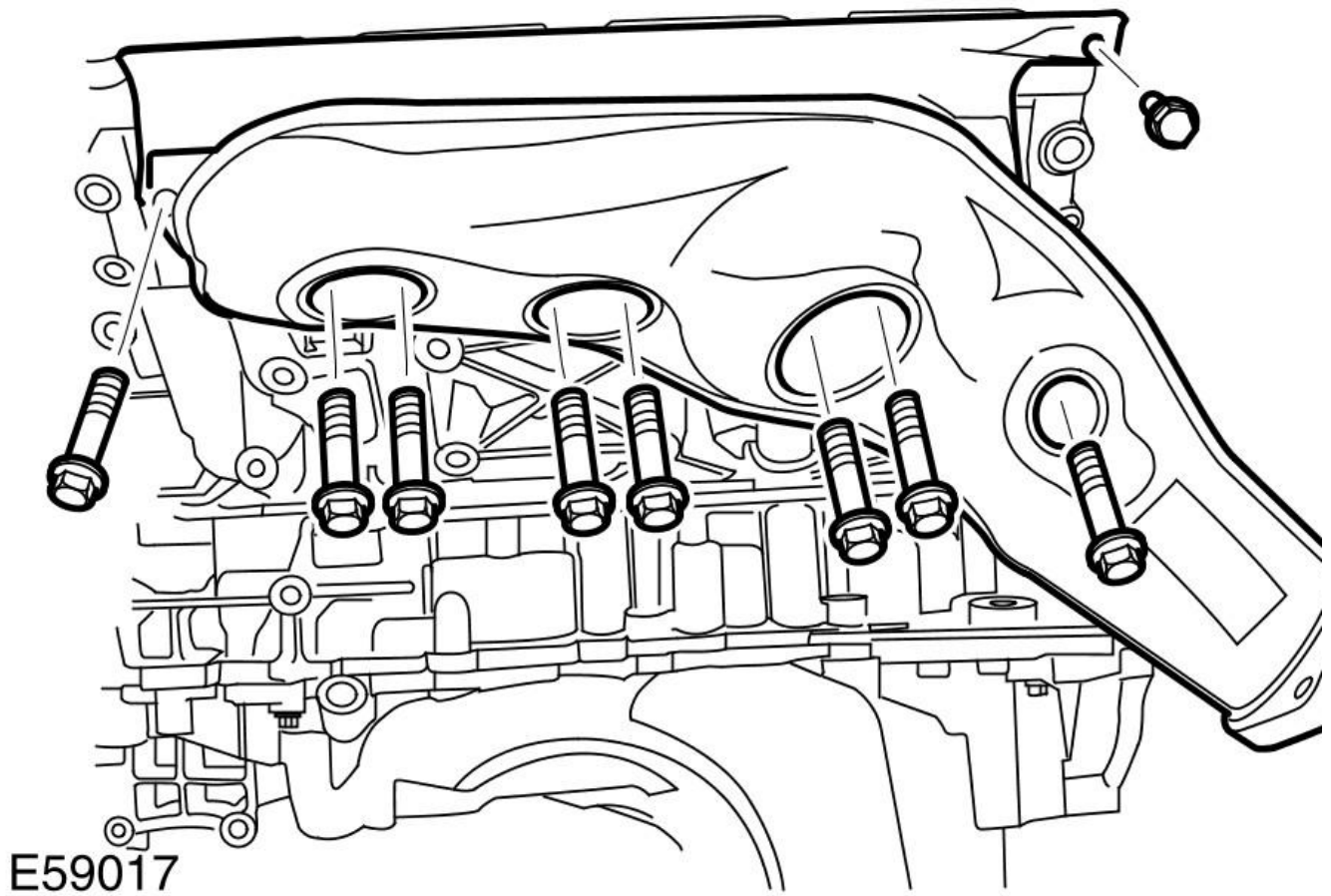
2. Raise and support the vehicle.
3. Remove the engine. Refer to **ENGINE**.
4. Remove the engine front cover. Refer to **ENGINE FRONT COVER**.
5. Remove the power steering pump and bracket.
 - Remove the 3 bolts.



6. LH side: Release the wiring harness.
 - Release the 3 clips.

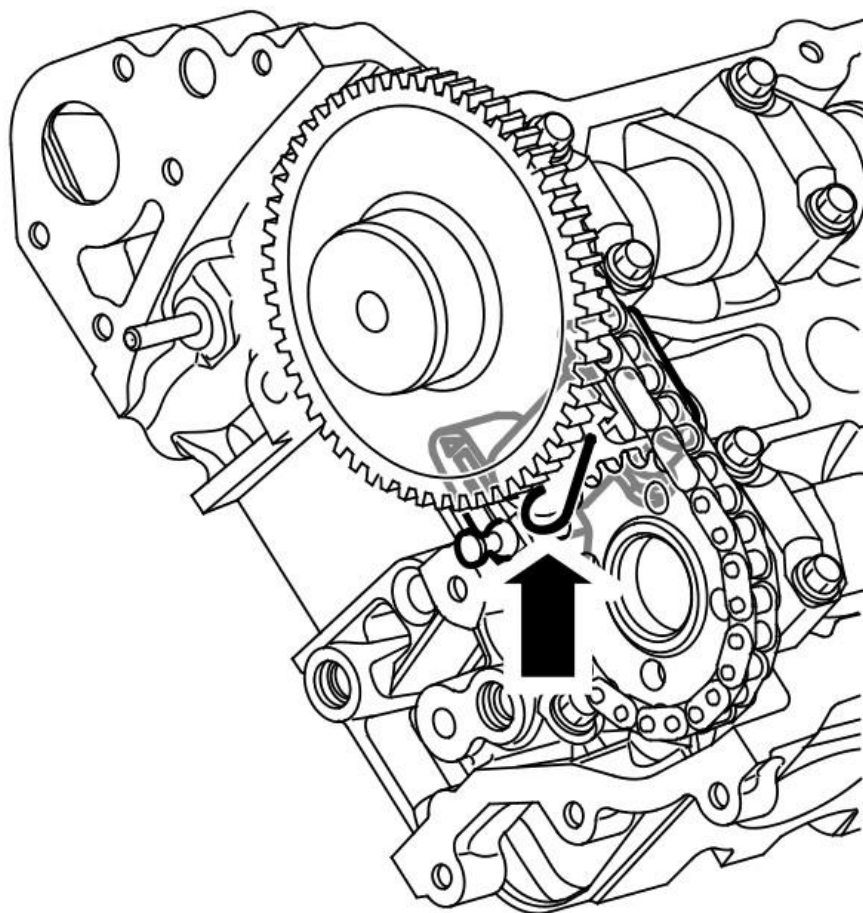


7. RH side: Release the wiring harness.
- Release the 3 clips.



8. Remove the halfshaft support bearing housing.

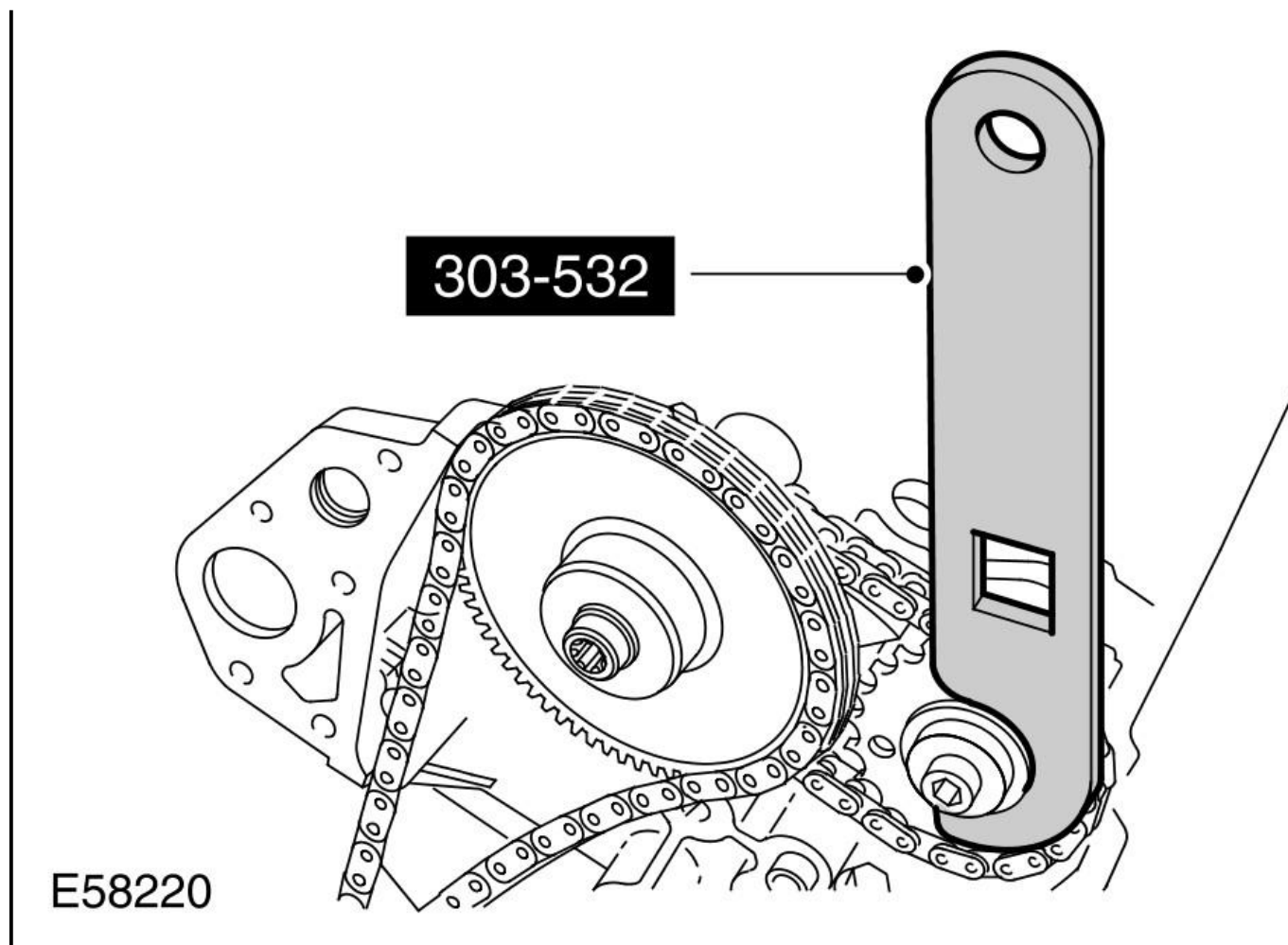
- Remove the 4 bolts.
- Remove and discard the O-ring seal.



E58311

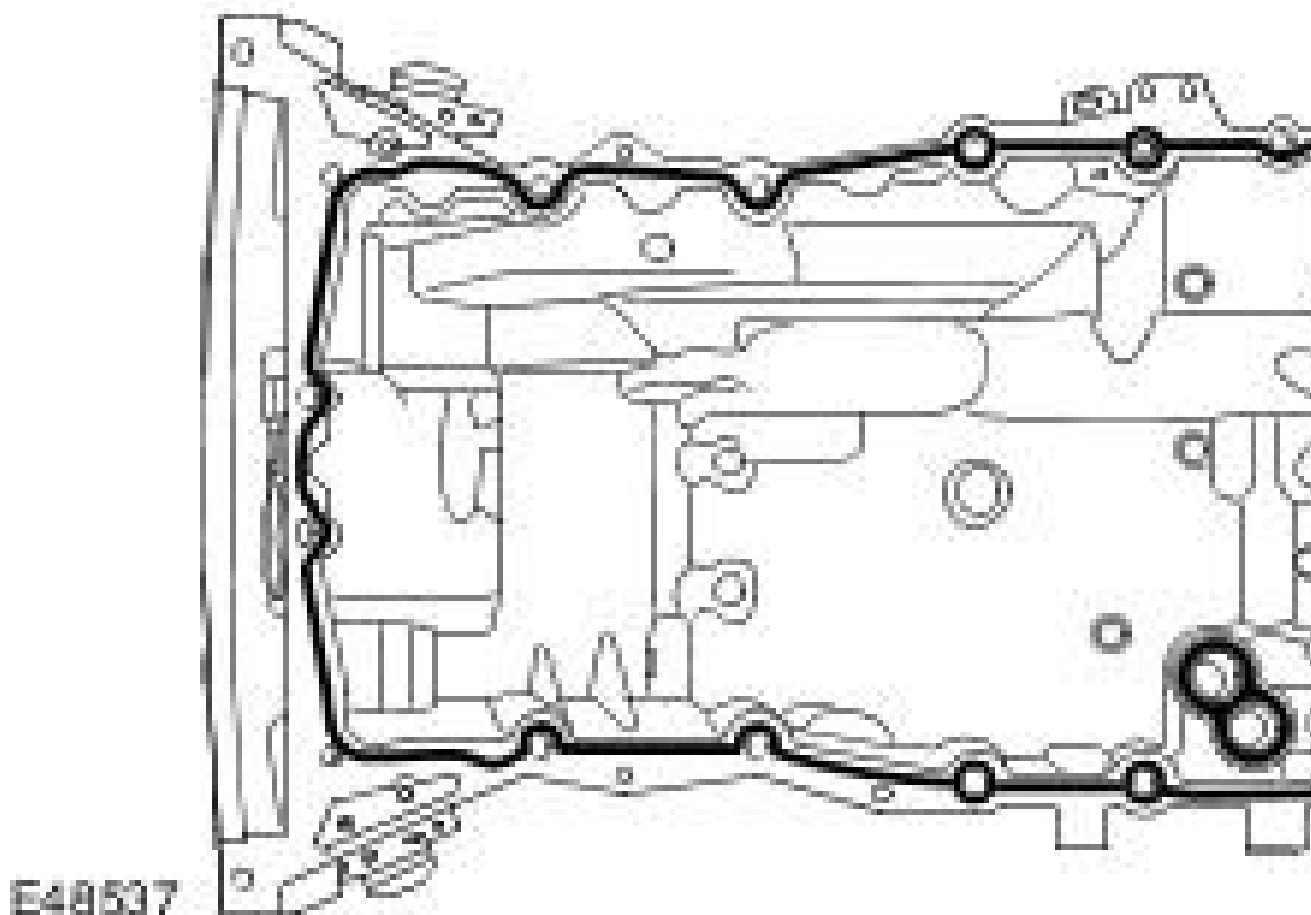
CAUTION: Note the position of the bolts, prior to removal.

9. Remove the oil pan.
 - Remove the 19 bolts.
 - Carefully remove the sealant.

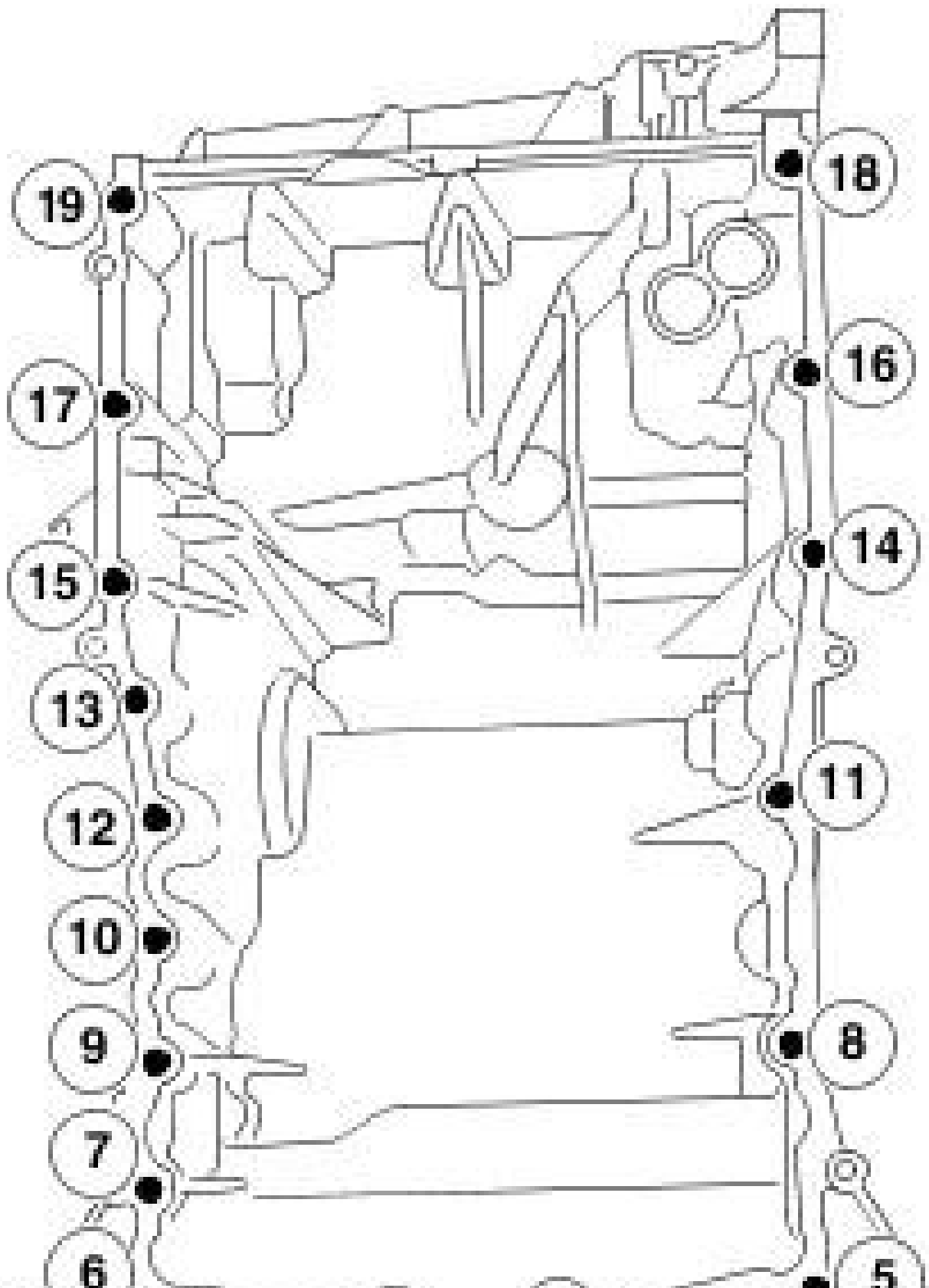


INSTALLATION

1. Install the oil pan.
 - Clean the component mating faces.
 - Apply a bead of sealant, 3 mm diameter, to the area indicated.
 - Install the bolts, but do not tighten fully at this stage.



2. Tighten the oil pan bolts in the sequence shown to 20 Nm (15 lb.ft).



3. Install the halfshaft support bearing housing.
 - Install a new O-ring seal.
 - Lubricate the O-ring seal with petroleum jelly.
 - Tighten the bolts evenly to 25 Nm (18 lb.ft).
4. RH side: Attach the wiring harness.
 - Secure the clips.
5. LH side: Attach the wiring harness.
 - Secure the clips.
6. Install the power steering pump and bracket.
 - Tighten the bolts to 25 Nm (18 lb.ft).
7. Install the engine front cover. Refer to **ENGINE FRONT COVER**.
8. Install the engine. Refer to **ENGINE**.
9. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

OIL COOLER

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

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

2. Raise and support the vehicle.
3. Drain the coolant. Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

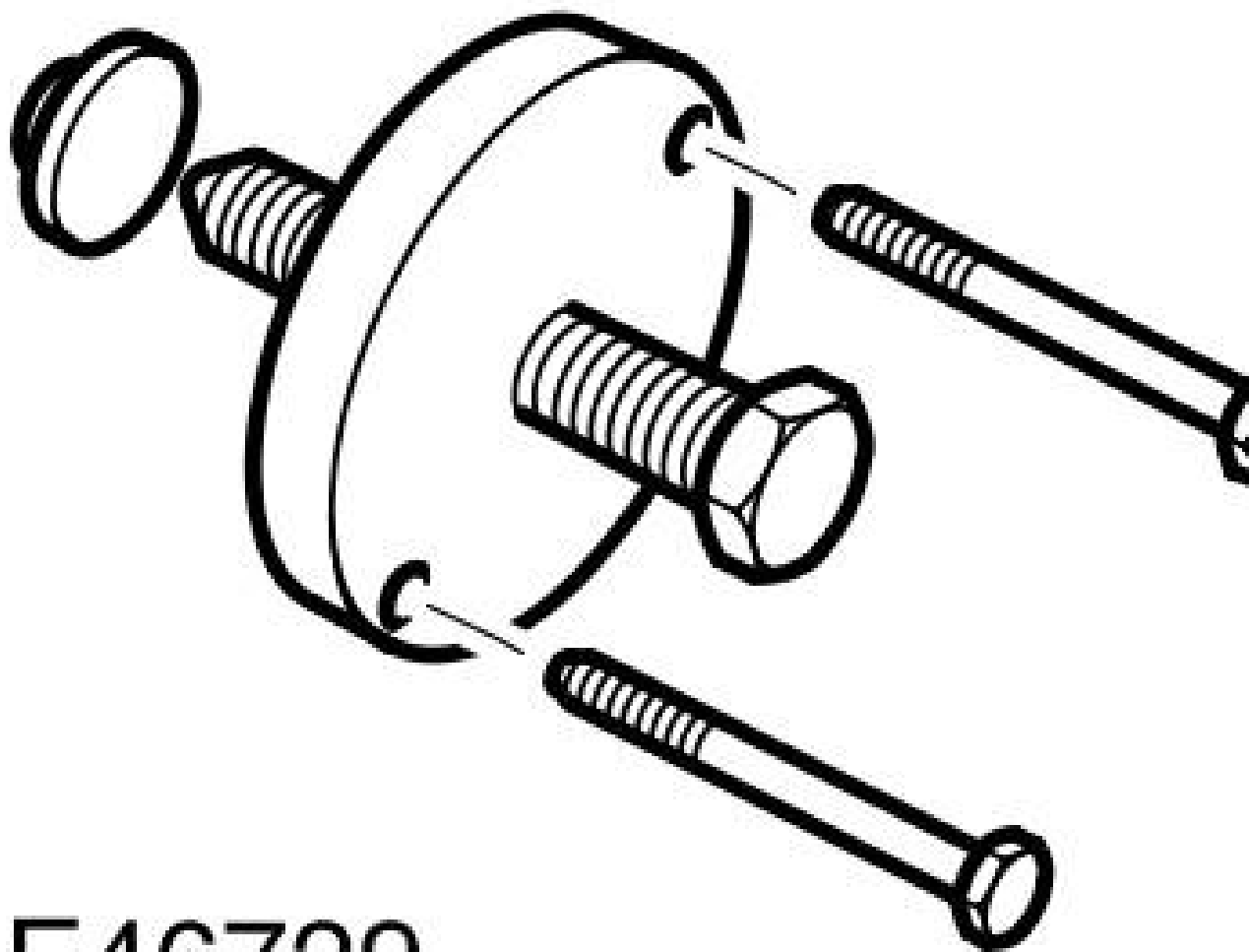
CAUTION: Before disconnecting or removing the components, ensure the area around the joint faces and connections are clean and dry. Plug open connections to prevent contamination.

4. Disconnect the 2 engine oil cooler, coolant hoses.
 - Release the 2 clips.

CAUTION: Before disconnecting or removing the components, ensure the area around the joint faces and connections are clean and dry. Plug open connections to prevent contamination.

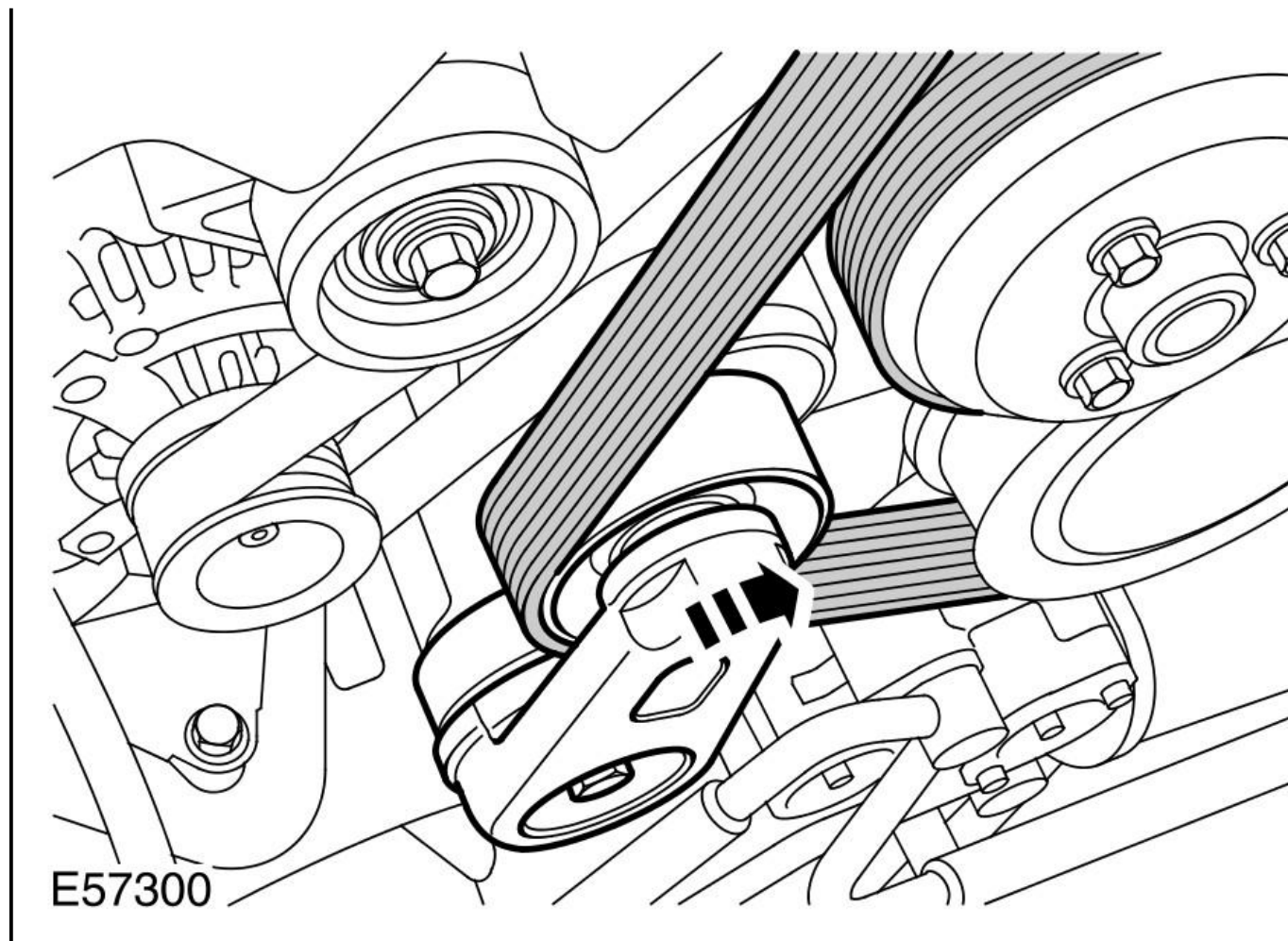
5. Disconnect the 2 engine oil cooler lines.
 - Depress the 2 quick release connectors.

303-588



E46729

6. Remove the engine oil cooler.
 - Remove the Torx screw.
 - Release from the 2 clips.

**INSTALLATION**

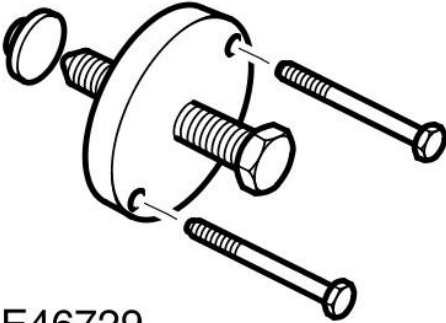
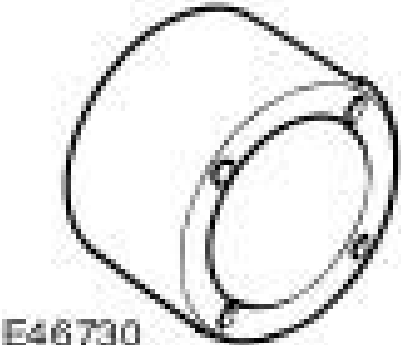
1. Install the engine oil cooler.
 - Secure in the clips.
 - Tighten the Torx screw.
2. Connect the engine oil cooler lines.
3. Connect the engine oil cooler, coolant hoses.
 - Secure with the clips.
4. Connect the battery ground cable. Refer to **SPECIFICATIONS**.
5. Refill and bleed the cooling system. Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
6. Check and top-up the engine oil.

ENGINE FRONT COVER**SPECIAL TOOLS**

Tool Illustration	Tool Name	Tool Number
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2006 Land Rover Range Rover HSE

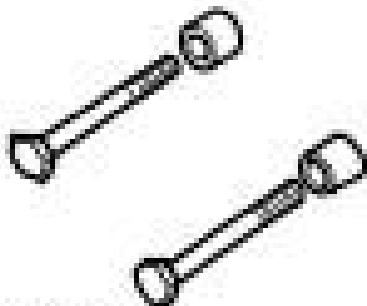
ENGINE Engine (4.2L)

 303-588 E46729	Remover, crankshaft pulley	303-588
 303-893 E46728	Holding Tool Crankshaft Pulley	303-893(LRT-12-080)
 303-191-03 E46730	Adapter	303-191-03
	Bolts and spacers	303-191-04

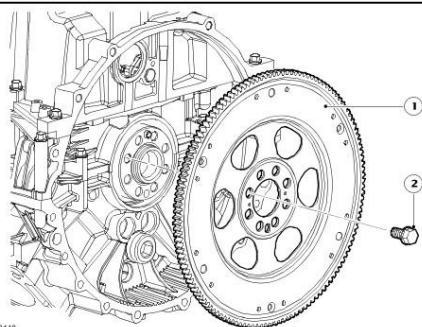
2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

303-191-04



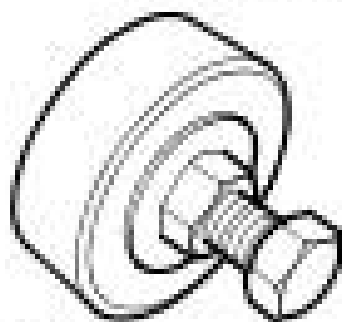
E59251



Remover, crankshaft seal

303-D121

303-1100



E46732

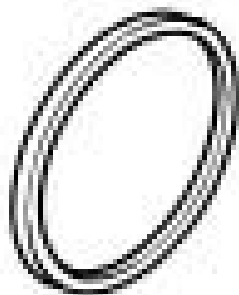
Installer, crankshaft seal

303-1100

Adapter - Crankshaft seal
installer

303-1100-01

303-1100-01



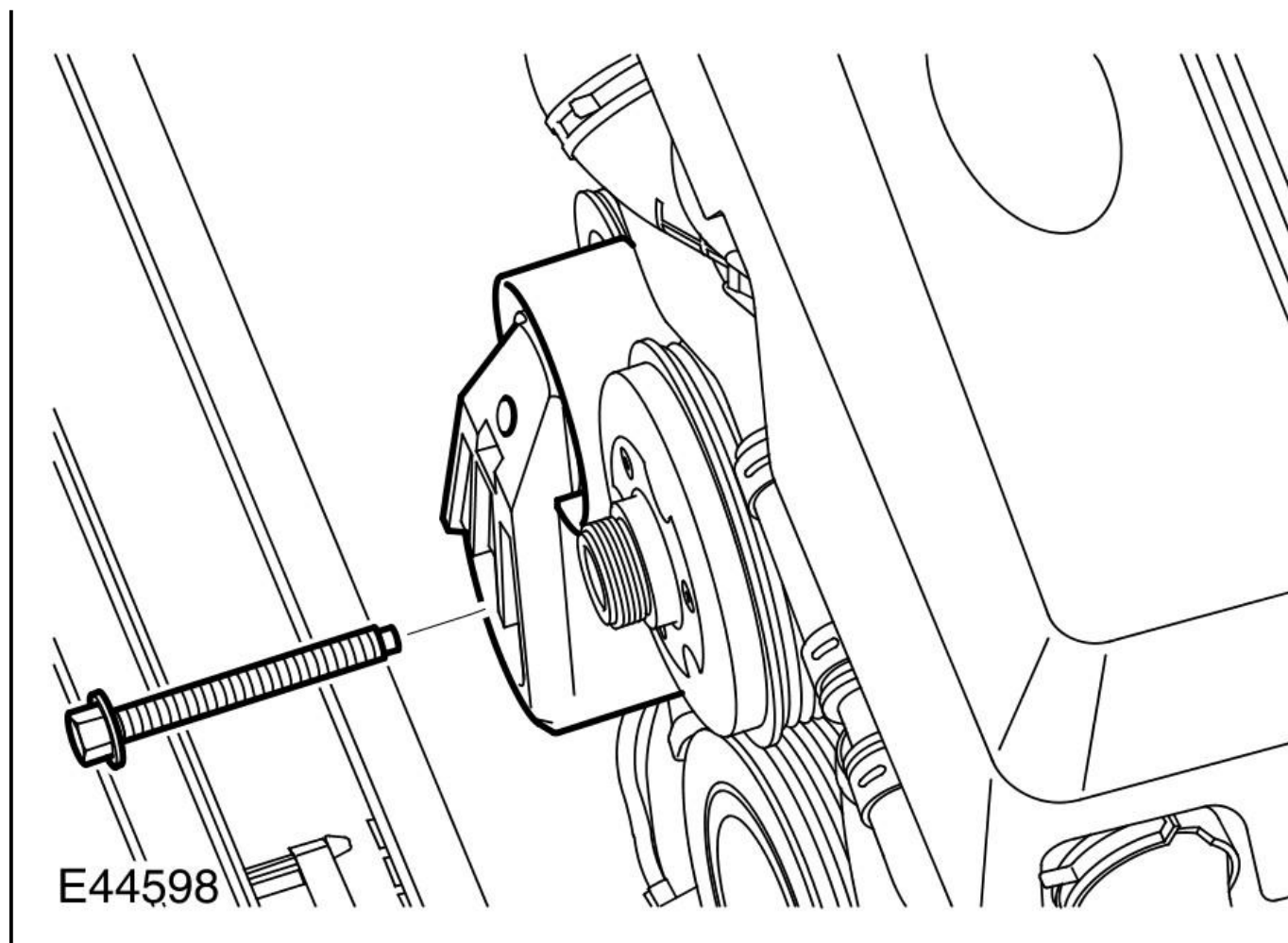
E87144

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

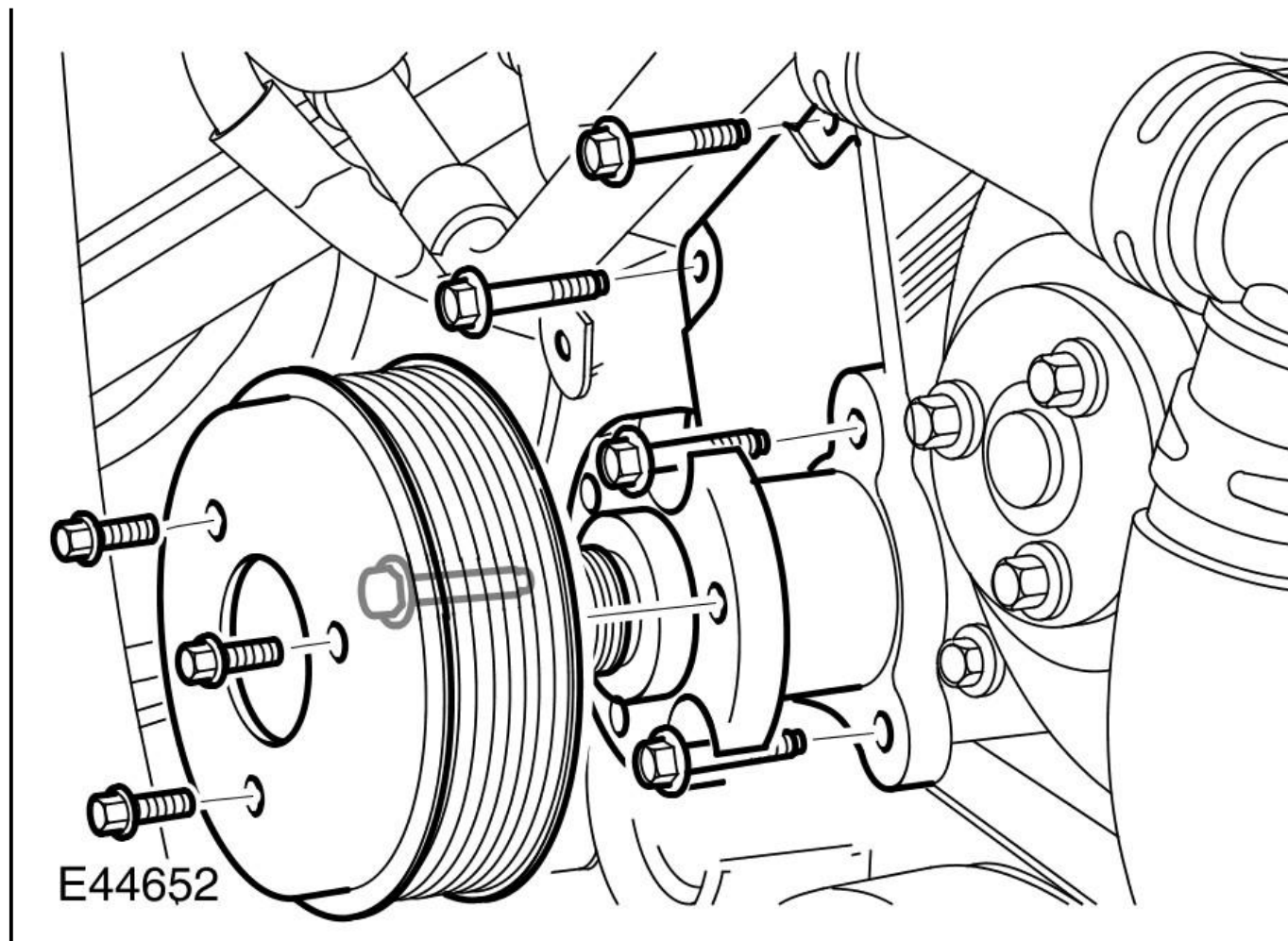
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the coolant manifold. Refer to **COOLANT MANIFOLD** .
4. Remove the cooling fan drive belt tensioner.
 - Remove the bolt.

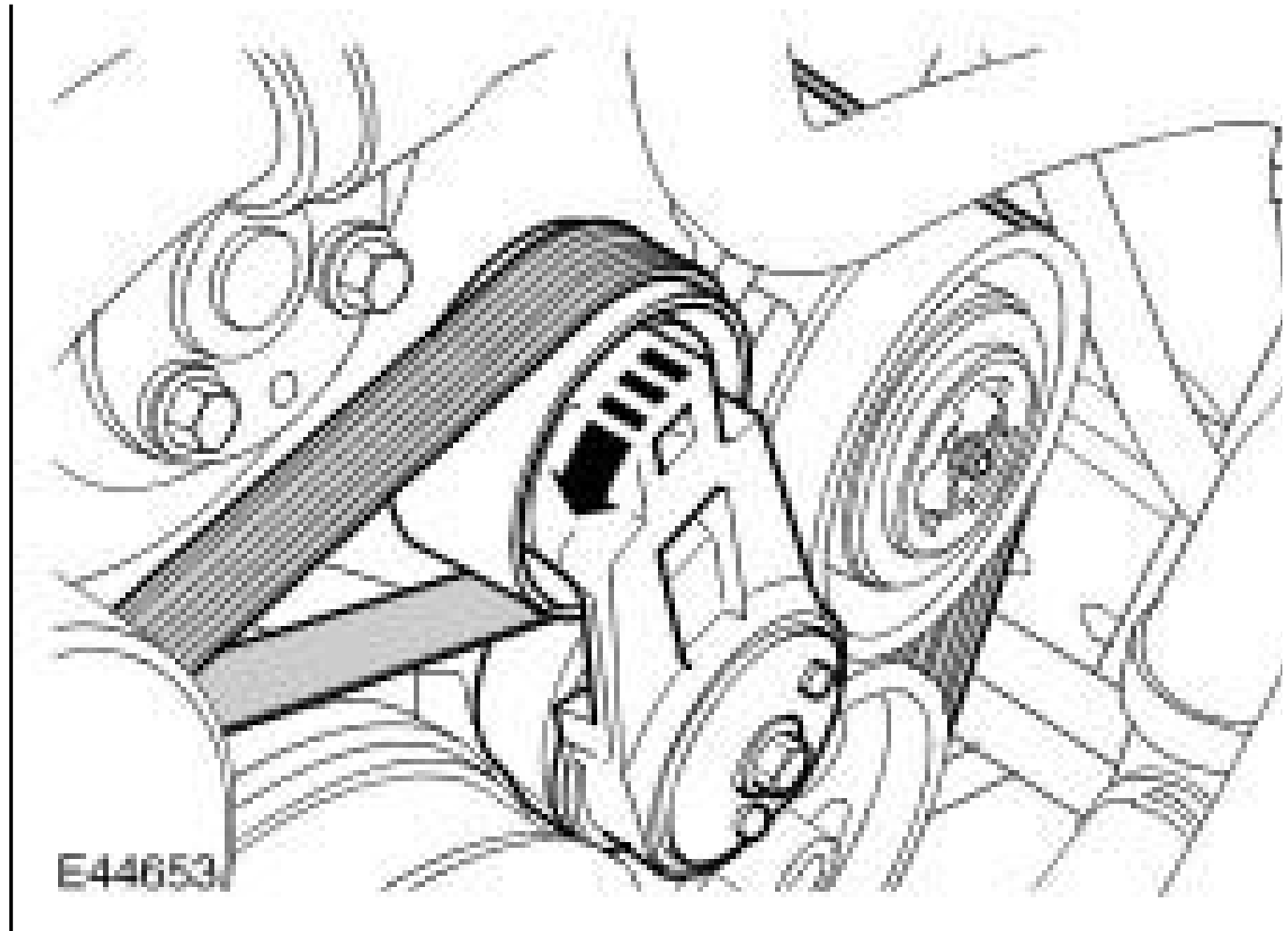


NOTE: **Restrain the pulley to aid the removal of the bolts.**

5. Remove the cooling fan pulley.
 - Remove the 3 bolts.
6. Remove the cooling fan drive hub bearing.
 - Remove the 5 bolts.

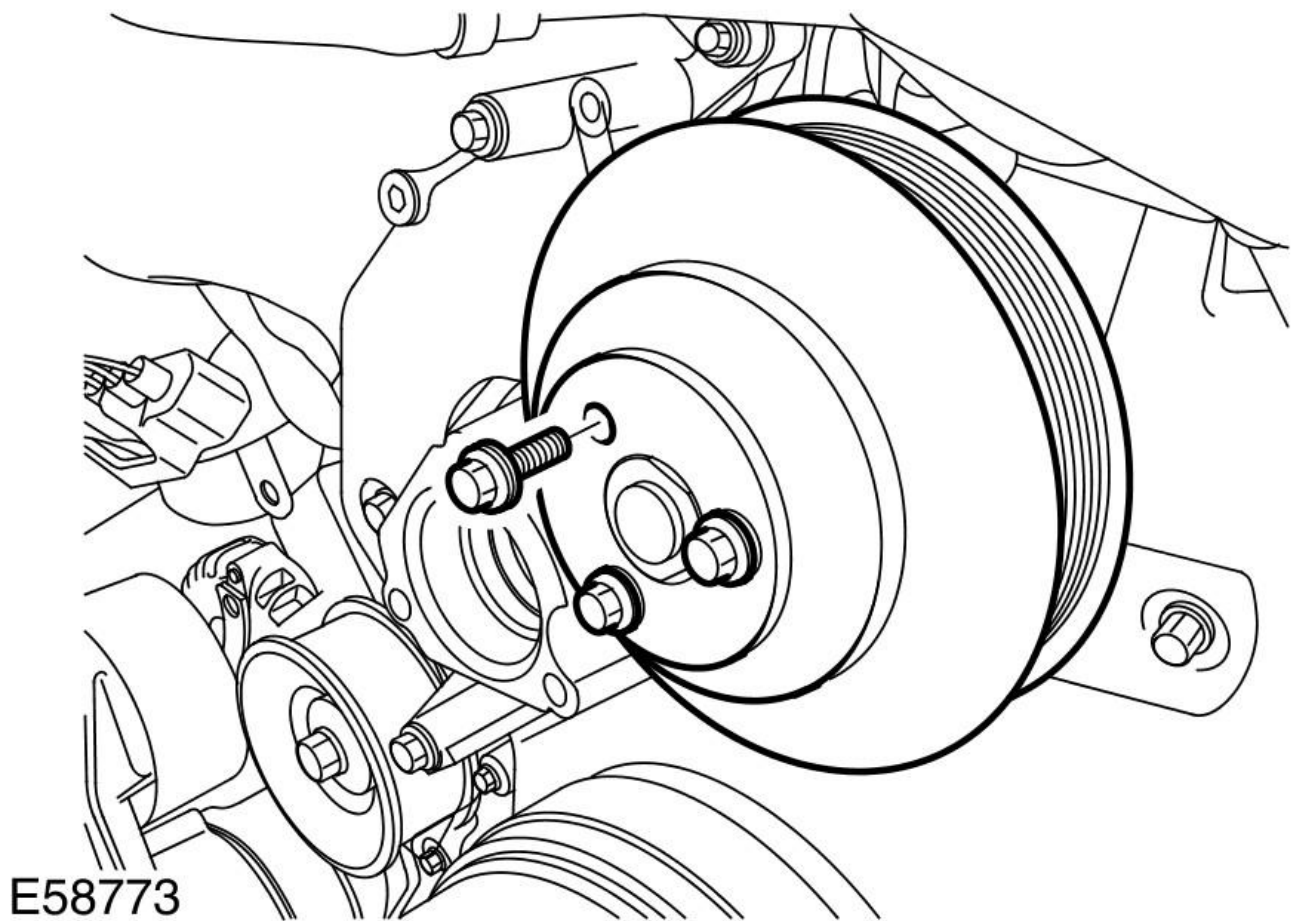


7. Release the accessory drive belt.
 - Rotate the accessory drive belt tensioner counter-clockwise, using a 3/8 " drive wrench.

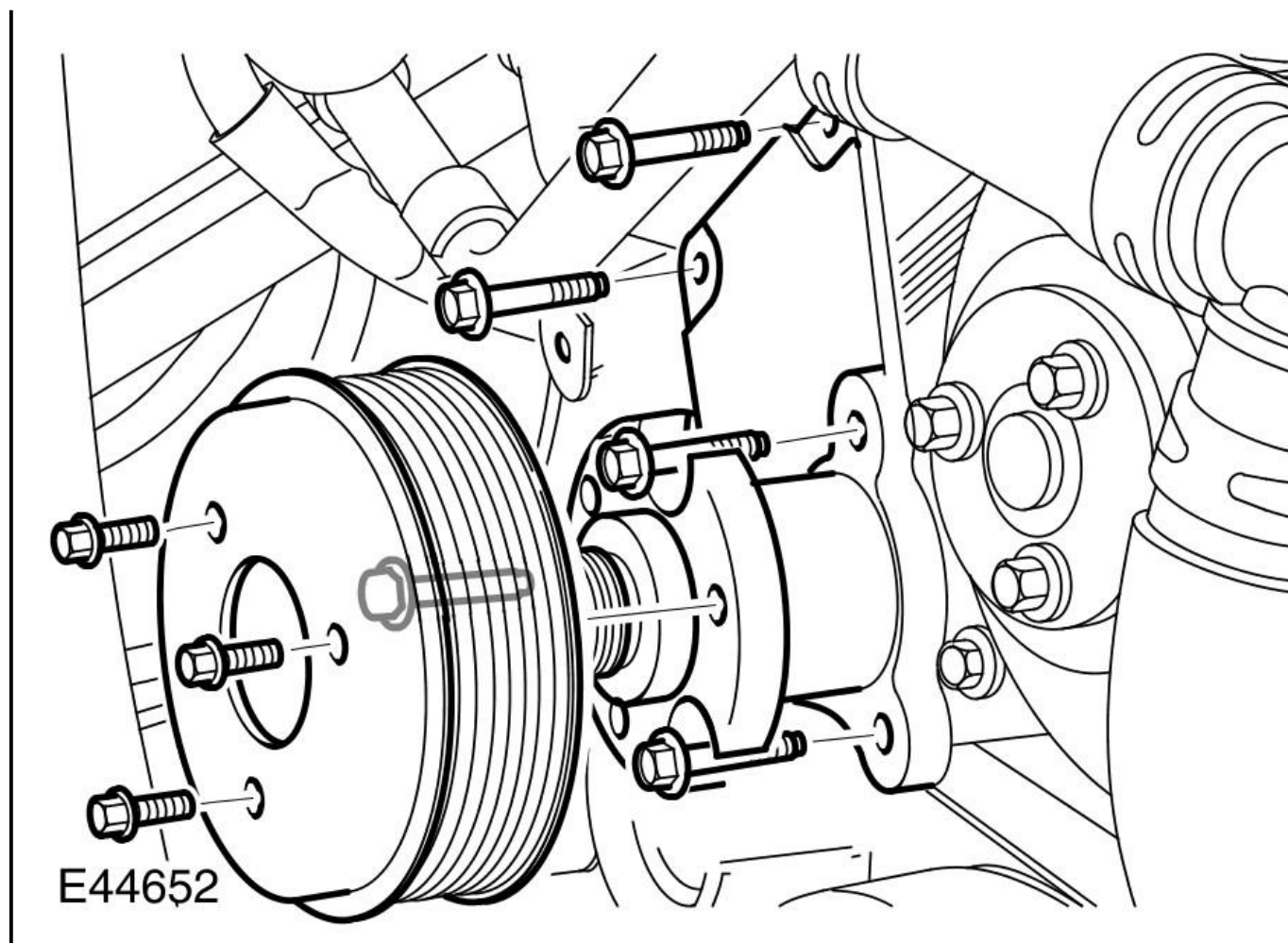


NOTE: Restrain the pulley to aid the removal of the bolts.

8. Remove the coolant pump pulley.
 - Remove the 3 bolts.

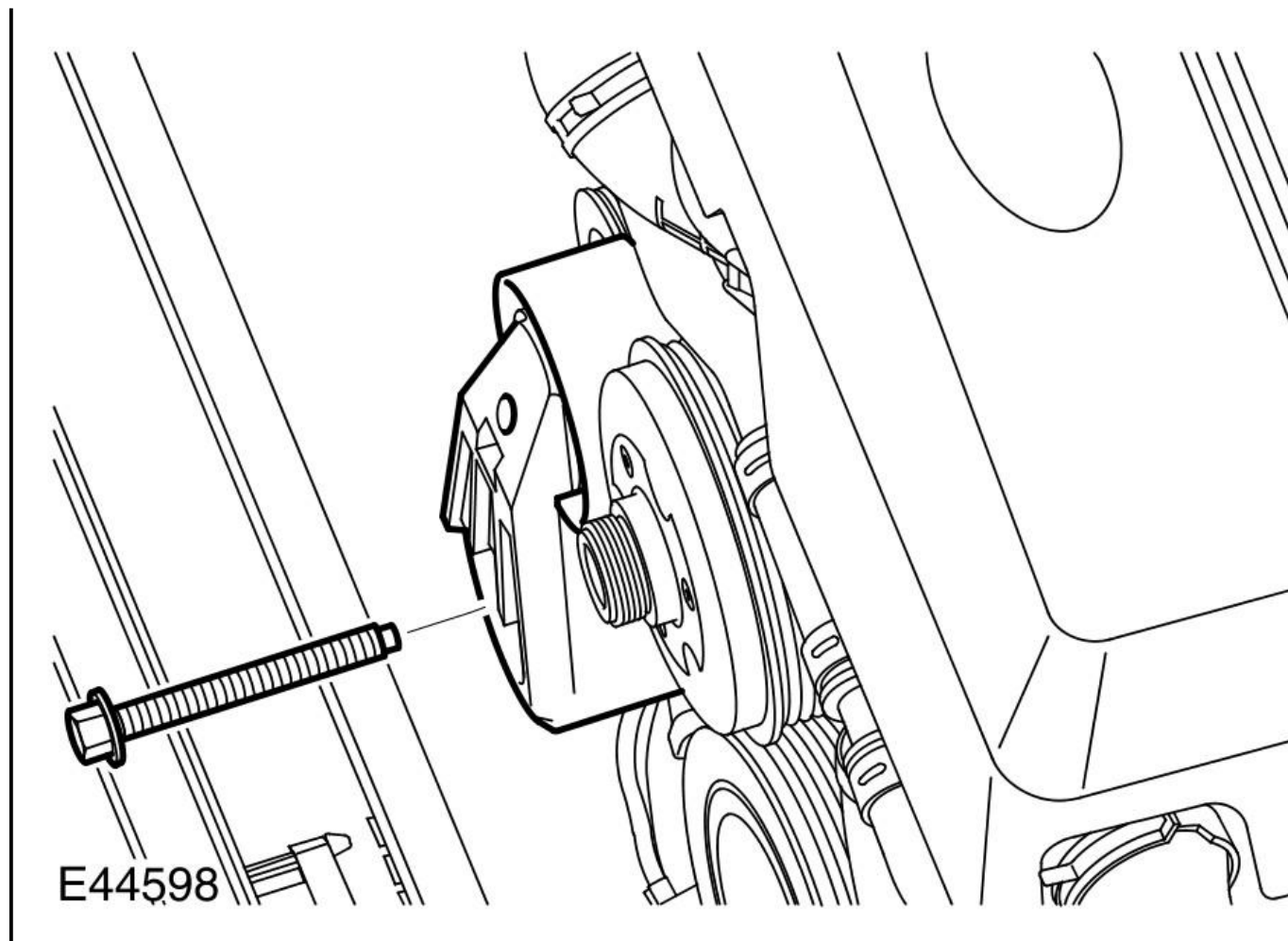


9. Remove the accessory drive belt tensioner.
 - Remove the bolt.



NOTE: **Note the fitted position.**

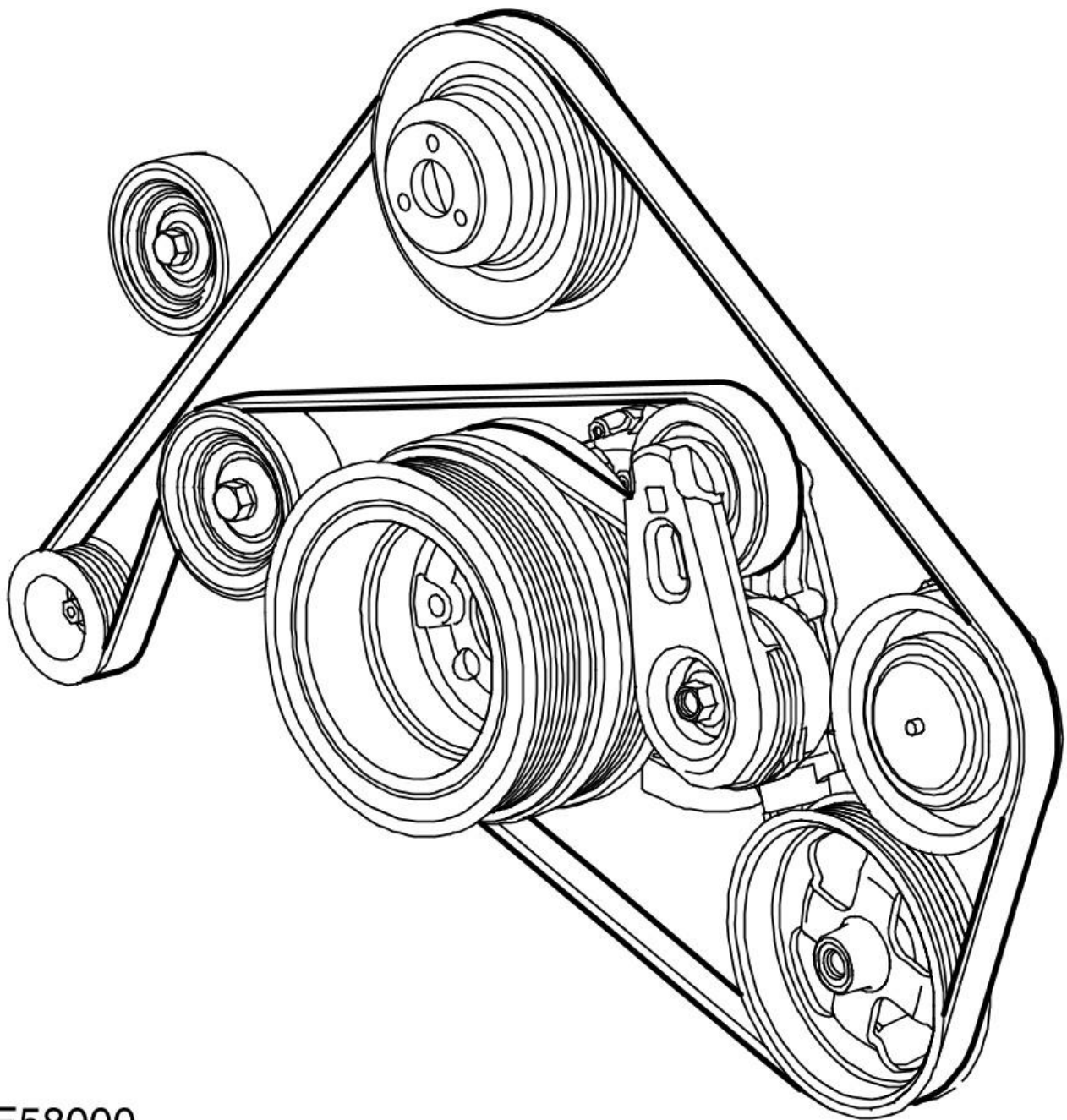
10. Remove the accessory drive belt.
11. Remove the accessory drive belt idler pulley.
 - Remove the bolt.
 - Repeat the above procedure for the remaining idler pulley.



12. Remove the oil level indicator and tube. Refer to **OIL LEVEL INDICATOR AND TUBE**.
13. Remove the LH front wheel.

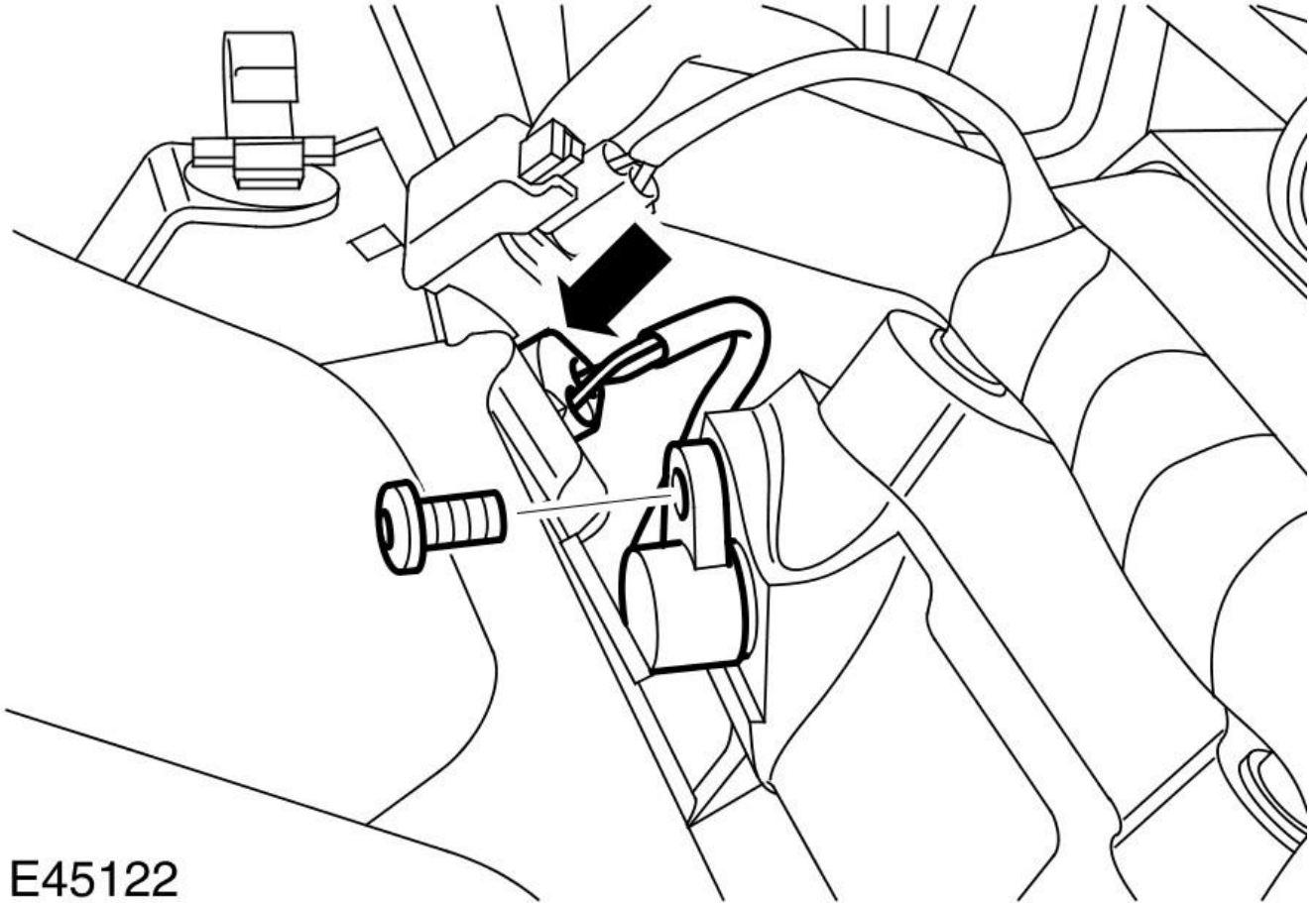
CAUTION: Immediately cap all refrigerant lines to prevent ingress of dirt and moisture.

14. Disconnect the refrigerant lines from the A/C compressor.
 - Remove the 2 bolts.
 - Remove and discard the 2 O-ring seals.



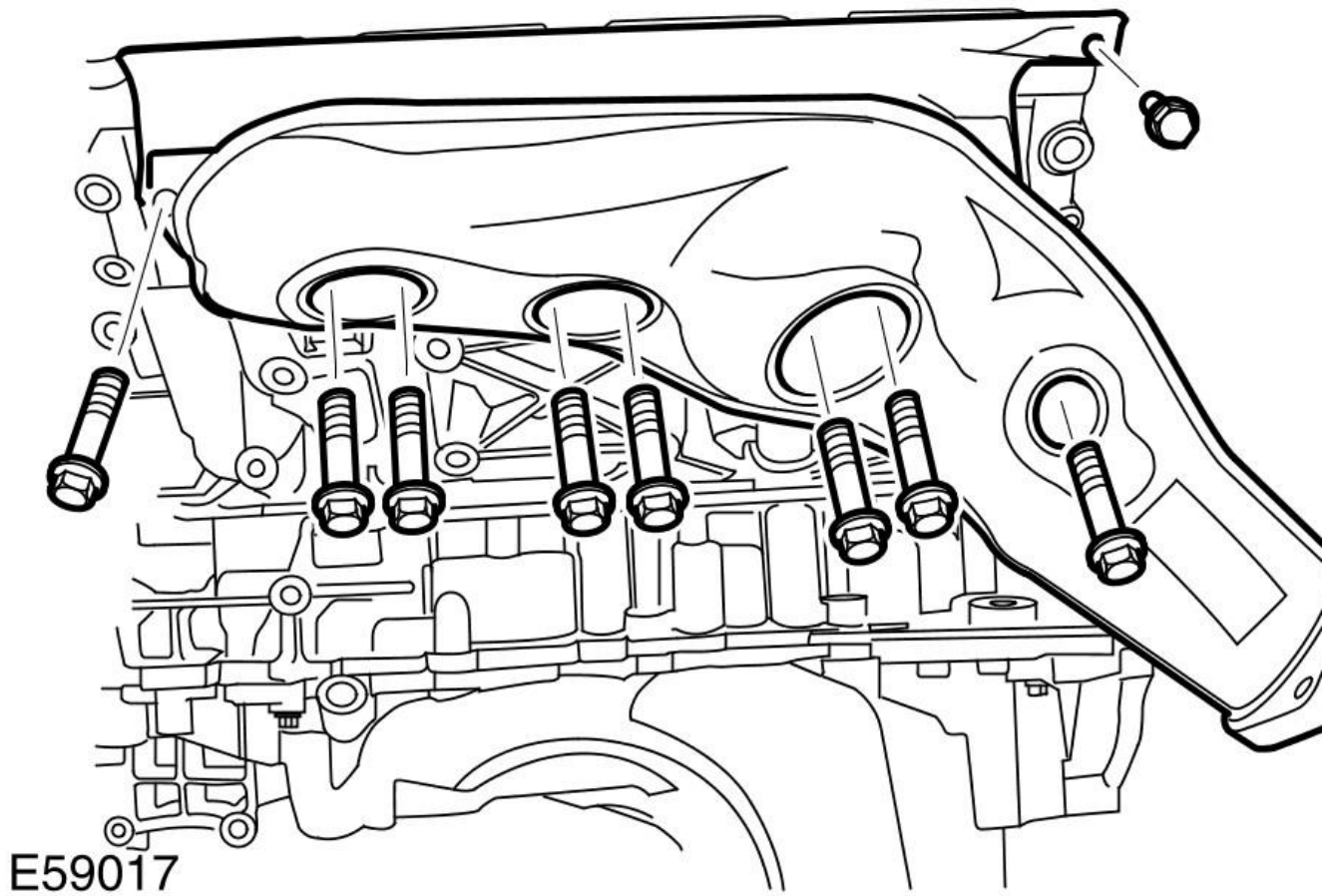
E58000

15. Disconnect the A/C clutch electrical connector.

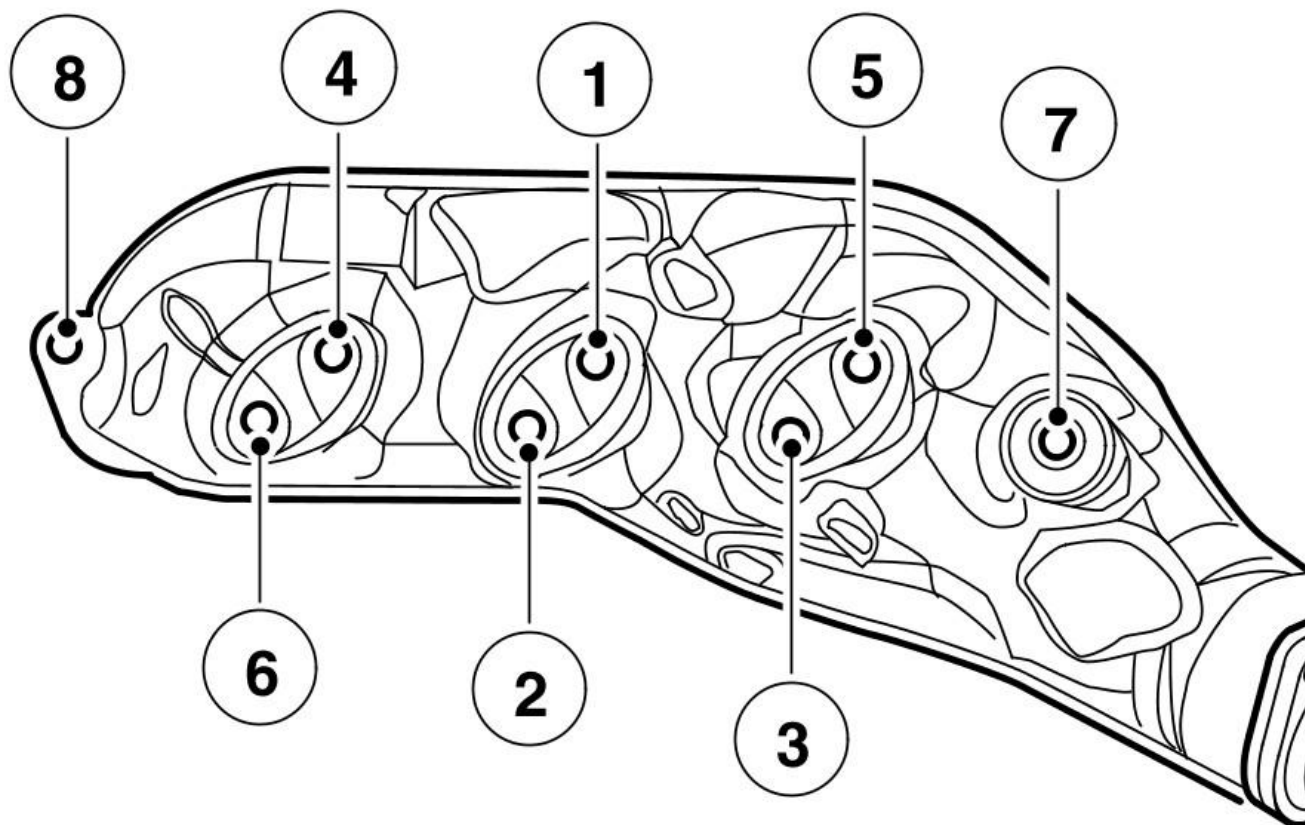


NOTE: 1 A/C compressor bolt will remain captive until the mounting bracket is removed.

16. Release the A/C compressor.
 - Remove the 3 bolts.

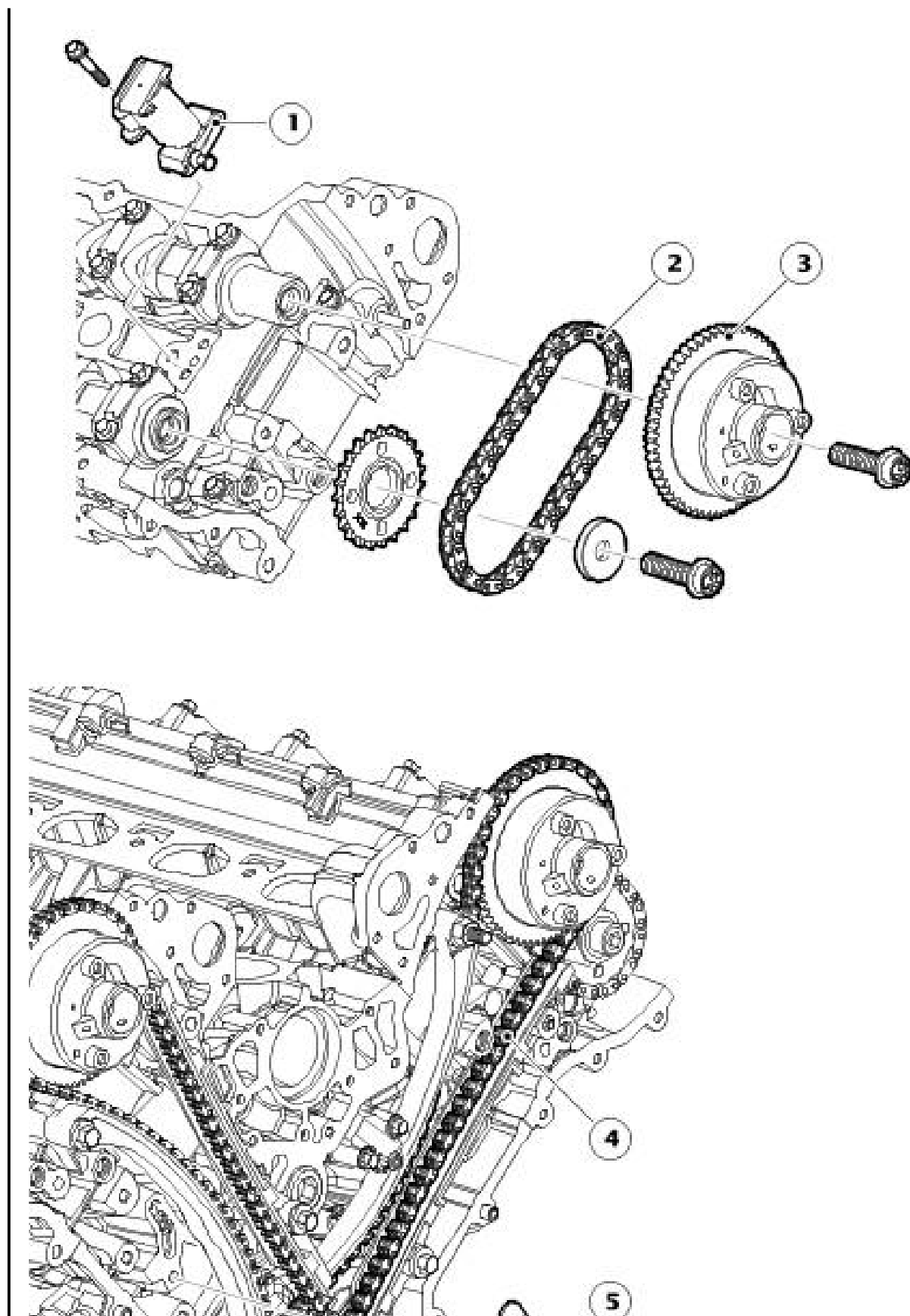


17. Remove the A/C compressor mounting bracket.
- Remove the 2 bolts.

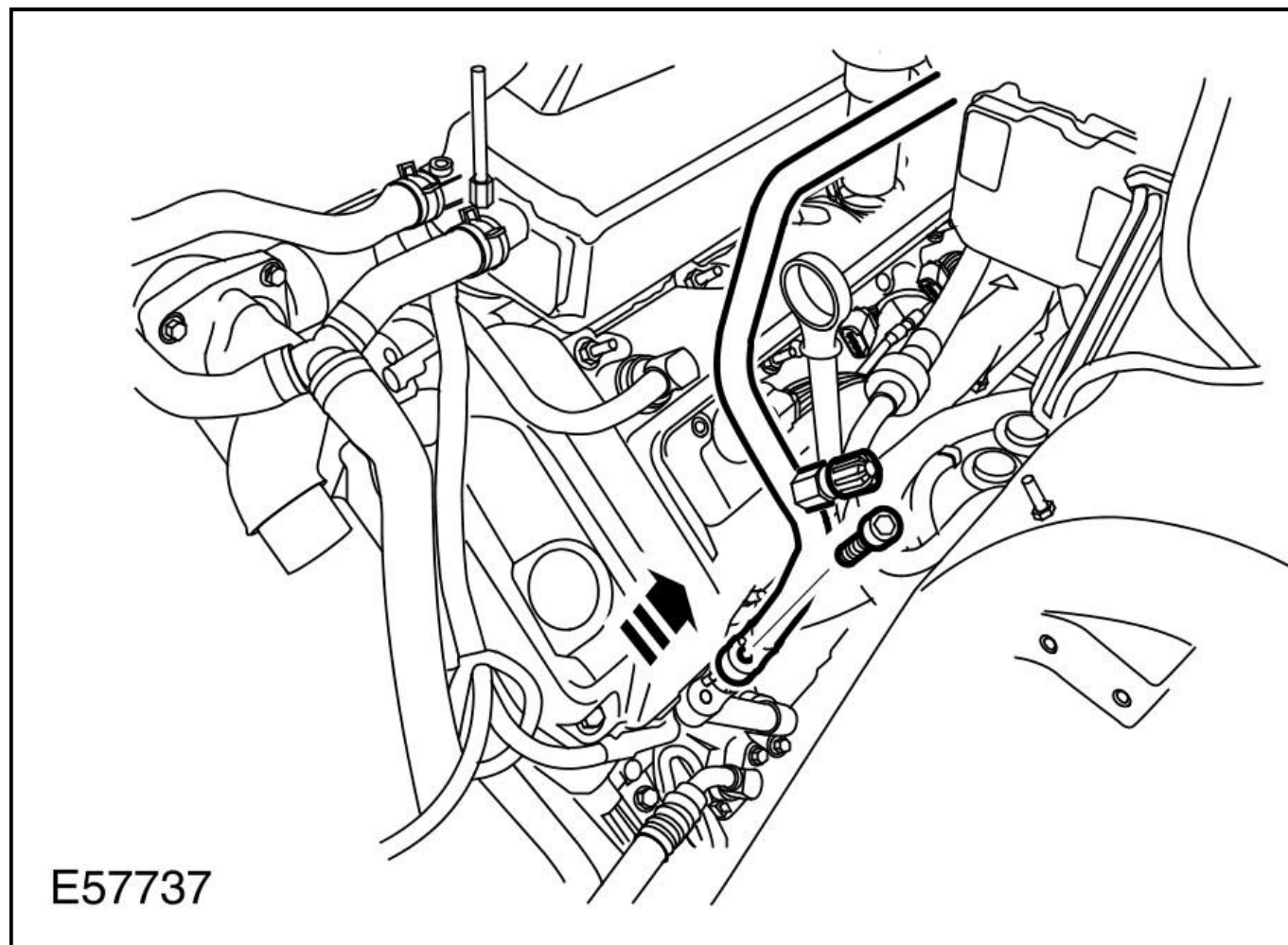


E59024

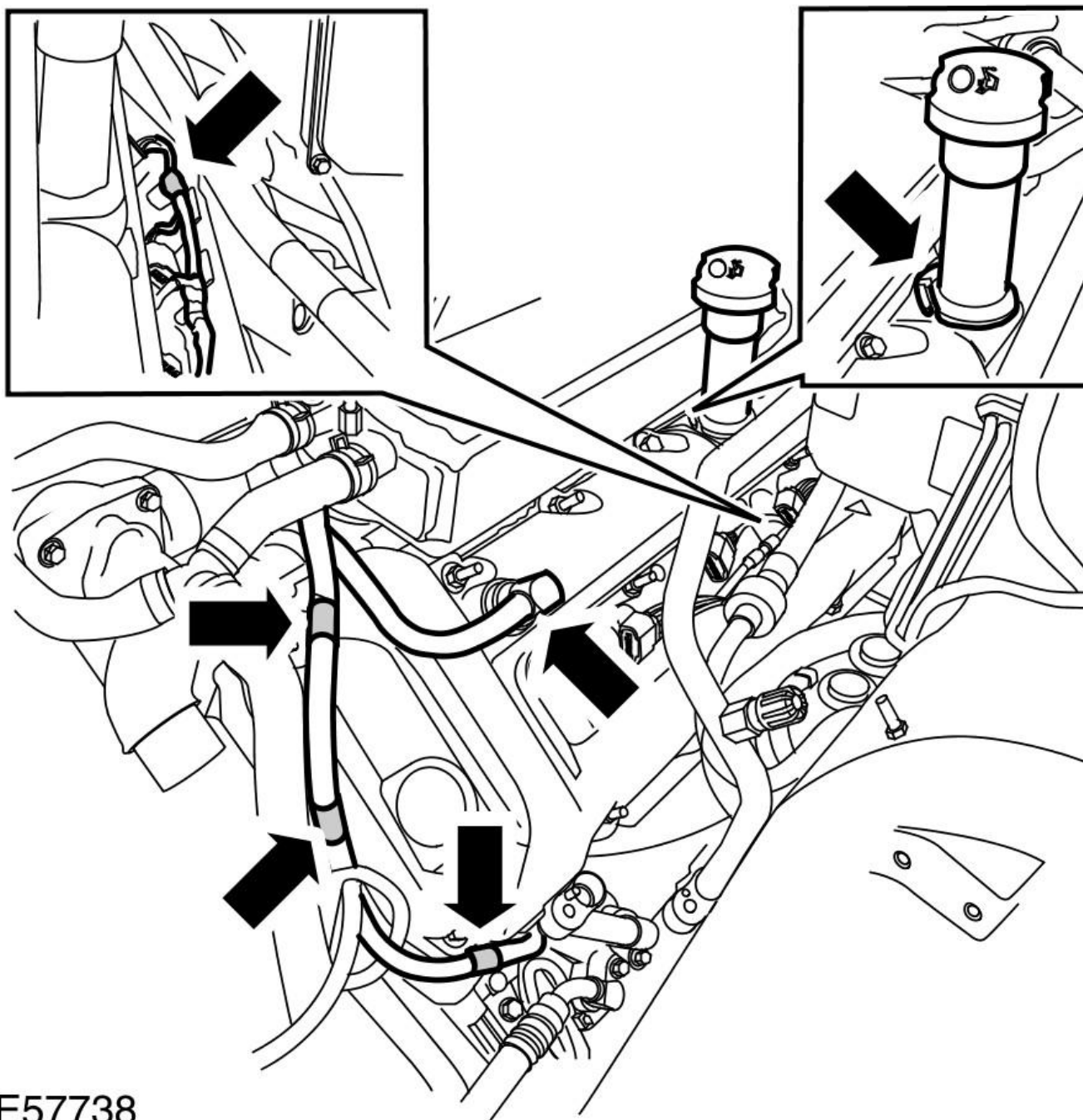
18. Remove the A/C compressor.
19. Remove the exhaust manifold heat shield.
 - Remove the 2 screws.



20. Disconnect the battery positive cable.
 - Release the cover.
 - Remove the nut.
21. Remove the generator.
 - Remove the 3 bolts.
 - Disconnect the electrical connector.

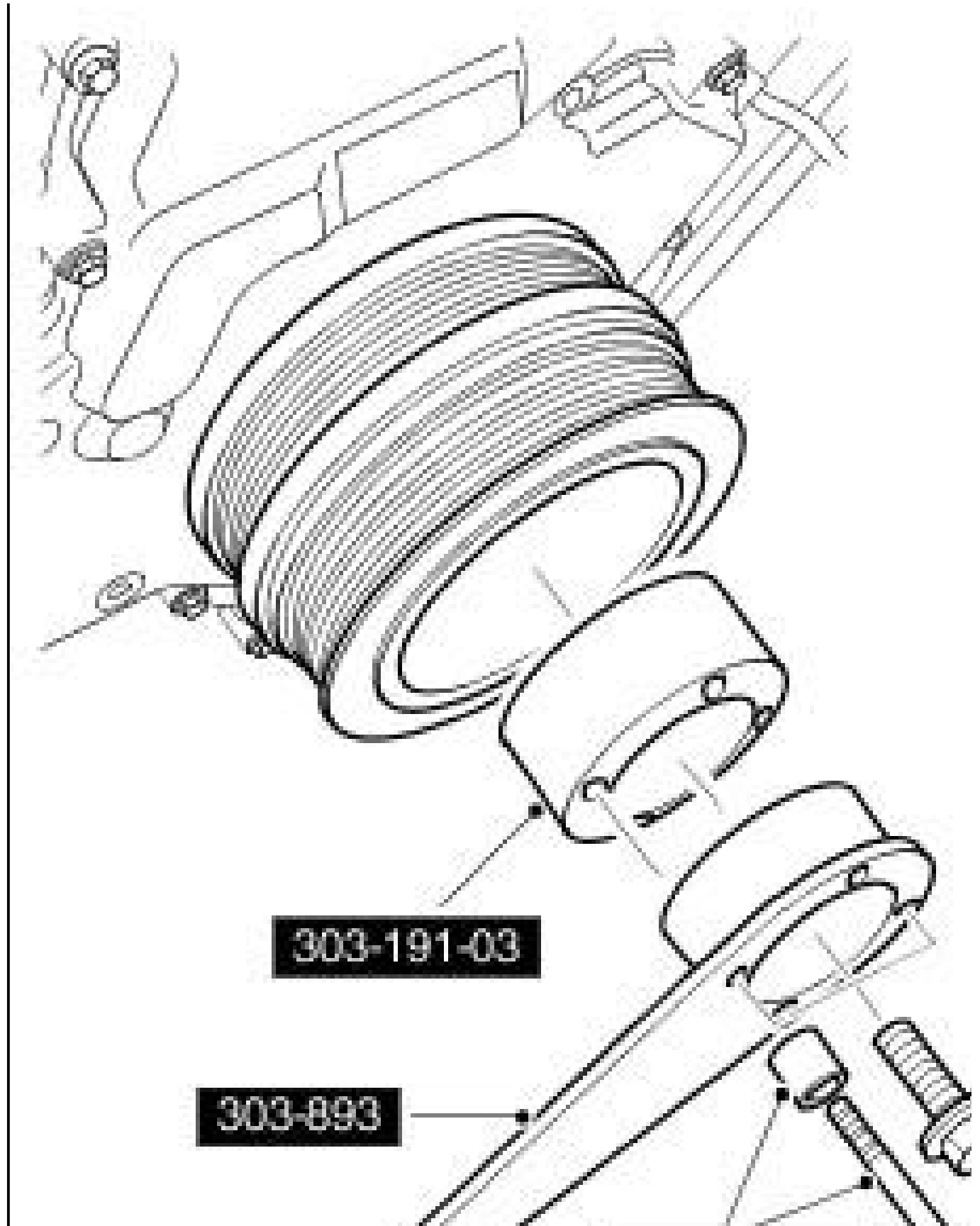


22. Release the generator mounting bracket.
 - Loosen the lower rear bolt.
 - Remove the 3 remaining bolts.



CAUTION: Under no circumstances should the crankshaft setting peg, 303-645, be used in the following operations, to restrain the crankshaft.

23. Using the special tools, retain the crankshaft pulley.



NOTE: The crankshaft pulley retaining bolt will be very tight.

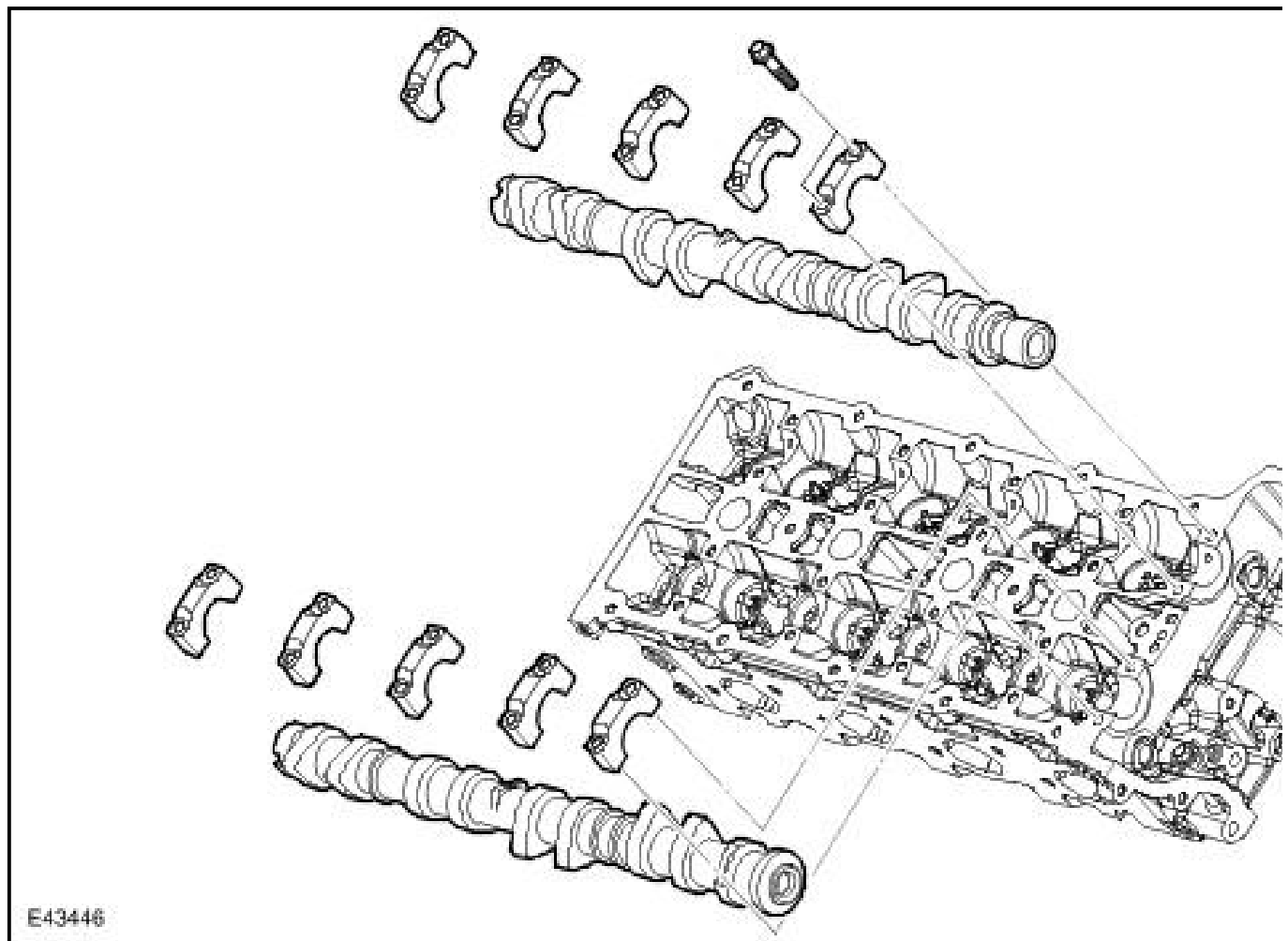
24. Remove the crankshaft pulley retaining bolt.

- Discard the bolt.
- Remove the special tools.

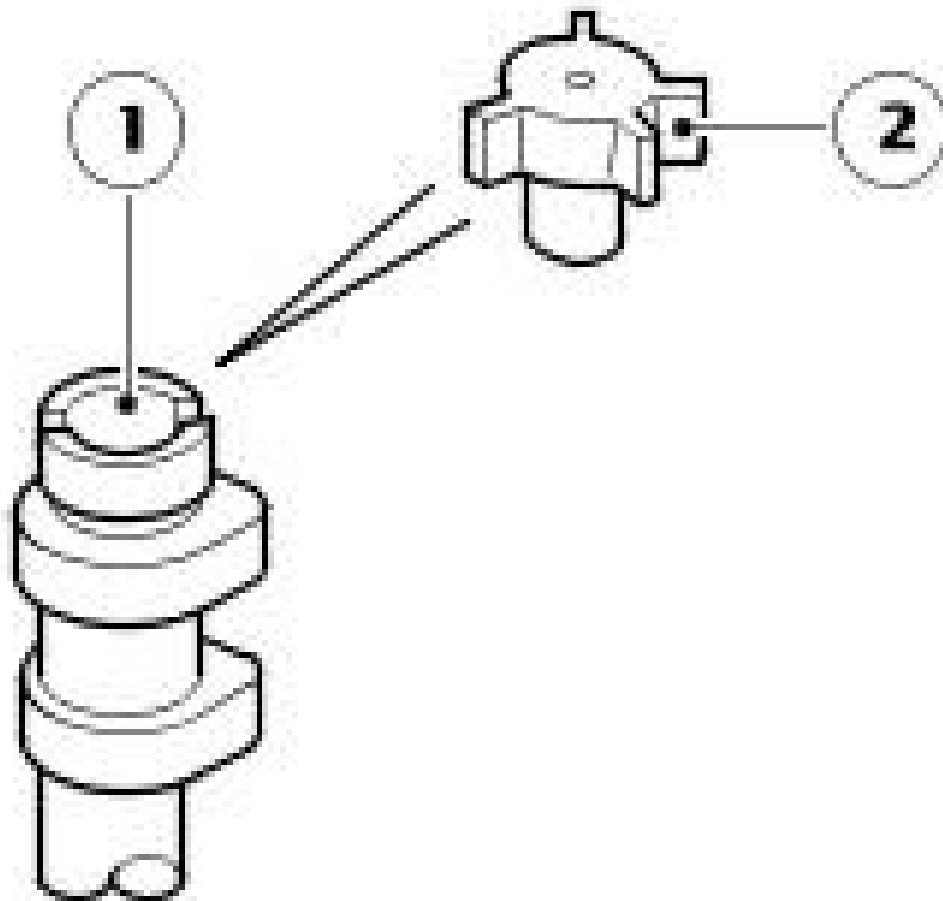
NOTE: The crankshaft pulley will be very tight.

25. Using the special tools, remove the crankshaft pulley.

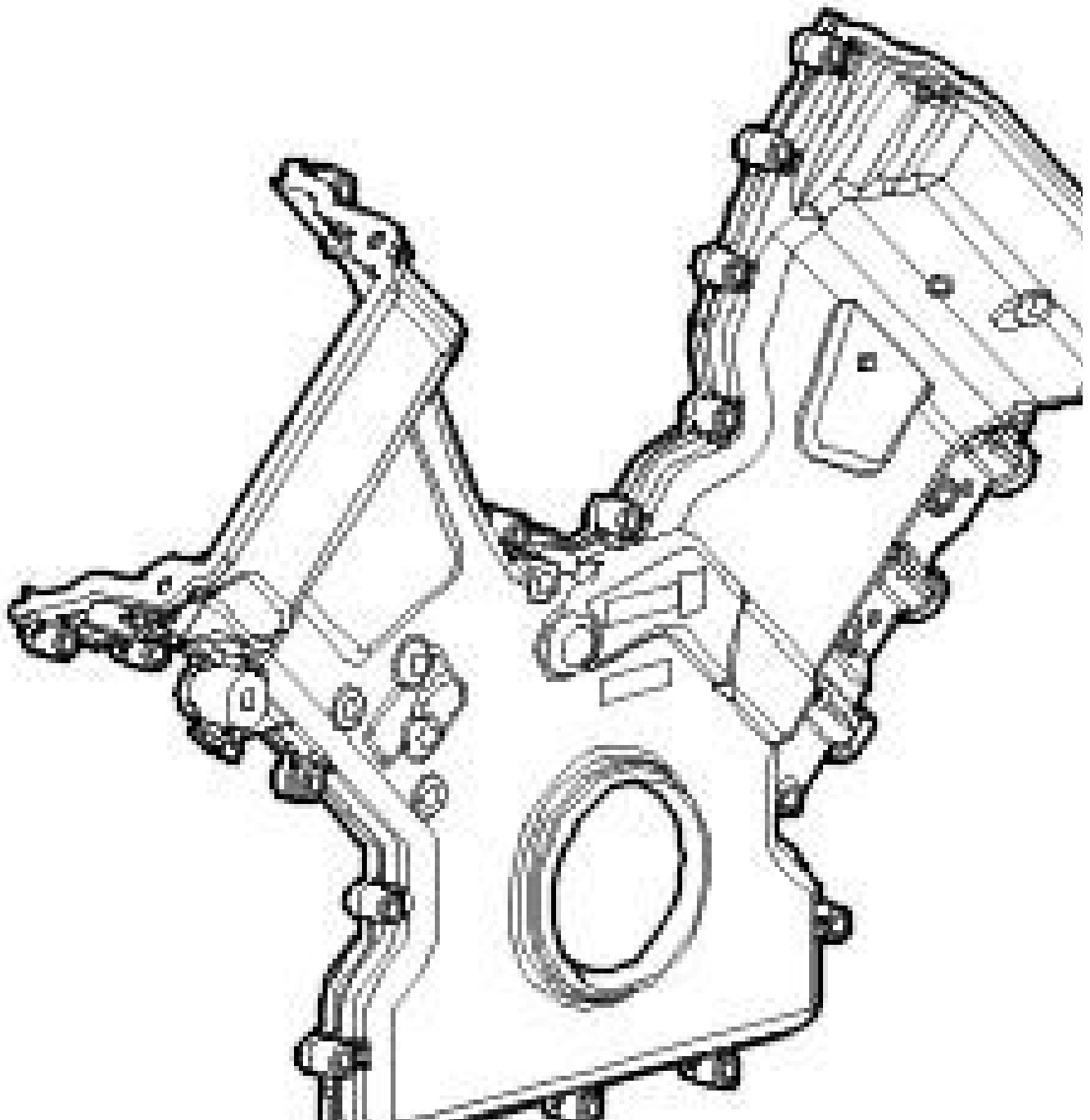
- Collect the locking ring.
- Remove the special tools.



26. Using the special tool, remove and discard the crankshaft front seal.

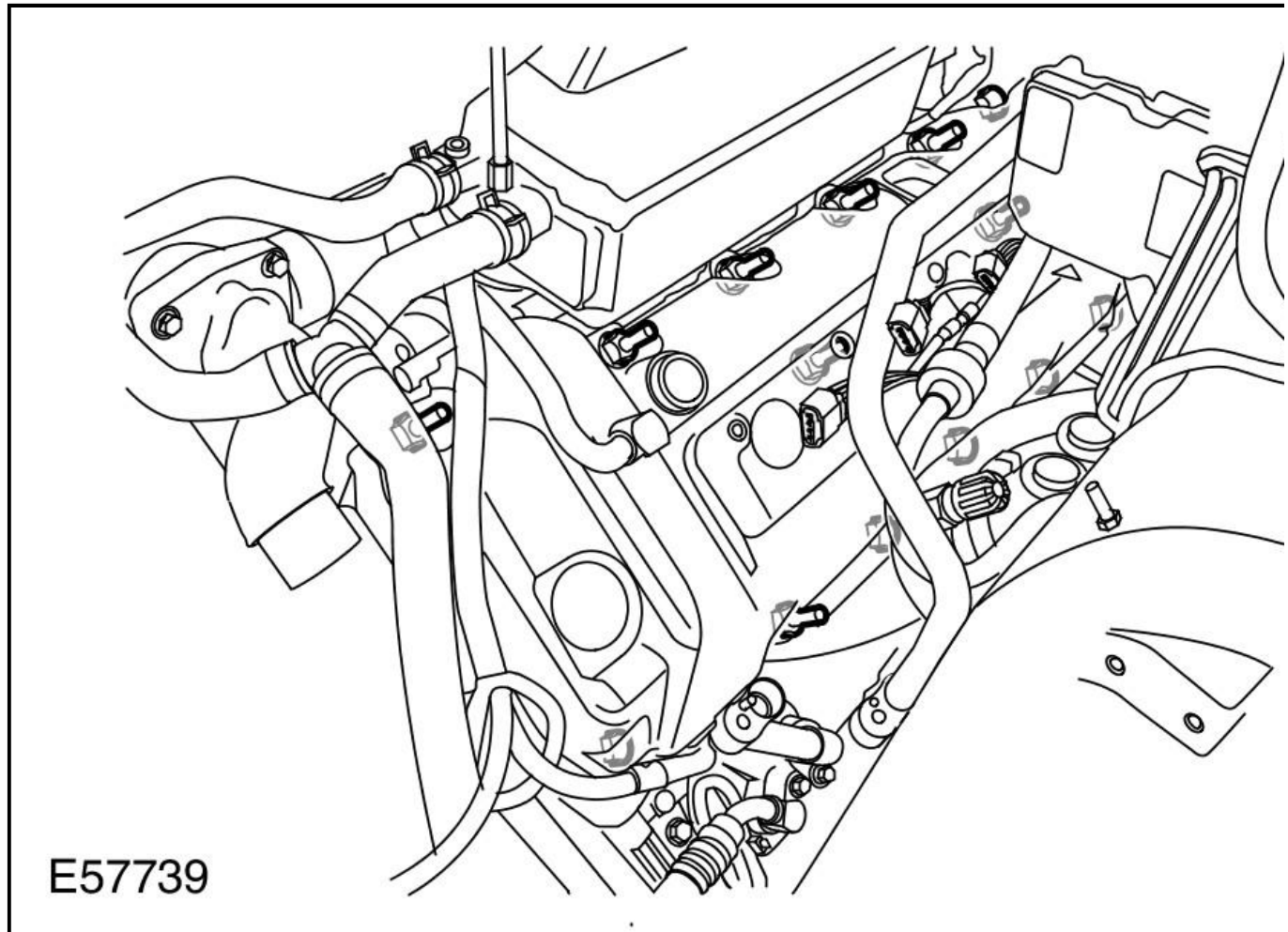


27. Check the crankshaft damper pulley and locking ring for damage.
28. Remove the RH valve cover. Refer to **VALVE COVER RH.**
29. Remove the LH valve cover. Refer to **VALVE COVER LH.**
30. Release the engine wiring harness.
 - Release the 2 clips.
 - Remove the bolt.

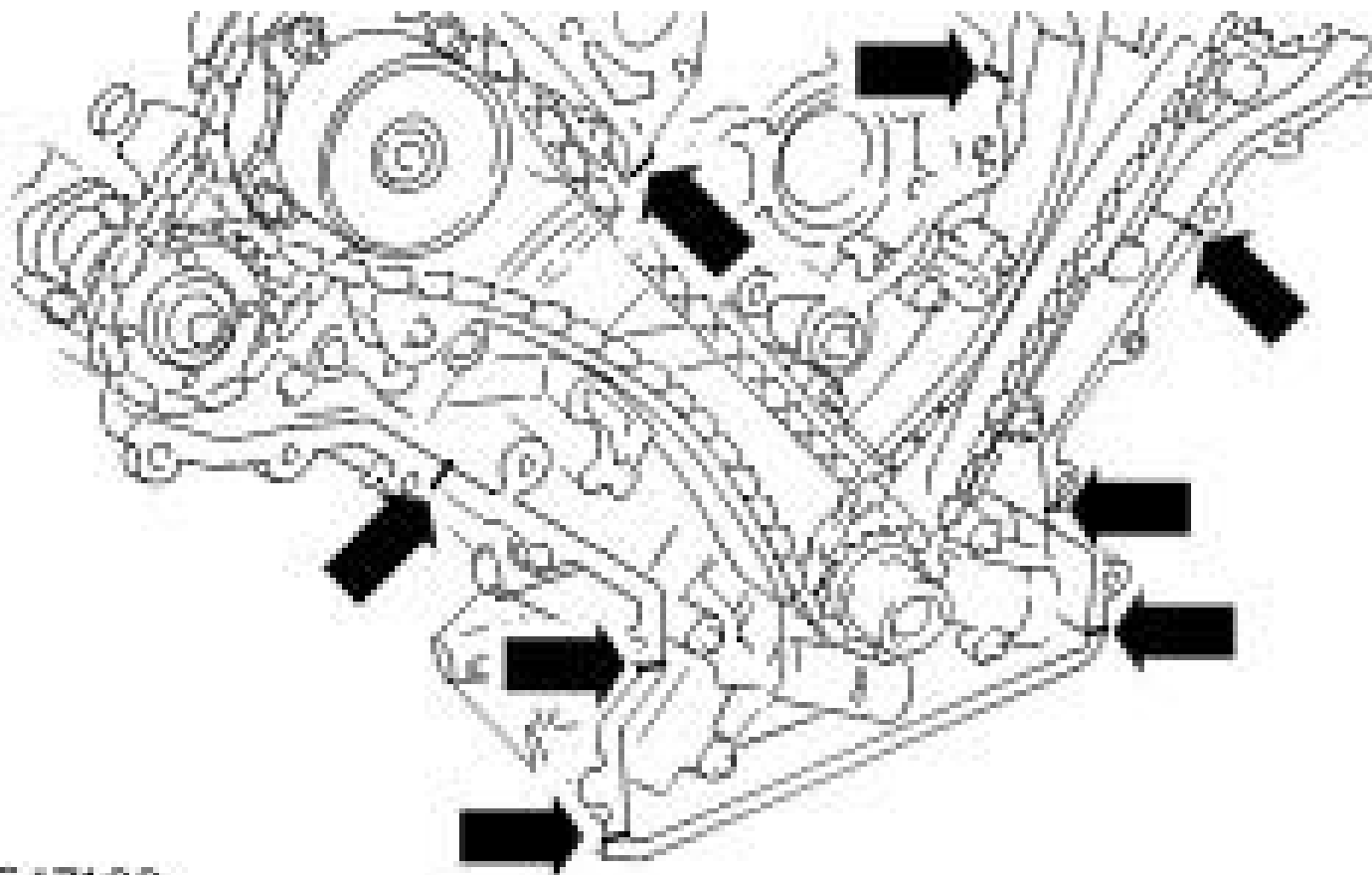


31. Remove the engine front cover.

- Remove the 24 bolts.
- Remove and discard the gasket.

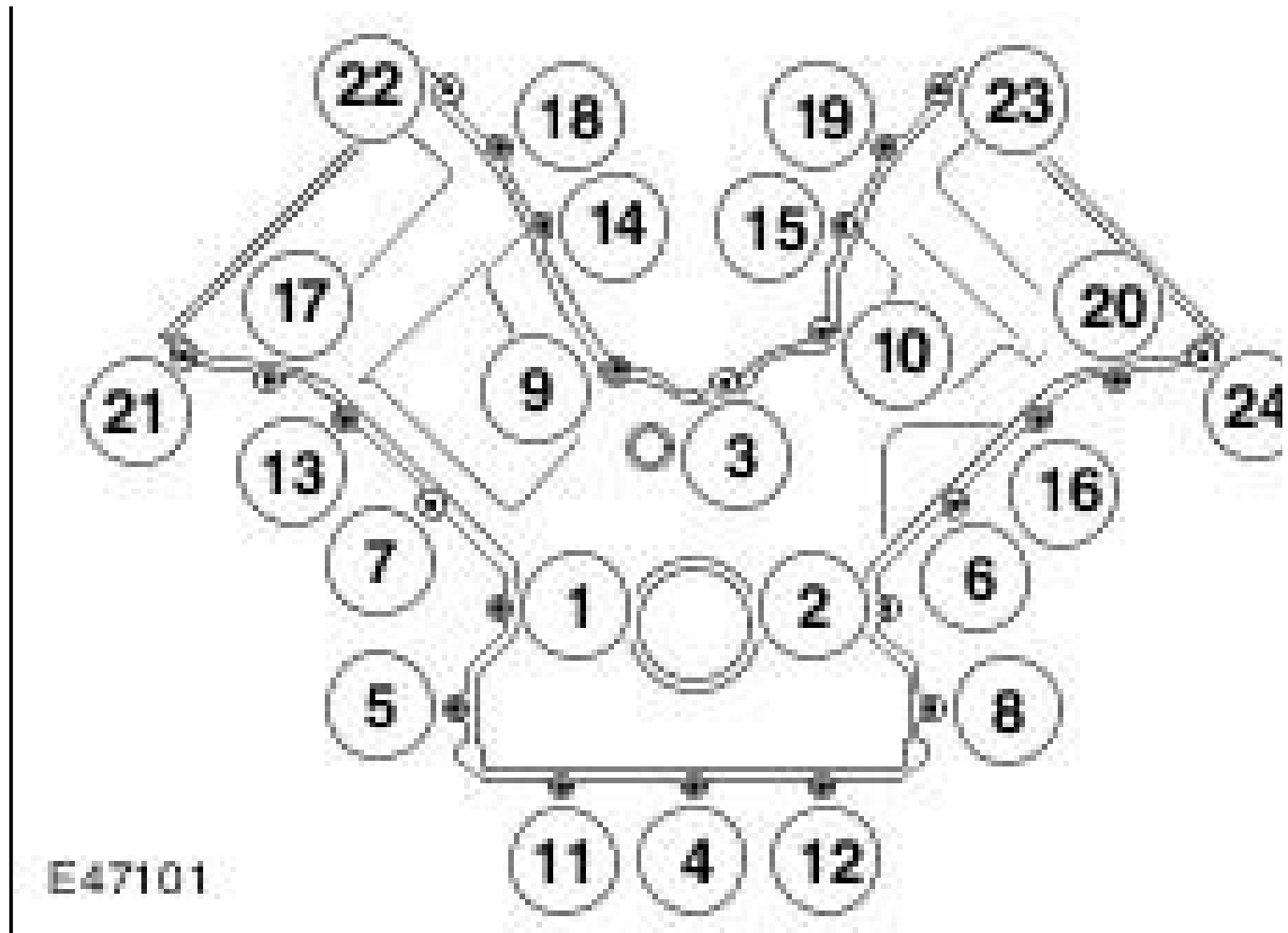


INSTALLATION

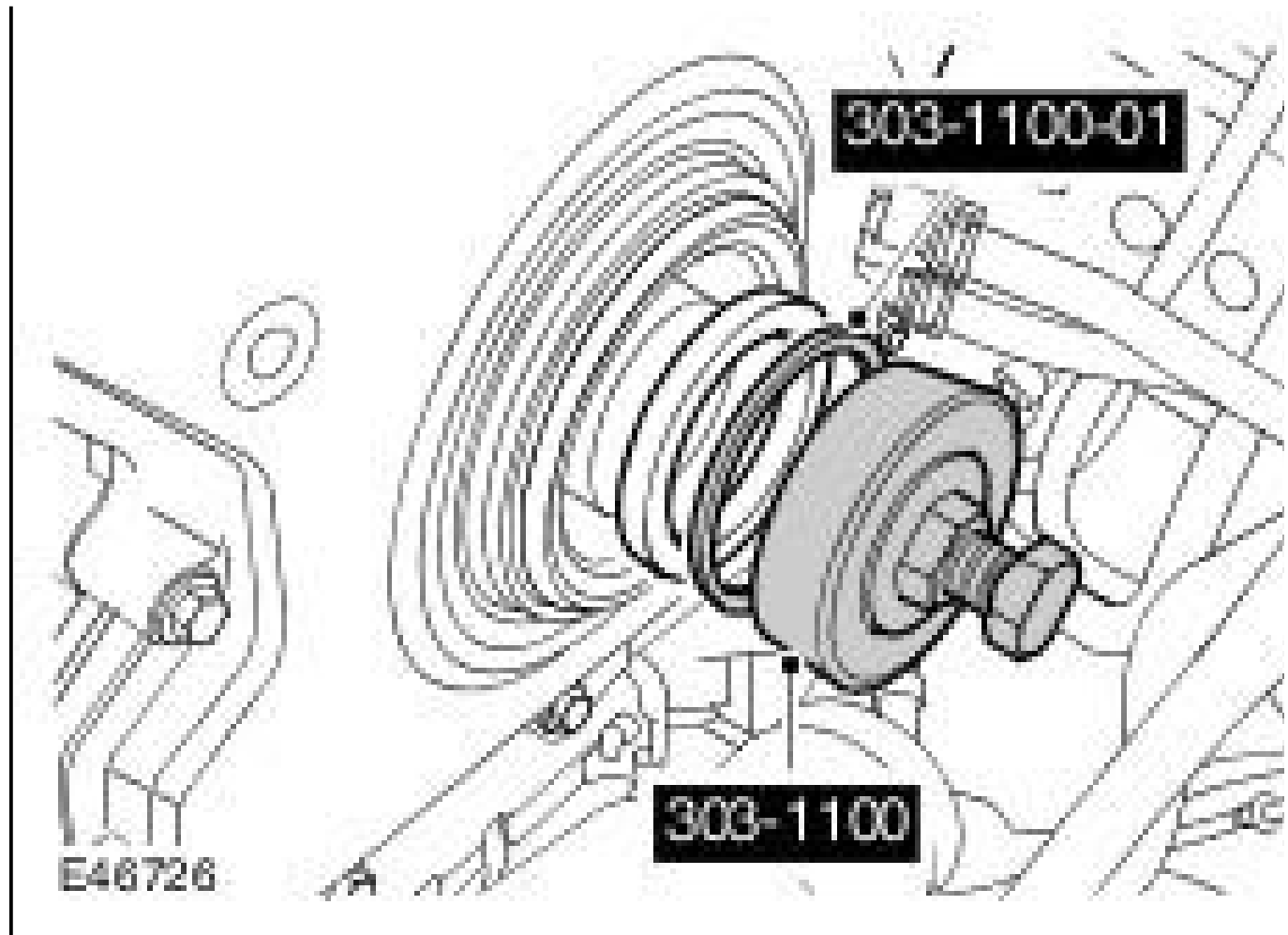


E47100

1. Install the engine front cover.
 - Clean the component mating faces.
 - Apply a bead of sealant 3 mm diameter, by 12 mm long, to the 8 places indicated.
 - Install the new gasket.
2. Evenly and progressively tighten the bolts in the sequence shown to 12 Nm (9 lb.ft).



3. Attach the engine wiring harness.
 - Secure the clips.
 - Tighten the bolt to 10 Nm (7 lb.ft).
4. Install the LH valve cover. Refer to **VALVE COVER LH.**
5. Install the RH valve cover. Refer to **VALVE COVER RH.**
6. Using the special tools, install the crankshaft front seal.
 - Lubricate the seal with clean engine oil.
 - Use the discarded crankshaft bolt with the special tool.
 - Remove the special tools.



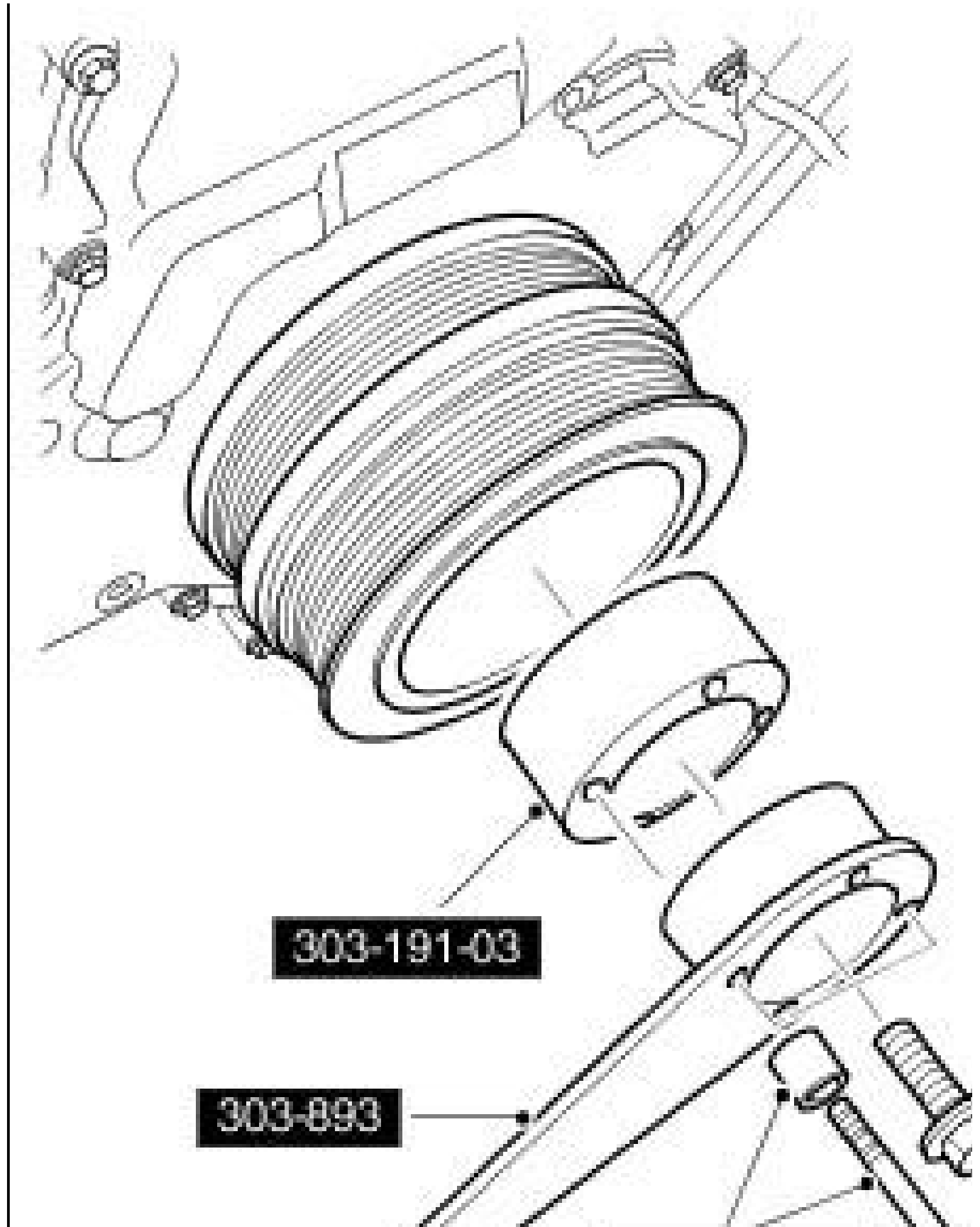
7. Install the crankshaft pulley.
 - Lubricate the seal with clean engine oil.
8. Install the crankshaft pulley locking ring.

CAUTION: The screw thread in the crankshaft pulley must be cleaned out before installing a new crankshaft pulley bolt.

9. Install, but do not tighten, the new crankshaft pulley bolt.

CAUTION: Under no circumstances should the crankshaft setting peg, 303-645, be used in the following operations, to restrain the crankshaft.

10. Using the special tools, retain the crankshaft pulley.
 - Tighten the crankshaft pulley bolt to 380 Nm (280 lb.ft).
 - Remove the special tools.

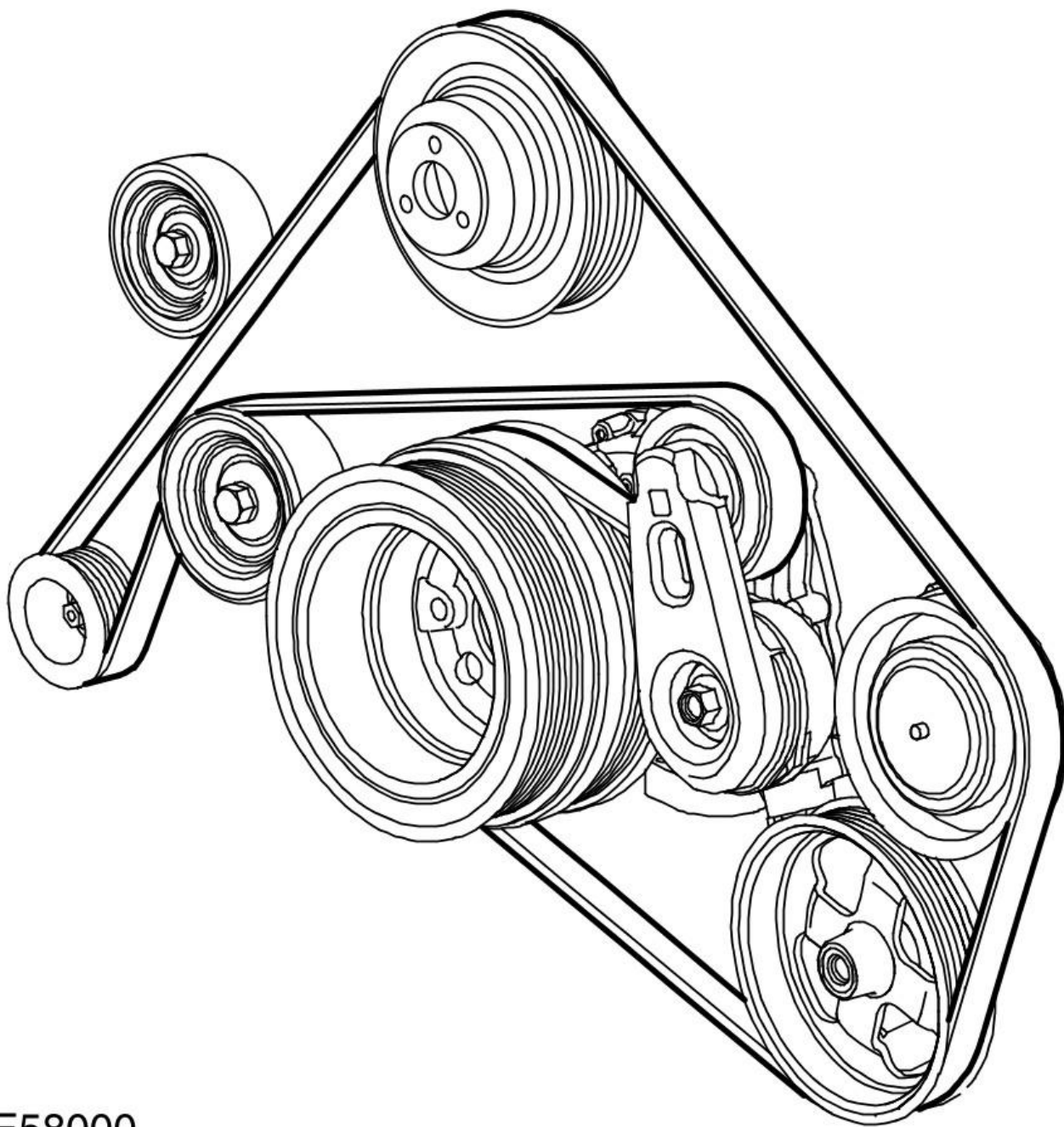


11. Secure the generator mounting bracket.
 - Tighten the bolts to 45 Nm (33 lb.ft).
12. Install the generator.
 - Tighten the 3 bolts to 48 Nm (35 lb.ft).
 - Connect the electrical connector.
13. Connect the battery positive cable.
 - Tighten the nut to 10 Nm (7 lb.ft).
 - Secure the cover.
14. Install the exhaust manifold heat shield.
 - Tighten the screws.
15. Install the accessory drive belt idler pulleys.
 - Tighten the bolts to 25 Nm (18 lb.ft).
16. Position the A/C compressor to the engine.
 - If a new compressor is being installed, the required amount of refrigerant oil must be drained from it.
17. Install the A/C compressor mounting bracket.
 - Tighten the bolts to 25 Nm (18 lb.ft).
18. Secure the A/C compressor.
 - Tighten the bolts to 25 Nm (18 lb.ft).
19. Connect the A/C clutch electrical connector.

CAUTION: Lubricate the new seals with clean refrigerant oil.

20. Connect the refrigerant lines.
 - Clean the component mating faces.
 - Install the new O-ring seals.
 - Tighten the bolts to 10 Nm (7 lb.ft).
21. Install the front wheel.
 - Tighten the wheel nuts to 140 Nm (103 lb.ft).
22. Install the oil level indicator and tube. Refer to **Oil Level Indicator and Tube**.
23. Install the coolant pump pulley.
 - Tighten the bolts to 10 Nm (7 lb.ft).
24. Install the accessory drive belt.
25. Install the accessory drive belt tensioner.
 - Tighten the bolt to 40 Nm (30 lb.ft).
26. Install the cooling fan drive hub bearing.
 - Tighten the bolts to 10 Nm (7 lb.ft).

27. Install the cooling fan pulley.
 - Tighten the bolts evenly to 25 Nm (18 lb.ft).
28. Secure the accessory drive belt.

**E58000**

29. Install the cooling fan drive belt tensioner.

- Tighten the bolt to 40 Nm (30 lb.ft).
30. Install the coolant manifold. Refer to COOLANT MANIFOLD .
 31. Connect the battery ground cable. Refer to SPECIFICATIONS .
 32. Refill and bleed the cooling system. Refer to COOLING SYSTEM DRAINING, FILLING AND BLEEDING .

EXHAUST MANIFOLD LH

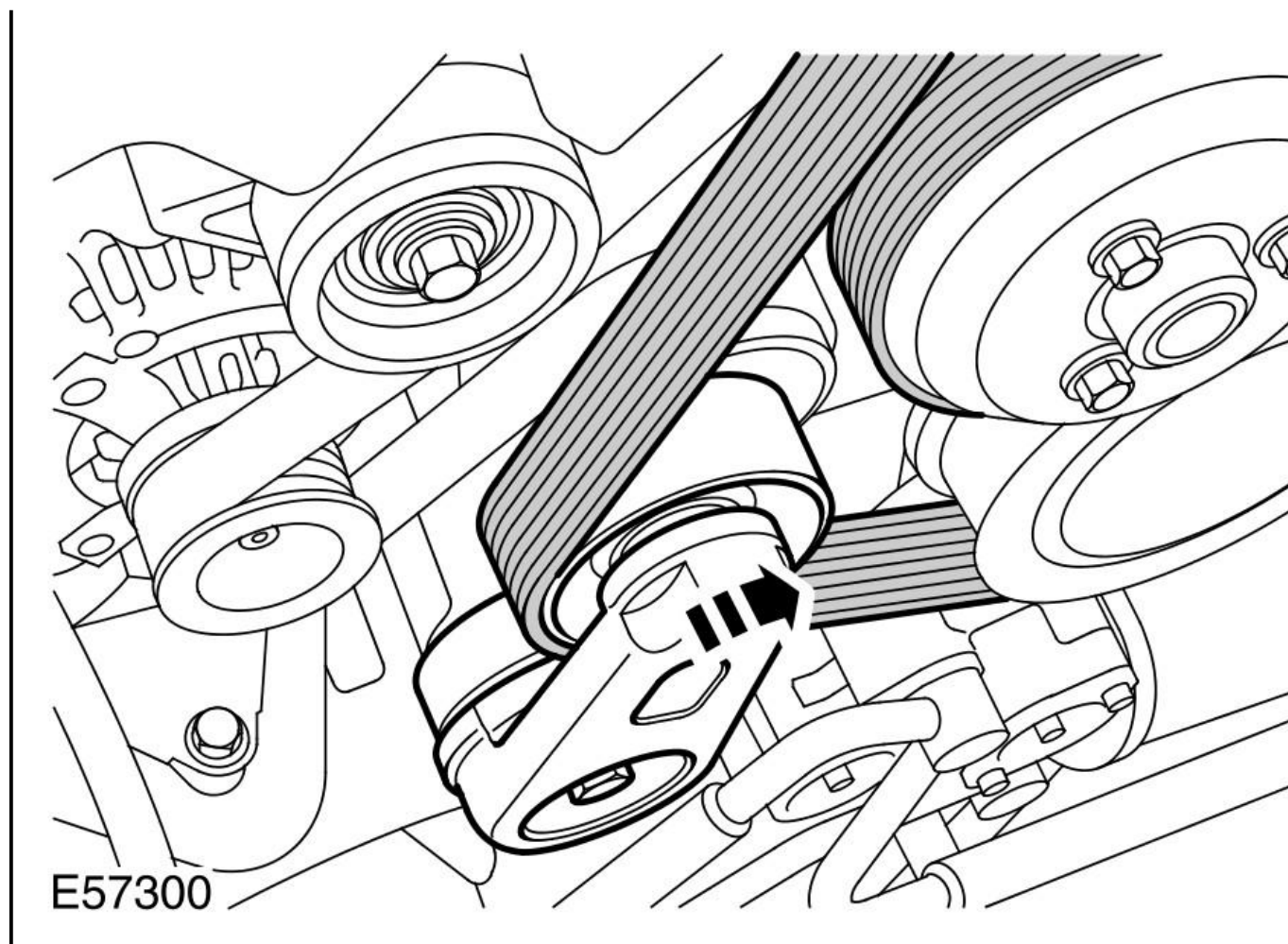
REMOVAL

All Vehicles

1. Disconnect the battery ground cable. Refer to SPECIFICATIONS .

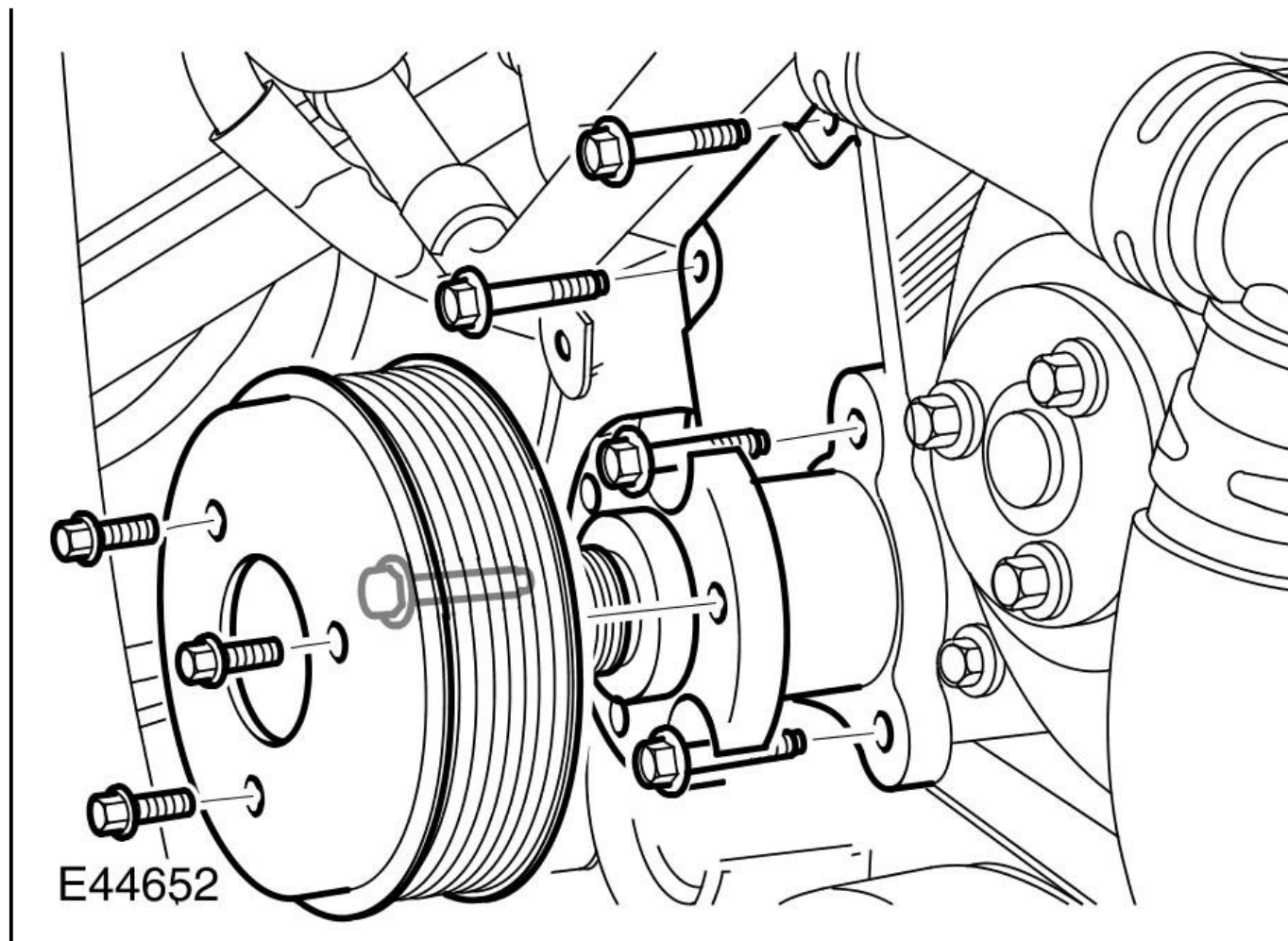
WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Raise and support the vehicle.
3. Remove the exhaust system. Refer to EXHAUST SYSTEM .
4. Remove the engine undershield. Refer to ENGINE UNDERSHIELD .
5. Remove the cooling fan. Refer to COOLING FAN .
6. Remove the cooling fan belt.
 - Note the fitted position.
 - Rotate the cooling fan belt tensioner clockwise.
 - Loosen the cooling fan belt tensioner bolt to aid the removal of the belt.



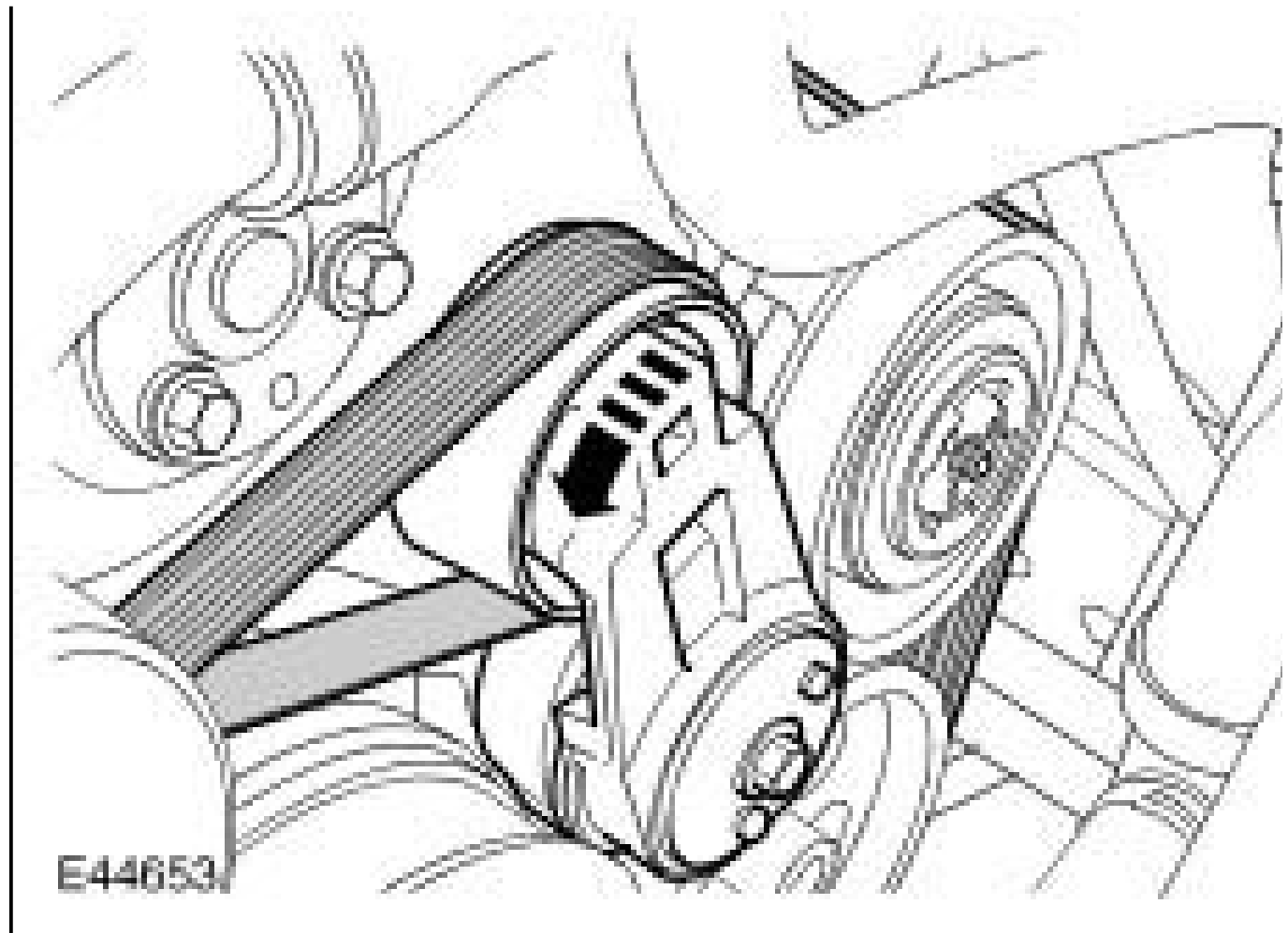
NOTE: Restrain the pulley to aid the removal of the bolts.

7. Remove the cooling fan pulley.
 - Remove the 3 bolts.
8. Remove the cooling fan drive hub bearing.
 - Remove the 5 bolts.

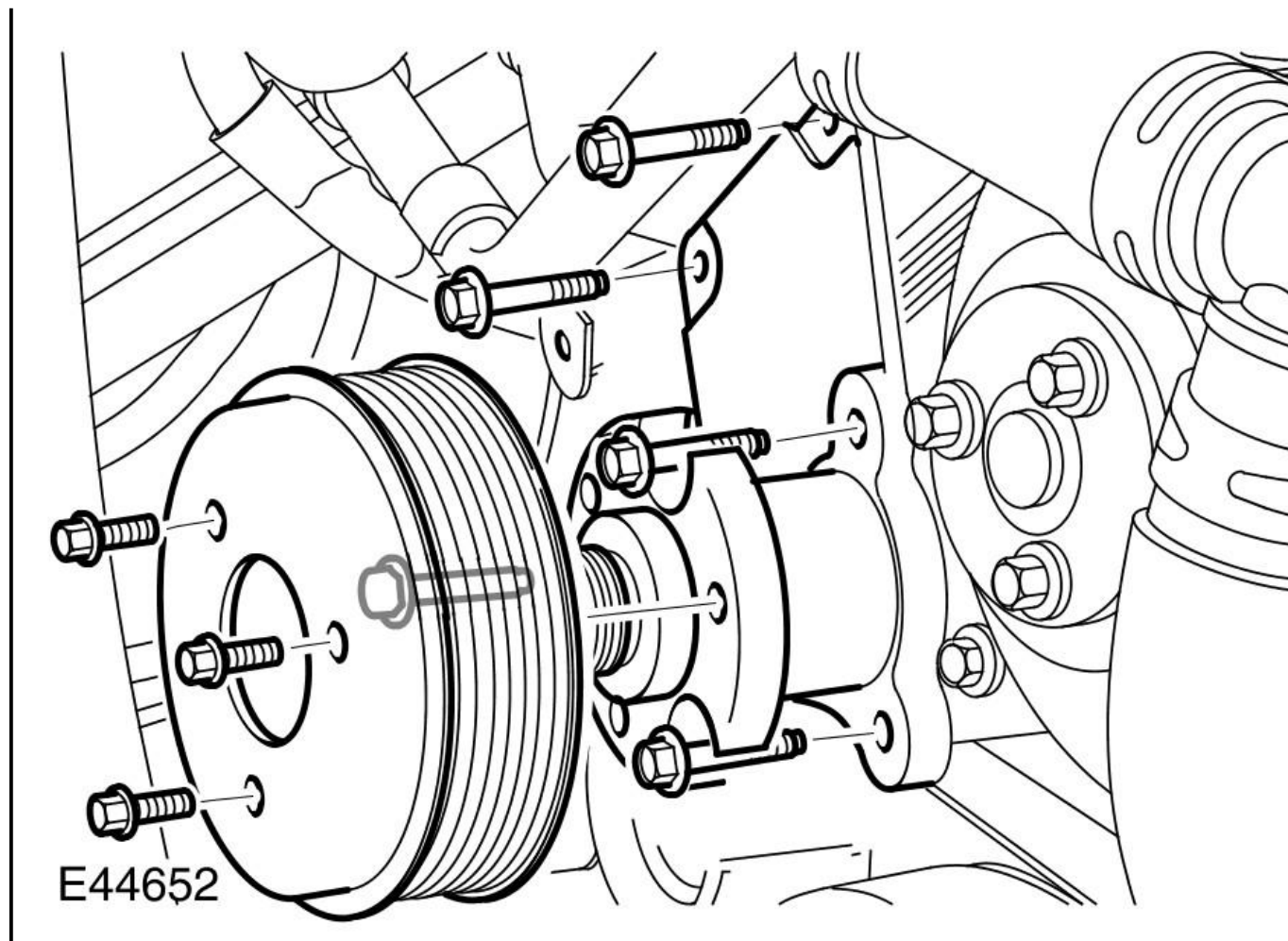


9. Release the accessory drive belt.

- Rotate the accessory drive belt tensioner counter-clockwise, using a 3/8 " drive wrench.

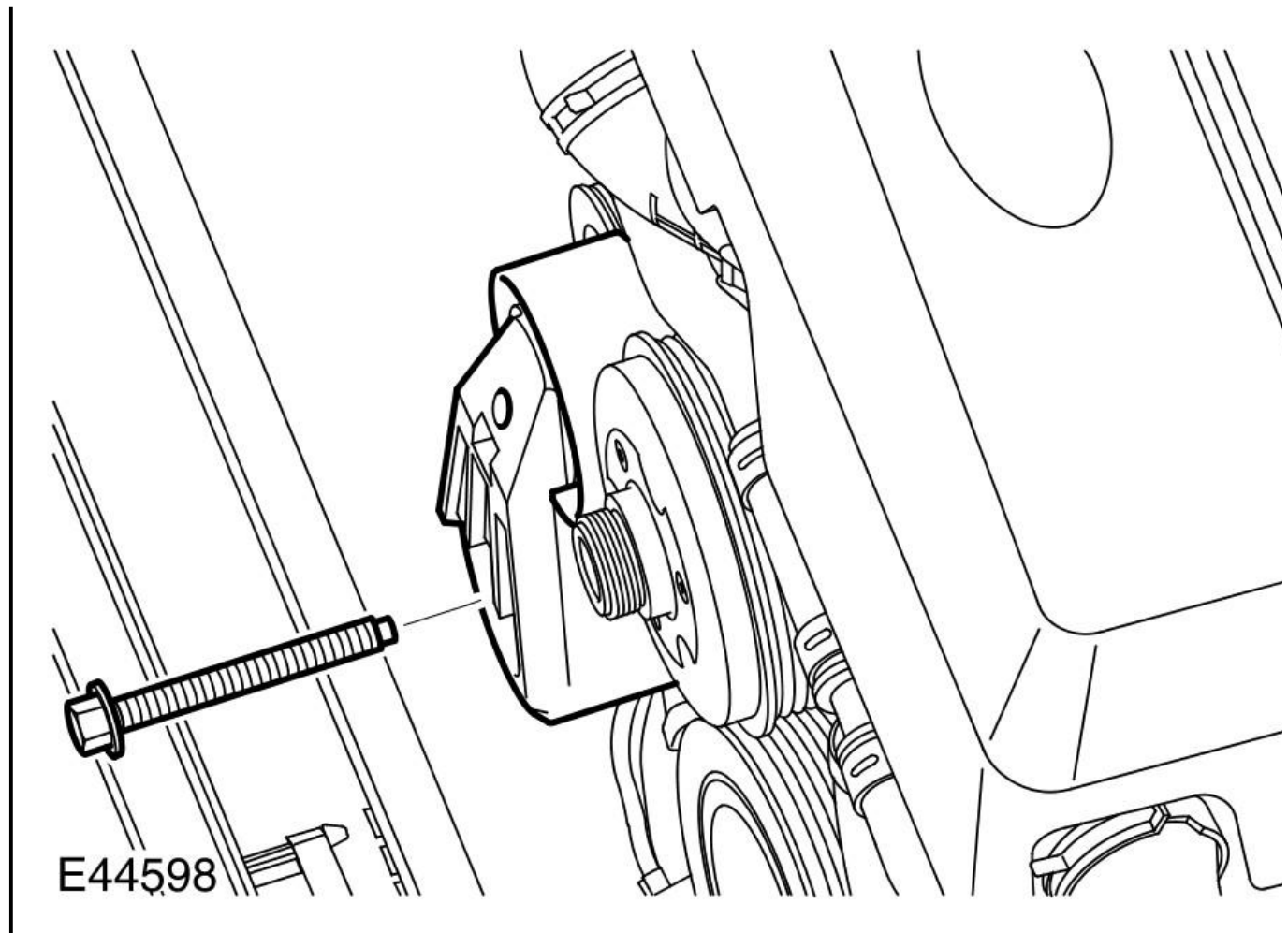


10. Remove the accessory drive belt tensioner.
 - Remove the bolt.

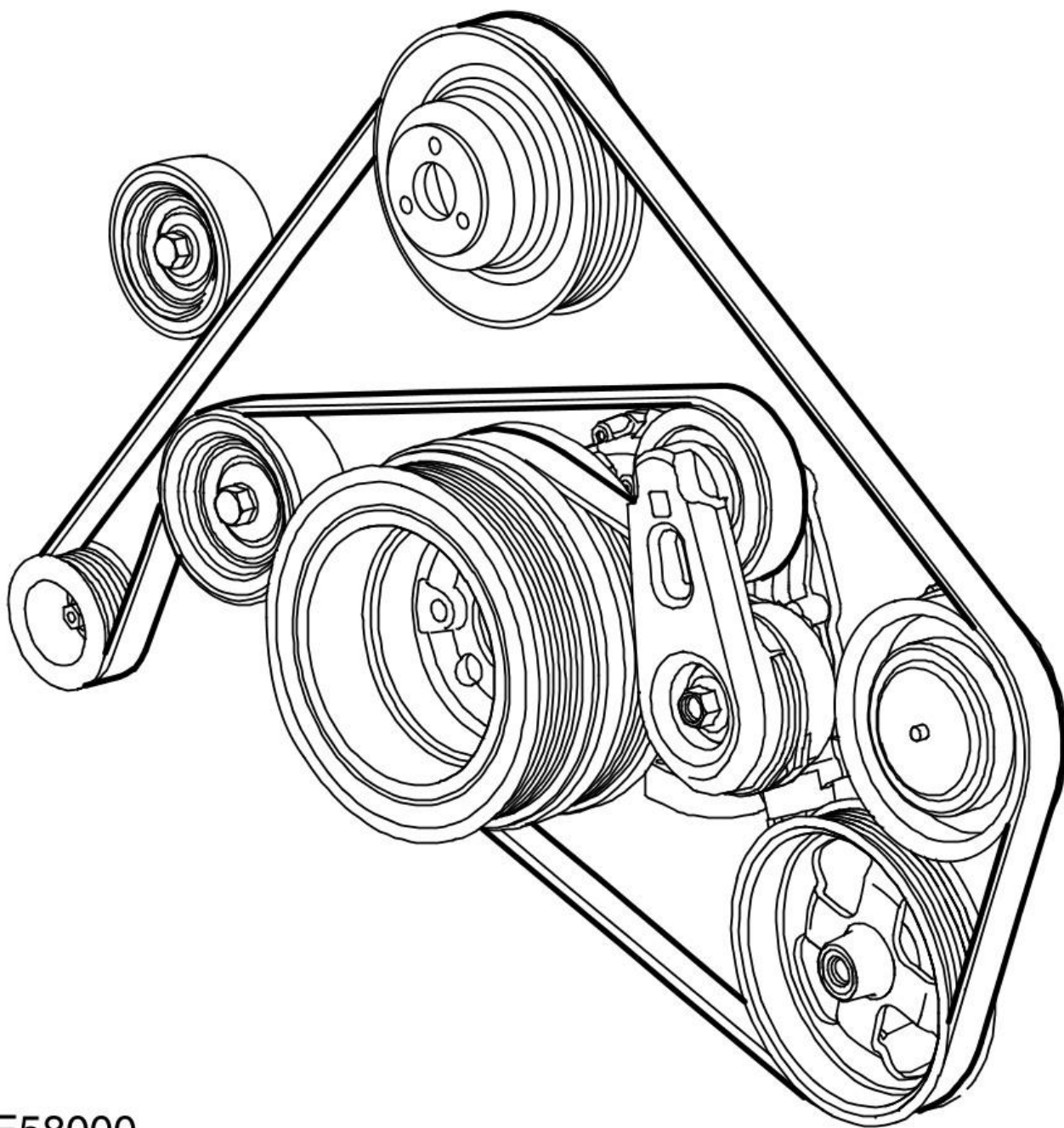


NOTE: Note the fitted position.

11. Remove the accessory drive belt.
12. Remove the accessory drive belt idler pulley.
 - Remove the bolt.
 - Repeat the above procedure for the remaining idler pulley.



13. Remove the oil level indicator and tube. Refer to **OIL LEVEL INDICATOR AND TUBE**.
14. Remove the LH front wheel.

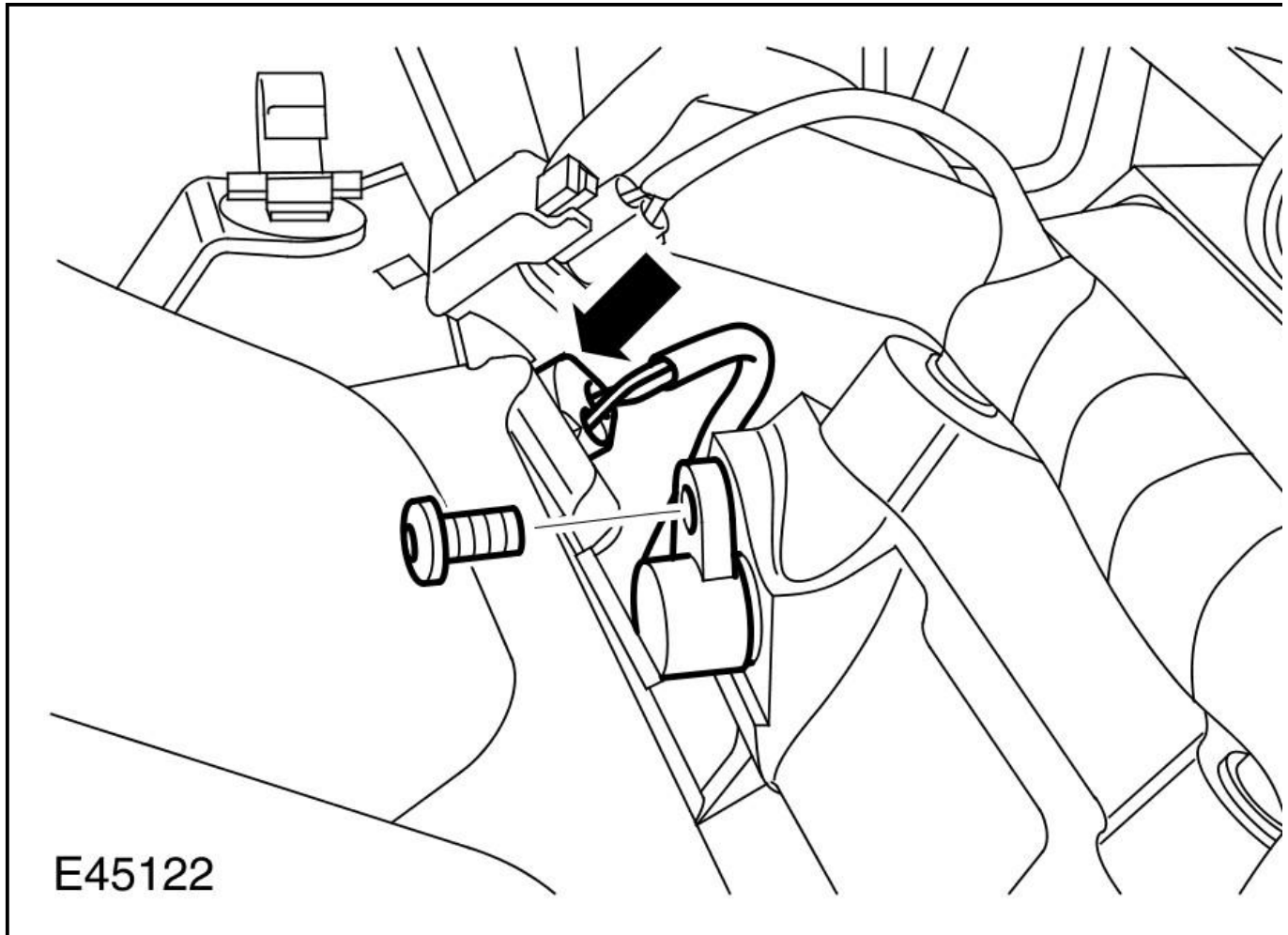


E58000

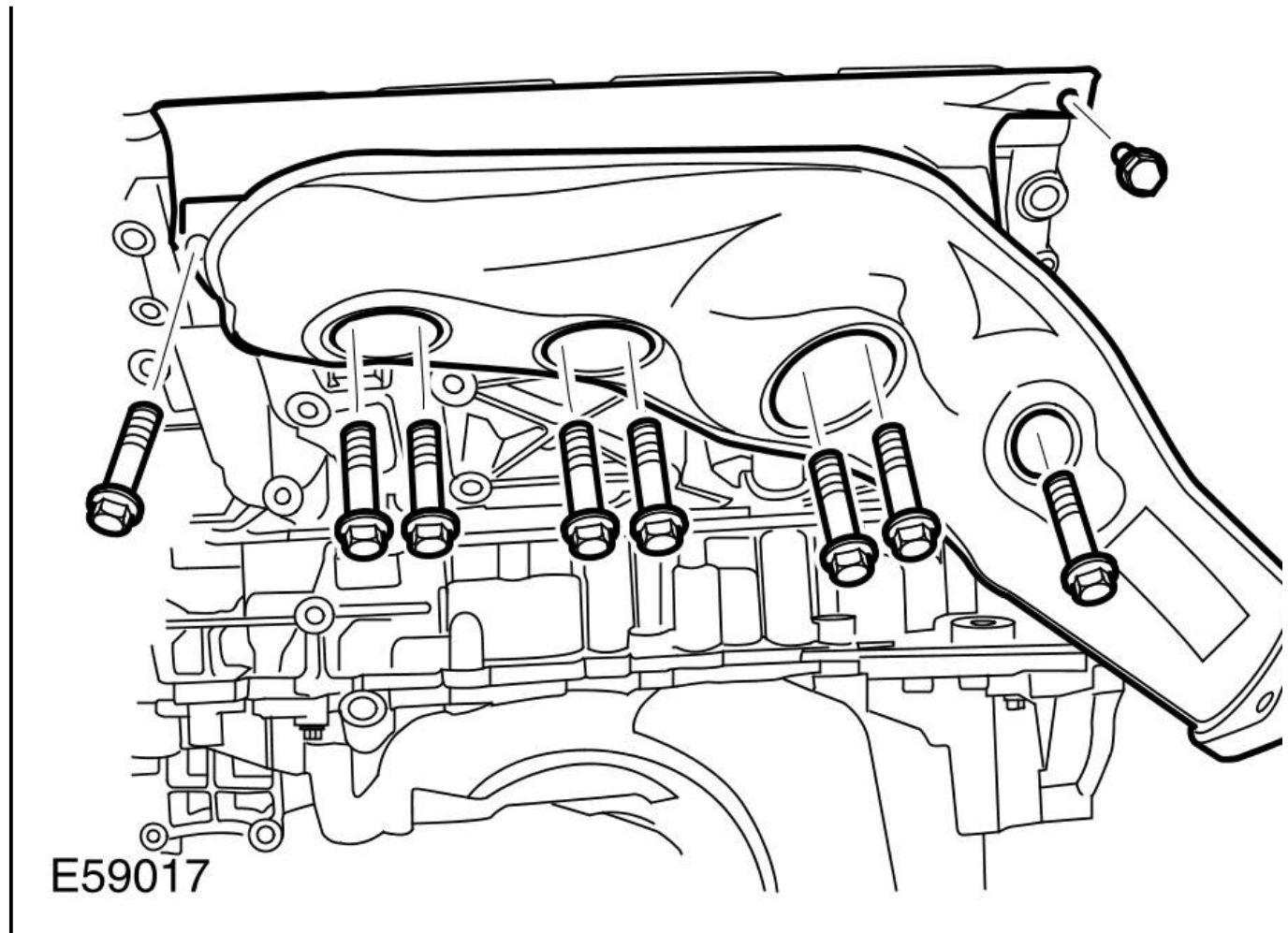
CAUTION: Immediately cap all refrigerant lines to prevent ingress of dirt and moisture.

15. Disconnect the refrigerant lines from the air conditioning (A/C) compressor.
 - Remove the 2 bolts.

- Remove and discard the 2 O-ring seals.

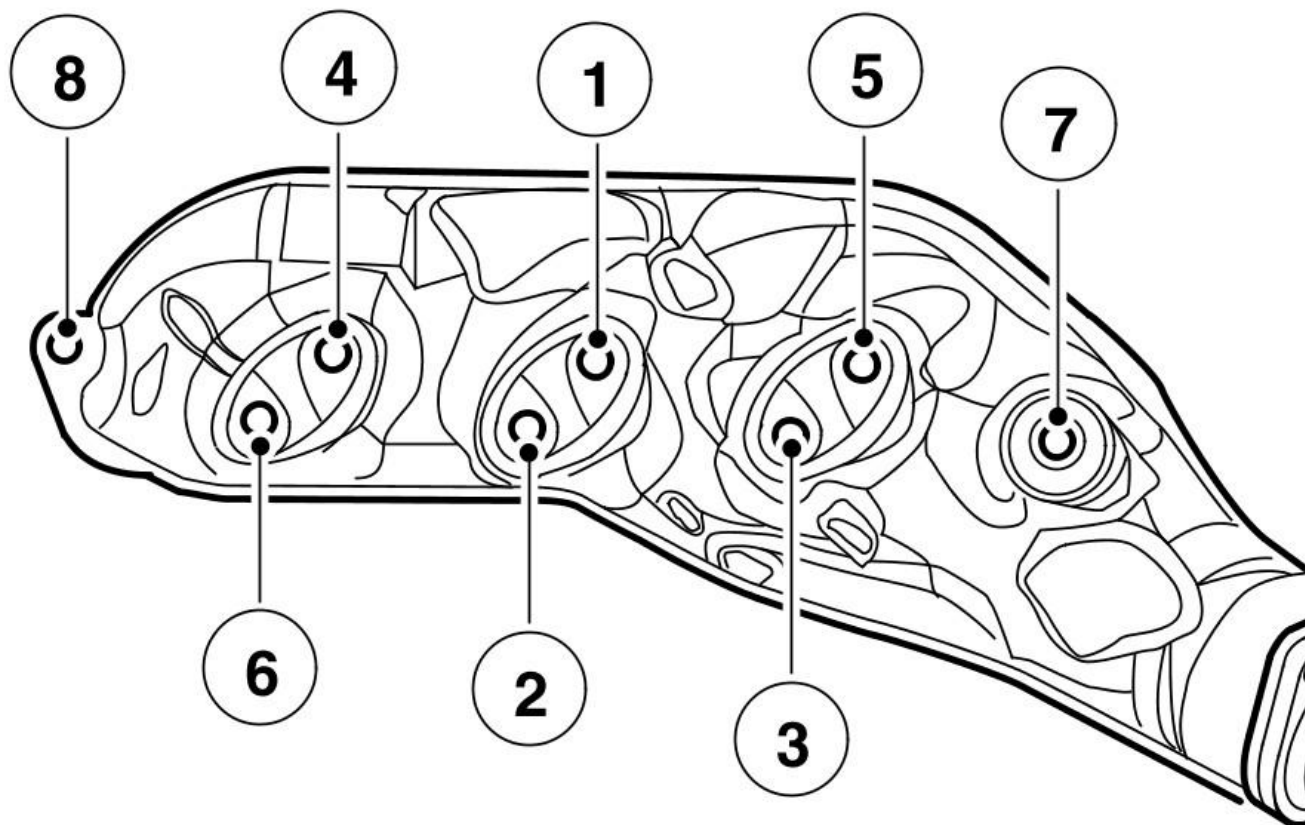


16. Disconnect the A/C clutch electrical connector.



NOTE: 1 A/C compressor bolt will remain captive until the mounting bracket is removed.

17. Release the A/C compressor.
 - Remove the 3 bolts.



E59024

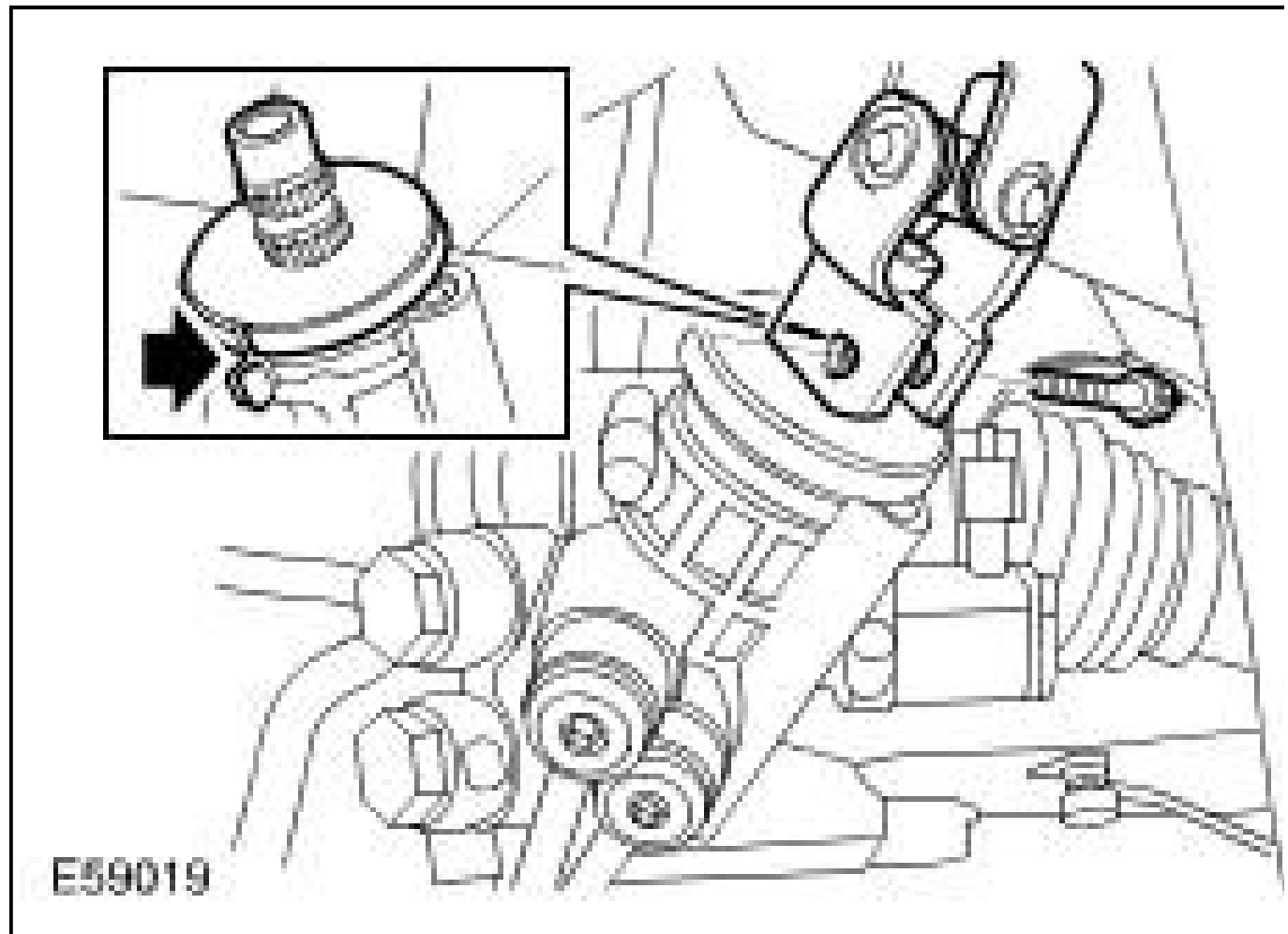
18. Remove the A/C compressor mounting bracket.
 - Remove the 2 bolts.
19. Remove the A/C compressor.
20. Remove the engine compartment LH heat shield.
 - Remove the 2 nuts.
 - Remove the 2 screws.



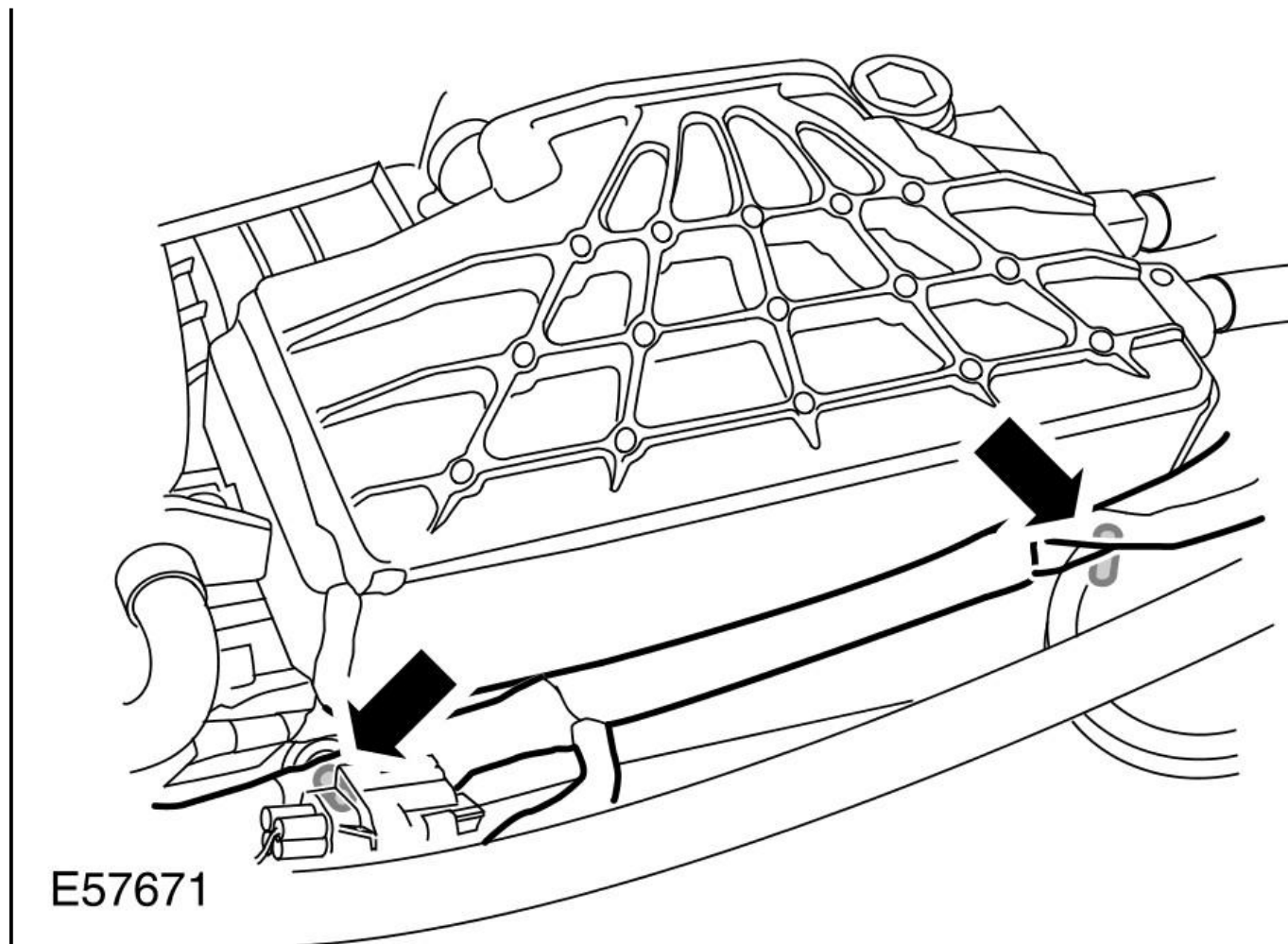
Left-Hand Drive Vehicles

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.

21. Disconnect the lower steering column from the steering gear.
- Note the fitted position.
 - Align the steering wheel to straight ahead.
 - Remove and discard the Torx bolt.

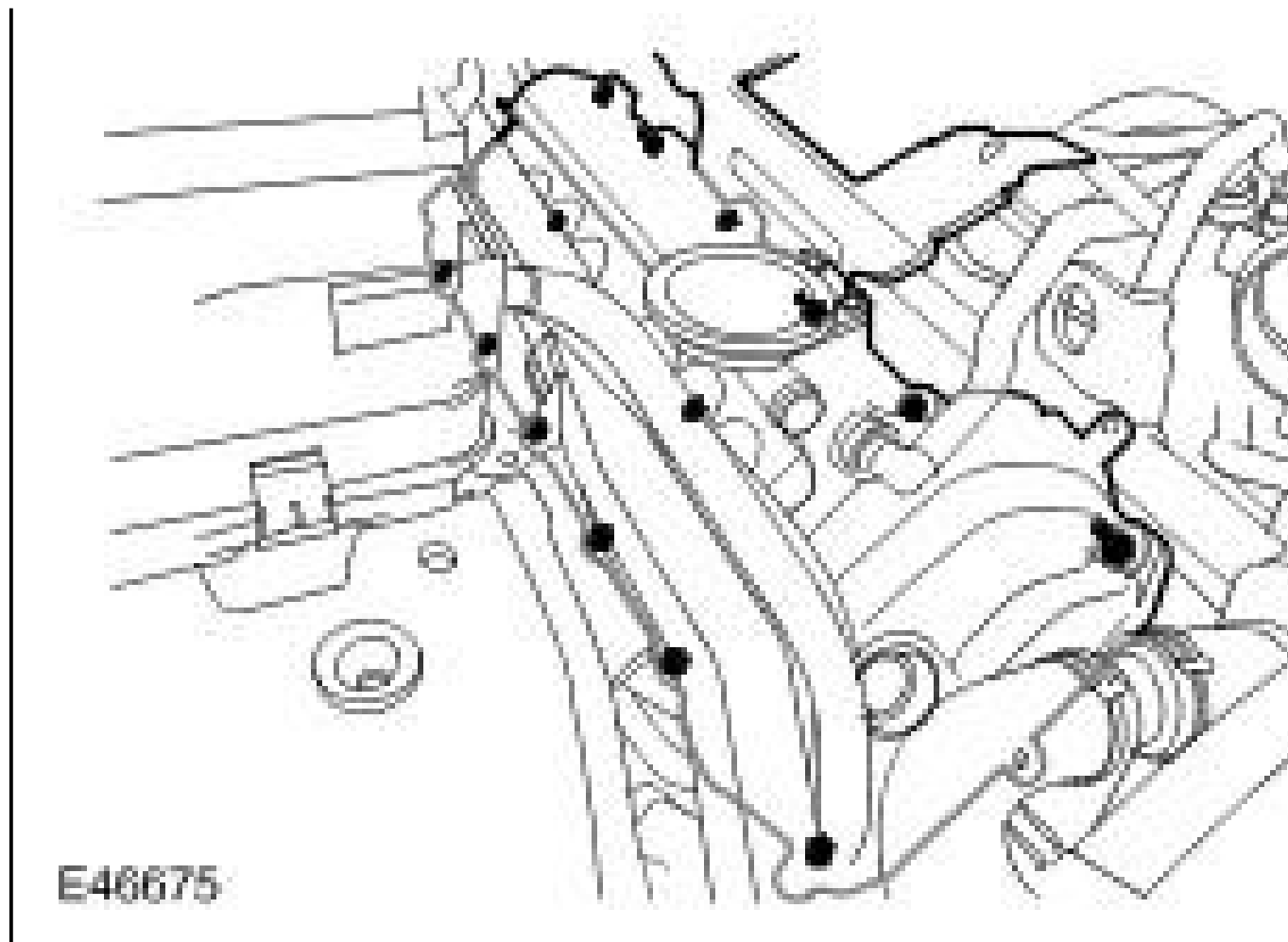
**All Vehicles**

22. Remove the LH front sidemember exhaust heat shield.
- Remove the 4 nuts.

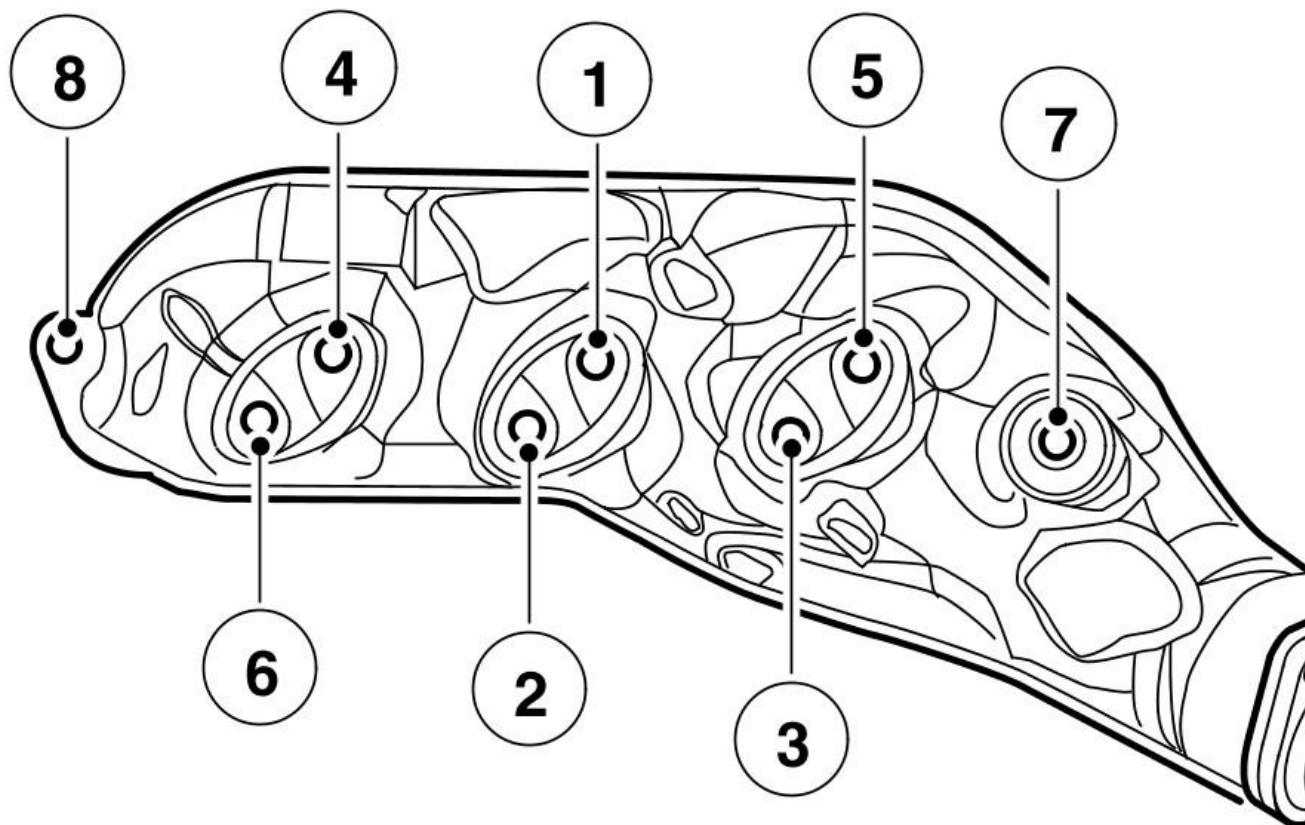


23. Remove the exhaust manifold.

- Remove and discard the 8 bolts.
- Remove the gasket/heat shield retaining bolt.
- Discard the gasket/heat shield.

**INSTALLATION****All Vehicles**

1. Install the exhaust manifold.
 - Clean the component mating faces.
 - Install the gasket/heat shield and tighten the bolt to 10 Nm (7 lb.ft).
 - Install, and lightly tighten the bolts.
 - Evenly and progressively, tighten the bolts in the sequence shown to 20 Nm (15 lb.ft).

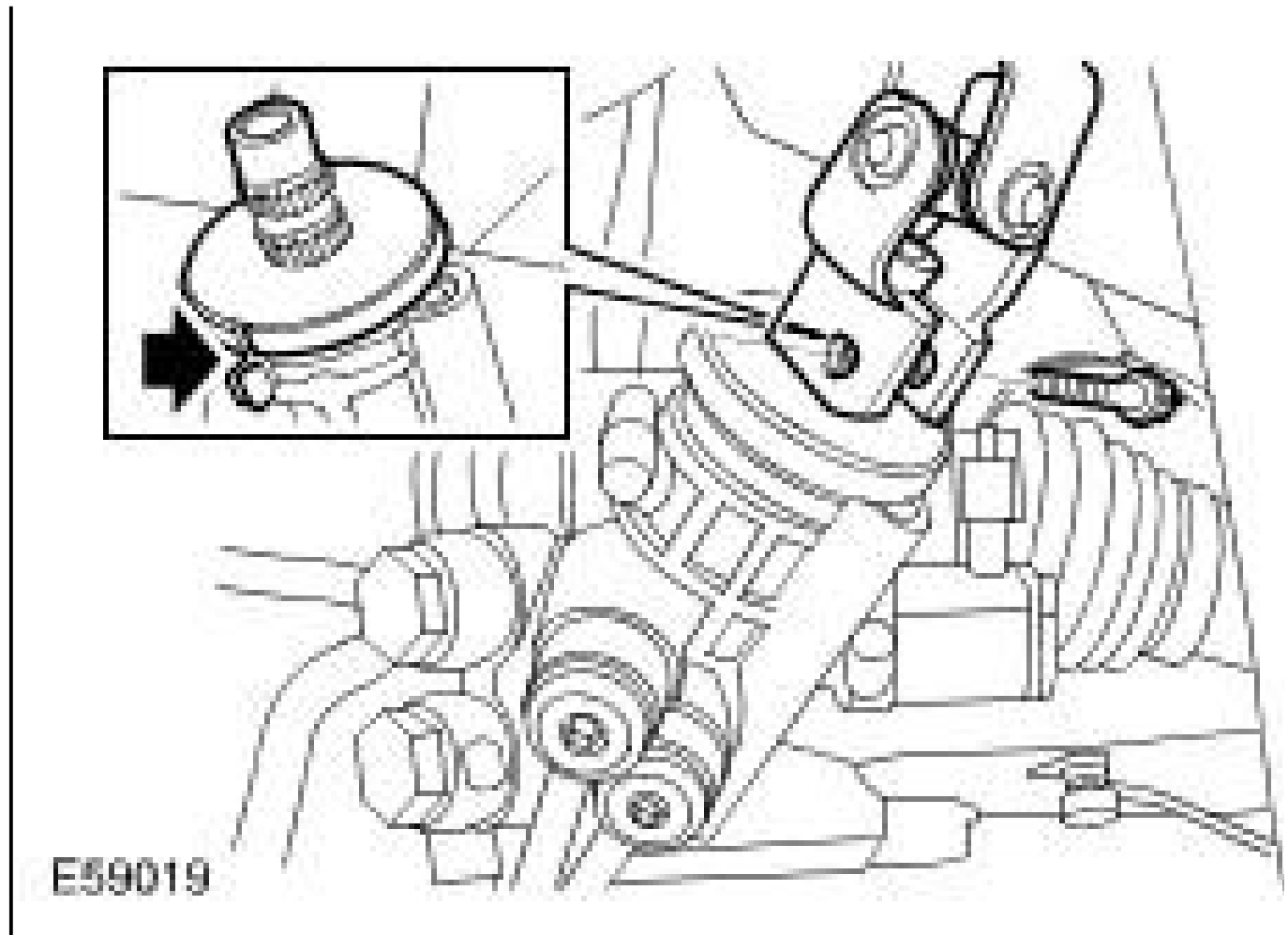


E59024

2. Install the LH front sidemember exhaust heat shield.
 - Tighten the nuts.

Left-Hand Drive Vehicles

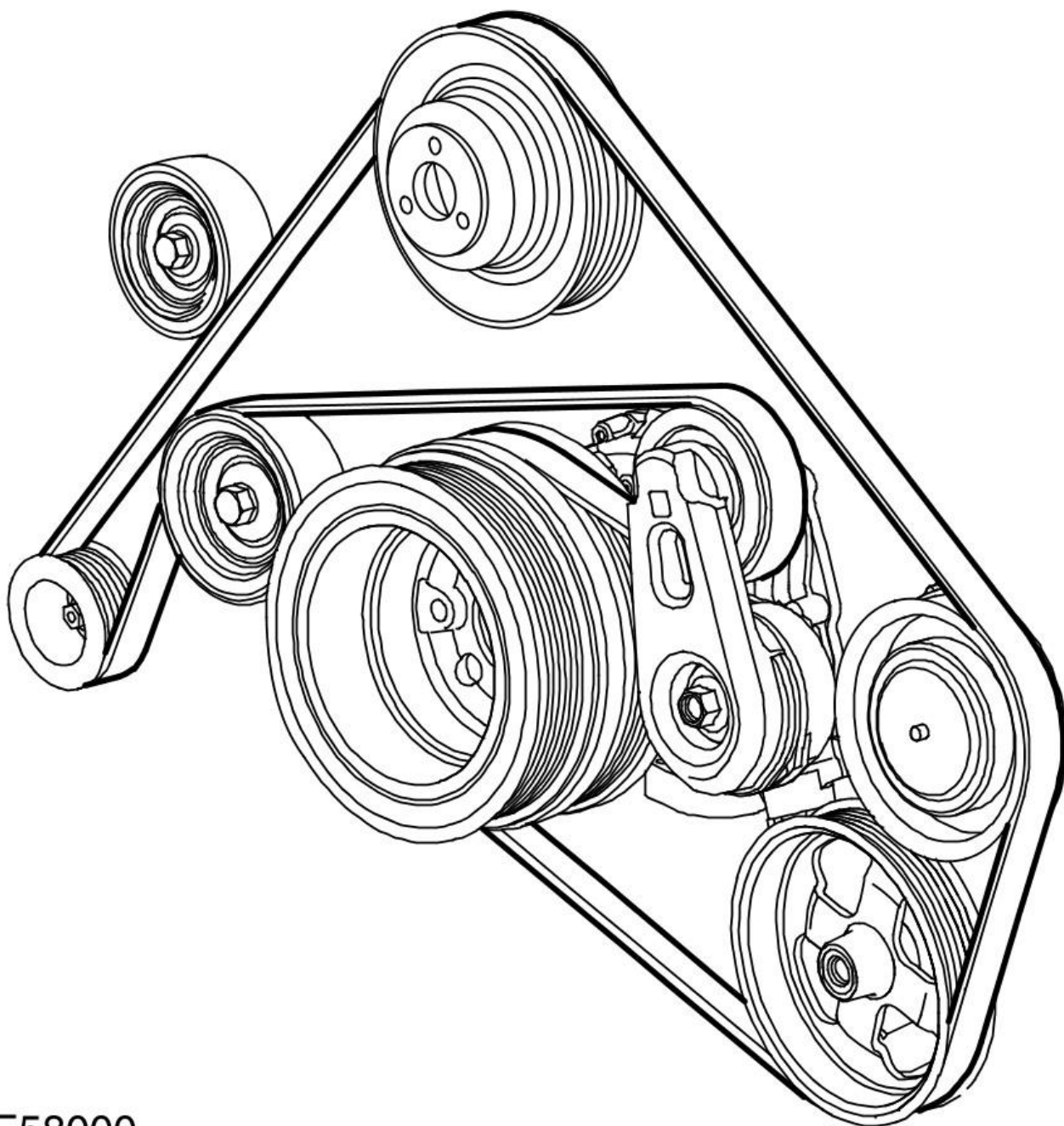
3. Attach the lower steering column.
 - Make sure that the steering gear tag is aligned correctly, as shown.
 - Install a new Torx bolt and tighten to 24 Nm (18 lb.ft).

**All Vehicles**

4. Install the engine compartment LH heat shield.
 - Tighten the screws.
 - Tighten the nuts.
5. Position the A/C compressor to the engine.
 - If a new compressor is being installed, the required amount of refrigerant oil must be drained from it.
6. Install the A/C compressor mounting bracket.
 - Tighten the bolts to 25 Nm (18 lb.ft).
7. Secure the A/C compressor.
 - Tighten the bolts to 25 Nm (18 lb.ft).
8. Connect the A/C clutch electrical connector.

CAUTION: Lubricate the new seals with clean refrigerant oil.

9. Connect the refrigerant lines.
 - Clean the component mating faces.
 - Install the new O-ring seals.
 - Tighten the bolts to 10 Nm (7 lb.ft).
10. Install the front wheel.
 - Tighten the wheel nuts to 140 Nm (103 lb.ft).
11. Install the oil level indicator and tube. Refer to **OIL LEVEL INDICATOR AND TUBE**.
12. Install the accessory drive belt.
13. Install the accessory drive belt tensioner.
 - Tighten the bolt to 40 Nm (30 lb.ft).
14. Install the cooling fan drive hub bearing.
 - Tighten the bolts to 10 Nm (7 lb.ft).
15. Install the cooling fan pulley.
 - Tighten the bolts evenly to 25 Nm (18 lb.ft).
16. Secure the accessory drive belt.



E58000

17. Install the cooling fan belt.
 - Tighten the cooling fan belt tensioner bolt to 40 Nm (30 lb.ft).
 - Rotate the cooling fan belt tensioner clockwise.
18. Install the cooling fan. Refer to **COOLING FAN** .
19. Install the engine undershield. Refer to **ENGINE UNDERSHIELD** .

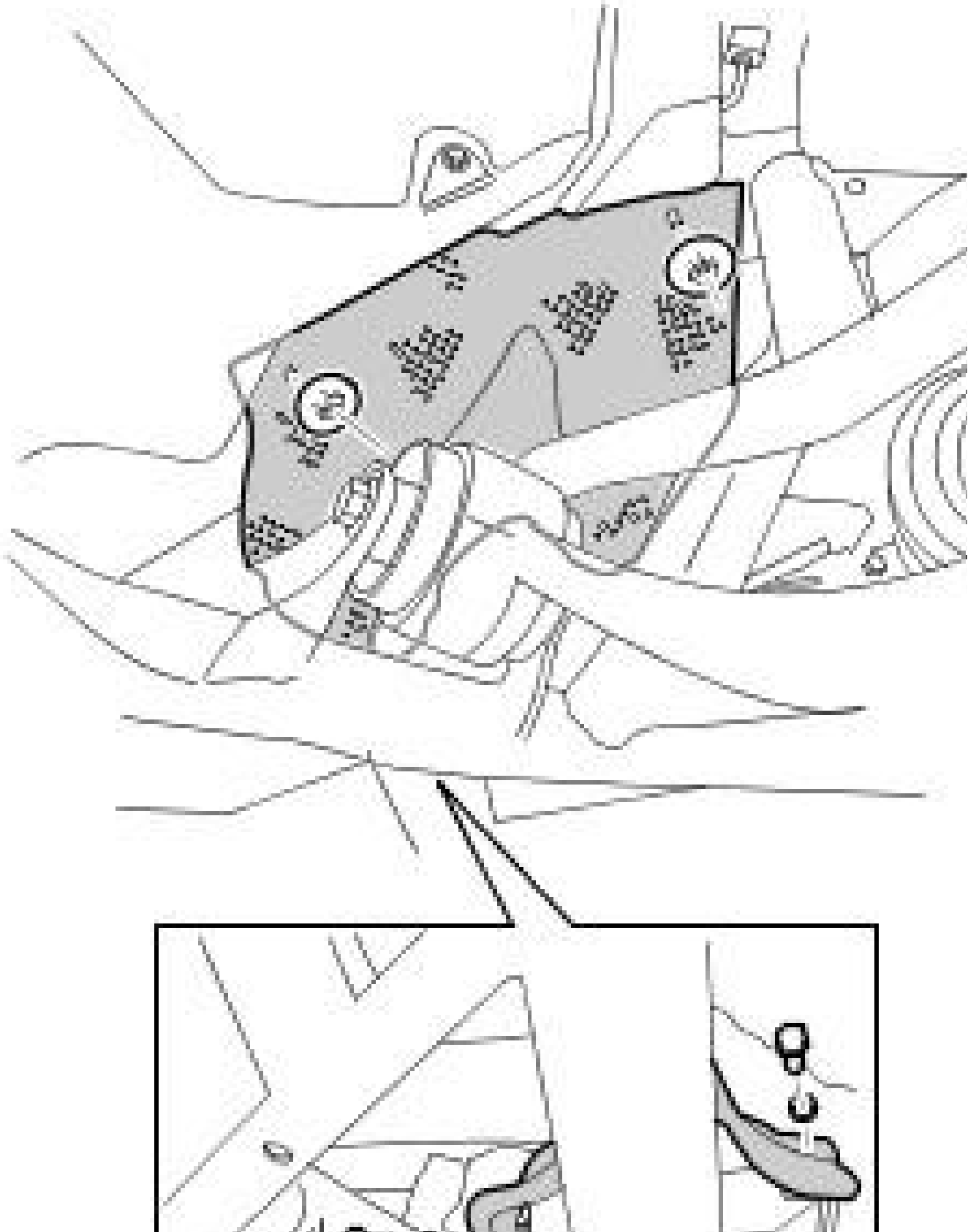
20. Install the exhaust system. Refer to **EXHAUST SYSTEM** .
21. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

EXHAUST MANIFOLD RH**REMOVAL****All Vehicles**

1. Disconnect the battery ground cable. Refer to **Specifications** .

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

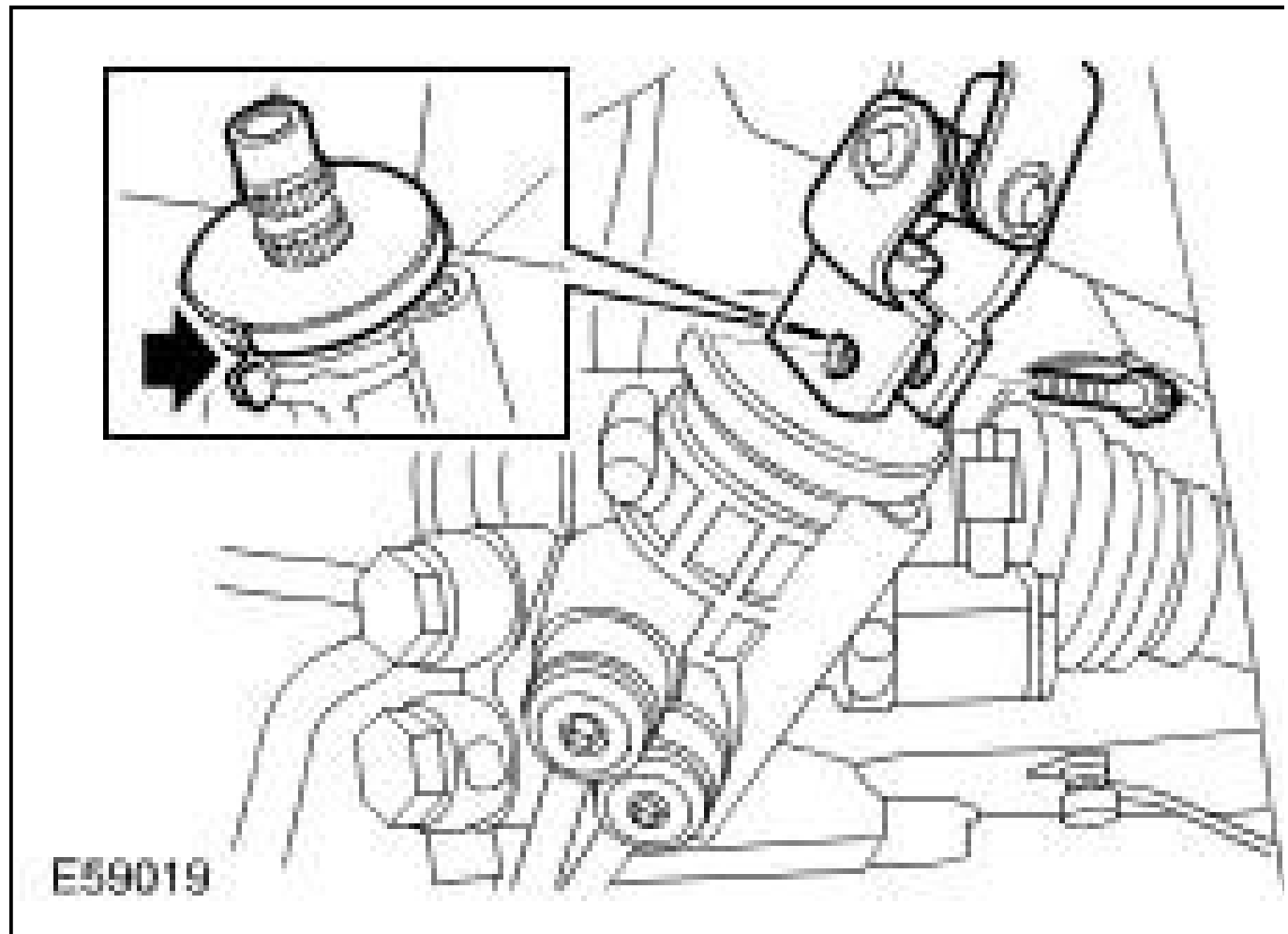
2. Raise and support the vehicle.
3. Remove the RH front wheel.
4. Remove the RH fender splash shield. Refer to **FENDER SPLASH SHIELD** .
5. Remove the engine undershield. Refer to **ENGINE UNDERSHIELD** .
6. Remove the engine compartment RH heat shield.
 - Remove the 2 nuts.
 - Remove the 2 screws.



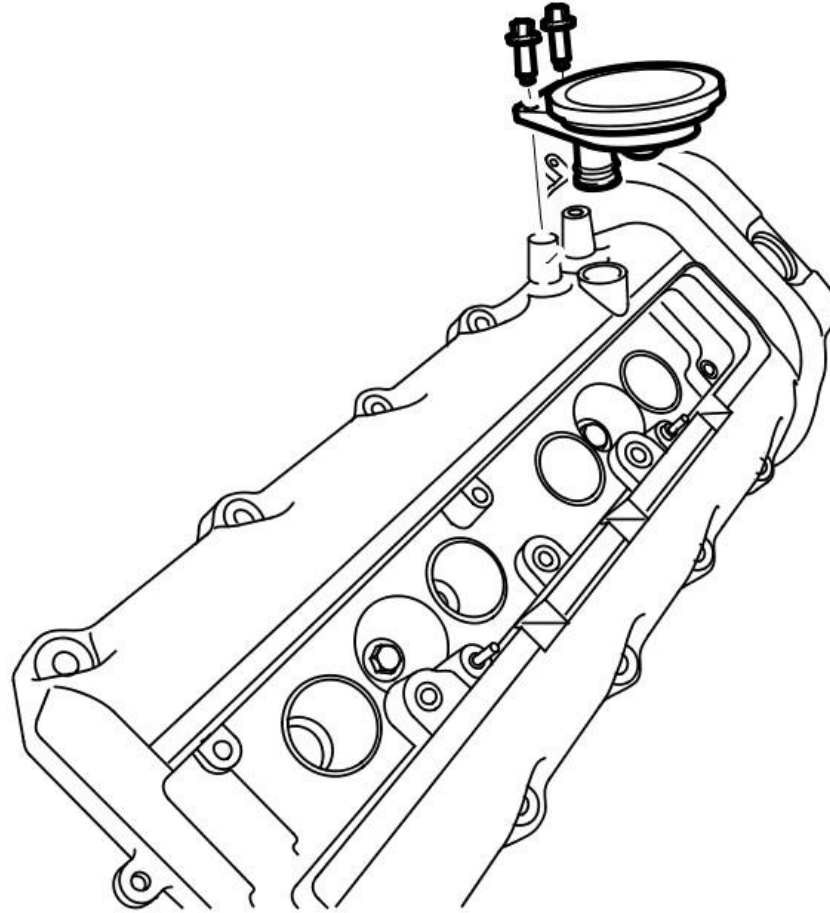
Right-Hand Drive Vehicles

CAUTION: Do not turn the steering wheel with the lower steering column disconnected as damage to the clock spring and steering wheel switches may occur.

7. Disconnect the lower steering column from the steering gear.
 - Note the fitted position.
 - Align the steering wheel to straight ahead.
 - Remove and discard the Torx bolt.

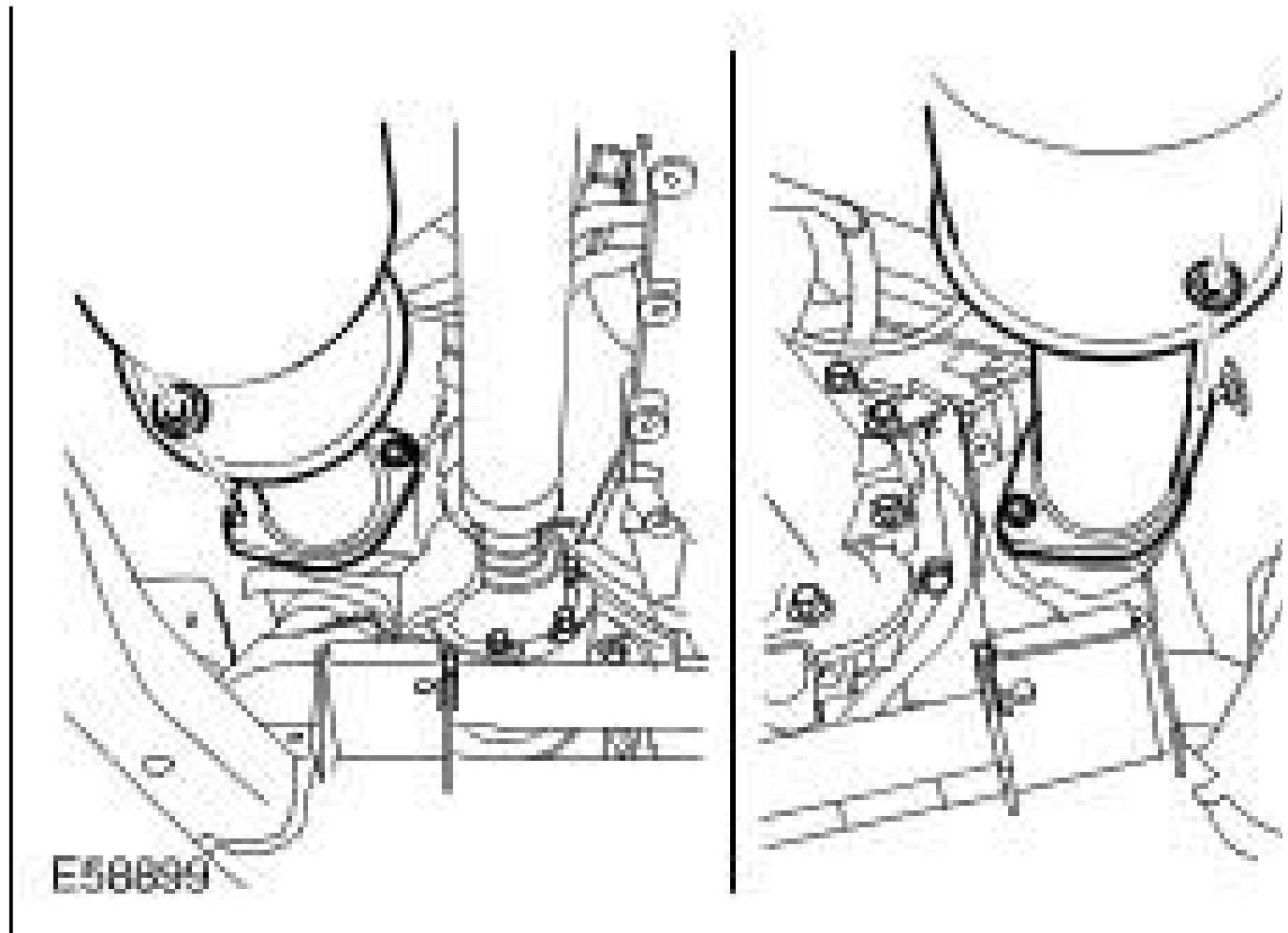
**All Vehicles**

8. Remove the starter motor heat shield.
 - Remove the 2 bolts.

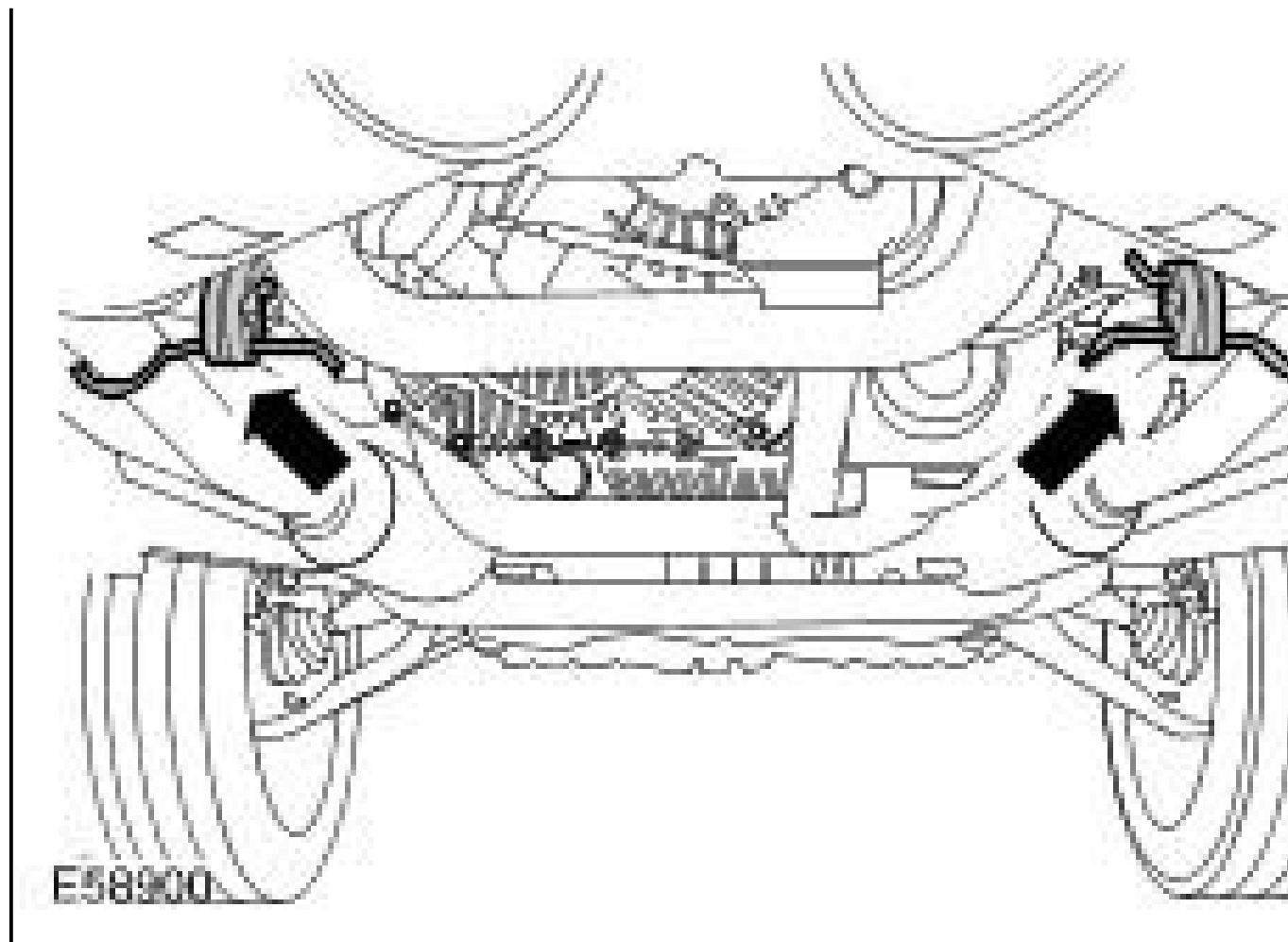


E46678

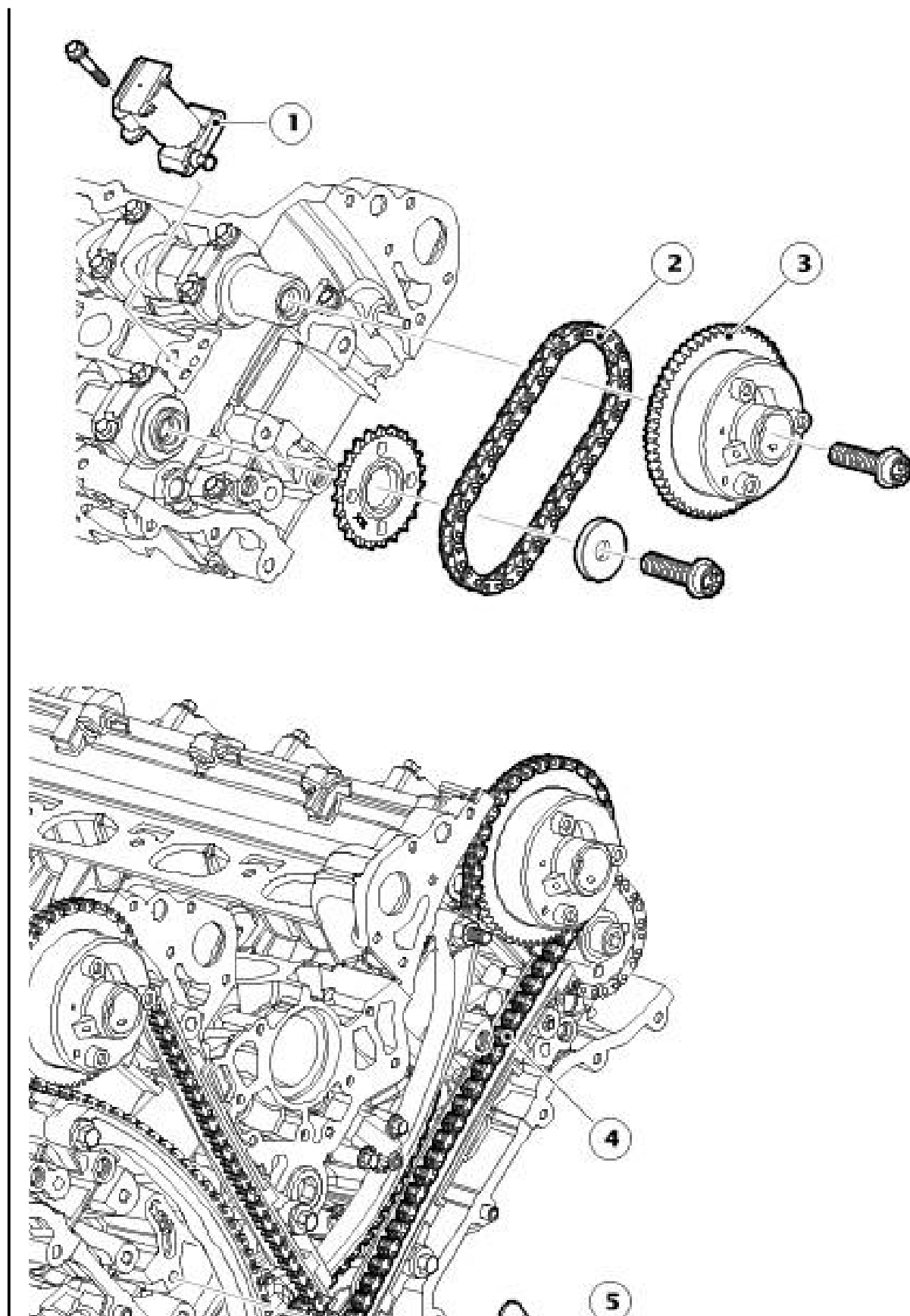
9. Disconnect the LH catalytic converter from the exhaust manifold.
 - Remove and discard the 2 nuts.
10. Disconnect the RH catalytic converter from the exhaust manifold.
 - Remove and discard the 2 nuts.



11. Disconnect the 2 front exhaust hangers.

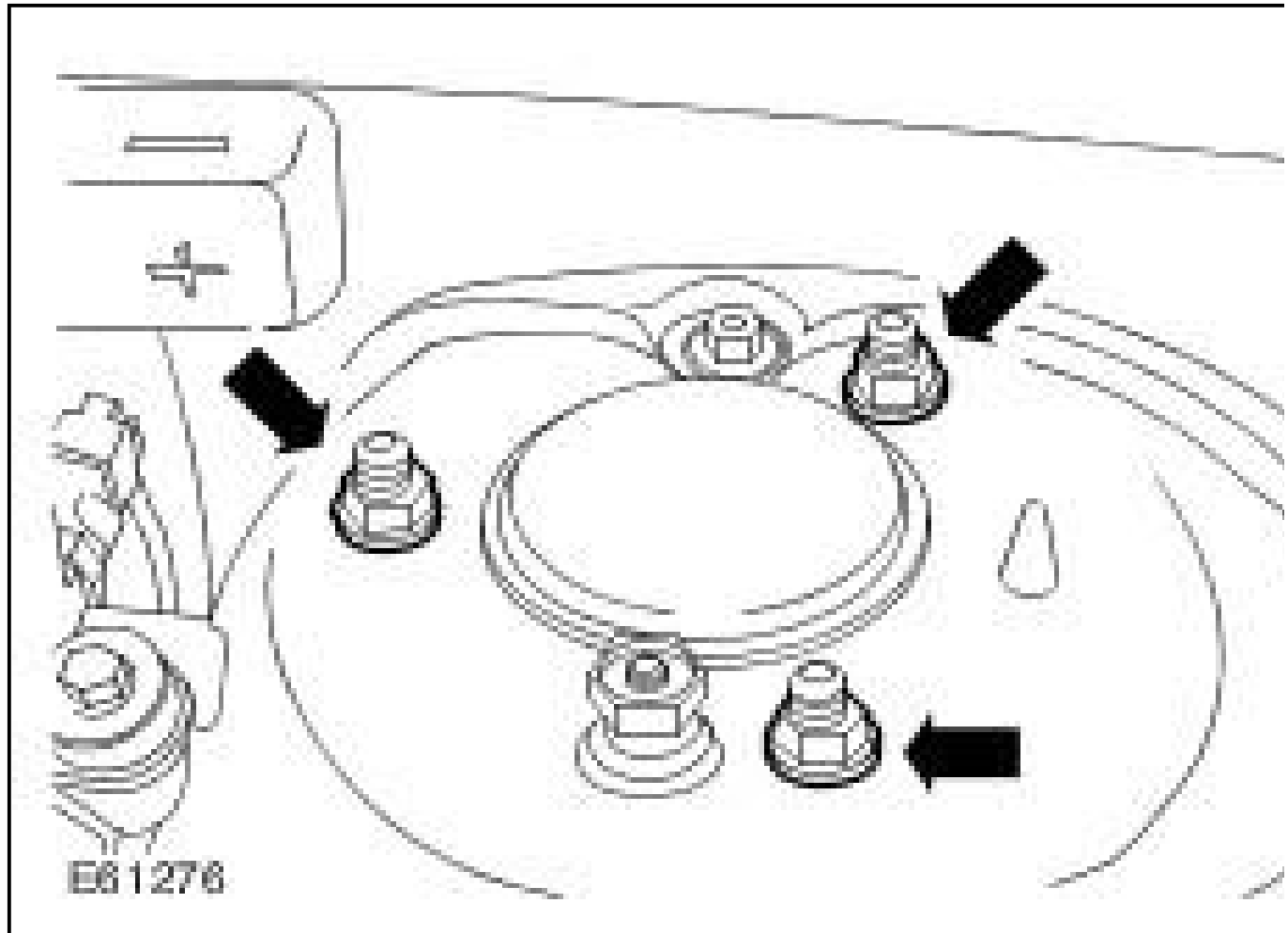


12. Remove the exhaust manifold heat shield.
 - Remove the 2 screws.



13. Remove the exhaust manifold.

- Remove and discard the 8 bolts.
- Remove the gasket/heat shield retaining bolt.
- Discard the gasket/heat shield.

**INSTALLATION****All Vehicles**

1. Install the exhaust manifold.

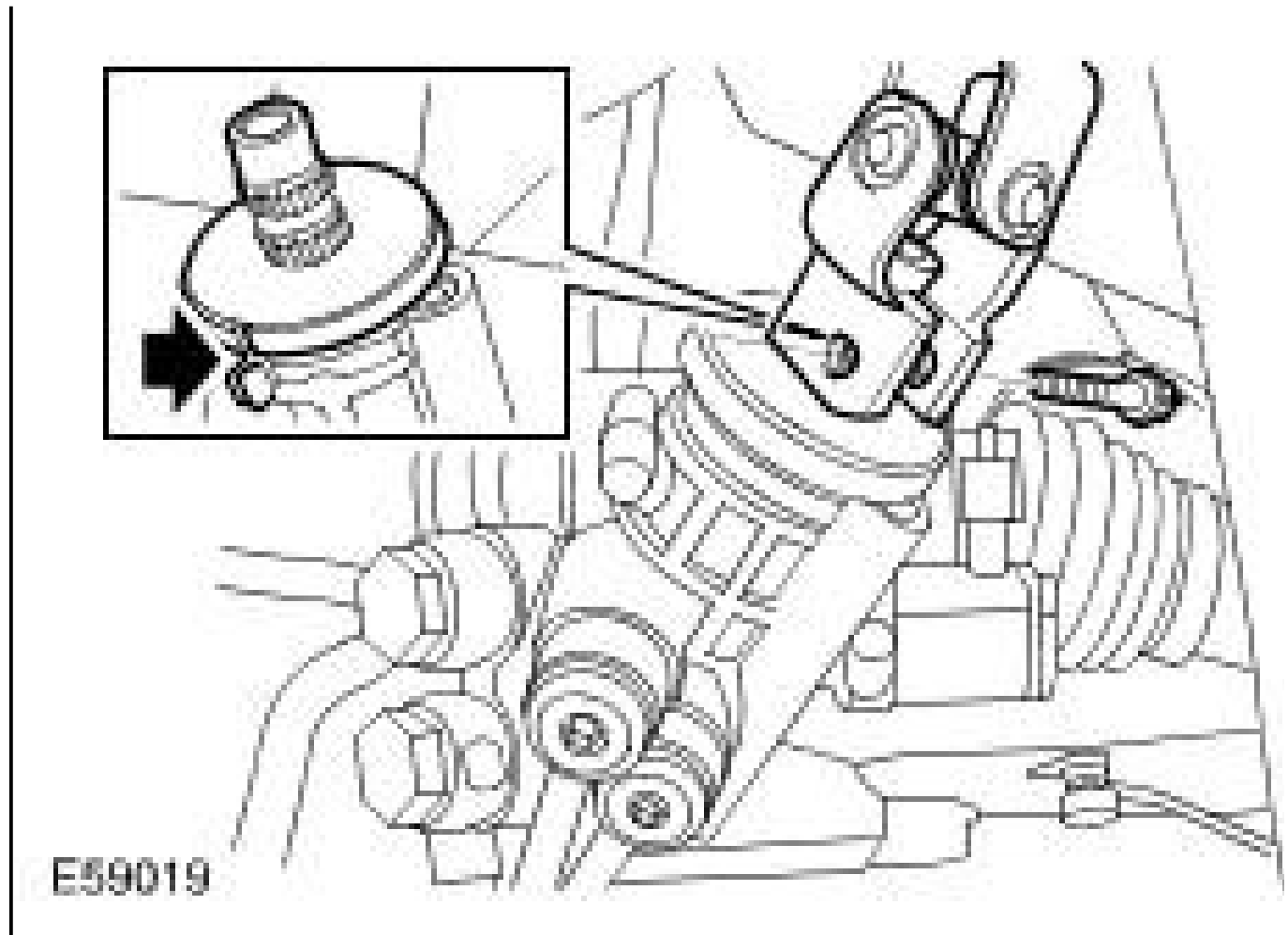
- Clean the component mating faces.
- Install the gasket/heat shield and tighten the bolt to 10 Nm (7 lb.ft).
- Install, and lightly tighten the bolts.
- Evenly and progressively, tighten the bolts in the sequence shown to 20 Nm (15 lb.ft).



2. Install the exhaust manifold heat shield.
 - Tighten the screws.
3. Attach the exhaust hangers.
4. Position the RH catalytic converter to the exhaust manifold.
 - Clean the components.
 - Tighten the new nuts to 20 Nm (15 lb.ft).
5. Position the LH catalytic converter to the exhaust manifold.
 - Clean the components.
 - Tighten the new nuts to 20 Nm (15 lb.ft).
6. Install the starter motor heat shield.
 - Tighten the bolts to 45 Nm (33 lb.ft).

Right-Hand Drive Vehicles

7. Attach the lower steering column.
 - Make sure that the steering gear tag is aligned correctly, as shown.
 - Install a new Torx bolt and tighten to 24 Nm (18 lb.ft).



All Vehicles

8. Install the engine compartment RH heat shield.
 - Tighten the screws.
 - Tighten the nuts.
9. Install the engine undershield. Refer to **ENGINE UNDERSHIELD** .
10. Install the fender splash shield. Refer to **FENDER SPLASH SHIELD** .
11. Install the front wheel.
 - Tighten the wheel nuts to 140 Nm (103 lb.ft).
12. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

AUXILIARY OIL COOLER

REMOVAL

1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .

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

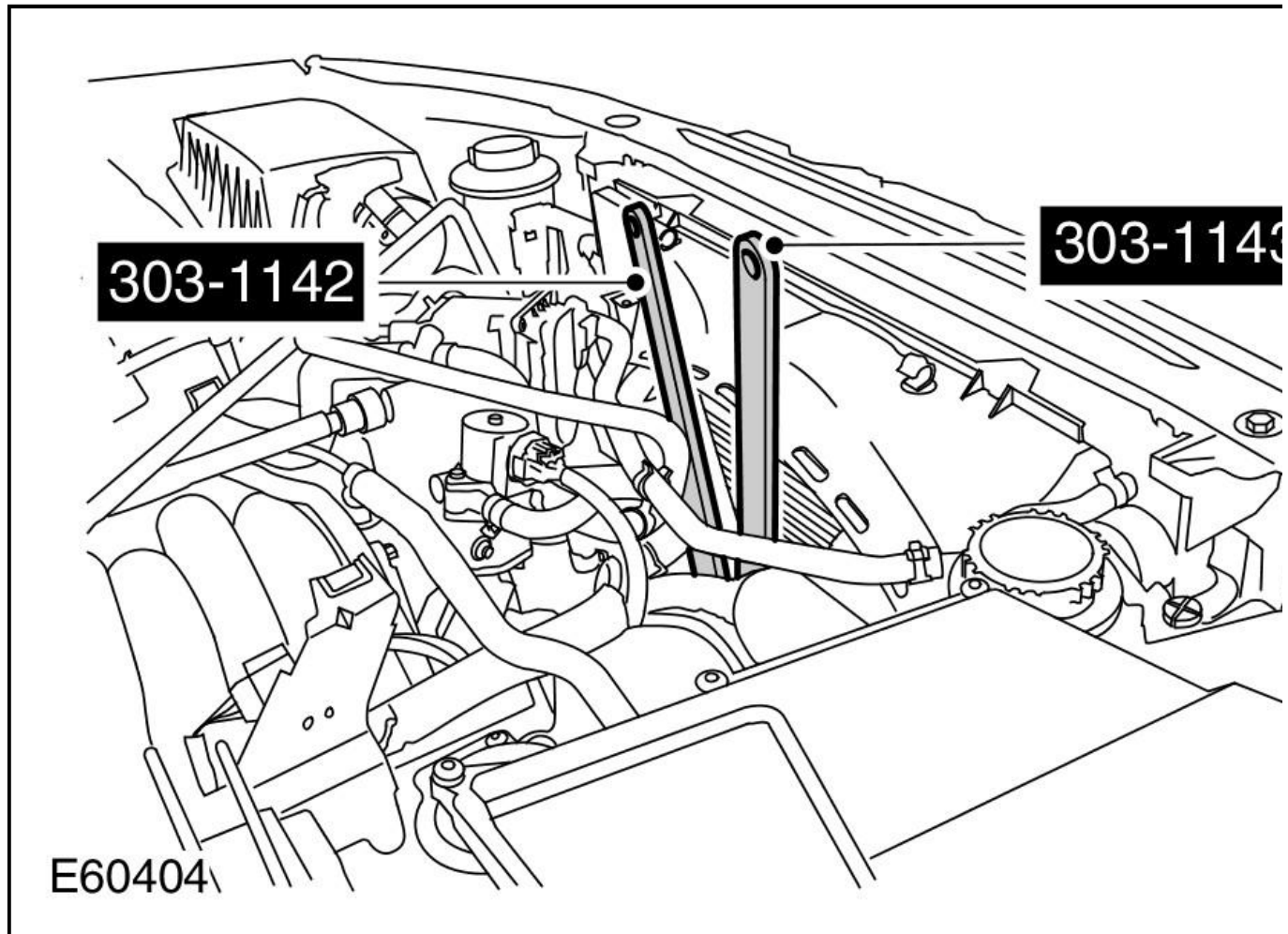
2. Raise and support the vehicle.
3. Remove the RH headlamp assembly. Refer to HEADLAMP ASSEMBLY .
4. Remove the RH fender splash shield. Refer to FENDER SPLASH SHIELD .

CAUTION: Before disconnecting or removing the components, ensure the area around the joint faces and connections are clean and dry. Plug open connections to prevent contamination.

5. Disconnect the 2 auxiliary oil cooler hoses.
 - Position a container to collect the oil spillage.
 - Release the 2 clips.



6. Remove the auxiliary oil cooler.
 - Remove the 2 bolts.



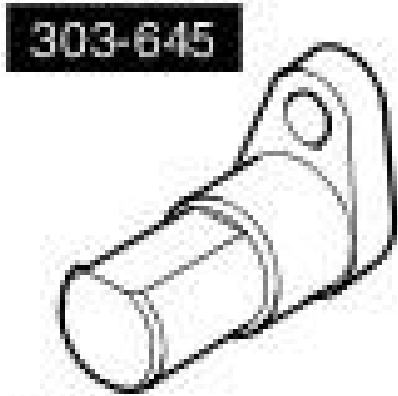
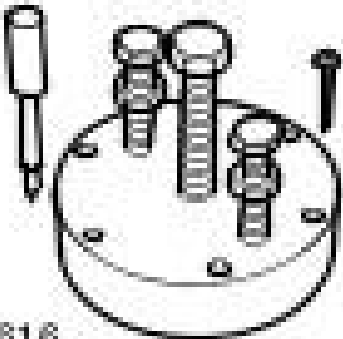
INSTALLATION

1. Install the auxiliary oil cooler.
 - Clean the components.
 - Tighten the bolts to 22 Nm (16 lb.ft).
2. Connect the auxiliary oil cooler hoses.
 - Clean the components.
 - Secure with the clips.
3. Install the RH fender splash shield. Refer to **FENDER SPLASH SHIELD** .
4. Install the RH headlamp assembly. Refer to **HEADLAMP ASSEMBLY** .
5. Connect the battery ground cable. Refer to **SPECIFICATIONS** .
6. Check and top-up the engine oil.

REMOVAL AND INSTALLATION

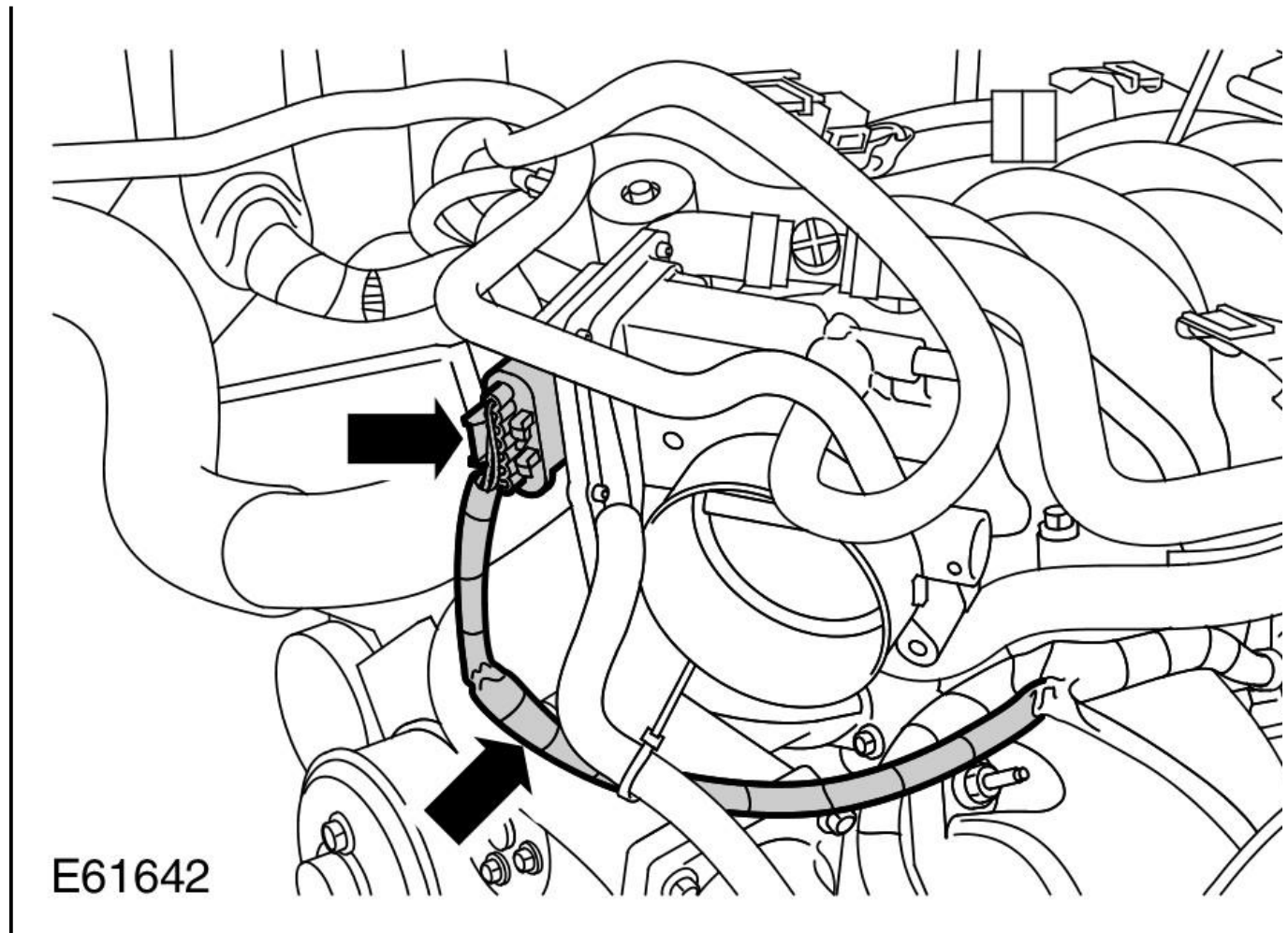
CRANKSHAFT MAIN BEARING CARRIER

SPECIAL TOOLS

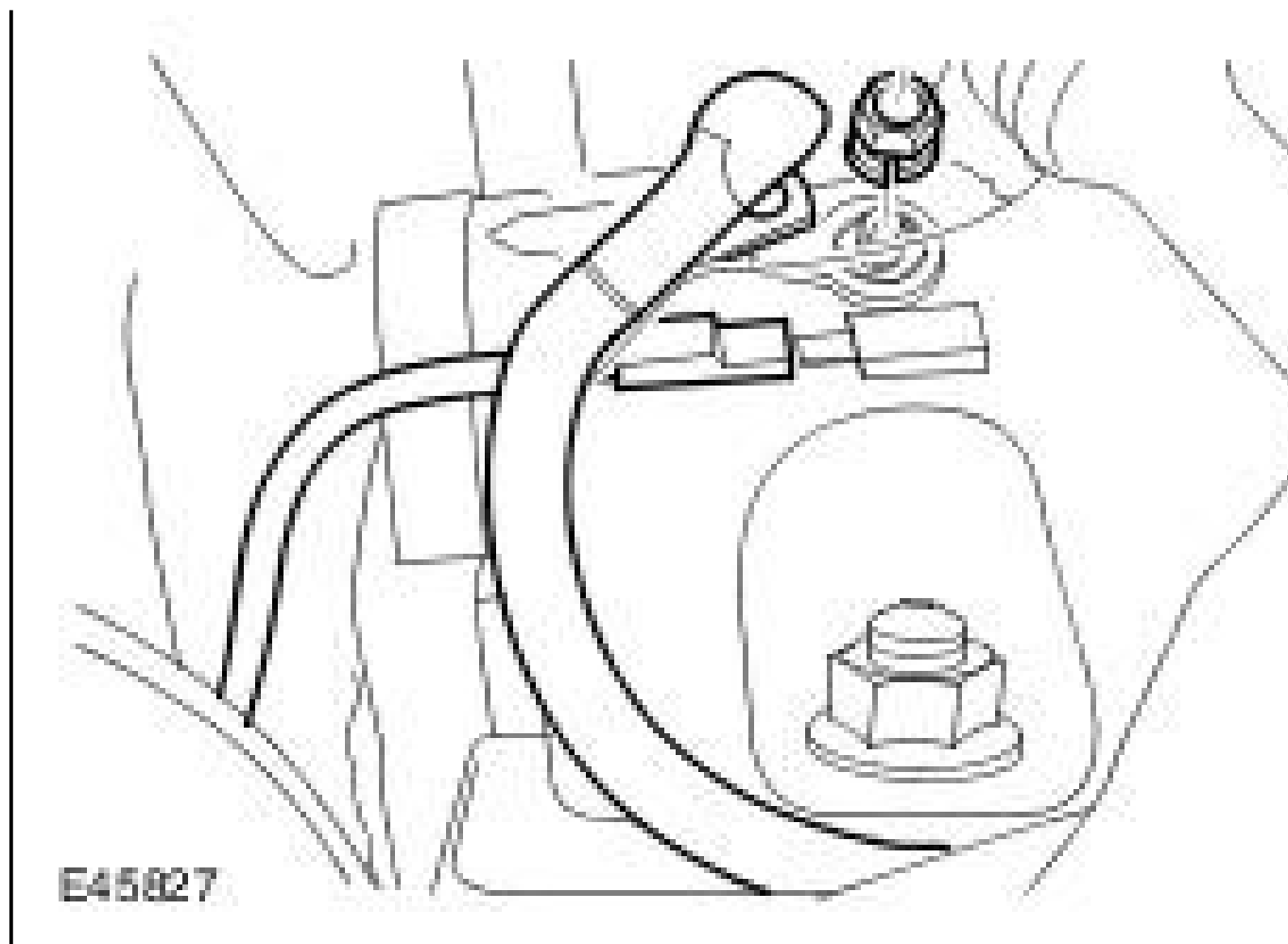
Tool Illustration	Tool Name	Tool Number
 303-645 E46881	Timing Setting tool	303-645
 303-538 E46816	Crankshaft rear oil seal remover/installer	303-538

REMOVAL

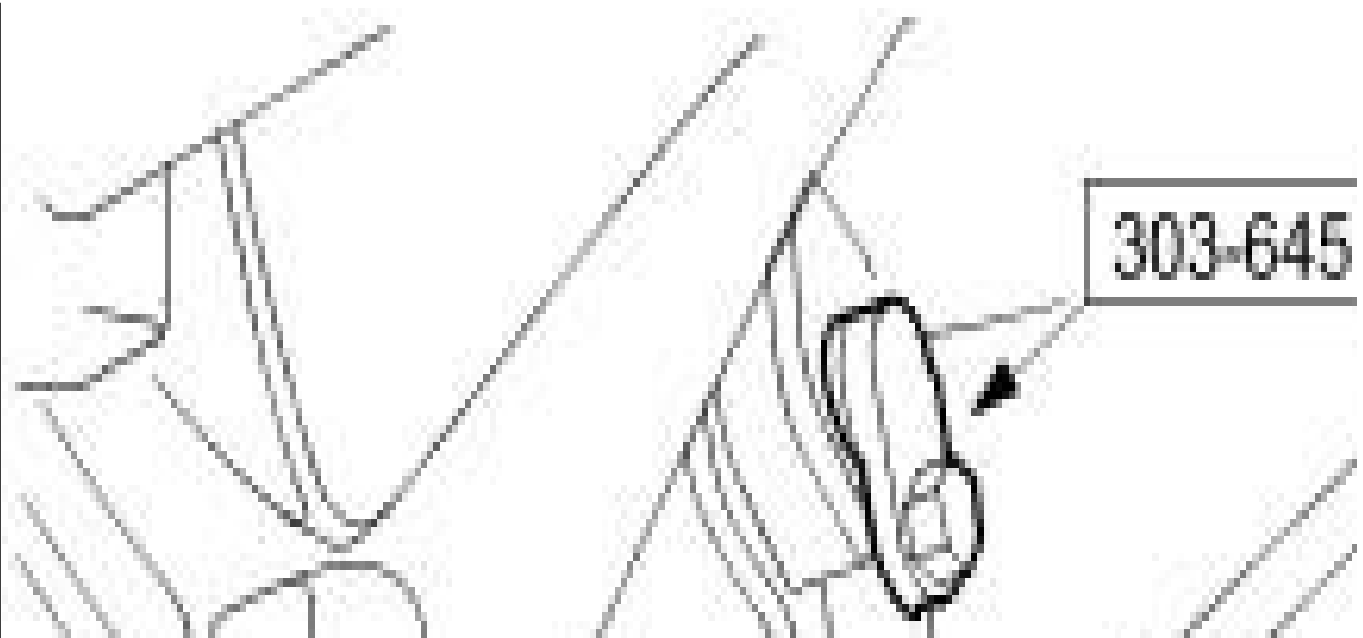
1. Disconnect the battery ground cable. Refer to **SPECIFICATIONS** .
2. Remove the oil pump. Refer to **OIL PUMP**.
3. Release the starter motor.
 - Remove the bolt.



4. Remove the starter motor.
 - Release the battery positive cable cover.
 - Remove the nut.
 - Disconnect the battery positive cable.
 - Disconnect the electrical connector.

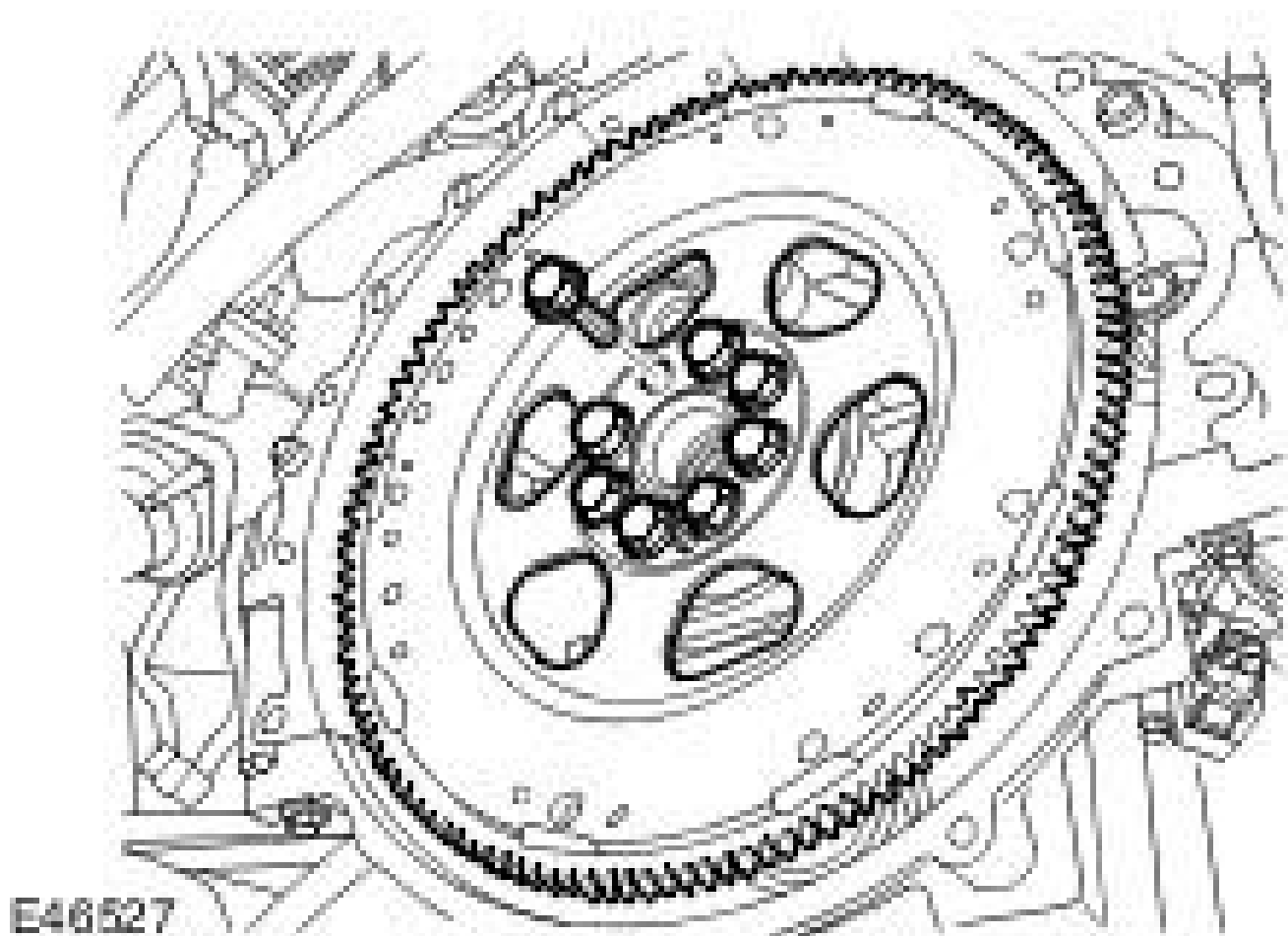


5. Remove the special tool.

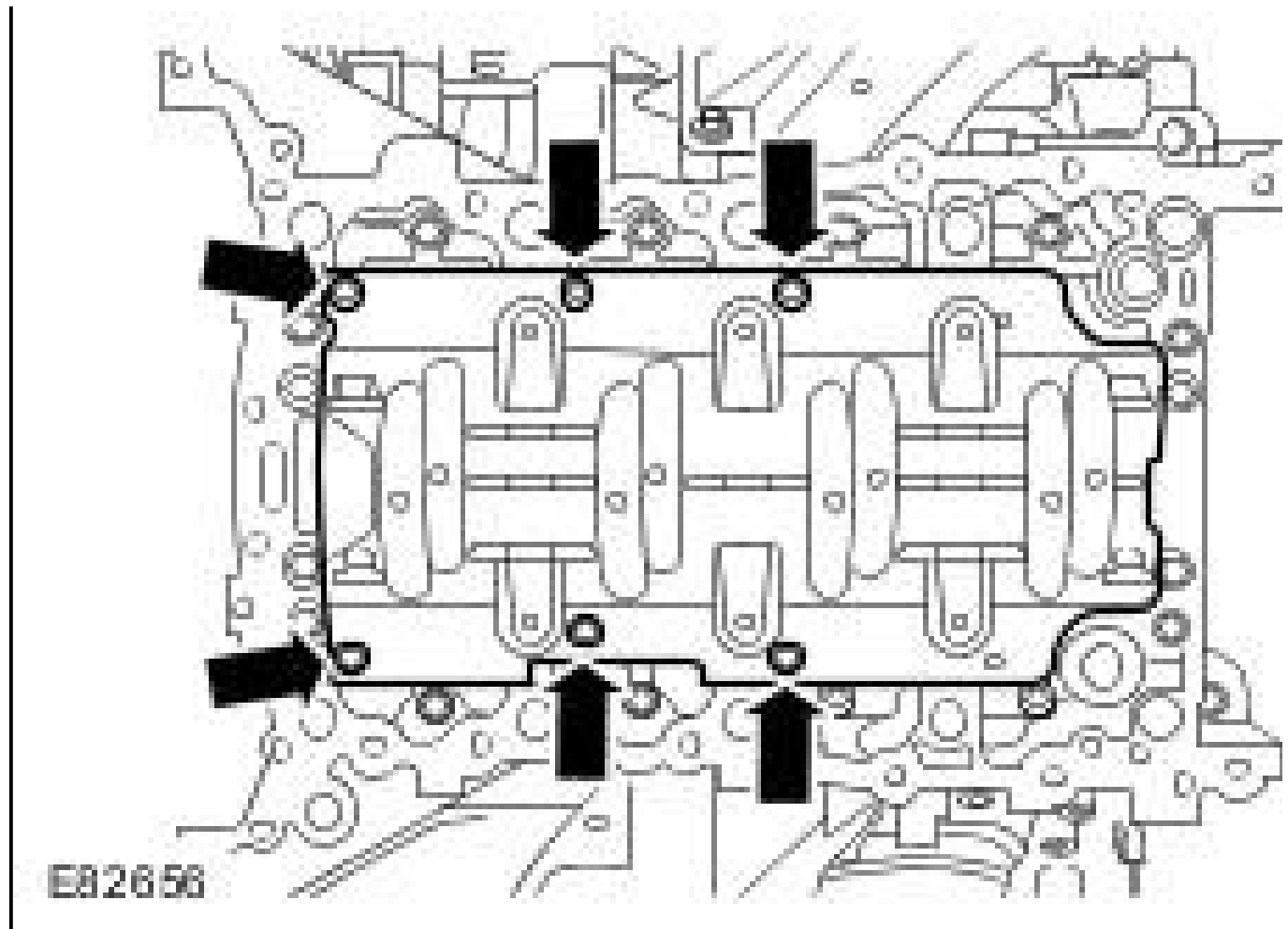


CAUTION: The bolts can only be used 3 times, mark the bolts with a center punch. If 2 punch marks are visible, discard the bolts.

6. Remove the torque converter flexplate.
 - Remove the 8 bolts.



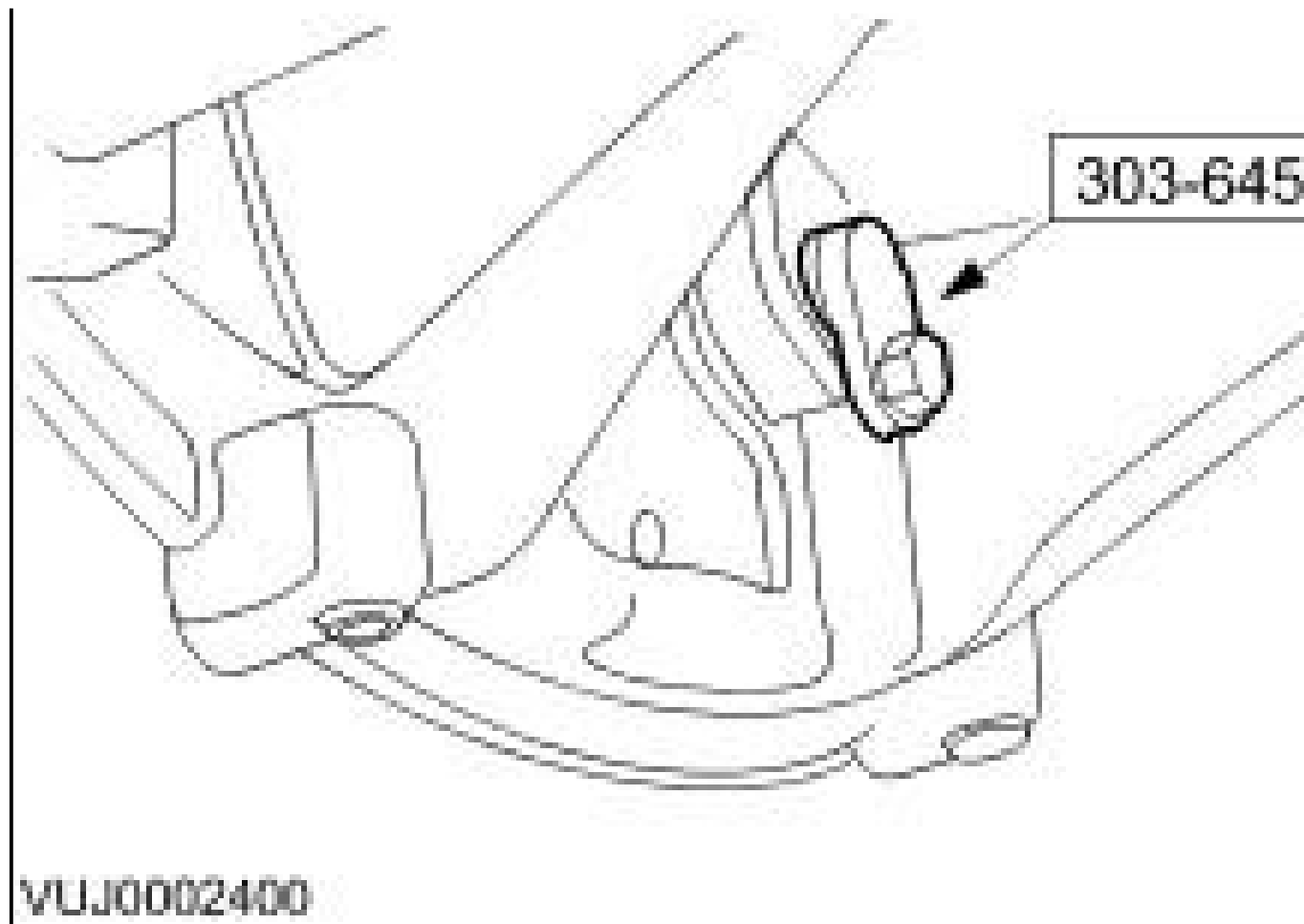
7. Remove the baffle plate.
 - Remove the 6 bolts.



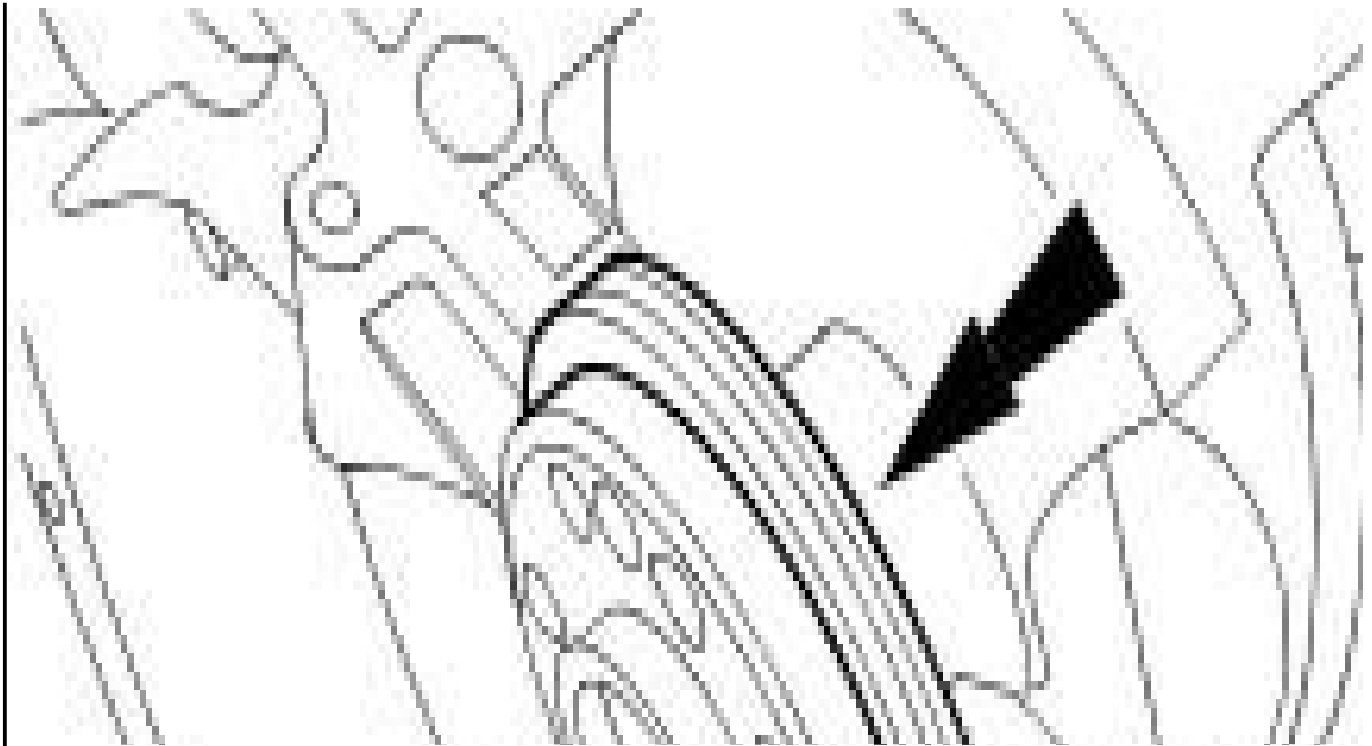
CAUTION: To make sure damage does not occur to the crankshaft and piston components, the engine must be inverted on the engine stand. Failure to follow this instruction may result in damage to the engine.

NOTE: If the crankshaft main bearing carrier retaining bolts have been marked with a center punch dot, they must be discarded and new bolts installed.

8. Remove the crankshaft main bearing carrier.
 - Remove the crankshaft main bearing carrier bolts in the indicated sequence.



9. Remove and discard the rear crankshaft oil seal.



INSTALLATION

CAUTION: Use only a plastic scraper when removing the sealing material.

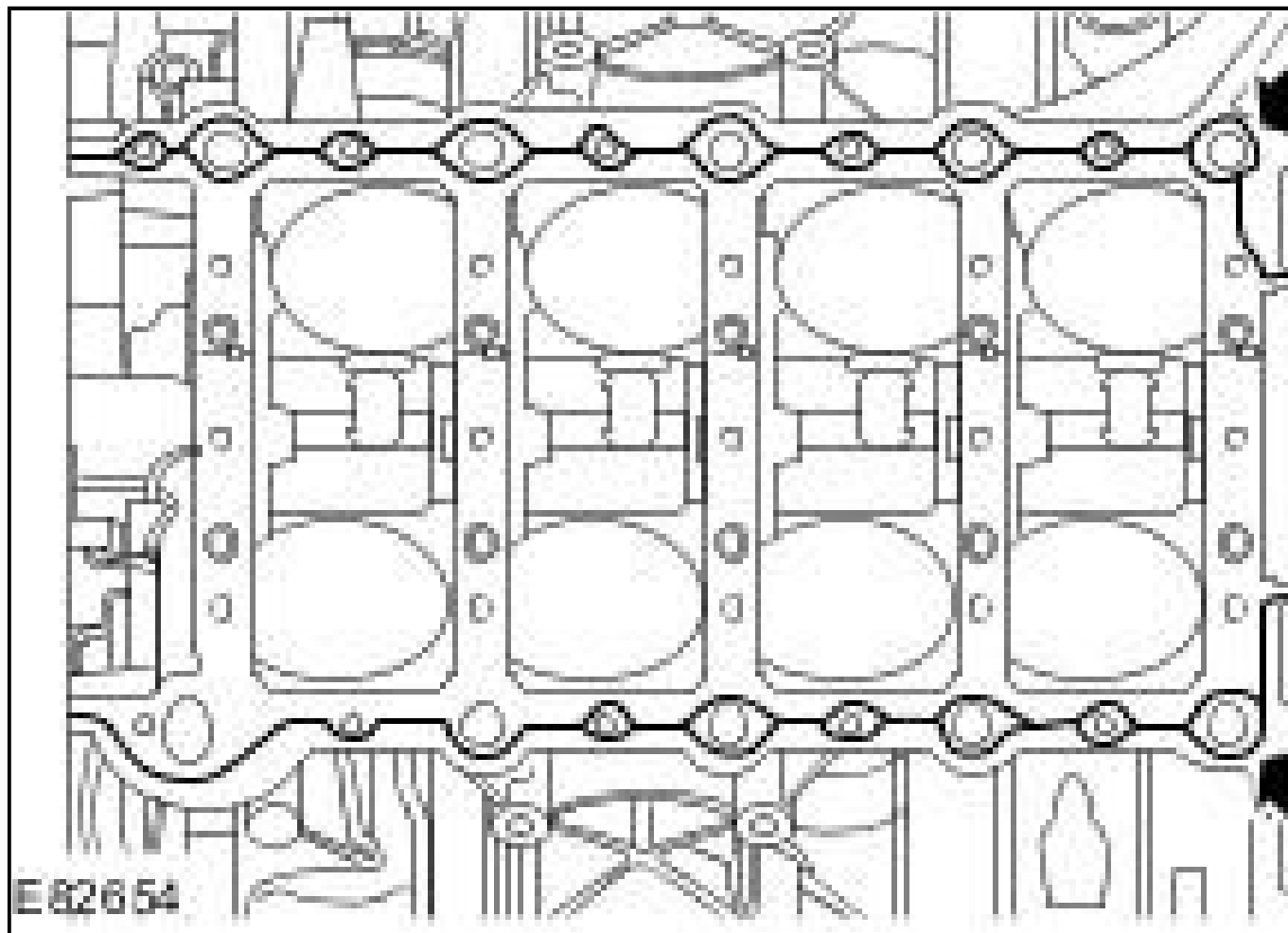
CAUTION: If any new bolts are to be installed to retain the crankshaft main

bearing carrier, pre-stress the retaining bolts by installing the crankshaft main bearing carrier without any sealant and tightening the new retaining bolts to the specified torque. Remove the crankshaft main bearing carrier once the bolts have been pre-stressed. Failure to follow this instruction may result in damage to the vehicle.

1. Clean all the mating faces and reusable parts thoroughly and check for damage.

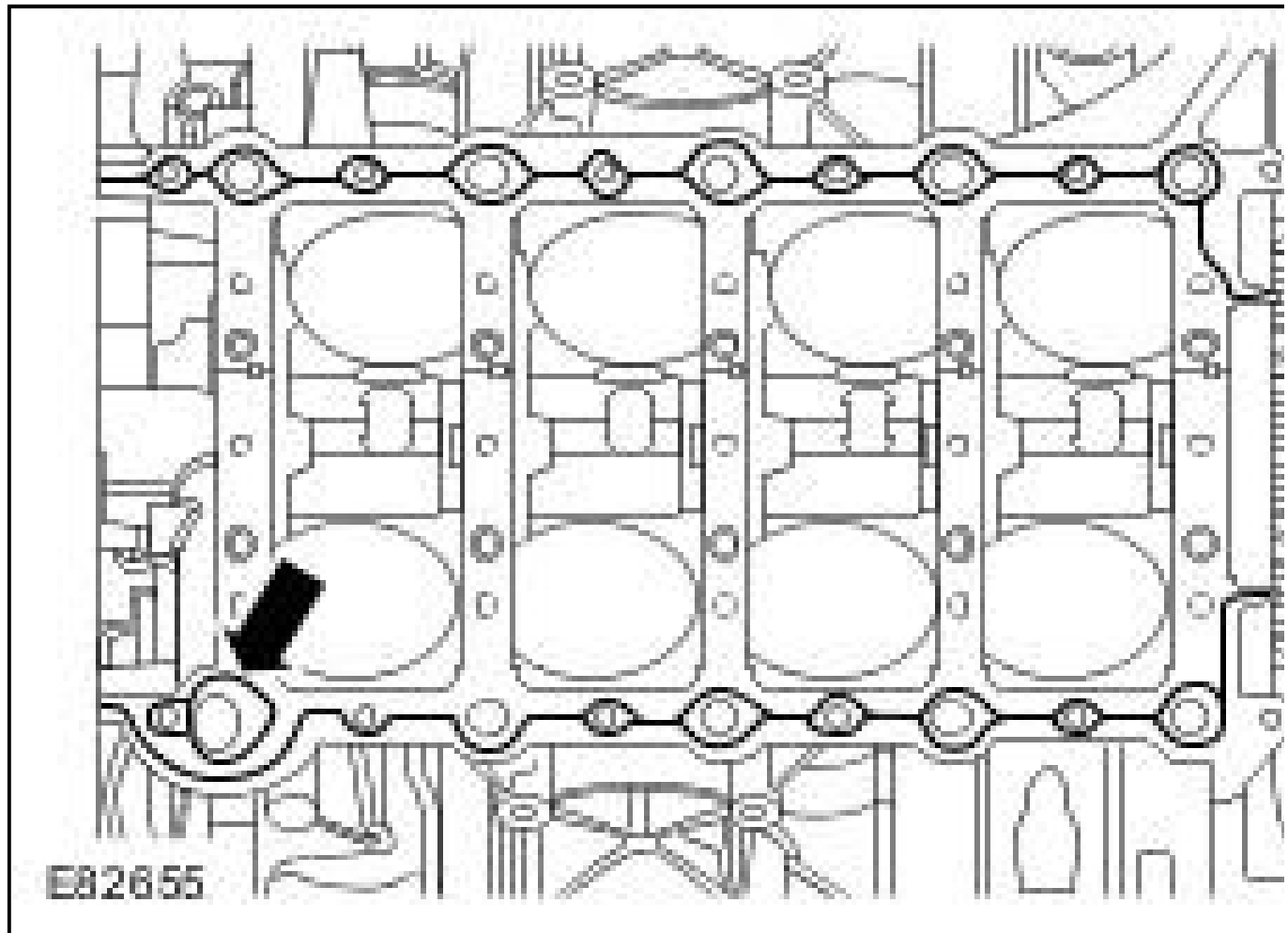
NOTE: Install the crankshaft main bearing carrier and tighten bolts to specification within twenty minutes of applying the sealant.

2. Apply a 2 mm (0.08in) bead of sealant to the cylinder block in the area shown.
 - Use WSS-M4G323-A4-RTV sealant.



NOTE: Install the crankshaft main bearing carrier and tighten bolts to specification within twenty minutes of applying the sealant.

3. Apply a 1 mm (0.039in) bead of sealant to the cylinder block in the area shown.
 - Use WSS-M4G323-A4-RTV sealant.



CAUTION: Make sure all dowels are fully seated into the crankshaft main bearing carrier prior to tightening the bolts.

NOTE: Do not lubricate the crankshaft main bearing carrier retaining bolts.

NOTE: Do not rotate the crankshaft until all the retaining bolts are tightened to specification.

NOTE: The retaining bolts must be tightened within twenty minutes of applying the sealant.

NOTE: Tighten the retaining bolts in the sequence shown.

4. Install the crankshaft main bearing carrier to the cylinder block.

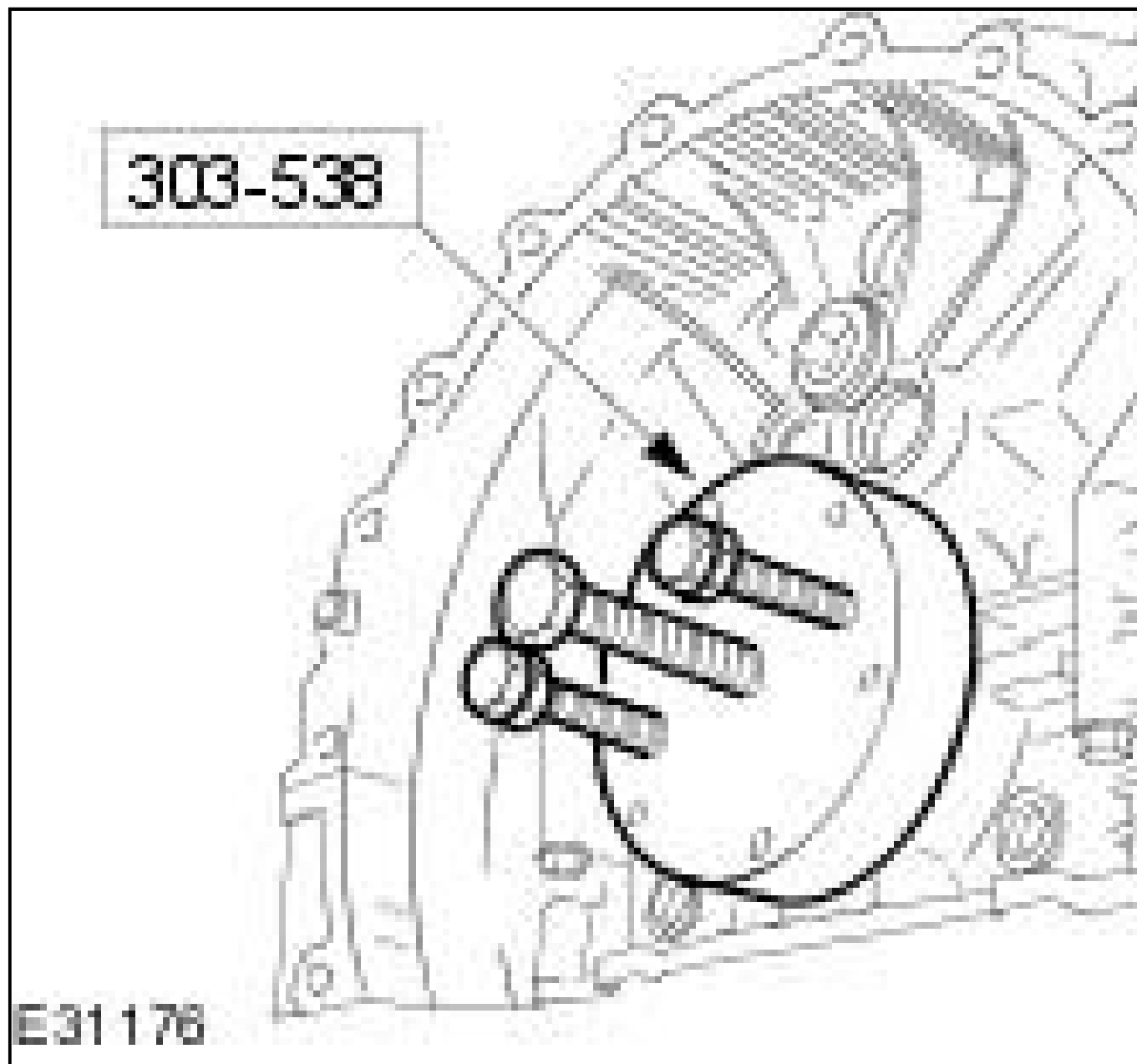
- Stage 1: Bolts 21 to 32, tighten to 15 Nm (11 lb.ft).
- Stage 2: Bolts 33 to 34, tighten to 15 Nm (11 lb.ft).
- Stage 3: Bolts 1 to 10, tighten to 25 Nm (18 lb.ft).
- Stage 4: Bolts 11 to 20, tighten to 15 Nm (11 lb.ft).
- Stage 5: Bolts 1 to 10, tighten to 35 Nm (26 lb.ft), then a further 135 degrees.
- Stage 6: Bolts 11 to 20, tighten to 20 Nm (15 lb.ft), then a further 150 degrees.
- Stage 7: Bolts 21 to 32, tighten to 20 Nm (15 lb.ft), then a further 90 degrees.
- Stage 8: Bolts 33 to 34, tighten to 20 Nm (15 lb.ft), then a further 150 degrees.
- Stage 9: Center punch each of the bolt heads to indicate it has been reused.

5. Rotate the crankshaft to check correct operation.
6. Remove excess sealant which may squeeze out at the front cover sealing surfaces.
7. Install the baffle plate.
 - Tighten the 6 bolts to 6 Nm (4 lb.ft).

NOTE: **Make sure that the transit sleeve is correctly positioned and install the new seal over the crankshaft. Do not use any lubricant on the seal, the transit sleeve or the crankshaft.**

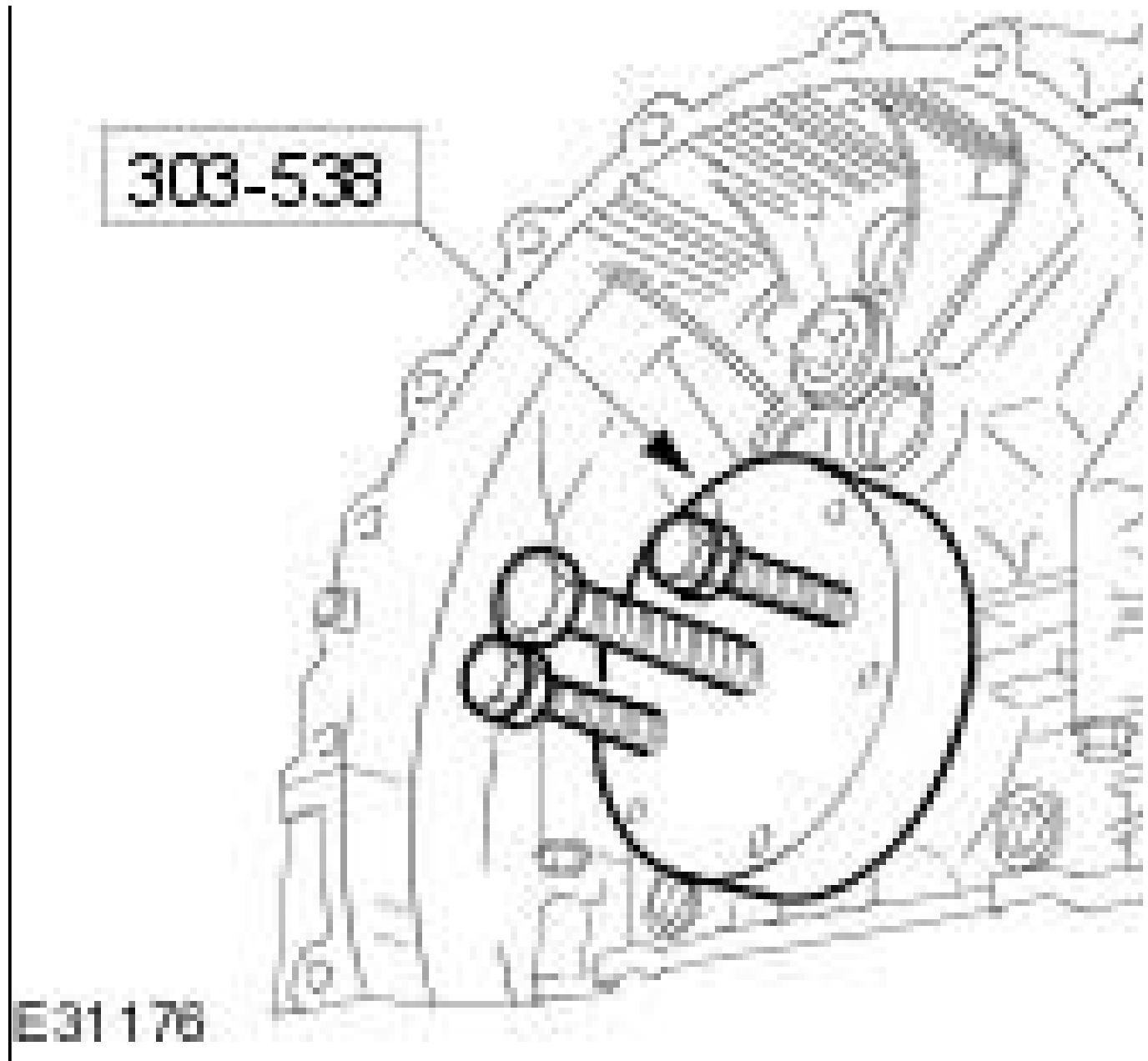
NOTE: Carefully remove the transit sleeve, leaving the seal in place.

8. Using the special tool, position the crankshaft rear oil seal.



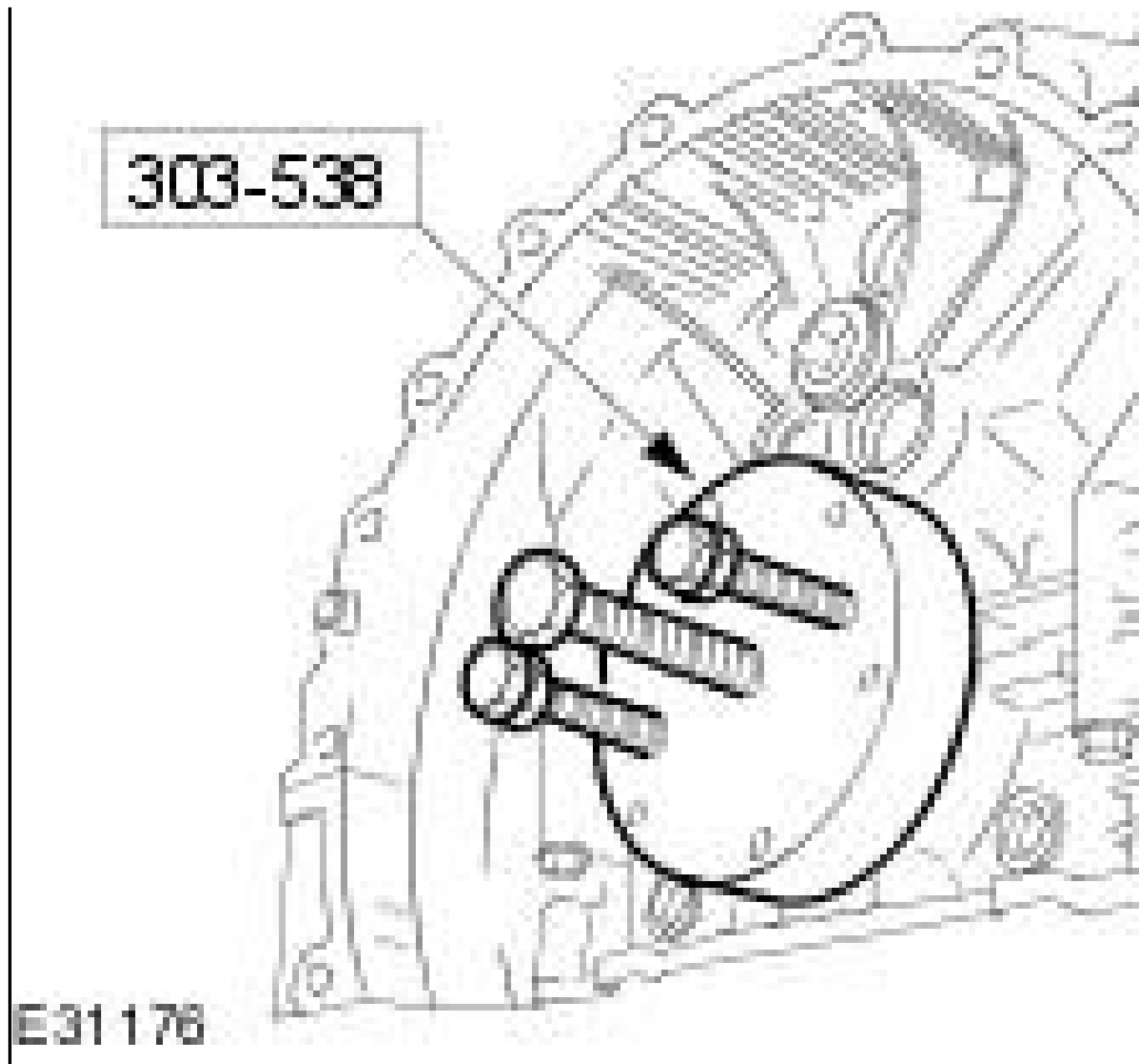
CAUTION: Alternate the nut tightening to correctly seat the crankshaft rear oil seal.

9. Using the special tool, install the crankshaft rear oil seal.



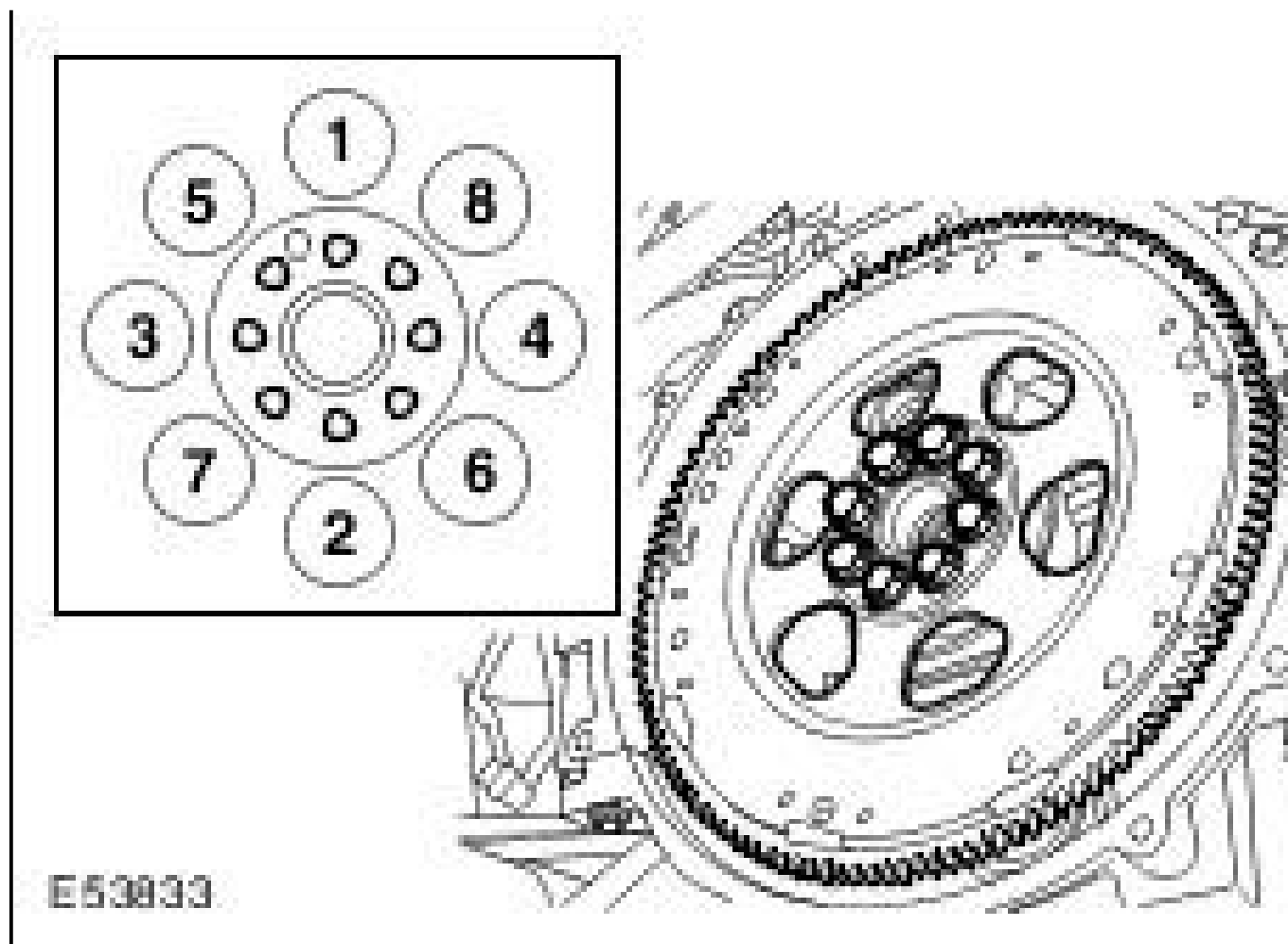
CAUTION: Make sure that the crankshaft rear oil seal is correctly located.

10. Remove the special tool.



NOTE: Prevent the flexplate from rotating.

11. Install the torque converter flexplate.
 - Clean the component mating faces.
 - Tighten the bolts evenly in 2 stages to the sequence shown.
 - Tighten the bolts to 15 Nm (11 lb ft).
 - Tighten the bolts to 110 Nm (81 lb.ft).



12. Install the special tool.





13. Connect the battery positive cable and the switch lead to the starter motor solenoid.
 - Connect the electrical connector.
 - Connect the battery positive cable.
 - Install the battery positive cable cover.
14. Install the starter motor.
 - Clean the component mating faces.
 - Tighten the bolt to 45 Nm (33 lb.ft).
15. Install the oil pump. Refer to **OIL PUMP**.

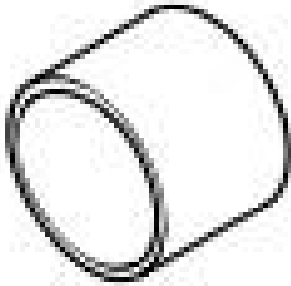
16. Connect the battery ground cable. Refer to **SPECIFICATIONS** .

ENGINE

REMOVAL

SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
 205-735 E61263	Remover halfshaft inboard joint	205-735(LRT-54-026)
 308-626/1 E54136	Installer halfshaft oil seal	308-626/1
	Installer/Guide halfshaft oil seal	308-626/2

308-626/2

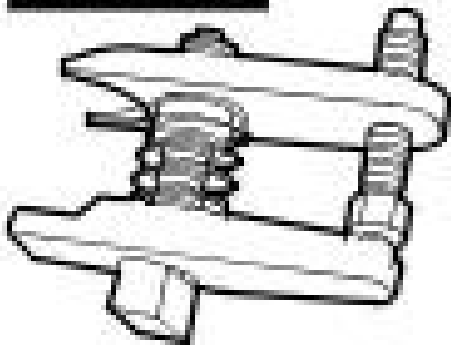
E54137

100-012

E54135

Impulse extractor

100-012(LRT-99-004)

205-754A

E45276

Ball joint separator

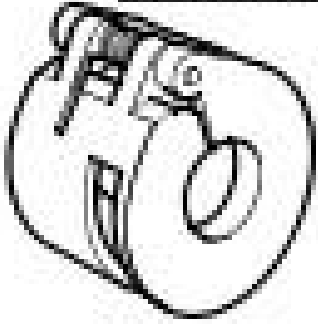
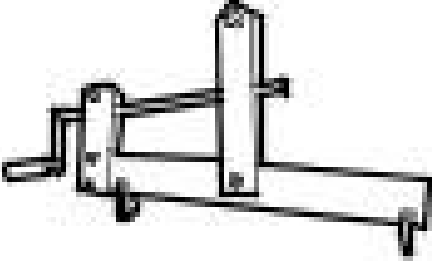
205-754(LRT-54-027)

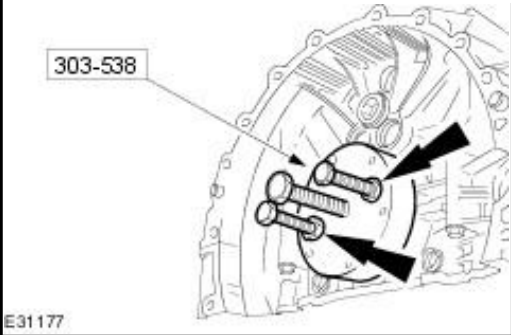
Fuel spring lock decoupling tool

310-D005

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

 310-D005 E45289		
 303-940 E61659	Engine lift and tilt bracket	303-940(LRT-12-138)
 303-940/1 E61731	Engine lift and tilt bracket chains	303-940/1
	Engine lifting brackets	303-536

		
	Engine lifting brackets	303-749

Removal

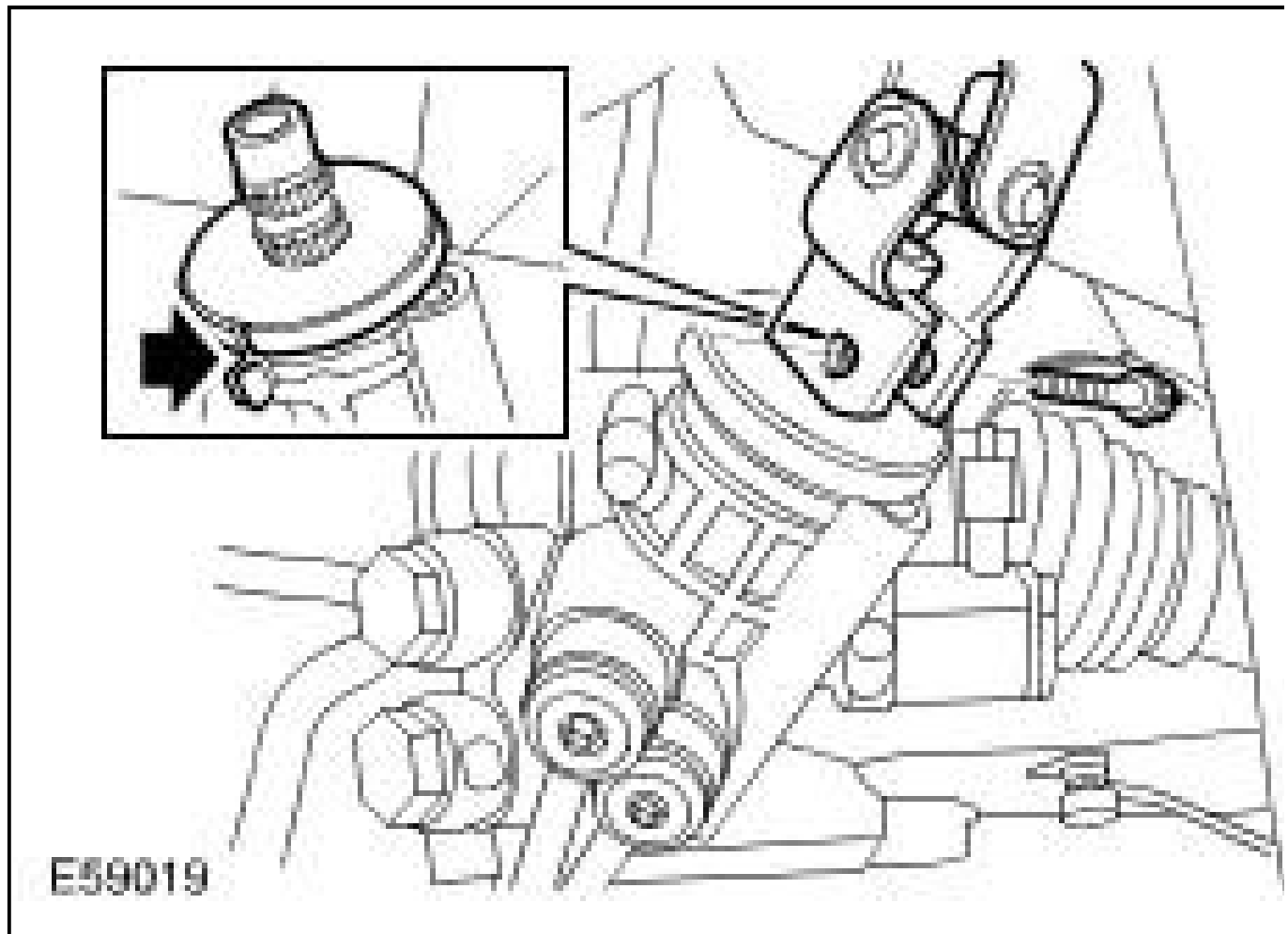
1. Disconnect the battery ground cable. Refer to SPECIFICATIONS .

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

2. Raise and support the vehicle.
3. Remove the engine cover. Refer to ENGINE COVER - 4.2L, VEHICLES WITH: SUPERCHARGER .
4. Evacuate the air conditioning (A/C) system. Refer to AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING .
5. Remove the transmission fluid cooler. Refer to TRANSMISSION FLUID COOLER .
6. Remove the RH air cleaner assembly. Refer to AIR CLEANER .
7. Drain the cooling system. Refer to COOLING SYSTEM DRAINING, FILLING AND BLEEDING .
8. Drain the engine oil. Refer to ENGINE OIL DRAINING AND FILLING .
9. Drain the differential fluid. Refer to DIFFERENTIAL DRAINING AND FILLING .
10. Remove the RH driveshaft. Refer to HALF SHAFT BEARING .
11. Remove the LH driveshaft. Refer to HALF SHAFT SEAL LH .

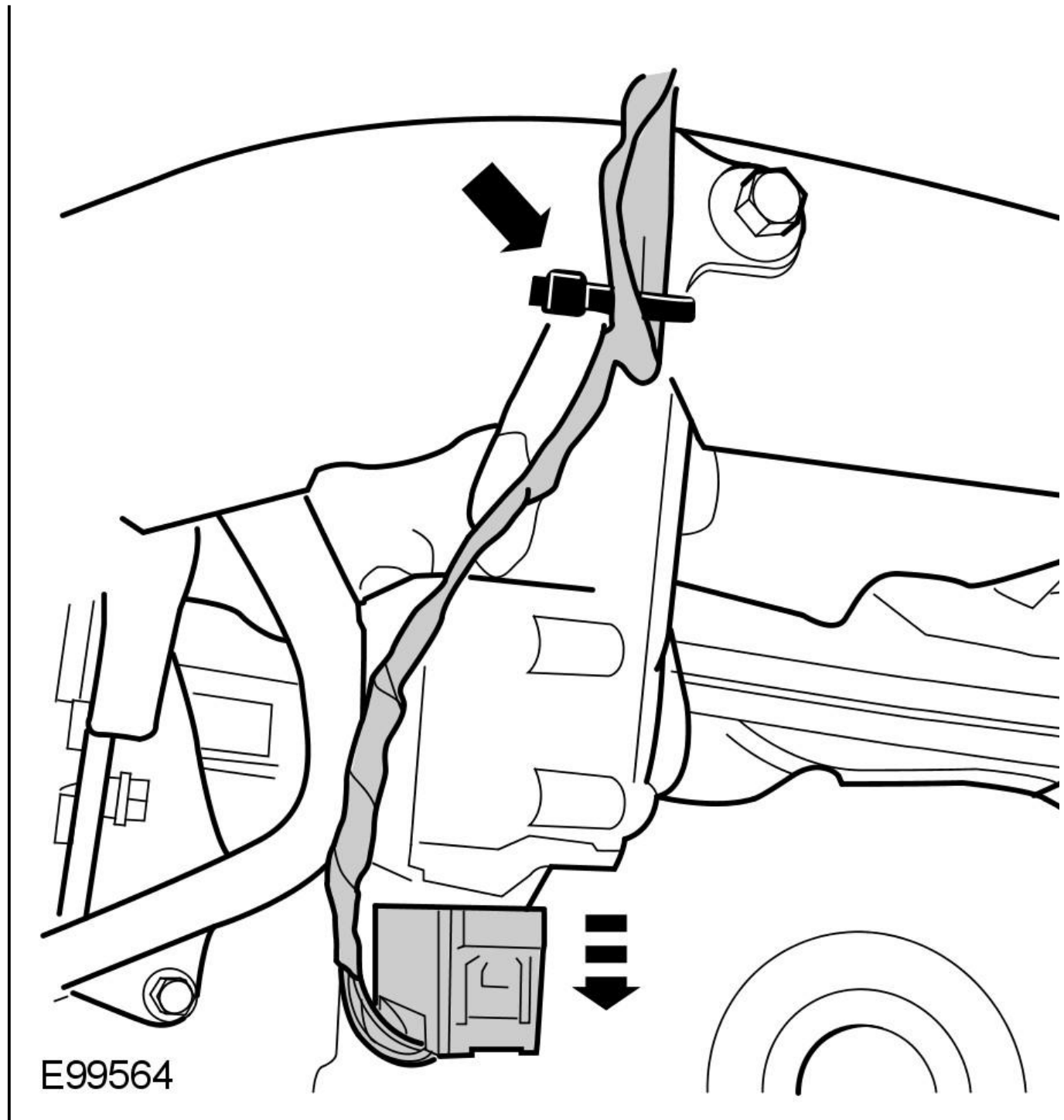
CAUTION: Do not turn the steering wheel with the steering column lower shaft disconnected as damage to the clockspring and steering wheel switches may occur.

12. Disconnect the lower steering column from the steering gear.
- Note the fitted position.
 - Align the steering wheel to straight ahead.
 - Remove and discard the Torx bolt.



NOTE: LH illustration shown, RH is similar.

13. Disconnect the height sensor electrical connector.
- Cut the cable tie.
 - Release and reposition the wiring harness.

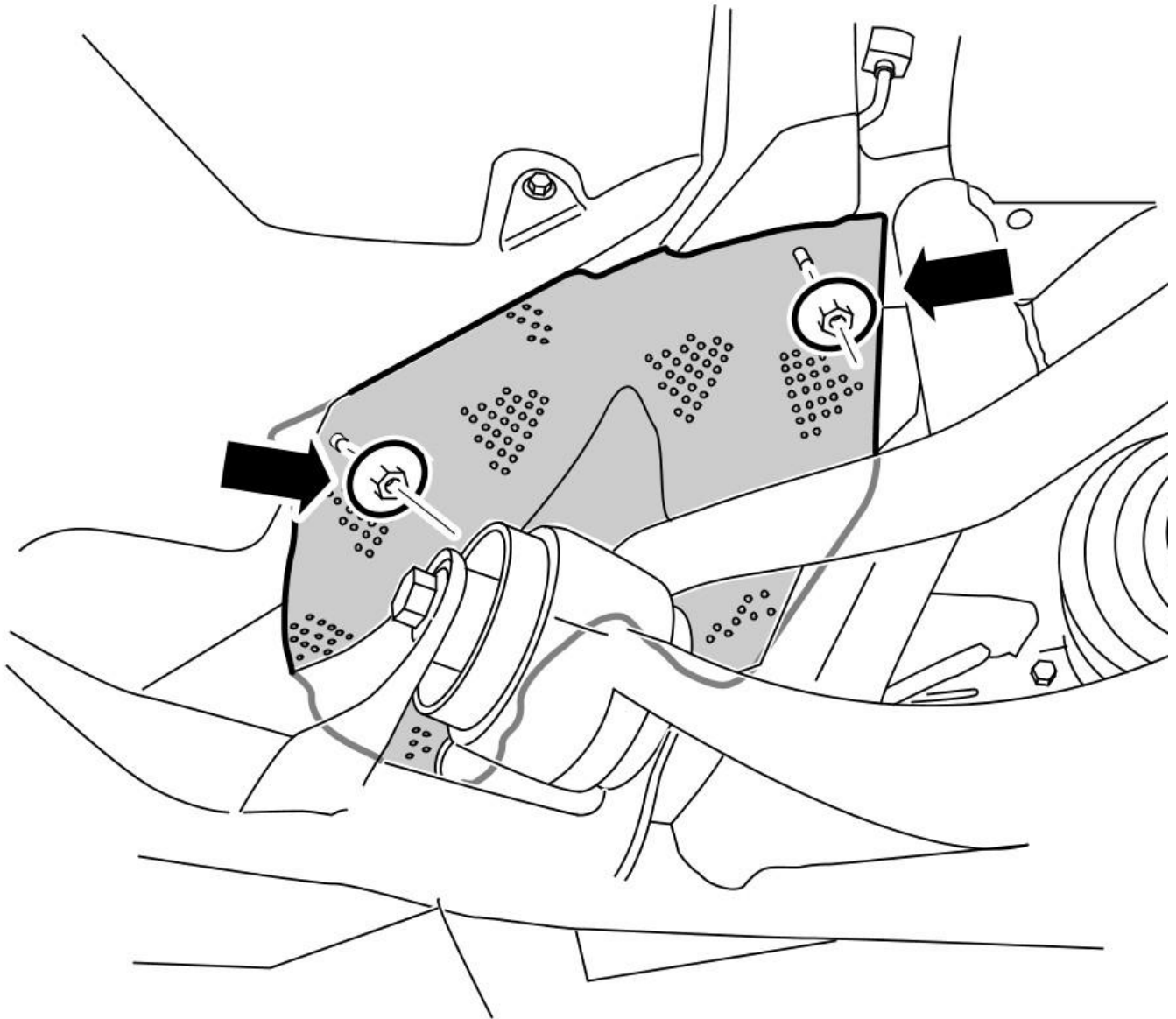


14. Disconnect the steering gear electrical connector.
 - Release and reposition the wiring harness.



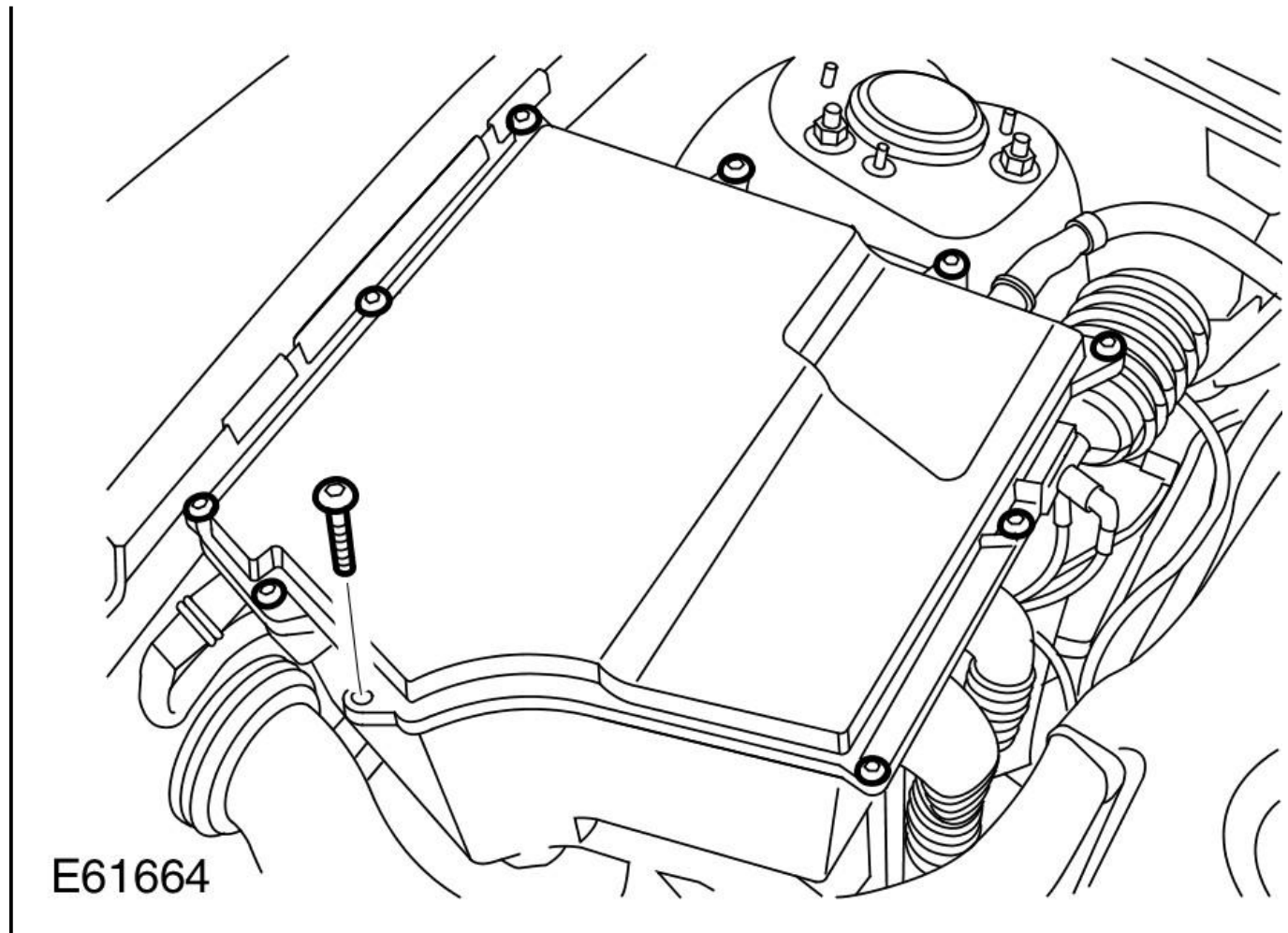
NOTE: RH illustration shown, LH is similar.

15. Release the stabilizer bar heat shields from body.
 - Remove the 2 nuts.

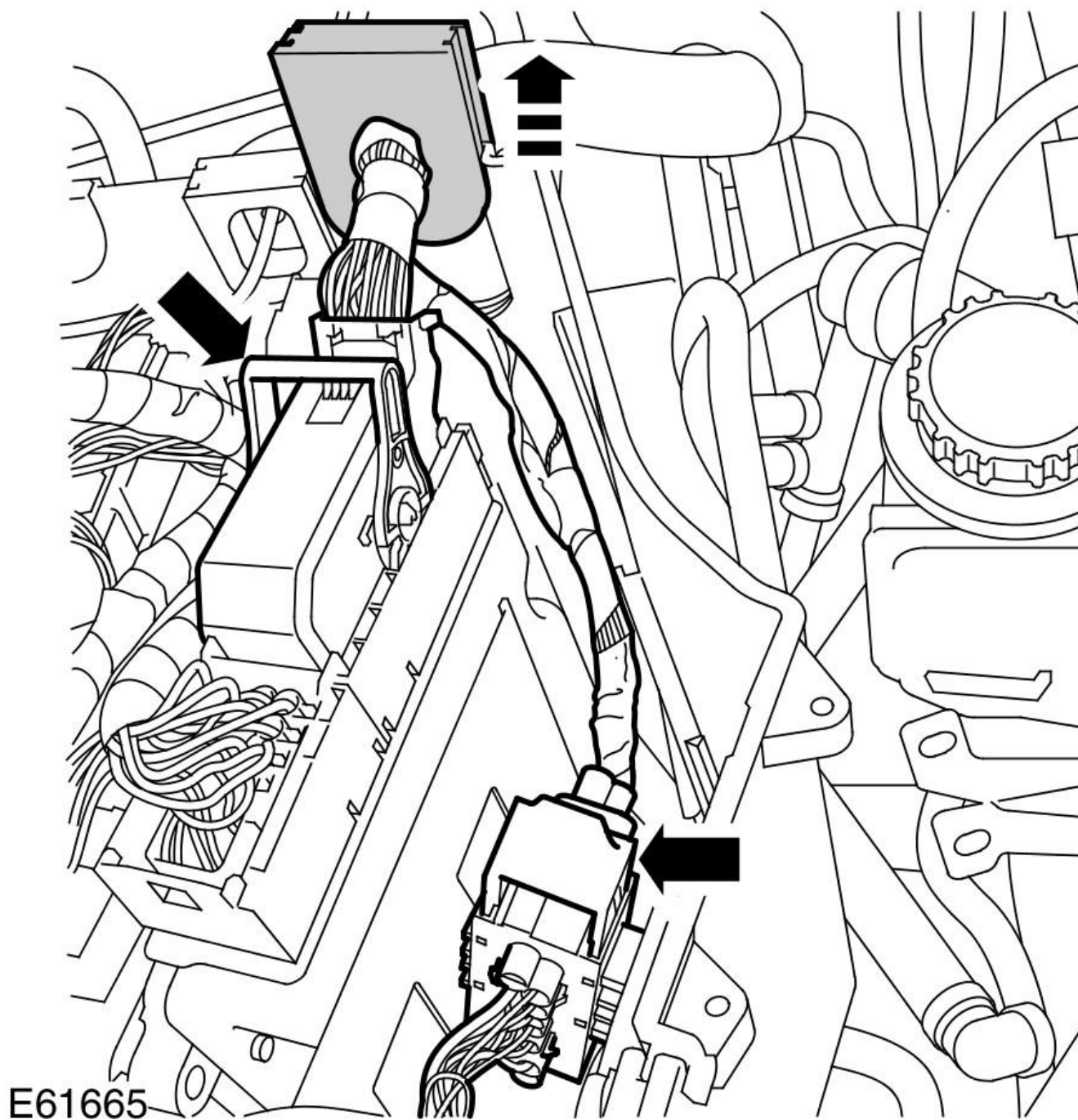


E99568

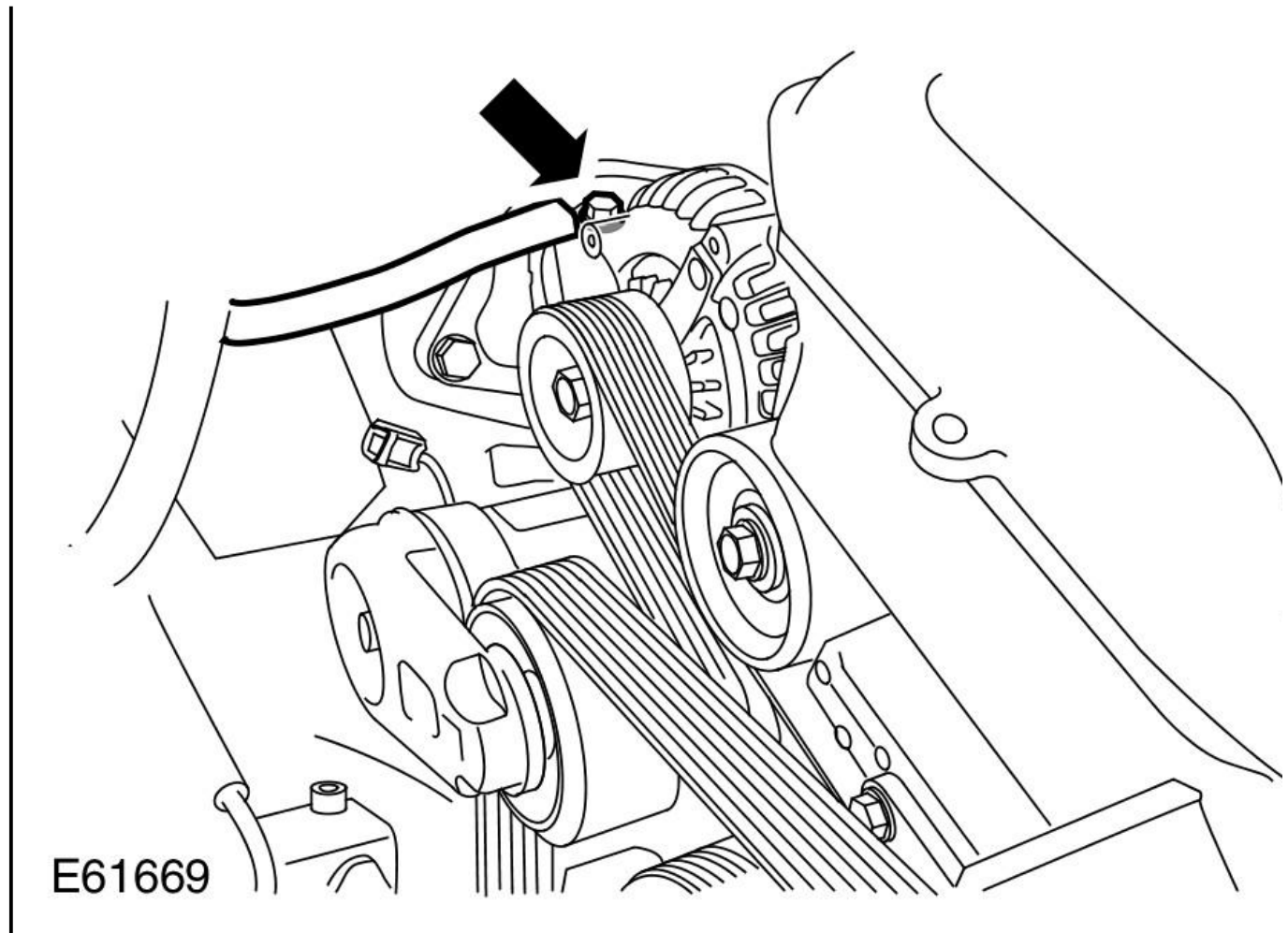
16. Remove the transmission assembly. Refer to **TRANSMISSION**.
17. Remove the engine control module (ECM) cover.
 - Remove the 10 Torx screws.



18. Release the engine wiring harness.
- Disconnect the 2 electrical connectors.
 - Release the grommet.

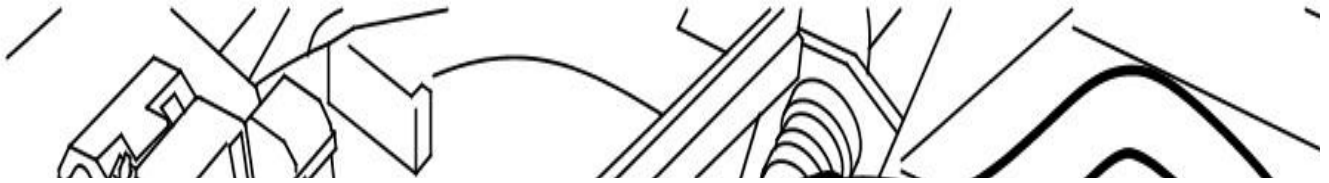


19. Disconnect the engine ground cable from the RH mounting bracket.
 - Remove the bolt.



20. Disconnect the battery positive cable from the junction box.

- Open the cover.
- Remove the nut.



21. Release the battery positive cable from the battery compartment side wall.

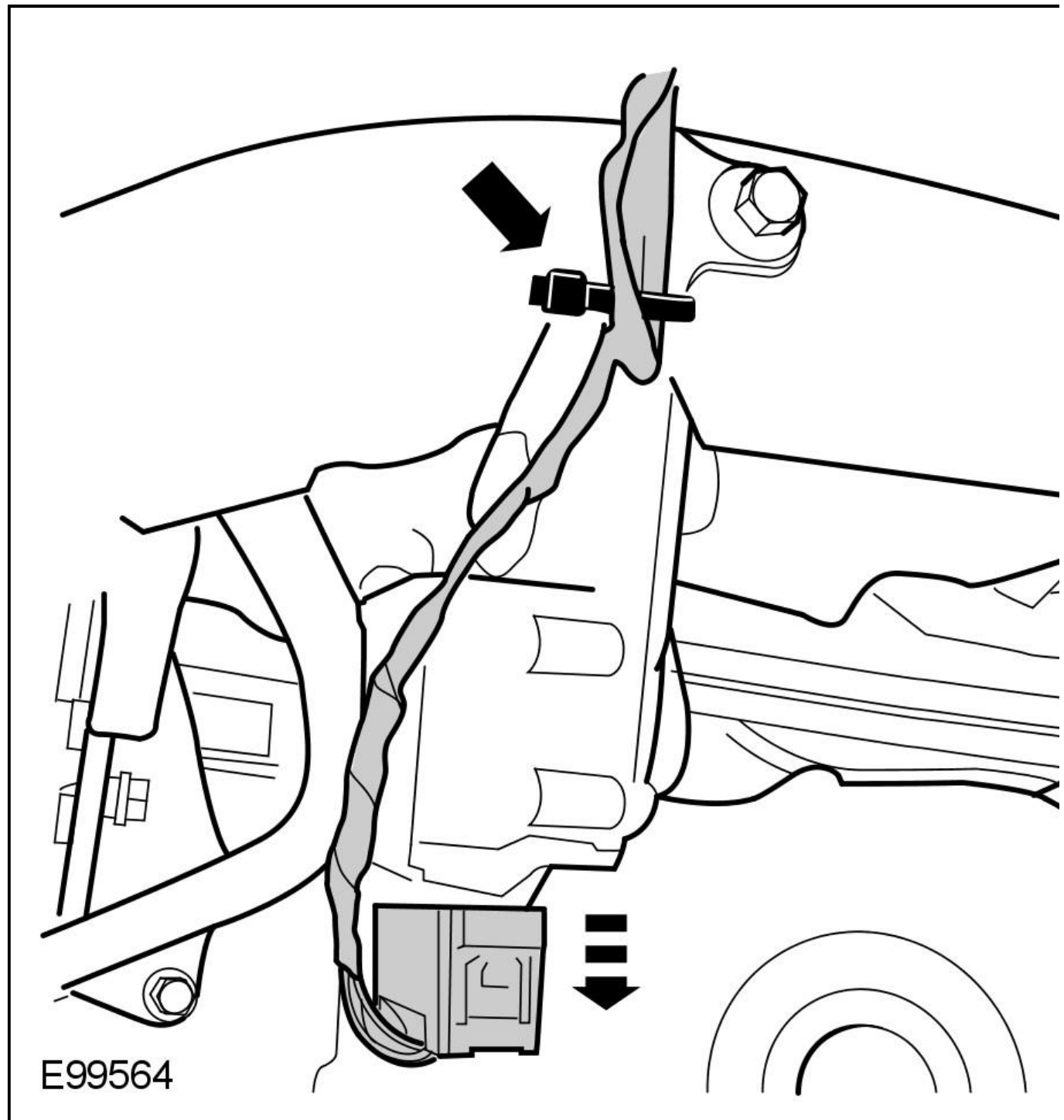
- Remove the cover.
- Remove the nut.



CAUTION: Immediately cap all refrigerant lines to prevent ingress of dirt and moisture.

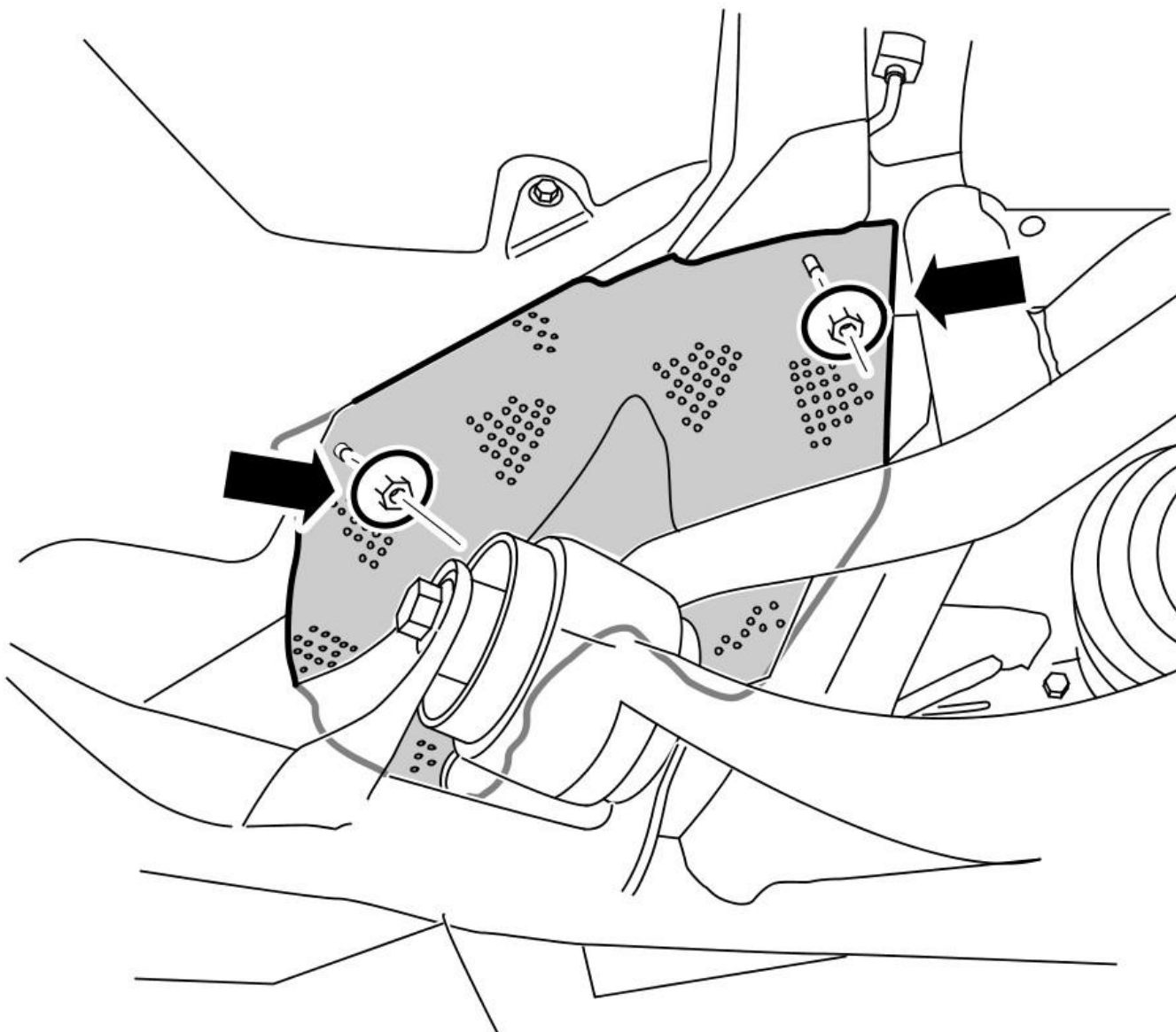
22. Remove the A/C compressor low-pressure refrigerant line.

- Remove the 2 bolts.
- Remove and discard the 2 O-ring seals.



23. Release the transmission fluid lines from the engine.

- Release from the clip.



E99568

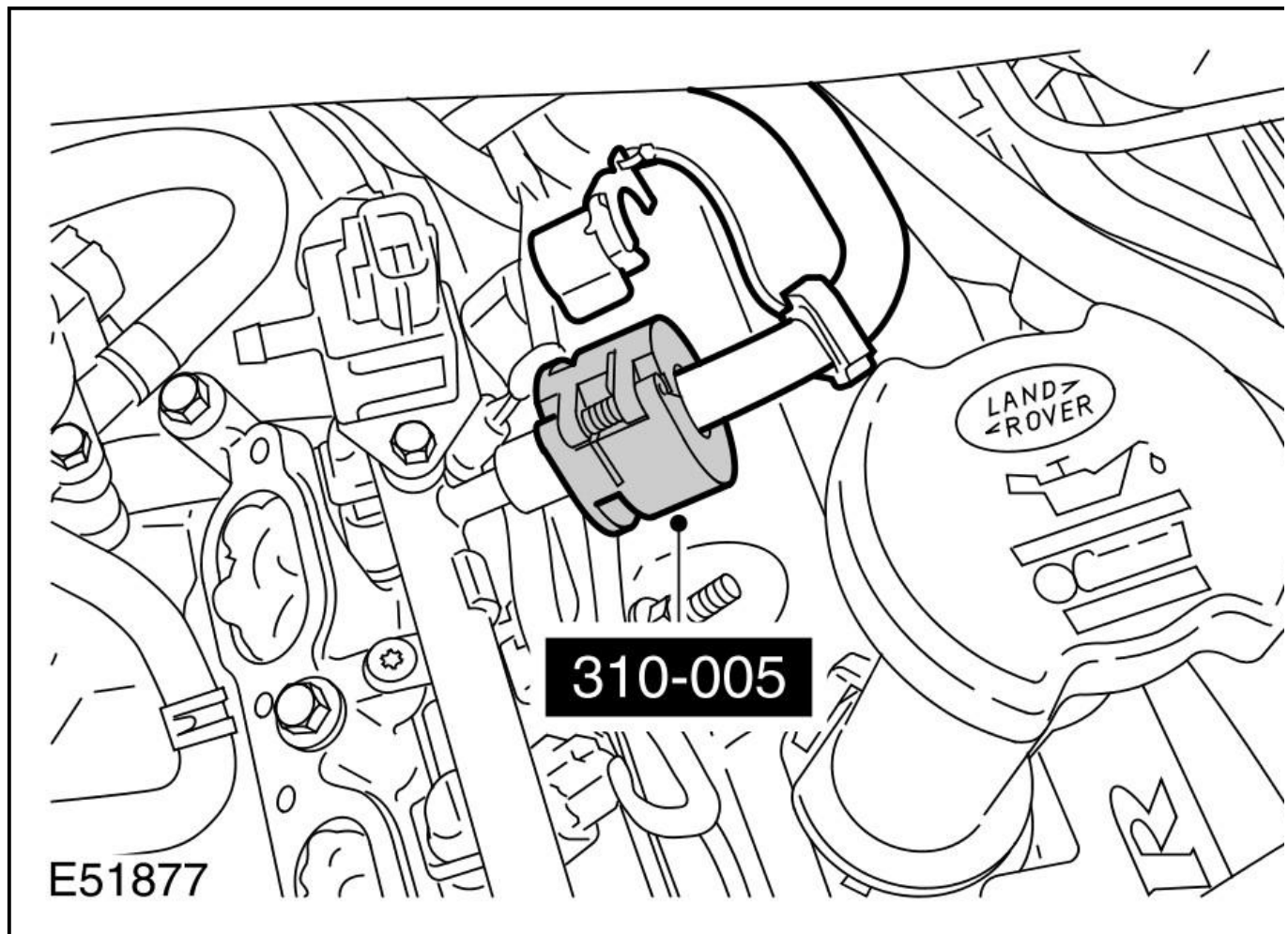
WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

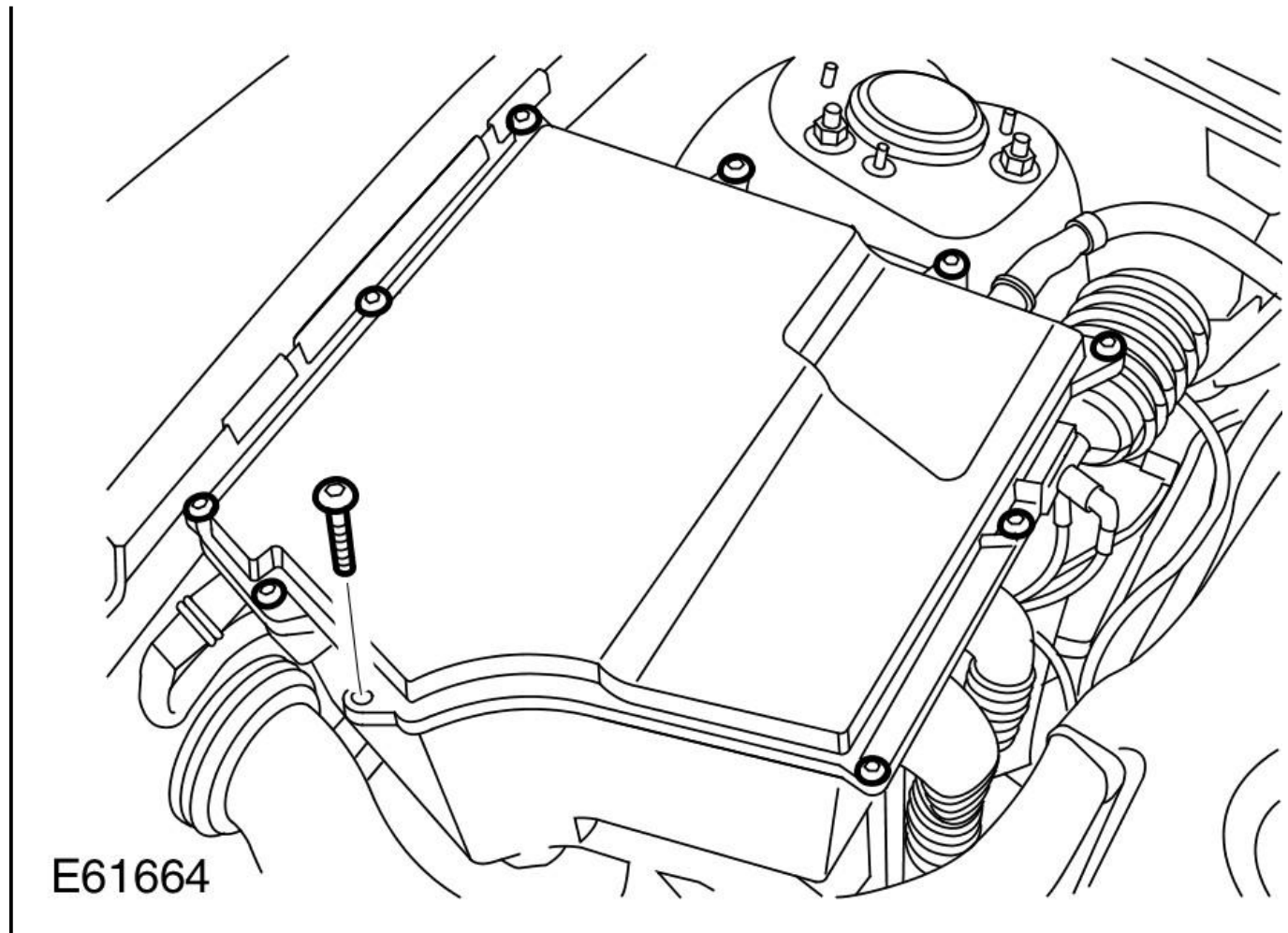
WARNING: The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

24. Using the special tool, disconnect the fuel line.

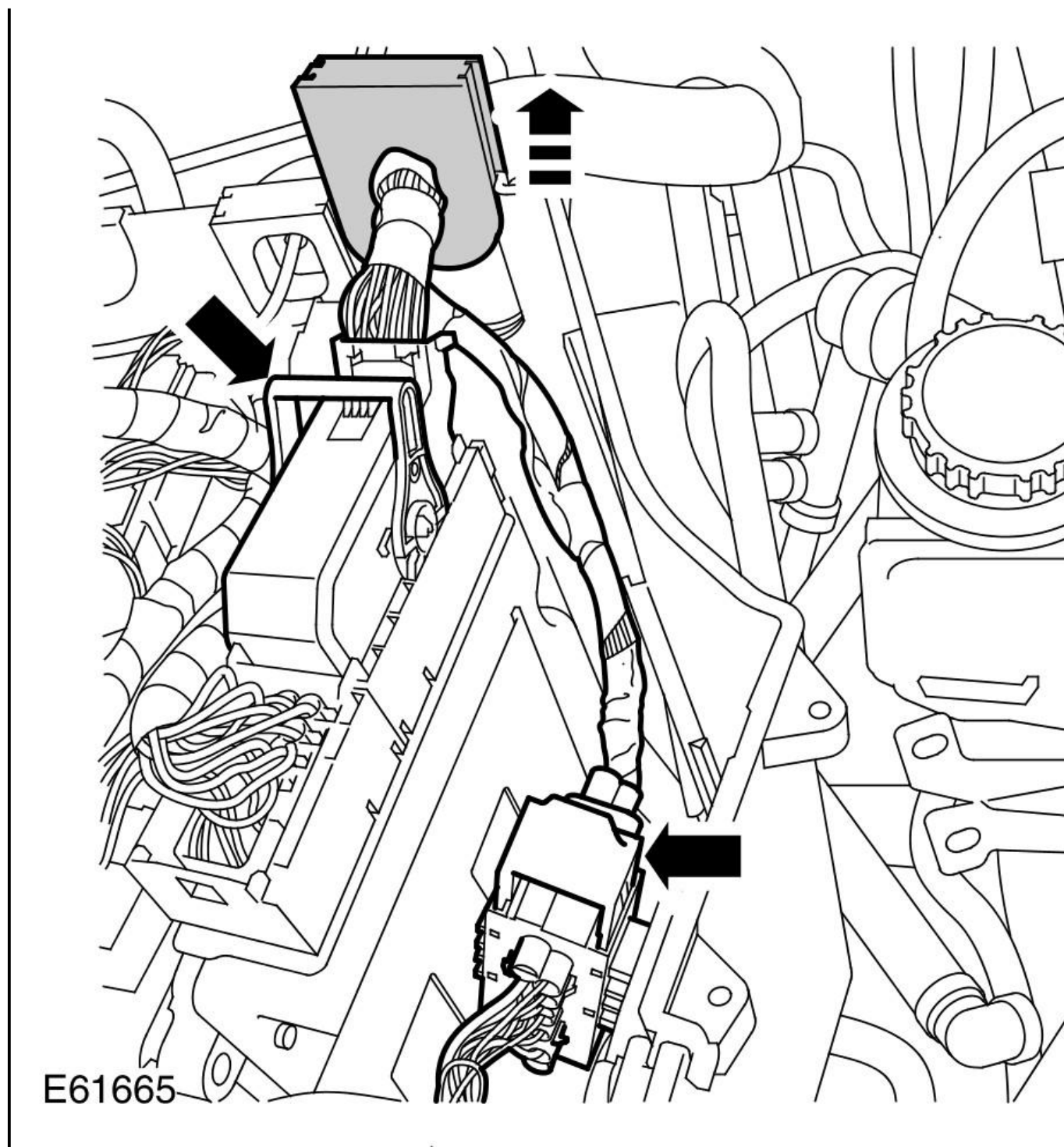
- Release the clip.
- Position an absorbent cloth to collect fluid spillage.



25. Disconnect the brake booster vacuum pipe.



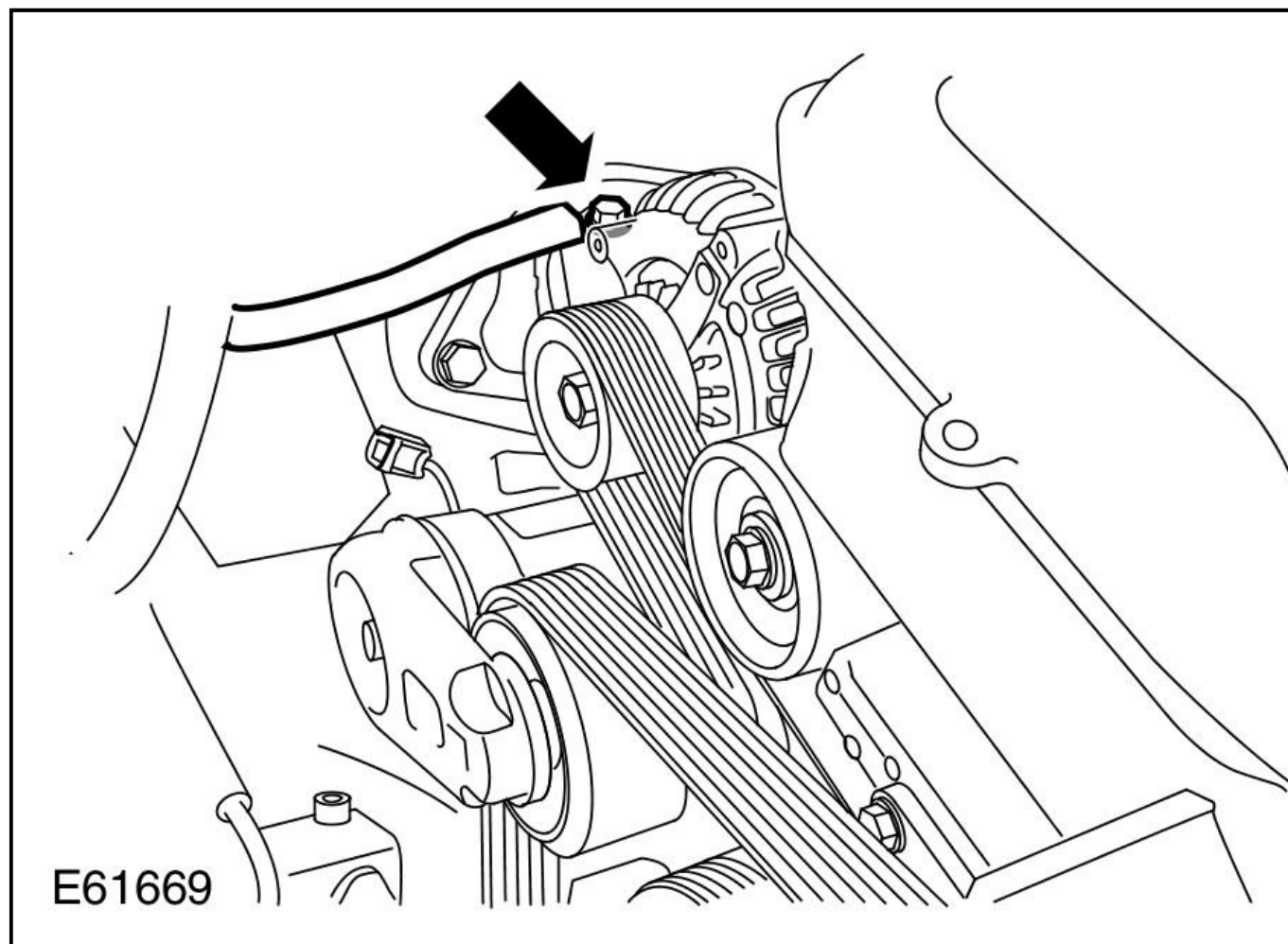
26. Release the purge valve assembly.
- Disconnect the electrical connector.
 - Depress the quick release connector.
 - Remove the bolt.



CAUTION: Always plug any open connections to prevent contamination.

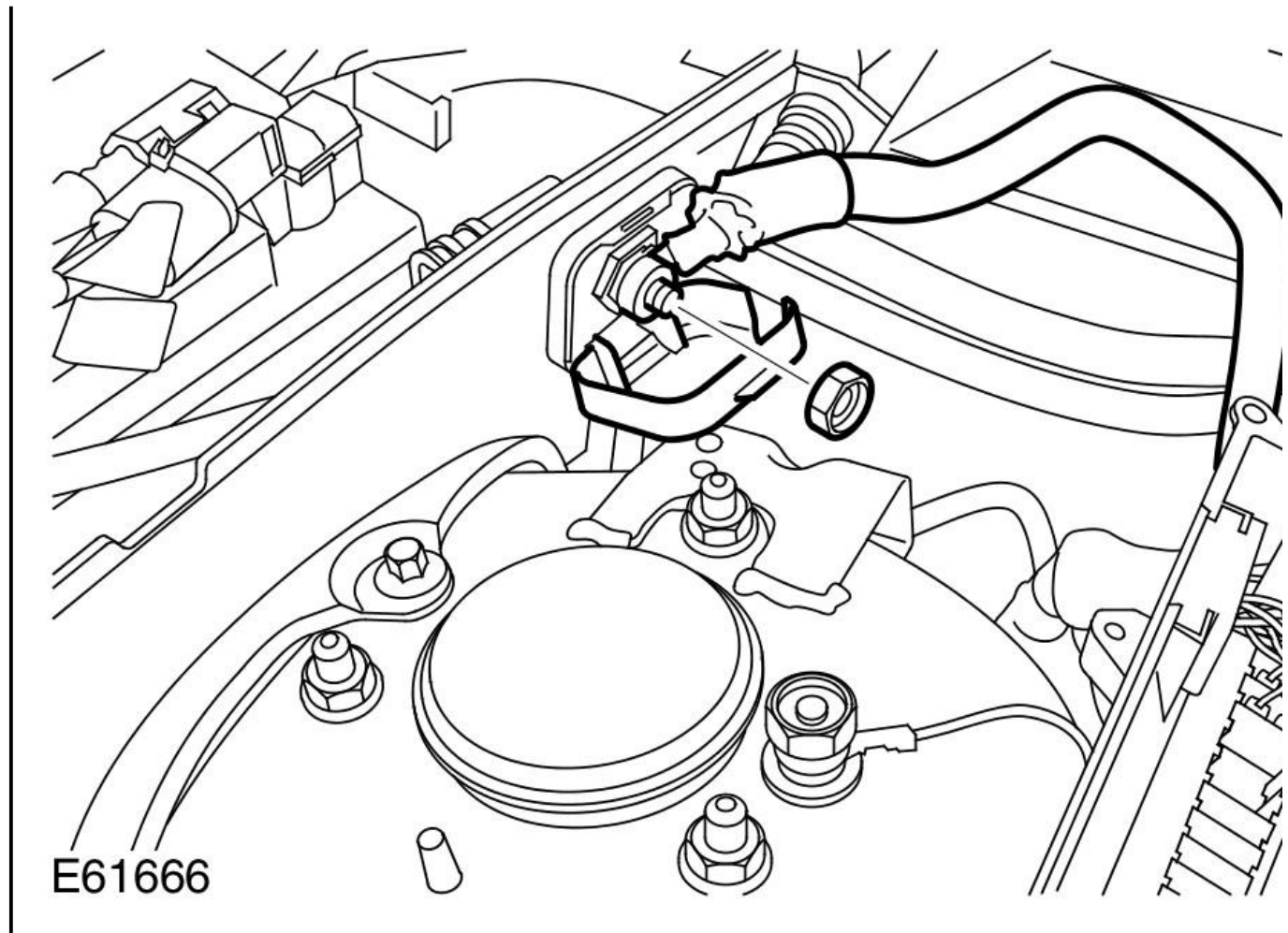
27. Remove the brake vacuum pump.
 - Release and disconnect the electrical connector.

- Disconnect the vacuum line.
- Remove the 2 nuts.

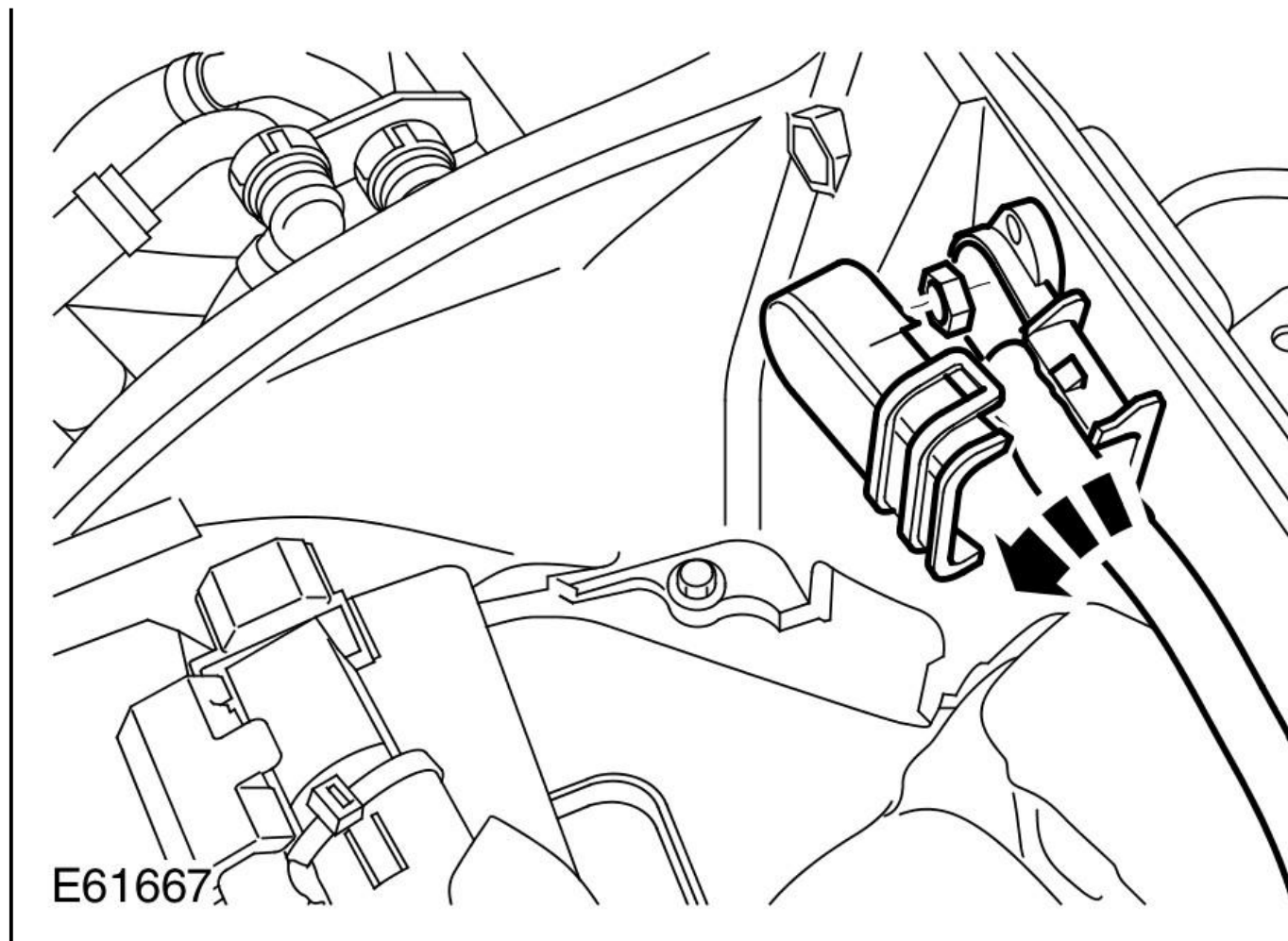


28. Remove the brake vacuum pump bracket.

- Remove the 3 bolts.
- Release the refrigerant line clip.
- Release the wiring harness clip.

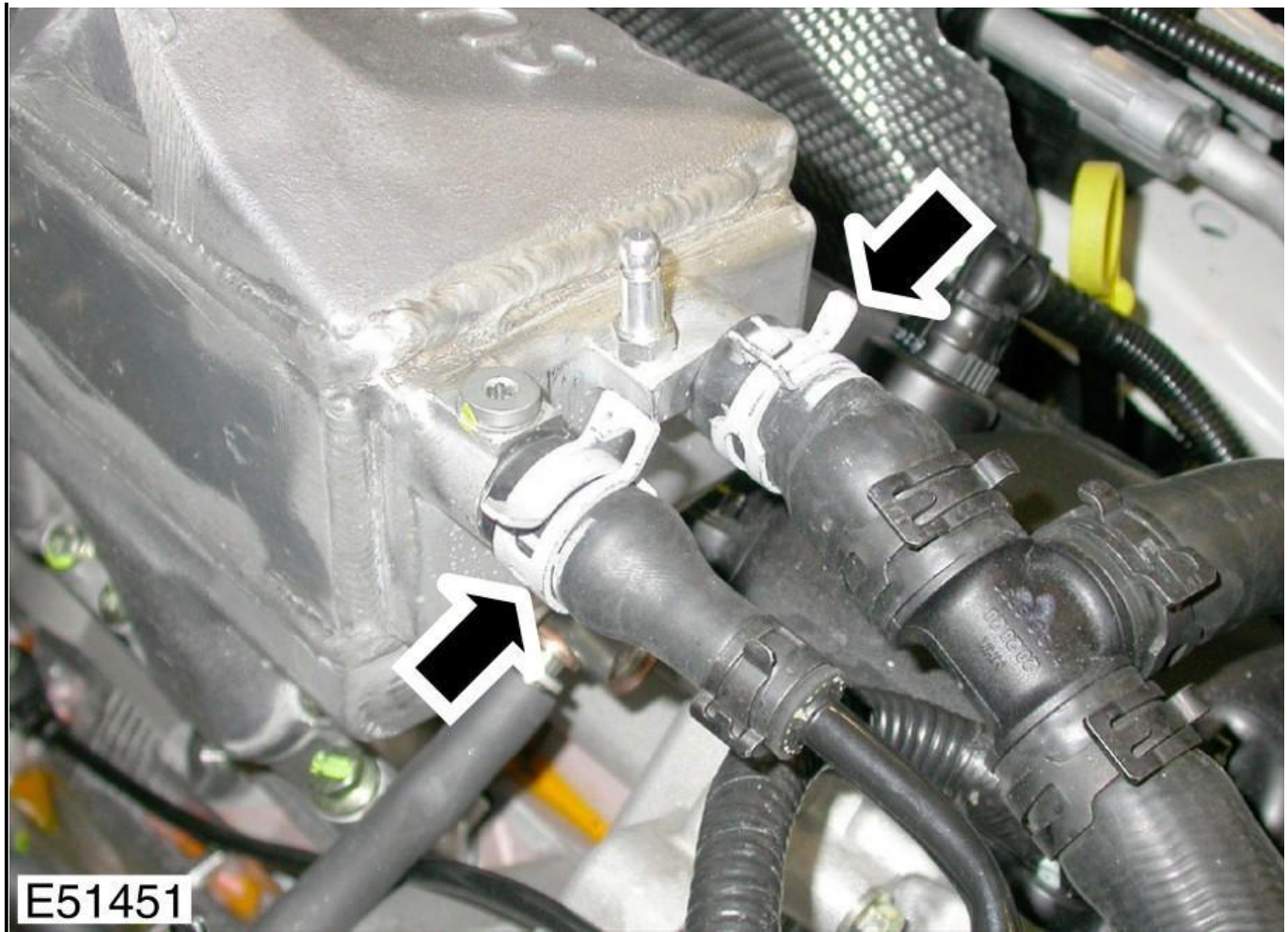


29. Disconnect the coolant hose from the coolant expansion tank.
- Release the clip and disconnect the hose.

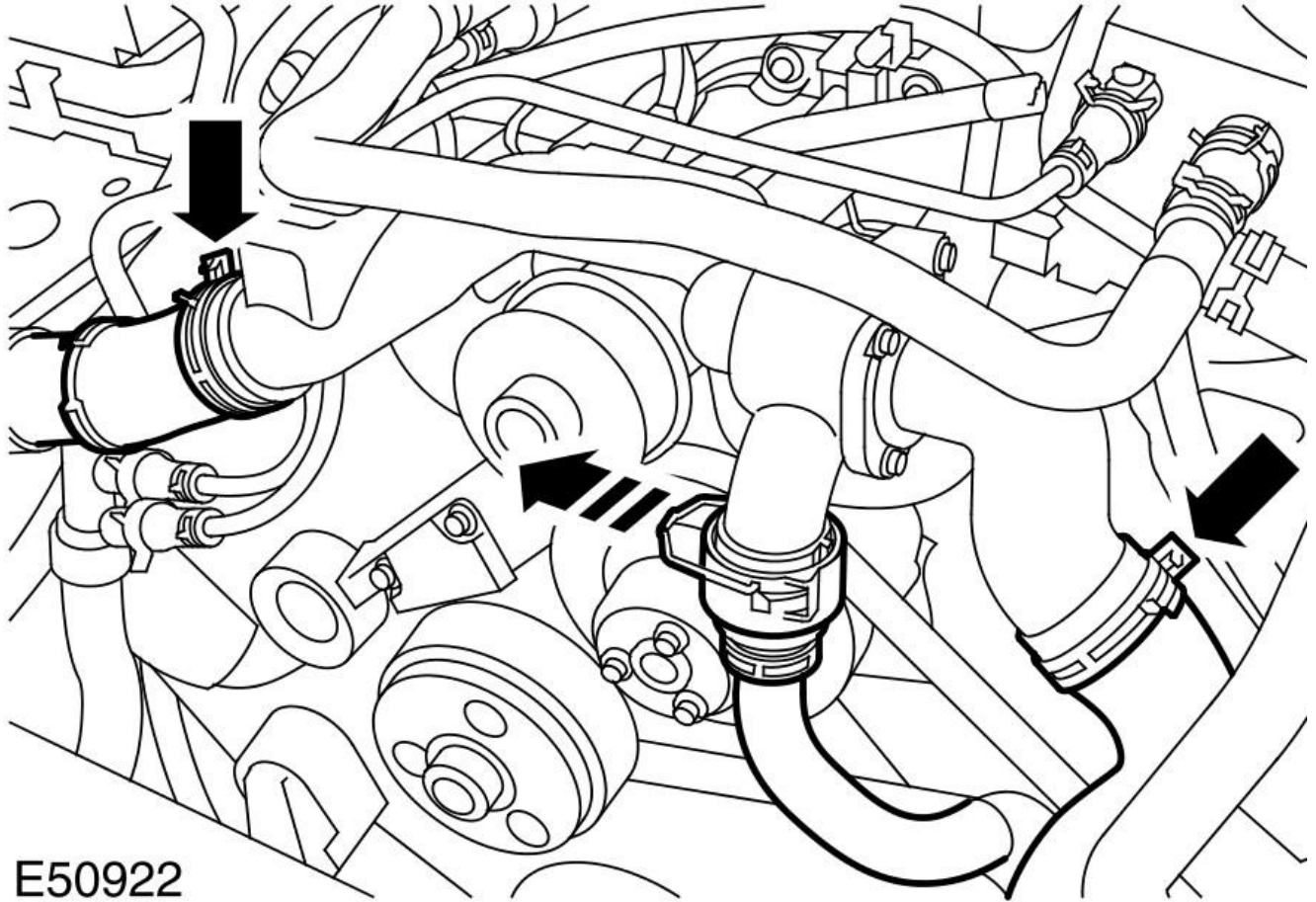


CAUTION: Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

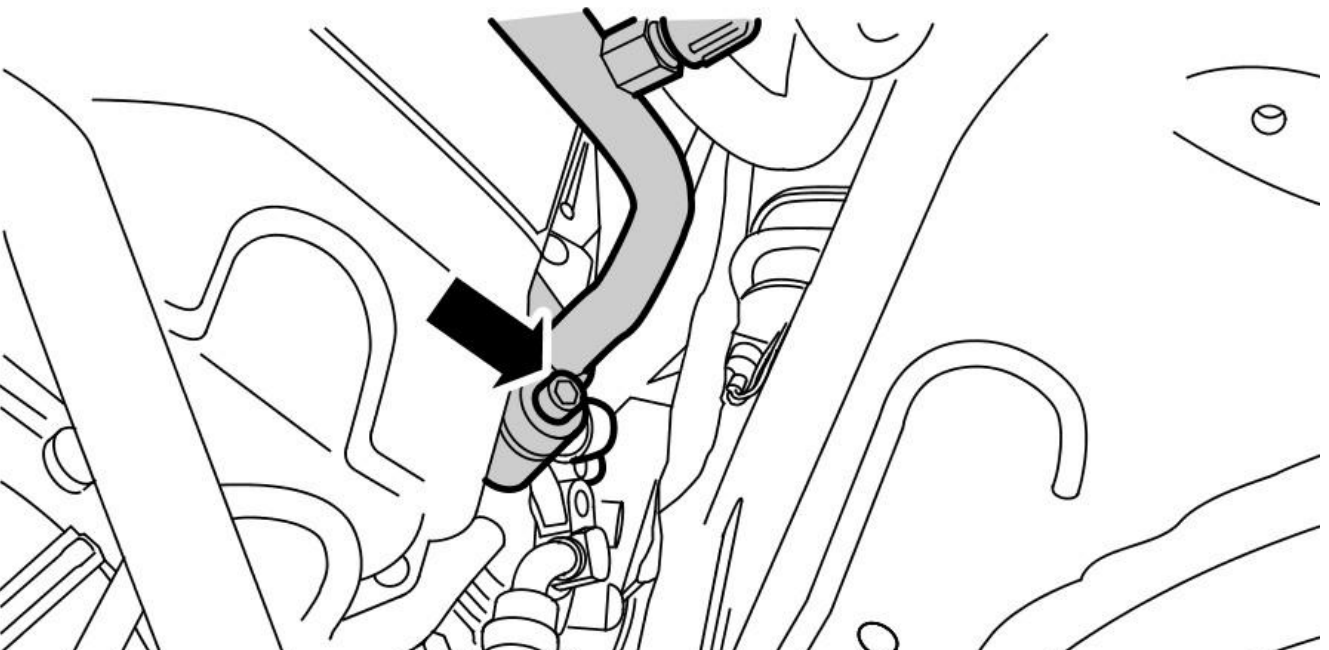
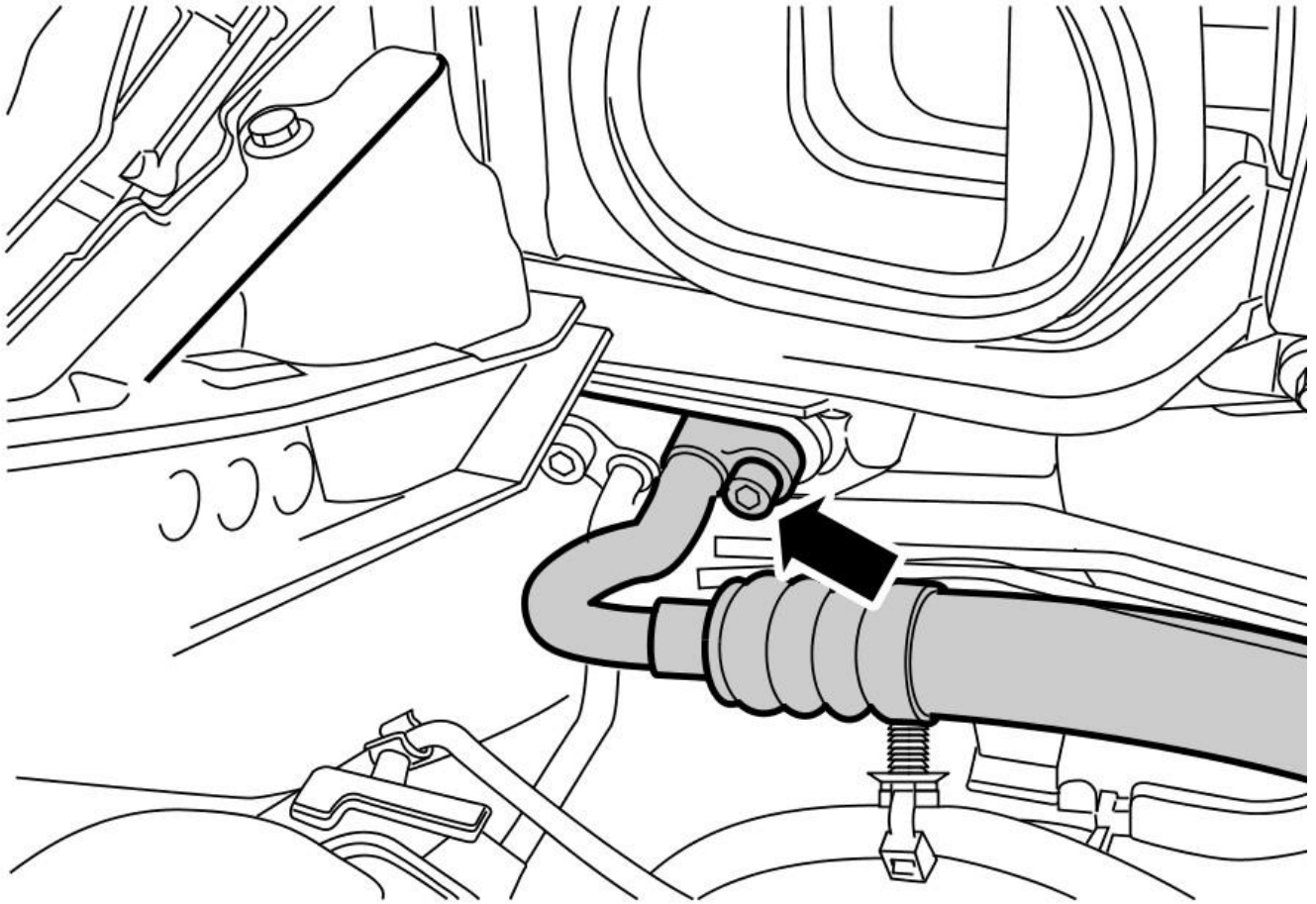
30. Disconnect the charge air cooler coolant hoses.
- Position an absorbent cloth to collect fluid spillage.
 - Release the 2 clips.
 - Repeat the above procedure for the RH side.



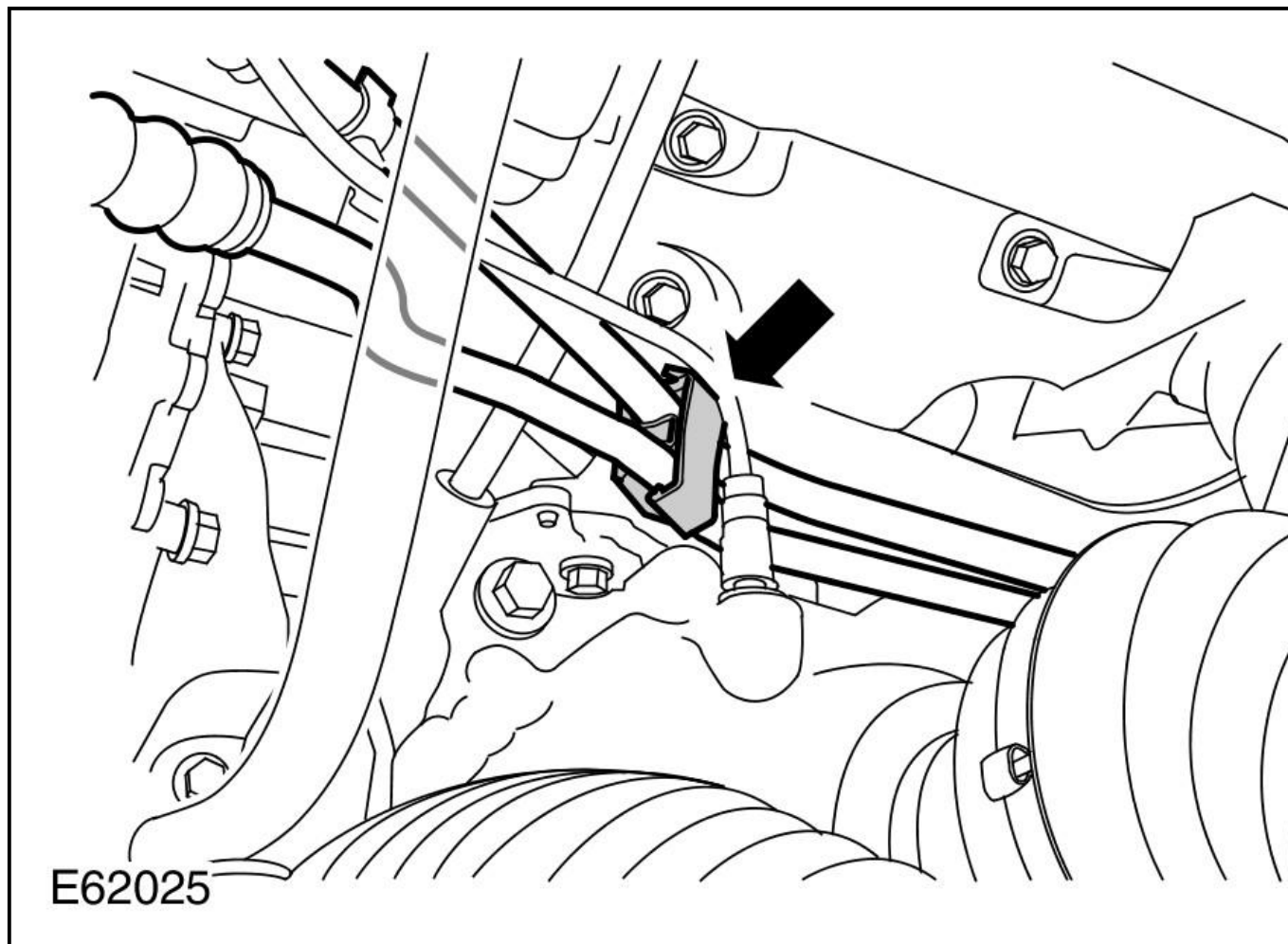
31. Disconnect the coolant manifold to radiator hose.
 - Remove the clip.
32. Disconnect the thermostat housing to radiator hose.
 - Release the clip.
33. Disconnect the coolant manifold to coolant reservoir hose.
 - Release the clip.



34. Disconnect the 2 bulkhead to engine coolant hoses.
- Disconnect the quick release connectors.



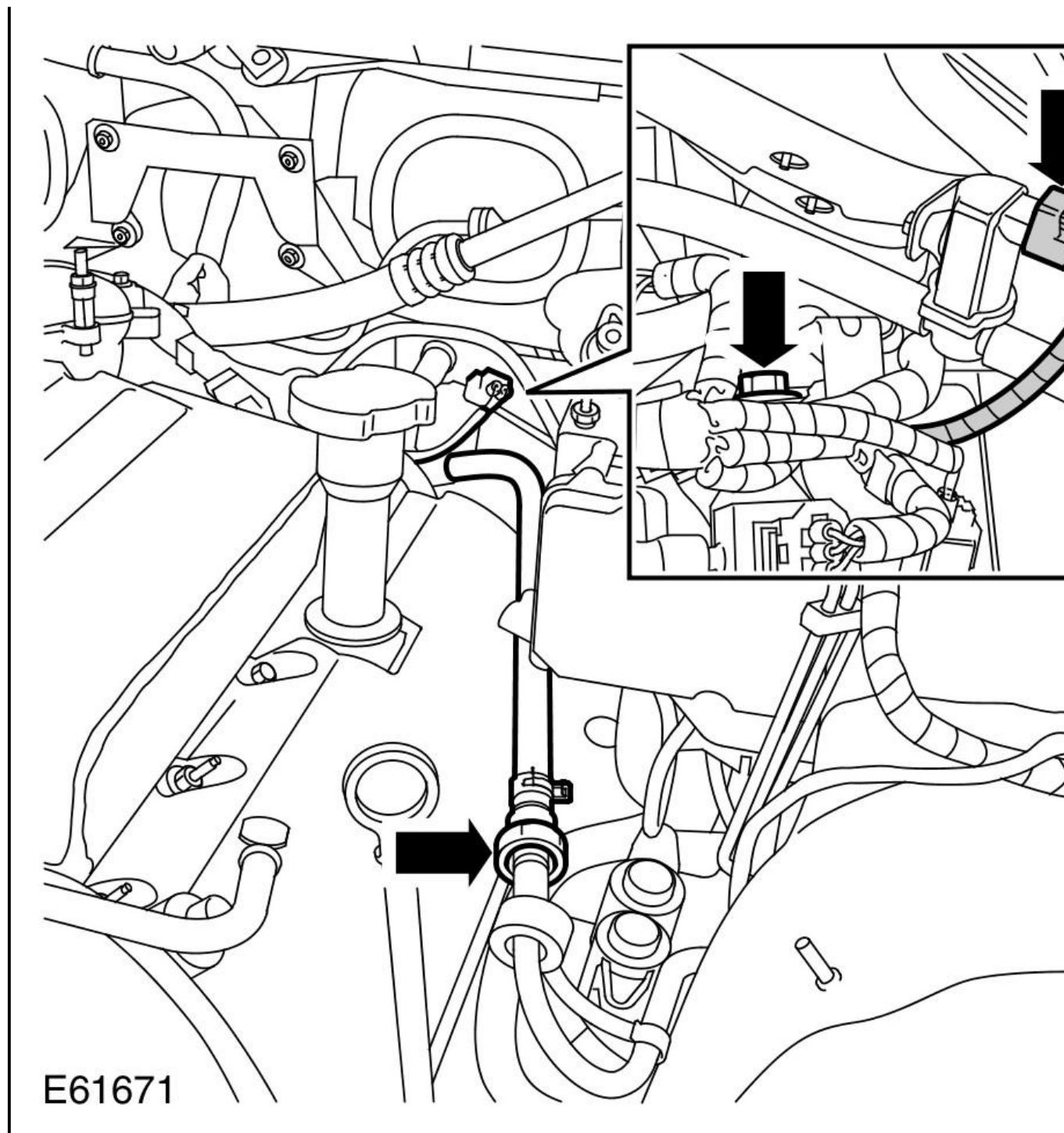
35. Install the special tools to the engine.



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

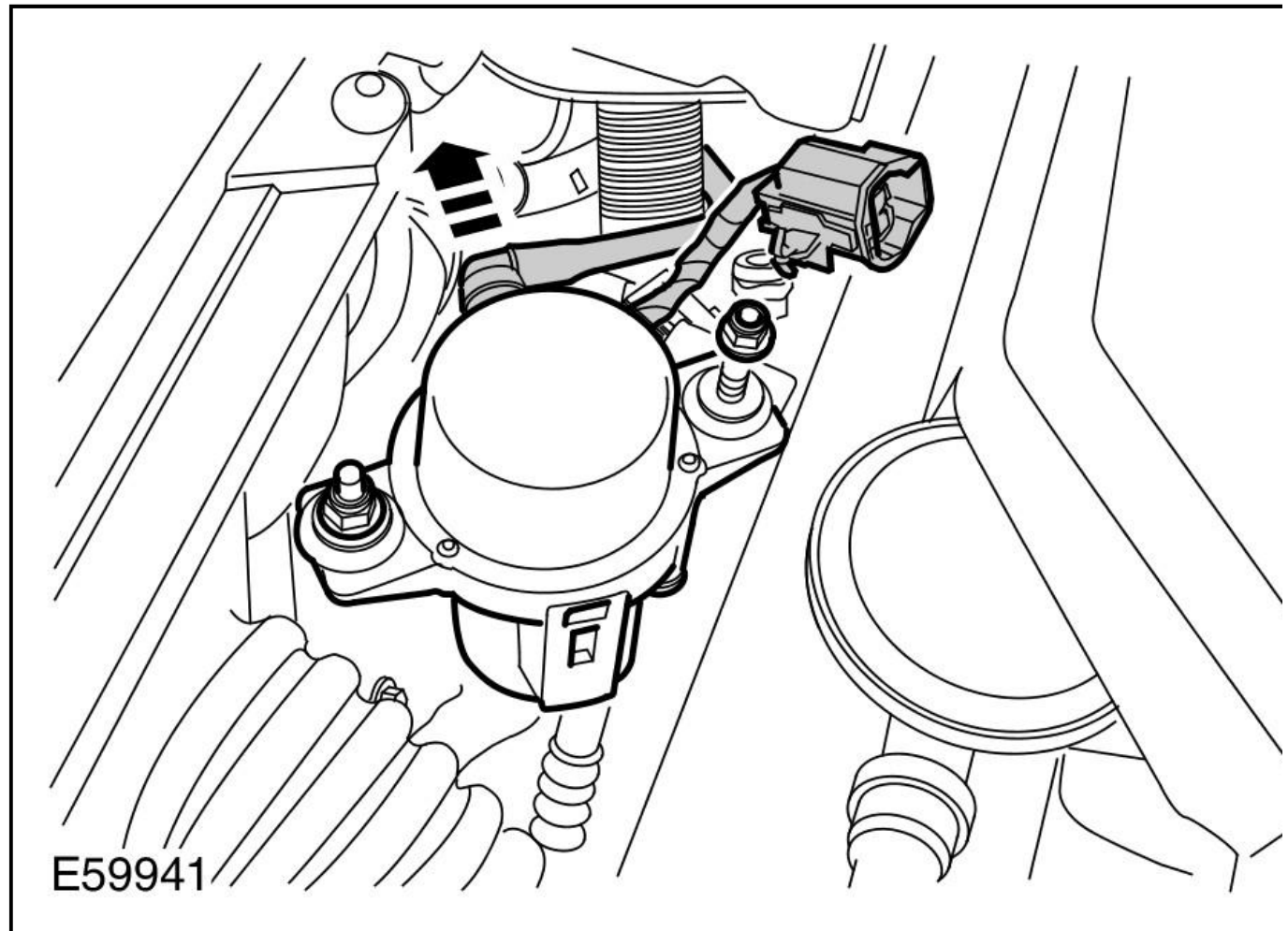
36. Disconnect the power steering pump supply hose.

- Position a container to collect the fluid spillage.
- Release the clip.

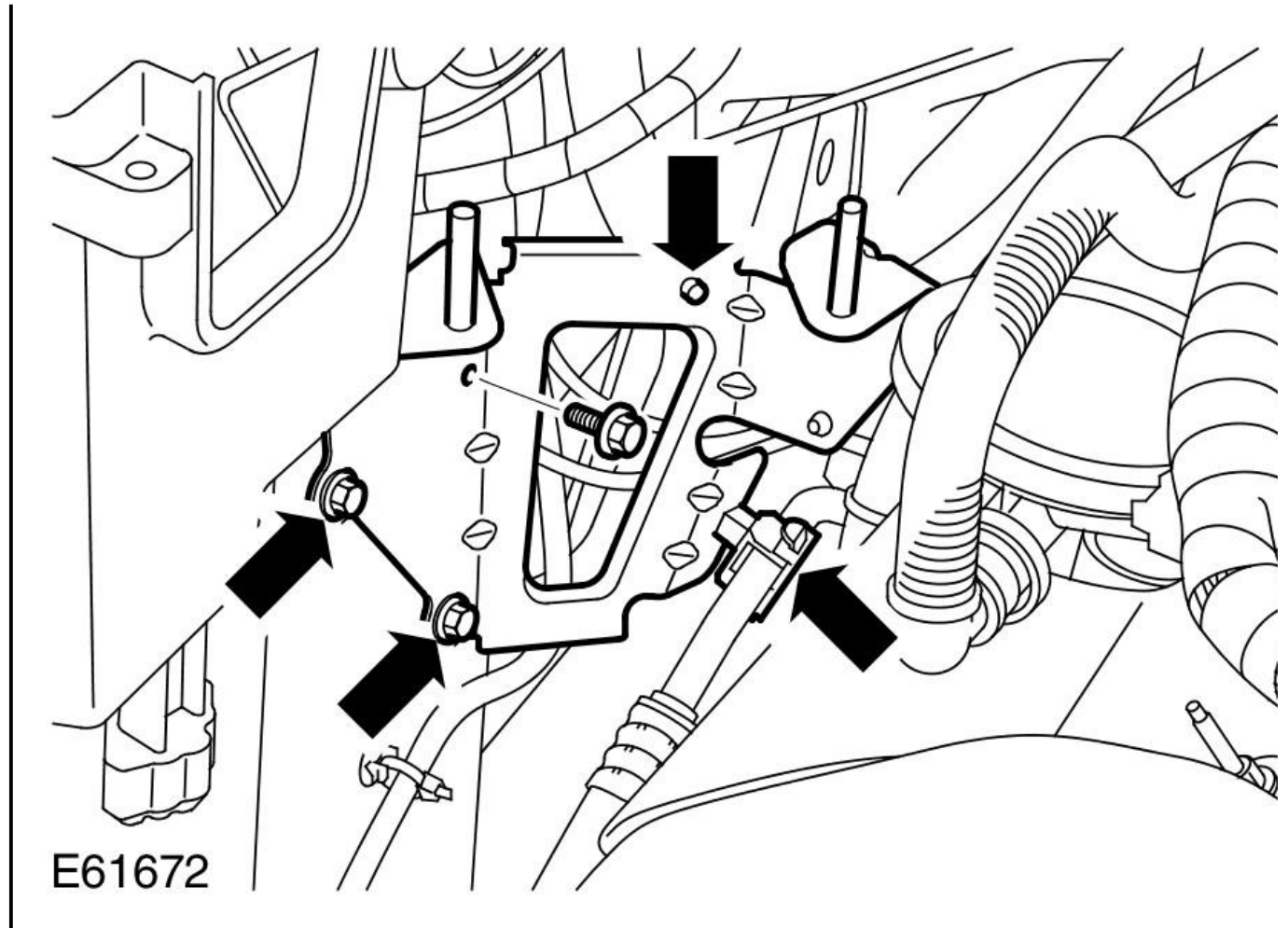


CAUTION: Make sure that all openings are sealed. Use new blanking caps.

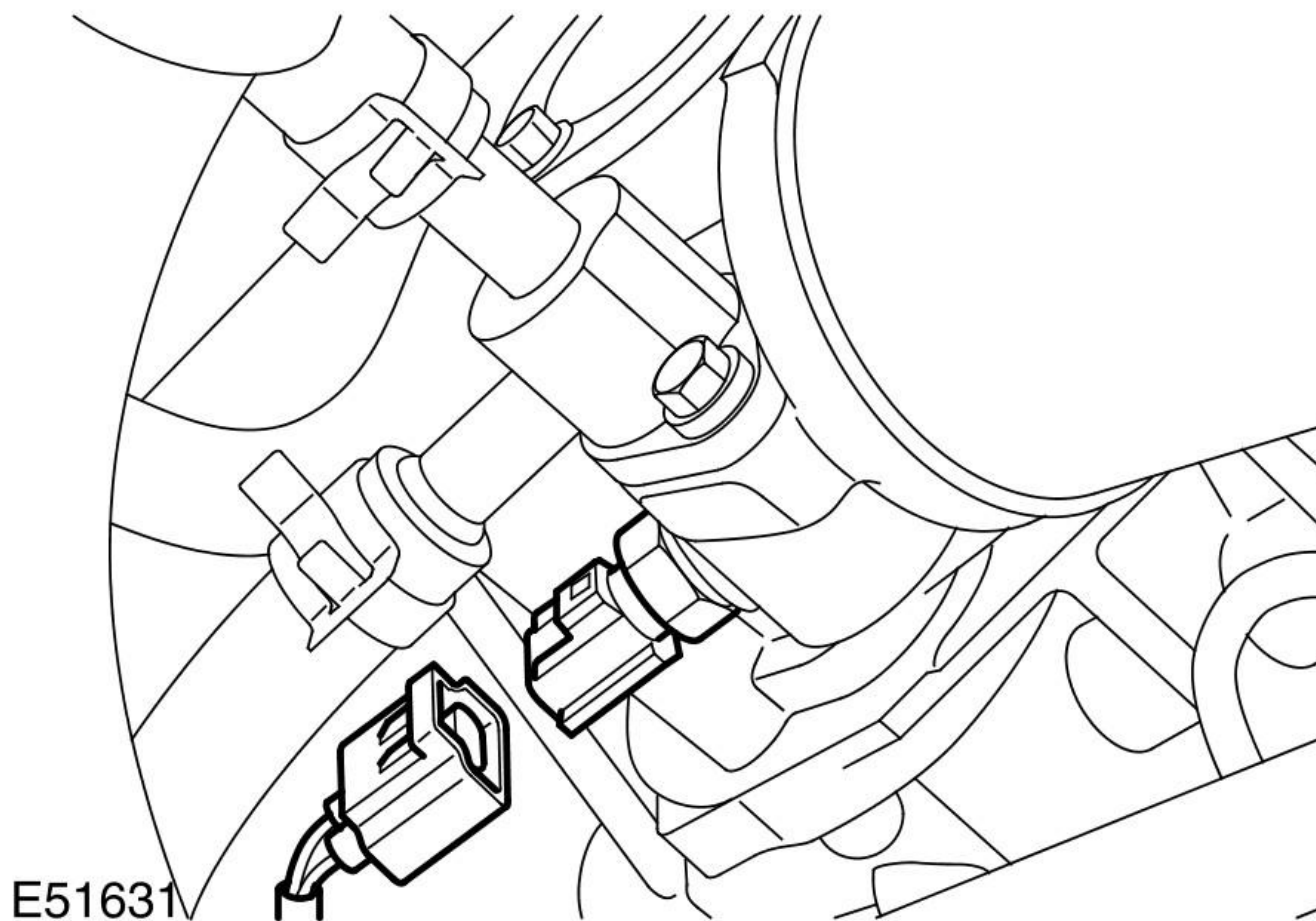
37. Disconnect the power steering pump high-pressure line.
 - Remove and discard the 2 sealing washers.



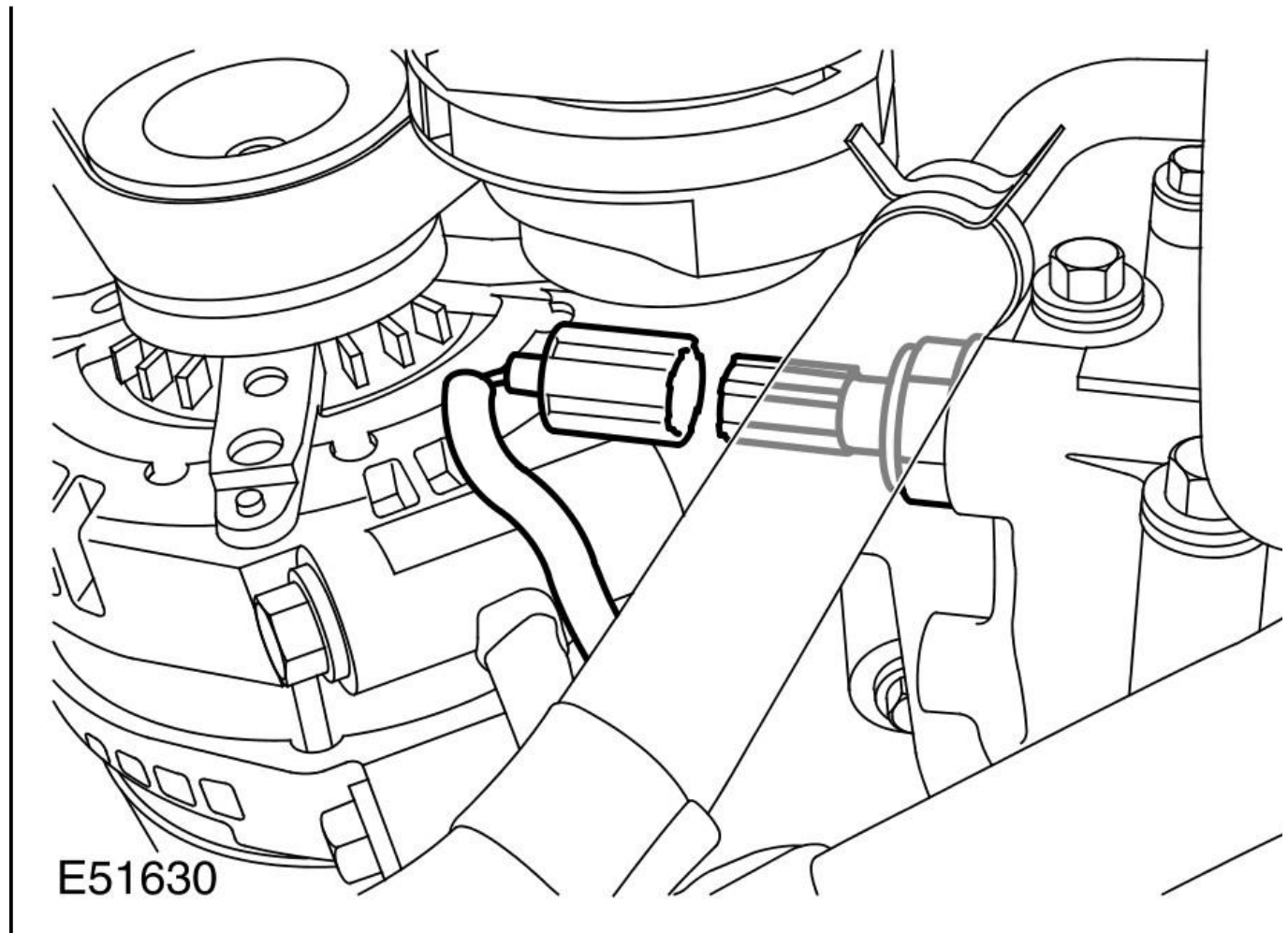
38. Release and reposition the power steering high-pressure pipe.
- Remove the nut.



39. Disconnect the engine oil temperature sensor electrical connector.

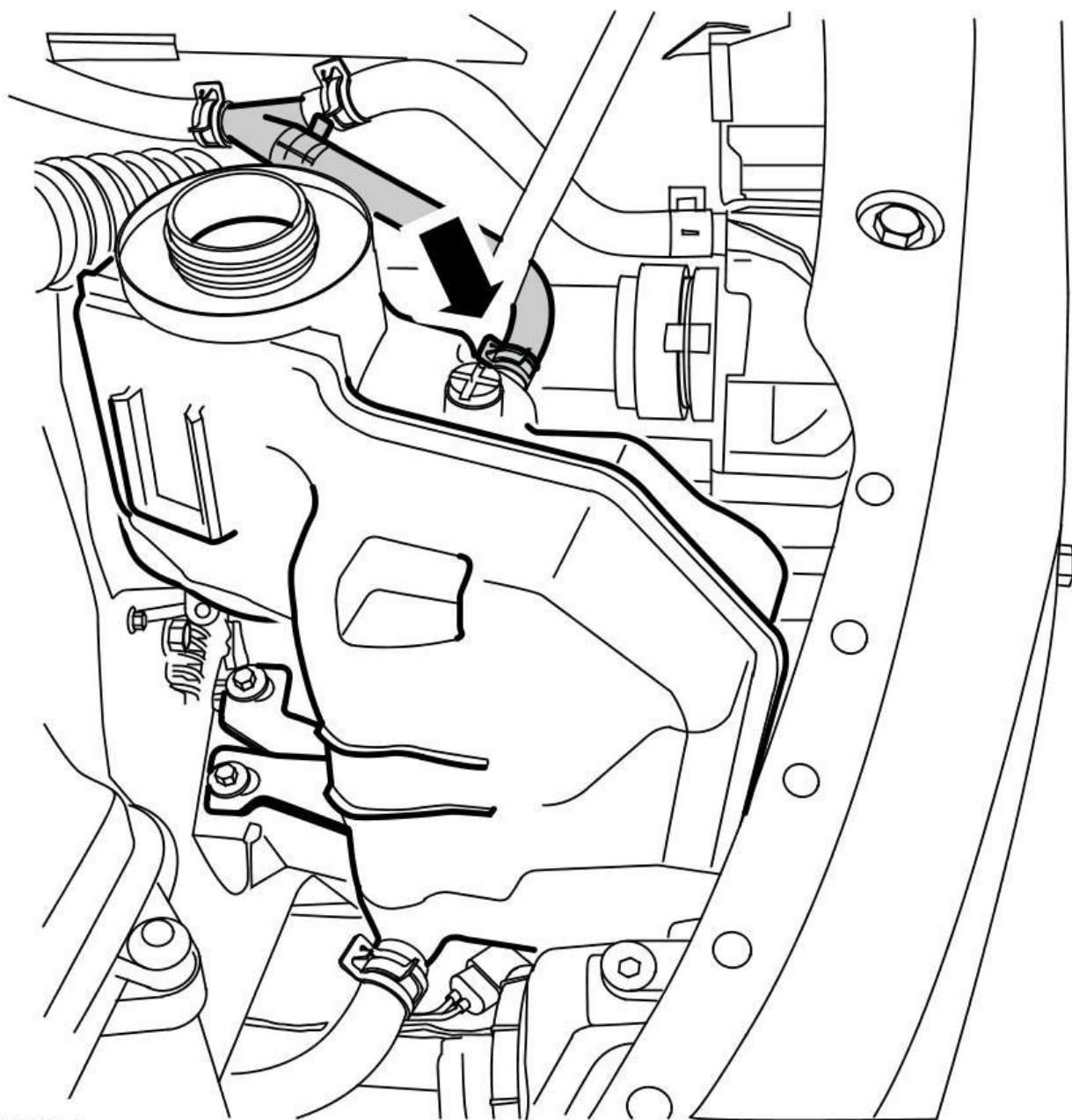


40. Disconnect the engine oil pressure (EOP) sensor electrical connector.



41. Release the oil filter housing.

- Remove the 3 bolts.
- Remove and discard the O-ring seal.
- Tie aside.

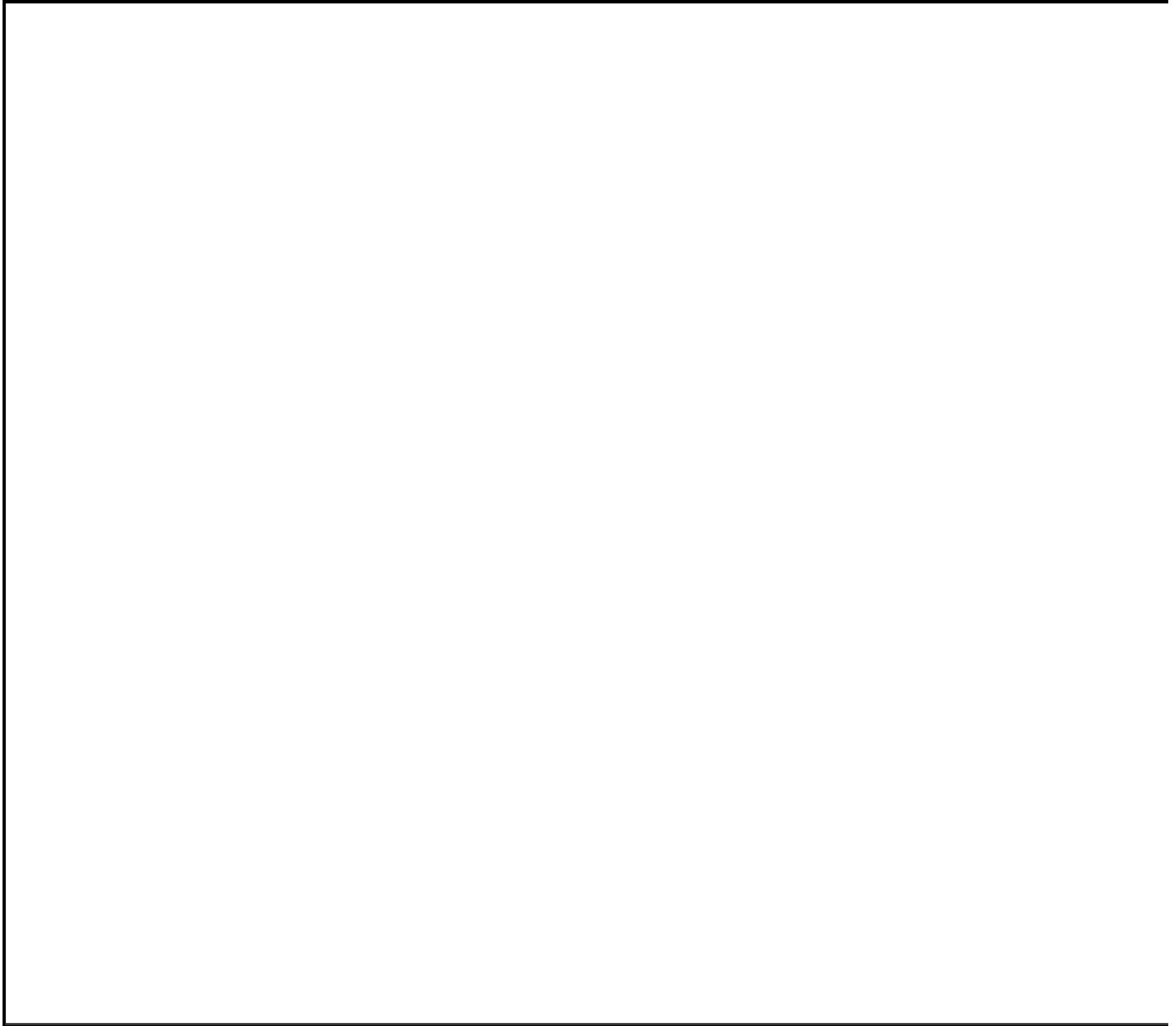


E99567

42. With assistance, carefully remove the engine.

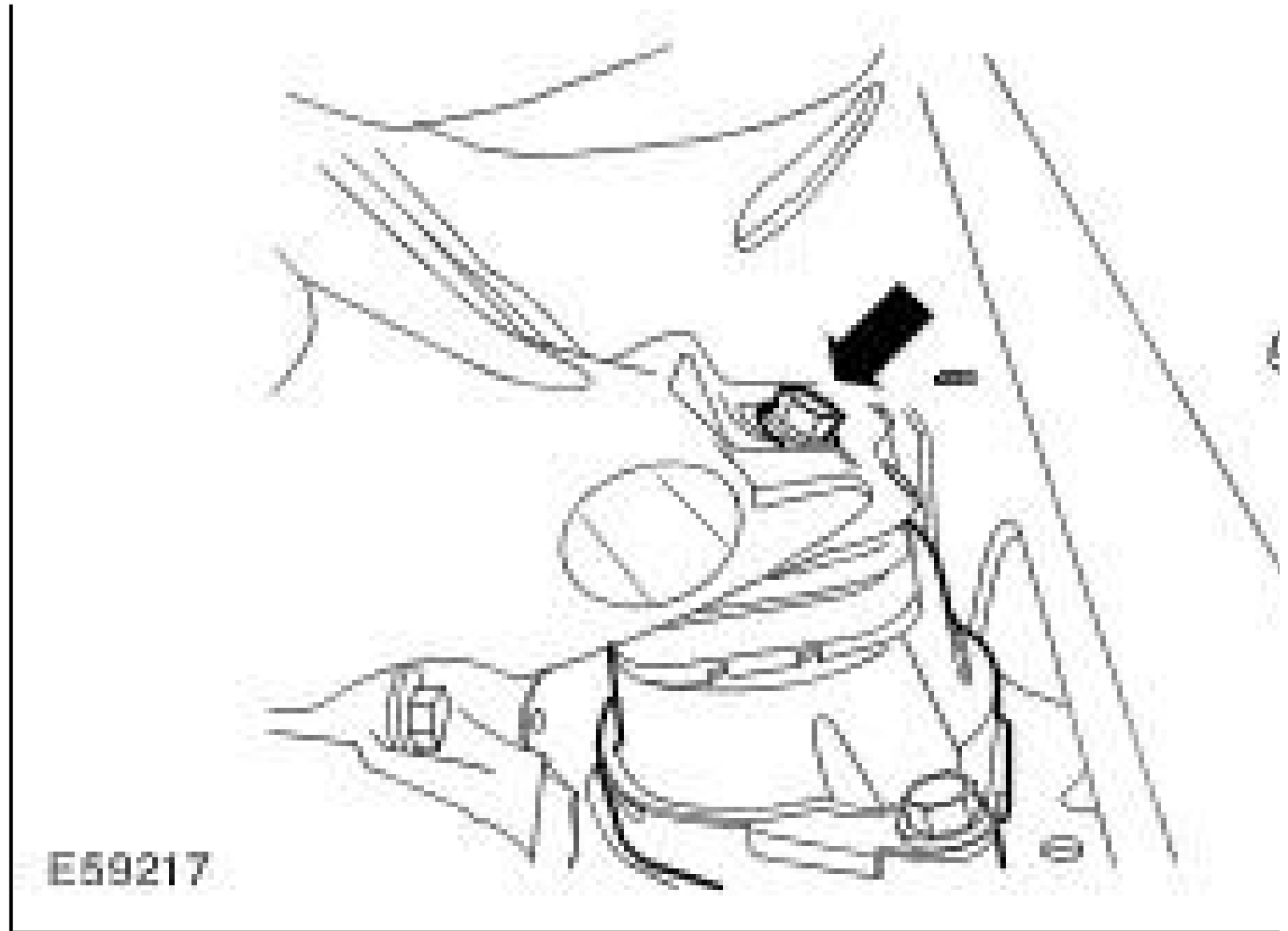
- Connect the lifting chains.
- Support the engine with the lifting equipment.
- Remove the front subframe mounting bolts.
- Using a suitable hydraulic jack, support the rear of the front subframe.

- Lower engine and allow assembly to tilt rearwards.
- Lower the engine to the ground.
- Remove the engine lifting equipment.

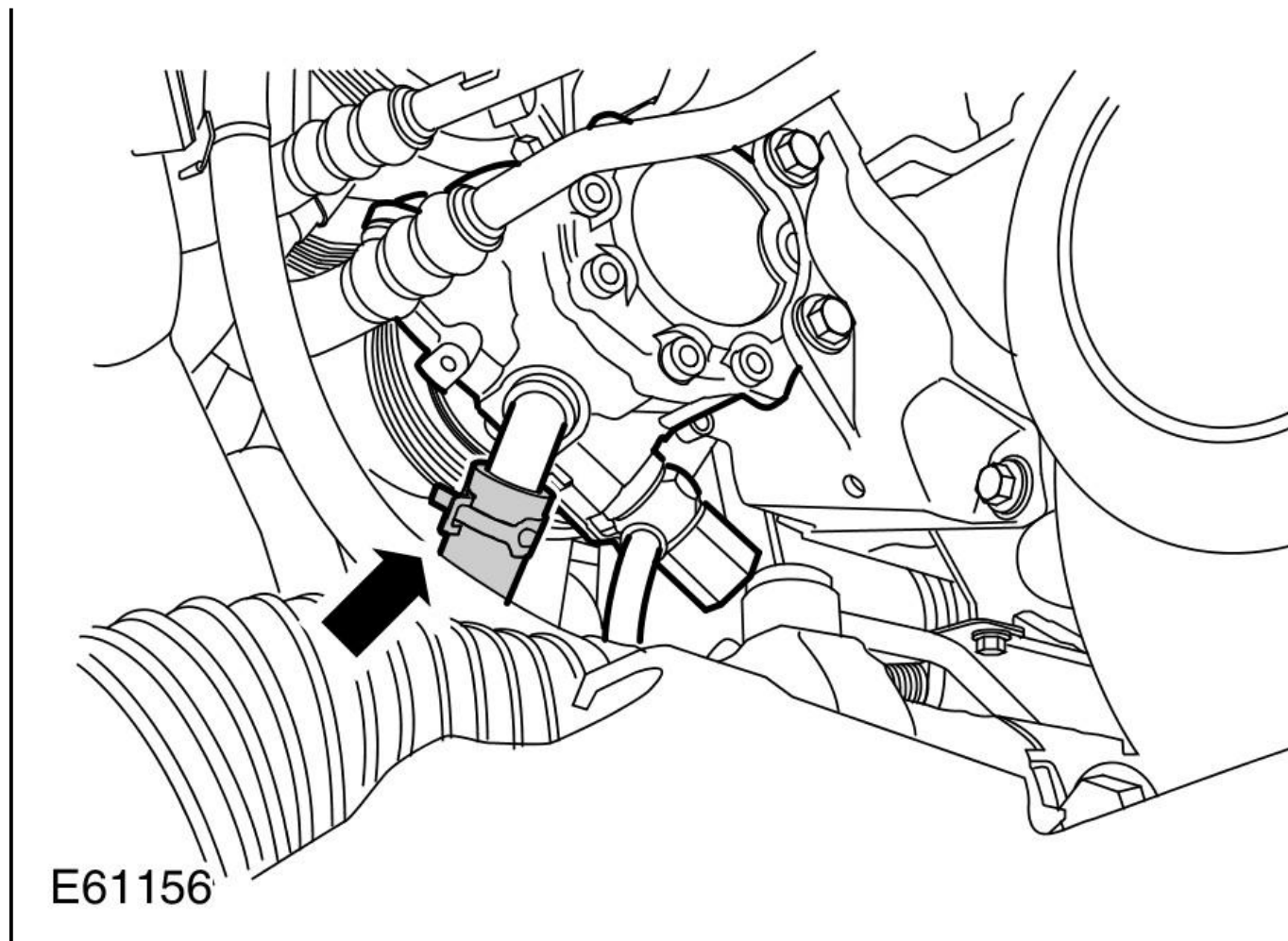


43. LH side: Remove the engine mount heat shield.
 - Remove the 2 screws.
44. LH side: Release the engine mount.
 - Remove the bolt.





45. Release the RH engine mount.
 - Remove the nut.
 - Lift engine clear of subframe.
46. With assistance, remove the differential.
 - Remove the 4 bolts.



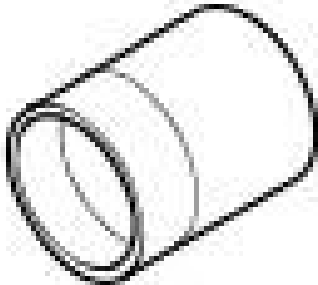
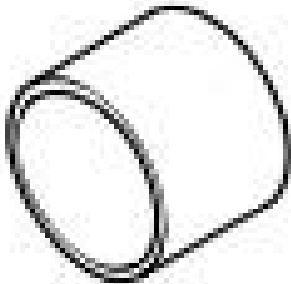
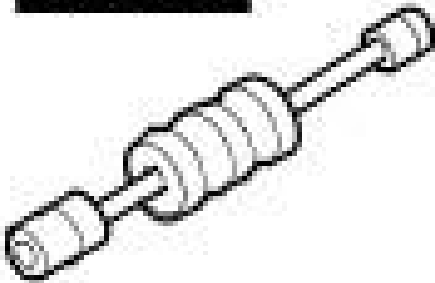
INSTALLATION

SPECIAL TOOLS

Tool Illustration	Tool Name	Tool Number
205-735 E61263	Remover halfshaft inboard joint	205-735(LRT-54-026)

2006 Land Rover Range Rover HSE

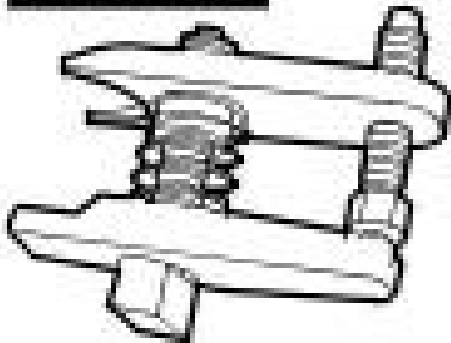
ENGINE Engine (4.2L)

308-626/1  E54136	Installer halfshaft oil seal	308-626/1
308-626/2  E54137	Installer/Guide halfshaft oil seal	308-626/2
100-012  E54135	Impulse extractor	100-012(LRT-99-004)
	Ball joint separator	205-754(LRT-54-027)

2006 Land Rover Range Rover HSE

ENGINE Engine (4.2L)

205-754A

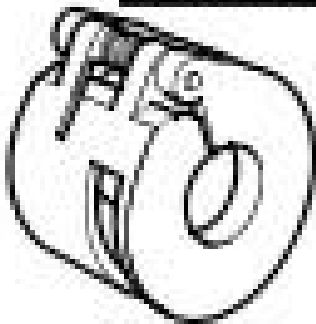


E45276

Fuel spring lock decoupling tool

310-D005

310-D005

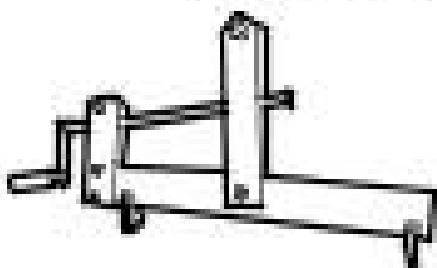


E45289

Engine lift and tilt bracket

303-940(LRT-12-138)

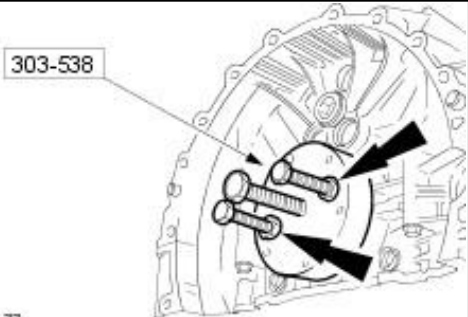
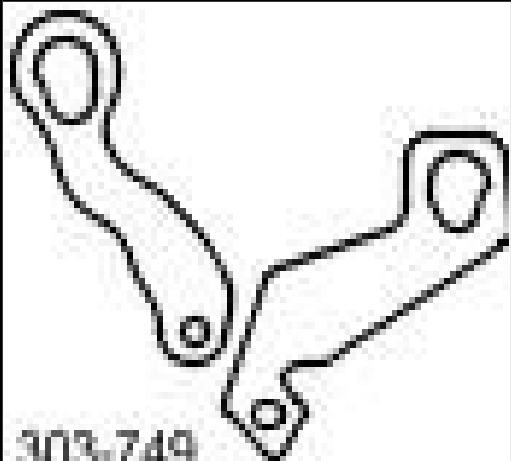
303-940



E61659

Engine lift and tilt bracket chains

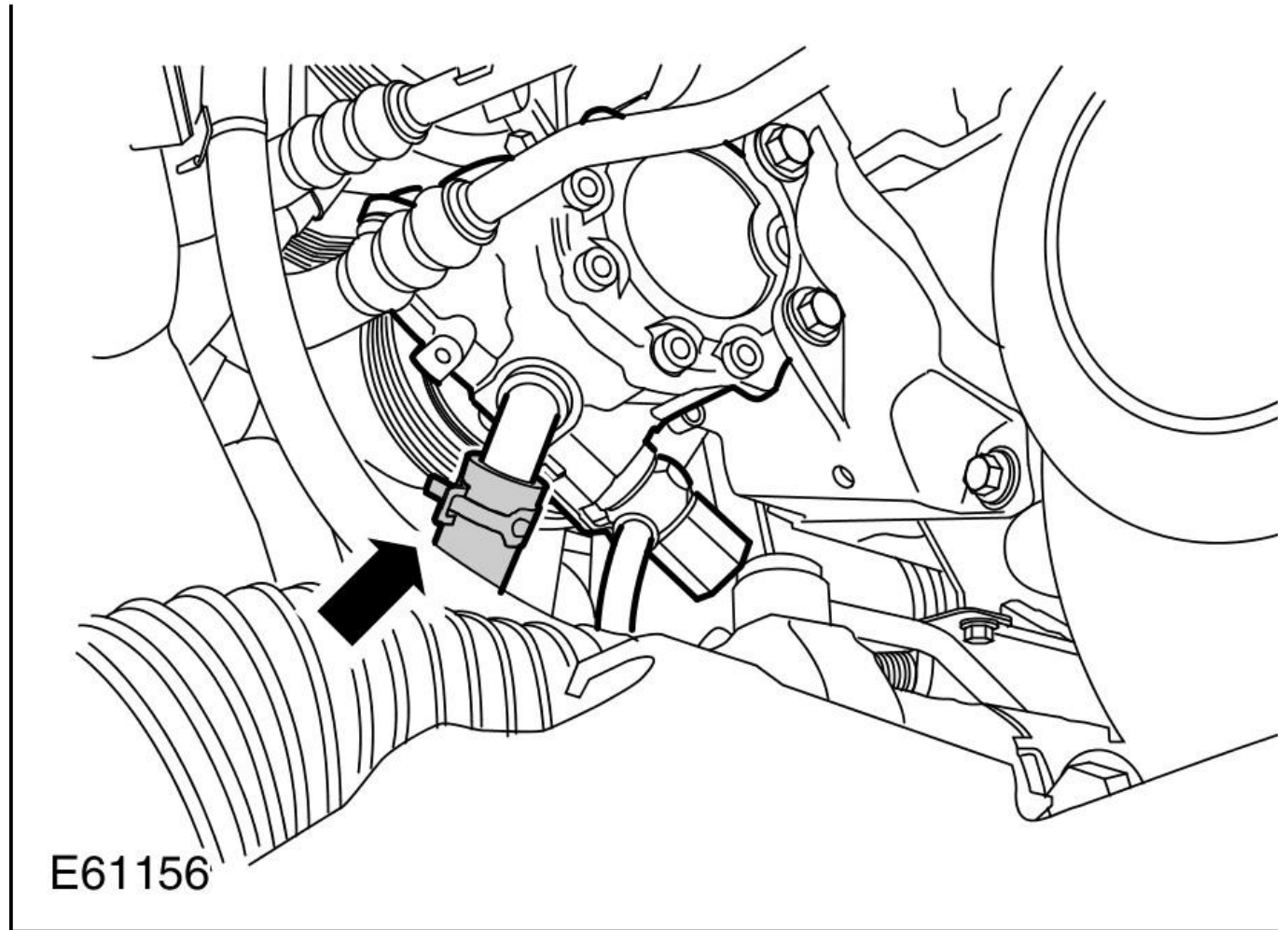
303-940/1

 303-940/1 E61731		
 303-538 E31177	Engine lifting brackets	303-536
 303-749	Engine lifting brackets	303-749

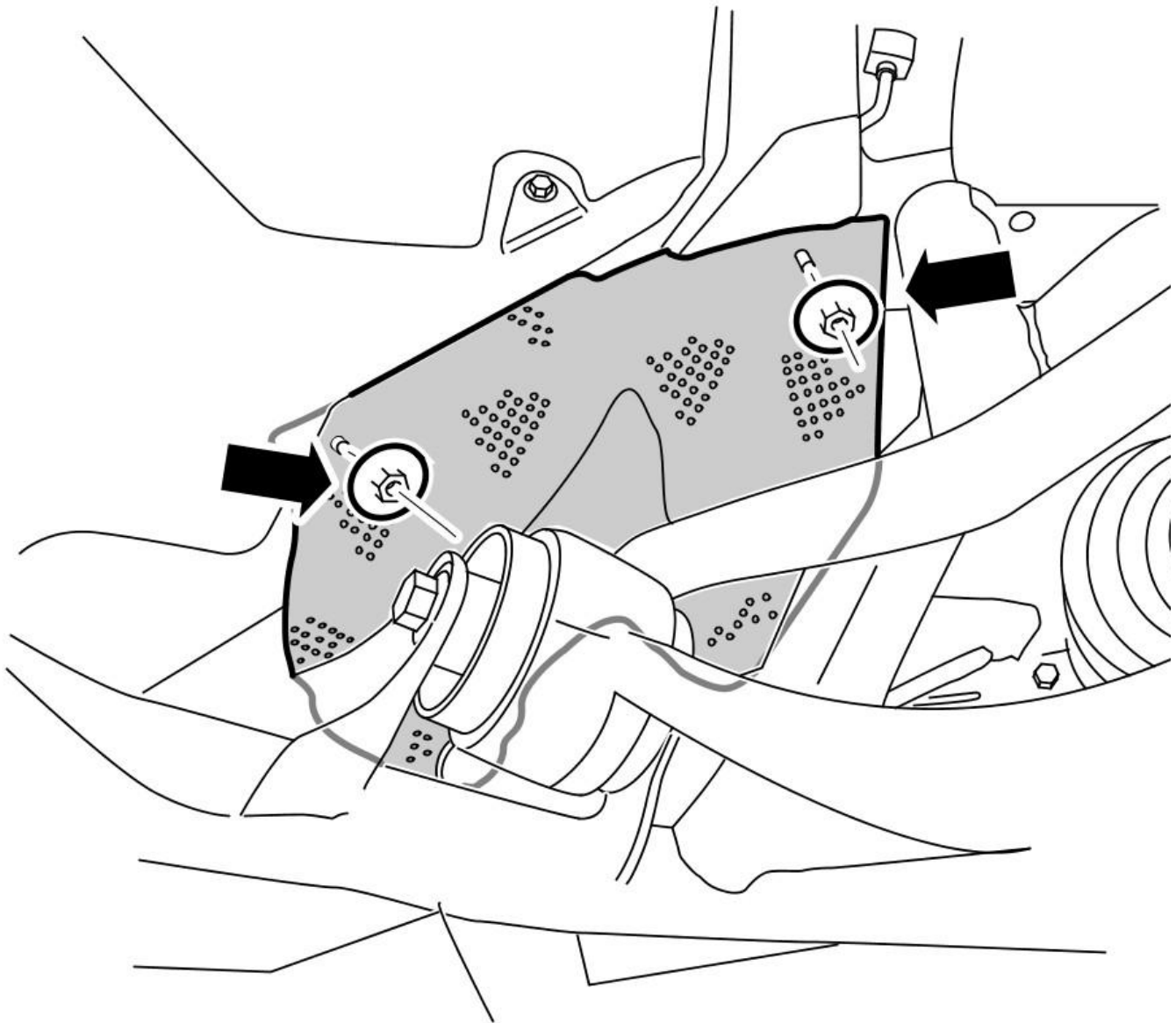
Installation

CAUTION: Make sure the O ring seal remains in its fitted position.

1. Install the front differential.
 - Align the dowel and tighten the bolts to 115 Nm (85 lb.ft).



2. Attach the transmission fluid lines to the engine.
 - Secure with the clip.



E99568

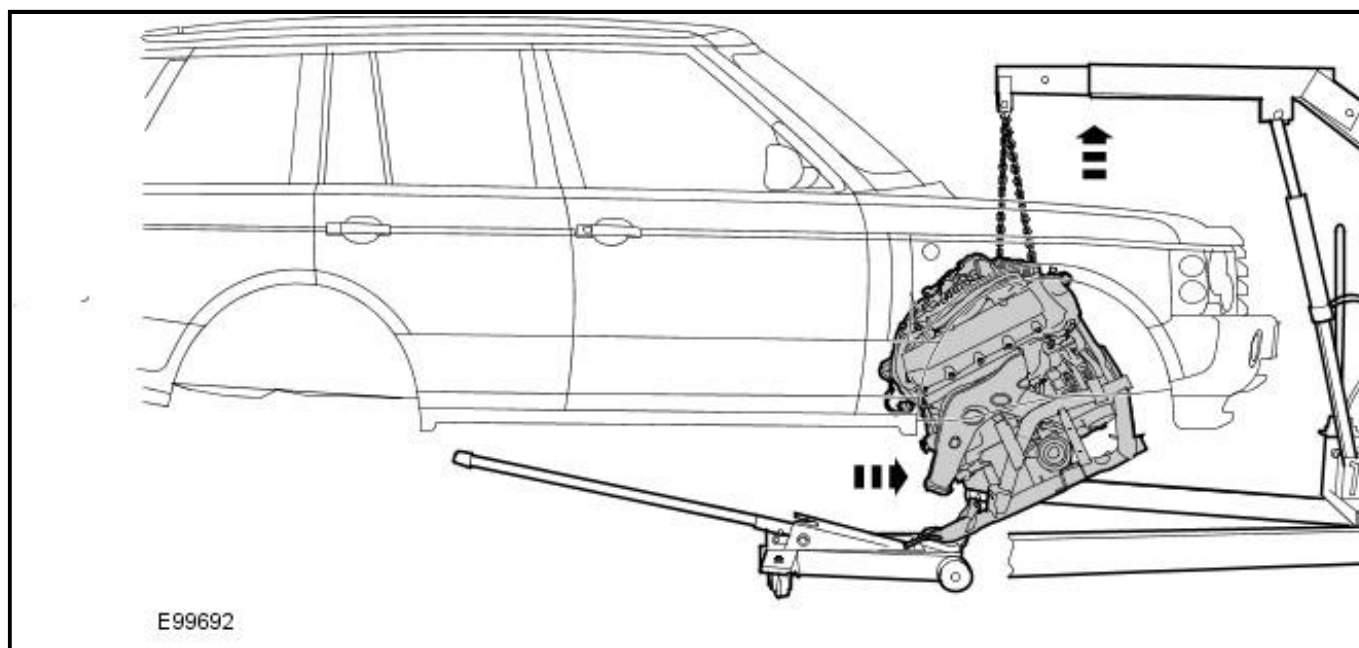
3. Lower the engine onto its mounts.
 - Tighten the engine mount bolts to 100 Nm (74 lb.ft).
4. Install the LH engine mount heat shield.

CAUTION: Support the engine on a jack. The angle may need to be adjusted

during this procedure.

5. Lift engine and sub frame into position.

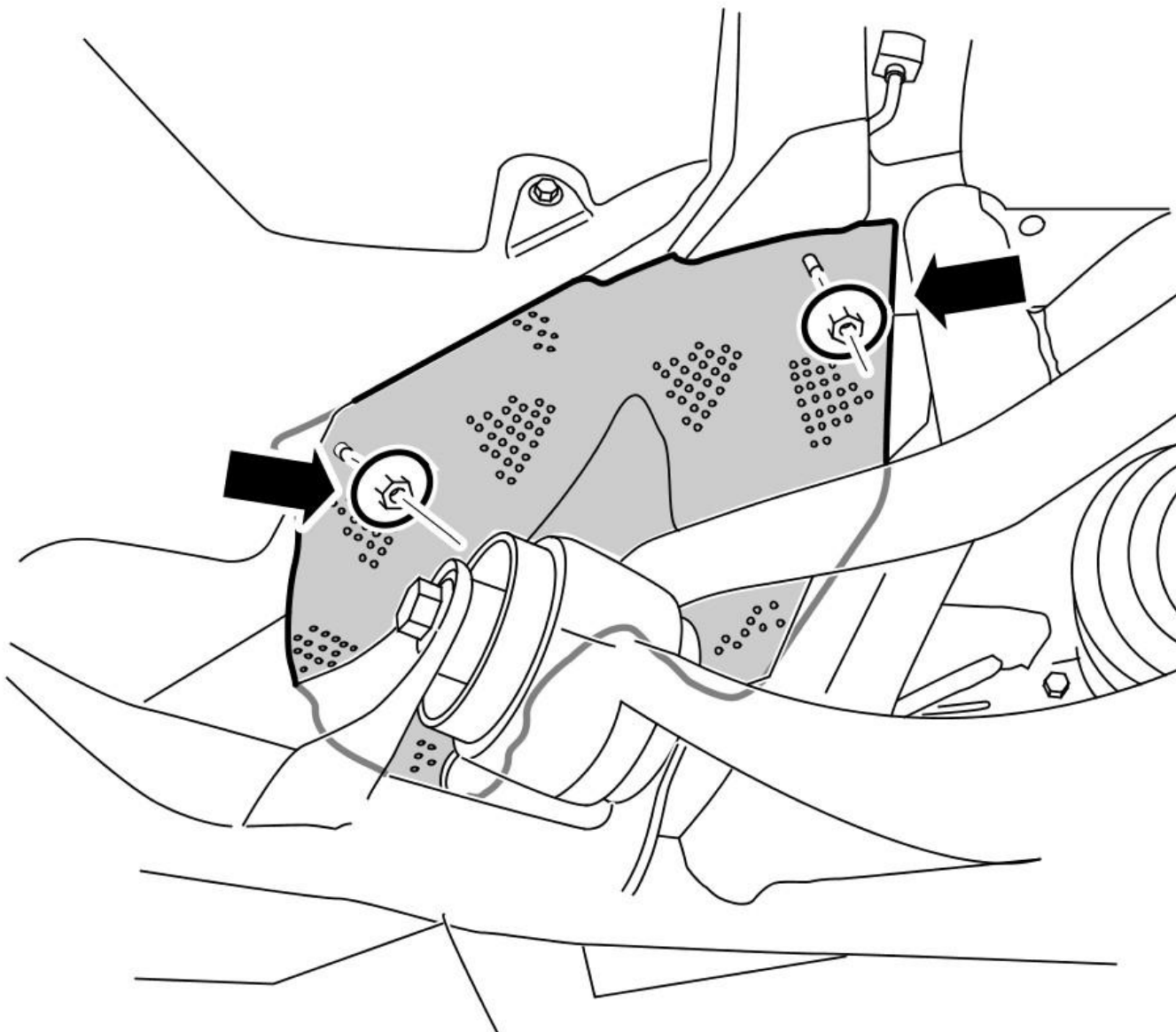
- Connect the lifting chains.
- Raise the engine.
- Using a suitable hydraulic jack, support the rear of the front subframe.
- With assistance, position and secure the subframe.
- Tighten the 6 subframe bolts.
- Stage 1: Tighten to 165 Nm (122 lb.ft).
- Stage 2: Turn a further 90 degrees
- Tighten the two front subframe bolts.
- Tighten nuts to 140 Nm (103 lb.ft).



6. Install the transmission. Refer to **TRANSMISSION** .

NOTE: Left-hand shown, right-hand similar.

7. Install the stabilizer bar heat shields.



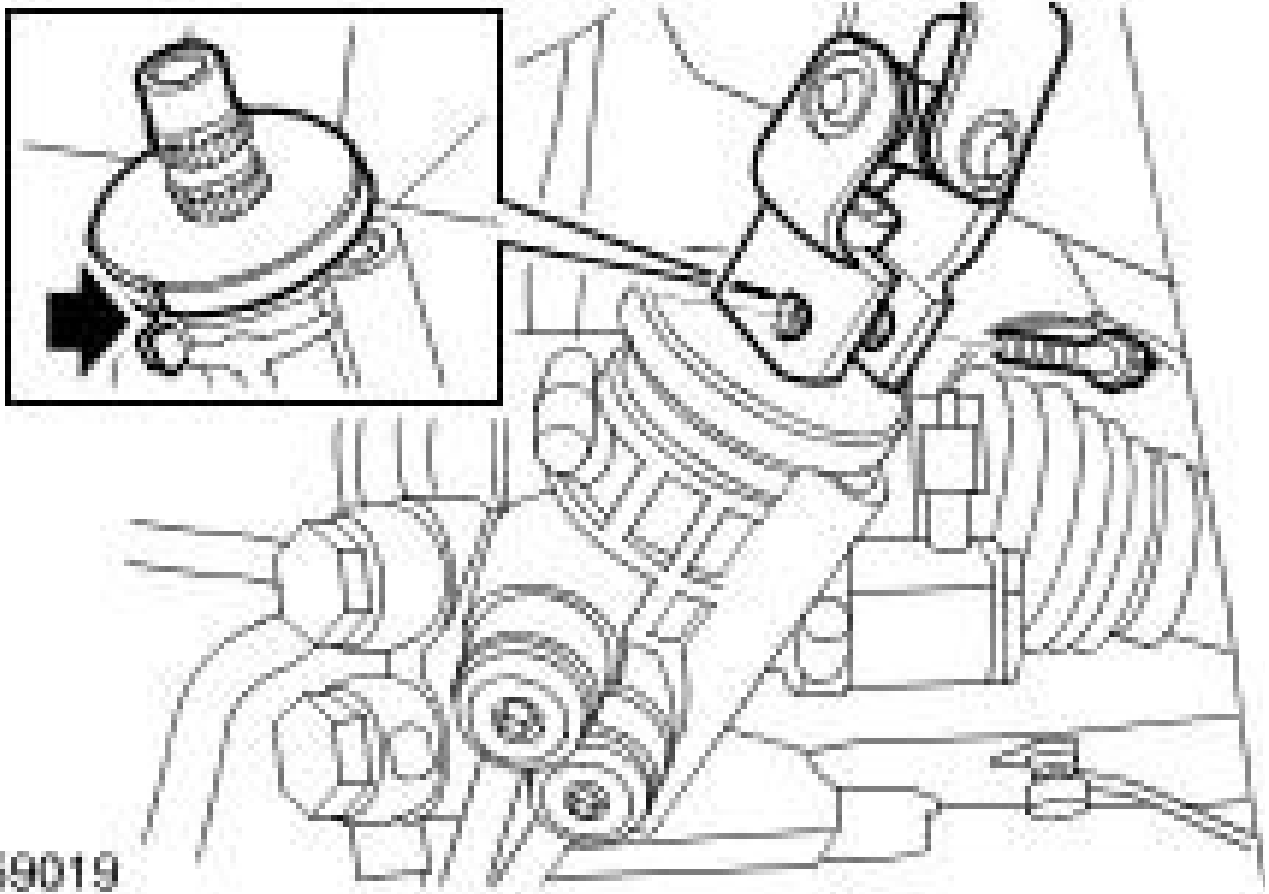
E99568

8. Connect the steering gear electrical connector.



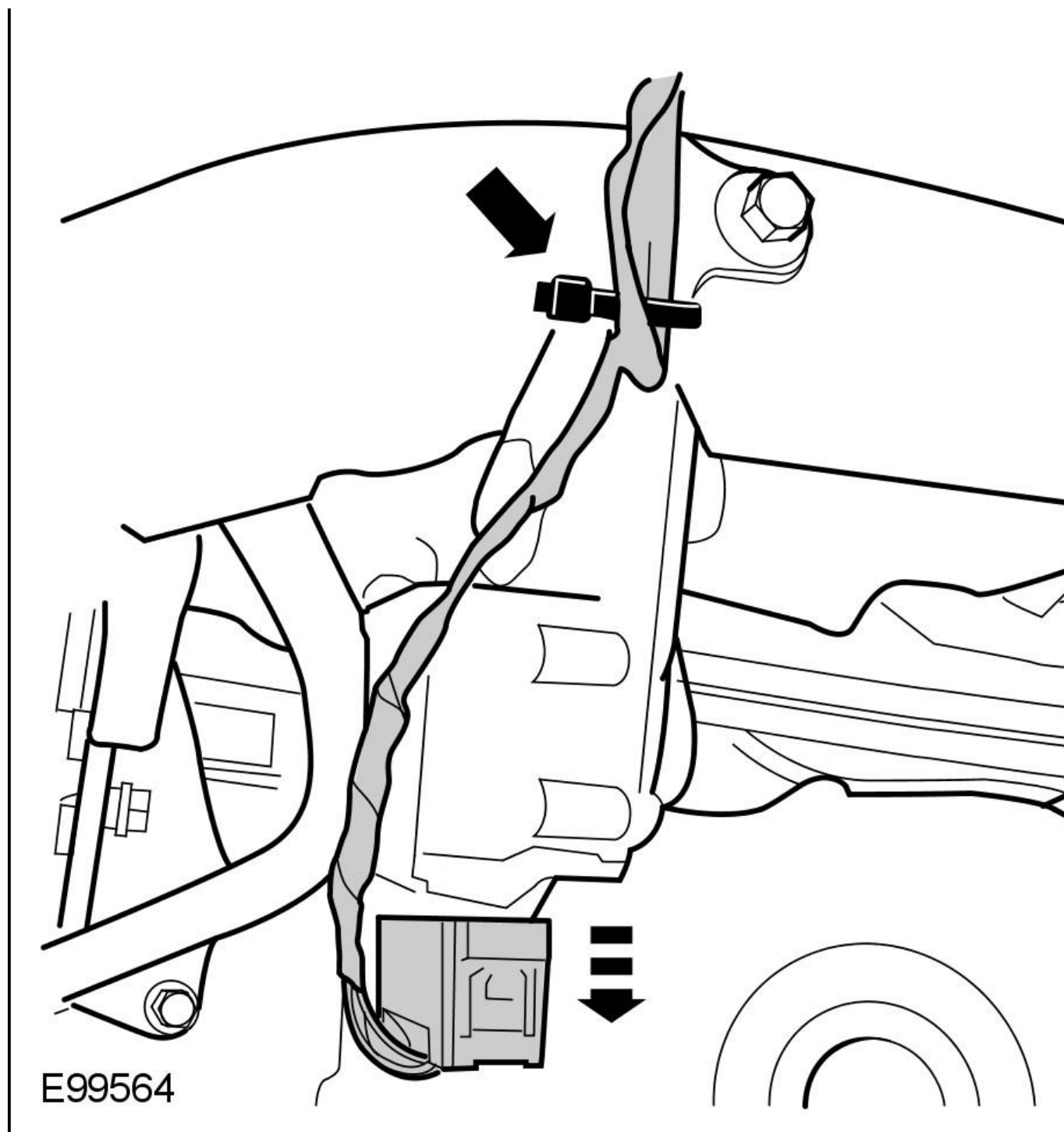
9. Attach the lower steering column.

- Make sure that the steering gear tag is aligned correctly, as shown.
- Install a new Torx bolt and tighten to 24 Nm (18 lb.ft).



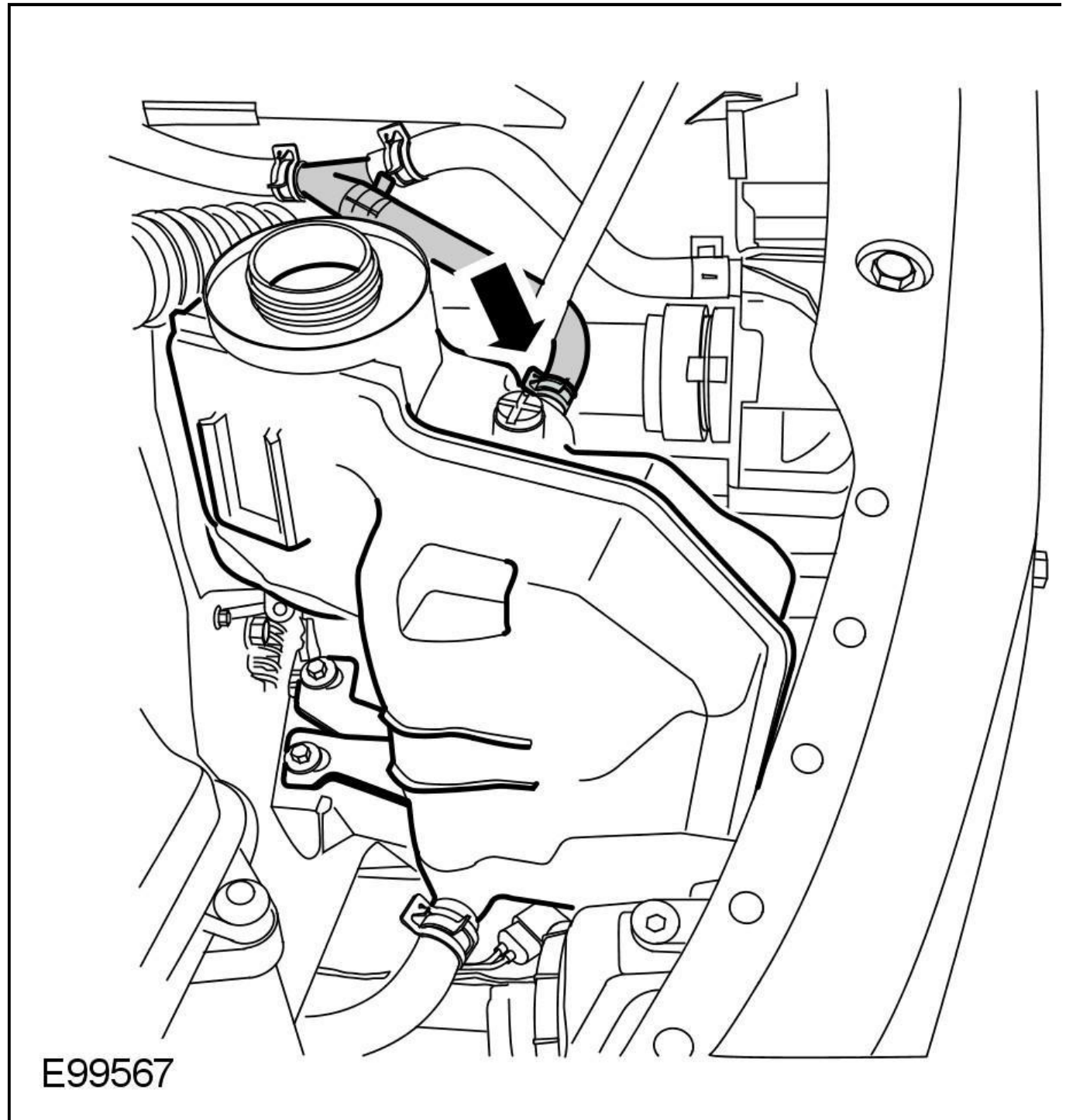
NOTE: LH illustration shown, RH is similar.

10. Connect the height sensor electrical connector.
 - Align the wiring harness and secure with a cable tie.

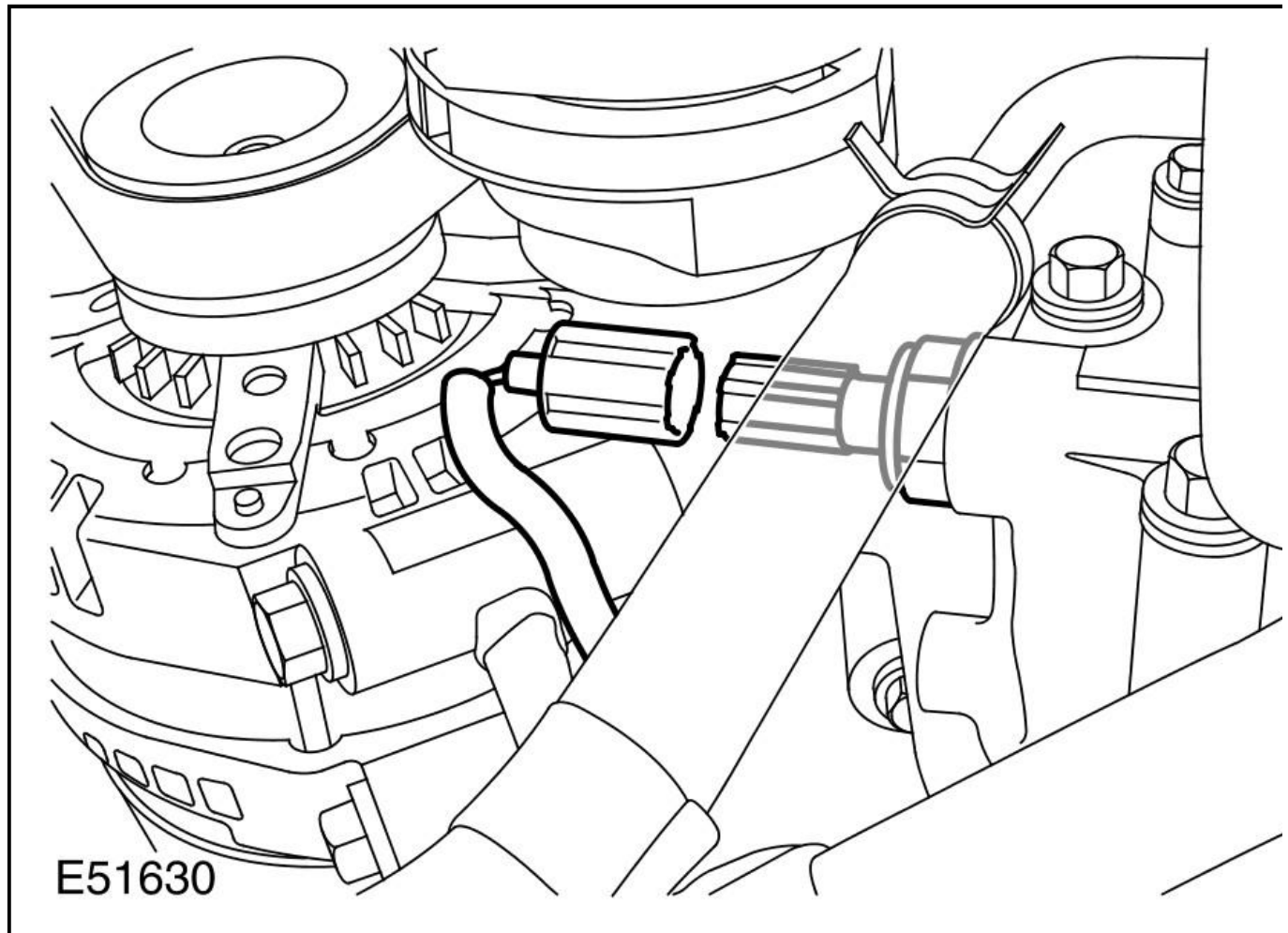


11. Install the RH driveshaft. Refer to **HALFSHAFT BEARING** .
12. Install the LH driveshaft. Refer to **HALFSHAFT SEAL LH** .
13. Fill the front differential case with the correct amount of fluid. Refer to **DIFFERENTIAL DRAINING AND FILLING** .
14. Install the oil filter housing.

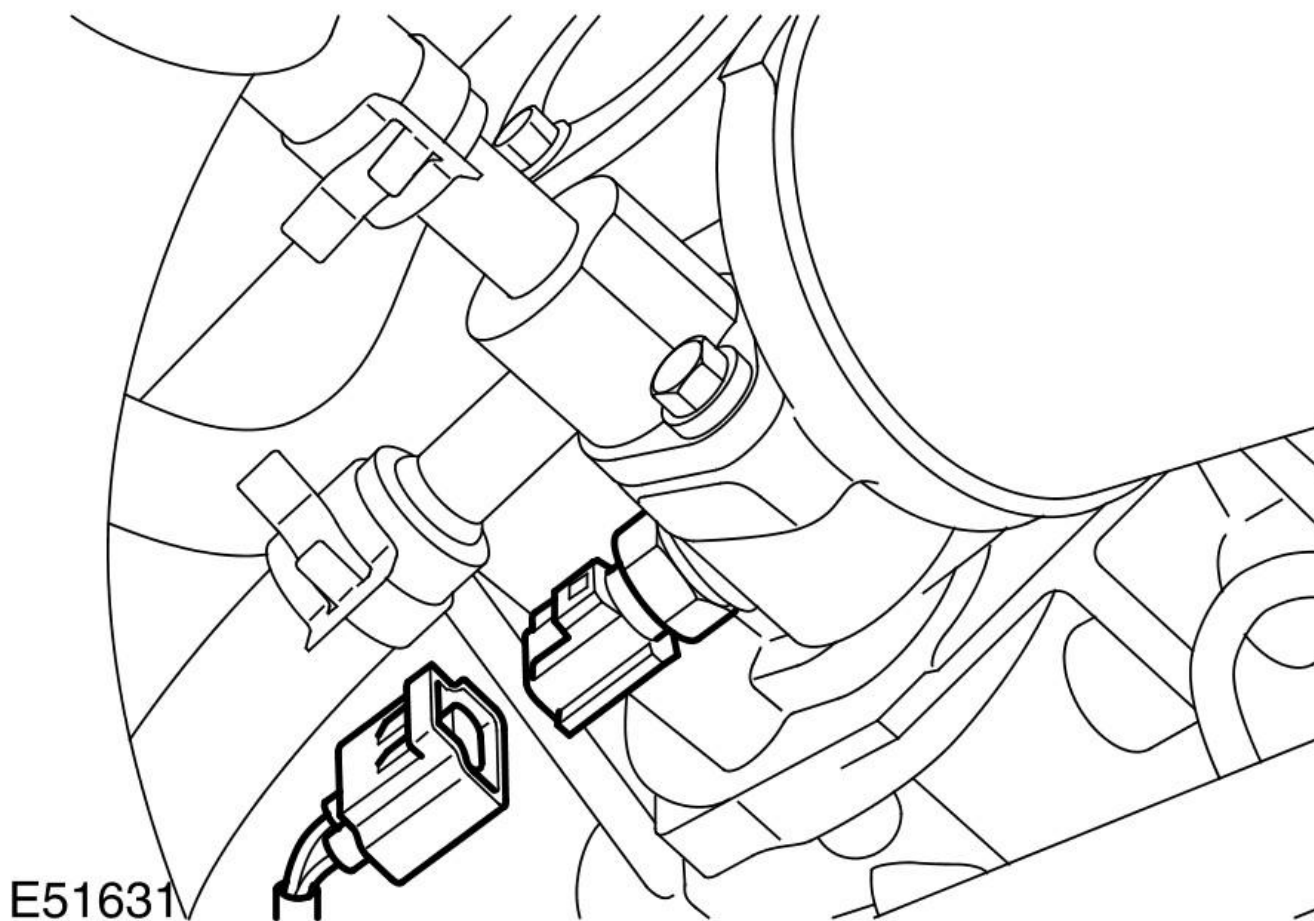
- Clean the component mating faces.
- Install a new O-ring seal.
- Tighten the bolts to 20 Nm (15 lb.ft).



15. Connect the EOP sensor electrical connector.

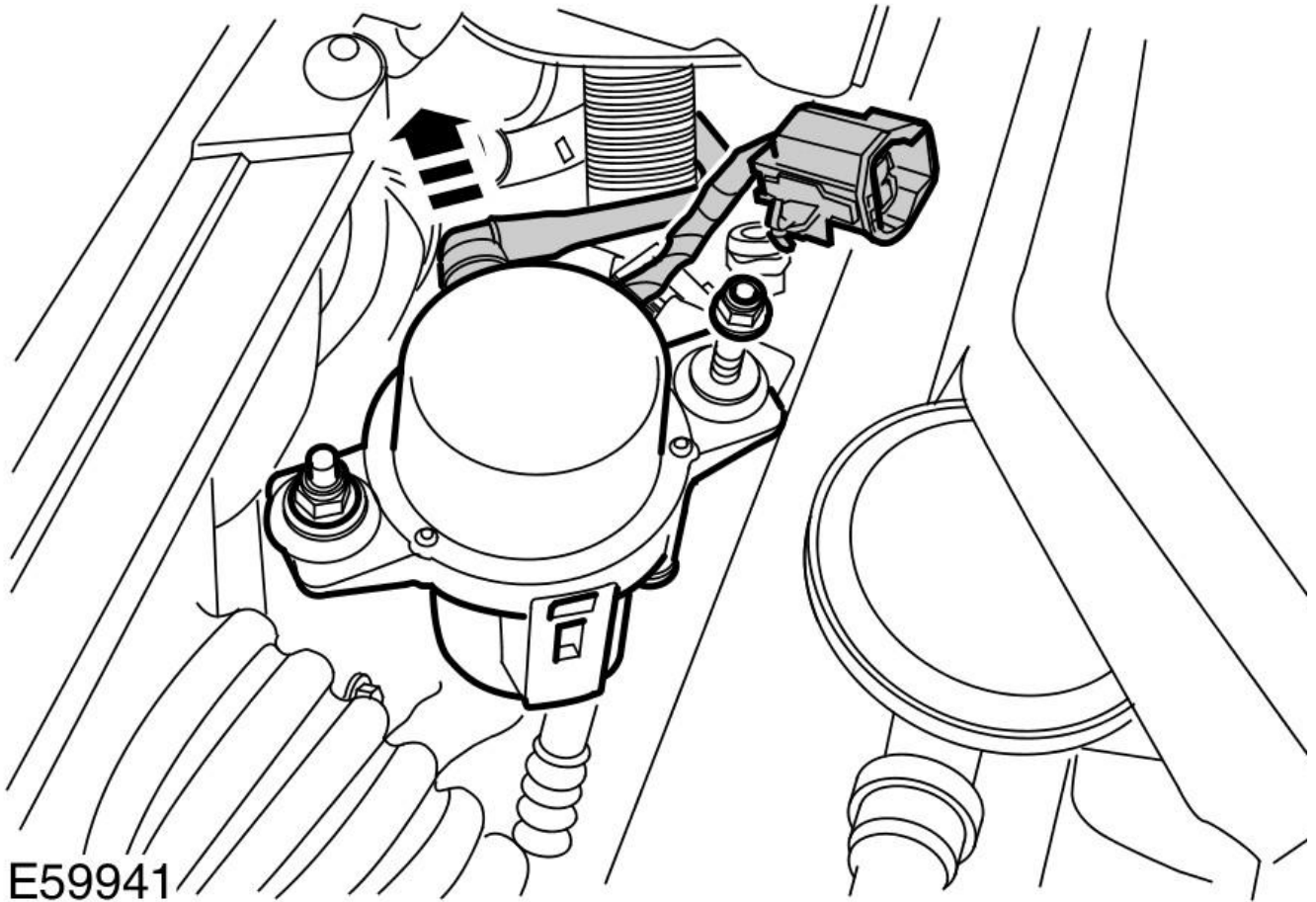


16. Connect the engine oil temperature sensor electrical connector.

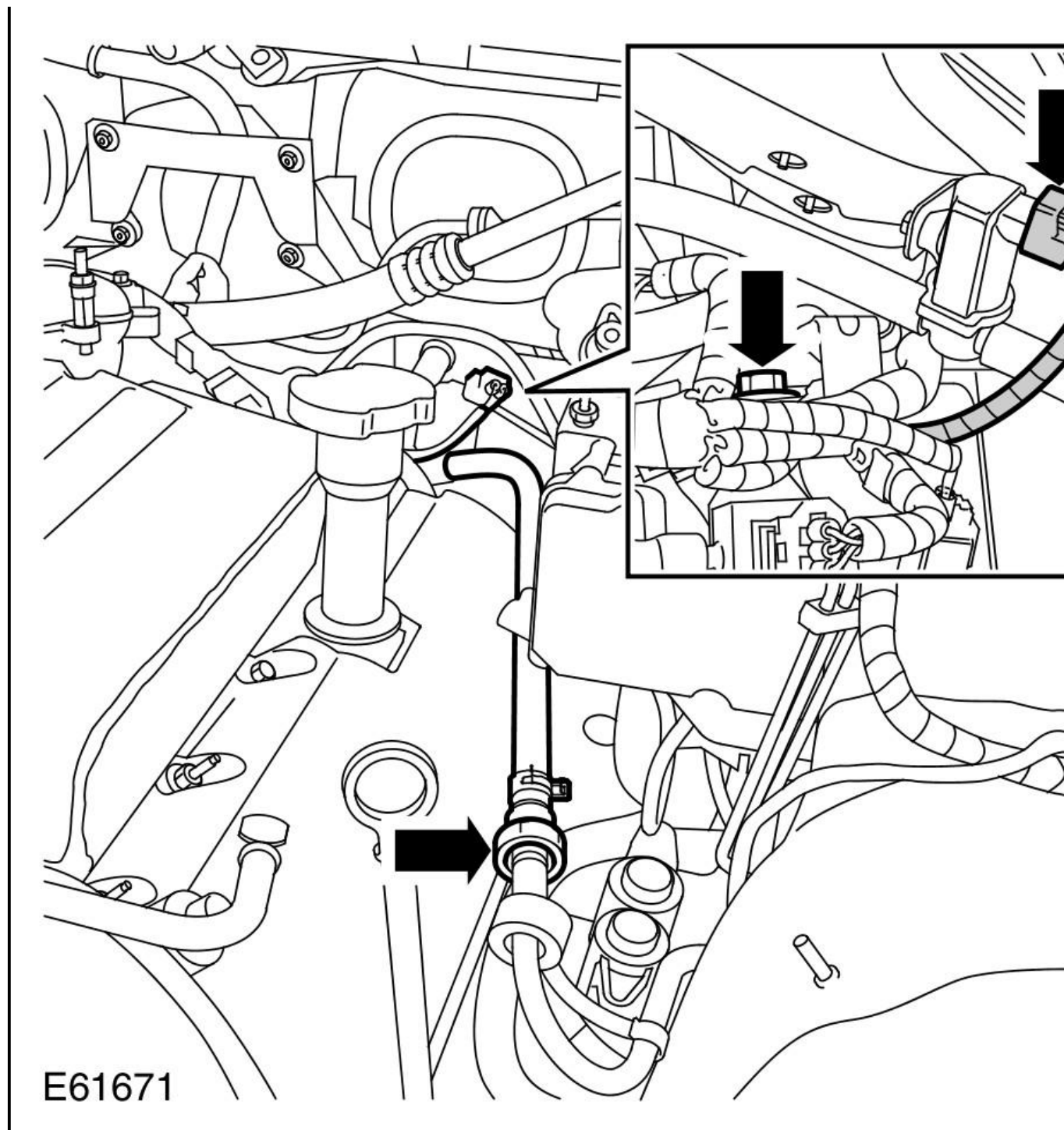


17. Connect the power steering pump high-pressure line.

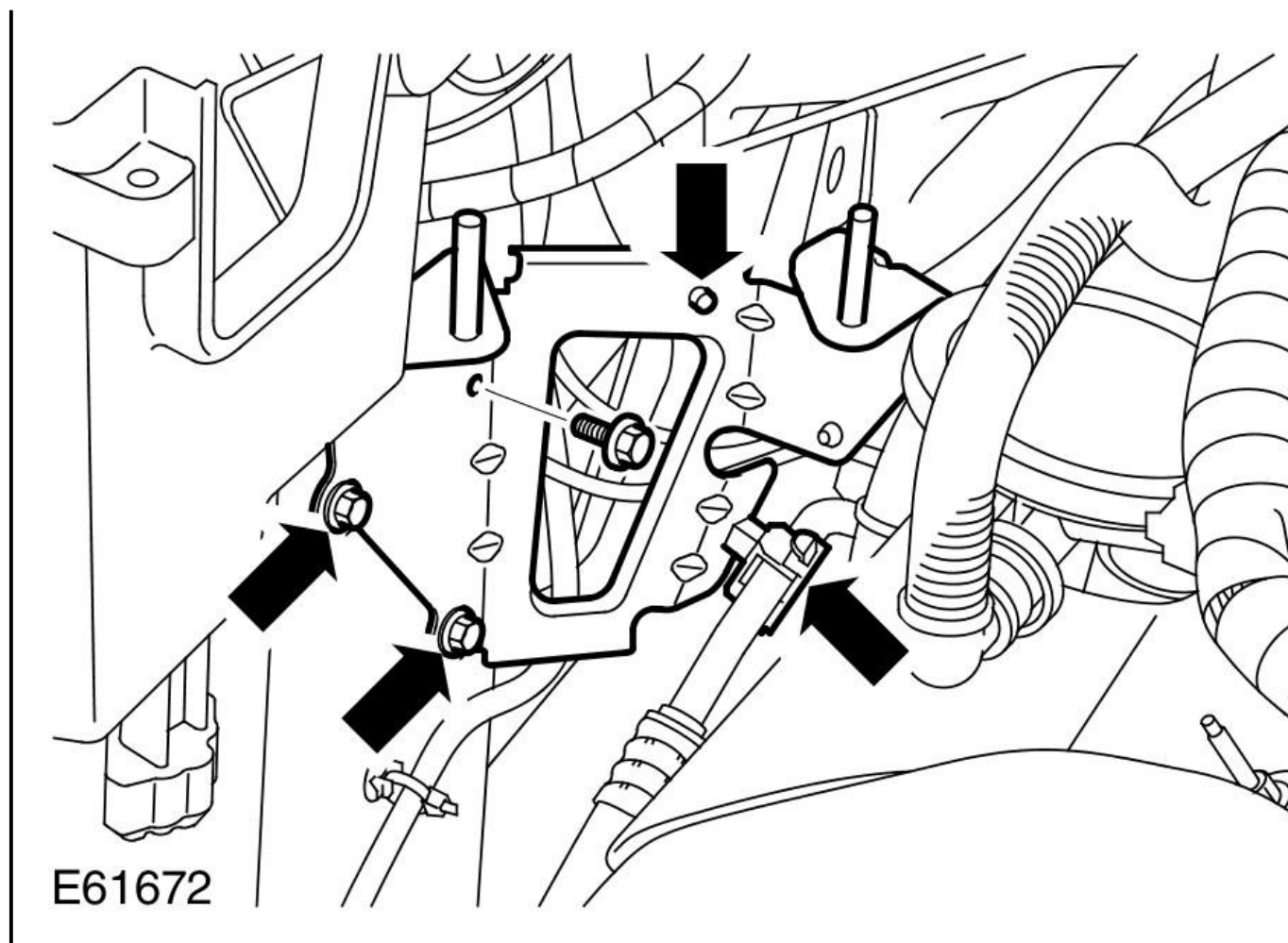
- Clean the component mating faces.
- Install new sealing washers.
- Tighten the union to 25 Nm (18 lb.ft).



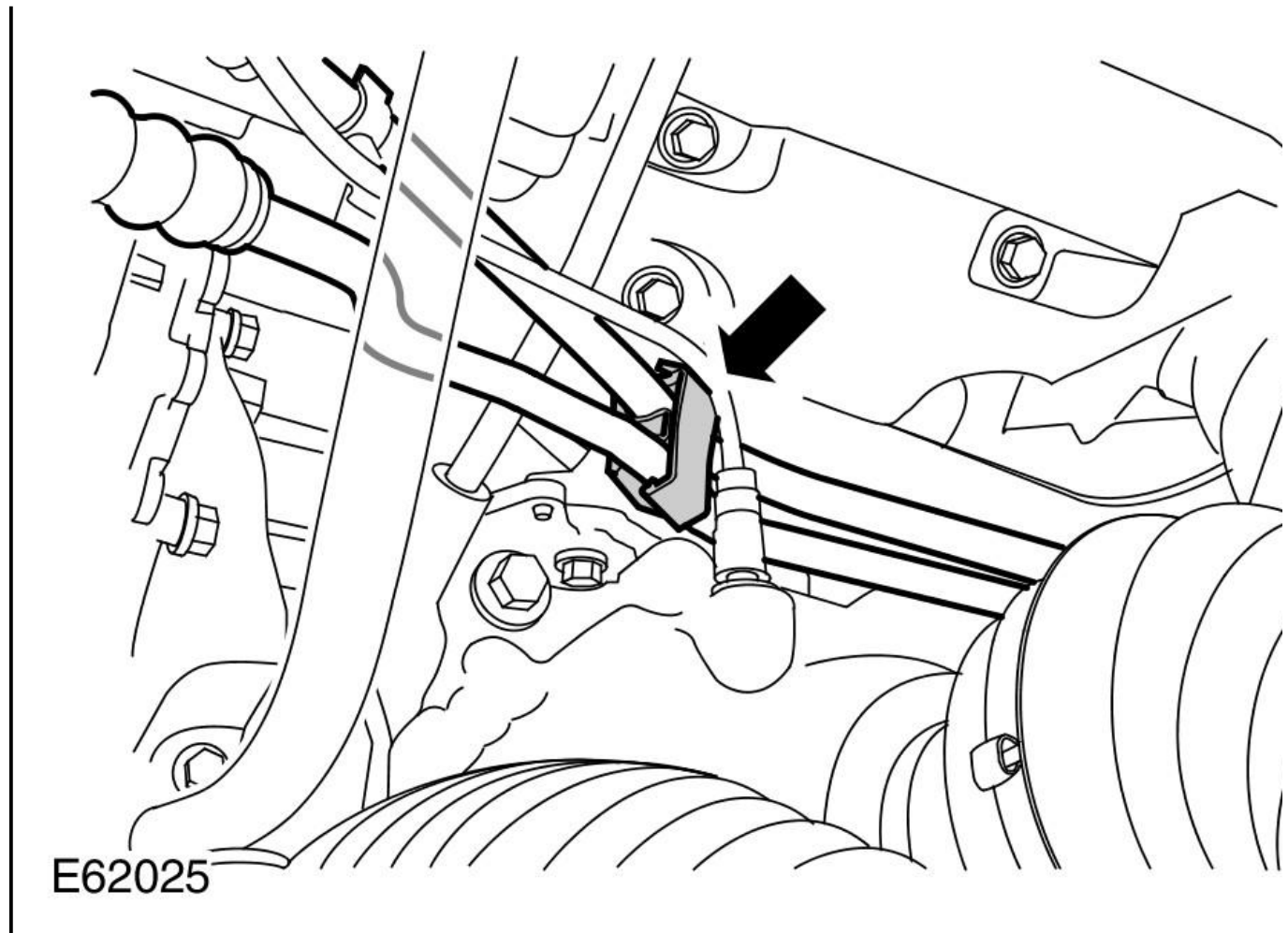
18. Connect the power steering supply hose to the steering pump.
- Clean the component mating faces.
 - Secure with the clip.



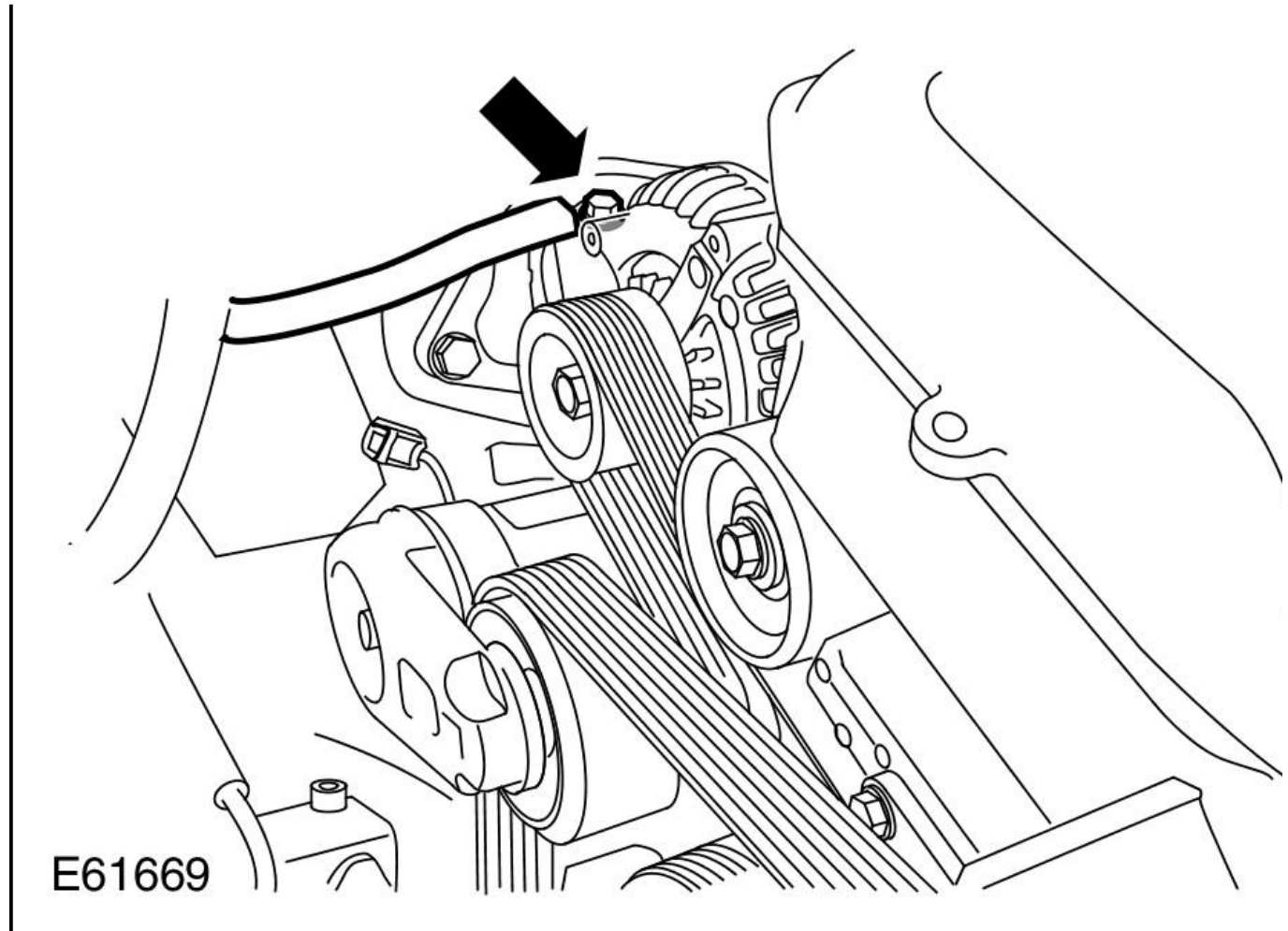
19. Secure the PAS pipe.



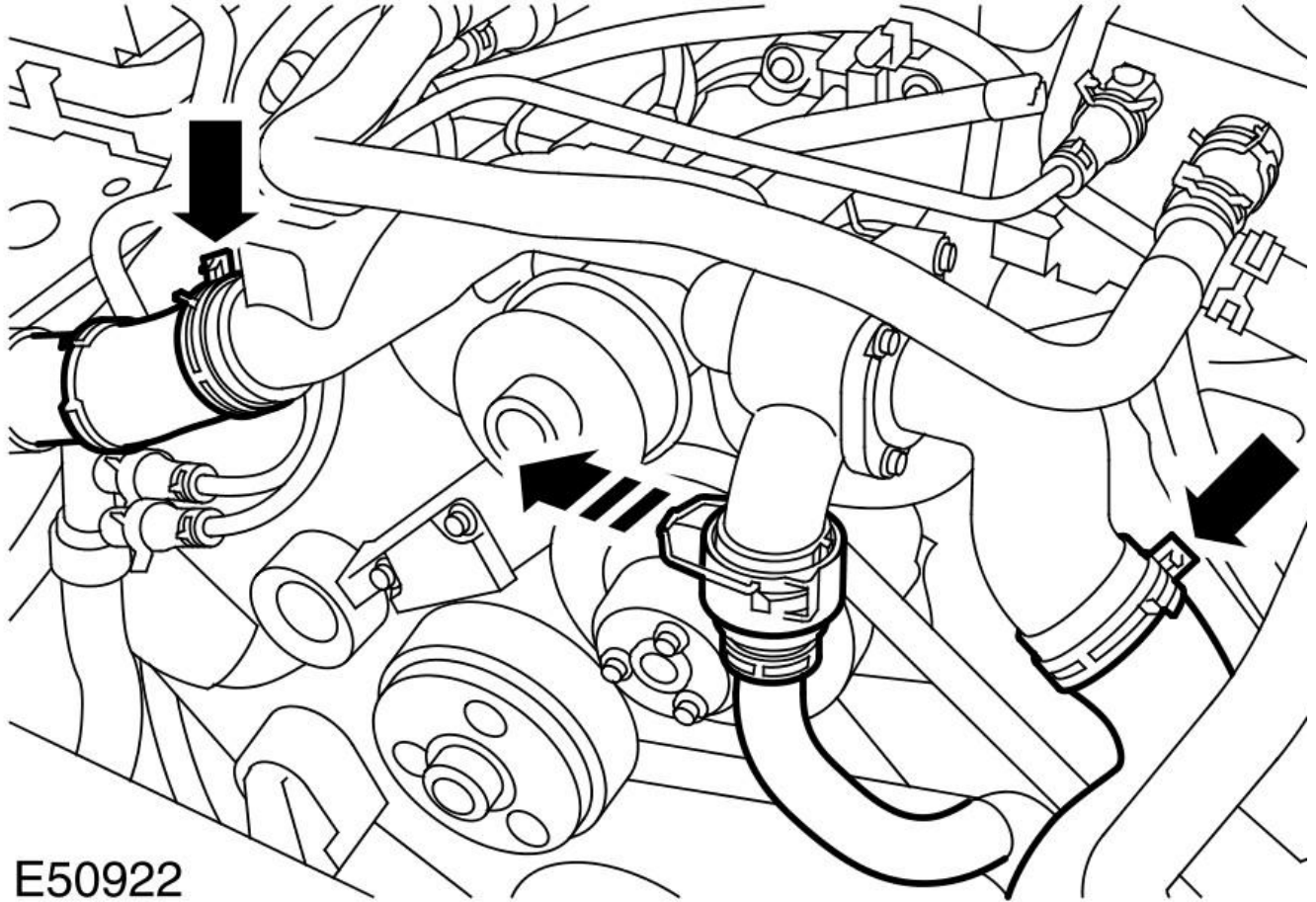
20. Remove the special tools.



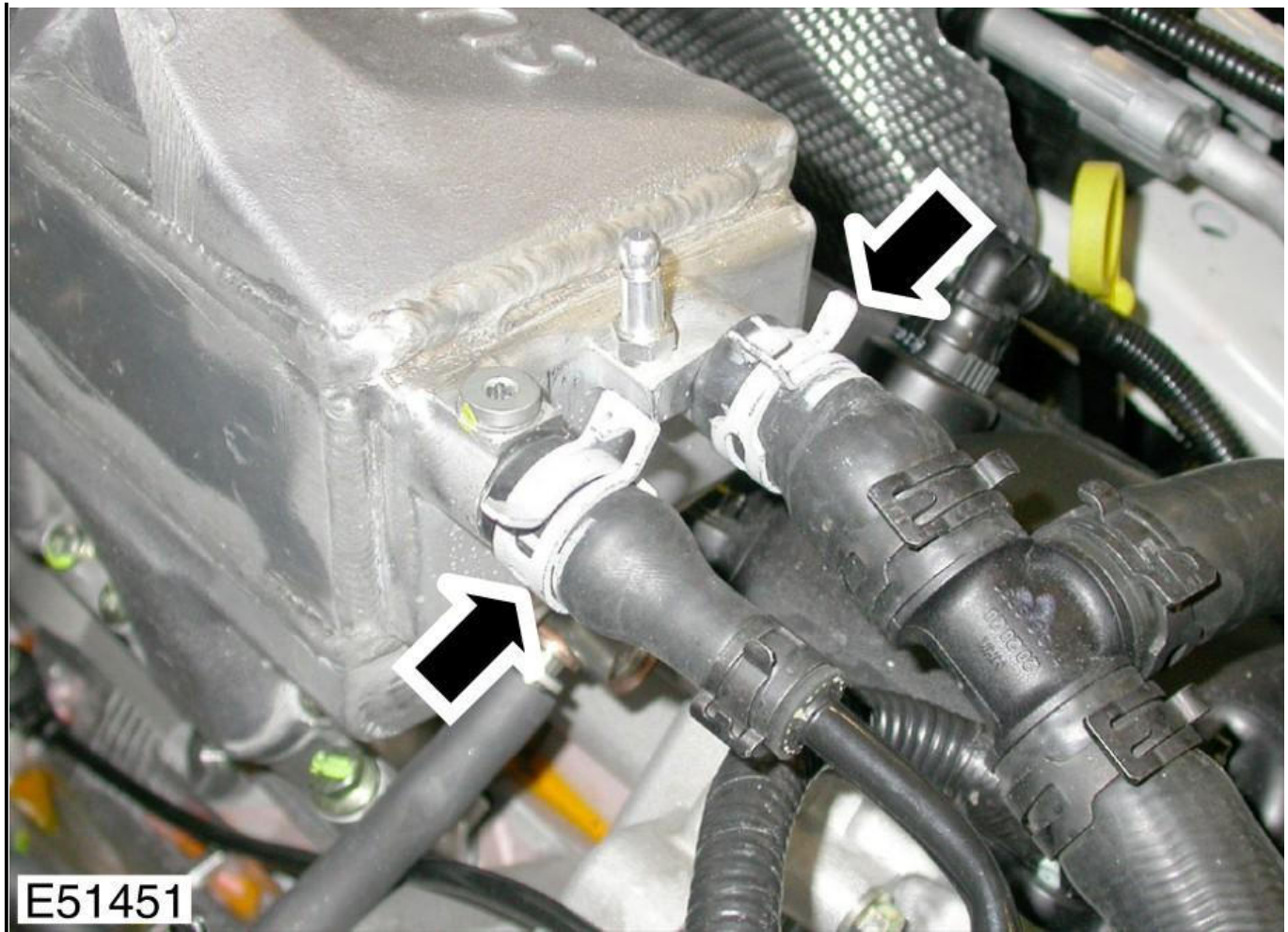
21. Connect the engine ground cable.
- Tighten the bolt to 25 Nm (18 lb.ft).



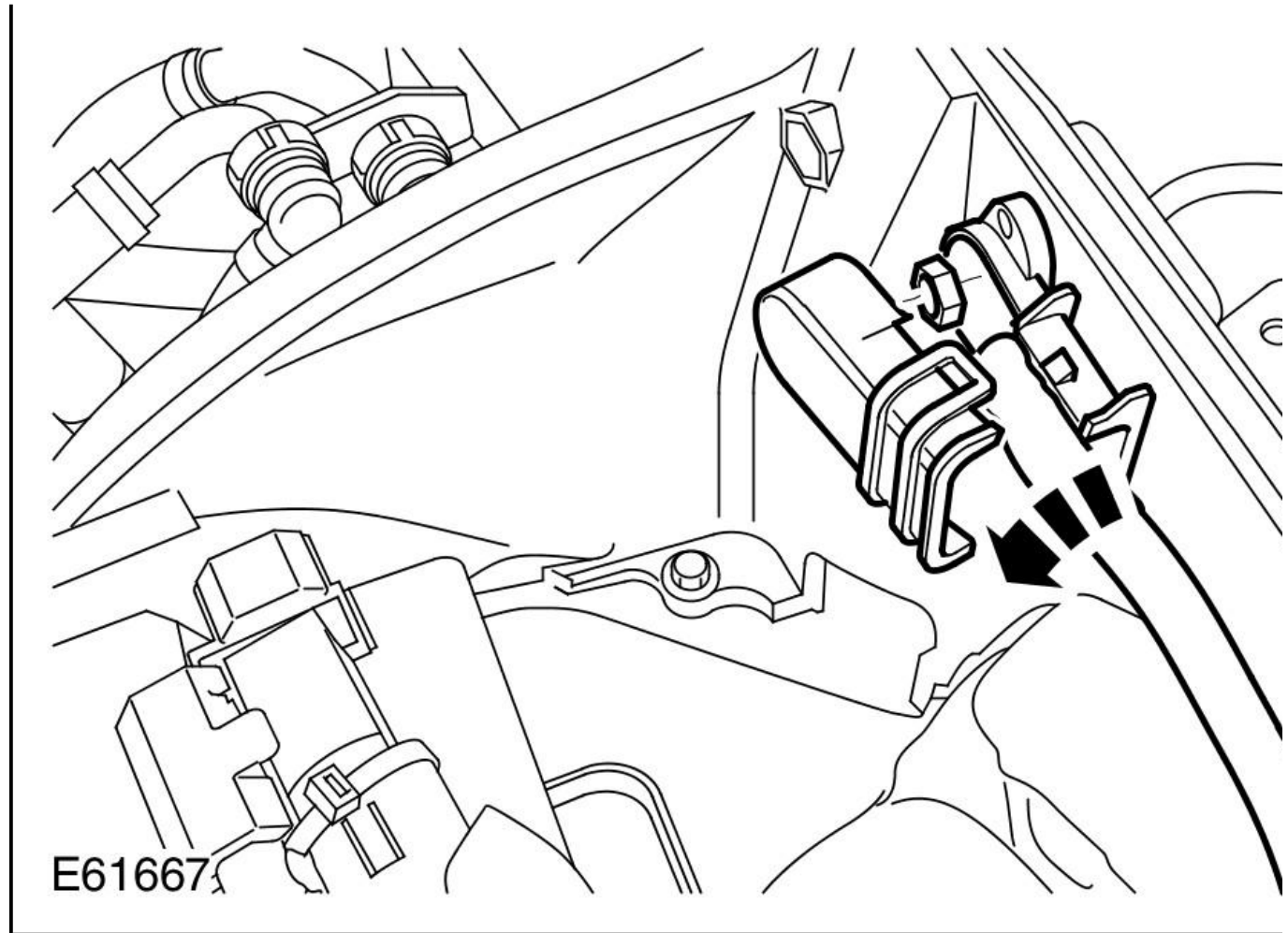
22. Connect the coolant manifold hoses.
- Secure with the clips.



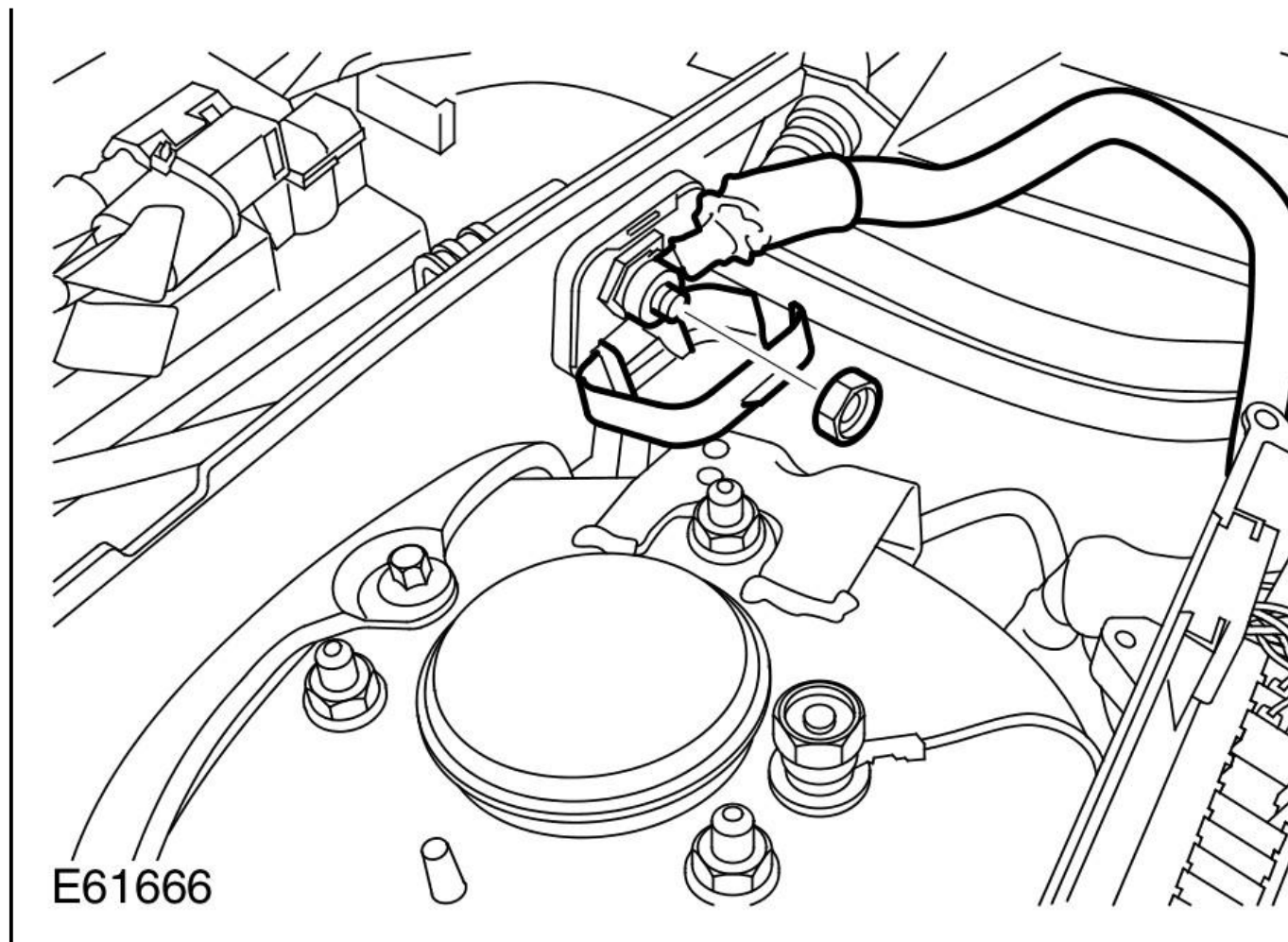
23. Connect the charge air cooler coolant hoses.
- Secure with the clips.



24. Install the transmission fluid cooler. Refer to **TRANSMISSION FLUID COOLER** .
25. Connect the coolant expansion tank hose.
 - Secure with the clip.

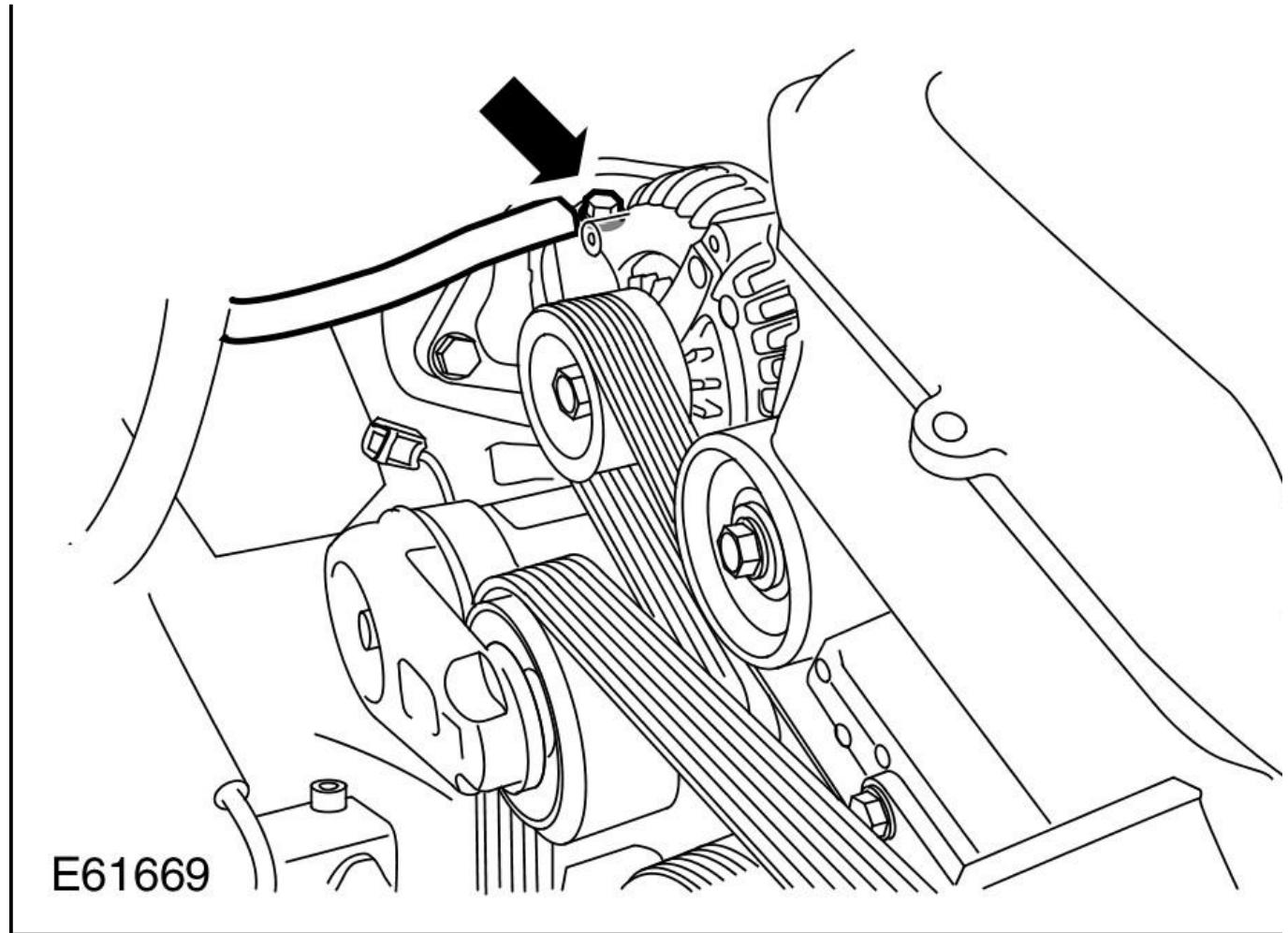


26. Install the brake vacuum pump bracket.
- Attach the wiring harness clip.
 - Attach the refrigerant line clip.
 - Tighten the bolts to 10 Nm (7 lb.ft).



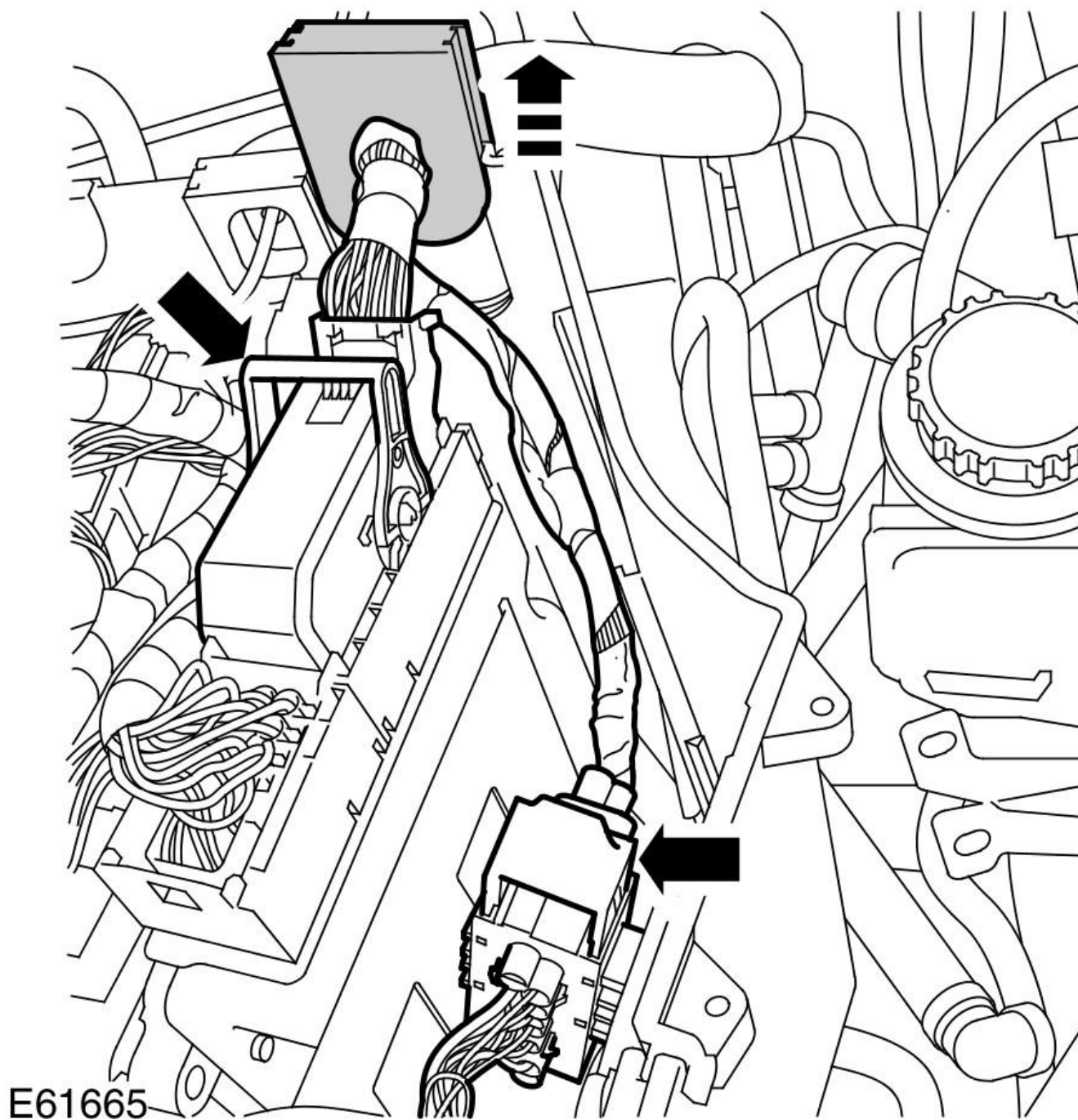
27. Install the brake vacuum pump.

- Tighten the nuts to 5 Nm (4 lb.ft).
- Connect the vacuum line.
- Connect the electrical connector.

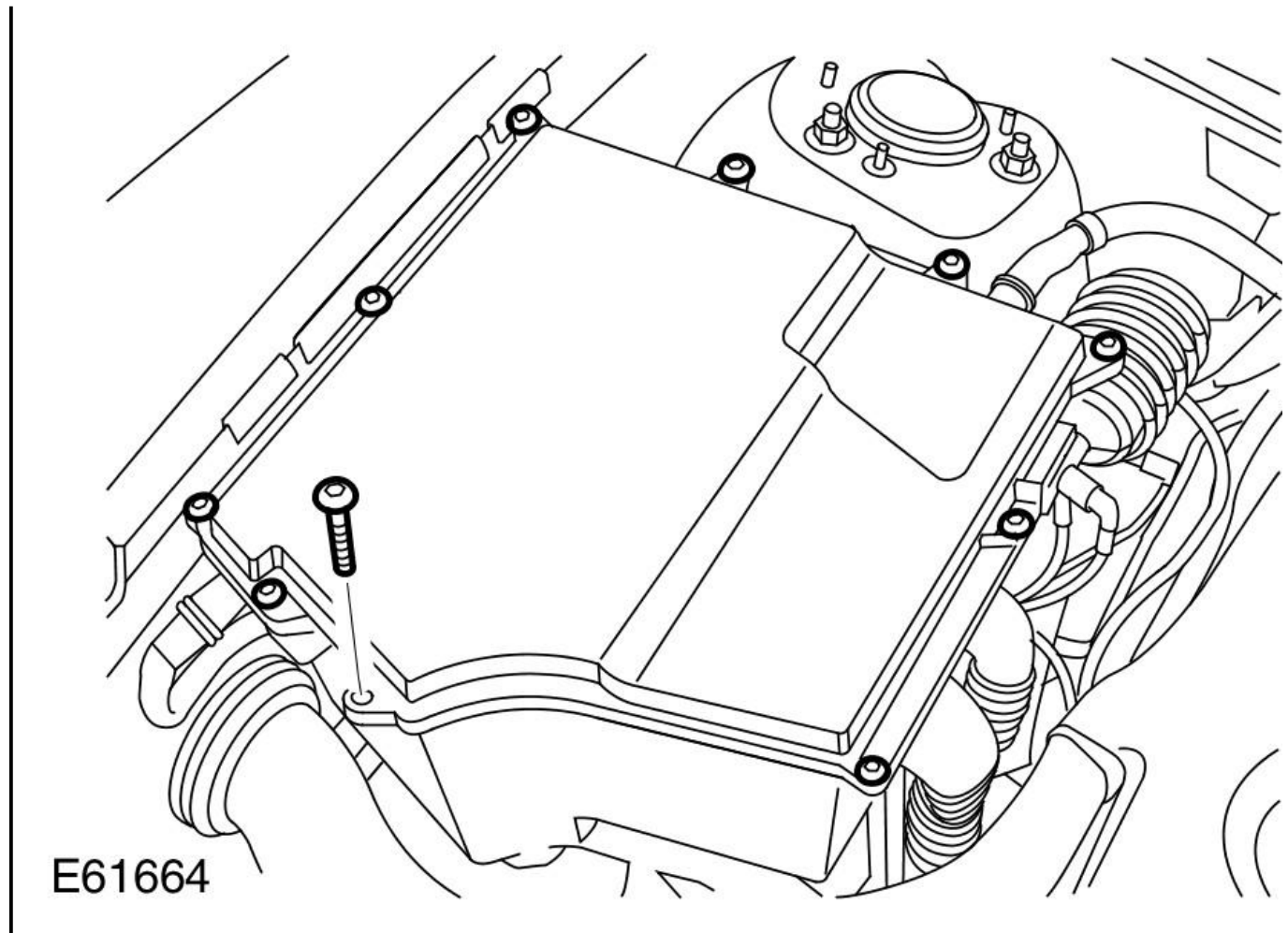


28. Secure the engine wiring harness.

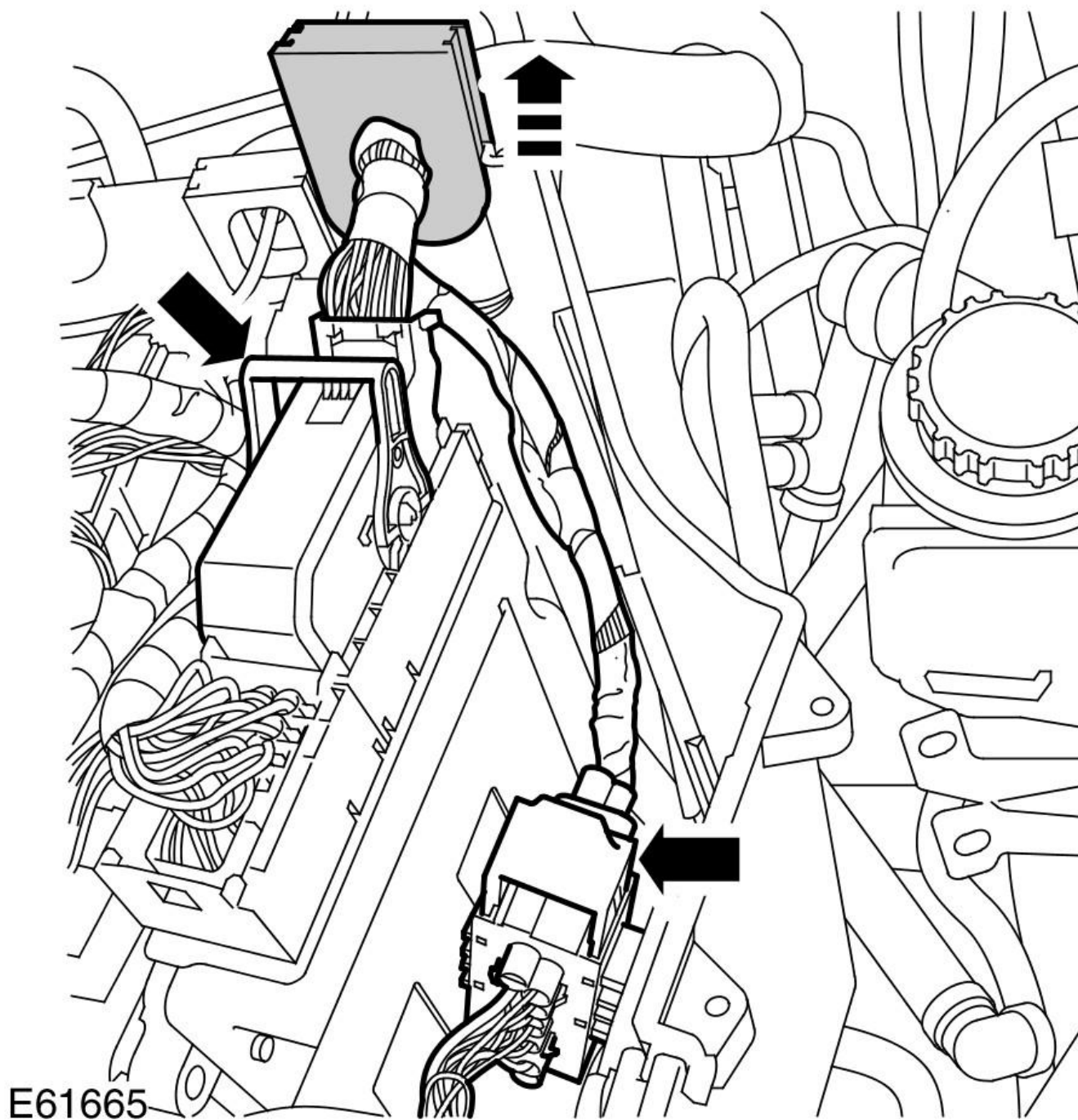
- Install the grommet.
- Connect the electrical connectors.



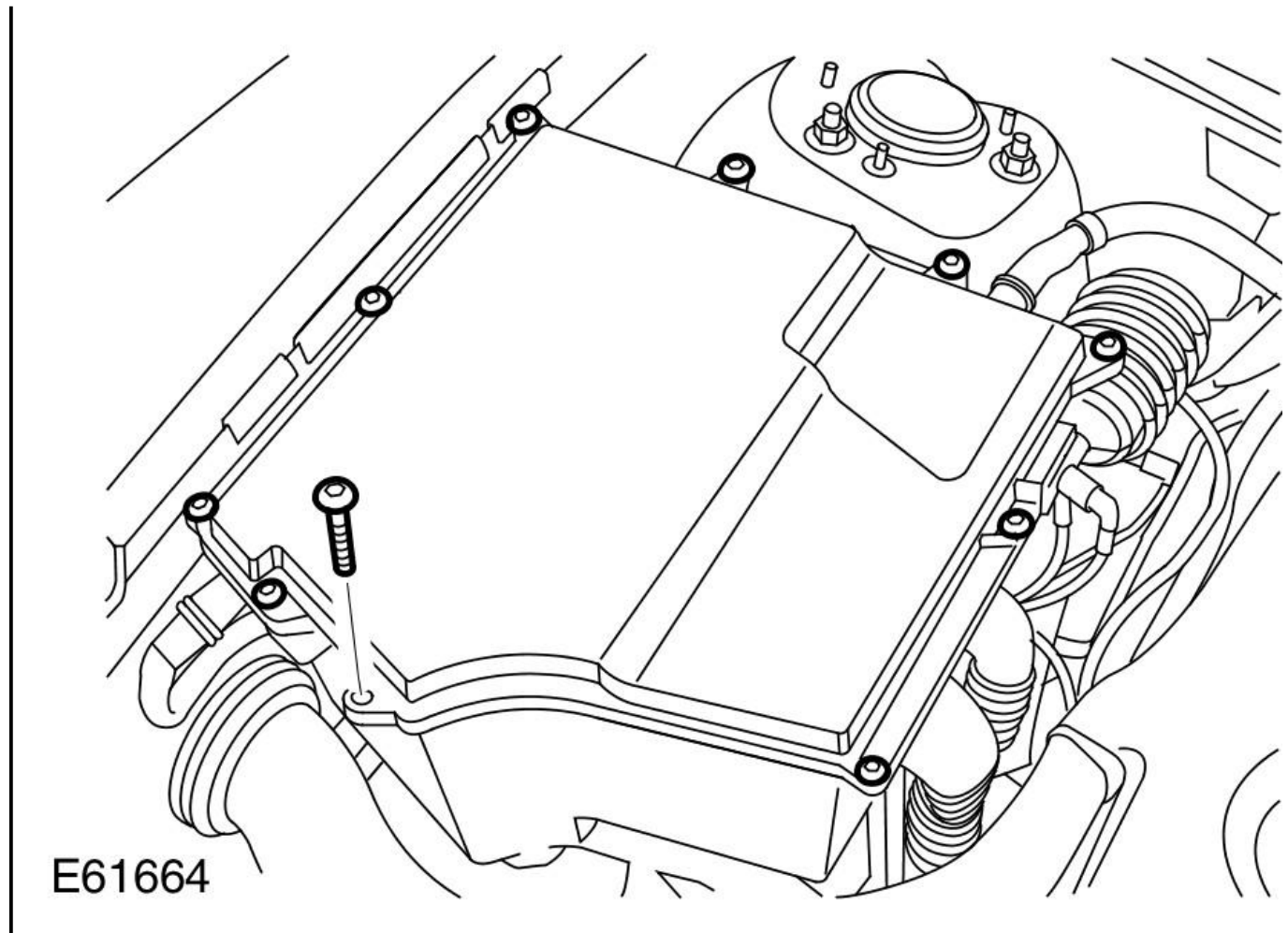
29. Install the ECM cover.
- Tighten the Torx screws.



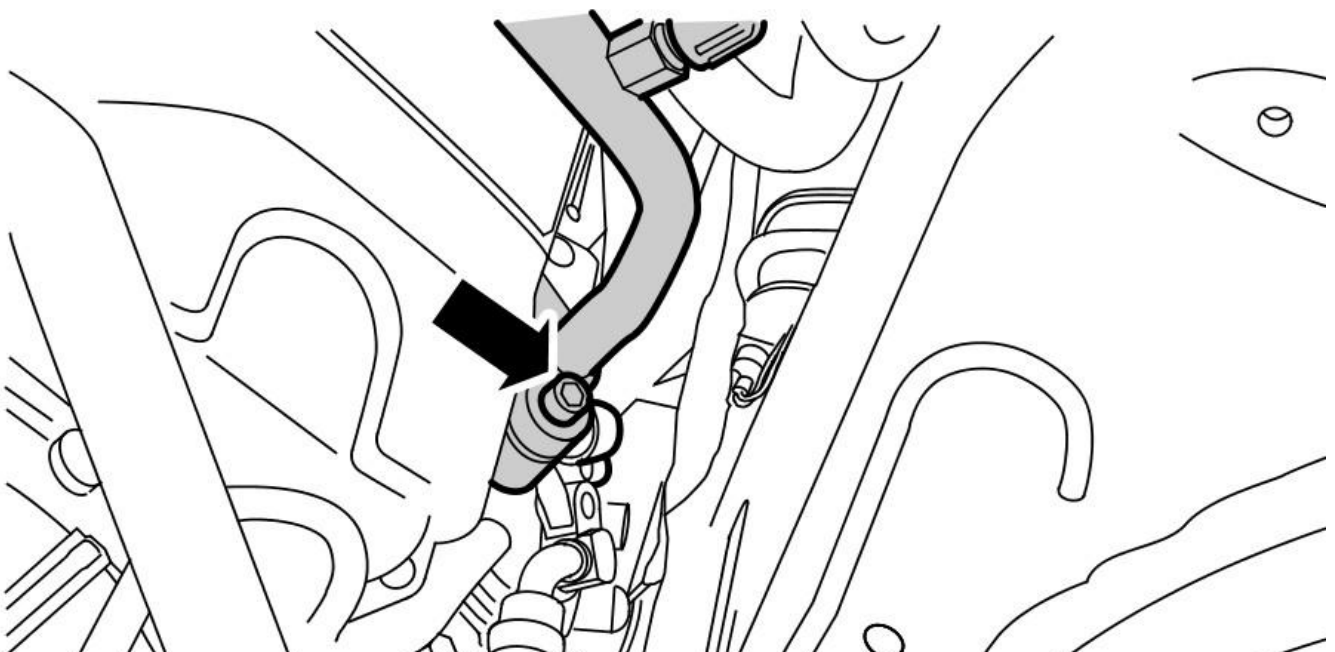
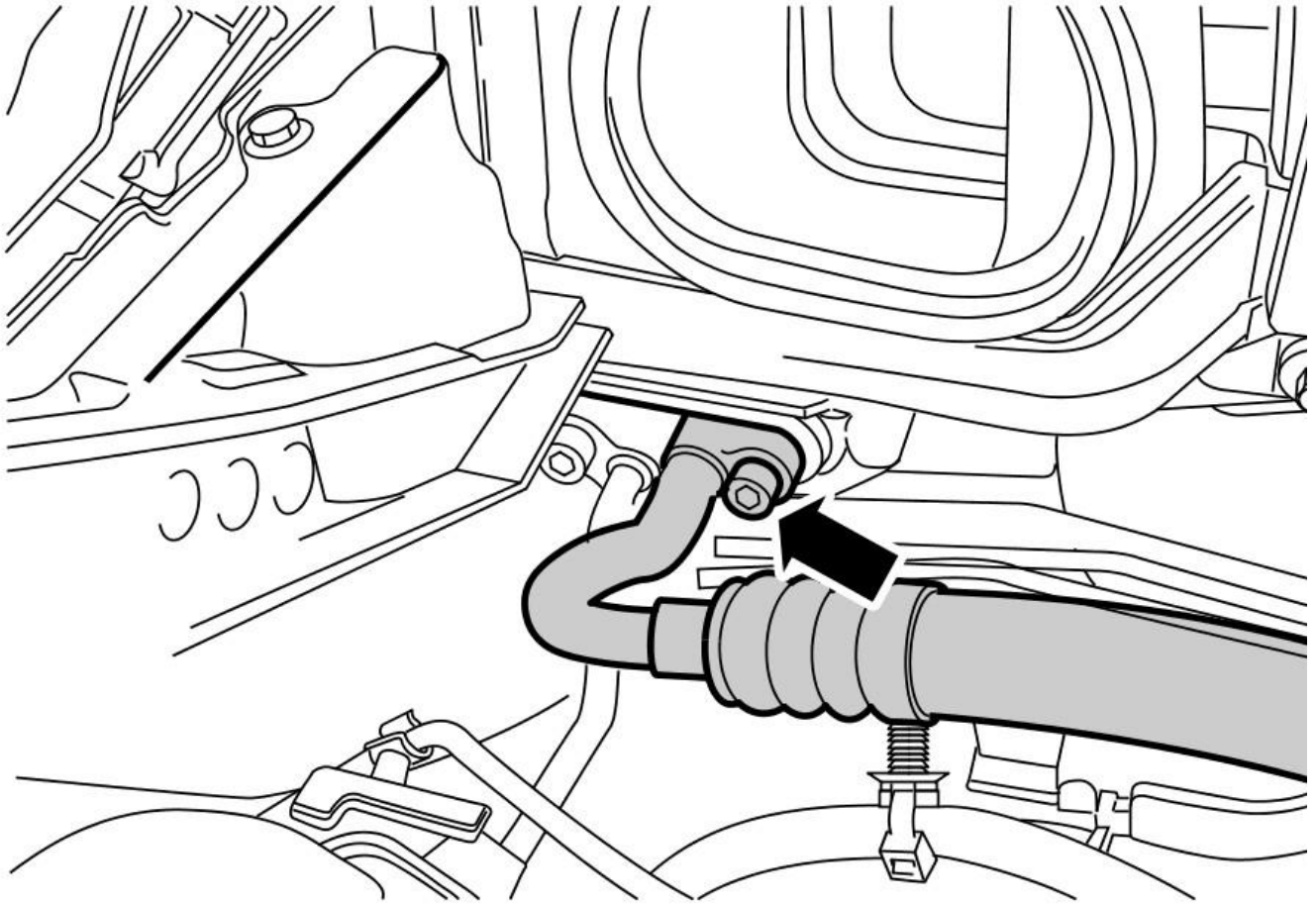
30. Attach the purge valve assembly.
- Tighten the bolt to 45 Nm (33 lb.ft).
 - Connect the quick release connector.
 - Connect the electrical connector.



31. Connect the brake booster vacuum hose.



32. Connect the fuel line to the fuel rail.
 - Clean the component mating faces.
 - Secure the clip.
33. Connect the bulkhead to engine coolant hoses.
 - Connect the quick release connectors.



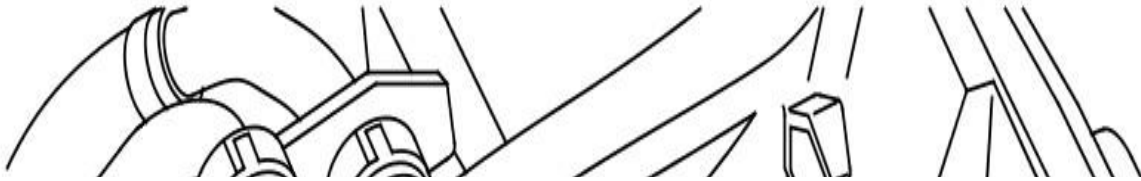
34. Connect the battery positive cable to the junction box.

- Tighten the nut to 25 Nm (18 lb.ft).
- Close the cover.



35. Connect the battery positive cable to the battery compartment side wall.

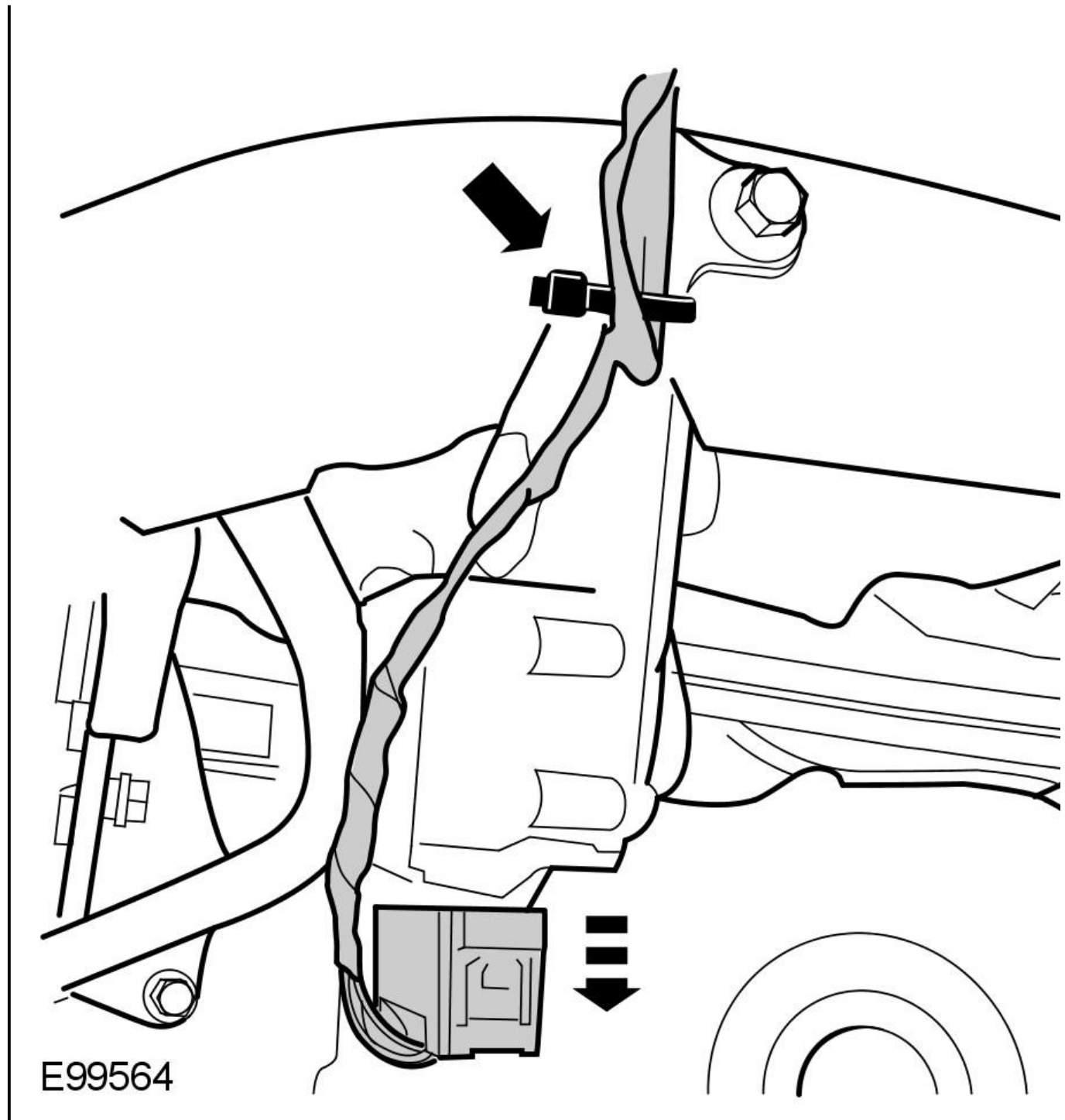
- Tighten the nut to 25 Nm (18 lb.ft).
- Install the cover.



CAUTION: Lubricate the new seals with clean refrigerant oil.

36. Connect the A/C compressor low-pressure refrigerant line.

- Clean the component mating faces.
- Install the new O-ring seals.
- Tighten the bolts to 10 Nm (7 lb.ft).



37. Connect the battery ground cable. Refer to **SPECIFICATIONS** .
38. Install the RH air cleaner assembly. Refer to **AIR CLEANER** .
39. Fill the engine with oil. Refer to **ENGINE OIL DRAINING AND FILLING** .
40. Refill the cooling system. Refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
41. Re-charge the air conditioning system. Refer to **AIR CONDITIONING (A/C) SYSTEM**

RECOVERY, EVACUATION AND CHARGING .

42. Install the engine cover. Refer to **ENGINE COVER - 4.2L, VEHICLES WITH: SUPERCHARGER .**
43. Carry out a complete vehicle geometry check and adjustment.
44. Using the approved diagnostic equipment, clear the powertrain control module (PCM) adaptations.