The use of compact graphite iron allows the cross sectional areas of the casting to be reduced, compared with a conventional gray cast iron block. This ensures reduced engine weight and length, with higher structural capabilities.

To maintain the stiffness of the bottom end of the cylinder block and crankshaft system, the cylinder block has a deep skirt and bearing cap design. Each of the main bearing caps is double bolted at each side of the crankshaft bearing and cross bolted back to the cylinder block.

The cylinder block assembly is further stiffened by coupling it to a separate die cast aluminium stiffening frame, which is bolted to the cylinder block skirt faces and to the bearing caps.

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

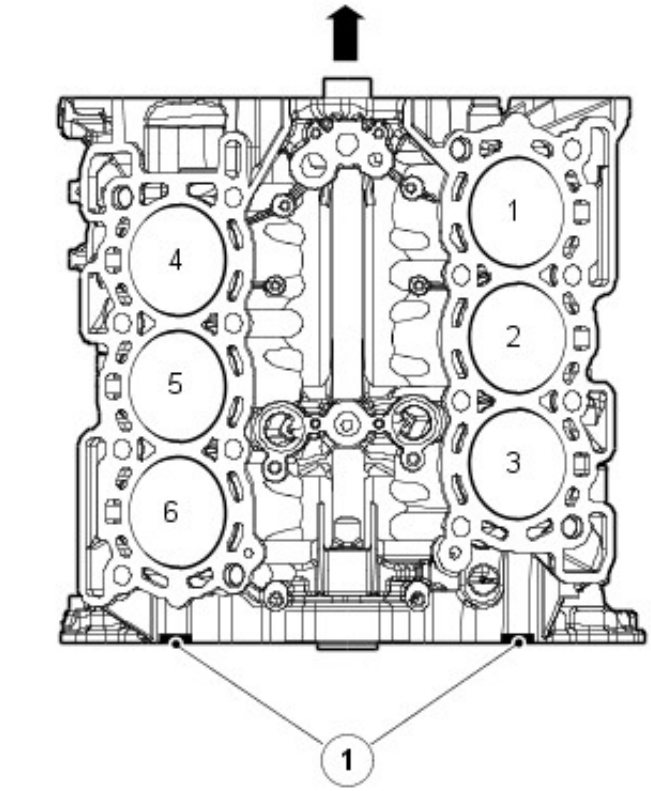
A tapping at the rear of the cylinder block connects a pipe to the turbochargers by means of banjo connections. Oil is supplied, under pressure via this tapping, from the oil pump to provide lubrication for the bearings of the turbochargers.

Cylinder cooling is achieved by coolant circulating through chambers in the cylinder block casting.

Two hollow metal dowels are used to locate the cylinder heads to the cylinder block, 1 on each side at the rear of the unit.

A port is included at the RH (right-hand) and LH (left-hand) side of the cylinder block, below each of the turbochargers, to connect the turbochargers oil return pipe to the oil pan.

Two coolant drain plugs are installed in the cylinder block; one is fitted in the rear RH side, and the other is fitted in the middle of the cylinder block on the LH side.

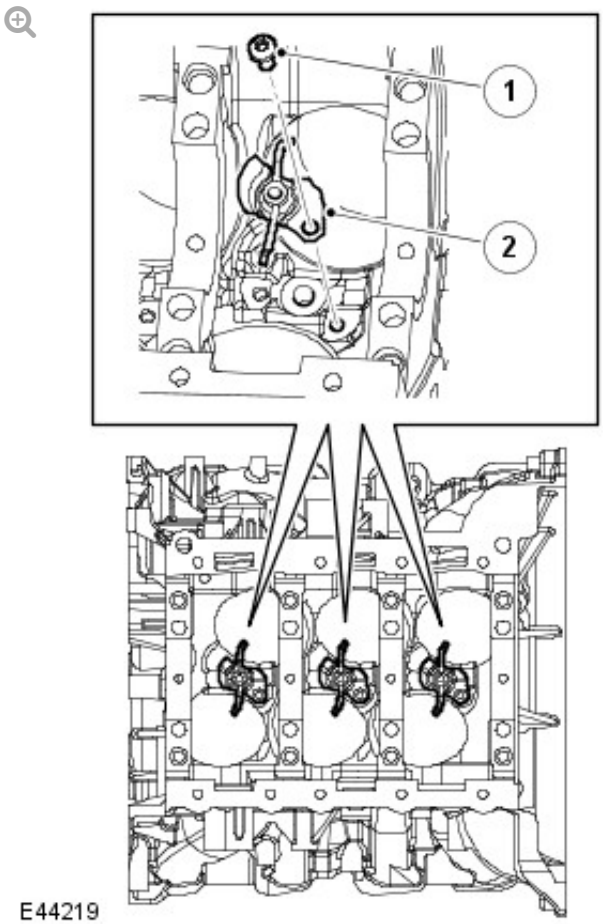


E44217

NOTE: ARROW INDICATES FRONT OF ENGINE

1	Engine data locations

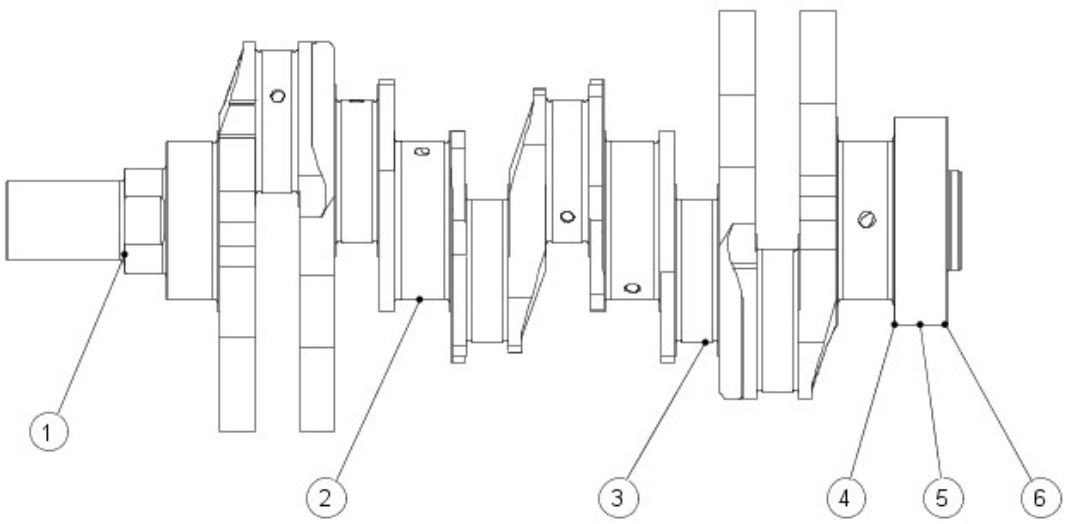
Engine data is marked at 2 locations at the back of the cylinder block. Component diameters are represented by alphabetical and numerical codes; keys to the codes are in the removal and installation section of this manual.



1	Bolt
2	Cooling jet

Jets located in the cylinder block provide piston and piston pin lubrication and cooling. These jets spray oil onto the inside of the piston, the oil then flows through 2 internal wave shaped channels to help cool each piston crown.

CRANKSHAFT



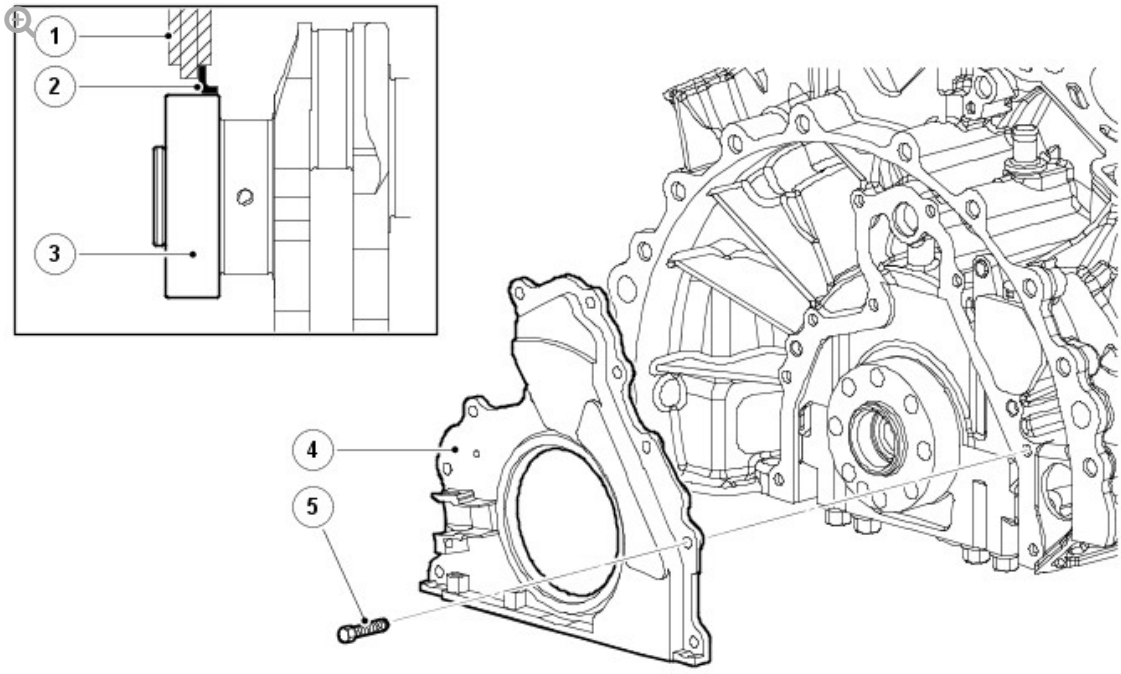
E52135

1	Oil pump drive
2	Main bearing Journal
3	Connecting rod bearing journal
4	Rear drive flange
5	Rear oil seal location
6	Trigger wheel location

The crankshaft is forged steel and fillet rolled with induction hardened journals, which run in 4 bearings with clamped 2 layer bearing shells. The upper and lower shells of bearing number 4 are flanged, which limits the end float of the crankshaft. The main bearing caps are double bolted and cross bolted to increase the strength and rigidity of the engine block.

The main bearings are aluminum/tin split plain selective bearings. An oil groove in the top half of each bearing transfers oil into the crankshaft for lubrication of the connecting rod bearings. The upper and lower shells of bearing number 4 contain integral thrust washers, which limit the end float of

the crankshaft.



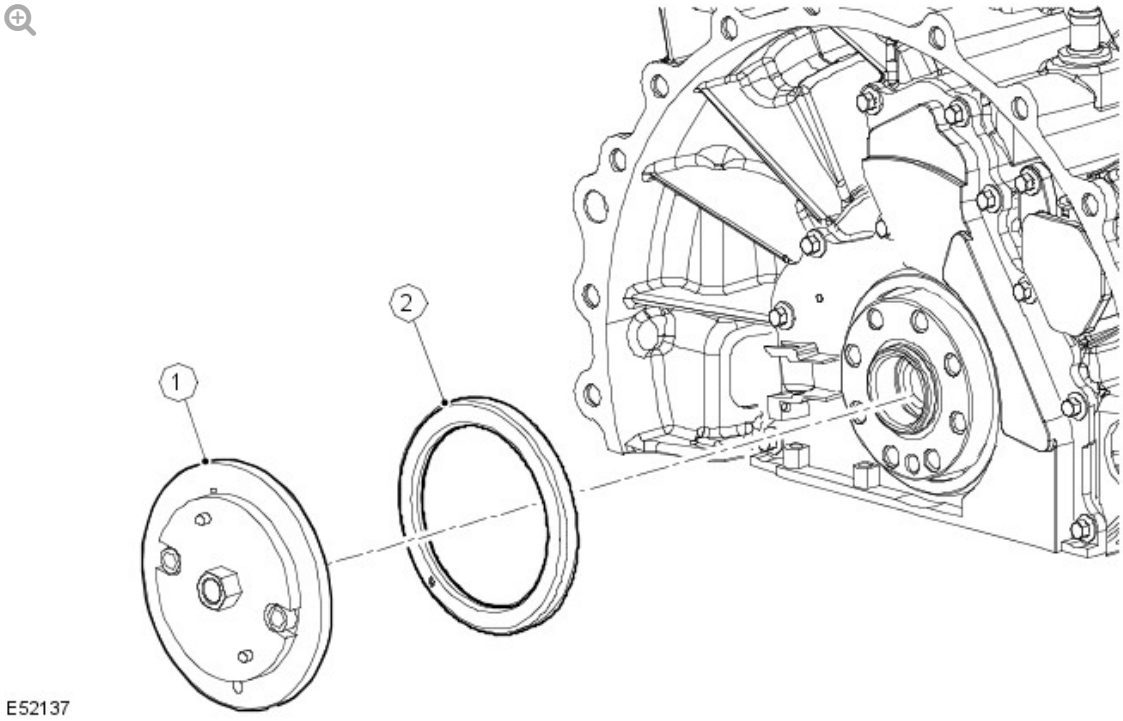
E44227

1	Housing
2	Seal
3	Crankshaft
4	Rear oil seal retainer
5	Bolt (10 off)

The rear main oil seal and retainer assembly is a one-piece unit and is supplied with its own plastic fitting sleeve. The seal and retainer have 2 locating dowels, 10 fixing bolts and a rubber seal. In addition, the retainer has a location for the crankshaft position sensor.
Refer to: Electronic Engine Controls (303-14A Electronic Engine Controls - TDV6 3.0L Diesel, Description and Operation).

A torsional vibration crankshaft damper pulley is bolted to the front of the

crankshaft.

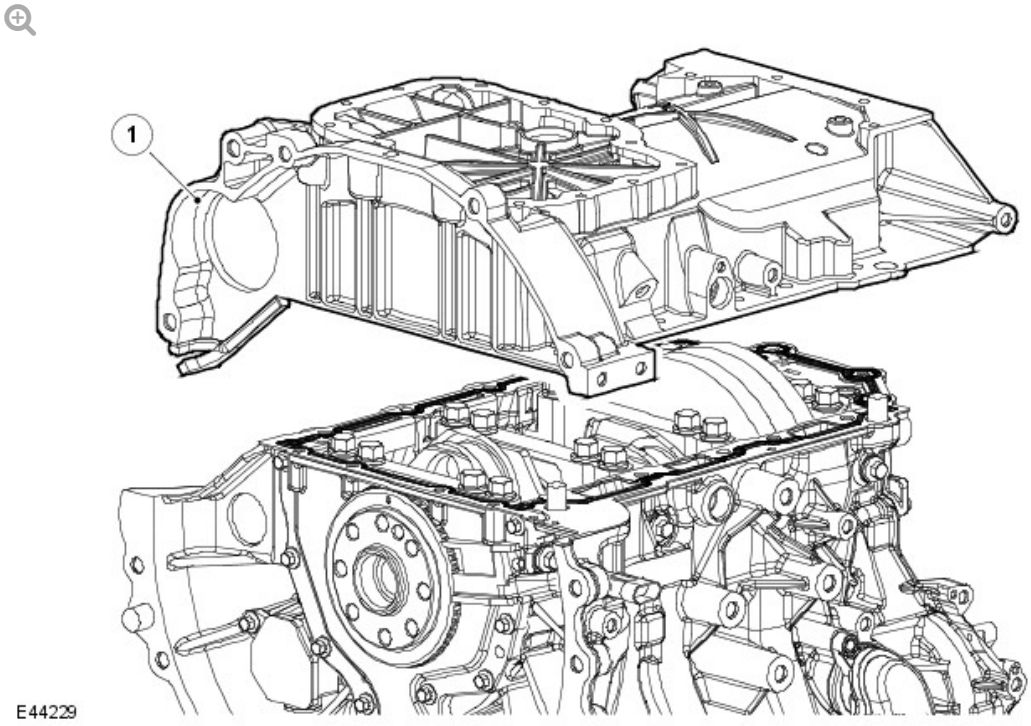


1	Special Tool
2	Trigger wheel

The crankshaft trigger wheel is located on the rear of the crankshaft. It is pressed onto the crank using a special tool, which also precisely aligns the trigger wheel for crankshaft position and timing.

The trigger wheel consists of 60 magnets minus 2 for ECM crankshaft position reference and synchronization. The magnets cannot be seen on the trigger wheel, which therefore can only be positioned using a special tool.
Refer to: Electronic Engine Controls (303-14A Electronic Engine Controls - TDV6 3.0L Diesel, Description and Operation).

If the trigger is removed for any reason, then a new trigger wheel must be fitted.



1	Stiffening Frame

The stiffening frame is fitted to the lower cylinder block to stiffen the base structure of the engine, helping to reduce noise, vibration and harshness. The frame is made of high-pressure die cast aluminum and also incorporates an oil baffle plate to reduce oil foaming and splash.

The stiffening frame is secured to the cylinder block with 2 dowels, 2 locator pins for the gasket and 18 retaining bolts; 3 different lengths of bolts are used:

- M6 x 20 (6 off)
- M8 x 75 (4 off)
- M6 x 105 (8 off).

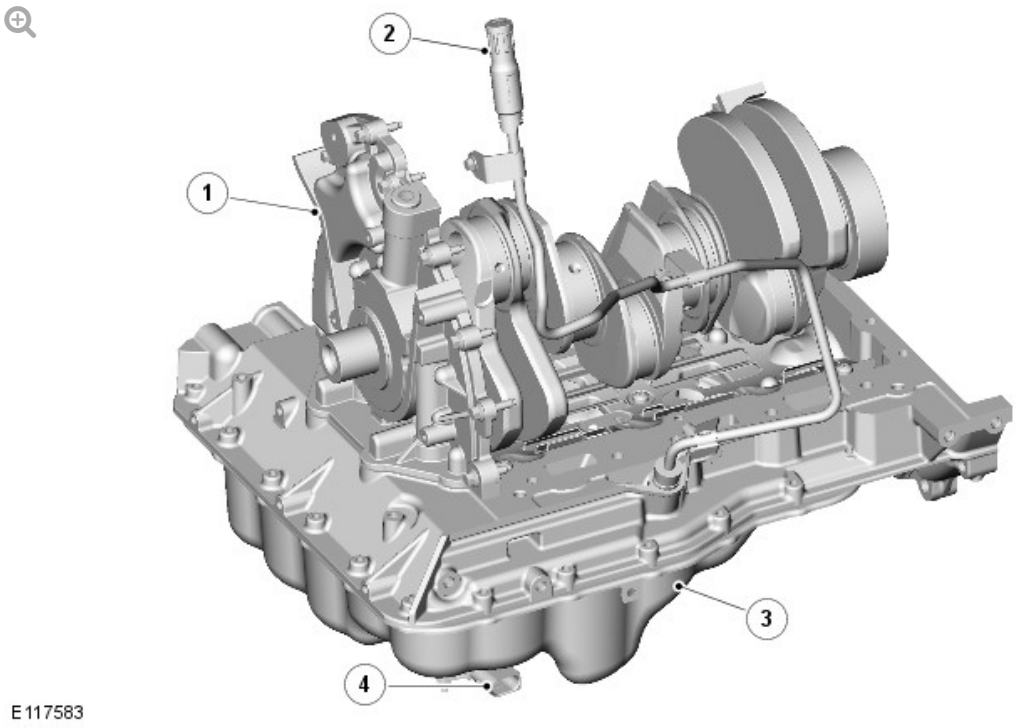
Iron inserts, cast into the main bearing supports of the stiffening frame, minimize main bearing clearance changes due to heat expansion.

A gasket seals the joint between the stiffening frame and the cylinder block.

An oil pick-up pipe with an integral strainer, locates in the front of the stiffening frame to provide oil to the crankshaft driven oil pump.

OIL PAN COMPONENTS

A pressed steel oil pan, manufactured from a ‘sound deadening steel’ material, is bolted to the stiffening frame with 14 M6 x 16 bolts and is sealed with a reusable gasket. An engine oil drain plug and the oil level and temperature sensor are located towards the front of the oil pan.

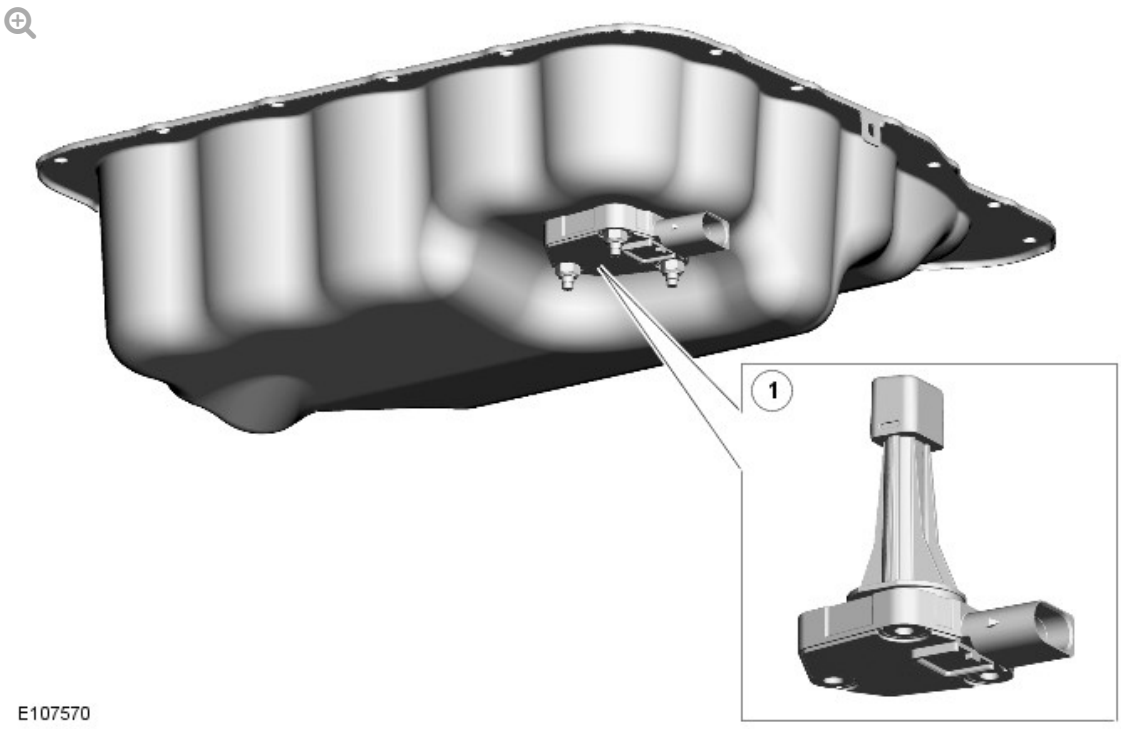


1	Oil pump
2	Oil suction tube
3	Oil pan
4	Oil level and temperature sensor

An ultrasonic sensor provides an electronic indication when the oil in the oil

pan is low or high. This removes the requirement for the mechanical dipstick. The sensor monitors the level of the oil continually during trips. An advantage in comparison with the static 'dipstick' method is that all marginal influences, for example vehicle being on a slope, lateral and longitudinal acceleration, are compensated for by averaging.

The values determined can be used to signal that the minimum oil level has been reached or to display the current oil level if required.

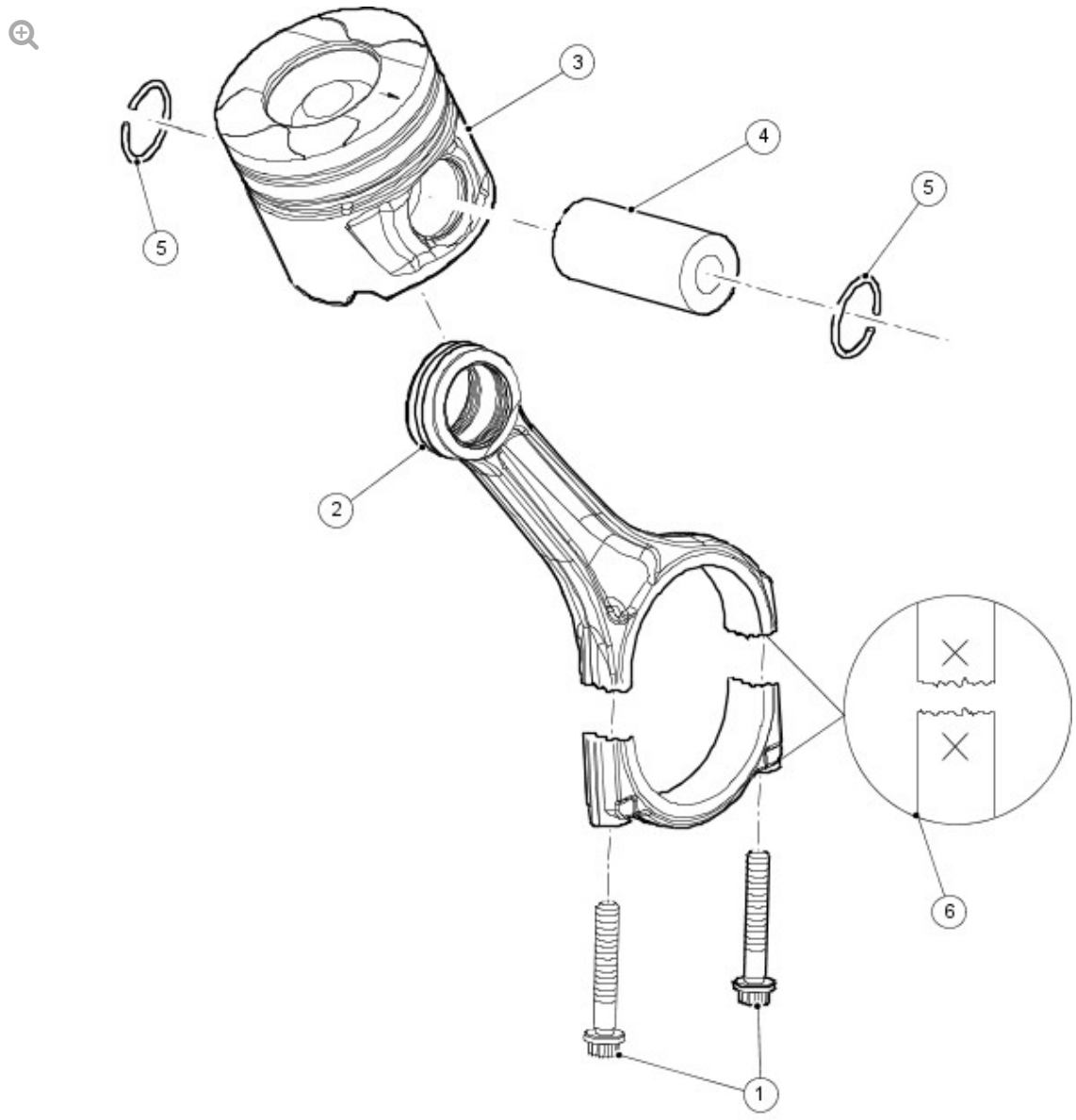


1	Oil level and temperature sensor

The sensor is mounted to the underside of the oil pan where it sends an ultrasonic pulse vertically upward, it then measures the time for the pulse to be reflected back from the top surface of the oil.

Warnings will be displayed in the message center if the oil level is not maintained within the safe operating levels (minimum and maximum). A warning will also be displayed if there is a fault with the oil level monitoring system.

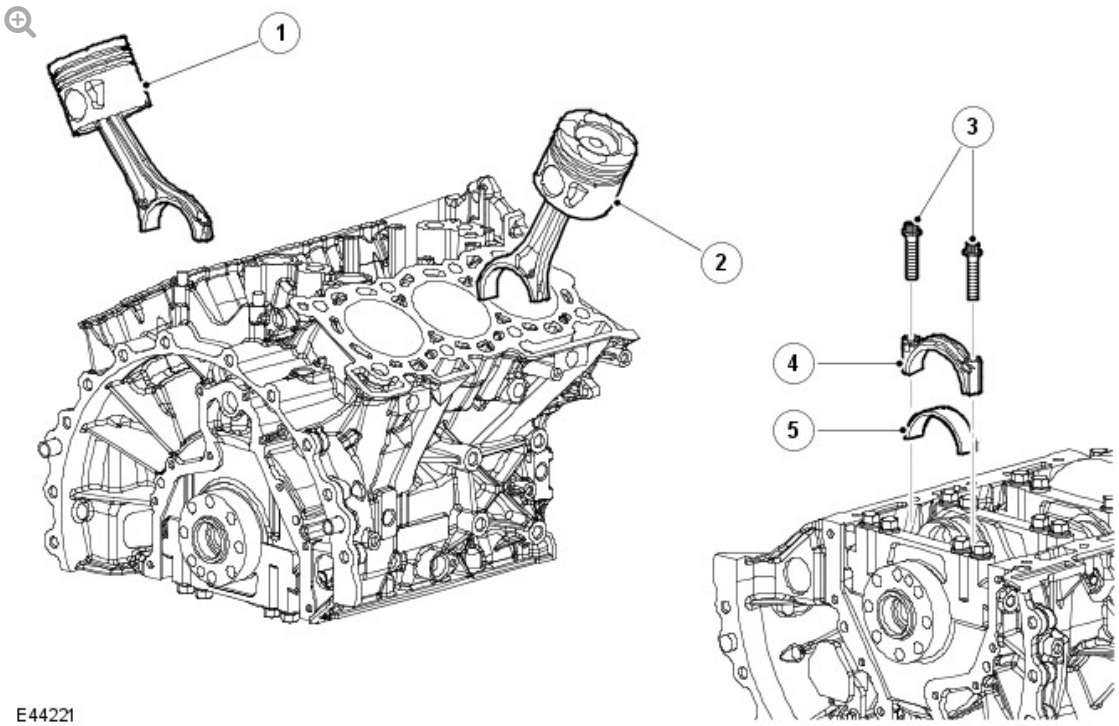
PISTON AND CONNECTING ROD ASSEMBLY



1	Connecting rod bolts (2 off)
2	Connecting rod
3	Piston
4	Piston pin
5	Circlips
6	Connecting rod identification

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 etched on adjoining sides of the joint to identify matching connecting rods and bearing caps. The selective connecting rod bearings are aluminum/tin split plain bearings. The connecting rod bearing is 'sputter coated', which is a manufacturing process that layers the bearing material to produce a higher load capacity for improved durability.

The connecting rods are not selective.



1	Piston and connecting rod assembly, cylinders 4-6

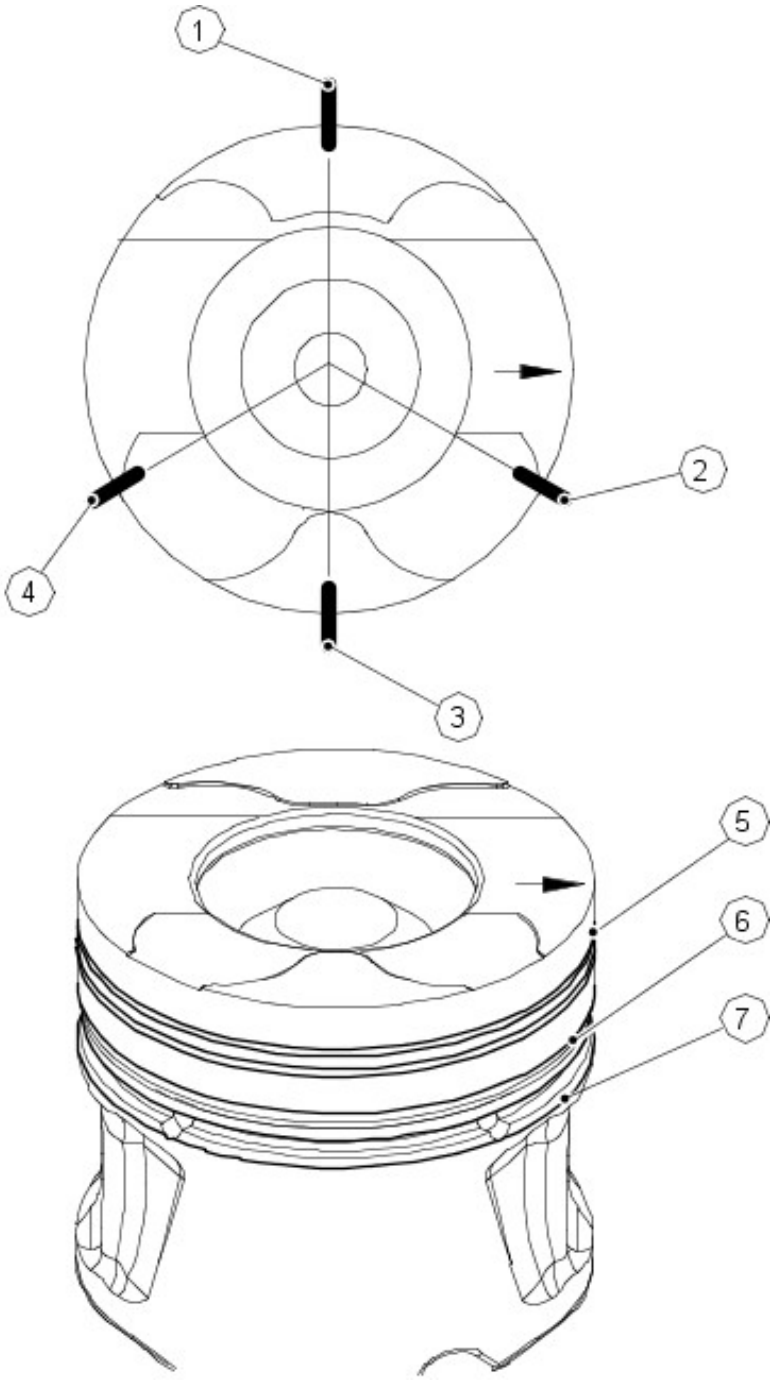
2	Piston and connecting rod assembly, cylinders 1-3
3	Bolts (12 off)
4	Connecting rod bearing cap (6 off)
5	Connecting rod lower bearing (6 off)

When installing a connecting rod, ensure the back of the connecting rod faces the center of the 'vee'.

The pistons are made from aluminum alloy and are fitted with 3 rings. The piston crown incorporates a pronounced bowl; this forms the combustion chamber, which promotes swirl and turbulence necessary for good combustion and improved emissions. In addition, the piston skirt has a molybdenum-coated surface, which counteracts scoring of the cylinder bore and piston.

The piston also incorporates a double wave gallery within the piston crown to enhance piston cooling. The pistons are supplied oil by means of spray jets located in the cylinder block oil gallery. These jets ensure optimum piston cooling to counteract the high temperatures generated by the combustion process.

Each piston is installed on a piston pin located in an aluminum/tin bushing in the connecting rod.



E52133

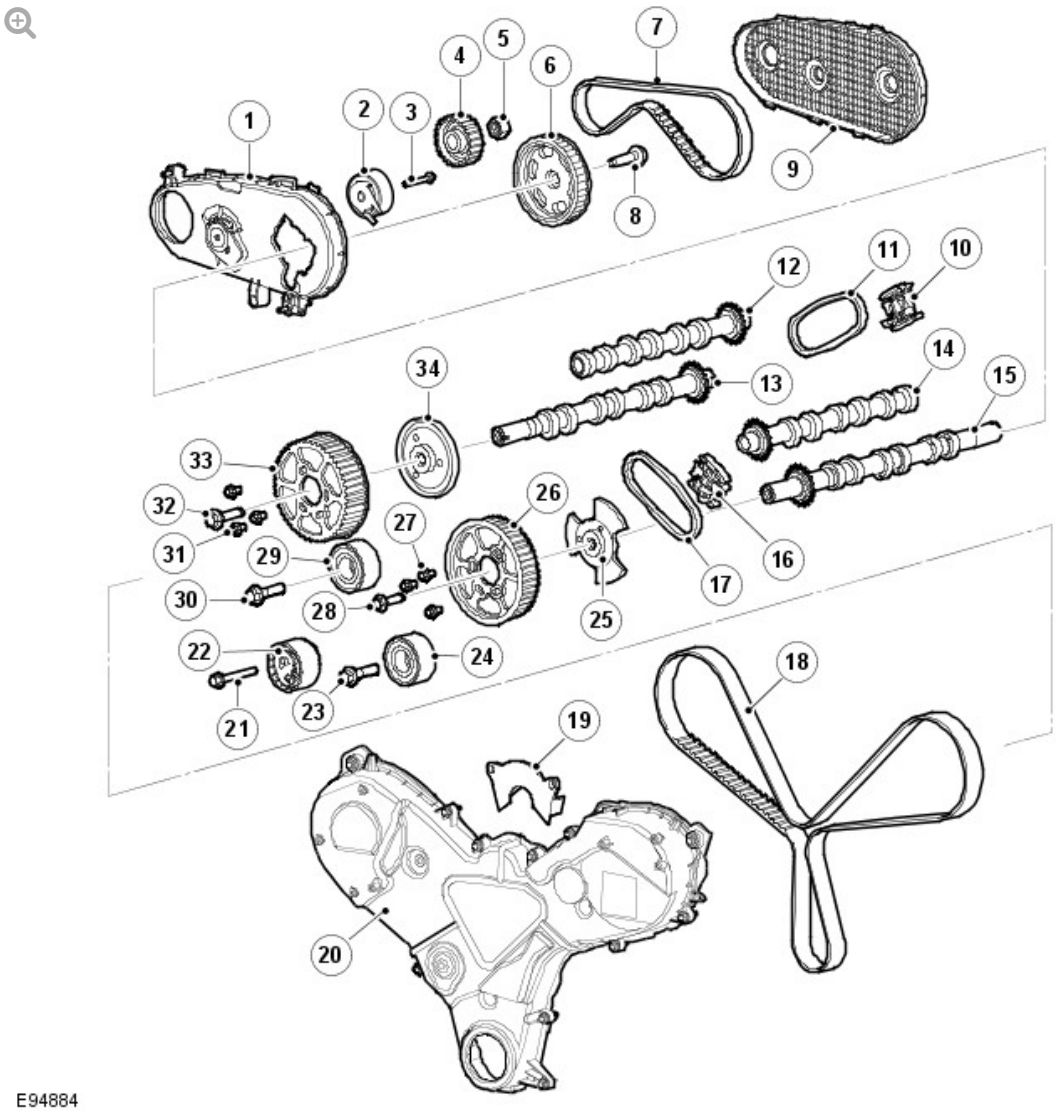
1	Ring gap oil control
2	Ring gap upper compression
3	Spiral joint oil control
4	Ring gap lower compression
5	Upper compression ring
6	Lower compression ring

7	Oil control ring

When installing pistons, ensure that the arrows on the piston crowns all point to the front of the engine. All pistons are common single grade/single part number for all engines.

The piston top ring is a taper type and is fitted with the taper to the top of the piston. All rings marked 'top' are assembled with 'top' uppermost. All rings must be spaced evenly around the piston before installing. The circumference gap of the double bevelled oil control ring must be opposite the spiral control joint.

CAMSHAFT TIMING COMPONENTS



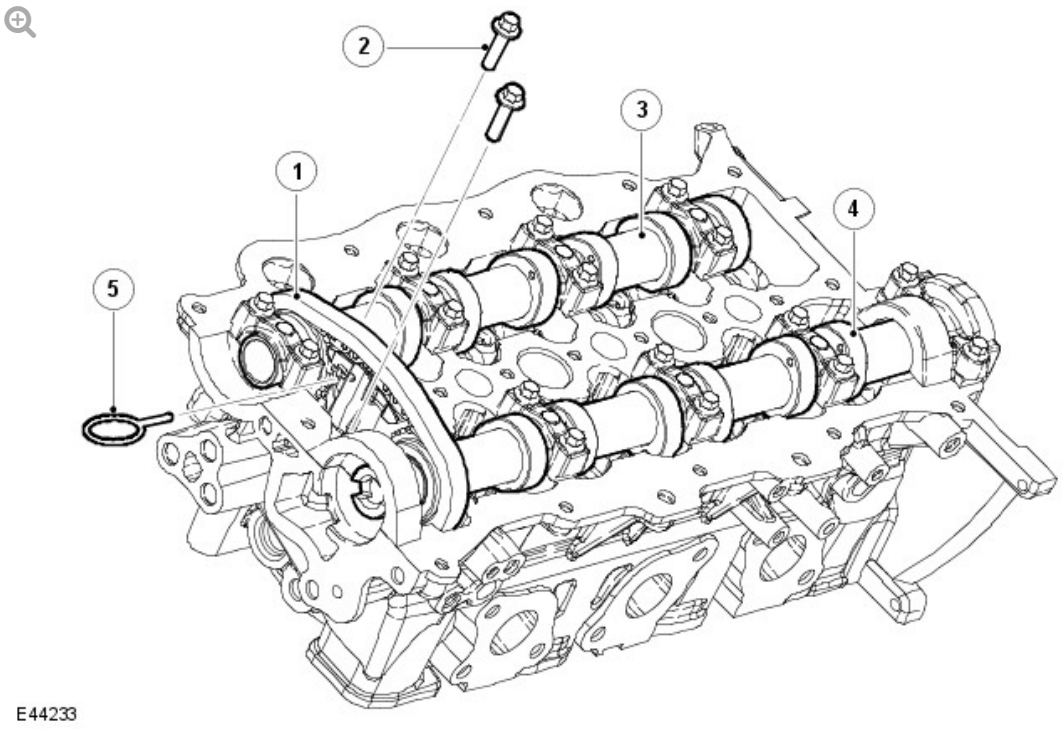
1	Rear engine accessory drive rear cover
2	Rear engine accessory drive tensioner
3	Bolt
4	Fuel pump pulley
5	Nut
6	Rear engine accessory drive camshaft pulley
7	Rear engine accessory drive belt
8	Bolt
9	Rear engine accessory drive front cover
10	RH chain tensioner
11	RH timing chain
12	RH intake camshaft
13	RH exhaust camshaft
14	LH intake camshaft
15	LH exhaust camshaft
16	LH chain tensioner
17	LH timing chain
18	Timing belt
19	Front cover bridge
20	Primary drive cover
21	Bolt
22	Tensioner
23	Bolt
24	Idler
25	Camshaft hub
26	LH camshaft timing pulley

27	Bolt (3 off)
28	Bolt
29	Idler
30	Bolt
31	Bolt (3 off)
32	Bolt
33	RH camshaft timing pulley
34	Camshaft hub

Primary drive is provided by a single toothed belt from the crankshaft to the exhaust camshaft gears of each cylinder bank via 2 idler pulleys and a tensioner.

Timing belt adjustment is carried out by an eccentric type tensioner mounted on the RH front face of the cylinder block.

A primary drive cover is made up from 3 separate plastic mouldings. The covers are secured to the front of the cylinder block and cylinder heads with 15 bolts and 1 stud and nut. The 2 upper covers are partially sealed with a rubber seal.



1	Timing chain
2	Bolts
3	Intake camshaft
4	Exhaust camshaft
5	Tensioner firing pin

Secondary drive is provided by 2 short crossover chains, which transfer drive from the exhaust camshaft gears to the intake camshaft gears. The crossover drives are located at the rear of the RH cylinder bank and the front of the LH cylinder bank. This allows for a much shorter and simpler run for the main camshaft drive belt at the front of the engine.

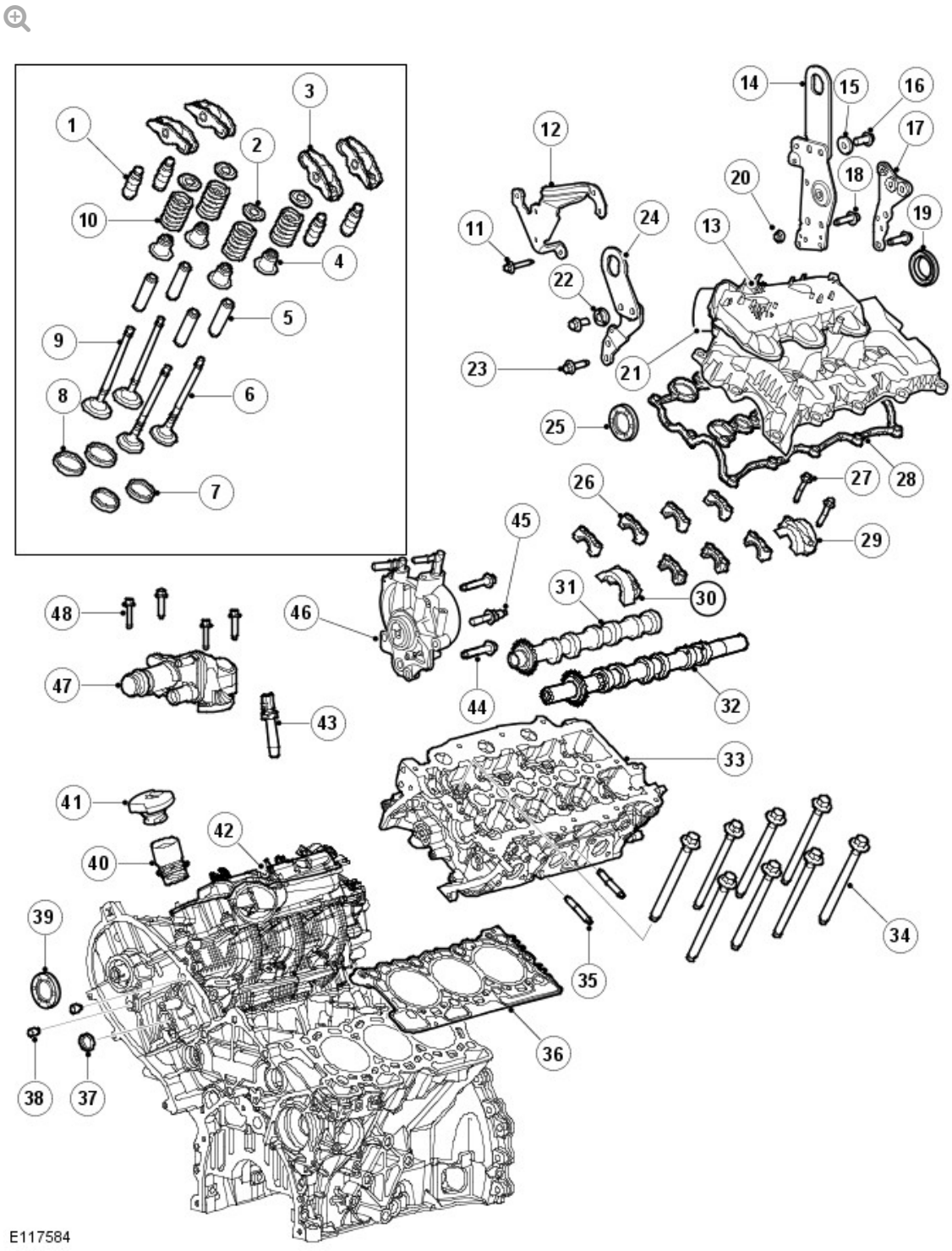
Each crossover chain is tensioned via an automatic chain tensioner, which acts directly on the chains via a guide rail. The tensioners are located between the exhaust and intake camshafts at the front or rear of the cylinder head, depending on the cylinder bank.

The tensioner firing pin holds the automatic chain tensioner in a compressed

state to aid installation.

CYLINDER HEAD COMPONENTS

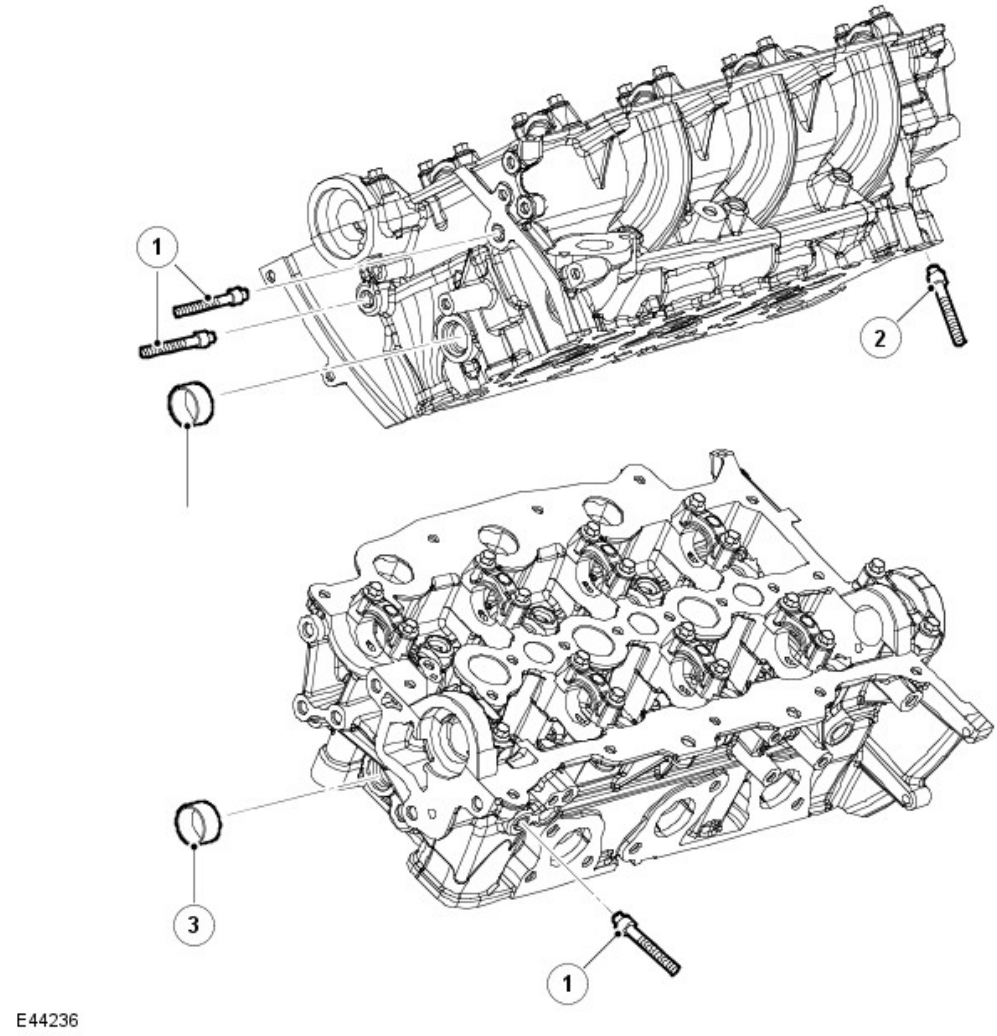
LH cylinder head shown; RH cylinder head similar.



1	Hydraulic lash adjusters (12 off)
2	Valve spring retainers (12 off)
3	Roller rockers (12 off)
4	Valve stem seals (12 off)
5	Valve guides (12 off)

6	Exhaust valves (6 off)
7	Intake valve seats (6 off)
8	Exhaust valve seats (6 off)
9	Intake valves (6 off)
10	Valve springs (12 off)
11	Bolt
12	Bracket
13	Intake manifold
14	Lifting eye
15	Washer
16	Bolt
17	Bolt
18	Bolt
19	Seal
20	Cap
21	Intake manifold cover assembly
22	Washer
23	Bolt
24	Lifting eye
25	Seal
26	Camshaft bearing caps (7 off)
27	Bolts (18 off)
28	Gasket
29	Camshaft bearing cap and seal housing
30	Camshaft bearing cap and seal housing
31	Intake camshaft
32	Exhaust camshaft
33	Cylinder head

34	Cylinder head bolts (8 off)
35	Exhaust manifold studs (6 off)
36	Cylinder head gasket
37	Core plug
38	Plug
39	Seal
40	Oil filler tube
41	Oil filler cap
42	Intake manifold
43	Injectors (3 off)
44	Bolt (2 off)
45	Bolt
46	Vacuum pump
47	Water outlet assembly
48	Bolt (4 off)



1	Studs
2	Bolts
3	Blanking plug

The aluminum gravity die cast cylinder heads are unique to each cylinder bank. Eight deep-seated bolts help reduce distortion and secure each cylinder head to the cylinder block. The cylinder head bolts are located beneath the camshafts, 4 under the intake camshaft and 4 under the exhaust camshaft. Two hollow dowels align each cylinder head with the cylinder block.

The cylinder heads cannot be reworked.

The cylinder head gasket is a 3-layer, laminated steel type and is available in 5 different thicknesses. The choice of gasket thickness is dependent on the maximum piston protrusion. Gasket thickness is identified by serrations cut into the front end of the gasket.

The cylinder head has 4 ports machined at each cylinder location, 2 exhaust ports and 2 intake ports. One of the intake ports is helical and functions as a swirl port, the other is arranged laterally as a tangential port and functions as a charge port.

The camshafts are of a hollow steel tube construction, with pressed on sintered lobes. Each camshaft is retained by aluminum alloy caps, 5 for the exhaust camshafts and 4 for the intake camshafts. Location letters, A to I for the intake camshaft and R to Z for the exhaust camshaft, are marked on the outer faces of the caps for each cylinder head.

The LH cylinder bank exhaust camshaft is machined to accept a rear camshaft gear. The rear camshaft gear provides drive for the high-pressure fuel pump.
Refer to: Fuel Charging and Controls (303-04C Fuel Charging and Controls - V8 N/A 5.0L Petrol, Description and Operation).

The exhaust camshaft gear of the LH cylinder head also incorporates a trigger wheel, which is used in conjunction with the camshaft sensor to measure engine position.
Refer to: Electronic Engine Controls (303-14A Electronic Engine Controls - TDV6 3.0L Diesel, Description and Operation).

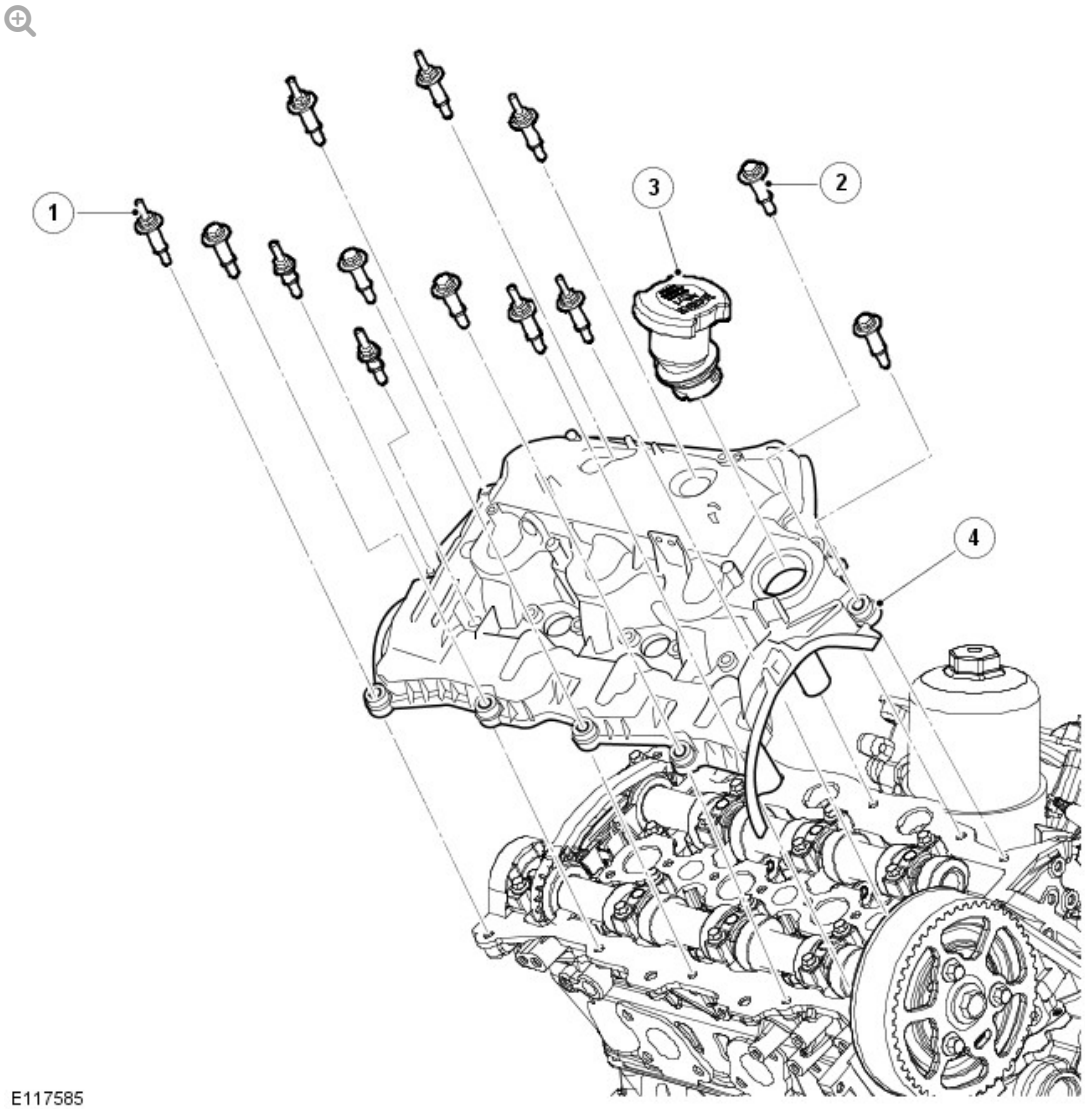
The RH cylinder head exhaust camshaft is machined at the rear end to provide a drive connection for the vacuum pump.

The fuel injection nozzles are centrally mounted above each cylinder.

Refer to: Fuel Charging and Controls (303-04A Fuel Charging and Controls - TDV6 3.0L Diesel, Description and Operation).

The glow plugs are arranged centrally on the intake side of the cylinder heads, between the 2 intake ports of each cylinder.
Refer to: Glow Plug System (303-07B Glow Plug System - TDV6 3.0L Diesel, Description and Operation).

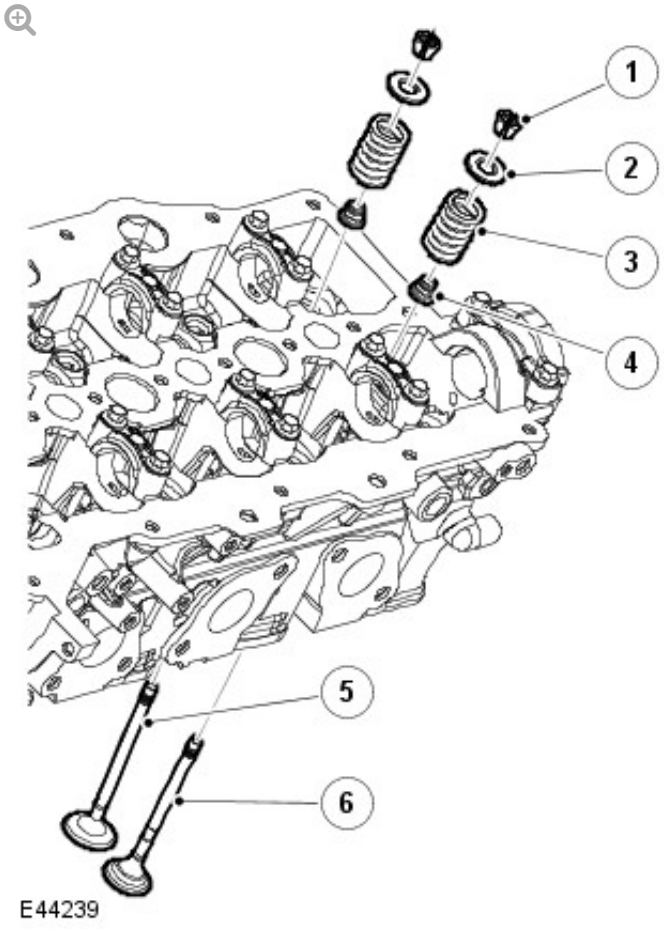
The engine lifting eyes are bolted to the cylinder head, 1 at the front and 2 at the rear, 1 per cylinder head.



1	Stud bolt M6 x 40 (6 off)
2	Bolt M6 x 40 (7 off)
3	Oil filler cap
4	RH camshaft cover assembly

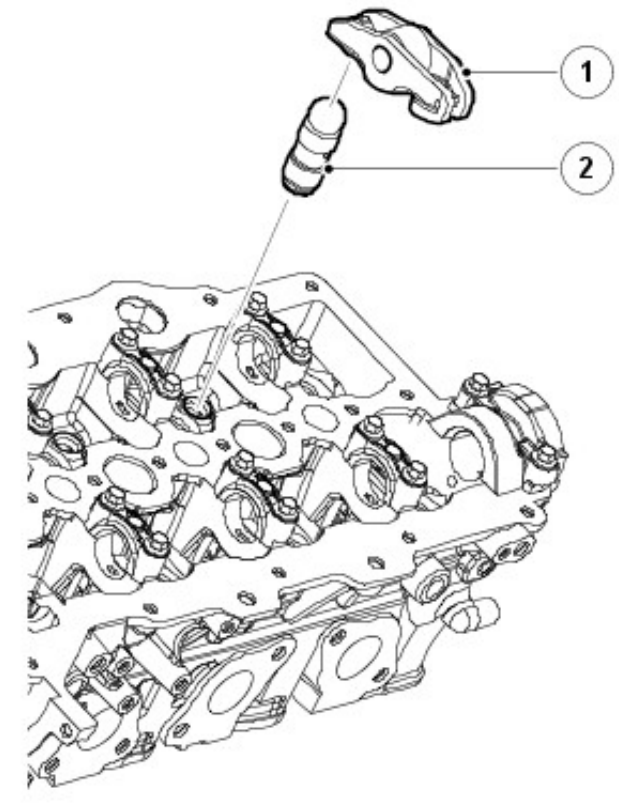
The camshaft covers are manufactured from vinyl ester composite. The RH bank camshaft cover incorporates an outlet for the full load engine breather and the engine oil filler cap. The LH bank camshaft cover incorporates an outlet for the part load engine breather. For additional information refer to 303-08A engine Emission Control.

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.



1	Valve spring collet (24 off, 12 per cylinder head)
2	Valve spring retainer (24 off, 12 per cylinder head)
3	Valve spring (24 off, 12 per cylinder head)
4	Valve stem seal (24 off, 12 per cylinder head)
5	Intake valve (12 off, 6 per cylinder head)
6	Exhaust valve (12 off, 6 per cylinder head)

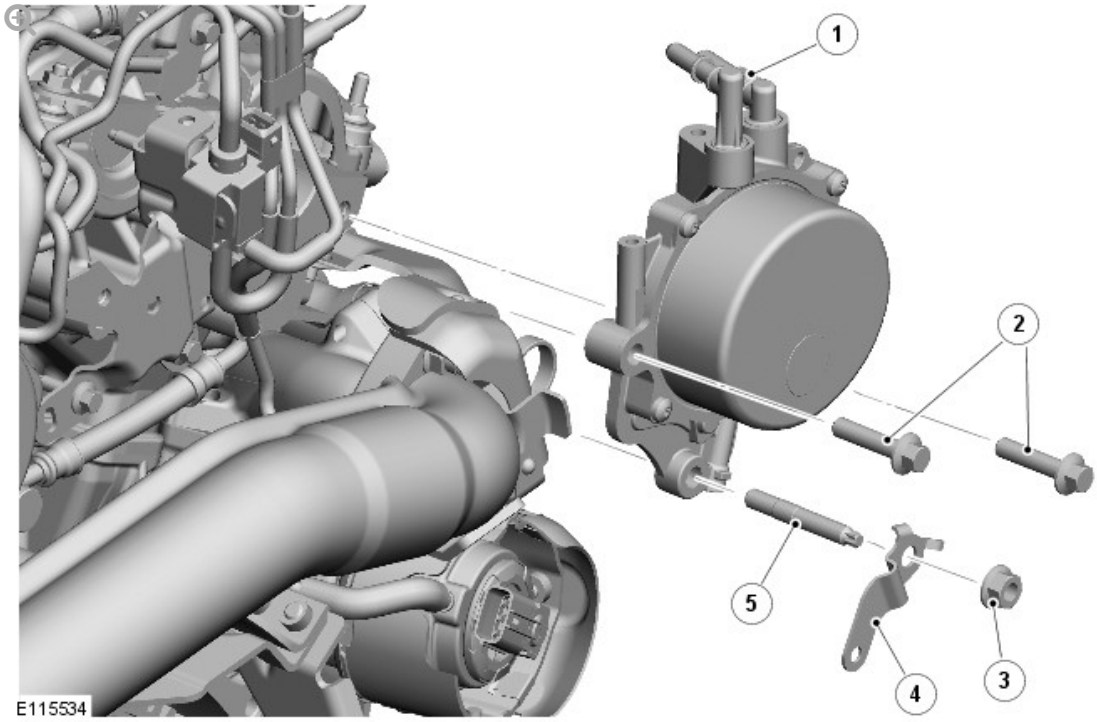
Each cylinder head incorporates 2 overhead camshafts operating 4 valves per cylinder via steel roller rockers with hydraulic lash adjusters.



E44238

1	Roller rocker (24 off, 12 per cylinder head)
2	Hydraulic lash adjuster (24 off, 12 per cylinder head)

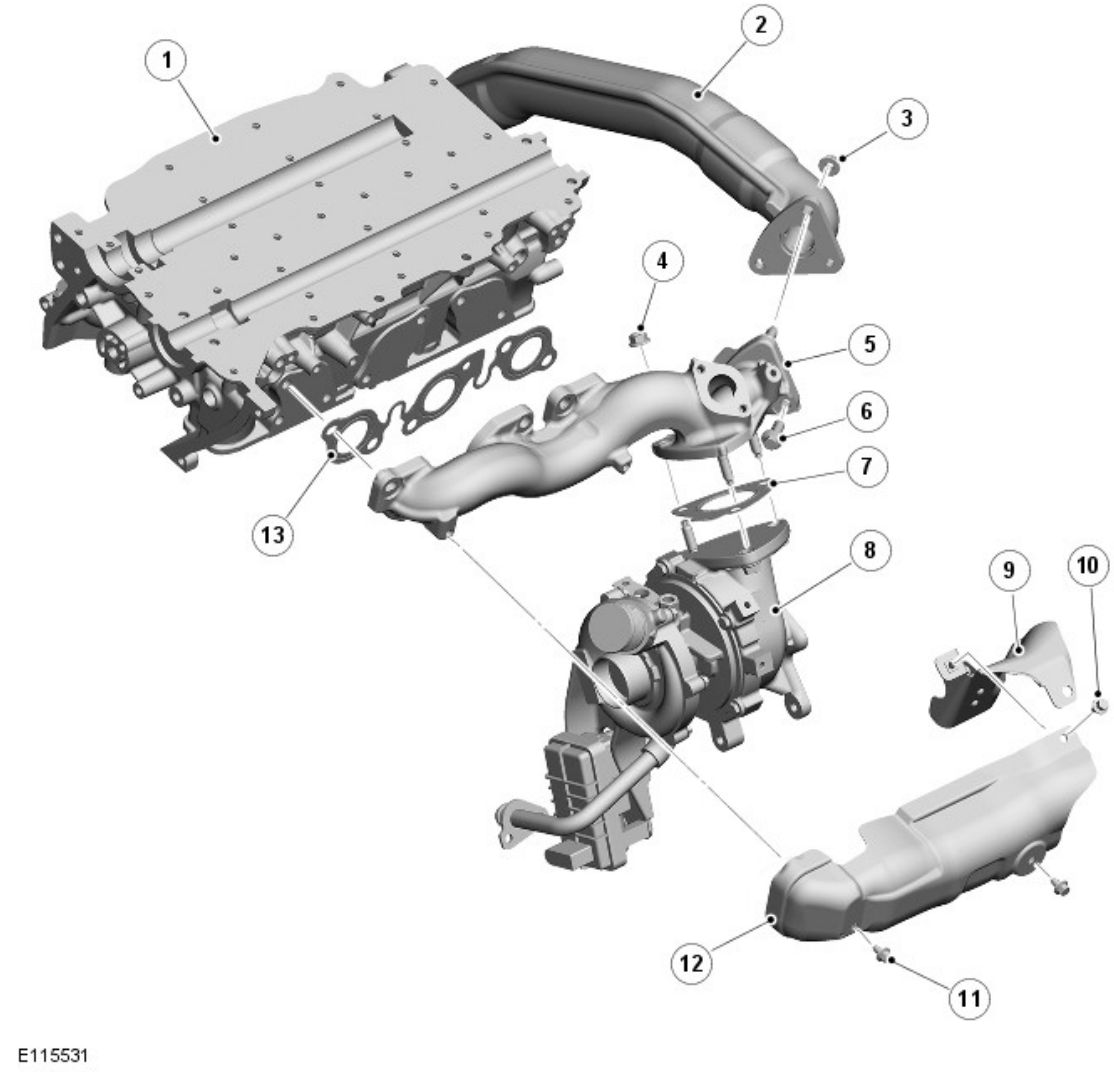
The lightweight valve gear provides good economy and noise levels. Valve head diameters are 31 mm (1.220 in) for the exhaust and 35 mm (1.378 in) for the intake. All valves have 5 mm (0.197 in) diameter stems supported in sintered metal seats and guide inserts. Collets, valve collars and spring seats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



1	Vacuum pump connections
2	Bolt (2 off)
3	Nut
4	Bracket (emission hose)
5	Stud

The vacuum pump is located at the rear of the RH side cylinder head and is driven from the exhaust camshaft.

LH exhaust manifold shown; RH exhaust manifold similar.



1	Cylinder head
2	Connecting pipe
3	Nut (2 off)
4	Nut (3 off)
5	Exhaust manifold
6	Bolt
7	Gasket
8	Turbocharger (primary turbocharger shown)
9	Manifold rear heat shield
10	Bolt

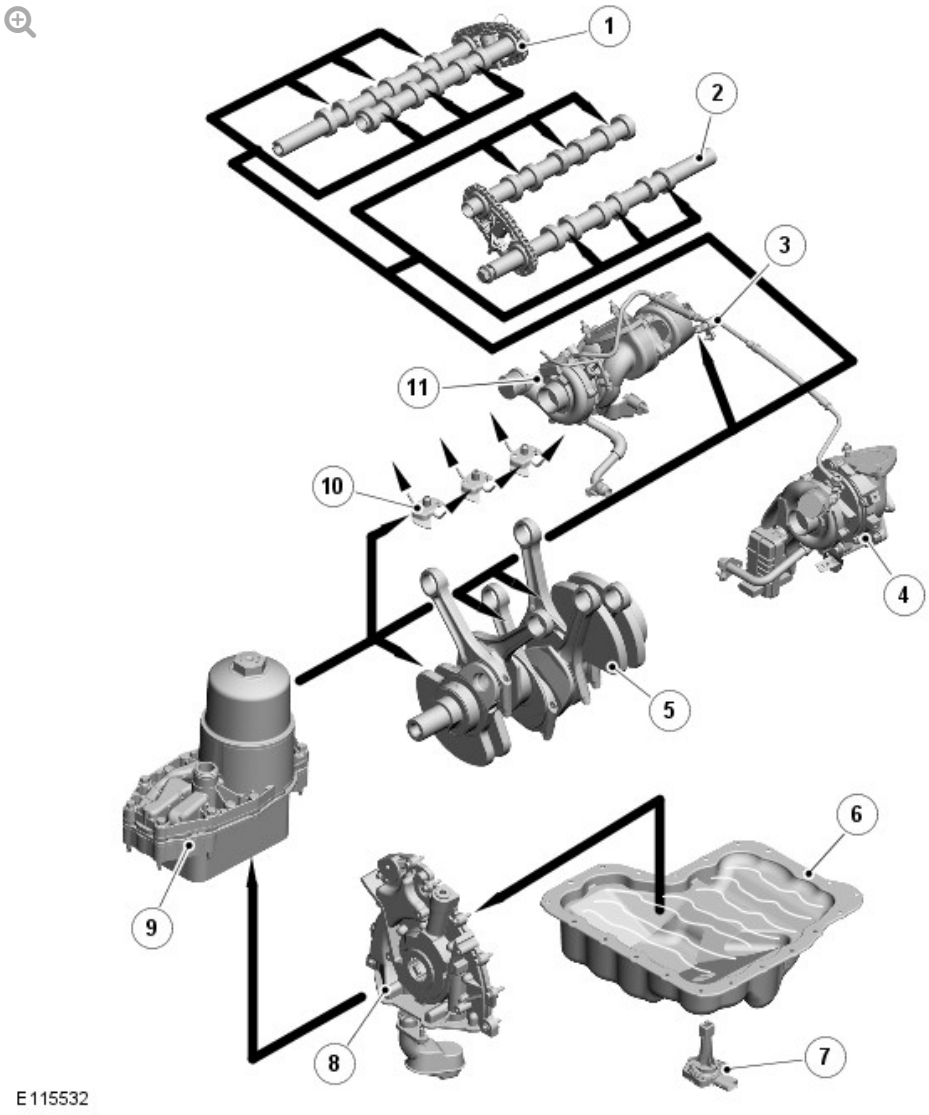
11	Bolt (2 off)
12	Manifold heat shield

The exhaust manifolds are cast from an iron alloy with a high nickel content giving excellent heat and corrosion resistance properties. They are sealed to the cylinder head by means of a steel gasket. Sacrificial plastic sleeves are used to align the manifolds. These sleeves must be changed when refitting the manifolds. Spacers on the securing bolts allow the manifolds to expand and retract with changes of temperature while maintaining the clamping loads.

Each manifold has a connection for the EGR (exhaust gas recirculation) transfer pipe.

The engine is fitted with twin variable geometry turbochargers, which fix to the exhaust manifolds by a 3-hole flange with a steel gasket.

LUBRICATION SYSTEM

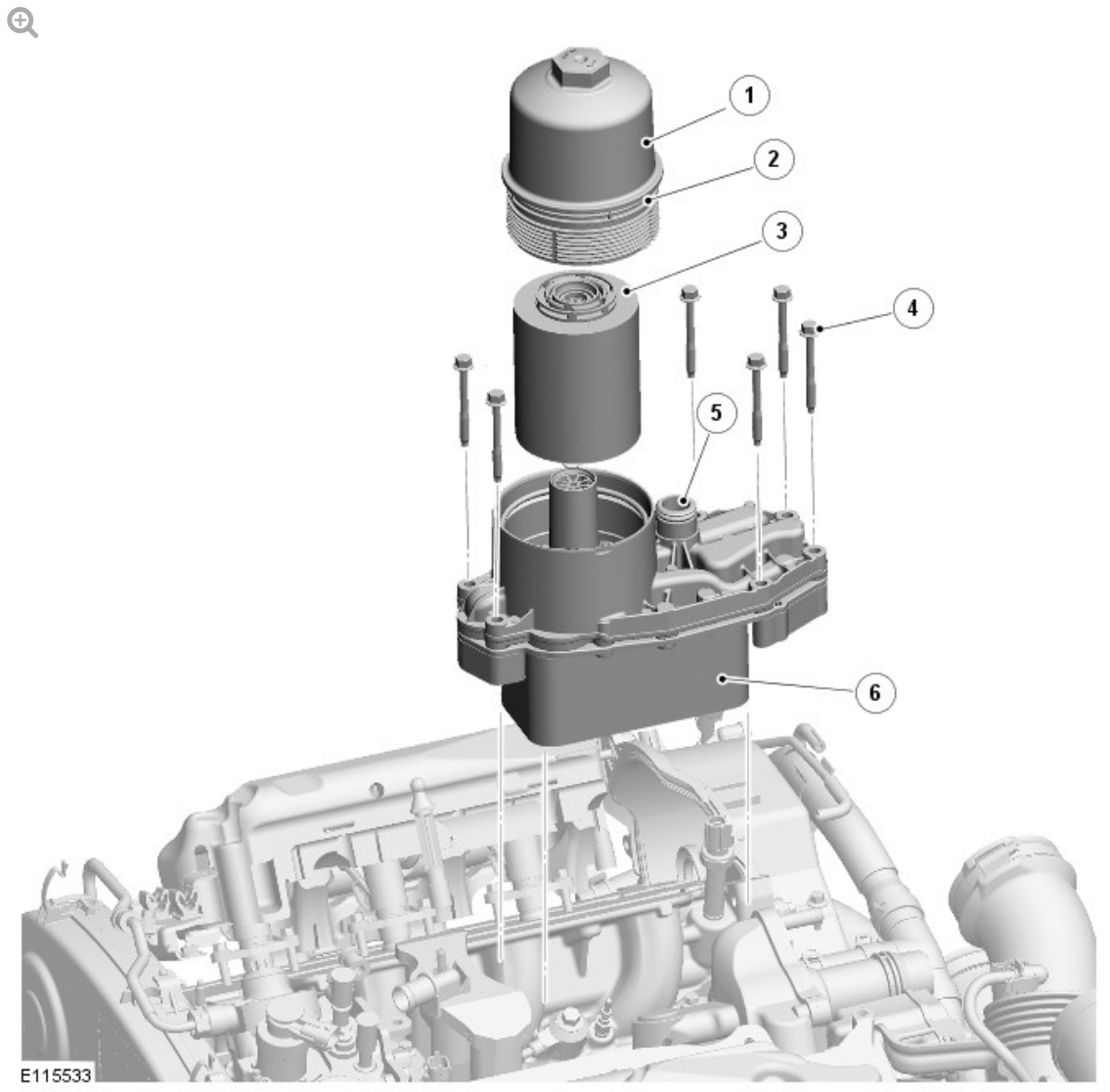


1	Inlet camshaft
2	Exhaust camshaft
3	Turbocharger oil supply
4	Primary turbocharger
5	Crankshaft and connecting rods
6	Oil pan
7	Oil level and temperature sensor
8	Oil pump
9	Oil cooler and filter assembly
10	Piston cooling jets

11	Secondary turbocharger

Oil is drawn from the oil pan and pressurized by the oil pump. The output from the oil pump is then filtered and distributed through internal oil passageways.

All moving parts are lubricated by pressure or splash oil. Pressurized oil is also provided for operation of the hydraulic adjusters and the timing gear chain tensioners.



1	Filter housing

2	'O' ring seal
3	Paper element
4	Retaining bolt (6 off)
5	Coolant outlet connection
6	Cooler assembly

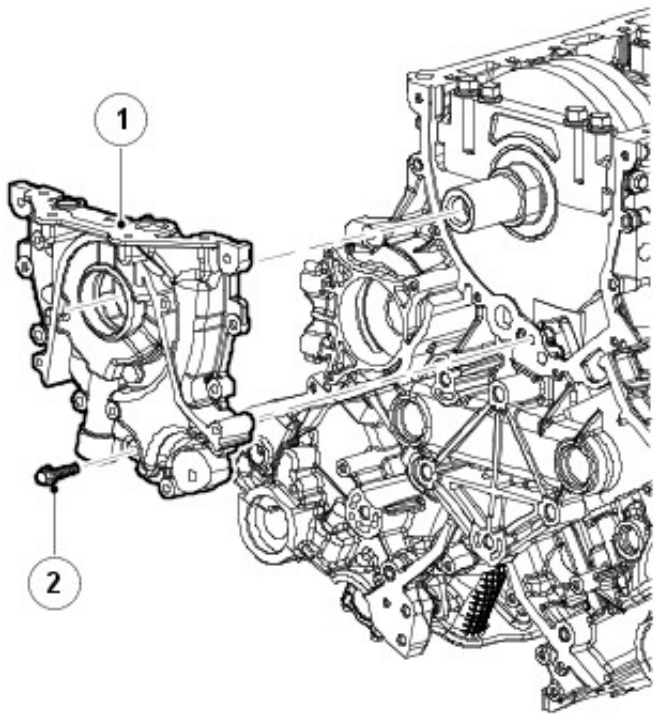
The engine is lubricated by a force-feed oil circulation system with a full flow oil filter. The oil cooler forms a unit with the oil filter, which is mounted centrally in the middle of the cylinder block between the 2 banks of cylinders. The engine oil is cooled using the engine cooling system. This eliminates the need for an additional engine oil cooler remotely mounted.

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 RH camshaft cover.

The moulded composite 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.

Fuel cooling is facilitated by a blast air fuel cooler in the return line to the fuel tank.



E44230

1	Oil pump
2	Bolt (10 off)

The oil pump is a gear type pump and is bolted and dowelled to the front of the cylinder block. It is sealed by means of a rubber gasket, which is recessed into the oil pump housing. The pump inlet and outlet ports align with oil passages in the stiffening frame.

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 lb/in^2).

The front crankshaft oil seal is housed in the oil pump casing and is fitted such that its front face is 1 mm (0.04 in) under flush with the machined front face of the oil pump.

The seal is not to be pushed all the way into the bore as this will block the seal drains.

The oil pressure switch, located in the 'vee' at the front of the LHcylinder head, 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 lb/in^2).

ENGINE - TDV6 3.0L DIESEL

PRINCIPLES OF OPERATION

For a detailed description of the engine system and operation, refer to the relevant Description and Operation section in the workshop manual. REFER to: (303-01A Engine - TDV6 3.0L Diesel)

Engine (Description and Operation),
Engine (Description and Operation),
Engine (Description and Operation).

INSPECTION AND VERIFICATION

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

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Verify the customer concern.

Visually inspect for obvious signs of mechanical damage.

- Engine oil level
- Engine (turns freely)
- Coolant level
- Transmission fluid level
- Fuel level
- Coolant leaks
- Oil leaks
- Fuel leaks
- Visibly damaged or worn parts
- Loose or missing nuts or bolts
- Fuel contamination/grade/quality
- Sensor installation/condition
- Viscous fan and solenoid

If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the symptom chart.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC INDEX

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.
REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Engine Control Module 3.0L Tdv6 (PCM) (100-00, Description and Operation).

ENGINE - TDV6 3.0L DIESEL

60° "Vee" • 6 Cylinder • 24 Valves	2993 ccm	600 Nm at 2000 RPM	202 kW at 4000 RPM	16.1:1 ± 0.5	84	90

1:4:2:5:3:6

9X2Q-6M090-AC

Engine oil - Vehicles with diesel particulate filter	SAE 5W30 STJLR.03.5005
Engine oil - Vehicles without diesel particulate filter	SAE 5W30 STJLR.03.5003
Sealant	WSE–M4G323–A5

Core plug and stub pipe retainer	WSK-M2G349-A7
Jaguar premium cooling system fluid	WSS-M97B44-D

Engine oil initial fill	7.7
Engine oil service fill with oil filter change	6.6

Valve guide inner diameter (mm)	5.980 ± 0.010
Intake valve effective length (mm) (tip to gauge line)	94.99mm +/- 0.15
Exhaust valve effective length (mm) (tip to gauge line)	94.45mm +/-0.15
Valve stem to guide clearance intake diametrical (mm)	0.027 - 0.063
Valve stem to guide clearance exhaust diametrical (mm)	0.037 - 0.073
Valve head diameter intake (mm)	27.8mm +/-0.1
Valve head diameter exhaust (mm)	25.2mm +/-0.1
Intake valve face angle (degrees)	44 deg 52 min +/-7min30sec
Exhaust valve face angle (degrees)	44 deg 52 min +/-7min30sec
Valve stem diameter intake (mm)	5.935±0.008
Valve stem diameter exhaust (mm)	5.925±0.008
Valve spring free length (mm) - inlet	38.9mm
Valve spring free length (mm) - exhaust	38.9mm
Valve spring installed height (mm) - inlet	31.22mm
Valve spring installed height (mm) - exhaust	31.22mm
Camshaft lobe max lift intake (mm)	3.75187mm

Camshaft lobe max lift exhaust (mm)	3.80999mm
Camshaft journal to cylinder head bearing surface clearance diametrical (mm)	0.040-0.090
Camshaft journal diameter - all positions	25.950±0.010
Bearing diameter - all positions	26.015±0.015
Camshaft journal maximum run out limit (mm)	0.030mm
Camshaft journal maximum out of round (mm) - all journals	0.010mm
Cylinder head **maximum** permitted warp (flatness specification)	0.2 mm (0.008 in)

2	1.17	0.552 - 0.603
3	1.22	0.604 - 0.655
4	1.27	0.656 - 0.707
5	1.32	0.708 - 0.760

A = refer to procedure for correct torque sequence

Piston cooling nozzle	10	7	88
Engine coolant drain plug	18	13	159
Cylinder head retaining bolts	**A**	-	-
Oil filter housing retaining bolts	10	7	88
Fuel injection pump cradle retaining bolts	23	17	203
Fuel injection pump to cradle	23	17	203

retaining bolts			
Fuel injection pump bracket to cradle retaining bolts	10	7	88
Fuel injection pump to bracket retaining bolts	10	7	88
Oil pump retaining bolts	10	7	88
Crankshaft rear oil seal housing retaining bolts	10	7	88
Oil pan extension retaining bolts M6	10	7	88
Oil pan extension retaining bolts M8	23	17	88
Oil pump pick up pipe retaining bolts	10	7	88
Oil pan retaining bolts	10	7	88
Engine oil level sensor retaining nuts	10	7	88
Crankshaft timing belt pulley retaining bolt	**A**	-	-
Crankshaft position sensor (CKP) retaining bolt	5	-	44
Timing chain tensioner retaining bolts	10	7	88
Camshaft bearing cap retaining bolts	**A**	-	-
Timing belt idler pulley retaining bolt	45	33	398
Fuel injection pump belt rear cover retaining bolts	10	7	88
Fuel injection pump sprocket retaining nut	50	37	442
Coolant outlet pipe retaining bolts	10	7	88
Coolant pump retaining bolts	10	7	88
Timing belt tensioner retaining bolt	Stage 1 - 20 Stage 2 - 55 degrees	14	177

Engine lifting eye bolts	23	17	203
Camshaft rear end accessory drive (READ) pulley hub retaining bolt	Stage 1 - 80 Stage 2 - 80 degrees	Stage 1 - 59 Stage 2 - 80 degrees	Stage 1 - 708 Stage 2 - 80 degrees
Camshaft front timing pulley hub retaining bolt	80 + 80°	59 + 80 °	708 + 80°
Camshaft READ pulley retaining bolt	23	17	203
Camshaft front timing pulley retaining bolt	23	17	203
Fuel injection pump timing belt tensioner bolt	23	17	203
Camshaft position sensor (CMP) retaining bolt	10	7	88
Intake manifold / camshaft cover retaining bolts	10	7	88
Brake vacuum pump retaining bolts	23	17	203
Engine oil pressure (EOP) switch	14	10	124
Glow plug	11	8	97
Fuel rail retaining bolts	23	16	203
Fuel rail bracket retaining bolts	23	16	203
Fuel injector retaining bolts	**A**	-	-
High pressure fuel line union nuts	**A**	-	-
High pressure fuel line bracket retaining bolts	9	-	80
Turbocharger assembly to exhaust manifold retaining nuts	24	18	212
Exhaust manifold to cylinder head retaining nuts	**A**	-	-
Exhaust manifold heatshield retaining bolts	11	8	97
Turbocharger heatshield retaining bolts	11	8	97

Exhaust gas recirculation (EGR) valve retaining bolts M6	10	7	88
Accessory drive belt idler pulley bracket retaining bolts	83	61	735
Timing belt covers retaining bolts	10	7	88
Engine mount bracket to engine retaining bolts	90	66	796
Engine mount bracket to body retaining bolts	47	35	415
Exhaust cross over pipe retaining nuts	24	18	212
Engine coolant inlet pipe retaining bolts	10	7	88
Coolant pump pulley retaining bolts	25	18	221
Crankshaft pulley/vibration damper retaining bolts	25	18	221
Throttle body retaining threaded stud	10	7	88
Wiring harness retaining nuts	10	7	88
Vacuum hose assembly retaining bolts	10	7	88
Flexplate retaining bolts	**A**	-	-
Accessory drive component bracket retaining bolts	23	17	203
Power steering pump retaining bolts	23	17	203
Generator retanining bolts	47	35	416
Accessory drive belt tensioner retaining bolt	47	35	416
Accessory drive belt idler pulley retaining bolt	47	35	416
Air conditioning compressor bracket retaining bolts	23	17	203
Air conditioning compressor retaining bolts	23	17	203

ENGINE - TDV6 3.0L DIESEL

TIMING BELT [G1272051]

SPECIAL TOOL(S)

303-1117

Timing Peg, Automatic Transmission

303-1126

Timing Peg, Camshaft Pulley

REMOVAL

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

1.

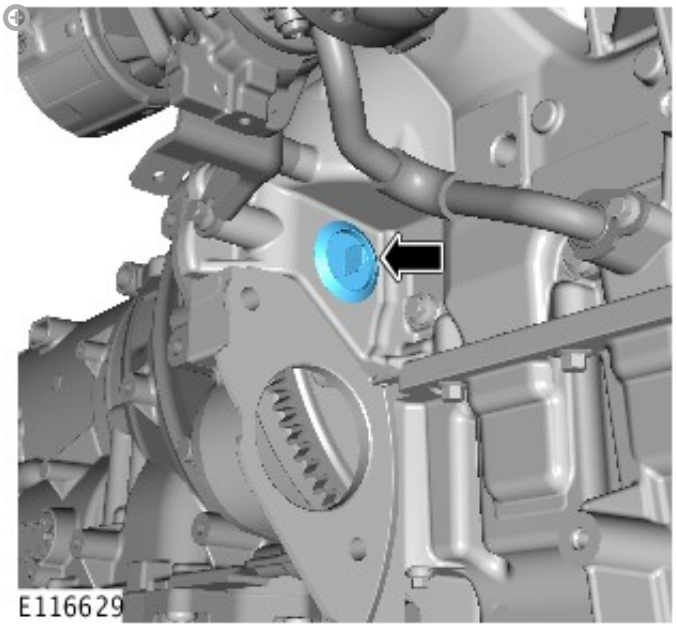
Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: Timing Cover (303-01A Engine - TDV6 3.0L Diesel, Removal and Installation).

3. Refer to: Starter Motor (303-06A Starting System - TDV6 3.0L Diesel, Removal and Installation).

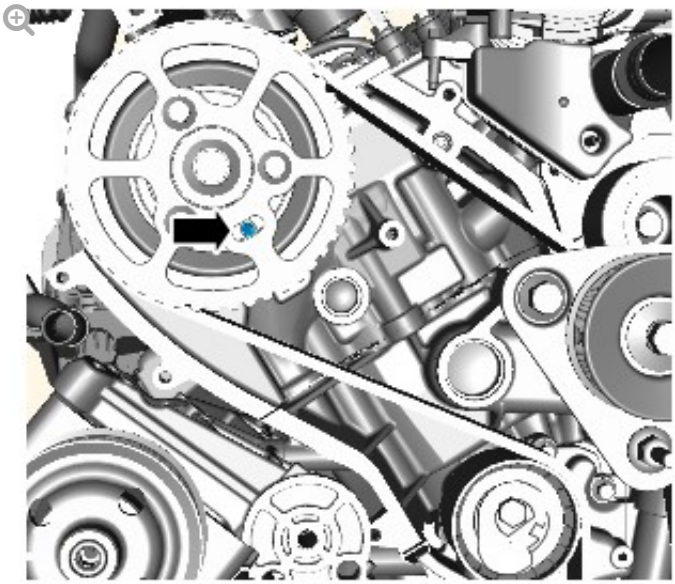
4.



E116629

5. Rotate the crankshaft clockwise to align the crankshaft alignment hole in the flywheel or flexplate with the block aperture.

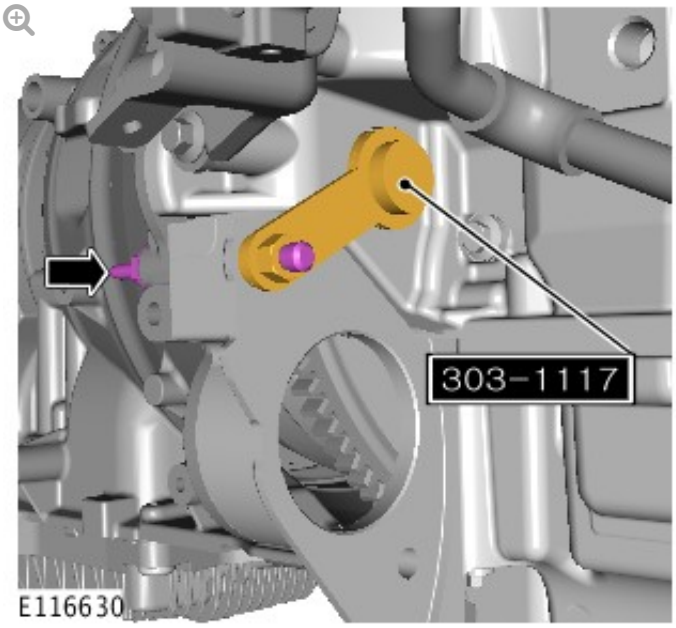
6.



E116840

Check the camshaft pulley alignment holes are correctly aligned. If the alignment holes are not aligned, rotate the crankshaft one full turn clockwise.

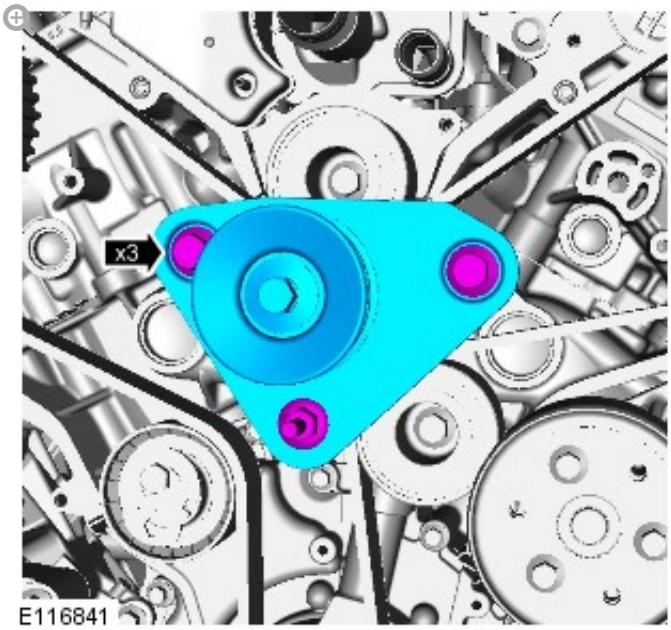
7.



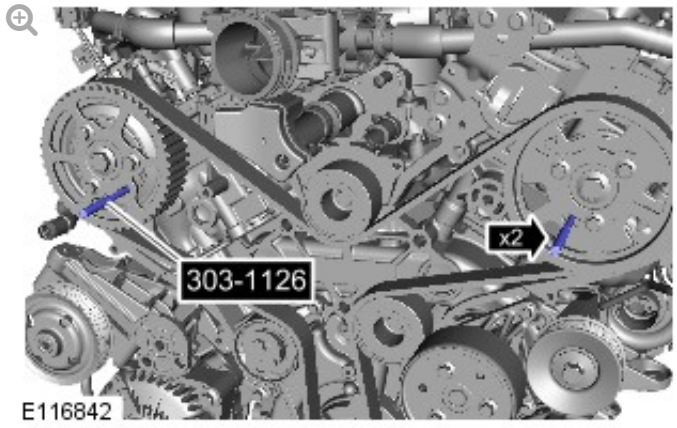
Install the special tool.

Special Tool(s): 303-1117

8.



9.



Install the special tool.

Special Tool(s): 303-1126

10.

Do not use the special tools to lock the camshafts. Failure to follow this instruction may result in damage to the engine or the special tools.

Do not loosen the bolts more than 2 turns.