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GENERAL

00 DESCRIPTION, COMPLETE MACHINE

000 General

Foreword

This service manual contains specifications, descriptions, repair instructions, drawings, and diagrams for engine D7E, equipped to fulfill governing legislation according to stage 3/stage IIIA for exhaust emissions.

Instructions are based on method studies conducted on D7E-LAE3. There may be some deviations, depending on the machine type for which the engines are adapted. Since illustrations in the service literature are re-used for different engine versions, some details may differ from the version in question. However, the essential information is always correct.

The instructions are valid on the condition that the engine has been removed from the machine or that it is exposed in the machine. The instructions for necessary work to expose the engine is available in the service manual for each machine type.

The instructions are based on the use of special tools and generally available standard tools.

Information about engine power, engine speeds, optional equipment, etc., see service manual for each machine type.



WARNING!

This warning symbol means risk of fatalities or personal injury if the instructions are not followed.

Also read through and follow the instructions in Section "Safety" in the service manual for each machine type.

For reference number of each manual, see the current publications catalogue and SSI (Service Support Information).

All lifting devices such as slings, straps, ratchet blocks, etc. must comply with the governing national regulations for lifting devices.

The operation numbers refer to "Time Guide".

Volvo Construction Equipment will not accept any responsibility if other tools or work methods other than those described in this publication are used.

The information and data given in this manual are valid at the time of publication.

Volvo Construction Equipment reserves the right to modify specifications and equipment without prior notice.

03 SPECIFICATIONS

030 General

VOLVO standard tightening torques

The tightening torques in the following tables refer to bolted joints with tensile strength as indicated. The tables should be regarded as a general guideline for tightening of bolted joints where nothing else is specified.

NOTE! For flange bolt of type U6FS, values should be increased by 10%. Bolts and nuts should be clean and lubricated with oil.

Tensile strength class 8.8 Metric coarse and fine threads

Thread	Nm	kpm	lbf ft
M 6	10 ±2	1.0 ±0.2	7.4 ±3.5
M 8	24 ±5	2.4 ±0.5	18 ±3.5
M 10	48 ±10	4.8 ±1.0	35 ±7.4
M 12	85 ±18	8.5 ±1.8	63 ±13.0
M 14	140 ±25	14.0 ±2.5	103 ±18.0
M 16	220 ±45	22.0 ±4.5	160 ±33.0
M 20	430 ±85	43.0 ±8.5	320 ±63.0
M 24	740 ±150	74.0 ±15.0	550 ±110.0

Tensile strength class 10.9 Metric coarse and fine threads

Thread	Nm	kpm	lbf ft
M 6	12 ±2	1.2 ±0.2	9 ±1.5
M 8	30 ±5	3.0 ±0.5	22 ±3.5
M 10	60 ±10	6.0 ±1.0	44 ±7.5
M 12	105 ±20	10.5 ±2.0	78 ±14.5
M 14	175 ±30	17.5 ±3.0	130 ±22
M 16	275 ±45	27.5 ±4.5	204 ±33
M 20	540 ±90	54.0 ±9.0	400 ±66
M 24	805 ±160	80.5 ±16.0	594 ±118

UNC threads, coarse pitch

Thread	Nm	kpm	lbf ft
1/4"	9 ±2	0.9 ±0.2	6.6 ±1.5
5/16"	18 ±4	1.8 ±0.4	13 ±3.0
3/8"	33 ±8	3.3 ±0.8	24 ±5.9
7/16"	54 ±14	5.4 ±1.4	40 ±10
1/2"	80 ±20	8.0 ±2.0	59 ±15
9/16"	120 ±30	12.0 ±3.0	89 ±22
5/8"	170 ±40	17.0 ±4.0	130 ±30

Cylinder head, tightening torques

Valve cover, bolts	13 Nm (9.6 lbf ft)
Attaching bolts	
Step 1	50 Nm (37 lbf ft)
Step 2	130 Nm (96 lbf ft)
Step 3	90°

Valve mechanism, specifications

Valves	
Valve head diameter:	
inlet	48 ±0.1 mm (1.89 ±0.004 in)
exhaust	42 ±0.1 mm (1.65 ±0.004 in)
Valve stem, diameter:	
inlet	8.98 – 0.05 mm (0.353 –0.002 in)
exhaust	8.96 – 0.05 mm (0.352 –0.002 in)
Valve clearance, cold engine, value when adjusting:	
inlet	90°
exhaust	150°
Clearance between control valve piston and rocker arm	144°
Measurement between valve disc and cylinder head's face:	
inlet	0.99 ±0.1 mm (0.039 ±0.0039 in)
exhaust	1.0 +0.15 –0.1 mm (0.039 +0.0059 –0.0039 in)
Valve head edge, thickness:	
inlet	2.62 mm (0.103 in)
exhaust	2.30 mm (0.091 in)

Valve guides	
Max. clearance valve stem - guide, wear tolerance:	
Inlet	0.045 — 0.075 mm (0.002 — 0.003 in)
Outlet	0.065 — 0.105 mm (0.0025 — 0.004 in)

Valve springs	
Inlet/exhaust	
Length, unloaded	64.7 mm (2.55 in)
Diameter, thread	4.5 mm (0.18 in)

Rocker arm	
Hole diameter inlet, exhaust	21.02 +0.033 (0.828 +0.0013 in)
Tapp	21.02 –0.021 (0.828 –0.0008 in)

Oil trap, tightening torque

Attaching bolts	20 ±2 Nm (14.7 ±1.5 lbf ft)
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Engine, dismantling

Op. no.210-077

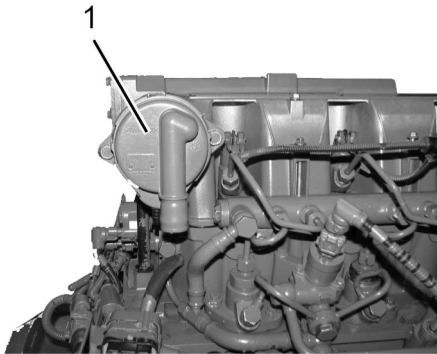
Tools:

11668409 Pliers
9998681 Rotation tool
9998674 Adapter
9996400 Impact puller
9998695 Installation tool
9993717 Quick nut
9993713 Puller bolt
9993722 Support
9998675 Puller plate

Socket or spanner Torx E10
Socket Torx E12
Socket Torx E18
Socket Torx E20
Lifting eyes M12
Lifting sling
Thread tap M8 with handle
Drift 20 mm

Check that the engine is drained of oil.

- 1 Remove the oil trap for the crankcase ventilation.



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Fig.7

- 1 Oil trap

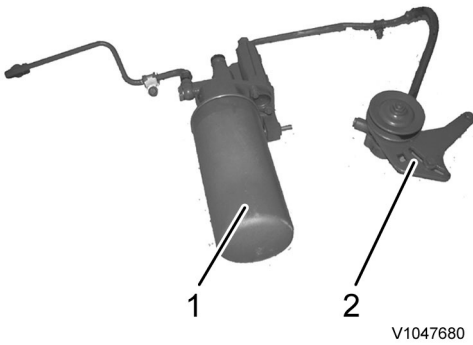


Fig.12

- 1 Fuel filter
- 2 Fuel feed pump

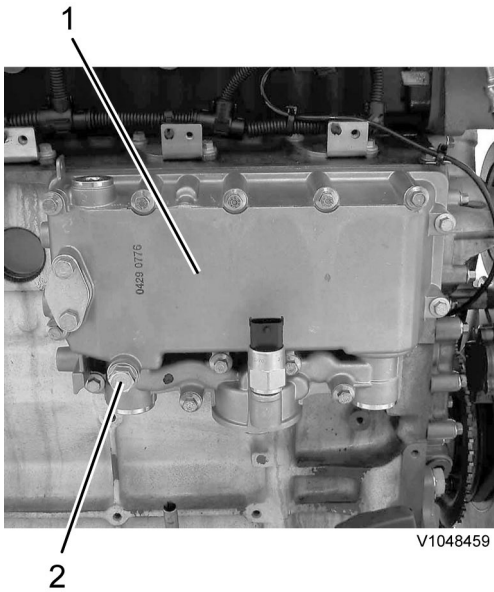


Fig.13

- 1 Oil cooler
- 2 Drain plug

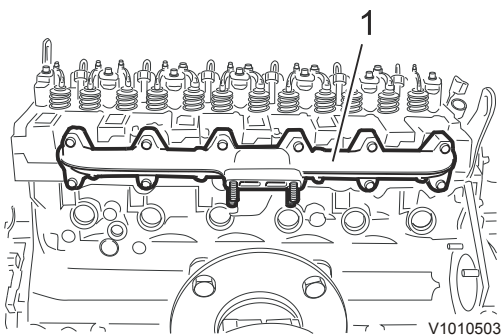


Fig.14

- 1 Exhaust pipe

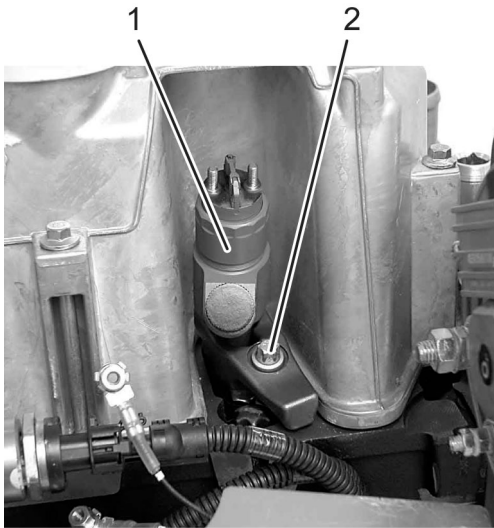
6 Loosen the clamps from the feed pump to the fuel control valve. Loosen the fuel feed pump and complete filter housing. Loosen the banjo connection to the fuel control valve. Lift away the fuel feed pump and complete filter housing as a unit. Plug all open connections.

7 Remove the lubrication oil filter. Install protective plugs.

8 Remove the drain plug and drain the coolant. Remove the attaching bolts and remove the oil cooler. Remove gasket remains from the sealing surfaces. Install protective plugs.

9 Remove the attaching nuts and remove the exhaust pipe.

10 Remove the preheating coil.



V1048576

Fig.20

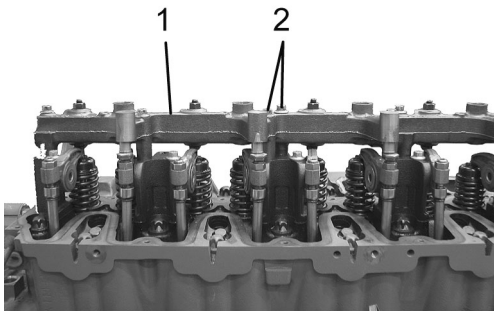
- 1 Injectors
- 2 Retainer

- 18 Remove the holders for the injectors, and remove the injectors.

NOTE! Make sure that the copper washer on the injectors' lower part also comes out.

Mark up the position of the injectors.

Store the injectors in a dust-free location, e.g., in a plastic bag.



V1048592

Fig.21

- 1 IEGR-unit
- 2 Attaching bolts

- 19 Loosen the bolts and lift away the IEGR-unit.
Pull apart the IEGR-unit and retain the small oil pipe.



V1048740

Fig.22 IEGR-unit

- 1 Oil pipe

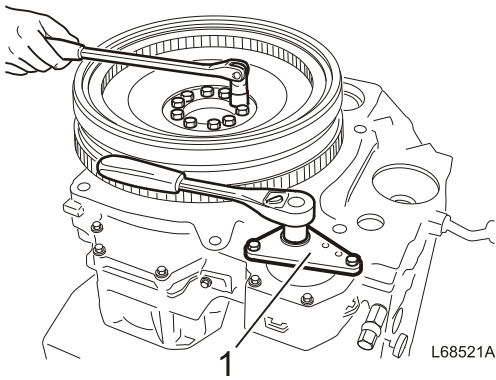


Fig.32

- 1 9998681 Rotation tool

- 30 Remove the bolts for the flywheel. Use 9998681 Rotation tool as counterhold.

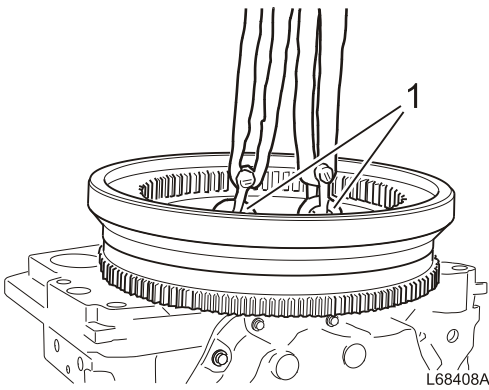


Fig.33

- 1 Lifting eyes M12

- 31 Install lifting eyes M12 and lifting sling.
Lift away the flywheel.
Flywheel weight: approx. 55 kg (120 lbs).

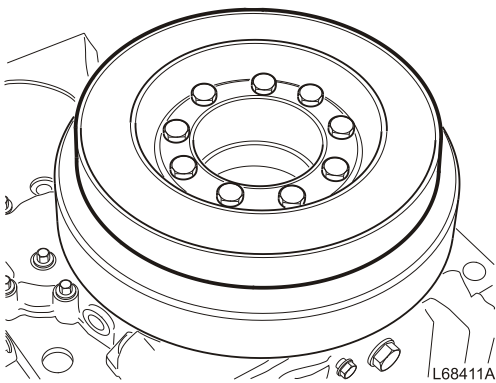


Fig.34

- 32 Rotate the engine to horizontal position. Make sure that 9998681 Rotation tool does not rotate. Remove the attaching bolts and remove the outer vibration damper together with the spacer and the inner vibration damper.
Weight: approx. 20 kg (44 lbs).

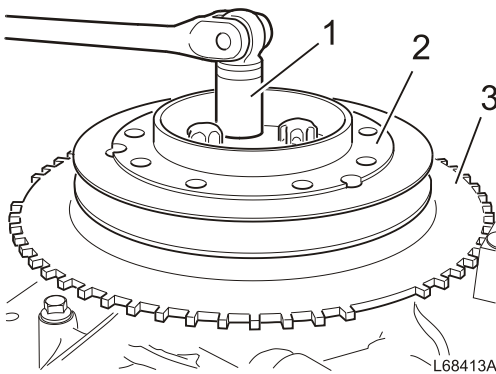


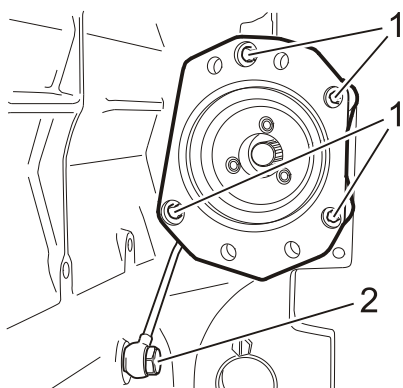
Fig.35

- 1 Torx E20
- 2 Toothed wheel
- 3 V-belt pulley

- 33 Remove the attaching bolts and lift away the V-belt pulley and the ring gear.

Power take-off housing, removing

- 48 Remove the oil pipe's connection from the engine block.
Remove the attaching bolts (socket Torx E10 and E12) and remove the power take-off housing with the oil pipe.



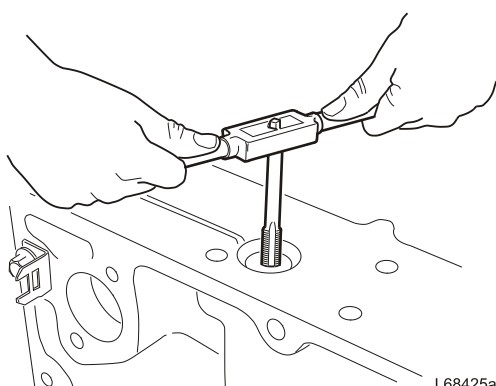
L68424a

Fig.50

- 1 Attaching bolts
- 2 Oil pipe

Pressure control valve, removing

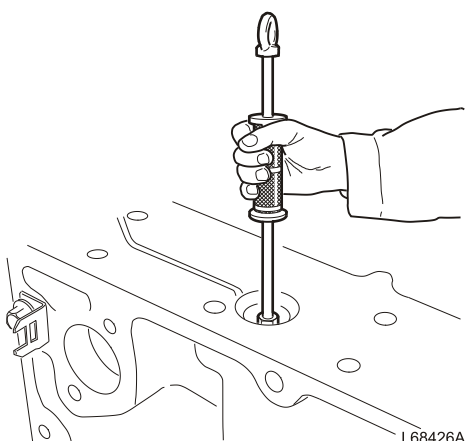
- 49 Thread the hole in the pressure control valve with an M8 thread tap.



L68425a

Fig.51

- 50 Pull out the pressure control valve with impact hammer 9996400 Impact puller and 9998674 Adapter.



L68426A

Fig.52

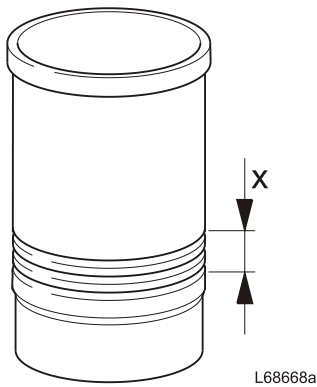


Fig.61

L68668a

- 7 Lube the engine block and cylinder liner in the indicated area, marked with an x in the figure.

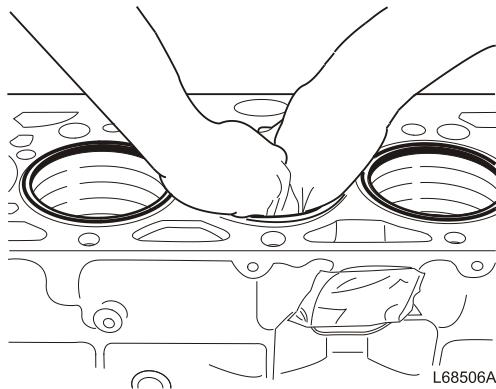


Fig.62

L68506A

- 8 Install the cylinder liners in the engine block. Drive them down as far as possible.

IMPORTANT! Do not use sealing compound.

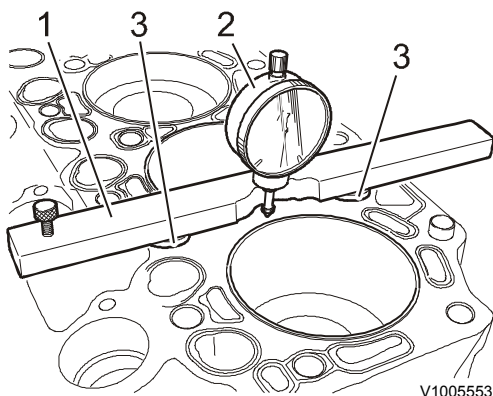


Fig.63

V1005553

- 9 Measure the cylinder liner's protrusion over the sealing face. First, clean the measuring surface thoroughly. Place the measuring tool with adjustments and dial indicator on the engine block. Reset the dial indicator.

NOTE! Place the adjustments on the block, not on the liner's edge.

Reset the dial indicator against the engine block's gasket face. Place the dial indicator against the cylinder liner's top edge. Measure in three places on the cylinder liner. Replace the cylinder liner if it's outside the tolerance. See *Cylinder block, specifications page 10*

- 1 9998678 Measuring tool
- 2 Dial gauge
- 3 Adjustments

Camshaft, installing

Replace camshaft if there is major damage or wear. See *Camshaft, specifications page 11*

All valve tappets should also be replaced when replacing the camshaft.

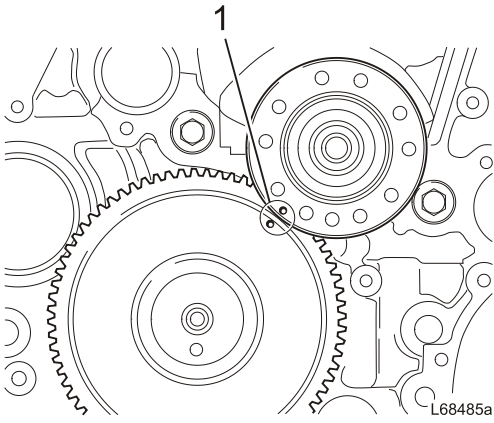


Fig.75

1 Marking (Camshaft marking may be hidden)

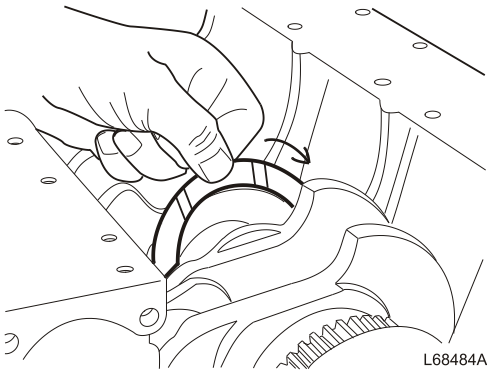


Fig.76

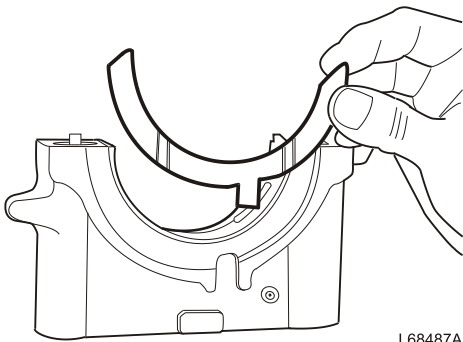


Fig.77

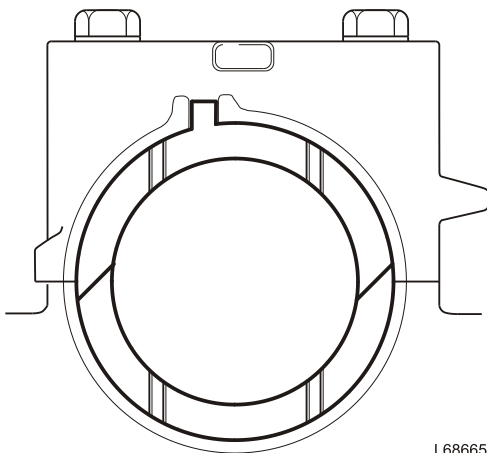


Fig.78

20 Lift the crankshaft into position. Make sure that the marking in relation to the camshaft gear will be correctly positioned. **Crankshaft weight: approx. 75 kg (165 lbs).**

21 Lubricate the thrust washer halves without pin with oil and install them. Insert them into position under the crankshaft. Turn the surfaces with the oil grooves toward the crankshaft's axial bearing surfaces.

22 Attach the other thrust washers onto the bearing cap with a little grease. Turn the washers so that the surfaces with oil grooves are facing toward the thrust bearing surfaces on the crankshaft

23 Lubricate the bearing caps with oil and install them according to the marking. No. 1 nearest to the flywheel end. Make sure that the thrust washers on the cap fit correctly against the washers in the block.

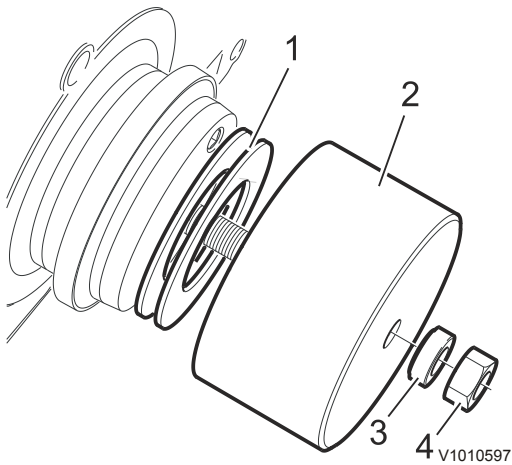


Fig.94

- 1 Washers
- 2 Press sleeve
- 3 Bearing
- 4 Nut

- 46 Install any spacer washers, press sleeve, the bearing and the nut. Use the number of washers required to prevent the new crankshaft oil seal from ending up in the same position as the old one.
- 47 Screw the nut until stop. Check that the seal ends up in the correct position.

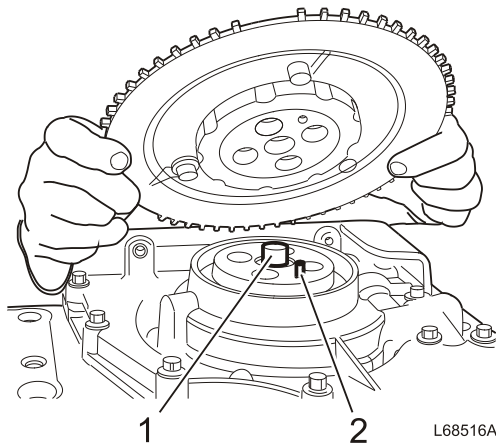


Fig.95

- 1 Guide sleeve
- 2 Guide pin

- 48 Install the ring gear and the V-belt pulley and align the guide sleeve and the guide pin.

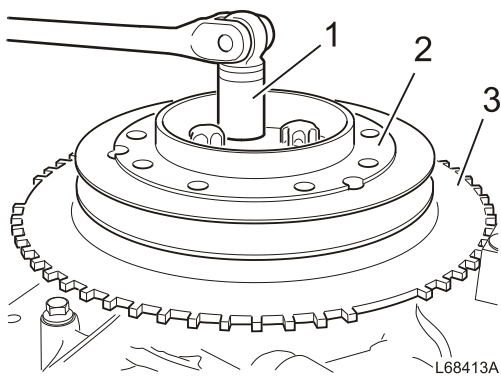


Fig.96

- 1 Torx E20
- 2 V-belt pulley
- 3 Toothed wheel

- 49 Tighten the bolts (Torx E20), counterhold with the rotation tool on the flywheel side. Tightening torque: see *Belt pulley/vibration damper, tightening torques page 15.*

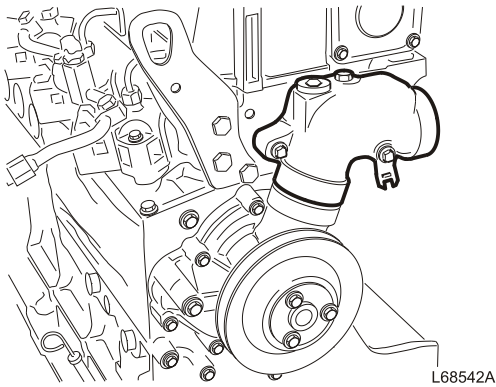


Fig.126

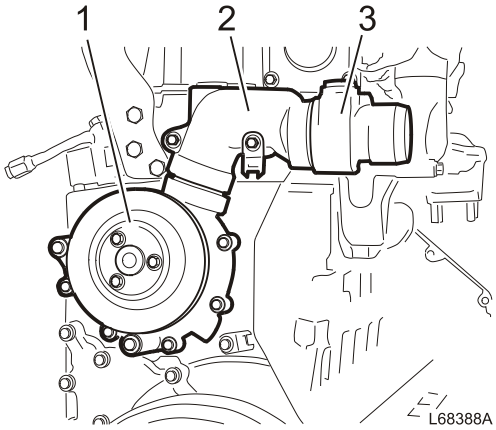


Fig.127

- 1 1 Coolant pump
- 2 Intermediate housing
- 3 Thermostat housing

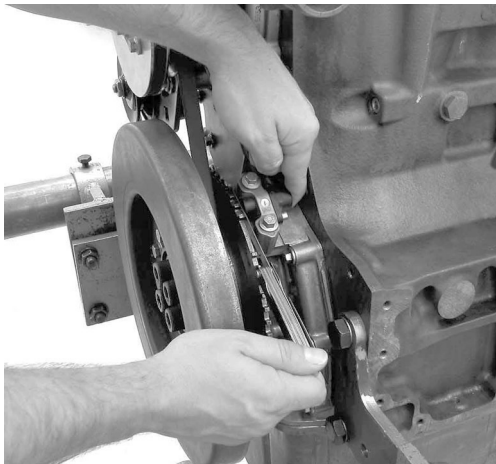
89 Lubricate the O-rings and install the intermediate housing.

90 Install the thermostat housing, use new gasket.

91 Tighten all bolts for the coolant pump and the thermostat housing.
Tightening torque: see *Coolant thermostat housing, tightening torques page 17*.

Crankshaft sensor, installing

92 Install the crankshaft's speed sensor. Hand-tighten the bolts. Insert a feeler gauge between the ring gear and the speed sensor. See *Speed sensor, specifications page 12*. Lightly press the sensor against the feeler gauge. Tighten the bolts.
Tightening torque: see *Speed sensor, tightening torque page 18*
Check the clearance.



V1052548

Fig.128 Checking clearance