

**SCANIA**

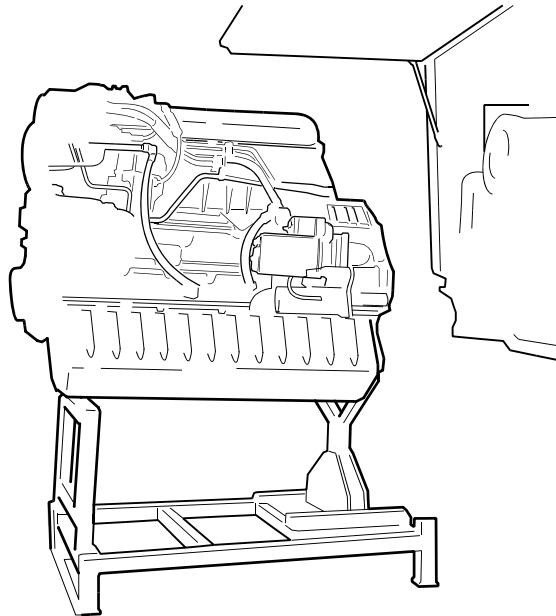
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Issue 2 **en**

## 9 litre engine

**L bus**

### Removing and fitting



124475

# Contents

## Removing the engine

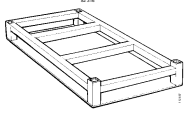
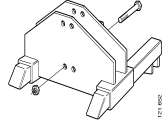
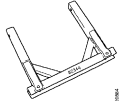

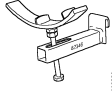
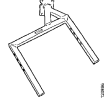

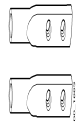
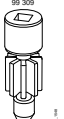
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# Removing the engine

## Special tools

Number	Designation	Illustration	Tool board
82 316	Engine support		
2 271 841	Rear lower engine support		
2 271 840	Front lower engine support		
2 271 842	Rear upper engine support		
82 346	Gearbox support		
82 348	Front upper engine support		
99 301	Adapter		D5
99 302	Tips		
99 309	Rotating tool		

## Other tools

<b>Number</b>	<b>Designation</b>
584 054	Torque wrench
587 129	Coolant tank
587 585	Pliers
588 571 *)	Fork lift trolley *)

\*) The fork lift trolley 588 571 used for removing and fitting the engine must be wider than a standard fork lift trolley and will have to be modified as described in tool sheet 588 571.

## Preparatory work

**IMPORTANT!** Clean the engine before starting the work. Always use protecting plugs, cover plates, etc., to seal exposed connections and openings so that dirt does not penetrate into the engine.

**IMPORTANT!** Help protect our environment. Avoid spillage. Use a suitable container.

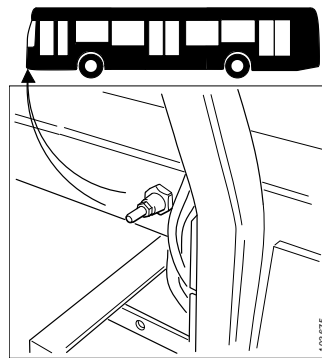


**WARNING!**

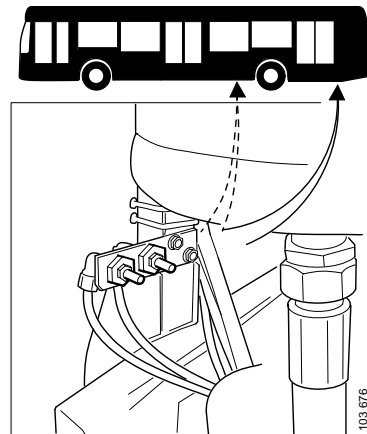
**Empty the air bellows before starting the work. Full air bellows are an explosion hazard.**

**Note:** Removing and fitting the engine should be carried out using wheel lifts 587 496.

- 1 Lower the suspension by releasing the air from the bellows. On vehicles with ELC, there is one bleeder nipple for the front axle and there are two for the rear axle.
- 2 Remove the negative battery cable.
- 3 Remove the floor covers over the engine and gearbox. It may be necessary to remove the seat in order to access the floor covers.
- 4 Open the rear engine cover of the vehicle.
- 5 Remove the rear bumper.
- 6 Drain the oil from the engine.



*Front bleed nipples on vehicles with ELC*

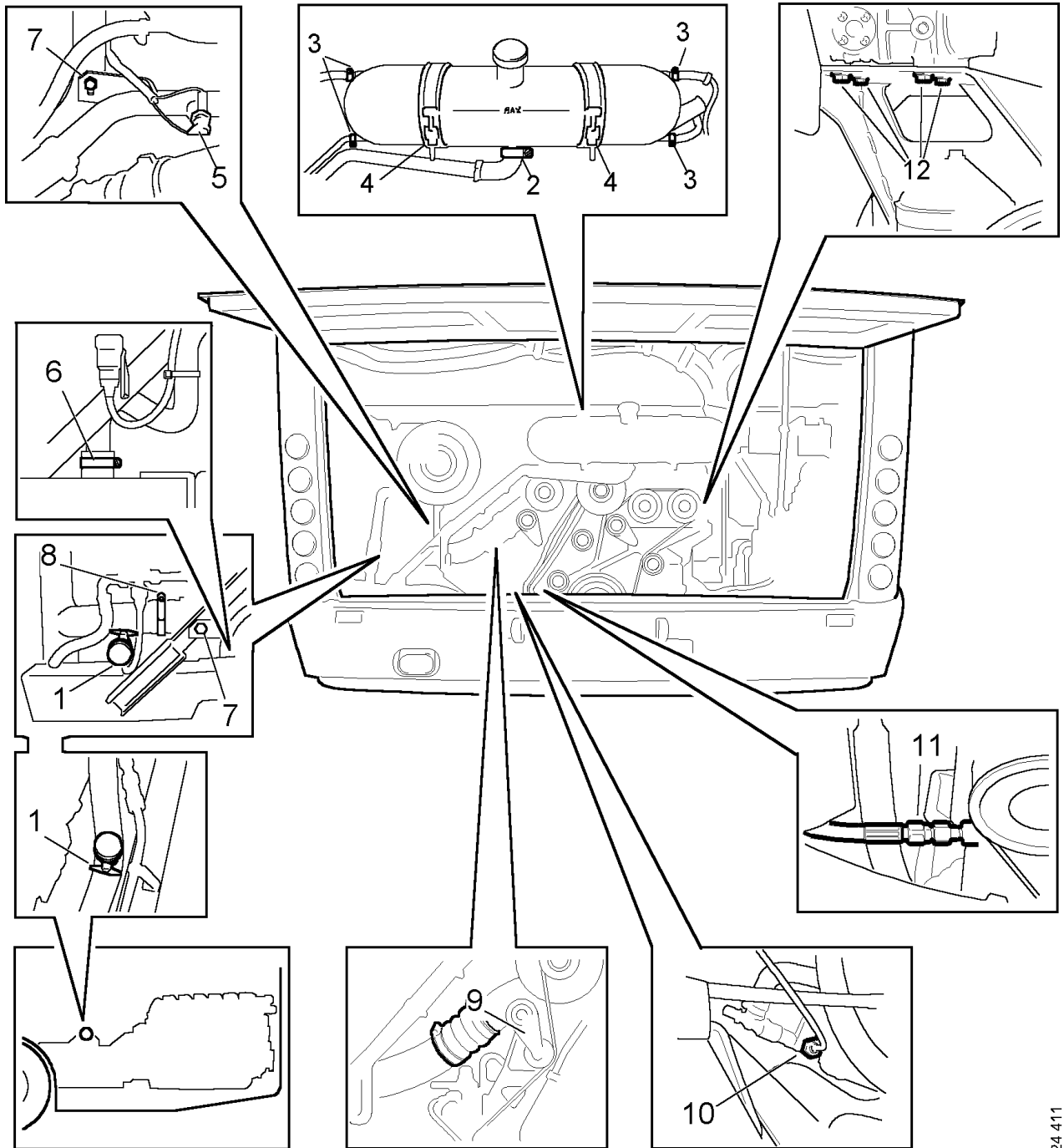


*Rear bleed nipples on vehicles with ELC*

## Rear engine cover

Pos.	Designation	Comments
1	2 heating system valves	<b>Note:</b> Close the valves for the vehicle heating system. Drain the cooling system. <b>Note:</b> Use adapter 99 301 and coolant tank 587 129.
2	Coolant hose	Undo the hose clamp and hose on the expansion tank.
3	Bleeder hoses on expansion tank	Detach the bleeder hoses from the expansion tank.
4	Expansion tank clamps	Undo the expansion tank clamps. Remove and tie up the expansion tank at a level above the rocker covers.
5	Level sensor	Detach the wires for the level sensor.
6	Coolant hose	Undo the clamp and the lower coolant hose.
7	Coolant pipe bolts	Remove the screws for the coolant pipe and remove the coolant pipe.
8	Lower clamp for charge air pipe	Undo the lower clamp for the charge air pipe between the charge air cooler and the intake manifold.
9	Upper clamp for charge air pipe	Undo the upper clamp and remove the charge air pipe between the charge air cooler and the intake manifold.
10	Compressor relief hose	Detach the hose for the compressor relief.
11	Hydraulic hose	Separate and plug the hydraulic line to the fan thermostat valve.
12	A/C compressor	Remove the drive belt for the A/C compressor. Remove the bolts for the A/C compressor. Make fast the A/C compressor to avoid bending and stretching the hoses.

Work carried out from the rear engine cover

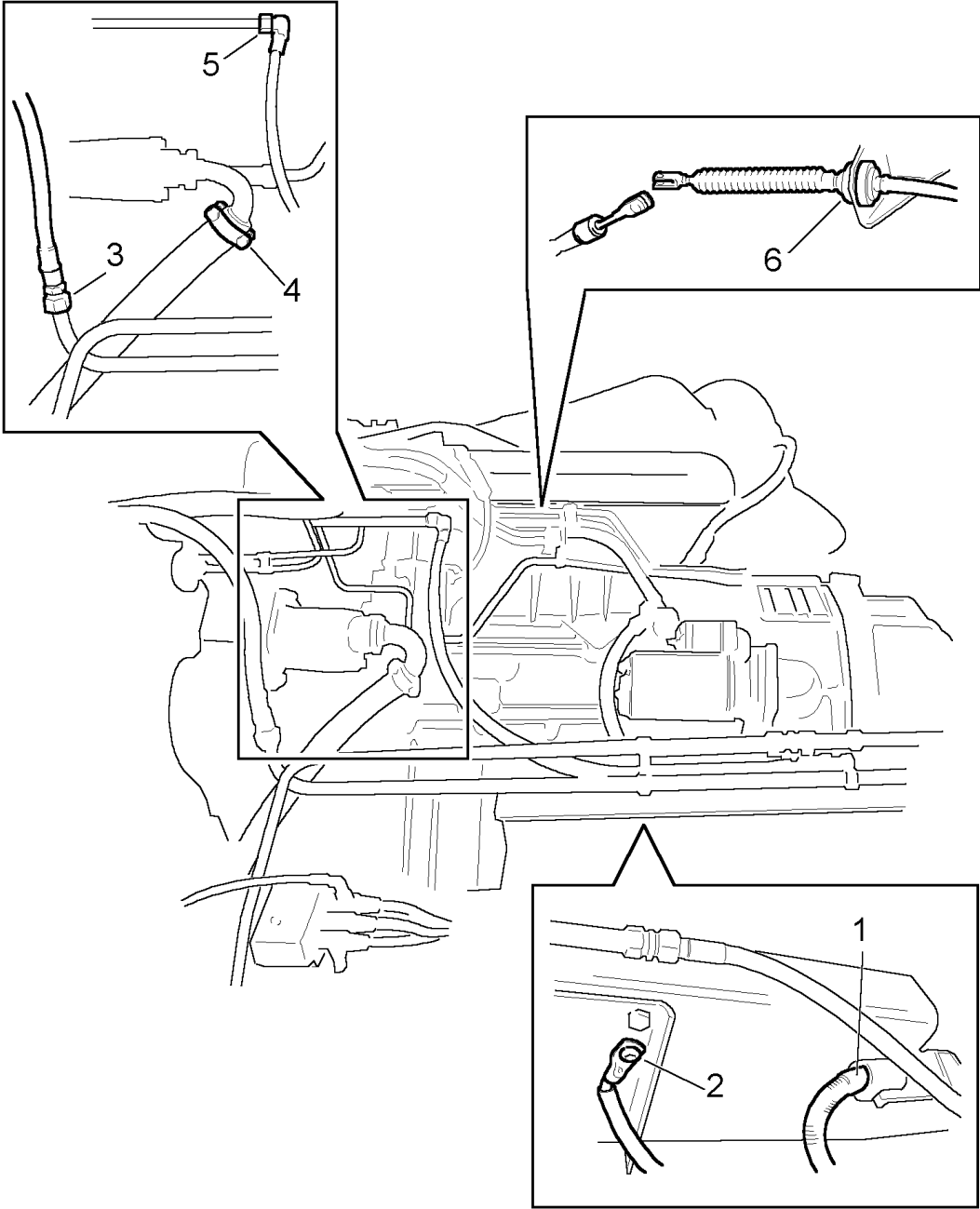


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## Right side cover

Pos.	Designation	Comments
1	Positive cable	Disconnect the positive cable for the starter motor from the frame next to the starter motor.
2	Ground connection	Disconnect the ground cable from the frame next to the starter motor.
3	Hydraulic line, return line from power steering gear	Drain the power steering fluid reservoir. Undo and plug the hydraulic line, return line from power steering gear.
4	Hydraulic line for radiator fan, suction pipe from hydraulic fluid reservoir.	Undo and plug the hydraulic line for the radiator fan, suction pipe.
5	Hydraulic line, delivery line for power steering gear	Undo and plug the hydraulic line for the power steering gear, delivery pipe.
6	Throttle wire	Remove the throttle wire if the vehicle is equipped with a mechanical throttle control. Remove the hose for the speed limiter if fitted on the vehicle.

Working from the right side cover

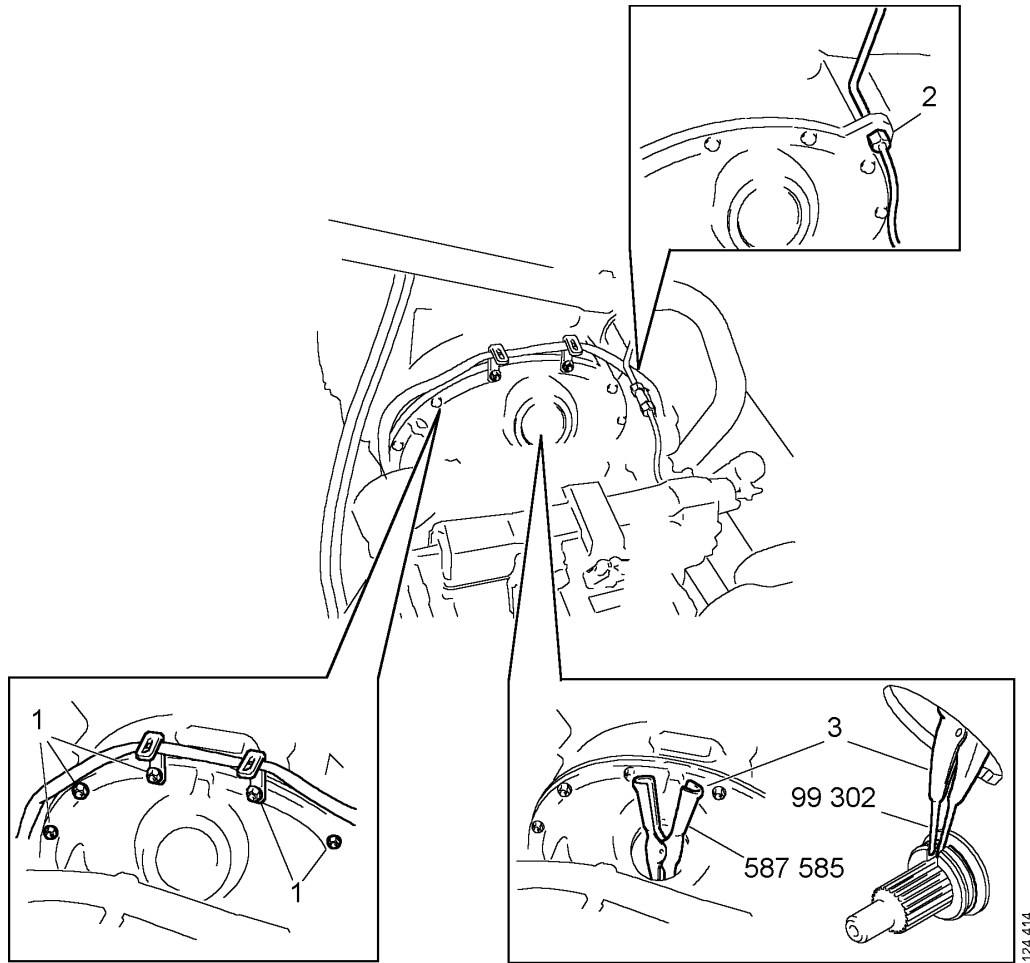


## Floor cover over gearbox

Pos.	Designation	Comments
1	Nuts	Remove the upper nuts which hold together the engine and gearbox.
2	Air pressure line	Dismantle the exhaust brake operating air pressure line.
3 *)	Clutch retaining ring *)	Fit pliers 587 585 with tips 99 302. *)

\*) On some vehicles with alternative equipment it may be easier to fit the pliers 587 585 for the clutch retaining ring from below. Alternatively a flattened pipe with an internal diameter of 15 mm can be used to hold together the clutch retaining ring.

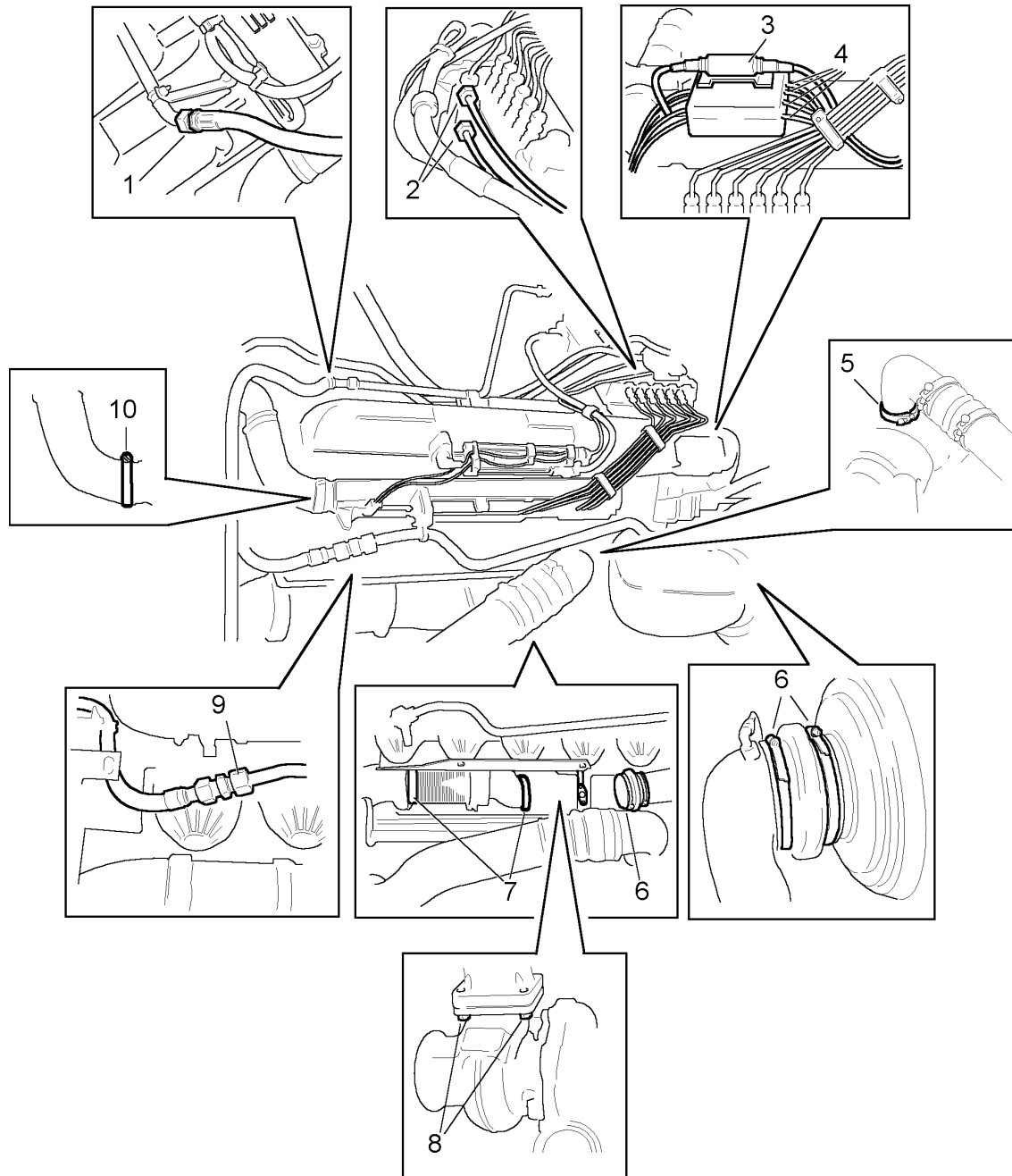
Removing parts through the floor cover over the gearbox



## Floor cover over engine

Pos.	Designation	Comments
1	Hydraulic line for radiator fan	Separate and plug the hydraulic line for the radiator fan, delivery pipe.
2	Fuel pipes	Mark the fuel lines. Separate and plug the fuel lines. The location of the fuel lines on the engine may vary.
3	Connector C516	Separate connector C516. To facilitate access to the connector, remove an alternator or the air cleaner and unplug the connector through the rear engine cover.
4	Connector in junction box	Open the junction box <b>IMPORTANT!</b> Mark the connectors and separate them. To facilitate access to the junction box, remove an alternator or the air cleaner and dismantle the junction box through the rear engine cover.
5	Charge air cooler pipe	Undo the V-clamp and fold aside the charge air pipe between the charge air cooler and turbocharger unit.
6	Air cleaner pipe	Undo the clamps and the hose for the compressor and remove the air cleaner pipe.
7	V-clamps	If the vehicle is equipped with an exhaust brake, undo the exhaust brake operating air pressure pipe. Undo the V-clamp and remove the flexible exhaust pipe.
8	Nuts	Remove the upper turbocharger nuts. Undo the turbocharger lubrication pipe.
9	Air pressure pipe for cooling coil	Separate the cooling coil air pressure pipe between the compressor and the air dryer.
10	Coolant hose	Remove the coolant hose from the pipe above the intake manifold at the rear edge of the engine.

Removing parts through the floor cover over the engine



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## From below

Empty the air bellows.



**WARNING!**

**Empty the air bellows before starting the work. Full air bellows are an explosion hazard.**

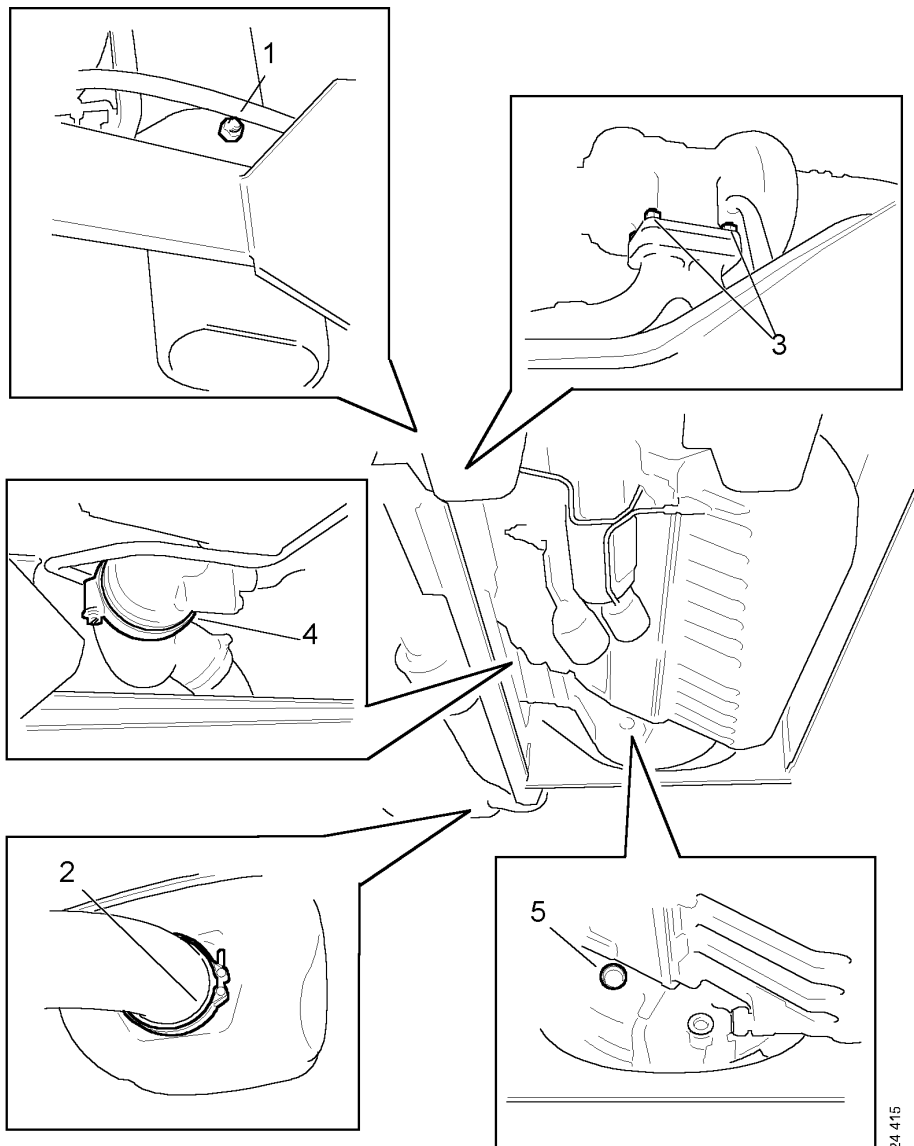
Raise the vehicle with wheel lifts 587 496.

Remove cover plates and covers beneath the engine and gearbox. Also remove the rails on the right and left frame members which hold the cover plates to obtain greater clearance for the tools and engine.

Pos.	Designation	Comments
1	End pipe bolt	Remove the bolt securing the end pipe to the crossmember. Undo the hose for the ejector pipe from the exhaust end pipe.
2	Clamp	Undo the exhaust pipe clamp and remove the silencer with end pipe.
3	Nuts	Remove the two lower nuts securing the turbocharger to the manifold. Undo the turbocharger return oil pipe. Remove the turbocharger through the floor cover for the engine.
4	Coolant hose	Detach the lower coolant hose.
5 *)	Torque converter bolts *)	Remove the protecting plug in the flywheel housing. Remove the 10 bolts which fasten the flex plate in the torque converter. Use rotating tool 99 309 to turn round the engine. *)

\*) On vehicles with automatic gearbox.

Work from below

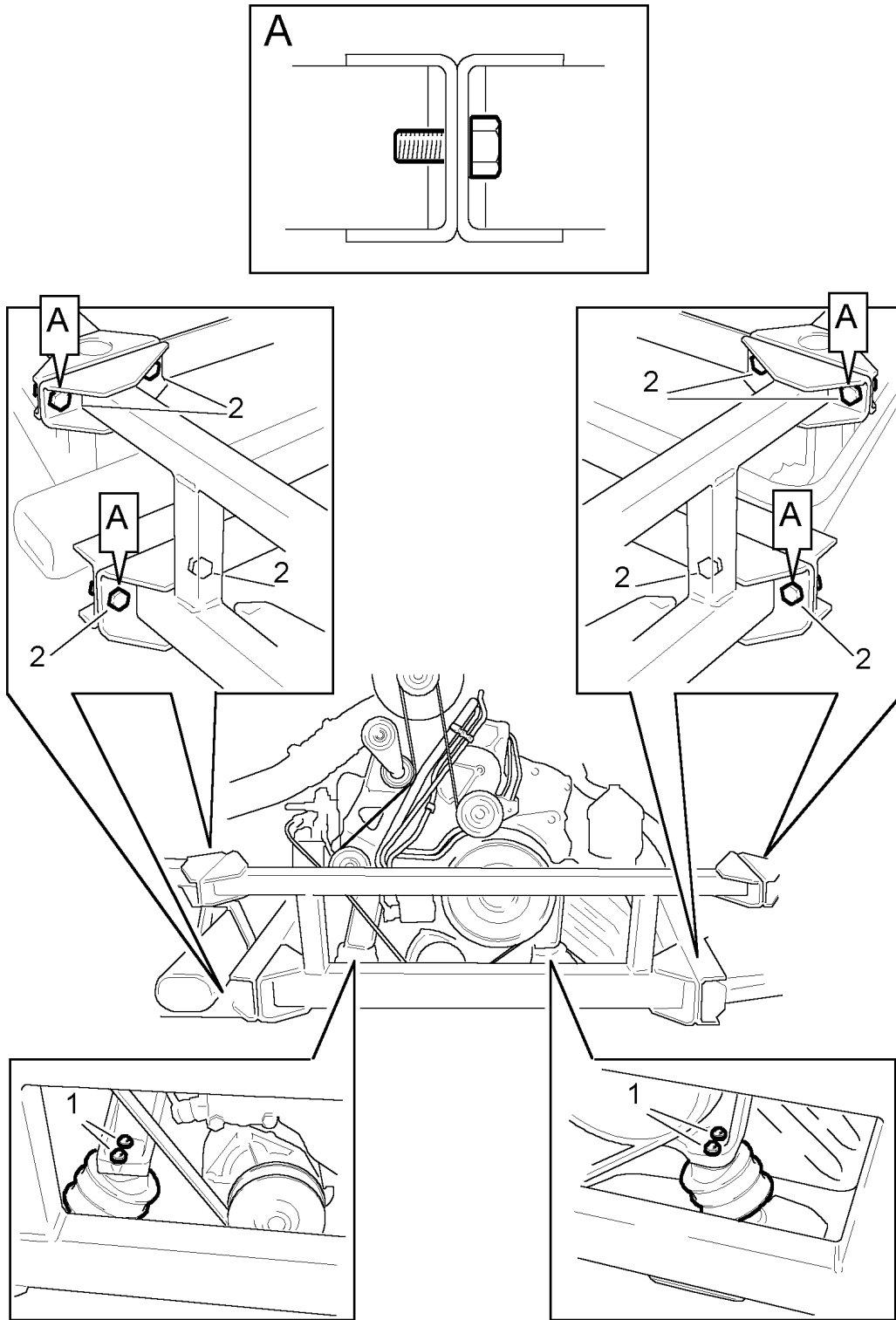


## Crossmember and engine brackets

Lower the vehicle so that you can access the bolts for the crossmember and engine brackets.

<b>Pos.</b>	<b>Designation</b>	<b>Comments</b>
1	Engine bracket nuts	Remove the upper nuts for the engine bracket.
2	Crossmember bolts	Also remove all the nuts and bolts for the crossmember except one in each corner A. Allow one bolt to remain in each corner. The engine remains suspended by the last bolts.

Removing the crossmember and engine brackets



## Engine support



**WARNING!**

**Use fork lift trolley 588 571 when removing the engine from the engine compartment. See Other Tools.**

**IMPORTANT!** If the vehicle is equipped with an automatic gearbox, remove the upper part of gearbox bracing tool 82 346 and support the automatic gearbox with the bolt.

Pos.	Designation	Comments
1	Gearbox bracing tool 82 346	Fit gearbox bracing tool 82 346 on the frame member which goes under the flywheel housing.
2	Front upper engine support 82 348	Fit the front upper engine support 82 348 on the engine.
3	Front lower engine support 2 271 840	Fit the front lower engine support 2 271 840 to the front upper engine support 82 348.
4	Rear lower engine support 2 271 841	Fit the rear lower engine support 2 271 841 to the engine support 82 316.
5	Rear upper engine support 2 271 842	Fit the rear upper engine support 2 271 842 to the rear lower engine support 2 271 841.
6	Engine support 82 316	Roll in engine support 82 316 using fork lift trolley 588 571.

Lower the vehicle with the wheel lifts so that you fit the height between the upper and lower strut of the engine support to suitable holes.

It may be necessary to adjust the height of the front and rear wheel lifts individually before the vehicle is in a horizontal position.

Adjust the height of gearbox bracing tool 82 346 so that the gearbox is lying on the support.

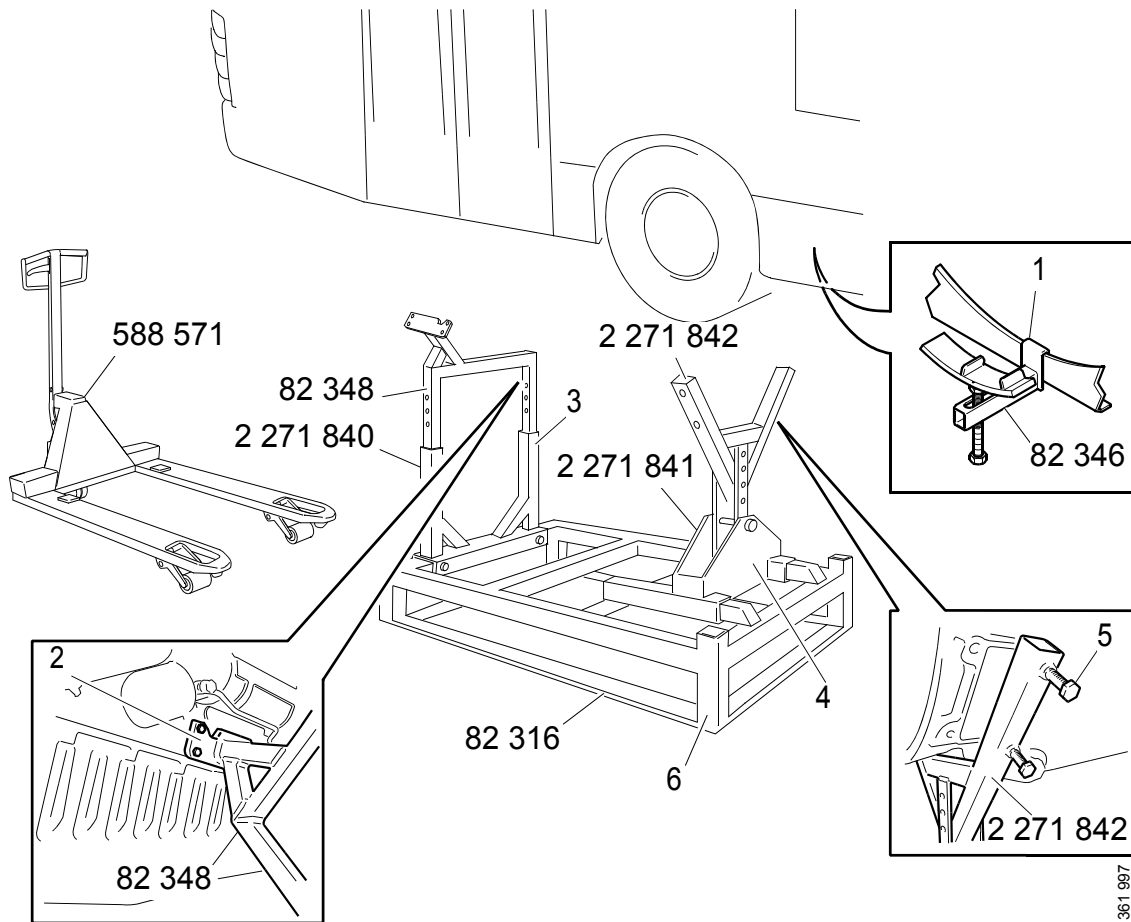
Raise the engine stand to relieve the pressure on the engine brackets. Remove the last two bolts in the crossmember, and remove it.

Remove the last nuts which hold the engine and gearbox together and separate the engine and gearbox.

Pull out the engine from the engine compartment. Use fork lift trolley 588 571.

Use overhead hoists to move the engine from the engine stand.

Fitting the engine support and removing the engine



# Fitting the engine

## Specifications

<b>Designation</b>	<b>Tightening torques</b>
Crossmember bolt	210 Nm
Engine bracket bolts	47 Nm
V-clamp bolts	8 Nm
Nuts for gearbox to engine	47 Nm
Bolts for flex plate to torque converter	84 Nm

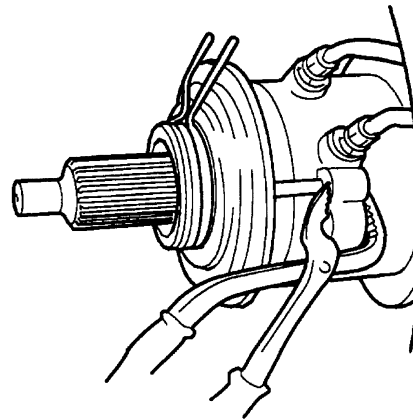
<b>The following tightening torques apply in general unless otherwise specified:</b>	<b>Tightening torques</b>
M5 thread	6.7 Nm
M6 thread	10.2 Nm
M8 thread	26 Nm
M10 thread	50 Nm
M12 thread	92 Nm
M14 thread	149 Nm

## Preparatory work

### Manual gearbox

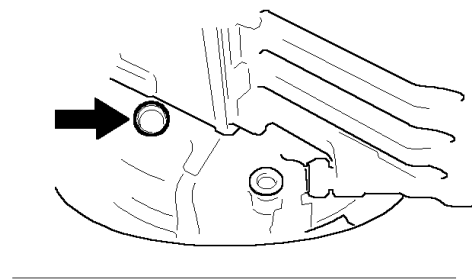
**Note:** Replace clutch retaining ring. Check that the puller ring and its securing ring are intact and are correctly seated. Oil the spring pins with anticorrosive oil. Push the slave cylinder end into the assembly position until the spring pin is level with the rear edge of the heel.

- Align the engine and push it into position. When the slave cylinder end engages with the diaphragm spring locking device an audible click is heard.
- Fit the engine to the gearbox and tighten the nuts holding the gearbox on to the flywheel housing. Tightening torque 47 Nm.



### Automatic gearbox

- Align the engine and push it into position. Position the flywheel so that one of the flex plate holes is directly in front of the access hole in the flywheel housing.
- Then turn the torque converter so that the holes in the torque converter and flex plate are aligned. Insert a screwdriver as a centering tool.
- Fit the engine to the gearbox and tighten the nuts holding the gearbox on to the flywheel housing. Tightening torque 47 Nm

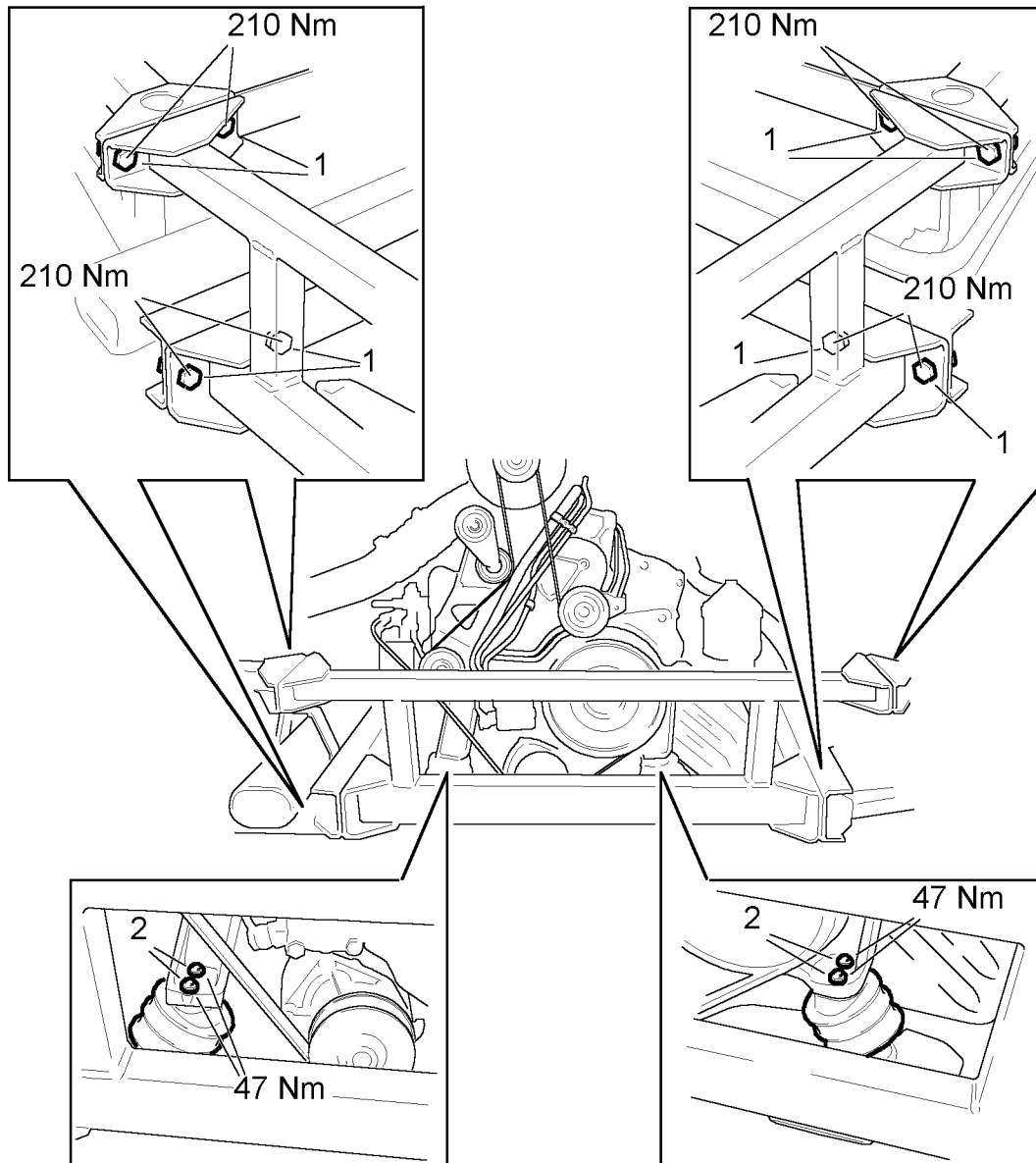


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## Crossmember and engine brackets

<b>Pos.</b>	<b>Designation</b>	<b>Comments</b>
1	Crossmember bolts	Fit all nuts and bolts for the crossmember. Tightening torque 210 Nm.
2	Engine bracket nuts	Fit the upper nuts on the engine brackets. Tightening torque 47 Nm.

Fitting the crossmember and engine brackets



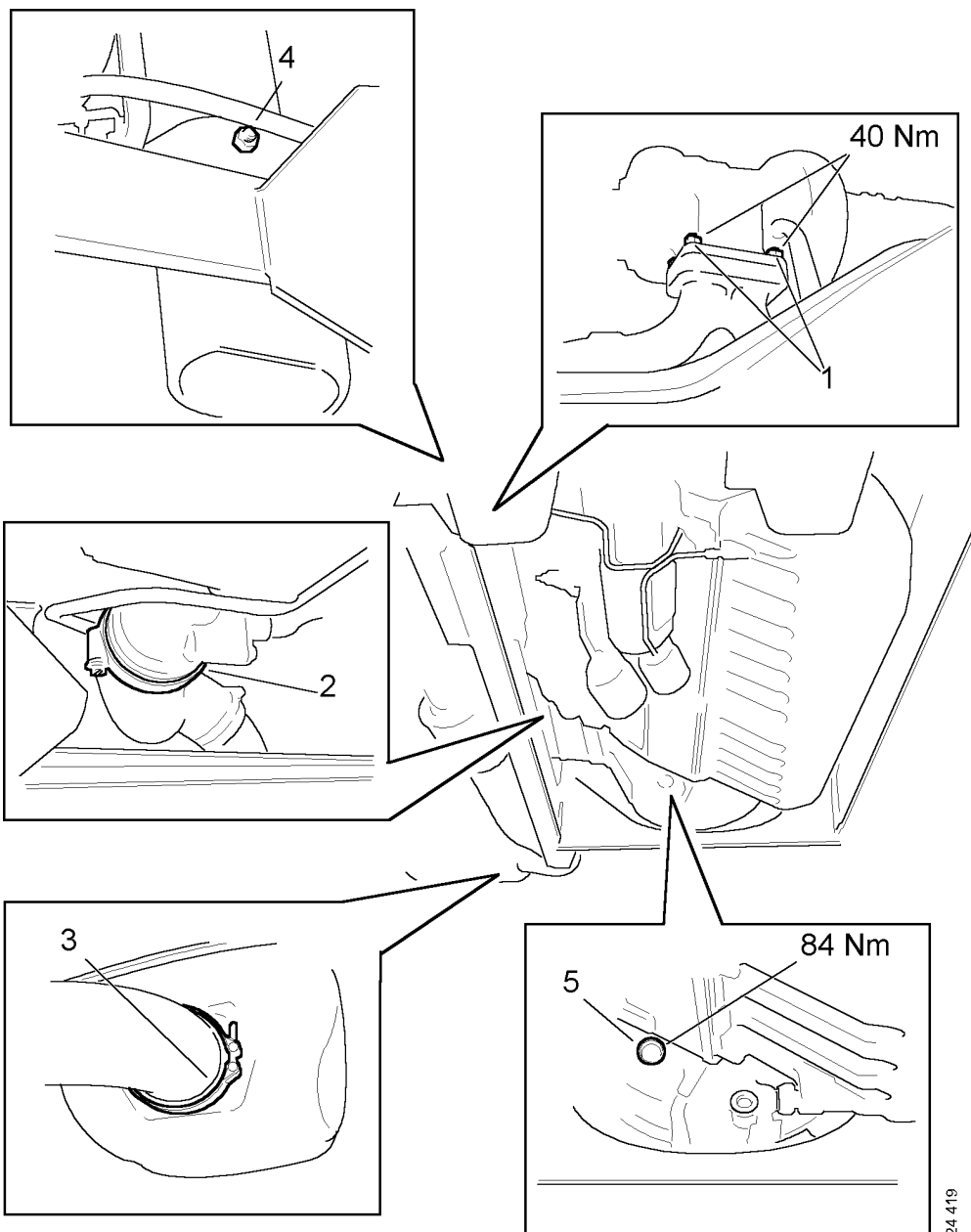
## From below

Lower and remove the fork lift trolley 588 571 and all engine and gearbox supports.

Pos.	Designation	Comments
1	Nuts	Fit the turbocharger through the floor cover for the engine. Fit the two lower nuts securing the turbocharger to the manifold. Tightening torque 40 Nm. Fit the turbocharger return oil pipe.
2	Coolant hose	Fit the lower coolant hose.
3	Clamp	Fit the silencer with end pipe and torque tighten the exhaust pipe clamp to 8 Nm. Fit the hose for the ejector pipe onto the exhaust end pipe.
4	End pipe bolt	Fit the bolt securing the end pipe to the crossmember.
5 *)	Torque converter bolts *)	Fit the 10 bolts securing the flex plate in the torque converter. Use rotating tool 99 309. Tightening torque 84 Nm. Fit the protecting plug in the flywheel housing. *)

\*) On vehicles with automatic gearbox.

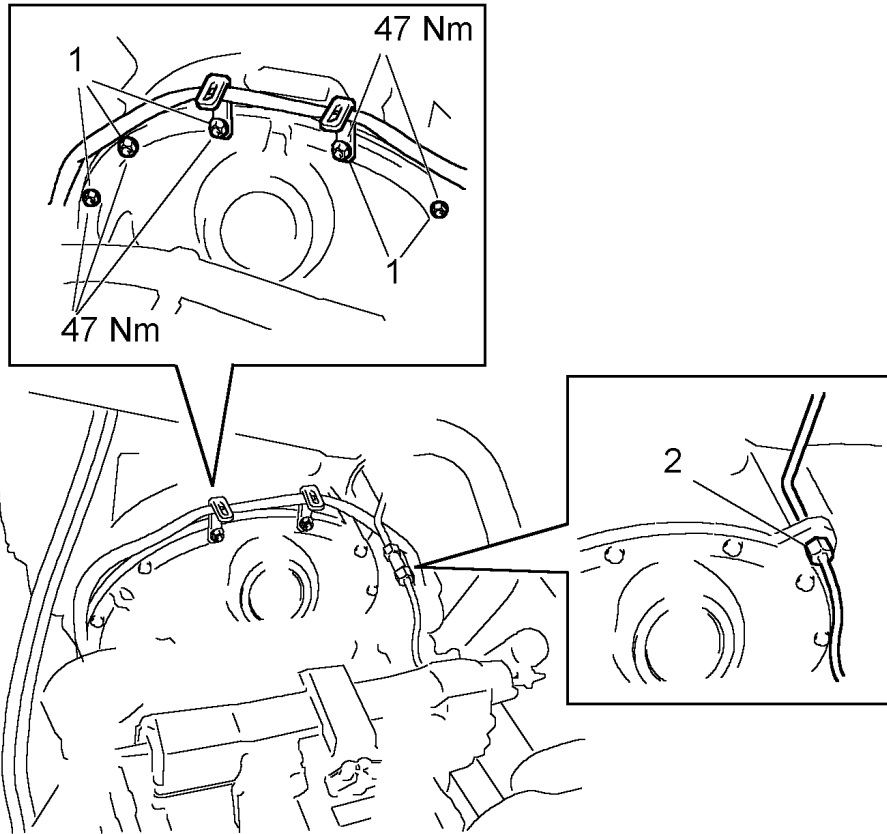
Fitting parts from below



## Floor cover over gearbox

<b>Pos.</b>	<b>Designation</b>	<b>Comments</b>
1	Nuts	Fit the upper nuts which hold together the engine and gearbox. Tightening torque 47 Nm.
2	Air pressure line	Fit the compressed air pipe for the operating air to the exhaust brake.

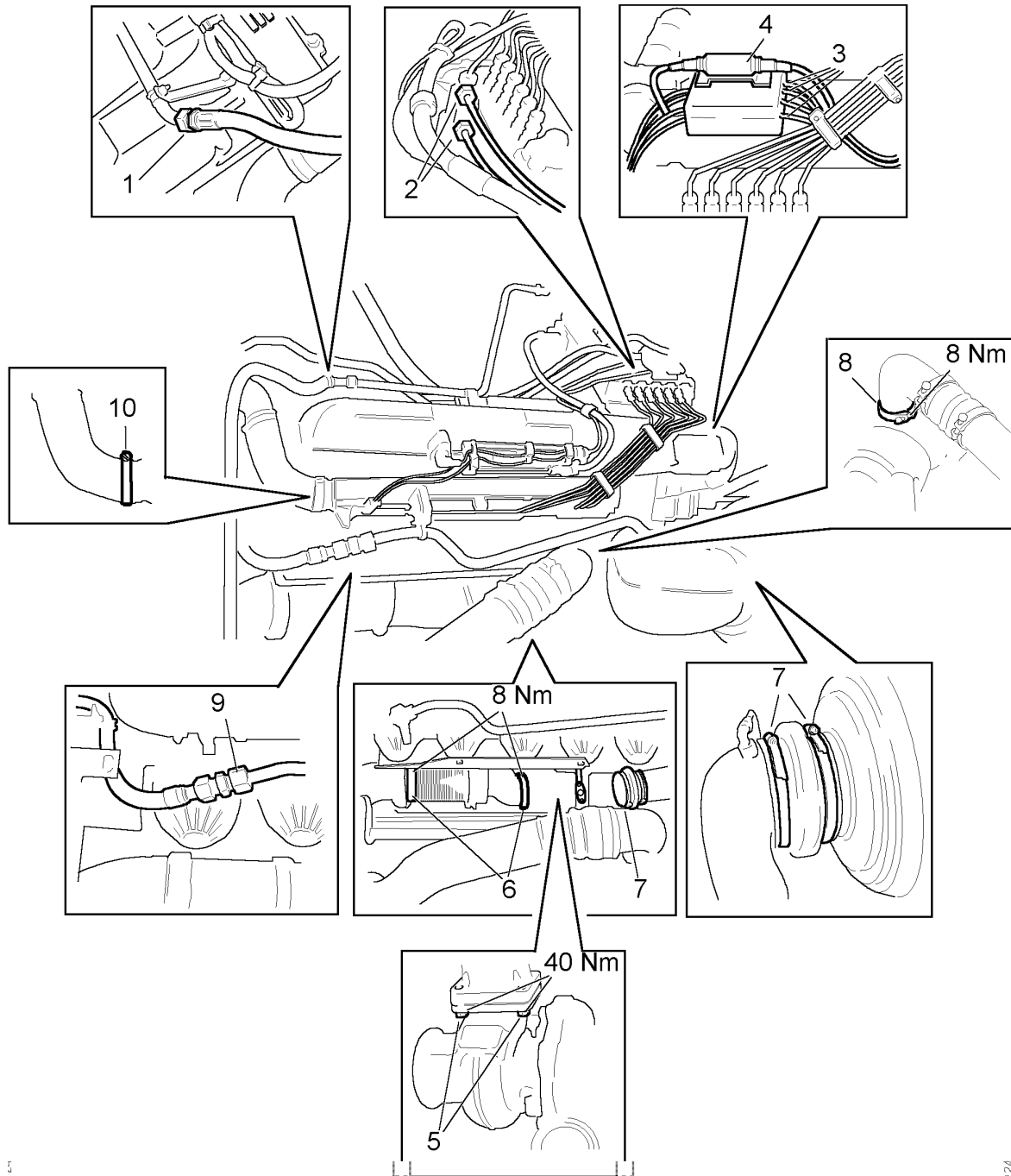
Fitting parts through the floor cover over the gearbox



## Floor cover over engine

Pos.	Designation	Comments
1	Hydraulic line for radiator fan	Fit together the hydraulic line for the radiator fan, delivery pipe.
2	Fuel pipes	Fit the fuel lines.
3	Connector in junction box	Plug in the connector and close the junction box.
4	Connector C516	Assemble connector C516.
5	Nuts	Fit the upper nuts for the turbocharger. Tightening torque 40 Nm. Fit the lubrication oil pipe.
6	V-clamps	Fit the flexible exhaust pipe with the exhaust brake. Tighten the V-clamps to 8 Nm. Fit the compressed air pipe if the vehicle is equipped with exhaust brake.
7	Air cleaner pipe	Fit the pipe between the air cleaner and turbocharger unit. Fit the hose for the compressor. Tighten the clamps.
8	Charge air cooler pipe	Fit the pipe between the charge air cooler and turbocharger unit. Tighten the V-clamp to 8 Nm.
9	Air pressure pipe for cooling coil	Fit together the cooling coil air pressure pipe between the compressor and the air dryer.
10	Coolant hose	Fit the coolant hose on the pipe above the intake manifold at the rear of the engine.

Fitting parts through the floor cover over the engine



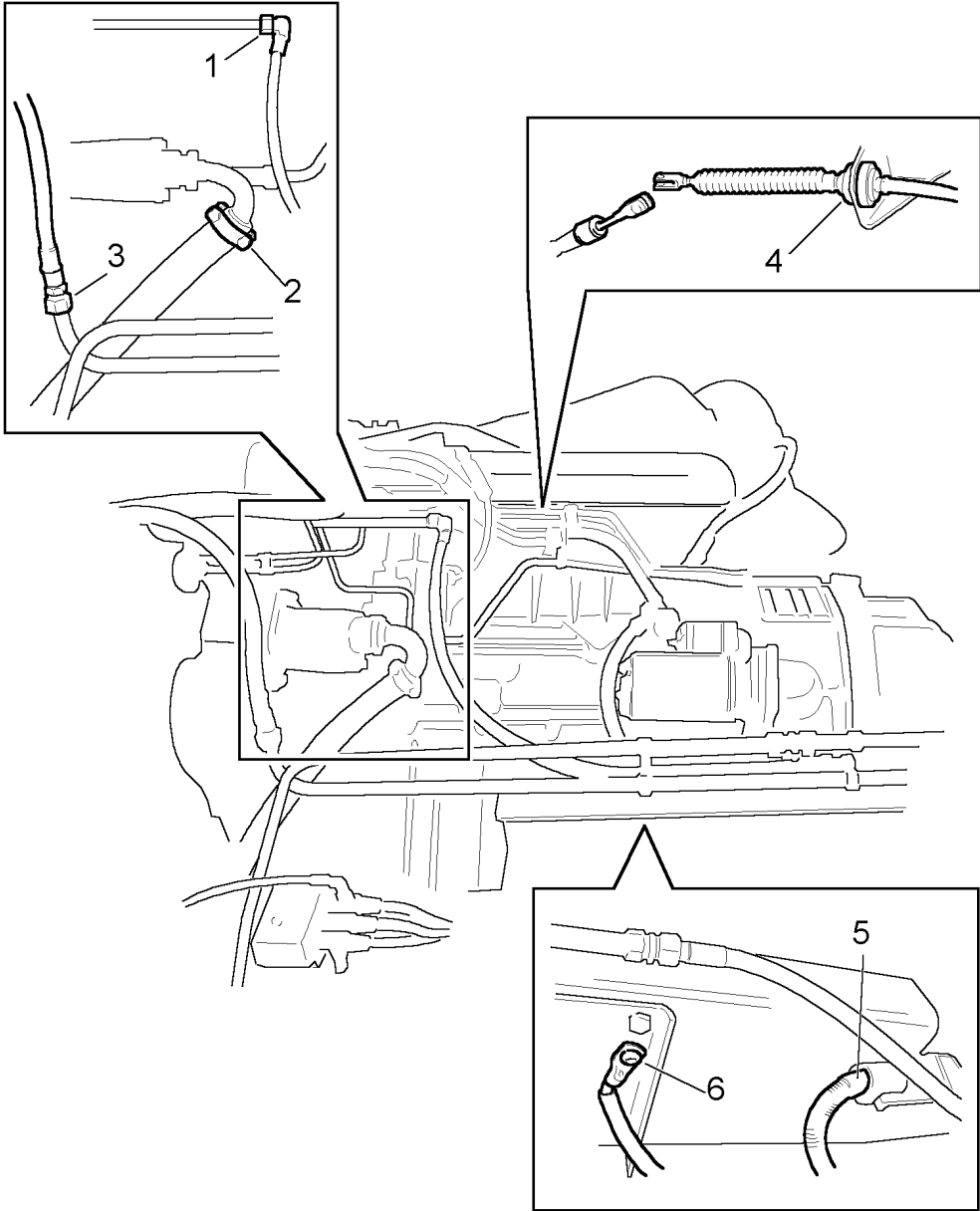
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## Right side cover

<b>Pos.</b>	<b>Designation</b>	<b>Comments</b>
1	Hydraulic line, delivery line for power steering gear	Fit together the hydraulic line for the power steering gear, delivery pipe.
2	Hydraulic line for radiator fan, suction pipe from hydraulic fluid reservoir.	Fit together the hydraulic line from the radiator fan hydraulic fluid reservoir, suction pipe.
3	Hydraulic line, return line from power steering gear	Fit together the hydraulic line, return line, from the power steering gear.
4	Throttle wire	Fit the throttle wire. If the vehicle is equipped with a speed limiter, fit the hose for the speed limiter.
5	Positive cable	Fit the positive cable to the starter motor on the frame.
6	Ground connection	Fit the ground cable to the frame.

Fitting parts through the right side cover



## Rear engine cover

Pos.	Designation	Comments
1	Hydraulic hose	Fit together the hydraulic line for the radiator fan thermostat.
2	Compressor relief hose	Fit together the hose for the compressor relief.
3	Upper clamp for charge air pipe	Fit the charge air pipe between the charge air cooler and intake manifold. Tighten the upper clamp to 8 Nm.
4	Lower clamp for charge air pipe	Torque tighten the lower clamp for the charge air pipe between the charge air cooler and the intake manifold to 8 Nm.
5	Coolant hose	Fit the coolant pipe and the lower coolant hose and tighten the clamp.
6	Expansion tank clamps	Fit the expansion tank and tighten its clamps.
7	Coolant hose	Fit the hose on the expansion tank.
8	Bleeder hoses on expansion tank	Fit the bleeder hoses on the expansion tank.
9	Coolant pipe bolts	Fit the coolant pipe bolts.
10	Level sensor	Fit the wires for the level sensor.
11	A/C compressor	Fit the A/C compressor. Fit the A/C compressor drive belt.
12	2 heating system valves	Open the valves for the vehicle heating system.

Fit the rear bumper.

Fit the negative battery cable.

Fit a new oil filter and fill with engine oil. See Group 0.

Fill with coolant. See Group 2.

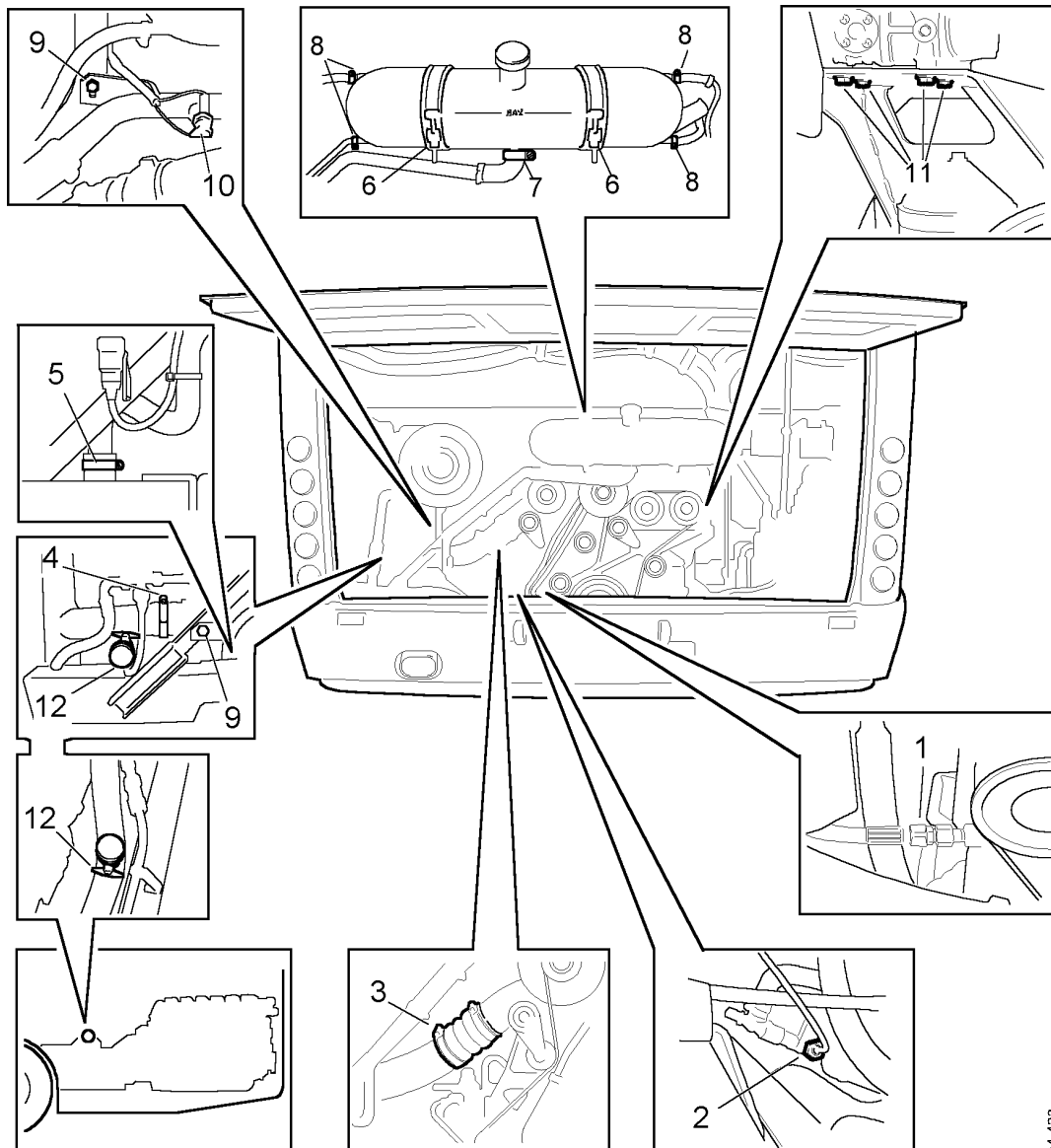
Bleed the fuel system. See Group 3.

Fill the radiator fan hydraulic system with hydraulic fluid. See Group 2.

Fill the power steering gear system with hydraulic fluid. See Group 13.

Fit the cover plates and covers beneath the engine.

Fitting parts through the rear engine cover



124 423