

N SERIES

EU/2002/88/CE

G-DRIVE application

N45

NEF45 AMI
NEF45 SMI - NEF45 SM2 - NEF45 TM1
NEF45 TM2

N67

NEF67 TE2 - NEF67 TM2 - NEF67 TM3
NEF67 SMI (not emissioned)

Technical and Repair manual

ENGINE OVERHAUL

Preface

Part of the operations illustrated within this section can be partially executed while the engine is assembled on the vehicle, depending on the room available for access to the engine and on the equipment application as well.

NOTE With regard to the engine disassembly operations from the machine, please apply for Information consulting the specific manual.
All operations of Engine disassembly operations as well as overhaul operations must be executed by qualified technicians provided with the specific tooling and equipment required.

The following information relates to the engine overhaul operations only for what concerns the different components customising the engine, according to its specific duties.

NOTE For specific application exigencies, some units can be assembled to the engine in different positions.

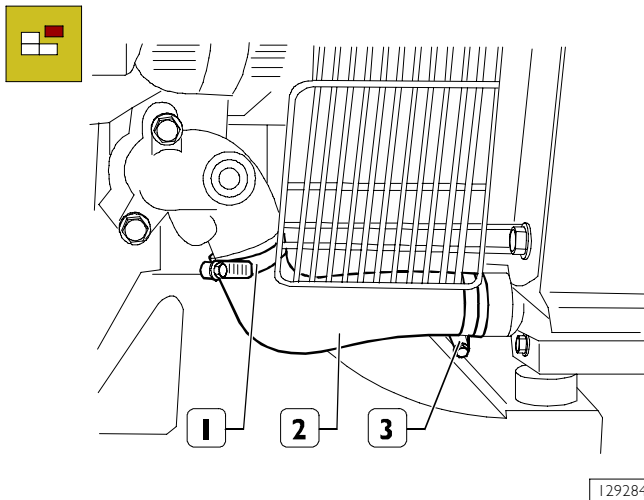
In section "General overhaul", all the operations of engine block overhaul have been contemplated. Therefore the above mentioned section is to be considered as following the part hereby described.

Removing engine from radiator

Remove the electrical wiring from all the components indicated in the electrical equipment section.

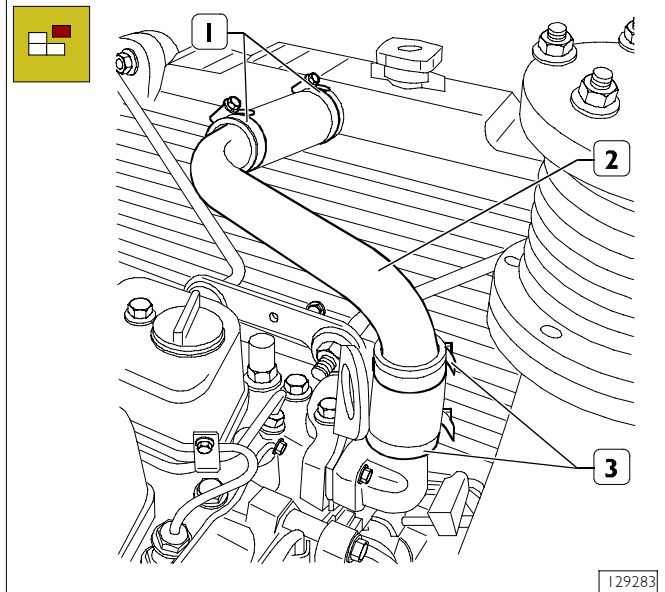
For 4 cylinder engines

Figure 2



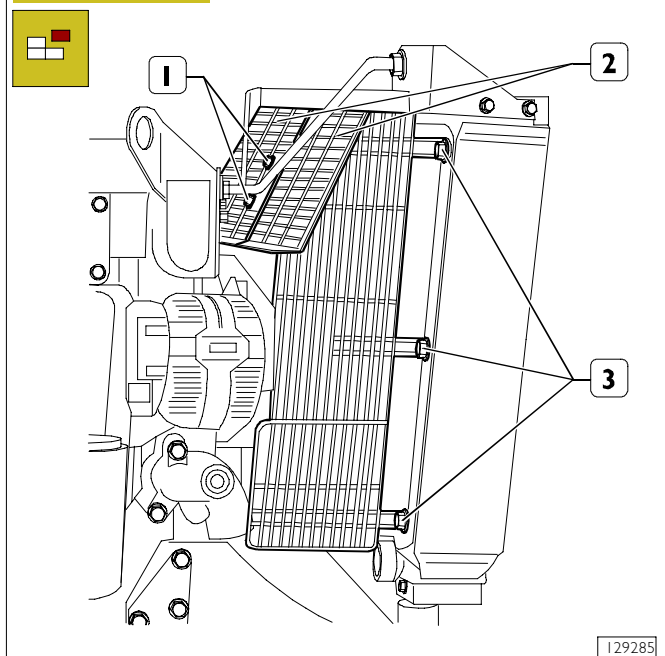
Have a special container ready by the pipe (2) for collecting the coolant. Disconnect and pipe (2) and remove it complete with hoses adjusting the bands (1) and (3).

Figure 3



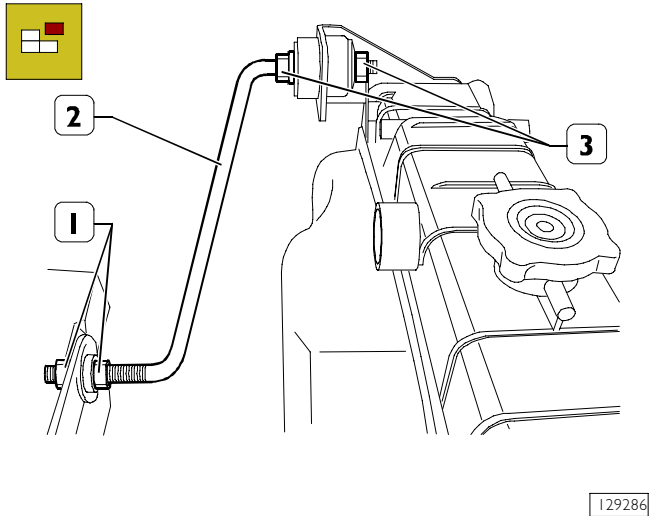
Disconnect and pipe (2) and remove it complete with hoses adjusting the bands (1) and (3).

Figure 4



Remove the protective grilles (2) for the fan adjusting the fastenings (1) and (3).

Figure 5

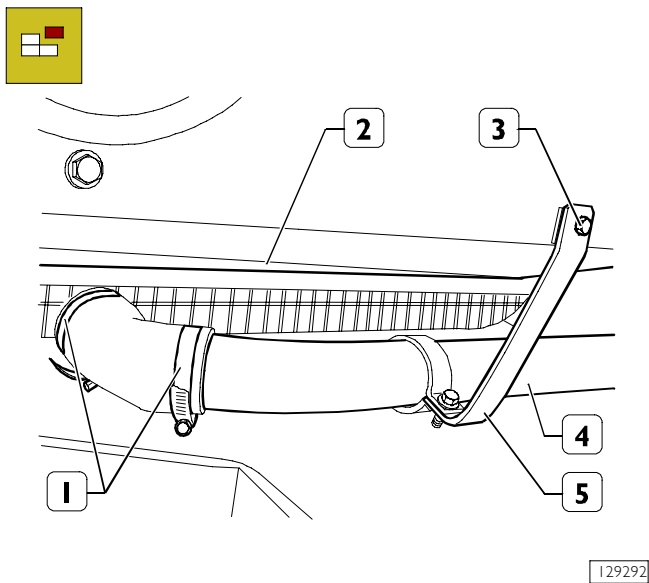


129286

- Undo the nuts (1) and (3) and remove the bracket (2). Repeat the operation for the second bracket.

For 6 cylinder engines

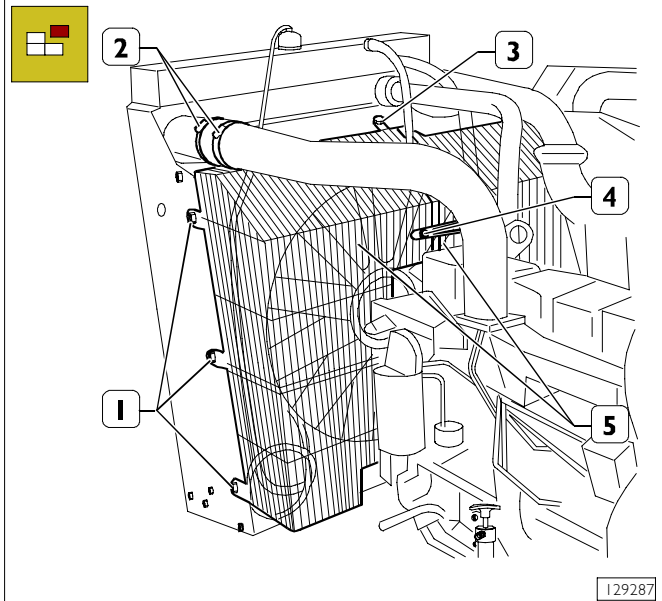
Figure 6



129292

- Have a special container ready by the pipe (4) for collecting the coolant. Disconnect the pipe (4) adjusting the bands (1).
- Undo the bolt (3) and release the pipe (4) complete with bracket (5) from the radiator assembly (2).

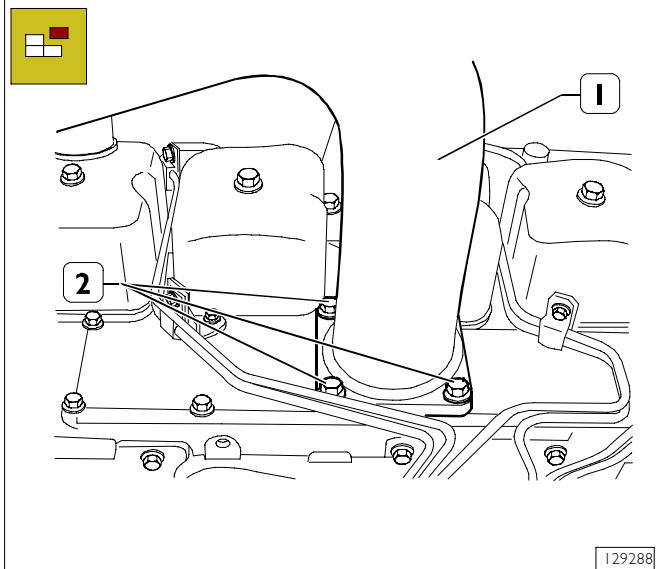
Figure 7



129287

- Remove the protective grilles (5) for the fan adjusting the fastenings (1), (3) and (4).
- Open the bands (2).

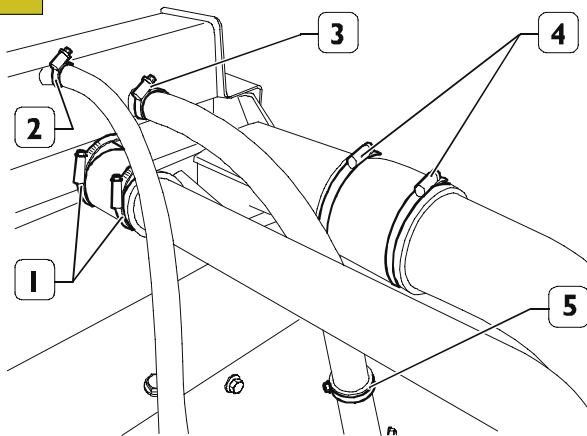
Figure 8



129288

- Undo the bolts (2) and remove the pipe (1) from the intake manifold.

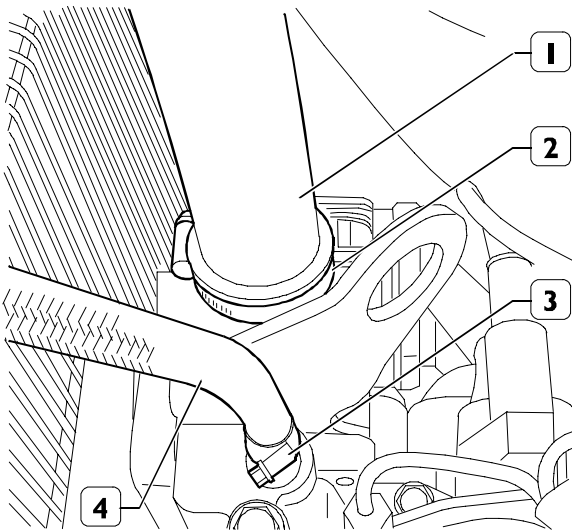
Figure 9



129289

- Disconnect the air and water pipes from the radiator assembly adjusting the bands (1), (2), (3) and (4) and the mounting bracket (5).

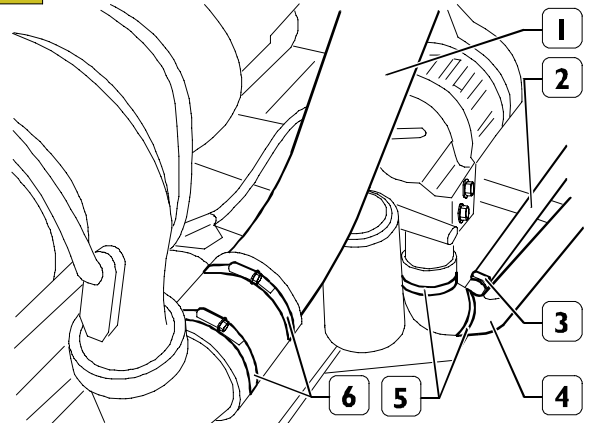
Figure 10



129290

- Disconnect the pipes (1) and (4) and remove them, complete with hoses, on the engine side adjusting the bands (2) and (3).

Figure 11



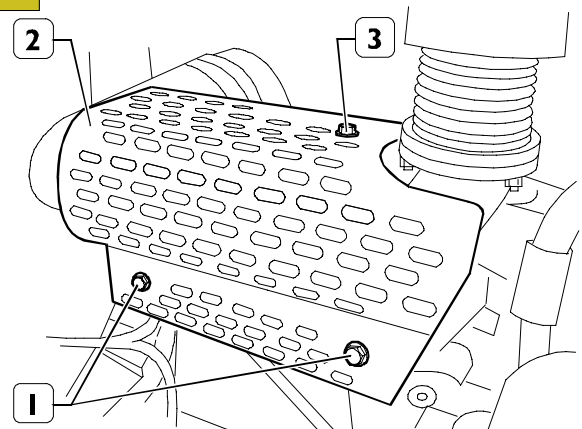
129291

- Disconnect and pipe (1) and remove it complete with hoses, on the engine side, adjusting the bands (6).
- Disconnect the pipe (2) and remove it, adjusting the band (3).
- Disconnect and pipe (4) and remove it complete with hoses, on the engine side, adjusting the bands (5).

For all engines

- Lock the radiator assembly appropriately, then release it from the crankcase adjusting the fastenings on both sides.
- Remove the radiator assembly from its housing paying attention to any possible interference with the fan.

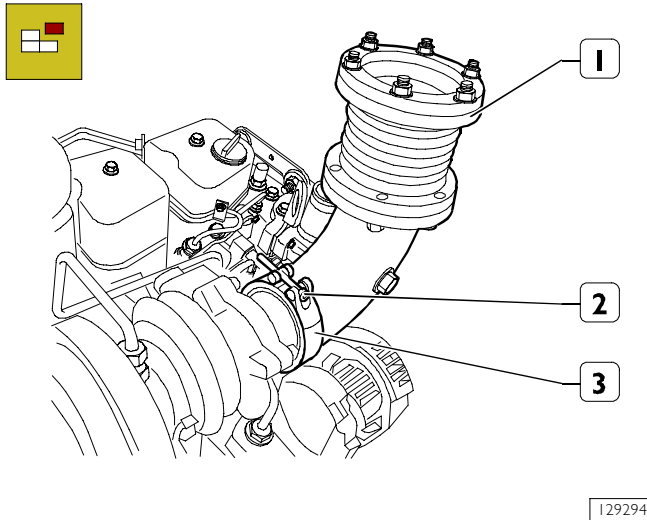
Figure 12



129293

- If present, remove the turbine guard grille (2), adjusting the bolts (1) and (3).
- Then remove the mounting brackets.

Figure 13

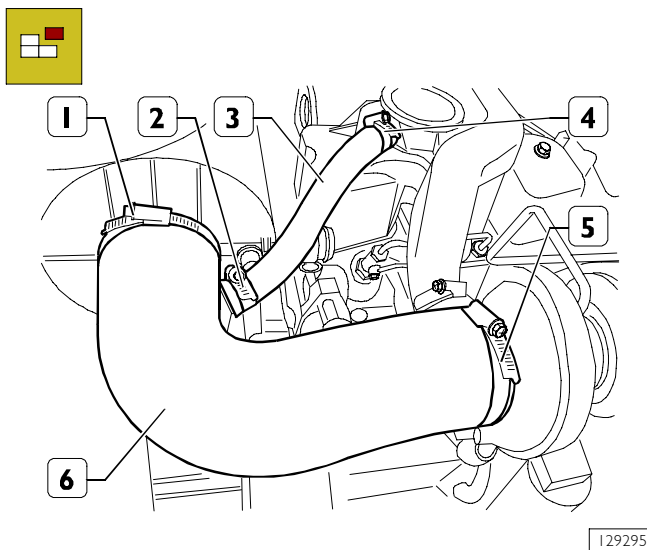


129294

- Disconnect the drainage pipe (1) from the system, adjusting the bolt (2) to open the band (3).

NOTE The shape and the size of the drainage pipe vary depending on the usage of the engine. The illustrations therefore provide guidelines for the operation to be carried out. The procedures described can, however, be applied.

Figure 14

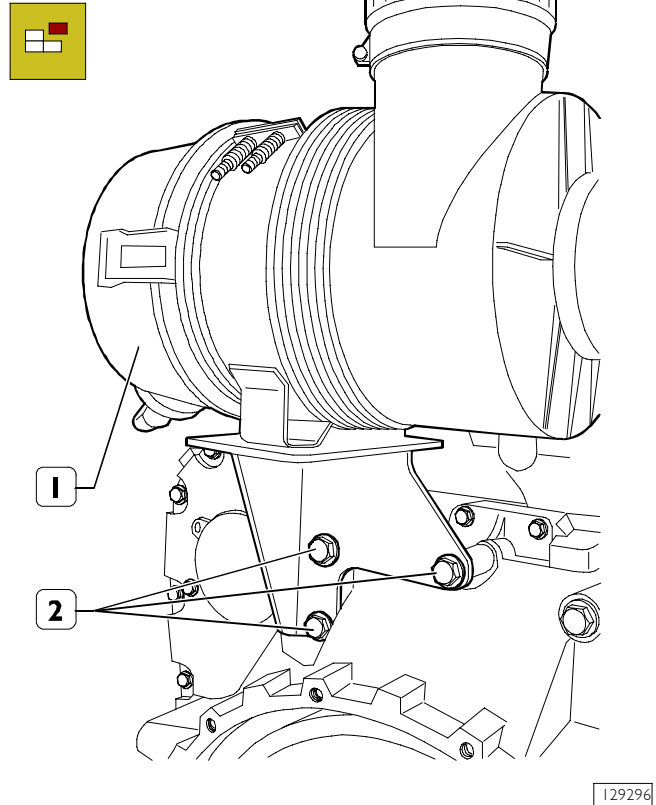


129295

- Disconnect and oil vapour recovery pipe (3) and remove it adjusting the bands (2) and (4).
- Disconnect and air intake pipe (6) and remove it adjusting the bands (1) and (5).

NOTE The shape and the size of the drainage pipe vary depending on the usage of the engine. The illustrations therefore provide guidelines for the operation to be carried out. The procedures described can, however, be applied.

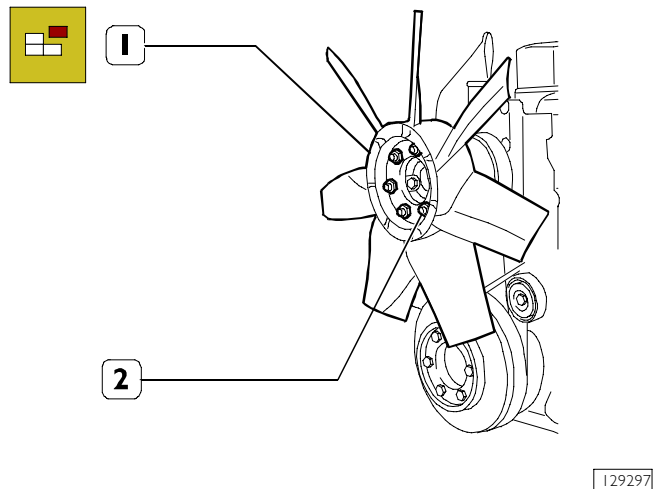
Figure 15



129296

- Remove the air filter (1) adjusting the fastenings (2) and remove it from its housing complete with support.

Figure 16



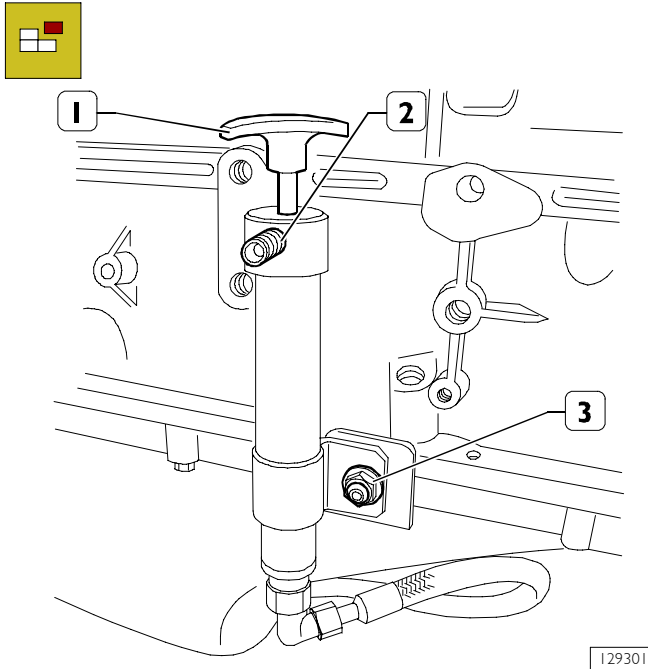
129297

- Remove the fan (1), complete with spacer, adjusting the bolts (2).

NOTE The shape and the size of the fan vary depending on the usage of the engine. The illustrations therefore provide guidelines for the operation to be carried out. The procedures described can, however, be applied.

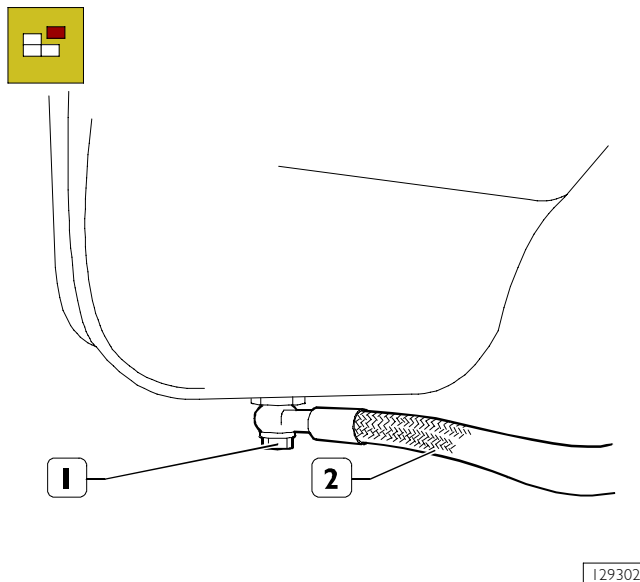
For versions with an oil drainage pump

Figure 17



- Extract the dipstick and the filler plug to facilitate the lubrication oil flow.
- Connect the special pipe for draining the pump (2) fitted in the engine to the outside.
- Remove the oil in the engine oil sump using the drainage pump (1).
- Remove the pump adjusting the nut (3).

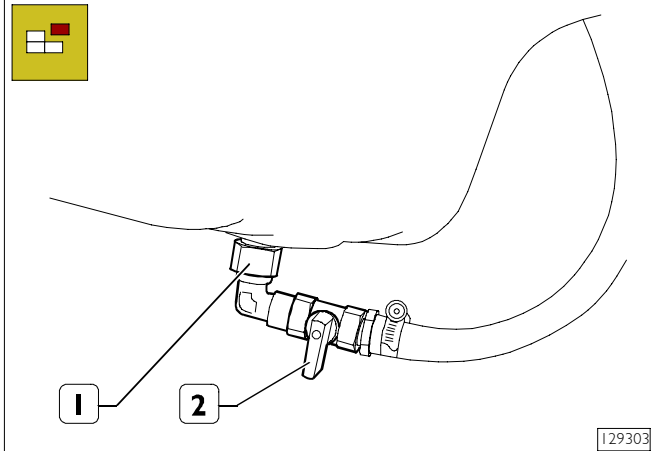
Figure 18



- Disconnect the pipe (2) and remove it, adjusting the bolt (1).

For versions with an oil drainage tap

Figure 19

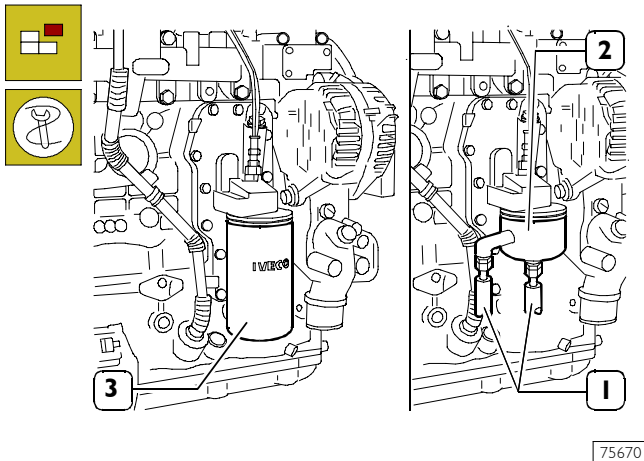


- Extract the dipstick and the filler plug to facilitate the lubrication oil flow.
- Remove the oil in the engine oil sump using the tap (1).
- Disconnect the pipe and remove it, adjusting the bolt (2).

NOTE Some versions have a plug for draining the oil from the sump. The procedure involves opening this plug located underneath the engine sump after having extracted the dipstick and the filler plug to facilitate the flow of lubrication oil.

Engine setting operations for the assembly on turning stand

Figure 20




75670

Figure relevant to turbocompressed versions

In order to apply the brackets 99361037 to the engine block to fix it on to the stand 99322205 for the overhaul, it is necessary to perform the following operations:

On the right hand side:

- disassemble pipes (1) from the union (2) fitting the lubrication oil filter (assembled on the opposite side); unlock the nuts fixing the pipes (1) and remove them from the union (2); drain the oil eventually still inside the pipes and plug them properly in order to avoid impurity inlet.

 For some versions, the oil filter (3) is directly assembled on to the heat exchanger; in such case it shall be disassembled using tool 99360076.


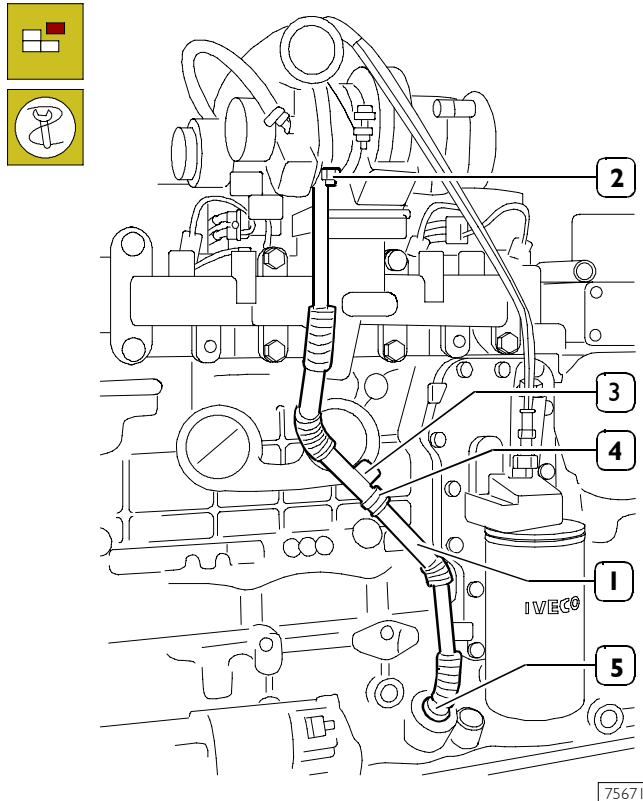
 Warning: the oil filter contains inside aprx. 1 kg. of engine oil. Provide for oil recovery and disposal in compliance with the law and regulations in force.

Figure 21

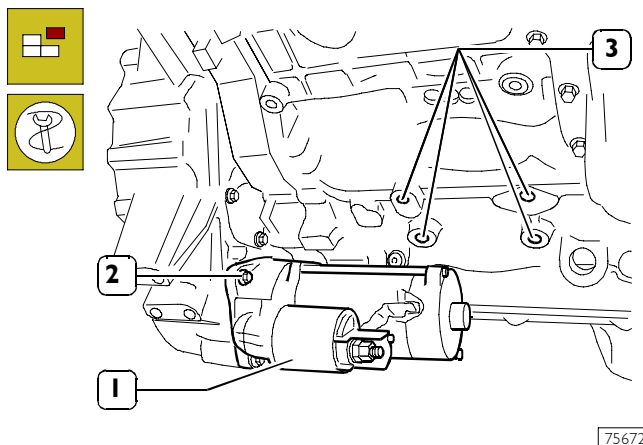


75671

Only for turbocompressed versions

- disassemble lubrication oil exhaust pipe from the turbo-blower:
Undemeath the turbo-blower loosen the two screws (2), loosen the screw (3) fixing the pipe throughout the stop collar (4) fixing the block; finally loosen and remove the union (5) from the block; plug the pipe ends and the exhaust of the turbo-blower.

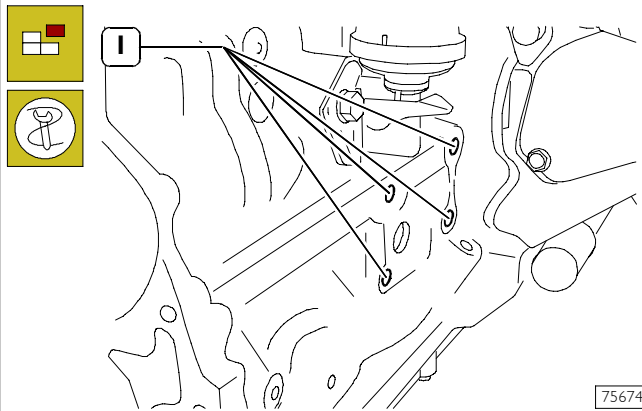
Figure 22



75672

- Disassemble the starter;
Properly hold the starter (1) and loosen the two fixing screws (2);
assemble the bracket bearing 99361037 using the four screw threaded ports (3).

Figure 23



75674

From the left-hand side:

- Assemble the second bracket 99361037 throughout the screw-threaded ports (1).
- Lift the engine using the rocker arm 99360595 and put it on the turning stand 99322205.
- Drain the oil through the cap underneath the plug.



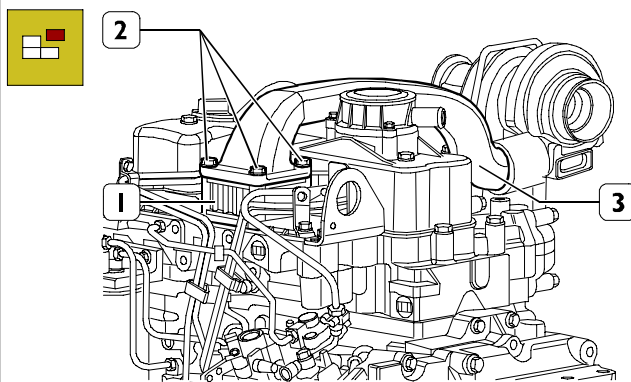
Warning: avoid contact of engine oil with the skin: in case of skin contamination, rinse in running water.



Engine oil is highly pollutant: provide for disposal in compliance with the law and regulations in force.

Disassembly of application components

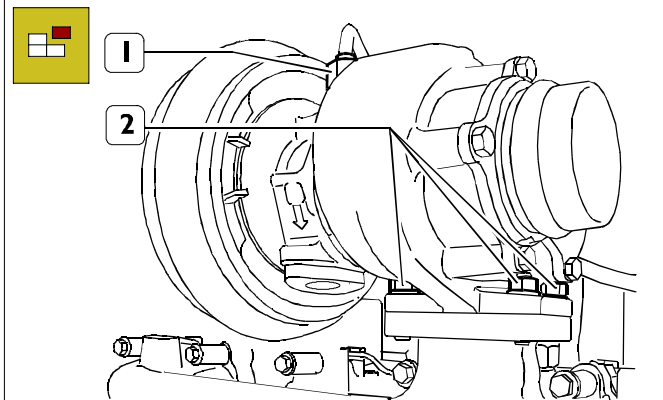
Figure 24



127121

Loosen the screws (2), remove the duct (3) and the heater (1) (if present).

Figure 25

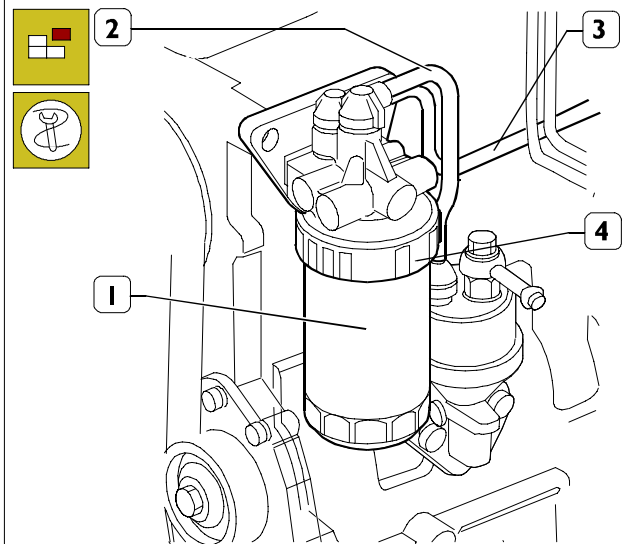


116389

Proceed disassembling the supercharger:

- Loosen the fixing nut (1) and remove the lubrication pipe from the supercharger. Analogously carry out the same operation on the other end of the pipe and remove it from the upper part of the heat exchanger.
- Loosen the screw nuts fixing (2) the supercharger on the exhaust manifold.
- Hold up the supercharger and after lifting it remove the gasket.

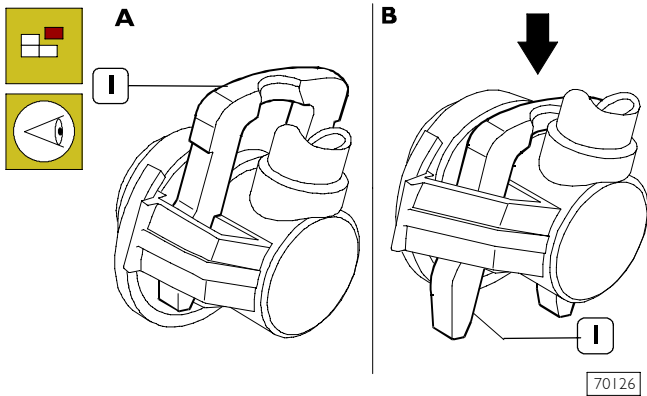
Figure 26



129268

- Place a container under the fuel filter and screw out the condense drain faucet underneath said filter. Carry out complete drainage of the fuel contained therein.
- Screw out completely the faucet and, using equipment 99360076 disassemble oil filter (2).
- Disconnect fuel pipelines (4 and 3) respectively from priming pump to filter bearing and from this last one to the feed pump.
- Remove the fuel filter bearing (1) from the bracket fixed to the engine head.

Figure 27

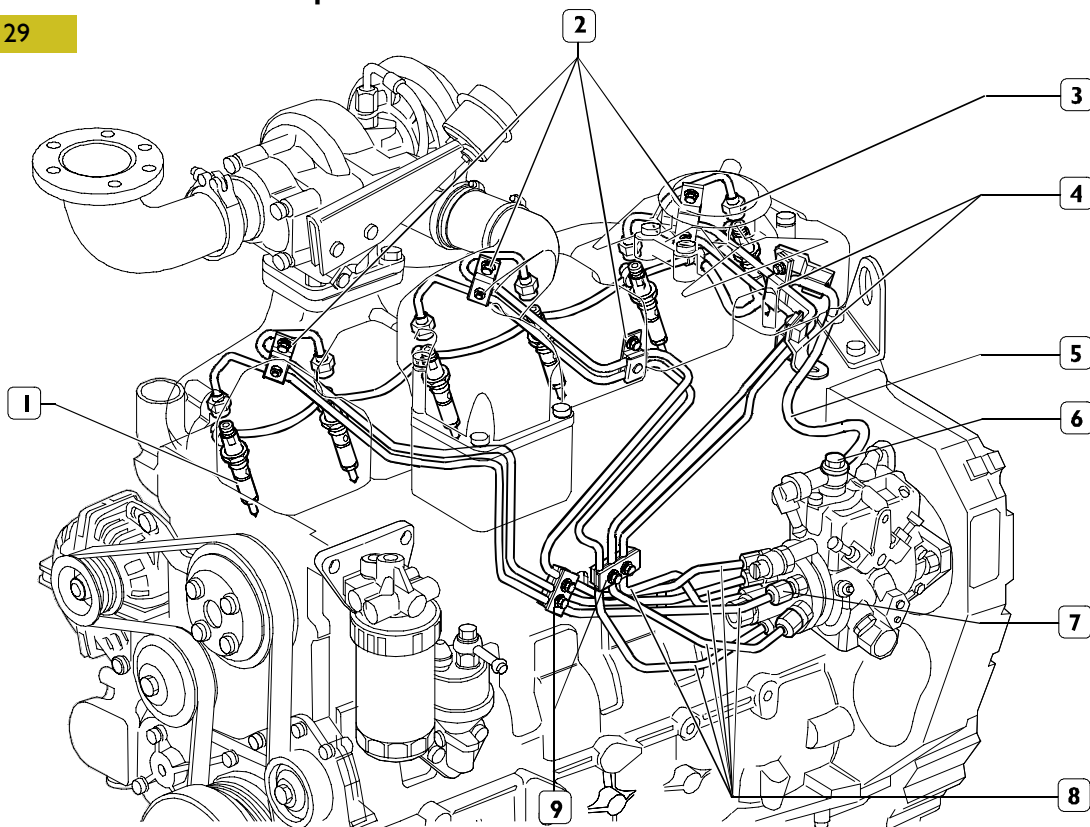


NOTE To disconnect fuel pipelines (3 and 4, Figure 26), in low pressure from the relating pipe fittings, it is necessary to press the locking fastener (1) as shown in picture B.

After having disconnected the pipeline, reset the locking fastener (1) in lock position as shown in picture A, to avoid any possible deformation of the fastener itself.

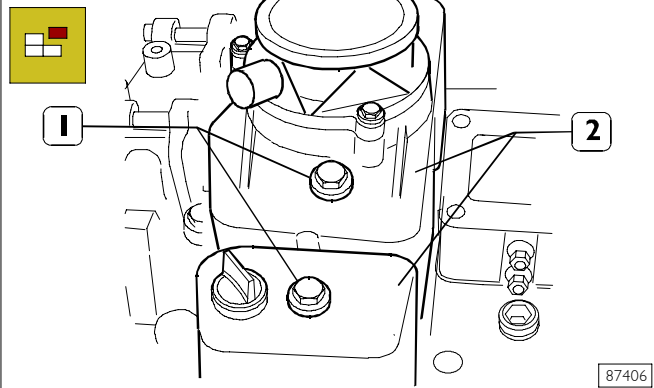
STANADYNE "D" Series Pump

Figure 29



Remove the pipes forming the fuel supply (8) and recovery (5) between the pump and the injectors (1); unscrew the ring nuts (7) securing the pipes to the pumping elements; free the collar (6) of the fuel recovery pipe returning to the injection pump; undo the ring nuts (7) fitted on the injectors and unscrew the bolts securing the fuel recovery pipe; unscrew the bolts retaining the

Figure 28



Remove tappet caps: Loosen the four fixing screws (1) and lift the caps (2); remove the gaskets.

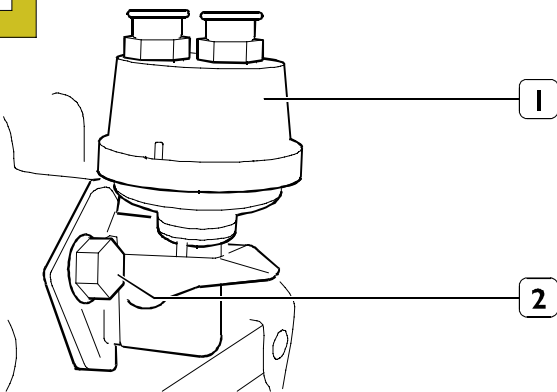
NOTE On the cap there is a blow-by valve for the lubrication oil vapours.

All the gaskets shall always be replaced during assembly.

brackets (2, 4, 9) securing the above-mentioned pipes. Put plugs on the ends of the pipes.

Remove the injectors (1) and take them out of their seat; retrieve the seals.

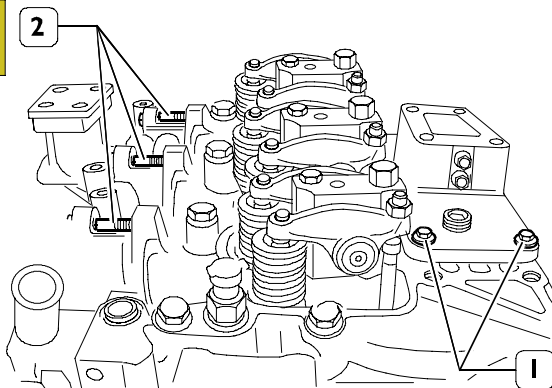
Figure 30



88102

- Loosen the two fixing screws (2) and disassemble priming pump (1).

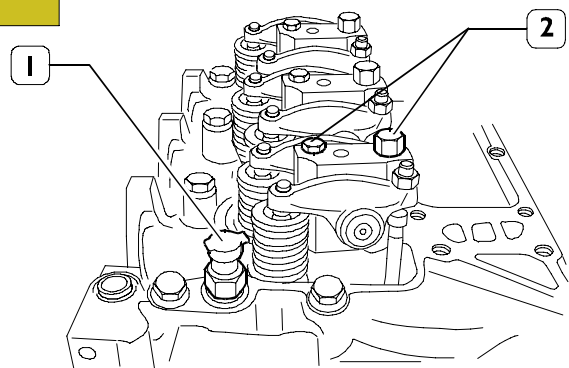
Figure 31



87409

- Disassemble suction and exhaust manifolds: loosen the 8 screws (1) fixing the suction manifold plate to the cylinder head (two of them have already been screwed-out since fixing the pipe brackets to the injectors); from the exhaust manifold side; loosen the (2) fixing screws; remove the gaskets.

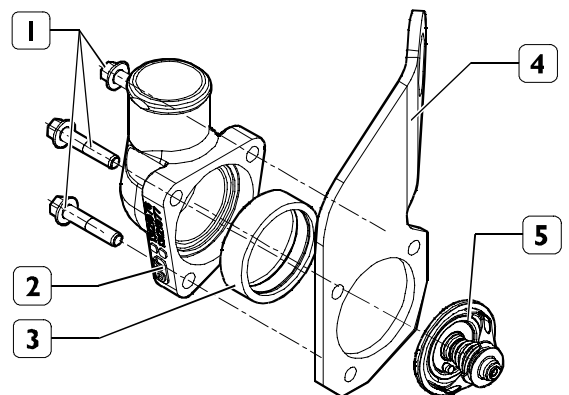
Figure 32



125114

- Disassemble rocker arm bearings; loosen the two fixing screws (2) and remove the complete rocker arm bearing; withdraw tappet rods. Repeat the operation for all the remaining rocker arm bearings.
- Disassemble water temperature transmitter (1).

Figure 33

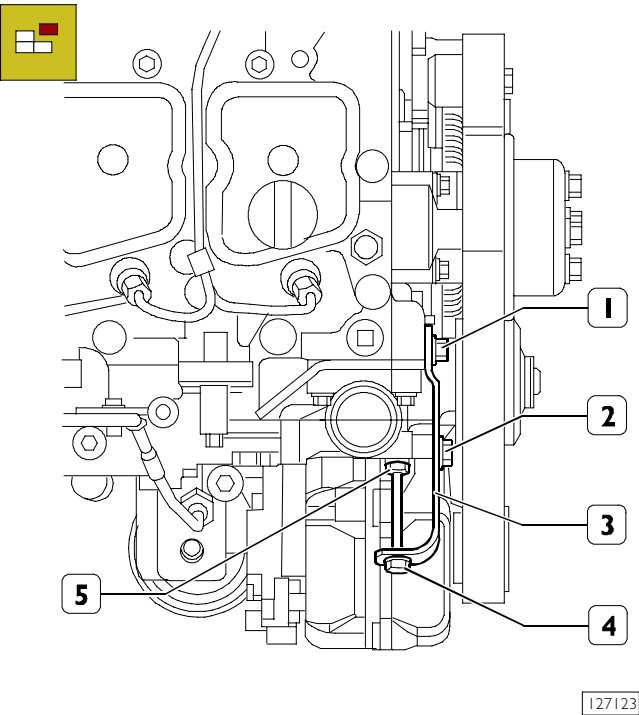


127122

- Disassemble thermostat unit; loosen the three fixing screws (1) and disassemble the thermostat unit (2) together with the bracket (4); remove the gasket (3) and the thermostat (5).
- Assemble the bracket in the original position fixing it with the screws of the thermostat unit.

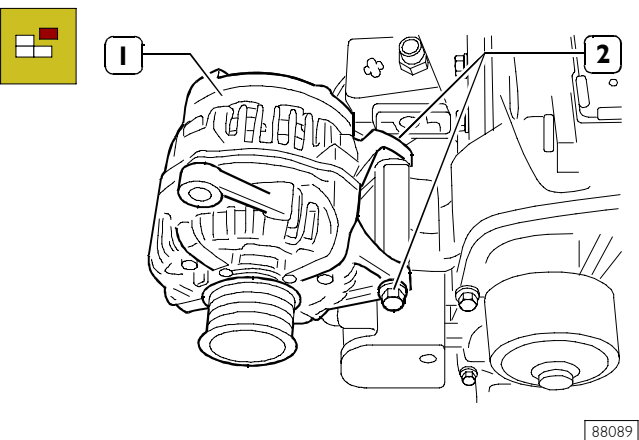
For engines with a traditional belt tensioner

Figure 34



- Loosen the screw nut (5) and the screw (2)
- Loosen the screw (2, figure 18)
- Reduce belt tension operating on the screw (4)
- Loosen the screw (2) on the belt tensioning bracket (3)
- Withdraw the POLY-V belt
- Remove the belt tensioning bracket loosening the screw (1)
- Disassemble the pulleys and the guide rollers.

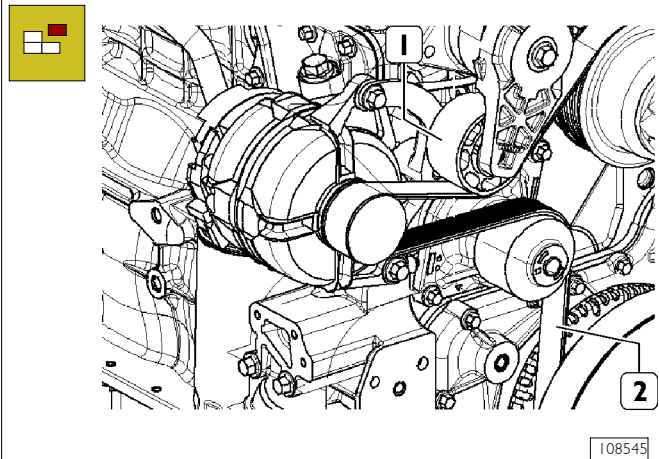
Figure 35



- Properly hold the alternator (1) separating it from its bearing by loosening the screw (2); remove screw nut and washer.

For engines with an automatic belt tensioner

Figure 36

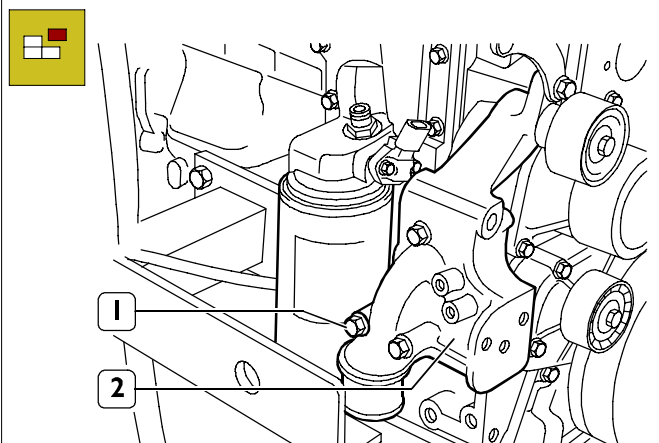


Release on the drive belt tensioner (1) and extract the belt (2) from the belt pulleys from the water pump ones and from the belt rebound pulleys;

Disassemble the belt tensioner (1).

Loosen the screws fixing the alternator to the support and disassemble it.

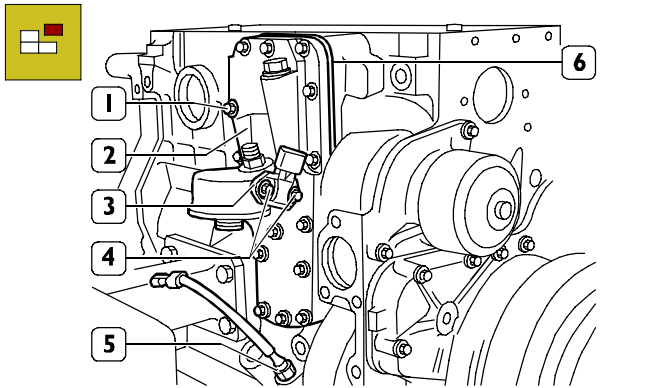
Figure 37



- Loosen the screws (1) and withdraw the alternator bearing (2).

NOTE The shape and the dimensions of the support of the alternator vary according to the use of the engine. The relevant pictures provide a general trace of the intervention that is to be carried out. The procedures described are always applicable.

Figure 38

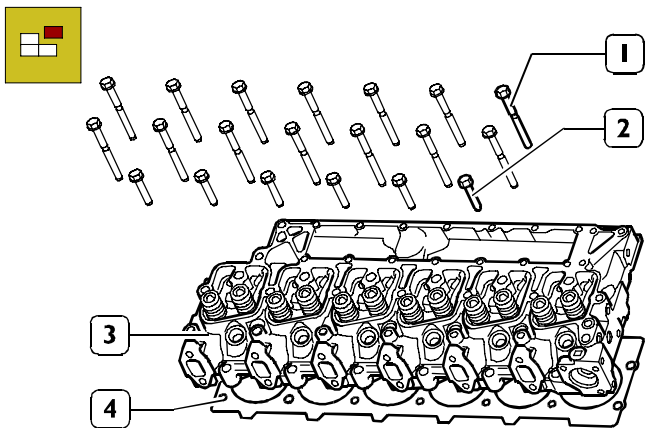


75810

- Loosen the screws (4) and disassemble the oil pressure/temperature sensor (3) (if fitted).
- Loosen the screws (1) and disassemble the oil filter/heat exchanger bearing (2), interlayer plate (6) and relating gaskets.
- Disassemble oil level sensor (5) (whether provided).
- Disassemble injection pump (see specific procedure) and the power take-off underneath.

For 6 cylinder engines

Figure 39

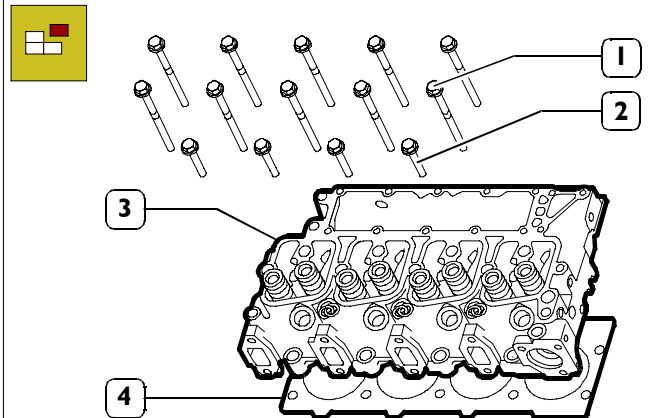


76152

- Disassemble cylinder head; loosen the screws (1) and (2) fixing the cylinder head (3); hook the brackets with metal ropes and, throughout a hoist withdraw cylinder head from the block.

For 4 cylinder engines

Figure 40

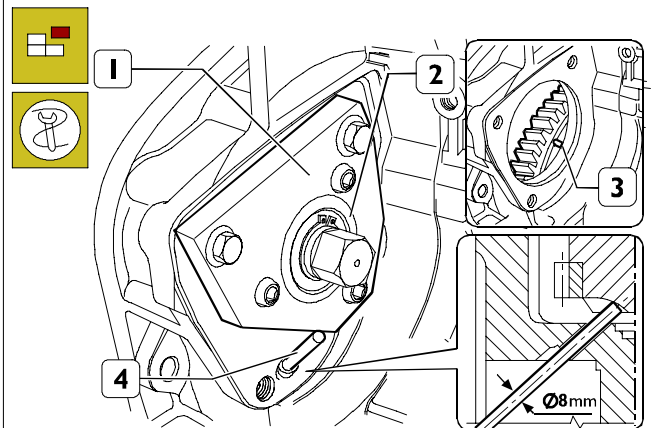


75688

- Disassemble cylinder head; loosen the screws (1) and (2) fixing the cylinder head (3); hook the brackets with metal ropes and, throughout a hoist withdraw cylinder head from the block.

Engine versions with tool (99360339)

Figure 41

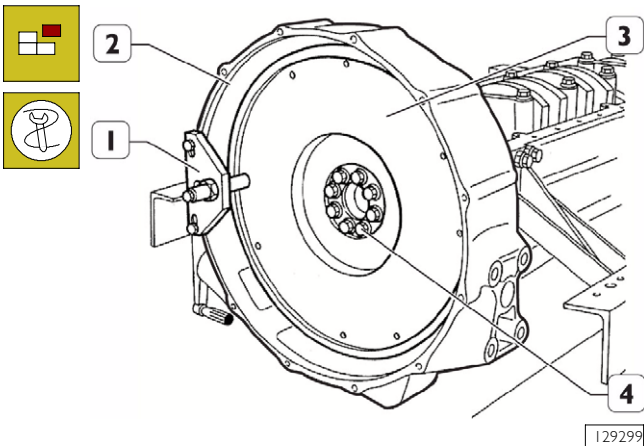


123031

- Apply tool 99360339 (1) on the flywheel housing cover to block rotation of the flywheel (3) using a spanner on the nut (2) and a pin (4). (use the stud bolts and the nuts fixing the starter motor).
- Loosen the flywheel fixing screws to engine drive shaft.

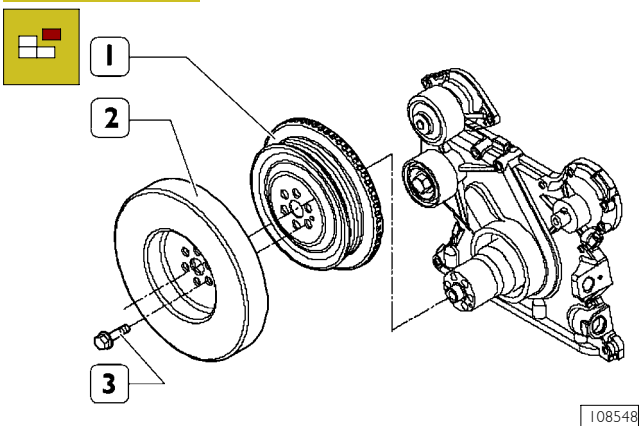
Engine versions with tool (99360351)

Figure 42



- Use the tool 99360351 (1) to operate on the flywheel cover box (2) in order to block flywheel rotation (3). (Utilise starter holding down studs and fixing screw nuts).
- Loosen the flywheel fixing screws (4) to engine drive shaft.

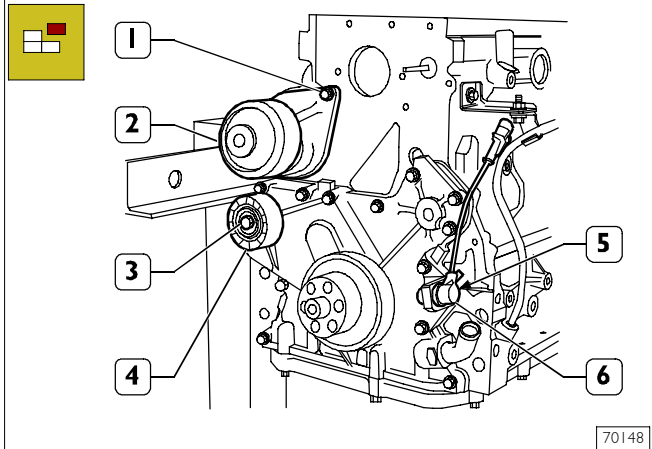
Figure 43



- Unloose the screws (3) and disassemble the damping flywheel (2) and the pulley (1).

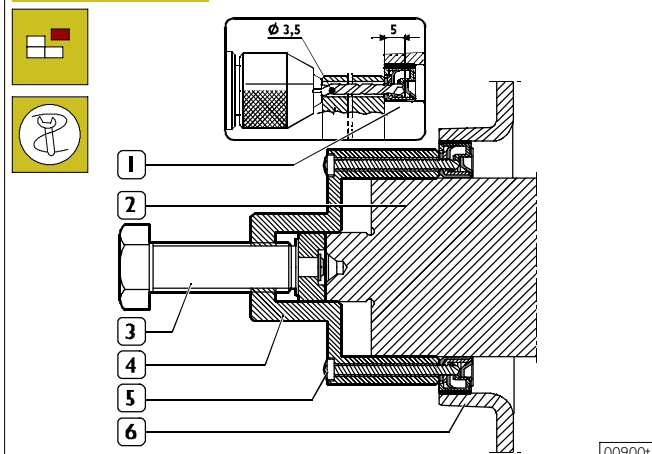
NOTE In some versions, the phonic wheel mounted on pulley (1) may be not present and pulley (1) can be different from the pulley shown in Figure.

Figure 44



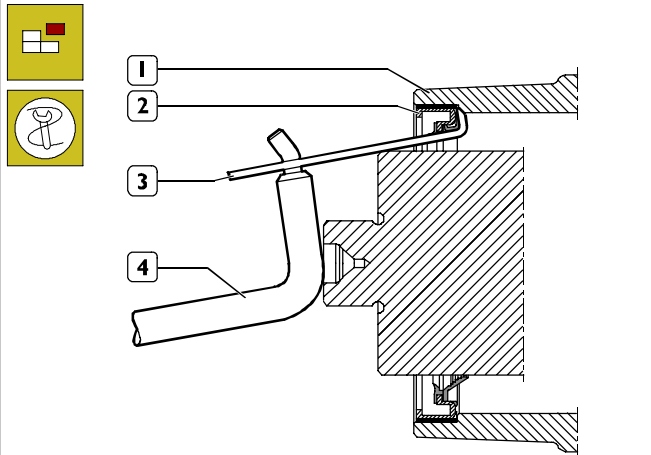
- Remove the screws (1) and disconnect the water pump (2).
- Remove the screw (3) and the roller (4).
- Remove the screw (5) and disconnect the engine speed sensor (6).

Figure 45



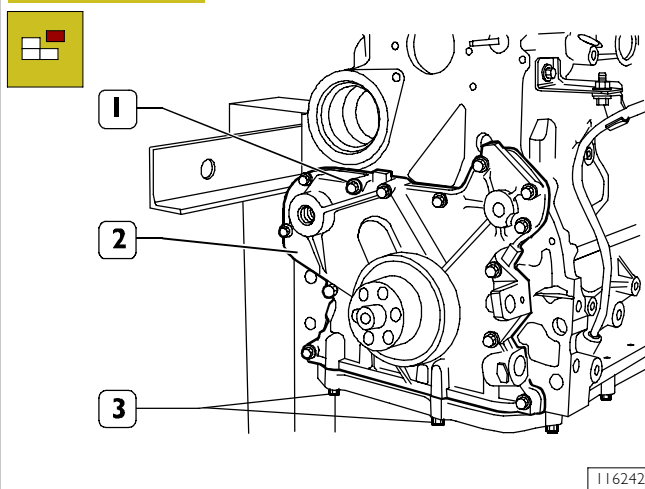
- Remove the engine drive shaft fixing ring from the front cover. Use the tool 99340055 (4) to operate on the front tang (2) of the engine drive shaft. Throughout the tool guide ports, drill the internal holding ring (1) using $\varnothing 3,5$ mm drill for a 5mm depth. Fix the tool to the ring tightening the 6 screws specially provided. Proceed withdrawing the ring (1) tightening the screw (3).

Figure 46



- Using the specially provided tie rod (3) for the tool 99363204 and the lever (4), withdraw the external holding ring (2) from the front cover (1).

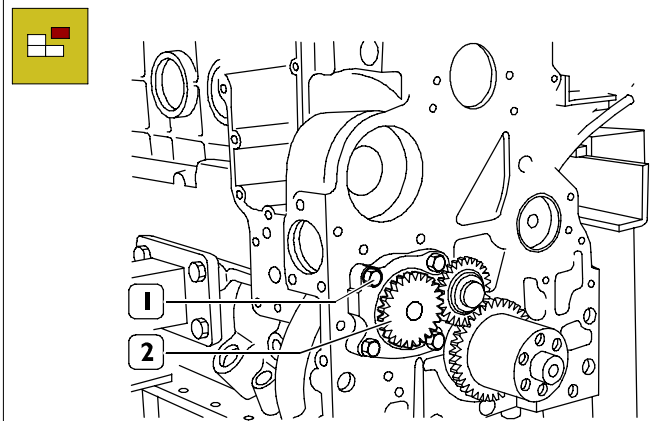
Figure 47



- Loosen the screws (1 and 3) and remove the front cover (2).

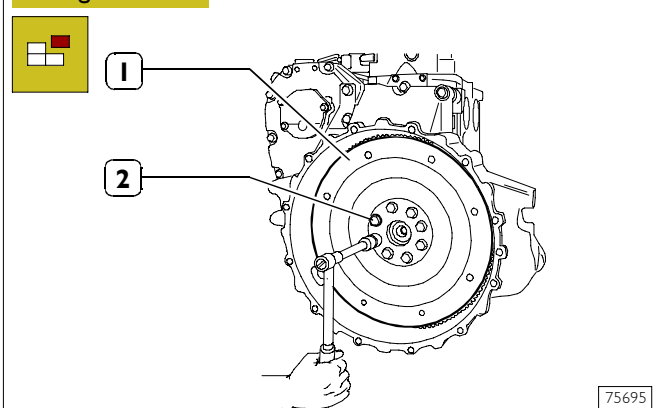
NOTE Take note of the screw (1 and 3) assembly position, since the screws have different length.

Figure 48



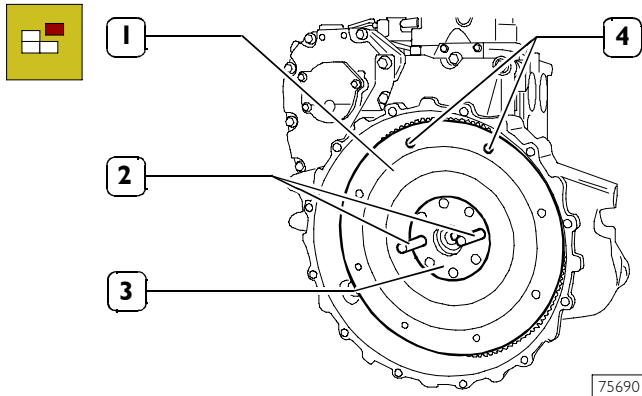
- Loosen the screws (1) and remove oil pump (2).

Figure 49



- Screw out the opposite screws (2) from the ports where the withdrawal pins shall be introduced (see picture following).
- Loosen remaining flywheel fixing screws (1) to the engine drive shaft.
- Remove the flywheel block tool (2).

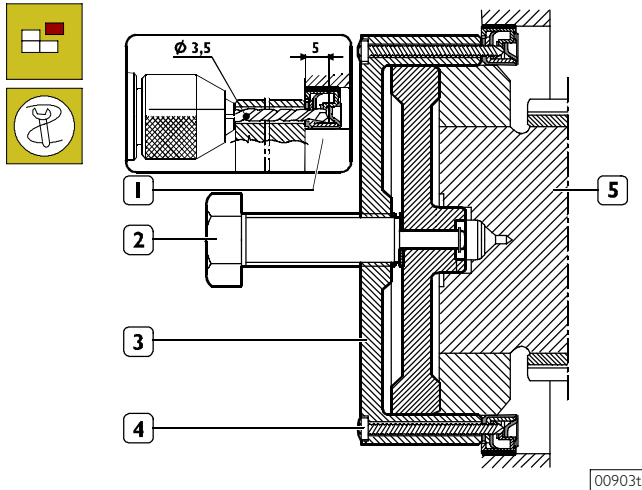
Figure 50



75690

- Screw up two medium length screws in the ports (4) to sling the flywheel with a hoist. Throughout two guide pins (2) previously screwed up into the engine drive shaft ports (3) control the engine flywheel withdrawal by means of a hoist.

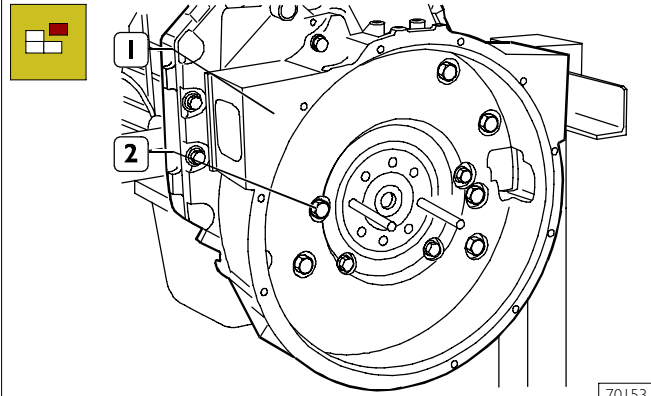
Figure 51



00903t

- Remove the flywheel cover box fixing ring using the tool 99340056 (3) to operate on the back tang (5) of the engine drive shaft. Throughout the tool guide ports, drill the internal holding ring using $\varnothing 3,5$ mm drill for a 5mm depth.
- Fix the tool 99340056 (3) to the ring (1) tightening the 6 screws specially provided (4).
- Proceed with drawing the ring (1) tightening the screw (2).
- Using the specially provided tie rod (3) for the tool 99363204 and the lever (4), withdraw the external holding ring of the flywheel cover box.

Figure 52

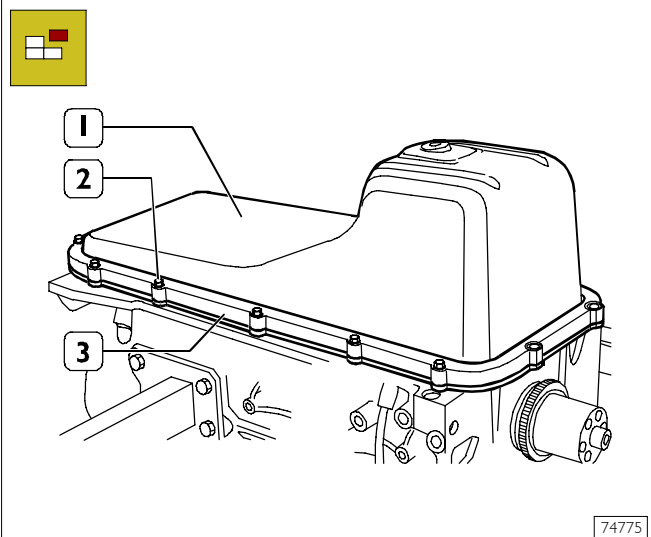


70153

- Loosen the screws (2) and remove the flywheel cover box (1).

NOTE Take note of the screw (1) assembly position, since the screws have different length.

Figure 53



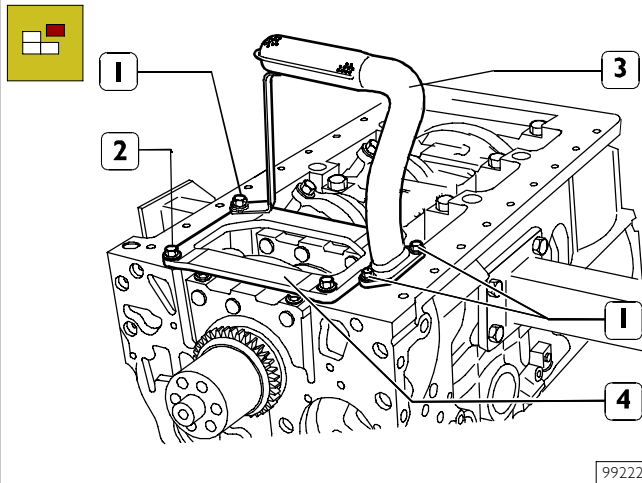
74775

- Turn the engine upside-down.
- Loosen the screws (2), disassemble the plate (3) and remove the oil pan (1).

NOTE The shape and dimensions of the pan and of the rose pipe may vary according to the engine application. The relating illustrations provide general guidelines of the operation to be performed. The procedures described are applicable anyway.

For 4 cylinder engines

Figure 54

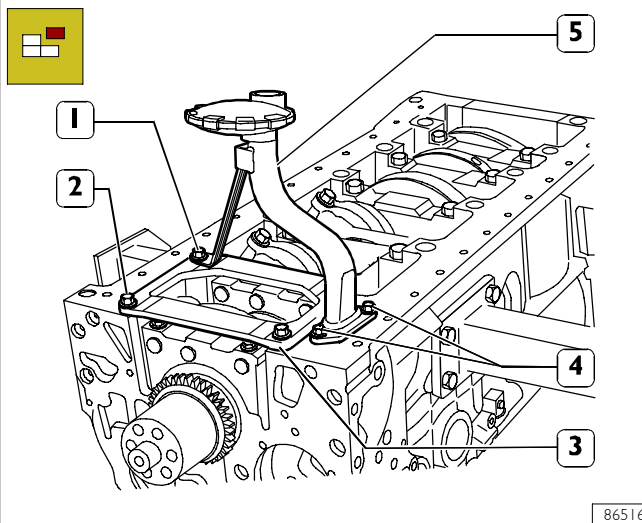


99222

- Loosen the screws (1) and disassemble the oil suction rose pipe (3).
- Loosen the screws (2) and remove the stiffening plate (4).

For 6 cylinder engines

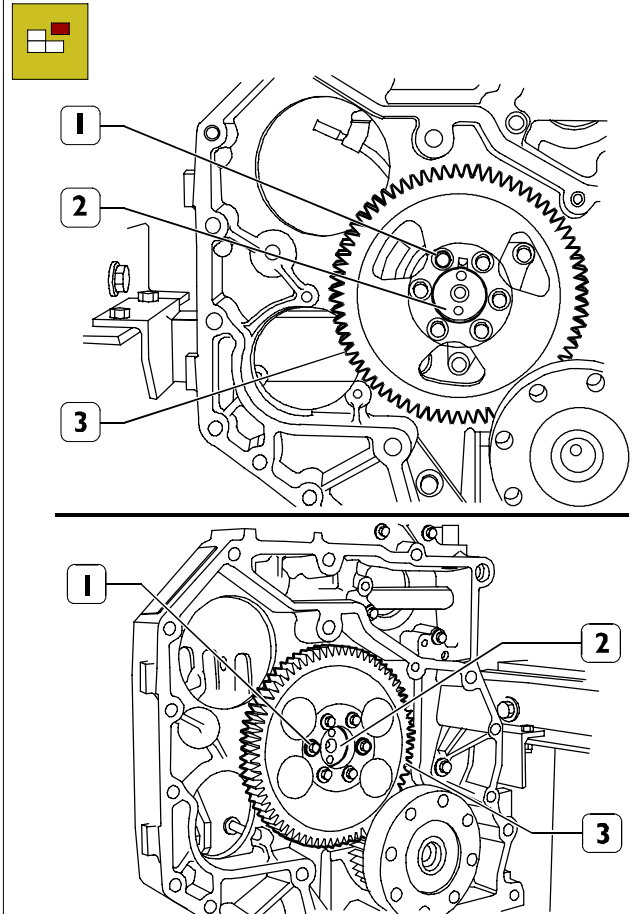
Figure 55



86516

- Remove the screws (1) and (4) and disassemble the suction rose (5).
- Remove the screws (2) and disassemble the stiffening plate (3).

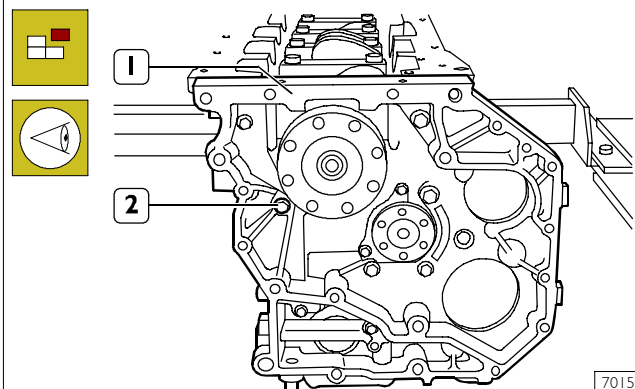
Figure 56



90505

- Loosen the screws (1) and disassemble the gear from the camshaft (2).

Figure 57



70157

- Loosen the screws (2) and disassemble the timing gearbox (1).

NOTE Take note of the screw (2) assembly position, since the screws have different length.

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