

Put on, where required by the intervention, garments and protections provided in accident prevention rules; contact with moving parts can cause serious injuries. Use suitable, preferably tight-fitted garments, and avoid to use jewels, scarves, etc.

Do not leave the engine in motion at workshop locations not provided with a pipe to scavenge exhaust gas outside.

Avoid to breathe fumes coming from heating or from paint welding because they can cause damages to health; operate outdoors or in suitably ventilated areas. Put on proper inspirator if paint powder is present.

Avoid contact with hot water or steam coming from the engine, radiator and pipings because they could cause serious burns. Avoid direct contact with liquids and fluids present in vehicle systems; where an accidental contact has occurred, refer to 12-point cards for provisions to make.



Clean the assemblies and carefully verify that they are intact prior to overhauling. Tidy up detached or disassembled parts with their securing elements (screws, nuts, etc.) into special containers.

Check for the integrity of the parts which prevent screws from being unscrewed: broken washers, dowels, clips, etc. Self-locking nuts with an insert made of nylon must always be replaced.

Avoid contact of rubber parts with diesel oil, petrol or other not compatible substances.

Before washing under pressure mechanical parts, protect electric connectors, and central units, if present.

Tightening screws and nuts must always be according to prescriptions; FPT commercial and assistance network is available to give all clarifications necessary to perform repair interventions not provided in this document.

Before welding:

- ❑ Disconnect all electronic central units, take power cable off battery positive terminal (connect it to chassis bonding) and detach connectors.
- ❑ Remove paint by using proper solvents or paint removers and clean relevant surfices with soap and water.
- ❑ Await about 15 minutes before welding.
- ❑ Equip with suitable fire resistant protections to protect hoses or other components where fluids or other materials flow which may catch fire easily on welding.

Should the vehicle be subjected to temperatures exceeding 80°C (dryer ovens), disassemble drive electronic central units.



The disposal of all liquids and fluids must be performed with full observance of specific rules in force.

KEY OF LECTURE OF THE HEADINGS AND FOOTNOTES

Type of vehicle

Section title

Page number

MOTORI NEF F4HE — SEZIONE 4 - REVISIONE MECCANICA GENERALE 11

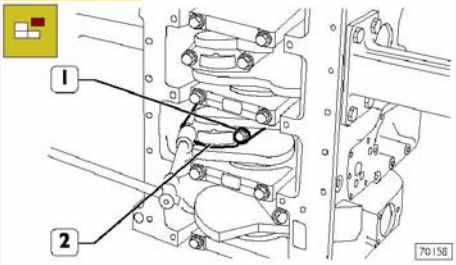
REVISIONE MOTORE 4 E 6 CIL. SMONTAGGIO DEL MOTORE AL BANCO

La trattazione seguente prevede che il motore sia stato montato sul cavalletto rotativo e si sia proceduto alla rimozione di tutti i componenti specifici dell'applicazione Iveco Motors (vedere la Sezione 3 del presente manuale).

La sezione riguarda quindi tutte le più importanti procedure di revisione del basamento motore.

Le operazioni seguenti riguardano il motore 4 cilindri, ma risultano analoghe per il 6 cilindri.

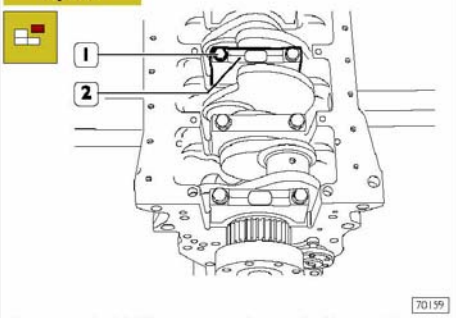
Figura 1



Svitare le viti di fissaggio (1) e rimuovere i cappelli di biella (2). Sfilare gli stantuffi completi di bielle dalla parte superiore del basamento.

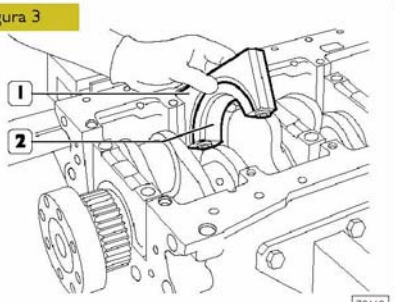
NOTA Mantenere i semicuscinetti nei rispettivi alloggiamenti, poiché, in caso di un loro utilizzo, dovranno essere montati nella posizione riscontrata allo smontaggio.

Figura 2



Rimuovere le viti (1) e smontare i cappelli di banco (2).

Figura 3

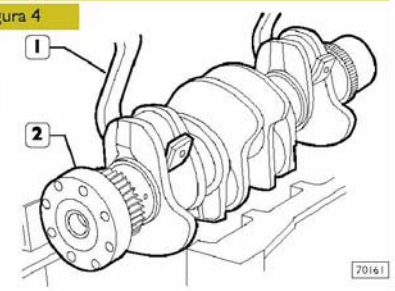


Il penultimo cappello di banco (1) e il relativo supporto hanno il semicuscinetto (2) dotato di spallamento.

NOTA Le viti M12 dei cappelli di banco, devono essere sostituite se il diametro nominale della parte filettata che non lavora, presenta un diametro < 0,1 mm rispetto al valore nominale.

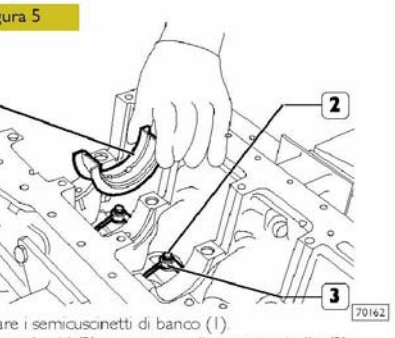
NOTA Annotare la posizione di montaggio dei semicuscinetti inferiori e superiori, poiché in caso di un loro riutilizzo, dovranno essere montati nella posizione riscontrata allo smontaggio.

Figura 4



Con l'attrezzo 99360500 (1) e sollevatore rimuovere l'albero motore (2) dal basamento.

Figura 5



Smontare i semicuscinetti di banco (1).
Rimuovere le viti (2) e smontare gli spruzzatori olio (3).

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LUBRICATION

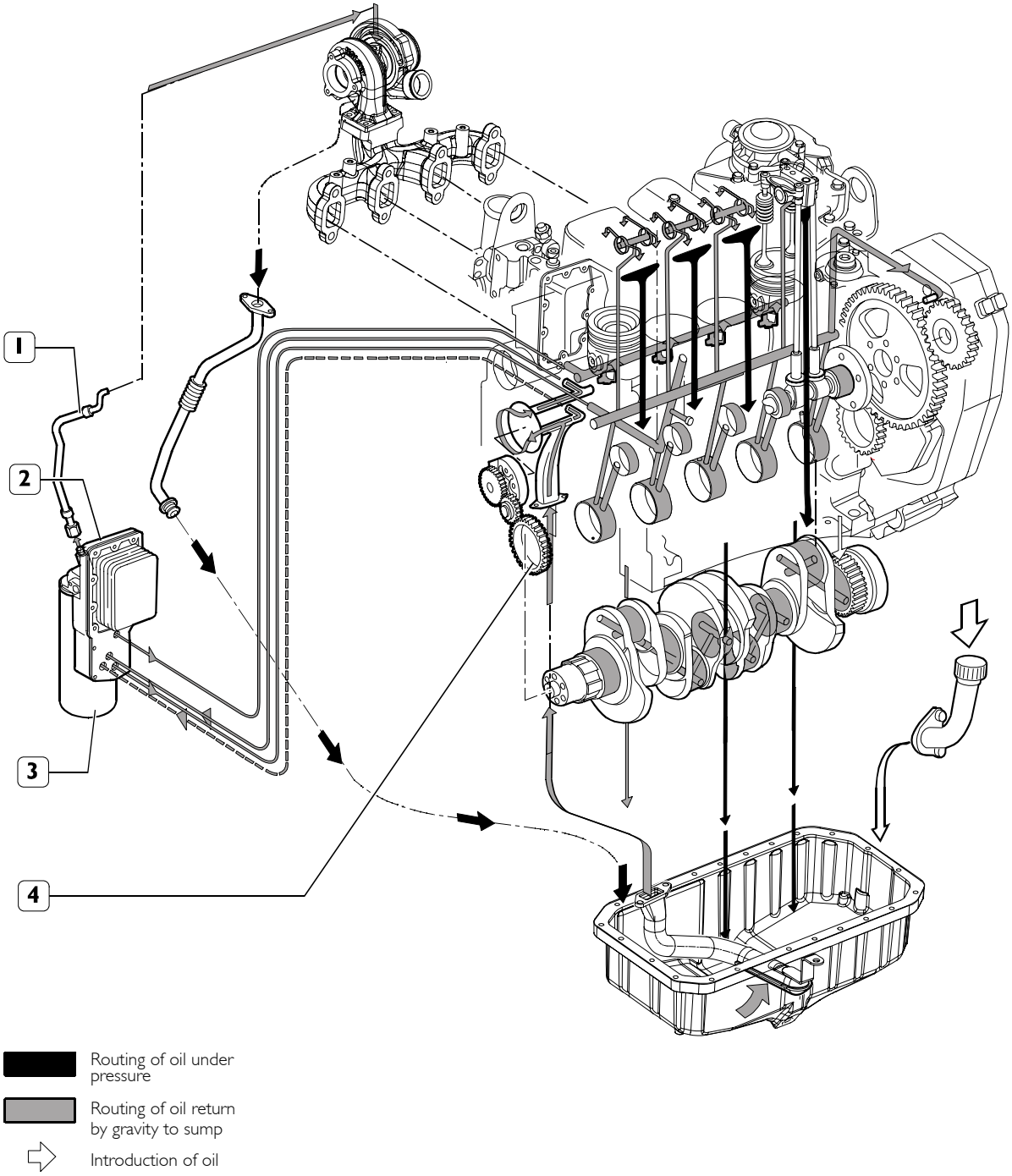
Lubrication by forced circulation is achieved through oil rotary expansion pump, placed in the front part of the basement, driven by the straight-tooth gear splined to the shaft's bar hold.

From the pan, the lubrication oil flows to the driving shaft, to the camshaft and to the valve drive.

Lubrication involves the heat exchanger and the turboblower.

All these components may often vary according to the specific duty.

Figure 1

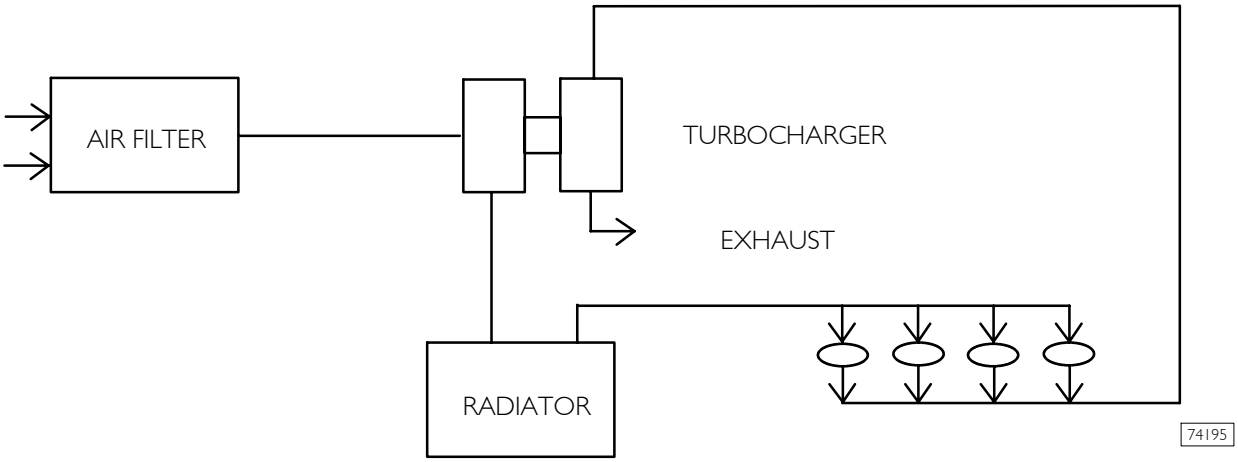


LUBRICATION SYSTEM LAYOUT

1. Lubrication oil pipe to supercharger - 2. Heat exchanger body - 3. Oil rotary expansion pump - 4. Oil filter.

Inter-cooled engine version

Figure 5



4 cylinders version

Description

The turbocharger is composed by the following main parts: one turbine, one transforming valve to regulate the boost feeding pressure , one main body and one compressor.

During engine working process, the exhaust emission flow through the body of the turbine, provoking the turbine disk wheel's rotation.

The compressor rotor, being connected by shaft to the turbine disk wheel, rotates as long as this last one rotates, compressing the sucked air through the air filter.

The above mentioned air is then cooled by the radiator and flown through the piston induction collector.

The turbocharger is equipped with a transforming valve to regulate the pressure , that is located on the exhaust collector before the turbine and connected by piping to the induction collector.

It's duty is to choke the exhaust of the emissions , releasing part of them directly to the exhaust tube when the boost feeding pressure, over the compressor, reaches the prescribed bar value.

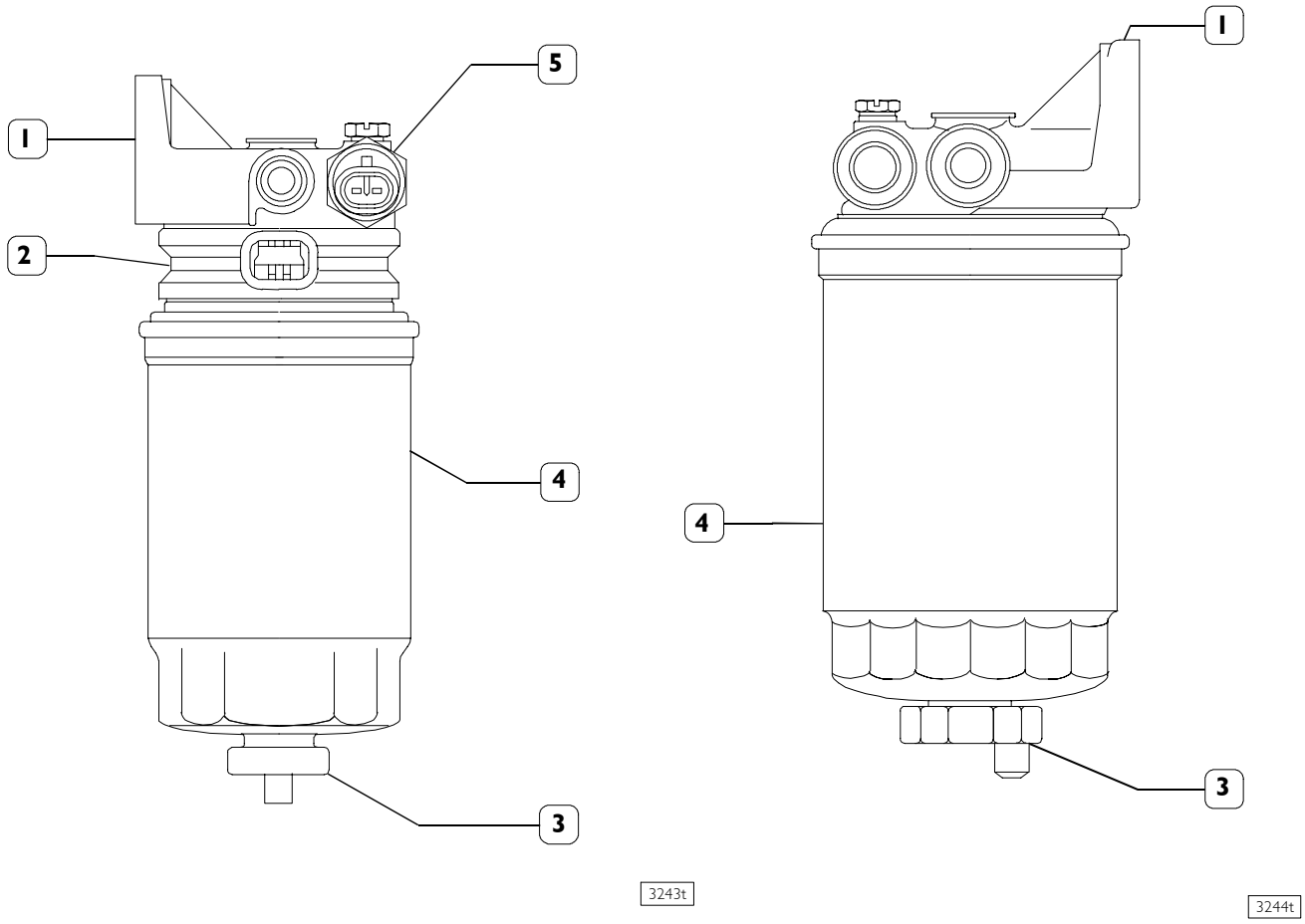
The cooling process and the lubrication of the turbocharger and of the bearings is made by the oil of the engine.

FUEL FILTER

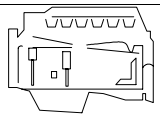
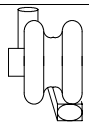
The filter is assembled close to the feed and priming pump and has the specific duty to provide barrier to the impurities and separation of water from fuel.

On the filter cartridge base there is a water dump screw, throughout which it is possible to provide regular drainage; on the bearing for those equipment applications requiring it (cold climate areas), there can be a heater assembled to and a temperature sensor. On some versions, a water presence sensor is present at filtering cartridge base.

Figure 5



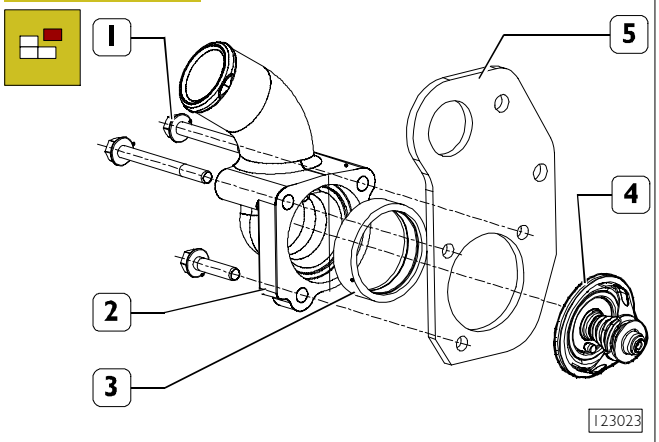
1. Fuel filter bearing- 2. Heater - 3. Water dump screw- 4. Filter cartridge - 5. Temperature sensor.

	Type	**F4GE9484F*J608**
ϱ	Compression ratio	17.5:1
	Max. output kW (HP) rpm	74 (101) 2200
	Max. torque Nm (kgm) rpm	430 (43.0) 1250
	Loadless engine idling rpm	 800
	Loadless engine peak rpm rpm	 2430
	Bore x stroke mm Displacement cm^3	104 X 132 4485
	**SUPERCHARGING**	With intercooler
	Turbocharger type	HOLSET HX25
	**LUBRICATION** **Oil pressure (warm engine)** - idling bar - peak rpm bar	Forced by gear pump, relief valve single action oil filter > 0.70 3.1
	COOLING **Water pump control Thermostat** - start of opening °C	By centrifugal pump, regulating thermostat, heat exchanger, intercooler Through belt 81 ± 2
	**FILLING** engine sump* liters engine sump + filter* liters * First filling operation	ACEA: E3, E5, E7 URANIA LD7 20W40: 0°C to 40°C (Very hot countries, heavy mission) 13 15W40: -10°C to 40°C (Europa/Nord American mission) 14 10W30: -28°C to 35°C (Cold mission)

NOTE Data, features and performances are valid only if the setter fully complies with all the installation prescriptions provided by FPT.

Furthermore, the users assembled by the setter shall always be in conformance to couple, power and number of turns based on which the engine has been designed.

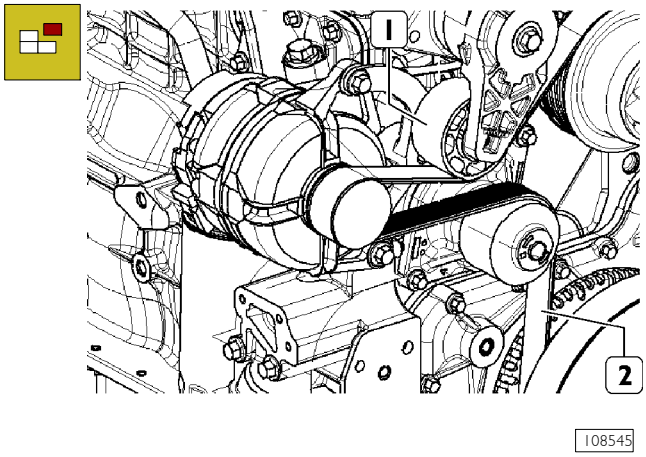
Figure 17



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

NOTE The shape and the size of the thermostat casing vary according to the usage of the engine.
The illustrations therefore provide a general guideline for the operation to be carried out.
The procedures described are therefore applicable.

Figure 18

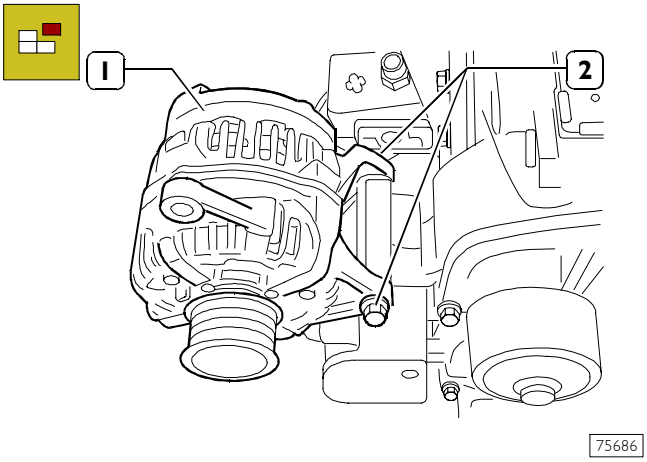


Release on the drive belt tensioner (1) and extract the belt (2) from the belt pulleys from the water pump ones and from the belt rebound pulleys.

Disassemble the belt tensioner (1).

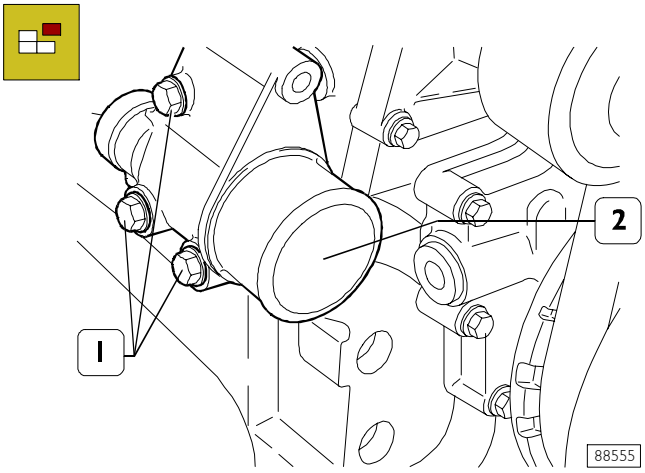
Loosen the screws fixing the alternator to the support and disassemble it.

Figure 19



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

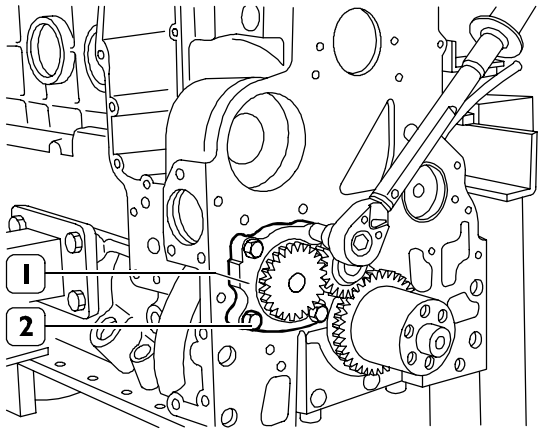
Figure 20



Unscrew the fixing screws (1) and disassemble the pipeline union (2).

Installation of front components

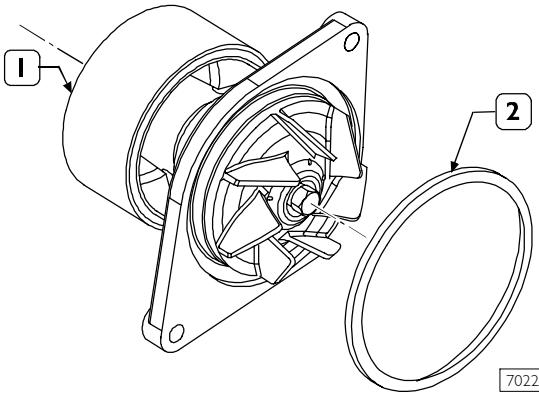
Figure 52



70220

- ❑ Assemble oil pump (1).
- ❑ Tighten fixing screws (2) and lock them to the prescribed couple.

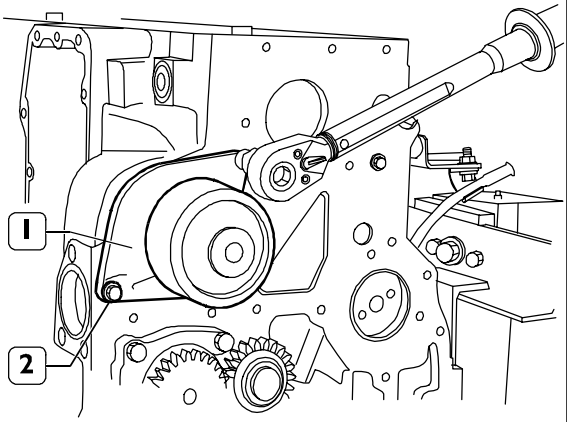
Figure 53



70221

- ❑ Apply to the water pump (1) a new fixing ring (2).

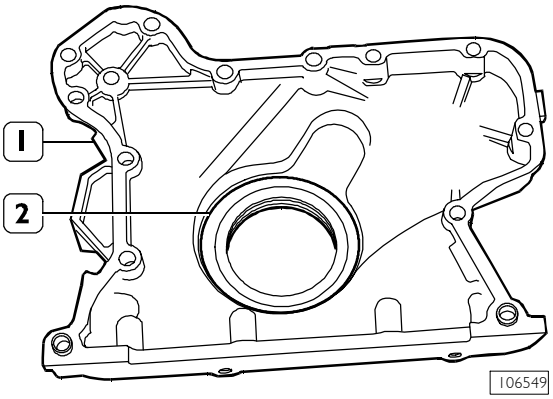
Figure 54



76112

- ❑ Assemble the water pump (1).
- ❑ Tighten the screws (2) and lock them to the prescribed couple.

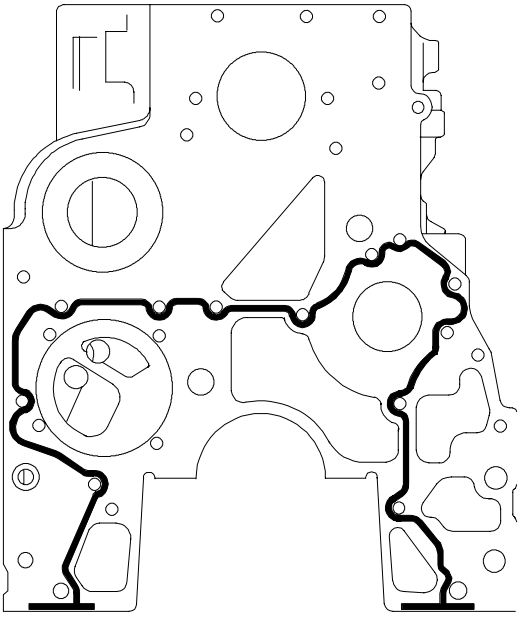
Figure 55



106549

- ❑ Remove the fixing ring (2) from the front cover (1), accurately clean the plug surface.

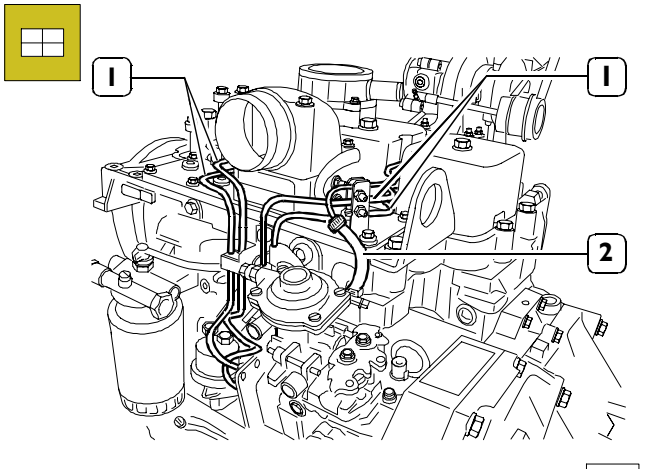
Figure 56



75710

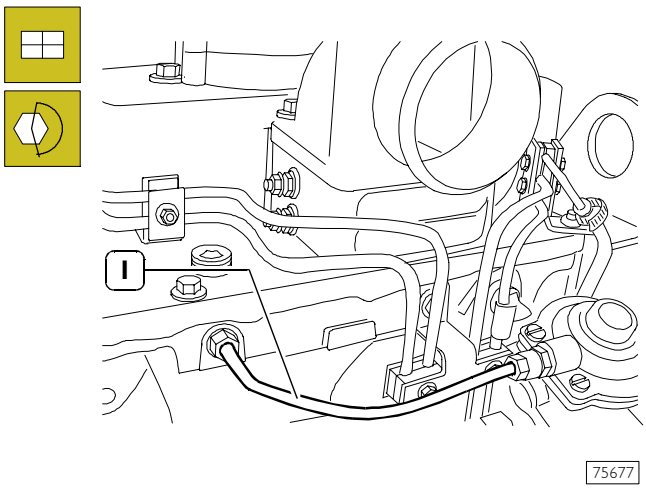
- ❑ Accurately clean the contact surface of engine block and apply sealing LOCTITE 5205 on it in order to form a uniform and continuous kerbstone with no crumbs.

Figure 86



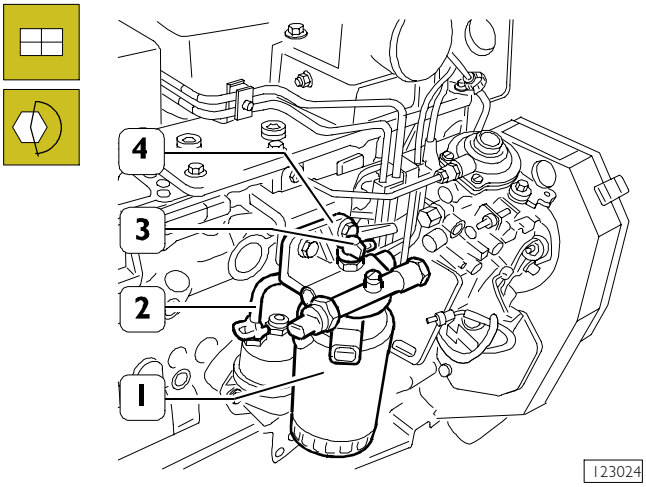
❑ Assemble the pipes (1) and (2) providing fuel feed and recovery between pump and injectors;
Screw up the locking nuts and tighten the screws fixing the fuel recovery manifold; fix the pipes to the injectors throughout the brackets previously assembled.

Figure 87



❑ Fix the LDA pipeline (1) to the engine head and to the feed pump.

Figure 88



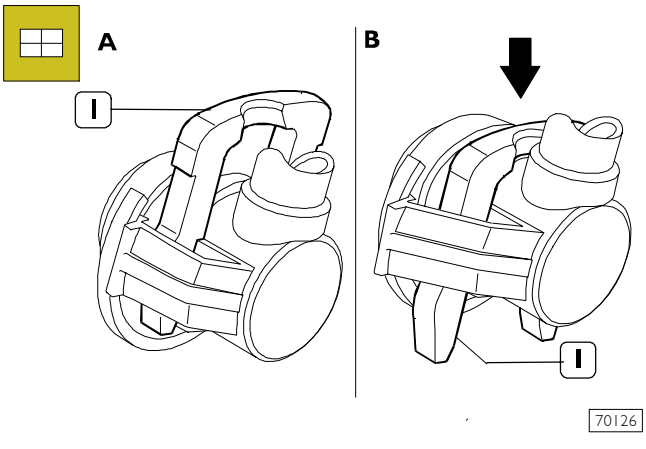
❑ Assemble the fuel filter bearing (4) to the bracket fixed to the engine head.

❑ Connect the fuel pipelines (2 and 3) respectively from priming pump to filter bearing and from this last one to feed pump.

❑ Using 99360076 equipment assemble fuel filter (1).

NOTE The filter shall be priory filled with fuel to facilitate feed system bleed operations.

Figure 89

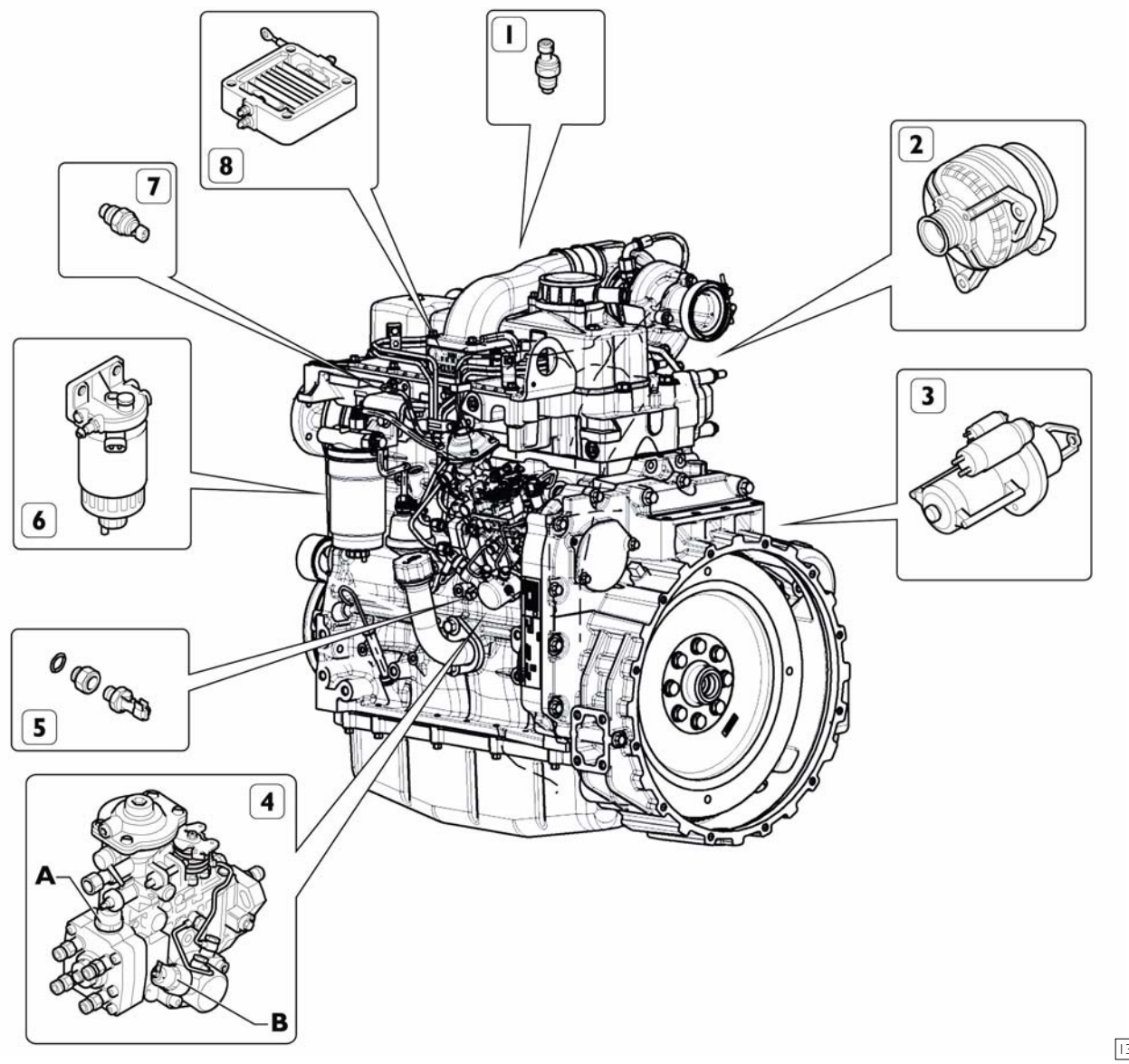


NOTE To connect fuel pipelines (3 and 4, Figure 89) in low pressure from the relating connection unions it is necessary to press the locking fastener (1) as shown in picture B.

After having connected the pipeline, reset the fastener (1) into block position as shown in pictur A.

ELECTRICAL COMPONENT LAYOUT

Figure 107



Below there are listed the electric components which are present on F4GE94--- engines.

1. Cooling liquid temperature sensor;
2. Alternator;
3. Starter;
4. (A) Engine STOP solenoid,
   (B) KSB electromagnet;
5. Oil pressure sensor;
6. Fuel heater (where provided for);
7. KSB Water temperature sensor;
8. Resistance for cold start up;

ANOMALY	POSSIBLE CAUSE	REMEDY	NOTE
The engine smokes abnormally. Black or dark grey smoke.	The injection pump has an excessive advance.	Correct the set-up.	
	The holes in the atomisers (or some of them) are partially or entirely blocked.	Replace the injectors with a series of new injectors or clean and rectify the original ones using suitable equipment.	
	Air cleaner blocked or deteriorated.	Clean or replace the filter element.	
	Loss of compression in the engine due to: stuck or worn flexible rings; worn cylinder liners; valves deteriorated or badly adjusted.	Overhaul the engine or limit the interventions to the relative parts.	
	Unsuitable injectors, different types of injectors or incorrectly calibrated.	Replace or calibrate the injectors.	
	Injection hoses with an unsuitable internal diameter, end of hoses pinched due to repeated blocking.	Check conditions of the end or unions and where necessary replace the hoses.	
Blue, grey-blue, grey smoke tending to white.	Excessive delay in injection pump.	Correct the set-up of the pump.	See your Iveco dealer.
	K.S.B. automatic cold advance device malfunctioning.	Check or replace injection pump.	See your Iveco dealer.
	Faulty injector.	Replace the injector.	
	Leaking of oil from the piston rings caused by glued or worn rings or wearing of cylinder liner walls.	Overhaul the engine.	
	Engine oil passing through the intake guides-valves following wearing of guides or valve stems.	Recondition the cylinder head.	
	Engine too cold (thermostat blocked or inefficient).	Replace the thermostat.	

❑ After the complete drainage, screw the plug and carry out the clean oil filling.



Use only the recommended oil or oil having the requested features for the corrrect motor functioning.

In case of topping up, don't mix oils having different features.

If you don't comply with theses rules, the service warranty is no more valid.

❑ Check the level through the dipsick until when the filling is next to the maximum level notch indicated on the dipsick.

Whereas you replace the lubrication oil, it is necessary to replace the filter.

According to the application the filter can be located in different positions: the following procedure is a valid guide for all applications.

❑ The filter is composed by a support and a filtering cartridge. For the cartridge replacement use the 9936076-tool.





Warning: the oil filter contains inside a quantity of oil of about 1 kg.

Place properly a container for the liquid.

Warning: avoid the contact of skin with the motor oil: in case of contact wash the skin with running water.

The motor oil is very pollutant: it must be disposed of according to the rules.

❑ Replace the filtering cartidge with a new one and screw manually until when the gasket is in contact with the support.

❑ Tigthen by means of the 99360076-tool of three fourth turn.

❑ Operate the motor for some minutes and check the level through the dipsick again. If it is necessary, carry out a topping up to compensate the quantity of oil used for the filling of the filtering cartridge.

Fuel filter replacement



During this operation don't smoke and don't use free flames.

Avoid to breathe the vapors coming from filter.



After filters replacement the supply equipment deaeration must be carried out.

According to the applications the filters position and the quantity can change.

However the following operations are valid for all applications.

❑ Drain the fuel inside the filter by operating the water release screw. Collect the fuel in a container without impurities.

❑ Unscrew the cartridge by using the 99360076-tool.

❑ Collect the eventual fuel inside the filtering cartridge.

❑ Clean the gasket seat on the support and oil slightly the gasket on the new filtering cartridge.

❑ Screw manually the new filtering cartdrige until when the gasket is completely on its seat.

❑ Tigthen through the 99360076-tool at 10-5 Nm torque.

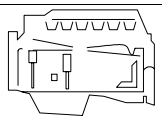
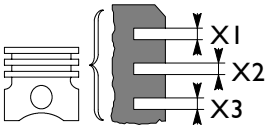
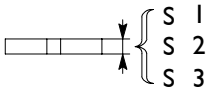
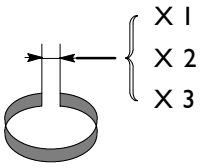
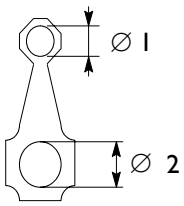
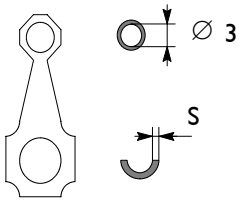
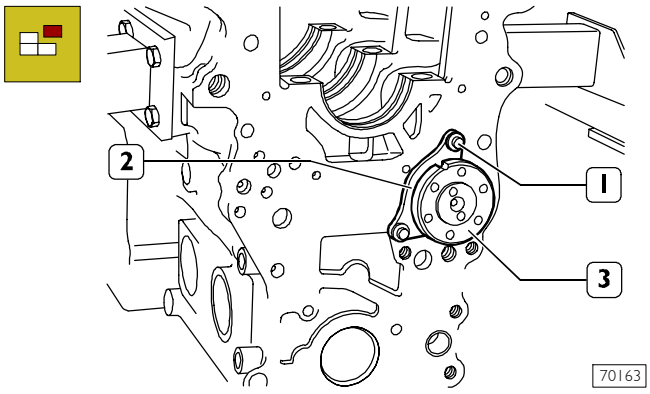
	Type		4 CYLINDERS
CYLINDER UNIT AND CRANKSHAFT COMPONENTS			**mm**
	Split ring slots * measured on a Ø of 99.00 mm	X1 X 2 X 3	2.705 to 2.735 2.440 to 2.460 4.030 to 4.050
	Split rings	S 1 S 2 S 3	2.560 to 2.605 2.350 to 2.380 3.970 to 3.990
	Split rings - slots	1 2 3	0.100 to 0.175 0.060 to 0.110 0.040 to 0.080
	Split rings		0.4
	Split ring end opening in cylinder barrel:	X 1 X 2 X 3	0.30 to 0.40 0.60 to 0.80 0.30 to 0.55
	Small end bush housing Big end bearing housing	Ø 1 Ø 2	40.987 to 41.013 72.987 to 73.013
	Small end bush diameter Inside Spare big end half bearings	Ø 3 S	38.019 to 38.033 1.955 to 1.968
	Piston pin – bush		0.037 to 0.016
	Big end half bearings		0.250 to 0.500

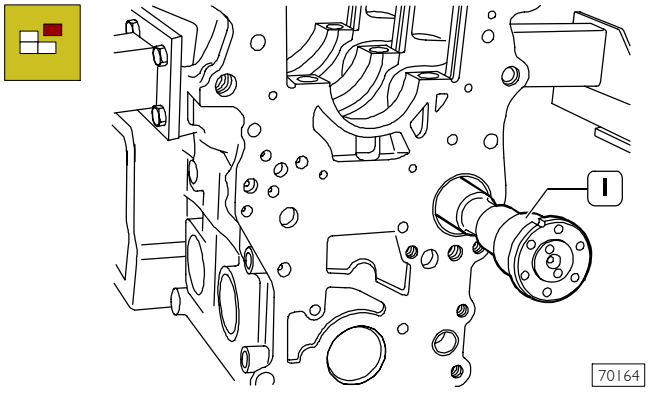
Figure 6



Remove the screws (1) and disconnect camshaft (3) retaining plate (2).

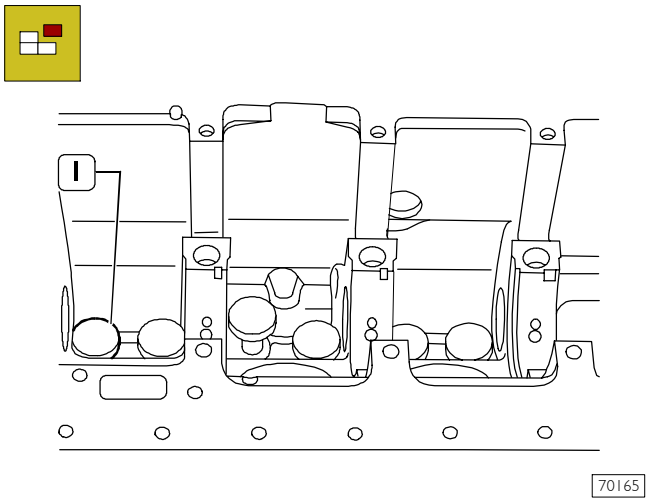
NOTE Take note of plate (2) assembling position.

Figure 7



Withdraw carefully the camshaft (1) from the engine block.

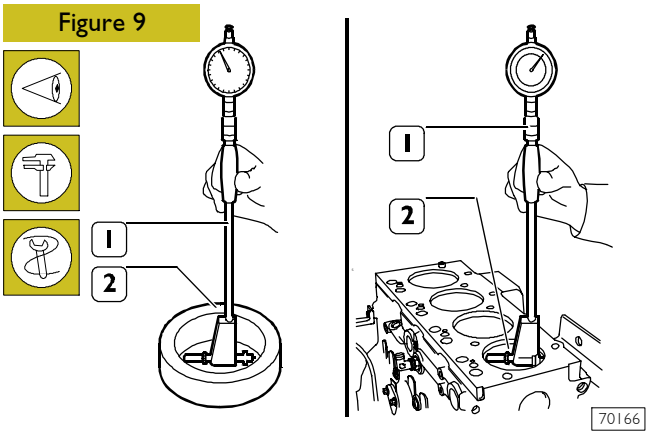
Figure 8



Withdraw the tappets (1) from the engine block.

REPAIR OPERATIONS
CYLINDER UNIT
Checks and measurements

Figure 9



Once engine is disassembled, clean accurately the cylinder-block assembly.

Use the proper rings to handle the cylinder unit.

The engine block shall not show cracks.

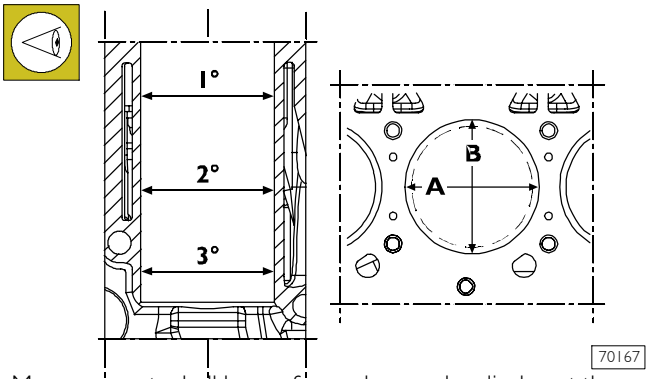
Check operating plug conditions and replace them in case of uncertain seal or if rusted.

Inspect cylinder barrel surfaces; they shall be free from seizing, scores, ovalisation, taper or excessive wear.

Inspection of cylinder barrel bore to check ovalisation, taper and wear shall be performed using the bore dial gauge 99395687 (1) fitted with the dial gauge previously set to zero on the ring gauge (2) of the cylinder barrel diameter.

NOTE Should the ring gauge be not available, use a micrometer for zero-setting.

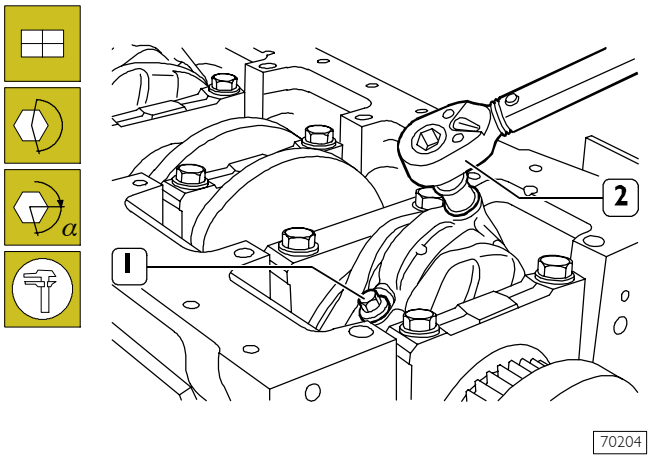
Figure 10



Measurements shall be performed on each cylinder, at three different heights in the barrel and on two planes perpendicular with each other: one parallel to the longitudinal axis of the engine (A), and the other perpendicular (B). Maximum wear is usually found on plane (B) in correspondence with the first measurement.

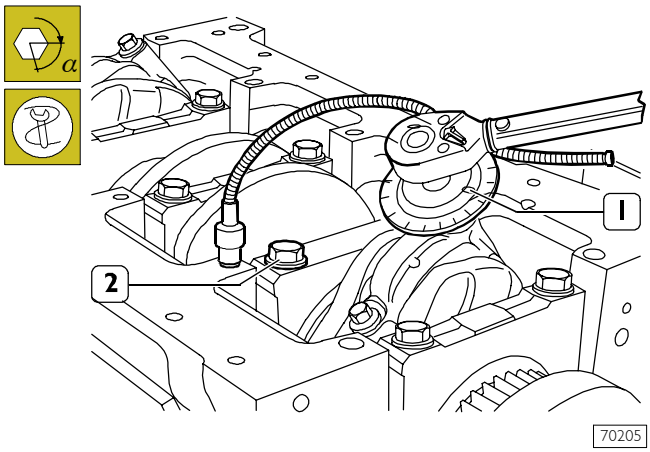
Should ovalisation, taper or wear be found, bore and grind the cylinder barrels. Cylinder barrel regrinding shall be performed according to the spare piston diameter oversized by 0.4 mm and to the specified assembling clearance.

Figure 53



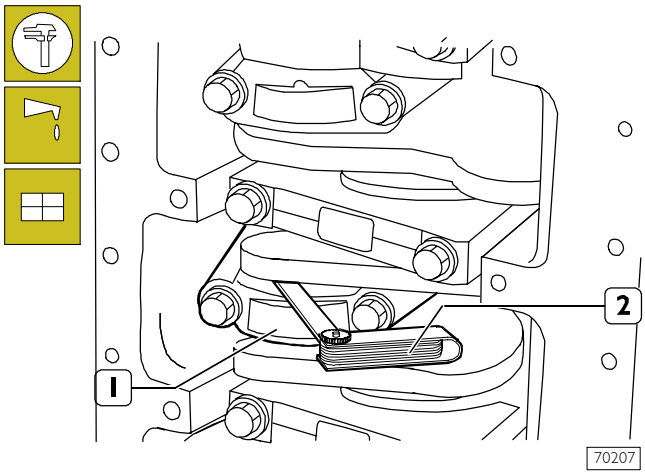
❑ Lubricate the screws (1) with engine oil and then tighten them to the specified torque using the dynamometric wrench (2).

Figure 54



❑ Apply tool 99395216 (1) to the socket wrench and tighten screws (2) of 60° ± 5°.

Figure 55



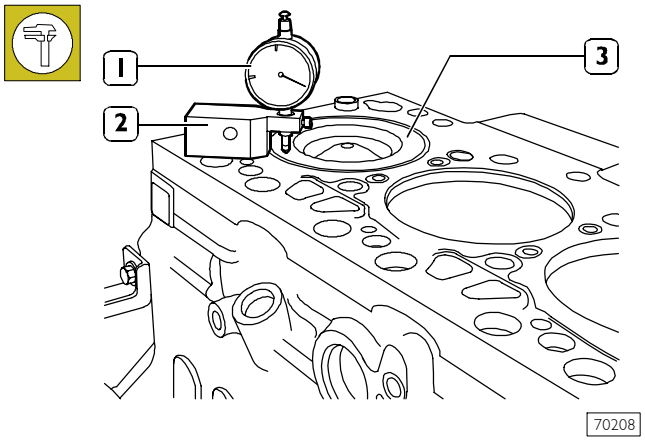
If a different clearance value is found, replace the half bearings and repeat the check.

Once the specified clearance has been obtained, lubricate the main half bearings and fit them by tightening the connecting rod cap fastening screws to the specified torque.

Check manually that the connecting rods (1) are sliding axially on the output shaft pins and that their end float, measured with feeler gauge (2) is 0.250 to 0.275 mm.

Checking piston protrusion

Figure 56



Once connecting rod-piston assemblies refitting is over, use dial gauge 39395603 (1) fitted with base 99370415 (2) to check piston (3) protrusion at T.D.C. with respect to the top of the engine block.

Protrusion shall be 0.28 to 0.52 mm.