

**445/M2 and 445T/M2  
Four Cylinder Engine  
For PX70 and PX85 Irrigation  
Power Units  
Repair Manual**

6-17660

**CASE** *iii*

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### PREFACE TO USER'S GUIDELINE MANUAL

Section 1 describes the engine illustrating its features and working in general.

Section 2 describes the type of fuel feed.

Section 3 relates to the specific duty and is divided in four separate parts:

1. Mechanical part, related to the engine overhaul, limited to those components with different characteristics based on the relating specific duty.
2. Electrical part, concerning wiring harness, electrical and electronic equipment with different characteristics based on the relating specific duty.
3. Maintenance planning and specific overhaul.
4. Troubleshooting part dedicated to the operators who, being entitled to provide technical assistance, shall have simple and direct instructions to identify the cause of the major inconveniences.

Sections 4 and 5 illustrate the overhaul operations of the engine overhaul on stand and the necessary equipment to execute such operations.

Installation general prescriptions are reported within the appendix.

Such prescriptions shall be strictly followed by the operators in-charge of installation to avoid incorrect working as well as serious failures which may reduce performance and life of the engine.

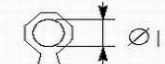
Furthermore, the appendix reports general safety prescriptions to be followed by all operators whether being in-charge of installation or maintenance, in order to avoid serious injury.

**SPECIAL REMARKS**

Where possible, the same sequence of procedures has been followed for easy reference.

Diagrams and symbols have been widely used to give a clearer and more immediate illustration of the subject being dealt with, (see next page) instead of giving descriptions of some operations or procedures.

Example



$\varnothing 1$  = housing for connecting rod small end bush



































$\varnothing 2$  = housing for connecting rod bearings



Tighten to torque  
Tighten to torque + angular value

## Graph and symbols

	Removal Disconnection		Intake
	Refitting Connection		Exhaust
	Removal Disassembly		Operation
	Fitting in place Assembly	$\varrho$	Compression ratio
	Tighten to torque		Tolerance Weight difference
	Tighten to torque + angle value		Rolling torque
	Press or caulk		
	Regulation Adjustment		Rotation
	Warning Note		Angle Angular value
	Visual inspection Fitting position check		Preload
	Measurement Value to find Check		Number of revolutions
	Equipment		Temperature
	Surface for machining Machine finish		Pressure
	Interference Strained assembly	$>$	Oversized Higher than... Maximum, peak
	Thickness Clearance	$<$	Undersized Less than... Minimum
	Lubrication Damp Grease		Selection Classes Oversizing
	Sealant Adhesive		Temperature < 0 °C Cold Winter
	Air bleeding		Temperature > 0 °C Hot Summer

# ENGINES

## General information

Thanks to a centenary engine tradition as well as to a continuous research and development process focused on product advancement, E.B.U. is able to ensure the highest level of versatility and efficiency on the market.

The new range of engines is the result of a project originated by the partnership among some of the most important sector manufacturers in the World to meet the expectations of the customer and comply with the new European regulations ruling preservation of the environment.

In addition to their better performances in terms of stout, power, efficiency, reliability and life, these engines comply not only with the anti-pollution Euro 3 regulations and the relevant prescriptions for noise limit allowed but will also meet the prescriptions of the future more severe specifications with no need of substantial modifications.

The improvement of the above mentioned features has been possible thanks to the utilisation of new materials, new technologies and technical solutions such as: cylinder head with two-four valves per cylinder, induction and exhaust manifolds improving the dynamic flow of air as well as of exhaust emissions, and pistons with new shaped combustion chamber.

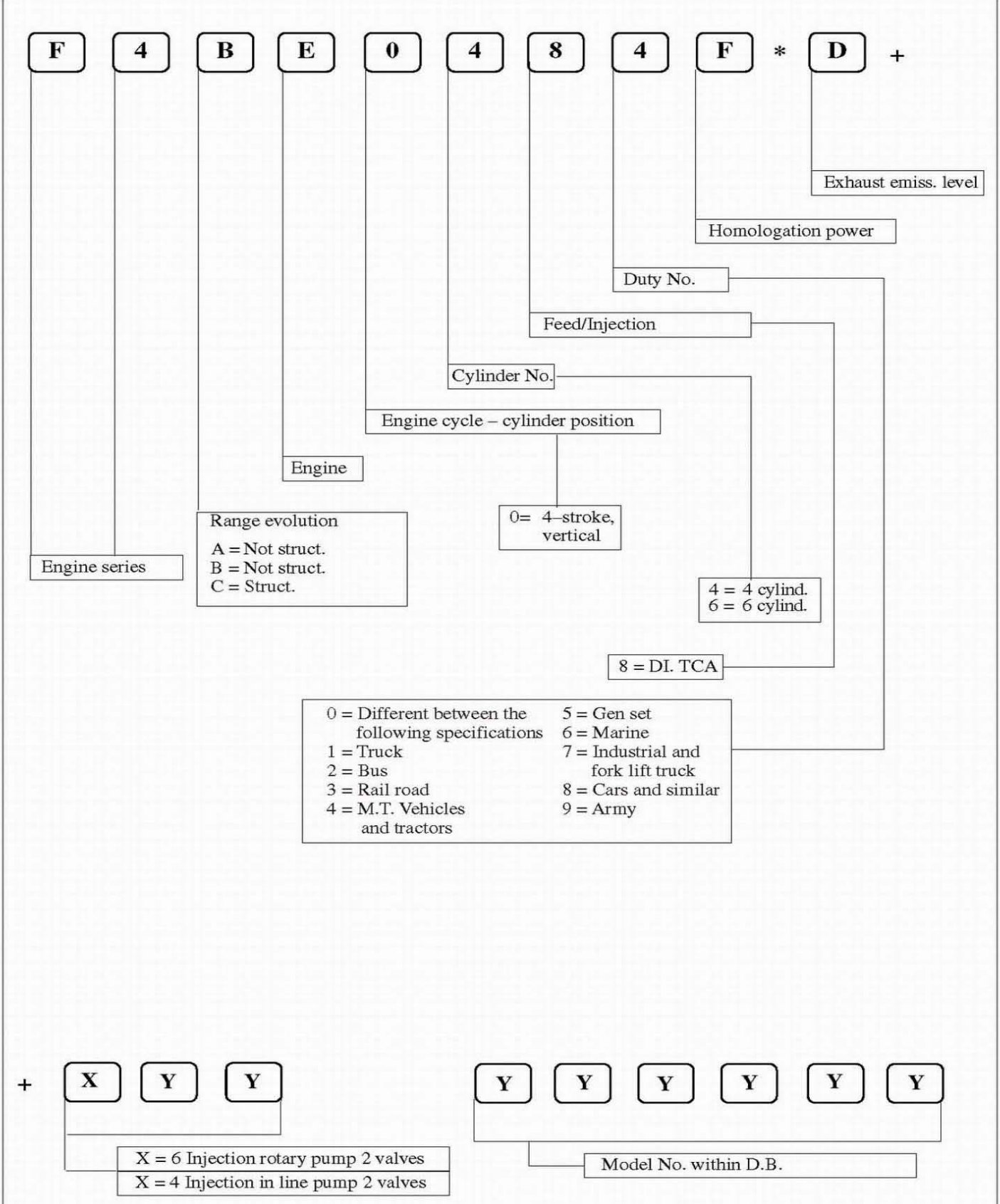
Furthermore, the reliability and cost reduction has been enhanced reducing the number of components and utilising the same parts not only for engines destined to road engine applications but also for the most different purposes such as marine and station engines.

**SECTION I****General Specifications**

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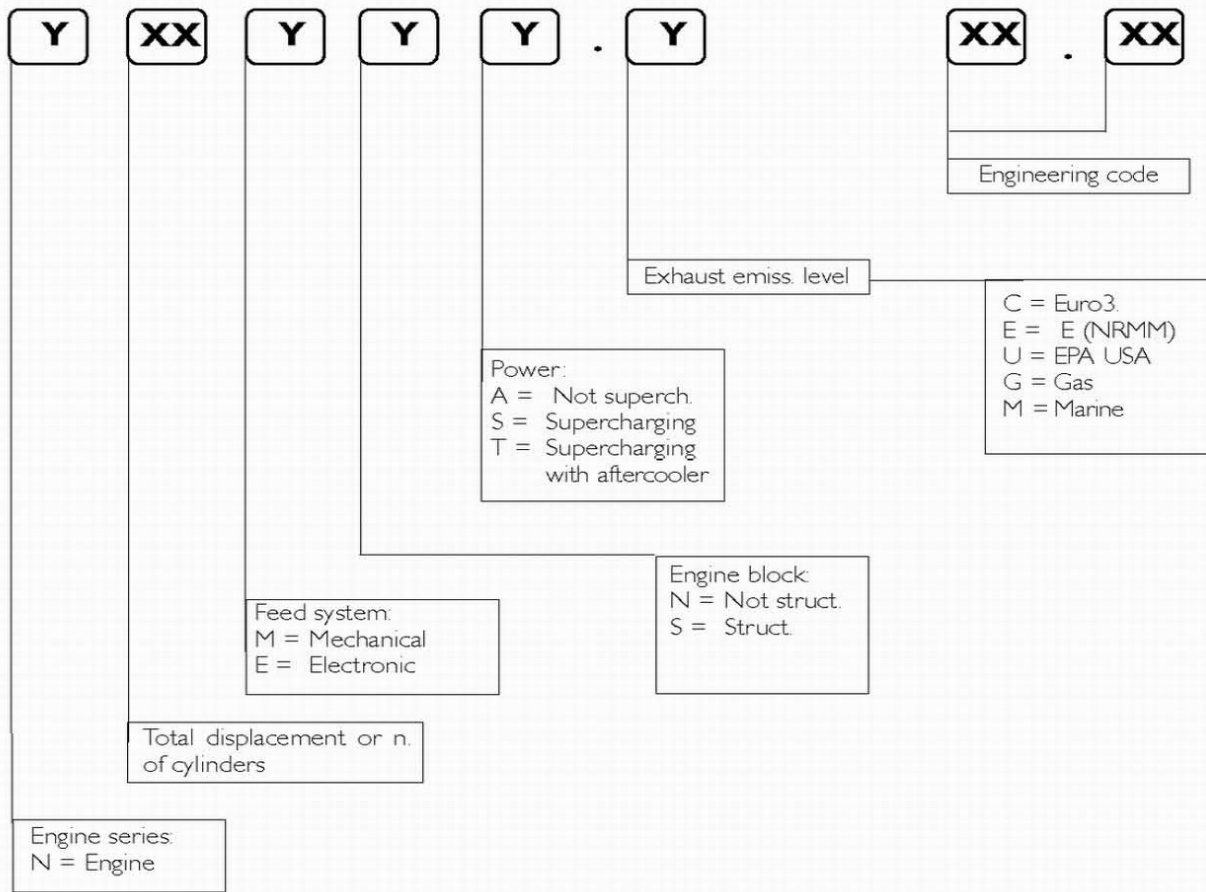


**ENGINE IDENTIFICATION CODE**





**SPECIFIC ENGINE CODE**



**EXAMPLES:**

- N40ENT.C
- N = Engine
- 40 = 4 liters
- E = Electronic
- N = Type of Engine block
- T = Supercharger with aftercooler
- C = Euro3

**LUBRICATION**

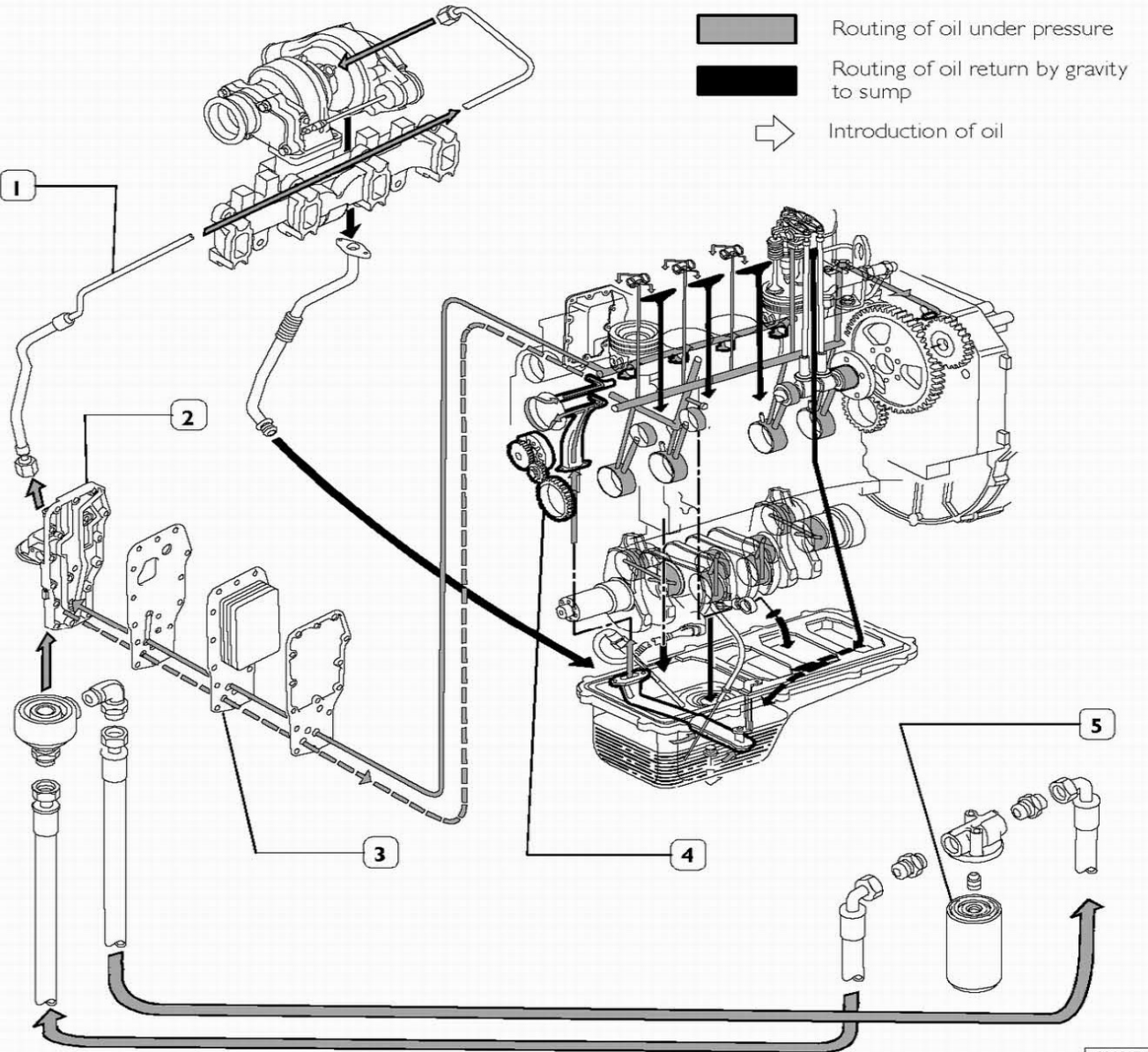
Lubrication by forced circulation is achieved through oil rotary expansion pump (4), placed in the front part of the basement, driven by the straight-tooth gear splined to the shaft's bar hold.

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

Lubrication involves the heat exchanger (2,3) as well, the supercharged (through pipe 1) and the eventual compressor for any eventual compressed air system.

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

Figure 1

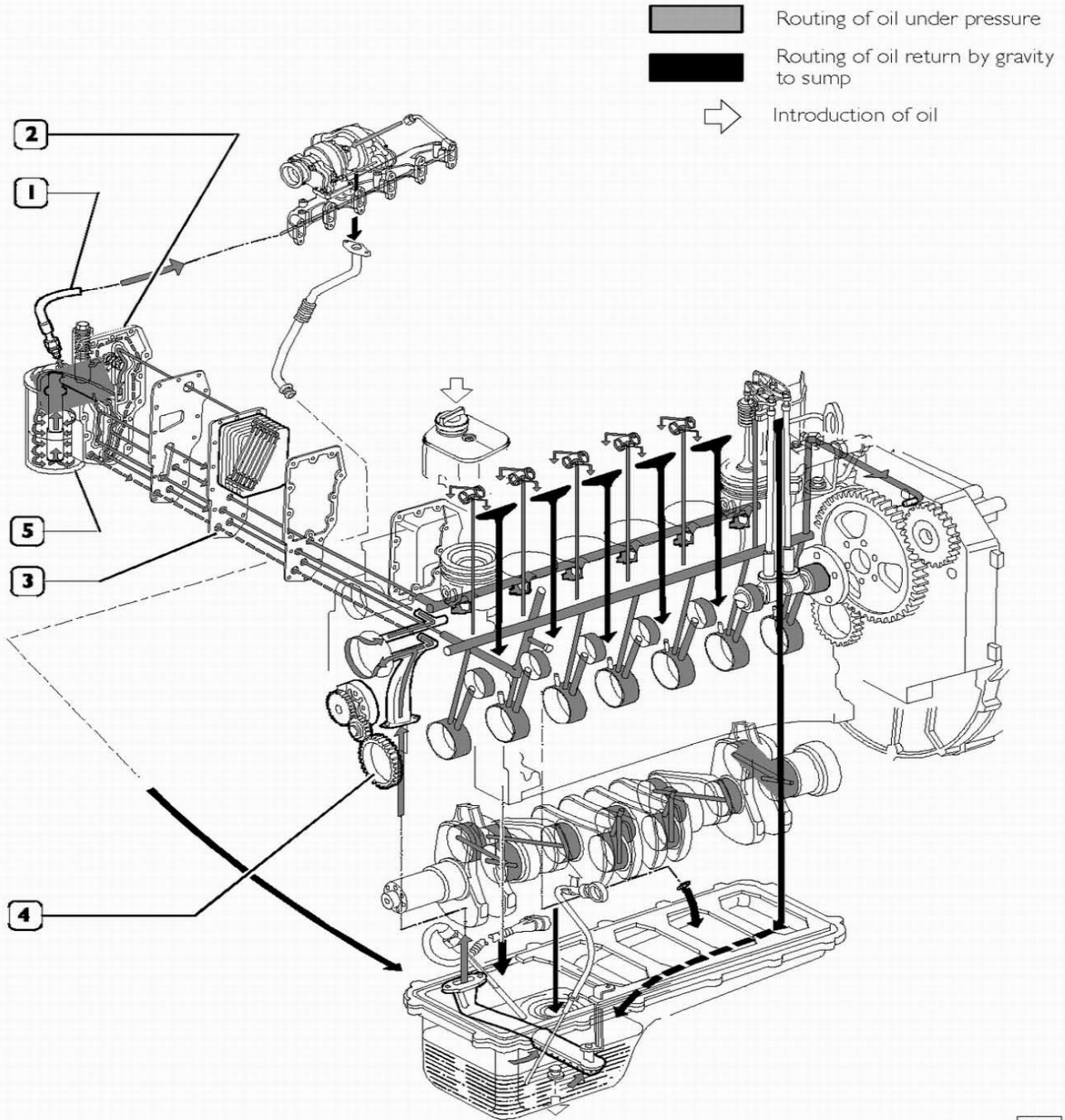


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LUBRICATION SYSTEM LAYOUT (4 cyl. engines)

- 1. Lubrication oil pipe to supercharger – 2. Heat exchanger body – 3. Heat exchanger – 4. Oil rotary expansion pump – 5. Oil filter

Figure 2

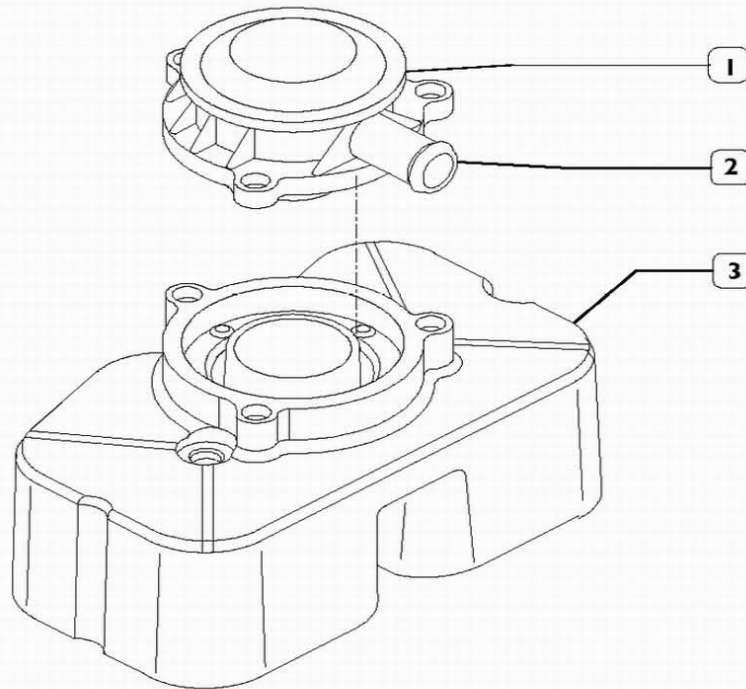


LUBRICATION SYSTEM LAYOUT (6 cyl. engines)

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

**OIL VAPOUR RECIRCULATING SYSTEM**

Figure 3



003240t

1. Valve – 2. Breather pipe – 3. Tappet Cap

On the tappet cap (3) there is a valve (1) whose duty is to condense oil vapour inducing these to fall down because of gravity, to the Tappet cap underneath.

The remaining non-condensed vapours shall be properly conveyed through the breather pipe (2), by suction as an example (connection towards these vapours shall be designed by the Engineer).



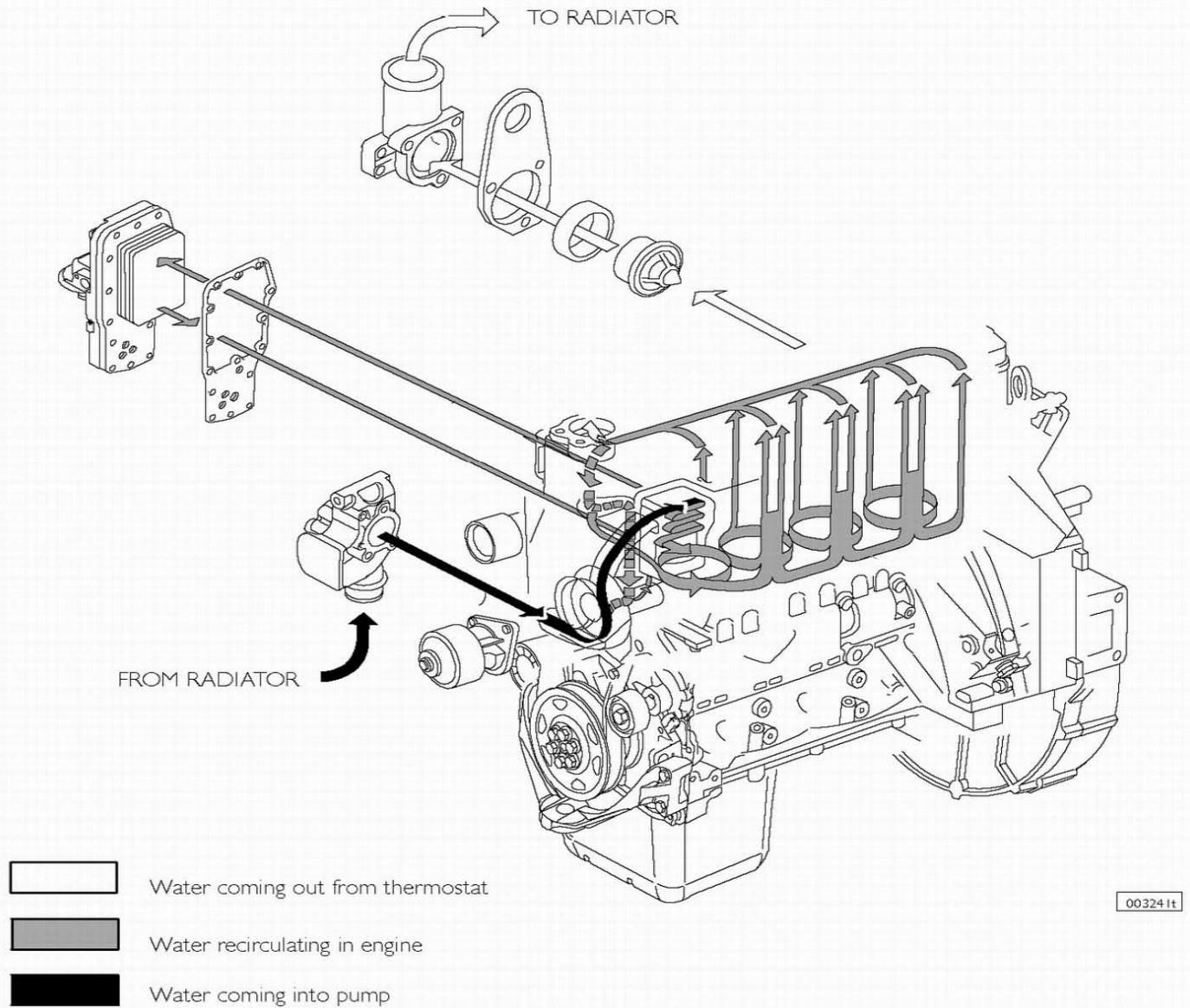
**COOLING SYSTEM**

The engine cooling system, closed circuit forced circulation type, generally incorporates the following components:

- Expansion tank; placement, shape and dimensions are subject to change according to the engine's equipment.
- Radiator; which has the duty to dissipate the heat subtracted to the engine by the cooling liquid. Also this component will have specific peculiarities based on the equipment developed, both for what concerns the placement and the dimensions.
- Visc pusher fan, having the duty to increase the heat dissipating power of the radiator. This component as well will be specifically equipped based on the engine's development.

- Heat exchanger to cool the lubrication oil: even this component is part of the engine's specific equipment.
- Centrifugal water pump, placed in the front part of the engine block.
- Thermostat regulating the circulation of the cooling liquid.
- The circuit may eventually be extended to the compressor, if this is included in the equipment.

**Figure 4**



COOLING SYSTEM LAYOUT (4 cyl. engines)

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