WORKSHOP MANUAL

FOCS Engine Series

cod. 1-5302-351



LOMBARDINI SERVICE
A KOHLER COMPANY

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This manual contains pertinent information regarding the repair of LOMBARDINI water-cooled, indirect injection Diesel engines type **LDW 502-602-903-1204-1204/T e LDW 702-1003-1404**: updated March 15th, 2006.

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TROUBLE SHOOTING

THE ENGINE MUST BE STOPPED IMMEDIATELY WHEN:

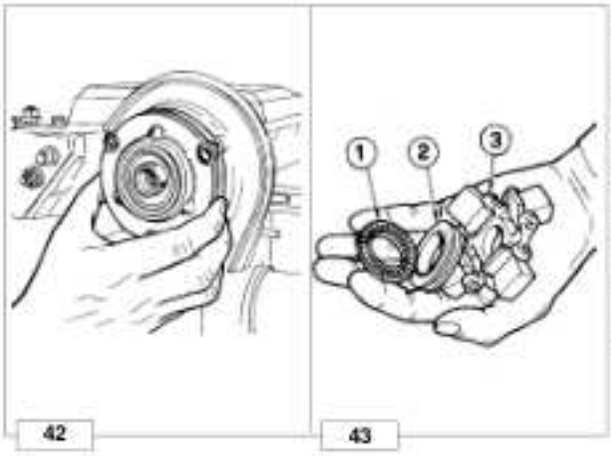
1) - The engine rpms suddenly increase and decrease;
2) - A sudden and unusual noise is heard;
3) - The colour of the exhaust fumes suddenly darkens;
4) - The oil pressure indicator light turns on while running.

TABLE OF LIKELY ANOMALIES AND THEIR SYMPTOMS

The following table contains the possible causes of some failures which may occur during operation.
Always perform these simple checks before removing or replacing any part.

	POSSIBLE CAUSE	TROUBLE												
		Engine does not start	Engine starts but stops	No acceleration	Non-uniform speed	Black smoke	White smoke	Oil preassure too low	Oil level increase	Excessive oil consumption	Oil and fuel dripping from the exhaust	Engine overheats	Inadequate performance	High noise level
FUEL CIRCUIT	Clogged fuel pipes	■	■	■	■								■	
	Clogged fuel filter	■	■	■	■								■	
	Air or water in the fuel circuit	■	■	■	■		■						■	
	Tank cap breather blocked	■	■	■	■								■	
	Faulty fuel pump	■	■	■	■				■				■	
	Lack of fuel	■	■											
ELECTRIC SYSTEM	Glow plug fuse burned	■												
	Faulty glow plug control relay	■												
	Flat battery	■												
	Unclear or mistaken cable connection	■												
	Faulty starter switch	■												
	Faulty starting motor	■												
	Faulty glow plugs	■					■							
MAINTENANCE	Clogged air filter	■	■	■	■	■				■			■	
	Prolonged operation at idle						■			■	■			
	Incomplete run-in						■			■			■	
	Overloaded engine	■	■	■		■				■		■		
SETTINGS REPAIRS	Excessive valve clearances												■	■
	Absence of valve clearances	■												
	Incorrect speed governor leverages	■			■								■	
	Speed governor spring broken or disengaged		■	■										
	Idle low		■		■	■				■	■			
	Worn out or stuck rings	■					■			■	■	■	■	
	Worn out cylinders	■					■			■	■	■	■	
	Worn out valve guides						■			■	■	■	■	
	Bad valve seal	■				■				■	■	■	■	
	Bearing shells of bearing cap - piston rod - rocker worn out							■		■		■	■	■
	E.G.R. valve blocked open					■								
	Governor leverages not running	■	■	■	■									
	Cylinder head gasket damaged	■							■	■		■	■	■
	Faulty timing system	■												■
	Supplementary starter spring broken or disengaged	■												

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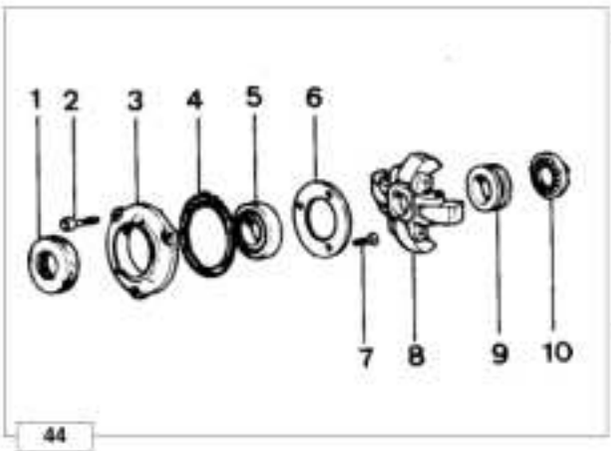
SPEED GOVERNOR

The weight-type mechanical governor, is driven directly by the camshaft and is housed with the cylinder head.

Components:

1 Thrust washer
2 Spool
3 Flyweight assembly

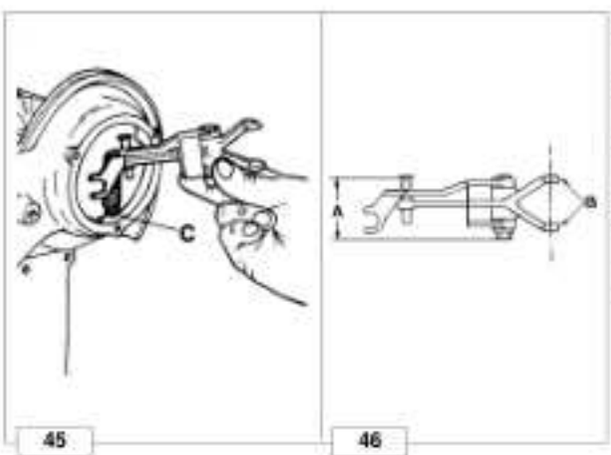
Note: In engines with the minimum/maximum (see fig. 49) the weights are lightened by 25%.



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Speed governor components

1 Oil seal
2 Screw
3 Support
4 O-Ring
5 Bearing
6 Retainer
7 Screw
8 Flyweight assembly
9 Spool
10 Thrust washer

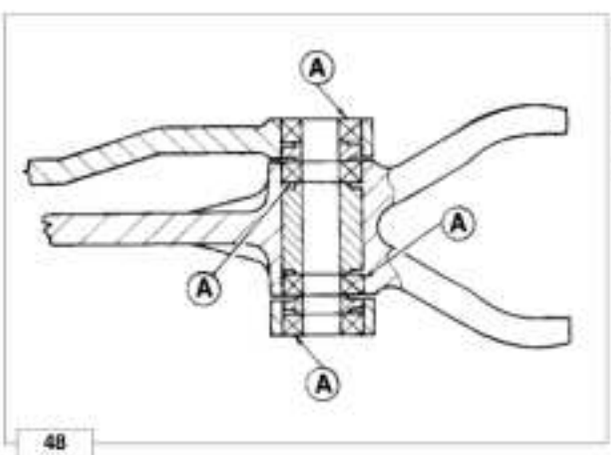


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Governor springs

Unscrew the pin that attaches it to the cylinder head.
To remove it as shown in the figure it is necessary to dismount the camshaft. It could also be removed from the accelerator box side by unscrewing the torque gearing device.
Before reassembling it, check value **A** (45 to 46 mm) and the parallelism of the two levels **B** that must not exceed 0.05 mm.

Note: There are 5 different types of regulator springs **C**. These change according to the engine adjustment: standard spring for 3,600 rpm, for 3,000 rpm, for 2,400 to 2,600 rpm, for 1,800 rpm and for 1,500 rpm.

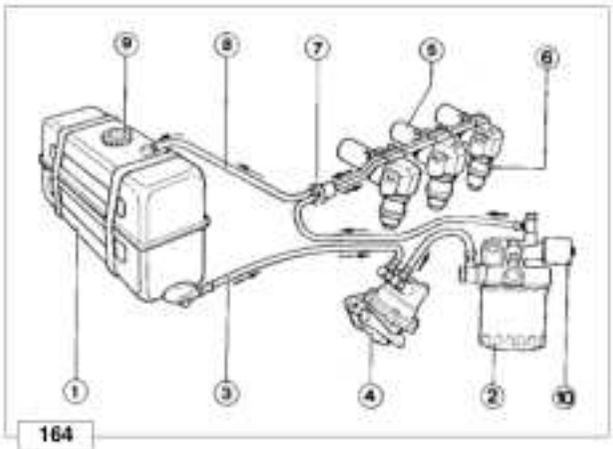


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Governor springs for Gensets

In the section view of the leverages the 4 ball bearings **A** are highlighted.
They are mounted on engines for generator sets adjusted at 1,500÷1,800 rpm and on other particular applications on request.

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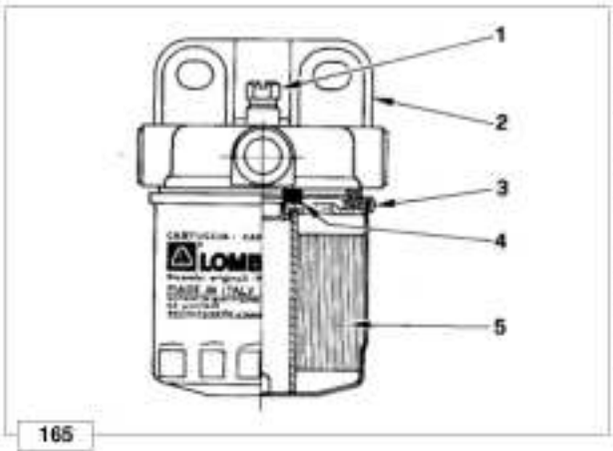
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Fuel feeding / injection circuit

Components:

1 Fuel Tank
2 Fuel filter
3 Fuel feeding tube
4 Fuel lift pump
5 Injection pump
6 Injector
7 Fuel rail passage rubber joint
8 Injector exhaust pipe
9 Fuel tank cap
10 Solenoid valve

Note: The tank complete with filter is supplied on request.



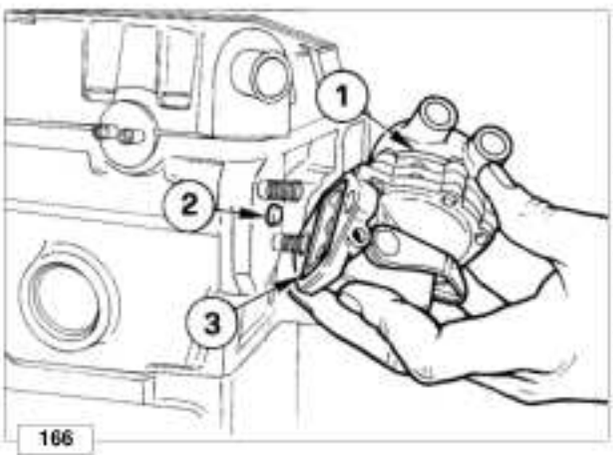
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Fuel filter detached from the tank (on request)

1 Air relief valve
2 Bearing
3 Cartridge
4 Rubber element
5 Filtering element

Cartridge characteristics:
Filtering paper: ..... PF 905
Filtering surface: ..... 2400 cm^2
Degree of filtration: ..... 2÷3 µ
Maximum operating pressure: ..... 4 bar

➲ See page 24 for periodic maintenance details.



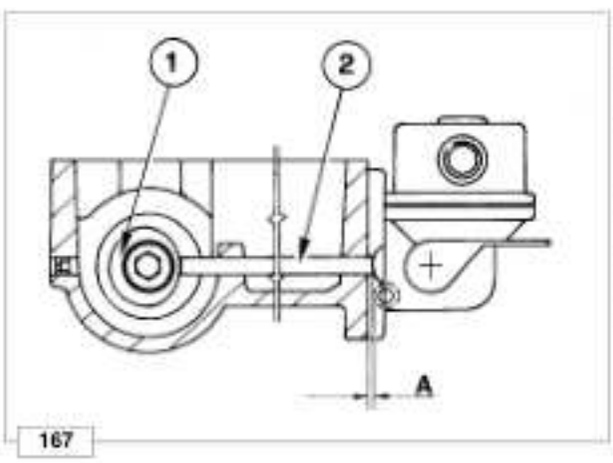
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Fuel lift pump

Components:
1 Fuel lift pump
2 Push rod
3 Seal ring

The fuel pump is membrane type. It is driven by camshaft cam via a drive rod.
It is equipped with an external manual fuel lever.

Characteristics:
With the control cam at 1500 rpm the delivery rate is 75 l/hours and the self-adjusting pressure is at 0.55 to 0.65 bar.



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Fuel pump drive rod projection

The protrusion **A** of drive rod **2** from the cylinder head surface is 1.66÷2.18 mm.
The check must be carried out with cam **1** idle as in the figure.

❍ Block the two fuel pump fastening nuts simultaneously at 24 Nm.

Check the length of the drive rod and if it is not the right size, replace it.
Drive rod length = 153.15÷153.35 mm.

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