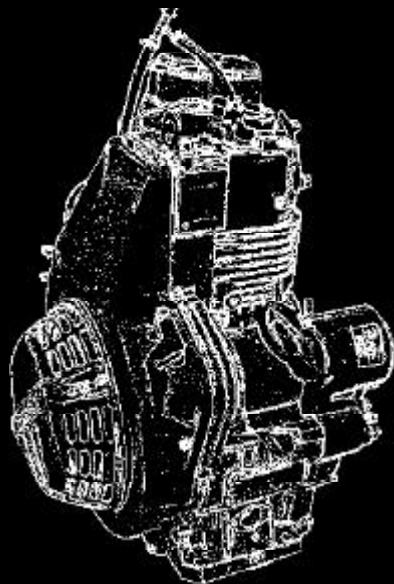


**USE-MAINTENANCE**

**15 LD 400**



 **LOMBARDINI**



## Summary of first maintenance operations

### 15 LD 400 SPECIAL MAINTENANCE

| OPERATION   | COMPONENT                                          | INTERVAL KM             |
|-------------|----------------------------------------------------|-------------------------|
|             |                                                    | After the first 1000 km |
| CHECK       | Check the valves gap (for mechanical tappets only) |                         |
| REPLACEMENT | Replace the lube oil filter                        |                         |

### STANDARD MAINTENANCE 15 LD 400

| OPERATION   | ITEM                                | MAINTENANCE INTERVAL AT KM |       |        |        |        |
|-------------|-------------------------------------|----------------------------|-------|--------|--------|--------|
|             |                                     | 1.000                      | 5.000 | 10.000 | 20.000 | 70.000 |
| CLEANING    | Dry air-cleaner                     |                            |       |        |        |        |
| CHECK       | Lube oil level                      |                            |       |        |        |        |
|             | Valves gap *                        |                            |       |        |        |        |
|             | Water presence in the fuel filter   |                            |       |        |        |        |
|             | Low pressure fuel lines             |                            |       |        |        |        |
| REPLACEMENT | Lube oil                            |                            |       |        |        |        |
|             | Lube oil filter                     |                            |       |        |        |        |
|             | Fuel filter main cartridge          |                            |       |        |        |        |
|             | Fuel filter cartridge on the engine |                            |       |        |        |        |
|             | Dry air filter cartridge            |                            |       |        |        |        |
| OVERHAUL    | General overhaul                    |                            |       |        |        |        |

\* for mechanical tappets only



If you are using oil of a quality lower than the recommended one then you will have to replace it every 3.000 km.

## NOTE

A series of 15 horizontal dotted lines for writing notes.

## INDEX

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Following operations should be performed by authorized personnel  
trained on the product.

Every 50.000 km

Setting and injector cleaning ..... P. 25

### ACCESSORY SET SUPPLIED WITH THE ENGINE

Request if not supplied.



## ENGINE TYPE

Engine type

Type 15 LD 400

rpm 3000

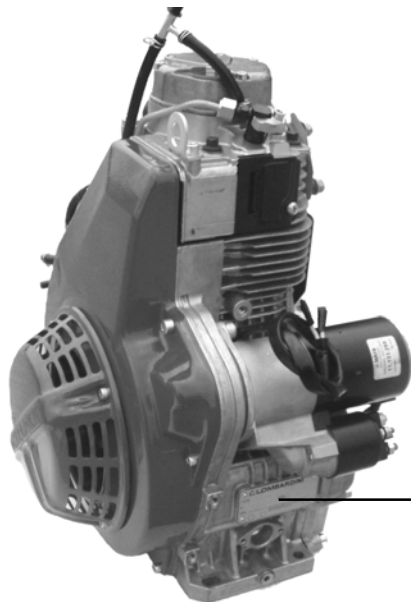
r/min

Serial number

s/n 4763609

K 791326

Customer code ('K' No.)



## CHARACTERISTICS

|                                                    |                 |           |
|----------------------------------------------------|-----------------|-----------|
|                                                    |                 | 15LD 400  |
| CYLINDERS                                          | N.              | 1         |
| BORE                                               | mm              | 82        |
| STROKE                                             | mm              | 76        |
| DISPLACEMENT                                       | Cm <sup>3</sup> | 401       |
| MAX INTERMITTENT ANGULARITY (PEAK VALUES) (MAX 1') |                 | 25° (35°) |
| OIL QUANTITY                                       | l.              | 1,5       |
| DRY WEIGHT                                         | Kg.             | 45        |

## NOTE

## NOTE

A series of 20 horizontal dotted lines for taking notes.



## PREFACE

Every attempt has been made to present within this service manual, accurate and up to date technical information. However, development on the Lombardini series is continuous. Therefore, the information within this manual is subject to change without notice and without obligation. The information contained within this service manual is the sole property of Lombardini. As such, no reproduction or replication in whole or part is allowed without the express written permission of Lombardini.

Information presented within this manual assumes the following:

- 1 - The person or persons performing service work on Lombardini series engines is properly trained and equipped to safely and professionally perform the subject operation;
- 2 - The person or persons performing service work on Lombardini series engines possesses adequate hand and Lombardini special tools to safely and professionally perform the subject service operation;
- 3 - The person or persons performing service work on Lombardini series engines has read the pertinent information regarding the subject service operations and fully understands the operation at hand.

## GENERAL SERVICE MANUAL NOTES:

- 1- Use only genuine Lombardini repair parts. Failure to use genuine Lombardini parts could result in sub-standard performance and low longevity.
- 2- All data presented are in metric format. That is, dimensions are presented in millimeters (mm), torque is presented in Newton-meters (Nm), weight is presented in kilograms (Kg), volume is presented in liters or cubic centimeters (cc) and pressure is presented in barometric units (bar).



## **WARNING SIGNS**

### **DANGER**



By not respecting these directions the user may place at risk persons and objects.

### **CAUTION**



By not respecting these directions the user can cause technical damage to the unit and/or to the installation.



## **SAFETY INSTRUCTIONS**

- Lombardini engines are built to provide safe and lasting performances, but in order to obtain these results it is essential that the maintenance requirements described in the manual are observed along with the following safety recommendations.
- The engine has been built to the specifications of a machine manufacturer, and it is his responsibility to ensure that all necessary action is taken to meet the essential and legally prescribed health and safety requirements. Any use of the machine other than that described cannot be considered as complying with its intended purpose as specified by Lombardini, which therefore declines all responsibility for accidents caused by such operations.
- The following instructions are intended for the user of the machine in order to reduce or eliminate risks, especially those concerning the operation and standard maintenance of the engine.
- The user should read these instructions carefully and get to know the operations described. By not doing so he may place at risk his own health and safety and that of anyone else in the vicinity of the machine.
- The engine may be used or mounted on a machine only by personnel suitably trained in its operation and aware of the dangers involved. This is particularly true for standard and, above all, special maintenance work. For special maintenance contact personnel trained specifically by Lombardini. This work should be carried out in accordance with existing literature.
- Lombardini declines all responsibility for accidents or for failure to comply with the requirements of law if changes are made to the engine's functional parameters or to the fuel flow rate adjustments and speed of rotation, if seals are removed, or if parts not described in the operating and maintenance manual are removed and reassembled by unauthorized personnel.
- In addition to all other machine specifications, ensure that the engine is in a near horizontal position when starting. If starting manually, ensure that the necessary operations can be performed without any risk of striking against walls or dangerous objects. Rope starting (except for recoil rope starting) is not permitted even in emergencies.
- Check that the machine is stable so that there is no risk of it overturning.
- Get to know the engine speed adjustment and machine stop operations.
- Do not start the machine in closed or poorly ventilated environments. The internal combustion process generates carbon monoxide, an odourless and highly toxic gas, so spending too long a time in an environment where the engine discharges its exhaust products freely can lead to loss of consciousness and even death.
- The engine may not be used in environments containing flammable materials, explosive atmospheres or easily combustible powders, unless adequate and specific precautions have been taken and are clearly stated and certified for the machine.
- To prevent the risk of fire, keep the machine at a distance of at least one metre from buildings or other machines.
- Children and animals must be kept at a sufficient distance from the machine to prevent any danger resulting from its operation.
- Fuel is flammable, so the tank must be filled only when the engine is turned off. Dry carefully any fuel that may have spilled, remove the fuel container and any cloths soaked in fuel or oil, check that any sound-absorbing panels made of porous material are not soaked with fuel or oil, and make sure that the ground on which the machine is located has not absorbed fuel or oil.
- To start the engine follow the specific instructions provided in the engine and/or machine operating manual. Do not use auxiliary starting devices not originally installed on the machine (e.g. Startpilot systems which utilise ether etc.)
- Before starting, remove any tools that have been used for carrying out maintenance work to the engine and/or the machine and check that any guards removed have been replaced. In cold climates it is possible to mix kerosene with the diesel fuel to make the engine easier to start. The liquids must be mixed in the tank by pouring in first the kerosene and then the diesel fuel. Consult Lombardini technical office for mixture proportions. Petrol may not be used because of the risk of it forming flammable vapours.
- During operation the surface of the engine reaches

temperatures that may be dangerous. Avoid in particular all contact with the exhaust system.

- Before carrying out any work on the engine, turn it off and allow it to cool down. Do not perform any operation while the engine is running.
- The liquid cooling circuit is under pressure. Do not carry out any checks before the engine has cooled down, and even then open the radiator cap or the expansion tank cautiously. Wear protective clothing and glasses. If there is an electric fan, do not approach the engine while it is still hot as the fan may come on even when the engine is not running. Clean the cooling system with the engine turned off.
- While cleaning the oil bath air filter, check that the oil is disposed of in such a way as not to harm the environment. Any filtering sponges in the oil bath air filter should not be soaked with oil. The cyclone pre-filter cup must not be filled with oil.
- Since the oil must be emptied out while the engine is still hot (approx. 80°C), particular care should be taken in order to avoid burns. In any case make sure that oil does not come into contact with your skin because of the health hazards involved.
- Check that the discharged oil, the oil filter and the oil contained in the oil filter are disposed of in such a way as not to harm the environment.
- Close the fuel tank filler cap carefully after each filling operation. Do not fill the tank right up to the top, but leave sufficient space to allow for any expansion of the fuel.
- Fuel vapours are highly toxic, so fill up only in the open air or in well ventilated environments.
- Do not smoke or use naked flames while filling.
- Take care when removing the oil filter as it may be hot.
- The operations of checking, filling up and replacing the cooling liquid must be carried out with the engine turned off and cold. Take particular care if liquids containing nitrites are mixed with others not containing these compounds as this may give rise to the formation of nitrosamines which are a health

hazard. The cooling liquid is polluting, so dispose of in a manner that does not damage the environment.

- During operations which involve access to moving parts of the engine and/or removal of the rotary guards, disconnect and insulate the positive cable of the battery so as to prevent accidental short circuits and activation of the starter motor.
- Check the belt tension only when the engine is turned off.
- In order to move the engine use exclusively the eyebolts fitted for this purpose by Lombardini. These lifting points are however not suitable for the entire machine, so in this case use the eyebolts fitted by the manufacturer.

## BEFORE STARTING



Carefully read and follow all instructions in this booklet as well as all those provided with the equipment on which this engine is used.

Failure to do so will make warranty void.

## USE



The engine may be damaged if operated with insufficient lube oil. It is also dangerous to supply too much lube oil to the engine because a sudden increase in engine rpm could be caused by its combustion. Use proper lube oil preserve your engine. Nothing affects the performance and durability of your engine more than the lube oil you use. If inferior oil is used, or if your engine oil is not changed regularly, the risk of piston seizure, piston ring sticking, and accelerated wear of the cylinder liner, bearing and other moving components increases significantly.

Always use oil with the right viscosity for the ambient temperature in which your engine is being operated . Use the chart on this page when choosing your engine oil.



The used engine oil can cause skin-cancer if kept frequently in contact for prolonged periods. If contact with oil cannot be avoided, wash carefully your hands with water and soap as soon as possible. Do not disperse the oil in the ambient, as it has a high pollution power.

## SAE CLASSIFICATION

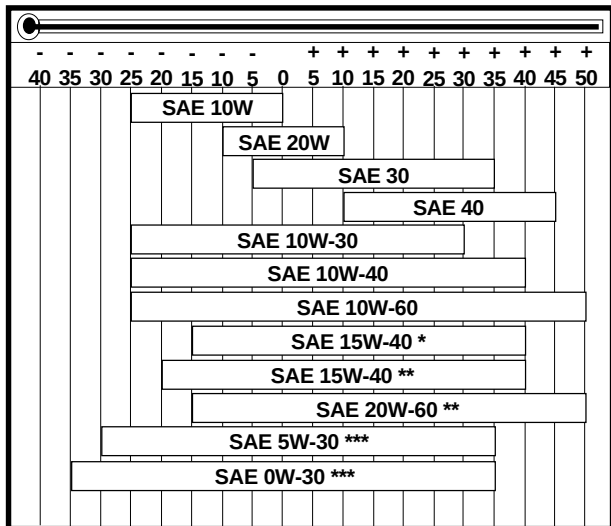
In the SAE classification, oils differ on the basis of their viscosity, and no other qualitative characteristic is taken into account.

The first number refers to the viscosity when the engine is cold (symbol W = winter), while the second considers viscosity with the engine at régime.

The criteria for choosing must consider, during winter, the lowest outside temperature to which the engine will be subject and the highest functioning temperature during summer.

Single-degree oils are normally used when the running temperature varies scarcely.

Multi-degree oil is less sensitive to temperature changes.



## SAE Grade

SAE 15W-40 \*

mineral base

SAE 15W-40 \*\*

SAE 20W-60 \*\*

semi-synthetic base

SAE 5W-30 \*\*\*

SAE 0W-30 \*\*\*

synthetic base

## **LUBRICANT INTERNATIONAL SPECIFICATIONS**

They define testing performances and procedures that the lubricants need to successfully respond to in several engine testing and laboratory analysis so as to be considered qualified and in conformity to the regulations set for each lubrication kind.

A.P.I : ( American Petroleum Institute )  
MIL : Engine oil U.S. military specifications released for logistic reasons  
ACEA : European Automobile Manufacturers Association

Tables shown on page 15 are of useful reference when buying a kind of oil.

Codes are usually printed-out on the oil container and the understanding of their meaning is useful for comparing different brands and choosing the kind with the right characteristics. Usually a specification showing a following letter or number is preferable to one with a preceding letter or number.

An SF oil, for instance, is more performing than a SE oil but less performing than a SG one.

## **ACEA REGULATIONS** **ACEA SEQUENCES**

### **PETROL**

**A1 =** Low-viscosity, for frictions reduction

**A2 =** Standard

**A3 =** High performances

### **LIGHT DUTY DIESEL ENGINES**

**B1 =** Low-viscosity, for frictions reduction

**B2 =** Standard

**B3 =** High performances (indirect injection)

**B4 =** High quality (direct injection)

### **HEAVY DUTY DIESEL ENGINES**

~~**E1 =** OBSOLETE~~ // // // // // // // //

**E2 =** Standard

**E3 =** Heavy conditions (Euro 1 - Euro 2 engines )

**E4 =** Heavy conditions (Euro 1 - Euro 2 - Euro 3 engines )

**E5 =** High performances in heavy conditions (Euro 1 - Euro 2 - Euro 3 engines )

## API / MIL SEQUENCES

| DIESEL              |      |      |      |      |    |                |    |    |    |    | PETROL                  |    |    |    |    |    |    |    |    |    |  |
|---------------------|------|------|------|------|----|----------------|----|----|----|----|-------------------------|----|----|----|----|----|----|----|----|----|--|
| API                 | CH-4 | CG-4 | CF-4 | CF-2 | CF | CE             | CD | CC | CB | CA | SA                      | SB | SC | SD | SE | SF | SG | SH | SJ | SL |  |
| MIL                 |      |      |      |      |    | L - 2104 D / E |    |    |    |    |                         |    |    |    |    |    |    |    |    |    |  |
|                     |      |      |      |      |    |                |    |    |    |    | L - 46152 B / C / D / E |    |    |    |    |    |    |    |    |    |  |
| OBSOLETE - OBSOLETE |      |      |      |      |    |                |    |    |    |    |                         |    |    |    |    |    |    |    |    |    |  |

### PREScribed LUBRICANT

AGIP SUPERDIESEL MULTIGRADE 15W40 specifications API CF-4/SG ACEA E2,B2 MIL-L-46152 D/E.

In the countries where AGIP products are not available, use oil API SJ/CF for Diesel engines or oil corresponding to the military specification MIL-L-46152 D/E.

## 15 LD ENGINES OIL CAPACITY

|                         |        | 15 LD 400  |
|-------------------------|--------|------------|
| OIL VOLUME AT MAX LEVEL | Litres | <b>1,5</b> |

Fill crankcase with oil



Oil filling and level inspections must be carried out with the engine on a flat surface

Remove oil filler cap.  
Pour the oil in and reassemble oil cap



Make sure that is nearly at max.  
Fit the dipstick correctly back in place



Check and refill oil up to the maximum level



Make sure that is nearly at max.  
Fit the dipstick correctly back in place



## Refueling



To avoid explosions or fire outbreaks, do not smoke or use naked flames during the operations. Fuel vapours are highly toxic. Only carry out the operations outdoors or in a well ventilated place. Keep your face well away from the plug to prevent harmful vapours from being inhaled. Dispose of fuel in the correct way and do not litter as it is highly polluting. When refuelling, it is advisable to use a funnel to prevent fuel from spilling out. The fuel should also be filtered to prevent dust or dirt from entering the tank. Use the same type of diesel fuel as used in cars. Use of other types of fuel could damage the engine. The cetane rating of the fuel must be higher than 45 to prevent difficult starting. Do not use dirty diesel fuel or mixtures of diesel fuel and water since this would cause serious engine faults.



## FUEL

Fuel can be:

|          |       |       |
|----------|-------|-------|
| - Summer | up to | 0°C   |
| - Winter | up to | -10°C |
| - Alpine | up to | -20°C |
| - Arctic | up to | -30°C |

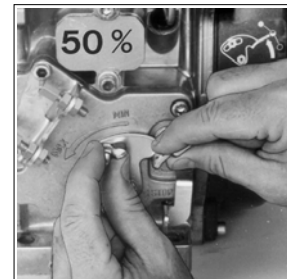
\* For all fuel types, the cetane number cannot be lower than 45

## STARTING



- In addition to all other machine specifications, ensure that the engine is in a near horizontal position when starting. If starting manually, ensure that the necessary operations can be performed without any risk of striking against walls or dangerous objects. Rope starting (except for recoil rope starting) is not permitted even in emergencies.
- Check that the machine is stable so that there is no risk of it overturning.

**Accelerator at 50 % speed**

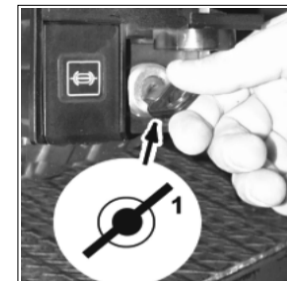


## Electric starting

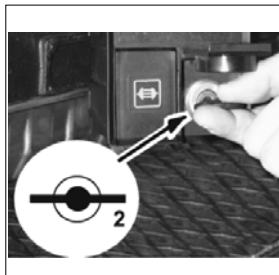


Do not actuate starter for more than 20 seconds at a time. If engine does not start, wait 1 minute before repeating attempt.  
If engine does not start after two attempts, trace the cause according to Diagnosis Chart (see page 32-33).

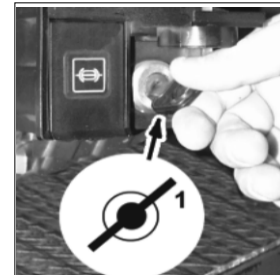
**First position  
Warning light on.**



**2<sup>nd</sup> Position - Starting.**



**Key always in on (1<sup>st</sup>) position  
when engine is running.**



Make sure that all the warning lights are off when the engine is running.  
For engines with starting panel equipped with engine protection, make sure the OK light only keeps ON.

### AFTER STARTING

At idle speed for a few minutes according to table

Temperature

Time

$\leq -20^{\circ}\text{C}$

5'

$-20^{\circ}\text{C} / -10^{\circ}\text{C}$

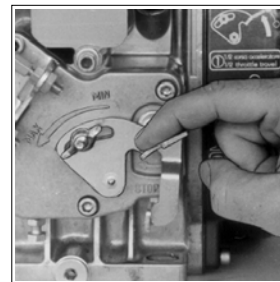
2'

$-10^{\circ}\text{C} - 5^{\circ}\text{C}$

1'

$\geq 5^{\circ}\text{C}$

20"



### RUN-IN

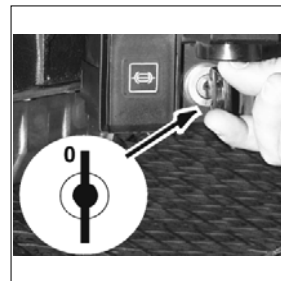
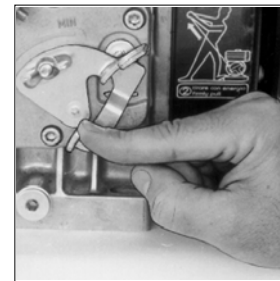
During first 50 hours do not exceed 70% of maximum rated power.

### BEFORE STOPPING

At idels speed for a few minutes

### STOPPING

Lever and/or key in stop position.



## MAINTENANCE



Use only genuine Lombardini repair parts. Failure to use genuine Lombardini parts could result in sub-standard performance and low longevity. The non-observance of the operations described in the following pages can involve the risk of technical damages to the machine and/or the installation. Failure to do so will make warranty void.

### Operation description

AFTER THE FIRST 1.000 km

### Oil carter replacement

PAG. ST. 21

### Oil filter replacement

PAG. ST. 23



**Maintenance operations to carry out on cold engine**



Every 1.000 km

**1.000 km**

Oil level check.  
If level is under the minimum, fill up.



In some cases, the oil refilling cannot be carried out through the plug located on the rocker-arm cover, therefore you need to use the hole on the drain side or on the air filter side, as showed in the figures



Every 5.000 km

**km 5.000**

In case of low use:  
every 6 months.

Oil carter replacement.



If you are using oil of a quality lower than the recommended one then you will have to replace it every 3.000 km.

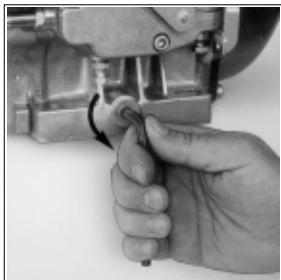


To quickly and completely drain off the engine oil, it is advisable to carry out this operation when the engine is hot.



The used engine oil can cause skin-cancer if kept frequently in contact for prolonged periods. If contact with oil cannot be avoided, wash carefully your hands with water and soap as soon as possible. Do not disperse the oil in the ambient, as it has a high pollution power

Remove the plug and drain the oil into a suitable vessel.



Reassemble oil drain cap.

Remove oil filter cap



Pour the oil in and reassemble oil cap



Make sure that it is at max with engine on level surface



Before restarting, make sure that the oil dipstick and the oil drain and fill plugs have been correctly fitted back in place to prevent lubricant from spilling out



#### OPERATIONS TO BE CARRIED OUT AT

|           |            |
|-----------|------------|
| 10.000 km | 20.000 km  |
| 30.000 km | 40.000 km  |
| 50.000 km | 60.000 km  |
| 70.000 km | 80.000 km  |
| 90.000 km | 100.000 km |

#### Air cleaner checking and cleaning.

Open air cleaner and remove element .



Always wear protective goggles if compressed air is used.



To clean the filter cartridge, tap it lightly and repeatedly on a hard surface to eliminate excess dirt. It is preferable to blow compressed air lengthways through paper filter elements, rather than crossways, and at a minimum distance of 250 mm.



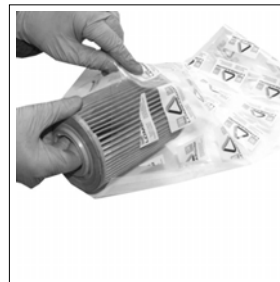
Carefully clean the inside of the filter housing and of the support. Next mount the new filter element and housing.



If the filtering element is heavily clogged, it must be replaced.



Use only genuine Lombardini spare parts.



Make sure that the filter is mounted in the correct way otherwise dust and other impurities could enter the intake ducts.



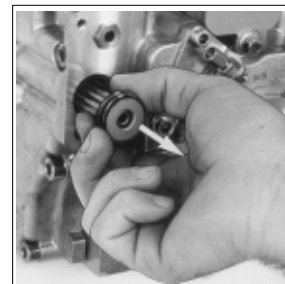
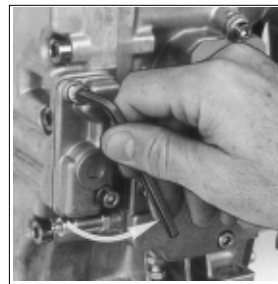
Every 10.000 km

**km 10.000**

In case of low use:  
every 12 months

Oil filter replacement

Remove and replace oil filter



Use only genuine  
Lombardini repair parts



When replacing the oil  
filter, keep it separate  
from the other waste  
material



Replacing the oil sump in  
engines with enhanced oil  
sump

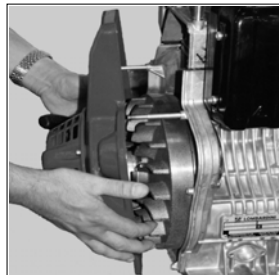


To quickly and  
completely drain off the  
engine oil, it is advisable  
to carry out this  
operation when the  
engine is hot.

Remove the plug A and drain  
the oil into a suitable vessel.

Cooling fins cleaning.

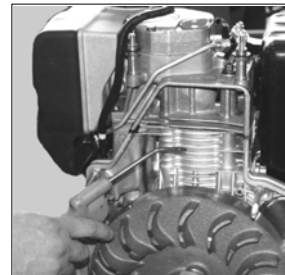
Unscrew the air shroud  
fastening nuts and remove it.

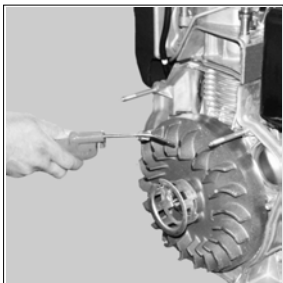


Blow compressed air on the  
cylinder cooling fins and the  
flywheel.

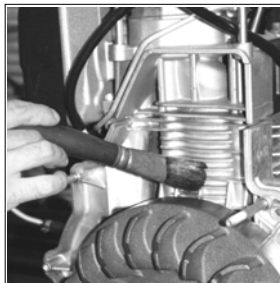


Always use protective  
goggles when  
compressed air is used





**In case the cooling fins are very dirty clean them with a brush soaked in diesel fuel and blow compressed air on them.**



## NOTE

Following operations should be performed by authorized personnel trained on the product.



Every 50.000 km

**km 50.000**

Setting and injector  
cleaning.



Adjustments and  
controls must be  
carried out on cold  
engine

The engines 15 LD 400  
have hydraulic tappets,  
therefore no adjustment is  
required.

## ENGINE STORAGE (NOT INSTALLED)

- If the engine is not to be used for long periods, check the storage environment, the type of packaging and make sure these conditions will allow proper maintenance. If necessary, cover the engine with protective sheeting.
- Do not store the engine directly on the ground, in damp environments, in areas exposed to the elements, near sources of danger, including less visible hazards such as high-voltage power lines, etc.

## ENGINE STORAGE (INSTALLED)

If an installed engine is not to be used for long periods, it is necessary to carry out a number of maintenance procedures in order to preserve its level of efficiency and protect its components. If an installed engine is to be inactive for short periods, carry out the following:

- Check the electrical contacts and, if necessary, protect them using an anti-rust spray.
- Disconnect the battery.
- Empty the fuel tank to prevent the risk of fire.
- Remove the key from the dashboard and put it in a safe place to avoid acts of vandalism.
- Lock the cabin and the cowl to prevent strangers gaining access.



**If the engine is not to be used for more than 1 month, it is necessary to apply protective measures that are valid for 6 months (see "Protective treatment").**

**If, after the first 6 months, the engine is still not to be used, it is necessary to carry out further measures to extend the protection period (see "Protective treatment").**

## PROTECTIVE TREATMENT

- 1 - Check that the engine oil and coolant are up to level.
- 2 - Run the engine at minimum idle speed for 15 minutes.
- 3 - Switch off the engine.
- 4 - Remove the lubrication oil.
- 5 - Fill the sump with protective oil: AGIP RUSTIA.
- 6 - Start the engine and check for fuel and oil leaks.
- 7 - Bring the engine to  $\frac{3}{4}$  of the maximum speed for 5-10 minutes.
- 8 - Switch off the engine.
- 9 - Empty the fuel tank completely.
- 10 - Replace the fuel filter.
- 11 - Spray SAE 10W oil on the exhaust and intake manifolds.
- 12 - Close all openings to prevent foreign bodies from entering.
- 13 - Thoroughly clean all external parts of the engine using suitable products.
- 14 - Treat non-painted parts with protective products (AGIP RUSTIA 100/F).
- 15 - Loosen the alternator/fan belt.
- 16 - If necessary, cover the engine with protective sheeting.



**After one year of engine inactivity, the coolant loses its properties and must be replaced.**

## PREPARING THE ENGINE FOR OPERATION AFTER PROTECTIVE TREATMENT

After a period of inactivity and before installing and running the engine, it is necessary to carry out a few measures in order to ensure that it runs at maximum efficiency.

- 1 - Remove the protective sheeting.
- 2 - Eliminate any blockages in the exhaust and intake ducts.
- 3 - Use a cloth soaked in degreasing product to remove the external protective treatment.
- 4 - Remove the intake manifold.
- 5 - Inject lubrication oil (no more than 2 cm<sup>3</sup>) into the valves and install the intake manifold.
- 6 - Adjust the alternator/fan belt tension
- 7 - Turn the flywheel manually to check the movement of the mechanical parts.
- 8 - Refill the tank with fresh fuel.
- 9 - Start the engine and run at  $\frac{3}{4}$  of the maximum speed for 5-10 minutes.
- 10 - Switch off the engine.
- 11 - Remove the protective oil to replace with engine oil.
- 12 - Introduce new oil (see "Lubricants") up to the correct level marked on the dipstick.
- 13 - Replace the filters (air, oil, fuel) with original spare parts.
- 14 - Empty the cooling circuit completely and pour in the new coolant up to the correct level.



**Over time, a number of engine components and lubricants lose their properties, even when the engine is not in use, and so it is important to consider whether they need replacing, based not only on the mileage, but also on age and wear.**

- 15 - Install the engine and make the necessary connections and unions.
- 16 - Make sure that electrical contacts are intact and efficient.
- 17 - Check that the engine oil and coolant are up to level.
- 18 - Start the engine and keep at minimum speed for a few minutes.
- 19 - Check for leaks and, if necessary, find and eliminate the cause.
- 20 - Switch off the engine.
- 21 - Double check that the engine oil and coolant are up to level.



**IF STORAGE EXCEEDS 6 MONTHS PLEASE CONTACT LOMBARDINI AUTHORIZED SERVICE CENTRES.**

## NOTE

A series of 20 horizontal dotted lines for taking notes.

CIRCUITS

- 1)\* Electrical system.
- 2) Fuel system

1)\* | Battery not supplied. Ground rubber mounted engines

RECOMMENDED BATTERIES

| In standard start conditions | In heavy-duty start conditions |
|------------------------------|--------------------------------|
| 12V - 44Ah/210A              | 12V - 55Ah/255A                |

1)

1) Alternator

2) Starting motor

3) Voltage regulator

4) Battery

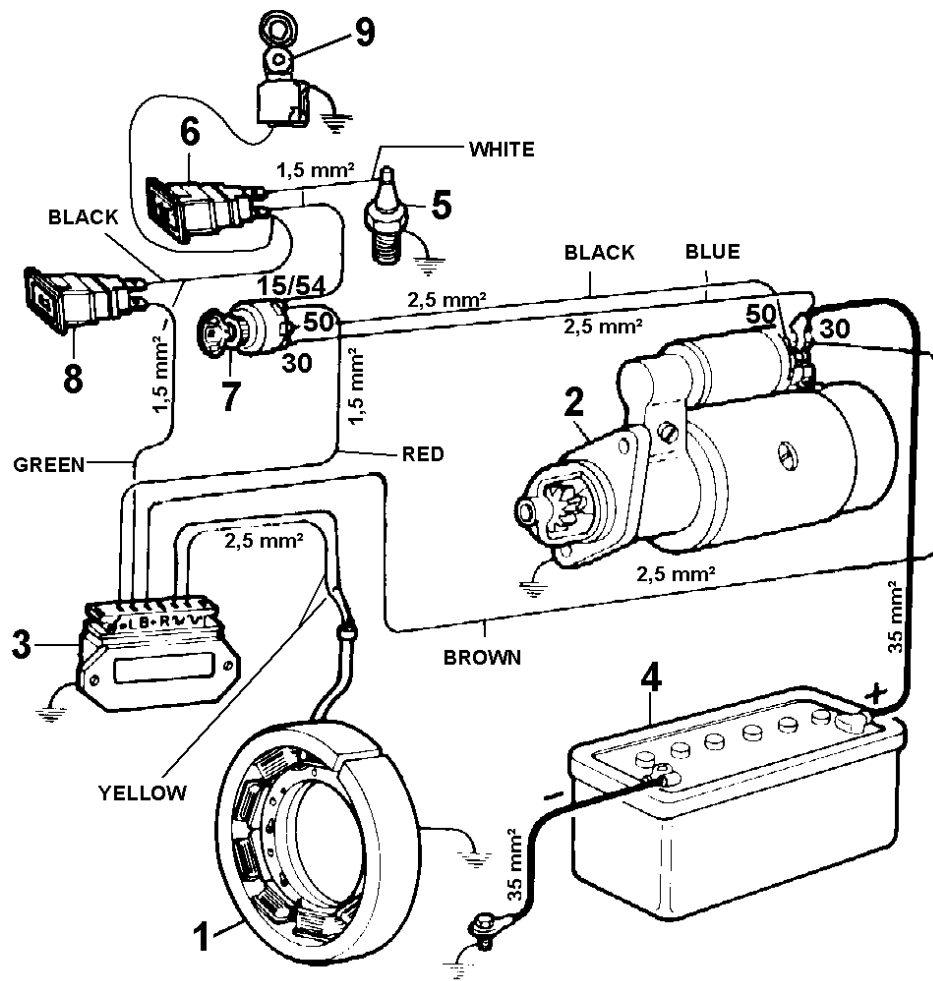
5) Oil pressure switch

6) Oil pressure warning light

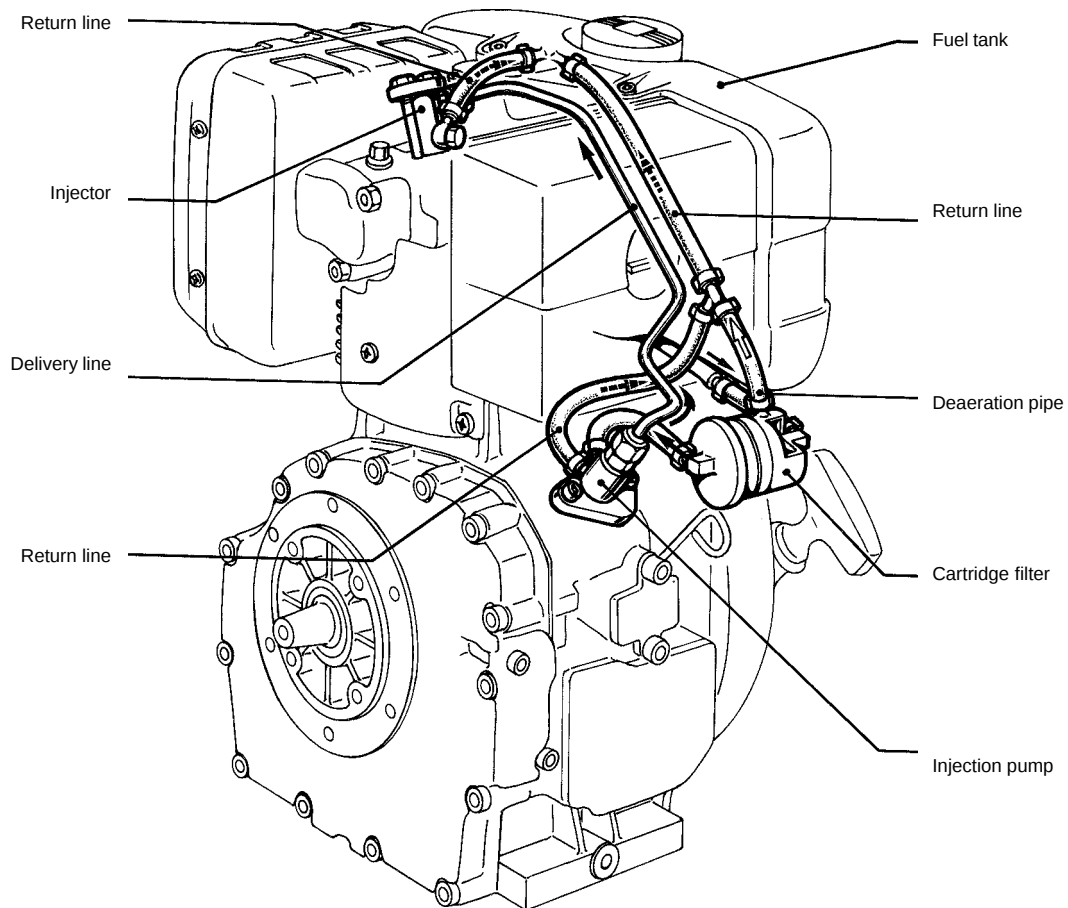
7) Starting keyswitch

8) Battery charging warning light

9) Solenoid valve



2)



| TROUBLES           |                                   | PROBABLE CAUSE | FAILURE TO START. | START AND STOPS | POOR ACCELERATION | UNSTEADY SPEED | BLACK SMOKE | WITHE SMOKE | LOW OIL PRESSURE |
|--------------------|-----------------------------------|----------------|-------------------|-----------------|-------------------|----------------|-------------|-------------|------------------|
| MMaintenance       | Clogged air filter                |                |                   |                 |                   |                |             |             |                  |
|                    | Excessive idle operation          |                |                   |                 |                   |                |             |             |                  |
|                    | Incomplete run-in                 |                |                   |                 |                   |                |             |             |                  |
|                    | Ovrloaded                         |                |                   |                 |                   |                |             |             |                  |
| Settings / Repairs | Incorrect injection timing        |                |                   |                 |                   |                |             |             |                  |
|                    | Governor linkage wrongly set      |                |                   |                 |                   |                |             |             |                  |
|                    | Governor spring broken            |                |                   |                 |                   |                |             |             |                  |
|                    | Low idle speed                    |                |                   |                 |                   |                |             |             |                  |
|                    | Rings worn or sticking            |                |                   |                 |                   |                |             |             |                  |
|                    | Worn cylinder                     |                |                   |                 |                   |                |             |             |                  |
|                    | Valves sticking                   |                |                   |                 |                   |                |             |             |                  |
|                    | Worn main con. rods bearings      |                |                   |                 |                   |                |             |             |                  |
|                    | Loose cylinder locknuts           |                |                   |                 |                   |                |             |             |                  |
| FUEL SYSTEM        | Obstructed fuel line              |                |                   |                 |                   |                |             |             |                  |
|                    | Fuel filter clogged               |                |                   |                 |                   |                |             |             |                  |
|                    | Air leaks in fuel system          |                |                   |                 |                   |                |             |             |                  |
|                    | Clogged tank vent hole            |                |                   |                 |                   |                |             |             |                  |
|                    | Injector sticking                 |                |                   |                 |                   |                |             |             |                  |
|                    | Injection pump valve sticking     |                |                   |                 |                   |                |             |             |                  |
|                    | Injector not adjusted             |                |                   |                 |                   |                |             |             |                  |
|                    | Faulty fuel feeding pump          |                |                   |                 |                   |                |             |             |                  |
|                    | Hardened inj. pump rack           |                |                   |                 |                   |                |             |             |                  |
|                    | Extra fuel control level sticking |                |                   |                 |                   |                |             |             |                  |
|                    |                                   |                |                   |                 |                   |                |             |             |                  |

| TROUBLES         |                                          | PROBABLE CAUSE | FAILURE TO START. | START AND STOPS | POOR ACCELERATION | UNSTEADY SPEED | BLACK SMOKE | WITHE SMOKE | LOW OIL PRESSURE |
|------------------|------------------------------------------|----------------|-------------------|-----------------|-------------------|----------------|-------------|-------------|------------------|
| LUBRICATION      | Oil level too high                       |                |                   |                 |                   |                |             |             |                  |
|                  | Oil pressure sticking                    |                |                   |                 |                   |                |             |             |                  |
|                  | Oil pressure regulator not adjusted      |                |                   |                 |                   |                |             |             |                  |
|                  | Worm oil pump                            |                |                   |                 |                   |                |             |             |                  |
|                  | Air into oil suction line                |                |                   |                 |                   |                |             |             |                  |
|                  | Faulty pressure gauge or pressure switch |                |                   |                 |                   |                |             |             |                  |
|                  | Oil suction line clogged                 |                |                   |                 |                   |                |             |             |                  |
| ELECTRICAL SYST. | Discharged battery                       |                |                   |                 |                   |                |             |             |                  |
|                  | Cable connections uncertain or incorrect |                |                   |                 |                   |                |             |             |                  |
|                  | Faulty starting switch                   |                |                   |                 |                   |                |             |             |                  |
|                  | Faulty starting motor                    |                |                   |                 |                   |                |             |             |                  |
|                  |                                          |                |                   |                 |                   |                |             |             |                  |

**SERVICE**



**PART ORDERS**

For any spare parts order please specify following details: ENGINE TYPE AND SERIAL NUMBER - Version (K) - on the engine name plate



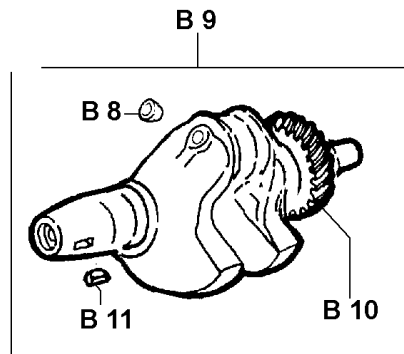
## **SPARE PARTS TABLE**

**15LD 400**

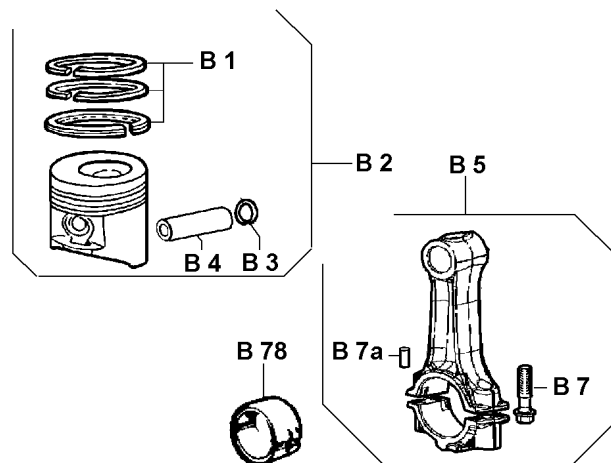
Drawing are subject to modifications - Pls contact Service Centers for special applications

|          |                                                           |
|----------|-----------------------------------------------------------|
| <b>A</b> | INTAKE AND EXHAUST                                        |
| <b>B</b> | CONN. ROD/PISTON/CRANKSHAFT/FLYWHEEL/CRANKCASE/FLANGING   |
| <b>C</b> | CYLINDER HEAD/ROCKER ARM BOX/VALVES/TIMING/SPEED GOVERNOR |
| <b>D</b> | CONTROLS/LUBRICATING SYSTEM                               |
| <b>E</b> | FUEL SYSTEM                                               |
| <b>F</b> | COOLING SYSTEM/STARTING                                   |
| <b>G</b> | CRANKSHAFT/SHORT BLOCK TABLE                              |
| <b>Z</b> | SHORT BLOCK                                               |

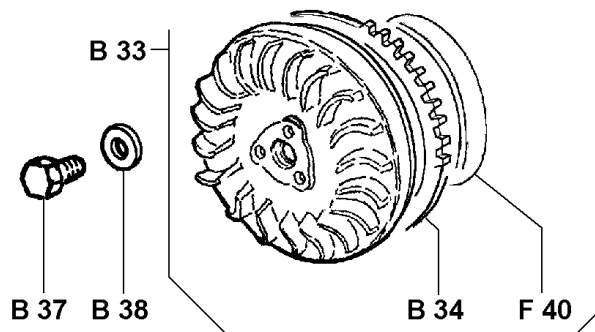
8 010 18 006 0 Crankshaft conical PTO std



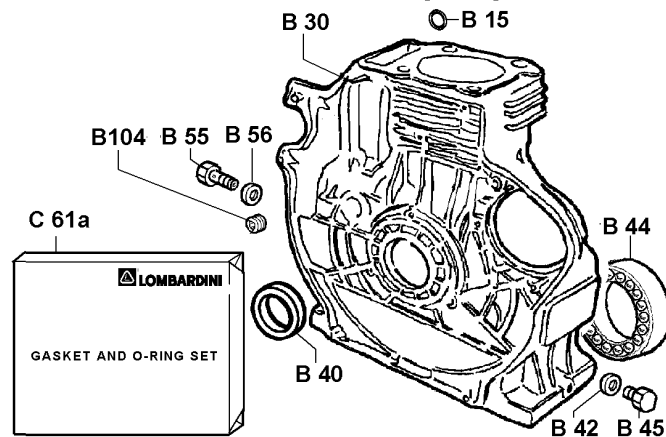
8 011 18 012 0 Connecting rod and piston set



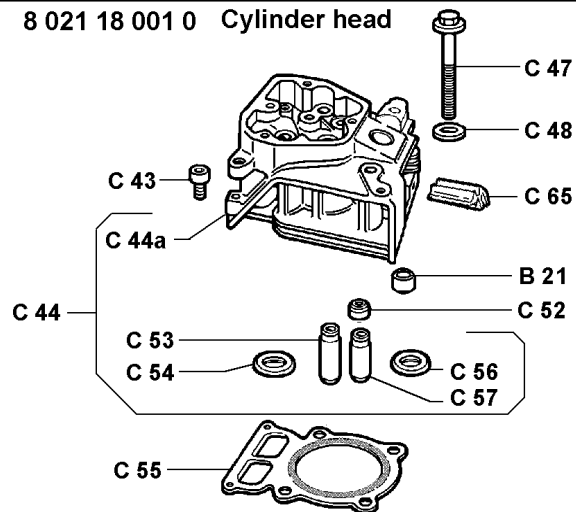
8 012 18 005 0 Flywheel ass.y fitted for electric starting



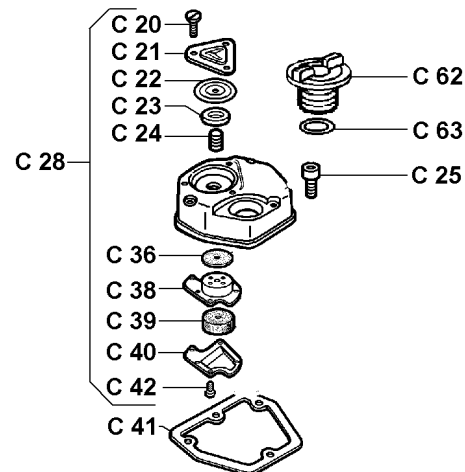
8 020 18 011 0  
Crankcase fitted for electr. starting and gasket set



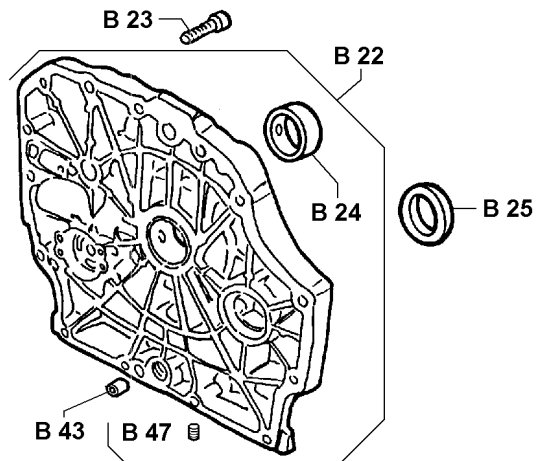
# 8 021 18 001 0 Cylinder head



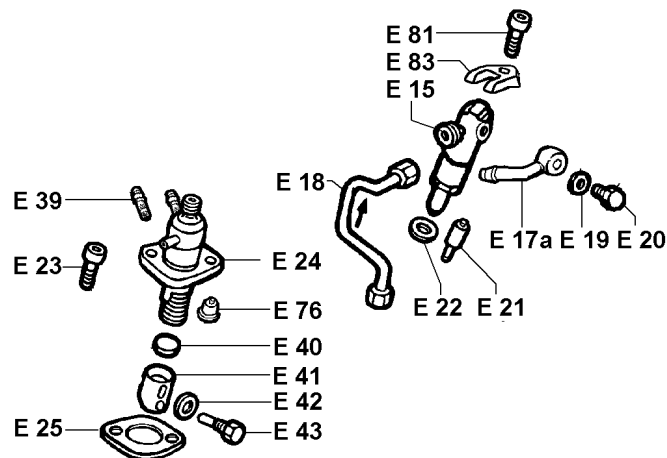
# 8 022 18 003 0 Rocker arms cover and oil filler



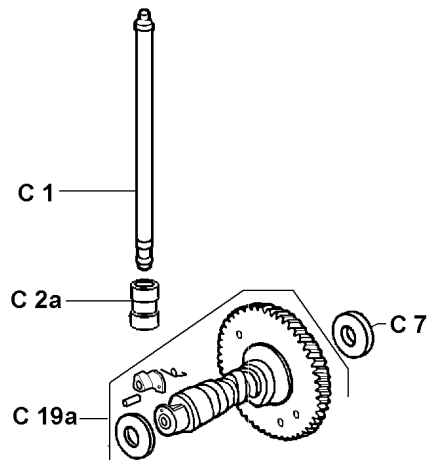
# 8 024 18 001 0 Timing gear cover ass.y std



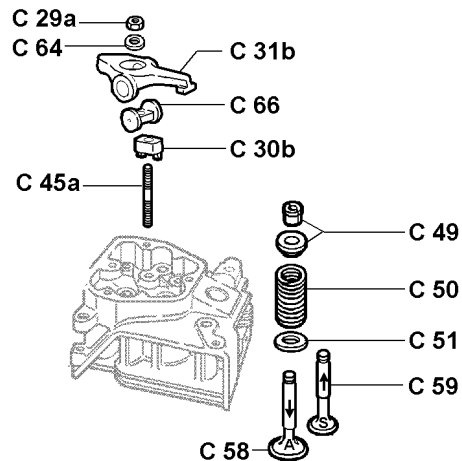
# 8 030 18 003 0 Injection system - pump and nozzle



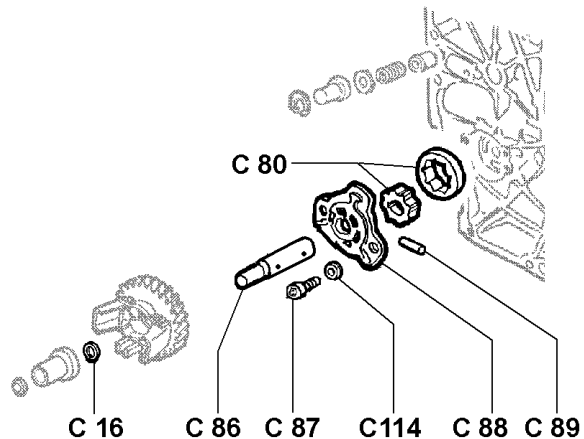
# 8 035 18 003 0 Camshaft - push rod



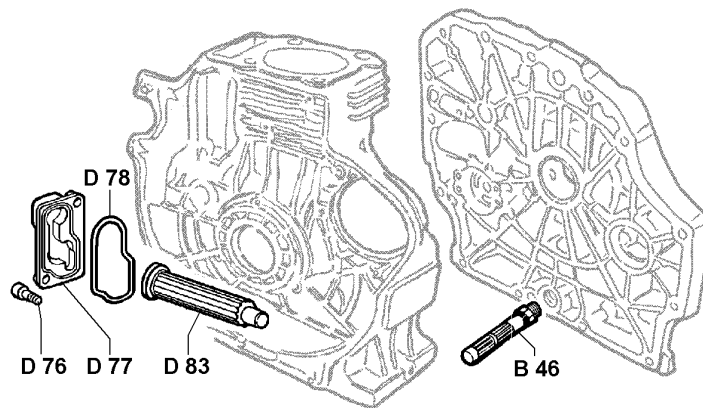
# 8 036 18 002 0 Rocker arm and valves



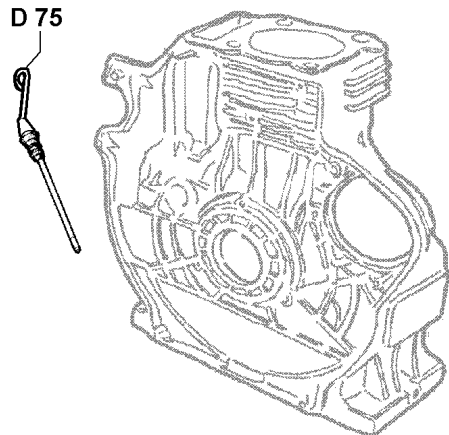
# 8 040 18 001 0 Oil pump



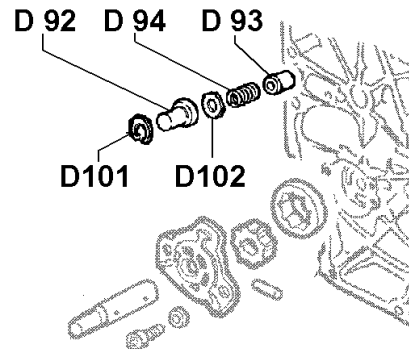
# 8 042 18 002 0 Oil filtering



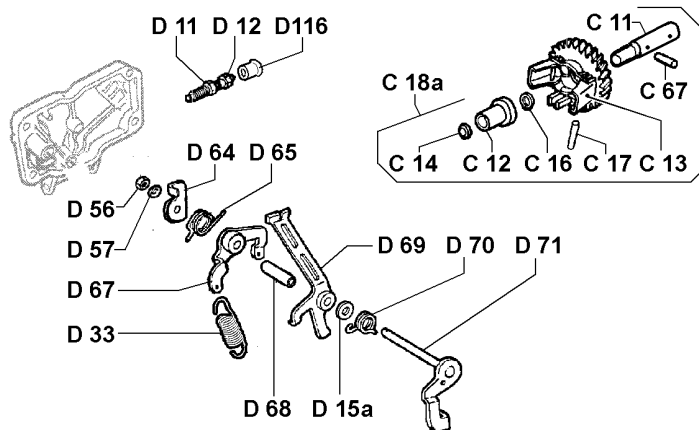
# 8 043 18 001 0 Oil dipstick



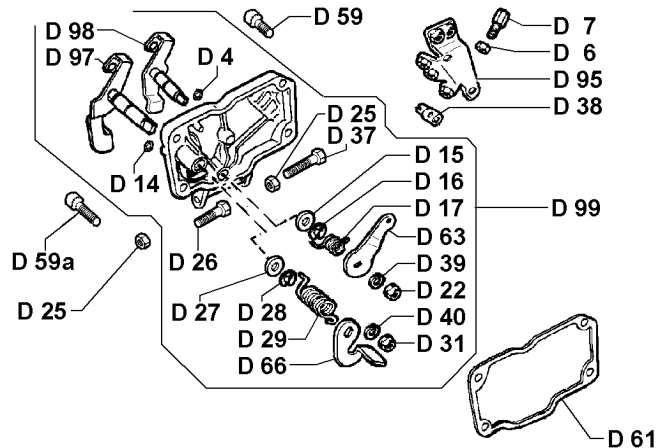
# 8 044 18 001 0 pressure oil safety valve



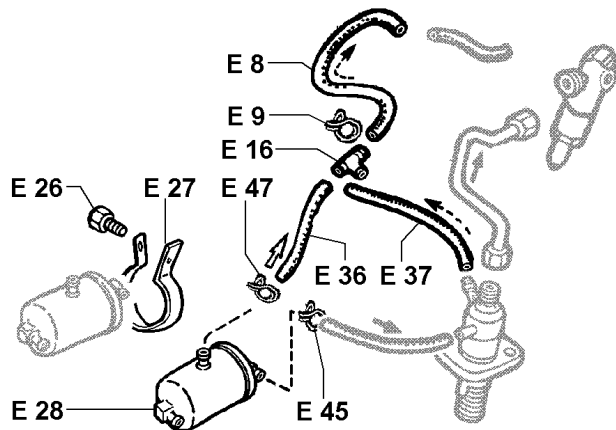
# 8 050 18 001 0 Speed governor (3600 r.p.m.)



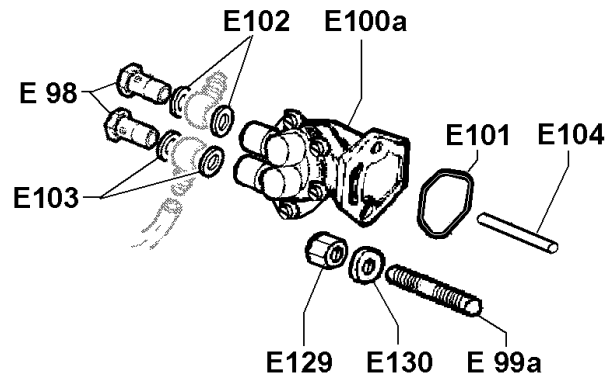
# 8 051 18 006 0 Accelerator and stop remote control



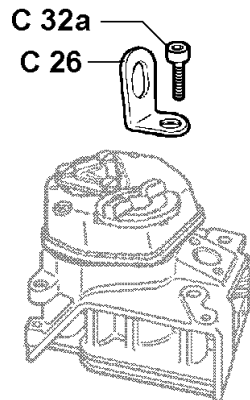
### 8 061 18 005 0 Fuel filtering



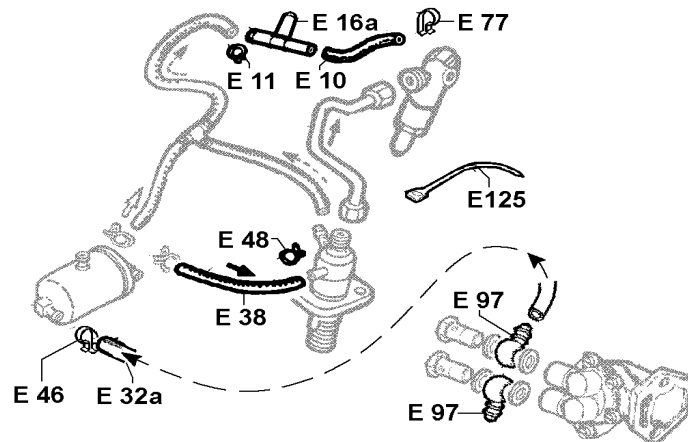
### 8 062 18 001 0 Fuel feed pump



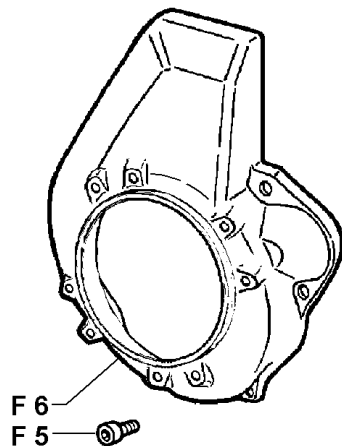
### 8 063 18 002 0 Fuel tank not supplied



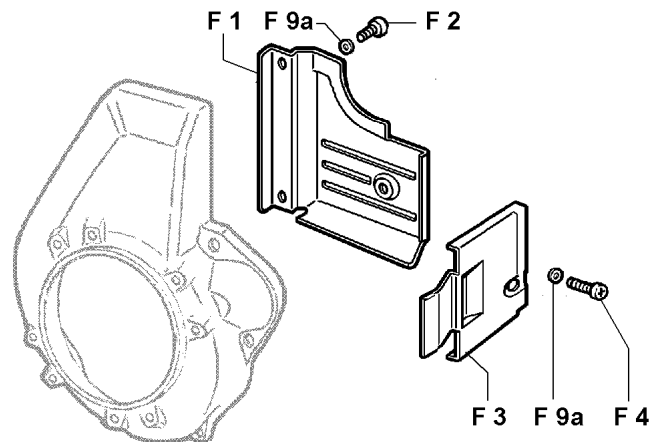
### 8 064 18 002 0 Fuel hoses



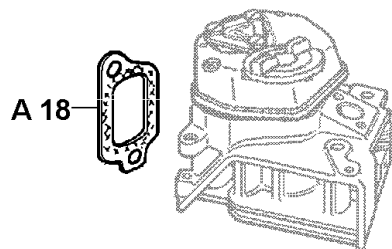
# 8 070 18 002 0 Shroud



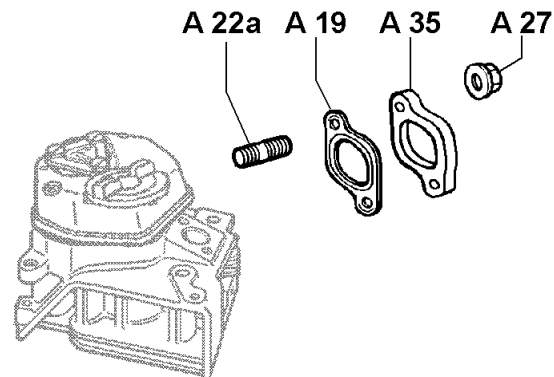
# 8 072 18 004 0 Cooling panels



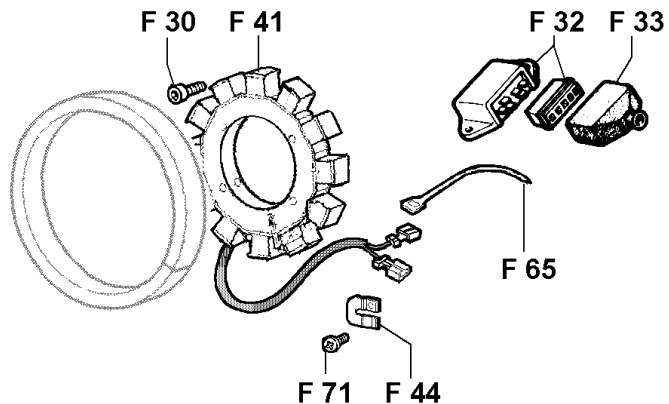
# 8 081 18 009 0 Air cleaner not supplied



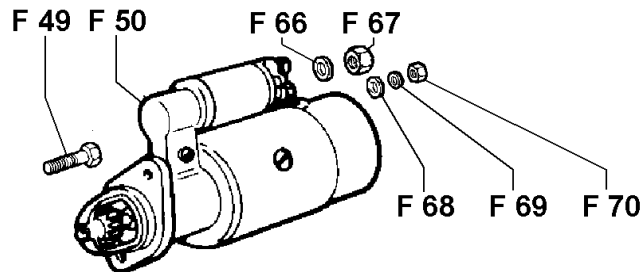
# 8 087 18 006 0 Exhaust muffler not supplied



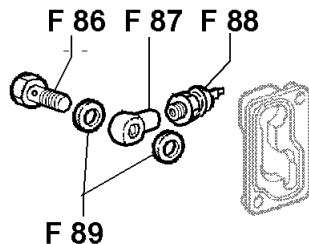
# 8 100 18 020 0 Voltage alternator and regulator



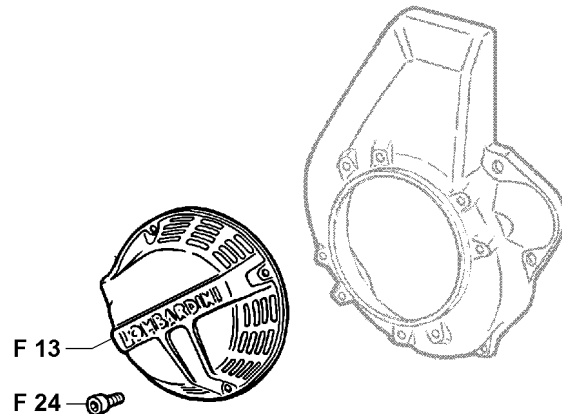
# 8 101 18 005 0 Staring motor



# 8 102 18 008 0 Pressure swicht 0,6 bar



# 8 120 18 004 0 Flywheel guard



## NOTE

A series of 20 horizontal dotted lines for taking notes.

## NOTE

A series of 20 horizontal dotted lines for writing notes.

Data reported in this issue can be modified at any time by Lombardini.



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LOMBARDINI (U.K.) LTD.  
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REVISIONE 00

| ENTE COMPILATORE TECO/ATI                                                           | COD. LIBRO | MODELLO N° | DATA EMISSIONE | REVISIONE | DATA       | VISTO                                                                                 |
|-------------------------------------------------------------------------------------|------------|------------|----------------|-----------|------------|---------------------------------------------------------------------------------------|
|  | 1.5302.710 | 51116      | 05.12.2005     | 00        | 05.12.2005 |  |