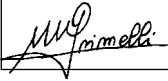


WORKSHOP MANUAL

Engine Series 3 - 4 LD



REGISTRATION OF MODIFICATIONS TO THE DOCUMENT

Drafting body	Document code	Model N°	Edition	Revision	Issue date	Review date	Endorsed
			4°	3			



• LOMBARDINI srl

LOMBARDINI srl

LOMBARDINI srl

LOMBARDINI srl
LOMBARDINI srl



PREFACE

www.lombardinigroup.it



GENERAL SERVICE MANUAL NOTES



WARNING



IMPORTANT



CAUTION

GLOSSARY AND TERMINOLOGY

- Cylinder number one:
- Rotation direction:

3LD 510, 3LD 451/S, 3LD 510/S, 4LD 640, 4LD 705, 4LD 820,

3LD 450,

1	GENERAL REMARKS AND SAFETY INFORMATION.....	Pag. 6 - 7
2	TECHNICAL INFORMATION	10 - 15
3	DISASSEMBLY / REASSEMBLY	16 - 29

5	LUBRICATION CIRCUIT	30 - 32
6	FUEL INJECTION CIRCUIT	33 - 35
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10	MAIN TORQUE SPECIFICATIONS AND USE OF SEALANTS	42 - 44

**CAUTION****WARNING****IMPORTANT****SAFETY INFORMATION****GENERAL NOTES**

• Lombardini

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Lombardini

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Lombardini

Lombardini

• Lombardini

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**WARNING**

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Lombardini



IMPORTANT

Regulations for lifting the engine



California Proposition 65 WARNING

Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

GENERAL SAFETY DURING OPERATING PHASES**SAFETY AND ENVIRONMENTAL IMPACT**

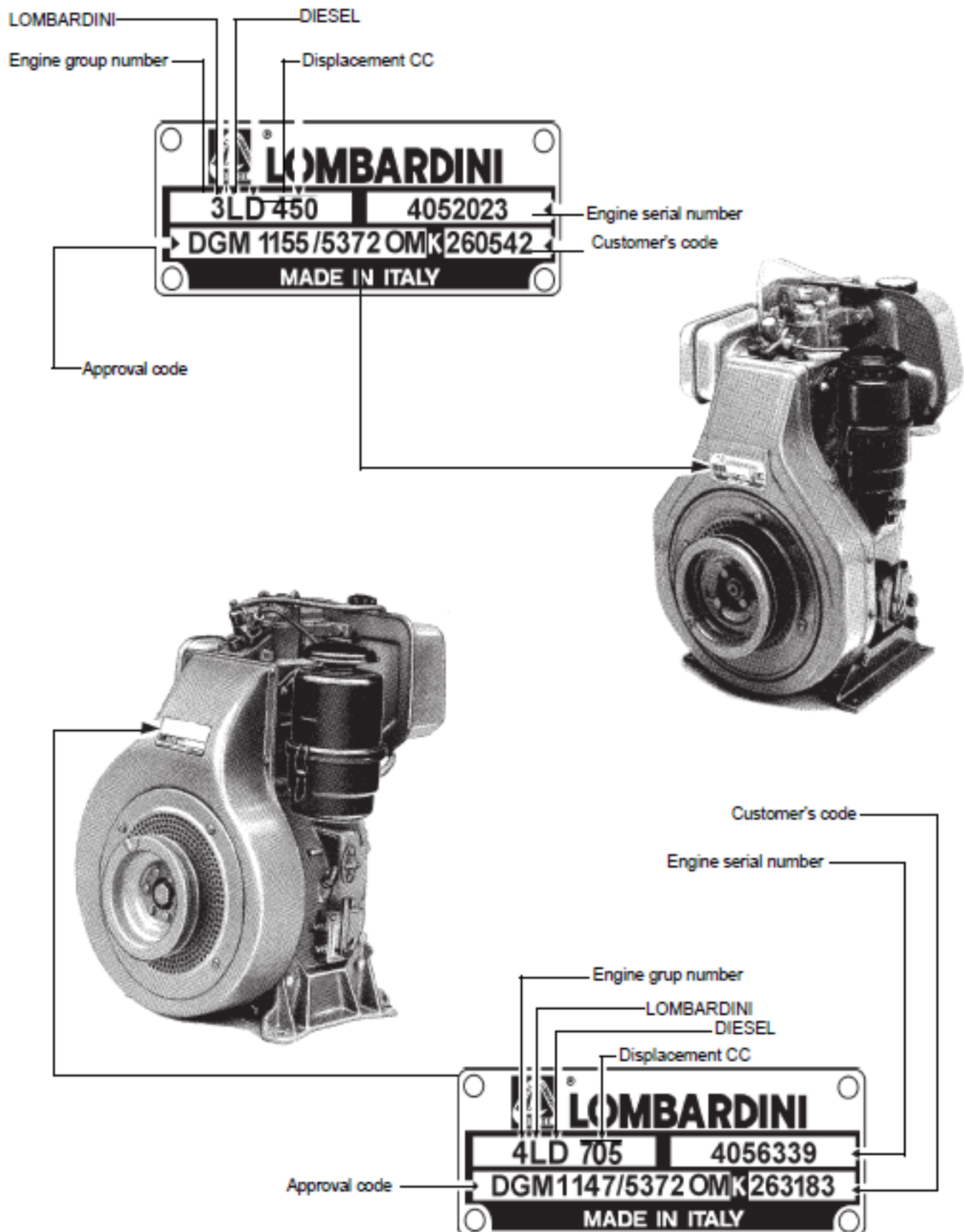
-
-
-

-
-
-

-
-
-



MANUFACTURER AND MOTOR IDENTIFICATION DATA



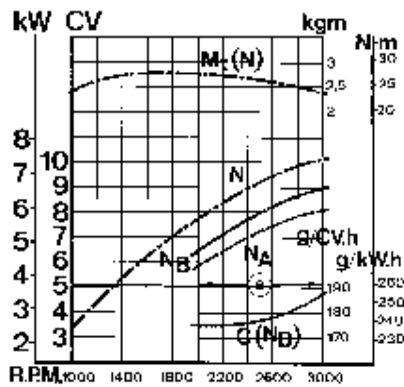
[illegible][illegible]

*

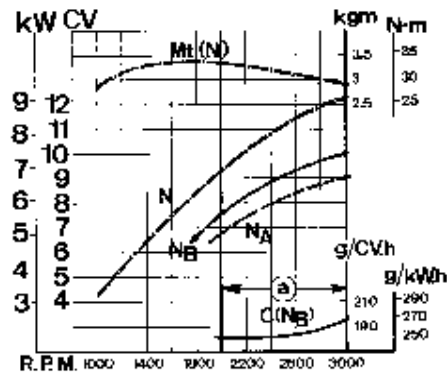
Note:

PERFORMANCE DIAGRAMS

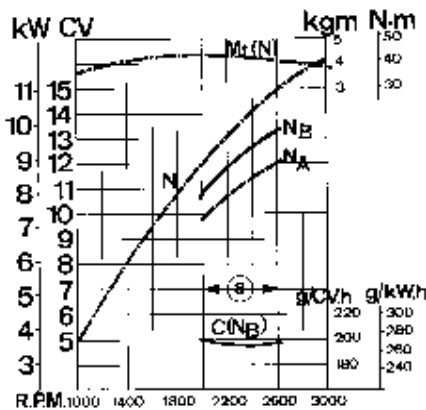
3LD 450



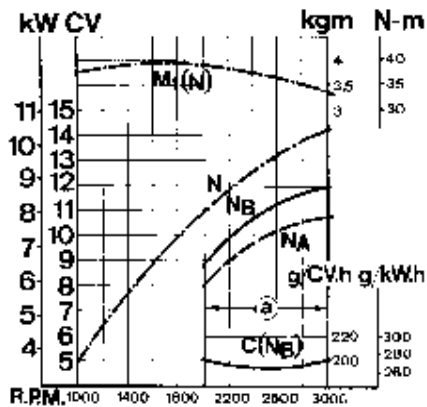
3LD 510



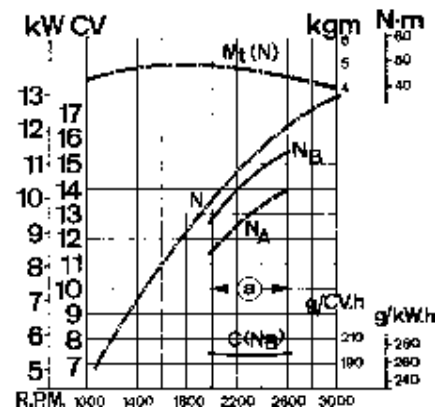
4LD 705



4LD 640



4LD 820



N (80/1269/EU - ISO 1585)

NB (ISO 3046 - 1 IFN)

NA (ISO 3046 - 1 ICXN)

AUTOMOTIVES POWER

NON-OVERLOADABLE POWER:

CONTINUOUS OVERLOADABLE POWER:

C (NB):

MT

a

POSSIBLE CAUSES AND TROUBLE SHOOTING
THE ENGINE MUST BE STOPPED IMMEDIATELY WHEN:

- 1)
- 2)
- 3)
- 4)

TABLE OF LIKELY ANOMALIES AND THEIR SYMPTOMS

PR											
FUEL CIRCUIT		•									
		•	•	•							
		•	•	•							
		•	•	•							
		•	•	•							
		•									
LUBRICATION											
ELECTRICAL EQUIPMENT		•									
		•									
		•									
		•									
		•									
MAINTENANCE		•									
SETTINGS AND REPAIRINGS		•									
		•									
			•								

ROUTINE ENGINE MAINTENANCE


Failure to carry out the operations described in the table may lead to technical damage to the machine and/or system

**MAINTENANCE ENGINES 3LD 450 - 510 - 450/S - 510/S
4LD 640 - 705 - 820**

			●				●				
									●		
								●			
			●								
			●								
				●							
								●			
								●			
								●			
			●								
				□		●					
				□		●					
						●					
										●	
											●

□

CAPACITIES IN LITERS

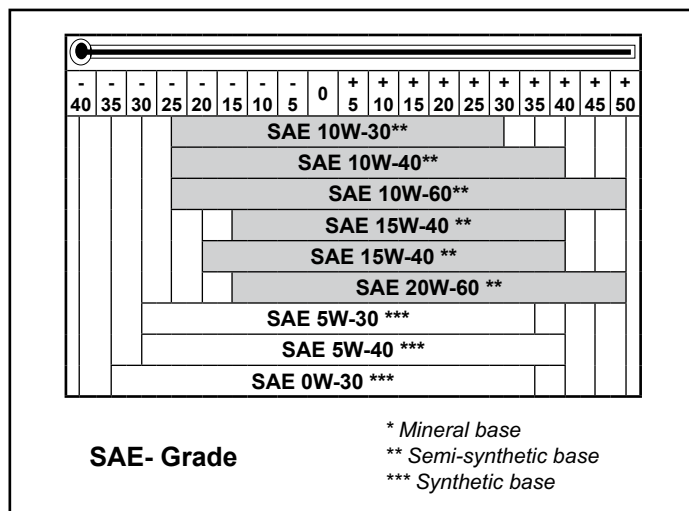
Standard fuel tank

Standard oil sump

Air filter oil bowl

LUBRICANT

SAE Classification



International specifications

ACEA REGULATIONS - SEQUENCES

LIGHT DUTY DIESEL ENGINES

B1 =	
B2 =	
B3 =	
B4 =	

HEAVY DUTY DIESEL ENGINES

E2 =	
E3 =	
E4 =	
E5 =	

API / MIL SEQUENCES

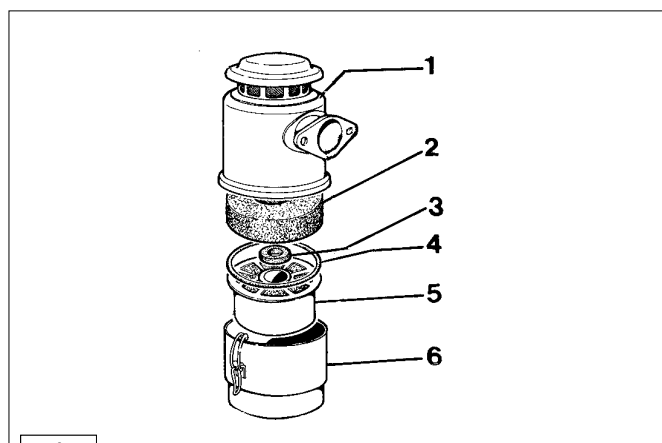
API	CH-4	CG-4	CF-4	CF-2	CF	CE	CD	CC
MIL			L- 46152 D / E					

RECOMMENDATIONS FOR DISASSEMBLING

**Important**

To locate specific topics, the reader should refer to the index.

-
-
-
-



Oil-bath air filter (standard)

**Danger – Attention****Caution – Warning**

1

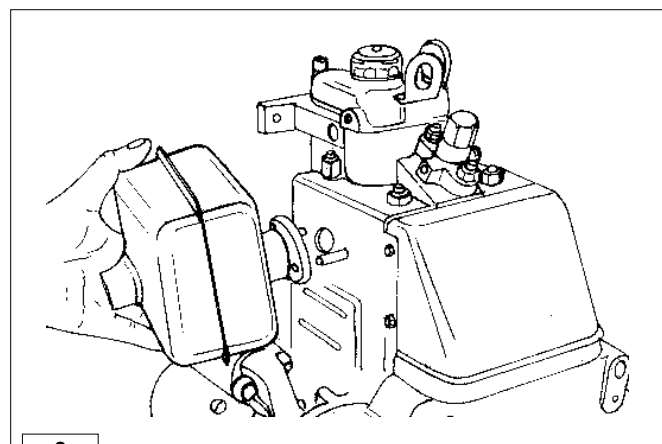
2

3

4

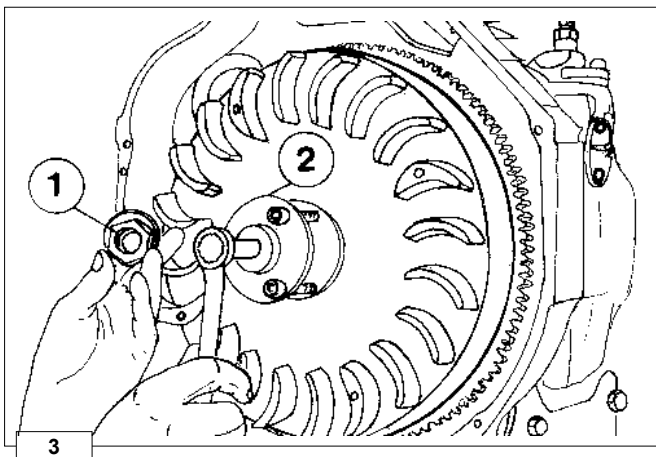
5

6



Silencer (standard)

**Danger – Attention**

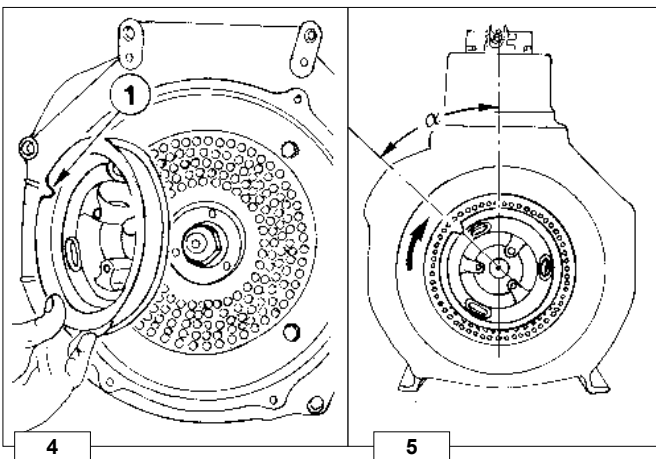


Flywheel

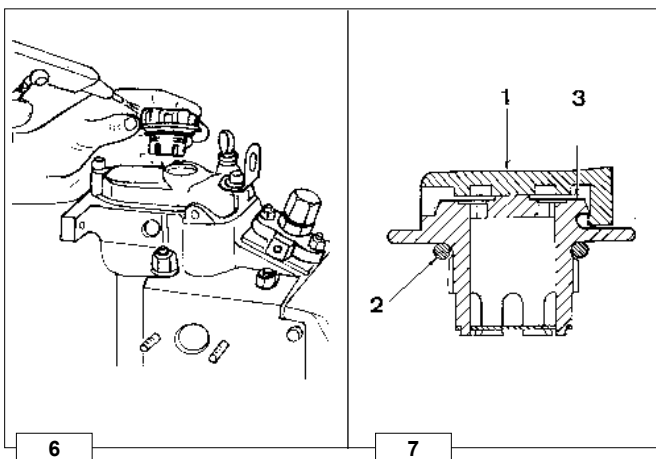
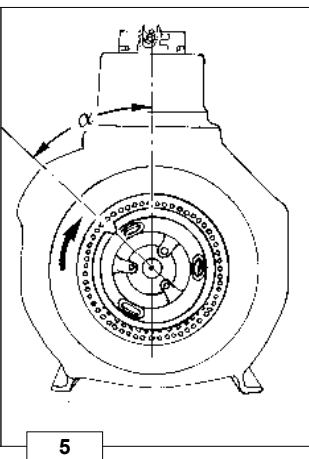
2 1

Note:

1

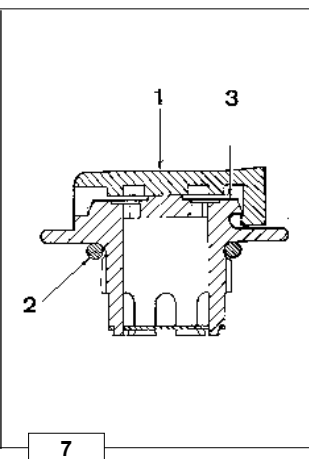


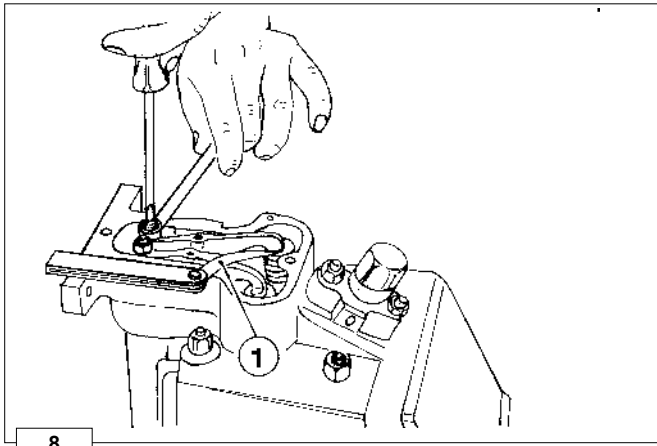
Starting pulley



Vent plug

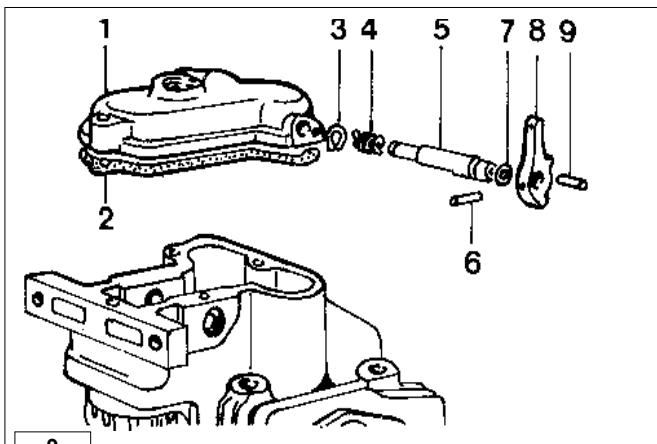
1
2
3





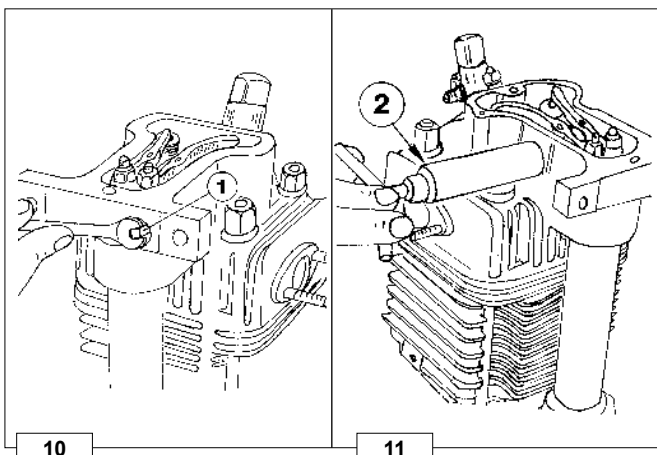
Valve/rocker arm clearance

1



Decompression (by request)

 1
 2
 3
 4
 5

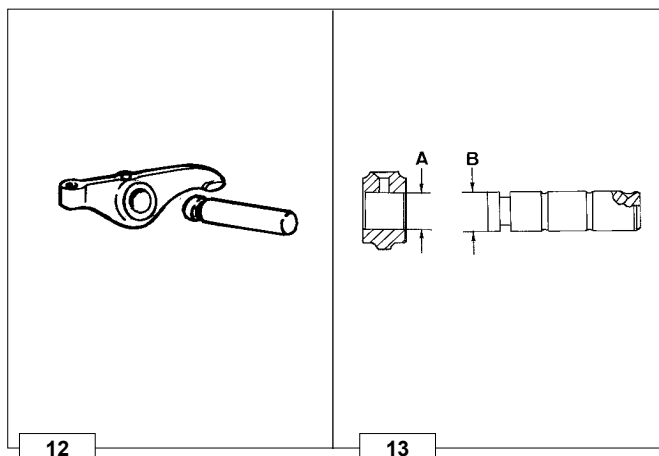
 6
 7
 8
 9


Rocker arm pin, extraction

1

2

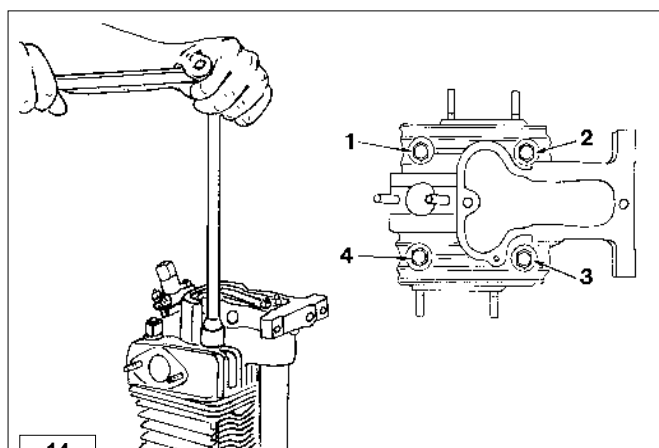
Rocker arm pin and hole



A
B

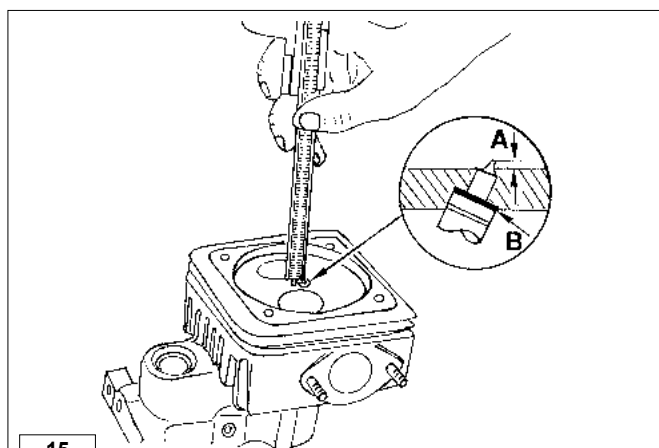
(A-B)
(A-B)

Head



1 3

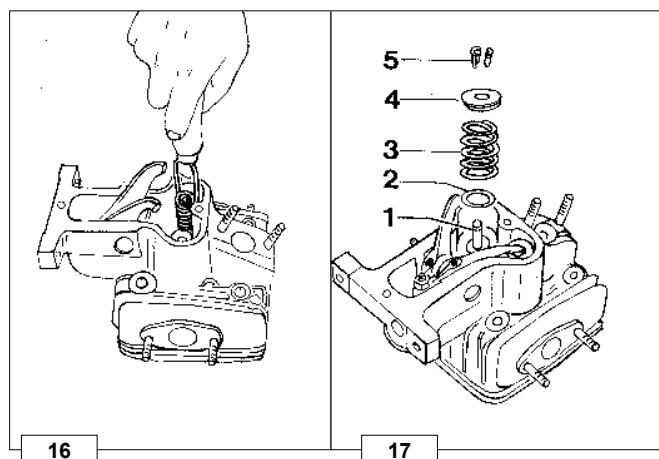
Injector, projection



A

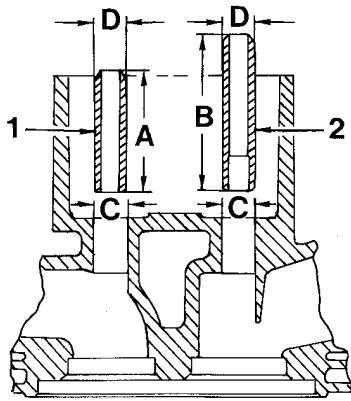
B

Valves



1
2
3
4
5

Note:



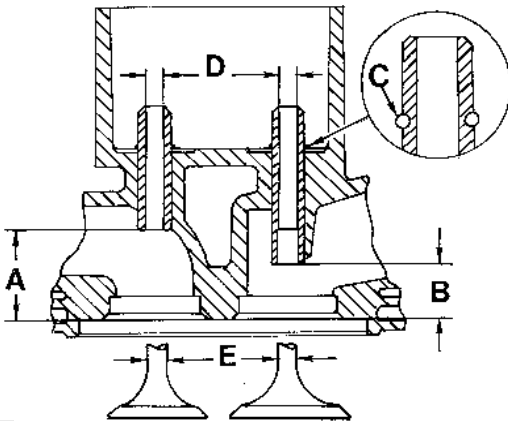
18

Valves guides and housings

1
2A
CB
DA
CB
D

Note

C



19

Valve guides insertion

B

A

A

B

A

B

Note

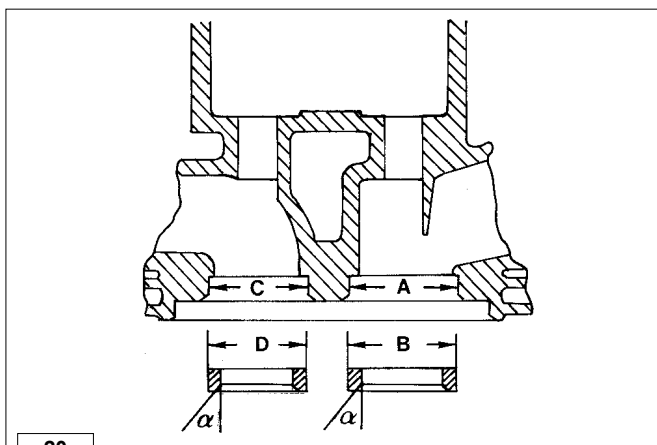
C

A

B

Valve guide dimensions and clearances

D
(D-E)E
(D-E)D
(D-E)E
(D-E)



20

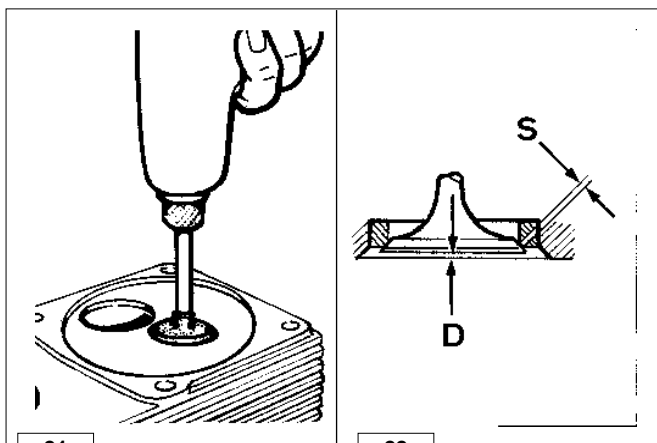
Valve housings and seats

A
B

C
D

A
B

C
D

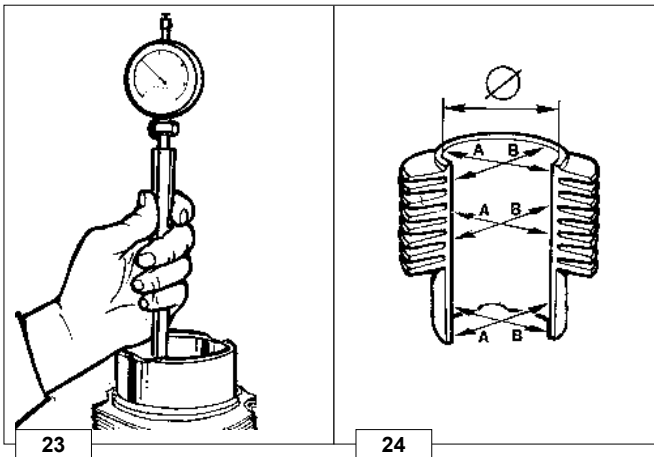


21

22

Valve seat grinding

Cylinder and piston



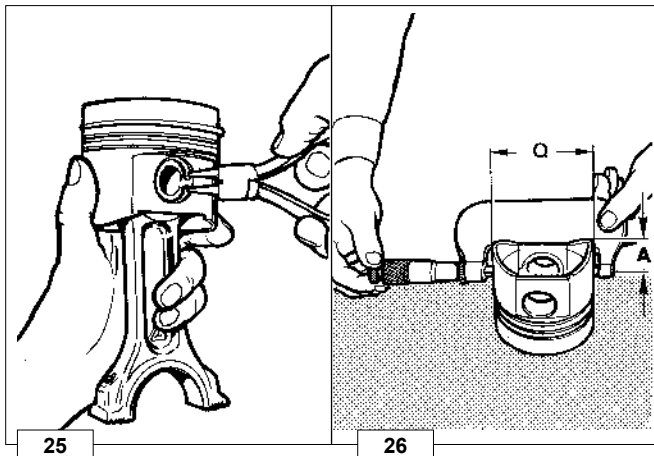
A
A
A

A B

Ø

Q

A



ENGINES	Ø	Q	(Ø-Q)

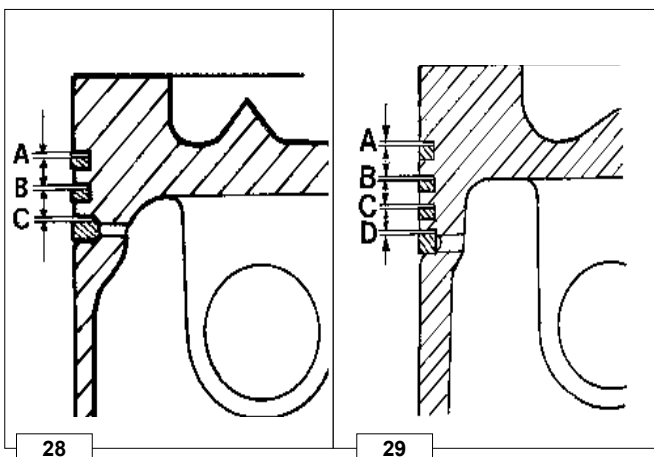
Note:



Distance among segment ends (mm)

A
A
A

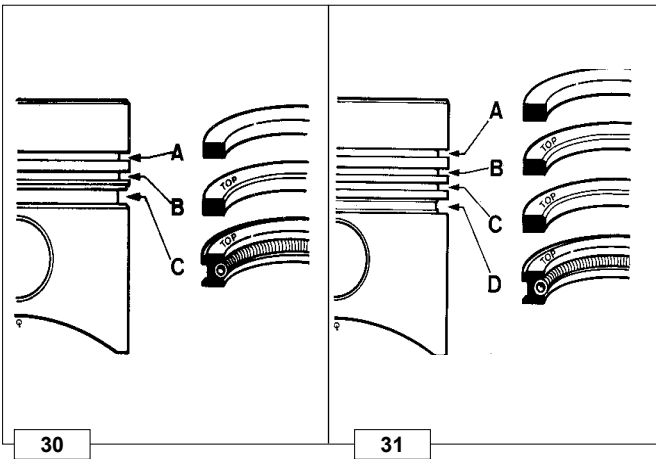
A
A
A
A



Piston ring - Clearances among slots (mm)

A
B
C

A
B
C
D

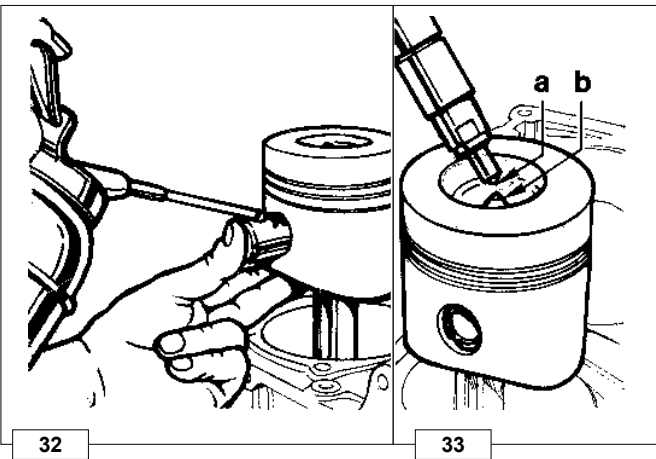


Piston ring assembly order

A
B
C

A
B
C
D

Note:



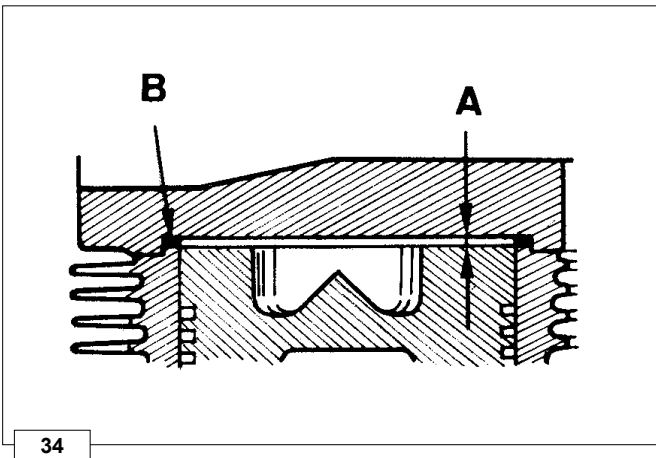
Piston reassembly



Important

B

A

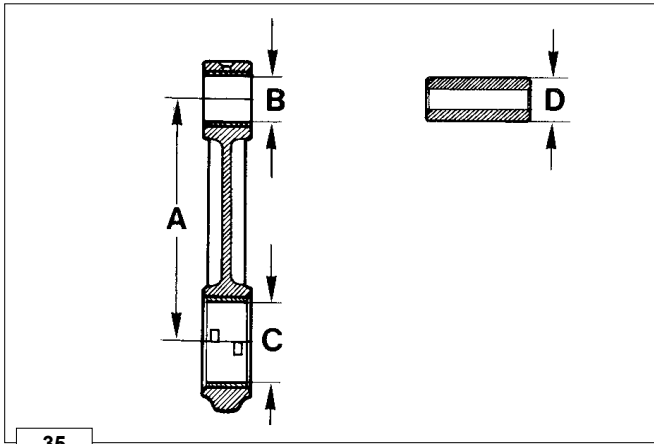


Clearance volume

A
B

A B

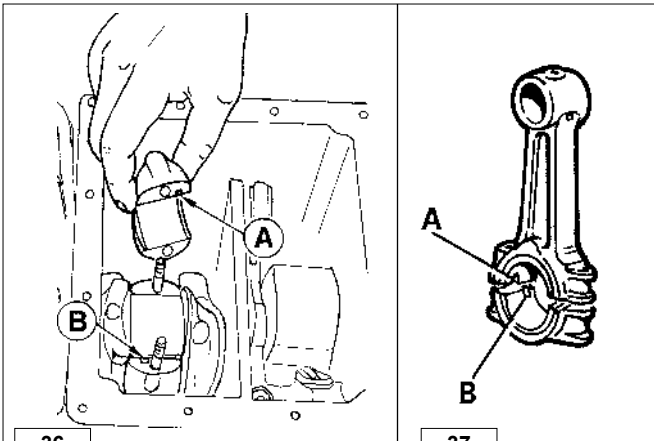
Connecting rod equipped with bearings and piston pin



35

A
B
C
DA
B
C
D

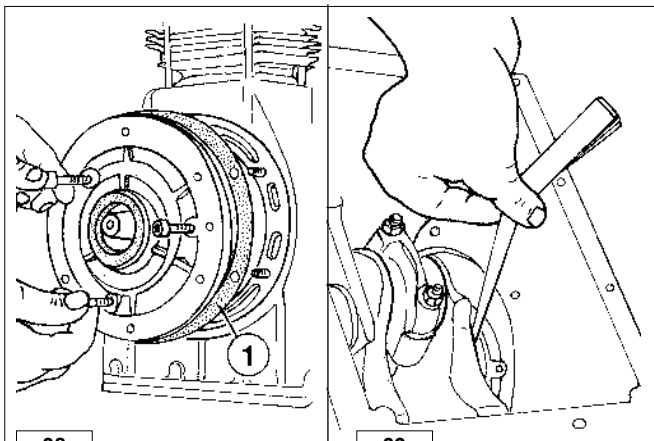
Connecting rod, big end bearings



36

37

Main bearing on flywheel side



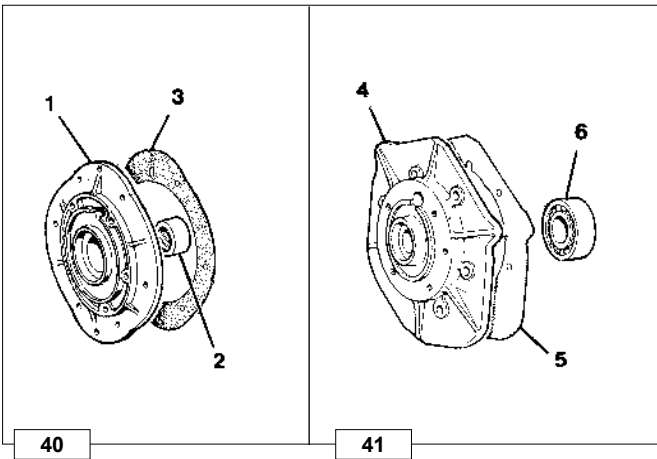
38

39

Drive shaft axial clearance

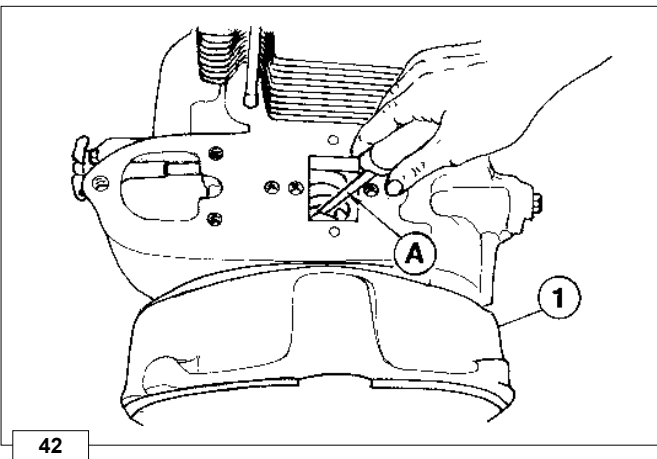
1

1



Side distributor port

- | | | | |
|---|---|---|---|
| | | 3 | 5 |
| 1 | 2 | | 3 |
| | | | |
| 4 | 5 | | 6 |



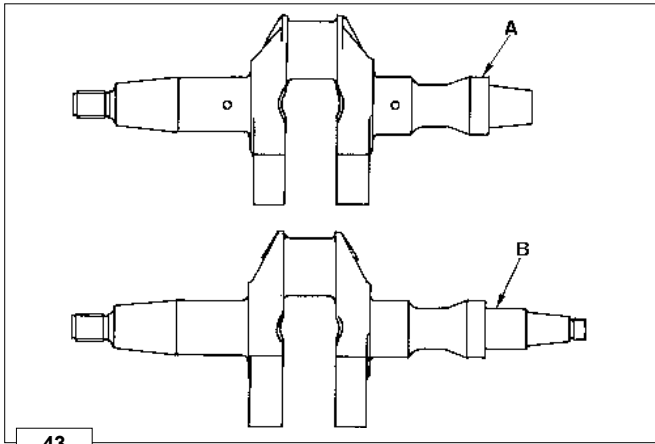
Camshaft axial clearance

- | | |
|---|---|
| | 1 |
| | A |
| A | |
| A | |

Drive shaft

A
B

Note:



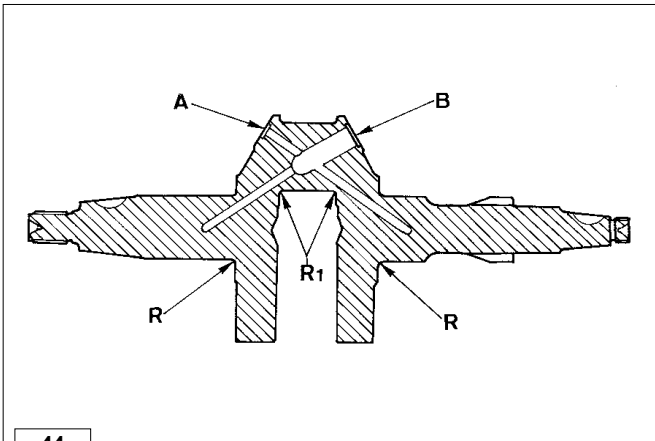
43

Drive shaft lubrication ducts



Caution – Warning

A B



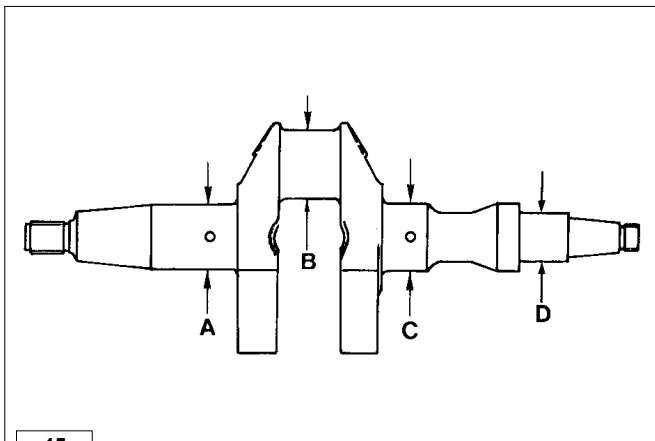
44

Drive shaft connecting radius

R
R₁

Note:

R R₁

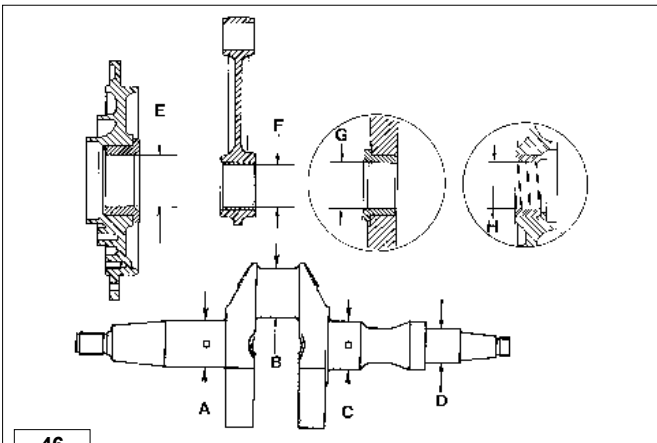


45

Drive shaft main journal and crank diameters (mm)

A
B
C
D

A
B
C
D



46

Drive shaft internal diam. crankshaft bearing / connecting rod head and clearances regarding their respective pins (mm)

E
G

F
H

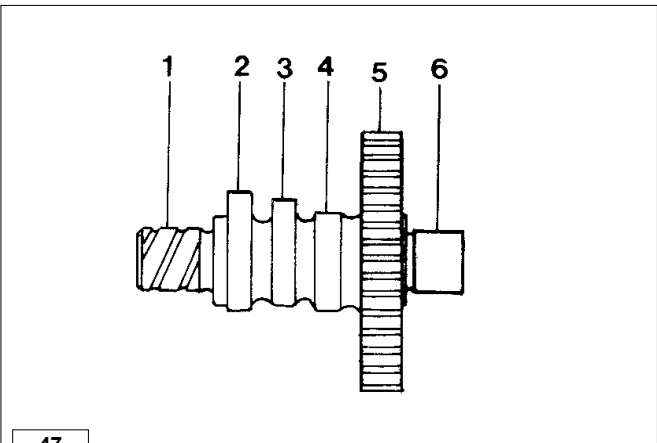
E - A
F - B
G - C
H - D

E

F

G

E - A
F - B
G - C

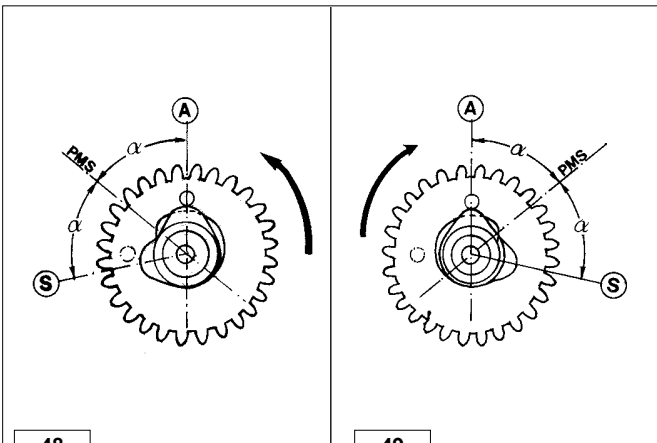


47

CAMSHAFT

1
2
3
4
5
6

Note:



48

49

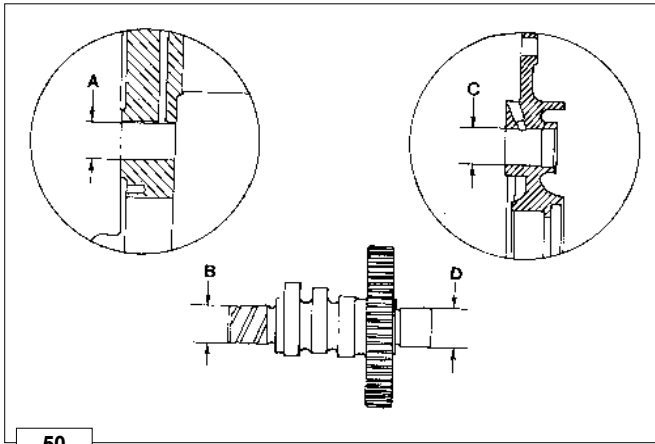
Camshaft intake and exhaust cam timing

TDC
A
S
 α

TDC
A
S
 α

Camshaft pin and housing dimensions (mm)

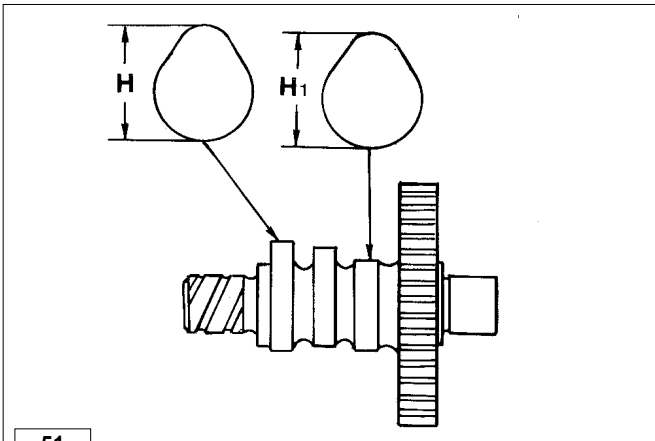
A
B
C
D
A-B C-D



50

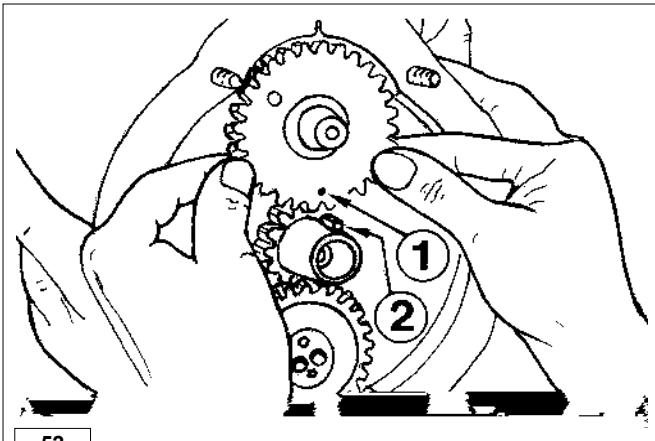
Camshaft intake and exhaust cam height.

H
H₁
H H₁



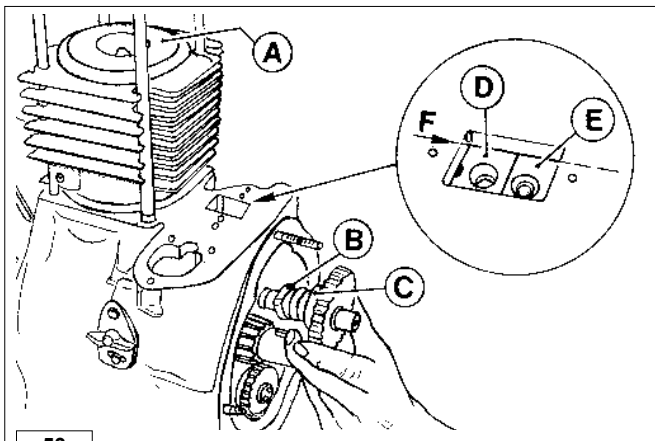
51

Distribution timing

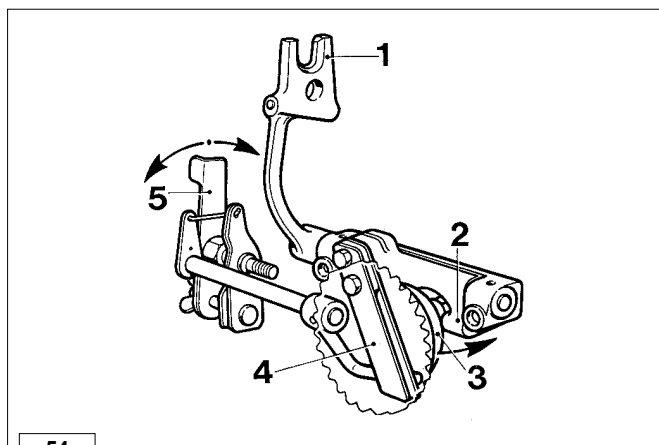


52

Distribution timing without following the references



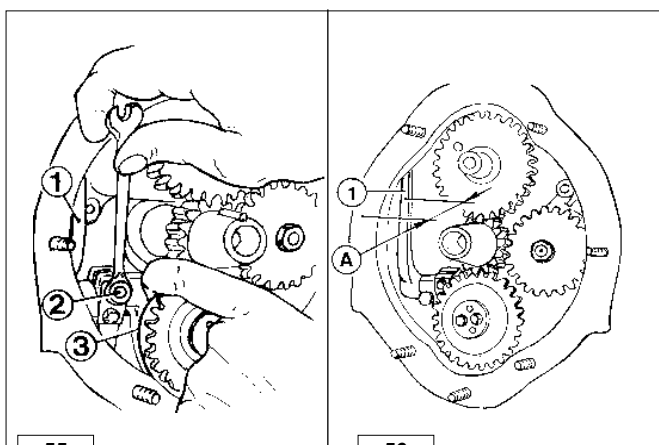
53



54

Speed governor

1 3 2
5 4



55

Timing of the speed governor

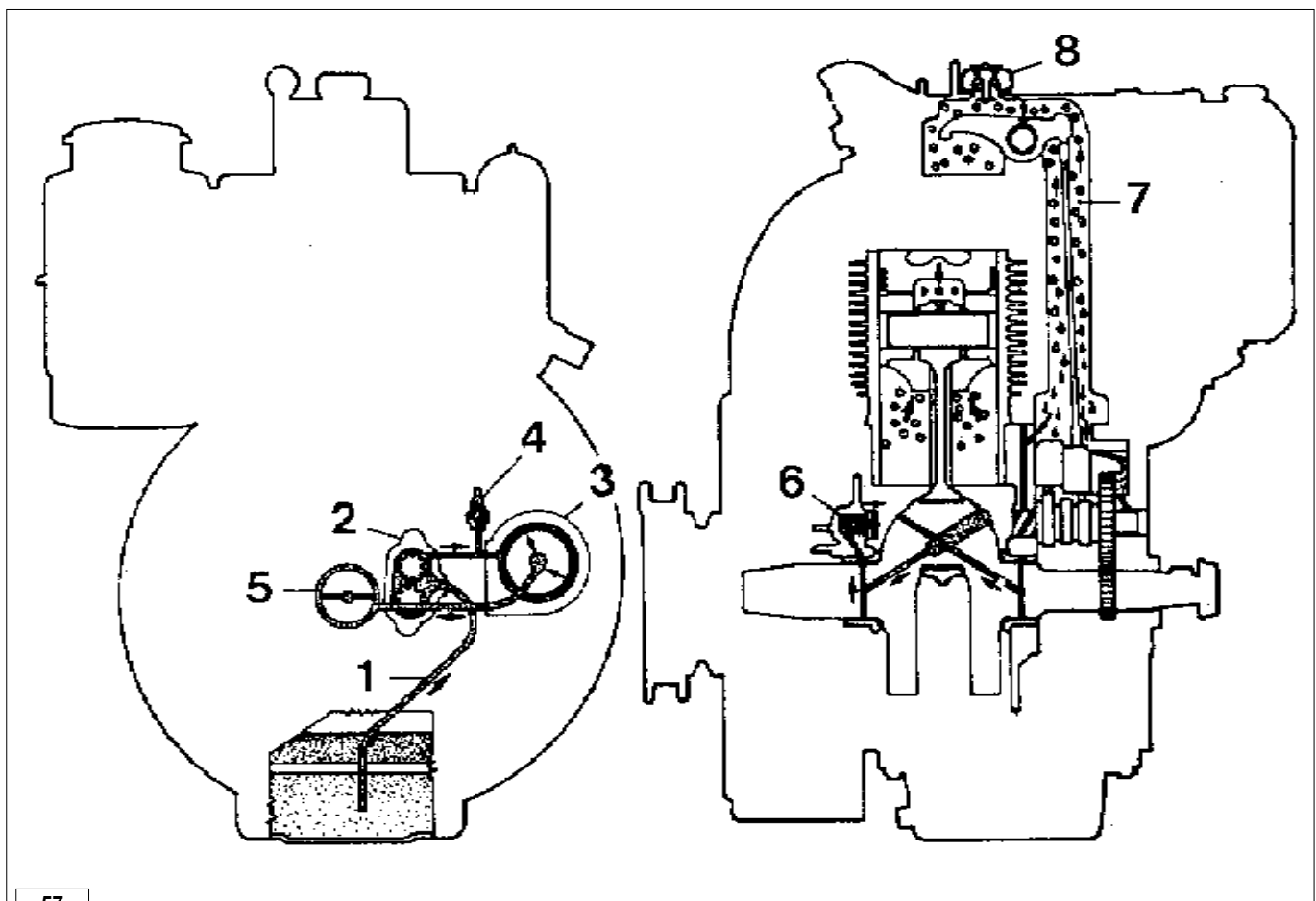
1
A
2
3
1 A
2

56



Danger – Attention

LUBRICATION CIRCUIT

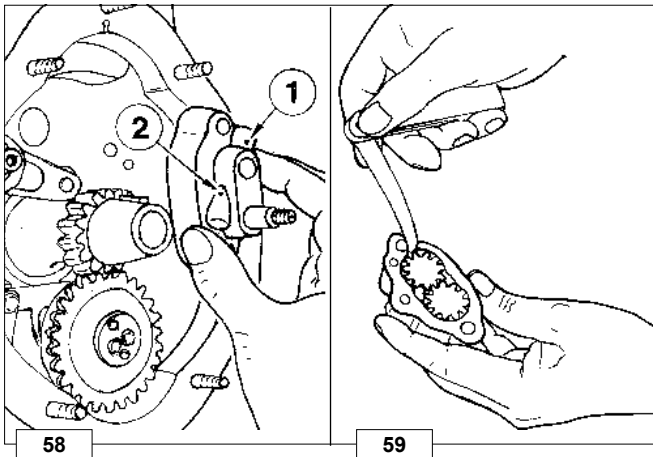


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Lubrication circuit

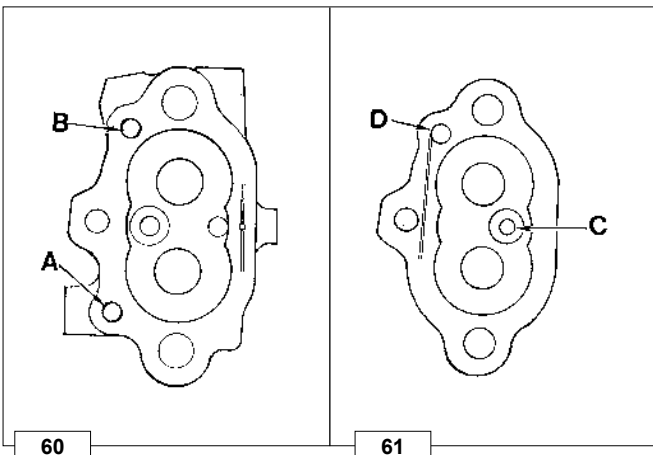
 1
 2
 3
 4

 5
 6
 7
 8



Oil pump

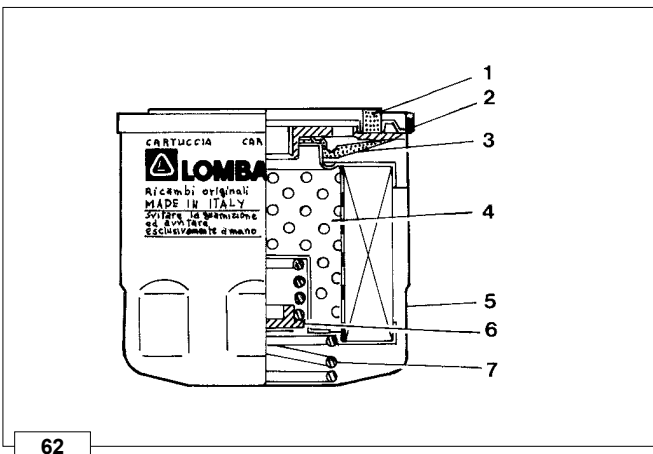
1 2



Oil pump, difference between clockwise rotation pump and anticlockwise pump

A
B

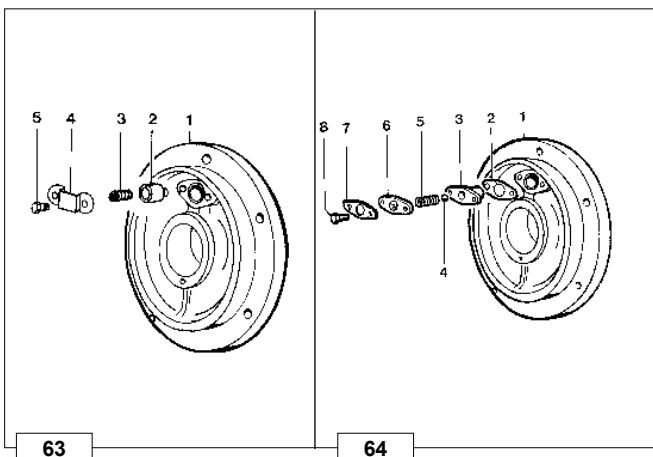
C
D



Oil filter cartridge

1 5
2 6
3 7
4

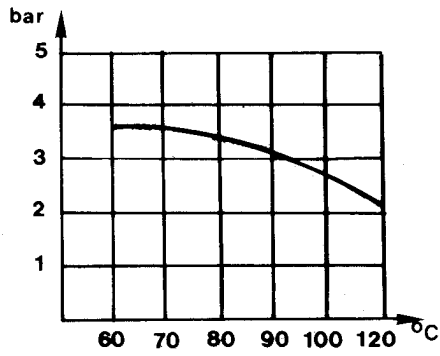
Features:



Oil pressure regulating valve

1 4
2 5
3

1 5
2 6
3 7
4 8



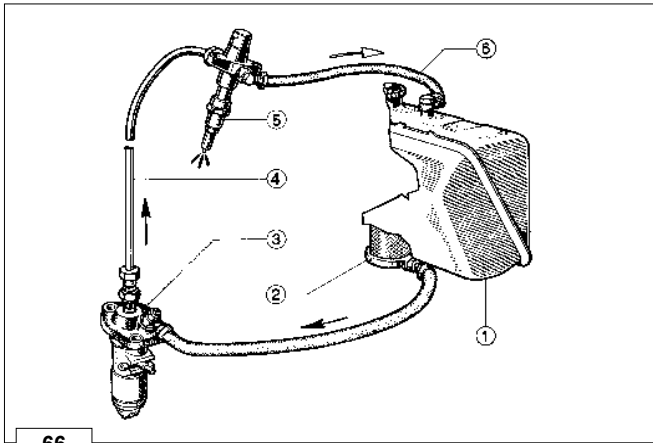
65

Oil pressure check

Oil pressure curve with the engine at its maximum speed

N

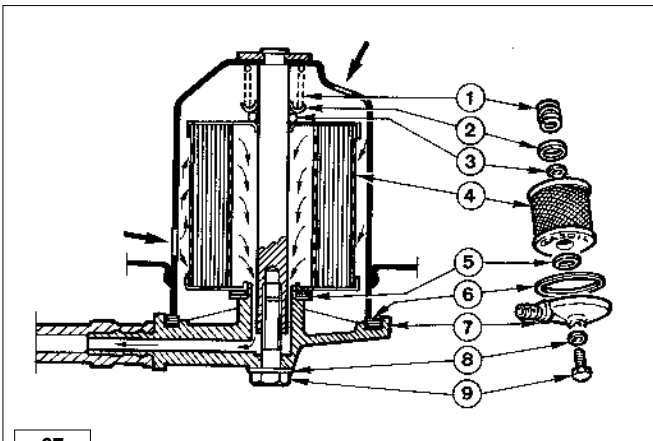
Note



66

Standard feeding/injection circuit

- 1
- 2
- 3
- 4
- 5
- 6

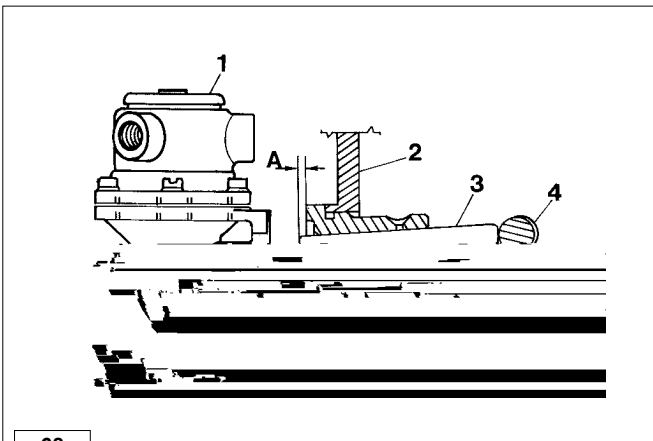


67

Fuel filter inside the tank (standard)

Details:

- | | |
|---|---|
| 1 | 6 |
| 2 | 7 |
| 3 | 8 |
| 4 | 9 |
| 5 | |



68

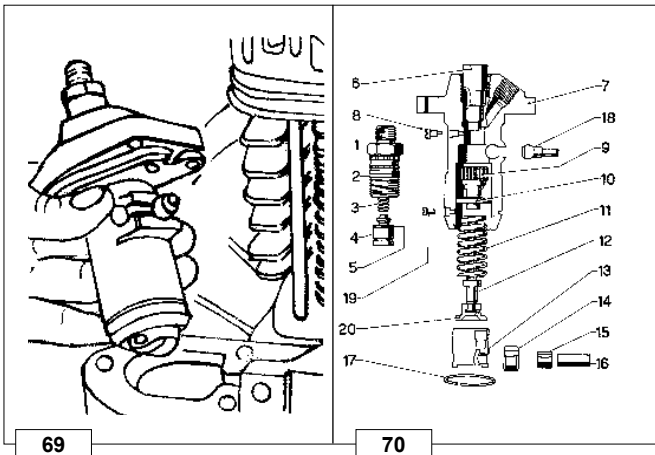
Feeding pump (by request)

Features

Feeding pump rod projection

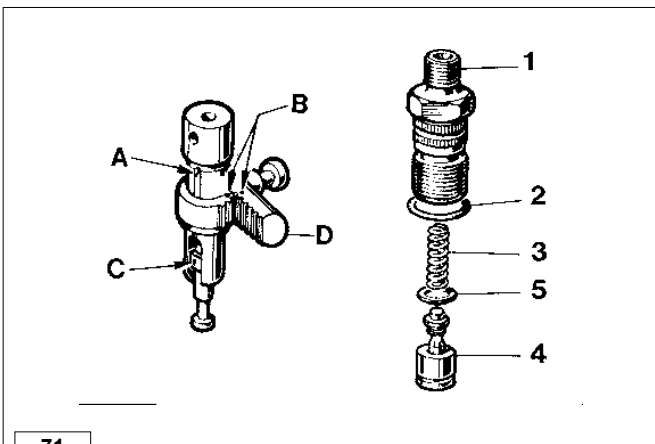
- 1
- 2
- 3
- 4

4



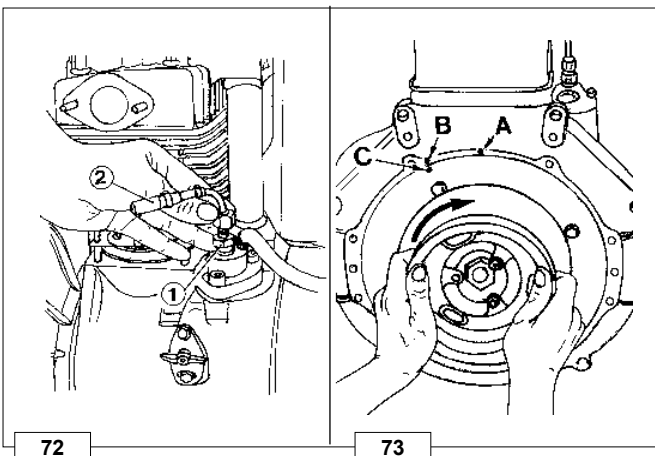
Injection pump

- | | |
|----|----|
| 1 | 11 |
| 2 | 12 |
| 3 | 13 |
| 4 | 14 |
| 5 | 15 |
| 6 | 16 |
| 7 | 17 |
| 8 | 18 |
| 9 | 19 |
| 10 | 20 |



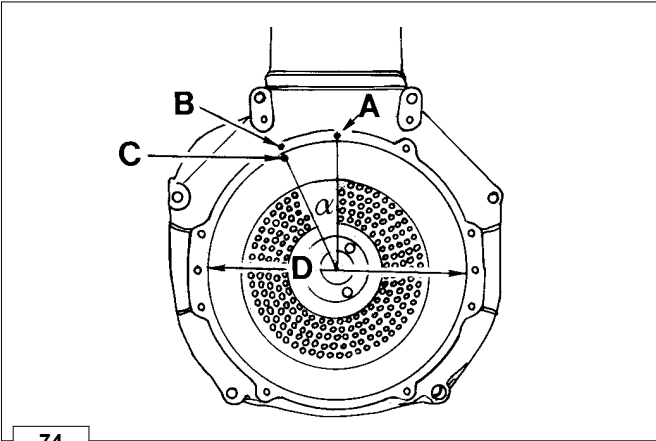
Injection pump assembly

- | | | |
|----|----|----|
| 6 | 7 | A |
| 8 | 4 | 5 |
| 18 | 10 | 11 |
| C | A | 12 |
| 16 | 20 | 13 |
| | | 14 |
| | | 15 |
| | | 17 |
| | | 19 |
| | | 2 |
| | | 3 |
| | | B |



Advanced injection (static)

- | | |
|------|---|
| 1 | 2 |
| C | B |
| B | C |
| Note | C |
| | B |



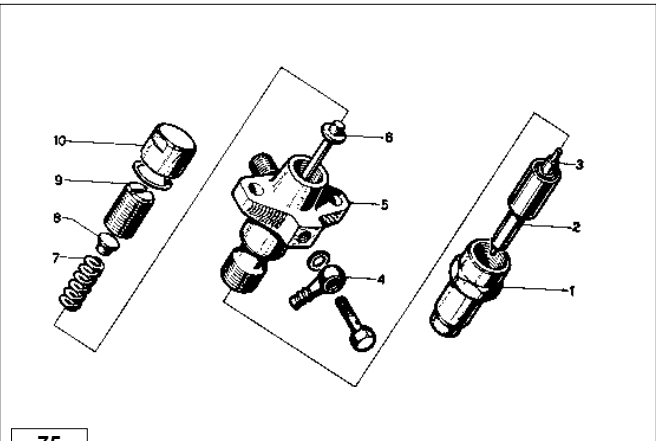
74

Advanced Injection references on the conveyor and flywheel protection disk

A
B
A ÷ B
C
 α
D

		α		

Note



75

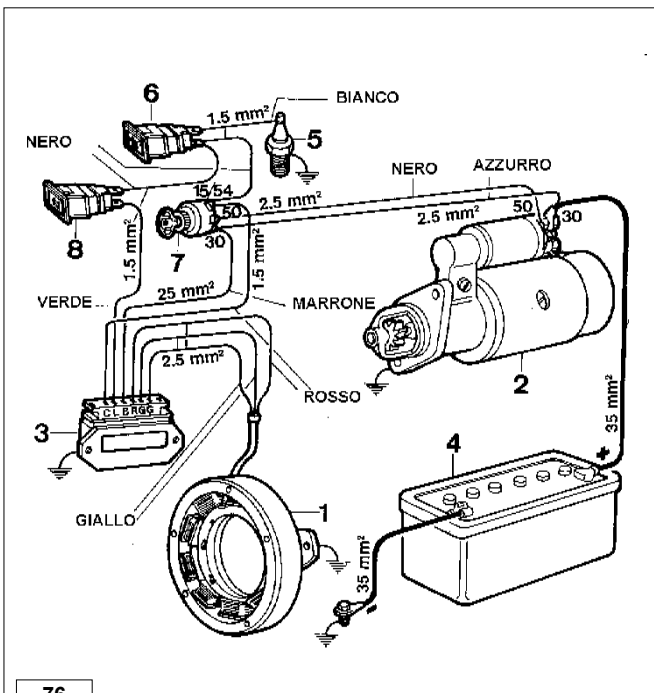
Injector

1
2
3
4
5
6
7
8
9
10

Setting

Note

12 V 14 A electrical ignition, diagram with voltage regulator, battery recharge lamp and manostat

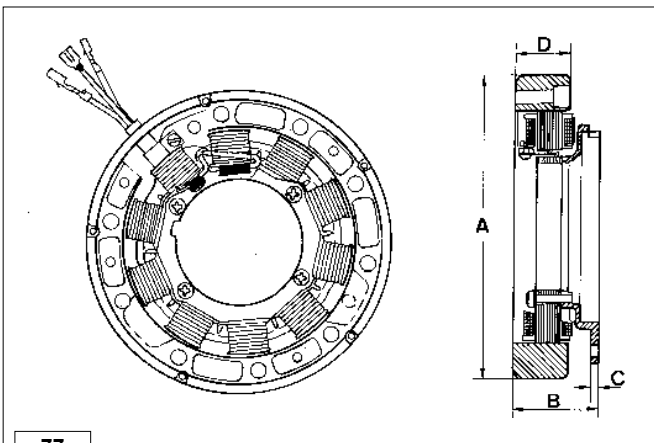


76

1
2
3
4
5
6
7
8

Note

12.5 V 14 A alternator

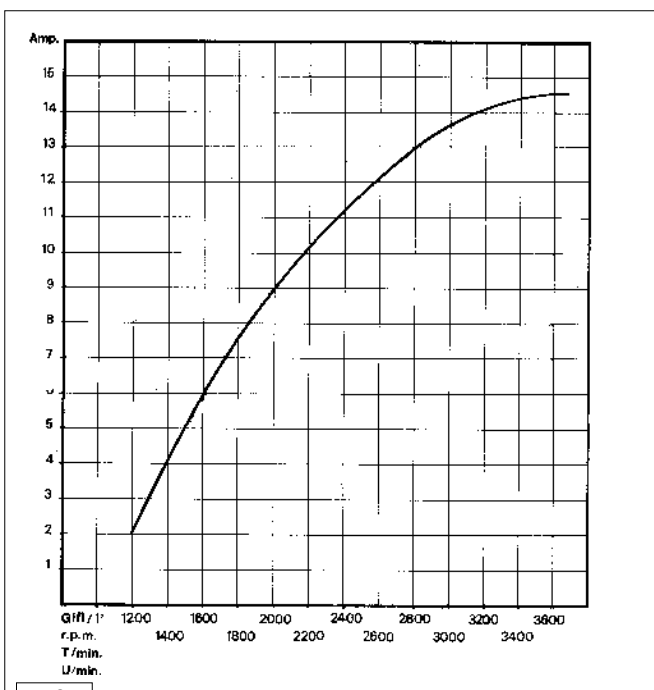


77

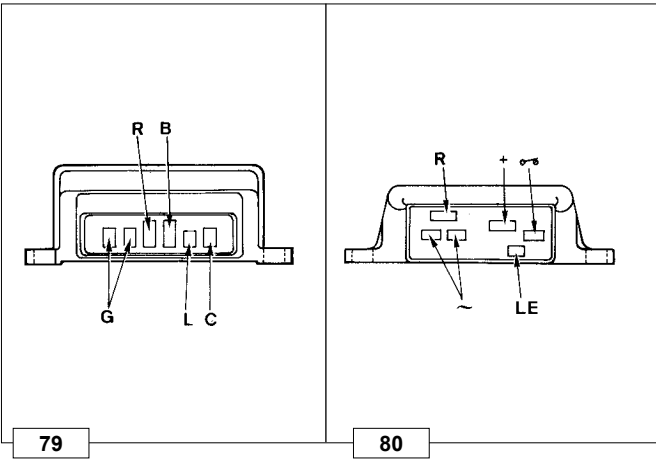
A
B
C
D

Note

12,5 V, 14 A alternator battery recharge curve

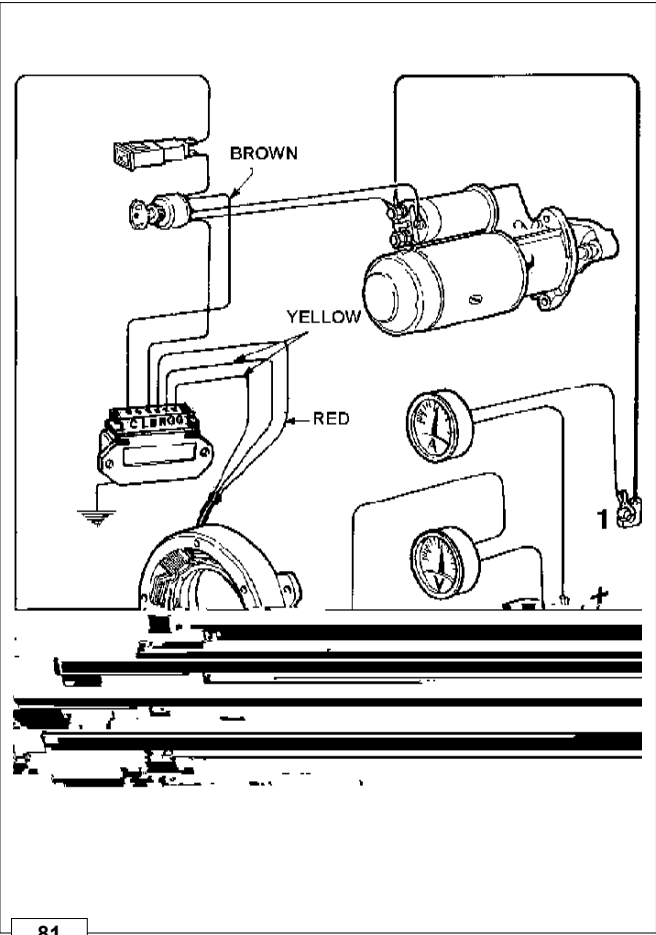


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Voltage regulator

ALTECNA SAPRISA NICSA	Cable Colours	DUCATI	Tab dimensions	
			Width	Thickness
~	giallo	G	6,25	0,8
R	rosso	R	9,50	1,2
+	rosso	B	9,50	1,2
LE	verde	L	4,75	0,8
	marrone	C	6,25	0,8

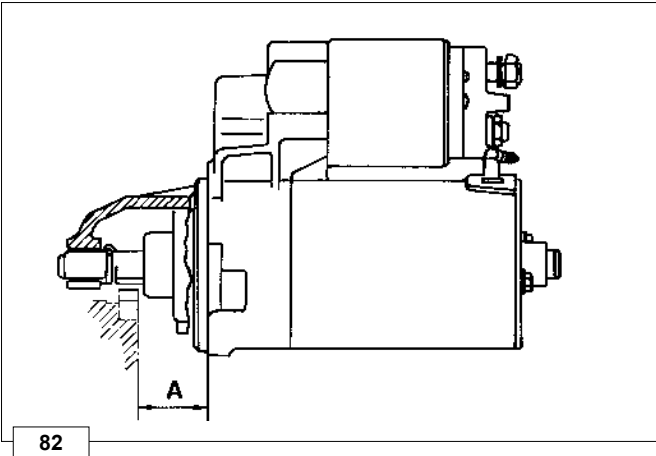


Voltage regulator, running check

1

Note

Warning

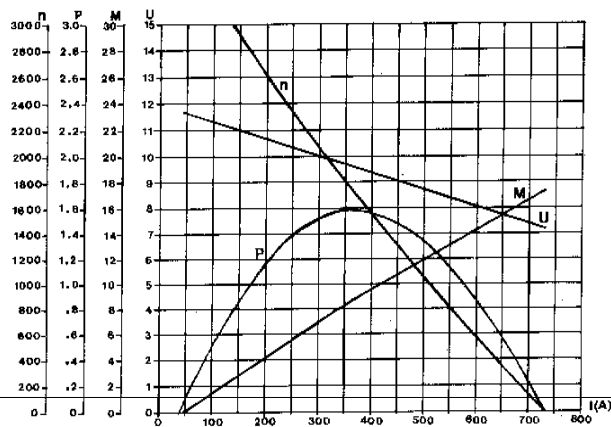


Bosch DW (L) 12 V 1, 1 KW type, starting motor

A

Note

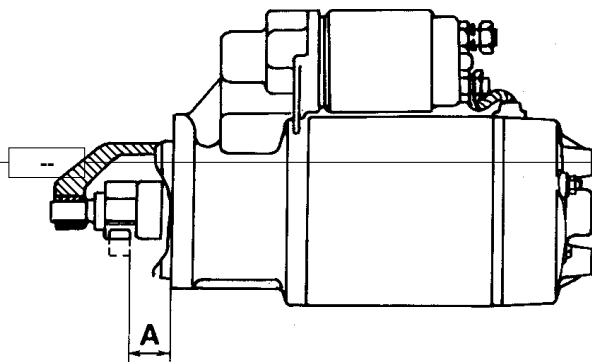
Characteristic curves for Bosch DW(L) 12V 1.1 kW type, starting motor



83

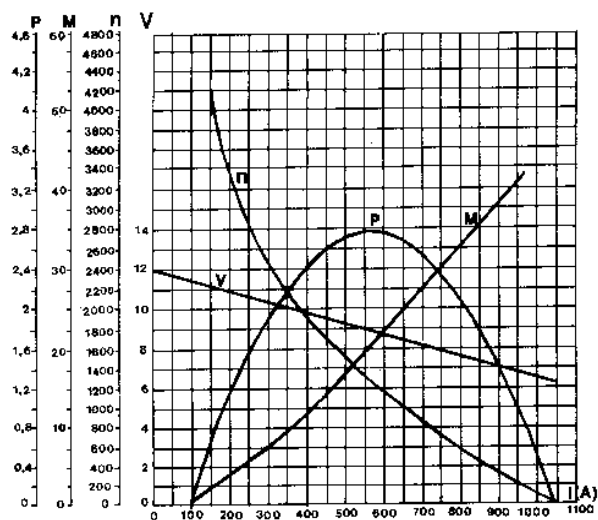
Bosch JF(L) 12V 2.5 kW type, starting motor

A

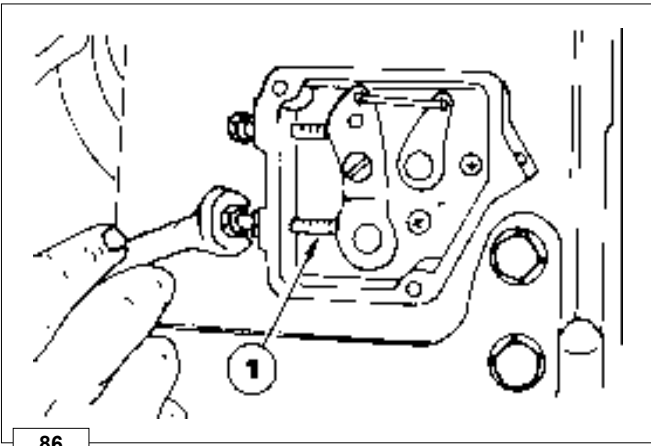


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Characteristic curves for Bosch JF(L) 12V 2,5 kW type starting motor



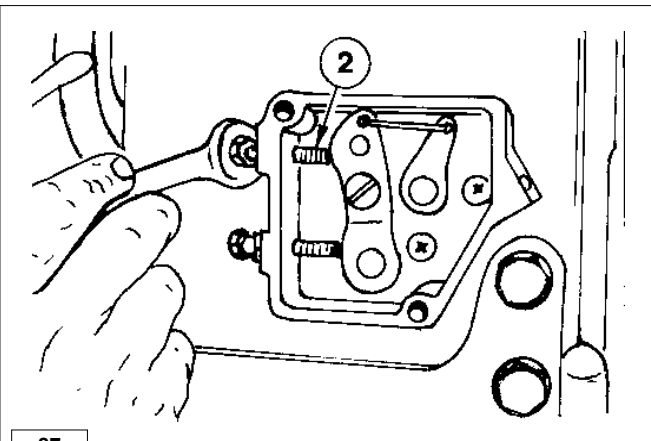
85



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Minimum rpm adjustment at idle running (standard)

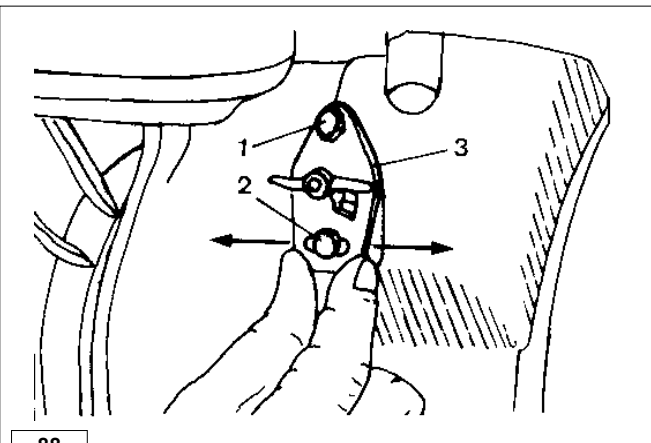
1



87

Peak rpm adjustment at idle (standard)

Note



88

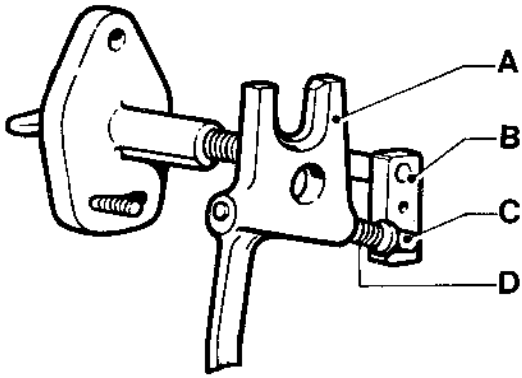
Injection pump delivery adjustment (standard)

1 2
3 1 2 2

Carry out the exhaust smoke check as it follows:

3

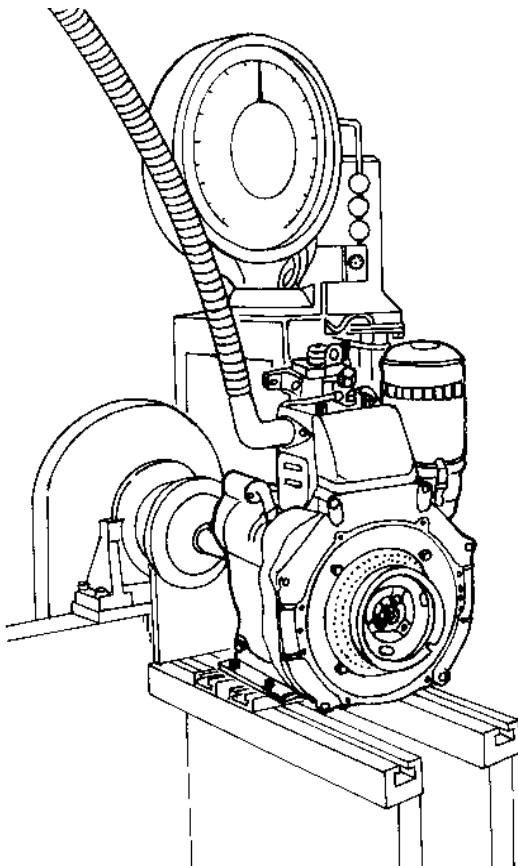
3



89

Limiting device for injection pump delivery and torque gearing device

B A A
 A,



90

Adjustment of injection pump delivery with braked engine

Required adjustments (the most demanded)



PROTECTIVE TREATMENT

1 -

2 -

3 -

4 -

5 -

6 -

7 -

8 -

9 -

10 -

11 -

12 -



In countries in which AGIP products are not available, find an equivalent product (with specifications: MIL-L-21260C).



Maximum every 24 months of inactivity, the engine must be started up by repeating all "Engine Storage" operations.

PREPARING THE ENGINE FOR OPERATION AFTER PROTECTIVE TREATMENT

1 -

2 -

3 -

4 -

5 -

6 -

7 -

8 -

9 -

10 -

11 -

12 -

13 -



Over time, a number of engine components and lubricants lose their properties, so it is important considering whether they need replacing, also based on age (see Replacement table).



Maximum every 24 months of inactivity, the engine must be started up by repeating all "Engine Storage" operations.

3LD 450 - 3LD 510 - 3LD 450/S - 3LD 510/S MAIN DRIVING TORQUES

[illegible]

MAIN DRIVING TORQUES 4LD 640 - 4LD 705 - 4LD 820

[illegible]

Table of tightening torques for standard screws (coarse thread)

[illegible]

Table of tightening torques for standard screws (fine thread)

[illegible]

USE OF DOPE FOR 3LD 450 - 3LD 510 - 3LD 451/S - 3LD 510/S

POSITION	TYPE OF SEALANT

USE OF DOPE FOR 4LD 640 - 4LD705 - 4LD 820

POSITION	TYPE OF SEALANT

[illegible]



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This image shows a full page of white paper with horizontal dotted lines, resembling notebook paper. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.



WORKSHOP MANUAL

cod. __ ED0053025560

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