OIL SYSTEM

TION OF THE OIL SYSTEM

Oil system at normal operating temperature

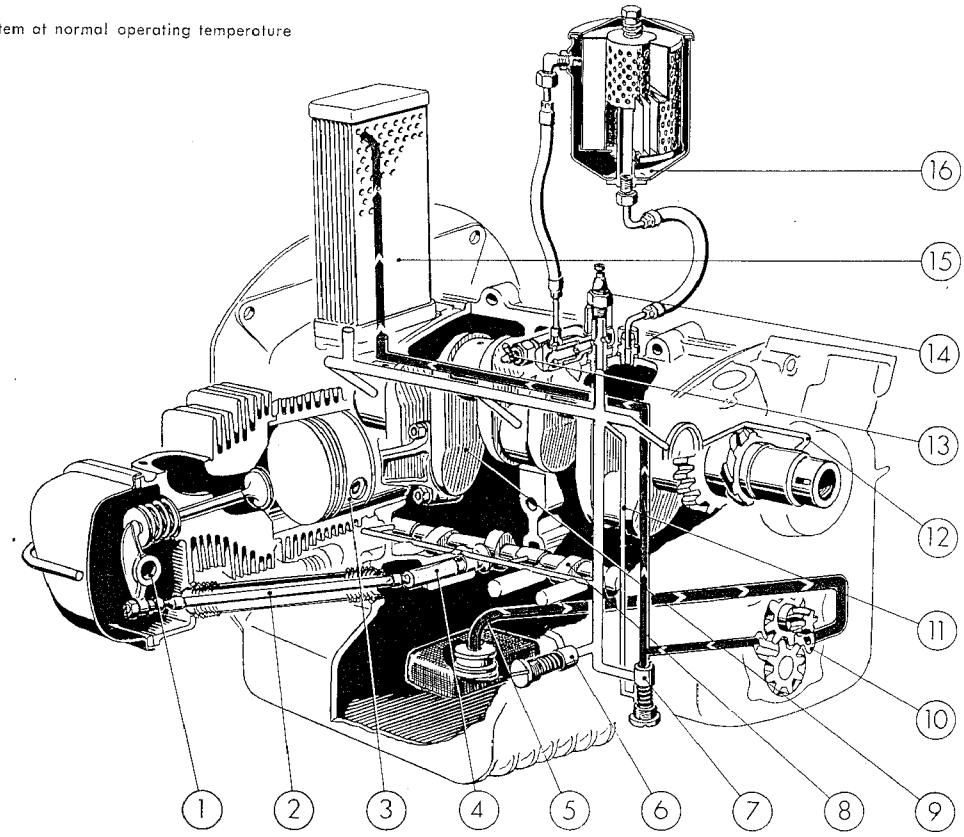

Fig. 108

⑪ **Back pressure line**
⑫ **No. 4 main bearing oil line**
⑬ **Sending unit for oil thermometer**
⑭ **Sending unit for pressure indicator**
⑮ **Oil cooler (offset rearward for better view).**
⑯ **By-pass oil filter**

When oil has filled the oil passages pressure builds up causing oil to enter the back pressure line to the by-pass valve at a pressure of approx. 2.9 atu (41.2 psi) (the pressure which is governed by the pressure relief valve).

At this time the by-pass valve piston pressure is reinforced by 3 atu pressure from beneath increasing the total upward pressure to 4.3 atu (61 psi).

This pressure rise working 4.3 atu against 3 atu, causes the by-pass valve to close. The oil now circulates first through the oil cooler and then to the lubrication points.

SCHEMATIC REPRE

Oil system immediatly after starting the engine

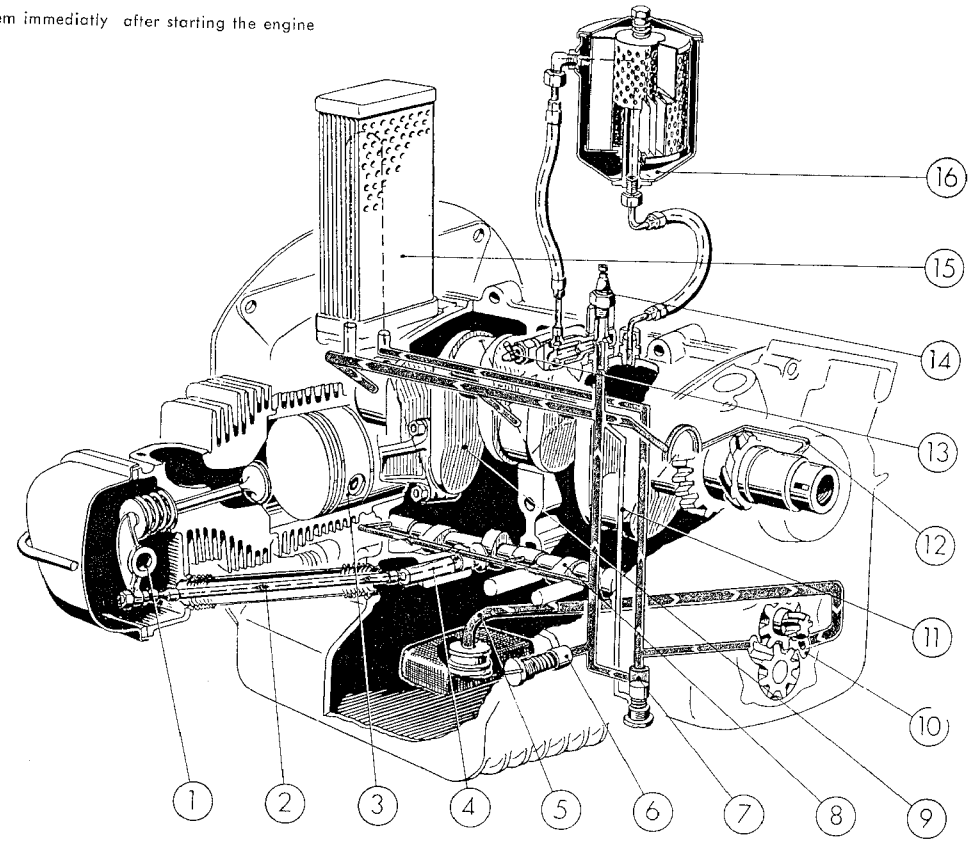

Fig. 10

① Rocker arm
② Push rod
③ Piston
④ Tappet
⑤ Oil suction pipe
⑥ Pressure relief valve
⑦ By-pass valve
⑧ Camshaft
⑨ Crankshaft
⑩ Oil pump

Description of Oil System

The cold oil is drawn from the crankcase by the oil pump and is sent to the by-pass valve which opens at approx. 1.3 atu (18.5 psi) whereby the piston moves to its lowest position. At this time the oil flows di to the lubrication points without first passing through the oil cooler. The pressure relief valve (6) allow in excess of 2.9 atu (41.2 psi) pressure to return directly into the oil sump.

14 EN

Removing and Installing Oil Strainer

Removal

1. Remove ten nuts from oil sump cover.
2. Remove cover and magnetic filter assembly.
3. Remove strainer and gaskets.

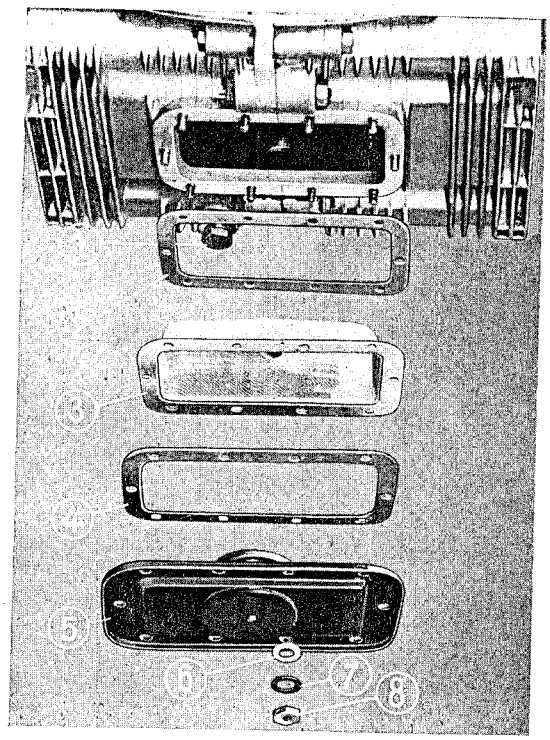

Fig. 109

① Oil drain plug
② Gasket
③ Strainer
④ Gasket
⑤ Cover plate with magnetic filter
⑥ Flat washer
⑦ Lock washer
⑧ Nut

Installation

The installation is accomplished in the reverse order of removal observing the following points:

1. Check the oil suction pipe for proper position.

2. Clean oil strainer and remove remaining gasket material.

3. Install new gaskets above and below strainer.

4. Install oil strainer with close fit on oil pipe.

5. Clean gasket material from cover plate and check for plane surface. This joint requires a flush fit for proper sealing.

6. Clean magnetic oil filter.

7. Install cover plate. Do not tighten nuts more than necessary in order to avoid bending the cover plate.

Note

A magnetic filter has been mounted on the oil strainer cover plate for additional oil cleaning. It is located inside the strainer and attracts any steel particles suspended in the oil. Oil must first pass through the strainer and the magnets before entering the suction pipe.

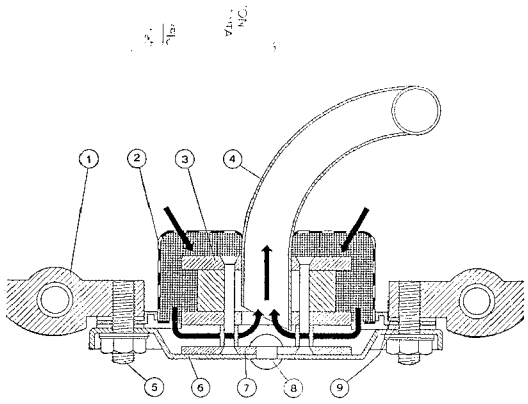

Fig. 110

① Crankcase
② Oil strainer
③ Magnetic filter
④ Oil suction pipe
⑤ Stud for oil strainer cover plate
⑥ Oil strainer cover plate
⑦ Plate
⑧ Rivet
⑨ Gaskets

Removing and Installing Oil Pressure Control Valves

Special Tools: P 74 Socket attachment

General

The pressure relief valve is located in the crankcase and regulates engine oil pressure.
In case of oil failure, and always in case of oil cooler leaks check the operation of the pressure relief valve.
The by-pass valve is located in the timing case cover and insures immediate lubrication to the engine bearings when starting.

By-pass valve function:

The by-pass valve in the timing case cover insures immediate oil flow to the lubrication points, by-passing the oil cooler which is normally included in the main oil flow.

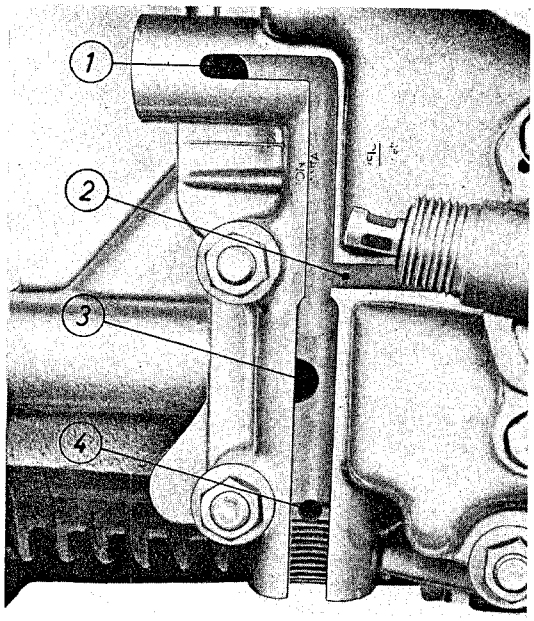

Fig. 111

① Oil passage to oil cooler
② Oil passage from oil pump
③ Oil passage direct to the lubrication points by-passing the oil cooler
④ Oil passage from back pressure line

With the engine not running the piston is in the closed position blocking oil passage (3) to the lubrication point. As soon as the engine is started, oil is drawn from the sump and forced into the by-pass valve chamber pushing the piston downward. The oil passage which passes directly to the lubrication points is then opened (Fig. 112).

As soon as the oil has filled all the passages pressure increases and returns through the back pressure line to the bottom of the by-pass valve piston. The piston is moved to the closed position by the spring and feed

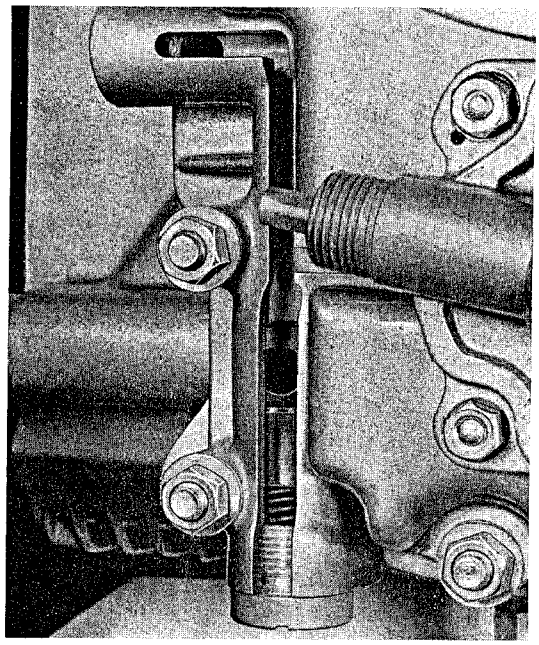

Fig. 112

back oil pressure. The oil must now pass through the oil cooler before lubricating the engine (Fig. 113).

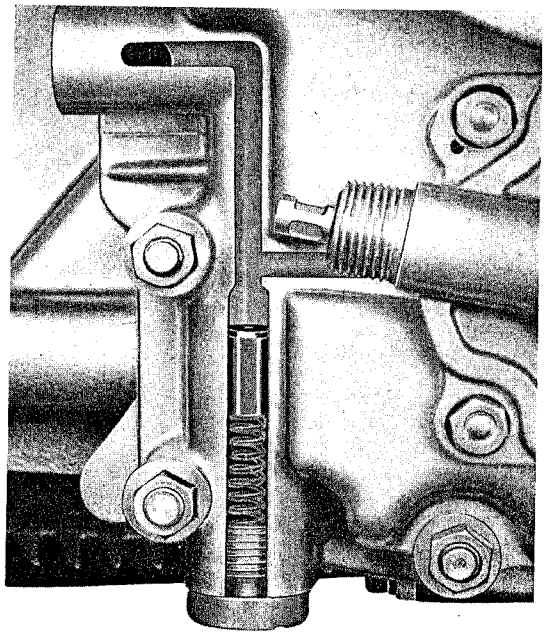

Fig. 113

Removal

1. Remove piston spring plug using special tool P 74.

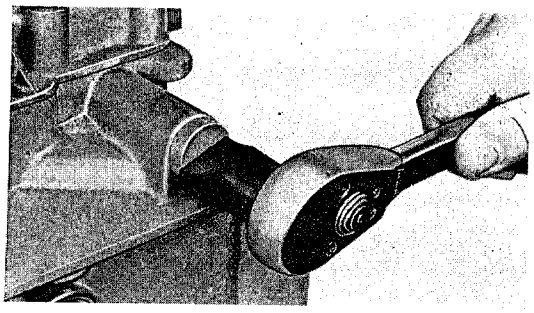

Fig. 114

2. Remove spring and piston (remove stuck pistons using M 10 thread tap).

Installation

The installation is accomplished in the reverse order of removal observing the following points:

1. Check piston and bore for rough or scratched surfaces and remove roughness or replace piston if necessary.

2. Test spring.

Pressure relief valve spring (Crankcase)	By-pass valve spring (Timing case cover)
Free length 66 mm (2.600 in.)	68 mm (2.680 in.)
Spring steel 1.4 mm (.055 in.) dia.	1.25 mm (.049 in.) dia.
Pressure at 49 mm (1.930 in.) = 4.7 kg (10.3 lb.) ± 7%	Pressure at 47 mm (1.850 in.) = 2.3 kg (5.6 lb.) ± 7%

3. Install new washer.

4. Install piston open end out.

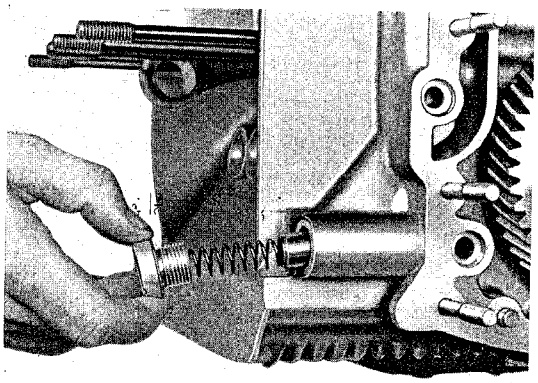

Fig. 115

5. To avoid scratching the bore make sure that the spring tip does not ride on the cylinder wall.

Removing and Installing Oil Cooler

Special Tools: VW 109 Box end wrench 10 mm

16 EN

Removal

1. Remove fan housing (4 EN).

2. Remove three mounting nuts using a 10 mm box end wrench.

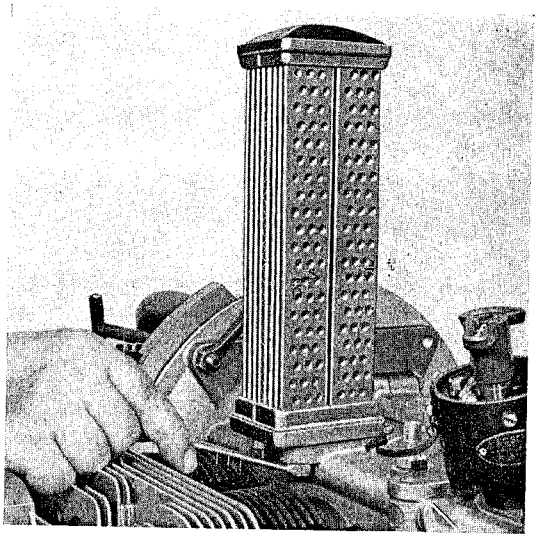

Fig. 116

3. Remove oil cooler and seals.

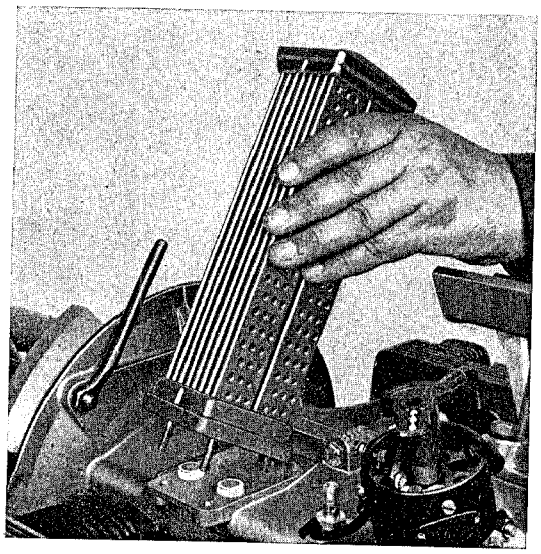

Fig. 117

Installation

The installation is accomplished in the reverse order of removal observing the following points:

1. Check oil cooler for proper fit, that the nuts are secure, and mounting brackets are rigid. (Test at 6 atu, 87 psi)

2. If oil cooler leaks, check pressure relief valve.

3. The oil cooler elements should not be in contact and separator plates must be secure.

4. Install new oil seals.

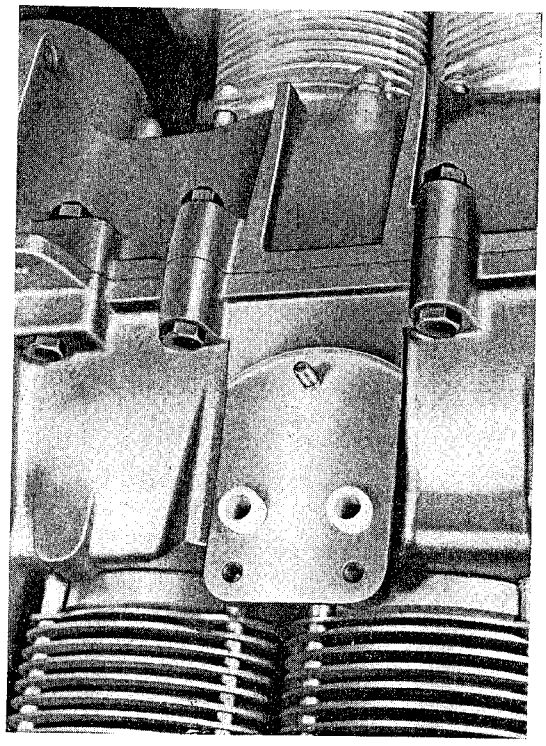

Fig. 118

17 EN

Removing and Installing Oil Pump and Tachometer Drive

Special Tools: P 43 Puller for V-belt pulley

Removal

1. Remove rear cover plate and the duct plates between the lower air channels.
2. Remove V-belt pulley (42 EN).

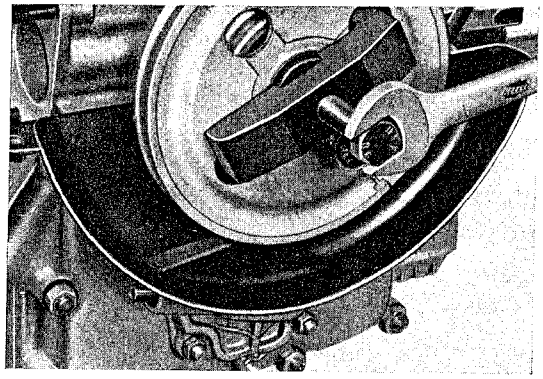

Fig. 119

3. Remove V-belt pulley cover plate.
4. Remove oil pump cover and tachometer drive.

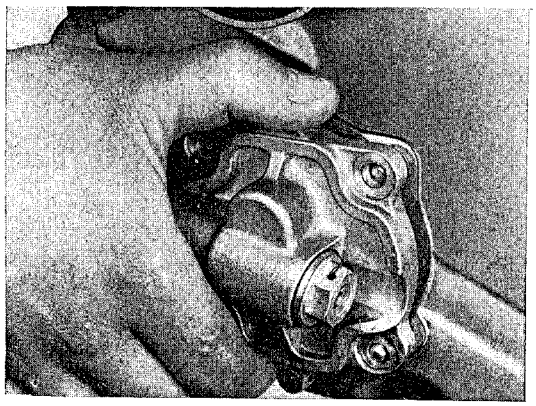

Fig. 120

5. Remove oil pump gears.

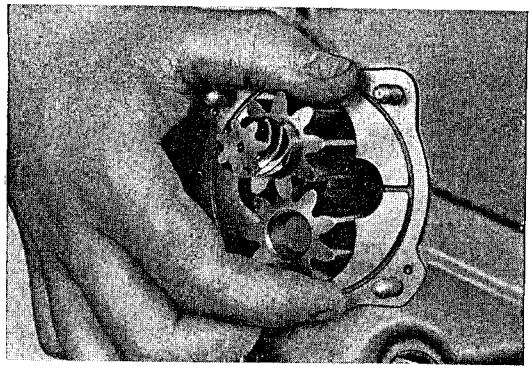

Fig. 121

Installation

The installation is accomplished in the reverse order of removal observing the following points:

1. Inspect the oil pump housing for wear, especially the bearing surfaces. A worn housing will result in pressure loss.
2. Inspect gears for wear. Tolerance 0.03 to 0.08 mm (.001 to .003 in.) backlash.
   End clearance with gaskets should be 0.035 to 0.10 mm (.0014 to .004 in.), replace at 0.20 mm (.008 in.).
3. Insure that driven gear shaft is secure in housing.
4. Clean gasket surface of timing case cover.
5. Lay a straight edge across the pump gears and check end clearance with a feeler gauge. Correct clearance is 0.06 to 0.128 mm (.002 to .005 in.).
6. Install new Porsche oil pump gasket 0.20 mm (.008 in.) without gasket compound. Use of other gaskets may cause pressure losses.
7. Insure that the gasket is installed with its holes aligned with the corresponding oil passages (Fig. 122).

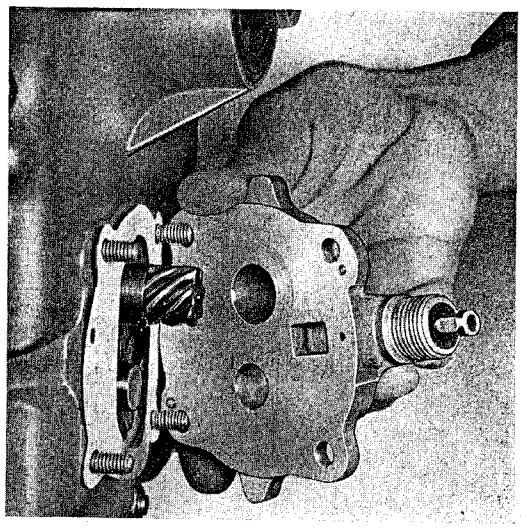

Fig. 122

8. Install rubber seal and flat washer on tachometer drive before connecting flexible shaft.

Oil Pump and Tachometer Drive

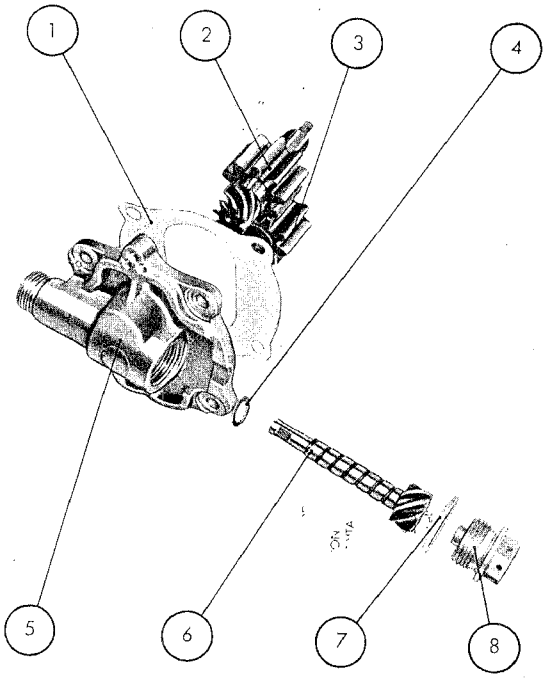

Fig. 123

1. Gasket.
2. Oil pump gear with tachometer drive pinion.
3. Oil pump gear.
4. Thrust washer.
5. Oil pump cover.
6. Pinion shaft (tachometer drive).
7. Light alloy washer.
8. Thrust bearing plug for pinion shaft.

Changing Filter Element of By-Pass Oil Filter

18 EN

None of the factory installed oil filters have reusable elements. They should be replaced every 6000 miles (10 000 km) in conjunction with an oil change.

1. Remove cover bolt.
2. Remove filter cover.
3. Remove dirty filter element.

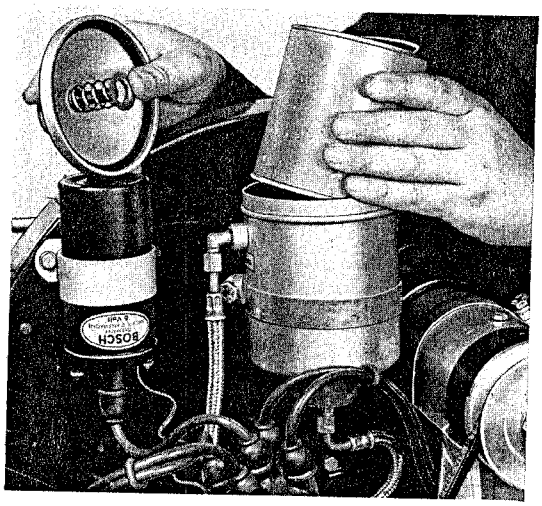

Fig. 124

4. Drain oil from filter housing.
5. Clean filter housing (do not use steel wool).
6. Install new filter element turning slightly for smooth fit.
7. Replace cover gasket and install cover. Tighten cover bolt.
8. Check engine oil level.
9. Run engine at idle.
10. Check for leaks.
11. Check oil level.
12. Add high quality HD oil to upper dip stick mark.