

GROUP 22 LUBRICATING SYSTEM

Description

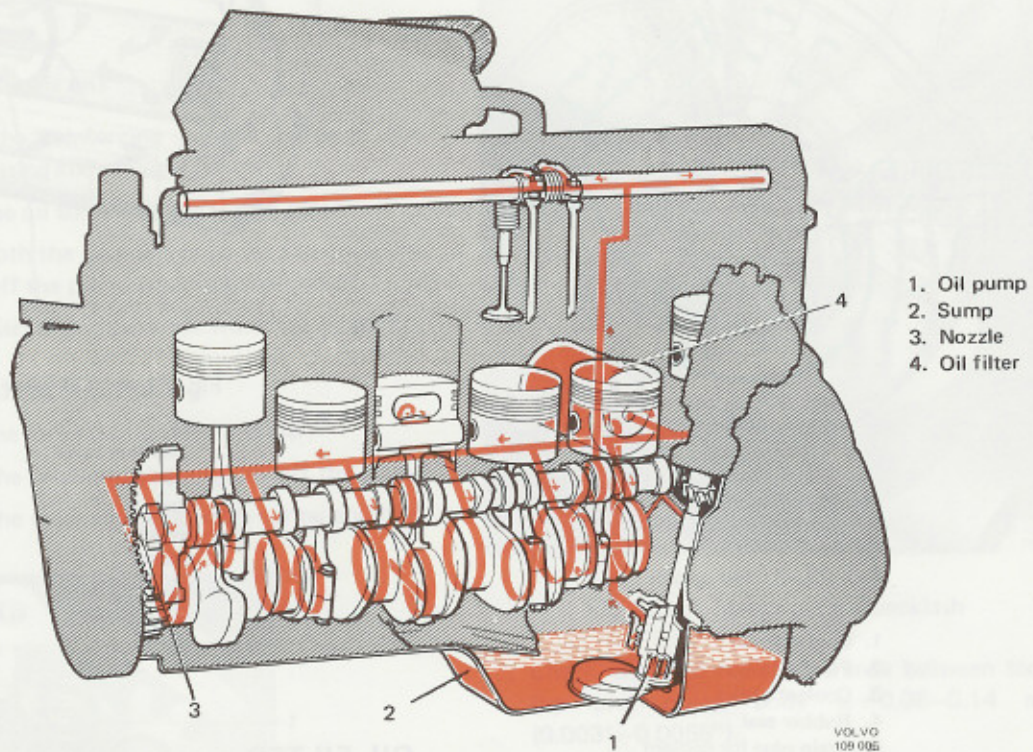


Fig. 22-1. Lubricating system

The engine has a force-feed lubricating system, Fig. 22-1. Pressure is provided by a gear pump driven from the camshaft and fitted under the crankshaft in the sump. The gear pump forces oil past the relief valve, which is also fitted on the pump, through the oil filter and then through oilways out to the various lubricating points. All the oil supplied in the lubricating points, therefore, first passes through the oil filter.

OIL PUMP, RELIEF VALVE

The oil pump (Fig. 22-2) is of the gear type and is driven via a gear train from the camshaft. When the pump gear is set in rotation, oil is transported to the tooth gaps along the walls of the pump body from the suction to the discharge side. The discharge pipe from the pump to the block does not have screw unions and is, therefore, automatically tightened in position when the attaching bolts for the pump are tightened up. At each end of the pipe there are sealing rings made of special rubber.

The relief valve is located in the pump and consists of a spring-loaded ball which seals against a seat in the pump body.

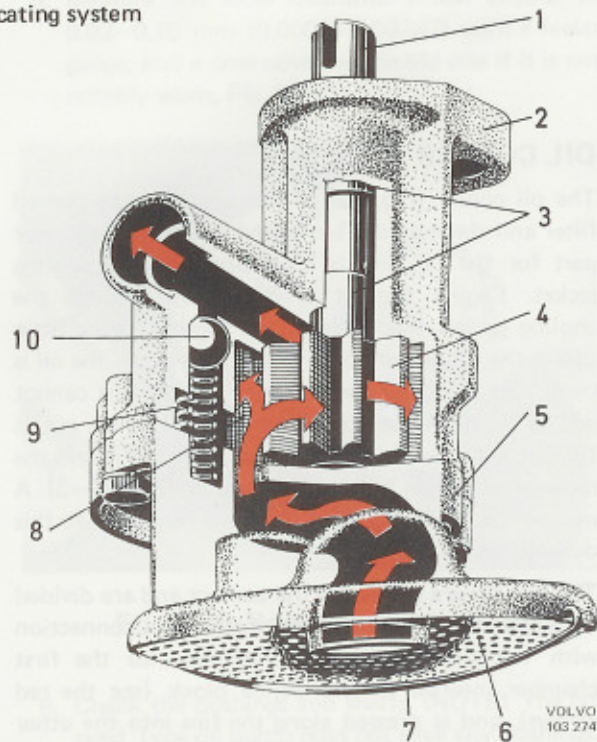


Fig. 22-2. Oil pump

- | | |
|-----------------|----------------------------|
| 1. Drive shaft | 6. Strainer |
| 2. Pump body | 7. Retainer clip |
| 3. Bushings | 8. Driven gear |
| 4. Driving gear | 9. Spring for relief valve |
| 5. Cover | 10. Valve ball |

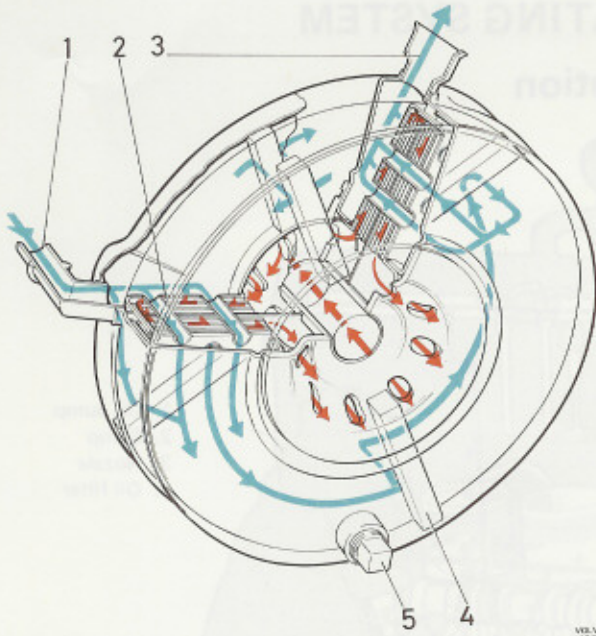


Fig. 22-3. Oil cooler

1. Coolant inlet
2. Fins
3. Coolant outlet
4. Rubber seal
5. Drain plug for coolant

OIL COOLER

The oil cooler (Fig. 22-3) is fixed between the oil filter and the cylinder block and consists of an inner part for the oil, which is surrounded by a cooling jacket. Engine coolant is conducted through the cooling jacket. Since the oil on its way to the filter passes the oil cooler some of the heat from the oil is cooled by means of the coolant. The coolant cannot go the shortest route from the inlet (1) to the outlet (3) but is forced to take a zig-zag path and round the radiator as shown by the blue arrows (Fig. 22-3). A number of rubber seals (4) force the fluid to take this definite route.

The fins (2) are cooled by the coolant and are divided by a plate into two chambers which are in connection with the fin periphery. Oil comes into the first chamber, nearest to the engine block (see the red arrows), and is pressed along the fins into the other chamber and along its fins. From there it continues on into the oil filter.

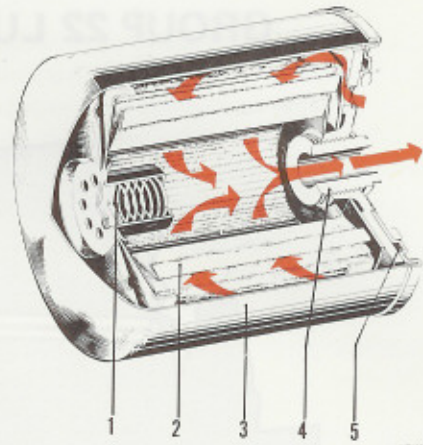


Fig. 22-4. Oil filter

1. Overflow valve
2. Element
3. Body
4. Nipple
5. Gasket

OIL FILTER

The oil filter (Fig. 22-4), which is made as a single unit complete with element, is of the full-flow type and is screwed directly onto the cylinder block. Oil fed out to the various lubricating points in the engine first passes through the oil filter element which is made of special paper. In the oil filter there is a by-pass valve which allows the oil to by-pass the element if resistance to flow should become excessive. When blocked so that it has to be replaced, remove and discard the old filter and fit a new one.

Service Procedures

OIL PUMP

Removing

1. Drain the engine oil.
2. Remove the reinforcing bracket between the flywheel casing and cylinder block.
3. Remove the oil sump and the sealing plate.
4. Remove both the retaining bolts for the oil pump and take off the pump and discharge pipe.
5. Pull the discharge pipe loose from the oil pump.

Checking and reconditioning

1. Remove the lock clasp and the strainer.
2. Remove the retaining bolts and lift off the cover.
3. Lift out the gears and relief valve spring and ball.

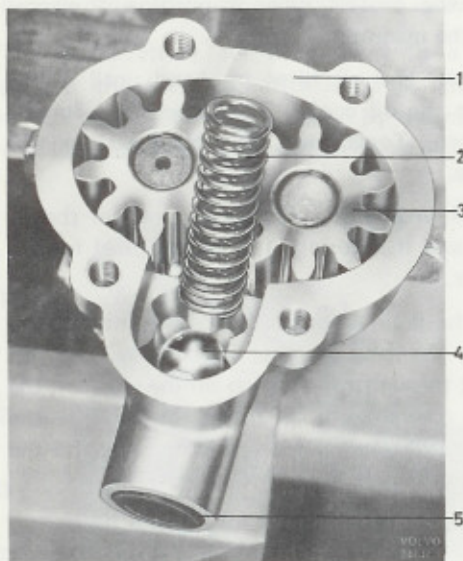


Fig. 22-5. Oil pump

1. Pump body
2. Spring for relief valve
3. Gear
4. Valve ball
5. Hole for oil pipe

4. Clean all parts.
5. Check the relief valve seat, ball and spring. Test the spring in a spring tester. Unloaded it should be 39 mm (1.5") in length, loaded with 50 ± 4 N (111 ± 9 lbf) it should be 26.25 mm (1.0") and loaded with 70 ± 8 N (154 ± 18 lbf) it should be 21 mm (0.8") in length.
6. Check to see whether the gear flanks, tops or ends are worn. Replace damaged or worn gears. Check that the backlash is 0.15–0.25 mm (0.006–0.010"), Fig. 22-6.

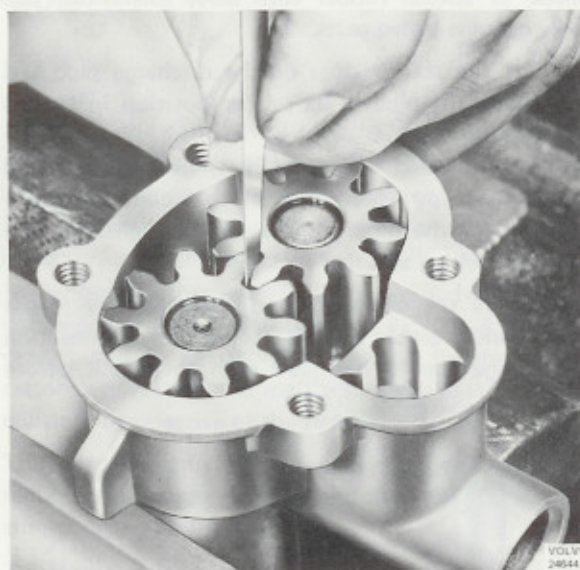


Fig. 22-6. Measuring the backlash

7. Check that the radial clearance between tooth top and pump body is 0.08–0.14 mm (0.0031–0.0055").
8. Measure the axial clearance which should be 0.02–0.10 mm (0.0008–0.0039") with a feeler gauge, and a new cover or the old one if it is not notably worn, Fig. 22-7.

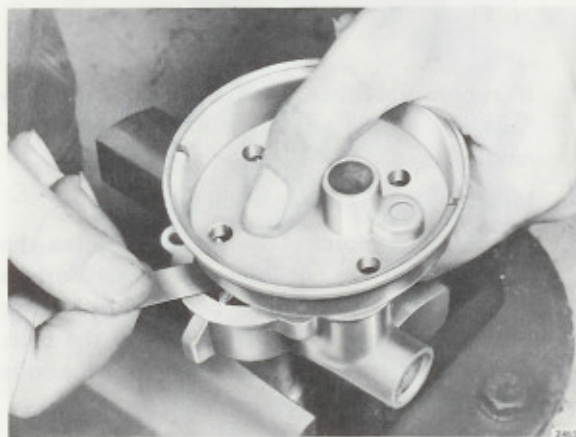


Fig. 22-7. Measuring the axial clearance

9. Check the bushings and shafts. (NOTE! The late prod. type oil pump does not have any bushings.) If necessary replace them with new ones. The drive shaft and gear wheel are replaced as a single unit. After being pressed in, the new bushings should be reamed with a guided reamer.
10. Assemble the oil pump.

Installing

The sealing rings at the ends of the discharge pipe are made of special rubber with close tolerances. Use only genuine Volvo parts.

1. Fit the sealing rings on the discharge pipe and insert the pipe in its proper position in the oil pump.
Before being installed, the rings can be coated with soapy water in order to facilitate installation of the pipe. If necessary tap lightly on the pipe with a soft mallet.
2. Install the oil pump and discharge pipe in the cylinder block, Fig. 22-8. The pump connection flange should be flush with the block before being tightened up.

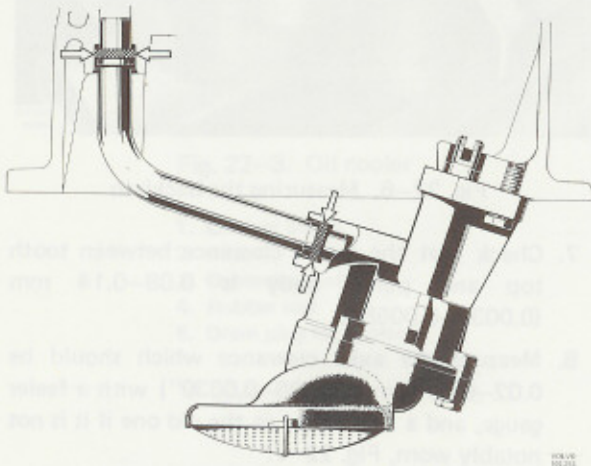


Fig. 22-8. Sealing rings on discharge pipe

3. If necessary replace the oil sump gasket. The "tongue" on the gasket should face the starter motor flange.
4. Install the sealing plate and oil sump.
5. Install the reinforcing bracket and tighten the bolts by hand. Do not forget the spacer washers on the front retaining bolts, between the bracket and cylinder block. Then tighten up the bolts against the clutch casing and thereafter the bolts against the cylinder block.
6. Fill with engine oil.
7. Start the engine and check for oil leakage.

Replacing the oil cooler

1. Drain the coolant by opening the drain cock on the lower radiator pipe running from the engine and remove the plug in the oil cooler.
2. Remove the oil filter. Use tool 2903 or similar, e.g., chain tongs.
3. Remove the clamps holding the coolant pipes together under the manifold.

4. Unscrew the nut from the nipple in the centre of the oil cooler.
5. Remove the coolant pipe from the oil cooler and pull the oil cooler from the nipple.
If the nipple is replaced, the new nipple should be tightened to a torque of 45-55 Nm (4.5-5.5 kpm = 33-40 lbftf).
6. Fit the new sealing washers for the coolant pipe connections. The groove for the sealing ring in the oil cooler should be coated with a light layer of glue, resistant to oil up to 140°C (284°F) (e.g. Pliobond). Install the sealing ring.
7. Install the oil cooler on the nipple in the cylinder block and fit the nut. Tighten the nut to a torque of 10 Nm (1 kpm = 7 lbftf) and check that the oil cooler is tight against the cylinder block. Then tighten the nut to a torque of 30-35 Nm (3.0-3.5 kpm = 22-25 lbftf).
8. Install the coolant pipe.
9. Clamp the coolant pipes in position, 2 clamps under the manifold.
10. Screw on the oil filter by hand until it just touches the oil cooler. Then screw it a further half turn. **Tools must not be used for this purpose.**
11. Fill with engine oil, 1/2 litre (1 pint) for the oil cooler and if necessary 1/2 litre (1 pint) for the oil filter.
12. Close the drain cock on the lower radiator pipe and fit the plug in the oil cooler. Fill with coolant through the opening on the radiator, the heater control should be at MAX. Fill the radiator fully and put on the cap. Also fill the expansion tank to the MAX. mark.
13. Start the engine and check for leakage.

Replacing the oil filter

Together with the insert and overflow valve, the oil filter forms a single unit screwed on to a nipple which is attached to the cylinder block. When replacing, scrap the old oil filter. Replacement is as follows:

1. Remove the oil filter with tool 2903 or similar, e.g., chain tongs.
2. Apply oil to the new oil filter rubber gasket and make sure that the contact surface is free from dirt.
3. Screw on the new oil filter until it just touches the oil cooler. Then screw the filter a further half turn. **Tools are not to be used for this purpose.**
4. Fill with 1/2 litre (1 pint) engine oil.
5. Start the engine and check for leakage at the joints.