

# Cooling Water Circulation

Job No.

50—0

The cooling system of the engine is a pressure-circulation system. The schematic diagram (Fig. 50—0/1) shows the cooling system circulation.

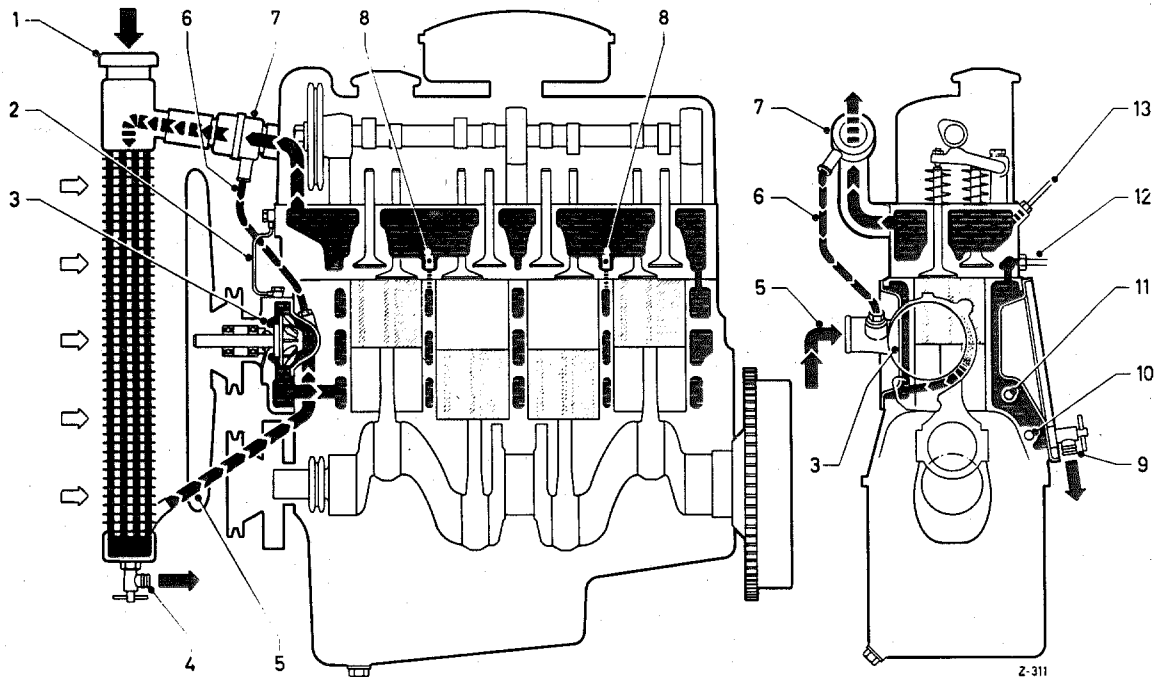


Fig. 50—0/1

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|--|---|
| 1 Radiator filler cap                                      | 8 Water distributor   |
| 2 Vent line for water pump                                 | 9 Drain cock in cylinder cover  |
| 3 Water pump   | 10 Oil passage to oil filter  |
| 4 Drain cock in radiator                                   | 11 Main oil passage   |
| 5 Cooling water line at bottom from radiator to water pump | 12 Cooling water drain outlet and water feeder line for the two heat exchangers |
| 6 Short circuit line from thermostat to water pump         | 13 Heat feeler for radiator thermometer   |
| 7 Thermostat   |   |

The cooling water is sucked up from the radiator block by the water pump and forced into the water jacket spaces of the crankcase and the cylinder head. From the cylinder head, the cooling water is fed back to the radiator block via the exhaust union neck.

The cooling water thermostat (7) is installed in the return flow line to the radiator block. The thermostat has the function of cutting out the radiator when the engine is cold so that the optimum working temperature is reached as quickly as possible. Thus the thermostat does not open until a water temperature of approximately 78 °C. has been reached. Below this temperature, the thermostat remains closed and the cooling water coming from the cylinder head is fed back from the thermostat to the water pump via the short circuit line (by-pass line) (6). Apart from its function of enabling the engine to reach its working temperature quickly, the thermostat also prevents the engine from cooling off too quickly, for example, on long down-grades. This is particularly important in preventing undue cylinder wear.

The cooling water temperature is normally between 70 and 95 °C.



An overpressure valve (3) which limits the overpressure developing in the cooling system to 1 atm., is located in the radiator filler cap. When the pressure rises above 1 atm., the overpressure valve opens and in doing so, opens up the overflow line (1) (see Fig. 50 — 1/2).

In order to prevent a partial vacuum from developing in the cooling system, an additional valve, an underpressure valve (4) is incorporated in the radiator filler cap. This valve opens at an underpressure of 0.1 atm. and the overflow line (1) enables the underpressure to be neutralized (see Fig. 50 — 1/2).

Water is fed to the two heat exchangers for the car heater from the exhaust union neck (12) at the cylinder head via a pipe (see Fig. 50 — 0/1). The heat exchangers can be individually switched on or off. The return flow takes place via a line to the cooling water line (5) from the radiator to the water pump.

A water drain cock (4) is fitted as usual to the radiator block. There is also a water drain cock (9) on the crankcase (see Fig. 50 — 0/1).

If the water is to be drained off, both cocks, the drain cock (4) at the radiator and also the drain cock (9) at the crankcase must be opened (see Fig. 50 — 0/1). In addition, the feeder line to the heat exchangers must be disconnected and the control valves of the heat exchangers opened. This is particularly important if the cooling system has to be completely drained in cold weather owing to the fact that no anti-freeze is available.