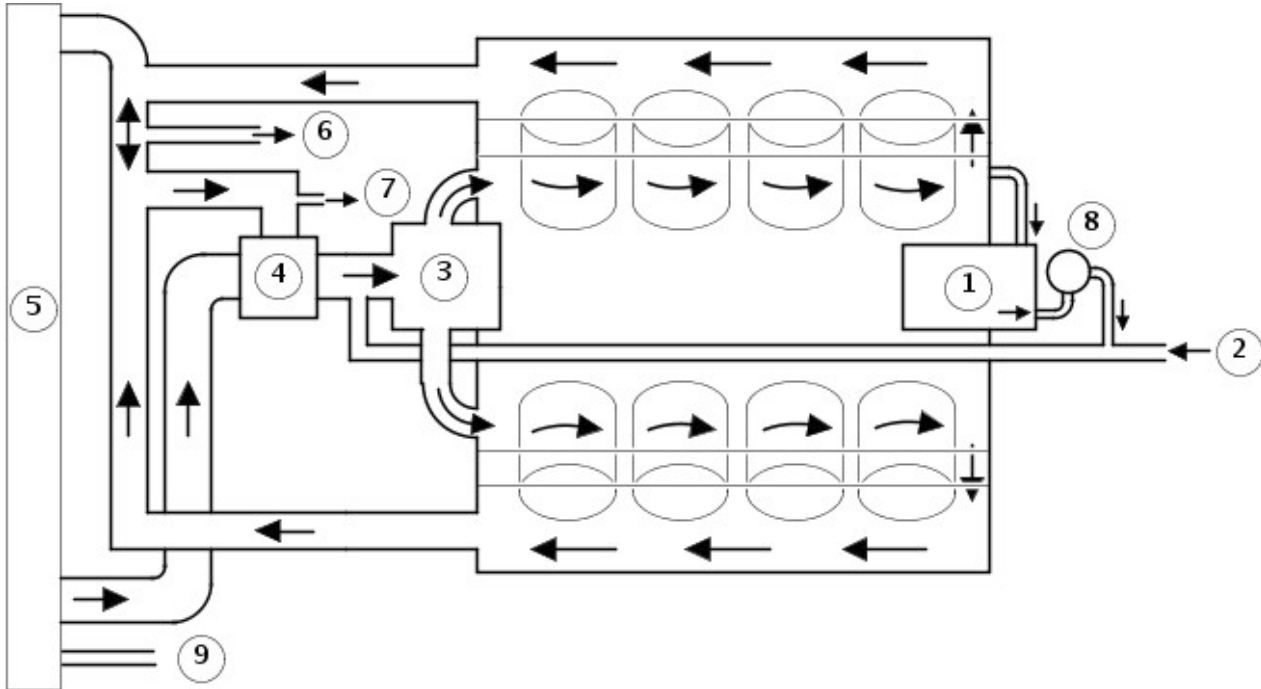


# Engine Cooling - Engine Cooling

Description and Operation

Engine Cooling Components - Normally Aspirated Vehicles



E32979

Item	Description
1	Throttle Body
2	Heater Return
3	Coolant Pump
4	Thermostat Housing
5	Vehicle Radiator
6	Heater Supply
7	Bleed Outlet (to expansion tank)
8	EGR Valve (when fitted)
9	Bleed Outlet (to expansion tank)

Engine cooling is via a low volume, high velocity system which achieves a very fast warm up. The temperature of the combustion chambers is reduced along with a more even temperature distribution. The temperature of the bores is increased.

From the pump, coolant flows into each bank of the cylinder block. In each bank, approximately 50% of the coolant cools the cylinder bores and the remainder is diverted through the bypass gallery to the cylinder head.

With the thermostat closed, coolant returns directly to the pump through the bypass on the thermostat housing.

With the thermostat open, coolant returns to the pump via the radiator.

The cooling system uses a mixture of water and Jaguar Anti-Freeze/Inhibitor (Dow 542).

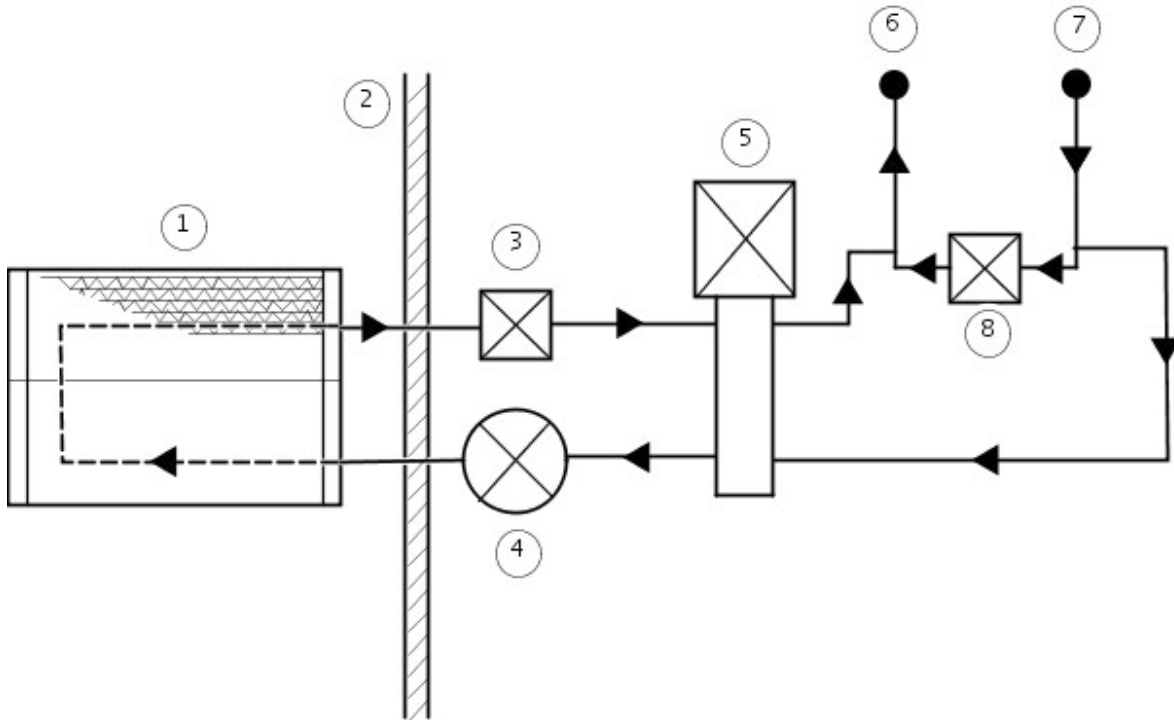
The cooling system on a supercharged engine is similar, but has additional components for cooling the intake air.

Engine Cooling Components - Supercharged Vehicles

# Heating and Ventilation - Heating and Ventilation

Description and Operation

## Schematic Diagram

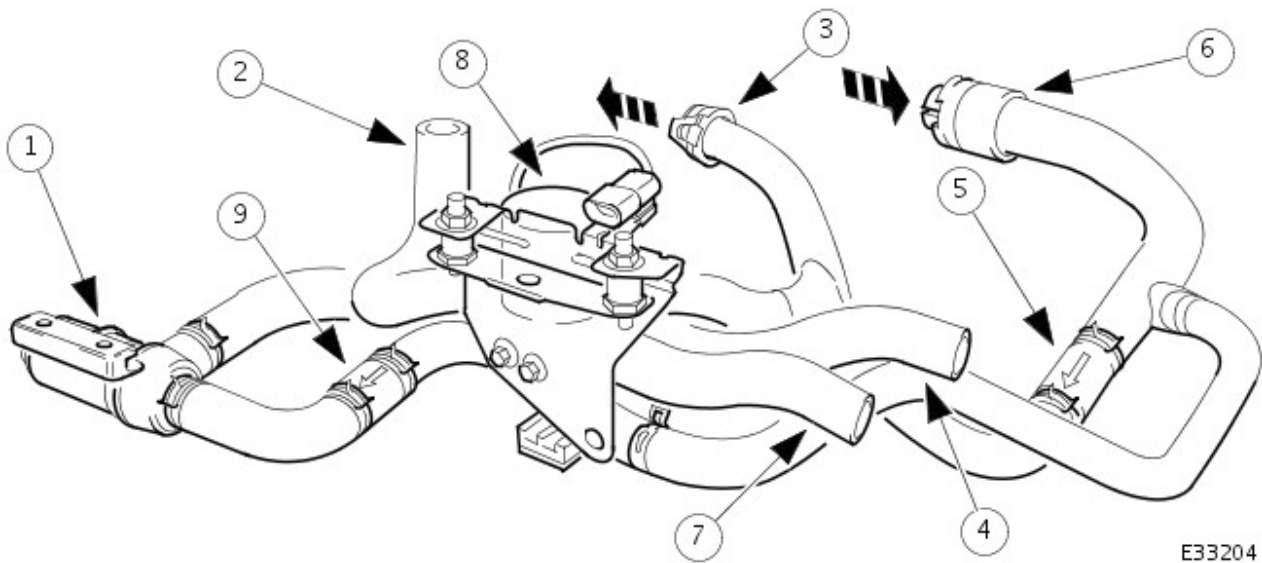


E34321

### Parts List

Item	Part Number	Description
1	—	Heater matrix
2	—	Firewall
3	—	Non return valve
4	—	Water pump
5	—	Water valve
6	—	Return to engine
7	—	Feed from engine
8	—	Non return valve (heater bypass)

Heater System Components



E33204

#### Parts List

Item	Part Number	Description
1	—	Assembly pump - water
2	—	Hose - from header tank
3	—	Hose / connector - return to engine
4	—	Hose - heater feed to matrix
5	—	Valve - non return (by-pass)
6	—	Hose / connector - feed from engine
7	—	Hose - heater return from matrix
8	—	Assembly valve - water
9	—	Valve - non return

The heater circuit 'scavenges' coolant from the engine cooling system by means of an electric water pump. The water pump has a protection circuit to inhibit operation when the coolant temperature is  $< 16^{\circ}\text{C}$ ; this is to prevent possible damage to the impeller due to the presence of coolant borne ice particles. Coolant is drawn from the engine system through the water valve inlet port into the heater matrix. The coolant passes through the bottom section of the heater matrix from left to right filling the end tank of the matrix before returning through the top half of the matrix and through the outlet ports of the water valve and back into the engine cooling system.

Non return valves are located in the heater bypass hose and the hose between the water pump and valve. These valves are required to prevent coolant flowing in the wrong direction at low engine speeds and restrict convected flow through the heater after the engine is switched off.

When the exterior ambient temperature is  $> 0^{\circ}\text{C}$  the refrigeration system automatically operates cooling and dehumidifying incoming air before it is re-heated by the heater matrix.

## Water Valve Assembly

### Location

The water valve assembly is located above the water pump, in the engine compartment and is secured to the firewall by a bracket. The valve operates by means of an electrical solenoid which oscillates the valve stem between the inlet and outlet ports.

When in automatic mode, the water valve duty cycle is influenced by the following inputs to the A/CCM:

- Outlet air temperature
- 'Air off' heater matrix temperature
- External ambient
- Coolant temperature