

ENGINE COOLING - V8 N/A 5.0L PETROL/V8 S/C 5.0L PETROL

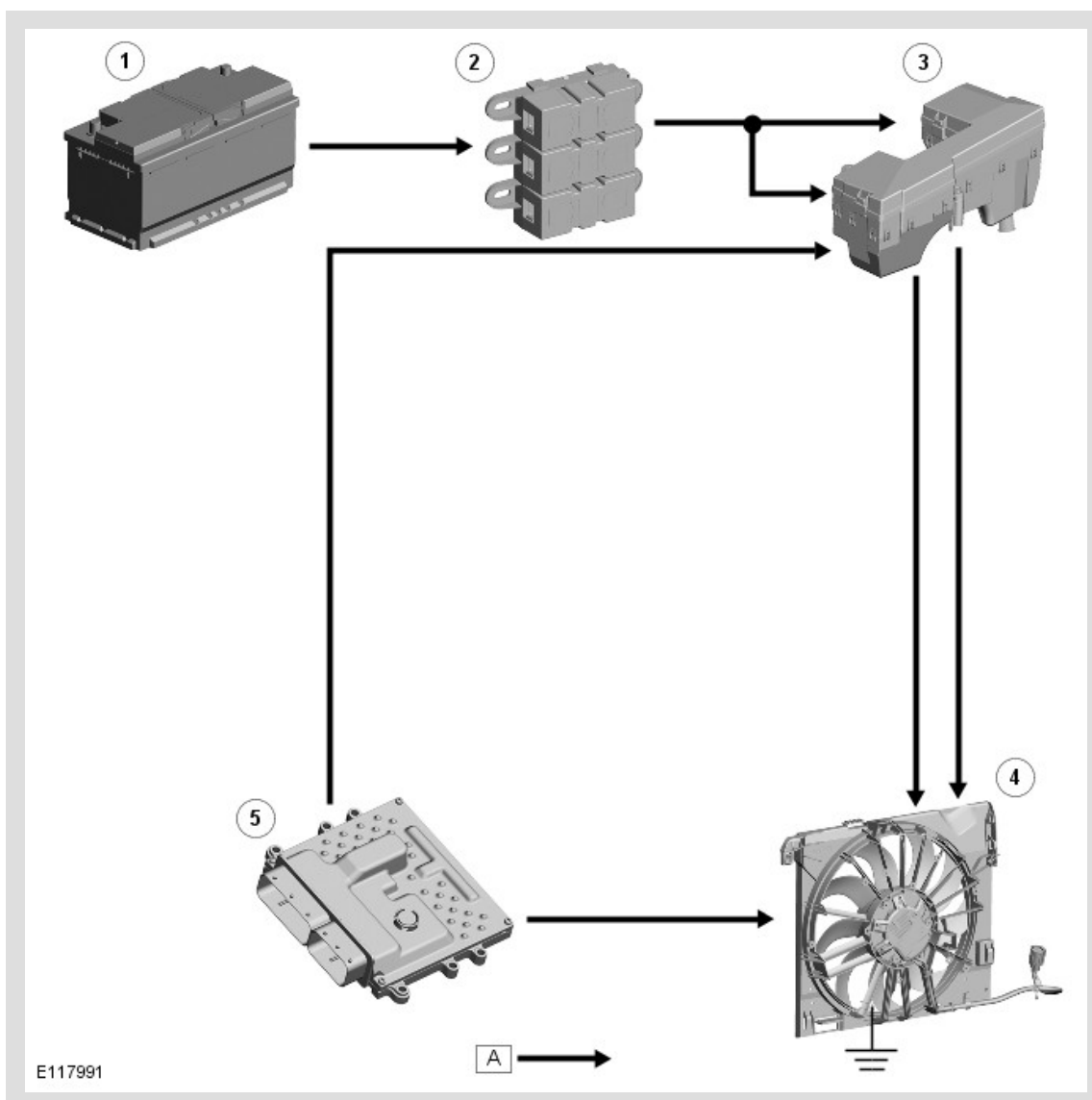
ENGINE COOLING - SYSTEM OPERATION AND COMPONENT DESCRIPTION (G1088323)

DESCRIPTION AND OPERATION

CONTROL DIAGRAM

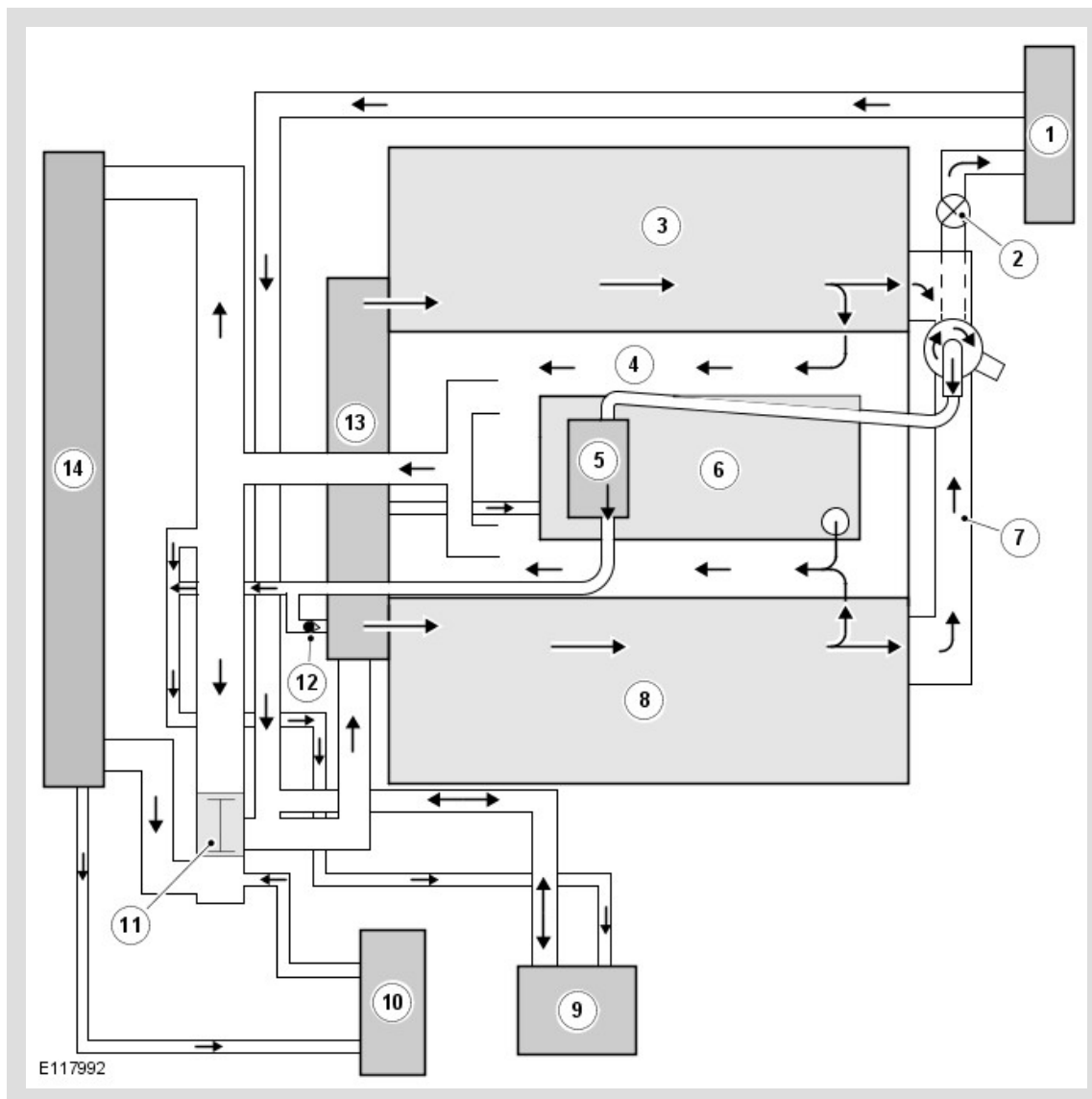
NOTE:

A = Hardwired



ITEM	DESCRIPTION
1	Battery
2	BJB (battery junction box) (250 A megafuse)
3	EJB (engine junction box)
4	Cooling fan
5	ECM (engine control module)

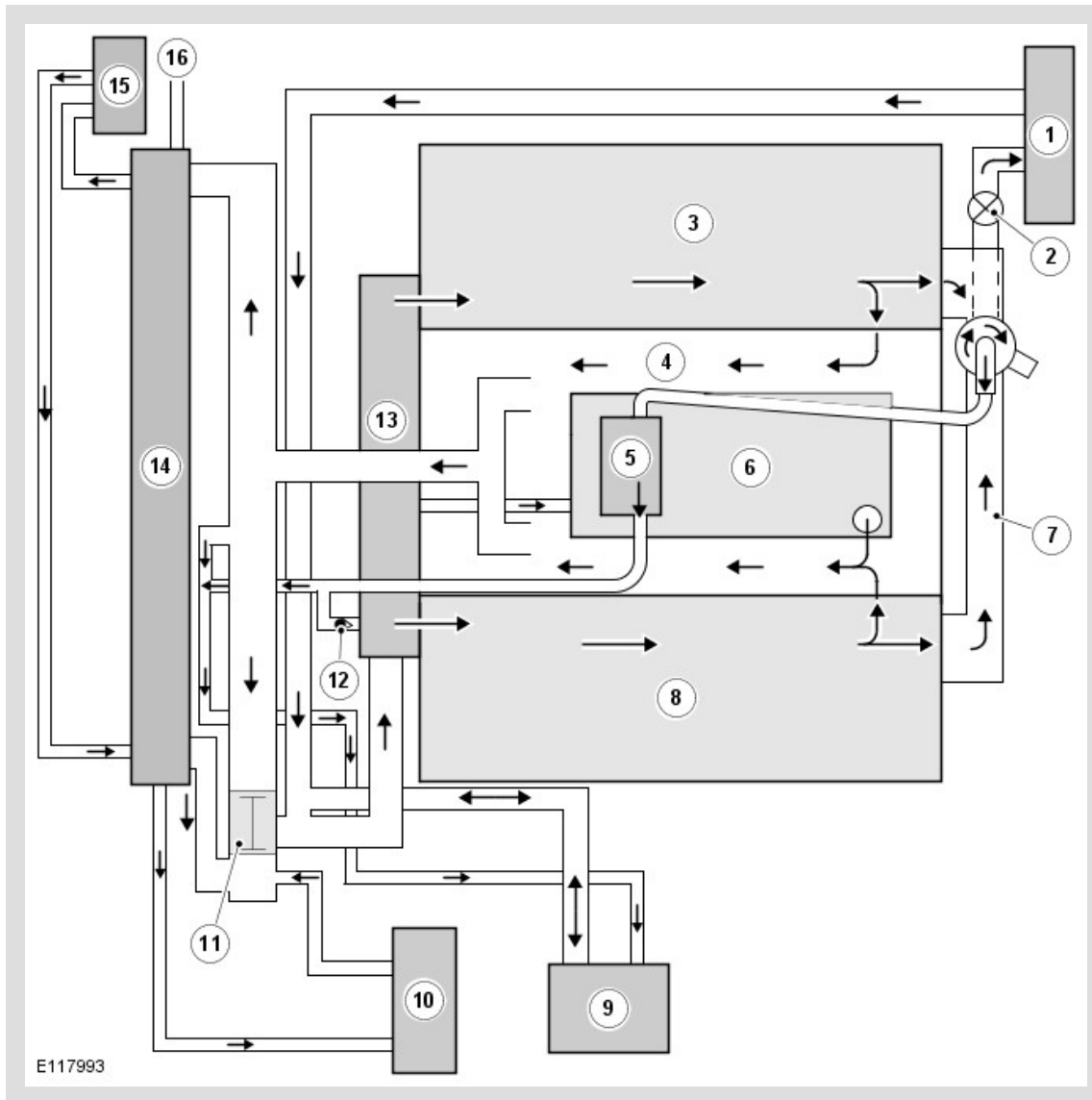
Engine Cooling Flow Diagram - Naturally Aspirated Vehicles



ITEM	DESCRIPTION
1	Heater core
2	Bleed screw
3	RH (right hand) cylinder head
4	Cylinder block
5	Throttle
6	Engine oil cooler
7	Heater manifold

8	LH (left hand) cylinder head
9	Expansion tank
10	Transmission fluid cooler
11	Thermostat
12	Check valve
13	Coolant pump
14	Radiator

Engine Cooling Flow Diagram - Supercharger Vehicles



ITEM	DESCRIPTION
1	Heater core
2	Bleed screw
3	RH cylinder head
4	Cylinder block
5	Throttle
6	Engine oil cooler

7	Heater manifold
8	LH cylinder head
9	Expansion tank
10	Transmission fluid cooler
11	Thermostat
12	Check valve
13	Coolant pump
14	Radiator
15	Auxiliary radiator
16	Connection with supercharger cooling system

SYSTEM OPERATION

When the engine is running, the coolant is circulated around the engine cooling system by the coolant pump. From the coolant pump, coolant flows through the cylinder heads and the engine oil cooler into the cylinder block and the heater manifold.

In the cylinder block, the coolant flows forwards to the outlet tube. When the coolant is cold, the thermostat is closed and the coolant flows direct from the outlet tube back to the coolant pump. Once the coolant reaches operating temperature the thermostat begins to open, to control system temperature, and coolant flows from the outlet tube to the coolant pump via the radiator and, on SC (supercharger) vehicles, the auxiliary radiator. When the thermostat is open, the coolant flow through the radiator(s) also generates a coolant flow through the transmission fluid cooler.

From the heater manifold the coolant flows through the electronic throttle and the heater core, in parallel circuits that are unaffected by the position of the thermostat. From the electronic throttle, the coolant merges with bleed coolant from the coolant pump and the outlet tube and flows to the expansion tank. From the heater core, the coolant flows back to the inlet of the coolant pump.

Expansion and contraction of the coolant is accommodated by an air space in the expansion tank and the compliance of the flexible hoses.

If the coolant level in the expansion tank decreases below a predetermined value, the level sensor connects a ground to the instrument cluster, which activates the appropriate warning. For additional information, refer to 413-01 Instrument Cluster.

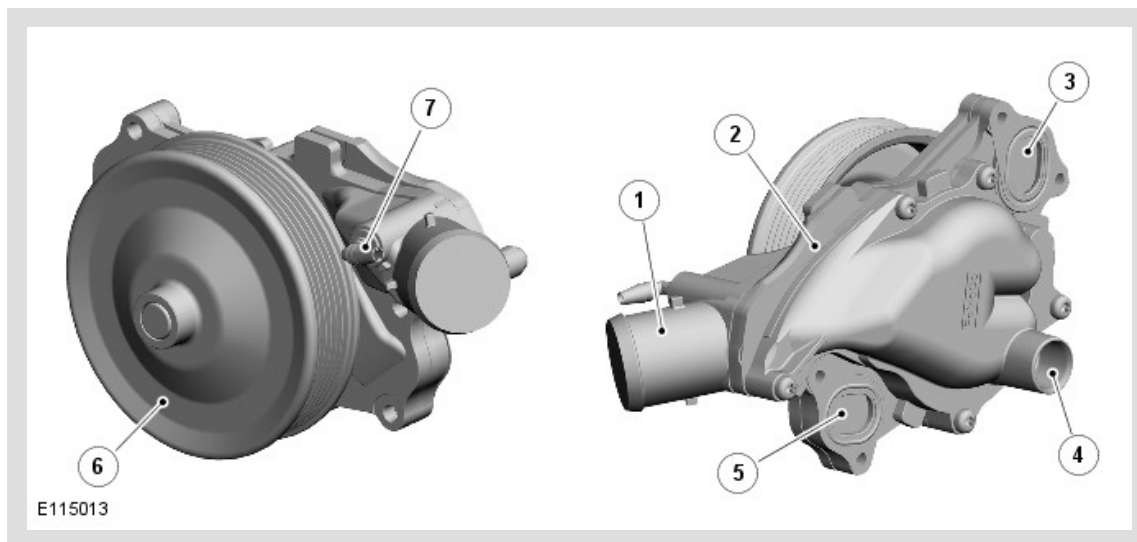
The cooling fan is operated by a fan control module integrated into the cooling fan motor. The fan control module regulates the voltage, and thus speed, of the cooling fan motor in response to a PWM (pulse width modulation) signal from the ECM (engine control module) .

The cooling fan receives a battery feed and an ignition feed from the EJB (engine junction box) . The ignition feed is supplied from the main relay in the EJB , which is controlled by the ECM .

The ECM calculates the required fan speed from the engine temperature, A/C (air conditioning) system pressure and transmission fluid temperature. Under hot operating conditions, the fan may continue to operate for 4 minutes after the engine has been switched off.

COMPONENT DESCRIPTION

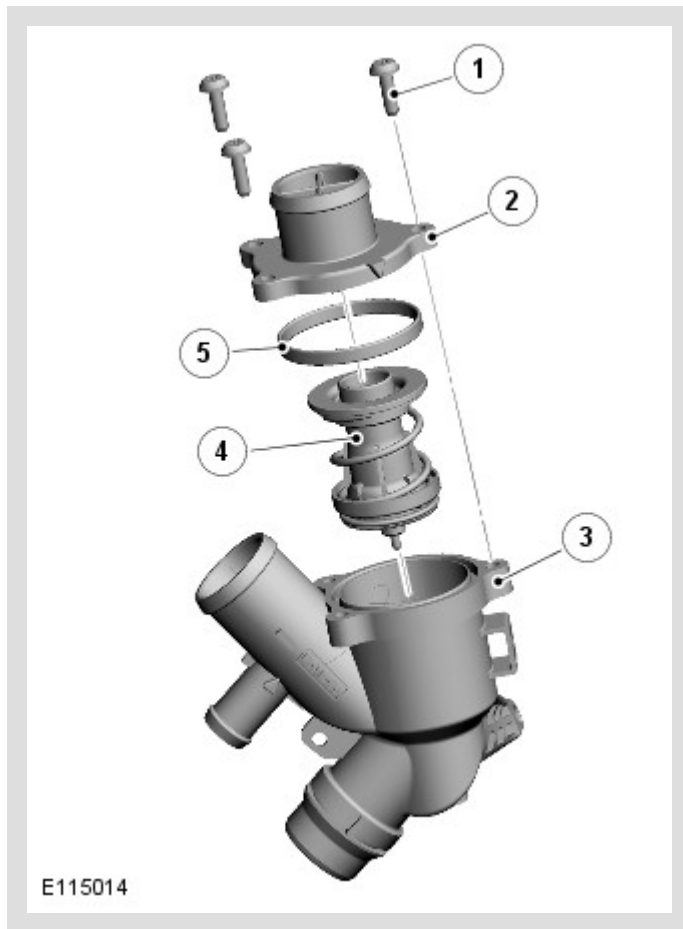
COOLANT PUMP



ITEM	DESCRIPTION
1	Inlet connection
2	Pump body
3	Outlet flange to RH cylinder head
4	Outlet to engine oil cooler
5	Outlet flange to LH cylinder head
6	Pulley
7	Bleed pipe connection (containing check valve)

The body of the coolant pump contains an impeller attached to a shaft supported in a bearing assembly. The impeller is driven by a pulley, pressed on to the front of the shaft, which is driven by the accessory drive belt. For additional information, refer to 303-05E Accessory Drive - 5.0L, Vehicles Without: Supercharger or 303-05F - 5.0L, Vehicles With: Supercharger.

Two coolant outlet flanges attach the coolant pump to the front of the cylinder heads. A pipe connects a further coolant outlet to a pipe from the engine oil cooler. A bleed connector is installed in the front of the coolant pump, adjacent to the coolant inlet connection from the thermostat. A check valve is incorporated into the bleed connection.



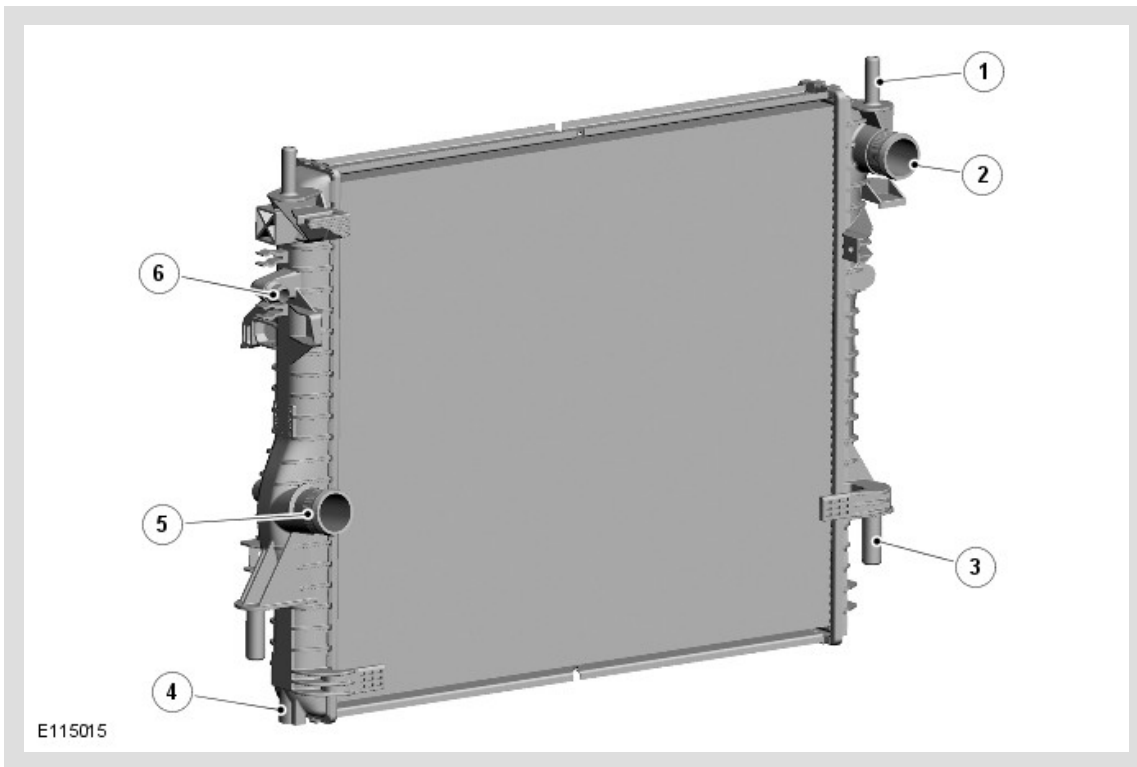
ITEM	DESCRIPTION
1	Screw (3 off)
2	Lower body
3	Upper body
4	Thermostat
5	Seal

The thermostat is a multi-stage device located in the coolant pump inlet to provide fast response and control of the engine outlet temperature.

The thermostat allows rapid engine warm-up by preventing coolant flow through the radiator and by limiting coolant flow through the cylinder block when the engine is cold. During warm-up and at engine speeds above approximately 1800 rev/min, a by-pass valve opens to control the coolant flow and pressure, to protect the engine components. When the thermostat opening reaches 6 mm (0.24 in.), the by-pass flow is shut-off. When the thermostat opening exceeds 6 mm (0.24 in.), the radiator coolant flow is further controlled up to the point where the thermostat is fully open. At this point maximum radiator coolant flow is achieved to provide maximum cooling.

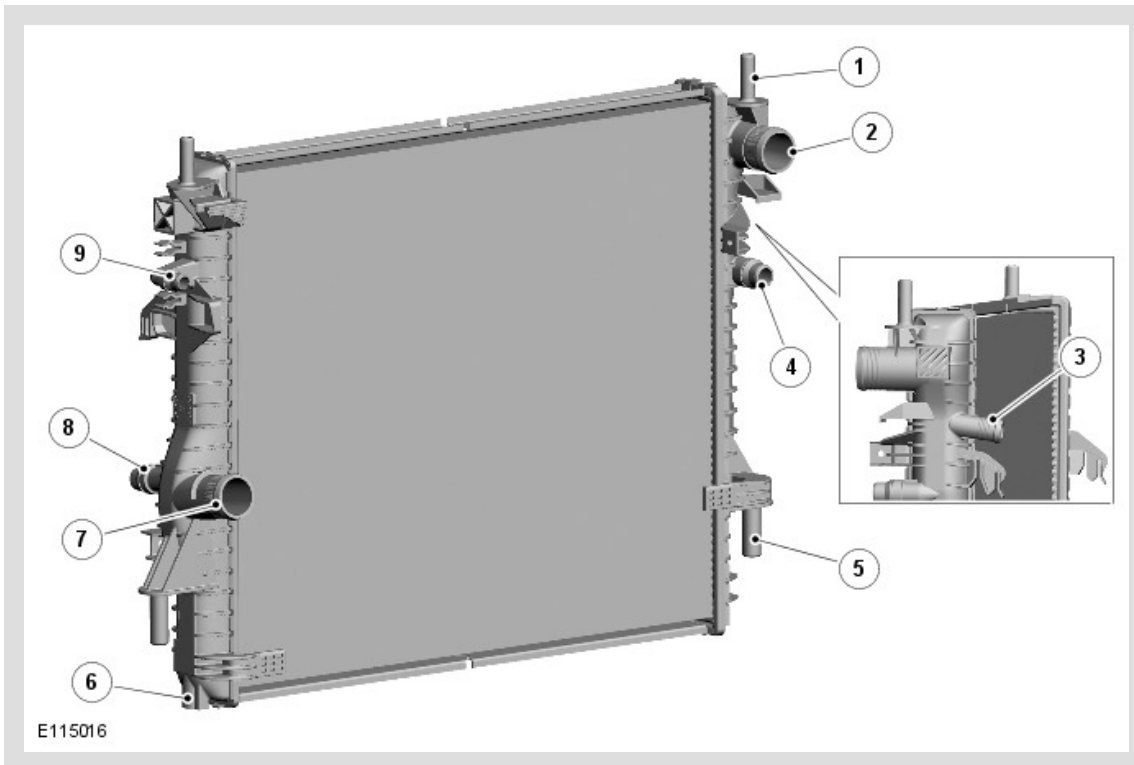
On both naturally aspirated and supercharger vehicles, the thermostat begins to open at 88 - 90 °C (190 - 194 °F) and is fully open at 102 °C (216 °F).

Radiator (Naturally Aspirated Vehicles)



ITEM	DESCRIPTION
1	Locating spigot (2 off)
2	Upper hose connection
3	Support (2 off)
4	Drain plug
5	Lower hose connection
6	Transmission fluid cooler inlet hose connection

Radiator (Supercharger Vehicles)



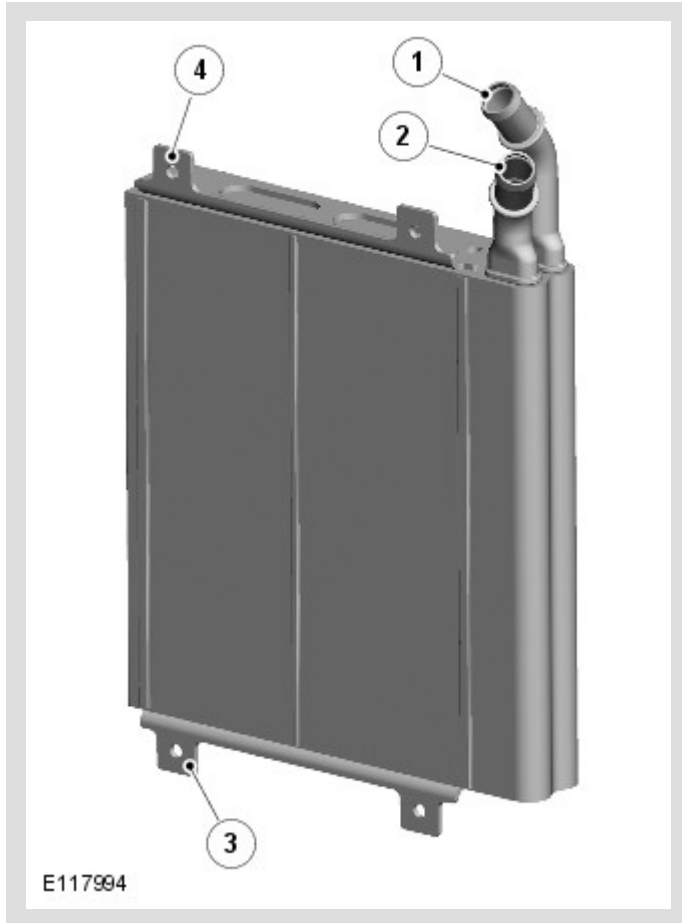
ITEM	DESCRIPTION
1	Locating spigot (2 off)
2	Upper hose connection
3	Supercharger cooling system connection
4	Auxiliary radiator inlet hose connection
5	Support (2 off)
6	Drain plug
7	Lower hose connection
8	Auxiliary radiator outlet hose connection
9	Transmission fluid cooler inlet hose connection

The radiator is a cross flow type with an aluminum core and plastic end tanks. The radiator is part of the cooling module and is attached to the vehicle by locating spigots and supports integrated into the end tanks. The supports are installed in rubber bushes located in mounting brackets on the front

subframe. The locating spigots are installed in rubber bushes located in mounting brackets on the front crossmember.

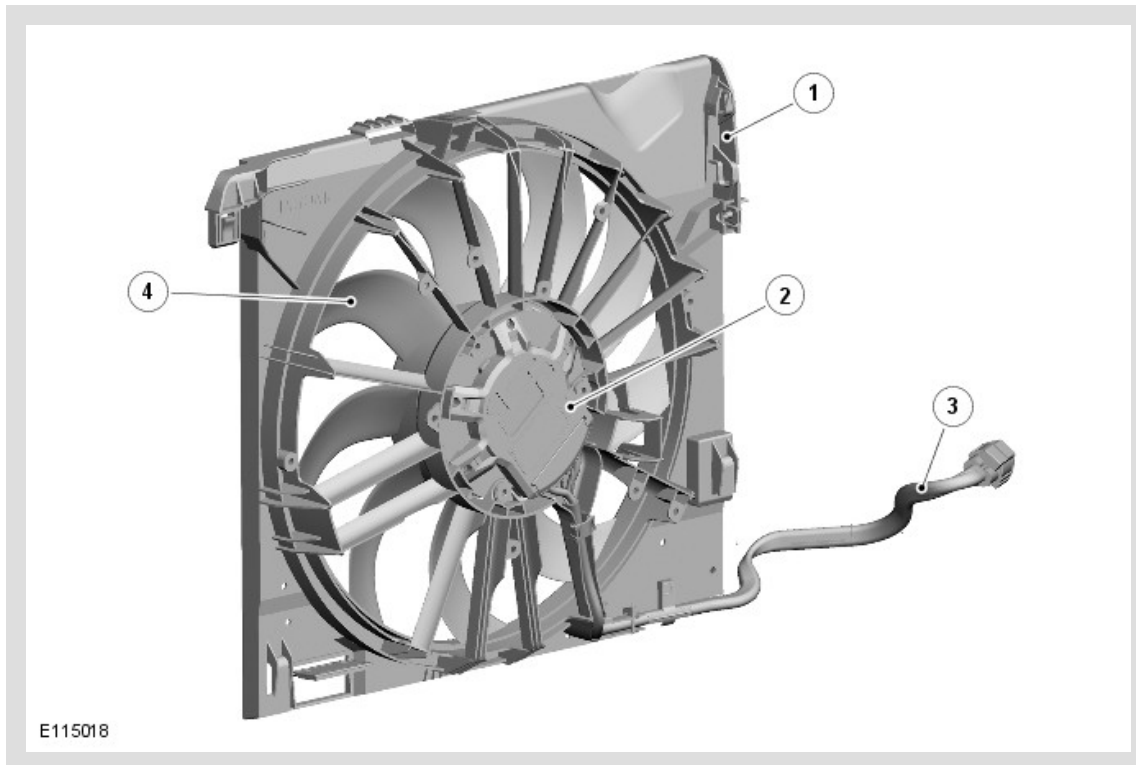
The two end tanks incorporate connections for the upper and lower hoses, the coolant supply hose of the transmission fluid cooler and, on SC vehicles, the supply and return hoses of the auxiliary radiator. A drain plug is installed in the bottom of the LH (left-hand) end tank.

AUXILIARY RADIATOR (SUPERCHARGER VEHICLES ONLY)



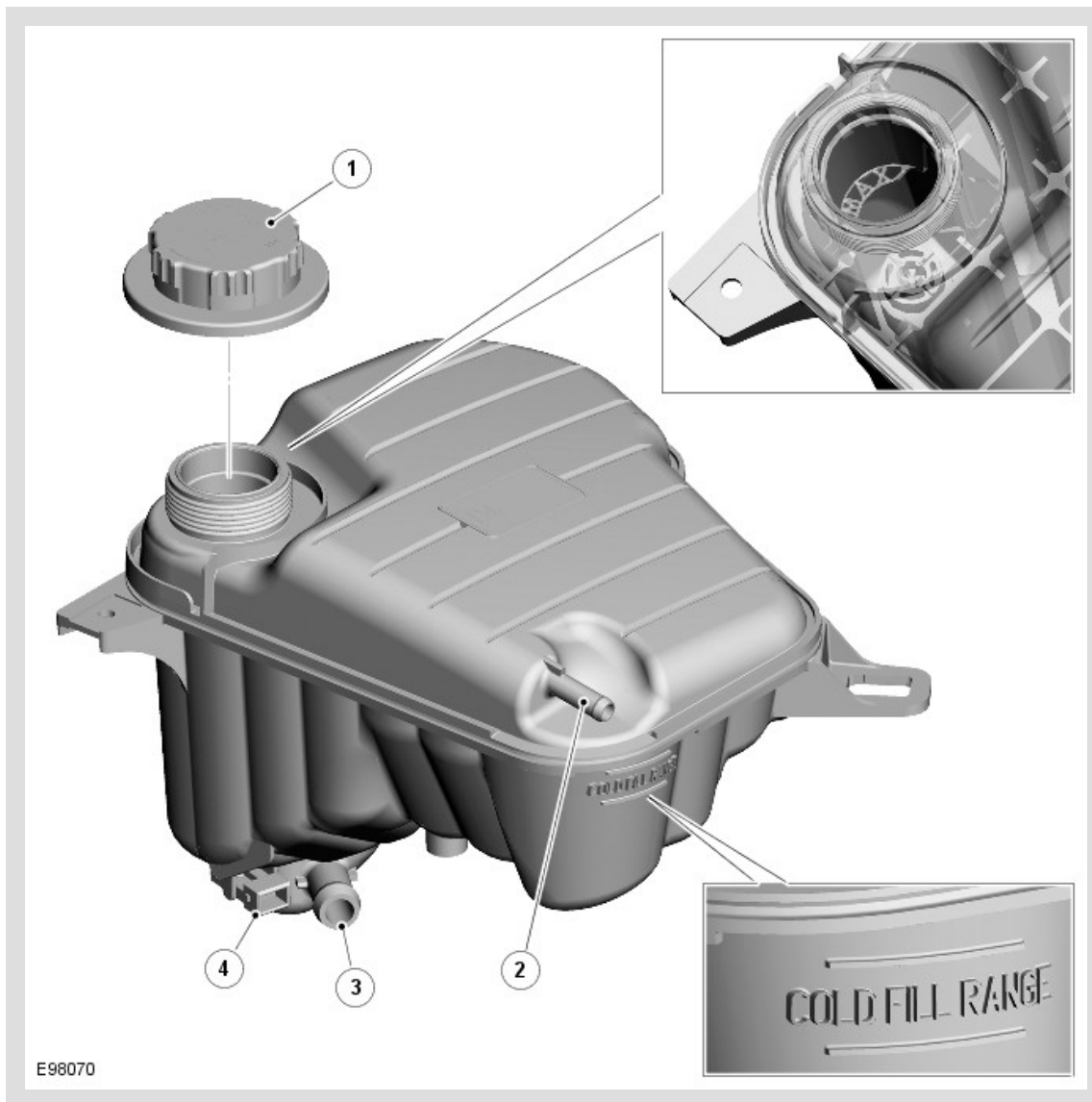
ITEM	DESCRIPTION
1	Return hose connection
2	Supply hose connection
3	Bottom bracket
4	Top bracket

The auxiliary radiator is connected in parallel with the (main) radiator to increase the engine cooling capacity on SC vehicles. The auxiliary radiator is installed in an air duct, to the right of the cooling module, which takes cooling air from the RH (right-hand) grille in the front bumper. Two spigots on the top of the auxiliary radiator provide the coolant supply and return connections with the main radiator.



ITEM	DESCRIPTION
1	Shroud
2	Motor and fan control module
3	Harness
4	Fan

An electric, variable speed cooling fan is installed in a shroud attached to the rear of the radiator. The cooling fan is operated by a fan control module, integrated into the electric motor, under the control of the ECM . An electrical connector at the RH side of the shroud provides the interface between the cooling fan harness and the vehicle wiring.



ITEM	DESCRIPTION
1	Filler cap
2	Vent hose connection
3	Expansion hose connection
4	Level sensor

The expansion tank is installed in the engine compartment, on the LH upper suspension housing.

A filler cap and level sensor are incorporated into the expansion tank. A MAX level marking is molded into the interior of the tank below the filler cap. Cold fill levels are molded onto the exterior of the tank.

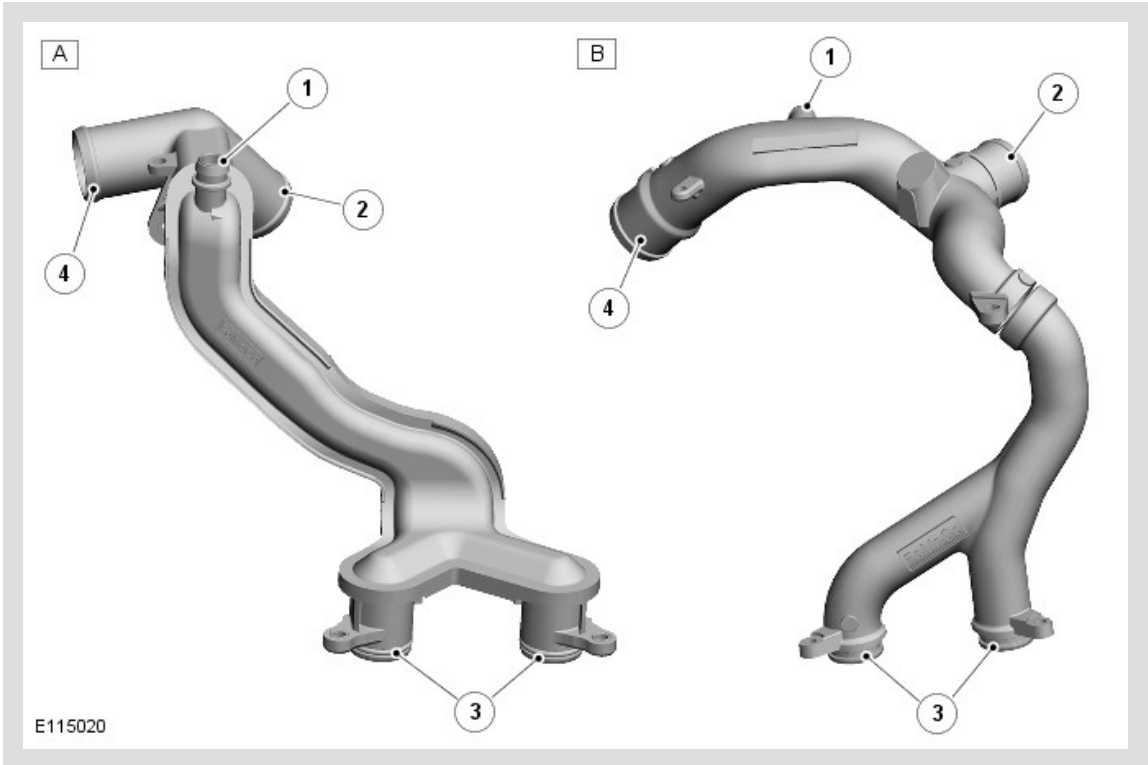
The expansion tank provides the following functions:

- Service fill.
- Coolant expansion during warm-up.
- Air separation during operation.
- System pressurization by the filler cap.

The expansion tank has an air space of approximately 0.5 liter (1.06 US pints), above the MAX level, to allow for coolant expansion.

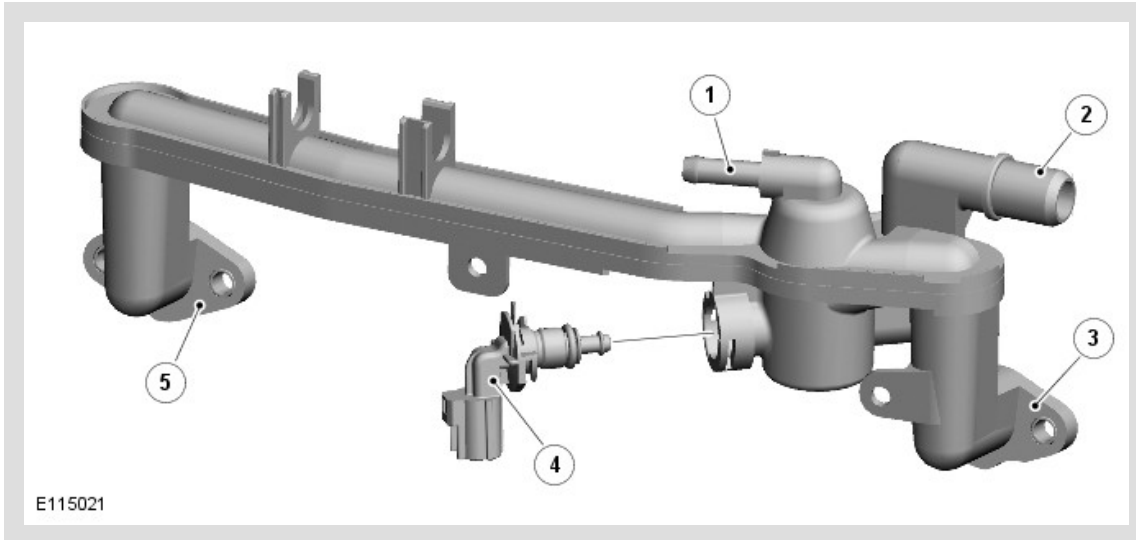
OUTLET TUBE AND HEATER MANIFOLD

Outlet Tube



ITEM	DESCRIPTION
A	Outlet tube on naturally aspirated vehicles
B	Outlet tube on supercharger vehicles
1	Bleed hose connection
2	Radiator upper hose connection
3	Cylinder block connections
4	Thermostat hose connection

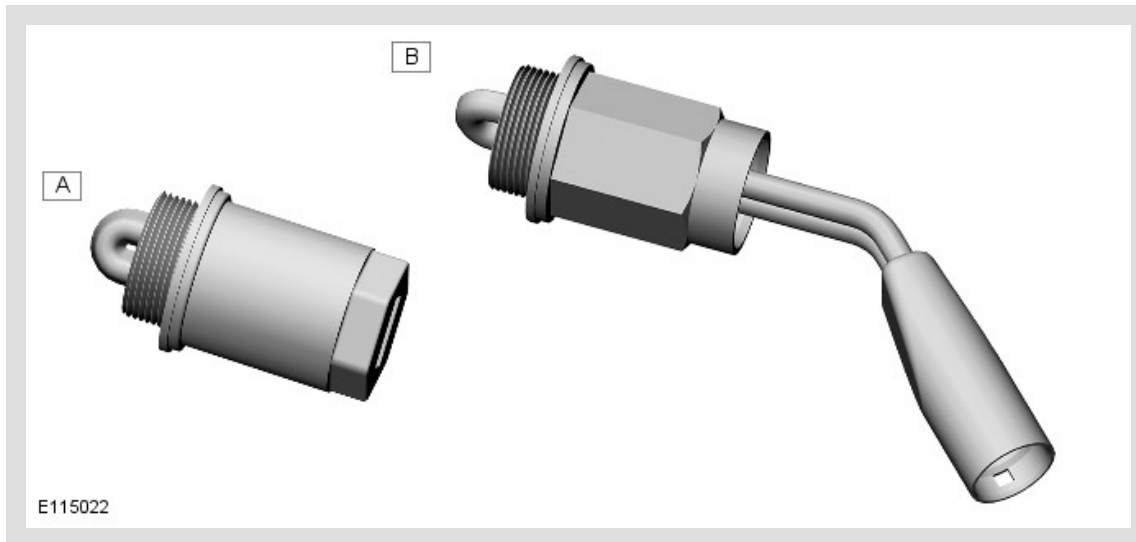
Heater Manifold



ITEM	DESCRIPTION
1	Throttle body heater hose connection
2	Heater core supply hose connection
3	RH cylinder head connection
4	Engine coolant temperature sensor
5	LH cylinder head connection

ENGINE COOLANT

The engine coolant is formulated to last for ten years or 240,000 km (150,000 miles). The coolant is silicate free and must not be mixed with conventional engine coolant.



ITEM	DESCRIPTION
A	110 V ac version
B	240 V ac version

For vehicle markets subject to very cold climatic conditions, an engine block heater is installed in place of the cylinder block drain plug. The engine block heater is either a 110 V ac or 240 V ac electric heater element, depending on the market, which can be connected to a domestic power supply via a connector in the lower center grill of the front bumper.