

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 -**Fluids and Lubricants**

Description	Specification
Jaguar Premium Cooling System Fluid	ESE-M97B44-A
Premium Cooling System Flush	EGR-M14P7-A
O-Ring Lubricant	ESE-M99B176-A

Cooling System Refill Capacities

Engine	Capacity
2.5/3.0L	8.25L

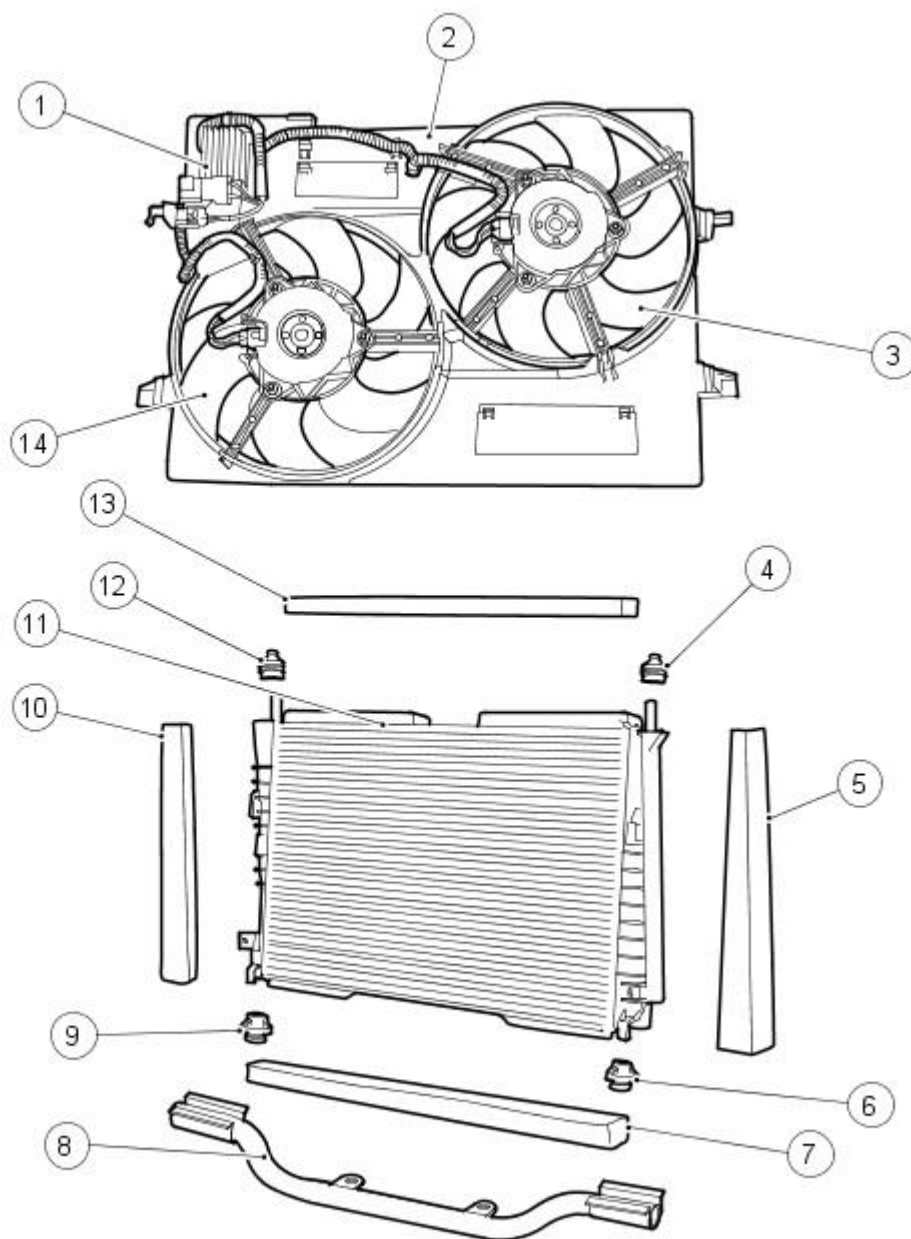
Torque Specifications

Description	Nm	lb-ft	lb-in
Air conditioning condenser retaining bolts	7	-	62
Block heater	40	30	-
Coolant expansion tank retaining bolt	3	-	27
Cooling fan motor control module retaining screws	2	-	18
Cooling fan motor retaining nuts	6	-	53
Engine block drain plug	40	30	-
Radiator drain plug	1	-	9
Radiator support beam retaining bolts	25	18	-
Thermostat housing retaining bolts	10	-	89
Water pump housing retaining bolts	10	-	89
Water pump to water pump housing retaining bolts	10	-	89
Water pump drive pulley retaining bolts	11	8	-
Water pump housing inlet pipe retaining nuts	9	-	80
Water pump housing inlet pipe retaining studs	12	9	-
Water pump housing outlet pipe retaining bolts	10	-	89

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Description and Operation

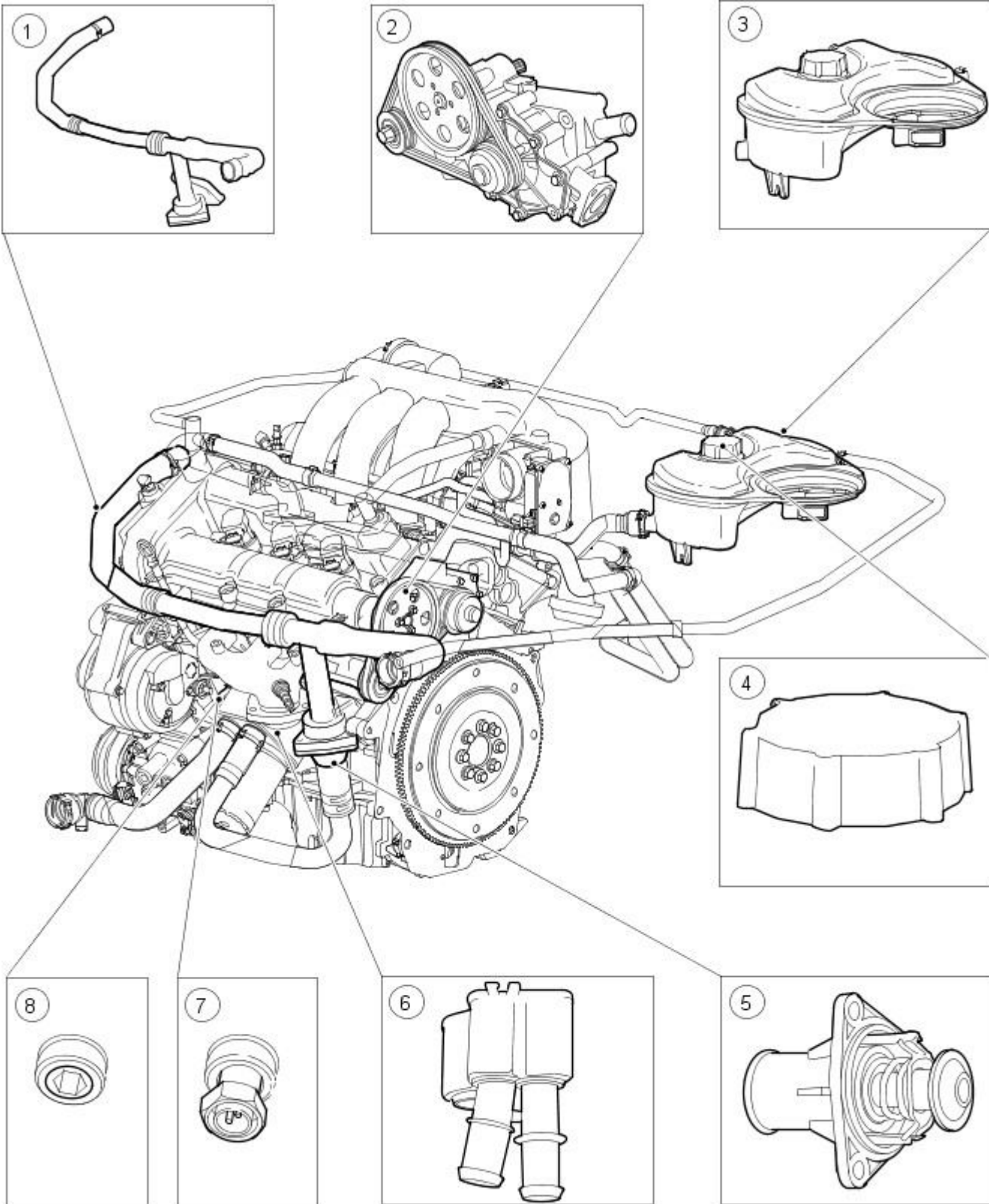
Cooling Module Components



VJJ0004066

Item	Part Number	Description
1	—	Cooling fan motor control module
2	—	Cooling fan shroud
3	—	Cooling fan, R/H
4	—	Radiator upper isolator mounting
5	—	Radiator side seal
6	—	Radiator lower isolator mounting
7	—	Radiator lower seal
8	—	Radiator support beam
9	—	Radiator lower isolator mounting
10	—	Radiator side seal
11	—	Radiator
12	—	Radiator upper isolator mounting
13	—	Radiator upper seal
14	—	Cooling fan, L/H

Engine Cooling System Components



VUJ0004061

Item	Part Number	Description
1	—	Upper coolant hose
2	—	Water pump
3	—	Coolant expansion tank
4	—	Coolant pressure cap
5	—	Thermostat
6	—	Engine oil cooler
7	—	Engine block heater (cold climate market vehicles only)
8	—	Engine block drain plug

• WARNINGS:

 Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.

To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.



Remove fuse 37 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fans when the engine is hot, since the cooling fan motors could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.

• CAUTIONS:



The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage.



Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in damage to the engine.

The cooling system consists of the following:

- Water pump.
- Thermostat.
- Radiator.
- Coolant expansion tank.
- Coolant pressure cap.
- Two electric cooling fans.
- Cooling fan motor control module.
- Engine oil cooler.

Water Pump

The water pump is of a conventional design and is located at the rear of the engine. It is driven by the L/H exhaust camshaft through the water pump drive pulley and belt. The water pump belt tension is maintained by an automatic drive belt tensioner. For additional information, refer to Section [303-05 Accessory Drive](#).

Thermostat

The thermostat is located in a housing in the upper coolant hose and allows rapid engine warm-up by restricting coolant flow through the radiator below 82°C (180°F). The thermostat also assists in keeping the engine operating temperature within predetermined limits. The thermostat begins to open at 82°C (180°F) and is fully open at 93°C (199°F).

When the engine is cold and the thermostat is closed, coolant flows from the water pump through the engine. It then returns to the water pump through the upper coolant hose.

When the engine is warm and the thermostat is open, coolant flows into the radiator through the upper coolant hose. It then returns to the water pump from the radiator through the lower coolant hose and engine oil cooler.

The heater core is on a parallel circuit and is unaffected by the position of the thermostat.

Radiator

The radiator is of aluminium construction with plastic end tanks. Foam seals are fitted to the radiator to prevent the cooling air from passing the radiator core. The radiator is located by four isolator mountings and supported by the radiator support beam. A coolant drain plug is provided in the lower coolant hose for the draining of the coolant. The Cooling fan shroud is attached to the radiator.

Cooling Fans

Two variable speed electric cooling fans are housed in the cooling fan shroud for the cooling of the radiator. The speed of the electric cooling fans are adjusted by the cooling fan motor control module, which is controlled by the engine control module (ECM).

The ECM determines the cooling fan speed by receiving inputs from the engine coolant temperature (ECT) sensor and the dual automatic temperature control module (DATC). The ECM sends a variable pulse width modulated (PWM) signal to the fan motor control module to operate the cooling fans at the required speed. The cooling fans are operated at slow speed when the engine coolant temperature is at 95°C (203°F) and are operated at full speed when the engine coolant temperature is at 105°C (221°F). A coolant temperature between these temperatures will cause the cooling fans to be operated at a speed which is proportional to the engine coolant temperature.

When the engine is running with the ECT above 100°C (212°F), if the ignition switch is turned to the OFF position the cooling fans will continue to operate for a time which is determined by the ECM.

If the PWM signal from the ECM to the cooling fan control module is between 7% and 95% the cooling fan control module will operate the cooling fans at the required speed. If the PWM signal from the ECM to the cooling fan control module is below 3% and above 95% the cooling fan control module will operate the cooling fans at maximum speed. If the PWM signal from the ECM to the cooling fan control module is between 3% and 7% the cooling fans will not be operated.

Engine Block Heater

For vehicle markets subject to very cold climate conditions, an engine block heater for connection to an external mains power supply, is fitted in place of the engine block drain plug.

Coolant Recovery System

A pressurized coolant expansion tank system is used which continuously separates the air from the cooling system and replenishes the system through the coolant expansion tank outlet hose, attached to the heater return hose.

A continuous vent from the engine and radiator to the coolant expansion tank prevents air locks from forming in the cooling system.

No manual bleed points are provided on the system.

The coolant expansion tank serves as the location for:

- Service fill.

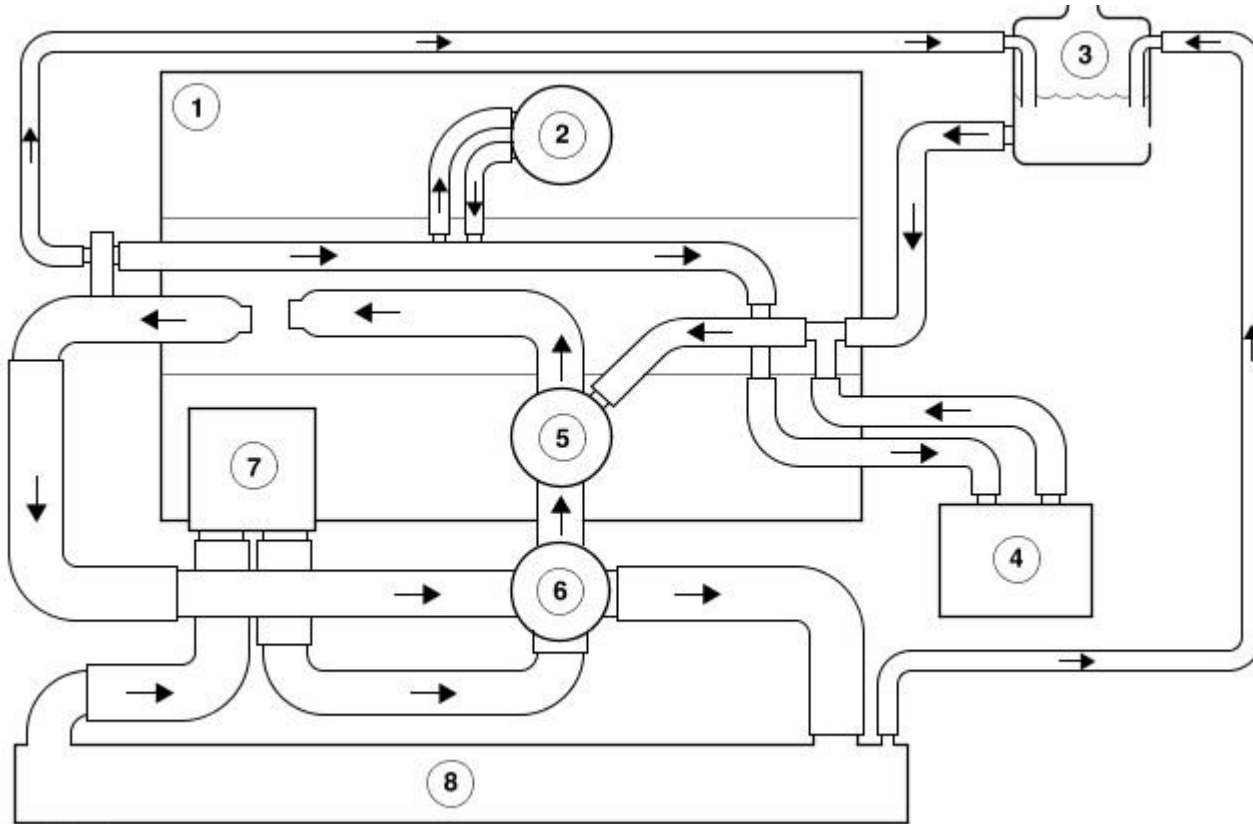
- Coolant expansion during warm-up.
- Air separation during operation.
- System pressurization by the coolant pressure cap.
- The coolant expansion tank is designed to have approximately 0.5 to 1 liter of air when cold to allow for coolant expansion.

Engine Oil Cooler

The engine oil cooler is a Modine oil to water type. The oil cooler is fitted between the oil filter housing and the oil filter and is a full flow system.

The coolant supply for the engine oil cooler is through the radiator bottom hose.

Coolant Flow Diagram (Thermostat open)



VJJ0004060

Item	Part Number	Description
1	—	Engine
2	—	Throttle body
3	—	Expansion tank
4	—	Heater core
5	—	Water pump
6	—	Thermostat
7	—	Engine oil cooler
8	—	Radiator

Engine Coolant

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

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Diagnosis and Testing

1. Verify the customer concern.
2. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
3. Visually inspect for obvious signs of mechanical or electrical damage.
4. If the concern is not an electrical fault and is not visually evident, verify the concern and refer to the symptom chart.
5. If the concern is an electrical fault and is not visually evident, use a fault code reader to retrieve the fault codes before proceeding to the symptom chart.

Visual Inspection Chart

Mechanical	Electrical
Leaks	Fuse
Coolant expansion tank	Wiring harness
Coolant pressure cap	Loose or corroded connector(s)
Cooling fan motor(s)	Cooling fan motor(s)
Radiator	Engine coolant temperature (ECT) sensor
Water pump	Cooling fan motor control module
-	Block heater

Symptom chart

Symptom	Possible Sources	Action
DTC P0480: High/low signal from the cooling fan motor control module to the engine control module (ECM)	* Fuse F40 (80A), power distribution fuse box. * Circuit. * Cooling fan motor. * Cooling fan motor control module. * ECM.	* GO to Pinpoint Test A.
Loss of coolant	* Hoses. * Hose connections. * Radiator. * Water pump. * Heater core. * Gaskets. * Coolant expansion tank. * Coolant pressure cap. * Engine casting cracks. * Engine core plugs.	* Go to Pinpoint Test B.
Engine overheats	* Engine coolant. * Thermostat. * Fuse F40 (80A), power distribution fuse box. * Circuit. * Cooling fan motor(s). * Radiator. * Water pump. * Water pump drive belt. * Engine coolant temperature (ECT) sensor. * ECM. * Cooling fan motor control module.	* Go to Pinpoint Test C.
Engine block heater does not operate properly	* Block heater power cable. * Block heater.	* Go to Pinpoint Test D.
The engine does not reach normal operating temperature	* Thermostat.	* INSTALL a new thermostat.

PINPOINT TEST A : DTC P0480; HIGH/LOW SIGNAL FROM THE COOLING FAN MOTOR CONTROL MODULE TO THE ECM

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK THE OPERATION OF THE COOLING FANS	
1	Disconnect the engine coolant temperature sensor electrical connector.
2	Connect a 100 ohm resistor to the engine coolant temperature sensor electrical connector.
3	START and RUN the engine.
	Are the cooling fans operating? Yes GO to A2. . No GO to A7. .
A2: CHECK THE OPERATION OF THE TWO COOLING FANS	
1	Inspect the operation of the two cooling fans.
	Are both the cooling fans operating? Yes Connect the engine coolant temperature sensor electrical connector. GO to A4. . No GO to A3. .
A3: RUN THE TWO COOLING FANS AT MAXIMUM SPEED.	
1	Turn the ignition switch to the OFF position and disconnect the cooling fan control module electrical connector JB187 (to VIN E71957) and connector JB190 (from VIN 71958).
2	Remove the PWM signal wire from the cooling fan control module electrical connector JB187-1 (WU) (to VIN E71957) and connector JB190-4 (WU) (from VIN 71958).

- 3** Connect the cooling fan control module electrical connector JB187 (to VIN E71957) and connector JB190 (from VIN 71958) and turn the ignition switch to the RUN position. The cooling fans will run at maximum speed.
- 4** Allow the cooling fans to run for 5 minutes. Turn the ignition switch to the OFF position and disconnect the cooling fan control module electrical connector JB187 (to VIN E71957) and connector JB190 (from VIN 71958).
- 5** Install the PWM signal wire to the cooling fan control module electrical connector JB187-1 (WU) (to VIN E71957) and connector JB190-4 (WU) (from VIN 71958).
- 6** Connect the cooling fan control module electrical connector JB187 (to VIN E71957) and connector JB190 (from VIN 71958) to the cooling fan control module.
- 7** Turn the ignition switch to the RUN position.

Are both the cooling fans operating?

Yes

Connect the engine coolant temperature sensor electrical connector. [GO to A4.](#) .

No

INSTALL a new cooling fan motor as necessary. For additional information, refer to REFER to: [Cooling Fan Motor](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
 . CLEAR the DTC. TEST the system for normal operation.

A4: CHECK CONTINUITY OF THE COOLING FAN MOTOR CONTROL MODULE SIGNAL WIRE FROM THE ECM

1 Turn the ignition switch to the OFF position.

2 Disconnect the ECM electrical connector EN16 and the cooling fan motor control module electrical connector JB187 (to VIN E71957) and connector JB190 (from VIN 71958).

3 Measure the resistance between electrical **connector (JB187-1 to VIN E71957) or connector (JB190-4 from VIN 71958)** and EN16-51.

Is the resistance less than 5 ohms?

Yes

[GO to A5.](#) .

No

REPAIR the circuit from the ECM to the cooling fan motor control module. CLEAR the DTC. TEST the system for normal operation.

A5: CHECK THE COOLING FAN MOTOR CONTROL MODULE SIGNAL WIRE FROM THE ECM FOR A SHORT TO GROUND

1 Measure the resistance between **connector (JB187-1 to VIN E71957) or connector (JB190-4 from VIN 71958)** and ground.

Is the resistance less than 10,000 ohms?

Yes

[GO to A6.](#) .

No

REPAIR the circuit from the ECM to the cooling fan motor control module. CLEAR the DTC. TEST the system for normal operation.

A6: CHECK THE COOLING FAN MOTOR CONTROL MODULE SIGNAL WIRE FROM THE ECM FOR A SHORT TO BATTERY POSITIVE

1 Measure the resistance between JB187-1 and JB187-2 (to VIN E71957) or JB190-4 and JB190-3 (from VIN 71958).

Is the resistance less than 10,000 ohms?

Yes

INSTALL a new cooling fan motor control module. For additional information, refer to REFER to: [Cooling Fan Module](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. For additional information, refer to REFER to: [Electronic Engine Controls](#) (303-14A Electronic Engine Controls - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Description and Operation).

No

REPAIR the circuit from the ECM to the cooling fan motor control module. CLEAR the DTC. TEST the system for normal operation.

A7: CHECK FUSE F40 IN THE POWER DISTRIBUTION FUSE BOX

1 Check the fuse.

Is the fuse OK?

Yes

[GO to A9.](#) .

No

[GO to A8.](#) .

A8: CHECK FUSE F40 OF THE POWER DISTRIBUTION FUSE BOX FOR A SHORT TO GROUND

1 Measure the resistance between electrical connector JB212-1 of the power distribution fuse box and ground.

Is the resistance less than 10,000 ohms?

Yes

REPAIR short to ground between the engine compartment fuse box and the cooling fan motor control module. INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.

No

INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.

A9: CHECK THE POWER SUPPLY TO THE COOLING FAN MOTOR CONTROL MODULE

1 Measure the voltage between the cooling fan motor control module electrical connector JB212-1 and ground.

Is the voltage less than 10 volts?

Yes

[GO to A10.](#) .

No

[GO to A11.](#) .

A10: CHECK FOR BATTERY VOLTAGE AT FUSE F40 OF THE ENGINE COMPARTMENT FUSE BOX

1 Measure the voltage between the engine compartment fuse box electrical connector JB212-1 and ground

Is the voltage less than 10 volts?

Yes

Repair the circuit between engine compartment fuse box and the battery. CLEAR the DTC. TEST the system for normal operation.

No

REPAIR the circuit between the engine compartment fuse box and the cooling fan motor control module. CLEAR the DTC. TEST the system for normal operation.

A11: CHECK THE IGNITION SUPPLY TO THE COOLING FAN MOTOR CONTROL MODULE

1 Turn the ignition switch to the RUN position.

2 Measure the voltage between the cooling fan motor control module electrical connector (JB187-2 to VIN E71957) or connector (JB190-3 from VIN 71958) and ground.

Is the voltage less than 10 volts?

Yes

REPAIR the circuit between the engine compartment fuse box and the cooling fan motor control module. CLEAR the DTC. TEST the system for normal operation.

No

[GO to A12.](#)

A12: CHECK THE COOLING FAN MOTOR CONTROL MODULE GROUND CIRCUIT

1 Measure the resistance between the cooling fan motor control module electrical connector (JB188-2 to VIN E71957) or connector (JB190-2 from VIN 71958) and ground.

Is the resistance less than 5 ohms?

Yes

INSTALL a new cooling fan motor control module. For additional information, refer to REFER to: [Cooling Fan Module](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. For additional information, refer to REFER to: [Electronic Engine Controls](#) (303-14A Electronic Engine Controls - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Description and Operation).

No

REPAIR the ground circuit to the cooling fan motor control module. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST B : LOSS OF COOLANT

TEST CONDITIONS

DETAILS/RESULTS/ACTIONS

B1: VISUAL INSPECTION

1 Visually inspect for loss of coolant.

Is the engine cooling system leaking?

Yes

INSTALL a new component as required. For additional information, refer to the appropriate section. TEST the cooling system for normal operation.

No


Carry out the Cooling System Pressure TEST. For additional information, refer to the component test in this section.

PINPOINT TEST C : THE ENGINE OVERHEATS

TEST CONDITIONS

DETAILS/RESULTS/ACTIONS

C1: CHECK COOLANT

 **WARNING:** Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.

To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.

 **CAUTION:** Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal damage to the engine.

1 Inspect the coolant level.

Is the coolant level OK?

Yes

[GO to C2.](#)

No

DIAGNOSE and REPAIR the coolant leaks. REFILL the cooling system. For additional information, refer to REFER to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).
TEST the cooling system for normal operation.

C2: CHECK THE CONDITION OF THE WATER PUMP DRIVE BELT

1 Inspect the water pump drive belt. For additional information, refer to REFER to: [Water Pump Belt - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27](#) (303-05 Accessory Drive, Removal and Installation).

Is the water pump drive belt OK?

Yes

[GO to C3.](#)

No

INSTALL a new water pump drive belt. For additional information, refer to REFER to: [Water Pump Belt - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27](#) (303-05 Accessory Drive, Removal and Installation).
TEST the cooling system for normal operation.

C3: CHECK THE WATER PUMP DRIVE

1 Remove the water pump drive belt. For additional information, refer to REFER to: [Water Pump Belt - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27](#) (303-05 Accessory Drive, Removal and Installation).

2 Attempt to turn the water pump drive pulley by hand.

Does the water pump drive pulley turn?

Yes

[GO to C4.](#)

No

[GO to C5.](#)

C4: CHECK THE LEFT HAND EXHAUST CAMSHAFT

1 Remove the water pump. For additional information, refer to REFER to: [Water Pump](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

2 Inspect the water pump drive shaft splines of the exhaust camshaft.

Are the drive splines OK?

Yes

Install a new water pump. For additional information, refer to REFER to: [Water Pump](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
. TEST the system for normal operation.

No

INSTALL a new camshaft. For additional information, refer to REFER to: [Camshafts LH](#) (303-01A Engine - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, In-vehicle Repair).
. Install a new water pump. For additional information, refer to REFER to: [Water Pump](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
. TEST the system for normal operation.

C5: CHECK THE OPERATION OF THE COOLING FANS

1 Disconnect the engine coolant temperature (ECT) sensor electrical connector.

2 Connect a 100 ohm resistor to the engine coolant temperature sensor electrical connector.

3 Turn the ignition switch to the RUN position.

Are the cooling fans operating?

Yes

Turn the ignition switch to the OFF position. Connect the ECT sensor. [GO to C7.](#) .

No

Turn the ignition switch to the OFF position. Connect the ECT sensor. [GO to A1.](#) .

C6: CHECK THE AIR CONDITIONING CONDENSER AND RADIATOR CORE FOR OBSTRUCTION.

1 INSPECT the air conditioning condenser and radiator core for obstruction.

Is the air conditioning condenser or radiator core obstructed?

Yes

Remove the obstruction and clean the air conditioning condenser and radiator core. TEST the system for normal operation.

No

[GO to C8.](#) .

C7: CHECK THE OPERATION OF THE COOLING FANS WITH THE ENGINE RUNNING AT NORMAL OPERATING TEMPERATURE

1 START and RUN the engine until the ECT is between 95°C (203°F) and 105°C (221°F).

Are the cooling fans operating?

Yes

Turn the ignition switch to the OFF position. [GO to C8.](#) .

No

DIAGNOSE the electronic engine controls. For additional information, refer to REFER to: [Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492](#) (303-14A Electronic Engine Controls - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).

C8: CHECK THE TEMPERATURE OF THE RADIATOR

1 Check the radiator core temperature.

Is the radiator core hot?

Yes

[GO to C9.](#) .

No

[GO to C10.](#) .

C9: CHECK THE RADIATOR CORE FOR COLD SPOTS

1 Check the radiator core for cold spots.

Does the radiator core have any cold spots?

Yes

Backflush the radiator. For additional information, refer to REFER to: [Cooling System Backflushing](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).
. TEST the system for normal operation. If the fault is still present, INSTALL a new radiator. For additional information, refer to REFER to: [Radiator](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

No

[GO to C10.](#) .

C10: CHECK THE THERMOSTAT

1 TEST the thermostat. For additional information, refer to the component TEST in this section.

Is the thermostat OK?

Yes

[GO to C11.](#) .

No

INSTALL a new thermostat. For additional information, refer to REFER to: [Thermostat](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
. TEST the system for normal operation.

C11: CHECK THE ENGINE OIL COOLER FOR A BLOCKAGE

1 Remove the engine oil cooler. For additional information, refer to REFER to: [Oil Cooler](#) (303-01A Engine - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, In-vehicle Repair).

2 Check the engine oil cooler for a coolant blockage.

Is the engine oil cooler blocked?

Yes

Install a new engine oil cooler. For additional information, refer to REFER to: [Oil Cooler](#) (303-01A Engine - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, In-vehicle Repair).
. TEST the system for normal operation.

No

INSTALL a new water pump. For additional information, refer to REFER to: [Water Pump](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

. TEST the system for normal operation.

PINPOINT TEST D : THE ENGINE BLOCK HEATER DOES NOT OPERATE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK CONTINUITY OF THE BLOCK HEATER POWER SUPPLY CABLE AND THE BLOCK HEATER	
	1 Measure the resistance between the live supply terminal and the negative terminal of the block heater power supply connector.
	Is the resistance less than 20 ohms? Yes Repair the mains power supply to the vehicle block heater cable. TEST the system for normal operation. No GO to D2.
D2: CHECK THE CONTINUITY OF THE BLOCK HEATER	
	1 Disconnect the block heater electrical connector from the block heater.
	2 Measure the resistance between the live supply terminal and the negative terminal of the block heater.
	Is the resistance less than 20 ohms? Yes GO to D3. No INSTALL a new block heater. For additional information, refer to REFER to: Block Heater (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). . TEST the system for normal operation.
D3: CHECK THE BLOCK HEATER FOR A SHORT TO GROUND	
	1 Measure the resistance between the live supply terminal and the earth terminal of the block heater.
	Is the resistance less than 10,000 ohms? Yes Install a new block heater. For additional information, refer to REFER to: Block Heater (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). . TEST the system for normal operation. No GO to D4.
D4: CHECK THE CONTINUITY OF THE BLOCK HEATER POWER SUPPLY CABLE	
	1 Measure the resistance of the live supply wire of the block heater cable.
	2 Measure the resistance of the neutral supply wire of the block heater cable.
	3 Measure the resistance of the ground supply wire of the block heater cable.
	Is the resistance less than 5 ohms? Yes GO to D5. No Install a new block heater power supply cable. TEST the system for normal operation.
D5: CHECK THE BLOCK HEATER POWER SUPPLY CABLE FOR A SHORT CIRCUIT	
	1 Measure the resistance between the live supply wire and the neutral supply wire of the block heater cable.
	2 Measure the resistance between the live supply wire and the ground wire of the block heater cable.
	Is the resistance less than 10,000 ohms? Yes Install a new block heater power supply cable. TEST the system for normal operation. No Repair the mains power supply to the vehicle block heater cable. TEST the system for normal operation.

Component Tests

Pressure Test



WARNING: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.

To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.

1. Switch the engine OFF.
2. Open the hood and install protective fender covers.
3. Carefully remove the coolant pressure cap from the coolant expansion tank to relieve pressure from the cooling system. Add coolant to the coolant expansion tank as necessary.
4. Install the cooling system Pressure Tester adaptor tightly to the coolant expansion tank.
5. Attach the pressure pump and gauge to the adapter fitting and pressurize the cooling system to 100 kPa (14.5 psi).
6. Observe the gauge reading for approximately two minutes. The pressure should not drop during this time.
 - If system holds pressure, proceed to step 8.
 - If the pressure drops check for leaks in the cooling system. Correct any leaks found and recheck the system.
7. Release the system pressure by slowly loosening the cooling system Pressure Tester adaptor. Check the coolant level and replenish as necessary with the correct coolant solution.
8. Conduct the pressure cap Pressure Test in this section.

Coolant Expansion Tank Pressure Cap Pressure Test



WARNING: Never remove the coolant expansion tank cap under any circumstances while the engine is operating. Failure to follow these instructions may result in damage to the cooling system or engine and/or personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant expansion tank cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant expansion tank cap and turn it slowly until the pressure begins to release, step back while the pressure is released from the system. When certain that all pressure has been released, (still with a cloth) turn and remove the coolant expansion tank cap. Failure to follow these instructions may result in personal injury.

1. Remove the coolant pressure cap from the coolant expansion tank.
2. Install the coolant pressure cap to the coolant system Pressure Tester.
3. Operate the cooling system pressure tester. Pressurize the coolant pressure cap until the pressure relief valve in the coolant pressure cap opens and observe the gauge reading.
 - NOTE: If the plunger of the pump is operated too quickly, an erroneous pressure reading will result.
3. Compare the gauge reading with the maximum opening pressure of the coolant pressure cap: 100 KPa (14.5 psi).
4. Release the pressure. Repeat Step 3 at least twice to make sure that the pressure test reading is repeatable and within acceptable gauge reading limits of the expansion tank cap.
5. If the pressure test gauge readings are not within acceptable gauge reading limits, install a new coolant pressure cap.
6. Pressurize the coolant pressure cap until the pressure is just below the opening pressure of the coolant pressure cap.
7. Observe the reading of the pressure gauge for one minute. The pressure should not fall within this time.
8. If the pressure falls below 10 KPa (1.5 psi) of the recorded pressure, install a new coolant pressure cap.

Thermostat Test, Mechanical

- NOTE: Fully open means the thermostat valve lifts a distance of 9.0 mm (0.35 inch) or more off the valve seat.
1. Remove the thermostat. For additional information, refer to REFER to: [Thermostat](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
 2. Immerse the thermostat in water.
 3. Increase the temperature of the water.
 4. Observe the state of the thermostat and the temperature of the water.
 5. The thermostat should begin to open at 82°C (179°F) and is fully open at 93°C (199°F).
 6. If the thermostat fails to open within acceptable limits, install a new thermostat.

Radiator Leak Test, Removed From the Vehicle



CAUTION: Do not leak test an aluminium radiator in the same water that is used to leak test copper/brass radiators. Flux and caustic cleaners may be present in the test water which will corrode aluminium.

Clean the radiator before leak testing to prevent contamination of the test tank. Leak test the radiator in clean water with 138 kPa (20 psi) air pressure.

A separate clean test tank is recommended for aluminium radiators. If a separate tank is not available for aluminium radiator testing, rinse the test tank each time before testing an aluminium radiator.

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling System Backflushing

General Procedures

• CAUTIONS:



The heater core must be backflushed separately from the engine cooling system to prevent the engine cooling system particles from clogging the heater core tubes and reducing (or eliminating) coolant flow through the heater core.

All engine cooling system flushing and backflushing procedures must include a separate backflushing of the heater core after the flushing or backflushing of the engine cooling system.



Heater core internal pressure must not exceed 100 kPa (14.5 psi). Failure to follow this instruction may cause damage to the heater core.

• NOTE: Cooling system backflushing should be carried out before the cooling system components are installed after the cooling system flushing procedure.

1. Disconnect the heater outlet coolant hose from the engine and connect the heater hose to a suitable hose pipe.
2. Disconnect the heater inlet coolant hose from the engine and allow the coolant to drain into a suitable container.
3. Turn the water supply valve to the hose ON and allow water pressure to flow through the heater core.
4. Allow water pressure to flow through the heater core for approximately five minutes.
5. Turn the water supply valve to the hose OFF and disconnect the hose pipe from the heater hose.
6. Connect the heater inlet coolant hose to the engine.
7. Connect the heater outlet coolant hose to the engine.
8. Fill the cooling system as described using a 50% mixture of Jaguar Premium Cooling System Fluid, or equivalent meeting Jaguar specification ESE-M97B44-A and 50% distilled water.
9. Test the system for correct heater performance with the specified engine cooling system conditions.

Radiator Backflushing

1. Remove the radiator. For additional information, refer to [Radiator](#).
2. Invert the radiator.
3. Connect a suitable hose pipe to the lower coolant hose connection of the radiator.
4. Turn the water supply valve to the hose ON and allow water pressure to flow through the radiator.
5. Allow water pressure to flow through the radiator for approximately five minutes.
6. Turn the water supply valve to the hose OFF and disconnect the hose pipe from the radiator.
7. Allow the coolant to drain from the radiator.
8. Install the radiator. For additional information, refer to [Radiator](#).

Engine Backflushing

• NOTE: Make sure that the thermostat is removed before backflushing the engine.

1. Position the high-pressure water hose into the engine through the engine return and backflush the engine.
2. Connect a suitable hose pipe to the upper coolant hose connection of the engine.
3. Turn the water supply valve to the hose ON and allow water pressure to flow through the engine.
4. Allow water pressure to flow through the engine for approximately five minutes.
5. Turn the water supply valve to the hose OFF and disconnect the hose pipe from the upper coolant hose connection of the engine.
6. Connect the upper coolant hose to the engine.
7. Fill the cooling system as described using a 50% mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification ESE-M97B44-A and 50% distilled water.


Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling System Draining, Filling and Bleeding

General Procedures


• WARNINGS:


 Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.

To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.

 To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.

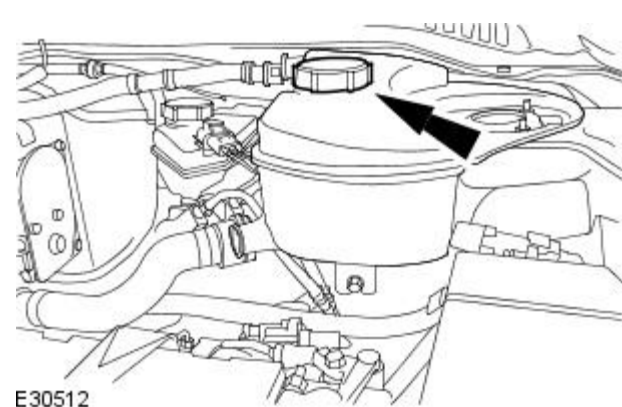
• CAUTIONS:


 Do not run the engine without first making sure the engine cooling fans operate. Start the engine, set air conditioning (A/C) to maximum cold, set the blower motor to maximum and observe that the engine cooling fan operates. Failure to follow this instruction may cause damage to the engine.

 The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage.

 Do not RUN the engine with the coolant pressure cap removed. Failure to follow this instruction may cause damage to the engine.

 Do not RUN the engine without the correct level of coolant. Failure to follow this instruction may cause damage to the engine.



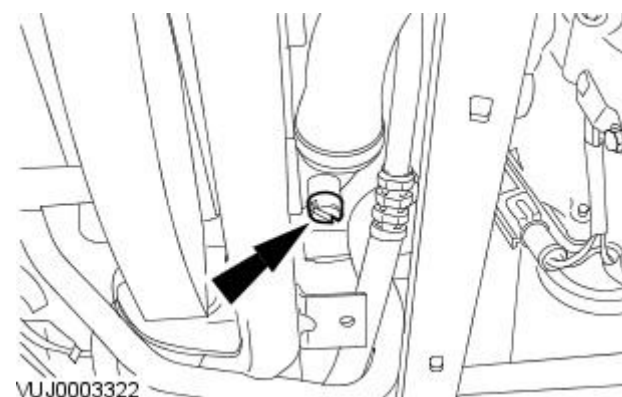
1.  **WARNING:** Relieve the cooling system pressure by unscrewing the coolant pressure cap.

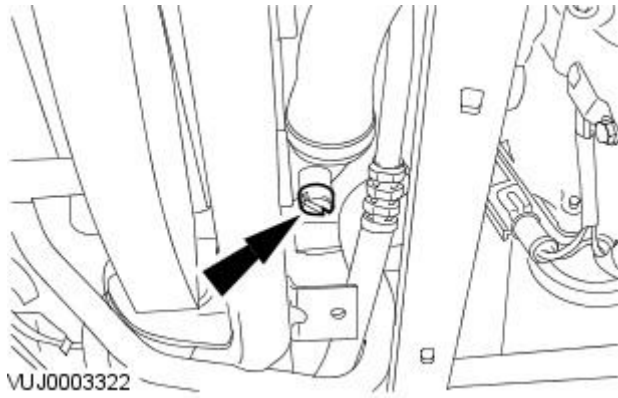
Remove the coolant expansion tank pressure cap.


2. Remove the undertray. For additional information, refer to Section [501-02 Front End Body Panels](#).

3. Remove the coolant drain plug.

- Drain the coolant into a suitable container.

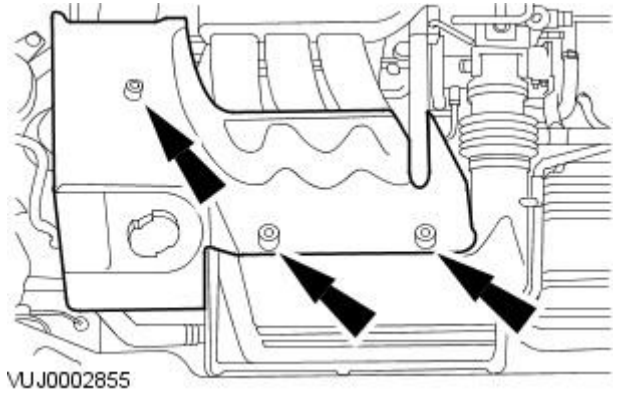




4.  **CAUTION:** Do not over tighten the drain plug. Failure to follow this instruction may cause damage to the vehicle.

Install the drain plug when all coolant has drained.

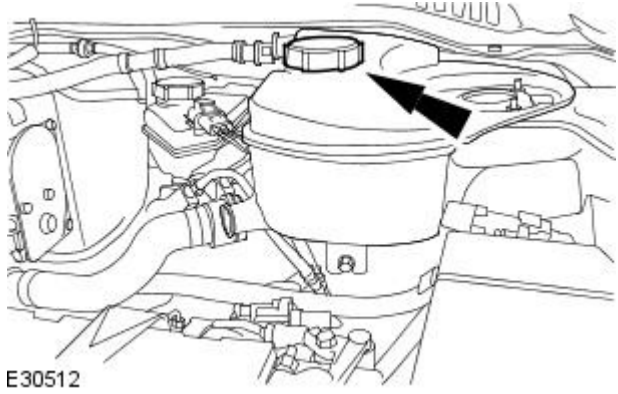
- Tighten to 1 Nm.
- Remove the drain tray.



5. Install the undertray. For additional information, refer to Section [501-02 Front End Body Panels](#).

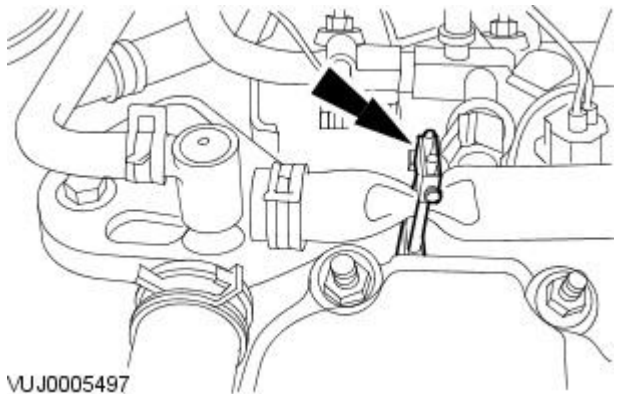
6. Lower the vehicle.

7. Remove the engine cover.



8. Fill the cooling system up to the MAX mark on the coolant expansion tank using a 50% mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification ESE-M97B44-A and 50% distilled water.

9. Install the coolant expansion tank pressure cap.



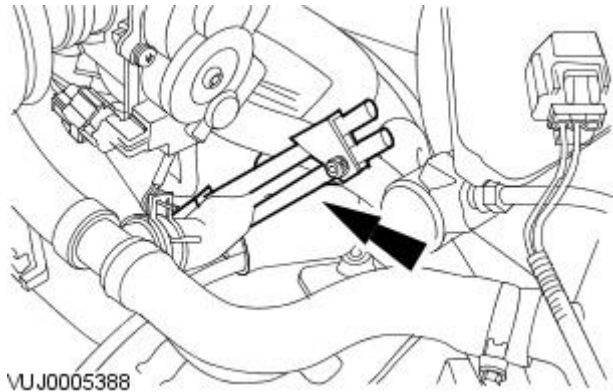
10. **NOTE:** During this procedure the thermostat should open.

START and RUN the engine at 2000 rpm until the cooling fan operates.

11. Stop the engine and allow to cool for two minutes.

12. Loosely install a pipe clamp to the heater inlet hose.

13. Loosely install a pipe clamp to the heater return hose.



VUJ0005388

14. START and RUN the engine at 2000 rpm.

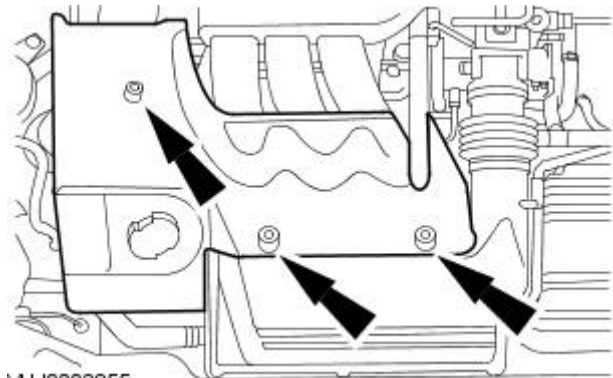
15. With the engine at 2000 rpm, fully clamp the heater outlet hose and then fully clamp the heater inlet hose.

16. Continue to run the engine for a further two minutes.

17. Switch the engine off.

18. Remove the heater hose clamps.

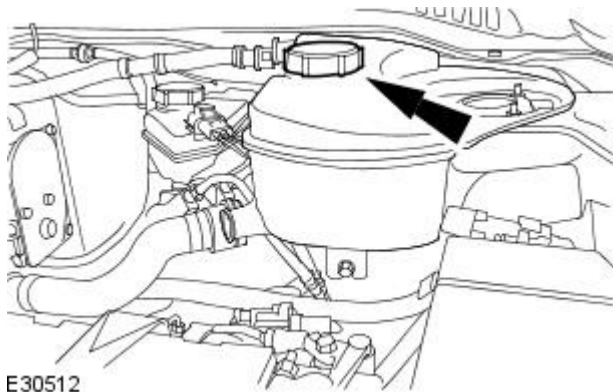
19. Fit the engine cover.



VUJ0002855

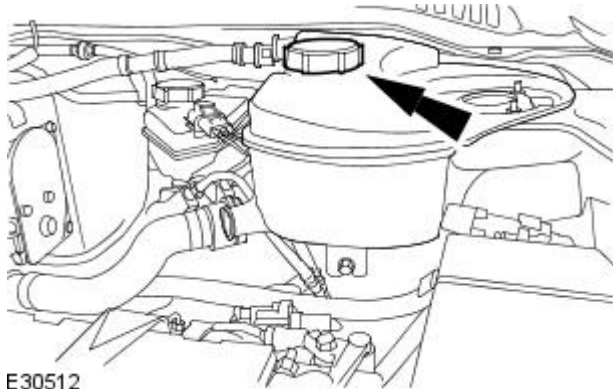
20. Allow the vehicle to cool to room temperature.

21. Remove the coolant expansion tank pressure cap, top up the coolant level to the MAX mark on the coolant expansion tank.



E30512

22. Install the coolant expansion tank pressure cap.



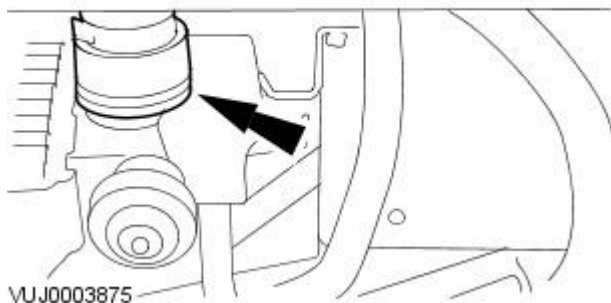
E30512

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling System Flushing

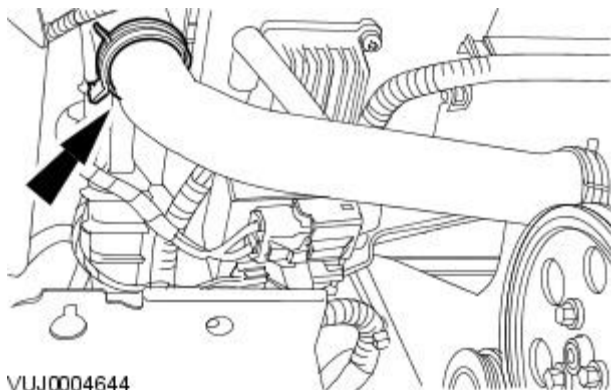
General Procedures

- NOTE: To remove rust, sludge and other foreign material from the cooling system, use Premium Cooling System flush, meeting Jaguar specification EGR-M14P7-A, which is safe for use with aluminium cooling systems. This cleaning restores cooling system efficiency and helps prevent overheating.
- NOTE: In severe cases where cleaning solvents will not properly clean the cooling system, it will be necessary to use the pressure flushing method using Cooling System Flusher, 164-R3670 to restore efficient operation.
- NOTE: A pulsating or reversed direction of flushing water will loosen sediment more quickly than a steady flow in the normal coolant flow direction.
- NOTE: Dispose of old coolant and flushing water contaminated with coolant and cleaning chemicals in accordance with local, state and federal laws.


1. Remove the air cleaner. For additional information, refer to Section [303-12A Intake Air Distribution and Filtering](#) Section [303-12B Intake Air Distribution and Filtering](#).
2. Remove the thermostat. For additional information, refer to [Thermostat](#).
3. Detach the lower coolant hose from the radiator and position to one side.



4. Lower the vehicle.
5. Detach the upper coolant hose from the radiator.



6. Connect a hose pipe to the radiator upper coolant hose connection using a suitable connector.

7.  **CAUTION:** Radiator internal pressure must not exceed 100 kPa (14.5 psi). Failure to follow this instruction may cause damage to the radiator.

Flush the radiator using the hose pipe until the coolant flowing from the radiator lower coolant hose connection is clear.

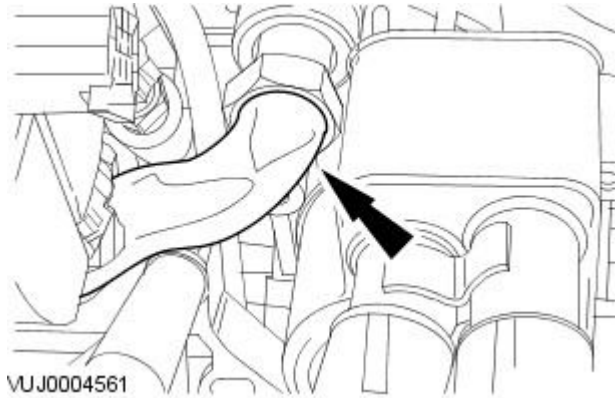
8. Remove the hose pipe from the radiator upper coolant hose connection.
9. Connect a hose pipe to the upper coolant hose using a suitable connector.
10. Flush the engine using the hose pipe until the coolant flowing from the radiator lower coolant hose is clear.
11. Remove the hose pipe from the upper coolant hose connection.
12. Connect the upper coolant hose to the radiator.
13. Install the thermostat. For additional information, refer to [Thermostat](#).
14. Fill the cooling system. For additional information, refer to [Cooling System Draining, Filling and Bleeding](#).
15. Install the undertray. For additional information, refer to Section [501-02 Front End Body Panels](#).
16. Install the air cleaner. For additional information, refer to Section [303-12A Intake Air Distribution and Filtering](#) Section [303-12B Intake Air Distribution and Filtering](#).

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Block Heater

Removal and Installation

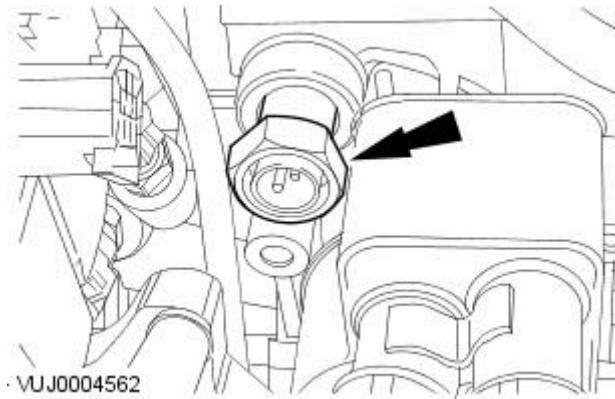
Removal

1. Drain the cooling system. For additional information, refer to [Cooling System Draining, Filling and Bleeding](#).
2. Disconnect the block heater electrical connector.



VUJ0004561

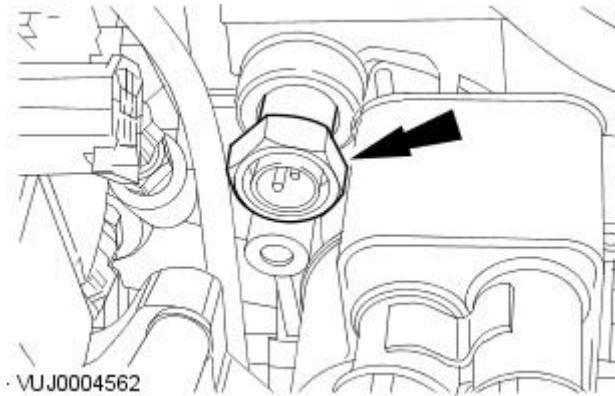
3. Remove the block heater.



VUJ0004562

Installation

1. To install, reverse the removal procedure.
 - Tighten to 40 Nm.



VUJ0004562

2. Fill the cooling system. For additional information, refer to [Cooling System Draining, Filling and Bleeding](#).

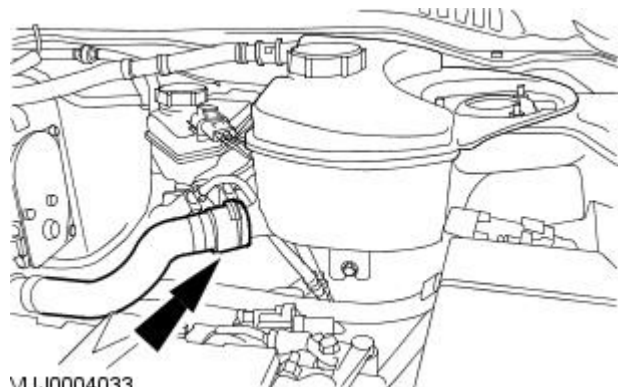
Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Coolant Expansion Tank

Removal and Installation

Removal

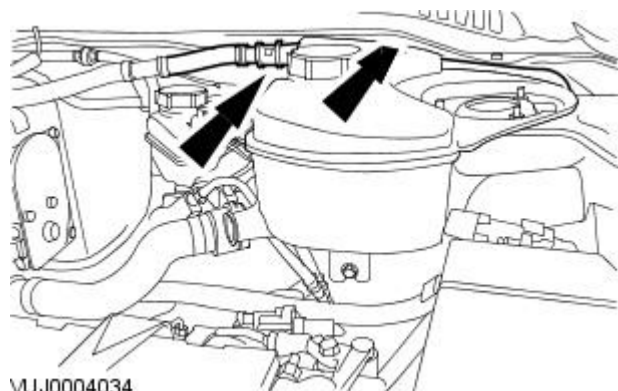
1. NOTE: Clamp the hose to minimize coolant loss.

Detach the coolant expansion tank outlet hose from the coolant expansion tank.

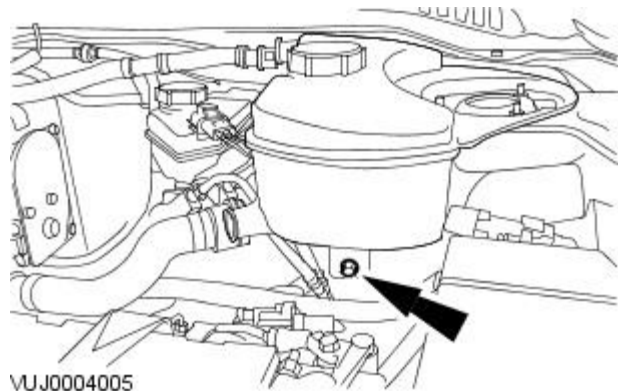


2. NOTE: Clamp the hoses to minimize coolant loss.

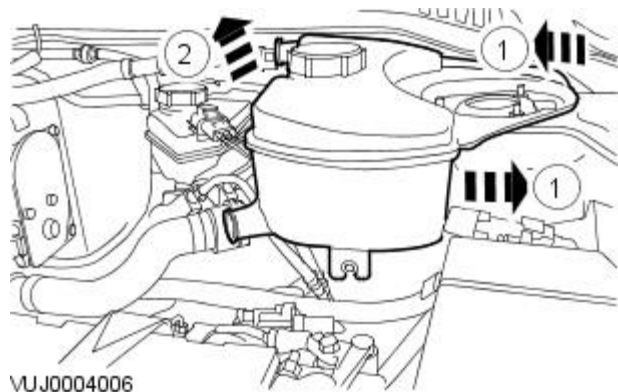
Detach the cooling system vent hoses from the coolant expansion tank.



3. Remove the coolant expansion tank retaining bolt.



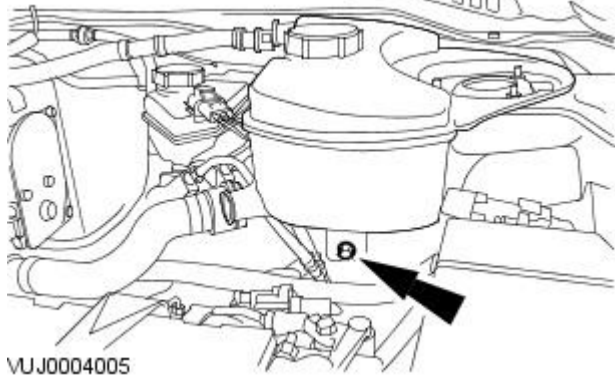
4. Remove the coolant expansion tank.



Installation

1. To install, reverse the removal procedure.

- Tighten to 3 Nm.



2. Check and top up the cooling system.

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling

Fan Module

Removal and Installation

Removal

1. Remove the air cleaner. For additional information, refer to:

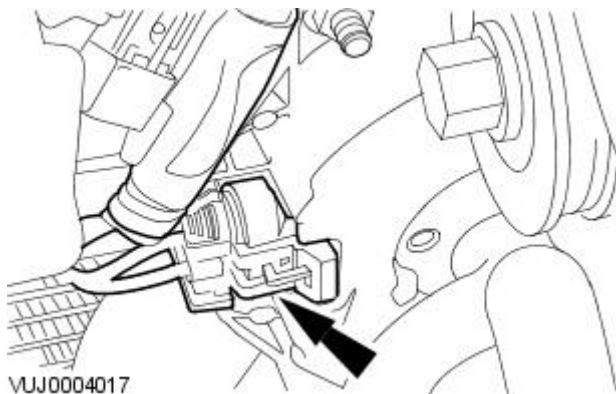
[Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation),
[Air Cleaner](#) (303-12B Intake Air Distribution and Filtering - 2.0L Duratorq-TDCi/2.2L Duratorq-TDCi (110kW/150PS) - Puma, Removal and Installation).

2. Remove the battery tray.

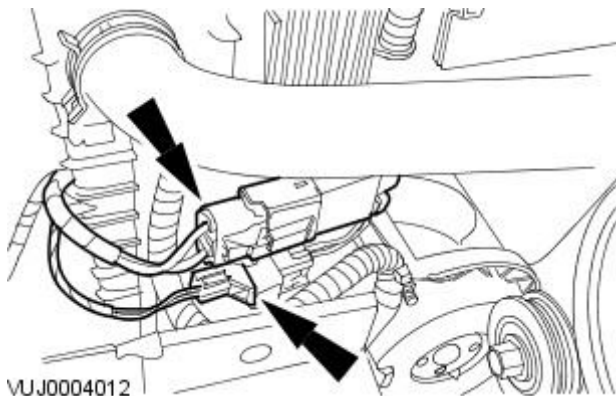
For additional information, refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).

3. **NOTE:** Left hand shown, right hand similar.

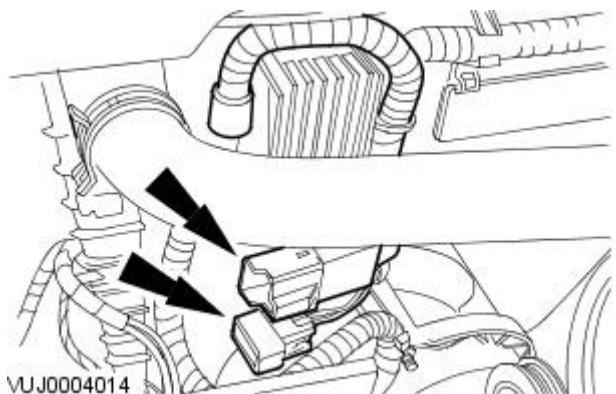
Disconnect the cooling fan motor electrical connectors.



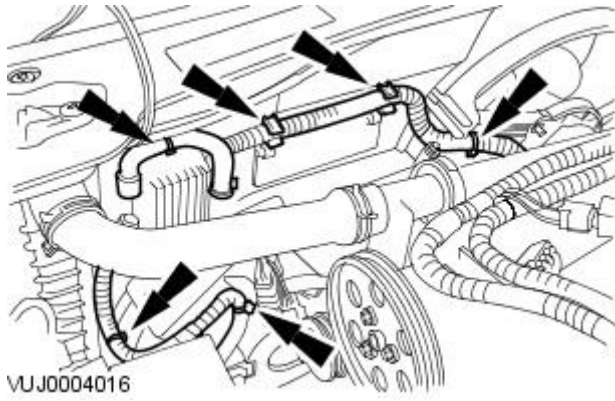
4. Disconnect the cooling fan module electrical connectors.



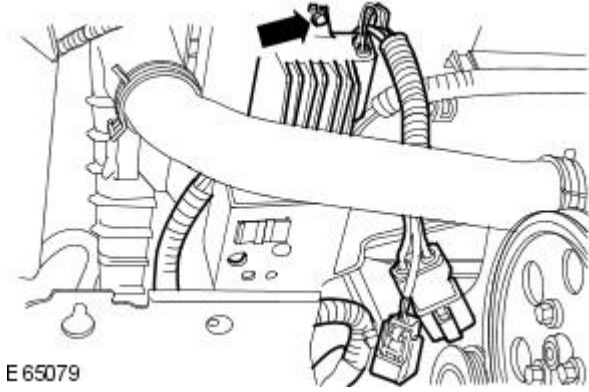
5. Detach the cooling fan module electrical connectors from the cooling fan shroud.



6. Detach the cooling fan module wiring harness from the cooling fan shroud.

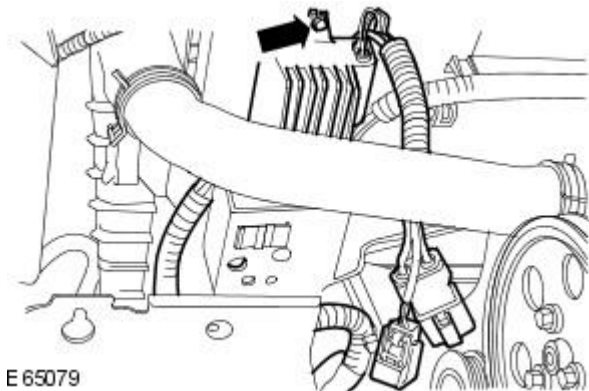


7. Remove the cooling fan module.



Installation

1. To install reverse the removal procedure.
 - Tighten to 3 Nm.



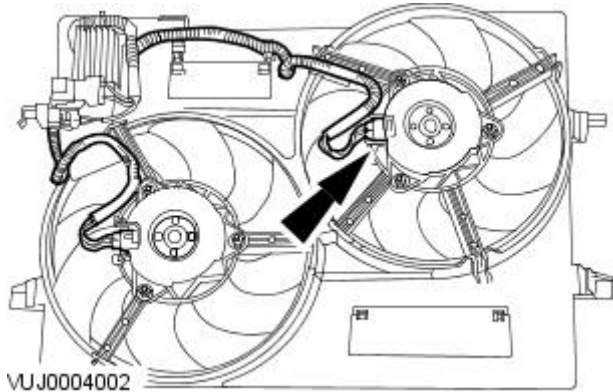
Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling

Fan Motor

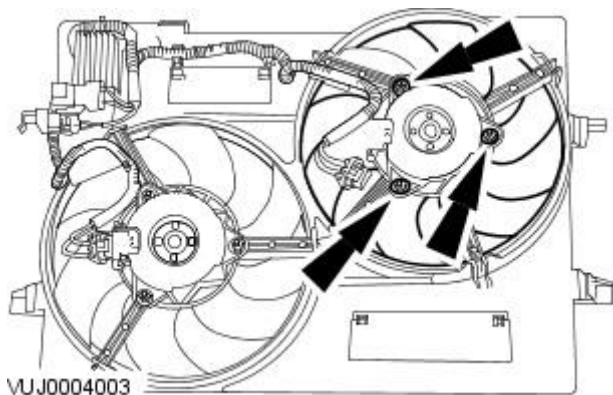
Removal and Installation

Removal

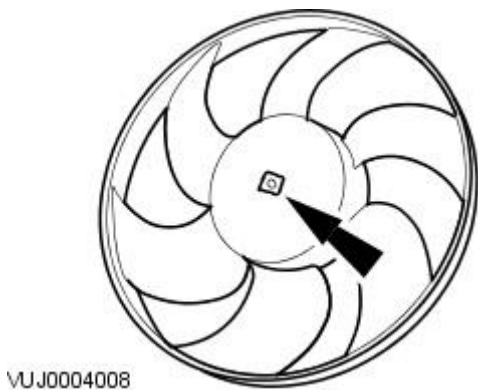
1. Remove the cooling fan motor and shroud. For additional information, refer to [Cooling Fan Motor and Shroud](#).
2. Disconnect the cooling fan motor electrical connector.



3. Remove the cooling fan motor assembly.

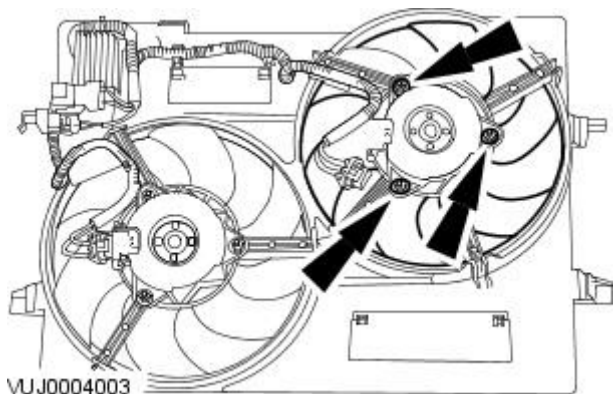


4. Remove the cooling fan from the cooling fan motor.



Installation

1. To install, reverse the removal procedure.
 - Tighten to 6 Nm.



Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling Fan Motor and Shroud


Removal and Installation

Removal

All vehicles

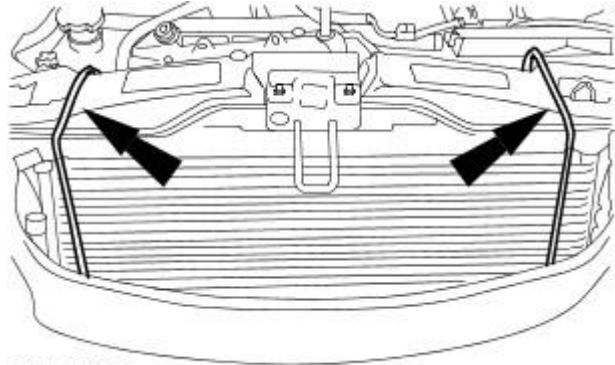
1. Remove the air cleaner.

For additional information, refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

2.  **CAUTION:** Make sure that the air conditioning (A/C) condenser is not damaged when installing the retaining straps. Failure to follow this instruction may result in damage to the vehicle.

- **NOTE:** To allow the cooling module to be partially lowered and supported when the radiator support beam is removed, suitable retaining straps must be installed to the radiator.

Loosely attach suitable retaining straps to the radiator.



VUJ0004036

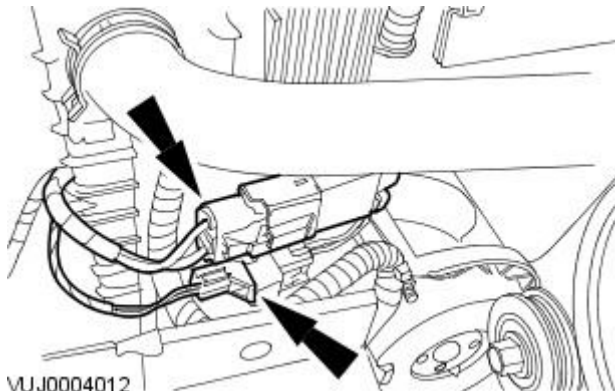
3. Drain the cooling system.

For additional information, refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

4. Lower the vehicle.

Vehicles built up to VIN:E71956

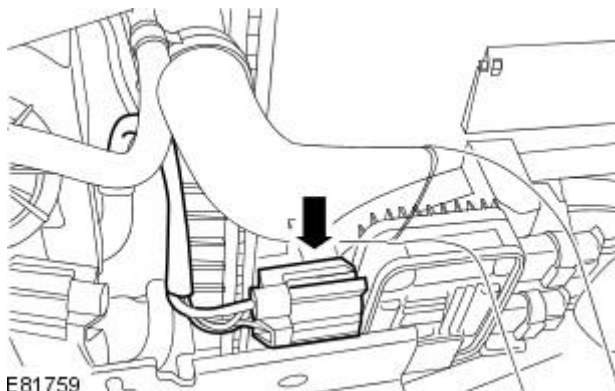
5. Disconnect the cooling fan motor control module electrical connectors.



VUJ0004012

Vehicles built from VIN:E71957

6. Disconnect the cooling fan motor control module electrical connector.

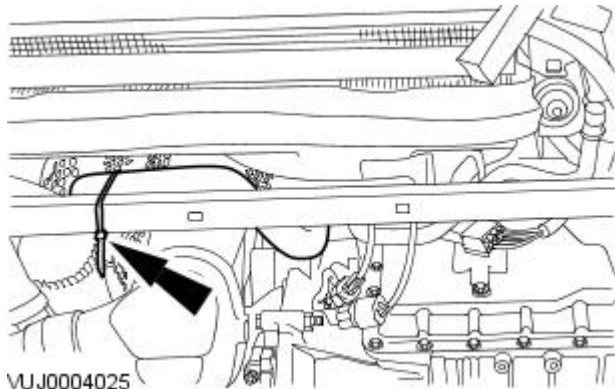


E81759

All vehicles

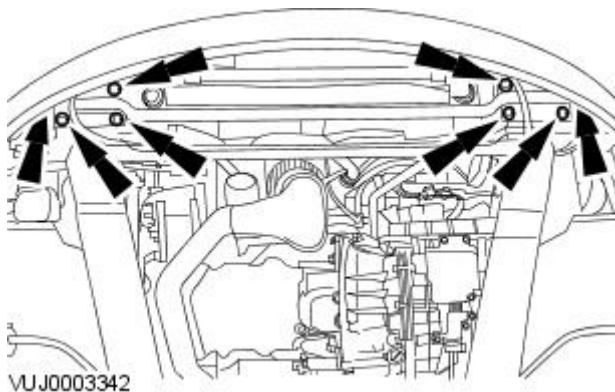
7. Raise the vehicle.

8. Reposition the coolant hose from the engine oil cooler to the thermostat housing and secure it to the front cross member using a suitable retaining strap.

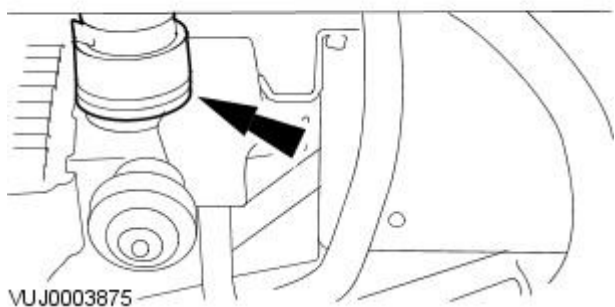



9. Remove the radiator support beam.

- Allow the cooling module to be partially lowered and supported by the retaining straps.



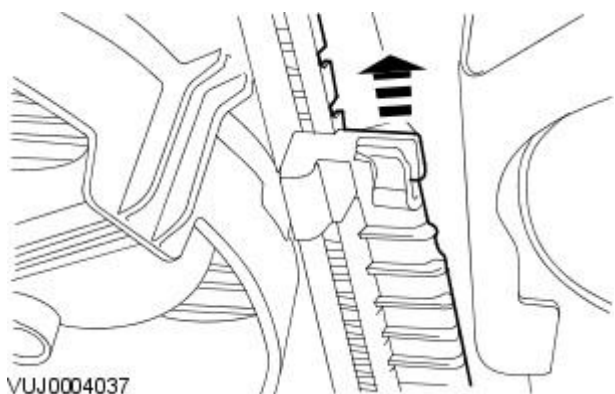
10. Detach the lower coolant hose from the radiator and position to one side.




11.  CAUTION: Make sure that the retaining lugs of the radiator are not damaged when displacing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.

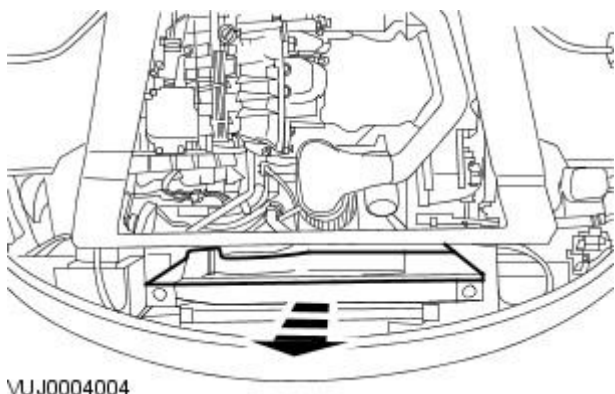
- NOTE: Right-hand shown, left-hand similar.

Displace the cooling fan motor and shroud from the retaining lugs of the radiator.



12.  CAUTION: Make sure that the radiator is not damaged when removing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.

Remove the cooling fan motor and shroud.



Installation

1. CAUTIONS:



Make sure that the radiator is not damaged when installing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.



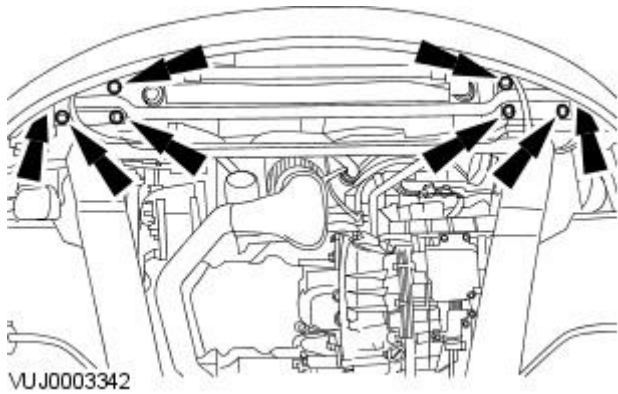
Make sure that the retaining lugs of the radiator are not damaged when installing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.

To install, reverse the removal procedure.

- Tighten to 25 Nm.

2. Fill the cooling system.

For additional information, refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).



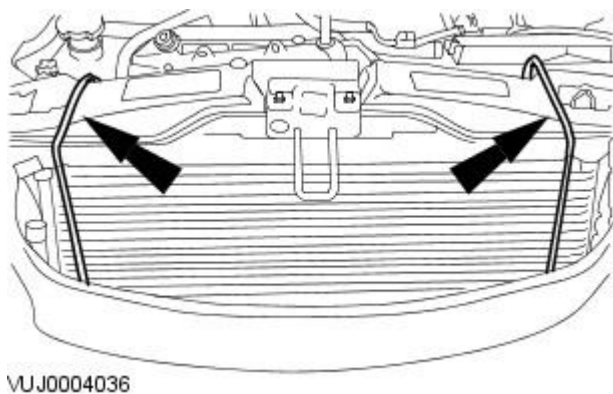
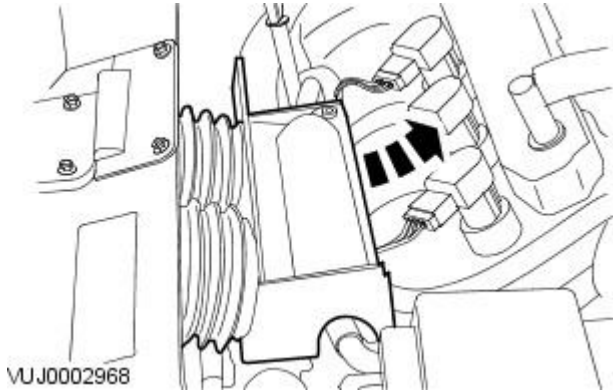
Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Cooling Module


Removal and Installation

Removal

All Vehicles

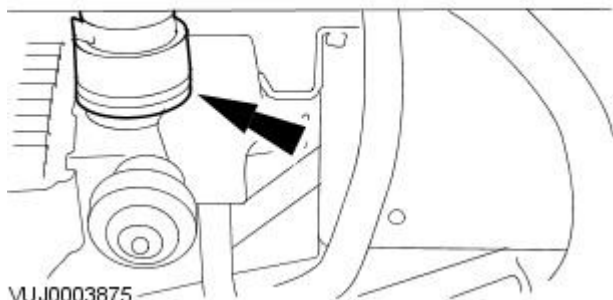
1. Remove the air cleaner.
For additional information, refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
2. Remove the air cleaner intake duct.



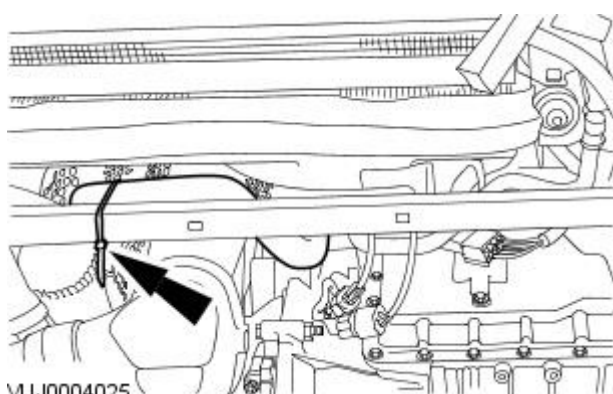
3.  **CAUTION:** Make sure that the air conditioning (A/C) condenser is not damaged when installing the retaining straps. Failure to follow this instruction may result in damage to the vehicle.

• **NOTE:** To allow the cooling module to be partially lowered and supported when the radiator support beam is removed, suitable retaining straps must be installed to the A/C condenser.

Loosely attach suitable retaining straps to the A/C condenser.



4. Drain the cooling system.
For additional information, refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).
5. Detach the lower coolant hose from the radiator and position to one side.

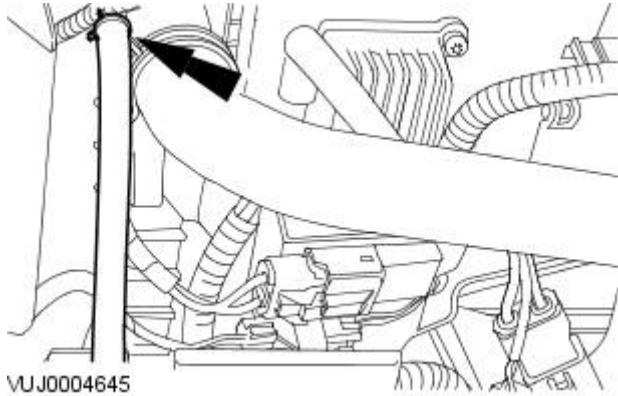


6. Reposition the coolant hose from the engine oil cooler to the thermostat housing and secure it to the front cross member using a suitable retaining strap.

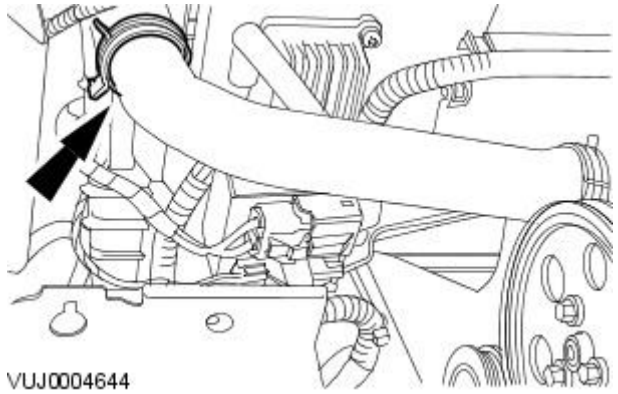
7. Lower the vehicle.

Vehicles built up to VIN:E71956

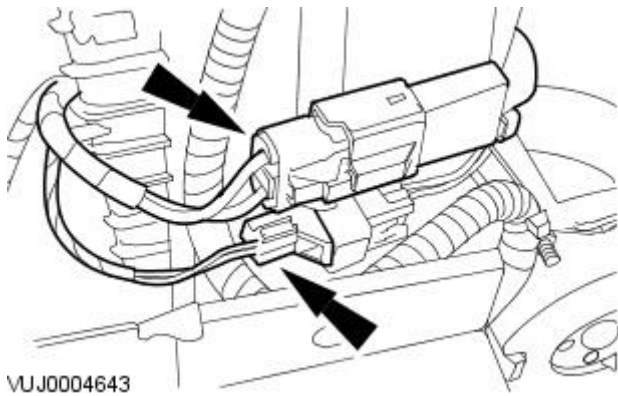
8. Detach the radiator vent hose from the radiator.



9. Detach the upper coolant hose from the radiator.

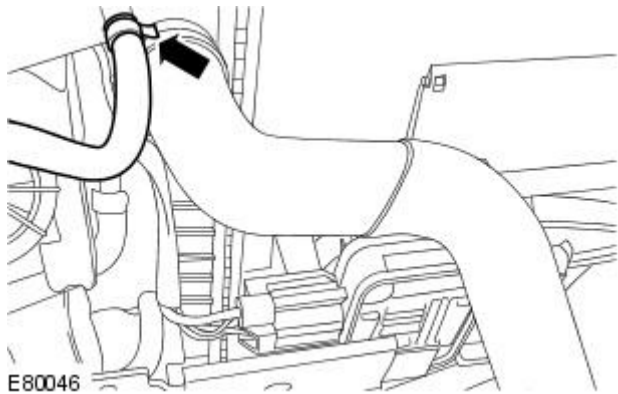


10. Disconnect the cooling fan motor control module electrical connectors.

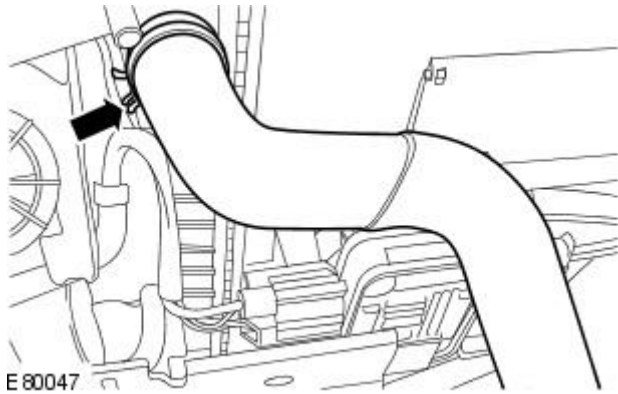


Vehicles built from VIN:E71957

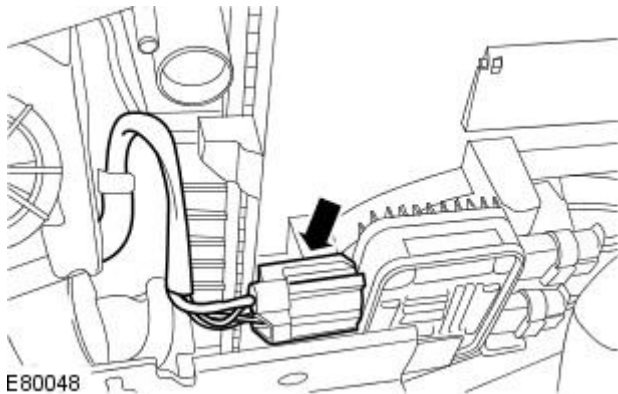
11. Detach the radiator vent hose from the radiator.



12. Detach the upper coolant hose from the radiator.



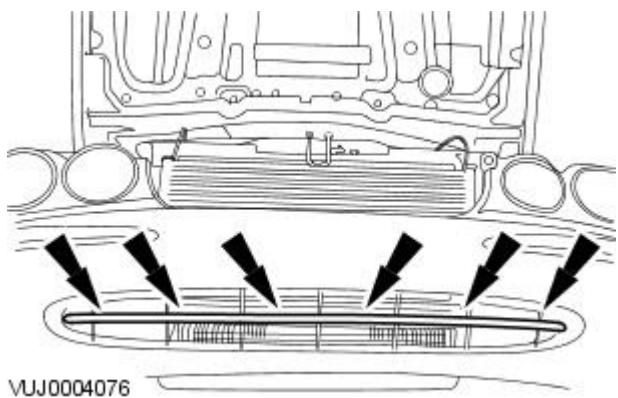
13. Disconnect the cooling fan motor control module electrical connector.



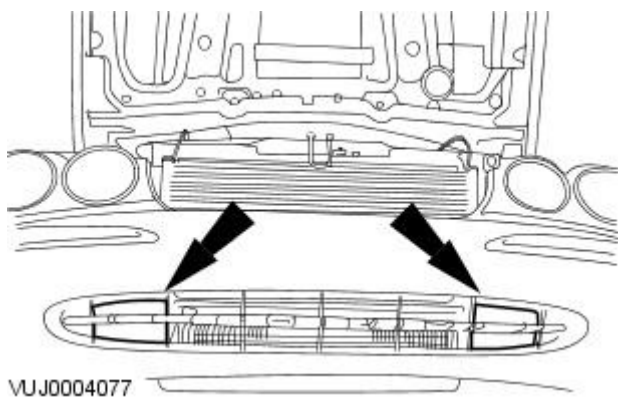
All vehicles

14. Raise the vehicle.

15. Remove the air splitter grille.



16. Remove the front towing eye trims.

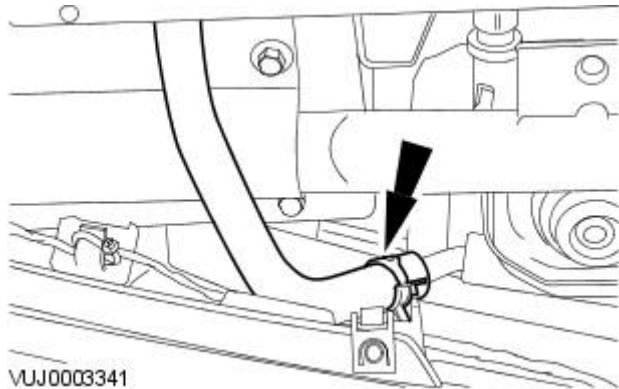


Vehicles With Automatic Transmission

17. NOTE: Left-hand side shown, right-hand side similar.

Detach the power assisted steering oil cooler inlet and return pipes.

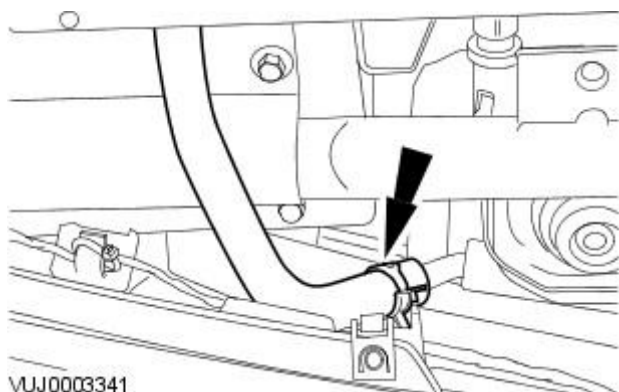
- Allow the power assisted steering fluid to drain into a suitable container.
- Using suitable blanking plugs, blank the exposed ports.



Vehicles With Manual Transmission

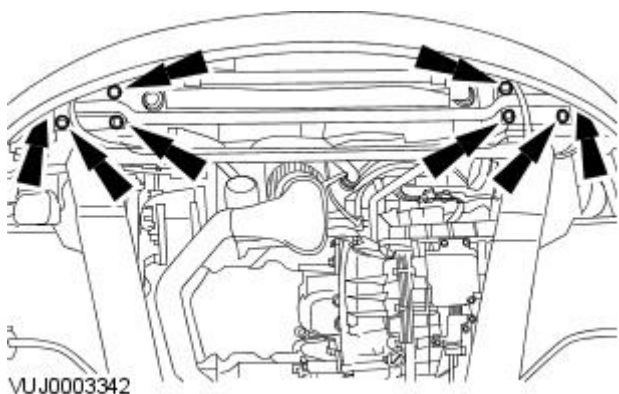
18. Detach the power assisted steering oil cooler inlet pipe.


- Allow the power assisted steering fluid to drain into a suitable container.
- Using suitable blanking plugs, blank the exposed ports.



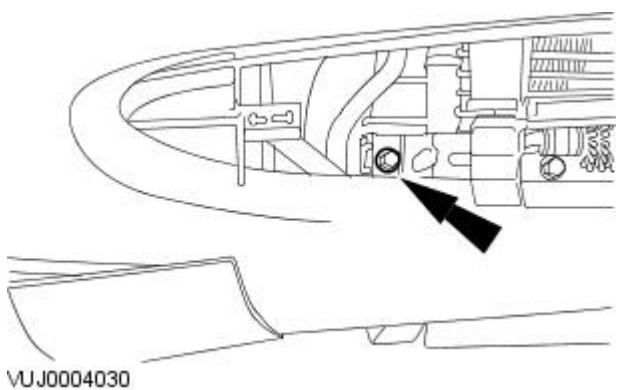
All Vehicles

19. Remove the radiator support beam.

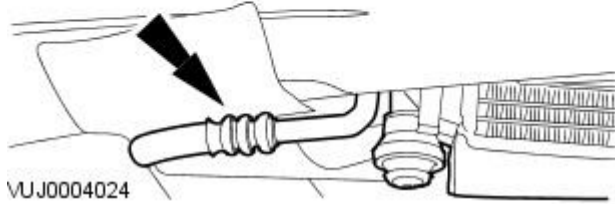
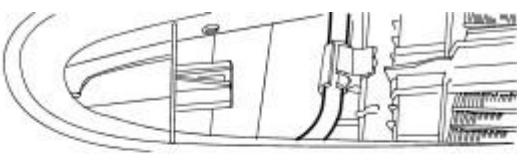


20.  **CAUTION:** Apply suitable tape to the right-hand side lower section of the front bumper to prevent damage to the paintwork from the A/C pipe when the cooling module is lowered. Failure to follow this procedure may cause damage to the vehicle.

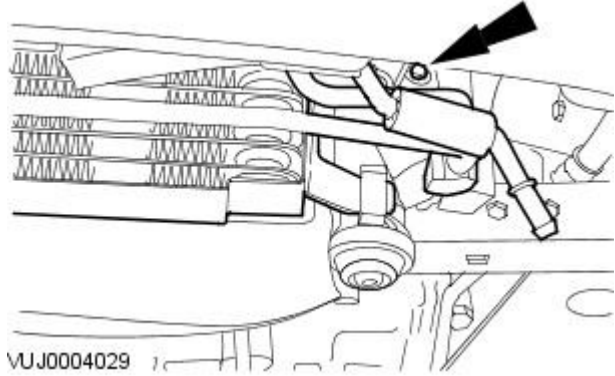
Remove the right-hand side A/C condenser retaining bolt from the radiator.



21. Lower the cooling module and the A/C condenser to a position where the air conditioning pipe is forward of the front bumper.



22. Remove the left-hand side A/C condenser retaining bolt from the radiator.

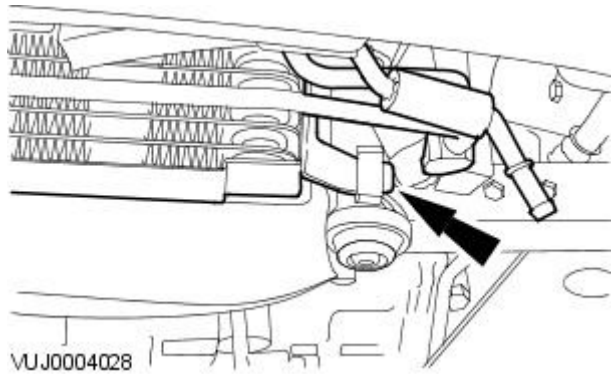



Vehicles With Automatic Transmission

23. NOTE: Left-hand side shown, right-hand side similar.

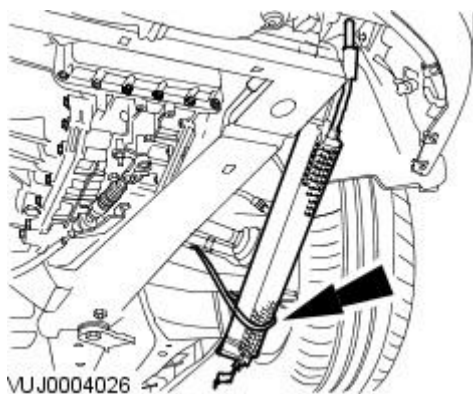
• NOTE: The power assisted steering oil cooler remains captive to the automatic transmission oil cooler.

Detach the automatic transmission oil cooler from the radiator.



24.  CAUTION: Do not allow the power assisted steering oil cooler and automatic transmission oil cooler to hang on the automatic transmission oil cooler pipes. Failure to follow this instruction may cause damage to the vehicle.

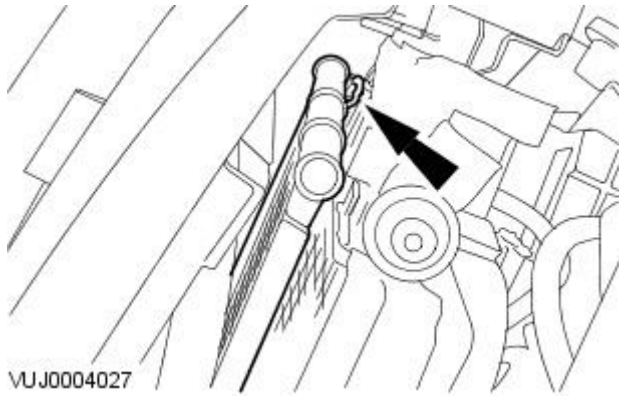
Position the power assisted steering oil cooler and the automatic transmission oil cooler to one side and secure with suitable retaining straps.




All vehicles

25. NOTE: Left-hand side shown, right-hand side similar.

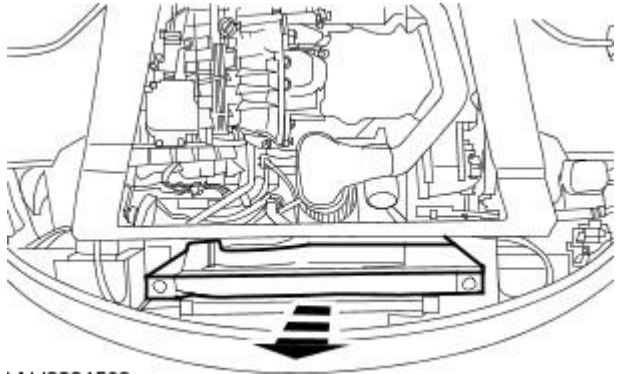
Detach the cooling module from the A/C condenser.



VUJ0004027

26.  CAUTION: Make sure that the radiator and the A/C condenser are not damaged during the removal of the cooling module. Failure to follow this instruction may cause damage to the vehicle.


Remove the cooling module.



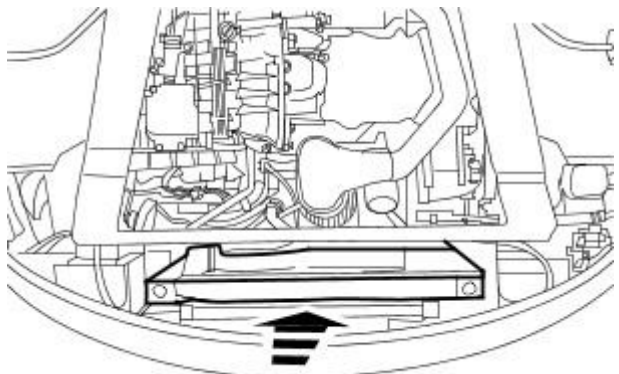
VUJ0004563

Installation

All vehicles

1.  CAUTION: Make sure that the radiator and the A/C condenser are not damaged whilst installing the cooling module. Failure to follow this instruction may cause damage to the vehicle.

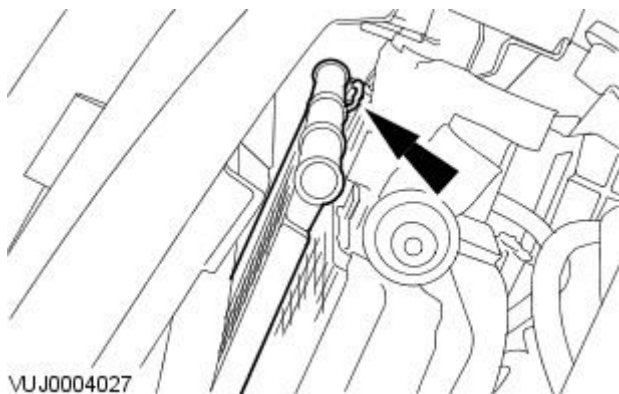
Install the cooling module.



VUJ0004564

2. NOTE: Left-hand side shown, right-hand side similar.

Attach the cooling module to the A/C condenser.

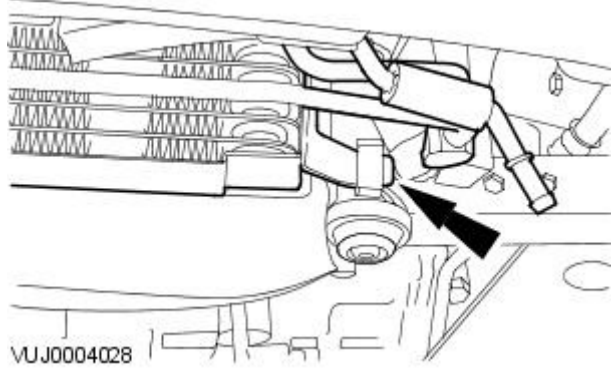


VUJ0004027

Vehicles With Automatic Transmission

3. NOTE: Left-hand side shown, right-hand side similar.

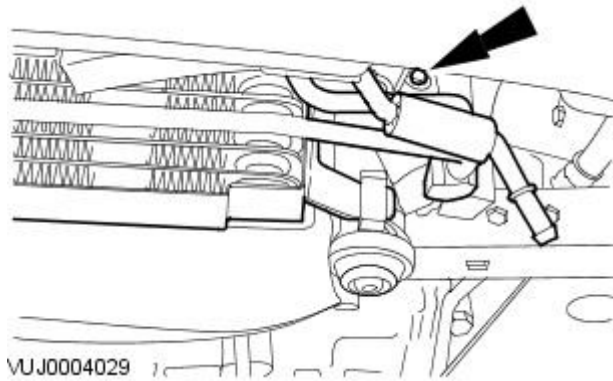
Install the automatic transmission oil cooler to the radiator.



All Vehicles

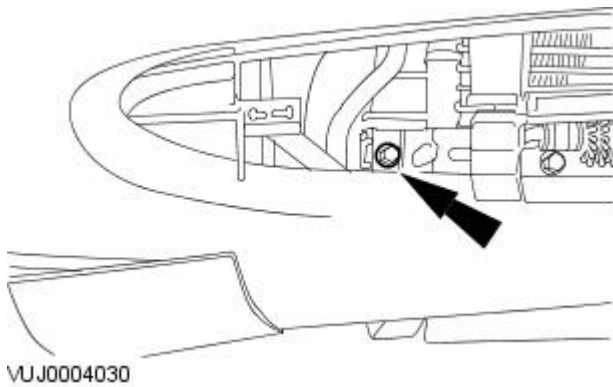
4. Install the left-hand side A/C condenser retaining bolt.

- Tighten to 7 Nm.



5. Install the right-hand side A/C condenser retaining bolt.

- Tighten to 7 Nm.



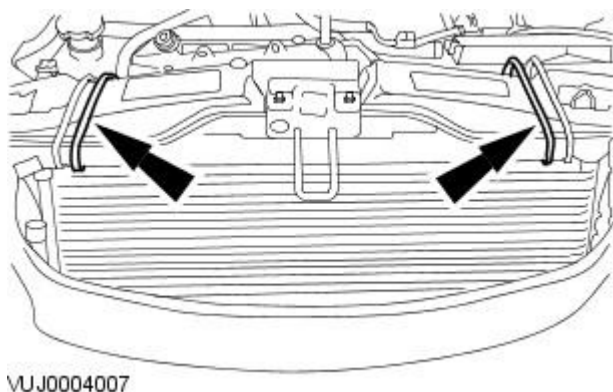
6. Lower the vehicle.

7.  CAUTION: Do not over tighten the retaining straps. Failure to follow this instruction may cause damage to the vehicle.

• NOTE: To allow installation of the radiator support beam, install retaining straps to the radiator to hold the cooling module in position.

Install suitable retaining straps to the radiator. Align the cooling module to the upper isolator mounting points.

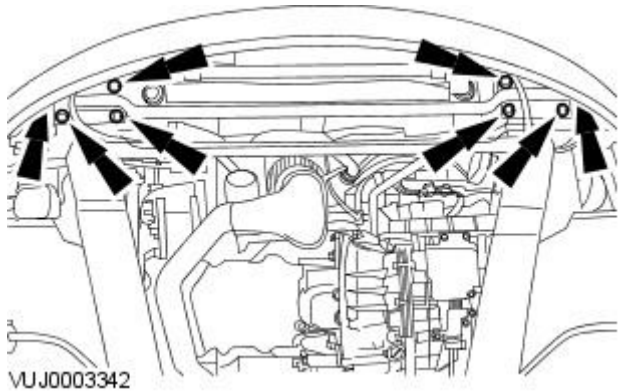
- Carefully tension the retaining straps to hold the cooling module in position.



8. Raise the vehicle.

9. Install the radiator support beam.

- Tighten to 25 Nm.

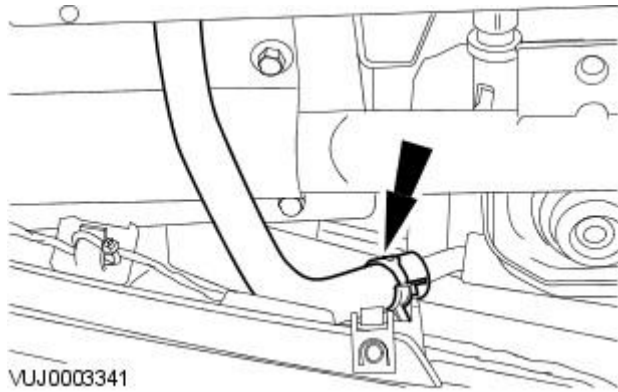


Vehicles With Automatic Transmission

10. NOTE: Left-hand side shown, right-hand side similar.

Connect the power assisted steering oil cooler inlet and return pipes.

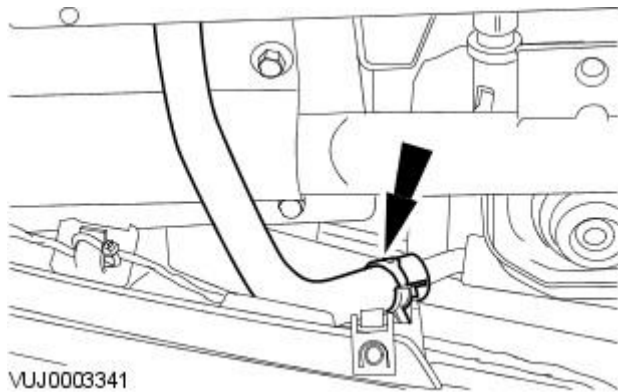
- Remove the blanking plugs.



Vehicles With Manual Transmission

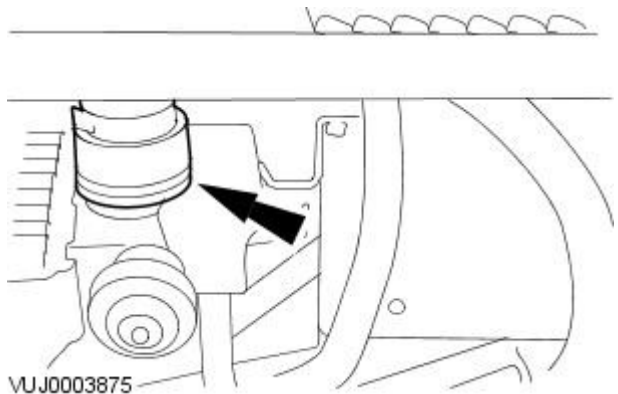
11. Connect the power assisted steering oil cooler inlet pipe.

- Remove the blanking plugs.

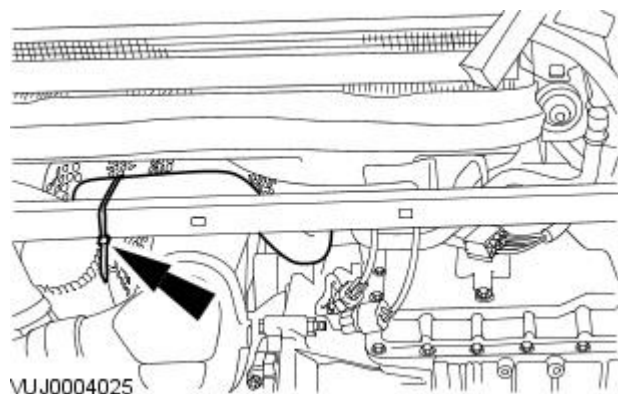


All Vehicles

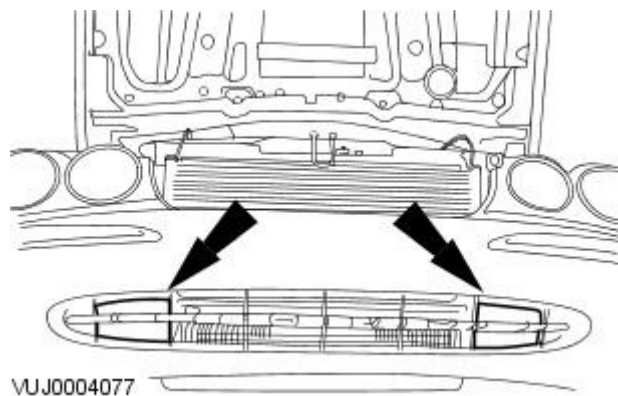
12. Connect the lower coolant hose to the radiator.



13. Remove the retaining strap from the engine oil cooler coolant hose.

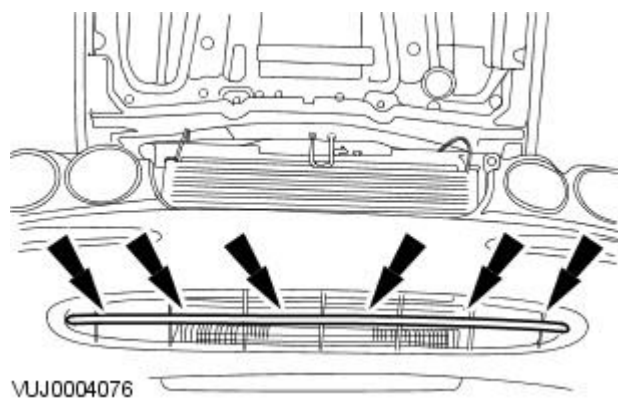


14. Install the front towing eye trims.



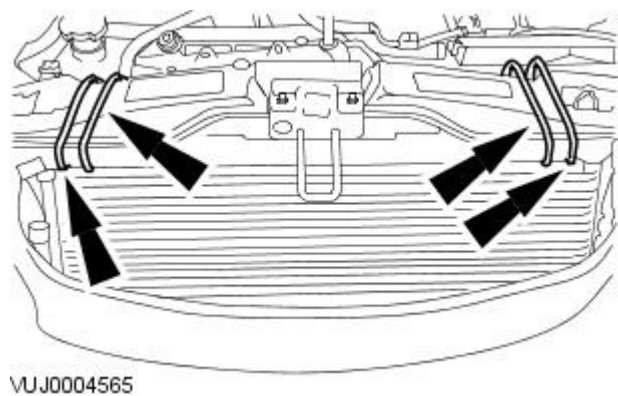
15. Install the air splitter grille.

- Remove the protective tape from the front bumper.



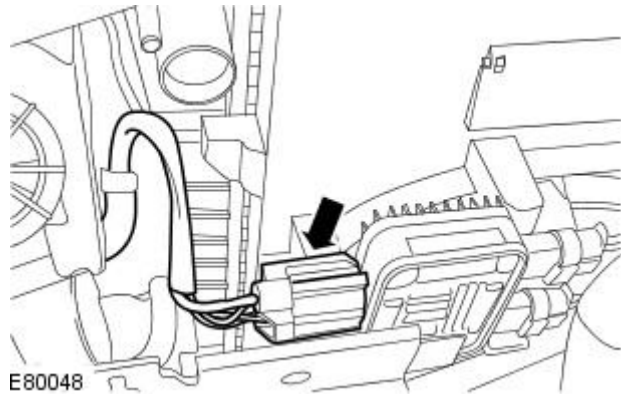
16. Lower the vehicle.

17. Remove the retaining straps from the A/C condenser and radiator.

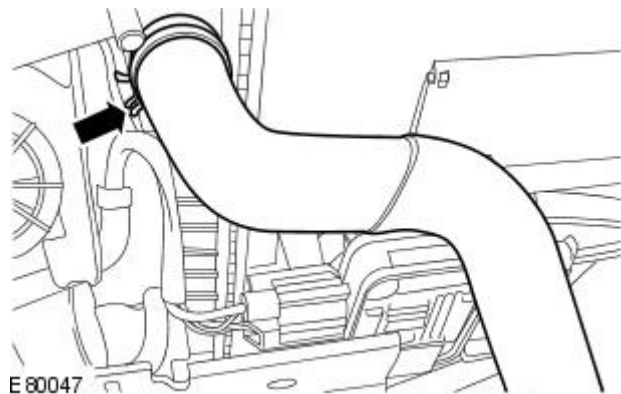


Vehicles built from VIN:E71957

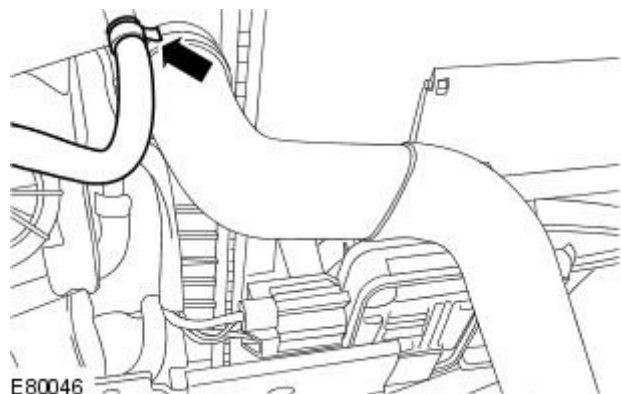
18. Connect the cooling fan motor control module electrical connector.



19. Connect the upper coolant hose onto the radiator.

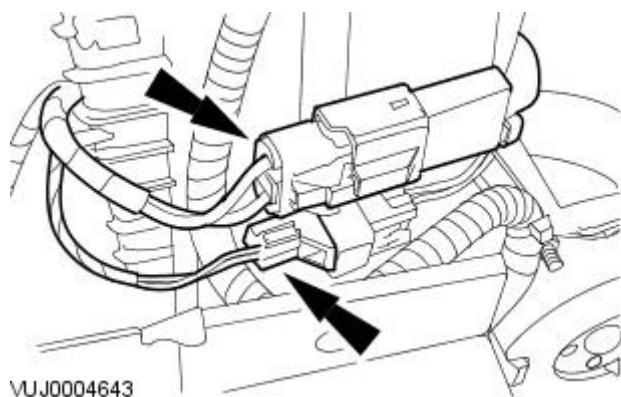


20. Connect the radiator vent hose onto the radiator.

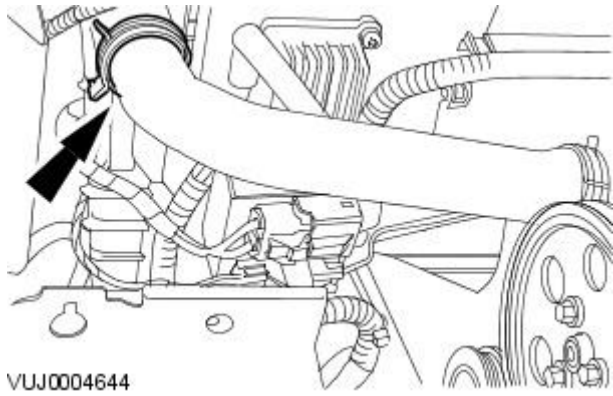


Vehicles built up to VIN: E71956

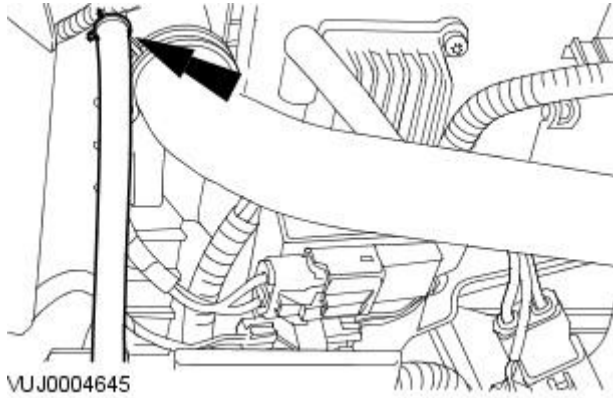
21. Connect the cooling fan motor control module electrical connectors.



22. Connect the upper coolant hose onto the radiator.

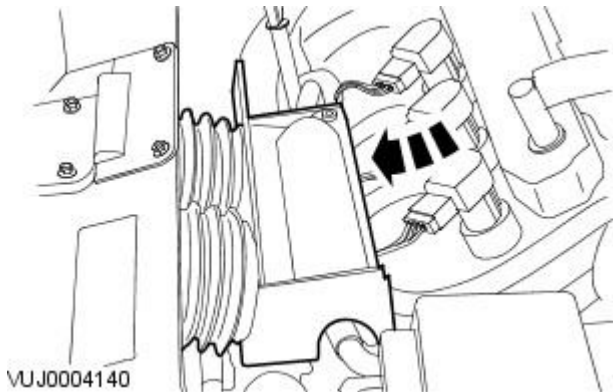


23. Connect the radiator vent hose onto the radiator.



All vehicles

24. Install the air cleaner intake duct.



25. Install the air cleaner.

For additional information, refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

26. Fill the cooling system.

For additional information, refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).


27. Check and adjust the power assisted steering fluid level.

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Radiator

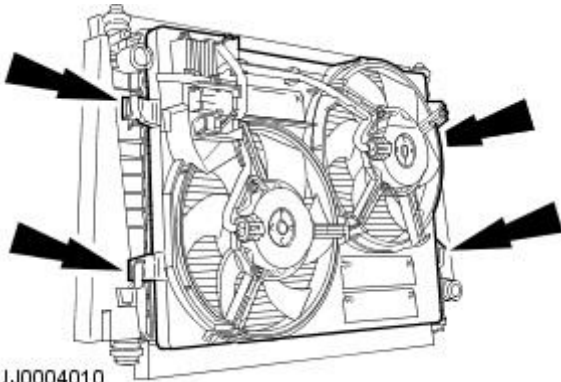
Removal and Installation

Removal

1. Remove the cooling module. For additional information, refer to [Cooling Module](#).

2.  **CAUTION:** Make sure that the retaining lugs of the radiator are not damaged when removing the cooling fan motor and shroud from the radiator.

Remove the cooling fan motor and shroud.



VUJ0004010

Installation

1. **CAUTIONS:**

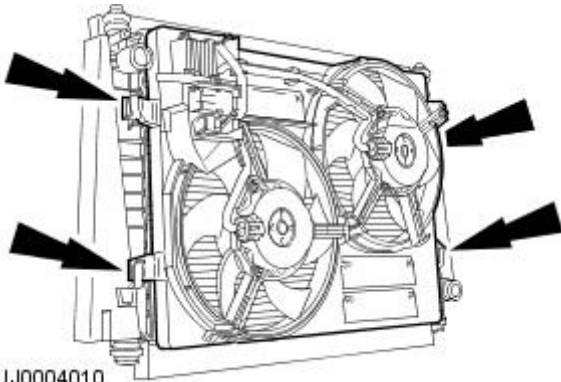
 Make sure that the retaining lugs of the radiator are not damaged when installing the cooling fan motor and shroud to the radiator.

 The radiator isolator mountings are constructed from a special material. Use only the correct specification radiator isolator mountings.

 Inspect the radiator isolator mountings for damage and fatigue. Install new radiator isolator mountings if required.

 Inspect the radiator seals for damage and security. Install new radiator seals if required.

To install, reverse the removal procedure.



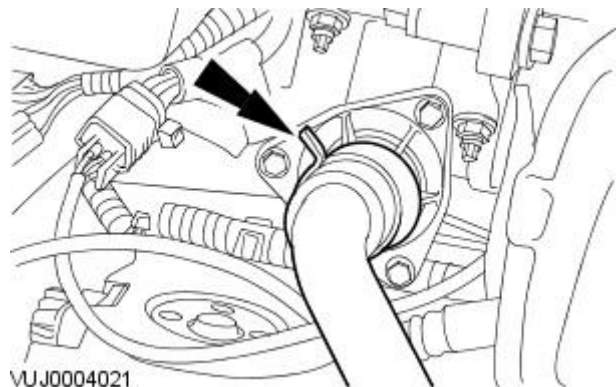
VUJ0004010

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 -**Thermostat**

Removal and Installation

Removal

1. Drain the cooling system. For additional information, refer to For additional information, refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).
2. Detach the oil cooler coolant hose from the thermostat housing and position to one side.

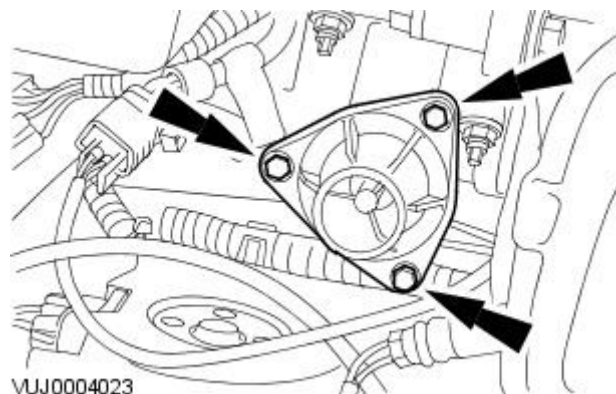


VUJ0004021

3. NOTE: The thermostat remains captive in the thermostat housing.

Remove the thermostat.

- Remove and discard the gasket.



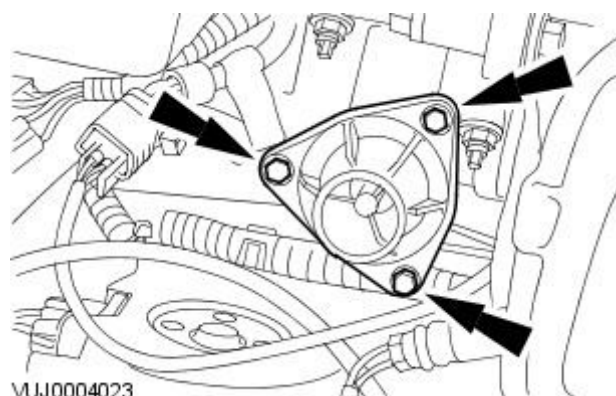
VUJ0004023

Installation

1. NOTE: Install a new gasket.

To install, reverse the removal procedure.

1. Tighten to 10 Nm.



VUJ0004023

2. Fill the cooling system. For additional information, refer to For additional information, refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03A Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

3. NOTE: For NAS vehicles only.

If required, carry out a long drive cycle.

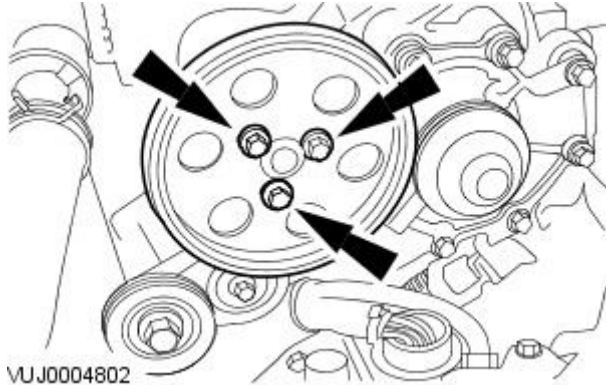
For additional information, refer to: [Powertrain Control Module \(PCM\) Long Drive Cycle Self-Test](#) (303-14A Electronic Engine Controls - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Water Pump

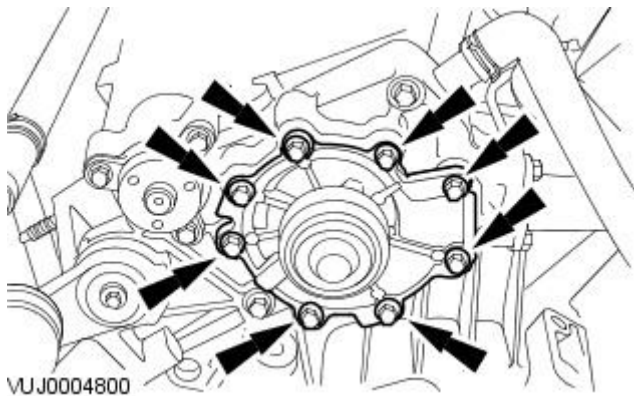
Removal and Installation

Removal

1. Drain the cooling system. For additional information, refer to [Cooling System Draining, Filling and Bleeding](#).
2. Lower the vehicle.
3. Remove the water pump belt. For additional information, refer to Section [303-05 Accessory Drive](#).
4. Remove the water pump drive pulley.



5. Remove the water pump.
 - Remove and discard the gasket.

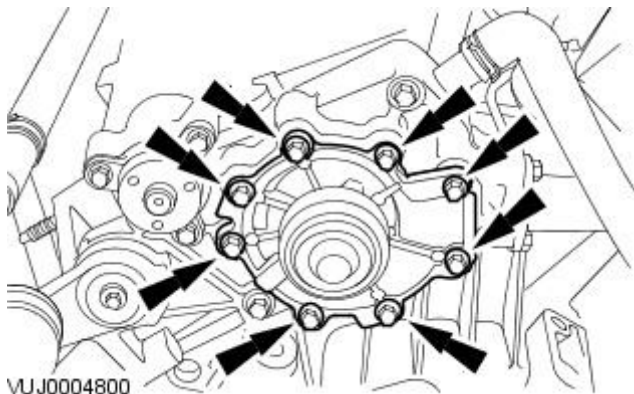


Installation

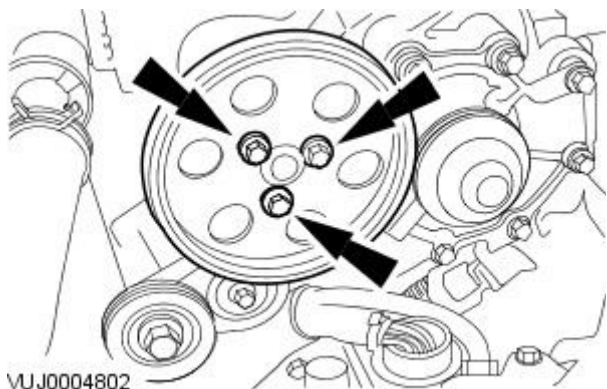
1. **NOTE:** Install a new gasket.

To install, reverse the removal procedure.

- Tighten to 10 Nm.



2. Tighten to 11 Nm.

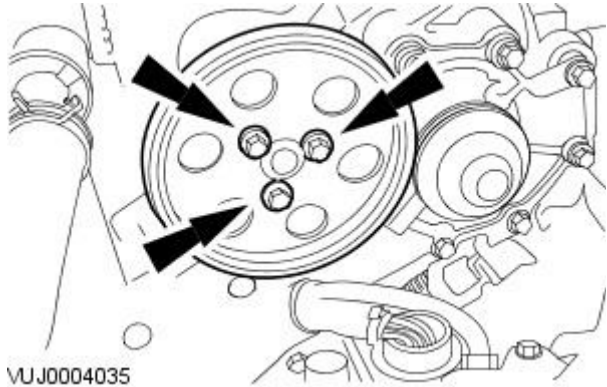


Engine Cooling - 2.0L NA V6 - AJV6/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 - Water Pump Housing

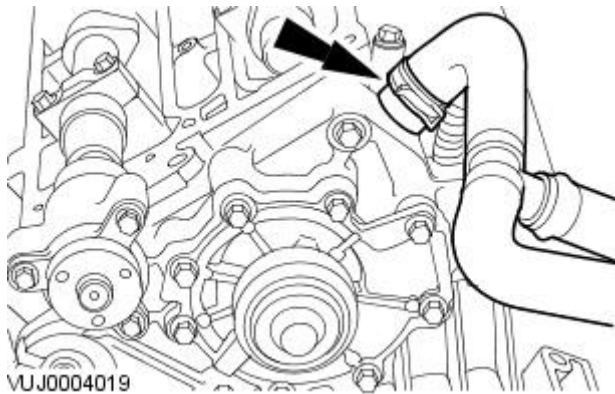
Removal and Installation

Removal

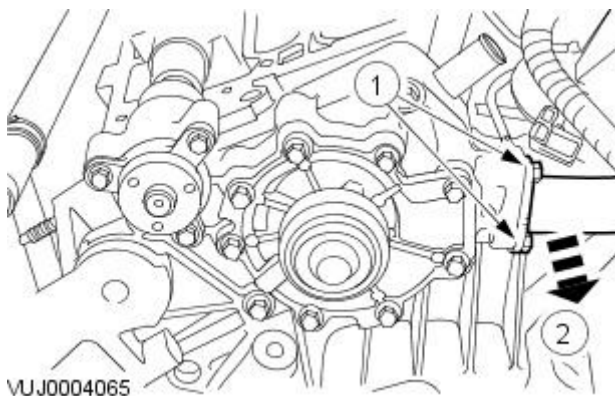
1. Drain the cooling system. For additional information, refer to [Cooling System Draining, Filling and Bleeding](#).
2. Lower the vehicle.
3. Remove the water pump belt tensioner. For additional information, refer to Section [303-05 Accessory Drive](#).
4. Remove the left-hand valve cover. For additional information, refer to Section [303-01A Engine](#) Section [303-01B Engine](#).
5. Remove the water pump drive pulley.



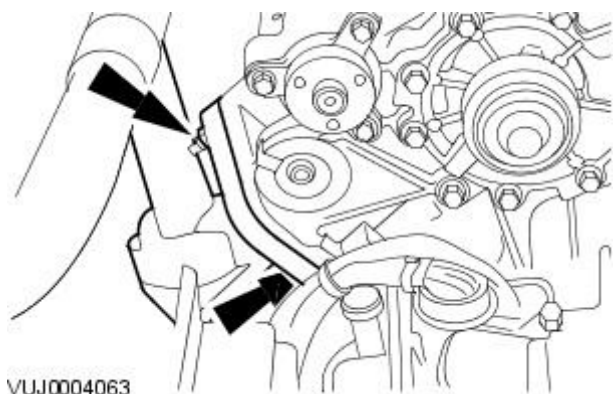
6. Detach the coolant expansion tank outlet hose from the water pump housing.



7. Remove the water pump coolant outlet pipe.
 - Remove and discard the seals.

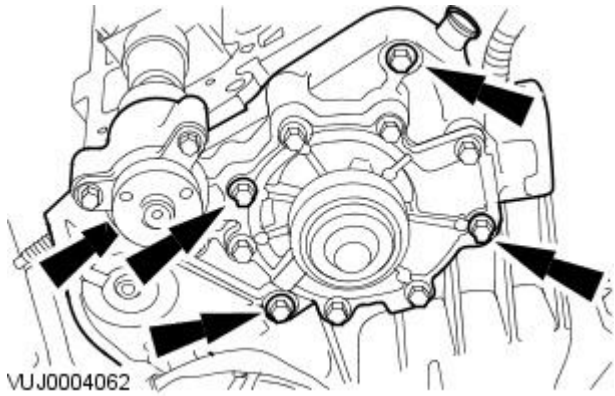


8. Detach the coolant inlet pipe from the water pump housing.
 - Remove and discard the gasket.



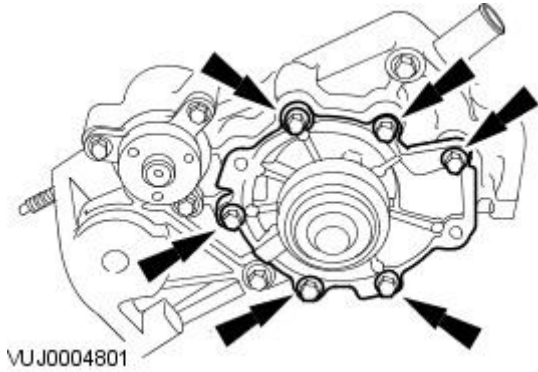
9. Remove the water pump housing.

- Remove and discard the gasket.



10. Remove the water pump from the water pump housing.

- Remove and discard the gasket from the water pump.

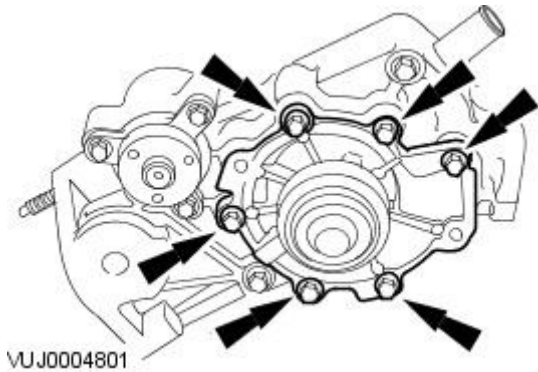



Installation

1. NOTE: Install a new gasket.

To install, reverse the removal procedure.

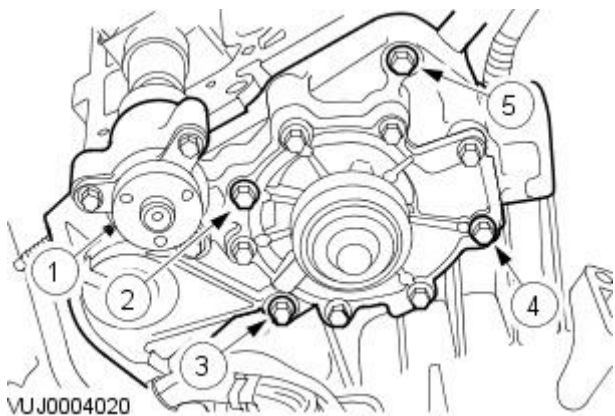
- Tighten to 10 Nm.



2.  CAUTION: Make sure that the water pump housing is tightened in the sequence shown. Failure to follow this instruction may result in damage to the water pump drive pulley bearings.

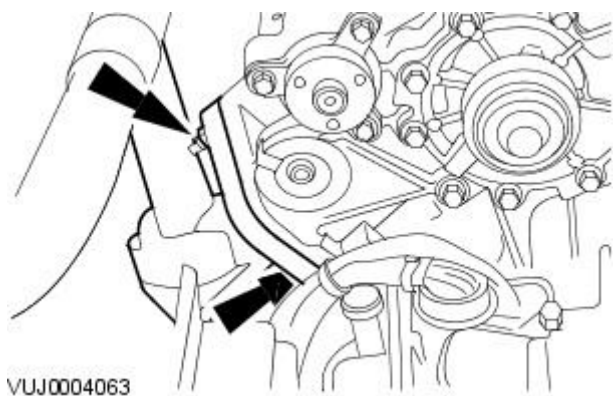
• NOTE: Install a new gasket.

Tighten in the sequence shown to 10 Nm.



3. NOTE: Install a new gasket.

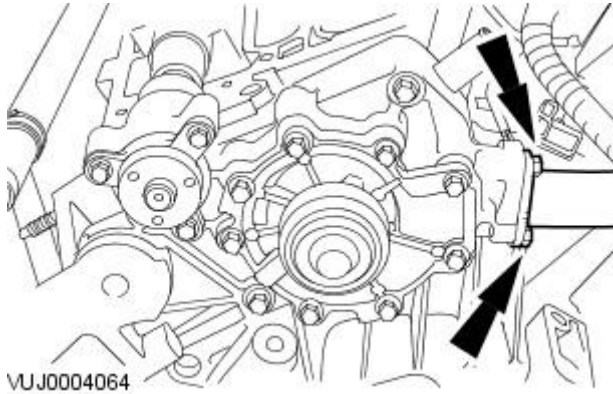
Tighten to 9 Nm.



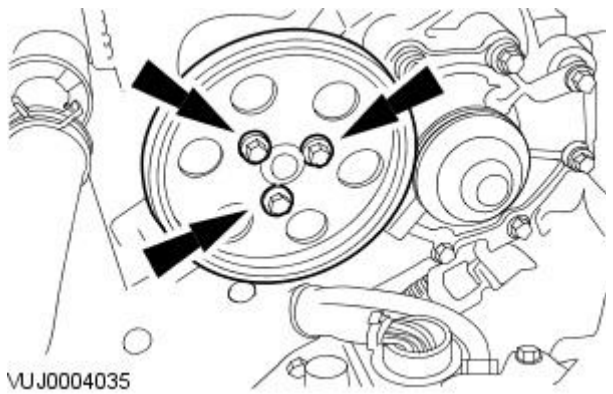
4. NOTE: Install new O-ring seals to the water pump coolant outlet pipe.

• NOTE: Prior to installation of the water pump outlet pipe, lubricate the O-ring seal of the water pump outlet pipe at the joint with the engine coolant inlet tube with lubricant ESE-M99B176-A.

Tighten to 12 Nm.



5. Tighten to 11 Nm.



6. Fill the cooling system. For additional information, refer to [Cooling System Draining, Filling and Bleeding](#).