

**2005 Ford Focus ZX5 S**

2005 ENGINE Engine Cooling - Focus

**2005 ENGINE****Engine Cooling - Focus****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
<b>Cooling System Capacity</b>	
2.3L engine	7.2L (7.6 qts.)
<b>Coolant Type</b>	
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1
<b>Other Chemicals</b>	
Premium Cooling System Flush VC-1	ESR-M14P7-A
Cooling System Stop Leak Pellets VC-6	WSS-M99B37-B6
<b>Cooling System Pressure Test Specifications</b>	
Radiator	138 kPa (20 psi)
<b>Radiator Cap Pressure Test Specification</b>	
Radiator cap	120 kPa (17.4 psi) to 150 kPa (21.7 psi)
<b>Thermostat Opening Temperatures</b>	
Thermostat starts to open	90°C (194°F)
Thermostat fully open	106°C (223°F)

**TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
Power steering hose bracket retaining nuts	10	-	89
A/C compressor bolts	25	18	-
Thermostat housing bolts	10	-	89
Coolant pump pulley bolts	25	18	-
Coolant pump bolts	10	-	89

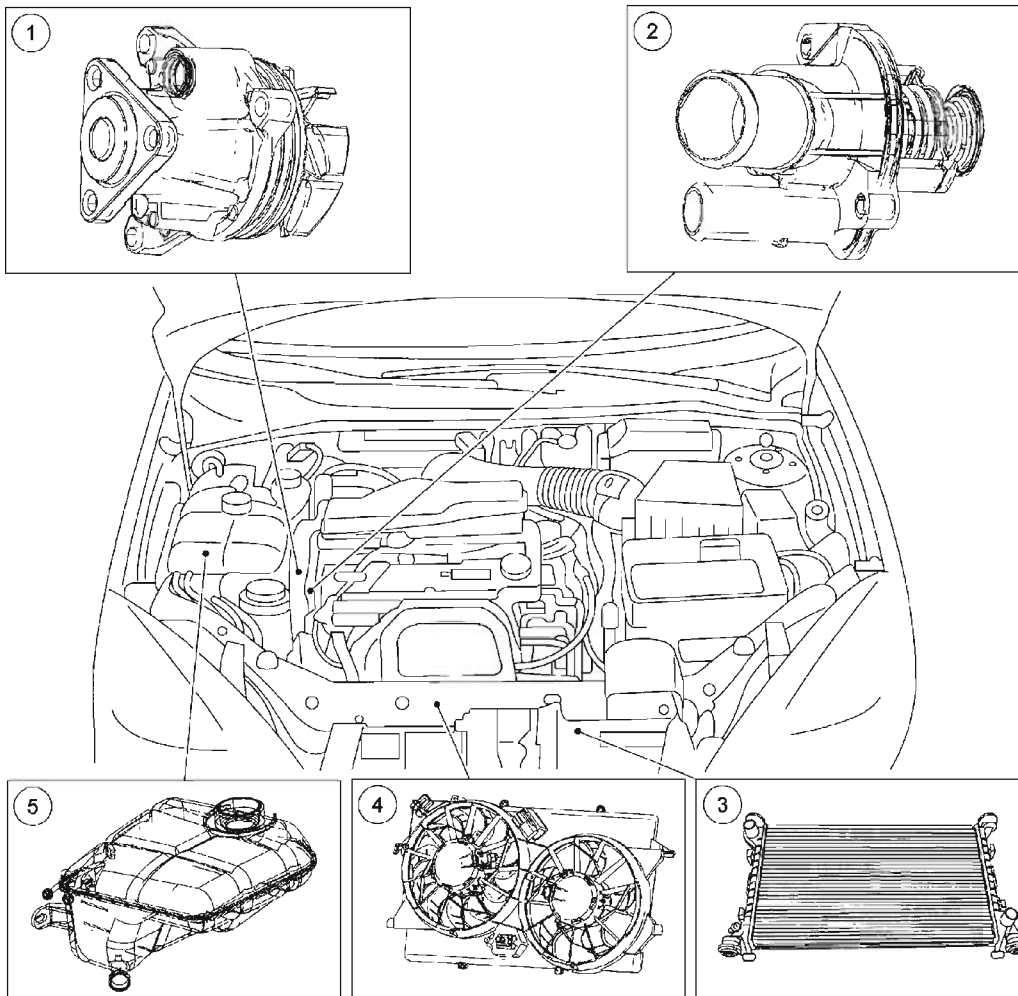
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A/C condenser tube nuts	8	-	71
Radiator support bracket bolts	25	18	-
Degas bottle-to-fender bolt	10	-	89
Block heater (if equipped)	21	15	-

**DESCRIPTION AND OPERATION****ENGINE COOLING**

## 2005 Ford Focus ZX5 S

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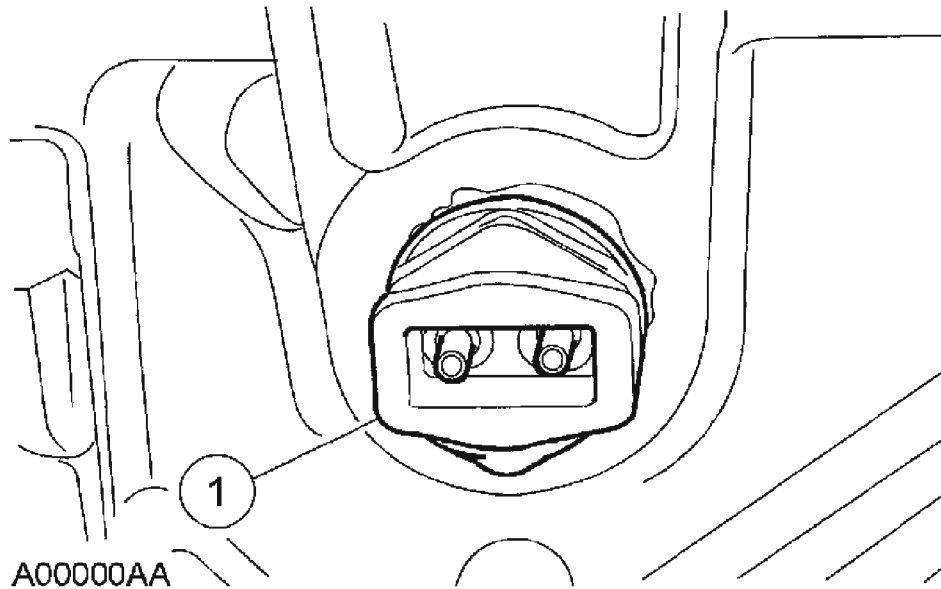


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Item	Part Number	Description
1	8501	Coolant pump
2	8575	Thermostat housing
3	8005	Radiator

Item	Part Number	Description
4	8C607	Fan motor and shroud
5	8A080	Degas bottle

**Fig. 1: Identifying Engine Cooling Components Location (2.0L And 2.3L Engines)**  
Courtesy of FORD MOTOR CO.



Item	Part Number	Description
1	6A051	Block heater

**Fig. 2: Identifying Block Heater (2.0L And 2.3L Engines - If Equipped)**  
Courtesy of FORD MOTOR CO.

The thermostat allows rapid engine warm-up by restricting engine coolant flow at lower operating temperatures. It also assists in maintaining engine operating temperatures between predetermined limits.

**WARNING:** Disconnect the battery when working in the vicinity of the engine cooling fan. The fan is controlled by the engine management system and an increase in coolant temperature can cause the fan to operate, even with the ignition in the OFF position. Failure to follow this instruction can result in personal injury.

The cooling fan(s) is mounted within a shroud behind the radiator.

#### Engine Coolant

**CAUTION:** All vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant VC-7-A or equivalent

**meeting Ford specification WSS-M97B51-A1 (yellow color). Always fill the cooling system with the same type of coolant that is present in the system. Do not mix coolant types.**

**NOTE: The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 or equivalent meeting Ford specification WSS-M99B37-B6 (except as noted in ES-F65E-19A511-AA) darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.**

The cooling system components include the:

- Radiator
- Pressure relief cap
- Degas bottle
- Radiator draincock
- Coolant pump
- Thermostat housing

Engine coolant provides freeze protection, boil protection, cooling efficiency and corrosion protection to the engine and cooling components. In order to obtain these protections, the engine coolant must be maintained at the correct concentration and fluid level in the degas bottle.

When adding engine coolant, use a 50/50 mixture of engine coolant and distilled water.

To maintain the integrity of the coolant and the cooling system:

**NOTE: The addition of Motorcraft Cooling System Stop Leak Pellets VC-6 or equivalent meeting Ford specification WSS-M99B37-B6 (except as noted in ES-F65E-19A511-AA) darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.**

- Add Motorcraft Premium Gold Coolant VC-7-A or equivalent meeting Ford specification WSS-M97B51-A1 (yellow color). Do not mix coolant types.
- Do not add/mix orange-colored Motorcraft Speciality Orange Engine Coolant VC-2 or equivalent meeting Ford specification WSS-M97B44-D or green colored Motorcraft Premium Engine Coolant VC-4-A (in Oregon VC-5, in Canada CXC-10) meeting Ford specification ESE-M97B44-A or equivalent. Mixing coolants may degrade the coolant's corrosion protection.
- Do not add alcohol, methanol or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

- Do not mix with recycled coolant unless it meets the requirements of Ford specification WSS-M97B51-A1. Not all coolant recycling processes meet this Ford specification. Use of such a coolant may harm the engine and cooling system components. Do not mix coolant types.

**Fail Safe Cooling**

The vehicle has a strategy built into the powertrain control module (PCM) that will control the engine if it starts to overheat.

Stage 1 of the strategy will commence if the engine starts to overheat. The cylinder head temperature (CHT) sensor transmits a signal to the PCM, which then moves the temperature gauge pointer into the red zone.

If the engine is not switched off and the temperature continues to rise, the Powertrain Check Lamp is illuminated. This indicates to the driver that the engine is approaching critical limits and should be stopped. At this point DTC P1285 is set in the PCM which can be retrieved using a scan tool.

Stage 2 of the strategy will commence if the lamp and temperature gauge are ignored by the driver. The PCM will start to control the engine by cutting out two cylinders and restricting the RPM to below 3,000 RPM. Simultaneously the malfunction indicator lamp (MIL) will be illuminated. This indicates that long term engine damage can occur and vehicle emissions will be affected. At this point DTC P1299 is set in the PCM which can be retrieved using a scan tool.

Air is then drawn into the deactivated cylinders. This helps to control the temperature of the engine internal components. The deactivated cylinders are alternated to allow even cooling of all the cylinders.

**NOTE:** If the driver is using a high percentage of throttle travel (for example, an overtaking maneuver) when the PCM starts engine deactivation (Stage 2), the deactivation will be delayed for 10 seconds.

**NOTE:** After 2-cylinder operation has begun, the engine will not revert to 4-cylinder operation, even if the temperature should fall, until the ignition is switched off and then on again.

**NOTE:** The malfunction indicator lamp can only be extinguished by using a diagnostic tool after the fault has been rectified and the DTC cleared.

Stage 3 of the strategy will commence if the engine temperature still continues to rise. This

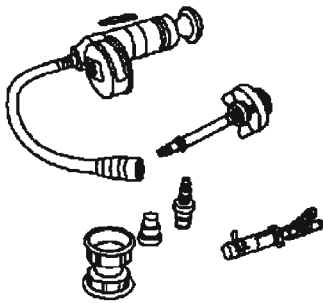
will result in the engine being totally disabled before major engine damage or seizure occurs. The Powertrain Check Lamp will begin to flash, indicating to the driver that the engine will be switched off after 30 seconds. This allows the driver time to choose a suitable parking place.

## DIAGNOSIS AND TESTING

### ENGINE COOLING

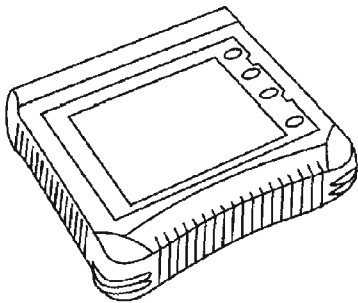
#### Special Tool(s)

#### SPECIAL TOOL DESCRIPTION



**ST1474-A**

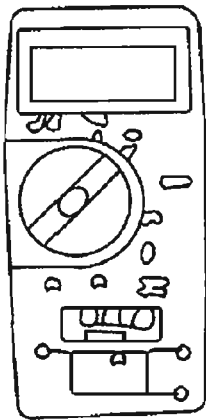
Radiator/Heater Core Pressure Tester  
014-R1072 or equivalent



**ST2332-A**

Worldwide Diagnostic System (WDS)  
418-224  
New Generation STAR (NGS) Tester  
418-F052 or equivalent scan tool with  
required adapter

73 III Automotive Meter 105-R0057 or  
equivalent



ST1137-A

**Inspection and Verification**

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical or electrical damage.

**VISUAL INSPECTION CHART**

<b>Mechanical</b>	<b>Electrical</b>
<ul style="list-style-type: none"> <li>• Leaks</li> <li>• Degas bottle</li> <li>• Radiator</li> <li>• Coolant pump</li> <li>• Accessory drive belt</li> </ul>	<ul style="list-style-type: none"> <li>• Fuse</li> <li>• Wiring harness</li> <li>• Loose or corroded connector(s)</li> <li>• Cylinder head temperature (CHT) sensor</li> <li>• Electric fan(s)</li> </ul>

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the concern is not visually evident, verify the symptom and GO to **SYMPTOM CHART**.

**Symptom Chart****SYMPTOM CHART**

<b>Condition</b>	<b>Possible Sources</b>	<b>Action</b>
<ul style="list-style-type: none"> <li>• Loss of coolant</li> </ul>	<ul style="list-style-type: none"> <li>• Hoses.</li> <li>• Hose connections.</li> </ul>	<ul style="list-style-type: none"> <li>• GO to <b><u>PINPOINT TEST A</u></b>.</li> </ul>



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	<ul style="list-style-type: none"><li>• Radiator.</li><li>• Coolant pump.</li><li>• Degas bottle.</li><li>• Heater core.</li><li>• Engine gaskets.</li><li>• Engine casting cracks.</li><li>• Engine block core plugs.</li></ul>	
<ul style="list-style-type: none"><li>• The engine overheats</li></ul>	<ul style="list-style-type: none"><li>• Engine coolant loss.</li><li>• Towing weight exceeded.</li><li>• System restriction.</li><li>• Blocked radiator grille.</li><li>• Thermostat.</li><li>• Fuse.</li><li>• Circuit.</li><li>• Fan motor.</li><li>• Coolant pump.</li><li>• Accessory drive belt.</li><li>• Cylinder head temperature (CHT) sensor.</li><li>• Powertrain control module (PCM).</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST B.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The engine does not reach normal operating temperature</li></ul>	<ul style="list-style-type: none"><li>• Thermostat.</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST C.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The cooling fan(s) is inoperative in any speed</li></ul>	<ul style="list-style-type: none"><li>• Fuse(s).</li><li>• Circuitry.</li><li>• Cooling fan motor.</li><li>• Cooling fan resistor.</li><li>• Cooling fan relay.</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST D.</u></b></li></ul>
<ul style="list-style-type: none"><li>• The cooling fans are on at all times</li></ul>	<ul style="list-style-type: none"><li>• Fuse(s).</li><li>• Circuitry.</li></ul>	<ul style="list-style-type: none"><li>• GO to <b><u>PINPOINT TEST E.</u></b></li></ul>

- Cooling fan relay.

## Pinpoint Tests

### PINPOINT TEST A: LOSS OF COOLANT

#### A1 CHECK THE ENGINE COOLANT LEVEL

**WARNING:** Never remove the pressure relief cap while the engine is operating or when the cooling system is hot. Failure to follow these instructions can result in damage to the cooling system or engine or personal injury. To avoid having scalding hot coolant or steam blow out of the degas bottle when removing the pressure relief cap, wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly. Step back while the pressure is released from the cooling system. When you are sure all the pressure has been released, turn and remove the pressure relief cap (still with a cloth).

**NOTE:** Allow the engine to cool before checking the engine coolant level.

- Visually check the engine coolant level at the degas bottle.
- Is the engine coolant level within specification?

Yes : GO to A2.

No : REFILL the engine coolant as necessary. GO to A2.

#### A2 CHECK THE DEGAS BOTTLE PRESSURE RELIEF CAP

**WARNING:** To avoid personal injury, do not unscrew the coolant pressure relief cap while the engine is operating or hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly.

- Inspect the pressure relief cap for foreign material between the sealing gasket and the diaphragm.
- Is pressure relief cap OK?

Yes : GO to A3.

No : INSTALL a new pressure relief cap. TEST the system for normal operation.

**A3 CHECK THE ENGINE COOLANT FOR INTERNAL LEAK**

**WARNING:** Never remove the pressure relief cap while the engine is operating or when the cooling system is hot. Failure to follow these instructions can result in damage to the cooling system or engine or personal injury. To avoid having scalding hot coolant or steam blow out of the degas bottle when removing the pressure relief cap, wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly. Step back while the pressure is released from the cooling system. When you are sure all the pressure has been released, turn and remove the pressure relief cap (still with a cloth).

- Inspect the engine coolant in degas bottle for signs of transmission fluid or engine oil.

- **Is oil or transmission fluid evident in coolant?**

**Yes :** If engine oil is evident, GO to **ENGINE SYSTEM-GENERAL INFORMATION** . If transmission fluid is evident, INSTALL a new radiator as necessary.

**No :** GO to **A4**.

**A4 CHECK THE ENGINE AND THE TRANSMISSION FOR COOLANT**

- Remove the oil level dipsticks from the engine and the transmission.
- **Is coolant evident in oil or transmission fluid?**

**Yes :** If coolant is in the engine oil, GO to **ENGINE SYSTEM-GENERAL INFORMATION** . If coolant is in the transmission fluid, INSTALL a new radiator. REFER to **RADIATOR**. REPAIR the transmission as necessary, REFER to **AUTOMATIC TRANSAXLE/TRANSMISSION** .

**No :** GO to **A5**.

**A5 PRESSURE TEST THE ENGINE COOLING SYSTEM**

- Pressure test the cooling system. Refer to **COMPONENT TESTS**, Pressure Test.
- **Does the engine cooling system leak?**

**Yes :** REPAIR or INSTALL new components if leaking. TEST the system for normal operation.

**No :** The cooling system is operational. GO to **SYMPTOM CHART**.

**PINPOINT TEST B: THE ENGINE OVERHEATS****B1 CHECK THE COOLANT CONDITION**

**WARNING:** Never remove the pressure relief cap while the engine is operating or when the cooling system is hot. Failure to follow these instructions can result in damage to the cooling system or engine or personal injury. To avoid having scalding hot coolant or steam blow out of the degas bottle when removing the pressure relief cap, wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly. Step back while the pressure is released from the cooling system. When you are sure all the pressure has been released, turn and remove the pressure relief cap (still with a cloth).

- Inspect the coolant level and condition.
- **Is the coolant condition OK?**

**Yes :** GO to **B2**.

**No :** If the coolant is weak or contaminated, FLUSH the engine cooling system. TEST the system for normal operation.

If the coolant is low, REFILL the engine coolant at the degas bottle. GO to **PINPOINT TEST A**.

## **B2 CHECK FOR AN AIRFLOW OBSTRUCTION**

- Inspect the A/C condenser core and radiator for obstructions such as leaves or dirt.
- **Is there an obstruction?**

**Yes :** REMOVE the obstruction. CLEAN the A/C condenser core and radiator. TEST the system for normal operation.

**No :** GO to **B3**.

## **B3 CHECK THE THERMOSTAT OPERATION**

- Start the engine and allow it to run while observing ECT until the engine cooling fans engage (may require 30-40 minutes to reach ECT of approximately 103°C (218°F)).
- Note any change in ECT reading while the fans are running and shortly after they turnoff.
- **Did the ECT drop by 10-14°F during this period?**

**Yes :** GO to **B4**.

**No :** INSTALL a new thermostat. TEST the system for normal operation.

## **B4 CHECK THE COOLING FAN OPERATION**

- Using the diagnostic tool, command the cooling fans ON in low, medium and

high speed.

- **Do the cooling fans operate correctly?**

**Yes :** INSTALL a new coolant pump. TEST the system for normal operation.

**No :** GO to **SYMPTOM CHART** to diagnose cooling fans.

**PINPOINT TEST C: THE ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE**

**C1 CHECK THE ENGINE TEMPERATURE**

- Start the engine and allow to run while observing ECT until the engine cooling fans engage (may require 30-40 minutes to reach ECT of approximately 103°C (218°F)).
- **Note any change in the ECT reading while the fans are running and shortly after they turn off.**
- **Did the ECT drop by 10-14°F during this period?**

**Yes :** REFER to **INSTRUMENT CLUSTER AND PANEL ILLUMINATION** for diagnosis of the engine coolant temperature gauge.

**No :** INSTALL a new thermostat. TEST the system for normal operation.

**PINPOINT TEST D: THE COOLING FAN(S) IS INOPERATIVE IN ANY SPEED**

**NOTE: Before carrying out the following test, diagnose any PCM DTCs.**

**D1 CHECK FOR FAN OPERATION**

- Key in ON position.
- Command the cooling fans ON in low, medium and high speed.
- **Are either or both fans inoperative in any speed?**

**Yes :**

If both fans are inoperative in all speeds, REPAIR circuit 31-DA4 (BK) for an open. TEST the system for normal operation.

If both fans are inoperative in low speed only, CARRY OUT the relay component test on relays R9 and R10. If the relays test good, REPAIR circuit 15S-PA22B (GN/YE) for an open. TEST the system for normal operation.

If both fans are inoperative in low speed and LH fan is inoperative in medium and high speed, GO to **D2**.

If both fans are inoperative in low speed and RH fan is inoperative in medium and high speed, GO to **D3**.

If both fans are inoperative in low and high speed only, GO to **D4**.

If both fans are inoperative in medium speed only, GO to **D6**.

If both fans are inoperative in medium speed and one fan is inoperative in low speed, REPAIR circuit 15S-PA22A (GN/YE) for a short to ground. TEST the system for normal operation.

If LH fan is inoperative in low speed only, CARRY OUT the relay component test on relay R10. If the relay tests good, GO to **D8**.

If RH fan is inoperative in low speed only, CARRY OUT the relay component test on relay R9. If the relay tests good, REPAIR circuit 5S-PA22B (GN/YE) for a short to ground. TEST the system for normal operation.

If LH fan is inoperative in medium and high speeds only, CARRY OUT the relay component test on relay R9. If the relay tests good, REPAIR circuit 31S-PA6 (BK/YE) for an open. TEST the system for normal operation.

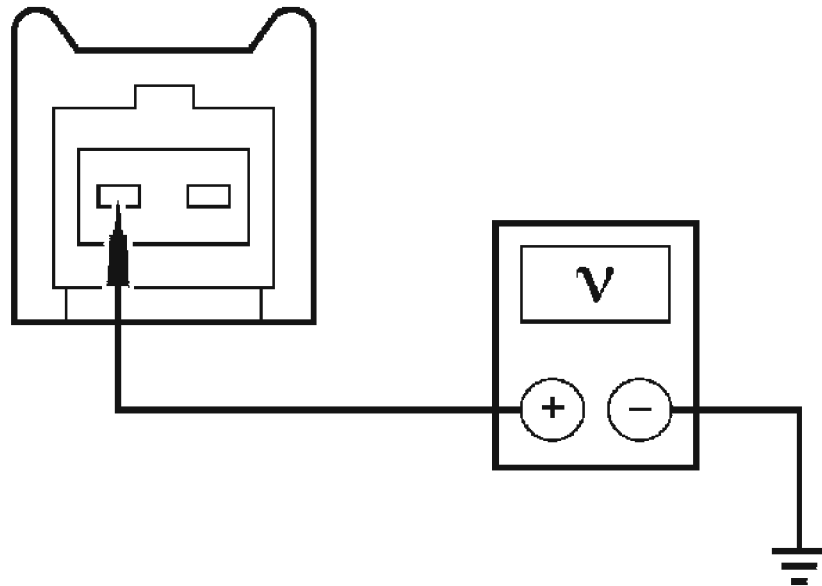
If RH fan is inoperative in medium and high speeds only, CARRY OUT the relay component test on relay R10. If the relay tests good, REPAIR circuit 15S-PA22 (BK/YE) for an open. TEST the system for normal operation.

If RH or LH fan is inoperative in all speeds, INSTALL a new fan motor. TEST the system for normal operation.

**No** : The cooling fans are functioning properly.

## **D2 CHECK CIRCUIT 15S-PA6 (GN/YE) FOR VOLTAGE**

- Key in OFF position.
- Disconnect: LH Cooling Fan C1048.
- Key in ON position.
- Command the cooling fans on high.
- Measure the voltage between LH cooling fan C1048 pin 2, circuit 15S-PA6 (GN/YE) and ground.



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**Fig. 3: Measuring Voltage Between LH Cooling Fan C1048 Pin 2, Circuit 15S-PA6 (GN/YE) And Ground**  
Courtesy of FORD MOTOR CO.

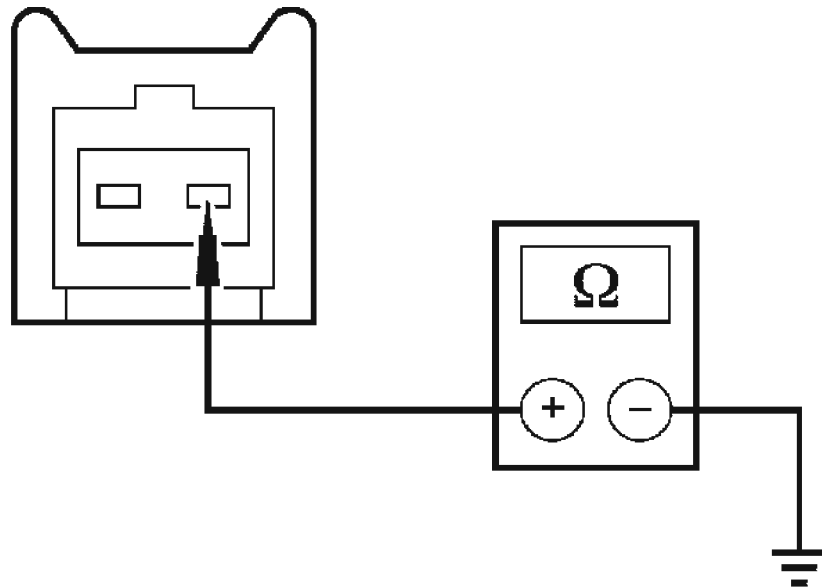
- **Is the voltage greater than 10 volts?**

**Yes :** CARRY OUT the relay component test on relay R9. If the relay tests good, REPAIR circuit 5S-PA22A (GN/YE) for an open. TEST the system for normal operation.

**No :** REPAIR circuit 15S-PA6 (GN/YE) for an open. TEST the system for normal operation.

### **D3 CHECK CIRCUIT 31-PA16 (BK) FOR GROUND**

- Key in OFF position.
- Disconnect: RH Cooling Fan C1406.
- Measure the resistance between RH cooling fan C1406 pin 1, circuit 31-PA16 (BK) and ground.



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**Fig. 4: Measuring Resistance Between RH Cooling Fan C1406 Pin 1, Circuit 31-PA16 (BK) And Ground**  
Courtesy of FORD MOTOR CO.

- **Is the resistance less than 5 ohms?**

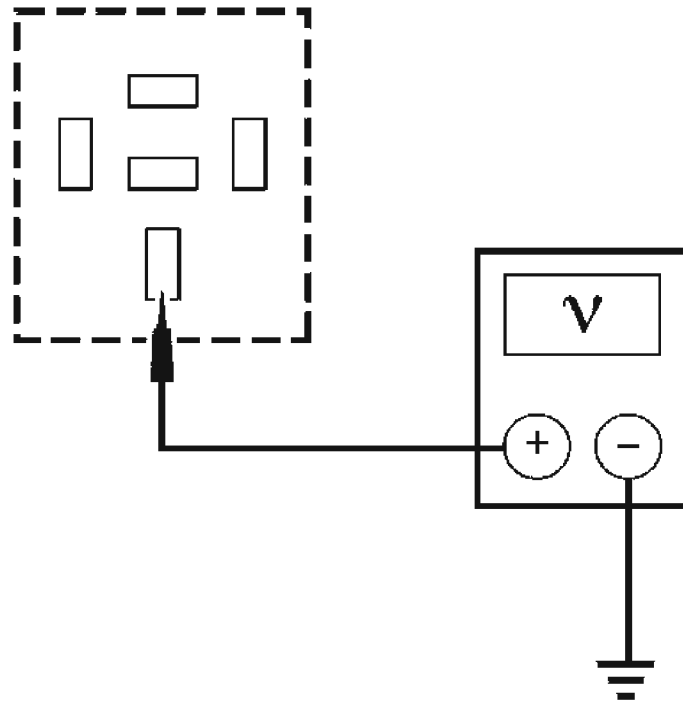
**Yes :** CARRY OUT the relay component test on relay R10. If the relay tests good, REPAIR circuit 15S-PA16 (GN/OG) for an open. TEST the system for normal operation.

**No :** REPAIR circuit 31-PA16 (BK) for an open. TEST the system for normal operation.

**D4 CHECK CIRCUIT 30-PA18 (RD) FOR VOLTAGE**

- Key in OFF position.
- Disconnect: Relay R3.
- Key in ON position.
- Measure the voltage between relay R3 pin 30, circuit 30-PA18 (RD) and ground.





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**Fig. 5: Measuring Voltage Between Relay Pin And Ground**  
Courtesy of FORD MOTOR CO.

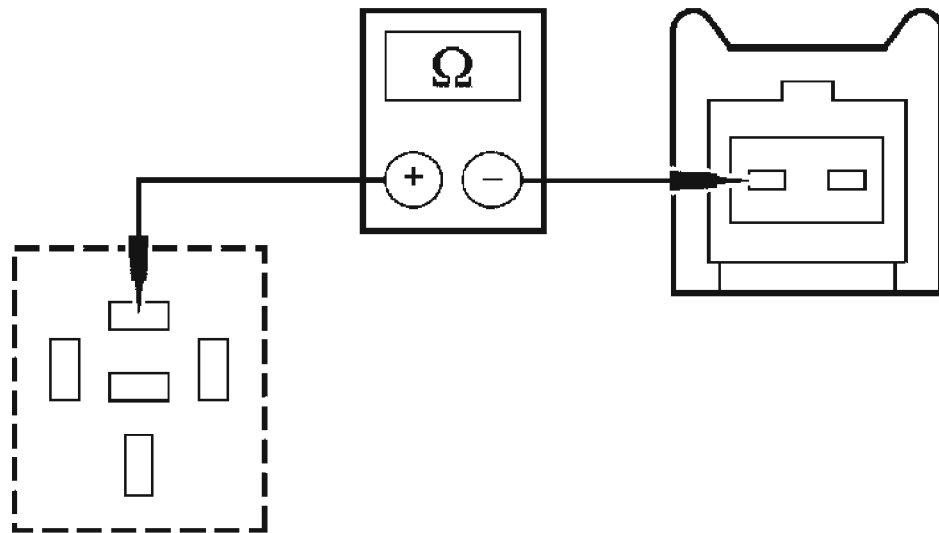
- **Is the voltage greater than 10 volts?**

**Yes :** GO to **D5**.

**No :** REPAIR circuit 30-PA18 (RD) for an open. TEST the system for normal operation.

**D5 CHECK CIRCUIT 15S-PA1 (GN/BU) FOR AN OPEN**

- Key in OFF position.
- Disconnect: LH Cooling Fan C1048.
- Measure the resistance between relay R3 pin 87, circuit 15S-PA1 (GN/BU) and LH cooling fan C1048 pin 2, circuit 15S-PA6 (GN/YE).



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**Fig. 6: Measuring Resistance Between Relay R3 Pin 87, Circuit 15S-PA1 (GN/BU) And LH Cooling Fan C1048 pin 2, Circuit 15S-PA6 (GN/YE)**  
Courtesy of FORD MOTOR CO.

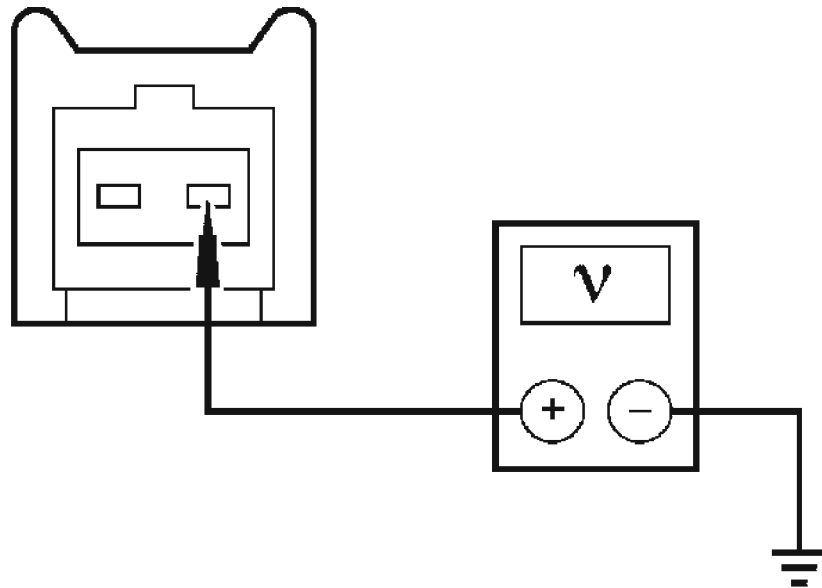
- **Is the resistance less than 5 ohms?**

**Yes :** INSTALL an new relay R3. TEST the system for normal operation.

**No :** REPAIR circuit 15S-PA1 (GN/BU) for an open. TEST the system for normal operation.

**D6 CHECK CIRCUIT 15S-PA9 (GN/WH) FOR VOLTAGE**

- Key in OFF position.
- Disconnect: Cooling Fan Resistor C1027.
- Key in ON position.
- Measure the voltage between cooling fan resistor C1027 pin 1, circuit 15S-PA9 (GN/WH) and ground.



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**Fig. 7: Measuring Voltage Between Cooling Fan Resistor C1027 Pin 1, Circuit 15S-PA9 (GN/WH) And Ground**  
Courtesy of FORD MOTOR CO.

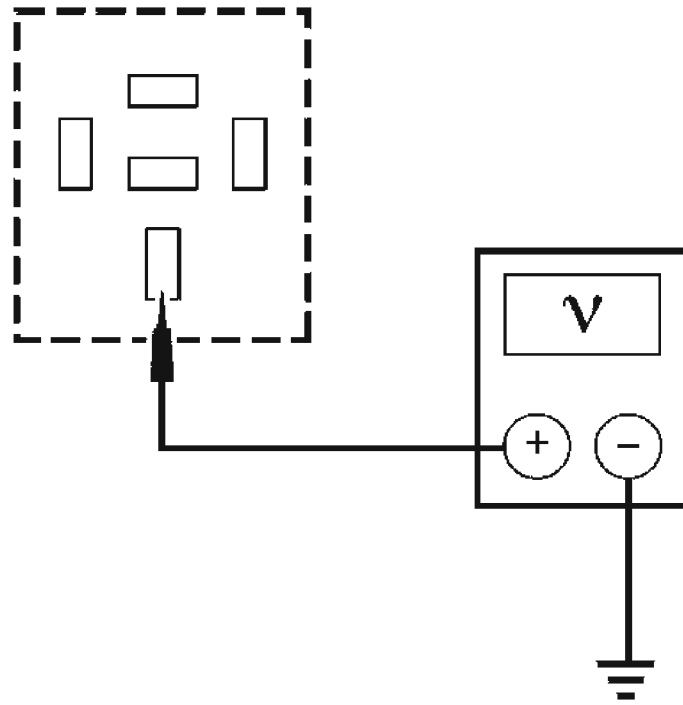
- **Is the voltage greater than 10 volts?**

**Yes :** CARRY OUT the relay component test on the cooling fan resistor. If the resistor tests good, REPAIR circuit 15S-PA2 (GN/BU) for an open. TEST the system for normal operation.

**No :** GO to **D7**.

**D7 CHECK CIRCUIT 30-PA8 (RD) FOR VOLTAGE**

- Key in OFF position.
- Disconnect: Relay R4.
- Key in ON position.
- Measure the voltage between relay R4 pin 30, circuit 30-PA8 (RD) and ground.



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**Fig. 8: Measuring Voltage Between Relay Pin And Ground**  
Courtesy of FORD MOTOR CO.

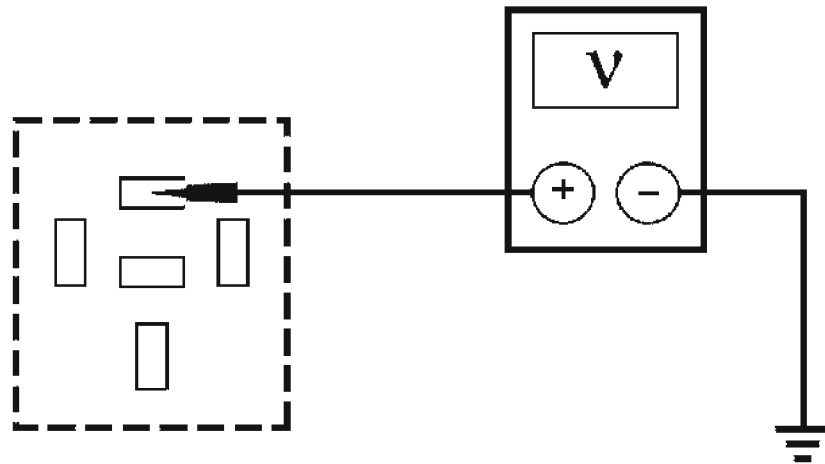
- **Is the voltage greater than 10 volts?**

**Yes :** CARRY OUT the relay component test on relay R4. If the relay tests good, REPAIR circuit 15S-PA9 (GN/WH) for an open. TEST the system for normal operation.

**No :** REPAIR circuit 30-PA8 (RD) for an open. TEST the system for normal operation.

**D8 CHECK CIRCUIT 15S-PA22B (GN/YE) FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Disconnect: Relay R9.
- Disconnect: Relay R10.
- Key in ON position.
- Measure the voltage between relay R9 pin 87, circuit 15S-PA22B (GN/YE) and ground.



A0013861

**Fig. 9: Measuring Voltage Between Relay R9 Pin 87, Circuit 15S-PA22B (GN/YE) And Ground**

Courtesy of FORD MOTOR CO.

- **Is voltage present?**

**Yes :** REPAIR circuit 15S-PA16 (GN/OG) for a short to voltage. TEST the system for normal operation.

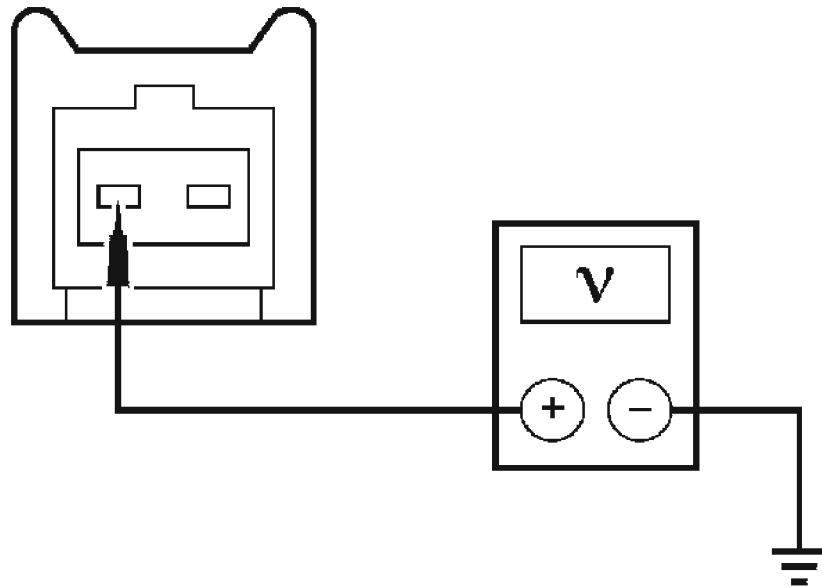
**No :** REPAIR circuit 15S-PA22B (GN/YE) for a short to voltage. TEST the system for normal operation.

**PINPOINT TEST E: THE COOLING FANS ARE ON AT ALL TIMES**

**NOTE: Before carrying out the following test, diagnose any PCM DTCs.**

**E1 CHECK CIRCUIT 15S-PA6 (GN/YE) FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Disconnect: LH Cooling Fan C1048.
- Disconnect: Relay R10.
- Key in ON position.
- Measure the voltage between LH cooling fan C1048 pin 2, circuit 15S-PA6 (GN/YE) and ground.



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**Fig. 10: Measuring Voltage Between LH Cooling Fan C1048 Pin 2, Circuit 15S-PA6 (GN/YE) And Ground**  
Courtesy of FORD MOTOR CO.

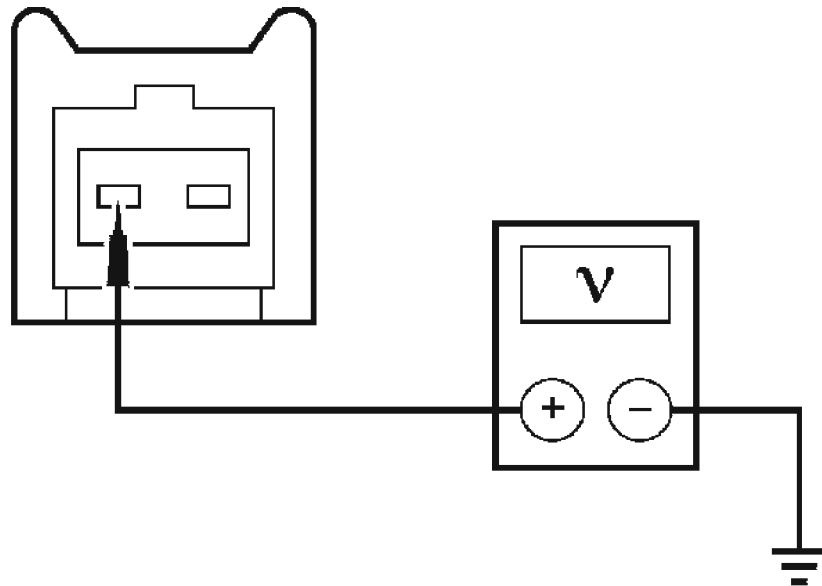
- **Is voltage present?**

**Yes :** GO to **E2**.

**No :** REPAIR circuit 15S-PA6 (GN/YE) for a short to voltage. TEST the system for normal operation.

**E2 CHECK CIRCUIT 15S-PA16 (GN/OG) FOR A SHORT TO VOLTAGE**

- Key in OFF position.
- Disconnect: RH Cooling Fan C1406.
- Key in ON position.
- Measure the voltage between RH cooling fan C1406 pin 1, circuit 15S-PA16 (GN/OG) and ground.



A0074696

**Fig. 11: Measuring Voltage Between RH Cooling Fan C1406 Pin 1, Circuit 15S-PA16 (GN/OG) And Ground**  
Courtesy of FORD MOTOR CO.

- **Is voltage present?**

**Yes :** CARRY OUT the relay component test on relays R3 and R4. If the relays tests good, REPAIR circuit 15S-PA9 (GN/WH) for a short to voltage. TEST the system for normal operation.

**No :** REPAIR circuit 15S-PA16 (GN/OG) for a short to voltage. TEST the system for normal operation.

#### Component Tests

##### Blower Motor Resistor

#### BLOWER MOTOR RESISTOR RESISTANCE SPECIFICATIONS

Cooling Fan Resistor Pins	Resistance
1 and 2	0.25 ohms

#### Radiator Leak Test, Removed From the Vehicle

**CAUTION:** Do not leak test an aluminum 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 aluminum.**

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.

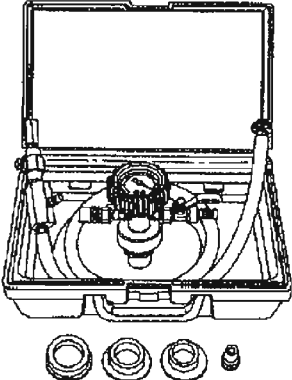
A separate clean test tank is recommended for aluminum radiators.

## GENERAL PROCEDURES

### COOLING SYSTEM DRAINING, FILLING AND BLEEDING

#### Special Tool(s)

#### SPECIAL TOOL DESCRIPTION

 ST2818-A	RADKITPLUS 078-00497
--	----------------------

#### Material

#### MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1

#### Draining

**WARNING:** When releasing the system pressure, cover the pressure relief cap with a thick cloth to prevent the possibility of coolant scalding. Failure to follow this instruction can result in personal injury.

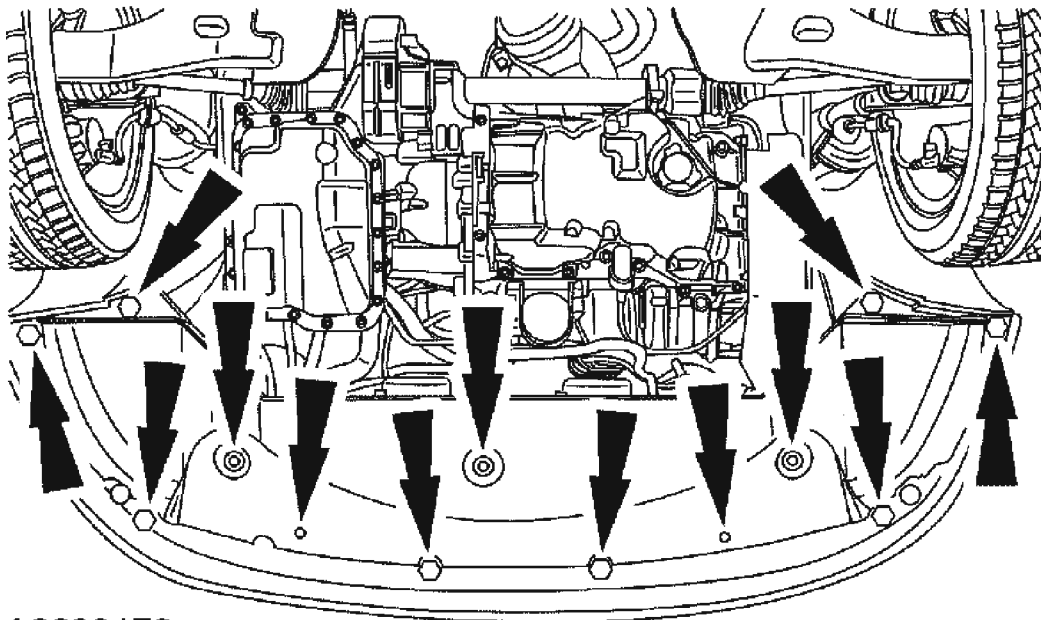


**CAUTION:** The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated it must be recycled or disposed of correctly.

**CAUTION:** All vehicle cooling systems are filled with Motorcraft Premium Gold Engine Coolant or equivalent. Always refill the cooling system with the same type of coolant that was drained from the system. Do not mix coolant types.

**NOTE:** The addition of Cooling System Stop Leak Pellets darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

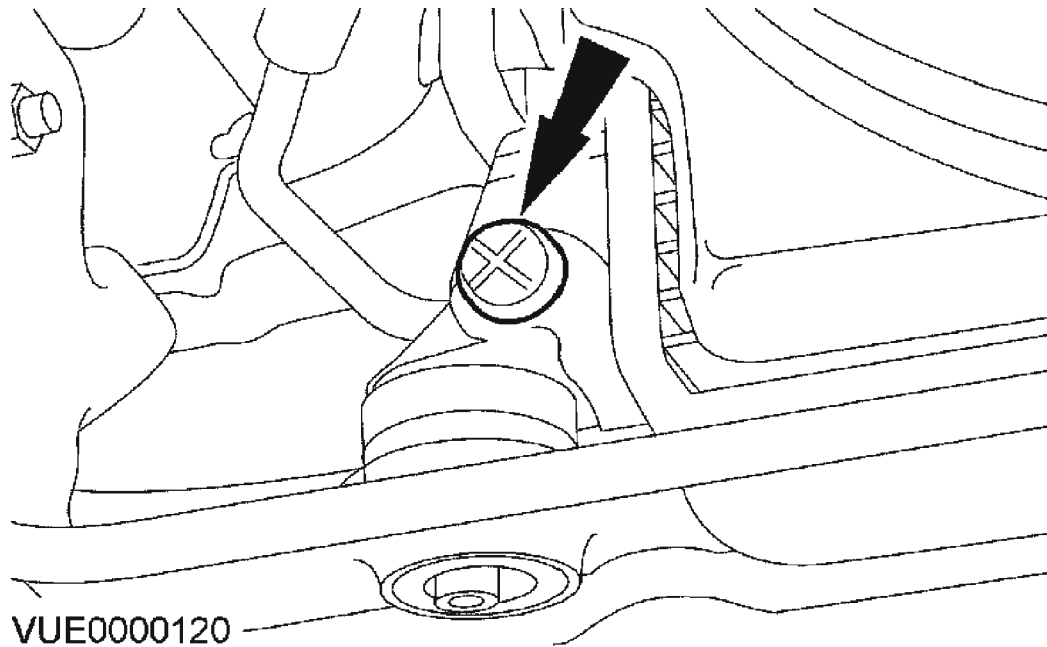
1. Release the cooling system pressure by slowly turning the pressure relief cap a quarter of a turn.
2. Remove the pressure relief cap when all the pressure has been released.
3. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
4. Remove the retainers and the engine undershield.



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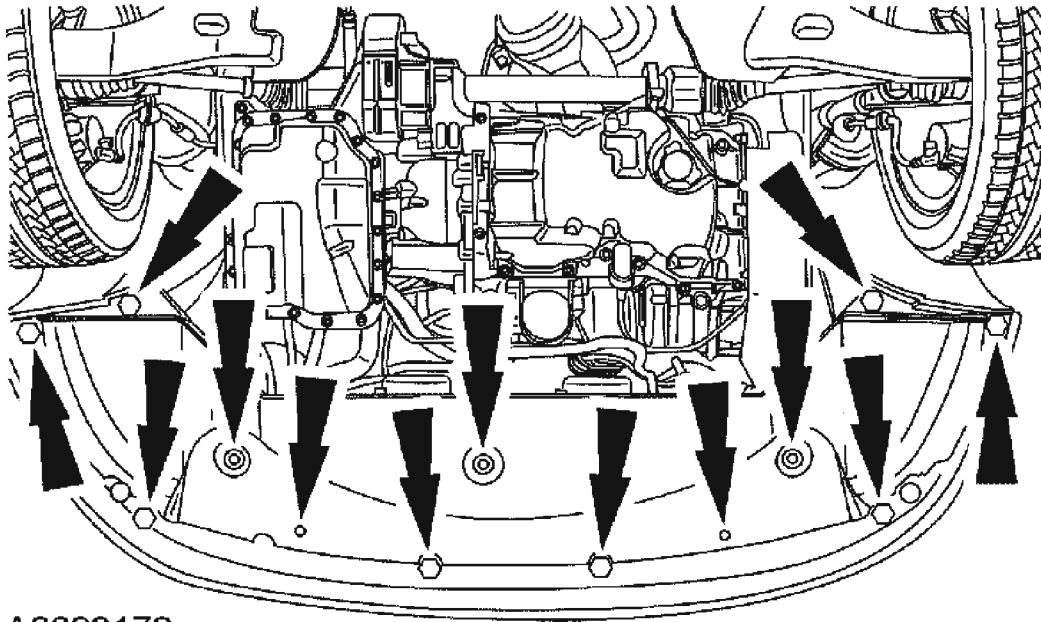
**Fig. 12: Removing Retainers And Engine Undershield**  
Courtesy of FORD MOTOR CO.

**NOTE:**      **Drain the coolant into a suitable container.**



**Fig. 13: Opening Radiator Drain Valve To Drain Coolant**  
**Courtesy of FORD MOTOR CO.**

5. Open the radiator drain valve to drain the coolant.
6. Close the drain valve when all the coolant has been drained from the system.
7. Install the retainers and the engine under shield.



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**Fig. 14: Installing Retainers And Engine Under Shield**  
Courtesy of FORD MOTOR CO.

**Filling and Bleeding with RADKITPLUS**

1. Using the special tool, install the RADKITPLUS and follow the manufacturer's instructions to fill and bleed the cooling system.

**Filling and Bleeding without RADKITPLUS**

**CAUTION:** Engine coolant provides freeze protection, boil protection, cooling efficiency, and corrosion protection to the engine and cooling components. In order to obtain these protections, the engine coolant must be maintained at the correct concentration and fluid level in the degas bottle. When adding engine coolant, use a 50/50 mixture of engine coolant and distilled water. To maintain the integrity of the coolant and the cooling system:

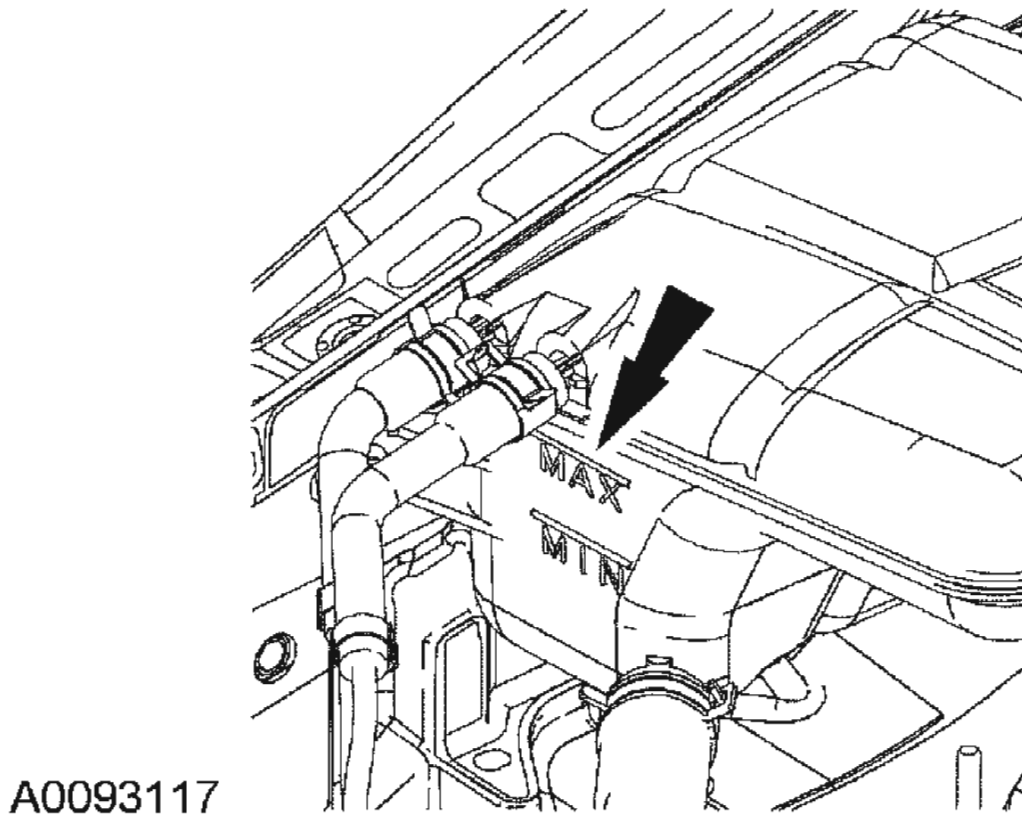
- Vehicle cooling systems are filled with Premium Gold Engine Coolant. Always fill the cooling system with the same coolant that is present in the system. Do not mix coolant types.

- Do not add/mix orange-colored Motorcraft Speciality Orange Engine Coolant VC-2 or equivalent meeting Ford specification WSS-M97B44-D or green colored Premium Engine Coolant. Mixing coolants may degrade the coolant's corrosion protection.
- Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
- Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft Premium Gold Engine Coolant since a Ford-approved recycling process is not yet available.
- Used engine coolant should be disposed of in an appropriate manner. Follow your community's regulations and standards for recycling and disposing of automotive fluids.

**NOTE:** The addition of Cooling System Stop Leak Pellets darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

1. Disconnect the heater inlet hose from the engine.
2. Using a funnel, fill the cooling system through the inlet hose until the coolant starts to trickle from the engine.
3. Reconnect the heater inlet hose.

**NOTE:** Make sure that the in-vehicle heater temperature control is in the HOT position and the heater blower switch is in the OFF position. Make sure the air conditioning is switched OFF.



**Fig. 15: Identifying Degas Bottle Max Mark**  
**Courtesy of FORD MOTOR CO.**

4. Refill the degas bottle to the MAX mark (with the engine switched off).
5. Install the degas bottle cap.
6. Warm the engine to 2,750 RPM for 2 fan cycles.
7. Allow the engine to cool down and then recheck the coolant level. Top off to the MAX mark as required.

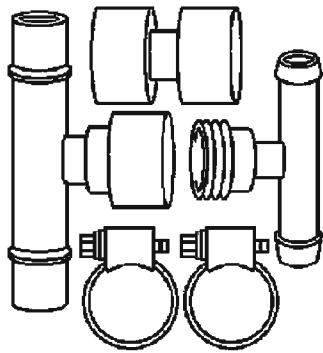
#### **COOLING SYSTEM FLUSHING**

#### **SPECIAL TOOL DESCRIPTION**

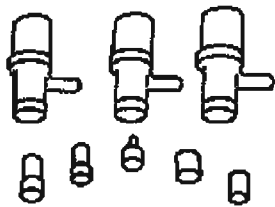
	Flush Kit 164-R3658 or equivalent
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## 2005 Ford Focus ZX5 S

### 2005 ENGINE Engine Cooling - Focus

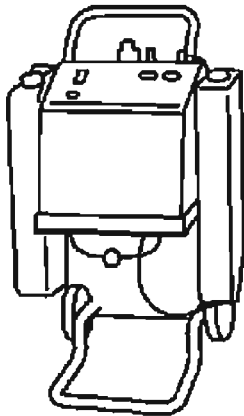


**ST1168-A**



**ST1167-A**

Drain Kit  
164-R3662



**ST2421-A**

Pro Flush and Fill Coolant Flush and Fill  
023-00154 or equivalent

## MATERIAL SPECIFICATIONS

Item	Specification
Premium Cooling System Flush VC-1	ESR-M14P7-A
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or	WSS-M97B51-A1

equivalent (yellow color)

**WARNING:** To avoid personal injury, do not unscrew the coolant pressure relief cap while the engine is operating or hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions can result in personal injury.

1. Drain the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
2. Remove the thermostat. For additional information, refer to **THERMOSTAT HOUSING**.
3. Install the water hose connection without the thermostat.

**NOTE:** Refer to the cooling system Pro Flush and Fill operating instructions for specific vehicle hook-up.

4. Use cooling system Pro Flush and Fill, Flush Kit and Drain Kit to flush the engine and radiator.
5. Install the thermostat. For additional information, refer to **THERMOSTAT HOUSING**.
6. Fill the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

## REMOVAL AND INSTALLATION

### THERMOSTAT HOUSING

#### Material

#### MATERIAL SPECIFICATIONS

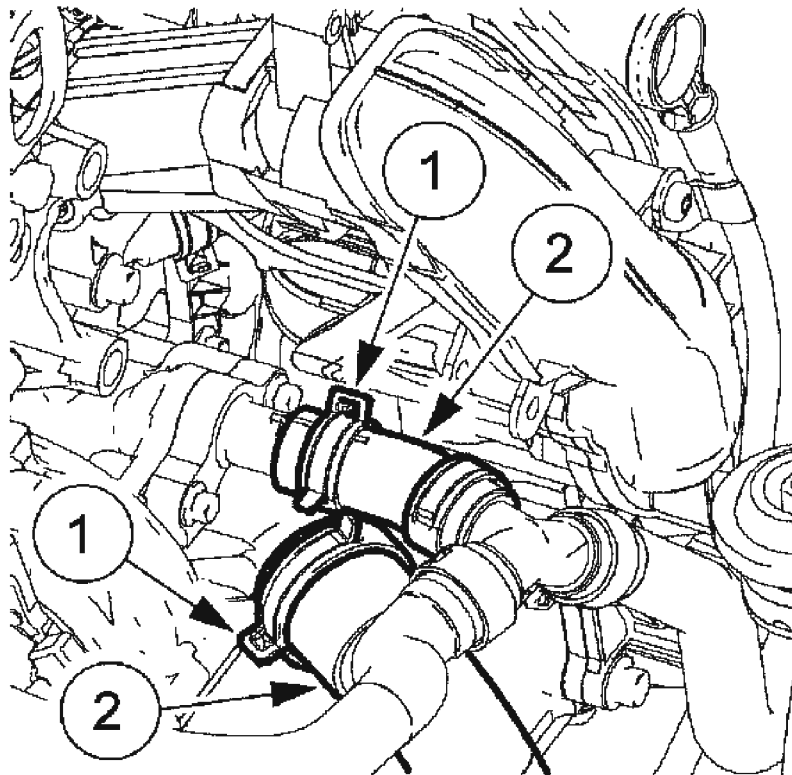
Item	Specification
Motorcraft Premium Gold Engine Coolant VC-7-A or equivalent	WSS-M97B51-A1

#### Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the air conditioning compressor. For additional information, refer to **AIR CONDITIONING**.

**NOTE:** The thermostat and thermostat housing are serviced as an assembly.

3. Drain the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
4. Remove the cooling fan motor and shroud. For additional information, refer to **COOLING FAN MOTOR AND SHROUD**.
5. Remove the hoses to the thermostat housing.
  1. Release the spring-style clamps.
  2. Twist and remove the coolant hoses from the thermostat housing.

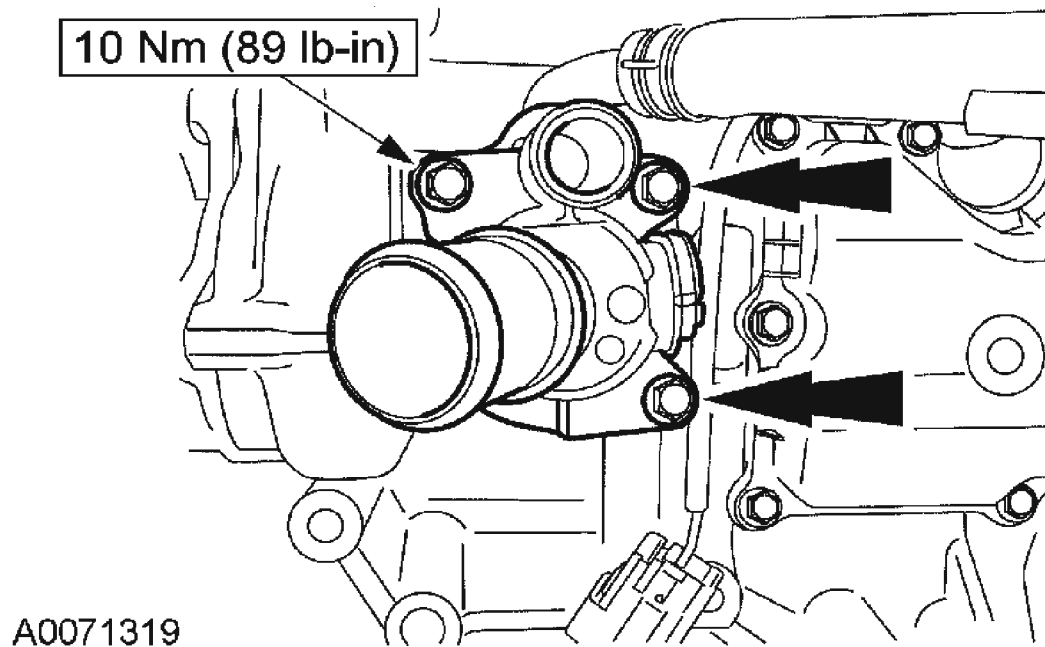


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**Fig. 16: Removing Hoses To Thermostat Housing**  
Courtesy of FORD MOTOR CO.

6. Remove the bolts, the thermostat housing and the thermostat as an assembly.





**Fig. 17: Removing Bolts, Thermostat Housing And Thermostat As An Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Lubricate the thermostat housing O-ring with clean engine coolant.

7. To install, reverse the removal procedure.
8. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

## WATER PUMP

### Material

### MATERIAL SPECIFICATIONS

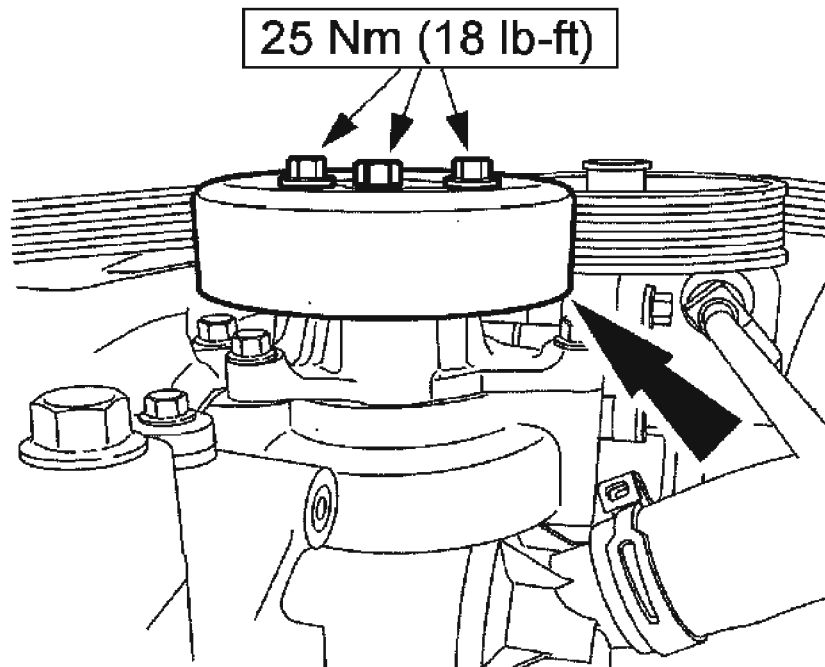
Item	Specification
Motorcraft Premium Gold Engine Coolant VC-7-A or equivalent	WSS-M97B51-A1

### Removal and Installation

1. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE**.
2. Drain the cooling system. For additional information, refer to **COOLING SYSTEM**

**DRAINING, FILLING AND BLEEDING.**

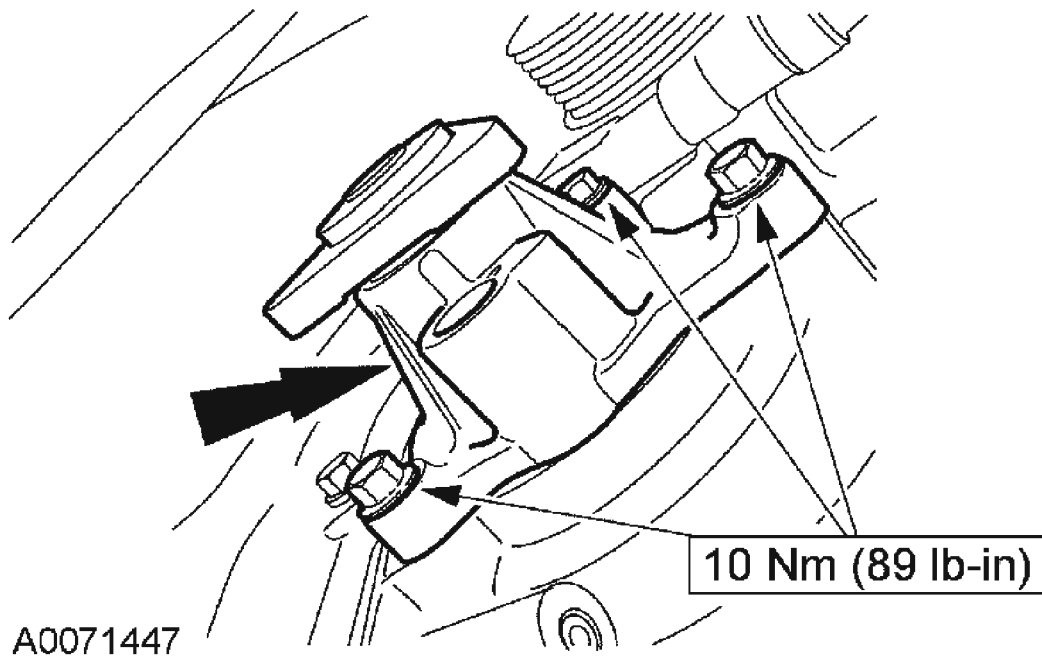
3. Remove the coolant pump pulley bolts and the pulley.



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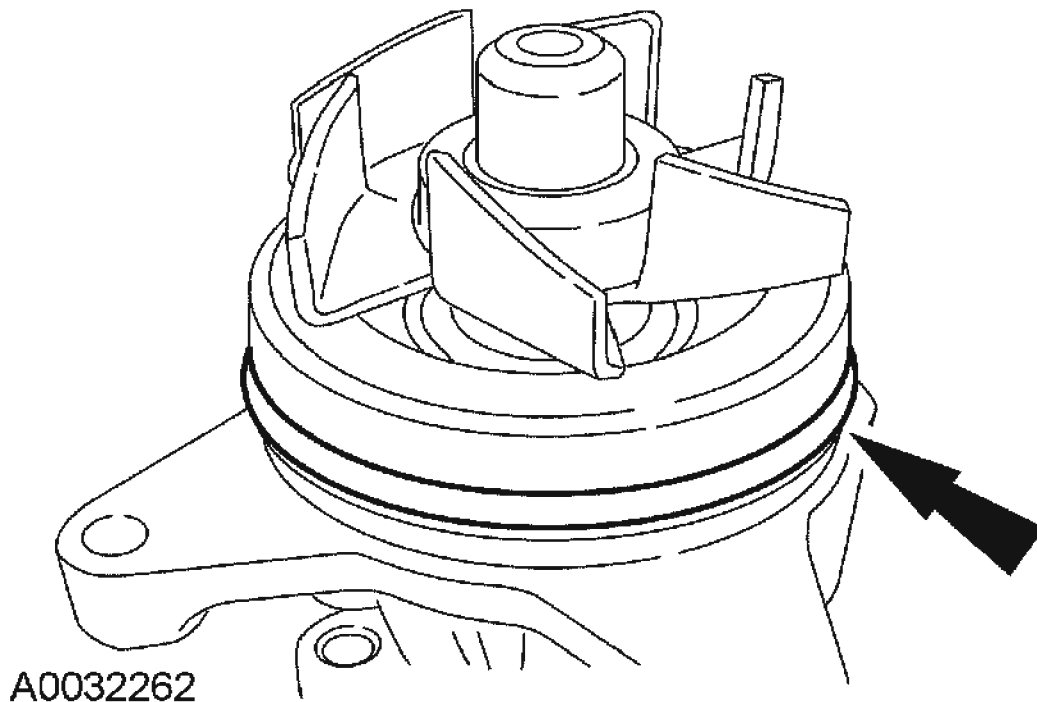
**Fig. 18: Removing Coolant Pump Pulley Bolts And Pulley**  
Courtesy of FORD MOTOR CO.

4. Remove the coolant pump retaining bolts and the coolant pump.



**Fig. 19: Removing Coolant Pump Retaining Bolts And Coolant Pump**  
Courtesy of FORD MOTOR CO.

**NOTE:** Install a new coolant pump O-ring and lubricate with clean engine coolant.



**Fig. 20: Installing New Coolant Pump O-Ring And Lubricate With Clean Engine Coolant**

**Courtesy of FORD MOTOR CO.**

5. To install, reverse the removal procedure.
6. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

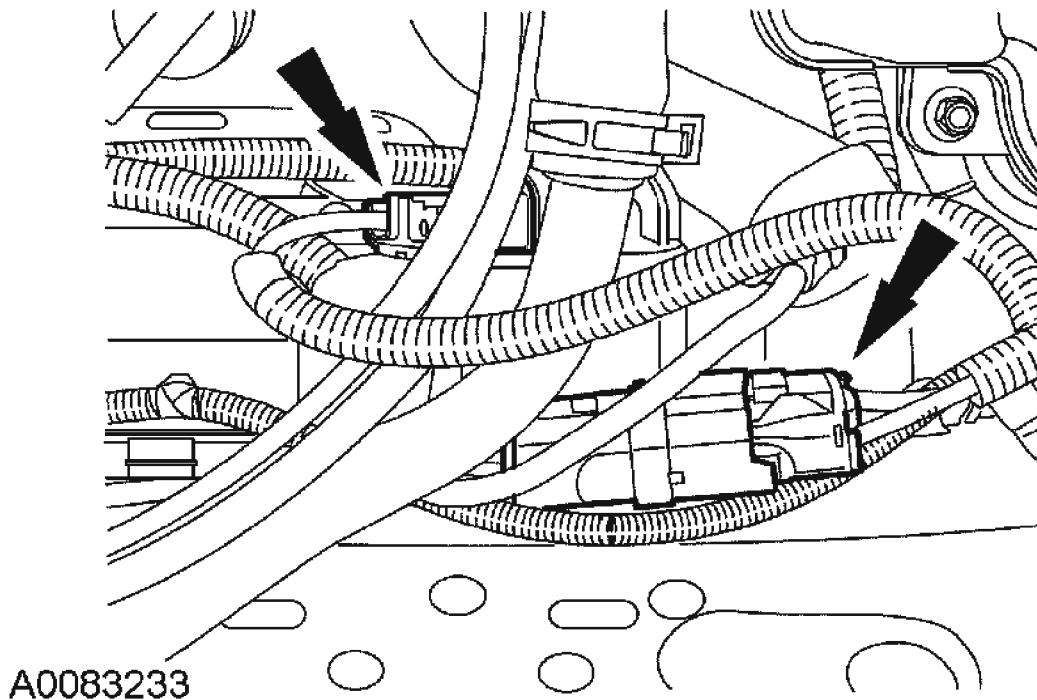
## **RADIATOR**

### **MATERIAL SPECIFICATIONS**

Item	Specification
Motorcraft Premium Gold Engine Coolant VC-7-A or equivalent	WSS-M97B51-A1

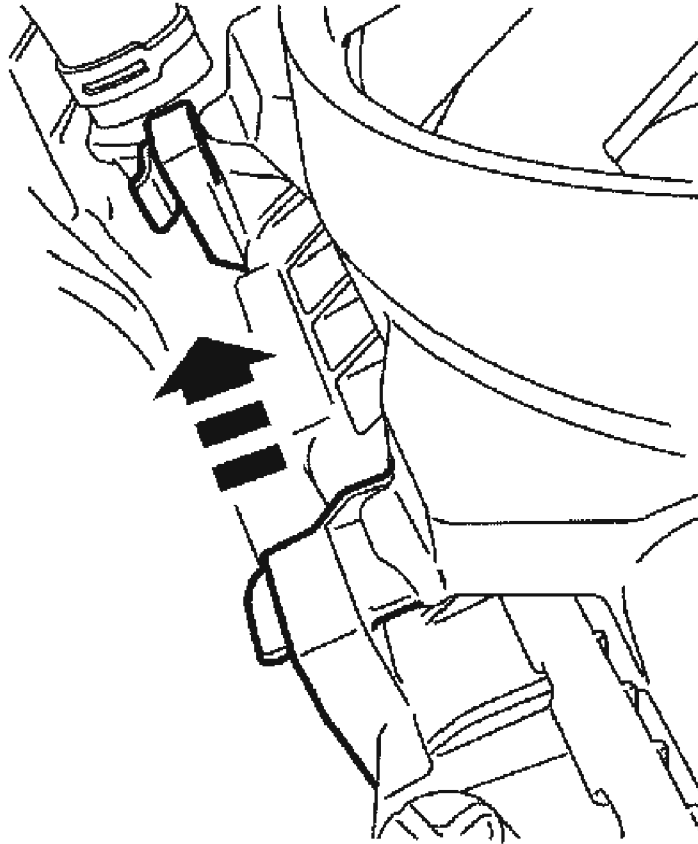
## **ALL VEHICLES**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
3. Disconnect the dual electric cooling fan electrical connectors.



**Fig. 21: Disconnecting Dual Electric Cooling Fan Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

4. Drain the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
5. Lift and remove the cooling fan motors and shroud from the retainer brackets and lower from the vehicle.

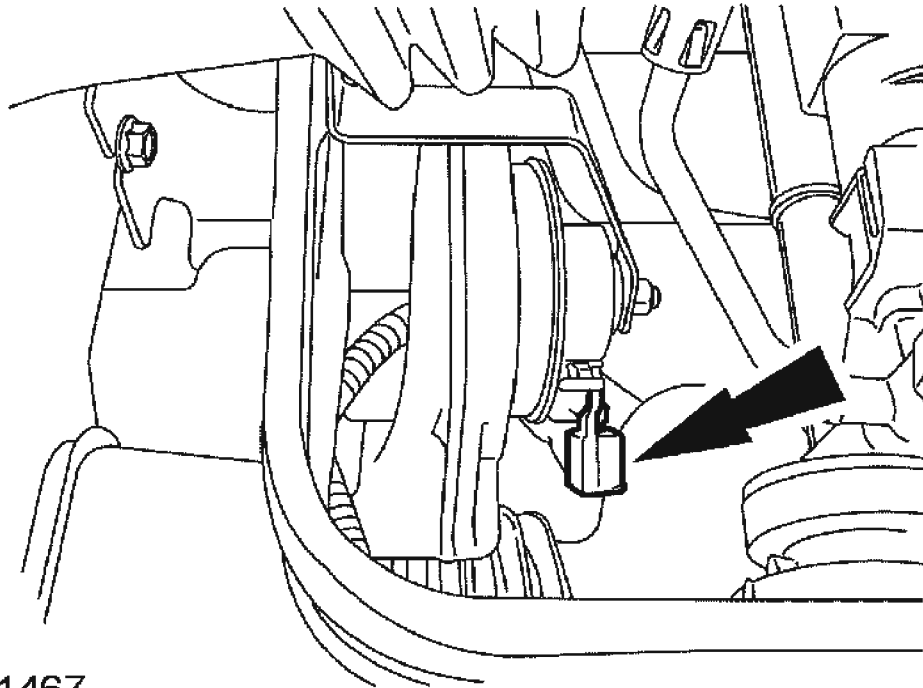


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**Fig. 22: Lifting And Removing Cooling Fan Motors And Shroud From Retainer Brackets**

**Courtesy of FORD MOTOR CO.**

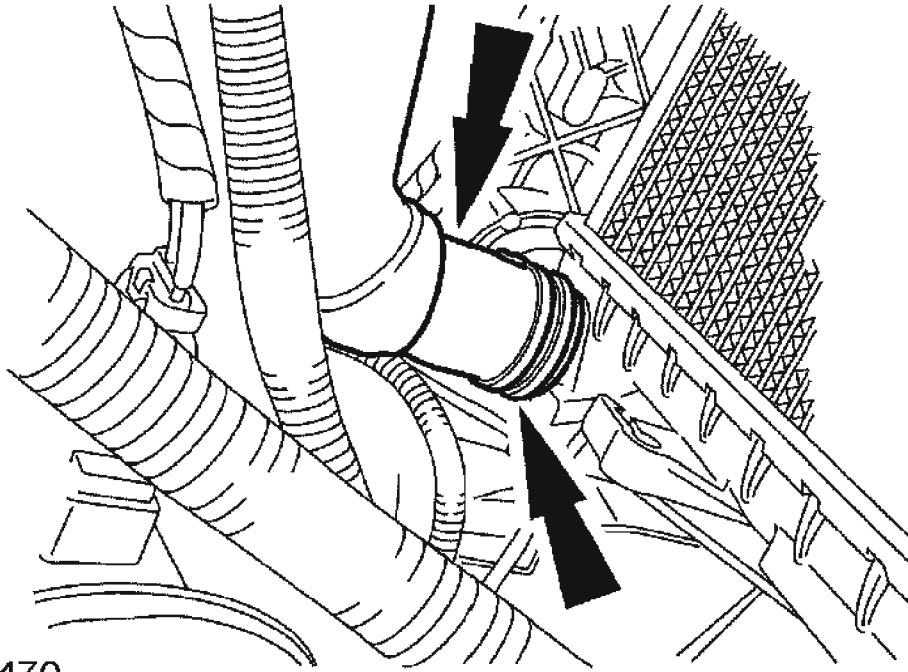
6. Disconnect the electrical connector from the horn.



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**Fig. 23: Disconnecting Electrical Connector From Horn**  
Courtesy of FORD MOTOR CO.

7. Release the clamp and disconnect the upper hose from the radiator.

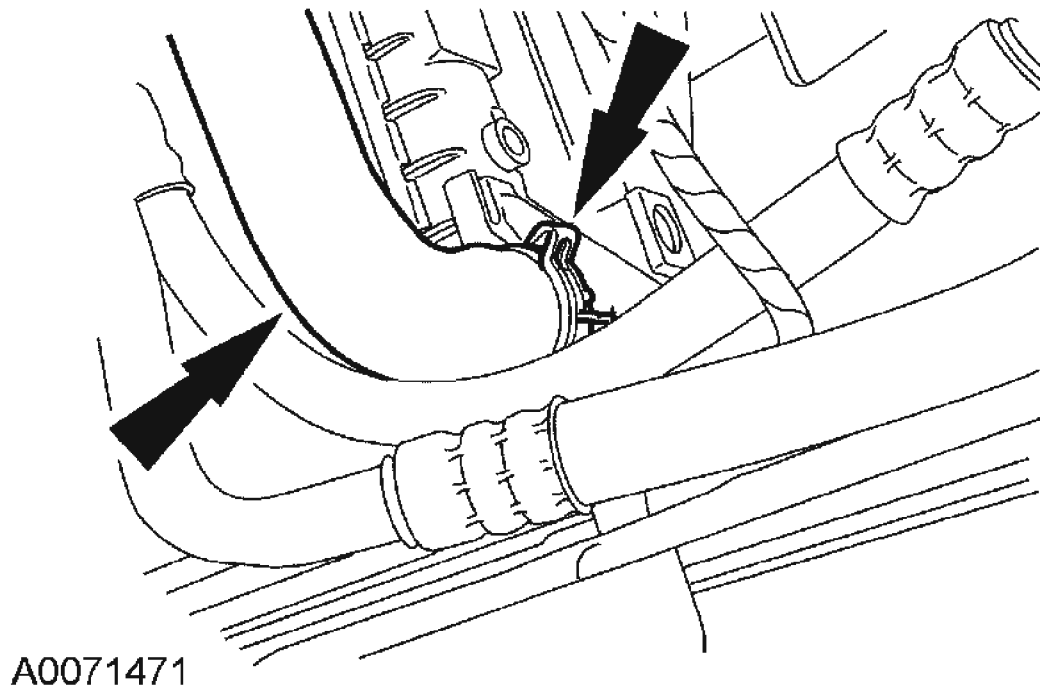


A0071470

**Fig. 24: Releasing Clamp And Disconnecting Upper Hose From Radiator**  
Courtesy of FORD MOTOR CO.

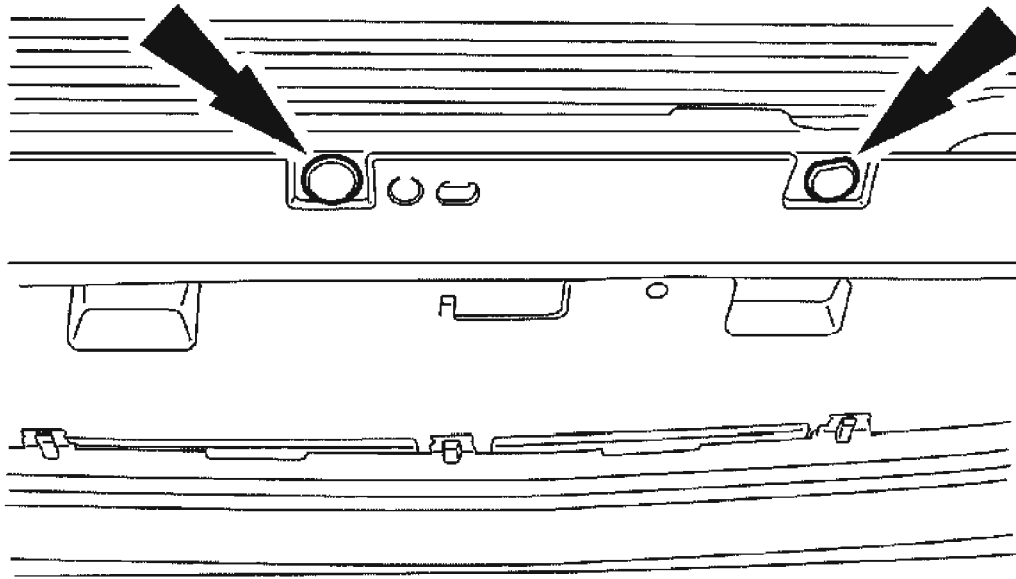
8. Release the clamp and disconnect the lower hose from the radiator.





**Fig. 25: Releasing Clamp And Disconnecting Lower Hose From Radiator**  
Courtesy of FORD MOTOR CO.

9. Remove the push-pins and the lower radiator splash shield.

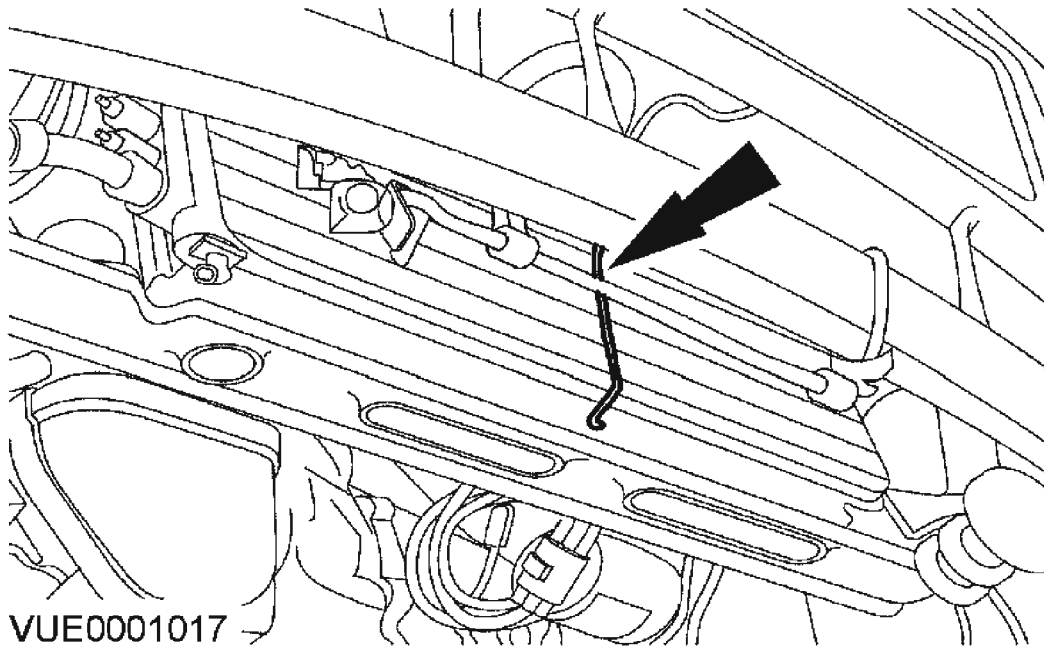


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**Fig. 26: Removing Push-Pins And Lower Radiator Splash Shield**  
Courtesy of FORD MOTOR CO.

**Vehicles equipped with air conditioning**

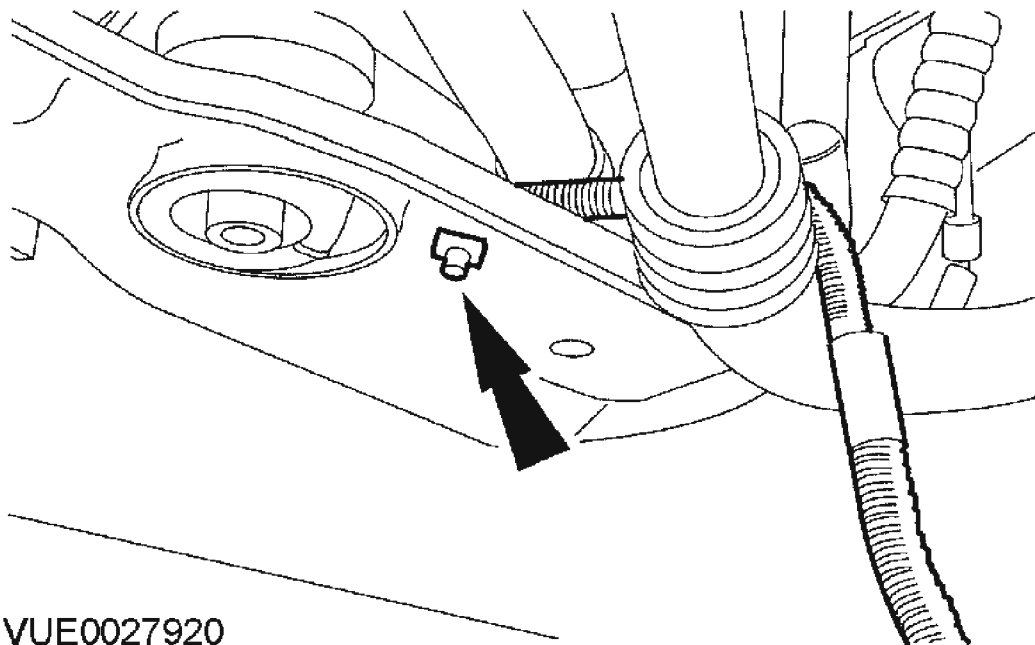
10. Detach and support the air conditioning condenser.



**Fig. 27: Detaching And Supporting Air Conditioning Condenser**  
Courtesy of FORD MOTOR CO.

**All vehicles**

11. Detach the wiring harness retaining clip from the radiator support bracket.

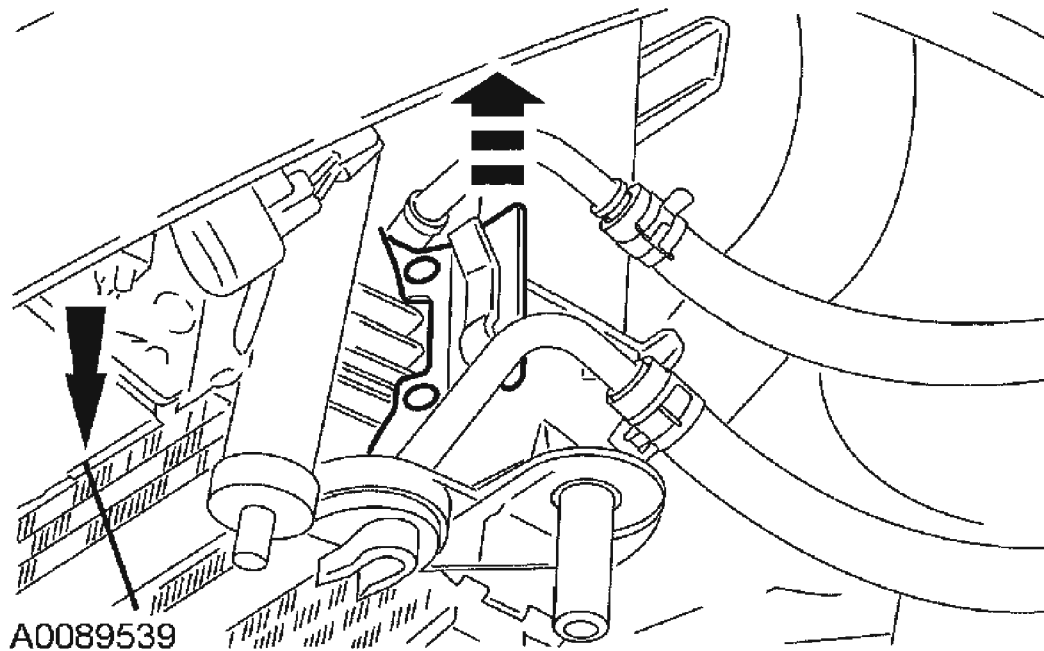


**Fig. 28: Detaching Wiring Harness Retaining Clip From Radiator Support Bracket**

Courtesy of FORD MOTOR CO.

Vehicles equipped with automatic transmission

**NOTE:** LH shown, RH similar.



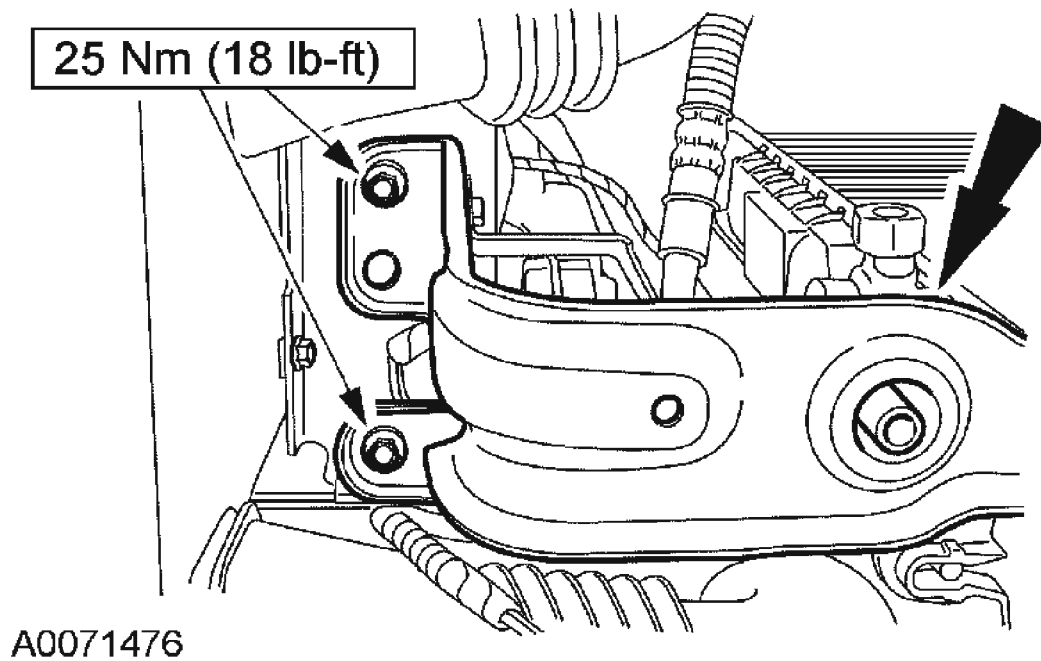
**Fig. 29: Detaching Transmission Fluid Cooler From Two RH And One LH Bracket**

**Courtesy of FORD MOTOR CO.**

12. Detach the transmission fluid cooler from the two RH and the one LH bracket.
  - Support the fluid cooler.

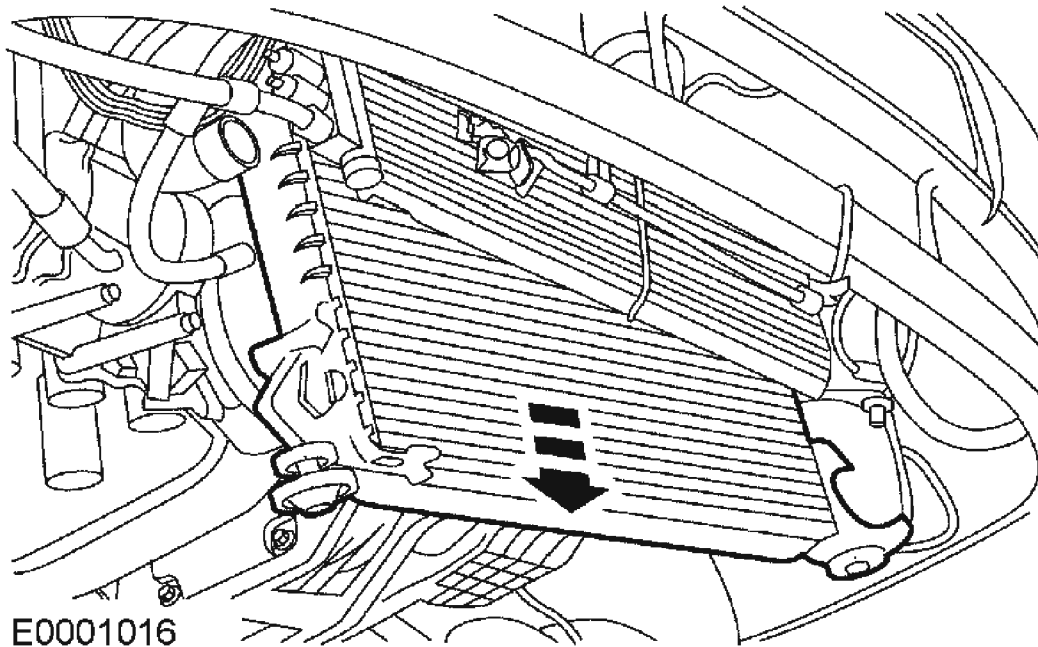
**All vehicles**

**NOTE:      LH shown, RH similar.**



**Fig. 30: Removing Four Bolts And Lower Core Support**  
**Courtesy of FORD MOTOR CO.**

13. Remove the four bolts and the lower core support.
14. Remove the radiator.



**Fig. 31: Removing Radiator**  
Courtesy of FORD MOTOR CO.

15. To install, reverse the removal procedure.
16. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

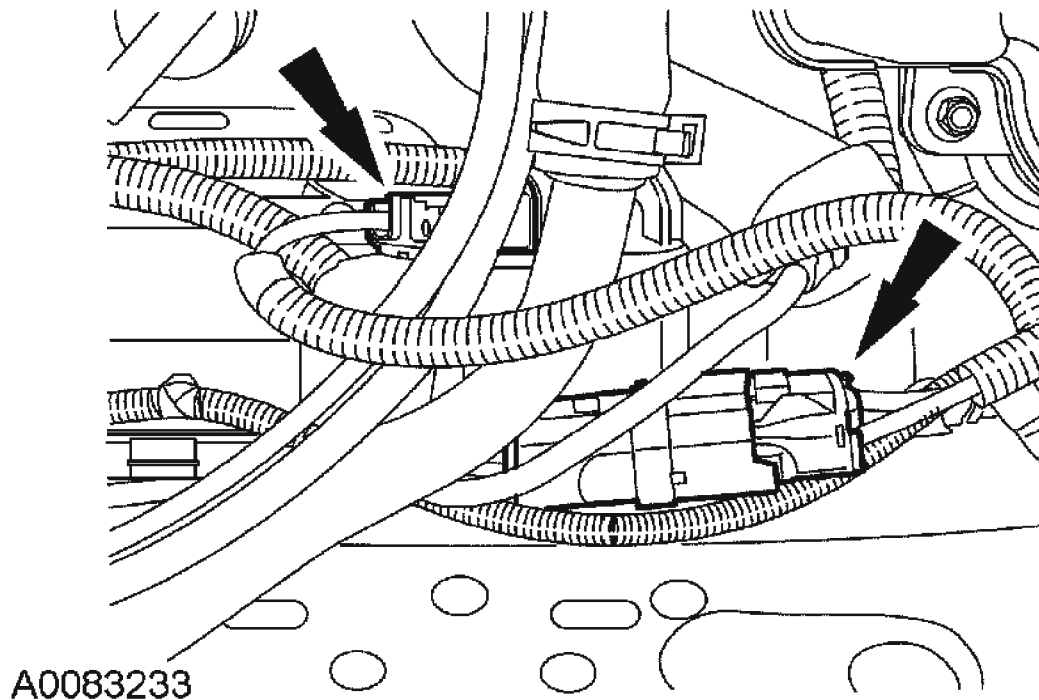
## **COOLING FAN MOTOR AND SHROUD**

### **Removal and Installation**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.

**NOTE:** The fan shroud and electric cooling fans are serviced as an assembly.

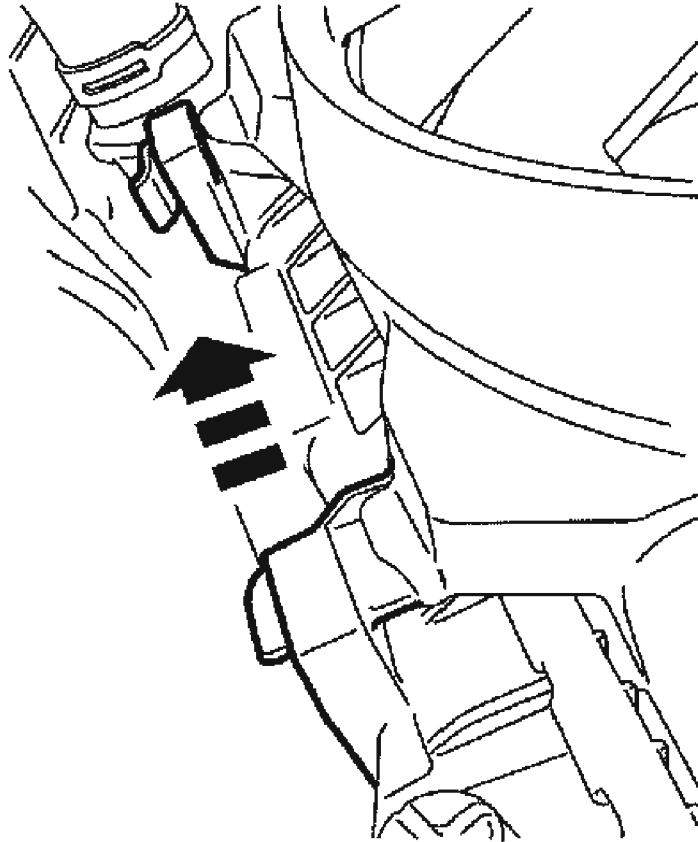
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
3. Disconnect the dual electric cooling fan electrical connectors.



**Fig. 32: Disconnecting Dual Electric Cooling Fan Electrical Connectors**  
**Courtesy of FORD MOTOR CO.**

4. Lift and remove the cooling fan motors and shroud from the retainer brackets and lower from the vehicle.





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**Fig. 33: Lifting And Removing Cooling Fan Motors And Shroud From Retainer Brackets**

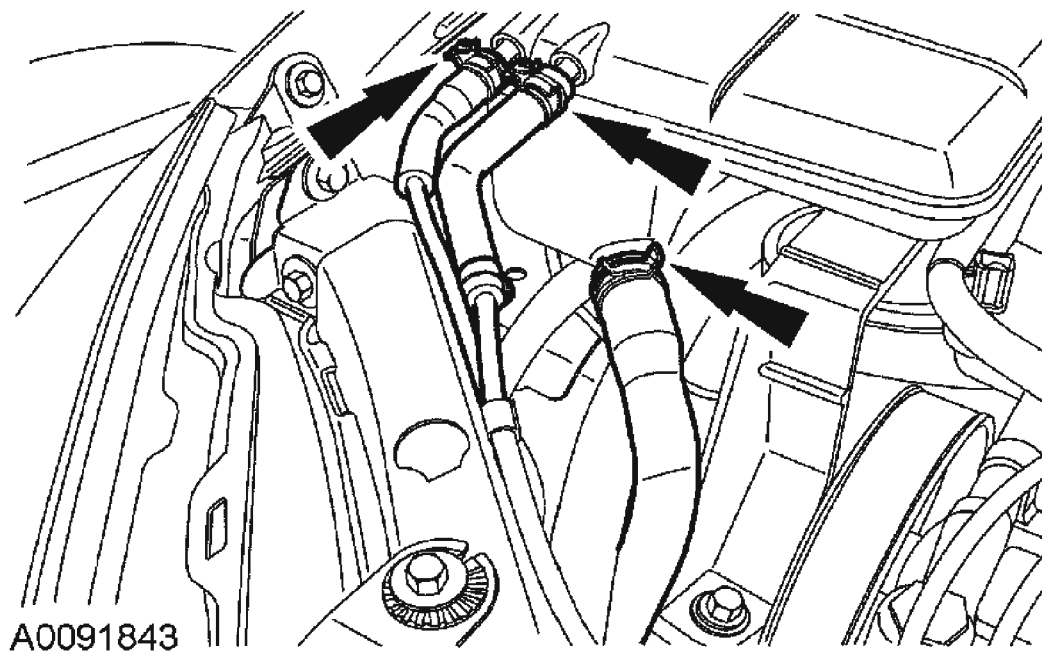
**Courtesy of FORD MOTOR CO.**

5. To install, reverse the removal procedure.

#### **DEGAS BOTTLE**

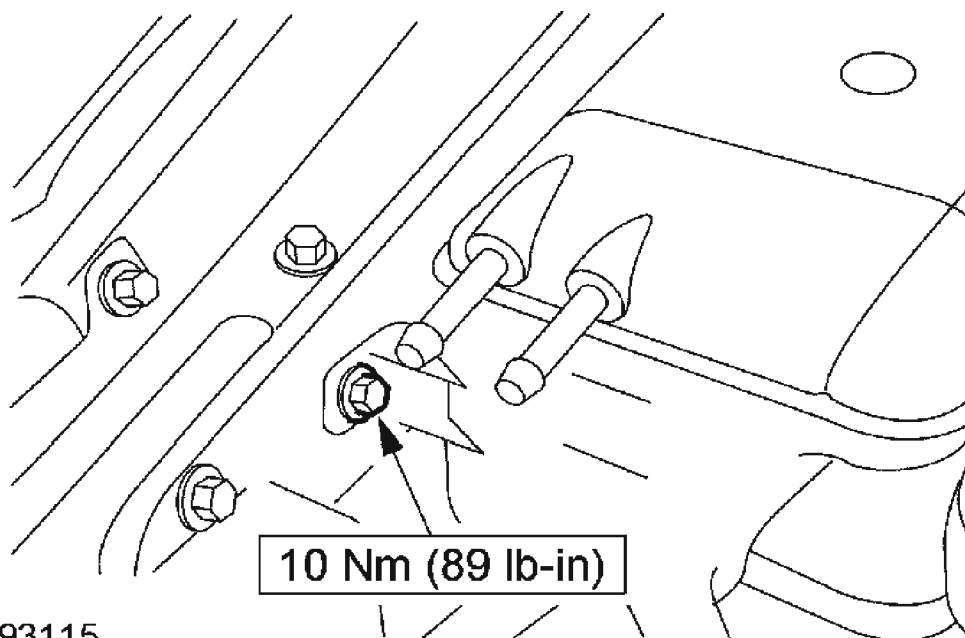
##### **Removal and Installation**

1. Partially drain the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
2. Disconnect the coolant hoses.



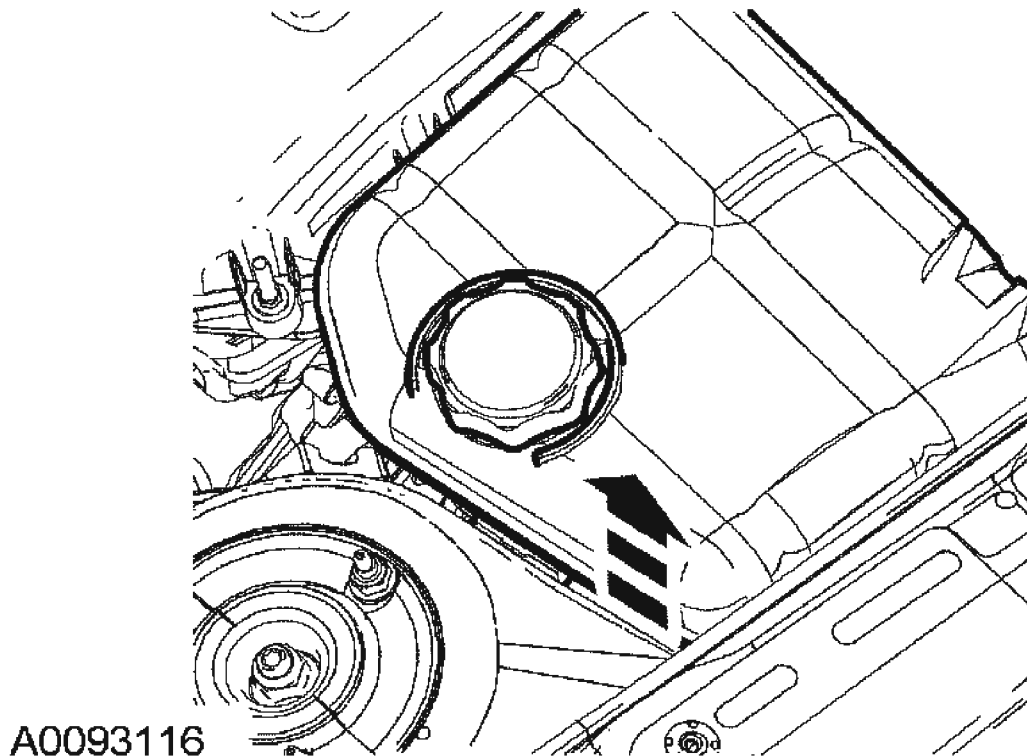
**Fig. 34: Disconnecting Coolant Hoses**  
Courtesy of FORD MOTOR CO.

3. Remove the degas bottle bolt.



**Fig. 35: Removing Degas Bottle Bolt**  
Courtesy of FORD MOTOR CO.

4. Remove the degas bottle.
  - Lift the degas bottle out of the retainer.



**Fig. 36: Removing Degas Bottle**  
Courtesy of FORD MOTOR CO.

5. To install, reverse the removal procedure.
6. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

## BLOCK HEATER

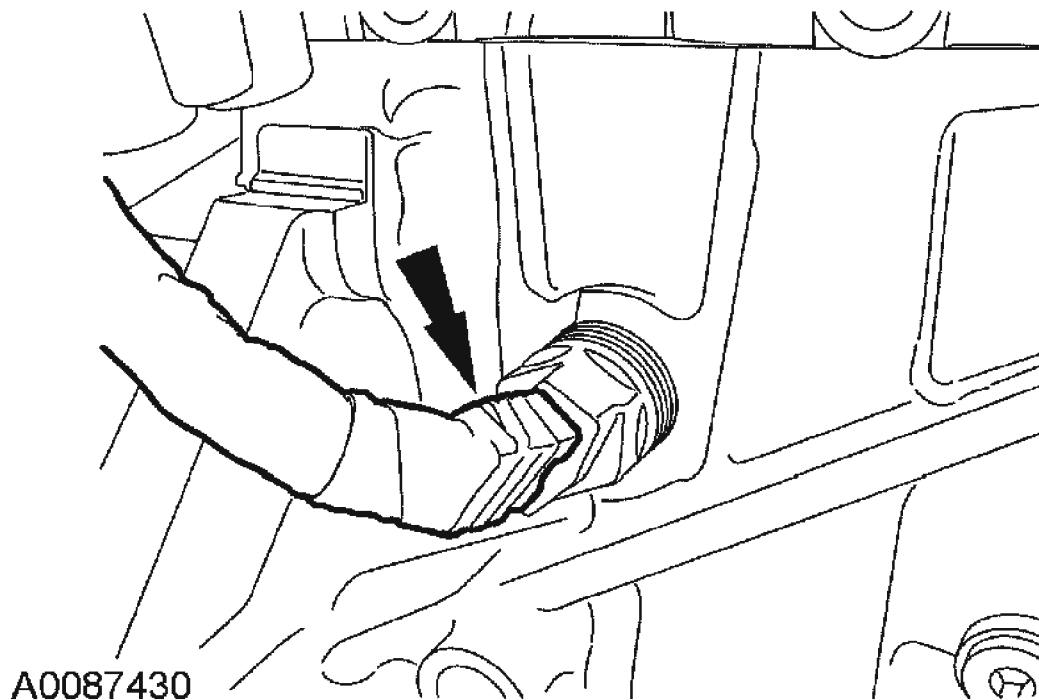
### Material

## MATERIAL SPECIFICATIONS

Item	Specification
Premium Gold Engine Coolant VC-7A or equivalent	WSS-M97B51-A1

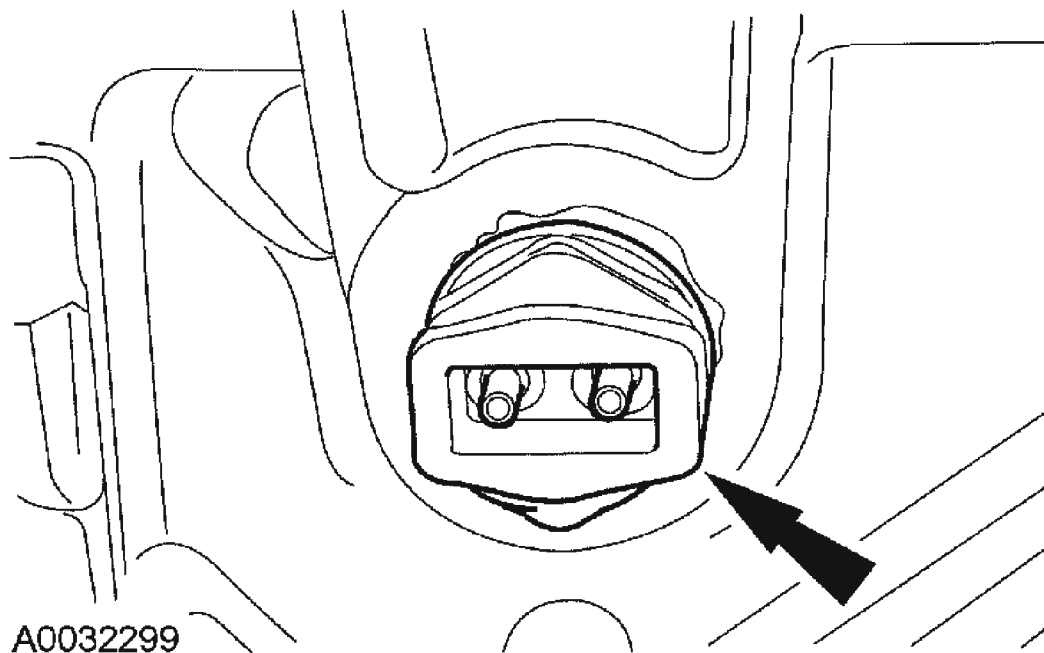
## Removal

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Drain the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.
3. Disconnect the block heater electrical connector.



**Fig. 37: Disconnecting Block Heater Electrical Connector**  
Courtesy of FORD MOTOR CO.

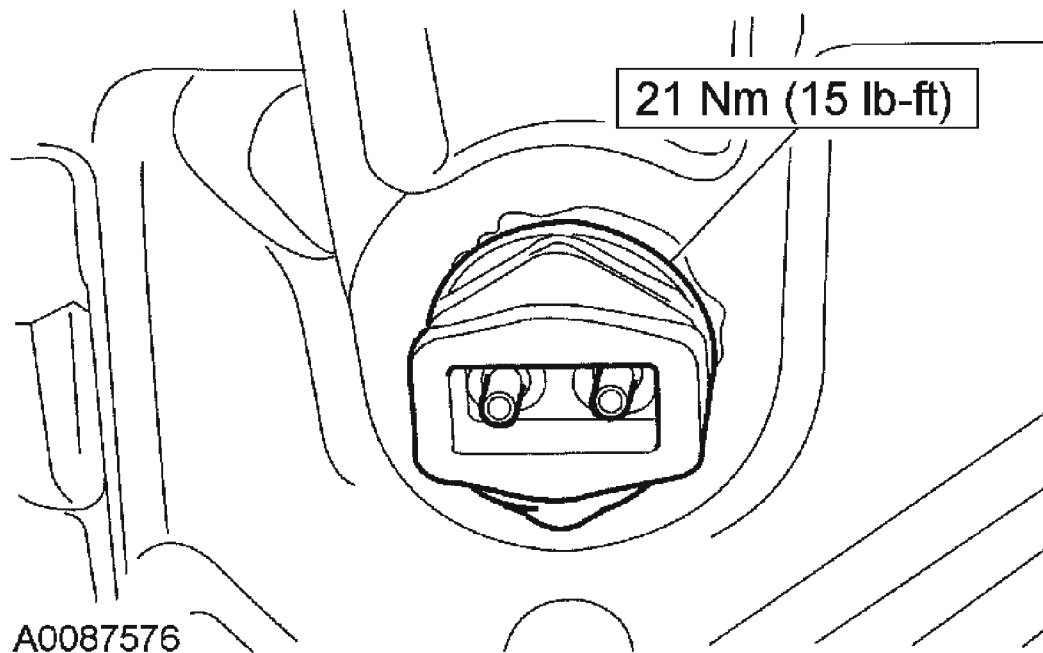
4. Remove the block heater.



**Fig. 38: Identifying Block Heater**  
Courtesy of FORD MOTOR CO.

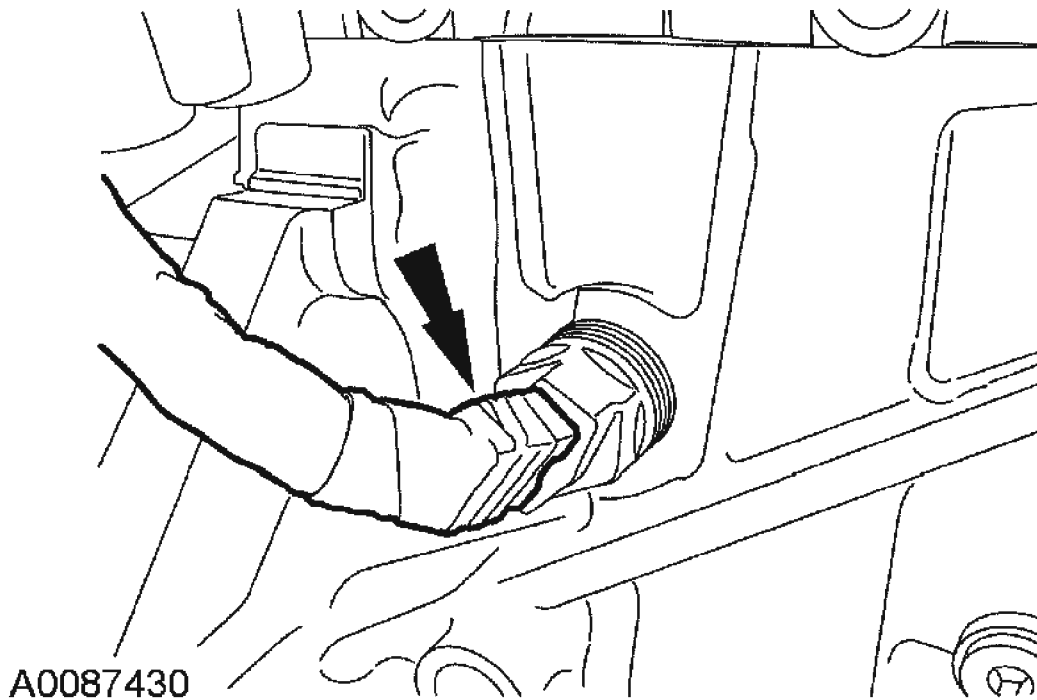
**Installation**

1. Install the block heater.



**Fig. 39: Installing Block Heater**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the block heater wiring is routed and secured away from rotating or hot components, or damage to the wiring can occur.



**Fig. 40: Connecting Block Heater Electrical Connector**  
**Courtesy of FORD MOTOR CO.**

2. Connect the block heater electrical connector.
3. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
4. Fill and bleed the cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.