

SECTION 03-03 Engine Cooling

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VEHICLE APPLICATION

Taurus/Sable and Taurus SHO.

DESCRIPTION AND OPERATION

"Walter C. Avrea, the owner of patents 3, 601, 181 and RE 27, 965, has granted Ford Motor Company rights with respect to cooling systems covered by these patents."

The cooling system includes a radiator, circulating pump, and a cooling fan which is activated by the integrated relay control module. Also included in the cooling system is a separate coolant recovery reservoir which is located beside the radiator and aids in maintaining the correct volume of coolant.

The water pump is of a conventional design and is driven by the accessory drive belt.

A thermostat is located in a water outlet connection housing at one end of the engine. The thermostat ensures rapid engine warm-up by restricting coolant flow at lower operating temperatures. It also assists in keeping the engine operating temperature within predetermined limits.

The coolant normally contains a 50/50 mix of water and permanent coolant / antifreeze fluid such as Premium Cooling System Fluid E2FZ-19549-AA (ESE-M97B44-A and ESE-M97B43-A) or equivalent.

CAUTION: The addition of more water than recommended will raise the freezing protection temperature and weaken the corrosion inhibitors.

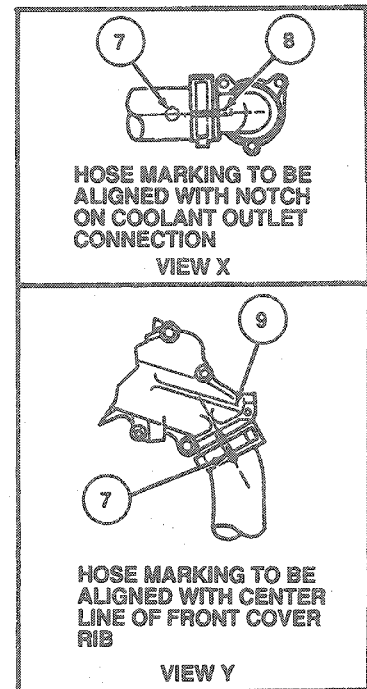
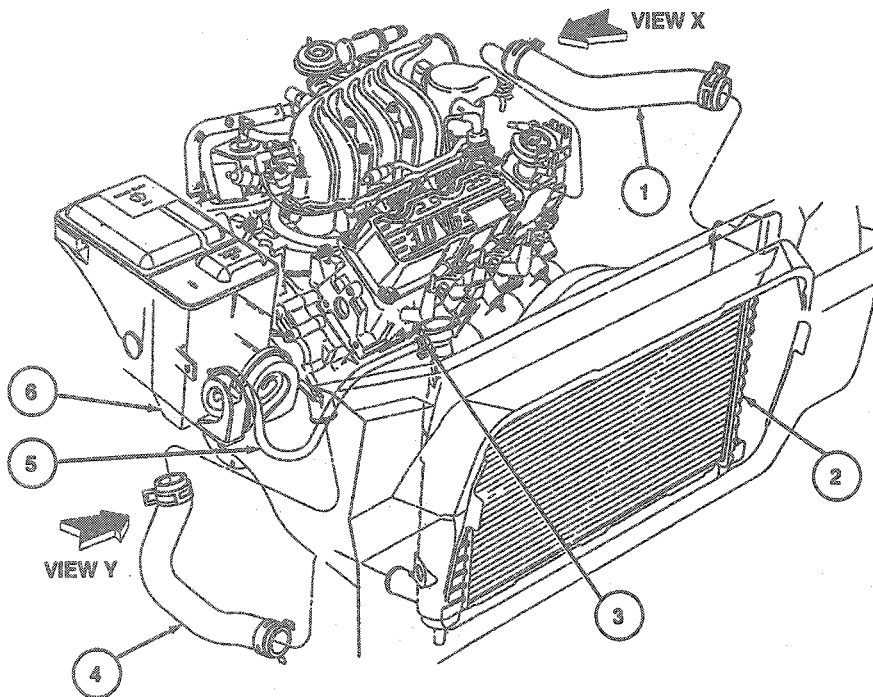
Refer to Specifications for the cooling system capacity for all vehicles.

NOTE: The system must be maintained with the correct concentration and type of antifreeze to prevent corrosion damage.

WARNING: DISCONNECT THE COOLING FAN PRIOR TO PERFORMING ANY UNDERHOOD SERVICE, SINCE THE FAN COULD CYCLE IF THE IGNITION SWITCH IS LEFT IN THE RUN POSITION.

The electric radiator cooling fan motor is mounted within a shroud behind the radiator. The integrated relay control module actuates the fan when the coolant reaches a specified temperature, when the engine reaches a specified speed, or when the air conditioning clutch is activated, if so equipped.

DESCRIPTION AND OPERATION (Continued)

Cooling System
3.0L Engine

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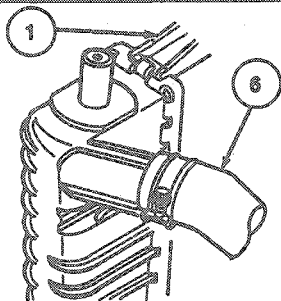
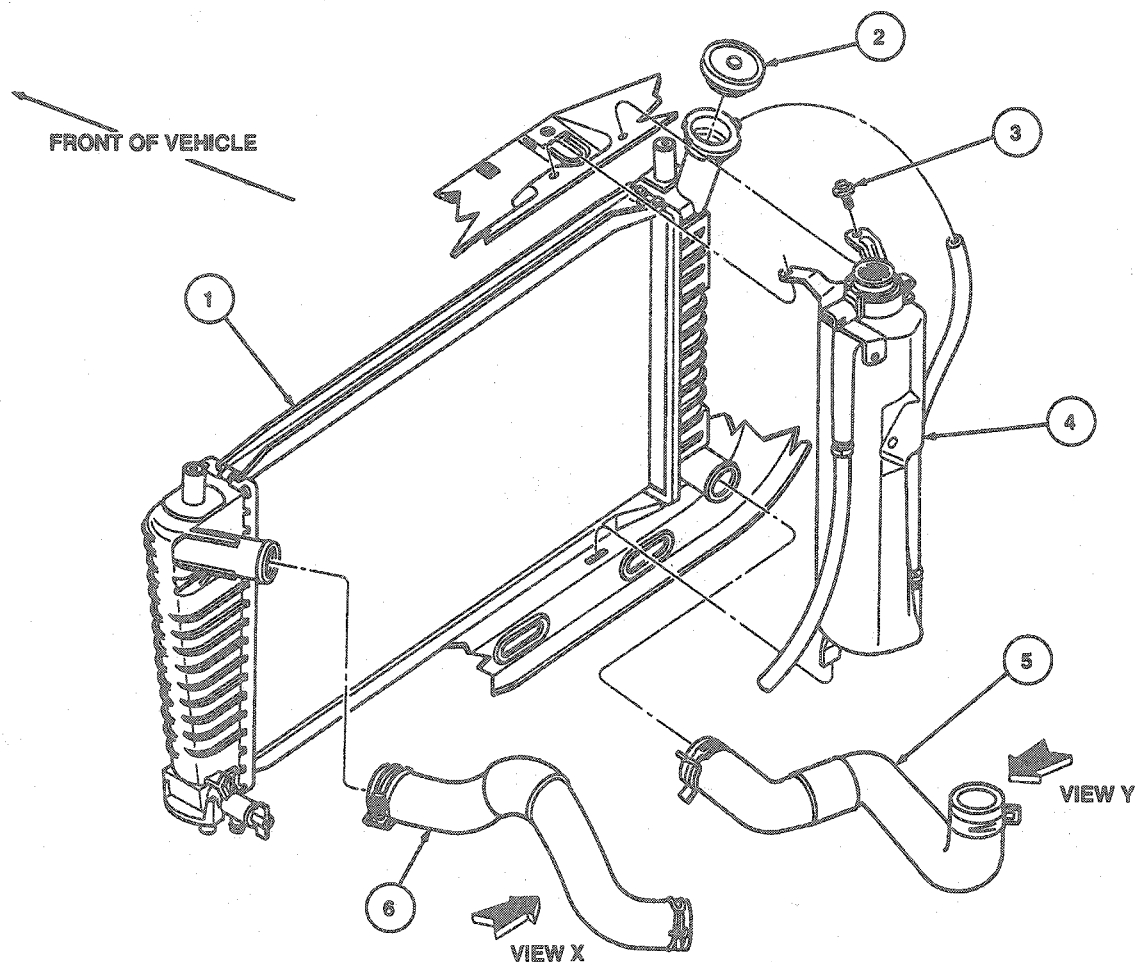
Item	Part Number	Description
1	86274	Upper Radiator Hose
2	8005	Radiator
3	389252-S100	Clamp (2 Req'd)
4	88273	Lower Radiator Hose

(Continued)

Item	Part Number	Description
5	381214-S200A	Overflow Hose
6	17B613	Reservoir Assy
7	—	Hose Marking
8	—	Notch
9	—	Rib

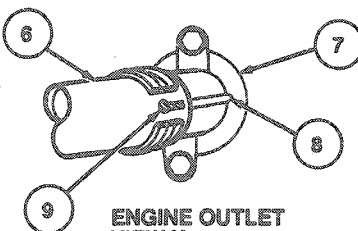
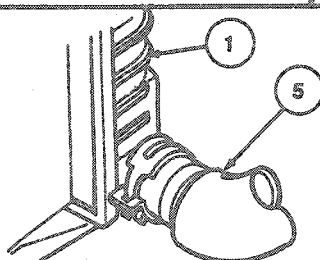
DESCRIPTION AND OPERATION (Continued)

3.0L/3.2L SHO

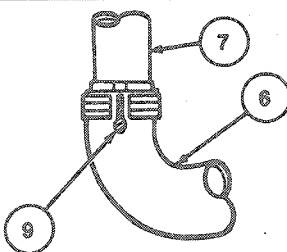
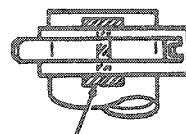


RADIATOR INLET

LOCATED MARKER STRIPE ON UPPER
RADIATOR HOSE WITHIN WIDTH OF RAISED
MARK ON ENGINE OUTLET

ENGINE OUTLET
VIEW X

RADIATOR OUTLET

ENGINE INLET
VIEW Y

ALL CLAMPS MUST BE INSTALLED
BETWEEN THE TWO PAINT STRIPES
ON HOSES UNLESS OTHERWISE STATED.

Q2518-C

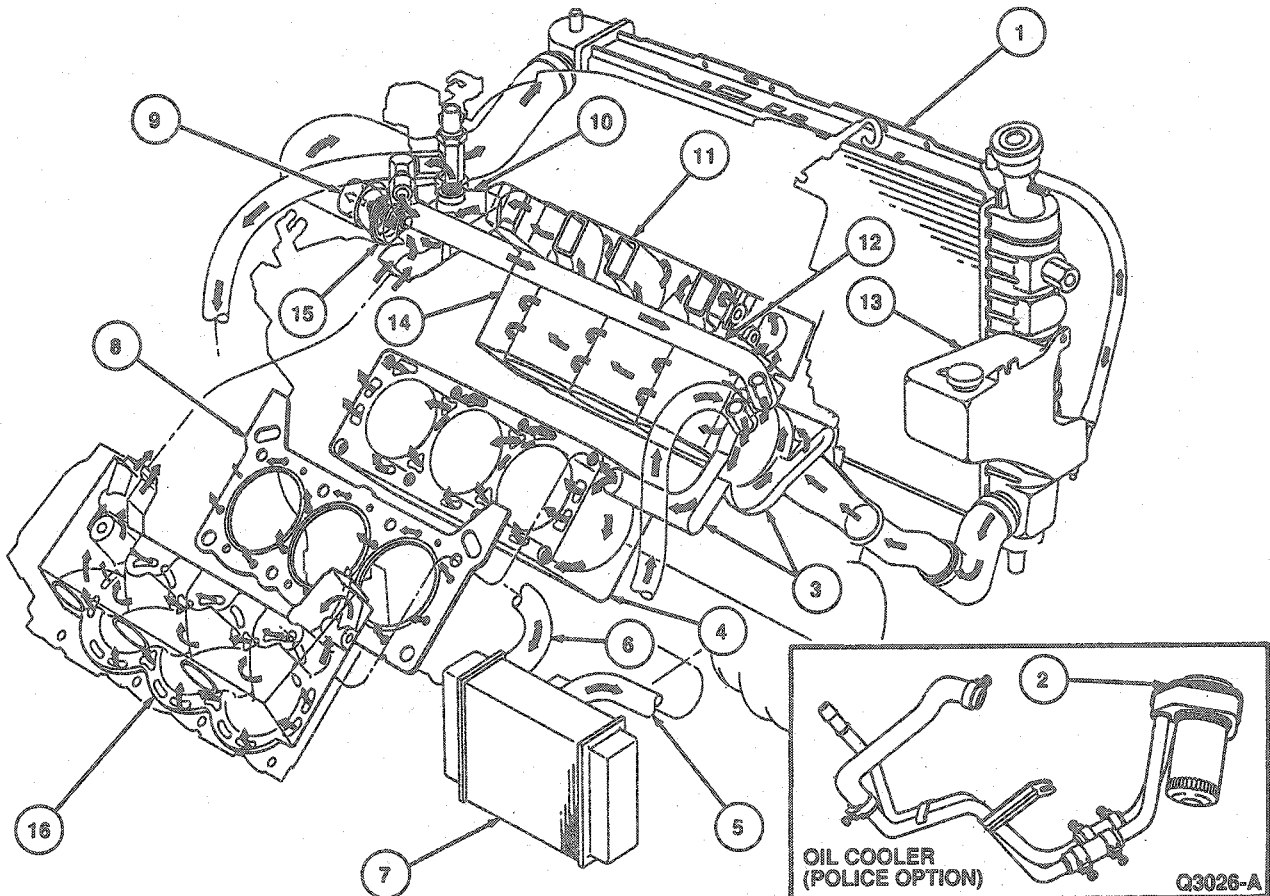
DESCRIPTION AND OPERATION (Continued)

Item	Part Number	Description
1	8005	Radiator Assy
2	—	Radiator Cap
3	N800312-S2	Screw and Washer Assy
4	8C045	Reservoir Assy (3.0 Version Shown)

(Continued)

Item	Part Number	Description
5	8B273	Hose and Clamp Assy
6	8B274	Hose and Clamp Assy
7	—	Engine Water Outlet Connection
8	—	Rib Alignment
9	—	Alignment Stripe

3.8L Engine



Item	Part Number	Description
1	8005	Radiator Assy
2	6A642	Oil Cooler
3	8501	Water Pump and Front Cover
4	6010 (RH Bank)	Cylinder Block
5	—	Heater Outlet
6	—	Heater Inlet
7	18476	Heater Core
8	6051	Cylinder Head Gasket

(Continued)

Item	Part Number	Description
9	—	Water Outlet Connector
10	—	Lower Intake Manifold Crossover / Outlet
11	6049 (LH Bank)	Cylinder Head
12	—	Engine Coolant Bypass
13	8A080	Coolant Overflow Reservoir
14	6010 (LH Bank)	Cylinder Block
15	8592	Thermostat Assy
16	6049 (RH Bank)	Cylinder Head

TQ3026B

DESCRIPTION AND OPERATION (Continued)

When the coolant is cold, the thermostat is in the closed position and the coolant flow is restricted to the cylinder block, head, intake manifold and heater. As the temperature increases, the thermostat opens, allowing a portion of the coolant to pass into the radiator. The coolant flows through the radiator tubes and is cooled by air passing over the cooling fins assisted by the cooling fan. Coolant is then circulated from the radiator outlet tank through the water pump and into the cylinder block to complete the circuit.

The coolant expands as the temperature and pressure rise in the system. When the limiting system working pressure is reached, the pressure relief valve in the radiator filler cap is lifted from its seat and allows coolant to flow through the radiator filler neck and the overflow hose into the coolant recovery reservoir. The radiator filler cap has a rubber seal on the underside to prevent leakage.

When the system temperature and pressure drop, the coolant contracts in volume and the pressure in the radiator is reduced. The coolant in the reservoir bottle will then flow back into the radiator through the vacuum relief valve in the radiator filler cap.

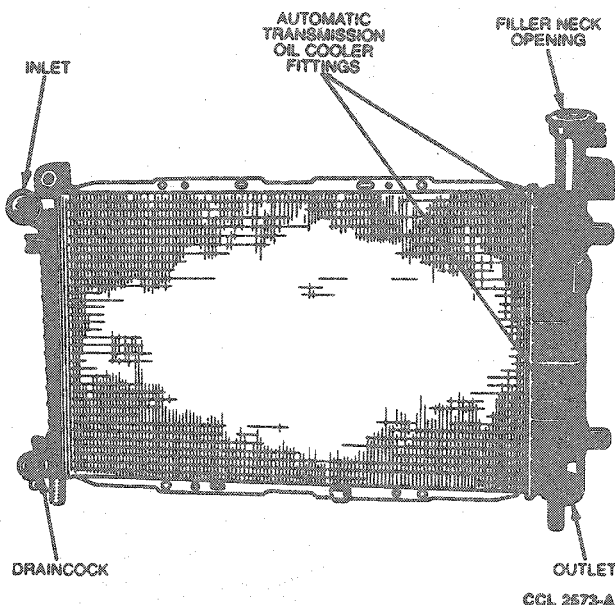
The Constant Control Relay Module (CCRM) activates the cooling fan motor when the coolant reaches a specified temperature, or when the engine reaches a specified temperature. On vehicles equipped with air conditioning, the cooling fan motor is activated whenever the air conditioning clutch is engaged.

NOTE: Cooling fan motor will not cycle with the air conditioning clutch on.

NOTE: An exception to this is when vehicle speed is over 72 km/h (45 mph) and coolant temperature is below 104°C (220°F). The fan will then automatically shut off.

Radiators

The radiator is a brazed aluminum fin and tube-type design arranged for crossflow of the engine coolant. Nylon end tanks on each end of the core allow uniform distribution of engine coolant to the radiator tubes. The nylon end tanks are attached to the aluminum core by bending tabs on the core header over the foot (edge) of the nylon tank. A rubber O-ring gasket is placed between the nylon tank and the radiator core header to achieve a seal between the tank and the radiator core header. The nylon tanks are a moulded one-piece design with mounting brackets as a part of each tank.



WARNING: NEVER REMOVE THE RADIATOR PRESSURE CAP UNDER ANY CONDITIONS WHILE THE ENGINE IS OPERATING. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD 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 RADIATOR, USE EXTREME CARE WHEN REMOVING THE CAP FROM A HOT RADIATOR. WAIT UNTIL THE ENGINE HAS COOLED, THEN WRAP A THICK CLOTH AROUND THE RADIATOR PRESSURE CAP AND TURN IT SLOWLY TO THE FIRST STOP. STEP BACK WHILE THE PRESSURE IS RELEASED FROM THE COOLING SYSTEM. WHEN CERTAIN ALL THE PRESSURE HAS BEEN RELEASED, PRESS DOWN ON CAP (STILL WITH A CLOTH), TURN AND REMOVE IT.

WARNING: THE ENGINE ELECTRIC COOLING FAN MAY COME ON AT ANYTIME WITHOUT WARNING EVEN IF THE ENGINE IS NOT RUNNING. DISCONNECT BATTERY GROUND CABLE BEFORE SERVICING.

DESCRIPTION AND OPERATION (Continued)

Cooling Fan

The fan control system consists of a two-speed fan on all 3.0L, 3.2L SHO and 3.8L engines with ATX or a one-speed fan on 3.0L SHO engines with an MTX, attached to a fan shroud located behind the radiator. The cooling fan is wired to operate only when the ignition switch is in the RUN position, thereby preventing cooling fan operation after the ignition switch is turned to the OFF position.

WARNING: DISCONNECT THE COOLING FAN PRIOR TO PERFORMING ANY UNDERHOOD SERVICE SINCE THE FAN COULD CYCLE IF THE IGNITION SWITCH IS LEFT IN THE ON POSITION EVEN THOUGH THE ENGINE IS NOT RUNNING.

The cooling fan is controlled during vehicle operation by the Constant Control Relay Module (CCRM) 12B577 and Powertrain Control Module (PCM) 12A650 which will energize the cooling fan under the following conditions:

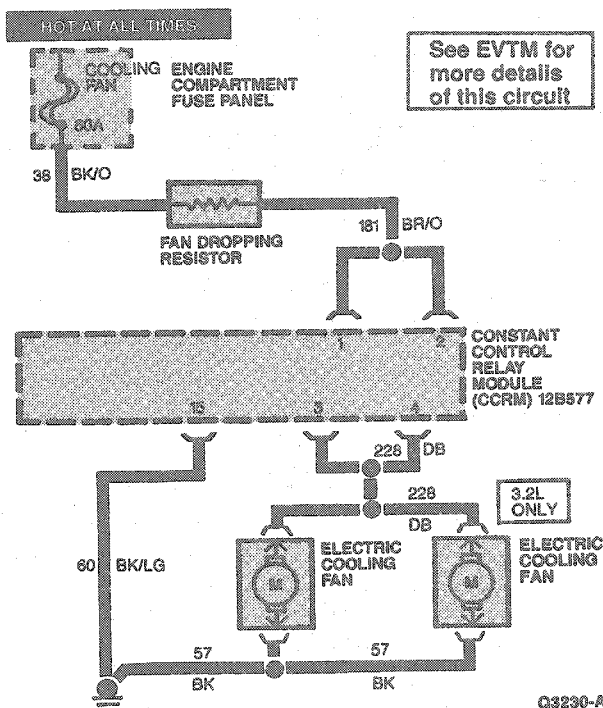
- Cooling fan is turned on for the 3.0L SHO and on at low speed for 3.0L, 3.2L SHO and 3.8L if:
 - a. Engine temperature is higher than normal. (Fan starts running at 102°C (215°F) and stops running at 99°C (210°F).
 - b. A/C is on and vehicle speed does not provide enough natural airflow. (Fan starts running at speeds at or below 69 km/h (43 mph) and stops running at 77 km/h (48 mph).

On 3.0L and 3.2L SHO engines with ATX, low speed cooling fan motor operation is achieved by using a dropping resistor in series with the motor / motors.

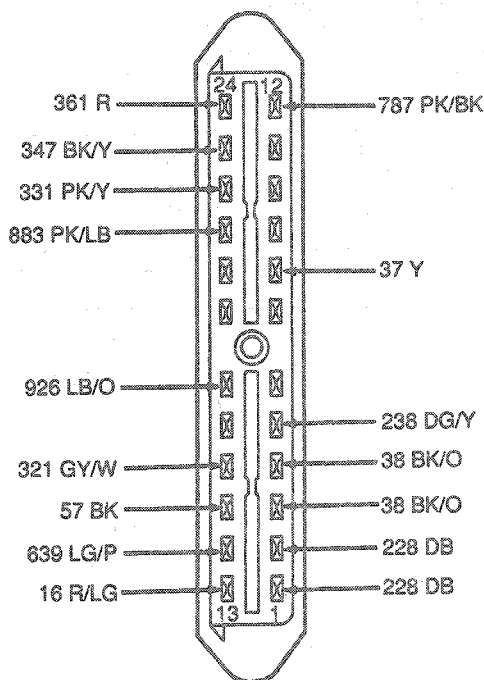
The 3.8L uses a dual winding fan motor in which low speed motor operation is achieved through the low speed motor winding circuit (no dropping resistor).

Normal operation and cycling of the engine cooling fan will cause the temperature gauge indicator to read between the mid-point and upper portion of the temperature gauge scale. The slightly higher indicator reading will return to mid-point when fan operation begins.

Cooling Fan Motor Circuit Diagram — 3.0L with ATX and 3.2L SHO



Constant Control Relay Module (CCRM) Connector End View

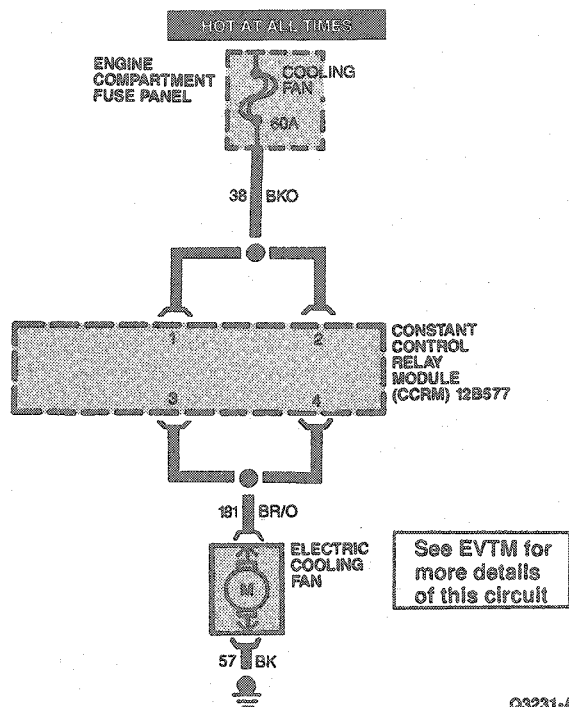


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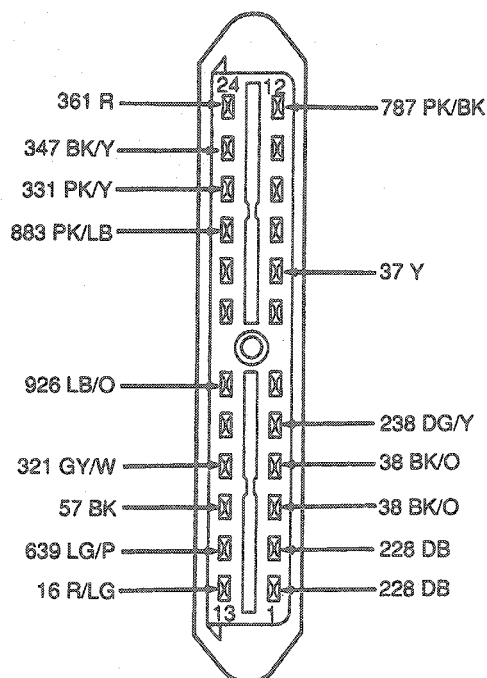
DESCRIPTION AND OPERATION (Continued)

Pin Number	Circuit	Circuit Function
1	181 (BR/O)	Fan Control (FC) Cooling Fan Motor(s) B+
2	181 (BR/O)	Fan Control (FC) Cooling Fan Motor(s) B+
3	228 (DB)	Cooling Fan Motor(s) Feed
4	228 (DB)	Cooling Fan Motor(s) Feed
5	787 (PK/BK)	Fuel Pump Safety Switch to Fuel Pump
6	38 (BK/O)	High Fan Control (HFC) Cooling Fan Motor(s) B+
7	38 (BK/O)	High Fan Control (HFC) Cooling Fan Motor(s) B+
8	37 (Y)	Constant Control Relay Module (CCRM) 12B577 B+
9	—	Not Used
10	—	Not Used
11	—	Not Used
12	38 (BK/O)	Fuel Pump B+
13	16 (R/LG)	B+
14	197 (T/O)	Fan Control (FC) Cooling Fan Ground
15	60 (BK/LG)	Ground
16	57 (BK)	A/C Clutch Ground
17	639 (LG/P)	High Fan Control (HFC) 12A650 Ground
18	926 (LB/O)	Fuel Pump Ground
19	—	Not Used
20	—	Not Used
21	863 (PK/LB)	A/C Mode Input
22	331 (PK/Y)	WOT A/C Cutout
23	347 (BK/Y)	A/C Clutch Feed
24	361 (R)	Powertrain Control Module (PCM) 12A650 B+

Cooling Fan Motor Circuit Diagram—3.0L SHO with MTX



Constant Control Relay Module (CCRM) Connector End View



DESCRIPTION AND OPERATION (Continued)

Pin Number	Circuit	Circuit Function
1	38 (BK/O)	12 Volt Power Supply
2	38 (BK/O)	12 Volt Power Supply
3	181 (BR/O)	Cooling Fan Motor Feed
4	181 (BR/O)	Cooling Fan Motor Feed
5	787 (PK/BK)	Fuel Pump Safety Switch to Fuel Pump
6	—	Not Used
7	—	Not Used
8	37 (Y)	Battery to Load
9	—	Not Used
10	38 (BK/O)	Fan Dropping Resistor
11	926 (LB/O)	Powertrain Control Module (PCM) 12A650
12	38 (BK/O)	12 Volt Power Supply
13	16 (R/LG)	Ignition Switch to Ignition Coil "Battery" Terminal
14	197 (T/O)	Coolant Temperature Switch to Control Relay

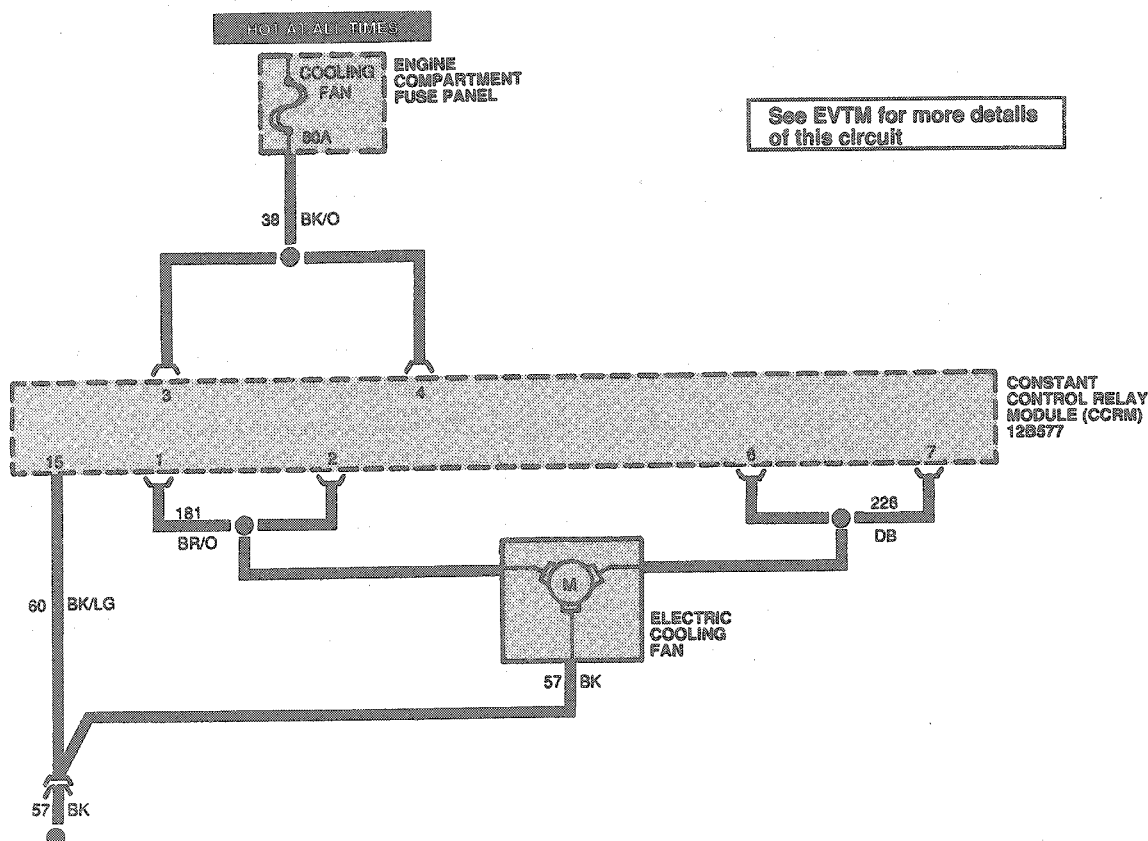
Pin Number	Circuit	Circuit Function
15	60 (BK/LG)	Ground
16	57 (BK)	Ground
17	—	Not Used
18	97 (T/LG)	Low Speed Fuel Pump Relay
19	—	Not Used
20	—	Not Used
21	883 (PK/LB)	Air Conditioning Control Relay Feed
22	331 (PK/Y)	WOT Cutout Relay
23	347 (BK/Y)	Compressor Clutch Feed
24	381 (R)	Power Relays to Powertrain Control Module (PCM) 12A650

● Cooling fan will run at high speed if:

- a. Engine temperature is higher than desirable and fan has been operating at low speed. Fan starts running at high speed at 110°C (230°F) and stops running at 107°C (224°F).

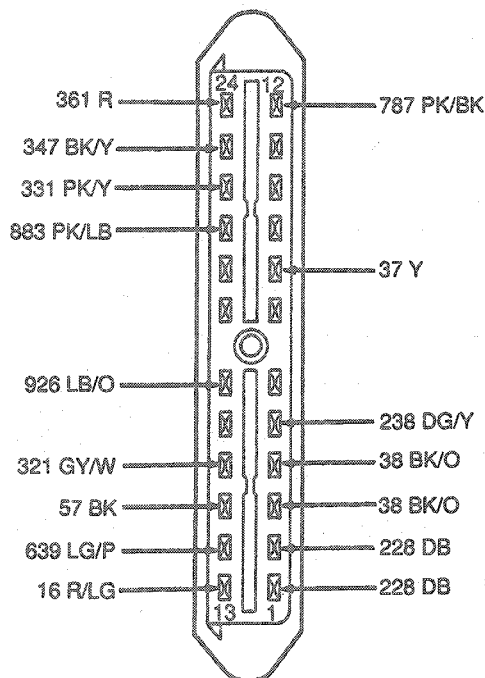
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Cooling Fan Motor Circuit Diagram—3.8L Engines



Q3232-A

DESCRIPTION AND OPERATION (Continued)

Constant Control Relay Module (CCRM)
Connector End View

Q3234-A

Pin Number	Circuit	Circuit Number
1	181 (BR/O)	Fan Control (FC) Motor Feed
2	181 (BR/O)	Fan Control (FC) Motor Feed
3	38 (BK/O)	VB+
4	38 (BK/O)	VB+
5	787 (PK/BK)	Fuel Pump Safety Switch to Fuel Pump
6	228 (DB)	High Fan Control (HFC) Cooling Fan Motor Feed
7	228 (DB)	High Fan Control (HFC) Cooling Fan Motor Feed
8	37 (Y)	Constant Control Relay Module (CCRM) 12B577 B+
9	—	Not Used
10	—	Not Used
11	—	Not Used
12	38 (BK/O)	Fuel Pump VBATT+
13	16 (R/LG)	Ignition Switch B+
14	197 (T/O)	Fan Control (FC) Cooling Fan Ground

(Continued)

Pin Number	Circuit	Circuit Number
15	60 (BK/LG)	Ground
16	321 (GY/W)	A/C Clutch Ground
17	639 (LG/P)	High Fan Control (HFC) Cooling Fan Ground
18	926 (LB/O)	Fuel Pump Ground
19	—	Not Used
20	—	Not Used
21	883 (PK/LB)	A/C Mode Input
22	331 (PK/Y)	WOT A/C Cutout
23	347 (BK/Y)	A/C Clutch Feed
24	361 (R)	Powertrain Control Module 12A650 B+

Several different integrated controller modules are available depending on application. Proper operation of the system cannot be obtained unless the correct integrated controller module is used.

DIAGNOSIS AND TESTING

Thermostat

When investigating a concern of overheating or insufficient heater / defroster performance, the following tests should be performed:

1. Check and service any leaks:
 - Radiator pressure cap
 - Heater hoses
 - Radiator hoses
 - Water outlet connection gasket
 - Head gasket
 - Water pump gasket
2. Check cold engine coolant level in radiator.
 - a. If level is below radiator filler neck, fill to filler neck with an approved coolant. Add coolant to recovery reservoir to the FULL COLD mark.

For Taurus SHO, fill coolant recovery reservoir to one-quarter full.

DIAGNOSIS AND TESTING (Continued)

- b. If the cold coolant level in the radiator is sufficient, run the vehicle for 10 minutes with the radiator pressure cap off and check for coolant circulation through the heater and radiator. If the coolant drops below the radiator filler neck, add coolant to the filler neck. Repeat the above procedure until all the air is purged from the cooling system.

When this procedure has been completed, feel the heater inlet and outlet hoses and the underside of the upper radiator hose. The thermostat should be removed only if these hoses are cold or if no coolant circulation is observed through the radiator after 10 minutes of operation.

Cooling System Pressure Test

Tools Required:

- Rotunda Radiator / Heater Core Pressure Tester 021-00012

1. Open hood and place fender covers.

WARNING: NEVER REMOVE THE RADIATOR PRESSURE CAP UNDER ANY CONDITIONS WHILE THE ENGINE IS OPERATING. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE COOLING SYSTEM OR ENGINE. TO AVOID HAVING SCALDING HOT COOLANT OR STEAM BLOW OUT OF THE RADIATOR, USE EXTREME CARE WHEN REMOVING THE CAP FROM A HOT RADIATOR.

WAIT UNTIL THE ENGINE HAS COOLED, THEN WRAP A THICK CLOTH AROUND THE RADIATOR CAP AND TURN IT SLOWLY TO THE FIRST STOP. STEP BACK WHILE THE PRESSURE IS RELEASED FROM THE COOLING SYSTEM. WHEN CERTAIN ALL THE PRESSURE HAS BEEN RELEASED, PRESS DOWN ON THE CAP (STILL WITH A CLOTH), TURN AND REMOVE.

2. When engine is cool, cautiously remove radiator pressure cap. Disconnect battery. Fit correct adapter to Rotunda Radiator / Heater Core Pressure Tester 021-00012 or equivalent and clip in position onto radiator filler neck.

NOTE: Small amount of "weeping" from the water pump blend hole is normal.

3. Pump up cooling system to a maximum of 110 kPa (16 psi) and hold for two minutes. If pressure drops within this time, inspect for leaks and service as required.

4. Pressure test radiator pressure cap.
5. Check condition of secondary seal on radiator cap seals.
6. Check coolant level in radiator and in reservoir. Fill as required with recommended coolant, install radiator pressure cap and connect battery cables.
7. Remove fender covers and close hood.

TESTING

Leak Testing

Clean the radiator before leak testing to prevent contaminating the test tank. Leak test the radiator in clean water with 145 kPa (21 psi) air pressure. Do not leak test an aluminum radiator in the same water that copper / brass radiators are tested in. Flux and caustic cleaners may be present in the tank and they will attack aluminum. A separate clean test tank is necessary for aluminum radiators. If conditions do not allow a separate tank for aluminum radiator leak testing, thoroughly clean the test tank each time before testing an aluminum radiator in the tank.

When a tank is removed to service a tube-to-header leak, the core can be leak tested by clamping the tank (with an O-ring gasket in place) to the core and leak testing with air under water. When service is completed, install the tank. Refer to Radiator Tank Installation.

Always install plugs in the oil cooler fittings before leak testing or cleaning any radiator equipped with an oil cooler.

REMOVAL AND INSTALLATION

Radiator

Tools Required:

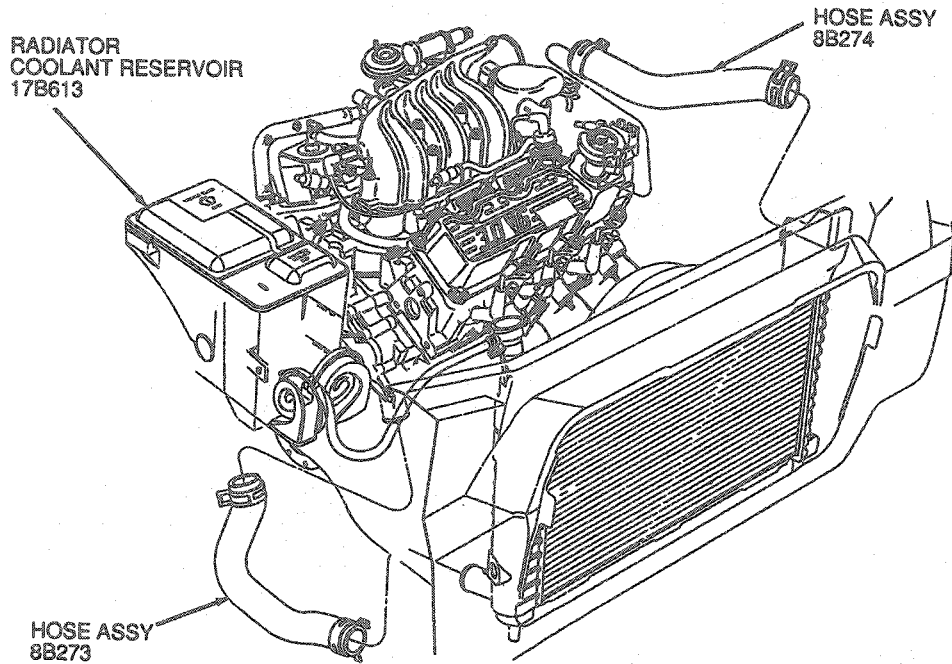
- Disconnect Tool T82L-9500-AH

Removal

1. Drain cooling system by removing radiator pressure cap and opening draincock located at lower rear corner of radiator inlet tank. Three revolutions are required to open draincock to full open position.
2. Remove rubber overflow tube from coolant recovery reservoir and detach it from radiator. On Taurus SHO, disconnect tube from radiator and remove recovery reservoir. Refer to illustration.

REMOVAL AND INSTALLATION (Continued)

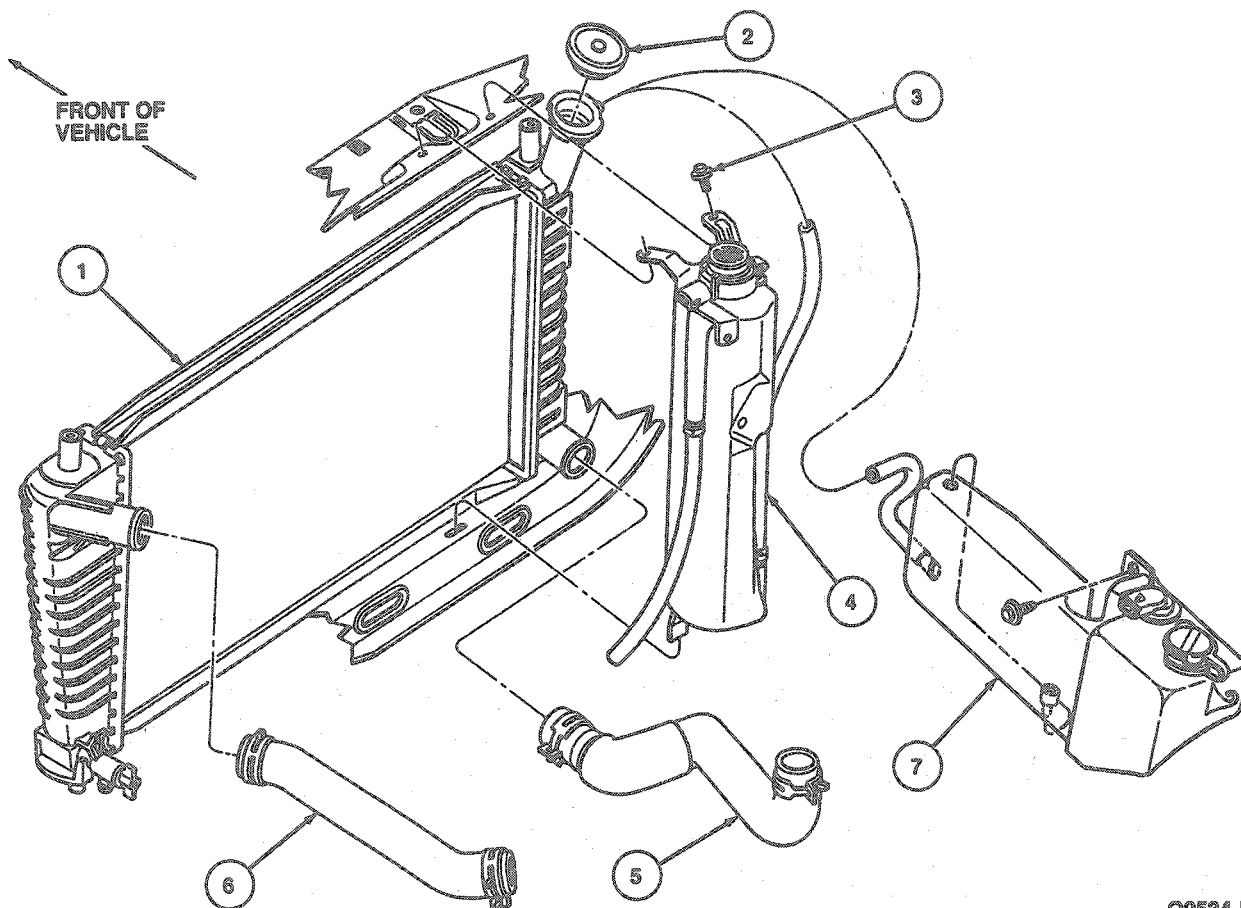
Taurus/Sable 3.0L



Q2269-C

REMOVAL AND INSTALLATION (Continued)

Taurus SHO 3.0L/3.2L



Q2534-B

Item	Part Number	Description
1	8005	Radiator Assy
2	—	Radiator Cap Assy
3	N80312-S2	Screw and Washer Assy

(Continued)

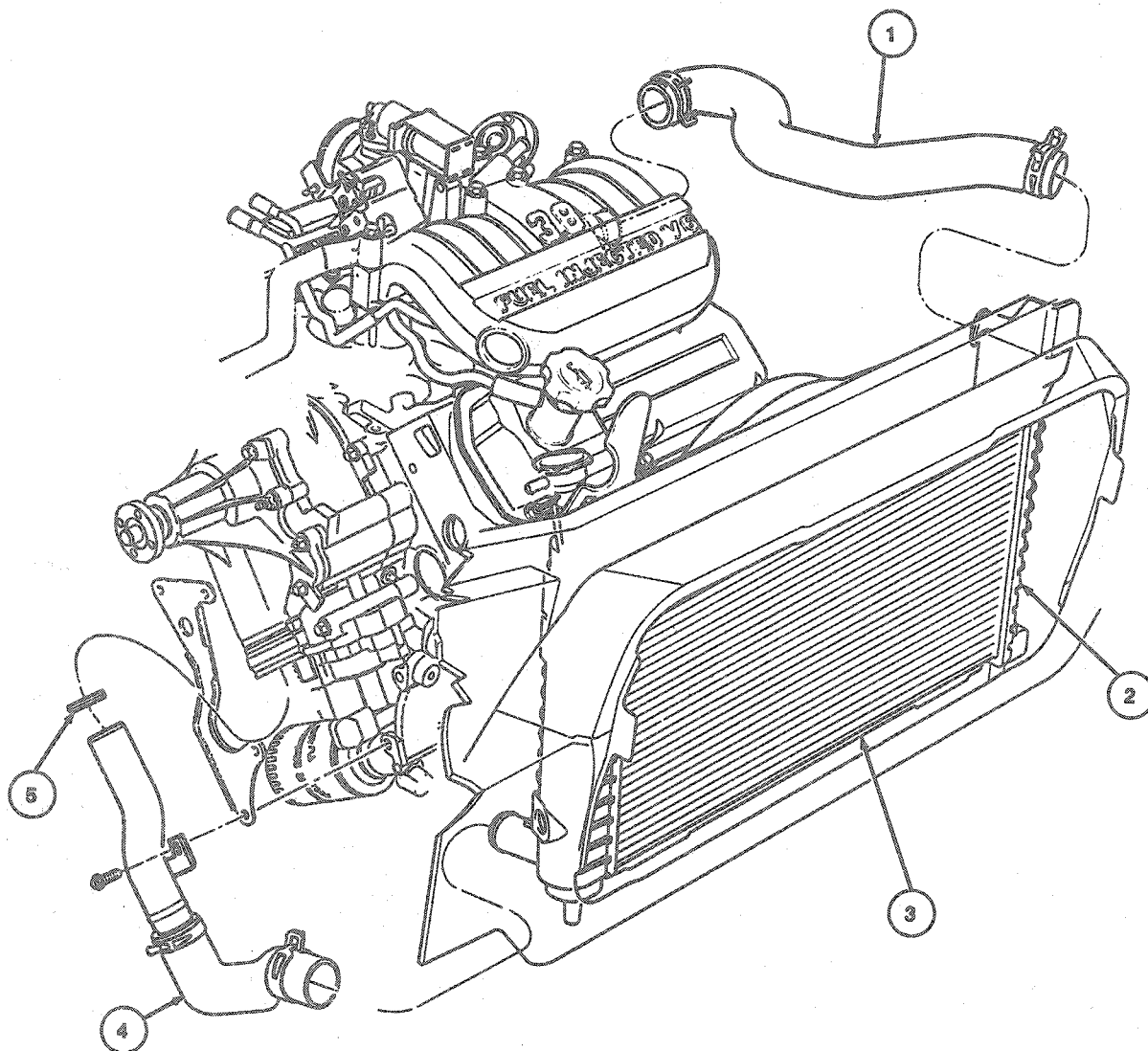
Item	Part Number	Description
4	8C045 (3.0L SHO)	Reservoir Assy
5	8B273	Hose and Clamp Assy
6	8B274	Hose and Clamp Assy
7	8C045 (3.2L SHO)	Reservoir Assy

3. Disconnect battery ground cable.
4. Remove two shroud upper retaining screws and lift shroud out of lower retaining clip.
5. Disconnect the electric cooling fan motor wires and remove fan and shroud assembly.
6. Loosen upper and lower hose clamps at radiator and remove hoses from radiator connectors.
7. Disconnect two automatic transmission oil cooling lines from radiator fittings.
8. On 3.0L engine remove two radiator upper retaining screws.
9. On 3.8L, 3.0L SHO, 3.2L SHO engines remove two hex nuts from RH radiator support bracket. Remove bracket.

10. On 3.8L, 3.0L SHO, 3.2L SHO engines remove two screws from LH radiator support bracket. Remove bracket.
11. Tilt radiator back (rearward) approximately 25mm (1 inch) and lift directly upward, clear of radiator support.
12. If either hose is to be replaced, loosen clamp at engine end and slip hose off connections with a twisting motion.

REMOVAL AND INSTALLATION (Continued)

Taurus/Sable

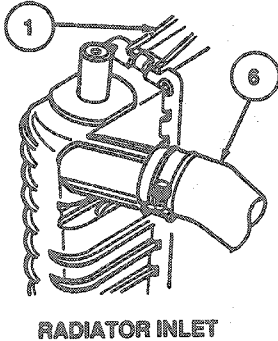
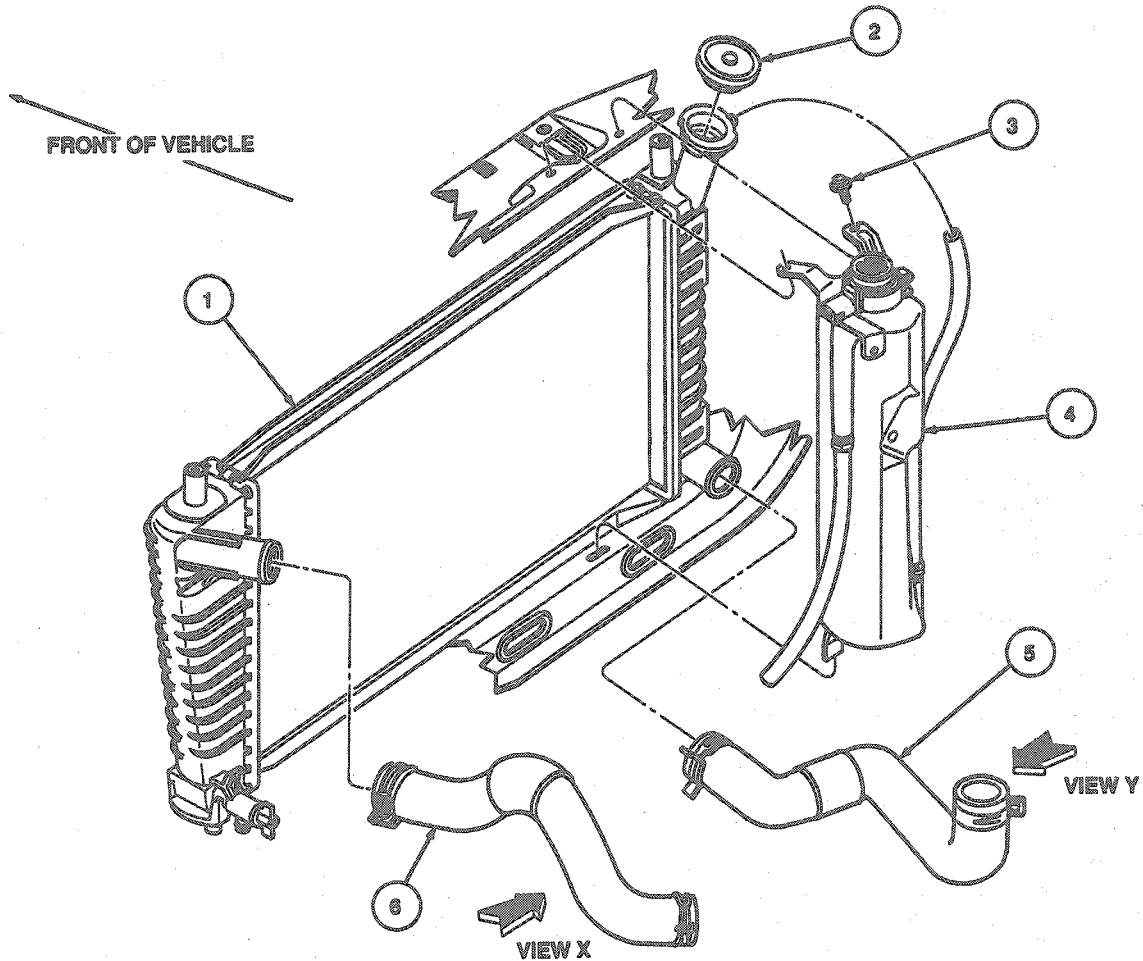


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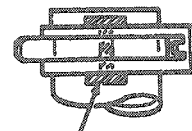
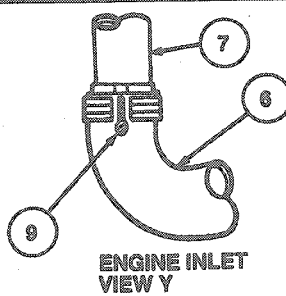
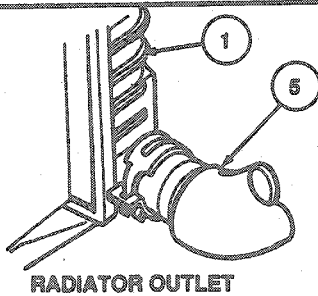
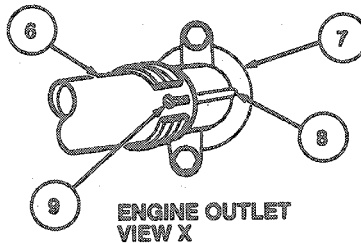
Item	Part Number	Description
1	8B274	Upper Radiator
2	8005	Radiator Assy
3	—	Radiator Core
4	8291	Lower Radiator Hose and Lower Tube Assy
5	87061-S94	O-Ring

REMOVAL AND INSTALLATION (Continued)

Taurus SHO



LOCATED MARKER STRIPE ON UPPER RADIATOR HOSE WITHIN WIDTH OF RAISED MARK ON ENGINE OUTLET



ALL CLAMPS MUST BE INSTALLED BETWEEN THE TWO PAINT STRIPES ON HOSES UNLESS OTHERWISE STATED.

Q2518-C

REMOVAL AND INSTALLATION (Continued)

Item	Part Number	Description
1	8005	Radiator Assy
2	—	Radiator Cap
3	N800312-S2	Screw and Washer Assy
4	8C045	Reservoir Assy (3.0 Version Shown)

(Continued)

Item	Part Number	Description
5	8B273	Hose and Clamp Assy
6	8B274	Hose and Clamp Assy
7	—	Engine Water Outlet Connection
8	—	Rib Alignment
9	—	Alignment Stripe

13. Remove radiator lower support rubber pads, if pad replacement is necessary.

Installation

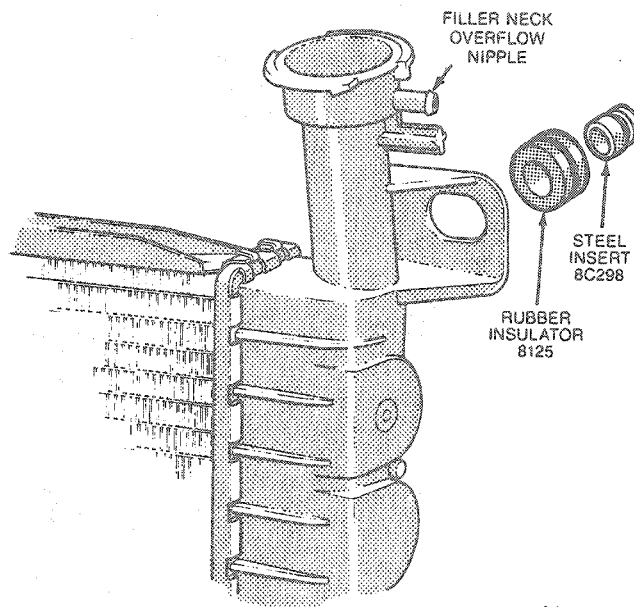
1. Position radiator lower support rubber pads to lower support, if necessary.
2. If either hose has been replaced, position hose on engine with index arrow in-line with mark on fitting at engine. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections.

CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.2-3.4 N·m (20-30 lb-in).

3. Position radiator into engine compartment and to radiator support. Insert the moulded pins at bottom of each tank through slotted holes in lower support rubber pads.
4. Inspect radiator nylon tank upper mounting bushings for damage. Replace if damaged.
5. On 3.8L, 3.0L SHO, and 3.2L SHO engines inspect LH and RH radiator support brackets. Replace if damaged.



CCL 2574-B

6. On 3.0L engine only, ensure plastic pads on bottom of radiator tanks are resting on rubber pads. Install two upper retaining bolts to attach radiator to radiator support. Tighten to 5-7 N·m (45-61 lb-in).
7. On 3.8L, 3.0L SHO, and 3.2L SHO engines position LH and RH support bracket over radiator and radiator support. Align holes in bracket with corresponding holes in radiator support and secure with two screws. Tighten screws to 12-24 N·m (9-17 lb-ft).
8. Install radiator upper and lower hoses to radiator. Position hose on radiator connector so that index arrow on hose is in line with mark on connector. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections.

CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.2-3.4 N·m (20-30 lb-in).

REMOVAL AND INSTALLATION (Continued)

On vehicles with automatic transaxles, connect oil cooler lines using Pipe Sealant with Teflon®D8AZ-19554-A (ESG-M4G194-A) or equivalent oil resistant sealer.

9. Install fan and shroud assembly by connecting motor wiring and positioning on lower retainer clips. Attach top of shroud to radiator with two screw and washer assemblies, and nut. Tighten to 4 N·m (36 lb-in).
10. Attach rubber overflow tube to radiator filler neck overflow nipple and coolant recovery reservoir.
On Taurus SHO, install coolant recovery reservoir and connect overflow hose.
11. Install new 50/50 mixture of water and antifreeze. Operate engine for 15 minutes. Check coolant level and bring it to within 38mm (1-1/2 inch) of radiator filler neck.
12. Connect battery ground cable.

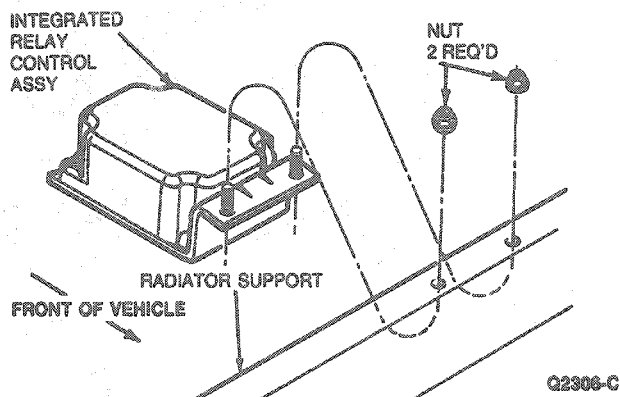
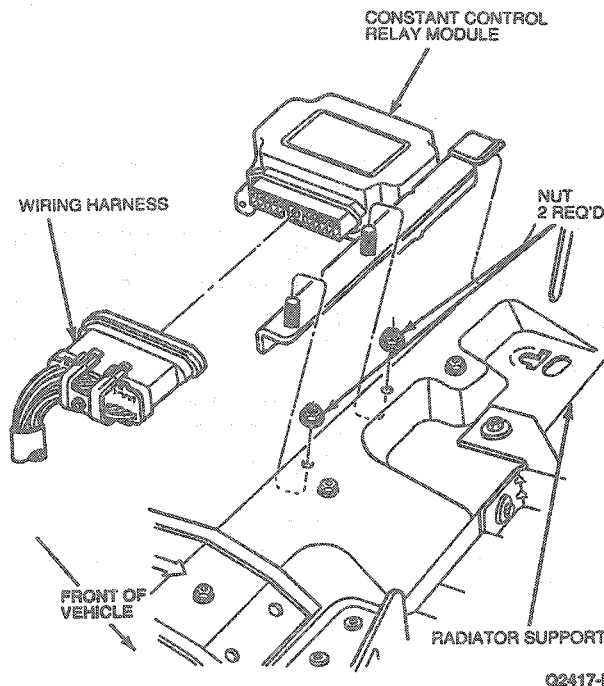
Fan, Motor and Constant Control Relay Module (CCRM)**3.0L****Removal and Installation**

1. Remove radiator sight shield.
2. Disconnect electrical connector. Remove integrated relay control assembly located on radiator support.
3. Disconnect electric fan connector.
4. Unbolt fan and shroud assembly from radiator.
5. Rotate fan and shroud assembly and remove past radiator.
6. Remove fan U-spring retainer from motor shaft and remove fan.
7. Unbolt fan motor from shroud.
8. To install, reverse Steps 1 through 7. Tighten fan retaining screws to 11-14 N·m (97-123 lb-in). Tighten shroud retaining bolts to 2.6-3.7 N·m (23-33 lb-in). Tighten shroud retaining nuts to 8-12 N·m (71-106 lb-in).

3.8L and 3.0L/3.2L SHO**Removal and Installation**

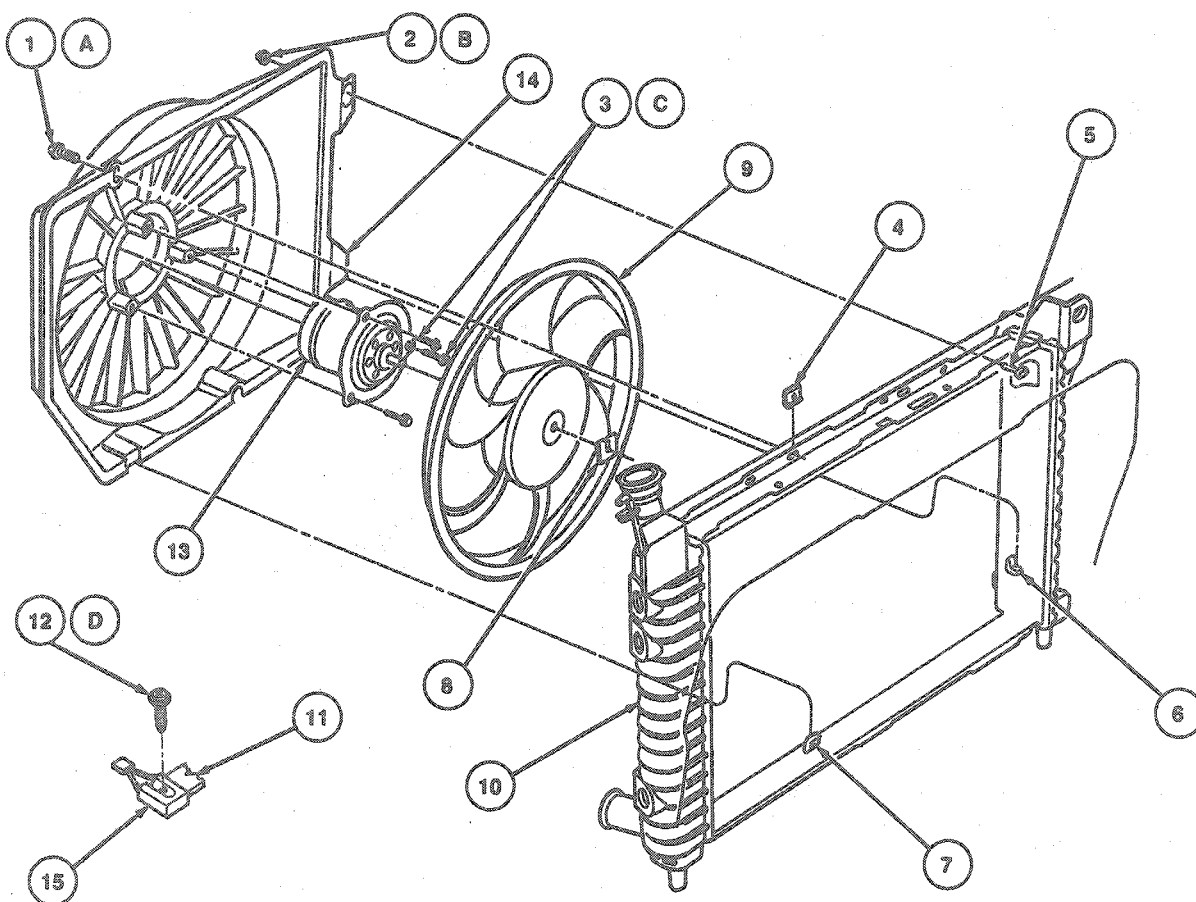
1. Remove radiator sight shield.
2. Disconnect electrical connector. Remove integrated relay control assembly located on radiator support.
3. Disconnect electric fan connector.
4. Unbolt fan and shroud assembly from radiator.

5. Slide cooling fan module clear of radiator hose connector and lift up past radiator.
6. Remove fan U-spring and remove fan.
7. Remove fan motor from shroud.
8. To install, reverse Steps 1 through 7. Tighten fan retaining screws to 10 N·m (86 lb-in). Tighten shroud retaining nuts and bolts to 4 N·m (36 lb-in).

Integrated Relay Control Assembly**3.0L****3.0L SHO and 3.8L**

REMOVAL AND INSTALLATION (Continued)

Fan and Motor—3.0L



A8582-D

Item	Part Number	Description
1A	389984	Bolt
2B	N802330-S2	Nut and Washer Assy
3C	N804019-S38	Screw and Washer Assy
4	N803191-S2	Nut
5	N802375-S2	Bolt
6	—	Shroud Mounting Tab
7	—	Radiator Clip
8	N801025-S2	U-Spring Retainer
9	8600	Engine Cooling Fan Assy
10	8500	Radiator Assy
11	—	Bracket

(Continued)

Item	Part Number	Description
12D	W611105-S2	Screw and Washer Assy
13	8K621	Fan Motor Assy
14	8146	Fan Shroud
15	—	Cooling Fan Dropping Resistor Assy
A		Tighten to 2.6-3.7 N·m (23-33 Lb-in)
B		Tighten to 8-12 N·m (71-106 Lb-in)
C		Tighten to 11-14 N·m (97-123 Lb-in)
D		Tighten to 5.2-6.8 N·m (46-60 Lb-in)

REMOVAL AND INSTALLATION (Continued)

Fan and Motor — 3.0L SHO

NUT AND WASHER ASSY N802350-S2
TIGHTEN TO 4 N·m (36 LB-IN)

BOLT 369984
TIGHTEN TO
4 N·m
(36 LB-IN)

COOLING FAN MODULE
8C607

U-NUT
390444-S2

BOLT
N802375-S2

RADIATOR TAB
FOR MOUNTING
SHROUD REF.

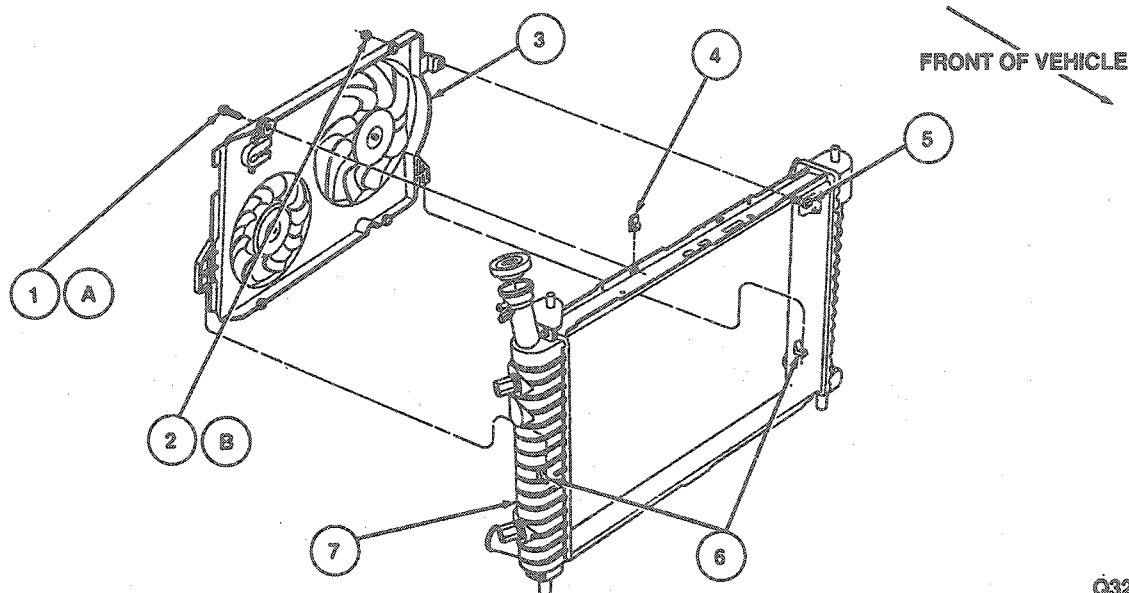
8005 RADIATOR ASSY

RADIATOR CLIP

CCL 3782-A

REMOVAL AND INSTALLATION (Continued)

Fan and Motors—3.2L SHO



Q3246-A

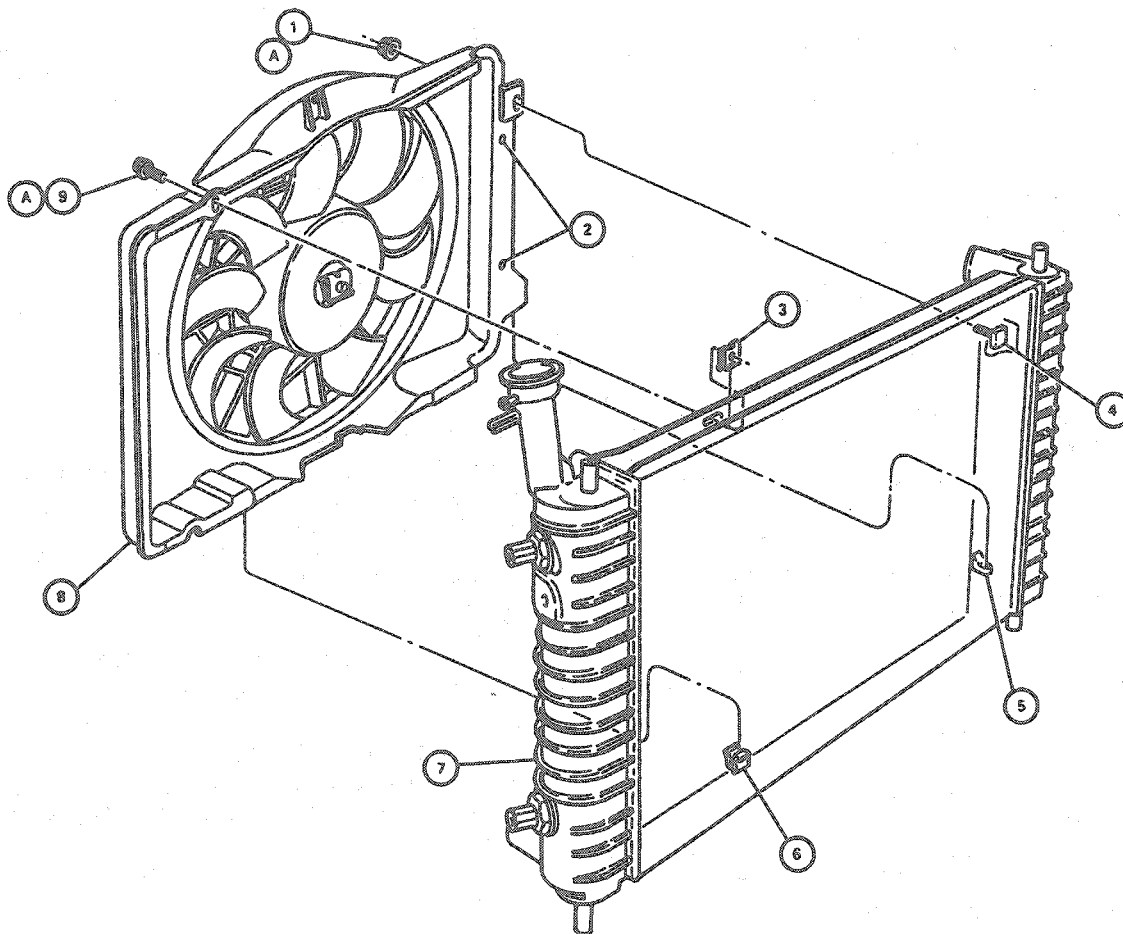
Item	Part Number	Description
1A	N807390-S2	Screw and Washer Assy
2B	N802350-S2	Nut and Washer Assy
3	8C607	Motor and Fan Assy
4	N823330-S2	Nut
5	N802375-S2	Bolt

(Continued)

Item	Part Number	Description
6	—	Radiator Tab for Mounting Shroud
7	8005	Radiator Assy
A		Tighten to 8-11.5 N·m (6-8.5 Lb·Ft)
B		Tighten to 2.5-3.5 N·m (2-2.6 Lb·Ft)

REMOVAL AND INSTALLATION (Continued)

Fan and Motor — 3.8L



ITEM	PART NO.	DESCRIPTION		
(1A)	N602350-S2	NUT AND WASHER ASS'Y	(6)	----- RADIATOR CLIP
(2)	-----	ENGINE WIRING HARNESS CLIP LOCATIONS	(7)	8005 RADIATOR ASS'Y
(3)	45258-S2	U-NUT	(8)	8C807 COOLING FAN MODULE
(4)	N802375-S2	BOLT	(9A)	58950-S2 BOLT (4 REQ'D)
(5)	-----	RADIATOR TAB FOR MOUNTING SHROUD	(A)	TIGHTEN TO 4 N·m (36 Lb-in)

CCL 3783-A

Thermostat

For Taurus SHO, refer to Section 03-01B.

3.0L Engine**Removal**

1. Drain cooling system as outlined.
2. Remove upper radiator hose from thermostat housing.

REMOVAL AND INSTALLATION (Continued)

3. Remove three retaining bolts from thermostat housing.
4. Remove housing and thermostat as an assembly.
CAUTION: Aluminum gouges easily which forms leak paths. Use care when scraping gasket.
5. Discard gasket. Clean sealing surfaces with gasket scraper.

Installation

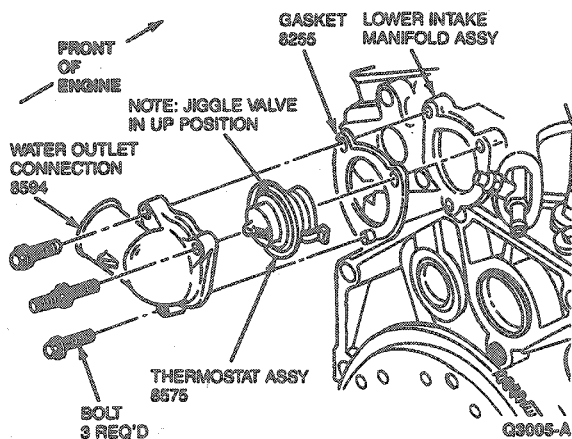
1. Sealing surfaces must be totally free of gasket material.
2. Install thermostat into housing and rotate clockwise to lock in. Note location of jiggle valve in relation to housing (up).
3. Position gasket onto housing using bolts as a holding device. Install thermostat assembly and tighten bolts to 12 N·m (9 lb-ft).
4. Install upper radiator hose. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections.

CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.2-3.4 N·m (20-30 lb-in).

5. Fill and bleed cooling system with proper amount and mixture.
6. Start engine and check for coolant leaks.

**3.8L Engine****Removal**

1. Open hood and place fender covers.
2. Disconnect battery cables.
3. Position drain tray below radiator.
4. Remove radiator pressure cap following outlined precautions. Attach 9.5mm (0.4 inch) hose to drain tube and open draincock. Drain radiator to a corresponding level below water outlet connection. Close draincock.

CAUTION: Do not pry housing off.

5. Loosen top hose clamp at radiator, remove water outlet connection retaining bolts, lift clear of engine and remove thermostat by rotating counterclockwise in water outlet connection until thermostat becomes free to remove.

Installation

1. Clean water outlet connection pocket and cylinder head mating faces.
2. Place thermostat in position, fully inserted and rotate clockwise in water outlet connection to secure. Position water outlet connection to intake manifold with a new gasket and secure bolts. Tighten to 20-30 N·m (15-22 lb-ft). Position top hose to radiator. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections. Close draincock.

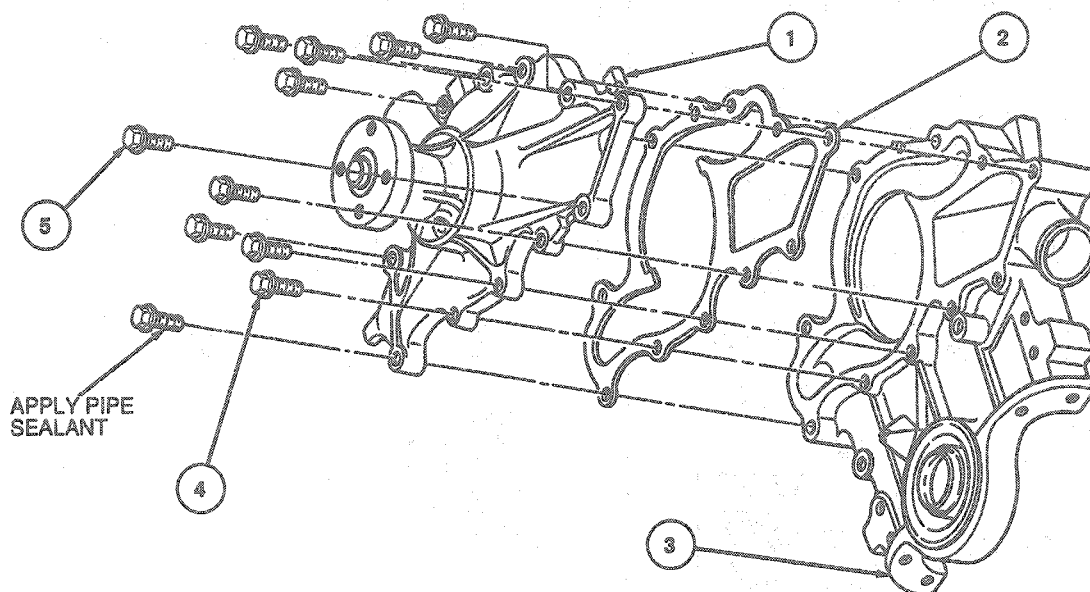
CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.2-3.4 N·m (20-30 lb-in).

3. Refill cooling system with specified antifreeze solution. Refer to Coolant Refill procedure.
4. Connect battery cables.
5. Start engine and check for leaks.
6. Check coolant level as required.

REMOVAL AND INSTALLATION (Continued)



A8593-E

Item	Part Number	Description
1	8501	Water Pump Assy
2	8507	Water Pump Gasket
3	6019	Front Cover Assy
4	N804168-S8	Bolt (5 Req'd)
5	N804811-S8	Bolt (6 Req'd)

Installation

NOTE: Lightly oil all bolt and stud threads before installation except those requiring special sealant.

CAUTION: Use care when scraping as aluminum gouges easily which may form leak paths.

1. Clean gasket surfaces on water pump and front cover.
2. Position a new gasket on water pump sealing surface using Gasket and Trim Adhesive D7AZ-19B508-B (ESE-M2G52-A and ESE-M2G52-A) or equivalent to hold gasket in place.
3. With pulley loosely positioned on water pump hub, align water pump to timing cover and install retaining bolts.

NOTE: Apply Pipe Sealant with Teflon®D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to bolt No. 3 (as illustrated) prior to installation.

4. Tighten retaining bolts as follows: Numbers 3, 4, 6, 7, 8, 9 and 10 to 20-30 N·m (15-22 lb-ft) and Numbers 11, 12, 13, 14 and 15 to 8-12 N·m (71-106 lb-in).

5. Hand tighten water pump pulley retaining bolts.
6. Install automatic belt tensioner assembly. Tighten the two retaining nuts and bolt to 48 N·m (35 lb-ft).
7. Install the generator and power steering drive belts as outlined in Section 03-05. Final tighten water pump pulley retaining bolts to 21 N·m (16 lb-ft).
8. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections.

CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

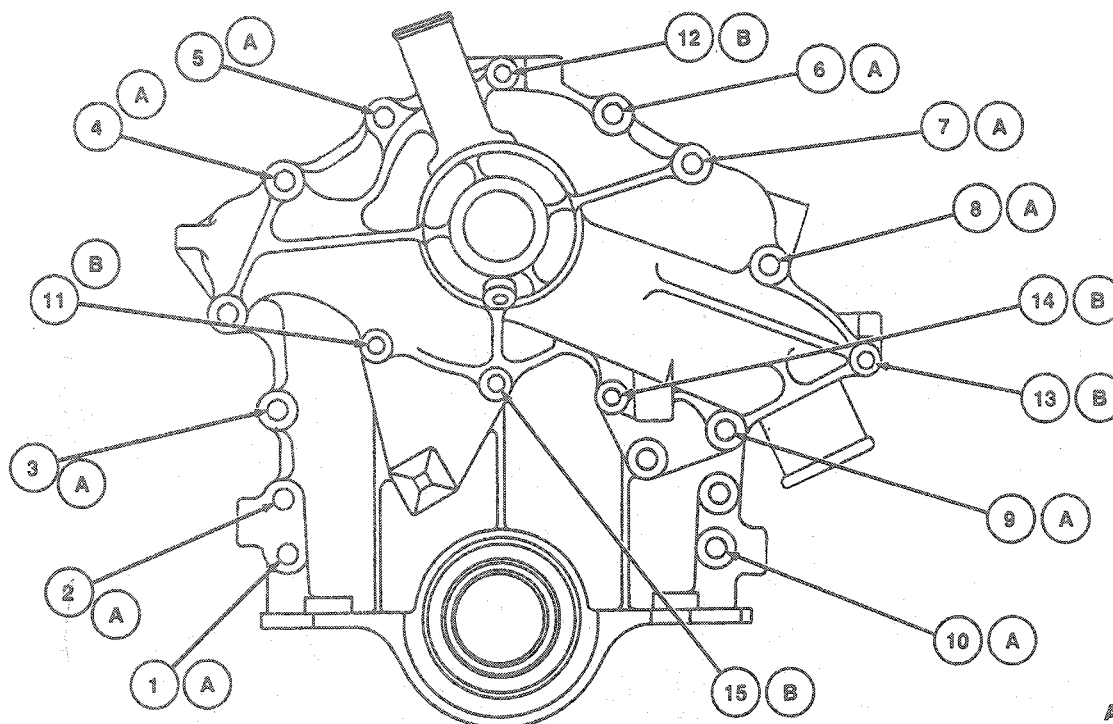
Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.3-3.4 N·m (20-30 lb-in).

9. Fill and bleed cooling system with specified quantity and type.
10. Connect negative battery cable.

REMOVAL AND INSTALLATION (Continued)

11. Start engine and check for leaks.



A13096-B

FASTENER AND HOLE NO.	FASTENERS		
	PART NO.	SIZE	FASTENER APPLICATION
1A	N804113-S8	M8 x 1.25 x 43.5	F/C TO BLOCK
2A	N804113-S100	M8 x 1.25 x 43.5	F/C TO BLOCK
3A	N804811-S100	M8 x 1.25 x 70	W/P & F/C TO BLOCK
4A	N804811-S8	M8 x 1.25 x 70	W/P & F/C TO BLOCK
5A	N605909-S8	M8 x 1.25 x 42	F/C TO BLOCK
6A	N804811-S8	M8 x 1.25 x 70	W/P & F/C TO BLOCK
7A	N804811-S8	M8 x 1.25 x 70	W/P & F/C TO BLOCK
9A	N804811-S8	M8 x 1.25 x 70	W/P & F/C TO BLOCK
10A	N606543-S8	M8 x 1.25 x 52	F/C TO BLOCK
11B	N804168-S8	M6 x 1 x 25	W/P TO F/C
12B	N804168-S8	M6 x 1 x 25	W/P TO F/C
13B	N804168-S8	M6 x 1 x 25	W/P TO F/C
14B	N804168-S8	M6 x 1 x 25	W/P TO F/C
15B	N804168-S8	M6 x 1 x 25	W/P TO F/C

(A) Tighten to 20-30 N·m (15-22 Lb·ft)

(B) Tighten to 8-12 N·m (7-10 Lb·in)

3.0L and 3.2L SHO

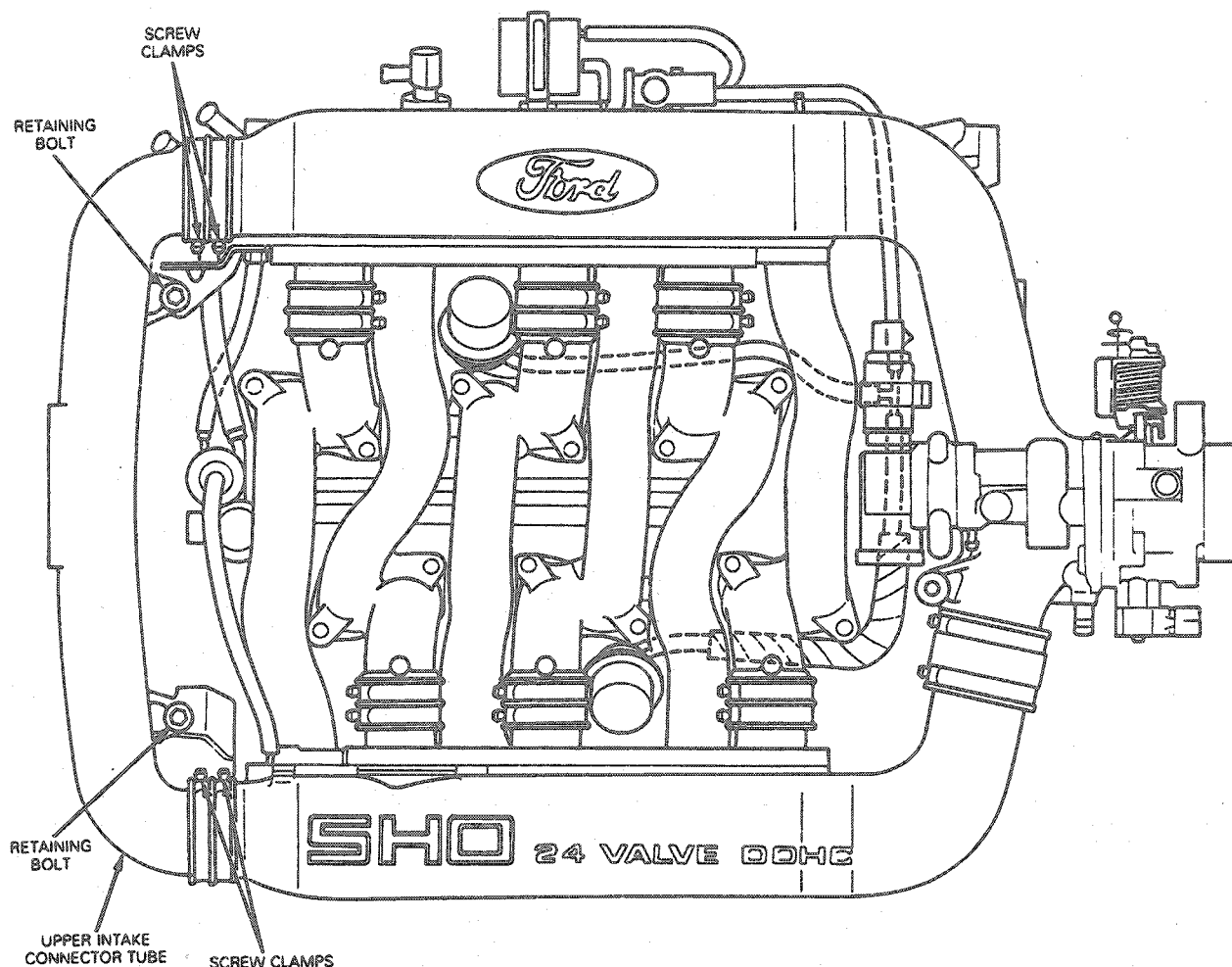
Removal

1. Drain engine coolant as outlined.
2. Disconnect battery ground cable.
3. Remove battery and battery tray.

4. Remove accessory drive belts. Refer to Section 03-05.
5. Remove three bolts retaining A/C and generator idler pulley and bracket assembly.
6. Disconnect electrical connector from ignition module and ground strap.
7. Loosen four screw clamps on upper intake connector tube and remove two retaining bolts.

REMOVAL AND INSTALLATION (Continued)

8. Remove upper intake connector tube.



CCL 3400-A

9. Raise vehicle and remove RH tire and wheel assembly. Refer to Section 00-02.
10. Remove splash guard.
11. Remove upper timing belt cover.
12. Remove crankshaft pulley.
13. Remove lower timing belt cover.
14. Remove bolts from center timing belt cover and position out of the way.
15. Remove water pump retaining bolts.
16. Remove water pump.

Installation

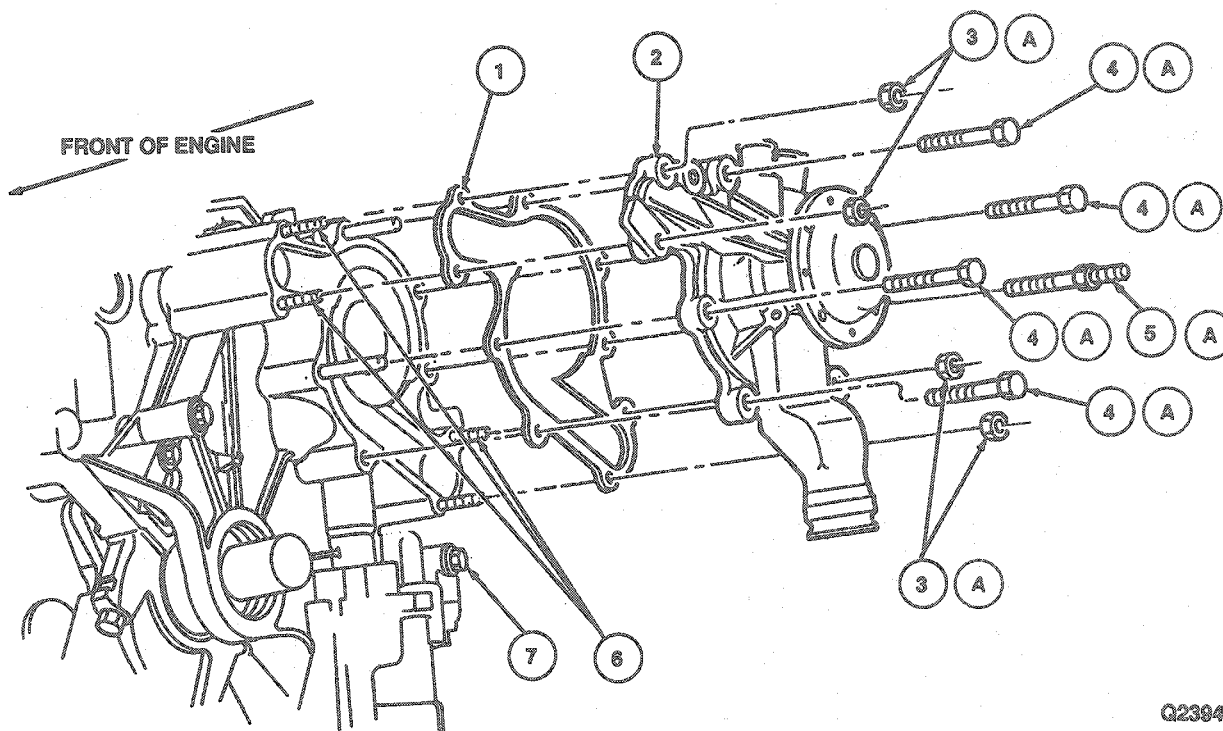
1. Install water pump to cylinder block. Tighten to 15-23 N·m (12-16 lb-ft).
2. Install center timing belt cover.
3. Install lower timing belt cover.
4. Install crankshaft pulley. Tighten to 152-172 N·m (113-126 lb-ft).
5. Install splash guard.
6. Install tire and wheel assembly. Tighten wheel lug nuts to 115-142 N·m (85-105 lb-ft).
7. Install upper timing belt cover.
8. Install upper intake connector tube.
9. Install two bolts on upper intake connector tube. Tighten to 15-23 N·m (12-16 lb-ft). Tighten four screw clamps.
10. Install A/C and generator idler pulley and bracket assembly.
11. Install accessory drive belts. Refer to Section 03-05.
12. Lower vehicle.
13. Connect battery ground cable.
14. Fill engine cooling system as outlined.
15. Start engine and check for leaks.

REMOVAL AND INSTALLATION (Continued)

3.8L Engine

Removal

1. Drain engine coolant. Refer to coolant drain procedure.
2. Disconnect battery ground cable.
3. Loosen accessory drive belt idler and remove drive belts.
4. Remove two nuts and one bolt attaching idler bracket to engine.
5. Disconnect heater hose at water pump.
6. Remove four pulley-to-pump hub bolts. The pulley will remain loose on hub due to insufficient clearance between inner fender and pump, restricting removal from vehicle.
7. Remove 11 water pump-to-engine retaining bolts.
8. Lift water pump and pulley out of vehicle.



Q2394-D

Item	Part Number	Description
1	8507	Gasket
2	8501	Water Pump Assy
3A	N804758	Nut
4A	605908	Bolt

(Continued)

Item	Part Number	Description
5A	N804756	Stud Bolt
6	—	Studs
7	—	Front Cover and Oil Pump Assy
A		Tighten to 20-30 N·m (15-22 Lb·Ft)

Installation

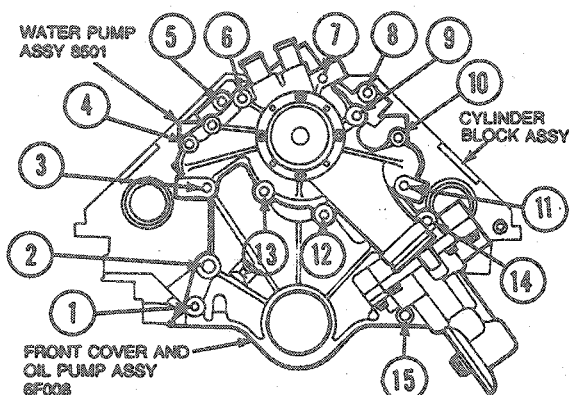
NOTE: Lightly oil all bolt and stud threads before installation except those specifying special sealant.

1. Clean both gasket mating surfaces on water pump and engine front cover.
2. Position gasket on water pump sealing surface using Gasket and Trim Adhesive D7AZ-19B508-BA (ESE-M2G52-A and ESR-M11P17-A) or equivalent.

REMOVAL AND INSTALLATION (Continued)

3. With pulley positioned on water pump hub, position water pump on front cover and install attaching bolts.

CAUTION: Two lengths of bolts are used. Install bolts as shown.



REF NO.	PART NO.	SIZE	PART NAME
1	N805112	M8 x 1.25 x 98.0	STUD
2	N805112	M8 x 1.25 x 98.0	STUD
3	N805757	M8 x 1.25 x 131.0	STUD
4	N805757	M8 x 1.25 x 131.0	STUD
5	N805787	M8 x 1.25 x 25.0	BOLT
6	N805808	M8 x 1.25 x 35.0	BOLT
7	N805808	M8 x 1.25 x 35.0	BOLT
8	N805787	M8 x 1.25 x 25.0	BOLT
9	N804756	M8 x 1.25 x 61.5	STUD BOLT
10	N805275	M8 x 1.25 x 141.0	STUD
11	N804757	M8 x 1.25 x 131.0	STUD
12	N805808	M8 x 1.25 x 35.0	BOLT
13	N805808	M8 x 1.25 x 35.0	BOLT
14	N804839	M8 x 1.25 x 105.0	BOLT
15	N804841	M8 x 1.25 x 20.0	CAP SCREW

*TIGHTEN ALL RETAINERS TO 20-30 N·m (15-22 LB-FT)

Q2385-C

4. Tighten retaining bolts to specification. Refer to illustration.
5. Install pulley-to-pump hub bolts. Tighten to 21 N·m (16 lb-ft).
6. Connect coolant bypass/heater hose to water pump.
7. Install idler bracket to front cover.
8. Position accessory drive belt over pump pulley and adjust drive belt tension, if equipped with manual tensioner. Refer to Section 03-05.
9. Connect battery ground cable.
10. Replace engine coolant. Refer to Coolant Refill procedures. Operate engine until normal operation temperature is reached. Check for leaks and check coolant level.

Radiator Hose

Removal

1. Open hood and place fender covers.
2. Disconnect battery ground cable.
3. Position drain tray below radiator.
4. Remove radiator pressure cap, attach a 9.5mm (0.4 inch) ID hose to draincock and drain radiator.
5. Position a drain tray under lower radiator hose. Loosen lower radiator hose clamps. Disconnect hose from water pump or inlet tube, and allow to drain.
6. Loosen clamps, disconnect top hose at radiator and thermostat housing and remove hose.

Installation

1. Position top hose to radiator and thermostat housing. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections.

CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

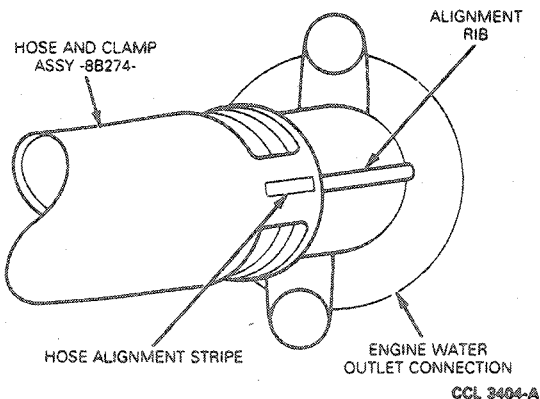
Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.2-3.4 N·m (20-30 lb-in).

On SHO engine, align hose as shown in illustration.

2. Position bottom hose to engine-mounted water pump or inlet tube and radiator. Secure clamps as outlined and close draincock.
3. Fill cooling system with specified cooling system concentrate and water solution. Refer to Coolant Refill procedure.
4. Connect battery cables.
5. Start engine. Check for leaks.
6. Check coolant level as required, only when engine is cool.
7. Remove fender covers and close hood.

LOCATE MARKER STRIPE ON UPPER RADIATOR HOSE WITHIN WIDTH OF RAISED RIB ON ENGINE OUTLET



REMOVAL AND INSTALLATION (Continued)**Water Pump Inlet Tube Assembly****3.8L Engine****Removal**

1. Open and secure hood and place fender covers.
2. Disconnect battery ground cable.
3. Remove radiator pressure cap following outlined precautions.
4. Raise vehicle. Refer to Section 00-02.
5. Position drain pan below radiator under lower radiator hose.
6. Loosen clamp, disconnect lower radiator hose from radiator, and drain engine coolant.
7. Remove inlet tube to engine mount retaining bolt.
8. Carefully remove water pump inlet tube assembly.
9. Remove O-ring from water pump.

Installation

1. Attach inlet tube to engine and install retaining bolt.
2. Position the clamps between the alignment marks on both ends of the hose and slide hose on connections.

CAUTION: Ensure the clamps are beyond the bead and placed in the center of the clamping surface of the connection.

Any used hose clamps must be replaced with a new clamp to ensure proper sealing at the connection.

Tighten screw clamps to 2.2-3.4 N-m (20-30 lb-in).

3. Lower vehicle.
4. Connect battery ground cable.
5. Replace engine coolant. Refer to Coolant Refill procedure. Ensure vent plug on water outlet connection is open during refill. Operate engine until normal operating temperature is reached. Check for leaks and check coolant level.

2. Connect overflow tube to recovery reservoir.
3. Fill and bleed cooling system as outlined. Check for coolant leaks and proper coolant level after engine reaches normal operating temperature.

Radiator Tank**Removal**

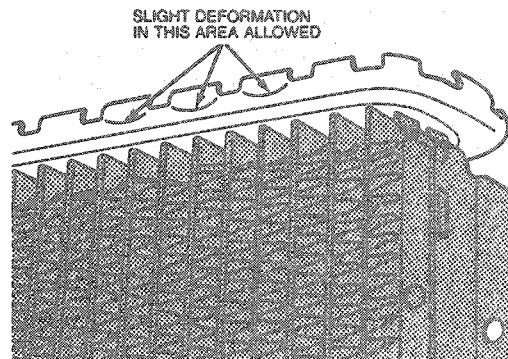
The radiator tank is moulded glass-filled nylon and is attached to the core header by bending the header tabs over the foot (edge) of the tank.

NOTE: The tabs on the vacuum-brazed aluminum radiator are easily work-hardened and require special attention to prevent tab damage.

If outlet end tank is to be removed, metallic pin support bracket must be removed first.

When removing a nylon tank, a screwdriver or one of the various special tools available can be used to open the header tabs. Some of these tools, including a screwdriver, may cause a small section of the header side to bend with the tabs as they are opened. This slight deformation is permissible, provided the tabs are opened only enough for tank removal. The header sides will usually return to the normal position when the tabs are recripped during tank installation.

Procedures given are for tank removal using a screwdriver or a Borroughs Tool BT-8260 or equivalent. Follow the manufacturer's instructions for other radiator tab opening and closing tools.



CCL 2175-B

Coolant Recovery Bottle**Removal**

1. Drain radiator until coolant is out of recovery reservoir. Disconnect radiator overflow line at recovery reservoir. Refer to illustration under Radiator Removal, Step 2.
2. Remove overflow tube from recovery reservoir. Remove recovery reservoir retainers and remove recovery reservoir.

Installation

1. Position recovery reservoir in vehicle and install retaining screws. Tighten to 7 N-m (5 lb-ft). On 3.0L SHO, insert tab at bottom of recovery reservoir in slot in lower radiator support.

With Screwdriver

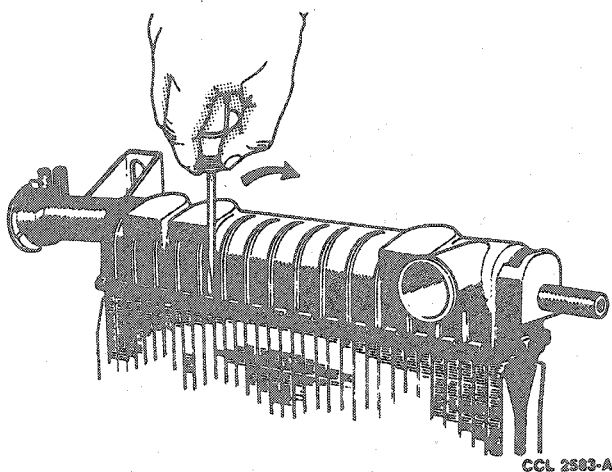
NOTE: Bend (open) the tabs only enough for tank removal.

1. Insert end of medium tip screwdriver between end of header tab and tank. Press screwdriver blade against tank to bend (pry) tab away from tank foot (edge). Repeat procedure for each tab.
2. Lift tank from core header when all of header tabs are bent away from tank foot (edge).
3. Remove O-ring gasket from header.

REMOVAL AND INSTALLATION (Continued)

With BT-8260

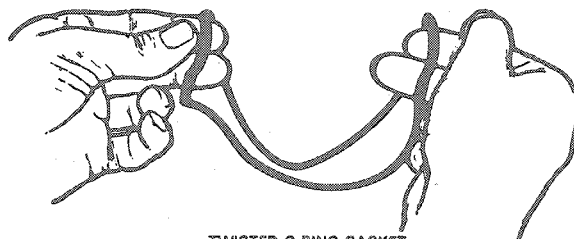
1. Insert end of Borroughs Tool BT-8260 or equivalent between end of header tab and tank. Then, push tool handle down toward core to bend tab away from radiator tank. Do not open the tabs more than is necessary for tank removal.
2. Repeat Step 1 for each header tab. Then, lift tank from header.
3. Remove O-ring gasket from header.



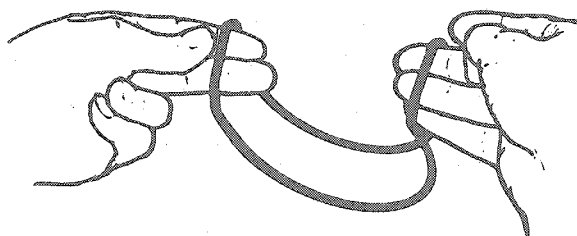
Installation

NOTE: If any header tabs are missing from an aluminum core, the core should be replaced.

1. Inspect seal surface of radiator core header to ensure it is clean and free of foreign material or damage.
2. Check new O-ring gasket to ensure it is not twisted.



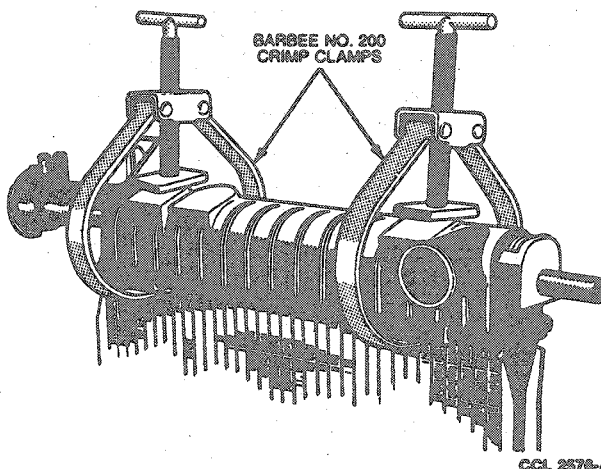
TWISTED O-RING GASKET



O-RING GASKET NOT TWISTED

CCL 2288-A

3. Dip new O-ring gasket in Premium Cooling System Fluid E2FZ-19549-AA (ESE-M97B44-A and ESE-M97B43-A) or equivalent and place gasket in header groove.
4. If outlet tank is being replaced and is equipped with an oil cooler, transfer oil cooler from replaced tank to new tank as outlined.
5. Position tank to header using care not to scratch tank sealing surfaces with header tabs.
6. Clamp tank in position on header with two header clamps as shown. Tighten header clamps to compress O-ring gasket.

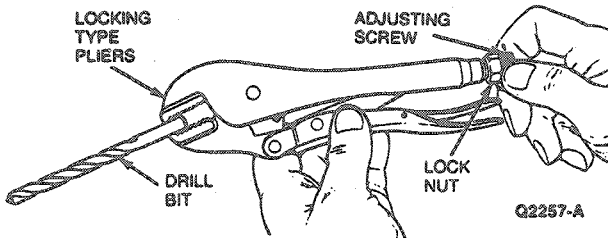


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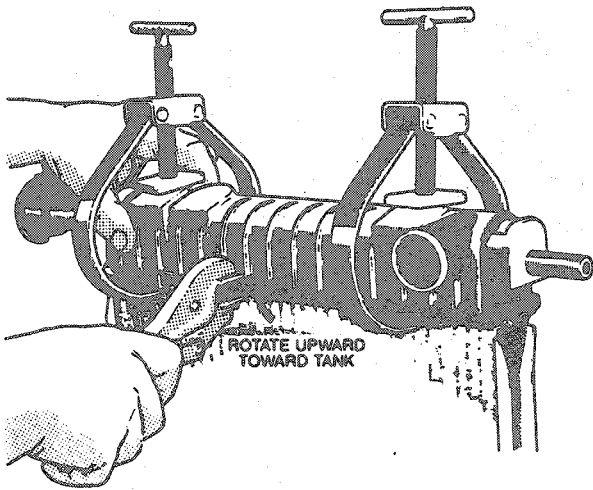
7. If locking-type pliers are used to squeeze header tabs against tank, install a hex nut on pliers adjusting screw.

REMOVAL AND INSTALLATION (Continued)

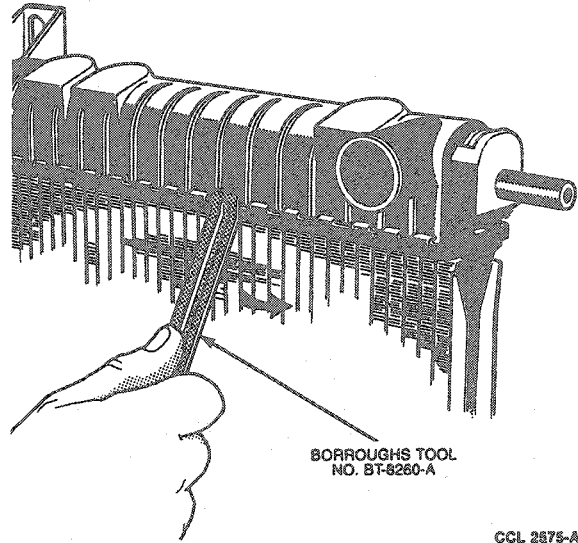
8. With jaws of locking-type pliers closed and locked, turn adjusting screw to position jaws against shank of a 10.9mm (27/64-inch) drill bit. Tighten hex nut on adjusting screw against handle to lock adjustment in place.



9. Squeeze header tabs down against lip of tank base with locking-type pliers while rotating pliers toward tank.

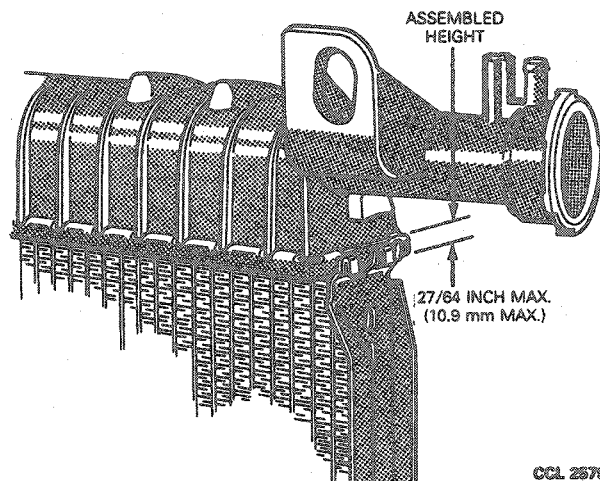


10. If a special crimping tool is used such as the one shown, follow the manufacturer's instructions.



It is important that assembled height of crimp be 10.32mm maximum (13/32 inch) when measured from bottom of header to top of tab.

11. Remove header clamps from radiator and squeeze header tab(s) down that were behind clamps.
12. Leak test radiator at 145 kPa (21 psi). Most minor leaks at tank seal can be corrected by again squeezing header tabs down against tank lip in area of indicated leak.



Oil Cooler Transfer or Replacement

Removal

1. Remove outlet tank from radiator following procedure given for Radiator Tank Removal.
2. Remove retaining nuts and washers from oil cooler inlet and outlet connections. Lift oil cooler from radiator outlet tank.

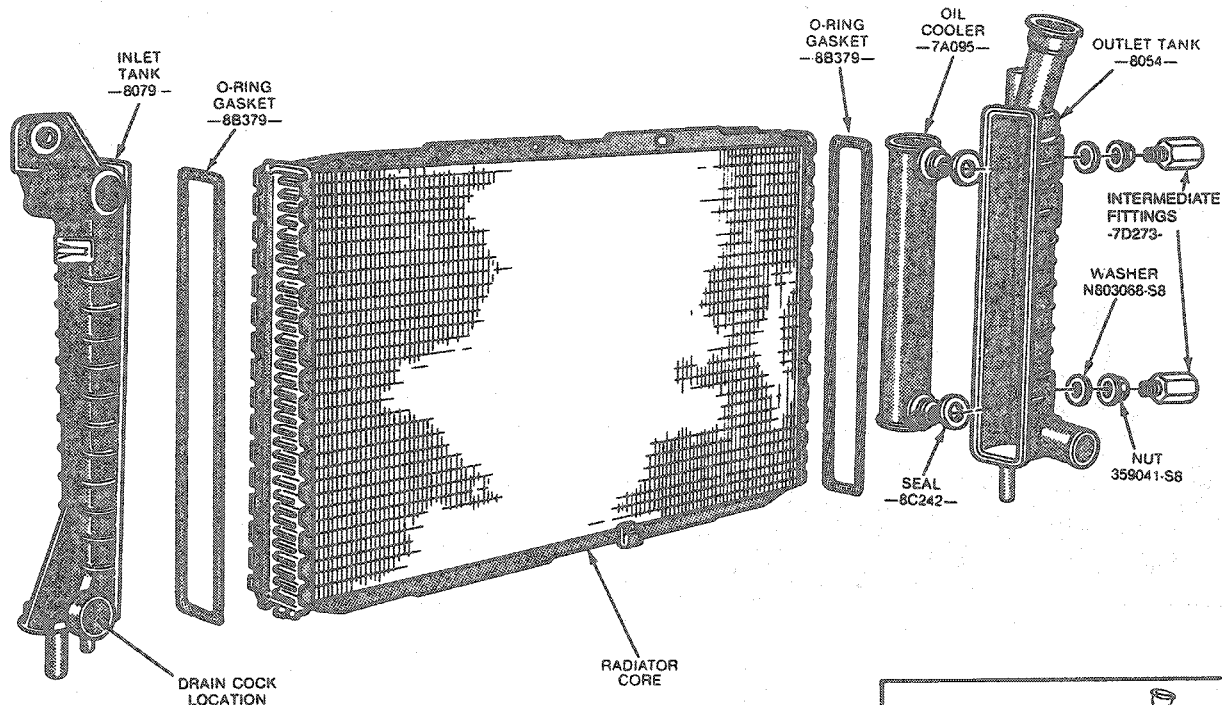
REMOVAL AND INSTALLATION (Continued)

3. Remove rubber gaskets from oil cooler inlet and outlet connections if oil cooler is to be reused.

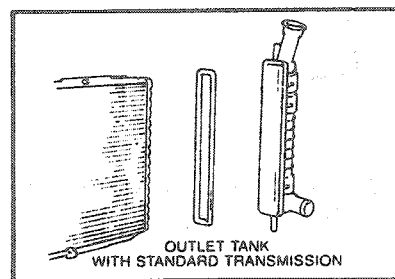
Installation

1. Position oil cooler to radiator outlet tank and insert inlet and outlet connections through holes in outlet tank.

2. Install flatwasher and nut on each oil cooler connections to retain oil cooler in radiator outlet tank.
3. Tighten oil cooler retaining nuts to 15-19 N·m (12-14 lb·ft). Tighten oil cooler intermediate fitting to 24.4-31.2 N·m (33-42 lb·ft).
4. Install outlet tank on radiator core header following procedure for Radiator Tank Installation.



	SEAL	WASHER	NUT	INTERMEDIATE FITTING	OIL COOLER
3.6L, 3.0L, 3.0L SHO	E4LH-8C242-AA	N803068-S8	359041-S8	E87A-7D273-EA	E57H-7A095-AA
3.2L SHO	E77H-8C242-AA	N805091-S8	N805092-S8	E87A-7D273-FA	F3DH-7A095-BA



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Draincock Replacement

The draincock is located near the bottom of the inlet tank and can be replaced without removing the tank from the radiator. However, the radiator may have to be removed from the vehicle for access to the draincock. All vehicles are equipped with a draincock that seals with an O-ring or a seal.

Removal

1. Turn draincock counterclockwise to unscrew stem. When draincock is unscrewed to end of threads, pull from radiator tank.

Installation

1. On all vehicles, moisten O-Ring before installation.
2. Tighten draincock by turning clockwise until tight. Additional tightening will not improve sealing ability.

CLEANING

External

The aluminum core can be cleaned externally with a soft bristle brush, warm water and a mild household liquid detergent. Do not use a metal brush to clean an aluminum core. Use only horsehair, bristle or nylon brushes. Rinse with clear water.

If the radiator is equipped with an oil cooler, install steel or brass plugs in the oil cooler fittings before cleaning and keep them installed during the entire service operation.

Internal

NOTE: Do not use caustic cleaning solutions or copper / brass radiator cleaning agents on aluminum radiators. Internal cleaning of the aluminum tubes can be accomplished with sonic cleaning equipment or by removing one end of the tank to gain access to the tubes. Clean the tubes with a mild household liquid detergent. Rinse the core with clean water when completed. Do not use a metal brush to clean an aluminum core. Use only horsehair, bristle or nylon brushes.

SERVICE PROCEDURES

Radiator Core

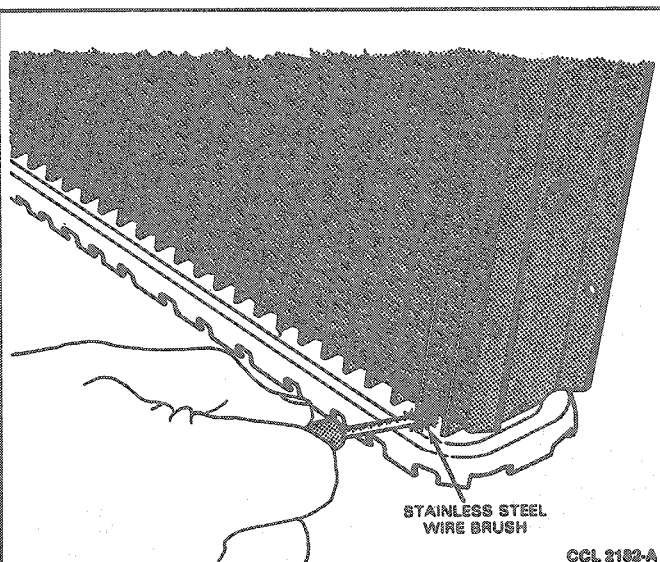
The only approved service method for the aluminum radiator core is using a two-component epoxy material. The materials and supplies necessary to repair the aluminum core are:

- Epoxi-Patch Kit No. 6C Aluminum. Hysol Division of the Dexter Corporation, Olean, New York 14760.
- Sandpaper and / or emery paper, 80 or 100 grit.
- Stainless steel wire brush No. 23151 or equivalent. The Milwaukee Brush Manufacturing Co., Menomonee Falls, Wisconsin 53051.
- 375 watt heat lamp.
- Mixing card and spatulas.

Service

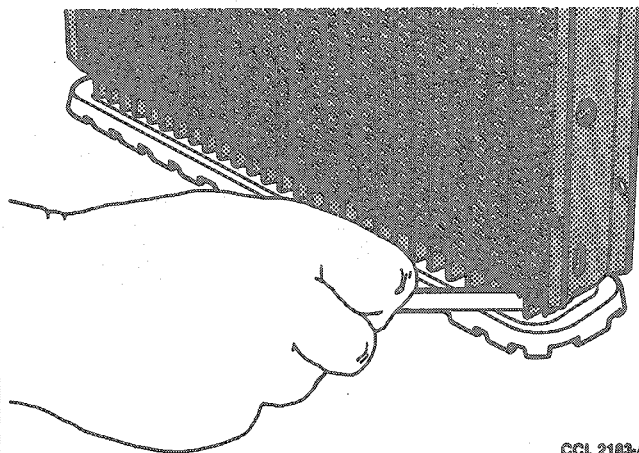
CAUTION: Do not use wire brushes that are not stainless steel.

1. Thoroughly clean the area around leak with a stainless steel wire brush and, if necessary, emery paper to get to hard to reach areas. Use the brush on the epoxy coating as well as on the aluminum.



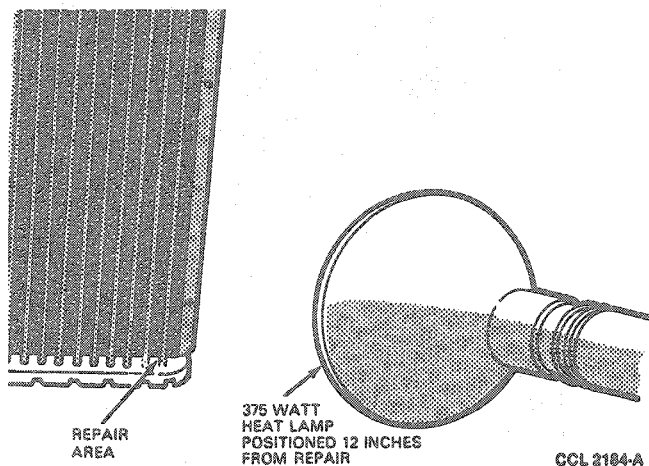
NOTE: Observe all cautions and warnings printed on the repair material containers.

2. Squeeze a bead (long enough to repair the leak) of repair material Part A (resin) on a clean, dry, disposable flat mixing surface. Use uniform pressure to obtain an even bead.
3. Squeeze an equal length bead of hardener (Part B) parallel to the Part A bead.
4. Mix parts A and B together.
5. If it is necessary to have epoxy flow to obtain satisfactory results, warm core around leak with a 375-watt heat lamp. Apply service material to leak.

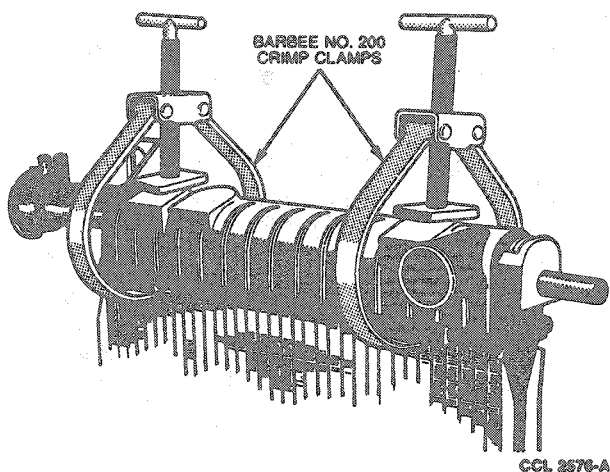


SERVICE PROCEDURES (Continued)

6. Position 375-watt heat lamp 305mm (12 inch) from service area and allow to cure for two hours. **Do not** position heat lamp closer to service area than 305mm (12 inch). **Do not** use a heat gun or overheat repair area material.



7. Leak test the serviced area by clamping tank to header with No. 200 Crimp Clamps or equivalent. After a successful leak test, install radiator tank following the procedure for Radiator Tank Installation.



INSPECTION

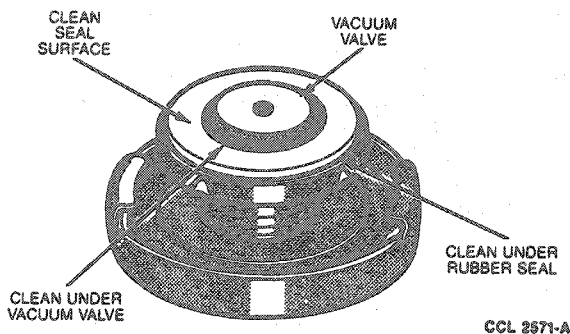
Radiator Pressure Cap

Tools Required:

- Rotunda Radiator / Heater Core Pressure Tester 021-00012

Cleaning and Inspection

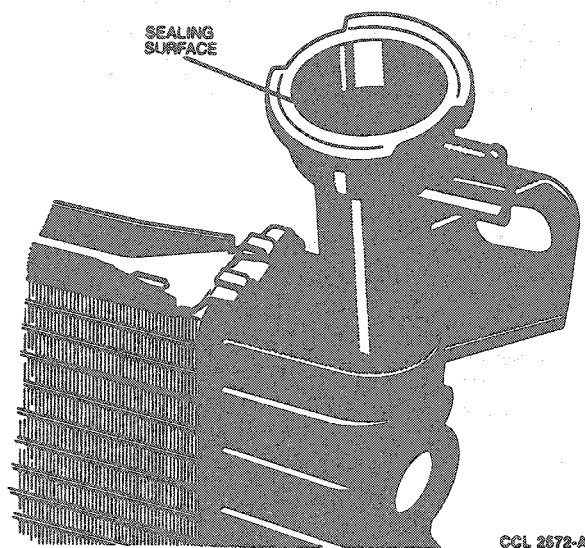
1. Remove radiator pressure cap from radiator filler neck. Follow outlined precautions.
2. Inspect areas under vacuum valve and rubber seal for rust or dirt particles.
3. Using warm tap water, clean the seal surface, raise vacuum valve and rubber seal and thoroughly flush away trapped, loose rust or dirt particles.



4. Inspect and remove any loose or imbedded rust or dirt particles on sealing surfaces of rubber seal.

NOTE: If paint is observed on filler neck sealing surface, remove it using paint thinner.

5. Inspect radiator filler neck opening for rust or dirt particles on sealing surface at bottom of filler neck opening. Use a clean cloth and wipe sealing surface to remove any rust or dirt particles.



INSPECTION (Continued)

Pressure Check

Tools Required:

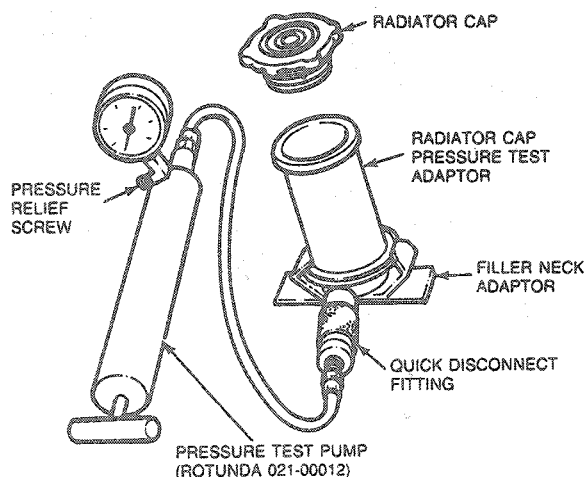
- Rotunda Radiator / Heater Core Pressure Tester 021-00012

WARNING: NEVER REMOVE THE RADIATOR PRESSURE CAP UNDER ANY CONDITIONS WHILE THE ENGINE IS OPERATING. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD 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 RADIATOR, USE EXTREME CARE WHEN REMOVING THE CAP FROM A HOT RADIATOR. WAIT UNTIL THE ENGINE HAS COOLED, THEN WRAP A THICK CLOTH AROUND THE RADIATOR PRESSURE CAP AND TURN IT SLOWLY TO THE FIRST STOP. STEP BACK WHILE THE PRESSURE IS RELEASED FROM THE COOLING SYSTEM. WHEN CERTAIN ALL THE PRESSURE HAS BEEN RELEASED, PRESS DOWN ON THE CAP (STILL WITH A CLOTH), TURN AND REMOVE.

1. Remove radiator pressure cap from radiator filler neck.
2. Use water to clean cap in area of rubber seal and vacuum relief valve. Immerse radiator cap in water and install radiator cap pressure test adapter from Rotunda Radiator / Heater Core Pressure Tester 021-00012 or equivalent.

NOTE: The filler neck seal is reversible so it may be used on either end of radiator cap pressure test adapter.

3. Immerse filler neck seal in water and install in filler neck adapter. Then, install filler neck adapter with seal on open end of radiator cap pressure test adapter.



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4. Connect female quick disconnect fitting of pressure test pump to male quick disconnect fitting of filler neck adapter.

NOTE: If plunger of pump is depressed too fast, an erroneous pressure reading will result.

5. SLOWLY depress plunger of pressure test pump until pressure gauge reading stops increasing and note highest pressure reading obtained.
6. Release pressure by turning pressure relief screw counterclockwise. Then, tighten pressure relief screw and repeat Step 5 (at least twice) to ensure pressure test reading is repeatable within acceptable gauge reading limits of radiator pressure cap and is not erratic. Refer to Specifications.
7. If pressure test gauge readings are not within acceptable gauge reading limits, replace radiator pressure cap.

Cooling System Hoses and Clamps Check

1. Inspect cooling system hoses and clamped hose connections for leaks and / or excessive deterioration. Service or replace as required.
2. Inspect radiator core and tanks for leaks. Service or replace as required.
3. Inspect cooling system hose routing to ensure sufficient clearance to engine compartment components. Reposition hoses if required.
4. Check radiator supports and brackets for firm radiator assembly retention. Correct as required. The radiator is installed with rubber isolation mounts.

Coolant Level Maintenance

Check coolant level in the coolant recovery reservoir at least once a month.

With cold engine, the level must be maintained at or above the FULL COLD mark. At normal engine operating temperature, the coolant level should be at the FULL HOT mark. If coolant level in the reservoir is below specified levels, a 50/50 mixture of Premium Cooling System Fluid E2FZ-19549-AA (ESE-M97B44-A and ESE-M97B43-A) (in Canada, Motorcraft CXC-8-B coolant) or equivalent and water should be added to the reservoir to the specified levels.

If the reservoir is low, add the specified 50/50 coolant mixture to the recovery reservoir. Check the coolant level again after one or two occasions of vehicle use.

Coolant Condition Check

Remove radiator pressure cap following outlined precautions. Check coolant for dirty or rusty appearance.

If coolant is not dirty or rusty in appearance, check level and concentration as outlined in the following procedures.

If coolant is dirty or rusty in appearance, proceed to the cooling system drain, flush and refill procedures.

INSPECTION (Continued)**Coolant Concentration Check****Tools Required:**

- Rotunda Battery Anti-Freeze Tester 021-00046

(Not Required when Coolant Is Replaced)

Check coolant concentration for recommended protection level using Rotunda Battery Anti-Freeze Tester 021-00046 or equivalent. If concentration is low, partially drain the system and add 100 percent coolant such as Premium Cooling System Fluid E2FZ-19549-AA (ESE-M97B44-A and ESE-M97B43-A) or equivalent to obtain the recommended protection level.

Radiator Removed

CAUTION: Radiator internal pressure must not exceed 138 kPa (20 psi). Damage may result.

1. Back-flush radiator. Ensure radiator pressure cap is in position. Turn radiator upside down. Position a high-pressure water hose in bottom hose location and back-flush.
2. Remove thermostat housing and thermostat. Refer to Thermostat Removal.
3. Back-flush engine. Position high-pressure hose into engine through thermostat location and back-flush engine.

Coolant Drain Procedure

With the engine off and sufficiently cool, place heater temperature control at the maximum heat position, remove radiator pressure cap, open draincock and allow coolant to drain. A 9.5mm (3/8-inch) hose should be attached to the draincock to direct coolant into a suitable container.

Coolant System Flush Procedure**Radiator Installed**

1. Drain cooling system as outlined.
2. Install block drain plug, if removed, and close radiator draincock.
3. Fill system with water at radiator filler neck.
4. Idle engine for 3 to 5 minutes.
5. Turn engine OFF and drain water by opening draincock.
6. Repeat Steps 1 through 5 as many times as necessary until nearly clear water is drained from radiator.
7. Allow remaining water to drain, then close draincock.
8. Disconnect overflow hose from radiator filler neck connection.
9. Remove coolant recovery reservoir from fender apron and empty fluid. Flush reservoir with clean water, drain and install reservoir and overflow hose and clamp to radiator filler neck.

Coolant Refill Procedure

With the entire cooling system drained, the following procedure should be used to ensure a complete fill.

NOTE: It is important to maintain engine coolant concentration between 40 percent -24°C (-11°F) and 60 percent -52°C (-62°F) depending on climate conditions. Below 40 percent there is a loss of freeze protection. Above 60 percent the engine may overheat on a warm day. Outside this range protection against rust and corrosion may be greatly reduced. Refer to the Owner Guide for specified coolant.

1. Install block drain plug, if removed, and close draincock. With engine off, add a 50/50 mixture of coolant and water to the bottom of the radiator filler as coolant in radiator filler neck seat. Wait approximately five minutes, as coolant in radiator will drop. Slowly add more coolant until level remains at the filler neck seat. Refer to Specifications for refill capacities. Then, add water until it reaches the radiator filler neck seat.
2. Install radiator pressure cap to first notch to keep spillage to a minimum.
3. Start and idle engine until upper radiator hose is warm. (This indicates thermostat is open and coolant is flowing through entire system).
4. Remove cap carefully and top off radiator with water.
5. Install cap on radiator securely.
6. Fill coolant recovery reservoir to FULL COLD mark with specified 50/50 coolant mixture, then add water to FULL HOT mark. This will ensure a proper mixture in coolant recovery reservoir.

SPECIFICATIONS

COOLING SPECIFICATIONS

Vehicle	Engine	Trans.	Cooling System	Capacity ¹	
				Liters	Quarts
Taurus/Sable	3.0L Sedan	ALL	ALL	10.4	11.0
Taurus/Sable	3.0L Wagon	ALL	A/C	11.2	11.8
Taurus/Sable	3.8L	ALL	ALL	11.5	12.1
Taurus SHO	3.0L/3.2L SHO	MTX IV	A/C	10.98	11.6

Listed Capacities include heater and coolant reservoir filled to add mark.

Service refill recommendations are 50/50 mixture of water and coolant. Use coolant meeting Ford specification ESE-M97B44-A and ESE-M97B43-A, such as Premium Cooling System Fluid E2FZ-19549-AA.

All figures shown are actual, but may vary ± 15 percent due to system variations.

CAP PRESSURE SPECIFICATIONS

Specified Cap Pressure PSI	Lower Limit PSI (Must Maintain)	Upper Limit PSI (Must Relieve)
16	15	18

TORQUE SPECIFICATIONS—3.0L ENGINE

Description	N-m	Lb-Ft
Water Outlet Connection Bolts	8-12	71-106 (Lb-In)
Water Pump Retaining Bolts (M6)	8-12	71-106 (Lb-In)
Water Pump Retaining Bolts (M8)	20-30	15-22
Automatic Belt Tensioner Nuts/Bolt	48	35
Water Pump Pulley Bolt	20-30	15-22
Oil Cooler	15-19	12-14
RH Support Bracket	12-24	9-17
Thermostat	12	9
Shroud Nuts	8-12	71-106 (Lb-In)
Shroud Bolts	4	36 (Lb-In)
Fan Screws	11-14	97-123 (Lb-In)
Hose Clamps	2.3-3.4	20-30 (Lb-In)
Radiator Support	17-27	13-19
Cooling Fan Resistor	5.2-6.8	46-60 (Lb-In)
Intermediate Transmission Oil Cooler Fitting	24.5-31.2	33-44

TORQUE SPECIFICATIONS—3.0L/3.2L SHO ENGINE

Description	N-m	Lb-Ft
Water Outlet Connection Bolts	15-23	12-16
Water Pump Retaining Bolts (M6)	15-23	12-16
Water Inlet Retaining Bolts	15-23	12-16
Clamps	2.3-3.4	20-30 (Lb-In)
Crankshaft Pulley Bolt	152-172	113-126
Wheel Lug Nuts	115-142	85-106
LH and RH Support Bracket	12-24	9-17
Oil Cooler	15-19	12-14
Shroud 3.0L	4	36 (Lb-In)
Fan Screws	10	86 (Lb-In)
Intermediate Transmission Oil Cooler Fitting	24.5-31.2	33-42
Shroud Bolt (3.2L)	8-11.5	6-8.5
Shroud Nut (3.2L)	2.5-3.5	2-2.6

TORQUE SPECIFICATIONS—3.8L ENGINE

Description	N-m	Lb-Ft
Water Outlet Connection Bolts	20-30	15-22
Water Pump Retaining Bolts (M8)	20-30	15-22
Water Pump Inlet Tube Bolt	10	7
Water Pump Pulley Bolts	21	16
Generator Center Bolt	40-61	30-45
Generator Lower Bolt and Nut	61-71	45-52

(Continued)

¹ Includes 1/2 liter (1/2 quart) in overflow reservoir.

SPECIFICATIONS (Continued)**TORQUE SPECIFICATIONS—3.8L ENGINE (Cont'd)**

Description	N-m	Lb-Ft
Outlet Tank Retaining Bolts	9-13	80-115 (Lb-In)
Radiator Support	17-27	13-19
LH and RH Support Bracket	12-24	9-17
Shroud	4	36 (Lb-In)
Fan Screws	10	86 (Lb-In)
Oil Cooler	15-19	12-14
Intermediate Transmission Oil Cooler Fitting	24.5-31.2	33-42

SPECIAL SERVICE TOOLS AND EQUIPMENT

- No. 200 Crimp Clamp. The Barbee Company, P.O. Box 323, Louisville, Kentucky 40201.
- No. 23151 Stainless Steel Wire Brush. The Milwaukee Brush Manufacturing Co., P.O. Box 830, Menomonee Falls, Wisconsin 53051.

- Heat Lamp and Socket, 375 watt.
- Sandpaper or Emery Paper 80 or 100 grit.
- Methylene Chloride Solvent.
- Mixing Card.
- Spatulas, Wood.
- Epoxi-Patch Kit No. 6C Aluminum. Hysol Division of the Dexter Corporation, Olean, New York 14760.
- O.T.C. Line Disconnect Tool T82L-9500-AH.
- Tool BT-8260 and 8260-A Radiator Tank Remover and Replacer. Borroughs Tool and Equipment Corporation, 2429 North Burdick St., Kalamazoo, Michigan 49007.
- Hazet 798-10 Constant Tension Clamp Tool: IMS/WINZER 10560 Markinson Rd. Dallas, TX 75238 1-800-527-4126

ROTUNDA EQUIPMENT

Model	Description
021-00012	Radiator/Heater Core Pressure Tester
021-00046	Battery Anti-Freeze Tester