

EG1-238

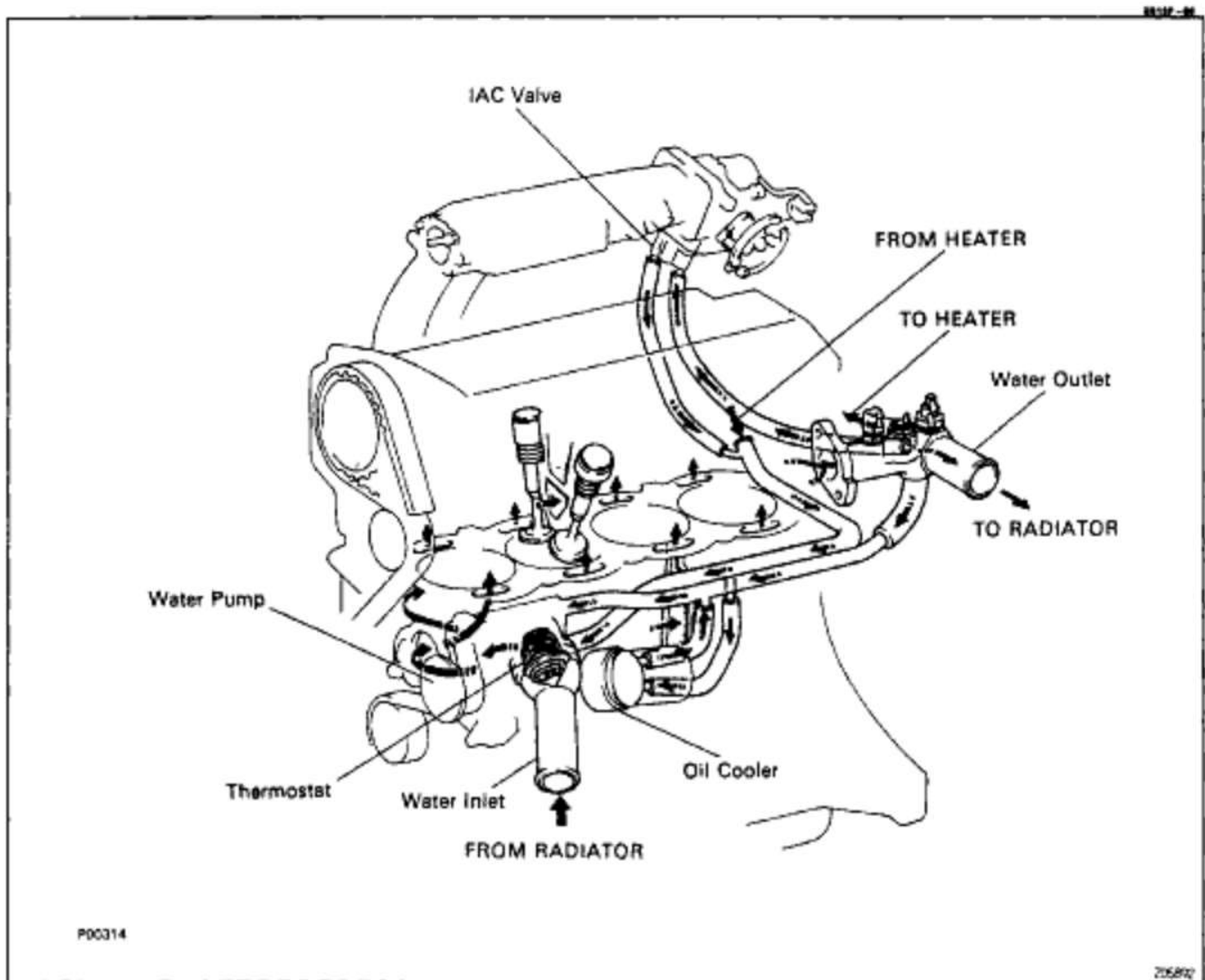
5S-FE ENGINE - COOLING SYSTEM

COOLING SYSTEM

DESCRIPTION

This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a bypass valve mounted on the inlet side.

OPERATION



The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.

Engine coolant which is heated in the water jacket is pumped to the radiator, through which an electric fan blows air to cool the coolant as it passes through. Engine coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.

The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders and combustion chambers which become heated during engine operation.

RADIATOR

The radiator performs the function of cooling the coolant which has passed through the water jacket and become hot, and it is mounted in the front of the vehicle. The radiator consists of an upper tank and lower tank, and a core which connects the two tanks. The upper tank contains the inlet for coolant from the water jacket and the filler inlet. It also has a hose attached through which excess coolant or steam can flow. The lower tank has an outlet and drain cock for the coolant. The core contains many tubes through which coolant flows from the upper tank to the lower tank as well as to cooling fins which radiate heat away from the coolant in the tubes. The air sucked through the radiator by the electric fan, as well as the wind generated by the vehicle's travel, passes through the radiator, cooling the coolant. Models with automatic transmission include an automatic transmission fluid cooler built into the lower tank of the radiator. A fan with an electric motor is mounted behind the radiator to assist the flow of air through the radiator. The fan operates when the engine coolant temperature becomes high in order to prevent it from becoming too high.

RADIATOR CAP

The radiator cap is a pressure type cap which seals the radiator, resulting in pressurization of the radiator as the coolant expands. The pressurization prevents the coolant from boiling even when the engine coolant temperature exceeds 100°C (212°F). A relief valve (pressurization valve) and a vacuum valve (negative pressure valve) are built into the radiator cap. The relief valve opens and lets steam escape through the overflow pipe when the pressure generated inside the cooling system exceeds the limit (coolant temperature: 110–120°C (230–248°F), pressure; 58.8103.0 kpa (0.6–1.05 kgf/cm², 8.5–14.9 psi). The vacuum valve opens to alleviate the vacuum which develops in the cooling system after the engine is stopped and the engine coolant temperature drops. The valve's opening allows the coolant in the reservoir tank to return to the cooling system.

RESERVOIR TANK

The reservoir tank is used to catch coolant which overflows from the cooling system as a result of volumetric expansion when the coolant is heated. The coolant in the reservoir tank returns to the radiator when the coolant temperature drops, thus keeping the radiator full at all times and avoiding needless coolant loss.

Check the reservoir tank level to learn if the coolant needs to be replenished.

WATER PUMP

The water pump is used for forced circulation of coolant through the cooling system. It is mounted on the front of the cylinder block and driven by a timing belt.

THERMOSTAT



The thermostat has a wax type bypass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the engine coolant temperature. This valve closes when the engine coolant temperature drops, preventing the circulation of coolant through the engine and thus permitting the engine to warm up rapidly. The valve opens when the engine coolant temperature has risen, allowing the circulation of coolant. Wax inside the thermostat expands when heated and contracts when cooled. Heating the wax thus generates pressure which overpowers the force of the spring which keeps the valve closed, thus opening the valve. When the wax cools, its contraction allows the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 82°C (180°F).

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5S-FE ENGINE - COOLING SYSTEM


PREPARATION**SST (SPECIAL SERVICE TOOLS)**

SST-01

	09228-06500 Oil Filter Wrench	
	09230-01010 Radiator Service Tool Set	

RECOMMENDED TOOLS

SST-02

	09082-00050 TOYOTA Electrical Tester Set	
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EQUIPMENT

SST-03

Heater	Engine coolant temperature switch
Radiator cap tester	
Thermometer	Engine coolant temperature switch
Torque wrench	

COOLANT

SST-04

Item	Capacity	Classification
Engine coolant (w/ Heater)	6.3 liters (6.7 US qts, 5.5 Imp. qts)	Ethylene-glycol base

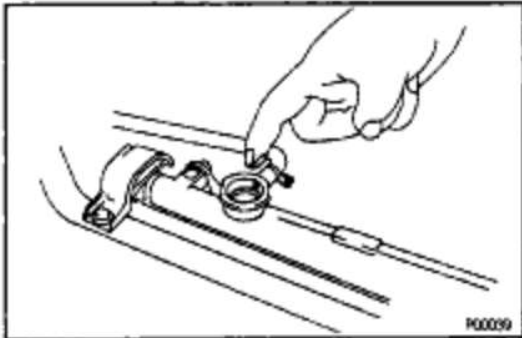


COOLANT CHECK AND REPLACEMENT

1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK

The engine coolant level should be between the "LOW" and "FULL" lines.

If low, check for leaks and add engine coolant up to the "FULL" line.



2. CHECK ENGINE COOLANT QUALITY

There should not be any excessive deposits of rust or scales around the radiator cap or radiator filler hole, and the engine coolant should be free from oil.

If excessively dirty, replace the engine coolant.

3. REPLACE ENGINE COOLANT

(a) Remove the radiator cap.

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(b) Drain the engine coolant from the radiator drain cock and engine drain plug. (Engine drain plug at the right rear of cylinder block.)

(c) Close the drain cock and plug.

Torque (Engine drain plug):

13 N-m (130 kgf-cm, 9 ft-lbf)

(d) Slowly fill the system with coolant.

Use a good brand of ethylene-glycol base coolant and mix it according to the manufacturer's directions.

Using engine coolant which includes more than 5096 ethylene-glycol (but not more than 7096) is recommended.

NOTICE:

- Do not use a alcohol type coolant.
- The engine coolant should be mixed with demineralized water or distilled water.

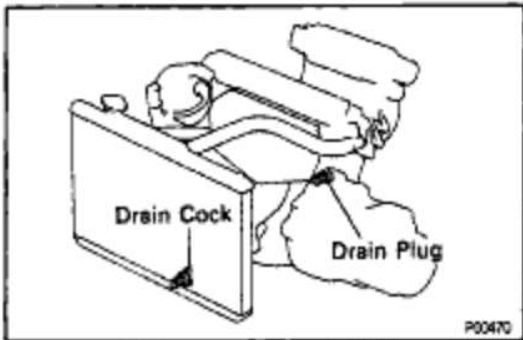
Capacity (w/ Heater):

8.3 liters (6.7 US qts, 5.5 Imp.qts)

(a) Reinstall the radiator cap.

(f) Warm up the engine and check for leaks.

(g) Recheck the engine coolant level and refill as necessary.

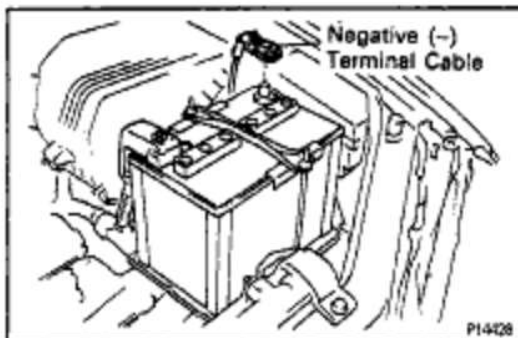
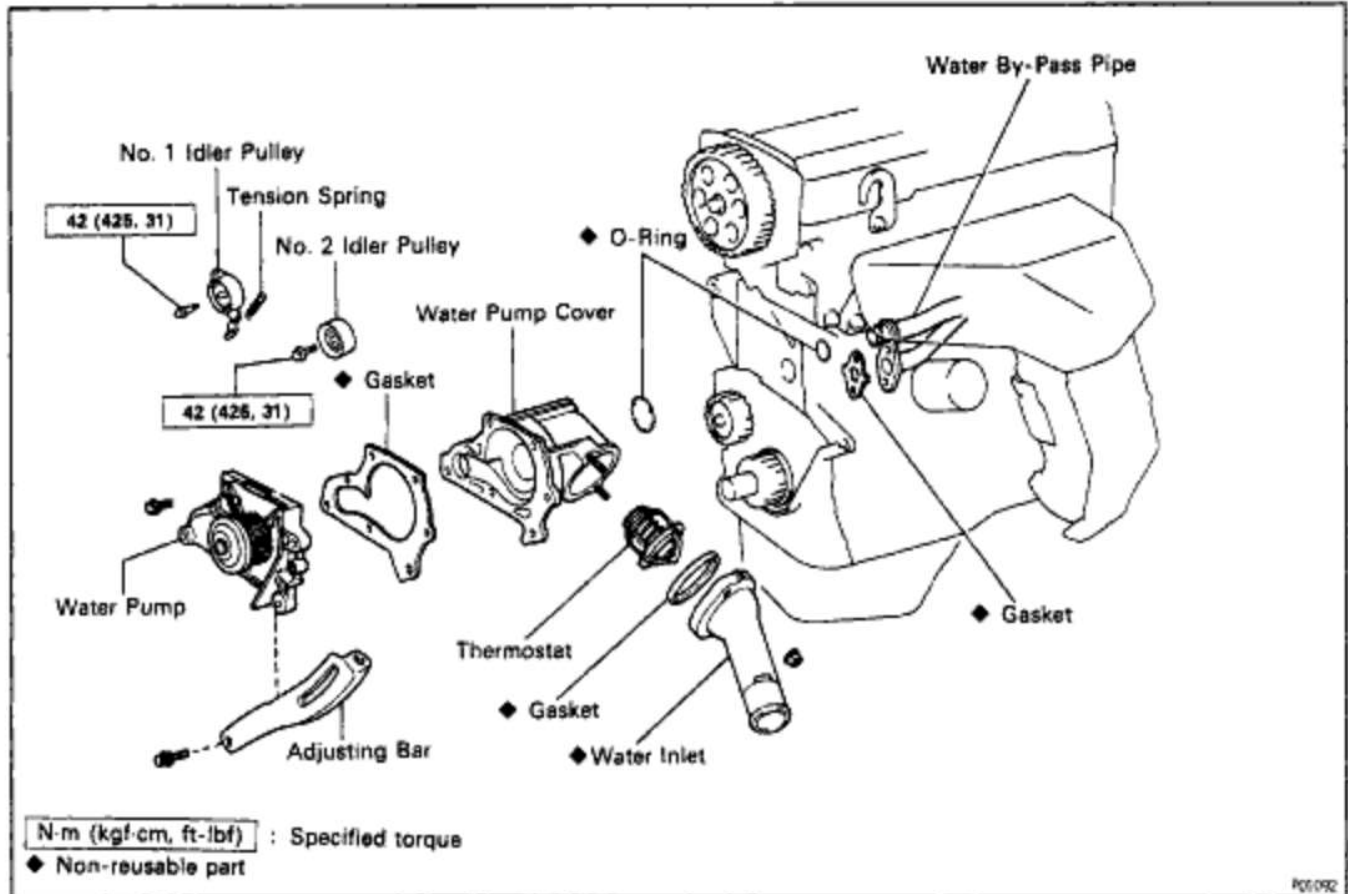


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5S-FE ENGINE - COOLING SYSTEM

WATER PUMP

COMPONENTS FOR REMOVAL AND INSTALLATION

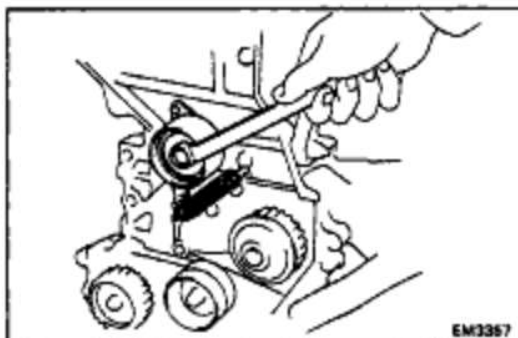


WATER PUMP REMOVAL

1. DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

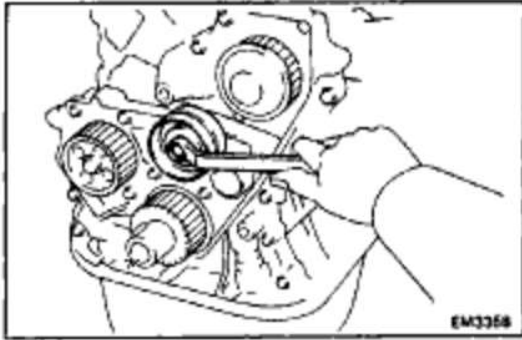
CAUTION: Work must be started after 90 seconds from the time the Ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.

2. DRAIN ENGINE COOLANT (See page [EG1-241](#))



3. REMOVE TIMING BELT (See page [EG1-26](#))
4. REMOVE NO. 1 IDLER PULLEY AND TENSION SPRING

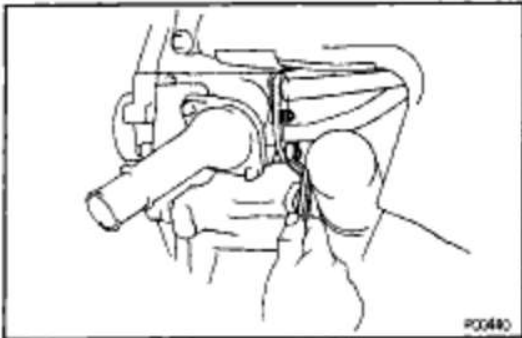
Remove the bolt, pulley and tension spring.

**5. REMOVE NO.2 IDLER PULLEY**

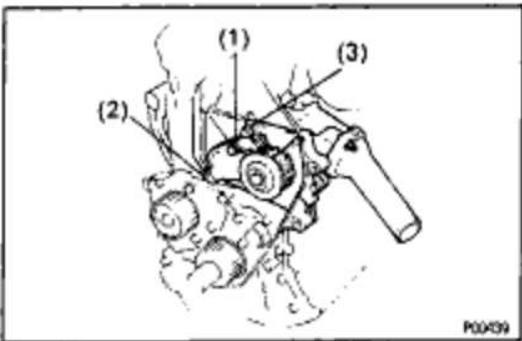
Remove the bolt and pulley.

6. DISCONNECT LOWER RADIATOR HOSE FROM WATER INLET**7. REMOVE GENERATOR BELT ADJUSTING BAR**

Remove the bolt and adjusting bar.

**8. REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY**

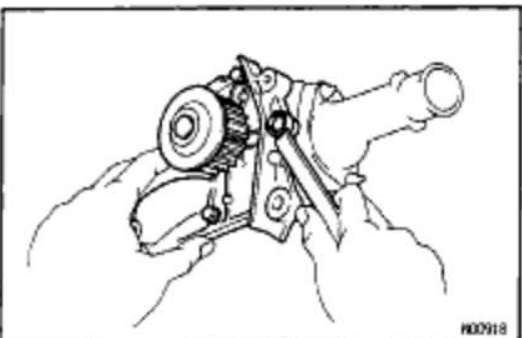
(a) Remove the 2 nuts holding the pump to the water bypass pipe.



(b) Remove the 3 bolts in the sequence shown.

(c) Pull out the water pump together with the water pump cover.

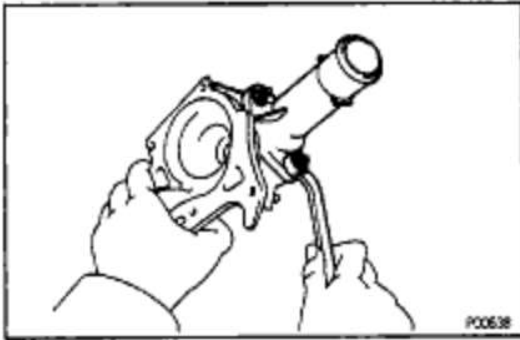
(d) Remove the gasket and 2 O-rings from the water pump and water bypass pipe.

**9. SEPARATE WATER PUMP AND WATER PUMP COVER**

Remove the 3 bolts, water pump and gasket from the water pump cover.

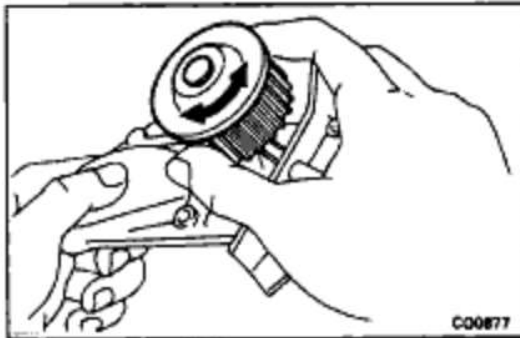
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5S-FE ENGINE - COOLING SYSTEM



10. REMOVE WATER INLET AND THERMOSTAT FROM WATER PUMP COVER

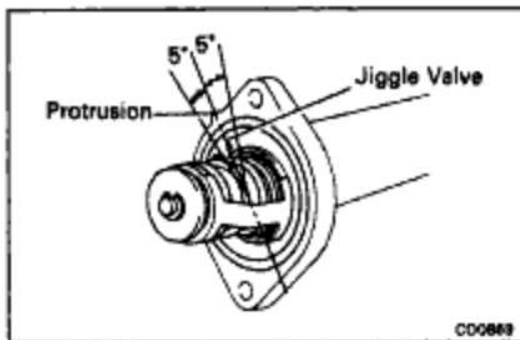
- (a) Remove the 2 nuts and water inlet from the water pump.
- (b) Remove the thermostat.
- (c) Remove the gasket from the thermostat.



WATER PUMP INSPECTION

INSPECT WATER PUMP

Turn the pulley and check that the water pump bearing moves smoothly and quietly.



WATER PUMP INSTALLATION

(See Components for Removal and Installation)

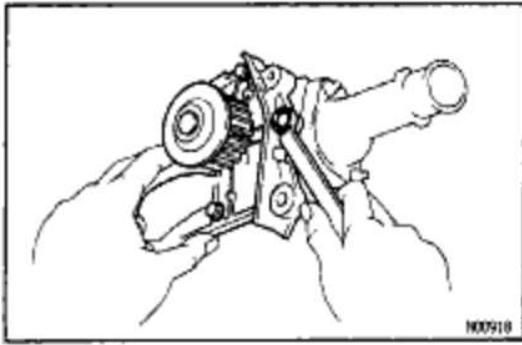
1. INSTALL THERMOSTAT AND WATER INLET TO WATER PUMP COVER

- (a) Install a new gasket to the thermostat.
- (b) Align the jiggle valve of the thermostat with the upper side of the stud bolt, and insert the thermostat in the water pump.

HINT: The jiggle valve may be set within 5° of either side of the prescribed position.



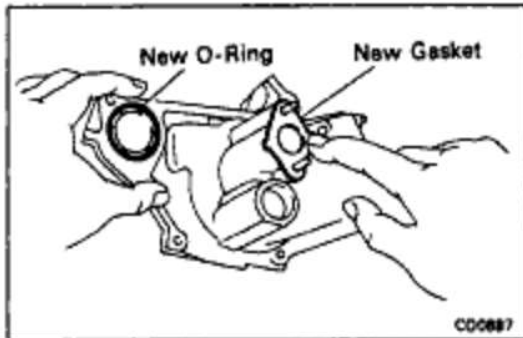
- (c) Install the water inlet with the 2 nuts.
Torque: 8.8 N-m (90 kgf-cm. 78 in.-lbf)



2. ASSEMBLE WATER PUMP AND WATER PUMP COVER

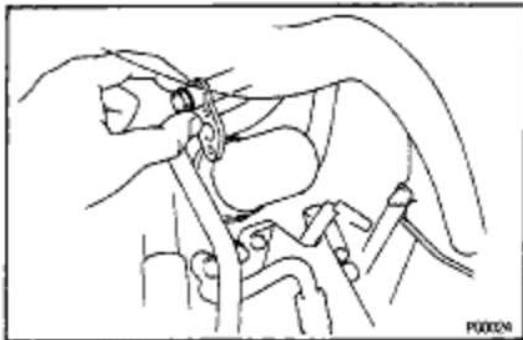
Install a new gasket and the water pump to the pump cover with the 3 bolts.

Torque: 9.3 N-m (95 kgf-cm, 82 in.-lbf)

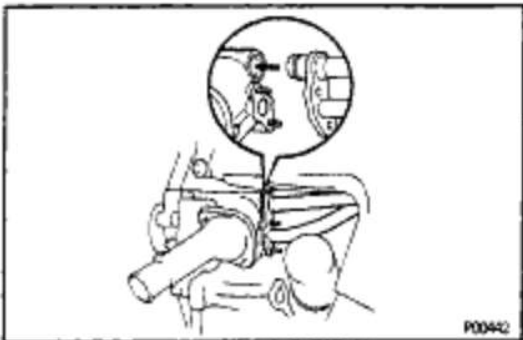


3. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Install new O-ring and gasket to water pump cover.

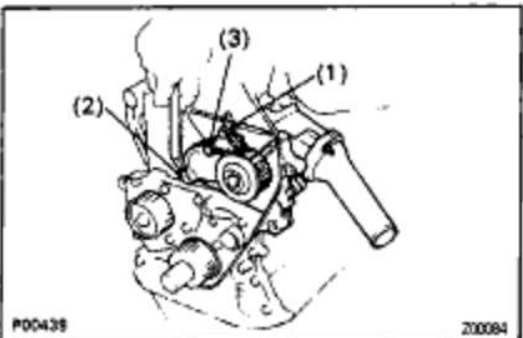


(b) Instal a new O-ring to the water bypass pipe.



(c) Apply soapy water to the O-ring on the water bypass pipe.

(d) Connect the pump cover to the water bypass pipe. Do not install the nuts yet.

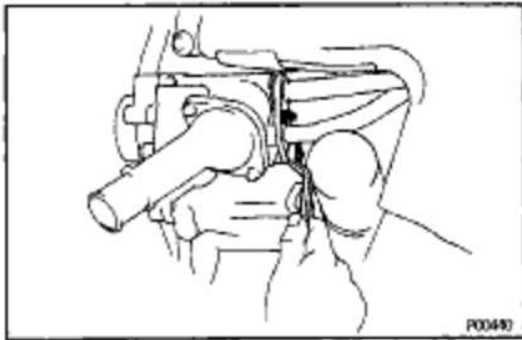


(e) Install the water pump with the 3 bolts. Tighten the bolts in the sequence shown.

Torque: 9.3 N-m (95 kgf-cm, 82 in.-lbf)

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(f) Install the 2 nuts holding the water pump cover to the water bypass pipe.

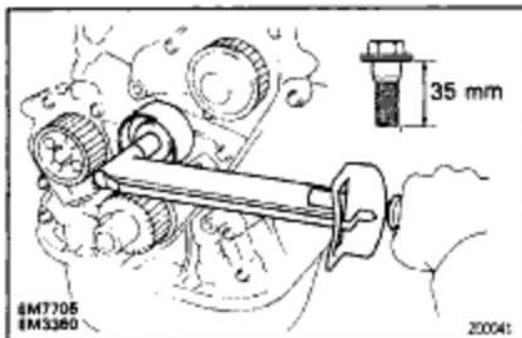
Torque: 8.8 N-m (90 kgf-cm, 78 in.-lbf)



4. INSTALL GENERATOR BELT ADJUSTING BAR

Temporarily install the adjusting bar with the bolt.

5. CONNECT LOWER RADIATOR HOSE TO WATER INLET



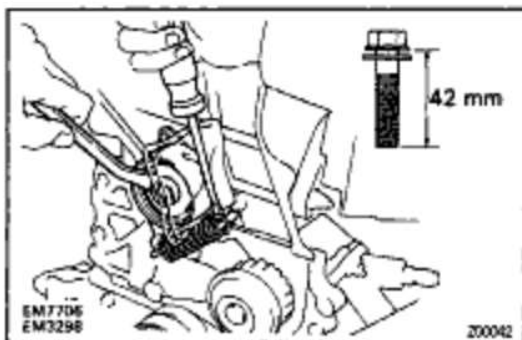
6. INSTALL NO.2 IDLER PULLEY

(a) Install the pulley with the bolt.

Torque: 42 N-m (425 kgf-cm, 31 ft-lbf)

HINT: Use a bolt 35 mm (1.38 in.) in length.

(b) Check that the idler pulley moves smoothly.



7. TEMPORARILY INSTALL NO.1 IDLER PULLEY AND TENSION SPRING

(a) Install the pulley with the bolt. Do not tighten the bolt yet.

HINT: Use bolt 42 mm (1.65 in.) in length.

(b) Install the tension spring.

(c) Pry the pulley toward the left as far as it will go and tighten the bolt.

(d) Check that the idler pulley moves smoothly.

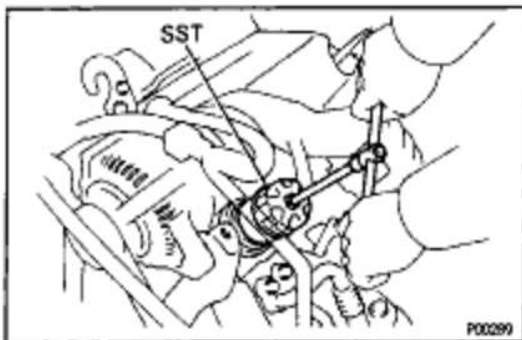
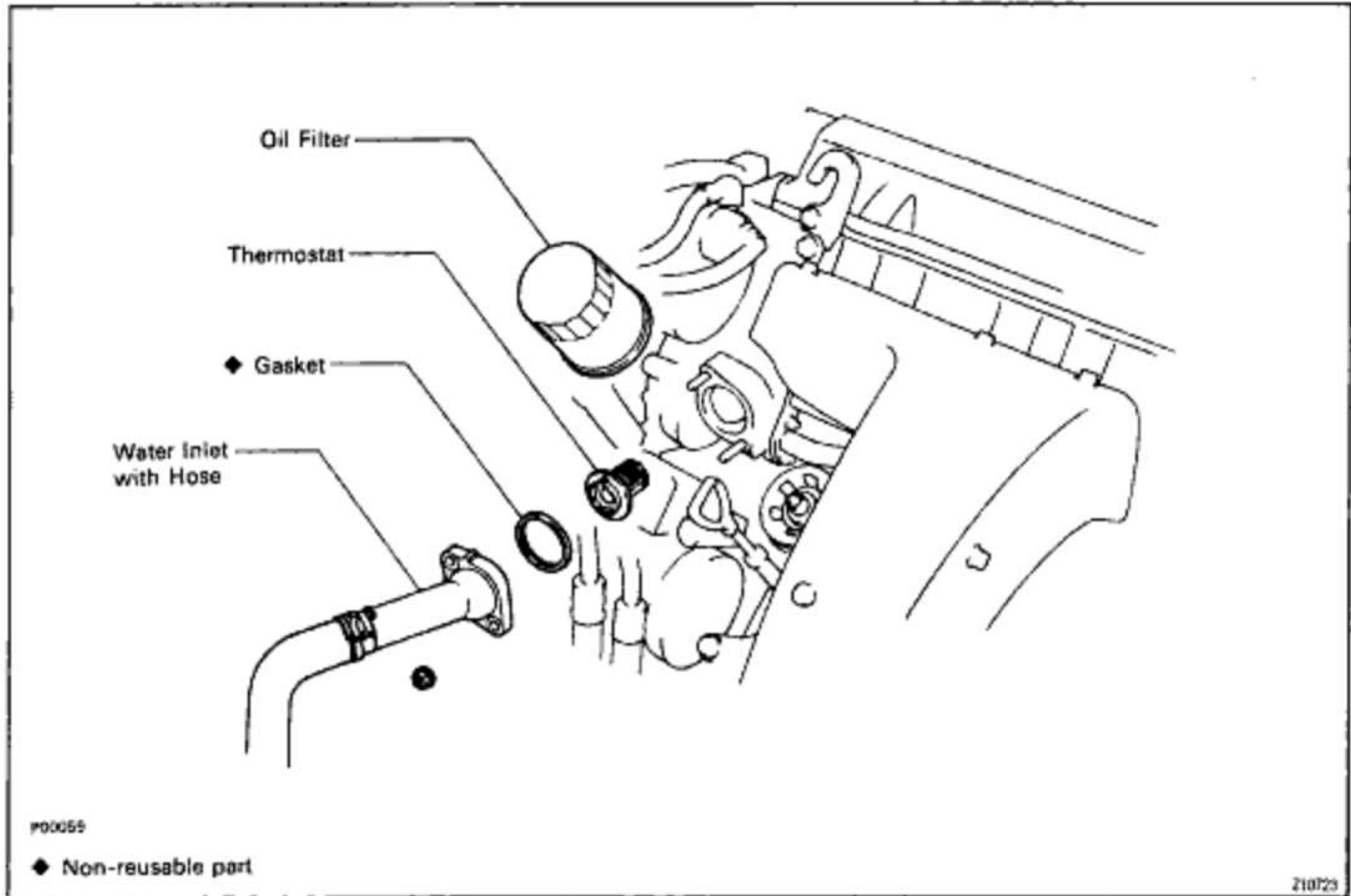
8. INSTALL TIMING BELT (See page EG1-33)

9. CONNECT NEGATIVE (-) TERMINAL CABLE TO BATTERY

10. FILL WITH ENGINE COOLANT

(See page EG1-241)

THERMOSTAT COMPONENTS FOR REMOVAL AND INSTALLATION



THERMOSTAT REMOVAL

HINT: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT (See page EG1-241)

2. REMOVE OIL FILTER

Using SST, remove the oil filter.

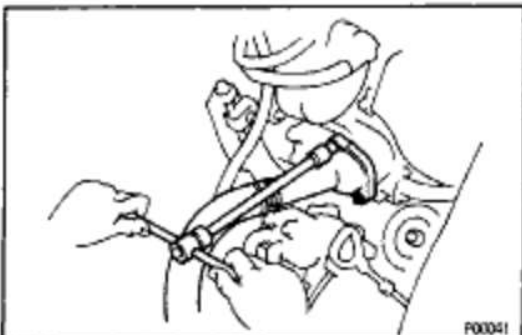
SST 09228-06500

3. REMOVE WATER INLET AND THERMOSTAT

(a) Remove the 2 nuts and water inlet from the water pump.

(b) Remove the thermostat.

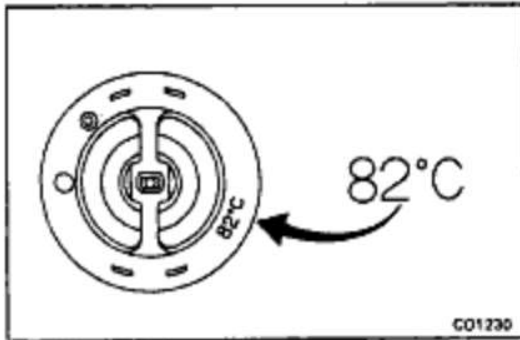
(c) Remove the gasket from the thermostat.



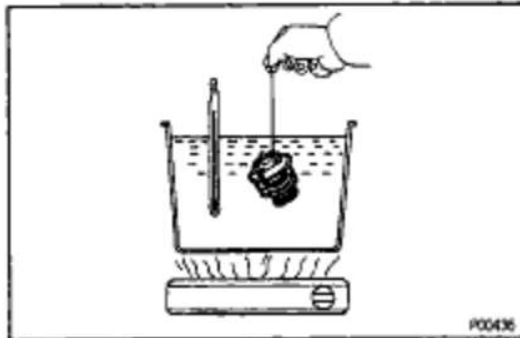
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5S-FE ENGINE - COOLING SYSTEM

8477-02

**THERMOSTAT INSPECTION****INSPECT THERMOSTAT**

HINT: The thermostat is numbered with the valve opening temperature.

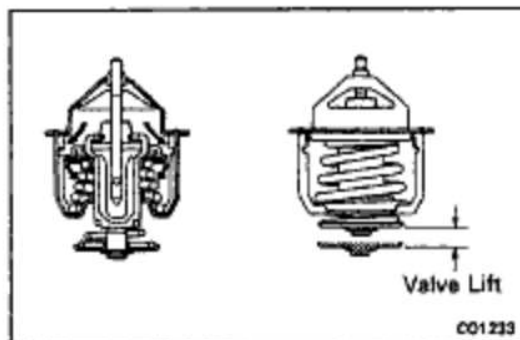


- (a) Immerse the thermostat in water and gradually heat the water.
- (b) Check the valve opening temperature.

Valve opening temperature:

80 – 84°C (176 – 183°F)

If the valve opening temperature is not as specified, replace the thermostat.



- (c) Check the valve lift.

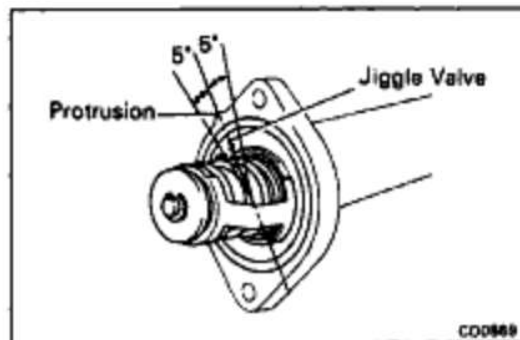
Valve lift:

8 mm (0.31 in.) or more at 95°C (203°F)

If the valve lift is not as specified, replace the thermostat.

- (d) Check that the valve spring is tight when the thermostat is fully closed.

If not closed, replace the thermostat.

**THERMOSTAT INSTALLATION**

(See Components for Removal and Installation)

1. PLACE THERMOSTAT IN WATER PUMP

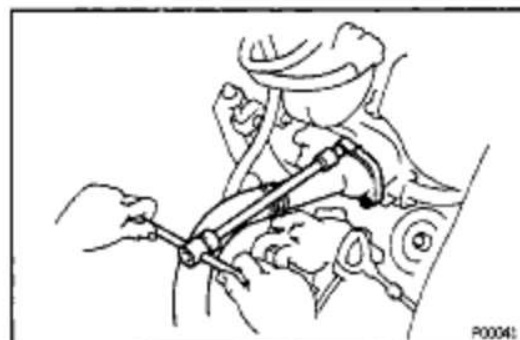
- (a) Install a new gasket to the thermostat.
- (b) Align the jiggle valve of the thermostat with the upper side of the stud bolt, and insert the thermostat in the water pump.

HINT: The jiggle valve may be set within 5° of either side of the prescribed position.

2. INSTALL WATER INLET

Install the water inlet with the 2 nuts.

Torque: 8.8 N·m (90 kgf·cm, 78in.-lbf)

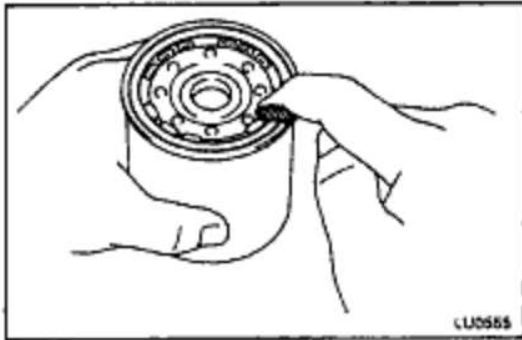


8477-02

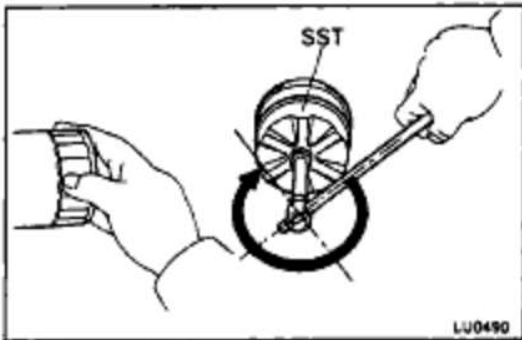


3. INSTALL OIL FILTER

(a) Clean the oil filter contact surface on the filter mounting.



(b) Lubricate the filter rubber gasket with engine oil.

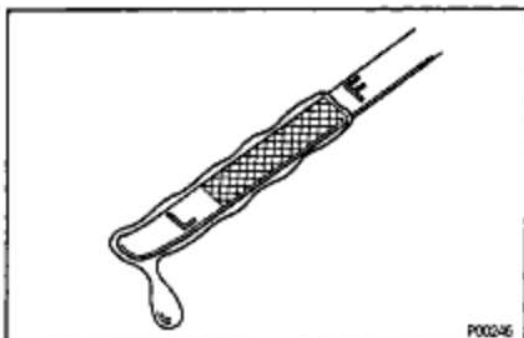


(c) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting. Then using SST, give it an additional 3/4 turn to seat the oil filter. SST 09228-06500

4. FILL WITH ENGINE OIL

5. FILL WITH ENGINE COOLANT (SEE PAGE [EG1-241](#))

6. START ENGINE AND CHECK FOR LEAKS



7. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.

If low, check for leakage and add oil up to "F" mark.

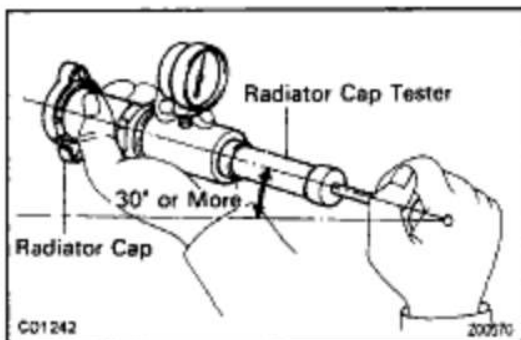
RADIATOR

RADIATOR CLEANING

S0074-01

Using water or a steam cleaner, remove any mud or dirt from the radiator core.

NOTICE: If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. If the cleaner nozzle pressure is 2,942 – 3,432 kPa (30 – 35 kgf/cm², 427 – 498 psi), keep a distance of at least 40 cm (15.75 in.) between the radiator core and cleaner nozzle.



S0075-01

RADIATOR INSPECTION

1. INSPECT RADIATOR CAP

NOTICE: When performing steps (a) and (b) below, keep the radiator pump tester at an angle of over 30° above the horizontal.

- (a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the relief valve.

Pump speed:

1 push/ 3 seconds or more

NOTICE: Push the pump at a constant speed.

If air is not coming from the relief valve, replace the radiator cap.

- (b) Pump the tester several times and measure the relief valve opening pressure.

Pump speed:

1 at time

1 push/1 second or less

2nd time or more

Any speed

Standard opening pressure:

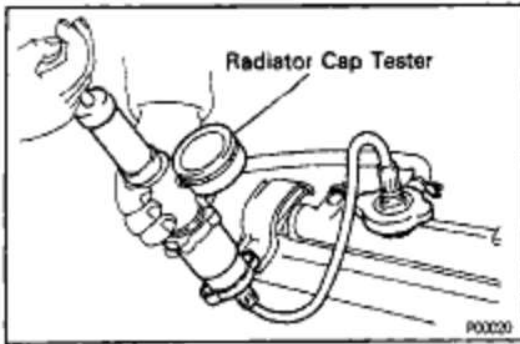
74–103 kPa

(0.75–1.05 kgf/cm², 10.7 – 14.9 psi)

Minimum opening pressure:

59 kPa (0.6 kgf/cm², 8.5 psi)

If the opening pressure is less than minimum, replace the radiator cap.

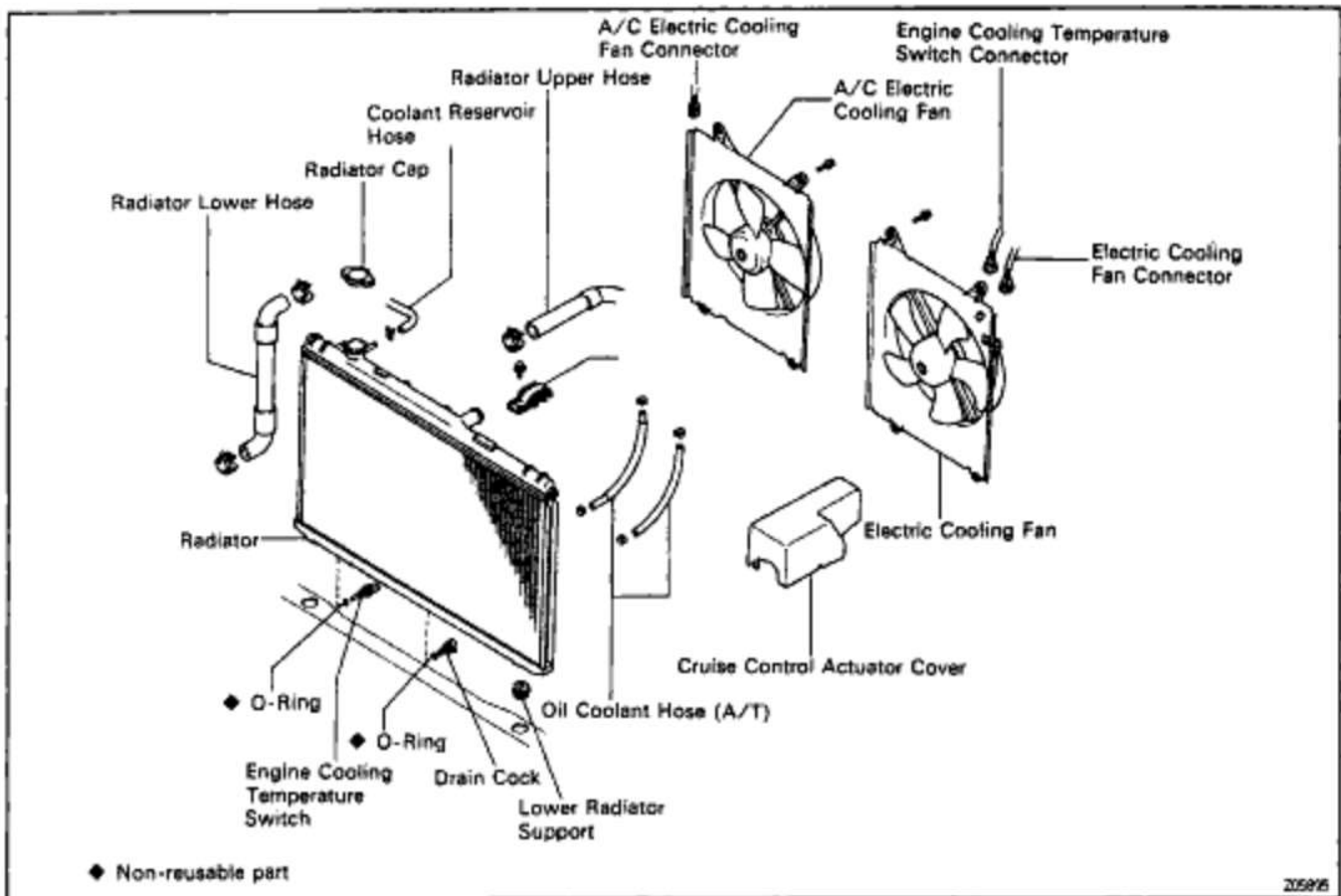


2. INSPECT COOLING SYSTEM FOR LEAKS

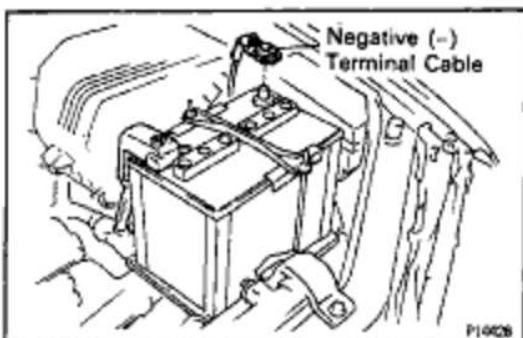
- Fill the radiator with coolant and attach a radiator cap tester.
- Warm up the engine.
- Pump it to 118 kPa (1.2 kgf/cm², 17.1 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

98108-01

COMPONENTS FOR REMOVAL AND INSTALLATION



98471-01



RADIATOR REMOVAL

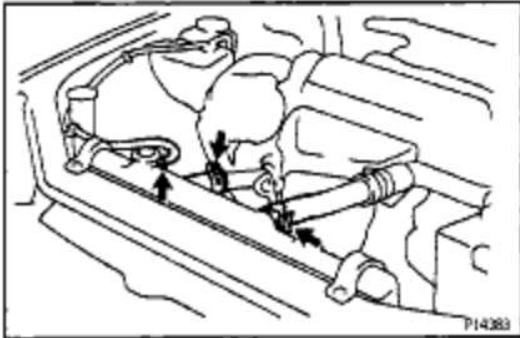
1. DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

CAUTION: Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.

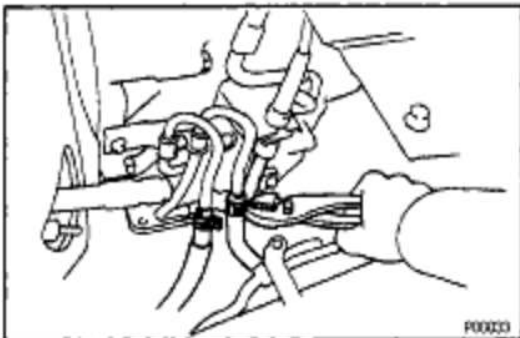
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5S-FE ENGINE - COOLING SYSTEM

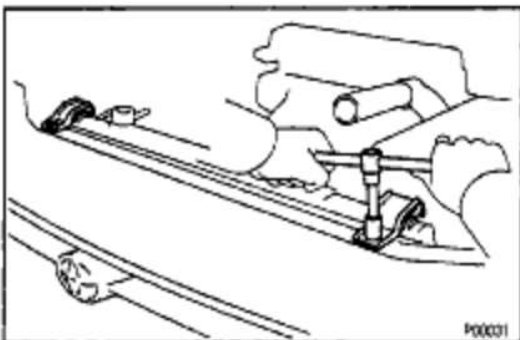
2. DRAIN ENGINE COOLANT (See page [EG1-241](#))
3. w/ CRUISE CONTROL SYSTEM:
REMOVE CRUISE CONTROL ACTUATOR COVER
4. DISCONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR FROM FAN SHROUD
5. DISCONNECT ELECTRIC COOLING FAN CONNECTORS



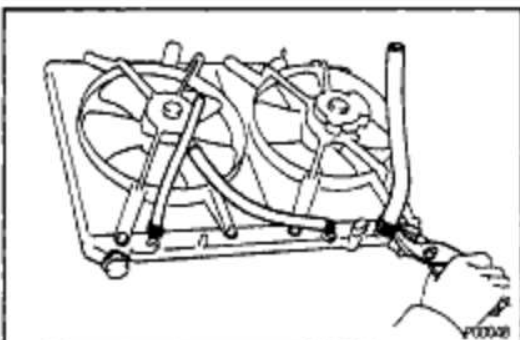
6. DISCONNECT RADIATOR HOSES
 - (a) Disconnect the upper hose from the radiator side.
 - (b) Disconnect the lower from the water inlet pipe.
7. DISCONNECT ENGINE COOLANT RESERVOIR HOSE



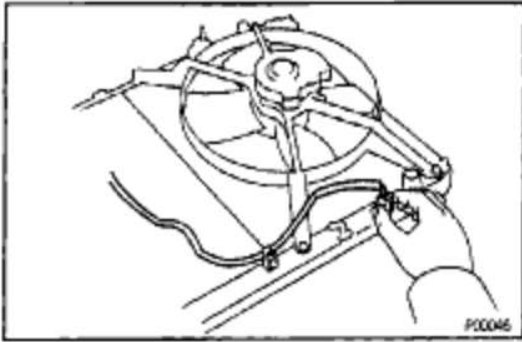
8. A/T:
DISCONNECT OIL COOLER HOSES



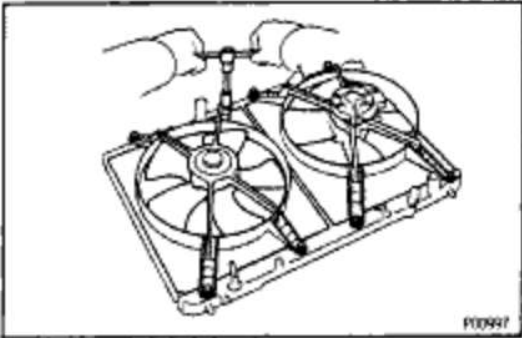
9. REMOVE RADIATOR AND ELECTRIC COOLING FANS
 - (a) Remove the 2 bolts and 2 upper supports.
 - (b) Lift out the radiator.
 - (c) Remove the 2 lower radiator supports.



10. REMOVE RADIATOR LOWER HOSE
11. A/T:
REMOVE A/T OIL COOLER HOSES

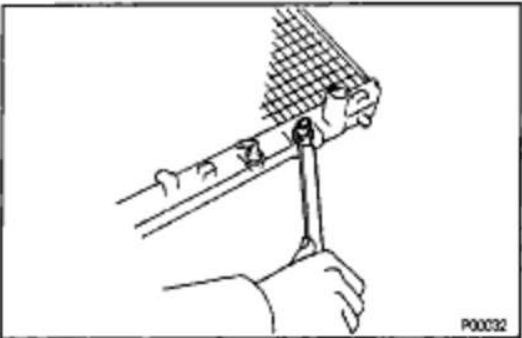


12. REMOVE ENGINE COOLANT TEMPERATURE SWITCH WIRE



13. REMOVE ELECTRIC COOLING FANS FROM RADIATOR

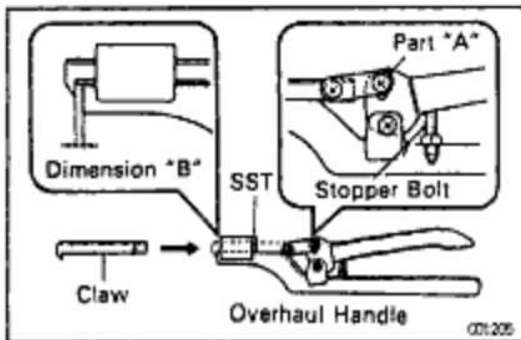
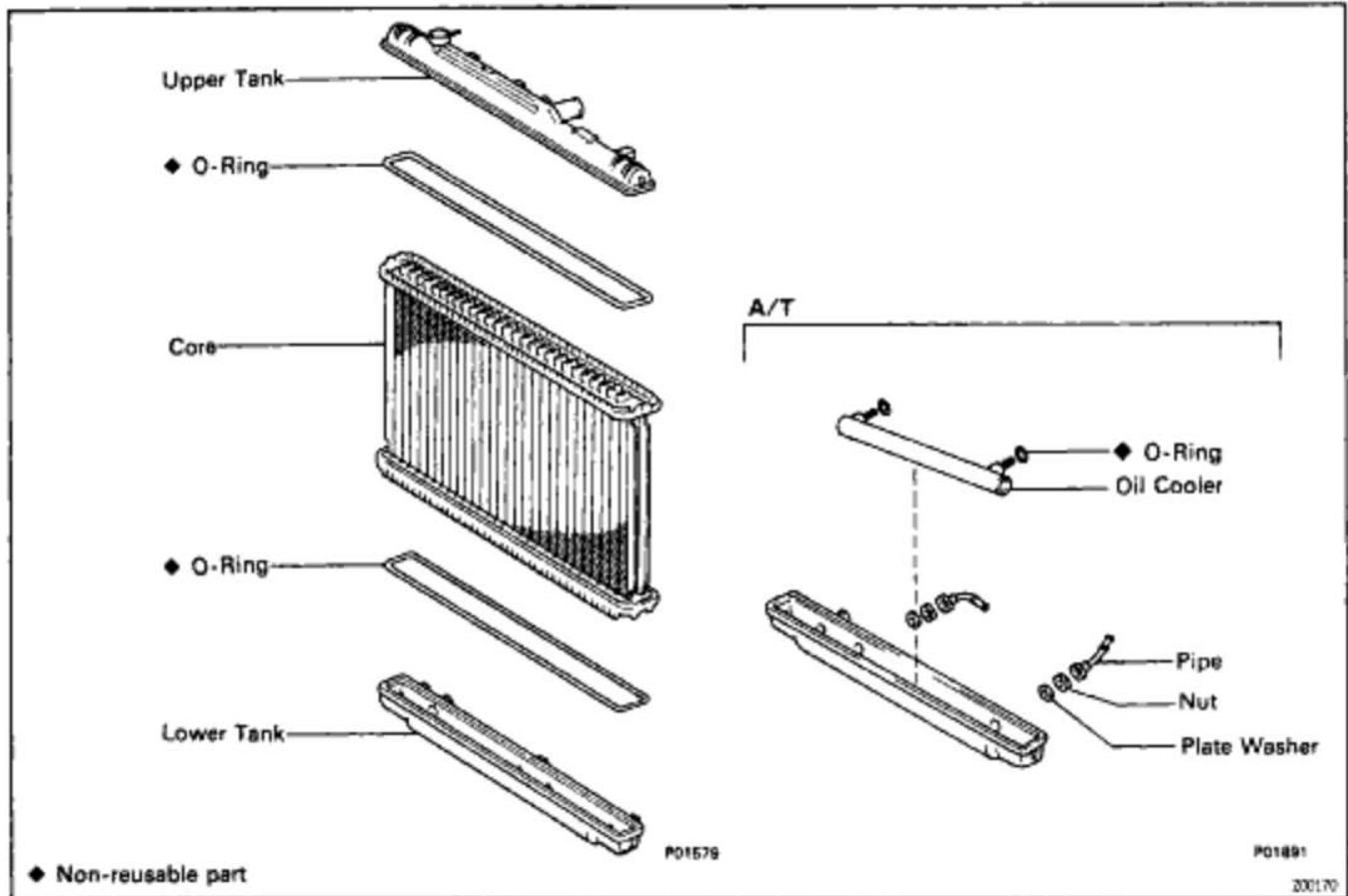
Remove the 8 bolts and cooling fans.



14. REMOVE ENGINE COOLANT TEMPERATURE SWITCH

- (a) Remove the engine coolant temperature switch.
- (b) Remove the O-ring.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY



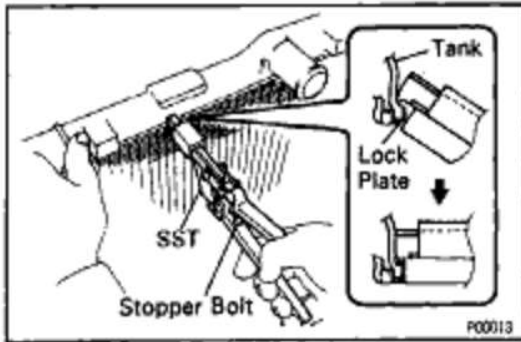
RADIATOR DISASSEMBLY

1. ASSEMBLE SST

SST 09230-01010

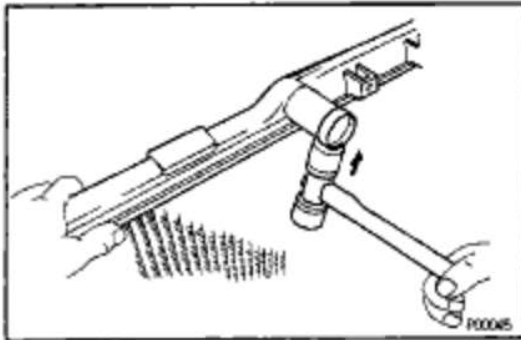
- (a) Install the claw to the overhaul handle, inserting it in the hole in part "A" as shown in the diagram.
- (b) While gripping the handle, adjust the stopper bolt so that dimension "B" shown in the diagram is 0.2–0.5 mm (0.008–0.020 in.).

NOTICE: If this adjustment is not performed, the claw may be damaged.



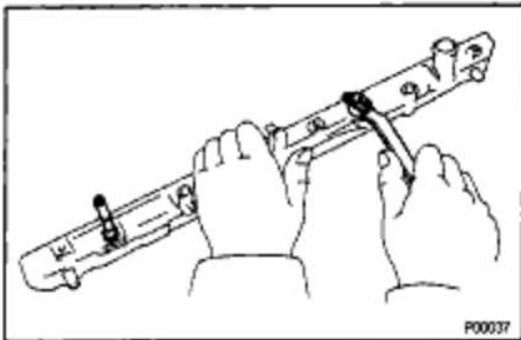
2. UNCAULK LOCK PLATES

Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.
SST 09230-01010



3. REMOVE TANKS AND O-RINGS

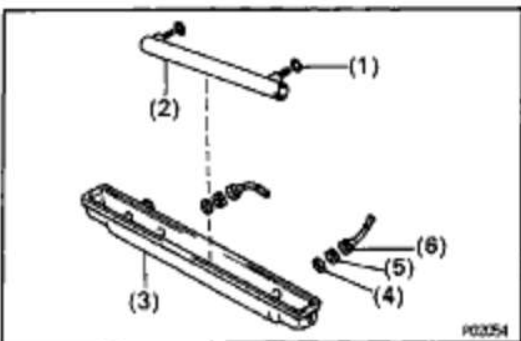
- Lightly tap the radiator hose inlet (or outlet) with a soft-faced hammer and remove the tank.
- Remove the O-ring.



4. A/T:

REMOVE OIL COOLER FROM LOWER TANK

- Remove the pipes.
- HINT: Make a note of the direction to face the pipes.
- Remove the nuts and plate washers.
 - Remove the oil cooler and O-rings.



RADIATOR ASSEMBLY

(See Components for Disassembly and Assembly)

1. A/T:

INSTALL OIL COOLER TO LOWER TANK

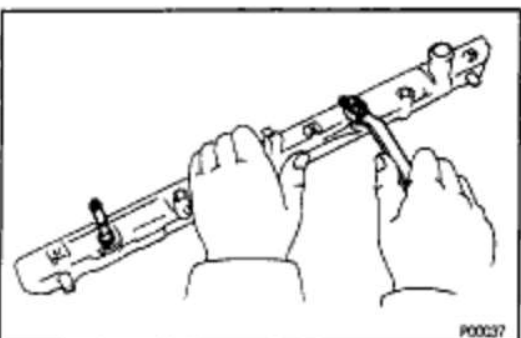
- Clean the O-ring contact surface of the lower tank and oil cooler.
- Install new O-rings (1) to the oil cooler (2).
- Install the oil cooler with the O-rings to the lower tank (3).
- Install the plate washers (4) and nuts (5). Torque the nuts.

Torque: 8.3 N-m (85 kgf-cm, 74 in.-lbf)

- Install the pipes (6).

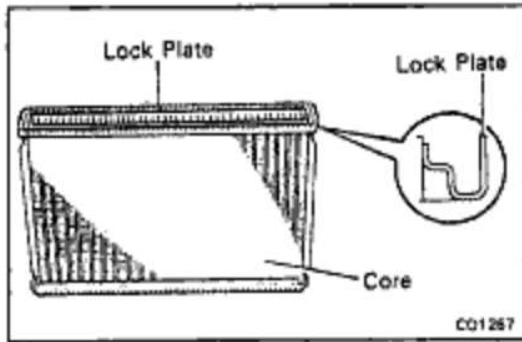
Torque: 22 N-m (220 kgf-cm, 16 ft-lbf)

HINT: Face the pipes in the same direction as before disassembly.



EG1-256

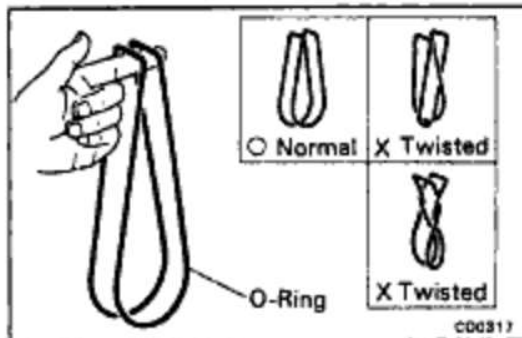
5S-FE ENGINE - COOLING SYSTEM

**2. INSPECT LOCK PLATE**

Inspect the lock plate for damage.

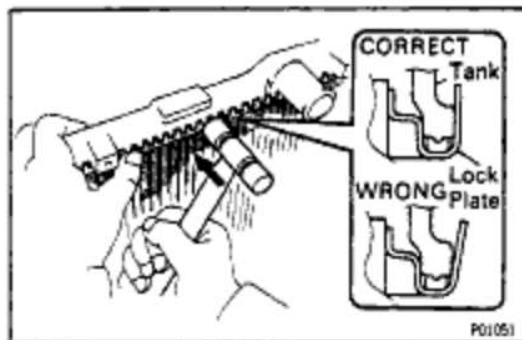
HINT:

- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible.
- Therefore, first correct any deformation with pliers or similar object. Water leakage will result if the bottom of the lock plate groove is damaged or dented. Therefore, repair or replace if necessary.

**3. INSTALL NEW O-RINGS AND TANKS**

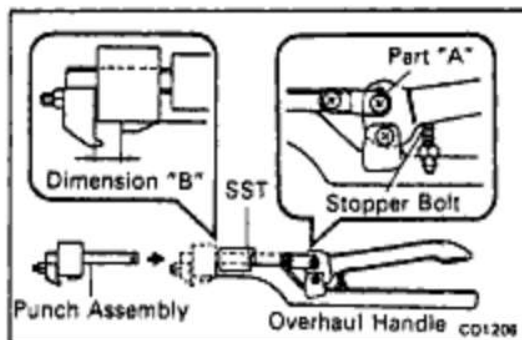
- (a) After checking that there are no foreign objects in the lock plate groove, install the new O-ring without twisting it.

HINT: When cleaning the lock plate groove, lightly rub it with sand paper without scratching it.



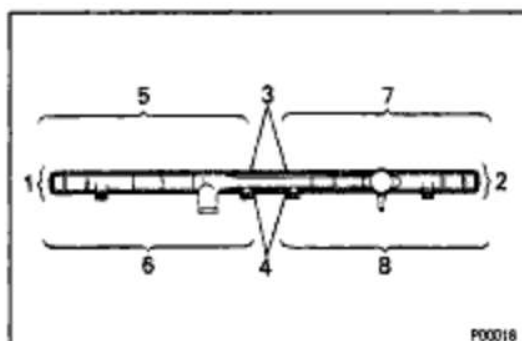
- (b) Install the tank without damaging the O-ring.

- (c) Tap the lock plate with a soft-faced hammer so that there is no gap between it and the tank.

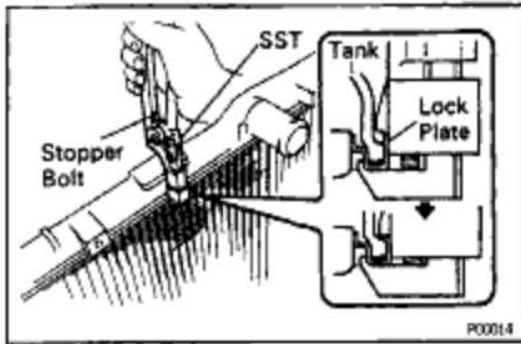
**4. ASSEMBLE SST**

SST 09230-01010

- (a) Install the punch assembly to the overhaul handle, inserting it in the hole in part "A" as shown in the illustration.
- (b) While gripping the handle, adjust the stopper bolt so that dimension "B" shown in the diagram is 7.7 mm (0.03 in.)

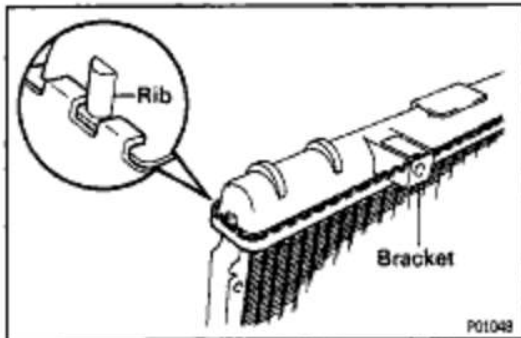
**5. CAULK LOCK PLATE**

- (a) Lightly press SST against the lock plate in the order shown in the illustration.



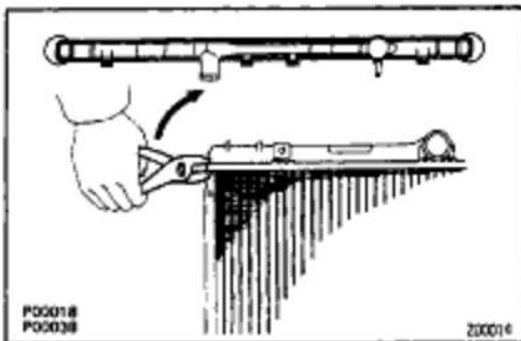
After repeating this a few times, fully caulk the lock plate by squeezing the handle until stopped by the stopper plate.

SST 09230 - 01010

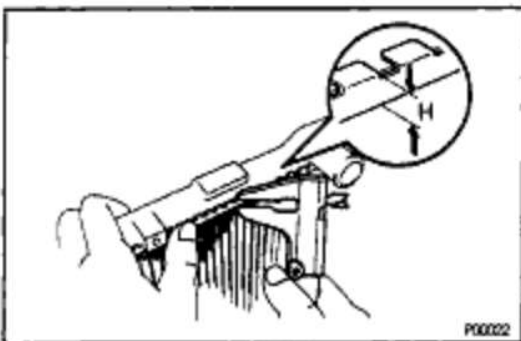


HINT:

- Do not stake the areas protruding around the pipes, brackets or tank ribs.



- The points shown in the illustration and oil cooler near here (A/T) cannot be staked with the SST. Use a plier or like object and be careful not to damage the core plates.

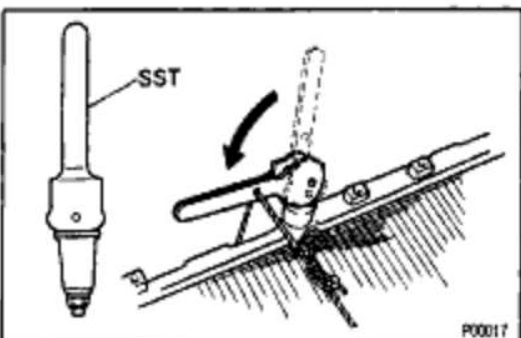


- (b) Check the lock plate height (H) after completing the caulking.

Plate height:

7.75–8.25 mm (0-3051–0.3248 in.)

If not within the specified height, adjust the stopper bolt of the handle again and perform the caulking again.



6. INSPECT FOR WATER LEAKS

- (a) Tighten the drain cock.
- (b) Plug the inlet and outlet pipes of the radiator with SST.

SST 09230 - 01010

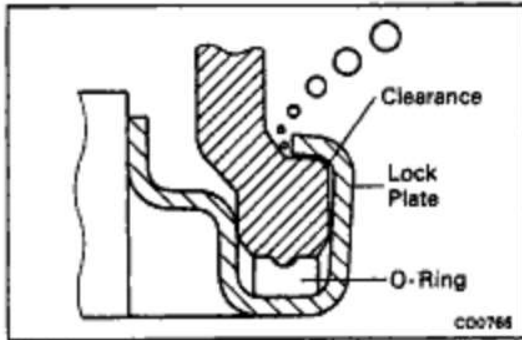
- (c) Using a radiator cap tester, apply pressure to the radiator.

Test pressure:

177 kPa (1.8 kgf/cm², 26 psi)

EG1-258

5S-FE ENGINE - COOLING SYSTEM



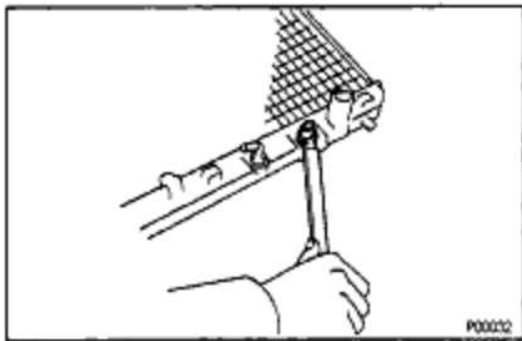
(d) Inspect for water leaks.

HINT: On radiators with resin tanks, there is a clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water.

Therefore, before performing the water leak test, first switch the radiator around in the water until all air bubbles disappear.

7. PAINT LOCK PLATES

HINT: If the water leak test checks out okay, allow the radiator to completely dry and then paint the lock plates.

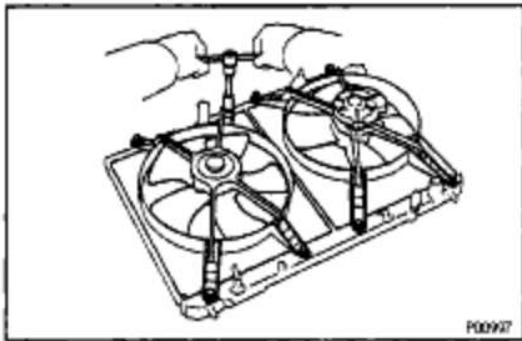


RADIATOR INSTALLATION

(See Components for Removal and installation)

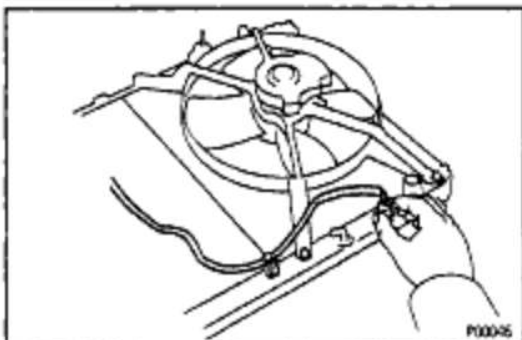
1. INSTALL ENGINE COOLANT TEMPERATURE SWITCH

- (a) Install a new O-ring to the engine coolant temperature switch.
- (b) Install the engine coolant temperature switch.

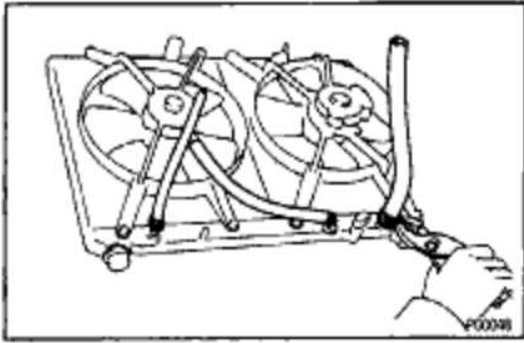


2. INSTALL ELECTRIC COOLING FANS TO RADIATOR

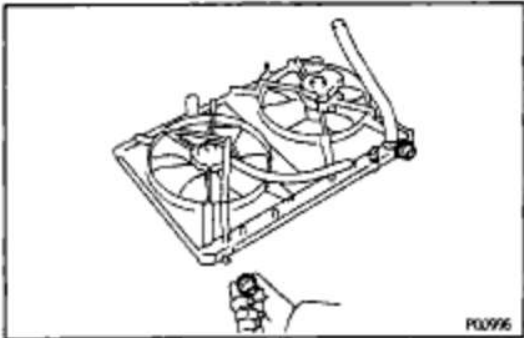
Install the cooling fans with the 8 bolts.



3. INSTALL ENGINE COOLANT TEMPERATURE SWITCH WIRE

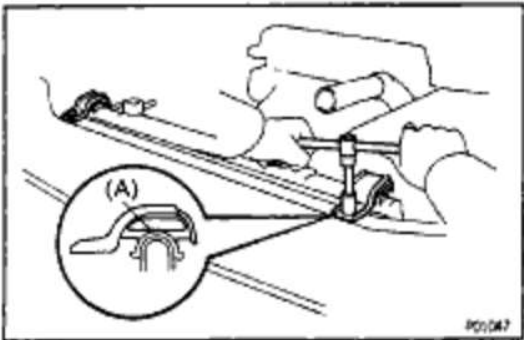


4. A/T:
 INSTALL A/T OIL COOLER HOSES
 5. INSTALL RADIATOR LOWER HOSE



6. INSTALL RADIATOR AND ELECTRIC COOLING FANS

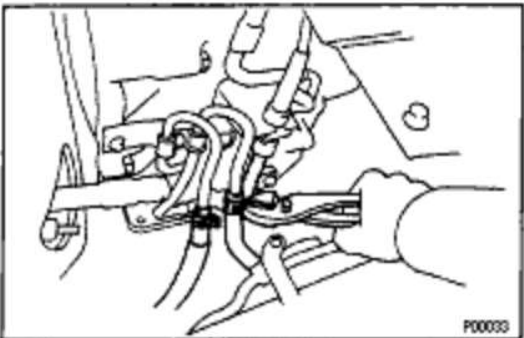
- (a) Place the 2 lower radiator supports in position on the body.



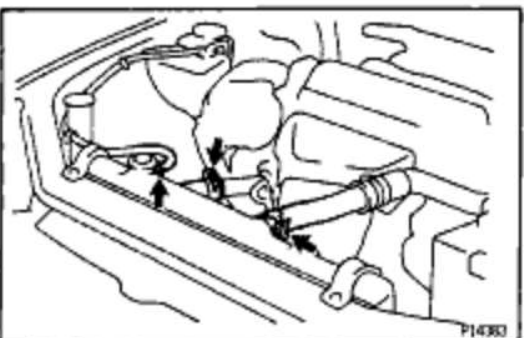
- (b) Place the radiator in position, and install the 2 upper supports with the 2 bolts.

HINT: After installation, check that the rubber cushion (A) of the support is not depressed.

Torque: 13 N-m (130 kgf-cm, 9 ft-lbf)



7. A/T:
 CONNECT OIL COOLER HOSES



8. CONNECT ENGINE COOLANT RESERVOIR HOSE
 9. CONNECT RADIATOR HOSES

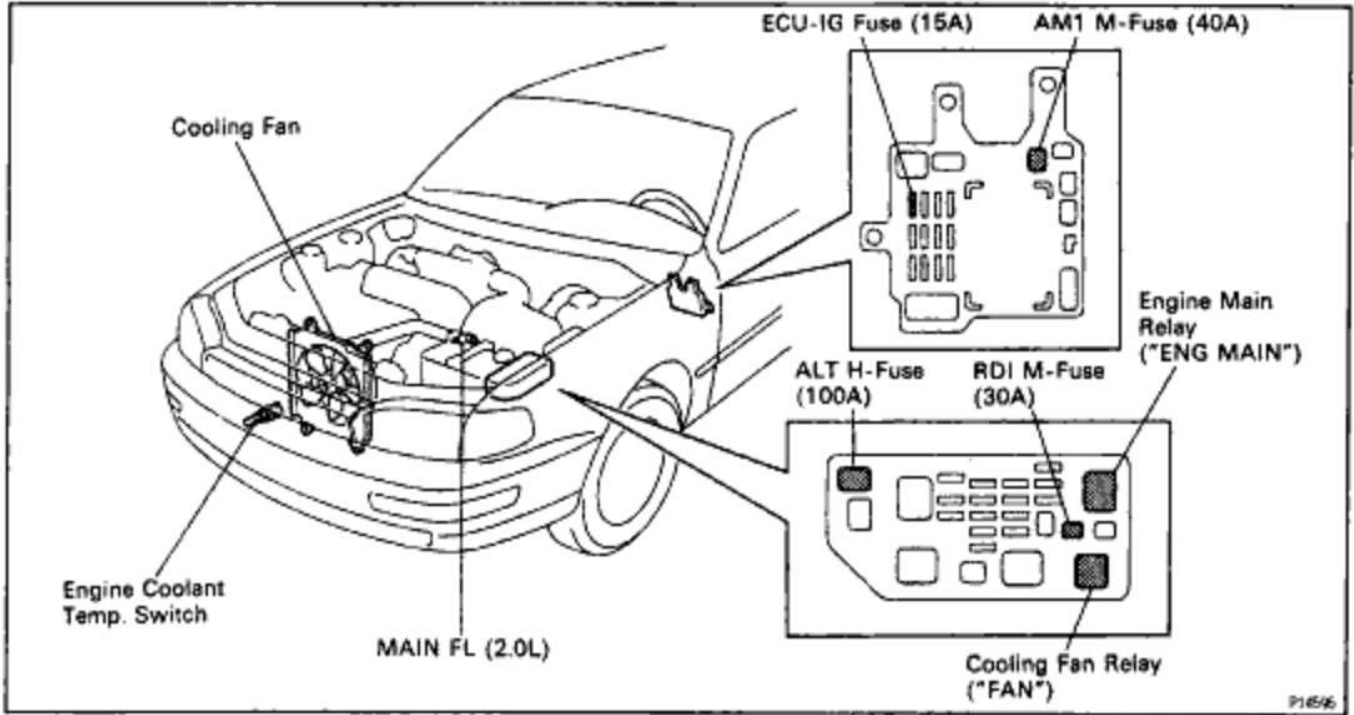
EG1-260**5S-FE ENGINE - COOLING SYSTEM**

10. CONNECT ELECTRIC COOLING FAN CONNECTORS
11. CONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR TO FAN SHROUD
12. w/ CRUISE CONTROL SYSTEM:
INSTALL CRUISE CONTROL ACTUATOR COVER
13. FILL WITH ENGINE COOLANT
(See page [EG1-241](#))
14. CONNECT NEGATIVE (-) TERMINAL CABLE TO BATTERY
15. START ENGINE AND CHECK FOR LEAKS
16. A/T:
CHECK AUTOMATIC TRANSMISSION (A/T) FLUID LEVEL

NOTICE: Do not overfill.

ELECTRIC COOLING FAN PART LOCATION

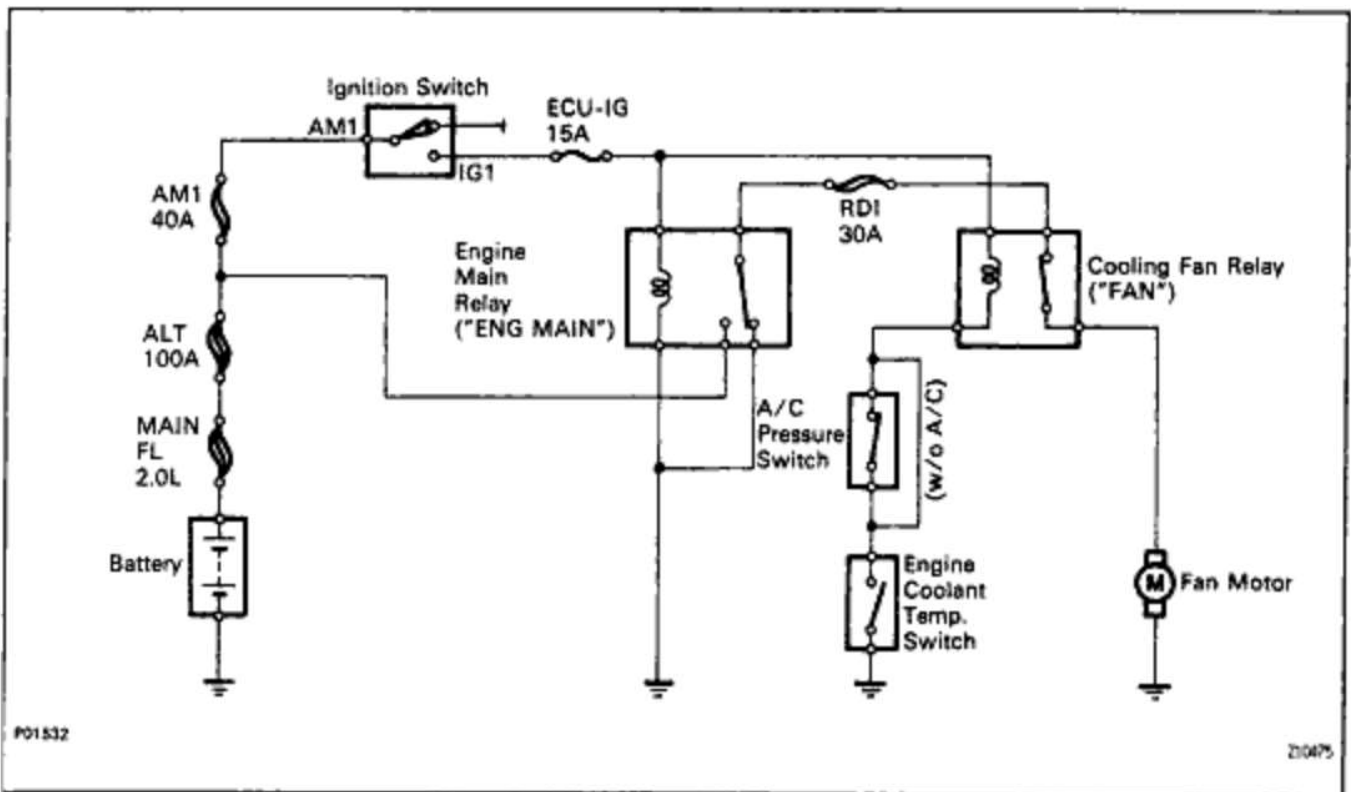
AM1-97



P165/6

86870-09

SYSTEM CIRCUIT



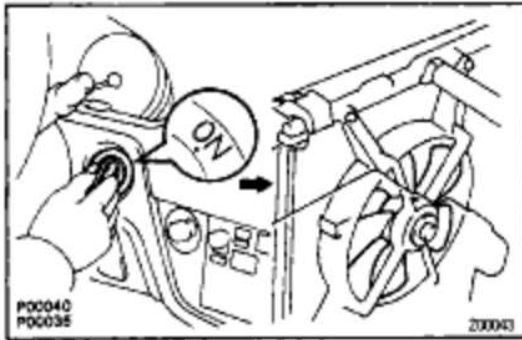
P01532

Z10475

EG1-262

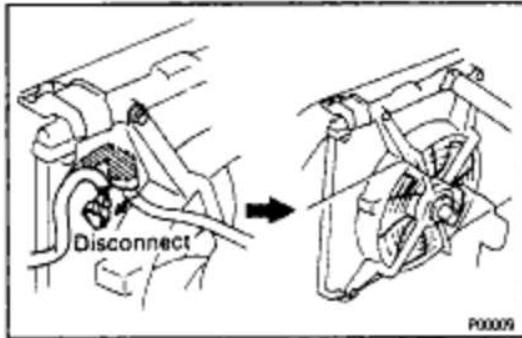
5S-FE ENGINE - COOLING SYSTEM

38072-01

**ON-VEHICLE INSPECTION****Low Temperature (Below 83°C (181°F))****1. TURN IGNITION SWITCH "ON"**

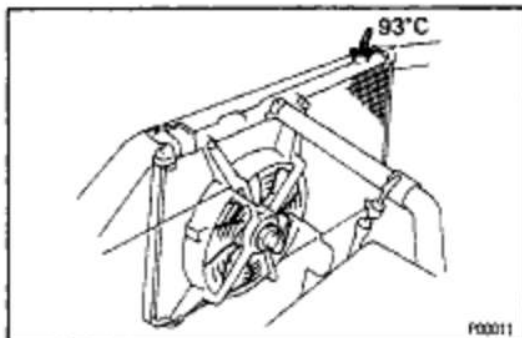
Check that the cooling fan stops.

If not, check the cooling fan relay and engine coolant temperature switch, and check for a separated connector or severed wire between the cooling fan relay and engine coolant temperature switch.

**2. DISCONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR**

Check that the cooling fan rotates.

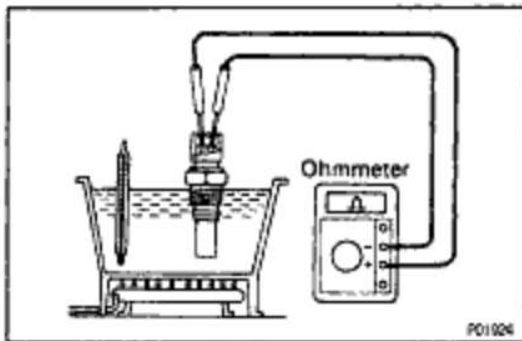
If not, check the cooling fan relay, cooling fan, engine main relay and fuse, and check for a short circuit between the cooling fan relay and engine coolant temperature switch.

3. CONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR**High Temperature (Above 93°C (199°F))****4. START ENGINE**

(a) Raise engine coolant temperature to above 93°C (199°F).

(b) Check that the cooling fan rotates.

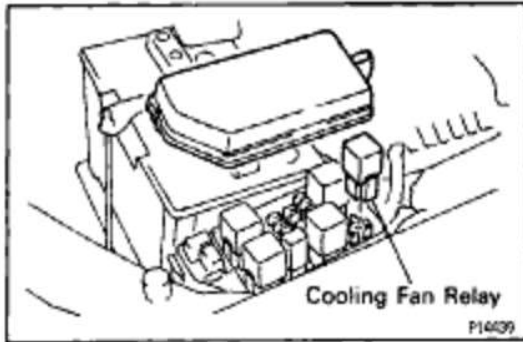
If not, replace the engine coolant temperature switch.

**ELECTRIC COOLING FAN COMPONENTS INSPECTION****1. INSPECT ENGINE COOLANT TEMPERATURE SWITCH**

(a) Using an ohmmeter, check that there is no continuity between the terminals when the engine coolant temperature is above 93°C (199°F).

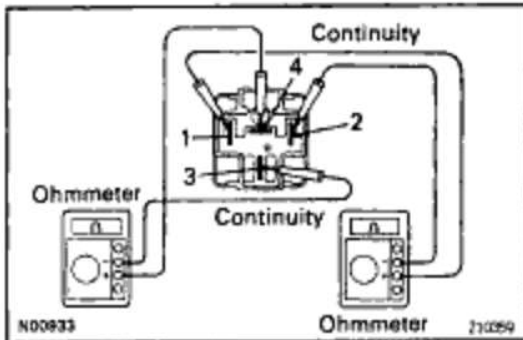
(b) Using an ohmmeter, check that there is continuity between the terminals when the engine coolant temperature is below 83°C (181°F).

If continuity is not as specified, replace the switch.



2. INSPECT COOLING FAN RELAY ("FAN")

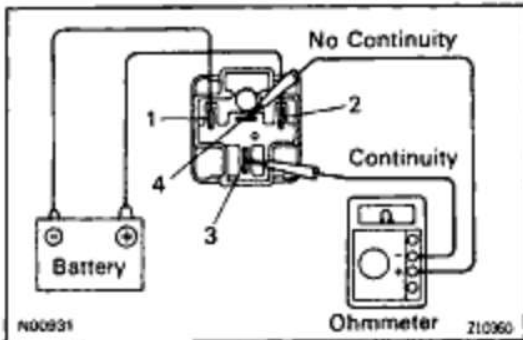
A. Remove cooling fan relay



B. Inspect relay continuity

- Using an ohmmeter, check that there is continuity between terminals 1 and 2.
- Check that there is continuity between terminals 3 and 4.

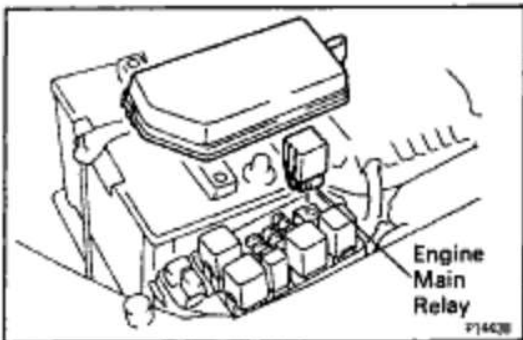
If continuity is not as specified, replace the relay.



C. Inspect relay operation

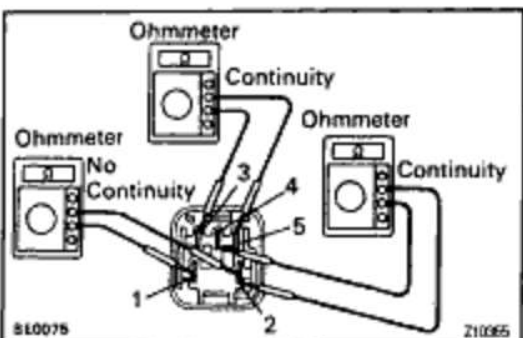
- Apply battery voltage across terminals 1 and 2.
 - Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
- If operation is not as specified, replace the relay.

D. Reinstall cooling fan relay



3. INSPECT ENGINE MAIN RELAY ("ENG MAIN")

A. Remove engine main relay



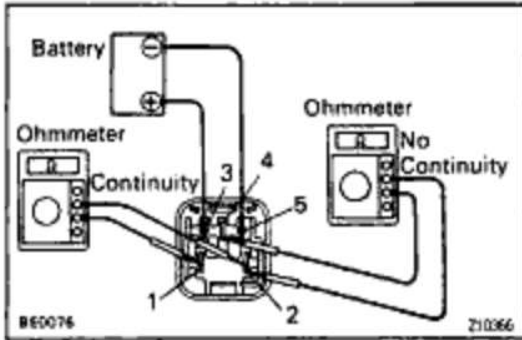
B. Inspect relay continuity

- Using an ohmmeter, check that there is continuity between terminals 3 and 5.
- Check that there is continuity between terminals 2 and 4.
- Check that there is no continuity between terminals 1 and 2.

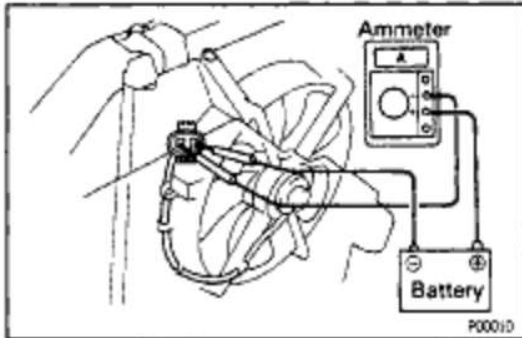
If continuity is not as specified, replace the relay.

EG1-264

5S-FE ENGINE - COOLING SYSTEM

**C. Inspect relay operation**

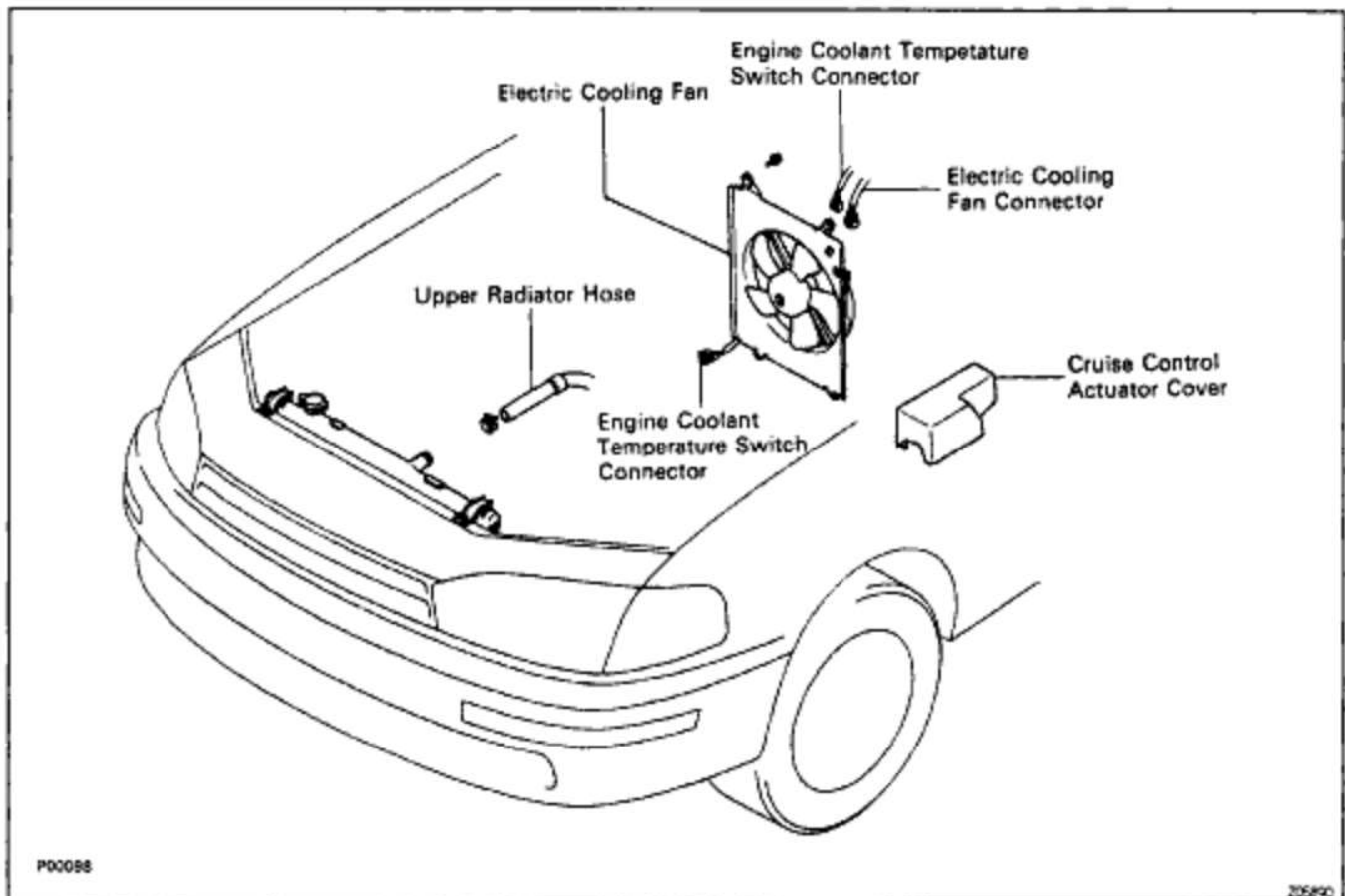
- Apply battery voltage across terminals 3 and 5.
 - Using an ohmmeter, check that there is no continuity between terminals 2 and 4.
 - Check that there is continuity between terminals 1 and 2.
- If operation is not as specified, replace the relay.

D. Reinstall engine main relay**4. INSPECT COOLING FAN**

- Connect battery and ammeter to the cooling fan connector.
- Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

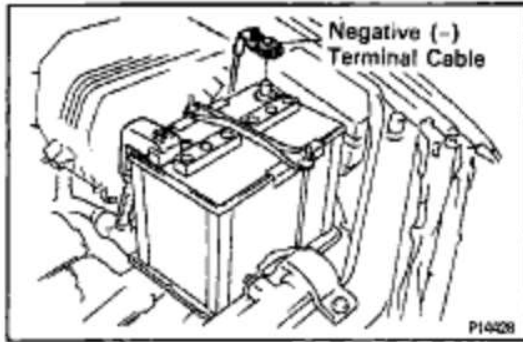
Standard amperage:**5.8 – 7.4 A**

3112-02

COMPONENTS FOR REMOVAL AND INSTALLATION

P00088

205890



ELECTRIC COOLING FAN REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

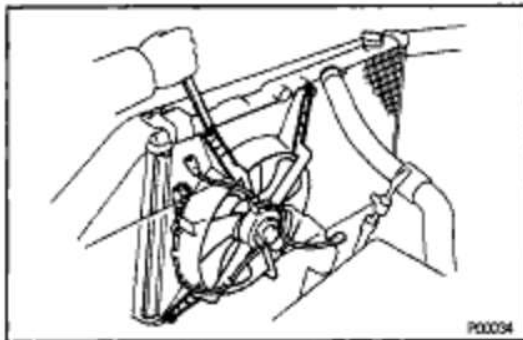
CAUTION: Work must be started after 90 seconds from the time the ignition switch is turned to the 'LOCK' position and the negative (-) terminal cable is disconnected from the battery.

2. DRAIN ENGINE COOLANT (See page EG1-241)

3. w/ CRUISE CONTROL SYSTEM:

REMOVE CRUISE CONTROL ACTUATOR COVER

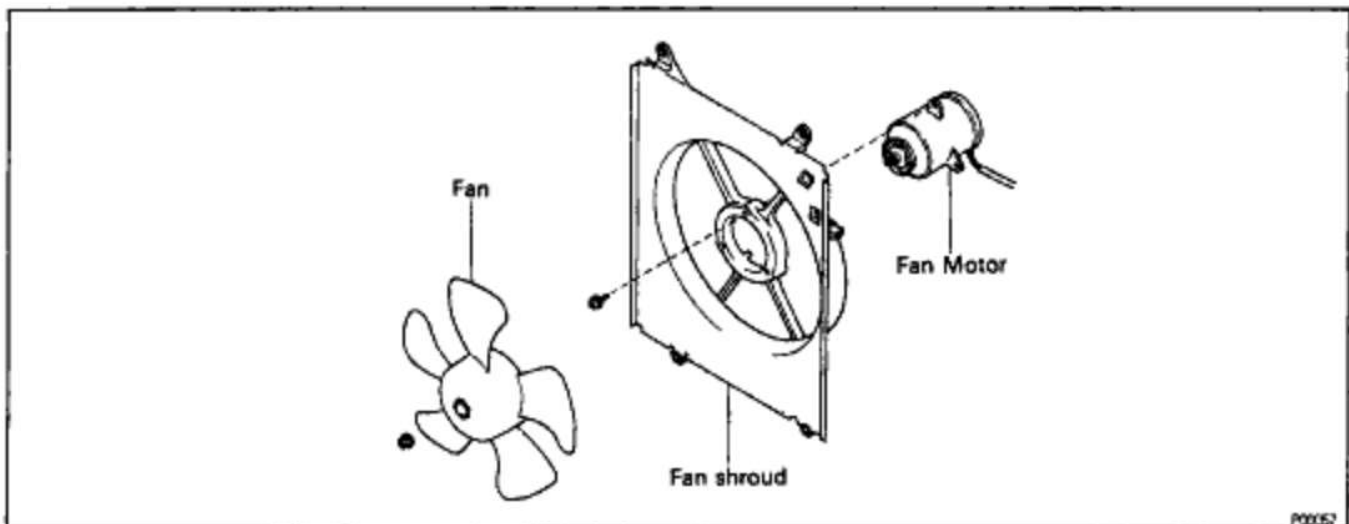
4. DISCONNECT UPPER RADIATOR HOSE FROM RADIATOR



5. REMOVE ELECTRIC COOLING FAN

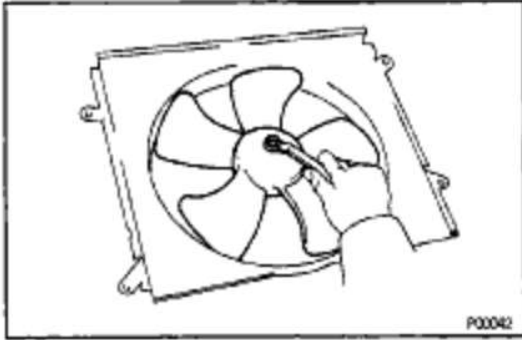
- Disconnect the engine coolant temperature switch connector from the radiator.
- Disconnect the engine coolant temperature switch and electric cooling fan connectors from the fan shroud.
- Remove the 4 bolts and cooling fan.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY



EG1-266

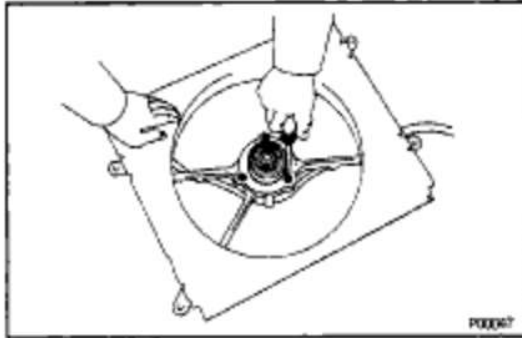
5S-FE ENGINE - COOLING SYSTEM

**ELECTRIC COOLING FAN DISASSEMBLY**

(See Components for Disassembly and Assembly)

1. REMOVE FAN

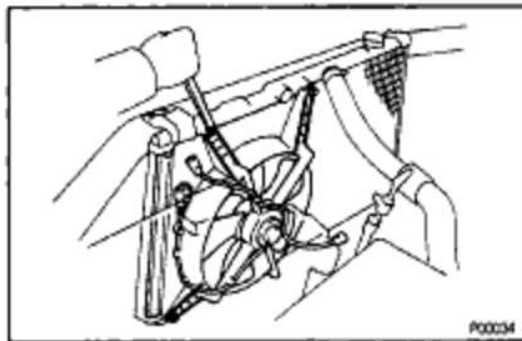
Remove the nut and fan.

**2. REMOVE FAN MOTOR**

Remove the screws and fan motor.

ELECTRIC COOLING FAN ASSEMBLY

(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR**2. INSTALL FAN****ELECTRIC COOLING FAN INSTALLATION**

(See Components for Removal and Installation)

1. INSTALL ELECTRIC COOLING FAN

- (a) Install the cooling fan with the 4 bolts.
- (b) Connect the engine coolant temperature switch and electric cooling fan connectors to the fan shroud.
- (c) Connect the engine coolant temperature switch connector to the radiator.

2. CONNECT UPPER RADIATOR HOSE TO RADIATOR**3. w/ CRUISE CONTROL SYSTEM:****INSTALL CRUISE CONTROL ACTUATOR COVER****4. FILL WITH ENGINE COOLANT**(See page [EG1-241](#))**5. CONNECT NEGATIVE (-) TERMINAL CABLE TO BATTERY****6. START ENGINE AND CHECK FOR LEAKS**

SERVICE SPECIFICATIONS

SERVICE DATA

SAC1-08

Thermostat	Valve opening temperature	60 - 84°C (176 - 183°F)
	Valve lift at 95°C (203°F)	8 mm (0.31 in.) or more
Radiator cap	Relief valve opening pressure	74 - 103 kPa (0.75 - 1.05 kgf/cm ² , 10.7 - 14.9 psi)
	STD Limit	59 kPa (0.6 kgf/cm ² , 8.5 psi)
Radiator	Plate height	7.75 - 8.25 mm (0.3051 - 0.3248 in.)
Electric cooling fan	Rotating amperage	5.8 - 7.4 A

SAC1-08

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Cylinder block x Drain plug	13	130	9
Water inlet x Water pump cover	8.8	90	78 in·lbf
Water pump x Water pump cover	9.3	95	82 in·lbf
Water pump x Cylinder block	9.3	95	82 in·lbf
Water bypass pipe x Water pump cover	8.8	90	78 in·lbf
No.2 idler pulley x Cylinder block	42	425	31
Water inlet x Water pump	8.8	90	78 in·lbf
Radiator oil cooler x Radiator lower tank	8.3	85	74 in·lbf
Radiator oil cooler pipe	22	220	16
Radiator support bolt	13	130	9