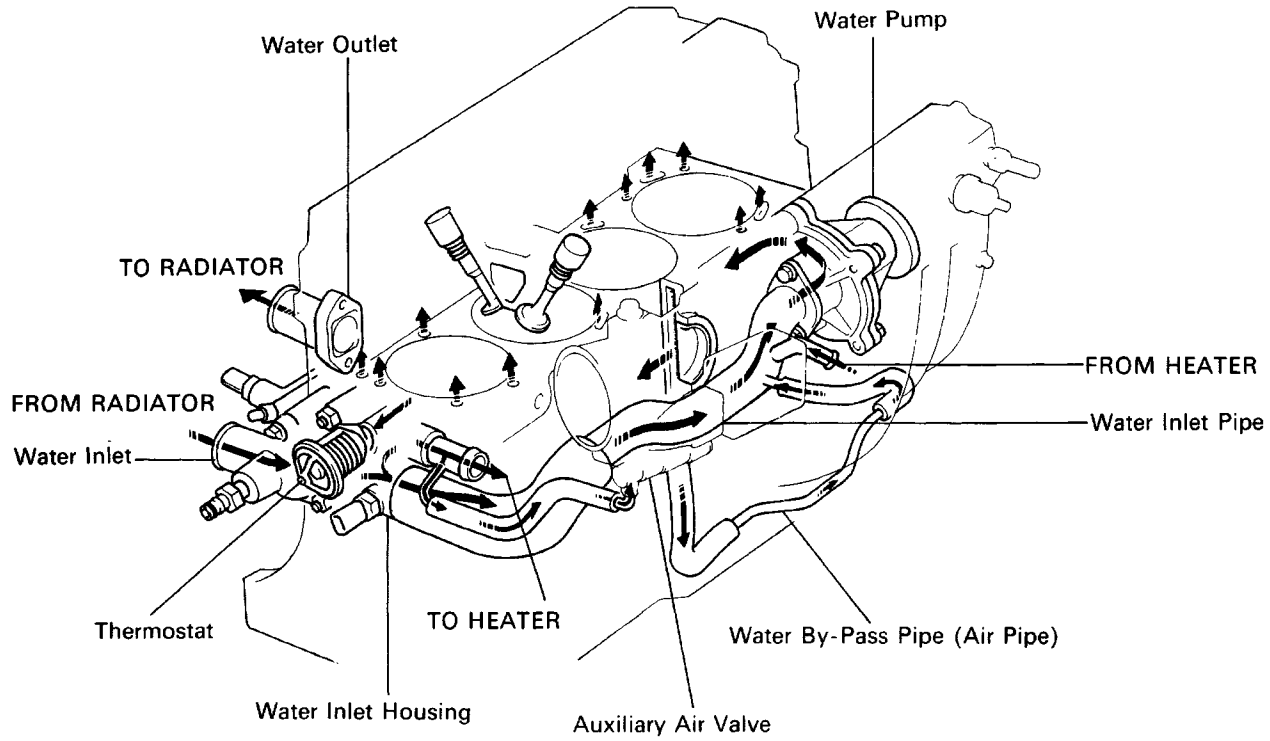
COOLING SYSTEM

DESCRIPTION

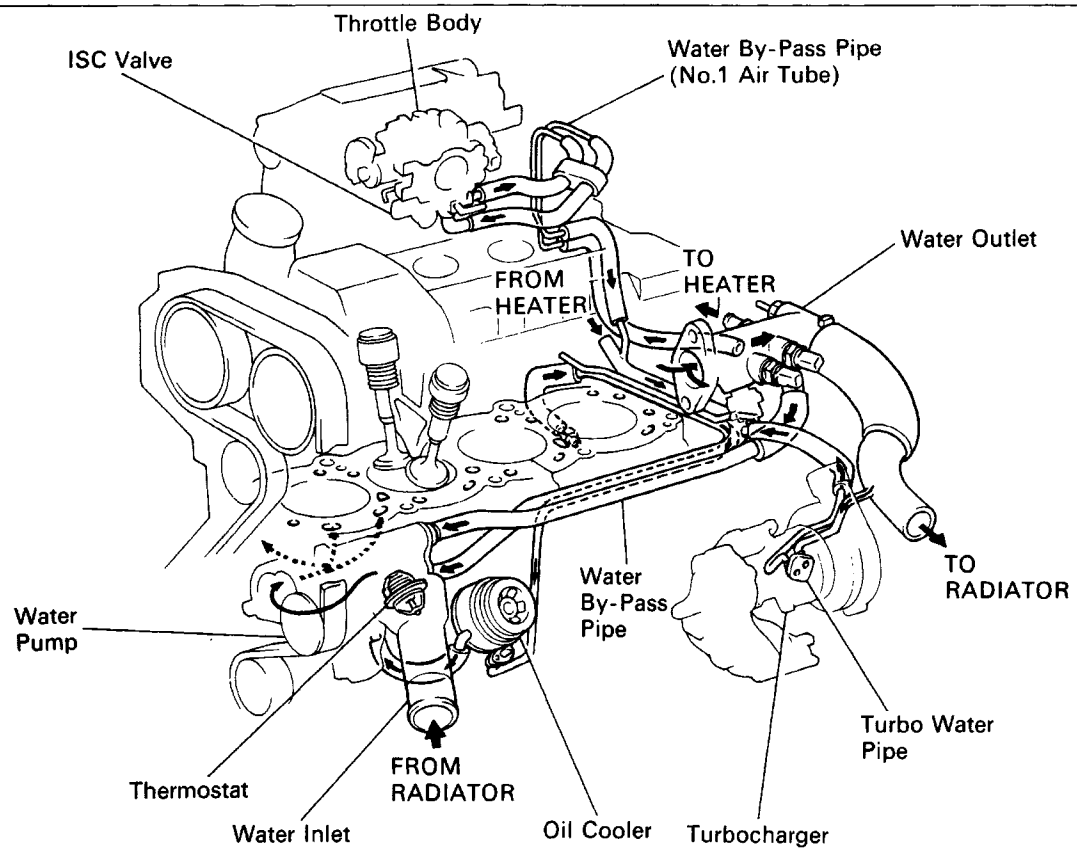
This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a by–pass valve mounted on the inlet side.

4A-FE

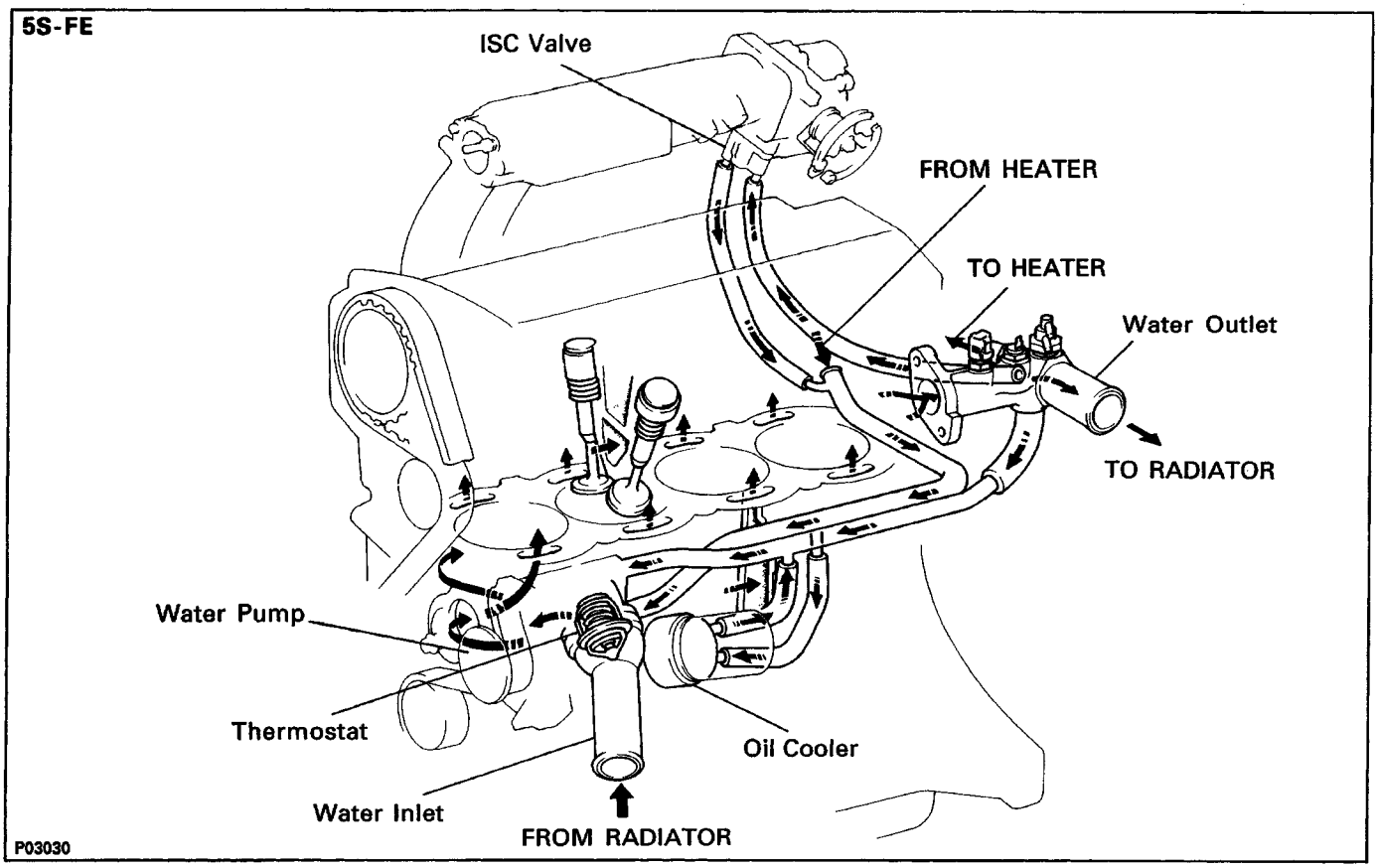


P03311

3S-GTE



CO0912


5S-FE
ISC Valve
FROM HEATER
TO HEATER
Water Outlet
TO RADIATOR
Water Pump
Thermostat
Oil Cooler
Water Inlet
FROM RADIATOR
P03030

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.
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. 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 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 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; 58.8 – 103.0 kPa (0.6 – 1.05 kgf/cm^2, 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 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 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 alternator belt (4A–FE) or timing belt (3S–GTE and 5S–FE).

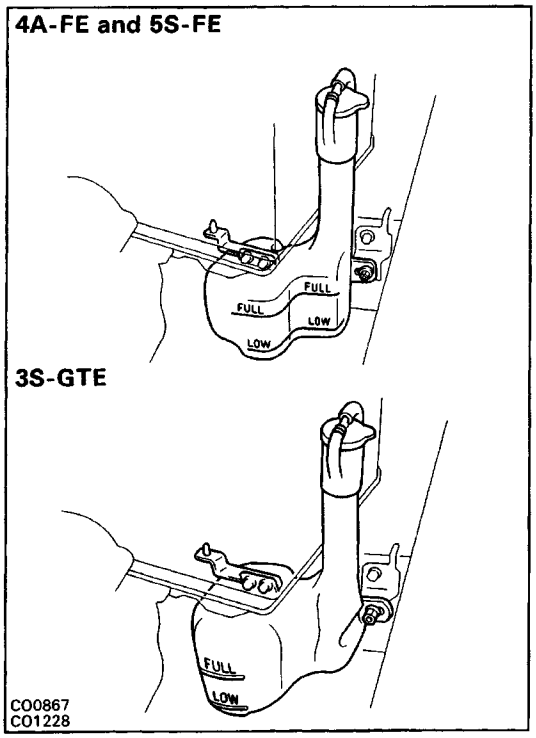
THERMOSTAT

The thermostat has a wax type by–pass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the coolant temperature. This valve closes when the 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 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 causes 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).

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Engine overheats	Dirt, leaves or insects in radiator or condenser	Clean radiator or condenser	CO–20
	Hoses, water pump, thermostat housing, radiator, heater, core plugs or head gasket leakage	Repair as necessary	
	Thermostat faulty	Check thermostat	CO–17
	Incorrect ignition timing	Reset timing	IG–24, 29 37
	Electric cooling system faulty		CO–27
	Radiator hose plugged or rotten	Inspect electric cooling system	
	Water pump faulty	Replace hose	
	Radiator plugged or cap faulty	Replace water pump	CO–7, 11
	Cylinder head or block cracked or water passage clogged	Check radiator and cap	CO–20
		Repair as necessary	

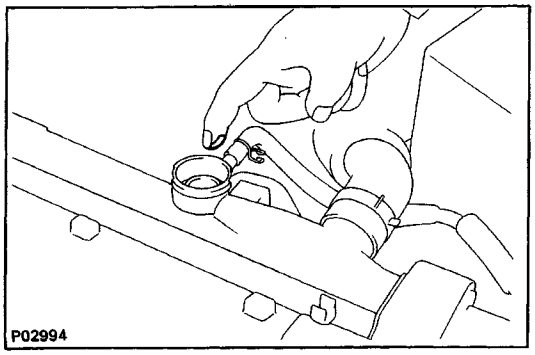
HINT: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.



CHECK AND REPLACEMENT OF ENGINE COOLANT

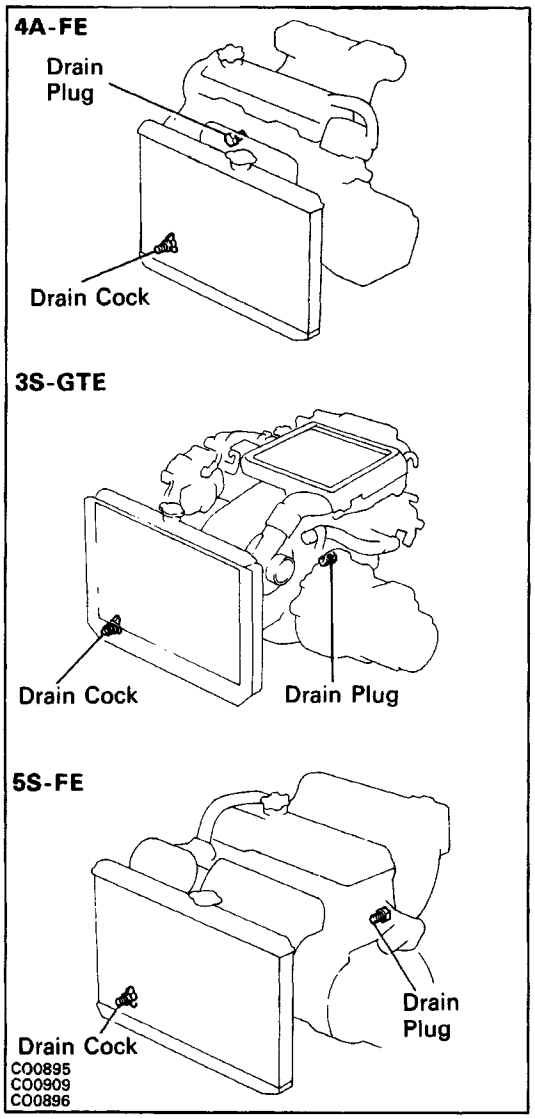
1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TAN K

The coolant level should be between the ”LOW” and ”FULL” lines.
If low, check for leaks and add 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 coolant should be free from oil.
If excessively dirty, replace the 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 coolant from the radiator drain cock and engine drain plug.

LOCATION (Engine drain plug):

4A–FE In the cylinder block on the front right side.

3S–GTE and 5S–FE In the cylinder block on the rear left side.

(c) Close the drain cock and plug.

Torque (Engine drain plug):

4A–FE 34 N–m (350 kgf–cm, 25 ft–lbf)

3S–GTE and 5S–FE 25 N–m (250 kgf–cm, 18 ft–lbf)

(d) Slowly till the system with coolant.

- Use a good brand of ethylene–glycol base coolant, mixed according to the manufacturer's directions.
- Using coolant which includes more than 50% ethylene–glycol (but not more than 70%) is recommended.

NOTICE:

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

Capacity (w/ Heater):

4A–FE M/T 5.2 liters (5.5 US qts, 4.6 Imp. qts)

A/T 5.6 liters (5.9 US qts, 4.9 Imp. qts)

3S–GTE 6.5 liters (6.9 US qts, 5.7 Imp. qts)

5S–FE M/T 6.2 liters (6.6 US qts, 5.5 Imp. qts)

A/T 6.1 liters (6.4 US qts, 5.4 Imp. qts)

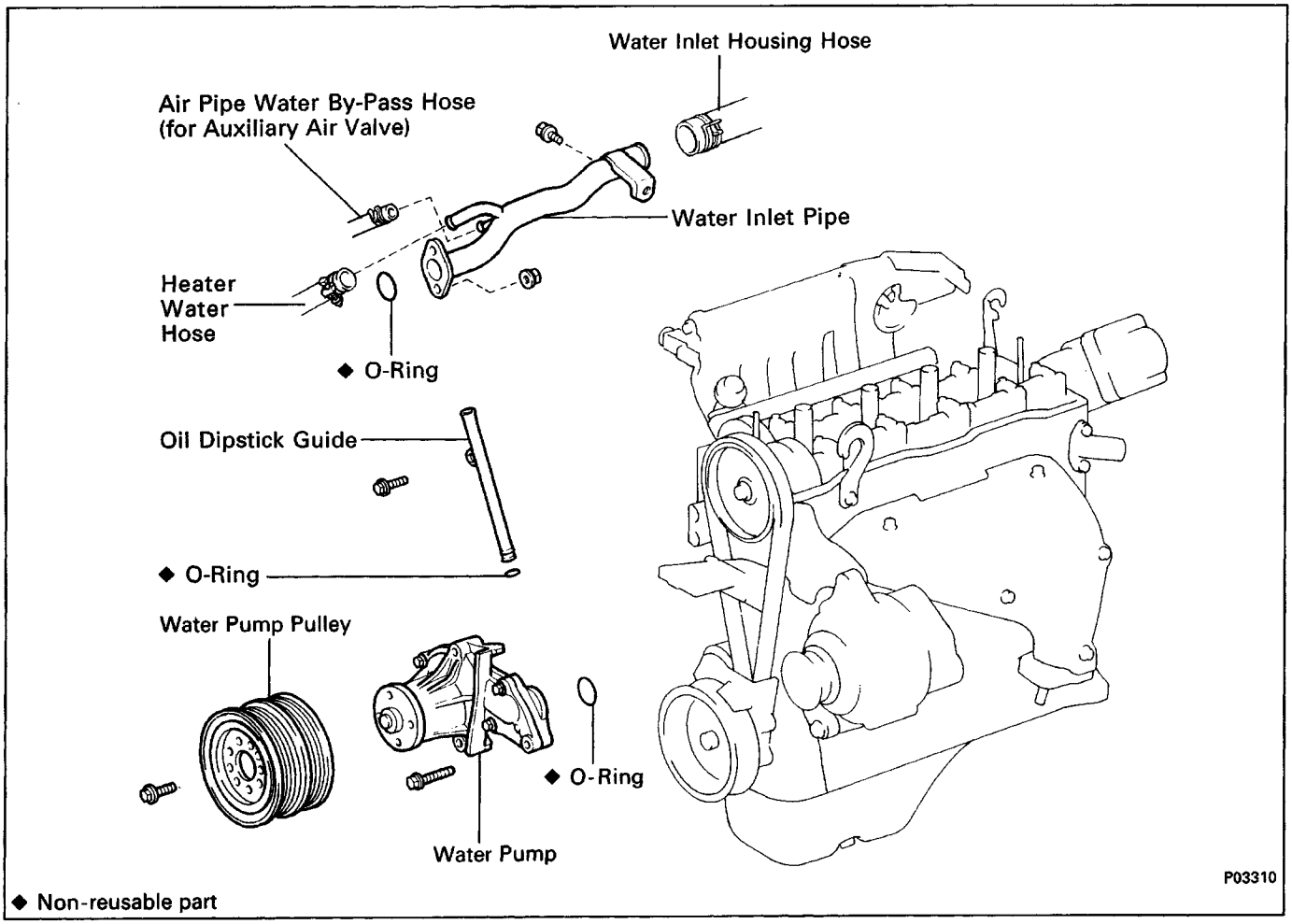
(e) Reinstall the radiator cap.

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

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

WATER PUMP (4A–FE)

COMPONENTS

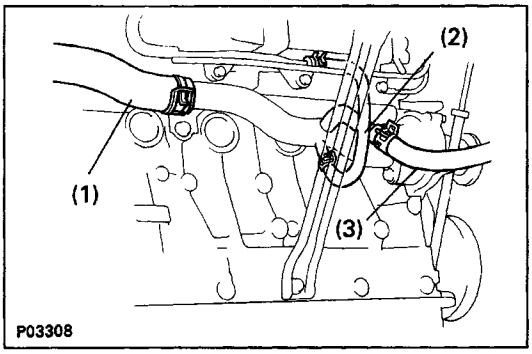


REMOVAL OF WATER PUMP

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

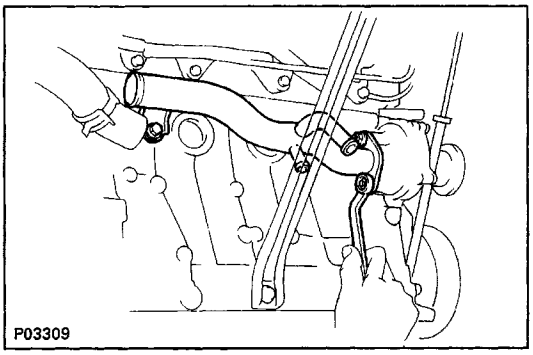
   CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

2. DRAIN ENGINE COOLANT (See page CO–6)
3. REMOVE NO.3 AND NO.2 TIMING BELT COVERS (See steps 2 to 13 on pages EM–33 to 35)
4. REMOVE PS DRIVE BELT ADJUSTING STRUT (See step 29 on page EM–87)

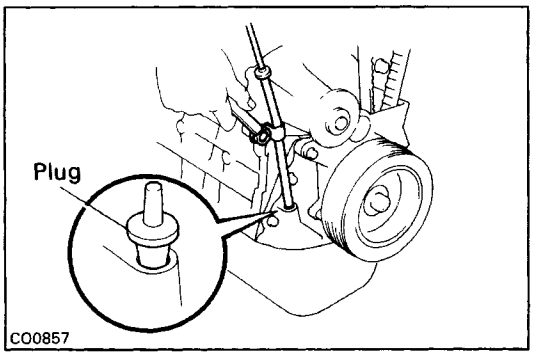


5. REMOVE WATER INLET PIPE

(a) Disconnect the following hoses:
(1) Water inlet housing hose
(2) Heater water hose
(3) Air pipe water by–pass hose

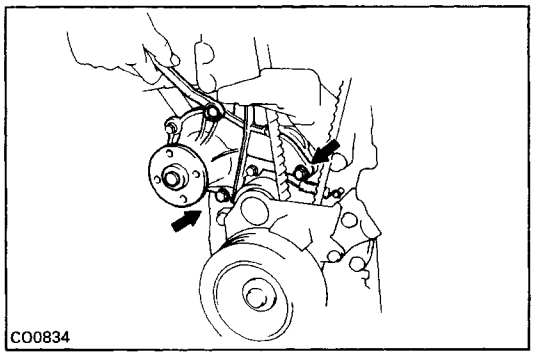


(b) Remove the bolt, two nuts., inlet pipe and 0–ring.



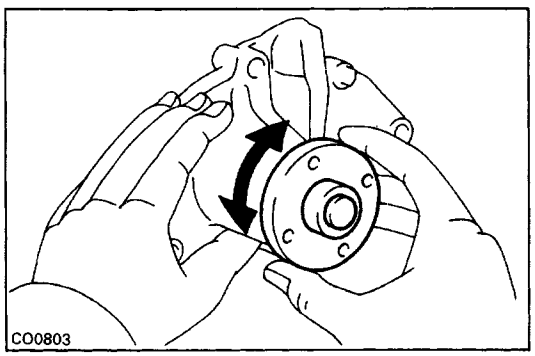
6. REMOVE OIL DIPSTICK AND DIPSTICK GUIDE

(a) Remove the dipstick.
(b) Remove the bolt, and pull out the dipstick guide.
Plug the guide installation hole of the oil pump.
(c) Remove the 0–ring from the dipstick guide.



7. REMOVE WATER PUMP

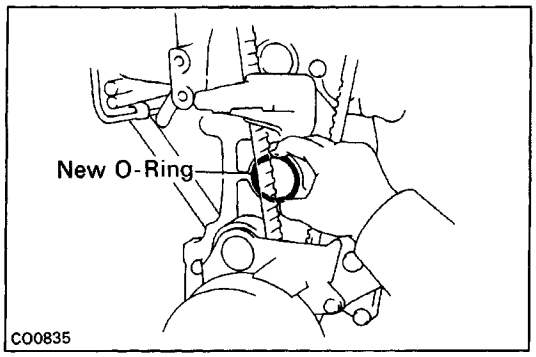
(a) Remove the three bolts holding the water pump to the cylinder block.
(b) Remove the water pump together with the pulley.
Remove the O–ring.
NOTICE: Be careful not to get coolant on the timing belt.



INSPECTION OF WATER PUMP

INSPECT WATER PUMP

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

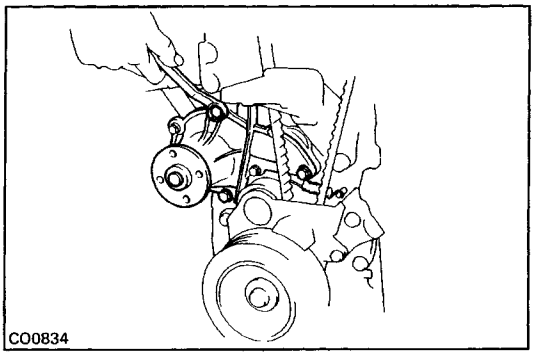


INSTALLATION OF WATER PUMP

(See page CO–7)

1. INSTALL WATER PUMP

(a) Place a new O–ring in position on the cylinder block.

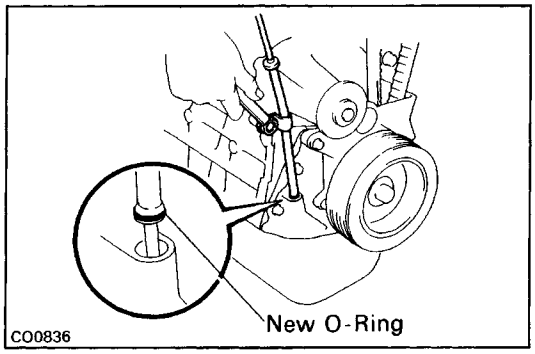


(b) Place the pulley on the water pump, and place the water pump together with the pulley on the cylinder block.

HINT: If the pulley is not placed on the water pump first, the pump cannot be installed later.

(c) Install the water pump with the three bolts.

Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)



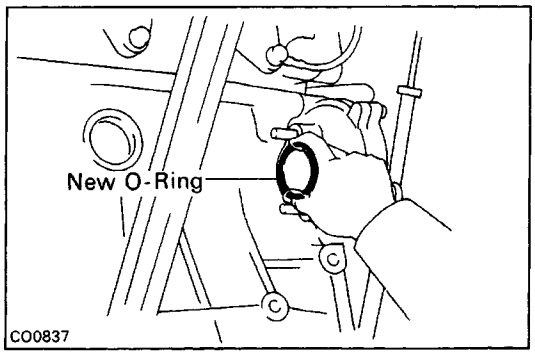
2. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

(a) Install a new O–ring to the dipstick guide.

(b) Apply soapy water to the 0–ring.

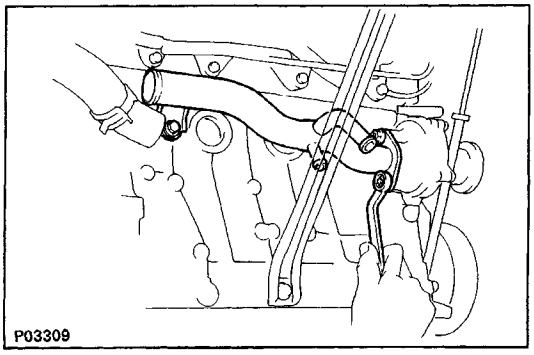
(c) Push in the dipstick guide, and install it with the bolt.

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



3. INSTALL WATER INLET PIPE

(a) Place a new 0–ring in position on the water pump.



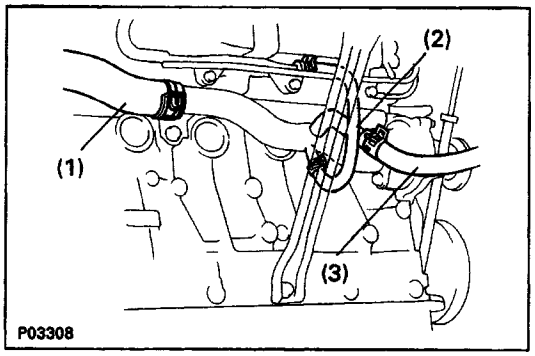
(b) Temporarily install water pump with the two nuts and bolt.

(c) Tighten the two nuts.

Torque: 20 N–m (200 kgf–cm, 14 ft–lbf)

(d) Tighten the bolt.

Torque: 13 N–m (730 kgf–cm, 9 ft–lbf)



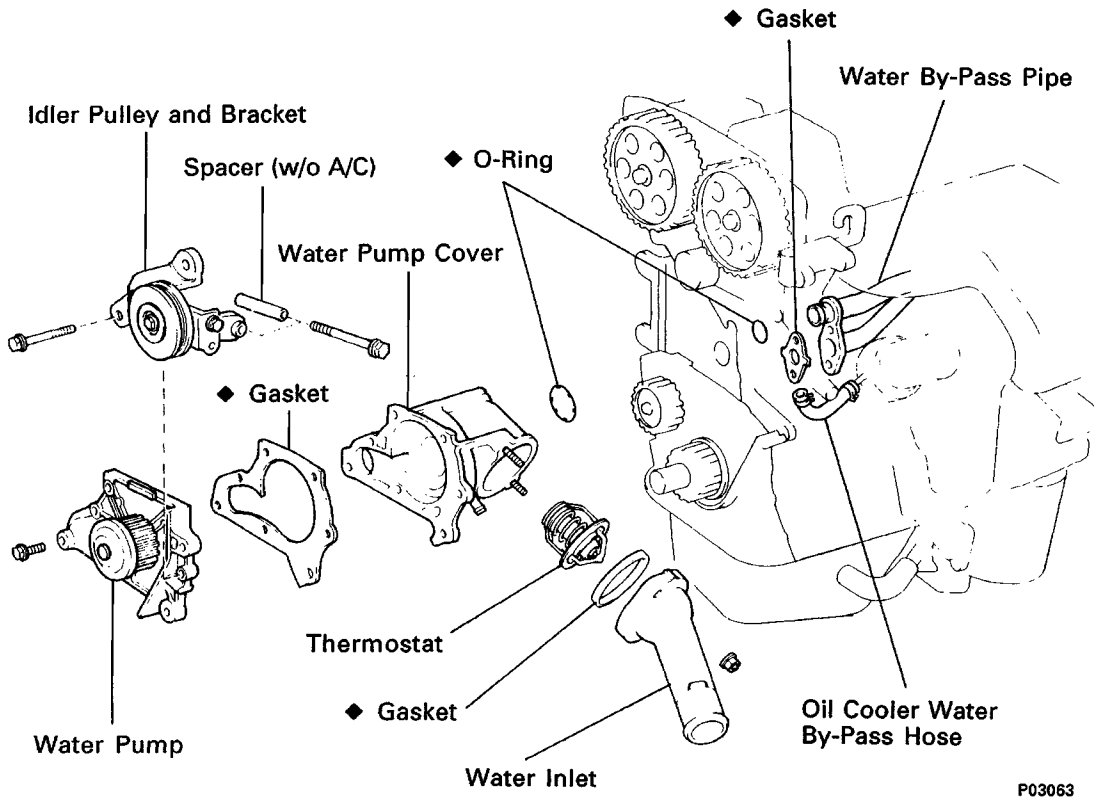
(e) Connect the following hoses:
(1) Water inlet housing hose
(2) Heater water by–pass hose
(3) Air pipe water by–pass hose

4. INSTALL PS DRIVE BELT ADJUSTING STRUT
(See step 5 on page EM–108)
5. INSTALL NO.3 AND NO.2 TIMING BELT COVERS
(See steps 12 to 24 on pages EM–43 to 45)
6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
7. FILL WITH ENGINE COOLANT (See page CO–6)

WATER PUMP (3S–GTE and 5S–FE)

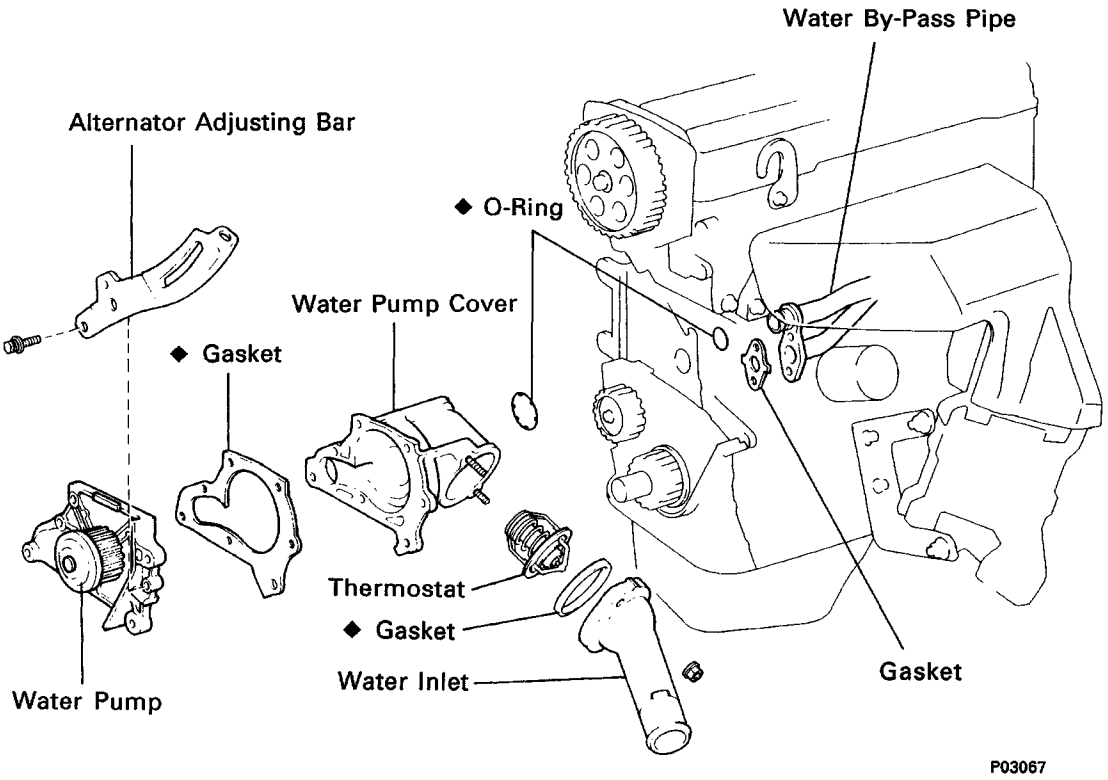
COMPONENTS

3S-GTE



◆ Non-reusable part

5S-FE



◆ Non-reusable part

REMOVAL OF WATER PUMP

(See page CO–11)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer 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 CO–6)

3. REMOVE TIMING BELT

3S–GTE (See steps 2 to 18 and 20 to 23 on pages EM–46 to 51)

5S–FE (See steps 2 to 17 and 19 to 22 on pages EM–67 to 72)

4. (3S–GTE)

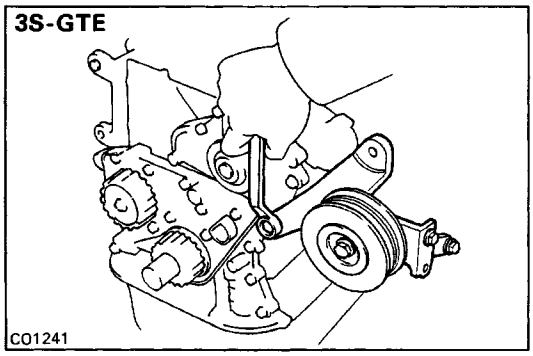
REMOVE NO.2 IDLER PULLEY

(See step 25 on page EM–52)

5. (5S–FE)

REMOVE IDLER PULLEYS

(See steps 23 to 24 on page EM–72)

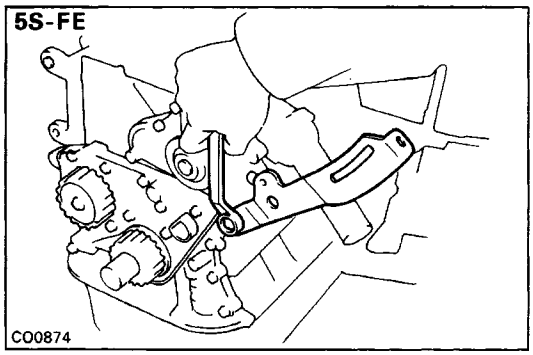


6. DISCONNECT LOWER RADIATOR HOSE FROM WATER INLET

7. (3S–GTE)

REMOVE IDLER PULLEY AND BRACKET

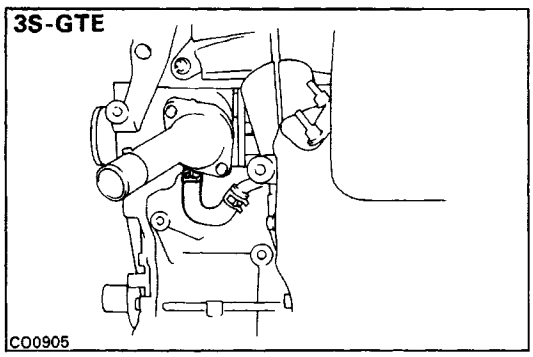
Remove the two bolts, pulley, bracket and spacer (w/o A/C).



8. (5S–FE)

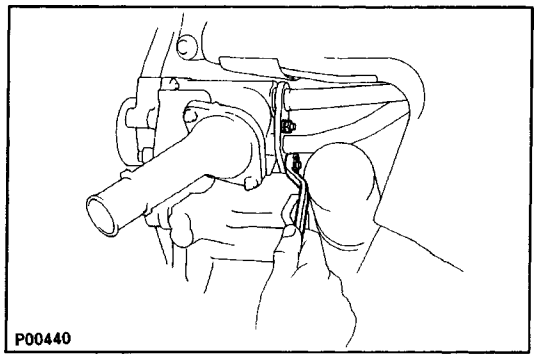
REMOVE ALTERNATOR BELT ADJUSTING BAR

Remove the bolt and adjusting bar.



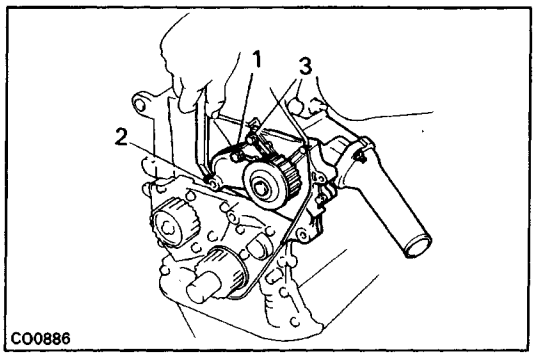
9. (3S–GTE)

DISCONNECT OIL COOLER WATER BY–PASS HOSE

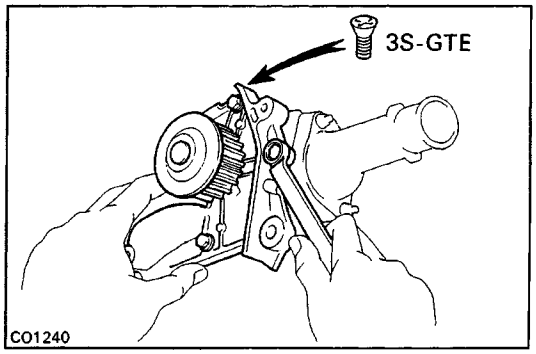


10. REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Remove the two nuts holding the pump to the water by–pass pipe.

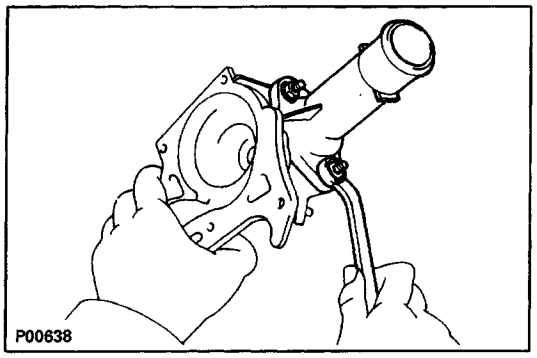


(b) Remove the three bolts in the sequence shown.
(c) Pull out the water pump together with the water pump cover.
(d) Remove the gasket and two 0–rings from the water pump and water by–pass pipe.



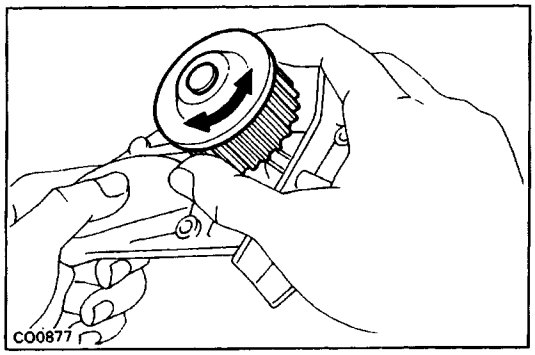
11. SEPARATE WATER PUMP AND WATER PUMP COVER

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



12. REMOVE WATER INLET AND THERMOSTAT FROM WATER PUMP COVER

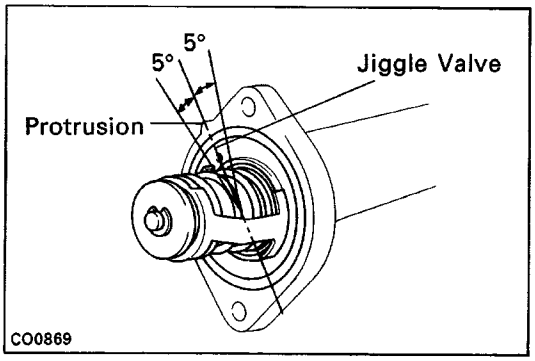
(a) Remove the two nuts and water inlet from the water pump.
(b) Remove the thermostat.
(c) Remove the gasket from the thermostat.



INSPECTION OF WATER PUMP

INSPECT WATER PUMP

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



INSTALLATION OF WATER PUMP

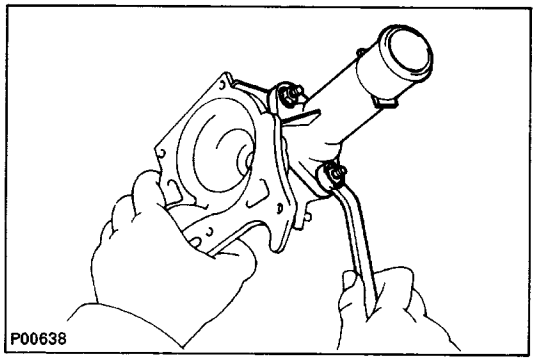
(See page CO–11)

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.

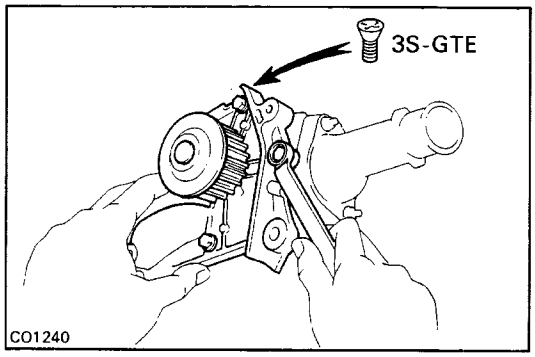


(c) Install the water inlet with the two nuts.

Torque:

3S–GTE 7.8 N–m (80 kgf–cm, 69 in.–lbf)

5S–FE 9.3 N–m (95 kgf–cm, 82 in.–lbf)



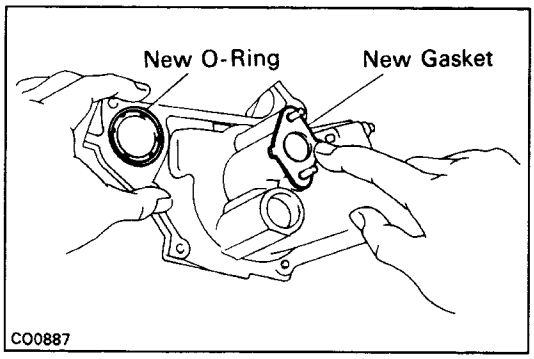
2. ASSEMBLE WATER PUMP AND WATER PUMP COVER

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

Torque:

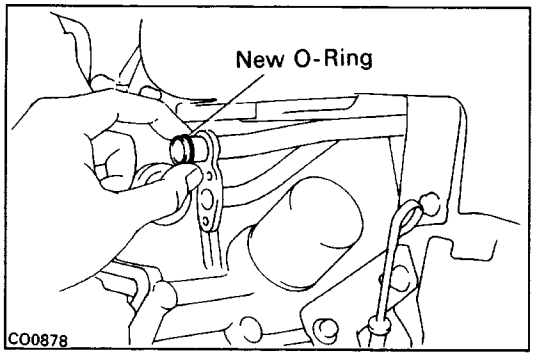
3S–GTE 9.3 N–m (95 kgf–cm, 82 in.–lbf)

5S–FE 8.8 N–m (90 kgf–cm, 78 in.–lbf)

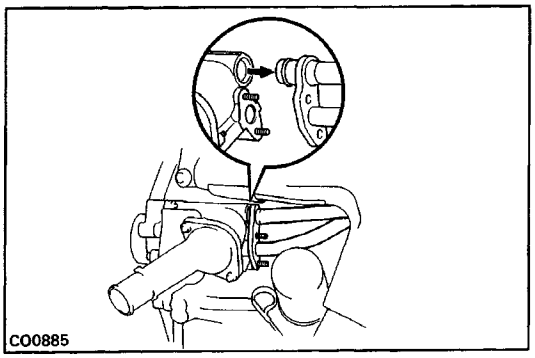


3. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

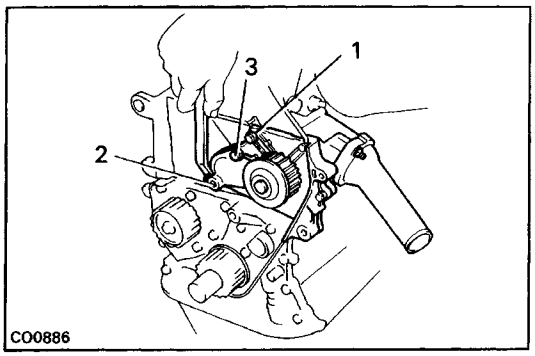
(a) Install new 0–ring and gasket to the water pump cover.



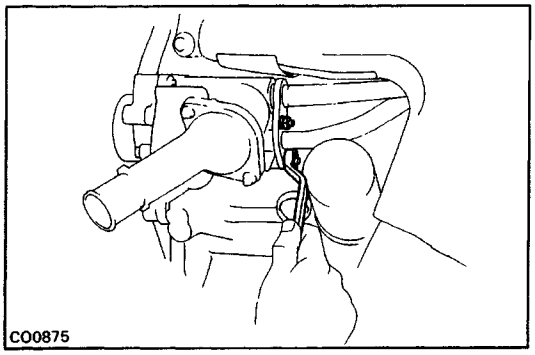
(b) Install a new O–ring to the water by–pass pipe.



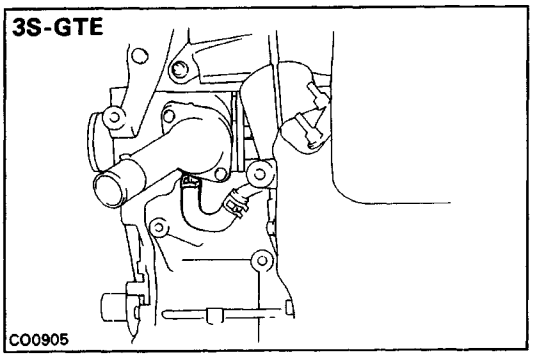
(c) Apply soapy water to the O–ring on the water bypass pipe.
(d) Connect the pump cover to the water by–pass pipe. Do not install the nuts yet.



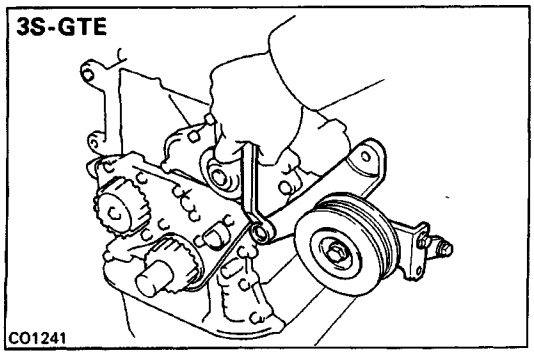
(e) Install the water pump with the three bolts. Tighten the bolts i n the sequence shown.
Torque:
3S–GTE 7.8 N–m (80 kgf–cm, 69 MAW)
5S–FE 8.8 N–m (90 kgf–cm, 78 MAW)



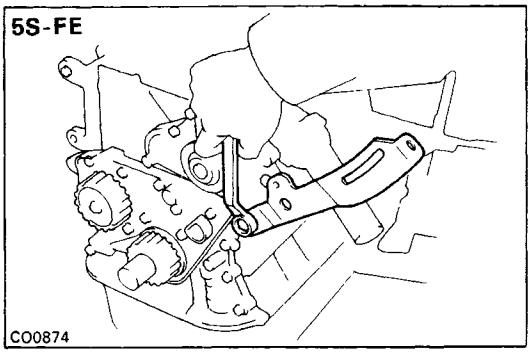
(f) Install the two nuts holding the water pump cover to the water by–pass pipe.
Torque:
3S–GTE 12 N–m (120 kgf–cm, 9 ft–lbf)
5S–FE 9.3 N–m (95 kgf–cm, 82 in.–lbf)



4. (3S–GTE)
CONNECT OIL COOLER WATER BY–PASS HOSE



5. (3S–GTE)
INSTALL IDLER PULLEY AND BRACKET
Install the pulley and bracket with the spacer (w/o A/C) and two bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



6. (5S–FE)
INSTALL ALTERNATOR BELT ADJUSTING BAR
Temporarily install the adjusting bar with the bolt.

7. CONNECT LOWER RADIATOR HOSE TO WATER IN LET
8. (3S–GTE)
INSTALL NO.2 IDLER PULLEY
(See step 3 on page EM–55)
9. (5S–FE)
INSTALL IDLER PULLEYS
(See steps 3 and 4 on page EM–75)
10. INSTALL TIMING BELT
3S–GTE (See steps 5 to 8 and 10 to 30 on pages EM–55 to 61)
5S–FE (See steps 5 to 8 and 10 to 27 on pages EM –75 to 80)
11. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
12. FILL WITH ENGINE COOLANT (See page CO–6)

THERMOSTAT

REMOVAL OF THERMOSTAT (4A–FE)

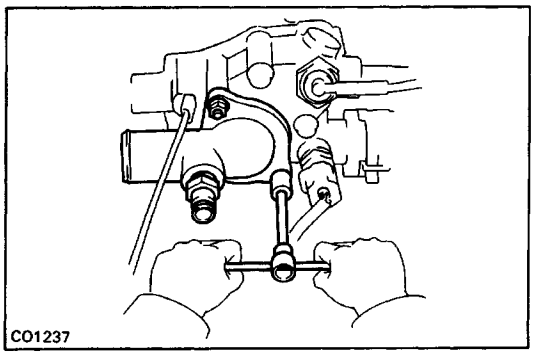
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer 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 CO–6)

3. DISCONNECT WATER TEMPERATURE SWITCH CONNECTOR

4. DISCONNECT LOWER RADIATOR HOSE



5. REMOVE WATER INLET AND THERMOSTAT

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

(b) Remove the thermostat.

(c) Remove the gasket from the thermostat.

REMOVAL OF THERMOSTAT (3S–GTE and 5S–FE)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer 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 CO–6)

3. (3S–GTE)

REMOVE ALTERNATOR (See page CH–7)

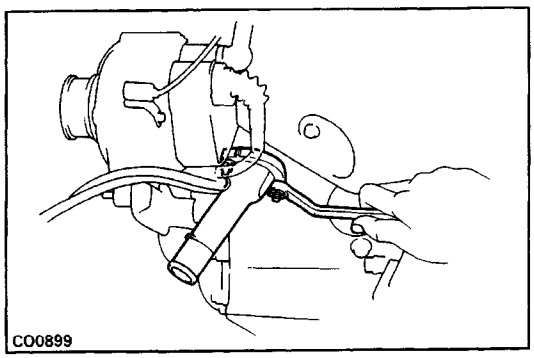
4. DISCONNECT LOWER RADIATOR HOSE

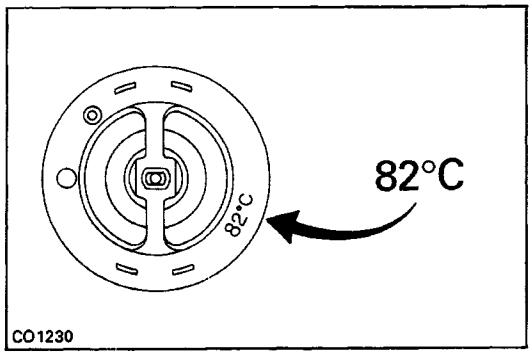
5. REMOVE WATER INLET AND THERMOSTAT

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

(b) Remove the thermostat.

(c) Remove the gasket from the thermostat.

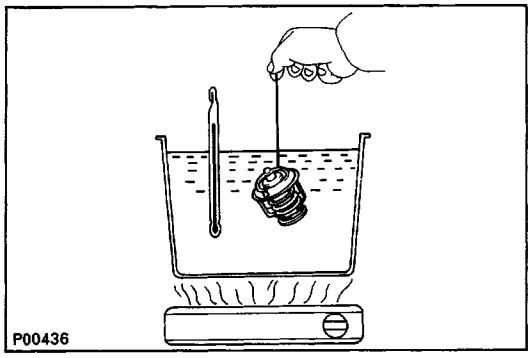




INSPECTION OF THERMOSTAT

INSPECT THERMOSTAT

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



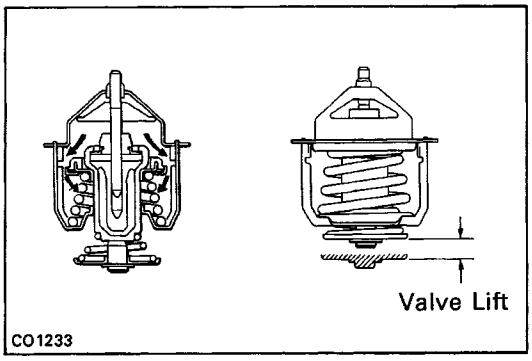
(a) Immerse the thermostat in water and gradually heat the water.

(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.

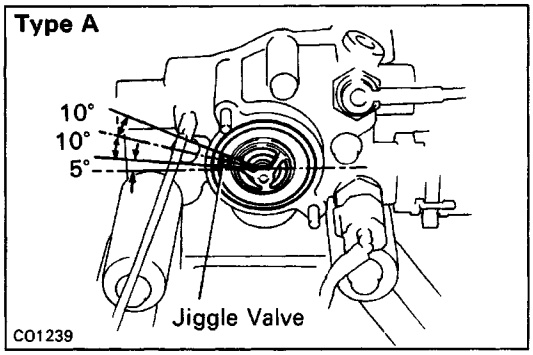
Valve lift:

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

If the valve lift is less than specification, replace the thermostat.

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

If necessary, replace the thermostat.



INSTALLATION OF THERMOSTAT (4A–FE)

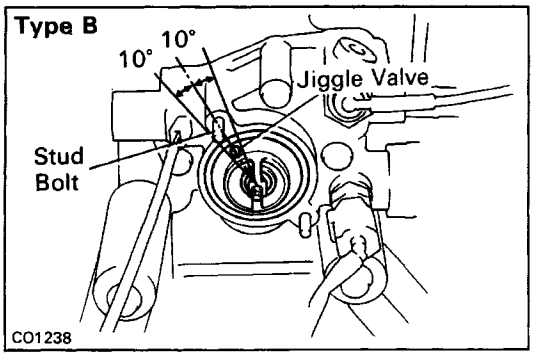
1. PLACE THERMOSTAT IN WATER PUMP

(a) Install a new gasket to the thermostat.

(b) (Type A)

Set the jiggle valve of the thermostat in angle position, and insert the thermostat in the water inlet housing.

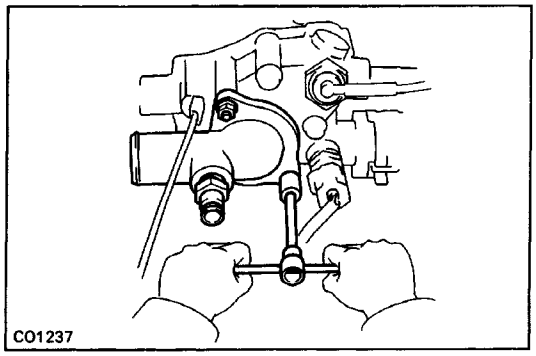
HINT: The jiggle valve may be set within 10˚ of either side of the prescribed position.



(b) (Type B)

Align the jiggle valve of the thermostat with the upper side of the stud bolt, and insert the thermostat in the water pump.

H I NT: The jiggle valve may be set within 10˚ of either side of the prescribed position.



2. INSTALL WATER INLET

Install the water inlet with the two nuts.

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

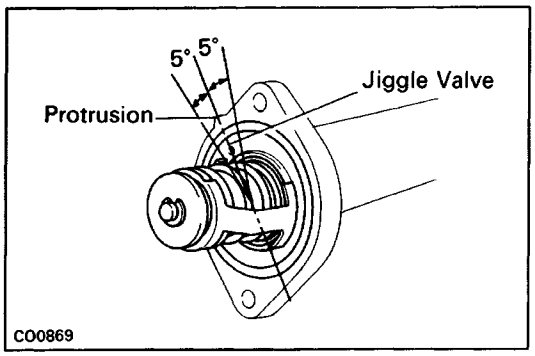
3. CONNECT WATER TEMPERATURE SWITCH CONNECTOR

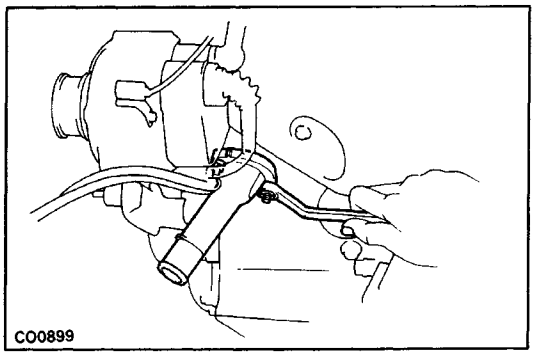
4. CONNECT LOWER RADIATOR HOSE

5. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

6. FILL WITH ENGINE COOLANT (See page CO–6)

7. START ENGINE AND CHECK FOR LEAKS





INSTALLATION OF THERMOSTAT (3S–GTE and 5S–FE)

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 two nuts.

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

3. (3S–GTE) INSTALL ALTERNATOR(Seepage CH–23)

4. CONNECT LOWER RADIATOR HOSE

5. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

6. FILL WITH ENGINE COOLANT (See page CO–6)

7. START ENGINE AND CHECK FOR LEAKS

RADIATOR

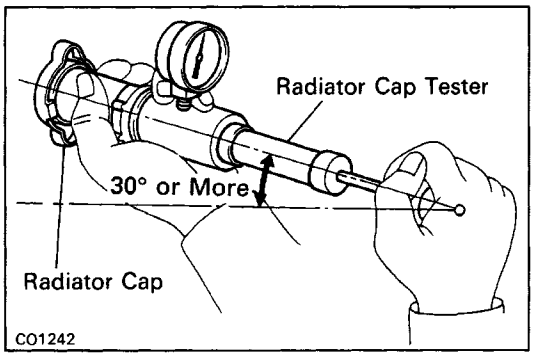
CLEANING OF RADIATOR

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

CAUTION: 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 – 50 cm (15.75 – 19.69 in.) between the radiator core and cleaner nozzle.

INSPECTION OF RADIATOR

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.

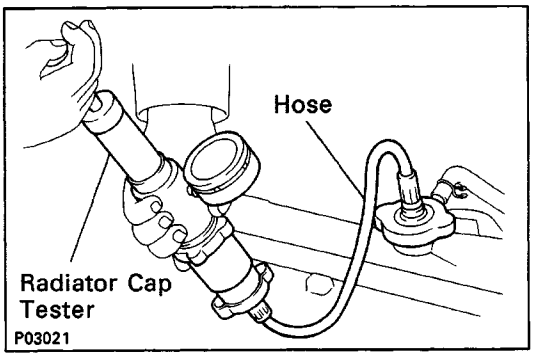
(b) Pump the tester several times and measure the relief valve opening pressure.

Pump speed:
1st time 1 push/1 second or less
2nd time or more Any speed

Standard opening pressure:
74 – 103 kPa
(0.75 – 1.05 kgf/cm^2, 10.7 – 14.9 psi)

Minimum opening pressure:
59 kPa (0.6 kgf/cm^2, 8.5 psi)

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



2. INSPECT COOLING SYSTEM FOR LEAKS

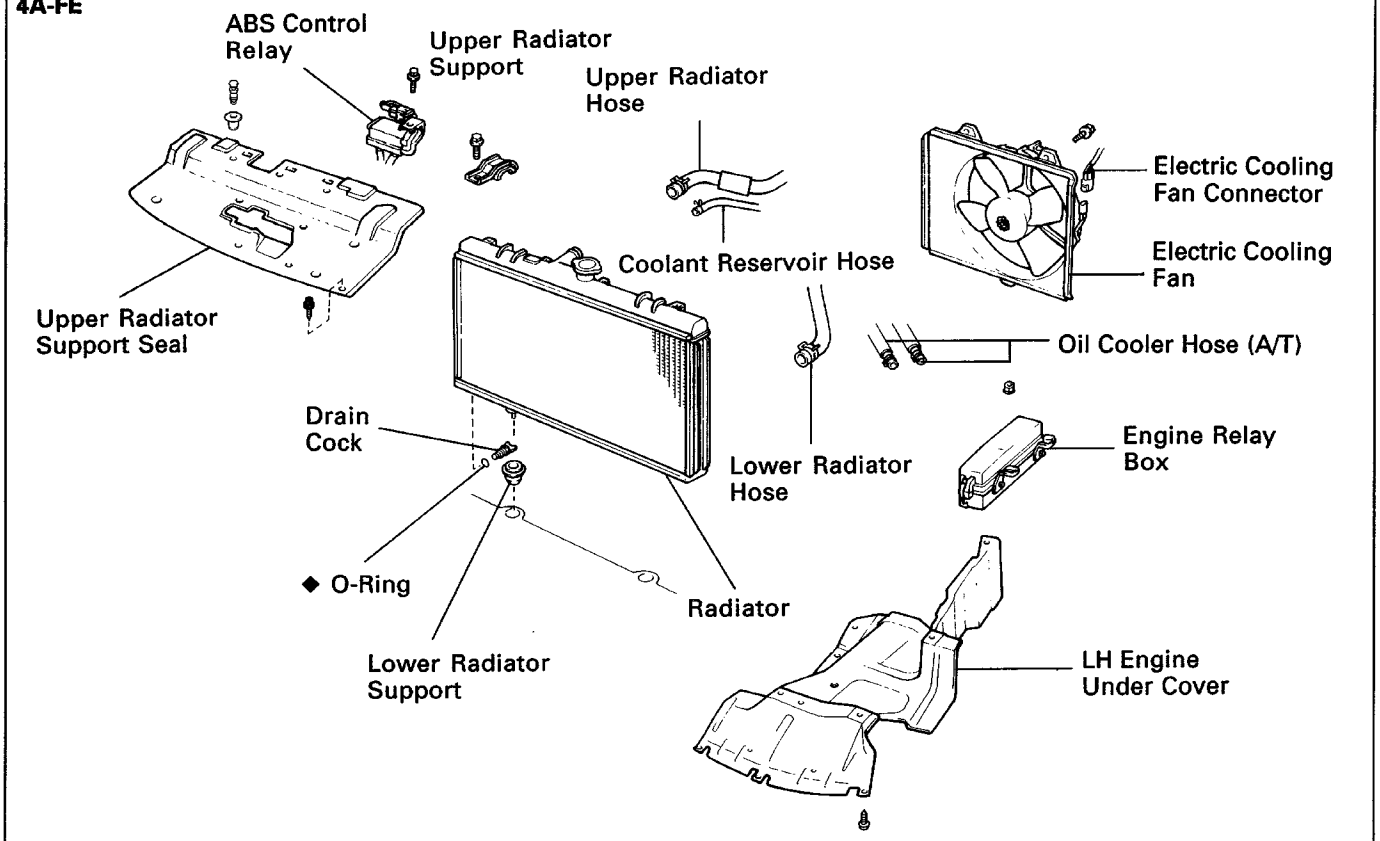
(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Pump it to 118 kPa (1.2 kgf/cm^2, 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.

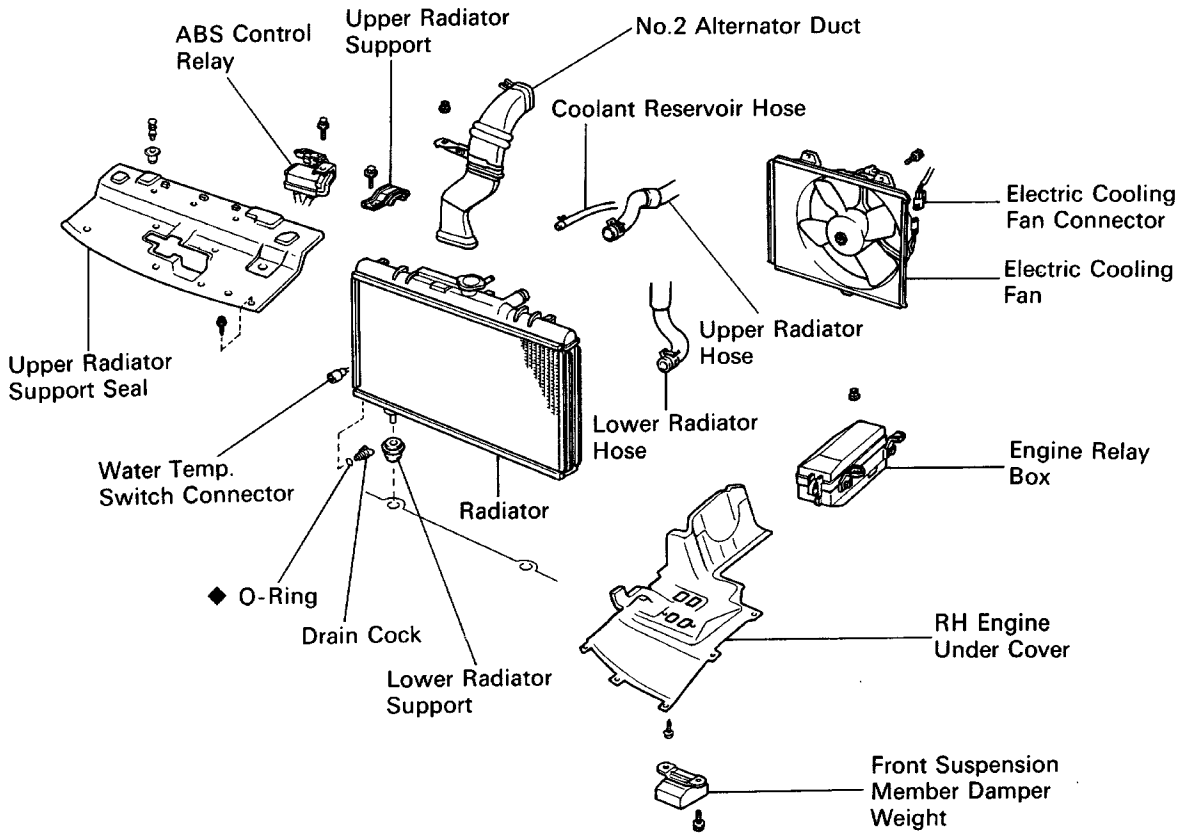
REMOVAL OF RADIATOR

4A-FE



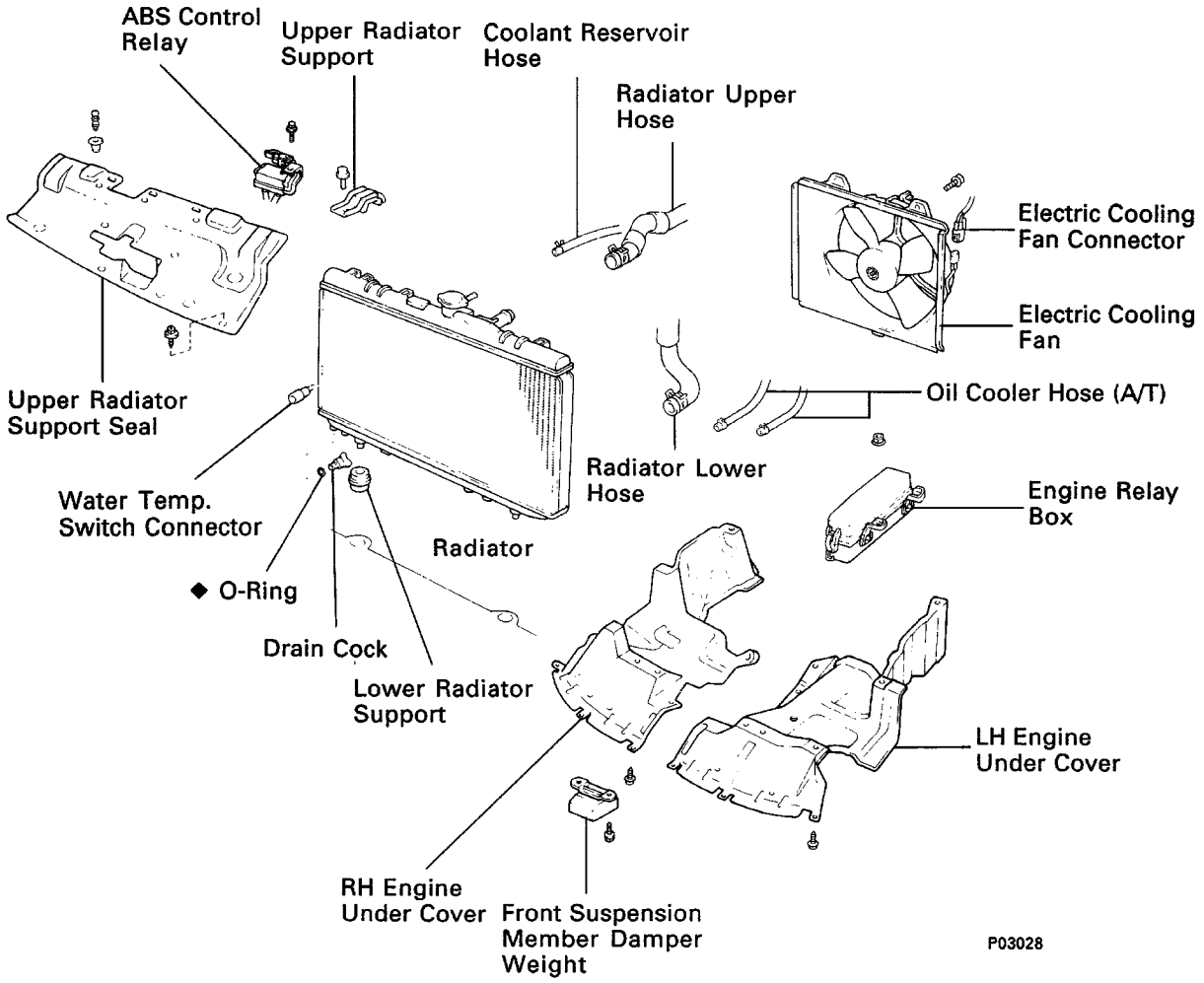
◆ Non-reusable part

3S-GTE



◆ Non-reusable part

5S-FE



◆ Non-reusable part

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

   CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

2. (4A–FE)

   REMOVE LH ENGINE UNDER COVER

3. (3S–GTE AND 5S–FE (M/T))

   REMOVE RH ENGINE UNDER COVER

4. (5S–FE (A/T))

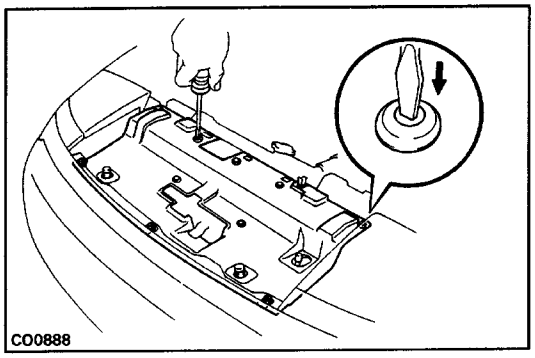
   REMOVE RH AND LH ENGINE UNDER COVERS

5. DRAIN ENGINE COOLANT (See page CO–6)

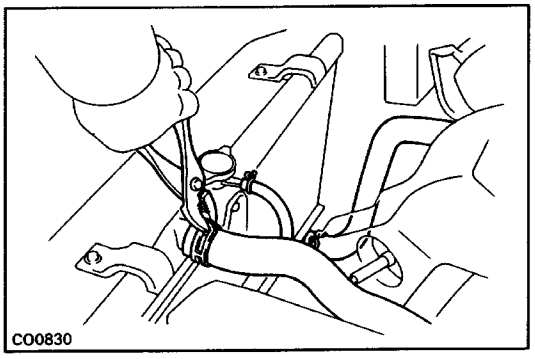
6. (3S–GTE AND 5S–FE)

   DISCONNECT WATER TEMPERATURE SWITCH CONNECTOR

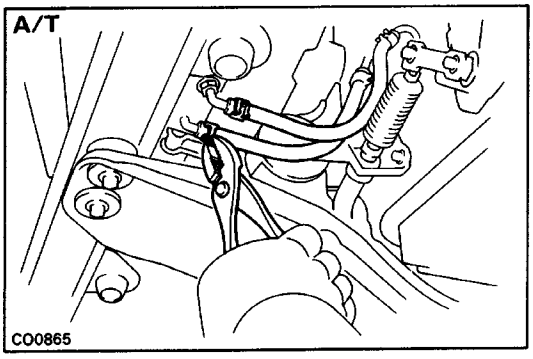
7. (w/ ABS)
DISCONNECT ABS CONTROL RELAY FROM RADIATOR
8. (3S–GTE)
REMOVE NO.2 ALTERNATOR DUCT
9. DISCONNECT ENGINE RELAY BOX FROM BATTERY



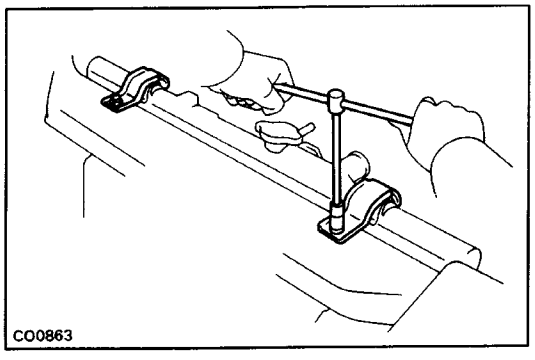
10. REMOVE UPPER RADIATOR SUPPORT SEAL
Remove the seven clips, three screws and support seal.
11. DISCONNECT ELECTRIC COOLING FAN CONNECTOR



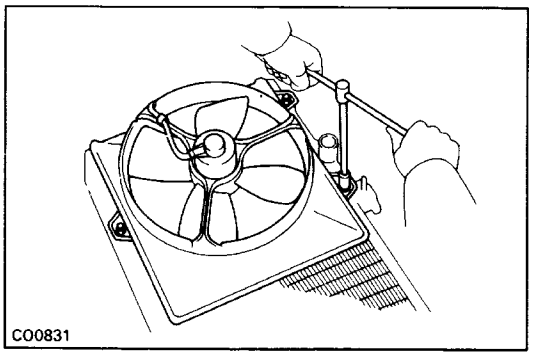
12. DISCONNECT COOLANT RESERVOIR HOSE
13. DISCONNECT RADIATOR HOSES



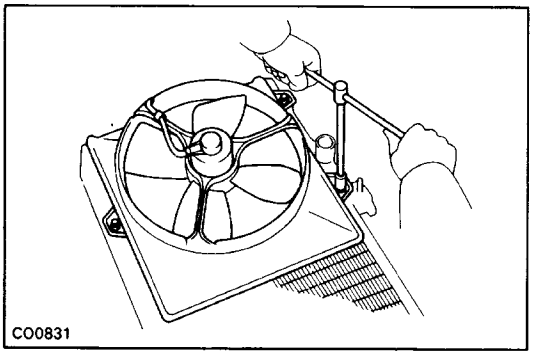
14. (A/T)
DISCONNECT OIL COOLER HOSES .



15. REMOVE RADIATOR AND ELECTRIC COOLING FAN
(a) Remove the two bolts and two upper supports.
(b) Lift out the radiator.
(c) Remove the two lower radiator supports.



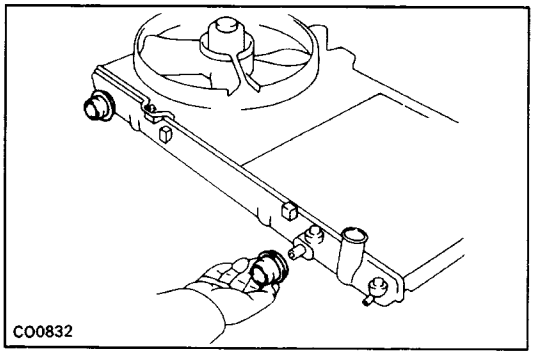
16. REMOVE ELECTRIC COOLING FAN FROM RADIATOR
Remove the three bolts and cooling fan.



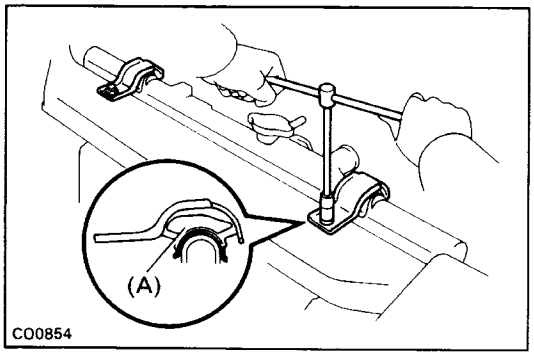
INSTALLATION OF RADIATOR

(See page CO–21 or 22)

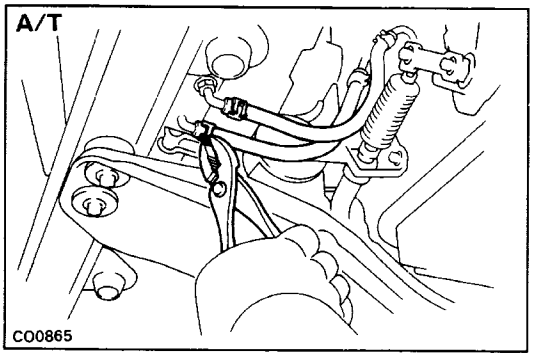
1. INSTALL ELECTRIC COOLING FAN TO RADIATOR
Install the cooling fan with the three bolts.



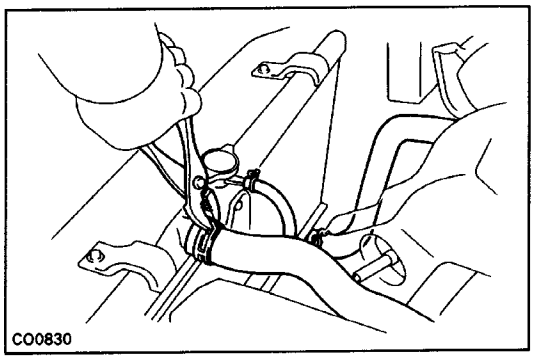
2. INSTALL RADIATOR
(a) Place the two lower radiator supports in position on the body.



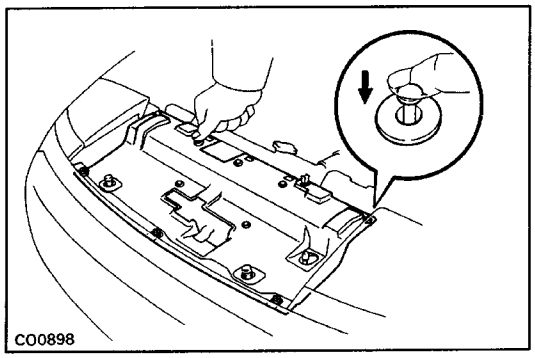
(b) Place the radiator in position, and install the two upper supports with the two bolts.
HINT: After installation, check that the rubber cushion (A) of the supports are not depressed.



3. (A/T)
CONNECT OIL COOLER HOSES



4. CONNECT RADIATOR HOSES
5. CONNECT COOLANT RESERVOIR HOSE
6. CONNECT ELECTRIC COOLING FAN CONNECTOR

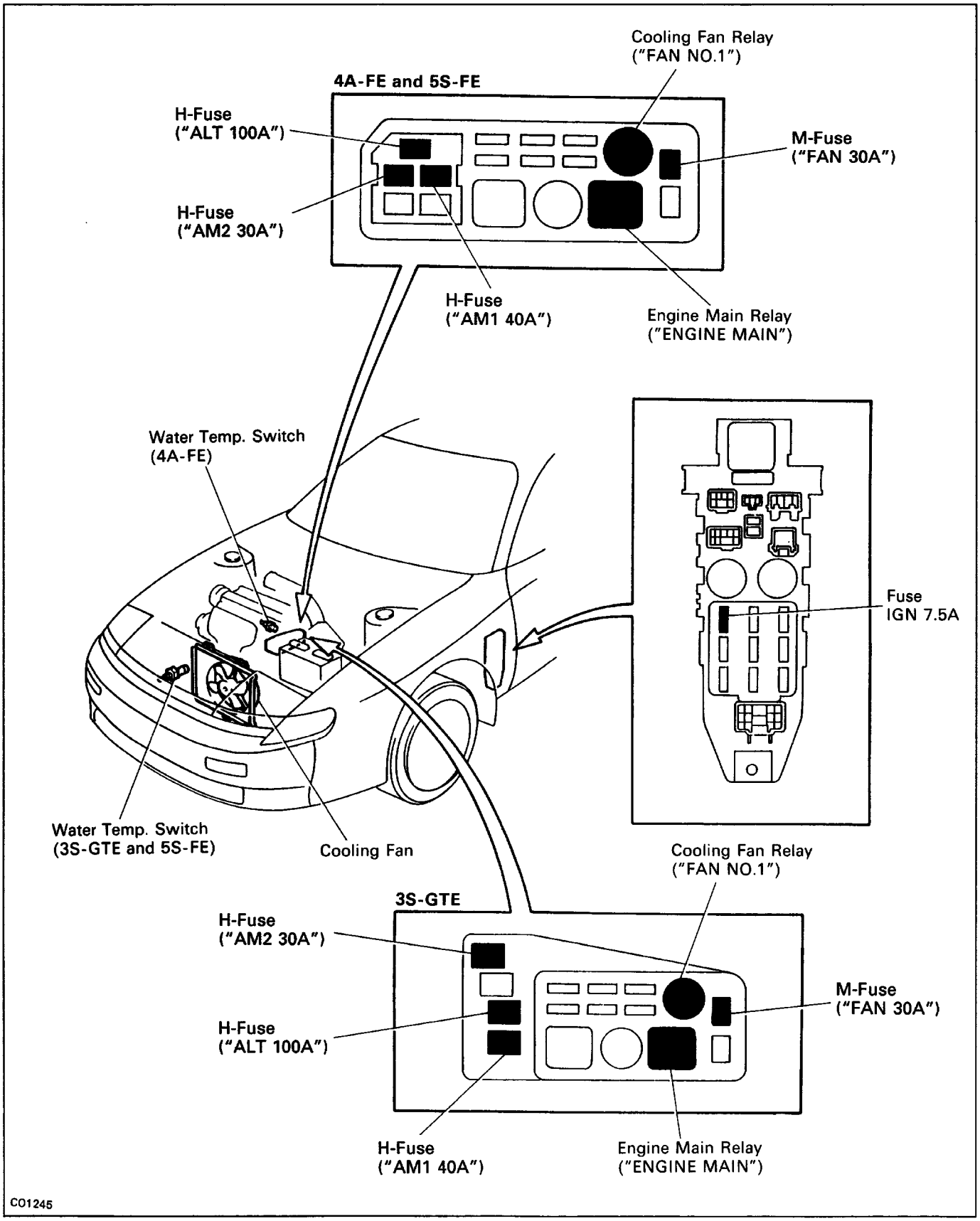


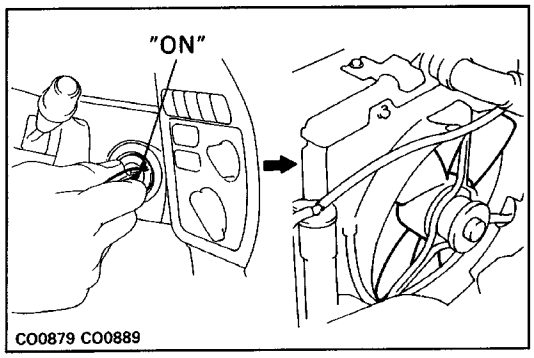
7. INSTALL UPPER RADIATOR SUPPORT SEAL
Install the support seal with the seven clips and three screws.

8. INSTALL ENGINE RELAY BOX
9. (3S–GTE)
INSTALL NO.2 ALTERNATOR AIR DUCT
10. (w/ ABS)
INSTALL ABS CONTROL RELAY
11. (3S–GTE AND 5S–FE)
CONNECT WATER TEMPERATURE SWITCH CONNECTOR
12. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
13. FILL WITH ENGINE COOLANT (See page CO–6)
14. START ENGINE AND CHECK FOR LEAKS
15. (A/T)
CHECK AUTOMATIC TRANSMISSION (A/T) FLUID LEVEL (See page MA–13)
NOTICE: Do not overfill.
16. (4A–FE)
INSTALL LH ENGINE UNDER COVER
17. (3S–GTE AND 5S–FE (M/T))
INSTALL RH ENGINE UNDER COVER
18. (5S–FE (A/T))
INSTALL RH AND LH ENGINE UNDER COVERS

ELECTRIC COOLING FANS

LOCATION OF ELECTRIC COOLING FAN COMPONENTS





ON–VEHICLE INSPECTION

Low Temperature (Below 83˚C (181 ˚F))

1. TURN IGNITION SWITCH "ON"

Check that the cooling fan stops.

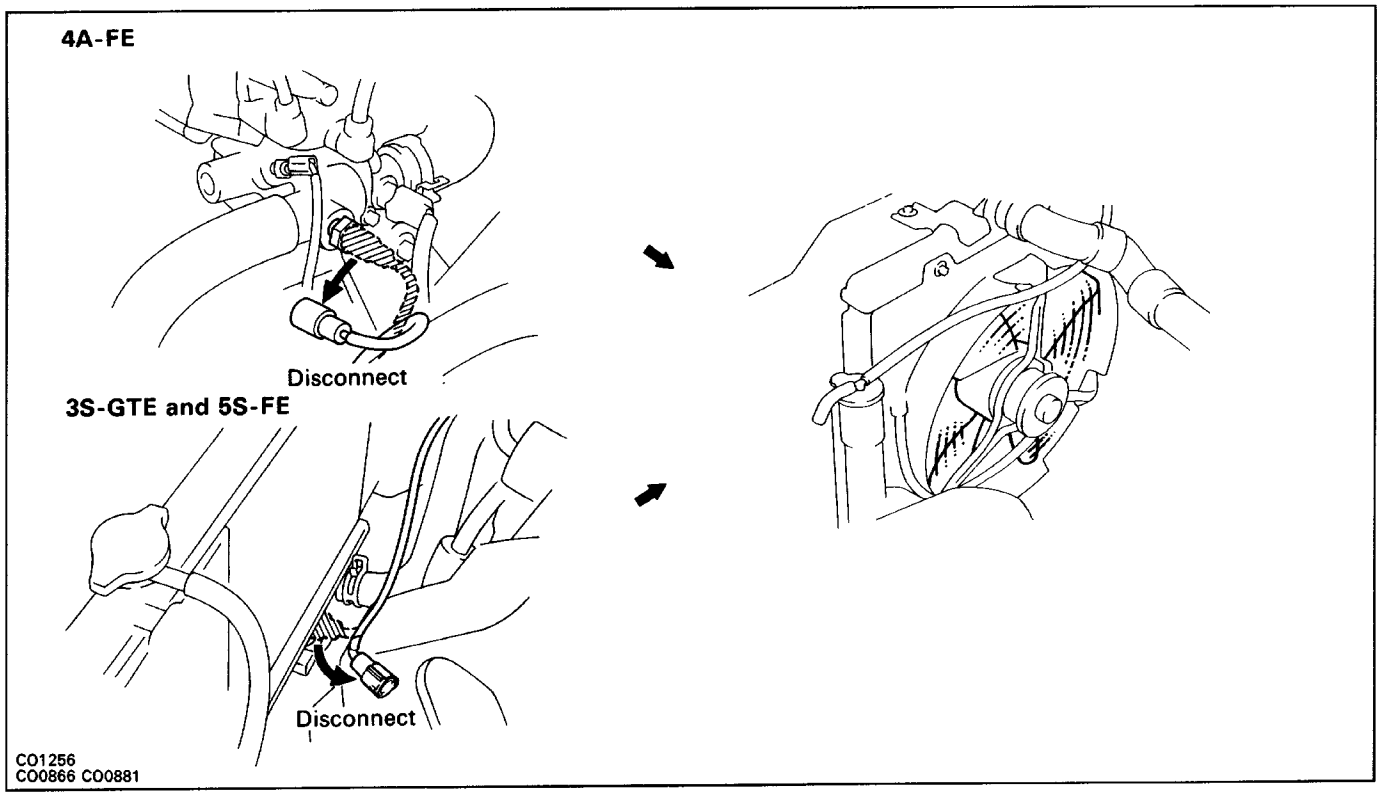
If not, check the cooling fan relay and water temperature switch, and check for a separated connector or severed wire between the cooling fan relay and water temperature switch.

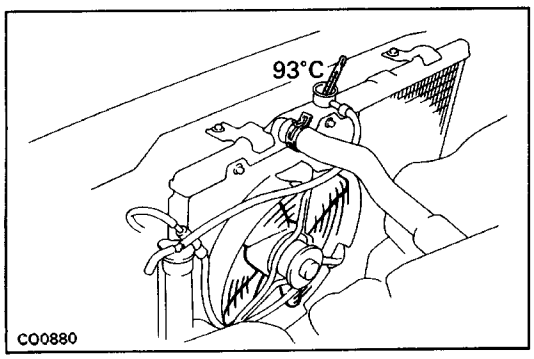
2. DISCONNECT WATER TEMPERATURE SWITCH CONNECTOR

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 water temperature switch.

3. CONNECT WATER TEMPERATURE SWITCH CONNECTOR





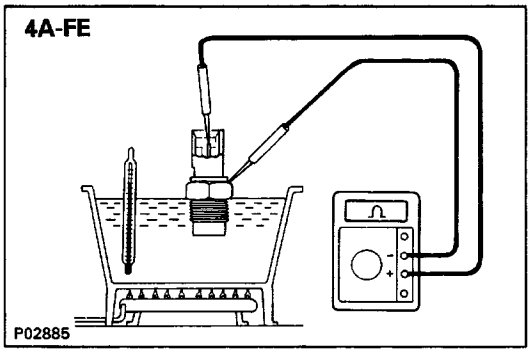
High Temperature (Above 93˚C (199˚F))

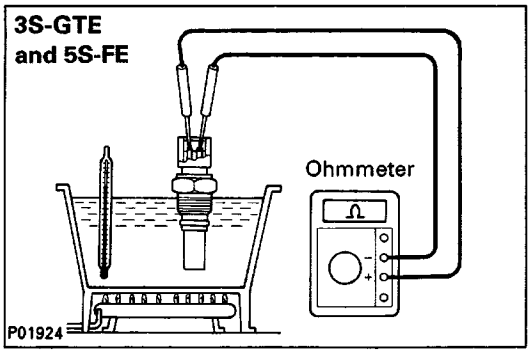
4. START ENGINE

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

(b) Check that the cooling fan rotates.

If not, replace the water temperature switch.





INSPECTION OF ELECTRIC COOLING FAN COMPONENTS

1. INSPECT WATER TEMPERATURE SWITCH (4A–FE)

(a) Using an ohmmeter, check that there is no continuity between the terminal and switch body when the coolant temperature is above 93˚C (199˚F).

(b) Using an ohmmeter, check that there is continuity between the terminal and switch body when the coolant temperature is below 83˚C (181T).

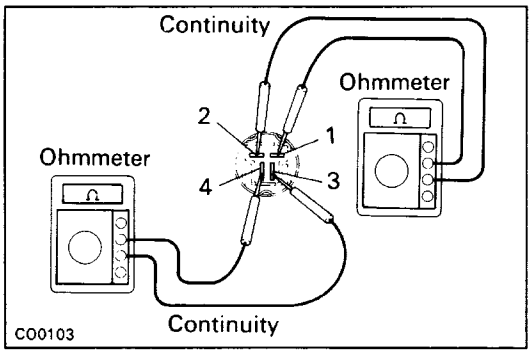
If continuity is not as specified, replace the switch.

(3S–GTE and 5S–FE)

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

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

If continuity is not as specified, replace the switch.



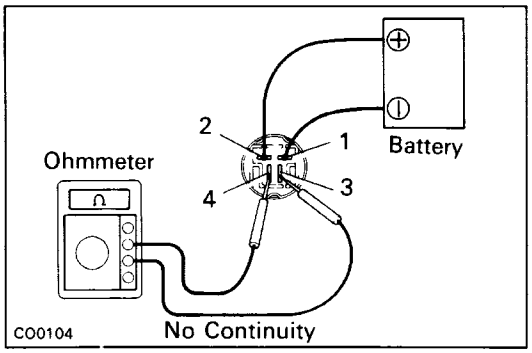
2. INSPECT COOLING FAN RELAY (”FAN NO.1 ”)

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

(b) Check that there is continuity between terminals 3 and 4.

If continuity is not as specified, replace the relay.

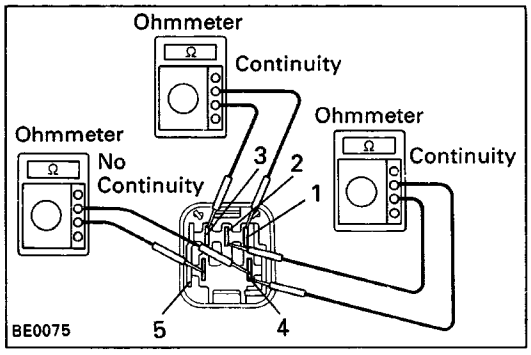


B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.



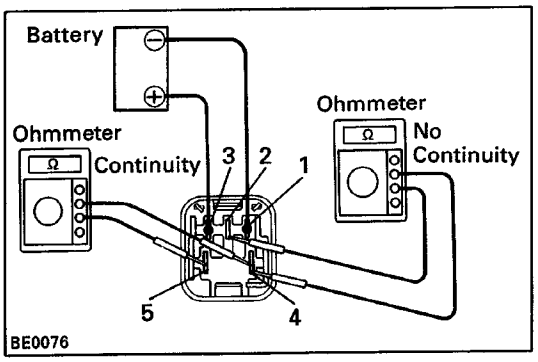
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 4.

(c) Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



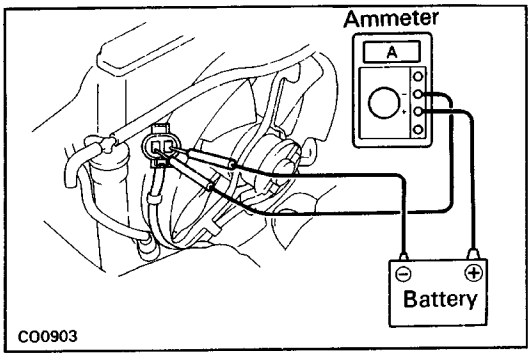
6. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.

(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 4.

(c) Check that there is continuity between terminals 4 and 5.

If operation is not as specified, replace the relay.



4. INSPECT COOLING FAN

(a) Connect battery and ammeter to the cooling fan connector.

(b) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

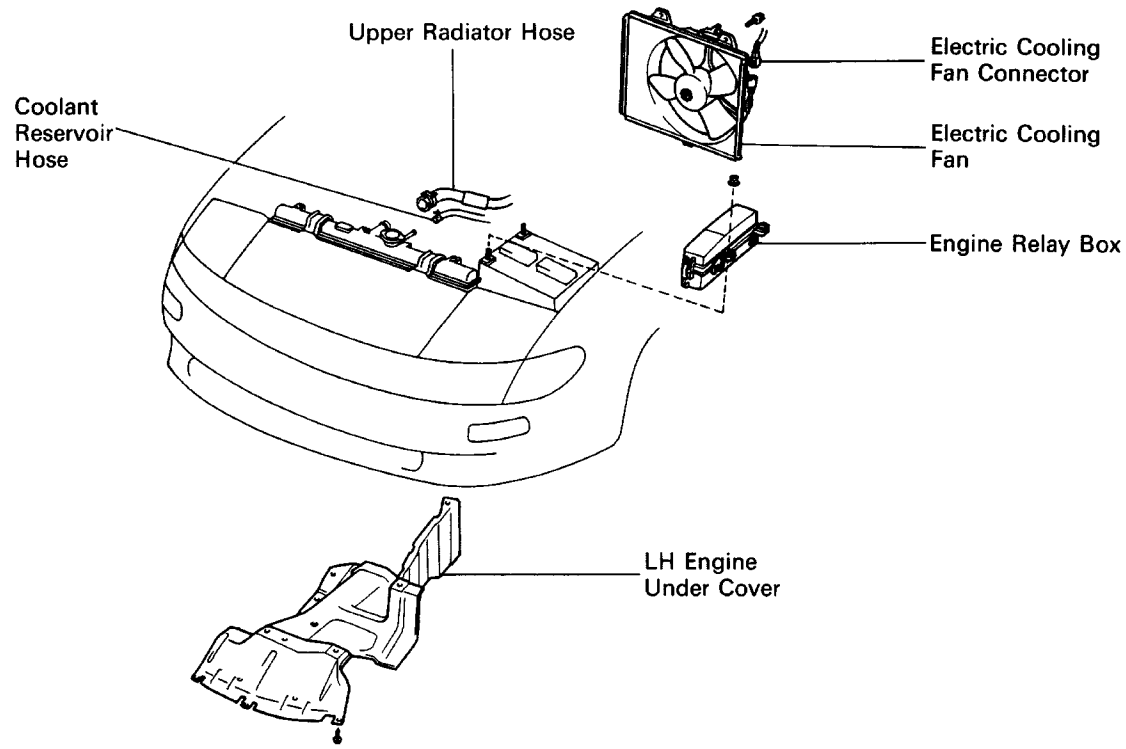
Standard amperage:

4A–FE and 5S–FE 5.8 – 7.4 A

3S–GTE 8.8 –10.8 A

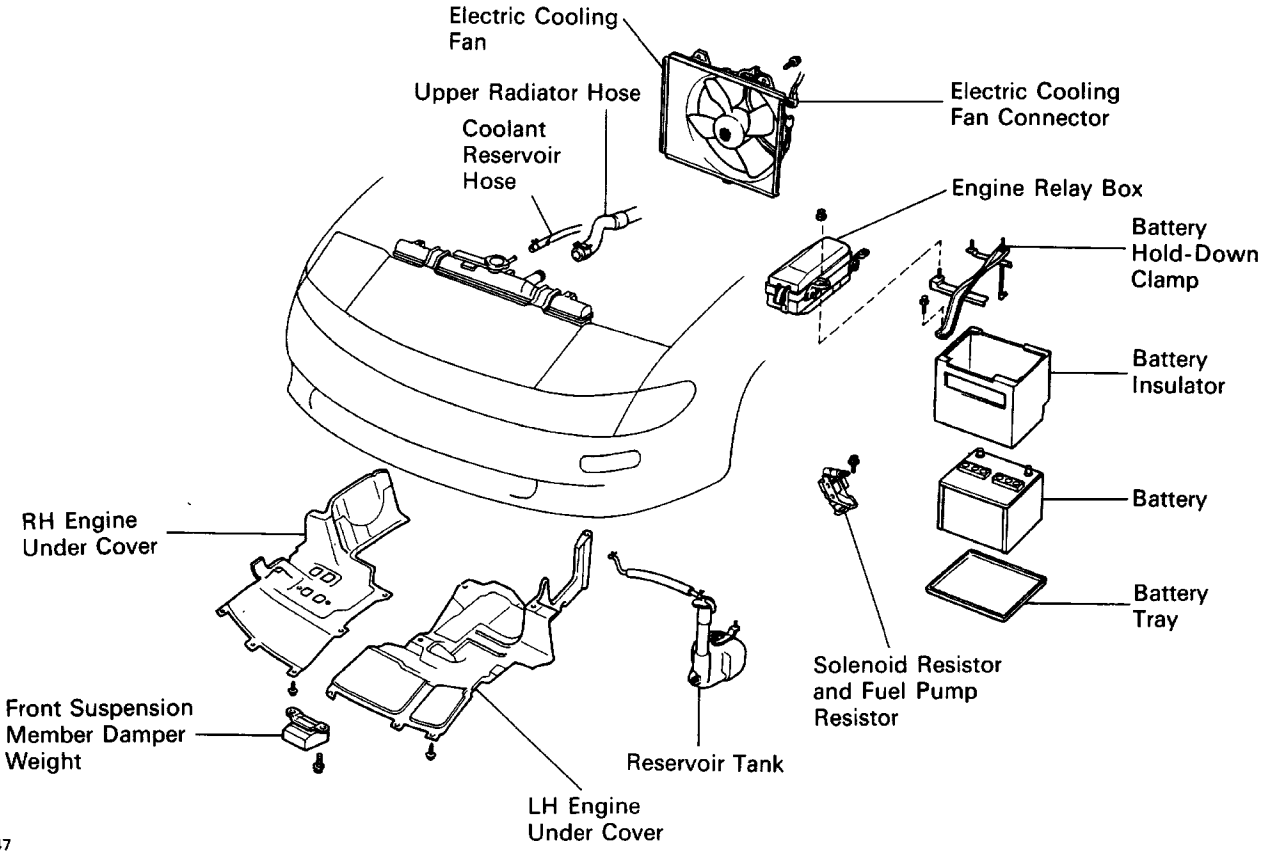
REMOVAL OF ELECTRIC COOLING FAN

4A-FE



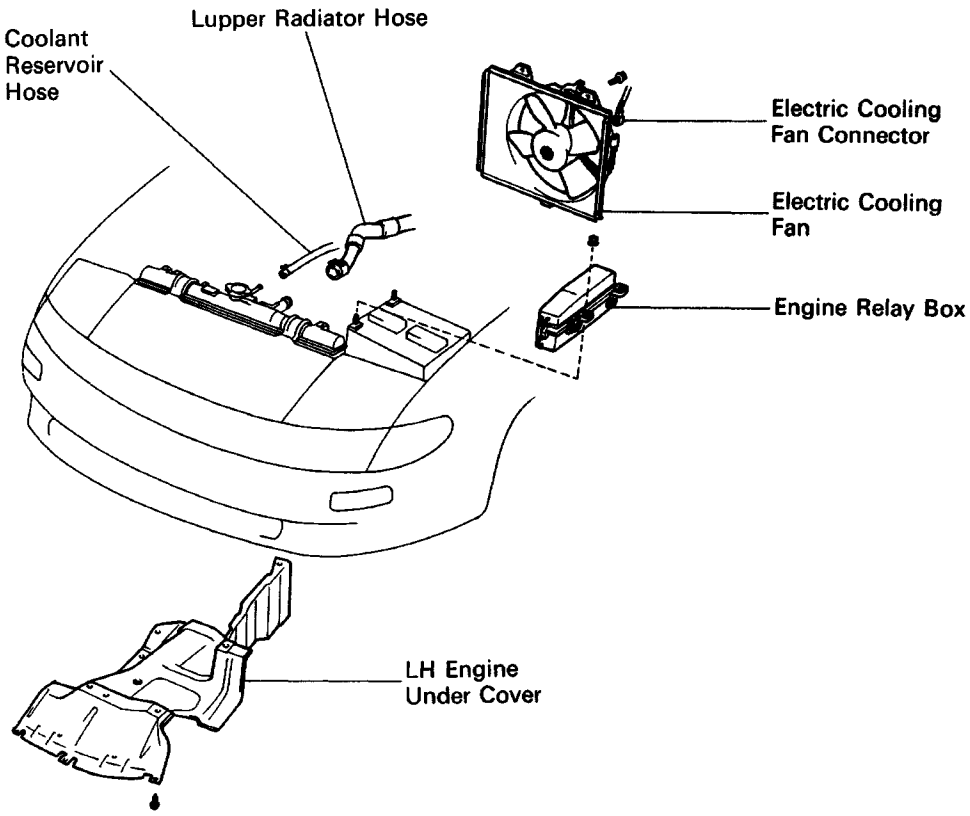
CO1246

3S-GTE



CO1247

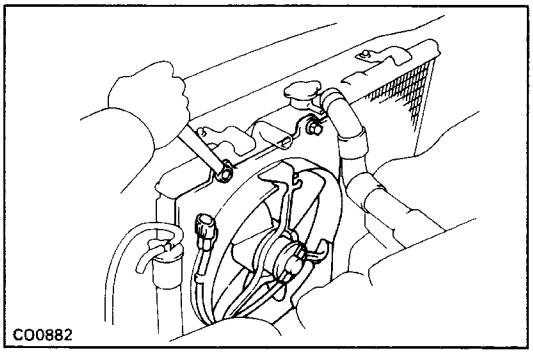
5S-FE



CO0883

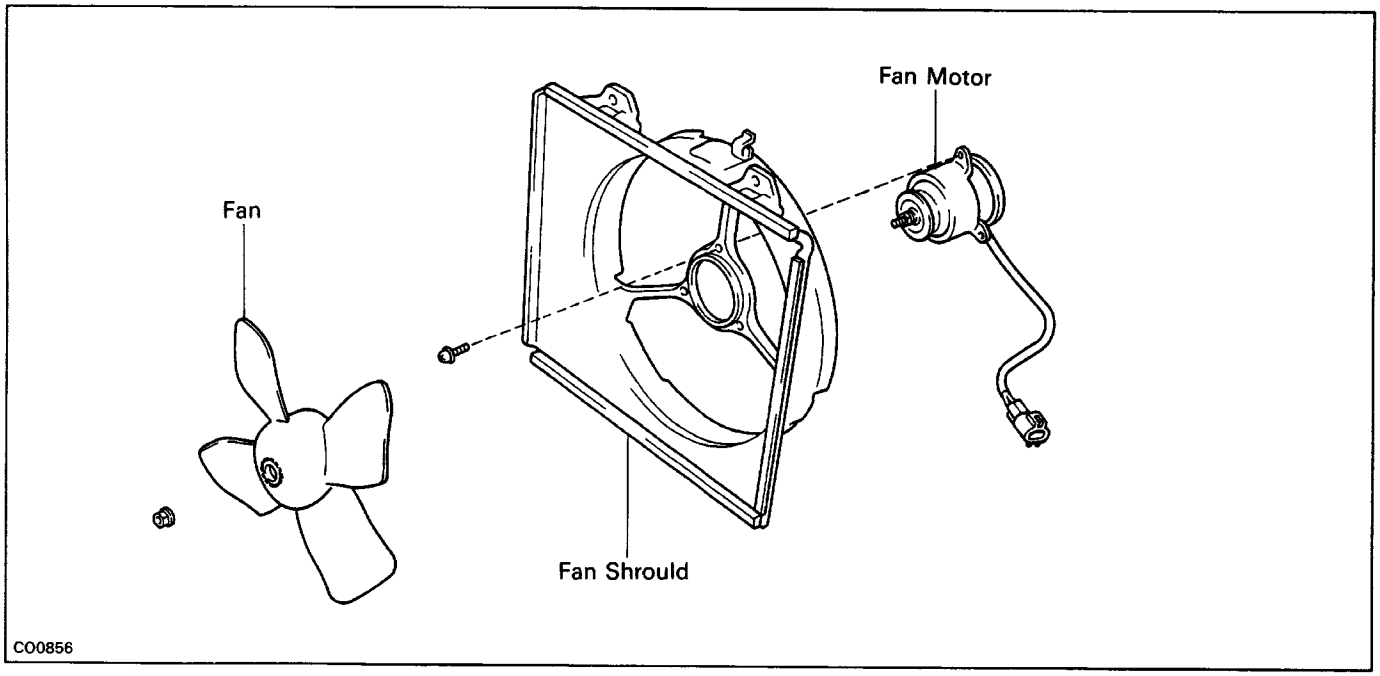
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
   CAUTION:Work must be started after approx.20 seconds or longer from the time the ignition switch is turned to the “LOCK”position and the negative(–) terminal cable is disconnect from the battery.
2. (4A–FE AND 5S–FE)
   RENOVE LH ENGINE UNDER COVER
3. (3S–GTE)
   REMOVE RH AND LH ENGINE UNDER COVERS
4. DRAIN ENGINE COOLANT (See page CO–6)
5. DISCONNECT ENGINE RELAY BOX FROM BATTERY
6. (3S–GTE)
   REMOVE BATTERY
7. (3S–GTE)
   REMOVE SOLENOID RESISTOR AND FUEL PUMP RESISTOR

8. (3S–GTE)
REMOVE RESERVOIR TANK
9. (4A–FE AND 5S–FE)
DISCONNECT COOLANT RESERVOIR HOSE FROM RADIATOR
10. DISCONNECT UPPER RADIATOR HOSE FROM RADIATOR

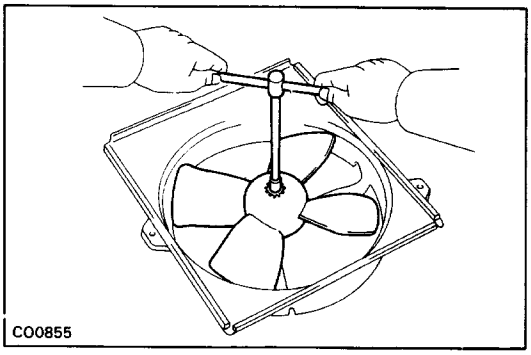

CO0882

11. REMOVE ELECTRIC COOLING FAN
(a) Disconnect the cooling fa¿¿ connector.
(b) Remove the three bolts and cooling fan.

COMPONENTS

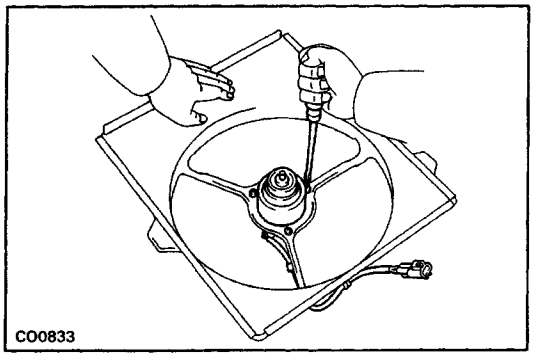


CO0856


CO0855

DISASSEMBLY OF ELECTRIC COOLING FAN

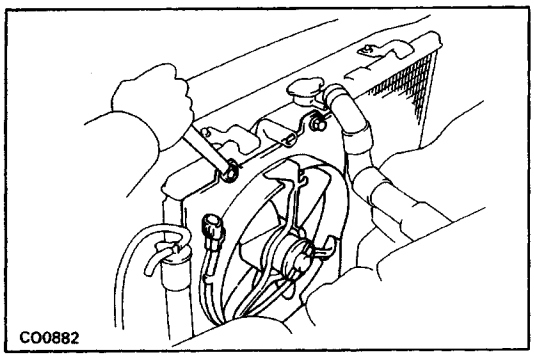
1. REMOVE FAN
Remove the nut and fan.



2. REMOVE FAN MOTOR
Remove the three screws and fan motor.

ASSEMBLY OF ELECTRIC COOLING FAN

(See page CO–32)
1. INSTALL FAN MOTOR
2. INSTALL FAN



INSTALLATION OF ELECTRIC COOLING FAN

(See page CO–30 or 31)
1. INSTALL ELECTRIC COOLING FAN
(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.
2. CONNECT UPPER RADIATOR HOSE TO RADIATOR
3. (4A–FE AND 5S–FE)
CONNECT COOLANT RESERVOIR HOSE TO RADIATOR
4. (3S–GTE)
INSTALL RESERVOIR TANK
5. (3S–GTE)
INSTALL SOLENOID RESISTOR AND FUEL PUMP RESISTOR
6. (3S–GTE)
INSTALL BATTERY
7. INSTALL ENGINE RELAY BOX FROM BATTERY
8. FILL WITH ENGINE COOLANT (See page CO–6)
9. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
10. START ENGINE AND CHECK FOR LEAKS
11. (3S–GTE)
INSTALL RH AND LH ENGINE UNDER COVERS
12. (4A–FE AND 5S–FE)
INSTALL LH ENGINE UNDER COVER