

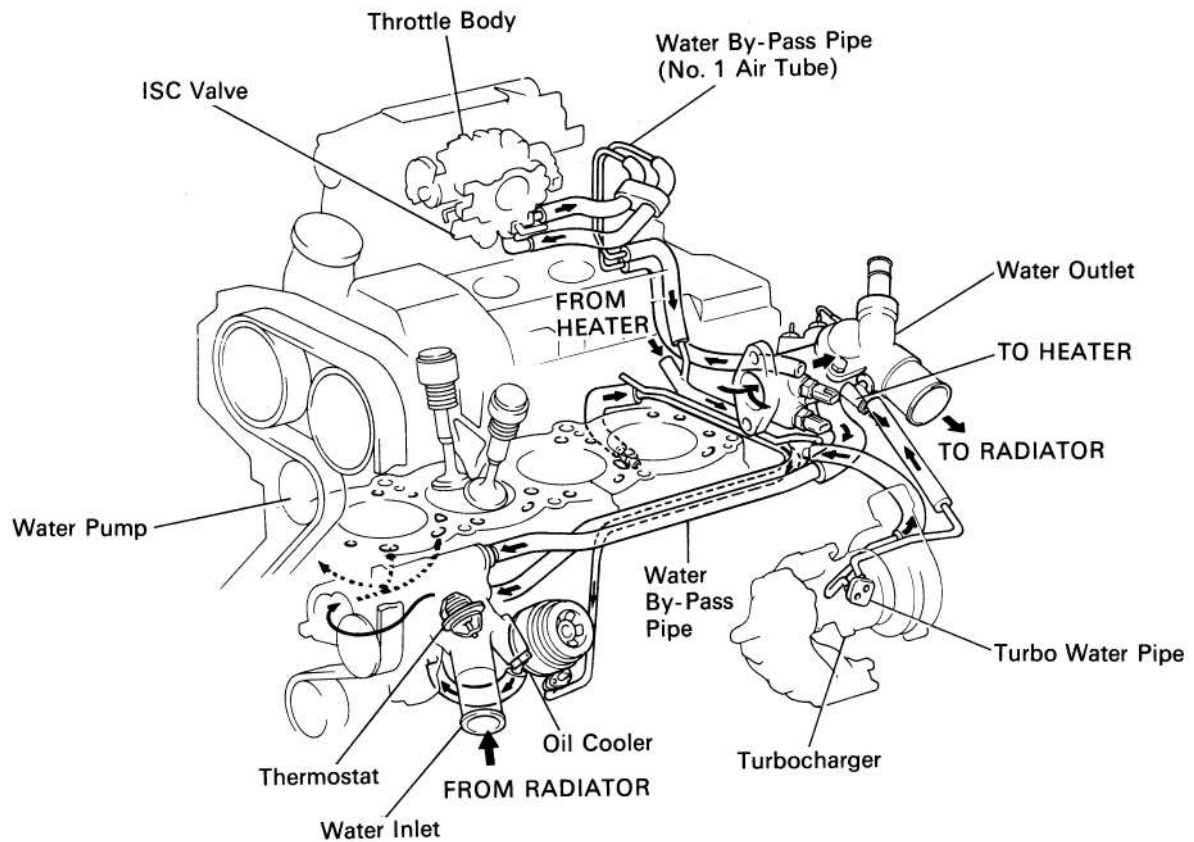
COOLING SYSTEM

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DESCRIPTION

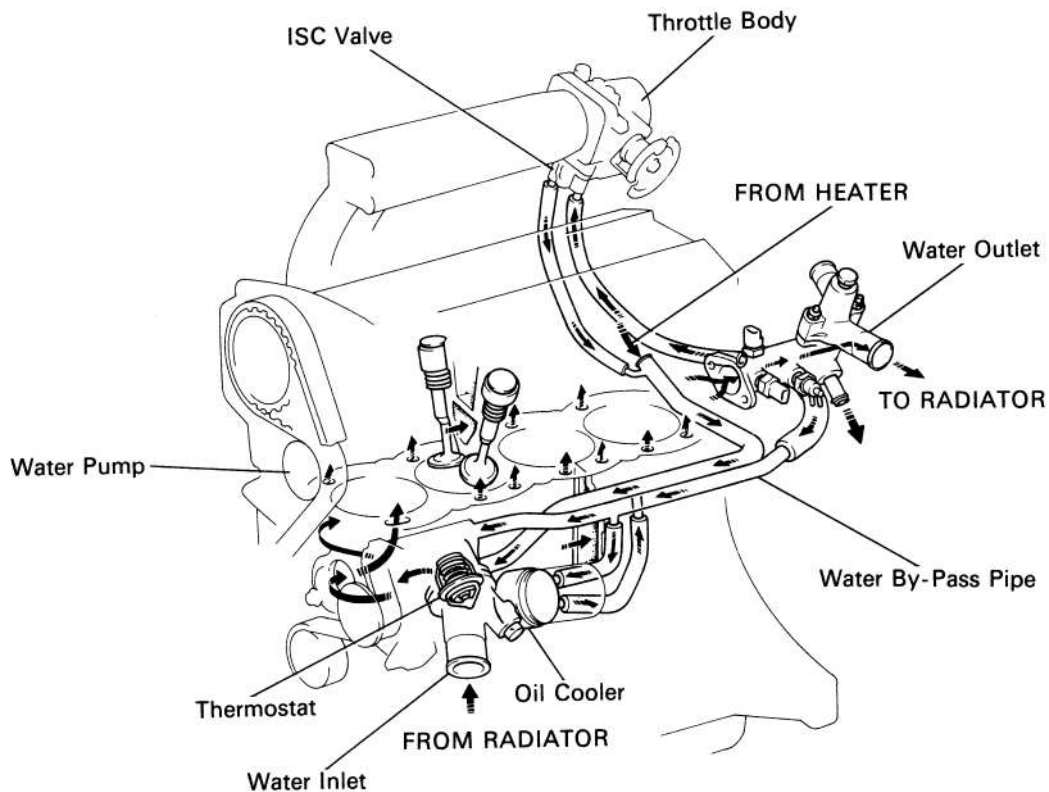
This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a by-pass valve mounted on the inlet side.

3S-GTE



CO0980

5S-FE



CO0981

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 MR2 radiator is different from that in other models, in that it is a cross flow type in which the coolant flows horizontally. It includes side tanks and a core which connects them. The inlet for coolant from the water jacket and the drain cock for draining out coolant are located in the left tank. The outlet coolant and an air drain, which facilitates the supply of coolant to the engine are located in the right tank. The core contains many tubes through which coolant flows from left tank to the right tank as well as cooling fins which radiate heat away from the coolant in the tubes. Air sucked in by the electric cooling fan, as well as the wind generated by the vehicle's travel, passes through the radiator, cooling the coolant heated by the water jacket as it passes through the tubes in the core. Models with automatic transmission include an automatic transmission fluid cooler incorporated into the cooling pipes. 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; 0.3 – 1.0 kg/cm², 4.3 – 14.2 psi, 29.4 – 98.1 kPa). The vacuum valve opens to alleviate the vacuum which develops in the coolant 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 timing belt.

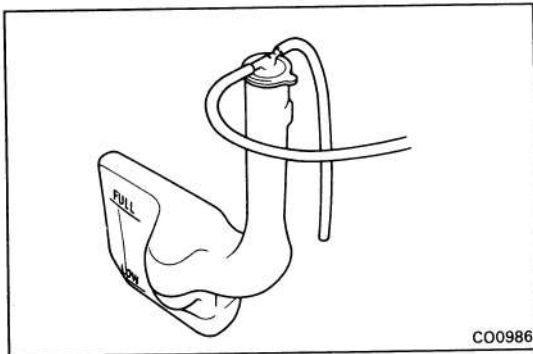
THERMOSTAT

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-16
	Hoses, water pump, thermostat housing, radiator, heater, core plugs or head gasket leakage	Repair as necessary	
	Thermostat faulty	Check thermostat	CO-14
	Incorrect ignition timing	Reset timing	IG-17, 22
	Electric cooling system faulty	Inspect electric cooling system	CO-22, 33
	Radiator hose plugged or rotted	Replace hose	
	Water pump faulty	Replace water pump	CO-10
	Radiator plugged or cap faulty	Check radiator and cap	CO-16
	Cylinder head or block cracked or water passage clogged	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.

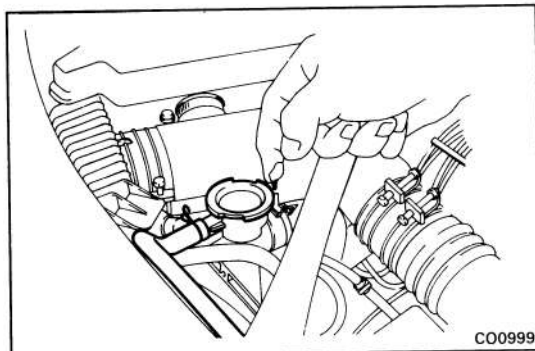


CO0986

ENGINE COOLANT CHECK

- CHECK ENGINE COOLANT LEVEL AT RESERVE TANK**
The coolant level should be between the "LOW" and "FULL" lines.

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



CO0999

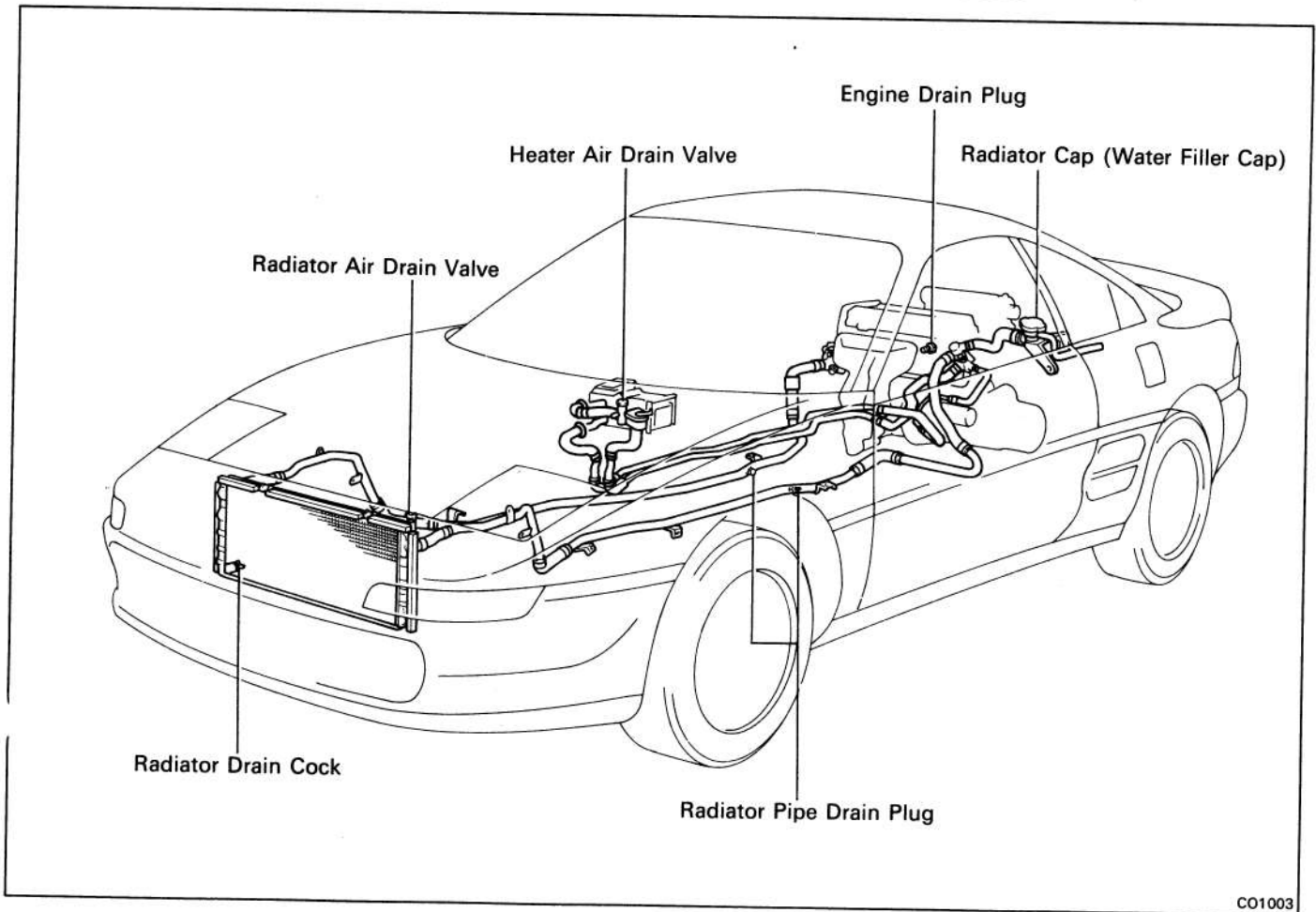
- CHECK ENGINE COOLANT QUALITY**

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

If excessively dirty, replace the coolant.

REPLACEMENT OF ENGINE COOLANT

ENGINE COOLANT CIRCUIT



CO1003

NOTICE:

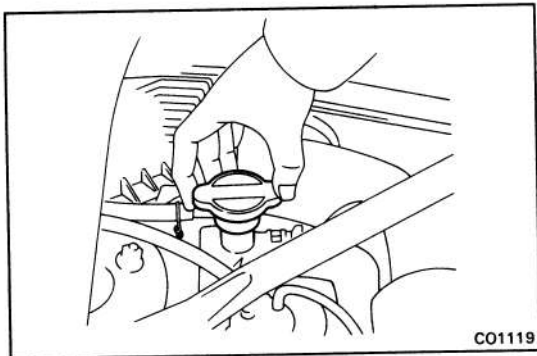
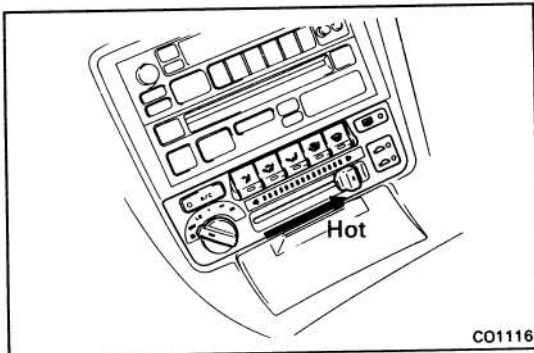
- To avoid the danger of burns, do not begin work until the engine and coolant are properly cooled down.
- To ensure that coolant is poured in properly, perform the operation at a level area. Performing work with the vehicle inclined may cause improper removal of coolant or improper air removal when pouring coolant.
- When replacement has been performed, check the water level in the water filler and reservoir tank once or twice within 500 km (311 miles) of driving or within one week.

DRAINAGE OF ENGINE COOLANT

1. REMOVE REAR FUEL TANK PROTECTOR
2. REMOVE FRONT LUGGAGE UNDER COVERS

3. DRAIN ENGINE COOLANT

- (a) Set the heater control lever to hot.



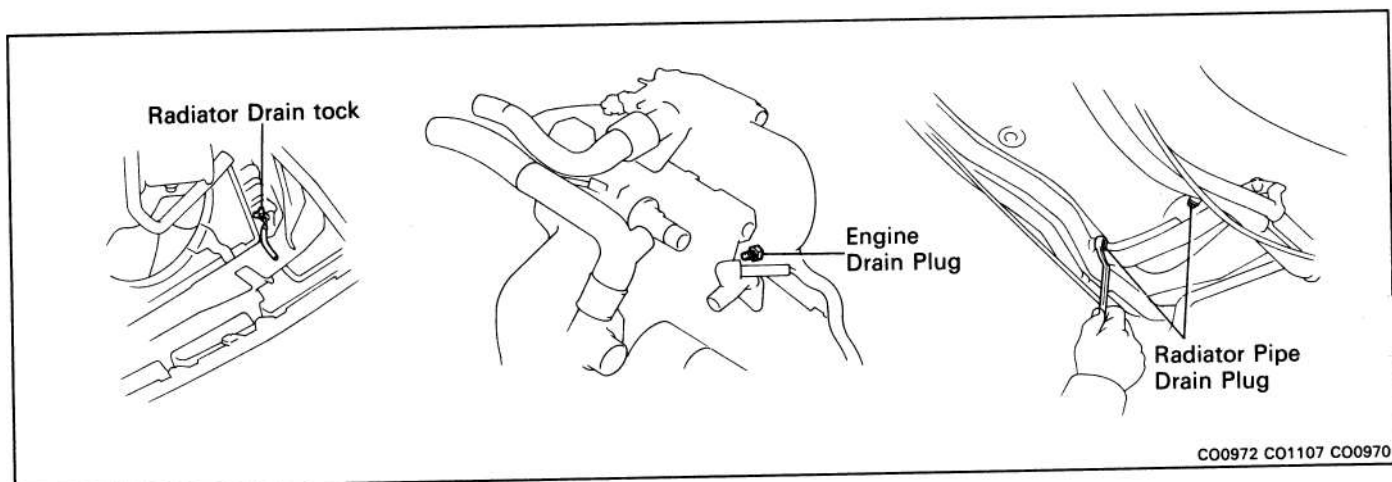
- (b) Remove the radiator cap.

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

- (c) Drain the coolant from the radiator cock and engine drain plug (engine drain plug are at the rear left of engine block) and two radiator pipe plugs.
- (d) Close the drain cocks.

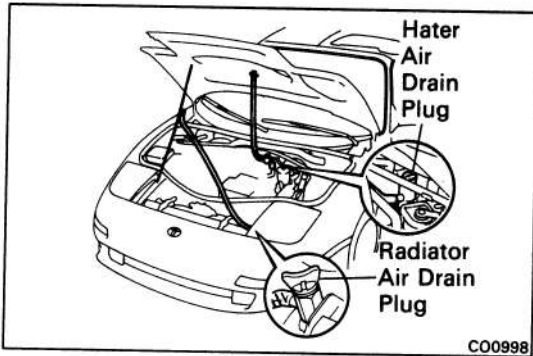
Torque:

Engine drain plug		
3S-GTE	250 kg-cm (18 ft-lb, 25 N·m)	
5S-FE	130 kg-cm (9 ft-lb, 13 N·m)	
Radiator drain plug	170 kg-cm (12 ft-lb, 17 N·m)	



REFILL OF ENGINE COOLANT

1. REMOVE SPARE TIRE
2. REMOVE FRONT LUGGAGE COMPARTMENT TRIM
3. REMOVE UPPER RADIATOR SUPPORT SEAL

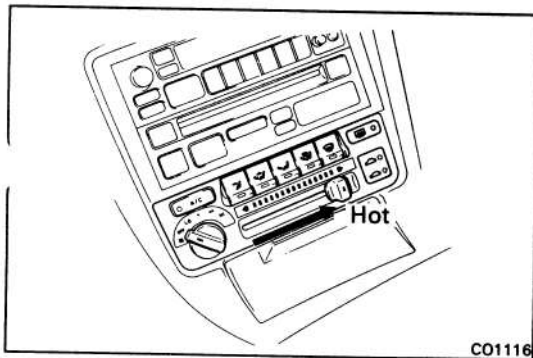
**4. SET SERVICE HOSES**

- (a) Connect the service hoses to the radiator air drain and heater valve.
- (b) Suspend the opposite end to the service hose connected to radiator air drain to the front hood stay.
- (c) Suspend the opposite end to the service hose connected to heater valve to the front hood.

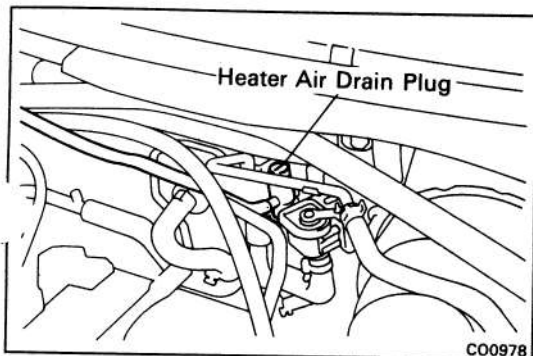
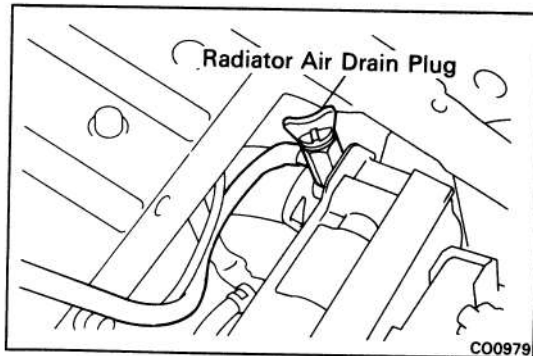
NOTICE: Do not close-off or pinch any of the service hoses.

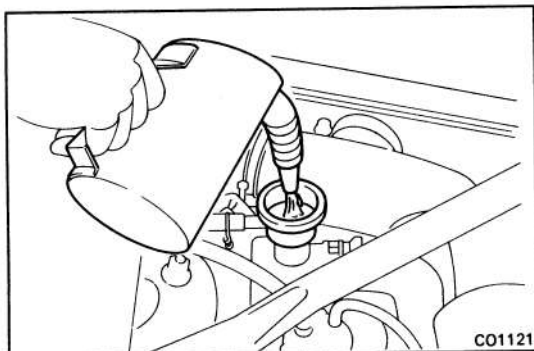
5. FILL WITH ENGINE COOLANT

- (a) Set the heater control lever to hot.



- (b) Open the radiator and heater air drain plugs above three turns.





(c) Slowly fill the water filler 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 is recommended).

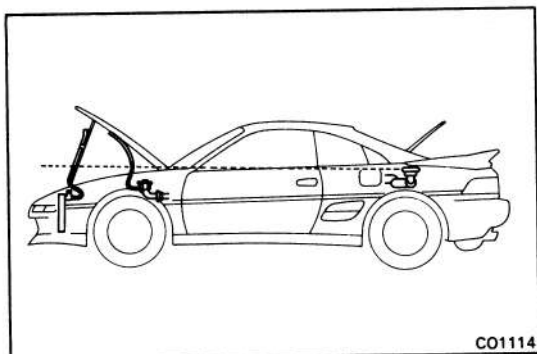
NOTICE:

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

Capacity (w/ Heater):

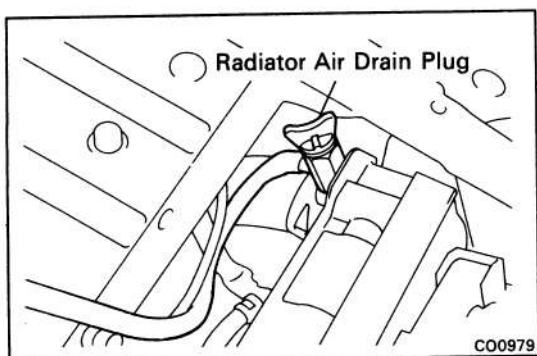
3S-GTE 13.6 liters (14.4 US qts, 12.0 Imp. qts)
5S-FE 13.0 liters (13.7 US qts, 11.4 Imp. qts)

(d) Check that air is absent from the air drain plugs of the radiator and heater while filling the water filler inlet to the top with coolant.

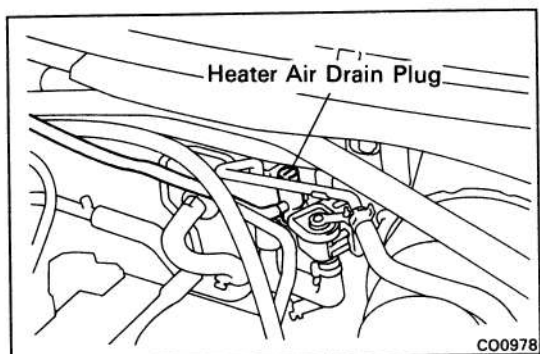


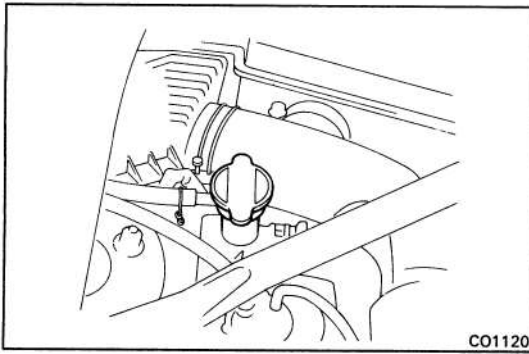
(e) Visually check that the level of coolant in the air drain service hoses of the radiator and heater are the same as in the water filler.

NOTICE: If the water level in the air drain service hose is clearly lower, air removal has been incomplete so check if the service hose is crushed or bent, then perform step (c).



(f) When the coolant level in the air drain service hoses stops dropping, close the air drain plugs of the radiator and heater.

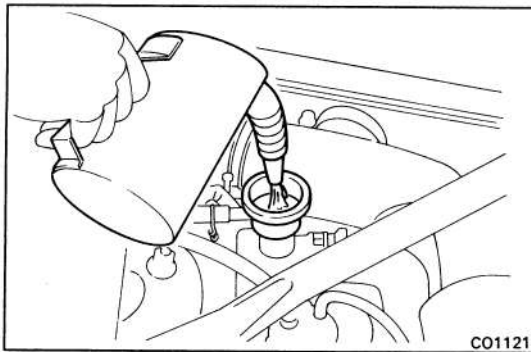




(g) Fasten the radiator cap to the first stop point.

NOTICE: Do not tighten the radiator cap completely (to the second stop point).

(h) Start the engine and run at fast idle for approx. 3 minutes, and stop the engine.

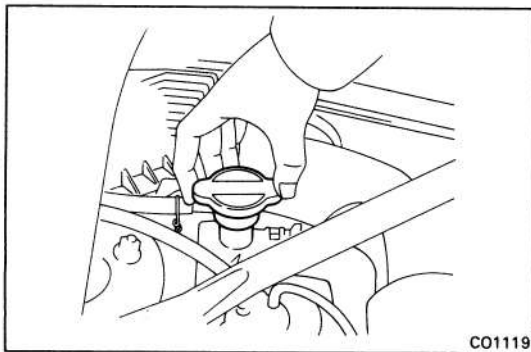


(i) Add more coolant and repeat steps (h) and (i).

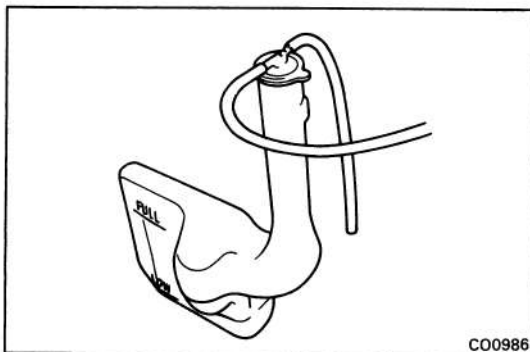
HINT: By performing steps (h) and (i), 0.2 – 0.5 liters (0.2 – 0.5 US qts, 0.2 – 0.4 Imp. qts) can normally be added.

(j) Check that the coolant level in the water filler has not dropped.

If the coolant level has dropped, add coolant and repeat the steps from (g) onward.



(k) Completely tighten the radiator cap.

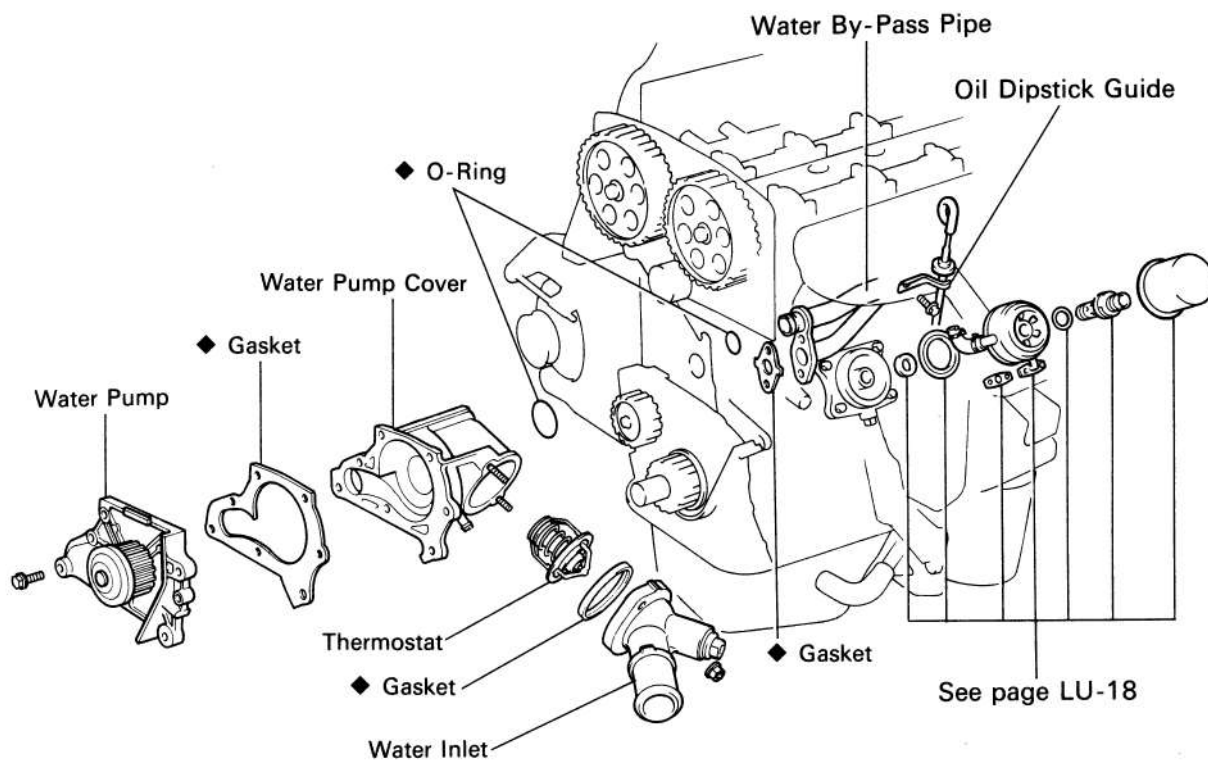


(l) Fill coolant into the reservoir tank up to the "FULL" line.

6. INSTALL UPPER RADIATOR SUPPORT SEAL
7. INSTALL FRONT LUGGAGE COMPARTMENT TRIM
8. INSTALL SPARE TIRE
9. INSTALL REAR FUEL TANK PROTECTOR
10. INSTALL FRONT LUGGAGE UNDER COVERS

WATER PUMP COMPONENTS

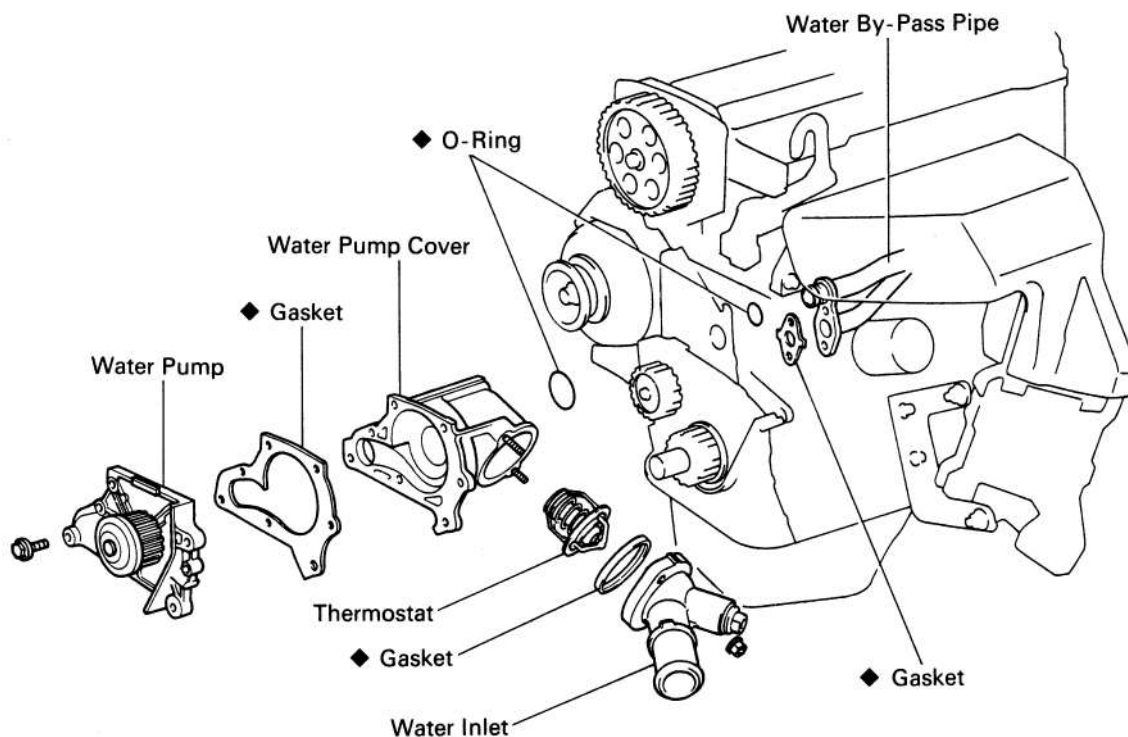
3S-GTE



◆ Non-reusable part

CO1117

5S-FE



◆ Non-reusable part

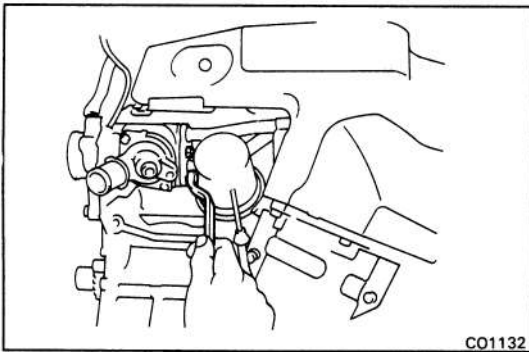
CO1113

REMOVAL OF WATER PUMP

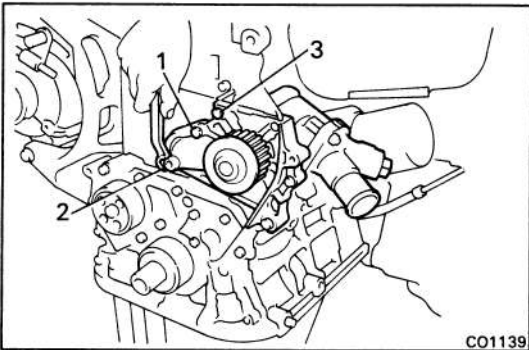
(See page CO-10)

1. DRAIN ENGINE COOLANT (See page CO-6)
2. DISCONNECT RADIATOR HOSE FROM WATER INLET
3. REMOVE TIMING BELT
 3S-GTE (See steps 1 to 25 on pages EM-26 to 31)
 5S-FE (See steps 1 to 21 on pages EM-47 to 52)
4. (5S-FE)
 REMOVE A/C COMPRESSOR IDLER PULLEY
 (See steps 31 ((b) to (d)) on page EM-187)
5. REMOVE NO.2 IDLER PULLEY
 3S-GTE (See step 27 on page EM-32)
 5S-FE (See step 23 on page EM-52)
6. (5S-FE)
 REMOVE TIMING BELT TENSION SPRING
7. (3S-GTE)
 REMOVE OIL COOLER
 (See steps 7 to 10 on pages EM-18 and 19)
8. REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY

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

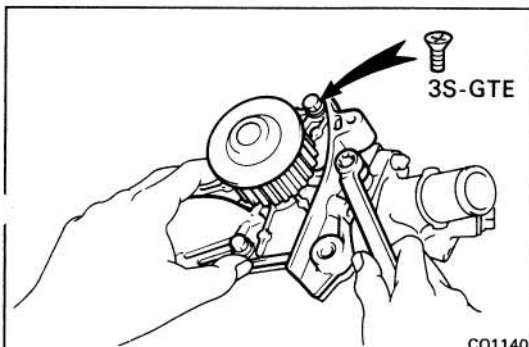


CO1132



CO1139

- (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 O-rings from the water pump and water by-pass pipe.

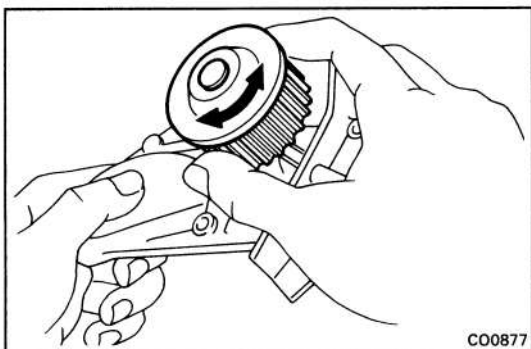


CO1140

9. SEPARATE WATER PUMP AND WATER PUMP COVER

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

10. REMOVE WATER INLET AND THERMOSTAT FROM WATER PUMP COVER (See step 4 on page CO-14)



INSPECTION OF WATER PUMP

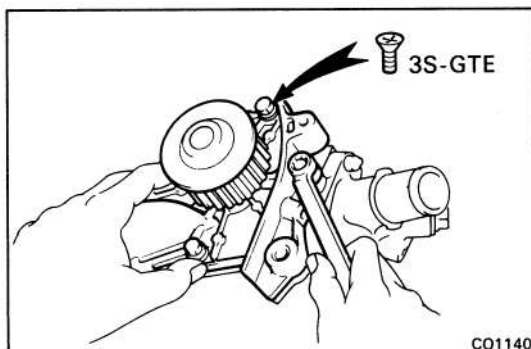
INSPECT WATER PUMP

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

INSTALLATION OF WATER PUMP

(See page CO-10)

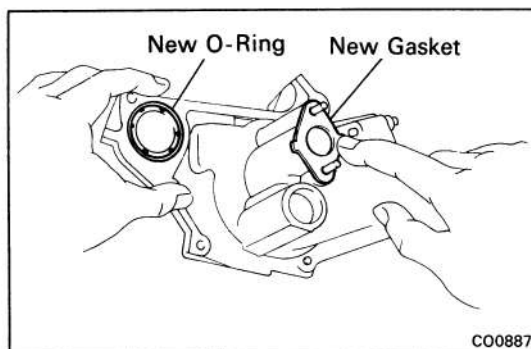
1. **INSTALL THERMOSTAT AND WATER INLET TO WATER PUMP COVER**
(See steps 1 and 2 on page CO-15)



2. **ASSEMBLE WATER PUMP AND WATER PUMP COVER**

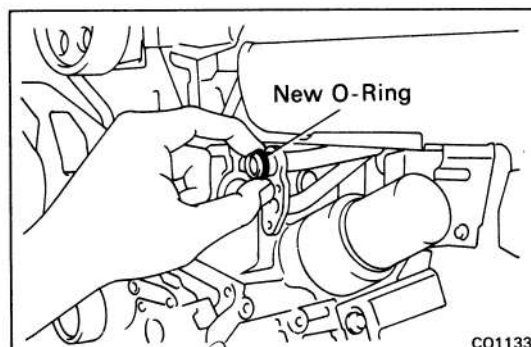
Install a new gasket and the water pump to the pump cover with the three bolts.

Torque: 95 kg-cm (82 in.-lb, 9.3 N·m)

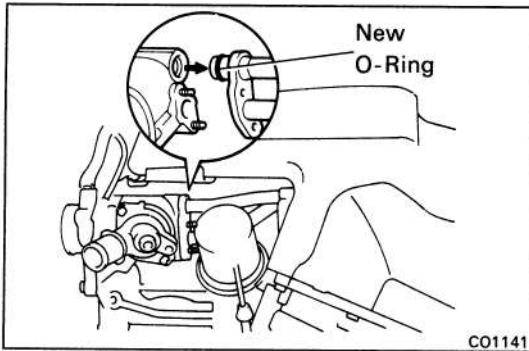


3. **INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY**

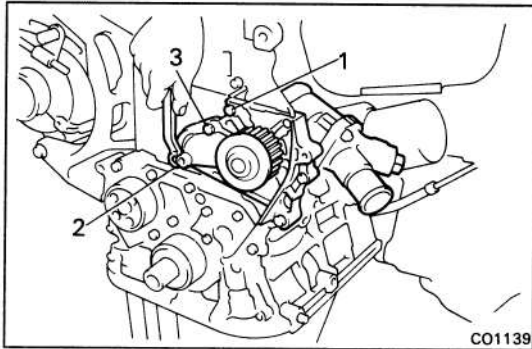
- (a) Install new O-ring and gasket to the water pump cover.



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



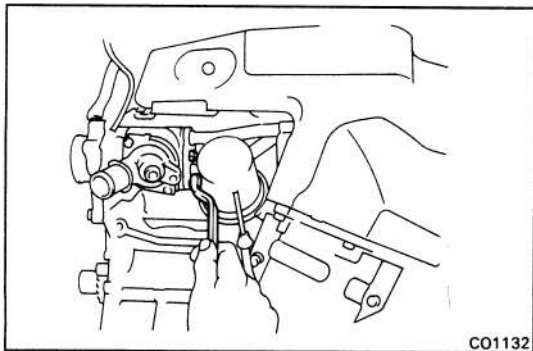
- (c) Apply soapy water to the O-ring on the water by-pass pipe.
- (d) Connect the pump cover to the water by-pass pipe. Do not install the nuts yet.



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

Torque:

3S-GTE	80 kg-cm (69 in.-lb, 8.0 N·m)
5S-FE	95 kg-cm (82 in.-lb, 9.3 N·m)



- (f) Install the two nuts holding the water pump cover to the water by-pass pipe.

Torque:

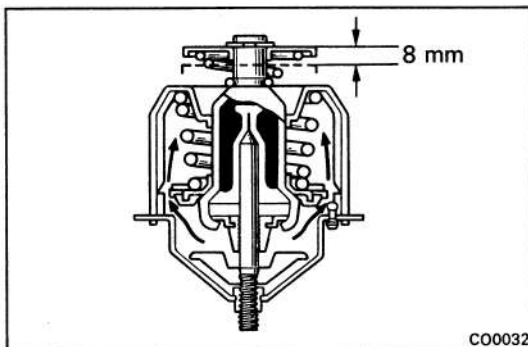
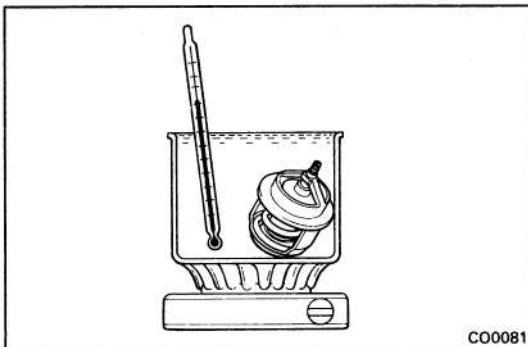
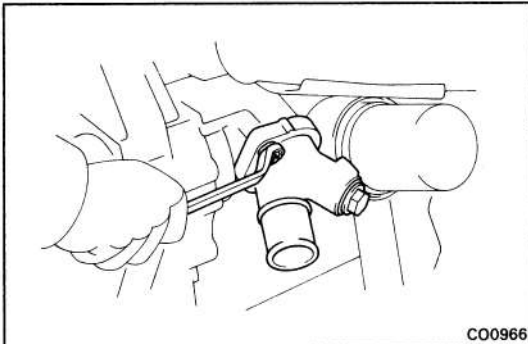
3S-GTE	120 kg-cm (9 ft.-lb, 12 N·m)
5S-FE	95 kg-cm (82 in.-lb, 9.3 N·m)

4. **(3S-GTE)**
INSTALL OIL COOLER
(See steps 2 to 5 on pages LU-21 and 22)
5. **(5S-FE)**
INSTALL TIMING BELT TENSION SPRING
6. **INSTALL NO.2 IDLER PULLEY**
3S-GTE (See step 3 on page EM-35)
5S-FE (See step 3 on page EM-55)
7. **(5S-FE)**
INSTALL A/C COMPRESSOR IDLER PULLEY
(See step 13 ((b) to (e)) on page EM-221)
8. **INSTALL TIMING BELT**
3S-GTE (See steps 5 to 32 on pages EM-35 to 41)
5S-FE (See steps 5 to 26 on pages EM-55 to 60)
9. **CONNECT RADIATOR HOSE TO WATER INLET**
10. **FILL WITH ENGINE COOLANT** (See page CO-7)

THERMOSTAT

REMOVAL OF THERMOSTAT

1. DRAIN ENGINE COOLANT (See page CO-6)
2. DISCONNECT RADIATOR HOSE FROM WATER INLET
3. (3S-GTE)
DISCONNECT OIL DIPSTICK GUIDE FROM WATER INLET (See step 8 on page LU-19)
4. 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.

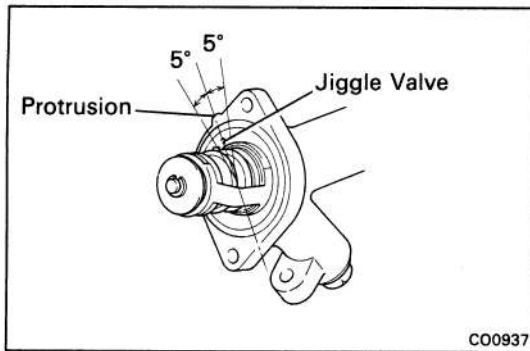
Valve lift:

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.

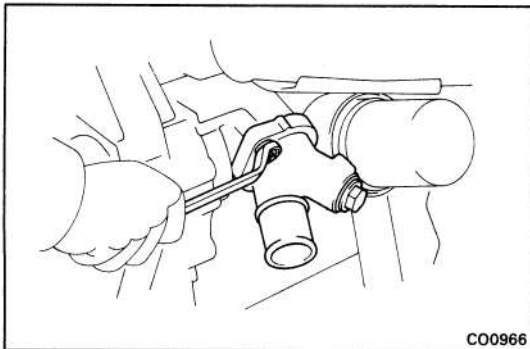


INSTALLATION OF THERMOSTAT

1. PLACE THERMOSTAT IN WATER PUMP

- Install a new gasket to the thermostat.
- 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:

3S-GTE	80 kg-cm (69 in.-lb, 7.8 N·m)
5S-FE	90 kg-cm (78 in.-lb, 8.8 N·m)

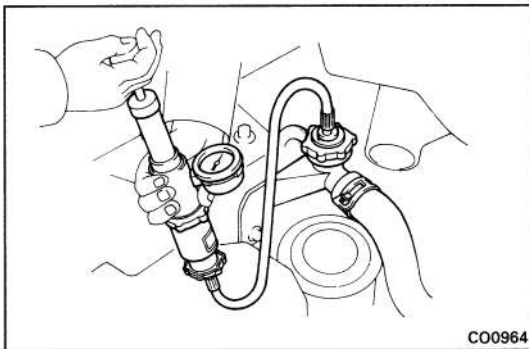
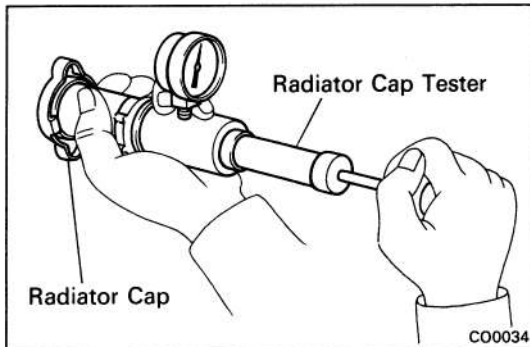
- (3S-GTE)
CONNECT OIL DIPSTICK GUIDE TO WATER INLET
(See step 4 on page LU-22)
- CONNECT RADIATOR HOSE TO WATER INLET
- FILL WITH ENGINE COOLANT (See page CO-7)
- START ENGINE AND CHECK FOR LEAKS

RADIATOR

CLEANING OF RADIATOR

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

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 30 – 35 kg/cm² (427 – 498 psi, 2,942 – 3,432), keep a distance at least 40 – 50 cm (15.75 – 19.69 in.) between the radiator core and cleaner nozzle.



INSPECTION OF RADIATOR

1. INSPECT RADIATOR (WATER FILLER) CAP

Using a radiator cap tester, pump the tester and measure the relief valve opening pressure.

Standard opening pressure:

0.75 – 1.05 kg/cm²

(10.7 – 14.9 psi, 74 – 103 kPa)

Minimum opening pressure:

0.6 kg/cm² (8.5 psi, 59 kPa)

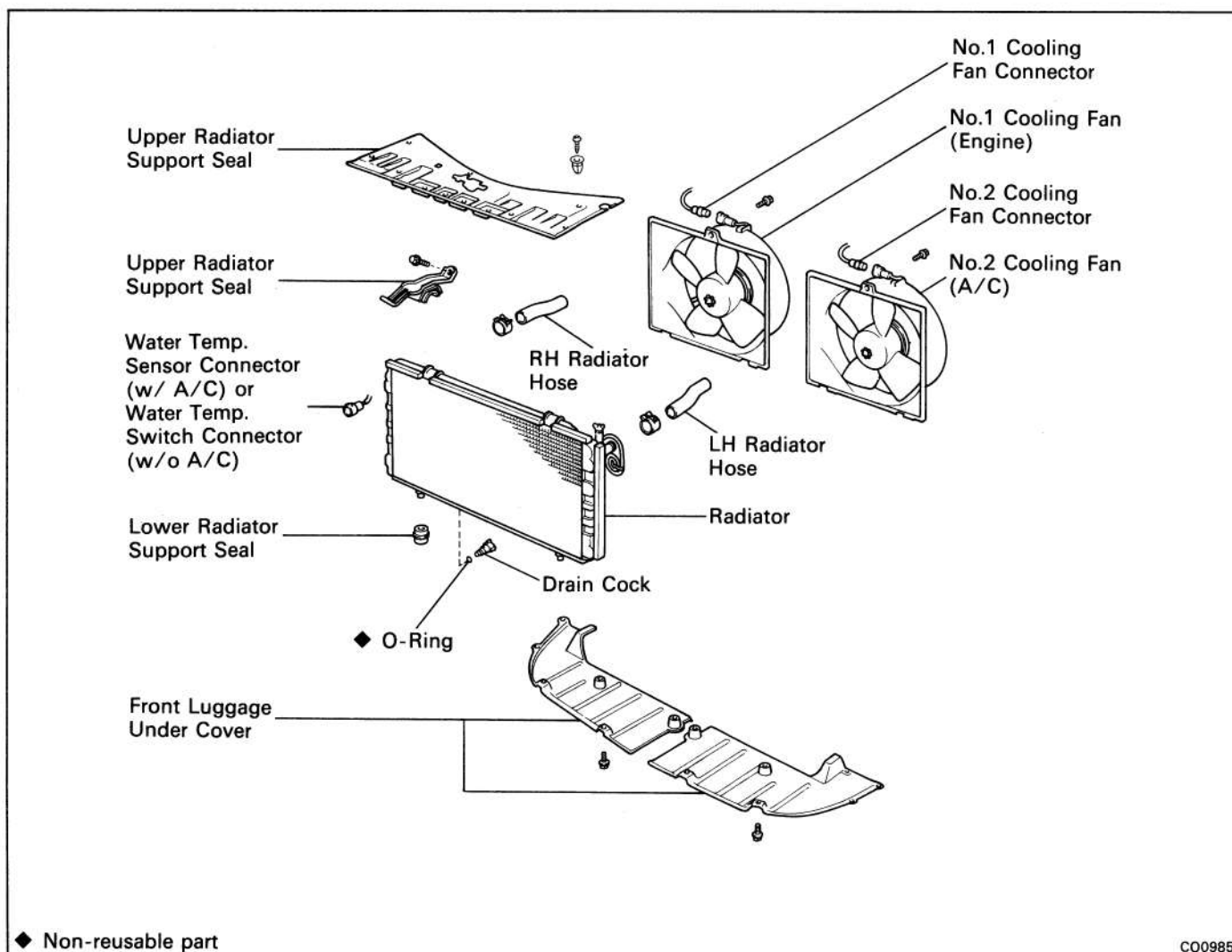
If the opening pressure is less than minimum, replace the radiator cap.

2. INSPECT COOLING SYSTEM FOR LEAKS

- Fill the radiator with coolant and attach a radiator cap tester to the radiator (water filler) cap.
- Warm up the engine.
- Pump it to 1.2 kg/cm² (17.1 psi, 118 kPa), check that pressure does not drop.

If the pressure drops, check for leaks on the hoses, radiator or water pump. If no external leaks are found, check the heater core, cylinder block and head.

REMOVAL OF RADIATOR

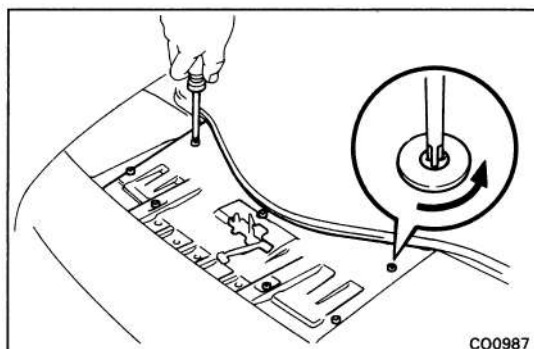


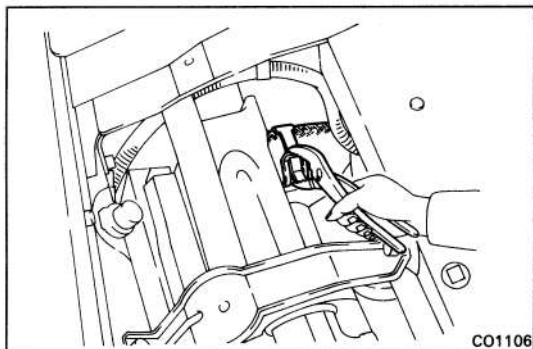
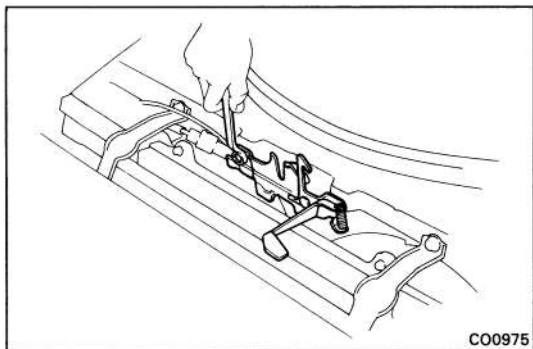
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

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.

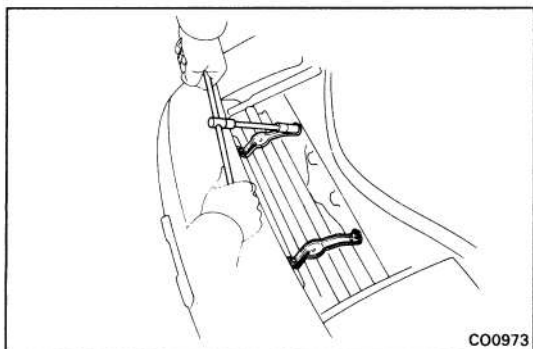
2. REMOVE FRONT LUGGAGE UNDER COVERS

3. DRAIN ENGINE COOLANT (See page CO-6)

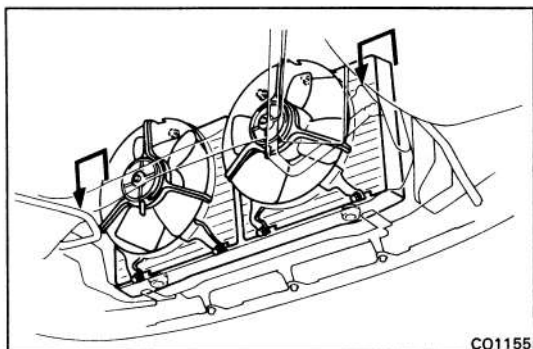
4. REMOVE UPPER RADIATOR SUPPORT SEAL
Remove the seven clips and support seal.

**5. DISCONNECT RADIATOR HOSES****6. REMOVE FRONT HOOD LOCK**

Remove the two bolts and hood lock.

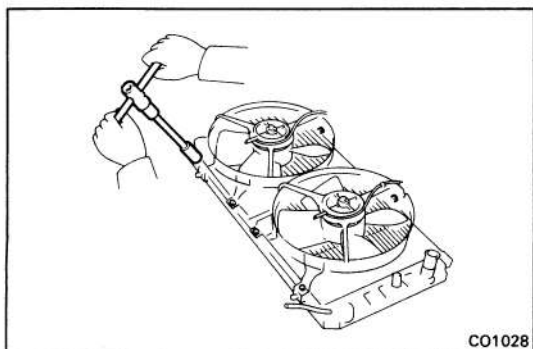
7. DISCONNECT RADIATOR COOLING FAN CONNETORS**8. DISCONNECT WATER TEMPERATURE SENSOR (w/A/C) or SWITCH (w/o A/C) CONNECTOR****9. REMOVE RADIATOR AND COOLING FANS**

(a) Remove the two bolts and upper support. Remove the two upper supports.

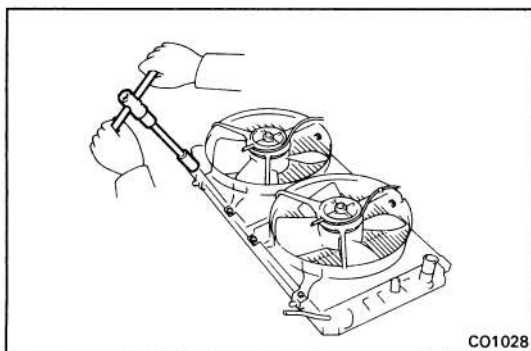


(b) Remove the radiator and two cooling fan assembly.

(c) Remove the two lower supports.

**10. REMOVE NO.1 AND NO.2 COOLING FANS FROM RADIATOR**

Remove the three bolts and cooling fan. Remove the two cooling fans.

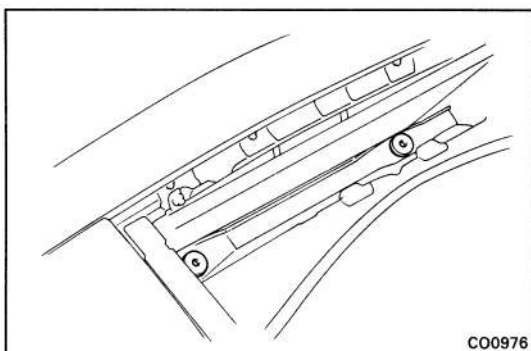


INSTALLATION OF RADIATOR

(See page CO-17)

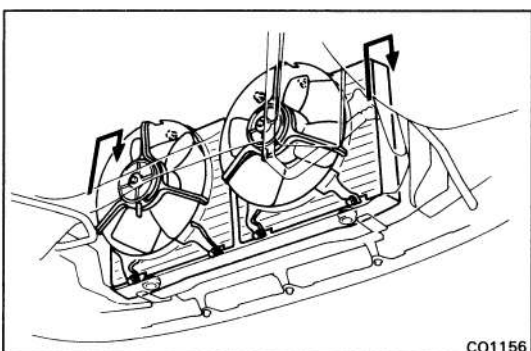
1. INSTALL NO.1 AND NO.2 COOLING FANS TO RADIATOR

Install the cooling fan with the three bolts. Install the two cooling fans.

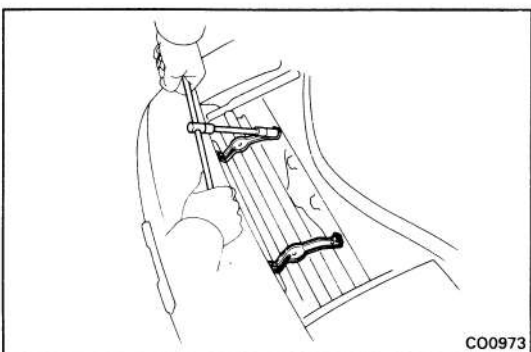


2. INSTALL RADIATOR AND COOLING FANS

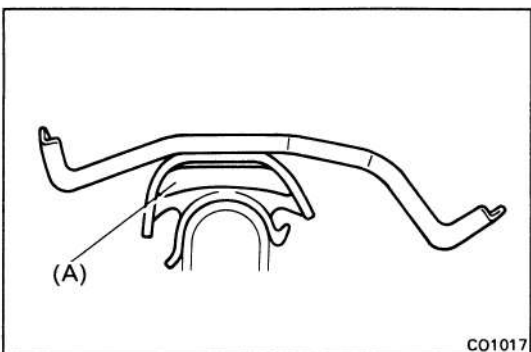
(a) Place the two lower supports in position on the body.



(b) Place the radiator and two cooling fan assembly in position on the body.



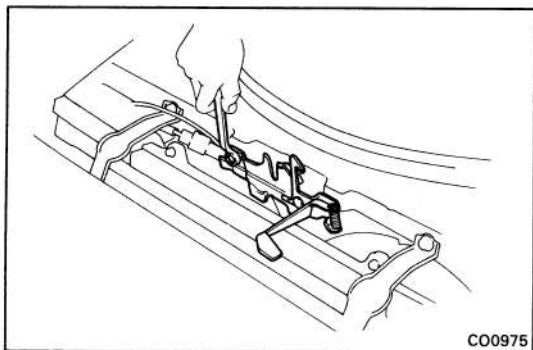
(c) Install the upper supports with the two bolts. Install the two upper supports.



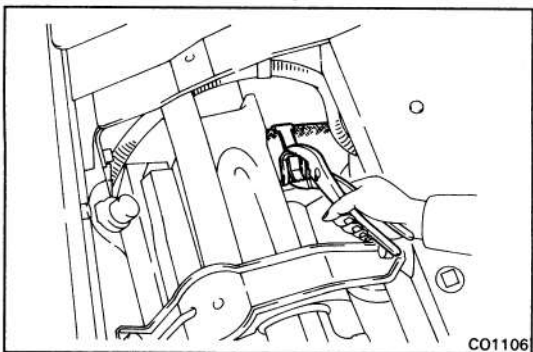
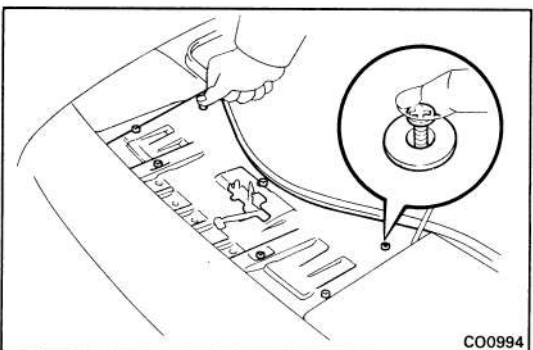
HINT: After installation, check that the rubber cushion (A) of the supports are not depressed.

3. CONNECT WATER TEMPERATURE SENSOR (w/ A/C) OR SWITCH (w/o A/C) CONNECTOR

4. CONNECT RADIATOR COOLING FAN CONNECTORS

**5. INSTALL FRONT HOOD LOCK**

Install the hood lock with the two bolts.

**6. CONNECT RADIATOR HOSES****7. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY****8. FILL WITH ENGINE COOLANT (See page CO-7)****9. START ENGINE AND CHECK FOR LEAKS****10. INSTALL UPPER RADIATOR SUPPORT SEAL**

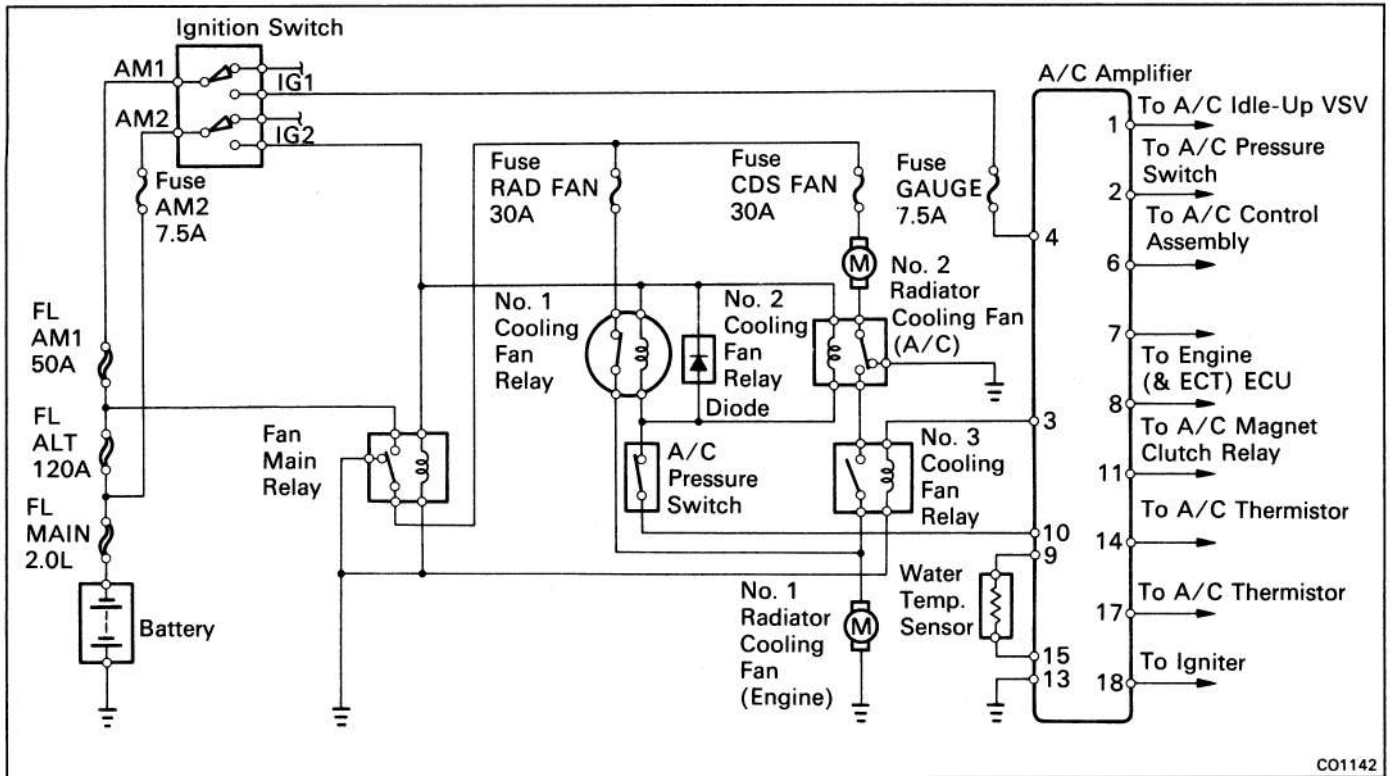
Install the support seal with the seven clips.

11. INSTALL FRONT LUGGAGE UNDER COVERS

ELECTRIC COOLING FANS

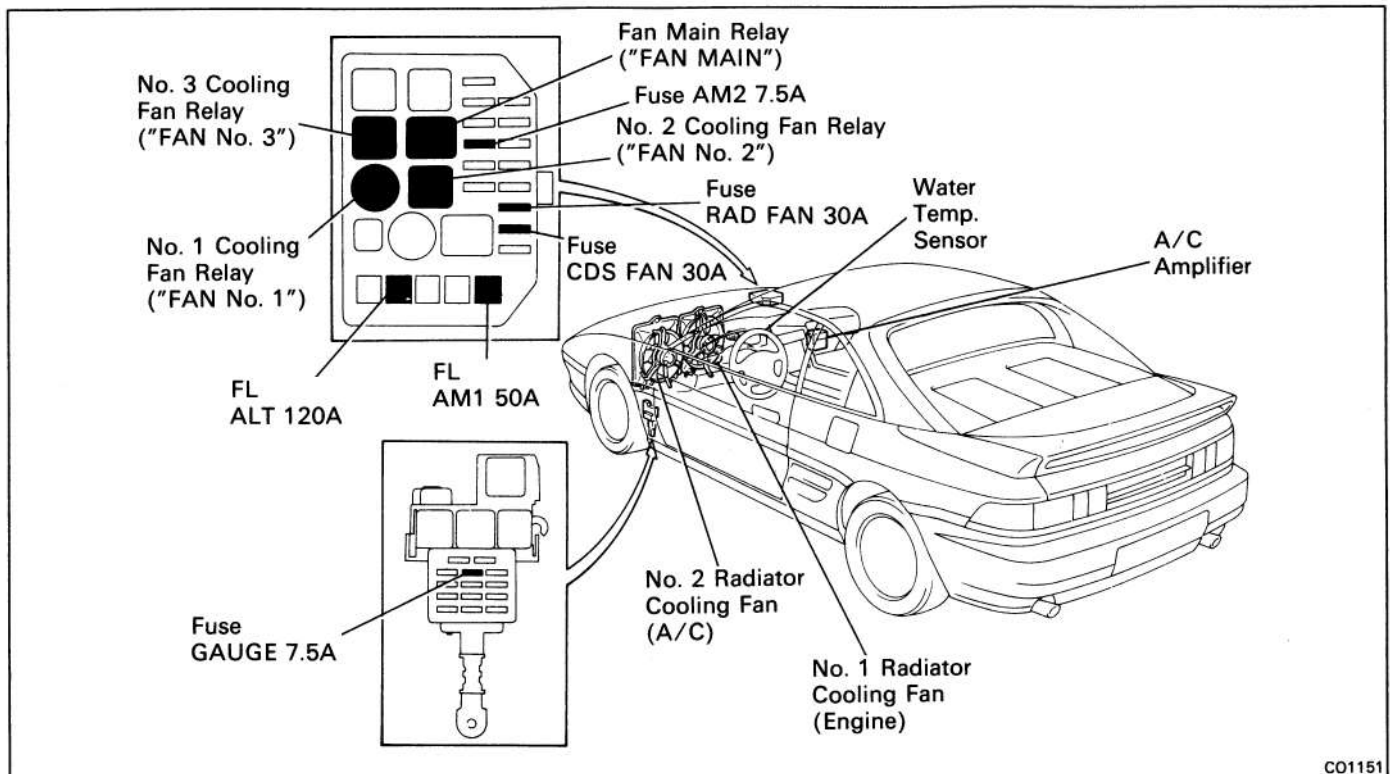
Radiator Cooling Fans (w/ A/C)

SYSTEM CIRCUIT

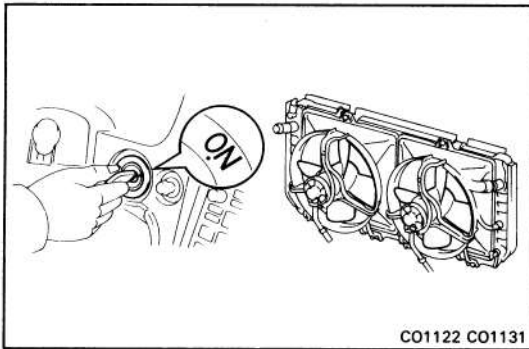


CO1142

LOCATION OF RADIATOR COOLING FAN COMPONENTS



CO1151



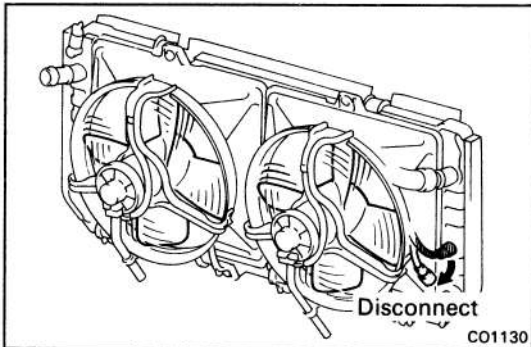
ON-VEHICLE INSPECTION

Low Temperature (Below 85°C (185°F))

1. TURN IGNITION SWITCH "ON"

Check that the cooling fans stops.

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

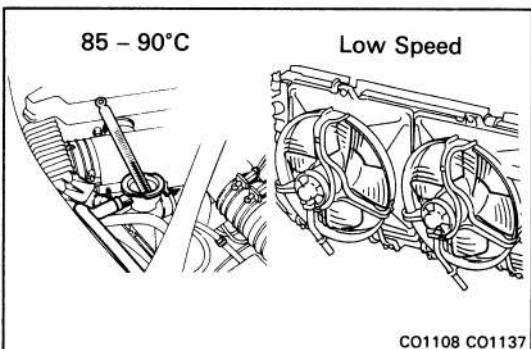


2. DISCONNECT RADIATOR WATER TEMPERATURE SENSOR CONNECTOR

Check that the cooling fans rotates.

If not, check the fan main relay, cooling fan relays, A/C amplifier, cooling fan and fuses, and check for a short circuit between the cooling fan relay and water temperature sensor.

3. CONNECT RADIATOR WATER TEMPERATURE SENSOR CONNECTOR



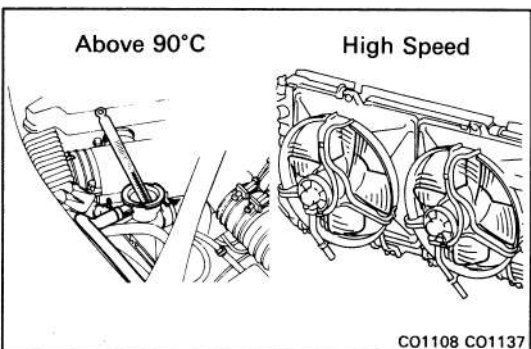
High Temperature (85 – 90°C (185 – 194°F))

4. START ENGINE

(a) Raise coolant temperature to 85 – 90°C (185 – 194°F).

(b) Check that the cooling fans rotates (at low speed).

If not, replace the water temperature sensor.



High Temperature (Above 90°C (194°F))

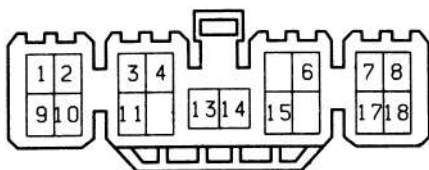
5. START ENGINE

(a) Raise coolant temperature to above 90°C (194°F).

(b) Check that the cooling fans rotates (at high speed).

If not, replace the water temperature sensor.

Wiring Harness Side



S-18-1

INSPECTION OF RADIATOR COOLING FAN COMPONENTS

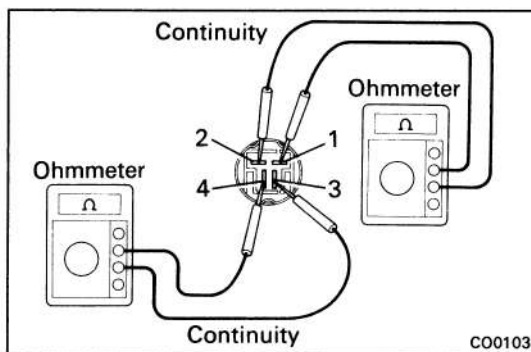
1. INSPECT A/C AMPLIFIER FOR CIRCUIT

Disconnect the A/C amplifier connector, and check the connector on the wiring harness side as shown in the chart on the next page.

Check for	Tester connection	Condition		Specified value
Continuity	3 – Ground	–		Continuity
Voltage	4 – Ground	Ignition switch ON		Battery voltage
Resistance	9 – 15	Coolant temp.	85°C (185°F)	Approx. 1.35 kΩ
			90°C (194°F)	Approx. 1.19 kΩ
			95°C (203°F)	Approx. 1.05 kΩ
Voltage	10 – Ground	Ignition switch ON		Battery voltage
Continuity	13 – Ground	–		Continuity

2. INSPECT FAN MAIN RELAY ("FAN MAIN") (See page CH-18)

Check the relay in the same way as the Ignition Main Relay.

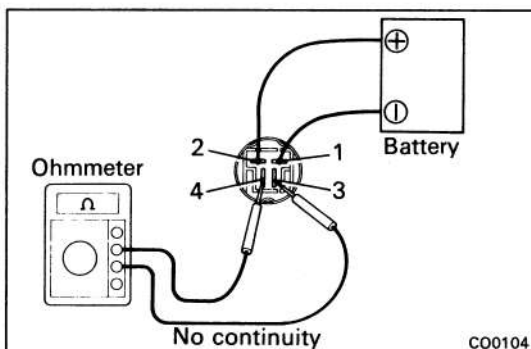


3. INSPECT NO.1 COOLING FAN RELAY ("FAN NO.1")

A. 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.

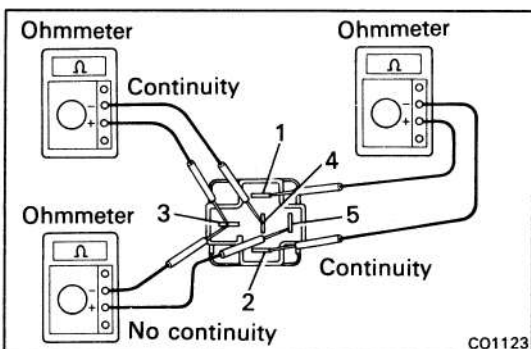
If continuity is not as specified, replace the relay.



B. Inspect relay operation

- Apply battery voltage across terminal 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.

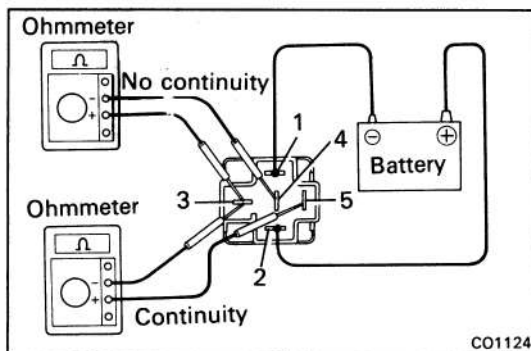


4. INSPECT NO.2 COOLING FAN RELAY ("FAN NO.2")

A. 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.
- Check that there is no continuity between terminals 3 and 5.

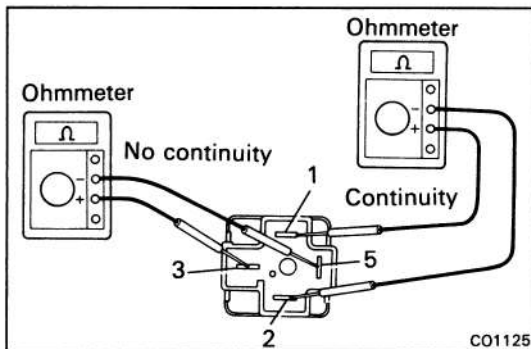
If continuity is not as specified, replace the relay.



B. Inspect relay operation

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

If operation is not as specified, replace the relay.

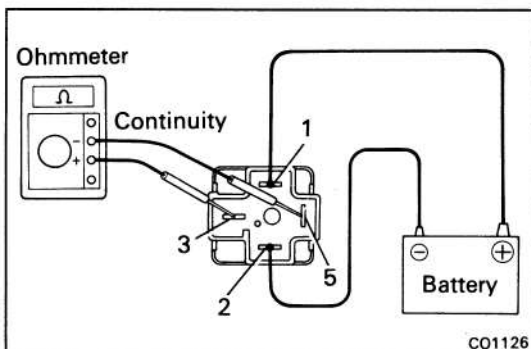


5. INSPECT NO.3 COOLING FAN RELAY ("FAN NO.3")

A. Inspect relay continuity

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

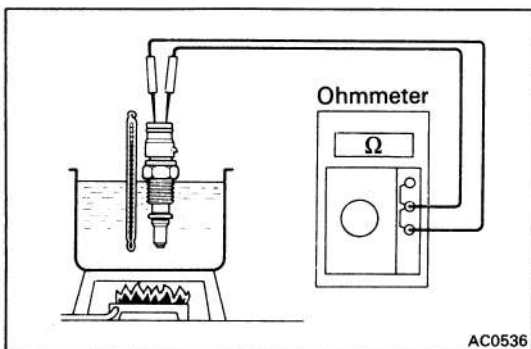
If continuity is not as specified, replace the relay.



B. Inspect relay operation

- Apply battery voltage across terminal 1 and 2.
- Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If operation is not as specified, replace the relay.



6. INSPECT RADIATOR WATER TEMPERATURE SENSOR

Using an ohmmeter, measure the resistance between the terminals.

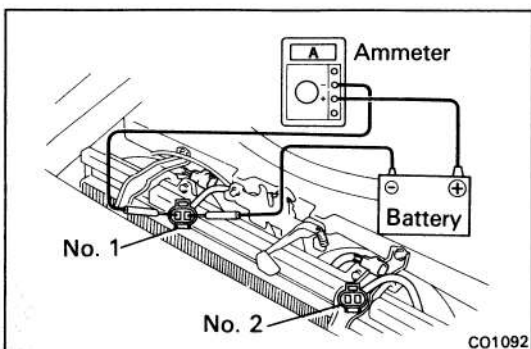
Resistance:

Approx. 1.35 k Ω at 85°C (185°F)

Approx. 1.19 k Ω at 90°C (194°F)

Approx. 1.05 k Ω at 95°C (203°F)

If resistance is not as specified, replace the sensor.

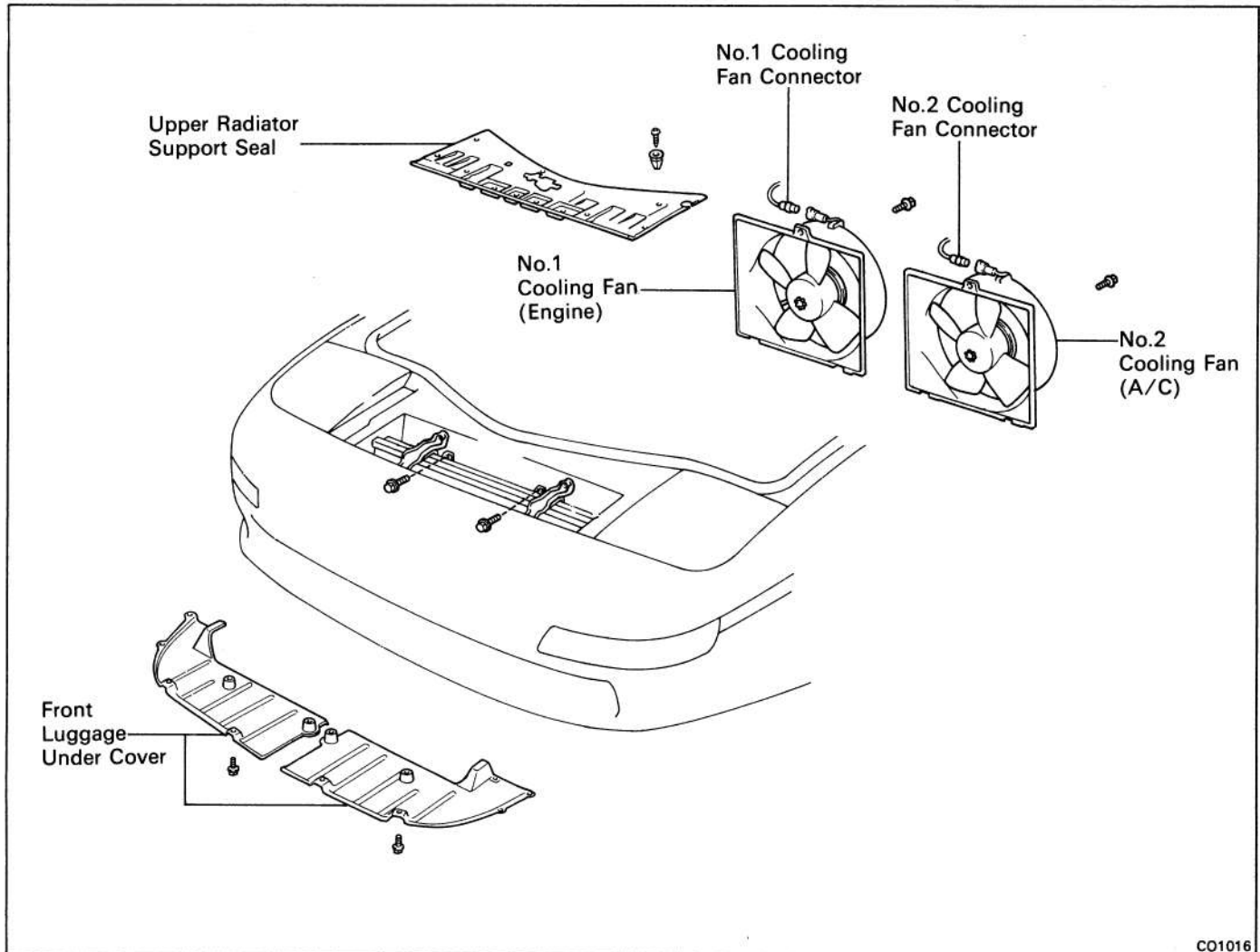


7. INSPECT NO. 1 AND NO. 2 RADIATOR COOLING FANS

- 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: M/T 5.8 – 7.4 A
A/T 8.8 – 10.8 A

REMOVAL OF RADIATOR COOLING FANS



CO1016

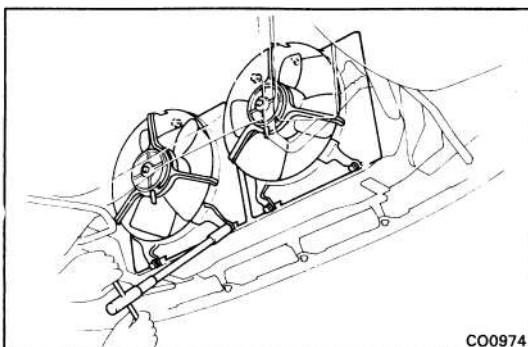
1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

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. **DISCONNECT FRONT LUGGAGE UNDER COVERS**
3. **DISCONNECT UPPER RADIATOR SUPPORT SEAL**
(See step 4 on page CO-17)
4. **DISCONNECT RADIATOR COOLING FAN CONNECTORS**

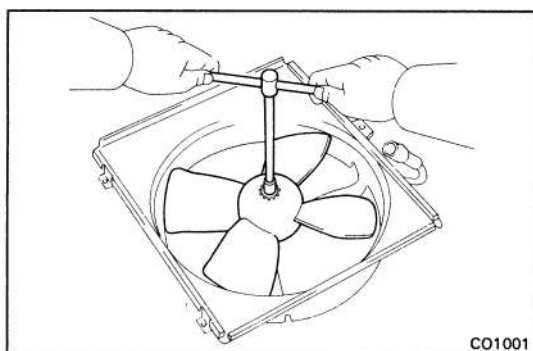
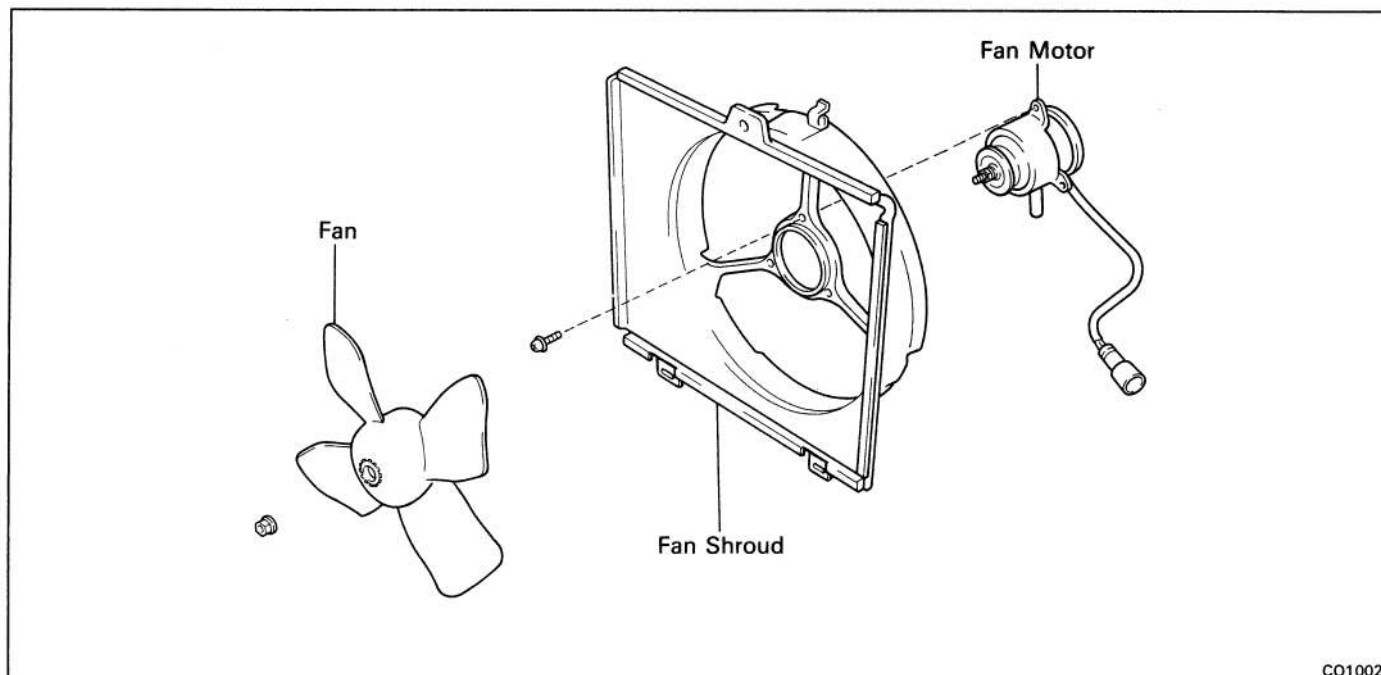
5. **REMOVE RADIATOR COOLING FANS**

Remove the three bolts and cooling fan. Remove the two cooling fans.



CO0974

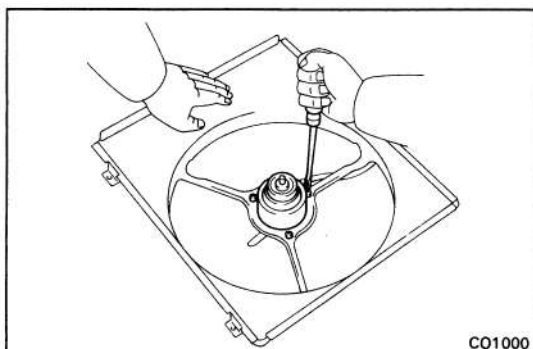
COMPONENTS



DISASSEMBLY OF RADIATOR COOLING FANS

1. REMOVE FAN

Remove the nut and fan.



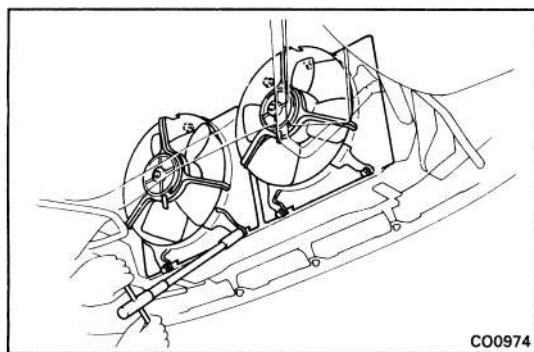
2. REMOVE FAN MOTOR

Remove the three screws and fan motor.

ASSEMBLY OF RADIATOR COOLING FANS

1. INSTALL FAN MOTOR

2. INSTALL FAN



INSTALLATION OF RADIATOR COOLING FANS

(See page CO-25)

1. INSTALL RADIATOR COOLING FANS

Install the cooling fan with the three bolts. Install the two cooling fans.

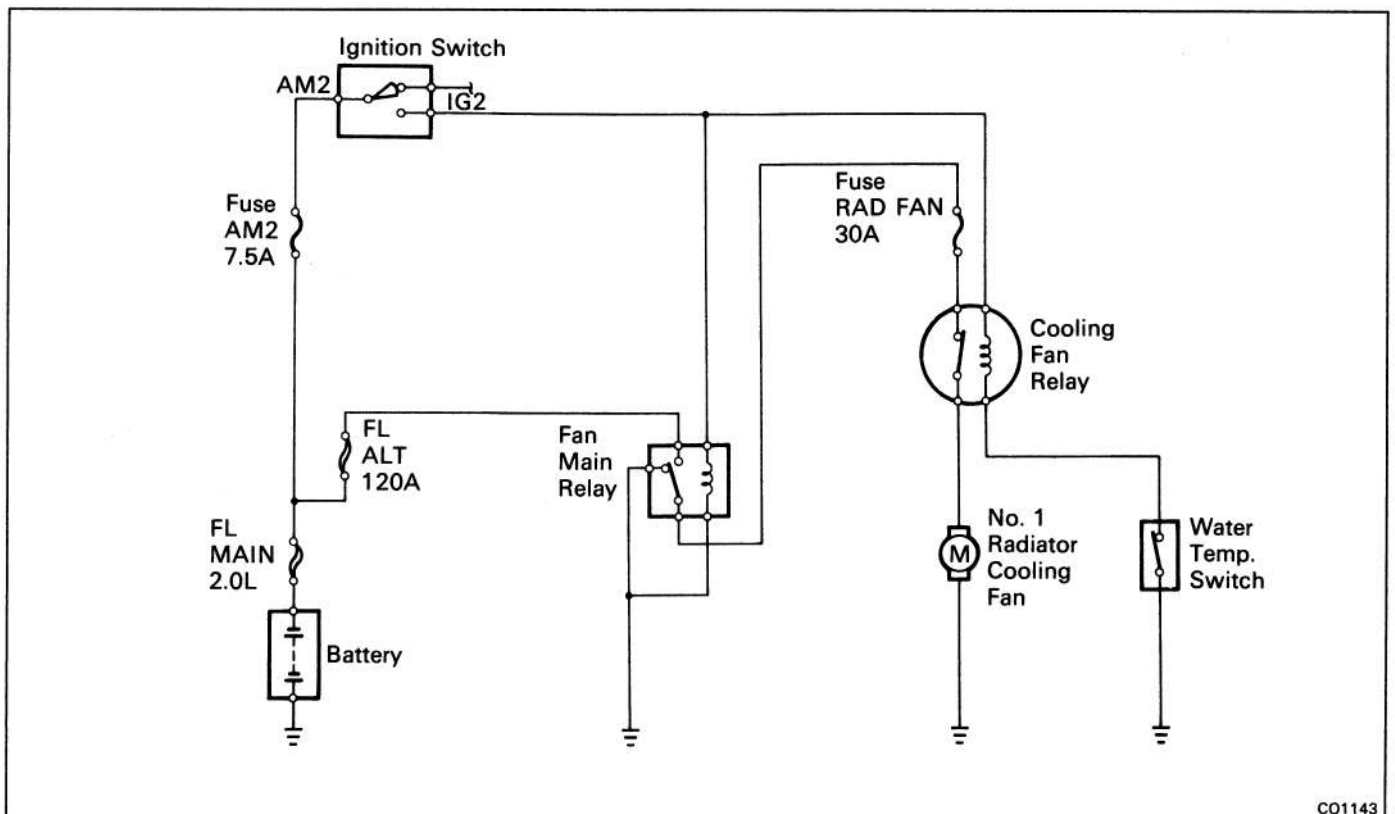
2. CONNECT RADIATOR COOLING FAN CONNECTORS

3. CONNECT UPPER RADIATOR SUPPORT SEAL (See step 10 on page CO-20)

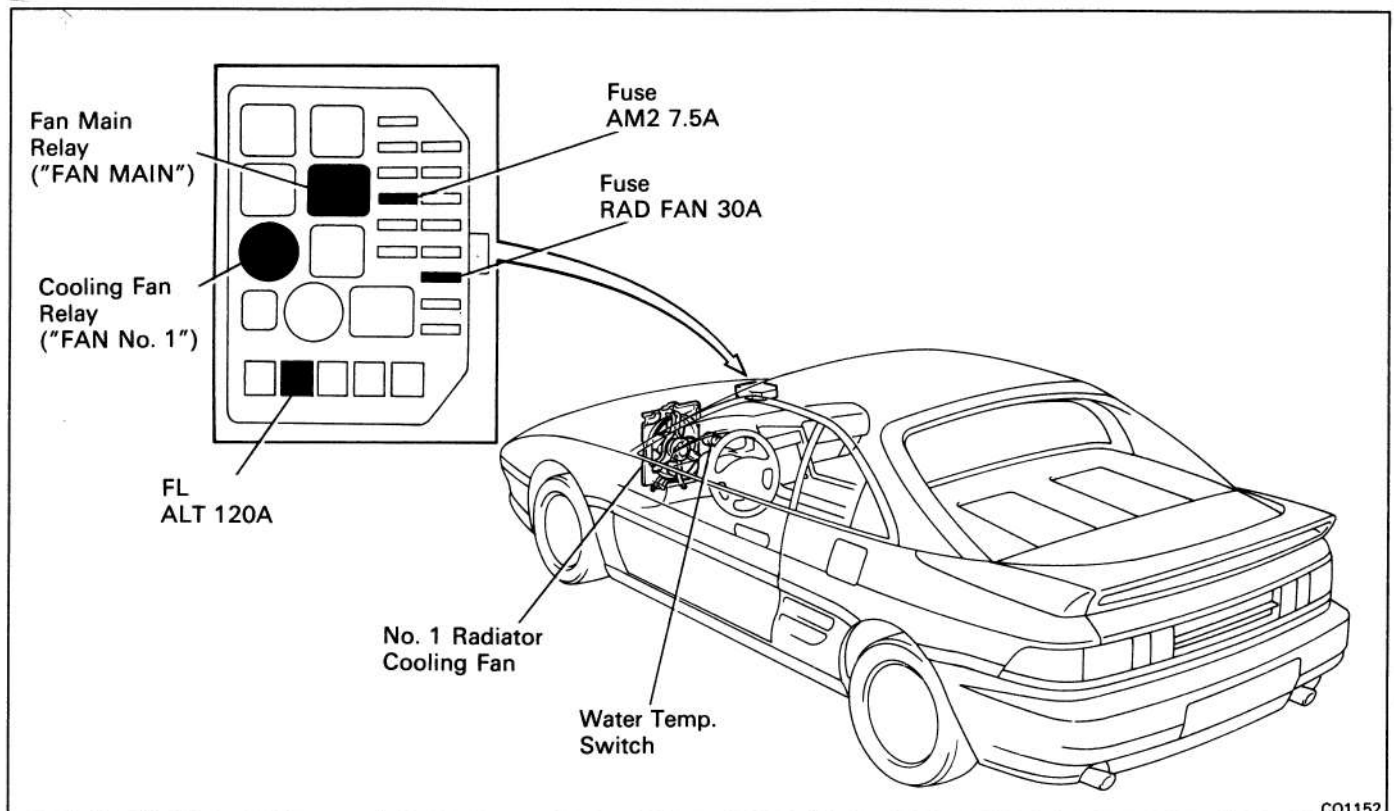
4. CONNECT FRONT LUGGAGE UNDER COVERS

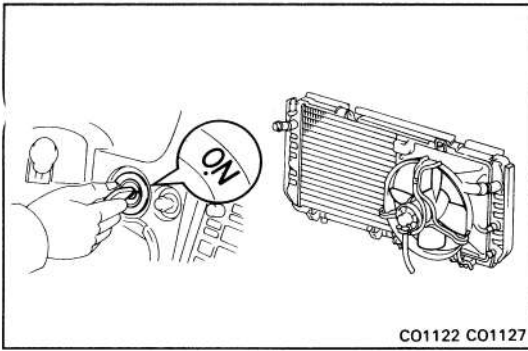
5. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

Radiator Cooling Fan (w/o A/C) SYSTEM CIRCUIT



LOCATION OF RADIATOR COOLING FAN COMPONENTS





ON-VEHICLE INSPECTION

Low Temperature (Below 83°C (181°F))

1. TURN IGNITION SWITCH "ON"

Check that the cooling fan stops.

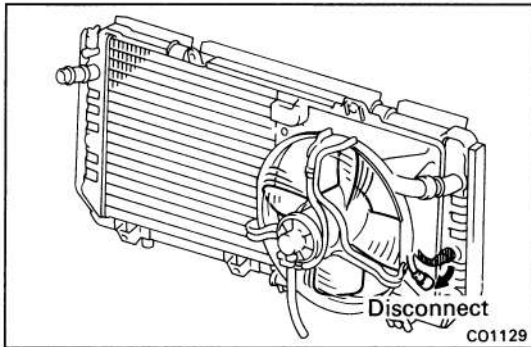
If not, check the cooling fan relays and water temperature switch, and check for a separated connector or severed wire between the cooling fan relay and water temperature switch.

2. DISCONNECT WATER TEMPERATURE SWITCH CONNECTOR

Check that the cooling fan rotates.

If not, check the fan main relay, cooling fan relays, cooling fan and fuses, and check for a short circuit between the cooling fan relay and water temperature switch.

3. CONNECT WATER TEMPERATURE SWITCH CONNECTOR



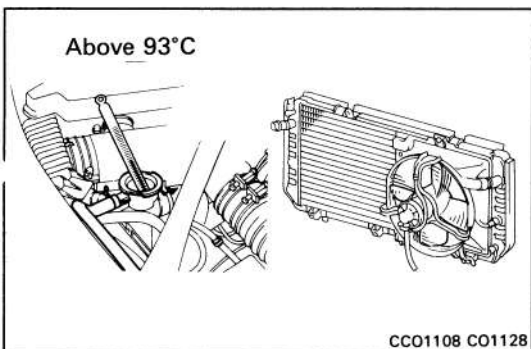
High Temperature (Above 93°C (199°F))

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 RADIATOR COOLING FAN COMPONENTS

1. INSPECT FAN MAIN RELAY ("FAN MAIN") (See page CH-18)

Check the relay in the same way as the Ignition Main Relay.

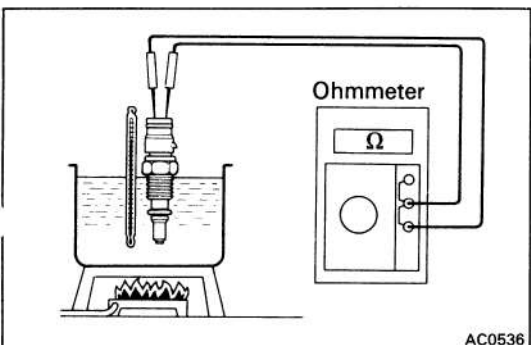
2. INSPECT NO.1 COOLING FAN RELAY ("FAN NO.1") (See page CO-23)

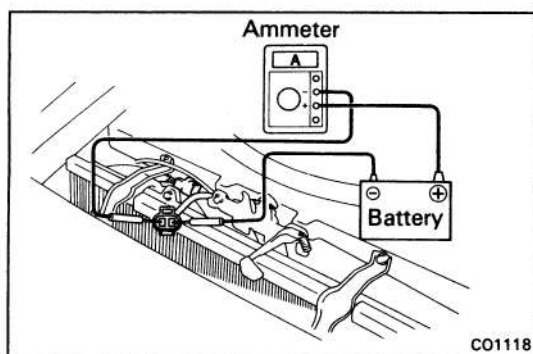
3. INSPECT RADIATOR WATER TEMPERATURE SWITCH

(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.





4. INSPECT NO. 1 RADIATOR 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: M/T 5.8 – 7.4 A
A/T 8.8 – 10.8 A

REMOVAL OF RADIATOR COOLING FAN

REMOVE NO.1 RADIATOR COOLING FAN
(See page CO-25)

DISASSEMBLY AND ASSEMBLY OF RADIATOR COOLING FAN

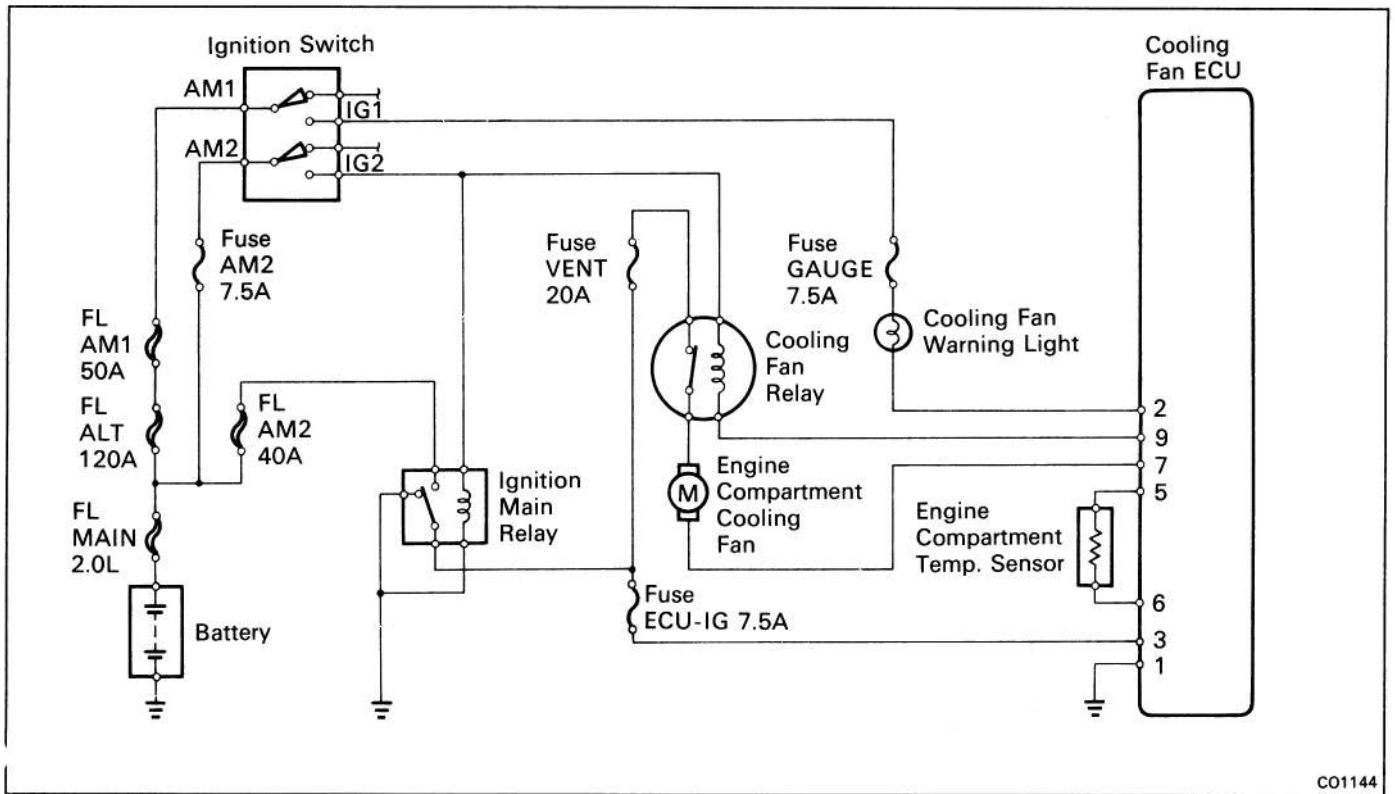
(See page CO-26)

INSTALLATION OF RADIATOR COOLING FAN

INSTALL NO. 1 RADIATOR COOLING FAN
(See page CO-27)

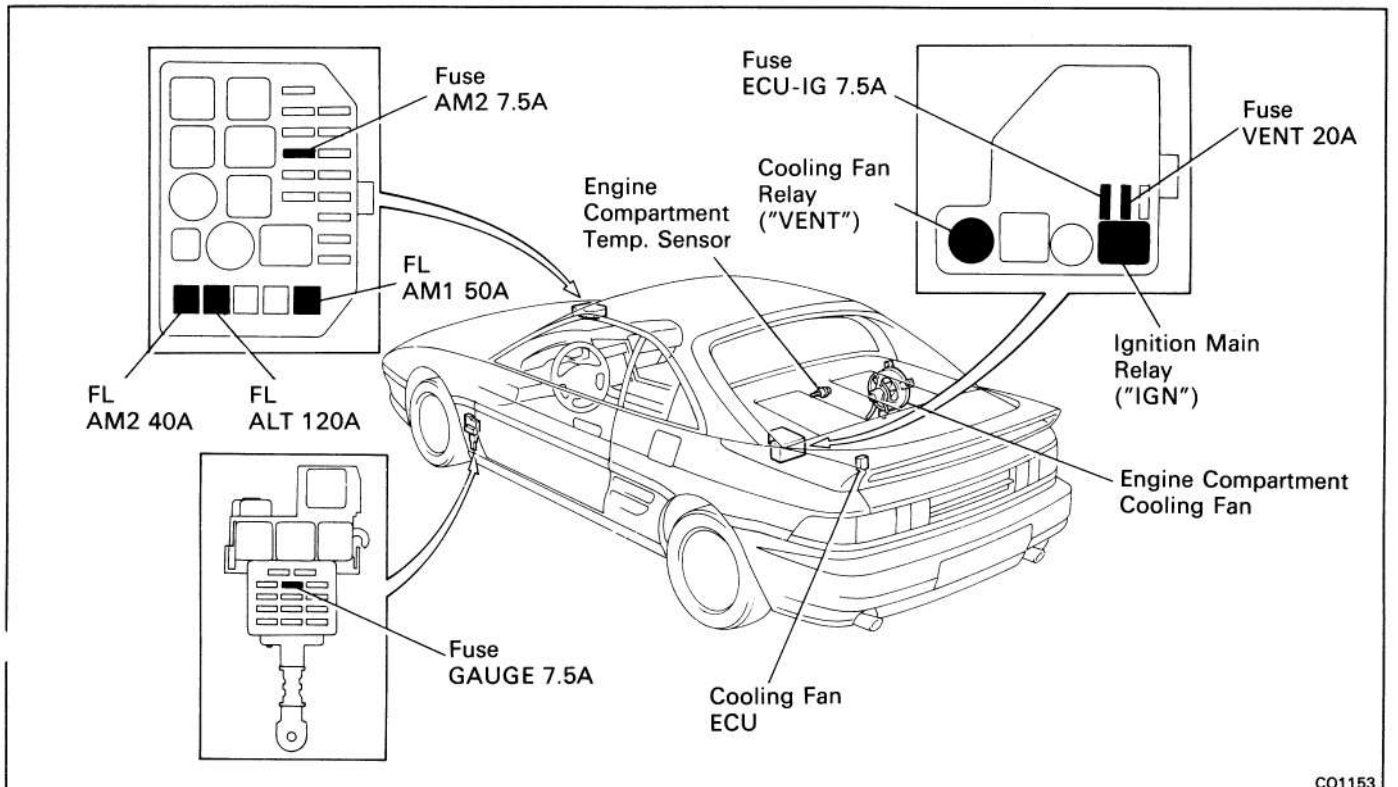
Engine Compartment Cooling Fan (3S-GTE)

SYSTEM CIRCUIT

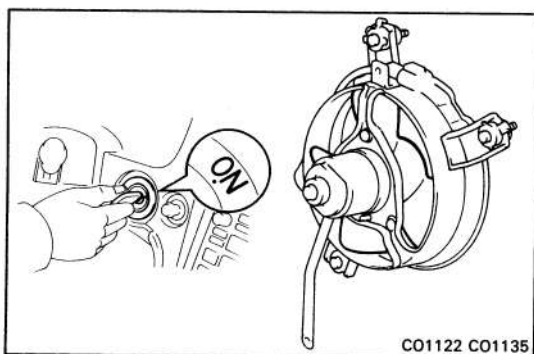


CO1144

LOCATION OF ENGINE COMPARTMENT COOLING FAN COMPONENTS

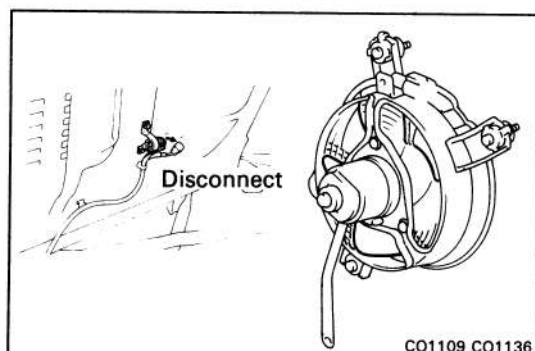


CO1153

**ON-VEHICLE INSPECTION****Low Temperature (Below 45.5°C (113.9°F))****1. TURN IGNITION SWITCH "ON"**

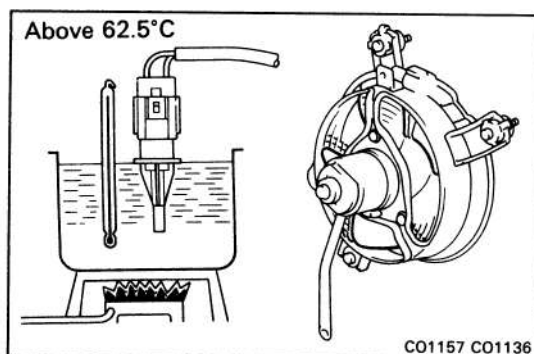
Check that the cooling fan stops.

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

**2. DISCONNECT ENGINE COMPARTMENT TEMPERATURE SENSOR CONNECTOR**

Check that the cooling fan rotates.

If not, check the ignition main relay, cooling fan relays, cooling fan ECU, cooling fan and fuses, and check for a short circuit between the cooling fan relay and engine compartment temperature sensor.

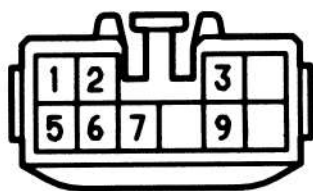
3. CONNECT ENGINE COMPARTMENT TEMPERATURE SENSOR CONNECTOR**High Temperature (Above 62.5°C (144.5°F))****4. START ENGINE**

(a) Raise coolant temperature to above 62.5°C (144.5°F).

(b) Check that the cooling fan rotates.

If not, replace the engine compartment temperature sensor.

Wiring Harness Side



AE-10-1

INSPECTION OF ENGINE COMPARTMENT COOLING FAN COMPONENTS

1. INSPECT COOLING FAN ECU FOR CIRCUIT

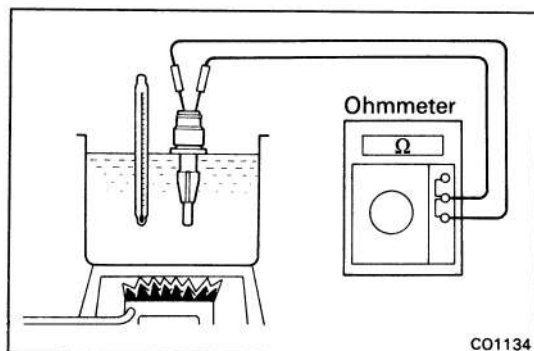
Disconnect the cooling fan ECU connector, and check the connector on the wiring harness side as shown in the chart.

Check for	Tester connection	Condition		Specified value
Continuity	1 – Ground	–		Continuity
Voltage	2 – Ground	Ignition switch ON		Battery voltage
Voltage	3 – Ground	Ignition switch ON		Battery voltage
Resistance	5 – 6	Coolant temp.	20°C (68°F)	Approx. 2.45 kΩ
			57.5°C (135.5°F)	Approx. 0.63 kΩ
			80°C (176°F)	Approx. 0.32 kΩ
Voltage	7 – Ground	Ignition switch ON		Battery voltage
Continuity	9 – Ground	Ignition switch ON		Battery voltage

2. INSPECT IGNITION MAIN RELAY ("IGN") (See page CH-18)

3. INSPECT COOLING FAN MAIN RELAY ("VENT") (See page CO-23)

Check the relay the same way as for the No.1 Cooling Fan Relay.



CO1134

4. INSPECT ENGINE COMPARTMENT TEMPERATURE SENSOR

Using an ohmmeter, measure the resistance between the terminals.

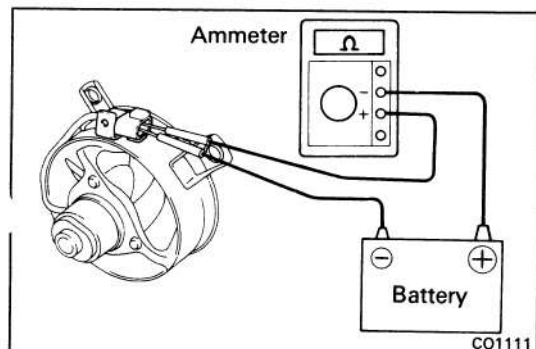
Resistance:

Approx. 2.45 kΩ at 20°C (68°F)

Approx. 0.63 kΩ at 57.5°C (135.5°F)

Approx. 0.32 kΩ at 80°C (176°F)

If resistance is not as specified, replace the sensor.



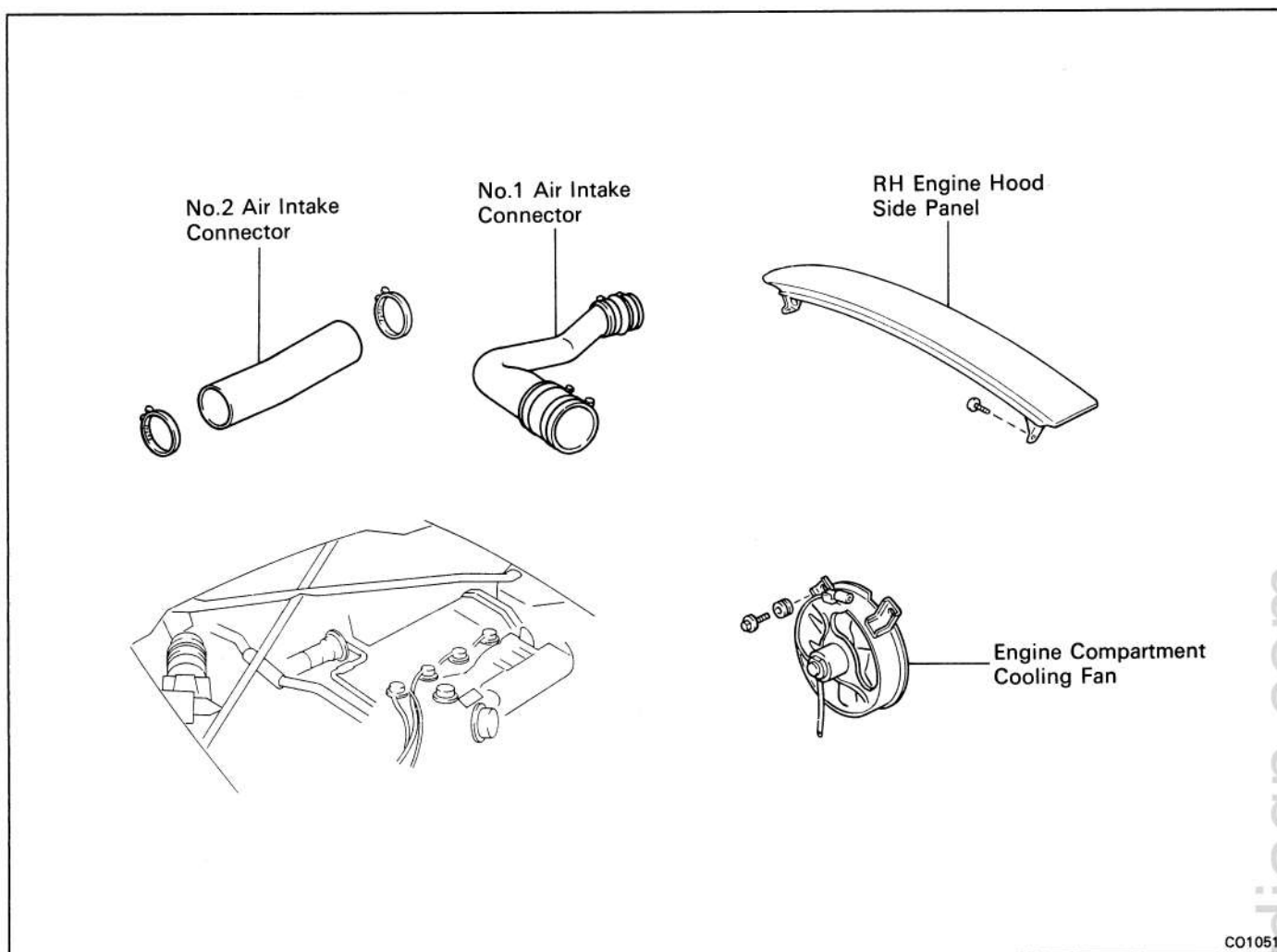
CO1111

5. INSPECT ENGINE COMPARTMENT 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.

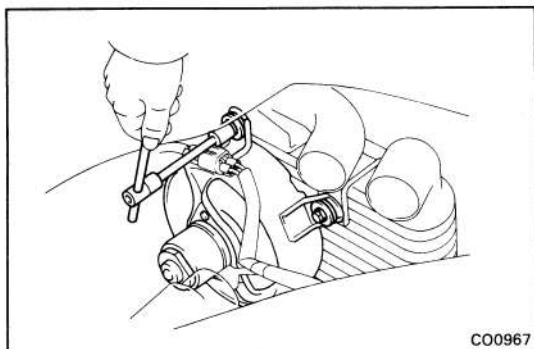
Standard amperage: 3.1 – 4.3 A

REMOVAL OF ENGINE COMPARTMENT COOLING FAN



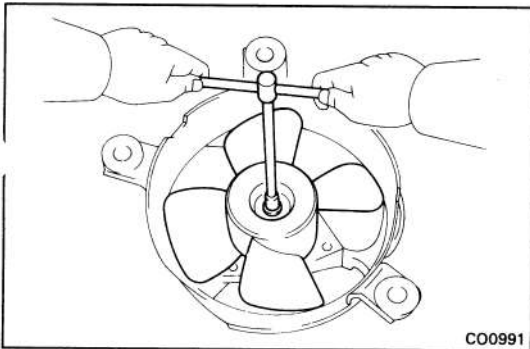
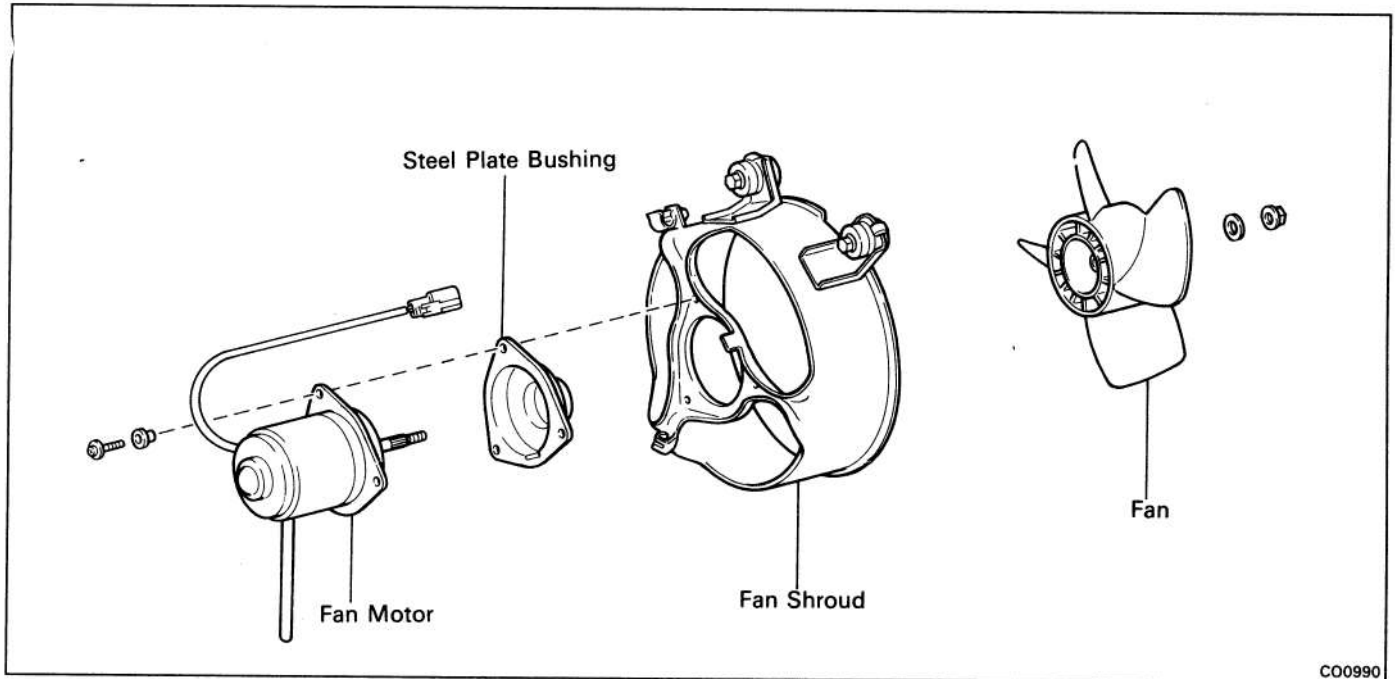
CO1051

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. **REMOVE RH ENGINE HOOD SIDE PANEL**
3. **REMOVE NO.1 AND NO.2 AIR INTAKE CONNECTORS**
 (See steps 4 and 5 on page TC-20)
4. **DISCONNECT ENGINE COMPARTMENT COOLING FAN CONNECTOR**
5. **REMOVE ENGINE COMPARTMENT COOLING FAN**
 Loosen the three bolts, and remove the cooling fan.



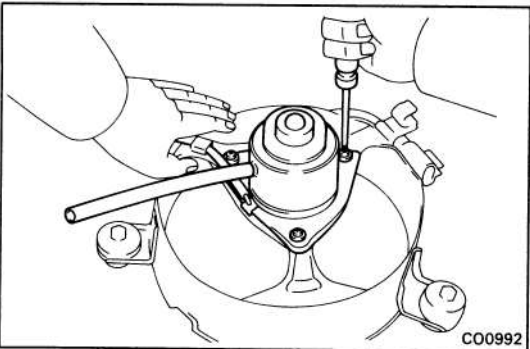
CO0967

COMPONENTS



DISASSEMBLY OF ENGINE COMPARTMENT COOLING FAN

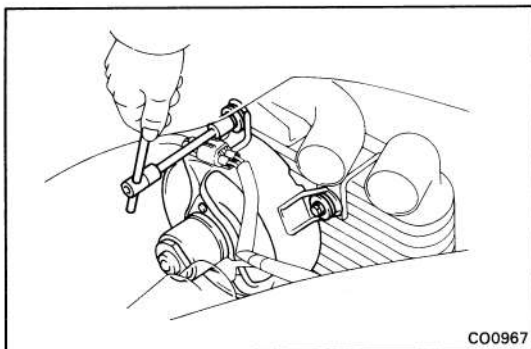
1. **REMOVE FAN**
Remove the nut and fan.



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

ASSEMBLY OF ENGINE COMPARTMENT COOLING FAN

1. **INSTALL FAN MOTOR**
2. **INSTALL FAN**



INSTALLATION OF ENGINE COMPARTMENT COOLING FAN

(See page CO-34)

1. INSTALL ENGINE COMPARTMENT COOLING FAN

Install the cooling fan with the three bolts.

2. CONNECT ENGINE COMPARTMENT COOLING FAN CONNECTOR

3. INSTALL NO.1 AND NO.2 AIR INTAKE CONNECTORS

(See steps 10 and 11 on page TC-25)

4. INSTALL RH ENGINE HOOD SIDE PANEL

5. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY