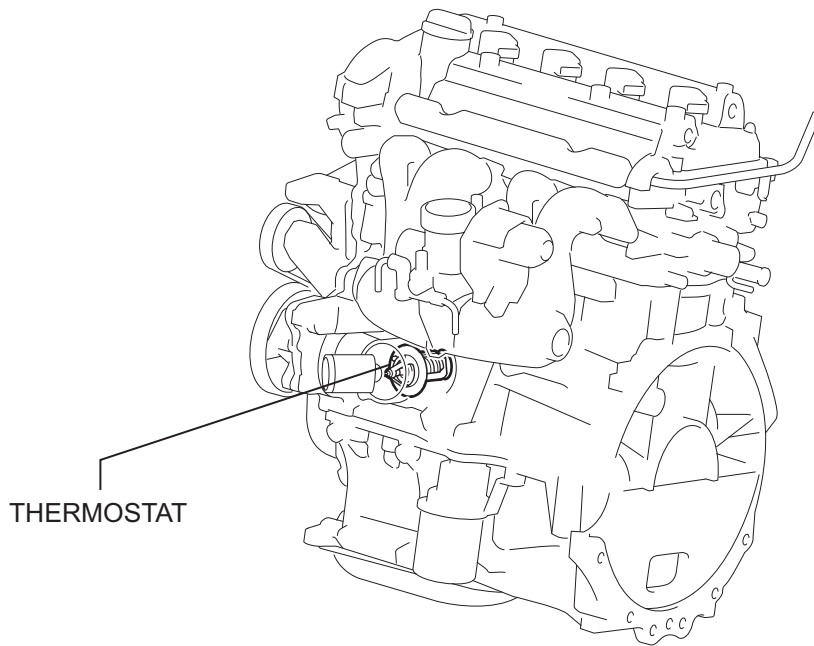
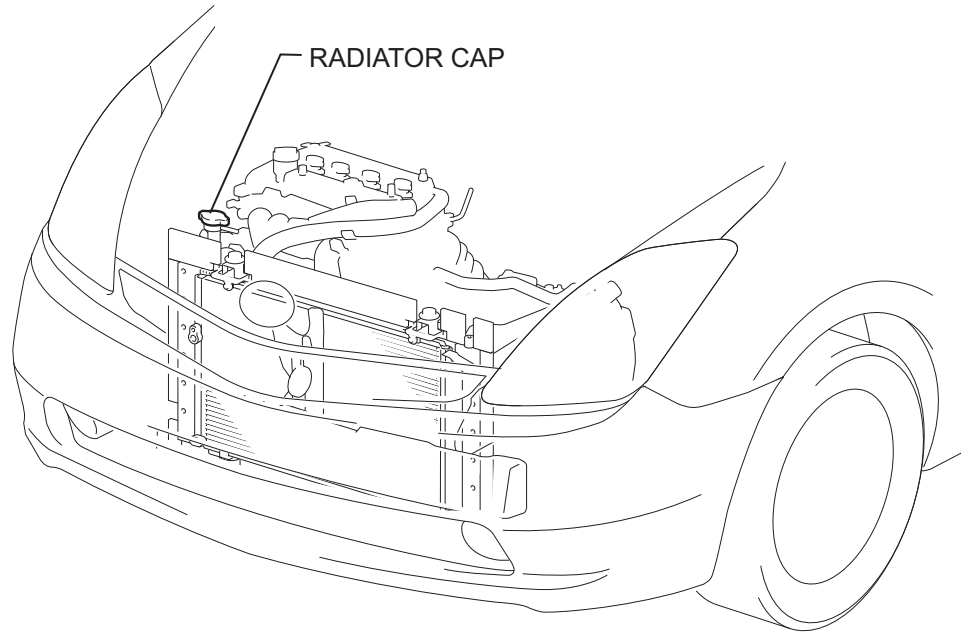


# COOLING SYSTEM

## PARTS LOCATION



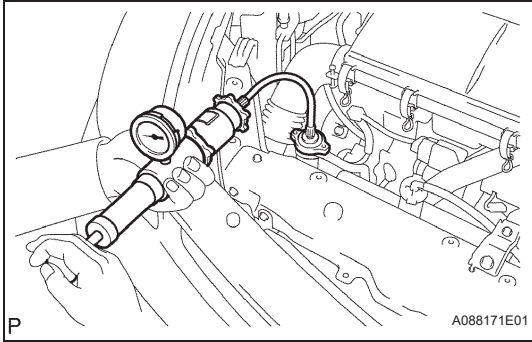
CO

## ON-VEHICLE INSPECTION

### 1. CHECK COOLING SYSTEM FOR LEAKS

**CAUTION:**

**Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.**



- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Using the radiator cap tester, increase the pressure inside the radiator to 177 kPa (1.8 kgf/cm<sup>2</sup>, 25.6 psi), and check that the pressure does not drop. If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the cylinder block and head.

### 2. CHECK ENGINE COOLANT LEVEL IN RESERVOIR

- (a) The engine coolant should be between the low and full lines when the engine is cold. If low, check for leaks and add TOYOTA Super Long Life Coolant (SLLC) or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology up to the full line.

**NOTICE:**

**Never use water as a substitute for engine coolant.**

### 3. CHECK ENGINE COOLANT QUALITY

- (a) Remove the radiator cap.
 

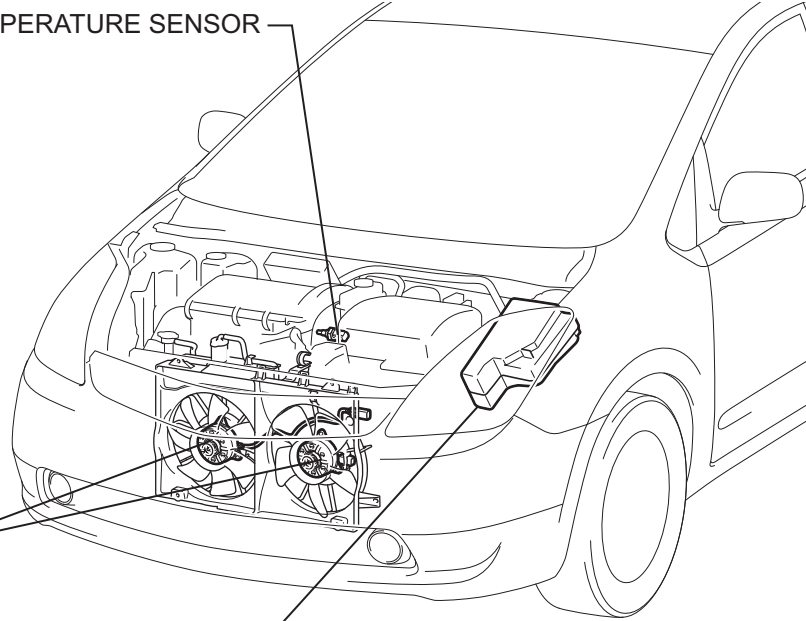
**CAUTION:**

**Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.**
- (b) Check if there are excessive deposits of rust or scale around the radiator cap and radiator filler hole. Also, the coolant should be free of oil. If excessively dirty, replace the coolant.
- (c) Install the radiator cap.

# COOLING FAN SYSTEM

## PARTS LOCATION

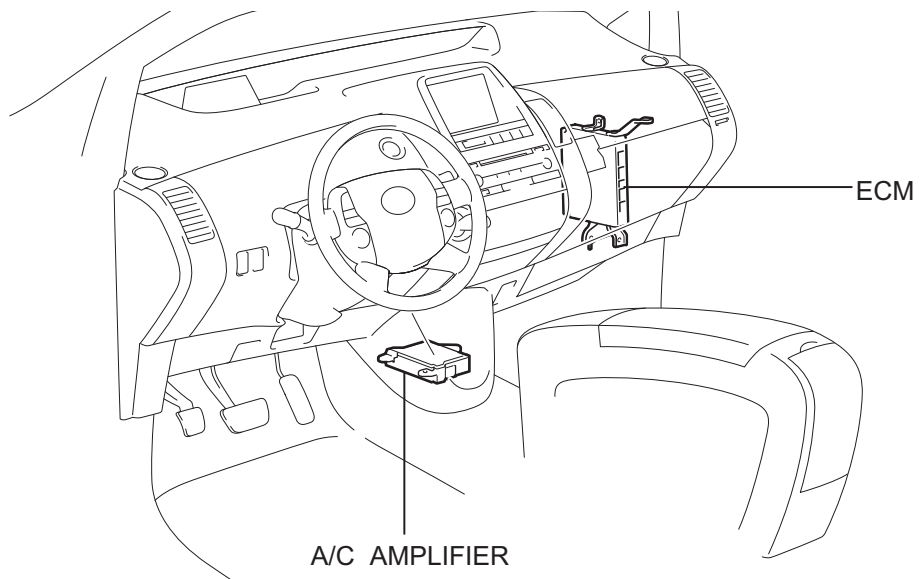
ENGINE COOLANT TEMPERATURE SENSOR



COOLING FAN MOTOR

ENGINE ROOM RELAY BLOCK, JUNCTION BLOCK

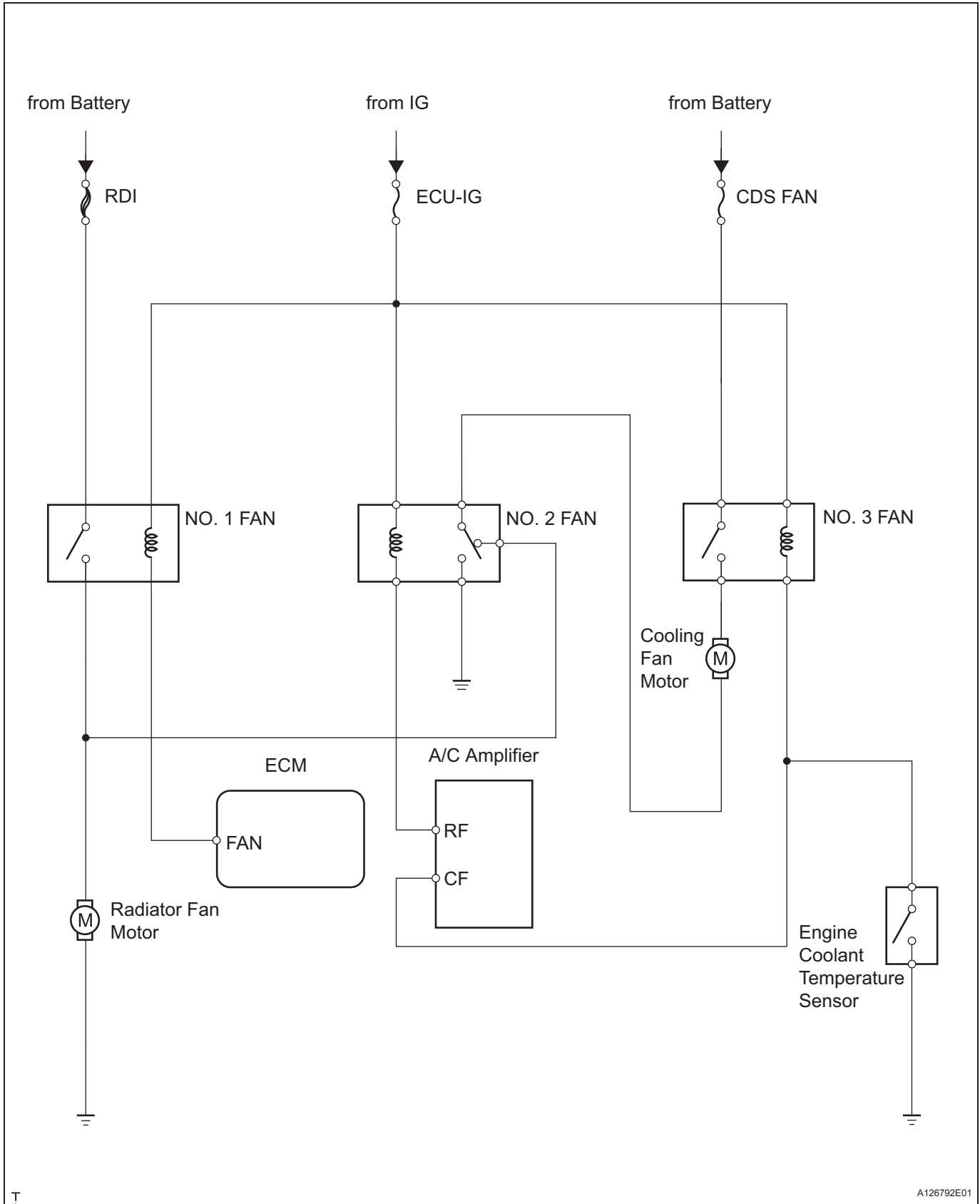
- RDI H-FUSE
- NO. 2 FAN RELAY (Marking: FAN NO. 2)
- CDS FAN FUSE
- NO. 3 FAN RELAY (Marking: FAN NO. 3)
- INTEGRATION RELAY (UNIT C: NO. 1 (FAN NO. 1) RELAY)



ECM

A/C AMPLIFIER

# SYSTEM DIAGRAM



## ON-VEHICLE INSPECTION

### HINT:

It is normal for the cooling fan to sometimes rotate when the ignition switch is turned from ACC to ON.

### 1. CHECK COOLING FAN OPERATION AT LOW TEMPERATURE (Below 83°C (181°F))

- (a) Turn the ignition switch ON with the A/C switch OFF.
- (b) Check that the cooling fan stops.  
If it does not, check the cooling fan relay and engine coolant temperature sensor, and check if there is a disconnection or circuit open between them.
- (c) Disconnect the engine coolant temperature sensor connector.
- (d) Check that the cooling fan rotates.  
If it does not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short in the circuit between the cooling fan relay and engine coolant temperature sensor.
- (e) Reconnect the engine coolant temperature sensor connector.

### 2. CHECK COOLING FAN OPERATION AT HIGH TEMPERATURE (Above 93°C (199°F))

- (a) Start the engine, and raise the coolant temperature to above 93°C (199°F).

#### HINT:

Coolant temperature is the value detected by the engine coolant temperature sensor on the cylinder head.

- (b) Check that the A/C switch is OFF.
- (c) Check that the cooling fan rotates.  
If it does not, check the fuses, cooling fan relay, ECM, cooling fan and engine coolant temperature sensor.

### 3. CHECK COOLING FAN

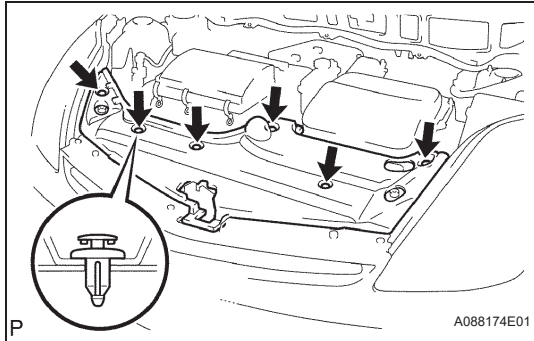
- (a) Disconnect the cooling fan connector.
- (b) Connect the battery and an ammeter to the cooling fan.
- (c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.  
**Standard amperage:**  
**9.2 to 11.0 A**
- (d) Reconnect the cooling fan connector.

# COOLANT

## ON-VEHICLE INSPECTION

### CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.



### 1. REMOVE RADIATOR SUPPORT OPENING COVER

- (a) Remove the 6 clips and radiator support opening cover.

### 2. REMOVE ENGINE UNDER COVER LH

### 3. REMOVE FRONT FENDER LINER LH

- (a) Remove the front part of the front fender liner LH.

### 4. DRAIN ENGINE COOLANT

- (a) Disconnect the coolant heat storage water pump connector.
- (b) Connect a vinyl hose to the drain cock of the radiator.
- (c) Connect a vinyl hose to the drain cock of the engine.
- (d) Connect a vinyl hose to the drain cock of the coolant heat storage tank.

### CAUTION:

**If the tank has any malfunctions, the tank surface becomes hot. To prevent injuries from burns, do not touch the tank.**

- (e) Loosen the drain cock plugs of the radiator, engine and coolant heat storage tank, then drain the coolant.

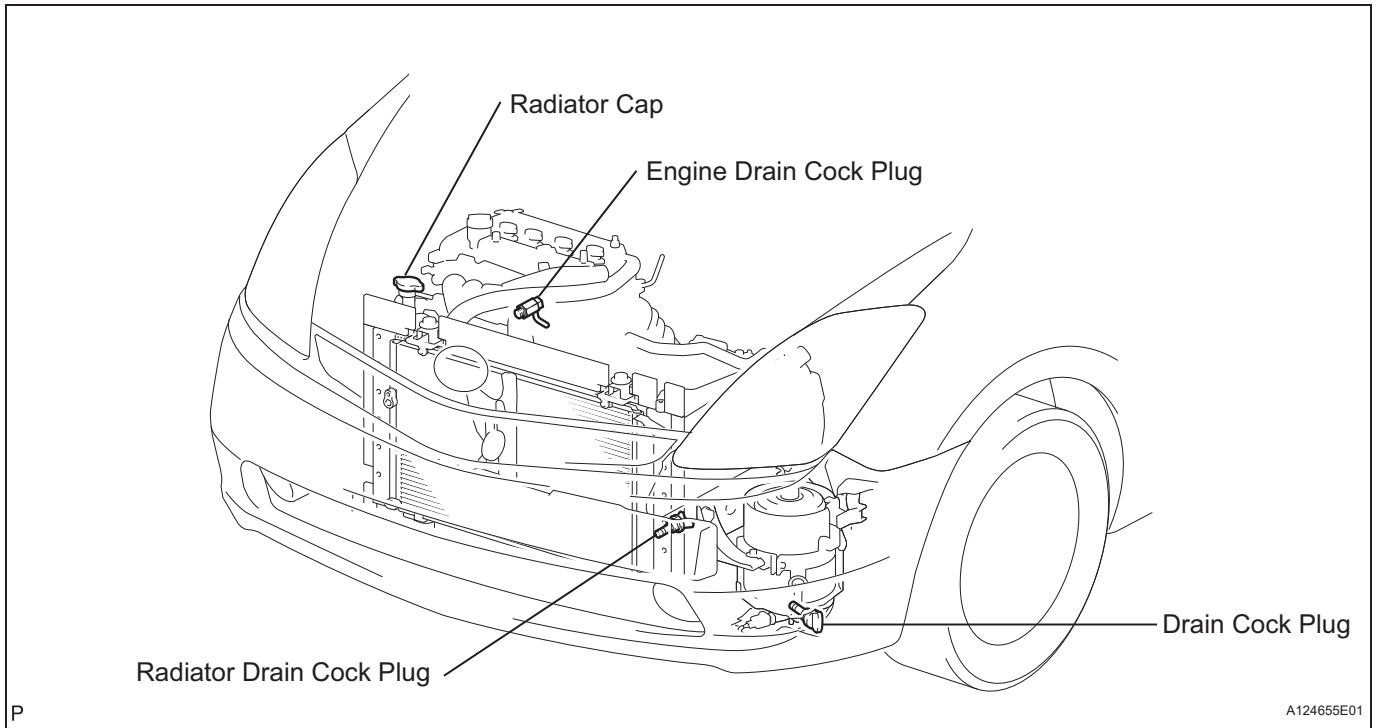
### CAUTION:

**Even if the engine is cold, the coolant in the coolant heat storage tank is still hot. Be careful of the hot coolant when draining it.**

### HINT:

Record the amount of the drained coolant. It will be referred to when refilling the tank with coolant.

- (f) Remove the radiator cap.



- (g) Drain the coolant in the radiator reservoir.

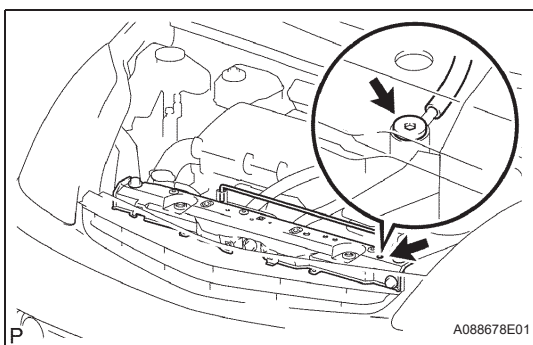
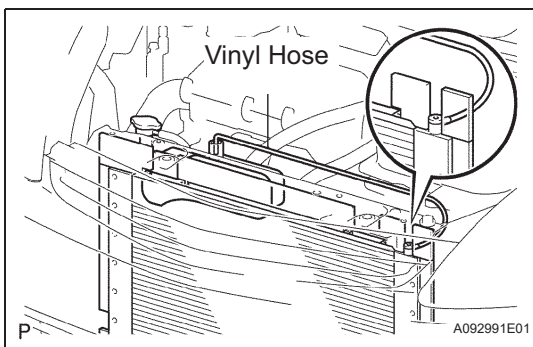
## 5. ADD ENGINE COOLANT

- (a) Tighten the drain cock plug of the coolant heat storage tank, then disconnect the vinyl hose.  
 (b) Tighten the drain cock plug of the engine, then disconnect the vinyl hose.  
**Torque: 13 N\*m (133 kgf\*cm, 9.6 ft.\*lbf)**  
 (c) Tighten the drain cock plug of the radiator, then disconnect the vinyl hose.

- (d) Connect a vinyl hose to the bleeder plug of the radiator assembly and the radiator reservoir.

HINT:

Insert the vinyl hose inside the radiator reservoir tank.



- (e) Using a 6 mm socket hexagon wrench, loosen the radiator bleeder plug from the radiator support service hole.

- (f) Fill the radiator with coolant up to the fill port.

**Standard capacity:**

**8.6 liters (9.1 US qts, 7.6 Imp. qts)**

HINT:

- When filling coolant, press the radiator hose a few times. If the coolant level goes down, add more coolant.

- Amount of coolant to fill: Approximately 2.4 liters (2.5 US qts, 2.1 Imp. qts)
- Use of improper coolants may damage the engine cooling system.
- Only use "Toyota Super Long Life Coolant", or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology.
- New Toyota vehicles are filled with Toyota Super Long Life Coolant (color is pink, premixed ethylene-glycol concentration is approximately 50% and freezing temperature is  $-35^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$ )). When replacing the coolant, Toyota Super Long Life Coolant is recommended.
- Observe the coolant level inside the radiator by pressing the inlet and outlet radiator hoses several times by hand. If the coolant level goes down, add more coolant.

**NOTICE:**

**Never use water as a substitute for engine coolant.**

- (g) Using a 6 mm socket hexagon wrench, tighten the radiator bleeder plug.  
**Torque: 1.5 N\*m (15 kgf\*cm, 13 in.\*lbf)**
- (h) Install the radiator cap.  
 (i) Fill the radiator reservoir tank with coolant to the full level.  
 (j) Connect the coolant heat storage water pump connector.  
 (k) Connect the intelligent tester to the DLC3.  
 (l) Turn the power switch ON (IG).  
 (m) Select the item:  
 DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / WATER PUMP

**NOTICE:**

- **The water pump motor operates for 30 seconds after WATER PUMP is ON in the ACTIVE TEST mode, then it automatically stops operating.**
- **Do not actuate the water pump motor without coolant filled.**

- (n) Using a 6 mm socket hexagon wrench, loosen the radiator bleeder plug from the radiator support service hole.  
 (o) Remove the radiator cap, then fill the radiator with coolant up to the fill port.

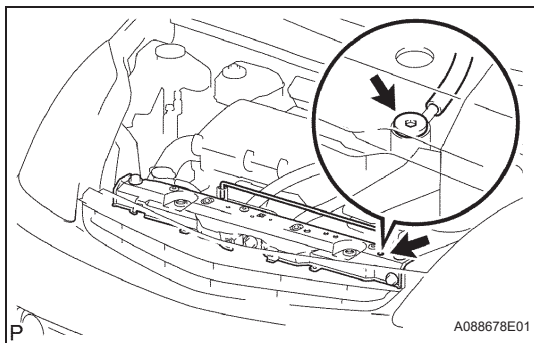
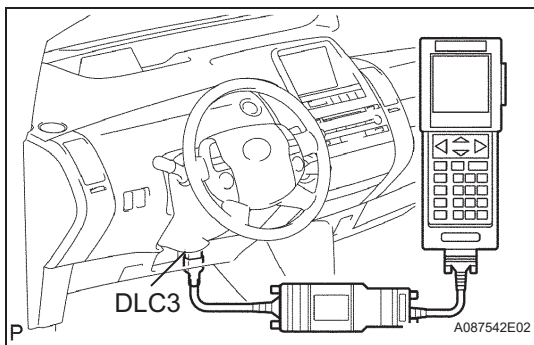
**HINT:**

When filling coolant, press the radiator hose a few times. If the coolant level goes down, add more coolant.

- (p) Using a 6 mm socket hexagon wrench, tighten the radiator bleeder plug.

**Torque: 1.5 N\*m (15 kgf\*cm, 13 in.\*lbf)**

CO





- (q) Install the radiator cap.
- (r) Slowly pour coolant into the radiator reservoir until it reaches the full line.
- (s) Disconnect the vinyl hose between the bleeder plug of the radiator assembly and the radiator reservoir tank.
- (t) Set the vehicle to inspection mode (see page [IN-5](#)).
- (u) Warm up the engine until the thermostat is open.
- (v) Stop the engine, then wait until the coolant becomes cold. Remove the radiator cap and check the coolant level.

**CAUTION:**

**If the engine or radiator is hot, do not remove the radiator cap.**

If the coolant level is lower, add coolant again. Warm up the engine, then check the coolant level.

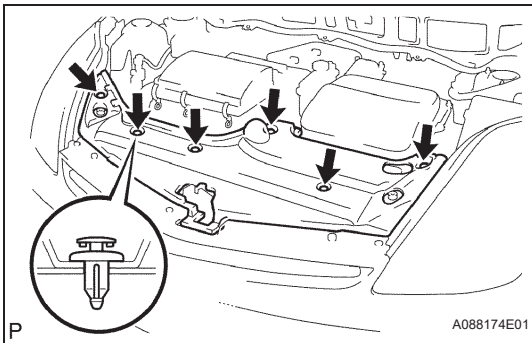
- (w) When the coolant level stops going down, add coolant to the radiator reservoir tank up to the full level.

**6. CHECK FOR ENGINE COOLANT LEAKS**

- (a) Fill the radiator with engine coolant and attach a radiator cap tester.
- (b) Pump the tester to 137 kPa (1.4 kgf/cm<sup>2</sup>, 19.9 psi) and check for leakage.

**7. INSTALL FRONT FENDER LINER LH****8. INSTALL ENGINE UNDER COVER LH****9. INSTALL RADIATOR SUPPORT OPENING COVER**

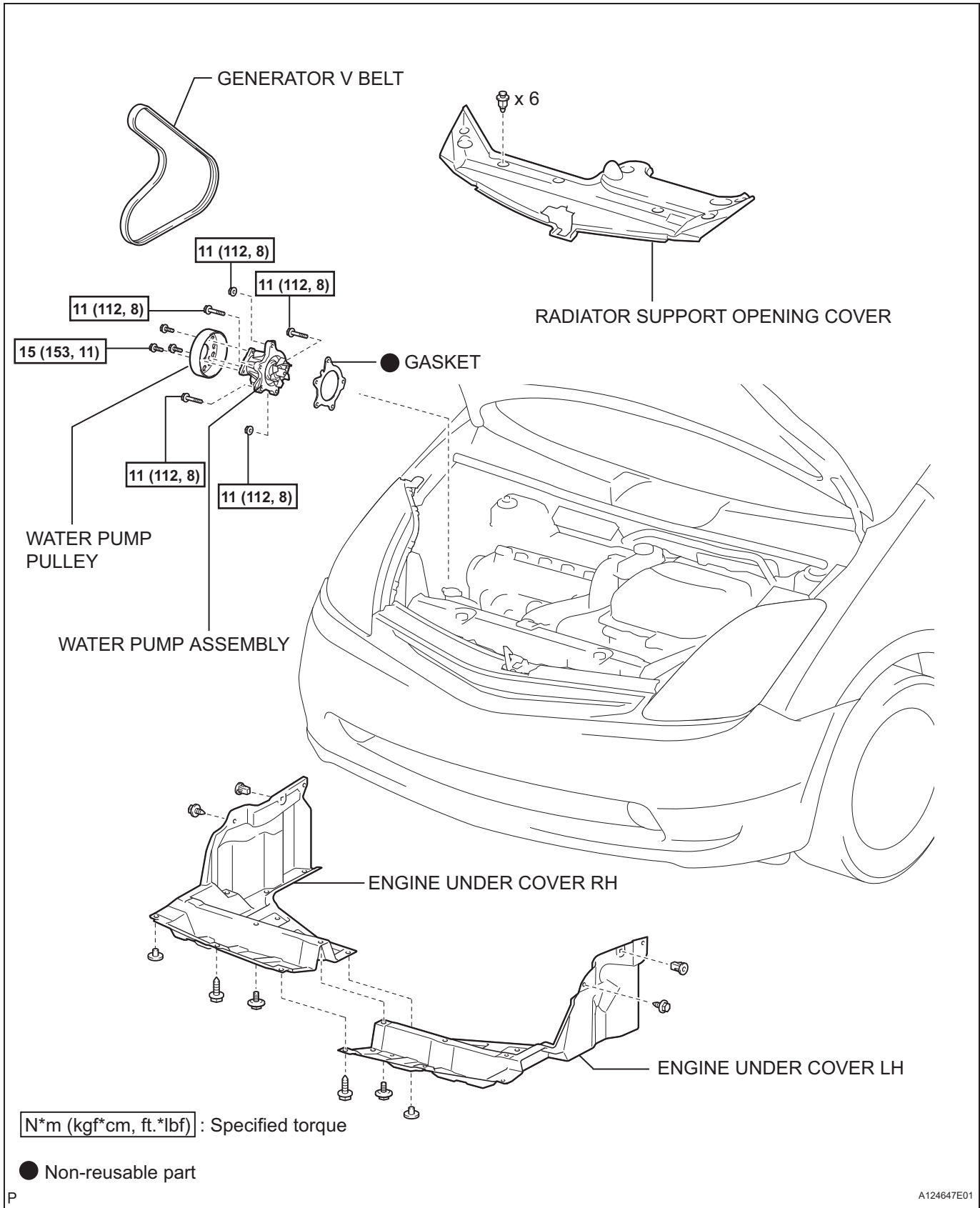
- (a) Install the opening cover with the 6 clips.



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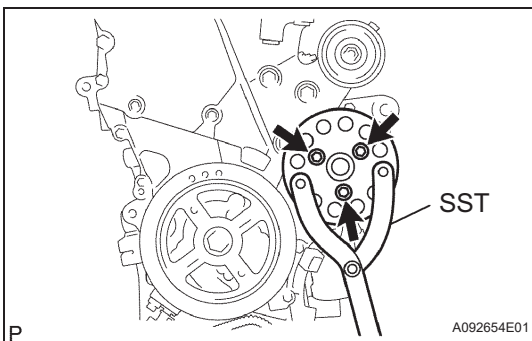
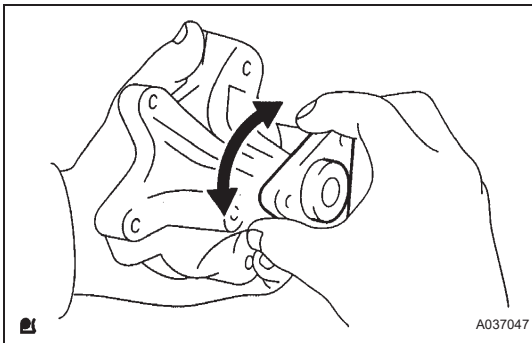
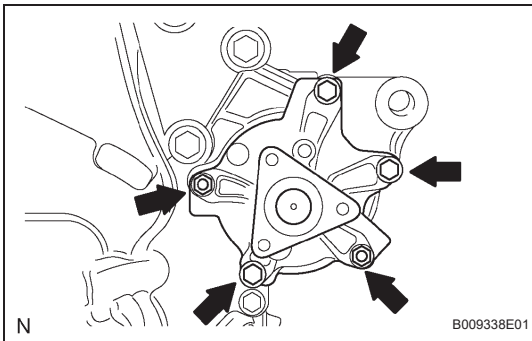
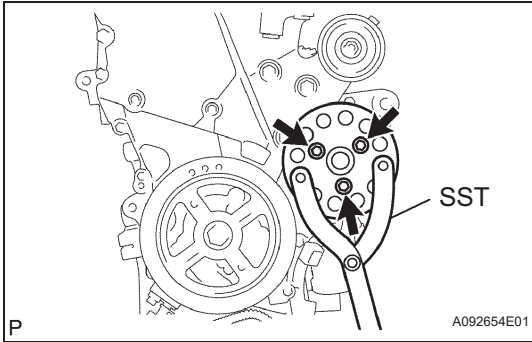
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# WATER PUMP COMPONENTS



## REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER (See page CO-6)
2. REMOVE ENGINE UNDER COVER LH
3. REMOVE ENGINE UNDER COVER RH
4. DRAIN ENGINE COOLANT (See page CO-6)
5. REMOVE GENERATOR V BELT (See page EM-6)
6. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH (See page EM-32)
7. REMOVE WATER PUMP PULLEY
  - (a) Using SST, hold the pump pulley.  
SST 09960-10010 (09962-01000, 09963-00600)
  - (b) Remove the 3 bolts and pump pulley.



8. REMOVE WATER PUMP ASSEMBLY
  - (a) Remove the 3 bolts and 2 nuts.
  - (b) Remove the water pump and gasket.

## INSPECTION

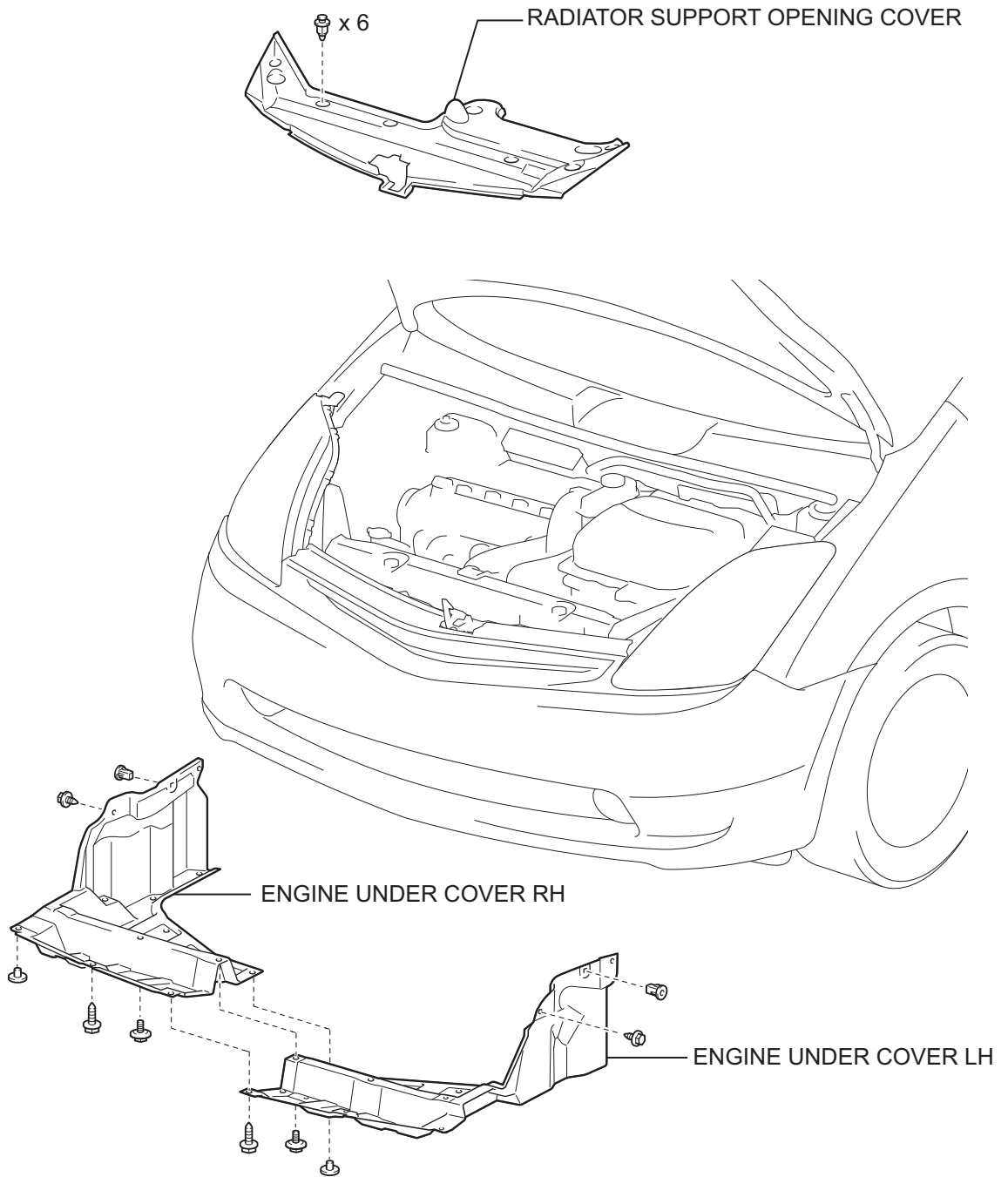
1. INSPECT WATER PUMP ASSEMBLY
  - (a) Visually check the water hole and air hole for coolant leakage.  
If leakage is found, replace the water pump assembly.
  - (b) Turn the pulley, and check that the pump bearing moves smoothly and quietly.  
If it moves roughly or noisily, replace the water pump assembly.

## INSTALLATION

1. INSTALL WATER PUMP ASSEMBLY
  - (a) Install a new gasket and the water pump with the 3 bolts and 2 nuts.  
Torque: 11 N\*m (112 kgf\*cm, 8 ft.\*lbf)
2. INSTALL WATER PUMP PULLEY
  - (a) Using SST, install the pump pulley with the 3 bolts.  
SST 09960-10010 (09962-01000, 09963-00600)  
Torque: 15 N\*m (153 kgf\*cm, 11 ft.\*lbf)

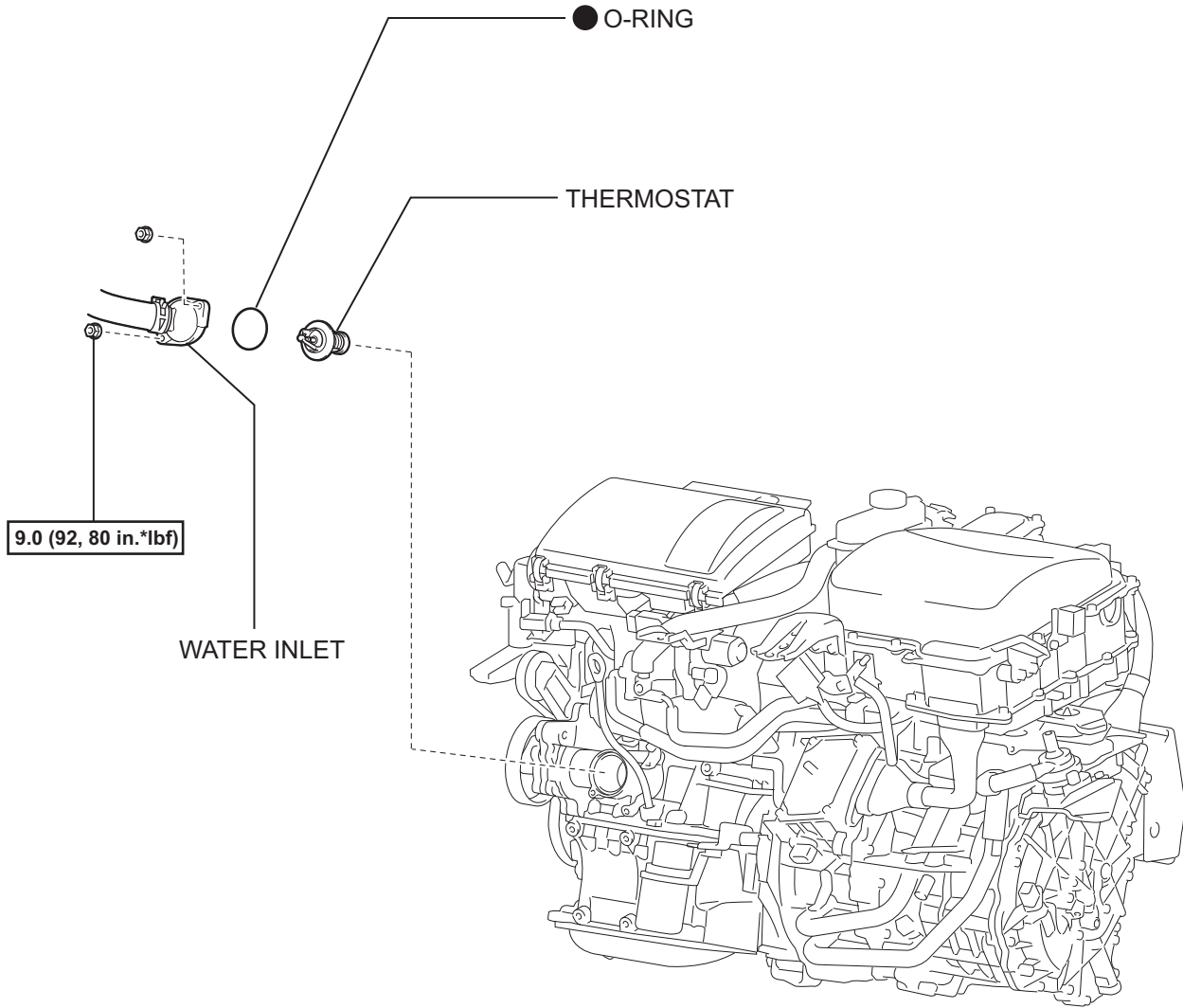
3. **INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH** (See page [EM-38](#))
4. **INSTALL GENERATOR V BELT** (See page [EM-6](#))
5. **ADJUST GENERATOR V BELT** (See page [EM-6](#))
6. **ADD ENGINE COOLANT** (See page [CO-7](#))
7. **CHECK FOR ENGINE COOLANT LEAKS** (See page [CO-9](#))
8. **INSTALL ENGINE UNDER COVER RH**
9. **INSTALL ENGINE UNDER COVER LH**
10. **INSTALL RADIATOR SUPPORT OPENING COVER** (See page [CO-9](#))

# THERMOSTAT COMPONENTS



CO

CO



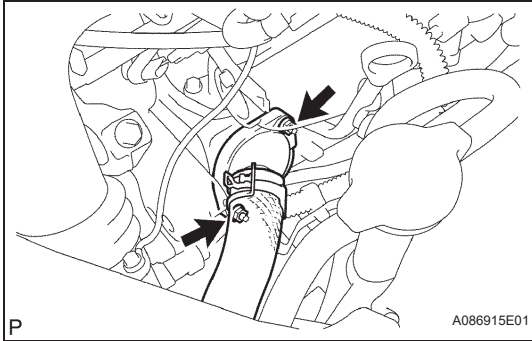
N\*m (kgf\*cm, ft.\*lbf) : Specified torque

● Non-reusable part

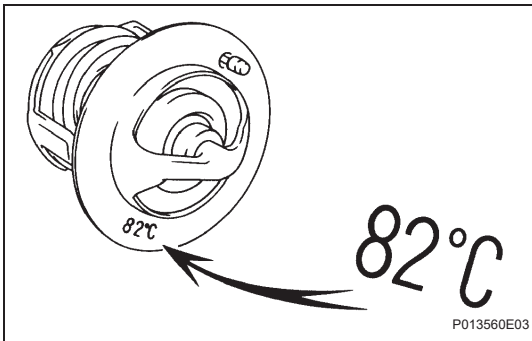
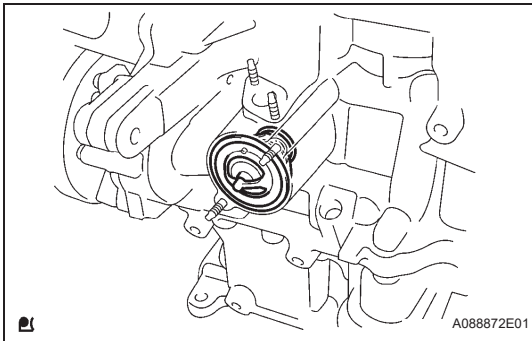
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## REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER  
(See page CO-6)
2. REMOVE ENGINE UNDER COVER LH
3. REMOVE ENGINE UNDER COVER RH
4. DRAIN ENGINE COOLANT (See page CO-6)
5. REMOVE WATER INLET
  - (a) Remove the 2 nuts and disconnect the water inlet from the cylinder block.



6. REMOVE THERMOSTAT
  - (a) Remove the thermostat.
  - (b) Remove the gasket from the thermostat.



## INSPECTION

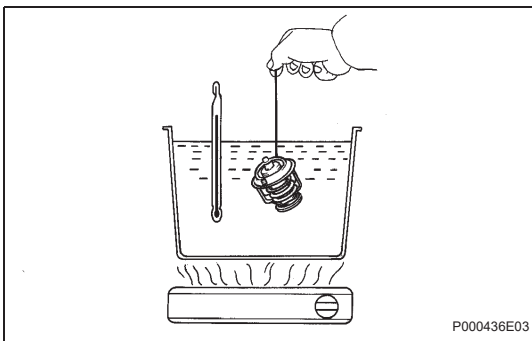
1. INSPECT THERMOSTAT  
HINT:  
The valve opening temperature is inscribed on the thermostat.

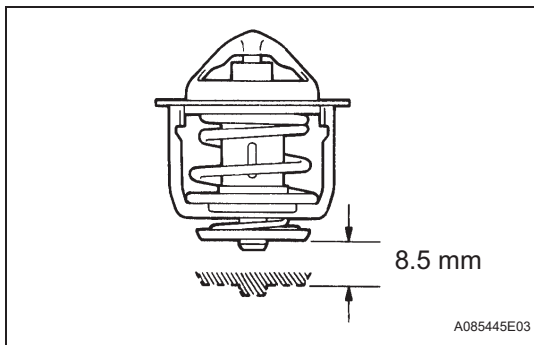
- (a) Immerse the thermostat in water and then gradually heat the water.
- (b) Check the valve opening temperature of the thermostat.

### Standard valve opening temperature:

**80 to 84°C (176 to 183°F)**

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



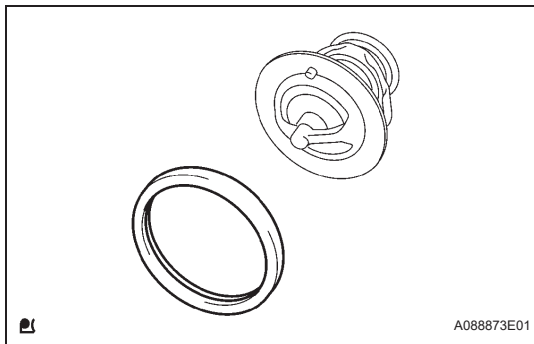


- (c) Check the valve lift.  
**Standard valve lift:**  
**8.5 mm (0.338 in.) or more at 95°C (203°F)**  
 If the valve lift is not as specified, replace the thermostat.
- (d) Check that the valve is fully closed when the thermostat temperature is below 77°C (171°F).  
 If not fully closed, replace the thermostat.

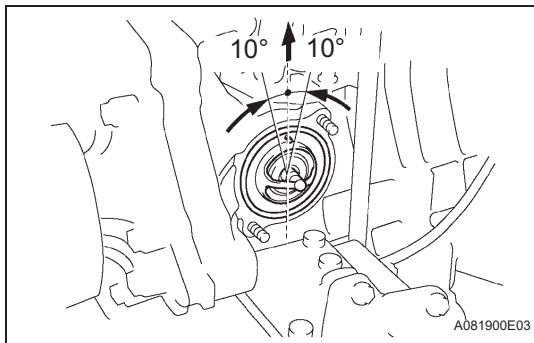
## INSTALLATION

### 1. INSTALL THERMOSTAT

- (a) Install a new gasket to the thermostat.



- (b) Install the thermostat with the jiggle valve facing upward.  
**HINT:**  
 The jiggle valve may be set within 10° of either side as shown in the illustration.



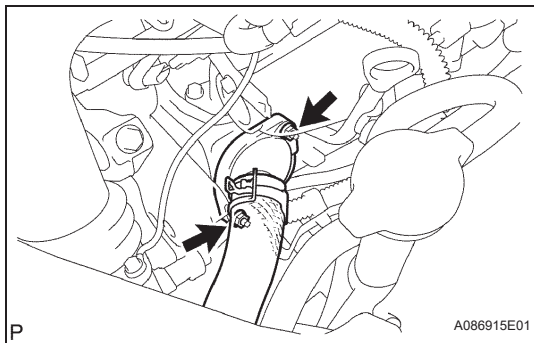
### 2. INSTALL WATER INLET

- (a) Install the water inlet to the cylinder block with the 2 nuts.

**Torque: 9.0 N\*m (92 kgf\*cm, 80 in.\*lbf)**

**NOTICE:**

Ensure that the gasket is not stuck between the water inlet and cylinder block.



### 3. ADD ENGINE COOLANT (See page [CO-7](#))

### 4. CHECK FOR ENGINE COOLANT LEAKS (See page [CO-9](#))

### 5. INSTALL ENGINE UNDER COVER RH

### 6. INSTALL ENGINE UNDER COVER LH

### 7. INSTALL RADIATOR SUPPORT OPENING COVER (See page [CO-9](#))