

# COOLANT INSPECTION

CO04D-04

**HINT:**

Check the coolant level when the engine is cold.

**1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR**

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

If low, check for leaks and add "Toyota Long Life Coolant" or equivalent up to the "FULL" line.

**2. CHECK ENGINE COOLANT QUALITY**

(a) Remove the reservoir cap.

**CAUTION:**

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

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

If excessively dirty, replace the coolant.

(c) Reinstall the reservoir cap.

## REPLACEMENT

### CAUTION:

Be sure to perform the operation after the engine and coolant are completely cool down because there is a fear of burning.

### NOTICE:

- In order to do sure filling of the coolant, perform the operation where the vehicle can be kept evenly flat.
- In order to replace the coolant securely, must keep the following operation procedure. Also, after replacing the coolant, driving within 500 km (311 miles) or within a week, check the water level of the reservoir tank once or twice.

### 1. DRAIN ENGINE COOLANT

- Remove the luggage under cover.
- Remove the tool box and luggage compartment trim box cover.
- Remove the reservoir tank cap.
- Remove the drain plugs (radiator, radiator pipes and engine), and drain the coolant.

### NOTICE:

Check the drain plug and the gasket of the radiator pipes. When they are damaged, replace them. At the same time, check the hoses and hose clamps. When there are any misregistration and deformation of the hose clamps or damage of the hoses, replace them.

### HINT:

We recommend to replace the gaskets at the same time when to replace the coolant.

- Close the drain plugs.

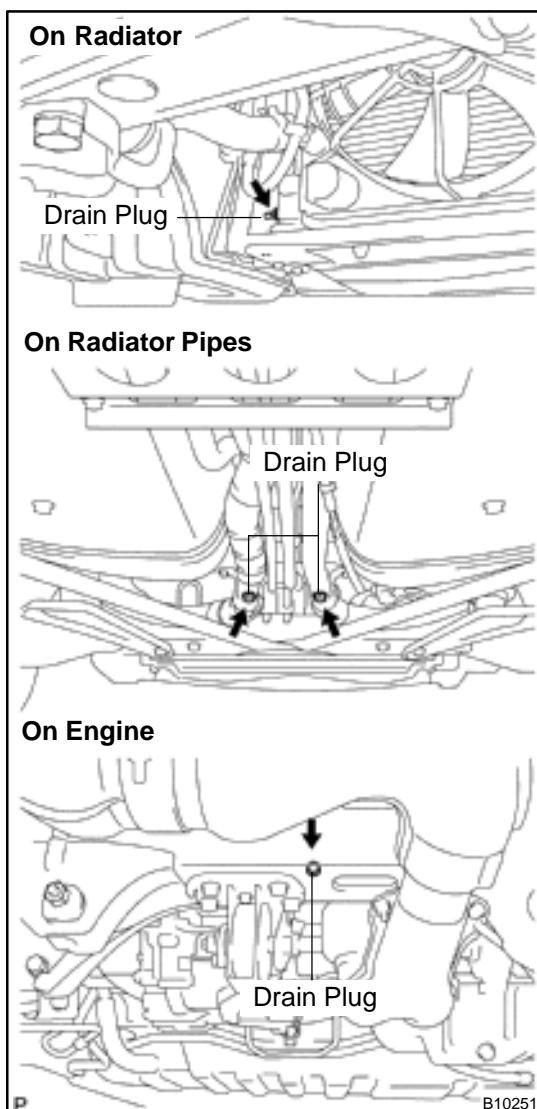
### Torque:

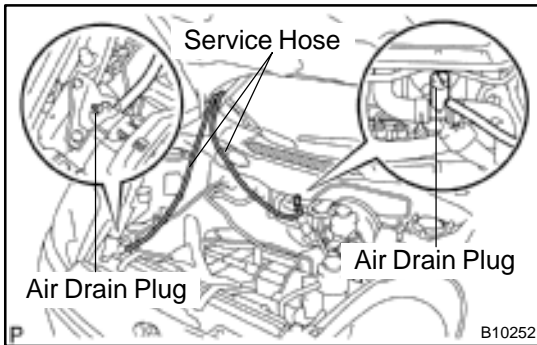
Engine: 13 N·m (133 kgf·cm, 9.6 ft·lbf)

Radiator pipes: 16.5 N·m (168 kgf·cm, 12 ft·lbf)

### 2. REFILL WITH ENGINE COOLANT

- Set the service hoses.
  - Connect the service hoses to the air drain plug of the radiator and heater water valve.





- (2) Suspend the opposite ends the front hood as shown in the illustration.

**NOTICE:**

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

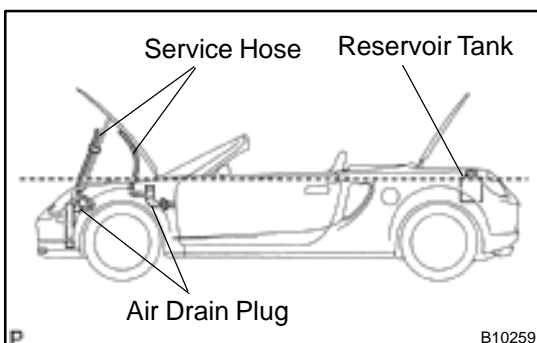
- (b) Fill the engine coolant.
  - (1) Turn each air drain plugs of the radiator and heater water valve counterclockwise and make it open.
  - (2) Slowly fill the system with coolant.
    - Use of improper coolants may damage engine cooling system.
    - Use "Toyota Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
    - Using of coolant which includes more than 50 % (freezing protection down to  $-35^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$ )) or 60 % (freezing protection down to  $-50^{\circ}\text{C}$  ( $-58^{\circ}\text{F}$ )) of ethylene-glycol is recommended but not more than 70 %.

**NOTICE:**

- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**

**Capacity: 10.4 liters (10.9 US qts, 9.2 Imp. qts)**

- (3) Check that air is bleeding from the air drain service hoses of the radiator and heater water valve.
- (4) When filling coolant into the reservoir tank, do it at the height as near to the filling inlet (by making the water surface by or more than 1/2 of the reservoir tank) as possible and fill the coolant until the level keeps A line of the filling inlet.



- (5) Check with your eyes that the water level of the air drain service hoses of radiator and heater water valve is as high as that of the reservoir tank.

When the water level of the air drain service hoses of the radiator and heater water valve is obviously lower, fix the crash and bent of the air drain service hoses, check the air bleed and perform step (4).

- (6) Turn the air drain plugs of the radiator and heater water valve clockwise and make it close.

- (7) Never have any leakage from each drain plugs of the radiator, radiator pipes or engine. Make sure that the air drain plugs of the radiator and heater water valve are closed and turn the reservoir tank cap to close until the lock position until it clicks.
  - (8) Remove the service hoses of the radiator and heater water valve and collect the coolant remained in the service hoses.
  - (9) Start the engine, check that the air is bleeding to the reservoir tank and warm up the engine sufficiently.
  - (10) Check that the water level of the reservoir tank after the warming up of the engine is over the FULL.
  - (11) After complete cooling of the engine, the level shall be between LOW and FULL.
- (c) Replace the service hoses to the original place.
  - (d) Reinstall the tool box and luggage compartment trim box cover.
  - (e) Reinstall the luggage under cover.

## WATER PUMP ON-VEHICLE INSPECTION

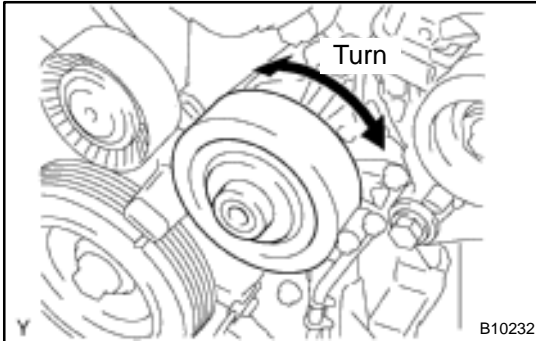
COOL-02

### INSPECT WATER PUMP

**NOTICE:**

**Be sure to do checking when the engine coolant is charged.**

(a) Remove the drive belt (See page [CH-7](#)).

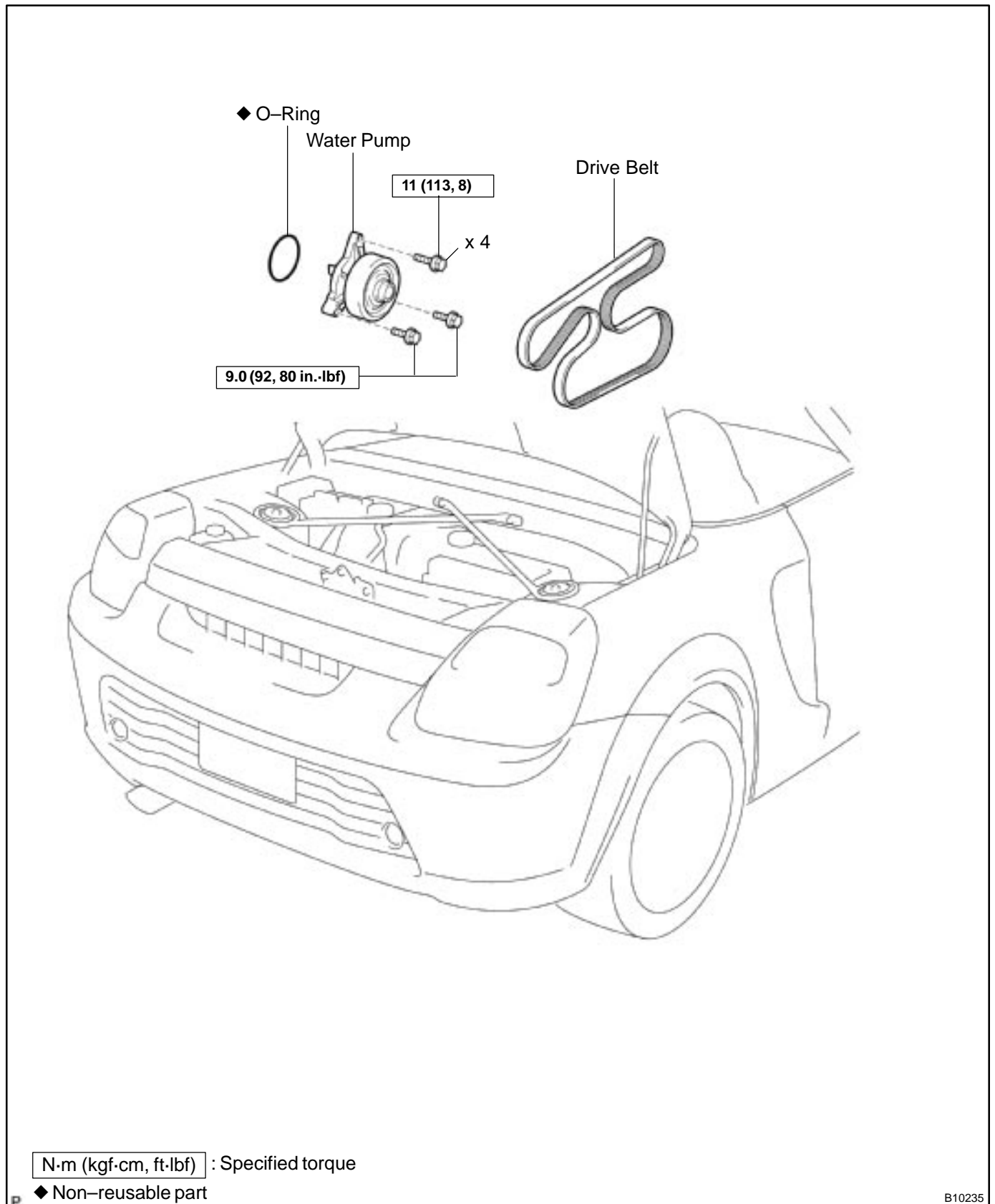


(b) Turn the pulley, and check that the water pump bearing moves smoothly and quietly.

If necessary, replace the water pump.

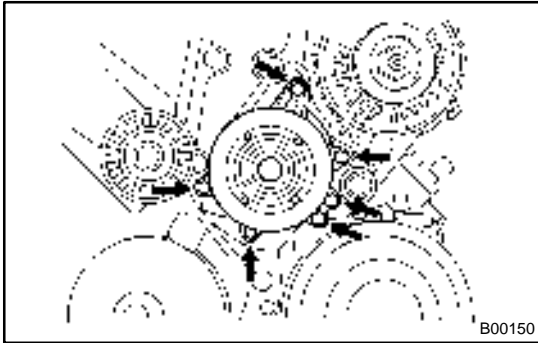
(c) Reinstall the drive belt (See page [CH-17](#)).

# COMPONENTS



## REMOVAL

1. DRAIN ENGINE COOLANT (See page [CO-2](#))
2. REMOVE DRIVE BELT (See page [CH-7](#))



3. REMOVE WATER PUMP

- (a) Remove the 6 bolts, water pump and gasket.
- (b) Clean up the engine coolant from the water chamber room.

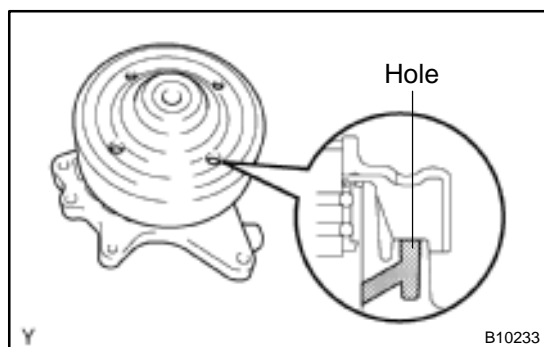
**NOTICE:**

**Do not remove the RH engine mounting bracket and generator when the water pump alone is replaced.**

## INSPECTION

### NOTICE:

Never rotate the pulley in a condition with a single unit of the water pump.

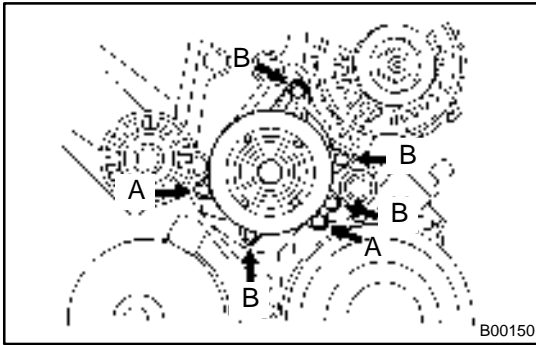


### INSPECT WATER PUMP

Visually check the drain hole for coolant leakage.

If leakage is found, replace the water pump.





## INSTALLATION

### 1. INSTALL WATER PUMP

- (a) Place a new O-ring on the timing chain cover.
- (b) Install the water pump with the 6 bolts.

#### Torque:

**Bolt A: 9 N·m (92 kgf·cm, 80 in.-lbf)**

**Bolt B: 11 N·m (113 kgf·cm, 8 ft·lbf)**

#### HINT:

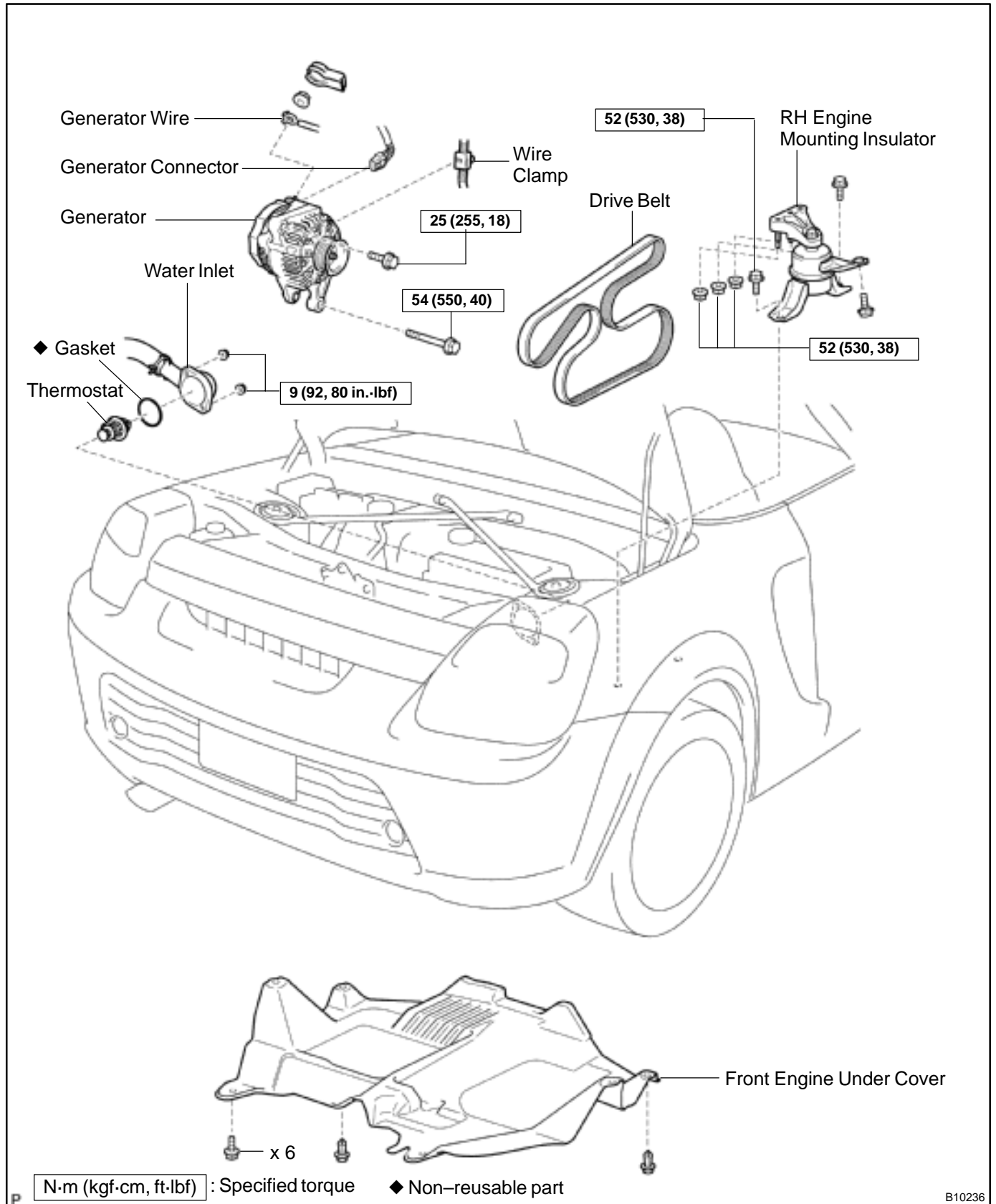
Each bolt length is indicated in the illustration.

|          |                  |
|----------|------------------|
| Bolt "A" | 30 mm (1.18 in.) |
| Bolt "B" | 35 mm (1.38 in.) |

2. **INSTALL DRIVE BELT (See page [CH-17](#))**
3. **FILL WITH ENGINE COOLANT (See page [CO-2](#))**
4. **START ENGINE AND CHECK FOR LEAKS**
5. **RECHECK ENGINE COOLANT LEVEL**

# THERMOSTAT COMPONENTS

CO04J-06



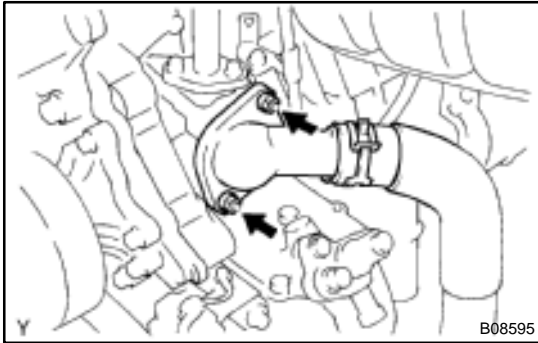
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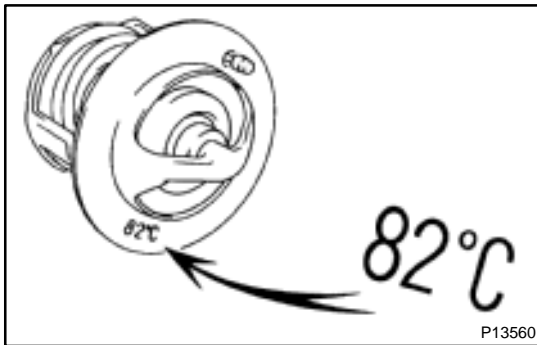
## REMOVAL

### HINT:

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

1. **DRAIN ENGINE COOLANT (See page CO-2)**
2. **REMOVE DRIVE BELT AND GENERATOR (See page CH-7)**
3. **REMOVE FRONT ENGINE UNDER COVER**
4. **REMOVE WATER INLET AND THERMOSTAT**
  - (a) Remove the 2 nuts, and disconnect the water inlet from the cylinder block.
  - (b) Remove the thermostat.
  - (c) Remove the gasket from the thermostat.



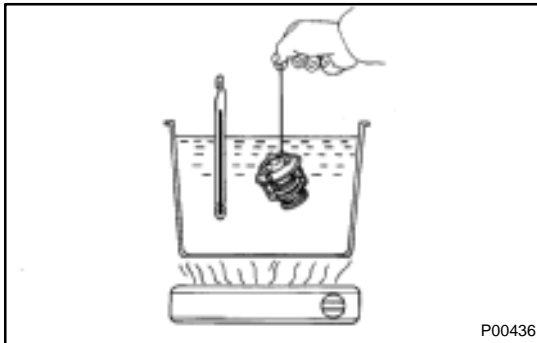


## INSPECTION

### INSPECT THERMOSTAT

#### HINT:

The thermostat is numbered with the valve opening temperature.

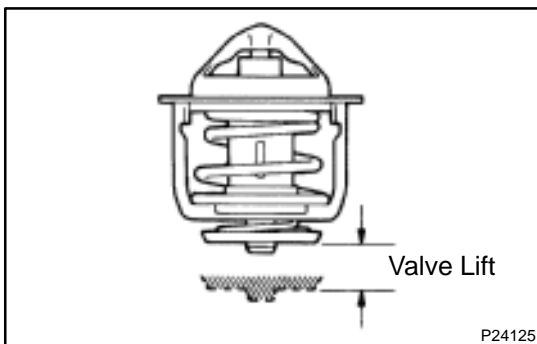


(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

**Valve opening temperature: 80 – 84 °C (176 – 183.2 °F)**

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



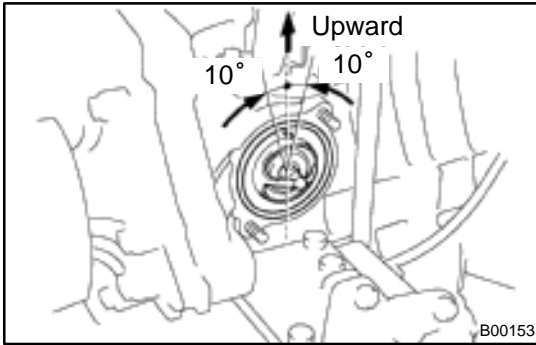
(c) Check the valve lift.

**Valve lift: 10 mm (0.39 in.) or more at 90 °C (194 °F)**

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

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 40 °C (104 °F)).

If not closed, replace the thermostat.



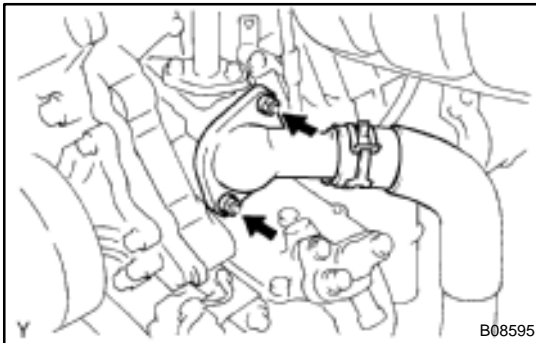
## INSTALLATION

### 1. PLACE THERMOSTAT IN CYLINDER BLOCK

- (a) Install a new gasket to the thermostat.
- (b) Install the thermostat with the jiggle valve upward.

#### HINT:

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 2 nuts.

**Torque: 9 N·m (92 kgf·cm, 80 in.-lbf)**

### 3. INSTALL FRONT ENGINE UNDER COVER

### 4. INSTALL GENERATOR AND DRIVE BELT (See page [CH-17](#))

### 5. FILL WITH ENGINE COOLANT (See page [CO-2](#))

### 6. START ENGINE AND CHECK FOR LEAKS

### 7. RECHECK ENGINE COOLANT LEVEL

# RADIATOR

## ON-VEHICLE CLEANING

CO04N-01

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

**NOTICE:**

**If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. (i.e. Maintain a distance between the cleaner nozzle and radiator core.)**

## ON-VEHICLE INSPECTION

### 1. REMOVE RESERVOIR CAP

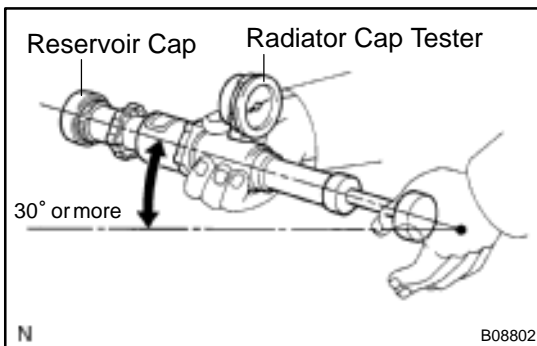
#### CAUTION:

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

### 2. INSPECT RESERVOIR CAP

#### NOTICE:

- If the reservoir cap has contaminations, always rinse it with water.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the radiator cap 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 vacuum valve.

**Pump speed: 1 push/(3 seconds or more)**

#### NOTICE:

**Push the pump at a constant speed.**

If air is not coming from the vacuum valve, replace the reservoir cap.

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

**Pump speed: 1 push within 1 seconds**

#### NOTICE:

**This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.**

**Standard opening pressure:**

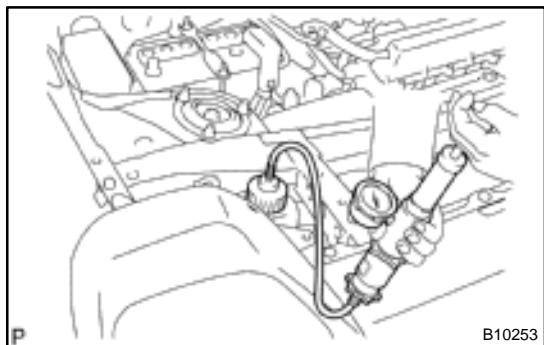
**93 – 123 kPa (0.95 – 1.25 kgf/cm<sup>2</sup>, 13.5 – 17.8 psi)**

**Minimum opening pressure:**

**79 kPa (0.8 kgf/cm<sup>2</sup>, 11.5 psi)**

#### HINT:

Use the tester's maximum reading as the opening pressure. If the opening pressure is less than minimum, replace the reservoir cap.

**3. INSPECT COOLING SYSTEM FOR LEAKS**

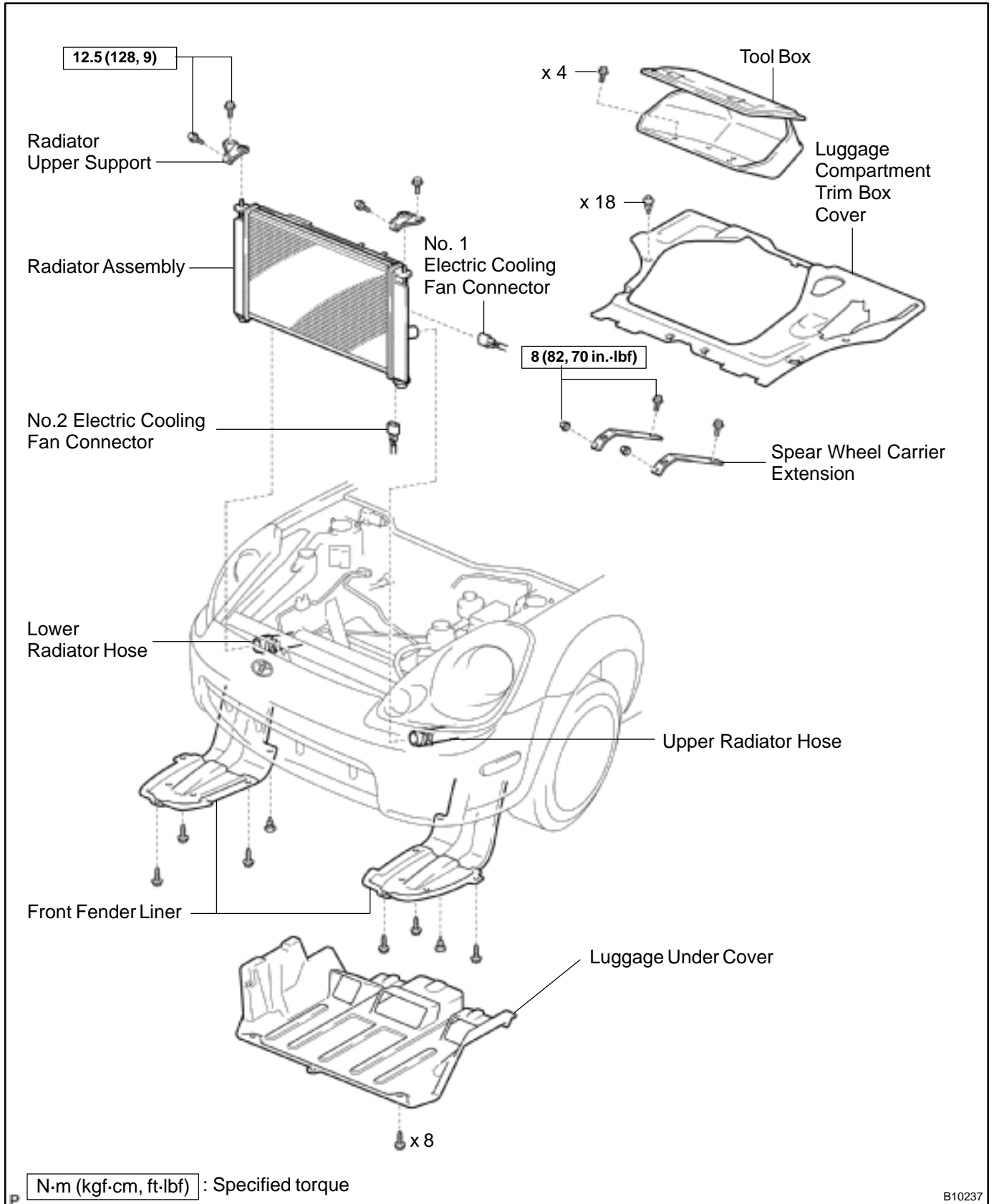
- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 118 kPa (1.2 kgf/cm<sup>2</sup>, 17.1 psi), and check that the pressure does not drop.

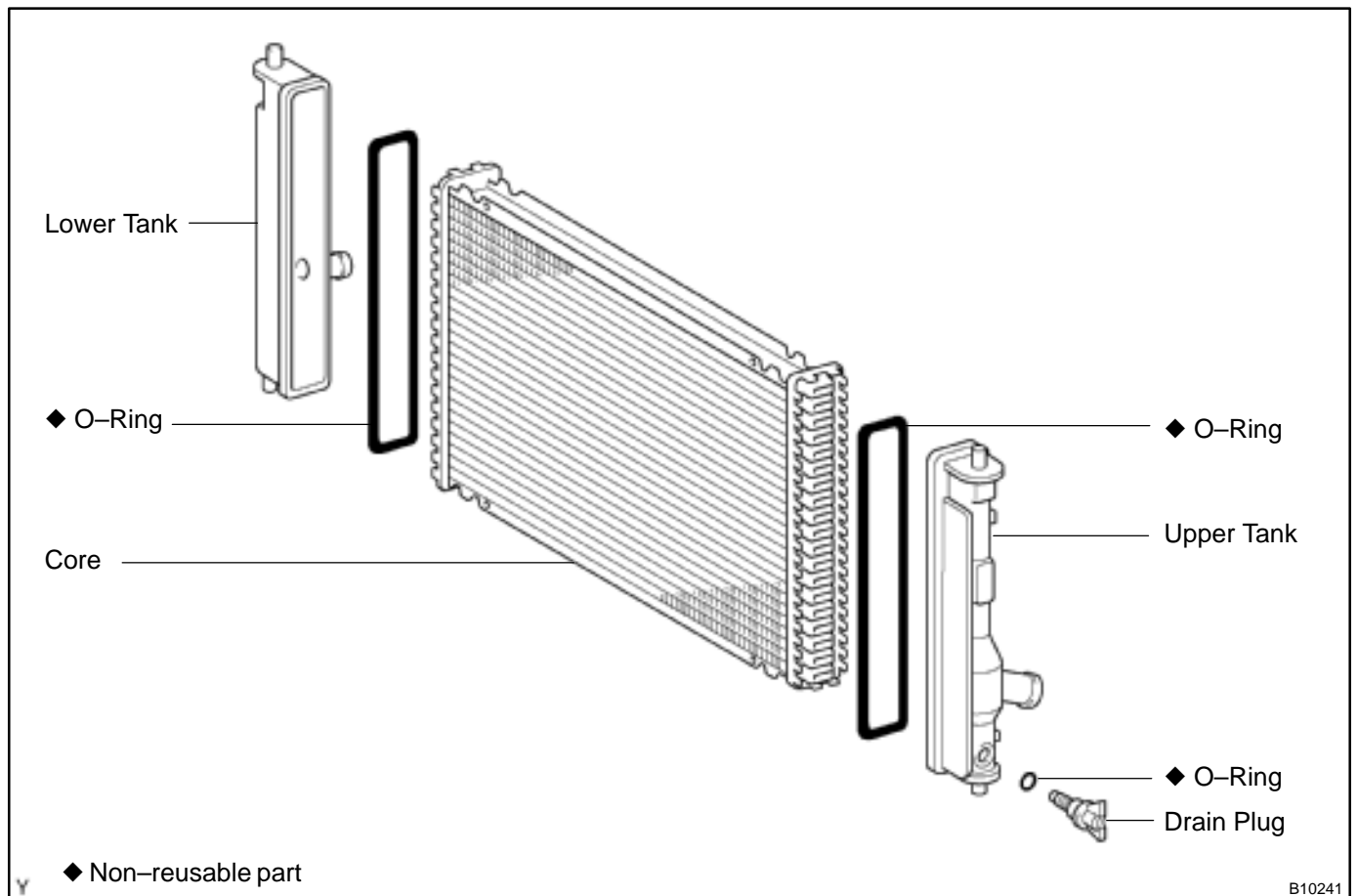
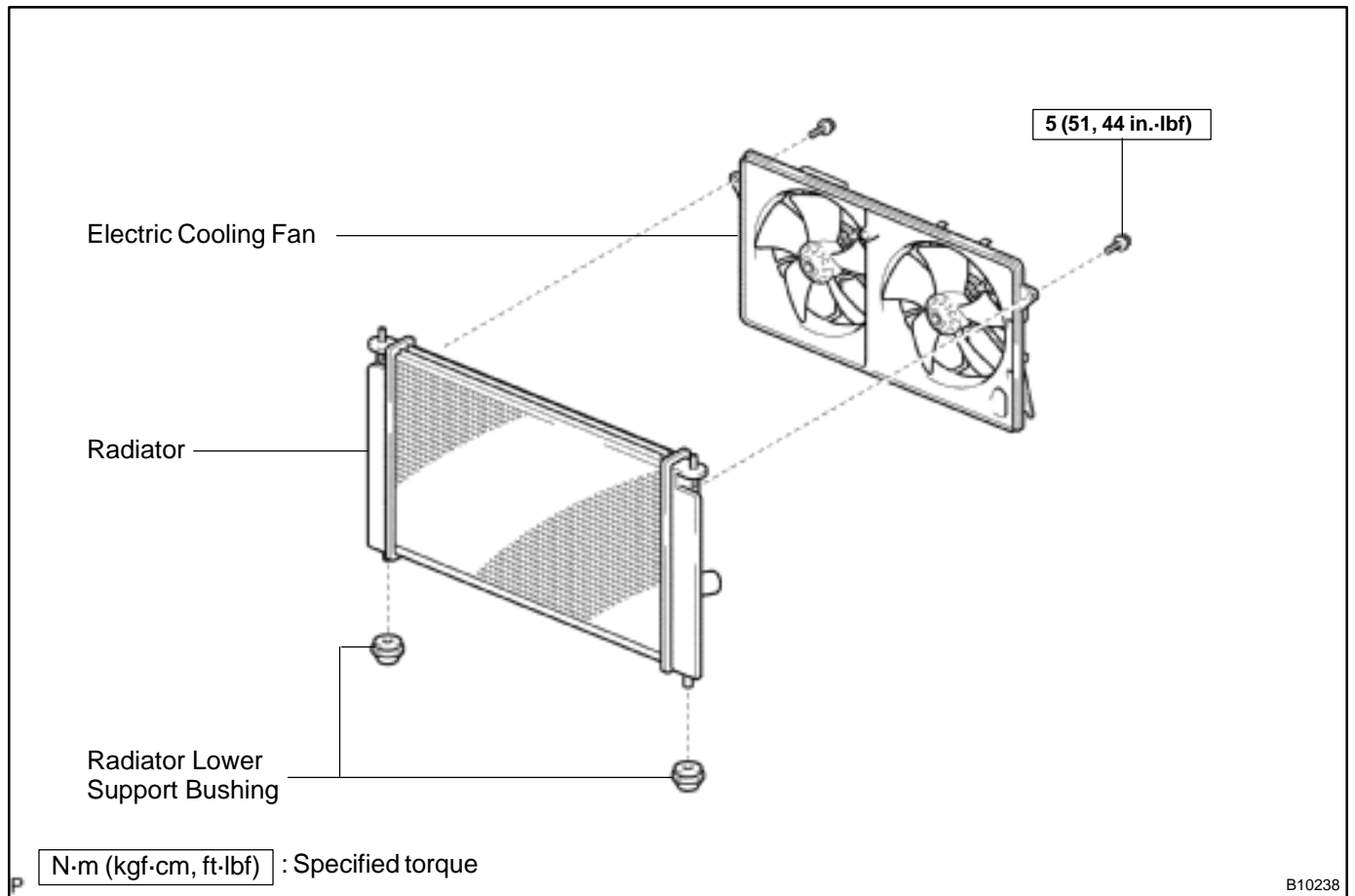
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

**4. REINSTALL RESERVOIR CAP**



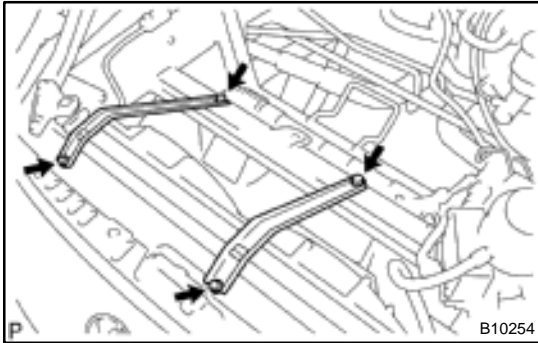
# COMPONENTS





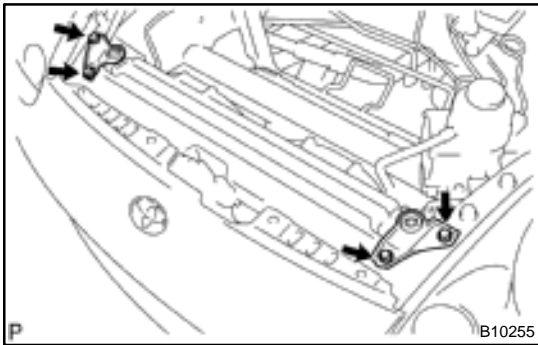
## REMOVAL

1. DRAIN ENGINE COOLANT (See page CO-2)
2. REMOVE TOOL BOX AND LUGGAGE COMPARTMENT TRIM BOX COVER



### 3. REMOVE RADIATOR ASSEMBLY

- (a) Remove the 2 bolts, 2 nuts and 2 spear wheel carrier extensions.
- (b) Disconnect the 2 electric cooling fan connectors.
- (c) Disconnect the 2 radiator hoses.



- (d) Remove the 4 bolts and 2 radiator upper supports.
- (e) Remove the 2 radiator lower support bushings.

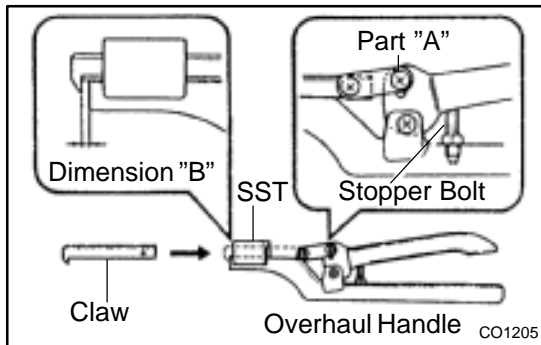
### 4. REMOVE ELECTRIC COOLING FAN FROM RADIATOR

Remove the 2 bolts and electric cooling fan assembly.

## DISASSEMBLY

### 1. REMOVE DRAIN PLUG

- (a) Remove the drain plug.
- (b) Remove the O-ring.



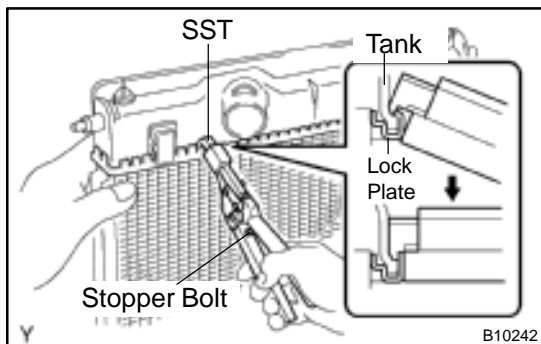
### 2. ASSEMBLE SST

SST 09230-01010

- (a) Install the claw to the overhaul handle, inserting it in the hole in part "A" as shown in the diagram.
- (b) While gripping the handle, adjust the stopper bolts so that dimension "B" shown in the diagram is 0.2 – 0.3 mm (0.008 – 0.012 in.).

#### NOTICE:

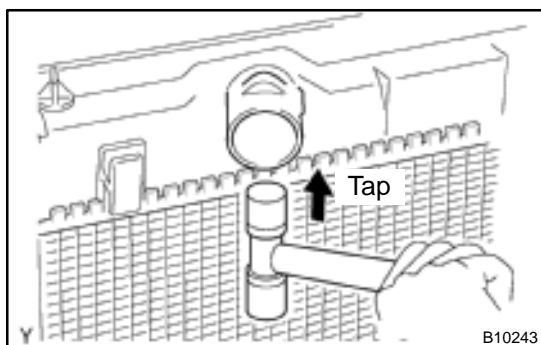
**If this adjustment is not done the claw may be damaged.**



### 3. UNCAULK LOCK PLATES

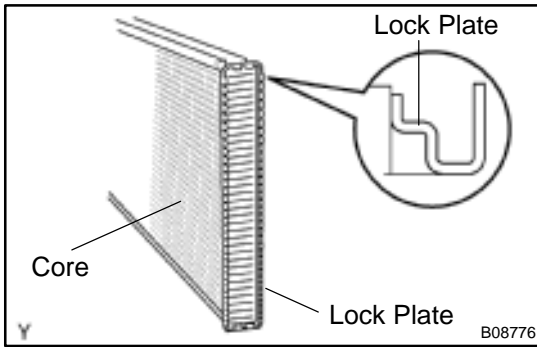
Using SST to release the caulking, squeeze the handle until stopped by the stopper bolts.

SST 09230-01010



### 4. REMOVE TANKS AND O-RINGS

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



## INSPECTION

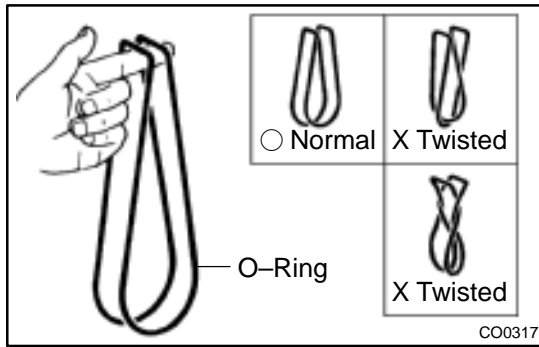
### INSPECT LOCK PLATE FOR DAMAGE

#### HINT:

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

#### NOTICE:

**The radiator can only be recaulked 2 times. After the 2nd time, the radiator core must be replaced.**



## REASSEMBLY

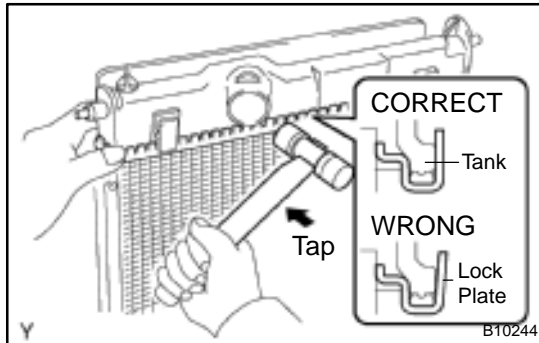
### 1. INSTALL NEW O-RINGS AND TANKS

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

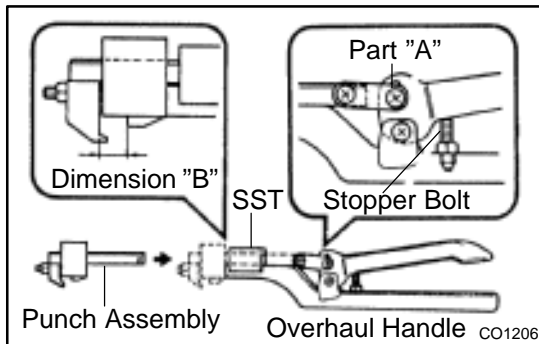
**HINT:**

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

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



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

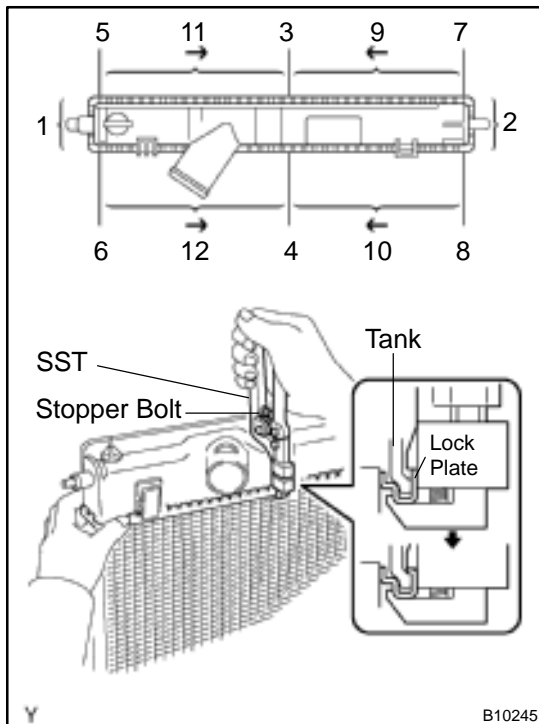


### 2. ASSEMBLE SST

SST 09230-01010, 09231-14010

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

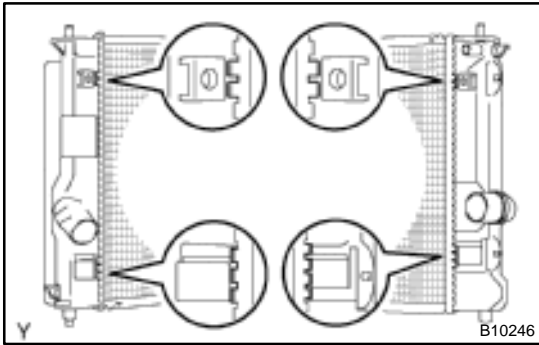
**Dimension: 8.4 mm (0.331 in.)**



### 3. CAULK LOCK PLATE

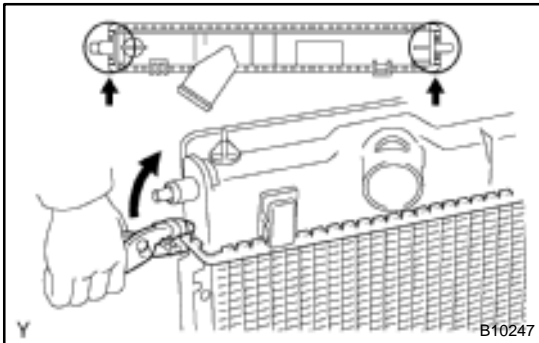
- (a) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by squeezing the handle until stopped by the stopper plate.

SST 09230-01010

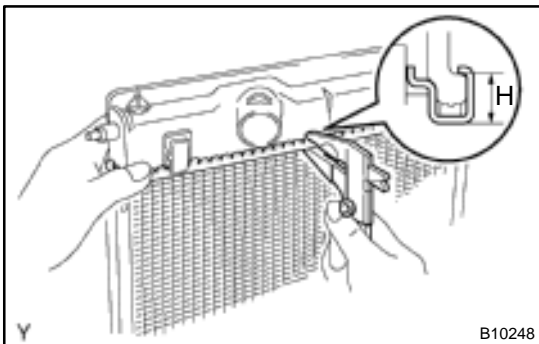


HINT:

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



- The points shown in the illustration cannot be staked with SST. Use wrap vinyl tape around the tip of a pair or similar object and be careful not to damage the core plates.



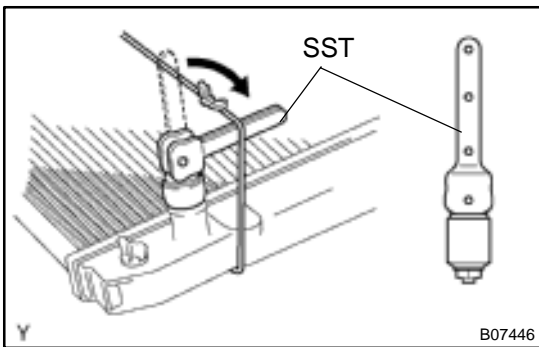
- (b) Check the lock plate height (H) after completing the caulking.

**Plate height: 7.4 – 7.8 mm (0.2913 – 0.3071 in.)**

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

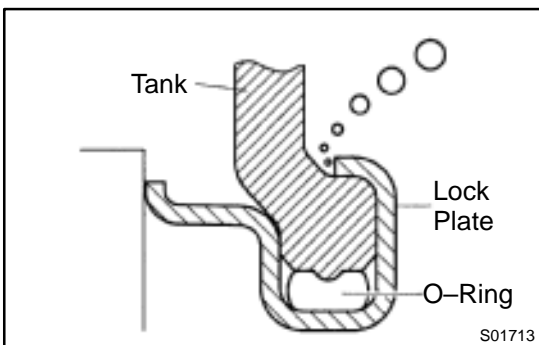
**4. INSTALL DRAIN PLUG**

- (a) Install a new O-ring to the drain plug.
- (b) Install the drain plug.



**5. INSPECT FOR WATER LEAKS**

- (a) Tighten the drain plug.
- (b) Install the engine coolant reservoir.
- (c) Plug the inlet and outlet pipes of the radiator with SST. SST 09230-01010
- (d) Using a radiator cap tester, apply pressure to the radiator. **Test pressure: 177 kPa (1.8 kgf/cm<sup>2</sup>, 26 psi)**
- (e) Submerge the radiator in water.



- (f) Inspect for leaks.

HINT:

On radiators with resin tanks, there is a clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. therefore, before doing the water leak test, first swish the radiator around in the water until all bubbles disappear.

## INSTALLATION

### 1. INSTALL ELECTRIC COOLING FAN TO RADIATOR

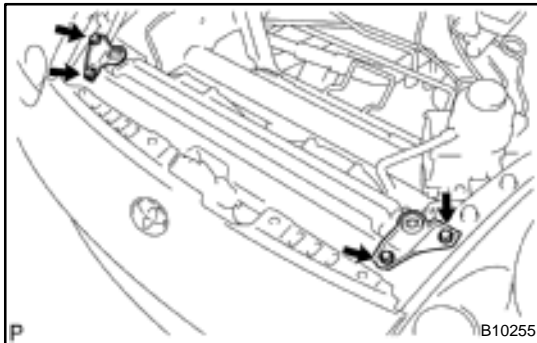
Install the electric cooling fan with the 2 bolts.

**Torque: 5 N·m (51 kgf·cm, 44 in.-lbf)**

### 2. INSTALL RADIATOR ASSEMBLY

(a) Install the 2 radiator lower support bushings.

(b) Place the radiator assembly to the body.

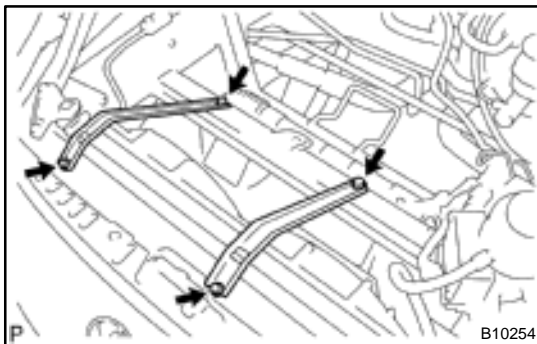


(c) Install the 2 radiator upper supports with the 4bolts.

**Torque: 12.5 N·m (128 kgf·cm, 9 ft-lbf)**

(d) Connect the 2 radiator hoses.

(e) Connect the 2 electric cooling fan connectors.



(f) Install the 2 spear wheel carrier extensions with the 2 bolts and 2 nuts.

**Torque: 8 N·m (82 kgf·cm, 70 in.-lbf)**

3. **FILL WITH ENGINE COOLANT (See page [CO-2](#))**

4. **INSTALL LUGGAGE COMPARTMENT TRIM BOX COVER AND TOOL BOX**

5. **START ENGINE AND CHECK FOR LEAKS**

6. **RECHECK ENGINE COOLANT LEVEL**



## ELECTRIC COOLING FAN ON-VEHICLE INSPECTION

COOYF-01

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

- (a) Turn the ignition switch ON.
- (b) Check that the cooling fan stops.

If not, check the cooling fan relay and ECT sensor, and check for separated connector or severed wire between the cooling fan relay and ECT sensor.

- (c) Disconnect the ECT sensor connector.
- (d) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooling fan relay and ECT sensor.

- (e) Reconnect the ECT sensor connector.

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

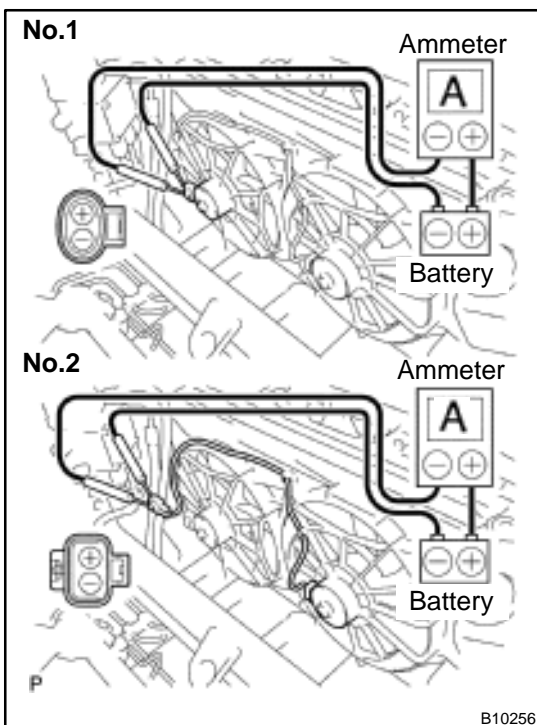
- (a) Start the engine, and raise coolant temperature to above 93°C (199°F).

HINT:

Coolant temperature is the detected value by the ECT sensor on the water outlet.

- (b) Check that the cooling fan rotates.

If not, replace the ECT sensor.



### 3. INSPECT COOLING FANS

- (a) Disconnect the cooling fan connector.
- (b) Connect battery and ammeter to the connector.
- (c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

**Standard amperage: 5.7 – 7.7 A**

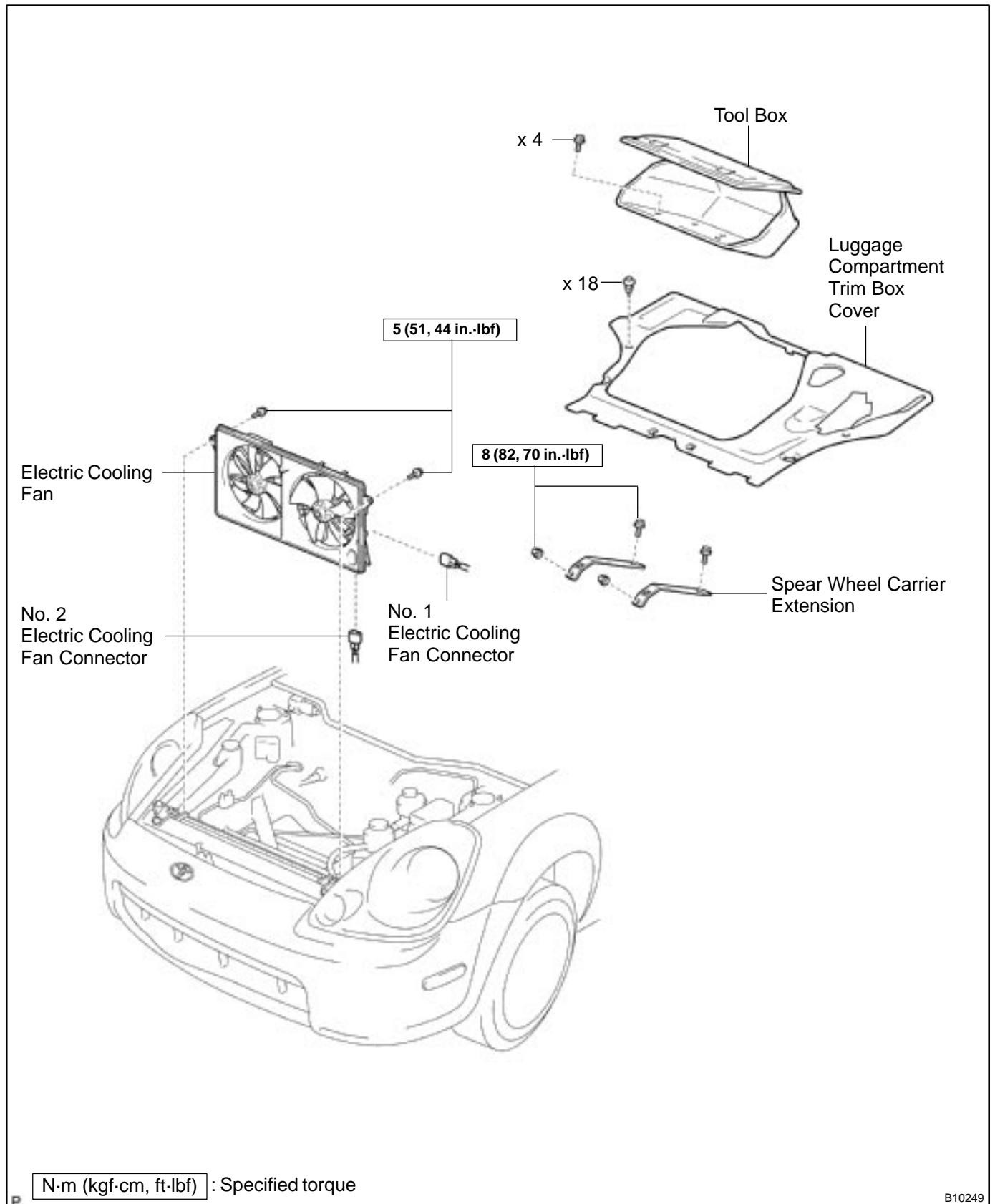
- (d) Reconnect the cooling fan connector.

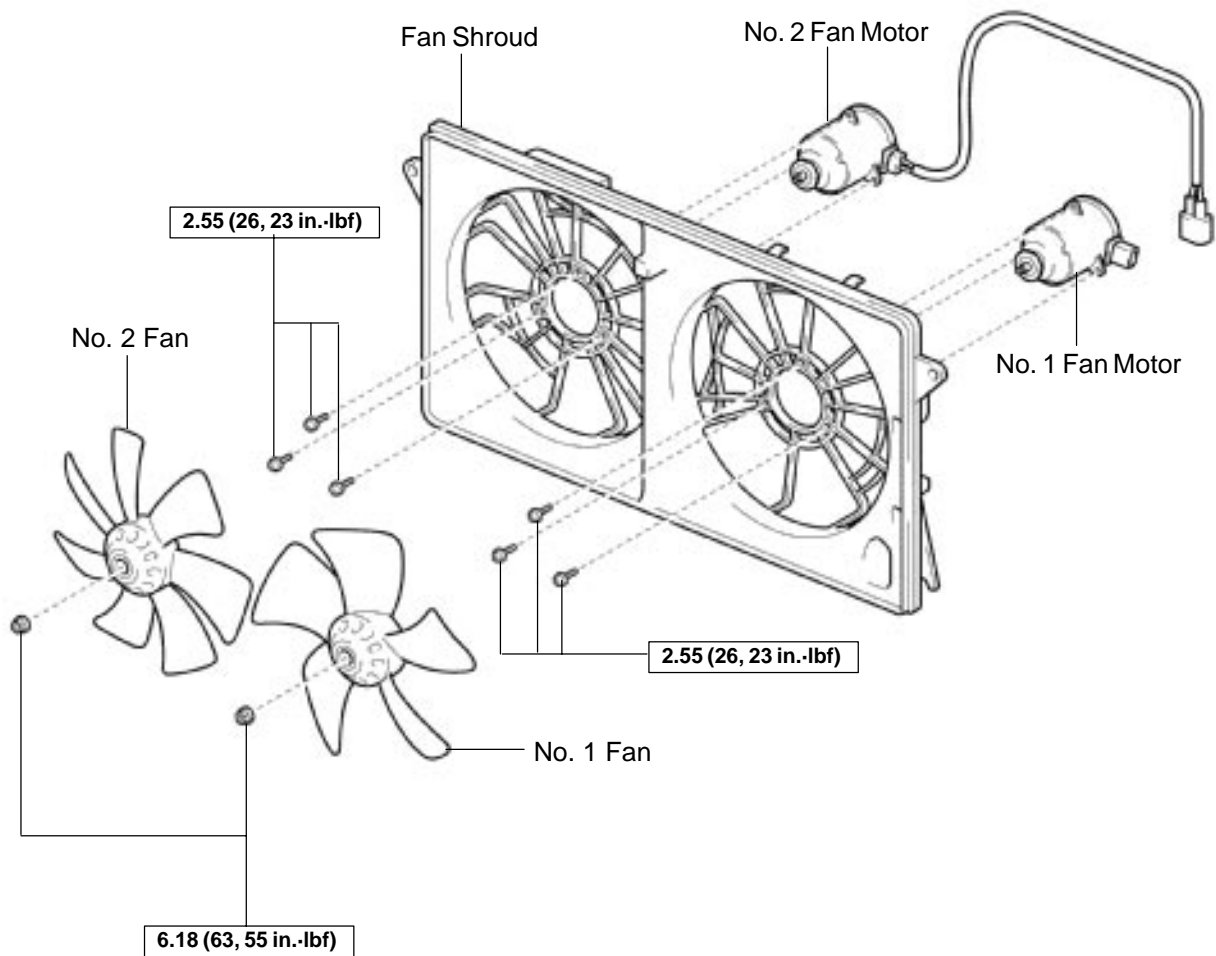
### 4. INSPECT ECT SENSOR (See page SF-55)

### 5. INSPECT ECM

Check the voltage between ECM terminals FAN and E1 (See page DI-19).

# COMPONENTS



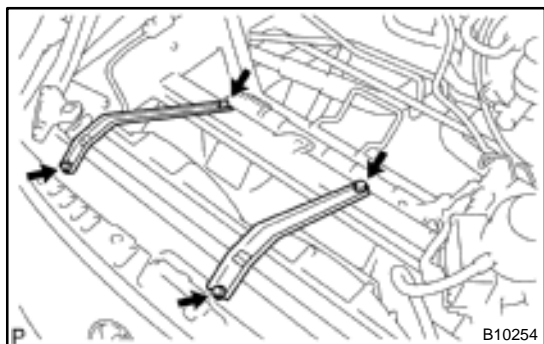


**N·m (kgf·cm, ft·lbf) : Specified torque**

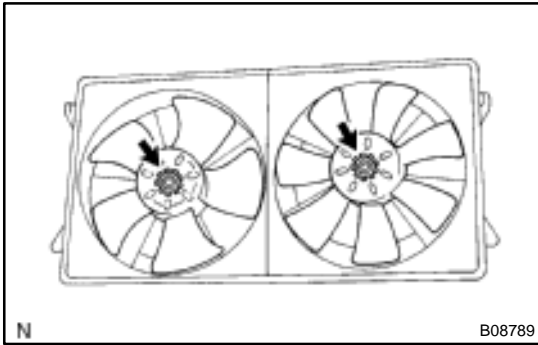
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## REMOVAL

1. REMOVE TOOL BOX AND LUGGAGE COMPARTMENT TRIM BOX COVER
2. REMOVE ELECTRIC COOLING FAN
  - (a) Disconnect the 2 electric cooling fan connectors.



- (b) Remove the 2 bolts, 2 nuts and 2 spear wheel carrier extensions.
  - (c) Remove the 2 bolts and electric cooling fan.



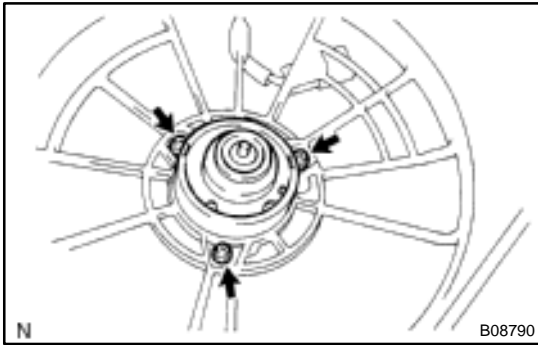
## DISASSEMBLY

### 1. REMOVE FANS

Remove the nut and fan.

### 2. REMOVE FAN MOTORS

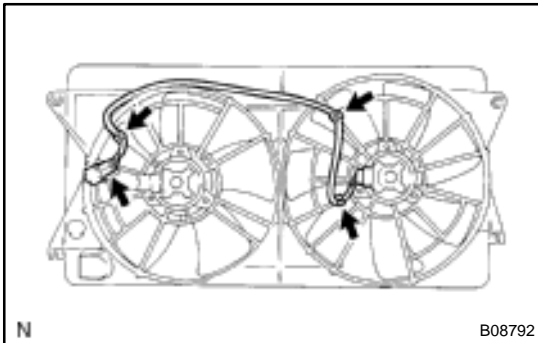
- (a) Disconnect the wire and connector holder from the fan shroud.
- (b) Remove the 3 screws and fan motor.



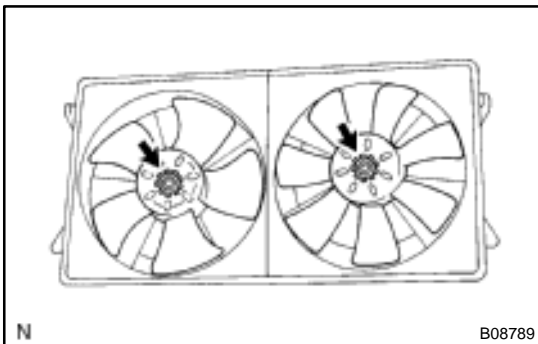
## REASSEMBLY

### 1. INSTALL FAN MOTORS

- (a) Install the fan motor with the 3 screws.  
**Torque: 2.55 N·m (26 kgf·cm, 23 in.-lbf)**



- (b) Install the wire and connector holder to the fan shroud.



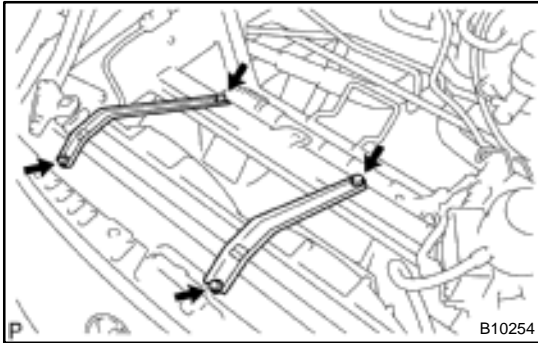
### 2. INSTALL FANS

Install the fan with the nut.

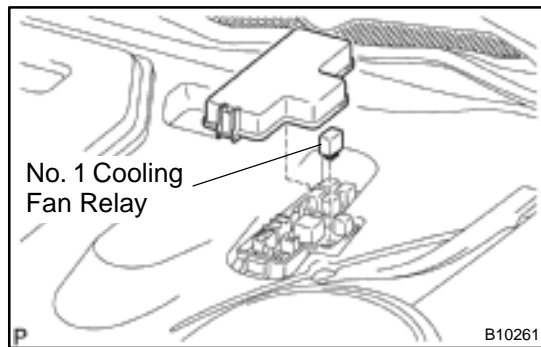
**Torque: 6.18 N·m (63 kgf·cm, 55 in.-lbf)**

## INSTALLATION

1. **INSTALL ELECTRIC COOLING FAN**
  - (a) Install the electric cooling fan with the 2 bolts.  
**Torque: 5 N·m (51 kgf·cm, 44 in.-lbf)**



- (b) Install the 2 spear wheel carrier extensions with the 2 bolts and 2 nuts.  
**Torque: 8 N·m (82 kgf·cm, 70 in.-lbf)**
  - (c) Connect the 2 electric cooling fan connectors.
2. **INSTALL LUGGAGE COMPARTMENT TRIM BOX COVER AND TOOL BOX**

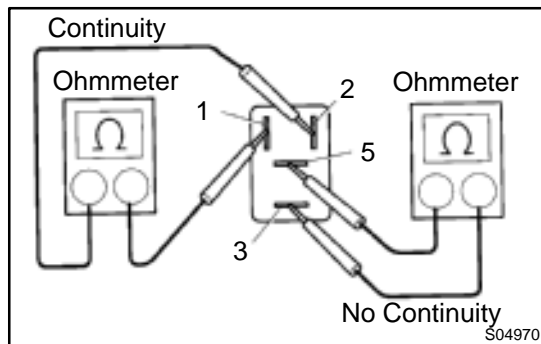


## COOLING FAN RELAY INSPECTION

COOYJ-01

### 1. INSPECT NO. 1 COOLING FAN RELAY

- (a) Remove the R/B No. 4 cover.
- (b) Remove the No. 1 cooling fan relay. (Marking: FAN No. 1)

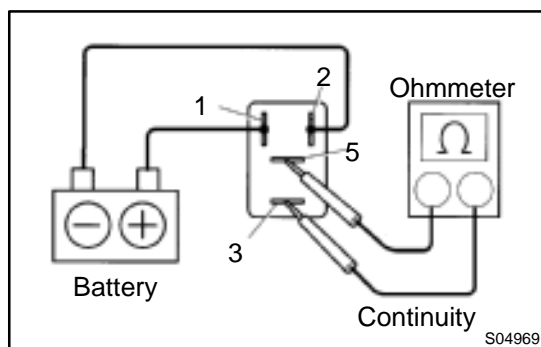


- (c) Inspect the No. 1 cooling fan relay continuity.
  - (1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

- (2) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



- (d) Inspect the No. 1 cooling fan relay operation.

- (1) Apply battery positive voltage across terminals 1 and 2.

- (2) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

- (e) Reinstall the No. 1 cooling fan relay.

- (f) Reinstall the R/B No. 4 cover.

### 2. INSPECT NO. 2 AND NO. 3 COOLING FAN RELAY (See page AC-73)