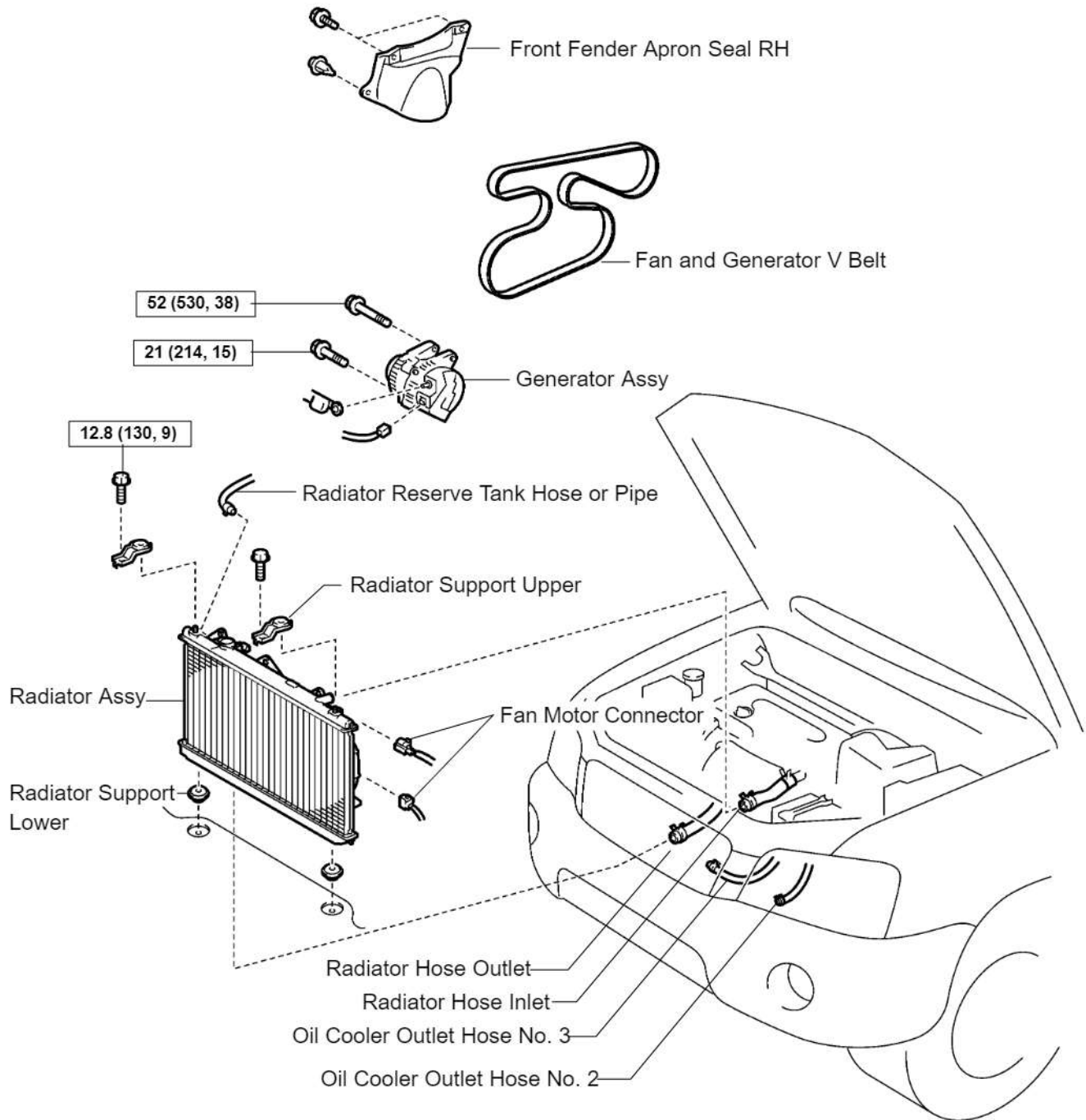
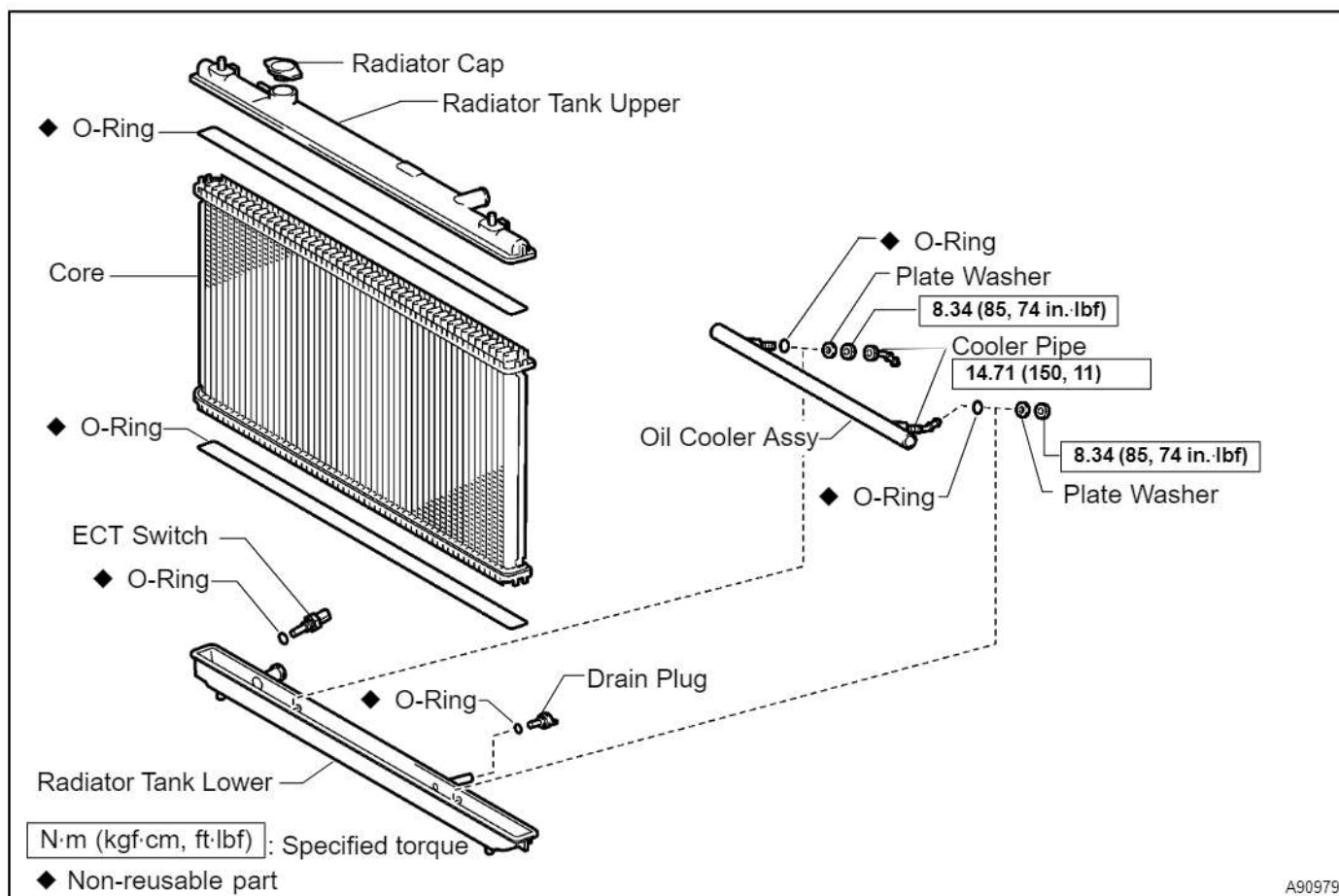
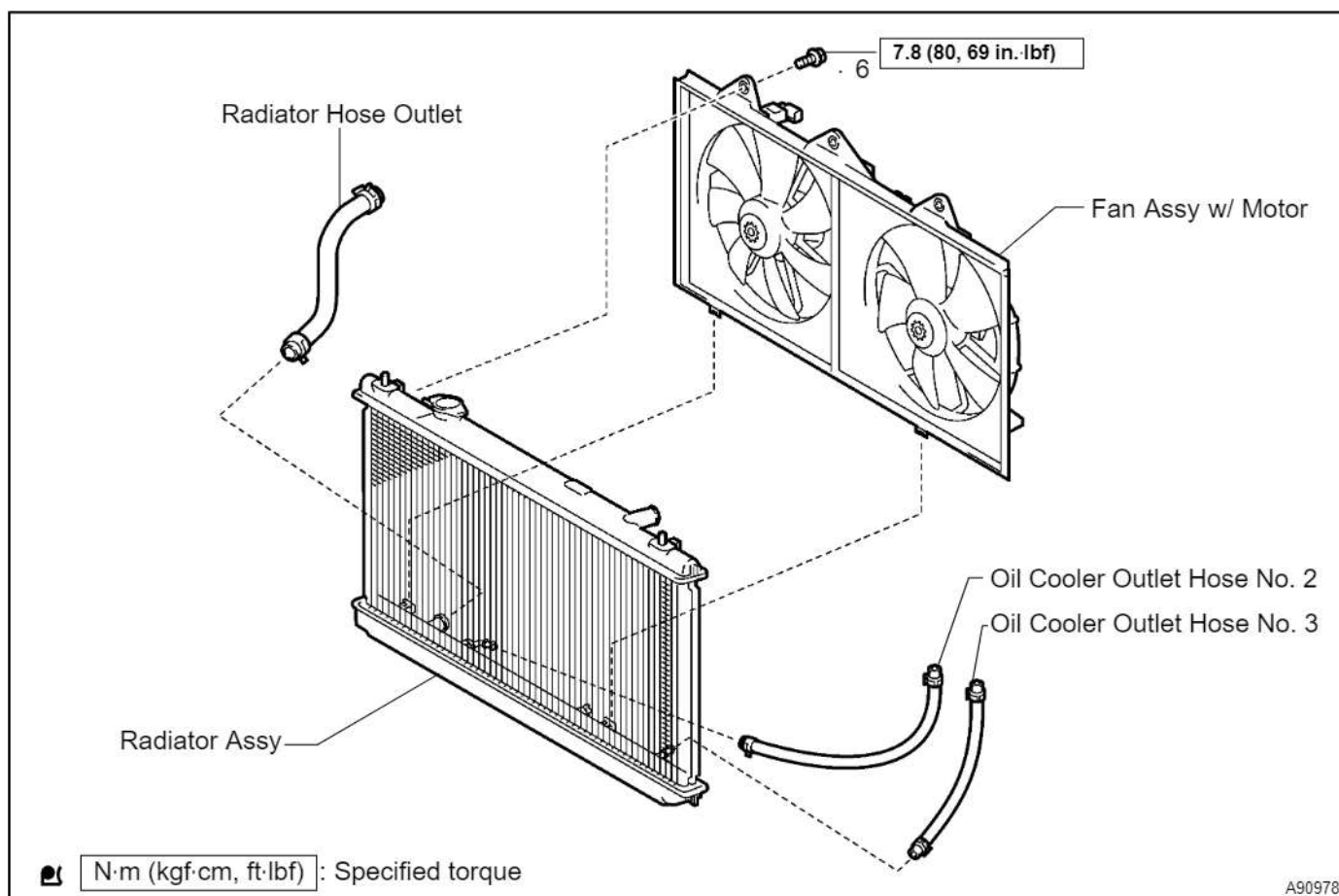


## COMPONENTS

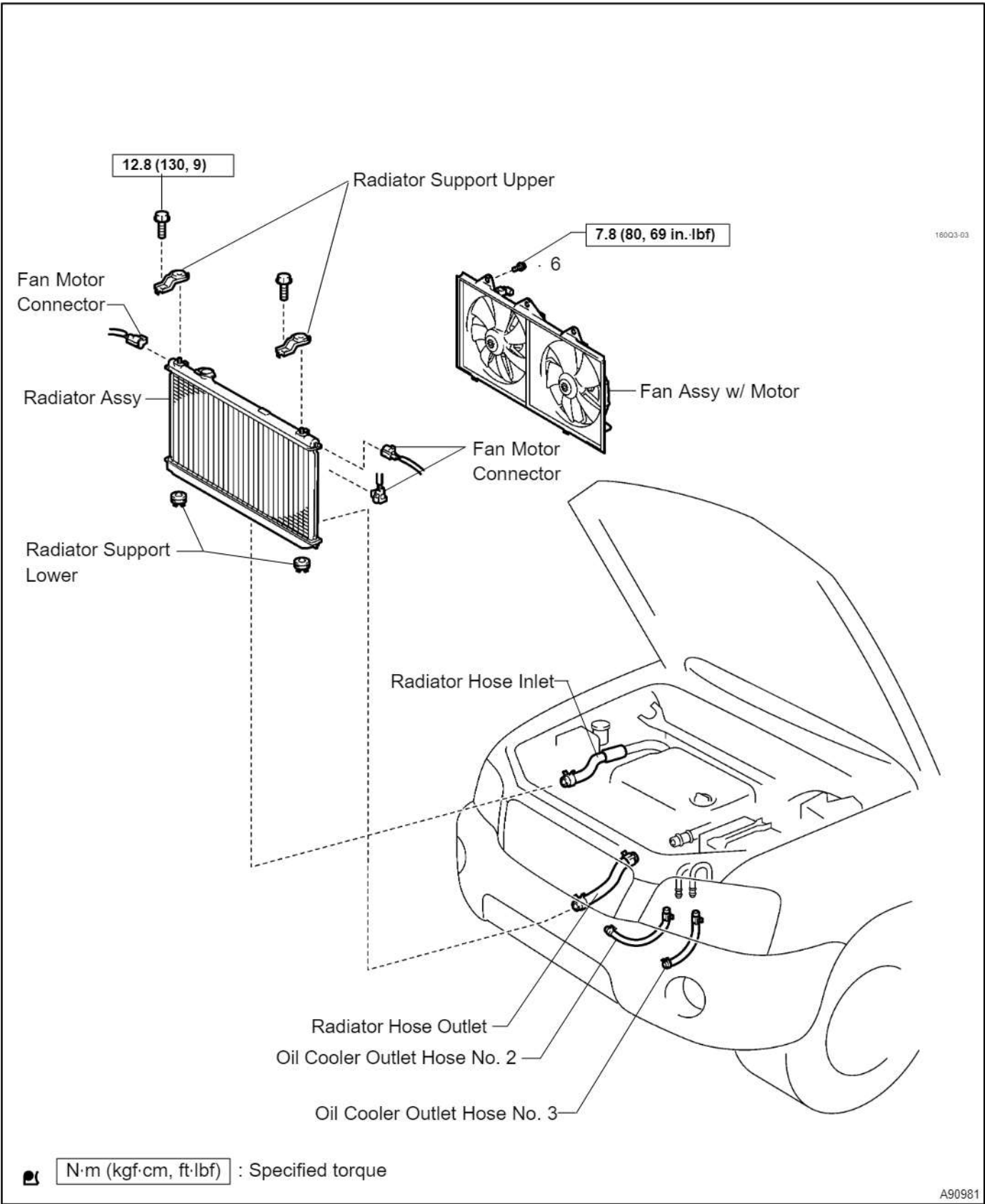


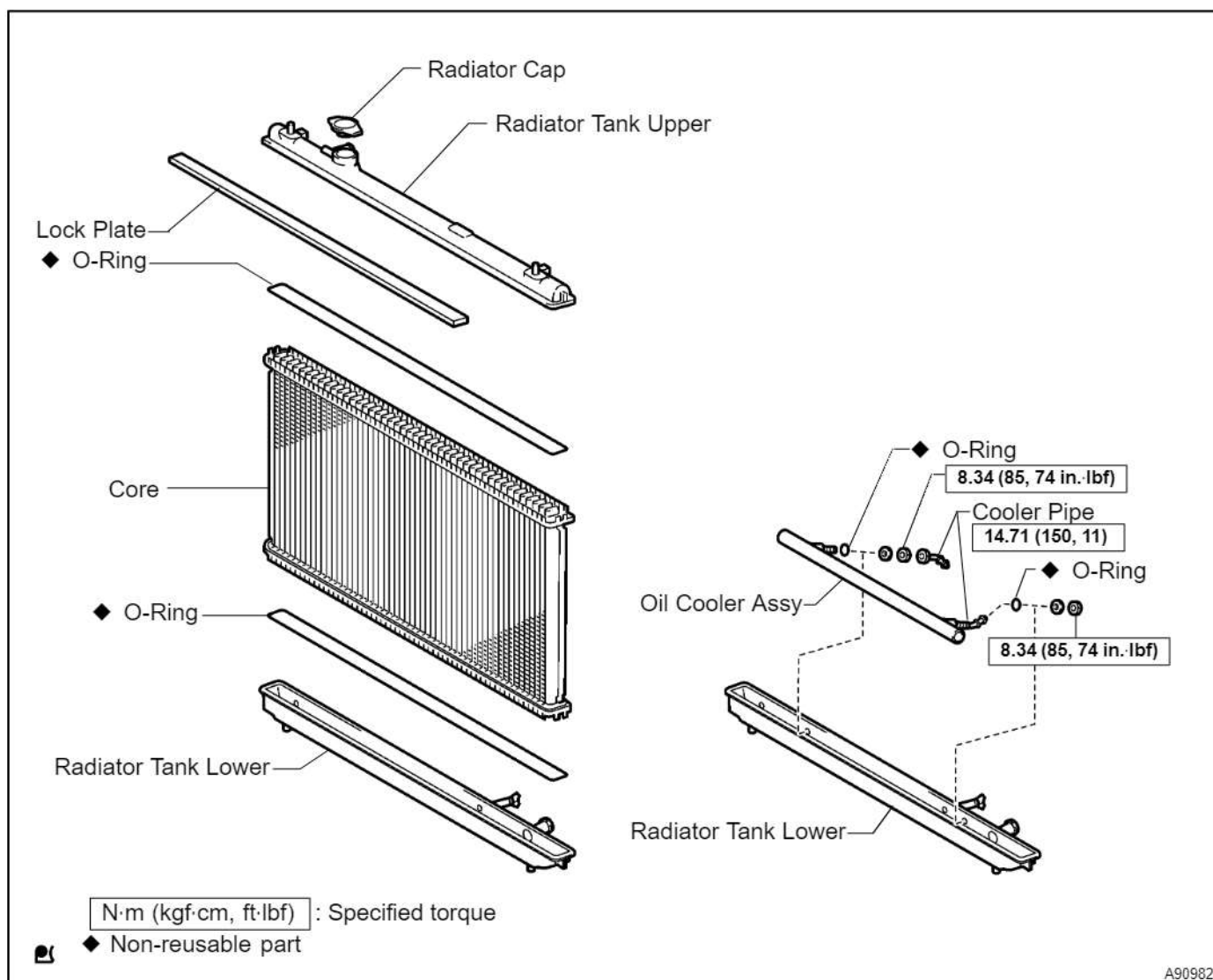
N·m (kgf·cm, ft·lbf) : Specified torque

A90980

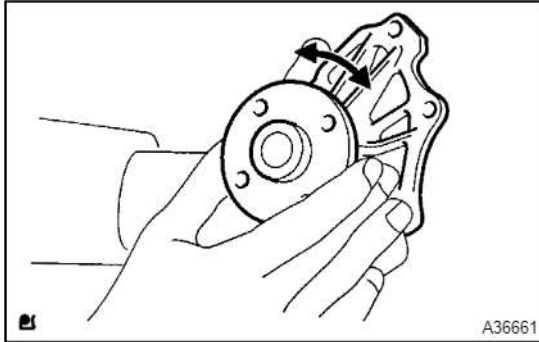


# COMPONENTS





## INSPECTION



### 1. INSPECT WATER PUMP ASSY

- (a) Visually check for drain hole coolant leakage.
- (b) Turn the pulley, and check that the water pump bearing moves smoothly and noiselessly.

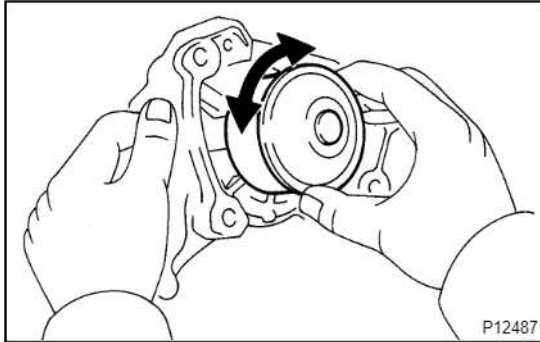
If the bearing moves roughly or noisily, replace the water pump assy.

- (c) Visually check the air holes for coolant leakage.

If leakage is found, replace the water pump assy.

If engine coolant has leaked onto the timing belt, replace the timing belt.

## INSPECTION



### 1. INSPECT WATER PUMP ASSY

- (a) Visually check the drain hole for coolant leakage.
- (b) Turn the pulley, and check that the water pump bearing moves smoothly and noiselessly.

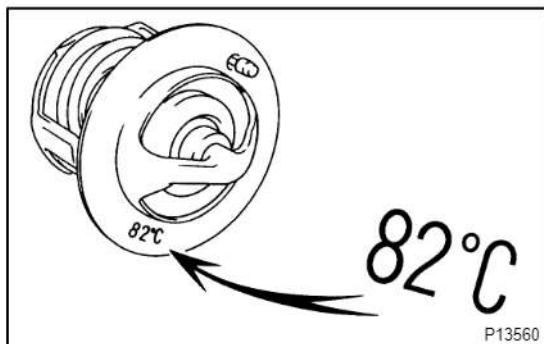
If the bearing moves roughly or noisily, replace the water pump assy.

- (c) Visually check the air holes for coolant leakage.

If leakage is found, replace the water pump assy.

If engine coolant has leaked onto the timing belt, replace the timing belt.

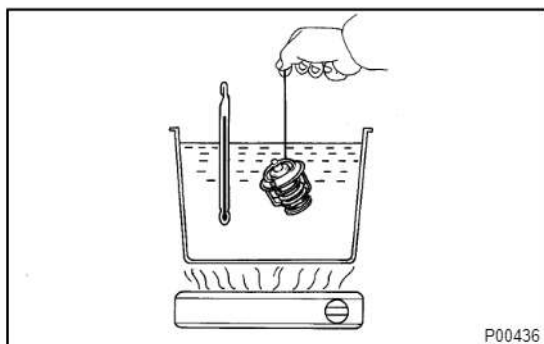
## INSPECTION



### 1. INSPECT THERMOSTAT

#### HINT:

The thermostat is numbered with the valve opening temperature is stamped on the thermostat.

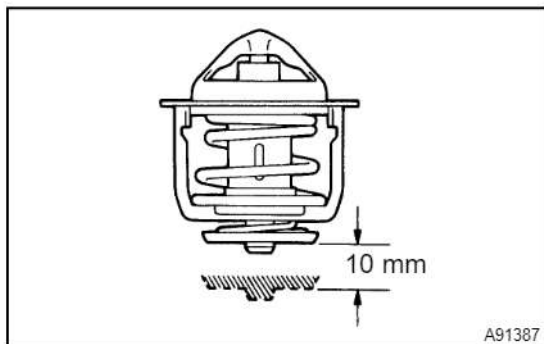


(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

**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.

**Valve lift: 10 mm (0.39 in.) or more at 95°C (203°F)**

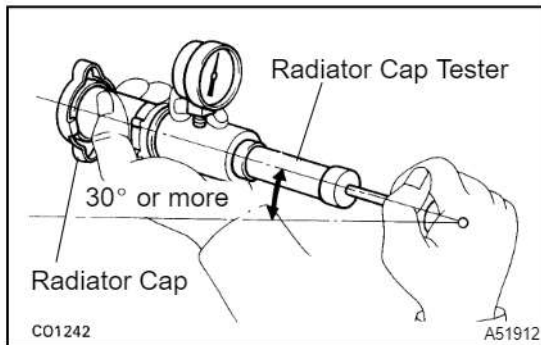
If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

If not closed, replace the thermostat.

**2. INSPECT RADIATOR CAP SUB-ASSY****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 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 being released from the vacuum valve.

**Pump speed: 1 push every 3 seconds or more**

**NOTICE:**

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

If air is not being released 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 second**

**NOTICE:**

The specified pump speed should be followed for the first pump only. It will close the vacuum valve. Once the vacuum valve is closed, the pump speed can be reduced.

**Standard opening pressure:**

**93 to 122 kPa (0.95 to 1.25 kgf/cm<sup>2</sup>, 13.4 to 17.6 psi)**

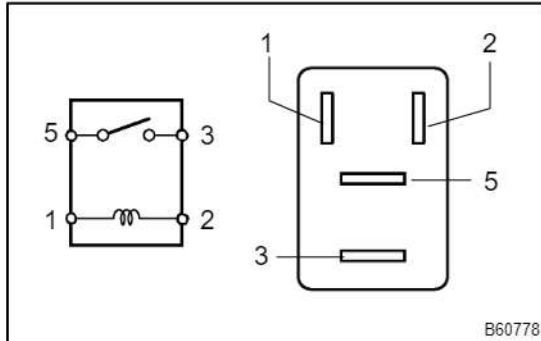
**Minimum opening pressure:**

**78 kPa (0.8 kgf/cm<sup>2</sup>, 11.4 psi)**

**HINT:**

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

# INSPECTION



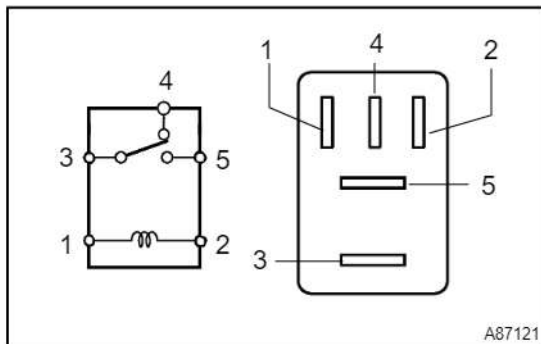
## 1. INSPECT RELAY (Marking: FAN NO. 1, FAN NO. 3)

- (a) Measure the resistance of the relay.

### Standard:

| Tester Connection | Specified Condition                                                        |
|-------------------|----------------------------------------------------------------------------|
| 3 - 5             | 10 k $\Omega$ or higher                                                    |
| 3 - 5             | Below 1 $\Omega$<br>(when battery voltage is applied to terminals 1 and 2) |

If the result is not as specified, replace the relay.



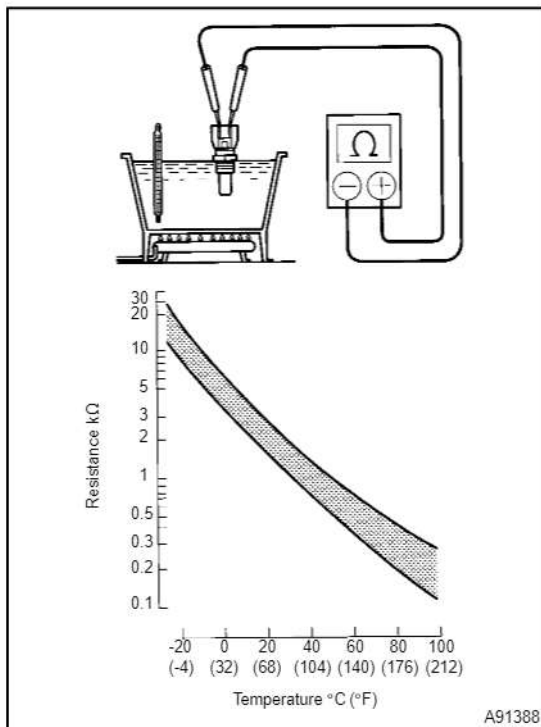
## 2. INSPECT RELAY (Making: FAN NO. 2)

- (a) Measure the resistance of the relay.

### Standard:

| Tester Connection | Specified Condition                                                        |
|-------------------|----------------------------------------------------------------------------|
| 3 - 4             | Below 1 $\Omega$                                                           |
| 3 - 5             | 10 k $\Omega$ or higher                                                    |
| 3 - 5             | Below 1 $\Omega$<br>(when battery voltage is applied to terminals 1 and 2) |

If the result is not as specified, replace the relay.



## 3. INSPECT ENGINE COOLANT TEMPERATURE SENSOR

- (a) Measure the resistance between terminals 1 and 2.

### Standard:

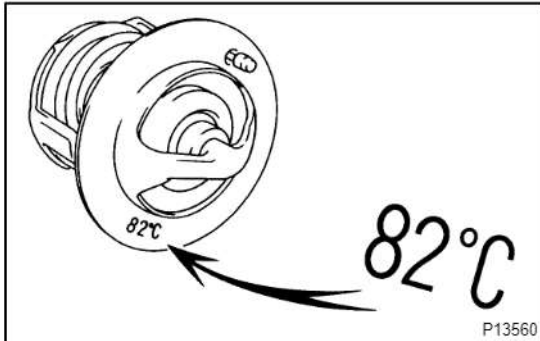
| Condition                  | Specified Condition       |
|----------------------------|---------------------------|
| Approximately 20°C (68°F)  | 2.29 to 2.6 k $\Omega$    |
| Approximately 80°C (176°F) | 0.300 to 0.327 k $\Omega$ |

If the result is not as specified, replace the sensor.

### NOTICE:

When checking the ECT sensor in the water, the terminals should be kept dry. After the check, dry the sensor.

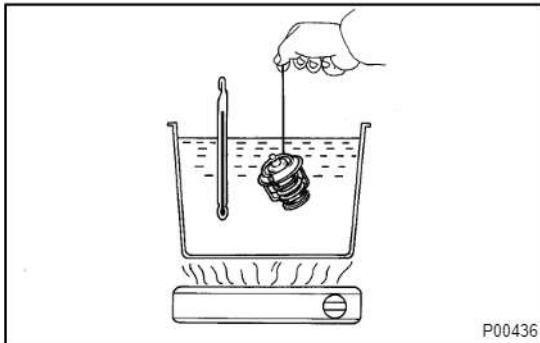
## INSPECTION



### 1. INSPECT THERMOSTAT

HINT:

The valve opening temperature is stamped on the thermostat.

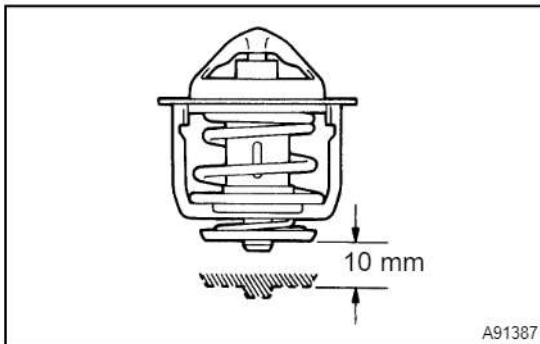


(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

**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.

**Valve lift: 10 mm (0.39 in.) or more at 95°C (203°F)**

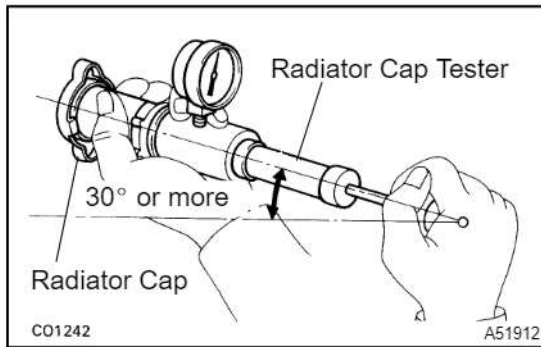
If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

If not closed, replace the thermostat.

**2. INSPECT RADIATOR CAP SUB-ASSY****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 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 being released from the vacuum valve.

**Pump speed: 1 push every 3 seconds or more**

**NOTICE:**

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

If air is not being released 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 second**

**NOTICE:**

The specified pump speed should be followed for the first pump only. It will close the vacuum valve. Once the vacuum is closed, the pump speed can be reduced.

**Standard opening pressure:**

**93 to 122 kPa (0.95 to 1.25 kgf/cm<sup>2</sup>, 13.4 to 17.6 psi)**

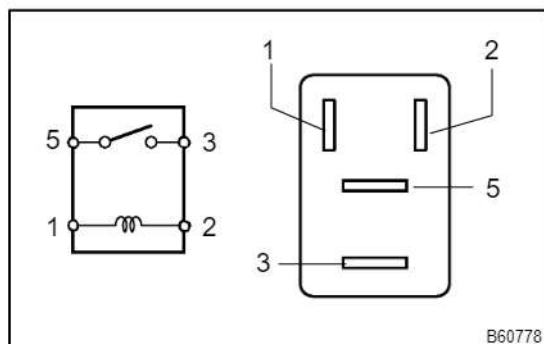
**Minimum opening pressure:**

**78 kPa (0.8 kgf/cm<sup>2</sup>, 11.4 psi)**

**HINT:**

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

# INSPECTION



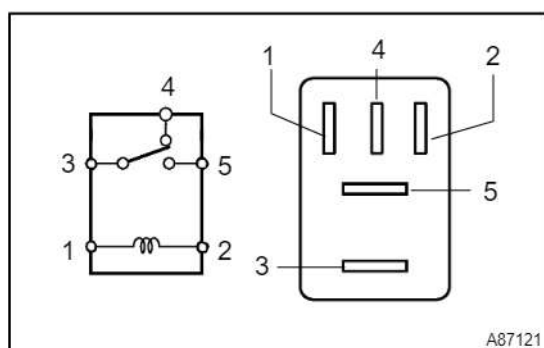
## 1. INSPECT RELAY (Marking: FAN NO. 1, FAN NO. 3)

- (a) Check the resistance of the relay.

### Standard:

| Tester Connection | Specified Condition                                                 |
|-------------------|---------------------------------------------------------------------|
| 3 - 5             | 10 kΩ or higher                                                     |
| 3 - 5             | Below 1 Ω<br>(when battery voltage is applied to terminals 1 and 2) |

If the result is not as specified, replace the relay.



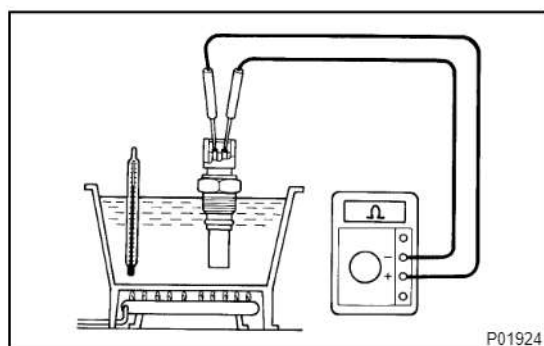
## 2. INSPECT RELAY (Marking: FAN NO. 2)

- (a) Check the resistance of the relay.

### Standard:

| Tester Connection | Specified Condition                                                 |
|-------------------|---------------------------------------------------------------------|
| 3 - 4             | Below 1 Ω                                                           |
| 3 - 5             | 10 kΩ or higher                                                     |
| 3 - 5             | Below 1 Ω<br>(when battery voltage is applied to terminals 1 and 2) |

If the result is not as specified, replace the relay.



## 3. INSPECT ECT SWITCH (NO. 1)

- (a) Check the resistance.

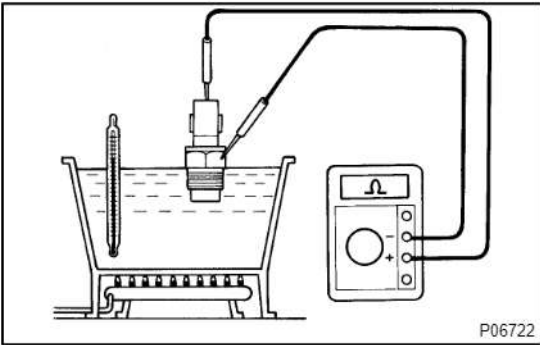
### Standard:

| Temperature        | Specified Condition |
|--------------------|---------------------|
| Above 98°C (208°F) | Below 1 Ω           |
| Below 88°C (190°F) | 10 kΩ or higher     |

If the result is not as specified, replace the switch.

### NOTICE:

When checking the ECT sensor in water, the terminals should be kept dry. After the check, dry the sensor.



**4. INSPECT ECT SWITCH (NO. 2)**

(a) Check the resistance.

**Standard:**

| Temperature        | Specified Condition     |
|--------------------|-------------------------|
| Above 93°C (199°F) | Below 1 $\Omega$        |
| Below 83°C (181°F) | 10 k $\Omega$ or higher |

If the result is not as specified, replace the switch.

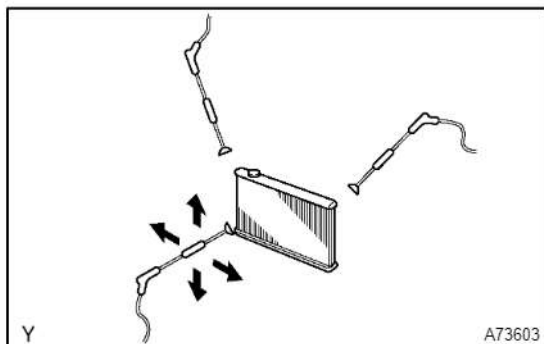
**NOTICE:**

**When checking the ECT sensor in water, the terminals should be kept dry. After the check, dry the sensor.**

## RADIATOR ASSY (2AZ-FE)

### ON-VEHICLE CLEANING

160PU-03



#### 1. INSPECT FINS BLOCKAGE

If the fins are clogged, wash them with water or a steam cleaner. Dry with compressed air.

##### NOTICE:

- If the distance between the steam cleaner and the core is too close, the fins may become damaged. Keep the following injection distance.

##### Standard:

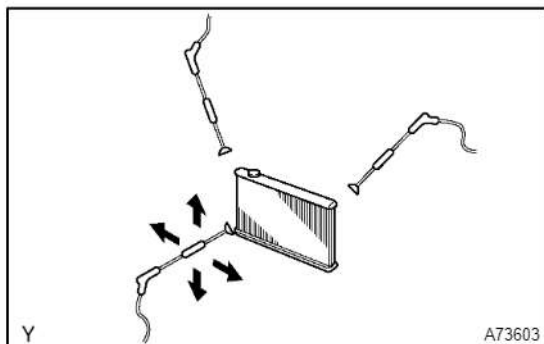
| Distance           | Steam Cleaner Pressures                                                 |
|--------------------|-------------------------------------------------------------------------|
| 300 mm (11.81 in.) | 2,942 to 4,903 kPa<br>(30 to 50 kgf/cm <sup>2</sup> , 427 to 711 psi)   |
| 500 mm (19.69 in.) | 4,903 to 7,845 kPa<br>(50 to 80 kgf/cm <sup>2</sup> , 711 to 1,138 psi) |

- If the fins are bent, straighten them with a screwdriver or pliers.
- Never apply water directly onto the electronic components.

# RADIATOR ASSY (3MZ-FE)

## ON-VEHICLE CLEANING

160Q2-03



### 1. INSPECT FINS BLOCKAGE

- (a) If the fins are clogged, wash them with water or a steam cleaner. Dry with compressed air.

#### NOTICE:

- If the distance between the steam cleaner and the core is too close, the fins may become damaged. Keep the following injection distance.

#### Standard:

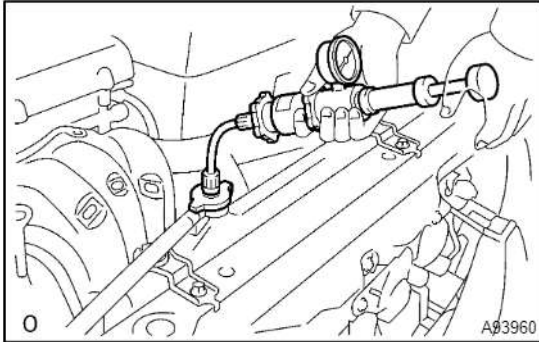
| Distance           | Steam Cleaner Pressures                                                 |
|--------------------|-------------------------------------------------------------------------|
| 300 mm (11.81 in.) | 2,942 to 4,903 kPa<br>(30 to 50 kgf/cm <sup>2</sup> , 427 to 711 psi)   |
| 500 mm (19.69 in.) | 4,903 to 7,845 kPa<br>(50 to 80 kgf/cm <sup>2</sup> , 711 to 1,138 psi) |

- If the fins are bent, straighten them with a screwdriver or pliers.
- Never apply water directly onto the electronic components.

## COOLING SYSTEM (2AZ-FE)

### ON-VEHICLE INSPECTION

1602Y-07



#### 1. INSPECT COOLING SYSTEM FOR LEAKS

- (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) Fill the radiator with coolant and attach a radiator cap tester.
- (c) Warm up the engine.
- (d) Using a radiator cap tester, increase the pressure inside the radiator 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.

#### 2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

- (a) The engine coolant level 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" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology up to the "FULL" line. Do not use plain water alone.

#### 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 is any excessive deposits of rust or scale around the radiator cap and radiator filler hole. Also, the coolant should be free from oil.

If excessively dirty, replace the coolant.

- (c) Reinstall the radiator cap.

## COOLING FAN SYSTEM (2AZ-FE)

16030-07

### ON-VEHICLE INSPECTION

#### HINT:

The cooling fan may rotate when the ignition switch is turned from ACC to ON. This is normal.

#### 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 disconnected connector or wire breaks 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 ECT sensor connector.

#### 2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 90°C (194°F))

- (a) Start the engine, and raise ECT to above 90°C (194°F).
- (b) Check that the cooling fan rotates.

If not, replace the ECT sensor.

#### 3. INSPECT COOLING FAN

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

**Standard amperage: 5.2 to 8.2 A at 20°C (68°F)**

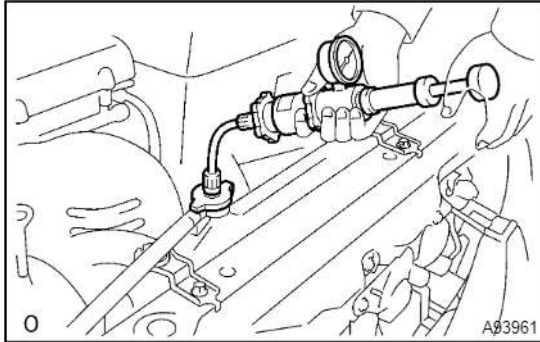
If not, replace the cooling fan.

- (d) Reconnect the cooling fan connector.

## COOLING SYSTEM (3MZ-FE)

### ON-VEHICLE INSPECTION

16034-08



#### 1. INSPECT COOLING SYSTEM FOR LEAKS

- (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) Fill the radiator with coolant and attach a radiator cap tester.
- (c) Warm up the engine.
- (d) Using a radiator cap tester, increase the pressure inside the radiator 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.

#### 2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

- (a) The engine coolant level 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" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology up to the "FULL" line. Do not use plain water alone.

#### 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 is any excessive deposits of rust or scale around the radiator cap and radiator filler hole. Also, the coolant should be free from oil.

If excessively dirty, replace the coolant.

- (c) Reinstall the radiator cap.

## COOLING FAN SYSTEM (3MZ-FE)

### ON-VEHICLE INSPECTION

16036-08

**HINT:**

The cooling fan may rotate when the ignition switch is turned from ACC to ON. This is normal.

**1. CHECK COOLING FAN OPERATION AT 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 switches, and check for disconnected connectors and wire breaks between the cooling fan relay and ECT switches.

- (c) Disconnect the ECT switch No. 1 connector.
- (d) Connect the terminals on the ECT switch No. 1 connector.
- (e) Check that the No. 1 cooling fan rotates at a high speed.

If not, check the No. 1 cooling fan relay and No. 1 cooling fan.

- (f) Reconnect the ECT switch No. 1 connector.
  - (g) Disconnect the ECT switch No. 2 connector.
  - (h) Ground the terminal on the ECT switch No. 2 wire harness side connector.
  - (i) Check that the No. 1 and No. 2 cooling fans rotate at a low speed.
- If not, check the No. 2 cooling fan relay, No. 3 cooling fan relay and No. 2 cooling fan.
- (j) Reconnect the ECT switch No. 2 connector.

**2. CHECK COOLING FAN**

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

**Standard amperage: 8.5 to 11.5 A at 20°C (68°F)**

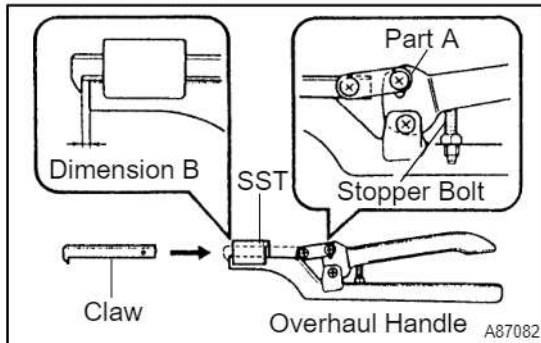
If not, replace the cooling fan.

- (d) Reconnect the cooling fan connector.

## OVERHAUL

### 1. REMOVE DRAIN PLUG

- Remove the drain plug.
- Remove the O-ring.



### 2. ASSEMBLE SST

SST 09230-01010

- Install the claw to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
- While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.

**Dimension B: 0.2 to 0.3 mm (0.008 to 0.012 in.)**

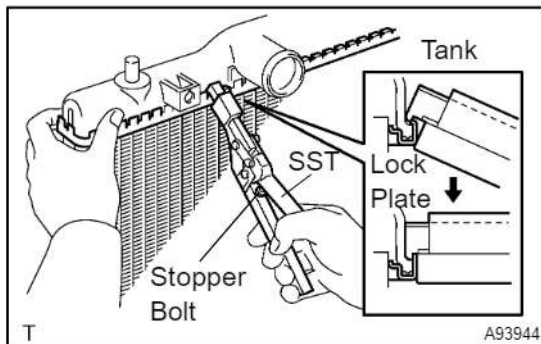
#### NOTICE:

If the stopper bolt is not adjusted, the claw may be damaged.

### 3. UNCAULK LOCK PLATE

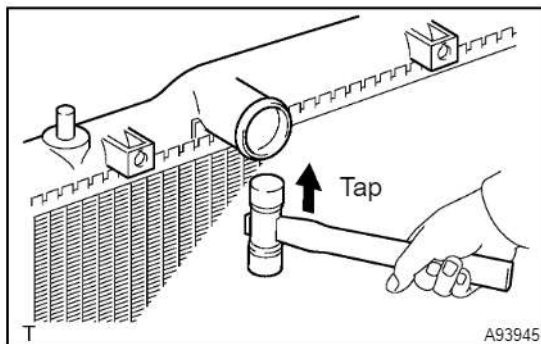
Using SST, grip the handle until stopped by the stopper bolt to uncaulk the lock plate.

SST 09230-01010 (09231-01010, 09231-01030)



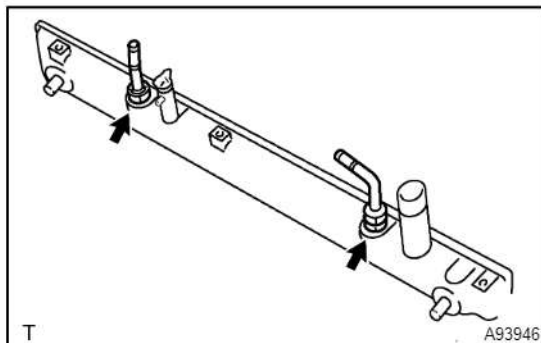
### 4. REMOVE RADIATOR TANK UPPER AND TANK LOWER

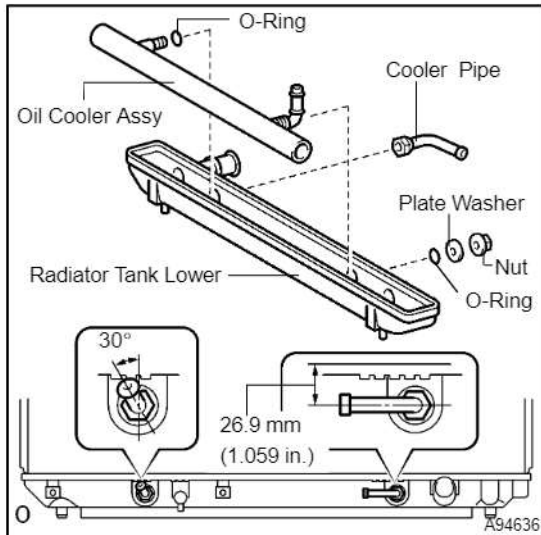
- Lightly tap the bracket of the radiator (or radiator hose inlet or outlet) with a plastic-faced hammer, and remove the tank.
- Remove the O-ring.



### 5. REMOVE OIL COOLER ASSY

- Remove the cooler pipe
- Loosen the 2 nuts and 2 plate washers.
- Remove the oil cooler.
- Remove the 2 O-rings from the oil cooler.





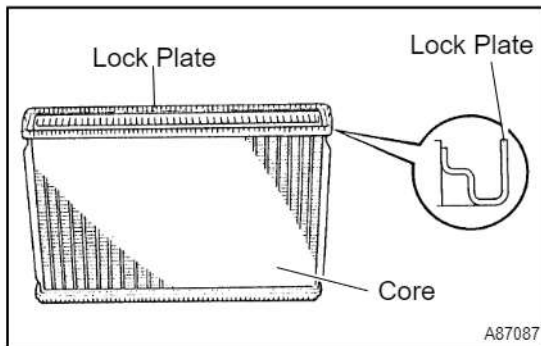
## 6. INSTALL OIL COOLER ASSY

- Clean the O-ring contact surfaces of the lower tank and oil cooler.
- Install 2 new O-rings to the oil cooler.
- Install the oil cooler to the lower tank with the 2 plate washers and nuts.

**Torque: 8.34 N·m (85 kgf·cm, 74 in.-lbf)**

- Install the cooler pipe in the direction indicated by the arrows in the illustration.

**Torque: 14.71 N·m (150 kgf·cm, 11 ft·lbf)**



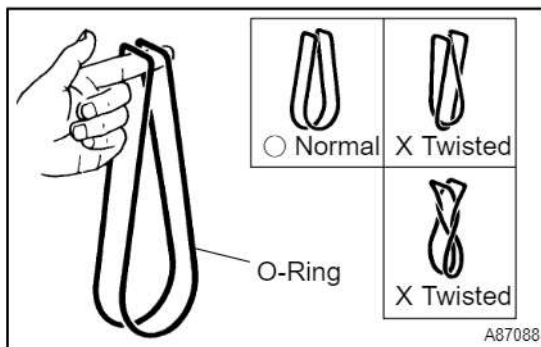
## 7. INSPECT LOCK PLATE FOR DAMAGE

### 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 or dented. Repair or replace if necessary.

### NOTICE:

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

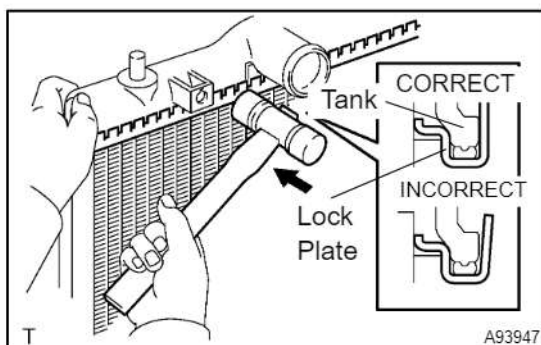


## 8. INSTALL RADIATOR TANK UPPER AND TANK LOWER

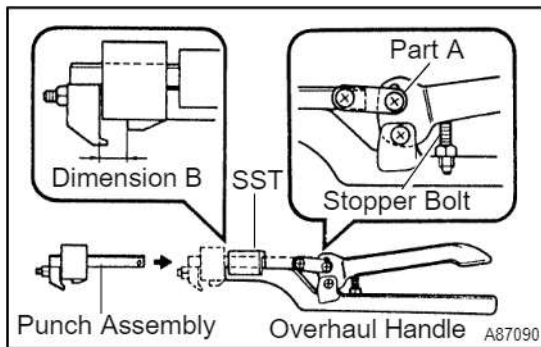
- After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.

### HINT:

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



- Install the tank without damaging the O-ring.
- Tap the lock plate with a plastic-faced hammer so that there is no gap between the lock plate and the tank.

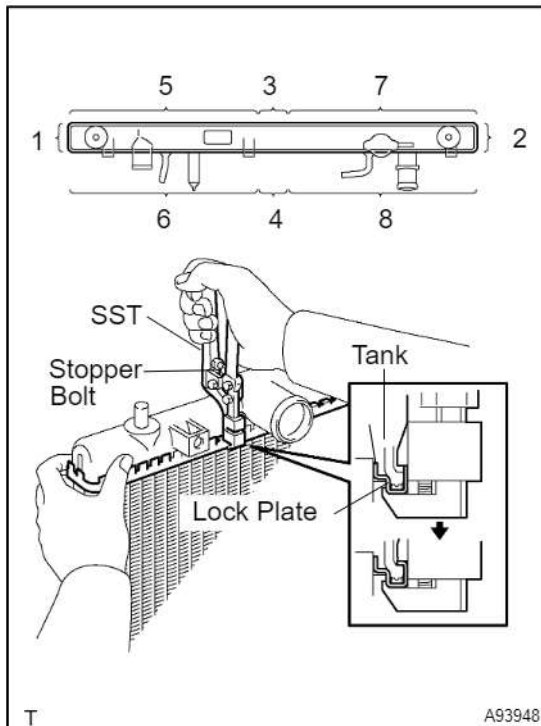


### 9. ASSEMBLE SST

SST 09230-01010, 09231-14010

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

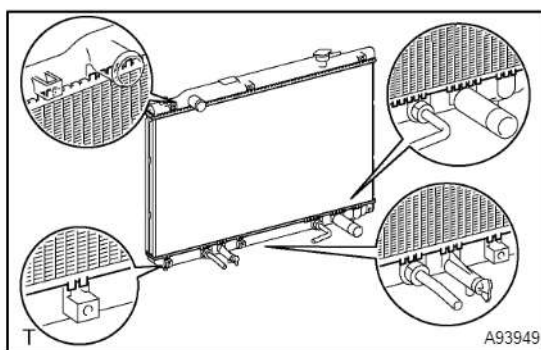
**Dimension: 8.4 mm (0.331 in.)**



### 10. CAULK LOCK PLATE

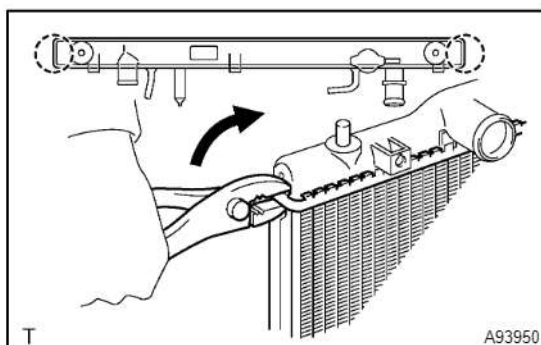
- Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by gripping the handle until stopped by the stopper plate.

SST 09230-01010

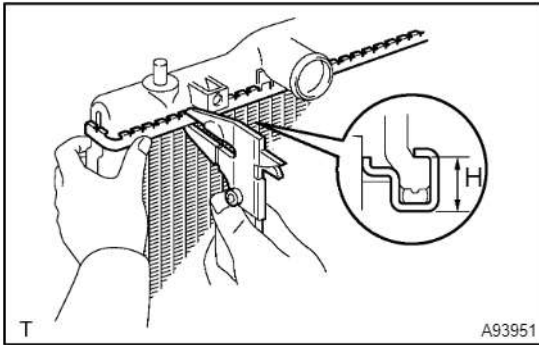


### HINT:

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



- The points shown in the illustration and oil cooler near here (A/T) cannot be tapped with the SST. Use pliers or similar objects and be careful not to damage the core plates.



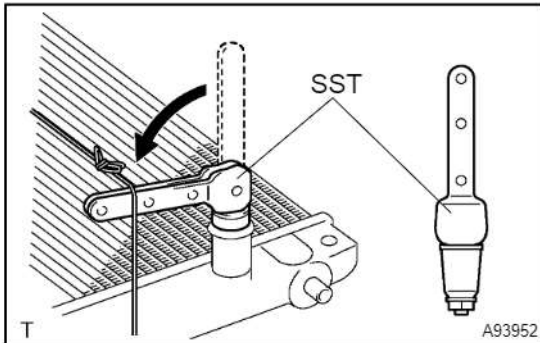
- (b) Check the lock plate height (H) after completing the caulking.

**Plate height (H): 7.40 to 7.80 mm (0.2913 to 0.3071 in.)**

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

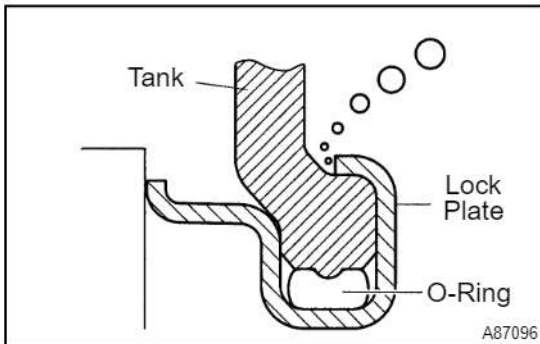
## 11. INSTALL DRAIN PLUG

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



## 12. INSPECT FOR WATER LEAKS

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



- (d) Inspect for leaks.

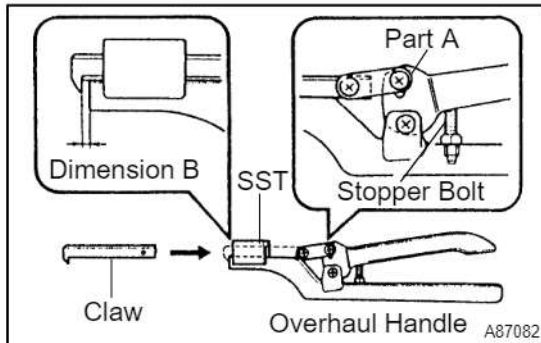
### HINT:

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. Before doing the water leak test, first swish the radiator in water until all air bubbles disappear.

## OVERHAUL

### 1. REMOVE DRAIN PLUG

- Remove the drain plug.
- Remove the O-ring.



### 2. ASSEMBLE SST

SST 09230-01010

- Install the claw to the overhaul handle, inserting it into the hole in part A as shown in the illustration.
- While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.

**Dimension B: 0.2 to 0.3 mm (0.008 to 0.012 in.)**

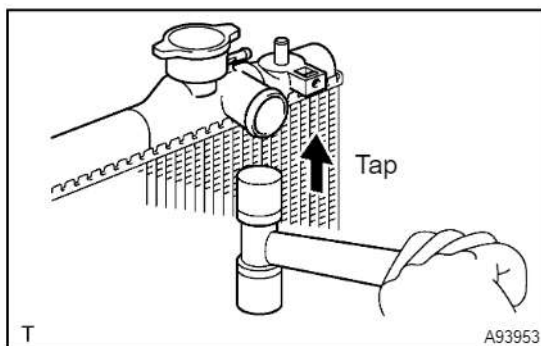
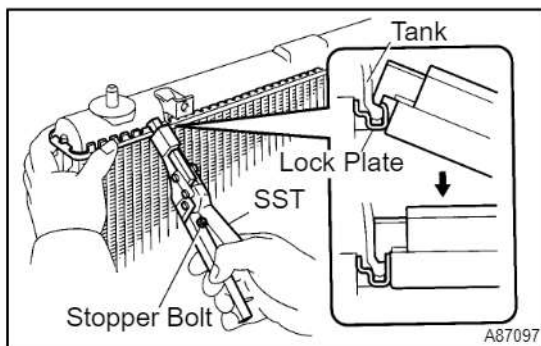
#### NOTICE:

If the stopper bolt is not adjusted, the claw may be damaged.

### 3. UNCAULK LOCK PLATE

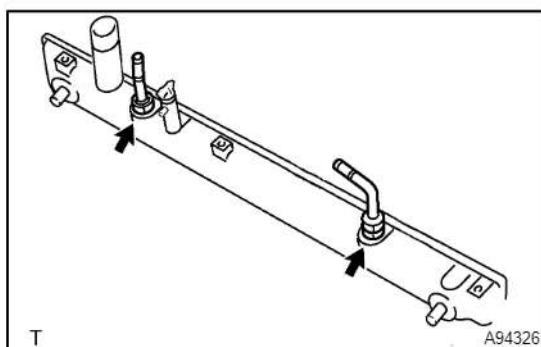
Using SST to release the caulking, grip the handle until stopped by the stopper plate uncaulk the lock plate.

SST 09230-01010 (09231-01010, 09231-01030)



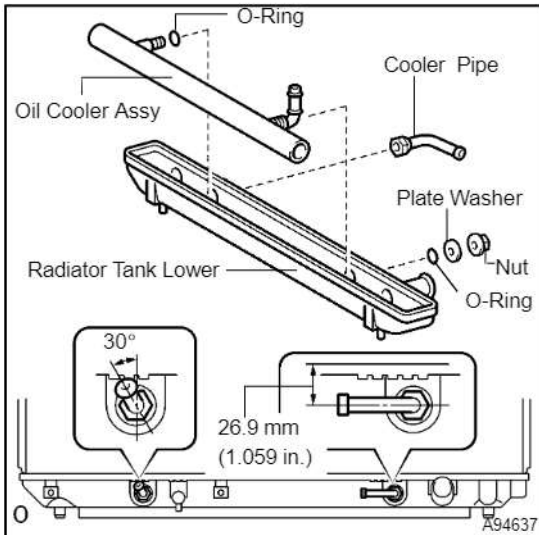
### 4. REMOVE RADIATOR TANK UPPER AND TANK LOWER

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



### 5. REMOVE OIL COOLER ASSY

- Remove the cooler pipe
- Loosen the 2 nuts and 2 plate washers.
- Remove the oil cooler
- Remove the 2 O-rings from the oil cooler.

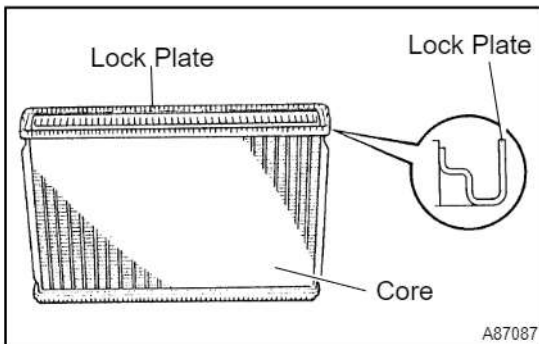


## 6. INSTALL OIL COOLER ASSY

- Clean the O-ring contact surface of the lower tank and oil cooler.
- Install 2 new O-rings to the oil cooler.
- Install the oil cooler to the lower tank.
- Install the plate washer and nut.
- Install the pipe.

**Torque: 8.34 N·m (85 kgf·cm, 74 in·lbf)**

**Torque: 14.71 N·m (150 kgf·cm, 11 ft·lbf)**



## 7. INSPECT LOCK PLATE FOR DAMAGE

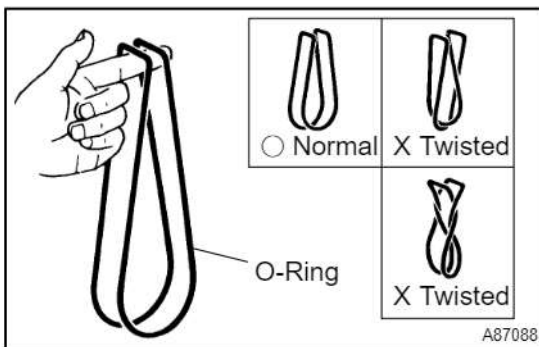
Inspect the lock plate for damage.

**HINT:**

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

**NOTICE:**

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

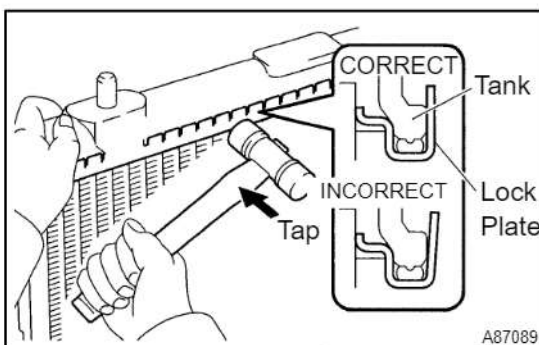


## 8. INSTALL RADIATOR TANK UPPER AND TANK LOWER

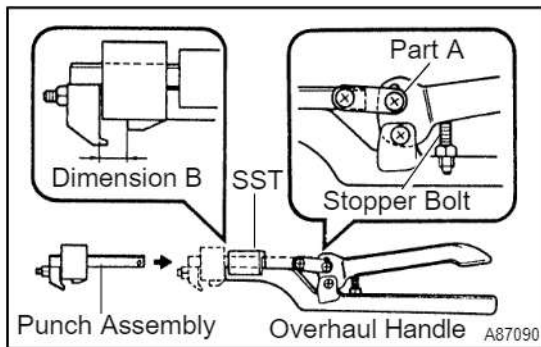
- After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.

**HINT:**

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



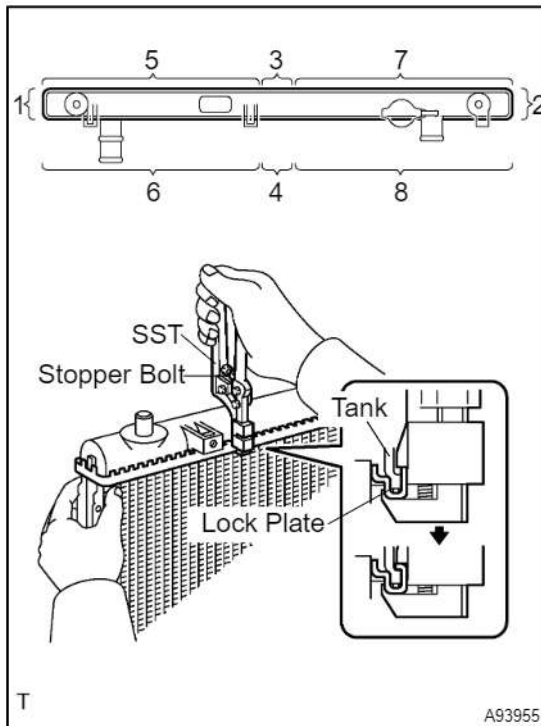
- Install the tank without damaging the O-ring.
- Tap the lock plate with a plastic-faced hammer so that there is no gap between the lock plate and the tank.

**9. ASSEMBLE SST**

SST 09230-01010, 09231-14010

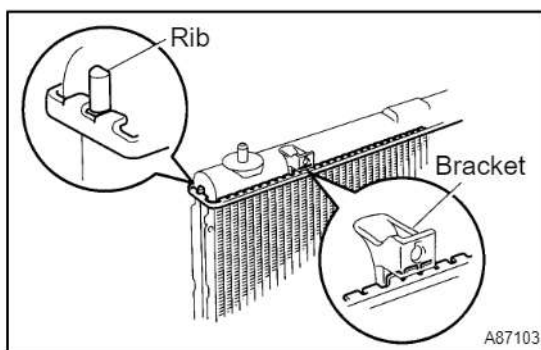
- (a) Install the punch assembly to the overhaul handle, inserting it into the hole in part A as shown in the illustration.
- (b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.

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

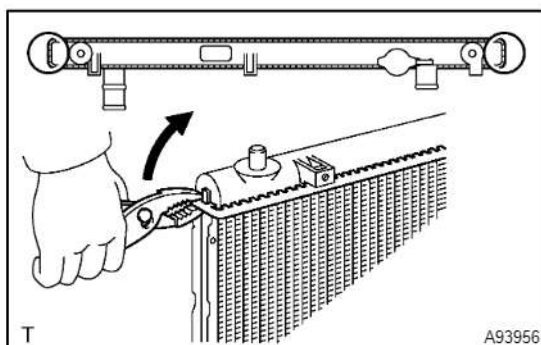
**10. CAULK LOCK PLATE**

- (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 gripping the handle until stopped by the stopper plate.

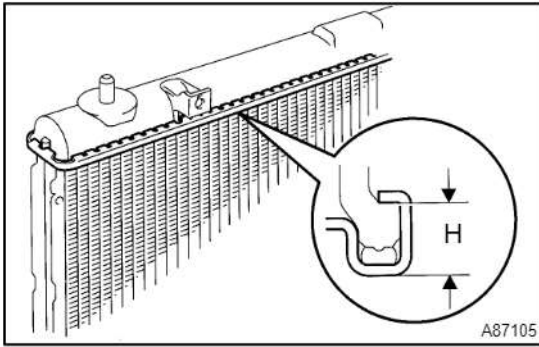
SST 09230-01010

**HINT:**

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



- The points shown in the illustration and oil cooler near here (A/T) cannot be tapped with the SST. Use pliers or similar objects and be careful not to damage the core plates.



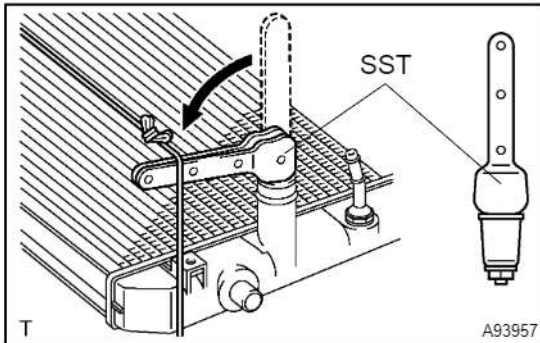
- (b) Check the lock plate height (H) after completing the caulking.

**Plate height (H): 7.40 to 7.80 mm (0.2913 to 0.3071 in.)**

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

## 11. INSTALL DRAIN PLUG

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



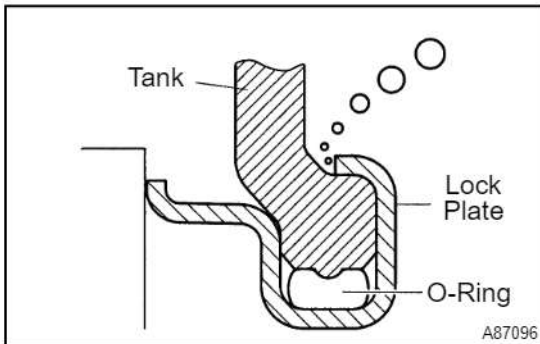
## 12. INSPECT FOR WATER LEAKS

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

- (d) 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 in water until all air bubbles disappear.



## COOLANT (2AZ-FE) REPLACEMENT

16032-08

### 1. DRAIN ENGINE COOLANT

- (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.**

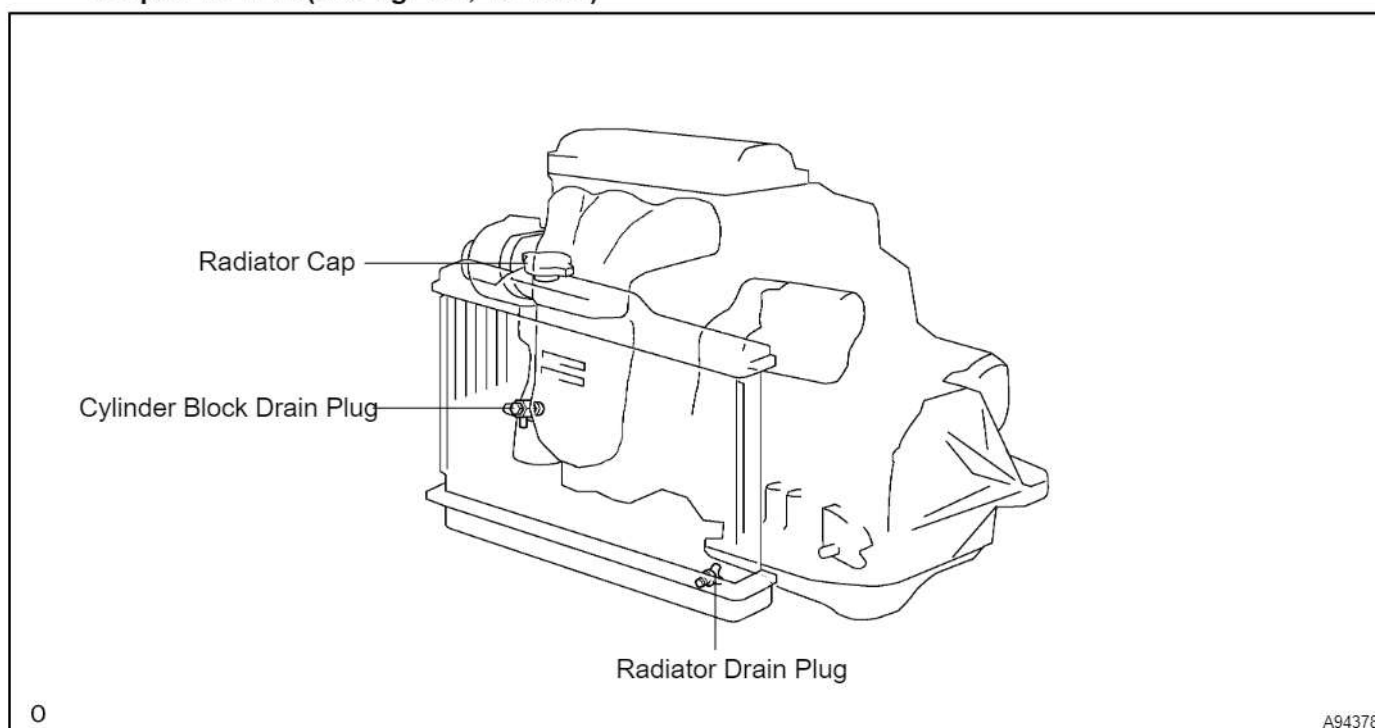
- (b) Drain engine coolant by loosening the radiator drain plug and the engine's cylinder block drain cock plug.

#### HINT:

Engine coolant inside the radiator is drained from the drain hole located on the bottom of the engine under cover.

- (c) Tighten the cylinder block drain cock plug.

**Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)**



0

A94378

### 2. ADD ENGINE COOLANT

- (a) Tighten the radiator drain plug.  
(b) Add engine coolant into the radiator until it overflows.

#### Capacity:

| Item                       |          | Specified Condition                   |
|----------------------------|----------|---------------------------------------|
| w/ Heater (front only)     | Standard | 6.3 liters (6.7 US qts, 5.5 Imp. qts) |
|                            | Towing   | 7.1 liters (7.5 US qts, 6.2 Imp. qts) |
| w/ Heater (front and rear) | Standard | 7.7 liters (8.1 US qts, 6.8 Imp. qts) |
|                            | Towing   | 8.5 liters (9.0 US qts, 7.5 Imp. qts) |

#### HINT:

- 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°C (-95°F)).

- 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 the coolant.

**NOTICE:**

**Do not use plain water alone.**

- (c) Pour coolant into the radiator reservoir tank until the coolant reaches the full line.
- (d) Install the radiator cap.
- (e) Start the engine and run the engine for 10 seconds.
- (f) Remove the radiator cap after 10 seconds. Pour coolant if the coolant level is lower.
- (g) Repeat steps (d) to (f) until the coolant level remains the same from steps (d) to (f).

**HINT:**

Perform the procedures above before the engine warms up. A warmed up engine causes the thermostat valve to open, and the air inside the engine circulates between the radiator and the engine.

- (h) Install the radiator cap.
- (i) Warm up the engine until the thermostat valve begins to open.

**HINT:**

As the engine warms up, press the radiator inlet and outlet hoses several times by hand.

- (j) Stop the engine and wait until the coolant cools down to the ambient temperature. If the coolant is below the full line, add coolant.
- (k) Install the radiator cap and check the radiator reservoir tank coolant level. If it is below the full line, add coolant.

**3. CHECK FOR ENGINE COOLANT LEAKS**

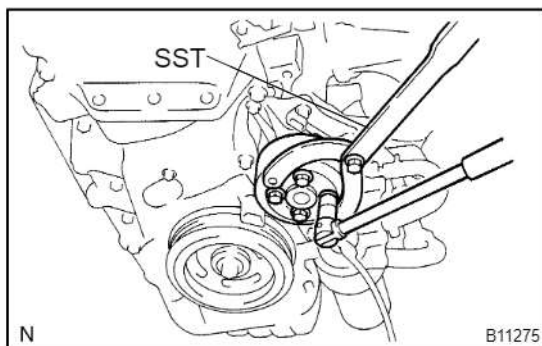
- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Pump it to 118 kPa (1.2 kgf/cm<sup>2</sup>, 17.1 psi) and check leakage.

## WATER PUMP ASSY (2AZ-FE)

1602V-08

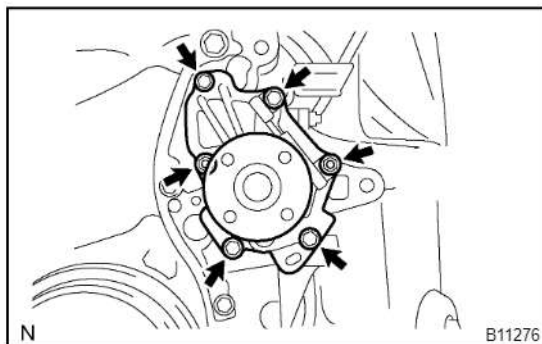
### REPLACEMENT

1. DRAIN ENGINE COOLANT (See page 16-6 )
2. REMOVE FRONT WHEEL RH
3. REMOVE FRONT FENDER APRON SEAL RH
4. REMOVE ENGINE MOVING CONTROL ROD W/BACKET (See page 14-24 )
5. REMOVE ENGINE MOUNTING STAY NO.2 RH (See page 14-24 )
6. REMOVE ENGINE MOUNTING BRACKET NO.2 RH (See page 14-24 )
7. REMOVE FAN AND GENERATOR V BELT (See page 14-5 )
8. REMOVE GENERATOR ASSY (See page 19-16 )



#### 9. REMOVE WATER PUMP PULLEY

- (a) Using SST, remove the 4 bolts and pump pulley.  
SST 09960-10010 (09962-01000, 09963-00700)
- (b) Disconnect the crankshaft position sensor wire harness clamp.



#### 10. REMOVE WATER PUMP ASSY

- (a) Remove the 4 bolts, 2 nuts, bracket and water pump.

#### 11. INSTALL WATER PUMP ASSY

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contacting surfaces of the water pump and cylinder block.

#### HINT:

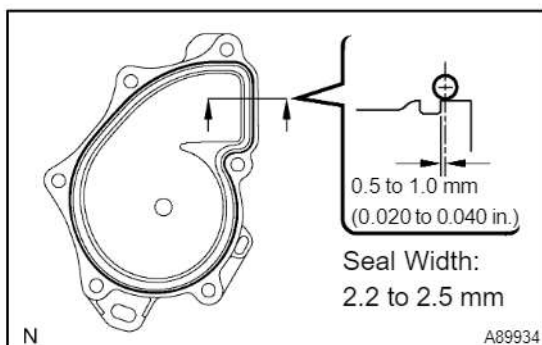
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) materials from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all loose material.
- Using a non-residue solvent, clean both sealing surfaces.

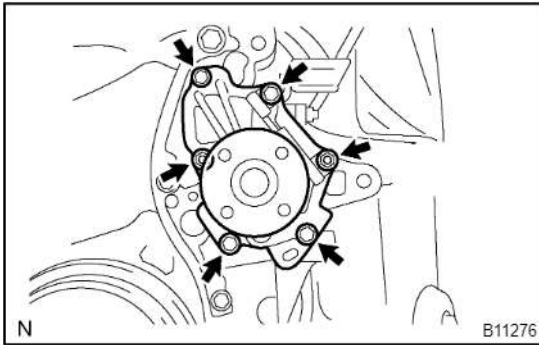
- (b) Apply seal packing to the water pump as shown in the illustration.

**Seal packing: Part No. 08826-00080 or equivalent**

#### HINT:

- Install a nozzle that has been cut to a 2.2 to 2.5 mm (0.087 to 0.098 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove the nozzle from the tube.

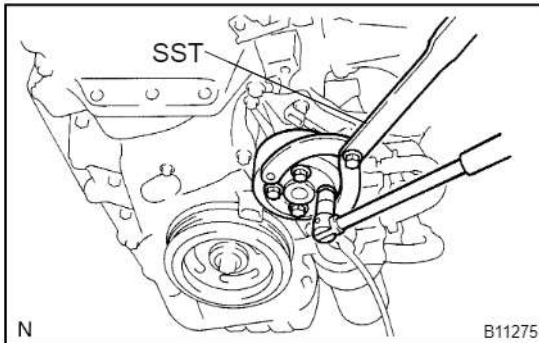




- (c) Install the water pump and bracket with the 4 bolts and 2 nuts.

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

- (d) Connect the crankshaft position sensor wire harness clamp.



## 12. INSTALL WATER PUMP PULLEY

- (a) Using SST, install the pump pulley with the 4 bolts.  
SST 09960-10010 (09962-01000, 09963-00700)

**Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)**

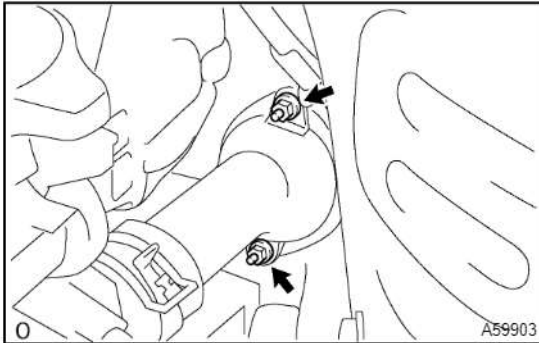
13. INSTALL GENERATOR ASSY (See page 19-16 )
14. INSTALL FAN AND GENERATOR V BELT (See page 14-5 )
15. INSTALL ENGINE MOUNTING BRACKET NO.2 RH (See page 14-24 )
16. INSTALL ENGINE MOVING CONTROL ROD W/BRACKET (See page 14-24 )
17. INSTALL ENGINE MOUNTING STAY NO.2 RH (See page 14-24 )
18. INSTALL FRONT FENDER APRON SEAL RH
19. INSTALL FRONT WHEEL RH
20. ADD ENGINE COOLANT (See page 16-6 )
21. CHECK FOR ENGINE COOLANT LEAKS (See page 16-1 )

# THERMOSTAT (2AZ-FE)

## REPLACEMENT

160U9-01

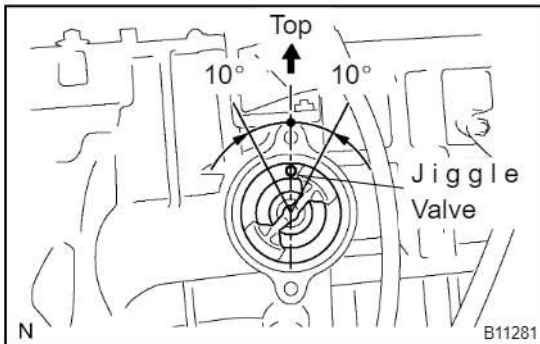
1. DRAIN ENGINE COOLANT (See page 16-6 )
2. REMOVE FAN AND GENERATOR V BELT (See page 14-5 )
3. REMOVE GENERATOR ASSY (See page 19-16 )
4. DISCONNECT RADIATOR HOSE INLET



### 5. REMOVE WATER INLET

- (a) Remove the 2 nuts and disconnect the water inlet from the cylinder block.

### 6. REMOVE THERMOSTAT

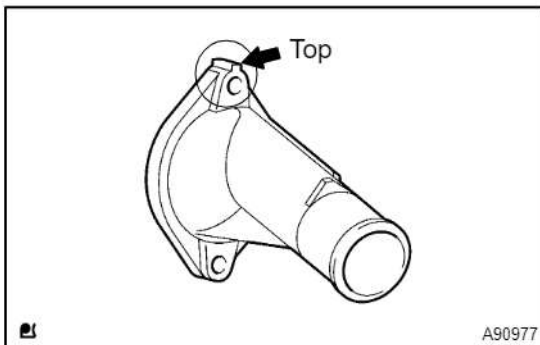


### 7. INSTALL THERMOSTAT

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

#### HINT:

The jiggle valve may be set within 10° on either side of the prescribed position.



### 8. INSTALL WATER INLET

- (a) Install the water inlet with the 2 nuts, as shown in the illustration.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

9. INSTALL RADIATOR HOSE INLET
10. INSTALL GENERATOR ASSY (See page 19-16 )
11. INSTALL FAN AND GENERATOR V BELT (See page 14-5 )
12. ADD ENGINE COOLANT (See page 16-6 )
13. CHECK FOR ENGINE COOLANT LEAKS (See page 16-1 )

## REPLACEMENT

### HINT:

The installation procedures are the removal procedures in reverse order. However, only installation procedures requiring additional information are included.

1. **DRAIN ENGINE COOLANT (See page 16-6 )**
2. **DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **DISCONNECT RADIATOR HOSE OUTLET**
5. **DISCONNECT OIL COOLER OUTLET HOSE NO.2**
6. **DISCONNECT OIL COOLER OUTLET HOSE NO.3**
7. **REMOVE RADIATOR SUPPORT UPPER**
  - (a) Remove the radiator support upper with the 2 bolts.
8. **REMOVE RADIATOR ASSY**
  - (a) Disconnect the fan motor connector.
  - (b) Remove the radiator from the body.
9. **REMOVE RADIATOR SUPPORT LOWER**
10. **REMOVE FAN ASSY W/MOTOR**
  - (a) Remove the 6 bolts and fan from the radiator.
11. **INSTALL FAN ASSY W/MOTOR**
  - (a) Install the fan to the radiator with the 6 bolts.  
**Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)**
12. **INSTALL RADIATOR ASSY**
  - (a) Install the radiator to the body.
  - (b) Connect the fan motor connector.
13. **INSTALL RADIATOR SUPPORT UPPER**
  - (a) Install the radiator support upper with the 2 bolts.  
**Torque: 12.8 N·m (130 kgf·cm, 9.4 ft·lbf)**
14. **ADD ENGINE COOLANT (See page 16-6 )**
15. **CHECK FOR ENGINE COOLANT LEAKS (See page 16-1 )**

## COOLANT (3MZ-FE)

1603B-10

### REPLACEMENT

#### 1. DRAIN ENGINE COOLANT

- (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.**

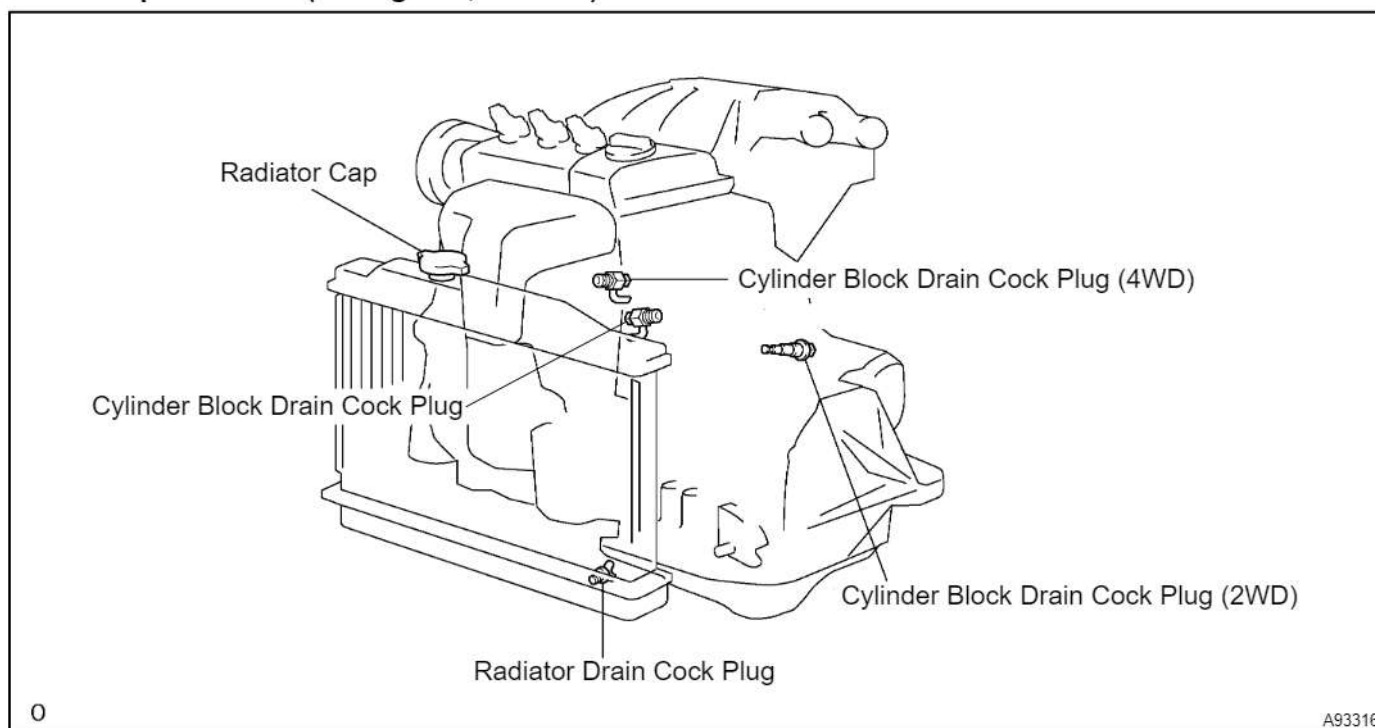
- (b) Drain engine coolant by loosening the radiator drain cock plug and the engine's cylinder block drain cock plug.

#### HINT:

Engine coolant inside the radiator is drained from the drain hole located on the bottom of the engine under cover.

- (c) Tighten the cylinder block drain cock plugs.

**Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)**



#### 2. ADD ENGINE COOLANT

- (a) Tighten the radiator drain plug.  
 (b) Add engine coolant into the radiator until it overflows.

#### Capacity:

| Item                            |          | Specified Condition                      |
|---------------------------------|----------|------------------------------------------|
| w/ heater (front only)          | Standard | 9.4 liters (9.9 US qts, 8.3 Imp. qts)    |
|                                 | Towing   | 10.1 liters (10.7 US qts, 8.9 Imp. qts)  |
| w/ Rear heater (front and rear) | Standard | 10.7 liters (11.3 US qts, 9.4 Imp. qts)  |
|                                 | Towing   | 11.4 liters (12.0 US qts, 10.0 Imp. qts) |

#### HINT:

- 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°C (-95°F)).
- 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 the coolant.

**NOTICE:**

**Do not use plain water alone.**

- (c) Pour coolant into the radiator reservoir tank until the coolant reaches the full line.
- (d) Install the radiator cap.
- (e) Warm up the engine.

**HINT:**

As the engine warms up, press the inlet and outlet radiator hoses several times by hand.

- (f) Stop the engine and wait until the coolant cools down to the ambient temperature.
- (g) Remove the radiator cap and check the coolant level inside the radiator.
- (h) If the coolant level is below the full level, repeat steps (c) to (g) until the coolant level stays the same from step (c) to (g).
- (i) Install the radiator cap and check the radiator reservoir tank coolant level. If it is below the full line, add coolant.

**3. CHECK FOR ENGINE COOLANT LEAKS**

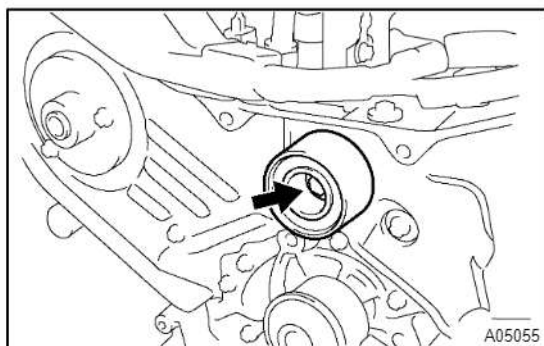
- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Pump it to 118 kPa (1.2 kgf/cm<sup>2</sup>, 17.1 psi) and check leakage.

## WATER PUMP ASSY (3MZ-FE)

1602G-13

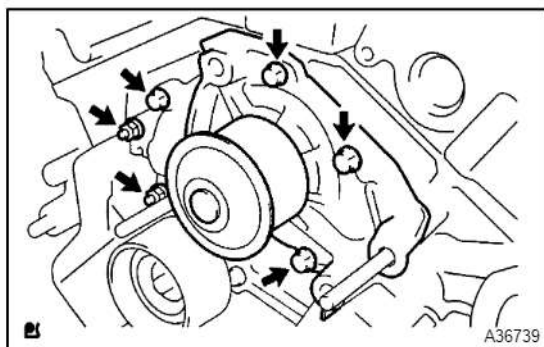
### REPLACEMENT

1. DRAIN ENGINE COOLANT (See page 16-26 )
2. REMOVE FRONT WHEEL RH
3. REMOVE FRONT FENDER APRON SEAL RH
4. REMOVE V BELT NO. 1 (See page 14-125 )
5. REMOVE VANE PUMP V BELT (See page 14-125 )
6. REMOVE ENGINE MOVING CONTROL ROD (See page 14-149 )
7. REMOVE ENGINE MOUNTING STAY NO.2 RH (See page 14-149 )
8. REMOVE GENERATOR BRACKET NO.2
9. REMOVE CRANKSHAFT PULLEY (See page 14-173 )
10. REMOVE TIMING BELT NO.1 COVER
11. REMOVE TIMING BELT NO.2 COVER
12. REMOVE ENGINE MOUNTING BRACKET RH
13. REMOVE TIMING BELT GUIDE NO.2
14. REMOVE TIMING BELT (See page 14-173 )



15. REMOVE TIMING BELT IDLER SUB-ASSY NO.2
  - (a) Remove the bolt and timing belt idler.

16. REMOVE CAMSHAFT TIMING PULLEY (See page 14-173 )
17. REMOVE TIMING BELT NO.3 COVER



18. REMOVE WATER PUMP ASSY
  - (a) Remove the 4 bolts, 2 nuts and water pump.

19. INSTALL WATER PUMP ASSY
  - (a) Install a new gasket and the water pump with the 4 bolts and 2 nuts.  
Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)
20. INSTALL TIMING BELT NO.3 COVER (See page 14-173 )
21. INSTALL CAMSHAFT TIMING PULLEY (See page 14-173 )

22. **INSTALL TIMING BELT IDLER SUB-ASSY NO.2**  
Torque: 34 N·m (347 kgf·cm, 25 ft·lbf)
23. **INSPECT TIMING BELT** (See page [14-173](#) )
24. **INSTALL TIMING BELT** (See page [14-173](#) )
25. **INSTALL TIMING BELT TENSIONER ASSY** (See page [14-173](#) )
26. **INSTALL TIMING BELT GUIDE NO.2** (See page [14-173](#) )
27. **INSTALL ENGINE MOUNTING BRACKET RH**  
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)
28. **INSTALL TIMING BELT NO.2 COVER** (See page [14-173](#) )
29. **INSTALL TIMING BELT NO.1 COVER** (See page [14-173](#) )
30. **INSTALL CRANKSHAFT PULLEY** (See page [14-173](#) )
31. **INSTALL GENERATOR BRACKET NO.2**  
Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)
32. **INSTALL ENGINE MOUNTING STAY NO.2 RH** (See page [14-149](#) )
33. **INSTALL ENGINE MOVING CONTROL ROD** (See page [14-149](#) )
34. **INSTALL VANE PUMP V BELT** (See page [14-125](#) )
35. **INSTALL V BELT NO. 1** (See page [14-125](#) )
36. **INSPECT DRIVE BELT TENSION** (See page [14-125](#) )
37. **ADD ENGINE COOLANT** (See page [16-26](#) )
38. **CHECK FOR ENGINE COOLANT LEAKS** (See page [16-20](#) )
39. **INSTALL FRONT WHEEL RH**

# THERMOSTAT (3MZ-FE)

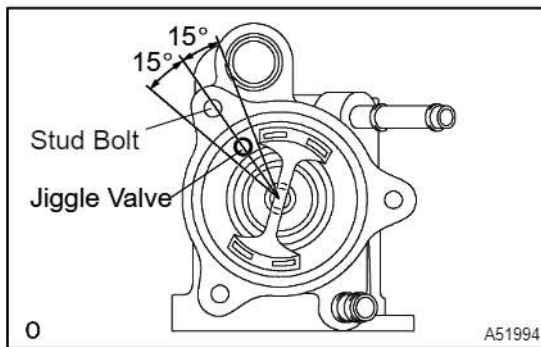
## REPLACEMENT

1602F-09

### HINT:

The installation procedures are the removal procedures in reverse order. However, only installation procedures requiring additional information are included.

1. **DRAIN ENGINE COOLANT (See page 16-26 )**
2. **REMOVE RADIATOR HOSE OUTLET**
3. **REMOVE WATER INLET PIPE**
  - (a) Remove the bolt and inlet pipe.
4. **REMOVE WATER INLET**
  - (a) Remove the 3 bolts and water inlet.
5. **REMOVE THERMOSTAT**



### 6. INSTALL THERMOSTAT

- (a) Install a new gasket to the thermostat.
- (b) Align the thermostat jiggle valve with the upper stud bolt, and insert the thermostat into the water inlet housing.

### HINT:

The jiggle valve may be set within 15° of either side of the prescribed position.

7. **INSTALL WATER INLET**  
Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)
8. **INSTALL WATER INLET PIPE**
  - (a) Install a new O-ring to the inlet pipe.
  - (b) Apply soapy water to the O-ring.
  - (c) Connect the inlet pipe to the water inlet.
  - (d) Install the bolt holding the inlet pipe to the cylinder head.  
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)
9. **ADD ENGINE COOLANT (See page 16-26 )**
10. **CHECK FOR ENGINE COOLANT LEAKS (See page 16-20 )**

## REPLACEMENT

### HINT:

The installation procedures are the removal procedures in reverse order. However, only installation procedures requiring additional information are included.

1. **DRAIN ENGINE COOLANT (See page 16-26 )**
2. **DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **DISCONNECT RADIATOR HOSE OUTLET**
5. **DISCONNECT OIL COOLER OUTLET HOSE NO. 2**
6. **DISCONNECT OIL COOLER OUTLET HOSE NO. 3**
7. **REMOVE RADIATOR SUPPORT UPPER**
  - (a) Remove the radiator support upper with the 2 bolts.
8. **REMOVE RADIATOR ASSY**
  - (a) Disconnect the fan motor connector.
  - (b) Disconnect the ECT switch No. 1 connector.
  - (c) Remove the radiator from the body.
9. **REMOVE RADIATOR SUPPORT LOWER**
10. **REMOVE FAN ASSY W/MOTOR**
  - (a) Remove the 6 bolts and fan from the radiator.
11. **INSTALL FAN ASSY W/MOTOR**
  - (a) Install the fan w/ to the radiator with the 6 bolts.  
**Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)**
12. **INSTALL RADIATOR ASSY**
  - (a) Install the radiator to the body.
  - (b) Connect the ECT switch No. 1 connector.
  - (c) Connect the fan motor connector.
13. **INSTALL RADIATOR SUPPORT UPPER**
  - (a) Install the radiator support upper with the 2 bolts.  
**Torque: 12.8 N·m (130 kgf·cm, 9 ft·lbf)**
14. **ADD ENGINE COOLANT (See page 16-26 )**
15. **CHECK FOR ENGINE COOLANT LEAKS (See page 16-20 )**