
COOLING

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COOLANT INSPECTION

C0000-05

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the "LOW" and "FULL" lines, when the engine is cold. If low, check for leaks and add engine coolant up to the "FULL" line.

2. CHECK ENGINE COOLANT QUALITY

- (a) Remove the radiator cap.

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

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

If excessively dirty, clean the coolant passages and replace the coolant.

- (c) Reinstall the radiator cap.

REPLACEMENT

C0004-05

1. DRAIN ENGINE COOLANT

- (a) Remove the radiator cap.

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

- (b) Loosen the radiator drain plug (on the right side of the radiator lower tank) and engine drain plug (on the left front of the cylinder block), and drain the coolant.

- (c) Close the drain plugs.

Torque (Engine drain plug): 35 N·m (350 kgf·cm, 25 ft·lb)

2. FILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.

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

NOTICE:

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

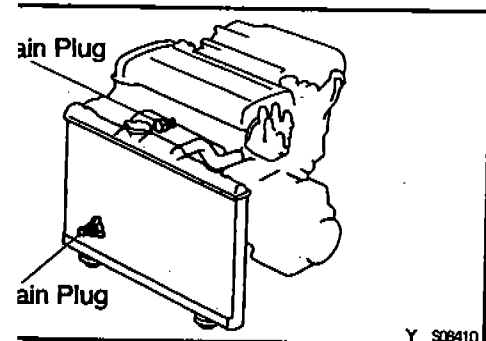
Capacity: 5.3 liters (5.6 US qts, 4.7 Imp. qts)

- (b) Reinstall the radiator cap.

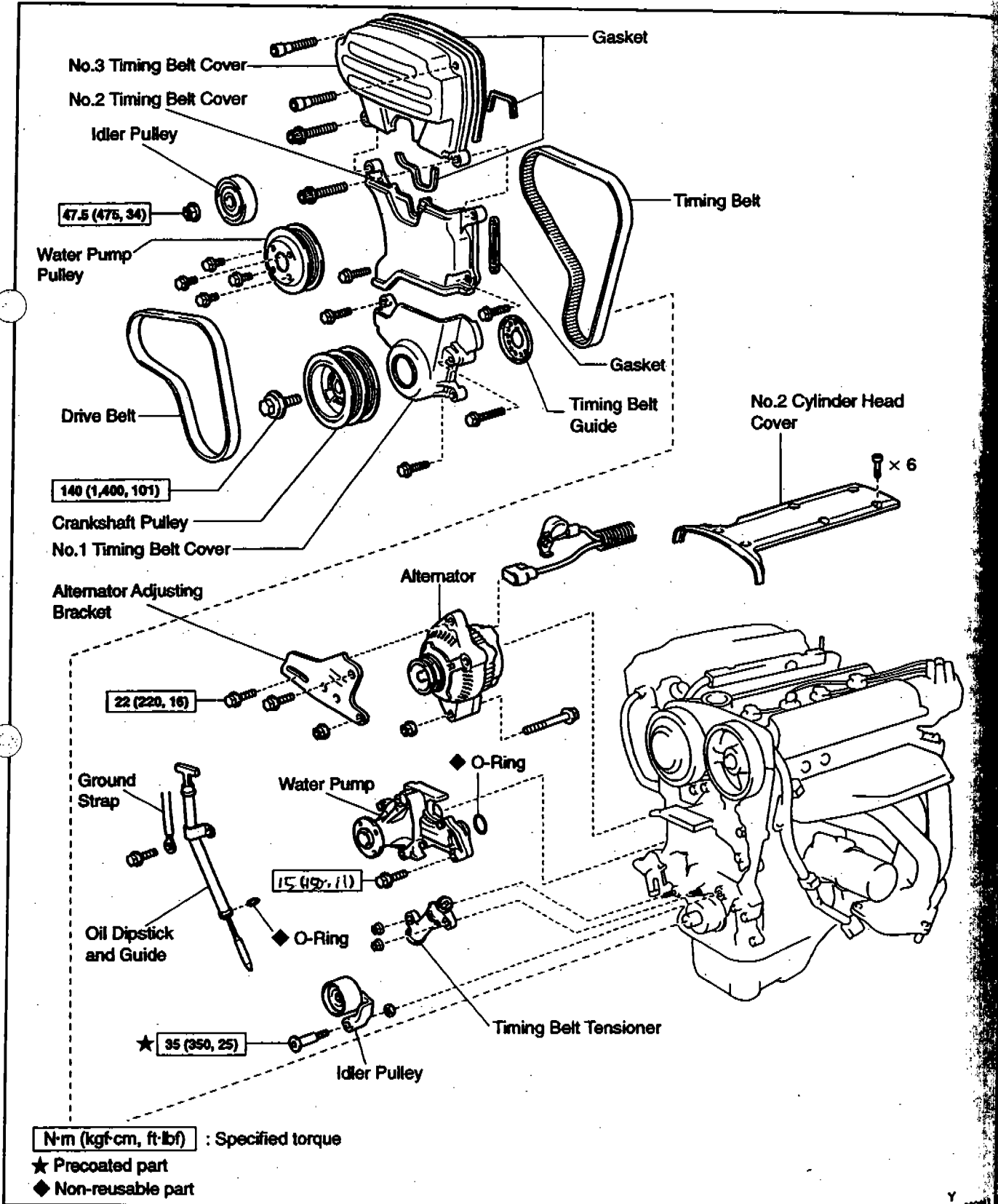
- (c) Start the engine, and bleed the cooling system.

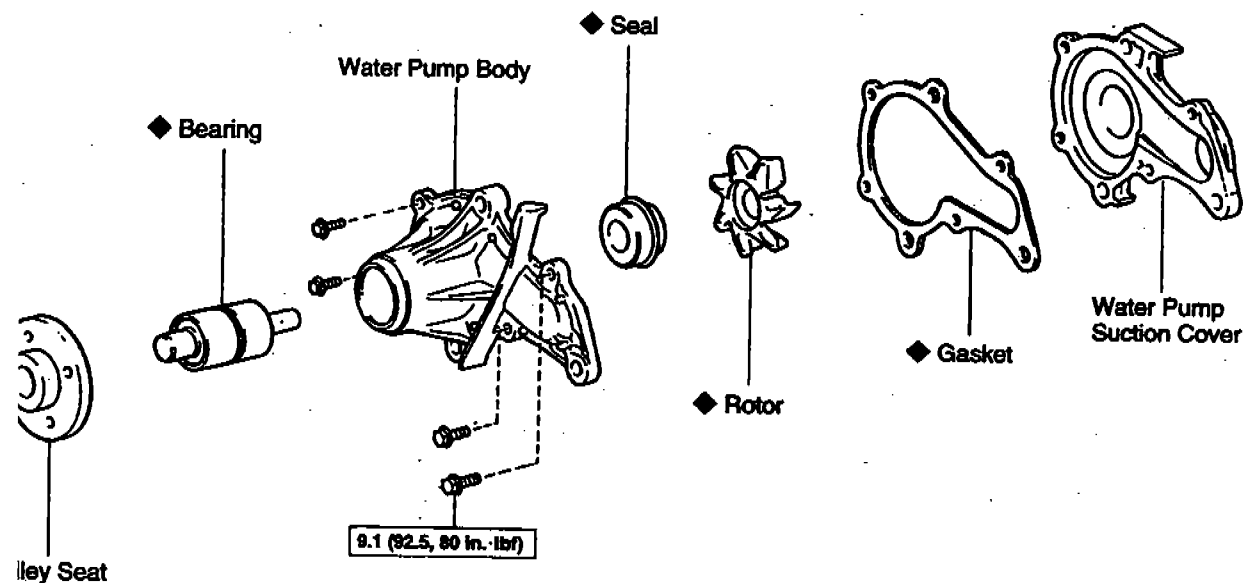
- (d) If necessary, refill coolant into the reservoir up to the "FULL" line.

3. CHECK ENGINE COOLANT FOR LEAKS



WATER PUMP COMPONENTS





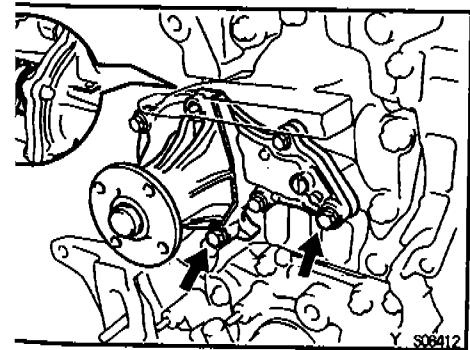
(kgf-cm, ft-lbf) : Specified torque
 ◆ : Non-reusable part

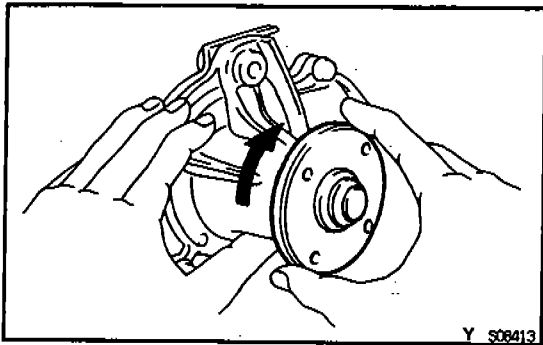
Y P24520

REMOVAL

CO051-01

1. DRAIN ENGINE COOLANT
2. REMOVE ALTERNATOR DRIVE BELT AND WATER PUMP PULLEY
(See EM section)
3. REMOVE TIMING BELT AND IDLER PULLEY
(See EM section)
4. REMOVE OIL DIPSTICK AND GUIDE
 - (a) Remove the mounting bolt and ground strap.
 - (b) Pull out the dipstick guide together with the dipstick.
 - (c) Remove the O-ring from the dipstick guide.
5. REMOVE ALTERNATOR AND ADJUSTING BAR
6. REMOVE WATER PUMP
 - (a) Remove the 2 bolts holding the water pump to the cylinder head.
 - (b) Disconnect the water pump from the water hose and remove the water pump.
 - (c) Remove the O-ring from the cylinder block.

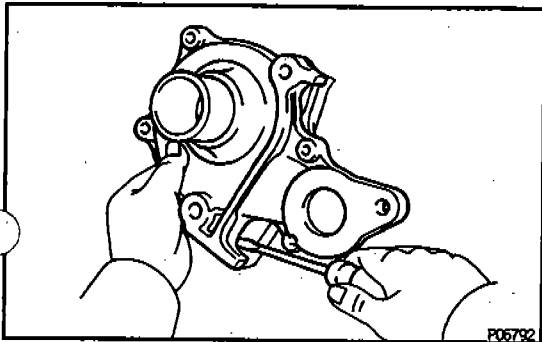




INSPECTION

INSPECT WATER PUMP

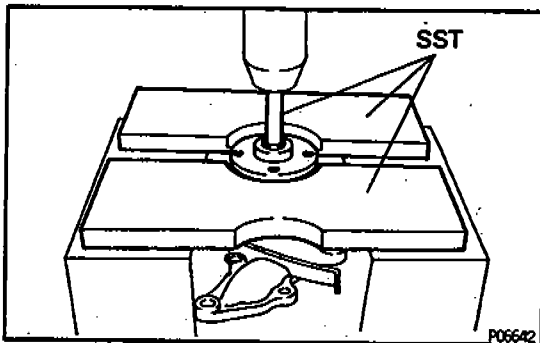
- (a) Visually check the air hole and water hole for coolant leakage.
If leakage is found, replace the water pump.
- (b) Turn the pulley and check that the water pump bearing moves smoothly and quietly.
If necessary, replace the water pump.



DISASSEMBLY

1. REMOVE WATER PUMP SUCTION COVER

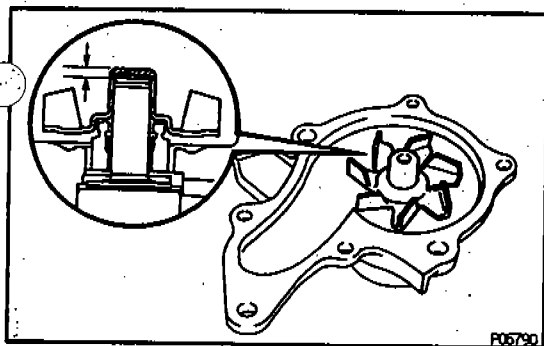
- (a) Remove the 4 bolts.
- (b) Using a screwdriver, pry off the water pump suction cover.



2. REMOVE PULLEY SEAT

Using SST and a press, press the shaft of the bearing to remove pulley seat.

SST 09236-00101 (09237-00010, 09237-00040)

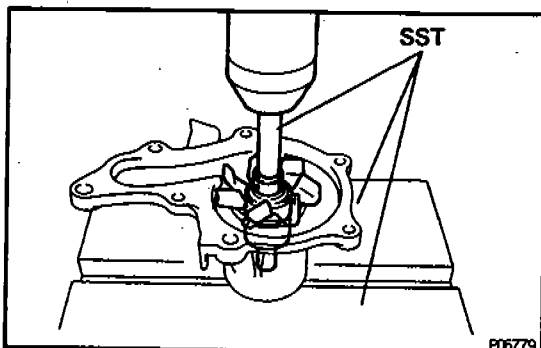


3. REMOVE WATER PUMP BEARING

- (a) Using a grinding wheel, grind the water pump rotor as shown.

NOTICE: Do not grind water pump bearing shaft.

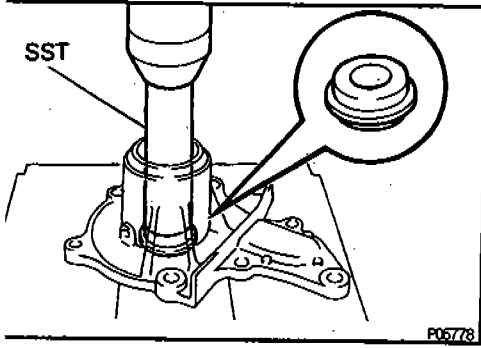
- (b) Gradually heat the water pump body to approx. 80°C (185°F).



- (c) Using SST and a press, press the shaft of the bearing to remove the rotor and bearing.

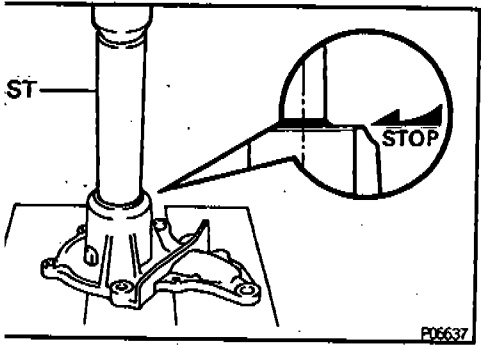
SST 09236-00101 (09237-00010, 09237-00040)

- (d) Remove the seal set from the water pump body.
NOTICE: Do not damage the water pump body.



4. REMOVE SEAL

Using SST and a press, press out the seal.
SST 09236-00101 (09236-15010)



REASSEMBLY

E0801-02

HINT: Always assemble the water pump with a new seal set, a new rotor and a new bearing.

1. INSTALL WATER PUMP BEARING

- (a) Gradually heat the water pump body to approx. 8.°C (185°F).
- (b) Using SST and a press, press the outer race of the bearing until its surface is flush with the water pump body surface.

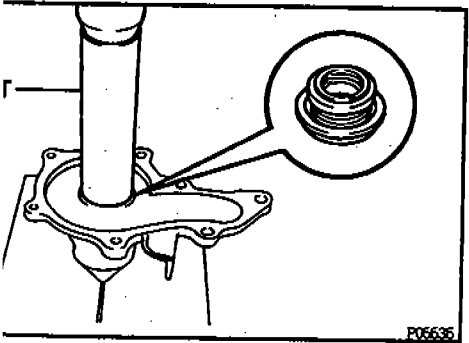
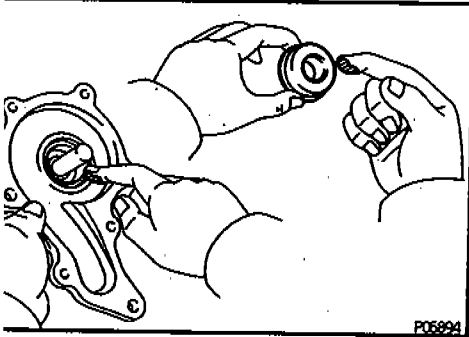
SST 09236-00101 (09237-00020)

2. INSTALL SEAL

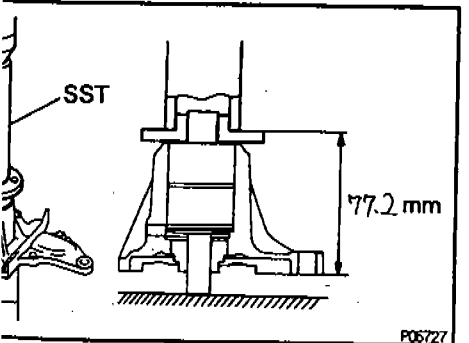
- (a) Apply a seal packing to a new seal and pump body.

Seal packing:

Part No. 08826-00100 or equivalent



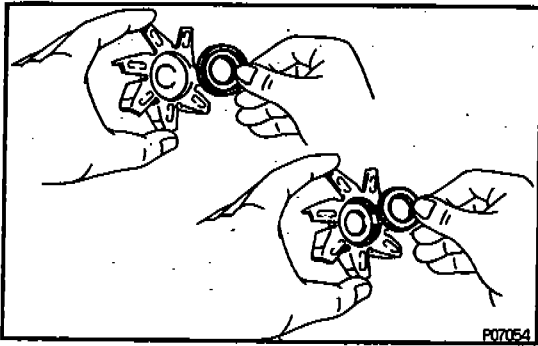
- (b) Using SST and a press, press in the seal.
SST 09236-00101 (09237-00020)



3. INSTALL PULLEY SEAT

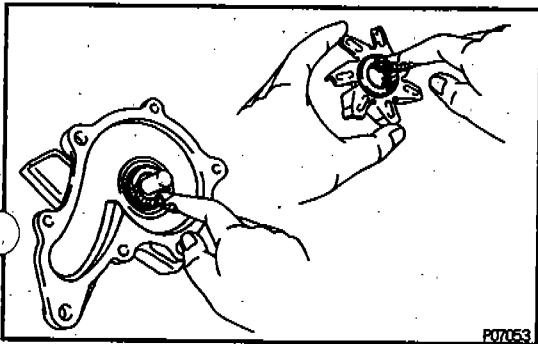
Using SST and a press, press in the pulley seat on the water pump bearing shaft to 77.2 mm (3.040 in.) from the installation surface of the pump body.

SST 09236-00101 (09237-00020)

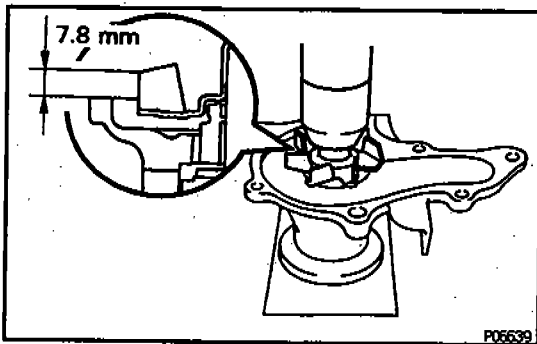


4. INSTALL ROTOR

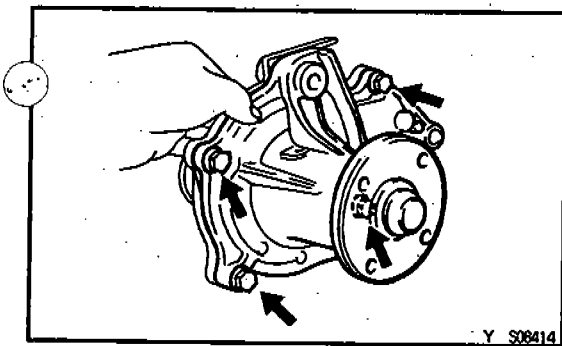
(a) Install a new packing and seat into the rotor.



(b) Apply a little silicon oil to the seat and rotor contact face.



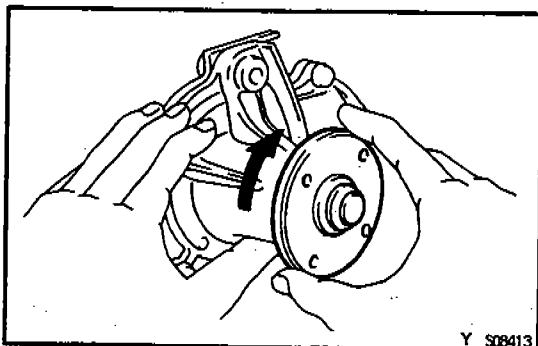
(c) Using a press, press in a new rotor on the water pump bearing shaft to 7.8 mm (0.307 in.) from the installation surface of the pump body.



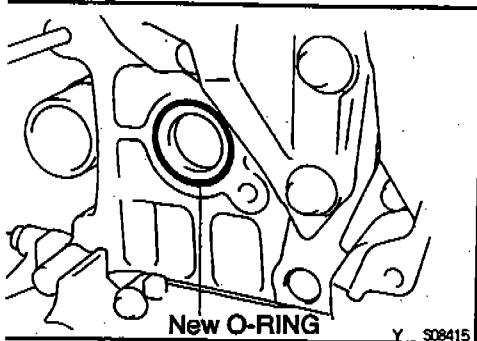
5. INSTALL WATER PUMP SUCTION COVER

Install the water pump suction cover with a new gasket and the 4 bolts.

Torque: 9.3 N·m (92.5 kgf·cm, 80 in.-lbf)



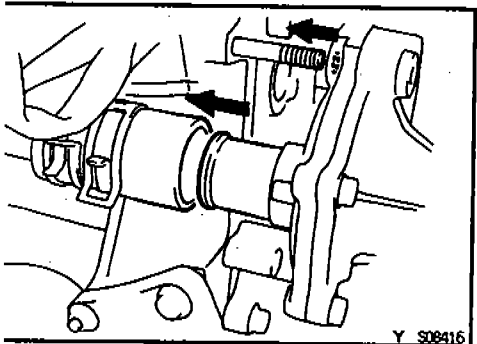
6. CHECK THAT WATER PUMP ROTATES SMOOTHLY



INSTALLATION

1. INSTALL WATER PUMP

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



- (b) Attach the water pump to the water hose and cylinder block.

- (c) Connect the water pump to the water hose.

- (d) Install the 2 bolts.

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

2. INSTALL ALTERNATOR AND ADJUSTING BAR

Torque: 22 N-m (220 kgf-cm, 16 ft-lbf)

3. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

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

- (b) Apply soapy water to the O-ring.

- (c) Push in the dipstick guide together with the dipstick, and install it with the bolt and ground strap.

Torque: 9.5 N-m (95 kgf-cm, 82 in.-lbf)

4. INSTALL TIMING BELT AND IDLER PULLEY

(See EM section)

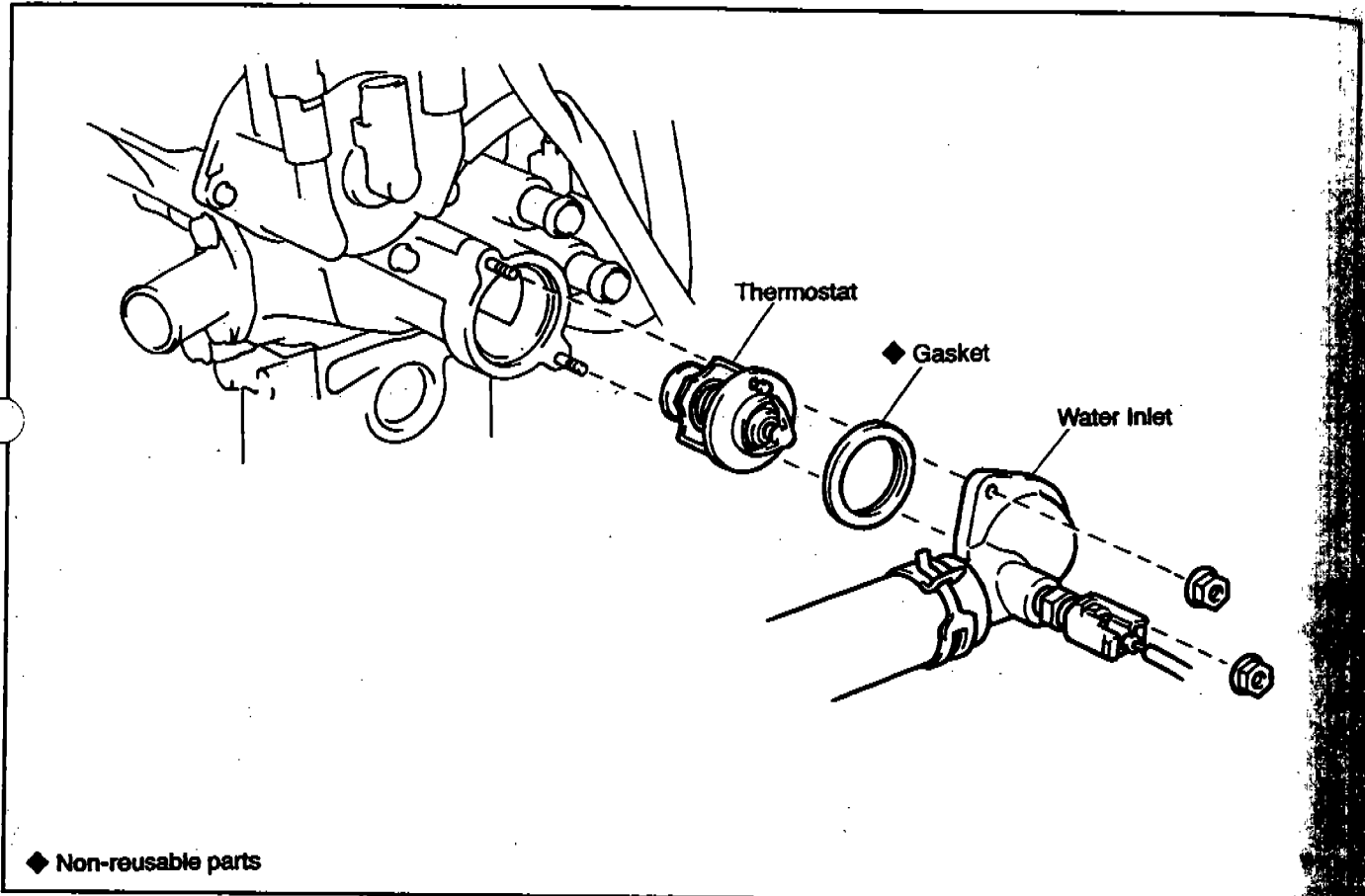
5. INSTALL WATER PUMP PULLEY AND ALTERNATOR DRIVE BELT

(See EM section)

6. FILL WITH ENGINE COOLANT

7. START ENGINE AND CHECK FOR COOLANT LEAKS

THERMOSTAT COMPONENTS



REMOVAL

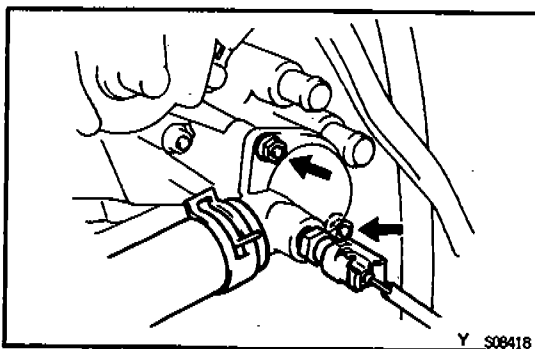
HINT: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not move the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT

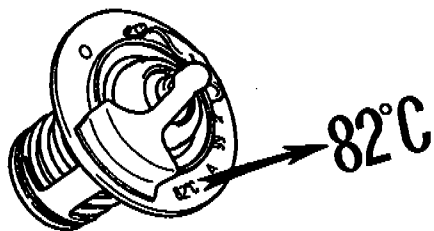
2. DISCONNECT WATER TEMPERATURE SWITCH CONNECTOR

3. REMOVE WATER INLET AND THERMOSTAT

- (a) Remove the 2 nuts and water inlet from the water inlet housing.
- (b) Remove the thermostat.
- (c) Remove the gasket from the thermostat.



E0134-02



P13255

INSPECTION

INSPECT THERMOSTAT

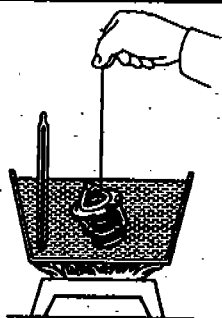
HINT: The thermostat is numbered with the valve opening temperature.

- (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°F)

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



C01234

- (c) Check the valve lift.

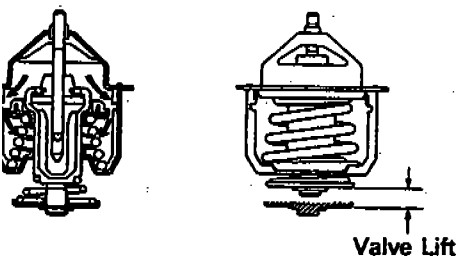
Valve lift:

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

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

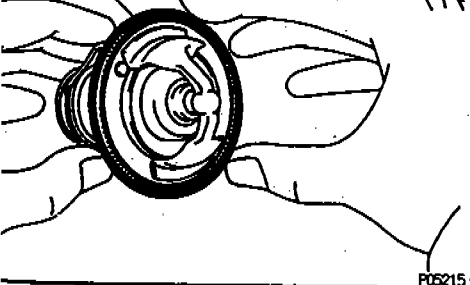
- (d) Check that the valve spring is tight when the thermostat is fully closed.

If not closed, replace the thermostat.



C01233

New Gasket



P05215

INSTALLATION

E0804-02

1. PLACE THERMOSTAT IN WATER INLET HOUSING

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

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

2. INSTALL WATER INLET

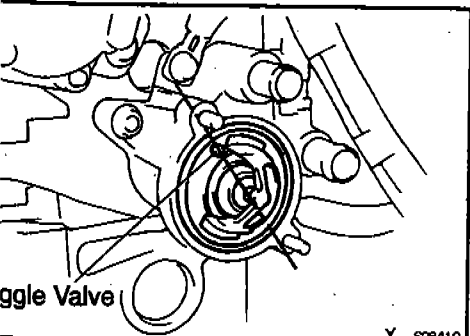
Install the water inlet with the 2 nuts.

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

3. CONNECT WATER TEMPERATURE SWITCH CONNECTOR

4. FILL WITH ENGINE COOLANT

5. START ENGINE AND CHECK FOR COOLANT LEAKS



Y. 308419

RADIATOR ON-VEHICLE CLEANING

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 distance between the cleaner nozzle and radiator core.)

ON-VEHICLE INSPECTION

1. REMOVE RADIATOR CAP

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

2. INSPECT RADIATOR CAP

NOTICE:

- If the radiator cap has contaminations, always remove it with water.
- When performing steps (a) and (b) below, keep the radiator pump tester at an angle of over 30° above horizontal.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.

- (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 radiator cap.

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

Pump speed:

1 push within 1 second

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:

74 - 103 kPa

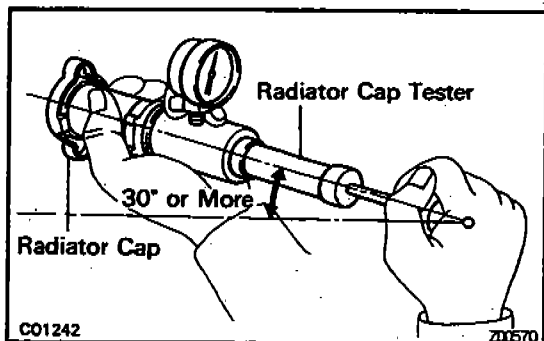
(0.75 - 1.05 kgf/cm², 10.7 - 14.9 psi)

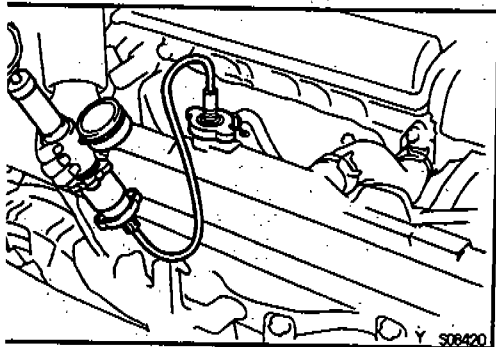
Minimum opening pressure:

59 kPa (0.6 kgf/cm², 8.05 psi)

HINT: Use the tester's maximum reading as the opening pressure.

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





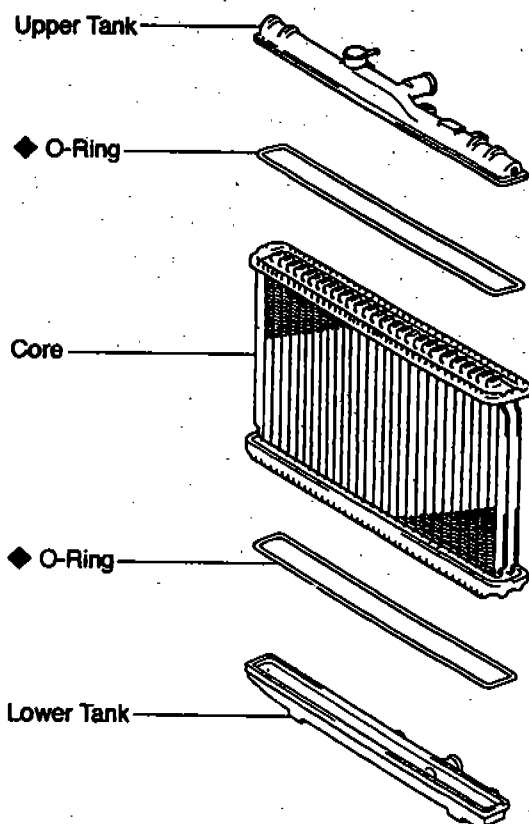
3. INSPECT COOLING SYSTEM FOR LEAKS

- (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/cm², 17.1 psi), and check that the pressure does not drop.

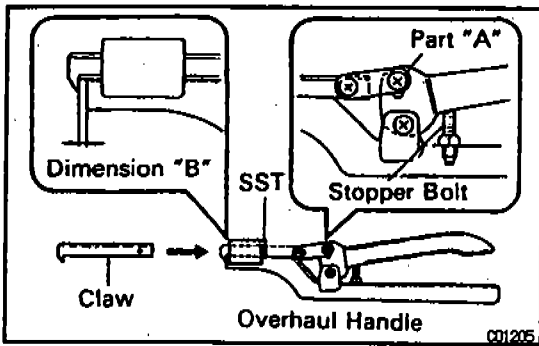
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

4. REINSTALL RADIATOR CAP

COMPONENTS



Non-reusable parts



DISASSEMBLY

1. ASSEMBLY SST

SST 09230-01010

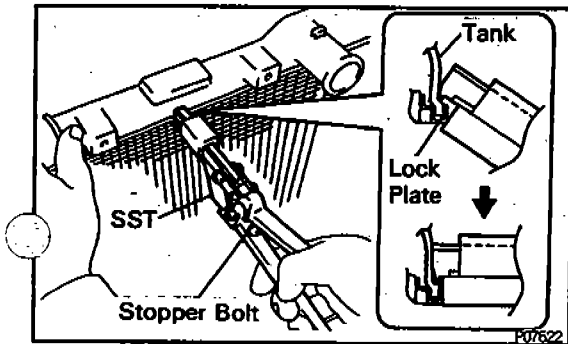
- (a) Install the claw to the overhaul handle, inserting it in the hole in part "A" as shown in the diagram.
- (b) While gripping the handle, adjust the stopper bolt so that dimension "B" shown in the diagram is 0.2-0.5 mm (0.008-0.020 in.).

NOTICE: If this adjustment is not done, the claw may be damaged.

2. UNCAULK LOCK PLATES

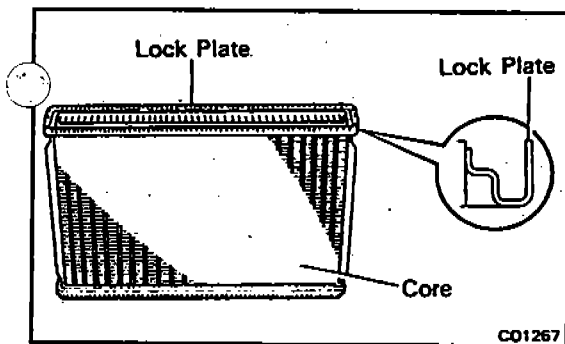
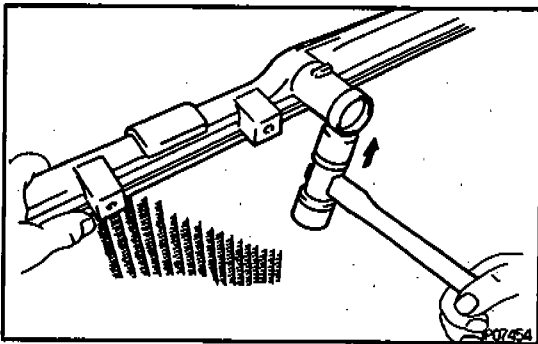
Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.

SST 09230-01010



3. REMOVE TANKS AND O-RINGS

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



ASSEMBLY

1. INSPECT LOCK PLATE

Inspect the lock plate for damage.

HINT:

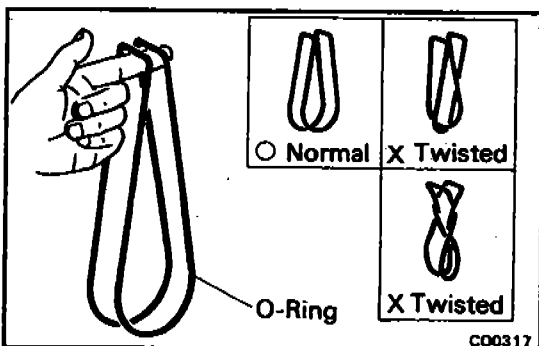
- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible.
- Therefore, first correct any deformation with pliers or a similar object. Water leakage will result if the bottom of the lock plate groove is damaged or deformed. Therefore repair or replace if necessary.

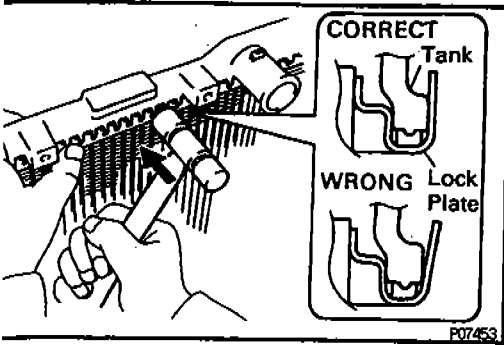
NOTICE: The radiator can only be recalced 2 times. After the 2nd time, the radiator core must be replaced.

2. INSTALL NEW O-RINGS AND TANKS

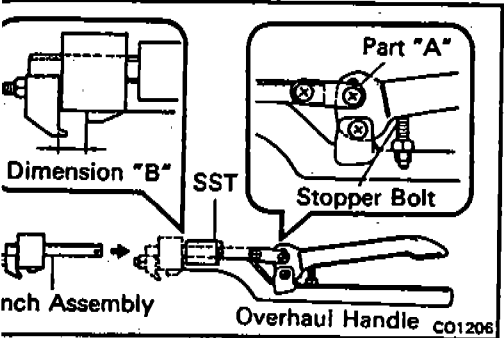
- (a) After checking that there are no foreign objects in the lock plate groove, install the new O-ring without twisting it.

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





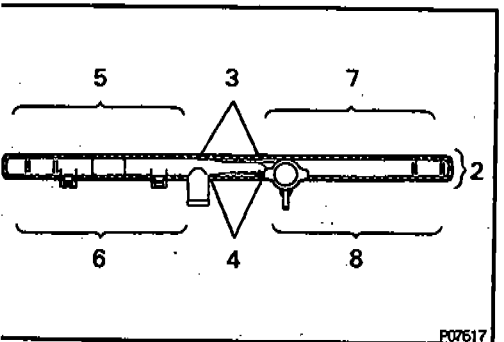
- (b) Install the tank without damaging the O-ring.
- (c) Tap the lock plate with a soft-faced hammer so that there is no gap between it and the tank.



3. ASSEMBLY SST

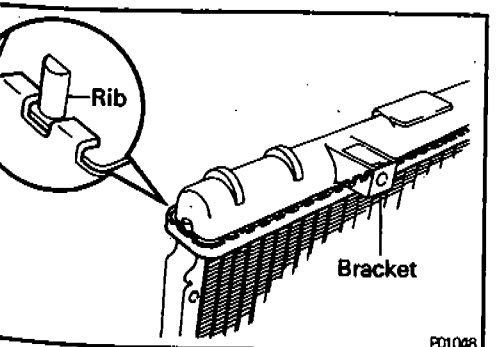
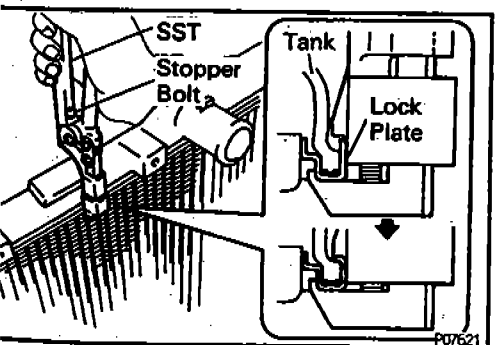
SST 09230-01010

- (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" shown in the diagram is 7.7 mm (0.03 in.)



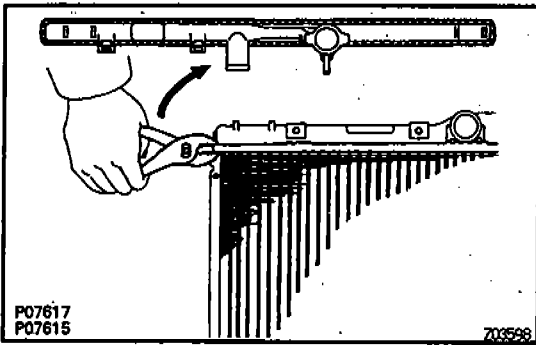
4. CAULK LOCK PLATE

- (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

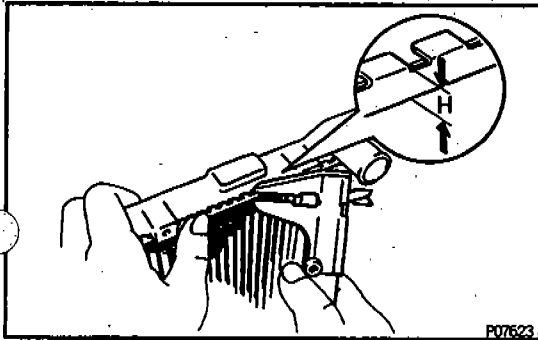


HINT:

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



- The points shown in the illustration cannot be started with the SST. Use a plier or similar object and be careful not to damage the core plates.

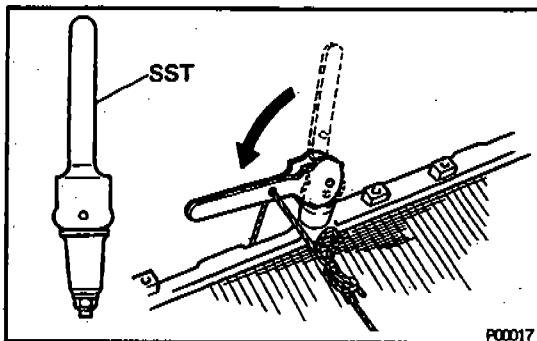


- (b) Check the lock plate height (H) after completing the caulking.

Plate height:

7.75 – 8.25 mm (0.3051 – 0.3248 in.)

If not within the specified height, adjust the stopper of the handle again and perform the caulking again.

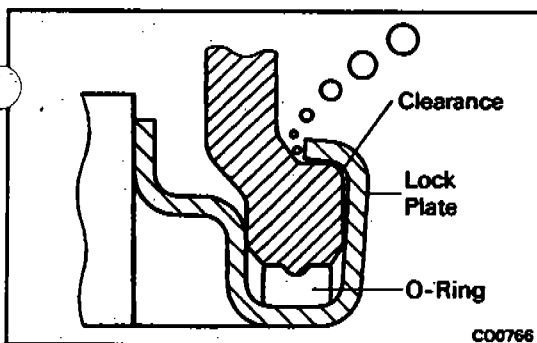


5. INSPECT FOR WATER LEAKS

- Tighten the drain cock.
- Plug the inlet and outlet pipes of the radiator with SST 09230-01010
- Using a radiator cap tester, apply pressure to the radiator.

Test pressure:

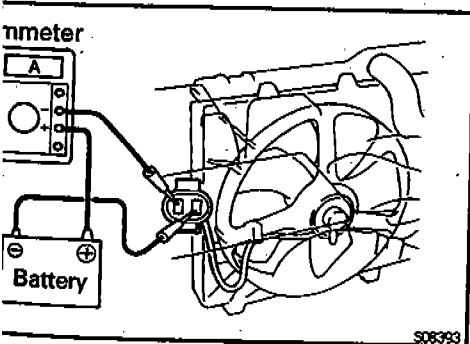
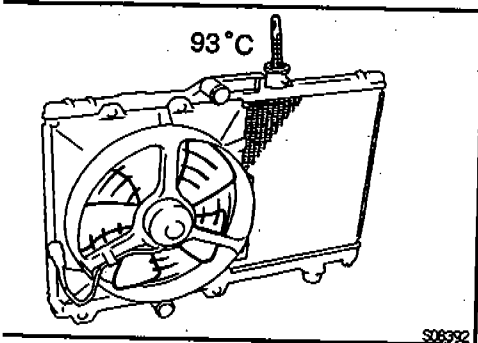
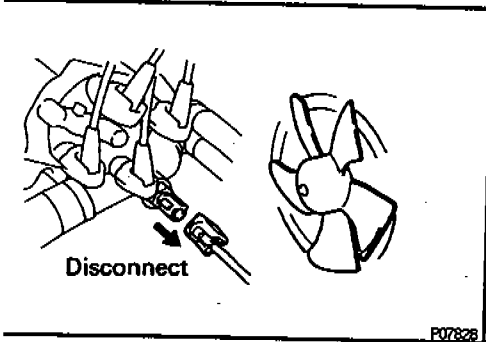
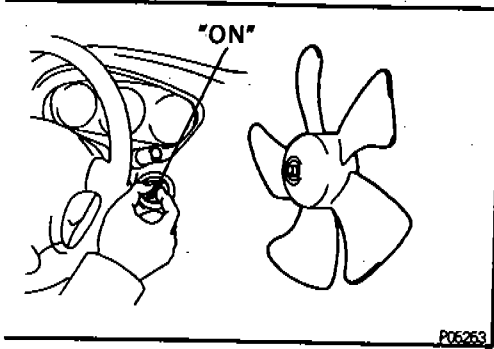
177 kPa (1.8 kgf/cm², 26 psi)



- Inspect for water 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 air leaks when the radiator is submerged in water.

Therefore, before doing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.



ELECTRIC COOLING FAN ON-VEHICLE INSPECTION

CO90-01

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 water temperature switch, and check for a separated connector or severed wire between cooling fan relay and water temperature switch.
- (c) Disconnect the water temperature switch connector.
- (d) Check that the cooling fan rotates.
If not, check the cooling fan relay, cooling fan, engine main relay and fuse, and check for a short circuit between the cooling fan relay and water temperature switch.
- (e) Reconnect the water temperature switch connector.

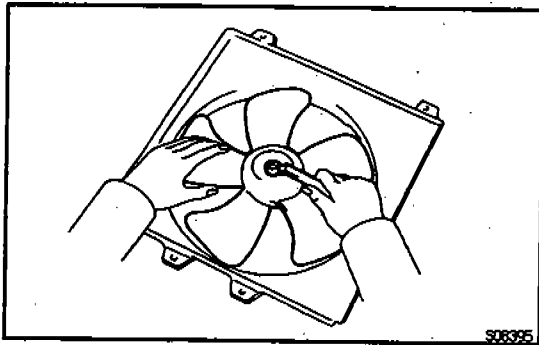
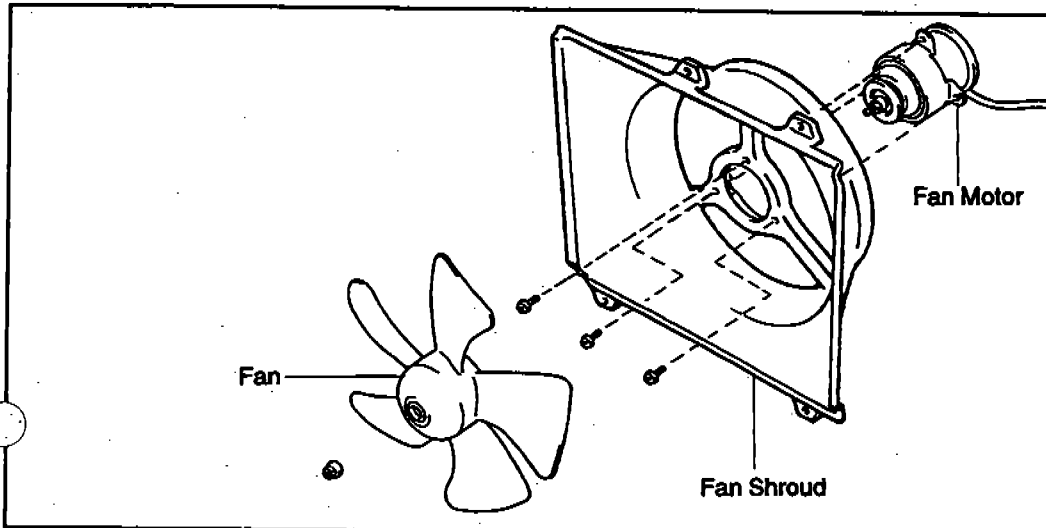
2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93°C (199°F))

- (a) Start the engine, and raise coolant temperature to above 93°C (199°F).
- (b) Check that the cooling fan rotates.
If not, replace the water temperature switch.

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:
3.2 - 4.4 A
- (d) Reconnect the cooling fan connector.

COMPONENTS

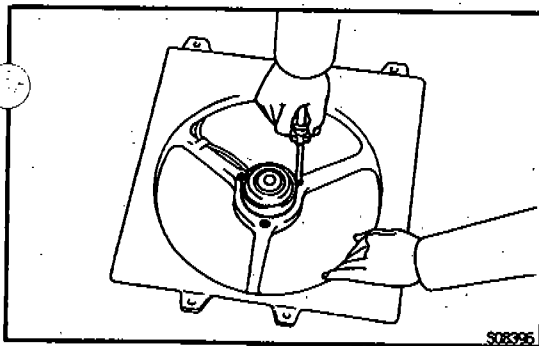


DISASSEMBLY

1. REMOVE FAN

Remove the nut and fan.

Torque: 6.2 N·m (63 kgf·cm, 55 in.-lbf)



2. REMOVE FAN MOTOR

Remove the 3 screws and fan motor.

Torque: 2.6 N·m (26 kgf·cm, 23 in.-lbf)

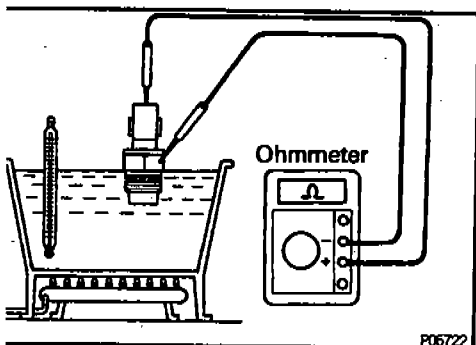
REASSEMBLY

Reassembly is in the reverse order of disassembly.

WATER TEMPERATURE SWITCH INSPECTION

80258-01

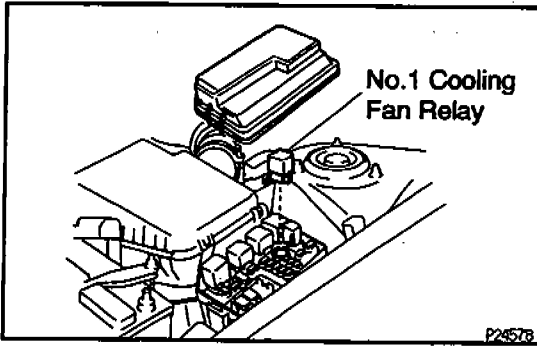
1. DRAIN ENGINE COOLANT
2. REMOVE WATER TEMPERATURE SWITCH



3. INSPECT WATER TEMPERATURE SWITCH
 - (a) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 93°C (199°F).
 - (b) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is below 83°C (181°F).

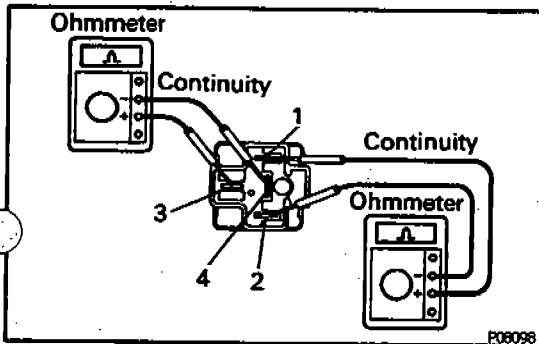
If continuity is not as specified, replace the switch.

4. REINSTALL WATER TEMPERATURE SWITCH
5. REFILL WITH ENGINE COOLANT



NO.1 COOLING FAN RELAY INSPECTION

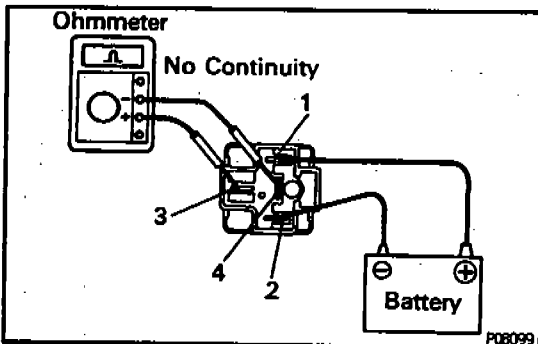
1. REMOVE NO.1 COOLING FAN RELAY ("FAN NO.1")



2. INSPECT NO.1 COOLING FAN RELAY CONTINUITY

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

(b) Check that there is continuity between terminals 3 and 4. If continuity is not as specified, replace the relay.



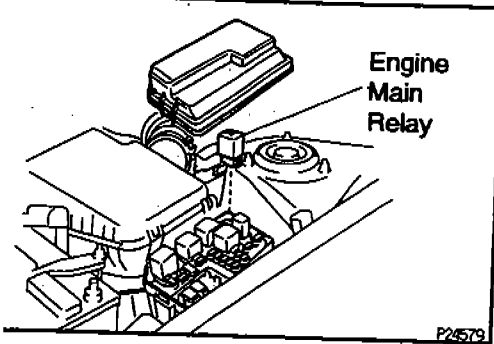
3. INSPECT NO.1 COOLING FAN RELAY OPERATION

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

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

If operation is not as specified, replace the relay.

4. REINSTALL NO.1 COOLING FAN RELAY



ENGINE MAIN RELAY INSPECTION

E0220-04

1. REMOVE ENGINE MAIN RELAY ("ENGINE MAIN")

2. INSPECT ENGINE MAIN RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

3. INSPECT ENGINE MAIN RELAY OPERATION

- Apply battery voltage across terminals 3 and 5.
 - Using an ohmmeter, check that there is no continuity between terminals 2 and 4.
 - Check that there is continuity between terminals 1 and 2.
- If operation is not as specified, replace the relay.

4. REINSTALL ENGINE MAIN RELAY

