
COOLING

COOLANT	CO-1
WATER PUMP	CO-3
THERMOSTAT	CO-10
RADIATOR	CO-14

COOLANT

INSPECTION

COING-02

HINT:

Check the coolant level when the engine is cold.

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the "L" and "F" lines.

If low, check for leaks and add "Toyota Long Life Coolant" or equivalent up to between the "L" and "F" lines.

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 excessive deposits of rust or scale around the radiator cap or water 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.

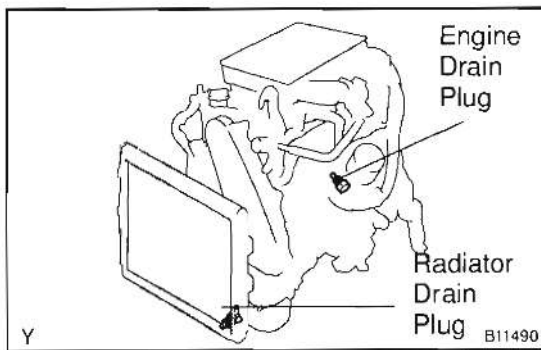
REPLACEMENT

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.

1. DRAIN ENGINE COOLANT

- (a) Remove the radiator cap.



- (b) Loosen the radiator drain plug (on the right side of the radiator lower tank) and engine drain plug (on the oil cooler cover), and drain the coolant.

- (c) Close the drain plugs.

Torque: 8 N·m (80 kgf·cm, 69 in.-lbf) for Engine

2. FILL ENGINE COOLANT

- (a) 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°C (-31°F)] or 60 % [freezing protection down to -50°C (-58°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:

w/ Rear heater:

M/T 10.5 liters (11.1 US qts, 9.2 Imp. qts)

A/T 11.0 liters (11.6 US qts, 9.7 Imp. qts)

w/o Rear heater:

M/T 9.5 liters (10.0 US qts, 8.4 Imp. qts)

A/T 10.0 liters (10.6 US qts, 8.8 Imp. qts)

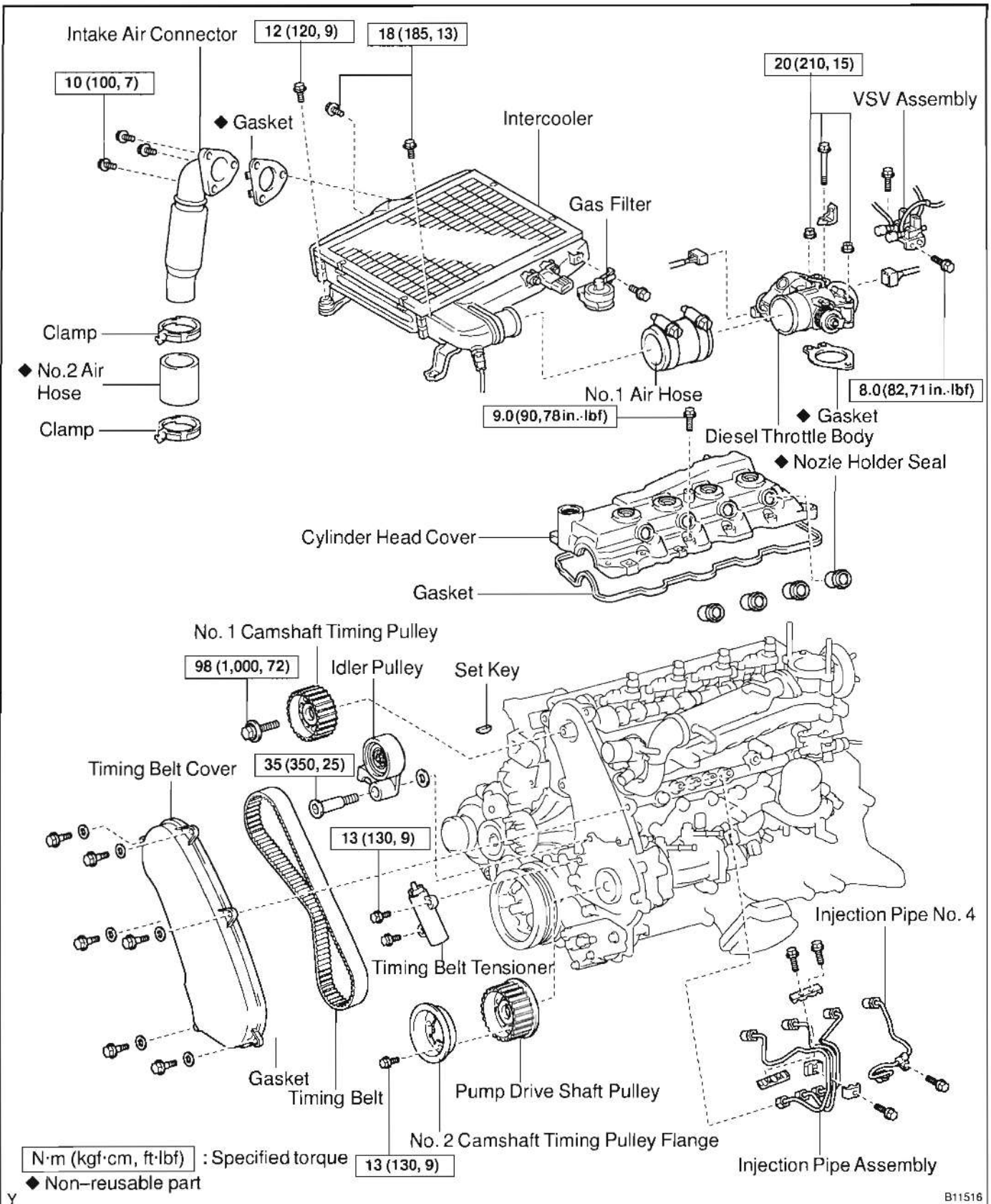
- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed the cooling system.
- (d) Refill the radiator reservoir with coolant until it reaches the "F" line.

3. CHECK ENGINE COOLANT FOR LEAKS

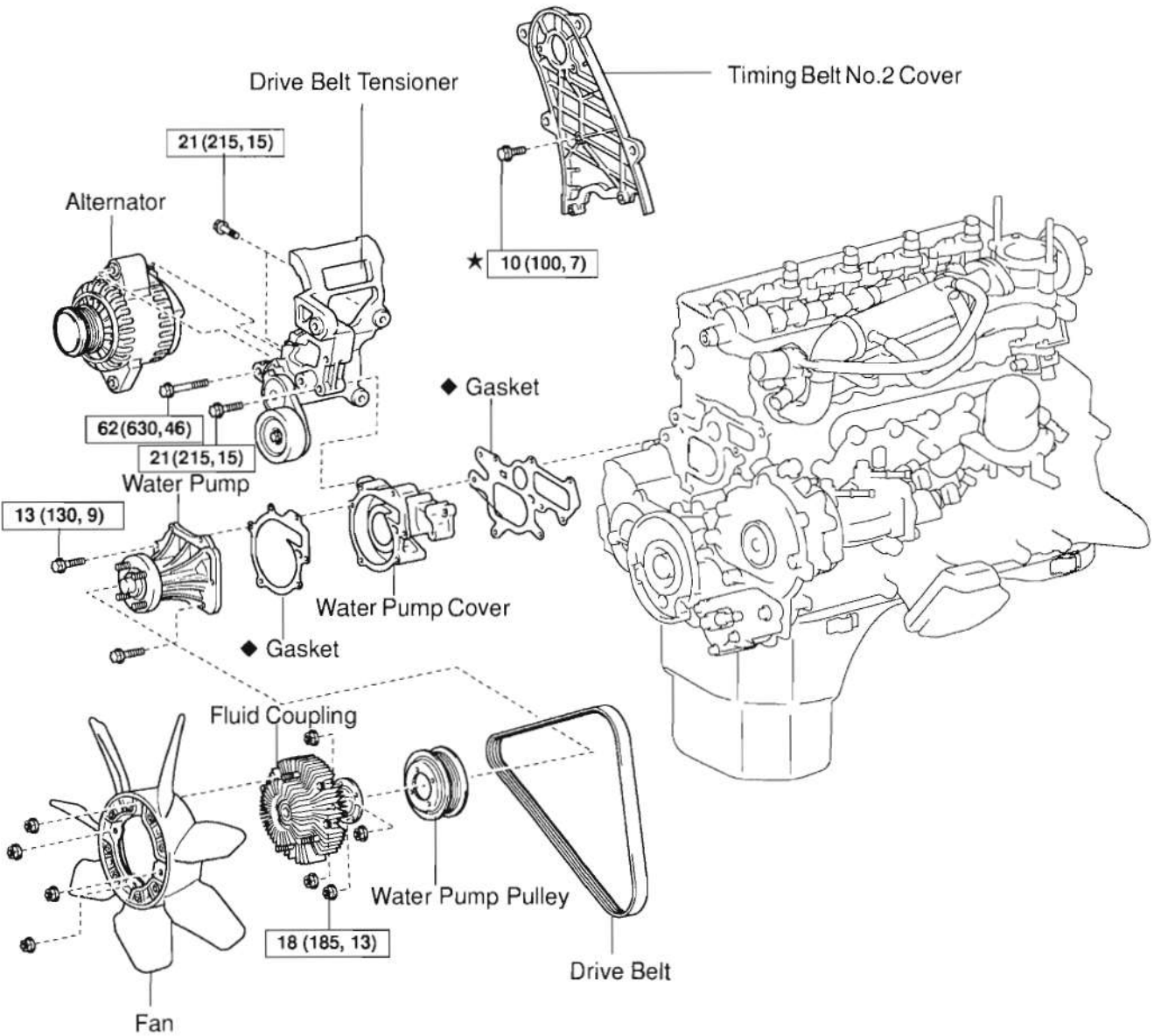
4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

WATER PUMP COMPONENTS

COOVL-03



CO

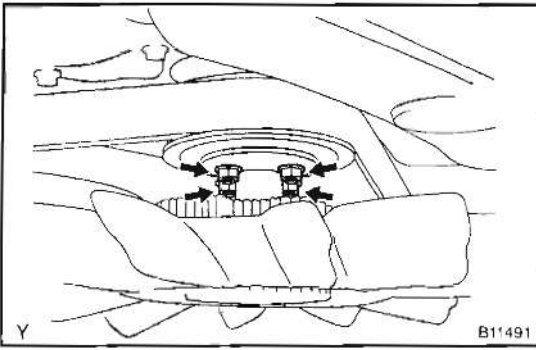


CO

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

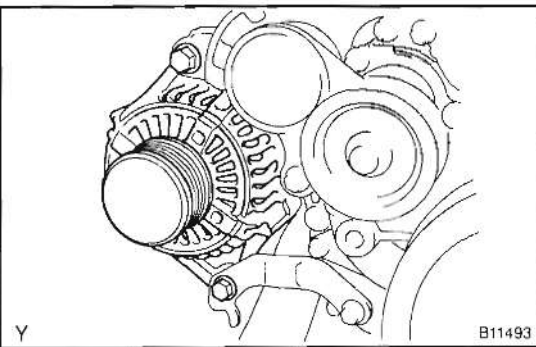
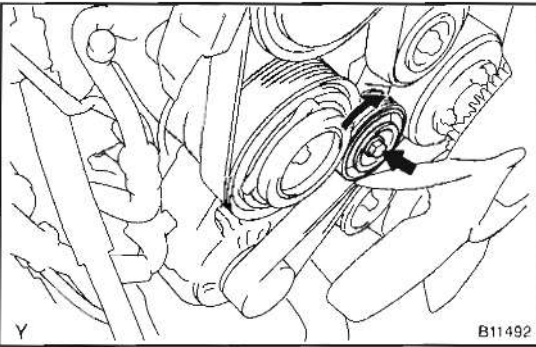
◆ Non-reusable part

★ Precoated part

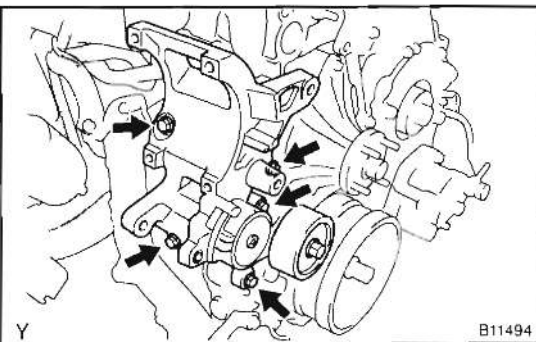


REMOVAL

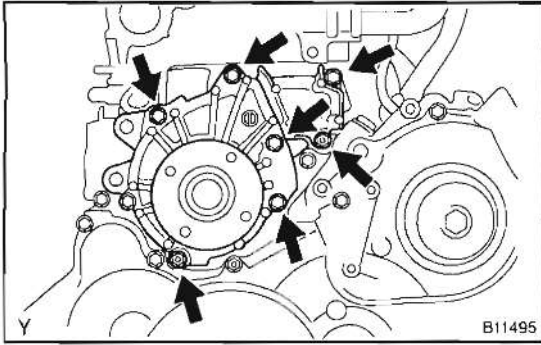
1. DRAIN ENGINE COOLANT
2. REMOVE DRIVE BELT, FAN AND WATER PUMP PULLEY
 - (a) Stretch the belt tight drive and loosen the 4 pump pulley set nuts.
 - (b) Turn the drive belt tensioner, and remove the drive belt.
 - (c) Remove the 4 nuts, fan and fluid coupling assembly and pulley.
3. REMOVE TIMING BELT AND IDLER PULLEY
(See page EM-11)
4. REMOVE NO.1 CAMSHAFT TIMING PULLEY
(See page EM-11)
5. REMOVE TIMING BELT NO. 2 COVER
(See page EM-21)
6. w/ A/C:
REMOVE A/C COMPRESSOR



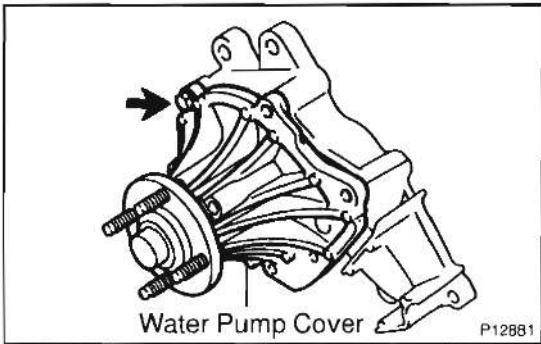
7. REMOVE ALTERNATOR AND DRIVE BELT TENSIONER
 - (a) Remove the 2 bolts and alternator.



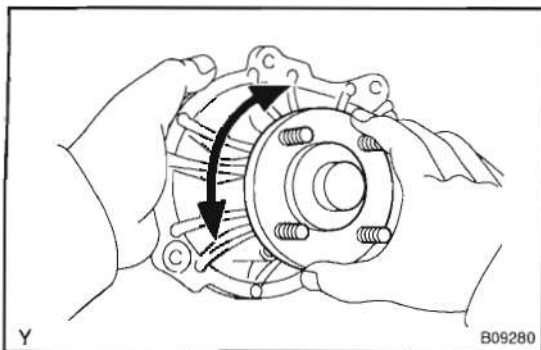
- (b) Remove the 5 bolts and drive belt tensioner.

**8. REMOVE WATER PUMP**

- (a) Remove the 5 bolts, 2 nuts, water pump and gasket.



- (b) Remove the bolt, water pump cover and gasket.

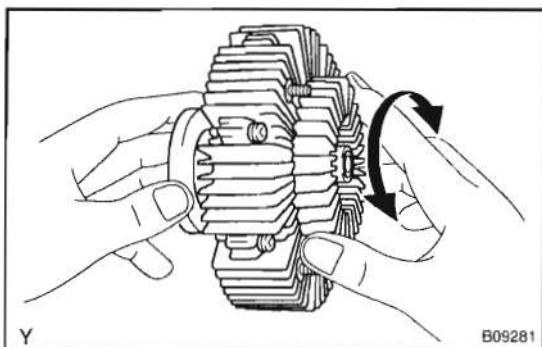


INSPECTION

1. INSPECT WATER PUMP

- (a) Visually check the 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.

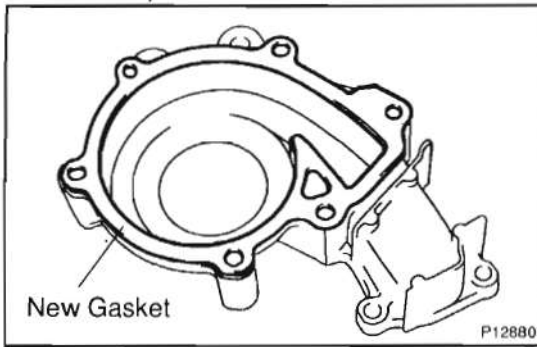
If necessary, replace the water pump.



2. INSPECT FLUID COUPLING

Check the fluid coupling for damage and silicon oil leakage.

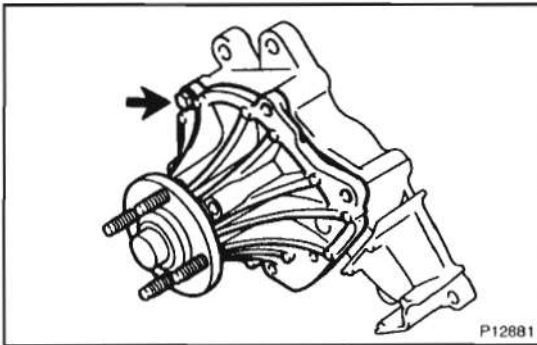
If necessary, replace the fluid coupling.



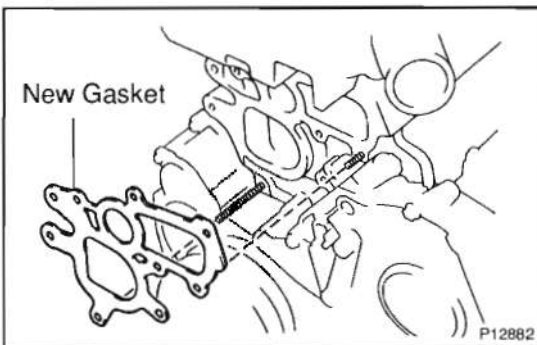
INSTALLATION

1. INSTALL WATER PUMP ASSEMBLY

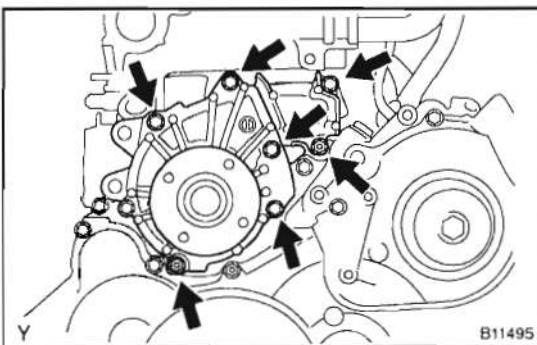
- (a) Install a new gasket to the water pump cover.



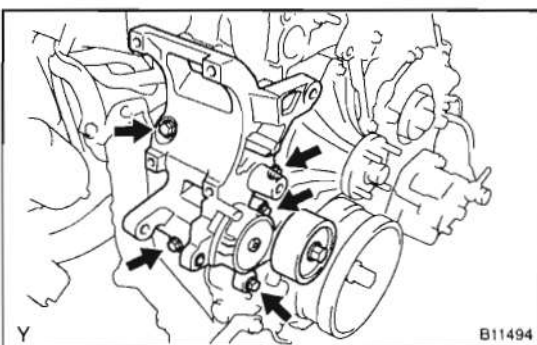
- (b) Temporarily install the water pump and water pump cover with the bolt.



- (c) Place a new gasket in position on the cylinder block.

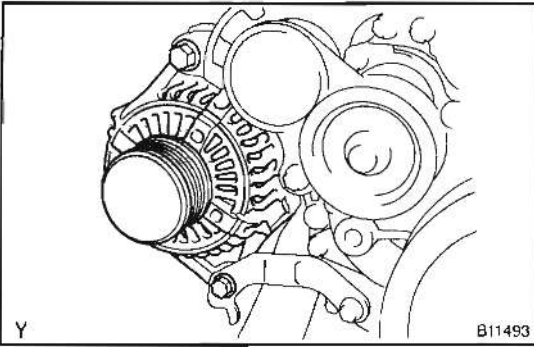


- (d) Temporarily install the water pump with the 5 bolts and 2 nuts.
- (e) Tighten the bolts and nuts.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



2. INSTALL DRIVE BELT TENSIONER AND ALTERNATOR

- (a) Install the drive belt tensioner with the 5 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



- (b) Install the alternator with the 2 bolts.

Torque:

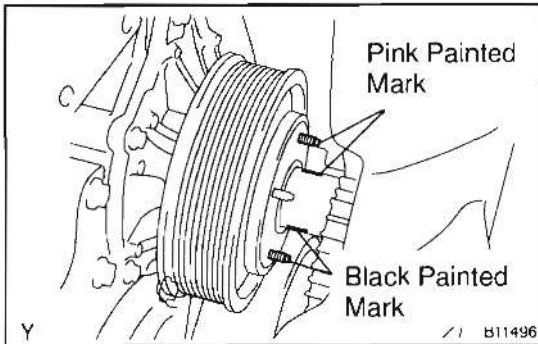
To Drive belt tensioner

62 N·m (630 kgf·cm, 46 ft·lbf)

To Alternator bracket

21 N·m (210 kgf·cm, 15 ft·lbf)

3. **INSTALL TIMING BELT NO. 2 COVER**
(See page EM-31)
4. **INSTALL NO.1 CAMSHAFT TIMING PULLEY**
(See page EM-16)
5. **INSTALL IDLER PULLEY AND TIMING BELT**
(See page EM-16)
6. **INSTALL WATER PUMP PULLEY, FAN AND DRIVE BELT**

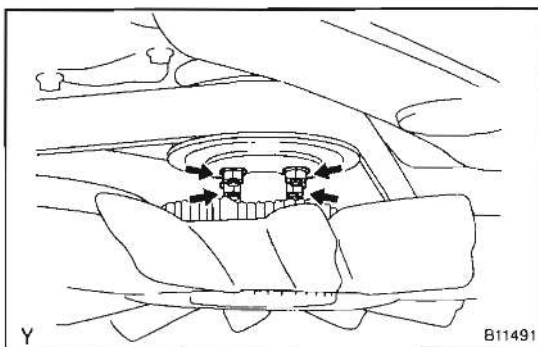


- (a) Install the pump pulley, the fluid, fan and coupling assembly with the 4 nuts. CO

HINT:

When installing the fluid coupling on the water pump, must install it by making the marking color of the bolt of the water pump and the marking color of the fluid coupling meet.

- (b) Install the drive belt tensioner.



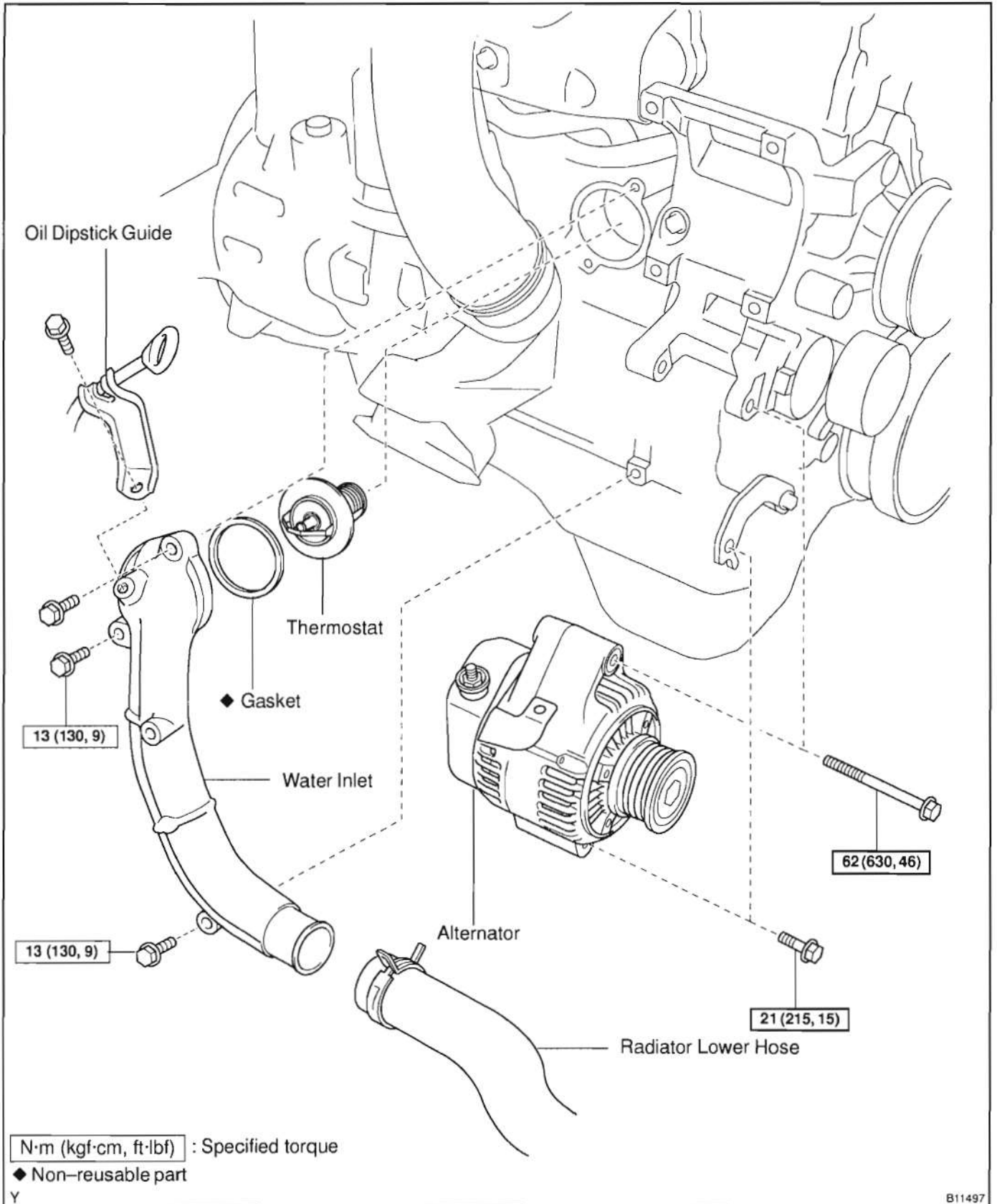
- (c) Stretch the belt tight and torque the 4 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

7. **FILL WITH ENGINE COOLANT**
8. **START ENGINE AND CHECK FOR COOLANT LEAKS**

THERMOSTAT COMPONENTS

CO69-03



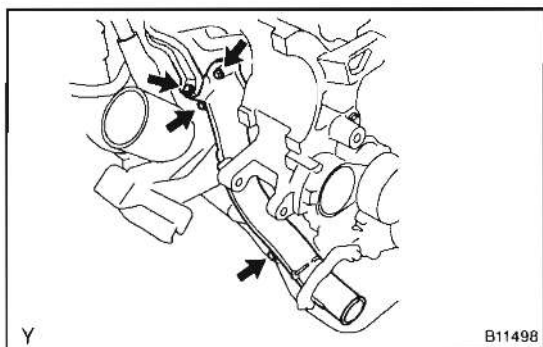
CO

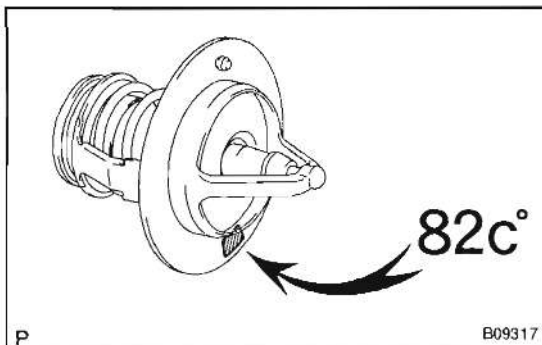
REMOVAL

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**
2. **DISCONNECT RADIATOR LOWER HOSE**
3. **REMOVE ALTERNATOR**
4. **REMOVE WATER INLET AND THERMOSTAT**
 - (a) Remove the bolt and oil dipstick guide.
 - (b) Remove the 3 bolts and water inlet from the cylinder block.
 - (c) Remove the thermostat.
 - (d) Remove the gasket from the thermostat.



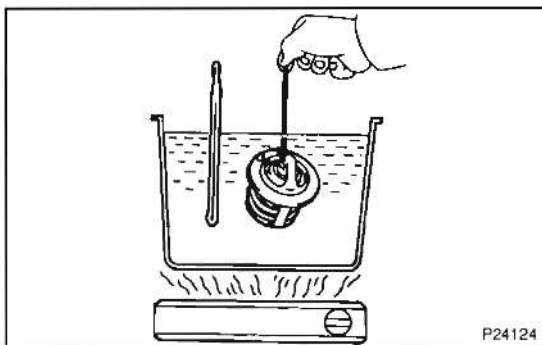


INSPECTION

INSPECT THERMOSTAT

HINT:

The thermostat is numbered with the valve opening temperature.

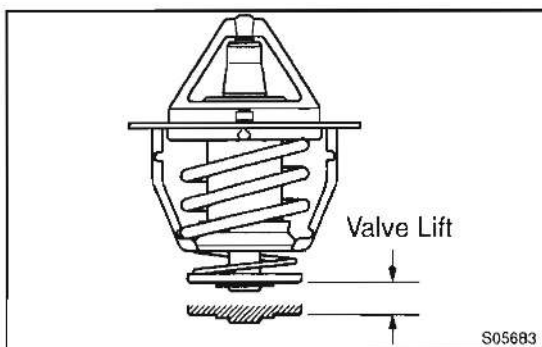


(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

Valve opening temperature: 80 – 84 °C (176 – 183 °F)

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



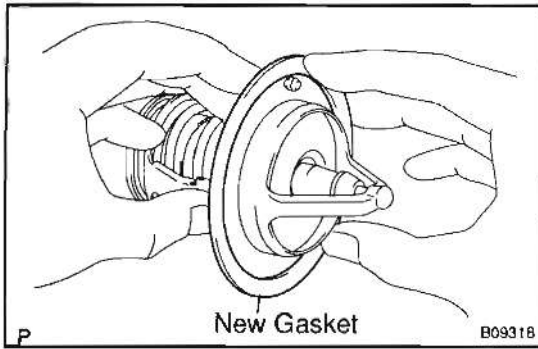
(c) Check the valve lift.

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 40 °C (104 °F)).

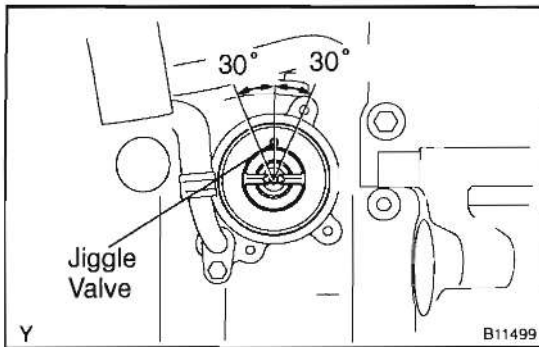
If not closed, replace the thermostat.



INSTALLATION

1. PLACE THERMOSTAT IN CYLINDER BLOCK

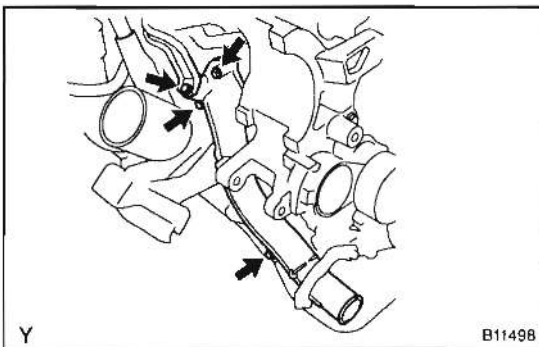
- (a) Install a new gasket to the thermostat.



- (b) Install the thermostat with the jiggle valve upward.

HINT:

The jiggle valve may be set within 30° of either side of the prescribed position.



2. INSTALL WATER INLET TO CYLINDER BLOCK

- (a) Install the water inlet with the 3 bolts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

NOTICE:

Torque the 2 upper bolts first.

- (b) Install the oil dipstick guide with the bolt.

3. CONNECT RADIATOR LOWER HOSE

4. INSTALL ALTERNATOR (See page CO-8)

5. FILL WITH ENGINE COOLANT

6. START ENGINE AND CHECK FOR COOLANT LEAKS

RADIATOR

ON-VEHICLE CLEANING

COOWO-01

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

NOTICE:

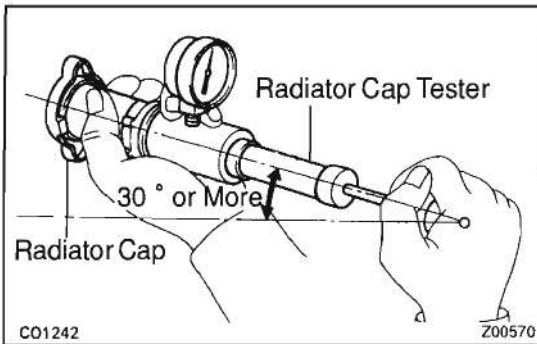
If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. (i.e. Maintain a distance between the cleaner nozzle and radiator core.)

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 still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR CAP

NOTICE:

- If the radiator 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 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:

93 – 123 kPa (0.95 – 1.25 kgf/cm², 13.5 – 17.8 psi)

Minimum opening pressure:

79 kPa (0.8 kgf/cm², 11.5 psi)

HINT:

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

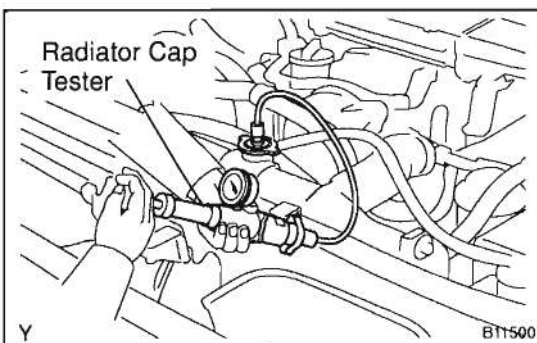
If the opening pressure is less than minimum, replace the radiator cap.

3. INSPECT COOLING SYSTEM FOR LEAKS

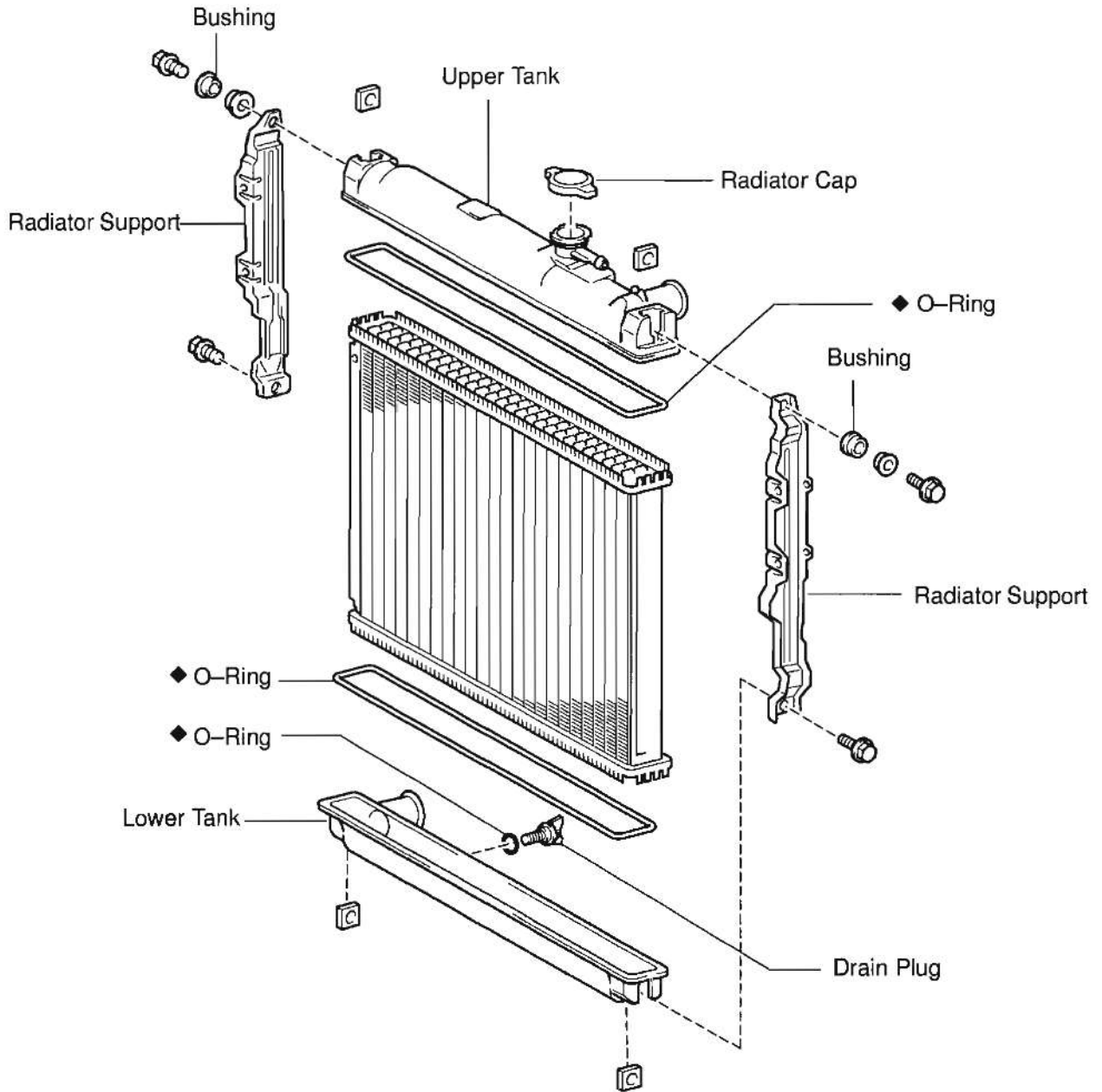
- (a) Fill the radiator with coolant, and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 118 kPa (1.2 kgf/cm², 17.1 psi), and check that the pressure does not drop.

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

4. REINSTALL RADIATOR CAP



COMPONENTS



◆ Non-reusable part

P

B09313

DISASSEMBLY

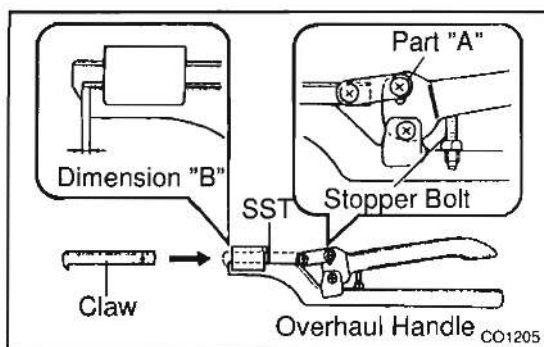
1. REMOVE RADIATOR SUPPORTS

Remove the 2 bolts, nuts, pipe, bushing and radiator support. Remove the LH and RH supports.

2. REMOVE RADIATOR CAP

3. REMOVE DRAIN PLUG

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



4. ASSEMBLE SST

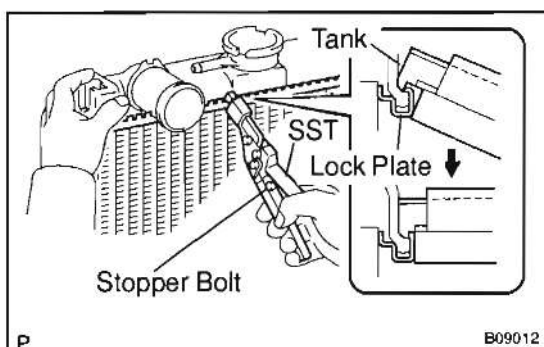
SST 09230-01010

- (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 bolt so that dimension "B" is as shown in the illustration.

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

NOTICE:

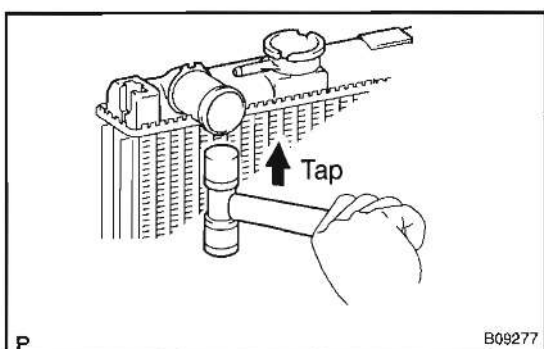
If this adjustment is not done the claw may be damaged.



5. UNCAULK LOCK PLATES

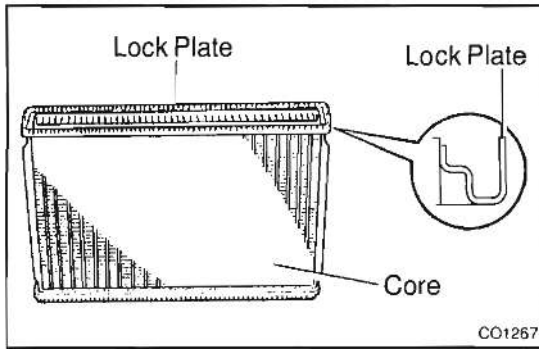
Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.

SST 09230-01010



6. REMOVE TANKS AND O-RINGS

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



REASSEMBLY

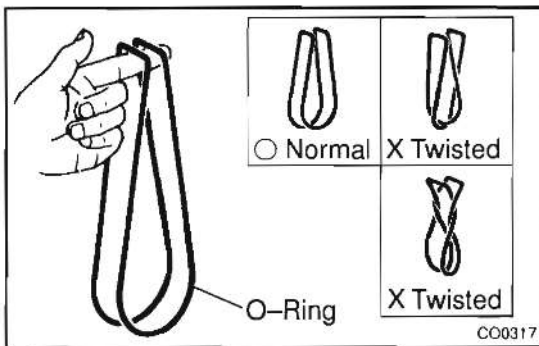
1. INSPECT LOCK PLATE FOR DAMAGE

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.

NOTICE:

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

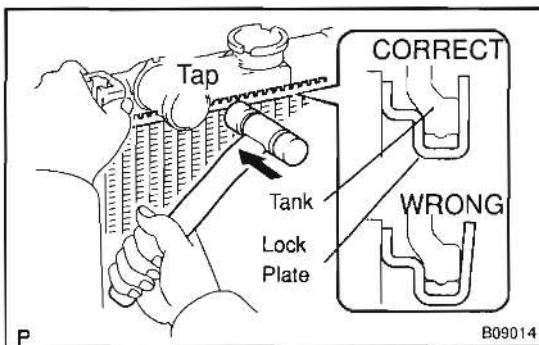


2. INSTALL NEW O-RINGS AND TANKS

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

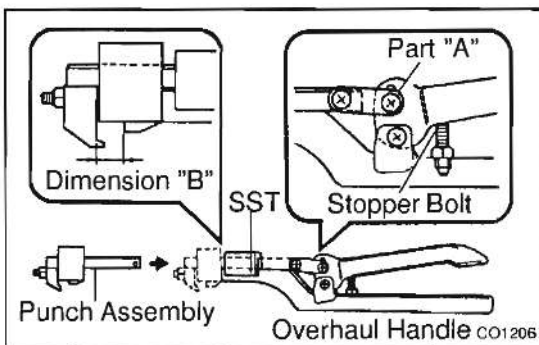
HINT:

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.

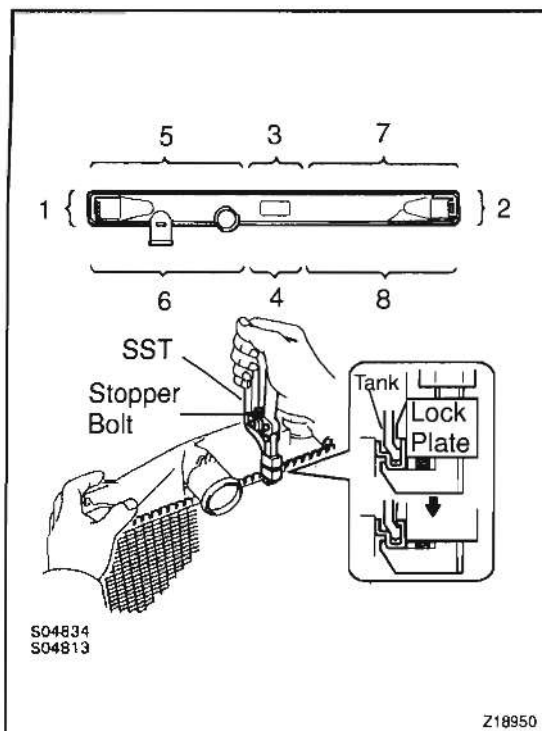


3. ASSEMBLE SST

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 "B": 8.4 mm (0.331 in.)



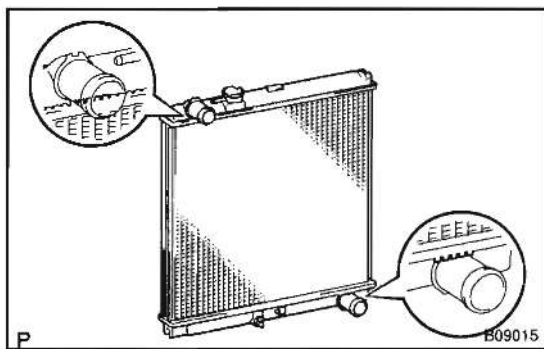
4. CAULK LOCK PLATE

- (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 bolt.

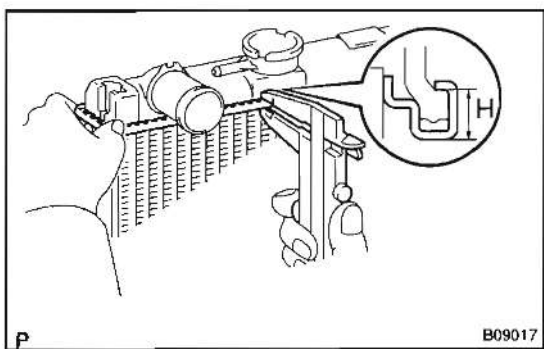
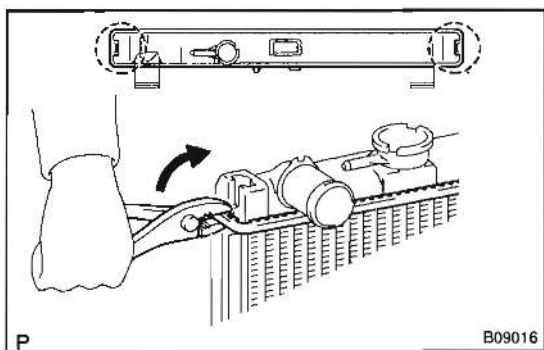
SST 09230-01010

HINT:

- Do not stake the areas protruding around the ports.



- The points shown in the rib sides near here cannot be staked with SST. Use pliers similar object and be careful not to damage the core plates.



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

Plate height (H):

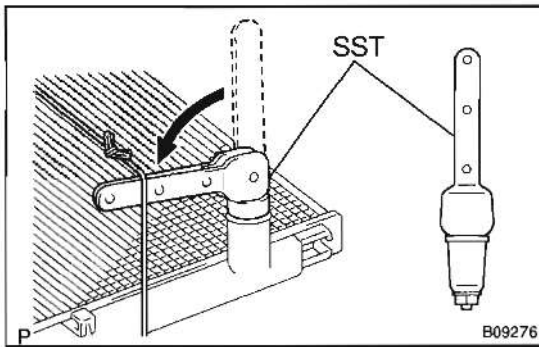
7.40 – 7.80 mm (0.2913 – 0.3071 in.)

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

5. INSTALL RADIATOR CAP

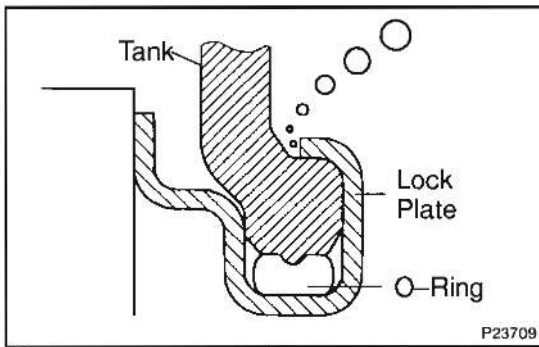
6. INSTALL DRAIN PLUG

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



7. CHECK FOR WATER LEAKS

- (a) Tighten the drain plug.
- (b) Using SST, plug the inlet and outlet pipes of the radiator.
SST 09230-01010
- (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure: 147 kPa (1.8 kgf/cm², 26 psi)
- (d) Submerge the radiator in water.



- (e) 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 an air leak 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.

8. INSTALL RADIATOR SUPPORTS

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

