

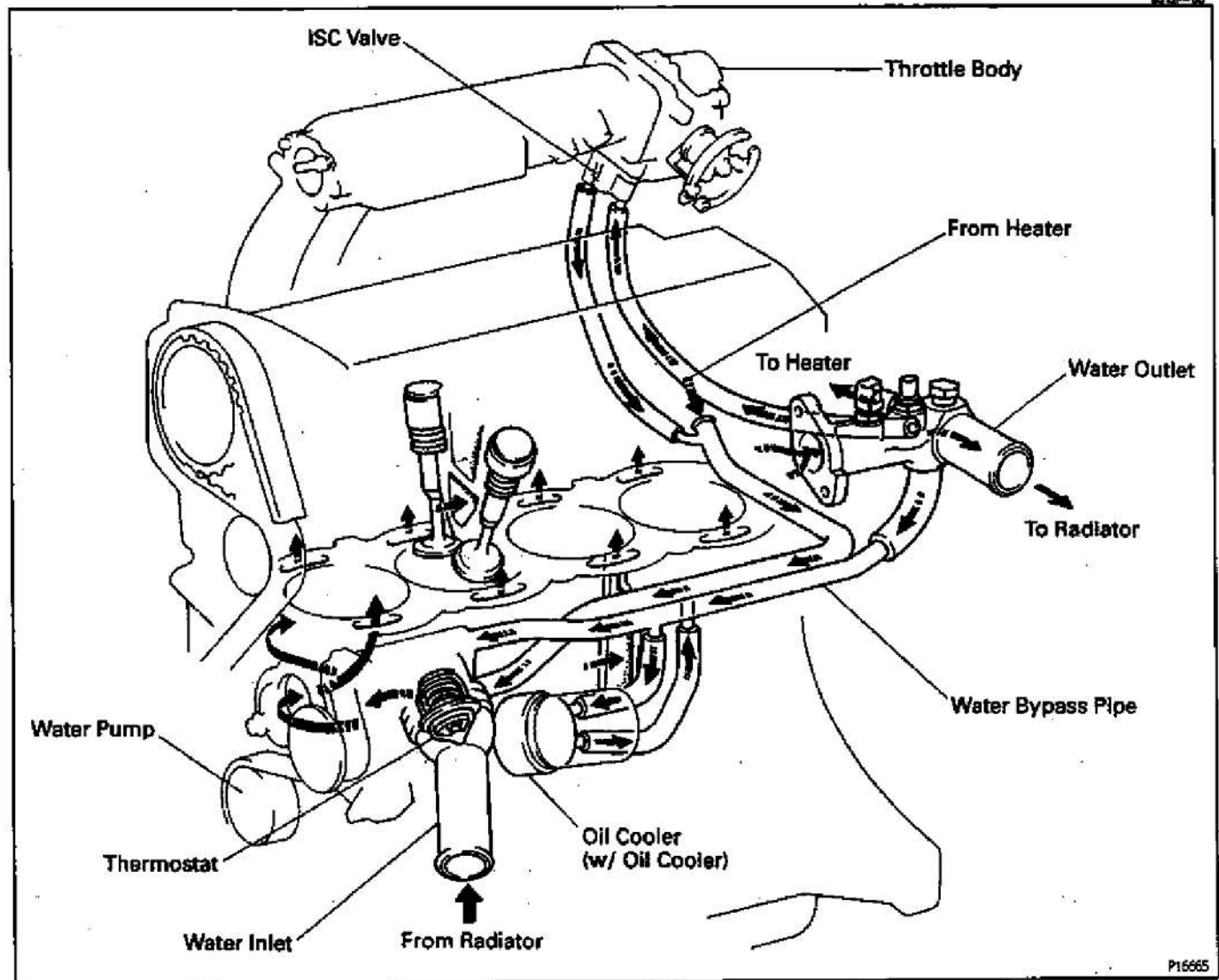
COOLING SYSTEM

DESCRIPTION

This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a bypass valve mounted on the inlet side. EG124-99

OPERATION

EG



P16665

The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.

Coolant which is heated in the water jacket is pumped to the radiator, through which the electric fan draws air to cool the coolant as it passes through. Coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.

The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders and combustion chambers which become heated during engine operation.

RADIATOR

The radiator performs the function of cooling the coolant which has passed through the water jacket and become hot, and it is mounted in the front of the vehicle. The radiator consists of an upper tank and lower tank, and a core which connects the two tanks. The upper tank contains the inlet for coolant from the water jacket and the filler inlet. It also has a hose attached through which excess coolant or steam can flow. The lower tank has an outlet and drain cock for the coolant. The core contains many tubes through which coolant flows from the upper tank to the lower tank as well as cooling fins which radiate heat away from the coolant in the tubes. The air drawn through the radiator by the electric fan, as well as the wind generated by the vehicle's travel, passes through the radiator, cooling the coolant. Models with automatic transmission include an automatic transmission fluid cooler built into the lower tank of the radiator. A fan with an electric motor is mounted behind the radiator to assist the flow of air through the radiator. The fan operates when the engine coolant temperature becomes high in order to prevent it from becoming too high.

RADIATOR CAP

The radiator cap is a pressure type cap which seals the radiator resulting in pressurization of the radiator as the coolant expands. The pressurization prevents the coolant from boiling even when the coolant temperature exceeds 100°C (212°F). A relief valve (pressurization valve) and a vacuum valve (negative pressure valve) are built into the radiator cap. The relief valve opens and lets steam escape through the overflow pipe when the pressure generated inside the cooling system exceeds the limit (coolant temperature: 110 – 120°C (230 – 248°F), pressure: 59 – 103 kPa (0.60 – 1.05 kgf/cm², 8.5 – 14.9 psi). The vacuum valve opens to alleviate the vacuum which develops in the coolant system after the engine is stopped and the coolant temperature drops. The valve's opening allows the coolant in the reservoir tank to return to the cooling system.

RADIATOR RESERVOIR

The reservoir is used to catch coolant which overflows the cooling system as a result of volumetric expansion when the coolant is heated. The coolant in the reservoir returns to the radiator when the coolant temperature drops, thus keeping the radiator full at all times and avoiding needless coolant loss.

Check the reservoir level to learn if the coolant needs to be replenished.

WATER PUMP

The water pump is used for forced circulation of coolant through the cooling system. It is mounted on the front of the cylinder block and driven by a timing belt.

THERMOSTAT

The thermostat has a wax type bypass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the coolant temperature. This valve closes when the coolant temperature drops, preventing the circulation of coolant through the engine and thus permitting the engine to warm up rapidly. The valve opens when the coolant temperature has risen, allowing the circulation of coolant. Wax inside the thermostat expands when heated and contracts when cooled. Heating the wax thus generates pressure which overpowers the force of the spring which keeps the valve closed, thus opening the valve. When the wax cools, its contraction allows the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 82°C (180°F).

PREPARATION**SST (SPECIAL SERVICE TOOLS)**

00133-04

	09230-01010 Radiator Service Tool Set	ST191
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RECOMMENDED TOOLS

00134-04

EG

	09082-00050 TOYOTA Electrical Tester Set	
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EQUIPMENT

00135-07

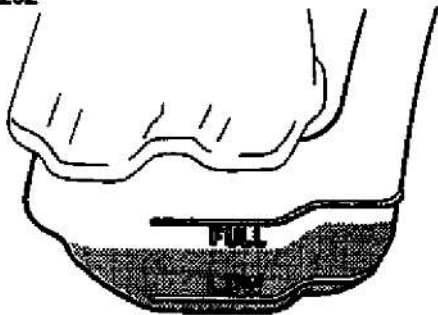
Heater	
Radiator cap tester	
Thermometer	
Torque wrench	

COOLANT

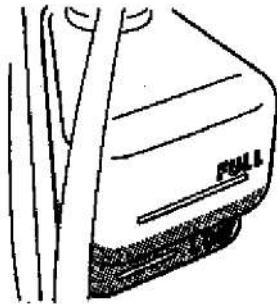
00136-00

Item	Capacity	Classification
Engine coolant (w/ Heater)		Ethylene—glycol base
ST202 M/T (w/ Oil cooler)	7.0 liters (7.4 US qts, 8.2 imp. qts)	
M/T (w/o Oil cooler)	6.5 liters (6.9 US qts, 5.7 imp. qts)	
A/T	6.9 liters (7.3 US qts, 6.1 imp. qts)	
ST191 M/T	6.6 liters (7.0 US qts, 5.8 imp. qts)	
A/T	7.0 liters (7.4 US qts, 6.2 imp. qts)	

ST202



ST191

P15424
P18855

Z11844

COOLANT CHECK

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

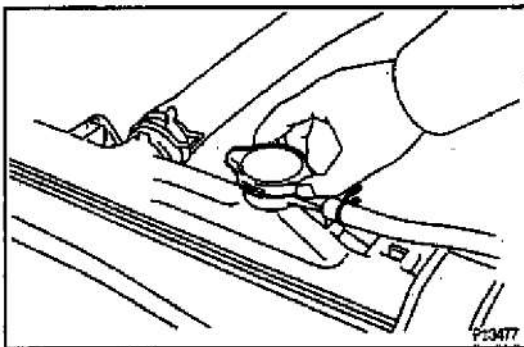
The engine coolant level should be between the "LOW" and "FULL" lines.

If low, check for leaks and add engine coolant up to the "FULL" line.

2. CHECK ENGINE COOLANT QUALITY

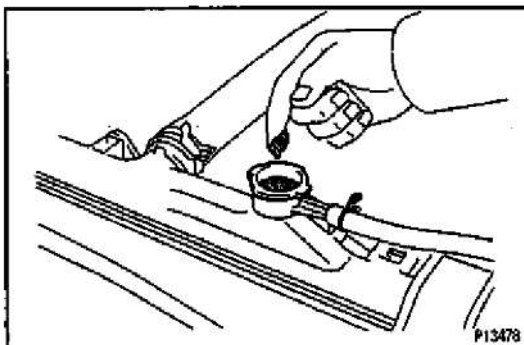
(a) Remove the radiator cap.

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.



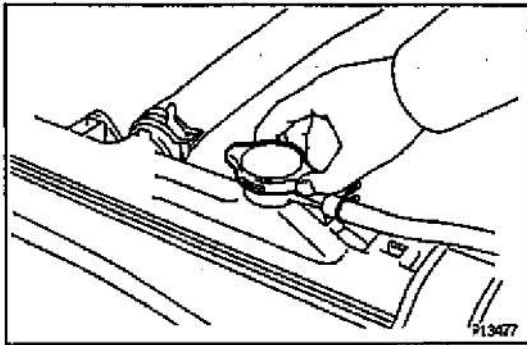
P13477

(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, replace the coolant.



P13478

(c) Reinstall the radiator cap.



COOLANT REPLACEMENT

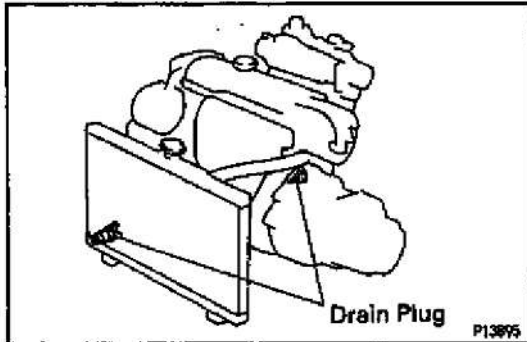
09221-04

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.

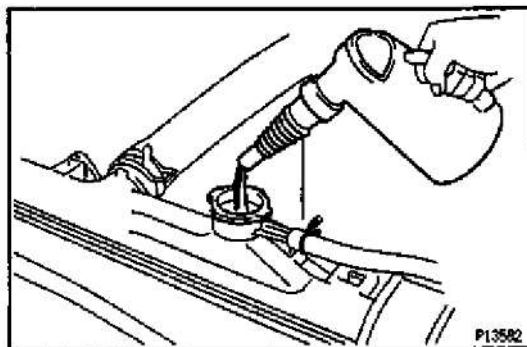
EG



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

Torque:

25 N·m (250 kgf·cm, 18 ft·lb) for engine



2. FILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.

- Use a good brand of ethylene—glycol base 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 (w/ Heater):

ST202

M/T (w/ Oil cooler)

7.0 liters (7.4 US qts, 6.2 imp. qts)

M/T (w/o Oil cooler)

6.5 liters (6.9 US qts, 5.7 imp. qts)

A/T

6.9 liters (7.3 US qts, 6.1 imp. qts)

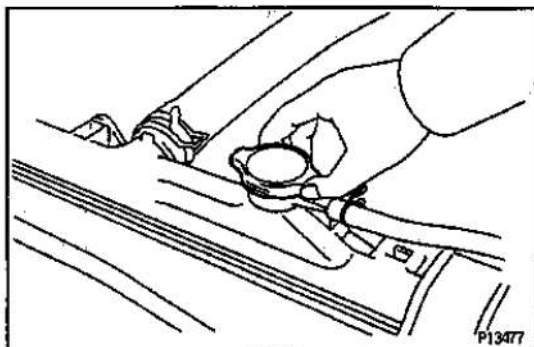
ST191

M/T

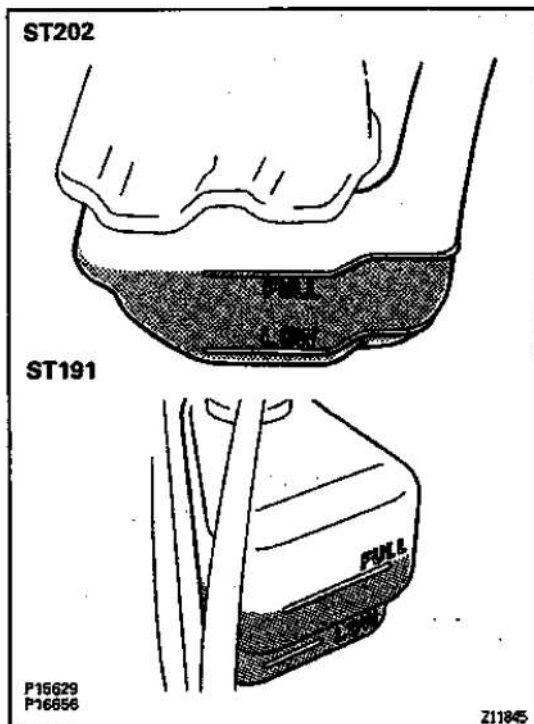
6.6 liters (7.0 US qts, 5.8 imp. qts)

A/T

7.0 liters (7.4 US qts, 6.2 imp. qts)



- (b) Install the radiator cap.
- (c) Start the engine, and bleed the cooling system.



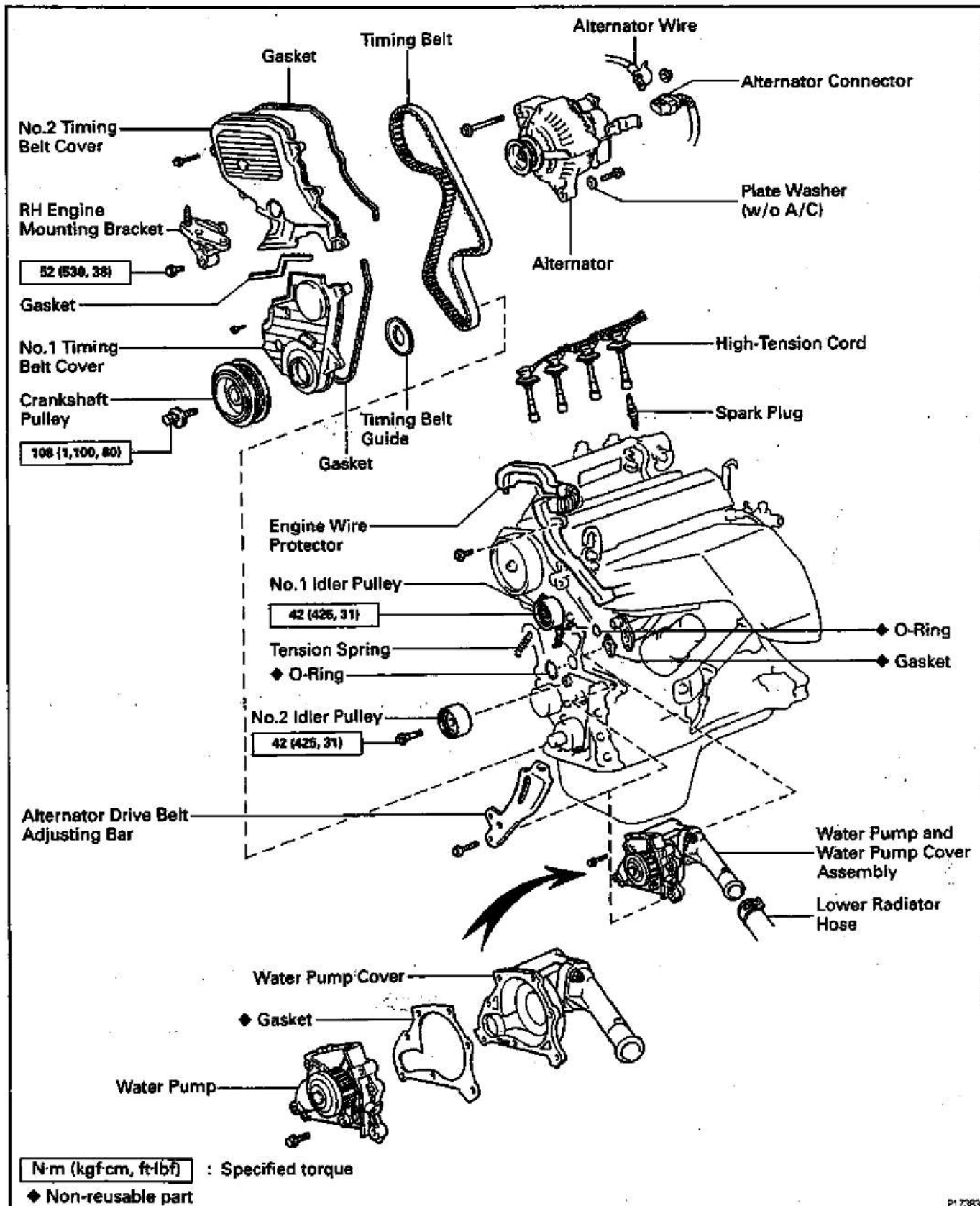
- (d) Refill the radiator reservoir with coolant until it reaches the "FULL" line.

3. CHECK ENGINE COOLANT FOR LEAKS

WATER PUMP COMPONENTS FOR REMOVAL AND INSTALLATION

EG301-01

EG



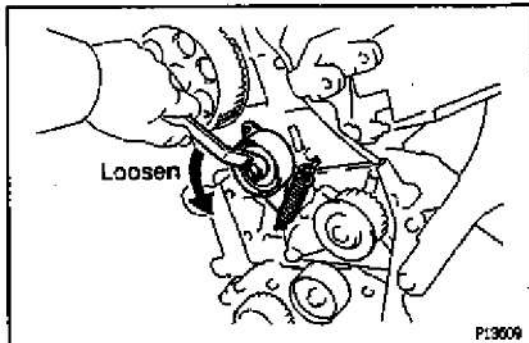
WATER PUMP REMOVAL

(See Components for Removal and Installation)

1. **DRAIN ENGINE COOLANT**
2. **REMOVE TIMING BELT**

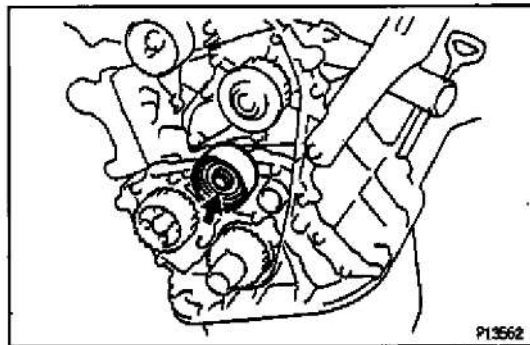
(See steps 1 to 6 and 8 to 11 on pages EG-35 to 40)

EG



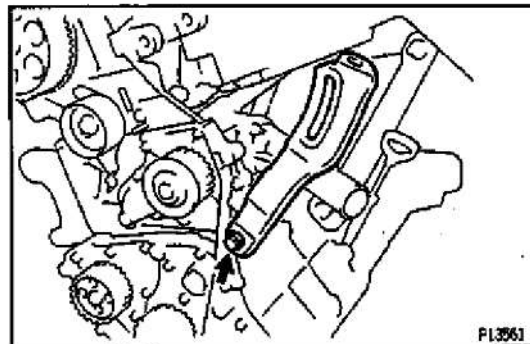
3. **REMOVE TIMING BELT TENSION SPRING**

Loosen the No.1 idler pulley bolt, and remove the tension spring.



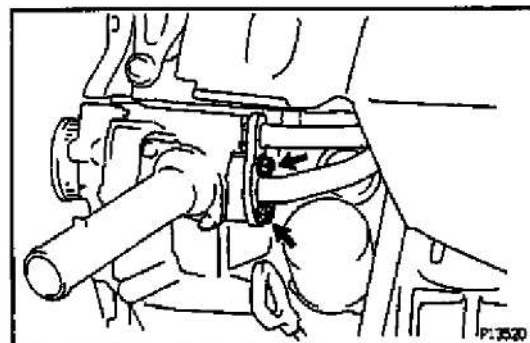
4. **REMOVE NO.2 IDLER PULLEY**

Remove the bolt and pulley.



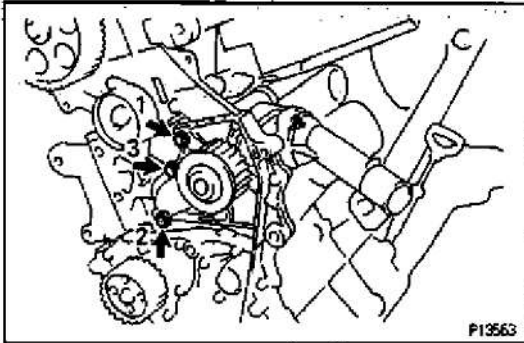
5. **REMOVE ALTERNATOR DRIVE BELT ADJUSTING BAR**

Remove the bolt and adjusting bar.

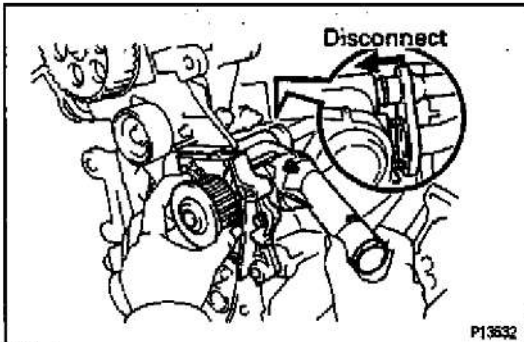


6. **REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY**

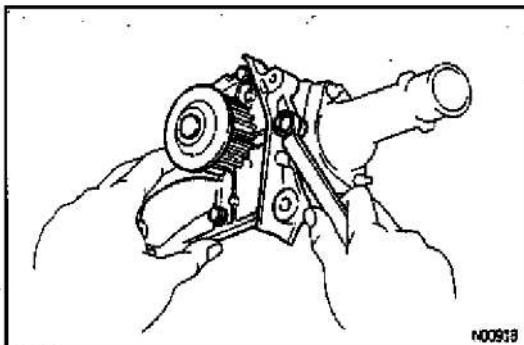
- (a) Remove the 2 nuts holding the water pump to the water bypass pipe.



- (b) Remove the 3 bolts in the sequence shown.

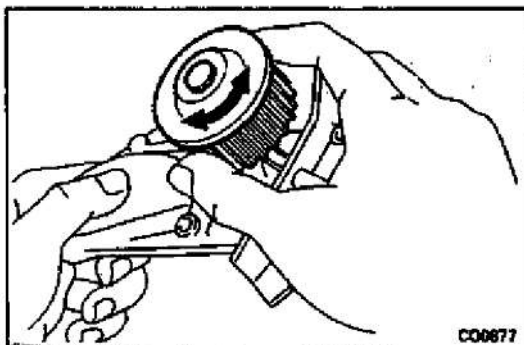


- (c) Disconnect the water pump cover from the water bypass pipe, and remove the water pump and water pump cover assembly.
 (d) Remove the gasket and 2 O-rings from the water pump and water bypass pipe.



7. REMOVE WATER PUMP FROM WATER PUMP COVER

Remove the 3 bolts, water pump and gasket.

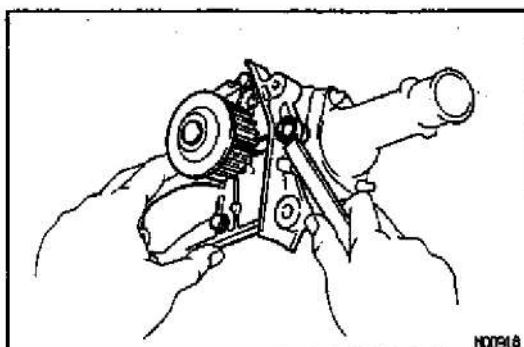


WATER PUMP INSPECTION

BSHA-97

INSPECT WATER PUMP

Turn the pulley and check that the water pump bearing moves smoothly and quietly.



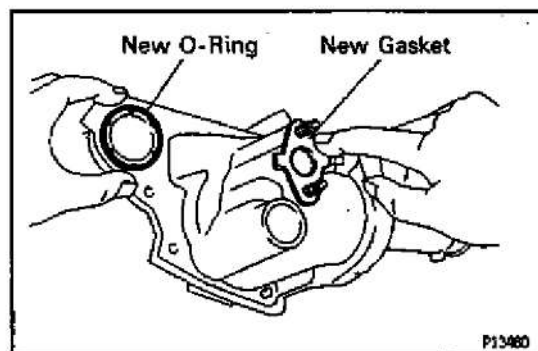
WATER PUMP INSTALLATION

BSHA-02

(See Components for Removal and Installation)

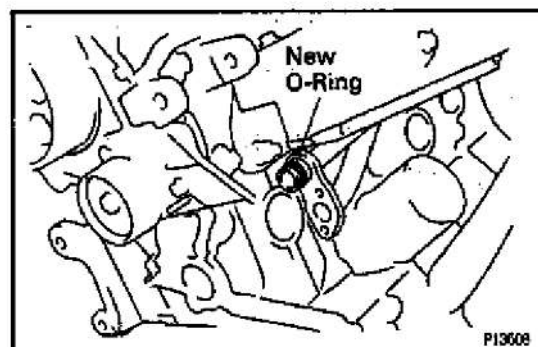
- 1. INSTALL WATER PUMP TO WATER PUMP COVER**
 Install a new gasket and the water pump with the 3 bolts.

Torque: 8.8 N-m (90 kgf-cm, 78 in.-lbf)

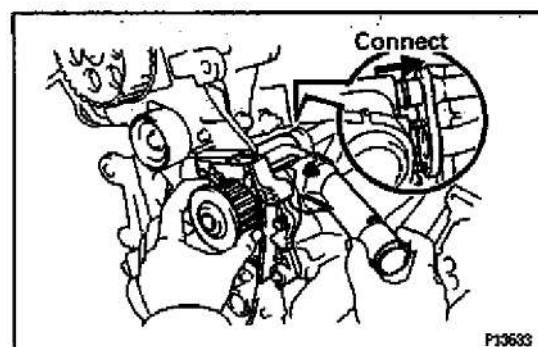


2. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

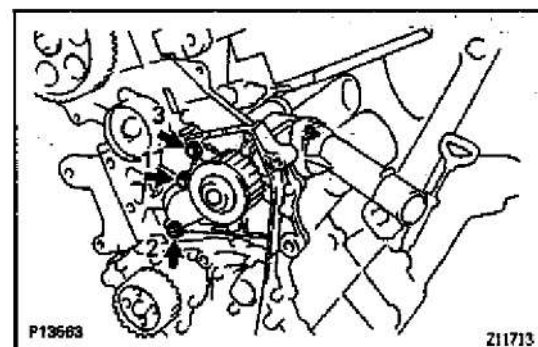
- (a) Install new O-ring and gasket to water pump cover.



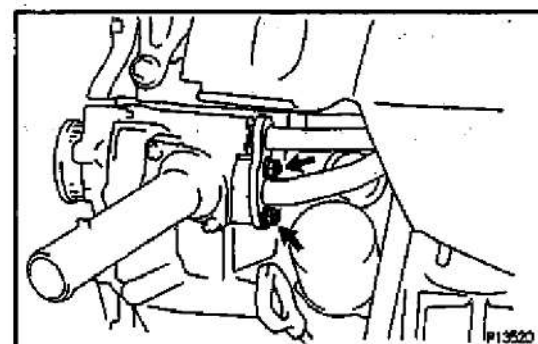
- (b) Install a new O-ring to the water bypass pipe.
 (c) Apply soapy water to the O-ring on the water bypass pipe.



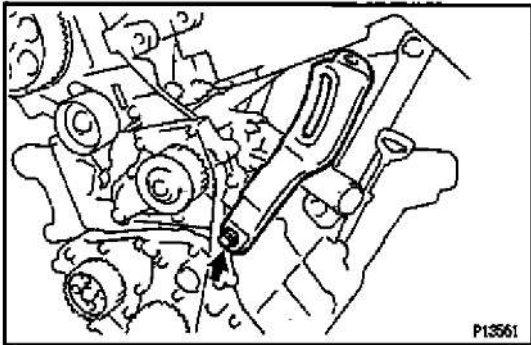
- (d) Connect the water pump cover to the water bypass pipe. Do not install the nuts yet.



- (e) Install the water pump with the 3 bolts. Tighten the bolts in the sequence shown.
 Torque: 8.8 N·m (90 kgf·cm, 78 in.-lbf)

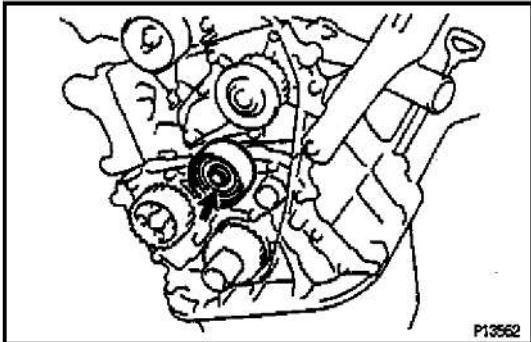


- (f) Install the 2 nuts holding the water pump cover to the water bypass pipe.
 Torque: 9.3 N·m (95 kgf·cm, 82 in.-lbf)

**3. INSTALL ALTERNATOR DRIVE BELT ADJUSTING BAR**

Install the adjusting bar with the bolt.

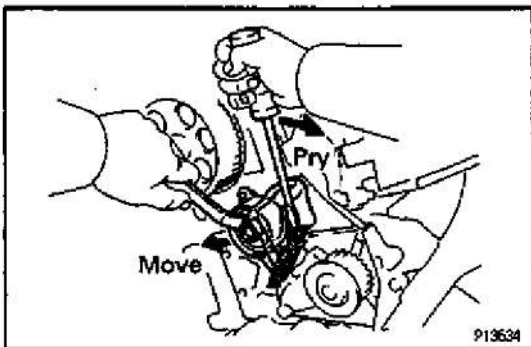
Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

**4. INSTALL NO.2 IDLER PULLEY**

(a) Install the pulley with the bolt.

Torque: 42 N·m (425 kgf·cm, 31 ft·lbf)

(b) Check that the idler pulley moves smoothly.

**5. INSTALL TIMING BELT TENSION SPRING**

(a) Install the tension spring.

(b) Pry the No.1 pulley toward the left as far as it will go, and tighten the pulley bolt.

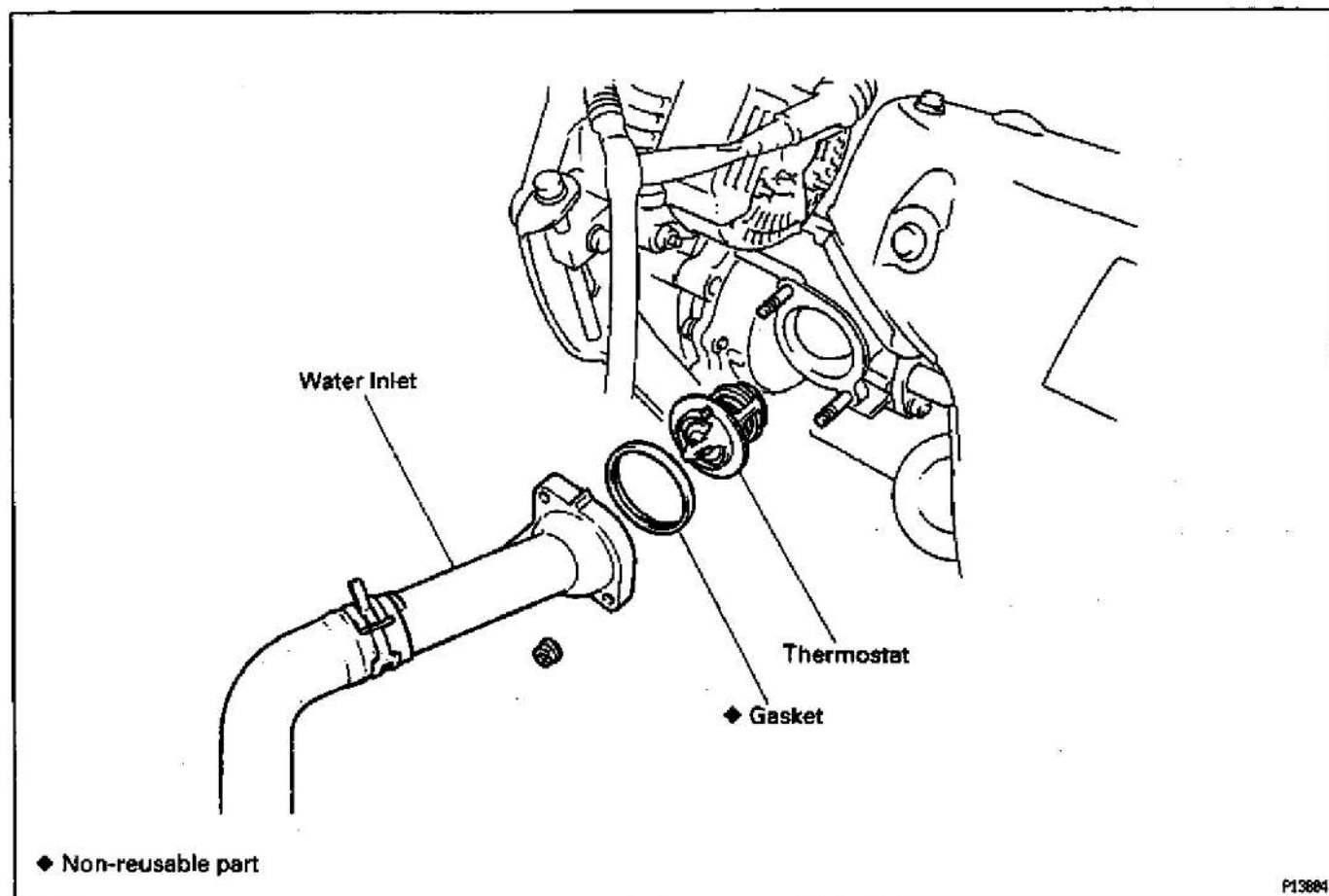
6. INSTALL TIMING BELT

(See steps 5 to 8 and 10 to 16 on pages EG-44 to 49)

7. FILL RADIATOR WITH ENGINE COOLANT

THERMOSTAT COMPONENTS FOR REMOVAL AND INSTALLATION

B0110-00



THERMOSTAT REMOVAL

B0090-01

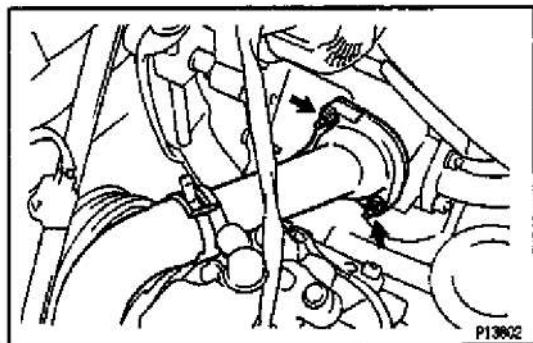
(See Components for Removal and Installation)

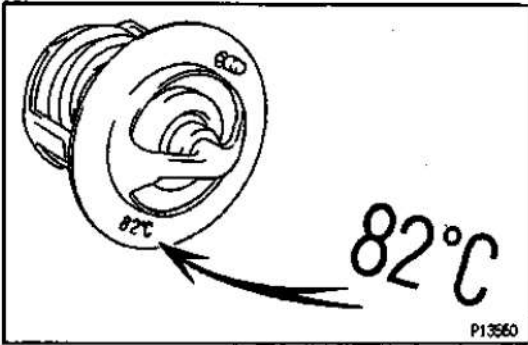
HINT: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT

2. REMOVE WATER INLET AND THERMOSTAT

- Remove the 2 nuts, and disconnect the water inlet from the water pump cover.
- Remove the thermostat.
- Remove the gasket from the thermostat.



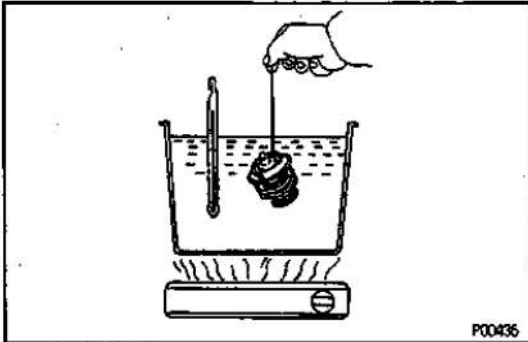


THERMOSTAT INSPECTION

INSPECT THERMOSTAT

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

EG



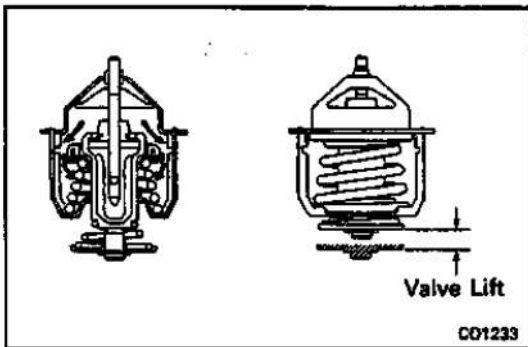
- (a) Immerse the thermostat in water and gradually heat the water.

- (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.

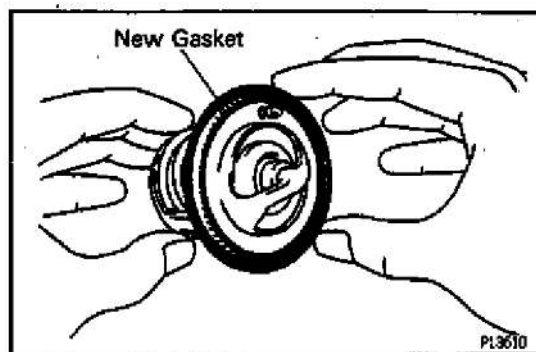
Valve lift:

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.

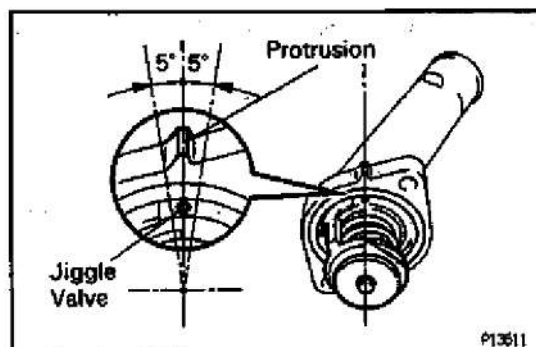


THERMOSTAT INSTALLATION

(See Components for Removal and Installation)

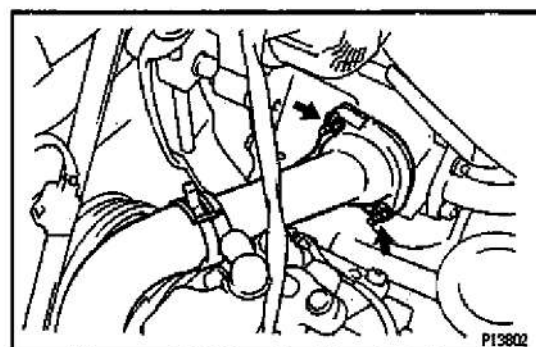
1. PLACE THERMOSTAT IN WATER PUMP

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



- (b) Align the jiggle valve of the thermostat with the protrusion of the water inlet, and insert the thermostat in the water inlet.

HINT: The jiggle valve may be set within 5° of either side of the prescribed position.



2. INSTALL WATER INLET AND THERMOSTAT

Install the water inlet and thermostat with the 2 nuts.

Torque: 8.8 N·m (90 kgf·cm, 78 in.-lbf)

3. FILL RADIATOR WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR LEAKS

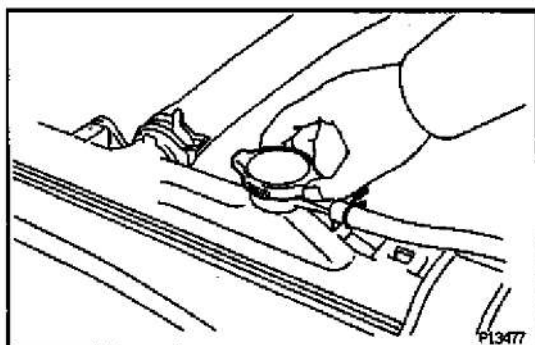
RADIATOR RADIATOR CLEANING

EGEP-03

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. If the cleaner nozzle pressure is 2,942 — 3,432 kPa (30 — 35 kgf/cm², 427 — 498 psi), keep a distance of at least 40 — 50 cm (15.75 — 19.69 in.) between the radiator core and cleaner nozzle.

EG

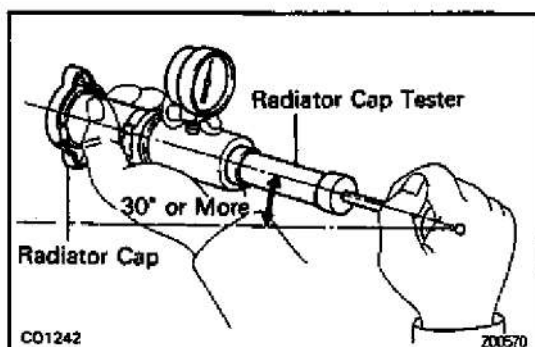


P13477

RADIATOR 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: When performing steps (a) and (b) below, keep the radiator pump 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 relief valve.

Pump speed:

1 push/3 seconds or more

NOTICE: Push the pump at a constant speed.

If air is not coming from the relief valve, replace the radiator cap.

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

Pump speed:

1st time

1 push/1 second or less

2nd time or more

Any speed

Standard opening pressure:

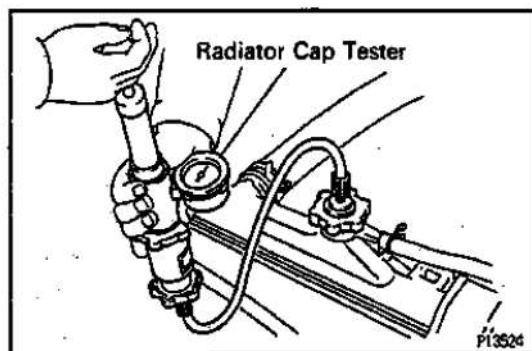
74 — 103 kPa

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

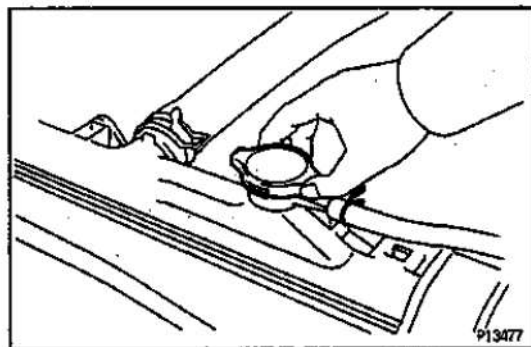
Minimum opening pressure:

59 kPa (0.6 kgf/cm², 8.5 psi)

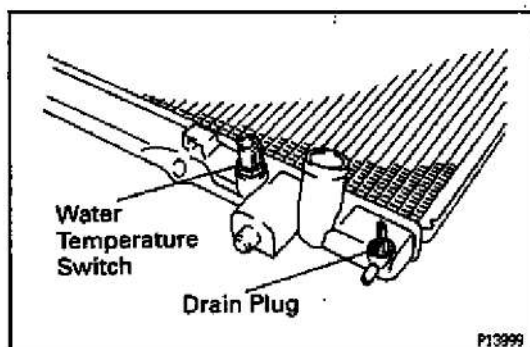
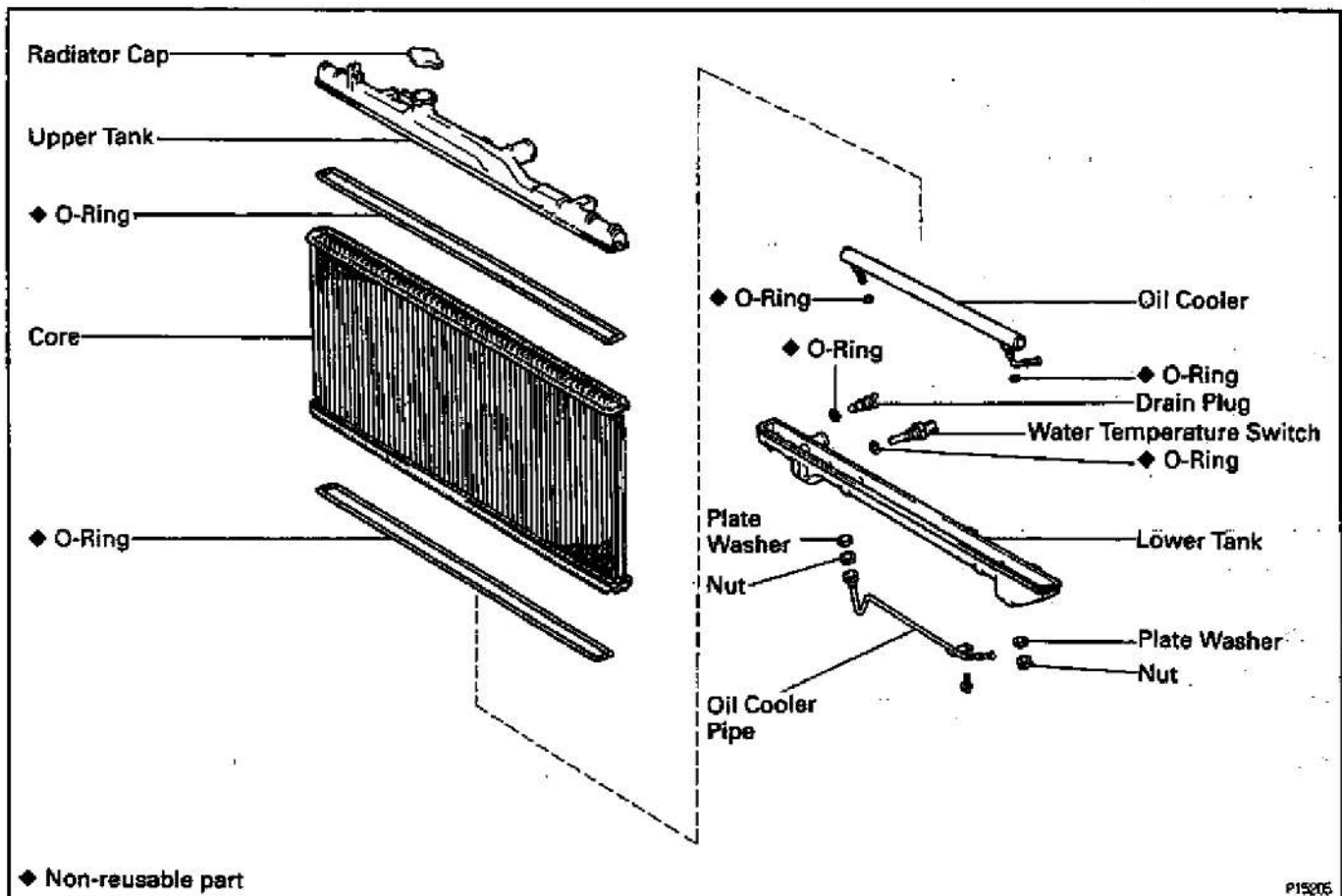
If the opening pressure is less than minimum, replace the radiator cap.

**3. INSPECT COOLING SYSTEM FOR LEAKS**

- (a) Fill the radiator with coolant and attach a radiator cap tester to the water filler.
- (b) Warm up the engine.
- (c) Pressurise the radiator 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 FOR DISASSEMBLY AND ASSEMBLY (ST191 only)



RADIATOR DISASSEMBLY (ST191 only)

(See Components for Disassembly and Assembly)

1. REMOVE WATER TEMPERATURE SWITCH

- Remove the water temperature switch.
- Remove the O-ring.

2. REMOVE DRAIN PLUG

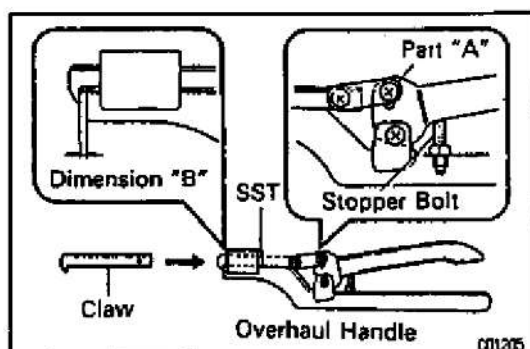
- Remove the drain plug.
- Remove the O-ring.

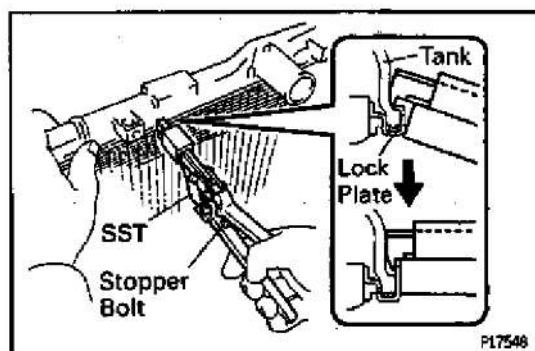
3. ASSEMBLY OF SST

SST 09230-01010

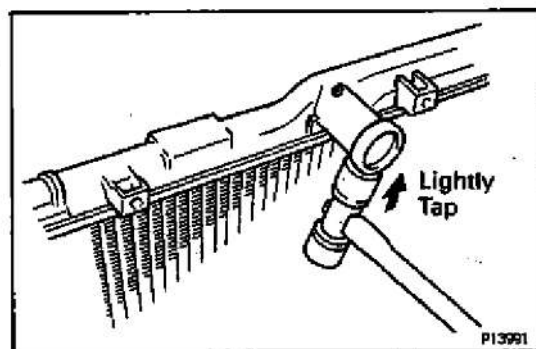
- Install the claw to the overhaul handle, inserting it in the hole in part "A" as shown in the diagram.
- While gripping the handle, adjust the stopper bolt so that dimension "B" shown in the diagram is 0.2–0.5 mm (0.008–0.020 in.).

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

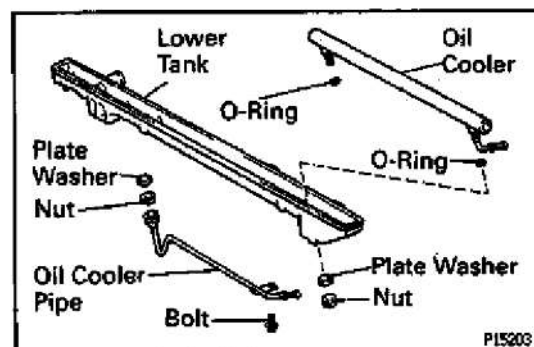


**4. UNCAULK LOCK PLATES**

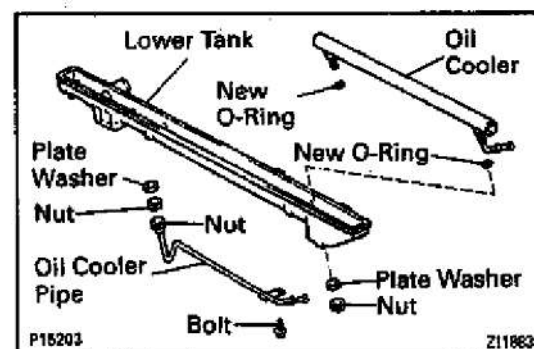
Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.
SST 09230-01010

**5. REMOVE TANKS AND O-RINGS**

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

**6. A/T:****REMOVE OIL COOLER FROM LOWER TANK**

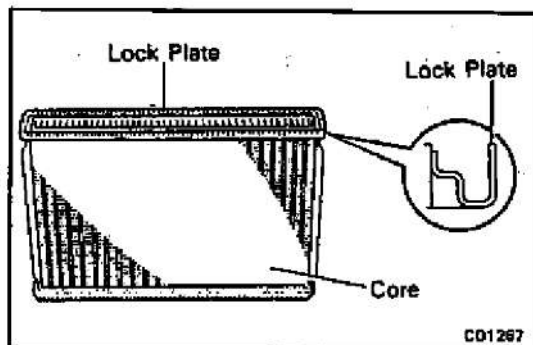
- (a) Loosen the nut, and remove the bolt and oil cooler pipe.
- (b) Remove the 2 nuts and plate washers.
- (c) Remove the oil cooler and 2 O-rings.

**RADIATOR ASSEMBLY (ST191 only)**

(See Components for Disassembly and Assembly)

1. A/T:**INSTALL OIL COOLER TO LOWER TANK**

- (a) Clean the O-ring contact surface of the lower tank and oil cooler.
- (b) Install 2 new O-rings to the oil cooler.
- (c) Install the oil cooler with the O-rings to the lower tank.
- (d) Install the 2 plate washers and nuts.
Torque: 8.3 N·m (85 kgf·cm, 74 in.-lbf)
- (e) Install the cooler pipe with the nut and bolt.
Torque: 14.7 N·m (150 kgf·cm, 11 ft-lbf) for nut



2. INSPECT LOCK PLATE

Inspect the lock plate for damage.

HINT:

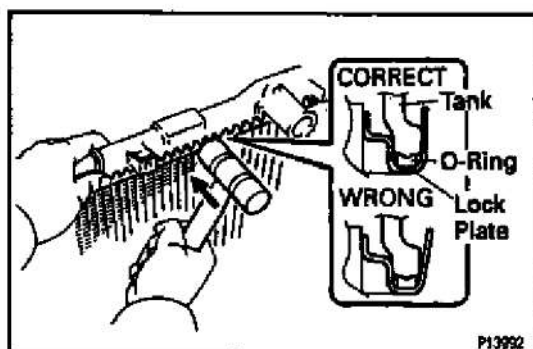
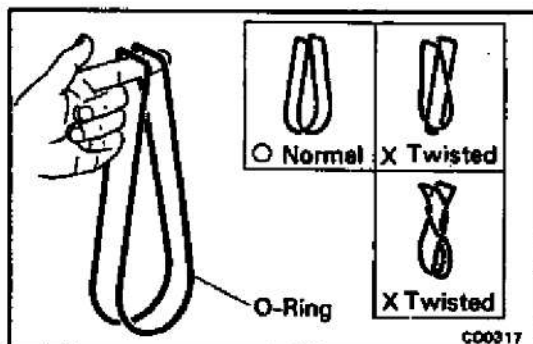
- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible.
- Therefore, first correct any deformation with pliers or similar object. Water leakage will result if the bottom of the lock plate groove is damaged or dented. Therefore, repair or replace if necessary.

EG

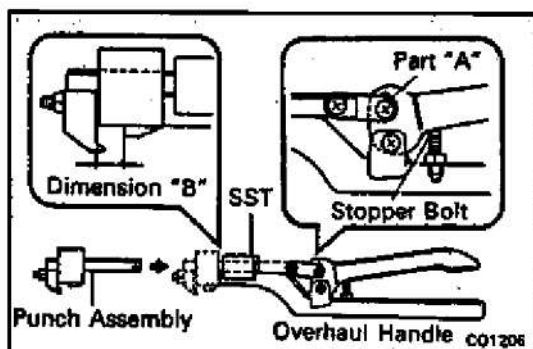
3. INSTALL NEW O-RINGS AND TANKS

- (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.



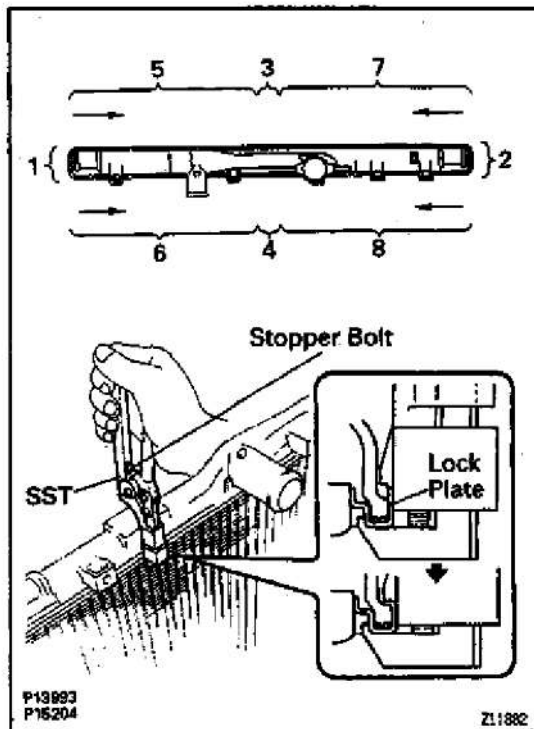
- (b) Install the tank without damaging the O-ring.
- (c) Tap the lock plate with a soft-faced hammer so that there is no gap between it and the tank.



4. ASSEMBLY OF SST

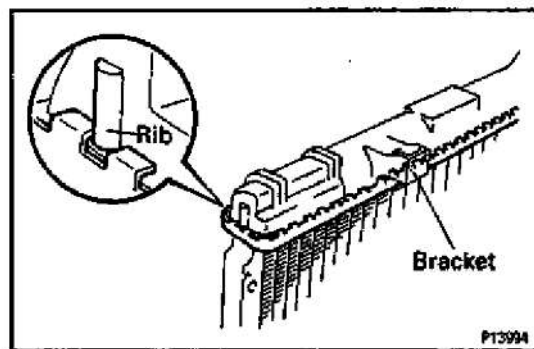
SST 09230-01010

- (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 (0.30 in.).



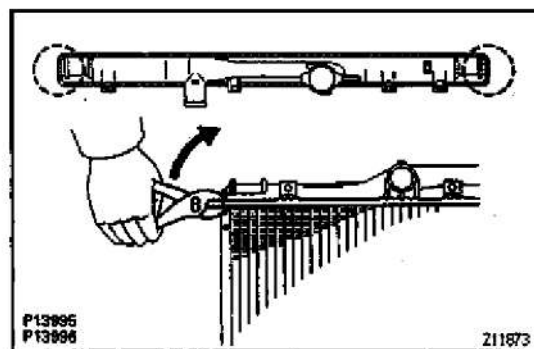
5. CAULK LOCK PLATE

- (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

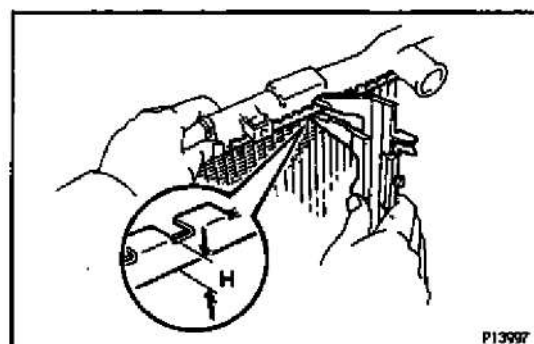


HINT:

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



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

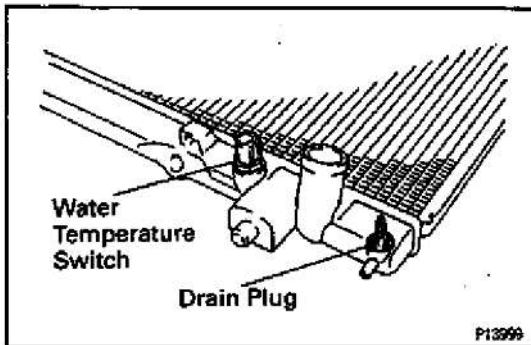


- (b) Check the lock plate height (H) after completing the caulking.

Plate height:

7.75 — 8.25 mm (0.3051 — 0.3248 in.)

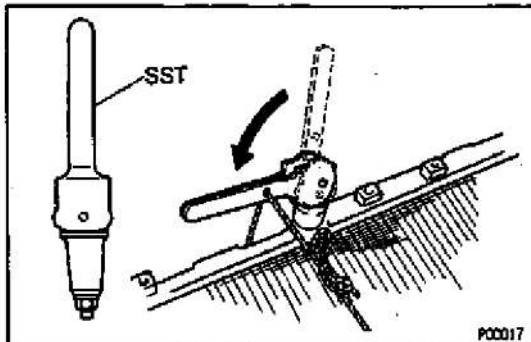
If not within the specified height, adjust the stopper bolt of the handle again and perform the caulking again.

**6. INSTALL WATER TEMPERATURE SWITCH**

- (a) Install a new O—ring to the water temperature switch.
- (b) Install the water temperature switch.

7. INSTALL DRAIN PLUG

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

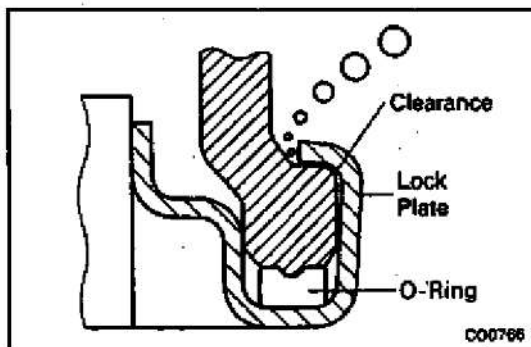
**8. INSPECT FOR WATER LEAKS**

- (a) Tighten the drain plug.
- (b) Plug the inlet and outlet pipes of the radiator with SST.

SST 09230—01010

- (c) Using a radiator cap tester, apply pressure to the radiator.

Test pressure: 177 kPa (1.8 kgf/cm², 26 psi)



- (d) Inspect for water leaks.

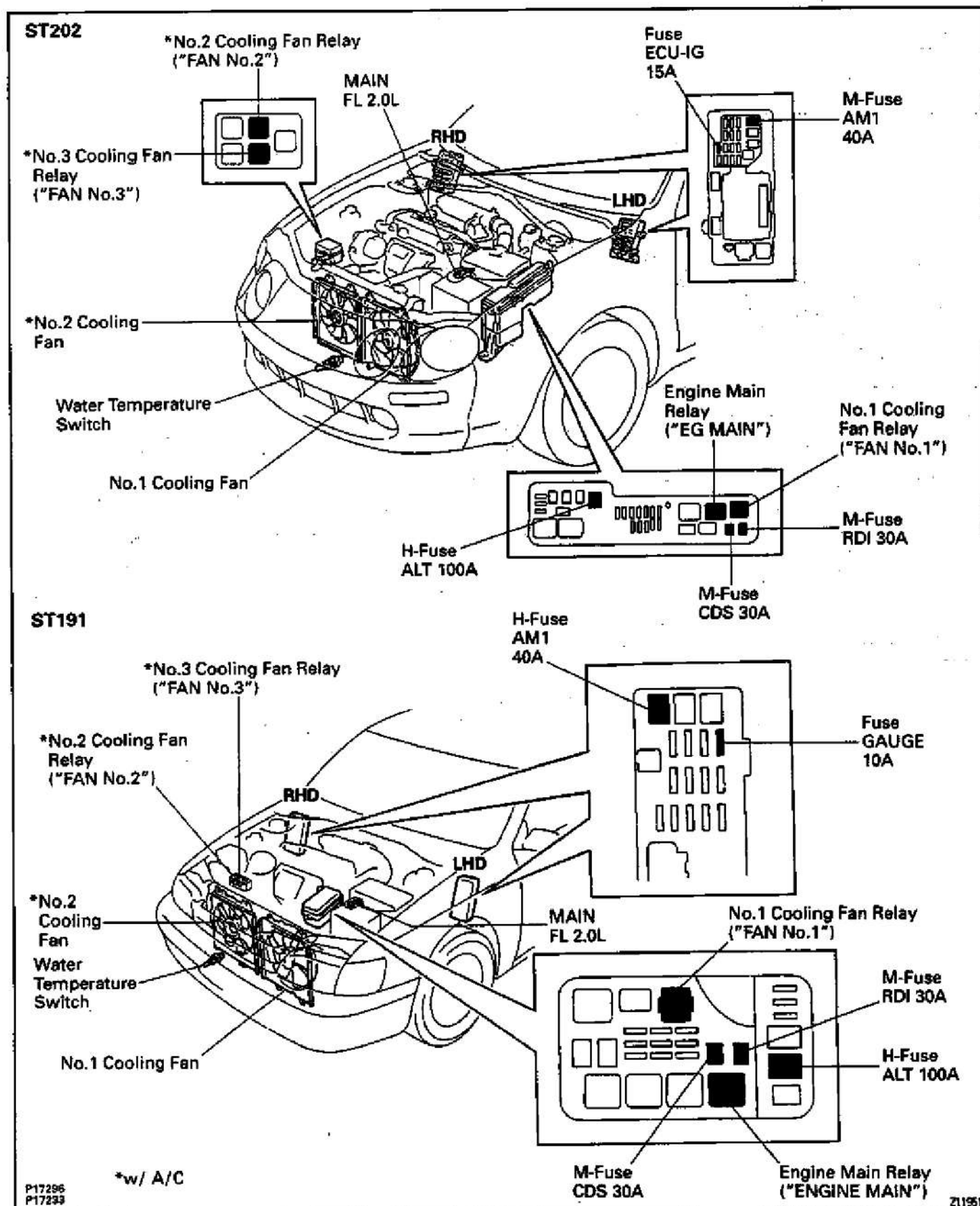
HINT: On radiators with resin tanks, there is a clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swish the radiator around in the water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

9. PAINT TANK PLATE

HINT: If the water leak test checks out okay, allow the radiator to completely dry and then paint the lock plates.

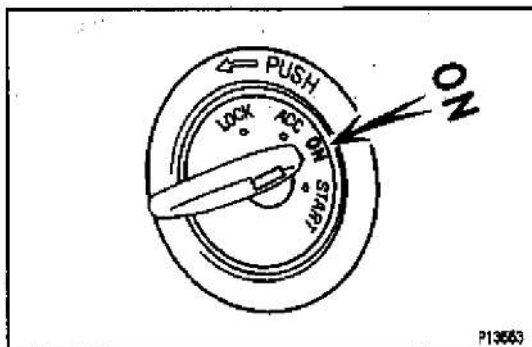
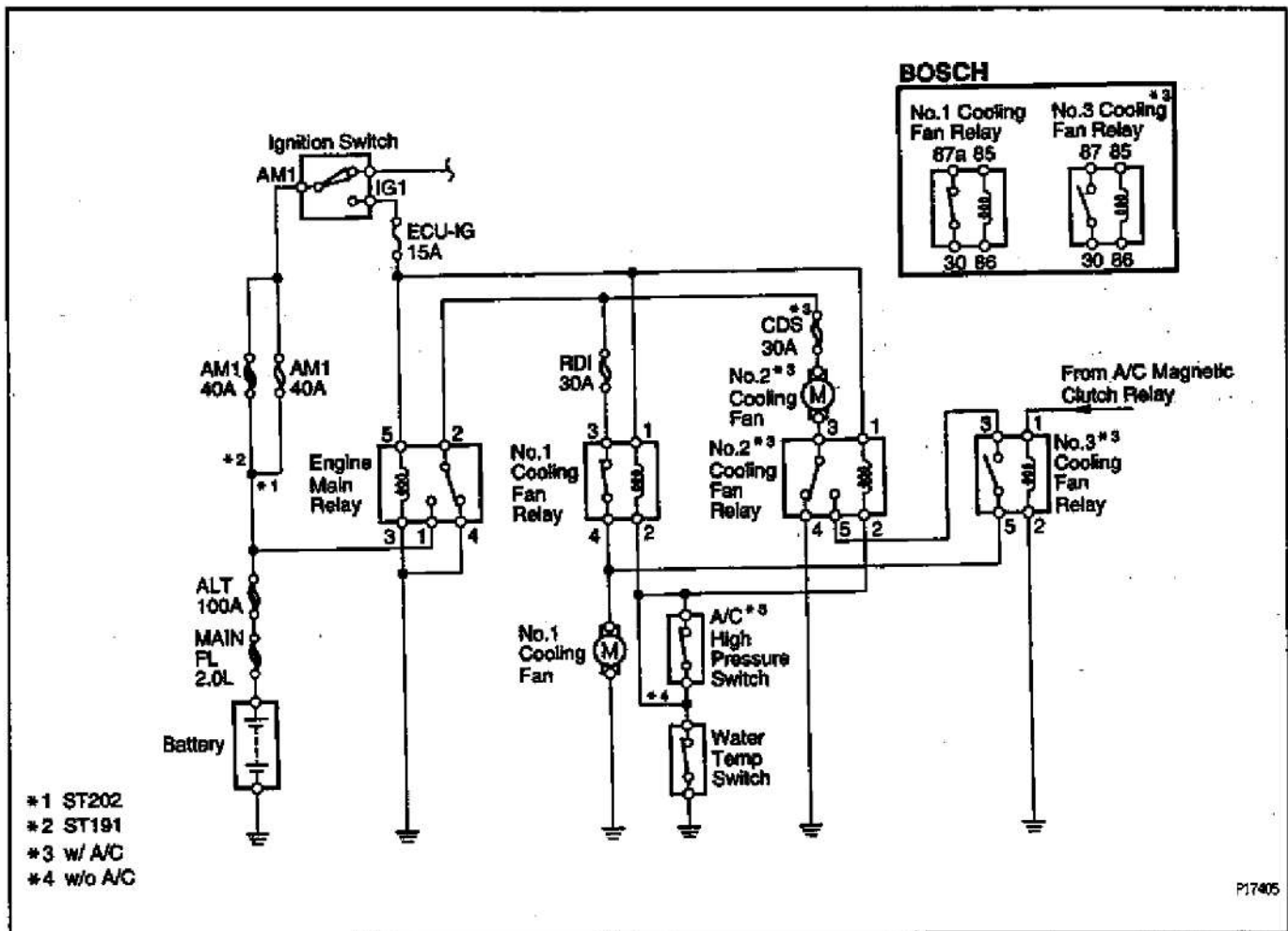
ELECTRIC COOLING FAN Part Location

R0078-02



System Circuit

8990-01



On - Vehicle Inspection

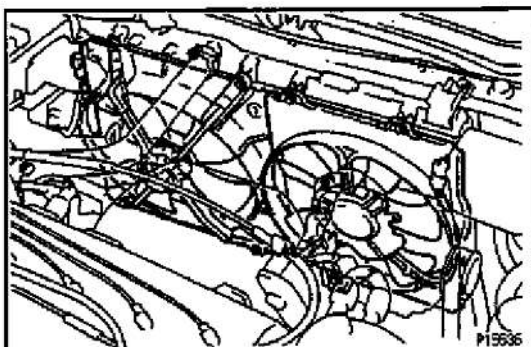
88148-01

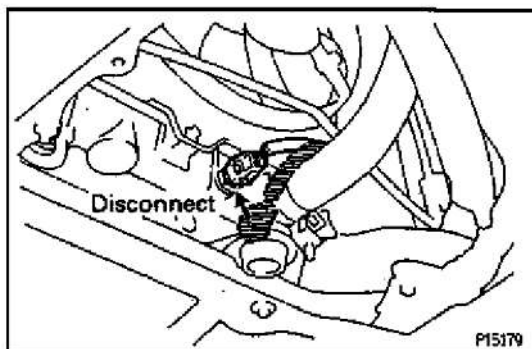
1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

(a) Turn the ignition switch ON.

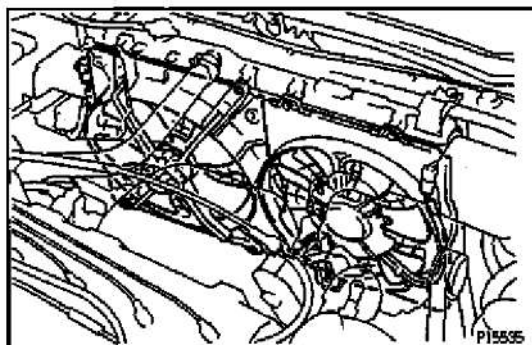
(b) Check that the cooling fan stops.

If not, check the cooling fan relay and water temperature switch, and check for a separated connector or severed wire between the cooling fan relay and water temperature switch.

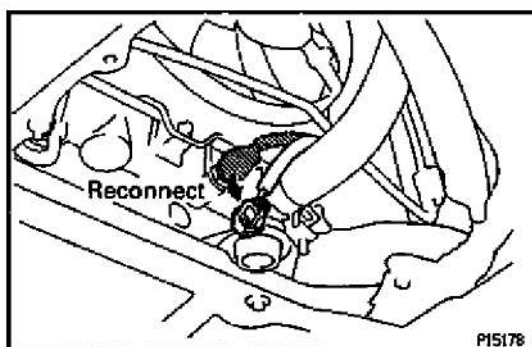




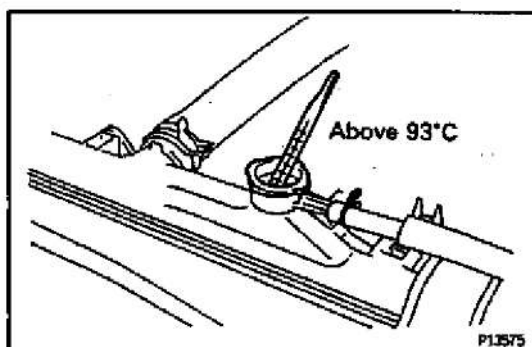
- (c) Disconnect the water temperature switch connector.



- (d) Check that the cooling fan rotates.
If not, check the fan main relay, cooling fan relay, cooling fan, fuses, and check for short circuit between the cooling fan relay and water temperature switch.

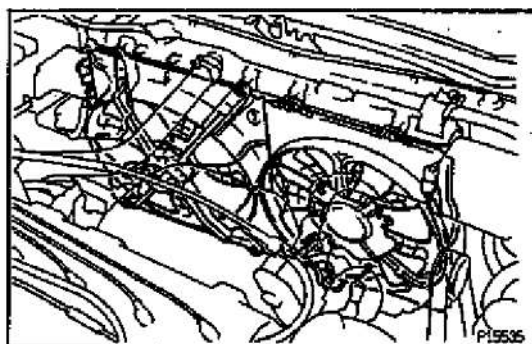


- (e) Reconnect the water temperature switch connector.

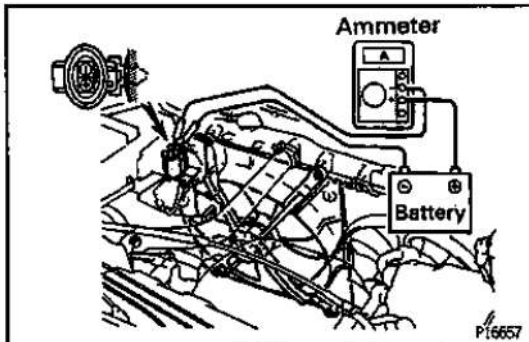


2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93°C (199°F))

- (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.

No.1 Cooling Fan**NO.1 COOLING FAN INSPECTION****1. DISCONNECT COOLING FAN CONNECTOR****EG****2. INSPECT NO.1 COOLING FAN**

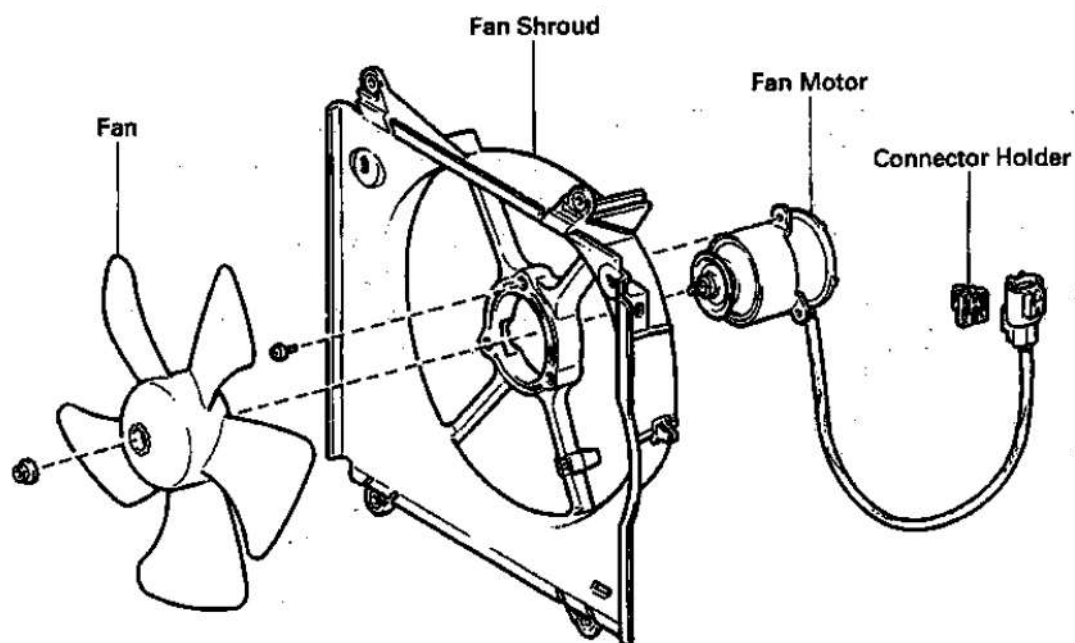
- (a) Connect battery and ammeter to the cooling fan connector.
- (b) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage (NIPPONDENSO):**ST202****6.0 — 7.4 A****ST191****Europe****3.2 — 4.4 A****Others (M/T)****6.0 — 7.4 A****Others (A/T)****9.1 — 11.1 A****Standard amperage (BOSCH):****2.9 — 4.1 A****3. RECONNECT COOLING FAN CONNECTOR**

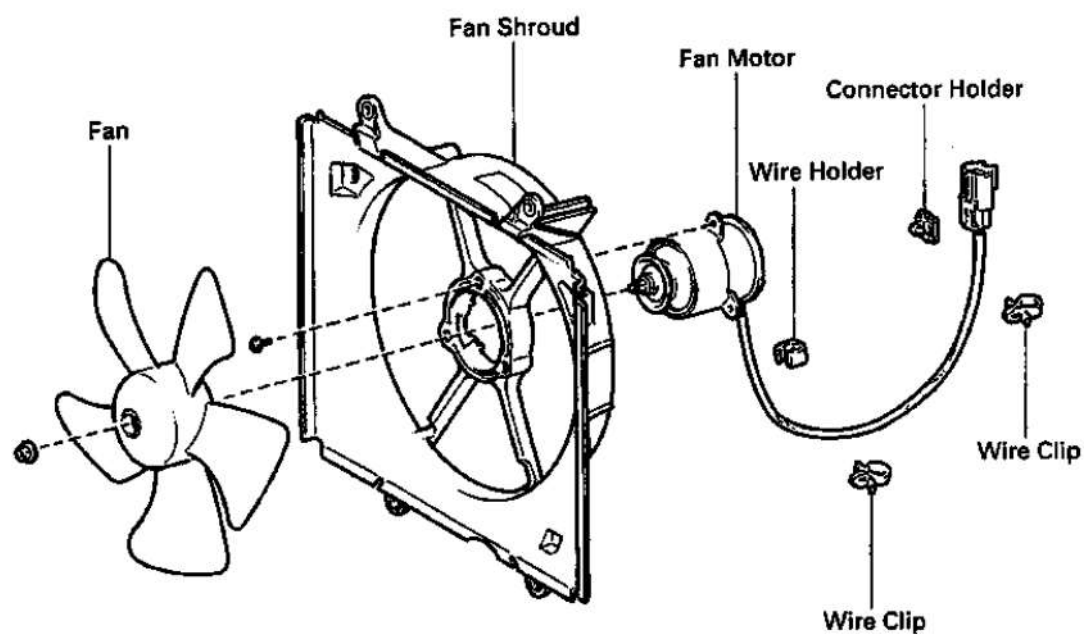
**COMPONENTS FOR DISASSEMBLY AND
ASSEMBLY (NIPPONDENSO)**

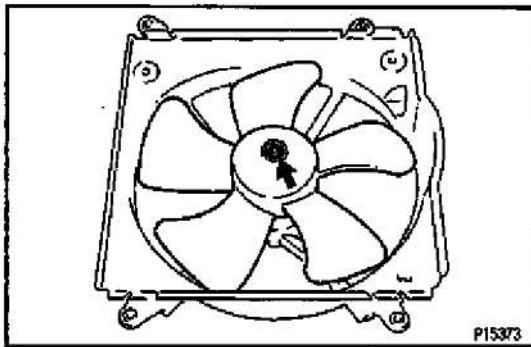
82079-10

ST202



ST191





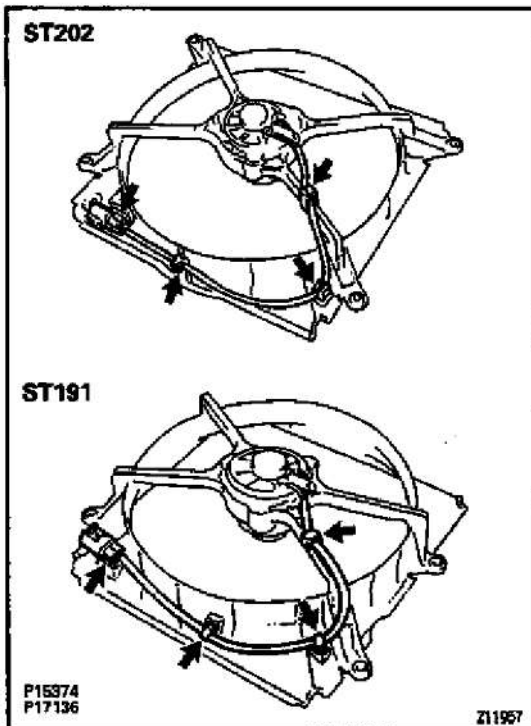
NO.1 COOLING FAN DISASSEMBLY (NIPPONDENSO)

(See Components for Disassembly and Assembly)

1. REMOVE FAN

Remove the nut and fan.

EG



2. REMOVE FAN MOTOR

(a) ST202:

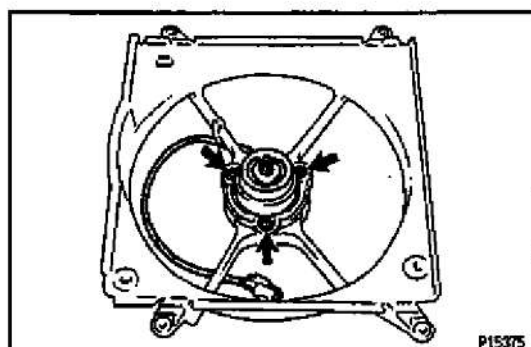
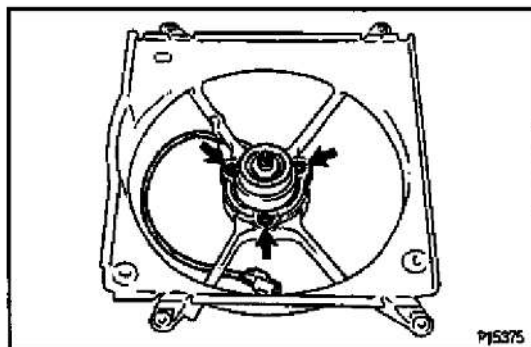
Disconnect the wire and connector from the fan shroud.

(b) ST191:

Remove the holder and 2 clips, disconnect the wire from the fan shroud.

(c) Disconnect the connector from the holder.

(d) Remove the 3 screws and fan motor.



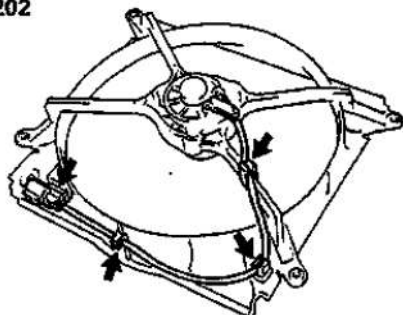
NO.1 COOLING FAN ASSEMBLY (NIPPONDENSO)

(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR

(a) Install the fan motor with the 3 screws.

ST202



(b) Install the connector to the holder.

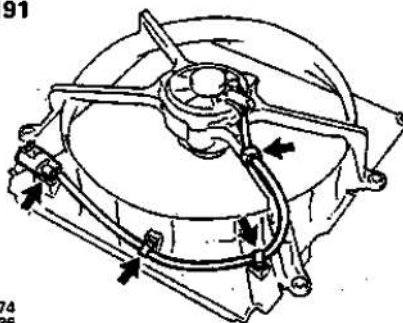
(c) ST202:

Install the wire and connector to the fan shroud.

(d) ST191:

Install the wire with the holder and 2 clips.

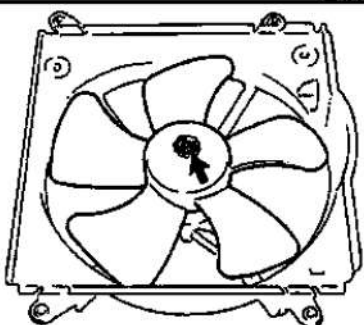
ST191

P15374
P17136

Z11957

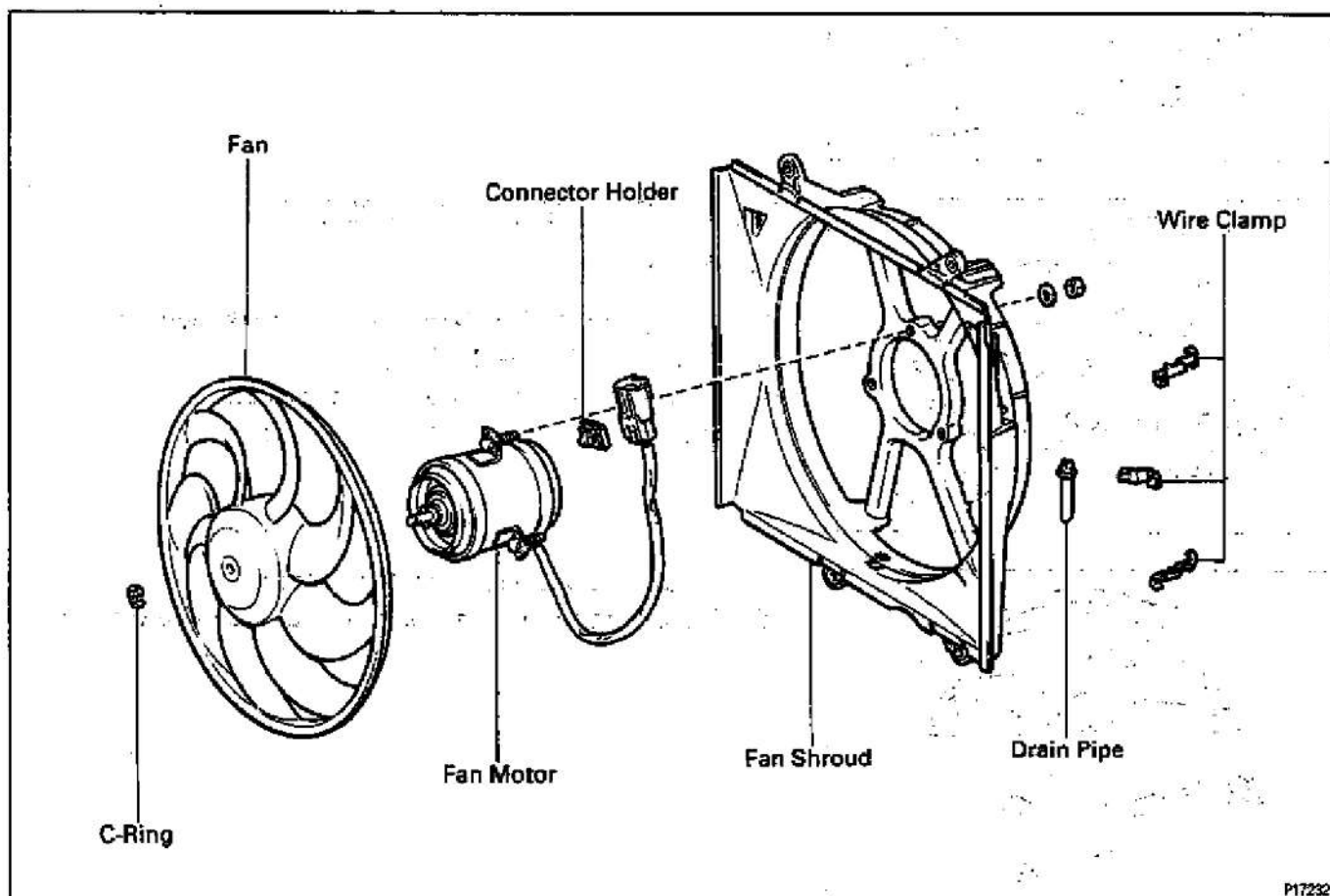
2. INSTALL FAN

Install the fan with the nut.

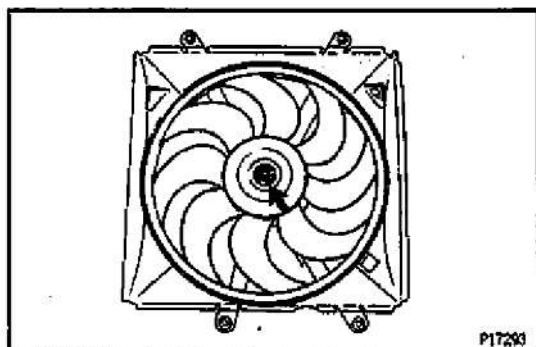


P15373

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY (BOSCH)



P17232



P17293

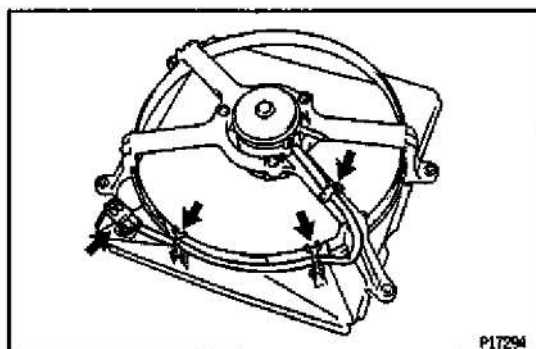
NO.1 COOLING FAN DISASSEMBLY (BOSCH)

0916X-06

(See Components for Disassembly and Assembly)

1. REMOVE FAN

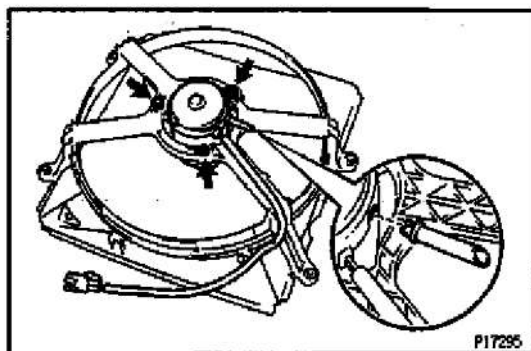
Remove the C—ring and fan.



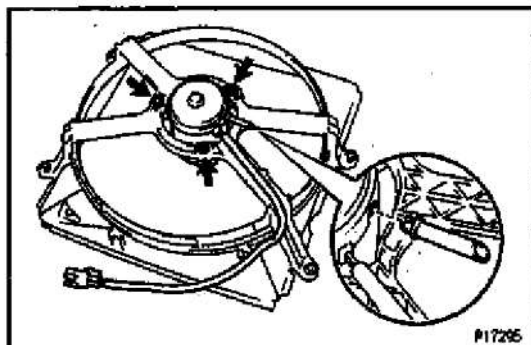
P17294

2. REMOVE FAN MOTOR

- Remove the holder and 3 wire clamps, disconnect the wire from the fan shroud.
- Disconnect the connector from the holder.



- (c) Remove the drain pipe from the fan motor.
- (d) Remove the 3 nuts and fan motor.



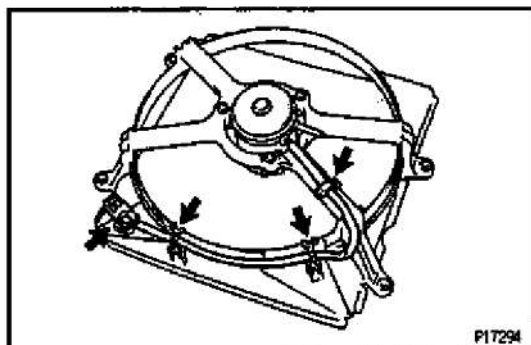
NO.1 COOLING FAN ASSEMBLY (BOSCH)

GB10Y-06

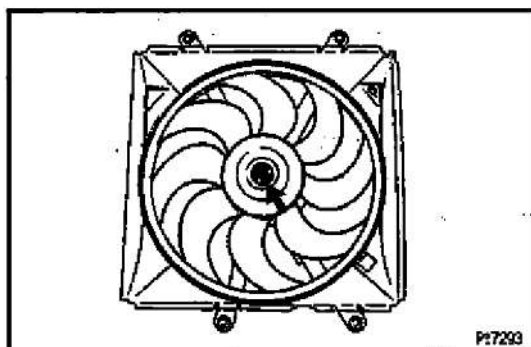
(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR

- (a) Install the fan motor with the 3 nuts.
- (b) Install the drain pipe to the fan motor.

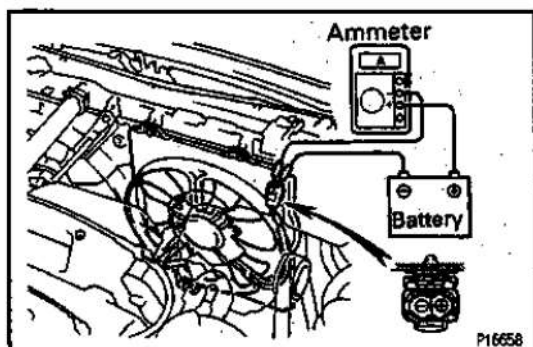


- (c) Install the connector to the holder.
- (d) Install the wire with the holder and 3 wire clamps.



2. INSTALL FAN

Install the fan with the C-ring.

w/ A/C:**No.2 Cooling Fan****NO.2 COOLING FAN INSPECTION****1. DISCONNECT COOLING FAN CONNECTOR****EG****2. INSPECT NO.2 COOLING FAN**

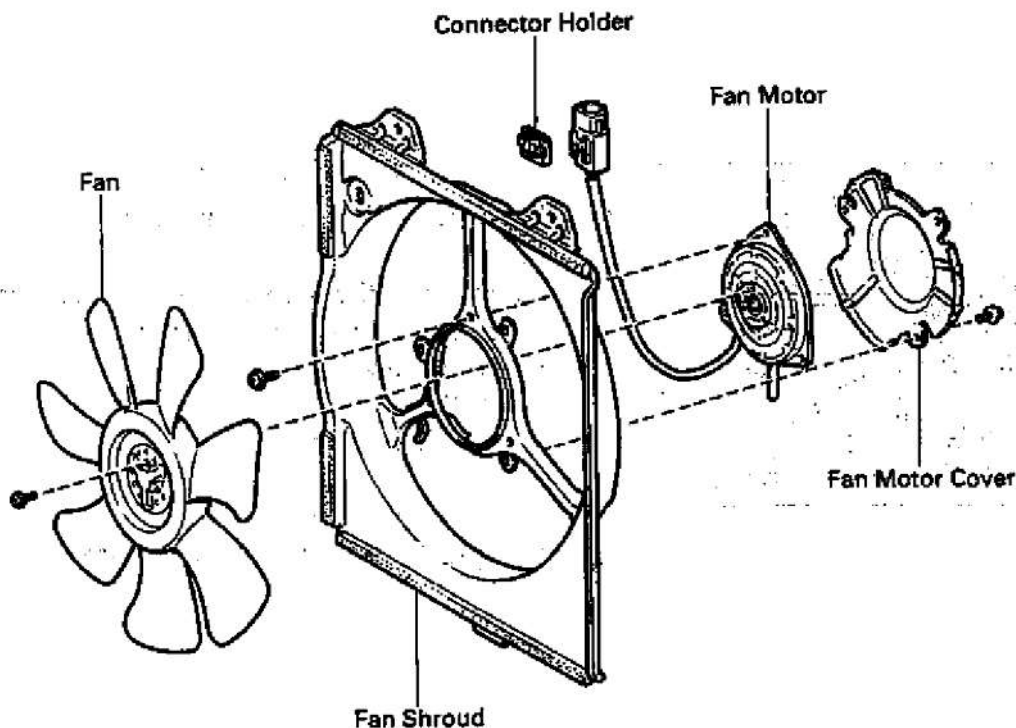
- (a) Connect battery and ammeter to the cooling fan connector.
- (b) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:**ST202****6.0 — 7.4 A****ST191****5.8 — 7.4 A****3. RECONNECT COOLING FAN CONNECTOR**

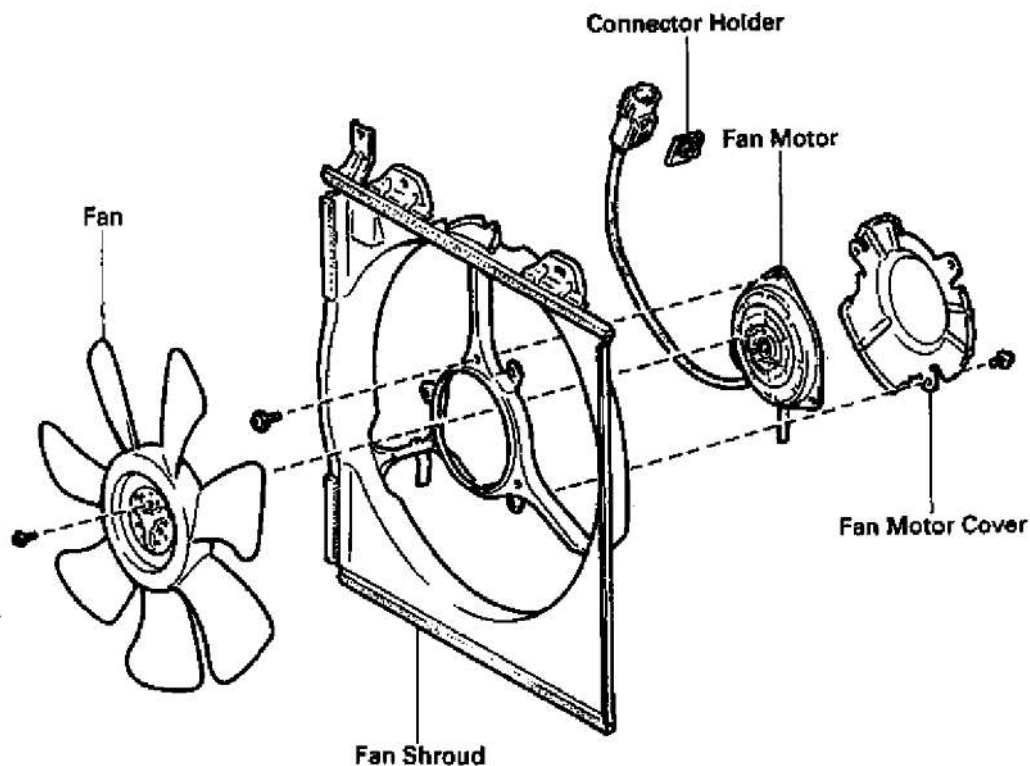
**COMPONENTS FOR DISASSEMBLY AND
ASSEMBLY**

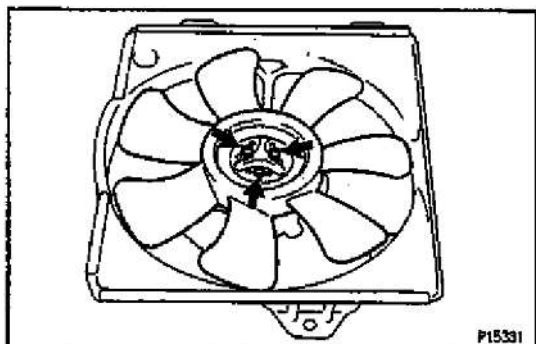
90276-10

ST202



ST191



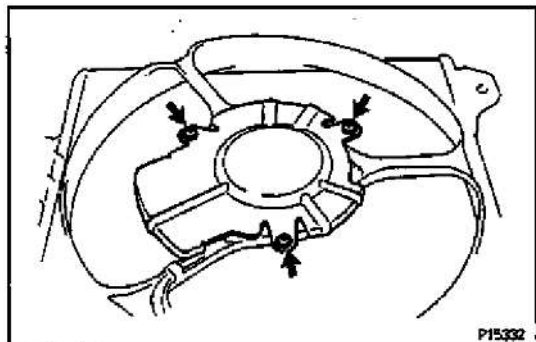
**NO.2 COOLING FAN DISASSEMBLY**

(See Components for Disassembly and Assembly)

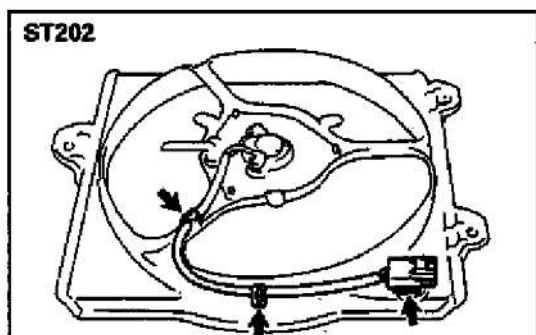
1. REMOVE FAN

Remove the 3 screws and fan.

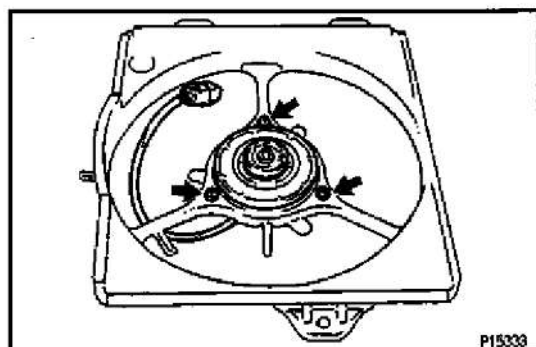
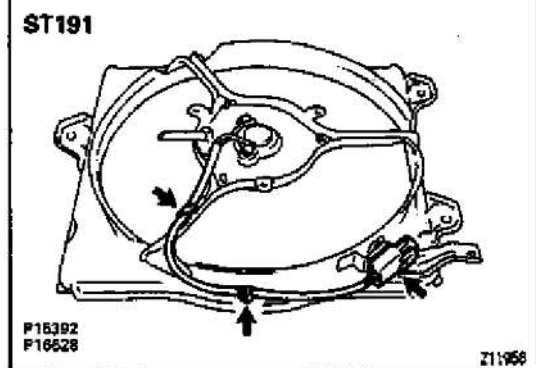
EG

**2. REMOVE FAN MOTOR COVER**

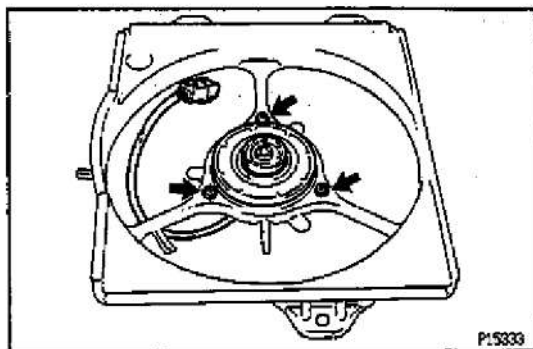
Remove the 3 screws and motor cover.

**3. REMOVE FAN MOTOR**

- (a) Disconnect the wire and connector from the fan shroud.



- (b) Remove the 3 screws and fan motor.



NO.2 COOLING FAN ASSEMBLY

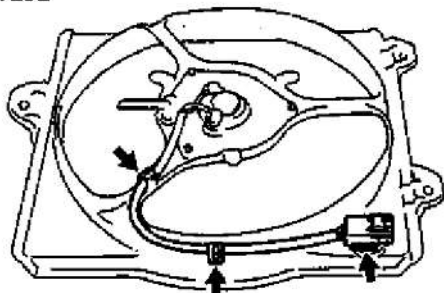
(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR

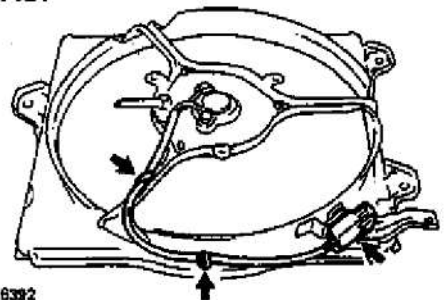
(a) Install the fan motor with the 3 screws.

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

ST202



ST191

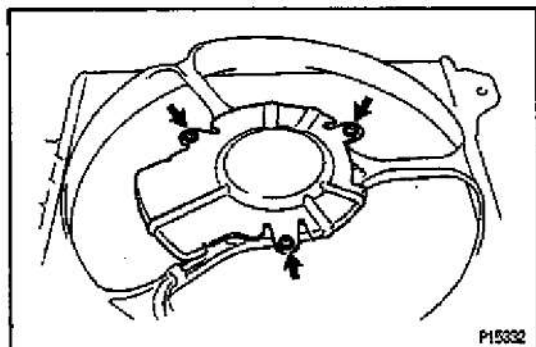


P16392
P16628

Z11958

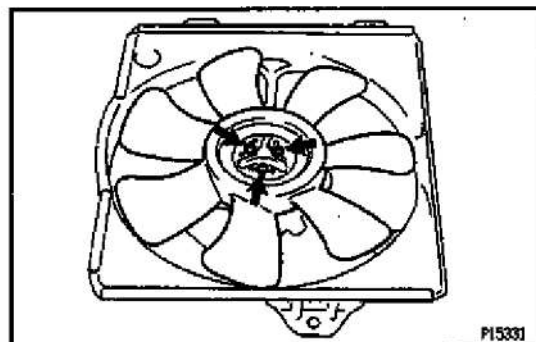
2. INSTALL FAN MOTOR COVER

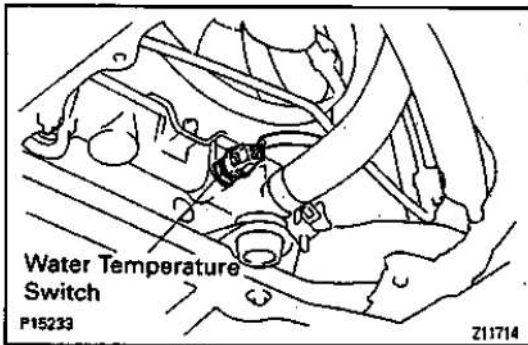
Install the motor cover with the 3 screws.



3. INSTALL FAN

Install the fan with the 3 screws.



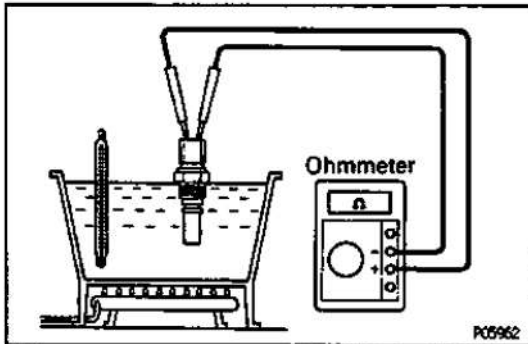


Water Temperature Switch

WATER TEMPERATURE SWITCH INSPECTION

1. DRAIN ENGINE COOLANT
2. REMOVE WATER TEMPERATURE SWITCH

EG

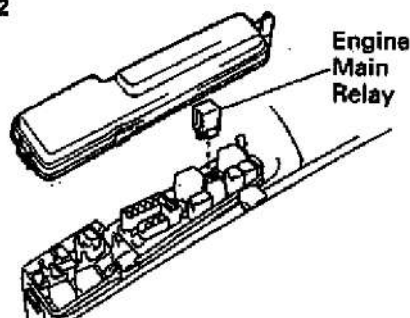


3. INSPECT WATER TEMPERATURE SWITCH

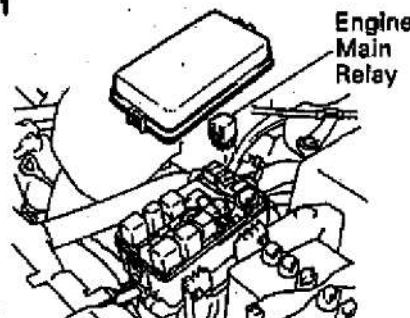
- (a) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 93°C (199°F).
 - (b) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is below 83°C (181°F).
- If continuity is not as specified, replace the switch.

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

ST202

Engine
Main
Relay

ST191

Engine
Main
RelayP13766
P13691

Z11708

Engine Main Relay ("EG MAIN" for ST202) ("ENGINE MAIN" for ST191)

ENGINE MAIN RELAY INSPECTION

1. REMOVE RELAY BOX COVER
2. REMOVE ENGINE MAIN RELAY

3. INSPECT ENGINE MAIN RELAY

A. Inspect relay continuity

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

If continuity is not as specified, replace the relay.

B. Inspect relay operation

- (a) Apply battery voltage across terminals 3 and 5.
- (b) Using an ohmmeter, check that there is no continuity between terminals 2 and 4.
- (c) Check that there is continuity between terminals 1 and 2.

If operation is not as specified, replace the relay.

4. REINSTALL ENGINE MAIN RELAY
5. REINSTALL RELAY BOX COVER

Ohmmeter

Ohmmeter

Continuity

Ohmmeter

Continuity

No Continuity

P08100

Ohmmeter

Ohmmeter

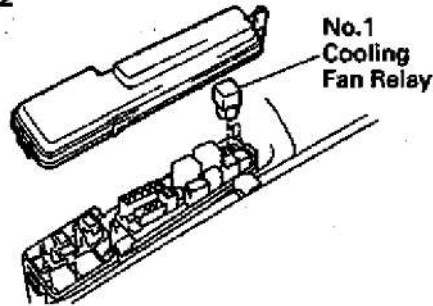
No Continuity

Continuity

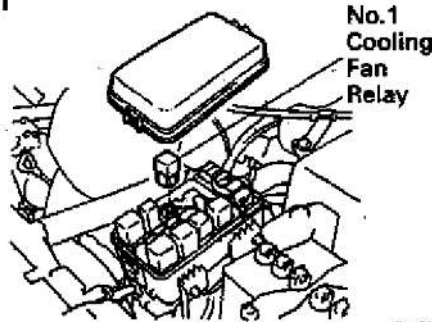
Battery

P08101

ST202



ST191

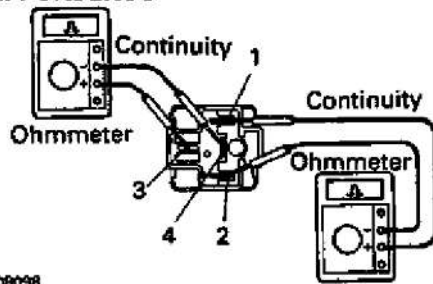
P13767
P13593

Z11783

No.1 Cooling Fan Relay ("FAN NO.1")**NO.1 COOLING FAN RELAY INSPECTION**

1. REMOVE RELAY BOX COVER
2. REMOVE NO.1 COOLING FAN RELAY

EG

NIPPONDENSO

P06098

Z11660

3. INSPECT NO.1 COOLING FAN RELAY (NIPPONDENSO)**A. Inspect relay continuity**

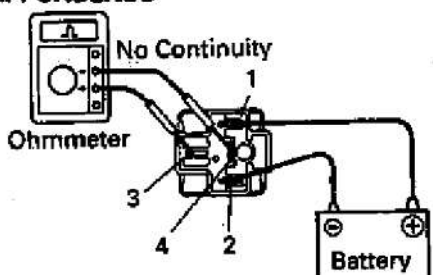
- (a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
- (b) Check that there is continuity between terminals 3 and 4.

If continuity is not as specified, replace the relay.

B. Inspect relay operation

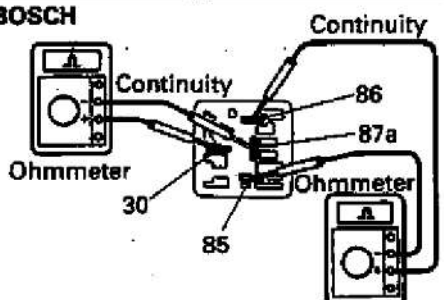
- (a) Apply battery voltage across terminals 1 and 2.
- (b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.

NIPPONDENSO

P06099

Z11861

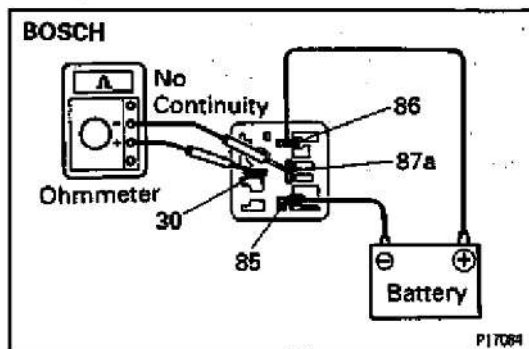
BOSCH

P17083

4. INSPECT NO.1 COOLING FAN RELAY (BOSCH)**A. Inspect relay continuity**

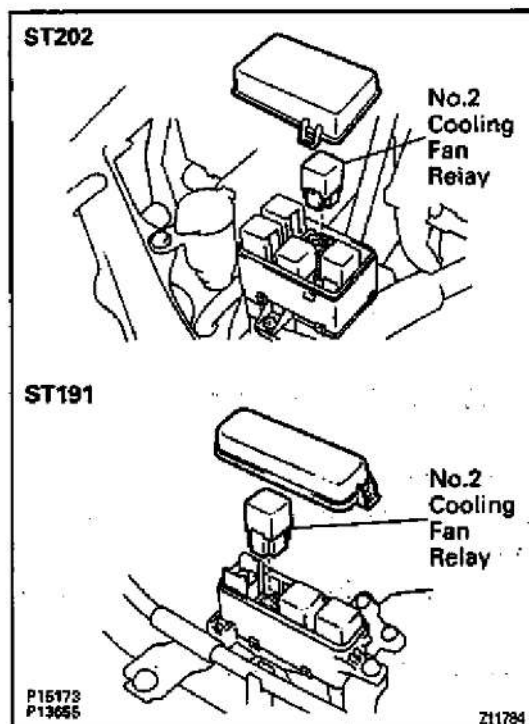
- (a) Using an ohmmeter, check that there is continuity between terminals 86 and 85.
- (b) Check that there is continuity between terminals 30 and 87a.

If continuity is not as specified, replace the relay.

**B. Inspect relay operation**

- (a) Apply battery voltage across terminals 86 and 85.
- (b) Using an ohmmeter, check that there is no continuity between terminals 30 and 87a.

If operation is not as specified, replace the relay.

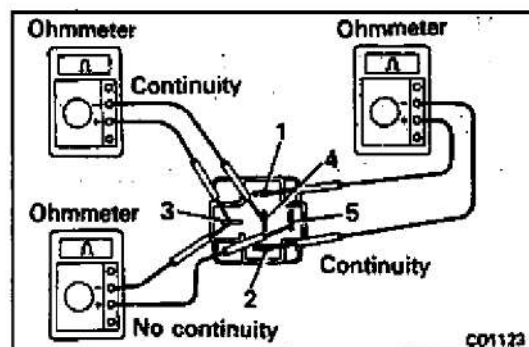
5. REINSTALL NO.1 COOLING FAN RELAY**6. REINSTALL RELAY BOX COVER****w/ A/C:****No.2 Cooling Fan Relay ("FAN NO.2")****NO.2 COOLING FAN RELAY INSPECTION**

1. REMOVE RELAY BOX COVER
2. REMOVE NO.2 COOLING FAN RELAY

3. INSPECT NO.2 COOLING FAN RELAY**A. Inspect relay continuity**

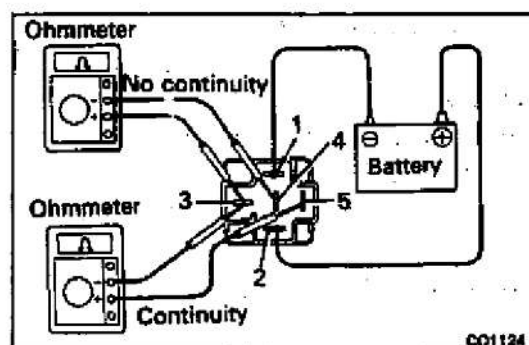
- (a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
- (b) Check that there is continuity between terminals 3 and 4.
- (c) Check that there is no continuity between terminals 3 and 5.

If continuity is not as specified, replace the relay.

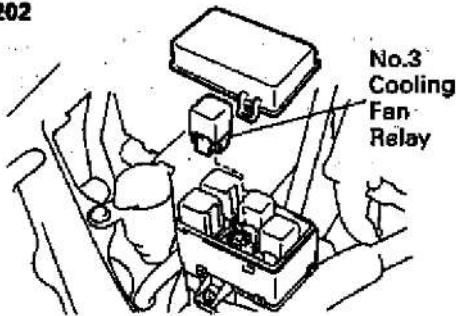
**B. Inspect relay operation**

- (a) Apply battery voltage across terminals 1 and 2.
- (b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
- (c) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

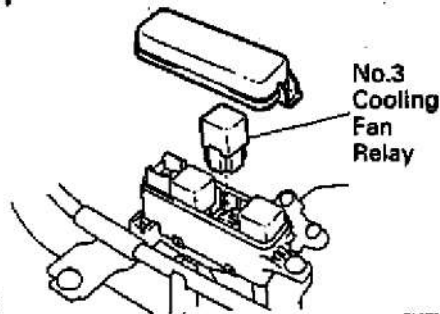
If operation is not as specified, replace the relay.

4. REINSTALL NO.2 COOLING FAN RELAY**5. REINSTALL RELAY BOX COVER**

ST202



ST191

P15174
P13654

Z11785

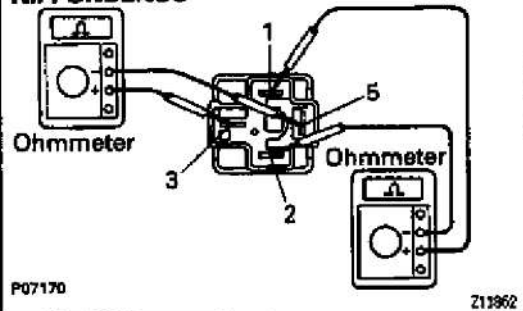
w/ A/C:

No.3 Cooling Fan Relay ("FAN NO.3")**NO.3 COOLING FAN RELAY INSPECTION**

1. REMOVE RELAY BOX COVER
2. REMOVE NO.3 COOLING FAN RELAY

EG

NIPPONDENSO



P07170

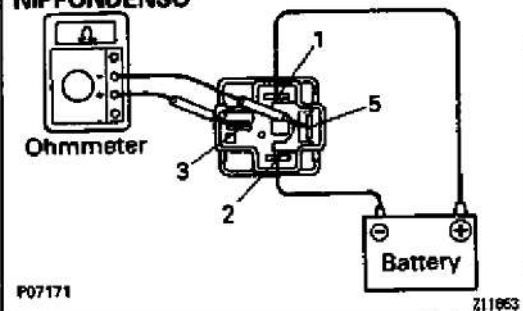
Z11962

3. INSPECT NO.3 COOLING FAN RELAY (NIPPONDENSO)**A. Inspect relay continuity**

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

If continuity is not as specified, replace the relay.

NIPPONDENSO



P07171

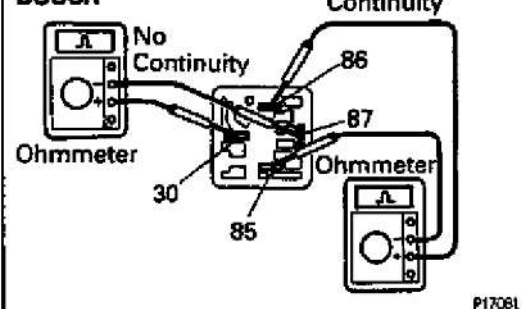
Z11963

B. Inspect relay operation

- (a) Apply battery voltage across terminals 1 and 2.
- (b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If operation is not as specified, replace the relay.

BOSCH

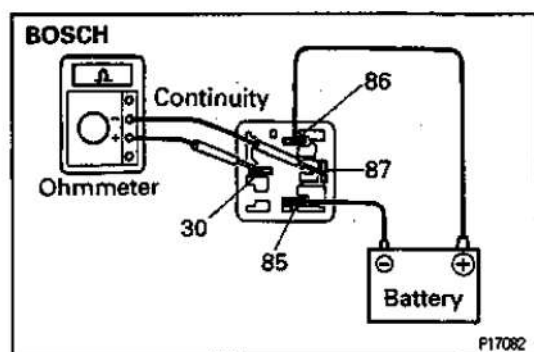


P17081

4. INSPECT NO.3 COOLING FAN RELAY (BOSCH)**A. Inspect relay continuity**

- (a) Using an ohmmeter, check that there is continuity between terminals 86 and 85.
- (b) Check that there is no continuity between terminals 30 and 87.

If continuity is not as specified, replace the relay.

**B. Inspect relay operation**

- (a) Apply battery voltage across terminals 86 and 85.
- (b) Using an ohmmeter, check that there is continuity between terminals 30 and 87.

If operation is not as specified, replace the relay.

5. REINSTALL NO.3 COOLING FAN RELAY
6. REINSTALL RELAY BOX COVER

SERVICE SPECIFICATIONS

SERVICE DATA

Thermostat	Valve opening temperature	80 — 84°C (176 — 183°F)
	Valve lift at 95°C (203°F)	8 mm (0.31 in.) or more
Radiator cap	Relief valve opening pressure	74 — 103 kPa (0.75 — 1.05 kgf/cm ² , 10.7 — 14.9 psi)
	STD Limit	59 kPa (0.6 kgf/cm ² , 8.5 psi)
No.1 electric cooling fan	Rotating amperage (NIPPONDENSO)	
	ST202	6.0 — 7.4 A
	ST191 Europe	3.2 — 4.4 A
	Others (M/T)	6.0 — 7.4 A
	Others (A/T)	9.1 — 11.1 A
	Rotating amperage (BOSCH)	2.9 — 4.1 A
No.2 electric cooling fan	Rotating amperage	
	ST202	6.0 — 7.4 A
	ST191	5.8 — 7.4 A

EG

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Cylinder block x Drain plug	25	250	18
Water pump x Water pump cover	8.8	90	78 in·lbf
Water pump x Cylinder block	8.8	90	78 in·lbf
Water bypass pipe x Water pump cover	9.3	95	82 in·lbf
Alternator drive belt adjusting bar x Cylinder block	27	275	20
No.2 idler pulley x Cylinder block	42	425	31
Water inlet x Water pump cover	8.8	90	78 in·lbf