

SECTION 1B

ENGINE COOLING SYSTEM

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GENERAL DESCRIPTION

COOLANT CIRCULATION

The cooling system consists of the water pump, radiator, thermostat, cooling fan, rubber hoses, and it makes the engine cooled to protect the overheating and to maintain the adequate temperature of the engine.

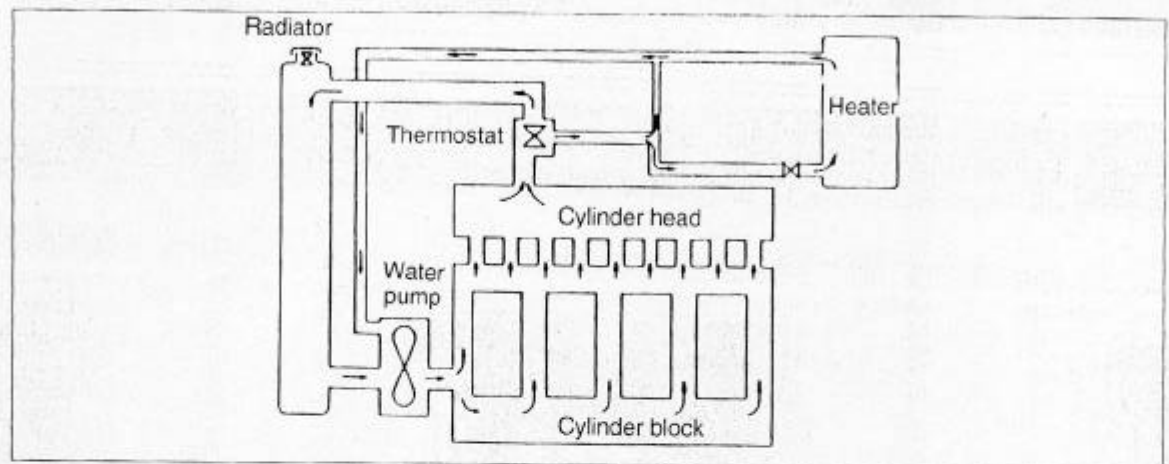


FIG. 1B — 1

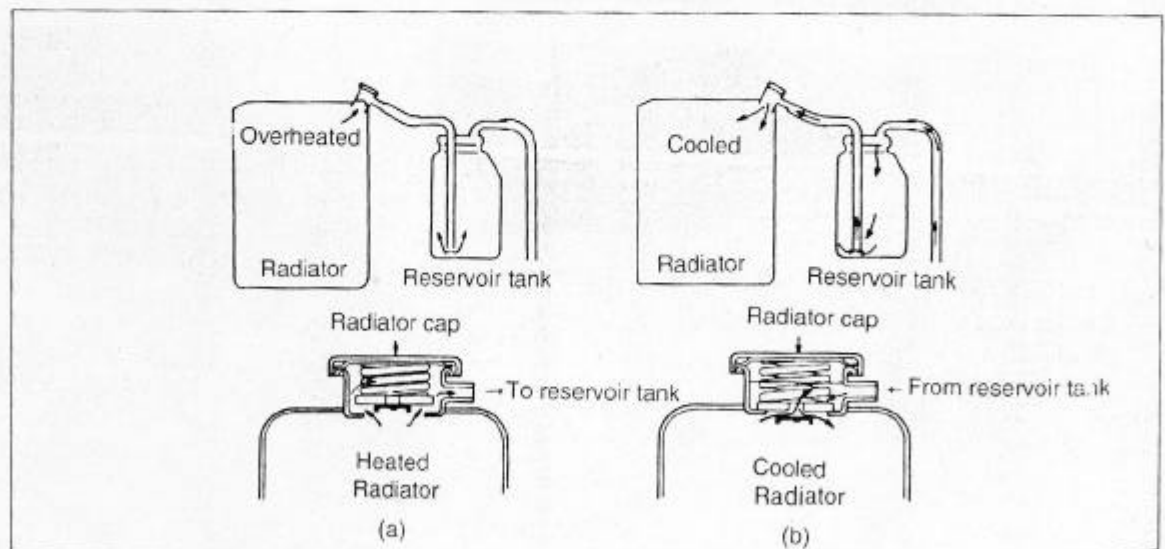


FIG. 1B — 2

The seal and pressure type radiator gets a structure to seal the radiator with a radiator cap, and to receive the expansion flows in the reservoir to prevent the expanded coolant from flowing outside.

Fig.(a) shows the coolant is heated and expands and that the expanded portion of the coolant flows from the radiator into the reservoir tank. As the pressure in the cooling system is over a specified level, the pressure valve of radiator cap is to be open to flow the heated coolant into the reservoir tank through overflow pipe. Fig.(b) shows the coolant contracts as the coolant temperature is lowered. At this time the pressure falls and the vacuum valve of radiator cap is to be open to draw the reserved coolant back into the radiator by the pressure difference.

Radiator Cap

A pressure-vent cap is used on the radiator. The cap contains pressure valve and vacuum valve. The pressure valve is held against its seat by a spring of pre-determined strength which protects the cooling system by relieving the pressure automatically, if the pressure in cooling system rises by $0.9\text{kg}/\text{cm}^2$.

The vacuum valve is held against its seat by a light spring which permits opening of the valve to relieve the negative pressure created in the system when it cools off and which otherwise might cause the radiator to collapse. The cap has its face marked 9 which means that its pressure valve opens at $0.9\text{kg}/\text{cm}^2$.

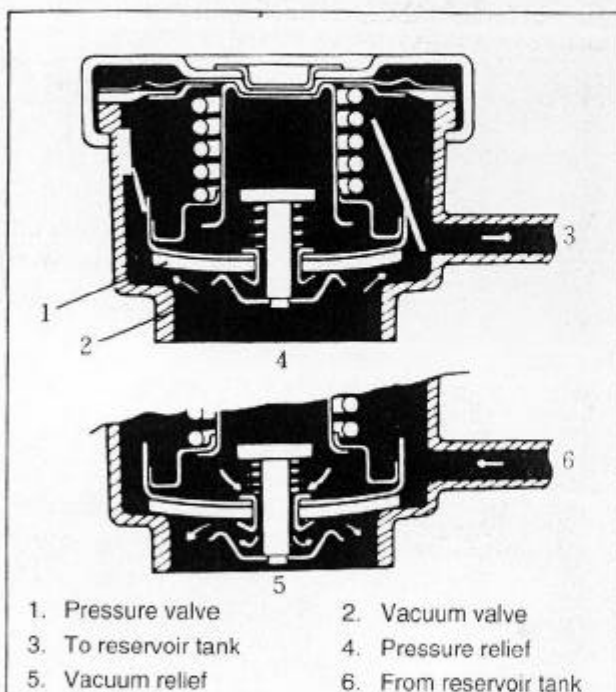


FIG. 1B — 5 A PRESSURE VENT TYPE RADIATOR CAP

Coolant Reservoir Tank

A reservoir tank is connected to the radiator by a hose. As the car is driven, the coolant is heated and expands. The portion of coolant expanded by heat flows from the radiator into the reservoir tank through the hose. When the car is stopped, the coolant contracts and the displaced coolant is drawn back into the radiator by the pressure difference. Thus, the radiator is kept filled with coolant to the desired level at all time, resulting in increased cooling efficiency.

Water Pump

The centrifugal type water pump is used in the cooling system. The pump impeller is supported by a totally sealed bearing. The water pump can not be disassembled.

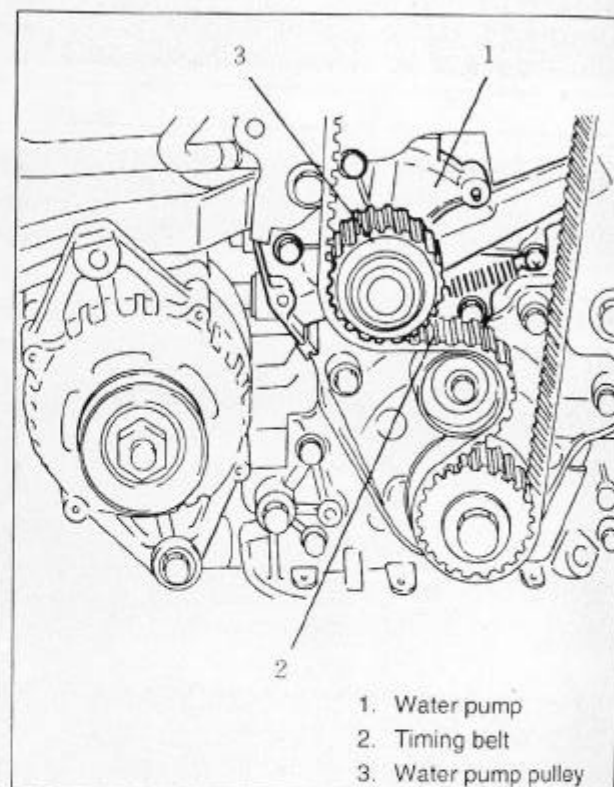


FIG. 1B — 6 WATER PUMP

Thermostat

A wax pallet type thermostat is used in the coolant outlet passage to control the flow of engine coolant, and to regulate coolant temperature.

A wax pallet element is contained in a metal case, and expands when heated and contracts when cooled.

When the pallet is heated and expands, the metal case pushes down the valve to open it.

As the pallet is cooled, the contraction allows a spring to close the valve. Thus, the valve remains closed while the coolant is cold, preventing circulation of coolant through the radiator. At this point, coolant is allowed to circulate only throughout the engine to warm it quickly and evenly. As the engine warms, the pallet expands and the thermostat valve opens, permitting coolant to flow through the radiator. In the top portion of the thermostat, an air bleed valve is provided. This valve is for venting out the gas or air, if any, that is accumulated in the circuit.

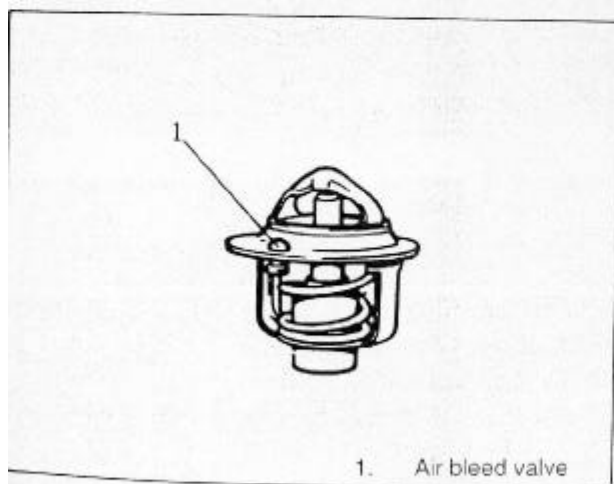


FIG. 1B — 7 THERMOSTAT

Thermostat functional spec.($\pm 1.5^{\circ}\text{C}$)	
Temperature at which valve begins to open($^{\circ}\text{C}$)	82
Temperature at which valve become fully open($^{\circ}\text{C}$)	95
Valve lift(mm)	more than 8 at 95°C

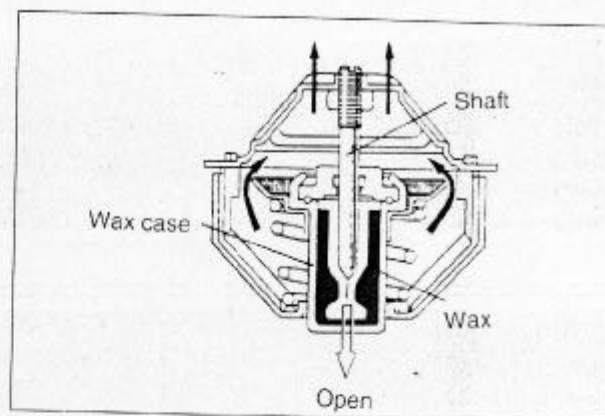


FIG. 1B — 8 OPERATING THERMOSTAT

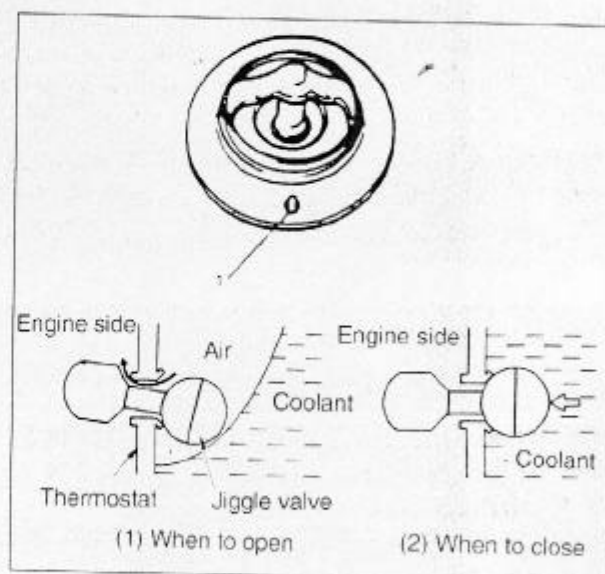


FIG. 1B — 9 OPERATING AIR BLEED VALVE

TROUBLESHOOTING

Condition	Probable Cause	Correction
Engine overheat	<ul style="list-style-type: none"> • Lack of coolant • Malfunction of thermostat • Malfunction of water pump • Clogged radiator pin • Leakage of coolant • Damage of cooling fan switch • Clogged radiator • Maladjustment of ignition timing • Malfunction of radiator cap • Dragging brake • Slipping clutch 	<ul style="list-style-type: none"> • Check coolant level and add • Replace • Replace • Clean or repair • Repair • Check and replace if necessary • Replace • Adjust • Replace • Adjust • Adjust or replace

INSPECTION AND MAINTENANCE

COOLANT

The coolant recovery system is standard. The coolant in the radiator expands with heat, and the overflow is collected in the reservoir tank. When the system cools down, the coolant is drawn back into the radiator. The mixing rate of the antifreeze depends upon the lowest ambient temperature of the area.

CAUTION

Besides the antifreezing effect, the coolant works excellently as an anti-corrosion and a foam-inhibited coolant. And for the performance of coolant keep the specified concentration as noted in below table.

Lowest temperature	Below -14.5℃	-25℃	-34℃	-65℃
Concentration	30%	40%	50%	60%

COOLANT LEVEL

Check level, lift hood and look at the reservoir tank. Not necessary to remove radiator cap to check coolant level.

CAUTION

Do not remove reservoir tank cap while coolant is boiling.

When engine is cool, check coolant level in reservoir tank.

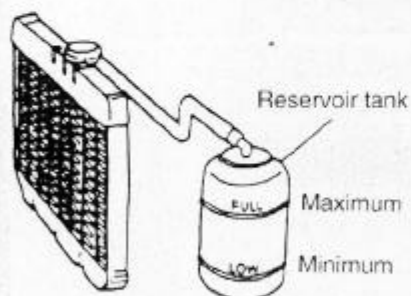
A normal coolant level should be between "FULL" and "LOW" marks on reservoir tank.

If coolant level is below "LOW" mark, remove reservoir tank cap and add proper coolant to tank to bring coolant level up to "FULL" mark.

CAUTION

If proper quality antifreeze is used, it is not necessary to add extra inhibitors or additives that claim to improve system. They may be harmful to proper operation of system.

Keep the arrow marks on the tank and cap in line to put the cap on the reservoir tank.



Coolant Capacity

Capacity (l)	Engine, radiator and heater	3.3
	Reservoir tank	0.6
	Total	3.9

COOLING SYSTEM SERVICE

Cooling system should be serviced as follows.

1. Check cooling system for leaks or damage.
2. Wash radiator cap and filler neck with clean water by removing radiator cap when engine is cold.
3. Check coolant for proper level and freeze protection.
4. Using pressure tester, check system and radiator cap for proper pressure holding capacity 0.9kg/cm². If replacement of cap is required, use proper cap specified for this vehicle.
5. Tighten hose clamps and inspect all hoses. Replace hose whenever cracked, swollen or otherwise deteriorated.
6. Clean frontal area of radiator core.

CAUTION

When installing radiator cap, make sure the ears be lined up with reservoir tank hose.

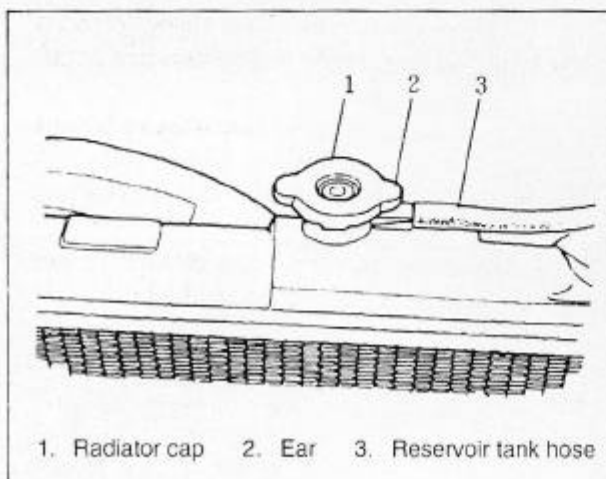


FIG. 1B — 11 RADIATOR CAP

COOLING SYSTEM, FLUSH AND REFILL

1. Remove radiator cap when engine is cool. Turn the cap to left slowly until all the pressure loss is confirmed (until no "HUE" sound is made), and pressing the cap down, turn it again to left to take it off.

CAUTION

To avoid the personal injury do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

2. With the radiator cap taken off, run the engine in idle until the upper radiator hose become hot by the coolant flowing through the thermostat opened.
3. Stop the engine, and disconnect the lower radiator hose to drain the coolant.
4. Reinstall the lower radiator hose and fill the system with water. Then run engine in idle until the upper radiator hose is hot.
5. Repeat these procedures 3 or 4 times until the drawing coolant almost becomes colorless.
6. Scrub and clean inside of reservoir with soap and water. Flush it well with clean water and drain. Reinstall tank and hose.
7. Add 50% mixture antifreeze and water to radiator and reservoir tank (filling radiator to the base of radiator filler neck and reservoir tank to "FULL" level mark). After filling, make reservoir cap lined up with the arrow mark on the tank.
8. Run engine, with radiator cap removed, until radiator upper hose is hot.
9. With engine idling, add coolant to radiator until level reaches to bottom of filler neck. Install radiator cap, making sure that the ear of cap lines up with reservoir tank hose.

ON-CAR SERVICE

CAUTION

Before disassembling the cooling system, check to make sure the cooling water temperature is cold, and be sure to disconnect \ominus terminal from battery.

COOLANT DRAINING

1. Remove radiator cap.
2. Disconnect the radiator lower hose and drain the coolant.
3. After draining coolant, install the lower hose and tighten well the clamp.
4. See page 75 to refill the coolant.

COOLANT PIPES OR HOSES

Removal

1. Drain the coolant.
2. To remove these pipes or hoses. Loosen screw on each pipe or hose clamp and pull hose end off.

Installation

It is the reverse of removal procedures. Take care of the followings.

- Tighten enough each clamp bolts.
- See page 75 to refill the specified coolant.

THERMOSTAT

Removal

1. Drain the coolant.
2. Disconnect thermostat cap from thermostat housing which is installed between distributor case and intake manifold.

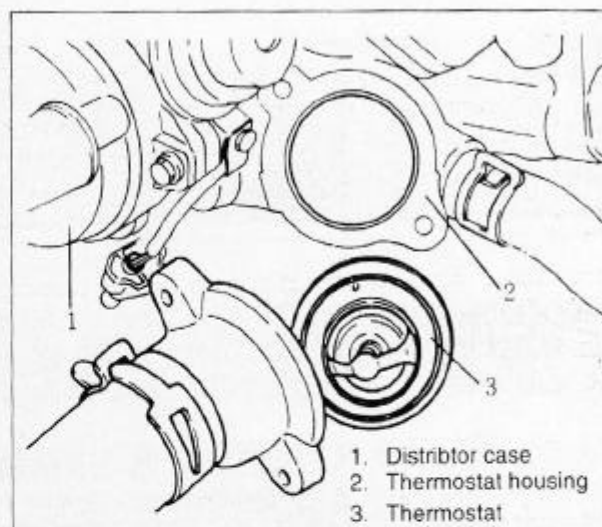


FIG. 1B — 12 REMOVING THERMOSTAT

Inspection

1. Make sure that air bleed valve of thermostat is clear (if valve is clogged, engine would tend to overheat).

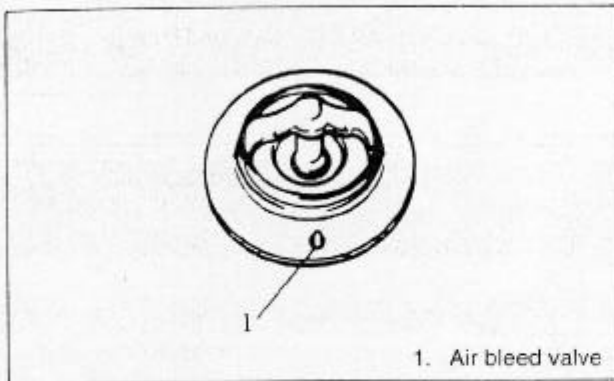


FIG. 1B — 13 AIR BLEED VALVE OF THERMOSTAT

2. Check valve seat for some foreign materials being stuck which prevent from secure seating.
3. Check thermostat movement of wax pallet as follows.
 - Immerse thermostat in water, and heat water gradually.
 - Check that valve starts to open at specified temperature.
 - If valve starts to open at a temperature substantially below or above specified temperature, thermostat unit should be replaced with new one, because such a unit will bring about overcooling or overheating tendency.

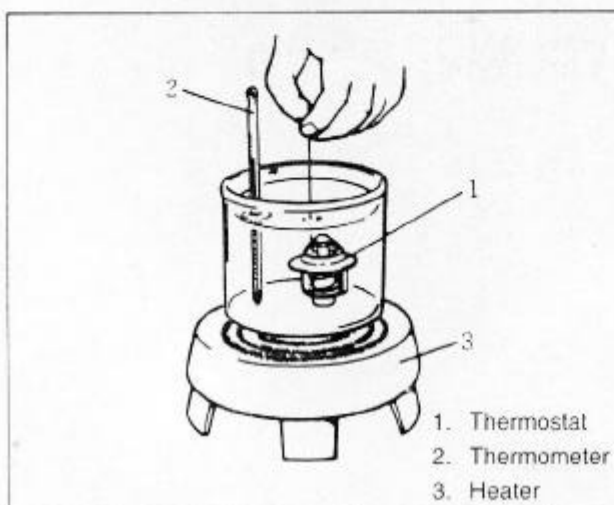


FIG. 1B — 14 INSPECTION OF THERMOSTAT VALVE OPERATION

Installation

1. Install thermostat in the thermostat housing with the air bleed valve in the front side of engine.
2. Install a new gasket on the thermostat housing.
3. Refill the coolant.

RADIATOR

Removal

1. Disconnect \ominus terminal from battery.
2. Disconnect the lower hose of radiator, and drain the coolant.
3. Disconnect coupler of cooling fan motor lead wire.
4. Remove coolant hoses from radiator.
5. Remove the radiator.

Inspection

Check radiator for any leakage or damage and straighten the flattened or bent pins, if any.

Clean

Clean front of the radiator cores.

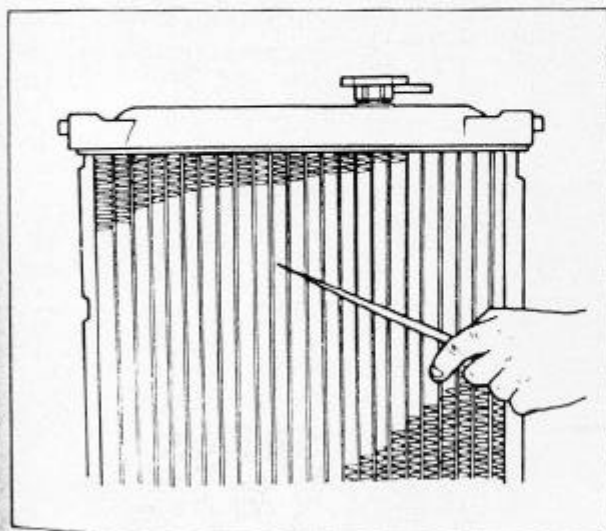


FIG. 1B — 15 CLEANING RADIATOR

Installation

It is the reverse of removal procedures.

CAUTION

- See page 74 "COOLANT" to refill the coolant in the system.
- Check each joints for any leakage.

WATER PUMP

Removal

1. Disconnect \ominus terminal from battery.
2. Drain the coolant.
3. Remove crankshaft pulley.
4. Remove timing belt outside cover.

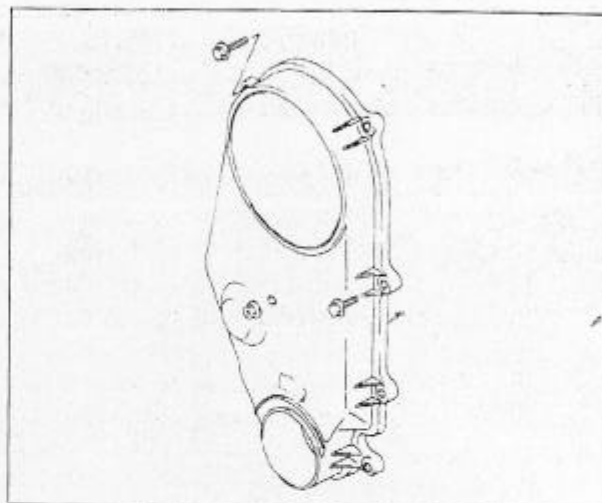
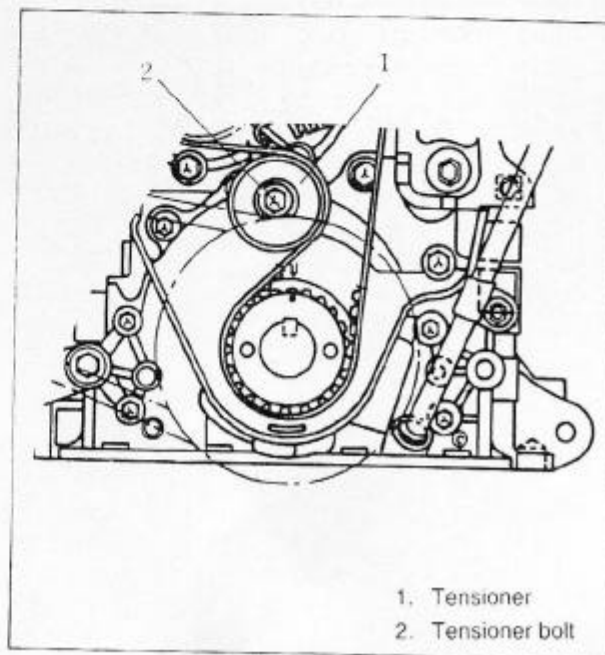


FIG. 1B — 16 TIMING BELT OUTSIDE COVER

5. Remove tensioner and timing belt.



1. Tensioner
2. Tensioner bolt

FIG. 1B — 17

6. Water pump

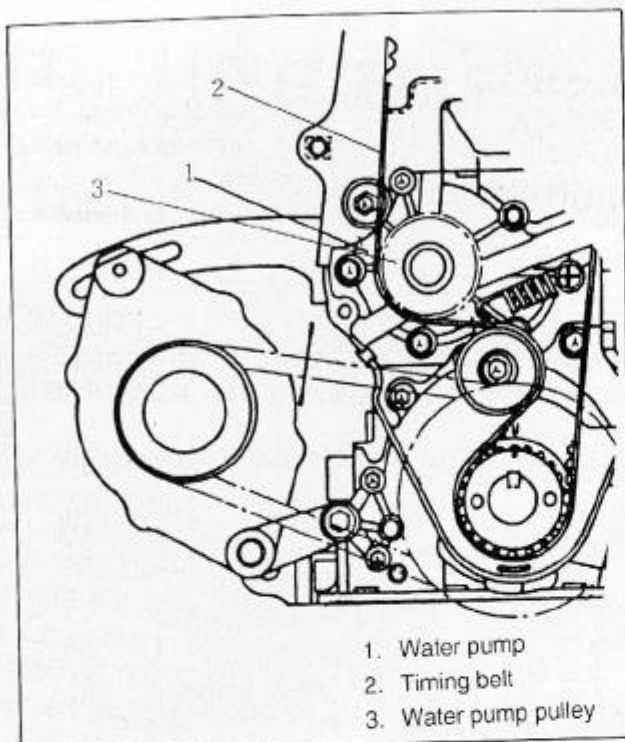


FIG. 1B — 18 WATER PUMP PULLEY

Inspection

CAUTION

Do not disassemble water pump.

If any repair is required on pump, replace it with new one.

Rotate water pump by hand to check for smooth operation. If pump does not rotate smoothly or makes an abnormal noise, replace it.

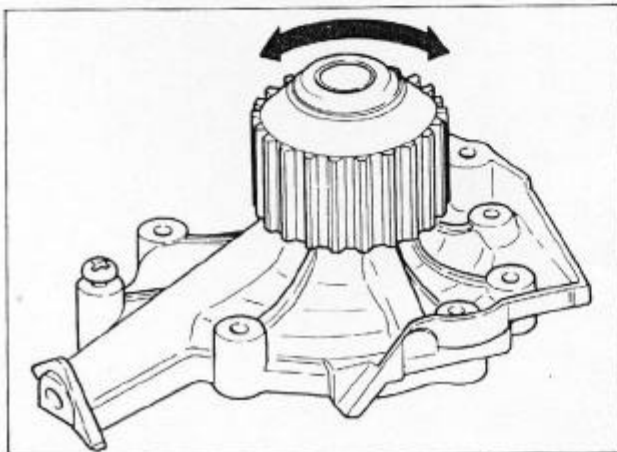


FIG. 1B — 19 CHECKING WATER PUMP

Installation

1. Install the new pump gasket on cylinder block.
2. Install water pump on cylinder block.

Tightening torque for bolts and nuts(kg · m)	100 — 130
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3. Install belt tensioner, timing belt, timing belt outside cover.

CAUTION

- Special care must be required when installing belt tensioner and timing belt. Be sure to refer to page 33 of this manual.
- Tighten each bolt and nut to specified torque.

4. Connect \ominus terminal at battery.
5. Refill the coolant.
6. After installing, check each part for any leakage.