

COOLING SYSTEM

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3 OUTLINE

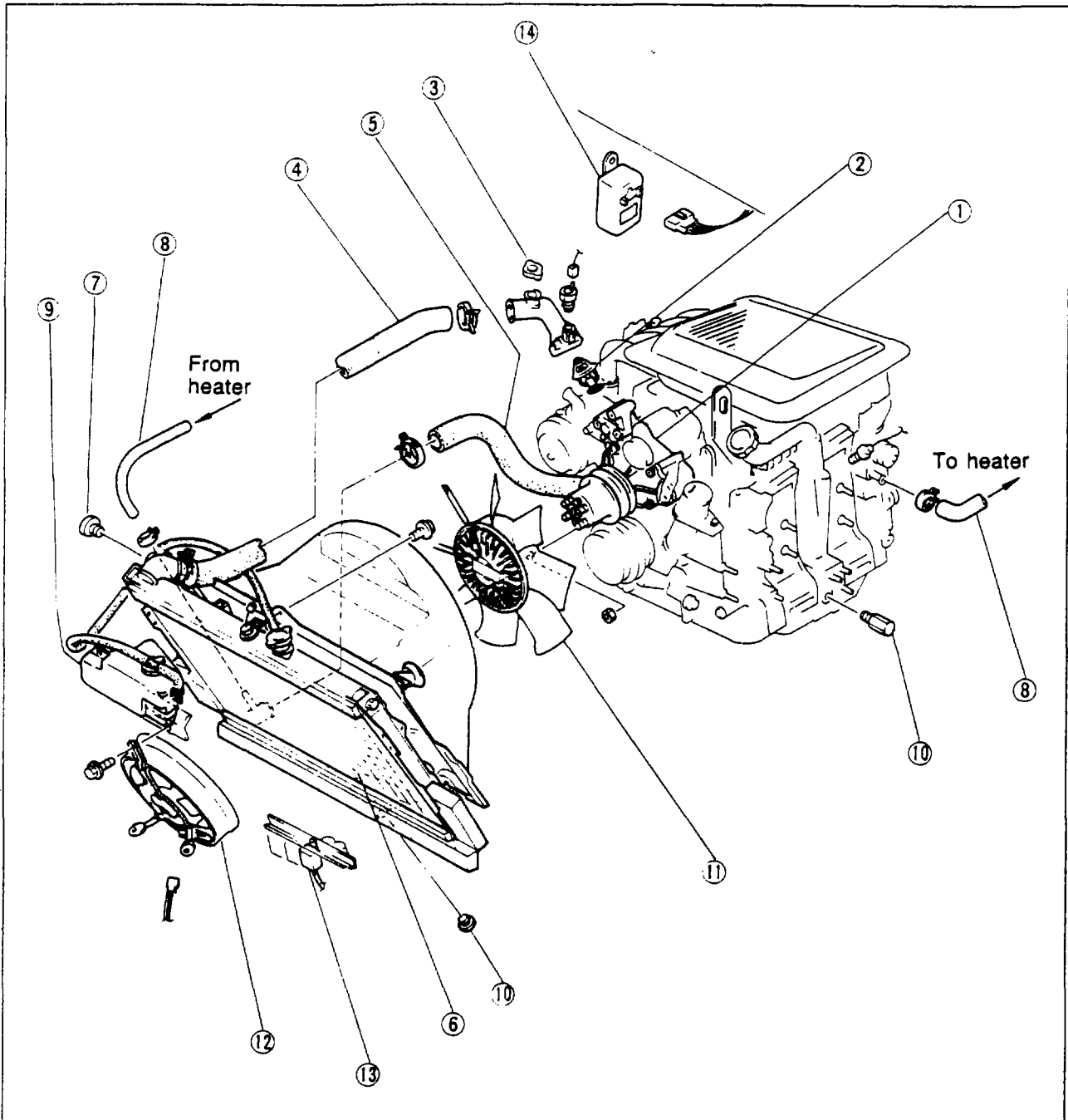
OUTLINE

OUTLINE OF CONSTRUCTION

A new radiator cap including a pressure valve is added to the radiator tank for improved air-bleeding.

STRUCTURAL VIEW

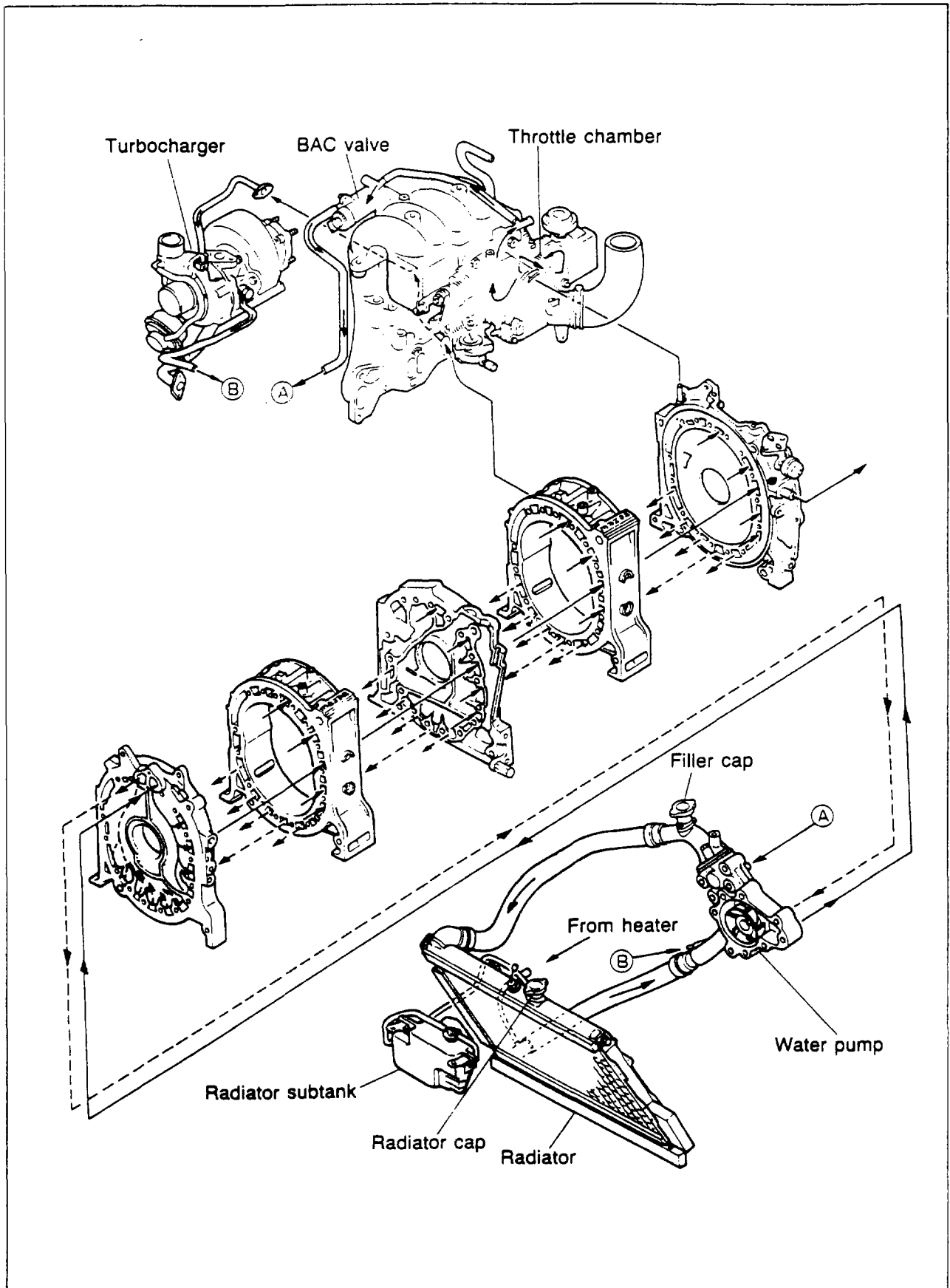
87U03X-001



87U03X-003

- | | |
|------------------------|--------------------------|
| 1. Water pump | 8. Heater hose |
| 2. Thermostat | 9. Coolant reservoir |
| 3. Coolant filler cap | 10. Drain plugs |
| 4. Upper radiator hose | 11. Thermo-modulated fan |
| 5. Lower radiator hose | 12. Electrical fan |
| 6. Radiator | 13. Fan relay |
| 7. Air bleeder plug | 14. Fan control unit |

COOLANT FLOW CHART



SPECIFICATIONS

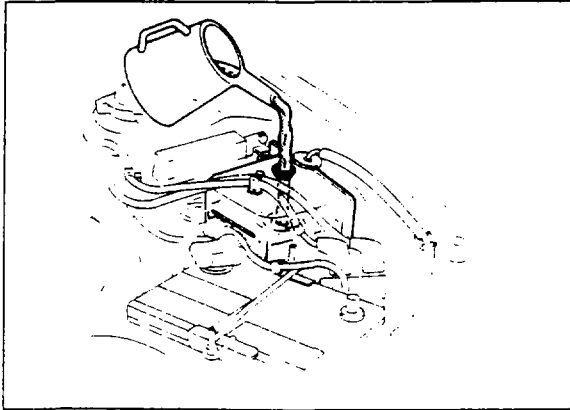
| Items | | Engine models | Turbo | Non-Turbo |
|------------------|-----------------------|--------------------------------|----------------------------------|----------------|
| Cooling method | | | Water cooled, forced circulation | |
| Coolant capacity | With heater | liters (US qt, Imp qt) | 8.7 (9.2, 7.7) | 7.3 (7.7, 6.4) |
| Water pump | Type | | Centrifugal | |
| | Pulley ratio (speed) | | 1.1:2.3 | |
| Thermostat | Type | | Wax, bottom bypass | |
| | Opening temperature | °C (°F) | 80.5—83.5 (197—183) | |
| | Full open temperature | °C (°F) | 95 (203) | |
| | Full open lift | mm (in) | 8 (0.315) or more | |
| Radiator | Type | | Corrugated fin | |
| Filler cap | Relief pressure | kPa (kg/cm ² , psi) | 73—103 (0.75—1.05, 107—14.9) | |
| Cooling fan | Type | | Thermo-modulated | |
| | Number of blades | | 8 | |
| | Outer diameter | mm (in) | 390 (15.35) | |
| Electrical fan | Type | | Electrical | |
| | Capacity | W | 90 | |
| | Number of blades | | 5 | |
| | Outer diameter | mm (in) | 255 (10.04) | |

77U03X-003

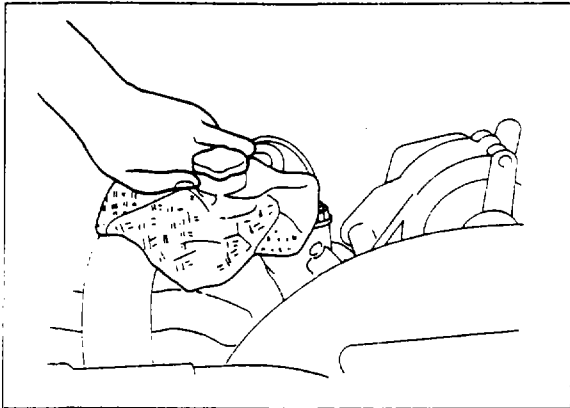
TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|------------------------|--|---------------------|------|
| Coolant leakage | Damaged radiator core seam | Replace | 3—14 |
| | Damaged or loose radiator hose or heater hose | Repair or replace | 3—6 |
| | Damaged or loose water temperature switch | Repair or replace | — |
| | Malfunction of water pump seal | Replace | 3—8 |
| | Damaged or loose thermostat cover or water pump case | Repair or replace | 3—13 |
| | Malfunction of gasket | Replace | — |
| | Damaged or loose tension bolt | Refer to Section 11 | |
| | Damaged sealing rubber | Refer to Section 11 | |
| | Damaged side housing | Refer to Section 11 | |
| | Damaged rotor housing | Refer to Section 11 | |
| Corrosion | Impurities in coolant | Replace | 3—5 |
| Overheating | Water passage clogged | Clean | 3—5 |
| | Thermostat malfunction | Replace | 3—13 |
| | Radiator fins clogged | Clean | 3—14 |
| | Water pump malfunction | Repair or replace | 3—8 |
| | Insufficient coolant | Add | 3—5 |
| | Loose or broken fan belt | Adjust or replace | 3—7 |
| | Thermo-modulated fan malfunction | Replace | 3—7 |
| | Electrical fan malfunction (A/T) | Repair or replace | 3—15 |
| | Coolant filler cap malfunction | Replace | 3—7 |

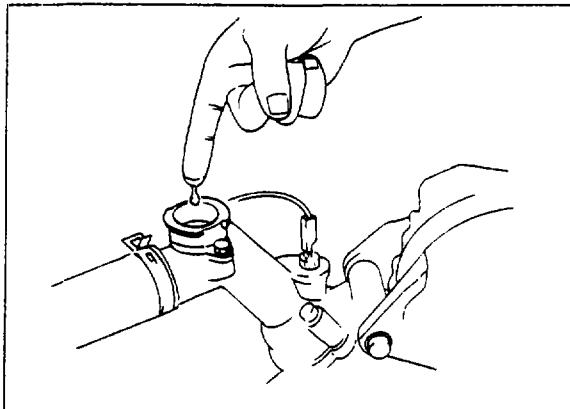
67U03X-006



67U03X-007



67U03X-008



67U03X-009



67U03X-010

INSPECTION

COOLANT Coolant Level

While the coolant is cold, the coolant level should be at the coolant filler port. Bleed air from the air bleeder hole on the radiator and add coolant if necessary. The level in the coolant reservoir should be between the FULL and LOW marks. Add coolant if the level is low.

Warning

Never remove the coolant filler cap while the engine is hot.

Wrap a thick cloth around the cap and carefully remove the cap.

Coolant Quality

1. Check to be sure that there is no excessive deposit of rust or scales around the filler cap or coolant filler port. If necessary, replace the coolant.
2. Check that the coolant is free from oil. If necessary, replace the coolant.

Replacement

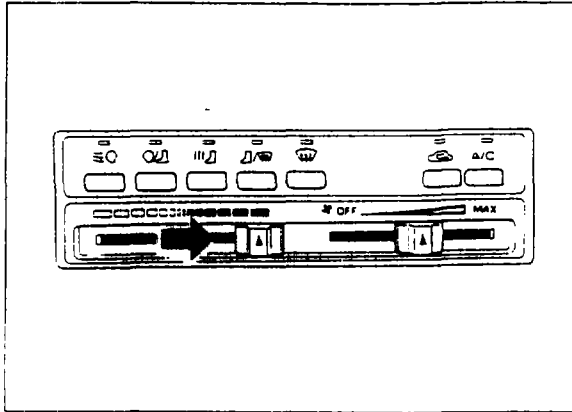
1. Remove the coolant filler cap and the air bleeder plug on the radiator.
2. Open the drain plug in the radiator and in the intermediate housing, let the coolant drain out.

Warning

Never remove the coolant filler cap while the engine is hot.

Wrap a thick cloth around the cap and carefully remove the cap.

3 INSPECTION

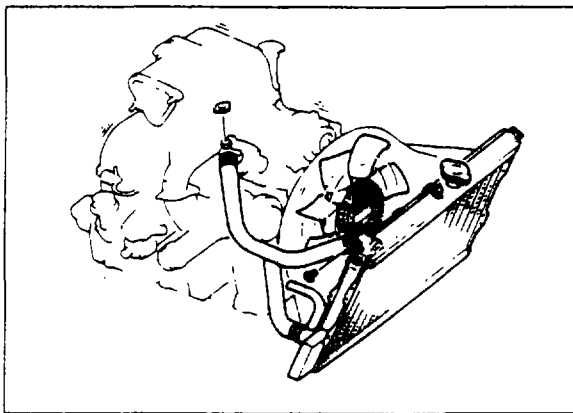


67U03X-011

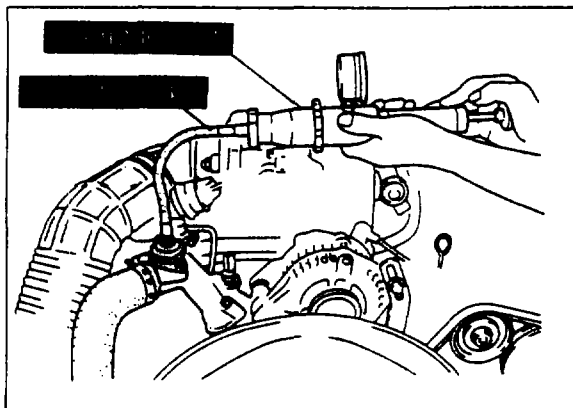
Anti-freeze solution mixture percentage

| Protection | Mixture percentage (by volume) | |
|---|--------------------------------|-------|
| | Anti-freeze solution | Water |
| Above -16°C (3°F) | 35 | 65 |
| Above -26°C (-15°F) | 45 | 55 |
| Above -40°C (-40°F) | 55 | 45 |

87U03X-002



67U03X-013



67U03X-014

- Adjust the heater control to the maximum heat.
- Flush the cooling system with water until all traces of color are gone, then let the system drain completely.

- Retighten the drain plug.
- Add the necessary amount of ethylene glycol-based coolant.

Caution

- Do not use alcohol- or methanol-based coolants.
- Use only soft (demineralized) water in the coolant mixture.

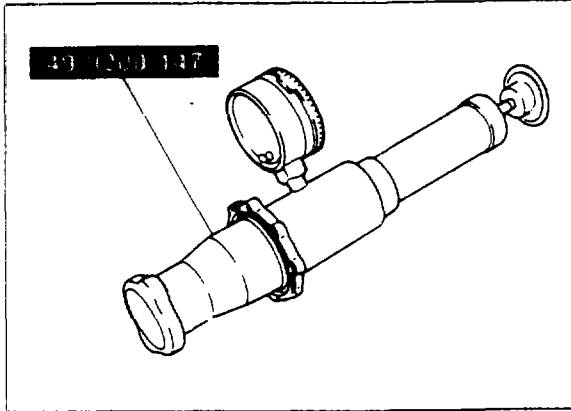
- Run the engine at idle with the filler cap removed, and slowly add additional coolant as necessary.
- Reattach the filler cap and air bleeder plug. Inspect all connections for leaks.

COOLANT CIRCUIT

- Connect a tester using the **adaptor set** (49 9200 145-consists of 49 9200 146 and 49 9200 147) to the coolant filler port.
- Apply pressure of **103 kPa (1.05 kg/cm², 15 psi)** to the circuit.
- Check that the pressure does not decrease. If it does, there may be a coolant leak. Check for any leaks.

Warning

When removing either the filler cap or the tester, loosen it slowly until the pressure drops to zero, and then remove it.

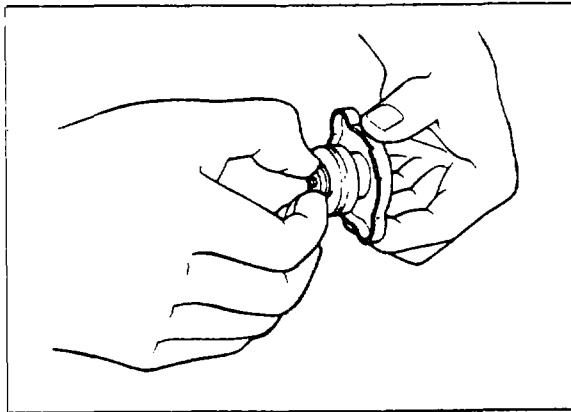


87U03X-003

COOLANT FILLER CAP

Relief Valve

1. Remove water residue from the filler cap valve and the negative-pressure valve seat.
2. Attach the filler cap to a tester using **adaptor B** (49 9200 147). Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm², 11—15 psi)**.
3. Check that the pressure does not decrease.

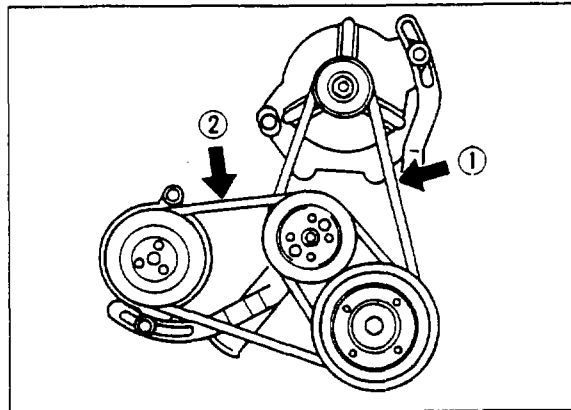


67U03X-016

Negative Pressure Valve

1. Pull the negative pressure valve to open it. Check to be sure it closes completely when released.
2. Check for damage on the contact surfaces, and for cracked or deformed seal packing.

Replace the radiator cap if necessary.



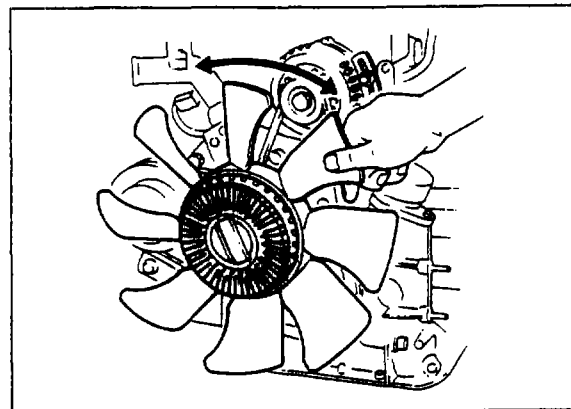
77U03X-102

COOLING FAN BELT

1. Inspect all surfaces of the fan belt. If it is cracked or damaged, replace it.
2. Check the amount of deflection by applying a pressure of about **98N (10 kg, 22 lb)**.

Deflection

1. **Alternator:** 14—17 mm (0.55—0.67 in)
2. **Air pump**
Turbo: 8—10 mm (0.31—0.39 in)
Non-Turbo: 11—13 mm (0.43—0.51 in)



67U03X-018

THERMO-MODULATED FAN

1. Inspect the following items; replace if necessary.
 - (1) Fluid leakage from the fan drive clutch
 - (2) Deformation of the bimetal
 - (3) Excessive play of the cooling fan bearing
 - (4) Grease leakage from the cooling fan bearing
2. When the engine is warm, turn the cooling fan by hand and check that resistance is felt. If not felt, replace the fan drive clutch.

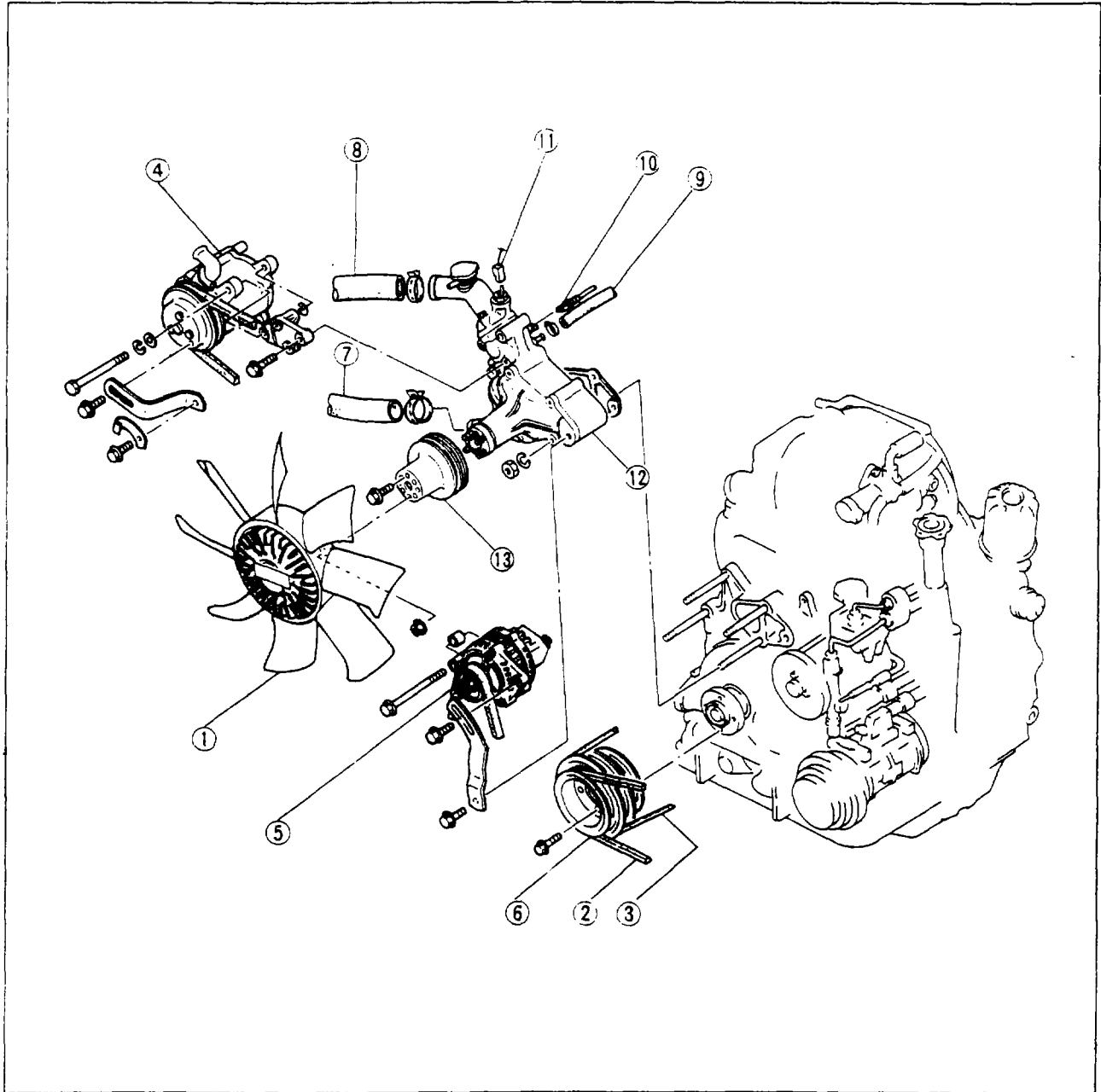
3 WATER PUMP

WATER PUMP

REMOVAL AND INSTALLATION

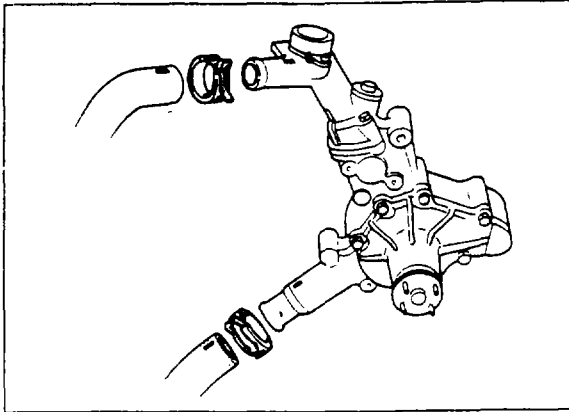
1. Disconnect the negative battery cable.
2. Turn the eccentric shaft so that the top mark of the pulley is aligned with the indicator pin.
3. Drain the engine coolant from the radiator drain plug.
4. Remove in the sequence shown in the figure
5. Install in the reverse order of removal.
6. Check for coolant leakage and check the coolant level.

67U03X-019



87U03X-004

- | | |
|------------------------------|---|
| 1. Cooling fan | 8. Upper radiator hose |
| 2. P/S pump drive belt | 9. Coolant bypass hose |
| 3. A/C compressor drive belt | 10. Water thermo sensor connector |
| 4. Air pump and drive belt | 11. Water thermo switch connector (for A/T) |
| 5. Alternator and drive belt | 12. Water pump |
| 6. Eccentric shaft pulley | 13. Cooling fan pulley |
| 7. Lower radiator hose | |

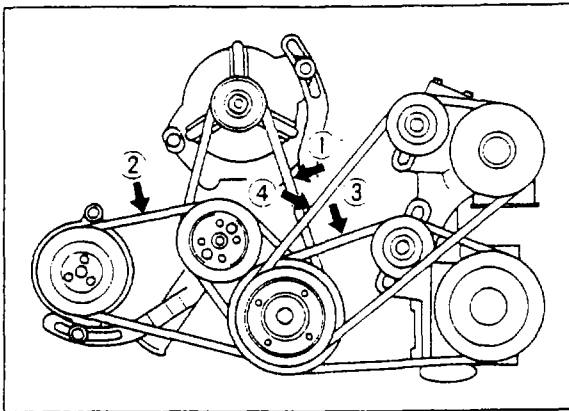


67U03X-021

Installation Note

Upper and lower radiator hoses

Install the hoses with the alignment marks aligned.

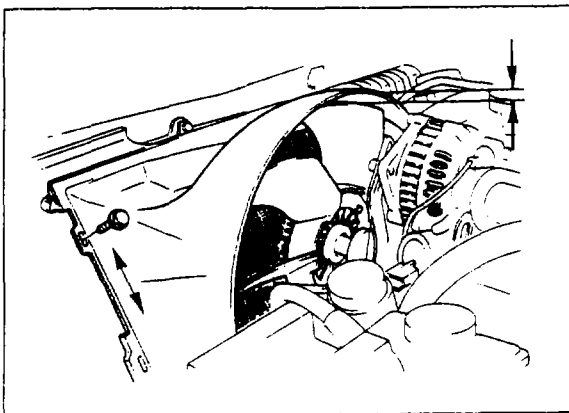


77U03X-103

Drive belt

Adjust the drive belt tension. Apply pressure (**98N, 10kg, 22 lb**) midway between the pulleys, and check the deflection.

| Drive belt | | Deflection | |
|------------|----------------|-------------------------|-------------------------|
| 1 | Alternator | 14—17 mm (0.55—0.67 in) | |
| 2 | Air pump | Turbo | 8—10 mm (0.31—0.39 in) |
| | | Non-turbo | 11—13 mm (0.43—0.51 in) |
| 3 | A/C compressor | 6—8 mm (0.24—0.31 in) | |
| 4 | P/S pump | 11—13 mm (0.43—0.51 in) | |



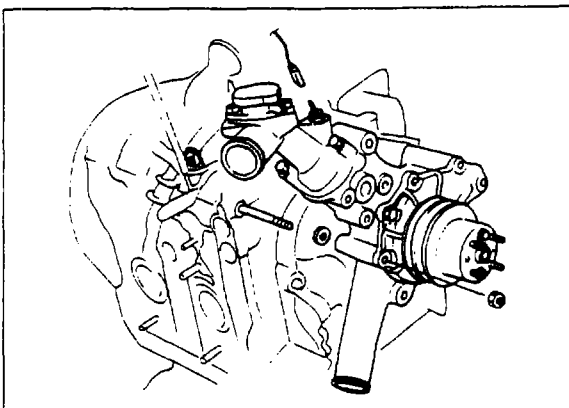
67U03X-023

Cooling fan

Check for cooling fan clearance, if necessary move the radiator cowling and adjust the clearance.

Cooling fan clearance:

16—24 mm (0.63—0.94 in)



67U03X-024

Water pump

1. Install the two spacers on the studs where the gasket does not mount.
2. Install the water pump with a new gasket.

Tightening torque:

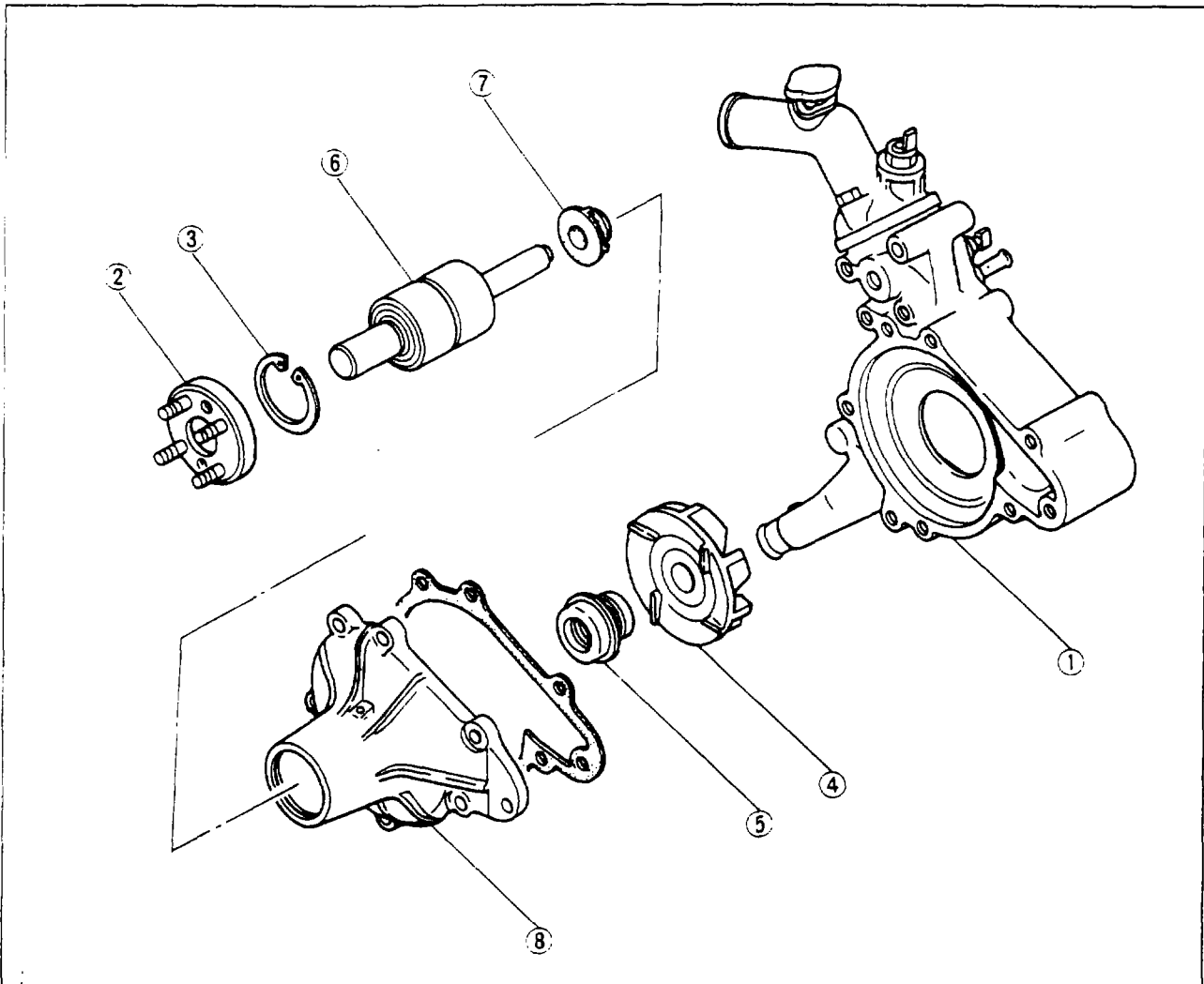
18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

3 WATER PUMP

DISASSEMBLY AND ASSEMBLY

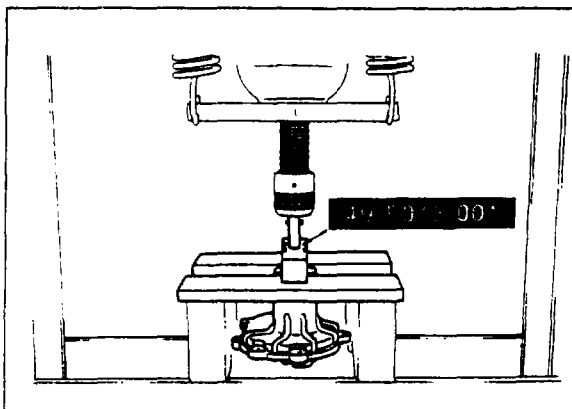
1. Disassemble in the sequence shown in the figure.
2. Assemble in the reverse order of disassembly.

67U03X-025



67U03X-026

- | | |
|--|--------------------|
| 1. Water pump body and thermostat assembly | 5. Water seal |
| 2. Pulley boss | 6. Shaft bearing |
| 3. Snap ring | 7. Baffle plate |
| 4. Impeller | 8. Bearing housing |

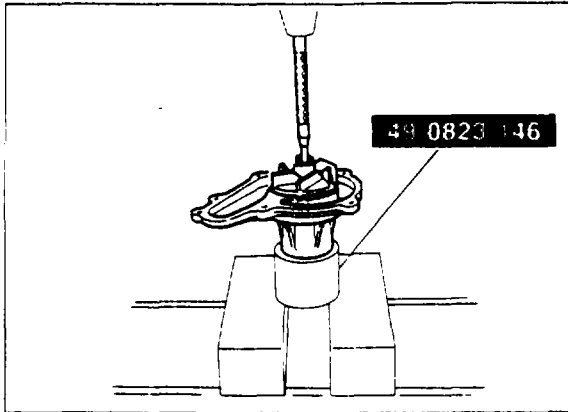


67U03X-027

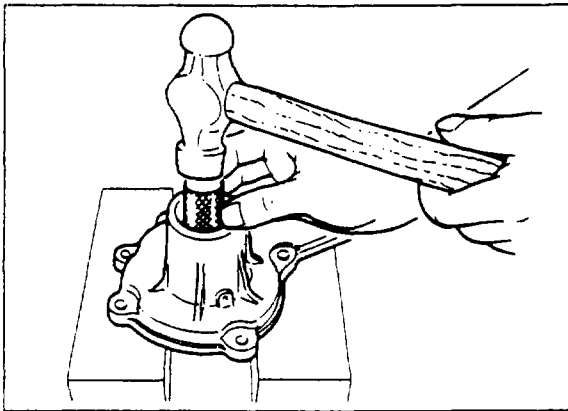
Disassembly Note

Pulley boss

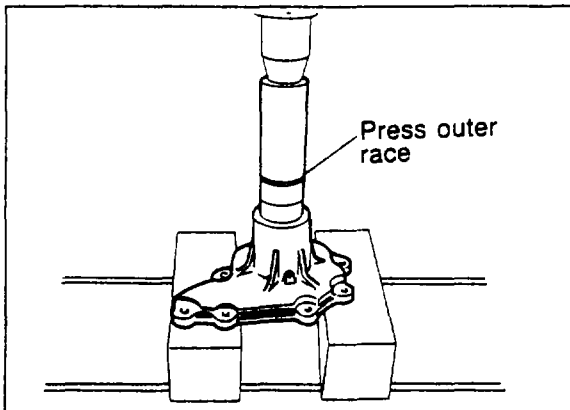
Remove the pulley hub using the **pulley boss puller and installer** (49 F015 001).



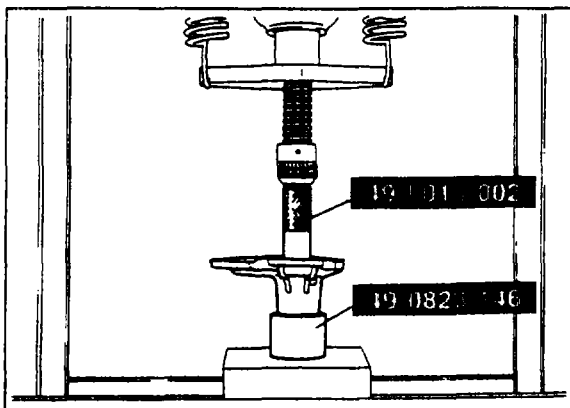
67U03X-028



67U03X-029



67U03X-030



67U03X-031

Shaft bearing, water seal and baffle plate

1. Support the bearing housing using the **support block** (49 0823 146).
2. Press out the shaft bearing.
3. Remove the baffle plate from the shaft bearing.

4. Remove the water seal by tapping lightly with a hammer.

Assembly Note

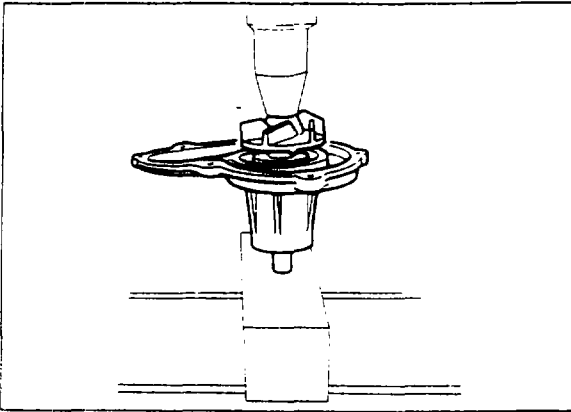
Shaft bearing

1. Install a new baffle plate on the shaft.
2. Install the shaft bearing by pressing against the outer race.
3. Install the snap ring.

Water seal

1. Apply coolant to the new water seal and the shaft.
2. Press the water seal in straight using the **water seal installer** (49 F015 002).

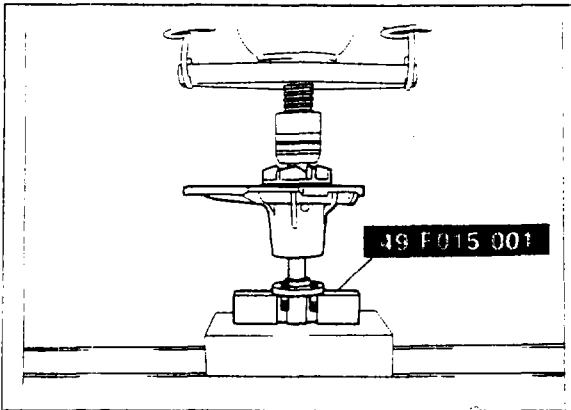
3 WATER PUMP



67U03X-032

Impeller

Support the shaft and press on the impeller so that it is flush with the end of the shaft.



67U03X-033

Pulley boss

Press on the pulley boss using the **pulley boss puller and installer** (49 F015 001).

The shaft protrusion is as specified.

Protrusion: 8.3—9.1 mm (0.33—0.36 in)

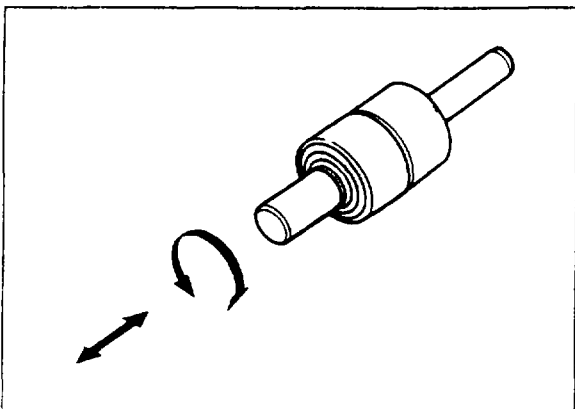


67U03X-034

INSPECTION

Water Pump Body and Bearing Housing

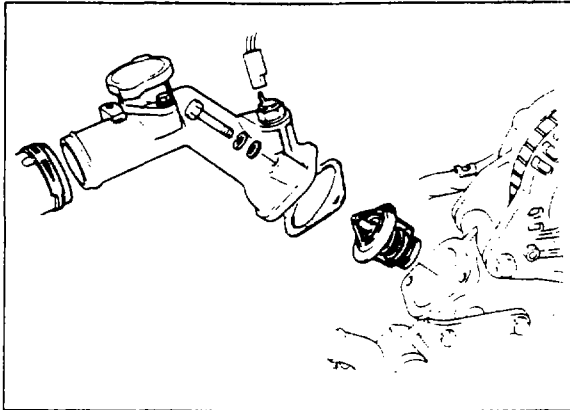
Check the water pump body and bearing housing for cracks or damaged gasket surfaces, replace if necessary.



67U03X-035

Shaft Bearing

Check the shaft bearing for roughness or excessive end play.

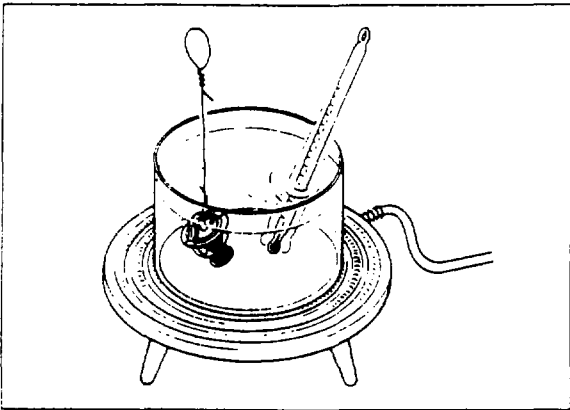


67U03X-036

THERMOSTAT

REMOVAL

1. Drain the coolant from the radiator drain plug.
2. Remove the following parts:
 - (1) Upper radiator hose
 - (2) Water thermo switch connector
 - (3) Thermostat cover
 - (4) Gasket
 - (5) Thermostat



67U03X-037

INSPECTION

Check the operation, replace if necessary.

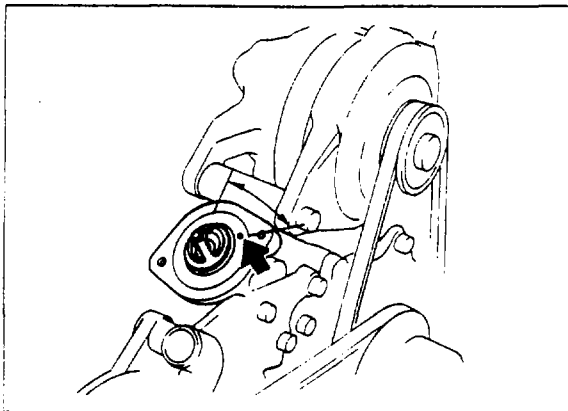
1. Visually check the valve to be sure it is air tight.
2. Place the thermostat and a thermometer in water, gradually increase the water temperature, and check the initial opening temperature, the full-open temperature, and the full-open lift.

Initial opening temperature:

80.5—83.5°C (177—182°F)

Full open temperature: 95°C (203°F)

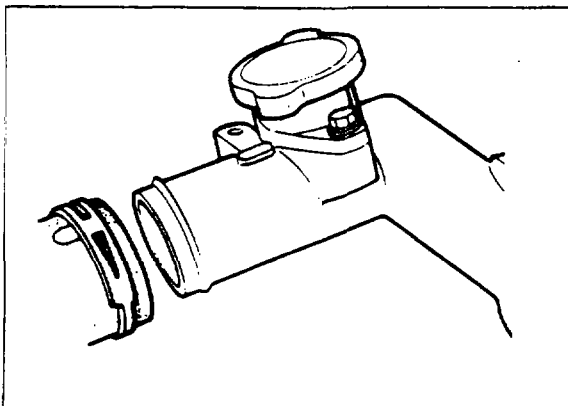
Full open lift: 8.5 mm (0.34 in) min.



67U03X-038

INSTALLATION

1. Install the thermostat with the jiggle pin upward.
2. Install the thermostat cover with a new gasket.
3. Connect the water thermo switch connector.



67U03X-039

4. Install the upper radiator hose with the alignment mark aligned.
5. Refill the coolant.
6. Run the engine, and check for coolant leakage and coolant level.

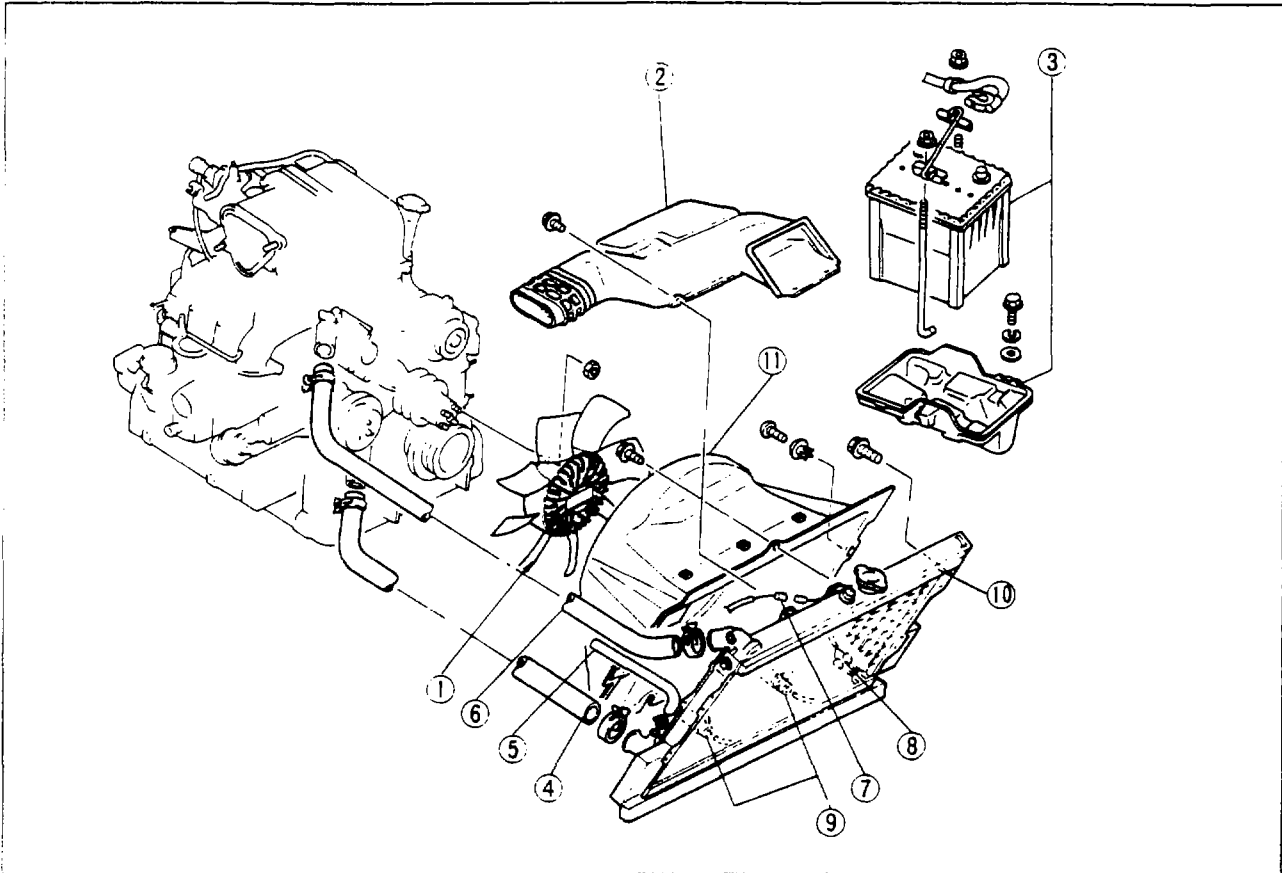
3 RADIATOR

RADIATOR

REMOVAL AND INSTALLATION

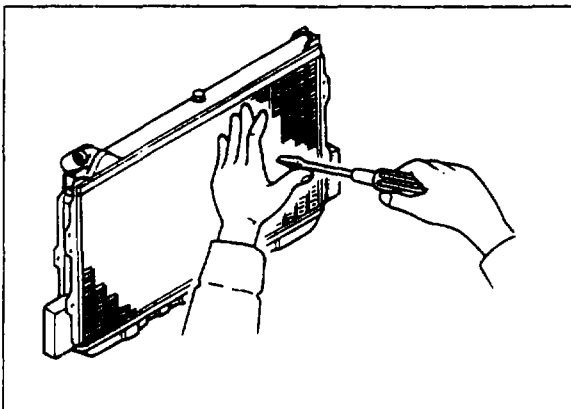
1. Drain the coolant from the radiator drain plug.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.
4. Check the clearance between the cooling fan and cowling.
5. Check for coolant leakage and check the coolant level.

67U03X-040



67U03X-041

- | | |
|------------------------|--|
| 1. Cooling fan | 7. Coolant level sensor connector |
| 2. Air intake pipe | 8. Radiator switch connector |
| 3. Battery and bracket | 9. ATF hose (only for A/T — Plug hoses.) |
| 4. Lower radiator hose | 10. Radiator |
| 5. Heater hose | 11. Radiator cowling |
| 6. Upper radiator hose | |



67U03X-042

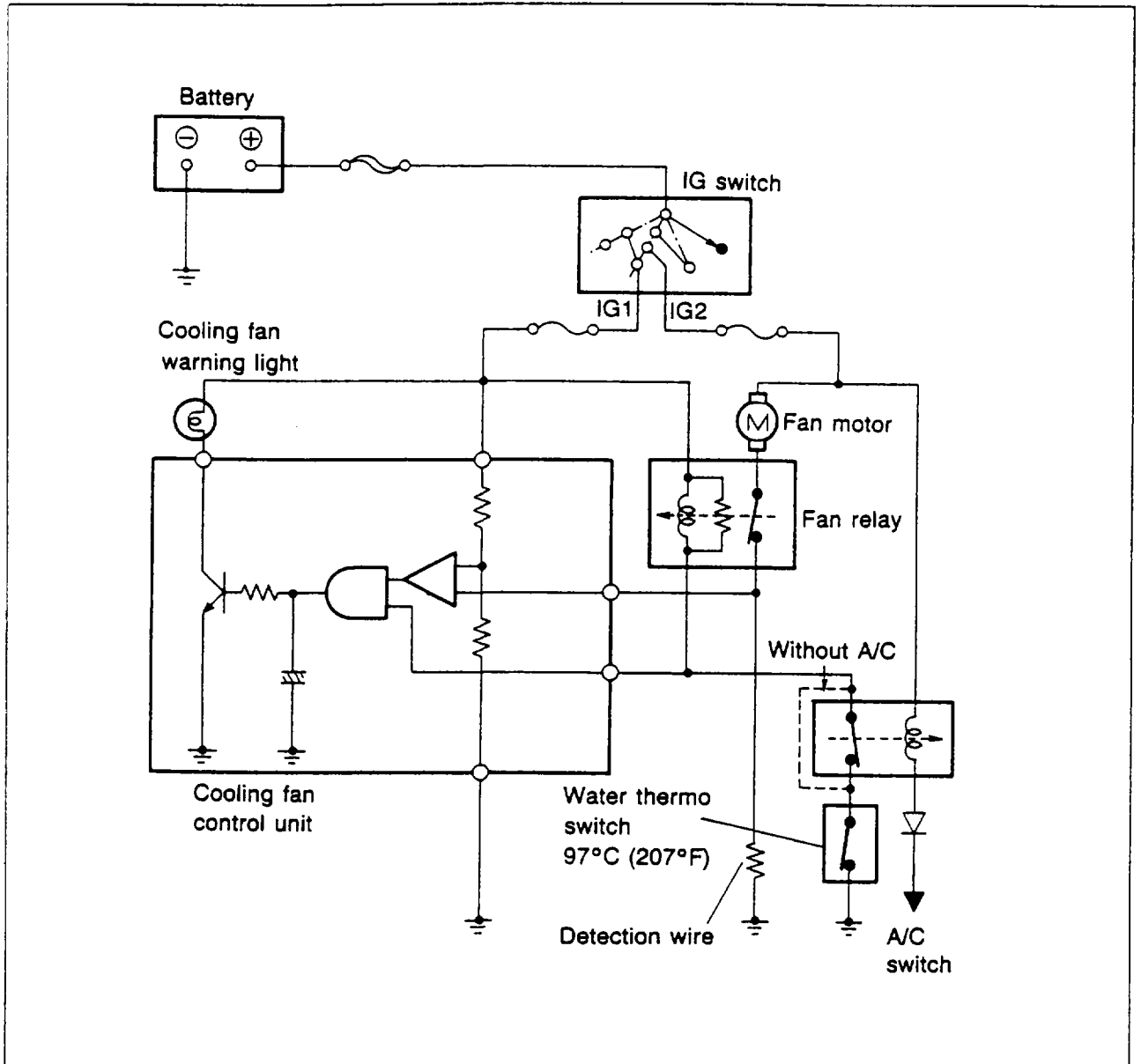
INSPECTION

Check the following points, and repair or replace if necessary.

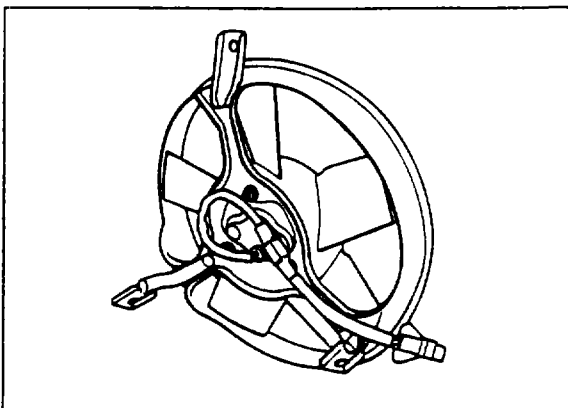
1. Cracks, damage, or water leakage
2. Bent fins (Repair by using a screwdriver.)
3. Distorted or bent radiator inlet

ELECTRICAL FAN

SYSTEM CIRCUIT



77U03X-104



67U03X-044

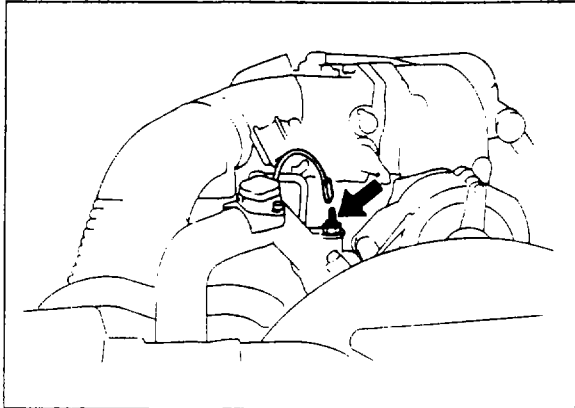
INSPECTION

Fan Motor

1. Connect an ammeter and the battery to the fan motor connectors.
2. Check the fan motor for the operation and the current. If necessary, replace the fan motor.

Standard current: 2.4—2.6 A

3 ELECTRICAL FAN



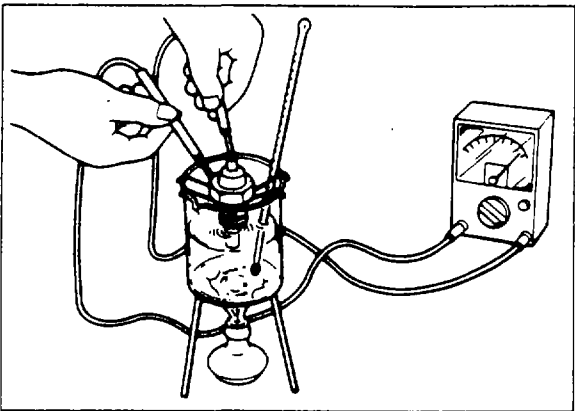
67U03X-045

Water Thermo Switch

1. Remove the water thermo switch for the electrical fan.

Note

Confirm that the ignition switch is OFF. If not, the fan will operate when the connector is removed.

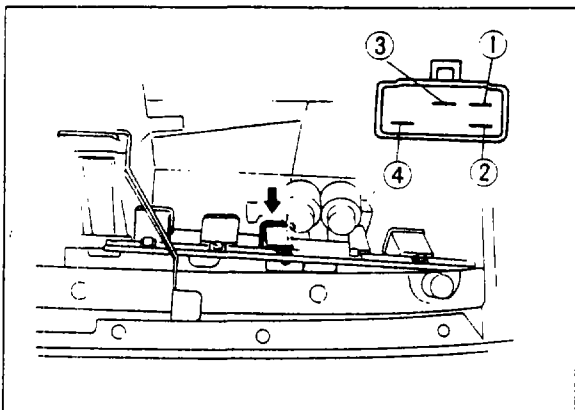


67U03X-046

2. Place the water thermo switch in water.
3. Check the continuity with a circuit tester.

Continuity 90°C (194°F) or less
No continuity..... 97°C (207°F) or more

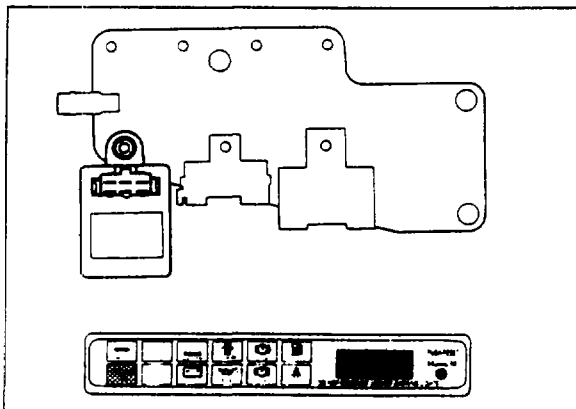
4. If necessary, replace the water thermo switch.



67U03X-047

Fan Relay

1. Check for continuity between terminals 1 and 2.
2. Check for continuity between terminals 3 and 4.
3. Apply battery voltage between terminal 1 and terminal 2, and check for no continuity between terminals 3 and 4.
4. If necessary, replace the fan relay.



67U03X-048

Fan Control Unit

1. Turn the ignition switch ON, and check that the cooling fan warning light comes on.
2. Run the engine, and check that the cooling fan warning light goes out.
3. Disconnect the fan motor connector.
4. Disconnect the water thermo switch, and check that the cooling fan warning light comes on within 6 seconds.
5. Connect the water thermo switch.
6. Short across the fan motor connector with a jumper wire.
7. Disconnect the water thermo switch, and check that the cooling fan warning light comes on in 6 seconds.
8. If necessary, replace the cooling fan unit or warning light.