

ENGINE COOLING SYSTEM

2-5

	Type		Cross flow, pressure type		
	Radiator	Radiation capacity	Non-TURBO	MT (Except 4WD dual-range)	
AT and 4WD dual-range				45.822 kW (39,400 kcal/h, 156,339 BTU/h)	
TURBO		MT		47.683 kW (41,000 kcal/h, 162,688 BTU/h)	
		AT	Except Canada	56.522 kW (48,600 kcal/h, 192,845 BTU/h)	
Canada			47.683 kW (41,000 kcal/h, 162,688 BTU/h)		
Core dimensions		Non-TURBO and TURBO MT		645 x 322 x 16 mm (25.39 x 12.68 x 0.63 in)	
	TURBO AT		645 x 322 x 32 mm (25.39 x 12.68 x 1.26 in)		
Pressure range in which cap valve is open			Above 88 ± 10 kPa (0.9 ± 0.1 kg/cm ² , 13 ± 1.4 psi) Below -4.9 to -10 kPa (-0.05 to -0.1 kg/cm ² , -0.7 to -1.4 psi)		
Fins			Corrugated fin type		
Reserve tank	Capacity		1.2ℓ (2.5 US pt, 2.1 Imp pt)		

SERVICE DATA

Water pump	Clearance between impeller and case		0.5 – 0.9 mm (0.020 – 0.035 in)
	Distance between pulley attaching surface of hub and pump case surface, which mates with gasket	A/C equipped model	103.6 – 104.2 mm (4.08 – 4.10 in)
		A/C not equipped model	109.7 – 110.1 mm (4.32 – 4.33 in)

COMPONENT PARTS

Water Pump

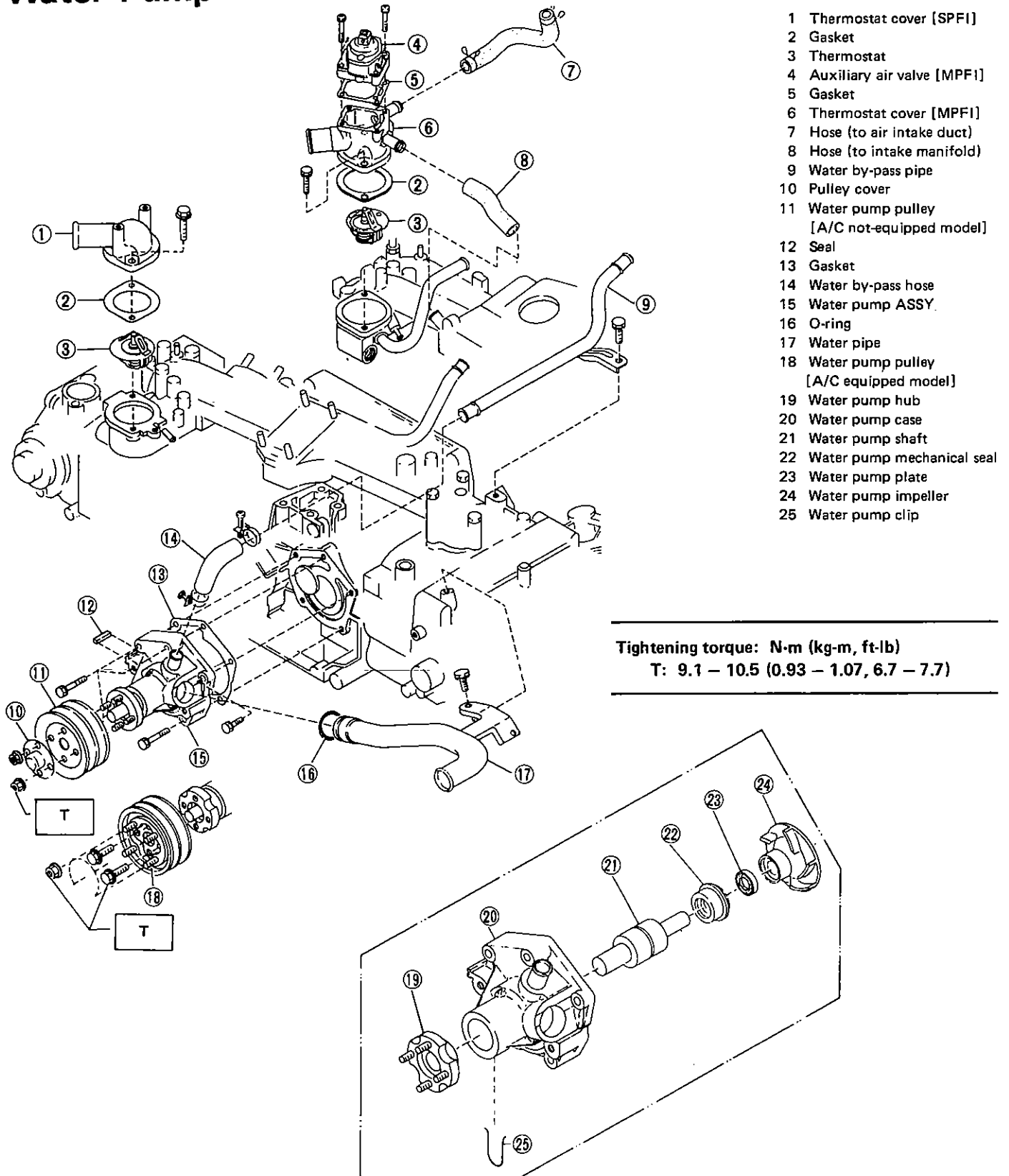
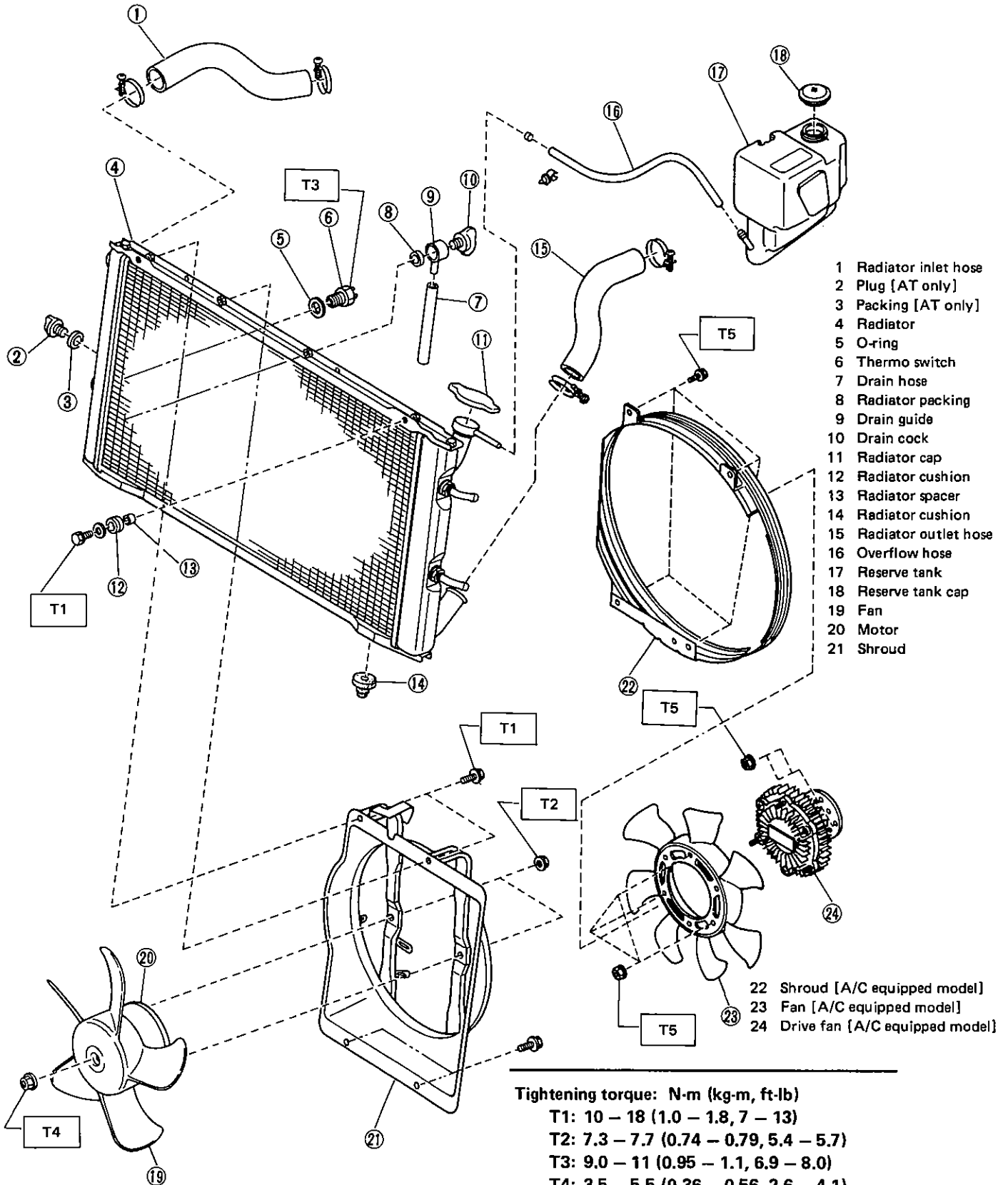


Fig. 4

Radiator and Cooling Fan



- 1 Radiator inlet hose
- 2 Plug [AT only]
- 3 Packing [AT only]
- 4 Radiator
- 5 O-ring
- 6 Thermo switch
- 7 Drain hose
- 8 Radiator packing
- 9 Drain guide
- 10 Drain cock
- 11 Radiator cap
- 12 Radiator cushion
- 13 Radiator spacer
- 14 Radiator cushion
- 15 Radiator outlet hose
- 16 Overflow hose
- 17 Reserve tank
- 18 Reserve tank cap
- 19 Fan
- 20 Motor
- 21 Shroud

Tightening torque: N-m (kg-m, ft-lb)

T1	10 – 18 (1.0 – 1.8, 7 – 13)
T2	7.3 – 7.7 (0.74 – 0.79, 5.4 – 5.7)
T3	9.0 – 11 (0.95 – 1.1, 6.9 – 8.0)
T4	3.5 – 5.5 (0.36 – 0.56, 2.6 – 4.1)
T5	5.5 – 9.5 (0.56 – 0.97, 4.1 – 7.0)

Fig. 5

SERVICE PROCEDURE

Water Pump

REMOVAL

- 1) Drain coolant and disconnect the radiator outlet hose and water by-pass hose from the water pump.
- 2) Loosen pulley nuts so that they can be turned by hand.
- 3) Loosen alternator ASSY mounting bolts and remove drive belt.
- 4) Remove front belt cover. Refer to 2-3 "Engine Disassembly" for procedures.

Be careful not to spill coolant on drive belt. If spilled, wipe clean immediately.

DISASSEMBLY

- a. Do not disassemble water pump unless absolutely necessary. It is advisable to replace water pump ASSY.
- b. In case of disassembling water pump, be sure to check "runout" of water pump hub after assembling. If it is outside specifications, replace water pump ASSY.

- 1) Remove water pump pulley.
- 2) Insert a screwdriver into the slit in water pump case and lift end of water pump clip.

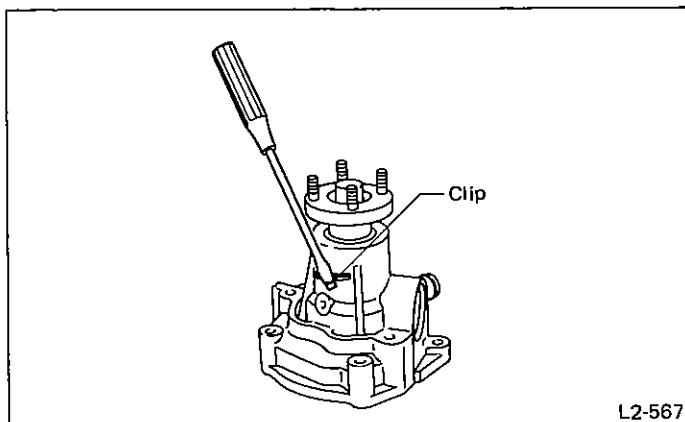


Fig. 6

- 3) Extract water pump clip with pliers.
- 4) Using a press, drive hub from water pump ASSY.

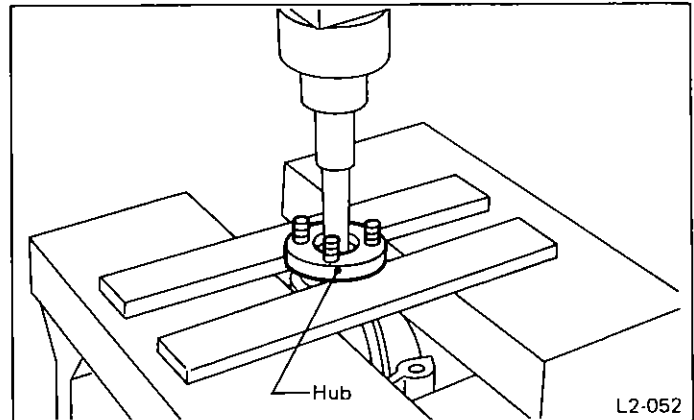


Fig. 7

- 5) Remove shaft, impeller, and mechanical seal from water pump case as a unit.

Do not press the shaft, or the bearings will be damaged. Press the bearing outer race.

- 6) Remove impeller from shaft with a press.

INSPECTION

- 1) Clean all the disassembled parts thoroughly.
- 2) Inspect the pump shaft for wear, damage, and operation.
- 3) Inspect the impeller surface that contacts the mechanical seal for wear and damage.
- 4) Inspect the mechanical seal and plate for wear, crack and damage.
- 5) Inspect the other parts for crack, wear and damage, and replace if defective.

ASSEMBLY

- 1) Heat water pump case to a temperature of 80 to 100°C, (176 to 212°F), and press shaft into bore in water pump case. Do not press any section other than outer race.

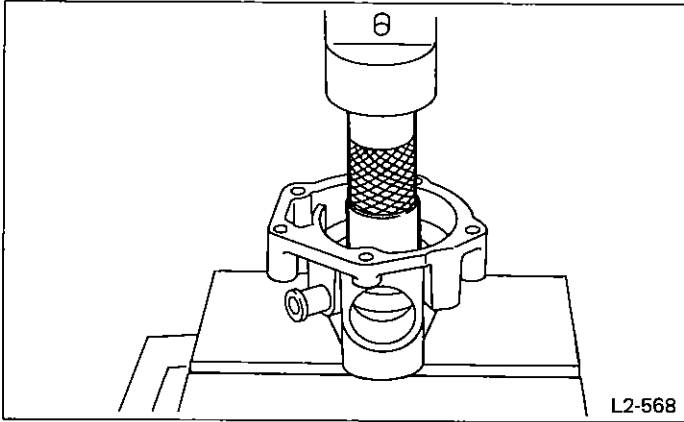


Fig. 8

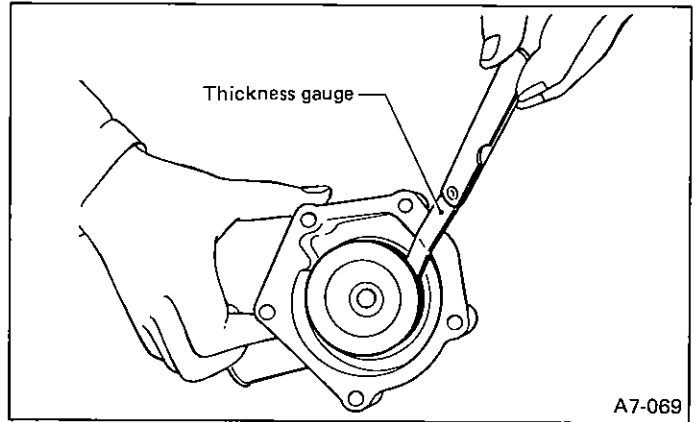


Fig. 10

2) **Be sure to install a new mechanical seal.**

Press the seal into the pump case with the carbon washer of the seal facing the impeller.

3) Apply coolant on the sliding surface between mechanical seal and impeller.

With a thin coat of oil on the shaft surface, install the impeller onto the pump shaft with a press.

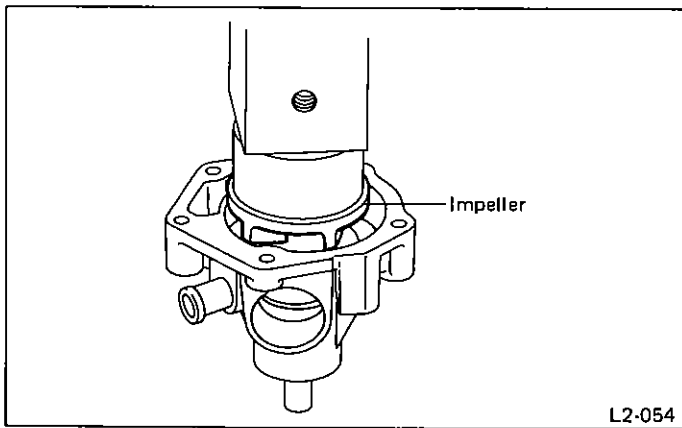


Fig. 9

5) Before pressing, apply oil on the pump shaft. Support the impeller side of the pump shaft end and install the hub by using a press until the distance "L" between the pump case surface, which mates with the gasket, and the pulley attaching surface of the hub becomes specified value.

After pressing water pump hub into place, measure "runout". If it exceeds 0.05 mm (0.0020 in), replace water pump ASSY.

"L":

A/C equipped model

103.6 – 104.2 mm (4.08 – 4.10 in)

A/C not-equipped model

109.7 – 110.1 mm (4.32 – 4.33 in)

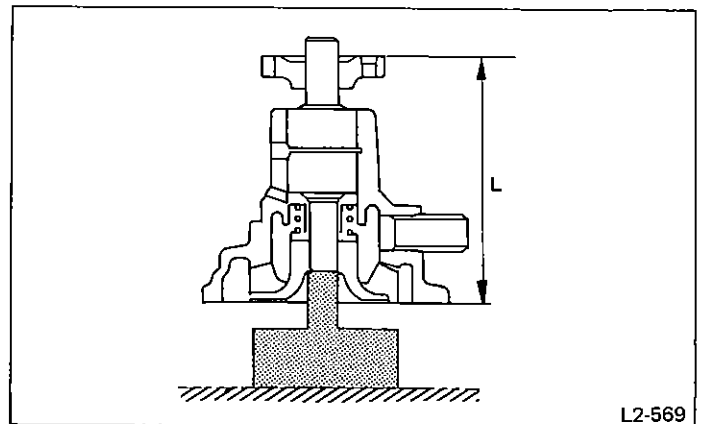


Fig. 11

4) Check for the following clearance after installation and correct if defective.

**Clearance between impeller and pump case:
0.5 – 0.9 mm (0.020 – 0.035 in)**

6) Looking through slit in water pump case, ensure that groove on water pump case is aligned with groove on outer surface of shaft.

Insert water pump clip into grooves and drive it into place with a plastic hammer.

Be careful not to deform the clip.

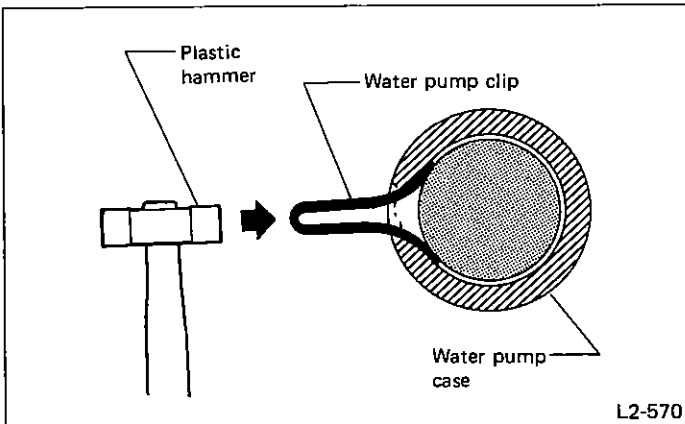


Fig. 12

7) Rotate water pump shaft by hand. It should turn smoothly without emitting noise.

INSTALLATION

Installation is in the reverse order of removal procedures. Observe the following:

- 1) Replace the gasket with a new one.
- 2) After reinstalling the water pump, adjust the drive belt tension and run the engine to make sure that neither water leakage nor abnormal noise exists.

Thermostat

REMOVAL AND INSTALLATION

- 1) Remove the thermostat case cover and gasket, and pull out the thermostat.
- 2) Install the thermostat in the intake manifold, and install the thermostat cover together with a gasket.

- a. When reinstalling the thermostat, use a new gasket.
- b. The thermostat must be installed with the jiggle pin upward.

INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:
86.5 – 89.5°C (188 – 193°F)
Fully opens:
100°C (212°F)

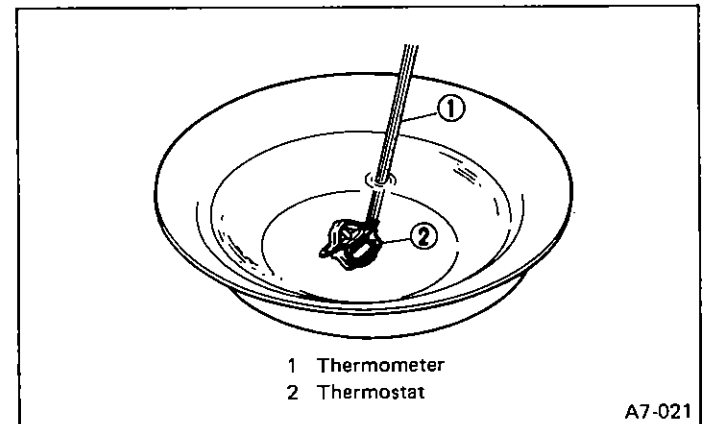


Fig. 13

Thermometer

INSPECTION

- 1) To test the thermometer, connect the gauge section and the sensor unit in series.
- 2) The thermometer performance data are shown below.

Temperature	Resistance
[120°C (248°F)]	14.9 – 17.3Ω
100°C (212°F)	26.2 – 29.3Ω
80°C (176°F)	47.5 – 56.8Ω
[50°C (122°F)]	133.9 – 178.9Ω

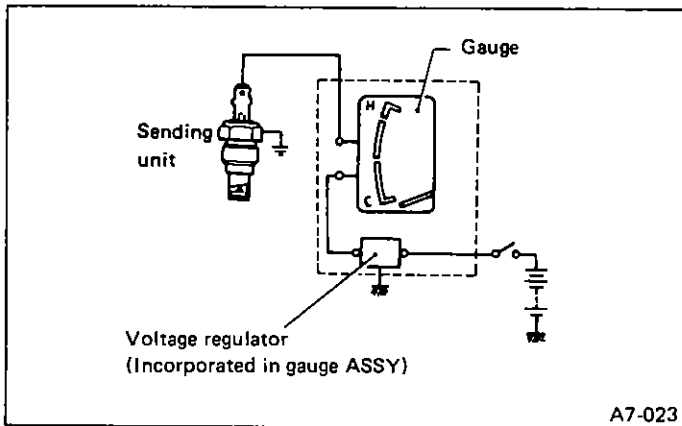


Fig. 14

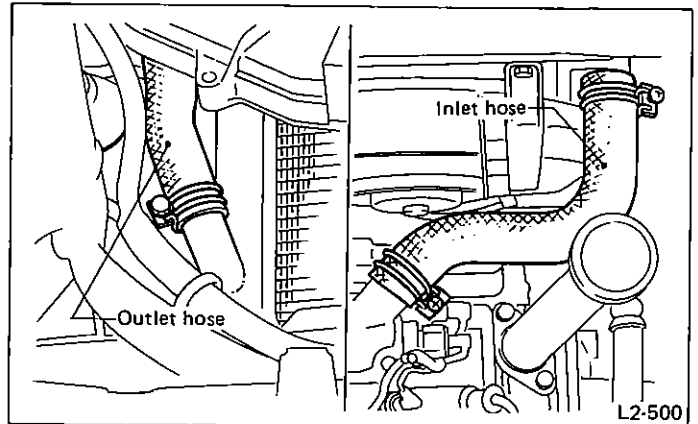


Fig. 15

PRECAUTIONS FOR HANDLING

- 1) When testing, do not apply battery voltage directly to the temperature gauge or sensor unit, because these two parts are designed to be connected in series. If the battery voltage is applied to only one of them, the heating wire on gauge or thermistor may be damaged.
- 2) Connect the wire firmly to the terminals. When the gauge reading is abnormal, inspect not only the gauge but also the grounding wire or the terminal for loose connections.
- 3) Use care not to short or ground the terminals or wirings, otherwise troubles described in 1) may occur.
- 4) Use care not to drop or strike either the gauge or unit, since these are precision products.
- 5) Make sure that the gauge needle indicates C when the ignition switch is not turned on.

- 4) Disconnect oil cooler's inlet and outlet hoses at radiator location (A/T model).

Catch both coolant and oil remained in the hoses into containers.

- 5) Disconnect lead wire connector from fan motor.
- 6) Disconnect main harness connector from thermoswitch.

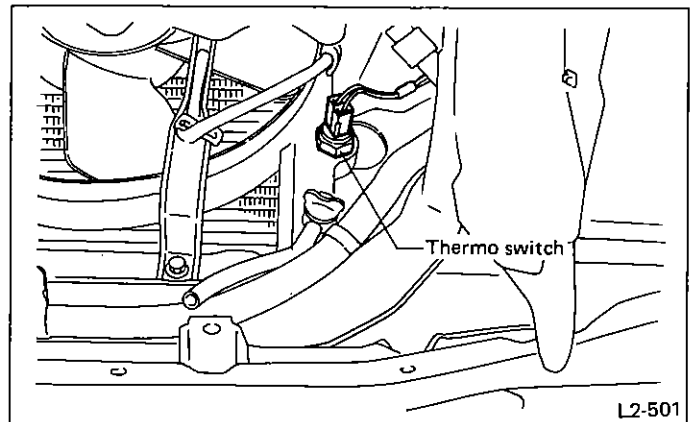


Fig. 16

- 7) Remove two radiator mounting bolts.
- 8) Lift radiator up and away from vehicle with radiator cap facing up to prevent remaining coolant from spilling.

Radiator

REMOVAL

- 1) Drain coolant.
- 2) Disconnect ground cable from battery terminal.
- 3) Loosen hose clamps and disconnect both inlet and outlet hoses from radiator.

INSPECTION

Check all removed parts and replace if defective.

- 1) A clogged radiator should be cleaned.
- 2) A deteriorated hose should be replaced.
- 3) Check the valve opening pressure of the pressure cap with a cap tester. If the pressure is out of specification, replace the cap ASSY.

Cap valve opening pressure:

Positive pressure side

78.5 to 98.1 kPa

(0.8 to 1.0 kg/cm², 11.4 to 14.2 psi)

Negative pressure side

-4.9 to -9.8 kPa

(-0.05 to -0.1 kg/cm², -0.7 to -1.4 psi)

- 3) Tighten two radiator mounting bolts.
- 4) Connect main harness connector to thermostwitch.
- 5) Connect lead wire connector to fan motor.
- 6) Connect both inlet and outlet hoses to radiator with marked sides facing up and tighten with hose clamps.

Be careful not to twist hoses.

- 7) Connect both inlet and outlet hoses to radiator's oil cooler and tighten with hose clamps (A/T model).
- 8) Pour coolant into radiator.
- 9) Connect ground cable to battery terminal.

INSTALLATION

- 1) Attach radiator mounting cushions to pins on the lower side of radiator.

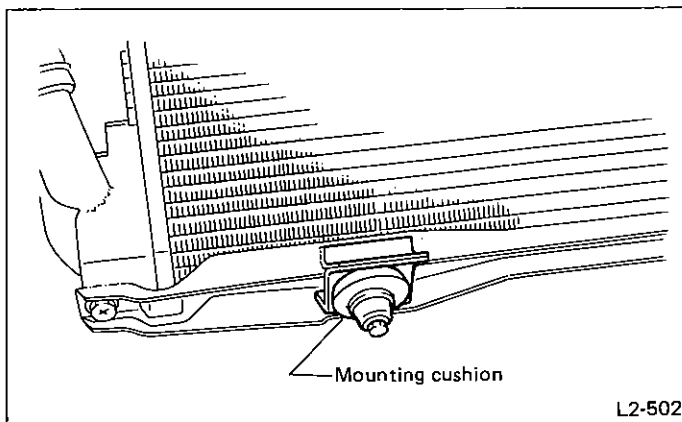


Fig. 17

- 2) Fit cushions, on lower side of radiator, into holes on body side and install radiator.

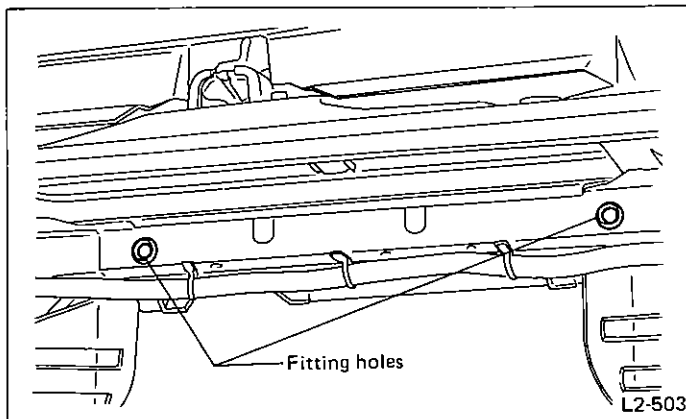


Fig. 18

Cooling Fan and Fan Motor

REMOVAL

- 1) Disconnect ground cable from battery terminal.
- 2) Disconnect lead wire connector from fan motor and remove harness from shroud.
- 3) Remove bolts holding shroud to radiator and detach shroud.

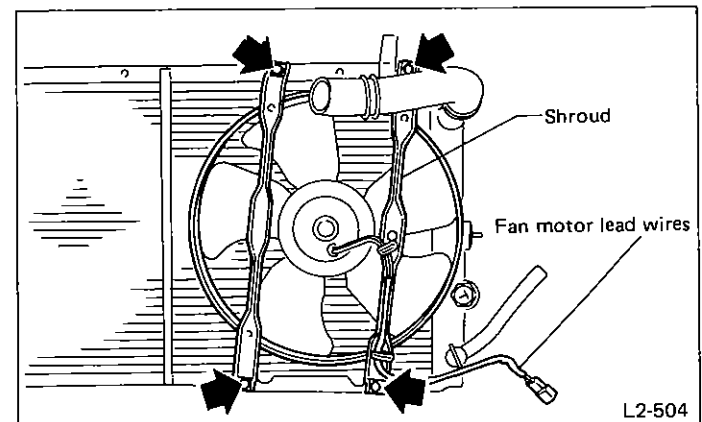


Fig. 19

- 4) Remove fan motor mounting nuts and detach fan motor from shroud.
- 5) Remove cooling fan mounting nuts and detach cooling fan from fan motor.

INSTALLATION

Installation is in the reverse order of removal procedures. Observe the following:

- 1) Before installing cooling fan motor, apply a coat of sealant to threads and tighten nuts.
- 2) Make sure cooling fan does not come into contact with shroud when installed.
- 3) After installation, make sure there is no unusual noise or vibration when fan is rotated.

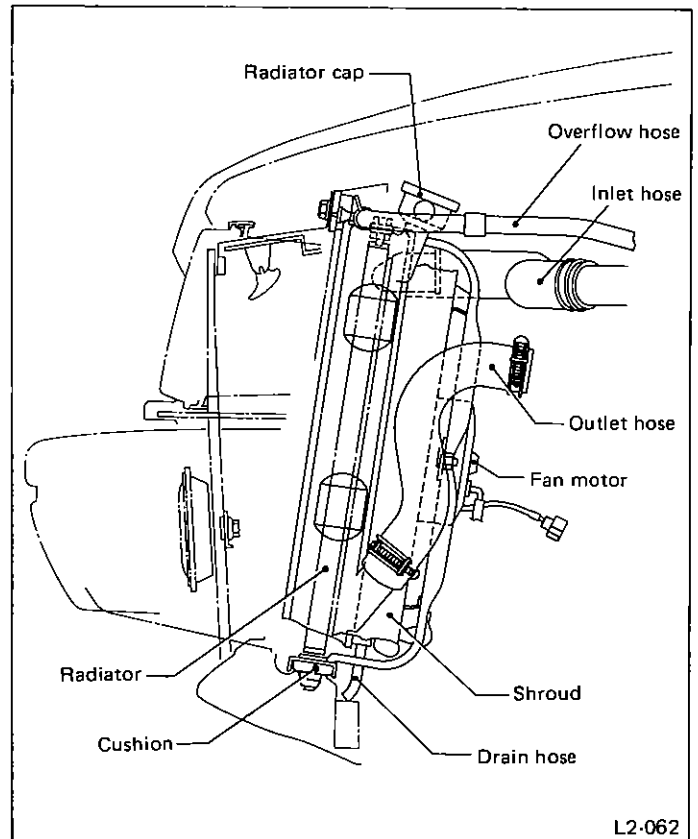


Fig. 20

TROUBLESHOOTING

Trouble	Possible cause	Corrective action
Over-heating	<ul style="list-style-type: none"> a. Insufficient coolant. b. Loose drive belt. c. Oil on drive belt. d. Malfunction of thermostat. e. Malfunction of water pump. f. Clogged coolant passage. g. Improper ignition timing. h. Clogged or leaking radiator. i. Improper engine oil. j. Air-fuel mixture too thin. k. Excessive back pressure in exhaust system. l. Insufficient clearance between piston and cylinder. m. Slipping clutch. n. Dragging brake. o. Improper transmission oil. p. Defective thermostat. q. Malfunction of electric fan. 	<ul style="list-style-type: none"> Replenish coolant, inspect for leakage, and repair. Adjust drive belt tension. Replace. Replace. Repair or replace. Clean. Adjust. Clean or repair, or replace. Replace. Inspect and repair fuel system. Clean or replace. Adjust or replace. Repair or replace. Adjust. Replace. Replace. Replace thermostwitch or motor.
Over-cooling	<ul style="list-style-type: none"> a. Atmospheric temperature extremely low. b. Defective thermostat. 	<ul style="list-style-type: none"> Partly cover radiator front area. Replace.
Coolant leaks	<ul style="list-style-type: none"> a. Loosened or damaged connecting units on hoses. b. Leakage from water pump. c. Leakage from intake manifold. d. Leakage around cylinder head gasket. e. Damaged or cracked cylinder head and crankcase. f. Damaged or cracked thermostat case. g. Leakage from radiator. 	<ul style="list-style-type: none"> Repair or replace. Repair or replace. Repair or replace. Retighten cylinder head nuts or replace gasket. Repair or replace. Repair or replace. Repair or replace.
Noise	<ul style="list-style-type: none"> a. Defective drive belt. b. Defective electric fan. c. Defective water pump bearing. d. Defective water pump mechanical seal. 	<ul style="list-style-type: none"> Replace. Replace. Replace. Replace.