ENGINE COOLING SYSTEM 2-5

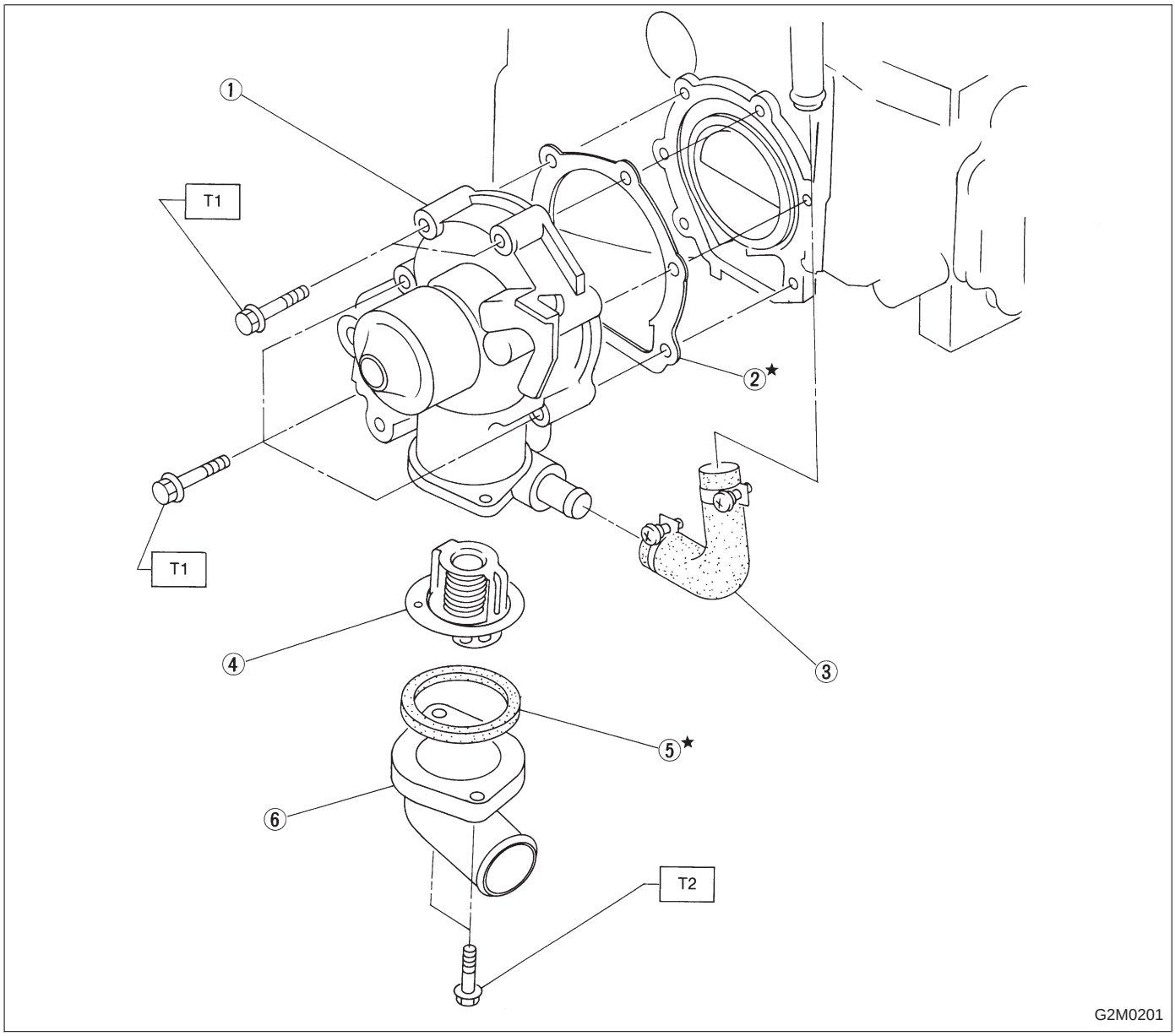
1. Specifications

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)		1800 cc	6.2 (6.6, 5.5)
		2200 cc	5.8 (6.1, 5.1)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed—total engine coolant head	760 rpm — 0.3 mAq (1.0 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed—total engine coolant head	3,000 rpm — 5.0 mAq (16.4 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed—total engine coolant head	6,000 rpm — 23.0 mAq (75.5 ftAq)
		Engine coolant temperature	85°C (185°F)
	Impeller diameter		76 mm (2.99 in)
	Number of impeller vanes		8
	Pump pulley diameter		60 mm (2.36 in)
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	Fully opened		91°C (196°F)
	Valve lift		9.0 mm (0.354 in) or more
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor		90 W
	Fan diameter x Blade		320 mm (12.60 in) x 5
Radiator	Type		Down flow, pressure type
	Core dimensions		691 x 340 x 16 mm (27.20 x 13.39 x 0.63 in)
	Pressure range in which cap valve is open		Above: 88±10 kPa (0.9±0.1 kg/cm^2, 12.8±1.4 psi) Below: −4.9 to −9.8 kPa (−0.05 to −0.1 kg/cm^2, −0.7 to −1.4 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

2. Service Data

Water pump	Clearance between impeller and case	Standard Limit	0.5 — 0.7 mm (0.020 — 0.028 in) 1.0 mm (0.039 in)
	“Thrust” runout of impeller end		0.5 mm (0.020 in)

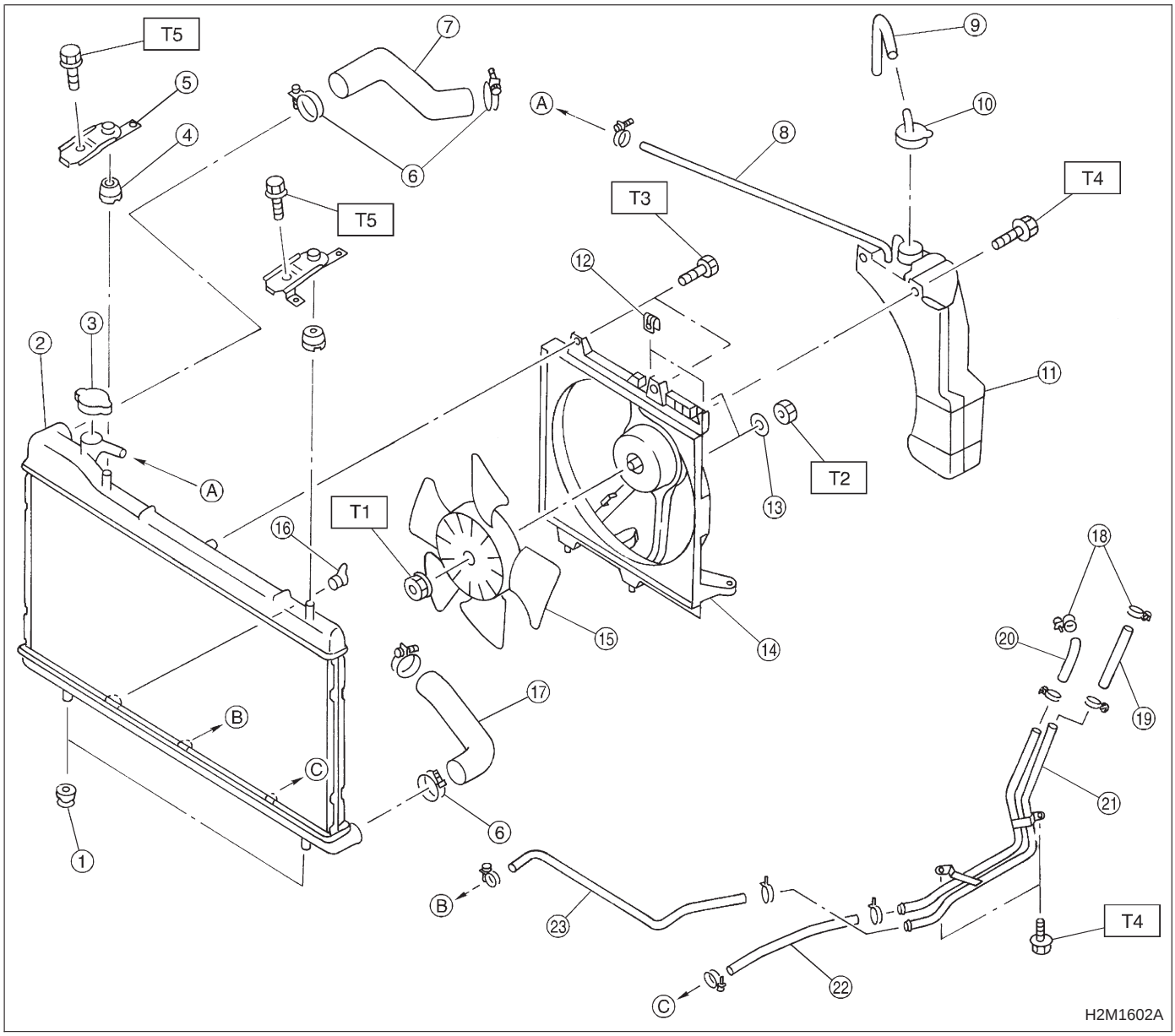
1. Water Pump



① Water pump ASSY
② Gasket
③ Heater hose
④ Thermostat
⑤ Gasket
⑥ Thermostat case

Tightening torque: N·m (kg-m, ft-lb)
T1: First 10^{+4}_{-0} ($1.0^{+0.4}_{-0}$, $7.2^{+2.9}_{-0}$)
Second 10^{+4}_{-0} ($1.0^{+0.4}_{-0}$, $7.2^{+2.9}_{-0}$)
T2: 6.4±0.5 (0.65±0.05, 4.7±0.4)

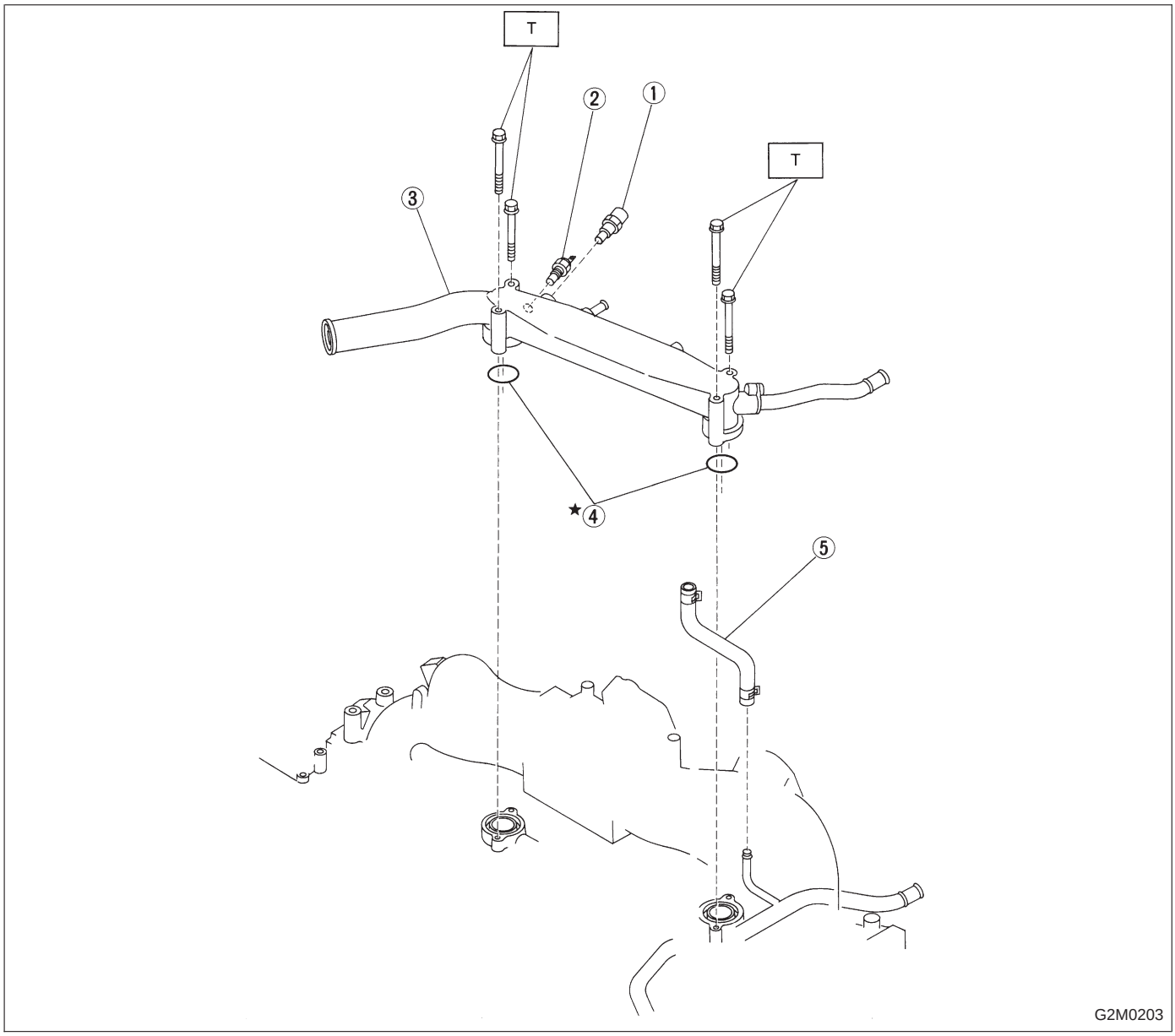
2. Radiator and Radiator Fan



① Radiator lower cushion
② Radiator
③ Radiator cap
④ Radiator upper cushion
⑤ Radiator upper bracket
⑥ Clamp
⑦ Radiator inlet hose
⑧ Over flow hose
⑨ Air vent hose
⑩ Engine coolant reservoir tank cap
⑪ Engine coolant reservoir tank
⑫ Clip
⑬ Washer
⑭ Radiator main fan motor ASSY
⑮ Radiator main fan
⑯ Radiator drain plug
⑰ Radiator outlet hose
⑱ ATF hose clamp
⑲ ATF inlet hose A
⑳ ATF outlet hose A
㉑ ATF pipe
㉒ ATF outlet hose B
㉓ ATF inlet hose B

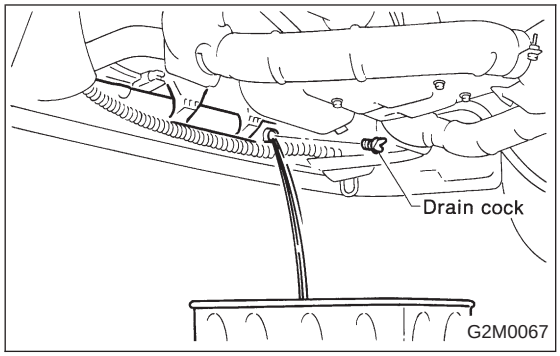
Tightening torque: N·m (kg-m, ft-lb)
T1: 2.0±0.5 (0.2±0.05, 1.4±0.4)
T2: 3.4±0.5 (0.35±0.05, 2.5±0.4)
T3: 3.9±1.0 (0.4±0.1, 2.9±0.7)
T4: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T5: 18±5 (1.8±0.5, 13.0±3.6)

3. Water Pipe



① Engine coolant temperature sensor
② Engine coolant temperature gauge
③ Water pipe
④ O-ring
⑤ By-pass hose

Tightening torque: N·m (kg-m, ft-lb)
T: 6.4±0.5 (0.65±0.05, 4.7±0.4)



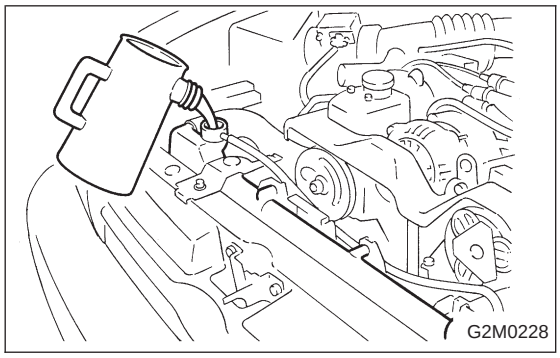
1. On-Car Service

A: DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.

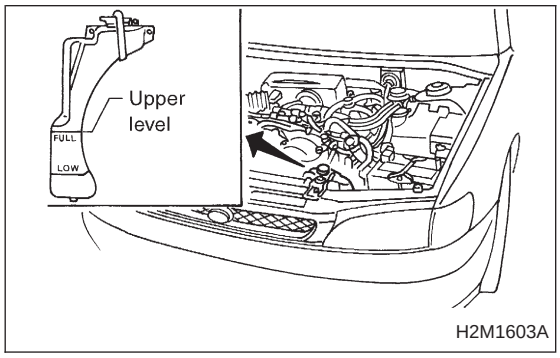
2) Loosen drain cock to drain engine coolant into container.

NOTE:
Remove radiator cap so that engine coolant will drain faster.



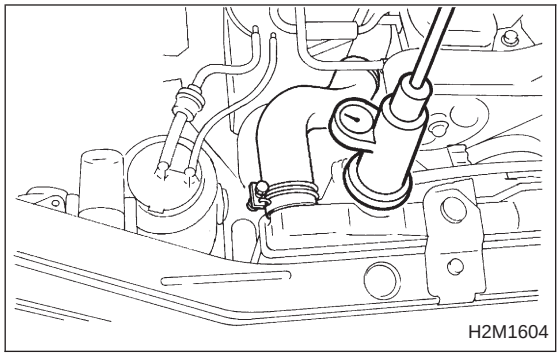
B: FILLING OF ENGINE COOLANT

1) Fill engine coolant into radiator up to filler neck position.



2) Fill engine coolant into reservoir tank up to upper level.

3) Attach radiator cap and reservoir tank cap properly.
4) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
5) Stop engine and wait until temperature drops to a safe level.
6) If engine coolant level drops in radiator, add engine coolant to filler neck position.
7) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
8) Attach radiator cap and reservoir tank cap properly.


H2M1604

C: CHECKING OF COOLING SYSTEM

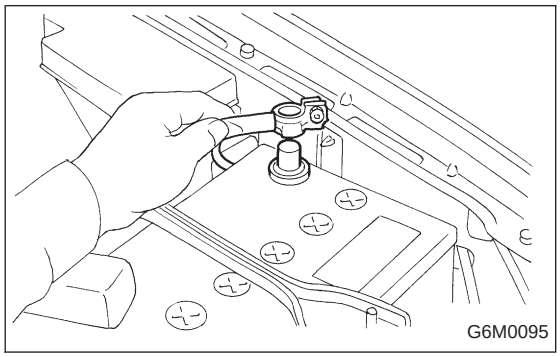
1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.
2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to radiator to check if:
   (1) Engine coolant leaks at/around radiator.
   (2) Engine coolant leaks at/around hoses or connections.

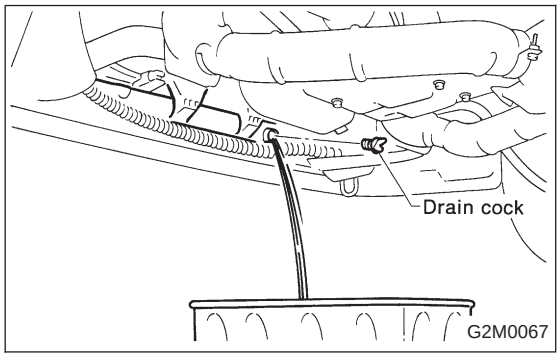
CAUTION:
- **Engine should be off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**
- **Be careful also not to deform filler neck of radiator when installing or removing tester.**

2. Water Pump

A: REMOVAL AND INSTALLATION

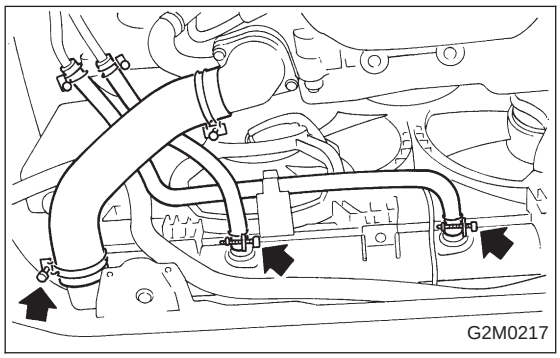
1) Open front hood.
2) Disconnect ground cable from the battery.


G6M0095

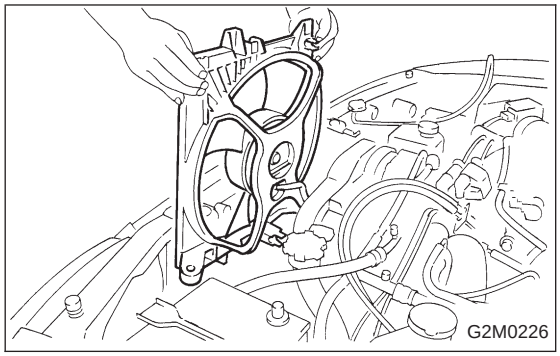


G2M0067

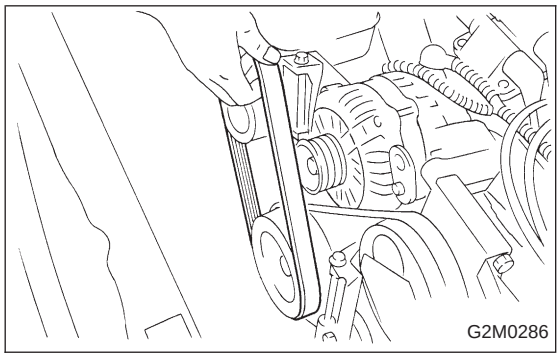
3) Drain engine coolant completely.
NOTE:
Set container under the vehicle, and remove drain cock from radiator.


G2M0217

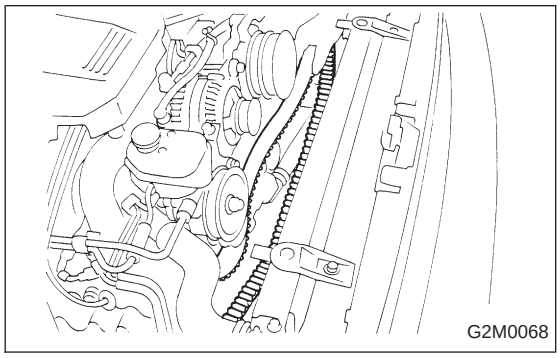
4) Disconnect radiator outlet hose from water pump.



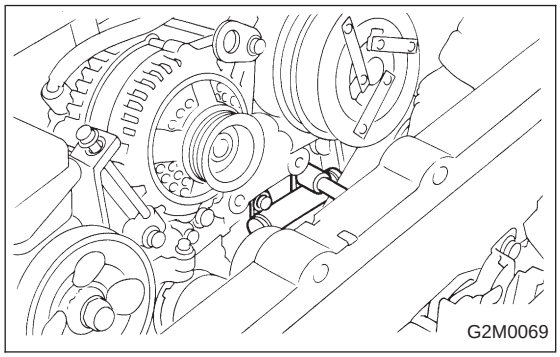
5) Remove radiator fan motor assembly.
<Ref. to 2-5 [W6A0].>



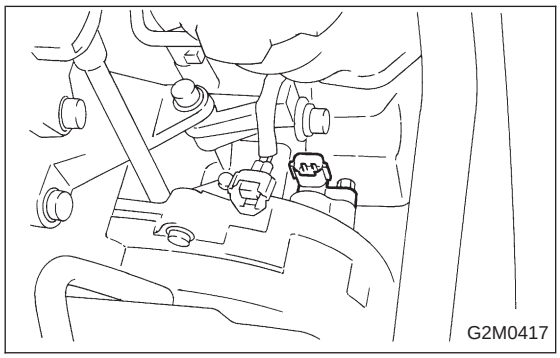
6) Remove V-belt(s).
<Ref. to 1-5 [02B0].>



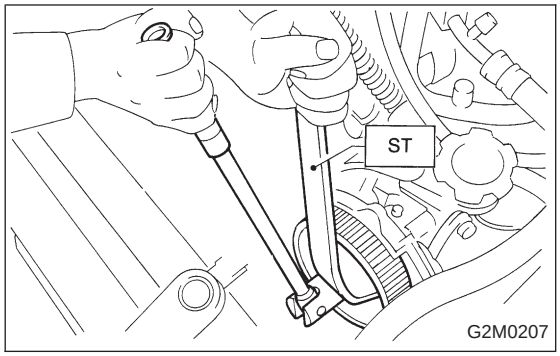
7) Remove timing belt.
<Ref. to 1-5 [03A0].>



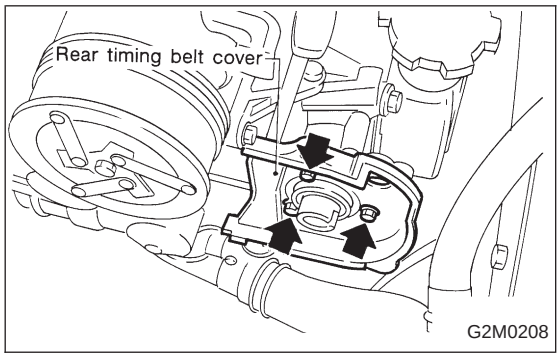
8) Remove belt tension adjuster.



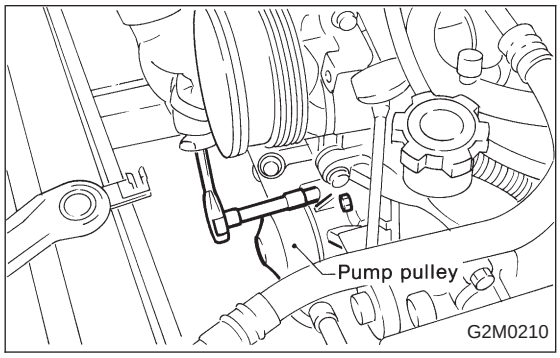
9) Remove camshaft position sensor.



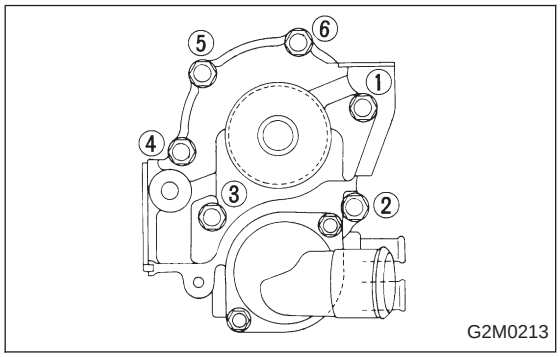
10) Remove left-hand camshaft sprocket by using ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH



11) Remove left-hand belt cover No. 2.



12) Remove tensioner bracket.
13) Disconnect heater hose from water pump.
14) Remove water pump.



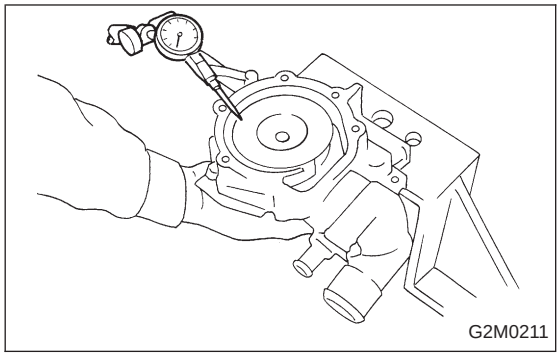
15) Installation is in the reverse order of removal.

CAUTION:
- **Replace gasket with a new one.**
- **When installing water pump, tighten bolts in two stages in numerical sequence as shown in figure.**

Tightening torque:
10^{+4}_{0} N·m ($1.0^{+0.4}_{0}$ kg-m, $7.2^{+2.9}_{0}$ ft-lb)

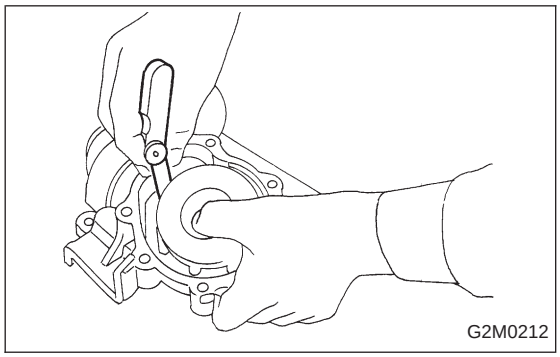
B: INSPECTION

1) Check water pump bearing for smooth rotation.
2) Check water pump pulley for abnormalities.


G2M0211

3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

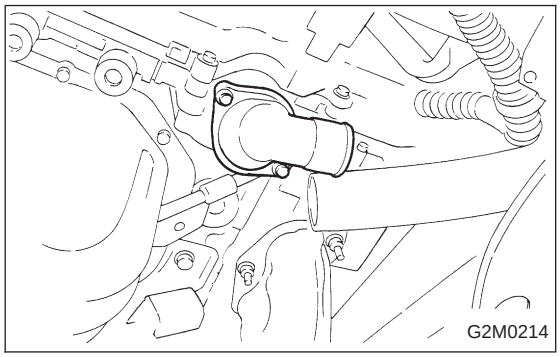
"Thrust" runout limit:
0.5 mm (0.020 in)


G2M0212

4) Check clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard
0.5 — 0.7 mm (0.020 — 0.028 in)
Limit
1.0 mm (0.039 in)

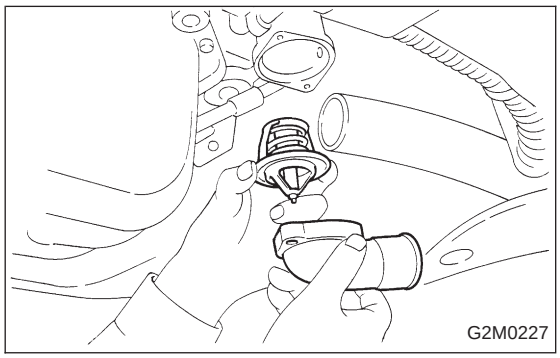
5) After water pump installation, check pulley shaft for engine coolant leaks. If leaks are noted, replace water pump assembly.


G2M0214

3. Thermostat

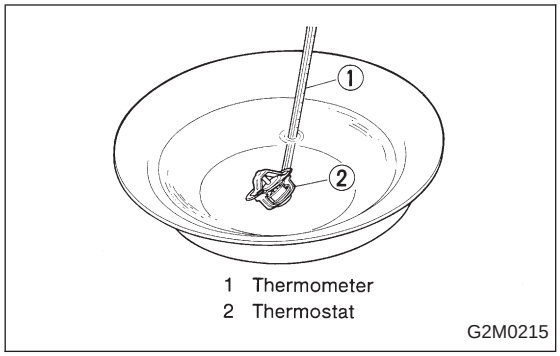
A: REMOVAL AND INSTALLATION

1) Drain engine coolant:
Set container under the vehicle, and remove drain cock from radiator.
2) Disconnect radiator outlet hose from thermostat cover.
3) Remove thermostat cover and gasket, and pull out the thermostat.


G2M0227

4) Install the thermostat in the intake manifold, and install the thermostat cover together with a gasket.

CAUTION:
- **When reinstalling the thermostat, use a new gasket.**
- **The thermostat must be installed with the jiggle pin upward.**
- **In this time, set the jiggle pin of thermostat for front side.**



1 Thermometer
2 Thermostat
G2M0215

B: 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.

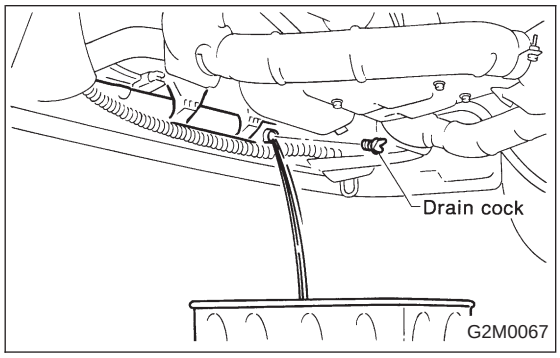
Starts to open:
76.0 — 80.0°C (169 — 176°F)

Fully opens:
91°C (196°F)

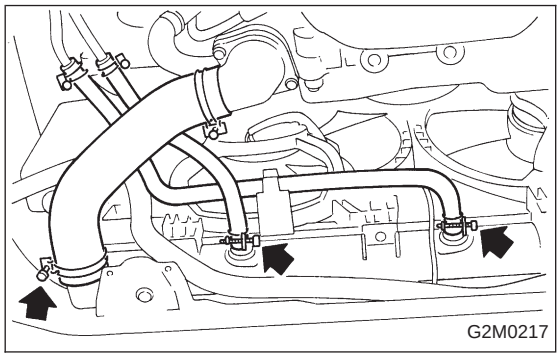
4. Radiator

A: REMOVAL

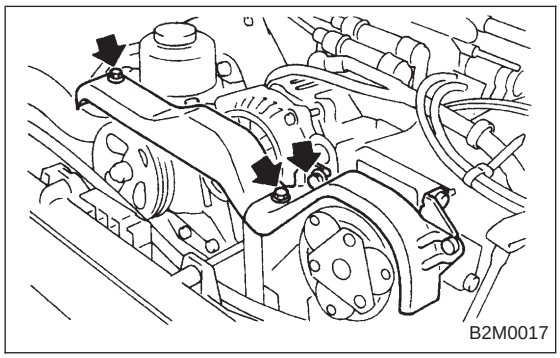
1) Disconnect battery cables and remove battery from body.
2) Drain engine coolant:
Set container under the vehicle, and remove drain cock from radiator.



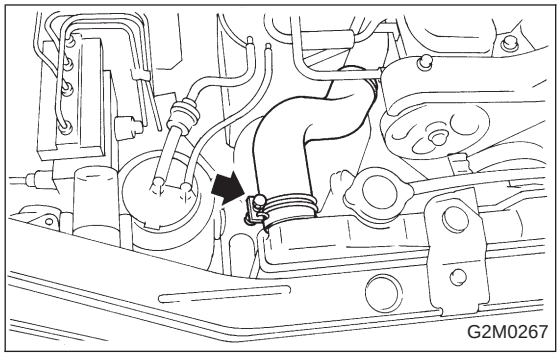
G2M0067


G2M0217

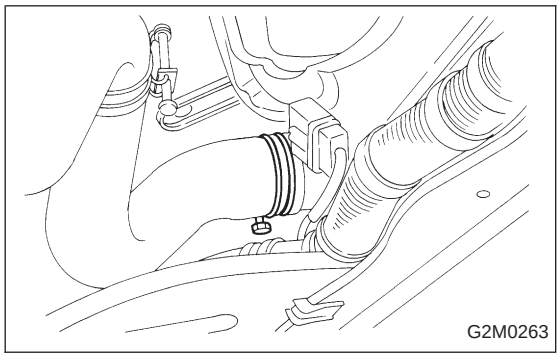
3) Disconnect radiator outlet hose from thermostat cover.
4) Disconnect ATF cooler hoses from radiator. (AT model)


B2M0017

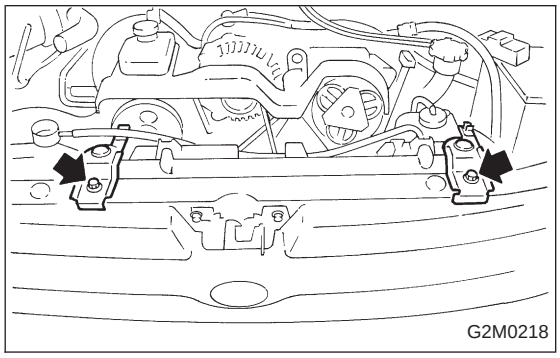
5) Remove V-belt cover.



6) Disconnect inlet hose from radiator.



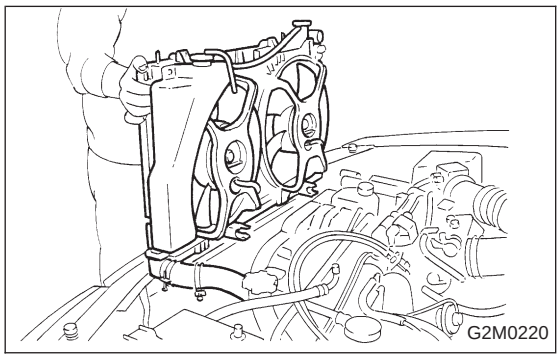
7) Disconnect connectors of radiator main fan and sub fan motor.



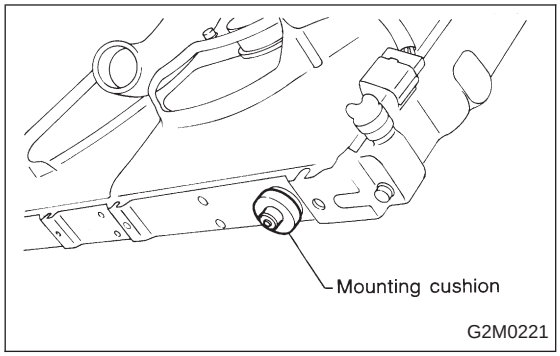
8) Remove radiator upper brackets.

NOTE:
Place left upper radiator bracket between grille and body.

9) While slightly lifting radiator, slide it to left.

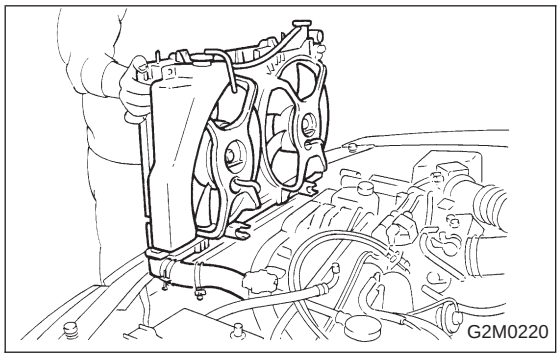


10) Lift radiator up and away from vehicle.

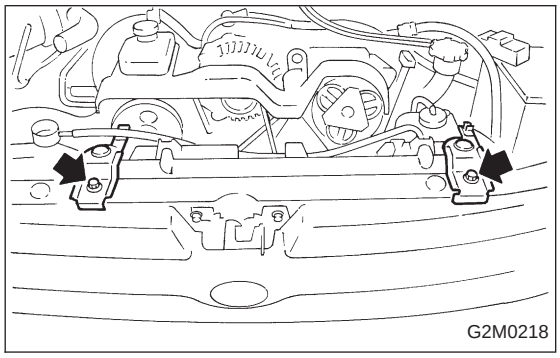


B: INSTALLATION

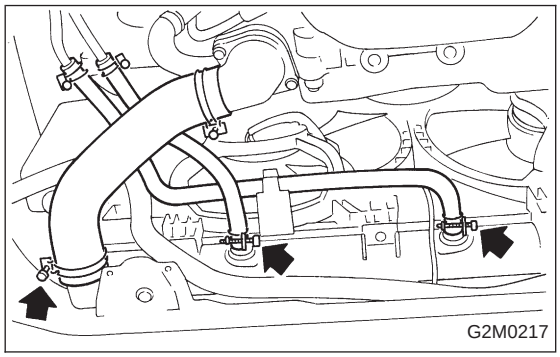
1) Attach radiator mounting cushions to pins on the lower side of radiator.



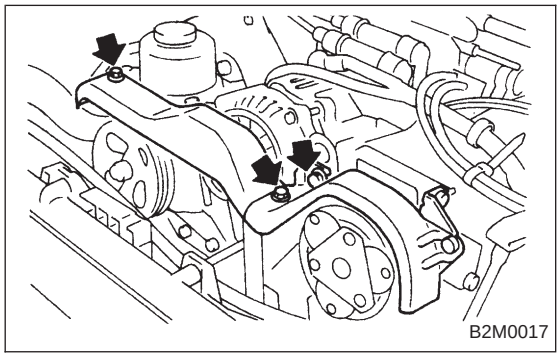
2) Fit cushions on lower side of radiator, into holes on body side and install radiator.



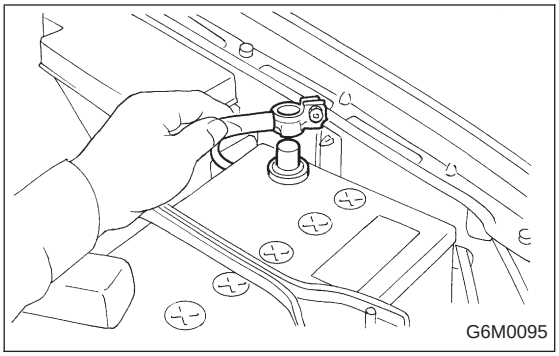
3) Install radiator brackets and tighten bolts.
4) Connect radiator main fan motor and sub fan motor connectors.



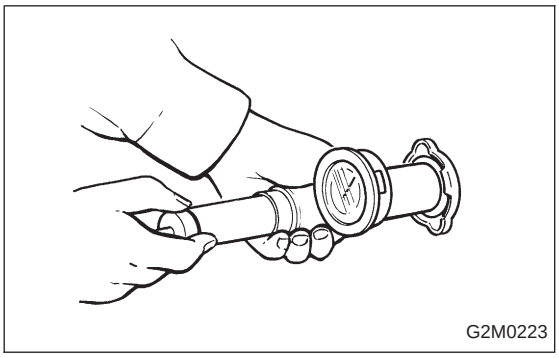
5) Connect radiator inlet and outlet hoses.
6) Connect ATF cooler hoses. (AT model)



7) Install V-belt cover.


G6M0095

8) Connect ground cable to battery terminal.


G2M0223

5. Radiator Cap

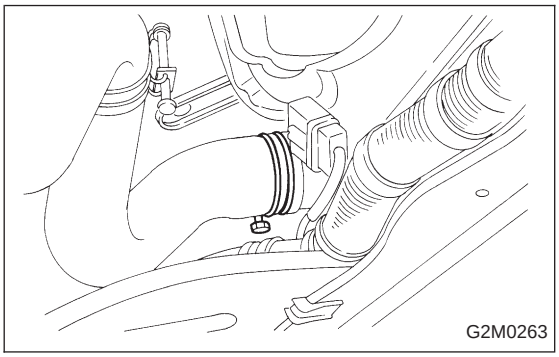
A: INSPECTION

1) Attach radiator cap to tester.
2) Increase pressure until tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Standard pressure:
78 — 98 kPa (0.8 — 1.0 kg/cm^2, 11 — 14 psi)

Service limit pressure:
69 kPa (0.7 kg/cm^2, 10 psi)

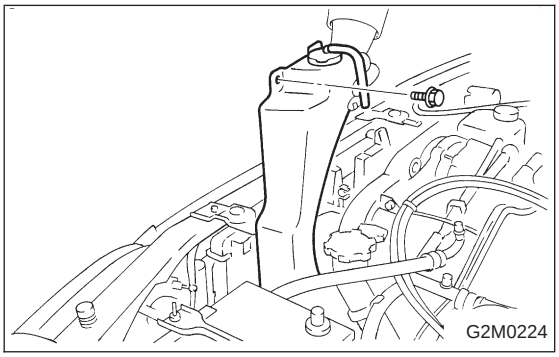
CAUTION:
Be sure to remove foreign matter and rust from the cap in advance; otherwise, results of pressure test will be incorrect.


G2M0263

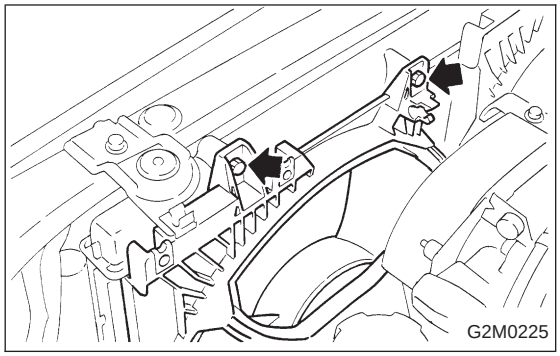
6. Radiator Fan and Fan Motor

A: REMOVAL AND INSTALLATION

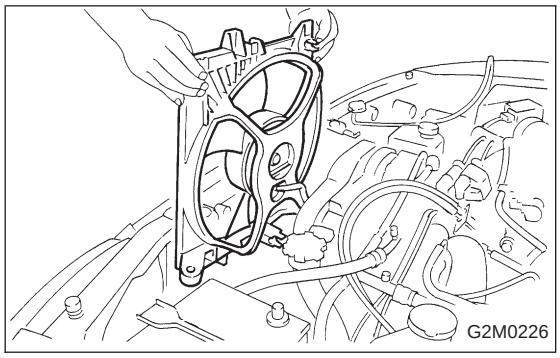
1) Disconnect ground cable from battery terminal.
2) Disconnect connector of fan motor.


G2M0224

3) Remove reservoir tank.


G2M0225

4) Remove two bolts holding shroud to radiator upper side.


G2M0226

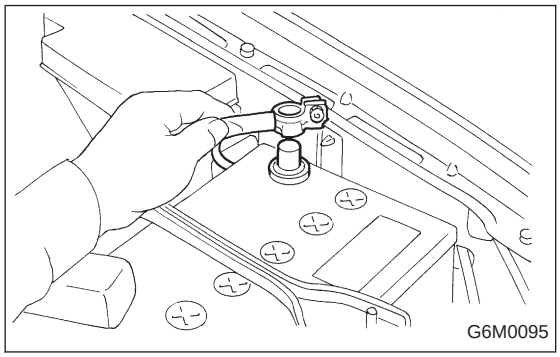
5) Remove radiator fan motor assembly.
6) Remove fan motor from shroud.

7) Installation is in the reverse order of removal procedures.

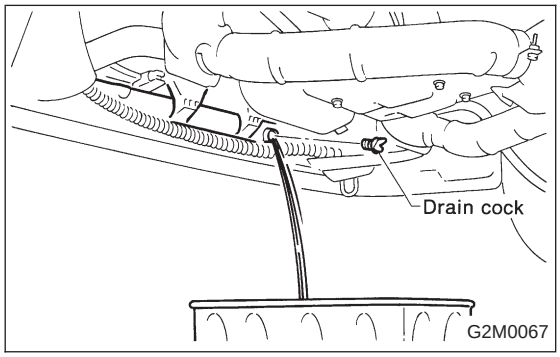
NOTE:
● Before installing radiator fan motor, apply a coat of sealant to threads and tighten nuts.
● Make sure radiator fan does not come into contact with shroud when installed.
● After installation, make sure there is no unusual noise or vibration when fan is rotated.

7. Water Pipe

A: REMOVAL

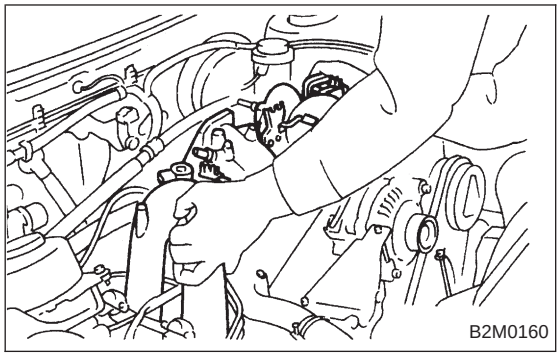

G6M0095

1) Release fuel pressure.
<Ref. to 2-8 [W1B0].>
2) Disconnect ground cable from the battery.

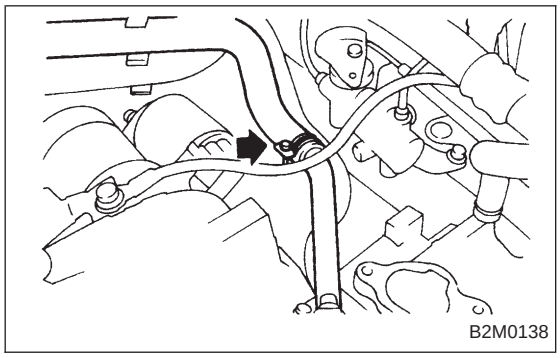


G2M0067

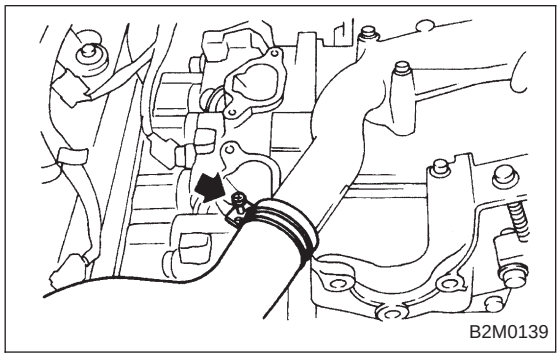
3) Drain engine coolant completely.
<Ref. to 2-5 [W1A0].>


B2M0160

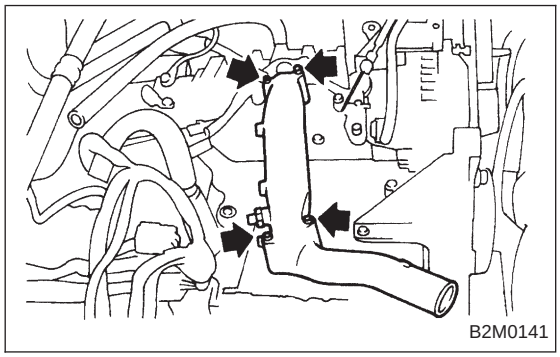
4) Remove intake manifold.
<Ref. to 2-7 [W4A0].>


B2M0138

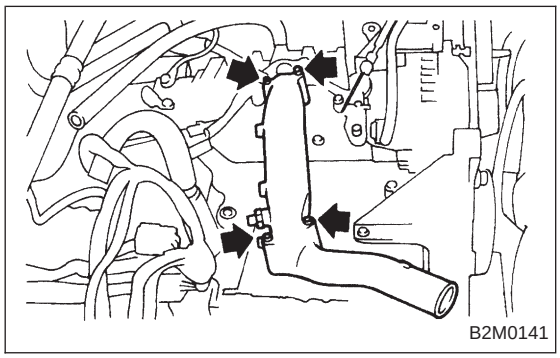
5) Disconnect heater inlet hose.


B2M0139

6) Disconnect radiator inlet hose from water pipe.


B2M0141

7) Remove bolts which install water pipe on cylinder block.

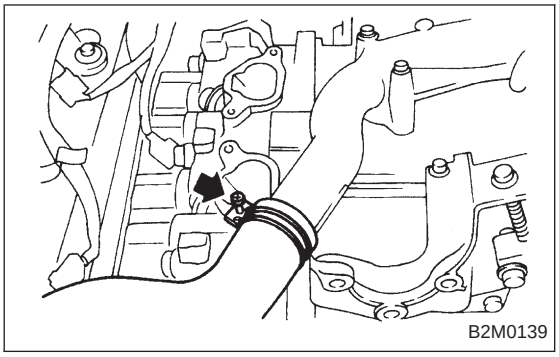

B2M0141

B: INSTALLATION

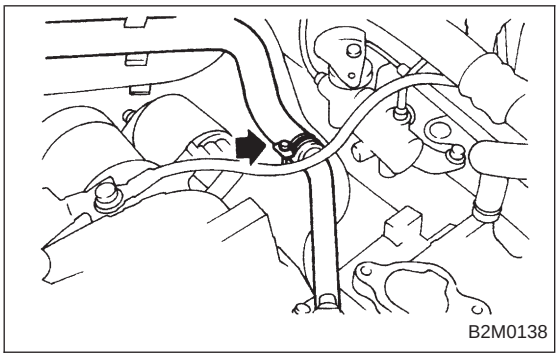
1) Install water pipe on cylinder block.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

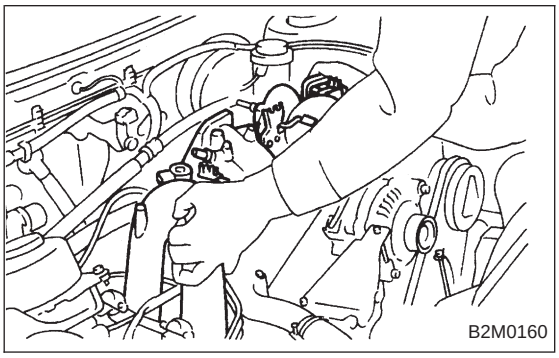
CAUTION:
Use a new O-ring.



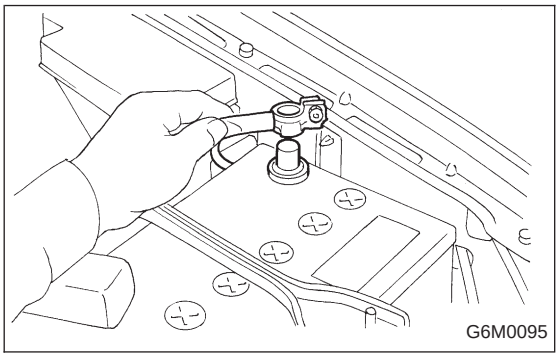
2) Connect radiator inlet hose.



3) Connect heater inlet hose.



4) Install intake manifold.
<Ref. to 2-7 [W4D0].>



5) Connect ground cable to battery terminal.

1. Engine Cooling System Trouble in General

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on drive belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair ignition control system. <Ref. to 2-7 [T8D0].>
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Replace engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair fuel injection system. <Ref. to 2-7 [T1000].>
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjust.
	o. Improper transmission oil	Replace.
	p. Defective thermostat	Replace.
	q. Malfunction of electric fan	Inspect radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
Over-cooling	a. Atmospheric temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks.	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.