

Brought to you by Eris Studios
NOT FOR RESALE

COOLING

General Description

COOLING

1. General Description

A: SPECIFICATION

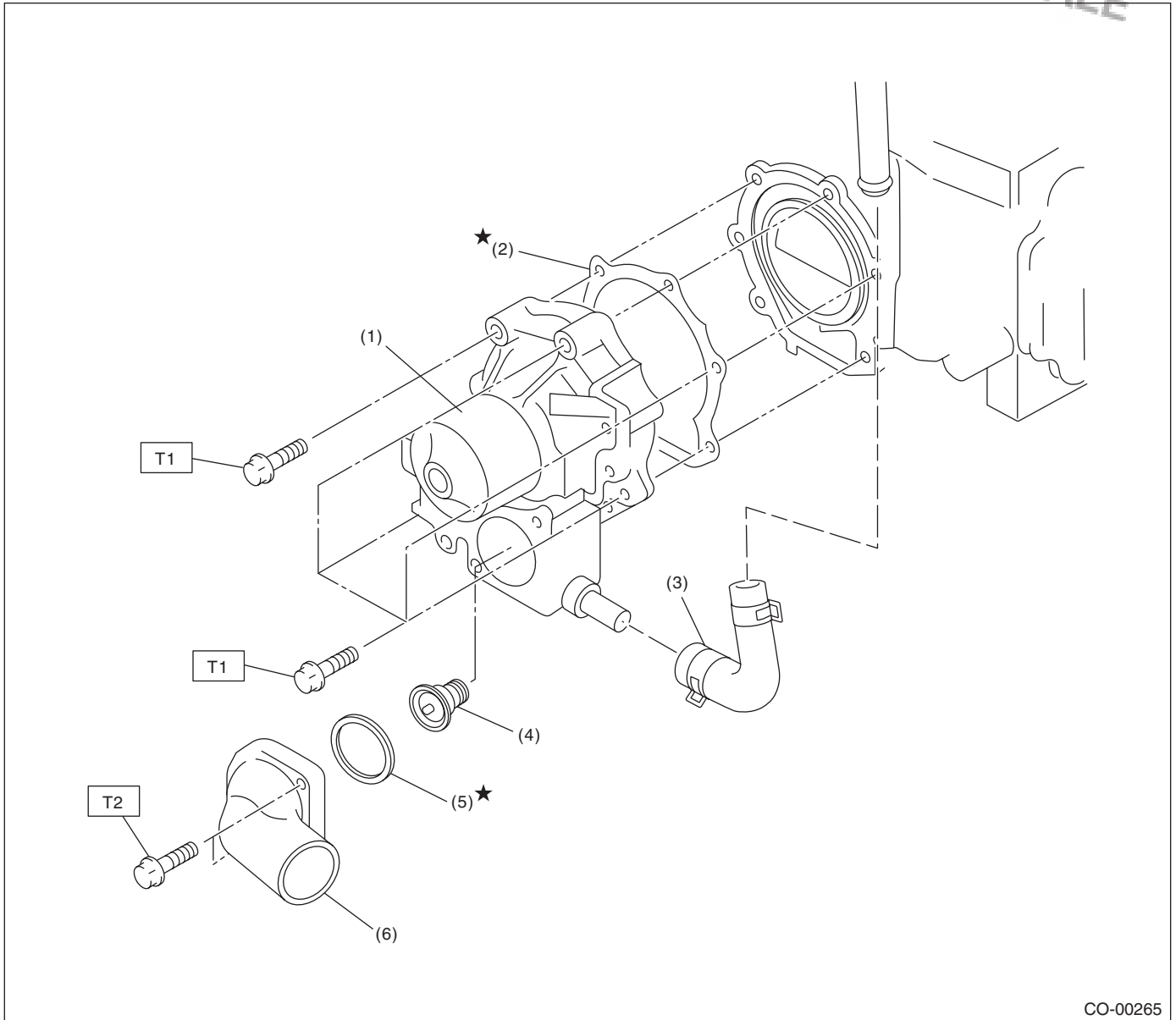
Cooling system		Electric fan + Forced engine coolant circulation system	
Total engine coolant capacity		ℓ (US qt, Imp qt)	AT model: approx. 6.9 (7.3, 6.1) MT model: approx. 7.0 (7.4, 6.2)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge rate	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed — Discharge pressure	760 rpm — 2.9 kPa (0.3 mAq)
		Engine coolant temperature	80°C (176°F)
	Discharge performance II	Discharge rate	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed — Discharge pressure	3,000 rpm — 49.0 kPa (5.0 mAq)
		Engine coolant temperature	80°C (176°F)
	Discharge performance III	Discharge rate	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed — Discharge pressure	6,000 rpm — 225.4 kPa (23.0 mAq)
		Engine coolant temperature	80°C (176°F)
Impeller diameter		76 mm (2.99 in)	
Number of impeller vanes		8	
Pump pulley diameter		60 mm (2.36 in)	
Clearance between impeller and case	Standard	0.5 — 1.5 mm (0.020 — 0.060 in)	
Thermostat	Type		Wax pellet type
	Starts to open		80 — 84°C (176 — 183°F)
	Fully opens		95°C (203°F)
	Valve lift		9.0 mm (0.354 in) or more
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor input	Main fan	120 W
		Sub fan	120 W
Fan diameter / Blade		320 mm (12.60 in) / 5 (main fan) 320 mm (12.60 in) / 7 (sub fan)	
Radiator	Type		Down flow
	Core dimensions	Width × Height × Thickness	691.5 × 340 × 16 mm (27.22 × 13.39 × 0.63 in)
	Pressure range in which cap valve is open		Above: 108±15 kPa (1.1±0.15 kgf/cm ² , 16±2 psi) Below: -1.0 — -4.9 kPa (-0.01 — -0.05 kgf/cm ² , -0.1 — -0.7 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

Coolant	Recommended materials	Item number	Alternative
Coolant	SUBARU coolant	000016218	Phosphoric acid (non-amine) type
Water for dilution	Distilled water	—	Soft water or tap water
Cooling system protective agent	Cooling system conditioner	SOA345001	None

B: COMPONENT

1. WATER PUMP

Brought to you by Eris Studios
NOT FOR RESALE



CO-00265

- | | |
|-------------------------|----------------------|
| (1) Water pump ASSY | (4) Thermostat |
| (2) Gasket | (5) Gasket |
| (3) Heater by-pass hose | (6) Thermostat cover |

Tightening torque:N·m (kgf·m, ft·lb)

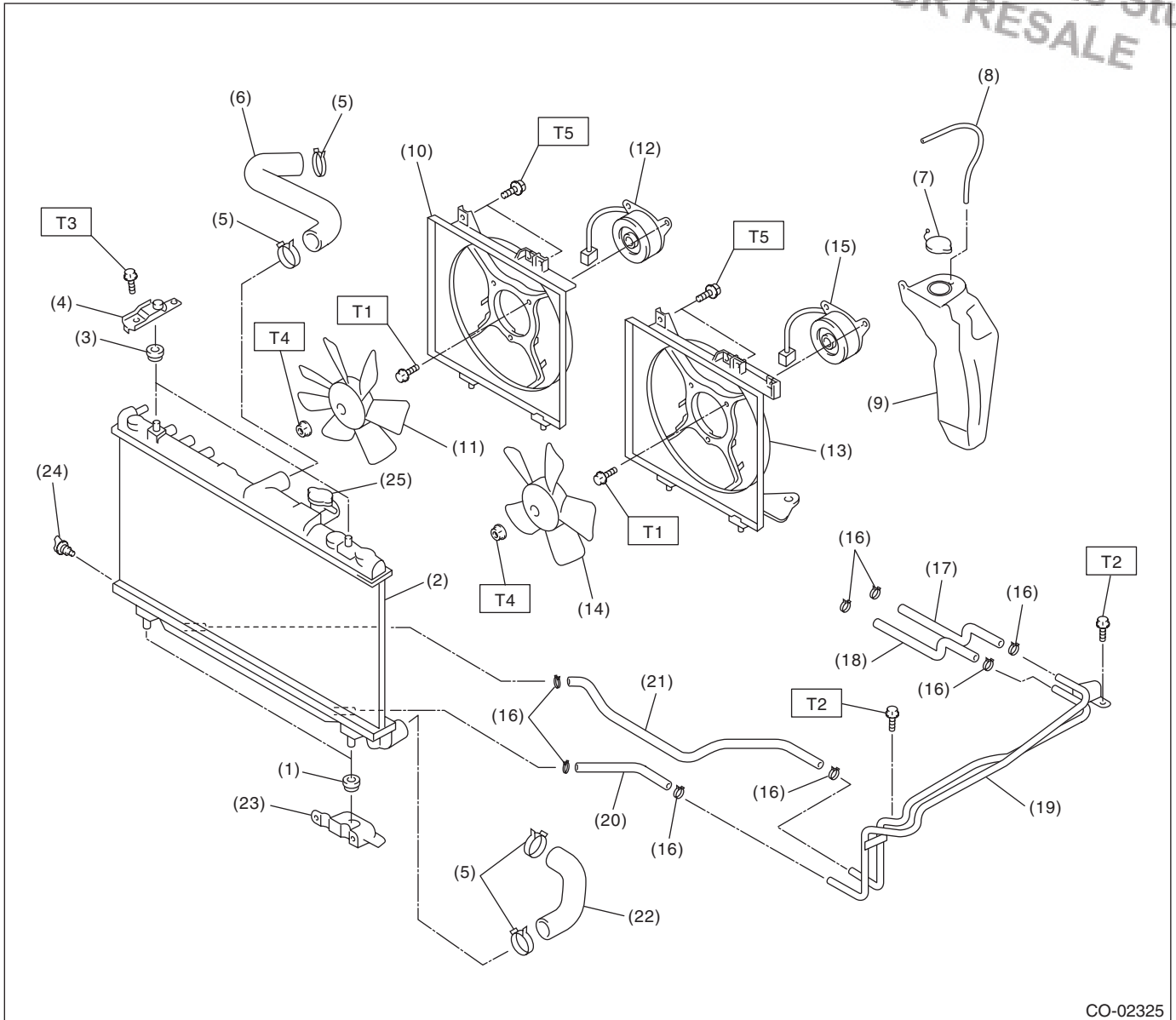
**T1: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)**

T2: 12 (1.2, 8.7)

General Description

COOLING

2. RADIATOR AND RADIATOR FAN



CO-02325

- | | | |
|---------------------------------------|--------------------------------|-----------------------------|
| (1) Radiator lower cushion | (12) Radiator sub fan motor | (23) Radiator lower bracket |
| (2) Radiator | (13) Radiator main fan shroud | (24) Radiator drain plug |
| (3) Radiator upper cushion | (14) Radiator main fan | (25) Radiator cap |
| (4) Radiator upper bracket | (15) Radiator main fan motor | |
| (5) Clamp | (16) ATF hose clamp (AT model) | |
| (6) Radiator inlet hose | (17) ATF hose A (AT model) | |
| (7) Engine coolant reservoir tank cap | (18) ATF hose B (AT model) | |
| (8) Over flow hose | (19) ATF pipe (AT model) | |
| (9) Engine coolant reservoir tank | (20) ATF hose C (AT model) | |
| (10) Radiator sub fan shroud | (21) ATF hose D (AT model) | |
| (11) Radiator sub fan | (22) Radiator outlet hose | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 4.4 (0.45, 3.3)

T2: 12 (1.2, 8.7)

T3: 18 (1.8, 13.0)

T4: 3.4 (0.35, 2.5)

T5: 4.9 (0.50, 3.6)

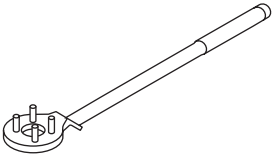
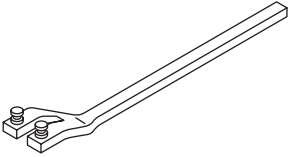
Brought to you by Eris Studios
NOT FOR RESALE

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499977100</p>	499977100	CRANK PULLEY WRENCH	Used for stopping the rotation of crank shaft pulley when removing and tightening the crank pulley bolt.
 <p>ST18231AA010</p>	18231AA010	CAM SPROCKET WRENCH	<ul style="list-style-type: none"> • Used for removing and installing cam sprocket. • CAM SPROCKET WRENCH (499207100) can also be used.

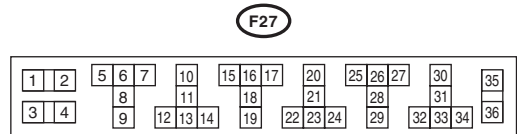
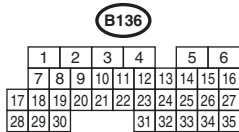
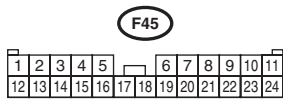
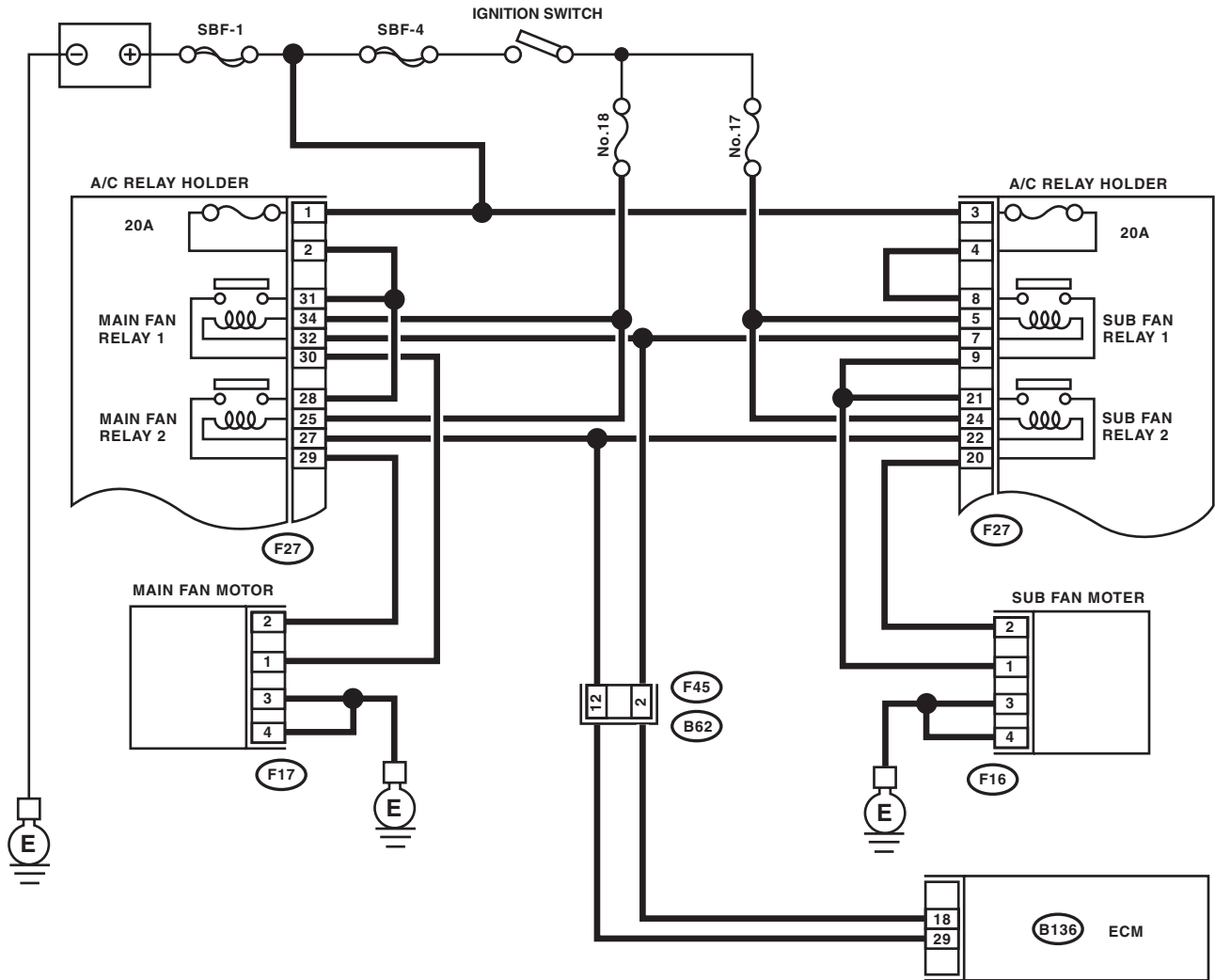
Radiator Main Fan System

COOLING

2. Radiator Main Fan System

A: WIRING DIAGRAM

Brought to you by Eris Studios
NOT FOR RESALE



CO-02326

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is 96°C (205°F) or more.
- A/C compressor is rotating.
- Vehicle speed is 19 km/h (12 MPH) or less.

TROUBLE SYMPTOMS:

- Radiator main fan does not rotate under the above conditions.
- Radiator main fan does not rotate at high speed when the following conditions are met at the same time.
 1. Engine coolant temperature is 90°C (194°F) or more.
 2. A/C is ON.

Step	Check	Yes	No	
1	CHECK RADIATOR OPERATION. 1) Warm-up the engine. (When vehicle is parked) 2) Turn the A/C switch to OFF. 3) Raise the engine coolant temperature to 96°C (205°F) or above.	Does the radiator main fan rotate?	Go to step 2.	Go to step 3.
2	CHECK RADIATOR OPERATION. Turn the A/C switch to ON under the condition of step 1.	Does the radiator main fan rotate at high speed when the A/C compressor is operating?	Radiator main fan system is normal.	Go to step 17.
3	CHECK POWER SUPPLY TO MAIN FAN MOTOR. CAUTION: Be careful not to overheat the engine during repair. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the main fan motor. 3) Start and warm up the engine until engine coolant temperature raises to 96°C (205°F) or above. 4) Stop the engine, and turn the ignition switch to ON. 5) Measure the voltage between main fan motor connector and chassis ground. Connector & terminal (F17) No. 1 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 4.	Go to step 7.
4	CHECK GROUND CIRCUIT OF MAIN FAN MOTOR. 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan motor connector and chassis ground. Connector & terminal (F17) No. 3 — Chassis ground: (F17) No. 4 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 5.	Repair the open circuit of the harness between main fan motor connector and chassis ground.
5	CHECK POOR CONTACT. Check poor contact of main fan motor connector.	Is there poor contact in the main fan motor connector?	Repair the poor contact of main fan motor connector.	Go to step 6.
6	CHECK MAIN FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 1, and the ground (-) terminal to terminal No. 3 or 4 of the main fan motor connector.	Does the main fan rotate?	Repair the poor contact of main fan motor connector.	Replace the main fan motor with a new part.

Radiator Main Fan System

COOLING

Step	Check	Yes	No
7 CHECK POWER SUPPLY TO MAIN FAN RELAY 1. 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1 from A/C relay holder. 3) Measure the voltage between main fan relay 1 terminal and chassis ground. Connector & terminal (F27) No. 31 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 8.	Go to step 9.
8 CHECK POWER SUPPLY TO MAIN FAN RELAY 1. 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay 1 terminal and chassis ground. Connector & terminal (F27) No. 34 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 12.	Go to step 11.
9 CHECK 20 A FUSE. 1) Remove the 20 A fuse from the A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 10.
10 CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL. Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. Connector & terminal (F27) No. 1 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Repair the open circuit of harness between 20 A fuse and main fan relay terminal.	Repair the open circuit of harness between main fuse box connector and 20 A fuse terminal.
11 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 18 from the joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit of harness between main fan relay 1 and ignition switch.
12 CHECK MAIN FAN RELAY 1. 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1. 3) Measure the resistance of main fan relay 1. Terminals No. 30 — No. 31:	Is the resistance 1 M Ω or more?	Go to step 13.	Replace the main fan relay 1.
13 CHECK MAIN FAN RELAY 1. 1) Connect the battery to terminals No. 34 and No. 32 of the main fan relay 1. 2) Measure the resistance of main fan relay 1. Terminals No. 30 — No. 31:	Is the resistance less than 1 Ω ?	Go to step 14.	Replace the main fan relay 1.
14 CHECK HARNESS BETWEEN MAIN FAN RELAY 1 TERMINAL AND MAIN FAN MOTOR CONNECTOR. Measure the resistance of harness between main fan motor connector and main fan relay 1 terminal. Connector & terminal (F17) No. 1 — (F27) No. 30:	Is the resistance less than 1 Ω ?	Go to step 15.	Repair the open circuit of harness between main fan motor connector and main fan relay 1 terminal.

Radiator Main Fan System

COOLING

Step	Check	Yes	No
15 CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Measure the resistance of harness between main fan relay 1 connector and ECM connector. <i>Connector & terminal</i> <i>(F27) No. 32 — (B136) No. 18:</i>	Is the resistance less than 1 Ω?	Go to step 16.	Repair the open circuit of harness between main fan relay 1 and ECM.
16 CHECK POOR CONTACT. Repair the open circuit of harness between main fan relay and ECM.	Is there poor contact in connector between main fan motor and ECM?	Repair the poor contact of connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-37, Read Diagnostic Trouble Code (DTC).>
17 CHECK POWER SUPPLY TO MAIN FAN MOTOR. CAUTION: Be careful not to overheat the engine during repair. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the main fan motor. 3) Start and warm up the engine until engine coolant temperature raises to 96°C (205°F) or above. 4) Turn on the A/C switch. 5) Measure the voltage while the A/C compressor is operating. 6) Measure the voltage between main fan motor connector and chassis ground. <i>Connector & terminal</i> <i>(F17) No. 2 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 18.	Go to step 20.
18 CHECK POOR CONTACT. Check poor contact of the main fan motor connector.	Is there poor contact in the main fan motor connector?	Repair the poor contact of main fan motor connector.	Go to step 19.
19 CHECK MAIN FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 2, and the ground (-) terminal to terminal No. 3 or No. 4 of the main fan motor connector.	Does the main fan rotate?	Repair the poor contact of main fan motor connector.	Replace the main fan motor with a new part.
20 CHECK POWER SUPPLY TO MAIN FAN RELAY 2. 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 2 from A/C relay holder. 3) Measure the voltage between main fan relay 2 terminal and chassis ground. <i>Connector & terminal</i> <i>(F27) No. 28 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 21.	Go to step 22.
21 CHECK POWER SUPPLY TO MAIN FAN RELAY 2. 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay 2 terminal and chassis ground. <i>Connector & terminal</i> <i>(F27) No. 25 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 25.	Go to step 24.

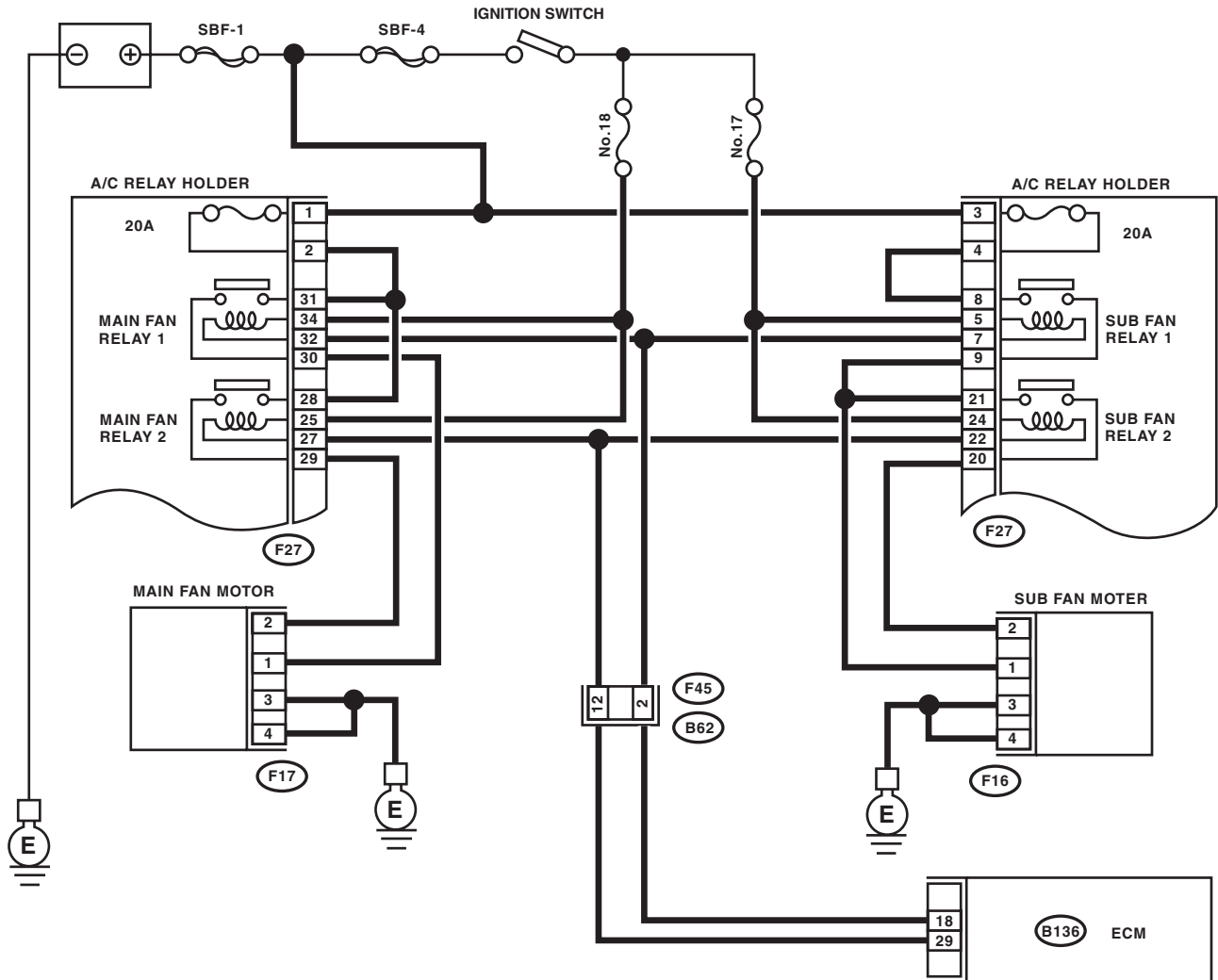
Radiator Main Fan System

COOLING

	Step	Check	Yes	No
22	CHECK 20 A FUSE. 1) Remove the 20 A fuse from the A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 23.
23	CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL. Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. <i>Connector & terminal</i> <i>(F27) No. 1 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the open circuit of harness between 20 A fuse and main fan relay terminal.	Repair the open circuit of harness between main fuse box connector and 20 A fuse terminal.
24	CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 18 from the joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit of harness between main fan relay 2 and ignition switch.
25	CHECK MAIN FAN RELAY 2. 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 2. 3) Measure the resistance of main fan relay 2. <i>Terminals</i> <i>No. 28 — No. 29:</i>	Is the resistance 1 M Ω or more?	Go to step 26.	Replace the main fan relay 2.
26	CHECK MAIN FAN RELAY 2. 1) Connect the battery to terminals No. 25 and No. 27 of the main fan relay 2. 2) Measure the resistance of main fan relay 2. <i>Terminals</i> <i>No. 28 — No. 29:</i>	Is the resistance less than 1 Ω ?	Go to step 27.	Replace the main fan relay 2.
27	CHECK HARNESS BETWEEN MAIN FAN RELAY 2 TERMINAL AND MAIN FAN MOTOR CONNECTOR. Measure the resistance of harness between main fan motor connector and main fan relay 2 terminal. <i>Connector & terminal</i> <i>(F17) No. 2 — (F27) No. 29:</i>	Is the resistance less than 1 Ω ?	Go to step 28.	Repair the open circuit of harness between main fan motor connector and main fan relay 2 terminal.
28	CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Measure the resistance of harness between main fan relay 2 connector and ECM connector. <i>Connector & terminal</i> <i>(F27) No. 27 — (B136) No. 29:</i>	Is the resistance less than 1 Ω ?	Go to step 29.	Repair the open circuit of harness between main fan relay 2 and ECM.
29	CHECK POOR CONTACT. Repair the open circuit of harness between main fan relay and ECM.	Is there poor contact in connector between main fan motor and ECM?	Repair the poor contact of connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-37, Read Diagnostic Trouble Code (DTC).>

3. Radiator Sub Fan System

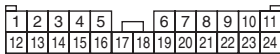
A: WIRING DIAGRAM



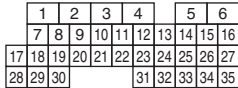
F16



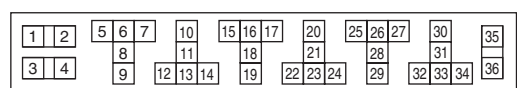
F45



B136



F27



Radiator Sub Fan System

COOLING

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is 96°C (205°F) or more.
- A/C compressor is rotating.
- Vehicle speed is 19 km/h (12 MPH) or less.

TROUBLE SYMPTOMS:

- Radiator sub fan does not rotate under the above conditions.
- Radiator sub fan does not rotate at high speed when the following conditions are met at the same time.
 1. Engine coolant temperature is 90°C (194°F) or more.
 2. A/C is ON.

	Step	Check	Yes	No
1	CHECK RADIATOR OPERATION. 1) Run the engine at idle. (When vehicle is parked) 2) Turn the A/C switch to OFF. 3) Raise the engine coolant temperature to 96°C (205°F) or above.	Does the radiator sub fan rotate?	Go to step 2.	Go to step 3.
2	CHECK RADIATOR OPERATION. Turn the A/C switch to ON under the condition of step 1.	Does the radiator sub fan rotate at high speed when the A/C compressor is operating?	Radiator sub fan system is normal.	Go to step 17.
3	CHECK POWER SUPPLY TO SUB FAN MOTOR. CAUTION: Be careful not to overheat the engine during repair. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the sub fan motor. 3) Start and warm up the engine until engine coolant temperature raises to 96°C (205°F) or above. 4) Stop the engine, and turn the ignition switch to ON. 5) Measure the voltage between sub fan motor connector and chassis ground. Connector & terminal (F16) No. 1 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 4.	Go to step 7.
4	CHECK GROUND CIRCUIT OF SUB FAN MOTOR. 1) Turn the ignition switch to OFF. 2) Measure the resistance between the sub fan motor connector and chassis ground. Connector & terminal (F16) No. 3 — Chassis ground: (F16) No. 4 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 5.	Repair the open circuit of harness between sub fan motor connector and chassis ground.
5	CHECK POOR CONTACT. Check for poor contact of sub fan motor connector.	Is there poor contact in the sub fan motor connector?	Repair the poor contact of sub fan motor connector.	Go to step 6.
6	CHECK SUB FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 1, and the ground (-) terminal to terminal No. 3 or 4 of the sub fan motor connector.	Does the sub fan rotate?	Repair the poor contact of sub fan motor connector.	Replace the sub fan motor with a new part.

Radiator Sub Fan System

COOLING

Step	Check	Yes	No
7 CHECK POWER SUPPLY TO SUB FAN RELAY 1. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay 1 from the A/C relay holder. 3) Measure the voltage between the sub fan relay 1 terminal and chassis ground. Connector & terminal (F27) No. 8 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 8.	Go to step 9.
8 CHECK POWER SUPPLY TO SUB FAN RELAY 1. 1) Turn the ignition switch to ON. 2) Measure the voltage between the sub fan relay 1 terminal and chassis ground. Connector & terminal (F27) No. 5 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 12.	Go to step 11.
9 CHECK 20 A FUSE. 1) Remove the 20 A fuse from the A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 10.
10 CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL. Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. Connector & terminal (F27) No. 3 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Repair the harness circuit between 20 A fuse and sub fan relay terminal.	Repair the open circuit of harness between sub fuse box connector and 20 A fuse terminal.
11 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 17 from the joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit of harness between sub fan relay 1 and ignition switch.
12 CHECK SUB FAN RELAY 1. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay 1. 3) Measure the resistance of the sub fan relay 1. Terminals No. 8 — No. 9:	Is the resistance 1 M Ω or more?	Go to step 13.	Replace the sub fan relay 1.
13 CHECK SUB FAN RELAY 1. 1) Connect battery to the terminals No. 5 and No. 7 of sub fan relay 1. 2) Measure the resistance of the sub fan relay. Terminals No. 8 — No. 9:	Is the resistance less than 1 Ω ?	Go to step 14.	Replace the sub fan relay 1.
14 CHECK HARNESS BETWEEN SUB FAN RELAY 1 TERMINAL AND SUB FAN MOTOR CONNECTOR. Measure the resistance of harness between sub fan motor connector and sub fan relay 1 terminal. Connector & terminal (F16) No. 1 — (F27) No. 9:	Is the resistance less than 1 Ω ?	Go to step 15.	Repair the open circuit of harness between sub fan motor connector and sub fan relay 1 terminal.

Radiator Sub Fan System

COOLING

Step	Check	Yes	No
15 CHECK HARNESS BETWEEN SUB FAN RELAY 1 AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Measure the resistance of harness between sub fan relay 1 connector and ECM connector. Connector & terminal (F27) No. 7 — (B136) No. 18:	Is the resistance less than 1 Ω?	Go to step 16.	Repair the open circuit of harness between sub fan relay 1 and ECM.
16 CHECK POOR CONTACT. Repair the open circuit of harness between sub fan relay and ECM.	Is there poor contact in connector between sub fan motor and ECM?	Repair the poor contact of connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-37, Read Diagnostic Trouble Code (DTC).>
17 CHECK POWER SUPPLY TO SUB FAN MOTOR. CAUTION: Be careful not to overheat the engine during repair. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the sub fan motor. 3) Start and warm up the engine until engine coolant temperature raises to 96°C (205°F) or above. 4) Turn on the A/C switch. 5) Measure the voltage while the A/C compressor is operating. 6) Measure the voltage between sub fan motor connector and chassis ground. Connector & terminal (F16) No. 2 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 18.	Go to step 20.
18 CHECK POOR CONTACT. Check for poor contact of sub fan motor connector.	Is there poor contact in the sub fan motor connector?	Repair the poor contact of sub fan motor connector.	Go to step 19.
19 CHECK SUB FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 2, and the ground (-) terminal to terminal No. 3 or 4 of the sub fan motor connector.	Does the sub fan rotate?	Repair the poor contact of sub fan motor connector.	Replace the sub fan motor with a new part.
20 CHECK POWER SUPPLY TO SUB FAN RELAY 2. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay 2 from the A/C relay holder. 3) Measure the voltage between the sub fan relay 2 terminal and chassis ground. Connector & terminal (F27) No. 21 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 21.	Go to step 22.
21 CHECK POWER SUPPLY TO SUB FAN RELAY 2. 1) Turn the ignition switch to ON. 2) Measure the voltage between the sub fan relay 2 terminal and chassis ground. Connector & terminal (F27) No. 24 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 25.	Go to step 24.

Radiator Sub Fan System

COOLING

Step	Check	Yes	No
22 CHECK 20 A FUSE. 1) Remove the 20 A fuse from the A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 23.
23 CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL. Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. <i>Connector & terminal (F27) No. 3 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the open circuit of harness between 20 A fuse and sub fan relay terminal.	Repair the open circuit of harness between sub fuse box connector and 20 A fuse terminal.
24 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 17 from the joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit of harness between sub fan relay 2 and ignition switch.
25 CHECK SUB FAN RELAY 2. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay 2. 3) Measure the resistance of the sub fan relay 2. <i>Terminals No. 20 — No. 21:</i>	Is the resistance 1 M Ω or more?	Go to step 26.	Replace the sub fan relay 2.
26 CHECK SUB FAN RELAY 2. 1) Connect battery to the terminals No. 22 and No. 24 of sub fan relay 2. 2) Measure the resistance of the sub fan relay 2. <i>Terminals No. 20 — No. 21:</i>	Is the resistance less than 1 Ω ?	Go to step 27.	Replace the sub fan relay 2.
27 CHECK HARNESS BETWEEN SUB FAN RELAY 2 TERMINAL AND SUB FAN MOTOR CONNECTOR. Measure the resistance of harness between sub fan motor connector and sub fan relay 2 terminal. <i>Connector & terminal (F16) No. 2 — (F27) No. 20:</i>	Is the resistance less than 1 Ω ?	Go to step 28.	Repair the open circuit of harness between sub fan motor connector and sub fan relay 2 terminal.
28 CHECK HARNESS BETWEEN SUB FAN RELAY 2 AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Measure the resistance of harness between sub fan relay 2 connector and ECM connector. <i>Connector & terminal (F27) No. 22 — (B136) No. 29:</i>	Is the resistance less than 1 Ω ?	Go to step 29.	Repair the open circuit of harness between sub fan relay 2 and ECM.
29 CHECK POOR CONTACT. Repair the open circuit of harness between sub fan relay and ECM.	Is there poor contact in connector between sub fan motor and ECM?	Repair the poor contact of connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-37, Read Diagnostic Trouble Code (DTC).>

4. Engine Coolant

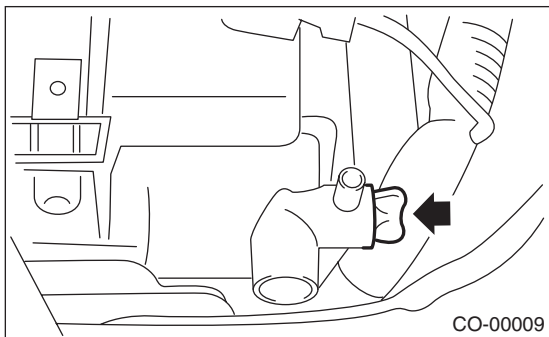
A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

- 1) Set the vehicle on a lift.
- 2) Lift up the vehicle.
- 3) Remove the under cover.
- 4) Remove the drain plug to drain engine coolant into container.

NOTE:

Remove the radiator cap so that engine coolant will drain faster.



- 5) Install the drain plug.

2. FILLING OF ENGINE COOLANT

- 1) Pour cooling system conditioner through the filler neck.

Cooling system protective agent:

Refer to "SPECIFICATION" for the cooling system protective agent. <Ref. to CO(H4SO)-2, SPECIFICATION, General Description.>

- 2) Pour engine coolant into the radiator up to the filler neck position.

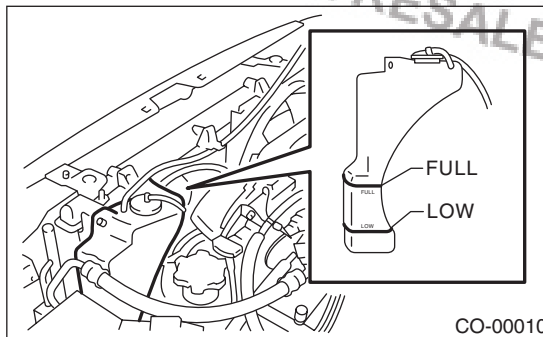
Recommended engine coolant:

Refer to "SPECIFICATION" for the recommended engine coolant. <Ref. to CO(H4SO)-2, SPECIFICATION, General Description.>

Coolant level:

Refer to "SPECIFICATION" for the recommended engine coolant. <Ref. to CO(H4SO)-2, SPECIFICATION, General Description.>

- 3) Fill engine coolant into the reservoir tank up to "FULL" level.



- 4) Close the radiator cap and start the engine. Race 5 to 6 times at 3,000 rpm or less, then stop the engine. (Complete this operation within 40 seconds.)
- 5) Wait for one minute after the engine stops, open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
- 6) Perform the procedures 4) and 5) again.
- 7) Attach the radiator cap and reservoir tank cap properly.
- 8) Start the engine and operate the heater at maximum hot position and the blower speed setting at "LO".
- 9) Run the engine at 2,000 rpm or less until radiator fan starts and stops.

NOTE:

Be careful with the engine coolant temperature gauge to prevent overheating.

- 10) Stop the engine and wait until the engine coolant temperature drops to 30°C (86°F) or less.
- 11) Open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position and reservoir tank to the "FULL" level.
- 12) Attach the radiator cap and reservoir tank cap properly.
- 13) Set the heater setting to maximum hot position and the blower speed setting to "LO" and start the engine. Perform racing at 3,000 rpm or less. If the flowing sound is heard from heater core, repeat the procedures from step 9).

B: INSPECTION

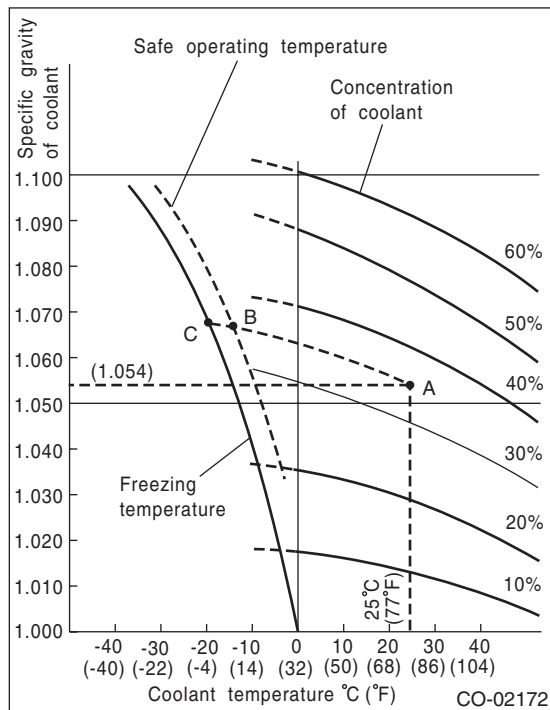
1. RELATIONSHIP OF ENGINE COOLANT CONCENTRATION AND FREEZING TEMPERATURE

The concentration and safe operating temperature of engine coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.

[Example]

If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 35% (point A), the safe operating temperature is -14°C (7°F) (point B), and the freezing temperature is -20°C (-4°F) (point C).

- Diagram 1



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

To adjust the concentration of coolant according to temperature, find the proper engine coolant concentration in the diagram 1 and replace the necessary amount of coolant with an undiluted solution of engine coolant (concentration 50%).

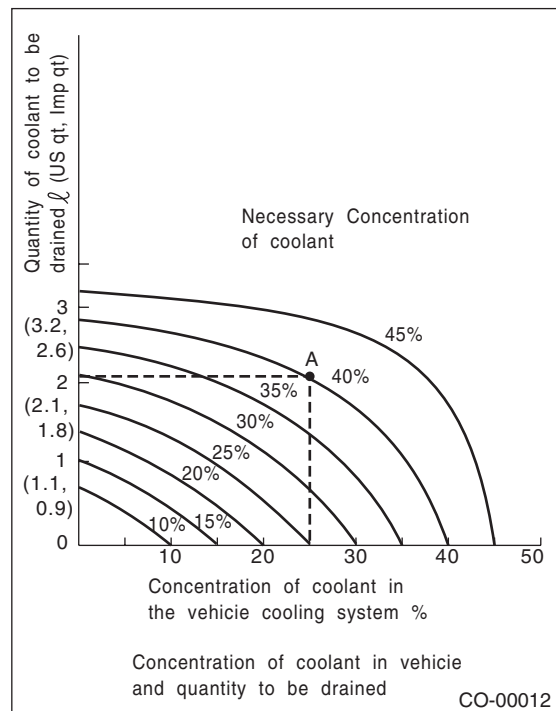
The amount of engine coolant that should be replaced can be determined using the diagram 2.

[Example]

Assume that the engine coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of engine coolant concentration intersects with the 40% curve of the necessary engine coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) undiluted coolant solution.

If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.

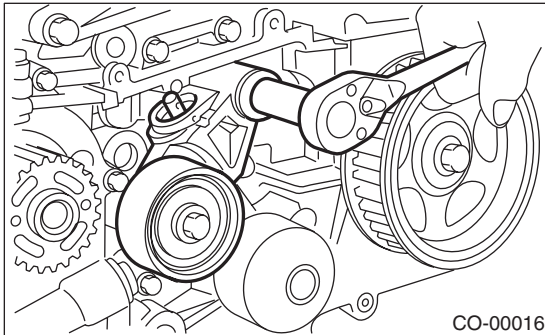
- Diagram 2



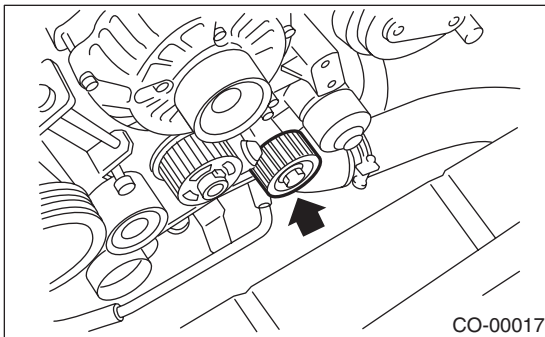
5. Water Pump

A: REMOVAL

- 1) Remove the radiator. <Ref. to CO(H4SO)-23, REMOVAL, Radiator.>
- 2) Remove the V-belts. <Ref. to ME(H4SO)-39, REMOVAL, V-belt.>
- 3) Remove the crank pulley. <Ref. to ME(H4SO)-41, REMOVAL, Crank Pulley.>
- 4) Remove the timing belt. <Ref. to ME(H4SO)-43, TIMING BELT, REMOVAL, Timing Belt.>
- 5) Remove the automatic belt tension adjuster.

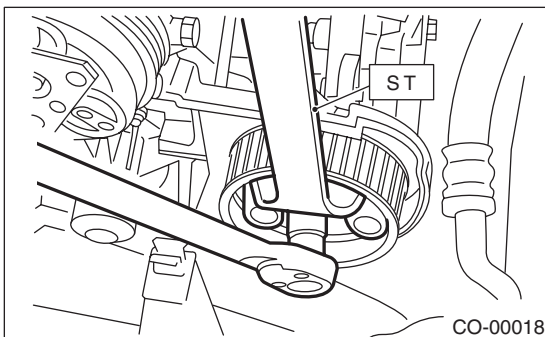


- 6) Remove the belt idler No. 2.

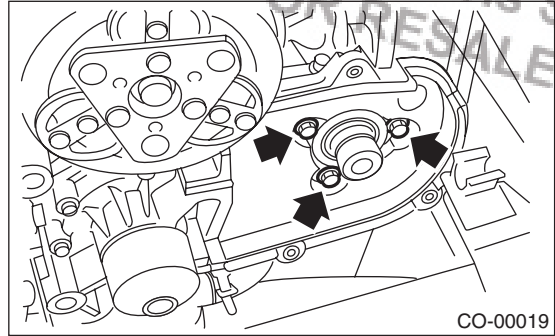


- 7) Remove the cam sprocket (LH) using ST.
ST 18231AA010 CAM SPROCKET WRENCH

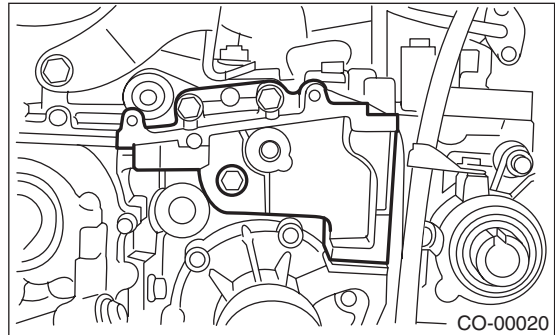
NOTE:
CAMSHAFT SPROCKET WRENCH (499207100)
can also be used.



- 8) Remove the belt cover (LH) No. 2.

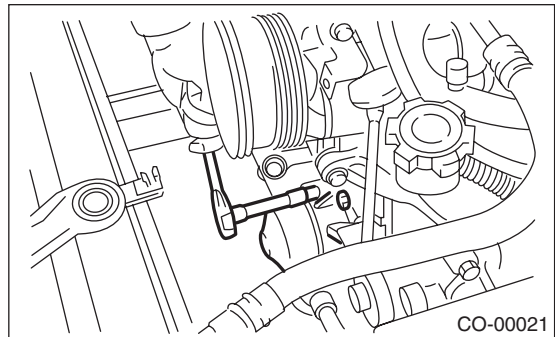


- 9) Remove the tensioner bracket.



- 10) Disconnect the hose from water pump.

- 11) Remove the water pump.



B: INSTALLATION

1) Install the water pump onto cylinder block (LH).

NOTE:

- Use a new gasket.
- When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in figure.

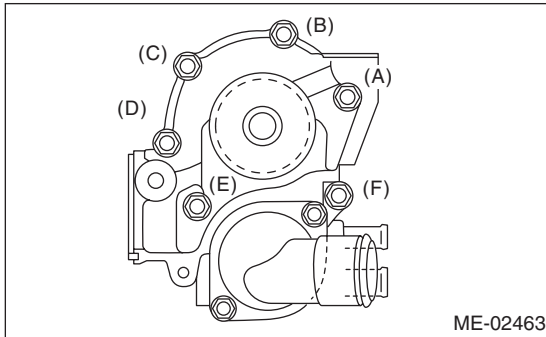
Tightening torque:

First:

12 N·m (1.2 kgf-m, 8.7 ft-lb)

Second:

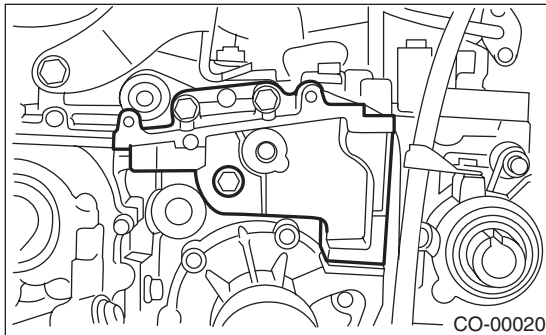
12 N·m (1.2 kgf-m, 8.7 ft-lb)



- 2) Install the hose to the water pump.
3) Install the tensioner bracket.

Tightening torque:

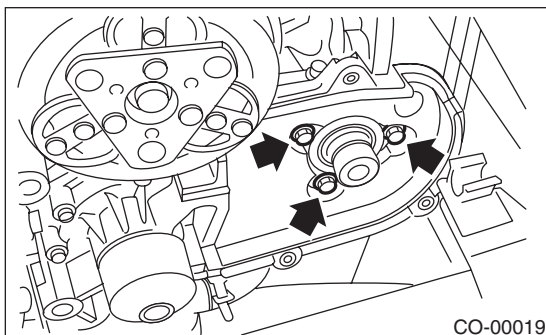
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



4) Install the belt cover No. 2 (LH).

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)



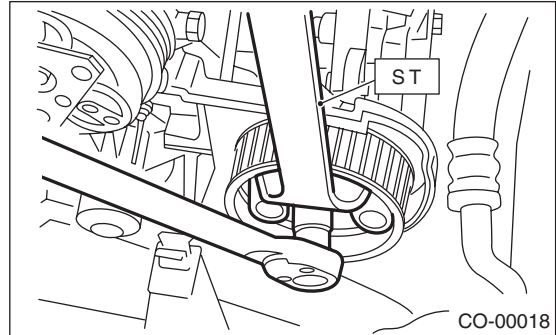
5) Install the cam sprocket (LH) using ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:

CAMSHAFT SPROCKET WRENCH (499207100) can also be used.

Tightening torque:

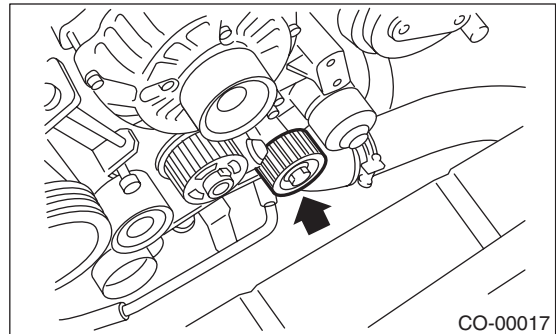
78 N·m (8.0 kgf-m, 57.9 ft-lb)



6) Install the belt idler No. 2.

Tightening torque:

39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Install an automatic belt tension adjuster with the tension rod held by a pin. <Ref. to ME(H4SO)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

8) Install the timing belt. <Ref. to ME(H4SO)-45, TIMING BELT, INSTALLATION, Timing Belt.>

9) Install the crank pulley.

<Ref. to ME(H4SO)-41, INSTALLATION, Crank Pulley.>

10) Install the V-belts. <Ref. to ME(H4SO)-39, INSTALLATION, V-belt.>

11) Install the radiator. <Ref. to CO(H4SO)-24, INSTALLATION, Radiator.>

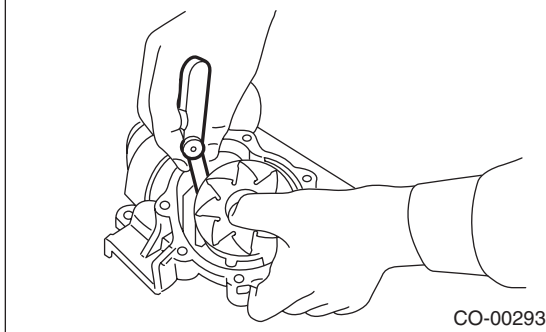
C: INSPECTION

- 1) Check the water pump bearing for smooth rotation.
- 2) Check the water pump pulley for abnormalities.
- 3) Make sure the impeller is not deformed or damaged.
- 4) Inspect the clearance between impeller and pump case.

Clearance between impeller and pump case:

Standard

0.5 — 1.5 mm (0.020 — 0.060 in)

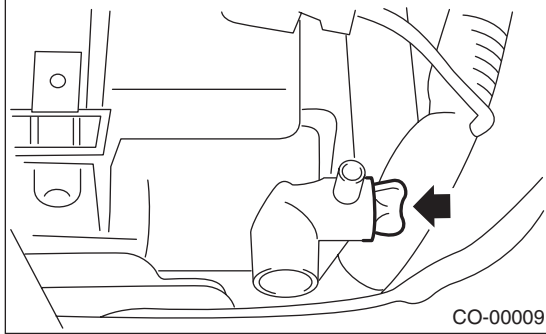


- 5) After water pump installation, check pulley shaft for engine coolant leaks or noise. If leaks or noise are noted, replace the water pump assembly.

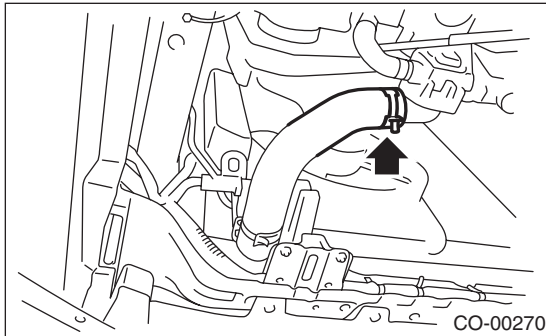
6. Thermostat

A: REMOVAL

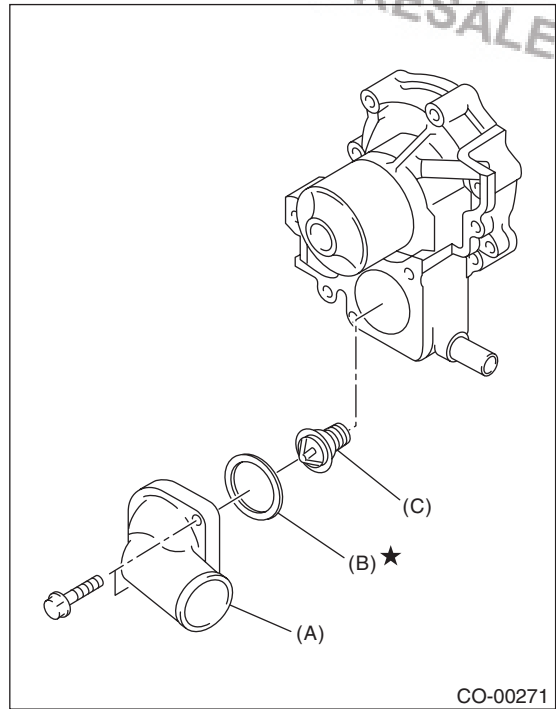
- 1) Set the vehicle on a lift.
- 2) Lift up the vehicle.
- 3) Remove the under cover.
- 4) Drain engine coolant completely.
 <Ref. to CO(H4SO)-16, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



- 5) Disconnect the radiator outlet hose from thermostat cover.



- 6) Remove the thermostat cover, and then remove the gasket and thermostat.



- (A) Thermostat cover
- (B) Gasket
- (C) Thermostat

B: INSTALLATION

1) Install a gasket to thermostat.

NOTE:

Use a new gasket.

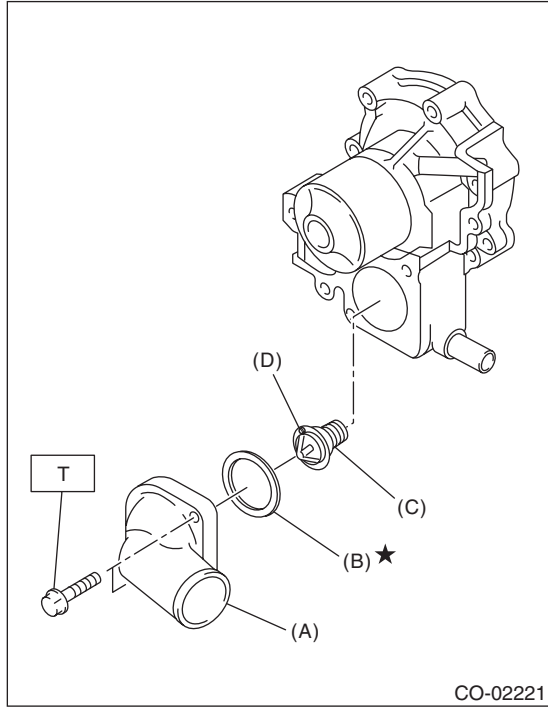
2) Install the thermostat and thermostat cover.

NOTE:

The thermostat must be installed with the jiggle pin facing upward.

Tightening torque:

12 N·m (1.2 kgf·m, 8.7 ft·lb)



- (A) Thermostat cover
- (B) Gasket
- (C) Thermostat
- (D) Jiggle pin

3) Connect the radiator outlet hose to thermostat cover.

4) Install the under cover.

5) Lower the vehicle.

6) Fill engine coolant. <Ref. to CO(H4SO)-16, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

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

• Inspection method

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 measured value should meet the specification.

NOTE:

- Leave the thermostat in the boiling water for five minutes or more before measuring valve lift.
- Hold the thermostat with a wire or the like to avoid contacting with container bottom.

Opening start temperature:

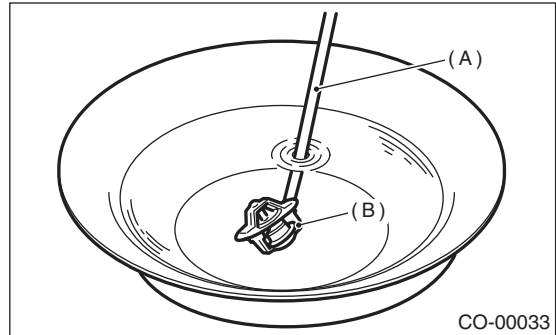
80 — 84°C (176 — 183°F)

Full open temperature:

95°C (203°F)

Valve lift:

9.0 mm (0.354 in) or more



- (A) Thermometer
- (B) Thermostat

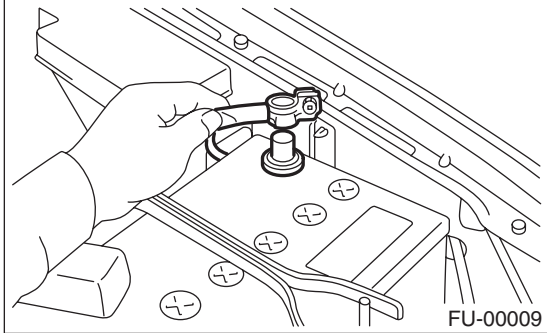
7. Radiator

A: REMOVAL

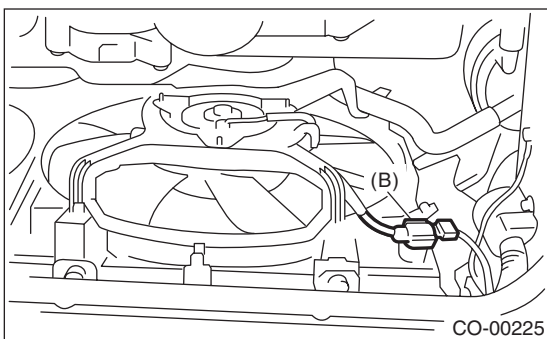
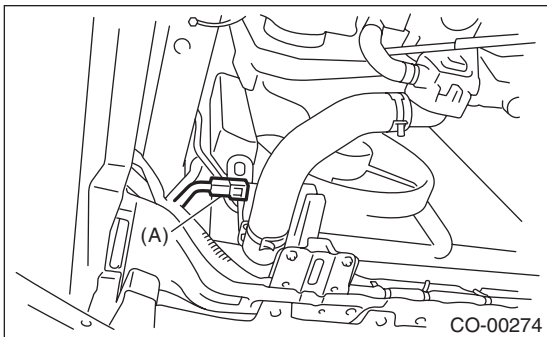
CAUTION:

The radiator is pressurized. Wait until engine cools down before working on the radiator.

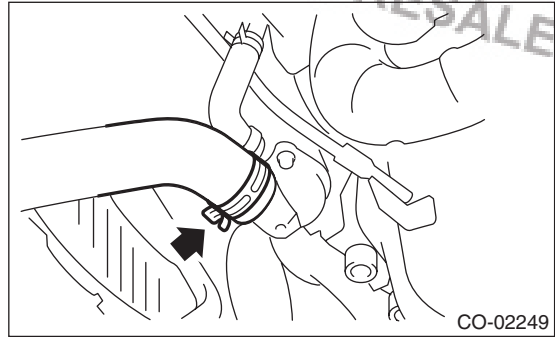
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.



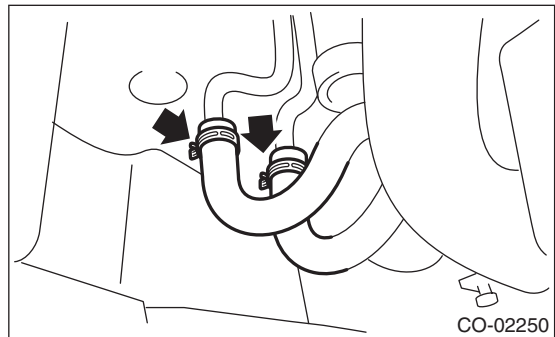
- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Drain engine coolant completely.
<Ref. to CO(H4SO)-16, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 6) Disconnect the connectors of radiator main fan (A) and sub fan motor (B).



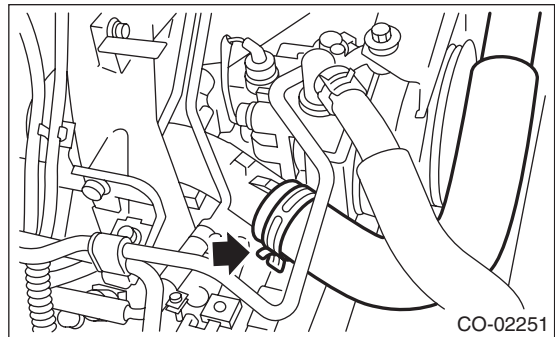
- 7) Disconnect the radiator outlet hose from thermostat cover.



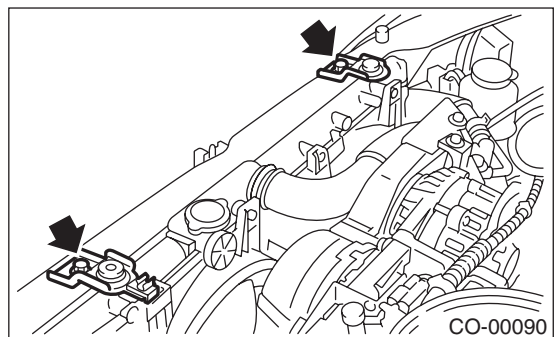
- 8) Disconnect the ATF cooler hoses from ATF pipes. (AT model) Apply the cap to prevent ATF leaks.



- 9) Lower the vehicle.
- 10) Disconnect the over flow hose.
- 11) Remove the reservoir tank. <Ref. to CO(H4SO)-31, REMOVAL, Reservoir Tank.>
- 12) Remove the air intake duct.
- 13) Disconnect the radiator inlet hoses from the engine.



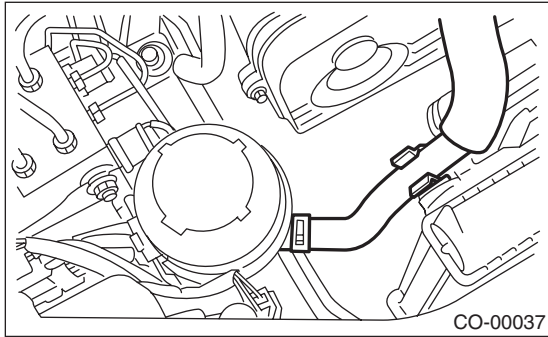
- 14) Remove the radiator upper brackets.



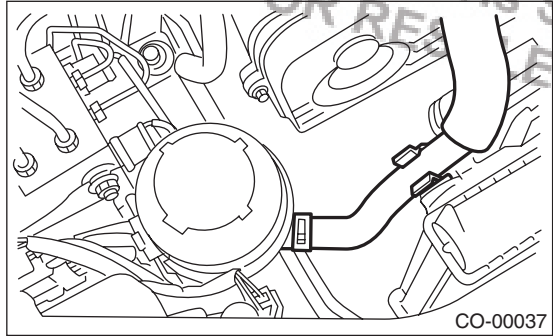
Radiator

COOLING

15) Detach the power steering hose from the clip on the radiator.



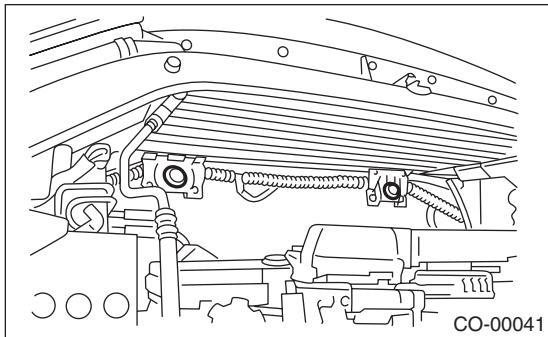
4) Attach the power steering hose to the radiator.



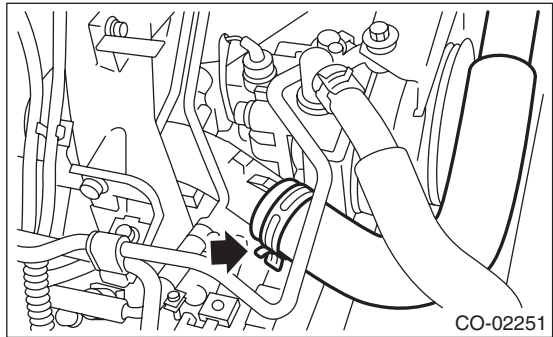
16) Lift the radiator up and away from vehicle.

B: INSTALLATION

1) Attach the radiator lower cushion to the hole on the radiator lower bracket.



5) Connect the radiator inlet hose.



2) Install the radiator to vehicle.

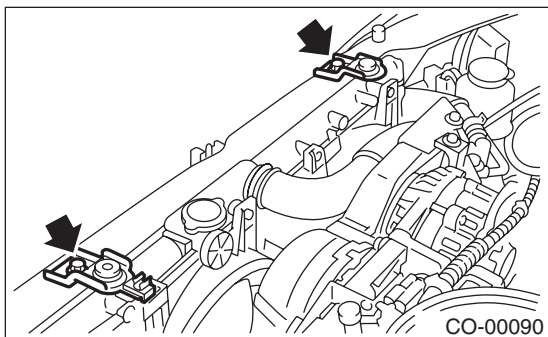
NOTE:

Make pins on the lower side of radiator be fitted into the radiator lower cushions on body side.

3) Install the radiator upper brackets and tighten the bolts.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



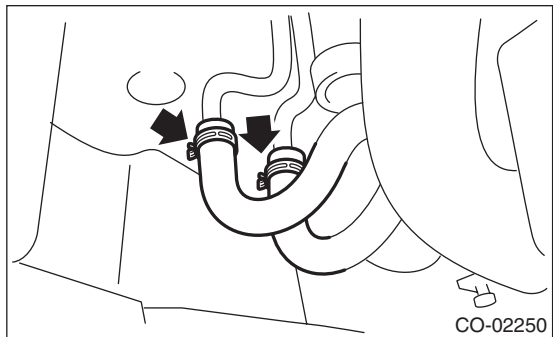
6) Install the air intake duct.

7) Install the reservoir tank. <Ref. to CO(H4SO)-31, INSTALLATION, Reservoir Tank.>

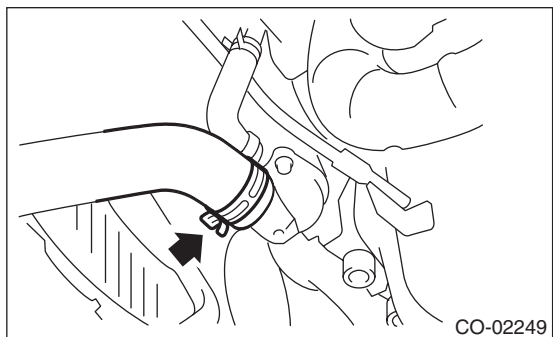
8) Connect the over flow hose.

9) Lift up the vehicle.

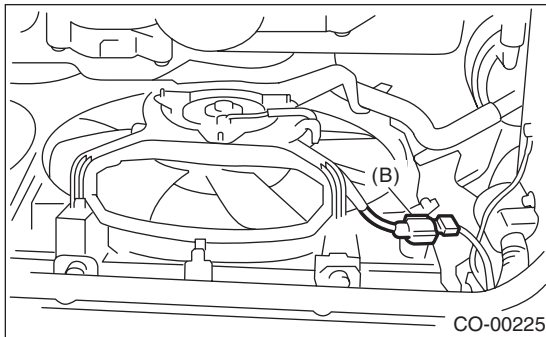
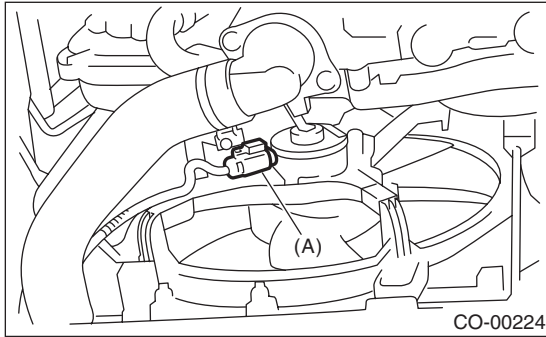
10) Connect the ATF cooler hoses. (AT model)



11) Connect the radiator outlet hose.



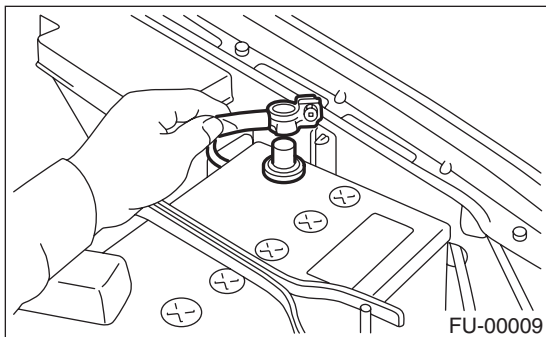
12) Connect the connectors to the radiator main fan motor (A) and sub fan motor (B).



13) Install the under cover.

14) Lower the vehicle.

15) Connect the ground cable to the battery.

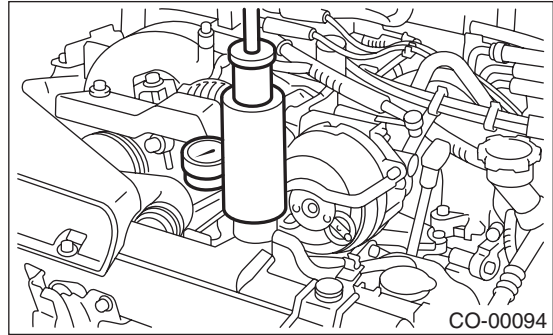


16) Fill engine coolant. <Ref. to CO(H4SO)-16, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

17) Check the ATF level. <Ref. to 4AT-28, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION

1) Remove the radiator cap, fill the radiator with engine coolant, and then install the tester to the installation position of cap.



2) Apply a pressure of 157 kPa (1.6 kgf/cm², 23 psi) to the radiator and check the following items:

- Leakage from the radiator or its vicinity
- Leakage from the hose or its connections

CAUTION:

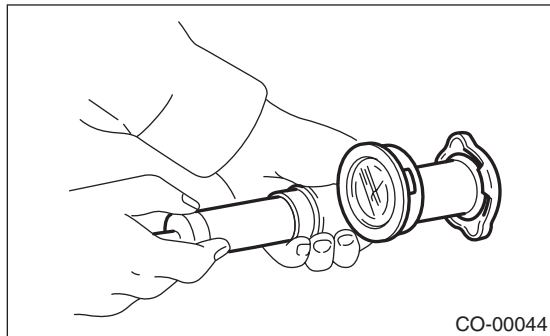
- Engine should be turned off.
- Wipe engine coolant from check points in advance.
- Be careful to prevent engine coolant from spurting out when removing tester.
- Be careful not to deform the filler neck of radiator when installing and removing the tester.

Brought to you by Eris Studios
NOT FOR RESALE

8. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase pressure until the tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds. Replace the radiator cap if it is opened under a pressure less than the service limit value.

Standard:

93 — 123 kPa (0.95 — 1.25 kgf/cm², 14 — 18 psi)

Service limit:

83 kPa (0.85 kgf/cm², 12 psi)

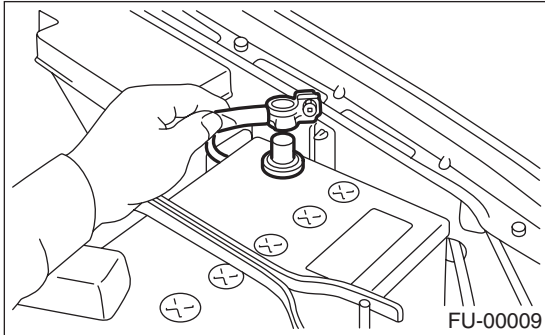
CAUTION:

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

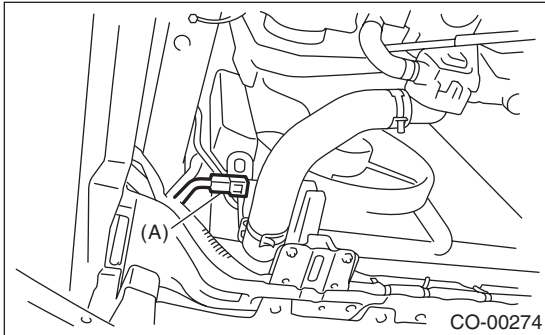
9. Radiator Main Fan and Fan Motor

A: REMOVAL

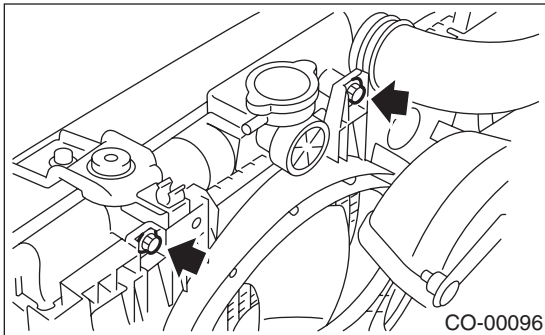
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.



- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Disconnect the connector of main fan motor (A).



- 6) Remove the ATF hose from the clip of the radiator main fan motor assembly. (AT model)
- 7) Lower the vehicle.
- 8) Disconnect the over flow hose.
- 9) Remove the reservoir tank. <Ref. to CO(H4SO)-31, REMOVAL, Reservoir Tank.>
- 10) Remove the bolts which hold the radiator main fan shroud to the radiator.



- 11) Remove the radiator main fan motor assembly.

B: INSTALLATION

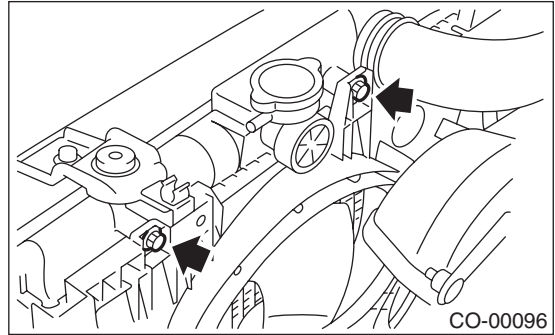
Install in the reverse order of removal.

NOTE:

If the installation of the radiator main fan motor assembly is difficult, attempt installation after loosening the bolts which hold the radiator sub fan motor assembly.

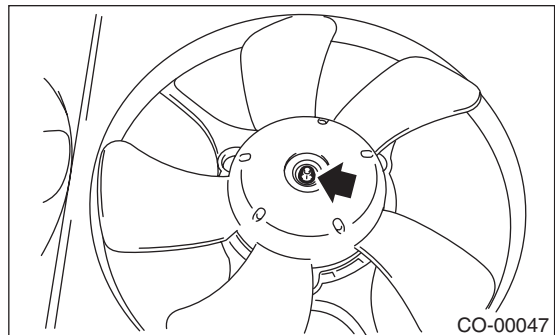
Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

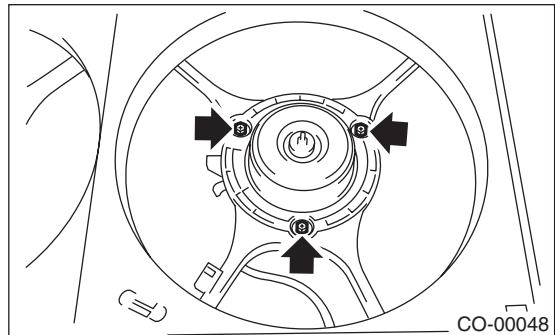


C: DISASSEMBLY

- 1) Remove the clip which holds the fan motor connector onto the shroud.
- 2) Remove the nut which holds the fan to the fan motor.



- 3) Remove the bolts which hold fan motor onto shroud.



Radiator Main Fan and Fan Motor

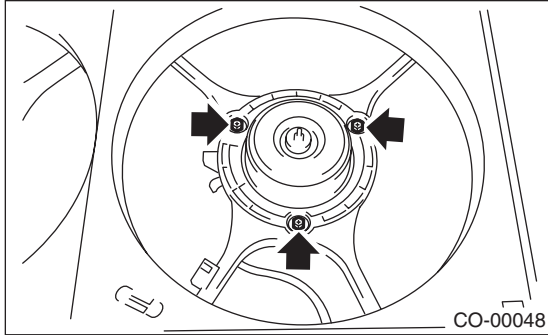
COOLING

D: ASSEMBLY

Assemble in the reverse order of disassembly.

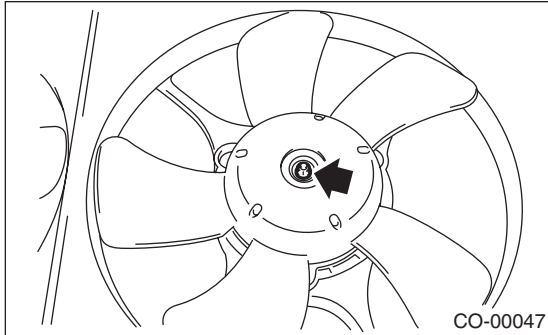
Tightening torque:

4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



Tightening torque:

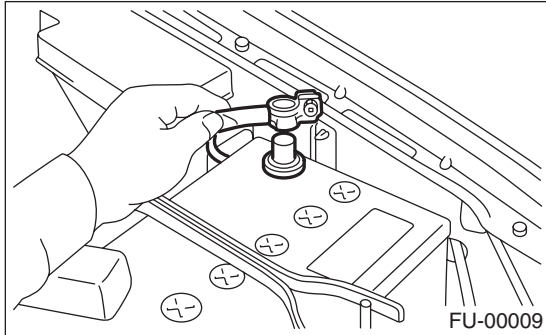
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



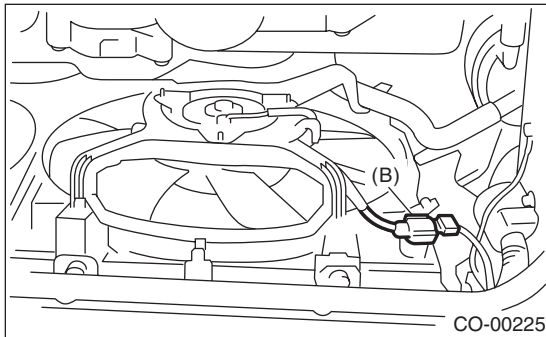
10. Radiator Sub Fan and Fan Motor

A: REMOVAL

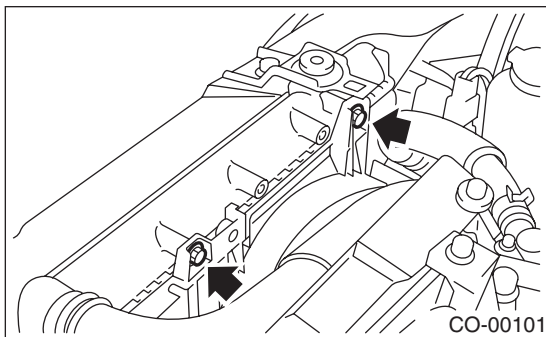
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.



- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Remove the connector of sub fan motor (B).



- 6) Remove the ATF hose from the clip of the radiator sub fan motor assembly. (AT model)
- 7) Lower the vehicle.
- 8) Remove the air intake duct.
- 9) Remove the bolts which hold the radiator sub fan shroud to the radiator.



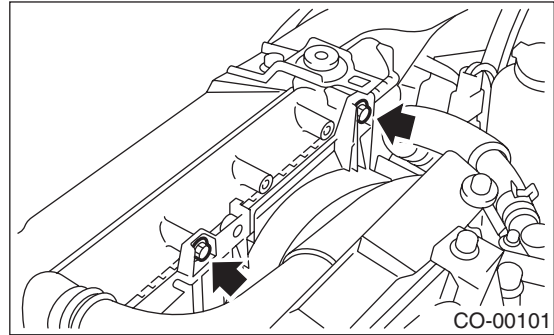
- 10) Remove the radiator sub fan motor assembly from underneath the vehicle.

B: INSTALLATION

Install in the reverse order of removal.

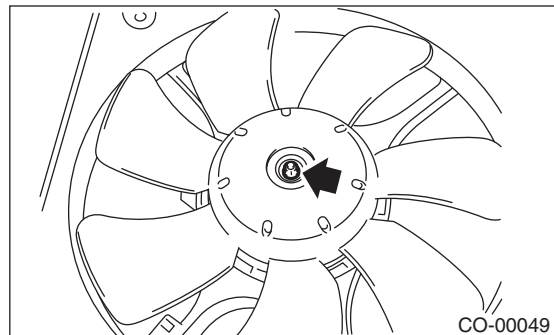
Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

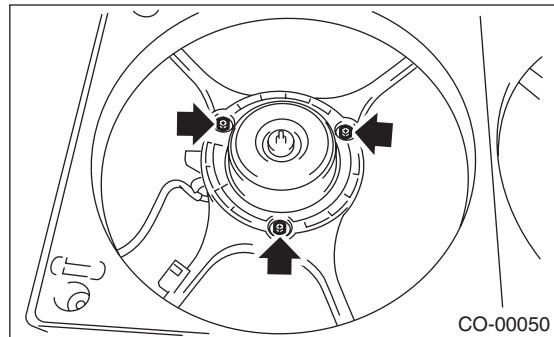


C: DISASSEMBLY

- 1) Remove the clip which holds the fan motor connector onto the shroud.
- 2) Remove the nut which holds the fan to the fan motor.



- 3) Remove the bolts which hold fan motor onto shroud.



Radiator Sub Fan and Fan Motor

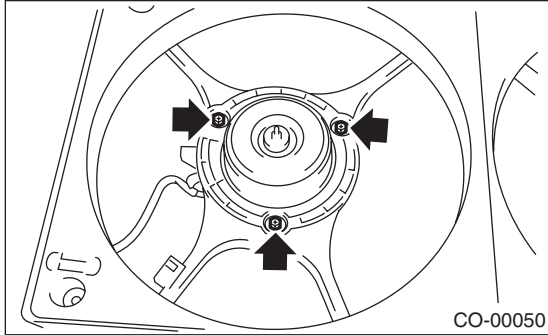
COOLING

D: ASSEMBLY

Assemble in the reverse order of disassembly.

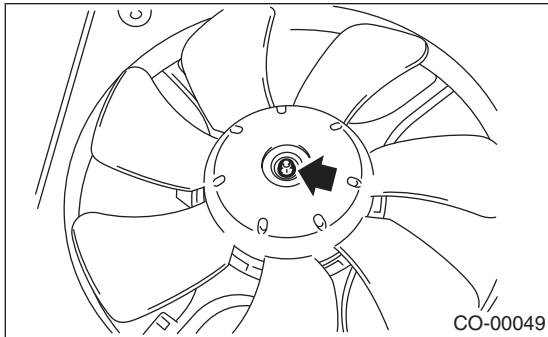
Tightening torque:

4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



Tightening torque:

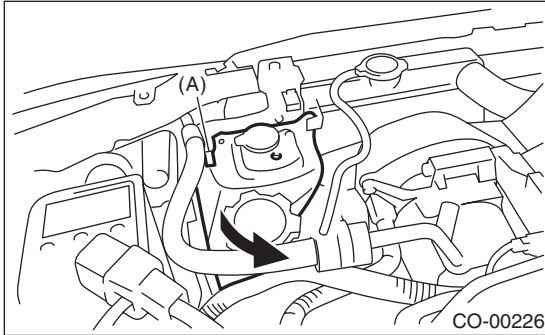
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



11. Reservoir Tank

A: REMOVAL

- 1) Disconnect the over flow hose from the radiator filler neck position.
- 2) Push the claw (A) and pull the reservoir tank in the direction of the arrow to remove.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure the engine coolant level is between "FULL" and "LOW".

Engine Cooling System Trouble in General

COOLING

12.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Overheating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on timing 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 EN(H4SO)(diag)-2, Basic Diagnostic Procedure.>
	h. Clogged or leaking radiator	Clean, repair or replace.
	i. Engine oil mixed in engine coolant	Replace the engine coolant. If it is ineffective, inspect and repair the engine side.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.>
	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. Defective radiator fan	Inspect the radiator fan relay, engine coolant temperature sensor or fan motor and replace them.
Over-cooling	a. Ambient 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 the cylinder head bolts or replace the gasket.
	e. Cylinder head and block damaged or cracked	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Abnormal noise	a. Timing belt problem	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.