

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEM) FU(H4SO)

**EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICE) EC(H4SO)**

INTAKE (INDUCTION) IN(H4SO)

MECHANICAL ME(H4SO)

EXHAUST EX(H4SO)

COOLING CO(H4SO)

LUBRICATION LU(H4SO)

SPEED CONTROL SYSTEM SP(H4SO)

IGNITION IG(H4SO)

STARTING/CHARGING SYSTEM SC(H4SO)

ENGINE (DIAGNOSTIC) EN(H4SO)

COOLING

CO(H4SO)

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General Description

COOLING

1. General Description

A: SPECIFICATION

Model		Non-turbo	Turbo
Cooling system		Electric fan+Forced engine coolant circulation system	
Total engine coolant capacity ℓ (US qt, Imp qt)		2.0L with ATF warmer: Approx. 6.9 (7.29, 6.07) 2.0L AT: Approx. 6.5 (6.87, 5.72) 2.0L MT: Approx. 6.6 (6.98, 5.81) 2.5L AT: Approx. 6.8 (7.19, 5.98) 2.5L MT: Approx. 6.9 (7.29, 6.07)	AT: Approx. 7.3 (7.71, 6.42) MT with oil cooler: Approx. 7.3 (7.71, 6.42) MT without oil cooler: Approx. 7.4 (7.82, 6.51)
Water pump	Type	Centrifugal impeller type	
	Discharge performance I	Discharge	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	85°C (185°F)
	Discharge performance II	Discharge	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	85°C (185°F)
	Discharge performance III	Discharge	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	85°C (185°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 — 0.7 mm (0.020 — 0.028 in)	
	Limit	1.0 mm (0.039 in)	
“Thrust” runout of impeller end	0.5 mm (0.020 in)		
Thermostat	Type	Wax pellet type	
	Starts to open	80 — 84°C (176 — 183°F)	76 — 80°C (169 — 176°F)
	Fully opened	95°C (203°F)	91°C (196°F)
	Valve lift	9.0 mm (0.354 in) or more	
	Valve bore	35 mm (1.38 in)	
Radiator fan	Motor	Main fan	70 W 2.0L AT (K4 ^{★1}) : 70 W 2.0L AT (EC, EK ^{★1}) : 120 W 2.0 L MT: 70 W 2.5 L: 120 W
		Sub fan	70 W 2.0L AT (K4 ^{★1}) : 70 W 2.0L AT (EC, EK ^{★1}) : 120 W 2.0 L MT: 70 W 2.5 L: 120 W
	Fan diameter×Blade	320 mm (11.81 in)×5 (main fan) 320 mm (11.81 in)×7 (sub fan)	

General Description

COOLING

Radiator	Type		Down flow, pressure type
	Core dimensions	Width×Height×Thickness	691.5×360×16 mm (27.22×14.17×0.63 in)
	Pressure range in which cap valve is open		Above: 108±15 kPa (1.1±0.15 kg/cm ² , 16±2 psi) Below: -1.0 to -4.9 kPa (-0.01 to -0.05 kg/cm ² , -0.1 to -0.7 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

★1: For option code, refer to ID section. <Ref. to ID-2, Identification.>

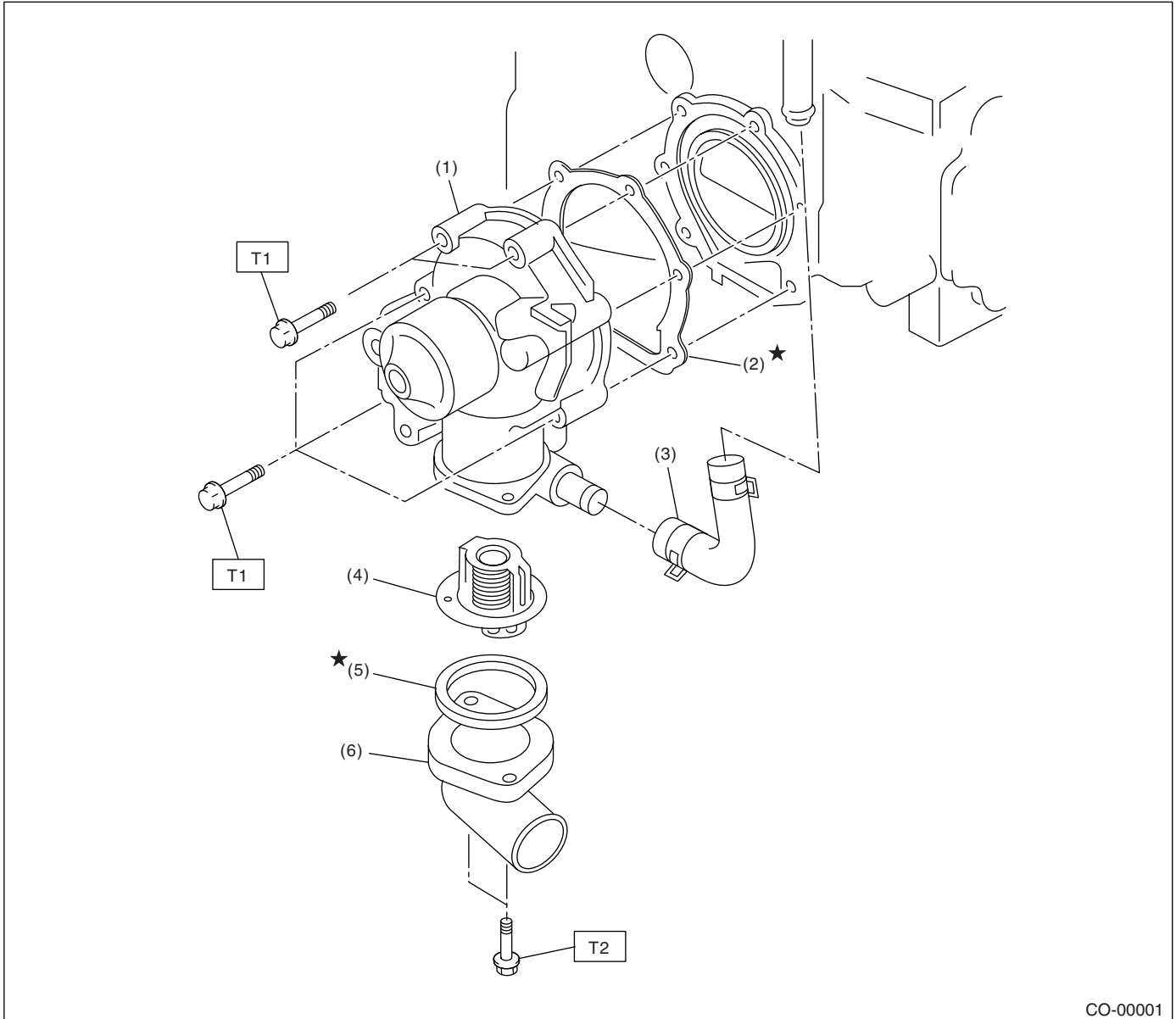
General Description

COOLING

B: COMPONENT

1. WATER PUMP

• NON-TURBO MODEL



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

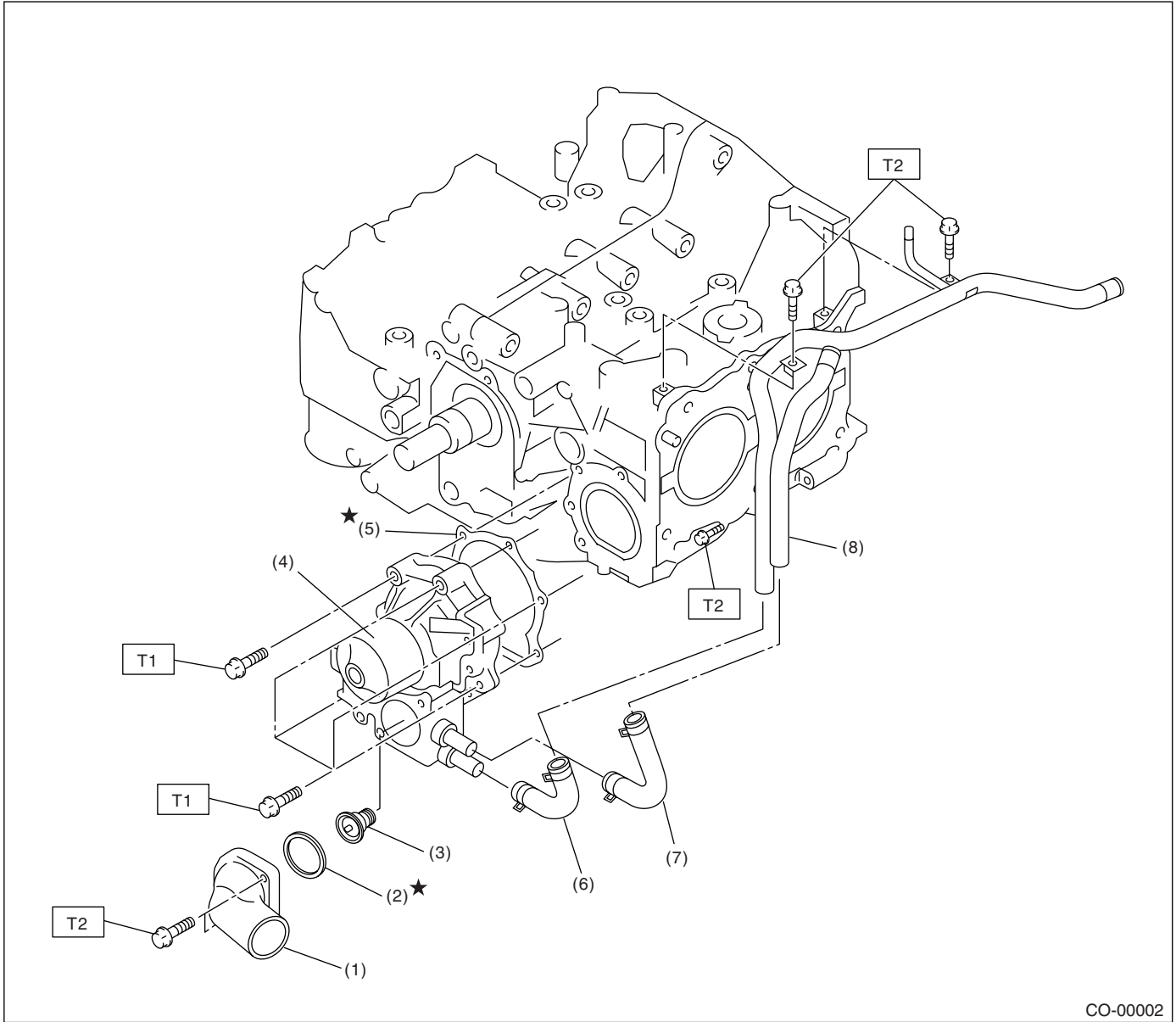
- (5) Gasket
- (6) Thermostat cover

Tightening torque: N·m (kgf·m, ft·lb)

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

T2: 6.5 (0.66, 4.8)

• TURBO MODEL



CO-00002

- | | |
|----------------------|--------------------------------------|
| (1) Thermostat cover | (5) Gasket |
| (2) Gasket | (6) Heater by-pass hose |
| (3) Thermostat | (7) Coolant filler tank by-pass hose |
| (4) Water pump ASSY | (8) Water by-pass pipe |

Tightening torque: N·m (kgf·m, ft·lb)

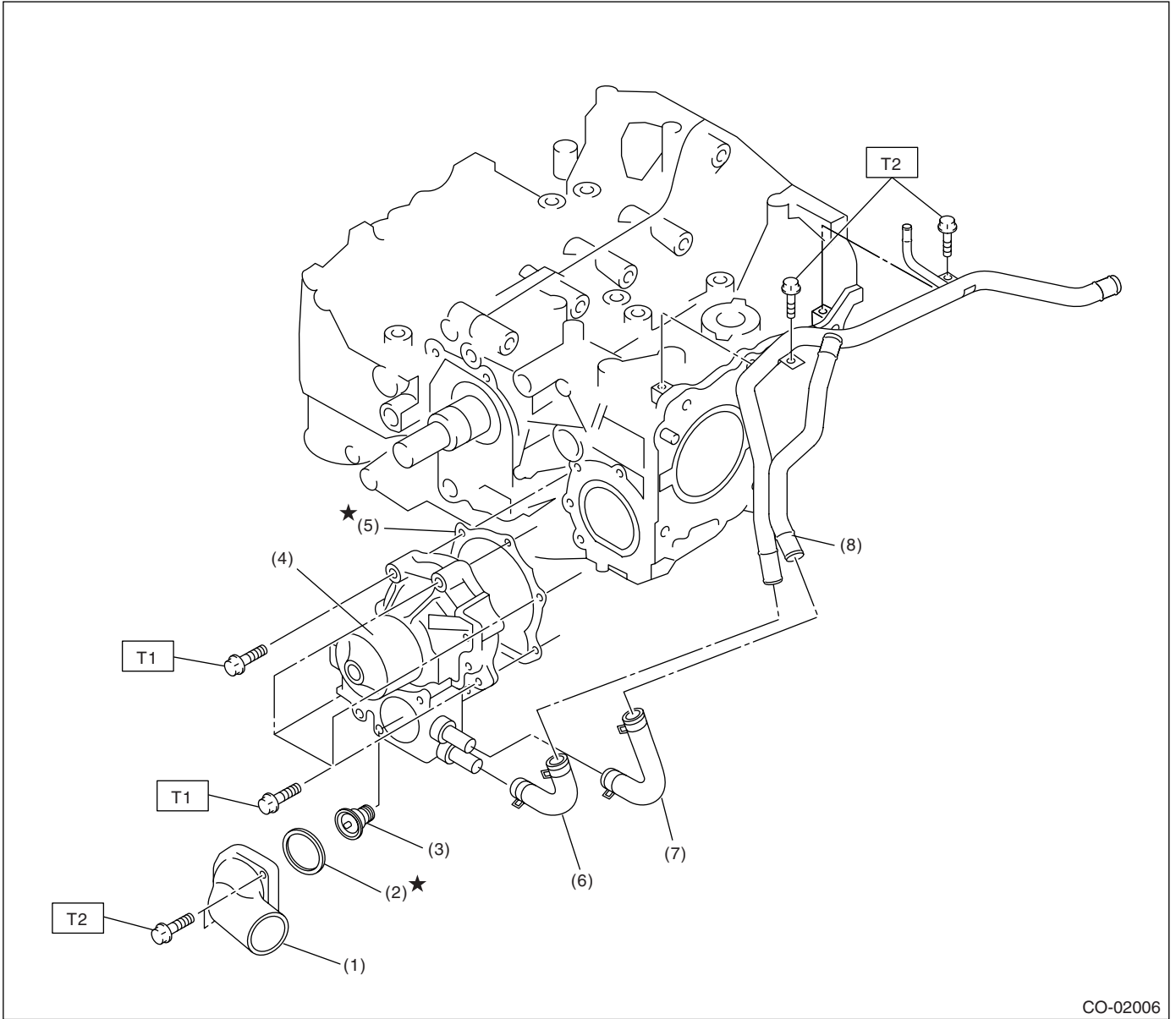
**T1: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)**

T2: 6.5 (0.66, 4.8)

General Description

COOLING

• MODEL WITH ATF WARMER



- | | |
|----------------------|--------------------------------------|
| (1) Thermostat cover | (5) Gasket |
| (2) Gasket | (6) Heater by-pass hose |
| (3) Thermostat | (7) Coolant filler tank by-pass hose |
| (4) Water pump ASSY | (8) Water by-pass pipe |

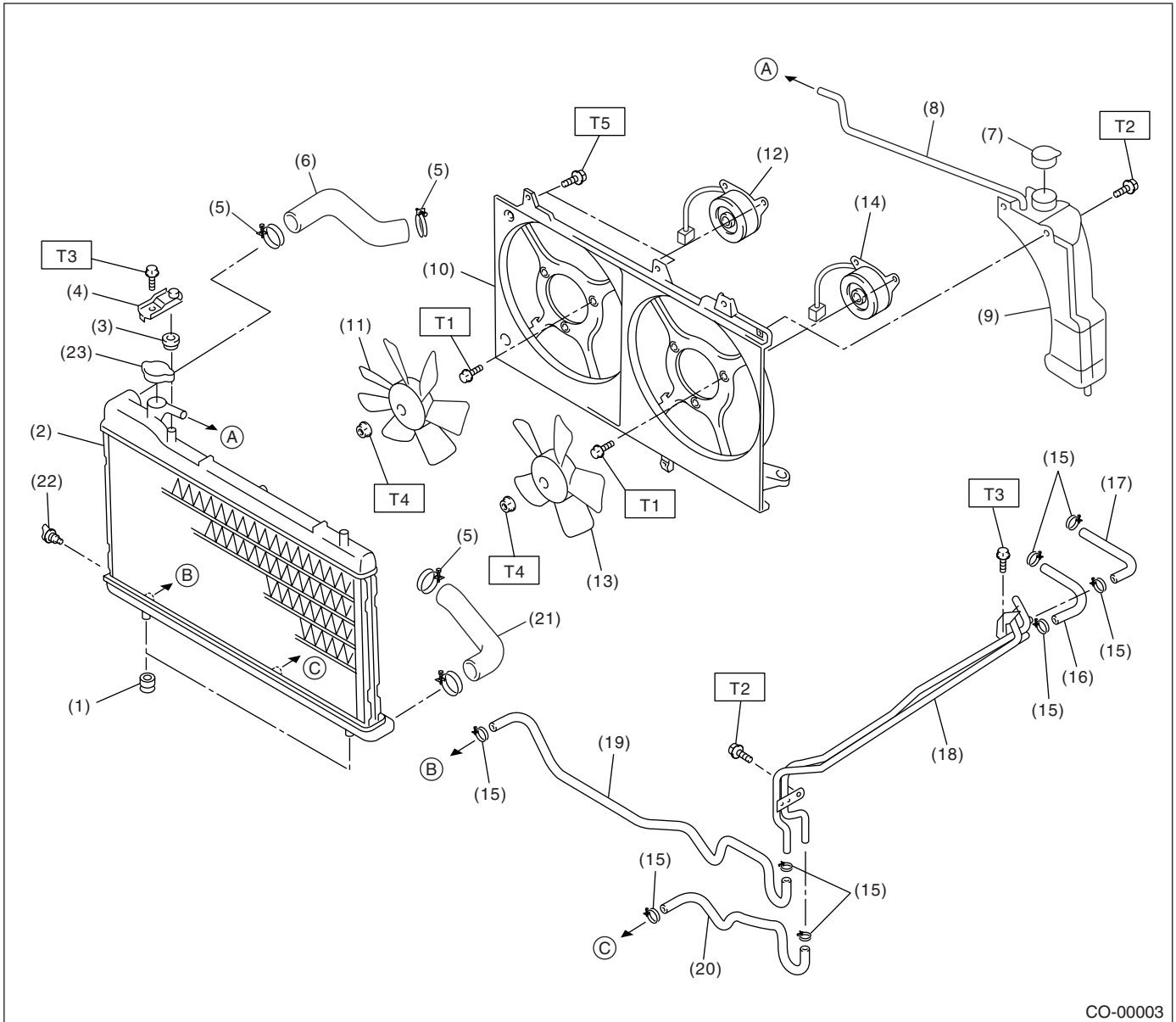
Tightening torque: N·m (kgf·m, ft·lb)

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

T2: 6.5 (0.66, 4.8)

2. RADIATOR AND RADIATOR FAN

• NON-TURBO MODEL



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

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

T1: 4.4 (0.45, 3.3)

T2: 7.5 (0.76, 5.5)

T3: 18 (1.8, 13.0)

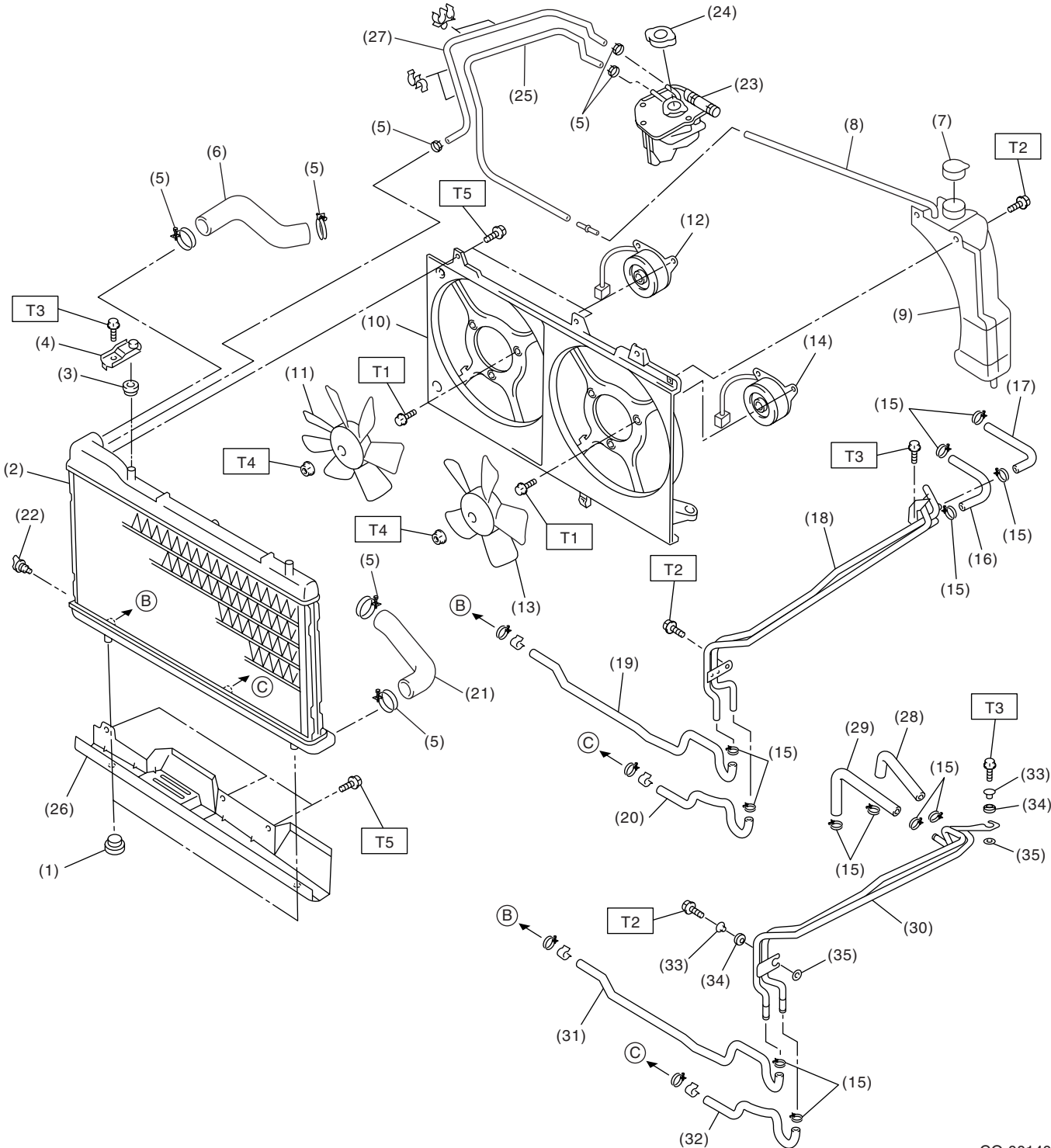
T4: 3.4 (0.35, 2.5)

T5: 4.9 (0.50, 3.6)

General Description

COOLING

• TURBO MODEL



CO-00140

General Description

COOLING

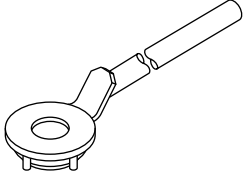
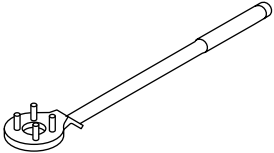
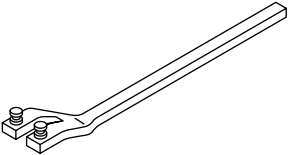
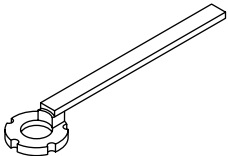
(1) Radiator lower cushion	(18) ATF pipe (AT model)	(31) Oil cooler inlet hose B (MT model with oil cooler)
(2) Radiator	(19) ATF inlet hose B (AT model)	(32) Oil cooler outlet hose B (MT model with oil cooler)
(3) Radiator upper cushion	(20) ATF outlet hose B (AT model)	(33) Spacer (MT model with oil cooler)
(4) Radiator upper bracket	(21) Radiator outlet hose	(34) Cushion (MT model with oil cooler)
(5) Clamp	(22) Radiator drain plug	(35) Setting washer (MT model with oil cooler)
(6) Radiator inlet hose	(23) Engine coolant filler tank	
(7) Engine coolant reservoir tank cap	(24) Engine coolant filler tank cap	
(8) Over flow hose	(25) Engine overflow hose	
(9) Engine coolant reservoir tank	(26) Radiator under cover (AT model)	
(10) Radiator fan shroud	(27) Engine air breather hose	
(11) Radiator sub fan	(28) Oil cooler inlet hose A (MT model with oil cooler)	<hr/> Tightening torque: N·m (kgf-m, ft-lb)
(12) Radiator sub fan motor	(29) Oil cooler outlet hose A (MT model with oil cooler)	T1: 4.4 (0.45, 3.3)
(13) Radiator main fan	(30) Oil cooler pipe (MT model with oil cooler)	T2: 7.5 (0.76, 5.5)
(14) Radiator main fan motor		T3: 18 (1.8, 13.0)
(15) ATF hose clamp (AT model)		T4: 3.4 (0.35, 2.5)
(16) ATF inlet hose A (AT model)		T5: 4.9 (0.50, 3.6)
(17) ATF outlet hose A (AT model)		<hr/>

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- 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 electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

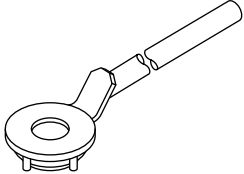
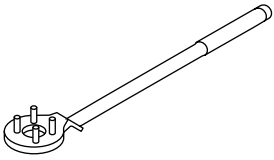
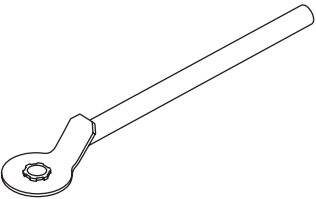
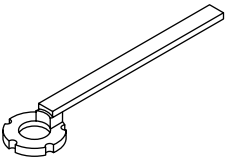
1. NON-TURBO MODEL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499977400</p>	<p style="text-align: center;">499977400 (2.0 L model)</p>	<p>CRANK PULLEY WRENCH</p>	<p>Used for stopping crank pulley when loosening and tightening crank pulley bolts.</p>
 <p style="text-align: center;">ST-499977100</p>	<p style="text-align: center;">499977100 (2.5 L model)</p>	<p>CRANK PULLEY WRENCH</p>	<p>Used for stopping crank pulley when loosening and tightening crank pulley bolts.</p>
 <p style="text-align: center;">ST18231AA010</p>	<p style="text-align: center;">18231AA010</p>	<p>CAM SPROCKET WRENCH (For left side)</p>	<ul style="list-style-type: none"> • Used for removing and installing cam sprocket (LH). • Also the CAM SPROCKET WRENCH (499207100) can be used.
 <p style="text-align: center;">ST-499207400</p>	<p style="text-align: center;">499207400</p>	<p>CAM SPROCKET WRENCH (For right side)</p>	<p>Used for removing and installing cam sprocket (RH).</p>

General Description

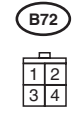
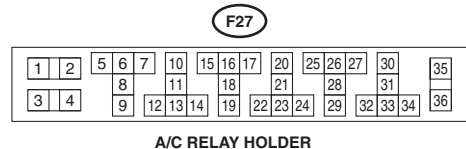
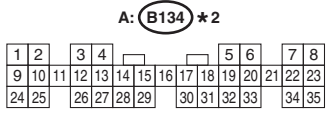
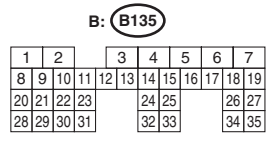
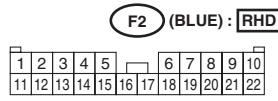
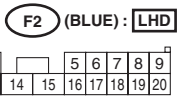
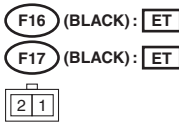
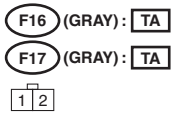
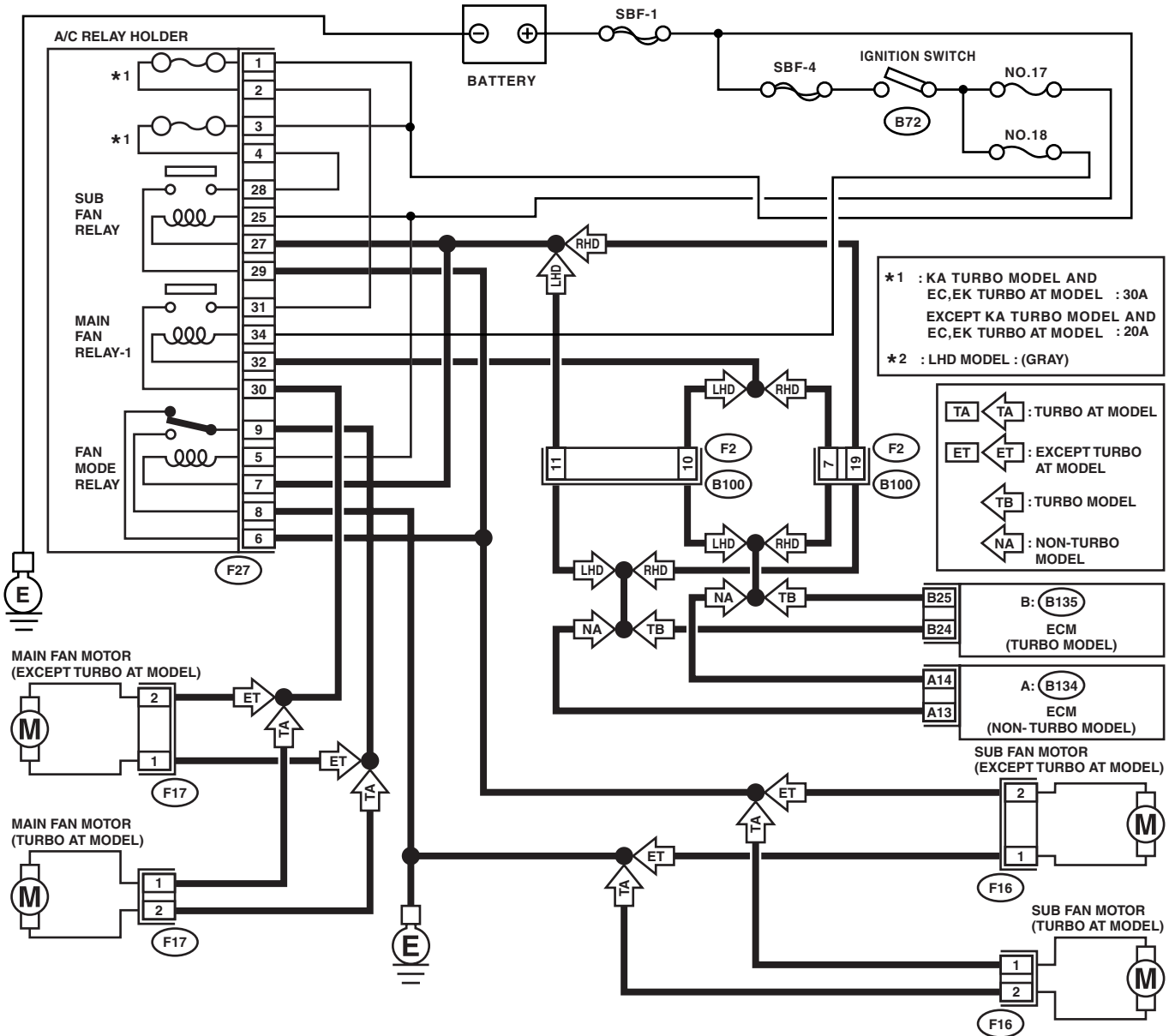
COOLING

2. TURBO MODEL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499977400</p>	<p style="text-align: center;">499977400 (2.0 L model)</p>	<p style="text-align: center;">CRANK PULLEY WRENCH</p>	<p>Used for stopping crank pulley when loosening and tightening crank pulley bolts.</p>
 <p style="text-align: center;">ST-499977100</p>	<p style="text-align: center;">499977100 (2.5 L model)</p>	<p style="text-align: center;">CRANK PULLEY WRENCH</p>	<p>Used for stopping crank pulley when loosening and tightening crank pulley bolts.</p>
 <p style="text-align: center;">ST-499977500</p>	<p style="text-align: center;">499977500</p>	<p style="text-align: center;">CAM SPROCKET WRENCH</p>	<p>Used for removing and installing cam sprocket. (Intake)</p>
 <p style="text-align: center;">ST-499207400</p>	<p style="text-align: center;">499207400</p>	<p style="text-align: center;">CAM SPROCKET WRENCH</p>	<p>Used for removing and installing cam sprocket. (Exhaust)</p>

2. Radiator Fan System

A: WIRING DIAGRAM



Radiator Fan System

COOLING

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is above 95°C (203°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

Radiator main fan and sub fan does not rotate under the above conditions.

Step	Check	Yes	No
1 CHECK OPERATION OF RADIATOR FAN. 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Using Subaru Select Monitor, check the compulsory operation of radiator fan relay. NOTE: • With Subaru Select Monitor When checking the compulsory operation of radiator fan, the radiator main and sub fan repeat the rotation in order of following: low speed rotation → high speed rotation → off. • Subaru Select Monitor Refer to Compulsory Valve Operation Check Mode for detail procedures. <Ref. to EN(H4SO)-45, Compulsory Valve Operation Check Mode.>	Do the radiator main and sub fan rotate at low speed?	Go to step 2.	Go to step 3.
2 CHECK OPERATION OF RADIATOR FAN. 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Using Subaru Select Monitor, check the compulsory operation of radiator fan relay. NOTE: • With Subaru Select Monitor When checking the compulsory operation of radiator fan, the radiator main and sub fan repeat the rotation in order of following: low speed rotation → high speed rotation → off. • Subaru Select Monitor Refer to Compulsory Valve Operation Check Mode for detail procedures. <Ref. to EN(H4SO)-45, Compulsory Valve Operation Check Mode.>	Do the radiator main and sub fan rotate at high speed?	Radiator main fan system is okay.	Go to step 32.
3 CHECK POWER SUPPLY TO MAIN FAN RELAY. 1) Turn the ignition switch to OFF. 2) Remove the fan relay 1 from A/C relay holder. 3) Measure the voltage between main fan relay terminal and chassis ground. Connector & terminal (F27) No. 31 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 4.	Go to step 5.
4 CHECK POWER SUPPLY TO MAIN FAN RELAY. 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay terminal and chassis ground. Connector & terminal (F27) No. 34 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 8.	Go to step 7.
5 CHECK FUSE. 1) Remove the fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 6.

Radiator Fan System

COOLING

Step	Check	Yes	No
6 CHECK HARNESS OF FUSE TERMINAL AND MAIN FAN RELAY TERMINAL. 1) Turn the ignition switch to OFF. 2) Measure the resistance between 20 A fuse terminal and main fan relay terminal. <i>Terminal</i> No. 2 — No. 31:	Is the resistance less than 1 Ω ?	Repair the power supply line.	Repair the open harness.
7 CHECK FUSE. 1) Turn the ignition switch to OFF 2) Remove the fuse No. 18. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
8 CHECK MAIN FAN RELAY. 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan relay terminals. <i>Terminal</i> No. 30 — No. 31:	Is the resistance more than 1 $M\Omega$?	Go to step 9.	Replace the main fan relay.
9 CHECK MAIN FAN RELAY. 1) Connect the battery to main fan relay terminals No. 32 and No. 34. 2) Measure the resistance between main fan relay terminals. <i>Terminal</i> No. 30 — No. 31:	Is the resistance less than 1 Ω ?	Go to step 10.	Replace the main fan relay.
10 CHECK HARNESS BETWEEN MAIN FAN RELAY TERMINAL AND MAIN FAN MOTOR CONNECTOR. 1) Disconnect the connector from main fan motor. 2) Measure the resistance between main fan relay terminal and main fan motor connector. <i>Connector & terminal</i> <i>Turbo AT model</i> (F17) No. 1 — (F27) No. 30: <i>Except turbo AT model</i> (F17) No. 2 — (F27) No. 30:	Is the resistance less than 1 Ω ?	Go to step 11.	Repair the open harness between main fan relay terminal and main fan motor connector.
11 CHECK HARNESS BETWEEN MAIN FAN MOTOR CONNECTOR AND FAN MODE RELAY CONNECTOR. 1) Remove the fan mode relay from A/C relay holder. 2) Measure the resistance between main fan motor connector and fan mode relay connector. <i>Connector & terminal</i> <i>Turbo AT model</i> (F17) No. 2 — (F27) No. 9: <i>Except turbo AT model</i> (F17) No. 1 — (F27) No. 9:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair the open harness between main fan motor connector and fan mode relay connector.
12 CHECK POOR CONTACT. Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair poor contact in main fan motor connector.	Go to step 13.
13 CHECK MAIN FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 2 (except turbo AT model), No. 1 (turbo AT model), and ground (-) terminal to terminal No. 1 (except turbo AT model), No. 2 (turbo AT model) of main fan motor.	Does the main fan rotate?	Go to step 14.	Replace the main fan motor with new one.

Radiator Fan System

COOLING

Step	Check	Yes	No
14 CHECK FAN MODE RELAY. Measure the resistance of fan mode relay. <i>Terminal</i> No. 6 — No. 9:	Is the resistance less than 1 Ω ?	Go to step 15.	Replace the fan mode relay.
15 CHECK RESISTANCE BETWEEN FAN MODE RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR. 1) Disconnect the connector from sub fan motor. 2) Measure the resistance between fan mode relay terminal and sub fan motor connector. <i>Connector & terminal</i> <i>Turbo AT model</i> (F16) No. 1 — (F27) No. 6: <i>Except turbo AT model</i> (F16) No. 2 — (F27) No. 6:	Is the resistance less than 1 Ω ?	Go to step 16.	Repair the open harness between fan mode relay terminal and sub fan motor connector.
16 CHECK SUB FAN MOTOR AND GROUND CIRCUIT. Measure the resistance between sub fan motor connector and chassis ground. <i>Connector & terminal</i> <i>Turbo AT model</i> (F16) No. 2 — Chassis ground: <i>Except turbo AT model</i> (F16) No. 1 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 17.	Repair the open harness between sub fan motor connector and chassis ground.
17 CHECK POOR CONTACT. Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair poor contact in sub fan motor connector.	Go to step 18.
18 CHECK SUB FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 2 (except turbo AT model), No. 1 (turbo AT model), and ground (-) terminal to terminal No. 1 (except turbo AT model), No. 2 (turbo AT model) of sub fan motor.	Does the sub fan rotate?	Go to step 19.	Replace the sub fan motor with new one.
19 CHECK HARNESS BETWEEN MAIN FAN RELAY AND ECM. 1) Disconnect the connector from ECM. 2) Measure the resistance between fan relay 1 terminal and ECM connector. <i>Connector & terminal</i> <i>Turbo model</i> (B135) No. 25 — (F27) No. 32: <i>Non-turbo model</i> (B134) No. 14 — (F27) No. 32:	Is the resistance less than 1 Ω ?	Go to step 20.	Repair the open harness between fan relay 1 terminal and ECM.
20 CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact with SUB-ARU dealers.
21 CHECK POWER SUPPLY TO SUB FAN RELAY. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from A/C relay holder. 3) Measure the voltage between sub fan relay terminal and chassis ground. <i>Connector & terminal</i> (F27) No. 28 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 22.	Go to step 23.

Radiator Fan System

COOLING

Step	Check	Yes	No
22 CHECK POWER SUPPLY TO SUB FAN RELAY. 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay terminal and chassis ground. <i>Connector & terminal</i> <i>(F27) No. 25 (+) — Chassis ground (-):</i>	Is the voltage more than 10 V?	Go to step 26.	Go to step 25.
23 CHECK FUSE. 1) Remove the fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 24.
24 CHECK HARNESS BETWEEN FUSE TERMINAL AND SUB FAN RELAY TERMINAL. 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuse terminal and sub fan relay terminal. <i>Terminal</i> <i>No. 4 — No. 28:</i>	Is the resistance less than 1 Ω ?	Repair the power supply line.	Repair the open harness.
25 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 17. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
26 CHECK SUB FAN RELAY. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from A/C relay holder. 3) Measure the resistance of sub fan relay. <i>Terminal</i> <i>No. 28 — No. 29:</i>	Is the resistance more than 1 M Ω ?	Go to step 27.	Replace the sub fan relay.
27 CHECK SUB FAN RELAY. 1) Connect the battery to terminals No. 25 and No. 27 of sub fan relay. 2) Measure the resistance of sub fan relay. <i>Terminal</i> <i>No. 28 — No. 29:</i>	Is the resistance less than 1 Ω ?	Go to step 28.	Replace the sub fan relay.
28 CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR. 1) Disconnect the connector from sub fan motor. 2) Measure the resistance between sub fan relay terminal and sub fan motor connector. <i>Connector & terminal</i> <i>Turbo AT model</i> <i>(F16) No. 1 — (F27) No. 29:</i> <i>Except turbo AT model</i> <i>(F16) No. 2 — (F27) No. 29:</i>	Is the resistance less than 1 Ω ?	Go to step 30.	Repair the open harness between sub fan relay terminal and sub fan motor connector.
29 CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM. 1) Disconnect the connector from ECM. 2) Measure the resistance between sub fan relay terminal and ECM connector. <i>Connector & terminal</i> <i>Non-turbo model: (B134) No. 13 — (F27) No. 27:</i> <i>Turbo model: (B135) No. 24 — (F27) No. 27:</i>	Is the resistance less than 1 Ω ?	Go to step 30.	Repair the open harness between sub fan relay terminal and ECM.

Radiator Fan System

COOLING

Step	Check	Yes	No
30 CHECK HARNESS BETWEEN FAN MODE RELAY AND ECM. Measure the resistance between fan mode relay terminal and ECM connector. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B134) No. 13 — (F27) No. 7:</i> <i>Turbo model</i> <i>(B135) No. 24 — (F27) No. 7:</i>	Is the resistance less than 1 Ω ?	Go to step 31 .	Repair the open harness between fan mode relay terminal and ECM.
31 CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Contact with SUBARU dealers. NOTE: Probable cause is deterioration of multiple parts.
32 CHECK OPERATION OF RADIATOR FAN.	Does the radiator main fan rotate when the radiator main and sub fan do not rotate at high speed?	Go to step 21 .	Go to step 33 .
33 CHECK GROUND CIRCUIT OF FAN MODE RELAY. 1) Remove the fan mode relay from A/C relay holder. 2) Measure the resistance between fan mode relay terminal and chassis ground. <i>Connector & terminal</i> <i>(F27) No. 8 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Go to step 34 .	Repair the open harness between fan mode relay and chassis ground.
34 CHECK POWER SUPPLY TO FAN MODE RELAY. 1) Turn the ignition switch to ON. 2) Measure the voltage between fan mode relay terminal and chassis ground. <i>Connector & terminal</i> <i>(F27) No. 5 (+) — Chassis ground (-):</i>	Is the voltage more than 10 V?	Go to step 35 .	Repair the power supply line.
35 CHECK FAN MODE RELAY. 1) Turn the ignition switch to OFF. 2) Remove the fan mode relay. 3) Measure the resistance of fan mode relay. <i>Terminal</i> <i>(F27) No. 8 — (F27) No. 9:</i>	Is the resistance more than 1 $M\Omega$?	Go to step 36 .	Replace the fan mode relay.
36 CHECK FAN MODE RELAY. 1) Connect the battery to terminals No. 5 and No. 7 of fan mode relay. 2) Measure the resistance of fan mode relay. <i>Terminal</i> <i>(F27) No. 8 — (F27) No. 9:</i>	Is the resistance less than 1 Ω ?	Go to step 29 .	Replace the fan mode relay.

3. Engine Coolant

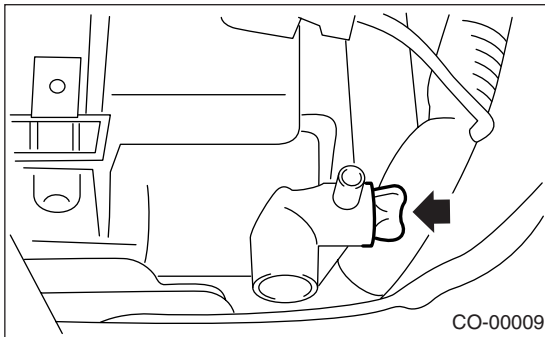
A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

- 1) Lift-up the vehicle.
- 2) Remove the under cover.
- 3) Remove the drain cock to drain engine coolant into container.

NOTE:

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



- 4) Install the drain cock.

2. FILLING OF ENGINE COOLANT

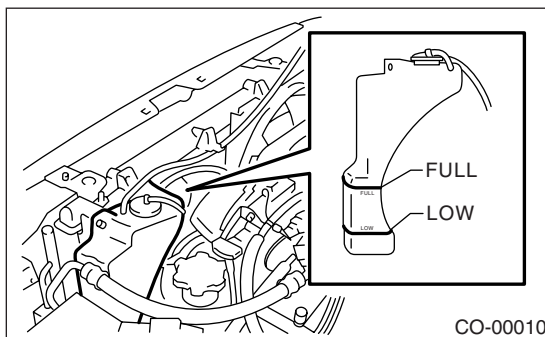
- 1) Fill engine coolant into the radiator up to filler neck position.

Coolant capacity (fill up to "FULL" level): <Ref. to CO(H4SO)-2, SPECIFICATION, General Description.>

NOTE:

The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crank-case. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

- 2) Fill engine coolant into the reservoir tank up to Full level.



- 3) Warm-up the engine completely for more than 5 minutes at 2,000 to 3,000 rpm.
- 4) If the engine coolant level drops in radiator, add engine coolant to filler neck position.

- 5) If the engine coolant level drops from Full level of reservoir tank, add engine coolant to Full level.
- 6) Attach the radiator cap and reservoir tank cap properly.

Engine Coolant

COOLING

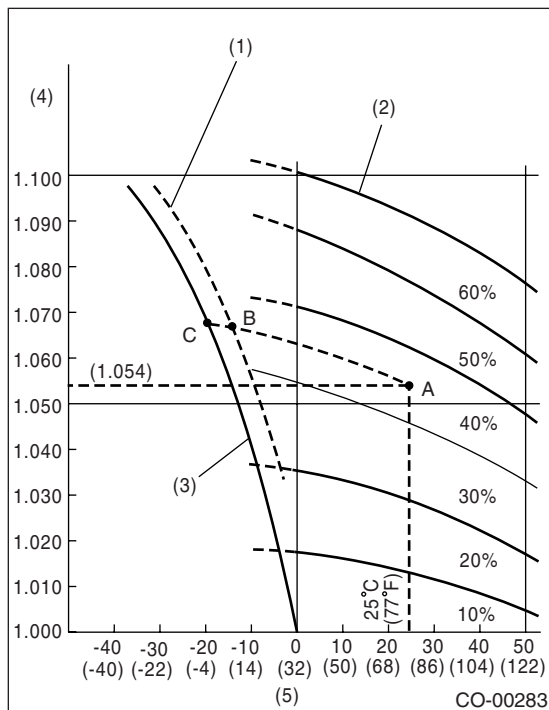
B: INSPECTION

1. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

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

[Example]

If the engine 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).



- (1) Safe operating temperature
- (2) Concentration of coolant
- (3) Freezing temperature
- (4) Specific gravity of coolant
- (5) Coolant temperature °C (°F)

2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE ENGINE COOLANT

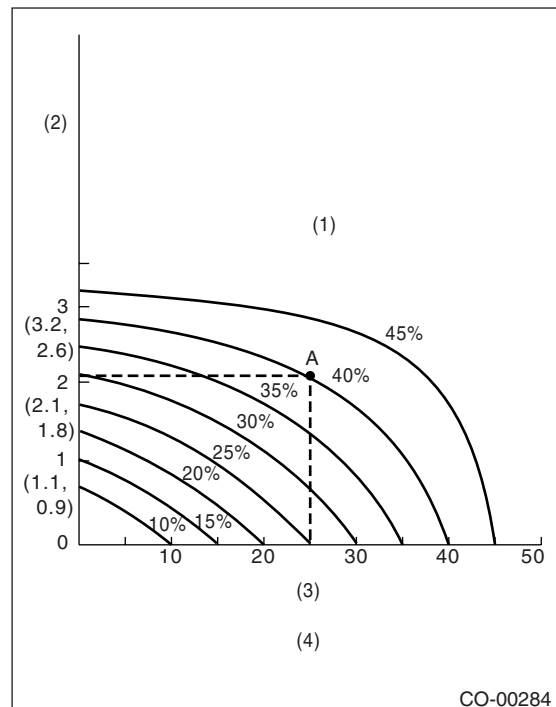
To adjust the concentration of the engine coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of the engine coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).

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

[Example]

Assume that the engine coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of the engine coolant concentration intersects with the 40% curve of the necessary the 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 the engine coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.

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



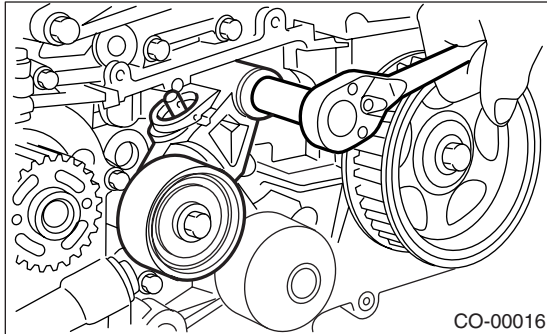
- (1) Necessary concentration of coolant
- (2) Quantity of coolant to be drained ℓ (US qt, Imp qt)
- (3) Concentration of coolant in the vehicle cooling system%
- (4) Concentration of coolant in vehicle and quantity to be drained

4. Water Pump

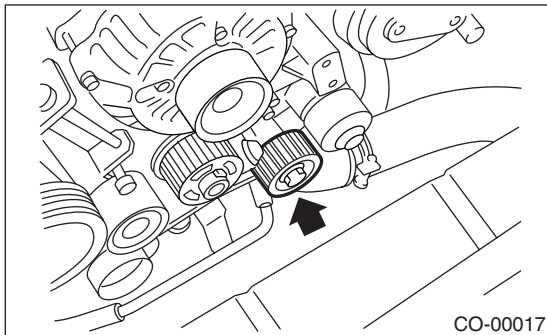
A: REMOVAL

1. NON-TURBO MODEL

- 1) Remove the radiator. <Ref. to CO(H4SO)-28, REMOVAL, Radiator.>
- 2) Remove the V-belts.
<Ref. to ME(H4SO)-43, REMOVAL, V-belt.>
- 3) Remove the timing belt.
<Ref. to ME(H4SO)-48, TIMING BELT, REMOVAL, Timing Belt.>
- 4) Remove the automatic belt tension adjuster.



- 5) Remove the belt idler No. 2.

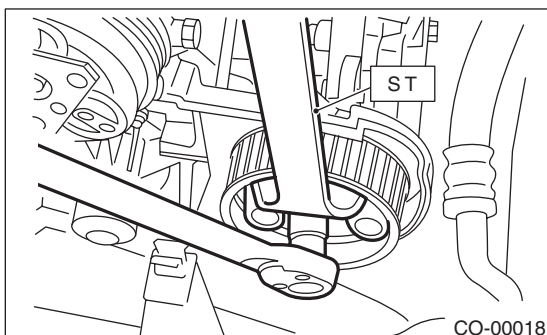


- 6) Remove the camshaft sprocket (LH) by using ST.

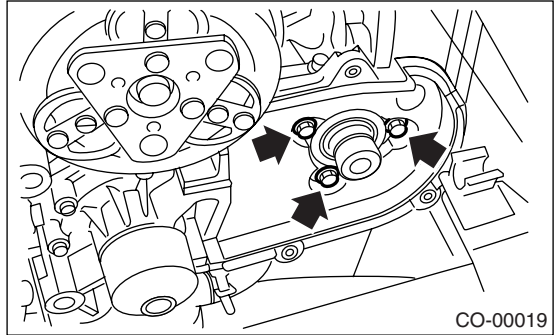
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:

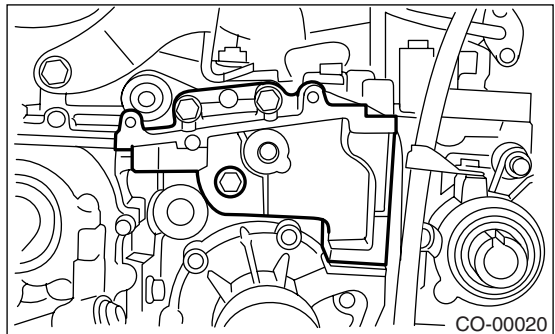
Also the CAM SPROCKET WRENCH (499207100) can be used.



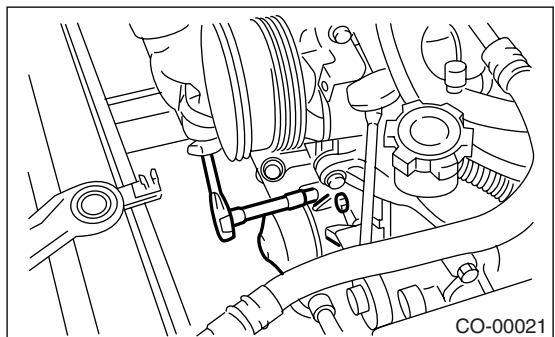
- 7) Remove the belt cover No. 2 (LH).



- 8) Remove the tensioner bracket.



- 9) Disconnect the hose from water pump.
- 10) Remove the water pump.

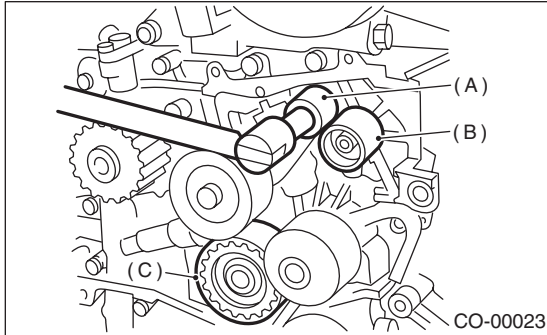


Water Pump

COOLING

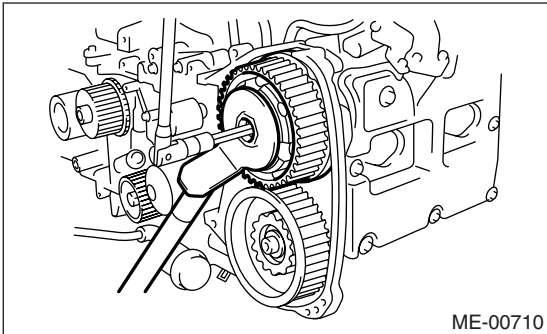
2. TURBO MODEL

- 1) Remove the radiator. <Ref. to CO(H4SO)-28, REMOVAL, Radiator.>
- 2) Remove the V-belts. <Ref. to ME(H4DOTC)-52, REMOVAL, V-belt.>
- 3) Remove the timing belt. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt Assembly.>
- 4) Remove the automatic belt tension adjuster (A).
- 5) Remove the belt idler (B).
- 6) Remove the belt idler No. 2 (C).

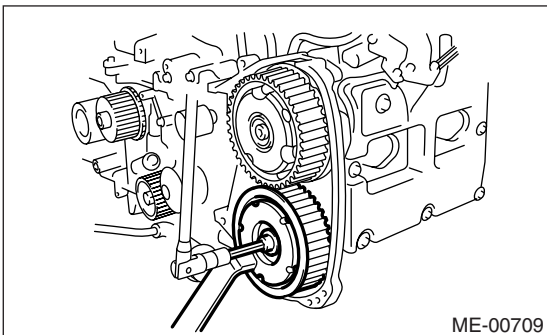


- 7) Remove the camshaft position sensor. (2.0 L model) <Ref. to FU(H4DOTC)-31, REMOVAL, Camshaft Position Sensor.>

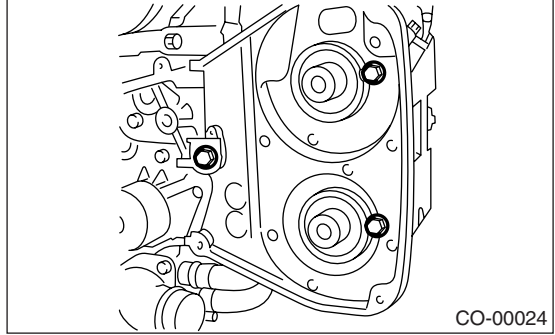
- 8) Remove the cam sprockets (LH) by using ST. ST 499977500 CAM SPROCKET WRENCH (Intake)



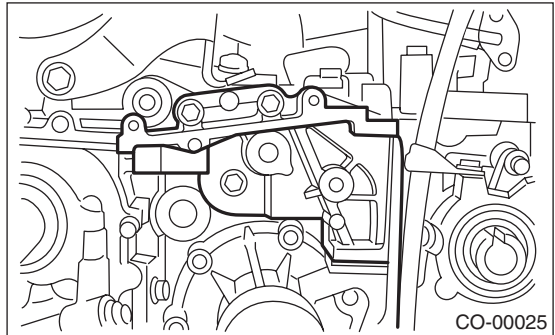
- ST 499207400 CAM SPROCKET WRENCH (Exhaust)



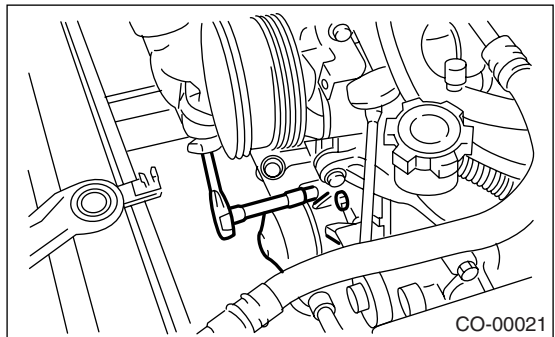
- 9) Remove the belt cover No. 2 (LH).



- 10) Remove the tensioner bracket.



- 11) Disconnect the hose from water pump.
- 12) Remove the water pump.



B: INSTALLATION

1. NON-TURBO MODEL

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

NOTE:

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

Tightening torque:

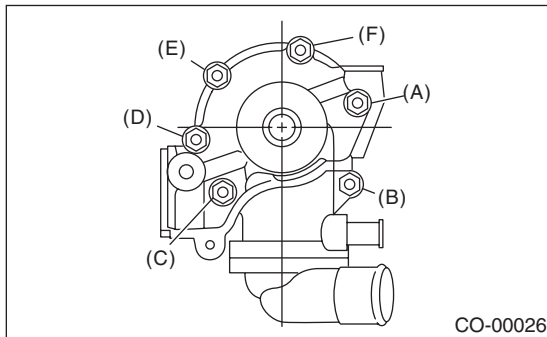
First:

12 N·m (1.2 kgf·m, 8.7 ft·lb)

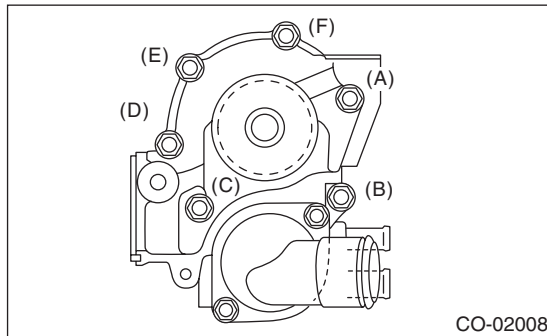
Second:

12 N·m (1.2 kgf·m, 8.7 ft·lb)

- Model without ATF warmer



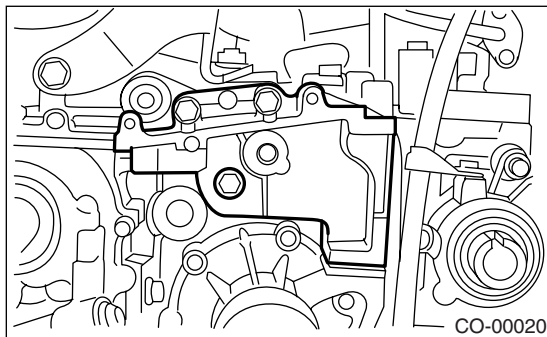
- Model with ATF warmer



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

Tightening torque:

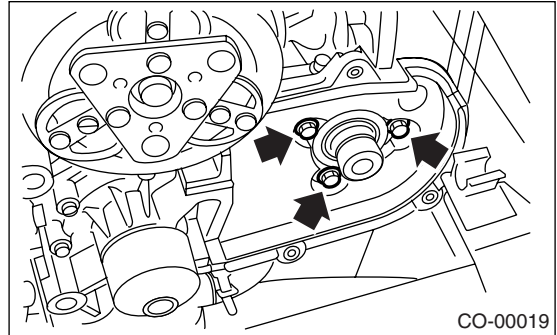
25 N·m (2.5 kgf·m, 18.1 ft·lb)



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

Tightening torque:

5 N·m (0.5 kgf·m, 3.6 ft·lb)



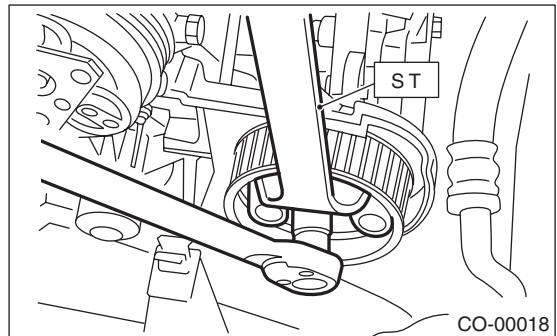
5) Install the camshaft sprockets (LH) by using ST. ST 18231AA010 CAM SPROCKET WRENCH

NOTE:

Also the CAM SPROCKET WRENCH (499207100) can be used.

Tightening torque:

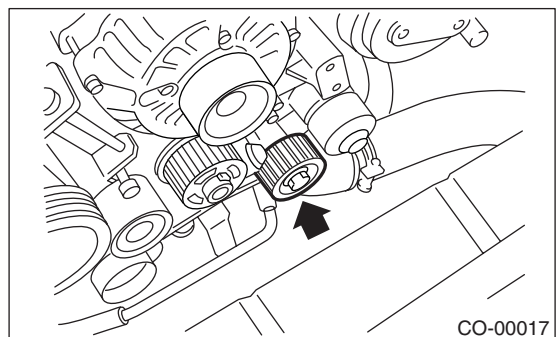
78 N·m (8.0 kgf·m, 57.9 ft·lb)



6) Install the belt idler No. 2.

Tightening torque:

39 N·m (4.0 kgf·m, 28.9 ft·lb)



7) Install the automatic belt tension adjuster which tension rod is held with pin. <Ref. to ME(H4SO)-49, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

8) Install the timing belt. <Ref. to ME(H4SO)-50, TIMING BELT, INSTALLATION, Timing Belt.>

Water Pump

COOLING

9) Install the V-belts. <Ref. to ME(H4SO)-43, INSTALLATION, V-belt.>

10) Install the radiator. <Ref. to CO(H4SO)-30, INSTALLATION, Radiator.>

2. TURBO MODEL

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

NOTE:

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

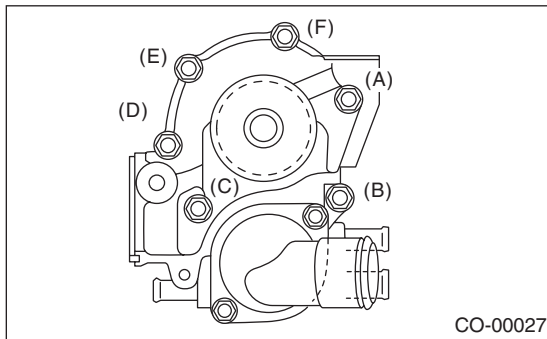
Tightening torque:

First:

12 N·m (1.2 kgf·m, 8.7 ft·lb)

Second:

12 N·m (1.2 kgf·m, 8.7 ft·lb)

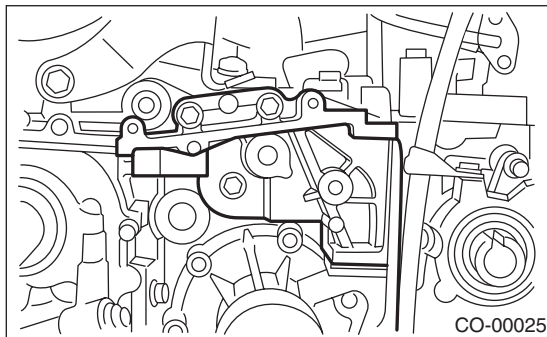


2) Connect the hose to water pump.

3) Install the tensioner bracket.

Tightening torque:

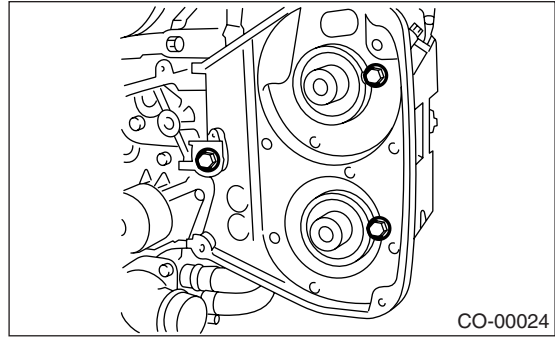
25 N·m (2.5 kgf·m, 18.1 ft·lb)



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 sprockets (LH) by using ST. 499977500 CAM SPROCKET WRENCH (Intake)

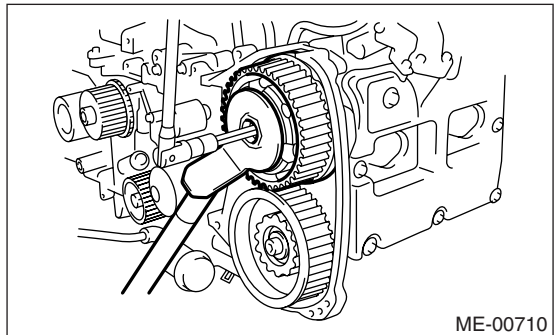
Tightening torque:

2.0 L model

98 N·m (10.0 kgf·m, 72.4 ft·lb)

2.5 L model

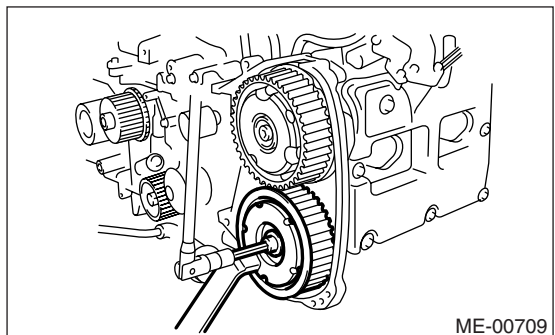
29.5 N·m (3.0 kgf·m, 21.8 ft·lb), and then tighten 45° furthermove



ST 499207400 CAM SPROCKET WRENCH (Exhaust)

Tightening torque:

98 N·m (10.0 kgf·m, 72.4 ft·lb)



6) Install the camshaft position sensor. (2.0 L model) <Ref. to FU(H4DOTC)-31, INSTALLATION, Camshaft Position Sensor.>

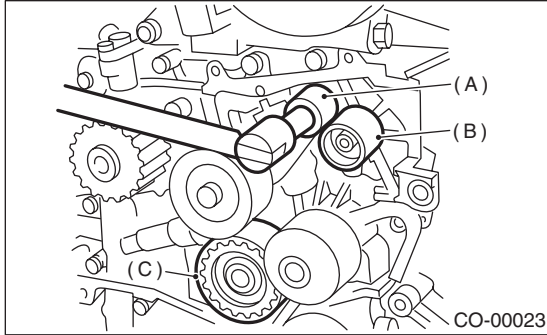
7) Install the belt idler No. 2 (C).

8) Install the belt idler (B).

9) Install the automatic belt tension adjuster (A) which has tension rod held by pin. <Ref. to ME(H4DOTC)-60, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt Assembly.>

Tightening torque:

39 N·m (4.0 kgf·m, 28.9 ft·lb)



10) Install the timing belt. <Ref. to ME(H4DOTC)-61, TIMING BELT, INSTALLATION, Timing Belt Assembly.>

11) Install the V-belts. <Ref. to ME(H4DOTC)-52, INSTALLATION, V-belt.>

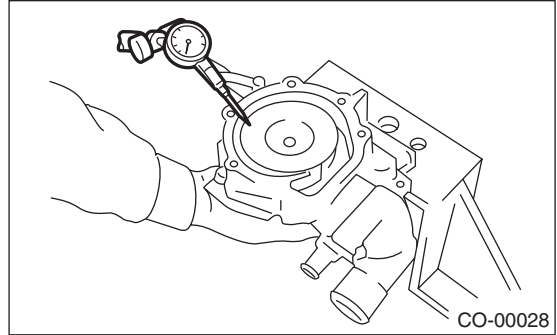
12) Install the radiator. <Ref. to CO(H4SO)-30, INSTALLATION, Radiator.>

C: INSPECTION

- 1) Check the water pump bearing for smooth rotation.
- 2) Check the water pump pulley for abnormalities.
- 3) Using a dial gauge, measure the impeller runout in thrust direction while rotating the pulley.

“Thrust” runout limit:

0.5 mm (0.020 in)



- 4) Check the clearance between impeller and pump case.

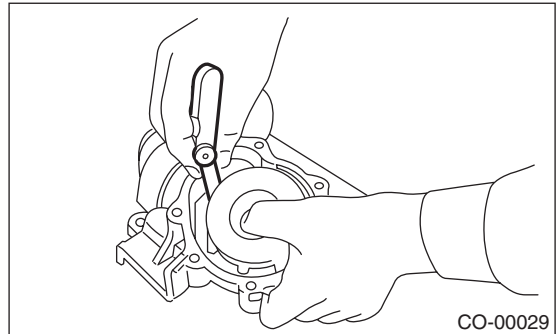
Clearance between impeller and pump case:

Standard

0.5 — 0.7 mm (0.020 — 0.028 in)

Limit

1.0 mm (0.039 in)



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

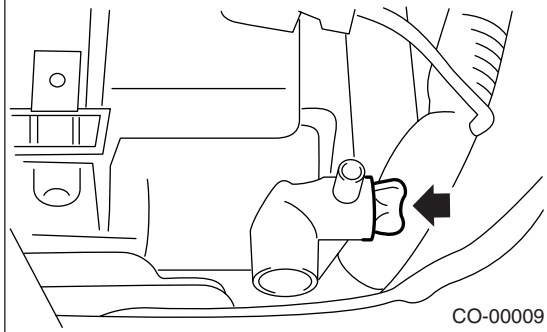
Thermostat

COOLING

5. Thermostat

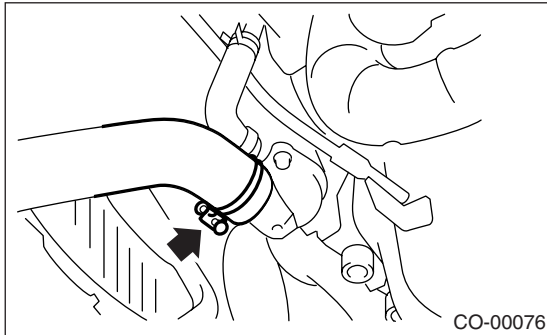
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Lift-up the vehicle.
- 3) Remove the under cover.
- 4) Drain the engine coolant completely. <Ref. to CO(H4SO)-19, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



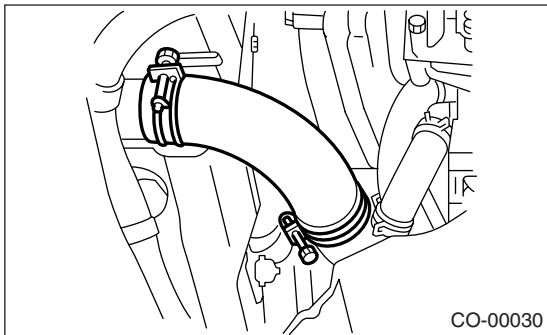
- 5) Disconnect the radiator outlet hose from thermostat cover.

- NON-TURBO MODEL

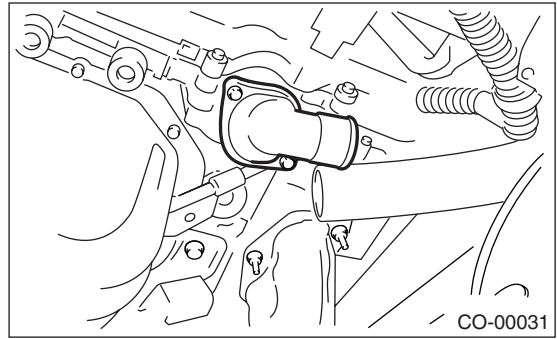


- 6) Disconnect the radiator outlet hose.

- TURBO MODEL



- 7) Remove the thermostat cover and gasket, and pull out the thermostat.



B: INSTALLATION

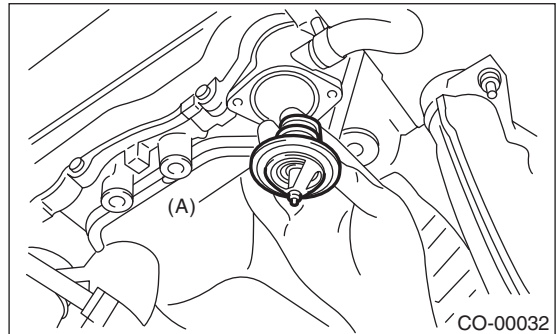
- 1) Install the thermostat in the water pump, and then install the thermostat cover together with a gasket.

NOTE:

- When reinstalling the thermostat, use a new gasket.
- The thermostat must be installed with the jiggle pin (A) facing to front side.

Tightening torque:

6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



- 2) Fill engine coolant. <Ref. to CO(H4SO)-19, 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.

Immerse the thermostat and 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:**Non-turbo model**

80 — 84°C (176 — 183°F)

Turbo model

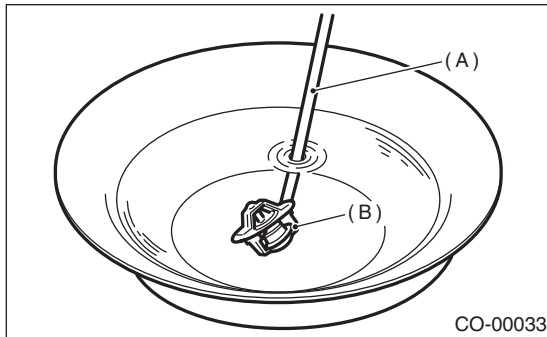
76 — 80°C (169 — 176°F)

Fully opens:**Non-turbo model**

95°C (203°F)

Turbo model

91°C (196°F)



(A) Thermometer

(B) Thermostat

6. Radiator

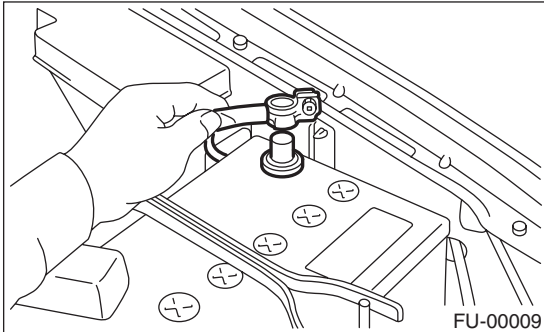
A: REMOVAL

1. NON-TURBO MODEL

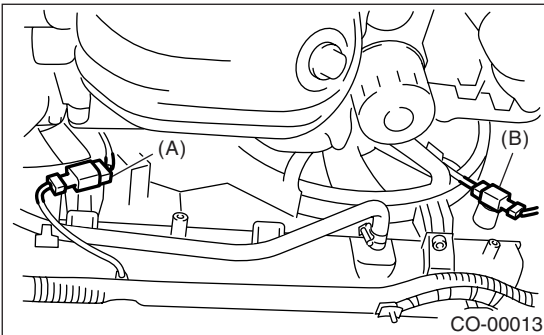
WARNING:

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

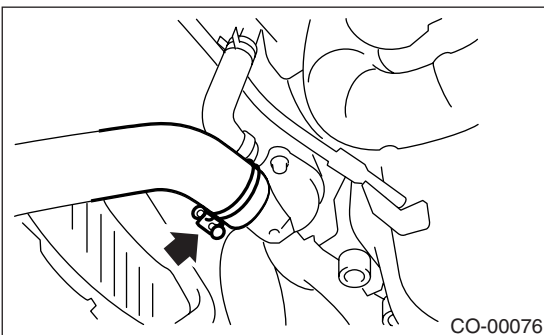
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.



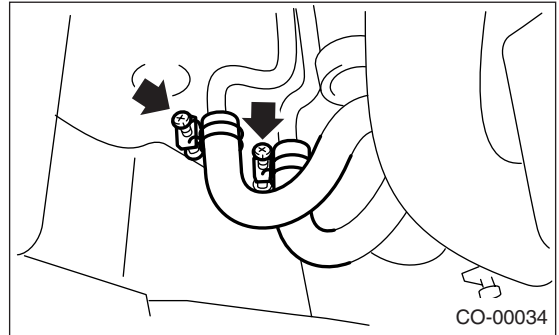
- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Drain the engine coolant completely. <Ref. to CO(H4SO)-19, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 6) Disconnect the connectors of radiator main fan motor (A) and sub fan motor (B).



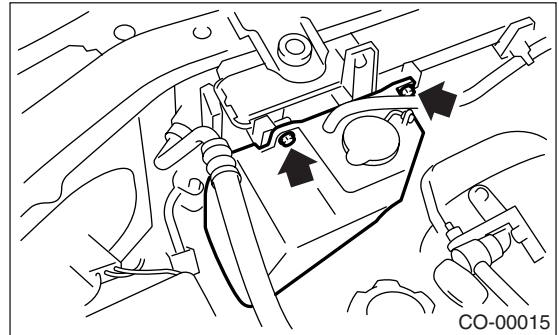
- 7) Disconnect the radiator outlet hose from water pump.



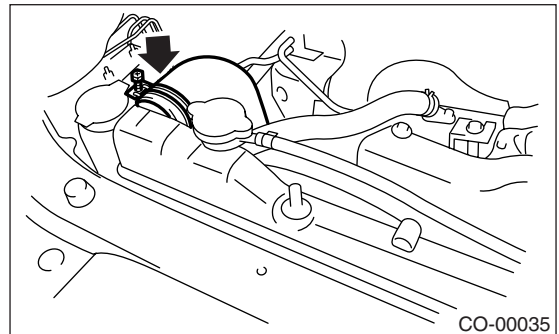
- 8) Disconnect the ATF cooler hoses from ATF pipe. (AT model) Plug the openings in the hose and radiator with caps in order to prevent ATF from leaking.



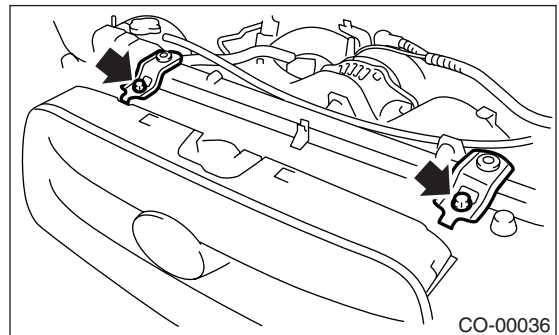
- 9) Lower the vehicle.
- 10) Disconnect the over flow hose.
- 11) Remove the reservoir tank.



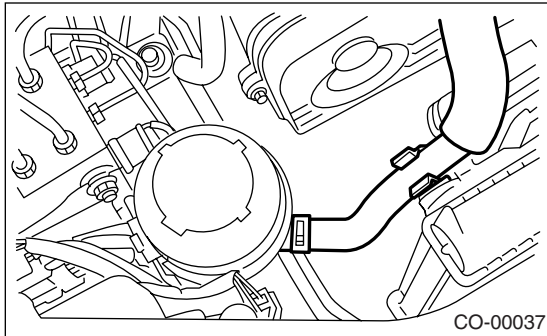
- 12) Disconnect the radiator inlet hose from engine.



- 13) Remove the radiator upper brackets.



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



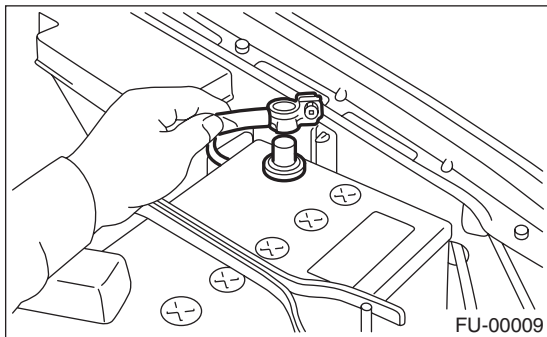
15) Lift the radiator up and away from the vehicle.

2. TURBO MODEL

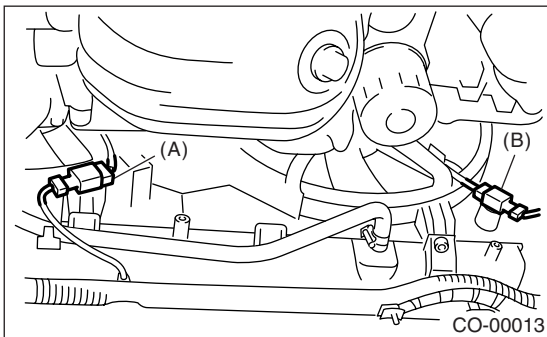
WARNING:

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

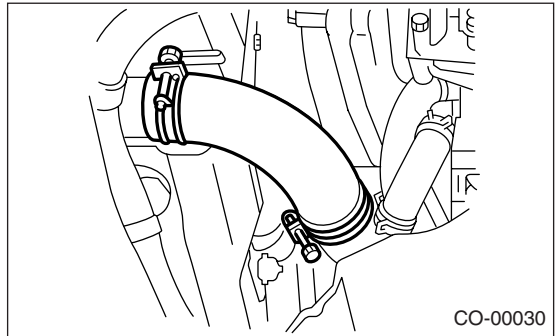
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.



- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Drain the engine coolant completely. <Ref. to CO(H4SO)-19, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 6) Disconnect the connectors of radiator main fan motor (A) and sub fan motor (B).

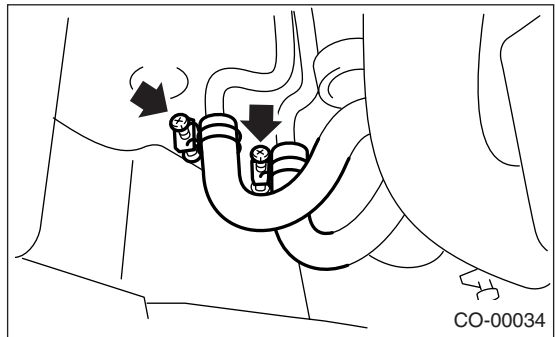


7) Disconnect the radiator outlet hose from thermostat cover.

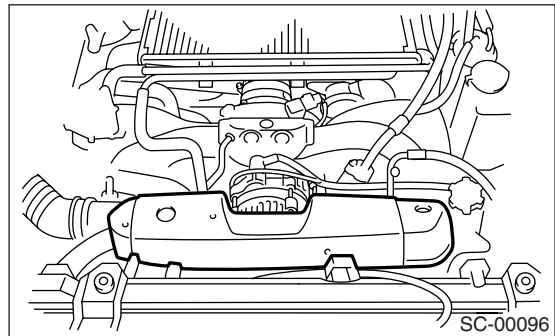


8) Disconnect the ATF cooler hose from ATF pipe. (AT model) Plug the openings in the hose and radiator with caps in order to prevent ATF from leaking.

9) Disconnect the oil cooler hose from oil cooler pipe. (MT model with oil cooler) Install the cap to prevent oil from leaking.



- 10) Lower the vehicle.
- 11) Remove the V-belt covers.

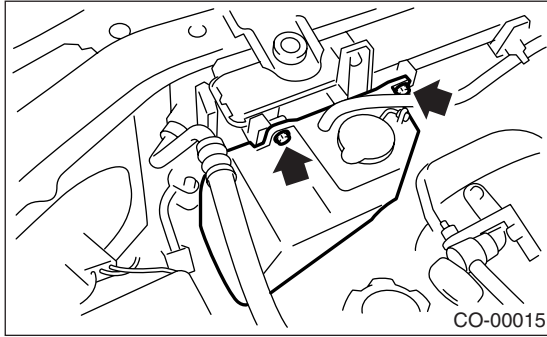


12) Disconnect the overflow hose.

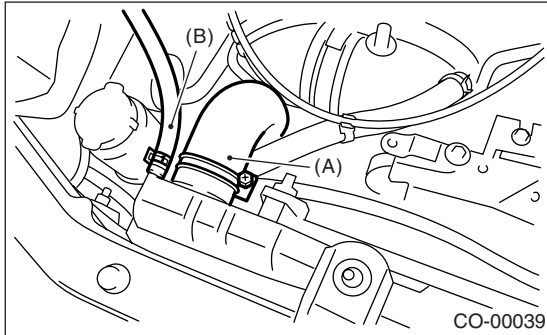
Radiator

COOLING

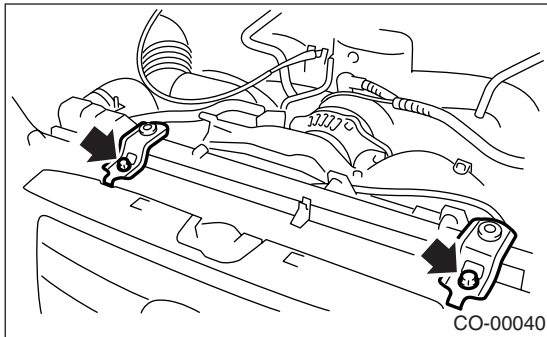
13) Remove the reservoir tank.



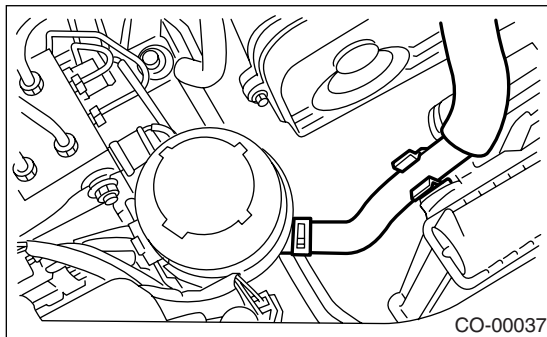
14) Disconnect the radiator inlet hose (A) and water tank hose (B) from radiator.



15) Remove the radiator upper brackets.

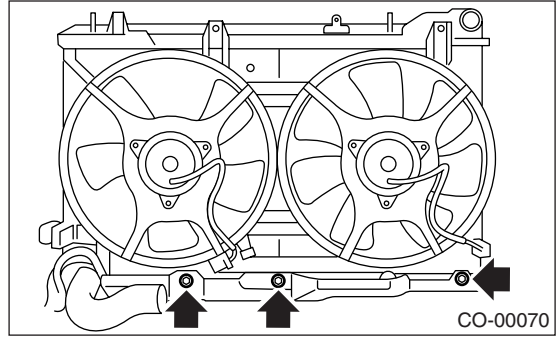


16) Disconnect the power steering hose from clips on radiator.



17) Lift the radiator up and away from the vehicle.

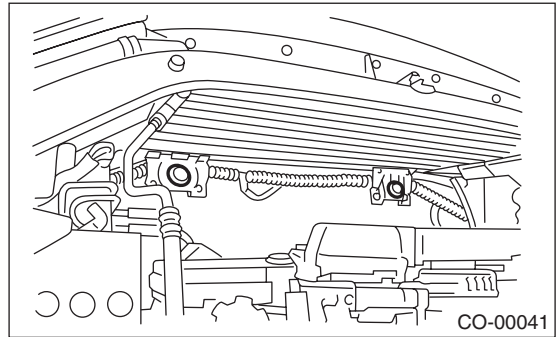
18) Remove the radiator under cover (AT model).



B: INSTALLATION

1. NON-TURBO MODEL

1) Attach the radiator lower cushions to holes on the vehicle.



2) Install the radiator to vehicle.

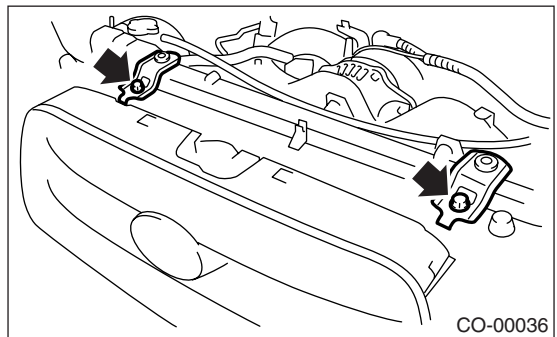
NOTE:

Fit pins on the lower side of radiator into cushions on the body side.

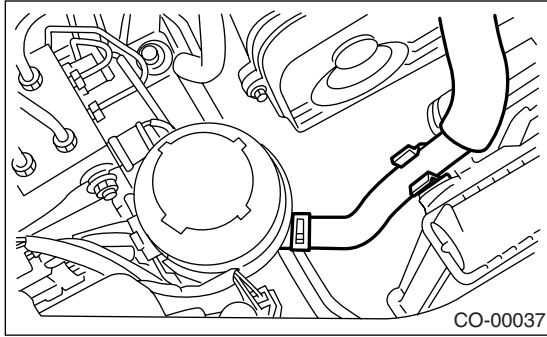
3) Install the radiator upper brackets and tighten bolts.

Tightening torque:

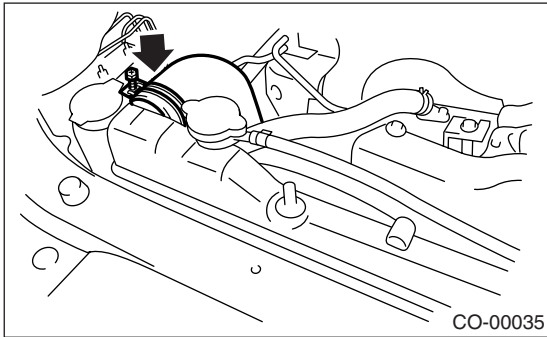
18 N·m (1.8 kgf-m, 13.0 ft-lb)



4) Attach the power steering hose to radiator.

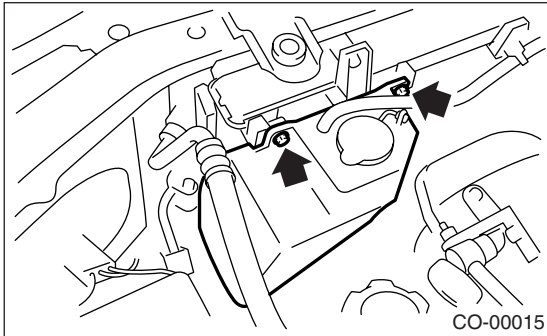


5) Connect the radiator inlet hose.



6) Install the reservoir tank.

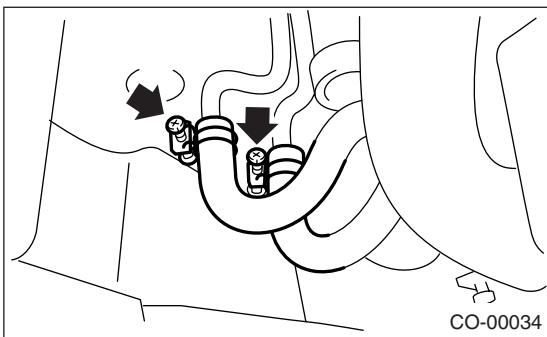
Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



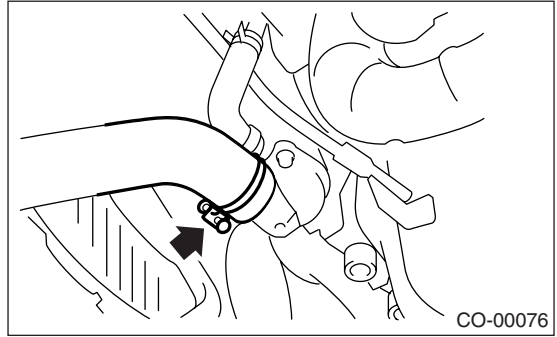
7) Connect the overflow hose.

8) Lift-up the vehicle.

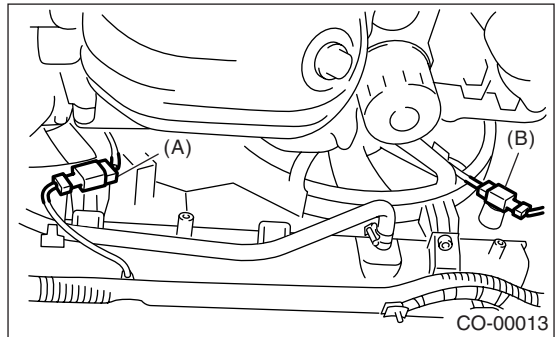
9) Connect the ATF cooler hoses. (AT model)



10) Connect the radiator outlet hose.



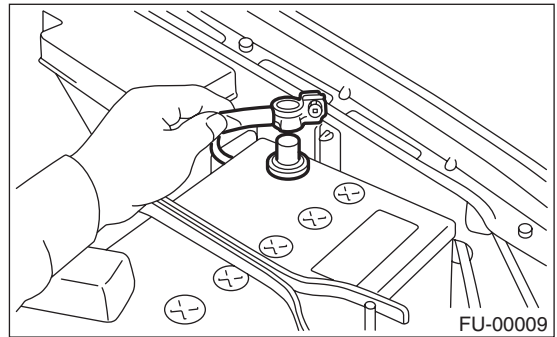
11) Connect the connectors to radiator main fan motor (A) and sub fan motor (B).



12) Install the under cover.

13) Lower the vehicle.

14) Connect the battery ground cable to battery.



15) Fill engine coolant. <Ref. to CO(H4SO)-19, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

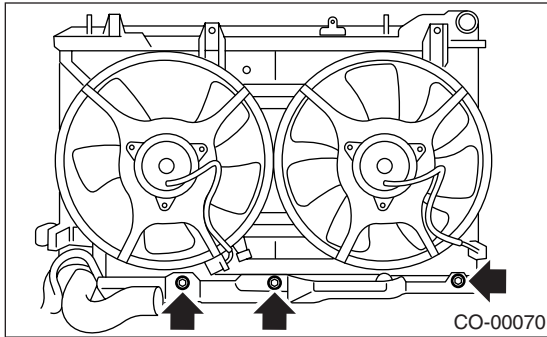
16) Check the ATF level. <Ref. to 4AT-30, INSPECTION, Automatic Transmission Fluid.>

Radiator

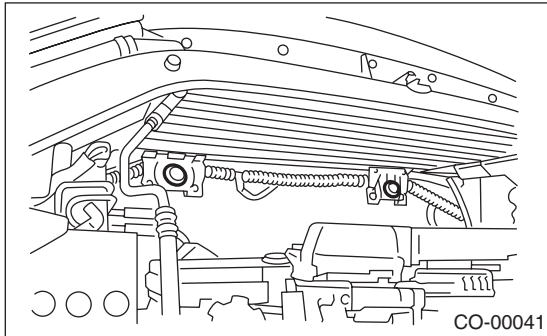
COOLING

2. TURBO MODEL

1) Install the radiator under cover to radiator.



2) Attach the radiator lower cushions to holes on the vehicle.



3) Install the radiator to vehicle.

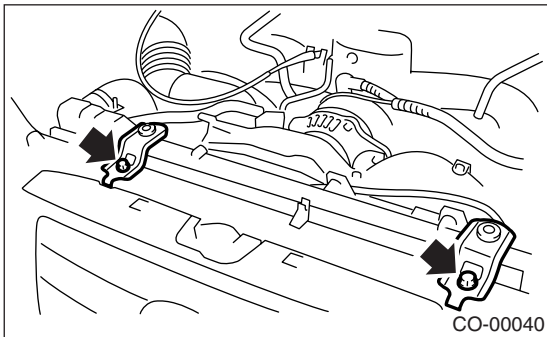
NOTE:

Fit pins on the lower side of radiator into cushions on body side.

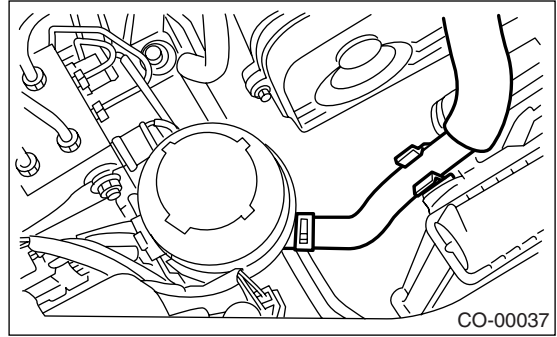
4) Install the radiator upper brackets, and then tighten the bolts.

Tightening torque:

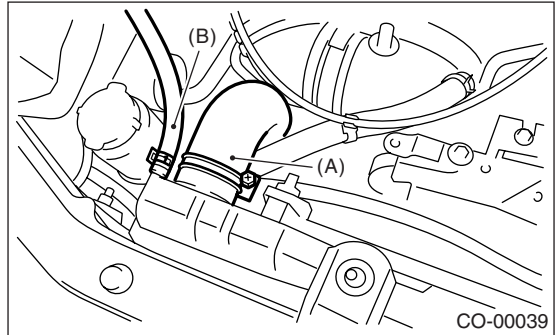
18 N·m (1.8 kgf·m, 13.0 ft·lb)



5) Connect the power steering hose to radiator.



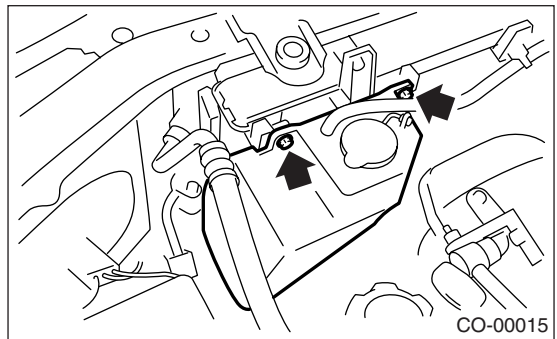
6) Connect the radiator inlet hose (A) and water tank hose (B).



7) Install the reservoir tank.

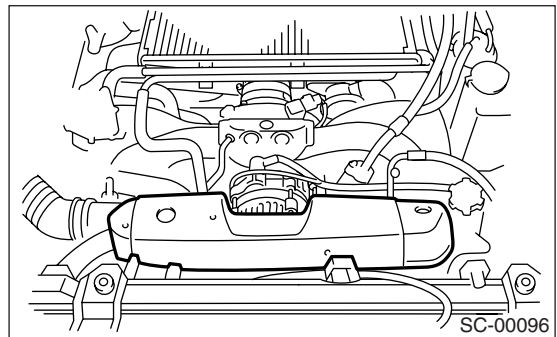
Tightening torque:

4.9 N·m (0.50 kgf·m, 3.6 ft·lb)



8) Connect the over flow hose.

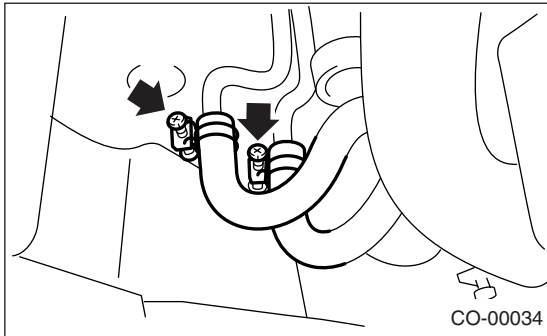
9) Install the V-belt cover.



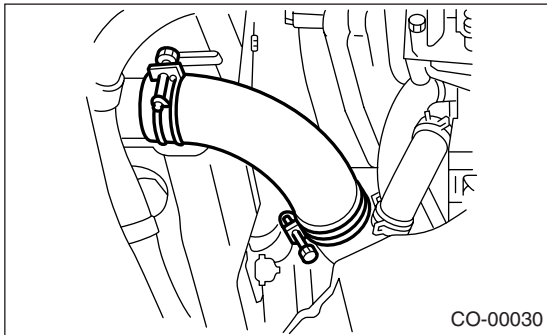
10) Lift-up the vehicle.

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

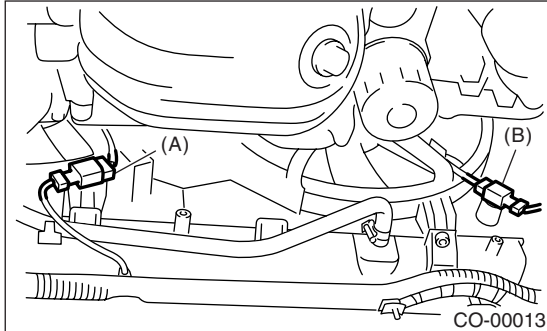
12) Connect the oil cooler hose. (MT model with oil cooler)



13) Connect the radiator outlet hose.



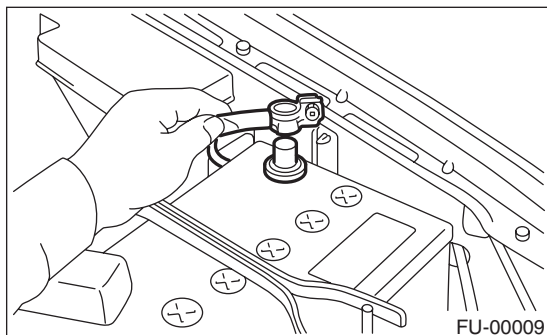
14) Connect the connectors to radiator main fan motor (A) and sub fan motor (B).



15) Install the under cover.

16) Lower the vehicle.

17) Connect the battery ground cable to battery.



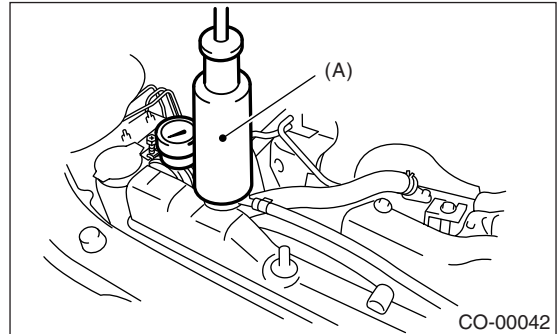
18) Fill engine coolant. <Ref. to CO(H4SO)-19, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

19) Check the ATF level. <Ref. to 4AT-30, INSPECTION, Automatic Transmission Fluid.>

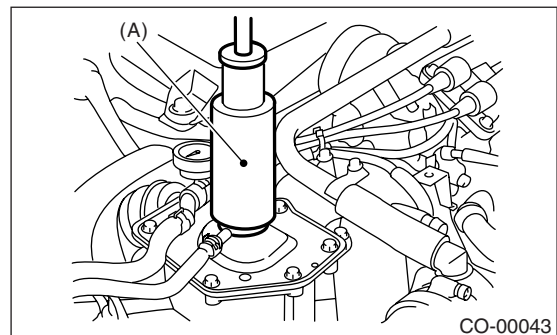
C: INSPECTION

1) Remove the radiator cap, top off radiator, and then attach the tester (A) to radiator in place of cap.

- NON-TURBO MODEL



- TURBO MODEL



2) Apply a pressure of 157 kPa (1.6 kg/cm², 23 psi) to the radiator to check if:

- (1) Engine coolant leaks at/around radiator.
- (2) Engine coolant leaks at/around hoses or connections.

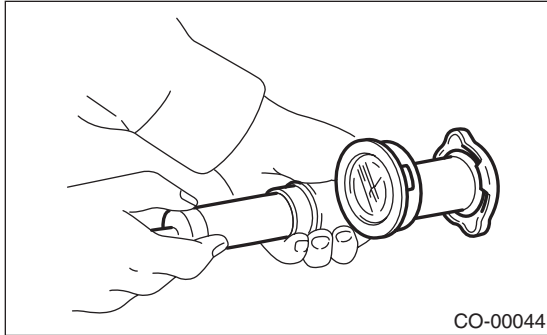
CAUTION:

- Inspection must be carried out at the side of coolant filler tank, not at the side of radiator.
- Engine should be off.
- Wipe engine coolant from check points in advance.
- Be careful to prevent engine coolant from spurting out when removing the tester.
- Be careful also not to deform the filler neck of radiator when installing or removing tester.

7. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase the pressure until tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for 5 to 6 seconds.

Standard pressure:

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

Service limit pressure:

83 kPa (0.85 kg/cm², 12 psi)

CAUTION:

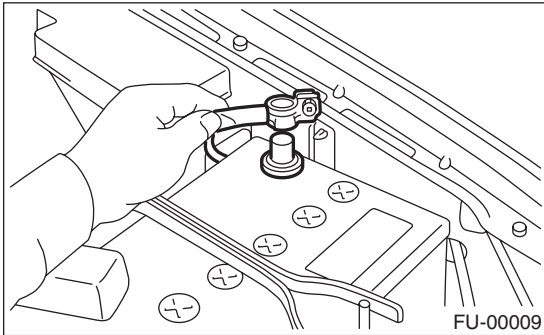
Be sure to remove foreign matter and rust from the cap in advance otherwise, results of pressure test will be incorrect.

8. Radiator Main Fan and Fan Motor

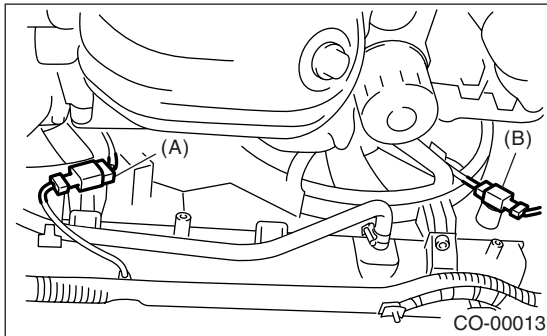
A: REMOVAL

1. NON-TURBO MODEL

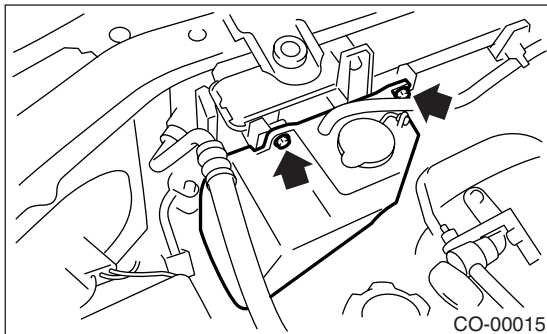
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.



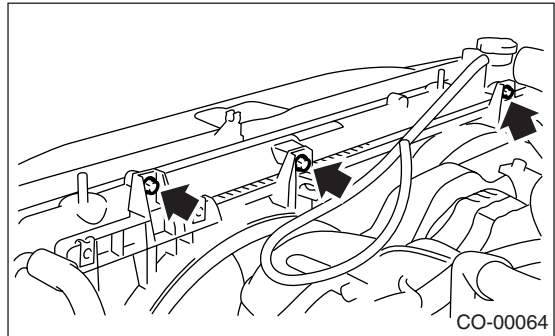
- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Drain the coolant approx. 1 ℓ (1.06 US qt, 0.88 Imp qt). <Ref. to CO(H4SO)-19, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 6) Disconnect the connector of main fan motor (A) and sub fan motor (B).



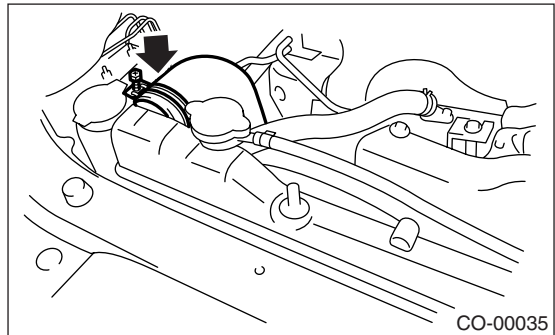
- 7) Remove the ATF hose from two clips of radiator fan motor assembly. (AT model)
- 8) Lower the vehicle.
- 9) Disconnect the over flow hose.
- 10) Remove the reservoir tank.



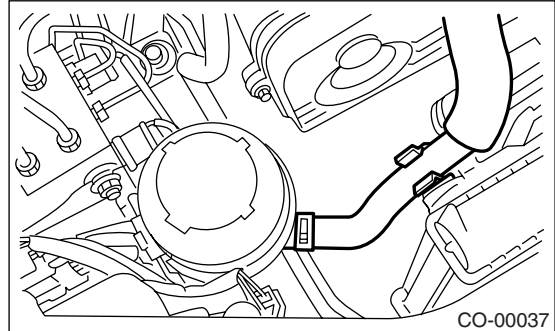
- 11) Remove the radiator fan motor assembly mounting bolts.



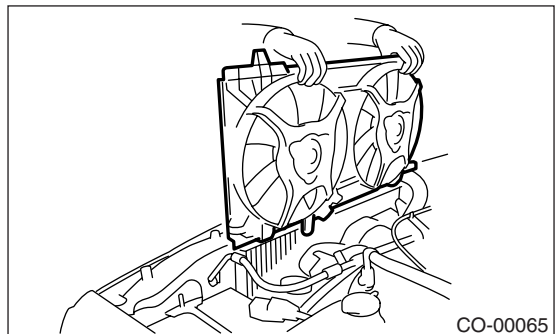
- 12) Disconnect the radiator inlet hose from engine.



- 13) Detach the power steering hose from clip on radiator.



- 14) Rise up the radiator fan motor assembly to remove it from vehicle.

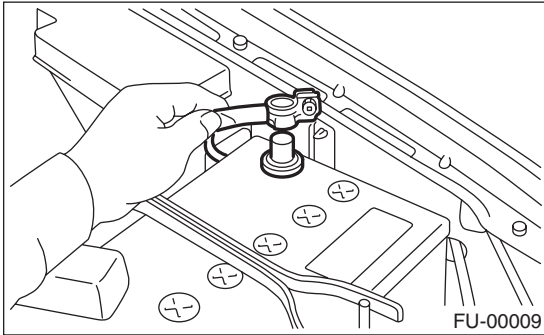


Radiator Main Fan and Fan Motor

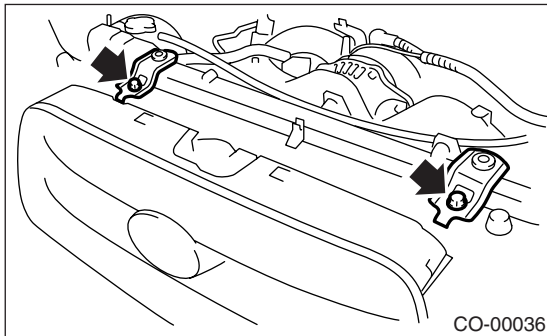
COOLING

2. TURBO MODEL

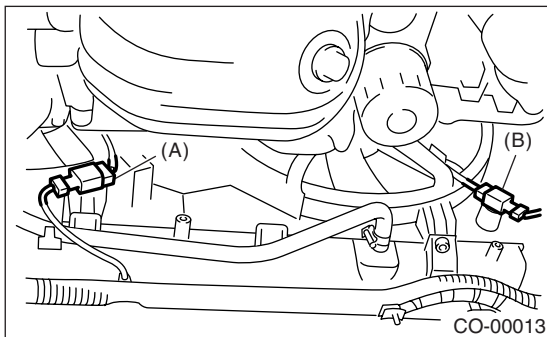
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.



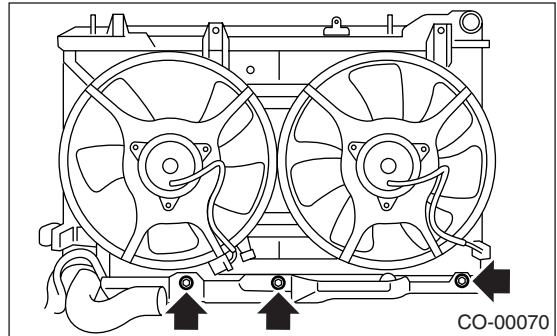
- 3) Remove the radiator upper bracket. (AT model)



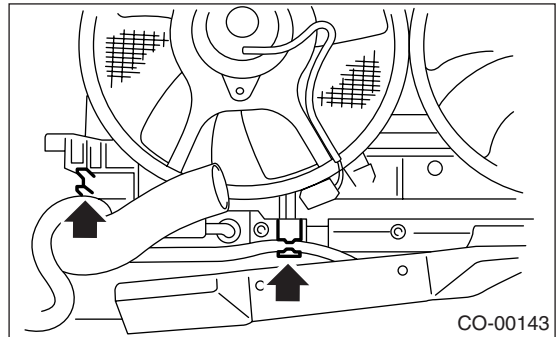
- 4) Lift-up the vehicle.
- 5) Remove the under cover.
- 6) Drain the engine coolant approx. 1 ℓ (1.06 US qt, 0.88 Imp qt). <Ref. to CO(H4SO)-19, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 7) Disconnect the radiator main fan motor connector (A) and sub fan motor connector (B).



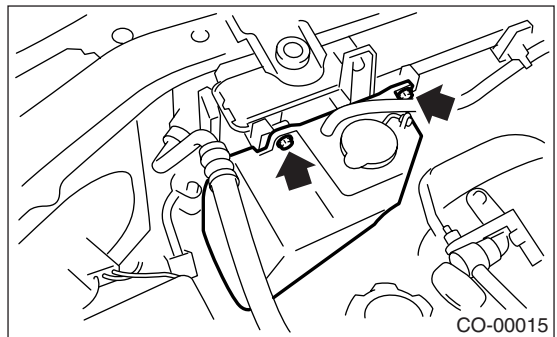
- 8) Remove the radiator under cover securing bolt. (AT model)



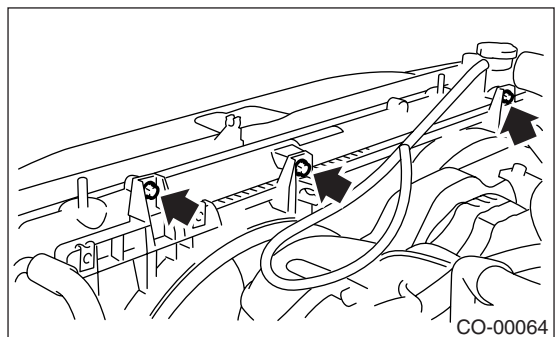
- 9) Pull the radiator lower hose upward to space radiator from radiator under cover. Remove the ATF hose to radiator fan motor assembly two clips. (AT model)



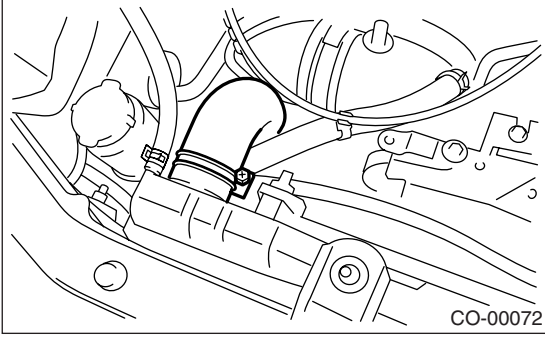
- 10) Lower the vehicle.
- 11) Remove the V-belt cover.
- 12) Disconnect the overflow hose.
- 13) Remove the reservoir tank.



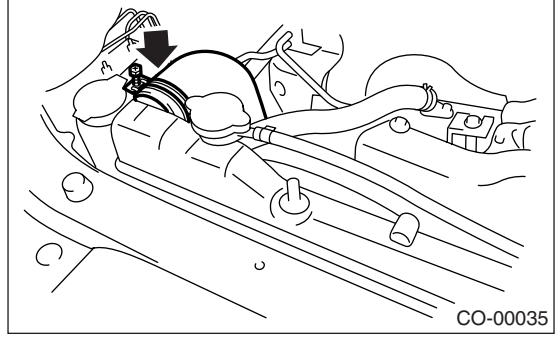
- 14) Remove the radiator main fan motor assembly securing bolt.



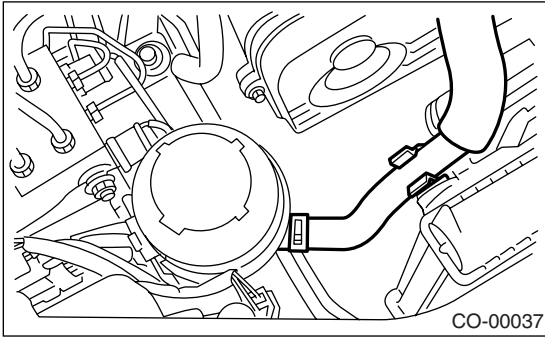
15) Disconnect the radiator inlet hose.



3) Connect the radiator inlet hose.

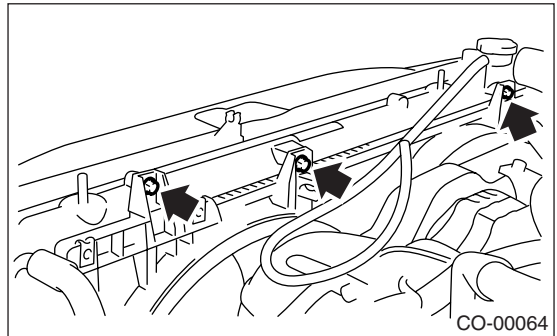


16) Disconnect the power steering hose from radiator clip.

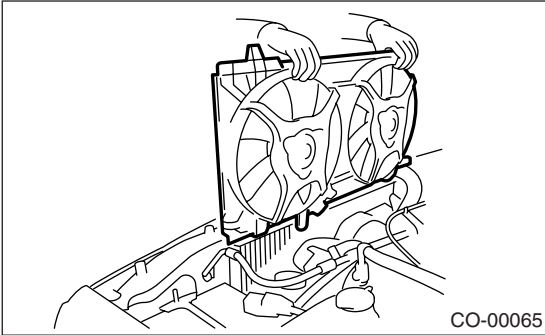


4) Install the radiator main fan motor assembly mounting bolts.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

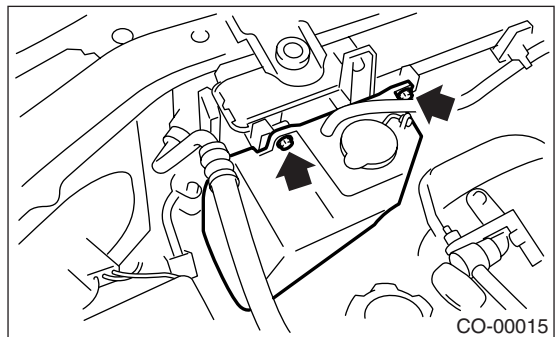


17) Remove the radiator main fan motor assembly from vehicle.



5) Install the reservoir tank.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

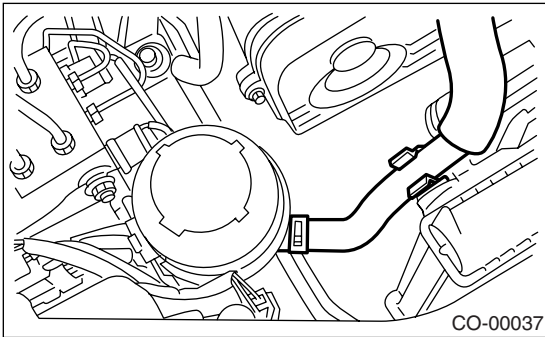


B: INSTALLATION

1. NON-TURBO MODEL

1) install the radiator main fan motor assembly to radiator.

2) Connect the power steering hose to radiator.



6) Install the over-flow hose.

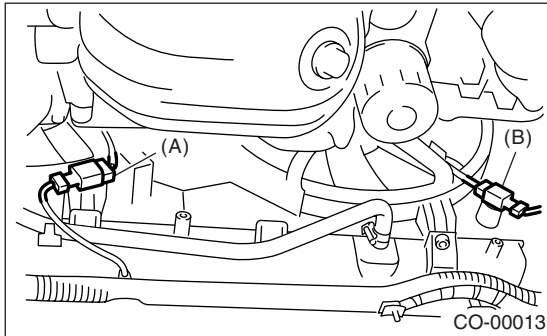
7) Lift-up the vehicle.

8) Install the ATF hose to two clips of radiator main fan motor assembly. (AT model)

Radiator Main Fan and Fan Motor

COOLING

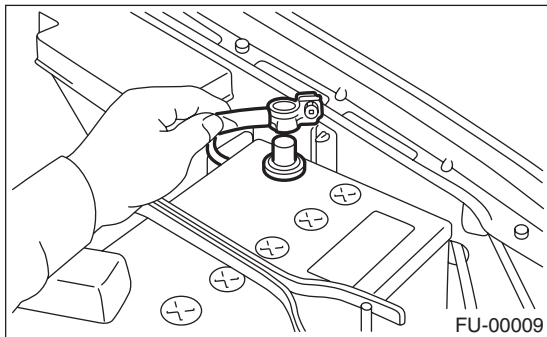
9) Connect the main fan motor (A) and sub fan motor (B).



10) Install the under cover.

11) Lower the vehicle.

12) Connect the battery ground cable to battery.



13) Fill the engine coolant. <Ref. to CO(H4SO)-19, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

2. TURBO MODEL

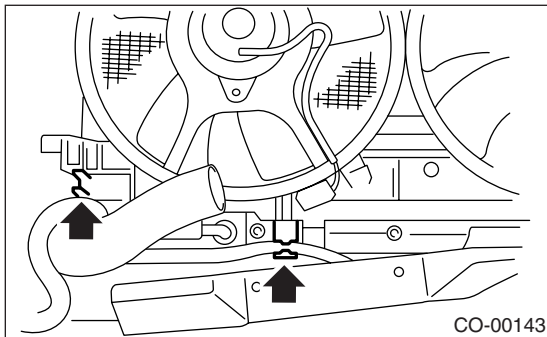
1) Install the radiator main fan motor assembly.

2) Lift-up the vehicle.

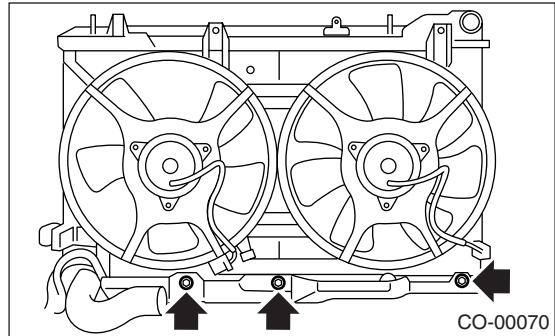
3) Pull the radiator lower hose upward to space radiator from radiator under cover. Install the ATF hose to radiator main fan motor assembly two clips. (AT model)

NOTE:

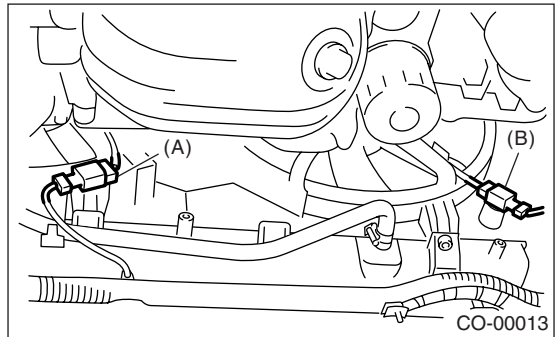
Fit securely the pins on lower side of radiator into body side.



4) Tighten the radiator under cover securing bolt. (AT model)



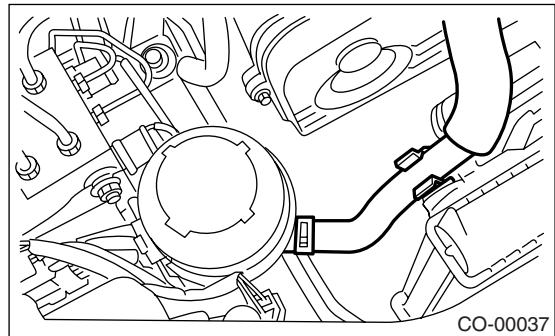
5) Connect the radiator main fan motor connector (A) and sub fan motor connector (B).



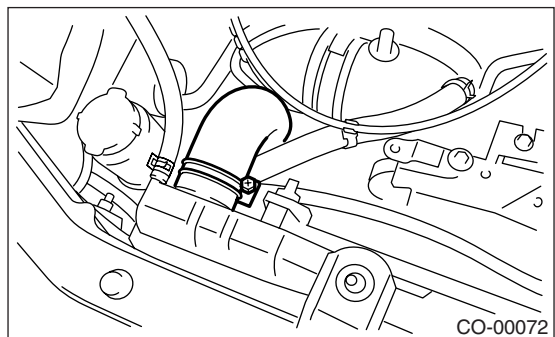
6) Install the under cover.

7) Lower the vehicle.

8) Connect the power steering hose to radiator clip.



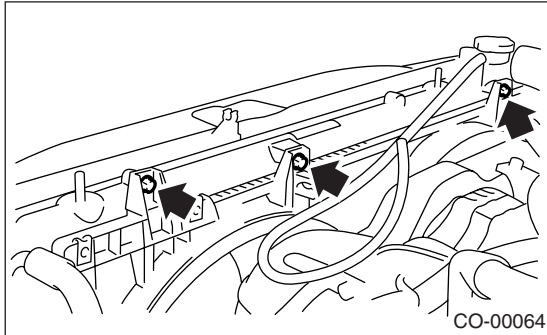
9) Connect the radiator inlet hose to radiator.



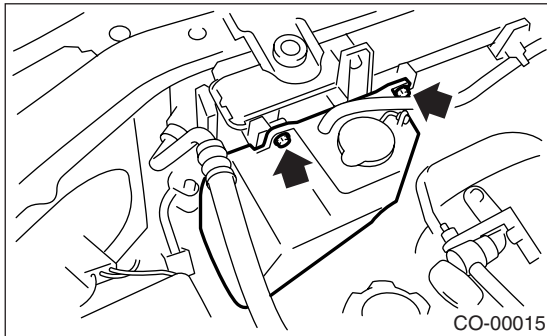
10) Install the radiator main fan motor assembly mounting bolts.

Tightening torque:

4.9 N·m (0.5 kgf·m, 3.6 ft·lb)



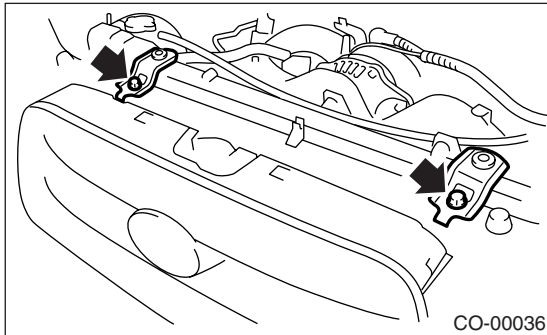
11) Install the reservoir tank.



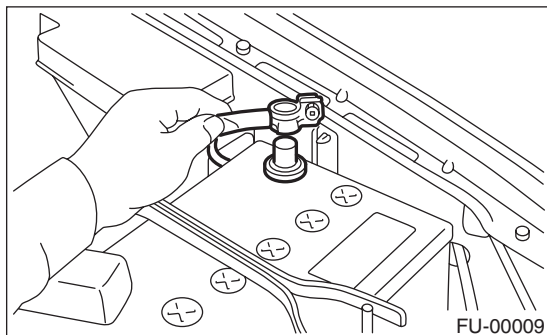
12) Connect the overflow hose.

13) Install the V-belt cover.

14) Install the radiator upper bracket. (AT model)



15) Connect the battery ground cable to battery.



16) Fill the engine coolant. <Ref. to CO(H4SO)-19, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

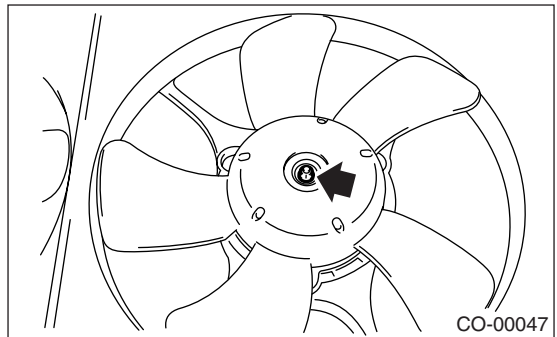
NOTE:

If it is difficult to install the radiator main fan motor assembly, first loosen the bolts which hold the radiator sub fan motor assembly.

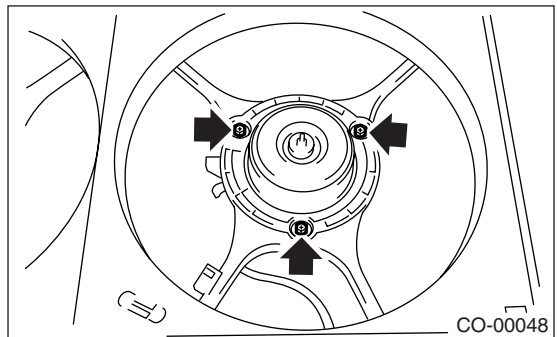
C: DISASSEMBLY

Remove the clip which holds motor connector onto shroud.

1) Remove the nut which holds fan itself onto fan motor and shroud assembly.



2) Remove the bolts which install fan motor onto shroud.



D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:

Refer to COMPONENT for tightening torque. <Ref. to CO(H4SO)-4, COMPONENT, General Description.>

9. Radiator Sub Fan and Fan Motor

A: REMOVAL

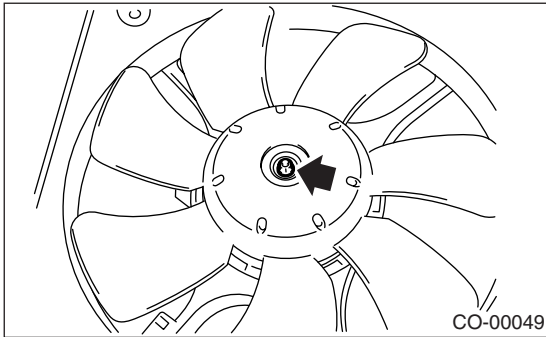
Refer to Radiator Main Fan and Fan Motor. <Ref. to CO(H4SO)-35, REMOVAL, Radiator Main Fan and Fan Motor.>

B: INSTALLATION

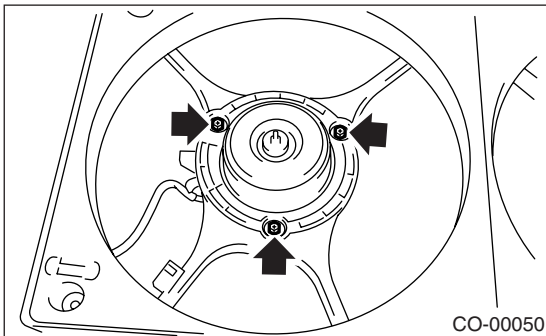
Refer to Radiator Main Fan and Fan Motor. <Ref. to CO(H4SO)-37, INSTALLATION, Radiator Main Fan and Fan Motor.>

C: DISASSEMBLY

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



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



D: ASSEMBLY

Assemble in the reverse order of disassembly.

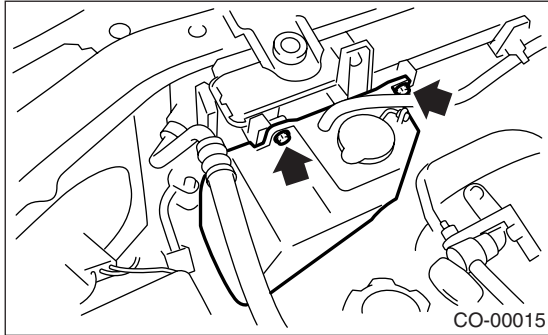
NOTE:

Refer to COMPONENT for tightening torque. <Ref. to CO(H4SO)-4, COMPONENT, General Description.>

10. Reservoir Tank

A: REMOVAL

- 1) Disconnect the over flow hose from radiator filler neck position.
- 2) Remove the bolts which install reservoir tank onto radiator main fan shroud.
- 3) Remove the reservoir tank.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Refer to COMPONENT for tightening torque. <Ref. to CO(H4SO)-4, COMPONENT, General Description.>

C: INSPECTION

Make sure the engine coolant level is between full and low.

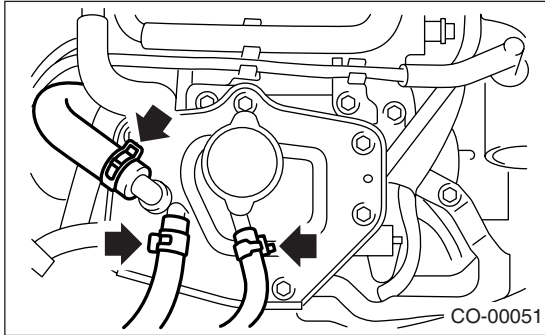
11. Coolant Filler Tank

A: REMOVAL

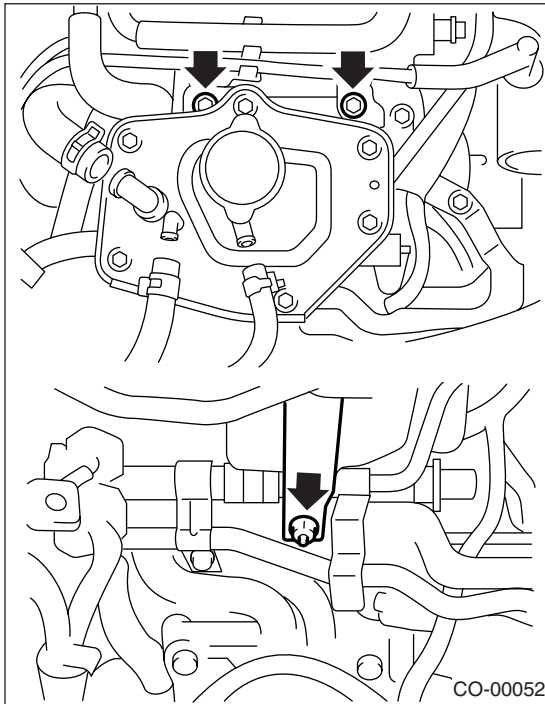
WARNING:

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

- 1) Drain the coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt). <Ref. to CO(H4SO)-19, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 2) Remove the air cleaner upper cover and air intake boot. <Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner.>
- 3) Remove the air cleaner element.
- 4) Disconnect the engine coolant hoses from coolant filler tank.



- 5) Remove the bolts and nut which install coolant filler tank.
- 6) Disconnect the engine coolant hose which connects under side of coolant filler tank.
- 7) Remove the coolant filler tank.



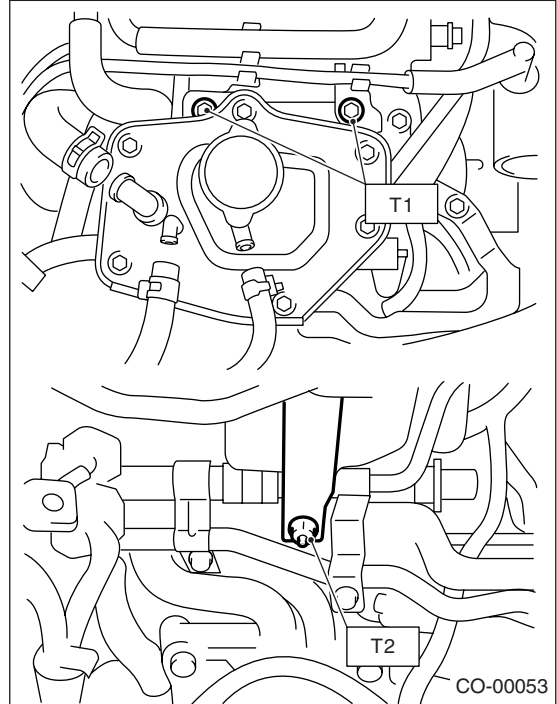
B: INSTALLATION

- 1) Install in the reverse order of removal.

Tightening torque:

T1: 19 N·m (1.9 kgf-m, 13.7 ft-lb)

T2: 21 N·m (2.1 kgf-m, 15.2 ft-lb)



- 2) Fill engine coolant. <Ref. to CO(H4SO)-19, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

12.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish the engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace the 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 the ignition control system. <Ref. to EN(H4SO)-2, Basic Diagnostics Procedure.> <Ref. to EN(H4DOTC)-2, PROCEDURE, Basic Diagnostics Procedure.>
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Replace the engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4SO)-2, Basic Diagnostics Procedure.> <Ref. to EN(H4DOTC)-2, PROCEDURE, Basic Diagnostics 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 thermostat	Replace.
p. Malfunction of radiator fan	Inspect the radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.	
Over-cooling	a. Atmospheric temperature extremely low	Partly cover the 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 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 the water pump.
	d. Defective water pump mechanical seal	Replace the water pump.

Engine Cooling System Trouble in General

COOLING
