

COOLING

CO(H4DOTC)

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General Description

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1. General Description

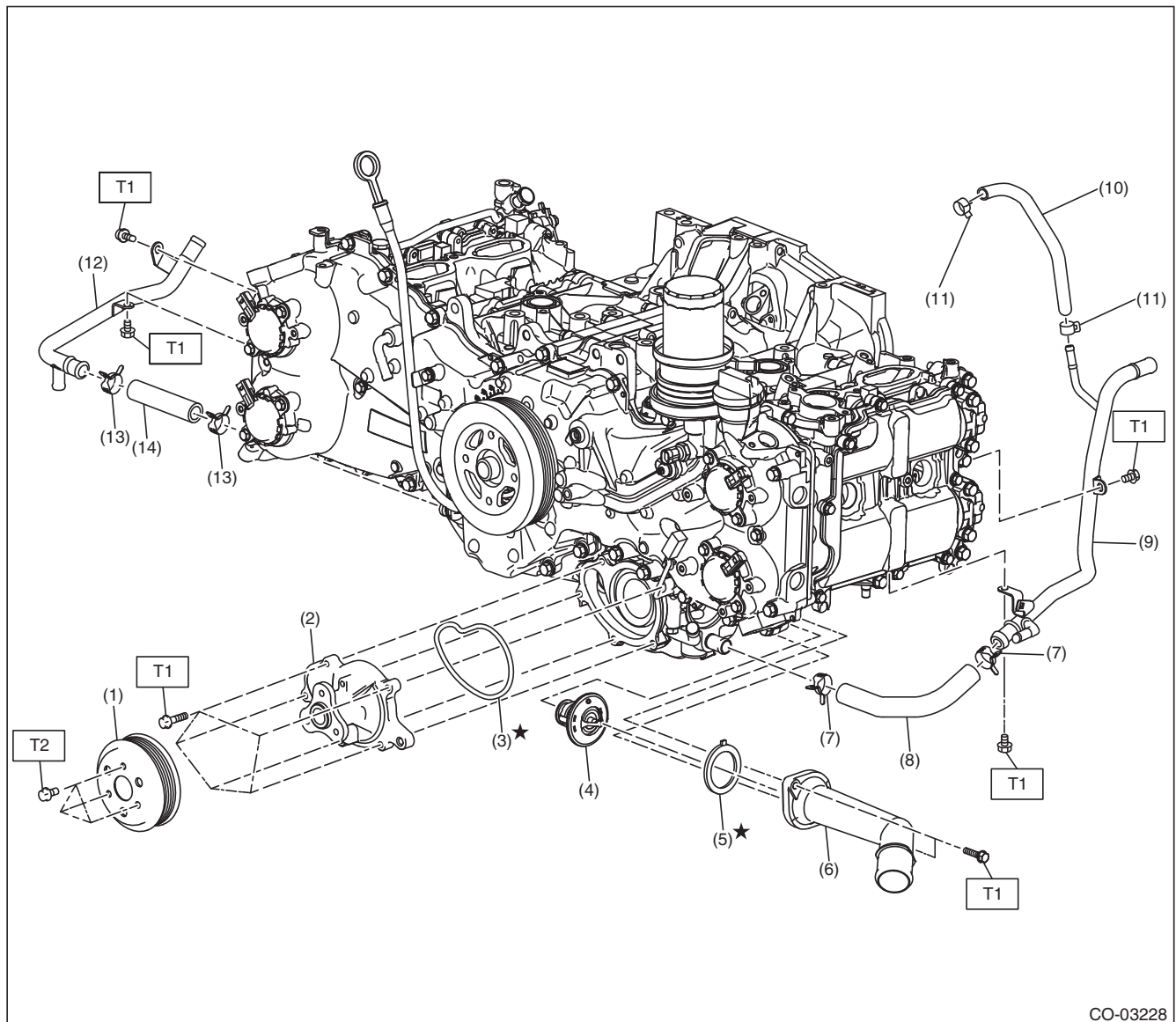
A: SPECIFICATION

Cooling system					Electric fan + Forced engine coolant circulation system	
Total engine coolant capacity					L (US qt, Imp qt)	
Water pump	Type				Centrifugal impeller type	
	Discharge performance	Discharge rate		L (US gal, Imp gal)/min		
		Pump speed — Discharge pressure		248 (65.5, 54.6)		
		Engine coolant temperature		8,580 rpm — 88 kPa (9.2 mAq)		
	Impeller diameter		mm (in)			
	Number of impeller vanes		80°C (176°F)			
	Pump pulley diameter		mm (in)			
Thermostat	Type				Wax pellet type	
	Starting temperature to open				56 (2.2)	
	Fully opens				7	
	Valve lift		mm (in)		100 (3.9)	
	Valve bore		mm (in)		100 (3.9)	
Radiator fan	Motor input	Main fan		W		
		Sub fan		W		
	Fan diameter / Blade	Main fan		318.5 mm (12.54 in)/9		
		Sub fan		318.5 mm (12.54 in)/11		
Radiator	Type				Down flow, pressure type	
	Core dimensions	Width × Height × Thickness			mm (in)	
	Pressure range in which cap valve is open		Positive pressure side	Standard	691.3 × 340 × 27 (27.06 × 13.39 × 0.63)	
				Limit	93 — 123 (0.95 — 1.25, 14 — 18)	
			Negative pressure side	Standard	83 (0.85, 12)	
						−1.0 to −4.9 or less (−0.01 — −0.05, −0.1 — −0.7)
Fins				Corrugated fin type		
Reservoir tank	Capacity				L (US qt, Imp qt)	
					0.45 (0.48, 0.40)	

	Recommended materials	Item number	Alternative
Coolant	SUBARU SUPER COOLANT (concentrated type)	—	—
	SUBARU SUPER COOLANT (diluted type)	K0670Y0001	
Water for dilution	Distilled water	—	Soft water or tap water
Cooling system protective agent	Cooling system conditioner	SOA345001	—

B: COMPONENT

1. WATER PUMP



CO-03228

- | | | |
|-----------------------|------------------------|-------------------------|
| (1) Water pump pulley | (7) Clip | (13) Clip |
| (2) Water pump ASSY | (8) Water pipe hose LH | (14) Water pipe hose RH |
| (3) Gasket | (9) Water pipe LH | |
| (4) Thermostat | (10) Preheater hose | |
| (5) Gasket | (11) Clip | |
| (6) Thermostat cover | (12) Water pipe RH | |

Tightening torque: N·m (kgf-m, ft-lb)

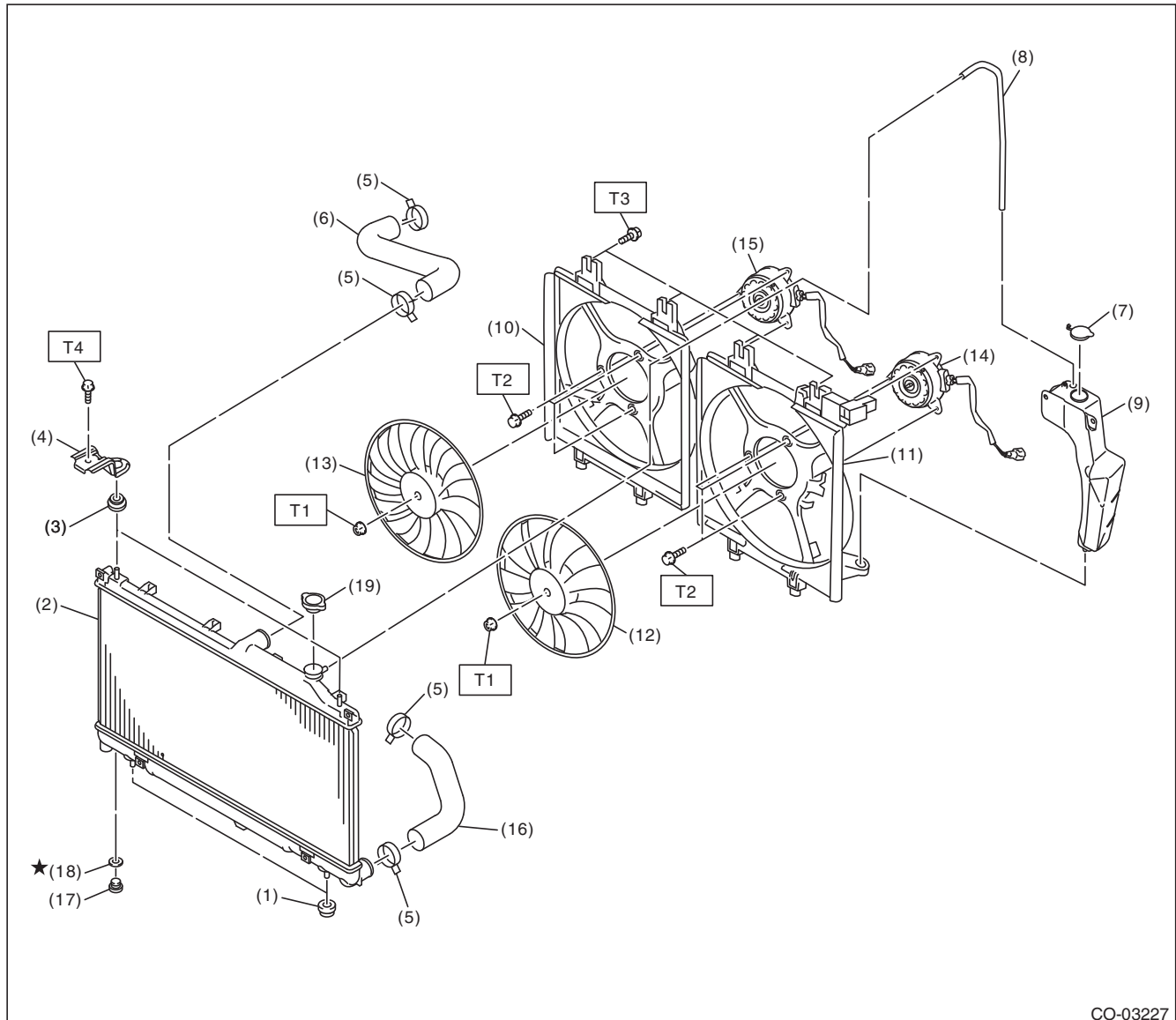
T1: 6.4 (0.7, 4.7)

T2: 14 (1.4, 10.3)

General Description

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2. RADIATOR AND RADIATOR FAN



- | | |
|---------------------------------------|-------------------------------|
| (1) Radiator lower cushion | (10) Radiator sub fan shroud |
| (2) Radiator | (11) Radiator main fan shroud |
| (3) Radiator upper cushion | (12) Radiator main fan |
| (4) Radiator upper bracket | (13) Radiator sub fan |
| (5) Clip | (14) Main fan motor |
| (6) Radiator inlet hose | (15) Sub fan motor |
| (7) Engine coolant reservoir tank cap | (16) Radiator outlet hose |
| (8) Over flow hose | (17) Radiator drain plug |
| (9) Engine coolant reservoir tank | (18) O-ring |

- (19) Radiator cap

Tightening torque: N·m (kgf·m, ft·lb)

T1: 3.4 (0.3, 2.5)

T2: 4.41 (0.45, 3.25)

T3: 7.5 (0.8, 5.5)

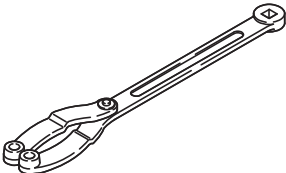
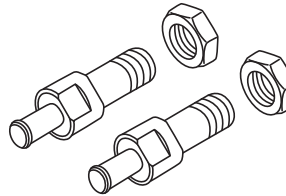
T4: 12 (1.2, 8.9)

C: CAUTION

- Prior to starting work, pay special attention to the following:
 1. Always wear work clothes, a safety cap, protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
 2. Protect the vehicle using a seat cover, fender cover, etc.
 3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Prepare a container and cloth to prevent scattering of engine coolant when performing work where engine coolant can be spilled. If the oil spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary removal, disassembly and replacement.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Always use the jack-up point when the shop jacks or rigid racks are used to support the vehicle.
- Remove contamination including dirt and corrosion before removal, installation, disassembly or assembly.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- Bolts, nuts and washers should be replaced with new parts as required.
- Be sure to tighten the fasteners including bolts and nuts to the specified torque.
- Follow all government and local regulations concerning disposal of refuse when disposing engine coolant.

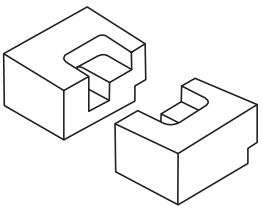
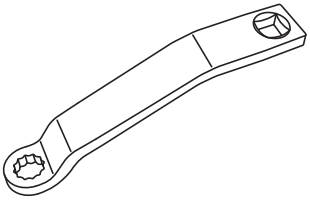
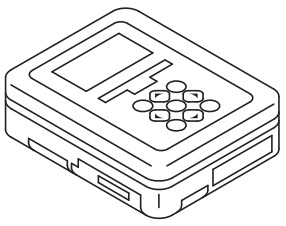
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18355AA000	18355AA000	PULLEY WRENCH	Used for removing and installing water pump pulley.
 ST18334AA030	18334AA030	PULLEY WRENCH PIN SET	Used for removing and installing water pump pulley.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18632AA020	18632AA020	STAND ASSY	Used for removing and installing the water pipe assembly.
 ST73099SG000	73099SG000 (Newly adopted tool)	SPECIAL TOOL CONDENSER	Used for installing the radiator.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Radiator cap tester	Used for checking radiator and radiator cap.

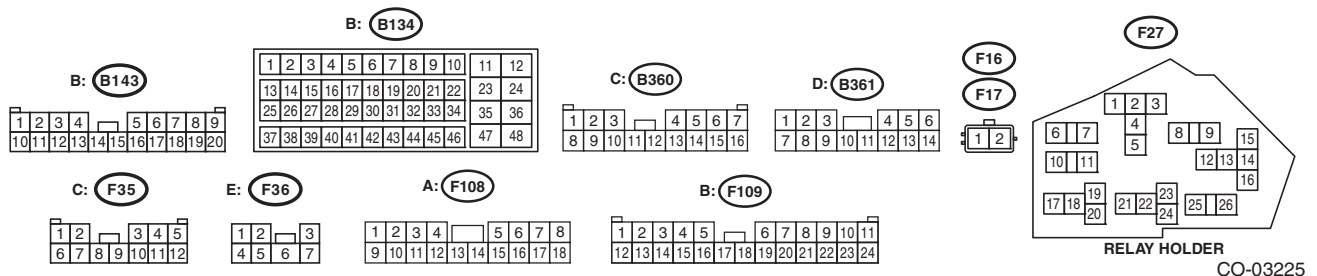
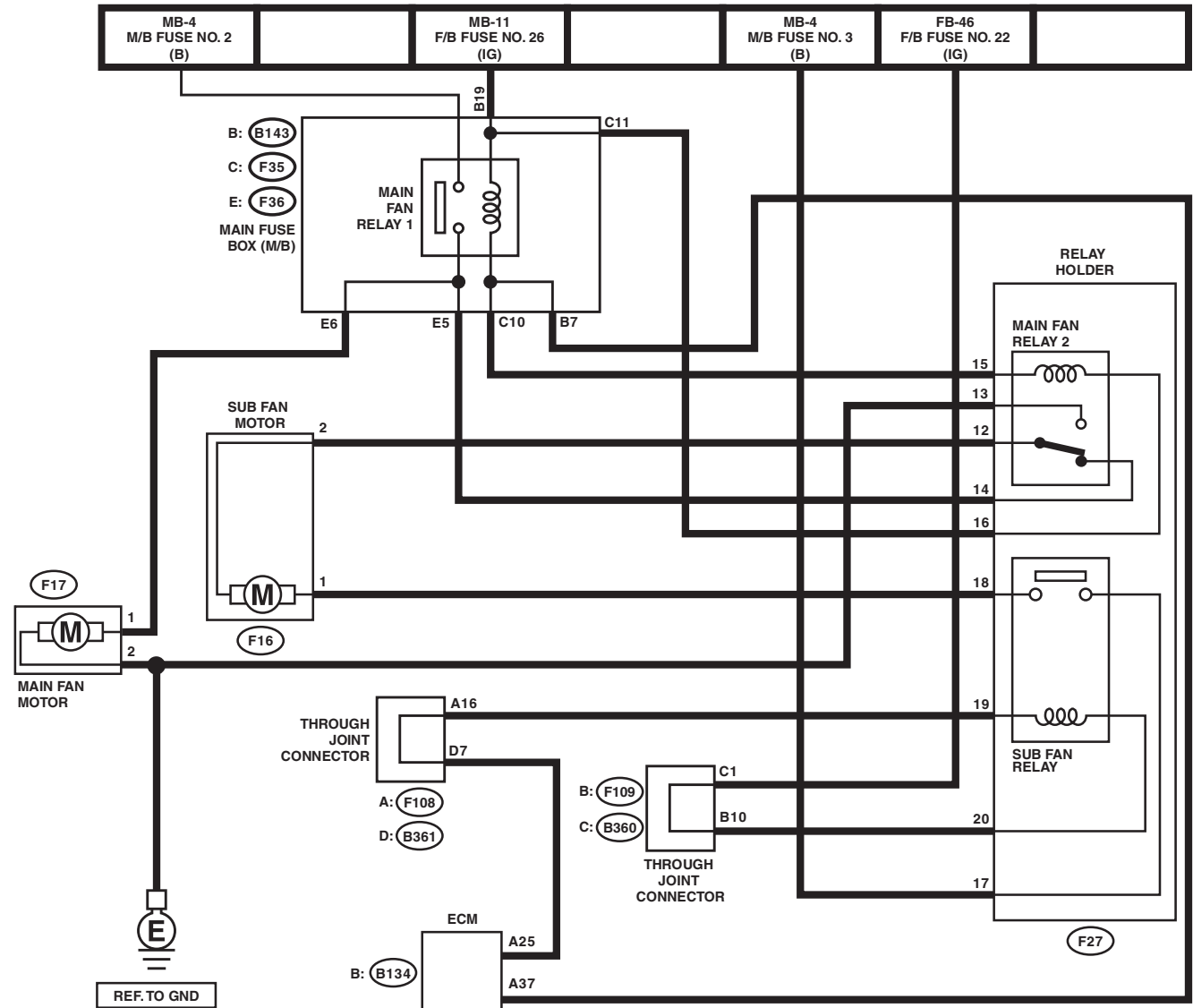
Radiator Fan System

COOLING

2. Radiator Fan System

A: WIRING DIAGRAM

Radiator fan system <Ref. to WI-345, WIRING DIAGRAM, Radiator Fan System.>



Radiator Fan System

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B: INSPECTION

Operating condition:

Vehicle speed	A/C compressor load	Engine coolant temperature		
		Increase: 94°C (201°F) or less Decrease: 92°C (198°F) or less	Increase: 95 — 99°C (203 — 210°F) Decrease: 93 — 94°C (199 — 201°F)	Increase: 100°C (212°F) or more Decrease: 95°C (203°F) or more
		Radiator fan operation	Radiator fan operation	Radiator fan operation
During acceleration: 19 km/h (12 MPH) or less During deceleration: 10 km/h (6 MPH) or less	OFF	OFF	Low-Speed	High-Speed
	Low	Low-Speed	Low-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
During acceleration: 20 — 69 km/h (12 — 43 MPH) During deceleration: 11 — 64 km/h (7 — 40 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	High-Speed	High-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
During acceleration: 70 — 134 km/h (43 — 83 MPH) During deceleration: 65 — 129 km/h (40 — 80 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	OFF*	Low-Speed*	High-Speed
	High	Low-Speed*	High-Speed	High-Speed
During acceleration: 135 km/h (84 MPH) or more During deceleration: 130 km/h (81 MPH) or more	OFF	OFF	OFF	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	OFF	Low-Speed	High-Speed

*The fan may run at High-Speed when ambient temperature is high.



Radiator Fan System

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DIAGNOSIS:

Radiator main fan and radiator sub fan do not rotate under the above operating conditions.

Step	Check	Yes	No
1 CHECK OPERATION OF RADIATOR FAN. 1) Install the delivery mode fuse. 2) Turn the ignition switch to ON. 3) Using the Subaru Select Monitor, perform the compulsory operation check for the radiator fan relay. NOTE: • When performing the compulsory operation check for the radiator fan relay using the Subaru Select Monitor, the radiator main fan and radiator sub fan will repeat low speed revolution → high speed revolution → OFF in this order. • Subaru Select Monitor For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".	Do the radiator main fans and radiator sub fans rotate at low speed?	Go to step 2.	Go to step 3.
2 CHECK OPERATION OF RADIATOR FAN. 1) Install the delivery mode fuse. 2) Turn the ignition switch to ON. 3) Using the Subaru Select Monitor, perform the compulsory operation check for the radiator fan relay. NOTE: • When performing the compulsory operation check for the radiator fan relay using the Subaru Select Monitor, the radiator main fan and radiator sub fan will repeat low speed revolution → high speed revolution → OFF in this order. • Subaru Select Monitor For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".	Do the radiator main fans and radiator sub fans rotate at high speed?	Radiator main fan system is normal.	Go to step 27.
3 CHECK POWER SUPPLY TO SUB FAN RELAY. 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from the relay holder. 3) Measure the voltage between the sub fan relay terminal and chassis ground. Connector & terminal (F27) No. 17 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 4.	Go to step 5.
4 CHECK POWER SUPPLY TO SUB FAN RELAY. 1) Turn the ignition switch to ON. 2) Measure the voltage between the sub fan relay terminal and chassis ground. Connector & terminal (F27) No. 20 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 7.	Go to step 6.
5 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 3. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
6 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.



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Step	Check	Yes	No
7 CHECK SUB FAN RELAY. 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan relay terminals. <i>Terminals</i> <i>No. 17 — No. 18:</i>	Is the resistance 1 M Ω or more?	Go to step 8.	Replace the sub fan relay. <Ref. to AC-32, Relay and Fuse.>
8 CHECK SUB FAN RELAY. 1) Connect the battery to terminals No. 19 and No. 20 of the sub fan relay. 2) Measure the resistance between sub fan relay terminals. <i>Terminals</i> <i>No. 17 — No. 18:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Replace the sub fan relay. <Ref. to AC-32, Relay and Fuse.>
9 CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR. 1) Disconnect the connector from the sub fan motor. 2) Measure the resistance of harness between the sub fan relay terminal and sub fan motor connector. <i>Connector & terminal</i> <i>(F16) No. 1 — (F27) No. 18:</i>	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the open circuit of harness between sub fan relay terminal and sub fan motor connector.
10 CHECK HARNESS BETWEEN SUB FAN MOTOR CONNECTOR AND MAIN FAN RELAY 2 CONNECTOR. 1) Remove main fan relay 2 from the relay holder. 2) Measure the resistance of harness between sub fan motor connector and main fan relay 2 connector. <i>Connector & terminal</i> <i>(F16) No. 2 — (F27) No. 12:</i>	Is the resistance less than 1 Ω ?	Go to step 11.	Repair the open circuit of the harness between sub fan motor connector and main fan relay 2 connector.
11 CHECK FOR POOR CONTACT. Check poor contact of sub fan motor connector.	Is there poor contact of the sub fan motor connector?	Repair the poor contact of sub fan motor connector.	Go to step 12.
12 CHECK SUB FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 1 of the sub fan motor, and the ground (–) terminal to terminal No. 2.	Does the radiator sub fan rotate?	Go to step 13.	Replace the sub fan motor. <Ref. to CO(H4DOTC)-55, Radiator Sub Fan and Fan Motor.>
13 CHECK MAIN FAN RELAY 2. Measure the resistance of main fan relay 2. <i>Terminals</i> <i>No. 14 — No. 12:</i>	Is the resistance less than 1 Ω ?	Go to step 14.	Replace the main fan relay 2. <Ref. to AC-32, Relay and Fuse.>
14 CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND MAIN FAN MOTOR CONNECTOR. 1) Disconnect the connector from the main fan motor. 2) Measure the resistance of the harness between main fan relay 2 terminal and main fan motor connector. <i>Connector & terminal</i> <i>(F17) No. 1 — (F27) No. 14:</i>	Is the resistance less than 1 Ω ?	Go to step 15.	Repair the open circuit of the harness between main fan relay 2 terminal and main fan motor connector.

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Step	Check	Yes	No
15 CHECK GROUND CIRCUIT OF MAIN FAN MOTOR. Measure the resistance between main fan motor connector and chassis ground. <i>Connector & terminal (F17) No. 2 — Chassis ground:</i>	Is the resistance less than 5 Ω ?	Go to step 16.	Repair the open circuit of the harness between main fan motor connector and chassis ground.
16 CHECK FOR POOR CONTACT. Check poor contact of main fan motor connector.	Is there poor contact of the main fan motor connector?	Repair the poor contact of main fan motor connector.	Go to step 17.
17 CHECK MAIN FAN MOTOR. Connect the battery positive (+) terminal to terminal No. 1 of the main fan motor, and the ground (–) terminal to terminal No. 2.	Does the radiator main fan rotate?	Go to step 18.	Replace the main fan motor. <Ref. to CO(H4DOTC)-52, Radiator Main Fan and Fan Motor.>
18 CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM. 1) Disconnect the connector from ECM. 2) Measure the resistance between the sub fan relay terminal and ECM connector. <i>Connector & terminal (B134) No. 25 — (F27) No. 19:</i>	Is the resistance less than 1 Ω ?	Go to step 19.	Repair the open circuit of harness between sub fan relay terminal and ECM.
19 CHECK FOR POOR CONTACT. Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4DO)(diag)-43, Read Diagnostic Trouble Code (DTC).>
20 CHECK MAIN FAN RELAY 1. 1) Turn the ignition switch to OFF. 2) Remove main fan relay 1 from the main fuse box. 3) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance 1 M Ω or more?	Go to step 21.	Replace the main fan relay 1. <Ref. to AC-32, Relay and Fuse.>
21 CHECK MAIN FAN RELAY 1. 1) Connect the main fan relay 1 coil side terminal to the battery. 2) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance less than 1 Ω ?	Go to step 22.	Replace the main fan relay 1. <Ref. to AC-32, Relay and Fuse.>
22 CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND MAIN FAN MOTOR CONNECTOR. 1) Disconnect the connector from the main fan motor. 2) Measure the resistance of the harness between main fan relay 1 terminal and main fan motor connector. <i>Connector & terminal (F17) No. 1 — (F36) No. 6:</i>	Is the resistance less than 1 Ω ?	Go to step 23.	Repair the open circuit of the harness between main fan relay 1 terminal and main fan motor connector.
23 CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND ECM. 1) Disconnect the connector from ECM. 2) Measure the resistance between main fan relay 1 terminal and ECM connector. <i>Connector & terminal (B134) No. 37 — (B143) No. 7:</i>	Is the resistance less than 1 Ω ?	Go to step 24.	Repair the open circuit of the harness between main fan relay 1 terminal and ECM.

Radiator Fan System

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Step	Check	Yes	No
24 CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND ECM. Measure the resistance between main fan relay 2 terminal and ECM connector. Connector & terminal (B134) No. 37 — (F27) No. 15:	Is the resistance less than 1 Ω ?	Go to step 25.	Repair the open circuit of the harness between main fan relay 2 terminal and ECM.
25 CHECK FUSE. 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 2 and No. 26. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 26.
26 CHECK FOR POOR CONTACT. Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Repair the power supply circuit to the main fuse box.
27 CHECK OPERATION OF RADIATOR FAN. If the both fans do not rotate at high speed in the condition of step 2, check whether the radiator sub fan is rotating.	Does the radiator sub fan rotate?	Go to step 20.	Go to step 28.
28 CHECK GROUND CIRCUIT OF MAIN FAN RELAY 2. 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance between main fan relay 2 terminal and chassis ground. Connector & terminal (F27) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 29.	Repair the open circuit of harness between main fan relay 2 and chassis ground.
29 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. Connector & terminal (F27) No. 13 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 30.	Repair the power supply line.
30 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. Terminals (F27) No. 12 — (F27) No. 13:	Is the resistance 1 M Ω or more?	Go to step 31.	Replace the main fan relay 2. <Ref. to AC-32, Relay and Fuse.>
31 CHECK MAIN FAN RELAY 2. 1) Connect the battery to terminals No. 15 and No. 16 of the main fan relay 2. 2) Measure the resistance of main fan relay 2. Terminals (F27) No. 12 — (F27) No. 13:	Is the resistance less than 1 Ω ?	Go to step 23.	Replace the main fan relay 2. <Ref. to AC-32, Relay and Fuse.>

3. Engine Coolant

A: INSPECTION

NOTE:

When adding the engine coolant, always use SUBARU Super Coolant.

- 1) Park the vehicle on a level surface.
- 2) Check the engine coolant amount, and if the coolant level is low, check for the coolant leakage, and then add the engine coolant.
 - (1) Make sure the engine coolant level in the reservoir tank is between "FULL" and "LOW" with the engine in a cold condition.
 - (2) Open the radiator cap and make sure that the radiator is filled with the engine coolant up to its filler neck position.

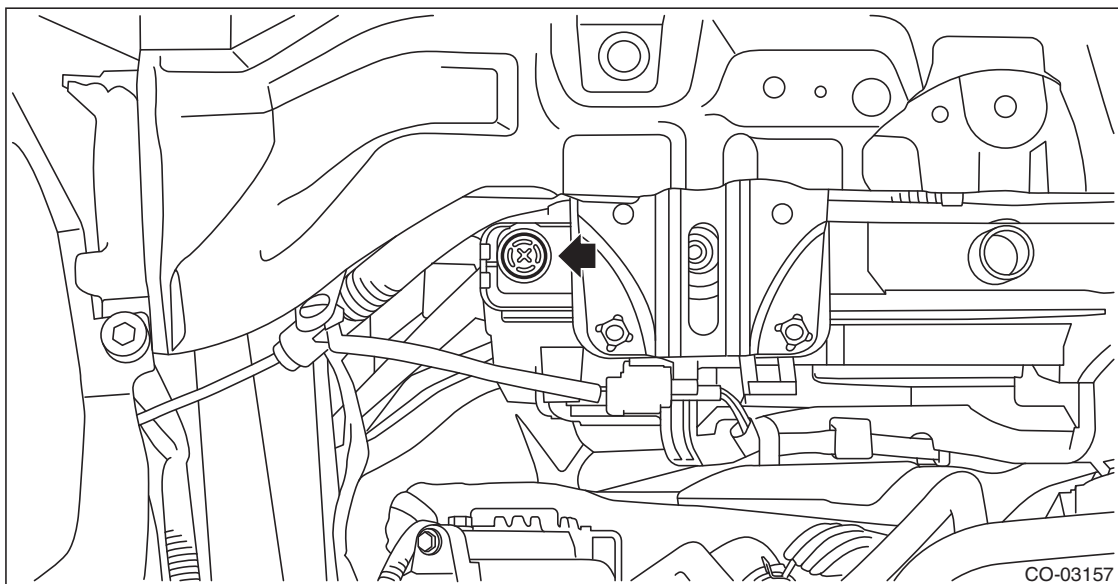
B: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

- 1) Lift up the vehicle.
- 2) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>
- 3) Remove the drain plug to drain engine coolant into container.

NOTE:

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



- 4) Install the drain plug.

NOTE:

Use new O-rings.

- 5) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>

Engine Coolant

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2. FILLING OF ENGINE COOLANT

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

Cooling system protective agent:

Refer to "SPECIFICATION" for cooling system protective agent. <Ref. to CO(H4DOTC)-2, SPECIFICATION, General Description.>

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

Recommended engine coolant:

Refer to "SPECIFICATION" for recommended engine coolant. <Ref. to CO(H4DOTC)-2, SPECIFICATION, General Description.>

Engine coolant level:

Refer to "SPECIFICATION" for engine coolant level. <Ref. to CO(H4DOTC)-2, SPECIFICATION, General Description.>

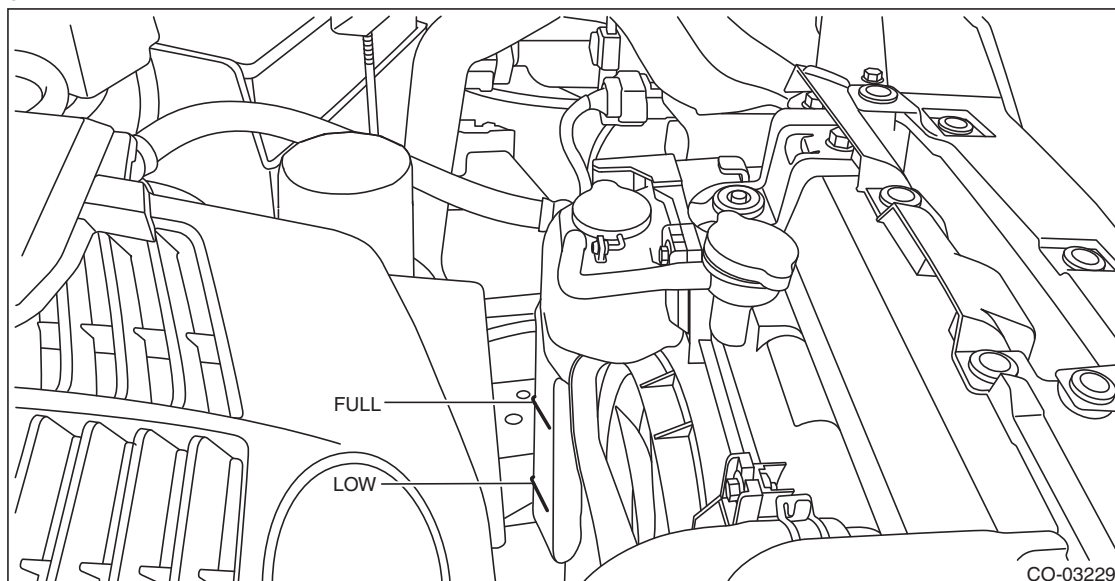
Engine coolant concentration:

Refer to "ADJUSTMENT" for the recommended engine coolant concentration. <Ref. to CO(H4DOTC)-15, ADJUSTMENT, Engine Coolant.>

NOTE:

The SUBARU Super Coolant contains anti-freeze and anti-rust agents, and is especially made for Subaru engines with an aluminum cylinder block. Be sure to use SUBARU Super Coolant, since other coolant may cause corrosion.

- 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, and 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 to "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 to prevent overheating.

- 10) Stop the engine and wait until the engine coolant temperature lowers to 30°C (86°F) or less.
- 11) Open the radiator cap. If the engine coolant level drops, add engine coolant into the radiator up to the filler neck position and the reservoir tank to "FULL" level.
- 12) Attach the radiator cap and reservoir tank cap properly.

Engine Coolant

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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 the heater core, repeat the procedures from step 9).

C: ADJUSTMENT

1. PROCEDURE TO ADJUST THE SUBARU SUPER COOLANT CONCENTRATION

CAUTION:

Use the SUBARU Super Coolant with a 50 — 60% concentration in order to obtain maximum anti-freeze and anti-rust performance.

To adjust the concentration of SUBARU Super Coolant according to temperature, find the proper SUBARU Super Coolant concentration in the table, and add dilution water to the SUBARU Super Coolant (concentrated type) until it reaches the proper dilution.

Relationship of SUBARU Super Coolant concentration and freezing temperature			
SUBARU Super Coolant concentration	50%	55%	60%
Freezing temperature	−36°C (−33°F)	−41°C (−42°F)	−50°C (−58°F)

Engine coolant and diluting water:

Refer to "SPECIFICATION" for recommended engine coolant and diluting water. <Ref. to CO(H4DOTC)-2, SPECIFICATION, General Description.>



Water Pump

COOLING

4. Water Pump

A: REMOVAL

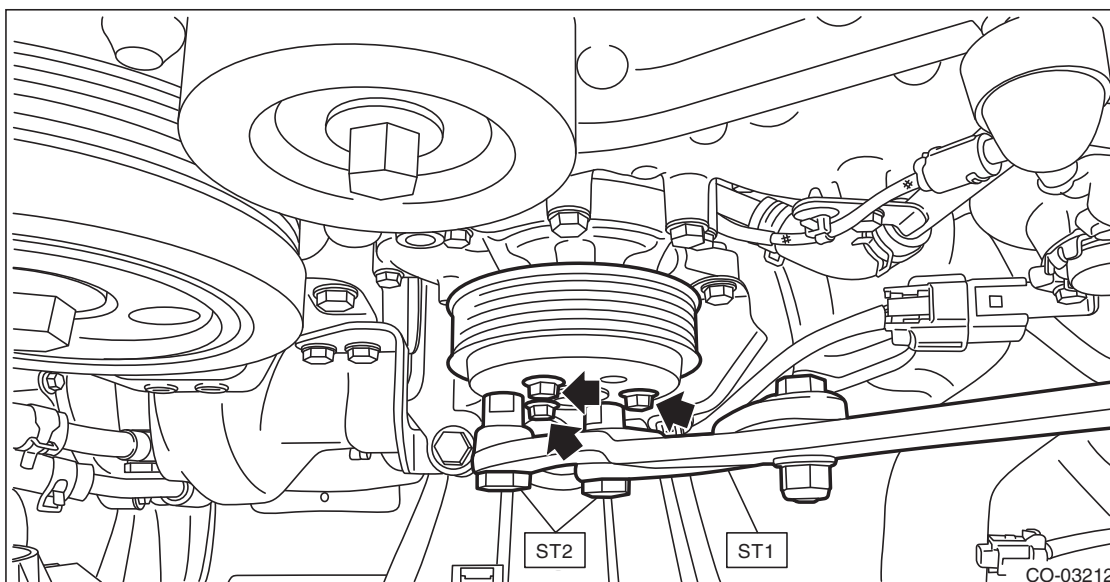
1. WATER PUMP PULLEY

1) Remove the V-belts. <Ref. to ME(H4DOTC)-75, REMOVAL, V-belt.>

2) Remove the water pump pulley using the ST.

ST1 18355AA000 PULLEY WRENCH

ST2 18334AA030 PULLEY WRENCH PIN SET



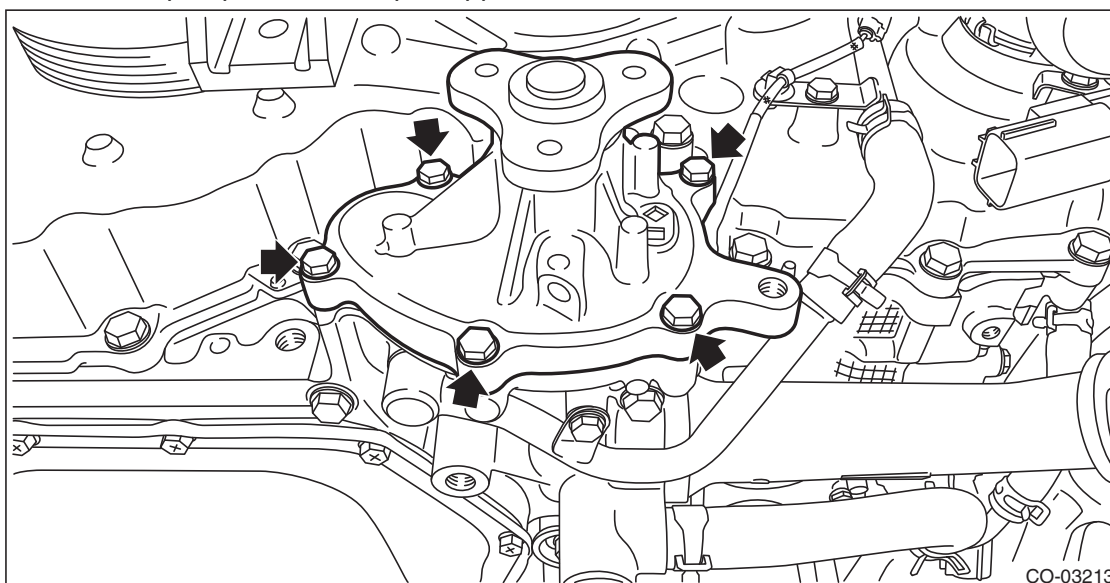
2. WATER PUMP

1) Disconnect the ground cable from battery.

2) Remove the water pump pulley. <Ref. to CO(H4DOTC)-16, WATER PUMP PULLEY, REMOVAL, Water Pump.>

3) Remove the front exhaust pipe. <Ref. to EX(H4DOTC)-7, REMOVAL, Front Exhaust Pipe.>

4) Remove the water pump from the oil pan upper.



CO(H4DOTC)-16

B: INSTALLATION

1. WATER PUMP PULLEY

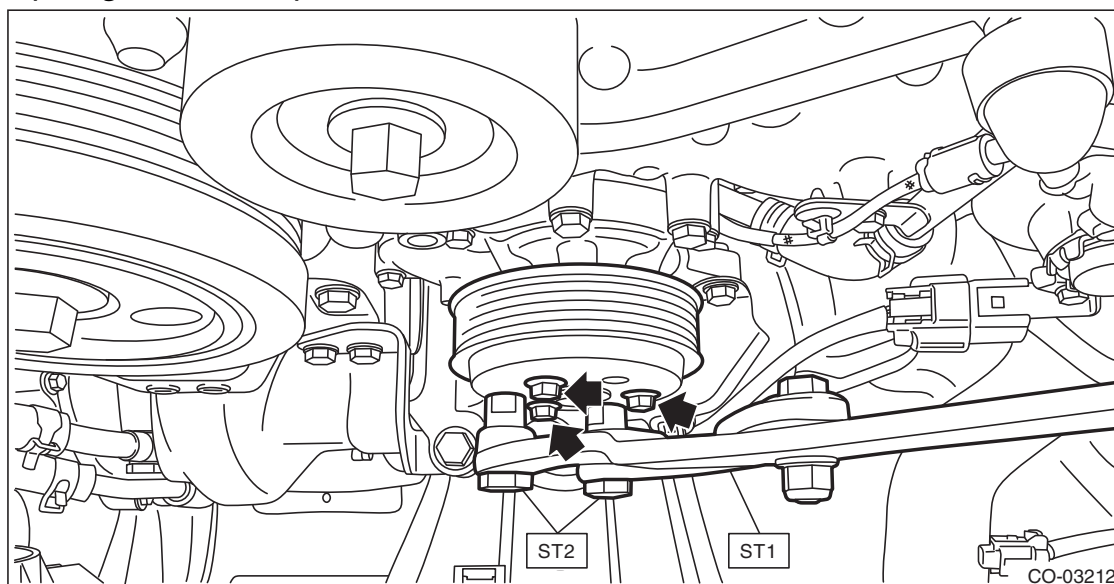
1) Using the ST, install the water pump pulley.

ST1 18355AA000 PULLEY WRENCH

ST2 18334AA030 PULLEY WRENCH PIN SET

Tightening torque:

14 N·m (1.4 kgf-m, 10.3 ft-lb)



2) Install the V-belts. <Ref. to ME(H4DOTC)-78, INSTALLATION, V-belt.>

2. WATER PUMP

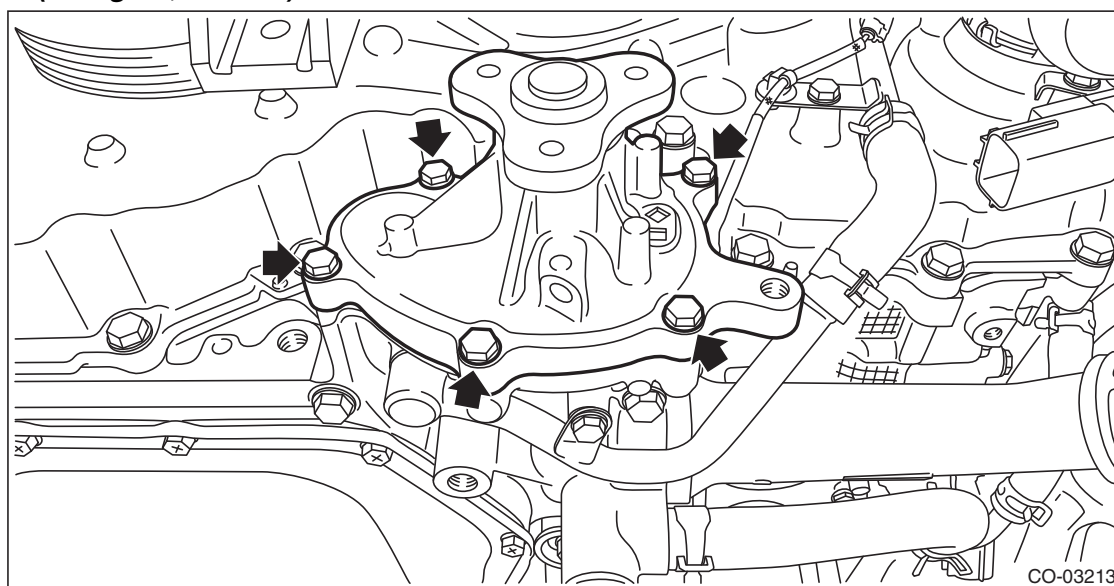
1) Install the water pump to oil pan upper.

NOTE:

Use a new gasket.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



2) Install the front exhaust pipe. <Ref. to EX(H4DOTC)-15, INSTALLATION, Front Exhaust Pipe.>

Water Pump

COOLING

- 3) Install the water pump pulley. <Ref. to CO(H4DOTC)-17, WATER PUMP PULLEY, INSTALLATION, Water Pump.>
- 4) Connect the battery ground terminal.
- 5) Fill engine coolant. <Ref. to CO(H4DOTC)-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

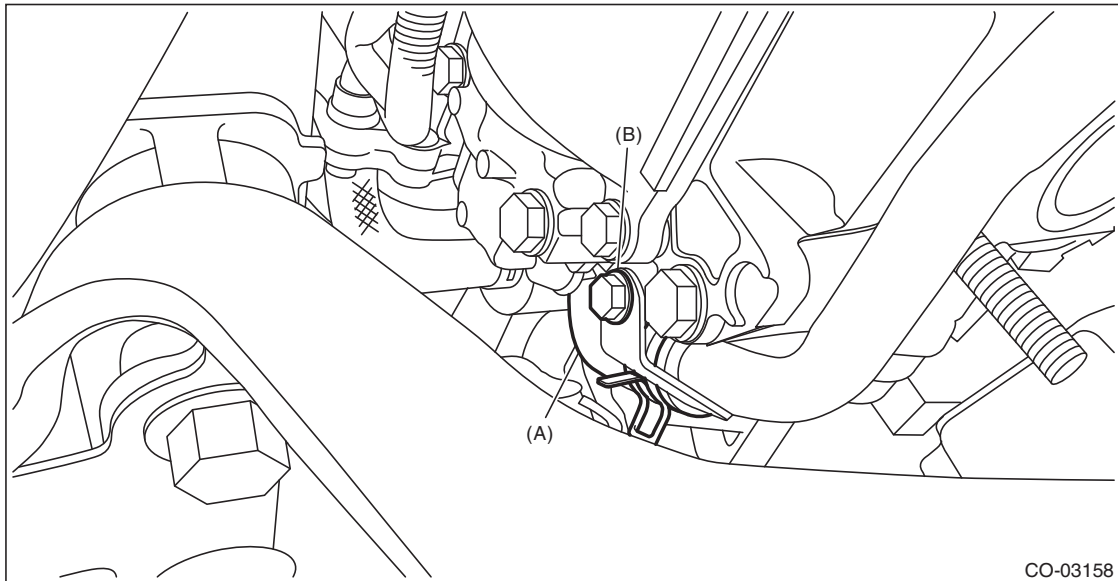
- 1) Check that the water pump pulley does not have deformation, cracks and any other damage.
- 2) Check the water pump bearing for smooth rotation.
- 3) Make sure the impeller is not abnormally deformed or damaged.

5. Water Pipe Assembly

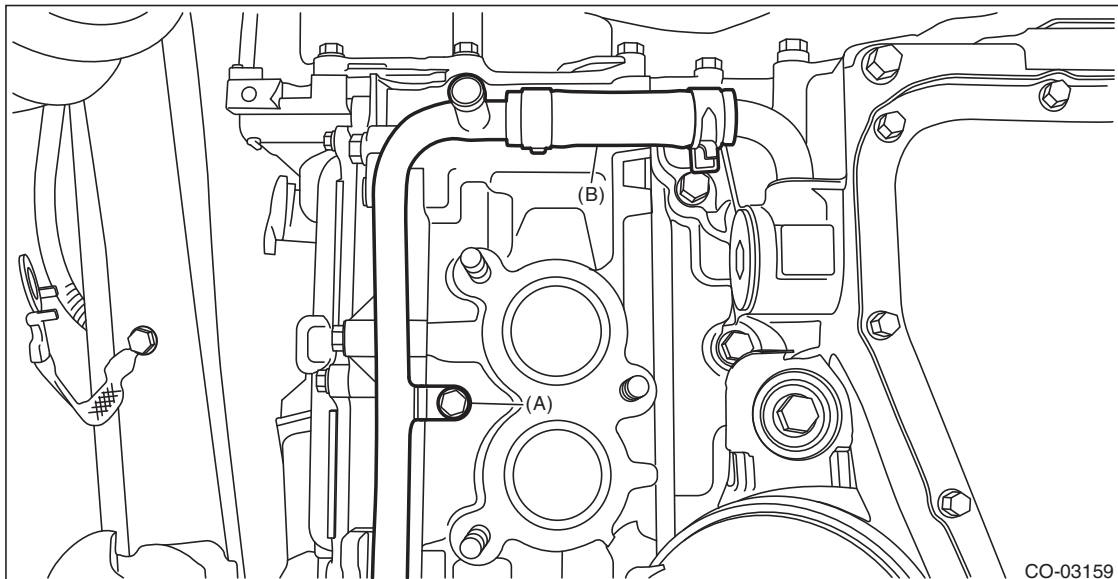
A: REMOVAL

1. WATER PIPE ASSEMBLY RH

- 1) Disconnect the ground cable from battery.
- 2) Remove the oil pipe assembly. <Ref. to LU(H4DO)-56, OIL PIPE ASSEMBLY, REMOVAL, Oil Pipe.>
- 3) Remove the front exhaust pipe. <Ref. to EX(H4DOTC)-7, REMOVAL, Front Exhaust Pipe.>
- 4) Disconnect the water hose (A) from the water pipe assembly RH, and remove the bolt (B) securing the water pipe assembly RH to the cam carrier RH.



- 5) Remove the bolt (A) which secures the water pipe assembly RH to the cylinder head RH.
- 6) Disconnect the water pipe hose RH (B) from oil pan upper, and remove the water pipe assembly RH.

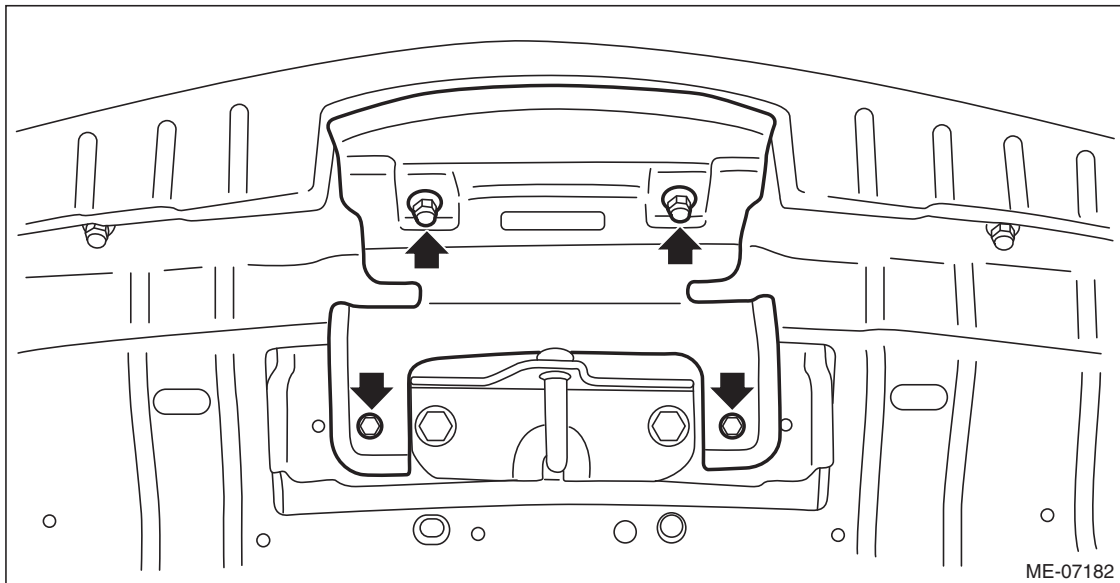


Water Pipe Assembly

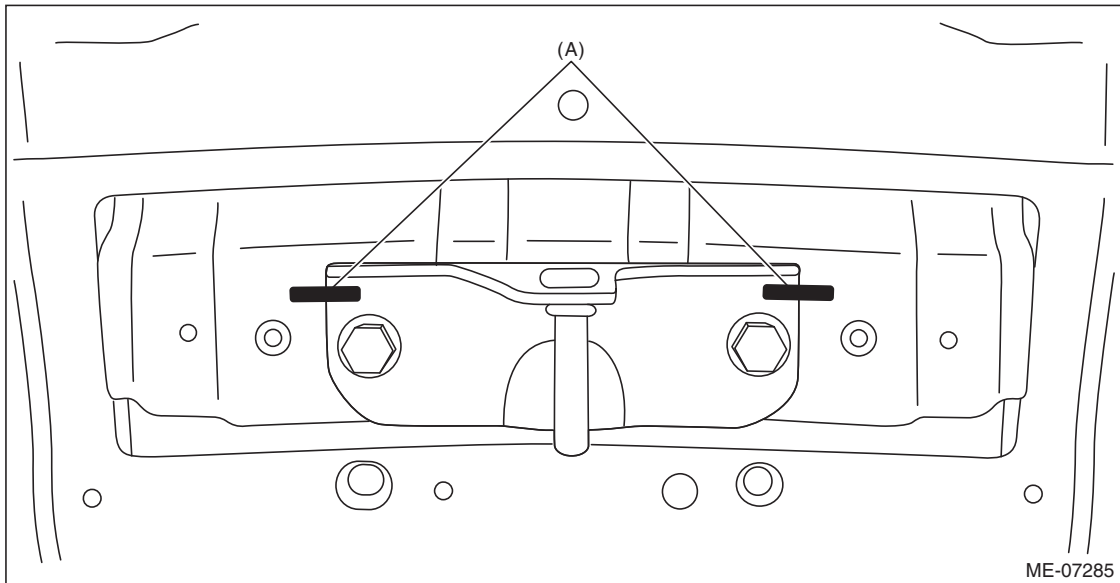
COOLING

2. WATER PIPE ASSEMBLY LH

1) Open the front hood, and remove the upper grille bracket from the front hood.



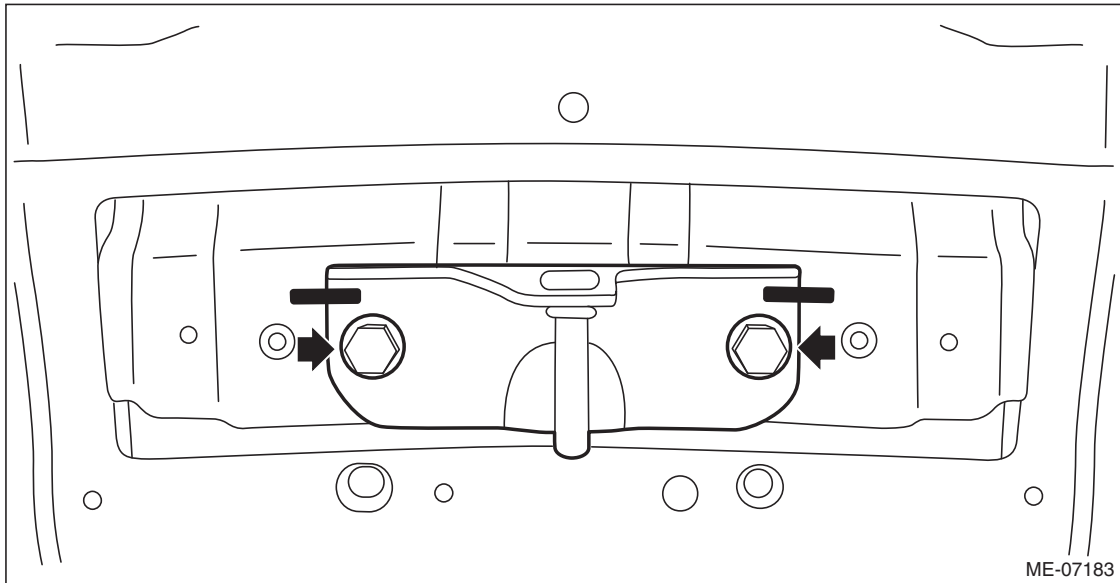
2) Using a marker pen, make alignment marks (A) on both the front hood and the front hood striker.



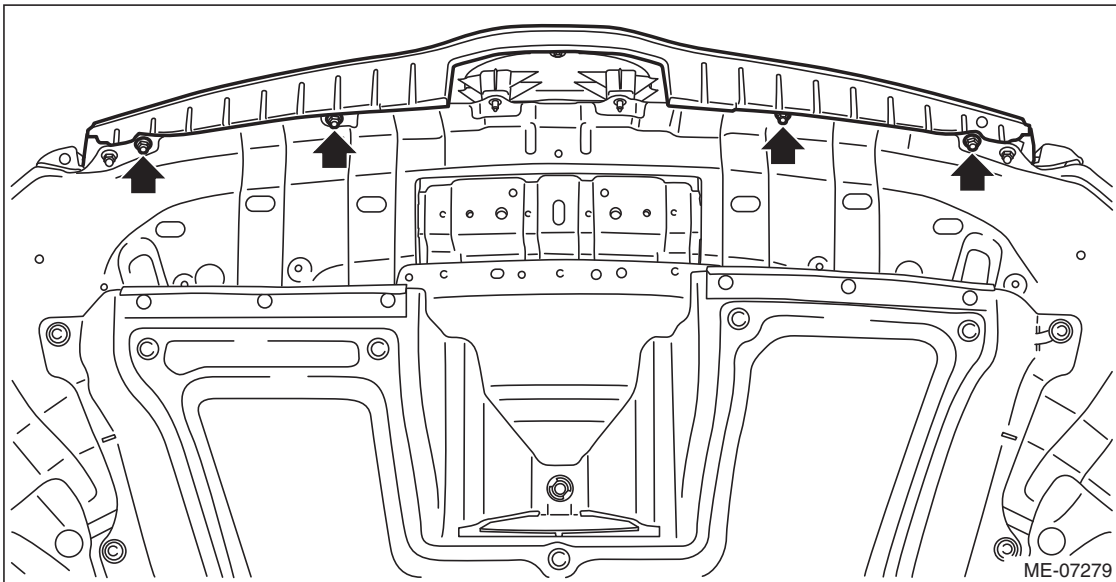
Water Pipe Assembly

COOLING

- 3) Remove the front hood striker from the front hood.



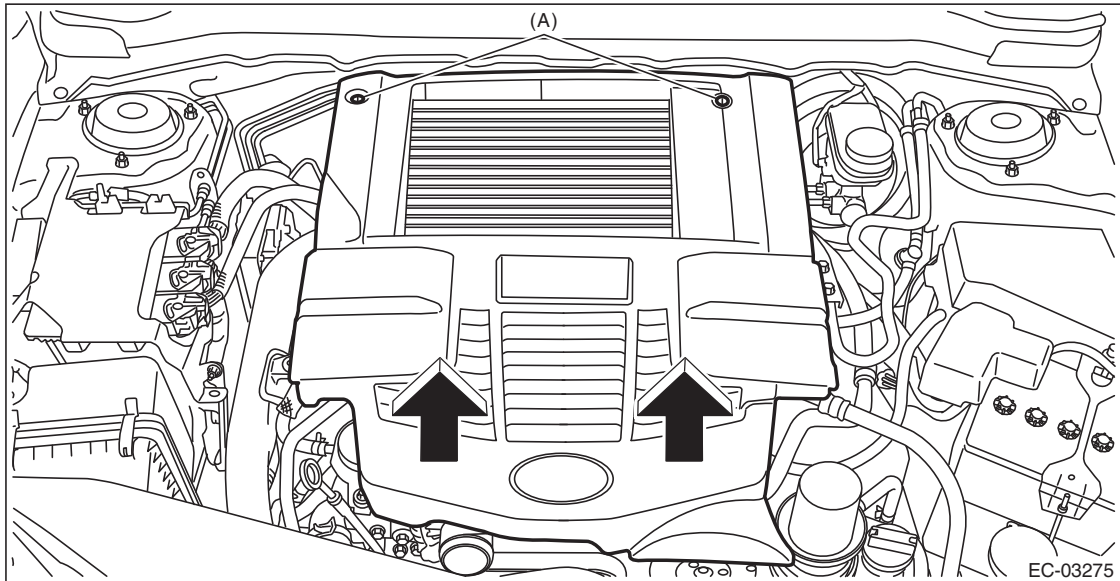
- 4) Remove the front center grille assembly from the front hood.



Water Pipe Assembly

COOLING

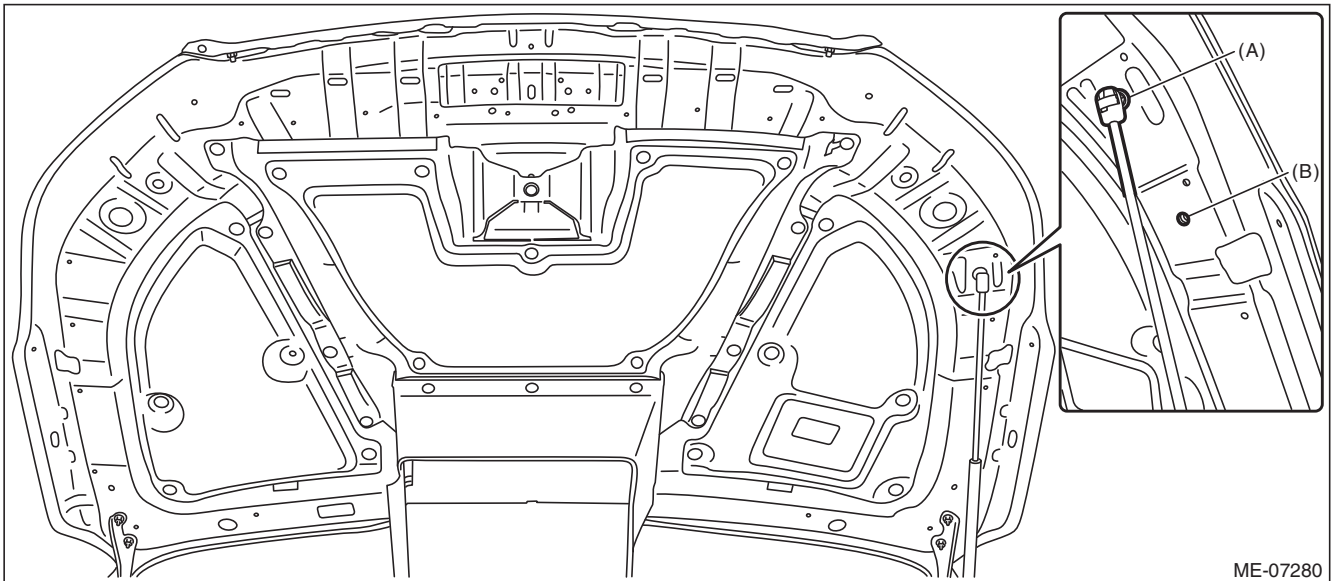
5) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.



6) Change the front hood damper mounting position from (A) to (B), and completely open the front hood.

Tightening torque:

20 N·m (2.0 kgf-m, 14.8 ft-lb)



7) Disconnect the ground cable from battery.

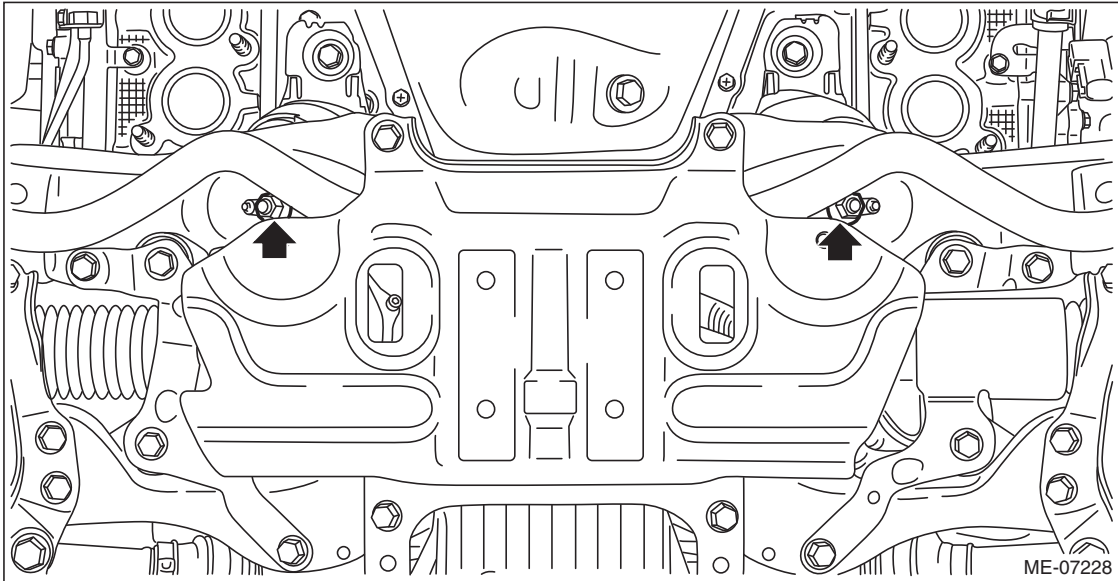
8) Remove the air intake duct (rear). <Ref. to IN(H4DOTC)-19, REMOVAL, Air Intake Duct.>

9) Remove the front exhaust pipe. <Ref. to EX(H4DOTC)-7, REMOVAL, Front Exhaust Pipe.>

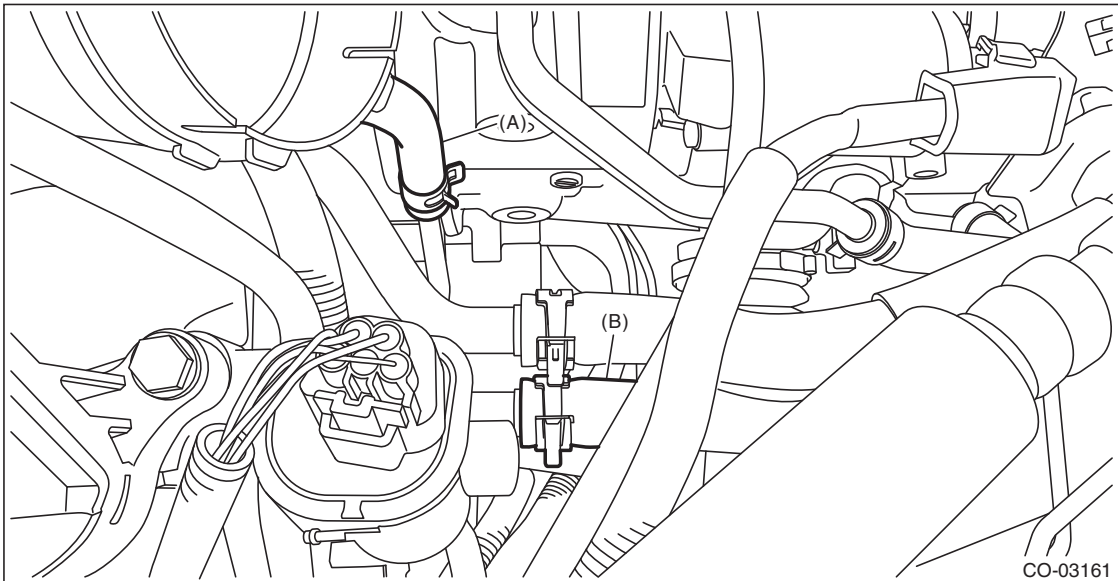
Water Pipe Assembly

COOLING

- 10) Remove the nuts which secure the engine mounting to the front crossmember.



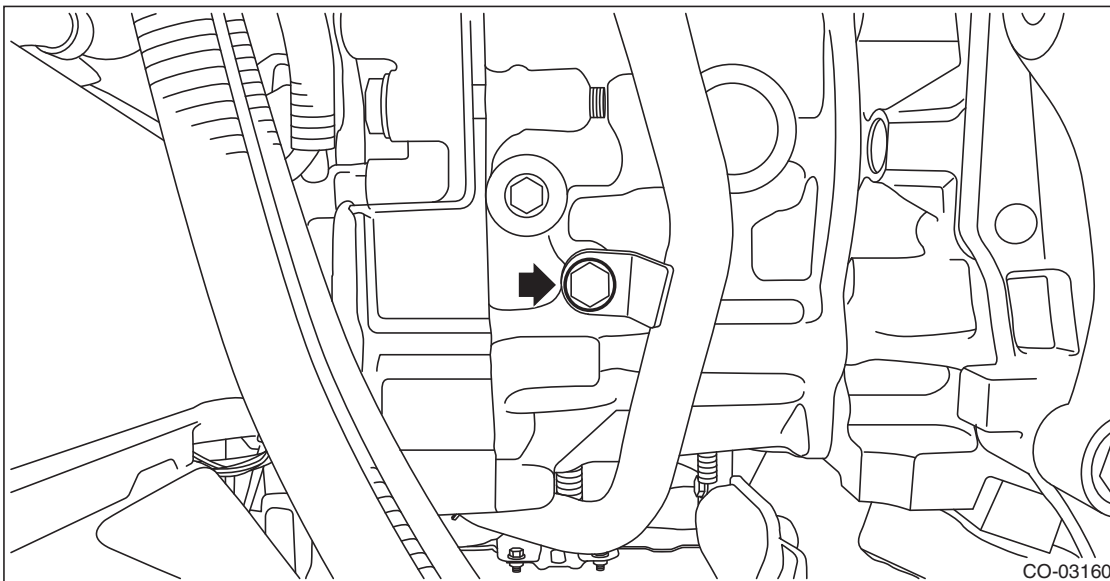
- 11) Lower the vehicle.
12) Remove the intercooler. <Ref. to IN(H4DOTC)-35, REMOVAL, Intercooler.>
13) Disconnect the preheater hose (A) and the heater outlet hose (B) from the water pipe assembly LH.



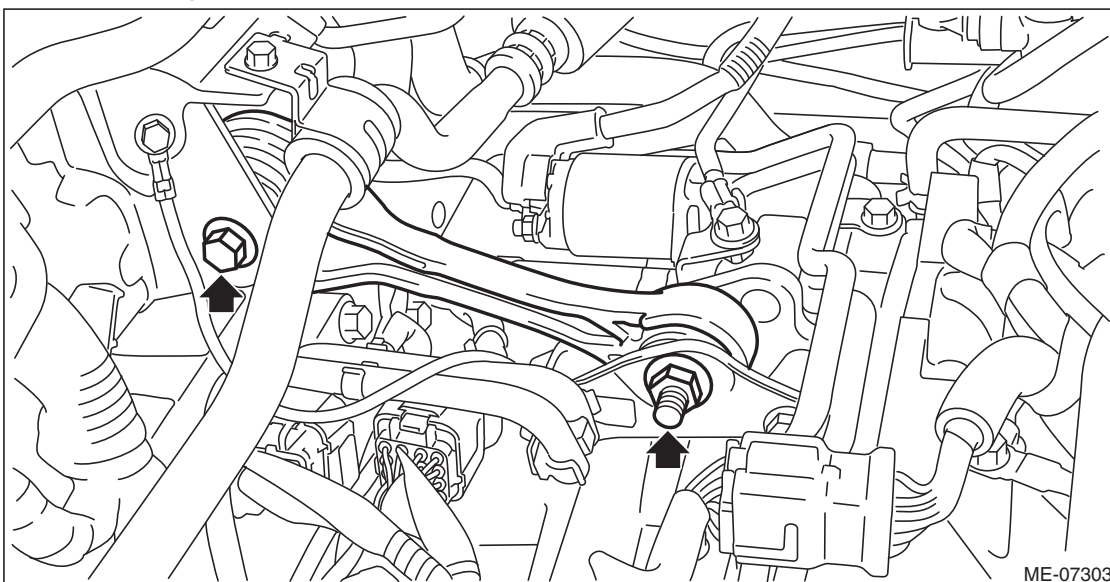
Water Pipe Assembly

COOLING

- 14) Remove the bolt which holds the water pipe assembly LH from the cylinder head LH.



- 15) Remove the pitching stopper.



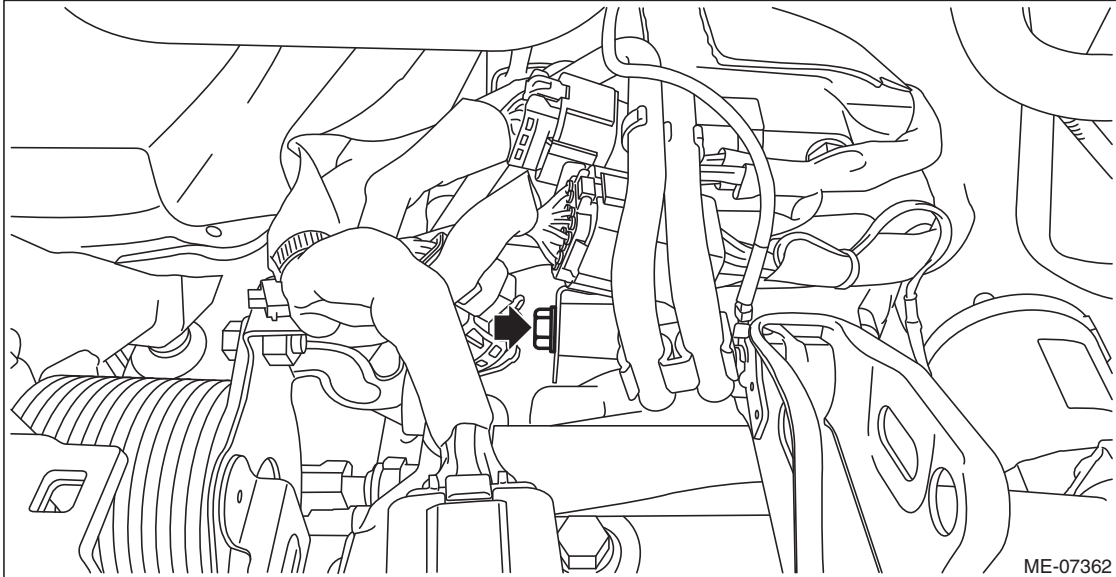
Water Pipe Assembly

COOLING

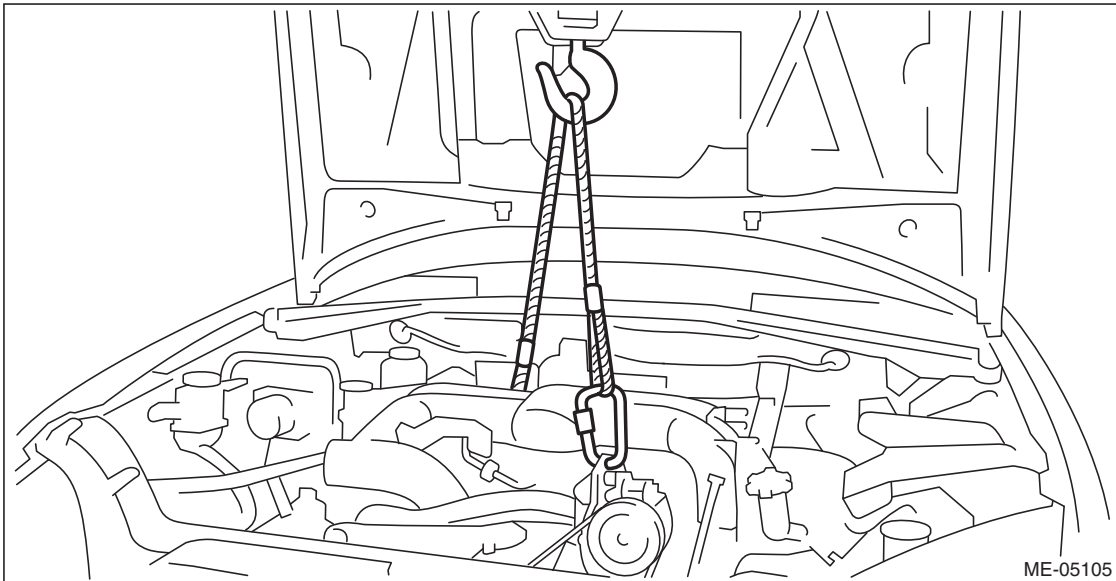
16) Remove the bolt securing the transmission harness stay to the CVT.

NOTE:

This procedure is required to prevent the transmission connector from touching the A/C pressure hose during engine removal/installation.



17) Support the engine with a lifting device and wire ropes.



18) Lift the engine high enough until the stud bolt of the engine mount is drawn out of the crossmember.

CAUTION:

When lifting up the engine, pay attention to the clearance of each part and be careful not to lift the engine too much, in order to prevent damaging the vehicle.

Water Pipe Assembly

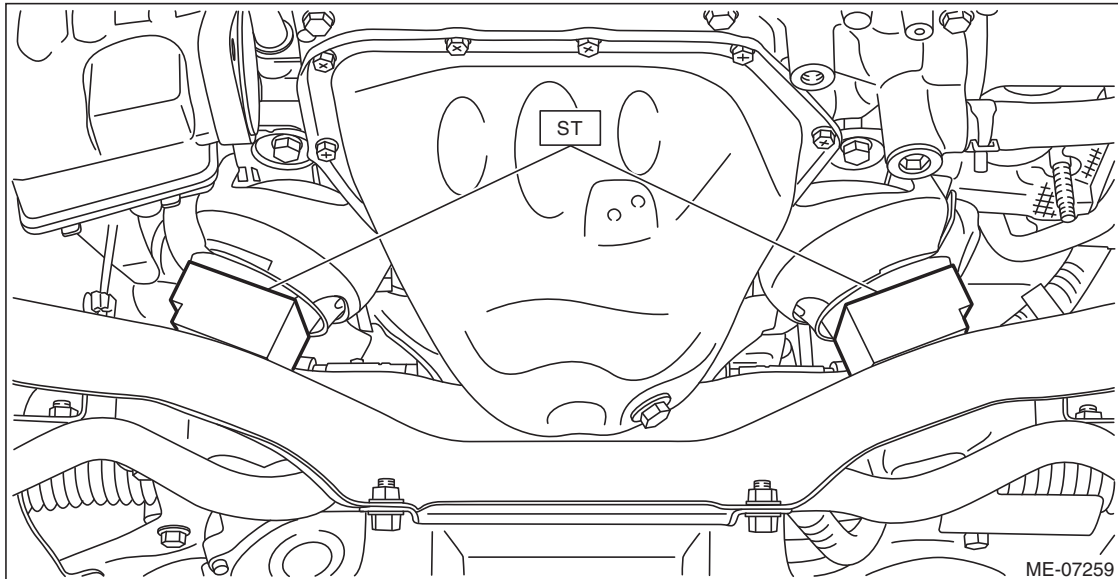
COOLING

19) Set the ST between the engine mount and crossmember, and slowly lower the engine.

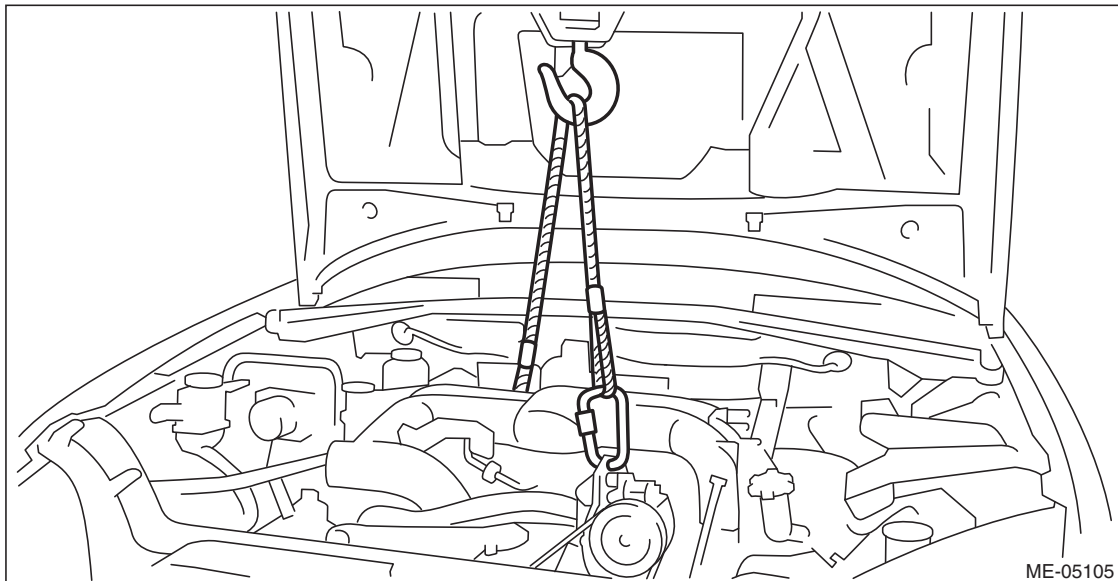
CAUTION:

After the engine is lowered, rock the engine to make sure that the ST is securely installed.

ST 18632AA020 STAND ASSY



20) Remove the lifting device and wire ropes.



21) Lift up the vehicle.

22) Remove the rear oxygen sensor connector (A) from the water pipe assembly LH.

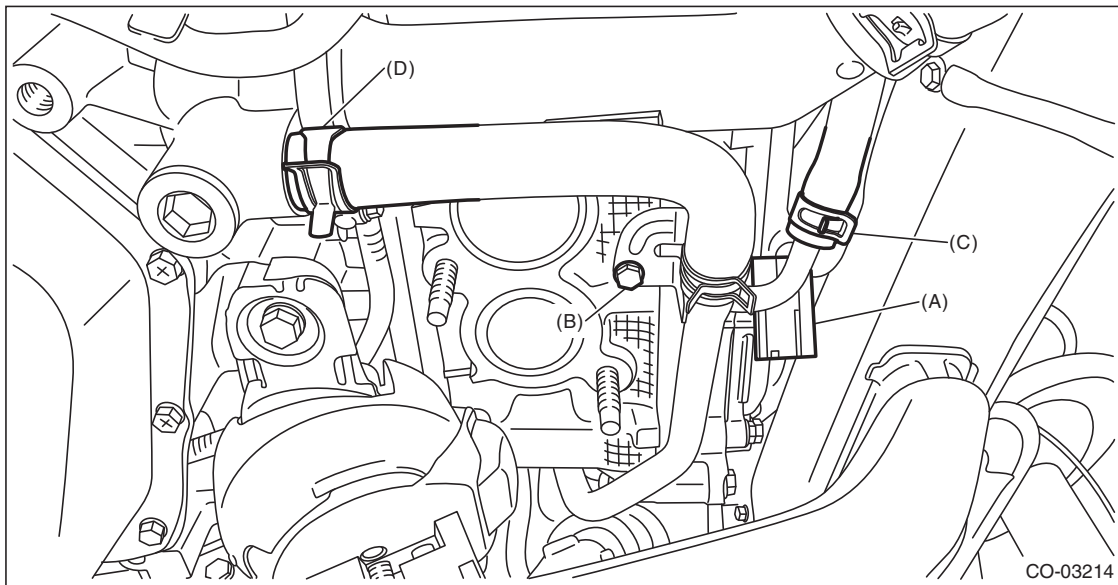
23) Remove the bolt (B) which secures the water pipe assembly LH to the cylinder head LH.

24) Disconnect the side engine oil cooler hose B (C) from the water pipe assembly LH.

Water Pipe Assembly

COOLING

- 25) Disconnect the water pipe hose LH (D) from oil pan upper, and remove the water pipe assembly LH.



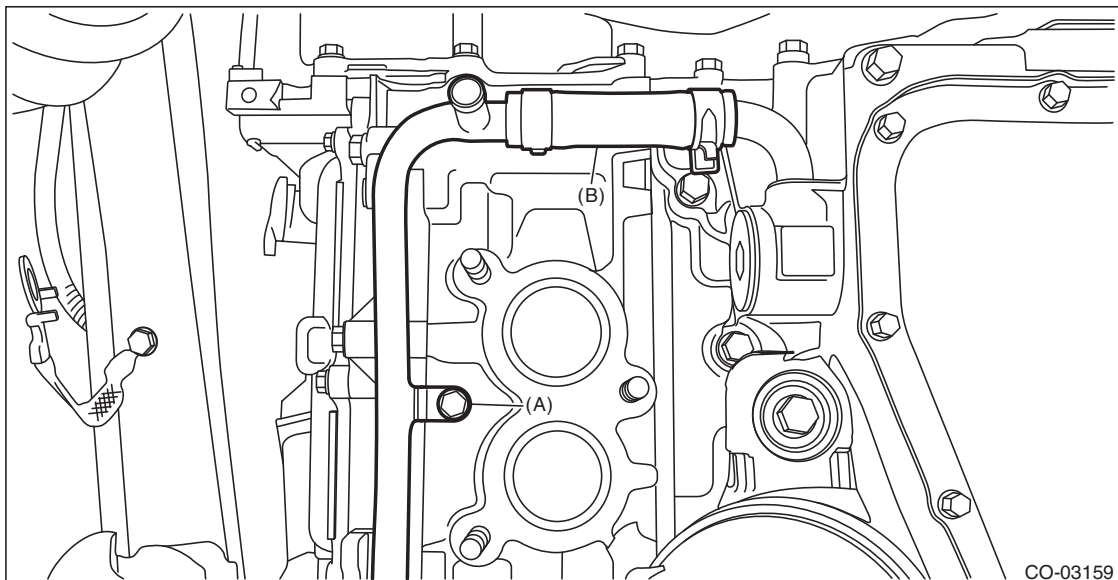
B: INSTALLATION

1. WATER PIPE ASSEMBLY RH

- 1) Set the water pipe assembly RH on the engine, and connect the water pipe hose RH (B) to the oil pan upper.
- 2) Install the bolt (A) which secures the water pipe assembly RH to the cylinder head RH.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



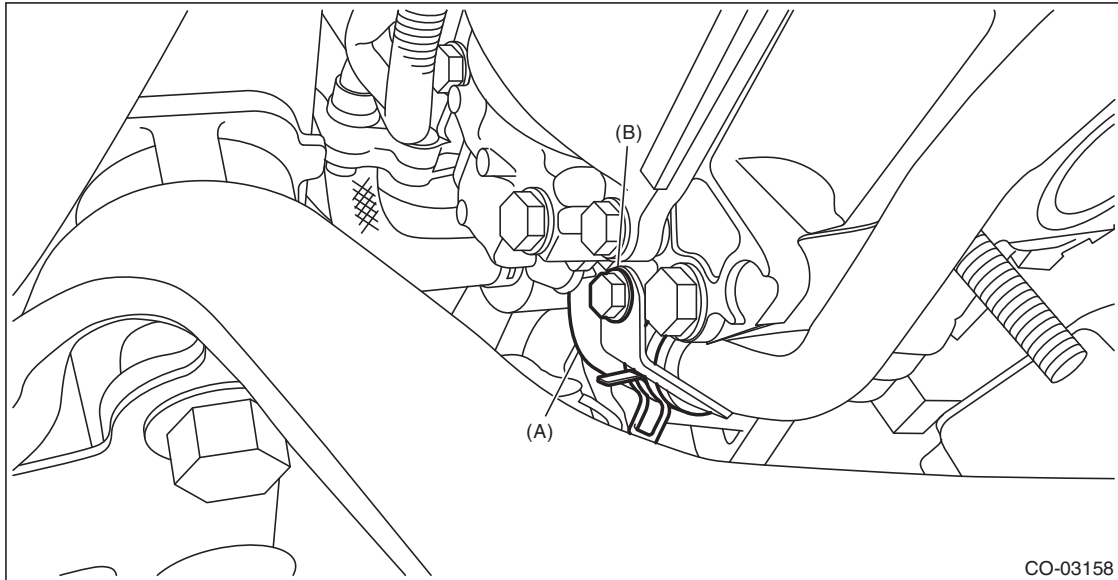
Water Pipe Assembly

COOLING

3) Connect the water hose (A) to the water pipe assembly RH, and install the bolt (B) which secures the water pipe assembly RH to the cam carrier RH.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



4) Install the front exhaust pipe. <Ref. to EX(H4DOTC)-15, INSTALLATION, Front Exhaust Pipe.>

5) Install the oil pipe assembly. <Ref. to LU(H4DO)-59, OIL PIPE ASSEMBLY, INSTALLATION, Oil Pipe.>

6) Connect the battery ground terminal.

7) Fill engine coolant. <Ref. to CO(H4DOTC)-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

2. WATER PIPE ASSEMBLY LH

1) Set the water pipe assembly LH on the engine, and connect the water pipe hose LH (D) to the oil pan upper.

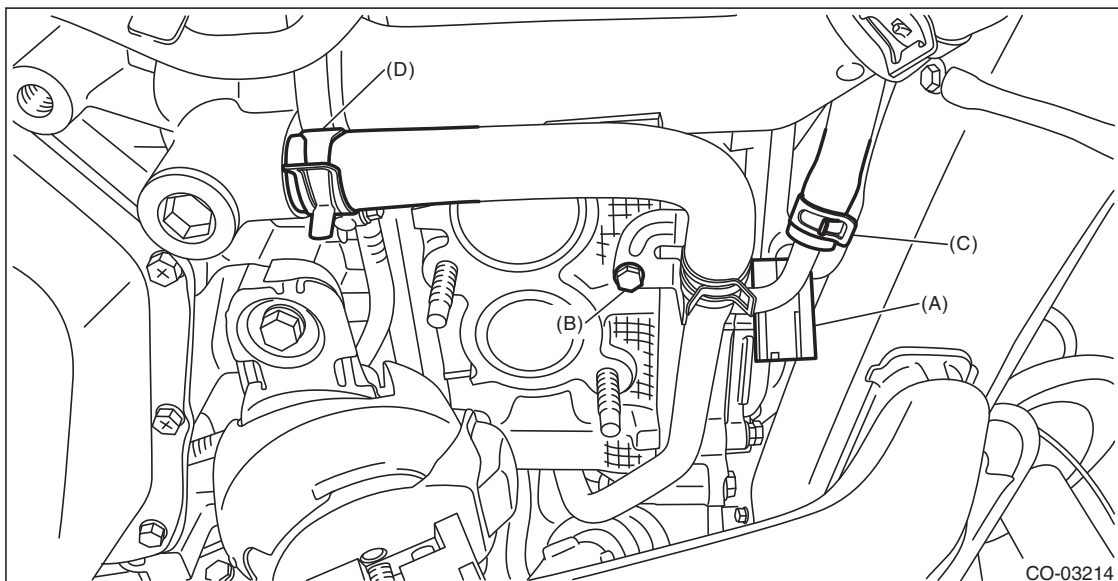
2) Connect the side engine oil cooler hose B (C) to the water pipe assembly LH.

3) Install the bolt (B) which secures the water pipe assembly LH to the cylinder head LH.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

4) Install the rear oxygen sensor connector (A) to the water pipe assembly LH.

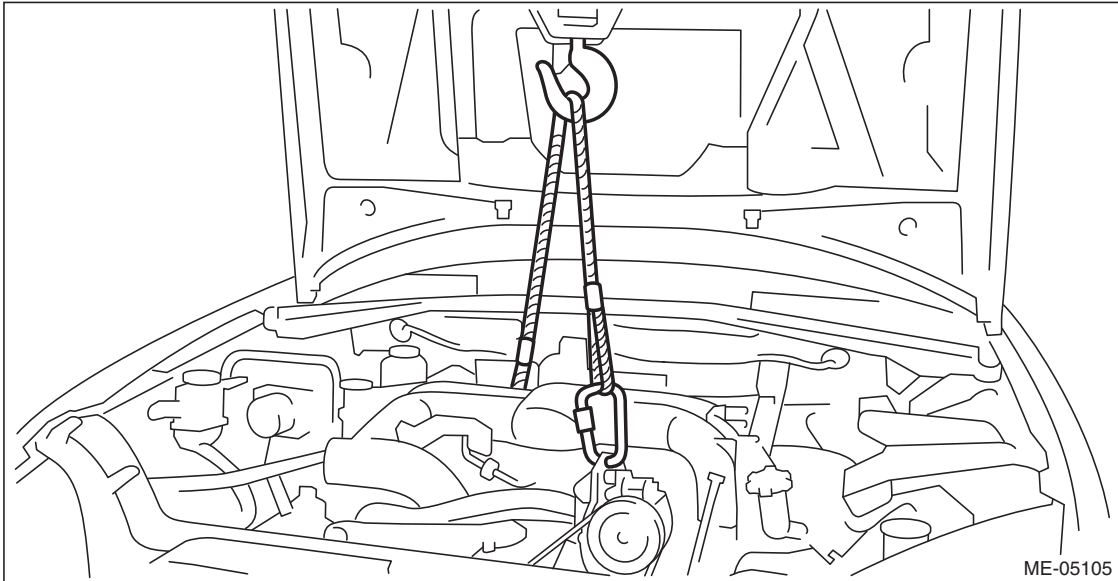


CO(H4DOTC)-28

Water Pipe Assembly

COOLING

- 5) Lower the vehicle.
- 6) Support the engine with a lifting device and wire ropes.

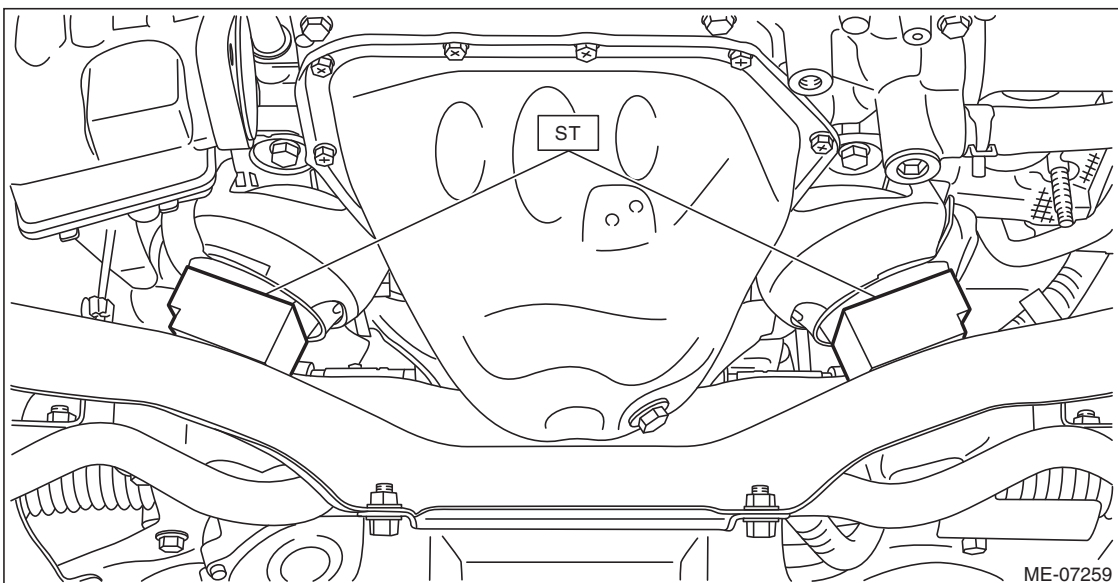


- 7) Lift the engine, and remove the ST.

CAUTION:

When lifting up the engine, pay attention to the clearance of each part and be careful not to lift the engine too much, in order to prevent damaging the vehicle.

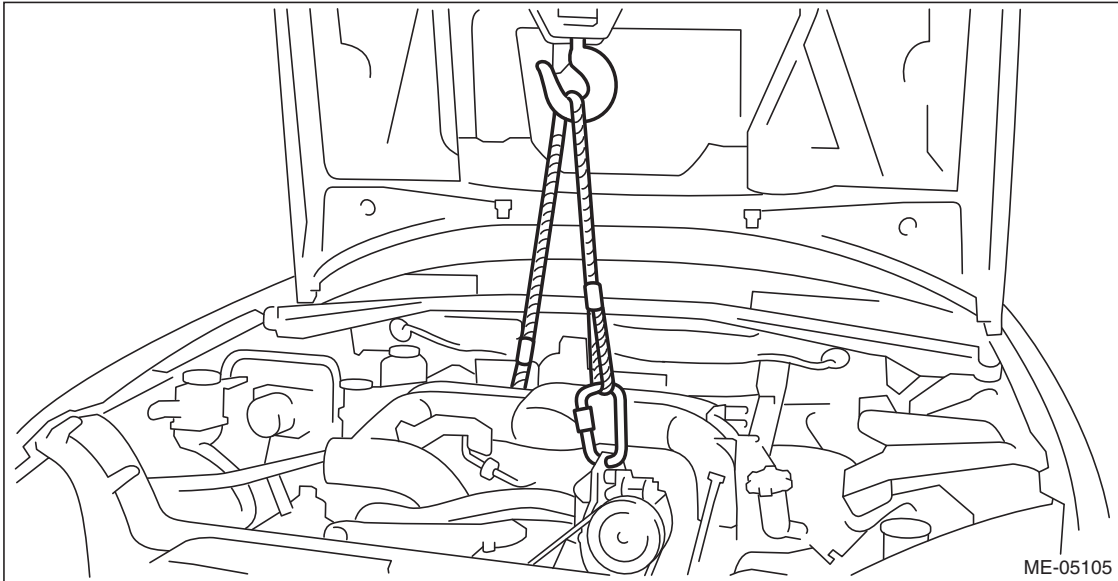
ST 18632AA020 STAND ASSY



Water Pipe Assembly

COOLING

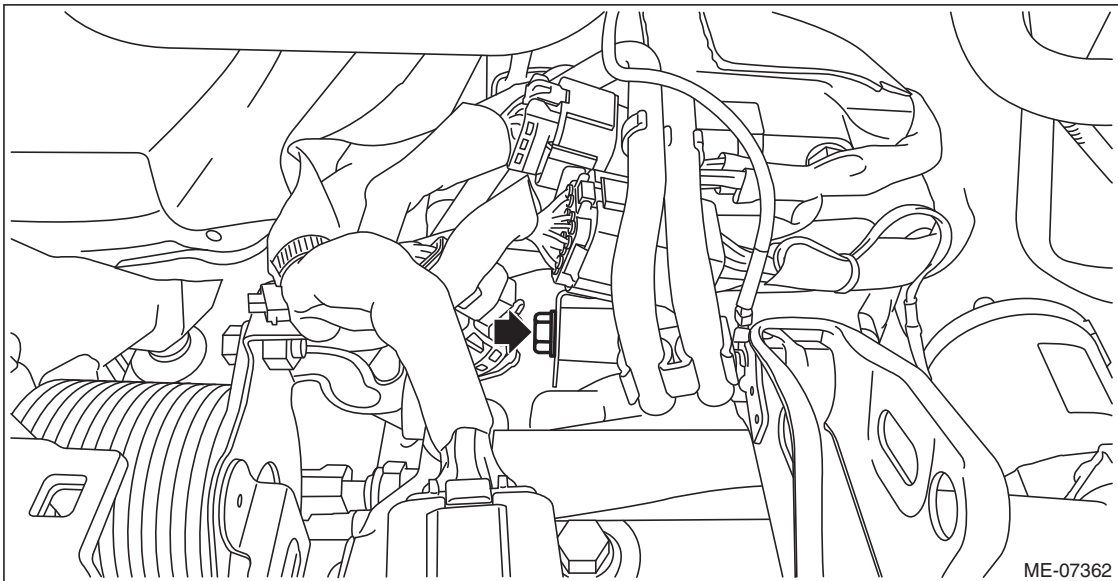
- 8) Lower the engine and remove the lifting device and wire ropes.



- 9) Install the bolt which secures the transmission harness stay to the CVT.

Tightening torque:

15 N·m (1.6 kgf-m, 11.8 ft-lb)



Water Pipe Assembly

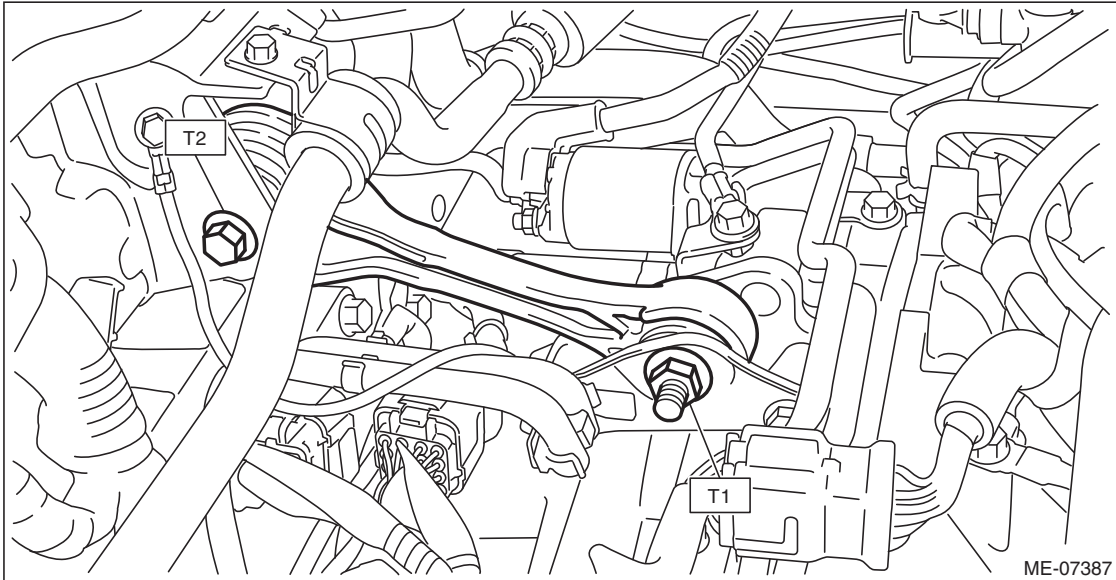
COOLING

10) Install the pitching stopper.

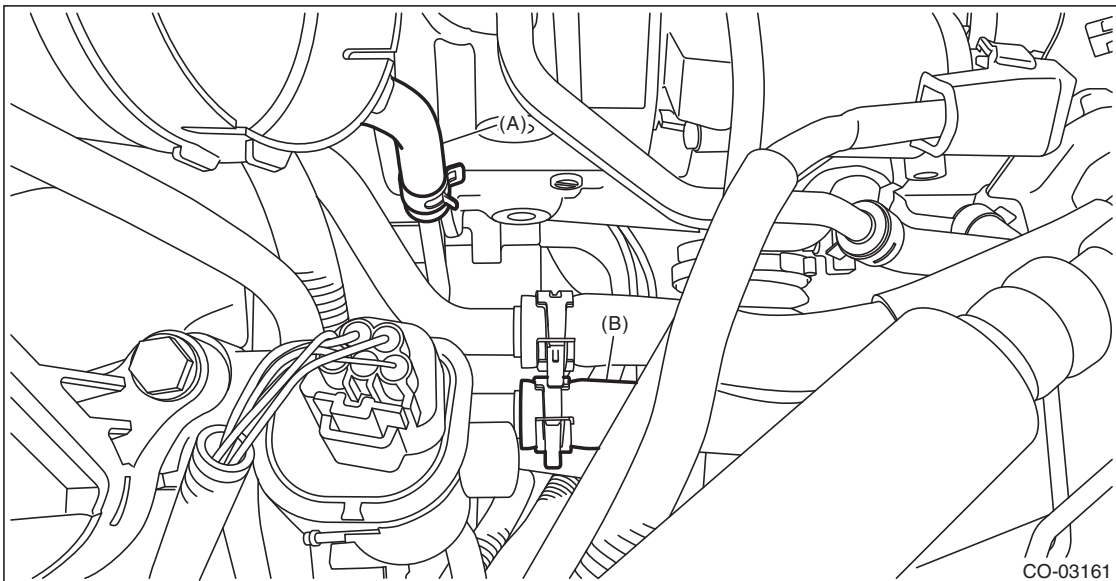
Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



11) Connect the preheater hose (A) and the heater outlet hose (B) to the water pipe assembly LH.



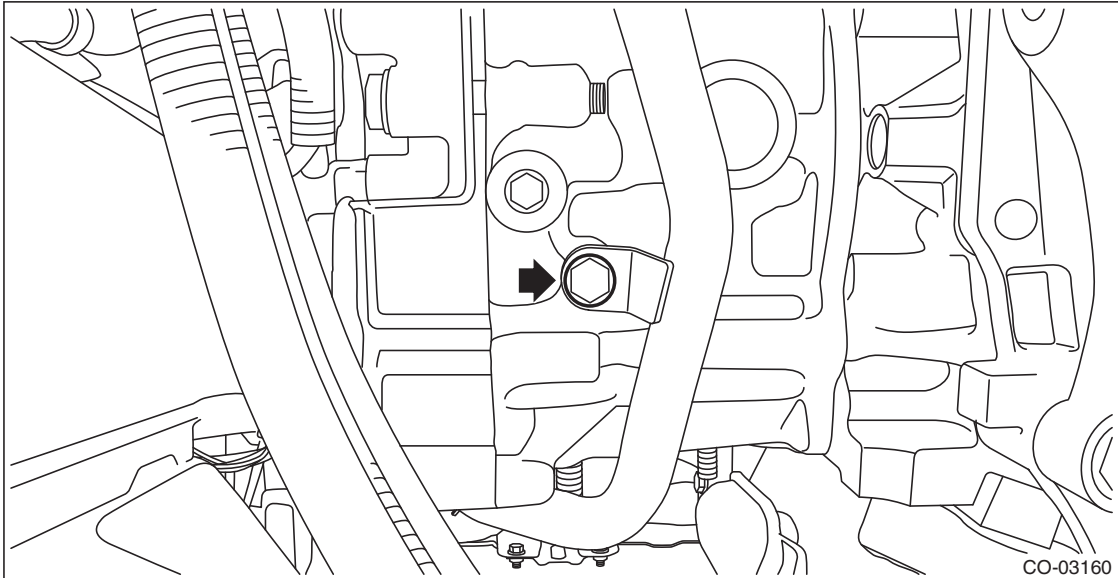
Water Pipe Assembly

COOLING

12) Install the bolt which secures the water pipe assembly LH to the cylinder head LH.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



13) Install the intercooler. <Ref. to IN(H4DOTC)-37, INSTALLATION, Intercooler.>

14) Lift up the vehicle.

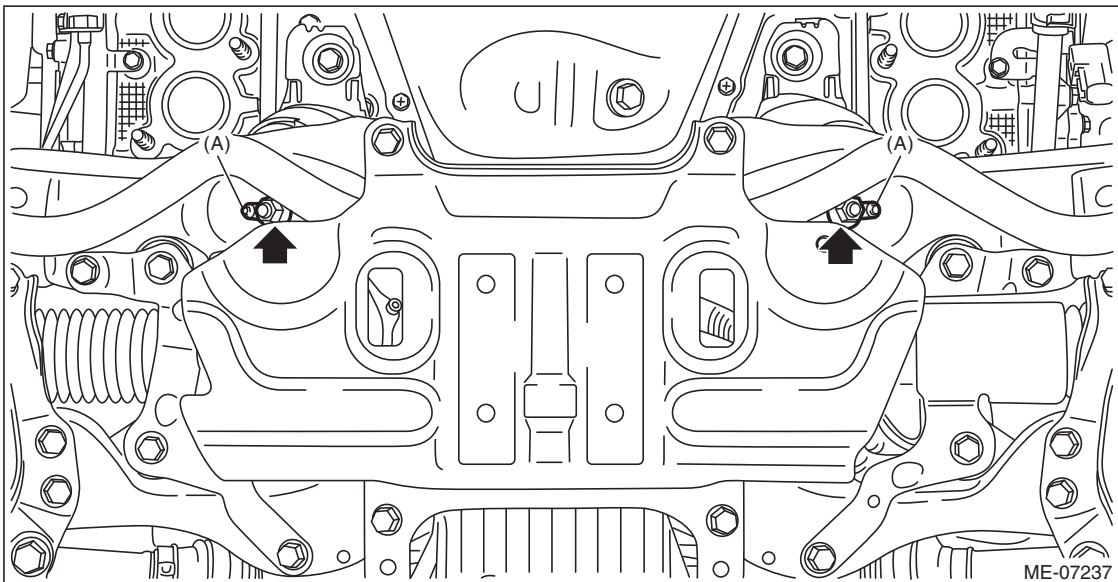
15) Install the nuts which hold the engine mounting to the crossmember.

NOTE:

Make sure that locators (A) of the engine mounting are securely inserted.

Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)



16) Install the front exhaust pipe. <Ref. to EX(H4DOTC)-15, INSTALLATION, Front Exhaust Pipe.>

17) Install the air intake duct (rear). <Ref. to IN(H4DOTC)-19, INSTALLATION, Air Intake Duct.>

18) Connect the battery ground terminal.

19) Fill engine coolant. <Ref. to CO(H4DOTC)-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

20) Install the collector cover.

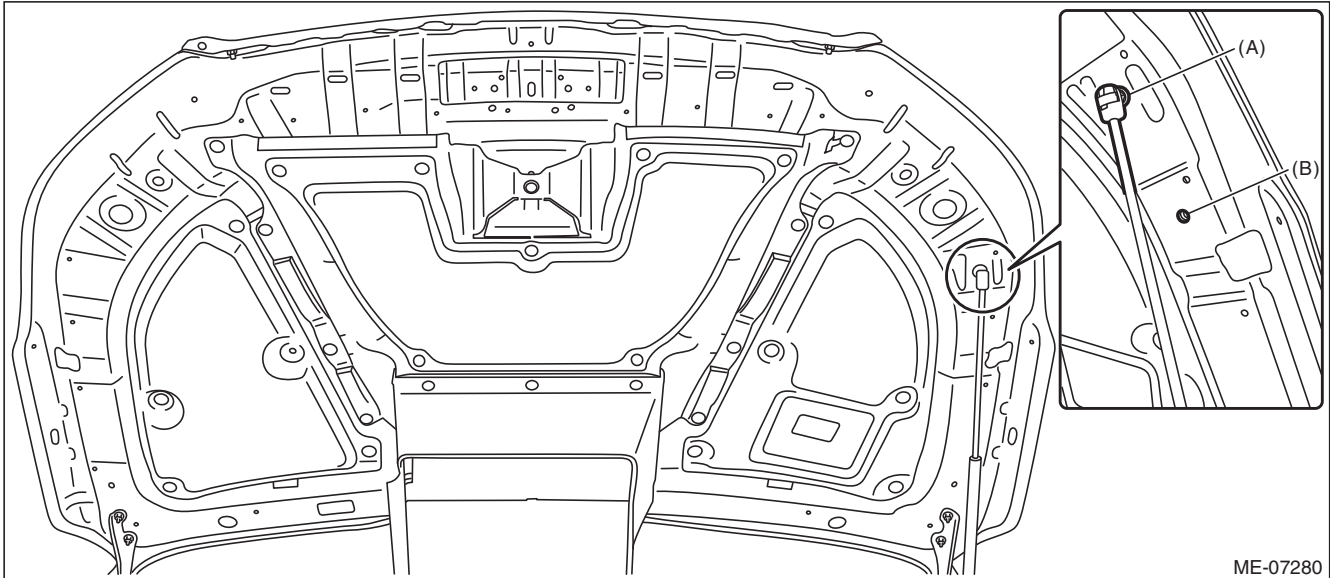
Water Pipe Assembly

COOLING

21) Change the installation position of the front hood damper from (B) to (A).

Tightening torque:

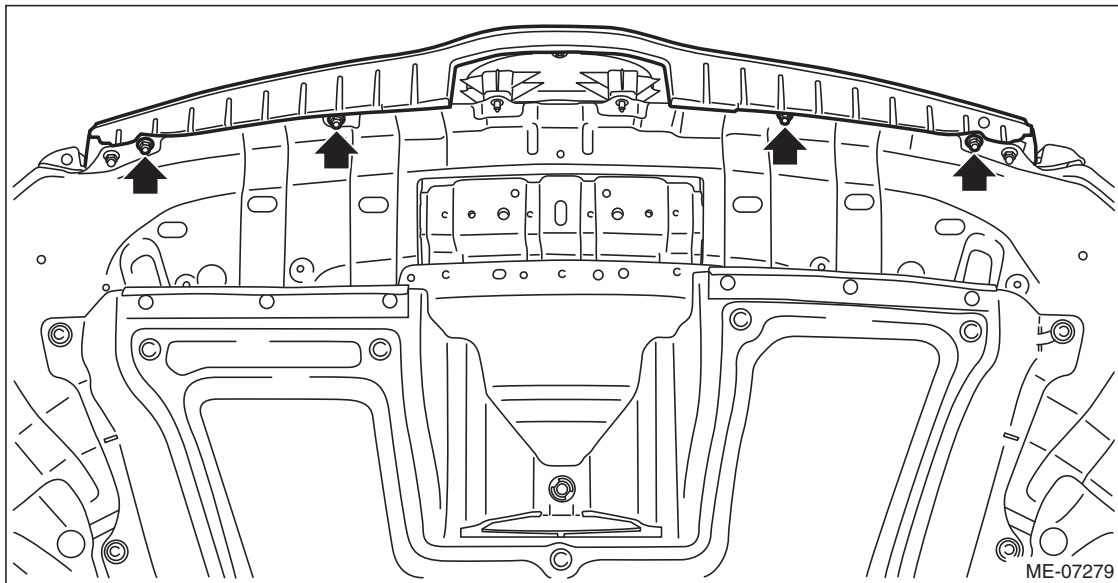
20 N·m (2.0 kgf-m, 14.8 ft-lb)



22) Install the front center grille assembly to the front hood.

Tightening torque:

4.5 N·m (0.5 kgf-m, 3.3 ft-lb)



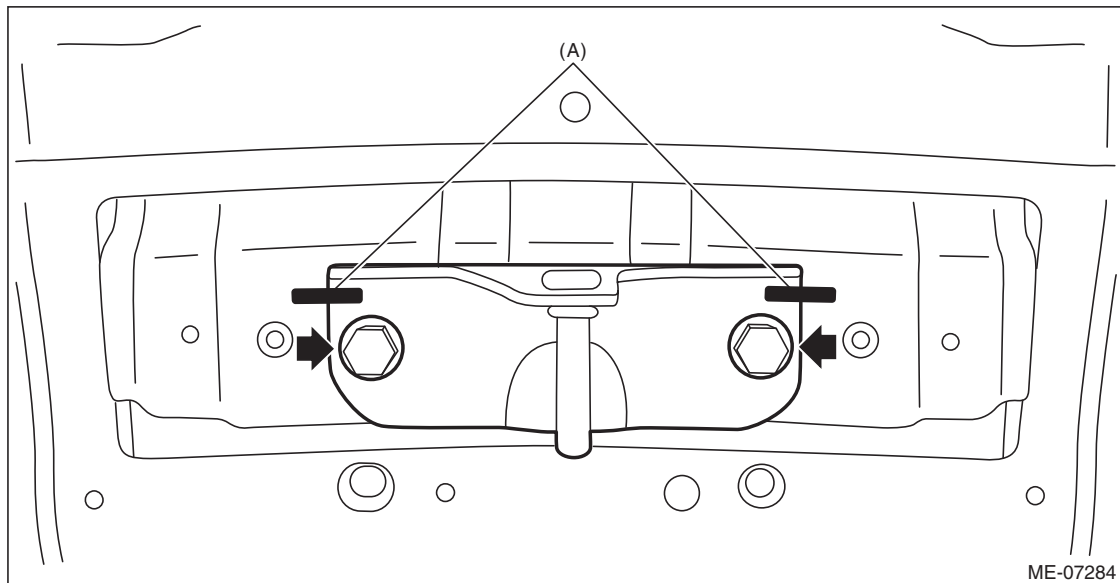
Water Pipe Assembly

COOLING

23) Align the alignment marks (A), and install the front hood striker to the front hood.

Tightening torque:

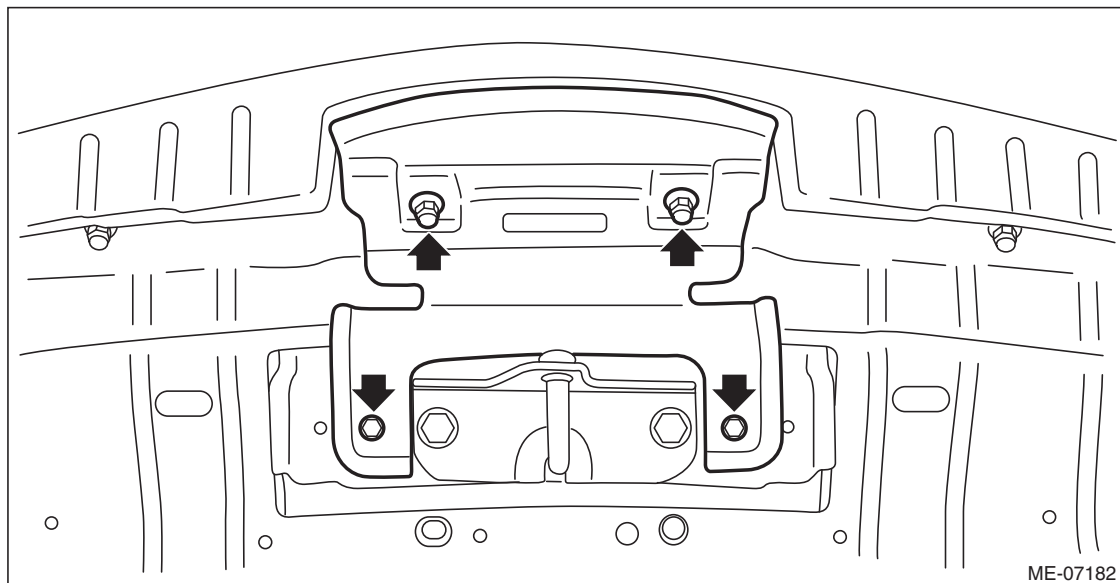
33 N·m (3.4 kgf-m, 24.3 ft-lb)



24) Install the upper grille bracket to the front hood, and close the front hood.

Tightening torque:

4.5 N·m (0.5 kgf-m, 3.3 ft-lb)



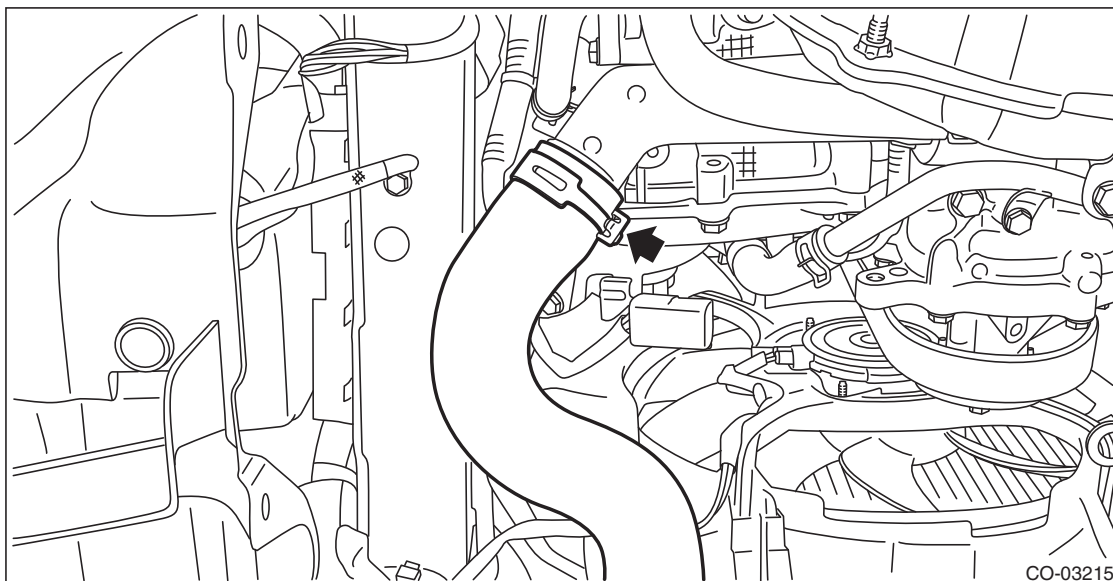
C: INSPECTION

- 1) Check that the water pipe assembly has no deformation, cracks or other damages.
- 2) Check that the hose has no cracks, damage or loose part.

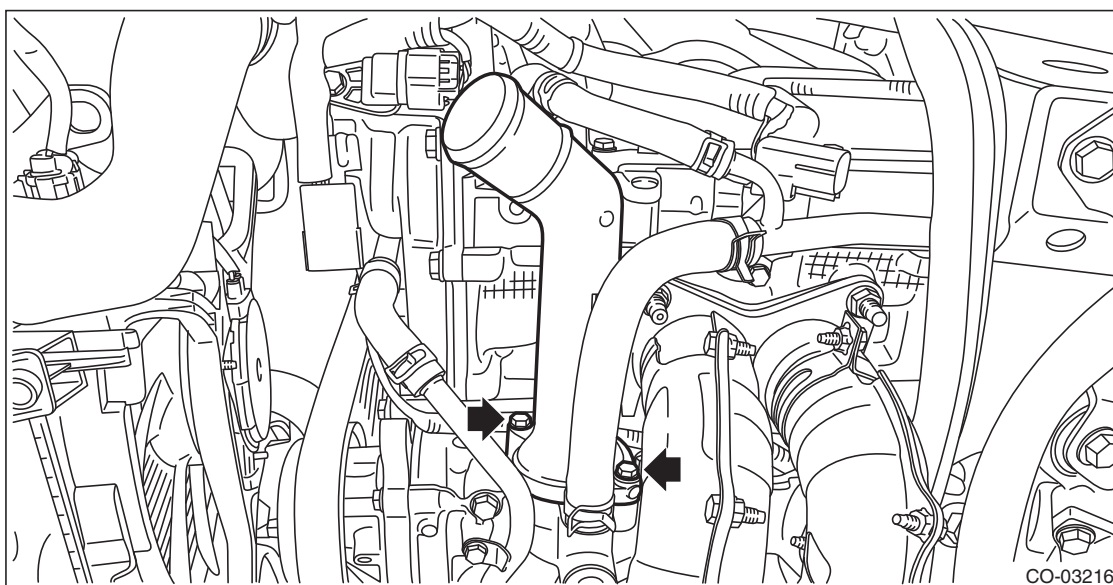
6. Thermostat

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>
- 4) Drain engine coolant. <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 5) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-30, REMOVAL, Center Exhaust Pipe.>
- 6) Disconnect the radiator outlet hose from thermostat cover.



- 7) Remove the thermostat cover, and then remove the thermostat.



- 8) Remove the gasket from thermostat.

Thermostat

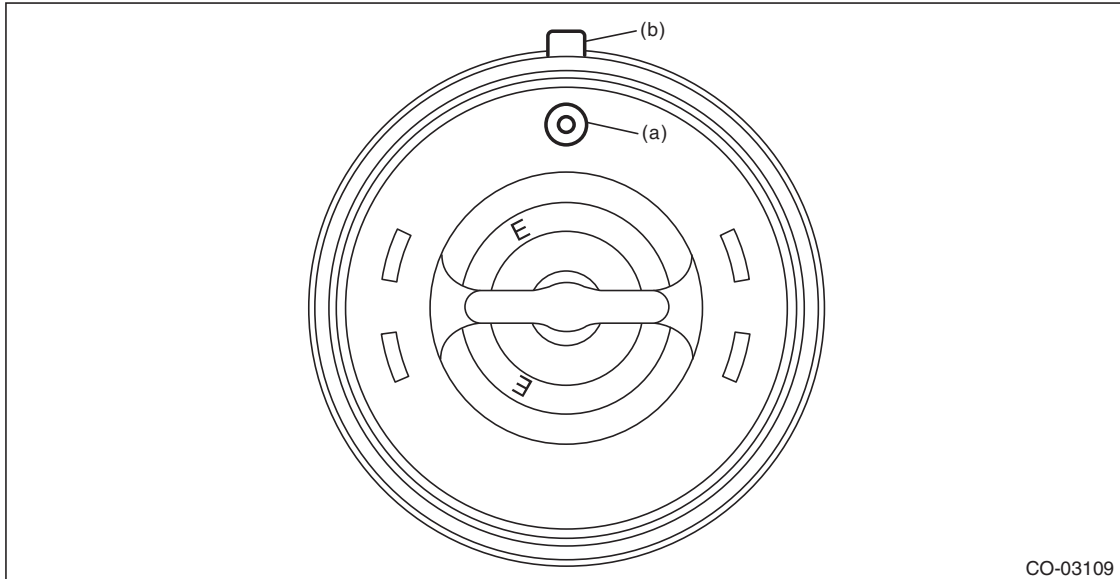
COOLING

B: INSTALLATION

1) Install a gasket to thermostat.

NOTE:

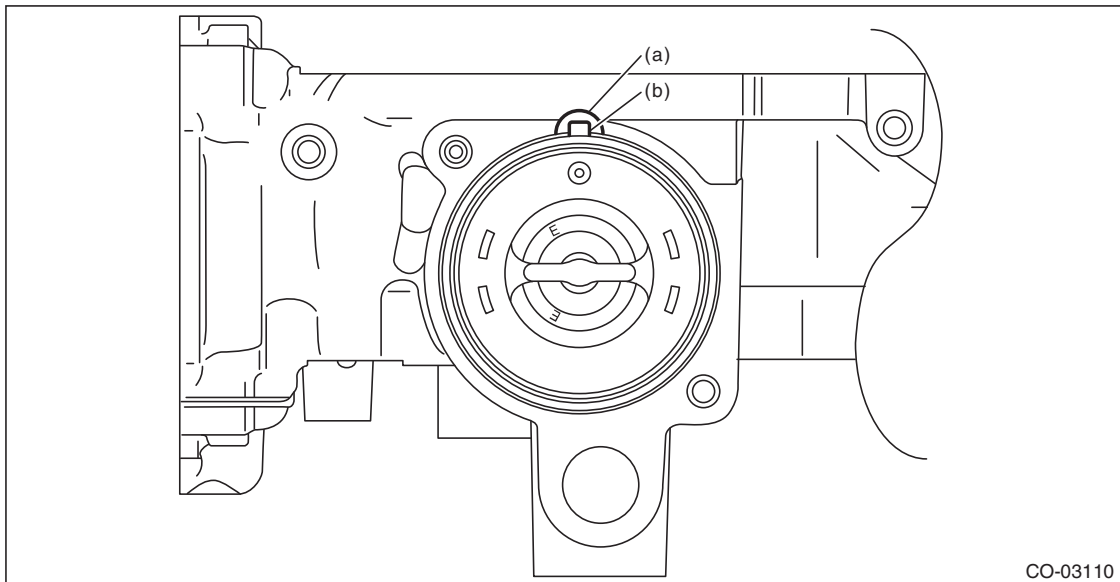
- Use a new gasket.
- Align the positions of the jig pin (a) and gasket ribs (b).



2) Install the thermostat and thermostat cover.

NOTE:

Align the oil pan upper cutout (a) with the position of the thermostat rib (b).

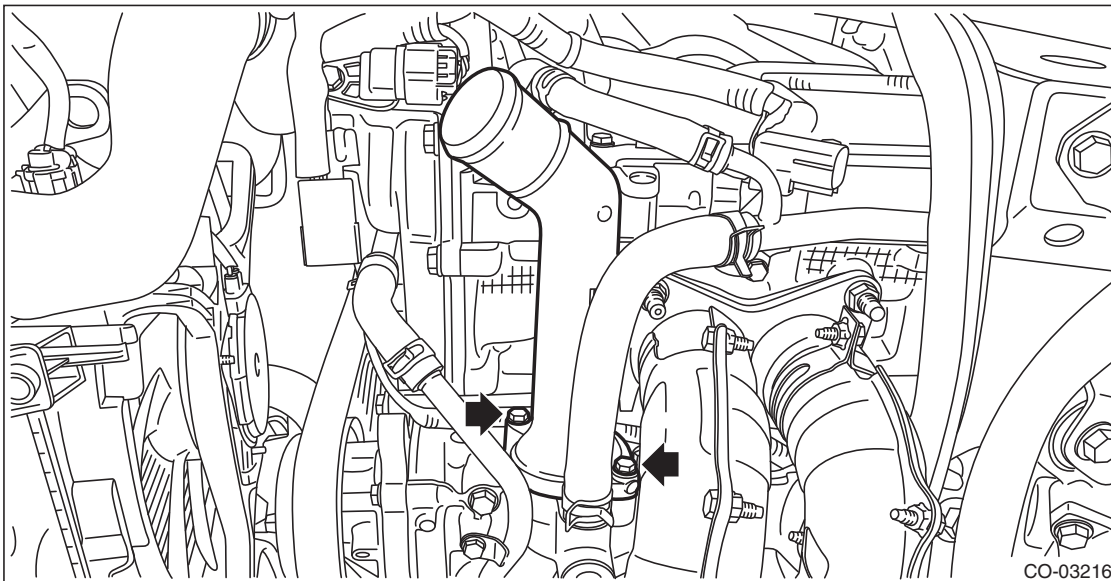


Thermostat

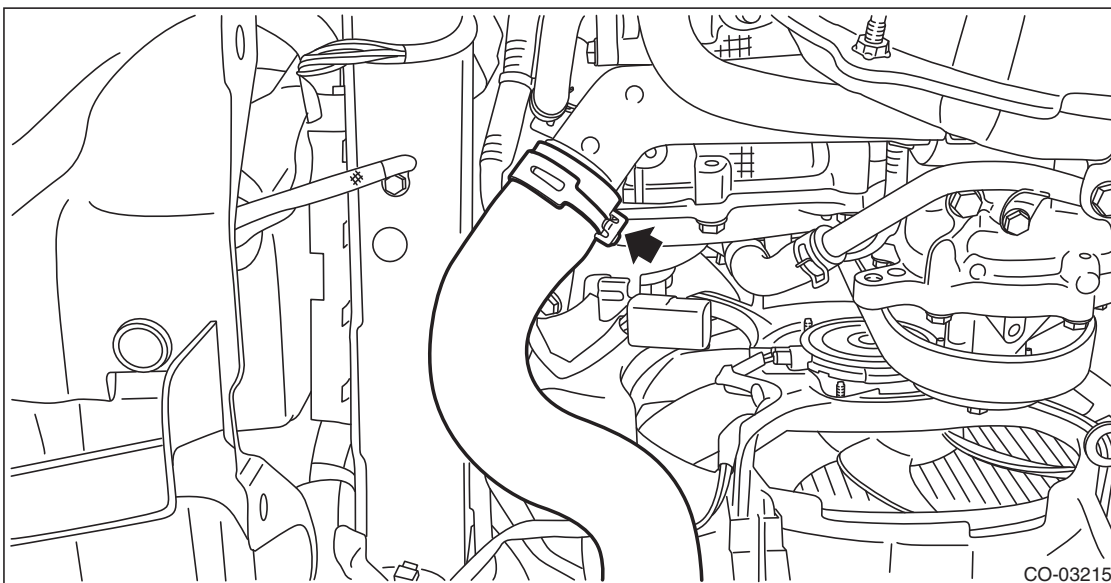
COOLING

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



3) Connect the radiator outlet hose to thermostat cover.



- 4) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-35, INSTALLATION, Center Exhaust Pipe.>
- 5) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>
- 6) Lower the vehicle.
- 7) Connect the battery ground terminal.
- 8) Fill engine coolant. <Ref. to CO(H4DOTC)-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

Thermostat

COOLING

C: INSPECTION

- 1) Check that the thermostat does not have deformation, cracks or damage.
- 2) Check that the thermostat valve closes completely at an ambient temperature.
- 3) Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and check the temperature and valve lift when the valve begins to open and when the valve is fully opened. Replace the thermostat if faulty.

NOTE:

- During the test, agitate the water for even temperature distribution.
- Leave the thermostat in the boiling water for five minutes or more before measuring the valve lift.
- Hold the thermostat with a wire or the like to avoid contacting with container bottom.

Starting temperature to open:

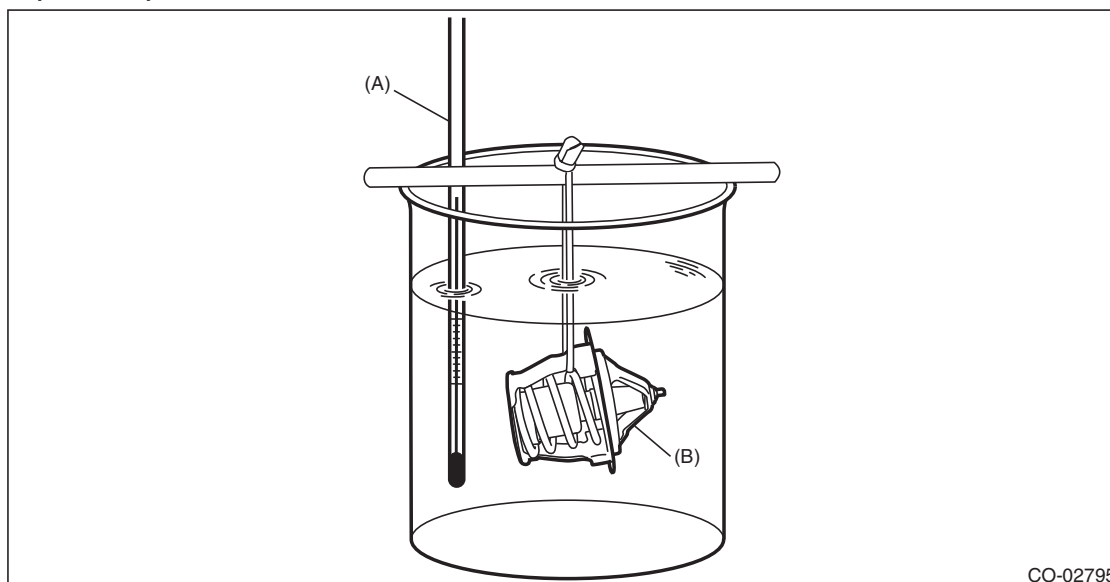
86 — 90°C (187 — 194°F)

Full open temperature:

95°C (203°F)

Total valve lift:

8.0 mm (0.315 in) or more



CO-02795

(A) Thermometer

(B) Thermostat

7. Radiator

A: REMOVAL

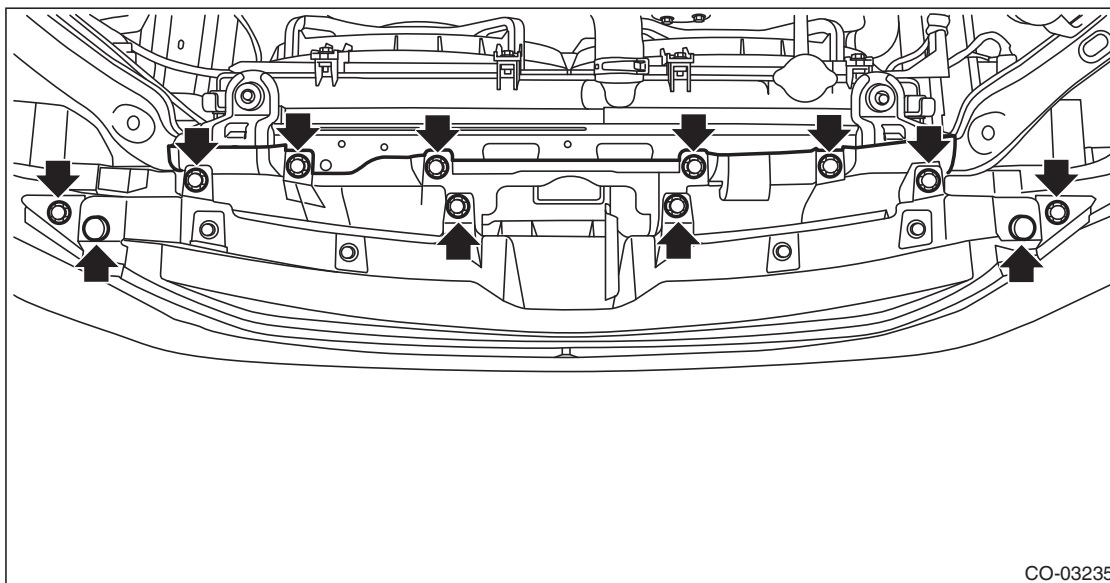
CAUTION:

The radiator is pressurized when the engine and radiator are hot. Wait until engine and radiator cool down before working on the radiator.

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct. <Ref. to IN(H4DOTC)-19, REMOVAL, Air Intake Duct.>
- 3) Remove the reservoir tank. <Ref. to CO(H4DOTC)-58, REMOVAL, Reservoir Tank.>
- 4) Remove the clips from the grille bracket and front bumper to remove the grille bracket.

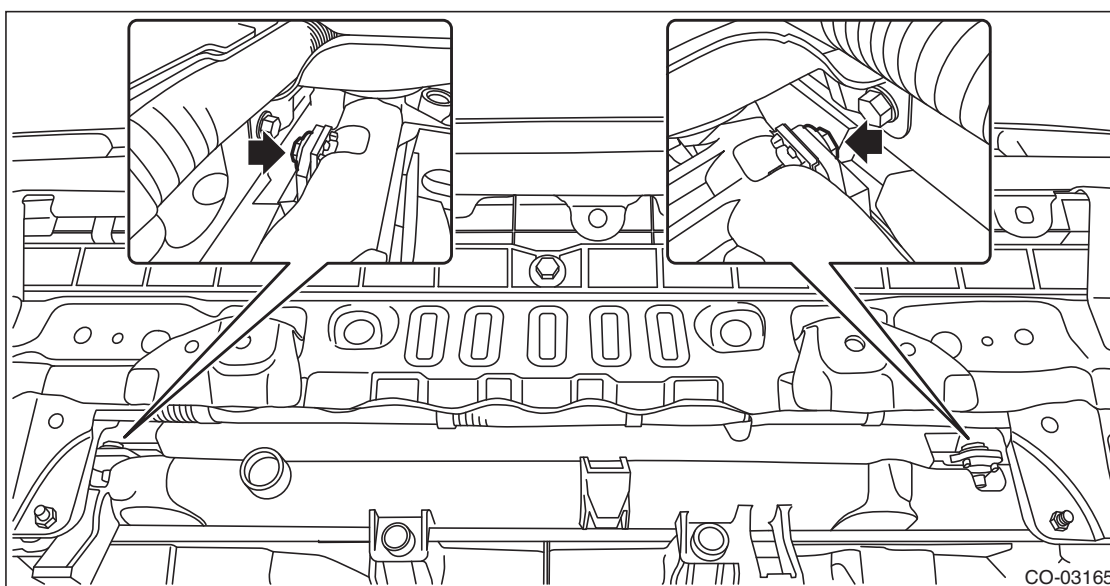
NOTE:

Remove the twelve clips.



CO-03235

- 5) Lift up the vehicle.
- 6) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>
- 7) Drain engine coolant. <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 8) Remove the bolts at the bottom of the condenser.

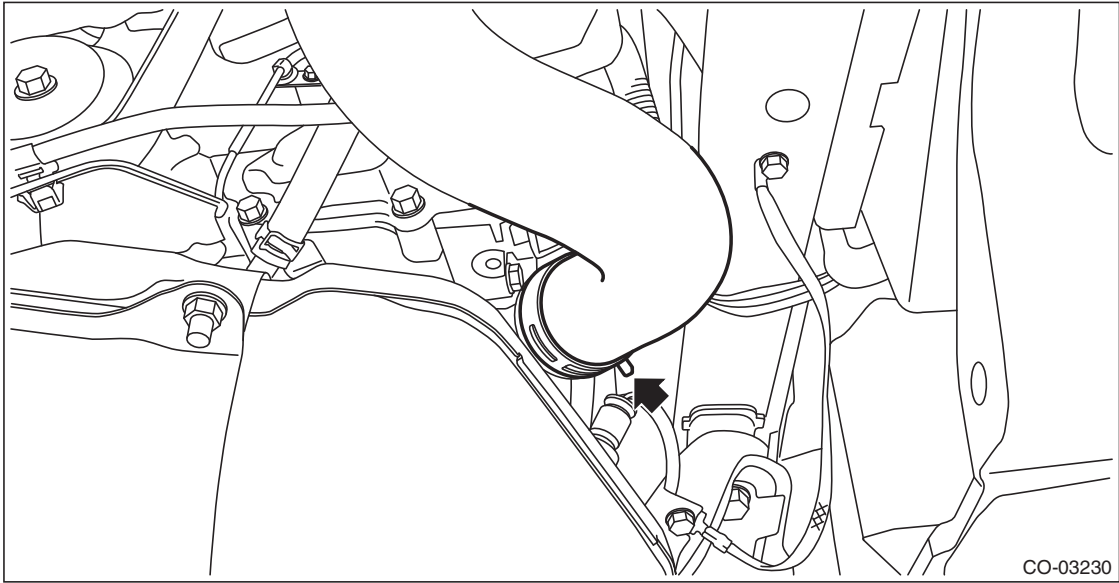


CO-03165

Radiator

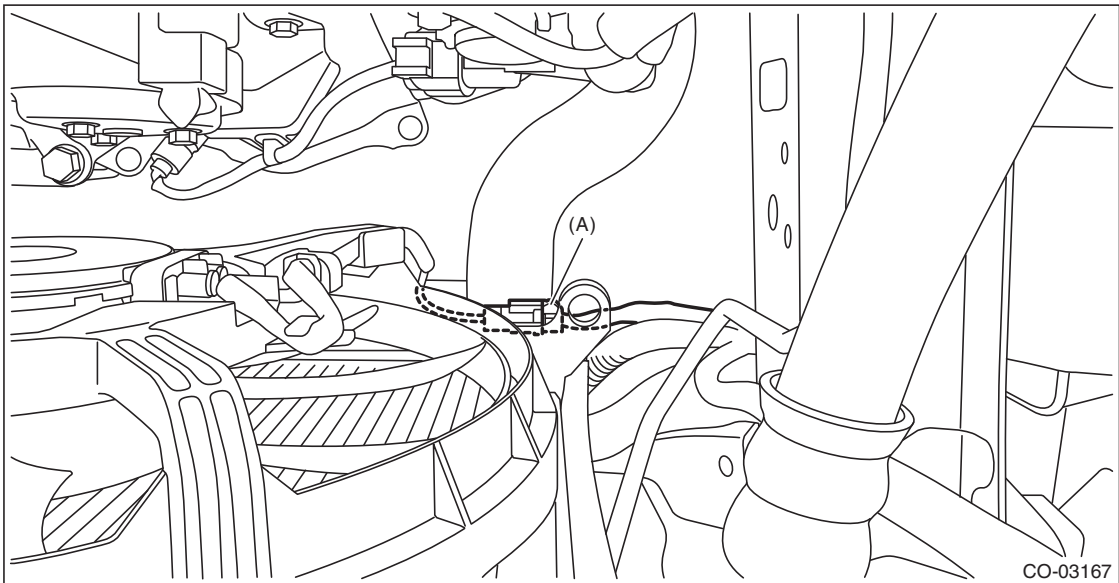
COOLING

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



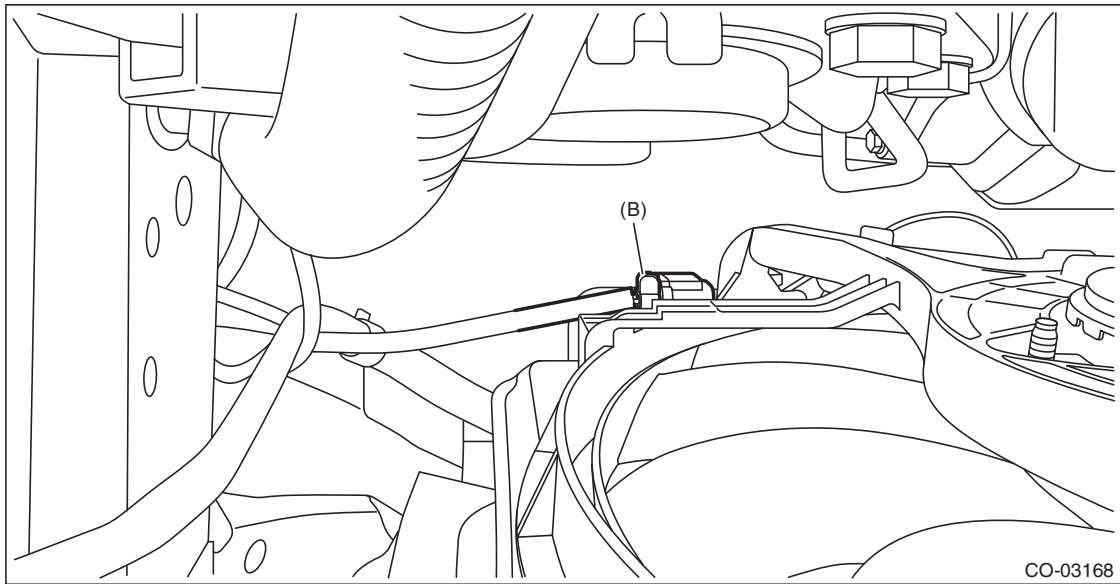
- 10) Lower the vehicle.

- 11) Disconnect the connector (A) from the main fan motor and the connector (B) from the sub fan motor.

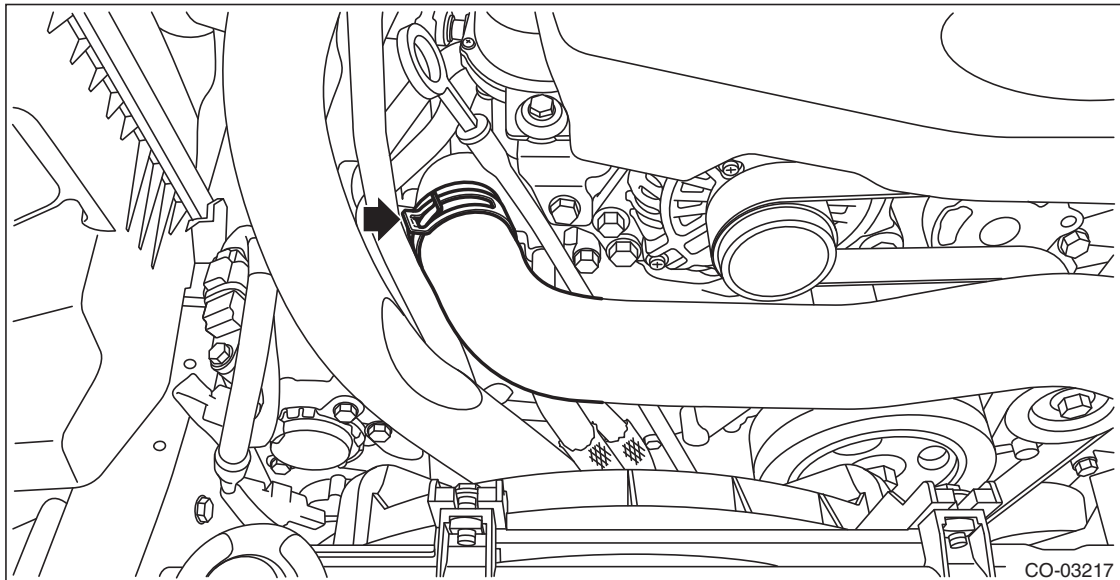


Radiator

COOLING



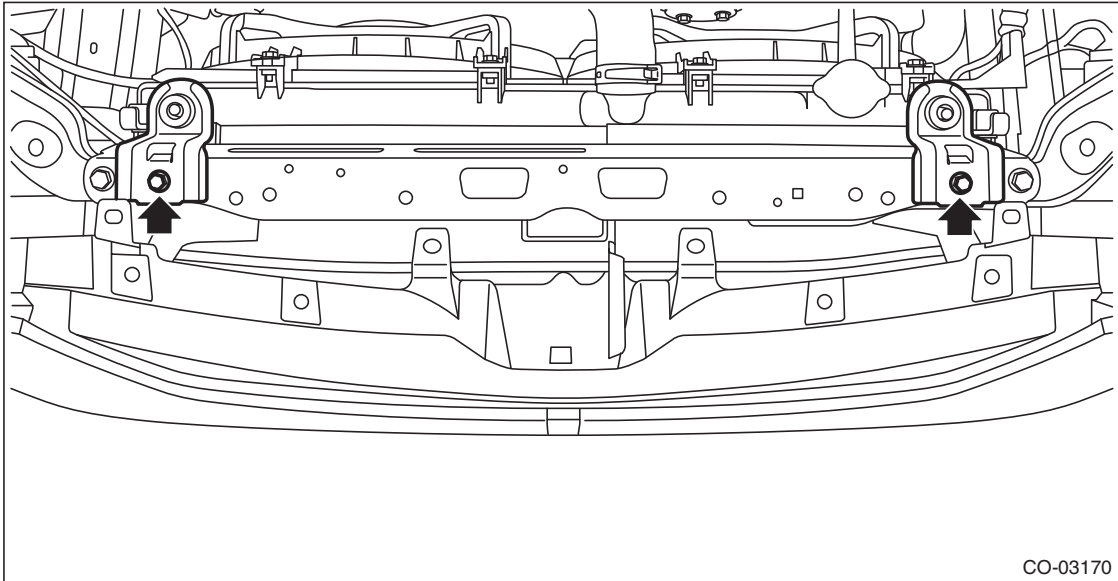
12) Disconnect the radiator inlet hose from the water pipe assembly.



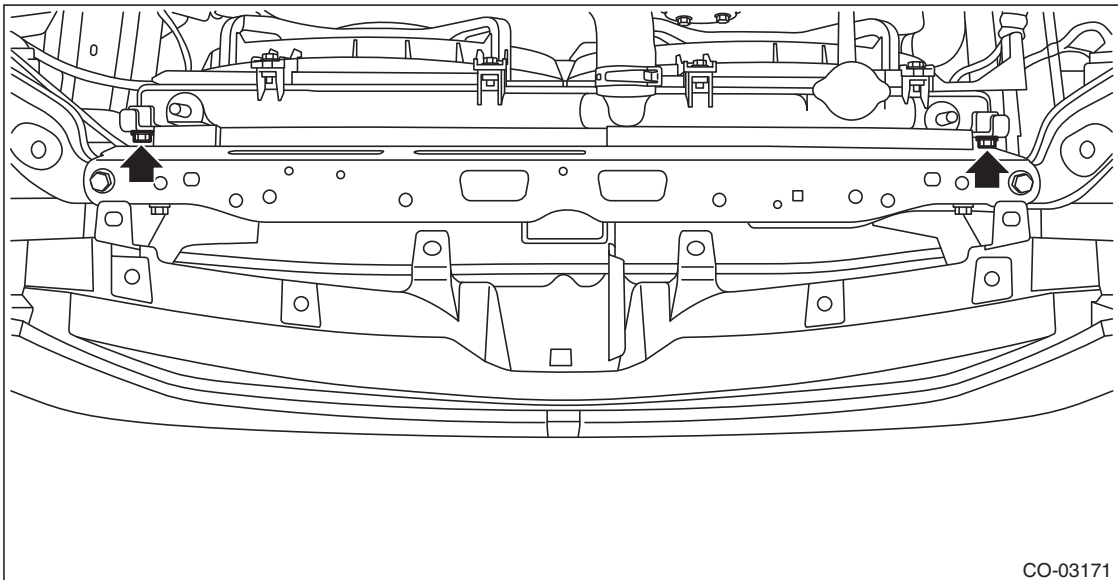
Radiator

COOLING

- 13) Remove the radiator upper brackets.



- 14) Remove the bolts at the top of the condenser.



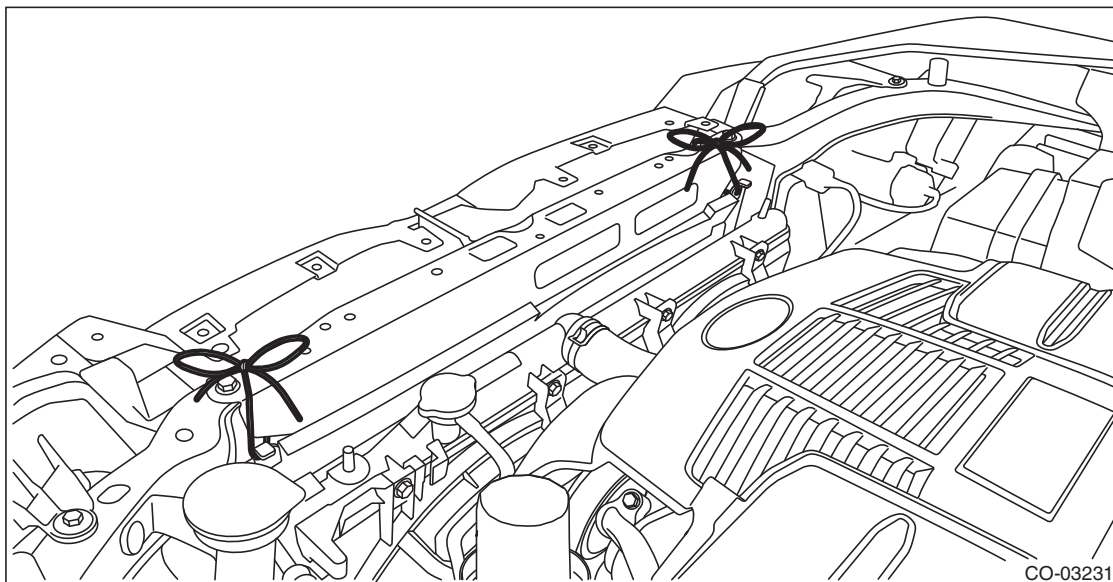
Radiator

COOLING

15) Secure the condenser to the vehicle using ropes or other means.

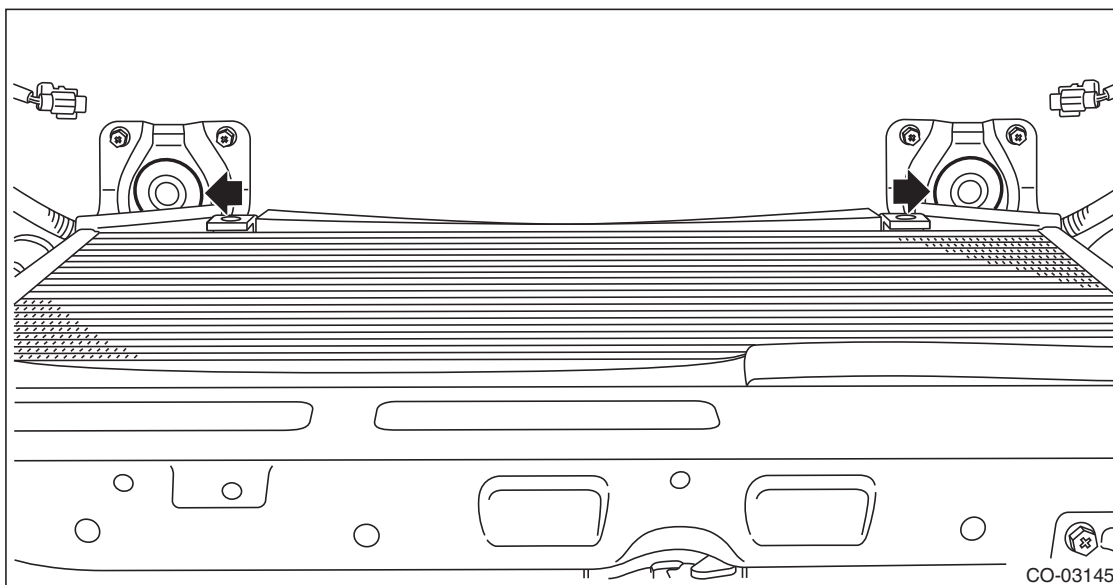
NOTE:

This procedure is required to prevent the condenser from dropping off and also damage to the air conditioner pipes.



16) Remove the radiator from vehicle.

17) Remove the radiator lower cushion from the radiator lower bracket.

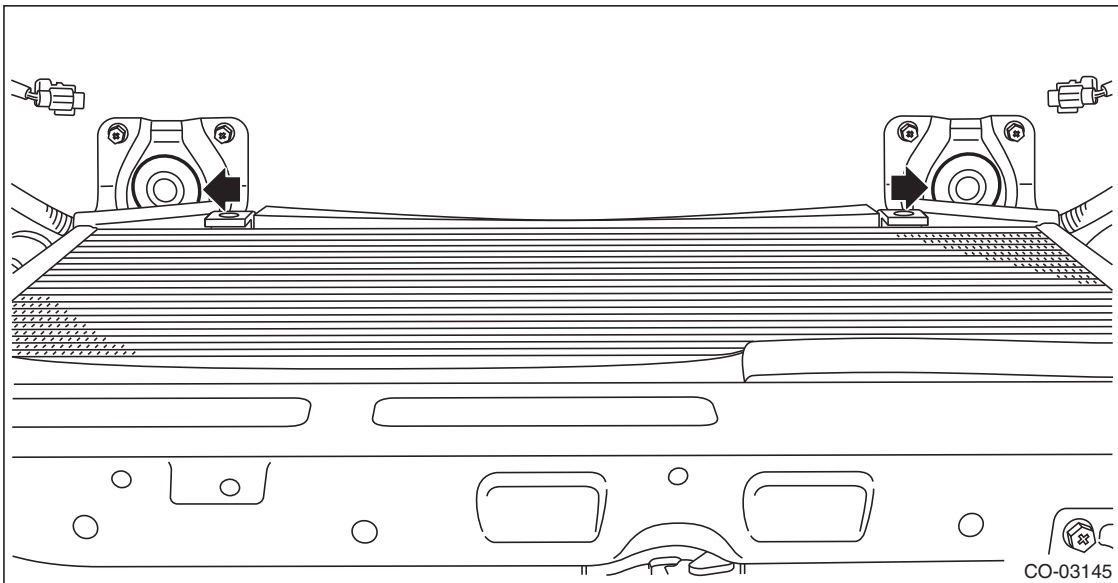


Radiator

COOLING

B: INSTALLATION

- 1) Attach the radiator lower cushion to the radiator lower bracket.

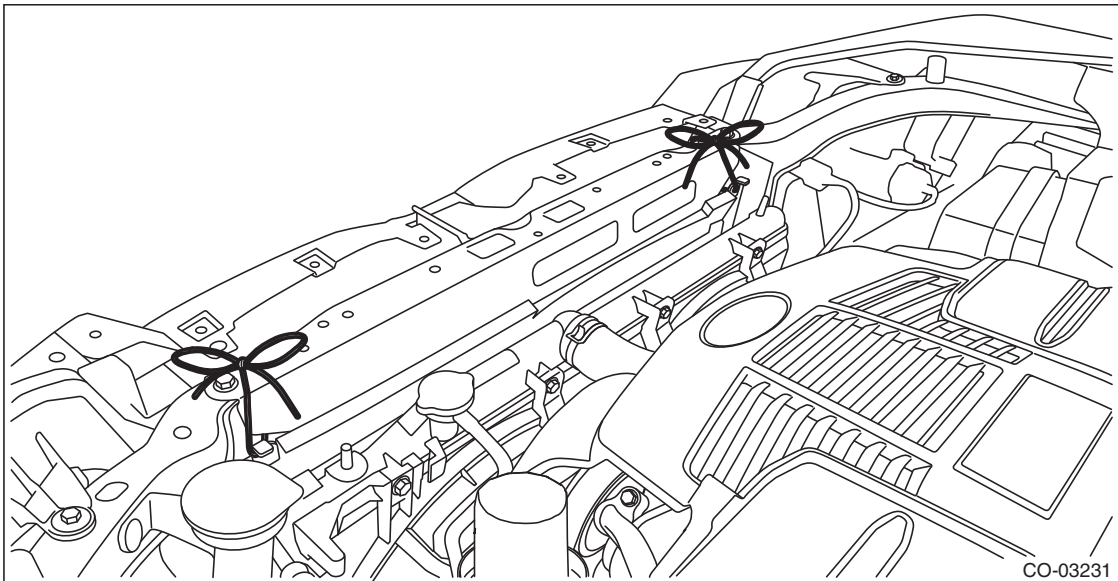


- 2) Install the radiator to vehicle.

NOTE:

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

- 3) Remove the ropes or other means used to secure the condenser to the vehicle.



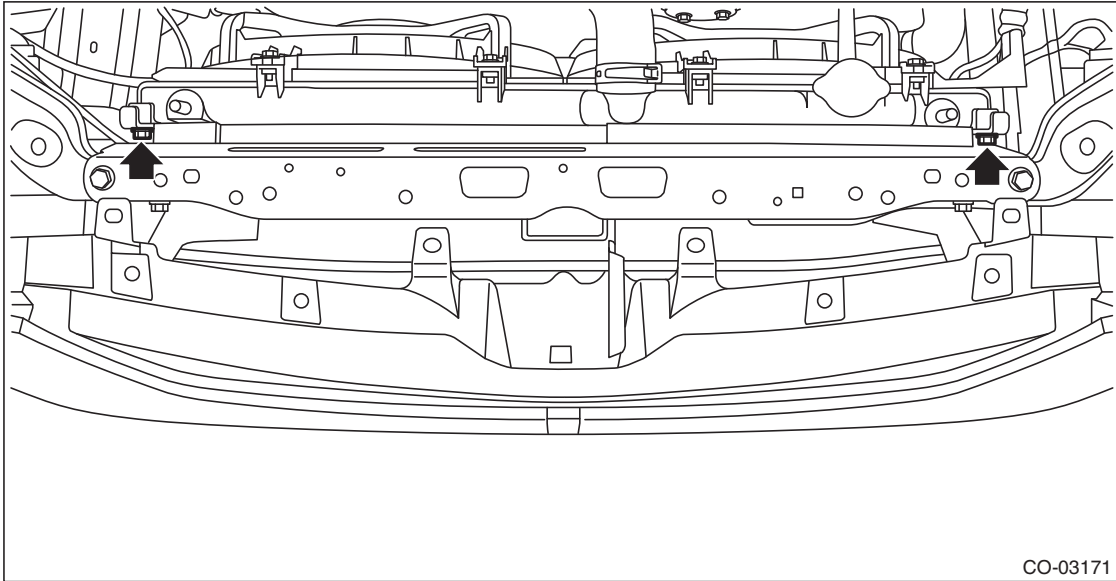
Radiator

COOLING

4) Install the bolts at the top of the condenser.

Tightening torque:

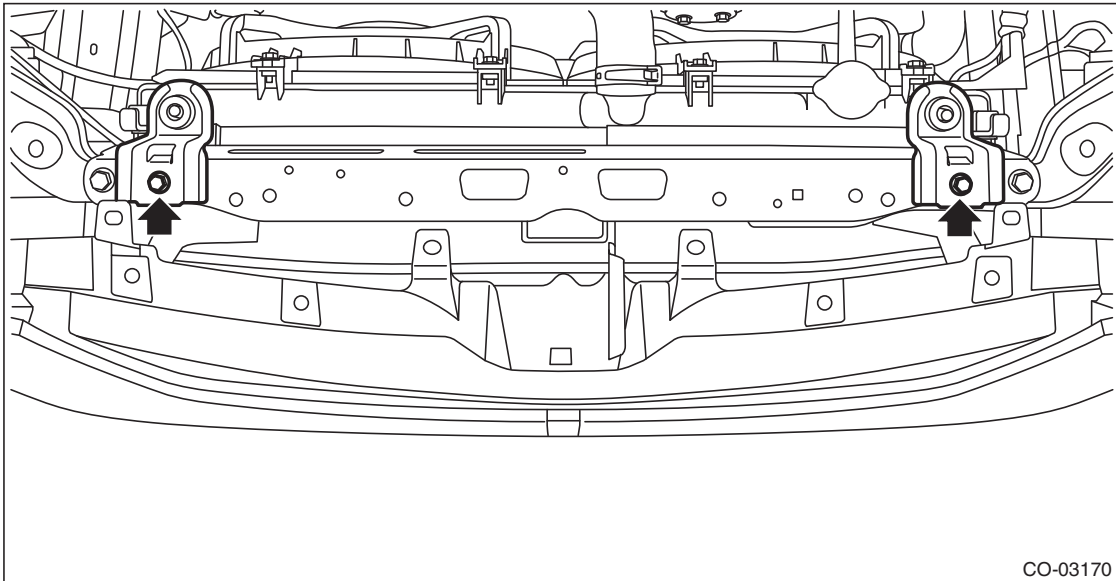
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



5) Install the radiator upper brackets.

Tightening torque:

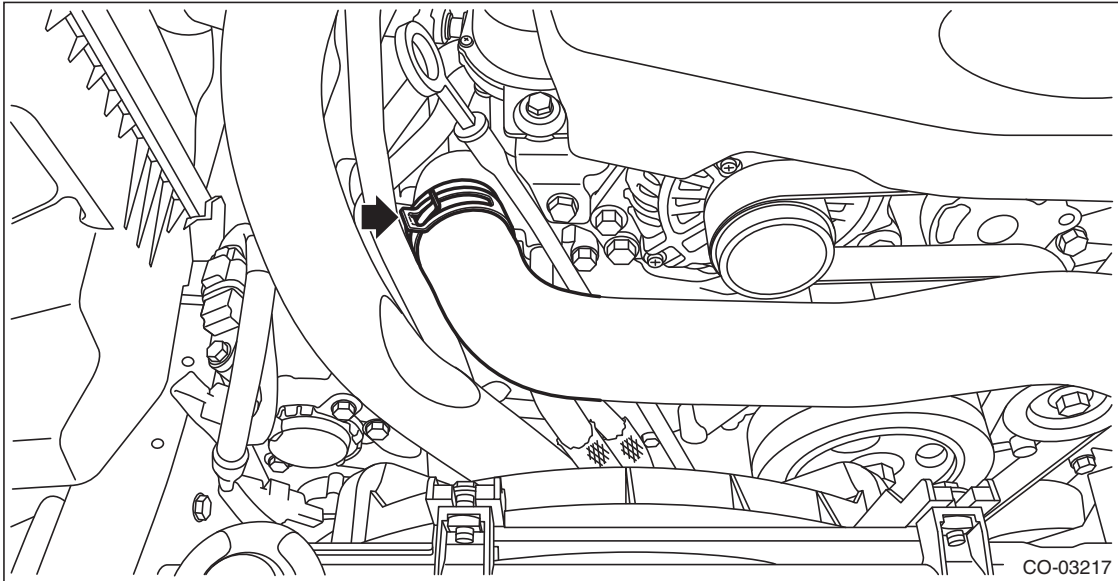
12 N·m (1.2 kgf-m, 8.9 ft-lb)



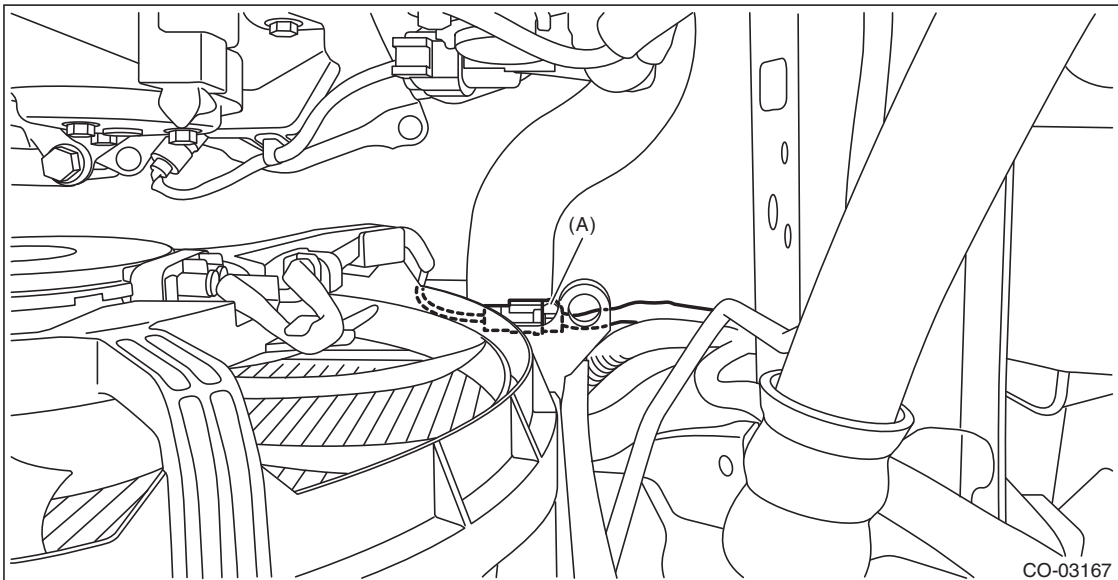
Radiator

COOLING

- 6) Connect the radiator inlet hose to the water pipe assembly.

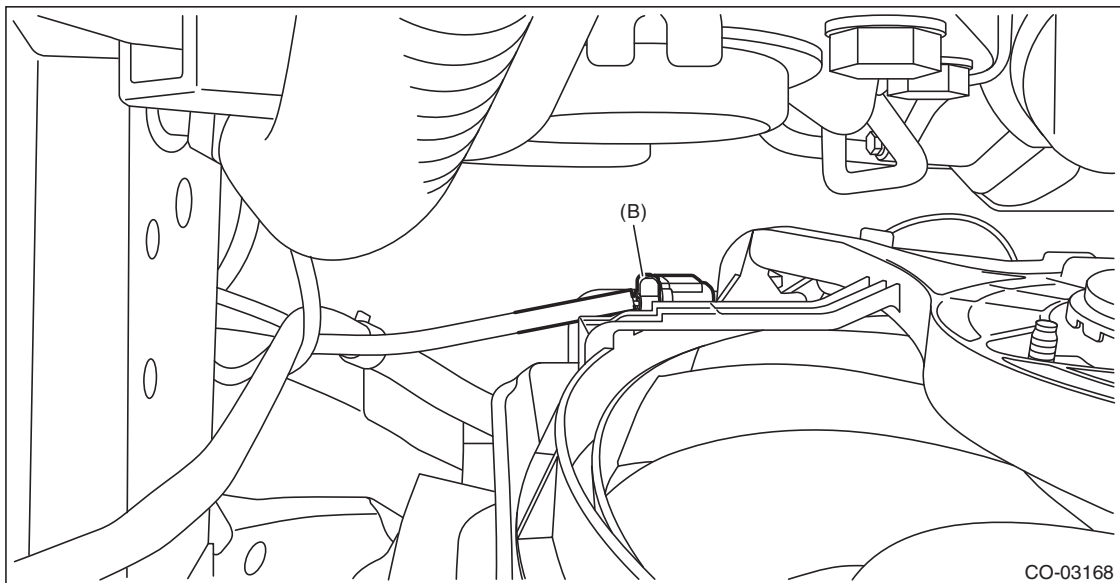


- 7) Connect the connector (A) to the main fan motor and the connector (B) to the sub fan motor.



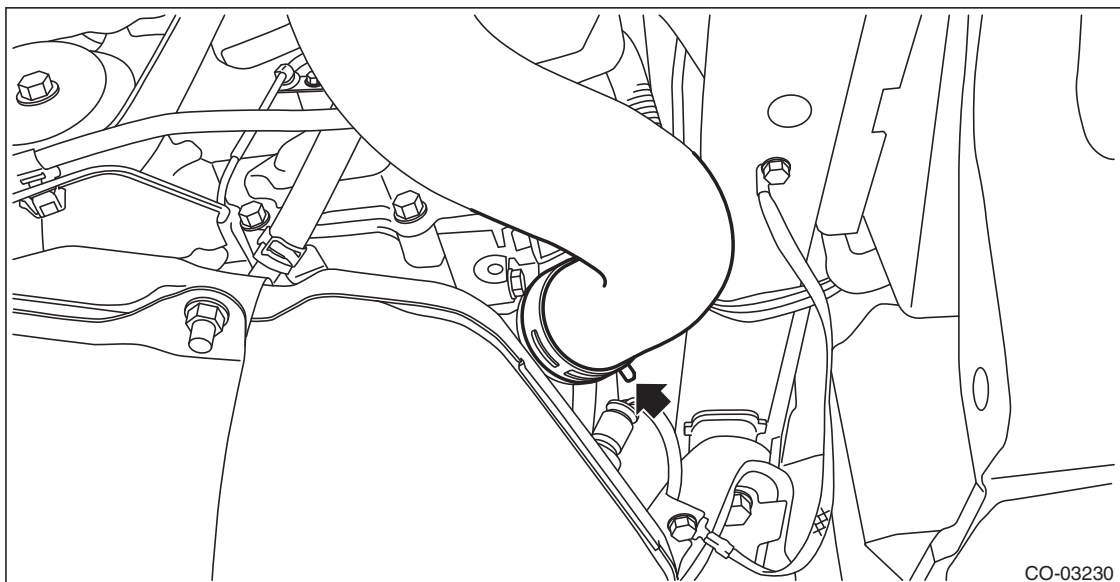
Radiator

COOLING



8) Lift up the vehicle.

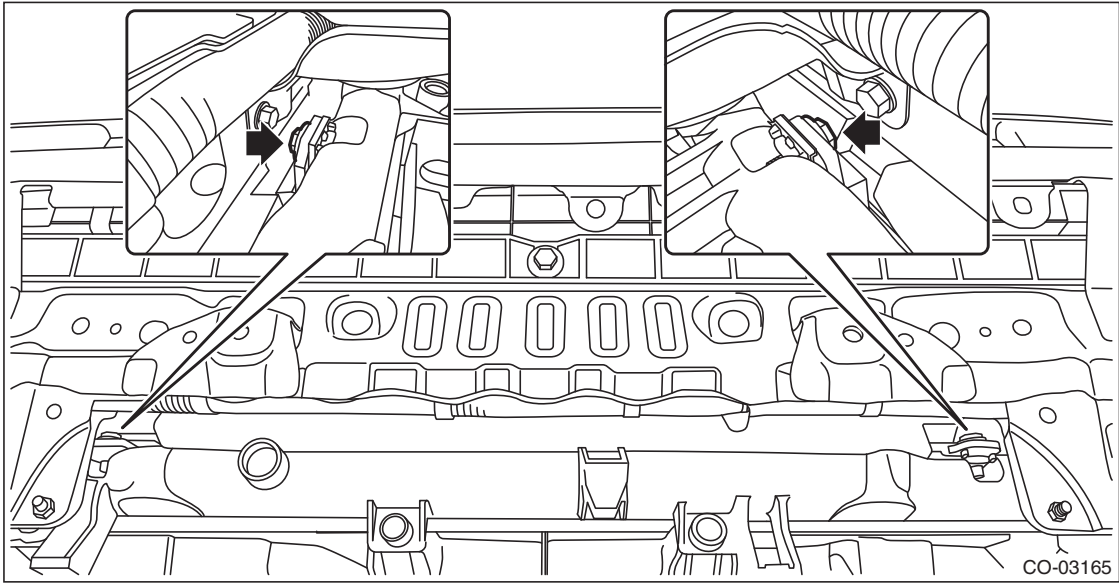
9) Connect the radiator outlet hose to thermostat cover.



Radiator

COOLING

10) Temporarily tighten the bolts a the bottom of the condenser.



11) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>

12) Lower the vehicle.

13) Tighten the bolts at the bottom of the condenser using the ST.

ST 73099SG000 SPECIAL TOOL CONDENSER

Tightening torque:

Calculation formula

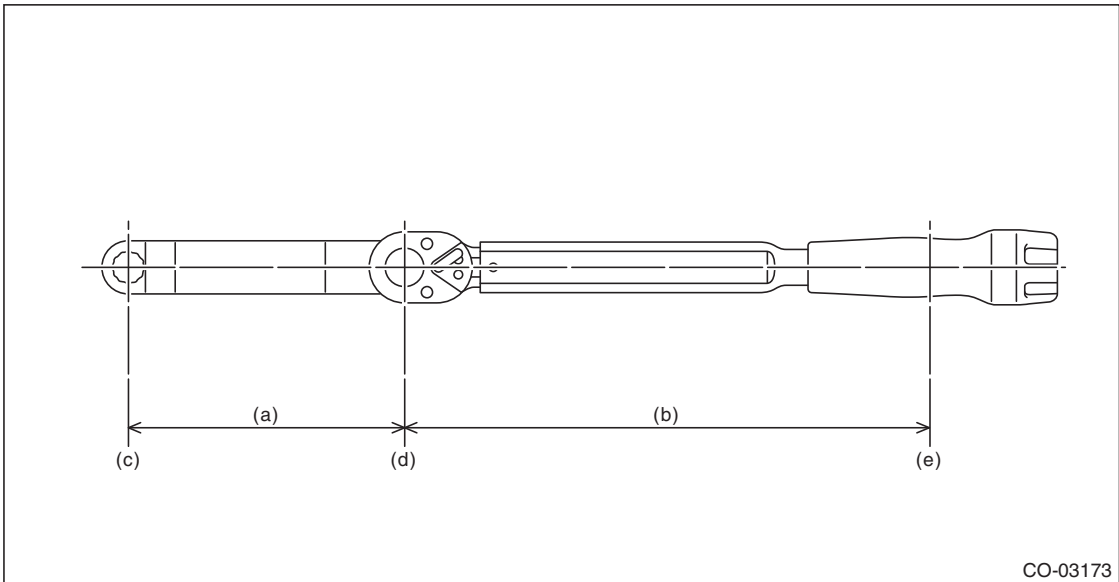
$$T = L / (100 \text{ mm (3.94 in) } + L) \times 7.5 \text{ N} \cdot \text{m (0.8 kgf} \cdot \text{m, 5.5 ft} \cdot \text{lb)}$$

T: Tightening torque

L: Effective length of torque wrench

NOTE:

If the effective length of the torque wrench used is unknown, consult the manufacturer of the torque wrench.



(a) Effective length of the ST

(b) Effective length of the torque wrench

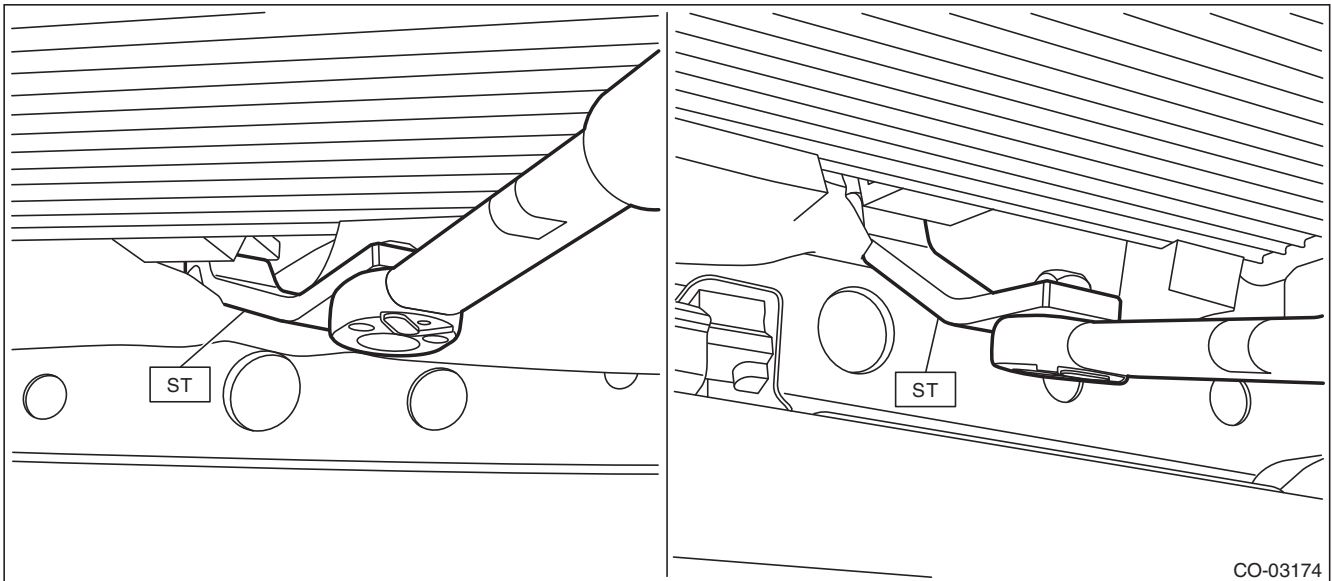
(c) Center of drive angle of the ST

(d) Center of drive angle of the torque wrench

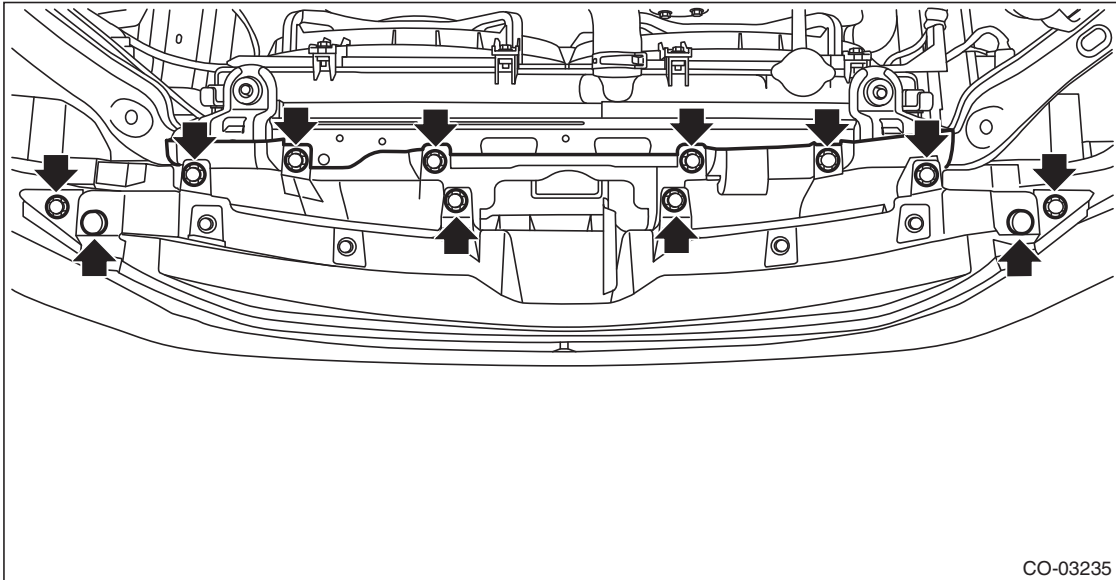
(e) Center of the position where a force is applied by hand

Radiator

COOLING



14) Install the clips to the grille bracket and front bumper and install the grille bracket.



15) Install the reservoir tank. <Ref. to CO(H4DOTC)-58, INSTALLATION, Reservoir Tank.>

16) Install the air intake duct. <Ref. to IN(H4DOTC)-19, INSTALLATION, Air Intake Duct.>

17) Connect the battery ground terminal.

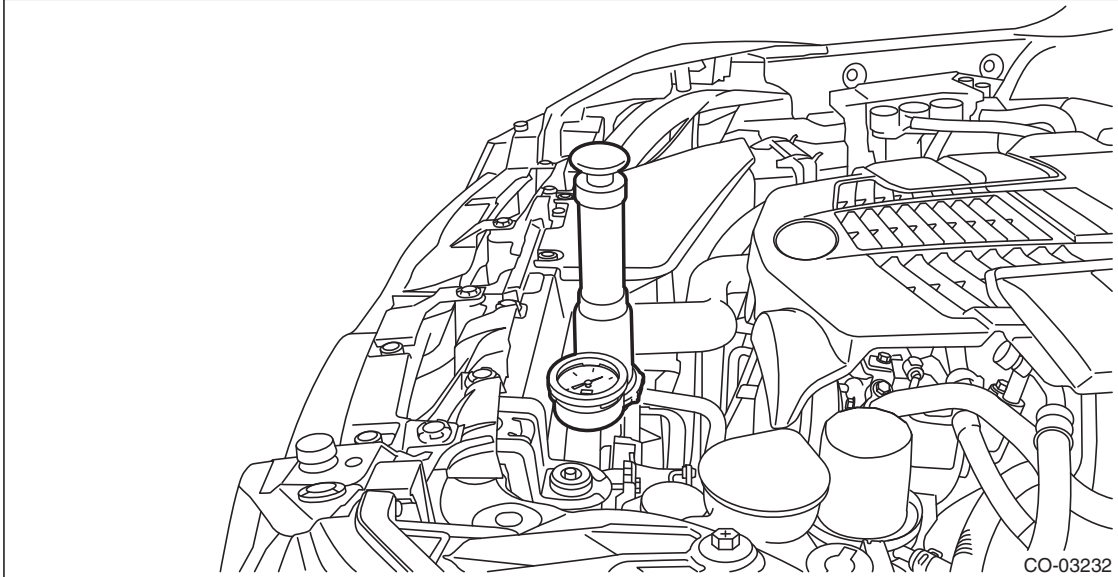
18) Fill engine coolant. <Ref. to CO(H4DOTC)-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

Radiator

COOLING

C: INSPECTION

- 1) Check that the radiator does not have deformation, cracks or damage.
- 2) Check that the hose has no cracks, damage or loose part.
- 3) Remove the radiator cap, fill the radiator with engine coolant, and then install the radiator cap tester to the filler neck of radiator.



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

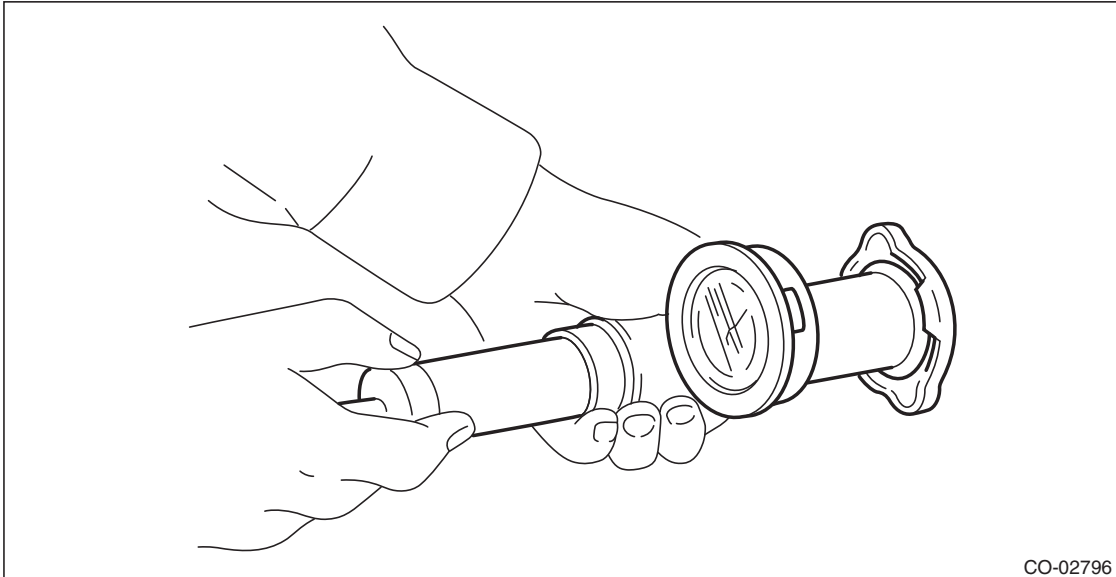
CAUTION:

- Engine should be turned off.
- Clean the check points.
- Be careful not to deform the filler neck of radiator when installing and removing the radiator cap tester.
- Be careful of engine coolant from spurting out when removing the radiator cap tester.
- Leakage from the radiator or its vicinity
- Leakage from the hose or its connections

8. Radiator Cap

A: INSPECTION

- 1) Check that the radiator cap does not have deformation, cracks or damage.
- 2) Attach the radiator cap tester to radiator cap.



- 3) Increase pressure until the radiator cap tester gauge needle stops. Radiator cap is functioning properly if it holds the service limit pressure for 5 — 6 seconds. Replace the radiator cap if its valve opens at less than the service limit.

CAUTION:

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

Standard:

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

Service limit:

83 kPa (0.85 kgf/cm², 12 psi)

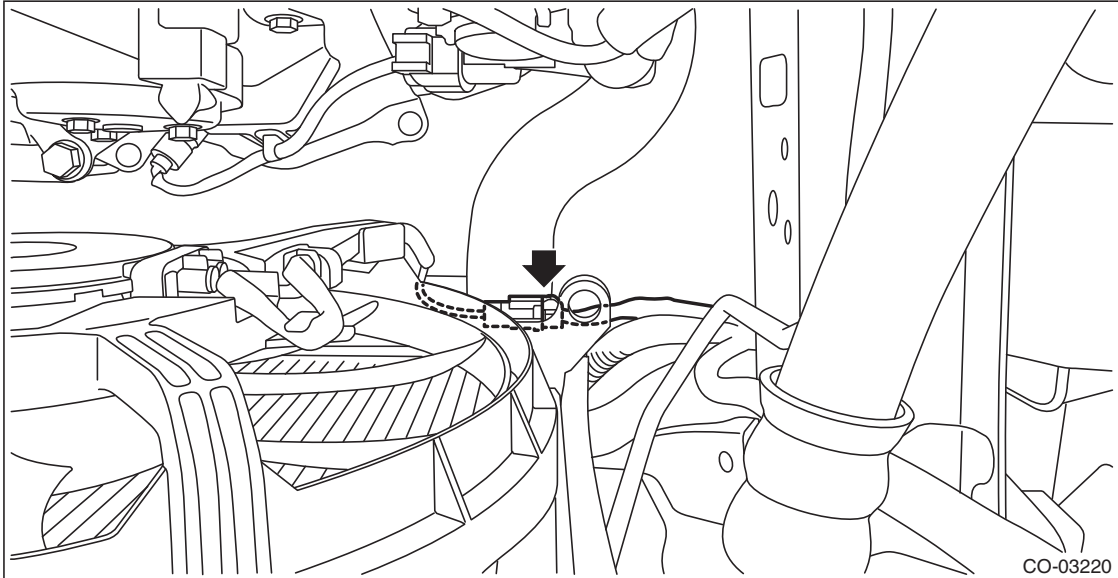
Radiator Main Fan and Fan Motor

COOLING

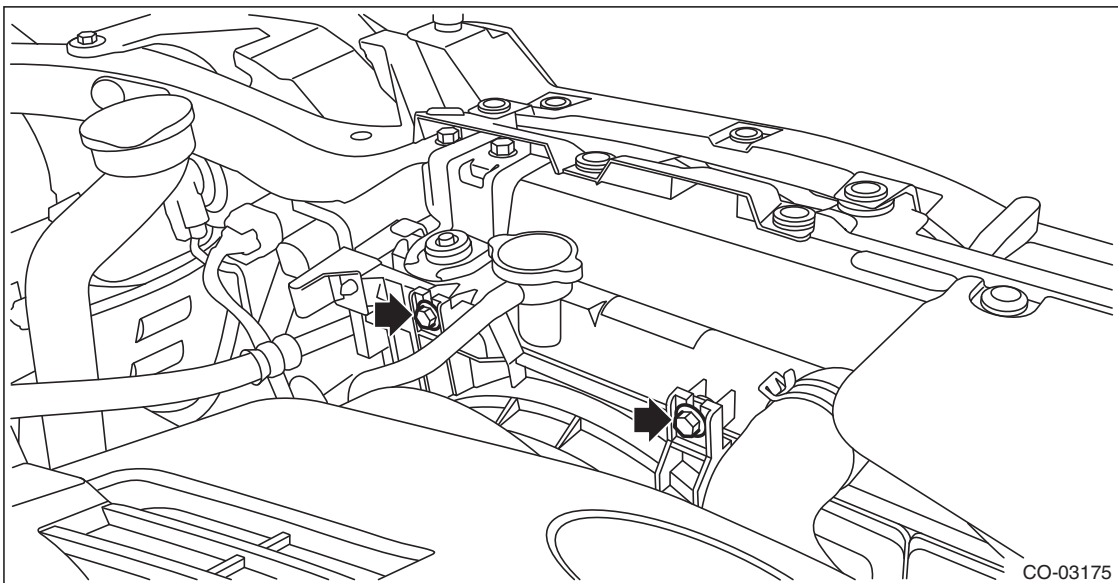
9. Radiator Main Fan and Fan Motor

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the reservoir tank. <Ref. to CO(H4DOTC)-58, REMOVAL, Reservoir Tank.>
- 3) Disconnect the connector from the main fan motor.



- 4) Remove the bolts which secure the radiator main fan motor assembly onto the radiator.



- 5) Remove the radiator main fan motor assembly from the vehicle.

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:

Confirm that the radiator hose is securely connected.

Tightening torque:

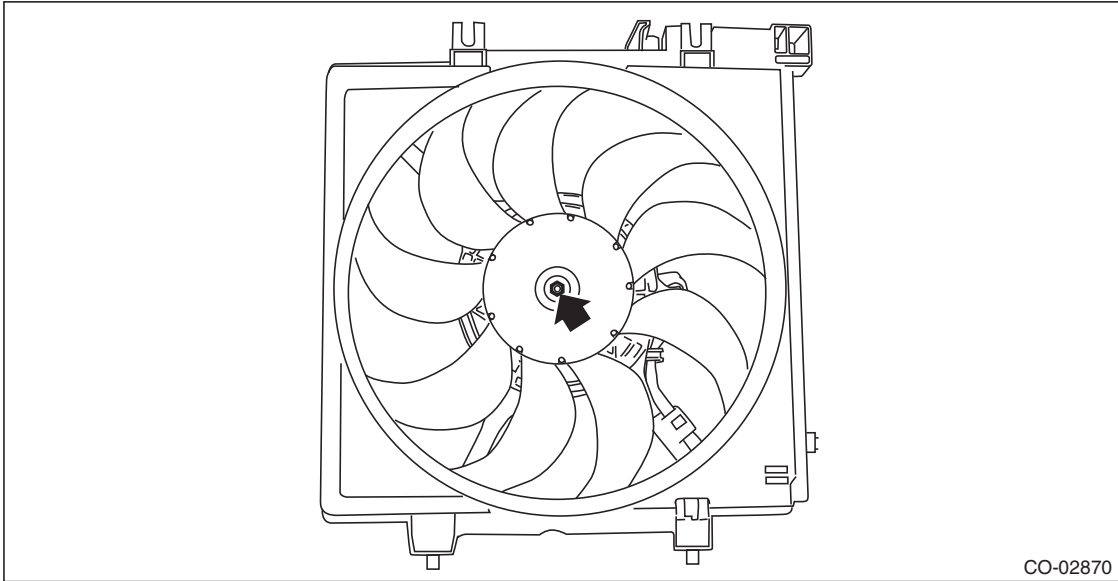
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

Radiator Main Fan and Fan Motor

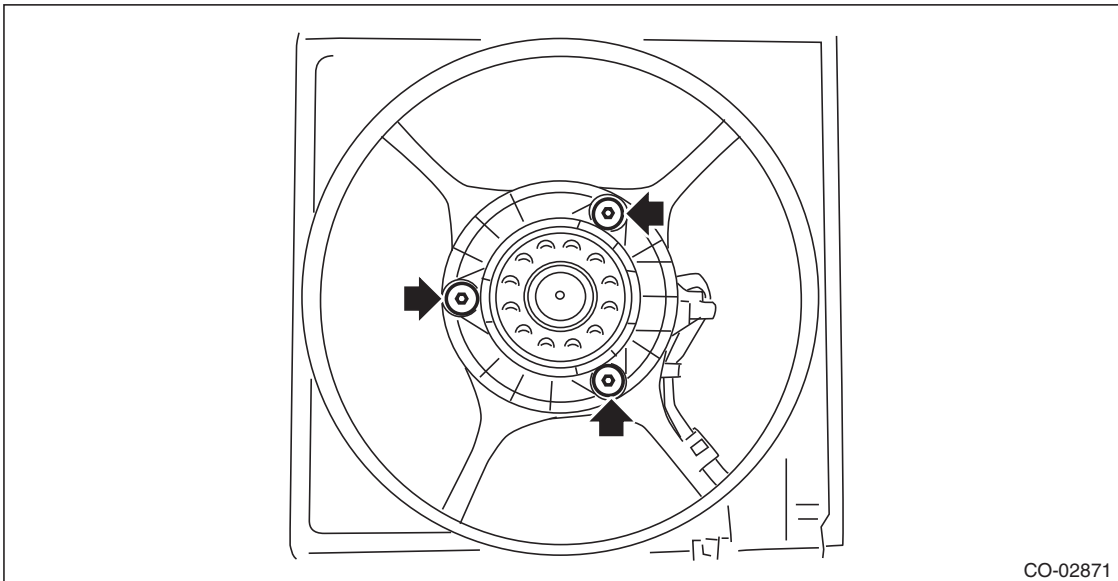
COOLING

C: DISASSEMBLY

- 1) Remove the clip which holds the main fan motor connector onto the radiator main fan shroud.
- 2) Disconnect the radiator main fan from the main fan motor.



- 3) Disconnect the main fan motor from the radiator main fan shroud.



Radiator Main Fan and Fan Motor

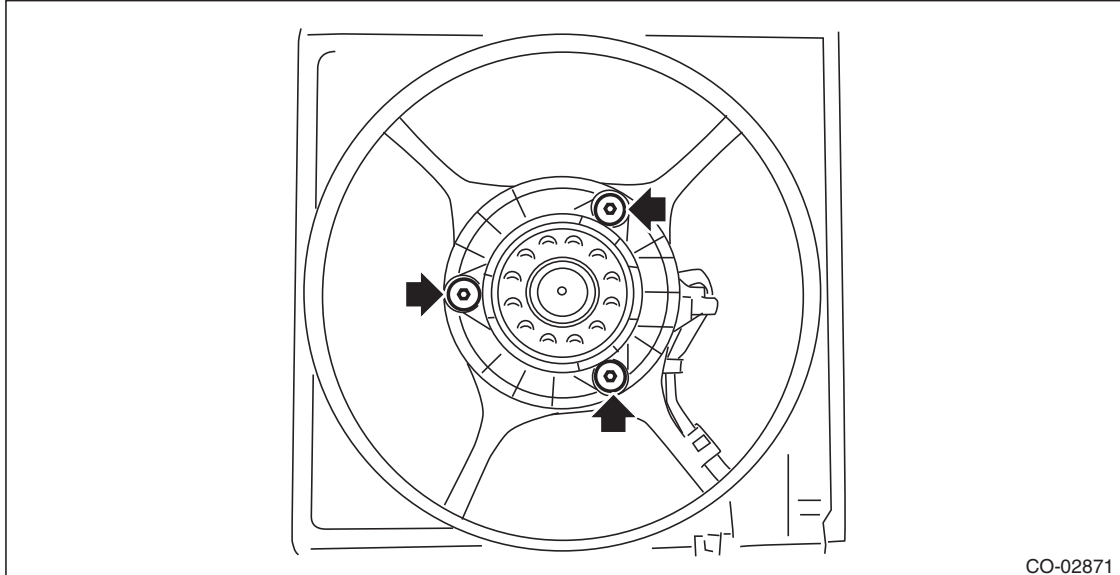
COOLING

D: ASSEMBLY

Assemble in the reverse order of disassembly.

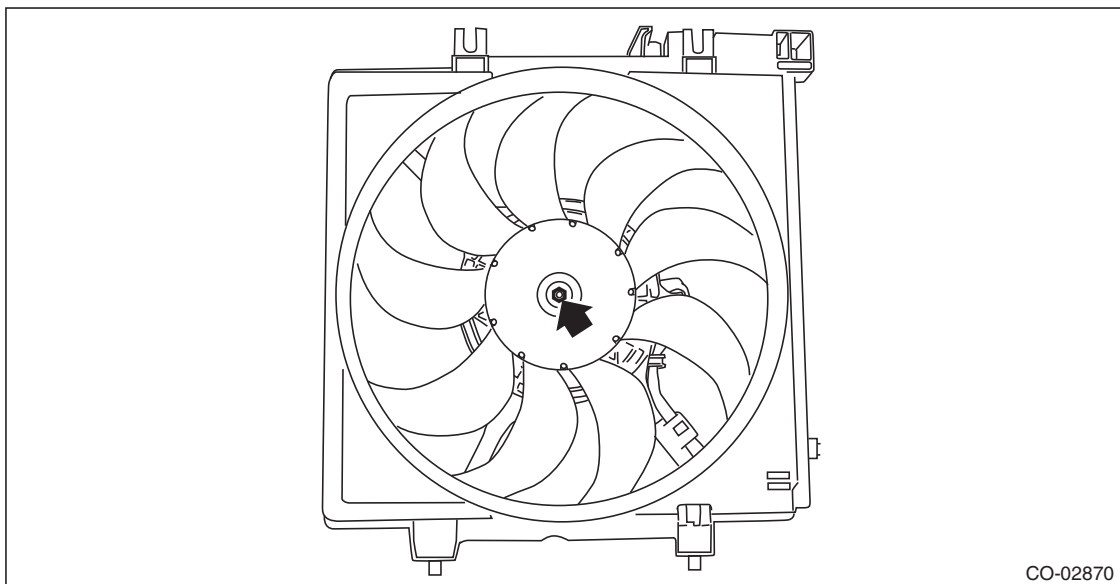
Tightening torque:

4.41 N·m (0.45 kgf-m, 3.25 ft-lb)



Tightening torque:

3.4 N·m (0.3 kgf-m, 2.5 ft-lb)



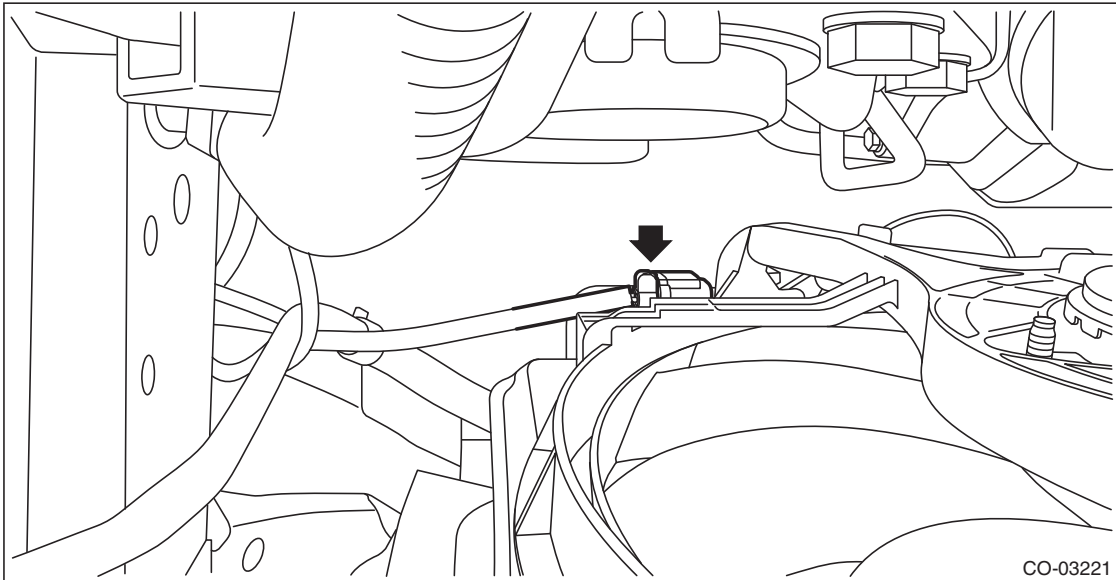
E: INSPECTION

Check that the radiator main fan, radiator main fan shroud and main fan motor do not have deformation, cracks or damage.

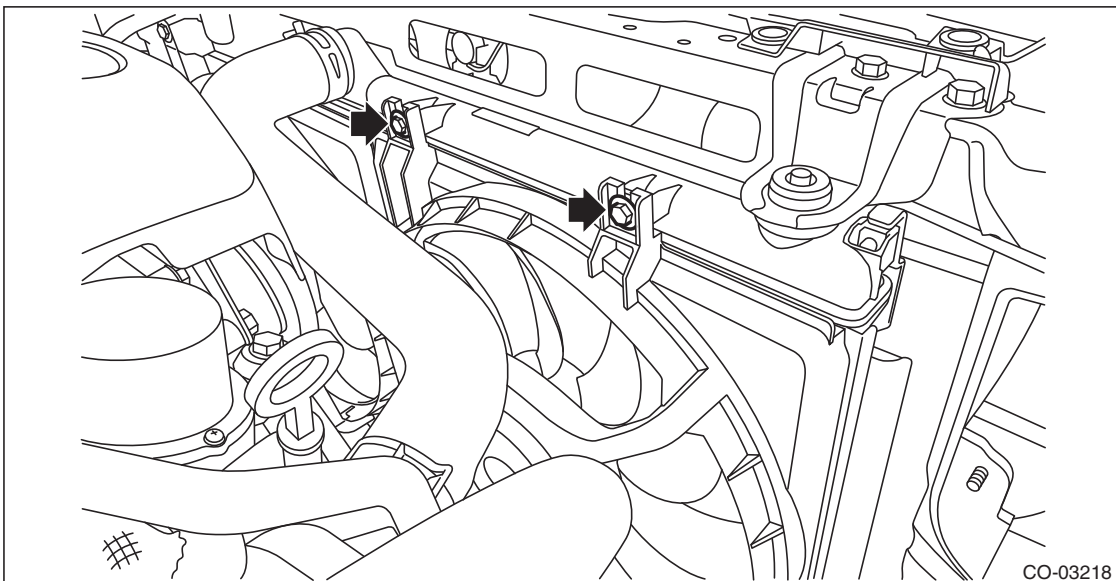
10. Radiator Sub Fan and Fan Motor

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct (rear). <Ref. to IN(H4DOTC)-19, REMOVAL, Air Intake Duct.>
- 3) Disconnect the connector from the sub fan motor.



- 4) Remove the bolts which secure the radiator sub fan motor assembly onto the radiator.



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

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:

Confirm that the radiator hose is securely connected.

Tightening torque:

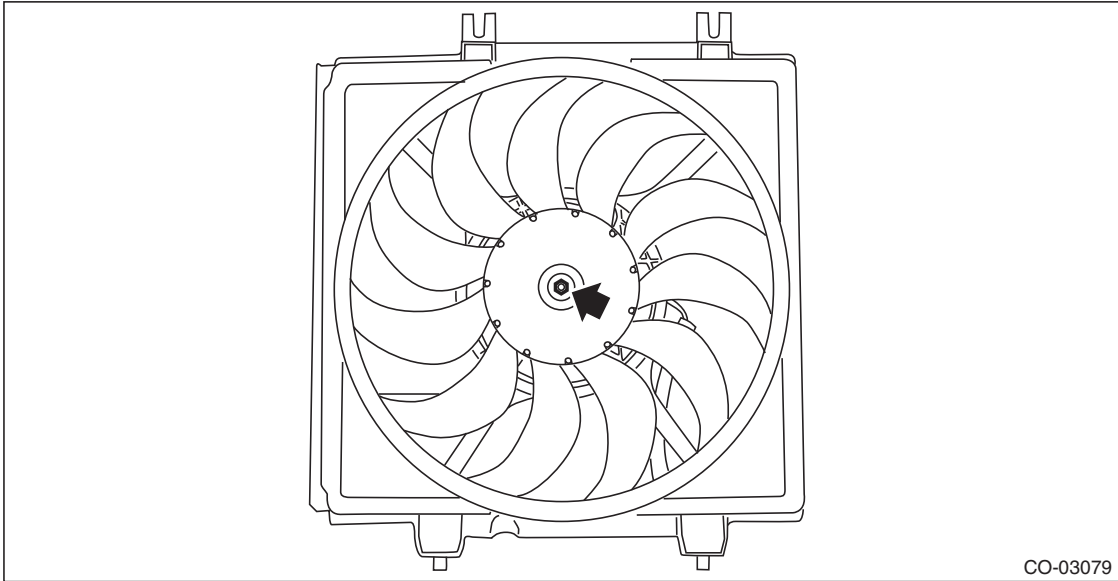
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

Radiator Sub Fan and Fan Motor

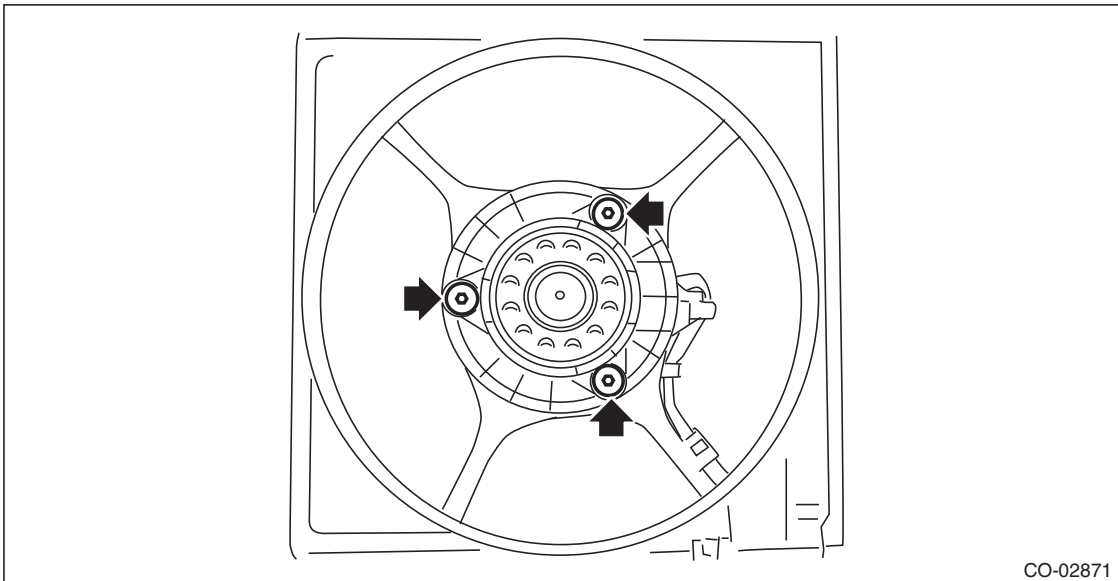
COOLING

C: DISASSEMBLY

- 1) Remove the clip which holds the sub fan motor connector onto the radiator sub fan shroud.
- 2) Disconnect the radiator sub fan from the sub fan motor.



- 3) Disconnect the sub fan motor from the radiator sub fan shroud.



Radiator Sub Fan and Fan Motor

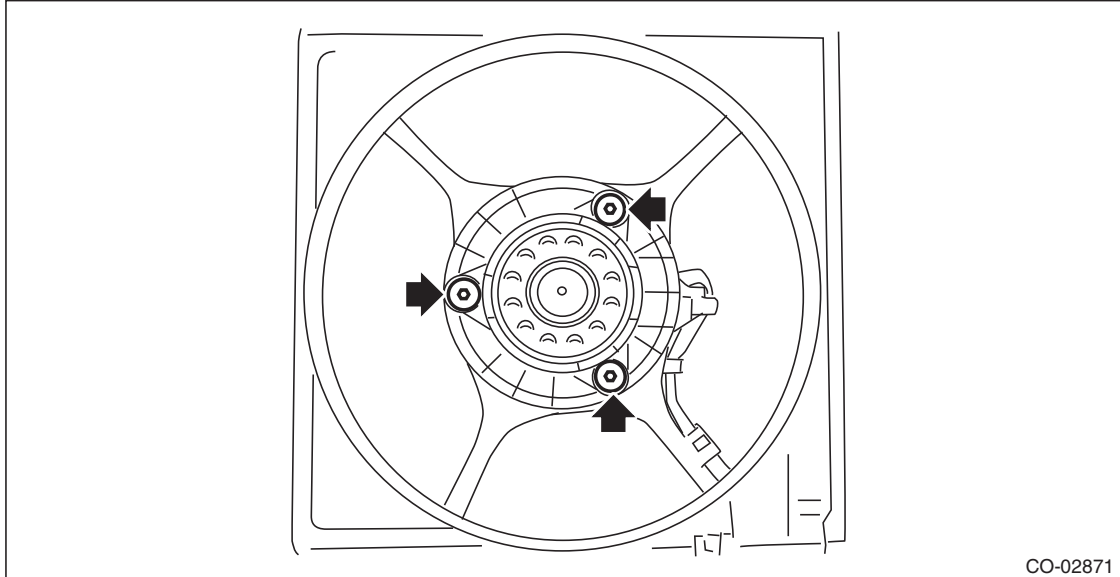
COOLING

D: ASSEMBLY

Assemble in the reverse order of disassembly.

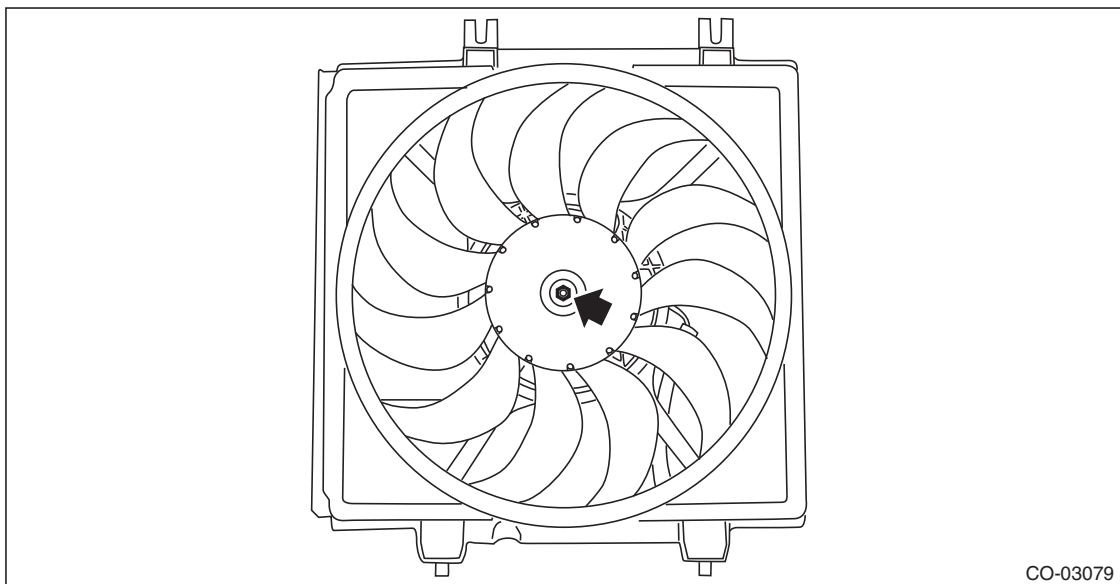
Tightening torque:

4.41 N·m (0.45 kgf-m, 3.25 ft-lb)



Tightening torque:

3.4 N·m (0.3 kgf-m, 2.5 ft-lb)



E: INSPECTION

Check that the radiator sub fan, radiator sub fan shroud and sub fan motor do not have deformation, cracks or damage.

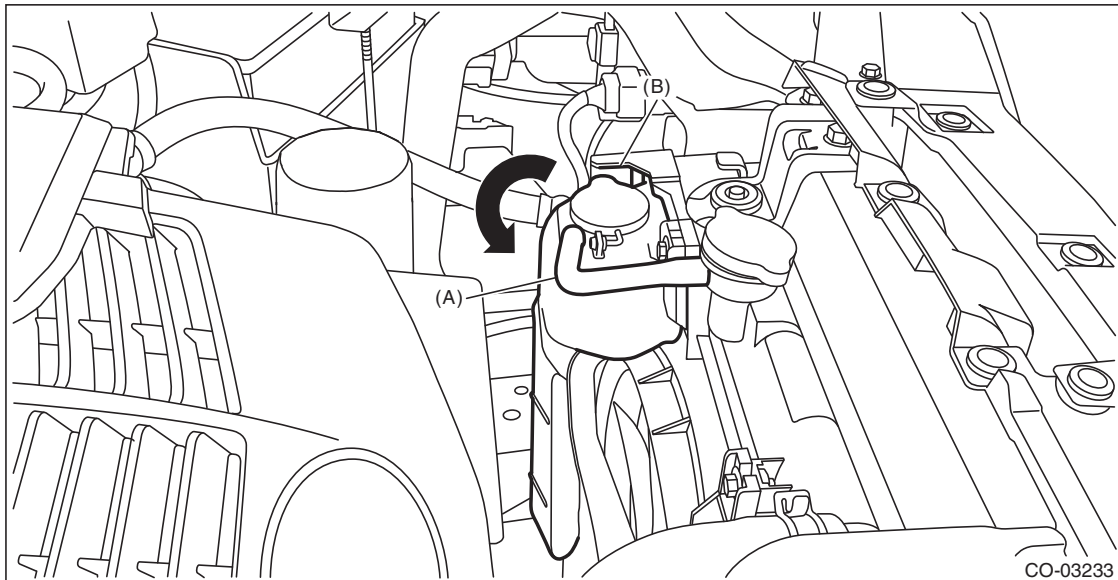
Reservoir Tank

COOLING

11. Reservoir Tank

A: REMOVAL

- 1) Disconnect the over flow hose (A) connected to the radiator filler neck from the reservoir tank.
- 2) Pull out the reservoir tank to the arrow direction while pushing the claw (B).

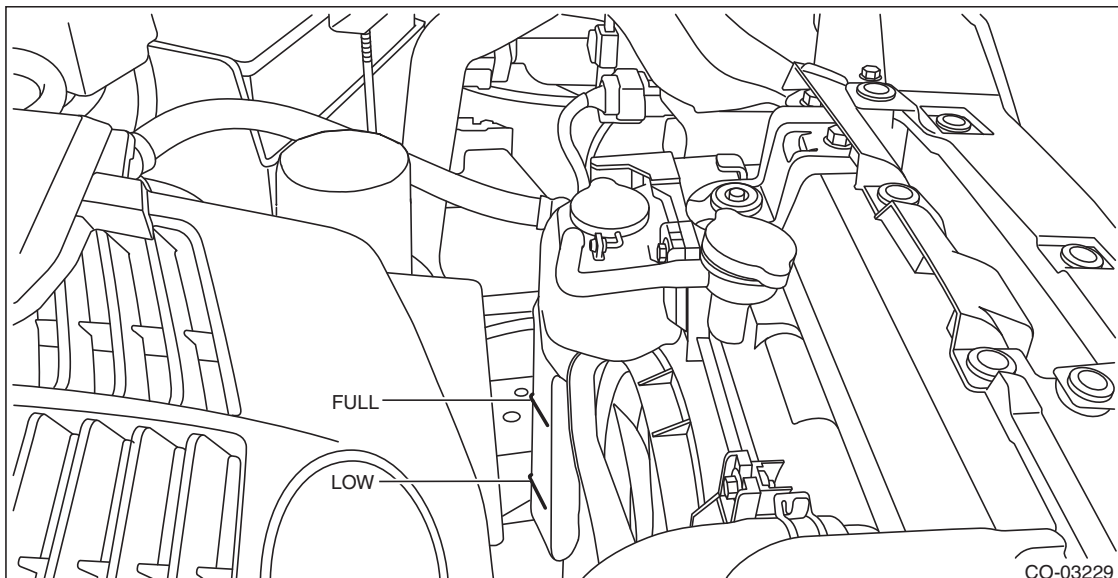


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

- 1) Check that the reservoir tank does not have deformation, cracks or damage.
- 2) Make sure the over flow hoses are not cracked, damaged or loose.
- 3) 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
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Defective thermostat	Replace.
	c. Malfunction of water pump	Replace.
	d. Clogged engine coolant passage	Clean.
	e. Improper ignition timing	Inspect and repair ignition control system. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>
	f. Clogged or leaking radiator	Clean, repair or replace.
	g. Defective radiator cap	Replace.
	h. Improper engine oil in engine coolant	Replace the engine coolant. If ineffective, check, repair or replace engine components.
	i. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>
	j. Excessive back pressure in exhaust system	Clean or replace.
	k. Insufficient clearance between piston and cylinder	Adjust or replace.
	l. Dragging brake	Adjust.
	m. 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 cylinder head bolts or replace cylinder head gasket.
	e. Damaged or cracked cylinder head and cylinder block	Repair or replace.
	f. Damaged or cracked thermostat cover	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective radiator fan	Replace.
	b. Defective water pump bearing	Replace water pump.
	c. Defective water pump mechanical seal	Replace water pump.

Engine Cooling System Trouble in General

COOLING
