

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)

LUBRICATION

LU(H4SO)

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General Description

LUBRICATION

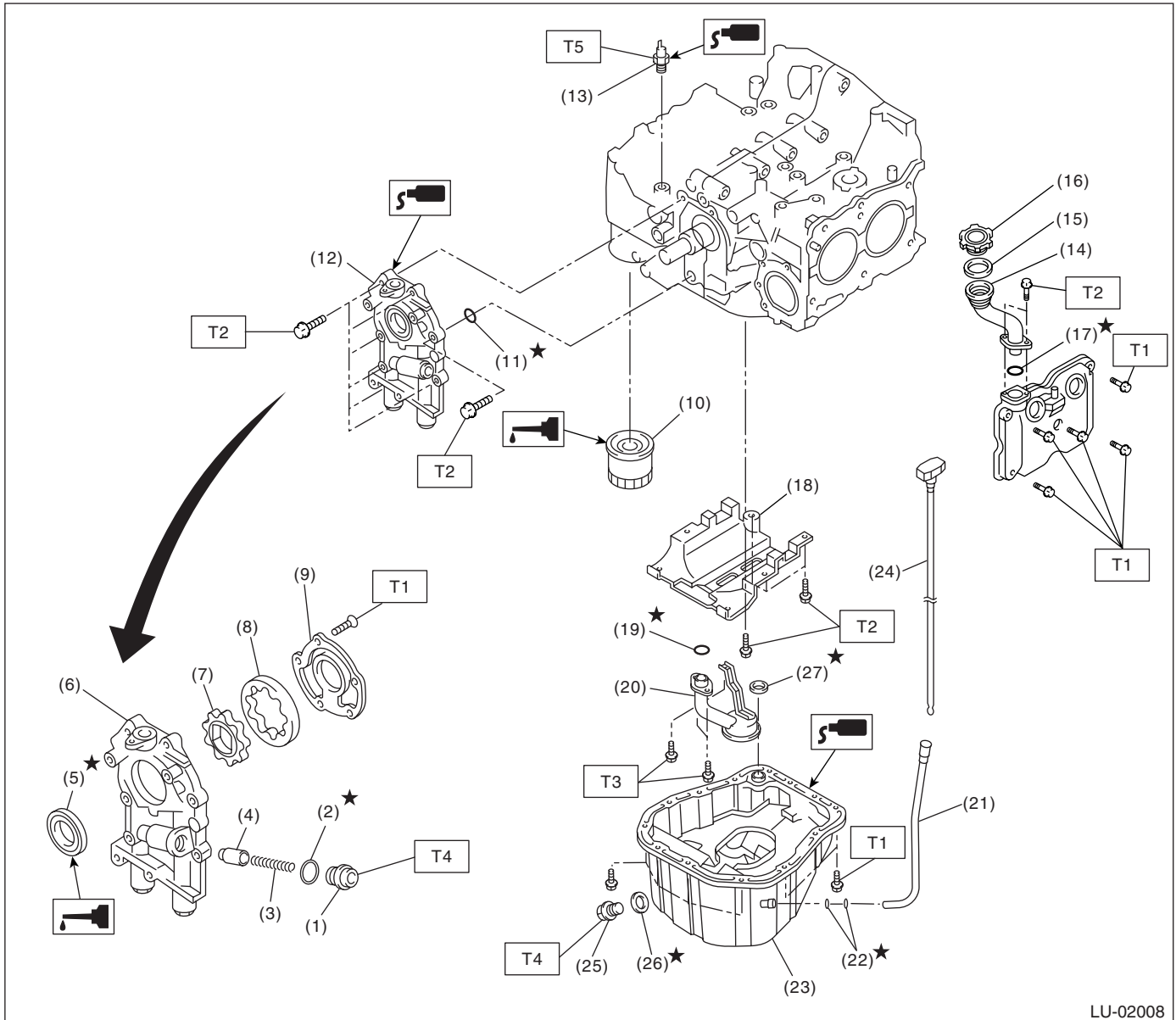
1. General Description

A: SPECIFICATION

Lubrication method			Forced lubrication		
Oil pump	Pump type		Trochoid type		
	Number of teeth	Inner rotor	9		
		Outer rotor	10		
	Outer rotor diameter×thickness	Non-turbo model	78×7 mm (3.07×0.28 in)		
		Turbo model	78×10 mm (3.07×0.39 in)		
	Tip clearance between inner and outer rotor		Standard	0.04 — 0.14 mm (0.0016 — 0.0055 in)	
			Limit	0.18 mm (0.0071 in)	
	Side clearance between inner rotor and pump case		Standard	0.02 — 0.07 mm (0.0008 — 0.0028 in)	
			Limit	0.12 mm (0.0047 in)	
	Case clearance between outer rotor and pump case		Standard	0.10 — 0.175 mm (0.0039 — 0.0069 in)	
			Limit	0.20 mm (0.0079 in)	
	Capacity at 80°C (176°F)	Non-turbo model	600 rpm	Discharge pressure	98 kPa (1.0 kg/cm ² , 14 psi)
				Discharge quantity	3.2 ℓ (3.4 US qt, 2.8 Imp qt)/min.
			5,000 rpm	Discharge pressure	294 kPa (3.0 kg/cm ² , 43 psi)
				Discharge quantity	32.6 ℓ (34.4 US qt, 28.7 Imp qt)/min.
Turbo model		600 rpm	Discharge pressure	98 kPa (1.0 kg/cm ² , 14 psi)	
			Discharge quantity	4.6 ℓ (4.9 US qt, 4.0 Imp qt)/min.	
		5,000 rpm	Discharge pressure	294 kPa (3.0 kg/cm ² , 43 psi)	
			Discharge quantity	47.0 ℓ (49.7 US qt, 41.4 Imp qt)/min.	
Relief valve operation pressure		Non-turbo model	490 kPa (5.0 kg/cm ² , 71 psi)		
		Turbo model	588 kPa (6.0 kg/cm ² , 85 psi)		
Oil filter	Type		Full-flow filter type		
	Filtration area		Non-turbo	760 cm ² (118 sq in)	
			Turbo	800 cm ² (124 sq in)	
	By-pass valve opening pressure		Non-turbo	157 kPa (1.60 kg/cm ² , 22.8 psi)	
			Turbo	160 kPa (1.63 kg/cm ² , 23.2 psi)	
	Outer diameter×width		Non-turbo	80×70 mm (3.15×2.76 in)	
Turbo			68×65 mm (2.68×2.56 in)		
Oil filter to engine thread size		M 20×1.5			
Oil pressure switch	Type		Immersed contact point type		
	Working voltage — wattage		12 V — 3.4 W or less		
	Warning light activation pressure		14.7 kPa (0.15 kg/cm ² , 2.1 psi)		
	Proof pressure		More than 981 kPa (10 kg/cm ² , 142 psi)		
Oil capacity (at replacement)			4.0 ℓ (4.2 US qt, 3.5 Imp qt)		

B: COMPONENT

1. NON-TURBO MODEL



LU-02008

- | | | |
|-------------------------|----------------------------|-------------------|
| (1) Plug | (13) Oil pressure switch | (25) Drain plug |
| (2) Gasket | (14) Oil filler duct | (26) Metal gasket |
| (3) Relief valve spring | (15) O-ring | (27) Gasket |
| (4) Relief valve | (16) Oil filler cap | |
| (5) Oil seal | (17) O-ring | |
| (6) Oil pump case | (18) Baffle plate | |
| (7) Inner rotor | (19) O-ring | |
| (8) Outer rotor | (20) Oil strainer | |
| (9) Oil pump cover | (21) Oil level gauge guide | |
| (10) Oil filter | (22) O-ring | |
| (11) O-ring | (23) Oil pan | |
| (12) Oil pump ASSY | (24) Oil level gauge | |

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

T1: 5 (0.5, 3.6)

T2: 6.4 (0.65, 4.7)

T3: 10 (1.0, 7.2)

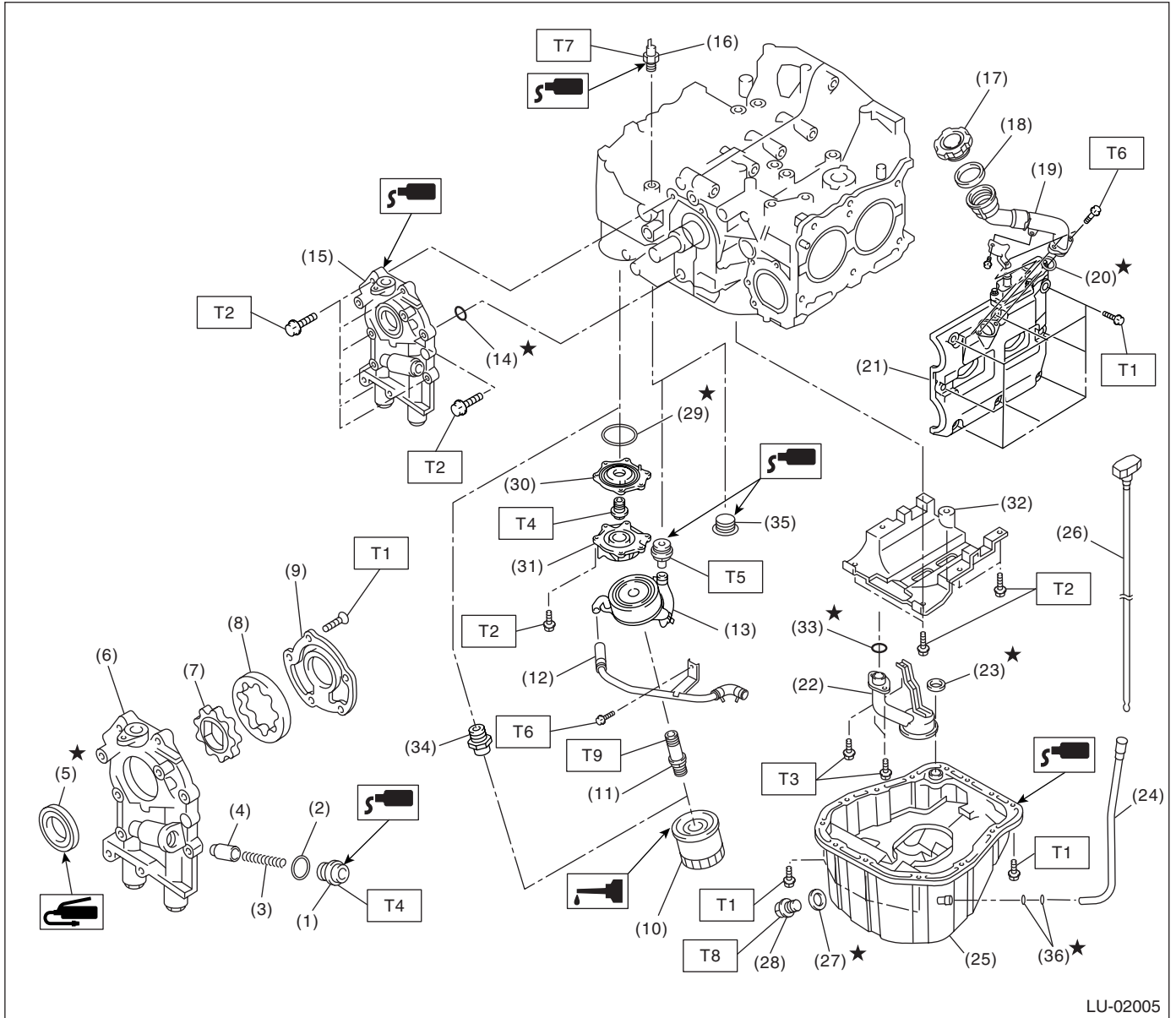
T4: 44 (4.5, 32.5)

T5: 25 (2.5, 18.1)

General Description

LUBRICATION

2. TURBO MODEL



LU(H4SO)-4

General Description

LUBRICATION

(1) Plug	(16) Oil pressure switch	(33) O-ring
(2) Gasket	(17) Oil filler cap	(34) Oil filter connector (model without oil cooler)
(3) Relief valve spring	(18) O-ring	(35) Plug (model without oil cooler)
(4) Relief valve	(19) Oil filler duct	(36) O-ring
(5) Oil seal	(20) O-ring	
(6) Oil pump case	(21) Rocker cover	
(7) Inner rotor	(22) Oil strainer	<hr/> Tightening torque: N·m (kgf-m, ft-lb)
(8) Outer rotor	(23) Gasket	T1: 5 (0.5, 3.6)
(9) Oil pump cover	(24) Oil level gauge guide	T2: 6.4 (0.65, 4.7)
(10) Oil filter	(25) Oil pan	T3: 10 (1.0, 7.0)
(11) Oil cooler connector (model with oil cooler)	(26) Oil level gauge	T4: 44 (4.5, 32.5)
(12) Water by-pass pipe (model with oil cooler)	(27) Metal gasket	T5: 69 (7.0, 50.9)
(13) Oil cooler (model with oil cooler)	(28) Drain plug	T6: 6.4 (0.65, 4.7)
(14) O-ring	(29) O-ring	T7: 25 (2.5, 18.1)
(15) Oil pump ASSY	(30) Adapter (1)	T8: 44 (4.5, 32.5)
	(31) Adapter (2)	T9: 54 (5.5, 40)
	(32) Baffle plate	<hr/>

C: CAUTION

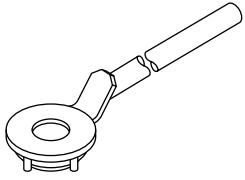
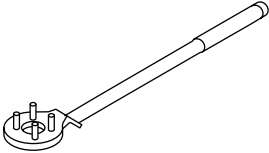
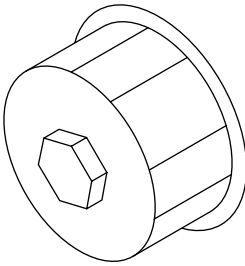
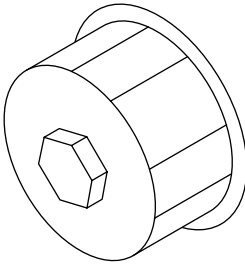
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn yourself, 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.

General Description

LUBRICATION

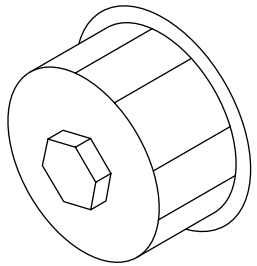
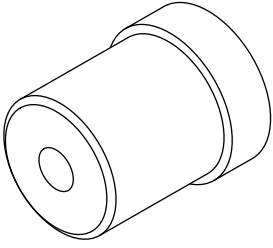
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499977400</p>	499977400 (2.0 L model)	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crankshaft pulley bolt.
 <p style="text-align: center;">ST-499977100</p>	499977100 (2.5 L model)	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crankshaft pulley bolt.
 <p style="text-align: center;">ST-498547000</p>	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 80 mm (3.15 in))
 <p style="text-align: center;">ST18332AA000</p>	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))

General Description

LUBRICATION

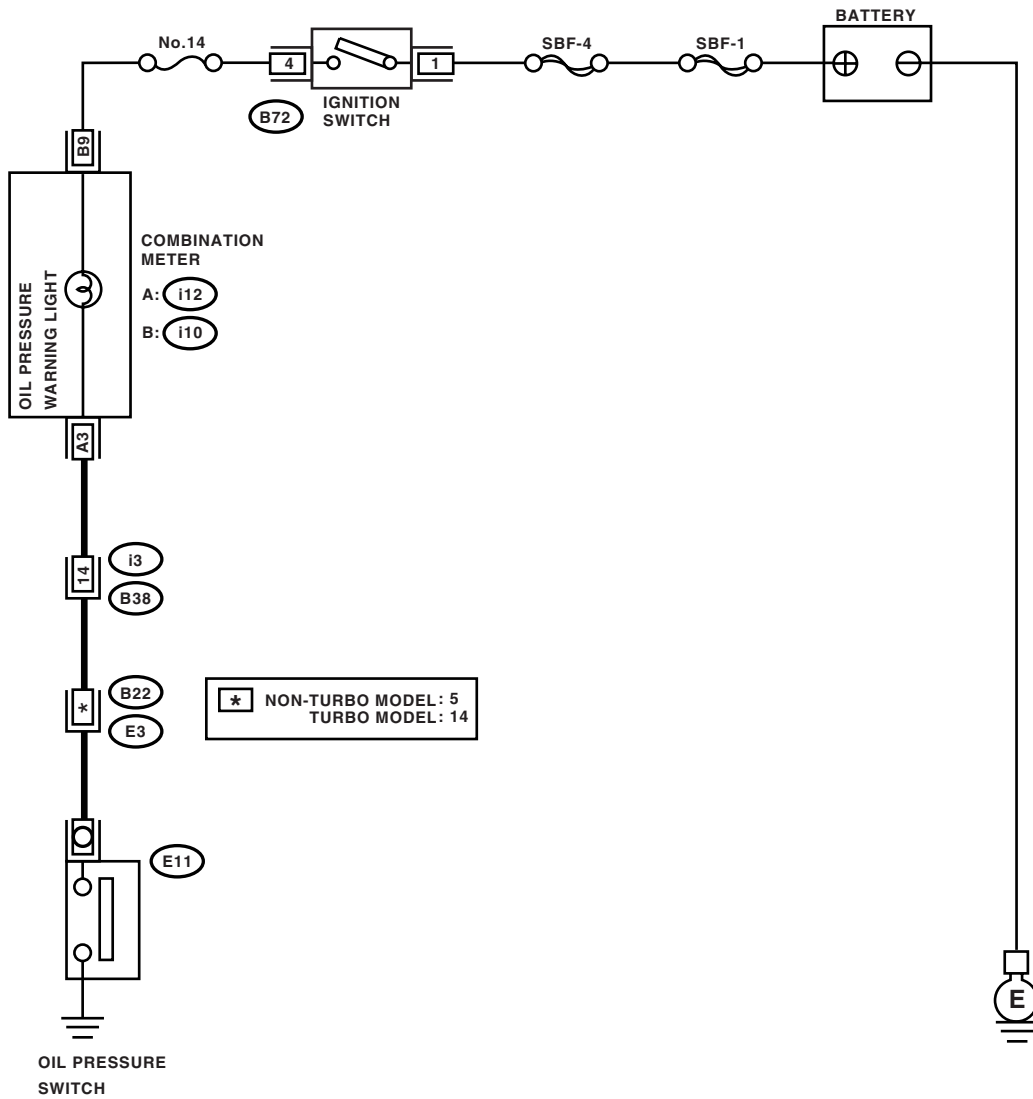
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

Oil Pressure System

LUBRICATION

2. Oil Pressure System

A: WIRING DIAGRAM



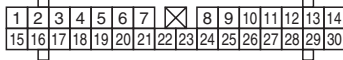
B72



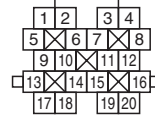
i12



B: i10



B22



i3



LU-00102

B: INSPECTION

Step	Check	Yes	No
1 CHECK COMBINATION METER. 1) Turn the ignition switch to ON. (engine OFF) 2) Check other warning lights.	Does the warning lights illuminate?	Go to step 2.	Repair or replace the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>
2 CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between the combination meter connector and chassis ground. <i>Connector & terminal (E11) No. 1 (+) — Chassis ground (-):</i>	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step 3.
3 CHECK COMBINATION METER. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of combination meter. <i>Terminal No. B9 — No. A3:</i>	Is the resistance less than 10 Ω ?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter and the oil pressure switch warning light bulb.

Engine Oil

LUBRICATION

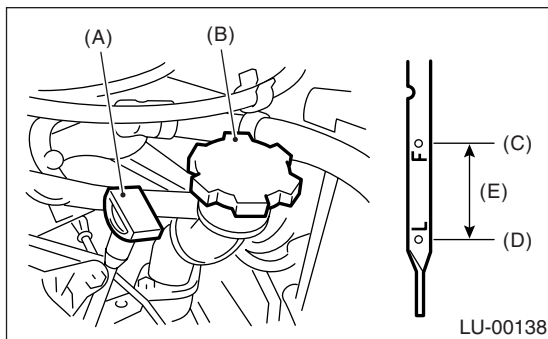
3. Engine Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Remove the oil level gauge and wipe it clean.
- 3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
- 4) Remove it again and note the reading. If the engine oil level is below the "L" line, add oil to bring the level up to "F" line.
- 5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
- 6) Just after driving or while the engine is warm, engine oil level may show in the range between the "F" line and notch mark. This is caused by thermal expansion of the engine oil.

NOTE:

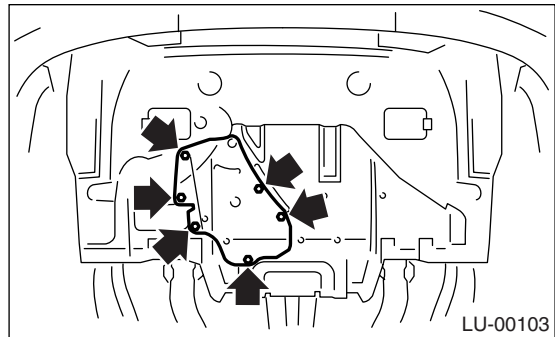
To prevent overfilling the engine oil, do not add oil above the "F" line when the engine is cold.



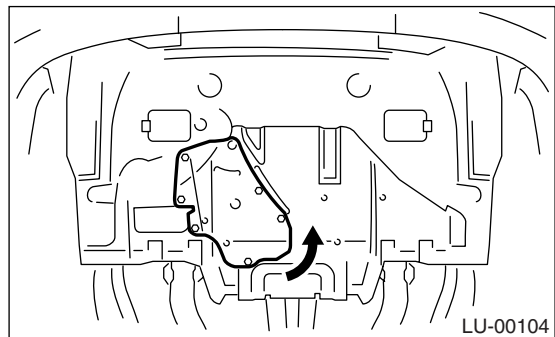
- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) Upper level
- (D) Lower level
- (E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

B: REPLACEMENT

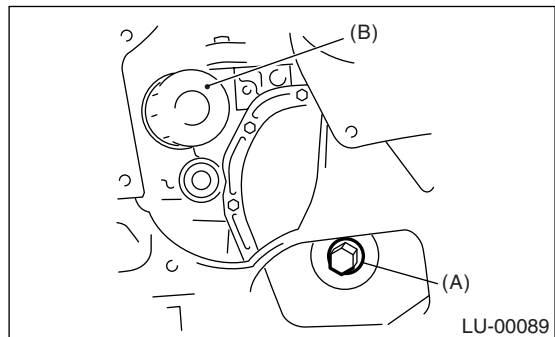
- 1) Open the engine oil filler cap for quick draining of the engine oil.
- 2) Remove six clips.



- 3) Turn the service hole cover counterclockwise.



- 4) Drain the engine oil by loosening the engine oil drain plug.



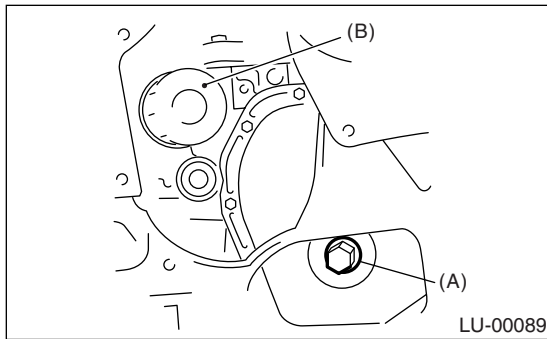
- (A) Drain plug
- (B) Oil filter

- 5) Replace the drain plug gasket.

6) Tighten the engine oil drain plug after draining engine oil.

Tightening torque:

44 N·m (4.5 kgf·m, 32.5 ft·lb)



- (A) Drain plug
- (B) Oil filter

7) Install the service hole cover.
 8) Fill engine oil through the filler pipe up to upper point on level gauge. Make sure that the vehicle is placed level when checking oil level. Use the engine oil of proper quality and viscosity, selected in accordance with the table in figure.

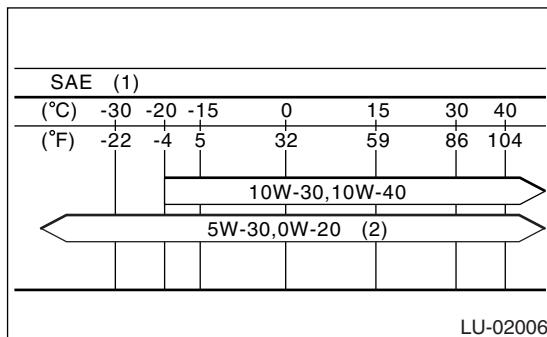
Recommended oil

API classification SL, SJ with the “Energy Conserving” logo is printed, or SH (if you cannot obtain the oil with SL, SJ or SH grades, you may use SG, SF grades “ENERGY CONSERVING” oil.)
ACEA specification, A1, A2 or A3
CCMC specification, G4 or G5
New API certification mark (Star burst mark) label is on the container.

Engine oil capacity:

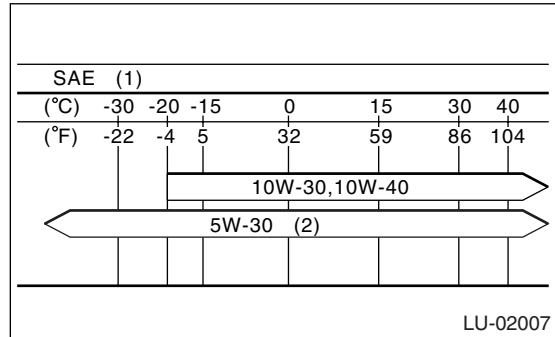
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)

- Non-turbo model



- (1) SAE Viscosity No. and Applicable Temperature
- (2) PREFERRED

- Turbo model



- (1) SAE Viscosity No. and Applicable Temperature
- (2) PREFERRED

The proper viscosity helps vehicle get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

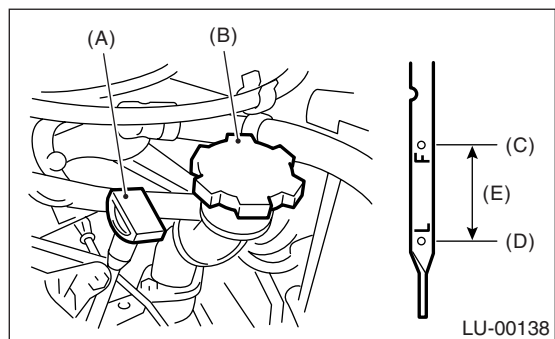
CAUTION:

When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

NOTE:

If the vehicle is used in areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used: API classification: SL or SJ or SH
 SAE Viscosity No. : 30, 40, 10W-50, 20W-40, 20W-50.

9) Close the engine oil filler cap.
 10) Start the engine and warm it up for a time.
 11) After the engine stops, recheck the oil level. If necessary, add engine oil up to the upper level on level gauge.

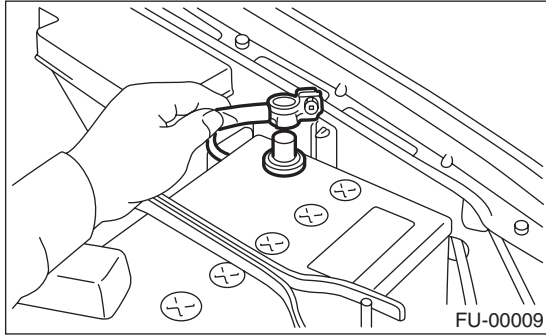


- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) Upper level
- (D) Lower level
- (E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

4. Oil Pump

A: REMOVAL

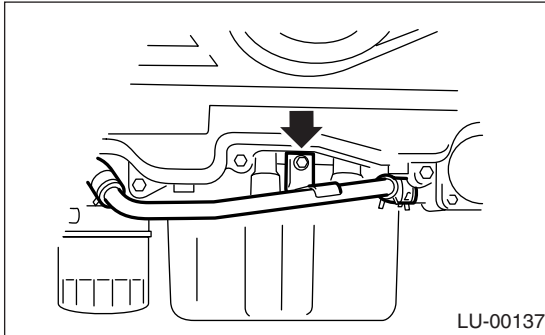
1) Disconnect the ground cable from battery.



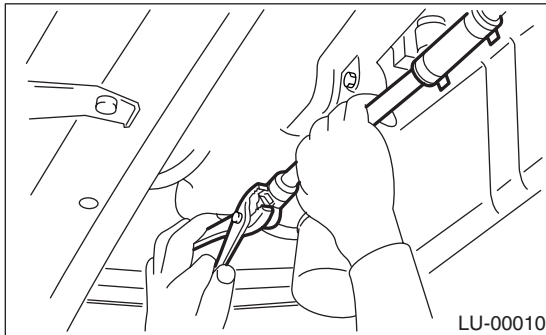
2) Lift-up the vehicle.

3) Remove the under cover.

4) Remove the bolts which install water pipe of oil cooler to oil pump. (Turbo model)

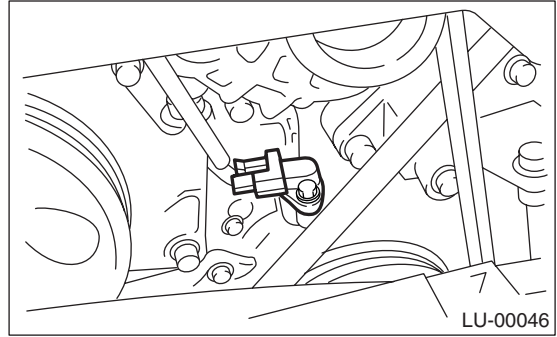


5) Remove the water pipe and hoses between oil cooler and water pump. (Turbo model)



6) Remove the radiator. <Ref. to CO(H4SO)-28, REMOVAL, Radiator.>

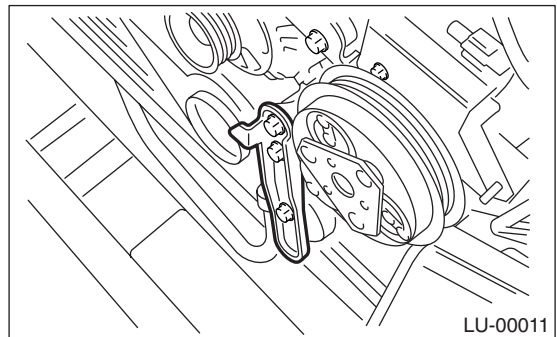
7) Remove the crankshaft position sensor.



8) Remove the V-belts.

<Ref. to ME(H4SO)-43, REMOVAL, V-belt.> <Ref. to ME(H4DOTC)-52, REMOVAL, V-belt.>

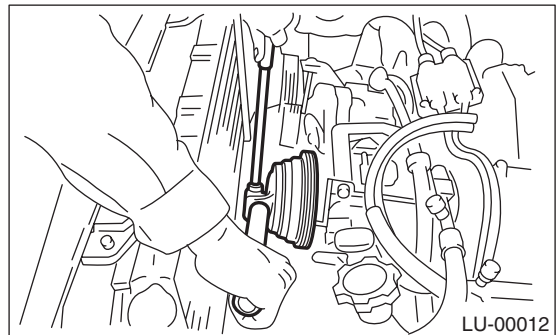
9) Remove the rear side V-belt tensioner.



10) Remove the crankshaft pulley by using ST.

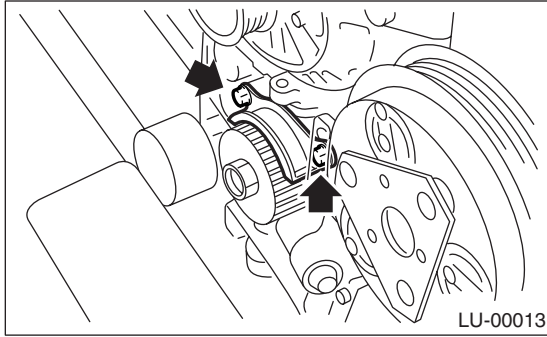
ST 499977400 CRANK PULLEY WRENCH (2.0 L model)

ST 499977100 CRANK PULLEY WRENCH (2.5 L model)

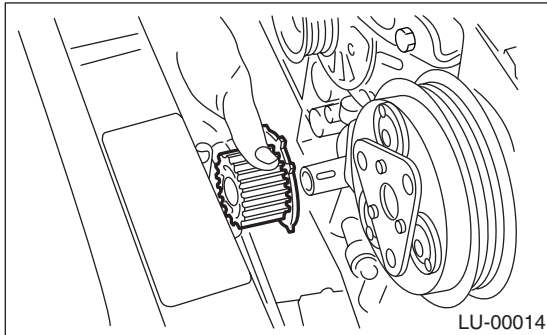


11) Remove the water pump. <Ref. to CO(H4SO)-21, REMOVAL, Water Pump.>

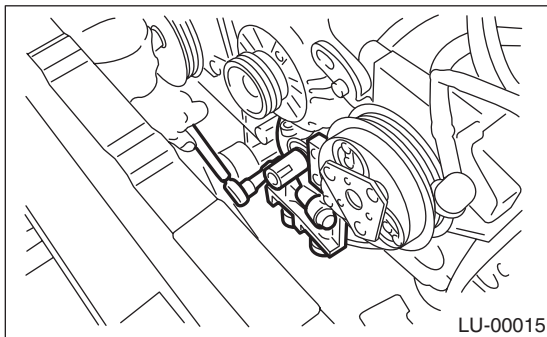
12) Remove the timing belt guide. (MT model)



13) Remove the crank sprocket.



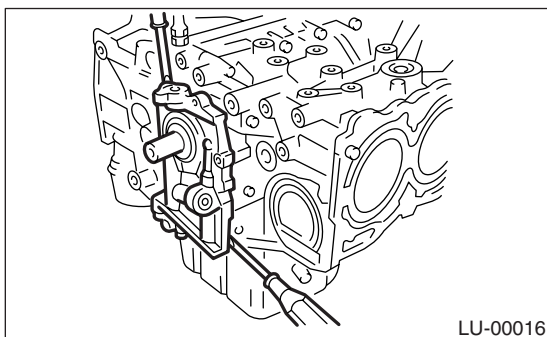
14) Remove the bolts which install oil pump onto cylinder block.



15) Remove the oil pump by using flat tip screwdriver.

CAUTION:

Be careful not to scratch the mating surfaces of cylinder block and oil pump.



B: INSTALLATION

Install in the reverse order of removal.

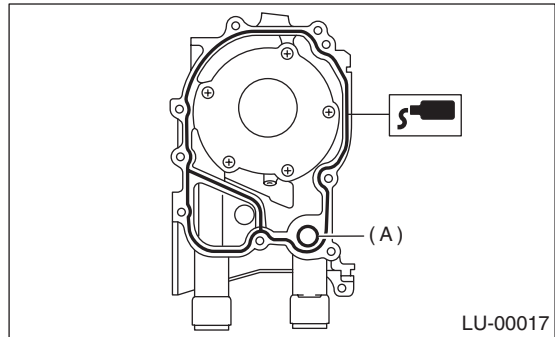
Do the following:

1) Apply liquid gasket to the matching surfaces of oil pump.

Liquid gasket:

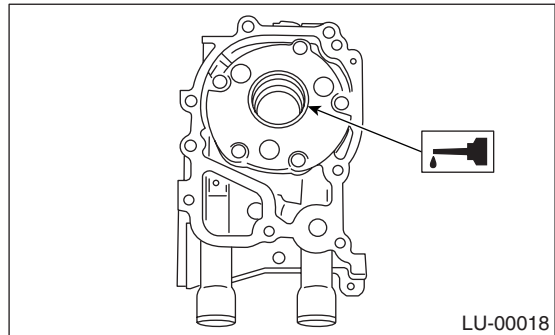
Part No. 004403007

THREE BOND 1215 or equivalent



2) Replace the O-ring (A) with a new one.

3) Apply a coat of engine oil to the inside of oil seal.



4) Be careful not to scratch the oil seal when installing oil pump on cylinder block.

5) Position the oil pump, aligning the notched area with crankshaft, and push the oil pump straight.

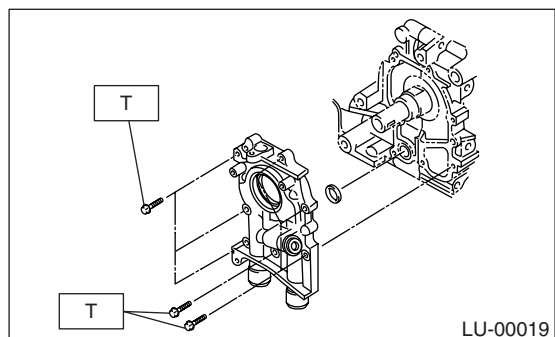
CAUTION:

Make sure the oil seal lip is not folded.

6) Install the oil pump.

Tightening torque:

T: 6.4 N·m (0.65 kgf·m, 4.7 ft·lb)



Oil Pump

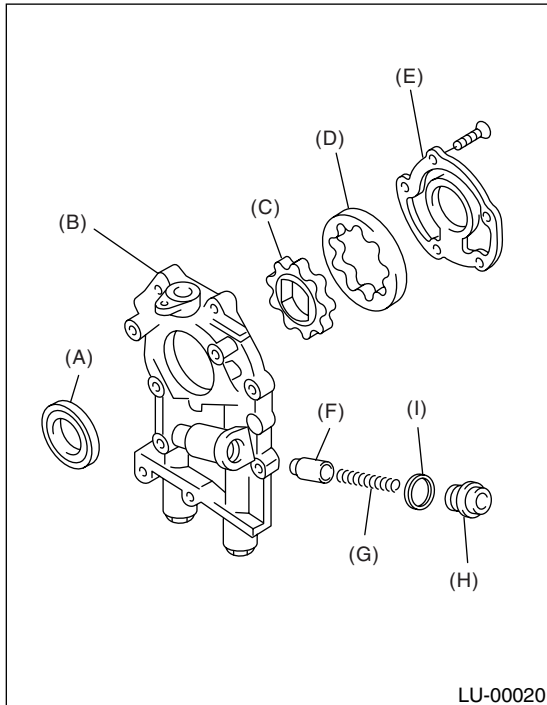
LUBRICATION

C: DISASSEMBLY

Remove the screws which secure oil pump cover and disassemble oil pump. Inscribe alignment marks on the inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:

Before disassembling the oil pump, remove the relief valve.



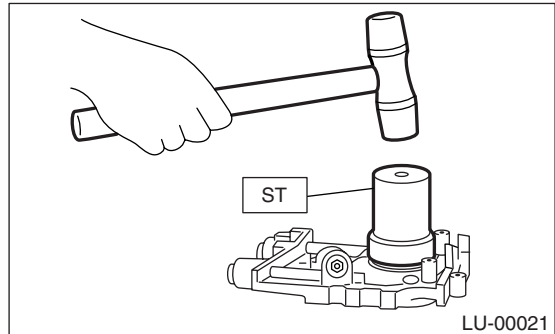
- (A) Oil seal
- (B) Pump case
- (C) Inner rotor
- (D) Outer rotor
- (E) Pump cover
- (F) Relief valve
- (G) Relief valve spring
- (H) Plug
- (I) Gasket

D: ASSEMBLY

1) Install the front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:

Use a new oil seal.



2) Apply a coat of engine oil to the inner and outer rotors.

3) Install the inner and outer rotors in their original positions.

4) Install the oil relief valve and relief valve spring and plug.

NOTE:

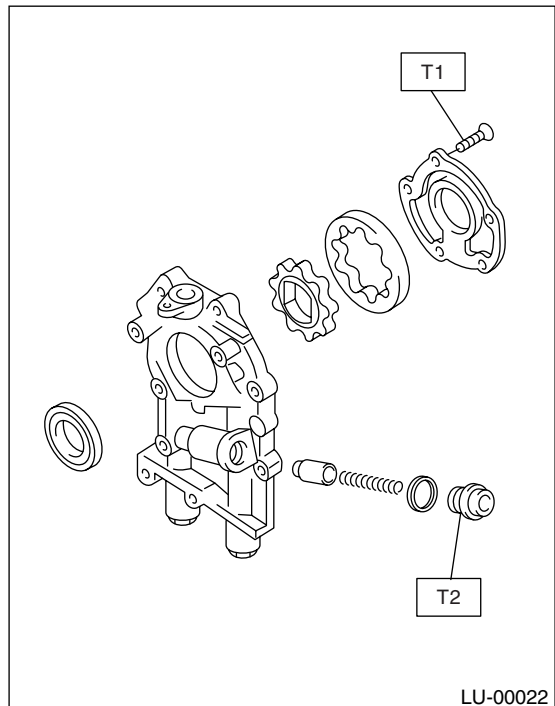
Use a new gasket.

5) Install the oil pump cover.

Tightening torque:

T1: 5 N·m (0.5 kgf·m, 3.6 ft·lb)

T2: 44 N·m (4.5 kgf·m, 32.5 ft·lb)



E: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If clearance exceeds the limit, replace the rotors as a matched set.

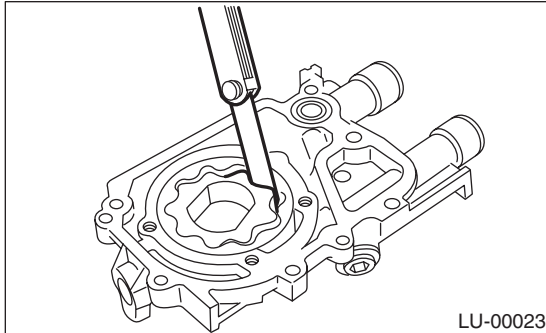
Tip clearance:

Standard

0.04 — 0.14 mm (0.0016 — 0.0055 in)

Limit

0.18 mm (0.0071 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and oil pump rotor housing. If clearance exceeds the limit, replace the rotor.

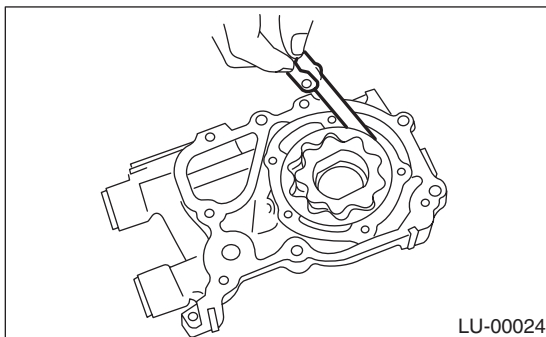
Case clearance:

Standard

0.10 — 0.175 mm (0.0039 — 0.0069 in)

Limit

0.20 mm (0.0079 in)



3. SIDE CLEARANCE

Measure the clearance between the oil pump inner rotor and pump cover. If clearance exceeds the limit, replace the rotor or pump body.

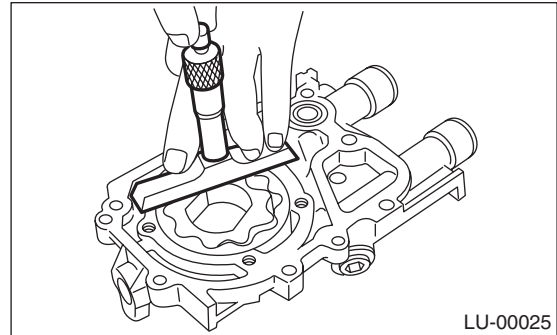
Side clearance:

Standard

0.02 — 0.07 mm (0.0008 — 0.0028 in)

Limit

0.12 mm (0.0047 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:

Non-turbo model

Free length

72.8 mm (2.866 in)

Installed length

54.7 mm (2.154 in)

Load when installed

81.4 N (8.3 kgf, 18.3 lb)

Turbo model

Free length

73.7 mm (2.902 in)

Installed length

54.7 mm (2.154 in)

Load when installed

93.2 N (9.5 kgf, 20.9 lb)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

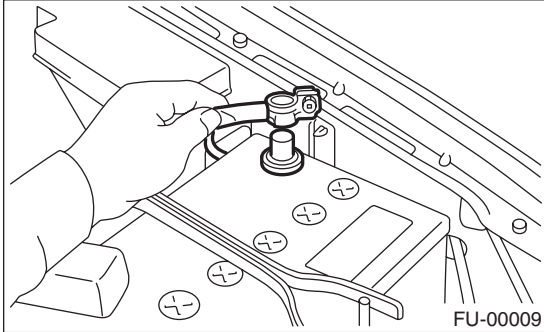
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

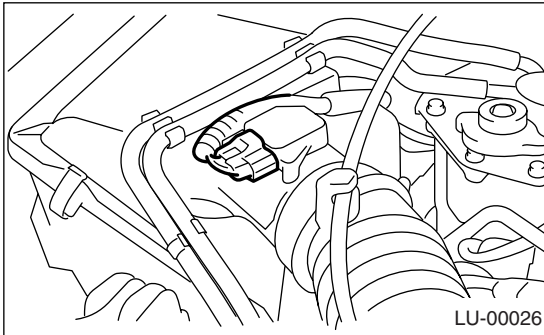
5. Oil Pan and Strainer

A: REMOVAL

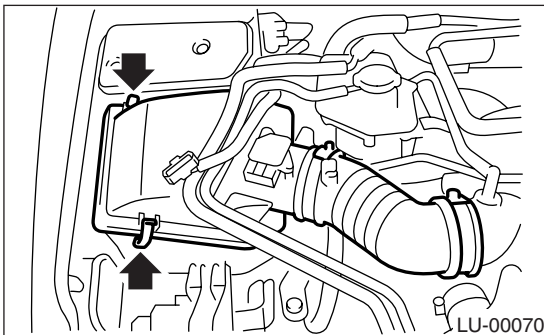
- 1) Set the vehicle on lift arms.
- 2) Remove the front wheels.
- 3) Disconnect the ground cable from battery.



- 4) Remove the air intake duct and air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 5) Disconnect the connector from mass air flow sensor. (Turbo model)

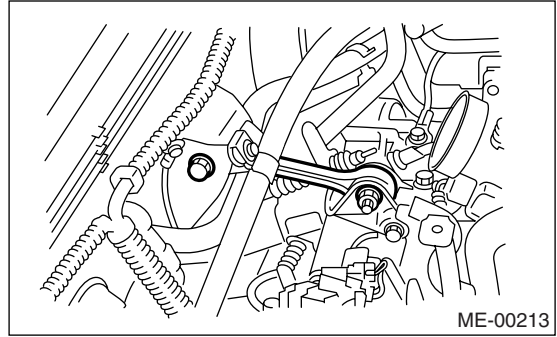


- 6) Remove the air intake boot and air cleaner upper cover. (Turbo model)

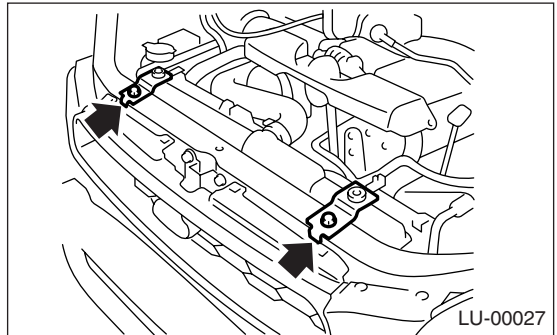


- 7) Remove the intercooler (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

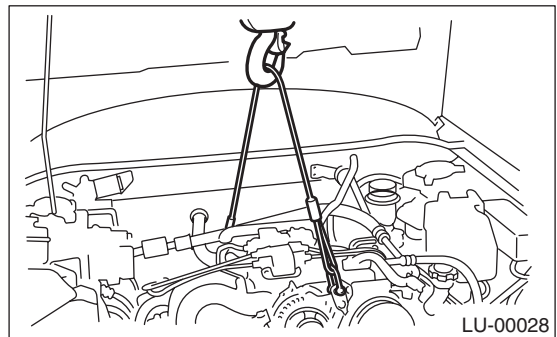
- 8) Remove the pitching stopper.



- 9) Remove the radiator upper brackets.



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

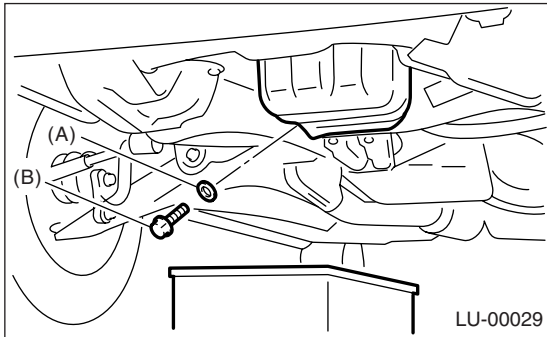


- 11) Lift-up the vehicle.

CAUTION:
When lifting up the vehicle, rise up the wire rope together.

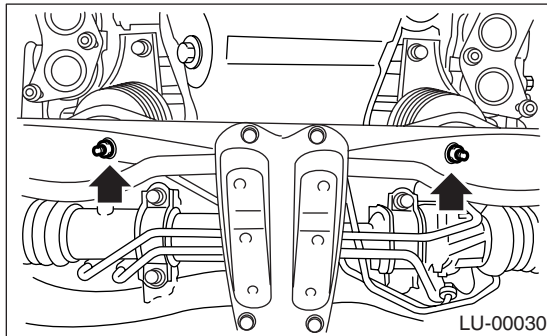
- 12) Remove the under cover.

- 13) Drain the engine oil.
Set a container under the vehicle, and remove the drain plug from oil pan.



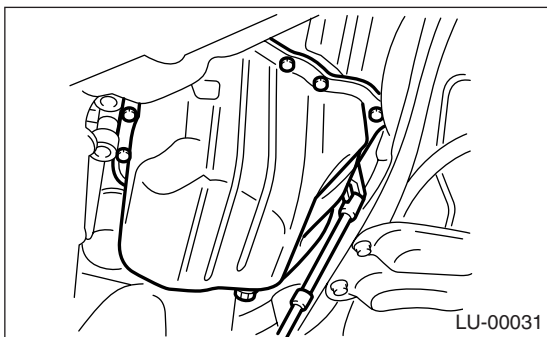
- (A) Gasket
- (B) Drain plug

- 14) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-7, REMOVAL, Front Exhaust Pipe.>
15) Remove the nuts which install front cushion rubber onto front crossmember.

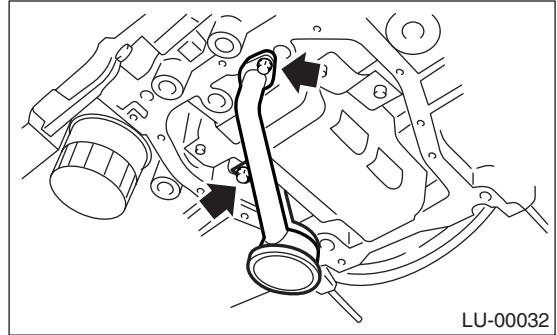


- 16) Remove the bolts which install oil pan on cylinder block while raising up engine.
17) Insert the oil pan cutter blade between the cylinder block to oil pan clearance.

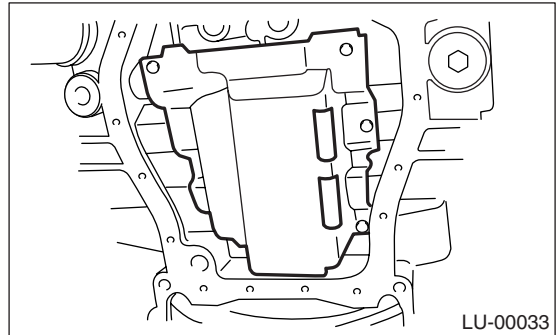
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.



- 18) Remove the oil strainer.



- 19) Remove the baffle plate.



Oil Pan and Strainer

LUBRICATION

B: INSTALLATION

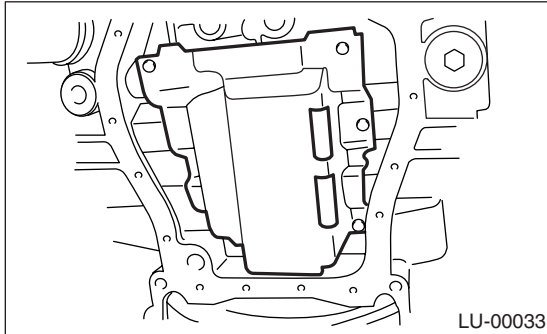
CAUTION:

Before installing the oil pan, clean sealant from oil pan and engine block.

1) Install the baffle plate.

Tightening torque:

6.4 N·m (0.65 kgf·m, 4.7 ft·lb)



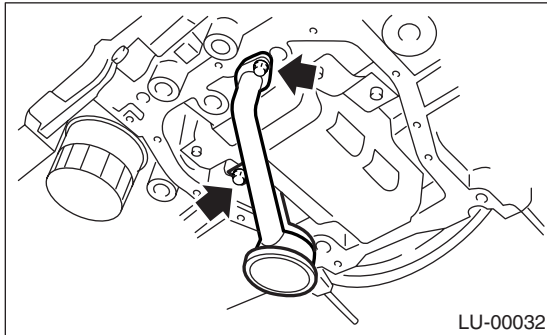
2) Install the oil strainer onto baffle plate.

NOTE:

Replace the O-ring with a new one.

Tightening torque:

10 N·m (1.0 kgf·m, 7.2 ft·lb)

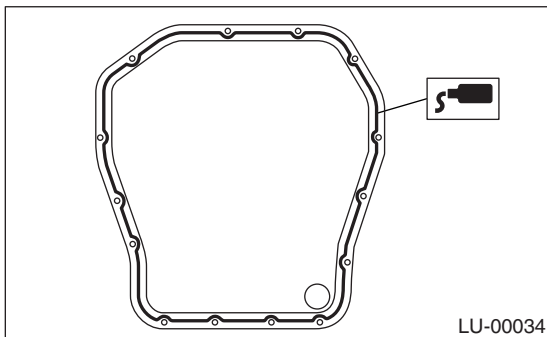


3) Apply liquid gasket to the mating surfaces and install oil pan.

Liquid gasket:

Part No. 004403007

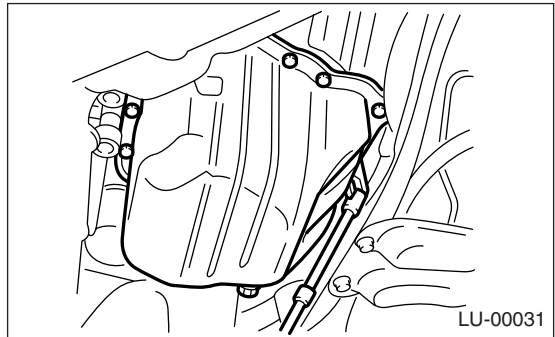
THREE BOND 1215 or equivalent



4) Tighten the bolts which install the oil pan onto engine block.

Tightening torque:

5 N·m (0.5 kgf·m, 3.6 ft·lb)

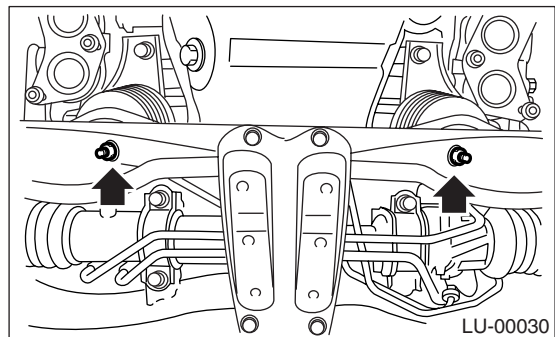


5) Lower the engine onto front crossmember.

6) Tighten the nuts which install front cushion rubber onto front crossmember.

Tightening torque:

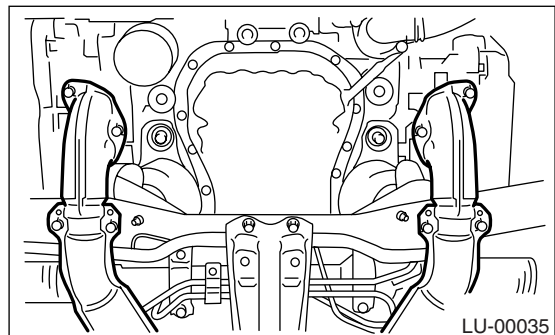
69 N·m (7.0 kgf·m, 50.9 ft·lb)



7) Install the front and center exhaust pipes. (Non-Turbo model) <Ref. to EX(H4SO)-8, INSTALLATION, Front Exhaust Pipe.>

NOTE:

Always use new gaskets.



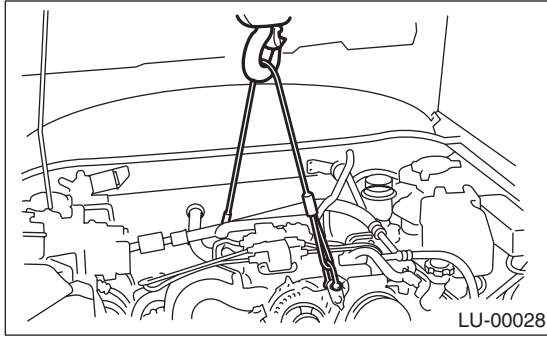
8) Install the under cover.

9) Lower the vehicle.

CAUTION:

When lowering the vehicle, lower the lifting device and wire rope together.

10) Remove the lifting device and steel cables.

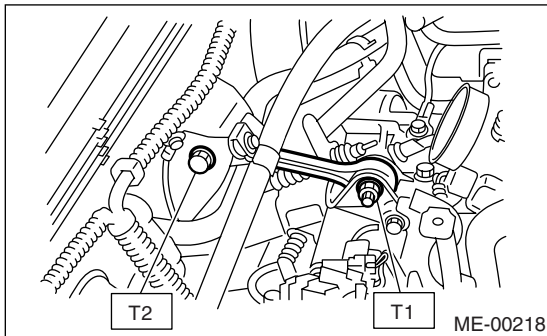


11) Install the pitching stopper.

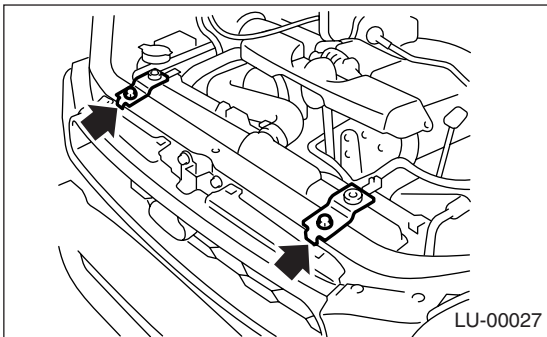
Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



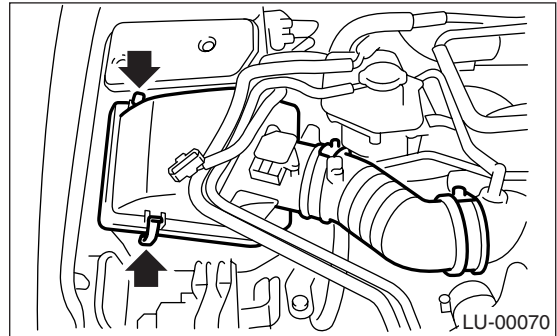
12) Install the radiator upper brackets.



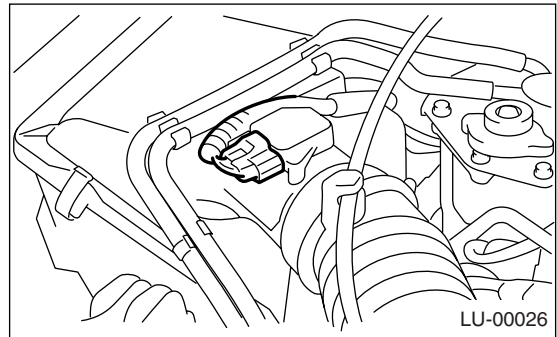
13) Install the air intake duct and air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>

14) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

15) Install the air intake boot and air cleaner upper cover. (Turbo model)

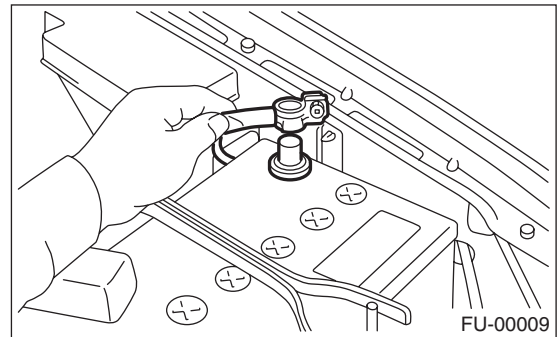


16) Connect the connector to mass air flow sensor. (Turbo model)



17) Install the front wheels.

18) Connect the battery ground cable to battery.



19) Fill engine oil. <Ref. to LU(H4SO)-10, INSPECTION, Engine Oil.>

C: INSPECTION

By visual check make sure the oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

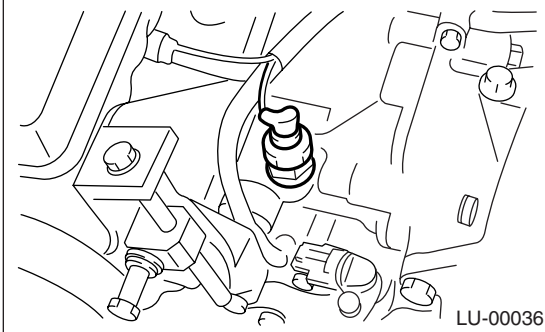
Oil Pressure Switch

LUBRICATION

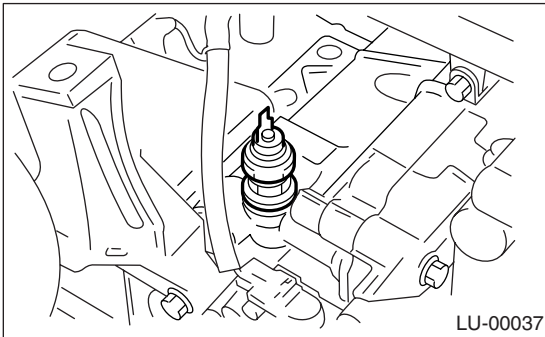
6. Oil Pressure Switch

A: REMOVAL

- 1) Remove the generator from bracket. <Ref. to SC(H4SO)-15, REMOVAL, Generator.>
- 2) Disconnect the terminal from oil pressure switch.



- 3) Remove the oil pressure switch.



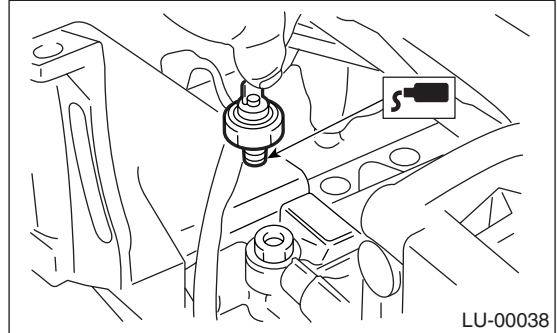
B: INSTALLATION

- 1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket:

Part No. 004403007

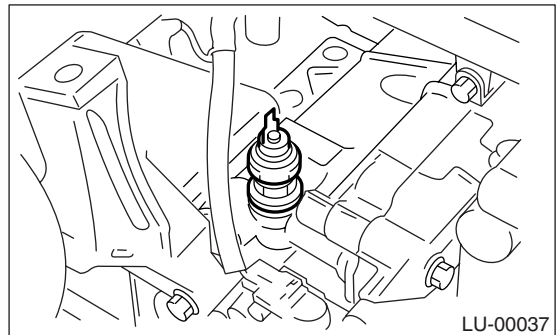
THREE BOND 1324 or equivalent



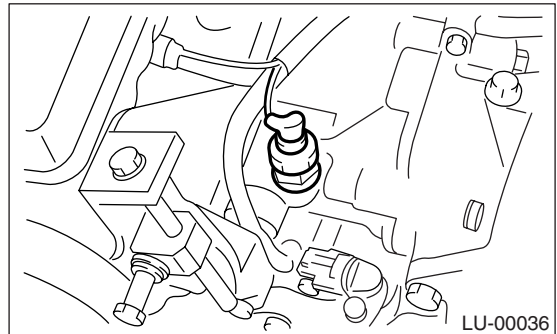
- 2) Install the oil pressure switch onto engine block.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



- 3) Connect the terminal of oil pressure switch.



- 4) Install the generator on bracket. <Ref. to SC(H4SO)-15, INSTALLATION, Generator.>

C: INSPECTION

Make sure oil does not leak or seep from where the oil pressure switch is installed.

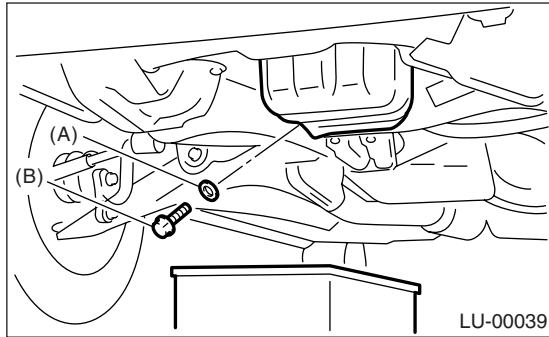
7. Engine Oil Cooler

A: REMOVAL

NOTE:

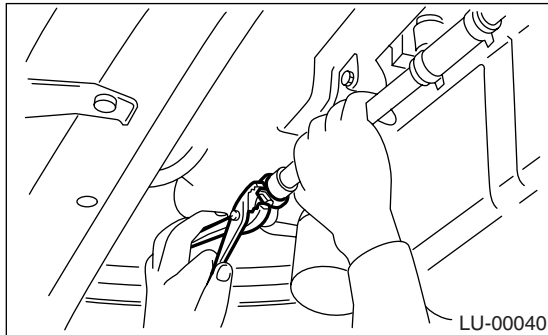
Engine oil cooler is equipped with turbo model only.

- 1) Lift-up the vehicle.
- 2) Remove the under cover.
- 3) Drain the engine oil. Set a container under the vehicle, and remove the drain plug from oil pan.



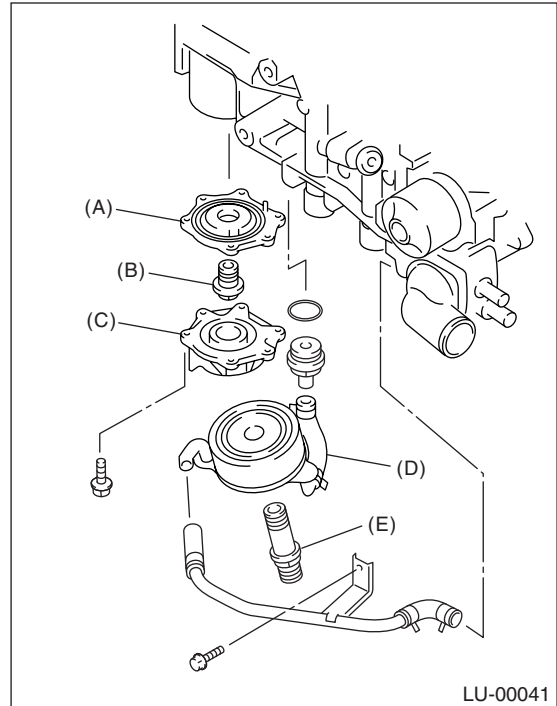
- (A) Gasket
- (B) Drain plug

- 4) Drain the engine coolant.
- 5) Remove the water by-pass pipe between oil cooler and water pump.



- 6) Remove the engine oil filter. <Ref. to LU(H4SO)-23, REMOVAL, Engine Oil Filter.>
- 7) Remove the connector and remove oil cooler.

- 8) Remove the adapters (1) and (2).



- (A) Adapter (1)
- (B) Adapter connector
- (C) Adapter (2)
- (D) Oil cooler
- (E) Oil cooler connector

Engine Oil Cooler

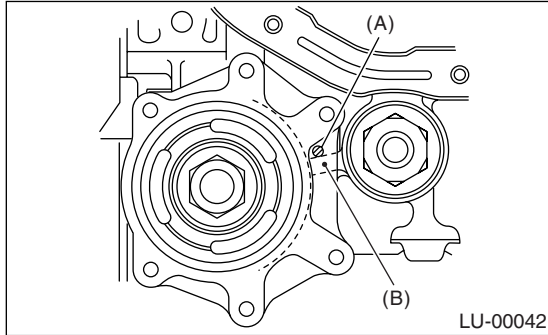
LUBRICATION

B: INSTALLATION

NOTE:

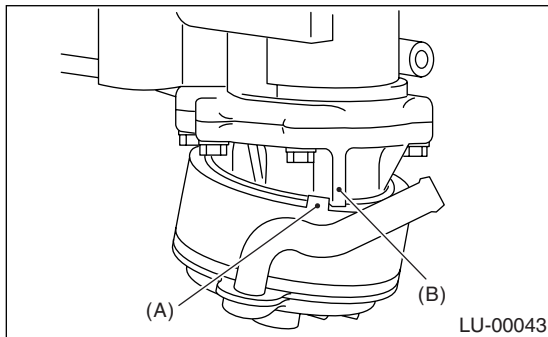
Engine oil cooler is equipped with turbo model only.

- 1) Install in the reverse order of removal.
- 2) Contact the knock pin (A) of adapter (1) to cylinder block rib (B) to install adapter (1).



- 3) Install the adapter (2).

- 4) Contact the engine oil cooler stopper (A) to adapter (2) rib (B) to install engine oil cooler.



Tightening torque:

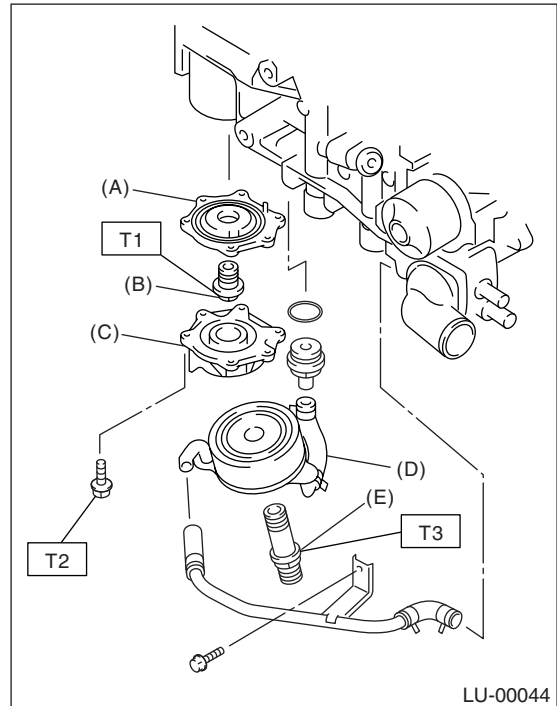
T1: 6.4 N·m (0.7 kgf-m, 5.1 ft-lb)

T2: 44 N·m (4.5 kgf-m, 33 ft-lb)

T3: 54 N·m (5.5 kgf-m, 40 ft-lb)

NOTE:

Always use a new O-ring.



- (A) Adapter (1)
- (B) Adapter connector
- (C) Adapter (2)
- (D) Oil cooler
- (E) Oil cooler connector

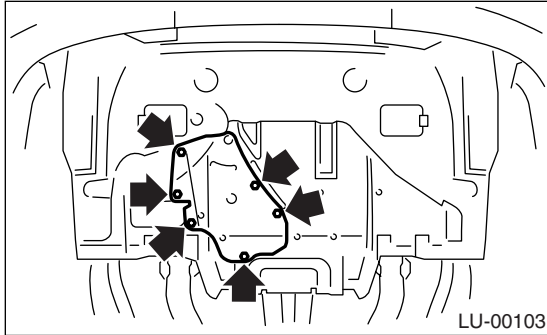
C: INSPECTION

- 1) Check that the coolant passages are not clogged using air blow method.
- 2) Check the mating surfaces of cylinder block, O-ring groove and oil filter for damage.

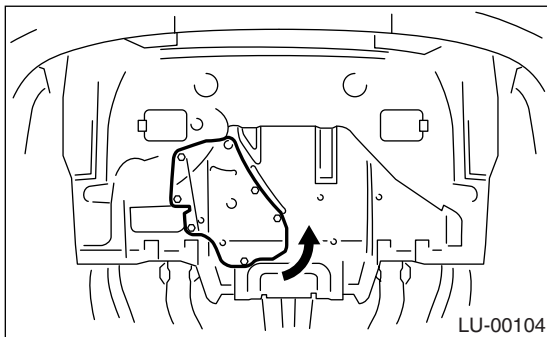
8. Engine Oil Filter

A: REMOVAL

1) Remove six clips on the under cover.

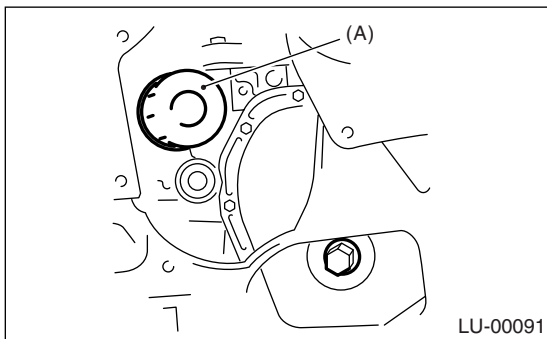


2) Turn the service hole cover counterclockwise.



3) Remove the oil filter with ST.

ST 498547000	OIL FILTER WRENCH (Outer diameter: 80 mm (3.15 in))
ST 18332AA000	OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST 18332AA010	OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))



(A) Oil filter

B: INSTALLATION

- 1) Wipe and clean the oil filter matching surface on cylinder block and oil cooler.
- 2) Get a new oil filter and apply a thin coat of engine oil to the seal rubber.

CAUTION:

Be careful not to use the oil filter 80 mm (3.15 in) in diameter to turbo model.

3) Install the oil filter by turning it by hand, being careful not to damage seal rubber.

- Tighten the oil filter 80 mm (3.15 in) or 65 mm (2.56 in) in diameter by approx. 2/3 — 3/4 rotation more after the seal rubber of oil filter comes in contact with cylinder block or oil cooler.

- Tighten the oil filter 68 mm (2.68 in) in diameter by approx. 1 rotation more after the seal rubber of oil filter comes in contact with cylinder block or oil cooler.

CAUTION:

Do not tighten excessively, or oil may leak.

C: INSPECTION

1) After installing the oil filter, run the engine and make sure that no oil is leaking around seal rubber.

NOTE:

The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H4SO)-10, INSPECTION, Engine Oil.>

Engine Lubrication System Trouble in General

LUBRICATION

9. Engine Lubrication System Trouble in General

A: INSPECTION

Before performing diagnostics, make sure that the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogged oil filter	Replace.
		Malfunction of oil by-pass valve of oil filter	Clean or replace.
		Malfunction of oil relief valve of oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
Stuck oil pump rotor		Replace.	
2. Warning light does not go on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1. — 2).