ENGINE SECTION 3

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.

MECHANICAL

ME(H6DO)

1. General Description

A: SPECIFICATION

Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Chain driven, double overhead camshaft, 4-valve/cylinder
	Bore × Stroke mm (in)			89.2 × 80 (3.512 × 3.150)
	Displacement cm^3 (cu in)			2,999 (183)
	Compression ratio			10.7
	Compression pressure (350 rpm and fully open throttle): kPa (kg/cm^2, psi)			1,275 — 1,471 (13.0 — 15.0, 185 — 213)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Min. advance	Open	BTDC 47°
			Close	ABDC 23°
		Max. retard	Open	ATDC 3°
			Close	ABDC 73°
	Exhaust valve timing		Open	BBDC 60°
			Close	ATDC 6°
	Valve clearance mm (in)	Intake		$0.20^{+0.04}_{-0.06}$ ($0.0079^{+0.0016}_{-0.0024}$)
		Exhaust		0.35±0.05 (0.0138±0.020)
	Idling speed [“P” or “N” range] rpm		No load	650±50
			A/C ON	770±50
	Ignition order			1 → 6 →3 → 2 → 5 → 4
	Ignition timing BTDC/rpm			15°±8°/650

NOTE:
OS: Oversize US: undersize

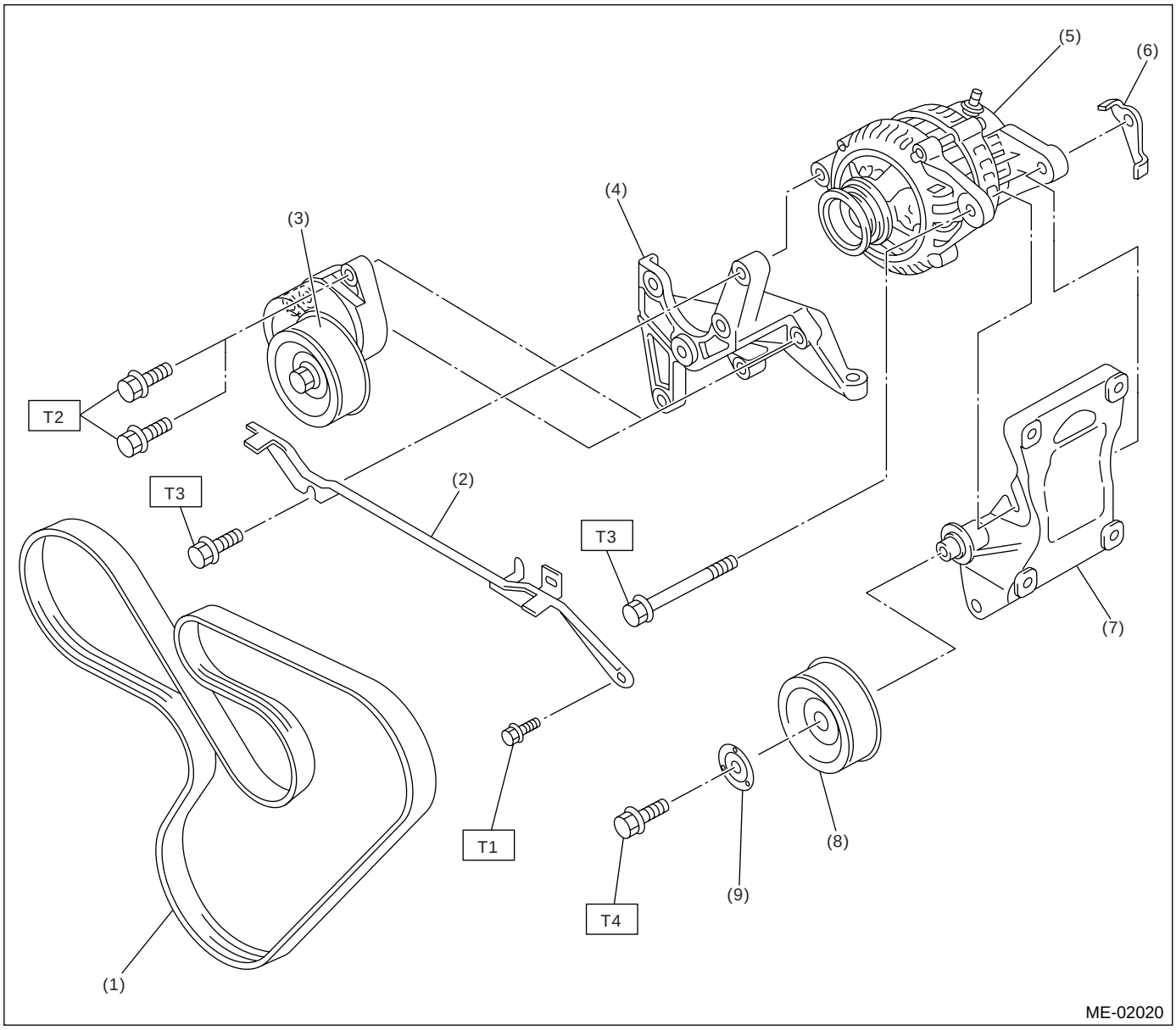
Camshaft	Side clearance mm (in)	Intake		Standard	0.075 — 0.135 (0.0030 — 0.0053)
		Exhaust		Standard	0.030 — 0.090 (0.0012 — 0.0035)
	Cam lobe height mm (in)	Intake	HIGH	Standard	42.09 — 42.19 (1.6571 — 1.6610)
			LOW1	Standard	38.14 — 38.24 (1.5016 — 1.5055)
			LOW2	Standard	34.94 — 35.04 (1.3756 — 1.3795)
		Exhaust		Standard	41.65 — 41.75 (1.6398 — 1.6437)
	Cam base circle diam-eter mm (in)	Intake	HIGH	Standard	32.00 (1.2598)
			LOW1	Standard	31.84 (1.2535)
			LOW2	Standard	31.84 (1.2535)
		Exhaust		Standard	32.00 (1.2598)
	Journal O.D. mm (in)	Front:		Standard	37.946 — 37.963 (1.4939 — 1.4946)
		Except for front		Standard	25.946 — 25.963 (1.0215 — 1.0222)
	Oil clearance mm (in)			Standard	0.037 — 0.072 (0.0015 — 0.0028)
Cylinder head	Flatness mm (in)			Standard	0.02 (0.0008)
	Inner diameter of valve lifter hole mm (in)				32.994 — 33.016 (1.2990 — 1.2998)
	Standard height mm (in)				124±0.05 (4.88±0.0020)
Valve seat	Refacing angle				90°
	Contacting width mm (in)	Intake		Standard	1.0 (0.039)
		Exhaust		Standard	1.5 (0.059)
Valve guide	Inside diameter mm (in)				5.500 — 5.512 (0.2165 — 0.2170)
	Protrusion above head mm (in)				11.4 — 11.8 (0.449 — 0.465)

Valve	Head edge thickness mm (in)	Intake	Standard	1.0 (0.039)
		Exhaust	Standard	1.2 (0.047)
	Stem outer diameter mm (in)	Intake		5.455 — 5.470 (0.2148 — 0.2145)
		Exhaust		5.455 — 5.460 (0.2148 — 0.2150)
	Stem oil clearance	Intake	Standard	0.030 — 0.057 (0.0012 — 0.0022)
		Exhaust	Standard	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)	Intake		99.7 (3.925)
		Exhaust		105.2 (4.142)
	Outer diameter of valve lifter mm (in)			32.959 — 32.975 (1.2976 — 1.2982)
Valve spring	Free length mm (in)	Intake	Inner	39.55 (1.5571)
			Outer	41.18 (1.6213)
		Exhaust		46.32 (1.8236)
	Squareness	Intake	Inner	2.5°, 1.7 mm (0.067 in)
			Outer	2.5°, 1.8 mm (0.071 in)
		Exhaust		2.5°, 2.0 mm (0.079 in)
Cylinder block	Standard height mm (in)			202 (7.95)
	Cylinder inner diameter mm (in)	Stan-dard	A	89.205 — 89.215 (3.5120 — 3.5124)
			B	89.195 — 89.205 (3.5116 — 3.5120)
	Cylindricality mm (in)		Standard	0.030 (0.0012)
	Out-of-roundness mm (in)		Standard	0.010 (0.0004)
	Piston clearance mm (in)		Standard	−0.010 — 0.010 (−0.0004 — 0.0004)
Piston	Outer diameter mm (in)	Standard	A	89.205 — 89.215 (3.5120 — 3.5124)
			B	89.195 — 89.205 (3.5116 — 3.5120)
		0.25 (0.0098) OS		89.445 — 89.465 (3.5215 — 3.5222)
		0.50 (0.0197) OS		89.695 — 89.715 (3.5313 — 3.5321)
	Inner diameter of piston pin hole		Standard	22.000 — 22.006 (0.8661 — 0.8664)
Piston pin	Outer diameter mm (in)		Standard	21.994 — 22.000 (0.8659 — 0.8661)
	Standard clearance between piston and piston pin mm (in)		Standard	0.004 — 0.008 (0.0002 — 0.0003)
Piston ring	Ring closed gap mm (in)	Top ring	Standard	0.20 — 0.35 (0.0079 — 0.0138)
		Second ring	Standard	0.35 — 0.50 (0.0138 — 0.0197)
		Oil ring	Standard	0.20 — 0.60 (0.0079 — 0.0236)
	Ring groove gap mm (in)	Top ring	Standard	0.040 — 0.080 (0.0016 — 0.0031)
		Second ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)
		Oil ring	Standard	0.045 — 0.125 (0.0018 — 0.0049)
Connecting rod	Side clearance of large end mm (in)		Standard	0.070 — 0.330 (0.0028 — 0.0130)
Bearing of large end	Oil clearance mm (in)		Standard	0.016 — 0.043 (0.0006 — 0.0017)
	Bearing size (Thickness at center) mm (in)	Standard		1.490 — 1.506 (0.0587 — 0.0593)
		0.03 (0.0012) US		1.509 — 1.513 (0.0594 — 0.0596)
		0.05 (0.0020) US		1.519 — 1.523 (0.0598 — 0.0600)
		0.25 (0.0098) US		1.619 — 1.623 (0.0637 — 0.0639)
Bushing of small end	Clearance between piston pin and bushing mm (in)		Standard	0 — 0.022 (0 — 0.0009)

Crankshaft	Crank pin and crank journal	Out-of-roundness mm (in)		0.005 (0.0002)
		Cylindricality mm (in)		0.006 (0.0002)
	Crank pin outer diameter mm (in)		Standard	51.984 — 52.000 (2.0466 — 2.0472)
			0.03 (0.0012) US	51.954 — 51.970 (2.0454 — 2.0461)
			0.05 (0.0020) US	51.934 — 51.950 (2.0446 — 2.0453)
			0.25 (0.0098) US	51.734 — 51.750 (2.0368 — 2.0374)
	Crank journal outer diameter mm (in)	#1, #3, #5, #7	Standard	63.992 — 64.008 (2.5194 — 2.5200)
			0.03 (0.0012) US	63.962 — 63.978 (2.5182 — 2.5188)
			0.05 (0.0020) US	63.942 — 63.958 (2.5174 — 2.5180)
			0.25 (0.0098) US	63.742 — 63.758 (2.5095 — 2.5102)
		#2, #4, #6	Standard	63.992 — 64.008 (2.5194 — 2.5200)
			0.03 (0.0012) US	63.962 — 63.978 (2.5182 — 2.5188)
			0.05 (0.0020) US	63.942 — 63.958 (2.5174 — 2.5180)
			0.25 (0.0098) US	63.742 — 63.758 (2.5095 — 2.5102)
	Thrust clearance mm (in)		Standard	0.030 — 0.115 (0.0012 — 0.0045)
	Oil clearance mm (in)		Standard	0.010 — 0.030 (0.0004 — 0.0012)
Main bearing	Bearing size (Thickness at center) mm (in)	#1, #3, #5, #7	Standard	1.992 — 2.005 (0.0784 — 0.0789)
			0.03 (0.0012) US	2.011 — 2.014 (0.0792 — 0.0793)
			0.05 (0.0020) US	2.021 — 2.024 (0.0796 — 0.0797)
			0.25 (0.0098) US	2.121 — 2.124 (0.0835 — 0.0836)
		#2, #4, #6	Standard	1.996 — 2.009 (0.0786 — 0.0791)
			0.03 (0.0012) US	2.015 — 2.018 (0.0793 — 0.0794)
			0.05 (0.0020) US	2.025 — 2.028 (0.0797 — 0.0798)
			0.25 (0.0098) US	2.125 — 2.128 (0.0837 — 0.0838)

B: COMPONENT

1. V-BELT

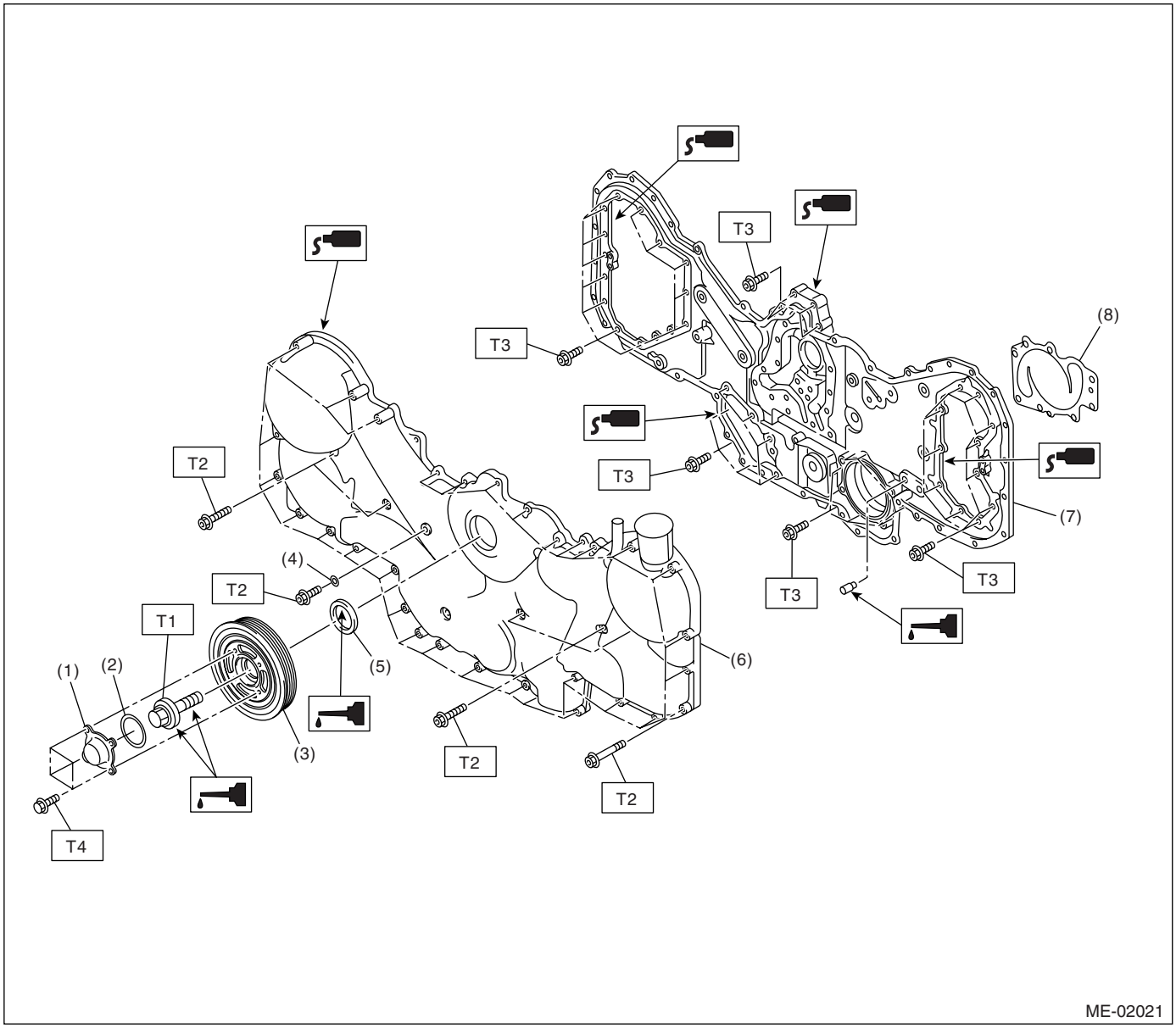


(1)	V-belt	(6)	Generator plate
(2)	Collector cover bracket	(7)	A/C compressor stay
(3)	Belt tension adjuster ASSY	(8)	Idler pulley
(4)	Power steering pump bracket	(9)	Idler pulley cover
(5)	Generator		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)
T2: 20 (2.0, 14)
T3: 25 (2.5, 18)
T4: 33 (3.4, 25)

2. TIMING CHAIN COVER



(1) Crank pulley cover
(2) O-ring
(3) Crank pulley
(4) Sealing washer
(5) Oil seal
(6) Front chain cover
(7) Rear chain cover
(8) Water pump gasket

Tightening torque: N·m (kgf-m, ft-lb)

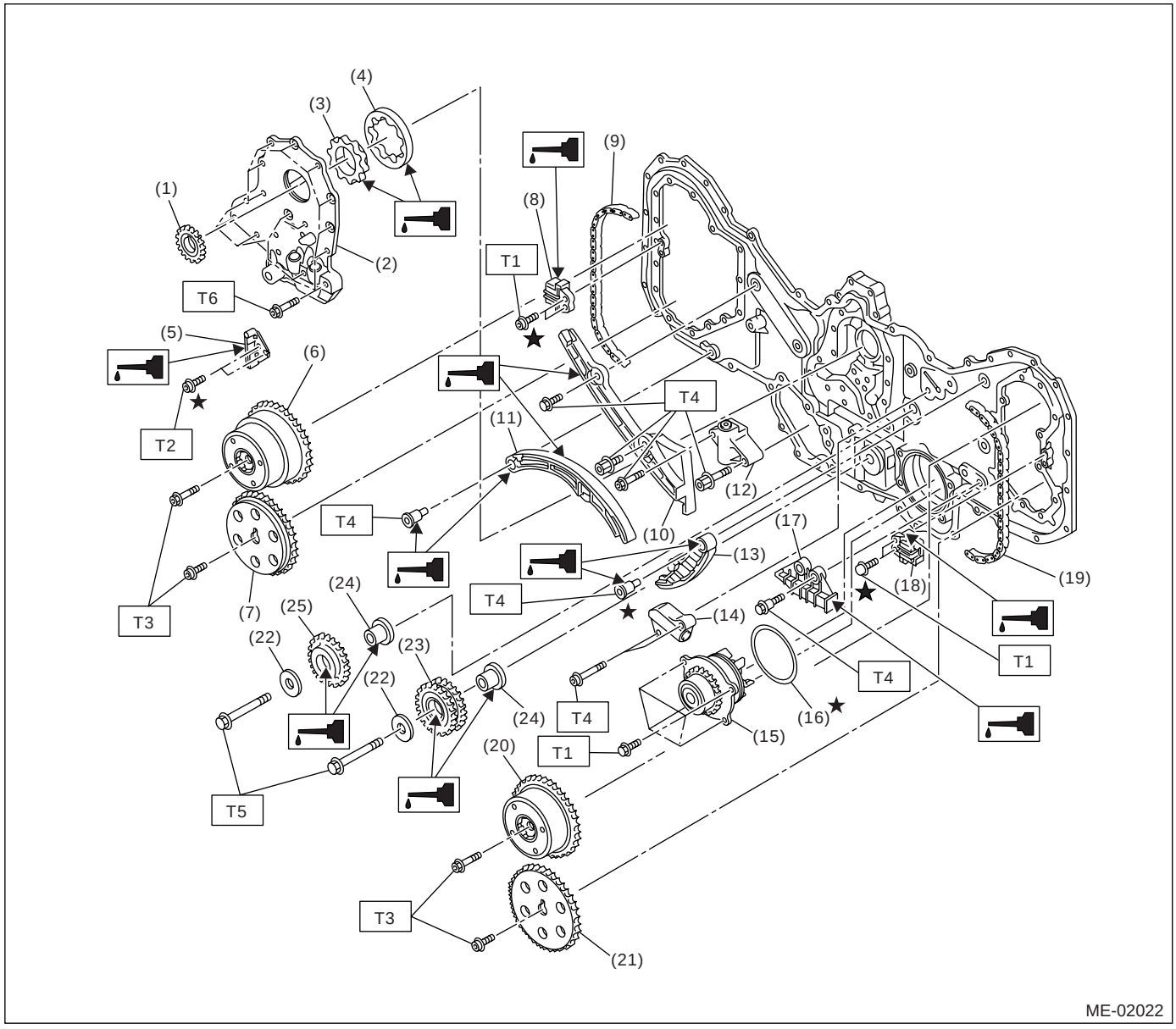
T1: <Ref. to ME(H6DO)-42, Crank Pulley.>

T2: <Ref. to ME(H6DO)-43, Front Chain Cover.>

T3: <Ref. to ME(H6DO)-52, Rear Chain Cover.>

T4: 6.4 (0.65, 4.7)

3. TIMING CHAIN



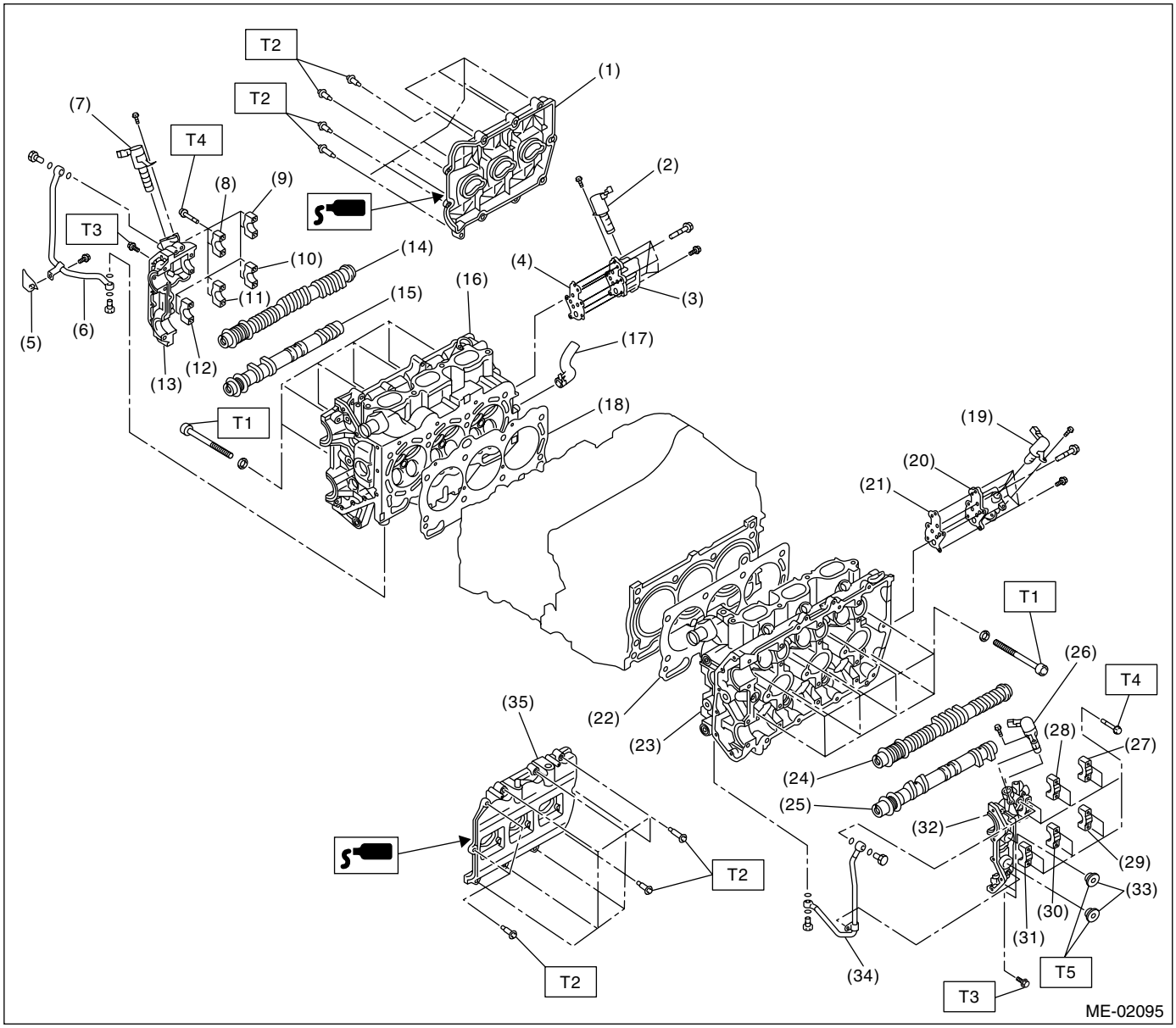
ME-02022

(1) Crank sprocket
(2) Oil relief case
(3) Inner rotor
(4) Outer rotor
(5) Chain guide (CTR)
(6) Intake cam sprocket (RH)
(7) Exhaust cam sprocket (RH)
(8) Chain guide (RH: between cams)
(9) Timing chain (RH)
(10) Chain guide (RH)
(11) Chain tensioner lever (RH)
(12) Chain tensioner (RH)
(13) Chain tensioner lever (LH)
(14) Chain tensioner (LH)
(15) Water pump
(16) O-ring
(17) Chain guide (LH)
(18) Chain guide (LH: between cams)
(19) Timing chain (LH)
(20) Intake cam sprocket (LH)
(21) Exhaust cam sprocket (LH)
(22) Idler sprocket plate
(23) Idler sprocket (lower)
(24) Idler sprocket collar
(25) Idler sprocket (upper)

Tightening torque: N·m (kgf-m, ft-lb)

T1: ***6.4 (0.64, 4.7)***
T2: ***7.8 (0.80, 5.8)***
T3: ***<Ref. to ME(H6DO)-50, Cam Sprocket.>***
T4: ***16 (1.6, 11.6)***
T5: ***69 (7.0, 50.6)***
T6: <Ref. to LU(H6DO)-8, Oil Pump.>

4. CYLINDER HEAD AND CAMSHAFT

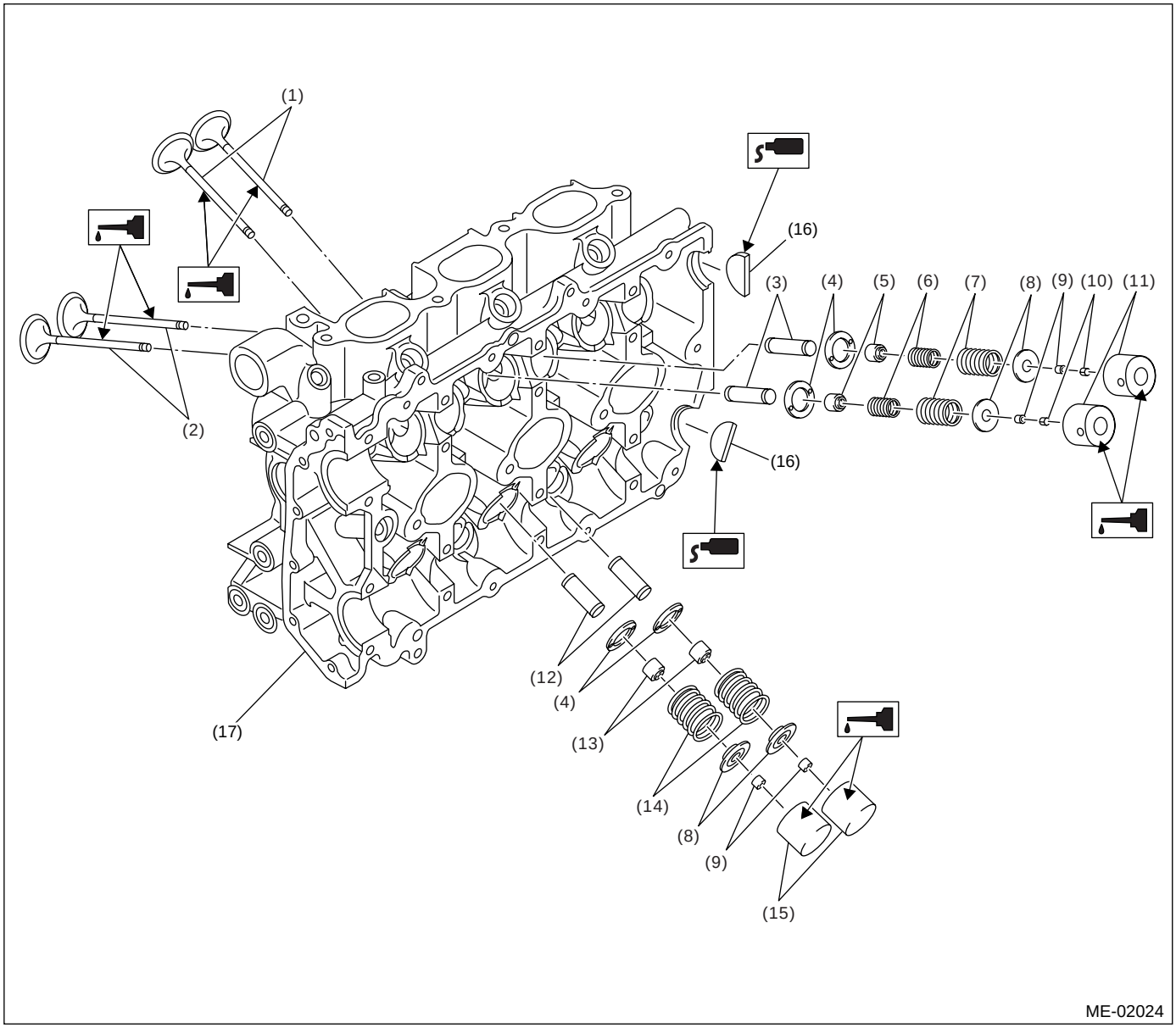


(1) Rocker cover (RH)
(2) Oil switching solenoid valve (RH)
(3) Oil switching solenoid valve holder (RH)
(4) Oil switching solenoid valve gasket
(5) Rear chain cover
(6) Oil pipe (RH)
(7) Oil flow control solenoid valve (RH)
(8) Intake camshaft cap (Center RH)
(9) Intake camshaft cap (Rear RH)
(10) Exhaust camshaft cap (Rear RH)
(11) Exhaust camshaft cap (Center RH)
(12) Exhaust camshaft cap (Front RH)
(13) Front camshaft cap (RH)
(14) Intake camshaft (RH)
(15) Exhaust camshaft (RH)
(16) Cylinder head (RH)
(17) Water hose
(18) Cylinder head gasket (RH)
(19) Oil switching solenoid valve (LH)
(20) Oil switching solenoid valve holder (LH)
(21) Oil switching solenoid valve gasket
(22) Cylinder head gasket (LH)
(23) Cylinder head (LH)
(24) Intake camshaft (LH)
(25) Exhaust camshaft (LH)
(26) Oil flow control solenoid valve (LH)
(27) Intake camshaft cap (Rear LH)
(28) Intake camshaft cap (Center LH)
(29) Exhaust camshaft cap (Rear LH)
(30) Exhaust camshaft cap (Center LH)
(31) Exhaust camshaft cap (Front LH)
(32) Front camshaft cap (LH)
(33) Plug
(34) Oil pipe (LH)
(35) Rocker cover (LH)

Tightening torque:N·m (kgf-m, ft-lb)

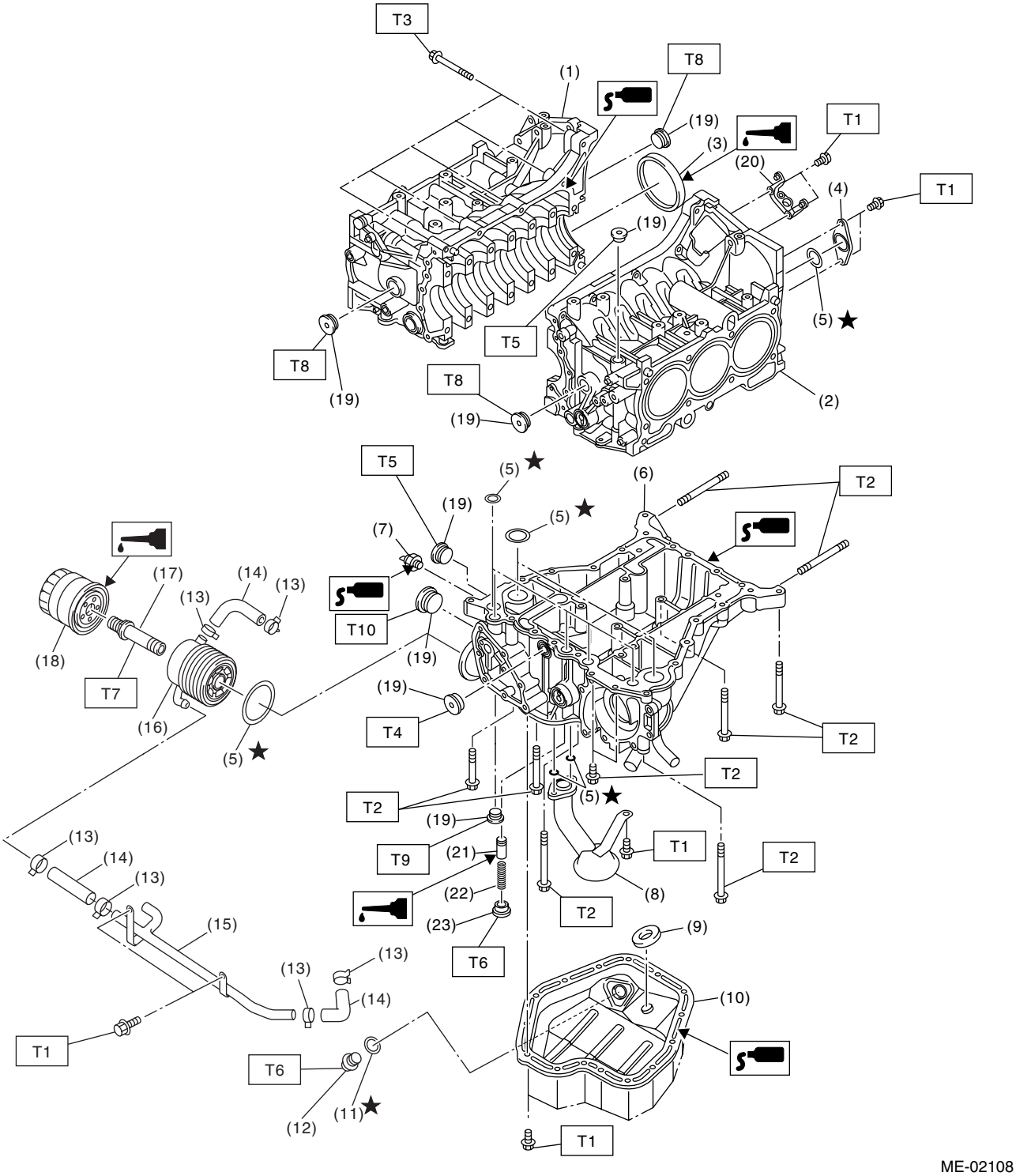
T1:	***<Ref. to ME(H6DO)-58, Cylinder Head.>***
T2:	***<Ref. to ME(H6DO)-54, Camshaft.>***
T3:	***9.75 (1.0, 7.2)***
T4:	***16 (1.6, 12)***
T5:	***60 (6.1, 44)***

5. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Intake valve guide
(4) Valve spring seat
(5) Intake valve stem seal
(6) Valve spring (Inner)
(7) Valve spring (Outer)
(8) Retainer
(9) Retainer key
(10) Shim
(11) Valve lifter (Intake)
(12) Exhaust valve guide
(13) Exhaust valve stem seal
(14) Valve spring
(15) Valve lifter (Exhaust)
(16) Cylinder head plug
(17) Cylinder head

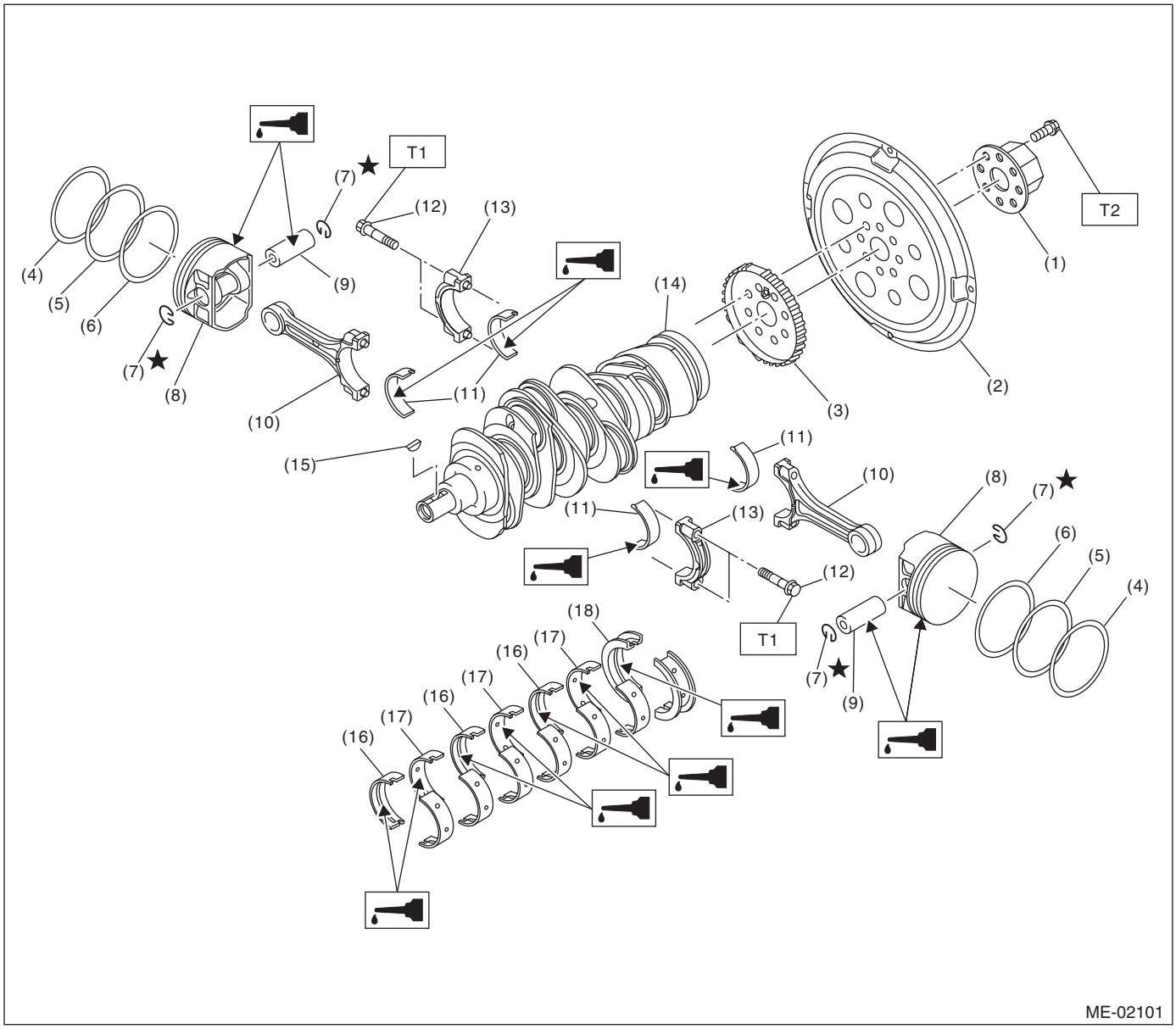
6. CYLINDER BLOCK



(1) Cylinder block (RH)
(2) Cylinder block (LH)
(3) Rear oil seal
(4) Service hole cover
(5) O-ring
(6) Oil pan upper
(7) Oil pressure switch
(8) Oil strainer
(9) Magnet
(10) Oil pan lower
(11) Metal gasket
(12) Drain plug
(13) Clamp
(14) Hose
(15) Oil cooler pipe
(16) Oil cooler
(17) Connector
(18) Oil filter
(19) Plug
(20) Crankshaft position sensor holder
(21) Relief valve
(22) Relief valve spring
(23) Plug

Tightening torque:N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 18 (1.8, 13.0)
T3: 25 (2.5, 18)
T4: 16 (1.6, 12)
T5: 37 (3.8, 27)
T6: 44 (4.5, 33)
T7: 54 (5.5, 40)
T8: 70 (7.1, 52)
T9: 23 (2.3, 17)
T10: 90 (9.2, 67)

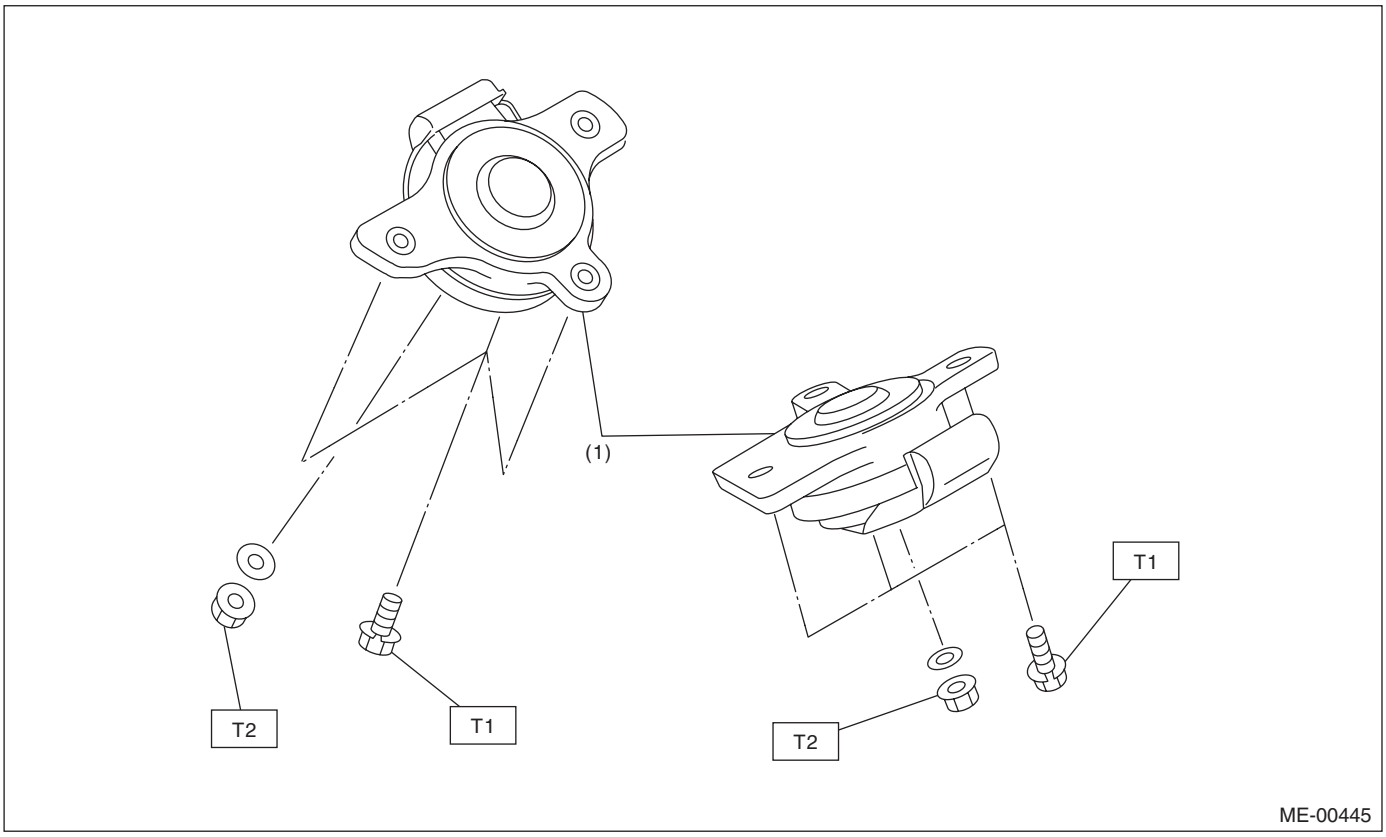
7. CRANKSHAFT AND PISTON



(1) Reinforcement
(2) Drive plate
(3) Crankshaft sensor plate
(4) Top ring
(5) Second ring
(6) Oil ring
(7) Snap ring
(8) Piston
(9) Piston pin
(10) Connecting Rod
(11) Connecting rod bearing
(12) Connecting rod bolt
(13) Connecting rod cap
(14) Crankshaft
(15) Woodruff key
(16) Crankshaft bearing #1, #3, #5
(17) Crankshaft bearing #2, #4, #6
(18) Crankshaft bearing #7

Tightening torque: N·m (kgf-m, ft-lb)
T1: 53 (5.4, 39)
T2: 81 (8.3, 60)

8. ENGINE MOUNTING



(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 85 (8.7, 63)

C: CAUTION

• Wear work 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 and 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 on 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.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools, or not to stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOL

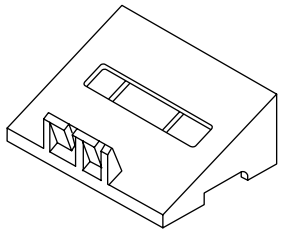
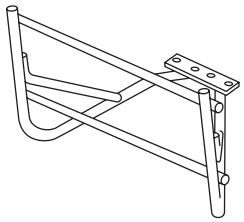
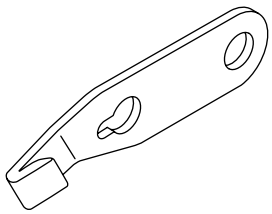
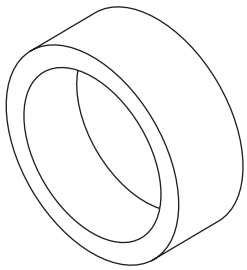
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18250AA010	18250AA010	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.
 ST18232AA000	18232AA000	ENGINE STAND	Used for disassembling and assembling engine.
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel or drive plate when loosening/tightening crank pulley bolt.
 ST18254AA000	18254AA000	PISTON PIN GUIDE	Used for installing piston in cylinder.

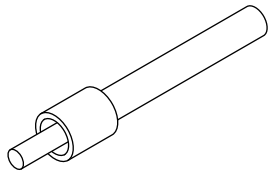
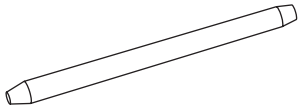
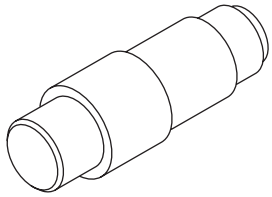
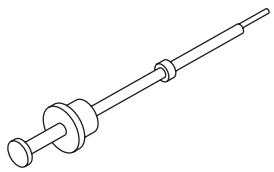
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499585500	499585500	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST18253AA000	18253AA000	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST18350AA000	18350AA000	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499097500	499097500	PISTON PIN REMOVER ASSY	Used for removing piston pin.

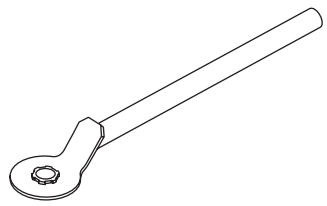
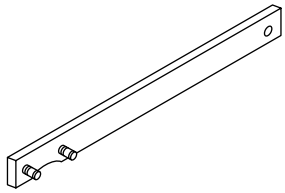
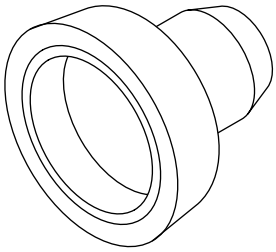
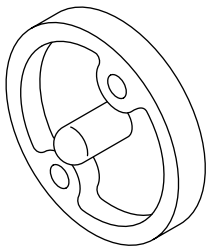
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket.
 ST18231AA020	18231AA020	CAM SPROCKET WRENCH	Used for removing and installing exhaust cam sprocket.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).

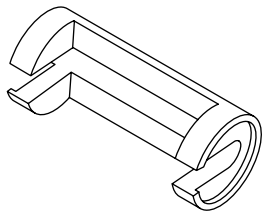
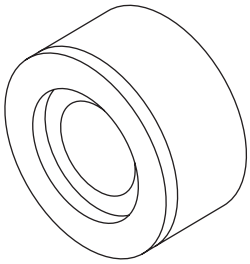
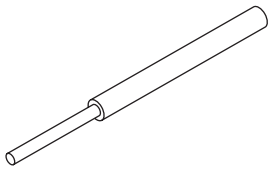
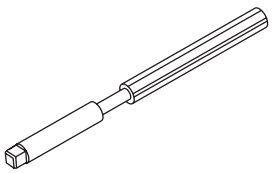
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA040	18251AA040	VALVE GUIDE ADJUSTER	Used for installing valve guides.
 ST-499765700	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499765900	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.

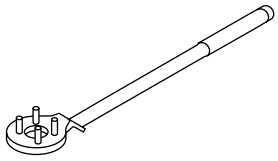
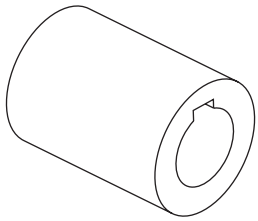
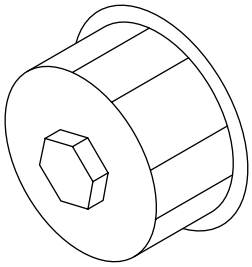
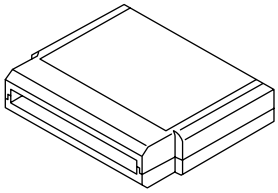
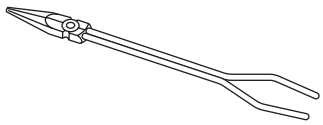
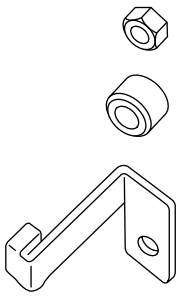
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt.
 ST18252AA000	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST-498547000	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)
 ST18233AA000	18233AA000	PISTON PIN SNAP RING PLIERS	Used for removing and installing snap ring of piston pin.
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- Camshaft
- Cylinder head

2. Compression

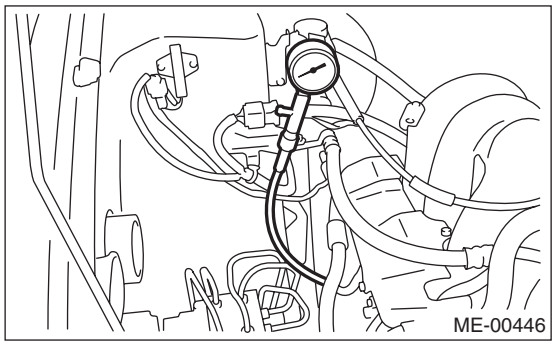
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
4) Remove all the spark plugs. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>
5) Check the starter motor for satisfactory performance and operation.
6) Hold the compression gauge tight against the spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

7) Fully open the throttle valve.
8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
Standard:
1,275 — 1,471 kPa (13.0 — 15.0 kg/cm^2, 185 — 213 psi)
Service limit:
1, 128 kPa (11.5 kgf/cm^2, 164 psi)

3. Idle Speed

A: INSPECTION

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to the Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine, and read engine idle speed.
12) Check the idle speed when no-loaded. (Headlight, heater fan, rear defroster, radiator fan, A/C, etc. are OFF.)

Idle speed [No load and gears in neutral]:
650±50 rpm

13) Check the idle speed when loaded. (Turn the air conditioning switch to “ON” and operate the compressor for at least one minute before measurement.)

Idle speed [A/C “ON”, and gears in neutral]:
770±50 rpm

NOTE:
Idle speed cannot be adjusted manually, because the idle speed is automatically adjusted. If the idle speed is out of specifications, refer to General Diagnosis Table under “Engine Control System”. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself at measurement.

1. WITH SUBARU SELECT MONITOR

1) Before checking the ignition timing speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to the Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine and check the ignition timing at the idle speed.

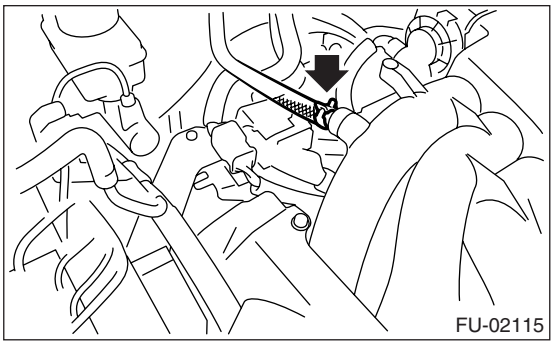
Ignition timing [BTDC/rpm]:
15°±8°/650

If the timing is not correct, check the ignition control system. Refer to “Engine Control System”. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Idle the engine.
2) Disconnect the brake vacuum hose from the intake manifold, and then install the vacuum gauge.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



Vacuum pressure (at idling, A/C "OFF"):
–60.0 kPa (–450 mmHg, –17.72 inHg) or less

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket, disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Exhaust pressure is too high, or exhaust system is clogged.
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Valve anchoring
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

6. Engine Oil Pressure

A: INSPECTION

1) Remove the oil pressure switch from cylinder block. <Ref. to LU(H6DO)-12, REMOVAL, Oil Pressure Switch.>
2) Connect the oil pressure gauge hose to cylinder block.
3) Connect the battery ground cable to battery.
4) Start the engine, and measure oil pressure.

OIL PRESSURE (at oil temperature of 80°C (176°F)):
Standard:
135 kPa (1.4 kg/cm^2, 20 psi) or more (at 600 rpm)
500 kPa (5.1 kg/cm^2, 73 psi) or more (at 5,000 rpm)

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H6DO)-16, INSPECTION, General Diagnostic Table.>
• If the oil pressure warning light come on and oil pressure is in specification, replace the oil pressure switch. <Ref. to LU(H6DO)-16, INSPECTION, General Diagnostic Table.>

5) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H6DO)-12, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

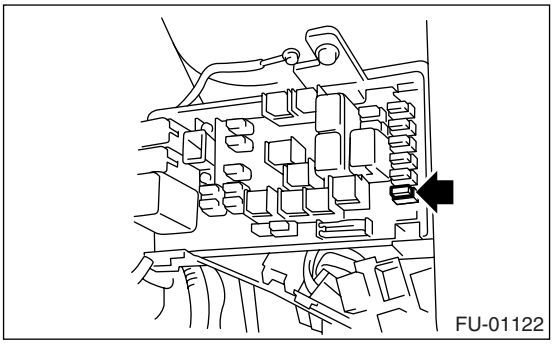
7. Fuel Pressure

A: INSPECTION

WARNING:
Before removing the fuel pressure gauge, release fuel pressure.

NOTE:
When the fuel pressure is out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the fuel delivery hose and connect fuel pressure gauge.
4) Remove the fuse of fuel pump from main fuse box.



5) Start the engine.
6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard: 333 — 363 kPa (3.4 — 3.7 kgf/cm^2, 48 — 53 psi)

7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard: 279 — 309 kPa (2.85 — 3.15 kgf/cm^2, 40 — 45 psi)

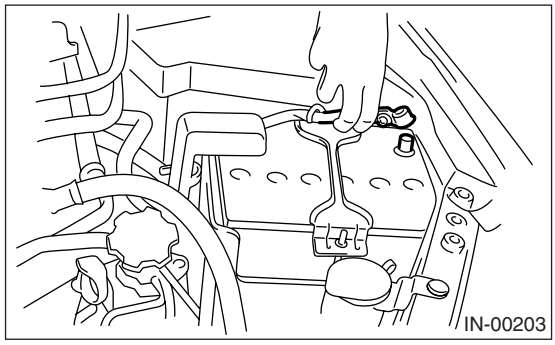
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

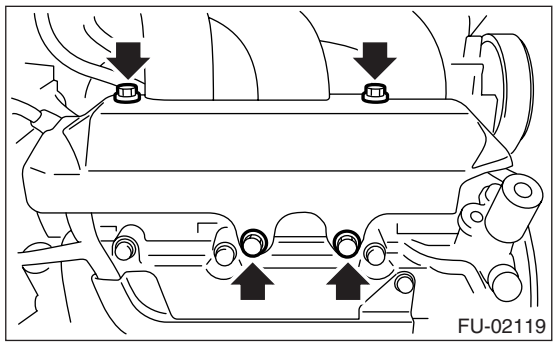
A: INSPECTION

Inspection and adjustment of valve clearance should be performed while engine is cold.

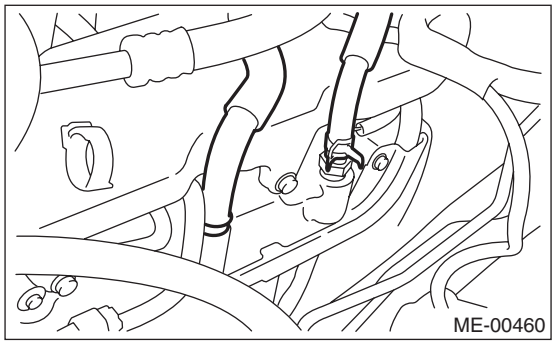
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.



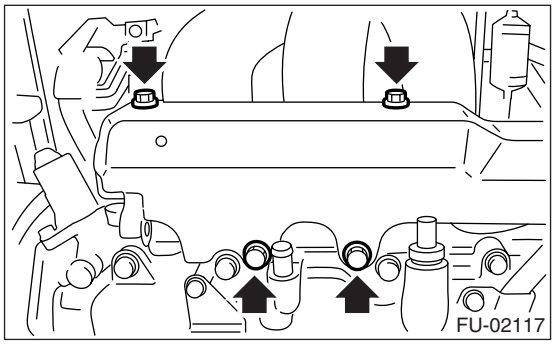
4) Lift-up the vehicle.
5) Remove the under cover.
6) Lower the vehicle.
7) When inspecting RH side cylinders:
   (1) Remove the air intake duct and air cleaner case. <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
   (2) Remove the fuel tank protector (RH).



   (3) Remove the fuel injectors. <Ref. to FU(H6DO)-26, REMOVAL, Fuel Injector.>
   (4) Disconnect the connector of oil pressure switch.
   (5) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil & Ignitor ASSY.>
   (6) Remove the rocker cover (RH).
8) When inspecting LH side cylinders:
   (1) Disconnect the battery cable, and then remove the battery and battery carrier.
   (2) Disconnect the PCV hose and blow-by hose from rocker cover (LH).

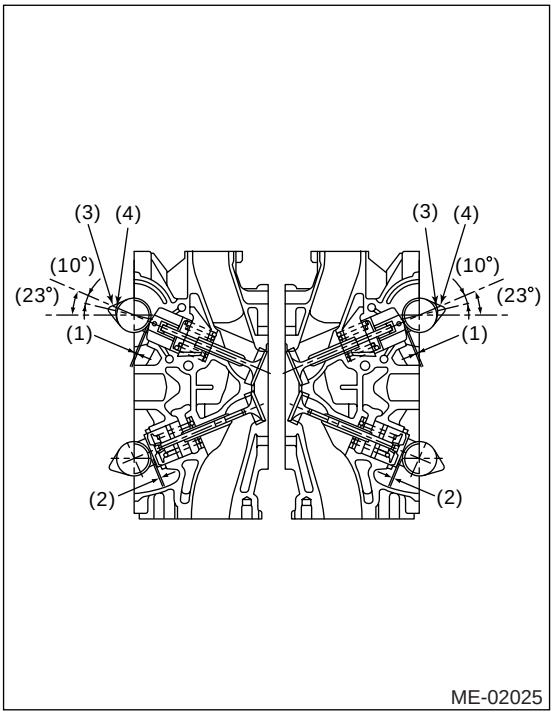


   (3) Remove the fuel pipe protector (LH).



   (4) Remove the fuel injectors. <Ref. to FU(H6DO)-26, REMOVAL, Fuel Injector.>
   (5) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil & Ignitor ASSY.>
   (6) Remove the rocker cover (LH).

9) Turn the crankshaft clockwise until the cam is set to position shown in the figure.



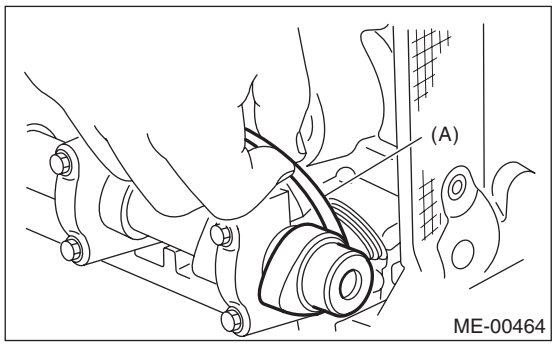
(1) Valve clearance (Intake side)
(2) Valve clearance (Exhaust side)
(3) High lift cam
(4) Low lift cam

10) Measure the clearance of intake valve and exhaust valve using thickness gauge (A).

NOTE:
• Measure it within the range of ±30° that shown in the figure.
• Measure it in low lift cam for intake side.
• Insert the thickness gauge in as horizontal a direction as possible with respect to the valve lifter.

Valve clearance
Intake:
$0.20^{+0.04}_{-0.06}$ mm ($0.0079^{+0.0016}_{-0.0024}$ in)
Exhaust:
0.35±0.05 mm (0.0138±0.0020 in)

• If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



11) If necessary, adjust the valve clearance. <Ref. to ME(H6DO)-29, ADJUSTMENT, VALVE CLEARANCE.>
12) Further turn the crank pulley clockwise and then measure the valve clearances again.
13) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

1. INTAKE SIDE

CAUTION:
• Adjustment of valve clearance should be performed while engine is cold.
• Do not wear gloves during removal and installation of valve lifter.
• Do not use a valve lifter which got high impact due to drop, etc.
• When installing the valve lifter, align the anti-rotation of valve lifter with groove on cylinder head, and then insert the valve lifter.

1) Measure all valve clearances.
<Ref. to ME(H6DO)-28, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.

2) Remove the camshaft. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of shim with a micrometer.
5) Select a shim of suitable thickness using measured valve clearance and shim thickness, by referring to the following table.

Unit: (mm)
S = (V + T) − 0.20
S: Required shim thickness V: Measured valve clearance T: Shim thickness to be used

Part No.	Thickness mm (in)
13218AK890	1.92 (0.0756)
13218AK900	1.94 (0.0764)
13218AK910	1.96 (0.0772)
13218AK920	1.98 (0.0780)
13218AK930	2.00 (0.0787)
13218AK940	2.02 (0.0795)
13218AK950	2.04 (0.0803)
13218AK960	2.06 (0.0811)
13218AK970	2.07 (0.0815)
13218AK980	2.08 (0.0819)
13218AK990	2.09 (0.0823)
13218AL000	2.10 (0.0827)
13218AL010	2.11 (0.0831)
13218AL020	2.12 (0.0835)
13218AL030	2.13 (0.0839)
13218AL040	2.14 (0.0843)
13218AL050	2.15 (0.0846)
13218AL060	2.16 (0.0850)
13218AL070	2.17 (0.0854)
13218AL080	2.18 (0.0858)
13218AL090	2.19 (0.0862)
13218AL100	2.20 (0.0866)
13218AL110	2.21 (0.0870)
13218AL120	2.22 (0.0874)
13218AL130	2.23 (0.0878)
13218AL140	2.24 (0.0882)
13218AL150	2.25 (0.0886)
13218AL160	2.26 (0.0890)
13218AL170	2.27 (0.0894)
13218AL180	2.28 (0.0898)
13218AL190	2.29 (0.0902)
13218AL200	2.30 (0.0906)
13218AL210	2.31 (0.0909)
13218AL220	2.32 (0.0913)
13218AL230	2.33 (0.0917)
13218AL240	2.34 (0.0921)
13218AL250	2.35 (0.0925)
13218AL260	2.36 (0.0929)
13218AL270	2.37 (0.0933)
13218AL280	2.38 (0.0937)
13218AL290	2.39 (0.0941)
13218AL300	2.40 (0.0945)
13218AL310	2.41 (0.0949)
13218AL320	2.42 (0.0953)
13218AL330	2.43 (0.0957)
13218AL340	2.44 (0.0961)
13218AL350	2.45 (0.0965)
13218AL360	2.46 (0.0969)
13218AL370	2.47 (0.0972)
13218AL380	2.48 (0.0976)
13218AL390	2.49 (0.0980)

Part No.	Thickness mm (in)
13218AL400	2.50 (0.0984)
13218AL410	2.51 (0.0988)
13218AL420	2.52 (0.0992)
13218AL430	2.53 (0.0996)
13218AL440	2.54 (0.1000)
13218AL450	2.55 (0.1004)
13218AL460	2.56 (0.1008)
13218AL470	2.57 (0.1012)
13218AL480	2.58 (0.1016)
13218AL490	2.59 (0.1020)
13218AL500	2.60 (0.1024)
13218AL510	2.61 (0.1028)
13218AL520	2.62 (0.1032)
13218AL530	2.64 (0.1039)
13218AL540	2.66 (0.1047)
13218AL550	2.68 (0.1055)
13218AL560	2.70 (0.1063)
13218AL570	2.72 (0.1071)
13218AL580	2.74 (0.1079)
13218AL590	2.76 (0.1087)

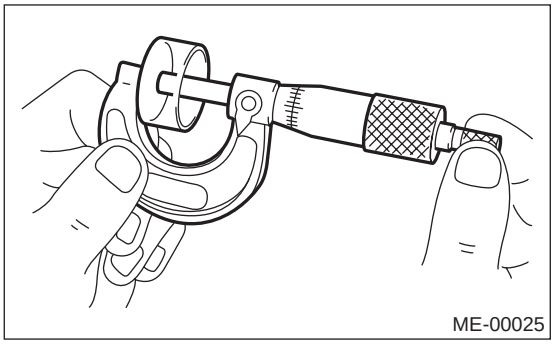
2. EXHAUST SIDE

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances.
<Ref. to ME(H6DO)-28, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.

2) Remove the camshaft. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of valve lifter with a micrometer.



5) Select a valve lifter of suitable thickness using measured valve clearance and valve lifter thickness, by referring to the following table.

Unit: (mm)
S = (V + T) − 0.35
S: Valve lifter thickness required V: Measured valve clearance T: Valve lifter thickness to be used

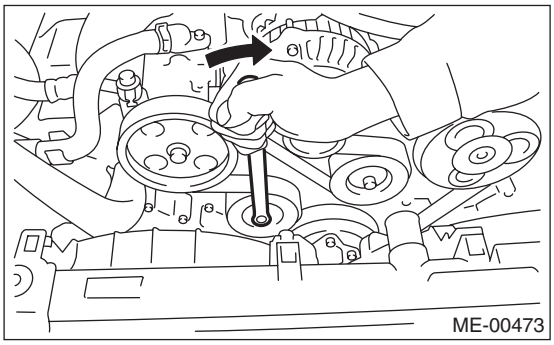
Part No.	Thickness mm (in)
13228AD180	4.32 (0.1701)
13228AD190	4.34 (0.1709)
13228AD200	4.36 (0.1717)
13228AD210	4.38 (0.1724)
13228AD220	4.40 (0.1732)
13228AD230	4.42 (0.1740)
13228AD240	4.44 (0.1748)
13228AD250	4.46 (0.1756)
13228AD260	4.48 (0.1764)
13228AD270	4.50 (0.1772)
13228AD280	4.52 (0.1780)
13228AD290	4.54 (0.1787)
13228AD300	4.56 (0.1795)
13228AD310	4.58 (0.1803)
13228AD320	4.60 (0.1811)
13228AC580	4.62 (0.1819)
13228AC590	4.63 (0.1823)
13228AC600	4.64 (0.1827)
13228AC610	4.65 (0.1831)
13228AC620	4.66 (0.1835)
13228AC630	4.67 (0.1839)
13228AC640	4.68 (0.1843)
13228AC650	4.69 (0.1846)
13228AC660	4.70 (0.1850)
13228AC670	4.71 (0.1854)
13228AC680	4.72 (0.1858)
13228AC690	4.73 (0.1862)
13228AC700	4.74 (0.1866)
13228AC710	4.75 (0.1870)
13228AC720	4.76 (0.1874)
13228AC730	4.77 (0.1878)
13228AC740	4.78 (0.1882)
13228AC750	4.79 (0.1886)
13228AC760	4.80 (0.1890)
13228AC770	4.81 (0.1894)
13228AC780	4.82 (0.1898)
13228AC790	4.83 (0.1902)
13228AC800	4.84 (0.1906)
13228AC810	4.85 (0.1909)
13228AC820	4.86 (0.1913)
13228AC830	4.87 (0.1917)
13228AC840	4.88 (0.1921)
13228AC850	4.89 (0.1925)
13228AC860	4.90 (0.1929)
13228AC870	4.91 (0.1933)
13228AC880	4.92 (0.1937)
13228AC890	4.93 (0.1941)
13228AC900	4.94 (0.1945)
13228AC910	4.95 (0.1949)
13228AC920	4.96 (0.1953)
13228AC930	4.97 (0.1957)
13228AC940	4.98 (0.1961)
13228AC950	4.99 (0.1965)
13228AC960	5.00 (0.1969)
13228AC970	5.01 (0.1972)
13228AC980	5.02 (0.1976)
13228AC990	5.03 (0.1980)
13228AC000	5.04 (0.1984)
13228AC010	5.05 (0.1988)
13228AC020	5.06 (0.1992)
13228AC030	5.07 (0.1996)
13228AC040	5.08 (0.2000)
13228AC050	5.09 (0.2004)
13228AC060	5.10 (0.2008)
13228AC070	5.11 (0.2012)
13228AC080	5.12 (0.2016)
13228AC090	5.13 (0.2020)
13228AC100	5.14 (0.2024)
13228AC110	5.15 (0.2028)
13228AC120	5.16 (0.2032)
13228AC130	5.17 (0.2035)
13228AC140	5.18 (0.2039)
13228AC150	5.19 (0.2043)
13228AC160	5.20 (0.2047)
13228AC170	5.21 (0.2051)
13228AD330	5.23 (0.2059)
13228AD340	5.25 (0.2067)
13228AD350	5.27 (0.2075)
13228AD360	5.29 (0.2083)
13228AD370	5.31 (0.2091)
13228AD380	5.33 (0.2098)
13228AD390	5.35 (0.2106)
13228AD400	5.37 (0.2114)
13228AD410	5.39 (0.2122)
13228AD420	5.41 (0.2130)
13228AD430	5.43 (0.2138)
13228AD440	5.45 (0.2146)
13228AD450	5.47 (0.2154)
13228AD460	5.49 (0.2161)
13228AD470	5.51 (0.2169)
13228AD480	5.53 (0.2177)
13228AD490	5.55 (0.2185)
13228AD500	5.57 (0.2193)

Part No.	Thickness mm (in)
13228AD510	5.59 (0.2201)

9. V-belt

A: REMOVAL

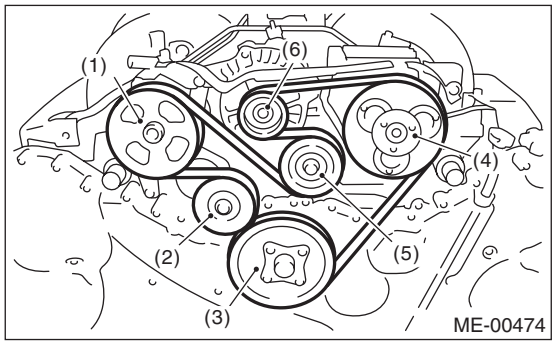
1) Install the tool to belt tension adjuster assembly installation bolt.
2) Rotate the tool clockwise and loosen the V-belt to remove.



3) Remove the V-belt covers.

B: INSTALLATION

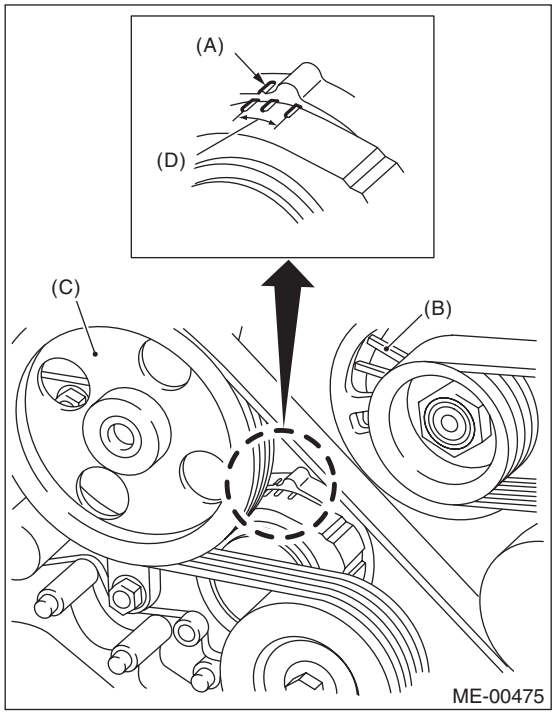
Install in the reverse order of removal.



(1) Power steering oil pump pulley
(2) Belt tension adjuster ASSY
(3) Crank pulley
(4) A/C compressor
(5) Belt idler
(6) Generator

C: INSPECTION

1) Replace the V-belt, if cracks, fraying or wear is found.
2) Check that the V-belt automatic belt tension indicator (A) is within the range (D).

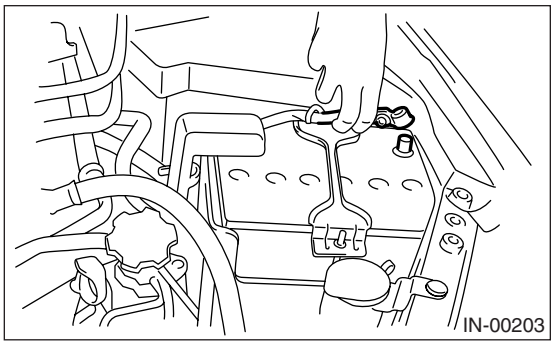


(A) Indicator
(B) Generator
(C) Power steering oil pump pulley
(D) Service limit

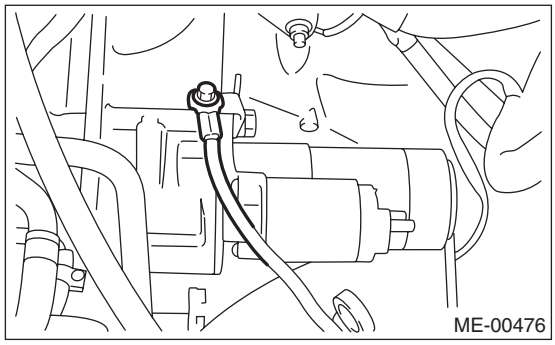
10.Engine Assembly

A: REMOVAL

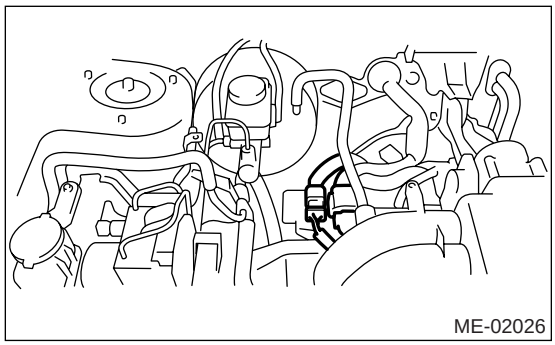
1) Set the vehicle on a lift.
2) Open the front hood fully and support with the front food stay.
3) Remove the collector cover.
4) Collect the refrigerant from A/C system. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
5) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
6) Remove the fuel filler cap.
7) Disconnect the ground cable from battery.



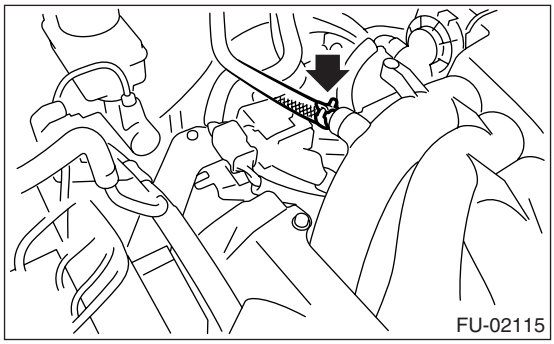
8) Remove the air intake duct, air cleaner case and air intake chamber.
<Ref. to IN(H6DO)-8, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
9) Remove the radiator from vehicle. <Ref. to CO(H6DO)-13, REMOVAL, Radiator.>
10) Remove the V-belts. <Ref. to ME(H6DO)-33, REMOVAL, V-BELT.>
11) Disconnect the A/C pressure hoses from A/C compressor. <Ref. to AC-38, REMOVAL, Hose and Tube.>
12) Disconnect the following connectors:
(1) Engine ground terminals



(2) Engine harness connectors

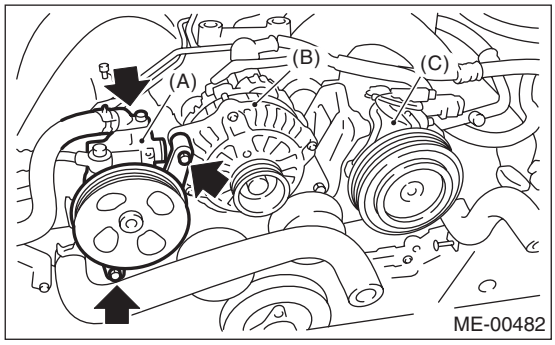


(3) Generator connector, terminal and A/C compressor connector
(4) Power steering switch connector
13) Disconnect the following hoses.
(1) Brake booster vacuum hose



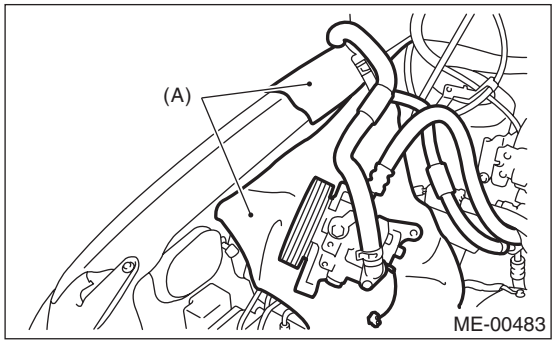
(2) Heater inlet and outlet hoses
(3) Pressure regulator vacuum hose
14) Remove the power steering pump from bracket.

NOTE:
Do not disconnect the hose and pipe from pump body.



(A) Power steering pump
(B) Generator
(C) A/C compressor

(1) Place the power steering pump on the right side wheel apron.

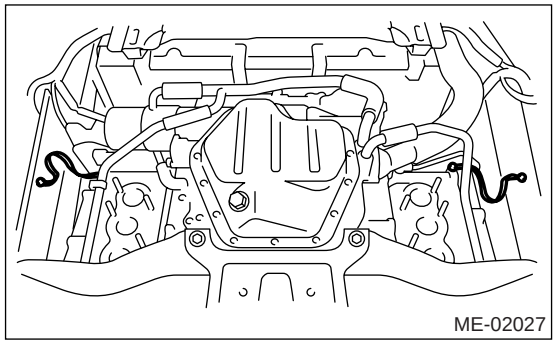


(A) Cloth

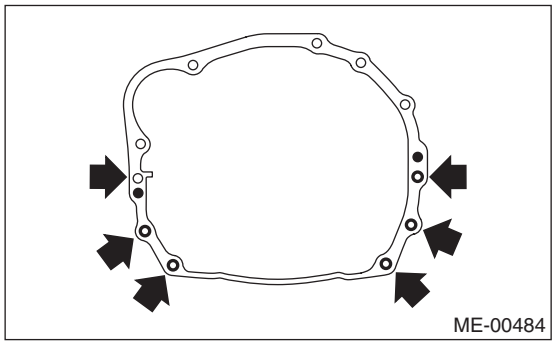
15) Lift-up the vehicle.
16) Remove the under cover.
17) Remove the front exhaust pipe.
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>

NOTE:
Be careful not to let the front exhaust pipe interfere with water pipes on engine side.

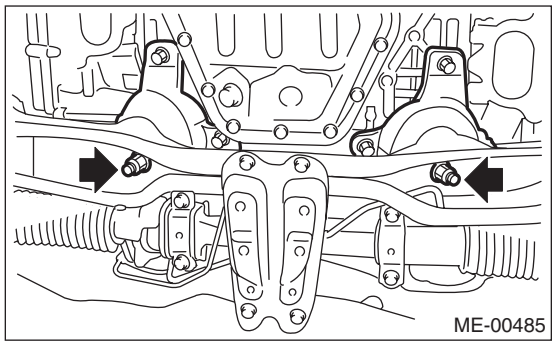
18) Remove the ground cable.



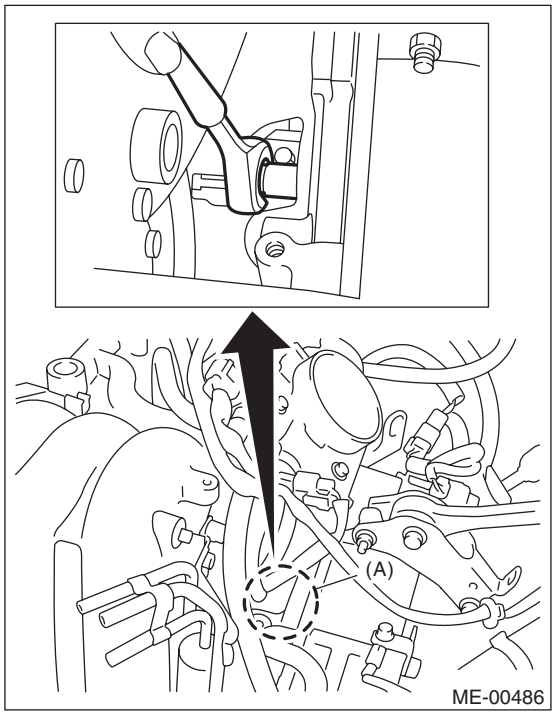
19) Remove the nuts which hold lower side of transmission to engine.



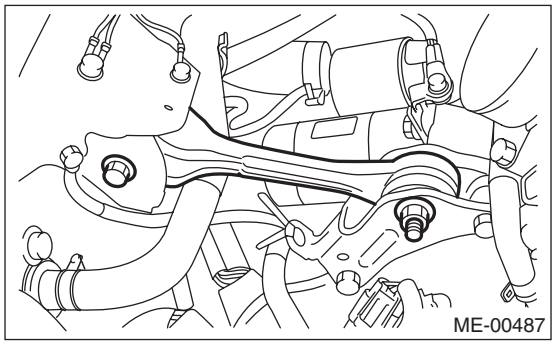
20) Remove the nuts which install front cushion rubber onto front crossmember.



21) Separate the torque converter clutch from drive plate.
(1) Lower the vehicle.
(2) Remove the service hole plug (A).
(3) Remove the bolts which hold torque converter clutch to drive plate.
(4) Remove other bolts while rotating the engine using a socket wrench.

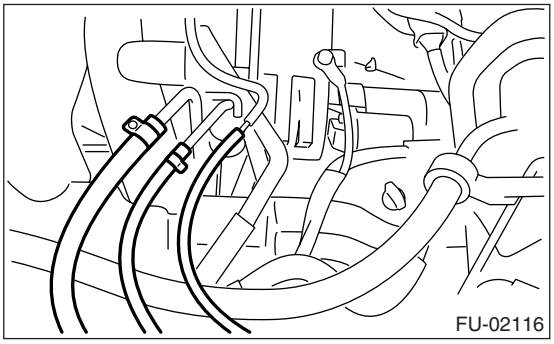


22) Remove the pitching stopper.

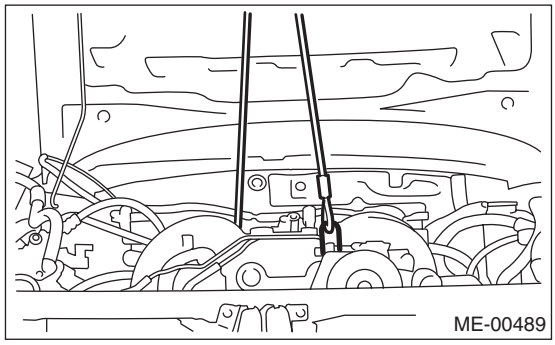


23) Disconnect the fuel delivery hose and evaporation hose.

CAUTION:
• Catch fuel from the hose into container.
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.

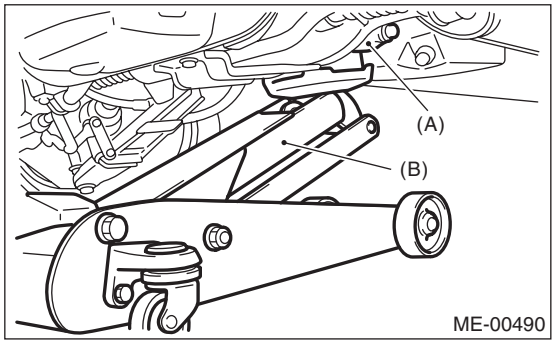


24) Support the engine with a lifting device and wire ropes.



25) Support the transmission with a garage jack.

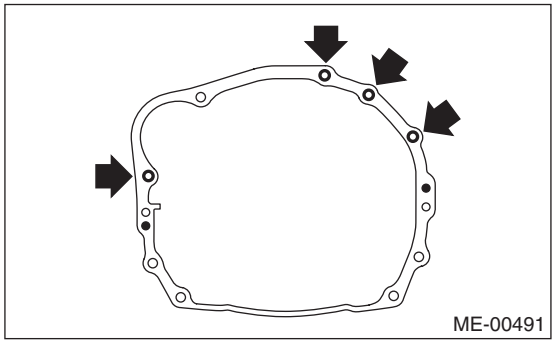
CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.



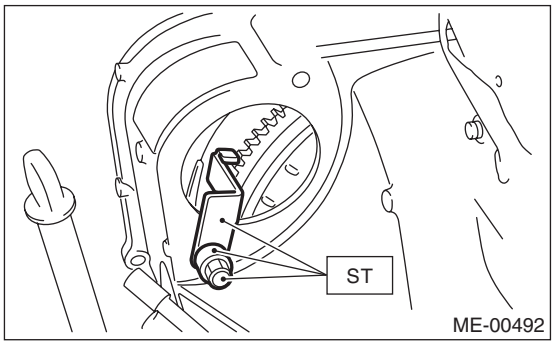
(A) Transmission
(B) Garage jack

CAUTION:
Before removing the engine away from transmission, check to be sure no work has been overlooked.

26) Separation of engine and transmission:
(1) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
(2) Remove the bolts which hold upper side of transmission to engine.

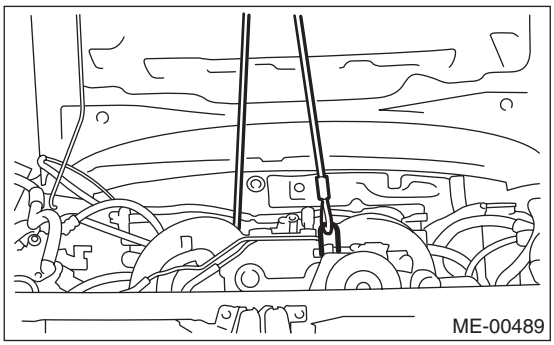


27) Set the ST to torque converter clutch case.
ST 498277200 STOPPER SET



28) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.



29) Remove the front cushion rubbers.

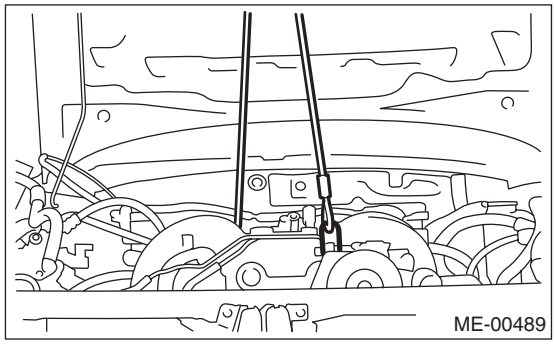
B: INSTALLATION

1) Install the front cushion rubbers.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

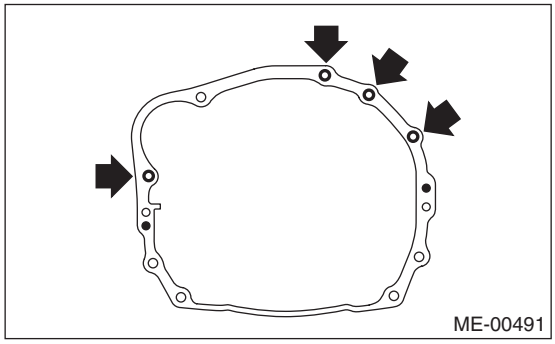
2) Position the engine in engine compartment and align it with transmission.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.

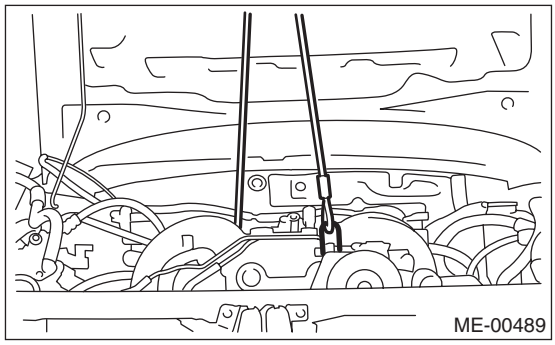


3) Tighten the bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

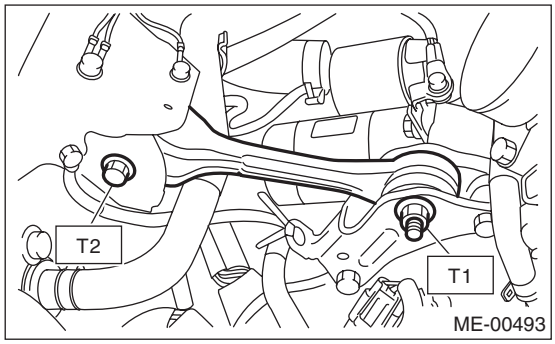


4) Remove the lifting device and wire ropes.



5) Remove the garage jack.
6) 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)



7) Remove the ST from torque converter clutch case.

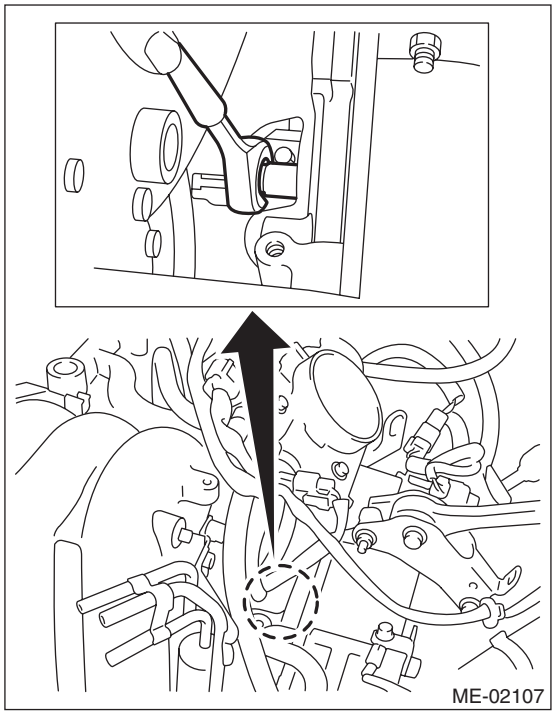
NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing the ST.

ST 498277200 STOPPER SET

8) Install the starter. <Ref. to SC(H6DO)-6, INSTALLATION, Starter.>
9) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine using a socket wrench.

NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing the ST.

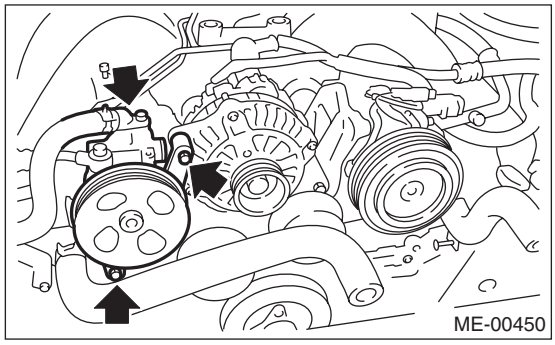
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(3) Install the service hole plug to prevent foreign matters from being mixed.

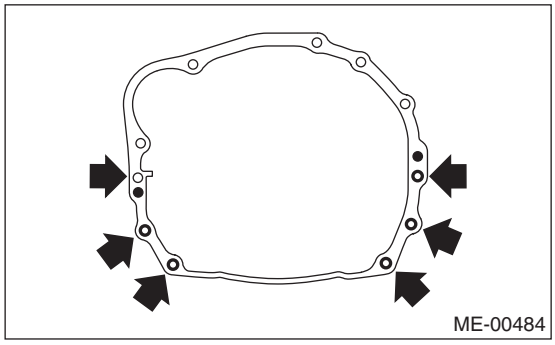
10) Install the power steering pump on bracket.

Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



11) Lift-up the vehicle.
12) Tighten the nuts which hold lower side of transmission to the engine.

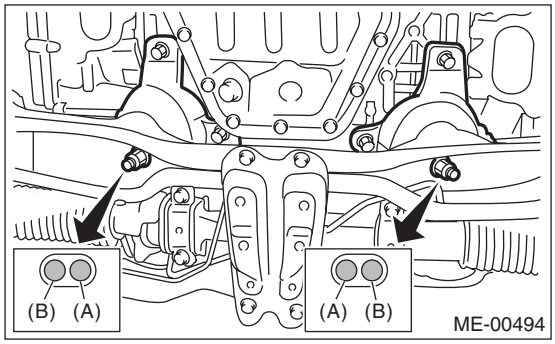
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



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

Tightening torque:
85 N·m (8.7 kgf-m, 63 ft-lb)

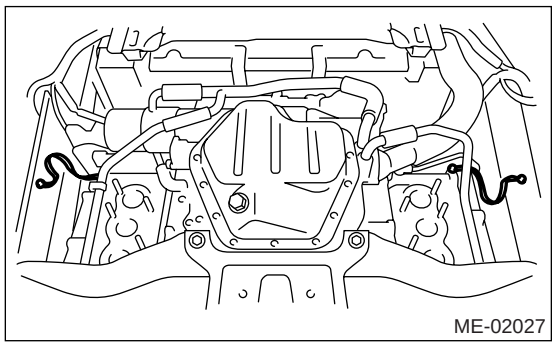
NOTE:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



14) Install the front exhaust pipe.
<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>

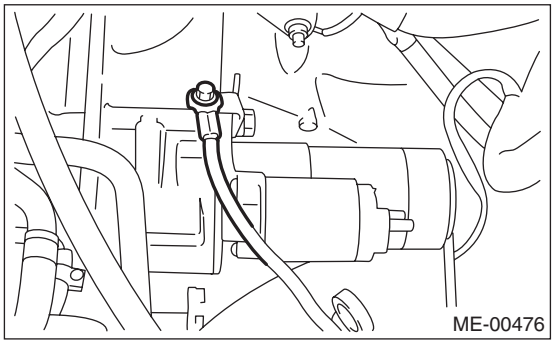
NOTE:
• Be care not to let the front exhaust pipe interfere with water pipes and crossmember on engine side.
• Be care not to scratch the flange surface of front exhaust pipe with stud bolt on engine.

15) Connect the ground cable.

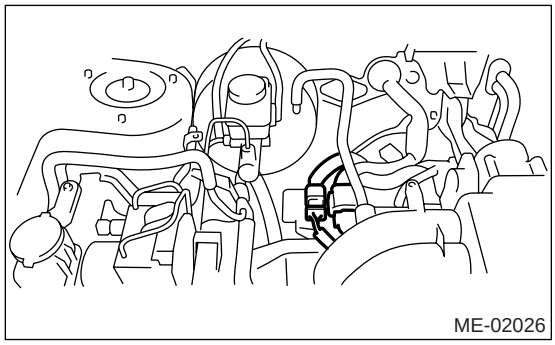


16) Install the under cover.
17) Lower the vehicle.
18) Connect the following hoses.
(1) Fuel delivery hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
(4) Pressure regulator vacuum hose
19) Connect the following connectors:
(1) Engine ground terminals

Tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)



(2) Engine harness connectors



(3) Generator connector and terminal
(4) A/C compressor connector
(5) Power steering switch connector

20) Install the A/C pressure hoses.
<Ref. to AC-38, INSTALLATION, Hose and Tube.>
21) Install the V-belts. <Ref. to ME(H6DO)-33, INSTALLATION, V-BELT.>
22) Install the radiator to vehicle. <Ref. to CO(H6DO)-14, INSTALLATION, Radiator.>
23) Install the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Duct.> <Ref. to IN(H6DO)-6, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
24) Install the battery in the vehicle, and connect cables.
25) Fill engine coolant.
<Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
26) Check the ATF level and replenish it if necessary.
<Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>
27) Charge the A/C system with refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>
28) Install the collector cover.
29) Remove the front hood stay, and close the front hood.
30) Take off the vehicle from a lift.

C: INSPECTION

1) Check pipes and hoses are installed firmly.
2) Check the engine coolant and ATF are at specified levels.

11.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H6DO)-34, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

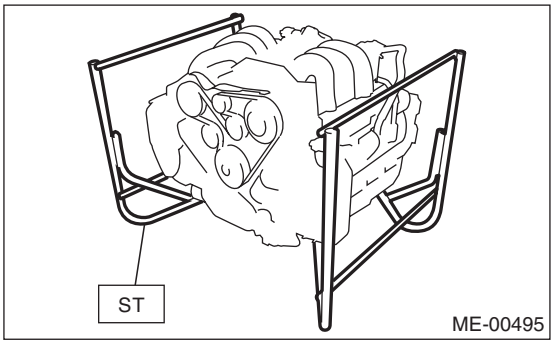
C: INSPECTION

Make sure that there are no cracks or other damages.

12.Preparation for Overhaul

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H6DO)-34, REMOVAL, ENGINE ASSEMBLY.>
2) Set the engine on ST1.
ST 18232AA000 ENGINE STAND

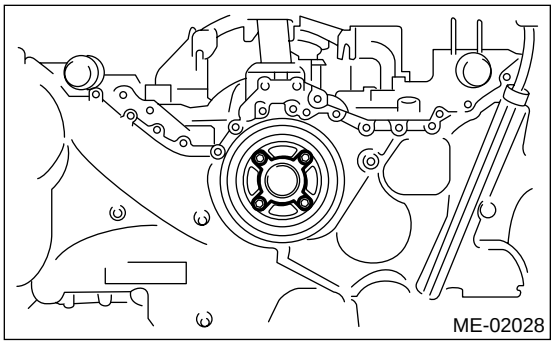


3) Before servicing overhaul, remove the sensor, pipe and hose that installed to engine.
(1) Remove the intake manifold.
<Ref. to FU(H6DO)-12, REMOVAL, Intake Manifold.>
(2) Remove the generator. <Ref. to SC(H6DO)-14, REMOVAL, Generator.>
(3) Remove the A/C compressor. <Ref. to AC-33, REMOVAL, Compressor.>
(4) Remove the EGR pipe. <Ref. to FU(H6DO)-25, REMOVAL, EGR Valve.>
(5) Disconnect the water pipe and hose.
(6) Disconnect the engine harness.
(7) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>
(8) Remove the camshaft position sensor. <Ref. to FU(H6DO)-20, REMOVAL, Camshaft Position Sensor.>
(9) Remove the crankshaft position sensor. <Ref. to FU(H6DO)-19, REMOVAL, Crankshaft Position Sensor.>
(10)Remove the knock sensor. <Ref. to FU(H6DO)-21, REMOVAL, Knock Sensor.>
(11)Remove the engine coolant temperature sensor. <Ref. to FU(H6DO)-18, REMOVAL, Engine Coolant Temperature Sensor.>
(12)Remove the oil pressure switch. <Ref. to LU(H6DO)-12, REMOVAL, Oil Pressure Switch.>
(13)Remove the oil filter. <Ref. to LU(H6DO)-13, REMOVAL, Engine Oil Filter.>
(14)Remove the oil cooler. <Ref. to LU(H6DO)-14, REMOVAL, Oil Cooler.>

13.Crank Pulley

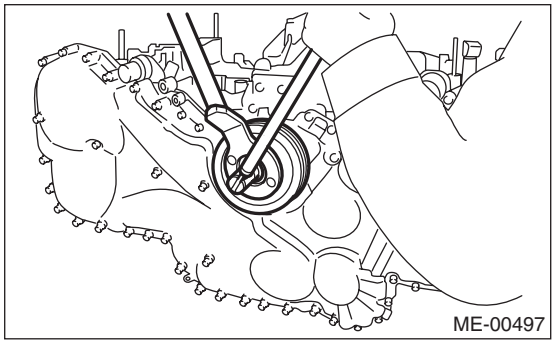
A: REMOVAL

1) Remove the crank pulley cover.



2) Remove the crank pulley bolt. To lock the crankshaft, use ST.

ST 499977100 CRANK PULLEY WRENCH



3) Remove the crank pulley.

B: INSTALLATION

1) Install the crank pulley.

2) Install the crank pulley bolt. To lock the crankshaft, use ST.

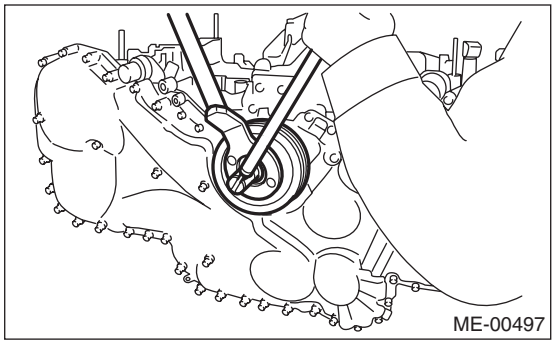
ST 499977100 CRANK PULLEY WRENCH

(1) Clean the crank pulley thread using compressed air.

(2) Apply engine oil to the crank pulley bolt seat and thread.

(3) Tighten the crank pulley bolts.

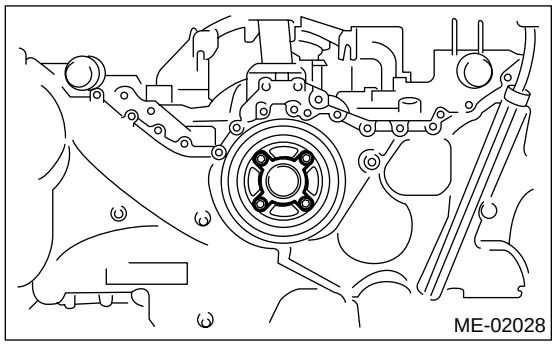
Tightening torque:
178 N·m (18.1 kgf-m, 131 ft-lb)



3) Install the crank pulley cover.

NOTE:
Attach the O-ring to crank pulley cover.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



C: INSPECTION

1) Check the crank pulley cover for oil and air leakage.

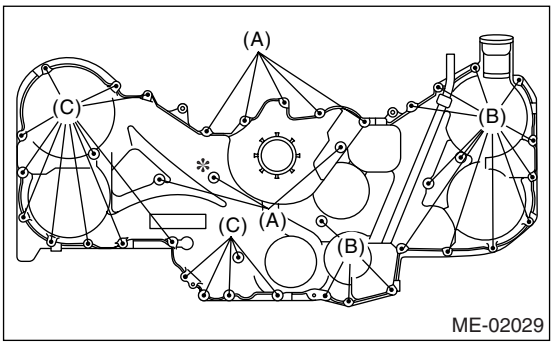
2) Check crank pulley for looseness.

14.Front Chain Cover

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, CRANK PULLEY.>
2) Remove the front chain cover.

NOTE:
Chain cover installation bolt has three different sizes. To prevent the confusion in installation, keep these bolts on container individually.



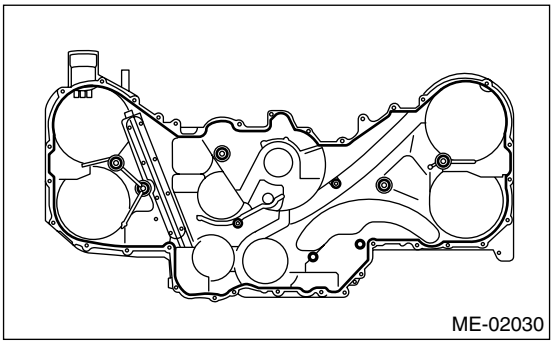
(A) M6 × 16
(B) M6 × 30
(C) M6 × 45
*: Sealing washer

B: INSTALLATION

1) Remove the used liquid gasket from mating surface, and degrease it.
2) Apply liquid gasket to the matching surface of front chain cover.

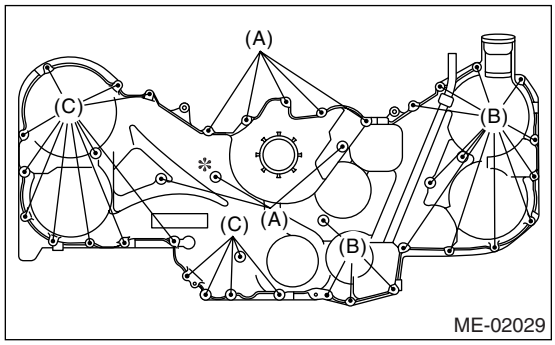
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter
2.5±0.5 mm (0.098±0.020 in)



3) Install the front chain cover. Temporarily tighten the bolts.

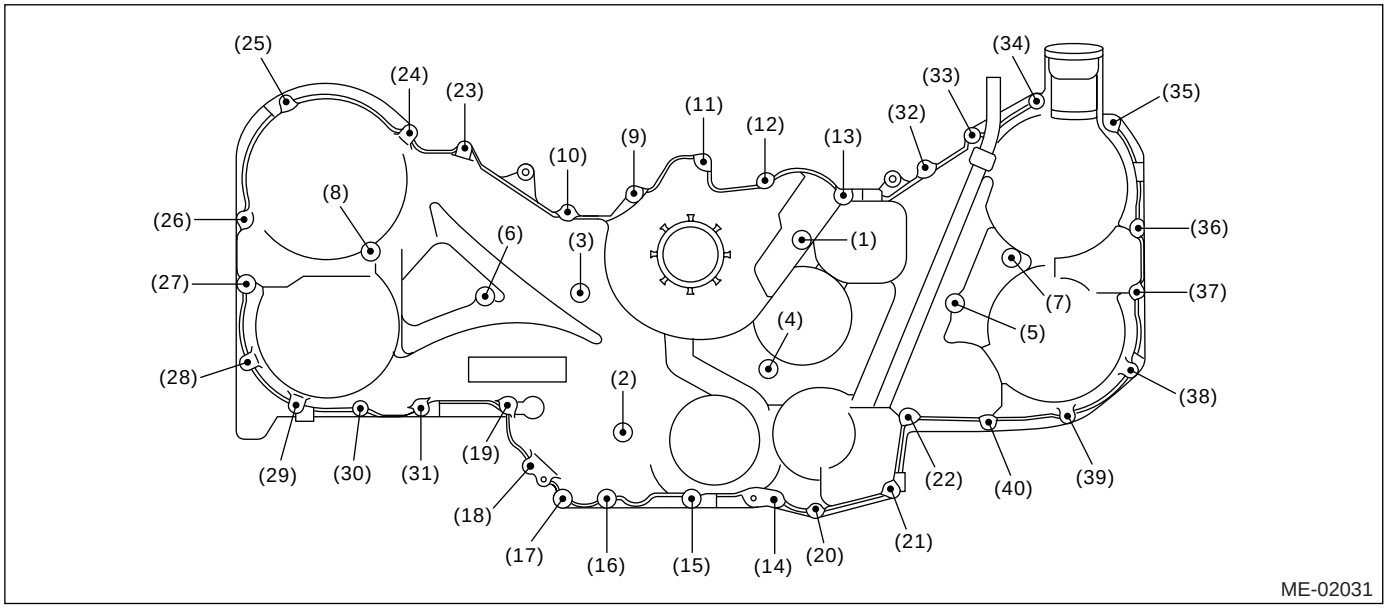
CAUTION:
Do not install the bolts in wrong place.



(A) M6 × 16
(B) M6 × 30
(C) M6 × 45
*: Sealing washer

4) Tighten the bolts in the numerical order as shown in the figure.

Tightening torque:
6.6 N·m (0.67 kgf-m, 4.8 ft-lb)



5) Install the crank pulley. <Ref. to ME(H6DO)-42, INSTALLATION, CRANK PULLEY.>

C: INSPECTION

Check the cover surface for scratch and damage.
Check for oil leakage on cover mating surface and installation part of crank pulley.