ENGINE SECTION 2

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.

FUJI HEAVY INDUSTRIES LTD.

G2320GE3

MECHANICAL

ME(H4DOTC)

1. General Description

A: SPECIFICATION

Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Belt driven, double overhead camshaft, 4 valves/cylinder
	Bore × Stroke mm (in)			92 × 75 (3.62 × 2.95)
	Displacement cm^3 (cu in)			1,994 (121.67)
	Compression ratio			9.5
	Compression pressure (at 400 rpm) kPa (kg/cm^2, psi)			1,100 — 1,300 (11.2 — 13.3, 160 — 189)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Open	Max.retard	ATDC 6°
			Min.advance	BTDC 37°
		Close	Max.retard	ABDC 62°
			Min.advance	ABDC 19°
	Exhaust valve timing	Open	Max.retard	BBDC 60°
			Min.advance	BBDC 30°
		Close	Max.retard	BTDC 2°
			Min.advance	ATDC 28°
	Valve clearance mm (in)	Intake		$0.20\ ^{+0.04}_{-0.06}$ ($0.0079\ ^{+0.0016}_{-0.0024}$)
		Exhaust		0.35±0.05 (0.0138±0.0020)
	Idle speed [“P”/“N” range] rpm		No-load	650±50
			A/C ON	825±50
	Ignition order			1 → 3 → 2 → 4
	Ignition timing BTDC/rpm			14°±3°/650

NOTE:
OS: Oversize US: Undersize

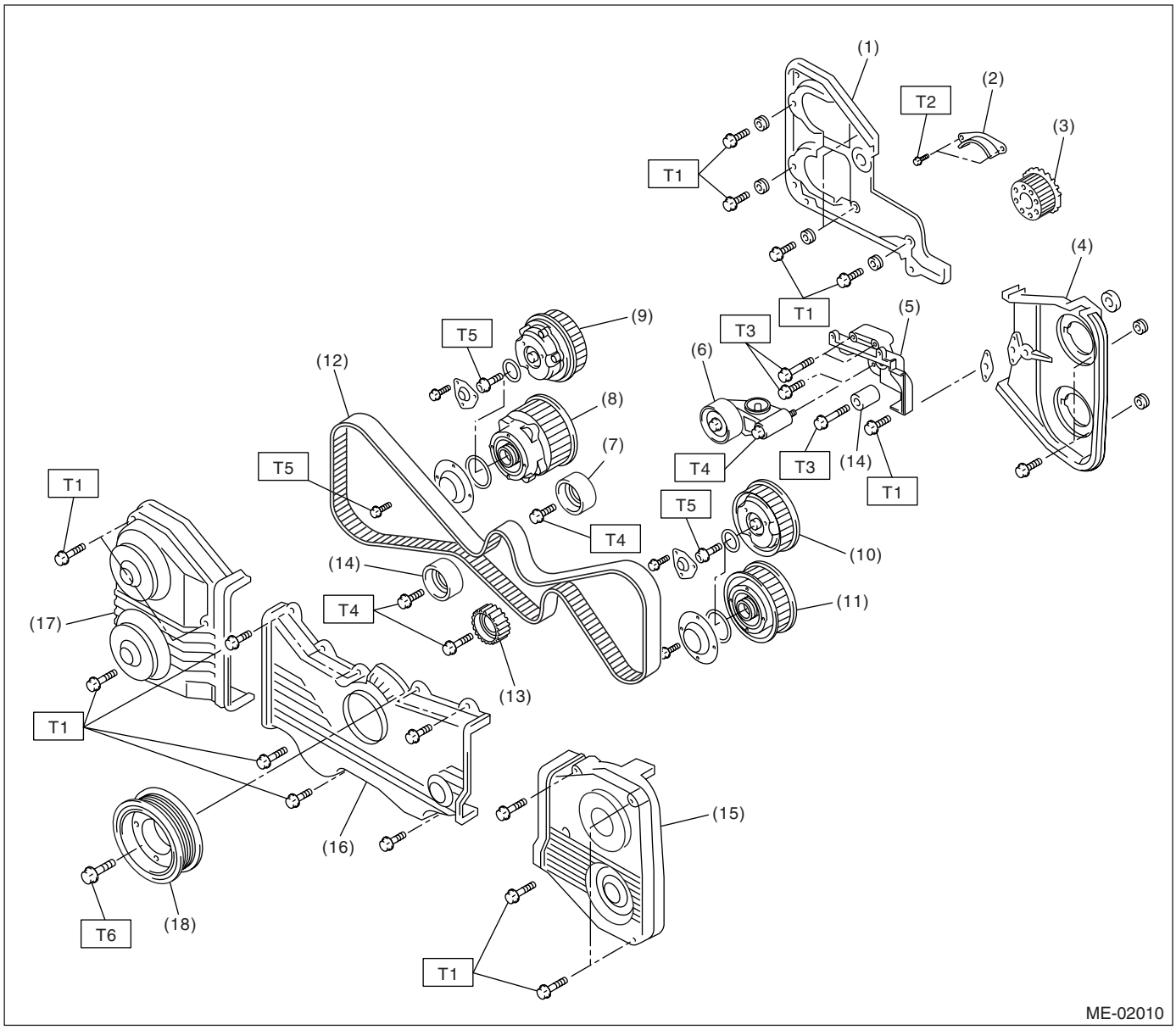
Belt tension adjuster	Protrusion of adjuster rod mm (in)			5.2 — 6.2 (0.205 — 0.244)
Belt tensioner	Spacer O.D. mm (in)			17.955 — 17.975 (0.7069 — 0.7077)
	Tensioner bush I.D. mm (in)			18.0 — 18.08 (0.7087 — 0.7118)
	Clearance between spacer and bush mm (in)		Standard	0.025 — 0.125 (0.0010 — 0.0049)
	Side clearance of spacer mm (in)		Standard	0.2 — 0.55 (0.0079 — 0.0217)
Camshaft	Bend limit mm (in)			0.020 (0.0079) or less
	Side clearance mm (in)		Standard	0.068 — 0.116 (0.0027 — 0.0047)
	Cam lobe height mm (in)	Intake	Standard	45.85 — 45.95 (1.805 — 1.809)
		Exhaust	Standard	45.75 — 45.85 (1.801 — 1.805)
	Journal O.D. mm (in)	Standard	Front	37.946 — 37.963 (1.4939 — 1.4946)
			Center rear	29.946 — 29.963 (1.1790 — 1.1796)
	Clearance at journal mm (in)		Standard	0.037 — 0.072 (0.0015 — 0.0028)
Cylinder Head	Surface warpage limit mm (in)			0.035 (0.0014)
	Grinding limit mm (in)			0.3 (0.012)
	Standard height mm (in)			127.5 (5.02)
Valve seat	Refacing angle			90°
	Contacting width mm (in)	Intake	Standard	0.6 — 1.4 (0.024 — 0.055)
		Exhaust	Standard	1.2 — 1.8 (0.047 — 0.071)
Valve guide	Inside diameter mm (in)			6.000 — 6.012 (0.2362 — 0.2367)
	Protrusion above head mm (in)			15.8 — 16.2 (0.622 — 0.638)

Valve	Head edge thickness mm (in)	Intake	Standard	1.0 — 1.4 (0.039 — 0.055)
		Exhaust	Standard	1.3 — 1.7 (0.051 — 0.067)
	Stem outer diameters mm (in)	Intake		5.955 — 5.970 (0.2344 — 0.2350)
		Exhaust		5.945 — 5.960 (0.2341 — 0.2346)
	Valve stem gap mm (in)	Standard	Intake	0.030 — 0.057 (0.0012 — 0.0022)
			Exhaust	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)	Intake		104.4 (4.110)
		Exhaust		104.65 (4.1201)
Valve springs	Free length mm (in)			44.67 (1.759)
	Squareness			2.5°, 2.0 mm (0.079 in)
	Tension/spring height N (kgf, lb)/mm (in)		Set	206 — 236 (21.0 — 24.1, 46.3 — 53.1)/36.0 (1.417)
			Lift	485 — 537 (49.5 — 54.8, 109 — 121)/26.00 (1.024)
Cylinder block	Surface warpage limit (mating with cylinder head) mm (in)			0.025 (0.00098)
	Grinding limit mm (in)			0.1 (0.004)
	Cylinder inner diameter mm (in)	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
			B	91.995 — 92.005 (3.6218 — 3.6222)
	Taper mm (in)		Standard	0.015 (0.0006)
	Out-of-roundness mm (in)		Standard	0.010 (0.0004)
	Piston clearance mm (in)		Standard	−0.010 — 0.010 (−0.00039 — 0.00039)
	Boring limit mm (in)			0.5 (0.020)
Piston	Outer diameter mm (in)	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
			B	91.995 — 92.005 (3.6219 — 3.6222)
		0.25 (0.0098) OS		92.245 — 92.265 (3.6317 — 3.6467)
		0.50 (0.0197) OS		92.495 — 92.515 (3.6415 — 3.6423)
Piston pin	Standard clearance between piston and piston pin mm (in)		Standard	0.004 — 0.008 (0.0002 — 0.0003)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Ring closed gap mm (in)	Top ring	Standard	Outer circle side: 0.20 — 0.25 (0.0079 — 0.0098)
				Inner circle side: 0.20 — 0.35 (0.0079 — 0.014)
		Second ring	Standard	0.40 — 0.50 (0.016 — 0.020)
		Oil ring	Standard	0.20 — 0.50 (0.0079 — 0.0197)
	Ring groove gap mm (in)	Top ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)
		Second ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)
Connecting rod	Bend or twist per 100 mm (3.94 in) in length mm (in)		Limit	0.10 (0.0039)
	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	0.026 — 0.052 (0.0010 — 0.0020)
	Bearing size (Thickness at center) mm (in)	Standard		1.486 — 1.498 (0.0585 — 0.0590)
		0.03 (0.0012) US		1.504 — 1.512 (0.0592 — 0.0595)
		0.05 (0.0020) US		1.514 — 1.522 (0.0596 — 0.0599)
		0.25 (0.0098) US		1.614 — 1.622 (0.0635 — 0.0639)
Bushing of small end	Clearance between piston pin and bushing mm (in)		Standard	0 — 0.022 (0 — 0.0009)

Crankshaft	Bend limit			mm (in)	0.035 (0.0014)
	Crank pin and crank journal	Out-of-roundness		mm (in)	0.005 (0.0002) or less
		Grinding limit (dia.)		mm (in)	51.750 (2.0374)
	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 (2.0447 — 2.0453)
			0.25 (0.0098) US		51.734 — 51.750 (2.0368 — 2.0374)
	Crank journal outer diameter mm (in)		Standard		59.992 — 60.008 (2.3619 — 2.3625)
			0.03 (0.0012) US		59.962 — 59.978 (2.3607 — 2.3613)
			0.05 (0.0020) US		59.942 — 59.958 (2.3599 — 2.3605)
			0.25 (0.0098) US		59.742 — 59.758 (2.3520 — 2.3527)
	Side clearance			mm (in)	Standard 0.030 — 0.115 (0.0012 — 0.0045)
	Oil clearance			mm (in)	Standard 0.010 — 0.030 (0.00039 — 0.0012)
Main bearing	Bearing size (Thickness at center) mm (in)	#1, #3	Standard		1.998 — 2.011 (0.0787 — 0.0792)
			0.03 (0.0012) US		2.017 — 2.020 (0.0794 — 0.0795)
			0.05 (0.0020) US		2.027 — 2.030 (0.0798 — 0.0799)
			0.25 (0.0098) US		2.127 — 2.130 (0.0837 — 0.0839)
		#2, #4, #5	Standard		2.000 — 2.013 (0.0787 — 0.0793)
			0.03 (0.0012) US		2.019 — 2.022 (0.0795 — 0.0796)
			0.05 (0.0020) US		2.029 — 2.032 (0.0799 — 0.0800)
			0.25 (0.0098) US		2.129 — 2.132 (0.0838 — 0.0839)

B: COMPONENT

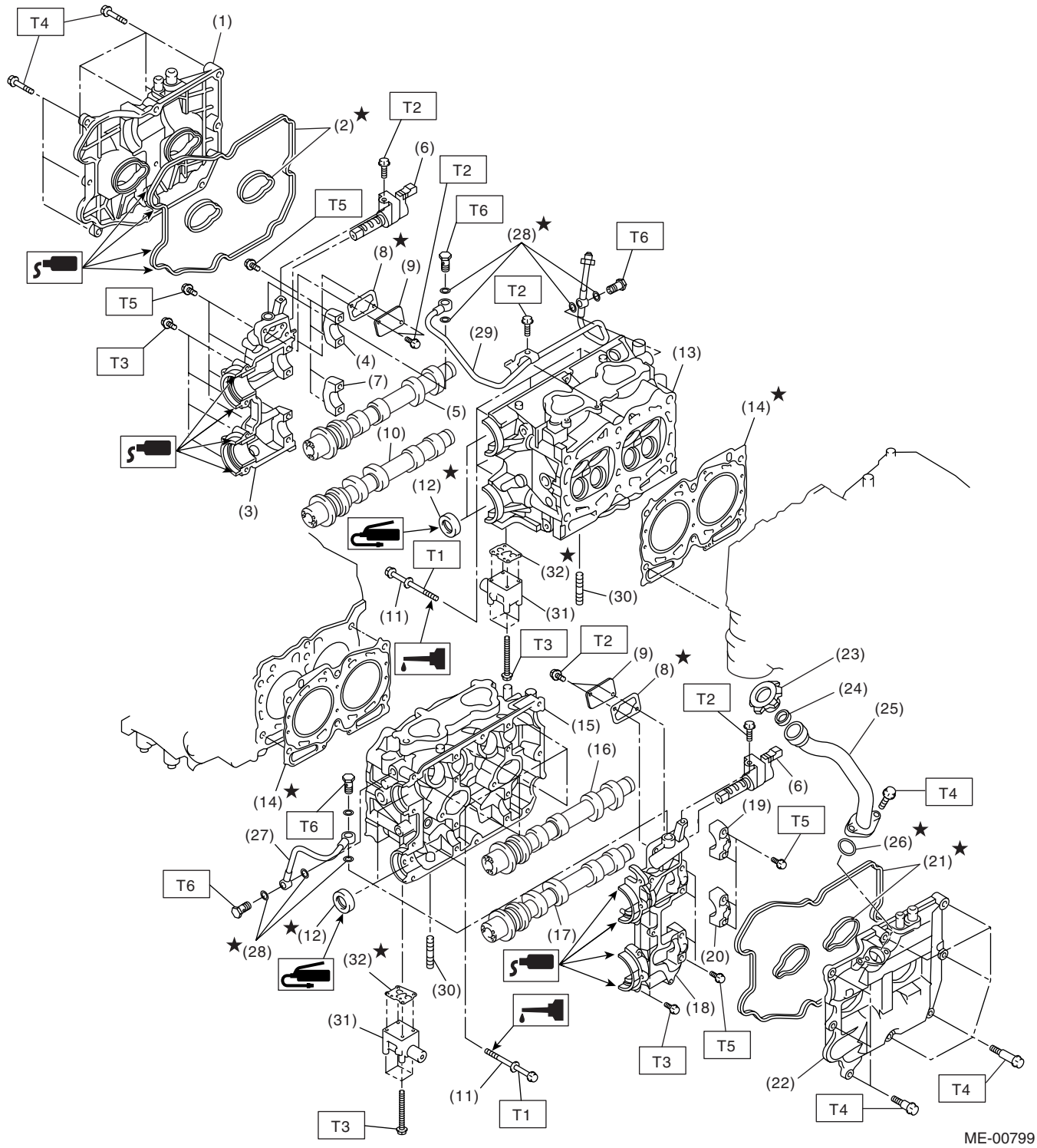
1. TIMING BELT



(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide
(3) Crank sprocket
(4) Timing belt cover No. 2 (LH)
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Exhaust cam sprocket (RH)
(9) Intake cam sprocket (RH)
(10) Intake cam sprocket (LH)
(11) Exhaust cam sprocket (LH)
(12) Timing Belt
(13) Belt idler No. 2
(14) Belt idler
(15) Timing belt cover (LH)
(16) Front belt cover
(17) Timing belt cover (RH)
(18) Crank pulley

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: <Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
T6: <Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>

2. CYLINDER HEAD AND CAMSHAFT

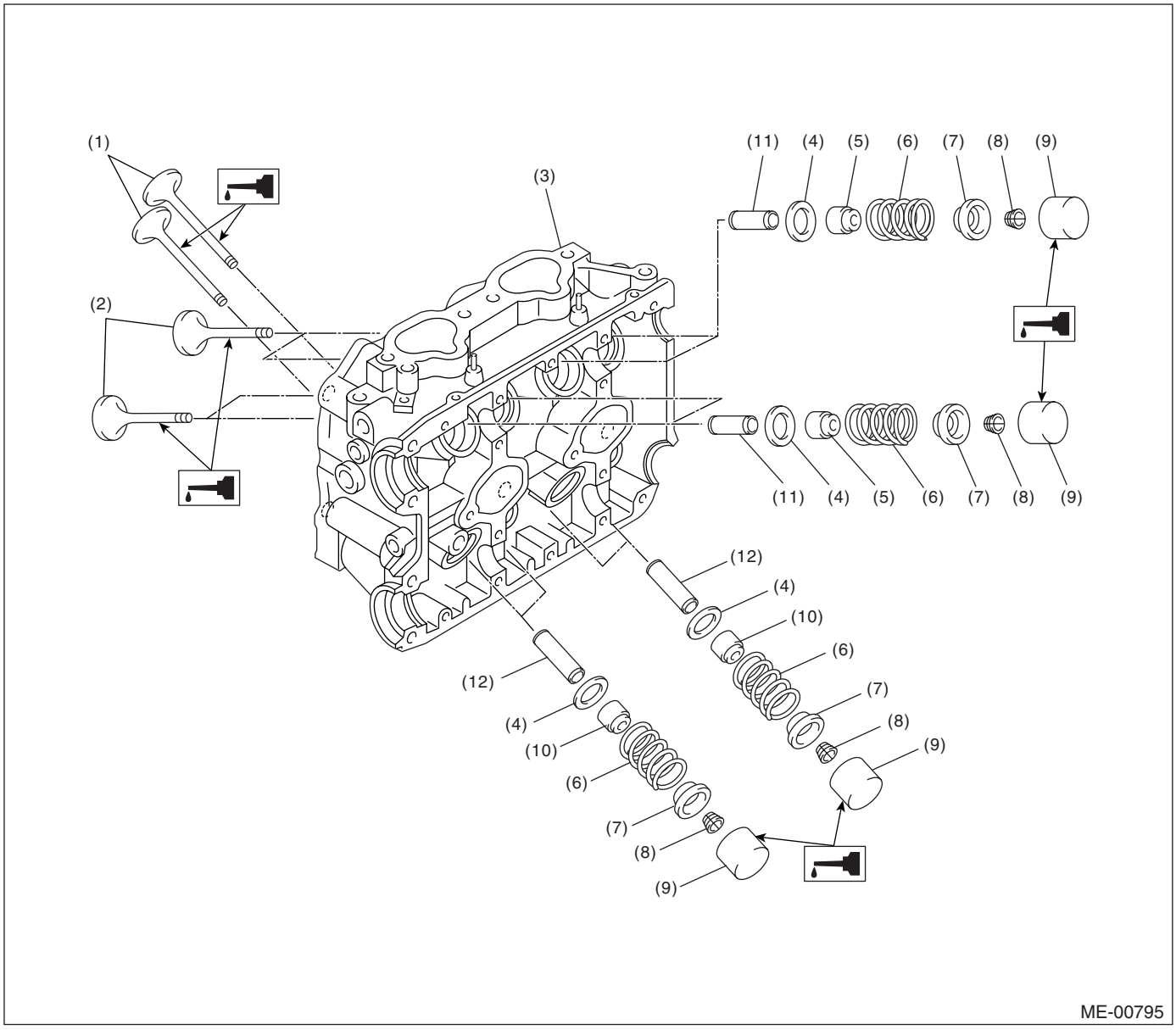


(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Camshaft cap (Front RH)
(4) Intake camshaft cap (Rear RH)
(5) Intake camshaft (RH)
(6) Oil flow control solenoid valve (Intake)
(7) Exhaust camshaft cap (Rear RH)
(8) Gasket
(9) Oil return cover
(10) Exhaust camshaft (RH)
(11) Cylinder head bolt
(12) Oil seal
(13) Cylinder head (RH)
(14) Cylinder head gasket
(15) Cylinder head (LH)
(16) Intake camshaft (LH)
(17) Exhaust camshaft (LH)
(18) Camshaft cap (Front LH)
(19) Intake camshaft cap (Rear LH)
(20) Exhaust camshaft cap (Rear LH)
(21) Rocker cover gasket (LH)
(22) Rocker cover (LH)
(23) Oil filler cap
(24) Gasket
(25) Oil filler duct
(26) O-ring
(27) Oil pipe (LH)
(28) Gasket
(29) Oil pipe (RH)
(30) Stud bolt
(31) Oil flow control solenoid valve (Exhaust)
(32) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

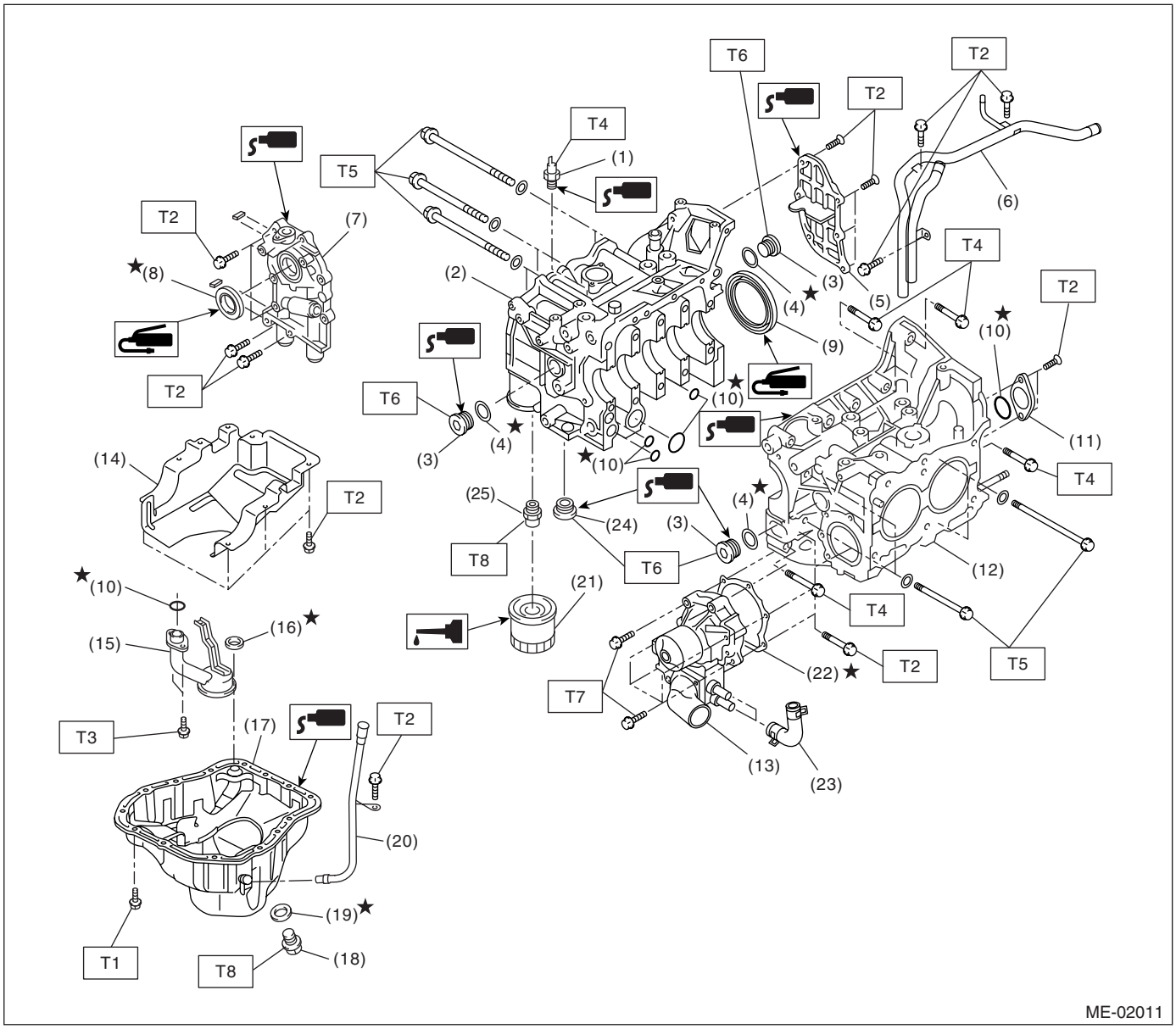
T1:	***<Ref. to ME(H4DOTC)-59, INSTALLATION, Cylinder Head.>***
T2:	***8 (0.8, 5.9)***
T3:	***10 (1.0, 7.2)***
T4:	***6.4 (0.65, 4.7)***
T5:	***20 (2.0, 14.5)***
T6:	***29 (3.0, 21.4)***

3. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve springs
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

4. CYLINDER BLOCK

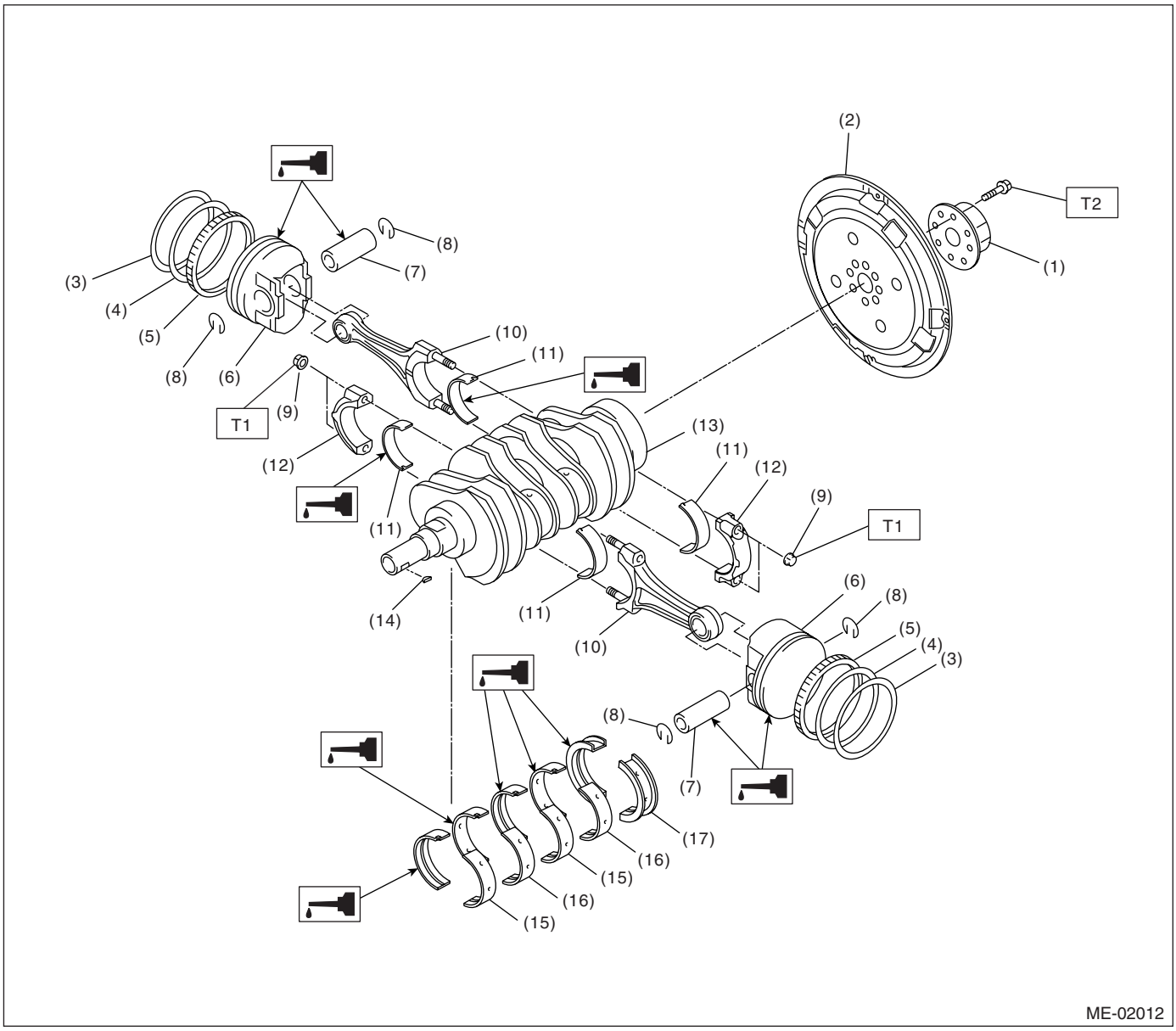


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil strainer
(16) Gasket
(17) Oil pan
(18) Drain plug
(19) Metal gasket
(20) Oil level gauge guide
(21) Oil filter
(22) Gasket
(23) Water pump hose
(24) Plug
(25) Connector

Tightening torque: N·m (kgf-m, ft-lb)

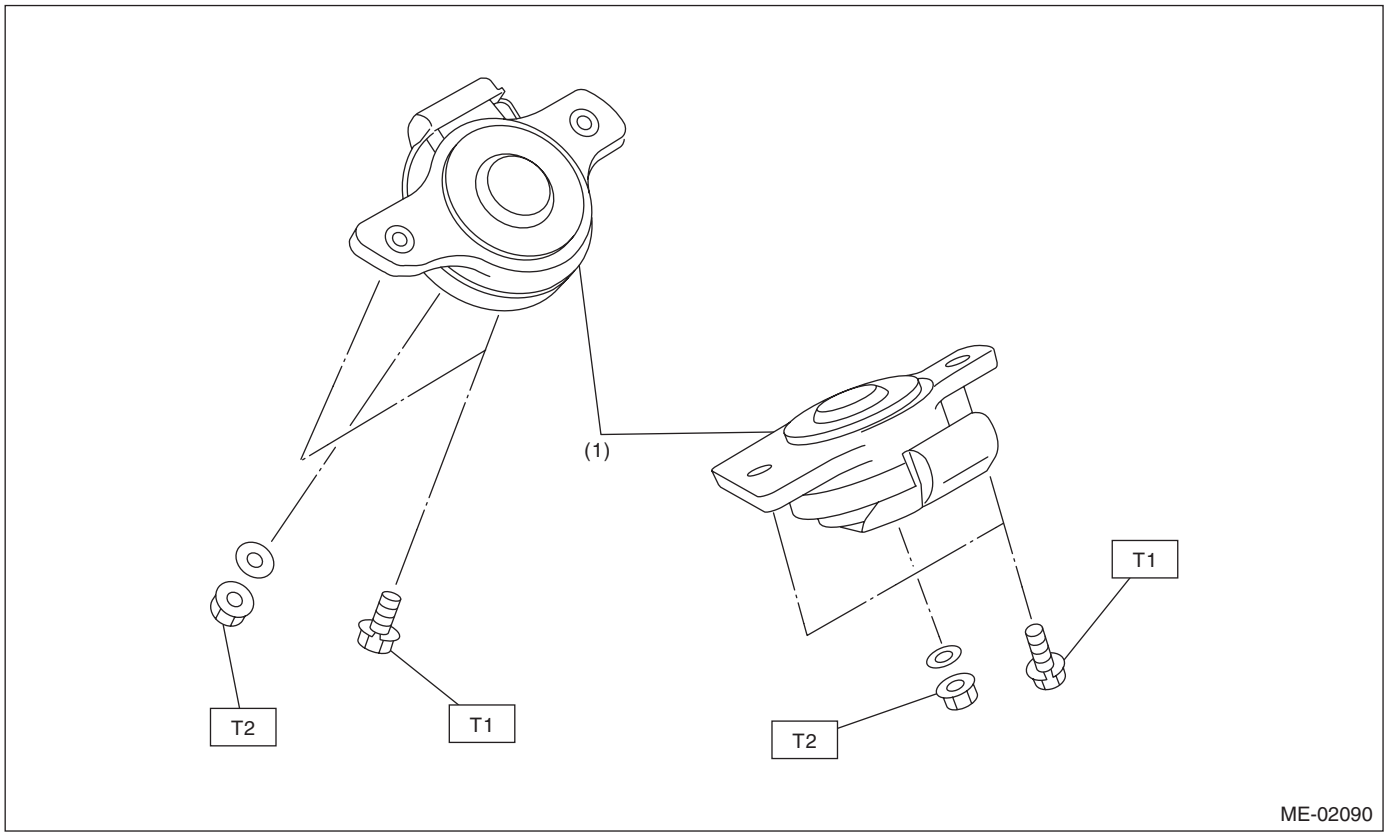
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: 25 (2.5, 18.1)
T5: <Ref. to ME(H4DOTC)-69, INSTALLATION, Cylinder Block.>
T6: 70 (7.1, 51.6)
T7: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T8: 44 (4.5, 33)

5. CRANKSHAFT AND PISTON



(1)	Reinforcement	(8)	Snap ring	(15)	Crankshaft bearing #1, #3
(2)	Drive plate	(9)	Connecting rod nut	(16)	Crankshaft bearing #2, #4
(3)	Top ring	(10)	Connecting rod	(17)	Crankshaft bearing #5
(4)	Second ring	(11)	Connecting rod bearing		
(5)	Oil ring	(12)	Connecting rod cap	***Tightening torque: N·m (kgf-m, ft-lb)***	
(6)	Piston	(13)	Crankshaft	***T1:***	***52 (5.3, 38.4)***
(7)	Piston pin	(14)	Woodruff key	***T2:***	***72 (7.3, 53.1)***

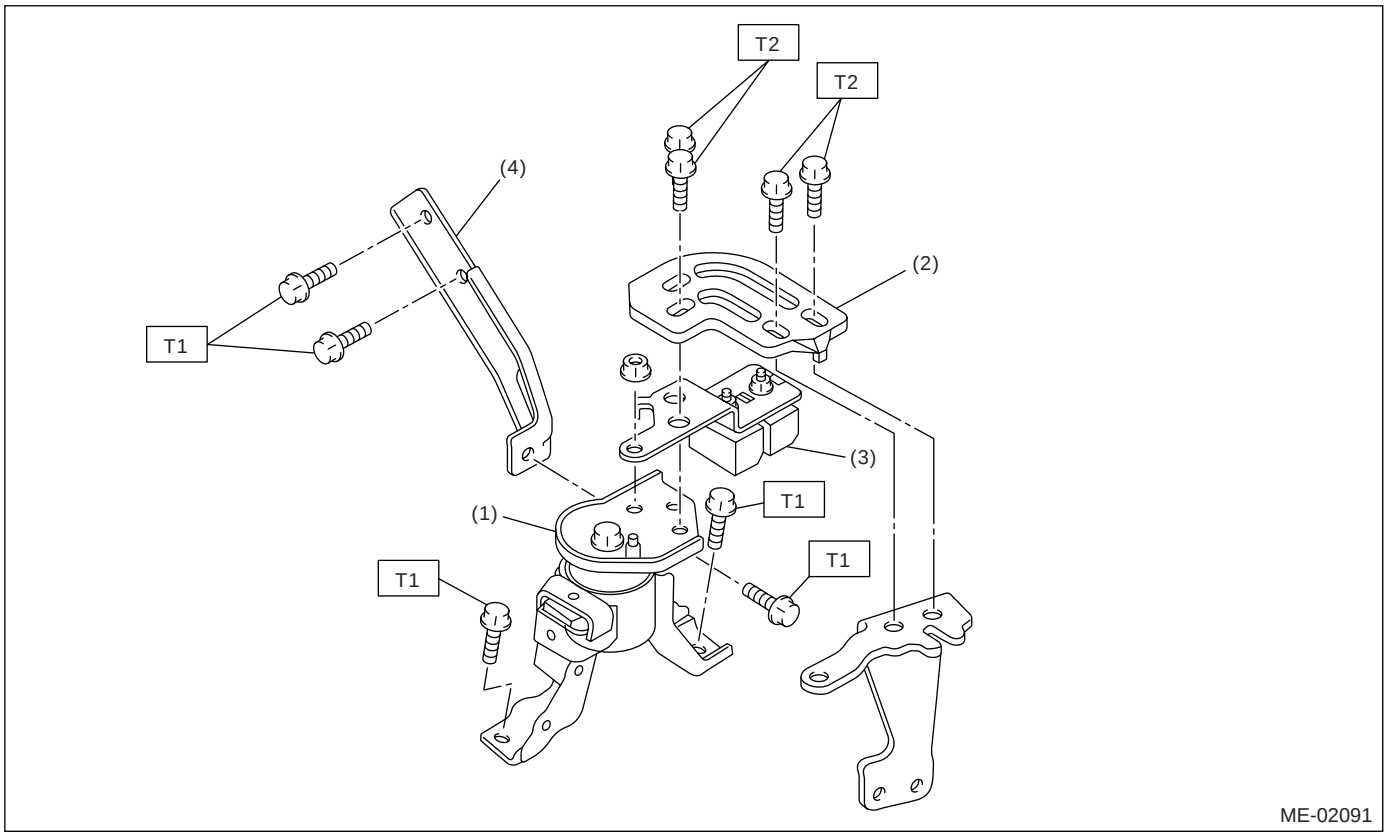
6. ENGINE MOUNTING



(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 85 (8.7, 62.7)

7. LINEAR MOTION MOUNTING



(1) Linear motion mounting
(2) Linear motion mounting bracket
(3) Dynamic damper
(4) Bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 33 (3.4, 24.3)
T2: 30 (3.1, 22.1)

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 fender, 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

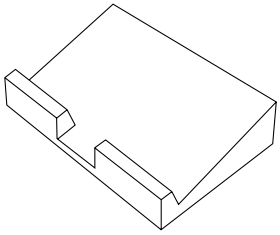
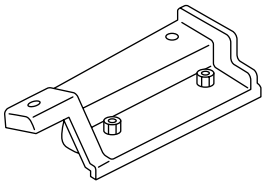
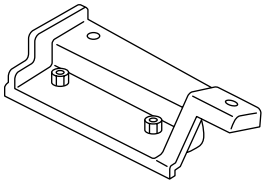
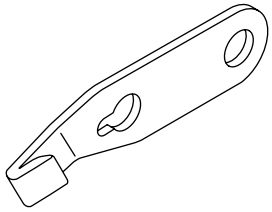
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498267600	498267600	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of drive plate when loosening/tightening crank pulley bolt.

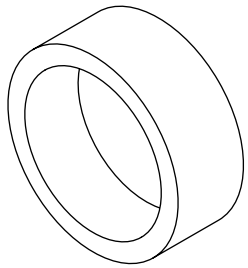
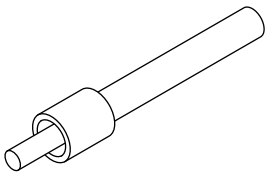
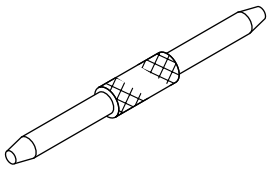
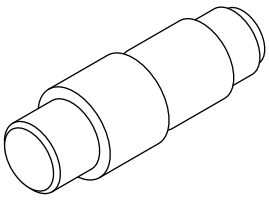
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder.
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.

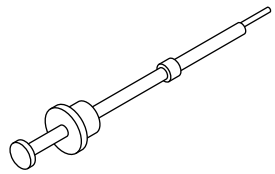
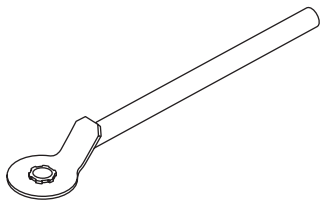
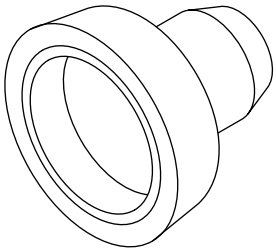
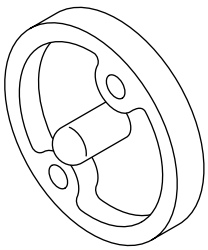
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing the intake cam sprocket and exhaust cam sprocket.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• 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).

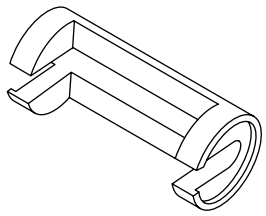
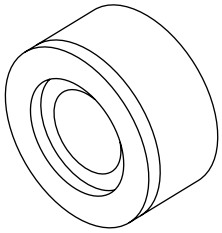
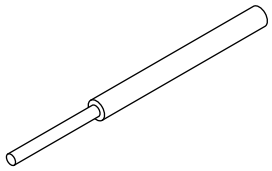
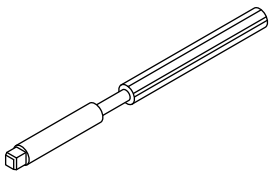
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA020	18251AA020	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.

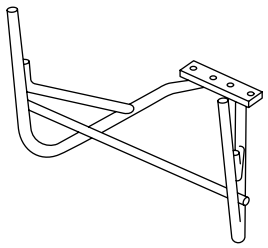
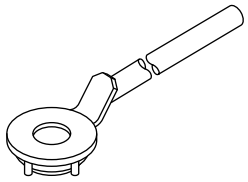
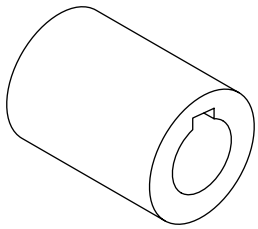
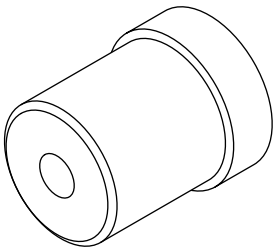
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499817000	499817000	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt.
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

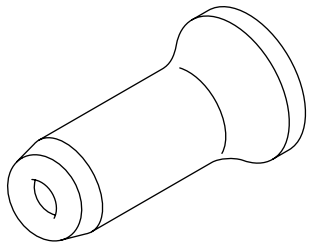
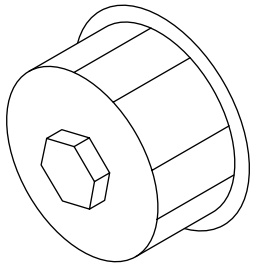
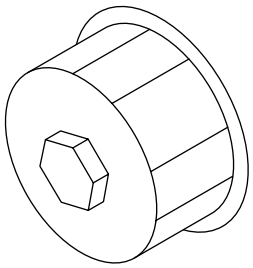
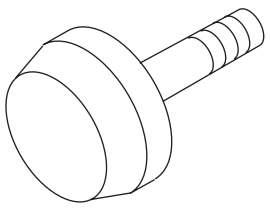
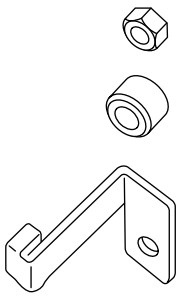
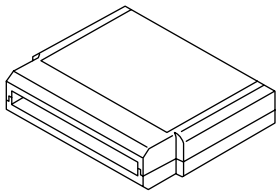
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587600	499587600	OIL SEAL INSTALLER	Used for installing camshaft oil seal for DOHC engine.
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))
 ST-499597200	499597200	OIL SEAL GUIDE	• Used for installing camshaft oil seal for DOHC engine. • Used with OIL SEAL INSTALLER (499587600)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
 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)

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 vehicle.

- V-belt
- Timing belt
- Camshaft
- Cylinder head

2. Compression

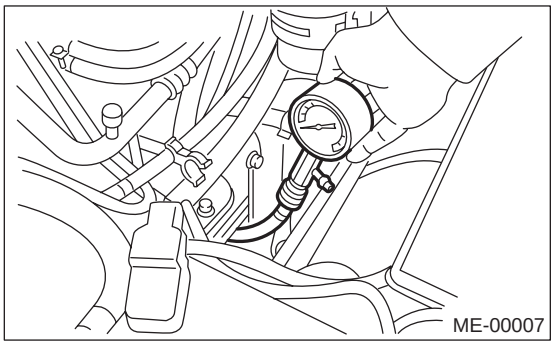
A: INSPECTION

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

1) Remove the collector cover.
2) After warming-up the engine, turn the ignition switch to OFF.
3) Make sure that the battery is fully charged.
4) Release the fuel pressure. <Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
5) Remove all the spark plugs.
<Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>
6) Fully open the throttle valve.
7) Check the starter motor for satisfactory performance and operation.
8) 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.

9) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



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

Compression pressure (Throttle fully open):
Standard:
1,100 — 1,300 kPa (11.2 — 13.3 kg/cm^2, 160 — 189 psi)
Difference between cylinders:
49 kPa (0.5 kgf/cm^2, 7 psi) or less

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 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 the engine idle speed.
12) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. 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]:
825±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(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

1) Before checking the ignition timing, 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 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 idle speed.

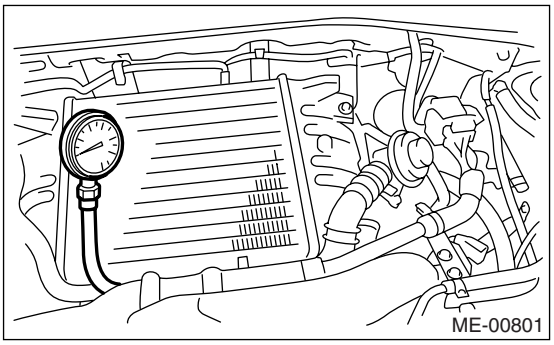
Ignition timing [BTDC/rpm]:
14°±3°/650

If the timing is not correct, check the ignition control system. Refer to “Engine Control System”. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

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



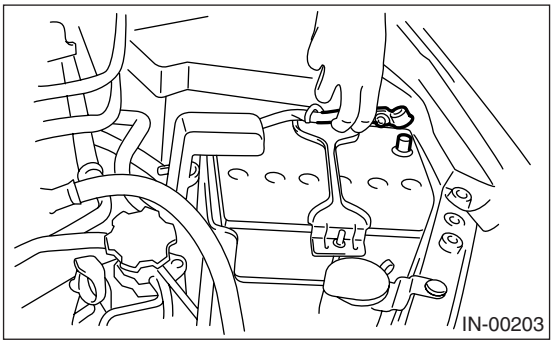
Vacuum pressure (at idling, A/C "OFF"):
–66.7 kPa (–500 mmHg, –19.70 inHg) or less

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle motion is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket, or disconnected 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.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to the lower position than normal.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valve
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

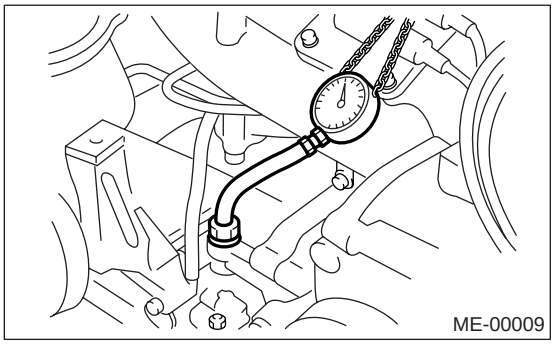
6. Engine Oil Pressure

A: INSPECTION

1) Remove the collector cover.
2) Remove the oil pressure switch from engine cylinder block. <Ref. to LU(H4DOTC)-16, REMOVAL, Oil Pressure Switch.>
3) Connect the oil pressure gauge hose to cylinder block.
4) Connect the battery ground cable to battery.



5) Start the engine, and measure the oil pressure.



Oil pressure:
Standard:
98 kPa (1.0 kgf/cm^2, 14 psi) or more (At 600 rpm)
588 kPa (6.0 kgf/cm^2, 85 psi) or more (At 6,000 rpm)

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H4DOTC)-18, INSPECTION, Engine Lubrication System Trouble in General.>
• If the oil pressure warning light is turned to ON and oil pressure is within specification, replace the oil pressure switch. <Ref. to LU(H4DOTC)-18, INSPECTION, Engine Lubrication System Trouble in General.>

NOTE:
The specified value is based on an engine oil temperature of 80°C (176°F).

6) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4DOTC)-16, INSTALLATION, Oil Pressure Switch.>

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

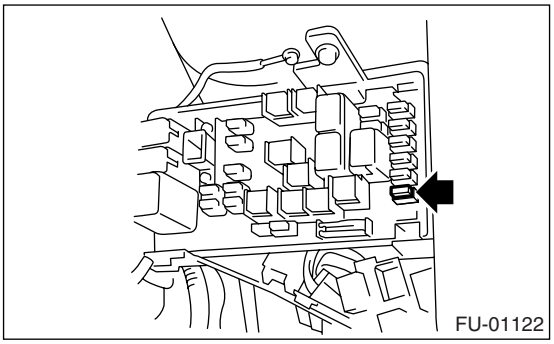
7. Fuel Pressure

A: INSPECTION

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

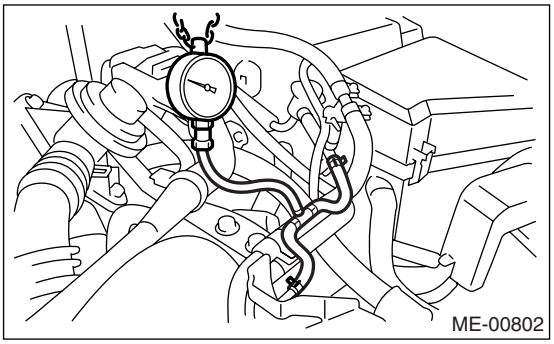
NOTE:
When the fuel pressure is out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Remove the collector cover.
2) Release the fuel pressure. <Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Disconnect the fuel delivery hose and connect fuel pressure gauge.
5) Remove the fuse of fuel pump from main fuse box.



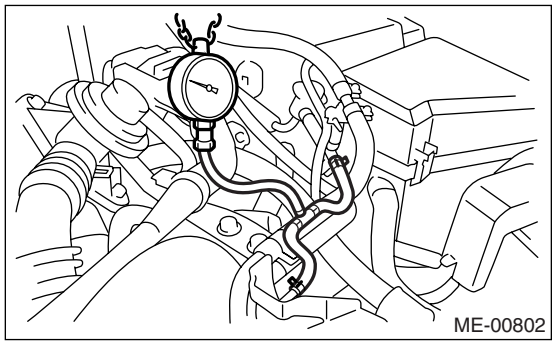
6) Start the engine.
7) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard: 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)



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

Fuel pressure:
Standard: 230 — 260 kPa (2.35 — 2.65 kgf/cm^2, 33 — 38 psi)



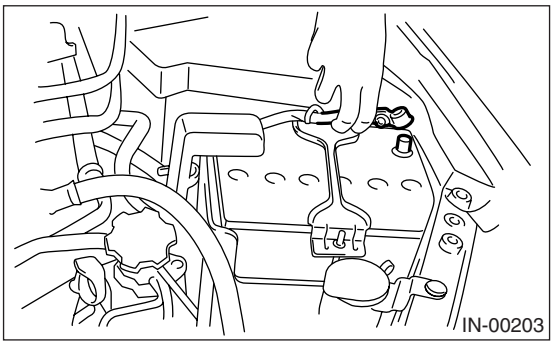
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

A: INSPECTION

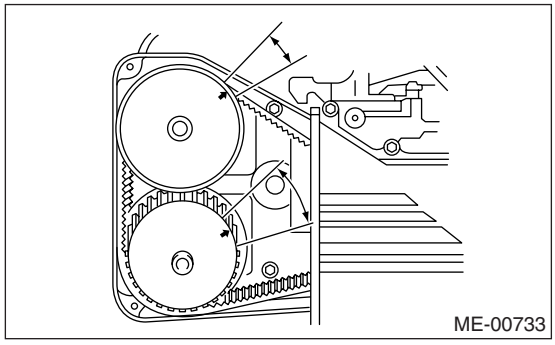
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Lift-up the vehicle.
2) Remove the under cover.
3) Lower the vehicle.
4) Remove the collector cover.
5) Disconnect the ground cable from battery.



6) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
7) Remove a bolt which secures timing belt cover (RH).
8) Loosen the remaining bolts which secure timing belt cover (RH), then remove the timing belt cover.
9) When inspecting #1 and #3 cylinders:
   (1) Remove the air cleaner case.
   <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
   (2) Disconnect the connector from ignition coil.
   (3) Remove the ignition coil.
   (4) Place a suitable container under the vehicle.
   (5) Disconnect the PCV hose from rocker cover (RH).
   (6) Remove the bolts, then remove the rocker cover (RH).
10) When inspecting #2 and #4 cylinders:
   (1) Disconnect the battery cable, and then remove the battery and battery carrier.
   (2) Disconnect the connector from ignition coil.
   (3) Remove the ignition coil.
   (4) Place a suitable container under the vehicle.
   (5) Disconnect the PCV hose from rocker cover (LH).
   (6) Remove the bolts, then remove the rocker cover (LH).
11) Turn the crank pulley clockwise until arrow mark on the cam sprocket is set to position shown in the figure.

NOTE:
Turn the crankshaft using a socket wrench.

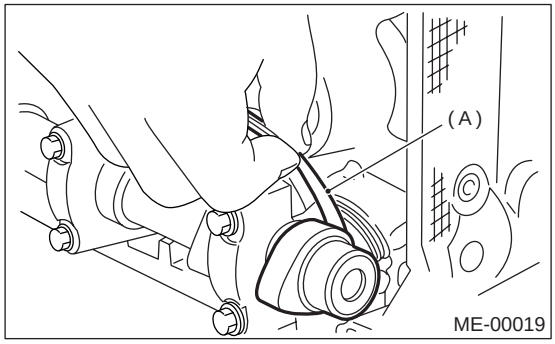


12) Measure the #1 cylinder intake valve and #3 cylinder exhaust valve clearance by using thickness gauge (A).

NOTE:
• Insert the thickness gauge in as horizontal a direction as possible with respect to the valve lifter.
• Measure the exhaust valve clearances while lifting-up the vehicle.

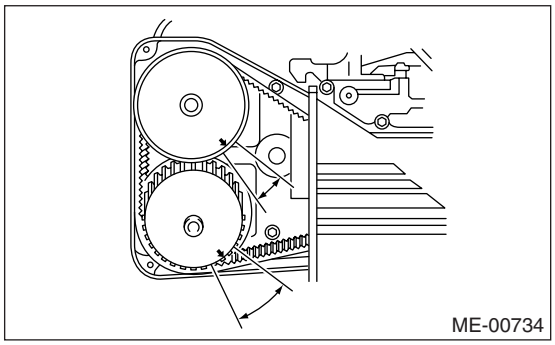
Valve clearance
Intake:
$0.20^{+0.04}_{-0.06}$ mm ($0.0079^{+0.0016}_{-0.0024}$ in)
Exhaust:
0.35 ± 0.05 mm (0.0138 ± 0.0020 in)

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

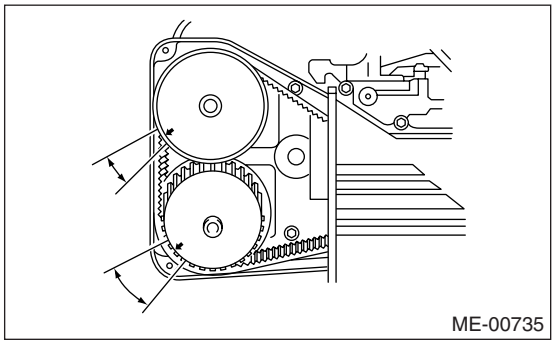


13) If necessary, adjust the valve clearance. <Ref. to ME(H4DOTC)-28, ADJUSTMENT, Valve Clearance.>
14) Further turn the crank pulley clockwise and then measure the valve clearances again.

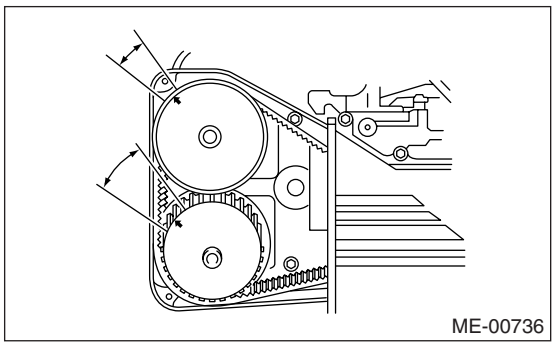
(1) Set the arrow mark on cam sprocket to the position shown in the figure, and measure the #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set the arrow mark on cam sprocket to the position shown in the figure, and measure the #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



(3) Set the arrow mark on cam sprocket to the position shown in the figure, and measure the #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



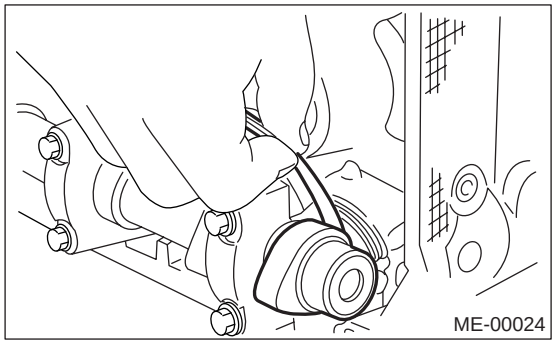
15) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

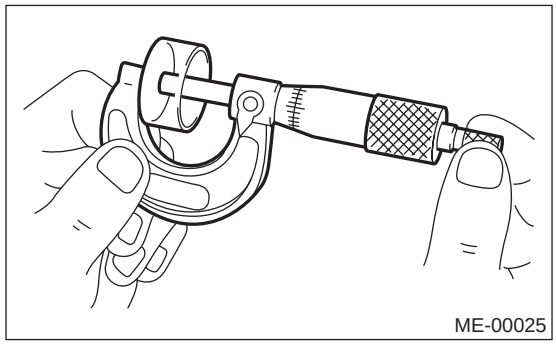
CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances. <Ref. to ME(H4DOTC)-27, INSPECTION, Valve Clearance.>

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



2) Remove the camshaft. <Ref. to ME(H4DOTC)-53, 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 based on the measured valve clearance and valve lifter thickness, by referring to the following table.

Unit: (mm)
Intake valve: S = (V + T) − 0.20 Exhaust valve: S = (V + T) − 0.35
S: Valve lifter thickness required V: Measured valve clearance T: Valve lifter thickness to be used

Part number	Thickness mm (in)
13228 AB101	4.68 (0.1843)
13228 AB111	4.69 (0.1846)
13228 AB121	4.70 (0.1850)
13228 AB131	4.71 (0.1854)
13228 AB141	4.72 (0.1858)
13228 AB151	4.73 (0.1862)
13228 AB161	4.74 (0.1866)
13228 AB171	4.75 (0.1870)
13228 AB181	4.76 (0.1874)
13228 AB191	4.77 (0.1878)
13228 AB201	4.78 (0.1882)
13228 AB211	4.79 (0.1886)
13228 AB221	4.80 (0.1890)
13228 AB231	4.81 (0.1894)
13228 AB241	4.82 (0.1898)
13228 AB251	4.83 (0.1902)
13228 AB261	4.84 (0.1906)
13228 AB271	4.85 (0.1909)
13228 AB281	4.86 (0.1913)
13228 AB291	4.87 (0.1917)
13228 AB301	4.88 (0.1921)
13228 AB311	4.89 (0.1925)
13228 AB321	4.90 (0.1929)
13228 AB331	4.91 (0.1933)
13228 AB341	4.92 (0.1937)
13228 AB351	4.93 (0.1941)
13228 AB361	4.94 (0.1945)
13228 AB371	4.95 (0.1949)
13228 AB381	4.96 (0.1953)
13228 AB391	4.97 (0.1957)
13228 AB401	4.98 (0.1961)
13228 AB411	4.99 (0.1965)
13228 AB421	5.00 (0.1969)
13228 AB431	5.01 (0.1972)
13228 AB441	5.02 (0.1976)
13228 AB451	5.03 (0.1980)
13228 AB461	5.04 (0.1984)
13228 AB471	5.05 (0.1988)
13228 AB481	5.06 (0.1992)
13228 AB491	5.07 (0.1996)
13228 AB501	5.08 (0.2000)
13228 AB511	5.09 (0.2004)
13228 AB521	5.10 (0.2008)
13228 AB531	5.11 (0.2012)
13228 AB541	5.12 (0.2016)
13228 AB551	5.13 (0.2020)
13228 AB561	5.14 (0.2024)
13228 AB571	5.15 (0.2028)
13228 AB581	5.16 (0.2031)
13228 AB591	5.17 (0.2035)
13228 AB601	5.18 (0.2039)

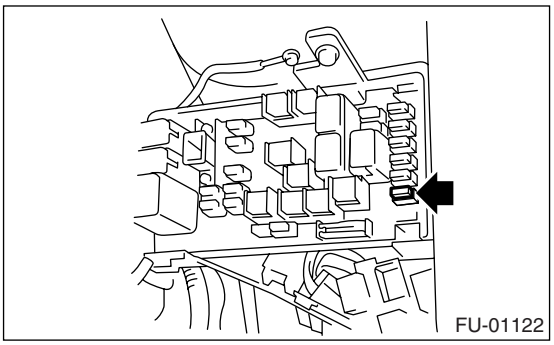
Part number	Thickness mm (in)
13228 AB611	5.19 (0.2043)
13228 AB621	5.20 (0.2047)
13228 AB631	5.21 (0.2051)
13228 AB641	5.22 (0.2055)
13228 AB651	5.23 (0.2059)
13228 AB661	5.24 (0.2063)
13228 AB671	5.25 (0.2067)
13228 AB681	5.26 (0.2071)
13228 AB691	5.27 (0.2075)
13228 AB701	4.38 (0.1724)
13228 AB711	4.40 (0.1732)
13228 AB721	4.42 (0.1740)
13228 AB731	4.44 (0.1748)
13228 AB741	4.46 (0.1756)
13228 AB751	4.48 (0.1764)
13228 AB761	4.50 (0.1771)
13228 AB771	4.52 (0.1780)
13228 AB781	4.54 (0.1787)
13228 AB791	4.56 (0.1795)
13228 AB801	4.58 (0.1803)
13228 AB811	4.60 (0.1811)
13228 AB821	4.62 (0.1819)
13228 AB831	4.64 (0.1827)
13228 AB841	4.66 (0.1835)
13228 AB851	5.29 (0.2083)
13228 AB861	5.31 (0.2091)
13228 AB871	5.33 (0.2098)
13228 AB881	5.35 (0.2106)
13228 AB891	5.37 (0.2114)
13228 AB901	5.39 (0.2122)
13228 AB911	5.41 (0.2123)
13228 AB921	5.43 (0.2138)
13228 AB931	5.45 (0.2146)
13228 AB941	5.47 (0.2154)
13228 AB951	5.49 (0.2161)
13228 AB961	5.51 (0.2169)
13228 AB971	5.53 (0.2177)
13228 AB981	5.55 (0.2185)
13228 AB991	5.57 (0.2193)
13228 AC001	5.59 (0.2201)
13228 AC011	5.61 (0.2209)
13228 AC021	5.63 (0.2217)
13228 AC031	5.65 (0.2224)

6) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.
7) After inspection, install the related parts in the reverse order of removal.

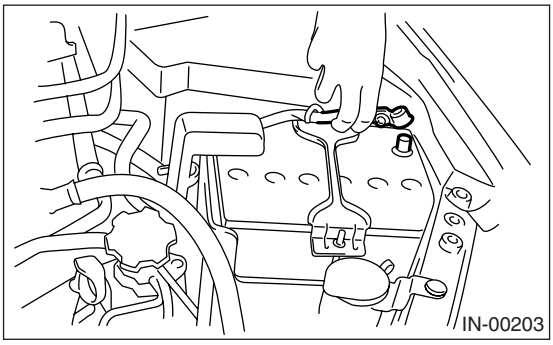
9. Engine Assembly

A: REMOVAL

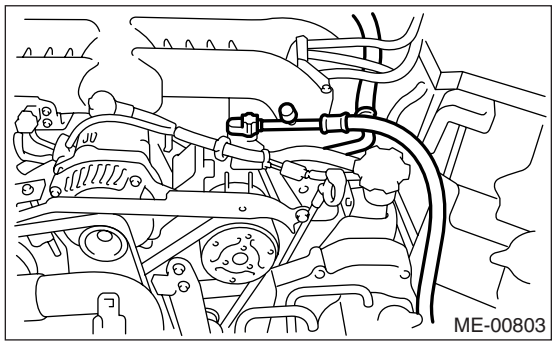
1) Set the vehicle on a lift.
2) Open the front hood fully and support with a front food stay.
3) Collect the refrigerant from A/C system. <Ref. to AC-20, Refrigerant Recovery Procedure.>
4) Release the fuel pressure.
   (1) Remove the fuse of fuel pump from main fuse box.



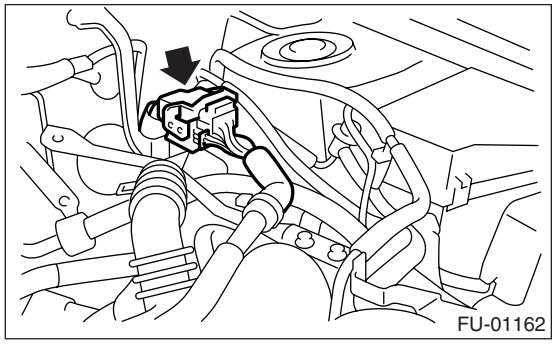
   (2) Start the engine, and run until stalls.
   (3) After the engine stalls, crank it for 5 seconds more.
   (4) Turn the ignition switch to OFF.
5) Remove the fuel filler cap.
6) Remove the collector cover.
7) Disconnect the ground cable from battery.

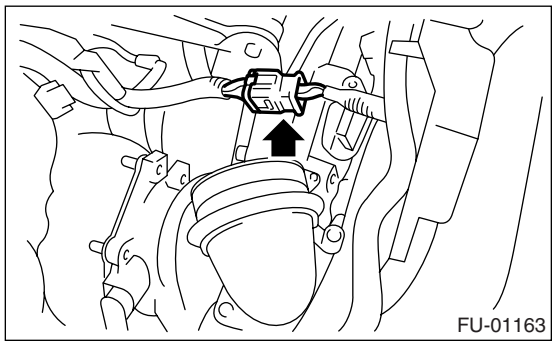


8) Remove the radiator from vehicle. <Ref. to CO(H4DOTC)-19, REMOVAL, Radiator.>
9) Remove the coolant filler tank.
<Ref. to CO(H4DOTC)-31, REMOVAL, Coolant Filler Tank.>
10) Disconnect the A/C pressure hoses from A/C compressor.

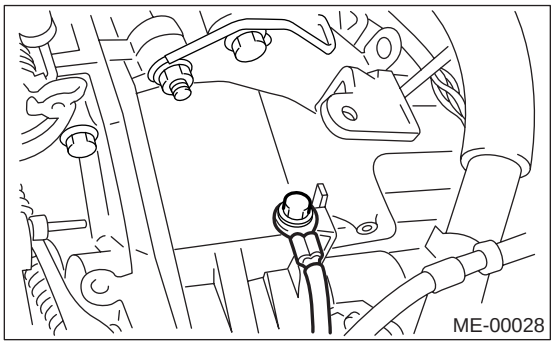


11) Repair the air intake system.
   (1) Remove the intercooler. (DOHC turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
   (2) Remove the air cleaner element and air cleaner case. <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
12) Disconnect the following connectors and cables.
   (1) Engine harness connectors

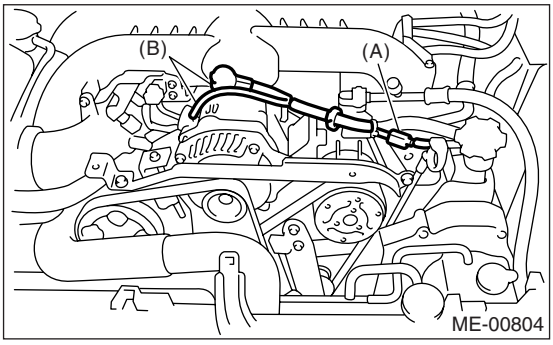




(2) Engine ground terminals

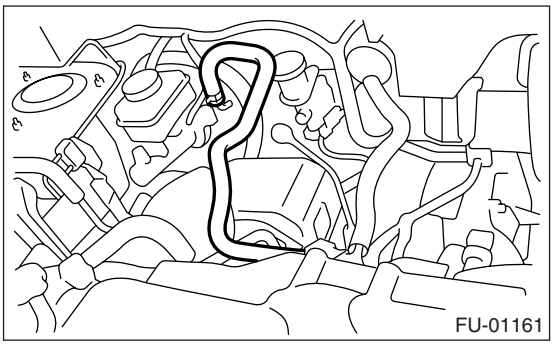


(3) Generator connector, terminal and A/C compressor connector

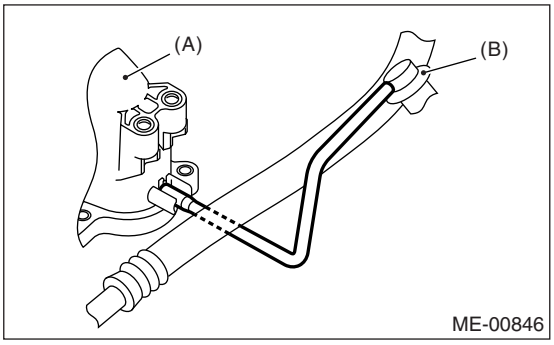


(A) A/C compressor connector
(B) Generator connector and terminal

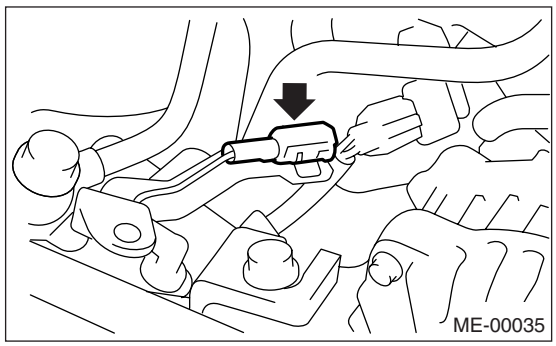
13) Disconnect the following hoses.
(1) Brake booster vacuum hose



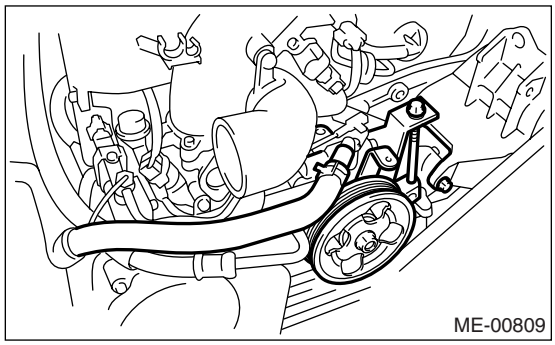
(2) Heater inlet and outlet hoses
(3) Remove the hose between intake manifold (A) and pressure regulator (B).



14) Remove the power steering pump from bracket.
(1) Loosen the lock bolt and slider bolt, and remove the front side belt. <Ref. to ME(H4DOTC)-39, FRONT SIDE BELT, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.



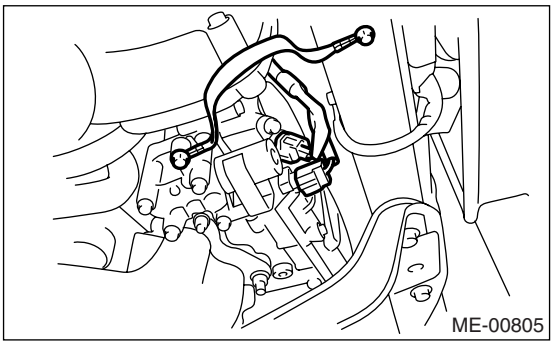
(3) Remove the power steering pump from engine.

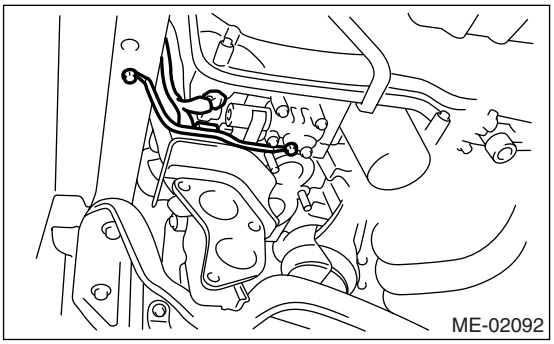


(4) Place the power steering pump on the right side wheel apron.

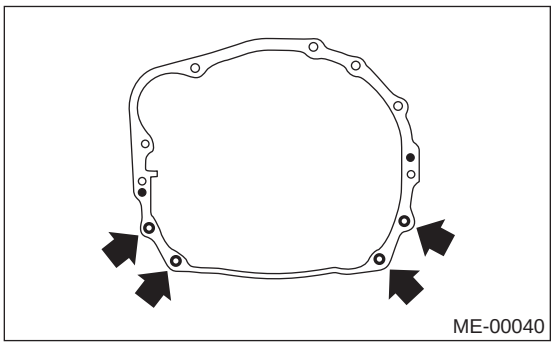
15) Remove the linear motion mounting. <Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>
16) Lift-up the vehicle.
17) Remove the center exhaust pipe.
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>

18) Disconnect the oil flow control solenoid valve connector and ground cable.

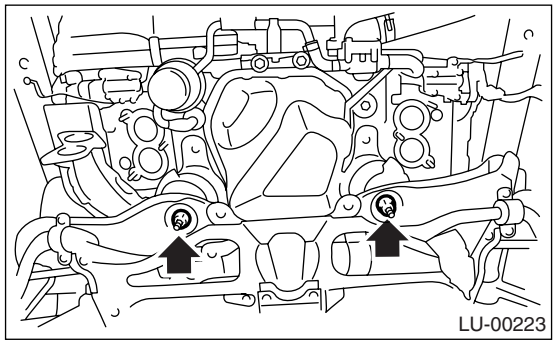

ME-00805


ME-02092

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

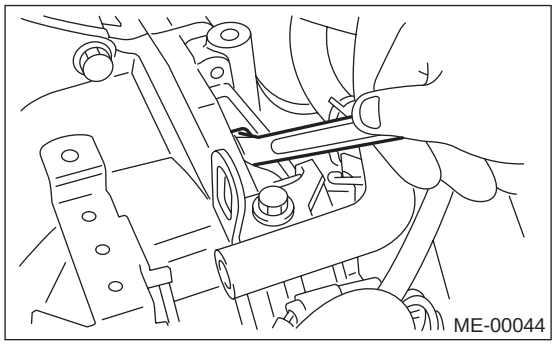

ME-00040

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

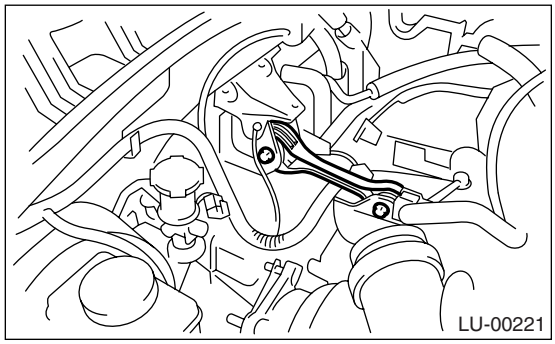

LU-00223

21) Separate the torque converter clutch from drive plate.

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

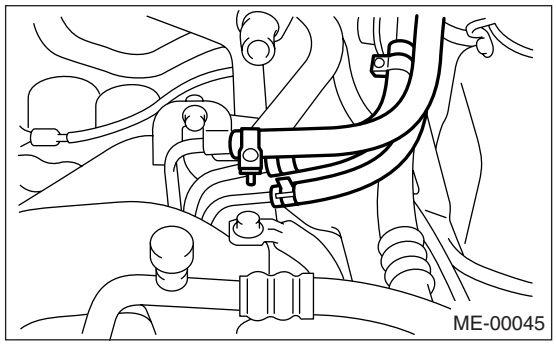

ME-00044

22) Remove the pitching stopper.

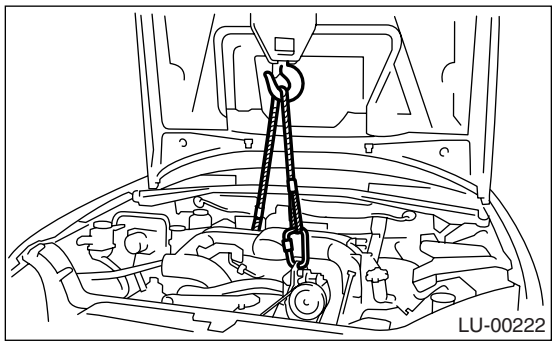

LU-00221

23) Disconnect the fuel delivery hose, return hose and evaporation hose.

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

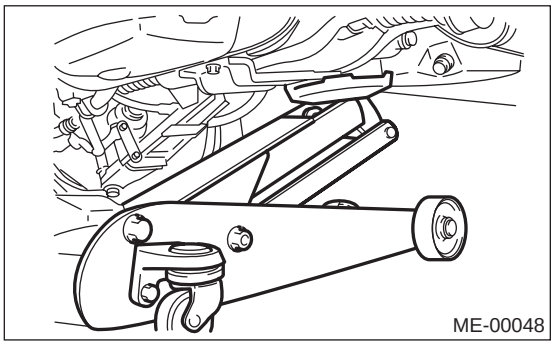

ME-00045

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


LU-00222

25) Support the transmission with a garage jack.

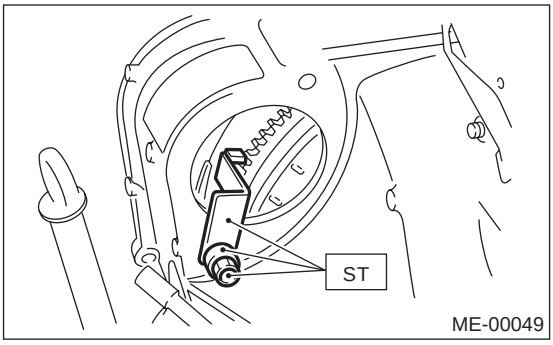
CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.


ME-00048

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

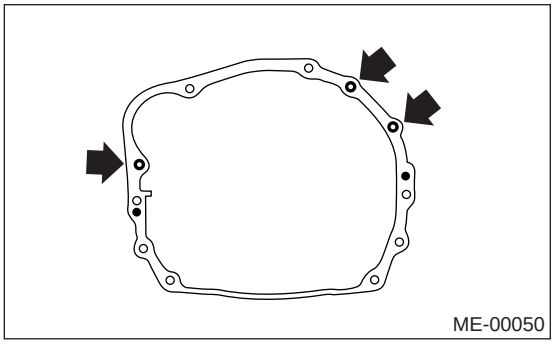
26) Separation of engine and transmission.
(1) Remove the starter. <Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
(2) Install the ST to converter case.

ST 498277200 STOPPER SET



ME-00049

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


ME-00050

27) 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.

28) Remove the front cushion rubbers.

B: INSTALLATION

1) Install the front cushion rubbers to engine.

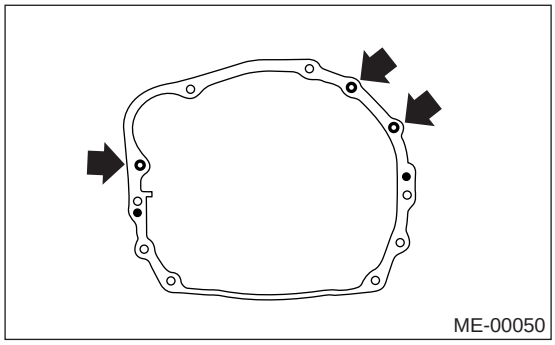
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

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

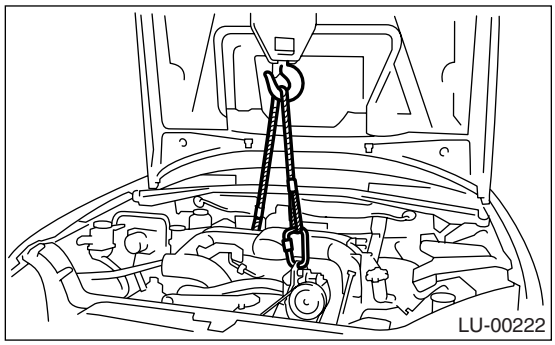
NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

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)


ME-00050

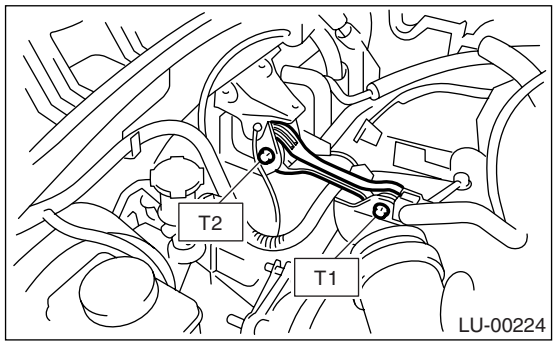
4) Remove the lifting device and wire ropes.


LU-00222

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, 43 ft-lb)



7) Remove the ST from converter case.

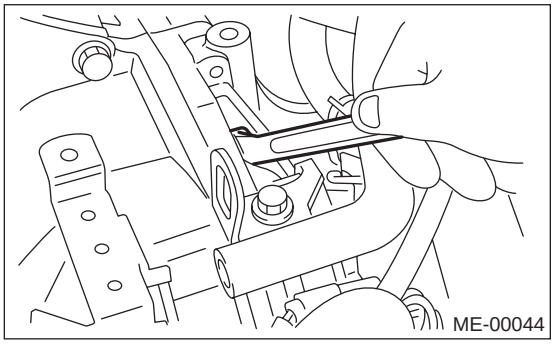
NOTE:
Be careful not to drop the ST into the converter case when removing the ST.
ST 498277200 STOPPER SET

8) Install the starter. <Ref. to SC(H4SO 2.0)-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 by using ST.

CAUTION:
Be careful not to drop bolts into the torque converter clutch housing.

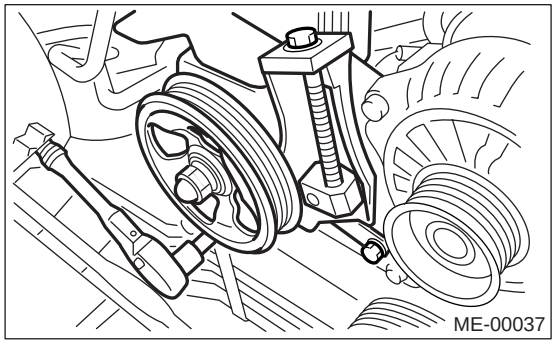
ST 499977400 CRANK PULLEY WRENCH

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

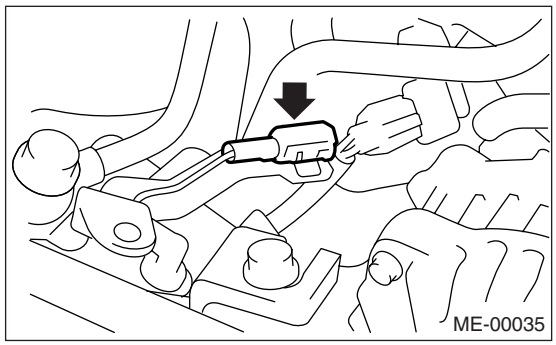


10) Install the linear motion mounting. <Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>
11) Install the power steering pump on bracket.
(1) Install the power steering pump.

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

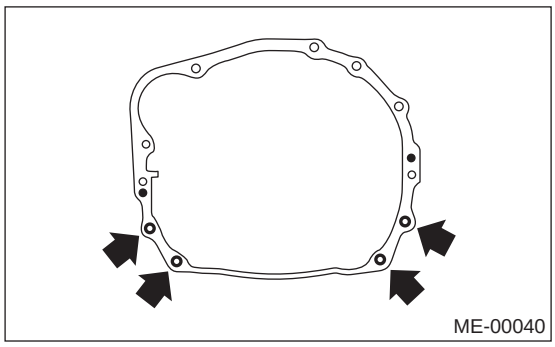


(2) Connect the power steering switch connector.



(3) Install the front side belt and adjust it. <Ref. to ME(H4DOTC)-39, FRONT SIDE BELT, INSTALLATION, V-belt.>
12) Lift-up the vehicle.
13) Tighten the nuts which hold lower side of the transmission to engine.

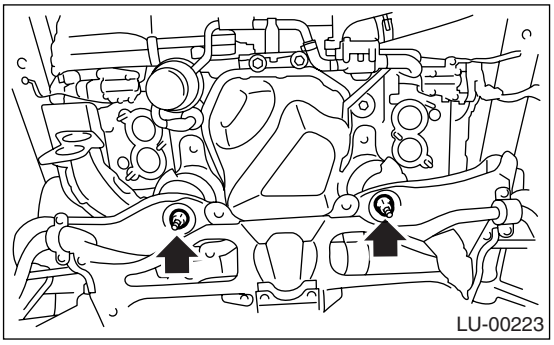
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



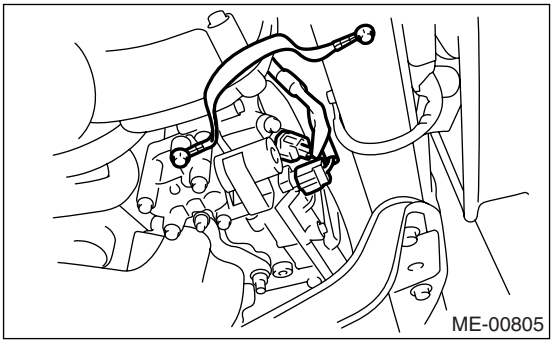
14) Tighten the nuts which install the front cushion rubber onto crossmember.

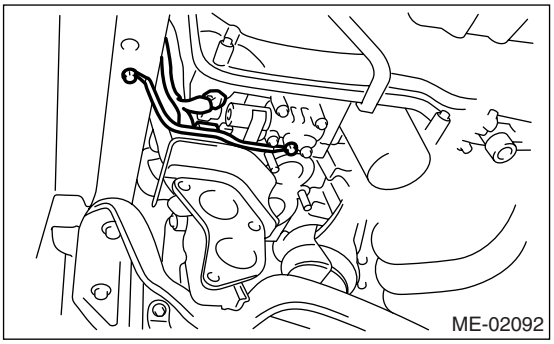
Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

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



15) Install the center exhaust pipe.
<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.>
16) Connect the oil flow control solenoid valve connector and ground cable of exhaust side.

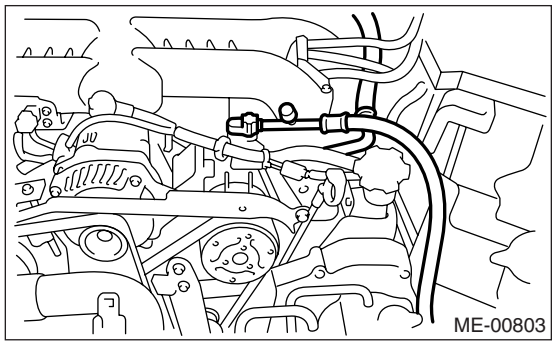




17) Lower the vehicle.
18) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
(4) Pressure regulator hose
19) Connect the following connectors and terminals.
(1) Engine ground terminals
(2) Engine harness connectors
(3) Generator connector and terminal
(4) A/C compressor connector
20) Install the air intake system.
(1) Install the intercooler. (DOHC turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
(2) Install the air cleaner element and air cleaner case. <Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Case.>
21) Install the A/C pressure hoses.

NOTE:
Use new O-rings.

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



22) Install the radiator. <Ref. to CO(H4DOTC)-20, INSTALLATION, Radiator.>
23) Install the coolant filler tank. (DOHC turbo model) <Ref. to CO(H4DOTC)-31, INSTALLATION, Coolant Filler Tank.>
24) Install the window washer tank.
25) Install the battery to vehicle, and connect the battery ground terminal.
26) Fill engine coolant.
<Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
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 connected firmly.
2) Check the engine coolant and ATF are at specified levels.

10.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4DOTC)-30, 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)

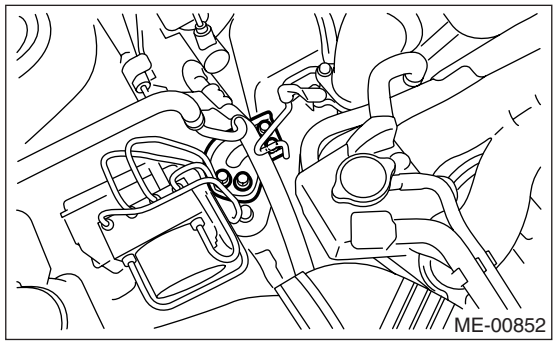
C: INSPECTION

Make sure that cracks or other damages do not exist.

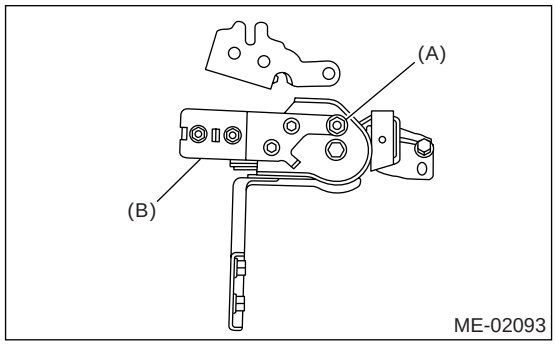
11.Linear Motion Mounting

A: REMOVAL

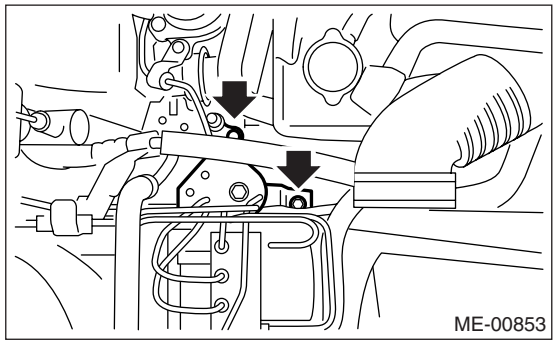
1) Remove the collector cover.
2) Remove the air cleaner case.
3) Remove the linear motion mounting bracket.



4) Remove the speed nut (A), and remove the dynamic damper (B).



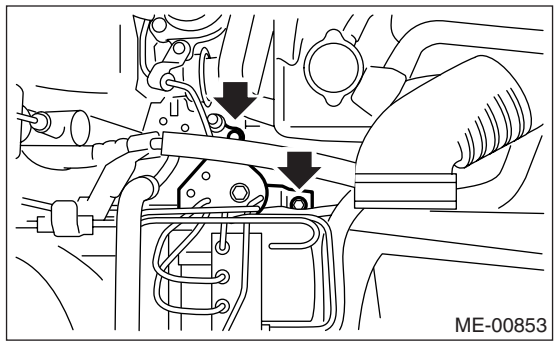
5) Remove the linear motion mounting.



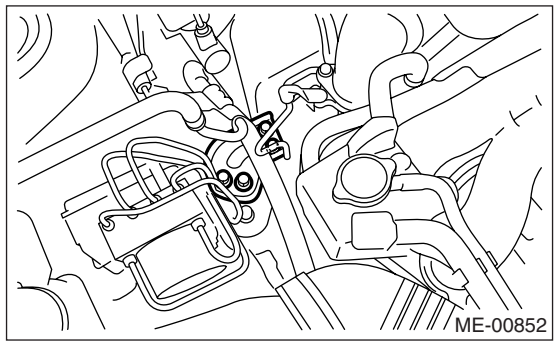
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

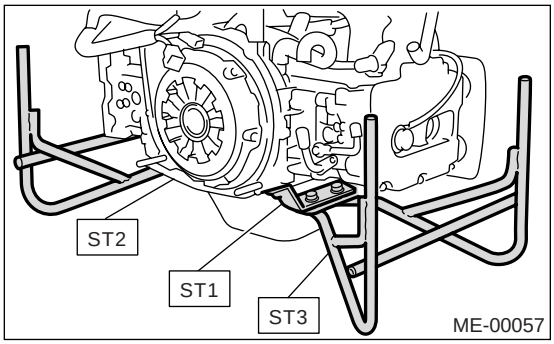


12.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from body, secure it in the STs shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

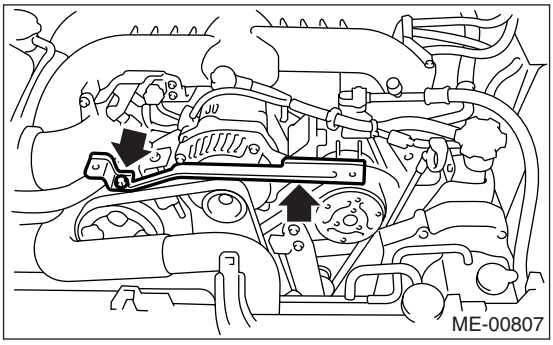
13.V-belt

A: REMOVAL

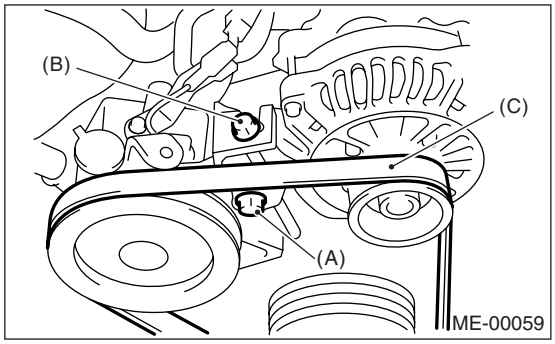
NOTE:
Perform the following procedures with the engine installed to the body.

1. FRONT SIDE BELT

1) Remove the collector cover.
2) Remove the V-belt covers.

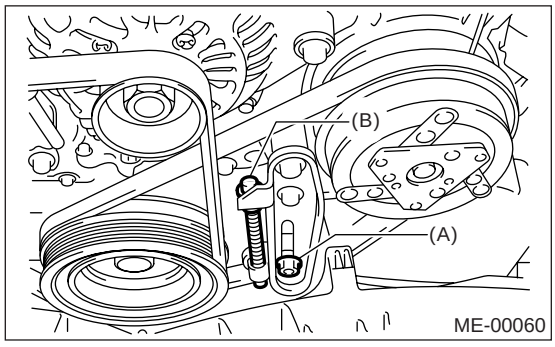


3) Loosen the lock bolt (A).
4) Loosen the slider bolt (B).
5) Remove the front side belt (C).

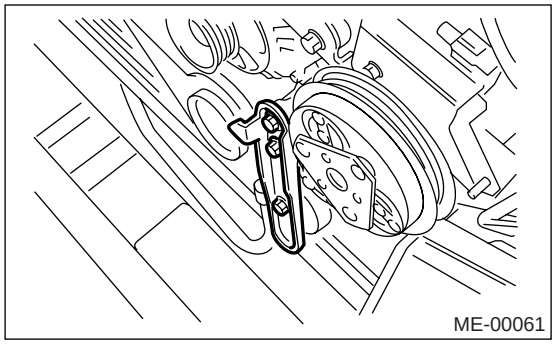


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the A/C belt.
4) Remove the A/C belt tensioner.



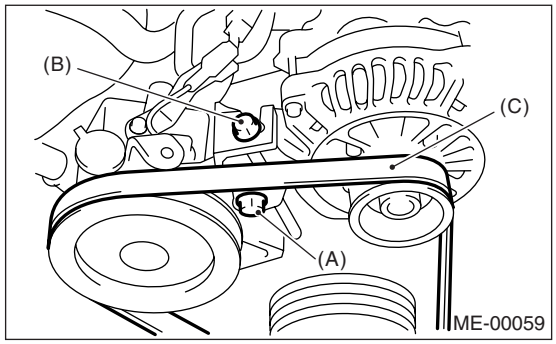
B: INSTALLATION

NOTE:
Wipe off any oil or water on the belt and pulley.

1. FRONT SIDE BELT

1) Install a V-belt (C), and tighten the slider bolt so as to obtain the specified belt tension. <Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>
2) Tighten the lock bolt (A).
3) Tighten the slider bolt (B).

Tightening torque:
Lock bolt (A):
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Slider bolt (B):
8 N·m (0.8 kgf-m, 5.9 ft-lb)

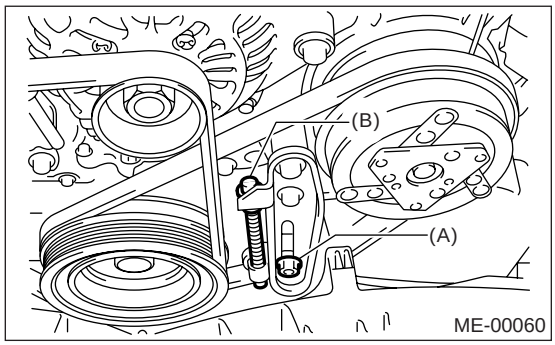


2. REAR SIDE BELT

1) Remove the A/C belt tensioner.
2) Install a V-belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.
<Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>

3) Tighten the lock nut (A).

Tightening torque:
Lock nut (A):
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



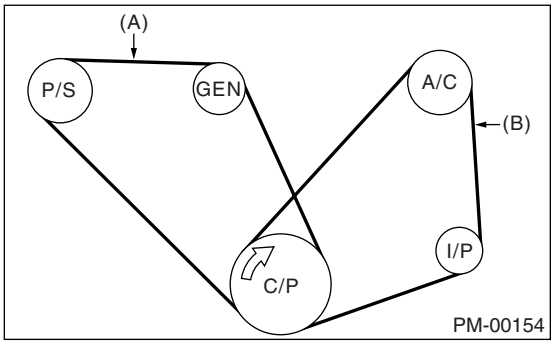
C: INSPECTION

1) Replace the belts, if crack, fraying or wear is found.
2) Check the V-belt tension and adjust it if necessary by changing the generator installing position and idler pulley installing position.

Belt tension (with belt tension gauge)

(A)
When installing new parts:
618 — 755 N (63 — 77 kgf, 139 — 170 lb)
At inspection:
490 — 640 N (50 — 65 kgf, 110 — 144 lb)

(B)
When installing new parts:
740 — 880 N (75 — 90 kgf, 166 — 198 lb)
At inspection:
350 — 450 N (36 — 46 kgf, 78 — 101 lb)

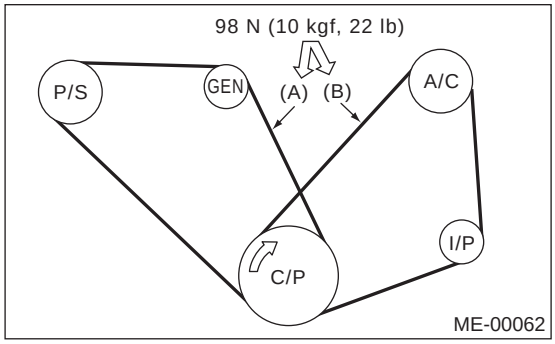


(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

Belt tension (without belt tension gauge)

(A)
When installing new parts:
7 — 9 mm (0.276 — 0.354 in)
At inspection:
9 — 11 mm (0.354 — 0.433 in)

(B)
When installing new parts:
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection:
9.0 — 10.0 mm (0.354 — 0.394 in)

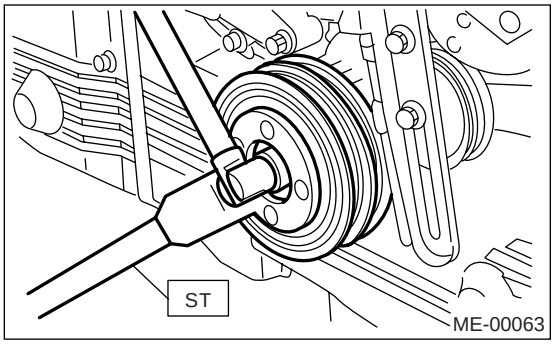


C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

14.Crank Pulley

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley bolt. To lock the crankshaft, use ST.
ST 499977400 CRANK PULLEY WRENCH

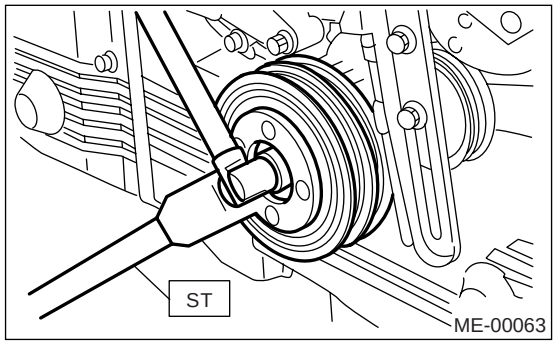


3) Remove the crank pulley.

B: INSTALLATION

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.
ST 499977400 CRANK PULLEY WRENCH
(1) Clean the crank shaft thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



3) Confirm that the tightening angle of the crank pulley bolt is 45° or more. Perform the following procedures when less than 45°.

CAUTION:
If the tightening angle of crank pulley bolt is less than 45°, the bolt should be damaged. In this case, the bolt must be replaced.

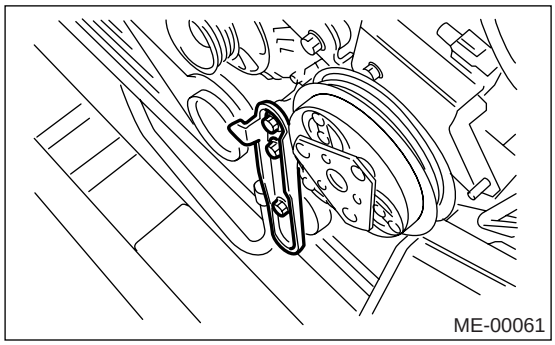
(1) Replace and clean the crank pulley bolts.

Crank pulley bolt:
Part No. 12369AA011

(2) Clean the crankshaft thread using compressed air.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts keeping them in an angle 45° — 60°.

NOTE:
Conduct the tightening procedures by confirming the turning angle of the crank pulley bolt referring to the gauge indicated on the timing belt cover.

4) Install the A/C belt tensioner.



5) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

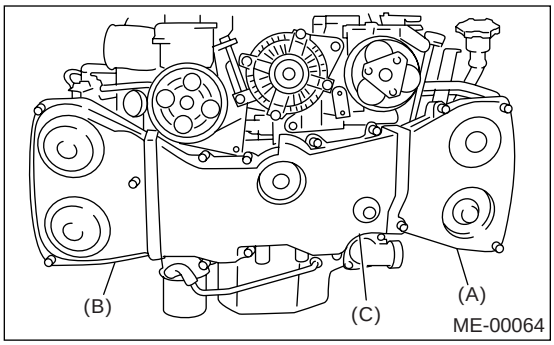
C: INSPECTION

1) Check the V-belt is not worn or otherwise damaged.
2) Check the tension of the belt. <Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>

15.Timing Belt Cover

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley.
<Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover (LH) (A).
4) Remove the timing belt cover (RH) (B).
5) Remove the front timing belt cover (C).



B: INSTALLATION

1) Install the front timing belt cover (C).

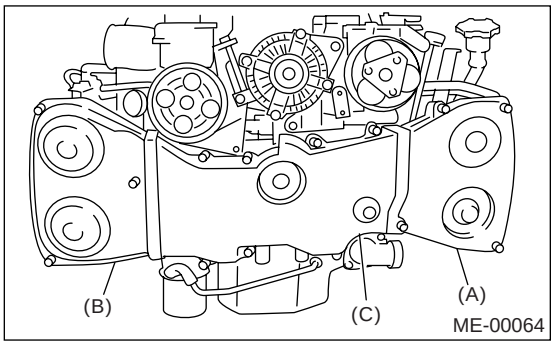
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install the timing belt cover (RH) (B).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

3) Install the timing belt cover (LH) (A).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install the crank pulley. <Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
5) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

C: INSPECTION

Check the cover for damage.