

GENERAL DESCRIPTION

MECHANICAL

1. General Description

A: SPECIFICATIONS

Engine	Type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement		Belt driven, single over-head camshaft, 4-valve/cylinder
	Bore x Stroke	mm (in)	99.5 x 79.0 (3.917 x 3.110)
	Displacement	cm ³ (cu in)	2,457 (150)
	Compression ratio		10.0
	Compression pressure (at 200 — 300 rpm)	kPa (kg/cm ² , psi)	1,079 — 1,275 (11.0 — 13.0, 156 — 185)
	Number of piston rings		Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening	1° BTDC
		Closing	51° ABDC
	Exhaust valve timing	Opening	50° BBDC
		Closing	6° ATDC
	Valve clearance	Intake mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust mm (in)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or "P" or "N" position on AT]		MT: 650±100 (No load) AT: 700±100 (No load) 850±100 (A/C switch ON)
Firing order		1 → 3 → 2 → 4	
Ignition timing		BTDC/rpm MT: 10°±8°/650 AT: 15°±8°/700	

NOTE:

STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter US: Undersize OS: Oversize

Belt tensioner adjuster	Protrusion of adjuster rod		5.2 — 6.2 mm (0.205 — 0.244 in)	
Belt tensioner	Spacer O.D.		17.955 — 17.975 mm (0.7069 — 0.7077 in)	
	Tensioner bushing I.D.		18.00 — 18.08 mm (0.7087 — 0.7118 in)	
	Clearance between spacer and bushing	STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)	
		Limit	0.175 mm (0.0069 in)	
Side clearance of spacer	STD	0.20 — 0.55 mm (0.0079 — 0.0217 in)		
	Limit	0.81 mm (0.0319 in)		
Valve rocker arm	Clearance between shaft and arm	STD	0.020 — 0.054 mm (0.0008 — 0.0021 in)	
		Limit	0.10 mm (0.0039 in)	
Camshaft	Bend limit		0.025 mm (0.0010 in)	
	Thrust clearance	STD	0.030 — 0.090 mm (0.0012 — 0.0035 in)	
		Limit	0.10 mm (0.0039 in)	
	Cam lobe height	Intake	STD	39.485 — 39.585 mm (1.5545 — 1.5585 in)
			Limit	39.385 mm (1.5506 in)
		Exhaust	STD	39.257 — 39.357 mm (1.5455 — 1.5495 in)
			Limit	39.157 mm (1.5416 in)
	Camshaft journal O.D.		31.928 — 31.945 mm (1.2570 — 1.2577 in)	
Camshaft journal hole I.D.		32.000 — 32.018 mm (1.2598 — 1.2605 in)		
Journal clearance	STD	0.055 — 0.090 mm (0.0022 — 0.0035 in)		
	Limit	0.10 mm (0.0039 in)		

ME(H4SO)-2

GENERAL DESCRIPTION

MECHANICAL

Cylinder head	Surface warpage limit (mating surface with cylinder block)			0.05 mm (0.0020 in)	
	Surface grinding limit			0.1 mm (0.004 in)	
	Standard height			97.5 mm (3.839 in)	
Valve set	Refacing angle			90°	
	Contacting width	Intake	STD	1.1 mm (0.039 in)	
			Limit	1.8 mm (0.067 in)	
		Exhaust	STD	1.5 mm (0.055 in)	
			Limit	2.2 mm (0.083 in)	
Valve guide	Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)	
	Protrusion above head		Intake	20.0 — 20.5 mm (0.787 — 0.807 in)	
			Exhaust	16.5 — 17.0 mm (0.650 — 0.669 in)	
Valve	Head edge thickness	Intake	STD	1.0 mm (0.039 in)	
			Limit	0.6 mm (0.024 in)	
		Exhaust	STD	1.2 mm (0.047 in)	
			Limit	0.6 mm (0.024 in)	
	Stem diameter		Intake	5.950 — 5.965 mm (0.2343 — 0.2348 in)	
			Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)	
	Stem oil clearance		STD	Intake	0.035 — 0.062 mm (0.0014 — 0.0024 in)
				Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
			Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	120.6 mm (4.75 in)	
Exhaust			121.7 mm (4.79 in)		
Valve spring	Free length			54.30 mm (2.1378 in)	
	Squareness			2.5°, 2.4 mm (0.094 in)	
	Tension/spring height		Set	214 — 246 N (21.8 — 25.1 kgf, 48.1 — 55.3 lb)/ 45.0 mm (1.772 in)	
			Lift	526 — 582 N (53.7 — 59.4 kgf, 118.2 — 130.8 lb)/ 34.7 mm (1.366 in)	
Cylinder block	Surface warpage limit (mating surface with cylinder head)			0.05 mm (0.0020 in)	
	Surface grinding limit			0.1 mm (0.004 in)	
	Cylinder bore	STD	A	99.505 — 99.515 mm (3.9175 — 3.9179 in)	
			B	99.495 — 99.505 mm (3.9171 — 3.9175 in)	
	Taper		STD	0.015 mm (0.0006 in)	
			Limit	0.050 mm (0.0020 in)	
	Out-of-roundness		STD	0.010 mm (0.0004 in)	
			Limit	0.050 mm (0.0020 in)	
	Piston clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)	
Limit			0.050 mm (0.0020 in)		
Enlarging (boring) limit			0.5 mm (0.020 in)		
Piston	Outer diameter	STD	A	99.485 — 99.495 mm (3.9167 — 3.9171 in)	
			B	99.475 — 99.485 mm (3.9163 — 3.9167 in)	
		0.25 mm (0.0098 in) OS		99.725 — 99.735 mm (3.9262 — 3.9266 in)	
		0.50 mm (0.0197 in) OS		99.975 — 99.985 mm (3.9360 — 3.9364 in)	
	Standard inner diameter of piston pin hole			23.000 — 23.006 mm (0.9055 — 0.9057 in)	
Piston pin	Outer diameter			22.994 — 23.000 mm (0.9053 — 0.9055 in)	
	Standard clearance between piston pin and hole in piston			0.004 — 0.008 mm (0.0002 — 0.0003 in)	
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).	

ME(H4SO)-3

GENERAL DESCRIPTION

MECHANICAL

Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm (0.0079 — 0.0138 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.37 — 0.52 mm (0.0146 — 0.0205 in)
			Limit	1.0 mm (0.039 in)
		Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.0197 in)
			Limit	1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm (0.0016 — 0.0031 in)
			Limit	0.15 mm (0.0059 in)
Second ring		STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)	
		Limit	0.15 mm (0.0059 in)	
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
	Side clearance	STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)	
		Limit	0.4 mm (0.016 in)	
Connecting rod bearing	Oil clearance		STD	0.012 — 0.038 mm (0.0005 — 0.0015 in)
			Limit	0.05 mm (0.0020 in)
	Thickness at center portion		STD	1.490 — 1.502 mm (0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm (0.0592 — 0.0595 in)
			0.05 mm (0.0020 in) US	1.514 — 1.522 mm (0.0596 — 0.0599 in)
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)
Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.020 mm (0.0008 in) or less
		Grinding limit		
	Crank pin outer diameter		STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0446 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter	#1, #3	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
		#2, #4, #5	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance	#1	STD	0.003 — 0.030 mm (0.0001 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)
		#2	STD	0.012 — 0.033 mm (0.0005 — 0.0013 in)
			Limit	0.045 mm (0.0018 in)
		#3	STD	0.003 — 0.030 mm (0.0001 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)
#4		STD	0.012 — 0.033 mm (0.0005 — 0.0013 in)	
		Limit	0.045 mm (0.0018 in)	
#5		STD	0.010 — 0.031 mm (0.0004 — 0.0012 in)	
		Limit	0.040 mm (0.0016 in)	

ME(H4SO)-4

GENERAL DESCRIPTION

MECHANICAL

Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

ME(H4SO)-5

GENERAL DESCRIPTION

MECHANICAL

MEMO:

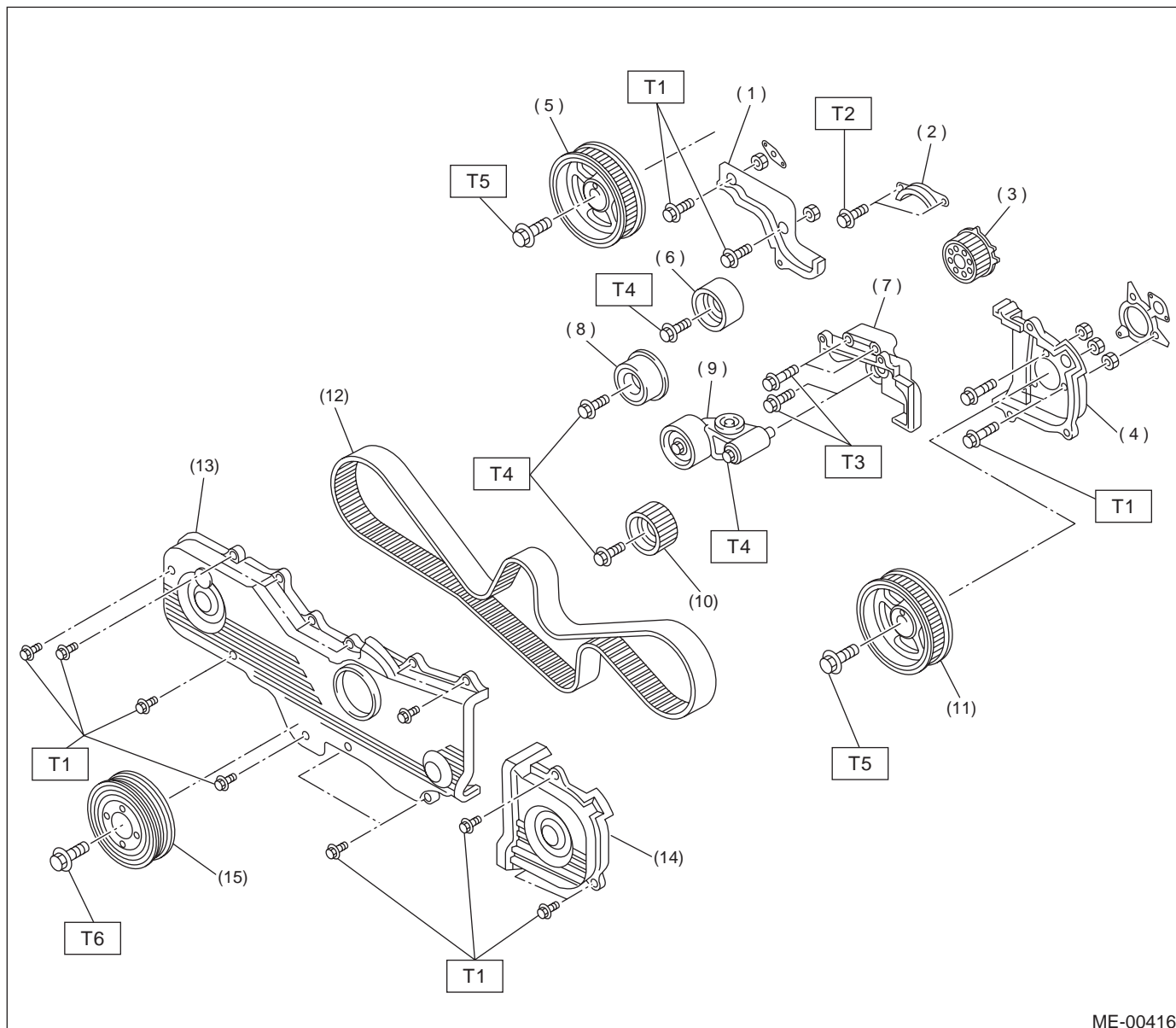
ME(H4SO)-6

GENERAL DESCRIPTION

MECHANICAL

B: COMPONENT

1. TIMING BELT



ME-00416

- | | |
|--|------------------------------|
| (1) Belt cover No. 2 (RH) | (10) Belt idler No. 2 |
| (2) Timing belt guide (MT vehicles only) | (11) Camshaft sprocket No. 2 |
| (3) Crankshaft sprocket | (12) Timing belt |
| (4) Belt cover No. 2 (LH) | (13) Front belt cover |
| (5) Camshaft sprocket No. 1 | (14) Belt cover (LH) |
| (6) Belt idler (No. 1) | (15) Crankshaft pulley |
| (7) Tensioner bracket | |
| (8) Belt idler (No. 2) | |
| (9) Automatic belt tension adjuster ASSY | |

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: 78 (8.0, 57.9)

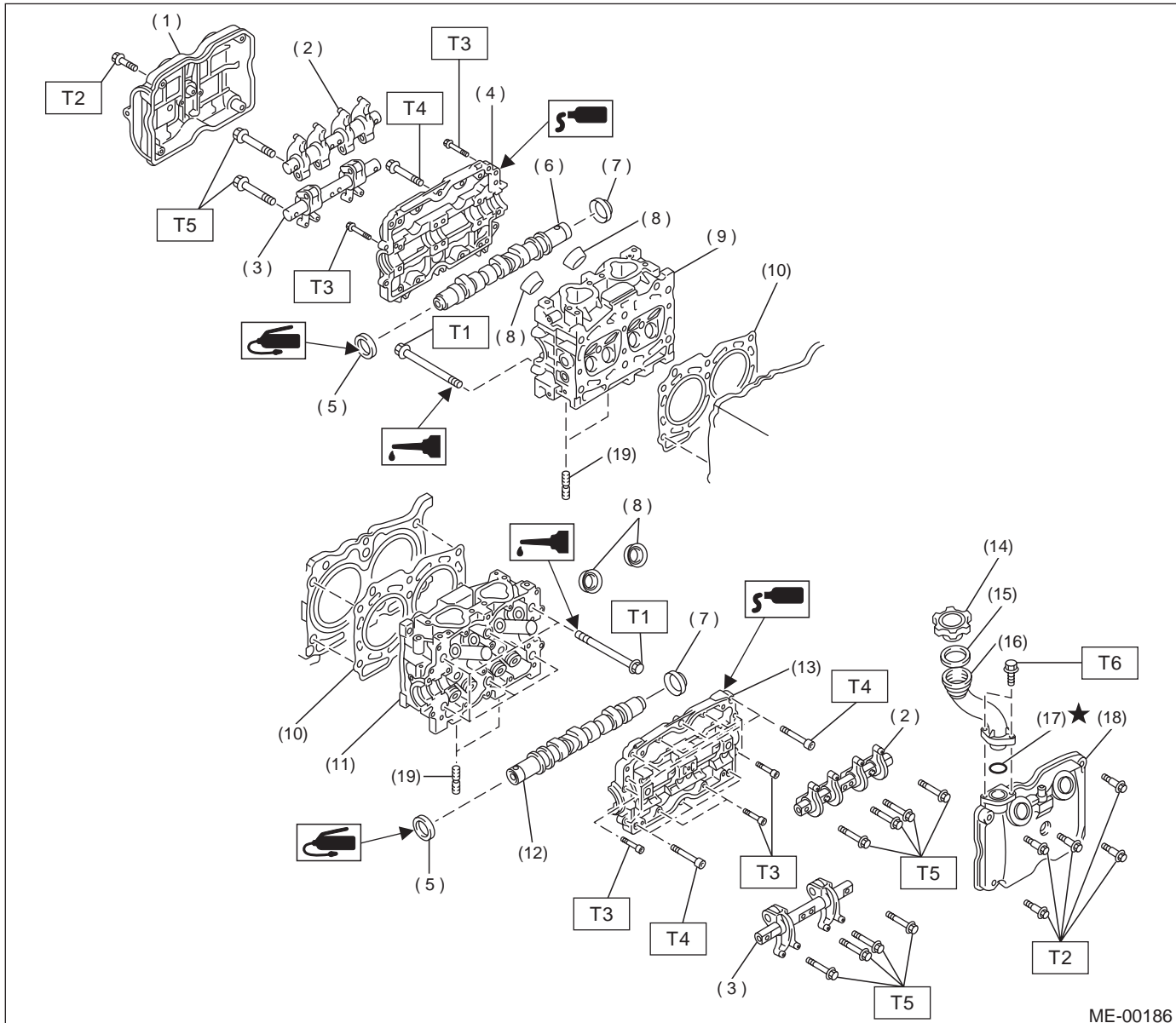
T6: <Ref. to ME(H4SO)-44, INSTALLATION, CRANKSHAFT PULLEY.>

ME(H4SO)-7

GENERAL DESCRIPTION

MECHANICAL

2. CYLINDER HEAD AND CAMSHAFT



ME-00186

- | | |
|-------------------------------|-------------------------|
| (1) Rocker cover (RH) | (11) Cylinder head (LH) |
| (2) Intake valve rocker ASSY | (12) Camshaft (LH) |
| (3) Exhaust valve rocker ASSY | (13) Camshaft cap (LH) |
| (4) Camshaft cap (RH) | (14) Oil filler cap |
| (5) Oil seal | (15) Gasket |
| (6) Camshaft (RH) | (16) Oil filler duct |
| (7) Plug | (17) O-ring |
| (8) Spark plug pipe gasket | (18) Rocker cover (LH) |
| (9) Cylinder head (RH) | (19) Stud bolt |
| (10) Cylinder head gasket | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: <Ref. to ME(H4SO)-60, CYLINDER HEAD, INSTALLATION, CYLINDER HEAD ASSEMBLY.>

T2: 5 (0.5, 3.6)

T3: 10 (1.0, 7.2)

T4: 18 (1.8, 13.0)

T5: 25 (2.5, 18.1)

T6: 6.4 (0.65, 4.7)

T2: 5 (0.5, 3.6)

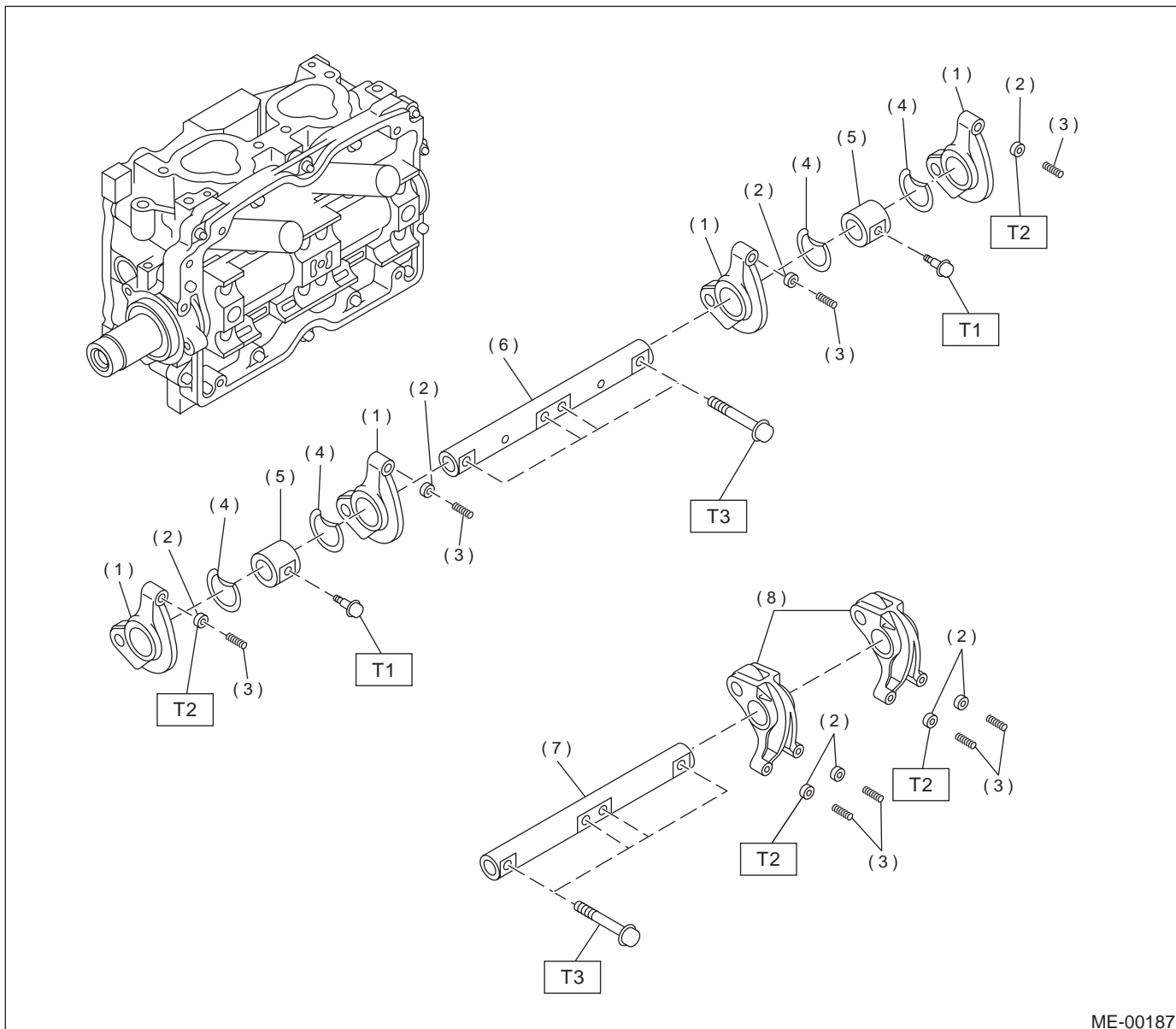
T3: 10 (1.0, 7.2)

ME(H4SO)-8

GENERAL DESCRIPTION

MECHANICAL

3. VALVE ROCKER ASSEMBLY



- (1) Intake valve rocker arm
- (2) Valve rocker nut
- (3) Valve rocker adjust screw
- (4) Spring
- (5) Rocker shaft support

- (6) Intake rocker shaft
- (7) Exhaust rocker shaft
- (8) Exhaust valve rocker arm

Tightening torque: N·m (kgf·m, ft·lb)

T1: 5 (0.5, 3.6)

T2: 10 (1.0, 7.2)

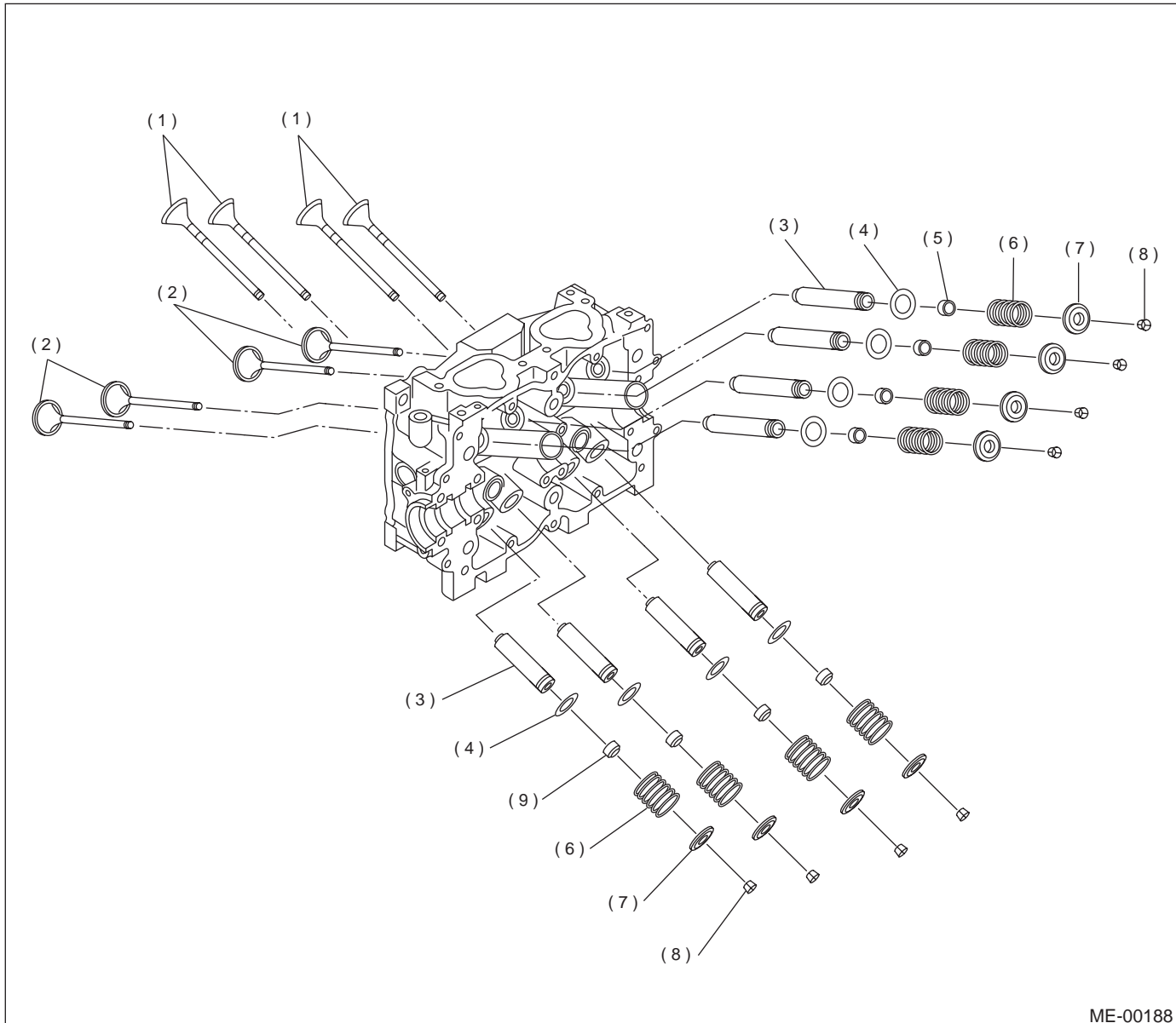
T3: 25 (2.5, 18.1)

ME(H4SO)-9

GENERAL DESCRIPTION

MECHANICAL

4. CYLINDER HEAD AND VALVE ASSEMBLY



ME-00188

- (1) Exhaust valve
- (2) Intake valve
- (3) Valve guide

- (4) Valve spring seat
- (5) Intake valve oil seal
- (6) Valve spring

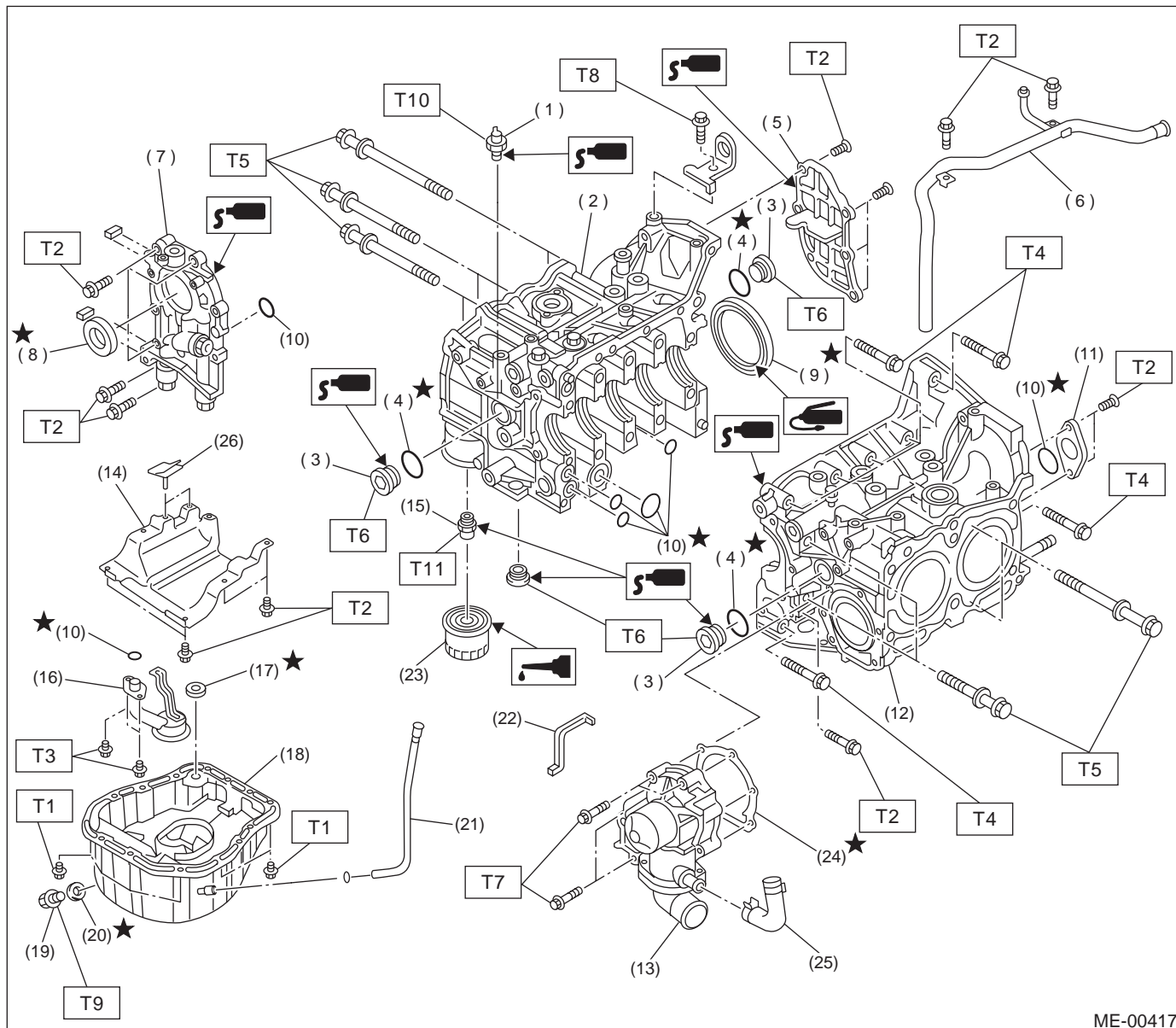
- (7) Retainer
- (8) Retainer key
- (9) Exhaust valve oil seal

ME(H4SO)-10

GENERAL DESCRIPTION

MECHANICAL

5. CYLINDER BLOCK



ME-00417

- | | |
|--------------------------|----------------------------|
| (1) Oil pressure switch | (15) Oil filter connector |
| (2) Cylinder block (RH) | (16) Oil strainer |
| (3) Service hole plug | (17) Gasket |
| (4) Gasket | (18) Oil pan |
| (5) Oil separator cover | (19) Drain plug |
| (6) Water by-pass pipe | (20) Metal gasket |
| (7) Oil pump | (21) Oil level gauge guide |
| (8) Front oil seal | (22) Water pump sealing |
| (9) Rear oil seal | (23) Oil filter |
| (10) O-ring | (24) Gasket |
| (11) Service hole cover | (25) Water pump hose |
| (12) Cylinder block (LH) | (26) Seal |
| (13) Water pump | |
| (14) Baffle plate | |

Tightening torque: N·m (kgf-m, ft-lb)

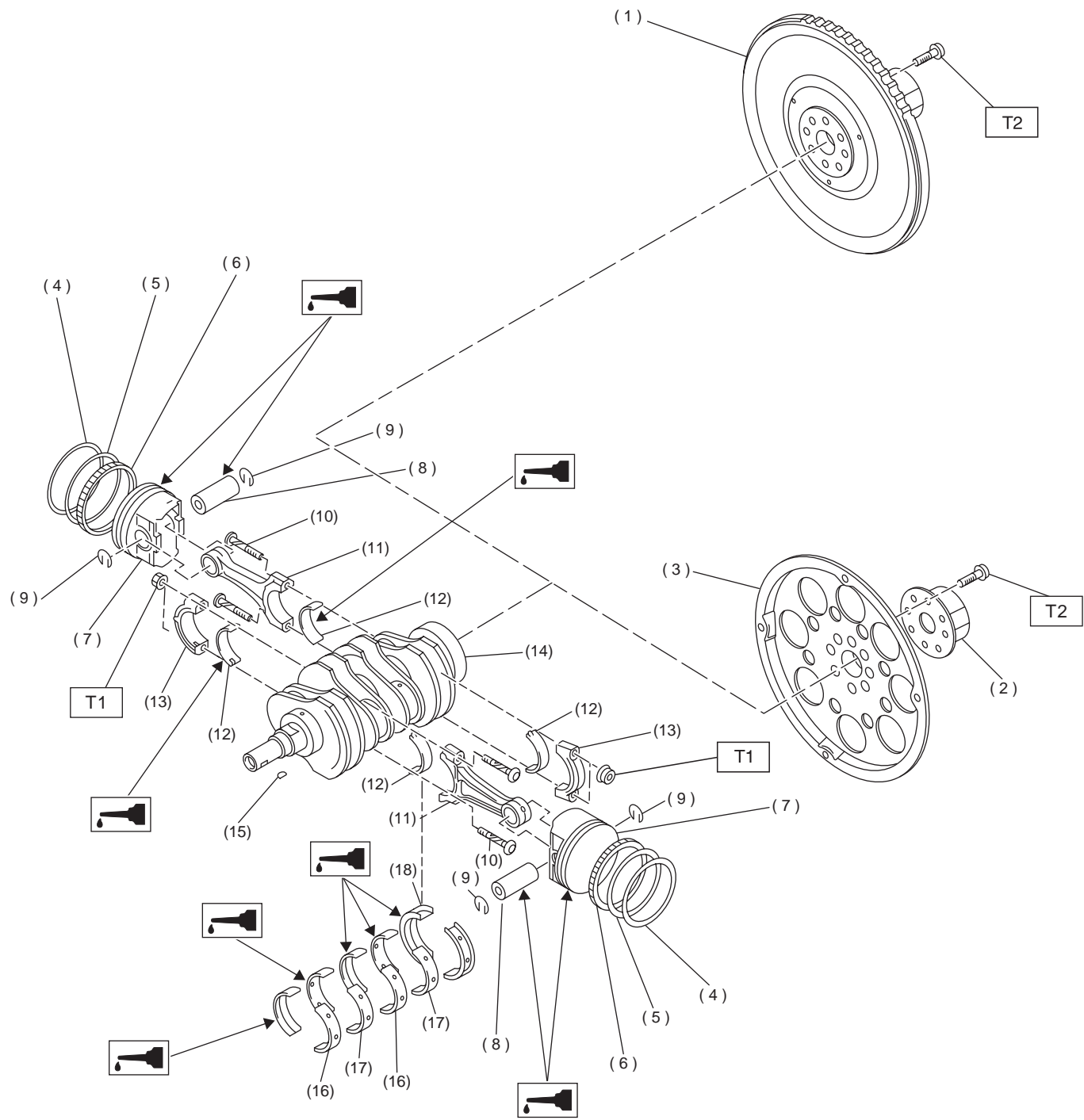
- | | |
|-------------|---|
| T1: | 5 (0.5, 3.6) |
| T2: | 6.4 (0.65, 4.7) |
| T3: | 10 (1.0, 7) |
| T4: | 25 (2.5, 18.1) |
| T5: | 47 (4.8, 34.7) |
| T6: | 70 (7.1, 51) |
| T7: | First 12 (1.2, 8.7)
Second 12 (1.2, 8.7) |
| T8: | 45 (4.6, 33) |
| T9: | 44 (4.5, 33) |
| T10: | 25 (2.5, 18.1) |
| T11: | 55 (5.6, 41) |

ME(H4SO)-11

GENERAL DESCRIPTION

MECHANICAL

6. CRANKSHAFT AND PISTON



ME-00607

ME(H4SO)-12

GENERAL DESCRIPTION

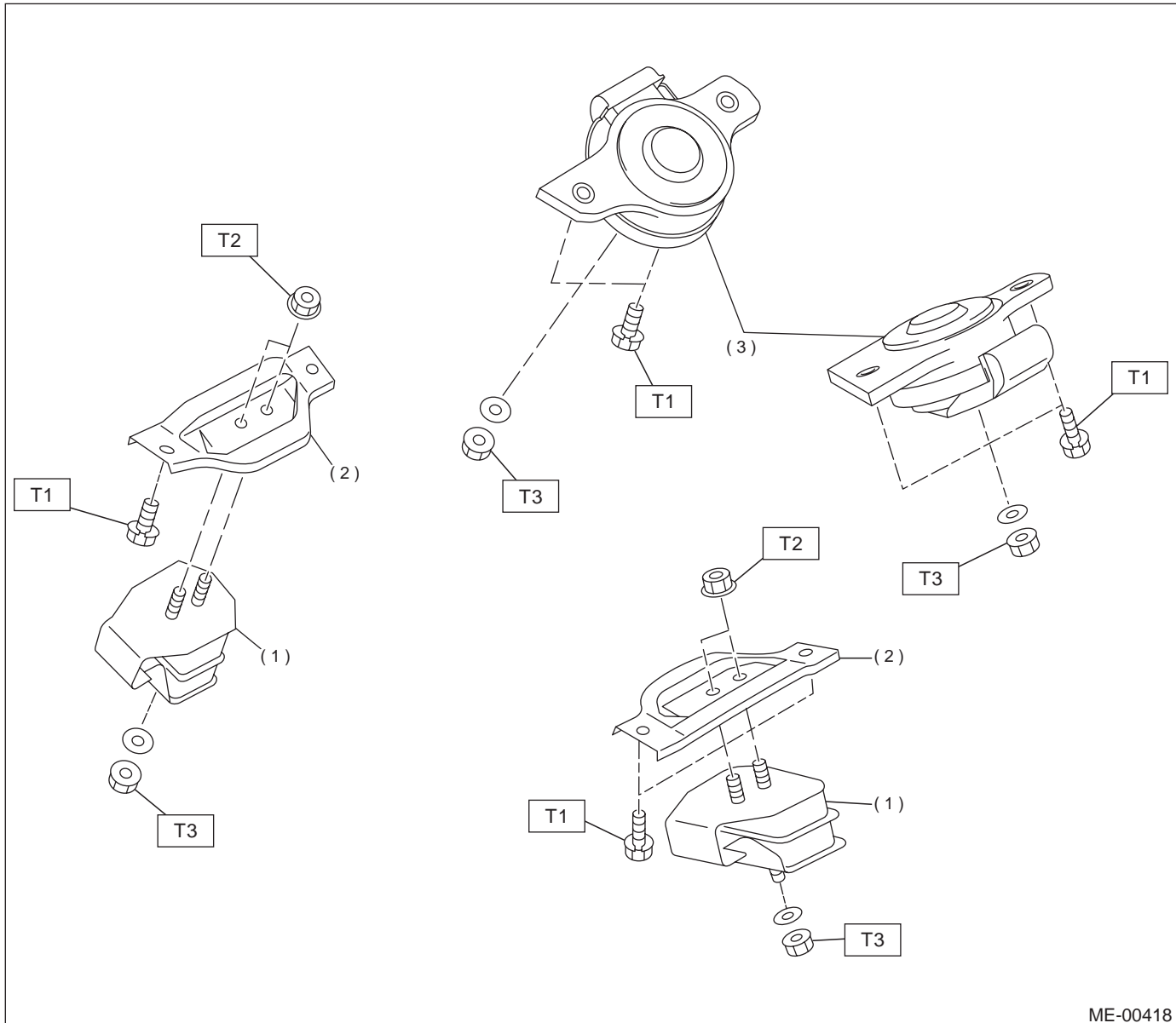
MECHANICAL

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- | | | |
|------------------------|--------------------------------|---|
| (1) Flywheel (MT) | (9) Snap ring | (17) Crankshaft bearing #2, #4 |
| (2) Reinforcement (AT) | (10) Connecting rod bolt | (18) Crankshaft bearing #5 |
| (3) Drive plate (AT) | (11) Connecting rod | |
| (4) Top ring | (12) Connecting rod bearing | <i>Tightening torque: N·m (kgf-m, ft-lb)</i> |
| (5) Second ring | (13) Connecting rod cap | <i>T1: 45 (4.6, 33)</i> |
| (6) Oil ring | (14) Crankshaft | <i>T2: 72 (7.3, 52.8)</i> |
| (7) Piston | (15) Woodruff key | |
| (8) Piston pin | (16) Crankshaft bearing #1, #3 | |
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GENERAL DESCRIPTION

MECHANICAL

7. ENGINE MOUNTING



- (1) Front cushion rubber
(BRIGHTON and L AT vehicles)
- (2) Front engine mounting bracket
(BRIGHTON and L AT vehicles)

- (3) Front cushion rubber (Except
BRIGHTON and L AT vehicles)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 25.8)

T2: 42 (4.3, 31.0)

T3: 85 (8.7, 63)

ME(H4SO)-14

GENERAL DESCRIPTION

MECHANICAL

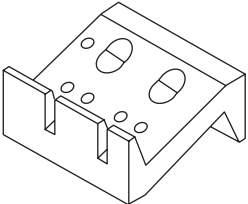
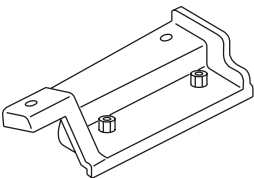
C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect 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 re-installed 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 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 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.

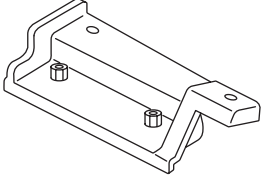
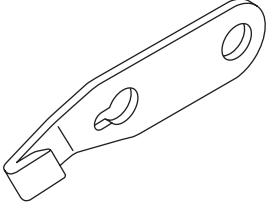
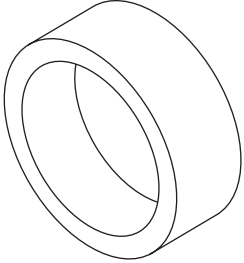
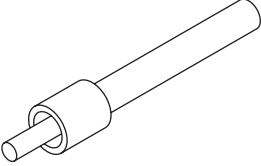
D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498267800	498267800	CYLINDER HEAD TABLE	<ul style="list-style-type: none"> • Used for replacing valve guides. • Used for removing and installing valve springs.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).

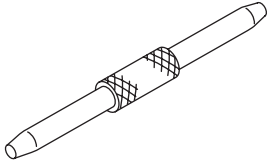
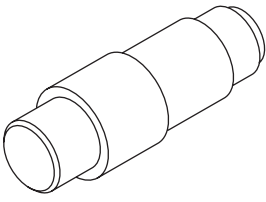
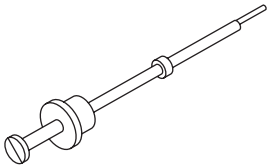
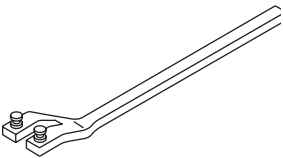
GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498457100</p>	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 <p style="text-align: center;">ST-498497100</p>	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
 <p style="text-align: center;">ST-498747300</p>	498747300	PISTON GUIDE	Used for installing piston in cylinder.
 <p style="text-align: center;">ST-498857100</p>	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.

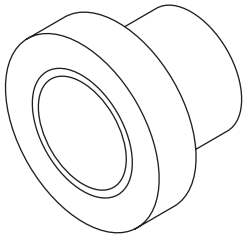
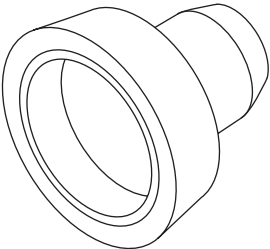
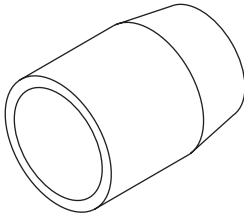
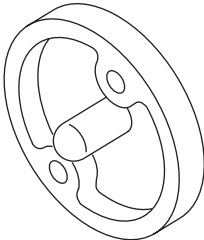
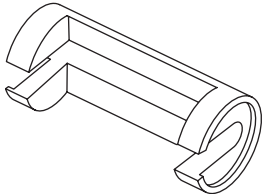
GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST18231AA0	18231AA010	CAMSHAFT SPROCKET WRENCH	<ul style="list-style-type: none"> • Used for removing and installing camshaft sprocket. • CAMSHFT SPROCKET WRENCH (499207100) is also can be used.

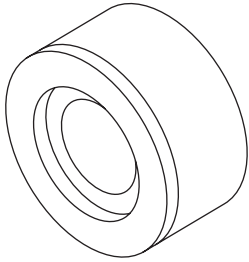
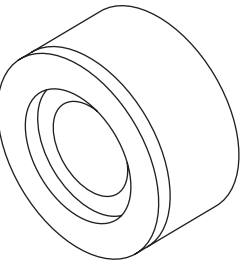
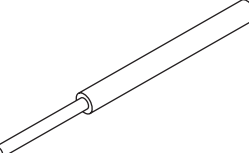
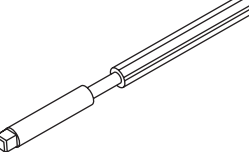
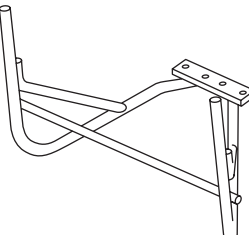
GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499587700</p>	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 <p style="text-align: center;">ST-499587200</p>	499587200	CRANKSHAFT OIL SEAL INSTALLER	<ul style="list-style-type: none"> • Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 <p style="text-align: center;">ST-499597000</p>	499597000	OIL SEAL GUIDE	<ul style="list-style-type: none"> • Used for installing camshaft oil seal. • Used with CAMSHAFT OIL SEAL INSTALLER (499587500).
 <p style="text-align: center;">ST-499597100</p>	499597100	CRANKSHAFT OIL SEAL GUIDE	<ul style="list-style-type: none"> • Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 <p style="text-align: center;">ST-499718000</p>	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.

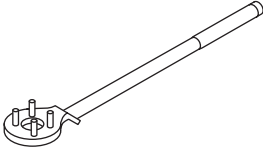
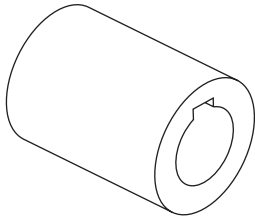
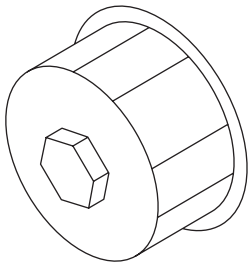
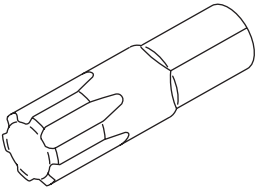
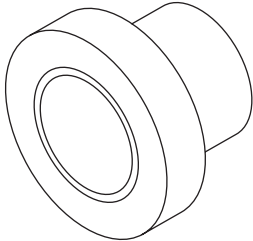
GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499767700</p>	<p style="text-align: center;">499767700 (Intake side)</p>	<p style="text-align: center;">VALVE GUIDE ADJUSTER</p>	<p>Used for installing valve guides.</p>
 <p style="text-align: center;">ST-499767800</p>	<p style="text-align: center;">499767800 (Exhaust side)</p>	<p style="text-align: center;">VALVE GUIDE ADJUSTER</p>	<p>Used for installing valve guides.</p>
 <p style="text-align: center;">ST-499767200</p>	<p style="text-align: center;">499767200</p>	<p style="text-align: center;">VALVE GUIDE REMOVER</p>	<p>Used for removing valve guides.</p>
 <p style="text-align: center;">ST-499767400</p>	<p style="text-align: center;">499767400</p>	<p style="text-align: center;">VALVE GUIDE REAMER</p>	<p>Used for reaming valve guides.</p>
 <p style="text-align: center;">ST-499817100</p>	<p style="text-align: center;">499817100</p>	<p style="text-align: center;">ENGINE STAND</p>	<ul style="list-style-type: none"> • Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).

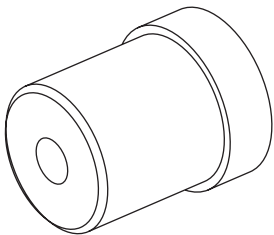
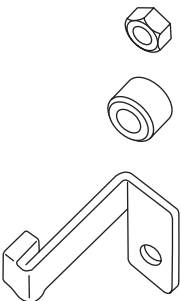
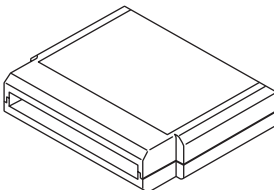

GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499977100</p>	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 <p style="text-align: center;">ST-499987500</p>	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 <p style="text-align: center;">ST18332AA000</p>	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 <p style="text-align: center;">ST-499497000</p>	499497000	TORX PLUS	Used for removing and installing camshaft cap.
 <p style="text-align: center;">ST-499587500</p>	499587500	OIL SEAL INSTALLER	Used for installing front camshaft oil seal.

GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST24082AA210	24082AA210 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SELECT MONI- TOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.
Tachometer (Secondary pick-up type)	Used for measuring idle speed.
Timing light	Used for measuring ignition timing.

ME(H4SO)-21

GENERAL DESCRIPTION

MECHANICAL

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.

- V-belt
- Timing Belt
- Valve Rocker Assembly
- Camshaft
- Cylinder Head