

# General Description

## MECHANICAL

### 1. General Description

#### A: SPECIFICATION

Engine	Model			2.5 L
	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Belt driven Single overhead camshaft 4 valve/cylinder
	Bore × Stroke mm (in)			99.5 × 79.0 (3.92 × 3.11)
	Displacement cm <sup>3</sup> (cu in)			2,457 (149.94)
	Compression ratio			10.0
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm <sup>2</sup> , psi)	Standard
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Constant	Open	BTDC 0°
			Close	ABDC 58°
		Low speed	Open	BTDC 0°
			Close	ABDC −10°
		High speed	Open	BTDC 14°
			Close	ABDC 62°
	Exhaust valve timing		Open	BBDC 30°
			Close	ATDC14°
	Valve clearance mm (in)		Intake	
Exhaust				
Idle speed (For CVT model, select lever in “P” or “N” range. For MT model, gear shift lever in neutral position.) rpm		No load	Standard	
		A/C ON	Standard	
Ignition order				
Ignition timing		BTDC/rpm	Standard	

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NOTE:

US: Undersize OS: Oversize

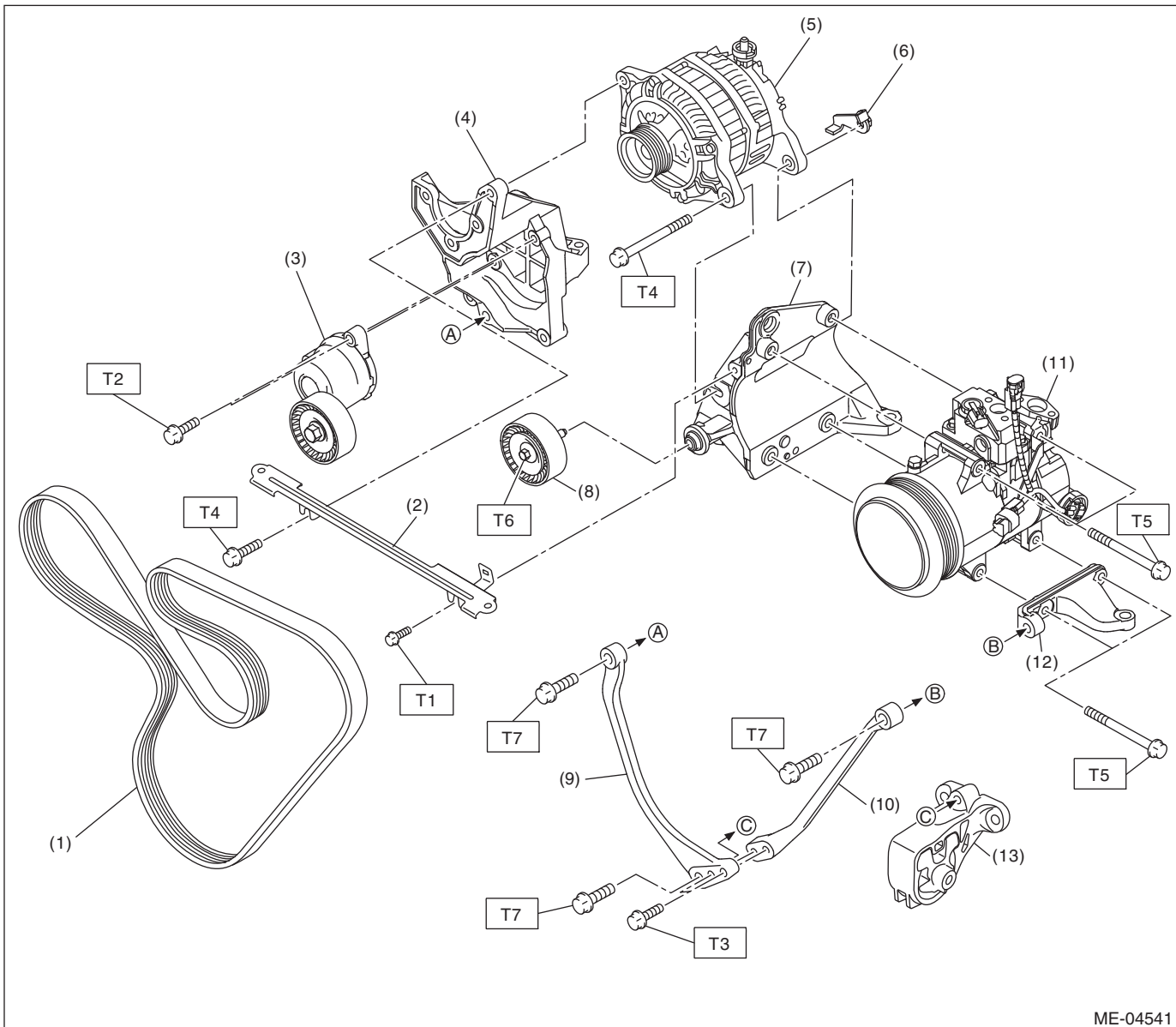
Belt tension adjuster	Adjuster rod protrusion amount			mm (in)	5.2 — 6.2 (0.205 — 0.244)	
Valve rocker arm	Clearance between arm and shaft		mm (in)	Standard	0.020 — 0.054 (0.0008 — 0.0021)	
	Rocker arm inside diameter		mm (in)	Standard	22.020 — 22.041 (0.8669 — 0.8678)	
	Rocker shaft diameter		mm (in)	Standard	21.987 — 22.000 (0.8656 — 0.8661)	
Camshaft	Bending limit			mm (in)	0.025 (0.00098)	
	Cam lobe height	mm (in)	Intake	Constant	Standard	40.075 — 40.175 (1.5778 — 1.5817)
			Low speed	Standard	35.496 — 35.596 (1.3975 — 1.4014)	
			High speed	Standard	40.315 — 40.415 (1.5872 — 1.5911)	
		Exhaust	Standard	39.289 — 39.389 (1.5468 — 1.5507)		
	Cam base circle diameter		mm (in)	Standard	34.00 (1.3386)	
	Base circle step of adjacent intake cams (low speed and high speed)		mm (in)	Standard	0.03 (0.001)	
	Oil clearance		mm (in)	Standard	0.055 — 0.090 (0.0022 — 0.0035)	
	Journal O.D.		mm (in)	Standard	31.928 — 31.945 (1.2570 — 1.2577)	
	Cylinder head journal inner diameter		mm (in)	Standard	32.000 — 32.018 (1.2598 — 1.2605)	
Thrust clearance		mm (in)	Standard	0.030 — 0.090 (0.0012 — 0.0035)		
Cylinder head	Warping limit (Mating surface with cylinder block)			mm (in)	0.035 (0.0014)	
	Grinding limit			mm (in)	0.1 (0.004)	
	Standard height			mm (in)	97.5 (3.84)	
Valve seat	Seating angle between valve and valve seat				90°	
	Contacting width of valve and valve seat	mm (in)	Intake	Standard	0.8 — 1.4 (0.03 — 0.055)	
			Exhaust	Standard	1.2 — 1.8 (0.047 — 0.071)	
Valve guide	Clearance between the valve guide and valve stem	mm (in)	Intake	Standard	0.035 — 0.062 (0.0014 — 0.0024)	
			Exhaust	Standard	0.040 — 0.067 (0.0016 — 0.0026)	
	Inside diameter		mm (in)		6.000 — 6.012 (0.2362 — 0.2367)	
	Valve stem outer diameter	mm (in)	Intake	5.950 — 5.965 (0.2343 — 0.2348)		
			Exhaust	5.945 — 5.960 (0.2341 — 0.2346)		
	Valve guide protrusion amount	mm (in)	Intake	20.0 — 21.0 (0.787 — 0.827)		
Exhaust			16.5 — 17.5 (0.650 — 0.689)			
Valve	Head edge thickness	mm (in)	Intake	Standard	0.8 — 1.2 (0.03 — 0.047)	
			Exhaust	Standard	1.0 — 1.4 (0.039 — 0.055)	
	Overall length	mm (in)	Intake	120.6 (4.75)		
Exhaust			121.7 (4.79)			
Valve spring	Free length			mm (in)	55.2 (2.173)	
	Tension/spring height	N (kgf, lb)/mm (in)	Set	235.3 — 270.7 (24 — 27.6, 52.9 — 60.8)/45.0 (1.772)		
			Lift	578.9 — 639.9 (59.1 — 65.3, 130.3 — 143.9)/34.7 (1.366)		
	Squareness			2.5°, 2.4 mm (0.094 in) or less		
Cylinder block	Warping limit (Mating surface with cylinder head)			mm (in)	0.025 (0.00098)	
	Grinding limit			mm (in)	0.1 (0.004)	
	Standard height			mm (in)	201.0 (7.91)	
	Taper	mm (in)	Standard	0.015 (0.0006)		
	Out-of-roundness		mm (in)	Standard	0.010 (0.0004)	
	Cylinder to piston clearance at 20°C (68°F):		mm (in)	Standard	−0.015 — 0.005 (−0.00059 — 0.00020)	
	Cylinder inner diameter boring limit (diameter)			mm (in)	To 100.005 (3.9372)	

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Piston	Piston grade point		mm (in)		38.2 (1.504)		
	Outer diameter	mm (in)	Standard	A	99.510 — 99.520 (3.9177 — 3.9181)		
				B	99.500 — 99.510 (3.9173 — 3.9177)		
			0.25 (0.0098) OS		99.750 — 99.770 (3.9272 — 3.9280)		
			0.50 (0.0197) OS		100.000 — 100.020 (3.9370 — 3.9378)		
Piston pin	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).			
	Clearance between piston pin hole and piston pin		mm (in)	Standard	0.004 — 0.008 (0.0002 — 0.0003)		
Piston ring	Piston ring gap	mm (in)	Top ring	Standard	0.20 — 0.35 (0.0079 — 0.0138)		
			Second ring	Standard	0.37 — 0.52 (0.0146 — 0.0205)		
			Oil ring	Standard	0.20 — 0.50 (0.0079 — 0.0197)		
	Clearance between piston ring and piston ring groove	mm (in)	Top ring	Standard	0.040 — 0.080 (0.0016 — 0.0031)		
			Second ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)		
Connecting rod and connecting rod bearing	Bend or twist per 100 mm (3.94 in) in length		mm (in)	Service limit	0.10 (0.0039)		
	Thrust clearance		mm (in)	Standard	0.070 — 0.330 (0.0028 — 0.0130)		
	Oil clearance		mm (in)	Standard	0.016 — 0.044 (0.0006 — 0.0017)		
	Bearing size (Thickness at center)	mm (in)	Standard		1.492 — 1.501 (0.0587 — 0.0591)		
			0.03 (0.0012) US		1.510 — 1.513 (0.0594 — 0.0596)		
			0.05 (0.0020) US		1.520 — 1.523 (0.0598 — 0.0600)		
			0.25 (0.0098) US		1.620 — 1.623 (0.0638 — 0.0639)		
Bushing of small end	Clearance between piston pin and bushing		mm (in)	Standard	0 — 0.022 (0 — 0.0009)		
Crankshaft and crankshaft bearing	Bending limit		mm (in)		0.035 (0.0014)		
	Crank pin		Out-of-roundness		mm (in)	0.003 (0.0001)	
			Cylindricity		mm (in)	0.004 (0.0002)	
			Grinding limit (dia.)		mm (in)	To 51.750 (2.0374)	
	Crank journal		Out-of-roundness		mm (in)	0.005 (0.0002)	
			Cylindricity		mm (in)	0.006 (0.0002)	
			Grinding limit (dia.)		mm (in)	To 59.758 (2.3527)	
	Crank pin outer diameter	mm (in)	Standard		51.984 — 52.000 (2.0466 — 2.0472)		
			0.03 (0.0012) US		51.954 — 51.970 (2.0454 — 2.0461)		
			0.05 (0.0020) US		51.934 — 51.950 (2.0446 — 2.0453)		
			0.25 (0.0098) US		51.734 — 51.750 (2.0368 — 2.0374)		
	Crank journal outer diameter	mm (in)	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)		
	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)	
	Thrust clearance		mm (in)	Standard	0.030 — 0.115 (0.0012 — 0.0045)		
Oil clearance		mm (in)	Standard	0.010 — 0.030 (0.0004 — 0.0012)			

**B: COMPONENT****1. V-BELT**

ME-04541

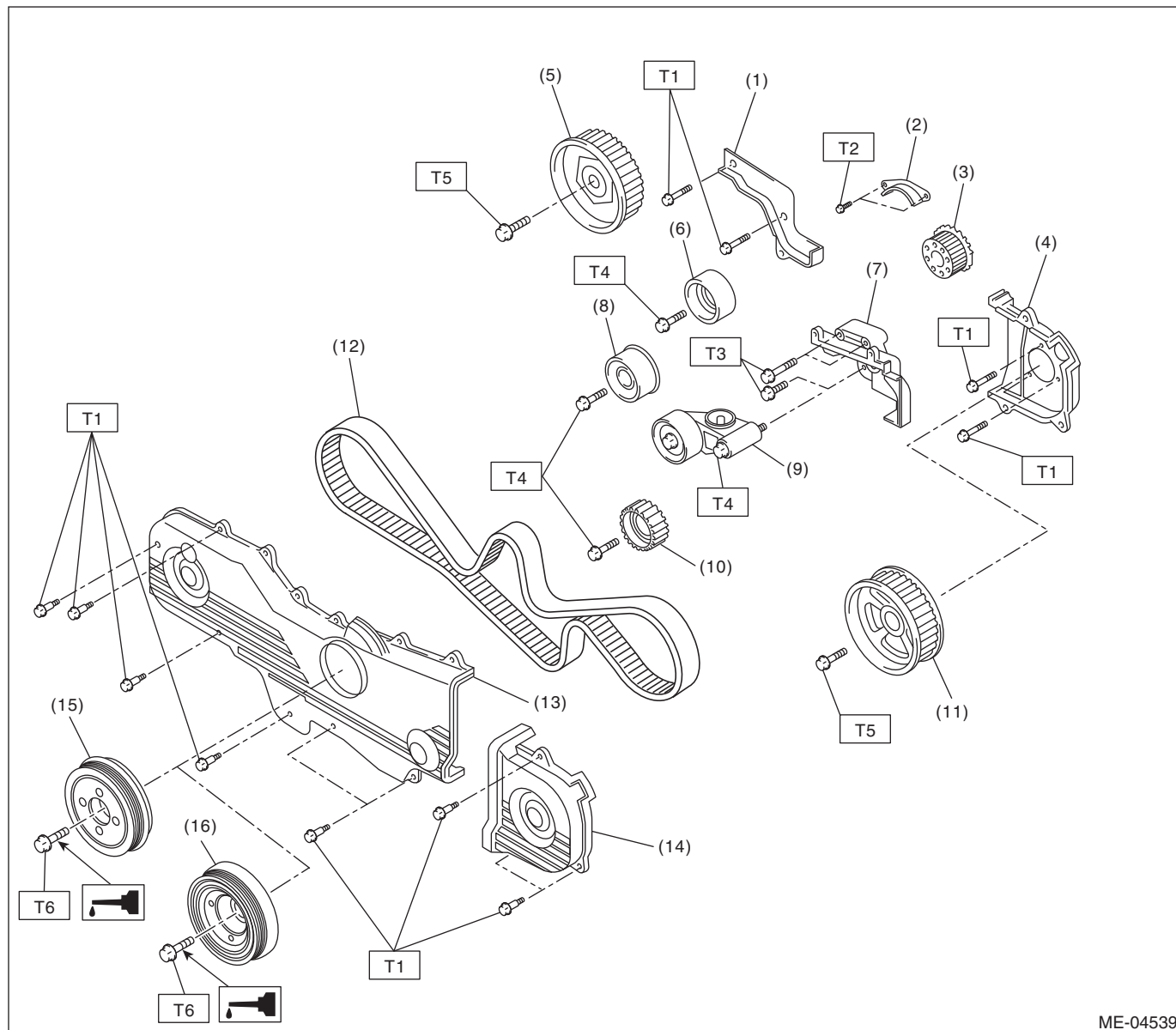
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|---------------------------------|-------------------------------|
| (1) V-belt                      | (8) Idler pulley ASSY         |
| (2) V-belt cover bracket        | (9) Stopper rod RH            |
| (3) V-belt tensioner ASSY       | (10) Stopper rod LH           |
| (4) Power steering pump bracket | (11) A/C compressor           |
| (5) Generator                   | (12) A/C compressor bracket B |
| (6) Generator plate             | (13) Front cushion rubber     |
| (7) A/C compressor bracket A    |                               |

**Tightening torque: N·m (kgf-m, ft-lb)****T1: 6.4 (0.7, 4.7)****T2: 20 (2.0, 14.8)****T3: 22 (2.2, 16.2)****T4: 25 (2.5, 18.4)****T5: 26.5 (2.7, 19.5)****T6: 33 (3.4, 24.3)****T7: 36 (3.7, 26.6)**

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### 2. TIMING BELT



ME-04539

- |                                  |  |
|----------------------------------|--|
| (1) Timing belt cover No. 2 RH   | (9) Automatic belt tension adjuster ASSY |
| (2) Timing belt guide (MT model) | (10) Belt idler No. 2                    |
| (3) Crank sprocket               | (11) Cam sprocket No. 2                  |
| (4) Timing belt cover No. 2 LH   | (12) Timing belt                         |
| (5) Cam sprocket No. 1           | (13) Front timing belt cover             |
| (6) Belt idler (A)               | (14) Timing belt cover LH                |
| (7) Tensioner bracket            | (15) Crank pulley (MT model)             |
| (8) Belt idler (B)               | (16) Crank pulley (CVT model)            |

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

**T1: 5 (0.5, 3.7)**

**T2: 9.75 (1.0, 7.2)**

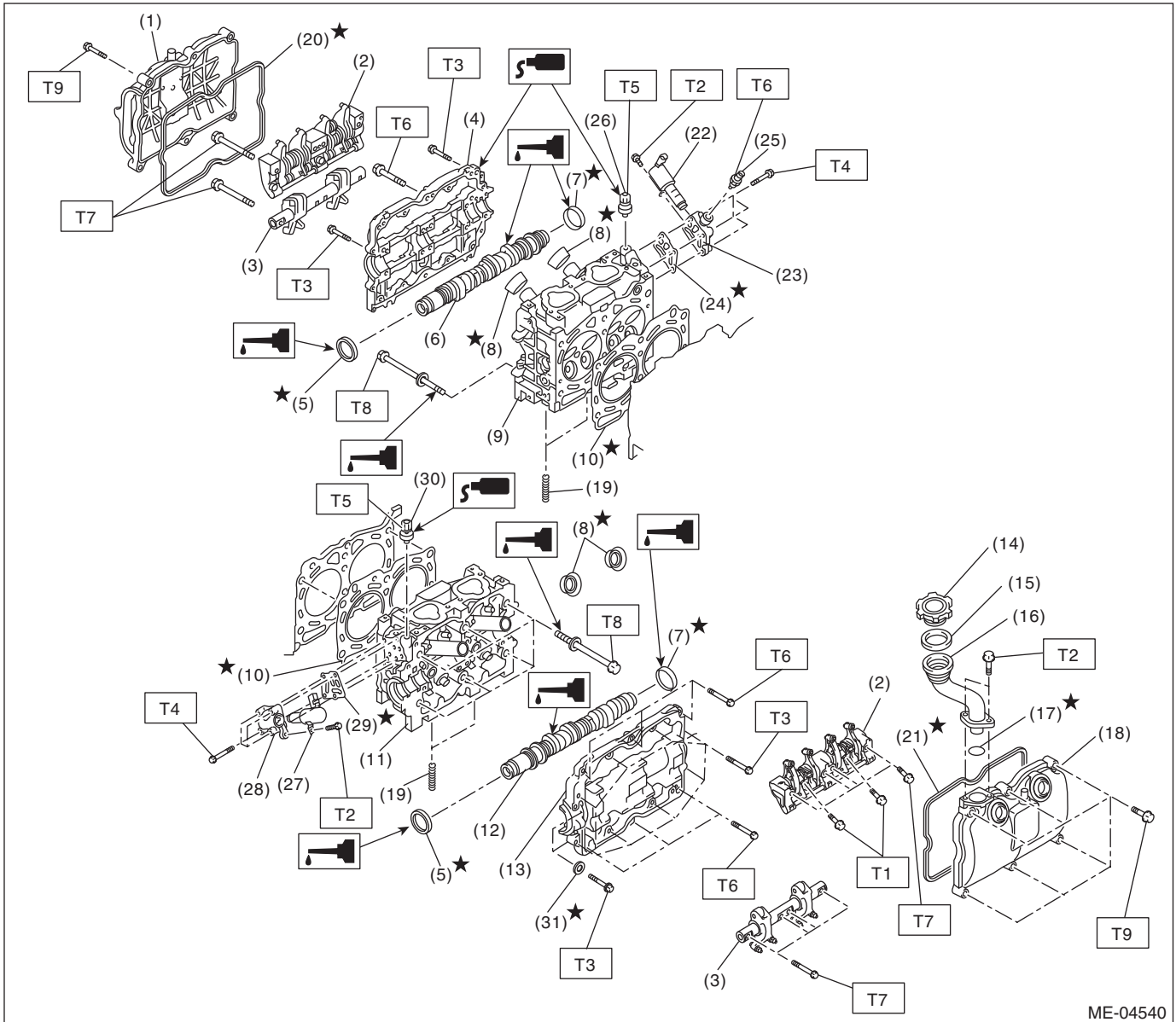
**T3: 24.5 (2.5, 18.1)**

**T4: 39 (4.0, 28.8)**

**T5: 78 (8.0, 57.5)**

**T6: <Ref. to ME(H4SO)-44, INSTALLATION, Crank Pulley.>**

## 3. CYLINDER HEAD AND CAMSHAFT

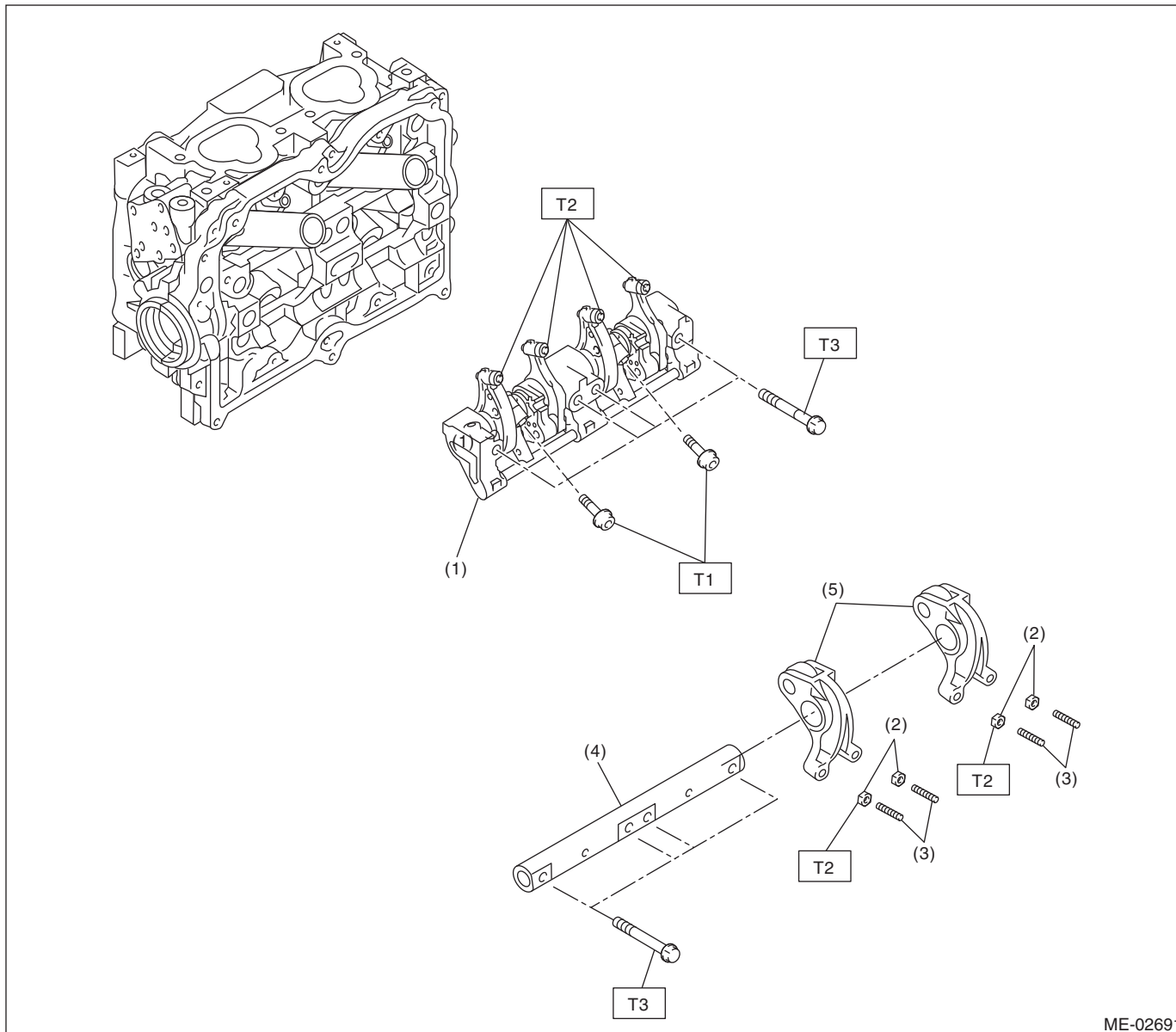


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(1) Rocker cover RH	(16) Oil filler duct	(31) Seal washer
(2) Intake valve rocker ASSY	(17) O-ring	
(3) Exhaust valve rocker ASSY	(18) Rocker cover LH	<b><i>Tightening torque:N-m (kgf-m, ft-lb)</i></b>
(4) Camshaft cap RH	(19) Stud bolt	<b><i>T1: 6 (0.6, 4.4)</i></b>
(5) Oil seal	(20) Rocker cover gasket RH	<b><i>T2: 6.4 (0.7, 4.7)</i></b>
(6) Camshaft RH	(21) Rocker cover gasket LH	<b><i>T3: 9.75 (1.0, 7.2)</i></b>
(7) PLUG	(22) Oil switching solenoid valve RH	<b><i>T4: 10 (1.0, 7.4)</i></b>
(8) Spark plug pipe gasket	(23) Oil switching solenoid valve holder RH	<b><i>T5: 17 (1.7, 12.5)</i></b>
(9) Cylinder head RH	(24) Gasket	<b><i>T6: 18 (1.8, 13.3)</i></b>
(10) Cylinder head gasket	(25) Oil temperature sensor	<b><i>T7: 25 (2.5, 18.4)</i></b>
(11) Cylinder head LH	(26) Variable valve lift diagnosis oil pressure switch RH	<b><i>T8: &lt;Ref. to ME(H4SO)-61, INSTALLATION, Cylinder Head.&gt;</i></b>
(12) Camshaft LH	(27) Oil switching solenoid valve LH	<b><i>T9: &lt;Ref. to ME(H4SO)-54, INSTALLATION, Valve Rocker Assembly.&gt;</i></b>
(13) Camshaft cap LH	(28) Oil switching solenoid valve holder LH	
(14) Oil filler cap	(29) Gasket	
(15) Gasket	(30) Variable valve lift diagnosis oil pressure switch LH	

## 4. VALVE ROCKER ASSY



ME-02691

- (1) Intake valve rocker ASSY
- (2) Valve rocker nut
- (3) Valve rocker adjusting screw

- (4) Exhaust rocker shaft
- (5) Exhaust valve rocker arm

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

**T1: 6 (0.6, 4.4)**

**T2: 9.75 (1.0, 7.2)**

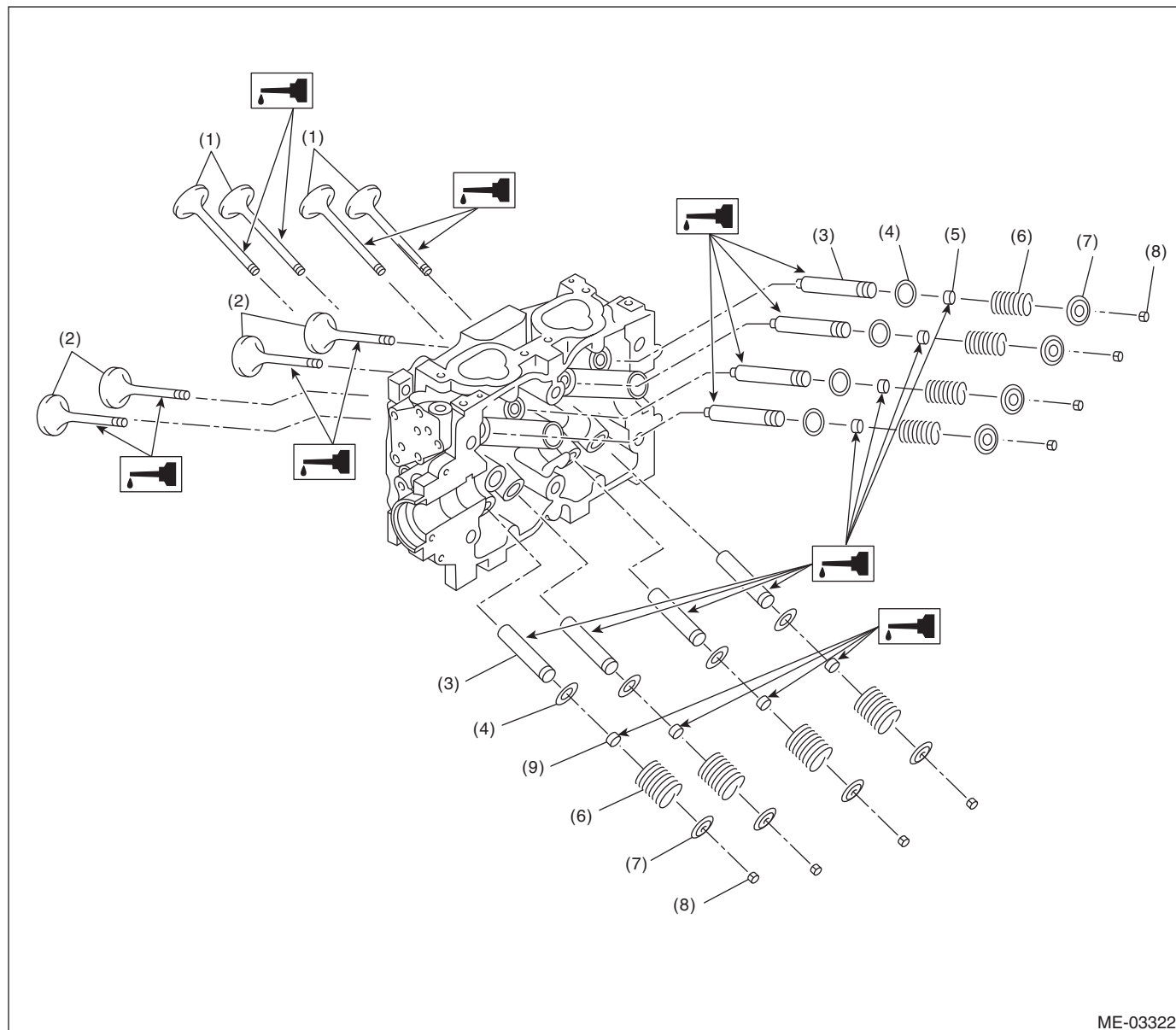
**T3: 25 (2.5, 18.4)**



# General Description

## MECHANICAL

### 5. CYLINDER HEAD AND VALVE ASSEMBLY



ME-03322

- |                   |                           |                            |
|-------------------|---------------------------|----------------------------|
| (1) Exhaust valve | (4) Valve spring seat     | (7) Retainer               |
| (2) Intake valve  | (5) Intake valve oil seal | (8) Retainer key           |
| (3) Valve guide   | (6) Valve spring          | (9) Exhaust valve oil seal |

This exploded view diagram illustrates the assembly of a 4-cylinder engine. The components are numbered 1 through 38, and torque specifications are indicated by letters T1 through T10 and values in parentheses. Torque values in parentheses (e.g., (10), (20)) refer to the torque applied to the fastener itself, while torque values with a letter (e.g., T1, T2) refer to the torque applied to the component being fastened. Stars (★) indicate specific torque application points or warnings.

**Key Components and Assembly Order:**

- Top End:** Includes the intake manifold (6), cylinder head (2), and valve train components (1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38).
- Bottom End:** Includes the crankshaft (15), connecting rods (12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38), and the oil pan (18).
- Accessories:** Includes the alternator (24), water pump (25), and other peripheral components.

**Torque Specifications:**

- T1:** 10 Nm (0.7 ft-lb)
- T2:** 10 Nm (0.7 ft-lb)
- T3:** 10 Nm (0.7 ft-lb)
- T4:** 10 Nm (0.7 ft-lb)
- T5:** 10 Nm (0.7 ft-lb)
- T6:** 10 Nm (0.7 ft-lb)
- T7:** 10 Nm (0.7 ft-lb)
- T8:** 10 Nm (0.7 ft-lb)
- T9:** 10 Nm (0.7 ft-lb)
- T10:** 10 Nm (0.7 ft-lb)

**ME(H4SO)-11**

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- |                           |                            |
|---------------------------|----------------------------|
| (1) Oil pressure switch   | (18) Oil pan               |
| (2) Cylinder block RH     | (19) Drain plug            |
| (3) Service hole plug     | (20) Drain plug gasket     |
| (4) Gasket                | (21) Oil level gauge guide |
| (5) Oil separator cover   | (22) Water pump sealing    |
| (6) Water by-pass pipe    | (23) Oil filter            |
| (7) Oil pump              | (24) Gasket                |
| (8) Front oil seal        | (25) Water pump hose       |
| (9) Rear oil seal         | (26) PLUG                  |
| (10) O-ring               | (27) Seal                  |
| (11) Service hole cover   | (28) Seal washer           |
| (12) Cylinder block LH    | (29) Washer                |
| (13) Water pump           | (30) O-ring                |
| (14) Baffle plate         | (31) Engine rear hanger    |
| (15) Oil filter connector | (32) Oil pump seal         |
| (16) Oil strainer         | (33) Oil level gauge       |
| (17) Cylinder block lower | (34) O-ring                |

- |                       |
|-----------------------|
| (35) O-ring           |
| (36) Oil drain pipe   |
| (37) O-ring           |
| (38) Oil level switch |

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

***T1: 5 (0.5, 3.7)***

***T2: 6.4 (0.7, 4.7)***

***T3: 10 (1.0, 7.4)***

***T4: First 12 (1.2, 8.7)***  
***Second 12 (1.2, 8.7)***

***T5: 16 (1.6, 11.8)***

***T6: 25 (2.5, 18.4)***

***T7: 41.7 (4.3, 30.8)***

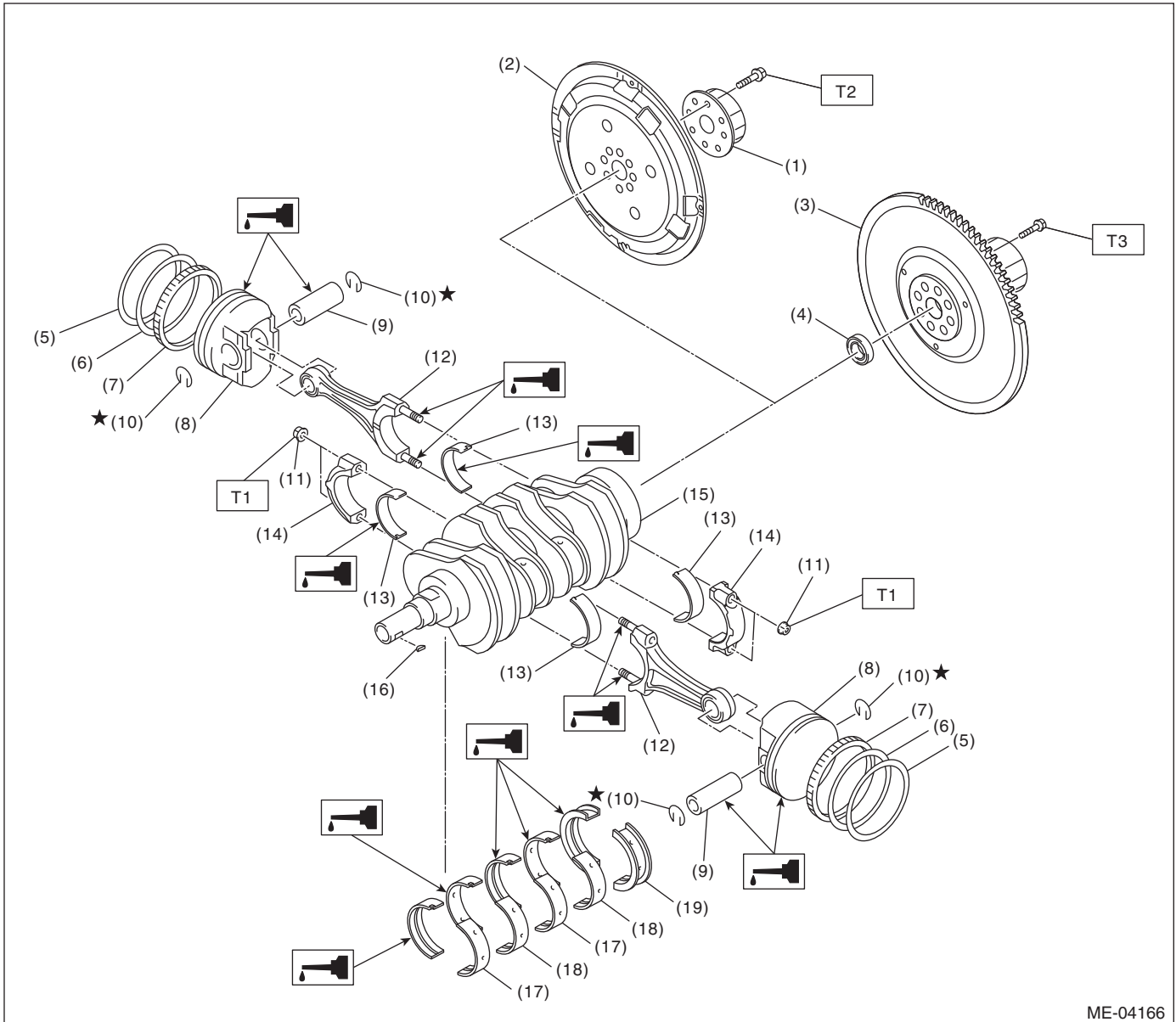
***T8: 45 (4.6, 33.2)***

***T9: 70 (7.1, 51.6)***

***T10: <Ref. to ME(H4SO)-73, INSTAL-  
LATION, Cylinder Block.>***

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## 7. CRANKSHAFT AND PISTON



ME-04166

- (1) Reinforcement (CVT model)
- (2) Drive plate (CVT model)
- (3) Flywheel (MT model)
- (4) Ball bearing (MT model)
- (5) Top ring
- (6) Second ring
- (7) Oil ring
- (8) Piston

- (9) Piston pin
- (10) Snap ring
- (11) Connecting rod nut
- (12) Connecting rod
- (13) Connecting rod bearing
- (14) Connecting rod cap
- (15) Crankshaft
- (16) Woodruff key

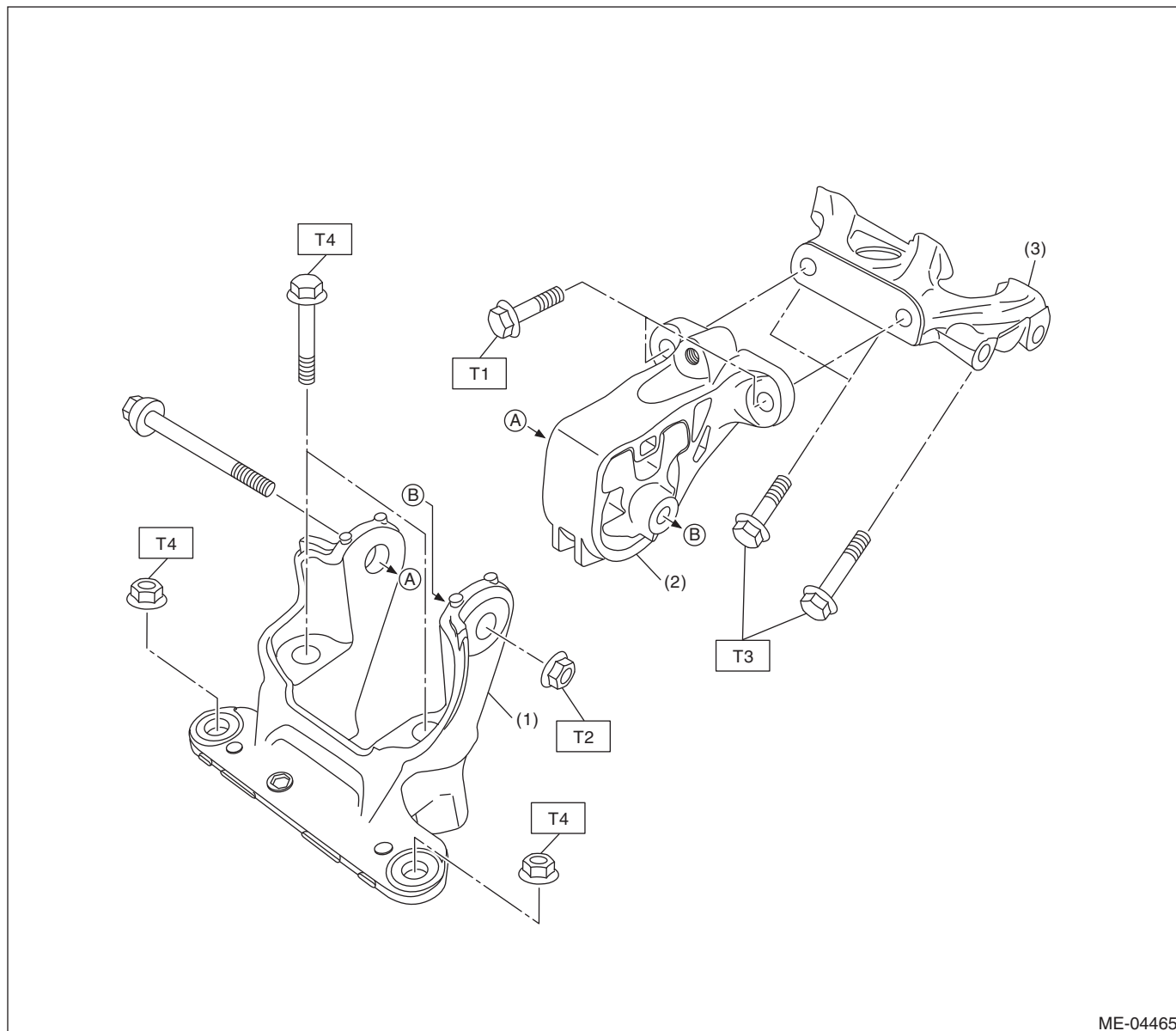
- (17) Crankshaft bearing #1, #3
- (18) Crankshaft bearing #2, #4
- (19) Crankshaft bearing #5

**Tightening torque: N·m (kgf-m, ft-lb)****T1: 45 (4.6, 33.2)****T2: <Ref. to CVT-135, INSTALLATION, Drive Plate.>****T3: <Ref. to CL-14, INSTALLATION, Flywheel.>**

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### 8. ENGINE MOUNTING



ME-04465

(1) Front mounting bracket

(3) Engine mounting bracket

(2) Front cushion rubber

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

**T1: 25 (2.5, 18.4)**

**T2: 45 (4.6, 33.2)**

**T3: 58 (5.9, 42.8)**

**T4: 60 (6.1, 44.3)**

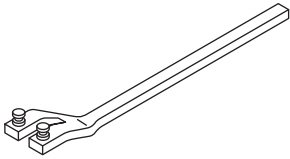
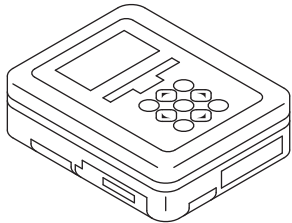
**C: CAUTION**

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- 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 connectors of sensors or units, be sure to disconnect the ground cable from the battery.
- All parts should be thoroughly cleaned, paying special attention to 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 parts 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.

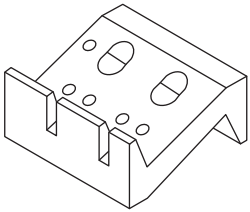
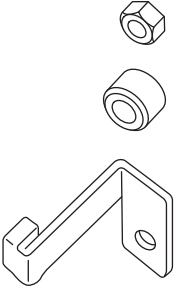
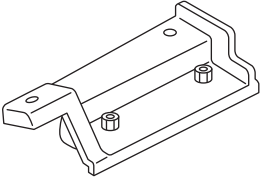
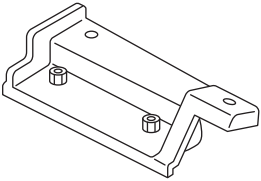
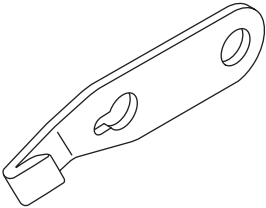
- Lift up or lower the vehicle when necessary. Make sure to support the correct positions.

**D: PREPARATION TOOL****1. SPECIAL TOOL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	Used for removing and installing cam sprocket. (LH side) NOTE: CAM SPROCKET WRENCH (499207100) can also be used.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for each inspection.

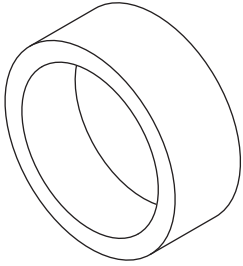
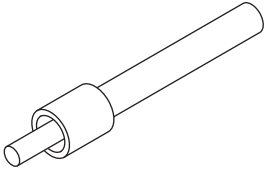
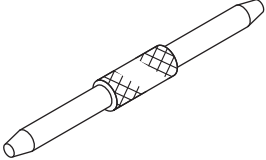
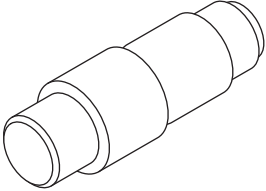
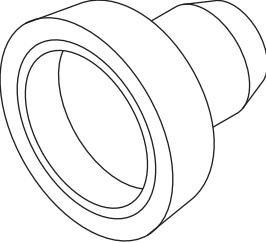
# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498267800</p>	498267800	CYLINDER HEAD TABLE	<ul style="list-style-type: none"> <li>Used for replacing valve guides.</li> <li>Used for removing and installing valve spring.</li> </ul>
 <p>ST-498277200</p>	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 <p>ST-498457000</p>	498457000	ENGINE STAND ADAPTER RH	Used together with ENGINE STAND (499817100).
 <p>ST-498457100</p>	498457100	ENGINE STAND ADAPTER LH	Used together with ENGINE STAND (499817100).
 <p>ST-498497100</p>	498497100	CRANKSHAFT STOPPER	Used for removing and installing drive plate.

# General Description

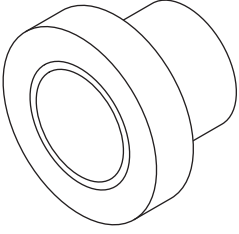
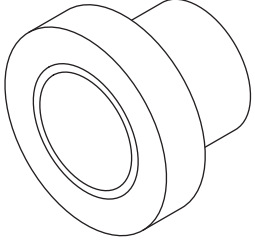
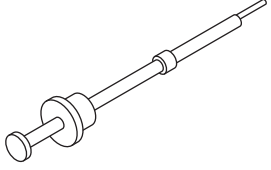
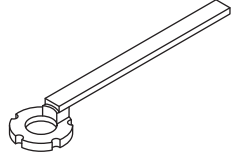
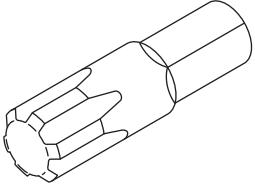
MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498747300</p>	498747300	PISTON GUIDE	Used for installing piston in cylinder.
 <p>ST-498857100</p>	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 <p>ST-499017100</p>	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 <p>ST-499037100</p>	499037100	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 <p>ST-499587200</p>	499587200	CRANKSHAFT OIL SEAL INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing crankshaft oil seal.</li> <li>• Used together with CRANKSHAFT OIL SEAL GUIDE (499597100).</li> </ul>



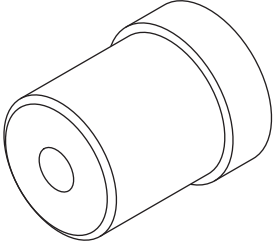
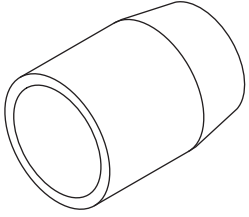
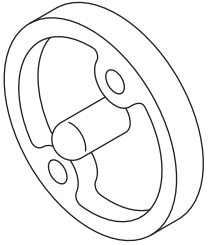
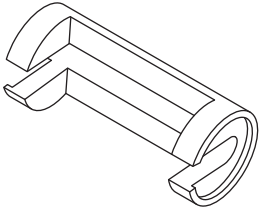
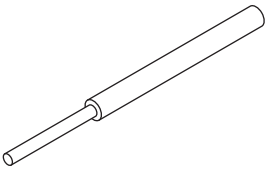
# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499587500</p>	499587500	OIL SEAL INSTALLER	<ul style="list-style-type: none"> <li>Used for installing the camshaft oil seal.</li> <li>Used together with OIL SEAL GUIDE (499597000).</li> </ul>
 <p>ST-499587700</p>	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 <p>ST-499097700</p>	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 <p>ST-499207400</p>	499207400	CAM SPROCKET WRENCH	Used for removing and installing cam sprocket. (RH side)
 <p>ST-499497000</p>	499497000	TORX® PLUS	Used for removing and installing camshaft cap.

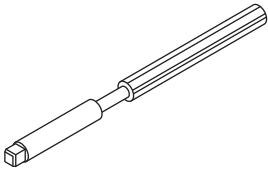
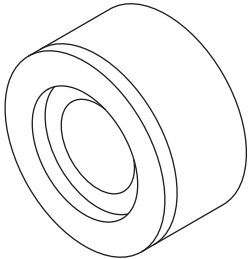
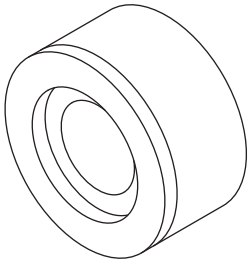
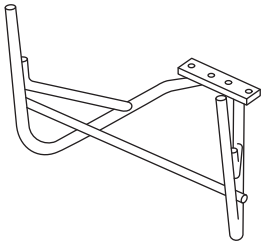
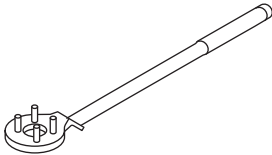
# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499587100</p>	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 <p>ST-499597000</p>	499597000	OIL SEAL GUIDE	<ul style="list-style-type: none"> <li>Used for installing the camshaft oil seal.</li> <li>Used together with CAMSHAFT OIL SEAL INSTALLER (499587500).</li> </ul>
 <p>ST-499597100</p>	499597100	CRANKSHAFT OIL SEAL GUIDE	<ul style="list-style-type: none"> <li>Used for installing crankshaft oil seal.</li> <li>Used together with CRANKSHAFT OIL SEAL INSTALLER (499587200).</li> </ul>
 <p>ST-499718000</p>	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 <p>ST-499767200</p>	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.

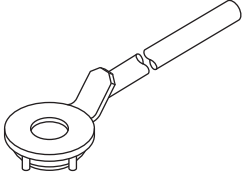
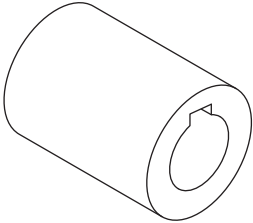
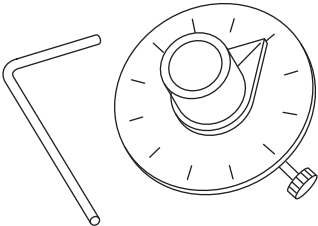
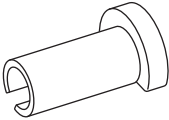
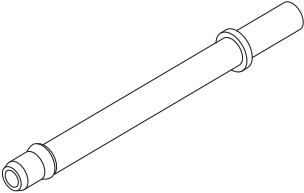
# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499767400</p>	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 <p>ST-499767700</p>	499767700	VALVE GUIDE ADJUSTER	Used for installing valve guides. (Intake side)
 <p>ST-499767800</p>	499767800	VALVE GUIDE ADJUSTER	Used for installing valve guides. (Exhaust side)
 <p>ST-499817100</p>	499817100	ENGINE STAND	<ul style="list-style-type: none"> <li>• Stand used for engine disassembly and assembly.</li> <li>• Used together with ENGINE STAND ADAPTER RH (498457000) &amp; LH (498457100).</li> </ul>
 <p>ST-499977100</p>	499977100	CRANK PULLEY WRENCH	Used for removing and installing the crank pulley. (MT model)

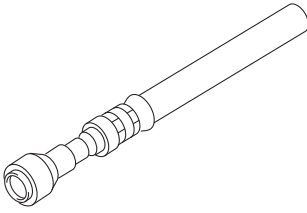
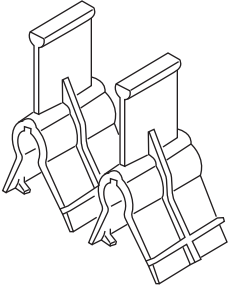
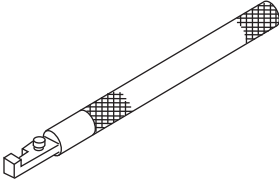
# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499977400</p>	499977400	CRANK PULLEY WRENCH	Used for removing and installing the crank pulley. (CVT model)
 <p>ST-499987500</p>	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 <p>ST18854AA000</p>	18854AA000	ANGLE GAUGE	Used for installing the crank pulley.
 <p>ST42099AE000</p>	42099AE000	QUICK CONNEC- TOR RELEASE	Used for disconnecting quick connector of the engine compartment.
 <p>ST18471AA000</p>	18471AA000	FUEL PIPE ADAPTER	Used for inspecting the fuel pressure.

## General Description

### MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST42075AG690	42075AG690	FUEL HOSE	Used for inspecting the fuel pressure. NOTE: This is the SUBARU genuine part.
 ST18354AA000	18354AA000	VALVE ROCKER HOLDER	Used for installing the valve rocker assembly (intake). (2-piece set)
 ST18258AA000	18258AA000	SPRING INSTALLER	Used for installing the valve rocker assembly (intake).

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.
Vacuum gauge	Used for measuring intake manifold vacuum.
Oil pressure gauge	Used for measuring engine oil pressure.
Fuel pressure gauge	Used for measuring fuel pressure.
Timing light	Used for measuring ignition timing.