

# General Description

## MECHANICAL

### 1. General Description

#### A: SPECIFICATION

Engine	Model			3.6 L
	Cylinder arrangement			Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Chain driven, double overhead camshaft, 4-valve/cylinder
	Bore × Stroke			mm (in)
	Displacement			cm <sup>3</sup> (cu in)
	Compression ratio			10.5
	Compression (350 rpm and fully open throttle)		kPa (kgf/cm <sup>2</sup> , psi)	Standard
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Open	Max. retard	ATDC 10°
			Min. advance	BTDC 40°
		Close	Max. retard	ABDC 74°
			Min. advance	ABDC 24°
	Exhaust valve timing	Open	Max. retard	BBDC 4°
			Min. advance	BBDC 44°
		Close	Max. retard	ATDC 44°
			Min. advance	ATDC 4°
	Valve clearance	Intake		0.20 <sup>+0.04</sup> <sub>−0.06</sub> (0.0079 <sup>+0.0016</sup> <sub>−0.0024</sub> )
Exhaust		0.35±0.05 (0.0138±0.0020)		
Idle speed [“P” or “N” range]	rpm	No load	Standard	
		A/C ON	Standard	
Ignition order				
Ignition timing				

NOTE:

OS: Oversize

US: Undersize

Camshaft	Bending limit		mm (in)		0.020 (0.00079)	
	Cam lobe height	mm (in)	Intake	Standard	45.90 — 46.00 (1.8071 — 1.8110)	
			Exhaust	Standard	44.65 — 44.75 (1.7579 — 1.7618)	
	Cam base circle diameter	mm (in)	Intake	Standard	36.00 (1.4173)	
			Exhaust	Standard	36.00 (1.4173)	
	Journal O.D.	mm (in)	Front	Standard	37.946 — 37.963 (1.4939 — 1.4946)	
			Except for front	Standard	25.946 — 25.963 (1.0215 — 1.0222)	
	Oil clearance		mm (in)		Standard	0.037 — 0.072 (0.0015 — 0.0028)
Thrust clearance	mm (in)	Intake	Standard	0.075 — 0.135 (0.0030 — 0.0053)		
		Exhaust	Standard	0.075 — 0.135 (0.0030 — 0.0053)		
Cylinder head	Warping limit (Mating surface with cylinder block)			mm (in)		0.020 (0.0008)
	Standard height			mm (in)		124±0.05 (4.88±0.0020)
Valve seat	Seating angle between valve and valve seat				90°	
	Contacting width between valve and valve seat	mm (in)	Intake	Standard	1.0 (0.039)	
			Exhaust	Standard	1.5 (0.059)	

# General Description

MECHANICAL

Valve guide	Clearance between the valve guide and valve stem mm (in)	Intake	Standard	0.030 — 0.057 (0.0012 — 0.0022)
		Exhaust	Standard	0.040 — 0.067 (0.0016 — 0.0026)
	Inside diameter mm (in)		5.500 — 5.512 (0.2165 — 0.2170)	
	Valve stem outer diameters mm (in)	Intake		5.455 — 5.470 (0.2148 — 0.2154)
		Exhaust		5.445 — 5.460 (0.2144 — 0.2150)
	Valve guide protrusion amount	Intake mm (in)		8.6 — 9.0 (0.3386 — 0.3543)
Exhaust mm (in)			10.7 — 11.1 (0.4213 — 0.4370)	
Valve	Head edge thickness mm (in)	Intake	Standard	1.0 (0.039)
		Exhaust	Standard	1.2 (0.047)
	Overall length mm (in)	Intake		103.5 (4.075)
		Exhaust		103.2 (4.063)
Valve spring	Free length mm (in)	Intake		49.06 (1.9315)
		Exhaust		49.06 (1.9315)
	Tension/spring height N (kgf, lb)/mm (in)	Set		182 — 210 (18.6 — 21.4, 40.9 — 47.2) / 31.0 (1.220)
		Lift		316 — 350 (32.2 — 35.7, 71.0 — 78.7) / 21.0 (0.827)
Squareness				2.5°, 2.1 mm (0.083 in)
Valve lifter	Outer diameter mm (in)	Standard		32.959 — 32.975 (1.2976 — 1.2982)
	Valve lifter mating surface inner diameter mm (in)	Standard		32.994 — 33.016 (1.2990 — 1.2998)
	Valve lifter and valve lifter mating surface clearance mm (in)	Standard		0.019 — 0.057 (0.0007 — 0.0022)
Cylinder block	Warping limit (Mating surface with cylinder head) mm (in)			0.020 (0.0008)
	Standard height mm (in)			202 (7.95)
	Taper mm (in)	Standard		0.030 (0.0012)
	Out-of-roundness mm (in)	Standard		0.010 (0.0004)
	Cylinder to piston clearance at 20°C (68°F) mm (in)	Standard		−0.010 — 0.010 (−0.0004 — 0.0004)
	Cylinder inner diameter boring limit (diameter) mm (in)			92.515 (3.6717)
Piston	Piston grade point mm (in)			37.3 (1.4685)
	Outer diameter mm (in)	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
			B	91.995 — 92.005 (3.6218 — 3.6222)
		0.25 (0.0098) OS		92.245 — 92.265 (3.6317 — 3.6325)
		0.50 (0.0197) OS		92.495 — 92.515 (3.6415 — 3.6423)
Inner diameter of piston pin hole mm (in)			Standard	22.000 — 22.006 (0.8661 — 0.8664)
Piston pin	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
	Outer diameter mm (in)	Standard		21.994 — 22.000 (0.8659 — 0.8661)
	Clearance between piston 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 — 0.25 (0.0079 — 0.0098)
		Second ring	Standard	0.40 — 0.50 (0.0157 — 0.0197)
		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)
		Oil ring	Standard	0.065 — 0.165 (0.0026 — 0.0065)

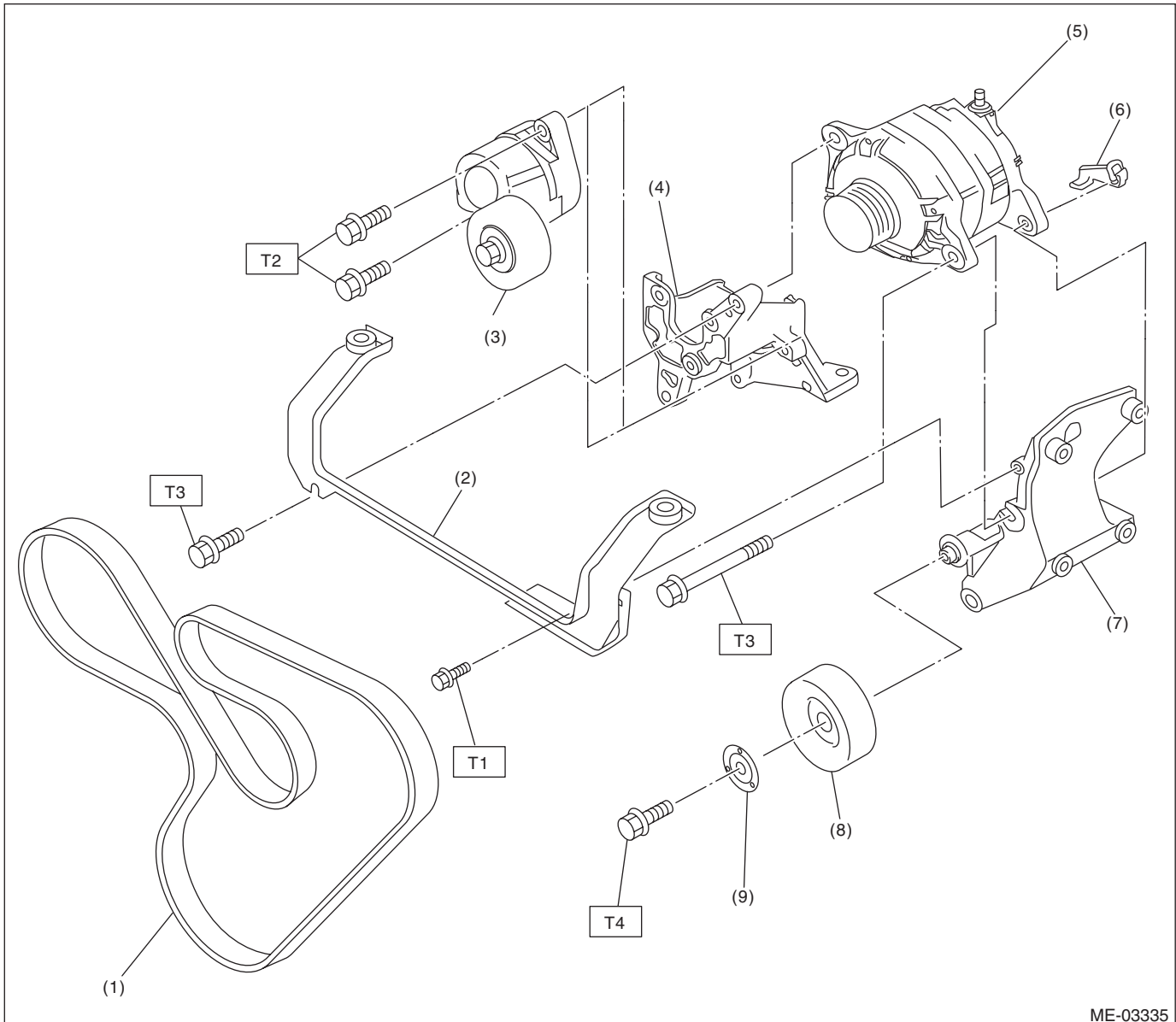
# General Description

## MECHANICAL

Connecting rod and connecting rod bearing	Bend or twist per 100 mm (3.94 in) in length		mm (in)	Limit	0.10 (0.0039 in)		
	Thrust clearance		mm (in)	Standard	0.070 — 0.330 (0.0028 — 0.0130)		
	Oil clearance		mm (in)	Standard	0.016 — 0.043 (0.0006 — 0.0017)		
	Bearing size (Thickness at center)		mm (in)	Standard		1.489 — 1.505 (0.0586 — 0.0593)	
				0.03 (0.0012) US		1.507 — 1.515 (0.0593 — 0.0596)	
				0.05 (0.0020) US		1.517 — 1.525 (0.0597 — 0.0600)	
0.25 (0.0098) US				1.617 — 1.625 (0.0637 — 0.0640)			
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)	0.005 (0.0002)		
		Cylindricity		mm (in)	0.006 (0.0002)		
		Grinding limit		mm (in)	51.734 (2.0368)		
	Crank journal	Out-of-roundness		mm (in)	0.005 (0.0002)		
		Cylindricity		mm (in)	0.006 (0.0002)		
		Grinding limit		mm (in)	63.742 (2.5095)		
	Crank pin outer diameter		mm (in)	Standard		51.976 — 52.000 (2.0463 — 2.0472)	
				0.03 (0.0012) US		51.954 — 51.970 (2.0454 — 2.0461)	
				0.05 (0.0020) US		51.934 — 51.950 (2.0446 — 2.0453)	
				0.25 (0.0098) US		51.734 — 51.750 (2.0368 — 2.0374)	
	Crank journal outer diameter	mm (in)	#1, #3, #5, #7	Standard		63.992 — 64.016 (2.5194 — 2.5203)	
				0.03 (0.0012) US		63.962 — 63.978 (2.5182 — 2.5188)	
				0.05 (0.0020) US		63.942 — 63.958 (2.5174 — 2.5180)	
				0.25 (0.0098) US		63.742 — 63.758 (2.5095 — 2.5102)	
		#2, #4, #6	Standard		63.992 — 64.016 (2.5194 — 2.5203)		
			0.03 (0.0012) US		63.962 — 63.978 (2.5182 — 2.5188)		
			0.05 (0.0020) US		63.942 — 63.958 (2.5174 — 2.5180)		
			0.25 (0.0098) US		63.742 — 63.758 (2.5095 — 2.5102)		
		Bearing size (Thickness at center)	mm (in)	#1, #3, #5	Standard		1.996 — 2.013 (0.0786 — 0.0793)
					0.03 (0.0012) US		2.011 — 2.014 (0.0792 — 0.0793)
					0.05 (0.0020) US		2.021 — 2.024 (0.0796 — 0.0797)
					0.25 (0.0098) US		2.121 — 2.124 (0.0835 — 0.0836)
	#2, #4, #6		Standard		1.996 — 2.013 (0.0786 — 0.0793)		
			0.03 (0.0012) US		2.015 — 2.018 (0.0793 — 0.0794)		
			0.05 (0.0020) US		2.025 — 2.028 (0.0797 — 0.0798)		
			0.25 (0.0098) US		2.125 — 2.128 (0.0837 — 0.0838)		
	#7		Standard		1.992 — 2.009 (0.0784 — 0.0791)		
			0.03 (0.0012) US		2.011 — 2.014 (0.0792 — 0.0793)		
			0.05 (0.0020) US		2.021 — 2.024 (0.0796 — 0.0797)		
			0.25 (0.0098) US		2.121 — 2.124 (0.0835 — 0.0836)		
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



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

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

**T1: 6.4 (0.7, 4.7)**

**T2: 20 (2.0, 14.8)**

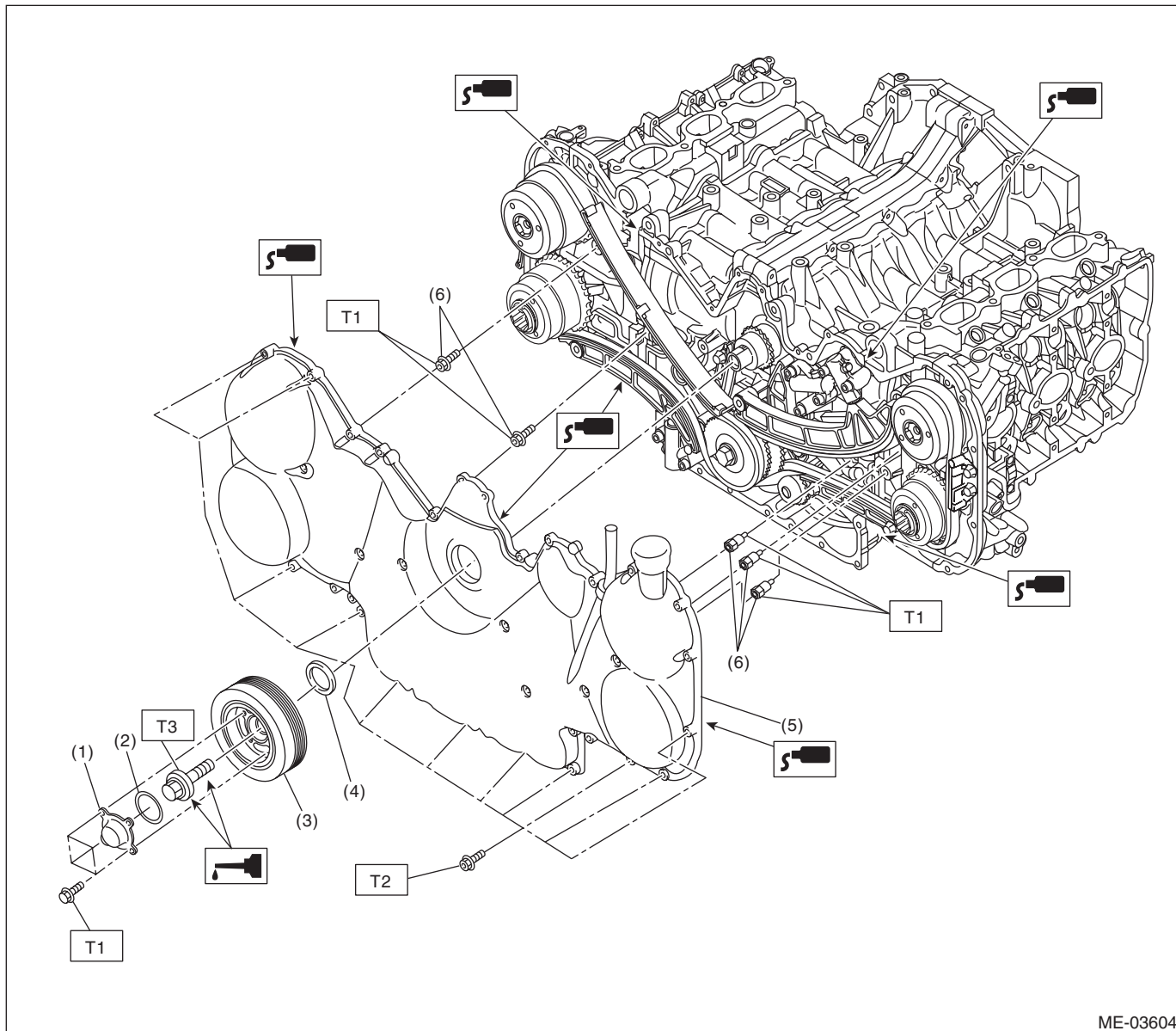
**T3: 25 (2.5, 18.4)**

**T4: 33 (3.4, 24.3)**

# General Description

## MECHANICAL

### 2. TIMING CHAIN COVER



- (1) Crank pulley cover
- (2) O-ring
- (3) Crank pulley

- (4) Oil seal
- (5) Chain cover
- (6) Bolt

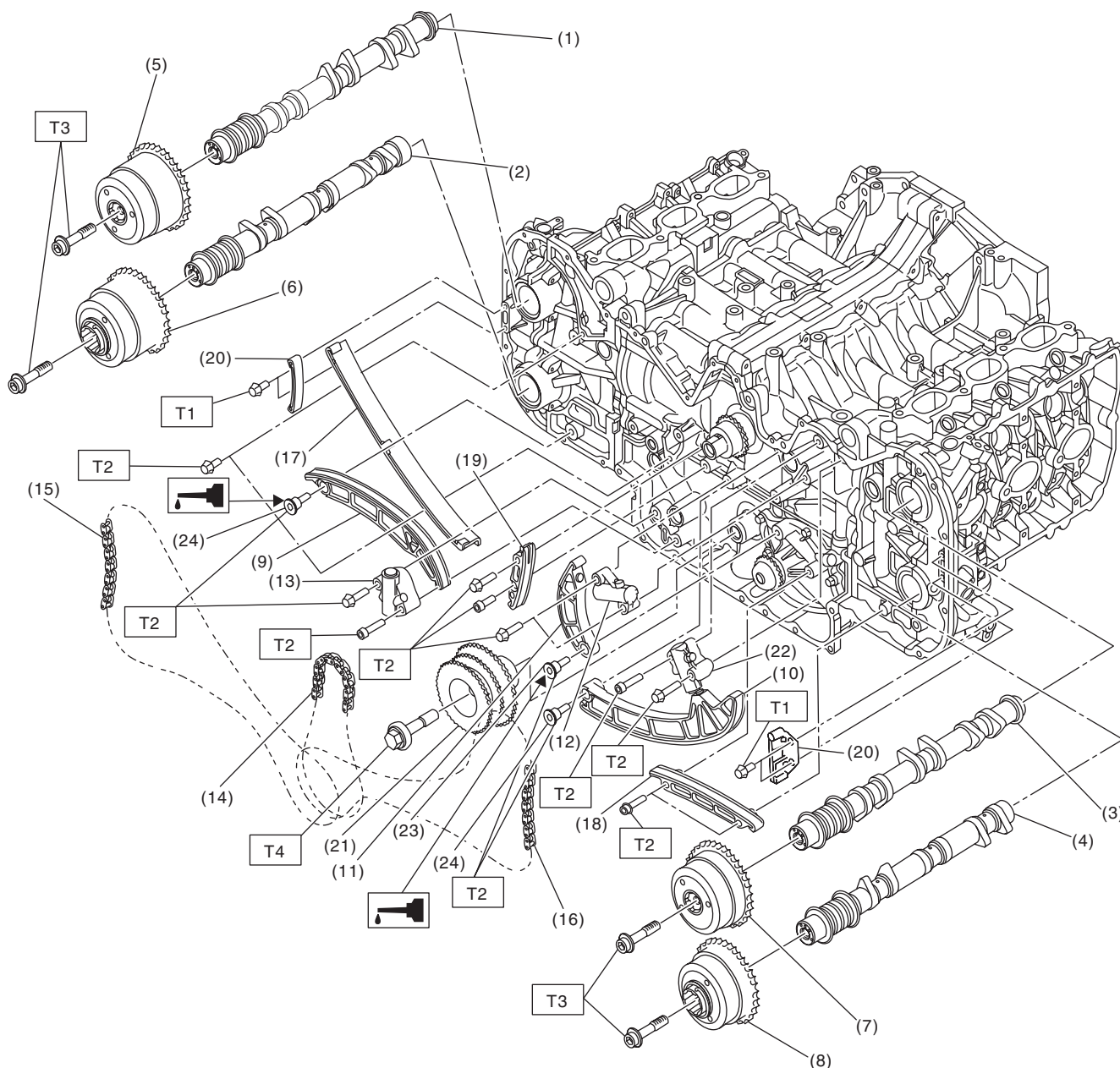
**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 6.4 (0.7, 4.7)**

**T2: 10 (1.0, 7.4)**

**T3: 195 (19.9, 143.8)**

## 3. TIMING CHAIN



ME-03605

## General Description

### MECHANICAL

---

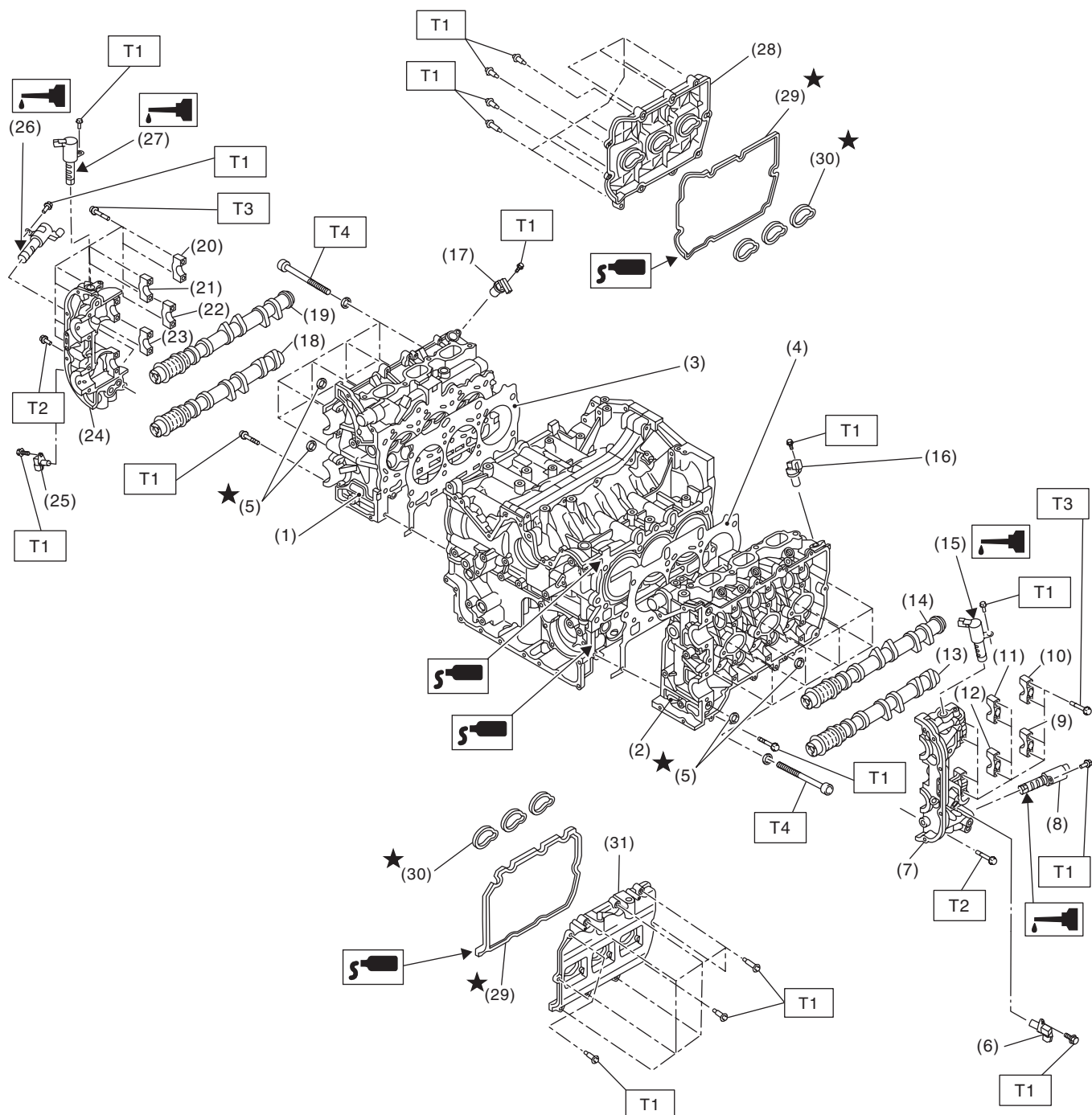
- |                                   |                                 |                                  |
|-----------------------------------|---------------------------------|----------------------------------|
| (1) Intake camshaft (RH)          | (12) Chain tensioner (Main)     | (23) Chain tensioner lever shaft |
| (2) Exhaust camshaft (RH)         | (13) Chain tensioner (RH)       | (24) Chain tensioner lever shaft |
| (3) Intake camshaft (LH)          | (14) Timing chain (Main)        |                                  |
| (4) Exhaust camshaft (LH)         | (15) Timing chain (RH)          |                                  |
| (5) Intake cam sprocket (RH)      | (16) Timing chain (LH)          |                                  |
| (6) Exhaust cam sprocket (RH)     | (17) Chain guide (RH)           |                                  |
| (7) Intake cam sprocket (LH)      | (18) Chain guide (LH)           |                                  |
| (8) Exhaust cam sprocket (LH)     | (19) Chain guide (Main)         |                                  |
| (9) Chain tensioner lever (RH)    | (20) Chain guide (Between cams) |                                  |
| (10) Chain tensioner lever (LH)   | (21) Idler sprocket             |                                  |
| (11) Chain tensioner lever (Main) | (22) Chain tensioner (LH)       |                                  |

---

**Tightening torque:N·m (kgf-m, ft-lb)****T1: 6.4 (0.7, 4.7)****T2: 16 (1.6, 11.8)****T3: <Ref. to ME(H6DO)-69, Cam Sprocket.>****T4: 120 (12.2, 88.5)**

---

## 4. CYLINDER HEAD AND CAMSHAFT



ME-03338

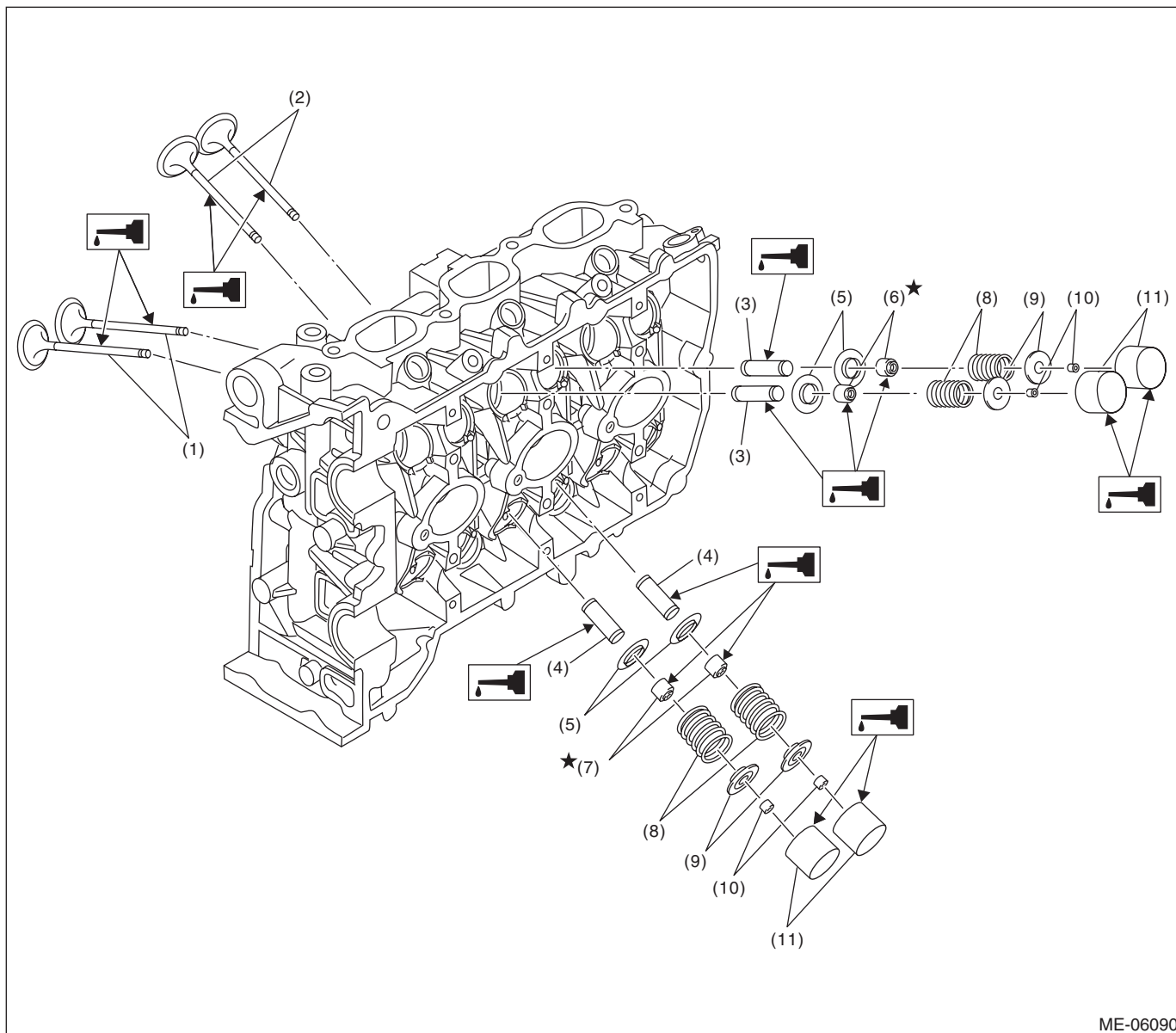


# General Description

## MECHANICAL

(1) Cylinder head (RH)	(14) Intake camshaft (LH)	(27) Intake oil flow control solenoid valve (RH)
(2) Cylinder head (LH)	(15) Intake oil flow control solenoid valve (LH)	(28) Rocker cover (RH)
(3) Cylinder head gasket (RH)	(16) Intake camshaft position sensor (LH)	(29) Gasket
(4) Cylinder head gasket (LH)	(17) Intake camshaft position sensor (RH)	(30) Gasket
(5) O-ring	(18) Exhaust camshaft (RH)	(31) Rocker cover (LH)
(6) Exhaust camshaft position sensor (LH)	(19) Intake camshaft (RH)	
(7) Front camshaft cap (LH)	(20) Intake camshaft cap (Rear RH)	<hr/> <b>Tightening torque:N·m (kgf-m, ft-lb)</b> <b>T1: 6.4 (0.7, 4.7)</b>  <b>T2: 9.75 (1.0, 7.2)</b> <b>T3: 16 (1.6, 11.8)</b>  <b>T4: &lt;Ref. to ME(H6DO)-77, Cylinder Head.&gt;</b> <hr/>
(8) Exhaust oil flow control solenoid valve (LH)	(21) Intake camshaft cap (Center RH)	
(9) Exhaust camshaft cap (Rear LH)	(22) Exhaust camshaft cap (Rear RH)	
(10) Intake camshaft cap (Rear LH)	(23) Exhaust camshaft cap (Center RH)	
(11) Intake camshaft cap (Center LH)	(24) Front camshaft cap (RH)	
(12) Exhaust camshaft cap (Center LH)	(25) Exhaust camshaft position sensor (RH)	
(13) Exhaust camshaft (LH)	(26) Exhaust oil flow control solenoid valve (RH)	

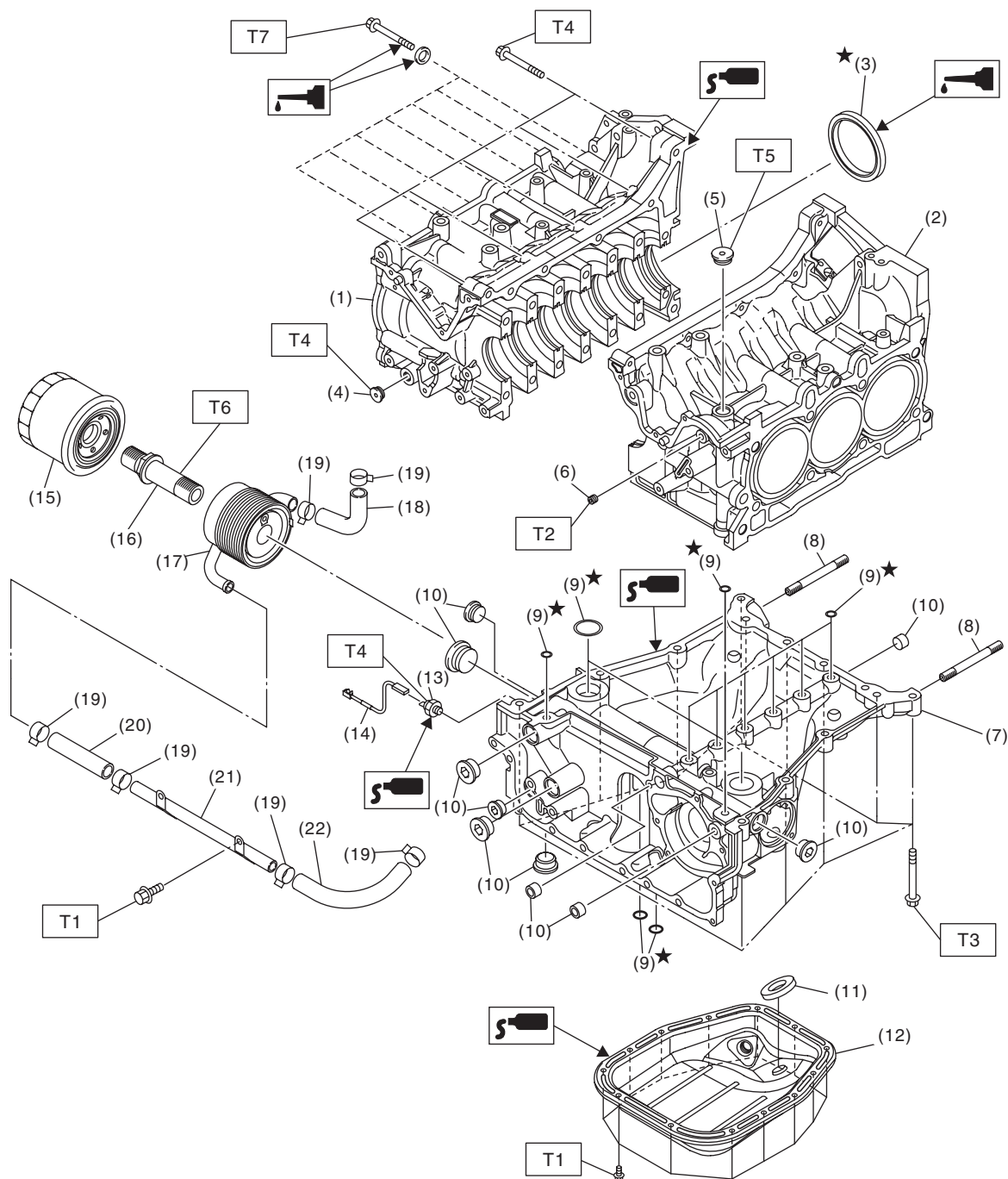
## 5. CYLINDER HEAD AND VALVE ASSEMBLY



- |                           |                         |                           |
|---------------------------|-------------------------|---------------------------|
| (1) Intake valve          | (5) Valve spring seat   | (9) Valve spring retainer |
| (2) Exhaust valve         | (6) Stem seal (Intake)  | (10) Valve collet         |
| (3) Valve guide (Intake)  | (7) Stem seal (Exhaust) | (11) Valve lifter         |
| (4) Valve guide (Exhaust) | (8) Valve spring        |                           |

## MECHANICAL

## 6. CYLINDER BLOCK



ME-04257

**ME(H6DO)-12**

# General Description

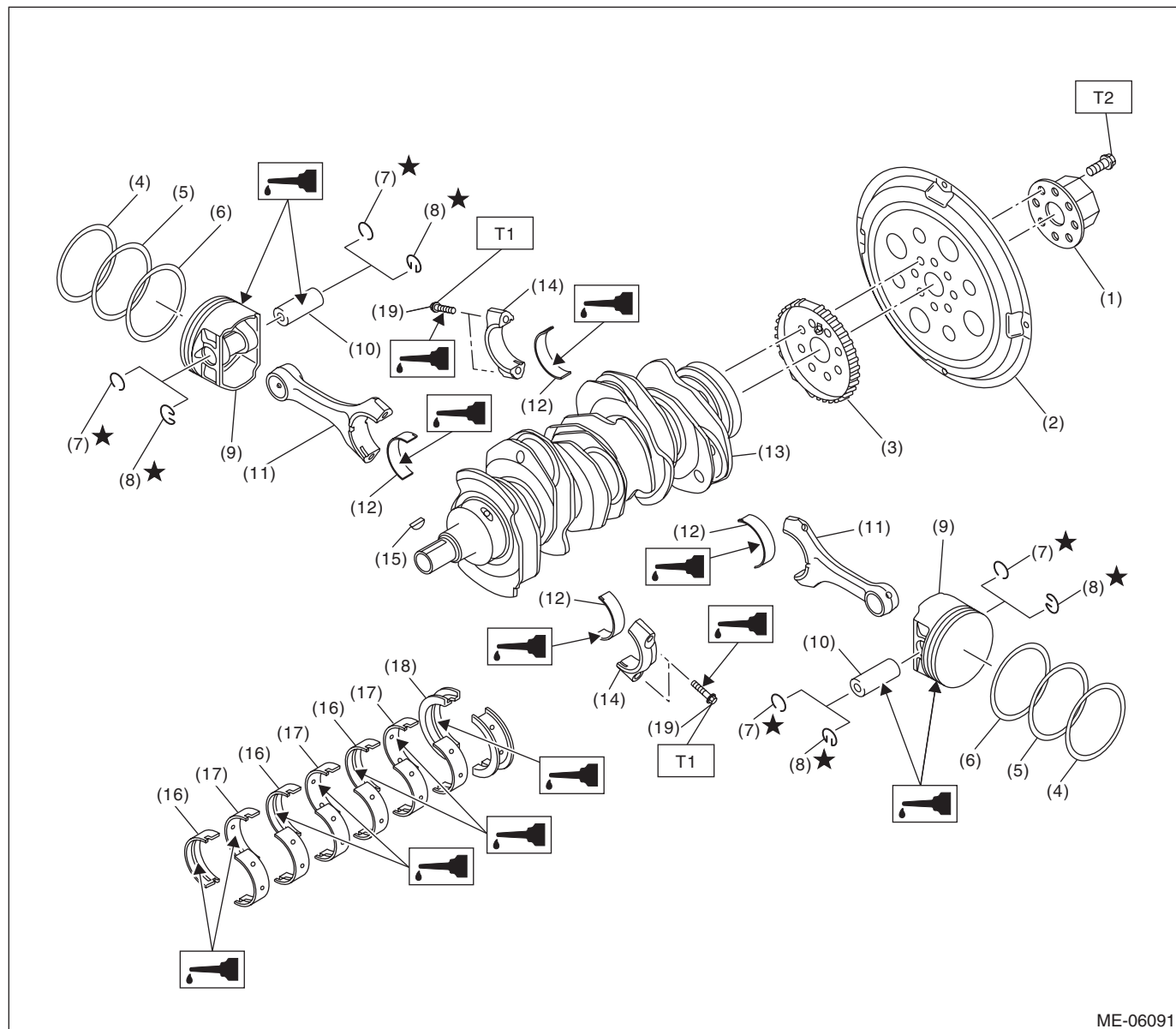
MECHANICAL

(1) Cylinder block (RH)	(12) Oil pan lower	<b><i>Tightening torque:N·m (kgf-m, ft-lb)</i></b>
(2) Cylinder block (LH)	(13) Oil pressure switch	<b><i>T1: 6.4 (0.7, 4.7)</i></b>
(3) Oil seal	(14) Oil pressure switch harness	<b><i>T2: 17 (1.7, 12.5)</i></b>
(4) Plug	(15) Oil filter	<b><i>T3: 18 (1.8, 13.3)</i></b>
(5) Plug	(16) Oil cooler connector	<b><i>T4: 25 (2.5, 18.4)</i></b>
(6) Orifice	(17) Oil cooler	<b><i>T5: 37 (3.8, 27.3)</i></b>
(7) Oil pan upper	(18) Hose	<b><i>T6: 54 (5.5, 39.8)</i></b>
(8) Stud bolt	(19) Clamp	<b><i>T7: &lt;Ref. to ME(H6DO)-88, Cylinder Block.&gt;</i></b>
(9) O-ring	(20) Hose	
(10) Plug	(21) Oil cooler pipe	
(11) Magnet	(22) Hose	

# General Description

## MECHANICAL

### 7. CRANKSHAFT AND PISTON



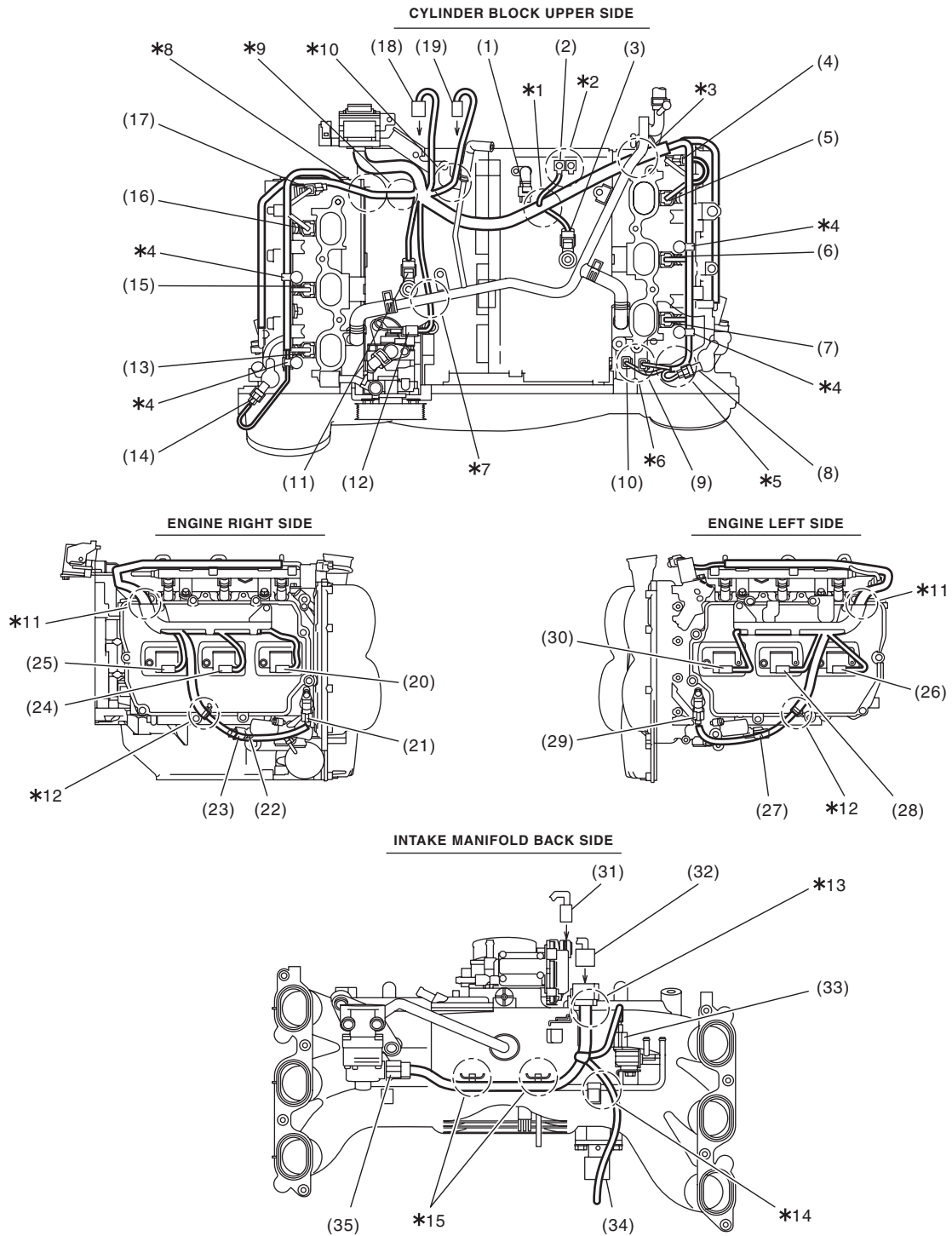
- |                             |                                    |                                    |
|-----------------------------|------------------------------------|------------------------------------|
| (1) Reinforcement           | (9) Piston                         | (17) Crankshaft bearing #2, #4, #6 |
| (2) Drive plate             | (10) Piston pin                    | (18) Crankshaft bearing #7         |
| (3) Crankshaft sensor plate | (11) Connecting rod                | (19) Connecting rod cap bolt       |
| (4) Top ring                | (12) Connecting rod bearing        |                                    |
| (5) Second ring             | (13) Crankshaft                    |                                    |
| (6) Oil ring                | (14) Connecting rod cap            |                                    |
| (7) Circlip                 | (15) Woodruff key                  |                                    |
| (8) Snap ring               | (16) Crankshaft bearing #1, #3, #5 |                                    |

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

**T1: 60 (6.1, 44.3)**

**T2: <Ref. to 5AT-65, INSTALLATION, Drive Plate.>**

## 8. ENGINE HARNESS



ME-03361

# General Description

## MECHANICAL

(1) Crankshaft position sensor connector	(13) #1 injector connector	(25) #5 ignition coil connector
(2) Engine ground	(14) Intake oil flow control solenoid valve RH connector	(26) #6 ignition coil connector
(3) Knock sensor LH connector	(15) #3 injector connector	(27) Exhaust oil flow control solenoid valve LH connector
(4) Intake camshaft position sensor LH connector	(16) #5 injector connector	(28) #4 ignition coil connector
(5) #6 injector connector	(17) Intake camshaft position sensor RH connector	(29) Exhaust camshaft position sensor LH connector
(6) #4 injector connector	(18) Upper/lower connection connector (To intake manifold)	(30) #2 ignition coil connector
(7) #2 injector connector	(19) Electronic throttle control connector (To intake manifold)	(31) Electronic throttle control connector (from cylinder block upper part)
(8) Intake oil flow control solenoid valve LH connector	(20) #1 ignition coil connector	(32) Upper and lower joint connector (from cylinder block upper part)
(9) Oil temperature sensor connector	(21) Exhaust camshaft position sensor RH	(33) Purge control solenoid valve connector
(10) Engine coolant temperature sensor connector	(22) Oil pressure switch connector	(34) Manifold absolute pressure sensor connector
(11) Knock sensor RH connector	(23) Exhaust oil flow control solenoid valve RH connector	(35) EGR valve connector
(12) Power steering switch connector	(24) #3 ignition coil connector	

\*1: Route between crankshaft position sensor and knock sensor LH.

\*2: Install so that engine ground terminals face the rear side of vehicle.

\*3: Route the harness under the heater hose.

\*4: Attach the engine harness fixing clip to the fuel pipe stay.

\*5: Route from the cutout portion on the fuel pipe protector LH.

\*6: Be careful not to mix up the connectors of oil temperature sensor and engine coolant temperature sensor.

\*7: Route the harness under the heater hose.

\*8: Route under the fuel pipe.

\*9: Install the engine harness fixing clip to the fixing boss of the cylinder block.

\*10: Route the harness over the heater hose stay.

\*11: Align the engine harness stay end with the end of engine harness identification tape.

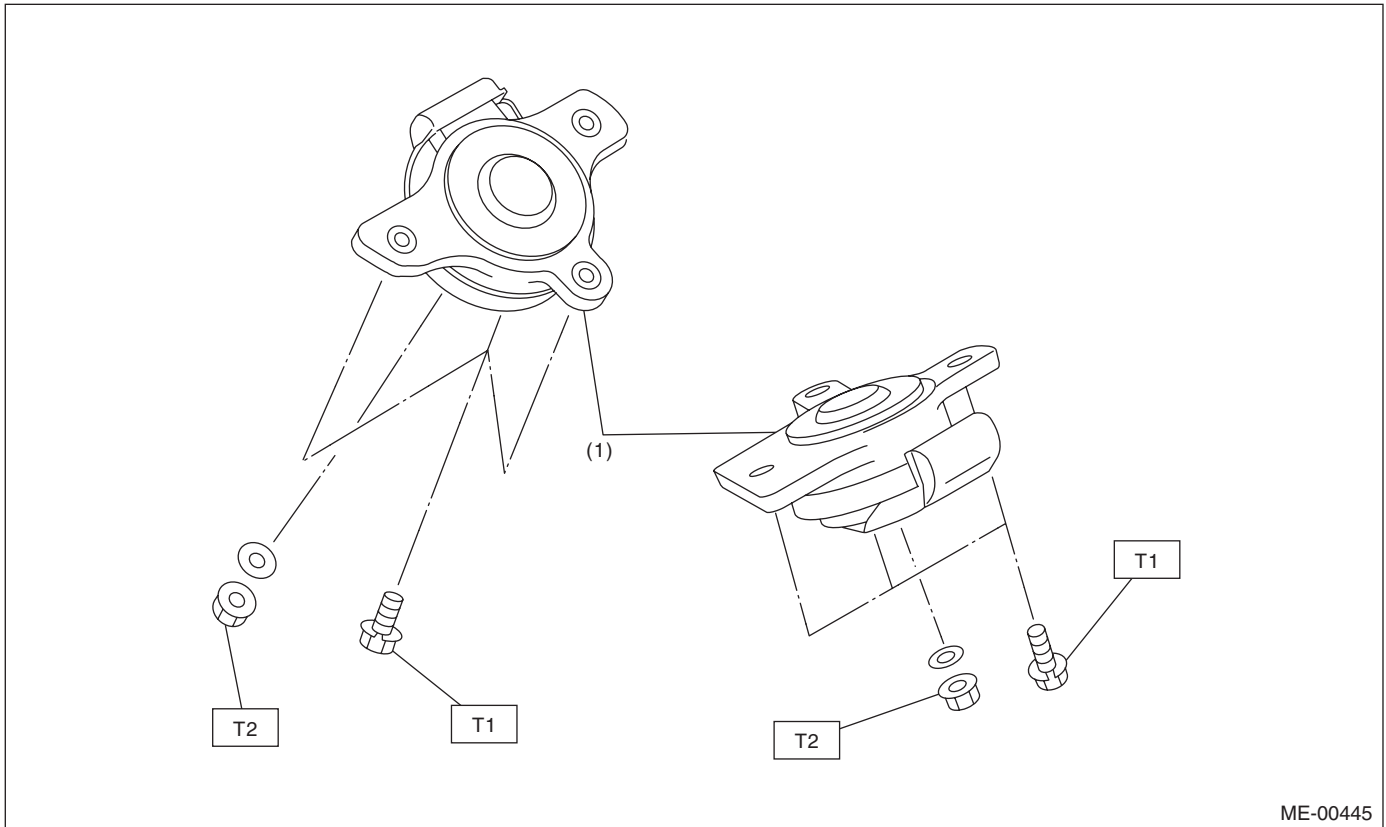
\*12: Attach the engine harness fixing clip to the fixing boss on the rocker cover.

\*13: Securely install the engine harness fixing stay.

\*14: Route outside the fuel pipe.

\*15: Attach the engine harness fixing clip to the fixing stay on the intake manifold.

## 9. ENGINE MOUNTING



(1) Front cushion rubber

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

**T1: 35 (3.6, 25.8)**

**T2: 75 (7.6, 55.3)**



## General Description

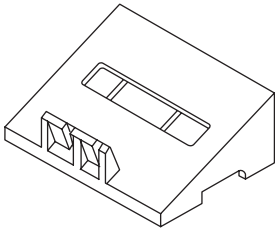
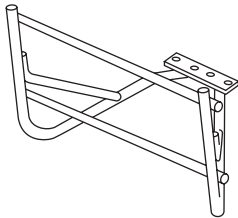
### MECHANICAL

#### 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.
- Before applying liquid gasket, completely remove the old liquid gasket and degrease it.
- Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
- 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.

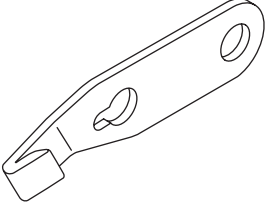
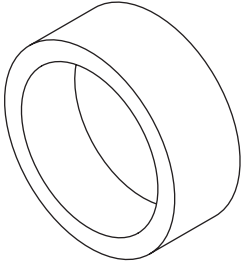
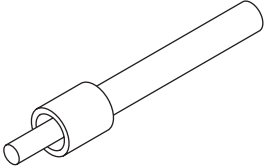
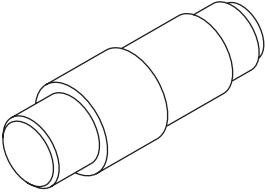
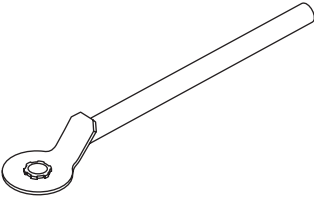
#### D: PREPARATION TOOL

##### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18250AA010	18250AA010	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>
 ST18232AA000	18232AA000	ENGINE STAND	Used for disassembling and assembling engine.

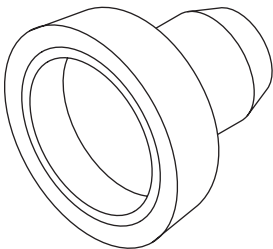
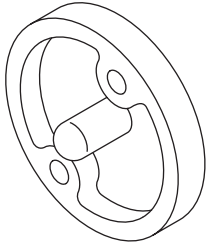
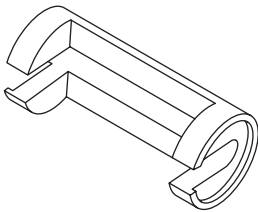
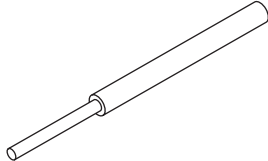
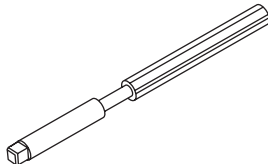
# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498497100</p>	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of drive plate when loosening / tightening crank pulley bolt.
 <p>ST-398744300</p>	398744300	PISTON GUIDE	Used for installing piston in cylinder.
 <p>ST-499585500</p>	499585500	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 <p>ST18350AA000</p>	18350AA000	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 <p>ST-499977500</p>	499977500	CAM SPROCKET WRENCH	Used for removing and installing camshaft sprocket.

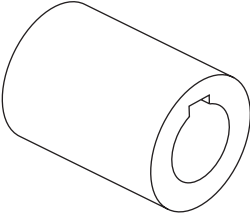
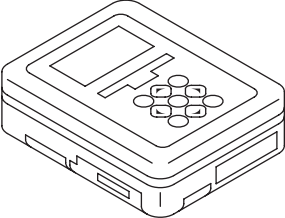
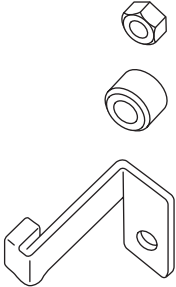
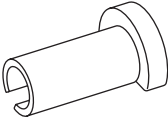
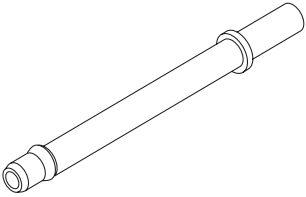
# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <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>
 <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-499765700</p>	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.
 <p>ST-499765900</p>	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.

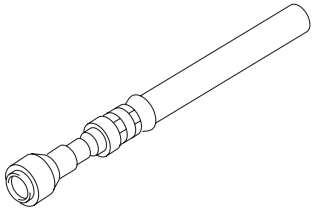
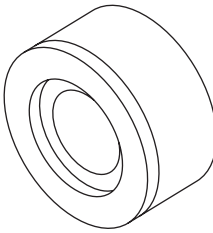
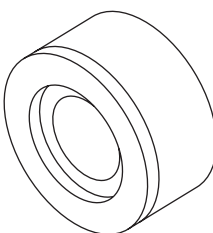
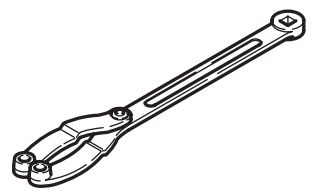
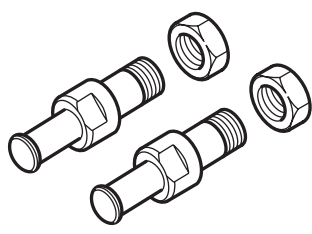
# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18252AA000</p>	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 <p>ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONI- TOR III KIT	Used for troubleshooting for electrical system.
 <p>ST-498277200</p>	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 <p>ST42099AE000</p>	42099AE000	QUICK CON- NECTOR RELEASE	Used for disconnecting quick connector of the engine compartment.
 <p>ST18471AA000</p>	18471AA000	FUEL PIPE ADAPTER	Used for measuring fuel pressure.

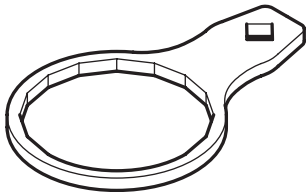
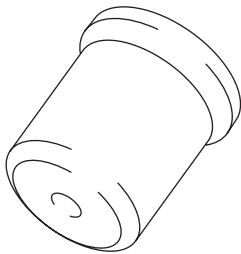
# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST42075AG690</p>	42075AG690	FUEL HOSE	<ul style="list-style-type: none"> <li>Used for measuring fuel pressure.</li> <li>This is a genuine Subaru part.</li> </ul>
 <p>ST18251AA050</p>	18251AA050	VALVE GUIDE ADJUSTER	Used for installing intake valve guides.
 <p>ST18251AA060</p>	18251AA060	VALVE GUIDE ADJUSTER	Used for installing exhaust valve guides.
 <p>ST18355AA000</p>	18355AA000	PULLEY WRENCH	<ul style="list-style-type: none"> <li>Used for stopping rotation of crank pulley when removing and installing crank pulley bolt.</li> <li>Used for stopping rotation of idler sprocket when removing and installing idler sprocket bolt.</li> </ul>
 <p>ST18334AA000</p>	18334AA000	PULLEY WRENCH PIN SET	<ul style="list-style-type: none"> <li>Used for stopping rotation of crank pulley when removing and installing crank pulley bolt.</li> <li>Used for stopping rotation of idler sprocket when removing and installing idler sprocket bolt.</li> </ul>

# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18332AA020</p>	18332AA020	OIL FILTER WRENCH	Used for removing and installing oil filter.
 <p>ST-499585700</p>	499585700	OIL SEAL GUIDE	Used for installing the chain cover oil seal.

## 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.
TORX® socket (E12)	Used for removing and installing connecting rod cap.

## E: PROCEDURE

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

- V-belt
- Timing chain