

# GENERAL DESCRIPTION

Mechanical

## 1. General Description S143001

### A: SPECIFICATIONS S143001E49

|                          |   |                       |  |
|--------------------------|---|-----------------------|--|
| Engine                   | Type  |                       | Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gaso-<br>line engine             |
|                          | Valve arrangement   |                       | Chain driven, double over-head camshaft, 4-valve/cylinder                                  |
|                          | Bore x Stroke mm (in)   |                       | 87.2 x 80 (3.433 x 3.150)  |
|                          | Displacement cm <sup>3</sup> (cu in)  |                       | 2,999 (183)  |
|                          | Compression ratio   |                       | 10.7   |
|                          | Compression pressure (350 rpm and fully open throttle) kPa (kg/cm <sup>2</sup> , psi) |                       | 1,275 — 1,471 (13.0 — 15.0, 185 — 213)   |
|                          | Number of piston rings  |                       | Pressure ring: 2, Oil ring: 1  |
|                          | Intake valve timing   | Opening               | 5° BTDC  |
|                          |   | Closing               | 55° ABDC   |
|                          | Exhaust valve timing  | Opening               | 52° BBDC   |
|                          |   | Closing               | 0° ATDC  |
|                          | Valve clearance   | Intake mm (in)        | 0.20 <sup>+0.04</sup> / <sub>-0.06</sub> (0.0079 <sup>+0.0016</sup> / <sub>-0.0024</sub> ) |
|                          |   | Exhaust mm (in)       | 0.25±0.05 (0.0098±0.0020)  |
|                          | Idle speed [At "P" or "N" position] rpm   |                       | 600±50 (No load)<br>700±50 (A/C switch ON)   |
| Firing order             |   | 1 → 6 → 3 → 2 → 5 → 4 |  |
| Ignition timing BTDC/rpm |   | 10°±3°/600            |  |

**NOTE:**

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

|                            |                                      |   |   |                                       |
|----------------------------|--------------------------------------|---|---|---------------------------------------|
| 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)                     |   |                                       |
| Camshaft                   | Bend limit                           |   | 0.020 mm (0.0008 in)                    |                                       |
|                            | Thrust clearance                     | Intake                                  | STD                                     | 0.075 — 0.135 mm (0.0030 — 0.0053 in) |
|                            |                                      |   | Limit                                   | 0.155 mm (0.0061 in)                  |
|                            |                                      | Exhaust                                 | STD                                     | 0.048 — 0.108 mm (0.0019 — 0.0043 in) |
|                            |                                      |   | Limit                                   | 0.130 mm (0.0051 in)                  |
|                            | Cam lobe height                      | Intake                                  | STD                                     | 46.05 — 46.15 mm (1.8130 — 1.8169 in) |
|                            |                                      |   | Limit                                   | 45.95 mm (1.8091 in)                  |
|                            |                                      | Exhaust                                 | STD                                     | 45.55 — 45.65 mm (1.7933 — 1.7972 in) |
|                            |                                      |   | Limit                                   | 45.45 mm (1.7894 in)                  |
|                            | Camshaft journal O.D.                | Front                                   | 37.963 — 37.946 mm (1.4946 — 1.4939 in) |                                       |
|                            |                                      | Center & Rear                           | 27.963 — 27.946 mm (1.1009 — 1.1002 in) |                                       |
| Camshaft journal hole I.D. | Front                                | 38.000 — 38.018 mm (1.4961 — 1.4968 in) |   |                                       |
|                            | Center & Rear                        | 28.000 — 28.018 mm (1.1024 — 1.1031 in) |   |                                       |
| Oil clearance              | STD                                  | 0.037 — 0.072 mm (0.0015 — 0.0028 in)   |   |                                       |
|                            | Limit                                | 0.10 mm (0.0039 in)                     |   |                                       |
| Cylinder head              | Surface warpage limit                |   | 0.05 mm (0.0020 in)                     |                                       |
|                            | Surface grinding limit               |   | 0.1 mm (0.004 in)                       |                                       |
|                            | Standard height                      |   | 124 mm (4.88 in)                        |                                       |

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|  |  |                        |  |  |  |
|--|--|------------------------|--|--|--|
| Valve seat                                 | Refacing angle   |                        |  | 90°  |  |
|  | Contacting width   | Intake                 | STD  | 1.0 mm (0.039 in)  |  |
|  |  |                        | Limit  | 1.7 mm (0.067 in)  |  |
|  |  | Exhaust                | STD  | 1.5 mm (0.059 in)  |  |
| Limit                                      |  |                        | 2.2 mm (0.087 in)  |  |  |
| Valve guide                                | Inner diameter   |                        |  | 5.500 — 5.512 mm (0.2165 — 0.2170 in)                                    |  |
|  | Protrusion above head                                    |                        | Intake   | 12.3 — 12.7 mm (0.484 — 0.500 in)  |  |
| Valve                                      | Head edge thickness                                      | Intake                 | STD  | 1.0 mm (0.039 in)  |  |
|  |  |                        | Limit  | 0.8 mm (0.315 in)  |  |
|  |  | Exhaust                | STD  | 1.2 mm (0.047 in)  |  |
|  |  |                        | Limit  | 0.8 mm (0.315 in)  |  |
|  | Stem diameter  |                        | Intake   | 5.455 — 5.470 mm (0.2148 — 0.2154 in)                                    |  |
|  |  |                        | Exhaust  | 5.455 — 5.460 mm (0.2148 — 0.2150 in)                                    |  |
|  | Stem oil clearance                                       | STD                    | Intake   | 0.030 — 0.057 mm (0.0012 — 0.0022 in)                                    |  |
|  |  |                        | Exhaust  | 0.040 — 0.067 mm (0.0016 — 0.0026 in)                                    |  |
|  | Overall length   |                        | Intake   | 103.5 mm (4.07 in)   |  |
|  |  |                        | Exhaust  | 103.2 mm (4.06 in)   |  |
| Valve spring                               | Free length  |                        |  | 46.79 mm (1.8421 in)   |  |
|  | Squareness   |                        |  | 2.5°, 2.0 mm (0.079 in)  |  |
|  | Tension/spring height                                    | Set                    | 186.2 — 205.8 N (18.99 — 20.99 kgf, 41.9 — 46.3 lb)/37.4 mm (1.472 in) |  |  |
|  |  |                        | Lift   | 446.5 — 493.5 N (45.54 — 50.34 kgf, 100.3 — 110.9 lb)/27.5 mm (1.083 in) |  |
| Cylinder block                             | Surface warpage limit (mating with cylinder head)        |                        |  | 0.05 mm (0.0020 in)  |  |
|  | Surface grinding limit                                   |                        |  | 0.1 mm (0.004 in)  |  |
|  | Cylinder bore  | STD                    | A  | 89.205 — 89.215 mm (3.5120 — 3.5124 in)                                  |  |
|  |  |                        | B  | 89.195 — 89.205 mm (3.5116 — 3.5120 in)                                  |  |
|  | Taper  |                        | Limit  | 0.050 mm (0.0020 in)   |  |
|  | Out-of-roundness   |                        | 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  | 89.185 — 89.195 mm (3.5112 — 3.5116 in)                                  |  |
|  |  |                        | B  | 89.175 — 89.185 mm (3.5108 — 3.5112 in)                                  |  |
|  |  | 0.25 mm (0.0098 in) OS |  | 89.425 — 89.435 mm (3.5207 — 3.5211 in)                                  |  |
|  |  | 0.50 mm (0.0197 in) OS |  | 89.675 — 89.685 mm (3.5305 — 3.5309 in)                                  |  |
| Standard inner diameter of piston pin hole |  |                        | 22.000 — 22.006 mm (0.8661 — 0.8664 in)                                |  |  |
| Piston pin                                 | Outer diameter   |                        |  | 21.994 — 22.000 mm (0.8659 — 0.8661 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).       |  |

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|                             |  |                                       |   |  |  |
|-----------------------------|--|---------------------------------------|---|--|--|
| 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                                     | 0.35 — 0.50 mm (0.0138 — 0.0197 in)                        |  |
|                             |  |                                       | Limit                                   | 1.0 mm (0.039 in)  |  |
|                             |  | Oil ring                              | STD                                     | 0.20 — 0.60 mm (0.0079 — 0.0236 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<br>Limit                            | 0.070 — 0.330 mm (0.0028 — 0.0130 in)<br>0.4 mm (0.016 in) |  |
|                             | Oil clearance  | STD                                   | 0.022 — 0.052 mm (0.0009 — 0.0020 in)   |  |  |
|                             |  | Limit                                 | 0.065 mm (0.0026 in)                    |  |  |
| Thickness at center portion |  | STD                                   | 1.490 — 1.502 mm (0.0587 — 0.0591 in)   |  |  |
|                             |  | 0.03 mm (0.0012 in) US                | 1.510 — 1.513 mm (0.0594 — 0.0596 in)   |  |  |
|                             | 0.05 mm (0.0020 in) US                               | 1.520 — 1.523 mm (0.0598 — 0.0600 in) |   |  |  |
|                             | 0.25 mm (0.0098 in) US                               | 1.620 — 1.623 mm (0.0638 — 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                        | 0.250 mm (0.0098 in)                    |  |  |
|                             | 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, #5, #7                        | STD                                     | 63.992 — 64.008 mm (2.5194 — 2.5200 in)                    |  |
|                             |  |                                       | 0.03 mm (0.0012 in) US                  | 63.962 — 63.978 mm (2.5182 — 2.5188 in)                    |  |
|                             |  |                                       | 0.05 mm (0.0020 in) US                  | 63.942 — 63.958 mm (2.5174 — 2.5180 in)                    |  |
|                             |  |                                       | 0.25 mm (0.0098 in) US                  | 63.742 — 63.758 mm (2.5095 — 2.5102 in)                    |  |
|                             |  | #2, #4, #6                            | STD                                     | 63.992 — 64.008 mm (2.5194 — 2.5200 in)                    |  |
|                             |  |                                       | 0.03 mm (0.0012 in) US                  | 63.962 — 63.978 mm (2.5182 — 2.5188 in)                    |  |
|                             |  |                                       | 0.05 mm (0.0020 in) US                  | 63.942 — 63.958 mm (2.5174 — 2.5180 in)                    |  |
|                             |  |                                       | 0.25 mm (0.0098 in) US                  | 63.742 — 63.758 mm (2.5095 — 2.5102 in)                    |  |
|                             |  |                                       | Thrust clearance                        | STD<br>Limit   | 0.030 — 0.115 mm (0.0012 — 0.0045 in)<br>0.25 mm (0.0098 in) |
|                             |  |                                       | Oil clearance                           | STD  | 0.015 — 0.030 mm (0.0006 — 0.0012 in)                        |
|                             | Limit  | 0.050 mm (0.0020 in)                  |   |  |  |

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|                    |                              |                |                        |                                       |
|--------------------|------------------------------|----------------|------------------------|---------------------------------------|
| Crankshaft bearing | Crankshaft bearing thickness | #1, #3, #5, #7 | STD                    | 1.992 — 2.005 mm (0.0784 — 0.0789 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                    | 1.996 — 2.000 mm (0.0786 — 0.0787 in) |
|                    |                              |                | 0.03 mm (0.0012 in) US | 2.019 — 2.020 mm (0.0795 — 0.0795 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) |

# GENERAL DESCRIPTION

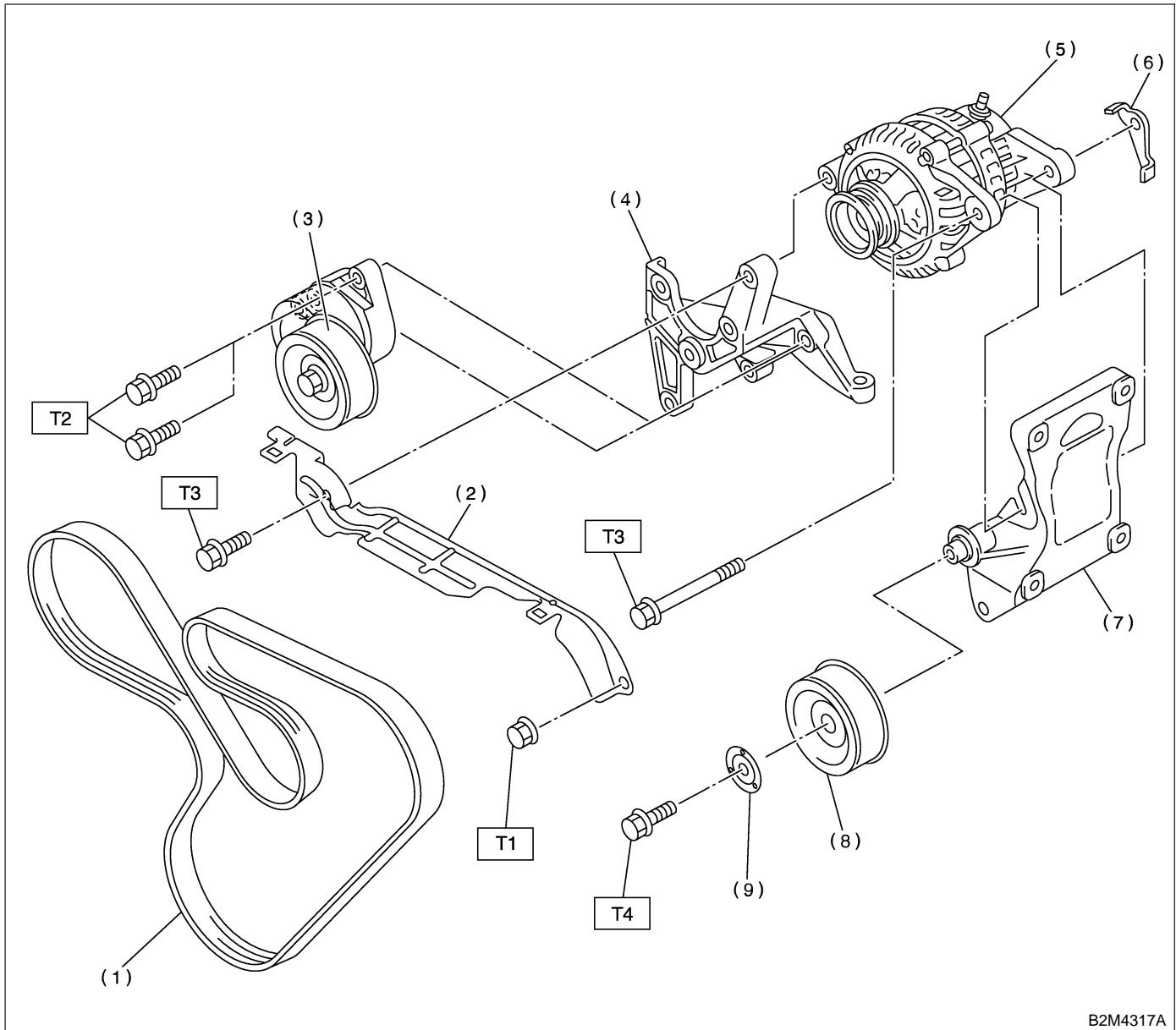
Mechanical

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**MEMO:**

## B: COMPONENT S143001A05

### 1. V-BELT S143001A0508



B2M4317A

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

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

**T1: 6.4 (0.65, 4.7)**

**T2: 20 (2.0, 14)**

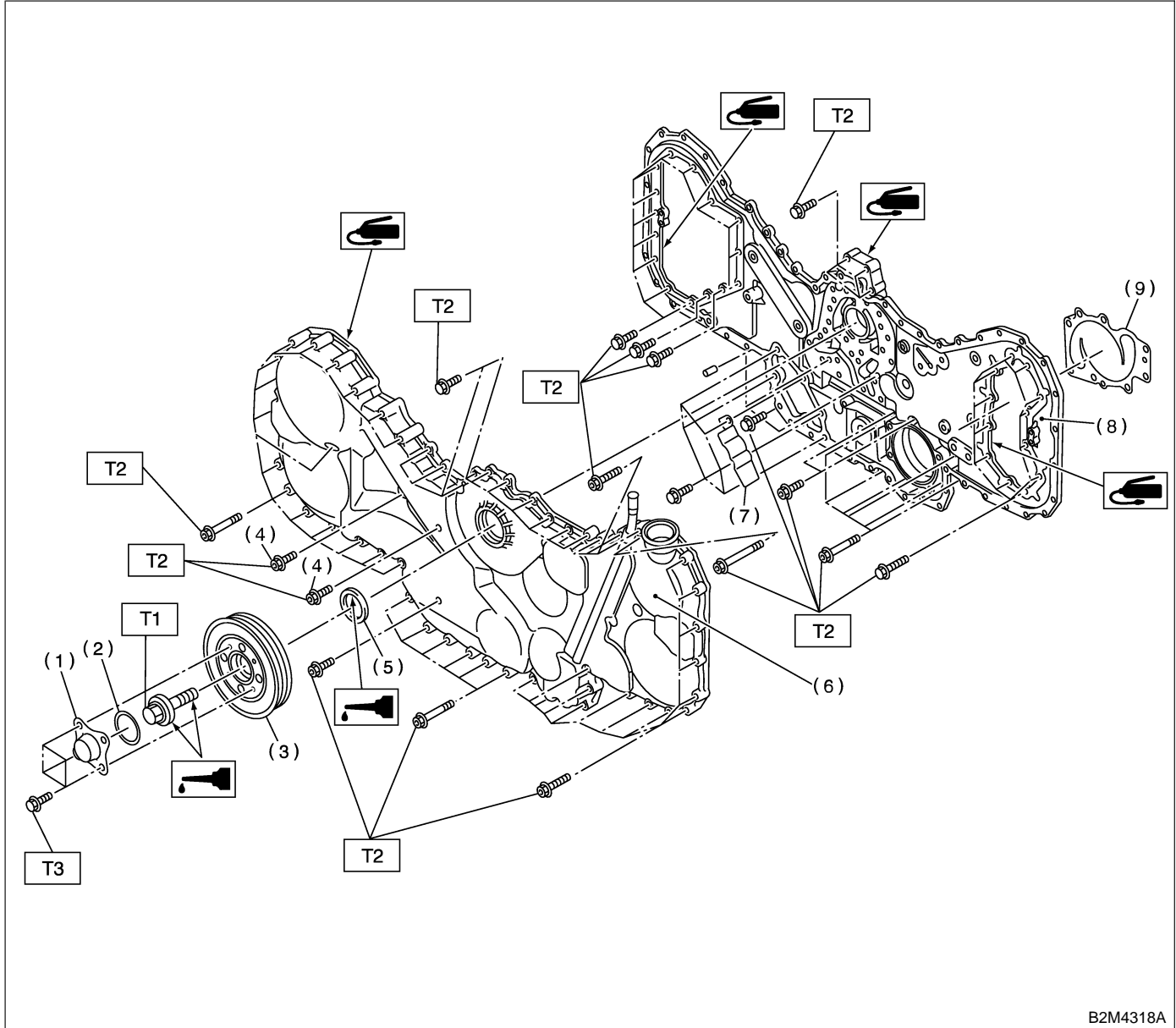
**T3: 25 (2.5, 18)**

**T4: 33 (3.4, 25)**

# GENERAL DESCRIPTION

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## 2. TIMING CHAIN COVER S143001A0509



- |                        |                       |
|------------------------|-----------------------|
| (1) Crank pulley cover | (7) Baffle            |
| (2) O-ring             | (8) Rear chain cover  |
| (3) Crank pulley       | (9) Water pump gasket |
| (4) Sealing washer     |                       |
| (5) Oil seal           |                       |
| (6) Front chain cover  |                       |

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

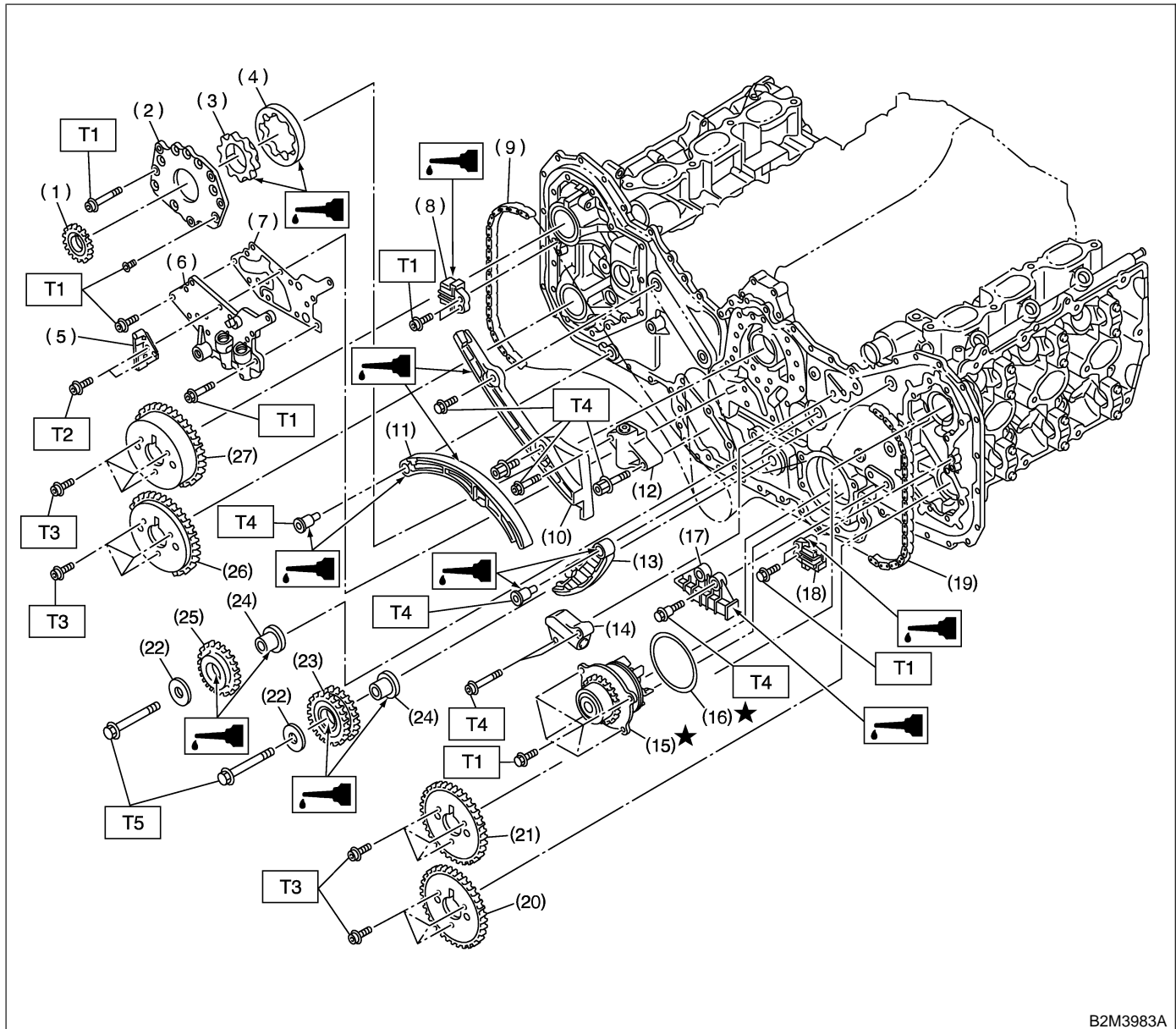
**T1: Refer to ME(H6)-42, Crankshaft Pulley.**

**T2: Refer to ME(H6)-43, Front Chain Cover.**

**T3: 6.4 (0.65, 4.7)**

**ME(H6)-8**

## 3. TIMING BELT S143001A0501



B2M3983A

- |  |  |                                |
|--|--|--------------------------------|
| (1) Crank sprocket                           | (13) Chain tensioner lever (LH)              | (25) Idler sprocket (Upper)    |
| (2) Oil pump cover                           | (14) Chain tensioner (LH)                    | (26) Exhaust cam sprocket (LH) |
| (3) Inner rotor                              | (15) Water pump                              | (27) Intake cam sprocket (LH)  |
| (4) Outer rotor                              | (16) O-ring                                  |                                |
| (5) Chain guide (Center)                     | (17) Chain guide (LH)                        |                                |
| (6) Relief valve case                        | (18) Chain guide (Left-hand between<br>cams) |                                |
| (7) Relief valve case gasket                 | (19) Timing chain (LH)                       |                                |
| (8) Chain guide (Right-hand<br>between cams) | (20) Exhaust cam sprocket (RH)               |                                |
| (9) Timing chain (RH)                        | (21) Intake cam sprocket (RH)                |                                |
| (10) Chain guide (RH)                        | (22) Idler sprocket plate                    |                                |
| (11) Chain tensioner lever (RH)              | (23) Idler sprocket (Lower)                  |                                |
| (12) Chain tensioner (RH)                    | (24) Idler sprocket color                    |                                |

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

**T1: 6.4 (0.64, 4.7)**

**T2: 7.8 (0.80, 5.8)**

**T3: 13 (1.3, 9.4)**

**T4: 16 (1.6, 11.6)**

**T5: 69 (7.0, 50.6)**

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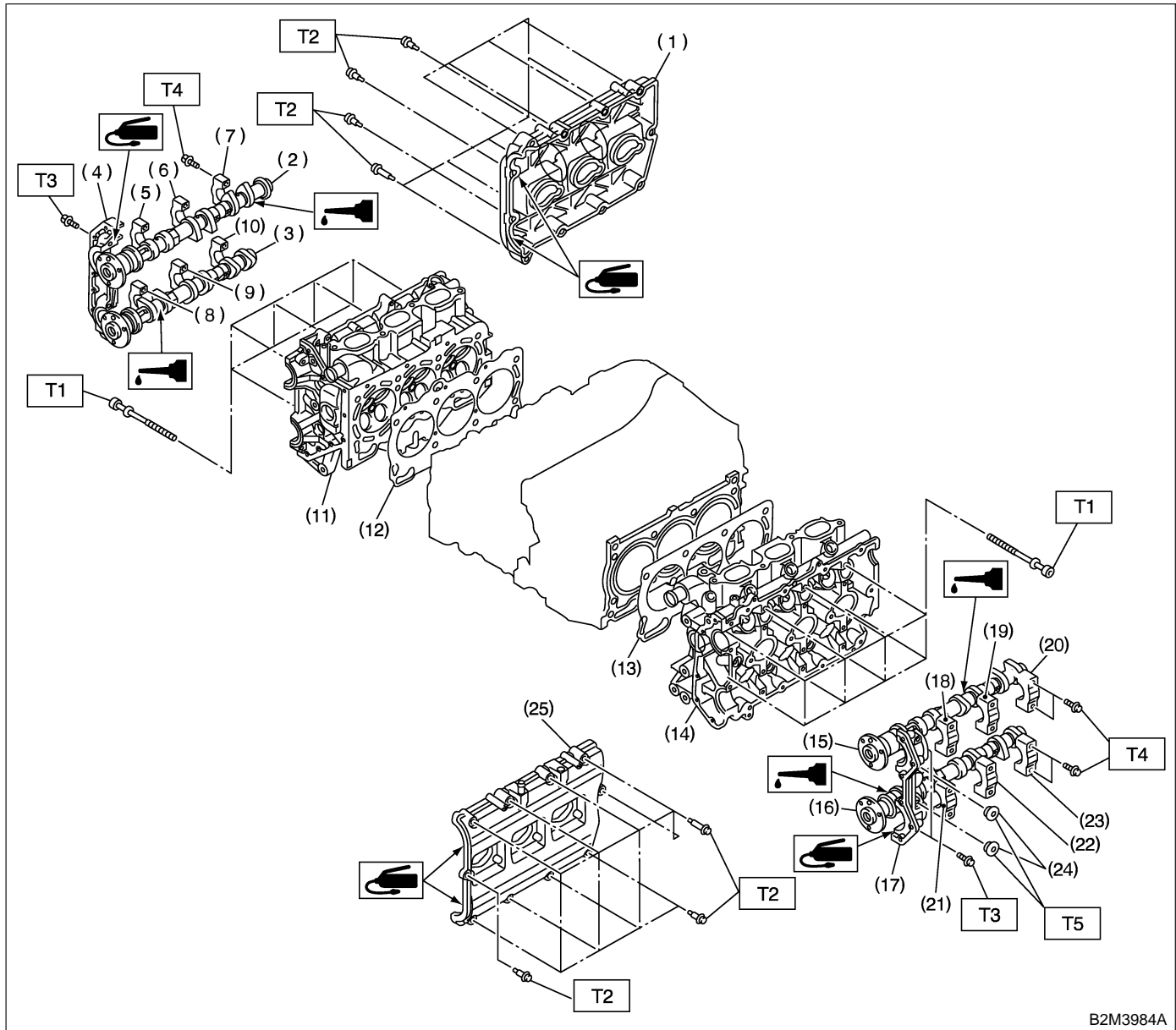


# GENERAL DESCRIPTION

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## 4. CYLINDER HEAD AND CAMSHAFT

S143001A0502



B2M3984A

- |                                      |                                       |
|--------------------------------------|---------------------------------------|
| (1) Rocker cover (RH)                | (12) Cylinder head gasket (RH)        |
| (2) Intake camshaft (RH)             | (13) Cylinder head gasket (LH)        |
| (3) Exhaust camshaft (RH)            | (14) Cylinder head (LH)               |
| (4) Front camshaft cap (RH)          | (15) Intake camshaft (LH)             |
| (5) Intake camshaft cap (Front RH)   | (16) Exhaust camshaft (LH)            |
| (6) Intake camshaft cap (Center RH)  | (17) Front camshaft cap (LH)          |
| (7) Intake camshaft cap (Rear RH)    | (18) Intake camshaft cap (Front LH)   |
| (8) Exhaust camshaft cap (Front RH)  | (19) Intake camshaft cap (Center LH)  |
| (9) Exhaust camshaft cap (Center RH) | (20) Intake camshaft cap (Rear LH)    |
| (10) Exhaust camshaft cap (Rear RH)  | (21) Exhaust camshaft cap (Front LH)  |
| (11) Cylinder head (RH)              | (22) Exhaust camshaft cap (Center LH) |
|                                      | (23) Exhaust camshaft cap (Rear LH)   |

- |                        |
|------------------------|
| (24) Plug              |
| (25) Rocker cover (LH) |

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

**T1: Ref. to ME(H6)-59, Cylinder Head Assembly.**

**T2: Ref. to ME(H6)-55, Camshaft.**

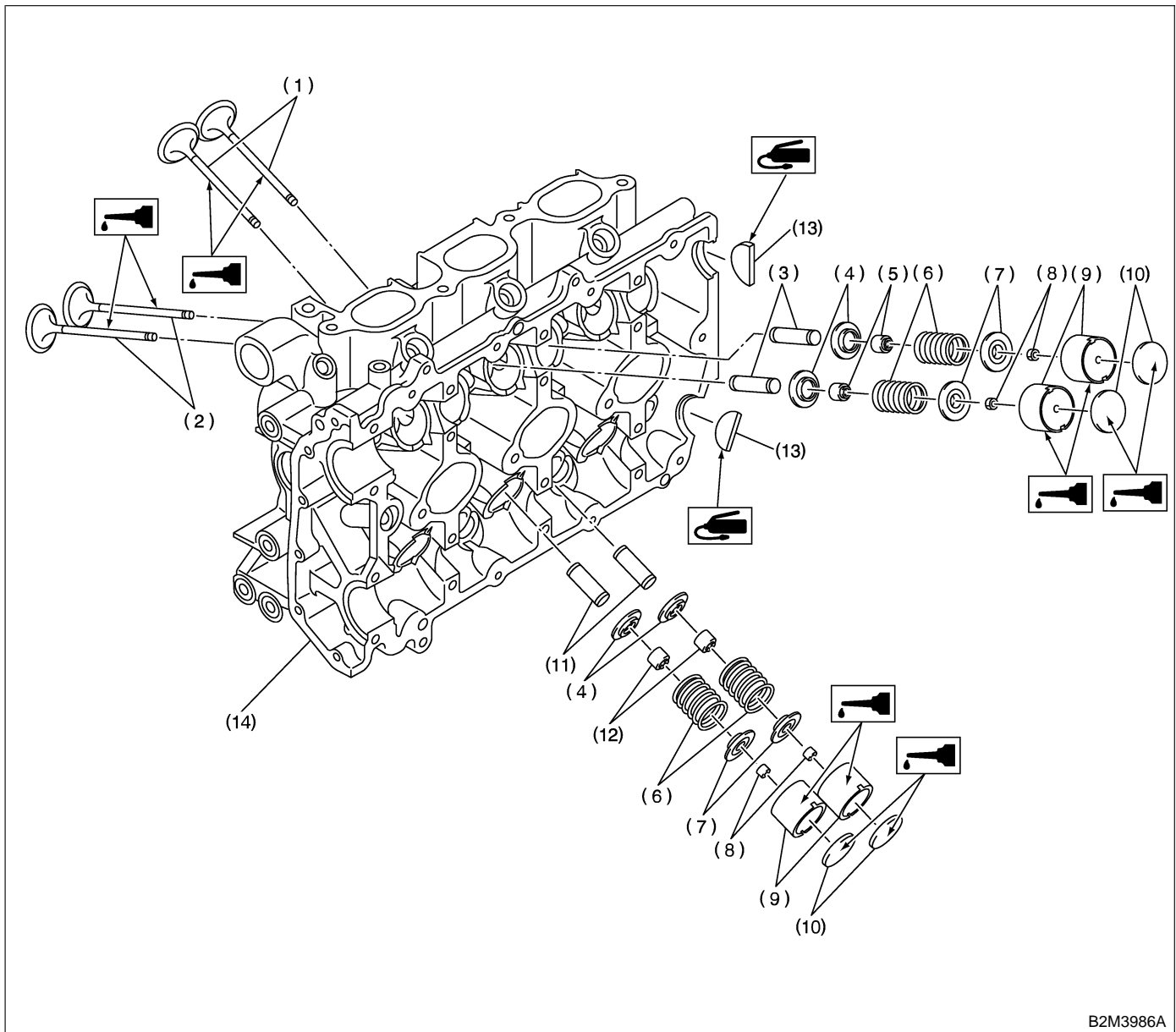
**T3: 9.8 (1.0, 7.2)**

**T4: 16 (1.6, 12)**

**T5: 59 (6.0, 43)**

## 5. CYLINDER HEAD AND VALVE ASSEMBLY

S143001A0504



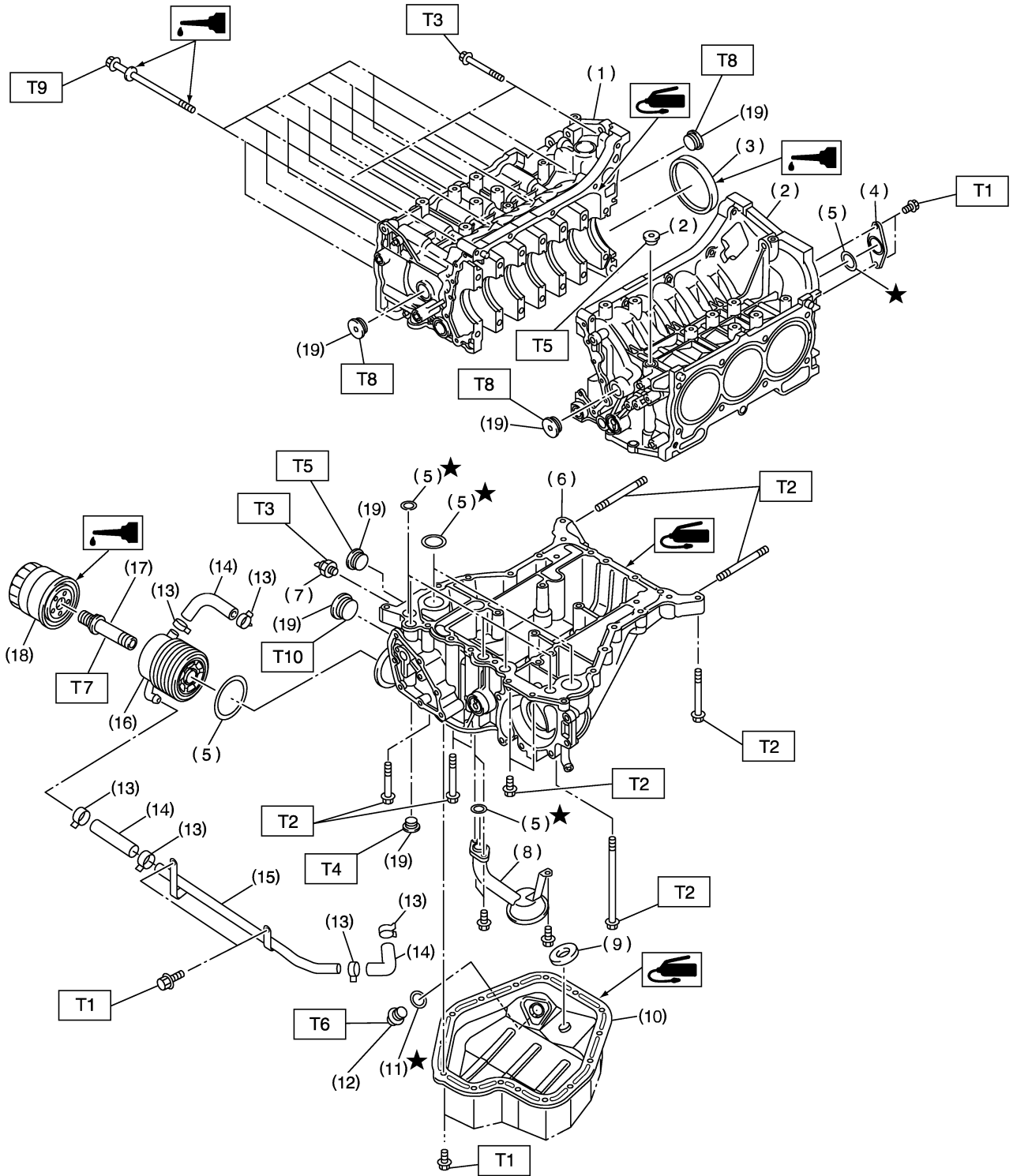
B2M3986A

- |                           |                  |                             |
|---------------------------|------------------|-----------------------------|
| (1) Exhaust valve         | (6) Valve spring | (11) Exhaust valve guide    |
| (2) Intake valve          | (7) Retainer     | (12) Exhaust valve oil seal |
| (3) Intake valve guide    | (8) Retainer key | (13) Cylinder head plug     |
| (4) Valve spring seat     | (9) Valve lifter | (14) Cylinder head          |
| (5) Intake valve oil seal | (10) Shim        |                             |

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## 6. CYLINDER BLOCK S143001A0505



B2M3987A

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- (1) Cylinder block (RH)
- (2) Cylinder block (LH)
- (3) Rear oil seal
- (4) Service hole cover
- (5) O-ring
- (6) Oil pan upper
- (7) Oil pressure switch
- (8) Oil strainer
- (9) Magnet
- (10) Oil pan
- (11) Metal gasket

- (12) Drain plug
- (13) Clamp
- (14) Hose
- (15) Oil cooler pipe
- (16) Oil cooler
- (17) Connector
- (18) Oil filter
- (19) Plug

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

***T1: 6.4 (0.65, 4.7)***

***T2: 18 (1.8, 13.0)***

***T3: 25 (2.5, 18)***

***T4: 34 (3.5, 25)***

***T5: 37 (3.8, 27)***

***T6: 44 (4.5, 33)***

***T7: 54 (5.5, 40)***

***T8: 69 (7.0, 51)***

***T9: Ref. to ME(H6)-65, Cylinder Block.***

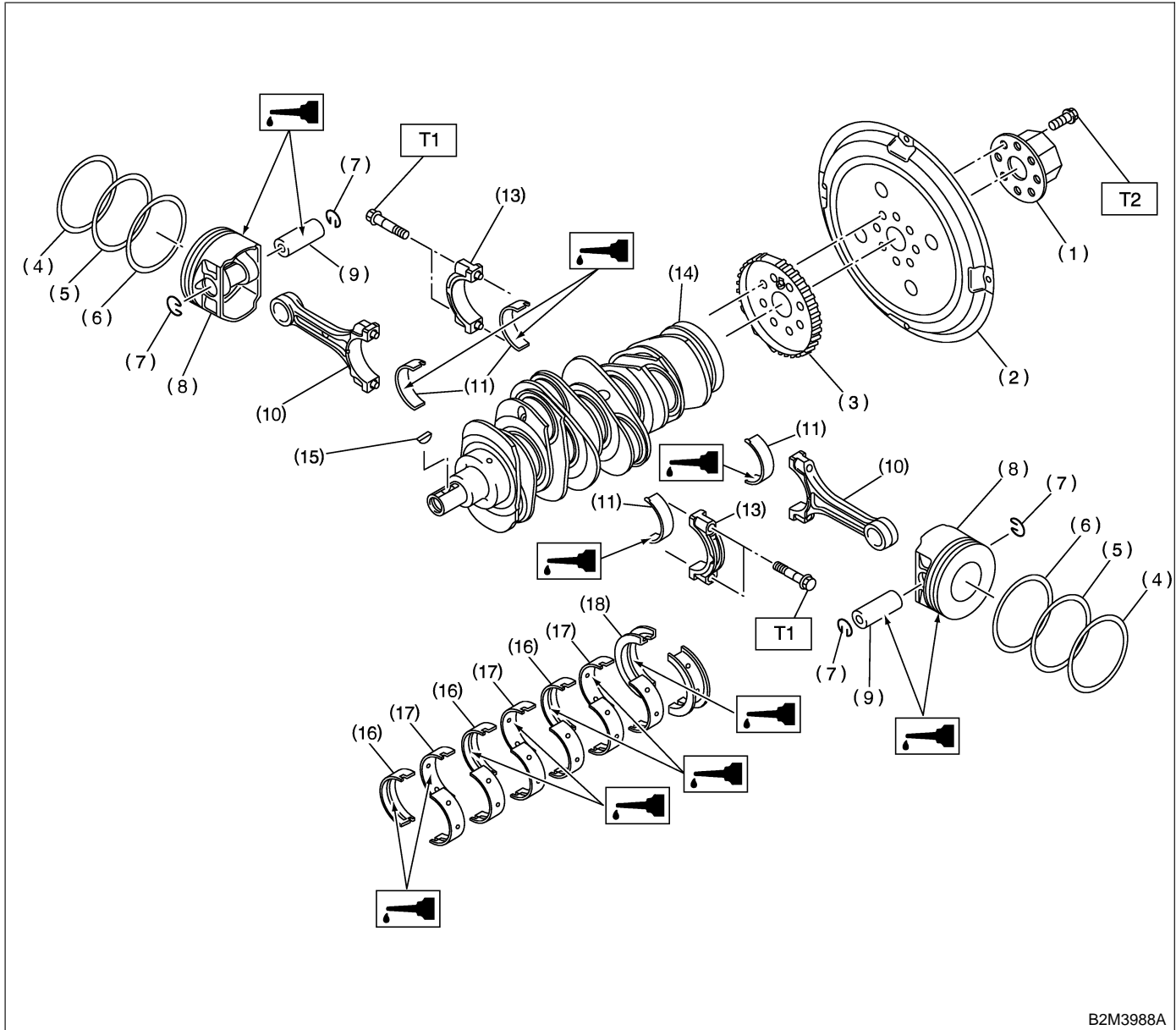
***T10: 90 (9.2, 67)***

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Mechanical

## 7. CRANKSHAFT AND PISTON S143001A0506



B2M3988A

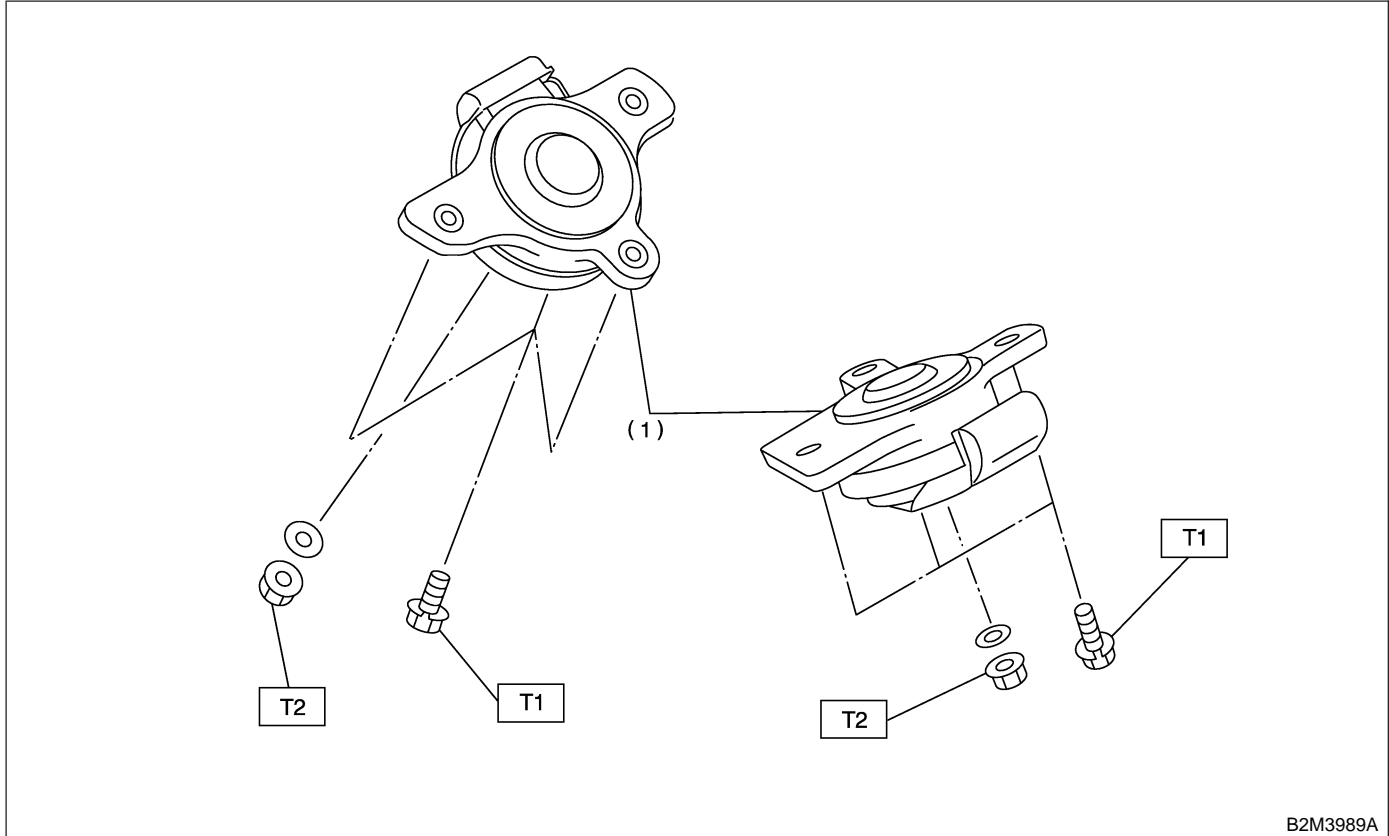
- |                      |                                    |                                    |
|----------------------|------------------------------------|------------------------------------|
| (1) Reinforcement    | (9) Piston pin                     | (17) Crankshaft bearing #2, #4, #6 |
|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

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

**T1: 53 (5.4, 39)**

**T2: 81 (8.3, 60)**

## 8. ENGINE MOUNTING S143001A0507



(1) Front cushion rubber

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

**T1: 34 (3.5, 25.3)**

**T2: 74 (7.5, 54)**

### C: CAUTION S143001A03

- 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 negative terminal 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 clutch disc and flywheel.
- All removed parts, if to be reused, should be reinstalled in the original positions and directions.
- Bolts, nuts and washers should be replaced with new ones as required.
- Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
- Remove or install 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:

# GENERAL DESCRIPTION

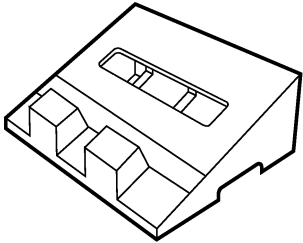
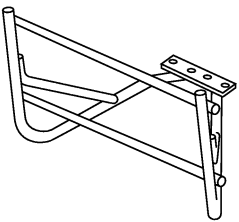
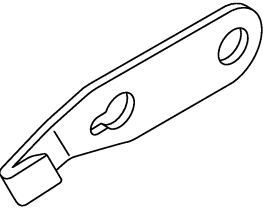
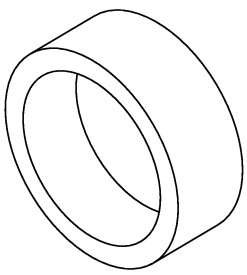
Mechanical

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.

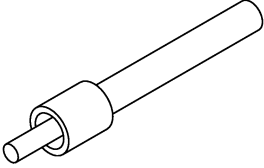
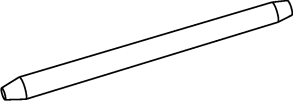
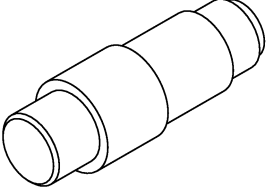
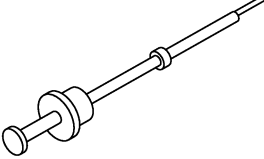
## D: PREPARATION TOOL S143001A17

### 1. SPECIAL TOOLS S143001A1701

| ILLUSTRATION   | TOOL NUMBER                        | DESCRIPTION         | REMARKS   |
|--|------------------------------------|---------------------|---|
|  <p style="text-align: center;">B2M3990</p>   | 18250AA000<br>(Newly adopted tool) | CYLINDER HEAD TABLE | <ul style="list-style-type: none"> <li>● Used for replacing valve guides.</li> <li>● Used for removing and installing valve springs.</li> </ul> |
|  <p style="text-align: center;">B2M3991</p>  | 18232AA000<br>(Newly adopted tool) | ENGINE STAND        | Used for engine disassembly and assembly.   |
|  <p style="text-align: center;">B2M3853</p> | 498497100                          | CRANKSHAFT STOPPER  | Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.   |
|  <p style="text-align: center;">B2M3854</p> | 18254AA000<br>(Newly adopted tool) | PISTON GUIDE        | Used for installing piston in cylinder.   |

# GENERAL DESCRIPTION

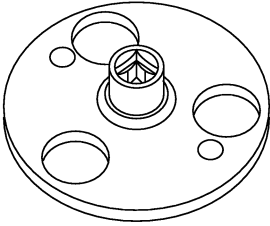
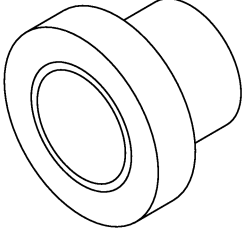
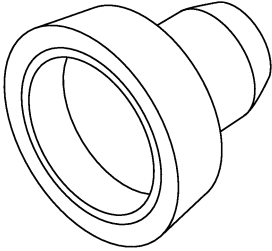
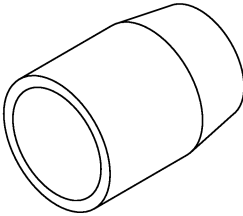
Mechanical

| ILLUSTRATION   | TOOL NUMBER                        | DESCRIPTION                                | REMARKS   |
|--|------------------------------------|--|---|
|  <p>B2M3855</p>   | 498857100                          | VALVE OIL SEAL GUIDE                       | Used for press-fitting of intake and exhaust valve guide oil seals. |
|  <p>B2M3993</p>   | 18253AA000<br>(Newly adopted tool) | PISTON PIN GUIDE                           | Used for installing piston pin, piston and connecting rod.          |
|  <p>B2M3857</p> | 18350AA000<br>(Newly adopted tool) | CONNECTING ROD BUSHING REMOVER & INSTALLER | Used for removing and installing connecting rod bushing.            |
|  <p>B2M3858</p> | 499097500                          | PISTON PIN REMOVER ASSY                    | Used for removing piston pin.                                       |



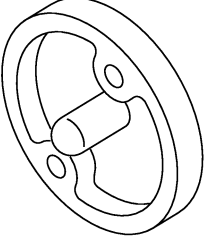
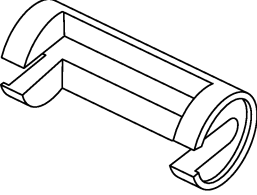
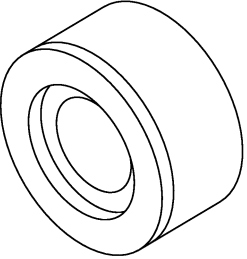
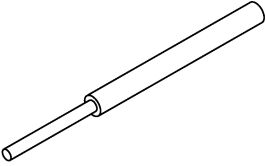
# GENERAL DESCRIPTION

Mechanical

| ILLUSTRATION  | TOOL NUMBER                                | DESCRIPTION                              | REMARKS  |
|---|--|--|--|
|  <p style="text-align: right;">B2M3995</p>   | <p>18231AA000<br/>(Newly adopted tool)</p> | <p>CAMSHAFT<br/>SPROCKET<br/>WRENCH</p>  | <p>Used for removing and installing camshaft sprocket.</p>   |
|  <p style="text-align: right;">B2M3860</p>   | <p>499587700</p>                           | <p>CAMSHAFT OIL<br/>SEAL INSTALLER</p>   | <p>Used for installing cylinder head plug.</p>   |
|  <p style="text-align: right;">B2M3861</p>  | <p>499587200</p>                           | <p>CRANKSHAFT OIL<br/>SEAL INSTALLER</p> | <ul style="list-style-type: none"> <li>● Used for installing crankshaft oil seal.</li> <li>● Used with CRANKSHAFT OIL SEAL GUIDE (499597100).</li> </ul> |
|  <p style="text-align: right;">B2M3862</p> | <p>499597000</p>                           | <p>OIL SEAL GUIDE</p>                    | <ul style="list-style-type: none"> <li>● Used for installing camshaft oil seal.</li> <li>● Used with CAMSHAFT OIL SEAL INSTALLER (499587100).</li> </ul> |

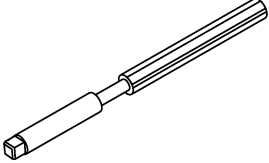
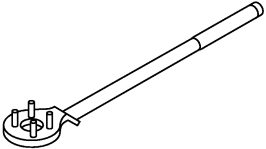
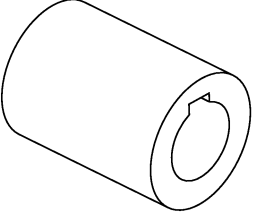
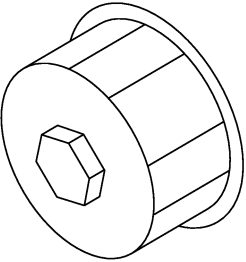
# GENERAL DESCRIPTION

Mechanical

| ILLUSTRATION   | TOOL NUMBER                        | DESCRIPTION               | REMARKS  |
|--|------------------------------------|---------------------------|--|
|  <p data-bbox="363 537 444 558">B2M3863</p>     | 499597100                          | CRANKSHAFT OIL SEAL GUIDE | <ul style="list-style-type: none"> <li>● Used for installing crankshaft oil seal.</li> <li>● Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).</li> </ul> |
|  <p data-bbox="363 919 444 940">B2M3864</p>     | 499718000                          | VALVE SPRING REMOVER      | Used for removing and installing valve spring.   |
|  <p data-bbox="363 1297 444 1318">B2M3865</p>  | 18251AA000<br>(Newly adopted tool) | VALVE GUIDE ADJUSTER      | Used for installing valve guides.  |
|  <p data-bbox="363 1675 444 1696">B2M3867</p> | 499765700                          | VALVE GUIDE REMOVER       | Used for removing valve guides.  |

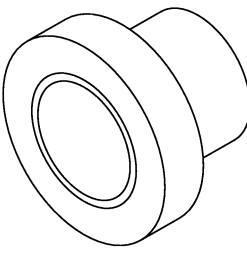
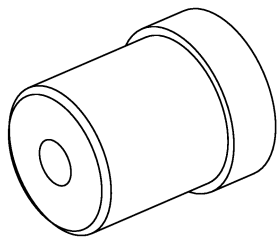
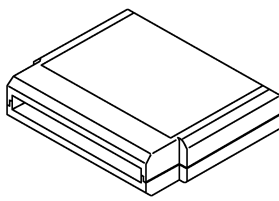

# GENERAL DESCRIPTION

Mechanical

| ILLUSTRATION  | TOOL NUMBER                        | DESCRIPTION         | REMARKS  |
|---|------------------------------------|---------------------|--|
|  <p style="text-align: right;">B2M3868</p>   | 499765900                          | VALVE GUIDE REAMER  | Used for reaming valve guides.   |
|  <p style="text-align: right;">B2M3870</p>   | 499977100                          | CRANK PULLEY WRENCH | Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts. |
|  <p style="text-align: right;">B2M3871</p> | 18252AA000<br>(Newly adopted tool) | CRANKSHAFT SOCKET   | Used for rotating crankshaft.  |
|  <p style="text-align: right;">B2M3872</p> | 498547000                          | OIL FILTER WRENCH   | Used for removing and installing oil filter.   |

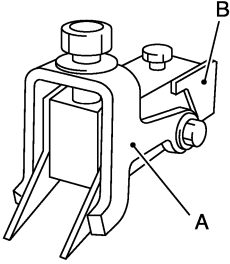
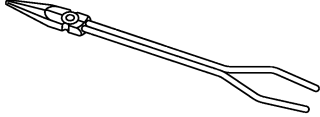
# GENERAL DESCRIPTION

Mechanical

| ILLUSTRATION   | TOOL NUMBER                        | DESCRIPTION        | REMARKS  |
|--|------------------------------------|--------------------|--|
|  <p style="text-align: center;">B2M3874</p>   | 499587500                          | OIL SEAL INSTALLER | Used for installing front camshaft oil seal.   |
|  <p style="text-align: center;">B2M3875</p>   | 499587100                          | OIL SEAL INSTALLER | Used for installing oil pump oil seal.   |
|  <p style="text-align: center;">B2M3876</p> | 24082AA130<br>(Newly adopted tool) | CARTRIDGE          | Troubleshooting for electrical systems.  |
|  <p style="text-align: center;">B2M3877</p> | 22771AA0202                        | SELECT MONITOR KIT | Troubleshooting for electrical systems.<br>● English:<br>22771AA020 (With printer)<br>22771AA030 (Without printer) |

# GENERAL DESCRIPTION

Mechanical

| ILLUSTRATION  | TOOL NUMBER                           | DESCRIPTION                | REMARKS  |
|---|---------------------------------------|----------------------------|--|
|  <p style="text-align: center;">B2M3992A</p> | 18329AA000<br>(Newly adopted tool)    | SHIM REPLACER ASSY         | Used for correct valve clearance.  |
|   | A: 18330AA010<br>(Newly adopted tool) | LIFTER                     | If 498187200 SHIM REPLACER ASSY (H4) tool is available, it is commonly used for H6 by partially replacing the following parts:<br>● LIFTER (H4) → LIFTER (H6) A: 18330AA010<br>● SLIDER (H4) → SLIDER (H6) B: 18351AA000 |
|   | B: 18351AA000<br>(Newly adopted tool) | SLIDER                     |  |
|  <p style="text-align: center;">B2M3994</p>  | 18233AA000<br>(Newly adopted tool)    | PISTON PIN CIR-CLIP PLIERS | Used for removing piston pin circlip.  |

## 2. GENERAL PURPOSE TOOLS S143001A1702

| TOOL NAME         | REMARKS                         |
|-------------------|---------------------------------|
| Compression gauge | Used for measuring compression. |

## E: PROCEDURE S143001E45

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

- Camshaft
- Cylinder Head