# 1. General Description

# A: SPECIFICATIONS

	Туре			Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gaso- line engine
	Valve arrangement			Chain driven, double over-head camshaft, 4-valve/cylinder
	Bore x Stroke mm (in)			89.2 x 80 (3.512 x 3.150)
	Displacement		cm <sup>3</sup> (cu in)	3,000 (183)
	Compression ratio			10.7
	Compression pressure (350 rpm and fully open throttle)	ure (350 rpm and kPa (kg/cm², psi)		1,275 — 1,471 (13.0 — 15.0, 185 — 213)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
Engine	Intake valve timing	Opening		5° BTDC
		Closing		55° ABDC
	Exhaust valve timing	Opening		52° BBDC
		Closing		0° ATDC
	Valve clearance	Intake	mm (in)	$0.20^{+0.04}/_{-0.06} (0.0079^{+0.0016}/_{-0.0024})$
		Exhaust	mm (in)	0.25±0.05 (0.0098±0.0020)
	Idle speed [At "P" or " tion]	Idle speed [At "P" or "N" position]		600±50 (No load) 700±50 (A/C switch ON)
	Firing order			$1 \rightarrow 6 \rightarrow 3 \rightarrow 2 \rightarrow 5 \rightarrow 4$
	Ignition timing		BTDC/rpm	10°±8°/600

#### NOTE:

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

	Bend limit			0.020 mm (0.0008 in)
		Intake	STD	0.075 — 0.135 mm (0.0030 — 0.0053 in)
	Thrust clearance	IIIIake	Limit	0.155 mm (0.0061 in)
	Trifust clearance	Forth accept	STD	0.048 — 0.108 mm (0.0019 — 0.0043 in)
		Exhaust	Limit	0.130 mm (0.0051 in)
		Intake	STD	45.75 — 45.85 mm (1.8012 — 1.8051 in)
	Cam lobe height	IIIIake	Limit	45.65 mm (1.7972 in)
Camshaft	Carriobe neight	Exhaust	STD	45.25 — 45.35 mm (1.7815 — 1.7854 in)
		Extrausi	Limit	45.15 mm (1.7776 in)
	Camphoft journal O.D.	Front		37.946 — 37.963 mm (1.4939 — 1.4946 in)
	Camshaft journal O.D.		ear	27.946 — 27.963 mm (1.1002 — 1.1009 in)
	Camshaft journal hole I.D.			38.000 — 38.018 mm (1.4961 — 1.4968 in)
	Carristiant journal flole 1.D.	Center & R	ear	28.000 — 28.018 mm (1.1024 — 1.1031 in)
	Oil clearance		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)
	Limi			0.10 mm (0.0039 in)
	Surface warpage limit			0.05 mm (0.0020 in)
Cylinder head	Surface grinding limit			0.1 mm (0.004 in)
	Standard height			124 mm (4.88 in)
	Refacing angle			90°
		Intake	STD	1.0 mm (0.039 in)
Valve seat	Contacting width	IIIIake	Limit	1.7 mm (0.067 in)
	Contacting width	Exhaust	STD	1.5 mm (0.059 in)
	Exnaus		Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter			5.500 — 5.512 mm (0.2165 — 0.2170 in)
vaive guide	Protrusion above head		Intake	12.3 — 12.7 mm (0.484 — 0.500 in)

				STD	1.0 mm (0.039 in)
			Intake	Limit	0.8 mm (0.315 in)
	Head edge thickness		STD	1.2 mm (0.047 in)	
			Exhaust	Limit	0.8 mm (0.315 in)
				Intake	5.455 — 5.470 mm (0.2148 — 0.2154 in)
Valve	Stem diameter			Exhaust	5.455 — 5.460 mm (0.2148 — 0.2150 in)
valve			T	Intake	0.030 — 0.057 mm (0.0012 — 0.0022 in)
	Stem oil clearan	.00	STD	Exhaust	0.040 — 0.067 mm (0.0012 — 0.0022 iii)
	Sterri dii dearan	ice	Limit	Extraust	0.040 — 0.067 Hilli (0.0016 — 0.0026 HI)  0.15 mm (0.0059 in)
			LIIIIII	Intake	·
	Overall length			Exhaust	103.5 mm (4.07 in) 103.2 mm (4.06 in)
	Free length			Extraust	46.79 mm (1.8421 in)
Valve spring	Squareness				2.5°, 2.0 mm (0.079 in)
		e limit (mating wi	th aulindar ha	and)	0.05 mm (0.0020 in)
	Surface warpag	, ,	in cylinder ne	au)	0.03 mm (0.0020 m) 0.1 mm (0.004 in)
	Surface grinding	j iirriit		ΤΛ	89.205 — 89.215 mm (3.5120 — 3.5124 in)
	Cylinder bore		STD	В	,
	Tanan				89.195 — 89.205 mm (3.5116 — 3.5120 in)
Cylinder block	Taper			Limit	0.050 mm (0.0020 in)
	Out-of-round- ness			Limit	0.050 mm (0.0020 in)
	Piston clearance	ے		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
	1 lotori dicarano			Limit	0.050 mm (0.0020 in)
	Enlarging (borin	g) limit			0.5 mm (0.020 in)
	Outer diameter		STD	Α	89.185 — 89.195 mm (3.5112 — 3.5116 in)
				В	89.175 — 89.185 mm (3.5108 — 3.5112 in)
Piston			0.25 mm (0	.0098 in) OS	89.425 — 89.435 mm (3.5207 — 3.5211 in)
		0.50 mm			89.675 — 89.685 mm (3.5305 — 3.5309 in)
	Standard inner	diameter of pistor	n pin hole	22.000 — 22.006 mm (0.8661 — 0.8664 in)	
	Outer diameter			21.994 — 22.000 mm (0.8659 — 0.8661 in)	
Piston pin	Standard cleara	nce between pist	on pin and h	ole in piston	0.004 — 0.008 mm (0.0002 — 0.0003 in)
о.о р	Degree of fit				Piston pin must be fitted into position with thumb at 20°C (68°F).
		Tan sin s	STD		0.20 — 0.35 mm (0.0079 — 0.0138 in)
		Top ring	Limit		1.0 mm (0.039 in)
	Distance size a seco	Canand sings	STD		0.35 — 0.50 mm (0.0138 — 0.0197 in)
	Piston ring gap	Second ring	Limit		1.0 mm (0.039 in)
		Oil siss si	STD		0.20 — 0.60 mm (0.0079 — 0.0236 in)
Piston ring		Oil ring	Limit		1.5 mm (0.059 in)
	Clearance	Tan sin s	STD		0.040 — 0.080 mm (0.0016 — 0.0031 in)
	between pis-	Top ring	Limit		0.15 mm (0.0059 in)
	ton ring and		STD		0.030 — 0.070 mm (0.0012 — 0.0028 in)
	piston ring groove	Second ring	Limit		0.15 mm (0.0059 in)
0	Bend twist per 100 mm (3.94 in) in length		Limit		0.10 mm (0.0039 in)
Connecting rod			STD		0.070 — 0.330 mm (0.0028 — 0.0130 in)
	Side clearance		Limit		0.4 mm (0.016 in)
	Oil alagrange		STD		0.022 — 0.052 mm (0.0009 — 0.0020 in)
	Oil clearance		Limit		0.065 mm (0.0026 in)
Connecting rod			STD		1.490 — 1.502 mm (0.0587 — 0.0591 in)
bearing	Thickness at center portion		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)
			0.23 11111 (0.0096 111) 05		` '

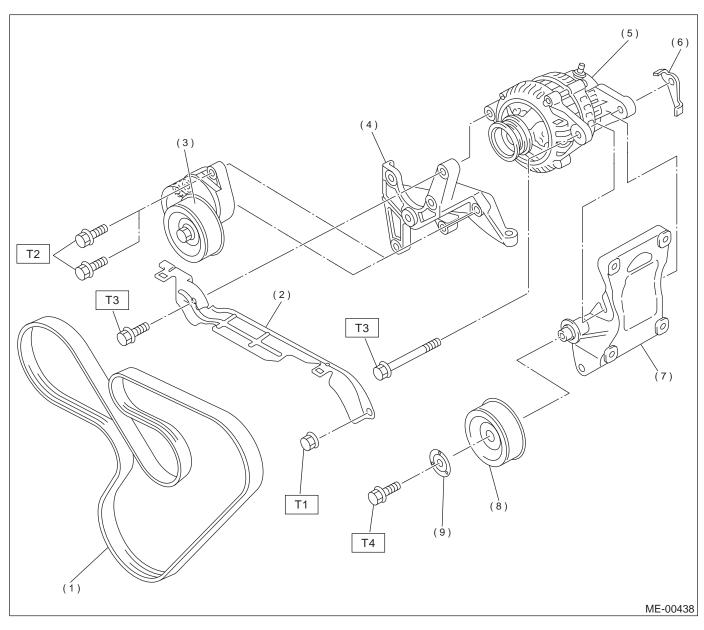
## **GENERAL DESCRIPTION**

### MECHANICAL

Connecting rod	Clearance between piston pin		STD	0 — 0.022 mm (0 — 0.0009 in)	
bushing	and bushing		Limit	0.030 mm (0.0012 in)	
	Bend limit			0.035 mm (0.0014 in)	
	Crank pin and	Out-of-roundness		0.020 mm (0.0008 in) or less	
	crank journal	Grinding limit		0.250 mm (0.0098 in)	
			STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)	
	Crank pin outer	diameter	0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)	
	Crank pin outer	ulametei	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)	
			STD	63.992 — 64.008 mm (2.5194 — 2.5200 in)	
		#1 #2 #5 #7	0.03 mm (0.0012 in) US	63.962 — 63.978 mm (2.5182 — 2.5188 in)	
Crankshaft	Crank journal outer diameter	#1, #3, #5, #7	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	0.030 — 0.115 mm (0.0012 — 0.0045 in)	
			Limit	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)	
			STD	1.992 — 2.005 mm (0.0784 — 0.0789 in)	
		#1, #3, #5, #7	0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)	
		#1, #3, #5, #1	0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)	
Crankshaft	Crankshaft bearing thick-		0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)	
bearing	ness		STD	1.996 — 2.000 mm (0.0786 — 0.0787 in)	
		#2, #4, #5	0.03 mm (0.0012 in) US	2.019 — 2.020 mm (0.0795 — 0.0795 in)	
		#2, #4, #5	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)	

### **B: COMPONENT**

#### 1. V-BELT



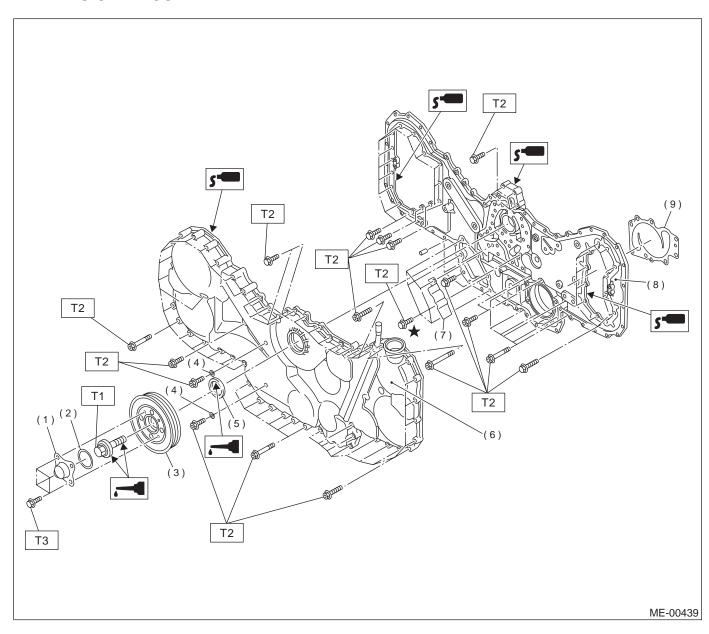
- (1) V-belt
- (2) Belt cover
- (3) Belt tensioner
- (4) Power steering pump bracket
- (5) Generator
- (6) Generator plate
- (7) A/C compressor stay
- (8) Idler pulley
- (9) Idler pulley cover

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)

#### 2. TIMING CHAIN COVER



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

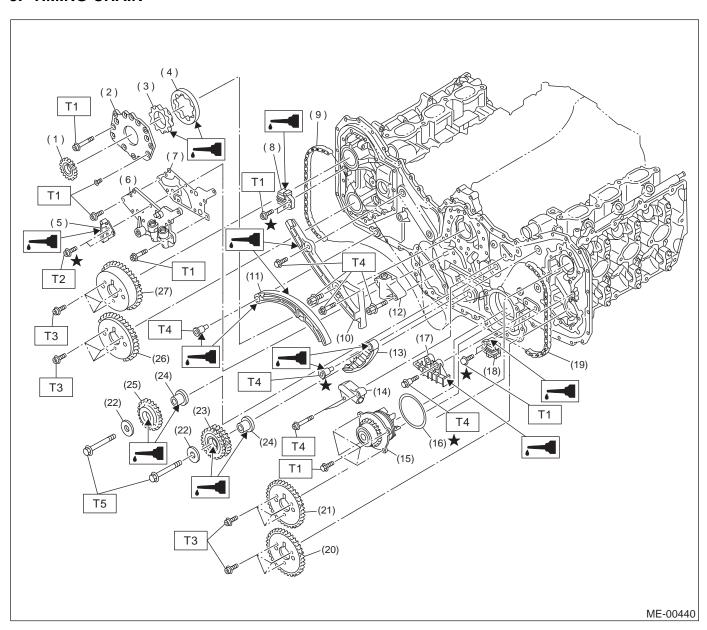
Tightening torque: N·m (kgf-m, ft-lb)

T1: <Ref. to ME(H6DO)-38, Crankshaft Pulley.>

T2: <Ref. to ME(H6DO)-39, Front Chain Cover.>

T3: 6.4 (0.65, 4.7)

#### 3. TIMING CHAIN



- (1) Crank sprocket
- (2) Oil pump cover
- (3) Inner rotor
- (4) Outer rotor
- (5) Chain guide (Center)
- (6) Relief valve case
- (7) Relief valve case gasket
- (8) Chain guide (Right-hand between cams)
- (9) Timing chain (RH)
- (10) Chain guide (RH)
- (11) Chain tensioner lever (RH)
- (12) Chain tensioner (RH)

- (13) Chain tensioner lever (LH)
- (14) Chain tensioner (LH)
- (15) Water pump
- (16) O-ring
- (17) Chain guide (LH)
- (18) Chain guide (Left-hand between cams)
- (19) Timing chain (LH)
- (20) Exhaust cam sprocket (RH)
- (21) Intake cam sprocket (RH)
- (22) Idler sprocket plate
- (23) Idler sprocket (Lower)
- (24) Idler sprocket color

- (25) Idler sprocket (Upper)
- (26) Exhaust cam sprocket (LH)
- (27) Intake cam sprocket (LH)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.64, 4.7)

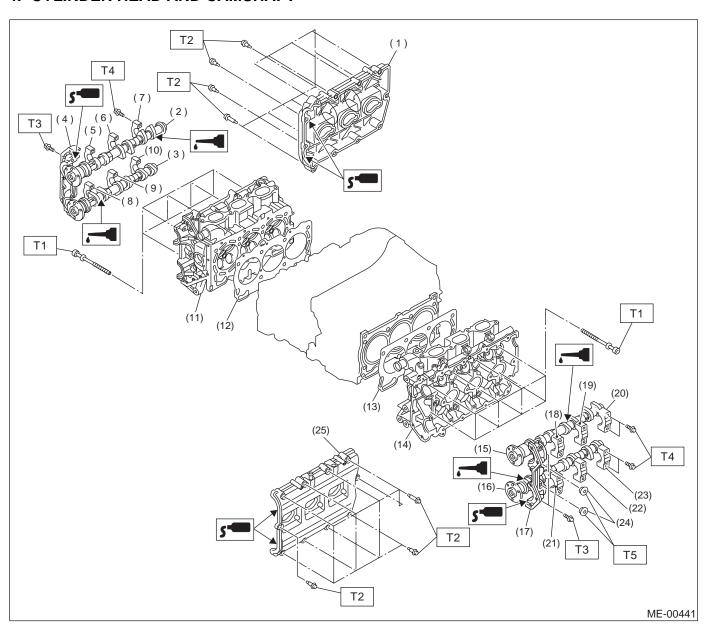
T2: 7.8 (0.80, 5.8)

T3: 13 (1.3, 9.4)

T4: 16 (1.6, 11.6)

T5: 69 (7.0, 50.6)

#### 4. CYLINDER HEAD AND CAMSHAFT



- (1) Rocker cover (RH)
- (2) Intake camshaft (RH)
- (3) Exhaust camshaft (RH)
- (4) Front camshaft cap (RH)
- (5) Intake camshaft cap (Front RH)
- (6) Intake camshaft cap (Center RH)
- (7) Intake camshaft cap (Rear RH)
- (8) Exhaust camshaft cap (Front RH)
- (9) Exhaust camshaft cap (Center RH)
- (10) Exhaust camshaft cap (Rear RH)
- (11) Cylinder head (RH)
- (12) Cylinder head gasket (RH)

- (13) Cylinder head gasket (LH)
- (14) Cylinder head (LH)
- (15) Intake camshaft (LH)
- (16) Exhaust camshaft (LH)
- (17) Front camshaft cap (LH)
- (18) Intake camshaft cap (Front LH)
- (19) Intake camshaft cap (Center LH)
- (20) Intake camshaft cap (Rear LH)
- (21) Exhaust camshaft cap (Front LH)
- (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(H6DO)-54, Cylinder Head Assembly.>

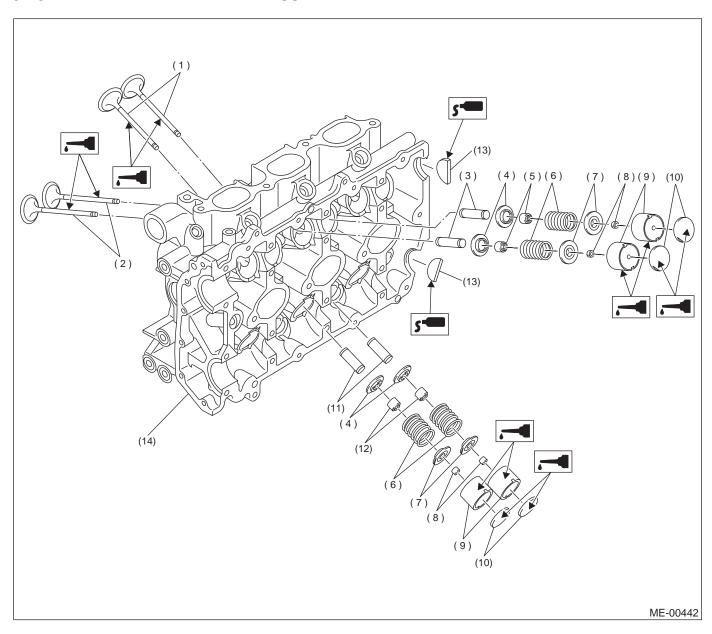
T2: <Ref. to ME(H6DO)-50, Camshaft.>

T3: 9.8 (1.0, 7.2)

T4: 16 (1.6, 12)

T5: 59 (6.0, 43)

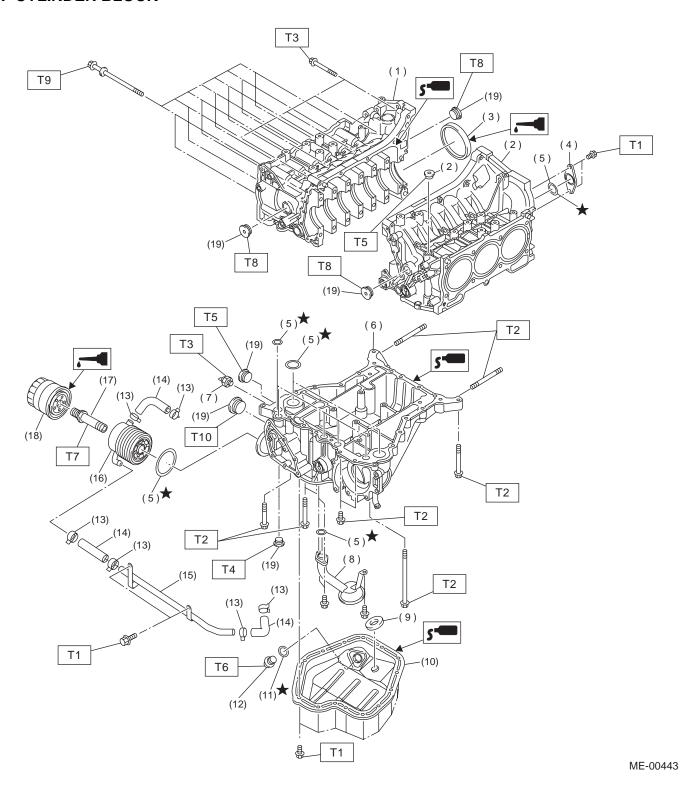
#### 5. CYLINDER HEAD AND VALVE ASSEMBLY



- (1) Exhaust valve
- (2) Intake valve
- (3) Intake valve guide
- (4) Valve spring seat
- (5) Intake valve stem seal
- (6) Valve spring
- (7) Retainer
- (8) Retainer key
- (9) Valve lifter
- (10) Shim

- (11) Exhaust valve guide
- (12) Exhaust valve stem seal
- (13) Cylinder head plug
- (14) Cylinder head

# 6. CYLINDER BLOCK



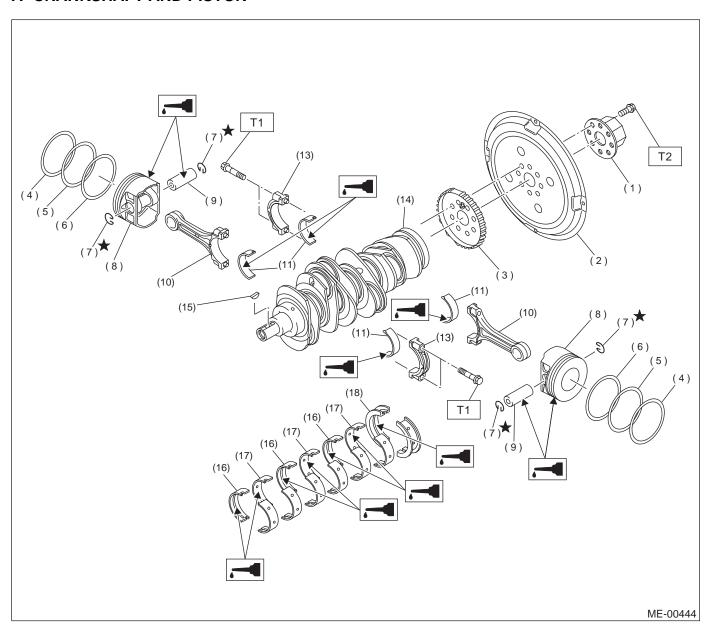
ME(H6DO)-10

## **GENERAL DESCRIPTION**

MECHANICAL

(1)	Cylinder block (RH)	(11)	Metal gasket	Tight	ening torque: N·m (kgf-m, ft-lb)
(2)	Cylinder block (LH)	(12)	Drain plug	T1:	6.4 (0.65, 4.7)
(3)	Rear oil seal	(13)	Clamp	T2:	18 (1.8, 13.0)
(4)	Service hole cover	(14)	Hose	T3:	25 (2.5, 18)
(5)	O-ring	(15)	Oil cooler pipe	T4:	34 (3.5, 25)
(6)	Oil pan upper	(16)	Oil cooler	T5:	37 (3.8, 27)
(7)	Oil pressure switch	(17)	Connector	T6:	44 (4.5, 33)
(8)	Oil strainer	(18)	Oil filter	T7:	54 (5.5, 40)
(9)	Magnet	(19)	Plug	T8:	69 (7.0, 51)
(10)	Oil pan			<b>T9</b> :	<ref. cylinder<="" me(h6do)-60,="" td="" to=""></ref.>
					Block.>
				T10:	90 (9.2, 67)

#### 7. CRANKSHAFT AND PISTON



- (1) Reinforcement
- (2) Drive plate
- (3) Crankshaft sensor plate
- (4) Top ring
- (5) Second ring
- (6) Oil ring
- (7) Circlip
- (8) Piston

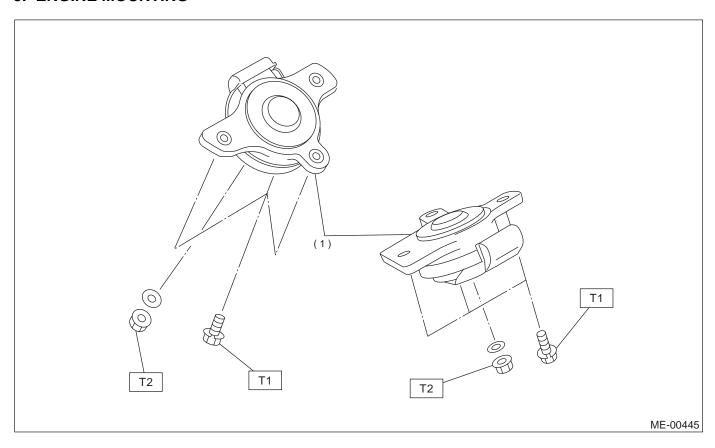
- (9) Piston pin
- (10) Connecting rod
- (11) Connecting rod bearing
- (12) Connecting rod bolt
- (13) Connecting rod cap
- (14) Crankshaft
- (15) Woodruff key
- (16) Crankshaft bearing #1, #3, #5
- (17) Crankshaft bearing #2, #4, #6
- (18) Crankshaft bearing #7

Tightening torque: N·m (kgf-m, ft-lb)

T1: 53 (5.4, 39)

T2: 81 (8.3, 60)

#### 8. ENGINE MOUNTING



(1) Front cushion rubber

#### C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect ground cable from battery.
- All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
- · Rotating parts and sliding parts such as piston,

Tightening torque: N·m (kgf-m, ft-lb)

T1: 34 (3.5, 25.3) T2: 74 (7.5, 54)

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:
   Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
- Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

## **D: PREPARATION TOOL**

## 1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18250AA000	CYLINDER HEAD TABLE	Used for replacing valve guides.     Used for removing and installing valve springs.
ST18250AA000			
	18232AA000	ENGINE STAND	Used for engine disassembly and assembly.
ST18232AA000			
0	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
ST-498497100			
	18254AA000	PISTON GUIDE	Used for installing piston in cylinder.
ST18254AA000			

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	498857100	VALVE STEM SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide stem seals.
		00.52	guido siom codio.
ST-498857100			
	18253AA000	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
ST18253AA000			
	18350AA000	CONNECTING ROD BUSHING	Used for removing and installing connecting rod bushing.
		REMOVER & INSTALLER	
ST18350AA000	499097500	PISTON PIN	Used for removing piston pin.
	733031300	REMOVER ASSY	OSCA for removing pistori pin.
OT 400007500			
ST-499097500	18231AA000	CAMSHAFT	Used for removing and installing camshaft
	1 12 11 11 13 13	SPROCKET WRENCH	sprocket.
		VVIXLINOIT	
ST18231AA000			

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	Used for installing crankshaft oil seal.     Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	Used for installing crankshaft oil seal.     Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
ST18251AA000	18251AA000	VALVE GUIDE ADJUSTER	Used for installing valve guides.
ST-499765700	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.
		KLAWLK	
ST-499765900			
	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
ST-499977100			
	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
ST18252AA000	498547000	OIL FILTER	Used for removing and installing oil filter.
	490547000	WRENCH	Osed for removing and installing on litter.
ST-498547000			
	24082AA210	CARTRIDGE	Troubleshooting for electrical systems.
	(Newly adopted tool)		
ST24082AA210			

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST22771AA020	22771AA020	SELECT MONITOR KIT	Troubleshooting for electrical systems.  • English: 22771AA020 (With printer) 22771AA030 (Without printer)
(B)	18329AA000	SHIM REPLACER ASSY	Used for correct valve clearance.
	A: 18330AA010	LIFTER	If 498187200 SHIM REPLACER ASSY (H4) tool
(A)	B: 18351AA000	SLIDER	is available, it is commonly used for H6 by partially replacing the following parts:  • LIFTER (H4) → LIFTER (H6) A: 18330AA010  • SLIDER (H4) → SLIDER (H6) B: 18351AA000
ST18329AA000			
	18233AA000	PISTON PIN CIR- CLIP PLIERS	Used for removing piston pin circlip.
ST18233AA000			
	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
ST-498277200			

#### 2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS	
Compression gauge	Used for measuring compression.	

## E: PROCEDURE

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

- Camshaft
- Cylinder Head