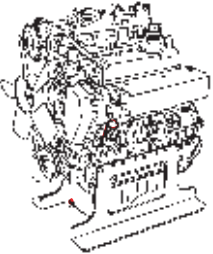

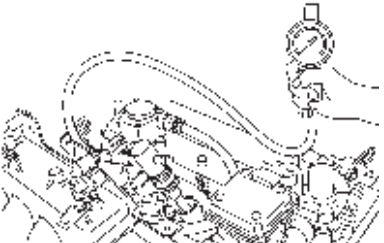

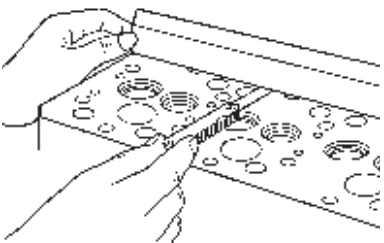
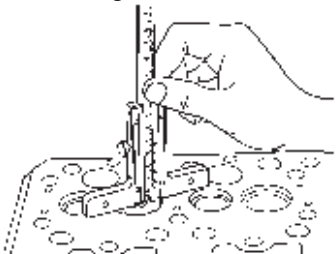
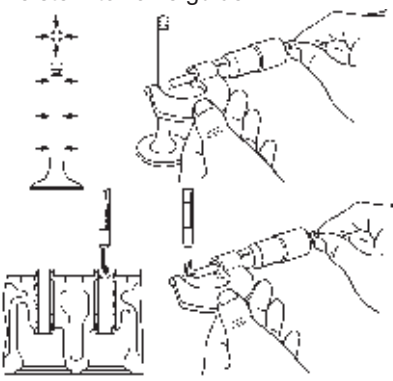
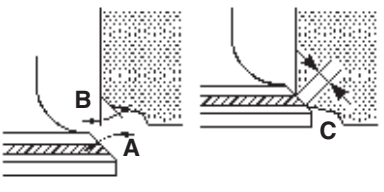
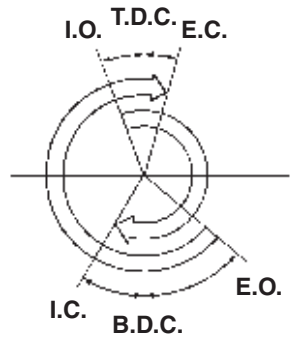
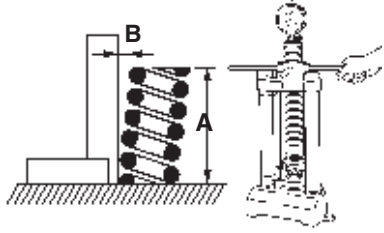
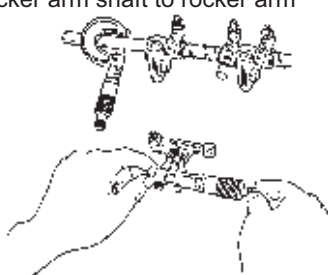
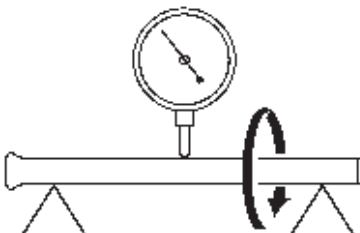
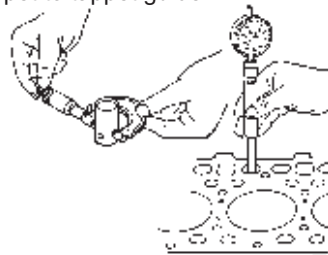

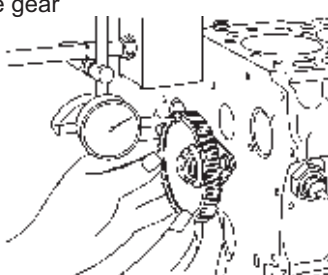


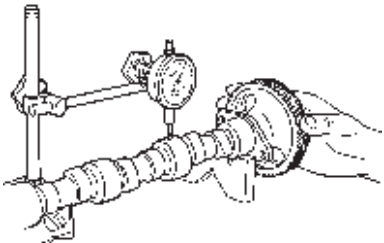
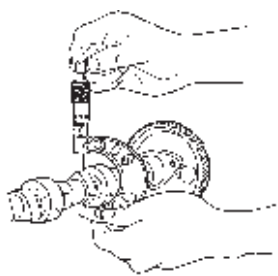


# SERVICING SPECIFICATIONS

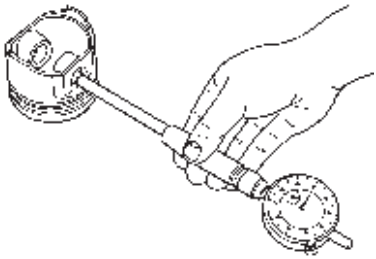
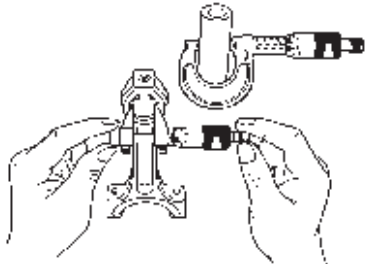
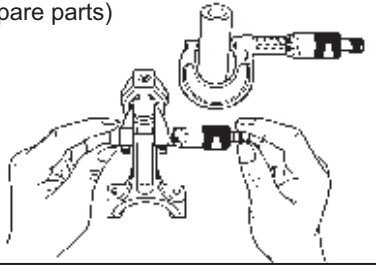

## (1) ENGINE BODY

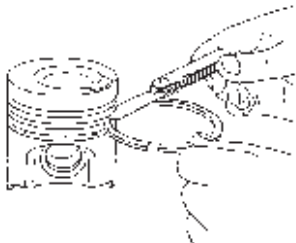
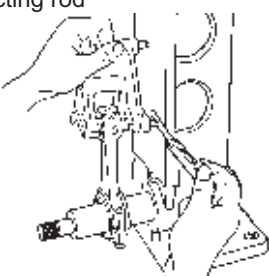
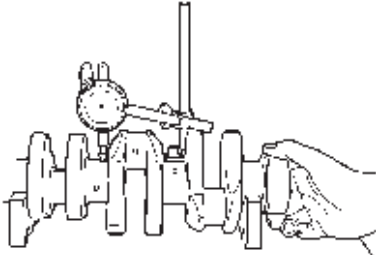


Item		Factory Specification	Allowable Limit
Lubricating oil capacity 		All models 6.0 L 1.6 U.S. gals	—
Valve clearance (When cold) 		All models 0.145 to 0.185 mm 0.00571 to 0.00728 in.	—
Compression pressure 		All models 1.27 MPa 13.0 kgf/cm <sup>2</sup> 185 psi	0.88 MPa 9.0 kgf/cm <sup>2</sup> 130 psi
Top clearance 		All models 1.2 to 1.5 mm 0.048 to 0.059 in.	—
Cylinder head surface 	Flatness	All models —	0.05 mm 0.002 in.

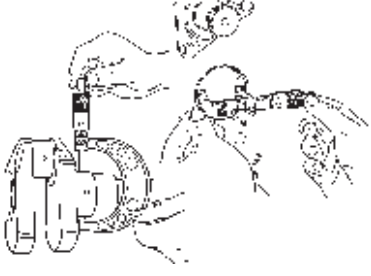
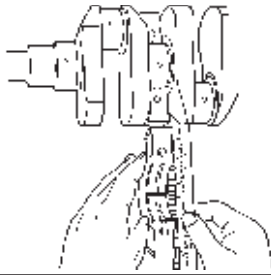
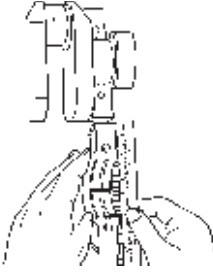
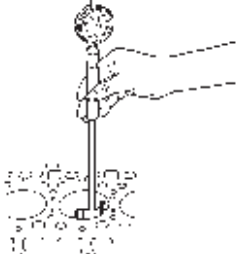
Item		Factory Specification	Allowable Limit		
Valve recessing 		All models	0.050 mm (Protrusion) to 0.25 mm (Recessing) 0.0020 in. (Protrusion) to 0.0098 in. (Recessing)	0.40 mm (Recessing) 0.016 in. (Recessing)	
Valve stem to valve guide 		Clearance	All models	0.035 to 0.065 mm 0.0014 to 0.0025 in.	0.10 mm 0.0039 in.
		Valve stem O.D.	All models	6.960 to 6.975 mm 0.2741 to 0.2746 in.	—
		Valve guide I.D.	All models	7.010 to 7.025 mm 0.2760 to 0.2765 in.	—
Valve & valve seat 		Face angle (A) (Intake)	All models	1.0 rad 60°	—
		Face angle (A) (Exhaust)	All models	1.0 rad 60°	—
		Seat angle (B) (Intake)	All models	1.0 rad 60°	—
		Seat angle (B) (Exhaust)	All models	1.0 rad 60°	—
		Seat width (C) (Intake)	All models	2.12 mm 0.0835 in.	—
		Seat width (C) (Exhaust)	All models	2.12 mm 0.0835 in.	—
Valve timing 		Open (Intake valve)	All models	0.38 rad before T.D.C. 22° before T.D.C.	—
		Close (Intake valve)	All models	0.82 rad after B.D.C. 47° after B.D.C.	—
		Open (Exhaust valve)	All models	0.91 rad before B.D.C. 52° before B.D.C.	—
		Close (Exhaust valve)	All models	0.30 rad after T.D.C. 17° after T.D.C.	—
Valve spring 		Free length (A)	All models	35.1 to 35.6 mm 1.39 to 1.40 in.	34.8 mm 1.37 in.
		Tilt (B)	All models	—	1.0 mm 0.039 in.
		Setting load / Setting length	All models	74 N / 31.0 mm 7.5 kgf / 31.0 mm 17 lbf / 1.22 in.	63 N / 31.0 mm 6.4 kgf / 31.0 mm 14 lbf / 1.22 in.

Item			Factory Specification	Allowable Limit
Rocker arm shaft to rocker arm 	Oil clearance	All models	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.10 mm 0.0039 in.
	Rocker arm shaft O.D.	All models	11.973 to 11.984 mm 0.47138 to 0.47181 in.	—
	Rocker arm I.D.	All models	12.000 to 12.018 mm 0.47244 to 0.47314 in.	—
Push rod 	Alignment	All models	—	0.25 mm 0.0098 in.
Tappet to tappet guide 	Oil clearance	All models	0.020 to 0.062 mm 0.00079 to 0.0024 in.	0.07 mm 0.003 in.
	Tappet O.D.	All models	19.959 to 19.980 mm 0.78579 to 0.78661 in.	—
	Tappet guide I.D.	All models	20.000 to 20.021 mm 0.78741 to 0.78822 in.	—
Timing gear 	Backlash (Crank gear to idle gear)	All models	0.0320 to 0.115 mm 0.00126 to 0.00452 in.	0.15 mm 0.0059 in.
	Backlash (Idle gear to cam gear)	All models	0.0360 to 0.114 mm 0.00142 to 0.00448 in.	0.15 mm 0.0059 in.
	Backlash (Idle gear to injection pump gear)	All models	0.0340 to 0.116 mm 0.00134 to 0.00456 in.	0.15 mm 0.0059 in.
	Backlash (Crank gear to oil pump drive gear)	All models	0.0320 to 0.118 mm 0.00126 to 0.00464 in.	0.15 mm 0.0059 in.
Idle gear 	Side clearance	All models	0.20 to 0.51 mm 0.0079 to 0.020 in.	0.80 mm 0.031 in.

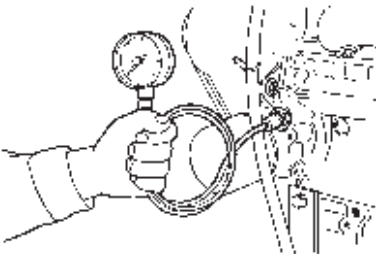
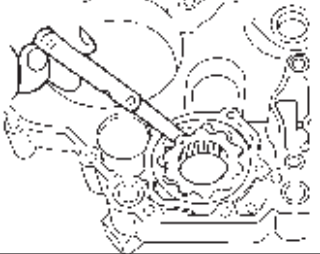
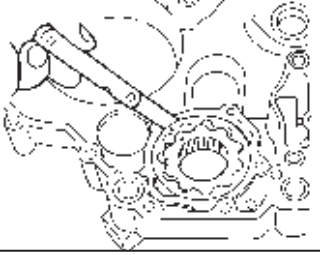
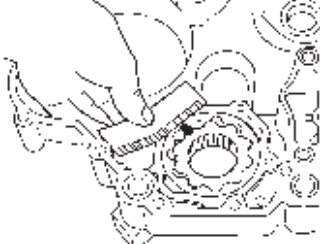
Item		Factory Specification	Allowable Limit	
Camshaft 	Alignment	All models	— 0.01 mm 0.0004 in.	
	Side clearance	All models	0.0700 to 0.220 mm 0.00276 to 0.00866 in.	0.30 mm 0.012 in.
Cam 	Intake	All models	28.80 mm 1.134 in.	28.75 mm 1.132 in.
	Exhaust	All models	29.00 mm 1.142 in.	28.95 mm 1.140 in.
Camshaft journal to cylinder block bore 	Oil clearance	All models	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
	Camshaft journal O.D.	All models	35.934 to 35.950 mm 1.4148 to 1.4153 in.	—
	Cylinder block bore I.D.	All models	36.000 to 36.025 mm 1.4174 to 1.4183 in.	—
Idle gear shaft to idle gear bushing 	Oil clearance	All models	0.020 to 0.054 mm 0.00079 to 0.0021 in.	0.10 mm 0.0039 in.
	Idle gear shaft O.D.	All models	25.967 to 25.980 mm 1.0224 to 1.0228 in.	—
	Idle gear bushing I.D.	All models	26.000 to 26.021 mm 1.0237 to 1.0244 in.	—

Item		Factory Specification	Allowable Limit
Piston pin bore 	Piston pin bore I.D.	All models 22.000 to 22.013 mm 0.86615 to 0.86665 in.	22.03 mm 0.8673 in.
	Oil clearance	All models 0.014 to 0.038 mm 0.00056 to 0.0014 in.	0.15 mm 0.0059 in.
Piston pin to small end bushing 	Piston pin O.D.	All models 22.002 to 22.011 mm 0.86622 to 0.86657 in.	—
	Small end bushing I.D.	All models 22.025 to 22.040 mm 0.86713 to 0.86771 in.	—
	Oil clearance	All models 0.0650 to 0.144 mm 0.00256 to 0.00566 in.	0.15 mm 0.0059 in.
Piston pin to small end bushing (Spare parts) 	Small end bushing I.D.	All models 22.076 to 22.146 mm 0.86914 to 0.87188 in.	—
	Ring gap (Top ring)	All models 0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
Piston ring 	Ring gap (Second ring)	All models 0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Ring gap (Oil ring)	All models 0.20 to 0.70 mm 0.0079 to 0.027 in.	1.25 mm 0.0492 in.

Item		Factory Specification	Allowable Limit
Piston ring groove to piston ring 	Clearance (Top ring)	All models 0.040 to 0.080 mm 0.0016 to 0.0031 in.	0.2 mm 0.008 in.
	Clearance (Second ring)	All models 0.030 to 0.070 mm 0.0012 to 0.0027 in.	0.2 mm 0.008 in.
	Clearance (Oil ring)	All models 0.020 to 0.055 mm 0.00079 to 0.0021 in.	0.15 mm 0.0059 in.
Connecting rod 	Alignment	All models —	0.15 mm 0.0059 in.
Crankshaft 	Alignment	All models —	0.02 mm 0.0008 in.
Crankshaft 	Side clearance	All models 0.15 to 0.31 mm 0.0059 to 0.012 in.	0.50 mm 0.020 in.
Crankpin to crankpin bearing 	Oil clearance	All models 0.065 to 0.091 mm 0.0026 to 0.0035 in.	0.20 mm 0.0079 in.
	Crankpin O.D.	All models 39.959 to 39.975 mm 1.5732 to 1.5738 in.	—
	Crankshaft bearing I.D.	All models 40.040 to 40.050 mm 1.5764 to 1.5767 in.	—

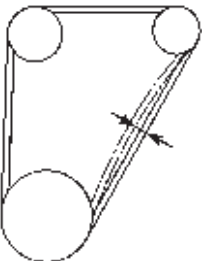
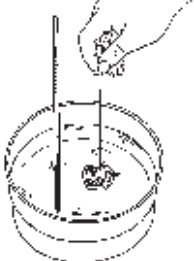
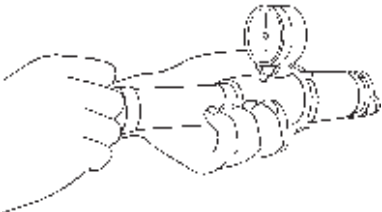
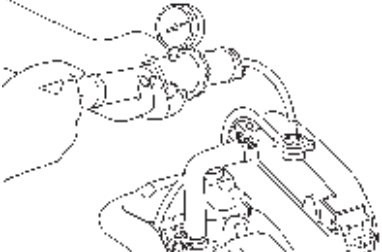
Item		Factory Specification	Allowable Limit
Crankshaft journal to crankshaft bearing 1 	Oil clearance	All models 0.0340 to 0.114 mm 0.00134 to 0.00448 in.	0.20 mm 0.0079 in.
	Crankshaft journal O.D.	All models 47.934 to 47.950 mm 1.8872 to 1.8877 in.	—
	Crankshaft bearing 1 I.D.	All models 47.984 to 48.048 mm 1.8892 to 1.8916 in.	—
Crankshaft journal to crankshaft bearing 2 (Flywheel side) 	Oil clearance	All models 0.034 to 0.095 mm 0.0014 to 0.0037 in.	0.20 mm 0.0079 in.
	Crankshaft journal O.D.	All models 47.934 to 47.950 mm 1.8872 to 1.8877 in.	—
	Crankshaft bearing 2 I.D.	All models 47.984 to 48.029 mm 1.8892 to 1.8909 in.	—
Crankshaft journal to crankshaft bearing 3 (Intermediate) 	Oil clearance	All models 0.0340 to 0.103 mm 0.00134 to 0.00405 in.	0.20 mm 0.0079 in.
	Crankshaft journal O.D.	All models 51.921 to 51.940 mm 2.0442 to 2.0448 in.	—
	Crankshaft bearing 3 I.D.	All models 51.974 to 52.024 mm 2.0463 to 2.0481 in.	—
Cylinder 	Bore I.D. (Standard size)	All models 79.000 to 79.019 mm 3.1103 to 3.1109 in.	79.15 mm 3.116 in.
	Bore I.D. (Oversize)	All models 79.500 to 79.519 mm 3.1300 to 3.1306 in.	79.65 mm 3.136 in.

**(2) LUBRICATING SYSTEM**

Item			Factory Specification	Allowable Limit
Engine oil pressure 	Engine oil pressure (At idle speed)	All models	49 kPa 0.50 kgf/cm <sup>2</sup> 7.1 psi	—
	Engine oil pressure (At rated speed)	All models	196 to 441 kPa 2.00 to 4.49 kgf/cm <sup>2</sup> 28.5 to 63.9 psi	147 kPa 1.50 kgf/cm <sup>2</sup> 21.3 psi
Inner rotor to outer rotor (Oil pump) 	Clearance	All models	0.060 to 0.18 mm 0.0024 to 0.0071 in.	—
Outer rotor to pump body (Oil pump) 	Clearance	All models	0.100 to 0.180 mm 0.00394 to 0.00708 in.	—
Inner rotor to cover (Oil pump) 	Clearance	All models	0.025 to 0.075 mm 0.00099 to 0.0029 in.	—



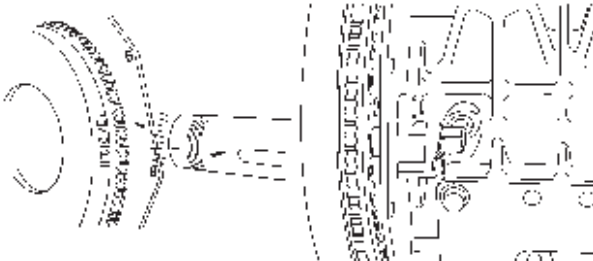
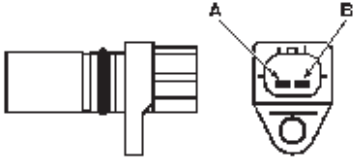
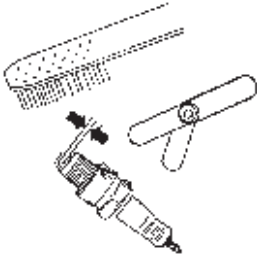
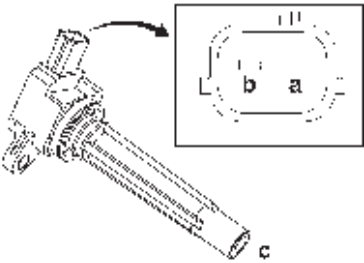
**(3) COOLING SYSTEM**

Item			Factory Specification	Allowable Limit
Fan belt 	Tension	All models	7.0 to 9.0 mm (0.28 to 0.35 in.) deflection at 98 N (10 kgf, 22 lbf) of force	—
Thermostat 	Valve opening temperature (At beginning)	All models	69.5 to 72.5 °C 157.1 to 162.5 °F	—
	Valve opening temperature (Opened completely)	All models	85 °C 185 °F	—
Radiator cap 	Pressure falling time	All models	10 seconds or more 88 → 59 kPa 0.89 → 0.61 kgf/cm <sup>2</sup> , 12 → 8.6 psi	—
Radiator 	Water tightness	All models	No leaks at specified pressure	—

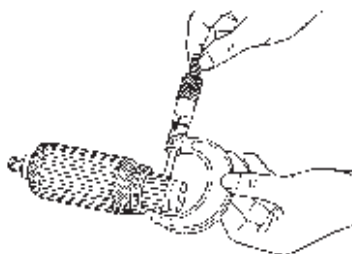
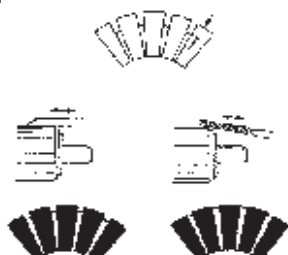
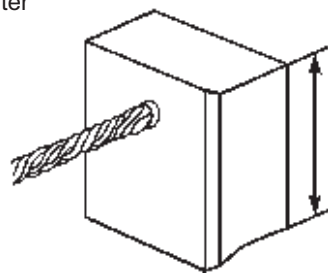
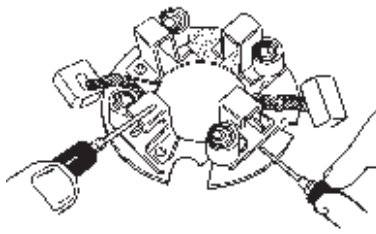
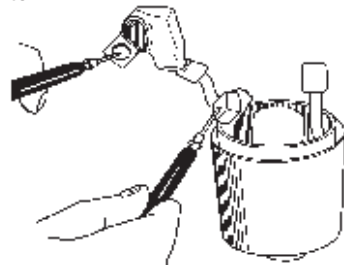
**(4) FUEL SYSTEM**


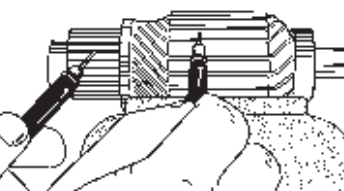
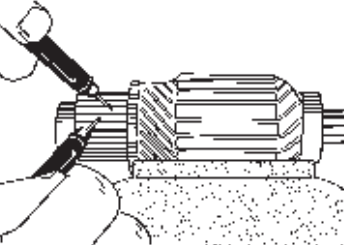
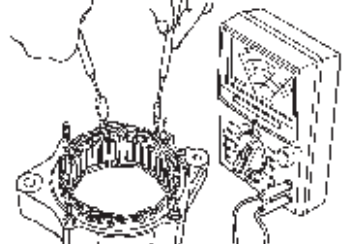
Item			Factory Specification	Allowable Limit
Engine speed	Lo-idling speed	All models	800 min <sup>-1</sup> (rpm) (775 to 825 min <sup>-1</sup> (rpm))	—
Engine speed	Hi-idling speed	All models	3000 min <sup>-1</sup> (rpm) (2975 to 3025 min <sup>-1</sup> (rpm))	—

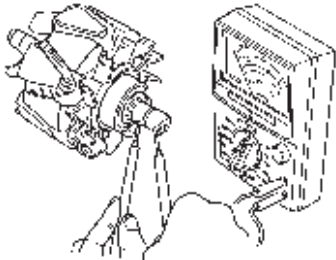

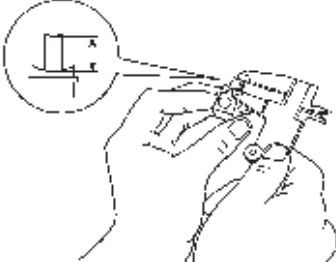
**(5) IGNITION SYSTEM**

Item		Factory Specification	Allowable Limit	
Ignition timing 	Gasoline fuel	0.45 rad (26 °) before T.D.C. / 3000 min <sup>-1</sup> (rpm) 0.17 rad (10 °) before T.D.C. / 800 min <sup>-1</sup> (rpm)	—	
	LPG fuel	0.35 rad (20 °) before T.D.C. / 3000 min <sup>-1</sup> (rpm) 0.17 rad (10 °) before T.D.C. / 800 min <sup>-1</sup> (rpm)	—	
Crank Sensor Cam Sensor 	Resistance A - B	All models	Crank Sensor 470 to 530 kΩ at 20 °C (68 °F)	—
			Cam Sensor 1.85 to 2.45 kΩ at 20 °C (68 °F)	—
Spark plug gap 		All models	0.70 to 0.80 mm 0.028 to 0.031 in.	—
Ignition coil 	a - b	All models	0.63 to 0.77Ω at 25 °C (77 °F)	—
	a - c	All models	7.29 to 8.91 kΩ at 25 °C (77 °F)	—

**(6) ELECTRICAL SYSTEM**

Item		Factory Specification	Allowable Limit
Starter 	Commutator O.D.	All models 28.0 mm 1.10 in.	27.0 mm 1.06 in.
	Difference of commutator O.D's	All models Less than 0.05 mm 0.002 in.	0.4 mm 0.02 in.
Starter 	Mica under cut	All models 0.50 to 0.80 mm 0.020 to 0.031 in.	0.20 mm 0.0079 in.
Starter 	Brush length	All models 16.0 mm 0.630 in.	10.5 mm 0.413 in.
Starter 	Brush holder resistance (Brush holder - Holder support)	All models Infinity	—
Starter 	Field coil resistance (Lead - Brush)	All models Continuity	—

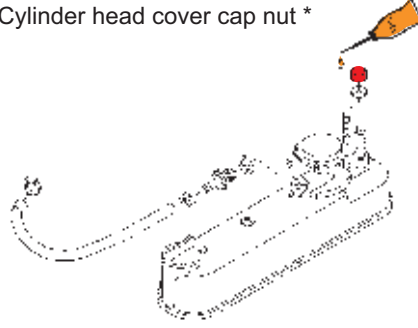
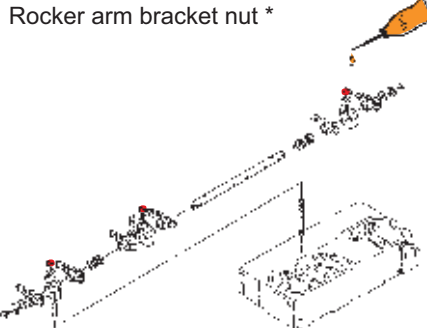
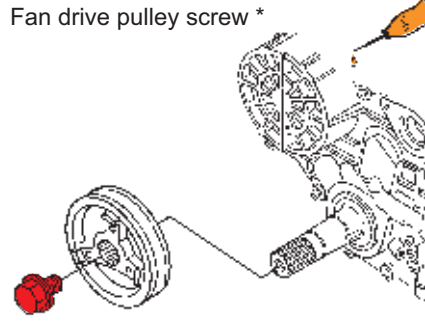
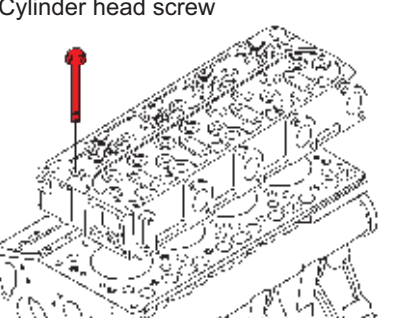
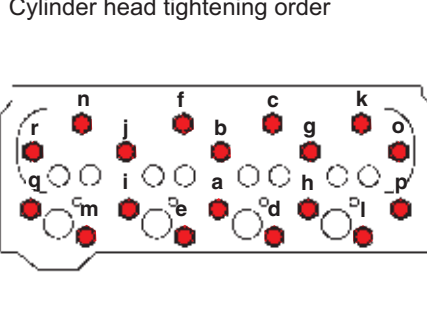

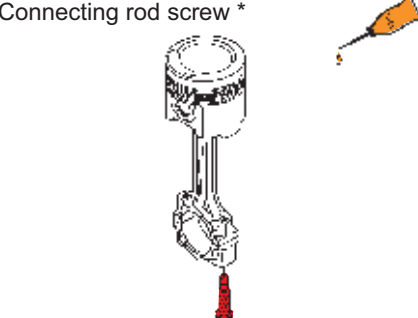
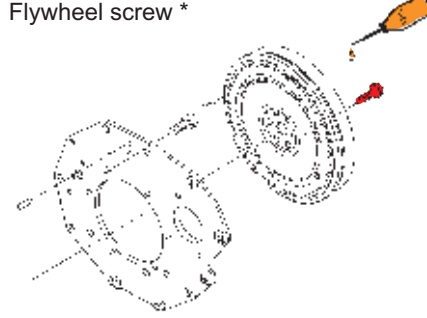
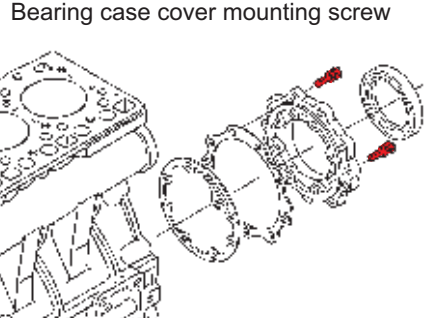
Item			Factory Specification	Allowable Limit
Starter 	Field coil resistance (Brush - Yoke)	All models	Infinity	—
Starter 	Armature coil resistance (Commutator - Armature coil core)	All models	Infinity	—
Starter 	Armature coil resistance (Segment - Segment)	All models	Continuity	—
Alternator 	Stator resistance	All models	Less than 1.0 $\Omega$	—

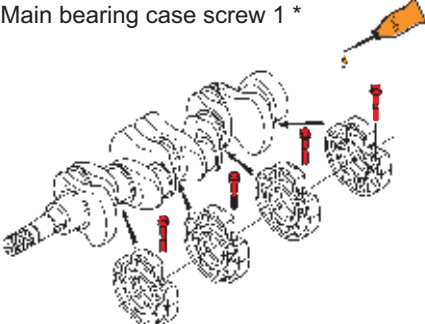
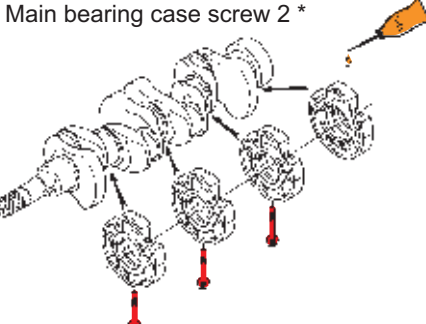
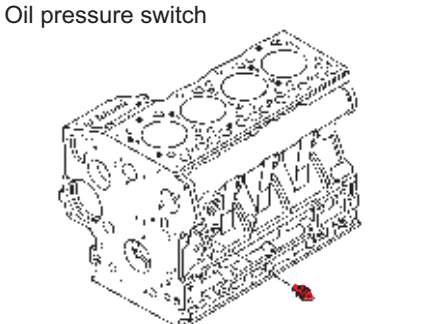

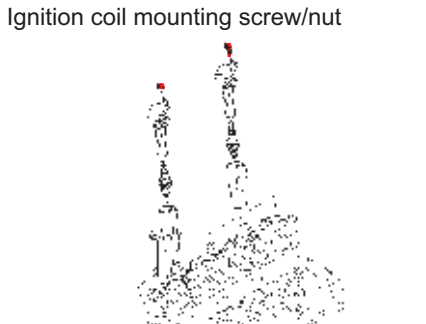
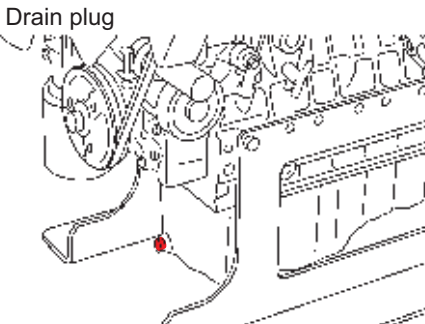
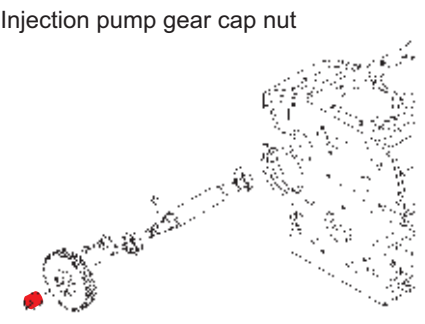
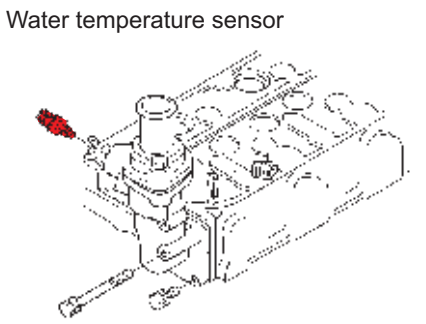
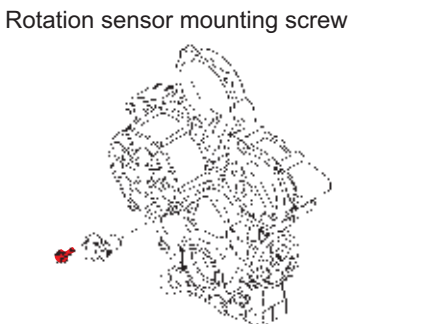
Item		Factory Specification	Allowable Limit
Alternator 	Rotor resistance All models	2.9 Ω	—
Alternator 	Slip ring O.D. All models	14.4 mm 0.567 in.	14.0 mm 0.551 in.
Alternator 	Brush length All models	10.0 mm 0.394 in.	8.4 mm 0.33 in.

# TIGHTENING TORQUES

## (1) Special Tightening Torques

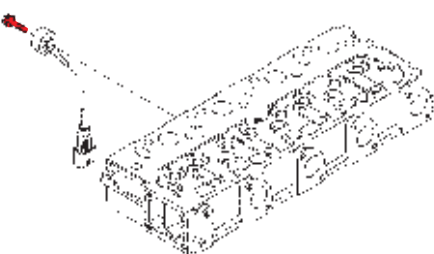
For "\*" marked screws, bolts and nuts on under table, apply engine oil to their threads and seats before tightening.

<p>Cylinder head cover cap nut *</p> 	<p>Rocker arm bracket nut *</p> 	<p>Fan drive pulley screw *</p> 			
<p>All models</p>	<p>6.9 to 8.8 N·m 0.71 to 0.89 kgf·m 5.1 to 6.4 lbf·ft</p>	<p>All models</p>	<p>21.6 to 26.5 N·m 2.21 to 2.70 kgf·m 16.0 to 19.5 lbf·ft</p>	<p>All models</p>	<p>235 to 245 N·m 24.0 to 24.9 kgf·m 174 to 180 lbf·ft</p>
<p>Cylinder head screw</p> 	<p>Cylinder head tightening order</p> 	<p>Idle gear shaft mounting screw *</p> 			
<p>All models</p>	<p>63.7 to 68.6 N·m 6.50 to 6.99 kgf·m 47.0 to 50.5 lbf·ft</p>	<p>All models</p>	<p>a → r</p>	<p>All models</p>	<p>9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft</p>
<p>Connecting rod screw *</p> 	<p>Flywheel screw *</p> 	<p>Bearing case cover mounting screw</p> 			
<p>All models</p>	<p>41.2 to 46.1 N·m 4.21 to 4.70 kgf·m 30.4 to 34.0 lbf·ft</p>	<p>All models</p>	<p>53.9 to 58.8 N·m 5.50 to 5.99 kgf·m 39.8 to 43.3 lbf·ft</p>	<p>All models</p>	<p>9.81 to 11.3 N·m 1.00 to 1.15 kgf·m 7.24 to 8.33 lbf·ft</p>

<p>Main bearing case screw 1 *</p> 	<p>Main bearing case screw 2 *</p> 	<p>Oil pressure switch</p> 			
<p>All models</p>	<p>29.4 to 34.3 N·m 3.00 to 3.49 kgf·m 21.7 to 25.2 lbf·ft</p>	<p>All models</p>	<p>49.0 to 53.9 N·m 5.00 to 5.49 kgf·m 36.2 to 39.7 lbf·ft</p>	<p>All models</p>	<p>14.7 to 19.6 N·m 1.50 to 1.99 kgf·m 10.9 to 14.4 lbf·ft</p>
<p>Spark plug</p> 	<p>Ignition coil mounting screw/nut</p> 	<p>Drain plug</p> 			
<p>All models</p>	<p>24.5 to 29.4 N·m 2.50 to 2.99 kgf·m 18.1 to 21.6 lbf·ft</p>	<p>All models</p>	<p>9.81 to 11.3 N·m 1.00 to 1.15 kgf·m 7.24 to 8.33 lbf·ft</p>	<p>All models</p>	<p>32.4 to 37.3 N·m 3.31 to 3.80 kgf·m 23.9 to 27.5 lbf·ft</p>
<p>Injection pump gear cap nut</p> 	<p>Water temperature sensor</p> 	<p>Rotation sensor mounting screw</p> 			
<p>All models</p>	<p>58.8 to 68.6 N·m 6.00 to 6.99 kgf·m 43.4 to 50.5 lbf·ft</p>	<p>All models</p>	<p>16.7 to 19.6 N·m 1.71 to 1.99 kgf·m 12.4 to 14.4 lbf·ft</p>	<p>All models</p>	<p>3.0 to 6.0 N·m 0.31 to 0.61 kgf·m 2.3 to 4.4 lbf·ft</p>

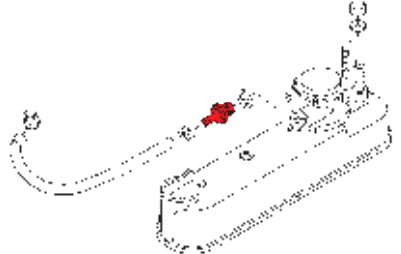


Knock sensor mounting screw



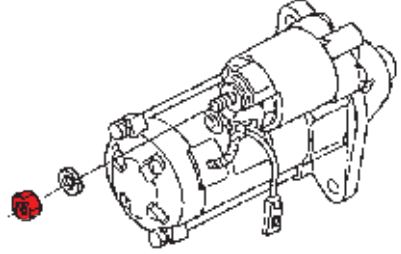
All models	15.0 to 25.0 N·m 1.53 to 2.54 kgf·m 11.1 to 18.4 lbf·ft
------------	---

PCV Valve



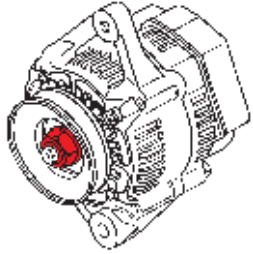
All models	16.0 to 24.0 N·m 1.64 to 2.44 kgf·m 11.8 to 17.7 lbf·ft
------------	---

Starter (B terminal nut)



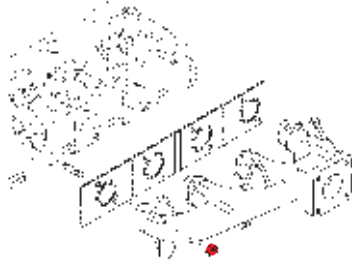
All models	5.88 to 11.8 N·m 0.600 to 1.20 kgf·m 4.34 to 8.70 lbf·ft
------------	--

Alternator's pulley nut



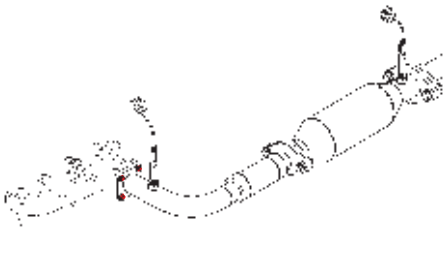
All models	58.4 to 78.9 N·m 5.95 to 8.05 kgf·m 43.1 to 58.2 lbf·ft
------------	---

Exhaust manifold mounting nut



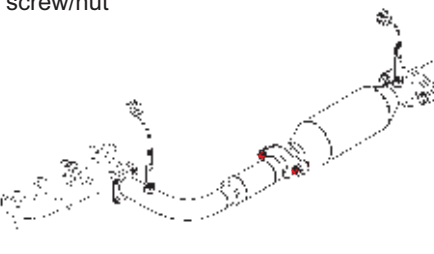
All models	15.7 to 18.6 N·m 1.60 to 1.89 kgf·m 11.6 to 13.7 lbf·ft
------------	---

Outlet of Exhaust manifold nut



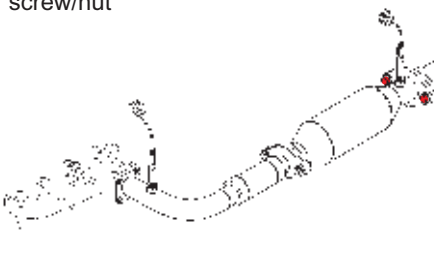
All models	29.4 to 34.3 N·m 3.00 to 9.16 kgf·m 21.7 to 25.2 lbf·ft
------------	---

Inlet of Catalytic converter mounting screw/nut



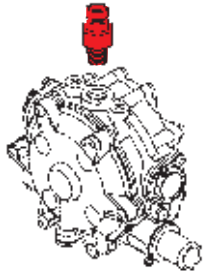
All models	48.1 to 55.9 N·m 4.91 to 5.70 kgf·m 35.5 to 41.2 lbf·ft
------------	---

Outlet of catalytic converter mounting screw/nut



All models	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft
------------	---

LPG in



All models	19.6 to 39.2 N·m 2.00 to 3.99 kgf·m 14.5 to 28.9 lbf·ft
------------	---

## (2) General Tightening Torques

Screw and bolt material grades are shown by numbers punched on the screw and bolt heads.

Prior to tightening, be sure to check out the numbers as shown below.

None or 4 : Standard grade

7 : Special grade

Nominal Diameter	Standard Grade	Special Grade
M6	7.9 to 9.3 N·m 0.80 to 0.95 kgf·m 5.8 to 6.8 lbf·ft	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
M8	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
M10	40 to 45 N·m 4.0 to 4.6 kgf·m 29 to 33 lbf·ft	49 to 55 N·m 4.9 to 5.7 kgf·m 37 to 41 lbf·ft
M12	62 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft