SERVICE SPECIFICATIONS

SERVICE DATA

Tune–up	Battery		
	Voltage (Except Delco Battery)	at 20°C (68°F)	12.7 – 12.9 V
	High–tension cord resistance	Maximum	25 kΩ per cord
	Spark plug		
	Recommended spark plug		
		ND	K16R–U
		NGK	BKR5EYA
	Correct electrode gap		0.8 mm (0.031 in.)
	Drive belt tension	New belt	160 ± 20 lbf
		Used belt	100 ± 20 lbf
	Valve clearance (Cold)	Intake	0.18 – 0.28 mm (0.007 – 0.011 in.)
		Exhaust	0.22 – 0.32 mm (0.009 – 0.013 in.)
	Valve clearance adjusting shim (for repair part)		
		Mark 2.200	2.200 mm (0.0866 in.)
		Mark 2.250	2.250 mm (0.0886 in.)
		Mark 2.300	2.300 mm (0.0906 in.)
		Mark 2.350	2.350 mm (0.0925 in.)
		Mark 2.400	2.400 mm (0.0945 in.)
		Mark 2.450	2.450 mm (0.0965 in.)
		Mark 2.500	2.500 mm (0.0984 in.)
		Mark 2.550	2.550 mm (0.1004 in.)
		Mark 2.600	2.600 mm (0.1024 in.)
		Mark 2.650	2.650 mm (0.1043 in.)
		Mark 2.700	2.700 mm (0.1063 in.)
		Mark 2.750	2.750 mm (0.1083 in.)
		Mark 2.800	2.800 mm (0.1102 in.)
		Mark 2.850	2.850 mm (0.1122 in.)
		Mark 2.900	2.900 mm (0.1142 in.)
		Mark 2.950	2.950 mm (0.1161 in.)
		Mark 3.000	3.000 mm (0.1181 in.)
		Mark 3.050	3.050 mm (0.1201 in.)
		Mark 3.100	3.100 mm (0.1220 in.)
		Mark 3.150	3.150 mm (0.1240 in.)
		Mark 3.200	3.200 mm (0.1260 in.)
		Mark 3.250	3.250 mm (0.1280 in.)
		Mark 3.300	3.300 mm (0.1299 in.)
		Mark 3.350	3.350 mm (0.1319 in.)
		Mark 3.400	3.400 mm (0.1339 in.)
	Ignition timing		10° BTDC @ idle (w/ Terminals TE1 and E1 connected of DLC1)
	Idle speed		800 ± 50 rpm
Compression pressure	at 250 rpm	STD	1,177 kPa (12.0 kgf/cm², 171 psi) or more
		Minimum	981 kPa (10.0 kgf/cm², 142 psi)
	Difference of pressure between each cylinder		98 kPa (1.0 kgf/cm², 14 psi) or less
Timing belt tensioner	Protrusion from housing end		10.0 – 10.5 mm (0.394 – 0.413 in.)

Cylinder head	Warpage	Maximum	0.10 mm (0.0039 in.)
	Valve seat Refacing angle		30°, 45°, 60°
	Contacting angle		45°
	Contacting width		1.2 – 1.6 mm (0.047 – 0.063 in.)
Valve guide bushing	Inside diameter		8.010 – 8.030 mm (0.3154 – 0.3161 in.)
	Outside diameter	STD	13.040 – 13.051 mm (0.5134 – 0.5138 in.)
		O/S 0.05	13.090 – 13.101 mm (0.5154 – 0.5158 in.)
Valve	Valve overall length	STD	104.3 mm (4.106 in.)
		Minimum	103.8 mm (4.087 in.)
	Valve face angle		44.5°
	Stem diameter	STD Intake	7.970 – 7.985 mm (0.3138 – 0.3144 in.)
		Exhaust	7.965 – 7.980 mm (0.3136 – 0.3142 in.)
	Stem oil clearance	STD Intake	0.025 – 0.060 mm (0.0010 – 0.0024 in.)
		Exhaust	0.030 – 0.065 mm (0.0012 – 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	1.3 – 1.7 mm (0.051 – 0.067 in.)
		Minimum	1.0 mm (0.039 in.)
Valve spring	Deviation	Maximum	1.23 mm (0.0484 in.)
	Free length	White painted mark	46.50 mm (1.8307 in.)
		Green painted mark	47.01 mm (1.8508 in.)
	Installed tension at 40.0 mm (1.575 in.)		242 – 268 N (24.7 – 27.3 kgf, 54.5 – 60.2 lbf)
Camshaft	Thrust clearance	STD	0.080 – 0.190 mm (0.0031 – 0.0075 in.)
		Maximum	0.25 mm (0.0098 in.)
	Journal oil clearance	STD	0.025 – 0.066 mm (0.0010 – 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal diameter		33.959 – 33.975 mm (1.3370 – 1.3376 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Cam lobe height	STD	47.830 – 47.930 mm (1.8830 – 1.8870 in.)
		Minimum	47.50 mm (1.8701 in.)
Valve lifter	Lifter bore diameter		37.922 – 37.932 mm (1.4930 – 1.4934 in.)
	Lifter diameter		37.960 – 37.975 mm (1.4945 – 1.4951 in.)
	Oil clearance	STD	0.028 – 0.053 mm (0.0011 – 0.0021 in.)
		Maximum	0.10 mm (0.0039 in.)
Air intake chamber	Warpage	Maximum	0.10 mm (0.0039 in.)
Intake Manifold	Warpage	Maximum	0.10 mm (0.0039 in.)
Exhaust Manifold	Warpage	Maximum	0.70 mm (0.0276 in.)

Cylinder block	Cylinder head surface warpage		Maximum	0.05 mm (0.0020 in.)
	Cylinder bore diameter	STD	Mark 1	87.500 – 87.510 mm (3.4449 – 3.4453 in.)
			Mark 2	87.510 – 87.520 mm (3.4453 – 3.4457 in.)
			Mark 3	87.520 – 87.530 mm (3.4457 – 3.4461 in.)
		Maximum	STD	87.73 mm (3.4539 in.)
			O/S 0.50	88.23 mm (3.4736 in.)
	Main journal bore diameter		Mark 1	68.010 – 68.016 mm (2.6776 – 2.6778 in.)
			Mark 2	68.016 – 68.022 mm (2.6778 – 2.6780 in.)
			Mark 3	68.022 – 68.028 mm (2.6780 – 2.6783 in.)
Piston and piston ring	Piston diameter	STD	Mark 1	87.360 – 87.370 mm (3.4394 – 3.4398 in.)
			Mark 2	87.370 – 87.380 mm (3.4398 – 3.4402 in.)
			Mark 3	87.380 – 87.390 mm (3.4402 – 3.4405 in.)
			O/S 0.50	87.860 – 87.890 mm (3.4590 – 3.4602 in.)
	Piston oil clearance		STD	0.130 – 0.150 mm (0.0051 – 0.0059 in.)
			Maximum	0.17 mm (0.0067 in.)
	Piston ring groove clearance	STD	No.1	0.020 – 0.060 mm (0.0008 – 0.0024 in.)
			No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
			Maximum	0.20 mm (0.0079 in.)
	Piston ring end gap	STD	No.1	0.280 – 0.500 mm (0.0110 – 0.0197 in.)
			No.2	0.380 – 0.600 mm (0.0150 – 0.0236 in.)
			Oil	0.150 – 0.500 mm (0.0059 – 0.0197 in.)
		Maximum	No.1	1.10 mm (0.0433 in.)
			No.2	1.20 mm (0.0472 in.)
			Oil	1.10 mm (0.0433 in.)
Connecting rod	Thrust clearance		STD	0.150 – 0.330 mm (0.0059 – 0.0130 in.)
			Maximum	0.38 mm (0.0150 in.)
	Connecting rod big end inner diameter Reference	STD	Mark 1	58.000 – 58.008 mm (2.2835 – 2.2838 in.)
			Mark 2	58.008 – 58.016 mm (2.2838 – 2.2841 in.)
			Mark 3	58.016 – 58.024 mm (2.2841 – 2.2844 in.)
	Connecting rod bearing center wall thickness Reference	STD	Mark 1	1.484 – 1.488 mm (0.0584 – 0.0586 in.)
			Mark 2	1.488 – 1.492 mm (0.0586 – 0.0587 in.)
			Mark 3	1.492 – 1.496 mm (0.0587 – 0.0589 in.)
	Connecting rod oil clearance		STD	0.024 – 0.053 mm (0.0009 – 0.0021 in.)
			U/S 0.25, U/S 0.50	0.023 – 0.069 mm (0.0009 – 0.0027 in.)
			Maximum	0.08 mm (0.0031 in.)
	Rod alignment	Maximum per 100 mm (3.94 in.)		0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)		0.15 mm (0.0059 in.)
	Connecting rod bolt thread outside diameter		STD	7.860 – 8.000 mm (0.3094 – 0.3150 in.)
			Minimum	7.60 mm (0.2992 in.)

Crankshaft	Thrust clearance		STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
			Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness			2.440 – 2.490 mm (0.0961 – 0.0980 in.)
	Main journal oil clearance		No.1 for STD	0.0025 – 0.0052 mm (0.0010 – 0.0020 in.)
			No.1 for U/S 0.25, U/S 0.50	0.0024 – 0.0080 mm (0.0009 – 0.0031 in.)
			Others for STD	0.0029 – 0.0056 mm (0.0011 – 0.0022 in.)
			Others for U/S 0.25, U/S 0.50	0.0028 – 0.0077 mm (0.0011 – 0.0030 in.)
			Maximum	0.80 mm (0.0031 in.)
	Main journal diameter		STD	63.985 – 64.000 mm (2.5190 – 2.5197 in.)
			U/S 0.25	63.745 – 63.755 mm (2.5096 – 2.5100 in.)
			U/S 0.50	63.495 – 63.505 mm (2.4998 – 2.5002 in.)
	Main journal diameter Reference	STD	Mark 0	63.996 – 64.000 mm (2.5195 – 2.5197 in.)
			Mark 1	63.990 – 63.996 mm (2.5193 – 2.5195 in.)
			Mark 2	63.985 – 63.990 mm (2.5191 – 2.5193 in.)
	Main bearing center wall thickness Reference	STD	No.1 Mark 1	1.991 – 1.994 mm (0.0784 – 0.0785 in.)
			Mark 2	1.994 – 1.997 mm (0.0785 – 0.0786 in.)
			Mark 3	1.997 – 2.000 mm (0.0786 – 0.0787 in.)
			Mark 4	2.000 – 2.003 mm (0.0787 – 0.0789 in.)
			Mark 5	2.003 – 2.006 mm (0.0789 – 0.0790 in.)
			Others Mark 1	1.989 – 1.992 mm (0.0783 – 0.0784 in.)
			Mark 2	1.992 – 1.995 mm (0.0784 – 0.0785 in.)
			Mark 3	1.995 – 1.998 mm (0.0785 – 0.0787 in.)
			Mark 4	1.998 – 2.001 mm (0.0787 – 0.0788 in.)
			Mark 5	2.001 – 2.004 mm (0.0788 – 0.0789 in.)
	Crank pin diameter		STD	54.987 – 55.000 mm (2.1648 – 2.1654 in.)
			U/S 0.25	54.745 – 54.755 mm (2.1553 – 2.1557 in.)
			U/S 0.50	54.495 – 54.505 mm (2.1455 – 2.1459 in.)
	Circle runout		Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out–of –round		Maximum	0.02 mm (0.0008 in.)
	Crank pin journal taper and out–of–round		Maximum	0.02 mm (0.0008 in.)

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	18	180	13
No.1 idler pulley x Cylinder head	34	350	25
Crankshaft pulley x Crankshaft	245	2,500	181
Camshaft timing pulley x Camshaft	108	1,100	80
Fan bracket x Cylinder block	41	420	30
Timing belt tensioner x Fan bracket	28	280	20
Water outlet x No.2 idler pulley	15	150	11
Cooling fen x Fluid coupling	5.4	55	48 in.·lbf
Exhaust manifold x Cylinder head	39	400	29
Generator bracket x Cylinder head	37	380	27

Cylinder head x Cylinder block	for 12 pointed head (1st)	44	450	33
	(2nd)	Turn 90°		
	(3rd)	Turn 90°		
	for 6 pointed head	41	420	30
Camshaft bearing cap x Cylinder head		16	160	12
Cylinder head cover x Cylinder head		5.4	55	48 in.·lbf
Engine hanger x Cylinder head		40	410	30
Oil dipstick guide x Cylinder head		37	380	27
Exhaust crossover pipe x Exhaust manifold		39	400	29
Intake manifold x Cylinder head		18	185	13
Water bypass outlet x Intake manifold		18	185	13
Delivery pipe x Cylinder head		13	130	9
No. 1 injection manifold x Exhaust manifold		29	300	22
PAIR reed valve x Cylinder head		37	380	27
No.3 timing belt cover x Cylinder head		8.3	85	74 in.·lbf
No.2 idler pulley x Intake manifold		18	185	13
No.4 timing belt cover x No.3 timing belt cover		8.3	85	74 in.·lbf
No.2 fuel pipe x Delivery pipe		34	350	25
No.3 fuel pipe x Delivery pipe		34	350	25
Air intake chamber x Intake manifold		18	185	13
EGR pipe x Exhaust manifold		29	300	22
EGR pipe x Air intake chamber		29	300	22
EGR valve x Air intake chamber		18	185	13
Air intake chamber stay x Air intake chamber		18	185	13
Air intake chamber stay x Cylinder head		18	185	13
Cold start injector tube x Cold start injector		15	150	13
Main bearing cap x Cylinder block	for 1st	61	625	45
	for 2nd	Turn 90°		
Connecting rod cap x Connecting rod	1st	25	250	18
	2nd	Turn 90°		
Rear oil seal retainer x Cylinder block		7.8	80	69 in.·lbf
Oil pump x Cylinder block		20	200	14
Oil strainer X Main bearing cap		6.9	70	61 in.·lbf
Oil strainer x Oil pump		6.9	70	61 in.·lbf
Oil pan x Cylinder block		5.9	60	52 in.·lbf
Oil pan x Oil pump		5.9	60	52 in.·lbf
Oil pan x Rear oil seal retainer		5.9	60	52 in.·lbf
Oil filter union x Cylinder block		25	250	18
Oil cooler x Cylinder block	for union bolt (2WD)	59	600	43
	for relief valve (4WD)	59	600	43
	for bolt	39	400	29
Engine coolant drain plug x Cylinder block		29	300	22
RH engine mounting bracket x Cylinder block		40	410	30
LH engine mounting bracket x Cylinder block		40	410	30
Oil pressure sender gauge x Cylinder block		15	150	11
Water pump x Cylinder block	for short bolt	20	200	14
	for long bolt	18	185	13
No. 1 water bypass pipe x Cylinder block	for bolt	4.9	50	43 in.·lbf
	for nut	6.9	70	61 in.·lbf

Rear end plate x Cylinder block	7.4	75	65 in.·lbf
Crankshaft x Flywheel (M/T)	88	900	65
Crankshaft x Drive plate (A/T)	83	850	61
Cylinder block x Oil cooler relief valve	59	600	43
Rear engine mounting bracket x Support member (2WD)	25	260	19
Rear engine mounting bracket x Mounting insulator (2WD)	13	130	9
No.2 frame crossmember x Side frame (4WD)	95	970	70
No.2 frame crossmember x Rear engine mounting insulator (4WD)	13	130	9
RH engine mounting insulator x Body	37	380	27
LH engine mounting insulator x Body	37	380	27
Front exhaust pipe x Exhaust manifold	62	630	46
Front exhaust pipe x Three–way catalytic converter	39	400	29
Tailpipe x Three–way catalytic converter	39	400	29